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CHEMICAL ABSTRACTS

Vol. 25. JANUARY 10, 1931 — May — No. 1

1—APPARATUS AND PLANT EQUIPMENT

W. L. BADGER

Amber laboratory apparatus. C. PLONAIT AND A. EISENACH. *Chem. Fabrik* 1930, 422.—Test tubes, beakers and dishes made from pressed amber are almost completely resistant to concd. HF and to 50% KOH soln at water-bath temps. J. H. MOORE

The evaporation of large quantities of liquids in the laboratory. P. FUCHS *Chem. Fabrik* 1930, 421–2.—The methods of Weber, Hildebrandt and Selke (*C. A.* **24**, 1767, 3137, 3927) are criticized and Selke's method is improved by standing the supply bottle upright with a siphon extending to the bottom, the outer arm reaching nearly to the bottom of the evapg. dish which is placed so that the highest liquor level desired is slightly higher than the bottom of the bottle. The lower end of the open air tube in the 2nd hole in the stopper is set at the desired level of the liquor in the evapg. dish. J. H. MOORE

Laboratory electric stirrer. MANUEL LÓPEZ DOMINGUEZ AND JOSÉ PASCUAL VILA. *Anales soc. españ. fís. quím.* **28**, 1003–4(1930). E. M. S.

Sensitive safety valve for pumps. JOSÉ PASCUAL VILA. *Anales soc. españ. fís. quím.* **28**, 1005(1930). E. M. SYMMES

Acid-circulating pumps. F. W. ZERKOWER. *Chem. Fabrik* 1930, 434–6.—A brief review of the demands on such pumps and a description of Wegelin and Hübner's rubber-coated pump. J. H. MOORE

New type of shortened manometer. L. CHUDOZILOV. *Z. anal. Chem.* **82**, 68–9 (1930).—In work involving the distn. of fats, the inner surface of the manometer tube often becomes dirty because of contact with the distg. vapors and it is a tedious operation to clean and refill the tube. It is recommended, therefore, to replace the closed end of the usual short manometer tube with a glass stopcock which is connected with a funnel tube, bent a little to one side. It is easy to fill such a tube with Hg. W. T. H.

A micromanometer of high sensitivity. E. OWER. *Phil. Mag.* [7], **10**, 544–51 (1930).—For measuring low gas speeds, the capillary air bubble method is combined with the Chattock principle, in which the movement of the liquid levels under pressure is balanced by tilting the cups. Xylene is used as the manometric liquid. The instrument is sensitive to 0.00001 in. of H_2O and is capable of measuring speeds of 2 ft. per sec. with an accuracy of ±1%. ARTHUR FLEISCHER

A new viscometer. HANS SCHAFFER. *Petroleum Z.* **26**, *Motorenbetrieb und Maschinen-Schmierung*, No. 9, 4–8(1930).—A viscometer is described in which the liquid is discharged from the capillary in drops; the results are expressed in C. G. S. units. It consists of an insulated closed outer vessel which contains an indirect heating medium (H_2O, for temps. to 100°), stirrer, heating element and thermometers. An inner vessel contains the liquid being exaind. The capillary is of such size that 10 cc. of H_2O is discharged in 24.15 ± 1 sec. The loss of 10 cc. causes a drop in level of 1 mm. Successive runs with the same fluid can be made with const. hydrostatic head either by the return of the fluid withdrawn or by the application of 1 mm. of pressure for every 10 cc. (of H_2O) discharged. Pressure may also be applied to shorten the time of discharge. The range of viscosities from $\eta = 0.01$ to 10 may be detd. with the same capillary tube. The radius of the tube may be obtained either by measurement or by detg. the time of discharge of a known vol. of fluid with a known viscosity and calcg. the radius by means of the Poiseuille formula. For oils of low viscosity, a more accurate detn. is made when 20 cc. of oil is used instead of 10 cc. In this case the amt. of oil placed within the inner vessel is increased by 5 cc. so that the av. hydrostatic pressure is about the same as that when 10 cc. is used. For oils of very low viscosity, $\eta = 0.01$–0.03, a correction factor has to be applied which increases from 1.000 for $\eta = 0.0167$ to 1.073 for $\eta = 0.0176$. I. M. LAMBIE

Proposals for improvements in the apparatus for distillation in a high vacuum.

SIGMUND FRÄNKEL AND HERMANN MATHIS. *Biochem. Z.* 226, 157–61(1930).—App. is described. S. MORGULIS

An electrical method and instrument for measuring liquid consistency. CHAS. E. FAWKES. *Am. Paint & Varnish Mfrs.' Assoc.*, Circ. No. 370, 543–7; *Paint, Oil & Chem. Rev.* 90, No. 17, 90–1; *Oil, Paint & Drug Reporter* 118, No. 19, 62(1930).—A device for detg. the consistency of liquids consists of a disk-like rotor attached to the shaft of an elec. motor which is designed to be extremely sensitive to the load on the rotor. The counter e. m. f. and the field current vary in proportion to the load, the latter being indicated on a scale in arbitrary units which may be converted into poises. Consistencies covering a range of 10 to 1000 centipoises may be measured. G. G. SWARD

Cap for holding Gutzeit mercuric chloride paper. T. J. WARD. *Analyst* 55, 630 (1930).—A loose-fitting cap, which is dropped over the $HgCl_2$ paper, is prepd. from glass about 2 in. sq. which is coarsely ground on the lower surface. A circular cardboard rim is fastened to the glass The 14 g. cap is sufficiently heavy to prevent any gas escaping without coming in contact with the $HgCl_2$. W T. H.

Apparatus for supplying air under pressure. EDWARD M. HOSHALL. *J. Chem. Education* 7, 2674(1930). E. H.

Regulating the temperature of commercial furnaces. M. BÜCHTING AND C. HIMMLER. *Siemens Z.* 10, 551–9(1930).—19 illus. Review of modern practice. C. G. F.

Influence of annealing atmosphere, annealing temperature and protecting tube material upon the stability of platinum thermoelements. F. STABLEIN AND J. HINNÜBER. *Krupp. Monatsh.* 11, 245–51(1930).—Such strongly reducing gases as H, CO and illuminating gas are injurious to Pt materials in the presence of incandescent metals or silicates, causing contamination of the Pt alloys. The greatest contamination occurs in the presence of incandescent metallic protecting tubes, the effect of silicate or quartz tubes being much less. In addn. to a change in the thermal force there is also an increase in sp. resistance and an impairment of mech. properties Pure Pt wire is found to be more sensitive than a 10% Rh alloy. In practical pyrometry it is always advantageous to protect the Pt element with a tube of ceramic material, particularly if an external protecting tube of metal is used. K 60 mass is more gas tight at higher temps. than is quartz. H. STOERTZ

Thermostat of high degree of precision. IV. MENDELEEV. *Zhur. Prikladnoĭ Khim.* 3, 759–64(1930).—Accuracy within 0 001° is secured. V. KALICHEVSKY

Determination of the explosive limits of gases and gas mixtures (LÖFFLER) 24.

Rotary filter for various materials. FRANK W. YOUNG. U. S. 1,780,777, Nov. 4. Structural features.

Air filter. EMMETT F. ANNIS (to Harry C. Chappell). U. S. 1,779,458, Oct. 28. Structural features.

Air filter. E. H. SCHÄFER (to H. Wittemeier). Brit. 331,754, Oct. 27, 1928. Structural features.

Tubular filters for gases. F. AMME. Brit. 332,475, Oct. 12, 1928. Structural features.

Apparatus for removing dust from air or other gases by centrifugal force. BRITISH REMA MFG. CO., LTD., and P. HOWDEN. Brit. 332,405, July 18, 1929. Structural features.

Apparatus for separating dust and grit from air or other gases. SAMUEL N. CHEW (to Pneumatic Conveyance & Extraction (1929), Ltd.). U. S. 1,780,641, Nov. 4. Structural features.

Pressure filter for oil. CHARLES R. SHORT (to General Motors Research Corp.). U. S. 1,780,723, Nov. 4. A pressure-controlled by-pass between the inlet and outlet pipes serves to maintain an approx. uniform pressure differential between these pipes.

Pressure filter for filtering oil. CHARLES A. WINSLOW and ELBERT J. HALL. U. S. 1,780,663, Nov. 4.

Device for separating heavier impurities from oil, etc. EZEKIEL F. WHITE (to Grover V. Lassen). U. S. 1,780,774, Nov. 4. Structural features.

Apparatus for separating oil from gas. MYRON E. WAGNER. U. S. 1,780,101, Oct. 28. Structural features.

Tank and baffle system for separating oil and gas. MILLARD F. WATERS (to Smith Separator Co.). U. S. 1,779,023, Oct. 21. Structural features.

Trap for separating liquids from compressed gases. H. W. WILDISH. Brit. 331,704, July 18, 1929. Structural features of a baffle device.

Rotary separator for separating sludge from liqu AAGE NYROP. U. S. 1,780,655, Nov. 4. Structural features.

Device for removing pasty filter cakes from continuous drum filters. CLARK C. HERITAGE (to National Aniline & Chemical Co.). U. S. 1,781,389, Nov. 11. Structural features.

Filtering apparatus with filter plates passing successively to and from a filtering zone. ROBERT S. BUTLER (to Southwestern Engineering Corp.). U. S. 1,780,905, Nov. 11. Structural features.

Crucible. AMERICAN MACHINE & FOUNDRY Co. Brit. 331,399, July 12, 1929. Various details are described of the manuf. of crucibles with an outer shell and a compressed non-corrodible lining such as "Amaloy" comprising Pb contg. Sn and P, the lining metal being poured into the shell while rotating the latter on its axis.

Gas calorimeter. JAMES P. FISHER (to Burgess-Parr Co.). U. S. 1,779,373, Oct. 21. Structural features.

Gas calorimeter. SAMUEL W. PARR (to Burgess-Parr Co.). U. S. 1,778,958, Oct. 21. Structural details.

Gas calorimeters. SAMUEL W. PARR (to Burgess-Parr Co.). U. S. 1,779,371-2, Oct. 21. Structural features.

Direct-reading photometer. SAMUEL WEIN (to Radiovision Corp.). U. S. 1,779,574, Oct. 28. Structural features.

Surface condenser. ALBIN J. NOTT. U. S. 1,780,837, Nov. 4. Structural features.

Surface condenser suitable for steam condensation. RAYMOND N. EHRHART (to Elliott Co.). U. S. 1,780,781, Nov. 4.

Viscometer. FRANZ P. ZIMMERLI (to Automatic Appliance Co.). U. S. reissue 17,841, Oct. 21. Reissue of original pat. No. 1,557,517 (*C. A.* 20, 2).

Viscometer with radio tubes and circuits influenced by a falling ball in the liquid tested. ERNEST M. SYMMES (to Hercules Powder Co.). U. S. 1,780,952, Nov. 11. The app. is especially suitable for use with opaque liquids.

Röntgen-ray apparatus. E. S. HUMPHREYS. Brit. 331,999, May 27, 1929. Structural features.

Photoelectric cells. GENERAL ELECTRIC Co., LTD., and N. R. CAMPBELL. Brit. 332,002, May 27, 1929. Photoelec. cathodes consisting of a thin film of Cs or Rb on a support of another metal such as Ag oxidized before the deposition of the film are sensitized, particularly to white light and to light at or beyond the red end of the spectrum, by a glow discharge through a rare gas such as He, which may be left in the cell so that the sensitivity of the cathode (likely to decrease during the early life of the cell) may be restored by a glow discharge (or automatically if the cell operates with considerable ionization). Various details of procedure are described. Cf. *C. A.* 24, 2921.

Thermionic valves. K. W. DAUMANN. Brit. 331,250, March 25, 1929. Various details are described of thermionic valves such as those used for rectifying high voltages supplied to x-ray tubes and having an outer insulating cylinder which may be formed of lead-glass or of artificial resin with addns. of Pb salts or $BaSO_4$ and is capable of absorbing x-rays produced in the valve.

Thermionic valves. F. A. GOULDING and S. F. GAME. Brit. 331,231, July 23, 1929. Various details of structure and manuf. are described.

Vacuum chambers. AMERICAN THERMOS BOTTLE Co. Brit. 331,493, Jan. 19, 1929. The inner surfaces of a vacuum chamber are coated by the decompn. of a volatile metallic compd. such as Ni carbonyl, Fe carbonyl, $NiCl_2$ or the chlorides of Al, Sb, Cu, Ti, Bi and Sn, as by heating in the presence of a reducing agent such as H or CO. Various details of procedure are given.

Apparatus for extracting moisture from air by a spiral wire gauze. FREDERICK R. HALL. U. S. 1,780,156, Nov. 4. Structural features.

Hygrometric filament apparatus for determining moisture content of sheet materials. ALBERT ALLEN (to Atlantic Precision Instrument Co.). U. S. 1,781,153, Nov. 11. Structural features.

Spray nozzle apparatus for humidifying air or other gases. COOLING and AIR CONDITIONING CORP. Brit. 331,218-9, March 25, 1929. Structural features.

Spray-cooling tower for liquids such as water. CHESTER R. KRANZ (to Binks Mfg. Co.). U. S. 1,780,020, Oct. 28. Structural features.

Cooling tower for treating showered liquid with air streams. J. M. SEYMOUR. Brit. 331,427, Aug. 28, 1929.

us for emulsifying oils, water and dispersing arsenic, etc., together by use of

concentric spraying nozzles. IMPERIAL CHEMICAL INDUSTRIES, LTD., and R. B. F. F. CLARKE. Brit. 331,928, April 12, 1929. Structural features.

Apparatus for emulsification of oils and water or other materials under successive oscillations of pressure from a piston. VINCENT G. WALSH. U. S. 1,780,853, Nov. 4. Structural features.

Devices for taking samples of liquid from different levels in tank cars, etc. JOHN M. MAYHALL and HOWARD C. MORRISON. U. S. 1,780,597–8, Nov. 4. Devices are described adapted also for simultaneously determining domage and ullage while taking samples.

Rectifying tube. JACQUES RISLER (to Risler Corp. of America). U. S. 1,780,504, Nov. 4. Various structural details are described relative to evacuated tubes with hollow cathodes contg. an alk. earth salt.

Column and plate type of apparatus for distillation and rectification. ADOLF MESSER. U. S. 1,780,563, Nov. 4. Structural features.

Meter for recording flow of ionized gas. A. E. BLAKE (to Humphreys & Glasgow, Ltd.). Brit. 331,439, Oct. 18, 1928. Structural and elec. features.

Apparatus for detecting inflammable gas mixtures. H. T. RINGROSE. Brit. 331,711, July 24, 1929. Combustion of an inflammable gas mixt. in a porous vessel causes collapse of a diaphragm and operation of an elec. lamp warning circuit. Various details of app. are described. Cf. *C. A.* **24**, 2606.

Centrifugal gas-cleaning device. E. J. BRADY (to Humphreys & Glasgow, Ltd.). Brit. 331,755, Oct. 26, 1928. Structural features.

Liquid and gas contact tower suitable for scrubbing gas. FREDERICK H. WAGNER. (to Bartlett Hayward Co.). U. S. 1,780,255, Nov. 4. Structural features.

Gas-washing apparatus with stationary or oscillating brushes. S. G. WATSON, D. M. HENSHAW and W. C. HOLMES & Co., LTD. Brit. 331,818, April 3, 1929. Structural features.

Baffle and spray apparatus for washing gases. PNEUMATIC CONVEYANCE & EXTRACTION, LTD., and W. A. SMITH. Brit. 332,283, April 18, 1929. Structural features.

Rotating brush apparatus for washing gases, etc. S. G. WATSON, D. M. HENSHAW and W. C. HOLMES & Co., LTD. Brit. 331,592, April 3, 1929. Structural features.

Container for storage and transport of liquefied gases. SCHULIM BRAUNSTEIN. U. S. 1,781,048, Nov. 11. Structural features.

Apparatus and procedure for liquefying solid carbon dioxide. MASCHINENFABRIK ESSLINGEN and J. STOFFELS. Brit. 331,750, Sept. 3, 1929. Various details are described.

Mixing and stirring apparatus for effecting chemical reactions, etc. CELANESE CORP. OF AMERICA and BRITISH CELANESE, LTD. Brit. 331,606, April 15, 1929. Structural features.

Apparatus for agitating materials in tanks. ARTHUR W. BULL (to Dorr Co.). U. S. 1,780,551, Nov. 4. Structural features.

Apparatus for agitating, mixing and circulating detergents or other liquids in tanks. THOMAS O'FARRELL (to Russell C. Bloomfield). U. S. 1,780,360, Nov. 4. Structural features.

Hydraulic molding press. LESLIE S. HUBBERT (to Hydraulic Press Mfg. Co.). U. S. 1,778,803, Oct. 21. Structural features.

Hardness tester of the pendulum type. EMIL VON LEESEN. U. S. 1,781,615, Nov. 11. Structural features.

Apparatus for drying coal, grain, ore, wood pulp, etc. JOHAN D. ULLGREN (to Aktiebolaget Karlstads Mekaniska Verkstad). U. S. 1,779,571, Oct. 28. Structural features of app. for agitating the material in contact with drying gases.

Acid jar with a clamping cover. REYNOLD W. PETERSON. U. S. 1,780,534, Nov. 4. Structural features.

Recording photometric apparatus. GEARY A. LONG, JR. (to General Elec. Co.). U. S. 1,779,324, Oct. 21.

Annealing box. HERMAN A. FISHER. U. S. 1,778,798, Oct. 21. Structural features.

Oven suitable for treating coated or lithographed tin sheets. HENRY A. DREFFEIN. U. S. 1,779,622, Oct. 28. Structural features.

Annular tunnel kiln. ARTHUR M. DUCKHAM. U. S. 1,780,119, Oct. 28.

Shaft furnace or kiln fired with gas, oil or powdered fuel. C. F. PRIEST. Brit. 332,037, June 25, 1929. Structural features.

Side-wall tuyère furnace. JACOB SPERLING (to Westinghouse Elec. & Mfg. Co.). U. S. 1,779,861, Oct. 28.

Rotary furnace for low-temperature distillations. KOHLENVEREDLUNG A.-G. and C. GEISSEN. Brit. 331,673, June 17, 1929. Various details are described of a special brickwork filling, etc.

Furnace regenerator. BABCOCK & WILCOX, LTD., and C. H. DAVY. Brit. 331,977, May 7, 1929.

Combustion system for boiler furnaces, etc. A. J. WHEELER. Brit. 331,183, Feb. 19, 1929. A higher temp. flame from supplementary burners impinges on fuel and air from a main burner at a point near its entrance into the furnace. Various details of construction and operation are described.

Automatic temperature-recording apparatus suitable for use with boiler furnaces. FREDERICK D. POTTER (to Combustion Control Co.). U. S. 1,779,619, Oct. 28.

Gas seal for furnaces. JAMES W. FLYNT (to Fuller Lehigh Co.). U. S. 1,779,120, Oct. 21. Structural features.

Gas burner. H. FRISCHKORN. Brit. 332,063, July 19, 1929.

Gas burner. JOHN L. MANDEVILLE (to J. B. Colt Co.). U. S. 1,780,596, Nov. 4.

Gas burner. RICHARD THURM (Baker Perkins Co., Inc.). U. S. 1,778,839, Oct. 21.

Gas burner. JOHN S. ZINK. U. S. 1,781,623, Nov. 11.

Electric liquid heaters. ANTON FAZEKAS. U. S. 1,779,667–8, Oct. 28. Structural features.

Electric water heater. MICHAEL S. GAZELLE. U. S. 1,779,696, Oct. 28. Structural features.

Electric water heater. L. P. HAUSSAUER. Brit. 332,401, July 16, 1929. Structural features.

Electric immersion water heater. WM. J. HANDLEY (to Handley-Brown Heater Co.). U. S. 1,779,128, Oct. 21. Structural features and details of operation of a storage continuous-supply heater.

Apparatus for heating water by electric heating elements. EMIL F. HOLINGER (to Hudson Electrical Heating Corp.). U. S. 1,779,937, Oct. 28. Structural features.

Apparatus for heating water or other liquids by waste gases such as those from Cowper heaters of a blast furnace. SUPERHEATER CO., LTD., and COMPAGNIE DES SURCHAUFFEURS. Brit. 332,274, April 16, 1929. Structural features.

Apparatus suitable for heating air by hot flue gases. WM. A. JONES (to Babcock & WILCOX Co.). U. S. 1,780,301, Nov. 4. Structural features.

Heat-exchange apparatus. HEENAN & FROUDE, LTD., and G. H. WALKER. Brit. 331,602, Jan. 10, 1930. Structural features.

Tubular heat-exchange apparatus. M. PAYNE. Brit. 331,392, July 4, 1929. Structural features.

Heat-exchange apparatus for heating air or other gases. W. E. KOCHS & CO., LTD., and H. FÖGE. Brit. 332,280, April 17, 1929. Structural features.

Heat-exchange device suitable for heating air by hot flue gases. DAVID S. JACOBUS and WM. A. JONES (to Babcock & Wilcox Co.). U. S. 1,780,300, Nov. 4. Structural features.

Heat-exchange apparatus suitable for heating air with flue gases, etc. CHARLES B. GRADY (to Metropolitan Engineering Corp.). U. S. 1,779,538, Oct. 28. Structural features.

Heat-exchange apparatus suitable for heating air by hot waste gases. ARCHIBALD H. DAVIS, JR. (to Shaw-Perkins Mfg. Co.). U. S. 1,780,294, Nov. 4. Structural features.

Heat-exchange apparatus with gills and baffles. H. JUNKERS. Brit. 332,455, Oct. 26, 1928. Structural details.

Heat-exchange apparatus with parallel sheet metal plates. J. M. HARRISON. Brit. 331,982, May 13, 1929. Structural features.

Heat-exchange apparatus with pipes, headers and an electric heater. G. KRÄNZLEIN and SAMESREUTHER & CO., GES. Brit. 331,910, April 9, 1929. Structural features.

Lining stills with rubber. IMPERIAL CHEMICAL INDUSTRIES, LTD., and F. H BRAMWELL. Brit. 331,838, Jan. 9, 1929. Sepn. of a rubber lining in stills or reaction chambers is prevented by forming the vessel with a double wall, the inner wall being perforated while there is maintained in the space between the walls a lower pressure than that within the app.

Apparatus for deodorizing hair, feathers, etc., with ozone. AMERICAN HAIR & FELT CO. Brit. 331,845, April 4, 1929. Structural features.

Thermostatic and magnetic circuit-breaking device. CHARLES A. MARTIN. U. S. 1,780,202, Nov. 4. Structural features.

Thermostatic control device for electric circuits. LAWRENCE E. KOCH and HENRY F. DEVER (to Time-O-Stat Controls Co.). U. S. 1,780,302, Nov. 4. Structural features.

Thermostatic control for electric circuits. HENRY G. LEUPOLD (to Electrical Laboratories, Inc.). U. S. 1,780,758, Nov. 4. Structural features.

Thermostatic control device for electric heaters. SAMUEL M. CARMEAN and JAMES H. CARMEAN. U. S. 1,780,462, Nov. 4. Structural features.

Thermostatic control device for electric heating appliances. PETER A. PETERSON. U. S. 1,780,631, Nov. 4. Structural features.

Thermostatic control device for electric heating pads. WALTER K. TAVENDER. U. S. 1,779,149, Oct. 21. Structural features.

Thermostatic valve for supply of gas to burners. JOHN H. GRAYSON. U. S. 1,781,328, Nov. 11. Structural features.

Fluid-pressure-operated thermostatic electric switches. EDWARD L. MAYO (formerly Edward J. Levy). U. S. 1,781,287-8-9, Nov. 11.

Thermostatic control device for regulating the feeding of arc electrodes of arc lamps. MARTIN L. PATTERSON (to Sperry Gyroscope Co.). U. S. 1,778,770, Oct. 21. Structural features.

Thermostatic device for fire-alarm systems, etc. LOUIS J. J. B. CHENEAU. U. S. 1,781,630, Nov. 11. Structural features.

2—GENERAL AND PHYSICAL CHEMISTRY

FREDERICK L. BROWNE

Louis Munroe Dennis. A. W. BROWNE. *Ind. Eng. Chem.* **22**, 1257–8(1930).—A biographical sketch with portrait. E. C. K.

Hermann Nissenson on his seventy-fifth birthday. PH. SIEDLER. *Z. Elektrochem.* **36**, 836a–836b(1930).—A biography with portrait. E. C. K.

Walter Herz. JULIUS MEYER. *Z. Elektrochem.* **36**, 836c–836d; *Chem.-Ztg.* **54**, 773–4(1930).—An obituary. E. C. K.

The meeting of Ostwald, Arrhenius and van't Hoff. BENJAMIN HARROW. *J. Chem. Education* **7**, 2697–2700(1930). E. H.

Cinchona, 1630-1930. P. VAN DER WIELEN. *Pharm. Weekblad* **67**, 1117–21 (1930).—Extracts from old documents relating to the early history of cinchona are briefly discussed, prefatory to the complete text (pp. 1123–1220) of "Zuma, or the Discovery of Cinchona Bark," a drama in 4 acts by Jan de Quack published in Amsterdam in 1819. A. W. DOX

The methodology of scientific research. HENRY M. LE CHATELIER. *J. Chem. Education* **7**, 2584–9(1930). E. H.

Modern physics—a survey. I, II, III. SAUL DUSHMAN. *J. Chem. Education* **7**, 1778–87, 2077–87, 2655–63(1930). E. H.

Grade-school methods an asset to the chemistry teacher. BRUCE F. LAMONT. *J. Chem. Education* **7**, 2701–3(1930). E. H.

The use of models in teaching polarity. SIDNEY J. FRENCH. *J. Chem. Education* **7**, 2687–91(1930). E. H.

A demonstration of changes in ionic equilibria during chemical reactions. HOSMER W. STONE. *J. Chem. Education* **7**, 2722–4(1930).—A lecture expt. E. H.

Alchemy: Folly or wisdom? RALPH E. OESPER. *J. Chem. Education* **7**, 2664–74 (1930). E. H.

Ozone and atomic oxygen in the upper atmosphere. S. CHAPMAN. *Phil. Mag.* [7], **10**, 369–83(1930); cf. *Memoirs Roy. Meteor. Soc.* **3**, 103–25(1930); and *C. A.* **24**, 5547.—Theoretical and speculative considerations of the O_3 and O concns. at heights greater than 50 km. show that the O_3 concn. diminishes rapidly at heights above the level of max. concn. and especially above the level at which convective mixing is important; the O concn. increases upward till it exceeds the O_2 concn. A. F.

Graphical methods for calculating constants. I. New methods of determining the order of a reaction. M. CRESPI. *Anales soc. espan. fis. quim.* **28**, 844–70(1930).—From the equation $\frac{dx}{dt} \quad n \log (a - x) + \log k$ a method is deduced to det. n and k, which are called angular coeffs. They can be generalized by the equation $\frac{dx}{dt} = k(a -$

$x)^\alpha(b-x)^\beta(c-x)^\gamma$ ..... From the equation $\log \frac{t''_p}{t'_p} = (n-1)\log \frac{a'}{a''}$ another method is deduced to det n by a series of measurements called partial concns. The asymptotic equation $y^{n-1}\theta = a^{n-1}$, is established for these chem. processes, and by making $\frac{y_1}{y_2} = \frac{y_2}{y_3} = \frac{y_3}{y_4} = \ldots = r$ there is obtained $\frac{\theta_3-\theta_2}{\theta_2-\theta_1} = \frac{\theta_4-\theta_3}{\theta_3-\theta_2} = \ldots = r^{n-1}$, r being a const. greater than 1. A new method called geometric progression is then deduced. Based on a property of tangents and secants of an equilateral hyperbole, there is shown a method of detg. whether a reaction is bimol. E. M. SYMMES

Determination of surface tension by lifting of large disks. J. E. VERSCHAFFELT. *Bull. sci. acad. roy. Belg.* [5], **16**, 26–34(1930).—Previously (*C. A.* **23**, 4119) a method was described for detg. surface tension by the lifting of disks from a liquid surface. For large disks the lifting force F equals $\pi r^2\delta g a\sqrt{2}f(a/r)$. The function $f(a/r)$ with a the "specific const." (a^2 is capillary const., r the radius of the disk) can be developed to $1 + (ma/r) + n(a/r)^2$, in which $m = -1/6\sqrt{2} = -0.2357$ and n is approx. 0.9. The present paper reports measurements for more accurate data on n in order to make the method of disk lifting an abs. detn. for surface tension. Circular glass disks were used of diam. 4, 6, 8 and 10 cm., carefully ground flat with beveled edges, 2.5 cm. thick. A Cu disk with vertical glass rod and hook attached was used for hanging the disk, the latter being well balanced. F of the order of 20 to 35 g. for the largest disks was measured (0.05% accuracy). Measurements were made on C_6H_6, $PhNO_2$, $PhNH_2$ and CCl_4 between 10° and 20°. The results were for the resp. liquids $a = 0.2585$, 0.2717, 0.2948 and 0.1848 (all values derived previously relative to water of $a = 0.3858$). $f(a/r)$ varies from 0.989 to 0.982 (CCl_4 was abnormal). The av. value of n is 0.86 (0.9999 for A, the first member of the a/r series) and the corrected values of $a = 0.2583$, 0.2718, 0.2945 and 0.1849 for the 4 liquids (20°, air boundary). The capillary constant a^2 for water at a point where $g = 980.6$ is corrected to 0.1489. B. J. C. VAN DER HOEVEN

Dark-field microscopy with polygonal illumination. CH. SPIERER. *Kolloid-Z.* **53**, 88–90(1930); cf. *C. A.* **24**, 3138.—The previously described app. revealed with greatest clearness the micelle fibrous structure of cellulose membranes of various plants. ARTHUR FLEISCHER

A study of the character of purified platinum contacts. R. HOLM AND R. STÖRMER. *Wiss. Veröffentlich. Siemens-Konzern* **9**, 323–30(1930).—Measurements of contact resistances at various temps. and pressures show agreement with resistances calcd. by formulas. F. D. ROSSINI

Abundance of the elements and the existence of a new periodic system. R. A. SONDER. *Z. anorg. allgem. Chem.* **192**, 257–85(1930).—A new system of the elements is based on a periodicity in the at. nos. of the elements arranged on the basis of abundance in the earth. A curve showing abundance of distribution exhibits a series of maxima for the elements O, Si, Ca, Fe, Sr, Sn, Ba, W, Pb, U with at. nos. of 8, 14, 20, 26, 38, 50, 56, 74, 82 and 92, resp., the difference between individual members being 6 or a multiple of 6 in nearly every case. The paper includes a complete discussion of this system and of the curves in which abundance of distribution is plotted against at. no. Elements with even at. no. are invariably more abundant than elements of odd at. no. immediately preceding and following them. Many of the discrepancies in this system are explained by inaccurate information regarding the abundance of the elements in question. H. S.

Photosensitivity and the periodic system of the elements. T. PAVOLINI. *Industria chimica* **5**, 1107–15(1930).—Among the 92 elements in the periodic system there are about 40 that exhibit photosensitivity of one form or another. They may be classified as follows: elements showing photoallotropy—O, P, As, Sb; photoelectricity—Se; photolysis—Cu, Ag, Au, Hg, Tl, Pb, Bi, halogens; photoreduction—Ti, V, Cr, Mn, Fe, Co, Se, Zr, Cb, Mo, Ru, Pd, Te, Ce, Ta, W, Os, Ir, Pt, U; photosynthesis and photoisomerism, as well as photolysis and photoreduction—C. Examples and references are given. A. W. CONTIERI

Mass of the normal liter and compressibility of ammonia gas. New revision of the atomic weight of nitrogen. E. MOLES AND T. BATUECAS. *Anales soc. espaü. fis. quím.* **28**, 871–94(1930); cf. *C. A.* **24**, 1264.—Revision of the mass of the normal l. of NH_3 gas was carried out with NH_3 from $(NH_4OOC)_2 + KOH$, with synthetic NH_3 and with NH_3 from hydrolysis of Mg_3N_2. Drying the NH_3 is best done by P_2O_5 sublimed in a current of very pure O_2. A total of 31 detns. of the wt. of the normal l. gave $L_0 = 0.77169 \pm 0.00005$, about 0.001 greater than the previously accepted value but identical with that of Leduc, after correcting for adsorption. At less than atm. pressure $L_{0.5087} = 0.76772$, $L_{0.4000} = 0.76585$, $L_{0.2333} = 0.76383$. Deviation from the Avogadro law is 1 +

$\lambda = 1.01552$. From calcn. of the mol. wt. of NH_3 that of N = 14.009, a good agreement with the accepted value and identical with that found by Moles and Clavera. NH_3, like other condensible gases, obeys the laws of limit d., as found by Batuecas and others for other gases. The assumed anomaly of NH_3 was not found. E. M. SYMMES

The boiling point of water as a function of the pressure. A. ZMACZYNSKI AND A. BONHOURE. *J. phys. radium* [7], **1**, 285–91(1930).—See *C. A.* **24**, 2929. E. C. K.

Dielectric constant of bromine vapor. ARTHUR BRAMLEY. *J. Franklin Inst.* **210**, 421–3(1930); cf. *C. A.* **21**, 1218.—The dielec. const. of Br vapor was measured by a d. c. bridge method with the aid of an electrometer. The results at 28.5° varied linearly with the pressure and were independent of the applied elec. field. The data for the dielec. const. D measured at 28.5° gave the value $D = 1.0047 \pm .0003$, reduced to 760 mm. and 0°. The values of the const. at higher temps. were considerably higher, and also depended on the voltage applied between the condenser plates. The theory that at the higher temps. the mols. were raised from the normal state to a higher energy level by heat radiation explains the results satisfactorily. This assumption leads to an expression for the dielec. const. D, at temp T and pressure P, of the form $(D-1)/(D+2) = P\sum_{s=1}^{\infty}\sum_{p=1}^{\infty} B_{sp} e^{\frac{h\nu(sp)}{kt}} \lambda^2 sp$, where B_{sp} is proportional to the transition probability of a transition from the state s to some other state p, and $\nu(sp)$ is the absorption frequency assocd. with this transition, a neg. no. in absorption of energy. LOUISE KELLEY

Electric moments of several molecules. HORST MÜLLER AND H. SACK. *Physik. Z.* **31**, 815–22(1930).—The results of detns. in benzene as the non-polar solvent are: ($\times 10^{18}$) C_6H_5Br 1.52, C_6H_5Cl 1.57, CH_2Cl_2 1.55, $CHCl_3$ 1.18, MeOAc 1.75, EtOAc 1.81, PrOAc 1.86, BuOAc 1.85, isobutyl acetate 1.87, AmOAc (mixt. of isomers) 1.91, *sec*-octyl acetate 1.93, benzyl acetate 1.80, cetyl alc. 1.66, 9-bromoanthracene 1.50, *trans*-dichloroethylene 0.70, *cis*-dichloroethylene 1.74, $CHBr_3$ 0.99, CHI_3 0.95, CH_2Br_2 1.38 and CH_2I_2 1.10. In hexane, the moments detd. are CHI_3 1.0, CH_2Br_2 1.42 and CH_2I_2 1.14. ARTHUR FLEISCHER

New studies on electric moments. O. HASSEL. *Z. Elektrochem.* **36**, 735–7(1930); cf. *C. A.* **24**, 4435, 4673.—Elec. moments were measured for soln in C_6H_6 of mixts. of $CHCl_3$ (0.3–1.5 *M*) and PhCl (0.3–2.0 *M*) and of Et_2O (0.5–2.5 *M*) + $CHCl_3$ (0.5 – 2.5 *M*). Results are also given for dil. solns. of C_6H_6, PhMe, $CHCl_3$, $PhNH_2$ in Me_2CO; C_6H_6, PhMe, $CHCl_3$, PhCl in $PhNO_2$; C_6H_6, PhMe, $CHCl_3$ in PhCl; C_6H_6, PhMe, $CHCl_3$ in PhCOMe; $H_2O + Et_2O$; $C_6H_6 + CHCl_3$; C_6H_6, PhMe in paraldehyde, C_6H_6, $CHCl_3$ in Et_2O; C_6H_6, Et_2O in $CHCl_3$; Et_2O + *p*-$C_6H_4(OH)_2$. Measurements at 18°, 40° and 60° show no temp. coeff. for *p*-$C_6H_4(OMe)_2$, *p*-$C_6H_4(OEt)_2$, PhCN, PhCHOHBz. Results are given at 18° for *p*-$ClC_6H_4NH_2$, *p*-$CNC_6H_4NO_2$, PhNC, PhNCO, PhCHOHCHOHPh and isohydrobenzoin. G. M. MURPHY

The statistical theory of para- and dia-magnetism. EMRYS HOWELLS. *Phil. Mag.* [7], **10**, 698–711(1930).—A generalization of Langevin's statistical theory of magnetization is developed somewhat along the lines laid down by Gans by assuming that the magnetization of mols. arises from their angular motions and is influenced by the magnetic force. ARTHUR FLEISCHER

The relations of the magnetic and thermal constants of ferromagnetic substances. J. R. ASHWORTH. *Phil. Mag.* [7], **10**, 681–94(1930). The relations of the 3 fundamental magnetic consts. are derived and discussed for Fe, Co, Ni, Heusler's alloy and magnetite. ARTHUR FLEISCHER

Magnetic change in resistance and Hall effect in cuprous oxide, with and without illumination. OTTO VON AUWERS. *Wiss. Veroffentlich. Siemens-Konzern* **9**, 294–9 (1930).—The Hall effect and magnetic change in resistance were investigated for strips of Cu_2O approx. 60 × 15 × 0.5 mm. for fields up to approx. 20,000 gausses. The Hall effect was found to be very large and almost uninfluenced by illumination. On the other hand, the effect of a magnetic field on the resistance was found to be vanishingly small but the effect of illumination is very large. The bearing of these results on the question of an inner photoelec. effect in a semi-conductor is discussed. W. W. S.

Influence of a magnetic field on the passivity of metals. U. SBORGI AND A. BORGIA. *Gazz. chim. ital.* **60**, 449–68(1930). Previous papers (cf. *C. A.* **19**, 3204–5; *C. A.* **21**, 852) set forth certain relations between the electronic structure of the atoms of transition elements of the periodic system and the passivity of the metals. These relations and the facts that the transition elements are generally paramagnetic (sometimes ferromagnetic), and that the magnetic properties depend upon some characteristic of the electronic structure, point to a connection between magnetic properties and passivity. It is now shown experimentally that passivity may be interpreted electronically (cf. S.,

Atti soc. Toscana sci. nat. 37). The *app.* is described in detail. It was possible to obtain intense magnetization of much greater duration than with previous methods, which permitted obtaining polarization curves and time-potential curves at a const. c. d. These latter are not only clearer than the polarization curves but also are more reproducible. With Fe and with Co (in 15% H_2SO_4) a distinct activating effect of magnetization was established. The Co, however, contained Fe, Cu and Ni as impurities. With Ni the effect was much smaller, and the results varied with the samples of Ni tested.
C. C. DAVIS

Dielectric losses and electric dipole moment in transformer oil. L. S. ORNSTEIN AND G. J. D. J. WILLEMSE. *Z. tech. Physik* 11, 345–9(1930); cf. *C. A.* 22, 3982.—The dielec. losses of transformer oil remaining after the cond. has been reduced by "stabilization" (l. c.) were studied. On the assumption that oils contain a considerable no. of dipoles, the *Kerr effect* was measured. Light from an arc or W ribbon lamp was passed through an optical system including an elec. condenser of 2 parallel plates with oil in between, placed between 2 crossed nicols, the plane of polarization being at 45° with the condenser plates. The condensers were between 1 and 20 cm. long and the plate distance was 4 mm. The Kerr effect for the oil was compared with that of CS_2 (const. = 100). A. c. or d. c. was used on the condenser. Furthermore the temp. coeff. of the dielec. const. was detd. for the oils between 17° and 150° by interference tone method; the dielec. losses were measured for low and high frequencies, 0, 50, 300, 500 and 6.10^4 to 3.10^6, resp. The oils used for these expts. were I a petroleum distillate, II the Edeleanu ext. of I, *i. e.*, the aromatics removable by SO_2 extn., III the "Edeleanu raffinate" of I, *i. e.*, the remaining oil after SO_2 extn., IV the same as III but extd. with fuming H_2SO_4, removing SO_3 aromatics. This oil is purely aliphatic and naphthenic. Other samples were prepd. by removal of org. acids from the former samples and by redistn. to bring them to equal viscosity. Two samples of liquid paraffin were also examd. The Kerr const. appeared to be equal for stabilized and non-stabilized oil as expected; it is stronger for I (53) than for III (18) and is therefore attributed to dipoles in the SO_2 ext. II (96). The sample IV had only 1.7 const. The same results were obtained from the redistd. samples with the difference only that higher viscosity gives a slightly decreased Kerr effect. The liquid paraffins had a const. of 1.4. For the temp. coeff. of dielec. const. and for dielec. losses a general trend was found running parallel to that of the Kerr const. qualitatively; it confirms the authors' opinion that dipoles in the oil are the cause of those losses which vary with the frequency. All values detd. are tabulated, including viscosity η, dielec. const. ϵ_{15}, $\epsilon_{15} - \epsilon_{100}$, $\eta\sigma$ (σ is cond.), d. and $(V_{300} - V_{50})/E^2\eta$ (V_{300} is dielec. loss for 300 frequency, E potential). In particular the latter quality, which can be considered as a fair measure for the hysteresis losses, corresponds almost quantitatively with the Kerr const.
B. J. C. VAN DER HOEVEN

Behavior of atomic hydrogen. II. Behavior of pentane toward ultra-violet light and of its polymerization products toward oxygen. Influence of mercury. ALFONS KLEMENC AND FRANZ PATAT. *Z. physik. Chem.*, Abt. A, 149, 449–64(1930).—When pentane is radiated, decompn. and polymerization take place even in the absence of Hg. The reaction $CO + H_2 \longrightarrow HCHO$ does not occur in the absence of Hg. In the presence of ultra-violet light, the polymerization products of pentane take up O. The latter is given off as CO and CO_2, while the C chain breaks and light hydrocarbons (methane) are given off. Light from a Hg arc causes oxidation of CO and H_2, without the influence of Hg. The splitting-off of H_2 from pentane and the formation of water are both sensitized by Hg, while the combustion of CO is not.
FRANK URBAN

The determination of molecular structure by the diffraction of electrons by a stream of vapor. H. MARK AND R. WIERL. *Z. Elektrochem.* 36, 675–6(1930).—Using 40-kv. electrons, the authors were able to get a photograph of the diffraction in CCl_4 vapor in 0.1 sec. From equations previously developed (cf. *C. A.* 24, 2948) and photographs, it was possible to calc. the at. radii: C = 0.8 A. U., Si = 1.2 A. U. and Ti = 1.5 A. U., which agree with Goldschmidt's values. By use of an aliphatic compd. like cyclopentane, the distance between C atoms = 1.5 A. U., while for aromatic compds. like benzene and cyclohexane, the distance = 1.4 A. U. Measurements on 1,5-dichloropentane showed that the mol. is not distorted; the distortion of the benzene ring in the di- and tri-chlorobenzenes is being investigated. Even ordinarily solid compds. can be investigated by this method, if the mol. vapor oven is used for vaporization.
LOUIS WALDBAUER

Effective cross-section and molecular structure. C. RAMSAUER. *Z. Elektrochem.* 36, 640(1930).
WILLIAM E. VAUGHAN

Approximate molecular weights from the boiling point rise: A laboratory experiment in elementary chemistry. ARTHUR ROSE AND R. D. BILLINGER. *J. Chem. Education* 7, 2715–8(1930).
E. H.

Viscosity, heat conductivity and diffusion in gaseous mixtures. VIII. The viscosity of hydrogen, helium, neon and argon and their binary mixtures. MAX TRAUTZ AND H. E. BINKELE. *Ann. Physik* [5], **5**, 561–80(1930); cf. *C. A.* **24**, 1775.—The viscosity coeffs. and the temp. coeff. of the viscosity of H, He, Ne and A between 20° and 250° were detd. experimentally. For H and He, $\eta_1/\eta_2 = (T_1/T_2)^{0.66}$. For Ne, $\eta = KT^{0.6}/[1 + (C/T)]$. Argon obeys the Sutherland relationship. The same properties were measured with binary mixts. of the above elements. The results are used to calc. the cross-section ratio. It falls between 0.45 and 1 for the 6 mixts. measured. **IX. Knowledge of the concentration function of the diffusion constant of gases.** MAX TRAUTZ AND OSKAR LUDWIG. *Ann. Physik* [5], **5**, 887–918(1930).—This is mainly a crit. review of the defects of the vaporization method of detg. D (diffusion const.). An improved app. is presented. Theoretical values of D are differential, while integral values are obtained by expts. Expts. give relative values of D which are correct within 1%, while abs. values are correct within 3%. Results are reported for benzene-O and benzene-H mixts. at 23°, and the relation between D and the concn. of the constituents is considered. For benzene D is computed as 0.059 sq. cm./sec. **X. Whole-number relationship of constants and quantum numbers in gas viscosity.** MAX TRAUTZ. *Ibid* 919–28.—A theoretical discussion. Relations are presented linking the relative cross-section to the at. wt. A. L. H.

Criticism of the electrical differential method of measuring C_v with gases. IV. Measurements. The standardization with argon. MAX TRAUTZ AND FRITZ KAUFMANN. *Ann. Physik* [5], **5**, 581–605(1930); cf. *C. A.* **24**, 4195.—C_v was detd. for air and for CH_4, with A as reference; the results are 4.955 and 6.57 cal./g. at 20°, resp. ALBERT L. HENNE

The effect of temperature on the viscosity of air. W. G. SHILLING AND A. E. LAXTON. *Phil. Mag.* [7], **10**, 721–33(1930).—The coeff. of viscosity of air was measured by a comparative transpiration method from 23° to 850°. There is a small but steady deviation from Sutherland's law. William's method (cf. *C. A.* **21**, 204) was confirmed. ARTHUR FLEISCHER

Analysis and calculation of the parachor. ARNULF SIPPEL. *Ber.* **63B**, 2185–8 (1930); cf. *C. A.* **23**, 5377.—A brief discussion of Sugden's at. parachors. O. T. Q.

Investigation of a kind of turbulence friction in binary liquid mixtures. RICHARD SPRINGER AND HUBERT ROTH. *Monatsh.* **56**, 1–15(1930); cf. *C. A.* **22**, 707.—A continuation of the former measurements with a special type of viscometer, giving a better idea of internal structure of liquids. GREGG M. EVANS

The theory of anisotropic liquids. XII. The relations between molecular structure and density fluctuations. C. W. OSSEN. *Arkiv. Mat. Astron. Fysik* **22A**, No. 12, 20 pp.(1930); cf. *C. A.* **24**, 764.—A math. theory is developed by using the assumption that the dependence of the d. on the space coördinates is already valid in the action sphere of the mol. The theory overcomes the difficulties in the previous theory of nucleus and convergence point. ARTHUR FLEISCHER

Internal structure of solid oxygen-containing salts at high temperatures. I. General theoretical foundation. WILHELM JANDER. *Z. anorg. allgem. Chem.* **192**, 286–94(1930).—Solid O-contg. salts occur in 4 fundamental types. In the first the structure is that of a pure ion lattice, the lattice positions being occupied by the metallic ion M and the element π (π = Cl, S, W, Mo, N, P, Cb, C, Si, Al, etc.), the O surrounding π to form a complex ion πO_4. In the second type of structure the lattice positions are occupied by M, R and O, the interval M to O being equal or closely similar to the interval R to O. The third type of structure is characterized by a lattice built up of neutral mols. as in the org. compds., while in the 4th type the double oxide lattice is found, compds. of the formula MRO_4 being represented by $MO.RO_3$. At elevated temps. sufficient oscillation of the elements about their lattice positions occurs to produce variations in structure. Thus a compd. of compn. MRO_4 will probably have a pure ion lattice of the first type at room temp., but at elevated temps. there will be sufficient oscillation about the lattice positions to produce a transformation to the 4th type, equil. being finally produced as follows: $MRO_4 \rightleftharpoons M\,O.RO_3$. With increase in temp. this is displaced more and more to the right. The occurrence and identification of these various types of lattice structure are discussed fully. **II. Tungstates and molybdates of bivalent metals.** *Ibid* 295–316.—Cond. detns. are made to det. the type of lattice structure of certain tungstates and molybdates. $NiWO_4$, $MnWO_4$ and $ZnWO_4$ are purely electronic conductors; $CdWO_4$ and the alk. earth tungstates and molybdates conduct the current either as ions or as mixed oxides. $MgWO_4$ shows such a high sp. resistance that significant results are not obtained, although it appears to be an electronic conductor. From the cond. data as well as diffusion expts. and a few reactions in the solid state it is

concluded that $NiWO_4$, $MnWO_4$, $ZnWO_4$, $MgWO_4$ and the corresponding molybdates possess a double oxide lattice between 600° and 1100°, while $CdWO_4$ and the alk. earth tungstates and molybdates show an ion lattice over the same temp. range. In $CdWO_4$ indications are also given of an equil. in the crystal between the ions Cd and WO_4 and the individual oxides CdO and WO_3. H. STOERTZ

Determination of the type of linkage by means of the lattice energy. WILHELM KLEMM. *Z. Elektrochem.* **36**, 704–11(1930).—The lattice quotients of halides were studied. The lattice quotient of a compd. is defined as the ratio of its lattice energy to that of a halide of an element in a main group of the periodic table of similar size and charge as the element under consideration. With gaseous compds., the energy liberated in the formation of the mol. from gaseous ions is used in place of the lattice energy. The lattice quotient characterizes a compd. as definitely as its b. p., density, etc. It is not yet possible to state the place in the periodic table at which ionic bonding changes to at. linkage. I. J. PATTON

The space group of strychnine. THORA C. MARWICK. *Nature* **126**, 438(1930).—The x-ray investigation of strychnine revealed the following: unit cell $a = 11.9_2$A. U., $b = 12.1_3$A. U., $c = 11.3_6$A. U., vol. = 1634A. U.^{3}; axial ratios: $a:b:c = 0.983:1:0.931$; no. of mols. = 4; space group Q_4. The dimensions of the cell, and the space group, are such that 4 of the disk-shaped mols. recently suggested by R. Robinson (Bakerian lecture) can be fitted in the unit cell. LOUIS WALDBAUER

Crystal structure in the system: copper–bismuth. WM. F. EHRET AND RAY D. FINE. *Phil. Mag.* [7], **10**, 551–9(1930).—The photograms of a series of alloys ranging from pure Cu to pure Bi show the characteristic diffraction pattern of both metals. Within the limits of error, the lattices remain unchanged and indicate low mutual solubilities and the formation of heterogeneous alloys. The Cu lattice parameter was found to be 3.607 ± 0.004 A. U. and the Bi lattice parameter 4.749 ± 0.005 A. U. ARTHUR FLEISCHER

Investigations on carbides. I. The crystal structure of carbides MC_2. M. v. STACKELBERG. *Z. physik. Chem.*, Abt. B, **9**, 437–75(1930); cf. *C. A.* **24**, 3689.—X-ray investigation by the powder method of a series of carbides of formula MeC_2 shows that they have a face-centered tetragonal lattice with 4 mols. in the unit cell and lattice consts. as follows, recording *a*, *c* and the d. in order: CaC_2 5.48, 6.37, 2.21; SrC_2 5.81, 6.68, 3.26; BaC_2 6.22, 7.06, 3.90; LaC_2 5.54, 6.55, 5.35; CeC_2 5.48, 6.48, 5.56; PrC_2 5.44, 6.38, 5.75; NdC_2 5.41, 6.23, 6.08; ThC_2 5.85, 5.28, 9.3; $NaHC_2$ 5.40, 8.17, 1.33; KHC_2 6.05, 8.42, 1.37. The C–C distance in the C_2 group is 1.4 A. U., agreeing with band spectra data. With the help of the polarizing microscope the tetragonal symmetry was confirmed for CaC_2, SrC_2 and BaC_2. An electron configuration similar to that of the N_2 mol. is postulated for the C_2 and HC_2 groups. The possible space group classifications are discussed. These carbides appear to show a new lattice type somewhat similar to that of pyrite. J. B. AUSTIN

The dependence of crystal plasticity on temperature. W. BOAS AND E. SCHMID. *Z. Physik* **61**, 767–81(1930); cf. *C. A.* **24**, 3686.—By use of a Schopper tenacity app. so modified that the specimen may be immersed in an oil bath, thrust tension and the tenacity of 14 Cd crystals were measured. The crystals were prepd. by the method of Czochralski, namely, by drawing from a melt at 20 cm./hr.—at temps. 20–473°K. The crit. thrust-tension falls linearly with increase in temp. to 473°K; beyond this temp. it is const. for a considerable period below the m. p. The tenacity coeff., which is the slope of the tenacity curve, falls with temp. between 100° and 300°K. At higher and lower temps. it is practically independent of temp. At high and low temps. the rate of applying the load is without effect on the coeff. The work of thrust is independent of temp. and the rate of stretch; it is 8.7 joules/cc. Zn crystals stretched at 100°, 150° and 300° C. show a transverse striation which may indicate the superficial destruction of the crystal. Detailed data, curves and photographs are given. E. R. SCHIERZ

Field strength dependence of polarization and true conductivity in ion crystals. ADOLF SMEKAL with research by O. BERAN and F. QUITTNER. *Physik. Z.* **31**, 809–11(1930).—The satn. value of the polarization was detd. at high voltages for NaCl and KCl from 114° to 300° with an accuracy of 2 to 3%. The true cond. of crystals increases with rise of field strength at all the temps. at which measurements were made. The true cond. of ion crystals does not obey Ohm's law but rather obeys Poole's formula. ARTHUR FLEISCHER

Electrical conductivity measurements at low temperatures. J. C. MCLENNAN, J. F. ALLEN AND J. O. WILHELM. *Phil. Mag.* [7], **10**, 500–11(1930).—The cond. from 1.9° to 300°K. was measured for the eutectic alloys of Ag-Bi, Cu-Bi, Mn-Bi, Ag-Sb,

Cu-As, Au-As, solid solns. of Cd-Bi, Cd-Sb, the alloys Pb-Ce, Pb-La, and Ce, La, AgCl, FeS, AgS, Bi_2S_3, CuO, PbS, and an old sample of Po. PbS was found to be supra-conducting at 4.2° while Cu-As, Au-As and Cd-Bi showed signs of a possible supra-conducting state below 1.9°. ARTHUR FLEISCHER

Further experiments on the cohesion of quartz fibers. G. A. TOMLINSON. *Phil. Mag.* [7], **10**, 541–4(1930); cf. *C. A.* **23**, 559.—Contrary to the experiences of Stone (cf. *C. A.* **24**, 4197) with glass beads, quartz fibers adhered even in a dry atm. for a long time. Two other examples of solid cohesion are: (1) A light disk having 3 in. of clean Pb is placed on a plate of clean glass or steel; on careful inversion the disk clings to the plate. (2) If clean glass is stroked repeatedly with a metal, a thin film appears which gradually increases in thickness assuming the characteristic color of the metal, and showing great tenacity. ARTHUR FLEISCHER

The expansion of metals at high temperatures. FDK. L. UFFELMANN. *Phil. Mag.* [7], **10**, 633–59(1930).—The expansion coeffs. were detd. by an optical interference method for 3 directions up to 800°. Sn, Cd and Zn showed pronounced anisotropic properties. The results are expressed in 2 equations: (1) $V = V_0(1 + At + Bt)$, where V = vol. at temp. t and V_0 = vol. at 0°. (2) Thiessen's formula $\alpha = K/V \cdot T^n$, where α is the coeff. of expansion. For Sn, Cd and Zn the cubical expansions are used; for the others the linear expansion.

Metal	Range	Equation 1		Equation 2	
		$A \times 10^{+5}$	$B \times 10^{8}$	$K \times 10^{6}$	n
Sn		Neither 1 nor 2 fits data over whole range			
	120 90°	5.05	9.9	...	....
Cd	90–130	...	...	2 25	0.626
	130–270	8.04	5 9	4.27	0.519
Zn	120–180	....	...	8.54	0.402
	120-360	8 50	3 9	....	.....
Pb	100 240	....	...	4.74	0 306
	250–280	....	...	4 44 × 10^{-1}	1.054
	100 280	1.60	3.2	...	.....
Al	100–530	2.16	0.95	2 40	0.384
Brass	62% Cu	Data do not fit either equation			
Cu	110–300	1 62	0.20	8.53	0.112

Co, Ni and Fe showed coeffs. that vary according as the measurement is made with rising or falling temp. ARTHUR FLEISCHER

The spark potential in helium. FRITZ LEVI. *Ann. Physik* [5], **6**, 409–33(1930).—Curves of spark potential in pure He plotted against product of gas pressure and distance between electrodes were approx. detd. but are not as reproducible as for other gases. With increasing purity of He, the curve first falls and then rises sharply. Traces of foreign gases and the state of the electrode surface probably account for the discrepancies. Polarization was always present, brass electrodes giving higher results than those of Ni. G. M. MURPHY

Quick evaporation. HANS N. NAUMANN. *Biochem. Z.* **226**, 164-5(1930).—Reply to a criticism of Jantzen and Schmalfuss (*C. A.* **24**, 3933). S. MORGULIS

The heat of vaporization of water and the specific volume of saturated steam up to 310° (100.7 atm.). M. JAKOB AND W. FRITZ *Z. Ver. deut. Ing.* **74**, 1266 (1930); cf. *C. A.* **24**, 4441.—The former investigation was extended to 310°. The results are, resp., temp. in degrees, pressure in kg./sq. cm., heat of vaporization in kg. cal./kg. and sp. vol. of satd. steam in cu. m./kg.: *270, 56 10, 381.94, 0.03554; 285, 70.48, 361.38, 0.02777; 300, 87.61, 334.73, 0.02153; 310, 100.65, 315.68, 0.01829.* G. M. MURPHY

Investigation of the conductivity of water which has been irradiated with x-rays. R. SCHNURMANN. *Z. physik. Chem.*, Abt. A, **150**, 110–4(1930). —Pure H_2O which has been exposed to x-rays does not permanently acquire increased cond. if it was irradiated through a Pt window which also served as an electrode of the cond. cell. The temporary increase in cond. is attributed to heat radiation from the x-ray tube. L. W.

Vapor pressure and constitution of the vapor of mercurous bromide. GERHARD JUNG AND WERNER ZIEGLER. *Z. physik. Chem.*, Abt. A, **150**, 139–44(1930); cf. *C. A.* **24**, 5621.—By use of the Dumas method the vapor d. of Hg_2Br_2 at temps. between 403° and 443° was found to be 9.863; the value calcd. for complete dissocn. is 9.861. At a vapor pressure of 1.3 mm. the Hg resonance line (253.7 mμ) is visible in the absorption spectrum for Hg_2Br_2 vapor. At higher pressures the Hg spectrum is blotted out by that of $HgBr_2$. Conclusion: Hg_2Br_2 is completely dissocd. into $HgBr_2$ and Hg. The vapor pressure of Hg_2Br_2 (detd. by the dynamic method between 97° and 185° and by the

sublimation method between 320° and 395°) is given by the expression: $\log p = -(4298/T) + 9.338$ over the temp. range 100–400°. On the basis of one mol. of Hg_2Br_2 the heat of dissocn. into Hg and $HgBr_2$ is 39,200 cal. and the heat of vaporization of Hg_2Br_2 is 52,000 cal. OSCAR T. QUIMBY

The electrical conductivities of dilute sodium amalgams at various temperatures. W. J. DAVIES AND E. J. EVANS. *Phil. Mag.* [7], **10**, 569–99(1930); cf. *C. A.* **23**, 1027.—The conductivities of 11 Na amalgams from 0.307 to 5.270 atom % of Na were measured at 8 temps. from 0° to 300°, with special precautions to prevent oxidation and contamination. For a const. concn. up to 3.6% the relative resistance increases with temp. up to 185°. At const. temp. the resistance rises to a max. with increasing concn. and then falls; the rise is steeper than the fall. The resistance of the amalgams is greater than the resistance of Hg except at 5.27 atom % of Na, where there sepd. a solid mass which seemed to have a cryst. structure. ARTHUR FLEISCHER

Adsorption of methane and hydrogen on charcoal at high pressure. P. K. FROLICH AND A. WHITE. *Ind. Eng. Chem.* **22**, 1058–60(1930).—Adsorption isotherms of CH_4 and of H_2 on charcoal were detd. over the pressure range of 1 to 150 atms.; those for H_2 were taken at 25° and at 100°, those for CH_4, at 25°, 50°, 100° and 180°. The adsorption increases with pressure in accordance with Langmuir's rather than with Freundlich's equation, reaching a satn. value at about 100 atms. and 25° of 12 l. per 100 g. of charcoal for CH_4 and 4 l., for H_2. From mixts. of the 2 gases at 25°, CH_4 appears to be adsorbed preferentially practically to the complete exclusion of H_2 and in an amt. approx. equal to that adsorbed at the same partial pressure of CH_4 in the absence of H_2. P. H. E.

Experimental studies on adsorption by means of x-rays. MORISÔ HIRATA. *Sci. Papers Inst. Phys. Chem. Research* **14**, 71–90(1930); cf. *C. A.* **24**, 1779.—X-ray diffraction patterns of coconut charcoal contg. the vapor of some org. liquid in an adsorbed state were studied and compared with those of the activated charcoal and those of the pure liquid. In PrOH, iso-PrOH and AmOH, the diffraction figures of the charcoal contg. their vapors are different in nature from those that are obtained by the simple superposition of that of the pure liquid on that of the activated charcoal. The expts. are considered to indicate a definite combination of mols. somewhat different from that in the ordinary liquid state. With CS_2, the data can be explained as resulting from the superposition of the diffraction pattern of liquid CS_2 upon that of the charcoal. PAUL H. EMMETT

A theory of condensation and adsorption. N. SEMENOV. *Z. physik. Chem.*, Abt. B, **7**, 471–9; *J. Russ. Phys.-Chem. Soc.*, Phys. Pt., **62**, 33–9(1930).—Theoretical. The adsorbed monomolecular layer is analogous to a two-dimensional gas; hence van der Waals' equation may be applied to it. At high pressure, the layer becomes a two-dimensional liquid accompanied by a satd. vapor phase. ALBERT L. HENNE

Adsorption in solutions and the dielectric properties of the solvent. ERICH HEYMANN AND ERICH BOYE. *Kolloid-Z.* **53**, 83–5(1930); cf. *C. A.* **24**, 2656. A. F.

Adsorption phenomena in solutions. XXI. The surface oxides of active charcoal. NIKOLAI SHILOV, HELENE SHATUNOVSKA AND KONSTANTIN CHMUTOV. *Z. physik. Chem.*, Abt. A, **150**, 31–6(1930); cf. *C. A.* **24**, 4975.—Chem. as well as phys. and elec. characteristics of the surface det. the adsorptive properties of active charcoal. Oxide B adsorbs KCl hydrolytically according to the equation $=C\langle^{OH}_{OH} + 2KCl \longrightarrow =C\langle^{Cl}_{Cl} +$ $2KOH$. Oxide C adsorbs KCl without hydrolytic cleavage: $=C\langle^{OH}_{OH} + 2-C\langle^{O}_{OH} +$ $2KCl \longrightarrow =C\langle^{Cl}_{Cl} + 2-C\langle^{O}_{OK} + 2H_2O$. The importance of the chem. properties of the surface oxides is further demonstrated by the behavior of active charcoal and $AlCl_3$ Na_2HPO_4, Na_2CO_3 and KI. However, adsorption is not regarded as a purely chem. exchange reaction. DON BROUSE

Adsorption phenomena in solution. XXII. The orientation of the adsorption series in its dependence on the state of activation of sugar charcoal. MICHAEL M. DUBININ. *Z. physik. Chem.*, Abt. A, **150**, 145–60(1930); cf. *C. A.* **23**, 1549.—Sugar charcoal activated at 500° adsorbed mineral acids from aq. solns. of equiv. concn. in the order $HCl > H_2SO_4 > H_3PO_4$, and org. acids in the order propionic > valeric > heptylic. When the charcoal was activated at 800° or for long periods of time the order of adsorption was reversed. Activation in air decreased the adsorption of I from KI soln. and increased

that of alkali. Activation in CO_2 increased the adsorption of I but did not affect that of alkali. Heating the charcoal *in vacuo* to 1000° destroyed its ability to adsorb alkali by removing the surface layer of CO_2. By this treatment the ability to adsorb acids was also decreased, but the amt. of I adsorbed was practically unchanged. Activation increases the pore size, allowing the larger mols. access to more surface. The amt. of the larger mols. adsorbed per unit mass of adsorbent is thereby increased in greater proportion than that of smaller mols. C. W. WILSON

The effect of the surrounding medium on the life of floating drops. L. D. MAHAJAN. *Phil. Mag.* [7], **10**, 383-6(1930); cf. *C. A.* **23**, 4118.—Drops of H_2O, soap soln. and aniline were placed in air, CO_2, gasoline, H_2O and olive oil at various temps. As the viscosity of the surrounding medium increased, the life of the drop increased. A. F.

The variation of electrical resistance with applied potential. II. Thin collodion films. L. R. BLINKS. *J. Gen. Physiol.* **14**, 127-38(1930); cf. *C. A.* **24**, 5319.—The resistance of very thin collodion membranes to d. c. resembles that of living cells in that it varies with the p. d. With membranes sepg. 2 different solns., the resistance varies with the direction and voltage of the applied p. d. When less mobile ions are carried across the membrane the p. d. rises, when more mobile ions are so carried it falls, the changes being prompt and regular. There is a hysteretic effect of previous current flow. These membranes differ from *Valonia ventricosa* cells in that the rise of resistance is largely ohmic, with little or no polarization p. d. **III. Impaled Valonia ventricosa.** L. R. BLINKS. *J. Gen. Physiol.* **14**, 139-62(1930).—*Valonia* cells were impaled upon fine glass capillaries and the elec. resistance and polarization were measured during the passage of d. c. across a single layer of protoplasm. The measurements were correlated with 5 stages of p. d. existing naturally across the protoplasm: (1) stage of shock after impalement, in which the p. d. reaches zero and then slowly recovers, the resistance and polarization being slight; (2) stage of recovery characterized by normal p. d. (15 mv. av.), inside of cell pos., polarization and resistance at first variable but finally reaching a "constant" state; (3) stage of increased p. d. (to 100 mv.), inside of cell pos., polarization and resistance being at first as in sea water but later decreasing; (4) a temporary stage of reversed p. d. (to 50 mv.), outside of cell pos., with polarization greater to outward than to inward currents; (5) disappearance of p. d. caused by death and various toxic agents, the resistance and polarization being negligible. The apparent resistance of the protoplasm is largely accounted for by the apparent back e. m. f. of polarization. The elec. capacitance of the protoplasm is about 1 microfarad per sq. cm. of surface. C. H. RICHARDSON

Color and particle sizes of colloidal silver, especially of the new hydrogen peroxide-silver sol. E. WIEGEL. *Kolloid-Z.* **53**, 96-101(1930); cf. *C. A.* **23**, 3389; **24**, 3415.—The table gives the sizes of the Ag particles corresponding to the various colors:

Transmitted Color	Particle Size mμ	Method
Yellow	10–20	Particle count
Red	25–35	Particle count
Red-violet	35–45	Particle count
Blue-violet	50–60	Particle count
Blue	70–80	Sedimentation velocity
Green	120–130	Sedimentation velocity

The reflected color is always the color complementary to the transmitted color. The results agree with Mie's theory if anisotropic particles are assumed. The Ag crystals tend to have a leaf form. There is no doubt that the color depends on the particle size. ARTHUR FLEISCHER

Colloidal nature and water content of clays. H. BERRIDGE. *Engineering* **130**, 5-7, 61-3(1930).—The relation between the phys. properties of clay and the stability of building foundations was investigated. Even when loaded to more than 5 tons per sq. ft., dried clay expands when wetted, and the limiting pressure required to prevent expansion seems to be approx. 15 tons per sq. ft., as calcd. from the laws governing osmotic pressure. As plastic clay dries, shrinkage practically ceases when the water content falls below about 12.5% of the dry wt., but spontaneous evapn. of water continues until it reaches about 6%. Prisms of clay without lateral support failed completely at a pressure of 1 ton per sq. ft. when the water content of the clay was 22.8 gal. per cu. yard., while air-dried clay supported a pressure of at least 4 tons per sq. ft. K. D. JACOB

The behavior of highly polymerized compounds in solution. H. MARK. *Kolloid-Z.* **53**, 32-46(1930).—The viscosity relations, vapor pressure lowering, spreading on surfaces and x-ray investigations of colloid solns., especially cellulose and cellulose ester solns., are reviewed. ARTHUR FLEISCHER

Deformation of high-molecular compounds. R. O. HERZOG. *Kolloid-Z.* **53**, 46–51(1930).—The properties of macromols. lead to 2 results: (1) cohesion is greatest in the direction of the fiber axis; (2) in the deformation of a mixt., the large and small mols. react differently. Examples used to illustrate are polyvinyl acetate, polyacrylic acid esters and cellulose esters. ARTHUR FLEISCHER

Highly polymerized compounds. XLVI. Organic and colloid chemistry. H. STAUDINGER. *Kolloid-Z.* **53**, 19–32(1930); cf. *C. A.* **24**, 5294, 5717.—A review in which the micellar theory is compared with S's. theory of macromols. Org. colloids are classified as follows: (1) lyophobic suspensoids and emulsoids which have low viscosities and which contain few large, approx. spherical particles (rubber latex). (2) Assocn. or micellar colloids, usually heteropolar org. materials of which the anion or cation is a large org. radical, giving colloid solns. in water (soaps). (3) Mol. colloids or compds. with very large mols. (*macromols.*) which dissolve in suitable solvents to yield very viscous liquids. Depending on the thermal properties, this class is divided into hemicolloids and eucolloids (polystyrene, rubber, etc.). ARTHUR FLEISCHER

Spatial representation of the structure of carbon compounds and their use in the chemistry of highly polymerized compounds. KURT H. MEYER. *Kolloid-Z.* **53**, 8–19 (1930).—Models are constructed for cellulose, rubber and protein from chem. and phys. data, especially those from x-ray measurements and from calcns. of the "molcohesion" (cf. *C. A.* **23**, 1623). ARTHUR FLEISCHER

Zwitterions. I. Proof of the Zwitterion constitution of the amino-acid molecule. LESLIE J. HARRIS. *Biochem. J.* **24**, 1080–5(1930).—**II. Amino acids, polypeptides etc., and proteins as Zwitterions with instances of non-Zwitterion ampholytes.** THOMAS WM. BIRCH AND LESLIE J. HARRIS. *Ibid* 1086–97.—Evidence is brought forward to show that amino acids possess the Zwitterion structure ($^+NH_3.R.COO^-$) rather than the classical structure ($NH_2.R.COOH$). The older view is represented as $Cl^- +$ $^+NH_3.R.COOH \xleftarrow[(k_b;\ \text{low})]{+HCl} {}^+NH_3.R.COOH \xrightarrow[(k_a;\ \text{low})]{+NaOH} {}^+NH_2.R.COO^- + Na^+$..... The new view is represented as $Cl^- + {}^+NH_3.R.COOH \xleftarrow[(K_a;\ \text{high})]{HCl} {}^+NH_3.R.COO^- \xrightarrow[(K_b;\ \text{high})]{NaOH} NH_2.R.COO^- + Na^+$.... In the newer view the amino group of the free amino acid is already ionized, so that addn. of HCl merely serves to depress the ionization of the carboxyl group (the acid carboxyl group is "replaced" by the stronger acid, HCl). The NaOH, on the other hand, being a stronger base "replaces" the weaker amino group, and the ionization of the carboxyl group is left unchanged. The addn. of HCl, then, measures K_a and not K_b; and similarly with NaOH The HCl and NaOH titration curves of glycine were detd. in the presence of increasing concns. of HCHO. The weakening of the basicity of the NH_2 group caused by the formation of a methylene deriv. resulted in a displacement not of the HCl curve but of the NaOH curve. The HCl and NaOH titration curves represent, therefore, not neutralization of NH_2 and COOH, resp., but "replacement" (back titration) of COOH and of NH_2 by a stronger acid and a stronger base. With ampholytes contg. more than 1 NH_2 or COOH group the no. of curves shifted is shown to be equal to the no. of basic groups. The method has been used to det. whether a given ampholyte possesses the Zwitterion or non-Zwitterion constitution. Polypeptides are Zwitterions; *p*-aminophenol and *p*-aminobenzoic acid are non-Zwitterions. BENJAMIN HARROW

Constitution and electrochemical behavior of proteins. WOLFGANG PAULI. *Kolloid-Z.* **53**, 51–61(1930).—The prepn. of electrolyte-free proteins by electrodialysis has yielded accurate data on cond. and H-ion activity in protein solns., and has permitted accurate calcns. of Zwitterion concns. The behavior of proteins toward neutral salts, toward acid and alkali addns., toward flocculating agents in the presence of acids, at the isoelec. point and toward the Ag ion are discussed from the standpoint of the Zwitterion. ARTHUR FLEISCHER

The thermodynamics of lyophilic colloids. HANS KROEPELIN. *Kolloid-Z.* **53**, 86–8(1930).—Equations useful for the study of swelling substances are derived. ARTHUR FLEISCHER

Hydrates and hydrogels. XII. Mono- and disilicic acids. R. WILLSTÄTTER, H. KRAUT AND K. LOBINGER. *Ber.* **62B**, 2027–34(1929).—Monosilicic acid was obtained in a purer state by shortening the time of reaction and controlling the acidity at 0.002–0.001 *N*. Both mono- and di-acids are most stable in feebly acid solns. Neutral or slightly alk. solns. hasten condensation. The acidity affects the properties of silicic acids (mol. wt. 200–300) as shown by the reaction with albumin. Time-*vs.*-mol. wt.

curves illustrate the condensation of monosilicic acid in solns. of differing acidities. Poly. alcs. retard condensation; EtOH is ineffective. During distn. of a silicic acid soln., traces of the acids are volatilized, whereas a soln. of boric acid gives no trace of acid in the distillate. ALBERT L. HENNE

An attempt to explain gel phenomena on the basis of properties of fluids with viscosity anomalies. D. DEUTSCH. *Z. physik. Chem.*, Abt. A., **150**, 161–8(1930).—A gel is assumed to be a plastic fluid. From this standpoint the phenomenon of thixotropy is seen to depend on hydrostatic pressure. Brownian motion, and the very small but finite diffusion of colloidal particles such as particles of azo blue dye, can be understood as the result of the plasticity of the gel. C. W. WILSON

Molecular weight of cocosin. BERTIL SJÖGREN AND ROMUALD SPYCHALSKI. *J. Am. Chem. Soc.* **52**, 4400 4(1930).—Cocosin (coconut globulin) is rather unstable, being easily decompd. during prepn. Centrifugal analysis proved cocosin to be a mixt. of 2 main components of wt. about 208,000 and 104,000 with the larger mols. present in much greater amts. than the smaller ones. It is extremely probable that native cocosin has a mol. wt. within exptl. limits identical with the other oil-seed globulins earlier studied, *viz.*, 208,000. The small fraction with half this wt. represents the 1st stage of the protein cleavage. The light-absorption curve is given. C. J. WEST

The physical chemistry of starch and bread making. I. The changes in the Röntgen spectrum of starch during baking and staling of bread. J. R. KATZ. *Z. physik. Chem.*, Abt. A., **150**, 37 59(1930).—The Rontgen spectrum of wheat or rye starch is of a typically cryst type (an A-spectrum) with somewhat broadened interference rings; the spectrum of the gluten present is not intense enough to be seen. In baking, a new form of crystal spectrum (a "paste formation" or V-spectrum) appears, indicating a new chem. compd. or an allotropic modification. Staling without loss of water produces a third spectrum (a retrogradation or B-spectrum) which is somewhat similar to the A-spectrum. **II. The starch modification with the V-spectrum is the equilibrium form at higher temperatures while at lower temperatures it is the modification with the B-spectrum.** J. R. KATZ AND L. M. RIENTSMA. *Ibid* 60 66.—A heterogeneous equil. exists between the starch modification with the V-spectrum (α starch) and the modification with the B-spectrum (β_B starch). At higher temps., α starch is the equil. form; at lower temps. it is the β_B starch. The influence of moisture content on this equil. has not been detd. **III. First and second stages of paste formation.** J. R. KATZ AND L. M. RIENTSMA. *Ibid* 67–80.—Two stages of paste formation may be distinguished by changes in the Rontgen spectrum. The first stage results if wheat starch is heated with much water to 60–62.5° or with little water to 100°; it corresponds to the changes in baking. The second stage appears upon heating with much water to 90 100°. In the first stage the starch grain is swollen; in the second it has changed to a sac filled with a thin starch soln. The change from the first to the second stage of paste formation is different from the change from β to α starch. **IV. Paste formation in starch and mercerization of cellulose.** J. R. KATZ AND J. C. DERKSEN. *Ibid* 81–9. A V-spectrum results when wheat starch is made into paste with an aq. soln. of NaOH. The concn. of NaOH must be about 0.07 or 0.08 *N* before conversion of β_B into α starch begins; then, within a narrow range (0.07 to 0.104 *N*), the more concd. the soln. the more starch is converted. The action is analogous to mercerization of cellulose with aq. NaOH. **V. All varieties of starch have similar retrogradation spectra.** J. R. KATZ AND TH. B. VAN ITALLIE. *Ibid* 90–9.—While all native starches display characteristically different Röntgen spectra (A), in the second stage of paste formation all have similar retrogradation spectra (B). This common retrogradation spectrum resembles the A-spectra of certain native starches (as potato, canna, etc.). The paste formation spectra (V) for all types of starches are similar. **VI. Changes in the Röntgen spectra upon drying starch derivatives.** J. R. KATZ AND J. C. DERKSEN. *Ibid* 100–9.—The Röntgen spectra of all substances belonging to the starch group change when the material is strongly dried. With the raw starch, the A-, B- or C-spectrum changes to a poorly defined diagram similar to an amorphous spectrum. The amt. of drying necessary to cause the change varies with the starch. The paste formation spectrum also changes characteristically to produce a new cryst. spectrum (VT-spectrum). The water of crystn. is apparently bound in a manner similar to that in a zeolite. D. BROUSE

Solubility relations in gas-liquid systems. IV. The solubility of oxygen in water as found by an analytical method. J. LIVINGSTON, R. MORGAN AND ALAN H. RICHARDSON. *J. Phys. Chem.* **34**, 2356–66(1930); cf. *C. A.* **24**, 5203.—The soly. of O_2 in water at pressures between 175 mm. and 760 mm. obeys Henry's law. The soly. detd. analytically agrees well with that obtained by other methods. PAUL H. EMMETT

The crystallization of sodium bromide from supersaturated solutions. I. N.

STRANSKI AND Z. C. MUTAFTSCHIEW. *Z. physik. Chem.*, Abt. A, **150**, 135–8(1930).—Cubes of NaBr crystallize out on compds. like sphalerite, rutile, magnetite and others whose crystal lattices differ widely from that of NaBr, as well as on PbS, which has the same lattice. The soly. of NaBr at 39° is 53.6 ± 0.05 parts by wt. per 100 of soln.
LOUIS WALDBAUER

The diffusion of substances that show deviations from Fick's law. D. KRÜGER AND H. GRUNSKY. *Z. physik. Chem.*, Abt. A, **150**, 115–34(1930).—A discontinuous method of diffusion which permits of recognizing deviations from Fick's law more easily than Öholm's method is described. The new method permits the evaluation of the results in cases where the diffusion coeff. depends on concn. Expts. with the sols of cellulose esters lead to the conclusion that the abnormal diffusion depends, not only on a diffusion coeff. varying with concn., but also on attractive forces between dissolved cellulose ester particles, and between ester and solvent mols. LOUIS WALDBAUER

Diffusion. II. Kinetic theory of diffusion in liquid systems. J. HOWARD ARNOLD. *J. Am. Chem. Soc.* **52**, 3937–55(1930); cf. *C. A.* **24**, 5549.—The classical kinetic theory is applied to diffusion in liquids. Assumptions made are: (1) resistance to diffusion is due to binary collisions; (2) shortening of the mean free path due to vol. of mols. is the same for all systems. The retarding effect of intermol. forces is allowed for by an empirical factor which is used with assocd. substances. This factor is independent of the nature of the diffusing substance and is proportional to the viscosity of the solvent. Observed and calcd diffusion coeffs. are compared. S. LENHER

The molecular state and mutual reactions of the halides in the 4th and 5th group of the periodic system. M. G. RAEDER. *Kgl. Norske Videnskab. Selskabs Skrifter* **1929**, No. 3, 1–118.—Cryoscopic and ebullioscopic investigations of mutual solns. of the halides in the 4th and 5th group of the periodic system were carried out systematically to clear up anomalies in previous investigations. (Cf. Walden, *Z. anorg. allgem. Chem.* **29**, 371(1902); Garelli and Bassani, *Atti acad. Lincei* [5], **10**, 255–62; Tolloczko, *Bull. acad. sci. Cracovie* [7/1], 22 pp.; Beckmann, *C. A.* **1**, 138.) The results are treated with special reference to the new soly. theory (*C. A.* **10**, 2426). Occurrence of reciprocal reactions and possible existence of mixed halides were investigated by establishing equil. diagrams for a series of binary halide systems. The cryoscopic consts. were detd. in a Beckmann app. provided with an electromagnetically driven Pt stirrer which permitted working with the hygroscopic halides in a completely closed app. Series of 3–5 measurements were made with increasing amts. of each dissolved compd. in the same solvent. The initial amt dissolved was regulated so as to give a depression in the f. p. of 0.2–0.5°. The av. mol. depression was calcd. for each series according to Raoult. The consts. obtained were plotted against g.-mols of substance per 100 g. solvent in a coördinate system, and the values for Δ at infinite diln. found by extrapolation. These values were controlled according to van't Hoff's empiric equation for dil. solns. Where the necessary thermochem. consts were not available the heats of vaporization of the resp. solvents were detd. ebullioscopically. For $SnBr_4$, m. 29–29.5°, the following values for Δ were obtained with the various halides, resp.: SnI_4 348, $SnCl_4$ 437, AsI_3 534, $AsCl_3$ 610, $AsBr_3$ 277, SbI_3 518, $SbBr_3$ 276, $SbCl_3$ 585, PI_3 446 immediately after addn. and 454 1–1½ hrs. after addn., PBr_3 264, PCl_3 283, CBr_4 275, CCl_4 270, $SiBr_4$ 136, $SiCl_4$ 260, $TiBr_4$ a slight tendency to raise the f. p., $TiCl_4$ 396. A series of the values for Δ is grouped around 275 and the 3 most reliable series give on an av. 276. Calcd. from this the heat of fusion, w = 6.59 cal./g. For $AsBr_3$, m. 32°, the values obtained for Δ were: AsI_3 186, $AsCl_3$ 227, SbI_3 55, $SbBr_3$ —122, $SbCl_3$ 95, PI_3 307, PBr_3 129, PCl_3 305, SnI_4 403, $SnBr_4$ 171, $SnCl_4$ 452, $TiBr_4$ 144, $TiCl_4$ 355, $SiBr_4$ 110, $SiCl_4$ 153, CBr_4 165, CCl_4 160, anthracene 182. The various halides are more sensitive to $AsBr_3$ than to $SnBr_4$. The value for the presumably indifferent anthracene is in fair agreement with that of Walden. It therefore seems probable that for $AsBr_3$ Δ = 185. Calcd. from this w = 9.93 cal./g. The ebullioscopic consts. were detd. in a Beckmann app., which, during varying atm. pressure, was provided with a Beckmann and Weber manostat (*C. A.* **6**, 1865). For $SnCl_4$, b. 114°, the following values for Δ were obtained: SnI_4 302, $SnBr_4$ 179, $TiBr_4$ 232, $TiCl_4$ 38, $SiBr_4$ 45, CBr_4 89.7, $SiCl_4$ and CCl_4 too volatile, SbI_3 309, $SbBr_3$ 207, $SbCl_3$ 73.5, AsI_3 243, $AsBr_3$ 153, $AsCl_3$ 15, PI_3 81 (stable), 112 (max.), PBr_3 0 and —7 (stable), 60 and 73 (max.), PCl_3 —146, anthracene 101. The ebullioscopic const. for $SnCl_4$ should thus be Δ = 98. For $TiCl_4$, b. 136°, the values obtained were: SnI_4 about 130, $SnBr_4$ 91, $SnCl_4$ —61, TiI_4 277, $TiBr_4$ 127, $SiBr_4$ 23.4, CBr_4 52.5, $SiCl_4$ and CCl_4 too volatile, SbI_3 about 160, $SbBr_3$ 142, $SbCl_3$ 44, AsI_3 104, $AsBr_3$ 67, $AsCl_3$ —30, PI_3 36 (stable), about 67 (max.), PBr_3 —72, PCl_3 very variable, anthracene 66. The latent heat of vaporization for $TiCl_4$ was detd. according to Clausius-Clapeyron as l = 48.8 cal./g., giving Δ = 67.8, which is in agreement with the value for anthracene solns.

The const. for $TiCl_4$ should thus be $\Delta = 67$. For $SiCl_4$, b. 57°, the values were: SnI_4 54, $TiBr_4$ 57, SiI_4 53.5, $SiBr_4$ 58, CBr_4 50.0, SbI_3 practically insol., $SbBr_3$ about 60, AsI_3 very little sol., max. increase in b. p. 0.047°, PI_3 56. All the compds. give nearly ideal solns. in $SiCl_4$. The av. $\Delta = 55$, corresponding to $l_{56.7}° = 39.3$ cal./g. The heat of vaporization was detd. as $l_{55.8}° = 40.4$ cal./g. The const. for $SiCl_4$ should thus be $\Delta = 54$. For CCl_4, b_{740} 76.1°, the values were: SnI_4 57, CBr_4 54, $SbBr_3$ 51, PI_3 51, AsI_3 not sufficiently sol. The heat of vaporization of CCl_4 is 46.4 cal./g. (Landolt-Börnstein), giving $\Delta = 52.5$. The halides investigated are indifferent to CCl_4 and give on an av. $\Delta = 53$. All data being considered, the const. for CCl_4 should be $\Delta = 52$. For $AsCl_3$, b. 130°, the values were: SnI_4 161, $SnBr_4$ 70, $SnCl_4$ —77, TiI_4 153.5, $TiBr_4$ 133, $TiCl_4$ white ppt. on the first addn. which dissolved on further addns. The ppt. was sol. in alc.; variable values, seem near —70, SiI_4 about 67, $SiBr_4$ 14.5, CBr_4 b. p. variable, $SiCl_4$ and CCl_4 were too volatile to give reliable results, SbI_3 229, $SbBr_3$ 168, $SbCl_3$ 62, AsI_3 166, $AsBr_3$ 110, PI_3, PBr_3 and PCl_3 did not give stable values, anthracene 70.5. $AsCl_3$ is active. An exptl. ebullioscopic const. for $AsCl_3$, $\Delta = 71.5$ and a calcd. const., $\Delta = 64.0$ are given. For PCl_3, b_{759} 75.6,° the values were: SnI_4 70, $SnBr_4$ 100, $SnCl_4$ 34, $TiBr_4$ about 130, $TiCl_4$ 41, $SiBr_4$ 45, SbI_3 about 150, $SbBr_3$ about 126, $SbCl_3$ 40, AsI_3 about 150, $AsBr_3$ 121, $AsCl_3$ 37, PI_3 108, PBr_3 about 90, anthracene 50. By considering the preceding osmotic consts. as the normal values, the anomalies within each series, *i. e.*, the deviations from Raoult's law, are explained as follows: Too small osmotic effect may be caused by a combined crystn., or vaporization, differences in the internal pressure, mol. assocns., or, in general, polarity of the components. Such influences could not be very noticeable in the present expts. because these halides have little polarity and possess uniform, low internal pressures. The trihalides of Sb and some of those of As are exceptions in this respect. The weak polarity also makes the tendency to form addn. compds. very slight. Well-crystd. double compds. were observed only in the Ti–P systems, where the compds. $TiCl_4.PCl_3$, $TiBr_4.2PBr_3$ and probably $TiBr_4.PBr_3$ were isolated. This anomaly is probably a result of the unsatd. character of the trihalides of P. Too high osmotic effect, which is far more pronounced, may be caused by electrolytic dissocns. or by chem. substitutions. The former can be eliminated because the compds. are non-ionizing and of too low polarity. Chem. substitutions appear more frequently either in the form of reciprocal conversions or of mixed halides. In most cases both types of reactions appear simultaneously. The reciprocal conversions can be sepd. into 2 groups. C and Si tetrahalides convert extraordinarily slowly with the halides of the other elements investigated and only at elevated temps., while the tetrahalides of Ti and Sn and the trihalides of P, As and Sb convert mutually very rapidly at ordinary temp. Contrary to the data of Karantassis (*C. A.* **20**, 1938, 2936) such reactions are reversible and in most cases without distinct direction. This condition is connected with the heat tones of the conversions, the latter always showing small values where an equil. is readily reached. The heat tones of possible reciprocal conversions with C and Si tetrahalides, calcd. from their heats of formation, are essentially higher and the conversions should therefore proceed more one-sidedly. The too high osmotic effects in such systems as SnI_4 in $SnBr_4$, AsI_3 in $AsCl_3$, etc., can be explained only by assuming a formation of mixed halides of the type $SnBr_2I_2$, $AsCl_2I$, etc. The disappearance of the characteristic colors of the iodides in the presence of excessive amts. of chlorides also speaks for the occurrence of such substitutions. Judged from the osmotic effects, this property of substitutions in the halides of the same element is strongest in Cl–I systems and weakest in Br–I systems. The osmotic anomalies are partly so great that they can be explained by a practically complete substitution. It is assumed that the substitutions take place in steps, *e. g.*, $3SnCl_4 + SnI_4 \rightleftarrows 4SnCl_3I$, $SnCl_4 + SnI_4 \rightleftarrows 2SnCl_2I_2$, $SnCl_4 + 3SnI_4 \rightleftarrows 4SnClI_3$. All steps are probably present simultaneously in solns. where the substitution is incomplete. In a previous paper (*C. A.* **18**, 636; **21**, 3324) it was shown that equil. diagrams of binary mixts. of Sn tetrahalides reveal no stable compds. The binary systems of As, Ti and Si halides here investigated showed no direct formation of intermediate compds. Since further the tetrahalide systems of Sn and Ti perfectly explain the f. ps. of the alleged mixed halides as given in the literature, without the assumption of compds., the mixed halides of these elements thus exist in soln. only and are not to be conceived as isolated, stable chem. individuals (Besson, *Compt. rend.* **124**, 683(1897); Lenormand, *J. pharm. chim.* **8**, 249 (1898); **10**, 114(1899); Friedel and Guérin, *Compt. rend.* **81**, 889(1875)). On freezing out or vaporization the equilibria are disturbed by the sepn. of more symmetrical and stable mols. of the single halides. While the binary systems of Si tetrahalides show no intermediate compds, they do not explain the f. ps. of the mixed halides as described by Besson (*Compt. rend.* **112**, 788, 1314, 1447(1891)), Besson and Fournier (*C. A.* **5**, 1885)

and Reynolds (*J. Chem. Soc.* **51**, 590(1887)). The existence of stable mixed compds., *e. g.*, $SiCl_2I_2.SiClBr_2$, etc., must therefore be assumed. From these results the following conclusion is drawn: The group P, As, Sb, Ti (probably Ge) and Sn form halides with readily interchangeable halogen atoms which, by a mere mixing together, enter into reciprocal conversions. The equilibria are easily displaced. Mixed halides are formed that cannot be isolated in solid or gaseous form. On the contrary the tetrahalides of C and Si have very little reactivity, are reluctant to enter into reciprocal conversions and form mixed halides only by special methods of prepn. When formed, these mixed halides can be isolated as stable compds. Cf. *C. A.* **1**, 2857; **3**, 603, 2077; **4**, 1276; **6**, 2720; **7**, 928; **9**, 402; **11**, 1588, 3146; **12**, 1436; **13**, 1663; **19**, 925, 3226; **20**, 2275; **22**, 1070. D. THUESEN

High-frequency conductivity of strong electrolytes in aqueous sugar solutions. S. MIZUSHIMA AND H. SACK. *Physik. Z.* **31**, 811–15(1930).—The cond. at 4×10^8 Hertz frequency for 0.005 to 0.4 molar solns. of $MgSO_4$ in 0 to 40% sugar solns. were measured by a comparative method with KCl as the standard. The results can be interpreted by the Debye electrolyte theory though not strictly quantitatively. A. F.

The electroösmotic salting out of concentrated solutions. R. HOFFMANN. *Wiss. Veröffentlich. Siemens Konzern.* **9**, 339–51(1930). F. D. ROSSINI

The interaction of molecules with the silver ion. FREDERICK K. V. KOCH. *Phil. Mag.* [7], **10**, 559–64(1930); cf. *C. A.* **22**, 1893.—The free energies of solvation for Ag ion in 10 org. liquids were calcd. from the previous exptl. data and compared with the free energies calcd. by the theory of Born on the assumption that the ion is a rigid sphere located in a continuous medium of dielec. strength. The difference is the extra energy expended in the excess mutual deformation above that due to induced moment. The errors are not sufficiently large to account for the observed regularities. Three classes occur, showing a gradual transition from solvation to complex-ion formation, (1) alcs., (2) nitriles and (3) N bases. Solvation may be defined as that state of ionic-mol. interaction in which the electronic configurations of the ions and mols. are quasi-rigid. ARTHUR FLEISCHER

Free energy of stannous hydroxyl chloride and the activity coefficient of stannous chloride and stannous ion. MERLE RANDALL AND SENZO MURAKAMI. *J. Am. Chem. Soc.* **52**, 3967–71(1930); cf. *C. A.* **22**, 3082.—The hydrolysis of stannous hydroxyl chloride was detd. in dil. HCl solns. at 25°, according to the equation, $Sn^{++} + Cl^- + 2H_2O(l) \rightleftharpoons SnOHCl.H_2O(s) + H^+$. Log $Km = m[H^+]/m[Sn^{++}]m[Cl^-]$ was plotted against the square root of the ionic strength. The 21 expts. gave points falling satisfactorily on a smooth curve. The activity coeffs. of $SnCl_2$ and of Sn^{++} were calcd. for vari. us concns. between $M = 0.0001$ and $M = 0.1000$. A. LLOYD TAYLOR

Activity coefficients of cesium chloride and hydroxide in aqueous solution. HERBERT S. HARNED AND ORION E. SCHUPP, JR. *J. Am. Chem. Soc.* **52**, 3886–92(1930); cf. *C. A.* **23**, 752, 1801.—From e. m. f. measurements of the cell Ag | AgCl | $Cs_xCl(m)$-Cs_xHg | $CsCl(m_0)$ | AgCl | Ag for concns. of CsCl from $M = 0.05$ to $M = 3.0$ the activity coeffs. of CsCl were calcd. by Hückel's equation (*C. A.* **19**, 1649) and by Harned's equation. Plotted values consistently fall below those for KCl as anticipated in the series of chlorides, HCl, LiCl, NaCl, KCl, CsCl. From e. m. f. measurements of the cell H_2 | $Cs(OH)(m)$ | CsHg | $CsOH(m_0)$ | H_2 for concns. of CsOH from $M = 0.01016$ to $M = 1.3205$ the activity coeffs. of CsOH were calcd. at all concns. They are somewhat above those for KOH. Details for the prepn. of very pure CsCl and CsOH are given. A. LLOYD TAYLOR

Activity coefficient and dissociation of water in cesium chloride solutions. HERBERT S. HARNED AND ORION E. SCHUPP, JR. *J. Am. Chem. Soc.* **52**, 3892–3900(1930); cf. preceding abstr.—The e. m. f. of the cell Ag | AgCl | HCl(0.01), $CsCl(m)$ | H_2 | HCl (0.01) | AgCl | Ag was measured for concns. of CsCl in the range $M = 0.01$ to $M = 3.0$ with satisfactory reproducibility below $M = 0.7$. By use of the equation, $E = 0.1183 \log (\gamma_{HCl}/0.904)[(m + 0.01)/0.01]$ the activity of the HCl was calcd. m_w for CsCl solns. passes through the expected max. and is lower than corresponding values in KCl solns. In the cell, H_2 | $CsOH(m_0)$, $CsCl(m)$ | Cs_xHg | $CsOH(m_0)$ | H_2, the e. m. f. was measured for concns. of CsCl between $M = 0.00503$ and $M = 3.6896$. The ionic activity coeff. product for water was calcd. by purely thermodynamic methods except for the math. extrapolation to zero concn. of acid or base and is given for concns. up to $CsCl(M = 1.0)$. Measurements were also made of the e. m. f. of the cell H_2 | $CsOHm_0$, $CsClm$ | AgCl | Ag, but exptl. difficulties make the results less certain. They are of value as a check. A. LLOYD TAYLOR

The determination of hydrogen-ion concentration in the presence of neutral salts. L. WOLF AND MISS D. ROSENTHAL. *Z. Elektrochem.* **36**, 803–6(1930).—Electrometric

and indicator methods do not give identical results for H-ion concns. in solns. contg. neutral salts. In order to det. whether the soln. is affected by the H electrode, the p_H of buffered phosphate solns. contg. KCl was detd. colorimetrically before and after an e. m. f. measurement. A difference ranging from −0.08 to −0.14 was found, which is named the *hydrogen effect*. The *salt error* therefore consists of the H effect plus a *true salt error* which is the same for similar indicators, but varies with the cations of the soln. The H effect was traced to some action of the Pt-H_2 couple on the soln. Neither the electrometric nor the indicator method gives the true p_H of such solns. J. H. R.

The theory of alkaline copper solutions and of the biuret reaction. WILHELM TRAUBE AND GERDA GLAUBITT. *Ber.* **63B**, 2094–8(1930).—A mechanism is suggested to explain the fact that $Cu(OH)_2$ dissolves in a soln. contg. both an alkali and a polyhydroxy or a biuret-type compd. but it does not dissolve in a soln. of either separately. Biuret and dulcitol both form alkali salts of little stability and may be brought into soln. by means of an excess of alkali. When $Cu(OH)_2$ is also added, these compds. dissolve much more easily and form stable alkali-cupri-salts which can be isolated. Since the org. compds. showing such behavior are all capable of acting as weak acids, it is suggested that they dissolve in alkali as anions by dissocg. one or more hydrogens, and that the $Cu(OH)_2$ is able to combine with these anions (but not with the undissocd. substance) to form a complex of greater acid strength so that the degree of ionization is increased and the org. substance is brought entirely into soln. Guanylurea and biguanide are able to bind $Cu(OH)_2$ in the absence of added alkali because they contain both acidic imino and basic amino groups. There is thus a tendency toward inner salt formation and a consequent inner ionization or amphoteric ion formation, while as before, $Cu(OH)_2$ combines with the ion to strengthen the acid properties of the dissocd. H. Similarly glyceryltrimethylammonium hydroxide is able to bind $Cu(OH)_2$ without the addn. of alkali. New compds. whose isolation and analysis are reported are diphenyliodonium cupribiuret and the corresponding Ni biuret, Th cupri-biuret and Th Ni biuret. R. C. H.

Gaseous oxidations. I. Homogeneous uncatalyzed reaction between oxygen and acetylene. GEO. B. KISTIAKOWSKY AND SAM LENHER. *J. Am. Chem. Soc.* **52**, 3785–96(1930).—Expts. are described showing that thermal oxidation of C_2H_2 by O_2 can be studied in Pyrex vessels between 250° and 315°. Comparison of reaction rates in packed and unpacked vessels shows that the reaction is homogeneous and of the chain type. The oxidation proceeds through the stages $C_2H_2O_2$ (glyoxal), HCHO and HCOOH. The gaseous products are mainly CO, with CO_2 and H_2. CO comes mainly from decompn. of $C_2H_2O_2$, and CO_2 from oxidation or decompn. of HCOOH. The origin of H_2 is uncertain. The rate of reaction is proportional to $[C_2H_2]^x$ and is independent of O_2 concn. In packed vessels the homogeneous oxidation is almost entirely suppressed, and the rate of reaction is proportional to $[C_2H_2][O_2]$. The mechanism of the reaction is discussed. S. LENHER

The heat of activation of bimolecular gas reactions and the hydrogen-chlorine reaction. J. FRANCK AND E. RABINOWITSCH. *Z. Elektrochem.* **36**, 794–9(1930).—For most reactions of the type $A + BC = AB + C$ the heat of activation bears a relation to the collision radii and nuclear distances of the factors and products. This is confirmed in a discussion of the reactions $Cl + H_2 = HCl + H$, $H + Cl_2 = HCl + Cl$, $F + H_2 = FH + H$. Some expts. on the action of ICl on H-Cl mixts. are described. Suggestions are made concerning the action of water, and visible and ultra-violet light on the photochem. H-Cl reaction. J. B. AUSTIN

The role of the liquid stationary film in batch absorptions of gases. I. Absorptions involving no irreversible chemical reactions. HAROLD S. DAVIS AND GEO. S. CRANDALL. *J. Am. Chem. Soc.* **52**, 3757–68(1930).—The reality of the liquid stationary film, the thin unstirred layer, on the surface of liquids is emphasized. For water stirred underneath at 1000 revolutions per min., the thickness is about 0.0045 cm. The rates of soln. of O_2 and of CO_2 by water and of O_2 by tetrachloroethane were measured. The time necessary to establish a uniform O_2 gradient through the stationary film depends on the degree of agitation of the water. The absorption rate of liquids stirred without breaking the surface increases with the stirring but tends to a max. With shaking the absorption rates were simply proportional to the solubilities of the gases. **II. Absorptions involving irreversible chemical reactions.** *Ibid* 3769–85.—The liquid stationary film theory is extended to cases where rapid chem. reactions take place in the soln. A study was made of the rates of absorption of CO_2 by water and by solns. of NaOH and KOH and of the rates of absorption of several olefin gases by H_2SO_4, both at rest and stirred beneath its surface. The effects of the reaction products on the liquid film diffusion coeff. were studied. Temp. changes in the film are discussed. P. T. N.

The binary system: iron-boron and the structure of the iron boride, Fe_2B. FRANZ

WEVER AND ANTON MÜLLER. *Z. anorg. allgem. Chem.* **192**, 317–36(1930).—The equil. diagram for Fe-B is detd. on the basis of thermal, microscopic and röntgenographic studies. It belongs to the group of Fe binary systems with very limited range of γ-phase, which because of limited soly. does not lead to the formation of a closed γ-field. The α-Fe-B mixed crystals are formed on the pattern of ordinary at. substitution. A complete structural analysis is made of the boride Fe_4B_2. It belongs to the tetragonal scalenohedric space group V_D^{11}, with 2 mols. of Fe_4B_2 in the base. The Fe atoms take an 8 point arrangement with 2 degrees of freedom. The parameters are $m = 1/6$ and $p = 2/10$. The B atoms have a 2 point arrangement with no degrees of freedom. H. S.

Crystal structure, electric conductivity, thermal forces and tempering phenomena of the system silver-platinum in relation to the phase diagram. C. H. JOHANSSON AND J. O. LINDE. *Ann. Physik* **6**, 458–86(1930).—The various measurements confirm in general the diagram of Doerinckel (cf. *C. A.* **1**, 2873). The boundaries of the miscibility gap in the solid were carefully detd. Under about 750° there are indications of 3, possibly 4, homogeneous regions. J. B. AUSTIN

The sorption of hydrogen sulfide by potassium benzenesulfonate and a thiohydrate of this salt. WILLY LANGE AND GERHARD LEWIN. *Ber.* **63B**, 2156–63(1930). — Compds. of the compn. $(PhSO_3K)_4.H_2O$ (I), $(PhSO_3K)_2.H_2O$ (II) and $(PhSO_3K)_4.H_2S$ (III) were prepd. from $PhSO_3K$ (IV). When H_2O vapor comes into contact with IV at 15° the H_2O content rises gradually with the pressure p (at equil.) to 5 mm. Hg at a concn. c of 1/4 (*i. e.*, the solid contains 1/4 H_2O per mol. of IV); p rises abruptly to nearly 10 mm. where it remains const. until $c = 1/2$; above 11 mm. the mass liquefies. The transition from II to I is marked by a mol. vol. change, but that from I to IV is not. For II $d_4^{18} = 1.604$ and for IV $d_4^{18} = 1.576$. If H_2S is confined with IV at 0°, the c of H_2S in the solid phase rises with p gradually at first, then more rapidly, finally approaching $c = 1/4$ asymptotically. The isobar at $p = 760$ mm. also approaches $c = 1/4$ at temps. 10–20° above the b. p. of H_2S. OSCAR T. QUIMBY

New examples of homogeneous catalysis. K. CLUSIUS AND C. N. HINSHELWOOD. *Z. Elektrochem.* **36**, 748–50(1930); cf. *C. A.* **24**, 2663. S. LENHER

Contribution to the problem of absorption catalysis. M. BORN AND J. FRANCK. *Nachr. Ges. Wiss. Gottingen Math.-physik. Classe* **1930**, No. 1, 77–89.—A theoretical treatment, mainly in terms of the synthesis of hydrazine. J. H. REEDY

Complex catalysts. A. MITTASCH. *Z. Elektrochem.* **36**, 569–80(1930).—A historical review of the development of complex or mixed catalysts. The oxidation of NH_3 and the reaction of CO with H_2 to give MeOH are discussed. Many references are included. A. LLOYD TAYLOR

The mechanism of the catalytic oxidation of ammonia. A. v. NAGEL. *Z. Elektrochem.* **36**, 754–7(1930). Low-temp. oxidation of NH_3 on mixed (Mn-contg.) catalysts was studied. At high rates of flow the products are NO and N_2; at lower rates of flow NO falls off and N_2O appears and increases in amt. as the flow decreases. At 350° and a flow of 0.5 l./hr. 70% of the NH_3 goes to N_2O. The results are explained by assuming the intermediate HNO (cf. Bodenstein, *C. A.* **21**, 1871) in the reactions, $2HNO = N_2O + H_2O$ at low temp. and $HNO + O_2 \longrightarrow NO \longrightarrow HNO_3$. S. LENHER

The decomposition of nitrous oxide on glowing platinum. H. CASSEL AND E. GLÜCKAUF. *Z. physik. Chem.*, Abt. B, **9**, 427–36(1930).—Measurements are given of the decompn. of N_2O at pressures of 0.1 mm. in the temp. range 1000–1800° abs. with and without addn. of O and N. The log of the dissocn. const. is a linear function of $1/T$. The following heats are calcd.: $1/2O_2 = O_{ads} + 21{,}700$ cal. $N_2O_{ads} = N_2 + O_{ads} + 38{,}000$ cal. J. B. AUSTIN

Dissociation of gypsum in presence of catalysts. I. E. ADADUROV, D. E. DERIBAS AND P. YA. KRAINII. *Zhur. Prikladnoĭ Khim.* **3**, 509–31(1930).—According to the resonance theory catalysts with wave lengths 4114–2576 A. U. induce dissocn. of $CaSO_4$ into CaO and SO_3, while catalysts with wave lengths 2576–1546 A. U. cause dissocn. into SO_2, SO_3 and O_2 and those with wave length less than 1545 A. U. dissoc. into SO_2 and O_2, particularly at high temp. Expts. confirm this theory. Salts of Cs, Ag, Na and Hg excite Ca atom (Ag_2O and Na_2SO_4 were tried); salts of Ce, Mg and Li excite ($MgSO_4$ and CeO_2 were tried) and salts of Os, Zn, W and Au excite O (Zn and W salts were tried). Catalyts that excite both Ca and O atoms (Al, Cu, Ni, Mo and Bi salts) or Ca, S and O atoms (Fe, V, Cr, Co, Ba and Mn salts) were also studied. Expts. showed that by choosing proper catalysts at 600° the yield of SO_3 can be raised from 0.18 to 25.85% while the yield of SO_2 is kept as low as 0.54% (MnO_2 used as catalyst). Conclusions: When the wave lengths of an element and of the catalyzed substance are the same it is a sure indication that this element is a catalyst. The catalytic activity diminishes with

increase in the wave length. Each wave length has a definite min. temp. at which it begins to show its activity. Each wave must carry a sufficient amt. of energy to break up the mol. It is therefore possible to calc. not only the direction of a reaction and its character but also its approx. temp. conditions and the catalysts to be used. V. K.

Dissociation of carbon monoxide on cobalt. H. A. BAHR AND V. JESSEN. *Ber.* **63B,** 2226–37(1930).—Finely divided metallic Co does not dissoc. CO at 225°. The dissocn. of CO takes place on the Co combined with 9.24% C as Co_2C. At temps. above 225° Co_2C decomposes, giving free C. No evidence of other Co carbides than Co_2C is found. Co carbide prepd. from CO dissocn. on finely divided Co gives up its carbide C as CH_4 on treatment with H_2 at temps. as low as 240–250°, while the carbide prepd. from free C + finely divided Co forms CH_4 on reacting with H_2 above 400°. S. LENHER

Catalytic properties of rhenium. HANS TROPSCH AND ROBERT KASSLER. *Ber.* **63B,** 2149–51(1930).—Reduced Re and Re-Cu catalysts act as hydrogenating catalysts in the reactions $CO \longrightarrow CH_4$ and $C_2H_4 \longrightarrow C_2H_6$. At 470° Re carbide is formed by passing CO over a Re-Cu catalyst. S. LENHER

Nickel molybdenum catalysts for the synthesis of ammonia. E. KEUNECKE. *Z. Elektrochem.* **36,** 690–2(1930).—The activity toward NH_3 synthesis of Ni-Mo catalysts of varying compn. was detd. at 200 atm., 550° and a gas flow of 50 l. per hr. per g. of metal catalyst. Freshly reduced catalysts possess an activity increasing linearly from 0 to 10.5% NH_3 as the Mo content increases from 0 to 70%, the activity of catalysts with more than 70% Mo decreases with increasing Mo content, becoming 1.5% on pure Mo. Three weeks' operation reduces the activity of catalysts contg. from 0 to 62% Mo to zero, but increases the activity of those contg. 80–100% Mo. The nitride content of the catalysts after a few hrs.' use is proportional to the Mo content, being 8% for 100% Mo catalysts; after 3 weeks' use the catalysts contg. less than 62% Mo lose practically all of their N; those above 62% in Mo content retain increasing amts. of N, as the Mo content approaches 100%. From magnetic, x-ray and metallographic data the results indicate that in the mixts. studied Mo is the catalyst, the Ni-Mo formed being a promoter. Neither the compd NiMo corresponding to 62% Mo nor the mixed crystals contg. 0–62% Mo are active catalytically. P. H. EMMETT

The thermodynamic treatment of stationary states in non-isothermal systems. II. Corrections and additions. CARL WAGNER. *Ann. Physik* **6,** 370–90(1930); cf. *C. A.* **24,** 1276. J. B. AUSTIN

Specific heats and latent heat of fusion of ice. W. H. BARNES AND O. MAASS. *Can. J. Research* **3,** 205–13(1930).—With an improved adiabatic calorimeter, the heat capacities of ice and resulting water from initial temps. between 0° and −78.5° to a final temp. of +25.00° were measured to ±0.05% or better. The sp. heats of ice over the temp. range 0° to −80° were found and the latent heat of fusion of ice at 0° was calcd. from heat capacity detns. The heat capacity of ice per g. at 0° was found to be 104.45 cals. and by taking the av. heat capacity of H_2O between 0° and +25.00° as 1.0020 the heat capacity per g. of H_2O over this range is 25.05 cals. The latent heat of fusion of ice at 0° is therefore 104.45 − 25.05 = 79.40 cals. per g. J. W. SHIPLEY

Heat of dissociation of fluorine. H. v. WARTENBERG AND J. TAYLOR. *Nachr. Ges. Wiss. Göttingen Math.-physik. Classe* **1930,** No. 1, 119–23.—Franck (*Z. physik. Chem.* **120,** 144(1926)) has shown that with Cl_2, Br_2 and I_2 the difference (Δ) in A. U. between the max. in the absorption spectrum and the point of convergence into a continuous spectrum is a linear function of the at. wt. By extrapolating the values for Cl_2, Br_2 and I_2, Δ for F_2 is calcd. as 1570 A. U. The max. in the absorption spectrum of F_2 is 2850 ± 50 A. U. The convergence was computed from this to be 4420 ± 50 A. U., from which the heat of dissocn. of F_2 is calcd. as 63.5 ± 0.7 Cal. Mixts. of carefully dried H_2 and F_2 are non-reactive, even under the influence of ultra-violet light. A mechanism dissimilar to the chain reaction proposed for the reaction between H_2 and Cl_2 is therefore indicated. J. H. REEDY

Heats of solution of difficultly soluble electrolytes. II. Determination of the heat of solution of silver iodide at 25.0°. E. LANGE AND Z. SHIBATA. *Z. physik. Chem., Abt. A,* **149,** 465–71(1930); cf. *C. A.* **21,** 1916.—The heat of pptn. of AgI at 25° and 3 different concns. was detd. and the first heat of soln. L_0 calcd. $L_0 = -26.71 \pm .05$ Cal./mol. AgI. This value lies between the uncorr. heats of pptn. of Thomsen $F = 26.44$ at 18° and of Berthelot $F = 26.90$ Cal. at 15°. FRANK URBAN

Studies in the thermochemistry of the compounds occurring in the system CaO–Al_2O_3–SiO_2. IV. The heat of solution of tricalcium aluminate and its hydrates in hydrochloric acid. T. THORVALDSON, WELDON G. BROWN AND C. R. PEAKER. *J. Am. Chem. Soc.* **52,** 3927–36(1930); cf. *C. A.* **24,** 2369.—From the heats of soln. in HCl.-

$20H_2O$ and $200H_2O$, the heat of formation of tricalcium aluminate from CaO and Al_2O_3 is found to be 77 cal./g. at 20°; the heat of hydration to $6H_2O$ is 214 cal_{20} per g. at 20°. ARTHUR FLEISCHER

A method for the determination of the heat conductivity of metals, particularly at high temperatures. R. HOLM. *Wiss. Veröffentlich. Siemens-Konzern* 9, 300–11 (1930); cf. *C. A.* 24, 2342.—Following a discussion of the theory of the method, calcns. are made concerning the lateral heat loss by radiation and gaseous conduction and the establishment of temp. equil. in the requisite time. F. D. ROSSINI

Measurement of the heat conductivity of a platinum test piece in the temperature region 19–1020°. R. HOLM AND R. STÖRMER. *Wiss. Veröffentlich. Siemens-Konzern* 9, 312–22(1930).—For Pt, 99.95% pure, from 15° to 1020°, the sp. resistance, ρ, $= 1.048 \times 10^{-5}[1 + 3.695 \times 10^{-3}(t^{-15}) - 5.98 \times 10^{-7}(t - 15)^2 + 5.25 \times 10^{-11}(t - 15)^3]$; and the heat cond., k, $= 0.699[1 + 2.83 \times 10^{-4}(t - 19.5)]$. F. D. ROSSINI

Science Reports of the Tokyo Bunrika Daigaku (Tokyo University of Literature and Science). Section A. (*New journal.*) Published by the University, Koishikawa, Tokyo, Japan Vol. 1, No. 1 appeared Sept. 5, 1930.

National Central University, Science Reports. Series A: Physical Sciences. (*New journal.*) Published by the College of Science, National Central University, Nanking, China. Vol. 1, No. 1 appeared in April, 1930.

3—SUBATOMIC PHENOMENA AND RADIOCHEMISTRY

W. ALBERT NOYES, JR.

The principle of identity and the exclusion of quantum states. GILBERT N. LEWIS. *Phys. Rev.* 36, 1444–53(1930). BERNARD LEWIS

A determination of e/m for an electron by direct measurement of the velocity of cathode rays. CHARLOTTE T. PERRY AND E. L. CHAFFEE. *Phys. Rev.* 36, 904–18 (1930).—The velocity of cathode rays, driven by potentials of from 10,000 to 20,000 v. is measured directly by timing the passage of the electrons between 2 localized transverse high-frequency elec. fields 75 cm. apart. The mean value for e/m_0 is $(1.761 \pm 0.001) \times 10^7$ abs. e. m. u. This value is in agreement with the value obtained spectroscopically but does not agree with the most accurate previous value obtained for free electrons. A possible explanation for the latter is given. BERNARD LEWIS

The theory and calculation of screening constants. CARL ECKART. *Phys. Rev.* 36, 878–92(1930). BERNARD LEWIS

Permitted and forbidden quantum jumps. RUDOLF LADENBURG. *Z. Elektrochem.* 36, 631–40(1930).—A treatment of quantum transitions, including the "transition probability." A summary. WILLIAM E. VAUGHAN

Quantum theory of homeopolar bonds. W. HEITLER. *Z. Elektrochem.* 36, 640–1 (1930); cf. *C. A.* 24, 2040.—A few remarks are made on the application of quantum theory to nonpolar bondings. WILLIAM E. VAUGHAN

Note on the frequency shifts in dispersing media. G. BREIT AND E. O. SALANT. *Phys. Rev.* 36, 870–7(1930). BERNARD LEWIS

The potential and potential energy of space lattices. C. N. WALL. *Phys. Rev.* 36, 1243–50(1930). BERNARD LEWIS

The dielectric constant of helium. J. V. ATANASOFF. *Phys. Rev.* 36, 1232–42 (1930).—A theory is developed, extending the Ritz method which is applicable to perturbation problems to the dielec. const. of He. The dielec. const. is calcd. as $\epsilon = 1.0000685$ as compared with the accepted value $\epsilon = 1.00007$. BERNARD LEWIS

Modification of the absorption curve of cosmic rays in water by secondary radiation. L. TUVIM. *Compt. rend. acad. sci. union ré. soviét social.* 1927A, 371–4.—In German. Math. ALBERT L. HENNE

Radiation scattering by bound and free electrons, according to the Dirac relativity mechanics. I. WALLER *Z. Physik* 61, 837–51(1930); cf. *C. A.* 24, 5212.—Math. ALBERT L. HENNE

The use of the refraction of x-rays for the determination of the specific charge of the electron. H. E. STAUSS. *Phys. Rev.* 36, 1101–8(1930). BERNARD LEWIS

X-ray satellites. F. K. RICHTMYER AND L. S. TAYLOR. *Phys. Rev.* 36, 1044–9 (1930); cf. *C. A.* 24, 1027. BERNARD LEWIS

High-potential x-ray tube. C. C. LAURITSEN AND B. CASSEN. *Phys. Rev.* 36, 988–92(1930); cf. *C. A.* 24, 4454.—An account of development work on a high-potential

x-ray tube. Operation was possible for some hrs. at 600,000 v. with a space current of 3 to 4 ma. BERNARD LEWIS

Connection between chemical constitution and *K*-Röntgen absorption spectra. OTTO STELLING. *Z. Elektrochem.* **36**, 605–11(1930). W. F. MEGGERS

Energy of $K\alpha_3$ of copper as a function of applied voltage with the double-crystal spectrometer. JESSE W. M. DU MOND AND ARCHER HOYT. *Phys. Rev.* **36**, 799–809 (1930).—With a *specially designed* double-crystal spectrometer the following investigations were made for the purpose of detg. the origin of the satellite $K\alpha_3$ of Cu: (1) dependence of intensity of satellite $K\alpha_3$ of Cu on voltage with const. current; (2) dependence of intensity of parent line $K\alpha_1$ of Cu on voltage with const. current; (3) ratio of intensities of satellite to parent; (4) dependence of satellite intensity on current at const. voltage. Conclusions: (1) The satellite is excited at a voltage differing from the excitation voltage of the parent line by too small an amt. to be measured with certainty (less than 200 v.) (2) The ratio of intensities of α_1 to α_3 as estd. from the areas of the spectral line structure is about 1:120. (3) The intensity of the satellite $K\alpha_3$ of Cu is strictly proportional to the current at const. voltage. Richtmyer's "double jump" hypothesis remains tenable with these facts. A doublet structure in $K\alpha_3$ of Cu was observed (sepn. of components about 2 X. U.). BERNARD LEWIS

Precision measurements in the *K* and *L* series of Cu (29), Sn (50) and the elements from erbium (68) to rhenium (75). INA WENNERLOF. *Arkiv. Mat. Astron. Fysik* **22A**, No. 8, 1–20(1930).—Siegbahn's tube spectrometer, described by Larsson (*C. A.* **21**, 2606), was used to obtain the *K* and *L* series of the x-ray spectra of Cu, Sn, and the elements from Er to Re. The results for the wave lengths, in X units, are presented in comprehensive tables, and are quoted in many instances to 2 or 3 decimal places. For the $K\alpha_1$ line of Cu, *e. g.*, the value 1537.395 was obtained. C. C. KIESS

The atomic scattering powers of nickel, copper and iron for various wave lengths. RALPH W. G. WYCKOFF. *Phys. Rev.* **36**, 1116–20(1930). —Data obtained for the at. scattering powers for the atoms in Ni, Cu and Fe show that the scattering power of an atom passes through a min. at its *K* absorption limit and attains a max. at, or near, its "resonance" wave length. The at. *F* curves of the Ni atom in metallic Ni and in NiO are practically identical. BERNARD LEWIS

X-ray scattering coefficient as a function of wave length and atomic number. ERROL N. COADE. *Phys. Rev.* **36**, 1109–15(1930).—The mass scattering coeffs. for Au, Sn, Ag, Fe and C were compared with those of Al for wave lengths between 0.48 and 1.09 A. U. The scattered radiation was collected in an ionization chamber surrounding the scatterer on one side. The primary beam consisted of characteristic fluorescence radiation excited in radiators of Sn, Ag, Mo and Se by a water-cooled W tube. A table of ratios is given which may be transformed into abs. scattering coeffs. BERNARD LEWIS

An analysis of scattered x-rays with the double-crystal spectrometer. NEWELL S. GINGRICH. *Phys. Rev.* **36**, 1050–9(1930). BERNARD LEWIS

Some precision measurements in the soft x-ray region. M. SODERMAN. *Phil. Mag.* [7], **10**, 600–16(1930); cf. *C. A.* **23**, 1569.—The previous vacuum app. was improved for greater accuracy in adjusting and with new gratings with 300, 900 and 1800 lines per mm. The following wave lengths were detd. and are referred to Cu $L\alpha$ = 13.306 A. U.

Al	$K\beta$	7 952	±0 002 A. U.
Al	$K\alpha_{3,4}$	8 262	.002
Al	$K\alpha_{1,2}$	8 323	.002
Mg	$K\alpha_{3,4}$	9.799	.003
Mg	$K\alpha_{1,2}$	9 874	003
Na	$K\alpha$	11.885	.004
F	$K\alpha$	18 275	.007
O	$K\alpha$	23.567	02
N	$K\alpha$	31.557	.03
C	$K\alpha$	44.54	.04
B	$K\alpha$	67 71	.1
Be	$K\alpha$	115 7	.15

X-ray structure analysis. RUDOLF TANDLER. *Oesterr. Chem.-Ztg.* **33**, 153–7 (1930).—A review. ARTHUR FLEISCHER

The lattice constants of saturated fatty acids of high molecular weight along with the x-ray spectra of some lower elements in the *K* and *L* series. ADOLF KARLSSON. *Arkiv Mat Astron. Fysik.* **22A**, No. 9, 23 pp.(1930).—The lattice consts. for lauric MALCOLM DOLE

palmitic, stearic, laurostearic and cerotic acids, $Pb(C_{31}H_{61}O_2)_2$, $Pb(C_{32}H_{63}O_2)_2$ and Pb palmitate were measured with different x-ray radiations and after different methods of crystn. By means of these crystals, x-ray wave lengths in the *K* and *L* series were measured for the following elements: Zn, Cu, Ni, Co, Fe, Mn, Cr, V, Na, F, O and N. MALCOLM DOLE

Quantitative spectral analysis by means of x-rays. G. v. HEVESY. *Metallwirtschaft* **9**, 801–4(1930); cf. *C. A.* **24**, 1312.—A quant. measure of the intensity of x-ray emission lines enables analyses of substances to be made if addnl. elements are introduced for purposes of comparison. H. discusses the disturbing effect of foreign substances and gives a list of metals and comparison metals whose analyses are comparatively free of error. The detns. of Ti in iron meteorites, traces of Pb in Zn, K in soils, Cb and Ta in volcanic rocks are mentioned as examples. MALCOLM DOLE

The space distribution of x-ray photoelectrons from a solid film. LEWIS SIMONS. *Phil. Mag.* [7], **10**, 387–401(1930).—The distribution of the photoelectrons from a Au film 0.003 in. in thickness when bombarded by x-rays was detd. The results are in agreement with the probability law and the Einstein photoelec. law, which require not only that the max. velocity of ejection should be independent of direction, but also that all unscattered photoelectrons of minor velocities should have the same spatial distribution as the most rapid ones. ARTHUR FLEISCHER

An x-ray investigation of the lead-antimony alloys. D. SOLOMON AND W. MORRIS JONES. *Phil. Mag.* [7], **10**, 470–5(1930).—Pure Sb, Pb, an alloy 70% Sb and 30% Pb, and an alloy 80% Pb and 20% Sb prepd. by Stephens (*C. A.* **24**, 4199) were examd. by the powder method. From the lack of change in the at. diams. in the alloys, it is concluded that the solubilities do not exceed 0.5% by wt. ARTHUR FLEISCHER

Transverse resistance of the oxide-layer of glowing cathodes. JULIUS KROCZEK AND ERNST LÜBCKE. *Wiss. Veröffentlich. Siemens-Konzern* **9**, 252–61(1930).—The resistance encountered by the electrons in passing from the central wire of an oxide-coated cathode to the surface of the cathode was measured in terms of the resp. heating and cooling effects produced on emission of electrons. By establishing an energy balance, the work function was also detd. simultaneously with this transverse resistance. By using a Hg-vapor amplifier tube as a rectifier in connection with a. c., the Maxwellian distribution of electrons was measured. The transverse resistance of the oxide layer was found in all cases to be ohmic in character. Its magnitude depends largely upon the Ba content of the paste used in forming the cathode, and increases both with the thickness of the layer and with the diam. of the individual particles composing the paste. The sp. resistance appears to decrease with increasing temp. according to an exponential law. It seems to lie below the value hitherto found for BaO, probably because of the diffusion of atoms of the alkaline earth metals in the paste back from the surface to the central wire. The least value for the work function was found to be $\phi = 0.945$ v. W. W. STIFLER

Corona discharge in hydrogen. J. H. BRUCE. *Phil Mag.* [7], **10**, 476–80(1930); cf. *C. A.* **22**, 2319.—The starting potentials, potential to maintain current, and the relation between current and applied potential were detd. Some similarities to the case of the monatomic gases were found. ARTHUR FLEISCHER

Some problems of nuclear physics treated according to wave mechanics. A. C. BANERJI. *Phil. Mag.* [7], **10**, 450–64(1930); cf. *C. A.* **24**, 2373, 3164.—The previously developed law of force is applied to the calcn. of the γ-rays of Ra B, Ra C, Th C and C′, MsTh2, RdAct, Act X. In most cases good agreement with expt. is found. ARTHUR FLEISCHER

Note on the photographic counting of α-particles. J. C. JACOBSEN. *Phil. Mag.* [7], **10**, 413–6(1930). The photographic method may be used when the no. of particles is between 10 and 200 thousand per sq. mm. and when the velocity is greater than 0.3 times the velocity of α-particles from Ra C. The chief difficulty is fogging of the plates. ARTHUR FLEISCHER

The capture of electrons by swift α-particles. J. C. JACOBSEN. *Phil. Mag.* [7], **10**, 401–12(1930).—The capture of electrons was measured for H_2 and for air. The exptl. results for H_2 agree with the calcd. when the assumptions are made: (1) the probability of capture in H_2 may be neglected and (2) the equil. state between singly and doubly charged pos. α-particles is the same for mica and for air for the same velocity of α-particles. ARTHUR FLEISCHER

Abnormal shot effect of ions of tungstous and tungstic oxide. JOHN S. DONAL, JR. *Phys. Rev.* **36**, 1172–89(1930). BERNARD LEWIS

Current, pressure and frequency relationships for the initiation and maintenance of the electrodeless glow discharge. MILTON L. BRAUN. *Phys. Rev.* **36**, 1195–1203

(1930).—Crit. current and crit. pressure values for the initiation of a discharge and their relation to the excitation frequency have been investigated by means of the electrodeless glow discharge for H_2, O_2, CO_2 and N_2. The approx. center of the bend on the graph showing the relation between the current necessary to start the discharge and the pressure has been chosen as the crit. point. It was found (1) that the crit. current and crit. pressure vary as the square of the wave length; (2) that the ratio of the crit. current to the crit. pressure is const. for a given gas. The current necessary to maintain the glow was also investigated, and formulas were obtained expressing relationships between maintaining current, initiating current, wave length and pressure. B. L.

Discharge phenomena for slow ions. H. KALLMANN AND B. ROSEN. *Z. Elektrochem.* **36**, 748(1930); cf. *C. A.* **24**, 3707.—Slow ions moving through gases lose their charge if the neutralization energy of the ion nearly equals the ionization energy of the mol. For doubly charged ions, the discharge takes place when the resonance conditions are most favorable for both electrons. A method for detg. the ionization potential of unstable mols. consists in measuring the discharge in several gases. The most intense spectrum is found when the ionization potential of the unknown corresponds to the ionization energy of the known mols. Results for CN and C_2 are approx. 14 and 12 v., resp. G. M. MURPHY

Linear correction for cathode ray oscillograph. FREDERICK BEDELL AND JACKSON KUHN. *Phys. Rev.* **36**, 993–6(1930). BERNARD LEWIS

Heating of electrolytes in high-frequency fields. J. C. MCLENNAN AND A. C. BURTON. *Can. J. Research* **3**, 224–40(1930).—The heating of solns. of simple electrolytes of varying concns. when irradiated by short electromagnetic waves from 10 to 200 m. in length was measured. Solns. of HCl, LiCl, NaCl and KCl were used. No effect was shown with sugar solns., with liquid O_2 or liquid SO_2. Irradiated milk showed no difference in aging properties either of the pasteurized or unpasteurized product. The heating of electrolytes depends on the sp. cond. of the liquid and rises to a max. for a certain cond. The higher the frequency the more marked the max. The cond. at which the max. effect occurs is proportional to the frequency. The sp. cond., dielec. const. and frequency are connected by the law $2C/nK = 1$, where C = sp. cond. in abs. units, K = dielec. const. and n = frequency of wave. "Skin effect" was shown to be negligible, both theoretically and experimentally, for substances having low cond. and deep-seated heating effects were found with the radio waves used. The possibility of directed selective heating effects is suggested and illustrated by expts. on blood. The diclec. const. for water was detd. as 81.7 by use of the law $2C/nK = 1$. J. W. SHIPLEY

The inner lattice potential of natural and yellow sodium chloride. E. RUPP. *Z. Physik* **61**, 587–92(1930); cf. *C. A.* **24**, 1020.—Further expts. were performed on the reflection of electrons of different velocities from crystals of natural and yellow NaCl. The reflection maxima of the yellow NaCl occur at lower electron velocities than those of the natural NaCl. This corresponds to a higher inner lattice potential for the former. The change of lattice potential with coloration is related to the electron mobility within the crystal. Blue NaCl showed no reflection maxima. Synthetic NaCl showed maxima at the same electron velocities as the natural NaCl but of different intensities. P. T. NEWSOME

A method for separation of the barrier film photoelectric effect and the internal photoelectric effect of cells of crystalline semiconductors. H. KERSCHBAUM. *Naturwissenschaften* **18**, 832–3(1930).—Cryst. semiconductors such as Cu_2O show a considerable barrier film photoelec. effect (Duhme and Schottky *C. A.* **24**, 5614). The photoelec potential depends on the barrier resistance; the latter in turn on the d. c. potential applied to the film, decreasing with increase of pos. potential on the semiconductor. The same substances show an internal photoelec. effect which changes in direction by application of potential. A method is given for sep. measurement of both effects. Irradiation of a photoelec. cell of the material by intermittent light allows sep. measurement of the alternating photoelec. potential. A curve of the latter *vs.* applied const. potential shows a decrease with increasing potential (barrier effect predominates up to about 150 to 200 mv., where the barrier resistance, and hence its potential, practically disappear). Further increase of the d. c. potential applied gives again an increase in total photoelec. effect. A second set of curves of the alternating photoelec. effect *vs.* frequency of the exciting light at different potential levels brings out the inertia of the internal photoelec. effect as compared with the lack of inertia in the barrier effect. Up to a pos. potential of 160 mv. practically no inertia is found; from 160 mv. on, the inertia influence rises rapidly. For neg. potentials where the barrier resistance disappears slowly a noticeable inertia is only found below —1.78 v. B. J. C. VAN DER HORVEN

The absorption of slow hydrogen positive rays in hydrogen. ROBERT E. HOLZER. *Phys. Rev.* **36**, 1204–11(1930).—An *exptl. method is described* for studying the absorption of slow hydrogen pos. rays in H_2. The absorption coeffs. of H^+, H_2^+ and H_3^+ in H_2 were measured in the range between 60 and 850 v. BERNARD LEWIS

Thermal electron emission and thermal electromotive force. M. v. LAUE AND GÖSTA SILJEHOLM. *Naturwissenschaften* **18**, 764–5(1930).—During measurements of the thermal electron emission current of Fe it was found that near the A_3 transition point ($\beta-\gamma$ iron) ($T = 1183°$ abs.) a relation exists between this current and the thermal e. m. f. of Fe against Pt. It is shown that thermodynamically a relation can be derived: $e_{Pt\beta} - e_{Pt\gamma} = (R/C) \ln (i_\beta/i_\gamma)$ for e the thermal e. m. f., i the electron satn. current, the value of R/C being $3.8.10^{-5}$ for e in v. per degree. Log i_β/i_γ was measured at the transition point and found to be 0.33 ± 0.03. Hence $e_{Pt\beta} - e_{Pt\gamma} = 1.25.10^{-5}$ v. per degree, found by S. $1.2.10^{-5}$, by Burgess and Scott (*Bull. Bur. Standards* **14**, 15 (1918)) $0.9.10^{-5}$ v. per degree (± 30%). The agreement shows the validity of several of the theorems utilized. B. J. C. VAN DER HOEVEN

Distinction between contact-potential effects and true reflection coefficients for low-velocity electrons. H. E. FARNSWORTH AND V. H. GOERKE. *Phys. Rev.* **36**, 119–94 (1930). BERNARD LEWIS

The scattering of fast electrons by metals. I. The sensitivity of the Geiger point-discharge counter. CARL T. CHASE. *Phys. Rev.* **36**, 984–7(1930).—C. presents new information on the sensitivity of the Geiger point-discharge counter. **II. Polarization by double scattering at right angles.** *Ibid* 1060–5; cf. *C. A.* **24**, 1019. B. L.

The velocity distribution of secondary electrons from molybdenum. THEODORE SOLLER. *Phys. Rev.* **36**, 1212–20(1930). BERNARD LEWIS

Reflection of cadmium and zinc atoms from sodium chloride crystals. HAROLD A. ZAHL. *Phys. Rev.* **36**, 893–903(1930).—A specularly reflected beam of Zn atoms from a NaCl crystal was investigated (1) by measuring the velocity distribution of the atoms composing the specular beam; and (2) by examg. the specular beam after reflection from a second crystal. A difference in angle of 22.5° between the 2 crystals does not greatly reduce the intensity of the specular beam. It is concluded that if velocity selection or a space-grating type of reflection of Zn is present it is not very pronounced. Double-reflection expts. of Cd from NaCl crystals have been repeated and apparently evidence for both space and surface-grating phenomena has been found in certain cases. It is suggested that individual differences in crystals may be an important factor in causing these differences. BERNARD LEWIS

Angle and energy distribution of electrons scattered by helium, argon and hydrogen. J. HOWARD MCMILLEN. *Phys. Rev.* **36**, 1034–43(1930).—The distribution of electrons rebounding at definite angles from gas mols. was investigated. The following energy losses at several angles were identified in He: 21.12, 22.97 and 23.52 v. for a primary electron beam of 50 v.; 19.77 and 20.55 v. losses were not found. The no. of electrons rebounding without loss of energy was measured for different angles of rebound (7° to 60°) from A, He and H_2 mols., and for various energies (50 to 150 v.). A scattering curve was also obtained in He for 100 v. electrons that had lost 21.12 v. energy. In nearly all cases, the no. scattered decreased rapidly as the angle increased. The higher the energy of the electrons, the more rapidly did the no. fall off with increasing angle. The steepness of the curve increases as one goes from A to He to H_2 for the slower electrons. For the faster electrons their curves are practically superposable. The results were compared with those of other observers and with the theoretical predictions of Mott, Mitchell and Sommerfeld. BERNARD LEWIS

The temperature radiation of non-metallic bodies, especially oxides. FRANZ SKAUPY AND GERHARD LIEBMANN. *Z. Elektrochem.* **36**, 784–6(1930); cf. *C. A.* **24**, 5222.—Lowering the grain size in a non-metallic body radiating selectively causes an increase in its absorptive power over the whole spectral region so that a fine-grained body has equal or better selectivity than a single crystal of the same material. Curves are given for Al_2O_3 and ThO_2. J. B. AUSTIN

Ionization potential of radon. F. HOLWECK AND L. WERTENSTEIN. *Nature* **126**, 433(1930).—Using a modified form of Hertz' method, the authors give curves for Kr, Xe and Rn, the ionization potentials being 13.3, 11.4 and 10.6 v., resp.; the latter were in good agreement with the value of 10.7 deduced by Rasmussen from spectral data. LOUIS WALDBAUER

Quantum transitions by collisions of the second kind. H. BEUTLER AND W. EISENSCHIMMEL. *Z. Elektrochem.* **36**, 746–7(1930).—For collisions between atoms in a singlet and triplet state, resp., the most probable result is that the multiplicity of the whole system remains unchanged. A weak discharge was passed through 3 mm. He,

satd. with Hg at room temp. (0.002 mm.) and Kr added from 0.004 to 0.5 mm. Measurements of the intensity of the emitted radiation show that the probability of excitation of the triplet states is greater than that of the singlet states by a factor of 15–30.
G. M. MURPHY

The theory of complex spectra. E. U. CONDON. *Phys. Rev.* **36**, 1121–33(1930).
BERNARD LEWIS

The structure of emission lines. FRANK HOYT. *Phys. Rev.* **36**, 860–70(1930).—A method for obtaining the *intensity distribution in a spectral line* is derived from Dirac's quantum theory of the radiation field. The calcns. are carried out for the case of emission from a first excited state (resonance line). A general method is also described for the treatment of radiation problems which is essentially Weyl's modification of Dirac's method.
BERNARD LEWIS

Remarks on the influence of self absorption on intensity measurements of spectral lines. R. MINKOVSKI. *Z. Physik* **63**, 188–97(1930); cf. *C. A* **24**, 1794.
W. F. MEGGERS

The hyperfine structures of some cadmium lines and the hypothesis of nuclear spin. C. L. ALBRIGHT. *Phys. Rev.* **36**, 847–54(1930).—Measurements have been made of the hyperfine structures of the Cd lines at 5086, 4800, 4678, 3614, 3613, 3610, 3468, 3466, 3404 and 6438 A. U.
BERNARD LEWIS

Fine structure in the singlet series of Hg. S. TOLANSKY. *Nature* **126**, 433–4(1930); cf. *C. A.* **24**, 5621.—Several lines show a complex structure. The 2 members of the series 6^1S_0-m^1P_1 have a sextet structure possibly due to an isotope effect. This is not the simple mass isotope effect, which would give much smaller max. sepns. than those observed.
LOUIS WALDBAUER

Applied spectroscopy. FRITZ LOEWE. *Pharm. Monatsh.* **11**, 200–3(1930); cf. *C. A.* **24**, 5222.—An address.
W. O. E

The appearance of "forbidden lines" in spectra. L. D. HUFF AND W. V. HOUSTON. *Phys. Rev.* **36**, 842–6(1930).
BERNARD LEWIS

The transition probabilities in the two first doublets of the principal series of cesium. R. MINKOVSKI AND W. MÜHLENBRUCH. *Z. Physik* **63**, 198–209(1930).—Measurements of the magnetic rotation of the plane of polarization in the vicinity of the lines show that the intensity ratio of the lines in the first doublet of the principal series is 2.1 ± 0.2, and in the second doublet it is 4.27 ± 0.12. The ratio of total intensity of the first doublet to that of the second is 69 ± 10. The abs. values of the intensities are $f_{1S-2P_{1/2}} = 0.32$; $f_{1S-2P_{3/2}} = 0.66$; $f_{1S-3P_{1/2}} = 0.00269$; $f_{1S-3P_{3/2}} = 0.0115$. The heat of vaporization of Cs in the temp. range 455° to 589° abs. is $(18{,}200 - 2.86T)$ cal.
W. F. MEGGERS

Some series in the extreme ultra-violet spark spectra of copper. F. C. CHALKLIN. *Phil. Mag.* [7], **10**, 711–21(1930); cf. *C. A.* **23**, 4884.—The Cu series in the soft x-ray region may be represented by the equation $A - b/n^2$ with $b = 2360$ and $A = 39.7$ v. For values of $n = 9$ to 13 there is a good comparison between theoretical and exptl. values.
ARTHUR FLEISCHER

Spectra of doubly and trebly ionized thallium. A. L. NARAYAN, P. PATTABHI AND A. S. RAO. *Nature* **126**, 434(1930).—A no. of terms of Tl III and Tl IV have been identified. The line intensities, term differences and interval ratios are of the right order.
LOUIS WALDBAUER

New lines in the arc and spark spectrum of helium. P. GERALD KRUGER. *Phys. Rev.* **36**, 855–9(1930).
BERNARD LEWIS

Spectrum of xenon in the ultra-violet (2700–1850 A. U.). GEORGES DÉJARDIN. *Ann. phys.* [10], **14**, 82–93(1930).—The spectrum of Xe, excited by means of an electrodeless discharge, was observed in the ultra-violet. The exptl. procedure and app. have been previously described (*C. A.* **22**, 726). The spectrum was found to consist of lines emitted by singly, doubly and trebly ionized atoms. The wave lengths which were measured, and of which more than 350 are new, extend from 2734 to 1873 A. U., and are presented in the tables together with the designation of their ionic origin.
C. C. KIESS

The arc spectrum of nitrogen. ERIK EKEFORS. *Z. Physik* **63**, 437–43(1930).—A discharge tube contg. N and He was used as a light source. The spectrum of N was photographed with a vacuum spectrograph of 1-m. radius and the wave lengths of 137 lines (1008.875 A. U. to 1889.056 A. U.) were measured. About half of the lines are classified as combinations of doublet or quartet terms. Intersystem combinations are found which fix the relative positions of all terms. The highest term is $(2p^2.np)^4S^\circ_{1/2} = 117{,}345$.
W. F. MEGGERS

The line spectra of ions in the solid state in the visible and ultra-violet regions of the spectrum. The absorption spectra of $GdBr_3 \cdot 6H_2O$ at room temperature and at that of liquid air, and their comparison with those of $GdCl_3 \cdot 6H_2O$. SIMON FREED AND FRANK H. SPEDDING. *J. Am. Chem. Soc.* **52**, 3747–56(1930).—The possibility of applying the quantum theory of the line spectra of gases to ions in the solid state suggested investigation of the spectra of rare earth ions. The absorption spectra of the crystal $GdBr_3.6H_2O$ were photographed with a quartz spectrograph, a H-discharge tube being used as a source of continuous spectrum. About 50 absorption lines are found between 2441 and 3110 A. U.; even at room temp. these lines are extremely sharp. There is complete parallelism between spectra of $GdBr_3 \cdot 6H_2O$ and $GdCl_3 \cdot 6H_2O$ (cf. *C. A.* **24**, 1023). The displacement toward the red and the greater sepn. in the former can be related to the greater deformability of the Br ion. W. F. MEGGERS

Experimental results and aims of band investigation. R. MECKE. *Z. Elektrochem.* **36**, 589–96(1930). W. F. MEGGERS

Methods of interpreting and predicting molecular spectra. F. HUND. *Z. Elektrochem.* **36**, 596–9; *Physik. Z.* **31**, 876–80(1930). W. F. MEGGERS

The spectra of solidified gases and their theoretical atomic meaning. L. VEGARD. *Ann. Physik* [5], **6**, 487–544(1930).—Results of work during 6 years on the spectra of solidified gases in liquid H_2 and He with special reference to the spectra of N_2 and N_2-rare gas mixts. are given. Excitation was by means of cathode rays from 100 to 30,000 v. and canal rays. Doublet and triplet lines, sharp and diffuse bands compose 6 series that are considered in detail. Intensity distributions are discussed in connection with the theory of Condon. The emitters are solid α-N_2 and NO, dissocn. energy and values being calcd. for the electronic transitions and for the vibrational const. The energy levels are detd. by comparison with the Mg^+ spectrum for N_2 and with the Al^{++} spectrum for NO. The solid N_2 states are compared with those for gaseous N_2. G. M. MURPHY

The interpretation of a type of diffuse band spectra. HEINRICH KUHN. *Z. Physik* **63**, 458–76(1930).—Besides the predissocn. spectra first observed by V. Henri there is still another type of diffuse bands having a different appearance and a different explanation. The general features are, in addn. to absence of band heads, the occurrence of only a single progression of bands as if only the initial or the final term had different vibration states; the interval between bands is often greater than the largest vibration quantum of the mol.; the interval between bands decreases abnormally rapidly and the bands become narrower. The spectra which result from the combination of a firmly bound mol. state with a loosely bound state are considered and it appears that the Franck-Condon principle in consequence of the flatness of one of the potential curves leads to a general explanation of the diffuse bands. The diffuse bands of Tll, AgI, AgBr, Hg_2 and I_2 are discussed and interpreted. W. F. MEGGERS

Evidence from band spectra of the existence of carbon isotope of mass 13. ARTHUR S. KING AND RAYMOND T. BIRGE. *Astrophys. J.* **72**, 19–40(1930).—Evidence of the existence of this isotope, C^{13}, appeared first in a faint band structure with head at 4744.5 A. U., showing on elec.-furnace spectrograms in which the Swan band at 4737 A. U. was of high intensity (cf. *C. A.* **23**, 4879). The quantum theory of band spectra showed that the band at 4744.5 A. U. was due to a $C^{13}C^{12}$mol., the emitter of 4737 A. U. being a $C^{12}C^{13}$ mol. Further exptl. work, together with examn. of older material, shows that C^{13} enters into mols. producing isotopic bands connected with the Swan band at 4383 A U., the cyanogen bands at 3883 and 3590 A. U. and the CO bands between 1200 and 1500 A. U. The relative abundance of C^{13} and C^{12}, estd. very roughly from photographic intensities of the bands, appears to be of the order 1:400. Such estimates are rendered uncertain, however, by an apparent dependence on the method of excitation. The furnace and other low-excitation sources, notably N-type stars, are very effective in emitting the C^{13} spectrum. In the arc the only evidence of C^{13} thus far is a group of lines in the cyanogen band at 3883 A. U. W. F. MEGGERS

Molecular ray experiments. The chemical activity of molecular and atomic oxygen. WORTH H. RODEBUSH AND W. A. NICHOLS, JR. *J. Am. Chem. Soc.* **52**, 3864–8(1930).—An exhaustive search failed to discover any surface with which a beam of O mols. will react to give a visible image. A beam of at. O appears to give the same product on reaction with MoO_3 as does a beam of at. H. The reaction is believed to be $3MoO_3 + O = Mo_3O_8 + O_2$. J. B. AUSTIN

Intensities in the spectra of diatomic molecules with uncoupling of the electron-orbit impulse. R. DE L. KRONIG AND Y. FUJIOKA. *Z. Physik* **63**, 168–74(1930).—The intensity relations in the spectra of diat. mols. are investigated theoretically for the case in which, on account of the rapid rotation of the nuclei, the orbital impulse of the electrons is no longer quantized on the line joining the nuclei. Band spectrum

analysis shows that this occurs in light mols. like H_2 or He_2. The theoretical results are compared with exptl. measurements in another paper (cf. following abstr.). W. F. M.

Intensities in He_2 bands with uncoupling of the electron-orbit impulse. Y. FUJIOKA. *Z. Physik* **63**, 175–87(1930).—Analysis of the He_2 spectrum has shown that for certain higher states of this mol. the electron-orbit impulse is not firmly coupled to the line joining the nuclei. The energy values then deviate from those given by a Deslandres formula, and the relative intensities are affected. A quant. theory of intensities in such a case is developed in another paper (cf. preceding abstr.). The present paper gives quant. intensity measurements in a considerable no. of bands in the single and triplet system of He_2; a satisfactory agreement with the theoretical predictions is found (cf. *C. A.* **23**, 1571). W. F. MEGGERS

The fine structure of helium as a test of the spin interaction of two electrons. G. BREIT. *Phys. Rev.* **36**, 383–97(1930). BERNARD LEWIS

The Zeeman effect in the ZnH and CdH bands. WILLIAM W. WATSON. *Phys. Rev.* **36**, 1134–43(1930). BERNARD LEWIS

Intensity measurements in the band spectrum of mercuric hydride. II. JOHANNA G. EYMERS. *Z. Physik* **63**, 396–401(1930).—In an earlier publication (Kapuscinski and Eymers, *C. A.* **23**, 3629) intensity measurements in 8 bands of the HgH spectrum were given. Results are now given for 3 addnl. bands designated as 4050, 4150 and 3647 A. U. W. F. MEGGERS

The origin of the bands in the spectrum of mercury vapor. S. MROZOWSKI. *Phys. Rev.* **36**, 1168–71(1930).—M. points out that the contradictions pointed out by Rollefson (*C. A.* **24**, 5228) do not exist and draws a no. of conclusions from the exptl. facts concerning the origin of absorption and emission bands in the spectrum of Hg vapor. A new observation is made of shaded absorption bands at 2267 and 2247 A. U. B. L.

Study of the continuous band spectra of mercury and zinc vapors. H. VOLKRINGER. *Ann. phys.* [10], **14**, 15–81(1930).—The vapors of Hg and Zn in fused quartz tubes were observed to emit continuous band spectra when excited by an electrodeless discharge. At low pressures ranging from that of the vapor at room temp. to that at 90°, a continuous spectrum appears in Hg extending from about 2000 A. U. to the red. Temp. changes do not affect the appearance of this spectrum. At higher pressures, up to that of the vapor at 120°, the continuous band undergoes a change in distribution of intensity, 2 max. appearing at 2537 and 2265 A. U. At pressures within the tube of 4 or 5 cm. the discharge excites a spectrum consisting of arc lines, several narrow bands, and a broad band beginning sharply at the resonance line of Hg I and extending to the red. The distribution of intensity within the bands obtained from microphotometer measurements is shown by means of curves. Similar results obtained with Zn vapor are also described in detail but have been reported previously (*C. A.* **24**, 1290). C. C. KIESS

The structure of the absorption bands of tellurium. A. PRZEBORSKI. *Z. Physik* **63**, 280–6(1930).—Two series of absorption bands characteristic of Te_2 mols. are photographed by sending white light through a quartz tube 1 m. long contg. Te heated to 450° or 550° in an elec. furnace. The bands extend between 5393 and 5405 A. U. and between 5357 and 5368 A. U.; their convergence limits are extrapolated to 5364.7 and 5336.2 A. U., resp. In the normal state the moment of inertia of the Te_2 mol. is calcd. to be 8.63×10^{-38} g. sq. cm., and the distance between atoms is 2.87×10^{-8} cm. W. F. MEGGERS

Canal ray and electron excitation of the band spectrum of nitrogen. H. D. SMYTH AND E. G. F. ARNOTT. *Phys. Rev.* **36**, 1023–33(1930). BERNARD LEWIS

Theory of the Raman effect. E. AMALDI AND E. SEGRÈ. *Atti accad. Lincei* [6], **9**, 407–9(1929); cf. *C. A.* **24**, 2040. E. J. C.

Raman spectra under high dispersion. W. M. DABADGHAO. *Indian J. Physics* **5**, 207–17(1930).—A Hilger E_1 spectrograph was used to photograph the Raman spectra of C_6H_6, $CHCl_3$ and CCl_4. The results obtained for the shifted lines are presented in tables in comparison with those by other investigators. In addn. to the greater precision attained in the wave lengths the higher dispersion of the spectrograph enables other features of the Raman spectrum to be observed, *e. g.*, the winged nebulosity accompanying the unmodified lines. C. C. KIESS

Raman spectra of the mercaptans. S. VENKATESWARAN. *Indian J. Physics* **5**, 219–36; *Nature* **126**, 434(1930).—The Raman spectra of the following mercaptans were excited by various Hg lines: Me, Et, Pr, Bu, isobutyl, isoamyl and Ph. The results of the observations are presented in detail in the tables. It is seen that all exhibit the frequency shifts 2573, 739 and 657, in common, of which the former is attributed to the SH oscillation, and the two latter to the oscillations of the CS group. The 2573

shift has been observed in H_2S also. It is analogous to the 3400 cm.$^{-1}$ shift of OH, which, however, has been observed only in H_2O and CH_3OH but not in the higher alcs. C. C. KIESS

Raman spectral of crystalline inorganic chlorides. P. KRISHNAMURTI. *Indian J. Physics* 5, 113–28(1930).—The method devised for observing the Raman spectra of the inorg. nitrates (*C. A.* 24, 3439) has been applied to the inorg. halides. The details of the investigation are tabulated. It was found that the chlorides of strongly electro-pos. elements do not show Raman lines, whereas those of the non-metals and metalloids do. The compds. showing the effect are either non-conductors or feeble conductors. Good conductors do not show the effect at all. The observations lead to the conclusion that covalent bonds are necessary for the Raman effect, compds. in which only electrovalent bonds are present failing to exhibit the effect. C. C. K.

Interpretation of Raman spectra: some aliphatic amines and alcohols. S. VENKATESWARAN AND S. BHAGAVANTAM. *Indian J. Physics* 5, 129–43(1930).—The results obtained in a study of the Raman effect of some lower members of the aliphatic amines and of some of the alcs. are presented in detail. $MeNH_2$, $EtNH_2$ and Et_3N all exhibit a Raman line at $\Delta\nu$ = 1050 cm.$^{-1}$ which is attributed to the C—N linkage. $MeNH_2$ and $EtNH_2$ also have a frequency of about 3300, absent in triethylamine, which is attributed to the N—H linkage. The alcs. and fatty acids exhibit 3 frequencies in common about 1050, 1250 and 1360 cm.$^{-1}$ which are attributed to the $-\overset{|}{\underset{|}{C}}-OH$ group, while the $-\overset{O}{\overset{\|}{C}}-$ group in the fatty acids is responsible for the frequencies 600 and 1700 which are not present in the alcs. Comparison of the paraffins with the alcs. and acids reveals a common frequency of 900 due to the C—C linkage, the line showing structure with increasing complexity of the C chain. C. C. KIESS

Raman effect in some organo-metallic and heterocyclic compounds. S. VENKATESWARAN. *Indian J. Physics* 5, 145–58(1930).—Observations of the Raman effect for $Zn(CH_3)_2$, $Zn(C_2H_5)_2$, C_4H_4S and C_4H_4NH are presented in detail. The 2 org.-metallic compds. exhibit 5 frequencies in common, of which 2 are attributed to the C—H linkage and the other 3 to the oscillations between the org. and metal groups. $Zn(C_2H_5)_2$ exhibits 2 addnl. frequencies, not present in $Zn(CH_3)_2$, which are attributed to the C chain. Although C_4H_4S and C_4H_4NH exhibit many Raman lines only one of frequency 1374 appears to be common to both and is attributed to the C=C linkage. Other frequencies of both compds. are traced to the oscillations of the C—H linkage. A study of the polarization of the Raman lines shows that those which are well polarized are also the most intense. C. C. KIESS

The intensities of the lines in Raman spectra. S. C. SIRKAR. *Indian J. Physics* 5, 159–68(1930).—A method of photographic photometry was used to measure the relative intensities of the displaced and undisplaced lines in the spectrum scattered by CCl_4. It was found that for all the shifted lines taken together the ratio of the intensity to that of the undisplaced line is about 1/150. For the Raman lines scattered by the Hg lines 3132 and 4046 A. U. compared with those scattered by 4358 A. U. the intensities were found to be 1.38 and 1.17 times, resp., those required by Rayleigh's 4th-power law. C. C. KIESS

Relation of Raman effect to crystal structure and properties of diamond. S. BHAGAVANTAM. *Indian J. Physics* 5, 169–82(1930); cf. *C. A.* 24, 4987.—The Raman line scattered by diamond corresponds to a frequency shift of 1331.9 cm.$^{-1}$. In addn. there is present in the scattered spectrum a system of 3 bands at 4131, 4157 and 4174 A. U., which do not represent a Raman transition, and a continuous spectrum extending from 4240 A. U. to the red. Regarding each atom in the crystal as in tetrahedral relationship to its neighbors and capable of oscillation with respect to the rest of the lattice, calcn. shows that there are 4 fundamental oscillation frequencies with wave nos. 440, 780, 1306 and 1750, of which the 3rd is in approx. agreement with the observed Raman shift. This is attributed to the vibration of the central C atom within the tetrahedron. C. C.

Raman effect in some crystalline inorganic sulfates. Influence of paramagnetis on Raman lines. P. KRISHNAMURTI. *Indian J. Physics* 5, 183–91(1930).—The powder method (*C. A.* 24, 3439) was used to observe the Raman spectra of 15 inorg. sulfates, the exciting line being Hg 4358 A. U. In all cases except ferrous and Ni sulfates a shifted line was observed at $\Delta\nu$ = 985 cm.$^{-1}$ corresponding to an infra-red line at 10μ. Many of the sulfates also showed shifted lines corresponding to 9, 16 and 22μ. The 2 sulfates in which the 10μ line is weak are both strongly paramagnetic. Those

in which 10μ is strong are diamagnetic. The intrinsic magnetic field due to the cation is apparently responsible for the weakness or absence of the 10μ line. It was found that for sulfates with cations in the same group in the periodic table there was a shift in the position of the 10μ line with change in ionic size when similarly hydrated.
C. C. KIESS

Raman spectra of inorganic sulfates and nitrates. C. RAMASWAMY. *Indian J. Physics* **5**, 193–206(1930).—The Raman spectra of aq. solns. of inorg. sulfates showed wave no. shifts 457, 617, 981 and 1102 cm.$^{-1}$, attributable to the sulfate ion. Aq. solns. of inorg. nitrates gave the shifts 726, 1048 and 1357 cm.$^{-1}$, attributable to the nitrate ion. The 4 frequencies observed for the sulfate ion are fundamental oscillations of which 2 are active and have been observed in infra-red spectra. Two of the frequencies observed for nitrate correspond to active oscillations of the group and have been observed in infra-red spectra. The appearance of the inactive oscillations of the ions as strong lines in Raman spectra is attributed to the high statistical wt. of that transition which involves no change in the elec. moment after the excitation process.
C. C. KIESS

Raman spectrum of dioxane. D. S. VILLARS. *J. Am. Chem. Soc.* **52**, 4612–3 (1930).—Values are given in tabular form.
C. J. WEST

The propagation of luminosity in discharge tubes. J. W. BEAMS. *Phys. Rev.* **36**, 997–1001(1930).
BERNARD LEWIS

Calibration of standard lamps for relative and absolute measurements. L. S. ORNSTEIN, D. VERMEULEN AND E. F. M. VAN DER HELD. *J Optical Soc. Am.* **20**, 573–84(1930).—Descriptions of 2 methods are given: (1) the photographic, which is independent of temp. measurement, and (2) pyrometric, made by means of a pyrometer. Agreement of 1–2% is obtained by the methods in the spectral region 7000–4000 A. U. Both systems are discussed in some detail, with especial emphasis on exptl. details.
WILLIAM E. VAUGHAN

Kinetics of the thermal transformation of para-hydrogen. A. FARKAS. *Z. Elektrochem.* **36**, 782–4(1930).—H_2 contg. 48% para-H was passed into a quartz vessel contained in an elec. furnace. As the surface of the vessel had no effect, the reaction is homogeneous; the time required for the same percent inversion is inversely proportional to the square root of the pressure, which corresponds to the mechanism: $H_2^p + H \rightleftarrows H_2^o + H$, where H_2^p and H_2^o correspond to para- and ortho-H mols. and H to atoms from thermal dissocn. The mechanism may be pictured thus: a H mol. collides with a H atom. In certain collisions, the H atom changes places with one of the H atoms in the mol. In this way ortho- and para-H_2 are formed in the ratio of 3:1. From the collision yield, the heat of activation of the reaction was calcd. as 11,000 cal. From the temp. coeff. of the reaction, the value is 4200 cal., a value considered as being in fair agreement, considering that the main effect of the increase of speed of reaction with temp. is due to the great increase in H atom concn., while increase in collision yield due to the relatively small heat of activation has only a small effect on the velocity.
LOUIS WALDBAUER

Action of high-speed electrons on methane, oxygen and carbon monoxide. J. C. MCLENNAN AND J. V. S. GLASS. *Can. J. Research* **3**, 241–51(1930).—CH_4, CH_4-O_2 mixts., CO and CO-CO_2 mixts. were exposed to the action of x rays. CH_4 gave small quantities of H_2 and C_2H_6. While CH_4-O_2 mixts. gave as gaseous products CO, CO_2 and H_2 together with H_2O and HCOOH. The relative proportions of the products did not vary widely under a wide variation of conditions. The reaction was of the 1st order in respect to pressure. The rate of reaction increases linearly with the voltage up to a certain value after which it becomes nearly independent of the voltage. The action of cathode rays on CO produces CO_2 and a solid brown suboxide $(C_3O)_n$ very sol. in H_2O. Moist CO gave no solid and less CO_2, while CO-O_2 mixts. under the action of cathode rays gave CO_2. H_2O vapor retarded the reaction. For mixts. of the same compn. the reaction rate was proportional to the total pressure. For dry mixts. the product increases with the CO present; in moist mixts. it is much less and independent of the CO. A brief theory of the reactions is given.
J. W. SHIPLEY

Chemical action in the glow discharge. V. The oxidation of hydrogen. A. KEITH BREWER AND J. W. WESTHAVER. *J. Phys. Chem.* **34**, 2343–55(1930); *cf. C. A.* **24**, 5238.—The rate of synthesis of H_2O from H_2-O_2 mixts. has been studied in a glow discharge between pressures of 0.05 mm. and 35 mm. Between 7 mm. and 0.3 mm. the synthesis occurs predominantly in the neg. glow at a rate independent of the gas pressure. The max. rate of reaction at 3.5 mm. pressure occurs with a gas contg. 87.5% H_2 and 12.5% O_2. At pressures below 7 mm. the reaction is believed to be initiated entirely by H_2^+ ions, while at higher pressures, O_2^+ ions, N_2^+ ions and A^+ ions are

effective as reaction nuclei. An M/N ratio of 4 is obtained in the neg. glow. A proposed mechanism involving ionic clusters in the neg. glow and an ionic chain reaction in the pos. column is in agreement with the data obtained. PAUL H. EMMETT

New experimental determination of effective cross-sections for the quenching of mercury resonance radiation. M. W. ZEMANSKY. *Phys. Rev.* **36**, 919–34(1930).—The problem of the quenching of resonance radiation by foreign gases is treated on the basis of Milne's theory of diffusion of radiation extended to take account of (1) a collimated incident beam, (2) a finite emission line, (3) a finite absorption line and (4) impacts of the second kind; and a curve is obtained from which one can find the no. of impacts of the 2nd kind corresponding to any experimentally observed value of the quenching. The effect of metastable atoms is discussed and a theory of their behavior outlined. Measurements were made of the quenching of Hg resonance radiation and the effective cross-section for quenching was calcd. for the following gases: O_2, H_2, CO, NH_3, CO_2, H_2O, N_2, CH_4, C_2H_6, C_3H_8, C_4H_{10}, He and A. These values are tabulated together with those for depolarization of resonance radiation and for collision broadening. The quenching cross-section of CO, NH_3, CO_2, H_2O, N_2, CH_4, C_2H_6 and C_4H_{10} are shown to be connected with the difference between the energy of the transition $2^3P_1 \longrightarrow 2^3P_0$ and the vibrational energy of the mols. in qual. agreement with the theory of Kallmann and London. BERNARD LEWIS

The quenching of mercury resonance radiation. I. The saturated hydrocarbons. JOHN R. BATES. *J. Am. Chem. Soc.* **52**, 3825–32(1930).—The quenching of Hg resonance radiation by CH_4, C_2H_6, C_3H_8 and C_4H_{10} has been measured and values of the effective collision cross section have been calcd. CH_4 quenches to the metastable level. J. B. AUSTIN

The photochemical reaction between hydrogen and carbon monoxide in the presence of excited mercury atoms, and the optical identification of the reaction products. W. FRANKENBURGER. *Z. Elektrochem.* **36**, 757–69(1930); cf. *C. A.* **23**, 3206.—Mixts. of H_2 and CO react at ordinary temps. and pressures in the presence of Hg atoms optically excited by absorption of 2356 A. U. with the formation of HCHO and $(CHO)_2$. The yields vary with the purities of the reacting gases, their rates of flow, the compn. of the mixts. and temp. of the gases, as well as with the concn. of the Hg vapor, but reach optimum values. $\frac{\text{no. of aldehyde groups formed}}{\text{no. of absorbed quanta 2356 A. U.}} \sim 1$ to 1.5, depending on the source of the radiation (arc or hot cathode type of lamp). The reaction is not a chain reaction, but a reaction involving H atoms and HCO radicals, with the formation of HCHO and $(CHO)_2$ as proved by absorption spectra. The neg. temp. coeff. of the reaction is due to the low heat of formation of the radical HCO from H and CO (—4 cal.). I. J. P.

Photochemical sensitization in the ultra-violet. L. FARKAS, F. HABER AND P. HARTECK. *Z. Elektrochem.* 36, 711–4(1930); cf. *C. A.* **24**, 3173, 4711.—A summary of previous work. I. J. PATTON

Quenching of the fluorescence of nitrogen dioxide. WARREN P. BAXTER. *J. Am. Chem. Soc.* **52**, 3920–7(1930).—The intensity of fluorescence excited in NO_2 by the Hg lines at 4358 and 4047 A. U. has been detd. from 0.001 to 18 mm. NO_2 is very efficient as a quenching agent. Calcns. indicate a deactivational diam. approx. 10 times greater than kinetic theory values. CO_2, N, O and H show specificity in quenching. J. B. A.

The influence of drying on the photolysis of carbon dioxide. ALFRED COEHN AND THEODOR SPITTA. *Z. physik. Chem.*, Abt. B, **9**, 401–25(1930).—In confirmation of previous work (cf. *C. A.* 10, 2549) it is shown that ultra-violet light causes only 1% dissocn. in CO_2 dried over H_2SO_4, whereas, after a long flow over P_2O_5, 20% dissocn. is found. CO_2 formed from CO and O dried with liquid air gives only 1% dissocn., which rises to 10.5% when a very small quantity of moisture is added. A decompn. of 20% was cut to 5% by further drying. The optimum decompn. (at 300 mm.) appears to be about 20% and occurs when a little moisture is present. J. B. AUSTIN

Spectroscopic determination of the equilibrium between nitric acid, nitrogen monoxide and nitrogen dioxide. E. ABEL, H. SCHMID AND M. STEIN. *Z. Elektrochem.* **36**, 692–700(1930); cf. *C. A.* **24**, 3157. W. F. MEGGERS

Measurements of the fluorescence of cellulose acetate, cellulose nitrate and gelatin in ultra-violet light. JAMES G. MCNALLY AND WALDEMAR VANSELOW. *J. Am. Chem. Soc.* **52**, 3846–56(1930).—The intensity of fluorescence of cellulose nitrate and acetate films depends on the wave length of the exciting radiation and on the chem. compn. and micellar structure of the film. The intensity for acetone solns. of cellulose acetate is independent of the colloidal properties of the soln. A decrease in viscosity causes a decrease in intensity for gelatin solns. J. B. AUSTIN

Tribothermoluminescence. R. E. NYSWANDER AND BYRON E. COHN. *Phys. Rev.*

36, 1257–60(1930).—Light of low intensity is emitted when glass, certain crystals and frits are subjected to grinding. A polarization photometer was used to measure the light intensity quantitatively from particles of 20 to 200 mesh. The results show that the quantity of light emitted depends on the substance and its size and diminishes slowly with the time following grinding. The max. quantity of light emitted by ground common glass tubing took place when the linear dimensions of the av. mesh size fell between 0.015 cm. and 0.025 cm., resp. BERNARD LEWIS

The temperature radiation of uncolored oxides in the visible. GERHARD LIEBMANN. *Z. Physik* **63**, 404–36(1930).—A new simple method of pyrometric temp. measurement of bodies of unknown radiation characteristics is developed and compared with the earlier methods. To lay the foundations for this method the visible emissivity of a no. of uncolored oxides (Al_2O_3, MgO, BeO, ThO_2, Cr_2O_3) is investigated as to dependence on temp., wave length, grain size and emission angle. W. F. M.

New investigations of the extinction of calcium phosphores, with especial consideration of mixed phosphores. FRITZ BANDOW. *Ann. Physik* [5], **6**, 434–57(1930); cf. *C. A.* **23**, 3165.—Different methods of prepg. CaSBi-α-phosphores have little effect on the max. of the long-wave extinction; other properties change noticeably. Total amt. of light, distribution of centers and extinction were investigated for pure sulfide and oxide phosphores as well as oxide-sulfide mixts. G. M. MURPHY

Preparation of luminescent substances. N. F. ZHIROV. *Zhur. Prikladnoĭ Khim.* **3**, 675–80(1930); cf. *C. A.* **23**, 3624.—H_3BO_3 was purified by crystn. from concd. HNO_3 contg. H_2O_2. Luminophores are easily obtained and may be prepd. during the lecture hrs. Optimum concn. of fluorescein (activator) is 1:10,000. Below this optimum the spectrum shifts toward violet, while above this optimum it shifts toward red. Intensity increases until the optimum is reached but is unchanged for higher concns. of the activator. Triphenylmethane gives a weak yellow luminescence. Complex luminophores show no improvements in properties, probably because of differences in the structure of the fluorescent centers of sulfides and H_3BO_3. Phosphorescence of H_3BO_3 with fluorescein can be used as a qual. test for H_3BO_3. As little as 1/50 mg. of H_3BO_3 can be thus detected. These luminophores are characterized by their sensitivity to even weak sources of light. V. KALICHEVSKY

The evaluation of Röntgen film densograms by cross-sectional diascopy of metals and alloys (CLAUS) **9**. Photosensitivity and the periodic system of the elements (PAVOLINI) **2**. Dissociation of gypsum in presence of catalysts (ADADUROV, *et al.*) **2**. The structure of C_2H_2 on the basis of spectroscopic investigations (MECKE, HEDFELD) **10**.

Polished nickel deflector for ultra-violet rays. W. A. E. CROMBIE. Brit. 332,310, April 29, 1929. Structural features.

4—ELECTROCHEMISTRY

COLIN G. FINK

Electric resistance furnaces for the chemical industry. ERNST SCHMIDT. *Chem. Fabrik* **1930**, 409–10, 425–6.—The Wild-Barfield furnace for tempering C steels is described. J. H. MOORE

Electric smelting of sulfur-rich ores. AXEL WEIJNARTH. *Medd. Sveriges Kem. Ind.-Kontor* **13**, 85–103(1930).—An address on electrometallurgy. Tables and graphs give the cond. of systems of sulfides and silicates at smelting temps. A. R. ROSE

Artificial atmospheres in electric furnaces. A. J. STRAIN. *Can. Chem. Met.* **14**, 290–2(1930).—A process has been developed which involves the complete or partial thermal decompn. of hydrocarbons with or without steam to produce mixts. having CO, H_2 and CO_2 as the main constituents. The relative quantities of gases in the mixt. will depend upon: (1) the hydrocarbon being treated; (2) the temp. to which it is heated; and (3) the amt. of steam used. The choice of raw material depends upon: (1) its availability; (2) the use to which the electrolene is to be put; and (3) its effects upon the final cost of the electrolene. The raw materials necessary for the production of electrolene are gas, steam and elec. energy. Twelve advantages claimed for the electrolene producer over all other com. app. are listed. Several tables and illustrations are included. W. H. BOYNTON

Electrolytic extraction of tin and copper from scrap bronze. O. SCARPA. *Bull. soc. franç. electriciens* **10**, 572–9(1930); *Chimie & industrie* **24**, 608(1930).—Scrap bronze

is melted and cast into plates which are used as sol. anodes in the electrolysis of a H_2SO_4 soln. of $CuSO_4$. In order to maintain the compn. of the electrolyte const., part of it is circulated continually through tanks where the colloidal Sn oxide is coagulated by heating. After decanting, the soln. is passed through a tower filled with Cu shot through which is also passed a current of air and steam, thus forming $CuSO_4$ again from the H_2SO_4 liberated by hydrolysis of $SnSO_4$. The $ZnSO_4$ and $FeSO_4$ which accumulate in the soln. interfere only when present in large quantities. Cu of 99.97% purity is obtained with a power consumption of 0.665 kw. hr. per kg. of Cu. The Sn sludge is treated with NaOH, the stannate soln. is treated chemically to remove Pb, Zn and Sb, and it is then electrolyzed giving a very pure spongy Sn, which only requires to be remelted.
A. PAPINEAU-COUTURE

Hydrogen overvoltage. I. Cathodic hydrogen evolution at low current density and the question of the least overvoltage. ERNST BAARS AND CARL KAYSER. *Z. Elektrochem.* **36**, 428–39(1930); cf. *C. A.* **24**, 4715.—Suitable app. is described for these measurements. Below a certain c. d. on certain metals the quantity of evolved H falls below that required by Faraday's law. This deficiency may be due to several factors such as soly., diffusion, convection, etc., but some may be dissolved in the electrode material. C. J. B.

The electrodeposition of nickel and chromium on zinc die castings. SAMUEL GORDON. *Metal Cleaning and Finishing* **2**, 765–6(1930).—In prepg. Zn die castings for Ni and Cr plating only such castings that are free from pin holes and will finish to a smooth, non-porous surface should be chosen. After being polished, the castings are cleaned electrolytically by immersion in any good cleaner for 15 sec. at about 65°. When rinsed in cold water they are flash plated in a brass soln. of the following compn.: water 1 gal., NaCN 4.5 oz., Cu cyanide 3 oz., $Zn(CN)_2$ 1 oz., Na_2CO_3 2 oz., aq. NH_3 1 qt. to each 100 gals. of soln. Ni may be plated directly on the non-porous metal, but it has been found that a light coat of brass prolongs the life of the finish. If Ni is plated directly, the castings should be cleaned and rinsed as before and then dipped in 20% HF. After being rinsed in water they are plated 4–5 min. at 26° in a Ni soln. of the following compn.: water 1 gal., single Ni salts 6 oz., double Ni salts 2 oz., NaCl 4 oz., $MgSO_4.7H_2O$ 2 oz., $Na_2SO_4.10H_2O$ 2 oz., H_3BO_3 1 oz. This soln. should have $p_H = 6.8$. The castings are then rinsed in cold and hot water, dried in sawdust, color buffed and are now ready for Cr plating. When wiped clean they are mounted on Cu racks and plated in the following Cr soln.: water 1 gal., CrO_3 48 oz., Fe chromate 1 oz., c. p. Na_2SO_4 0.5 oz. This bath is operated at 32° and a c. d. of 75 amp./sq. ft. of surface. A 3–5 min. plate is sufficient to insure lasting service. After being washed in cold and boiling water the castings are dried at 93° and color buffed. D. THUSSEN

The electrodeposition of chromium—practical difficulties and their obviation. J. W. CUTHBERTSON. *Chem. Trade J.* **87**, 371–2(1930); cf. *C. A.* **24**, 5640.—The prepn. of the work, the plating soln., hints on technic and the effect of base metal are reviewed. Electrolytic iron tanks with sides glass-lined and heated by gas burners from below are economical. The anodes should be Pb. The sulfate ratio of the vat is important. In bright chrome plating baths the ratio between CrO_3 and $Cr_2(SO_4)_3$ may be expressed in the form: $\frac{CrO_3 \text{ molarity}}{SO_4 \text{ normality}}$ = a factor, approx. 50. Motion of the article being plated appears to have little noticeable effect. W. H. BOYNTON

Researches on the electrodeposition of chromium. OSVALDO MACCHIA. *Chem. News* **141**, 1–7(1930); cf. *C. A.* **24**, 1582.—A bibliography and brief review of the various theories put forward to explain Cr deposition since Bartoli and Papasogli first mentioned it in 1883 are given. Most writers, it is pointed out, are unanimous in admitting the formation of a solid or colloidal film of oxide or hydroxide at the cathode. The aim of the present researches was to prove experimentally the existence of such a film at the cathode, and to expound better the phenomena which appear during the deposition of Cr. Results have been obtained (in the first part) which afford some proof of the variation of the thickness of the cathode film, and (in the second part) the relation existing between the quantity of sulfate ion present in the plating soln. and the thickness of the film. The exptl. conditions for the first part were 500 cc. soln. contg. 250 g./l. CrO_3 and 2.5 g./l. H_2SO_4; sheet Pb (contg. 6% Sb) circular anode, 2 mm. × 13 mm.; cathode, cylindrical Cu rod, 6 cm. long and 0.5 cm. diam. welded to Cu rod 2 mm. in diam. attached to an elec. motor for rotation. The expts. have confirmed the theory of the formation of a cathodic film. *E. g.*, with a c. d. of 12 amps./sq. cm. at 25° and a fixed cathode, the deposit was oxidized, but if the cathode was rotated sufficiently fast the deposit was bright: also, if the speed of rotation was less than 100 r. p. m. the deposit became less bright. Hence, the thickness of the film

around the cathode is not uniform but increases with the c. d. Further, at 25° with 5 amp./sq. cm. the deposit was bright, but at a c. d. of 12 amp./sq. cm. the deposit was oxidized. This, it is stated, makes it necessary to admit that in this last case the thickness of the cathodic film of H_2, or Cr oxide or hydroxide, solid or colloidal, is different and thicker, since the discharge of Cr ions is not obtained in such a way as to give bright deposits. Thus, there is a relationship between speed of rotation (and, therefore, thickness of film) and brightness. A table is given showing the type of deposit at various temps., c. ds. and speeds. Part II. A stationary cathode was used, temp. and c. d. were maintained const. and the sulfate content was varied by addns. of H_2SO_4. A table gives the relationships between c. d., g. H_2SO_4/l., ratio SO_4/CrO_3 and appearance of deposit. From the results obtained it is concluded that the thickness of the film is almost maintained const. when temp., bath compn. and c. d. are maintained const. When the sulfate ratio is greater than those given, the cathodic film is assumed to adsorb some of the sulfate ions, thus producing bright deposits. The formation of a dull deposit depends on the small thickness of the cathode film in relation to the greater quantity of sulfate ions which comes into contact with it during electrolysis; increasing c. d. increases the thickness of the film and, therefore, more sulfate ions are adsorbed, so that a bright deposit is thereby obtained. If the concn. of sulfate diminishes, then the deposit is duller, because of the insufficient quantity of sulfate ions coming into contact with the cathodic film, giving rise to the reactions by which a frosty deposit is formed: a decrease in c. d., and, therefore, in thickness of film, yields a bright deposit. The same hypothesis is used to explain the differences observed in the deposits with variation of temp. with const. CrO_3/H_2SO_4 ratio (a table of these results is also given). The brightness of Cr deposits depends on the thickness of the cathodic film, and on the quantity of sulfate ions present at a given temp. The thickness depends on c. d. and temp. since, with a rise in temp., it tends to become thinner. EDWARD B. SANIGAR

Basis for computations in electrolytic copper refining installations. HEINRICH WOHLWILL. *Metall u. Erz* **27**, 504–7(1930).—Comments upon an article under the same title by F. Vogel (*C. A.* **24**, 2675). H. STOERTZ

Electrolytic separation of the amino acids arginine and alanine. WALDERSEE HENDREY AND TREAT B. JOHNSON. *Biochem. Z.* **226**, 47–55(1930).—Good results are obtained with the aid of the 5 chamber electrodialysis app. and the control of the reaction of the medium by means of indicators. S. MORGULIS

Studies on the materials for the dry cell. I. II. SABURO MAKINO. *J. Soc. Chem. Ind.* (Japan) **33**, Suppl. binding 326(1930).—The e. m. f. and the capacity of the dry cell have no relation to the C content of graphite or C used. The difference of elec. resistance between the natural and artificial graphite on the market has little influence upon the e. m. f. and the capacity. The cell capacity has some definite relations to the grain size of MnO_2, to the relative quantity of the dioxide and graphite and to the rate of discharge. The electrode distance must be changed properly according to the rate of discharge. D. K. ALPERN

Study of light effects produced on electrodes during electrolysis. FRAYMANN. *Recherches inventions* **11**, 36–41(1930).—F. describes 3 types of luminous effects: (*a*) When an electrode is covered by a thin, insulating, insol. skin, the whole surface gives off a greenish yellow light of low intensity. This is especially noticeable in electrolytic rectifiers. Cathode and anode may give off light, depending on the nature of the electrolyte. F. describes the different effects obtained with Al as electrode in various electrolytes. (*b*) The second type is a continuous cathodic or anodic sparking obtained when heavy current densities are used through any kind of electrolyte. The sparking changes continually from place to place, and the color varies with the nature of the cathode. (*c*) The third type is a lilac light given on the surface of the cathode when heavy current passes through the electrodes. F. also describes the spectra of these lights and the app. used to obtain them. Numerous references are given. P. THOMASSET

The Wehnelt interrupter and crystal structure. SATYENDRA RAY. *Z. Elektrochem.* **36**, 425–7(1930).—A formula is developed. C. J. B.

Sphere electrodes under oil. J. L. MILLER. *Electrician* **105**, 254–5(1930).—Twenty-five impulses of 150,000 v. d. c. are impressed across 2 brass sphere electrodes immersed in transformer oil. With spheres 2.5 in. diam. having a 0.020 in. wall, indentations on both electrodes to a max. depth of 0.5 in. are obtained. The elec. energy content involved is less than 100 watt-sec. It appears that the distortion is due to rapid gas evolution as decompn. of the oil proceeds during the elec. discharge. The influence of elec. circuit parameters on the magnitude of the indentation is discussed. D. K. A.

Constant current obtained by electrolytic or thermoelectric methods. SATYENDRA

RAY. *Z. Elektrochem.* **36**, 425(1930).—A vertical tube (diam. not given) contg. $CuSO_4$ soln. (compn. not given) and equipped with Cu electrodes is connected to a galvanometer as for cond. measurements. Resistance up to 12,000 ohms was inserted in the circuit without modifying the potential between the electrodes. This potential is explained either electrochemically or electrothermally. C. J. B.

Space charges and spatial forces in insulation materials. P. BÖNING. *Z. tech. Physik* **11**, 373–6(1930).—From the general presence of colloidal particles in liquid insulating materials it is considered probable that free charges can occur in these fluids when exposed to an elec. field. Furthermore, because of the frictional resistance for the ions in the liquid (complementary ions and adsorbed boundary ions with attached colloidal particle (cf. *C. A.* **23**, 4147)) a hydrostatic pressure difference will occur at the electrodes relative to the surrounding liquid. This effect was studied, the present paper being a preliminary report. Of 2 parallel electrodes at 4 mm. distance in a glass vessel one was charged and the other one (measuring electrode) grounded. The latter had a —3 mm. hole in the center with attached glass manometer tube. Light transformer oil and gasoline were used as liquids, natural asphalt and colophonium being added to them as colloids. The potential used was 6000 v.; the temp. was 25°. For the pure oil only a slight difference in manometer height was observed; for gasoline none was observed on applying the potential. Addn. of the colloids previously dissolved in oil gave a pos. measuring electrode +12 mm. hydrostatic pressure (lasted 20 min.), for a neg. one +10 mm. (zero after 5 to 6 min.) with asphalt. For colophonium the resp. pressures were —3 mm. (after 20 min. —1/4 mm.) and +6 mm. (after 20 min. +5 mm.). Other solvents behaved in a similar way. Previously a study had been made of the behavior of colloidal charges on passing liquids through fibers (Diss., Braunschweig 1926); the relations found for the pos. asphalt and the neg. colophonium colloid are discussed in connection with the present effect. A few other observations on these liquids are given. On pouring an asphalt soln. in gasoline the mixing takes place very slowly; application of an elec. field causes rapid homogenization. In high-tension cables the proper field caused by the colloidal space charges in the cylindrical space between the 2 electrodes (insulating layer) will cause an enrichment of colloid (impregnation mass) outside the insulating paper layer. The simple equation for attraction of 2 electrodes does not hold when insulation with space charges is introduced between the 2. B. J. C. VAN DER HOEVEN

The measurement of high voltages, with special reference to the measurement of peak voltages. R. DAVIS, G. W. BOWDLER AND W. G. STANDRING. *J. Inst. Elec. Eng.* (London) **68**, 1222–30(1930).—Two methods of measuring peak voltage have been investigated. One method involves a condenser divider with the voltage on the low-voltage arm of the divider rectified. In the other the current through a condenser connected across the voltage to be measured is rectified, and the mean current so obtained is a measure of the peak voltage across the condenser. The accuracy of the methods is considered theoretically for different wave forms; results by the 2 methods are compared and the agreement is found to be about 2 parts in 1000 for peak loads up to 10^6 where suitable conditions exist and all necessary precautions are taken. W. H. BOYNTON

Electrical porcelain. I. J. K. GILLETT. *Electrician* **105**, 434–6(1930).—The mineralogical microscope makes it possible to det. the quality of the finished product and to predict its performance. The manuf. of porcelain insulators is outlined and a practical comparison of 2 com. bodies made. Glaze and porosity are shown to affect porcelain performance. W. H. BOYNTON

Recent developments in (incandescent) lamp manufacturing. J. A. JONES AND E. I. MORWICK. *Elec. News Eng.* **39**, 39–48(1930).—9 illus. C. G. F.

A method for studying the drying of paste in pocket lamp dry cells. HANS GRIMM. *Z. Elektrochem.* **36**, 427–8(1930).—The jacket contg. the C electrode and the depolarizer is stained by pressing it on a filter paper dusted with acetylene lamp-black; then it is pressed on a clean piece of filter paper. The impression which is produced on the clean paper is fixed by spraying with alc. shellac; it may then be planimetered to measure the light and dark areas to indicate the extent of drying. C. J. B.

Electricity in vessels in brewing (JAKOB) 16. Electricity in fermentation and storage vats (HALLERMANN) 16. Manufacture of chromic anhydride for electroplating (LAFIN, GOLTZ) 18. Alloys for electrical contacts (U. S. pat. 1,779,602) 9. Electric apparatus for dehydrating petroleum oils (U. S. pat. 1,779,695) 22. Electrophoretic deposition of rubber, etc. (Brit. pat. 331,563) 30. Openwork metal designs (Brit. pat. 331,856) 5. Electrodeposition of rubber (U. S. pat. 1,778, 841) 30.

Dry cell electric battery. CHARLES A. GILLINGHAM (to National Carbon Co.). U. S. 1,779,767, Oct. 28. Structural features.

Dry cell electric battery. J. M. HENDERSON (to Burgess Battery Co.). Brit. 331,467, Nov. 2, 1928. The dolly of the battery is coated with a compn. consisting of a fibrous material such as wood pulp, hair, asbestos or cotton linters mixed with a flake material such as graphite, mica or Al bronze and a colloid such as starch.

Forming dollies of electric dry cell batteries. H. A. BUMKE GES. and AUTOM SPEZIAL-MASCHINEN GES. Brit. 332,101, July 26, 1929. Mech. features. Brit. 332,103 (H. A. BUMKE GES.) also relates to manuf. of dry cell batteries with an electrode consisting of a carbon rod surrounded by depolarizer and provided with a protective coating such as collodion permeable to the electrolyte and describes app. for coating the electrodes.

Sheet zinc cups for electric batteries. A. GASSAN and P. RUCK. Brit. 331,650, May 22, 1929. Longitudinal joints of sheet Zn cups are formed by die-casting Zn or a more easily fusible metal electrically equiv. or inactive to Zn. Various structural details are described.

Electric battery electrodes. A. KUNZE. Brit. 332,155, Oct. 24, 1929. To secure a MnO_2 depolarizer contg. exciting salts to a C electrode, a small quantity of a resin such as coumarone resin is mixed with the depolarizer and the assembly of C rod and depolarizer is heated sufficiently to melt the resin without decompg. the depolarizer.

Electrodes for sea batteries for firing explosive mines. J. K. M. HARRISON. Brit. 332,233, March 9, 1930. Structural features.

Sea batteries for firing submarine mines. J. K. M. HARRISON. Brit. 332,265, March 9, 1929. The low voltage from a sea battery is converted to high voltage for firing a spark-gap detonator. Various details of elec. app. are described.

Porous metal articles such as storage-battery electrodes. I. G. FARBENIND. A.-G. Brit. 332,052, July 8, 1929. Metal powders such as Fe, Ni, Co or their mixts. are sintered at a relatively low temp. (suitably 500–700°) and then further sintered at a higher temp. (suitably 800–1200°) in a reducing or inert atm. or *in vacuo*. Other finely divided metals such as Cu or reducible oxides, hydrates, carbonates, etc., may be added.

Storage battery. WALTER E. HOLLAND (to Philadelphia Storage Battery Co.). U. S. 1,781, 640, Nov. 11.

Storage batteries. I. G. FARBENIND. A.-G. Brit. 331,540, Jan. 4, 1929. Electrodes comprise supports of porous iron, Ni, Co, Cd or ferroso-ferric oxide, the pores of which are filled with active material which may be introduced into the porous metal support by impregnating the latter with solns. of salts such as nitrates and heating. The walls of the pores in the support material may be preliminarily coated with a resistant metal such as Ni or Co before introduction of the active material, to prevent the electrolyte from attacking the support. Various details of manuf. are described. Cf. *C. A.* **24**, 3183.

Alkaline storage battery. JOHN F. MONNOT. U. S. 1,780,935, Nov. 11. Metal tubes of circular cross-section, for use in the pos. plates of alk. storage batteries, have a filling of alternate layers of Ni hydroxide and pieces of perforated Ni foil of larger area than the cross-section of the tube.

Hydrometer for testing electrolyte of storage batteries. LAWRENCE J. PEARSON (to Philadelphia Storage Battery Co.). U. S. 1,781,597, Nov. 11. Structural features.

Storage-battery separators formed of slitted material such as celluloid or ebonite. PAUL PAUTOU (to Soc. anon. des accumulateurs monoplaque). U. S. 1,779,286, Oct. 21. Structural features, relating to separators with slits having irregular walls to prevent their closure from coming together of the walls.

Electrodeposition of metals on wood, etc. I. AINSTEIN. Brit. 331,863, April 9, 1929. A surface of wood or other material is prepd. to receive an electrolytic deposit of metal by atomizing on it an alloy of easily fusible metals such as Pb, Sb, Bi, Sn and Zn, followed by a preliminary electroplating in a bath at a temp. of 10–30°, the main plating operation being carried out in a hot bath. The article may be preliminarily dipped in a sol. silicate soln. and its surface sanded and dried, and after the first treatment with metal may be given an intermediate treatment with Cu, bronze or brass.

Electrodeposition of metals of the platinum group. CHRISTIAN W. KEITEL (to Baker & Co.). U. S. 1,779,436, Oct. 28. In the deposition of Pt, Pd or Rh, metal deposited from the soln. is renewed by adding an amino nitrite of the metal while keeping the soln. ammoniacal.

Electrodeposition of platinum group metals. HERBERT E. ZSCHIEGNER (to Baker & Co.). U. S. 1,779,457, Oct. 28. An electrolyte for deposition of Pt, Pd or Rh com-

prises a heat-treated aq. soln. of a chloride of the metal and an excess of $NaNO_3$ contg. also an excess of NH_3.

Electrodeposition of zinc and other metals. U. C. TAINTON. Brit. 332,244, April 17, 1929. Mist or spray formation from $ZnSO_4$ solns. or other electrolytes is supressed by adding a small proportion of silicic acid and an org. compd. such as cresylic acid, stabilized rubber latex or saponin capable of forming a froth over the surface.

Chromium plating. WM. M. PHILLIPS (to General Motors Research Corp.). U. S. 1,780,535, Nov. 4. A bath contg. chromic acid as the principal substance in soln. and substantially free from other constituents tending to attack iron during the Cr deposition is used with an anode formed mainly of iron.

Chromium plating ferrous metals. VINCENT M. VERTUCCI. U. S. 1,780,213, Nov. 4. Metal such as iron or steel is heated to dull redness, cooled and immediately cleaned (suitably by HCl, NaOH and electrolysis in dil. H_2SO_4 soln.) to prepare it for Cr plating.

Two-toned finish on metal surfaces. MARVIN J. UDY. U. S. 1,780,212, Nov. 4. A portion of a surface is coated with a substance such as re-etching ink which retards the action of electrodeposition on such portion but is gradually removed during such action; the coated surface is immersed in an electroplating soln. such as one contg. chromic acid and a sulfate having an etching action on the metal during the period of retarded deposition and both the coated and uncoated portions are subjected to electroplating action which is continued until after the coating has become removed and both the coated and uncoated portions are electroplated.

Impregnating carbon electrodes for use in electrolysis of alkaline chlorides. OTTO A. LAUBI (to Bozel Maletra (Soc. industrielle de produits chimiques)). U. S. 1,779,242, Oct. 21. A partially halogenized hydrocarbon material such as a chlorinated paraffin is used as impregnating agent, in order to improve the durability of the electrodes.

Refining crude antimony electrolytically. HEINRICH ROSCHER (to Norddeutsche Affinerie). U. S. 1,780,944, Nov. 11. An electrolyte is prepd. with SbF_3 contg. about 100 g. free H_2SO_4 per l. and about 20 g. free HF per l., and there is introduced into this an Sb anode sol. in the electrolyte and contg. impurities such as Pb insol. in the electrolyte. The electrolyte is of such character as to prevent the anode from becoming passive, and Sb is deposited substantially without deposition of Pb.

Apparatus for measuring conductivity of electrolytes. A. SCHWARZ and B. LANGE. Brit. 332,240, April 15, 1929. An app. is described suitable for direct connection to a. c. lines and which may have a rectifier of the Cu oxide type.

Electrolytes for switches passing high currents. M. PAUL and P. WANGEMANN. Brit. 331,852, April 8, 1929. Currents such as those of about 5000 kilowatts are broken without production of an arc by the use of a good cond. acid or base of a cond. of at least 0.1 reciprocal ohms (preferably a 28% KOH soln.). Various details of construction are described.

Acetylene and hydrogen from methane by electric arc treatment. I. G. FARBENIND. A.-G. Brit. 332,057, July 12, 1929. In producing C_2H_2 and H from CH_4 or gases contg. the latter, gases remaining after whole or partial sepn. of the C_2H_2 are divided into 2 parts, one of which is mixed with fresh gases and the other further treated in a second arc or arc system. The process is preferably effected under slightly reduced pressure and various details and modifications of procedure are described.

Porous sheets for use in electrolytic cells, etc. I. G. FARBENIND. A.-G. Brit. 331,197, Jan. 24, 1929. A porous substance such as coarse raw kieselguhr is incorporated with polymerization products of butadiene and various other substances may be added such as S, ZnO, diphenylguanidine, naphthylamine and reënforcing fabric or metal network, and sheets of the material may be vulcanized.

Porous sheets for electrolytic cells, etc. I. G. FARBENIND. A.-G. Brit. 331,227, Jan. 24, 1929. A polymerization product of butadiene is mixed with a substance which yields a gas on heating or which can be dissolved out such as NaCl or Na_2CO_3 or $(NH_4)_2CO_3$ and porosity is subsequently produced by heating or dissolving out the added substances. Fillers, vulcanizing ingredients, etc., also may be added and the material may be vulcanized.

Electrolytic cell suitable for rectifying alternating currents. WALTER E. HOLLAND and LAWRENCE J. PEARSON (to Philadelphia Storage Battery Co.). U. S. 1,781,641, Nov. 11.

Alternating-current rectifier. HENRI G. ANDRE. U. S. 1,780,056, Oct. 28. A film-forming cathode such as ferro-Ni is used with a finely divided anode material such as Ag and a slightly ionizable liquid such as H_2SO_4 or H_3PO_4 from which the oxidation product carried by the cathode is derived. Various structural details are described. U. S. 1,780,057 describes the formation of a rectifier by placing one electrode about the

other, *e. g.*, a Ag wire helix around a rod of Ni alloy, immersing in a soln. such as H_2SO_4 to produce an oxidation product on one of the electrodes, passing elec. current through the rectifier to form a colloid, and removing excess soln.

Electric current rectifier of the mercury-vapor type. JOHANNES KUBLER and ERNST KOBEL. U. S. 1,781,286, Nov. 11. Structural features.

Mercury-vapor rectifier. LLOYD SMEDE (to Westinghouse Elec. & Mfg. Co.). U. S. 1,781,305, Nov. 11. Anodes are formed of a non-noble metal such as case-hardened iron which is not readily attacked by Hg vapor and which contains inclusions of materials of relatively great electron emissivity, as compared to iron, at the working temps., in the interior of the anodes, and carbides of the inclusions at the surface.

Ignition device for mercury-arc rectifiers. JULIUS JONAS (to Akt.-Ges. Brown, Boveri and Cie.). U. S. 1,781,330, Nov. 11. Structural features.

Cooling system for mercury-vapor high-vacuum pumps of rectifiers, etc. AKT.-GES. BROWN, BOVERI ET CIE. Brit. 331,446, Oct. 5, 1928.

Electrical condenser. ELLERY T. HOCH (to Bell Telephone Laboratories, Inc.). U. S. 1,780,917, Nov. 11. Layers of metal foil and paper are enclosed in a container with an impregnating and filling mixt. contg. petrolatum and "mineral beeswax" (a described petroleum wax resembling beeswax.)

Electrical condenser. SAMUEL RUBEN (to Ruben Patents Co.). U. S 1,781,033, Nov. 11. A dielectric for elec. condensers comprises a mixt. of finely divided cryst. TiO_2 and a viscous org. binder such as petroleum jelly.

Electric resistance annealing furnace. HIRSCH, KUPFER- UND MESSINGWERKE A.-G. Brit. 331,793, Dec. 15, 1928. Structural features.

Electric resistance furnace for annealing metals in a non-oxidizing atmosphere. C. F. KENWORTHY. Brit. 332,436, Jan. 14, 1929. Various structural details are described.

Electric tube resistance furnace suitable for heating metal billets. R. M. CATTERSON-SMITH. Brit. 332,015, June 7, 1929. Structural features. Brit. 332,016 also relates to an elec. furnace for heating billets and to mechanisms for conveying the billets.

Electric induction furnace. N. R. DAVIS and ASSOCIATED ELECTRICAL INDUSTRIES, LTD. Brit. 331,324, May 8, 1929. Structural features.

Electric induction furnace. N. R. DAVIS, M. J. MARCHBANKS, J. H. LUDLOW and ASSOCIATED ELECTRICAL INDUSTRIES, LTD. Brit. 332,325, May 8, 1929. Structural features.

Reductions in electric induction furnaces. W. B. HAMILTON and T. A. EVANS. Brit. 331,892, Feb. 5, 1929. Reductions such as those of chromite ore with ferro-Si are started by incorporating an elec. conductor or primer (such as Fe or Fe-Cr alloy) in the mixt. If Ni-Cr alloy is being prepd., Ni-Cr conductors are used. Various details of procedure are described.

Stirring and poking apparatus for electric furnaces. PAUL L. J. MIGUET (to Soc. électrométallurgique de Montricher). U. S. 1,778,809, Oct. 21. Structural features.

Resistance unit for electric heating apparatus. DAVID G. PETRIE (to Young, Osmond & Young Ltd.). U. S. 1,778,811, Oct. 21.

Electric heating elements. KOJYU NOGUCHI (to Mitsubishi Zosen Kabushiki Kaisha). U. S. 1,779,822, Oct. 28. In forming elec. heating elements having a compact filling composed mainly of alumina, powd. Al is mixed with powd. lime in the proportions of about 2 to 1, the space between an elec. heating element such as a wire and its metallic sheath is filled with this mixt., and water is added to effect conversion of the Al into Al_2O_3.

Apparatus for electrical precipitation of suspended particles from gases. H. V. WELCH and LODGE-COTTRELL, LTD. Brit. 331,699, July 11, 1929. Structural features.

Electrode vessel suitable for hydrogen-ion determinations. STANLEY L. HANDFORTH (to E. I. du Pont de Nemours & Co.). U. S. 1,779,232, Oct. 21. A reference cell and a NaCl cell are electrolytically connected by porous plugs. Various details of construction are described.

Device for detecting oxygen in hydrogen. GAYLORD W. PENNEY (to Westinghouse Elec. & Mfg. Co.). U. S. 1,778,834, Oct. 21. In app. such as H-cooled elec. app., an elec. fan is operated in a chamber contg. the H and infiltration of O into this chamber serves to increase the pressure of the gas and vary the quantity of power required to operate the fan. Various details of app. are described.

Electric hygrometer. W. LUBACH and E. GIESER (trading as Editenfra Editio Teuto-Franka). Brit. 332,135, Oct. 1, 1929. Structural features.

Gas-producer valve-control system, etc. C. MIEDBRODT. Brit. 332,097, Aug. 12, 1929. Elec. app. is described for operating a warning signal and closing all valves for

interrupting the operation of a producer when any of the valves fails to be correctly actuated in its proper order.

5—PHOTOGRAPHY

C. E. K. MEES

New type of pure light photograph. G. KÖGEL. *Phot. Korr.* **66**, 29(1930).—K. describes a new and theoretically interesting process in which the sensitive material is a colorless or nearly colorless compd., such as that obtained by fusing together ϕ-nitrophenylpropiolic acid and thiosinamine. This changes spontaneously in the dark to a dye, the change, however, being permanently prevented by an exposure to light. A direct positive picture, permanent in light, is thus possible, and without the need for development or fixing. E. R. BULLOCK

Photography on copper. C. J. SMITHELLS. *Nature* **126**, 133(1930).—A polished Cu or brass surface, after cleaning, is dipped into 10% $CuCl_2$ soln. for 10 sec. The thin white CuCl film is washed in H_2O, rinsed in alc., and air dried. Contact prints from ordinary negatives may be made by exposure of 1 min. to an arc lamp. The image is fixed by washing in dil. "hypo" or salt soln. Also in *Brit. J. Phot.* **77**, 461 (1930). ARTHUR FLEISCHER

Optical photographic properties of certain groups of sensitizing and desensitizing dyes of the cyanine and related series. O. BLOCH AND FRANCES M. HAMER. *Phot. J.* **70**, 374(1930).—The pseudocyanines derived from a no. of representative heterocyclic bases were compared optically and photographically with the corresponding styryls and anils (obtained by condensing the appropriate quaternary salts with *p*-dimethylaminobenzaldehyde and *p*-nitrosodimethylaniline, resp., although some of the cyanines show double-banded absorption, the styryls and the anils possess, as a rule, broad single bands, those of the anils being invariably nearer the red end of the spectrum than those of the corresponding styryls, while most of the cyanines have a band nearer the blue than the styryls. With some cyanines a change in the positions of the absorption bands according to the concns. of the solns. tested was observed. In related series, increase in mol. wt. produced, in most cases, a shift in the absorption bands toward the red, while in both the styryl and cyanine series there was no deviation from the general rule that the sensitizing band is situated nearer the red than the absorption band, the shift varying from 25 to 80 mμ. Since some sensitizers are also desensitizers, the anils (which usually desensitize powerfully) were tested over long exposures for possible sensitizing action, but none was found. Two cinnamylidene derivs. (obtained from *p*-dimethylaminocinnamaldehyde) were tested and one was a weak sensitizer, less powerful than the corresponding styryl, while the other had practically no photographic action. Both Me groups in 2, 4-dimethylquinoline may be made to react so as to give a distyryl and a dianil deriv. The former was of no value as a sensitizer. L. G. S. BROOKER

Desensitizing properties of basic scarlet N. FRANCES M. HAMER. *Phot. J.* **70**, 436(1930).—Basic scarlet N is shown to be a mixt. of a safranine with a chrysoidine, the 2 components having been sepd. When used in 1:5000 soln., its desensitizing action is at least equal to that of a safranine soln. of the same dilution, but, unlike the latter, it causes a slight destruction of the latent image. Since, moreover, the dye stains almost as much as safranine, it is not superior to the latter in practice. When used in a concn. of 1:1000 or 1:5000, the characteristic inhibiting influence of the chrysoidine on the rate of development becomes very apparent. L. G. S. BROOKER

Photographic significance of the reduction–oxidation cystine–cysteine system and analogous disulfide–sulfhydryl systems. A. STEIGMANN. *Phot. Korr.* **66**, 88(1930).—S. shows that (under certain conditions) cystine, acting presumably as a reducible S compd., is able to increase very considerably the sensitizing action of another S compd.; it thus appears to activate the H rather than the S of the latter. E. R. BULLOCK

Microscopic and ultramicroscopic studies of transverse sections of photographic layers. K. SCHAUM AND O. KLEIN. *Z. wiss. Phot.* **28**, 43–71(1930).—The technic of making the sections is fully described. The authors studied exposed and developed Ag grains along with unexposed AgBr, the depth action of aminophenol developer, intensified and reduced densities, resolving power, reversal phenomena and colloid colors in photographic layers in a series of excellent microscopic studies. A. P. H. T.

Halogen values of silver iodide emulsions: Their determination and photographic significance. H. H. SCHMIDT AND F. PRETSCHNER. *Z. wiss. Phot.* **28**, 111(1930).—

After HNO_3 treatment only I ions could be found in the filtrate of the AgI emulsions investigated. The emulsions were prepd. with excess of KI. The amt. of sol. iodide is detd. by the kind of emulsion and by the grain size, and differs considerably from what was previously found with AgBr emulsions. This shows that the photographic emulsion presents a very complicated picture and only detn. of the photographic properties together with chem. analyses can give fuller knowledge. A. P. H. TRIVELLI

Nomenclature of silver and halogen values in photographic layers. H. H. SCHMIDT AND F. PRETSCHNER. *Z. wiss. Phot.* **28**, 118(1930).—The authors criticize Weigert and Lühr's expression of "Ursilber" for the values of free Ag detd. in photographic emulsions. A. P. H. TRIVELLI

Stationary conditions in photographic materials. LÜPPO-CRAMER. *Phot. Ind.* **28**, 777(1930).—The author reviews previous work where increased exposure of photographic materials has yielded no increase or decrease in developed images. This stationary effect has been noticed in HgI_2-gelatin emulsion, in AgI-gelatin emulsion, and in AgBr-gelatin emulsion desensitized with phenosafranine and KBr. In this last case, the stationary condition may be the result of a fortuitous balancing of the primary exposure process with reversal. Expts. are given showing how reversal tendency depends on conditions of exposure and relative amts. of phenosafranine and bromide. C. E. MEULENDYKE

Nucleus denudation by alkalies and alkaline salts in the case of chromic acid-treated exposed silver halide plates. H. H. SCHMIDT. *Phot. Korr.* **66**, 68(1930).—Some large values for the nucleus denuding action of alkalies are recorded. Conclusion: The difference between the sensitivity and the development centers is not fundamental, but at most one of degree. E. R. BULLOCK

Avoidance of halation and solarization. K. HELLER. *Camera (Luzern)* **9**, 33 (1930).—The exposed plate is first given a protracted development in an oxidized partially exhausted glycine developer until the highlights appear. It is then given 35 to 45 seconds development in a warm (28° to 30°) caustic soda-pyrocatechol developer to bring out the shadows. H. claims that by this method plates having a brightness range of 1:1500 may be easily developed to give normal negatives. M. W. S.

Solarization. I. Influence of bromine ions on solarization. H. ARENS. *Z. wiss. Phot.* **28**, 91(1930).—Bromide increases solarization only if it is present during the exposure. Removal of the sol. bromide by $AgNO_3$ and removal of $AgNO_3$ by NaCl prevent solarization in a great no. of com. plates. Peptized AgBr shows a diminution of solarization after such treatment. Addn. of KBr immediately reinstitutes solarization. The resolving power in the solarization region of plates treated with $NaNO_3$ can be destroyed by KBr. **II. Dependence of solarization on the mode of preparation of photographic emulsions.** *Ibid* 98.—AgBr peptized in $AgNO_3$ solarizes less than AgBr peptized in KBr. Greater excess of KBr diminishes solarization. No relation could be found between solarization and grain size. Peptizing with NH_3 increases the solarization considerably. A. P. H. T.

Metallic silver in undeveloped photographic layers. I. F. WEIGERT AND F. LÜHR. *Z. wiss. Phot.* **27**, 312–37(1930).—The high "Ag values" of undeveloped photographic layers were regarded by the authors as metallic Ag. This was criticized by others. Therefore, a new method of fixing by $Na_2S_2O_3.5H_2O$ was worked out which practically removed all Ag otherwise left in the photographic layer. The "Ag values" were redetd. and gave slightly lower values than those previously obtained. Treatment with persulfate showed that the Ag values obtained were due to metallic Ag and not to Ag_2S. The relation between this analytically determinable amt. of free metallic Ag and the photographic properties are discussed. A. P. H. TRIVELLI

Gravimetric determination of excess of silver in photographic gels. H. H. SCHMIDT AND F. PRETSCHNER. *Z. wiss. Phot.* **28**, 30–4(1930).—This is a reply to the criticism of Arens and Jessien (*C. A.* **24**, 5649). The Ag values of photographic emulsions by the gravimetric method show that the excess of Ag (metallic Ag + organic Ag compds.) was originally present in the emulsion and is not formed during the action of HNO_3 by reduction of Ag halide. A. P. H. TRIVELLI

Chemical nature and the origin of relatively high silver values in silver chloride and a new method of determination and separation of the silver values by sedimentation. H. H. SCHMIDT AND F. PRETSCHNER. *Z. wiss. Phot.* **38**, 35–40(1930).—The Ag values are detd. after pptn. of the Ag halide by the addn. of alcohol or $K_2C_2O_4.H_2O$. The clear liquid above the ppt. is suitable for Ag detns. A very quick sedimentation because of liquefaction of the gelatin may be produced by addn. of sulfosalicylic acid. That part of the Ag which is sol. in Na_2SO_3 originates in the action of $AgNO_3$ on a

gelatin compd. and contains no nitrate group. The action of KCl on this Ag compd. is less pronounced than that of KBr and KI and is the source of fog in paper emulsions on longer development. Removal of this Ag compd. by chromic acid or by centrifuging removes the fog. Diminution of the Ag values from Cl to I is probably caused by the decreasing formation of organic Ag compds. It is very probable that the compd. which is formed by the action of $AgNO_3$ on gelatin is identical with the Ag value which is sol. in Na_2SO_3. A. P. H. TRIVELLI

Photolyses of some diazo compounds. W. SCHRÖTER. *Z. wiss. Phot.* **28**, 1–29 (1930).—The bleach and N detn. methods were employed on the diazo compd. (I) of 2-amino-1-naphthol-4-sulfonic acid and the diazo compd. (II) of *p*-aminodiphenylamine. Within wide limits the light action is independent of intensity and wave length, and of concn. and temp. of the soln. The quantum effect, γ, with wave length λ = 436mμ is $\gamma = 0.40 \pm 0.06$ for I, and $\gamma = 0.52 \pm 0.05$ for II detd. by the bleach method. The N method gave, for I, $\phi = 0.35 \pm 0.03$, and for II, $\phi = 0.20 \pm 0.02$. X-ray irradiation did not liberate N_2 in the solid substance I in spite of the fact that a noticeable change had taken place. The influence of acidity and the behavior of solvents such as EtOH and MeOH were investigated. The quantum effect on diazobenzenesulfonic acid and its Na salt was detd. by the N method, and was $\phi = 0.07$ to 0.1. A tentative hypothesis in explanation of the results is proposed. A. P. H. T.

The reversal of silver gelatino-bromide papers. L. LOBEL AND M. DUBOIS. *Chimie & industrie* Special No., 385–6(March, 1930).—Positives cannot be obtained directly on gelatino-bromide paper by the process used for the reversal of "Pathé Baby" films (complete darkening of the residual AgBr) because with most papers pure whites cannot be obtained after reversal. The treatment used for autochrome plates (*Agenda Lumière* 1929, p. 280) was found to give excellent results, and required only normal exposure (instead of over-exposure as in the other process), but the time required for developing is considerably longer to dissolve completely the excess of AgBr which is not required for the formation of the reversed image. A.P.-C.

The fate of the iodide in the development of bromo-iodide emulsions. M. L. DUNDON AND A. BALLARD. *Brit. J. Phot.* **77**, 90–1(1930).—A description is given of the probable course of the development of bromo-iodide emulsions whereby the sol. iodide liberated by development is redeposited on undeveloped AgBr grains. It was found that with partial exposure most of the iodide remains in the undeveloped portion of the emulsion but with full exposure it can be leached out into the developer. The small quantity of iodide which accumulates in a used developer is a very important factor in its decreased fogging action. M. L. DUNDON

The action of light on silver bromide. A. C. CHATTERJI AND P. S. MACMAHON. *J. Indian Chem. Soc.* **7**, 443–9(1930).—The absorption of O by AgCl has been studied to no small extent. Little work, however, has been carried on in the study of the absorption of O by AgBr. The authors found that, when pure, dry AgBr was sealed in a tube with O, and exposed to the tropical sunlight for long periods of time, absorption takes place in all cases to almost the same degree as that with AgCl. The amt. of absorption is dependent upon the exposed surface rather than the vol. of the AgBr. The darkened product contains O, and its formation is hastened by the presence of oxidizing agents. When dispersed Ag is formed by striking an arc in air, O and N, it is contaminated with oxide and nitrate. The dispersed Ag produced in air is capable of further oxidation when exposed to dry O. The photobromides formed are not due to the photochem. synthesis of an oxy. compd., but are due partly at least, to the direct absorption of O by the disperse Ag produced in the photochem. decompn. of the AgBr, resulting in a partial oxidation of the disperse Ag formed. W. VANSELOW

Deterioration of sulfite-hydroquinone solutions and the mode of activity of cold solutions. J. PINNOW. *Z. wiss. Phot.* **27**, 344–60(1930).—By careful oxidation with permanganate in H_2SO_4 soln. in the cold., α- and β-hydroquinonedisulfonic acid gave compds. which liberate, on boiling, oxalic acid and large amts. of sulfonic acid. A similar oxidation by air could explain the formation of the "complex compound" observed by Schilom and Fedotoff, which formed in solns. having no more developing power. The sulfite soln. in the developer is better protected against oxidation by a mixt. of α- and β-hydroquinonedisulfonate than by hydroquinone. A. P. H. TRIVELLI

Destruction and intensification of the image during bright light development. LÜPPO-CRAMER. *Z. wiss. Phot.* **27**, 305–11(1930).—Fog on exposed plates bathed in desensitizers can be prevented by exposing the plates wet to red light. With increasing red light exposure the latent image is destroyed more in the lower than in the higher density region, resulting in an increased contrast of the reduced image. It was found

that in desensitized plates the latent image increased with green light exposure. A. P. H. TRIVELLI

Mineralogical contributions to the theory of the latent image. R. E. LIESEGANG. *Phot. Ind.* **28**, 805(1930).—L. calls attention to 2 recent publications in the field of radioactivity on the formation of colloidal Na in bluish rock salt and on the formation of colored colloidal Au in fusions of alk. halides. Analogy to the latent image problem of photographic exposure is suggested. Regarding the radioactivity of K in fogging photographic materials, K. Przibram has calcd. that an exposure of 20,000 years is necessary to produce a bluish color in rock salt by K radiation. C. E. M.

Optical investigations on the formation of the latent photographic image. M. SAVOSTIANOVA. *Nature* **126**, 399(1930).—When rock salt is exposed to short wave length radiation, it becomes colored; this color can be removed by heat or by exposure to light of a wave length absorbed by the new absorption band thus produced. A similar effect is obtained with AgBr. The new absorption band has a max. at 610 mμ, and continues uniformly as far as 2000 mμ into the infra-red. With rock salt, simultaneous illumination and heating produce colloidal clumps of Na atoms; AgBr exposed to active and decolorizing radiations becomes brown, probably because of the formation of colloidal Ag. E. W. H. S.

Colloido-chemical foundation of toning by direct development. G. SCHWARZ. *Phot. Korr.* **66**, 59(1930).—A general review is given of the colloido-chem. phenomena in toning by direct development, from which it is shown that the resulting color tones are primarily dependent upon the ratio of the velocity of soln. of the Ag halide to the velocity of its chem. reduction. S. discusses this fact (which has long been taken into account in practice) from a uniform physicochem. point of view. E. R. B.

Two-bath development for the elimination of abrasion marks. RAFAEL GARRIGA. *Chimie & industrie* **Special No.** 387(March, 1930).—Abrasion marks can be prevented by adding 1–5 g. $Na_2S_2O_3$ per l. of developing bath; but development is thereby retarded and the image is weak and grayish. This is overcome by starting development in a bath consisting of: normal hydroquinone developing soln. 100, H_2O 100, 10% $Na_2S_2O_3$ soln. 20; when the contours of the image show up, quickly wash with water and finish development in a normal undiluted bath. A. PAPINEAU-COUTURE

Concentration speck theory and crystal structure strain. A. P. H. TRIVELLI. *Z. wiss. Phot.* **28**, 41–2(1930).—T. claims priority for laying the foundation of the crystal lattice strain theory of light sensitivity. A. P. H. TRIVELLI

Concentration speck theory and centripetal theory of light action. A. STEIGMANN. *Z. wiss. Phot.* **28**, 167(1930).—A controversy with Trivelli (preceding abstr.) about priority for the concn. speck theory of the latent image and the tension theory of light sensitivity. A. P. H. TRIVELLI

Some properties of fixing baths. J. I. CRABTREE AND H. A. HARTT. *Trans. Soc. Motion Picture Eng.* **13**, 364(1929); *Brit. J. Phot.* **76**, 743–5, 758–61, 777–8(1929); **77**, 4–6, 19–22 (1930).—The hardening characteristics of acid-alum fixing baths are not related to the alum concn. alone, but are also affected by the addn. of acetic acid and sulfite. It is possible to compound fixing baths having any desired properties by referring to a series of curves prepd. from exptl. data. $NaC_2H_3O_2$ may be used to replace the sulfite in a fixing bath, but it is only $^1/_5$ as efficient as a sulfurization inhibitor. Under certain conditions where the efficiency of the fixing bath is detd. by the quantity of developer which may be added before Al sulfite is pptd. it has been shown that the addn. of acid at intervals during exhaustion is advantageous. Practical recommendations are made relative to the use of plain acid and of acid hardening fixing baths. J. I. CRABTREE

Actinic and color temperature of magnesium ribbon burning in air and of magnesium flashlight. J. M. EDER. *Z. wiss. Phot.* **27**, 337–43(1930).—The actinic value of 1 mg. Mg, burning in air, was redetd. and found to be 413 m. c. s. in relation to AgBr gelatin. Flashlight of Mg powder and nitrates is lower (200–300 m. c. s.). Burning Mg gives a double value in pure O. The color temp. of Mg burning in air is higher than that with $Th(NO_3)_4$. The color temp. of Mg burning in pure O is 4000°K. The color temp. of Mg flashlight with $Th(NO_3)_4$ is 3000–3100°K. A. P. H. TRIVELLI

Color photography. SOCIÉTÉ FRANÇAISE DE CINÉMATOGRAPHIE ET DE PHOTOGRAPHIE FILMS EN COULEURS KELLER-DORIAN, A. AVERAN and I. KITROSER. Brit. 331,971, Oct. 23, 1928. Optical features.

Optical system for color photography. HAROLD N. COX (to Cox Multi-Color Photo Co.). U. S. 1,781,496, Nov. 11.

Forming and projecting color photographs. M. B. DuPont. Brit. 331,200, Feb. 14, 1929. Optical features.

Photographic films. I. G. Farbenind. A.-G. Brit. 331,042, May 9, 1929. The sensitive surface at the end of a roll-film is colored as described in Brit. 308,693 (*C. A.* **24**, 305). A tanning agent may be used further to stabilize the coloring matter and a wetting medium such as Na phenylacetate or saponin can be used to facilitate uniform coloration.

Photographic reversal films. Erwin Mankenberg (to Agfa Ansco Corp.). U. S. 1,780,025, Oct. 28. The film is first subjected to an under-development, the Ag image is dissolved, the remaining Ag salt image is developed after a second exposure, followed by equalization of the excessive d. of the reversed image due to the first under-development by means of a solvent for Ag such as a bath prepd. from I, KI, thiocarbamide and water which has a uniform and even reducing action.

Cinematograph picture films. M. G. M G. Bizot. Brit. 332,195, Oct. 11, 1928. In developing and toning films sensitized with dichromated gelatin, unexposed dichromate is removed by washing with cold water, the unexposed gelatin is swelled by immersion in a bath of cold water contg. NaOCl followed by treatment with hot water and the remaining gelatin is dye-toned. The hot water may contain a trace of methylene blue to facilitate development and the same dye may be used for the dye-toning.

Photographic diazotypes. Kalle & Co. A.-G. Brit. 331,459, Oct. 19, 1928. Aromatic hydroxyl compds. contg. one or more guanidine groups, and in which the *o*- or *p*-position to the hydroxyl is non-substituted, are used as azo components in the diazotype process. Several examples are given.

Apparatus for developing photographic prints such as diazotypes with ammonia, etc. F. C. Fuke and Ozalid Co., Ltd. Brit. 331,823, April 5, 1929. Structural features.

Openwork metal designs. F. W. Miller. Brit. 331,856, April 9, 1929. A sensitized plate which may be coated with dextrin, glucose or gum arabic sensitized with a dichromate is exposed under a transparency of the design, metal or other cond. material is dusted on and adheres to the unexposed parts, a layer of collodion is coated on the design, the original coating is washed off (leaving the design of cond. material on the collodion) and metal is then electrolytically deposited on the design (which can then be stripped off and transferred to wood or other material for ornamentation).

6—INORGANIC CHEMISTRY

A. R. MIDDLETON

Correction to the work of Ipat'ev and Muromzev: Precipitation of crystalline hydroxides of aluminum and chromium from solutions of their salts at high temperature and pressure. V. Ipat'ev. *Ber.* **63B**, 2365(1930); cf. *C. A.* **22**, 1742.—The cryst. ppt. of the compn. $Al_2O_3 \cdot H_2O$ (previously considered identical with the mineral diaspore) gives an x-ray diagram identical with that of bauxite having the same compn. (böhmite).
Oscar T. Quimby

The preparation of arsenic triiodide by the wet method. Pedro G. Paternosto. *Rev. facultad cienc. quim.* (Univ. La Plata) **7**, 43–6(1930).—A modification of the classical method for prepg. AsI_3 gives a yield of 94 and 99.8% purity. With a pptg. flask 2 g. of pure As_2O_3 was treated with 30 cc. HCl (d. 1.19). Ten g. KI and 10 cc. H_2O were heated and this soln. was poured into the pptg. flask, allowed to react for 4–5 min. and the ppt. was then filtered on asbestos and dried in vacuum. The dried ppt. was extd. several times with CS_2. The AsI_3 was extd., eliminating KCl which is insol. The CS_2 is evapd. off in vacuum and beautiful, hexagonal plates of AsI_3 are obtained.
M. McMahon

Hydrated sulfates containing three metals. B. Gossner and Th. Bäuerlin. *Ber.* **63B**, 2151–5(1930); cf. *C. A.* **24**, 1006.—The mineral voltaite is considered to have the formula: $[KH_3(SO_4)_3]_2.[(Fe, Al)O_3H_3]_3.[FeSO_4]_4.4H_2O$. Nine similarly composed sulfates have been prepd. by replacing (1) the FeO by MnO, CoO, MgO, ZnO or CdO and (2) the K_2O by $(NH_4)_2O$, Rb_2O or Tl_2O and keeping the Fe_2O_3 const. The relation $SO_3:MeO:Me'_2O = 10:4:1$ found for voltaite was found to hold for the entire series. The ratio $SO_3:Fe_2O_3$ varied between 10:1.54 and 10:1.88. In each case the total H equiv. of the 3 metals is approx. equal to that of the SO_3. It is doubtful whether all the salts conform to a single type formula. Only the 3 ferro-voltaites are isotropic. The edge of the elementary cube in each salt is approx. 27.5 A. U. Oscar T. Quimby

Borates. The system Na_2O–B_2O_3–H_2O at 45°. U. Sborgi and L. Amelotti. *Gazz. chim. ital.* 60, 468–74(1930).—The expts. complete data on the system Na_2O–B_2O_3–H_2O (cf. *Z. anorg. Chem.* 50, 38(1906); S. and Mecacci, *C. A.* 9, 2845; 11, 1607; Rosenheim and Leyser, *C. A.* 16, 1194; S. and L., *Atti soc. Toscana sci. nat.* 35 (1926)) and make possible the construction of a polythermic diagram. The *app.* and *technic* are described in detail, and the results are tabulated as well as shown by the diagram mentioned, which should be consulted for details. C. C. Davis

The borates of cesium. A. P. Rollett and L. Andrés. *Compt. rend.* 191, 375–8(1930).—When alc. solns. of H_3BO_3 and Cs_2O are mixed a ppt. forms with a const. compn. of $5B_2O_3.Cs_2O$. It is anhyd. and amorphous. An isothermal diagram of the B_2O_3–Cs_2O–H_2O system at 18° has been detd. up to 35% Cs_2O. This curve shows the presence of 3 distinct compds.: $5B_2O_3.Cs_2O.8H_2O$, small orthorhombic crystals; $2B_2O_3.Cs_2O.5H_2O$, large orthorhombic crystals; $B_2O_3.Cs_2O.7H_2O$, orthorhombic prisms. Amy LeVesconte

The formation and the constitution of lead sodium thiosulfate. B. Oddo and Q. Mingoia. *Gazz. chim. ital.* 60, 501–8(1930).—See *C. A.* 24, 4230. C. C. Davis

Revision of some cases of coördination number 5. The amines of nickel thiosulfate. L. Le Boucher. *Anales soc. españ. fís. quím.* 28, 895–904(1930).—$NiS_2O_3.5NH_3$ prepd. by Ephraim is not a pure substance. Violet $NiS_2O_3.6NH_3$, blue $NiS_2O_3.4NH_3$ and olive-green $NiS_2O_3.2NH_3$ were prepd. and their mol. vols. detd. The hexamine was systematically destroyed by the aid of vapor pressure detns. E. M. Symmes

Complex ammoniacal cobalt molybdates. Priyada Ranjan Ray and Sailendra Nath Maulik. *J. Indian Chem. Soc.* 7, 607–16(1930).—Crystals of the following compds. were prepd. by oxidizing by the passage of a vigorous current of air through a soln. of the Co salt and *N* Na molybdate or molybdic acid in the presence of calcd. quantities of NH_4 salt and NH_3: $[Cl.Co.(NH_3)_5]MoO_4$, insol; $[OH.Co(NH_3)_5]MoO_4.1$ or $2^1/_2$ H_2O, sol.; $[H_2O.Co.(NH_3)_5]_2(MoO_4)_3$, fairly sol.; $[MoO_4.Co.(NH_3)_5]_2MoO_4$, insol.; $[H_2O.NO_2.Co.(NH_3)_4]MoO_4$, sparingly sol.; $[MoO_4.NO_2.Co.(NH_3)_4]$, sparingly sol.; $[SCN.Co.(NH_3)_5]MoO_4$, sparingly sol.; $[NO_3.Co.(NH_3)_5]MoO_4$, sol. W. C. F.

Ammonates of copper selenate. Loren C. Hurd and Victor Lenher. *J. Am. Chem. Soc.* 52, 3857–64(1930).—$CuSeO_4.4NH_3.H_2O$ (I), $CuSeO_4.3NH_3.H_2O$ and $CuSeO_4.4NH_3$ (II) have been prepd. according to the methods of Dennis and Koller (*C. A.* 13, 1567). A new method for prepg. II has been described. I and $CuSeO_4.5H_2O$ absorb NH_3 to produce $CuSeO_4.5NH_3$ although the latter was more easily prepd. by the action of liquid NH_3 on II. If $CuSeO_4.6NH_3$ was formed at all it is not stable at atm. pressure above —33°. By heating II to 178°, $CuSeO_4.2NH_3$ resulted. No evidence was found for the existence of $CuSeO_4.4NH_3.2H_2O$ reported by Lange (*C. A.* 21, 868). W. C. F.

Ammonates of copper selenite. Loren C. Hurd, George I. Kemmerer and V. W. Meloche. *J. Am. Chem. Soc.* 52, 3881–6(1930).—$CuSeO_3.2NH_3.H_2O$ (I) was deposited from an ammoniacal soln. of $CuSeO_3.2H_2O$ (II) upon evapn. at 60° by a rapid stream of NH_3. I was also prepd. by the action of anhyd. NH_3 on II at 25°. Below 10° the passage of NH_3 into an ammoniacal soln. of $CuSeO_3$ gave blue crystals of $CuSeO_3.3NH_3.xH_2O$. Evapn. of solns. of $CuSeO_3$ with excess NH_3 in absence of air gave green $CuSeO_3.NH_3.H_2O$ (III) [cf Boutzaureanu, *Ann. chim. phys.* 6, 18, 346 (1889)]. III also resulted upon exposure of I to air. Desiccation of I over soda lime at 15 mm. gave $CuSeO_3.2NH_3$ (IV). Both III and IV reacted at 0° with NH_3 gas to give $CuSeO_3.3NH_3$. $CuSeO_3.4NH_3$ was obtained from liquid NH_3. The transition point of the system $CuSeO_3.4NH_3$–$CuSeO_3.3NH_3$ falls at —25 ±1°. Green $CuSeO_3.NH_3$ results upon warming all the anhyd. ammonates of $CuSeO_3$ to 120°. W. C. Fernelius

7—ANALYTICAL CHEMISTRY

W. T. HALL

Sulfuric acid salts of aromatic amines as standards in alkalimetry. E. Strasser. *Z. anal. Chem.* 82, 114–6(1930).—Sulfates of aniline, chloroaniline, *p*-anisidine and *p*-toluidine can be used as standards with phenolphthalein as indicator. W. T. H.

Application of light of short wave length to quantitative chemical investigations. J. Eisenbrand. *Pharm. Ztg.* 75, 1033–6(1930).—A discussion of both "strong" and "weak" fluorescence phenomena in connection with certain new reactions. W. O. E.

Advancement in analytical investigation by means of ultra-violet rays. Frank. *Chem. Tech. Rundschau* 45, 841(1930).—The analytical quartz lamp has been found of practical value in identification of alkaloids. *Morphine* can be detected in a dilu.

of 0.001 mg. in 30 cc. of fluid. *Hydrastine sulfate* solns. show an intensive blue-green fluorescence in diln. as great as $1:10^{11}$, the max. being at $1:10^{4}$. By means of fluorescence *quinine* can be detected in the saliva 5 days after administration. From a mixt. of products with known impurities a fluorescence scale can be developed which permits the detn. of the quality so accurately that a difference of 0.001% in ash content is recognizable. This lamp can also be used to differentiate *artificial tanning materials* from those of vegetable origin since the latter do not fluoresce in dilns. of 1:1000. E. P.

Use of the filtration method in volumetric analysis, particularly in the analysis of portland cement. HANS TH. BUCHERER AND F. W. MEIER. *Z. anal. Chem.* **82**, 1–44 (1930).—I. In the absence of Fe, Al and H_2SiO_3, *Ca can be detd.* accurately as follows: To 100 cc. of soln. contg. 0.2 g. or less of Ca, add 1.25–1.5 equivs. of NaOAc, heat to 70–80° and add 0.1 *N* $H_2C_2O_4$ soln. dropwise until further addn. of precipitant produces no further pptn. This is best detd. by adding the reagent, without testing, as long as pptn. obviously occurs, then filtering off a small portion of the soln. and testing with $C_2O_4^{--}$ or with Ca^{++} to det. whether an excess of C_2O_4 has been added. It is best to carry out 2 tests in this way, *i. e.*, add, the second time, nearly the entire amt. indicated by the first test before making any filtration test. II. With oxine as precipitant, the following procedure serves for the *detn. of Mg:* To 100 cc. of soln. contg. 0.12 mg. or less of Mg, add 20 cc. of 2 *N* NH_4Cl and 10 cc. of concd. NH_4OH. Heat to 70–80° and, while shaking and gradually raising the temp. to boiling, add a slight excess of oxine, as shown by the yellow color, and titrate the excess with standard $MgCl_2$ soln. III. For the *detn. of Ca and Mg* in the presence of one another, titrate first as outlined above with oxalic acid and then, without filtering off the CaC_2O_4 ppt., titrate the Mg with oxine, filtering small portions of the soln. to det. whether the pptn. is complete. The method succeeds in the analysis of limestone from which SiO_2 and $Al(OH)_3$ have been removed in the usual manner. IV. The filtration method can also be used to advantage for the *detn. of H_2SO_4 with $BaCl_2$.* Excellent results were obtained in the titration of 100 cc. of soln. contg. 5–120 mg. of H_2SO_4 with 0.1 *N* $BaCl_2$ soln. V. The filtration method can also be used for the *titration of Cu with Na_2S* soln. The titration succeeds in ammoniacal solns., the end point being detd. by testing a small portion of filtered soln. with a drop of the precipitant. In acid solns. the titration succeeds if a trial test is made first. Otherwise there is danger of some H_2S escaping from the soln. VI. The filtration method can also be used for the *titration of Zn with Na_2S or with oxine.* With the former reagent, add 3–5 g. of NaOAc to the faintly acid Zn soln. and titrate at a vol. of 100 cc. at room temp. With oxine the temp. should be about 60° and the soln. should contain 3–6% of free NaOAc. VII. The *titration of Cu and of Zn with Na_2S* succeeds when both are present. Titrate the Cu first at 75°, dilg. to 100 cc., providing 5 milli-equivs. of H_2SO_4 and adding Na_2S until the filtration test shows no more Cu^{++} to be present. Add a few drops of alc. AcSH soln. to make sure that the last traces of Cu are pptd. and boil off the excess H_2S. Filter, wash with hot, dil. H_2SO_4, cool to room temp., neutralize with NaOH (methyl orange), add 3–5 g. of NaOAc and titrate the Zn with Na_2S. VIII. The *pptn. of Mn as $MnNH_4PO_4$* also succeeds by the filtration method. To 100 g. of neutral soln. contg. 10–100 mg. of Mn, add 10 g. of NH_4Cl, make slightly ammoniacal, heat to 75° and titrate with standard Na_2HPO_4. IX. The method proved successful for the *titration of Zn and Mn.* First the Zn was titrated with oxine, then the ppt. was removed by filtration, the filtrate made slightly ammoniacal and titrated in the presence of NH_4Cl as just described. X. The method was also applied to the *detn. of Cu, Zn and Mn in brass.* The Cu was titrated with Na_2S, the Zn with oxine and the Mn with Na_2HPO_4. XI. *Determination of Fe and Al with oxine.*—To 100 cc. of faintly acid soln. contg. 0.12 g. of Fe or less, add 4 g. NaOAc and a measured vol. of oxine acetate soln., as detd. by a preliminary test or by spot tests with diazobenzenesulfonic acid paper. Heat and filter off the Fe ppt. Filter and det. the excess of oxine bromometrically. The same procedure serves for the simultaneous pptn. of Fe and Al; in such a case the Fe can be detd. alone in a sep. sample either iodometrically or by means of $KMnO_4$. XII. *Sepn. of SiO_2 in Ca silicates and analysis of portland cement.*—Considerable exptl. evidence is offered to show that the usual method of detg. SiO_2 in silicates rich in Ca and Mg gives low results and it is recommended in the analysis of cement to treat 1 g. of the strongly ignited cement with 25 cc. of water and 25 cc. of 7.5 *N* HNO_3. Stir well and evap. on the water bath until perfectly dry. Rub the residue with a pestle and dry at 115° until there is no more odor of acid Cool in a desiccator and triturate the dry powder with 10 cc. of a mixt. contg. equal parts of alc. and ether to remove $Ca(NO_3)_2$ and $Mg(NO_3)_2$. Filter through a dry filter and wash the residue with alc. ether until the extn. is complete. Treat the residue with 75 cc. of 10% HCl, evap. to dryness and

dry thoroughly at 115°. Treat this residue also with 75 cc. of 10% HCl, heat on the water bath for 10 min. and filter off the SiO_2. The rest of the analysis follows conventional lines except that the Fe and Al, after one pptn. with NH_4OH, are finally pptd. with oxine and the Mg is also pptd. with oxine as outlined above. The results for SiO_2 are distinctly higher and of Al_2O_3 distinctly lower than those by the usual method. W. T. H.

Micro-iodometry. RUFINA V. TEIS. *Z. anal. Chem.* **82**, 116–22(1930).—See *C. A.* **24**, 4999. W. T. H.

Electrometric titration. LASSIEUR. *Ann. chim. anal. chim. appl.* **12**, 290–6 (1930).—A review of the development and theory of potentiometric titration. W. T. H.

The analytical significance of aging phenomena. HELLMUT FISCHER. *Z. angew. Chem.* **43**, 919–22(1930).—Gelatinous ppts. on being aged consist of larger particles than when freshly formed. The aged ppts. are less sol. and do not adsorb other ions like the unaged gels. Thus a gelatinous ppt. of $Be(OH)_2$ formed in the presence of NaF may yield BeO contg. 23% of adsorbed NaF, but by heating the suspended ppt. in the mother liquor at 80° with a reflux condenser attached to the flask contg. the soln., the ppt. becomes less gelatinous and more nearly cryst., with the result that only 0.5% of NaF will be found in the ignited BeO. The gelatinous hydroxides of Fe, Al and Cr can be sepd. more efficiently from the hydroxides of the bivalent metals if the ppts. are aged before filtering. Heating the soln. is the means commonly adopted to accomplish an artificial aging. Another expedient is to make the ppt. form more slowly under conditions such that the aged and less amorphous ppt., because of its slighter soly., is formed directly as with pptg. hydroxides by adding NH_4NO_2 or $Na_2S_2O_3$. Numerous other practical applications of the principle are pointed out in this interesting paper. W. T. H.

New adsorption indicators for argentometry with a comparison of their limits of sensitiveness. A. J. BERRY AND P. J. DURRANT. *Analyst* **55**, 613–7(1930).—As an adsorption indicator *tartrazine* has been found suitable, better results being obtained than with chrysoidine and "phosphine" which can, like tartrazine, be used in solns. which are 0.5 *N* in acid. When tartrazine is used, the ppt. of AgCl or AgBr assumes a strong yellow color as long as Ag^+ is present in soln. but as soon as a slight excess of halide has been added, the soln. assumes a greenish yellow color. The change is very sharp and is particularly well suited for rapid titrations. In this method the end points, however, occur about 0.1 cc. earlier with 0.1 *N* KBr soln. than in the Gay Lussac method of stopping when no further sign of turbidity is produced, and the results of parallel expts. do not agree quite as well. W. T. H.

Properties of diphenylamine and diphenylbenzidine as oxidation-reduction indicators. I. M. KOLTHOFF AND L. A. SARVER. *J. Am. Chem. Soc.* **52**, 4179–91(1930); cf. *C. A.* **24**, 2078.—In solns. which are 0.1–0.2 *N* in H^+, diphenylamine is oxidized completely to diphenylbenzidine by the slow addn. of $K_2Cr_2O_7$. An excess of dichromate oxidizes it further to a violet quinoid salt which combines quickly with unchanged diphenylbenzidine to form a very difficultly sol., green meriquinoid salt. In titrating the violet soln. with $FeSO_4$, a color change of violet to green occurs at about 0.51 against a satd. HgCl electrode, regardless of the H-ion concn. of the soln. A theoretical explanation is offered to account for this behavior. From a stoichiometric standpoint, the results of this analytical study are hampered by the fact that certain side reactions are likely to occur because diphenylbenzidine and diphenylbenzidine green are very slightly sol. and diphenylbenzidine violet decomposes readily, especially at low H-ion concn. The absorption spectra of oxidized diphenylamine and of diphenylbenzidine solns. are identical. About 0.06 mg. of diphenylbenzidine dissolves in 1 l. of water at 25–50° and its ionization const. is 2×10^{-14}. W. T. H.

Titrimetric determination of the active oxygen in mixtures of hydrogen peroxide and persulfuric acid. G. D. LYUBARSKII AND M. G. DIKOVA. *Z. anal. Chem.* **81**, 450–4 (1930).—Pour 5 cc. of the liquid, such as may be obtained by electrolysis of H_2SO_4, into 150 cc. of cold water and add 5–10 cc. of 10% KI soln. After 24 hrs. standing in a cold, dark place, titrate the I_2 with $Na_2S_2O_3$ soln., carrying out at the same time a blank test without any peroxide present. Results obtained by this procedure are compared with 5 other methods of analysis. W. T. H.

Qualitative test for fluorine in bones. J. AND R. CASARES. *Anales soc. españ. fis. quim.* **28**, 910–5(1930).—The literature is contradictory on F in bones. The corrosive action of HF on glass, and decompn. of SiF_4 by H_2O were studied, defects pointed out, and modifications suggested. To a small quantity of Ag_2SO_4, powd. glass and concd. H_2SO_4, a little bone ash is added, the crucible covered with a watch glass carrying a

drop of $Ba(OAc)_2$ acidified by HOAc. Formation of a ring of SiO_2 or characteristic Ba hydrofluosilicate proves the presence of F. Various bones and marine products were tested. F does not exist in teeth, and there is less in bones of young than in old animals. E. M. SYMMES

Methods for the analysis of red phosphorus. S. A. TOLKACHOV AND M. A. PORTNOV. *Z. anal. Chem.* **82**, 122-33; *Zhur. Prikladnoĭ Khim.* **3**, 605-14(1930).—Red P is likely to contain traces of metal salts, As, H_2SO_4, P acids and a small quantity of yellow P. The detns. of total P, P acids and yellow P present certain difficulties and the expts. described in this paper show that the methods hitherto used are far from satisfactory. The following procedures are recommended: *Total P.* To 0.25 g. of sample in a 100 cc. Philips' flask, add 2-3 cc. of water and then, while heating on the water bath with the flask covered, carefully add small portions of a satd. soln. of Br in concd. HNO_3. White vapors should not form on the surface of the water. This treatment requires about 20 min.; the oxidation is incomplete if it is hurried. Evap. the soln. to a small vol. and add 5 cc. more of the Br-HNO_3. Repeat this treatment with Br-HNO_3. Finally evap. till all acid fumes are removed. Add a little hot water, filter and det. H_3PO_4 in the filtrate in the usual manner, eventually weighing as $Mg_2P_2O_7$. *P acids.* Digest 20 g. of sample in a 250 cc. measuring flask with 20 cc. of 2 *N* H_2SO_4 and water. After digesting 12-15 hrs. with shaking, make up to the mark and filter through linen. To 50 cc. of filtrate add 5 cc. of Br-HNO_3 mixt. and det. the P as described above. *Yellow P.* Cover 15-20 g. of sample in a 100 cc. measuring flask with CS_2 and digest 12-15 hrs. with shaking. Filter into a flask filled with CO_2 and keep the funnel also filled with this gas to prevent oxidation. Take 50 cc. of the filtrate, using CO_2 to empty the pipet into a flask contg. Br-aq. Shake and add more Br unless an excess is present as shown by the color. Distil off the CS_2 on the water bath, using a condenser, and to the residue add Br-HNO_3 and continue as in the detn. of total P. *Detn. of H_2O.* Dry in a vacuum desiccator for 1.5-2 days. W. T. H.

Determination of phosphorus in aluminum. STEINHÄUSER. *Z. anal. Chem.* **81**, 433-8(1930). The difficulties attending the accurate detn. of 0.0005-0.002% of P in metallic Al are shown and a method is developed in which 30-50 g. of metal is dissolved in dil. HCl in an atm. of H_2. The P is liberated as phosphine. The H_2 and PH_3 from the decompn. vessel are burned and the resulting P_2O_5 is collected, partly as a white deposit and partly by absorption in dil. NaOH. Then, to remove SiO_2 from the deposit it is treated with HF and H_2SO_4. The absorbent is treated similarly to remove traces of Si. Finally the P is pptd. with molybdate. It is also shown that the escaping gas from treating Al with HCl may blacken $AgNO_3$ paper as a result of the presence of SiH_4 so that the test cannot be used to indicate the presence of P. W. T. H.

Gravimetric determination of aluminum, chromium and iron by means of potassium cyanate. B. J. F. DORRINGTON AND A. M. WARD. *Analyst* **55**, 625-8(1930).—Ripan's method of detg. Al by means of KCNO (*C. A.* **22**, 3373) has given low and irregular results and, contrary to the statements of R., the ppt. was gelatinous. By washing the ppt., after standing overnight, with a hot, faintly alk. NH_4NO_3 soln. and finally heating 2 hrs. in a muffle, it was found possible to overcome most of the error. Similar difficulties were encountered in the detn. of Cr and similarly overcome. Directions are now given for applying the method to the detn. of Fe. R. has stated the Zn and Mn do not interfere with this method of pptn. but this does not appear to be true. W. T. H.

Volumetric determination of barium by direct titration with potassium chromate solution. S. BALACHOWSKI. *Z. anal. Chem.* **82**, 206-10(1930).—For the micro and semimicro detn. of Ba it is recommended to titrate 1-2 cc. of soln. with 0.04 *N* K_2CrO_4 until an indicator, within the range bromothymol blue to phenol red, changes color, showing that the p_H of the soln. has increased by the presence of a slight excess of K_2CrO_4. A *new microburet* is shown which is suitable for the titration. W. T. H.

Gravimetric determination of beryllium by means of hydrazine carbonate. A. JILEK AND J. KOTA. *Collection Czechslov. Chem. Comm.* **2**, 571-83(1930).—Hydrazine carbonate has certain advantages over NH_4OH and $(NH_4)_2CO_3$ as a precipitant for $Be(OH)_2$ or Be basic carbonate. The ppt. is less slimy and less sol. in a slight excess of the precipitant. To 100 cc. of soln. contg. not over 0.1 g. of Be, in 100 cc. add 5 g. of NH_4 salt and, while boiling, a slight excess (2-3 cc.) of hydrazine carbonate soln. Allow the ppt. to stand 2 hrs., filter and wash with 0.5-1.0% NH_4NO_3 soln. which has been made neutral to methyl red. Ignite and weigh as BeO. W. T. H.

Potentiometric determination and separation of chromium, vanadium and molyb-

denum with respect to steel analysis. W. TRZEBIATOWSKI. *Z. anal. Chem.* **82**, 45–61 (1930).—See *C. A.* **24**, 5000. W. T. H.

Two sensitive color tests for cobalt. EDWIN EEGRIWE. *Z. anal. Chem.* **82**, 150–4 (1930).—Eriochromblueblack B(G) and eriochromred B(G) serve for the detection of very small quantities of Co. The former gives a reddish violet soln. and when treated with nitrite and AcOH becomes yellowish brown or orange. If Co is present the violet color persists or, if considerable Ni is present, a transient brownish yellow coloration is first obtained but on standing violet color appears. As reagent, dissolve 0.01 g. of the dye in 50 cc. of water. To test a soln. for Co, add 5–10 drops of the reagent, 1 drop of nitrite soln. and a slight excess of 0.5 *N* AcOH. As little as 0.001 mg. of Co can be detected in 1 cc. of total vol. With the latter dye, the procedure and concn. of reagents are the same. The aq. soln. of this dye is reddish yellow on being treated with nitrite and AcOH. The color is orange when Co is present. This test is delicate if Ni is first removed which can be accomplished as follows: To a drop of Ni soln. add 1.5–2 cc. of 5 *N* NaOH contg. 10% of glycerol by vol. Boil a short time and filter. Make the filtrate acid by adding concd. HCl, neutralize with solid $NaHCO_3$, add 5–10 drops of dye soln., then 2 drops of nitrite soln. and make acid with 0.5 *N* AcOH. In this way the presence of 0.0005 mg. Co can be detected in a soln. which originally contained 10,000 times as much Ni. W. T. H.

Quantitative precipitations at extreme concentrations. II. Determination of magnesium. N. NJEGOVAN AND V. MARJANOVIC. *Z. anal. Chem.* **82**, 154–61(1930); cf. *C. A.* **22** 1927.—The following procedure has been evolved as a result of 72 expts. which are described in this paper: Evap. the soln., contg. not over 0.3 g. of MgO as sulfate or chloride, to dryness in a 300–400 cc. beaker. Cool, add 5 cc. of concd. H_2SO_4 and heat until all chloride or oxalate is removed. Cool, add 15–25 cc. of cold, satd. Na_2HPO_4 soln. and a few drops of phenolphthalein indicator. Then, while shaking, add at one time enough of a mixt. of equal parts concd. NH_4OH and 96% alc. to make the soln. red. Dil. with 150–200 cc. of water and heat 1 hr. on the water bath. Cool, filter through a Berlin filtering crucible through which water has been passed three times. Wash the ppt. with 2.5% NH_4OH until all sulfate is removed and ignite in an elec. oven to const. wt. ($Mg_2P_2O_7$). W. T. H.

The permanganate determination of molybdenum. TH. DÖRING. *Z. anal. Chem.* **82**, 193–206(1930).—Steel chemists of the U. S. A. have known for over 30 yrs. that an acid soln. of molybdate can be reduced completely to the tervalent condition by passage through a Jones reductor and if the reductor contains ferric alum soln., the reduced Mo is oxidized partly, leaving an equiv. quantity of Fe^{++} so that when the soln. is titrated with $KMnO_4$, the consumption corresponds to the vol. required theoretically to convert the tervalent Mo back to molybdic acid. This method was worked out in the lab. of the Penn. R. R. by Dudley and Pease toward the end of the 19th century but was not published at that time. For some reason, the method has never been well known in Europe. In the present paper a careful, critical examn. of the method is described and the advantages over other procedures are acknowledged. It is unnecessary to work in an atm. of CO_2 or to hurry in titrating the reduced soln. W. T. H.

Analytical application of catalytic reactions: Characteristic test for palladium. F. FEIGL AND P. KRUMHOLZ. *Ber.* **63B**, 1917–9(1930).—Metallic Pd, formed by reduction of a Pd salt by CO, reduces molybdates or phosphomolybdic acids to Mo blue. A rapid stream of CO is passed through a boiling acid soln. of Pd salt and phosphomolybdic acid; in a few min. a blue to green color appears. This is true only of Pd among the Pt metals. Au, Hg or Fe^{++} decreases the sensitivity of the test. Ag, Pb, Cu, Cd, Sb, Sn, Ni, Co, Zn, Al, Ca, Mg, Na and K in 0.5 *N* HCl soln. in concn. of less than 0.25–1.0% do not effect the test. 0.025 γ Pd in 1 cc. can be detected. 0.5 γ Pd with 1000 times this amt. Ru, 0.25 γ Pd with 4000 times this amt. Os or 8000 times this amt. Ir can be detected. S. LENHER

Determination of potassium in very dilute solutions and in soil extracts. MARGARETHE V. WRANGELL (Princess Andronikow). *Z. anal. Chem.* **82**, 224–6(1930).—Detailed directions are given for pptg. the K as $K_2Na(NO_2)_6$ and detg. the NO_2 content of the centrifuged ppt. colorimetrically by means of a soln. prepd. from indole and H_2SO_4. W. T. H.

Notes on the analytical chemistry of rhenium. I. Determination of soluble perrhenates with the aid of nitron. W. GEILMANN AND A. VOIGT. *Z. anorg. allgem. Chem.* **193**, 311–5(1930).—In slightly acid soln. contg. $KReO_4$, nitron acetate soln. ppts. insol. nitron perrhenate; 17–18 mg. of the salt dissolves in 100 cc. of pure water but in the presence of 0.3–0.5% nitron acetate, the ppt. is practically insol. and well

adapted for the detn. of Re. To the neutral soln. of perrhenate contg. not more than 0.1 g. of Re, add hot water to make 50 cc. and 1 cc. of 2 *N* H_2SO_4. Heat to 80° and add enough of 5% nitron acetate soln. to make the soln. contain 0.3–0.4% of free nitron at the end. Cool for 2 hrs. in ice water, stirring frequently and vigorously. Filter and wash with ice-cold, 0.3% nitron soln., using as little as possible. Finally wash with water that is satd. with nitron perrhenate, dry 2 hrs. at 110° and weigh. The ppt. contains 33.06% Re. W. T. H

Direct determination of sodium in the presence of aluminum and chromium. EARLE R. CALEY AND DARREL V. SICKMAN. *J. Am. Chem. Soc.* 52, 4247–51(1930).—A slightly modified technic is described for pptg. Na as $NaMg(UO_2)_3(OAc)_9.6.5H_2O$. The procedure is applicable to the direct detn. of Na in a soln. contg. Al^{+++} and Cr^{+++} but a high concn. of NH_4^+ should be avoided. W. T. H.

Investigations into the analytical chemistry of tantalum, columbium and their mineral associates. XVIII. New method for the separation of titanium from zirconium and hafnium. A. R. POWELL AND W. R. SCHOELLER. *Analyst* 55, 605–12(1930); cf. *C. A.* 24, 1055.—The best way to sep. Ti from Zr is generally regarded to be that of pptg. $ZrHPO_4$ in the presence of H_2SO_4 and H_2O_2 which keep Ti in soln. as pertitanic acid. Dittrich and Freund (*C. A.* 2, 1250) published a method based on the formation of a sol. Ti complex of salicylic acid. A re-investigation of the latter method, which does not appear to have received comment in the literature, was undertaken and the conclusion drawn that it is not strictly accurate, although more effective than the sepn. recommended by Noyes and Bray. Better than either of these methods is the method now proposed which is based on the pptn. of TiO_2 by tannin from a neutralized oxalate soln. which is half satd. with NH_4Cl. Under the conditions recommended, Zr remains in soln. although U is pptd. Fuse the mixed oxides, contg. not over 0.1 g. of TiO_2, with $K_2S_2O_7$ in a silica crucible and dissolve the melt in 75 cc. of 3% $(NH_4)_2C_2O_4$ soln. in a 600 cc. beaker. To the boiling soln. add *N* NH_4OH till a slight cloudiness is produced and dissolve this immediately by adding a little *N* HCl. Add an equal vol. of satd. NH_4Cl soln. (29%) and continue boiling. Add the precipitant (a freshly prepd., filtered 4–5% tannin soln.) dropwise from a buret while stirring, using about 12 times as much tannin by wt. as there is TiO_2 present. Allow the beaker to remain on the hot plate until the flocculent, red ppt. has settled, leaving the liquid clear. If the latter is at all orange, more tannin must be added. Digest on the hot plate for less than an hr. Filter the ppt. (P_1) with moderate suction and wash with a soln. contg. 5% NH_4Cl and 1% $(NH_4)_2C_2O_4$. Test the filtrate (F_1) by carefully neutralizing with NH_4OH and adding tannin soln. dropwise until a slight pptn. takes place. If this is a dirty gray the Ti pptn. is probably complete but if yellow or orange, Ti is still present and must be removed by adding more tannin. Ignite the P_1, wet in a porcelain crucible and dissolve the melt in 75 cc. of 3% $(NH_4)_2C_2O_4$ soln. Filter the hot soln. for the removal of traces of grit and CaC_2O_4. Treat as before, using 12 times as much tannin as the wt. of P_1. Test the filtrate (F_2) for complete pptn. of Ti. Ignite the ppt. and weigh as TiO_2. Boil the combined filtrates ($F_1 + F_2$) with a large excess of HNO_3 and H_2SO_4 for the removal of NH_4Cl, oxalate and tannin, finally fuming till all HNO_3 is removed. Cool, dil. with water, neutralize somewhat with Na_2CO_3, filter and ppt. the Zr in the filtrate by boiling with $Na_2S_2O_3$. Ignite and weigh as ZrO_2. W. T. H.

The flame test for tin. FR. L. HAHN. *Z. anal. Chem.* 82, 113–4(1930).—This test, recently described as new by Meissner (*C. A.* 24, 3966), has been known for at least 29 yrs. M.'s conclusion that SnH_4 is formed in the test seems doubtful for the test can be obtained when a large excess of O is present. It does, however, furnish a sensitive method for detecting SnH_4 in H_2 gas. A bright test with very little Sn present can be obtained only when the water in the test tube, which is held in the non-luminous flame, is distinctly above room temp. It seems probable that the test can be used for the detection of halogen as well as for Sn. W. T. H.

New iodometric method for determining vanadium in alloy steels and in ferrovanadium. W. WERZ. *Z. anal. Chem.* 81, 448–50(1930).—In a 500 cc. Erlenmeyer flask, treat 1–3 g. of filings with 50 cc. of H_3PO_4, d. 1.70, 170 cc. of water and 5 cc. of 6 *N* HNO_3. Boil gently until all of the metal has dissolved. Oxidize the soln. with concd. HNO_3 and add 0.5–1 g. of $(NH_4)_2S_2O_8$. Boil 15 min. to decomp. the excess persulfate. Cool to about 70° and decomp. $HMnO_4$ by adding 5–10 cc. of 1% oxalic acid soln. Cool to room temp., add some KI, shake and after 5 min. titrate with $Na_2S_2O_3$. For Fe-V, use 1 g. of sample dissolved in 25 cc. of HNO_3. Make up to 500 cc. and take 50 cc. for further analysis. Add 75 cc. of H_3PO_4, 100 cc. of water and persulfate, etc., as above. The reduction of the V is from the quinquevalent to the quadrivalent state.

No data are given to show the accuracy of the method which appears to be easier to carry out than the hitherto-described procedures. W. T. H.

Observations on the rare earths. XXXVI. Separation of ytterbium by electrolytic reduction. ROBERT W. BALL AND L. F. YNTEMA. *J. Am. Chem. Soc.* **52**, 4264-8

dil.

single operation, it is possible to obtain [illegible] material contg. only 2% of Yb. The ppt. is light green, dissolved in dil. non-reducible acids with evolution of H_2 and in HNO_3 with evolution of NO. W. T. H.

Volumetric determination of certain rare metals by means of visual conductivity titration. E. ROTHER AND G. JANDER. *Z. angew. Chem.* **43**, 930-3(1930).—Na_2MoO_4 soln. (about 0.04 molal) can be titrated conductometrically with 0.1 molal $Pb(OAc)_2$. A soln. of Na_2WO_4 (approx. 0.01 molal) can be titrated conductometrically with 0.2 molal $Pb(NO_3)_2$ soln. A soln. of $Tl(SO_4)_2$ (approx. 0.1 molal) can be titrated conductometrically with 0.07 molal Na_2CrO_4 soln. or with 0.2 *N* NaI soln. The results are a little low in the last case because of the appreciable soly. of TlI_2. The breaks in the titration curves were sharply defined in all cases. W. T. H.

Sulfur monochloride studies. III. A new method for determining total chlorine and sulfur in a naphtha solution of sulfur monochloride. HIDEMARO ENDOH. *J. Soc. Chem. Ind.* (Japan) **33**, Suppl. binding 287-90(1930); cf. *C. A.* **23**, 4905.—A 10-cc. sample of a naphtha soln. of S_2Cl_2 is treated with 50 cc. of 1% $NaNO_3$, 20 cc. of 10% $CuSO_4$ soln. and 50 cc. water. Decompn. ensues and excess of naphtha is removed by careful heating. Elementary S is removed by filtration, HNO_3 is added, the soln. is boiled and then treated with $AgNO_3$. Cl is detd. as AgCl. Total S is detd. by soln. of a 10-cc. sample in 20 cc. of glacial HOAc, addn. of 2.5 cc. of pure Br_2 and 70 cc. of warm water. The flask is heated for 1 hr. on the water bath and then over the Bunsen flame to remove all naphtha and HOAc. The soln. is filtered and S detd. as $BaSO_4$. Total S may also be detd. by Weber's Na ethylate method. **IV. A new method for determining chlorine and sulfur in sulfur monochloride.** *Ibid* 290-2.—The Dubosc method may be modified for application to the detn. of Cl and S in S_2Cl_2. A 30-cc. portion of a $AgNO_3$-satd. HNO_3 soln. is allowed to react with the S_2Cl_2 sample in HOAc. After the sample has been fumed down twice with concd. HNO_3, 100 cc. of H_2O is added, and the pptd. AgCl filtered, dried and weighed. To the filtrate HCl and crystals of KNO_3 are added and the soln. is evapd. to dryness, the residue taken up in water and HCl and the S are pptd. as $BaSO_4$. **V.** *Ibid* 292.—In the detn. described in IV the sample of S_2Cl_2 need not be dissolved in HOAc, but may be used directly. L. F. A.

The quantitative precipitation of calcium oxalate in the presence of the arsenate ion. J. T. DOBBINS AND W. M. MEBANE. *J. Am. Chem. Soc.* **52**, 4285-8(1930).—The formation of CaC_2O_4 in the presence of AsO_4^{---} did not take place as readily as in the presence of PO_4^{---} (cf. *C. A.* **24**, 2401), especially at low temp. Accurate results were obtained, however, by the following procedure: Make the soln. alk. with NH_4OH, adding a few drops in excess. Add an excess of $(NH_4)_2C_2O_4$ and boil gently for 10 min. After standing for an hr., filter, wash with very dil. NH_4OH and titrate the CaC_2O_4 with $KMnO_4$ in the usual manner. W. T. H.

Possible sources of error in determining nitrate by the method of Grandval-Lajoux. B. A. SKOPINTZEV. *Zhur. Prikladnoi Khim.* **3**, 747-58(1930).—Evapn. of the standard KNO_2 on a water bath heated with a gas burner leads to a loss of nitrates because of the presence of S compds. in the gas. This is avoided by adding 0.5-1.0 cc. 0.1 *N* NaOH to the soln. The sample of the standard soln. should be 1-3 cc. and the buret must read within 0.01 cc. Presence of NH_3 compds. is harmful only if their content is higher than the equiv. amt. of alkalies. V. KALICHEVSKY

Titrating sodium arsenate solutions. E. V. CHRISTENSEN. *Arch. Pharm. Chemi.* **87**, 350-8(1930).—The titration method for $Na_2HSO_4.7H_2O$ solns. in Dan. Pharm. gives values 1% higher than gravimetric detns. Increasing $AgNO_3$ and Na_2CO_3 increases the titration figures. If $AgNO_3$ soln. is limited to 0.5 cc. in excess of stoichiometric requirements the titrations will be very satisfactory. A. R. ROSE

[illegible] of expts. testing various methods for detg. HNO_3 and HNO_2 in concd. H_2SO_4, the conclusion is drawn that it is advisable to det. the total N by reducing the suitably neutralized soln. with Devada's alloy and KOH, eventually titrating the NH_3 formed. HNO_2 is best detd. by the colorimetric method with *m*-phenylenediamine. W. T. H.

The combination of phosphoric acid with stannic acid and its precipitation in

chemical analysis. ALBERT KRÜGER. *Z. anal. Chem.* **82**, 62–8(1930).—The classic method of removing H_3PO_4 in qual. analysis by treating with Sn and HNO_3 has been assumed by some to depend upon the formation of $Sn_3(PO_4)_2$ and by others to depend upon the adsorption of H_3PO_4 by β-stannic acid gels. Probably neither of these assumptions is correct for the exptl. evidence here described makes it seem probable that α-stannic acid forms an insol. complex acid with H_3PO_4, somewhat of the same nature as phosphomolybdic acid, which is well known in the form of its NH_4 salt. In this case the mol. ratio of Sn:P is much smaller than that of Mo:P for the insol. ppt. appears to have the compn. indicated by the formula $SnO_2.P_2O_5.8H_2O$ and the name *stanniphosphoric acid* is proposed because a similar stannous compd. is known of the formula $5SnO.2P_2O_5.4H_2O$. The ppt. of stanniphosphoric acid is white and voluminous but not slimy. It dissolves in HCl soln. but is insol. in HNO_3. It is also sol. in concd. H_2SO_4 and from this solvent it is pptd. by diln. in the form of a powder. When exposed to the action of OH^- by adding NH_4OH or NaOH, alkali salts of phosphoric and stannic acids are formed. The knowledge of these facts enables one to modify the Sn method for removing PO_4^{---} so that only about 1/6 as much Sn is required. If much Fe is present, it must be removed, preferably by shaking the $FeCl_3$ soln. with ether as recommended by Rothe. To remove PO_4^{---} from the filtrate from the usual H_2S pptn. when only a little Fe is present, evap. the soln. nearly to dryness, add HNO_3 and repeat the evapn. twice more to remove all HCl. Finally add more HNO_3, take up with water, add a drop of NH_4OH and boil for a few min. Cool and add sufficient $Sn(NO_3)_2$ soln. to furnish 3Sn to 1P (1. g SnO dissolved in 100 cc. of 15% HNO_3 at 50°). Add 5 cc. of fuming HNO_3, evap. to pasty consistency, dil. with hot water and heat for some time. If a filtered portion of the soln. gives a test with molybdate, a little more NH_4OH must be added and the treatment with $Sn(NO_3)_2$, etc., repeated. In the final filtrate, a little Sn will be found which can be removed by adding some NH_4OH and satg. the dil. soln. with H_2S. In qual. anal. probably the basic acetate sepn. will be preferred when considerable Fe is present. W. T. H.

Analysis of phosphorous acid. I. N. BUSHMAKIN AND E. P. LOPATIN. *Zhur. Prikladnoĭ Khim.* **3**, 615–22(1930).—The most reliable method is that of Schwicker (*C. A.* **23**, 5438). V. KALICHEVSKY

Volumetric determination of silicic acid in silicates. N. A. TANANAEV AND A. K. BABKO. *Z. anal. Chem.* **82**, 145–50(1930); cf. *C. A.* **24**, 5447.—Fuse the sample with K_2CO_3, using 4 g. of flux for 0.4 g. of kaolin or 0.3 g. of feldspar. Transfer the melt to a Pt dish, using not more than 20 cc. of water. Add 20 cc. of concd. HCl and, after the mixt. has cooled somewhat, add 2 g. of NH_4F. By this treatment a soln. contg. H_2SiF_6, HF and HCl is obtained. After allowing to stand for some time, filter off the K_2SiF_6 ppt. with the aid of a paraffined funnel and wash with a satd. soln. of K_2SiF_6. Place the ppt. and filter in a conical flask, add 20 cc. of 4 *N* $CaCl_2$ soln. and enough water to make 75–100 cc. Heat on the water bath, add methyl red indicator soln. and titrate with 0.5 *N* NaOH. The end of the titration is recognized by the change of color or by the coagulation of the ppt. Carry out a blank test with all the reagents used. The reactions upon which the titration is based is: $SiF_6^{--} + 3Ca^{++} + 4OH^- = 3CaF_2 + Si(OH)_4$. The results appear to be within 0.3–0.4% of the truth in the analysis of materials contg. 43–78% SiO_2. W. T. H.

Micro method for the determination of highly unsaturated fatty acids. H. TANGL. *Biochem. Z.* **226**, 180–4(1930).—The method consists in brominating a mixt. of unsatd. fatty acids, the reaction with Br_2 being more complete and more rapid than with I_2. The various Br_2 addn. products of fatty acids have different solubilities. The product is ashed in a Tschopp app., the halogen being received in H_2O_2 soln. To 5 cc. blood or serum in a 100 cc. flask add dropwise an alc.-ether mixt. (Bloor) and allow to stand at room temp. for 6 hrs. To the filtrate add a 3% soln. of Br_2 in glacial AcOH dropwise until the color remains, and after 12–24 hrs. filter off the ppt., wash the filter and ppt. with a few cc. of hot benzene which removes all fatty acid bromides with less than 8Br atoms. Transfer the paper and residue to the Tschopp oxidation app. contg. 5 cc. of 0.01 *N* $AgNO_3$. After closing the app. add 1 cc. H_2O_2 and 2 cc. concd. HNO_3. Lead the escaping Br vapor into H_2O_2. The oxidation is complete in 30 min. when the Br-H_2O_2 is allowed to flow into the flask. After the further addn. of 1 cc. 1% starch titrate with 0.01 *N* I_2. In blood after a day's fasting the triarachidonate content is 0.016–0.022%. Data are also reported on the triarachidonate content of different tissues. S. MORGULIS

Rapid method for the analysis of brass and copper. W. KOLLREPP. *Z. Ges. Giessereipr.* **51**, 60(1930); *Chimie & industrie* **24**, 601(1930).—The method described is similar to a procedure commonly used except that Cu is detd. by difference. The

sample is dissolved in HNO_3, any residual SnO_2 is filtered off and weighed, the Pb is pptd. as $PbSO_4$ and the Cu pptd. as a sulfide with H_2S. The sulfide ppt. is discarded, the Fe^{++} is oxidized and pptd. as $Fe(OH)_3$, then the Ni is detd. on the dimethylglyoxime and finally the Zn is pptd. as ZnS and weighed as ZnO. A. P.-C.

Volumetric determination of the fluoride ion. A. KURTENACKER AND W. JURENKA. *Z. anal. Chem.* **82**, 210–7(1930).—*Titration with Al salt.*—When a soln. of a sol. Al salt is added to a soln. contg. F^- the following reaction takes place: $6\,F^- + Al^{+++} = AlF_6^{---}$. If methyl red is present, it will show an acid reaction as soon as an excess of Al salt has been added. Dissolve $^1/_6$ mole of $AlCl_3.6H_2O$ in 1 l. of water and filter if necessary. Test to see if any free acid or base is present as follows: Add 20 cc. of the Al soln. slowly to 10 cc. of an approx. 8% soln. of KF which has been made neutral to phenolphthalein. If free acid is present, the soln. will remain colorless; in this case titrate with *N* NaOH soln. until the pink phenolphthalein color is obtained. If free base is present, as is usually the case, the soln. is colored a deep red and direct titration with acid does not give a good result because of the formation of basic double fluorides. Add, therefore, a measured excess of *N* acid and titrate back with *N* NaOH. In accordance with the result obtained in this preliminary expt., add NaOH or HCl to the Al soln. and repeat the above test; a barely perceptible reddening should take place and the color should disappear when 5 cc. of the soln. is treated with 1 drop of 0.1 *N* HCl. It is better to leave the $AlCl_3$ soln. barely alk., rather than slightly acid. Allow the $AlCl_3$ to stand a week or two before using or age it by boiling for a short time. To det. the titer of the $AlCl_3$ soln. prep. a soln. of known F^- content by taking about 1.5 g. of pure 35% HF in a Pt dish and titrating with carbonate-free NaOH. Take a measured vol. of the F^- soln., dil. to 50–100 cc., add an excess of NaCl so that some will remain undissolved at the end of the titration, add methyl red, heat to 70–80° and titrate with the $AlCl_3$ soln. until a permanent red coloration is obtained. In the titration of an unknown F^- soln. proceed similarly, first making the soln. neutral to phenolphthalein, which requires particular care if carbonates are present. In that case it is better to use methyl red in the preliminary neutralization and toward the end heat to 30–40°. The above method serves for the titration of 0.02 g. or less of F^-. It is unsuccessful if phosphates, borates or any acid forming an insol. salt with Al is present. *Titration with Ce^{+++} soln.*—In this case insol. CeF_3 is formed. The method is sensitive to the presence of SO_4^{--}. The procedure is similar to that outlined above. *Titration with H_3BO_3.*—The procedure is based on the following reaction: $4\,F^- + H_3BO_3 = BF_4^- + 3OH^-$. Prep. a satd. soln. of H_3BO_3. Take 15–30 cc. of the F^- soln., neutralize with phenolphthalein and add an excess of H_3BO_3 soln. Add an equal vol. of alc. and 10–20 g. of KCl. Titrate at room temp. with *N* acid, using methyl orange as indicator. W. T. H.

The use of copper tubes in organic elementary analysis. N. KLATSCHIN. *Z. anal. Chem.* **82**, 133–44(1930).—The substitution of Cu tubes for glass tubes in org. combustions is warmly recommended. The work is easier and less time is required. One Cu tube will serve for at least 25 combustions. If the substance contains N, halogens or small quantities of S, the tube should contain, besides the usual CuO layer, some $PbCrO_4$-pumice and a mixt. of PbO_2, finely divided Ag and asbestos. The stoppers at the end of the tube are kept at about 90° by means of hot water jackets near the ends of the tube; there is then no condensation of H_2O in the tube and the stoppers do not burn. A secondary stream of O_2, or air, is provided by making a small opening near the back end of the tube. In heating the tube, one starts at the CuO filling and goes step by step toward the boat and not in the reverse manner as is frequently done. The disadvantage of not being able to watch the combustion is more than compensated by the use of a higher temp. which results in more perfect oxidation. Full details are given. W. T. H.

New reaction for formic acid. M. MASRIERA. *Anales soc. espan. fis. quim.* **28**, 916–31(1930).—The sample is dissolved in the least possible amt. of cold Et_2O or $CHCl_3$, 2 vols. of petroleum ether and then a little $PbNH_2$ are added. Crystn. of white needles, m. 64°, shows the presence of HCO_2H. The distribution coeffs. of HCO_2H and HOAc in Et_2O-H_2O and $CHCl_3$-H_2O, and extn. of aq. HCO_2H and HOAc by Et_2O were detd. These processes are not quant. Various theoretical possibilities of the reaction are suggested. E. M. SYMMES

Volumetric determination of acetone. ANDRE MEYER AND SUZANNE MATHEY. *Compt. rend.* **191**, 490–3(1930).—The method depends upon the pptn. of the acetone with an acid soln. of $HgSO_4$ and detg. the excess Hg by titrating with KCNS. The method of Denigès is used for the pptn. As reagent, use a soln. obtained by dissolving 50 g. of HgO in 200 cc. of concd. H_2SO_4 and dilg. to 1 l. In a flask, mix 25 cc. of

reagent with an equal vol. of the soln. contg. acetone and heat on the water bath for 10 min. Cool, filter off the acetone ppt. and wash with water. Dil. to, say, 100 cc. and take 0.1 for the titration of the Hg with KCNS, ferric alum being used as indicator. Det. the concn. of the reagent in the same way. According to D. the formula of the ppt. is ($2\ HgSO_4.3HgO_3$) $4C_3H_6O$ but Van Slyke gives the formula $3HgSO_4.5HgO.2C_3H_6O$. The method has been used for aq. solns., solns. in MeOH, com. acetone, acetone in urine, etc. The assumption that the ppt. contain 28% acetone seems to give the best results. W. T. H.

Systematic study of the reaction of diphenylbenzidine in sulfuric acid solution with nitrates in the presence of chloride. Comparison with the diphenylamine test. H. RIEHM. *Z. anal. Chem.* **81**, 439–47(1930); cf. *C. A.* **24**, 5670.—The similarity of the 2 tests is pointed out. The resulting color is deeper and the shade more bluish violet, as it should be, the greater the concns. of H_2SO_4, nitrate and chloride and the lower the concn. of excess diphenylbenzidine. Rise in temp. makes the test for nitrate more delicate. The permanence of the color obtained depends upon the ratio of reagent to the nitrate content. In comparison with the diphenylamine test, the depth of color is about twice as great and the stability of the violet-blue color is much more sensitive to the presence of excess diphenylbenzidine. For these reasons the diphenylamine test for nitrate is preferable except when it is desirable to have a somewhat greater sensitivity and a more rapid reaction. W. T. H.

Bromo-potentiometric titration of β-naphtholsulfonic acids in presence of each other. I. Shaeffer acid, R. acid and G. acid. STANLEY D. FORRESTER AND DAVID BAIN. *J. Soc. Chem. Ind.* **49**, 410–2T(1930).—The G. salt in soln. does not brominate at room temp. in the presence of sufficient H_2SO_4. Shaeffer and R. salts monobrominate quantitatively in H_2SO_4 soln. at room temp. and can be titrated in the presence of G. salt with standard bromide-bromate soln. if the initial concn. of H_2SO_4 is 10 *N*, the end point being detd. potentiometrically. The method is described in detail and typical titration curves are shown. W. T. H.

Production, application and detection of MeOH and isopropyl alcohol (BODENDORFF) **16**. Galician W ores (PARGO, ARANGO) **9**.

8—MINERALOGICAL AND GEOLOGICAL CHEMISTRY

EDGAR T. WHERRY AND J. F. SCHAIRER

Hydrothermal experiments on solubility, hydrolysis and oxidation of iron and copper sulfides. FRED FOREMAN. *Econ. Geol.* **24**, 811–27(1929).—The manner in which metallic sulfides are carried in hydrothermal solns. has been a question to geologists, and the object of these expts. was to measure the solubilities of Fe and Cu sulfides under conditions similar to those of their transportation in hydrothermal solns. Previous work is reviewed, expts. are described in detail and tables are given to show results. Conclusions: In the presence of H_2O, formation of Fe or Cu sulfides, oxides or hydroxides depends on the possibility of escape of the generated gases. When sulfide is in contact with H_2O, H_2S is generated at 150–250°. The solubilities of pyrite, pyrrhotite and chalcocite in hot water are very small. Sulfides are not dissolved to any extent by 0.1 *N* $NaHCO_3$ or Na_2S solns., and pyrite does not dissolve in more concd. solns. of Na_2S. The presence of H_2S does not increase the soly. of the sulfides, but actually prevents it. Iron and cuprous sulfides are not carried in igneous solns. as such at the temps. of the expts., nor does Fe seem to be carried as an alk. double sulfide, unless it be in enormously concd. alk. sulfide solns. It seems probable that the Fe was carried as some other compd. and pptd. by chem. reaction with a S compd. as the sulfide. ALICE W. EPPERSON

A diabase contact-metamorphic mineral deposit in Ontario. FRELEIGH F. OSBORNE. *Econ. Geol.* **24**, 722–32(1929).—Reduction of ferric compds. in the presence of limestone is indicated. O. concludes that the quartz magma intruded the Huronian rocks, and the volatile constituents altered it to an amphibolite. The emanations escaped, altering the country rock to form metamorphic silicates. Ferric salts were reduced to magnetite by the action of limestone. The deposit is unusually telescoped. The magnetite is similar to that of the Cornwall Dist., Pa., and Iron Springs, Utah. Pyrite-chalcopyrite and sphalerite-galena zones show features in common with Siberian deposits. The Co zone has striking similarity to deposits of Cobalt, Ontario. ALICE W. EPPERSON

Geology and ore deposits of Boulder Belt, Kalgoorli. F. L. STILLWELL. Geologi-

cal Survey Western Australia, *Bull.* **94**, 110 pp.(1929).—The rocks surrounding the Boulder Belt are ancient sediments, older and younger green-stones, porphyrites, jaspers and graphitic schists. A relationship exists between the lodes and the acid and basic forms of the porphyry dikes. The lode frequently clings to the wall of a dike. The dip of the lode is generally steep and is rarely less than 70°. The main hope of the future discovery of payable ore at depth lies at the southwestern end of the field. A. E. MIX

Gold deposits of the Guayana highlands, Venezuela. W. H. NEWHOUSE AND GUILLERMO ZULOAGA. *Econ. Geol.* **24**, 797–810(1929).—The features of the Venezuelan deposits are described, and the presence of similar features in connection with the Au belt in the Guianas is pointed out. The source of the Au in the Venezuela-Guiana region is considered the closely assocd. diabase rocks. It is stated that the Au-bearing solns. probably came from a magma chamber that had just given off rhyolite-porphyry. Occurrence of tourmaline suggests that the more siliceous intrusives are closely related to the Au veins. ALICE W. EPPERSON

Economic relations of silver to other metals in argentiferous ores. CHARLES W. MERRILL, *et al.* Bur. Mines, *Econ. Paper* **10**, 29 pp.(1930).—The % of total world Ag production contributed by ores whose Ag content represents the indicated proportion of the value of the ore is: Ag 0–10% of ore value, 12.3% total Ag production; 10–20, 21.0; 20–30, 10.3; 30–40, 9.0; 40–50, 5.0; 50–60, 1.7; 60–70, 5.4; 70–80, 8.3; 80–90, 16.9; 90–100, 10.1, resp. More than half the total Ag production is from ores to which Ag contributes $< 1/2$ its value and $1/3$ from the 0–20% classes. A table shows the % of value contributed by each of the other metals in the above classes. Analyses of ores by countries and districts are given. ALDEN H. EMERY

Studies of the origin of the Wabana iron ore of Newfoundland. A. O. HAYES. *Econ. Geol.* **24**, 687–90(1929).—Observations indicate that this ore during formation was exposed to oxidizing conditions in a shallow marine basin. The ferruginous beds are sedimentary, and there is an overlying deposit of oölitic Fe sulfide, free from oxides. The chamosite, a hydrated Fe silicate, was deposited directly from Ordovician sea water, and the same origin is suggested for the hematite, although the possibility is pointed out of the oxidation of the chamosite as a source of the hematite. H. thinks both sources are probable. The mineralogical characteristics and chem. compn. of the ore are given in tables. ALICE W. EPPERSON

Origin of chromite deposits. LLOYD W. FISHER. *Econ. Geol.* **24**, 691–721 (1929).—Chromite ores and minerals assocd. with them throughout the world are described. Origin of chromite is discussed in detail, giving criteria on which conclusions are based. Chem. data indicate that there is no relation between the compn. of chromite and its mode of occurrence, its crystn. or the degree of alteration of chromiferous rock; also that the mineral chromite cannot be expressed by a definite chem. formula. Hydrothermal solns. causing serpentinization have played an important role in the formation of chromite deposits by dissolving magmatic chromite and redepositing it with the hydrothermal silicates. ALICE W. EPPERSON

Deposits of titanium-bearing ores (domestic and foreign). E. P. YOUNGMAN. Bur. Mines, *Information Circ.* **6386**, 41 pp.(1930).—Deposits in 23 states and 46 foreign countries are described. ALDEN H. EMERY

Feldspar. OLIVER BOWLES AND C. V. LEE. Bur. Mines, *Information Circ.* **6381**, 21 pp.(1930).—A general discussion of feldspar is given under the following headings: varieties, phys. properties, origin, occurrence, weathering, uses, specification and tests, mining, milling, grinding capacity, marketing, production centers, foreign deposits, production, imports and exports, tariff, prices and a $2\,1/2$ p. bibliography. A. H. E.

The graphite deposits of Louisa, Quebec. GEO. W. BAIN. *Econ. Geol.* **24**, 733–52 (1929).—The deposits described lie in Wentworth Township in Argenteuil Co., Quebec. The graphite occurs in columnar, flake and massive form. The columnar deposits are assocd. with veinlets of albite and quartz, while the flake form occurs in hydrothermally altered skarn. Geological maps of the region are given, and the deposits are described in detail. B. concludes that the graphite is introduced material, replacing the earlier silicate minerals, the introduction being independent of, and later than, the silication of the limestone from which the skarn was made, and brought about by solns. of silico-alkalic type which are usually responsible for uralitization and chloritization. ALICE W. EPPERSON

Summary of results of investigation on brines and muds of saline lakes in Ukrainia and Kuban regions. E. S. BURKSER. *Ann. inst. anal. phys.-chim.* (Leningrad) **4**, No. 2, 133–62(1930).—An outline is given of methods of chem. and phys. investigation of brines and medicinal muds, their radioactivity and the history of lake formation. ROBERT SCHLESS

Investigations of medicinal mud deposits of the Saki Lake. S. A. SHCHUKAREV, S. K. KOSMAN AND O. M. KOSMAN. *Ann. inst. anal. phys.-chim.* (Leningrad) **4**, No. 2, 163–95(1930).—Analyses of brines and muds are given, as well as other data concerning the lake. ROBERT SCHLESS

Review of work of the Research Laboratory of the Central Administration for social insurance sanatoriums in Evpatoria. A. F. SAGAIDACHNUII. *Ann. inst. anal. phys.-chim.* (Leningrad) **4**, No. 2, 207–16(1930).—Methods of analysis and study of medicinal muds employed at the lab. are outlined. ROBERT SCHLESS

Study of equilibrium in natural soda lakes. Ternary system: sodium sulfate-sodium carbonate-water. N. S. KURNAKOV AND S. Z. MAKAROV. *Ann. inst. anal. phys.-chim.* (Leningrad) **4**, No. 2, 307–63(1930).—There are a no. of lakes contg. Na carbonates in Russia. It is pointed out that efficient production of Na_2CO_3 from these lakes should be preceded by the study of salt equil. and conditions of salt sedimentation at various temps. There are present in these lakes: Na_2CO_3, Na_2SO_4 and NaCl. From the study of the system Na_2SO_4–Na_2CO_3–H_2O, the conclusion is drawn that Na_2CO_3 in crystg. out of soln. will contain Na_2SO_4 in solid soln., and that the most unfavorable temps. for crystn. of pure Na_2CO_3 are 25–50°. The more salts there are in soln. the more Na_2SO_4 will be taken up by the Na_2CO_3. Introduction of one salt into the hydrate of the other, as a solid soln., decreases vapor tension and increases stability. ROBERT SCHLESS

Work of the Karabugaz expeditions. III. Expedition of 1927. B. L. RONKIN. *Akad. Nauk U. S. S. R. Material* No. 73, (*Karabugaz and Its Industrial Importance, 3rd Ed.*) 139–68(1930); cf. *C. A.* **23**, 2396.—The expedition had for its purpose further study of Glauber salt production, its dehydration in natural conditions, impurities in the finished product, investigation of drinking water supply of the region and of transportation of Glauber salt, also investigation of other salt lakes of the region. ROBERT SCHLESS

Rocks of the Pribilof Islands. HENRY S. WASHINGTON AND MARY G. KEYES. *Am. J. Sci.* [5], **20**, 321–38(1930).—The lavas of these wholly volcanic islands are mostly basaltic, with or without olivine. A nephelite-basanite from St. Paul is described. It is shown that trachyte occurs on St. George. ALDEN H. EMERY

Peculiar mud-grains and their relation to the origin of glauconite. JUN-ICHI TAKAHASHI AND TSUGIO YAGI. *Econ. Geol.* **24**, 838–52(1929).—The chem. and mineralogical features of these mud-grains in certain localities around Japan were studied in connection with the origin of petroleum. The mud-grains are widely distributed in estuarine and littoral regions, and are considered the excretions of mud-eaters. They become glauconitized under favorable conditions. Tables showing chem. analyses are given. The origin of glauconite in littoral deposits of different geological ages is thus suggested to be, in part at least, from fossil coprolites. ALICE W. EPPERSON

Cellular structure in limonite. P. F. BOSWELL AND ROLAND BLANCHARD. *Econ. Geol.* **24**, 791–6(1929).—The shape of the cellular pattern in limonite boxwork is governed largely by the fracture pattern inherent to the articular sulfide nodule prior to oxidation. In some cases, as chalcocite and galena, the pattern may be modified by other factors, the nature of which is discussed. Rigidity of the boxwork depends chiefly on the content of supergene silica. Less siliceous types do not survive long unless protected against even mild erosion. Chem. attack, and consequent re-soln., of the cellular boxwork during oxidation of surrounding sulfides is limited because of low soly. of limonitic jasper in acid. ALICE W. EPPERSON

Sn metallurgy in Great Britain—1929 (FITZPATRICK, ELFORD) **9**. Milling methods and costs at the Nacozari concentrator of the Phelps Dodge Corporation, Nacozari, Sonora, Mexico (ROSE, CRAMER) **9**. Milling methods and cost at the conglomerate mill of the Calumet and Hecla Consolidated Copper Co. (BENEDICT) **9**. The Bannockburn Au discovery (RICKABY) **9**. Quantitative spectral-analysis by means of x-rays (v. HEVESY) **3**.

9—METALLURGY AND METALLOGRAPHY

D. J. DEMOREST, H. W. GILLETT AND RICHARD RIMBACH

The refinery of the Mond Nickel Company, Limited, at Clydach, South Wales. ANON. *Engineering* **130**, 349–51, 422–5, 454–7(1930). E. H.

International Nickel Co. LORD MELCHETT. *Mining J.* **170**, 743(1930).—A brief

description is given of the various concentrators and refineries of this Co. in Canada.
ALDEN H. EMERY

Mechanical installations of the lead and zinc district at Letiuche, East Siberia. WÖBLING. *Metall u. Erz* **27**, 497-504(1930).—Power stations, crushing and grinding, and concg. equipment in use at the Pb and Zn mines in this district are described.
H. STOERTZ

Milling method and cost at the conglomerate mill of the Calumet and Hecla Consolidated Copper Co. C. HARRY BENEDICT. Bur. Mines, *Information Circ.* **6364**, 22 pp.(1930); cf. *C. A.* **24**, 5682.—Cu occurs native as the cement in a conglomerate of felsite, feldspar porphyry and quartz porphyry. Complete liberation of values is impossible. Sands are leached and slimes floated. Flotation reagents are Na xanthate, CaO and pine oil. Feed for 1929 averaged 0.58% Cu, tails 0.109%, concentrates 35.05%. Recovery was 81.2%. The cost was 8.65¢ per ton of ore or 1¢ per lb. of Cu. Cupric NH_4 carbonate is the leaching agent. The cuprous salt formed by reaction with the native Cu is oxidized by air in towers. CuO is recovered by distn. and $(NH_4)_2CO_3$ returned to the cycle. Leading costs for 1929 were $23.02 per ton of sand, or 1.83¢ per lb. of Cu. The feed assayed 0.736 and the tails 0.108% Cu with an 85.3% extn.
ALDEN H. EMERY

Milling methods and costs at the Nacozari concentrator of the Phelps Dodge Corporation, Nacozari, Sonora, Mexico. E. H. ROSE AND W. B. CRAMER. Bur. Mines, *Information Circ.* **6358**, 38 pp.(1930).—Chalcopyrite accompanied by min. quantities of chalcocite, covellite and bornite with about 0.05% acid-sol. Cu, chiefly tenorite with some cuprite, is the economic mineral. The ratio of pyrite to chalcopyrite is 2:1. Some sphalerite, magnetite and hematite are present. About ¾ oz. Ag per ton of ore is assocd. with the chalcopyrite. Gang in the upper levels of the mine (20% of output) is hard latite breccia and in the lower levels it is hard andesite breccia. These flows are cut by intrusions of monzonite, diorite and quartz porphyry. Mill heads analyze Cu (total) 2.63, Cu (acid-sol.) 0.05, Fe 11.54, S 8.70, SiO_2 48.58, Al_2O_3 13.70, CaO 1.88, MgO 2.25, ignition loss + material unaccounted for 10.67%. This calcs. to chalcopyrite 7.22, chalcocite and bornite 0.10, tenorite, etc., 0.10, pyrite 11.53 and non-sulfide gang 81.05%. Costs for 1928 and 1929 per ton of dry ore (in cents) were: crushing and conveying 6.15, primary grinding 10.59, secondary grinding 11.70, flotation 10.53, concentrates handline 1.70, tailings 2.76, mill H_2O 1.79, assaying and sampling 1.37, mill dept. expense 4.71 and total 51.30. Pine oil is the frothing reagent; Et xanthate is the collector. The mill recovered 95.86% of the Cu from July to Dec., 1929; tailings assayed: Cu 0.13%, Ag 0.12 oz. and Au 0.001 oz. per ton; concentrates assayed: Cu 23.08%, Ag 5.80 oz. and Au 0.022 oz. per ton. ALDEN H. EMERY

The French aluminum industry. MAX DUVAL. *Bull. Soc. Ind. Rouen* **58**, 264-8 (1930).—A review of the Al industry in France, covering history, methods of production, properties, and uses of Al and its alloys. The latter include aviation, automobiles, elec. work, food and other chem. industries and building. I. H. ODELL

Lithium—the lightest metal. H. S. SPENCE. *Canadian Mining J.* **51**, 994(1930).—An outline of the present situation regarding Li ores in Canada. The Silver Leaf Mining Co. has opened a property about 10 miles northeast of Pointe-du-Bois, where the principal minerals found are lepidolite, spodumene and montebrasic (a variety of amblygonite).
W. H. BOYNTON

Application of light metals in mining construction. E. LOHRKE *Metall u. Erz* **27**, 521-4(1930).—Difficult operating conditions favor the application of light metals in mining machinery and structures. Ventilators, water pumps, safety lamps, pneumatic drills and compressors can advantageously be constructed wholly or in part of such light metal alloys as *silumin* and *lautal*.
H. STOERTZ

Gold, silver, copper, lead and zinc in Arizona in 1928. C. N. GERRY. Bur. Mines, *Mineral Resources of the U. S. 1928*, Pt. I, 761-815(preprint No. 25 published October 15, 1930).
E. H.

The Bannockburn gold discovery. H. C. RICKABY. *Canadian Mining J.* **51**, 1074-5(1930).—The preliminary official rept. describes outcrops and outlines the geological conditions.
W. H. BOYNTON

Occurrence and recovery of finely divided gold. J. TRAUBE. *Metall u. Erz* **27**, 526-7(1930).—Au occurs in a colloidal condition in many minerals. It can be recovered by finely grinding in a colloidal mill followed by flotation. Another method consists in heating at such temp. as will cause aggregation of the fine Au particles. T. has developed a method by which Au can be recovered from colloidal soln. by adsorption on a $BaSO_4$ filter. The red or violet colored $BaSO_4$ so obtained is mixed with glass

powder and heated to about 600°, at which point Au seps. in pieces about the size of pin heads. H. STOERTZ

Tin metallurgy in Great Britain—1929. A. S. FITZPATRICK AND HAROLD S. ELFORD. *Proc. Australasian Inst. Mining Met.* No. 78, 81–161(1930).—A description is given of geology, treatment plants at 9 mines (with flow sheets), ore dressing machinery, roasting practice including As recovery and refining of crude As_2O_3, magnetic sepn., costs of treatment, recovery of SnO from mill waste, flotation in Sn metallurgy, recovery of W, sampling, assaying, sale of Sn concentrates and smelting practice at 2 smelters. ALDEN H. EMERY

The world's resources of tungsten. HARALD CARLBORG. *Jernkontorets Ann.* **114**, 455–90(1930).—The occurrence, uses, consumption, prices, geographical distribution and statistics are discussed. H. C. DUUS

Galician tungsten ores. III. Analysis of Juno, Monte Neme, Casayo and A. Veiga y Vilacoba wolframites. I. PARGO AND AMPARO ARANGO. *Anales soc. españ. fís. quím.* **28**, 905–9(1930).—The chem. compn. of 5 wolframites is shown. A method of analysis of the residue insol. in HCl found in the Corti method is developed, and spectrographic detns. of the Ta_2O_5-Cb_2O_5 residue show it to be only Cb_2O_5. E. M. S.

Swedish iron ore: mining and transport. B. H. STROM. *Eng. Mining J.* **105**, 381–6(1930) W. H. BOYNTON

A process for the extraction of zinc and other metals from ores. H. EDWIN COLEY. *Trans. Inst. Mining and Met.* (London) **37**, 255–65, 265–96(1928).—Active C is considered a far better reducing agent than CO. The advantages claimed for this process which utilizes active C are: continuity of action, small fuel costs, in case of Zn, elimination of retort, complete reduction and almost complete extn. and small power charges. E. I. S.

Flotation of non-sulfidic minerals. G. GERTH. *Metall u. Erz* **27**, 527–9(1930).—Non-sulfidic minerals can be floated by addn. of oleic acid or Na oleate, but to prevent gang materials such as quartz and mica from likewise being floated it is necessary to add Na silicate and an acid or acid salt. Pptn. of the quartz and mica is due to the formation of a silicic acid gel. In an appendix to this article, W. PETERSEN describes the sepn. of oil from sand by flotation, using Na silicate and $FeCl_3$ to hold back the sand particles. H. STOERTZ

Concentration of Swedish iron ores. GUST. G. BRING. *Jernkontorets Ann.* **114**, 64–132(1930).—The concn. referred to is concn. to produce as nearly pure Fe mineral as possible. Magnetite ore can be concd. successfully by magnetic separators and concn. tables. Hematite can be concd. by concn. tables, by flotation or by magnetic roasting. The concn. table causes too great losses. Flotation appears to require extremely fine grinding which adds too much to the expense. Roasting to convert Fe_2O_3 to magnetic Fe_3O_4 was finally resorted to, the reducing agent being air-dried sawdust. It was found that the transformation took place with measurable speed at 300° but the speed increased up to 800°. Cooling of the roast should take place as rapidly as possible for hematite, and might advantageously be done in water since wet grinding is required. Limonites, however, should be cooled slowly in air from 400° to 500°. Photomicrographs indicate that the magnetized roast is a mixt. of Fe_3O_4 and FeO rather than a soln. Large-scale tests using generator gas as fuel showed that a concentrate of over 69% Fe could be obtained. The heat requirements were found to be 10.4% by weight of wood for a 40% ore, of which 30% is present as Fe_2O_3. For charcoal 4.8% by weight is needed. The product is in a very friable condition and easily crushed. Industrial installations have produced a concentrate with 68.32% Fe and a 92.7% recovery. H. C. DUUS

High-velocity hydraulic classification. LEONARD ANDREWS. *Trans. Inst. Mining and Met.* (London) **37**, 406–36(1928). E. I. S.

Core-binders. H. H. EBERT. *Iron and Steel Ind. and Brit. Foundryman* **3**, 363–4 (1930).—A discussion of natural and artificial core-binding materials and their uses are given. C. H. LORIG

Machine control of combustion in metallurgical furnaces of the iron and steel industry. J. F. SHADGEN. *Iron Steel Eng.* **7**, 490–2(1930).—"A survey of the realities and an appreciation of the possibilities." This analysis has mostly the fuel aspect and its relation to greater process economy and plant efficiency. The application of machine control to open-hearth furnaces results in: (1) increase in production; (2) decrease in fuel consumption per ton; (3) longer life of furnace; and (4) better and easier mech. operation. Complete machine control is essential; engineering application is necessary; and service and education of personnel are desirable. W. H. BOYNTON

Technical thermal measurements in cupola furnaces. W. Liesegang and W. Winkhaus. *Die Giesserei* 17, 529–34(1930).—The value for cupola furnace operation and supervision of measuring the amt. and pressure of the blast, and of detg. the compn. and temp. of the throat gases and the temp. of the molten Fe is detd., instruments to be used being discussed. Controlling the amt. and pressure of the blast is necessary, since these det. the coke consumption to a large degree. In agreement with others, it is found that continuous compn. and temp. detns. of the throat gases do not make for a more efficient supervision of the furnace. Measurement of the temp. of the tapped Fe is essential in the operation of furnaces, particularly when these have been newly constructed. J. Balozian

Acid hearth of copper-refining furnace. L. Katterbach. *Metall u. Erz* 27, 525–6 (1930).—Mixing the hearth material, ignition, soaking and handling the first charge are described. H. Stoertz

Furnaces and mills at Apollo Steel Co. A. L. Hollinger. *Blast Furnace & Steel Plant* 18, 1607–10(1930). E. H.

British and Continental open-hearth furnace steel works. H. C. Wood. *Engineering* 130, 373–7, 447–8(1930); *Iron Age* 126, 1299–1302; cf. *C. A.* 24, 5688. E. H.

The optical determination of high metallurgical temperatures—the melting point of iron. C. H. M. Jenkins and Marie L. V. Gayler. *Proc. Roy. Soc.* (London) 129A, 91–114 (1930).—The m. p. of Fe has been detd. by 2 methods. In one, a closed refractory tube is immersed in the center of a mass of metal to serve as a black body enclosure for sighting an optical pyrometer. In the other, a bubble is blown down into a surface of metal. The pyrometer was calibrated by observing the e. m. f. of a Pd thermocouple in a black body enclosure. The m. p. of Pd (1555°) is indicated by the breaking of the metallic circuit, and over a further temp. range by means of the sector method, the m. p. of Au (1063°) being used as the other fixed temp. The m. p. of Fe was found to be 1527° ± 3°. Refractories were made of hard pure alumina. Difficulties were also encountered in that metal vapors penetrated the refractories and emitted radiations to the pyrometer on condensation, but this difficulty was overcome by ventilation with H_2. H. C. Duus

Basic slags from blast furnaces and their utilization for manufacturing cement. P. P. Budnikov and V. M. Lezhoev. *Zhur. Prikladnoĭ Khim.* 3, 669–74(1930).—Properties of unsatisfactory slags are improved by adding $CaSO_4$ to molten slags. V. Kalichevsky

Modern die-casting practice. Ernest V. Pannell. *Engineer* 150, 168–9, 193–4 (1930).—The advantages of various *Zn alloys* are discussed. D. B. Dill

The application of Röntgen rays to steel castings. Herbert R. Isenburger. *Die Giesserei* 17, 893–6(1930).—Descriptive. J. Balozian

Casting operations in iron and steel foundries. H. H. Ebert. *Iron and Steel Ind. and Brit. Foundryman* 4, 3–4(1930). C. H. Lorig

Bessemer steel, its properties and use. J. R. Miller. *Blast Furnace & Steel Plant* 18, 1602–5(1930). E. H.

The new metal microscope "Seibert-Metallus." B. Blumenthal. *Die Giesserei* 17, 826–9(1930).—A descriptive lecture. J. Balozian

Production of special pig iron and its use in foundries. Paschke. *Metallbörse* 20, 2051–2(1930).—By use of bauxite, limestone and residue-poor ore or scrap in the blast furnace, a special pig iron, with the following av. compn., is obtained: C 4.5–5, Si 0.10–0.30, Mn 0.50, S 0.02 and Al 0.015–0.02%. The metallic Al probably so lowers the CO pressure in the melt that no gas can escape during the solidification. The resulting undercooling capacity permits favorable graphite formation; the structure of the gray special pig iron is purely pearlitic. It is very suitable as added iron in the production of gray iron with very good tenacity; the fluidity of the alloy is uncommonly good and the tendency to funnel formation is minimal. In several foundries the special pig iron has replaced Swedish charcoal pig iron and Indian pig iron. The slag is composed principally of about 7% SiO_2, 40% CaO and 45% Al_2O_3; it is ground and used directly as blast-furnace smelting cement, which is as efficient as elec. furnace cement. Wellington

Long heating periods at high temperatures affect gray cast iron. R. S. Macpherran and H. Krueger. *Foundry* 58, 103–6, 111–2(1930).—Tests conducted by various investigators are cited. The authors detd. the effect of heat on various types of gray cast Fe from 800° to 1100° F., showing changes in combined C, Brinell hardness, tensile and transverse strength. One series was heated to various temps. for 500 hrs. intermittently, while the other was heated continuously. Tests showed tensile strength at elevated temps. The best results were obtained from a series contg. Cr.

The European practice is outlined. Results of investigations are tabulated.
V. S. POLANSKY

X-ray study of some tungsten magnet steel residues. W. A. WOOD. *Phil. Mag.* [7], **10**, 659–67(1930).—The carbides were isolated by dissolving the iron from a no. of steels with analyses averaging W 6, C 0.72, Ni 0.19, Mn 0.28, Si 0.14, S 0.023 and P 0.027%. Photograms showed the presence of W carbide, mixed Fe_4W_2C and a 3rd unidentified compd. No cementite was found. ARTHUR FLEISCHER

Metallographic investigation of vanadium steels. MASAKICHI OYA. *Sci. Repts. Tohôku Imp. Univ.*, 1st Ser., **19**, 331–64(1930).—A systematic investigation of V steels was carried out by means of dilatometric and magnetic analyses, and microscopic observation; an equil. diagram was proposed, from which the following result was deduced: The soly. of C in γ-solid soln. markedly decreases by addn. of V. In the region of γ-phase, 3 primary surfaces exist on which α-phase, Fe_3C and V_4C_3 begin to sep., resp. The A_1 point, that is eutectoid temp. in the Fe–Fe_3C system, is raised by 15° by the addn. of 0.5% V, remaining const. on a further addn. of V; the binary eutectoid reaction ($\gamma \rightleftharpoons \alpha + V_4C_3$) takes place in the temp. range from 745° to about 1330°. A non-variant reaction ($V_4C_3 + \gamma \rightleftharpoons Fe_3C + \alpha$) takes place in the vicinity of the compn. of 0.5% V and 0.9% C. Finally, from the results of the present investigation, several phenomena, which have remained unsolved hitherto, are satisfactorily explained.

Alloy steels for industrial purposes. R. L. DUFF. *Petroleum Mech. Eng.*, Oct. 6–8, 93–7(1930).—The need for accurate data on construction materials is becoming more urgent, especially in the oil industry where increasing temps. and pressures create the necessity for new designs and new alloys and data pertaining to them. The creep of metals and phys. consts. such as the modulus of elasticity, Poissan's ratio, coeffs. of thermal expansion, heretofore but little considered, are becoming increasingly important; the investigation of these at high temps. and pressures presents special difficulties. There is a discussion of some of the work that must be done, some of the research that is now being carried on, together with a description of some of the app. and a few results. WELLINGTON

Cupping test for aluminum sheet. ROBERT J. ANDERSON. *Metal Ind.* (London) **37**, 265–8(1930).—As a measure of drawability, the most reliable and, at the same time the most practical, test is the cupping test. For making the tests, the 2 principal machines used are the Olsen and Erichsen testers. Values obtained in the cupping test depend upon the temper, thickness, compn. and grain size of sheet. The elongation and tensile strength combined influence cupping values. Appearance of the fractured dome of cupping piece is of importance. Results of the test are tabulated.
V. S. POLANSKY

Aluminum—the light metals and their alloys. PAUL MELCHIOR. *Z. Ver. deut. Ing.* **74**, 1267–72(1930).—The properties of the technical "light-metals," *i. e.*, Al, Mg, and their alloys with other metals have been collected and tabulated in the "Aluminum Book" of the author (cf. *C. A.* **23**, 4663). The most important properties for the designer are given, elec. and thermal consts. of the light rolling metals and cast alloys, tensile strength as function of the chem. compn. and pre-treatment, admissible stresses and constructive utilization of the low sp. gr. Most of these properties depend on the purity of the metal and kind of alloy. Rolling metals are: (1) pure Al; (2) refined Al alloys of high tensile strength; (3) refined Al alloys of high elec. cond.; (4) Al alloys of especially high resistance against corrosion; (5) electron. Cast alloys are: (*a*) Al alloys with addns. mainly of Cu, Zn, Si; (*b*) refinable Al-cast alloys; (*c*) electron. Numerical figures of most of the above-mentioned properties are given and tabulated, and fields of application named. All light metals, even if containing iron in comparatively high amounts, are non-magnetizable. M. HARTENHEIM

Aluminum alloys for aircraft-engine piston and cylinder heads. A. J. LYON. *Aeronautical Eng.* (*A. S. M. E. Trans.*) **2**, 257–69(1930).—See *C. A.* **24**, 3743.
E. C. K.

Nature of eutectoid transformation of aluminum-bronze. II. Effect of quenching velocity. ICHIJI OBINATA. *Mem. Ryojun Coll. Eng.* **3**, No. 2 B, 87–94 (reprint) (1930); cf. *C. A.* **24**, 1068.—An evolution of heat between 500° and 400° on water quenching is due to the transformation $\beta \longrightarrow \beta'$; the resulting acicular structure is an intermediate structure of this change. The homogeneous structure resulting from cooled-toluene quenching is a single solid soln. of the β-phase. Upon cooling the alloy at a certain velocity less than water quenching, the acicular pattern disappears and an apparently homogeneous structure, regarded as the β'-phase and having the max. Brinell hardness value, appears; the segregation of the α-phase occurs independently of the martensitic needles. WELLINGTON

Artificial aging of duralumin and superduralumin. K. L. MEISSNER. *Engineering* **130**, 473–5(1930).—See *C. A.* **24**, 5268. E. C. K.

Magnetic properties of permalloy with internal strains, and their influence through stretching and compression. OTTO VON AUWERS. *Wiss. Veröffentlich. Siemens-Konzern* **9**, 262–93(1930).—The magnetic properties of compound wires, consisting of a permalloy sheath surrounding a central core, were studied after drawing both before and after heat treatment. By proper choice of core material, the permalloy sheath was subjected to various internal strains, while the corresponding external stresses were applied by stretching or the use of hydraulic pressure. The effects of these stresses upon the magnetic properties are shown by a no. of tables and curves exhibiting the influence of stretching and compression on the initial magnetization curve, the μ-curve, max. permeability, remanence, coercive force and position of the hysteresis loops. Under the influence of stretching the hysteresis loops seem to be tipped to a definite axis passing through the origin as if there were 2 fixed points on the increasing and decreasing branches, the coördinates of which are independent of the load. Pressure in general affects only coercive force and produces an effect opposite to that produced by stretching. The effects on hysteresis of regulated stresses seem to be the same as those produced by unregulated stresses (*e. g.*, those due to impurities or working) but this is not the case with remanence and coercive force.
W. W. STIFLER

The evaluation of Röntgen film densograms by cross-sectional diascopy of metals and alloys. WILLI CLAUS. *Die Giesserei* **17**, 745–9(1930).—The method of obtaining densometric curves from the röntgenograms of cast metals and alloys is briefly described, and is applied to studying the structure of the GBz 10 of C. and Goeke (*C. A.* **23**, 5143). These investigations show that densometry may be advantageously employed in metal foundries. Densograms (10) of sections of the cast bronze alloy GBz 10 with the corresponding röntgenogram positives are shown. J. BALOZIAN

X-ray study of the constitution of some copper-nickel-aluminum-manganese alloys. LYMAN J. WOOD. *J. Am. Chem. Soc.* **52**, 3833–8(1930).—Methods and app. used are described and results tabulated. Both the photomicrographs and x-ray patterns show that these alloys are in the main α-solid solns. Some evidence for a second constituent is presented but complete identification has not yet been made. V. S. POLANSKY

The shrinkage of metals and alloys. F. SAUERWALD *Die Giesserei* **17**, 793–5(1930).—Expts. are made to det. if the shrinkage nos. of metal or alloy castings are related to their coeffs. of expansion or to various other influences during the pouring and solidification. The castings are made in a V-shaped quartz ladle, thereby eliminating these influences and allowing the choice of any gas atm. or cooling velocity. The results of these and previous investigations (Sauerwald, *C. A.* **23**, 5455) of pure metals belonging to the regular crystal system show that the shrinkage nos. may be calcd. with exactness from the neg. coeffs. of expansion (if the influence of gases is excluded)
J. BALOZIAN

The shrinkage of copper-tin alloys. F. BOEHM AND F. SAUERWALD. *Die Giesserei* **17**, 841–9(1930).—The shrinkage of various Cu-Sn alloys (contg. 40%, 38.36% (Cu_3Sn), 31.82% (Cu_4Sn), 10, 5, 4, 2.5% Sn) is detd., the specimens being fused and solidified in a quartz ladle in either an A or H_2 atm. The thermal effects are studied by use of the Cu-Sn equil. diagram of Bauer and Vollenbruch (*C. A.* **18**, 2676). The av. values of the total shrinkages of the alloys are: 40% Sn = 2.38%, 38.36% Sn = 2.53%, 31.82% Sn = 2.02%, 10% Sn = 1.28%, 5% Sn = 1.56%, 4% Sn = 1.77%, and 2.5% Sn = 1.82%. The total shrinkage may be calcd. from the coeff. of expansion for small temp. differences. In general, the shrinkage curves of the alloys are horizontal until solidification is complete and then drop suddenly (indicating that shrinkage is taking place). However, when solidified in a H_2 atm., alloys in the α-mixed crystal field show a strong expansion after the horizontal followed by shrinkage, but if solidified in an A atm. these show a shrinkage after the horizontal followed by an expansion and finally by shrinkage. The expansion is proportional to the liquidus interval and decreases with the Sn content of the alloy. J. BALOZIAN

The influence of nickel on the temperatures of the metastable and stable A_1-transformation of eutectic iron-carbon and iron-carbon-silicon alloys. The graphite eutectoid. A. MERZ AND F. FLEISCHER. *Die Giesserei* **17**, 817–25(1930).—Since the results in the literature are not in agreement, the influence of Ni (0–3%) on the metastable and stable A_1-transformation (I) temps. of Fe-C and Fe-C-Si (contg. up to 3% Si) alloys is investigated for the velocity 0°/min. The metastable I temp. decreases linearly with increasing Ni content (12°/1% Ni) and is increased initially by Si, this increase becoming progressively smaller with increase in Si. The lowering of the temp.

of Ac_1 by Ni is less than that of Ar_1, while the increase in Ac_1 on addn. of Si is greater than that in Ar_1. This hysteresis increases with increasing Ni and Si contents of the alloys, being smallest in those contg. Ni alone. The stable I temp. is increased linearly with increase in Si (31°/1% Si), and is linearly decreased with increase in Ni (12°/1% Ni). The metastable and stable I temp. surfaces in dependency on the Ni and Si contents are continuous, the former lying below the latter. The existence of the graphite eutectoid is affirmed. Micrographs (4) are given. J. BALOZIAN

Silicon-copper alloys and silicon-manganese-copper alloys. E. VOCE. *Engineering* **130**, 441–3(1930).—See *C. A.* **24**, 5270. E. C. K.

New silicon-zinc-copper alloy. E. VADERS. *Metal Ind.* (London) **37**, 315–8, 465–8(1930).—See *C. A.* **24**, 5270. E. C. K.

Equilibrium diagram of the lead–tin system. KOTARO HONDA AND HITISABURO ABE. *Sci. Repts. Tohôku Imp. Univ.*, 1st Ser., **19**, 315–30(1930).—The equil. diagram of the Pb–Sn system has been studied by differential thermal analysis. It was confirmed that the heat evolution occurring at about 160° just below the eutectic point is due to a rapid decrease in soly. of the β-phase in the α solid soln., with the fall of temp. Thus the equil. diagram of the system was greatly simplified by omitting a horizontal line at about 160°.

Change of electric resistance produced in cold-worked metals by annealing. *Sci. Repts. Tohôku Imp. Univ.*, 1st Ser., **19**, 265–82(1930).—The elec. resistance of cold-worked metals decreases as the result of annealing them in a vacuum at comparatively low temps., but this resistance is generally increased by annealing them at higher temps. It has also been found that the resistance of Cu is considerably increased by the occlusion of H gas. An explanation of these changes of elec. resistance of metals caused by cold-working and annealing is given.

Effect of hydrogen sulfide on wire rope. L. W. VOLLMER AND B. B. WESTCOTT. *Petroleum Mech. Eng.* Oct. 6–8, 57–61(1930).—Mol. H cannot induce brittleness in steel. At. or nascent H ($H_2S + Fe \longrightarrow FeS + 2H$), absorbed by the intercryst. material, rapidly causes embrittlement. The effect is largely a surface reaction. A method was devised for detg. degree of embrittlement. Cold-drawn plain C steel wires did not become embrittled when treated with perfectly dry H_2S or immersed in water-free crude oil satd. with H_2S, but rapidly became brittle when treated with moist H_2S or immersed in oil-well brine satd. with H_2S; the degree of embrittlement is proportional to the amt. of cold work and has no relation to the C content while in dead-soft annealed plain C steels the degree of embrittlement is inversely proportional to the C content. Steel wire embrittled by H_2S recovers most of its original ductility after standing for a time or by gentle baking for several hrs. Embrittlement may be prevented by a coating that prohibits the contact of the H_2S with the steel. Zn, Pb and Cu offer excellent protection; Sn is worthless. WELLINGTON

The nature of corrosion and its measurement. G. DORFMÜLLER. *Deut. Zuckerind.* **55**, 981–2(1930).—A discussion. J. F. LEETE

A new method for quickly testing the corrosion of different metals simultaneously. G. GOLLNOW. *Die Giesserei* **17**, 665(1930).—The app. of Tödt (*Chem.-Ztg.* **29**, 567), manufd. by Ströhlein & Co., Braunschweig, Wolfenbütteler Str. 41, for electrically measuring the corrosion of metals in corrosive liquids is briefly described and directions for its use are given. J. BALOZIAN

Purely chemical methods for prevention of corrosion of metals. JEAN COURNOT AND JEAN BARY. *Rev. metal.* **27**, 479–85(1930).—A brief survey of the methods of coating metals including bronzing of steel and parkerization, giving some results of corrosion tests in the salt spray on the latter. Mention is made of a new process somewhat similar to parkerization invented by Boulanger and giving remarkable protection. J. D. GAT

Effect of contamination by nitrogen on the structure of electric welds. L. W. SCHUSTER. *J. Iron Steel Inst.* (London) advance copy, Sept., 1930, No. 8, 30 pp.—A bibliography of 50 references is given. Microscopic examn. of arc welds made from various rods and in amts. of air, CO_2, O, N and H have shown that the needles found in welds are caused by N. Needles never occur in the absence of N. A heat treatment is frequently necessary to develop the needles. Typical photomicrographs are shown. Also in *Engineering* **130**, 538–40 (1930). J. L. GREGG

Silver solders. R. H. LEACH. *Metal Ind.* (London) **37**, 337–40, 369–71(1930).—See *C. A.* **24**, 4498. E. C. K.

Physicochemical analysis of *Eucalyptus globulus* essential oil [as flotation agent] (BATUECAS, MORALES) 17. Chemical characteristics of cement pipe lining (Chappell)

20. Influence of annealing atmosphere, annealing temperature and protecting tube material upon the stability of Pt thermoelements (STÄBLEIN, HINNÜBER) **1.**

GRARD, C., and COURNOT, J.: Metals and Alloys. Paris. Berger-Levrault. 3 Vols. F. 110. Reviewed in *Bull. Soc. Ind. de Mulhouse*, **96**, 549.

Rotatable ball mill for crushing ores, etc. HARLOWE HARDINGE (to Hardinge Co.). U. S. 1,780,915, Nov. 11. Structural features.

Ore-flotation concentration. ELMER K. BOLTON (to E. I. du Pont de Nemours & Co.). U. S. 1,780,000, Oct. 28. A mercaptothiazole such as 1-mercapto-3-methylbenzothiazole is used with frothing agents to facilitate concn. of Cu ores, etc.

Flotation concentration of phosphate-bearing material. JOHN W. LITTLEFORD (to Minerals Separation North American Corp.). U. S. 1,780,022, Oct. 28. A pulp of the material relatively free from slimes is mixed with alkali such as NaOH and afterward mixed with a float-assisting substance such as oleic acid and fuel oil and agitated to produce a float concentrate and the latter is sepd. An arrangement of app. is described.

Selective agent for concentration of ore by flotation. ROYER LUCKENBACH. U. S. 1,780,024, Oct. 28. A heavy asphalt base petroleum oil 7 is mixed with horse grease oil 1–2 parts.

Liquid supersaturated solution of thiocarbanilide. PHILIPP SIEDLER and AUGUST MOELLER (to I. G. Farbenind. A.-G.). U. S. 1,780,634, Nov. 4. A compn. which is suitable for use as a froth-flotation agent comprises a supersatd. soln. of thiocarbanilide in "technically pure" toluidine together with 0.3–20% of resin such as colophony.

Separating metal compounds from ores such as those of copper, iron and zinc. OSCAR A. FISCHER. U. S. 1,779,841, Oct. 28. Ores such as sulfide ores of Cu, Fe and Zn contg. As or Sb are subjected to a sulfatizing roast and to selective reduction by temp. control below 800° in the presence of a reducing agent to form insol. products from some of the sulfates, such as those of Cu and Fe, in the absence of substantial quantities of SO_3, while other sulfates remain unchanged, and the sol. sulfates such as $ZnSO_4$ are then leached out.

Reducing iron ores. FREDERICK L. DUFFIELD. U. S. 1,779,411, Oct. 28. A charge of ore and carbon is introduced into a reducing chamber at the base of the chamber and is raised through progressively hotter zones inside the chamber; gases evolved in the reducing chamber are collected at its top and are burned in admixture with air in a sep. combustion chamber at the side of the reducing chamber, the direction of movement of the burning gases being opposite to the movement of the ore charge. App. is described.

Iron ore reduction, etc. N. AHLMANN. Brit. 332,226, April 16, 1929. In promoting reduction of iron ore or other operations of chem. reaction, drying, etc., involving heating or cooling of pulverulent or granular materials, the material, in a filled chamber, is stirred with hollow stirring arms through which a heating or cooling medium may be circulated and air or a suitable gas is introduced at low pressure at the bottom of the chamber to facilitate stirring. App. is described.

Extracting tin from ores, etc. EDGAR A. ASHCROFT. U. S. 1,780,106, Oct. 28. A mass of Sn-bearing material such as Cornish "lode tin" ore is mixed with a carrying salt such as $ZnCl_2$ and a collecting metal such as Ni and the materials are heated to form an alloy of Sn with the collecting metal. Various modifications of the process are described.

Vanadium recovery from ores, etc. BYRAMJI D. SAKLATWALLA (to Vanadium Corp. of America). U. S. 1,779,856, Oct. 28. An aq. pulp of material such as sulfidic V-bearing ore or residue is subjected to the action of a Cl-contg. gas such as Cl or S chloride which produces oxygenating Cl compds. in contact with water, in order to form sol. V compds.

Treating zinciferous material containing lead or cadmium. LLOYD E. TEITER (to New Jersey Zinc Co.). U. S. 1,779,862, Oct. 28. Material such as roasted Zn concentrates contg. Pb or Cd or both is sintered by blast roasting in the presence of a chloridizing agent so that a substantial amount of Pb and Cd or both segregates near the blast-exiting surface, and this surface portion is sepd. from the remainder of the sintered product. App. is described

Rotary ore-roasting apparatus. GEORGE E. STORER (to National Processes, Ltd.). U. S. 1,778,872, Oct. 21. Various details are described of an app. arranged for sep. collection of gases from different stages of the operation.

Blast-furnace tuyère. E. H. HOLZWORTH. Brit. 331,464, Oct. 30, 1929.

Blast-furnace operation. JOHN C. HOPKINS and ALFRED OSOLIN. U. S. 1,780,485, Nov. 4. The furnace is tapped with the blast pressure on and the flow of iron is then stopped while the blast pressure is maintained by forcing a continuous and uninterrupted flow of clay into the tapping hole under sufficient pressure to stop the flow of the iron and completely plug the tapping hole. Structural details are described.

Furnace and associated apparatus for heat treatment of minerals, etc., in containers which are passed through the heating chamber. J. E. HACKFORD. Brit. 331,259, Dec. 21, 1928. Structural features.

Furnace with a pivotally mounted tilting hearth, suitable for heating small metal articles for hardening. RICHARD KAIER (to Singer Mfg. Co.). U. S. 1,779,435, Oct. 28. Structural features.

Furnace heating for metal sheets in packs, etc. HENRY A. DREFFEIN (to Flinn & Dreffein Co.). U. S. 1,779,964, Oct. 28.

Treating furnace dust. WM. J. MCGURTY (to Bartlett Hayward Co.). U. S. 1,780,833, Nov. 4. Dust-carrying gases such as blast-furnace gases are discharged into a dust collector where at least a portion of the solids is arrested and the gas is then washed, solids recovered are dewatered and these solids are mixed with those arrested in the dust collector and the mass is dried and roasted, sintered and returned to the furnace.

Ingot mold. AXEL G. E. HULTGREN. U. S. 1,781,392, Nov. 11. A mold with a downwardly tapered casting cavity has a depressible bottom adapted to allow sinking of the ingot after initial peripheral congealing has occurred, thus maintaining contact between the ingot and the mold. Various structural details are described.

Casting electric heater plates from molten metal. LON MCKINNEY (to Griswold Mfg. Co.). U. S. 1,778,808, Oct. 21. Various mech. details are described.

Malleable iron castings. LESLIE H. MARSHALL (one-half to Adin A. Grubb). U. S. 1,781,119, Nov. 11. White iron castings are subjected to heat treatment to effect malleableization and while the temp. is above 540° a non-oxidizing and etching gaseous atm. such as one contg. chloride vapors is maintained around the castings.

Dental castings. F. S. MEYER. Brit. 332,194, April 9, 1929. To compensate for contraction during solidification of Au castings such as crowns and inlays, the plaster mold is made of a harder plaster than usual and at an elevated temp. so that the wax pattern is expanded. A fluid plaster mixt. may be used contg. a large proportion of silica, at a temp. of about 50°. Various details of procedure are described.

Casting and rolling copper. WM. F. EPPENSTEINER and HENRY M. GREEN (to American Metal Co., Ltd.). U. S. 1,779,534, Oct. 28. Cu is cast into elongated cakes by pouring into a parallel-sided upright open-topped mold provided with a water jacket which causes chilling of the cast metal and shrinking to free it from the mold walls; the cake is removed, and has an oxidized portion substantially confined to its top end, and it is rolled endwise to a thin elongated form and the oxidized end is cropped off.

Rolling metals. AMERICAN ROLLING MILL CO. Brit. 332,462, Jan. 8, 1929. In forming sheets, the metal is hot rolled with substantial reduction, cold rolled without removal of scale, annealed and pickled and then rolled to gage. Various details of app. and procedure are described.

Rolling wide thin pieces of metal. W. STRINGHAM. Brit. 331,448, Sept. 30, 1929. Various details of rolling are described.

Rolling thin material such as steel strips. ABRAM P. STECKEL (to Cold Metal Process Co.). U. S. 1,779,195, Oct. 21. In operating a mill with working rolls, and backing rolls of larger diam. for the working rolls, rise in temp. of the backing rolls is sufficiently limited to prevent change of their contour which would permit buckling or wrinkling of the thin material passed between the working rolls. App. is described. Cf. *C. A.* **24**, 1337.

Refining copper. AMERICAN METAL CO., LTD. Brit. 331,353, June 7, 1929. Copper ingots to be melted and refined are preheated to a temp. somewhat below the m. p. and are plunged separately into a bath of metal in the melting furnace. The metal, in superheated state, is discharged from the melting furnace to a tilting refining chamber in which it is covered by a layer of deoxidizing slag and a layer of carbon. Oxide from the metal passes to the slag and the latter may be maintained in an active state either chemically by the carbon layer or electrolytically. Various details of app. and procedure are described.

Refining zinc. FRANK R. KEMMER (to American Cyanamid Co.). U. S. 1,779,973, Oct. 28. Raw Zn is placed in a liquating furnace, the temp. of which is raised to a point materially above the m. p. of Zn, causing the molten mass to sep. into at least 2 layers,

the upper layer being spelter contg. the major portion of the precious metals, and the next layer being hard Zn contg. only a minor portion of the precious metals; the spelter is distd. to volatilize and recover refined Zn, and the precious metals are recovered as a residue. App. is described.

Metallic grit from molten iron. DAVID MARTIN (to Globe Steel Abrasive Co.). U. S. 1,780,201, Nov. 4 Streams of molten iron are introduced between closely spaced opposed parallel surfaces of rotating rolls in the presence of a cooling liquid such as water carried peripherally on the rolls, the streams are flattened and the flattened molten iron is broken up by the combined effects of mol. cohesion of the metal and the conversion into steam of portions of the water in engagement with the flattened surfaces. Various details of app. are described.

Pig iron. M. NEUMARK. Brit. 331,190, March 22, 1929. A pig iron with properties of charcoal iron is obtained by melting down, in a coke blast furnace, scrap alone or in admixture with ore and a flux mixt. proportioned to produce a slag contg. at least 30% alumina and below 10% silica. Bauxite may be added to supply the alumina.

Steel or iron from cast iron. GASPARD JAKOVA-MERTURI (to Société générale d'exploitation des carbones). U. S. 1,779,744, Oct. 28. A fibrous carbonaceous material such as wood is heated to a point short of complete decompn., the resulting product is impregnated with salt such as $NaNO_3$ and the impregnated material is pulverized and injected upon the cast iron as the latter comes from a blast furnace, to effect its desulfurization and dephosphorization.

Heat-treating steel. HORACE C. KNERR. U. S. 1,779,604, Oct. 28. The metal is passed through a heating zone to raise its temp., its progress being retarded by the action on it of a magnetic field through which it passes until it reaches a temp. at which it becomes non-magnetic, and the time when cooling occurs is controlled by the time the metal becomes non-magnetic, as by release from magnetic force. App. is described.

Alloys for electrical contacts. EDWIN F. KINGSBURY (to Western Elec. Co.). U. S. 1,779,602, Oct. 28. Pd is alloyed with Cu (suitably about 40%). U. S. 1,779,603 specifies Pd alloyed with W. Ni and other metals also may be present.

Alloys such as alloy steels. PERCY A. E. ARMSTRONG. U. S. 1,781,490, Nov. 11 In effecting the melting of metals in a metallic crucible such as one formed of Cu having a lower m. p. than the temp. to which the melted metal is raised, metallic ingredients such as those for an alloy steel, intermixed with slag-forming ingredients, are exposed to the heat of an elec. arc initiated near the bottom of the crucible, while permitting heat to dissipate from the walls of the crucible, so that a progressive slag lining for the crucible is formed as the volume of molten metal increases. App. is described.

Lead alloy containing antimony and bismuth. MARTIN THIELERS. U. S. 1,779,784, Oct. 28. An alloy which is suitable for sheathing cables comprises Pb about 98-99 and Sb about 1% together with a small quantity of Bi (suitably about 0.5%).

Hardening lead alloys. MICHAEL G. CORSON. U. S. 1,780,261, Nov. 4. An alloy formed mainly of Pb and contg. also 0.5–15% each of Sb and Cd is heated to above 200° but below the m. p. for a sufficient time to bring the Sb and Cd into solid soln. in the Pb matrix, followed by cooling to produce supersatn. and then by aging.

Iron alloy containing copper, silicon and aluminum. BYRAMJI D. SAKLATWALLA. U. S. 1,781,527, Nov. 11. An alloy resistant to corrosion and scaling at high temps. and which is suitable for engine valves, elec. resistance heaters, etc., comprises Fe together with Cu 0.5–5.0, Si 0.5–6.0 and Al 0.1–2.0%, together with C within the range present in cast iron.

Acid-resisting iron alloys. K. M. TIGERSCHIÖLD. Brit. 331,414, Aug. 2, 1929. Alloys are described contg. Fe together with Ni 15–30, Cr up to 3, C 0.05–1.5, Si 2.5–10 and Cu 0.2–25% (the Si being wholly or partly replaceable by Mo and the Ni by Co). Small proportions of V, Ti, W and Mn also may be present, and when the alloy contains Mo (suitably 0.2–10%) the Si and Mo together preferably exceed 10%.

Steel alloy. LINWOOD M. BROWN. U. S. reissue 17,846, Oct. 28. See original pat. No. 1,643,054 (*C. A.* **21**, 3596).

Zinc alloys for die casting. EDMUND A. ANDERSON (to New Jersey Zinc Co.). U. S. 1,779,525, Oct. 28. Zn is alloyed with Al 2–5 and Mg 0.01–0.3%.

Melting zinc alloys or other metals in a rotary furnace. C. BRACKELSBERG. Brit. 331,791, Aug. 20, 1929. The metal is melted by contact with the walls of a rotary furnace which is heated up before insertion of the charge. Various details of a furnace construction are described.

Apparatus for hardening the bearing parts of shafts by heating and quenching. F. KLOPP. Brit. 331,484, Feb. 25, 1929. Structural features.

Chromium- or chromium-alloy-plating of paper-making apparatus. J. STRACHAN and R. MARX. Brit. 331,196, Jan. 18, 1929. Wire fabric is plated with Cr or its alloys such as those with Ti, Mo or W. Various details are given.

Silicon steel sheets for electrical purposes. A. F. MURPHY and W. JONES. Brit. 331,511, April 2, 1929. The sheets are pickled, freed of acid, annealed, cold-rolled, and re-annealed in a process, various details of which are described.

Pickling metals. LUDWIG J. CHRISTMANN (to American Cyanamid Co.). U. S. 1,779,961, Oct. 28. A pickling bath for metals such as iron or steel sheets contains H_2SO_4 together with a small proportion of a condensation product of aldehyde-NH_3 and monophenyl thiourea, which serves as an inhibitor. Cf. *C. A.* **24**, 330.

Pickling and cleaning metals. RALPH E. LAWRENCE (to Grasselli Chem. Co.). U. S. 1,780,594, Nov. 4. An acid bath such as a soln. of H_2SO_4 for pickling steel sheets is used with an inhibitor such as thioglycolic acid or its derivs. contg. the radical $COOH\text{-}CH_2\text{-}S$. U. S. 1,780,595 relates to the use of a mustard oil as an inhibitor. Cf. *C. A.* **24**, 5015.

Pickling iron and steel. JAMES C. VIGNOS (to Rubber Service Laboratories Co.). U. S. 1,779,787, Oct. 28. A soln. of H_2SO_4 is used which contains a small proportion of sulfonated creosote oil which serves as an inhibitor.

Utilizing galvanizer's waste. WM. G. WARING. U. S 1,780,323, Nov. 4. Metallic particles are screened out from the wet ground waste, the screened slurry is neutralized (suitably with $Ca(OH)_2$), NH_3 is distd. off, ferrous iron is oxidized to ferric condition (suitably by an air current) and the slurry is filtered and the solids are washed to remove chlorides, and the washed solids are extd. with $(NH_4)_2CO_3$ soln. to dissolve and remove Zn while leaving Pb compds. undissolved.

Preventing corrosion of tin plate kettles. W. M. SIMPSON. Brit. 331,649, May 22, 1929. One or more strips of Zn are soldered to the base of the kettle.

Preventing incrustation and corrosion of heating and cooling apparatus. H. GROECK (to Groeck Wasserveredlung-Ges.). Brit. 331,725, Nov. 14, 1928. In app. in which no substantial evapn. of water occurs, incrustation and corrosion are prevented by adding chromic acid or a dichromate to the water.

Welding flux. W. REUSS. Brit. 332,048, Nov. 1, 1928. To a flux such as described in Brit. 296,923 (*C. A.* **23**, 2416) is also added NH_4Cl, NaCl and H_2SO_4 or HCl. Alkali metal sulfates or nitrates also may be used instead of part or all the NaCl.

Electric flash welding of metals. WARREN F. HEINEMAN (to A. O. Smith Corp.). U. S 1,780,297, Nov. 4. Mech. and elec. features.

Electric welding of tubes of different metals such as copper and iron. GEORG KALSCHNE (to General Elec. Co.). U. S. 1,779,278, Oct. 21. Various mech. and elec. details are described, relative to welding abutting ends of tubes.

10—ORGANIC CHEMISTRY

CHAS. A. ROUILLER AND CLARENCE J. WEST

An appreciation of the life and work of Prof. W. H. Perkin. W. N. HAWORTH. *Chemistry and Industry* **49**, 886–9(1930). E. H.

The discovery of synthetic alizarin. LOUIS F. FIESER. *J. Chem. Education* **7**, 2609–33(1930). E. H.

Synthesis of some higher isoparaffins. S. LANDA AND R. RIEDL. *Collection Czechoslov. Chem. Comm.* **2**, 520–30(1930).—$Me(CH_2)_{14}CHMe_2$ (I) and $Me(CH_2)_{28}CHMe_2$ (II) have been prepd. by the following series of reactions. The ester with 2 less C atoms with MeMgBr gives the alc. which on distn. yields 2 olefins which by hydrogenation give the paraffin. $Me(CH_2)_{14}CMe_2OH$ was made from Et palmitate, a 20% excess of MeMgBr being used. Yield 90%. The alc. is dehydrated by distn. at 100 mm. 2-Methyl-2-heptadecene, m. —2.5°, b. 314°, d_{20} 0.7953, is the only product as proved by oxidation. The di-Br deriv. b_{28} 267–8°. Hydrogenation was carried out at 220–40° for 82 hrs. The unchanged olefin was brominated and the 2 products sepd. by distn. Yield 25%. Rape oil was hydrogenated, using 2% Ni at 120 atm. The solid product is sapond. with twice the theoretical amt. of alc. KOH and the acid freed by dil. H_2SO_4. After heating to 125° the acid is dissolved in alc., HCl gas passed in, water is added and the product heated to 135°. Distn. at 15 mm. and 252–8°, recrystn. from alc. and a 2nd distn. at 255° yields 20% Et behenate, m. 48.5°. Treatment with twice the theoretical amt. of MeMgBr, distn. at 0.002 mm., and crystn. from Et_2O yields 90% $Me(CH_2)_{20}CMe_2OH$, m. 63°. Distn. of the alc. at 290° and

100 mm. yields $Me(CH_2)_{10}CH:CMe_2$, m. 41.5, b_{10} 234–7°. Hydrogenation, carried out at 180° and 1 atm., is incomplete and the product is obtained by twice pptg. an Et_2O soln. with 0.5 its vol. of alc. The product has I no. 1.2, m. 42°, d. 0.7882 at the m. p. V. F. HARRINGTON

Aluminum chloride in organic chemistry. G. KRÄNZLEIN. *Metallbörse* **20**, 1856–7 (1930).—The scientific and com. importance of anhyd. $AlCl_3$ in the Friedel-Crafts reaction, the Fries displacement, the Scholl dehydration and addn. reactions, condensation with H_2O splitting off, halogen transfer, introduction of NO_2 groups, polymerization and condensation, splitting and rearrangement, and cracking processes as well as hydrocarbon and Gattermann-Koch aldehyde syntheses are reviewed. Various possibilities of prepn. of aromatic CO_2H acids are pointed out. The prepn. of ketones and the importance of *o*-benzoylbenzoic acids are discussed. The use of $AlCl_3$ for ring closure is explained, *e. g.*, oxythionaphthene, acenaphthenone, condensations with $(COCl)_2$ give open and closed ring ketones. Many isatin syntheses can be made with $AlCl_3$. Coupling of other than C atoms with aromatic nuclei is mentioned. Data on the Fries displacement are explained on the basis of the most recent results. Advances made in the Scholl reaction are shown, pointing out the necessity of removal of split off H by an oxidizing agent. Among the dehydration reactions flavanthrene and 2,5-diphenylbenzoquinone are mentioned. In addn. reactions there is shown the favorable effect of $AlCl_3$ in causing H_2O to split off and halogen or NO_2 groups to enter the ring more easily. E. M. SYMMES

Polymerization reactions of ethylene. H. M. STANLEY. *J. Soc. Chem. Ind.* **49**, 349–54T(1930).—A review of chem. and patent literature on the polymerization of C_2H_4. S. believes that the action of $AlCl_3$ on C_2H_4 can be explained by (1) polymerization to higher olefins, (2) isomerization of the latter to produce the corresponding cycloparaffins, and (3) the splitting off of lower paraffin mols. with the simultaneous production of hydrocarbons of lower H content. Reactions 1 and 2 take place at lower temps. Reaction 3 requires a higher temp. L. F. AUDRIETH

Autoxidation of the amylenes. JULIUS HYMAN AND C. R. WAGNER. *J. Am. Chem. Soc.* **52**, 4345–9(1930).—$PrCH:CH_2$ and $EtMeC:CH_2$ show no reaction with O in the dark at 15° with Co oleate as oxidation catalyst. Iso-$PrCH:CH_2$, $EtCH:CHMe$ and $Me_2C:CHMe$ react, the first compd. showing a long induction period; all 3 show about the same order of activity, the reaction being followed by titration of the bound O by I; after 156 hrs. the cc. of 0.01 *N* $Na_2S_2O_3$ used by the 3 hydrocarbons are: 22.15, 18.00, 19.75. The results indicate that, in general, internal double bonds are more readily oxidized by mol. O than end double bonds. In the prepn. of $PrCH:CH_2$ by Kirrmann's method, there is obtained a fraction b. 20–4°, probably ethylcyclopropane. The results appear to bear little or no relationship to the results of the H_2SO_4 polymerization expts. of Norris and Joubert (*C. A.* **21**, 1444). C. J. WEST

The structure of acetylene on the basis of spectroscopic investigations. R. MECKE AND K. HEDFELD. *Z. Elektrochem.* **36**, 803(1930).—The absorption spectrum for the region 9000–7000λ shows 3 bands of identical structure at 7887, 7956 and 8623λ. These measurements show that C_2H_2 has an extended ("gestreckte") structure with 1 moment of inertia. Five frequencies were found, in agreement with the calcd. values: 730, 1330, 1970 (inactive), 3280 and 3320 (inactive). Intensity measurements indicate a 1:3 interval, exactly as in H_2, suggesting that C_2H_2 should exist in 2 modifications. J. H. REEDY

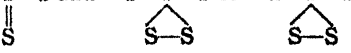
Pyrolysis of allene and methylacetylene. RICHARD N. MEINERT AND CHARLES D. HURD. *J. Am. Chem. Soc.* **52**, 4540–7(1930).—Results are given for the pyrolysis of allene (I) at 400–600°; a temp. of 500° is best for the formation of liquids by the flow method; at this temp. and with a contact time of 86 sec., 80% of the I entering the reaction tube was consumed and 90% of the products appeared as liquids. At 600° with a contact time of 50 sec., only 43% of the non-recoverable I appeared as liquids. At 500° 1 cc. of gas (mixt. of C_2H_2, C_2H_4, H and paraffins) was formed from each 10 cc. of I. CH_4 represented the large part at 500° but at 600° the vols. of CH_4 and H were almost equal. The following liquid fractions were obtained from the liquids formed at 500°: b. 63–6°, n_D^{20} 1.4358, sharp, irritating odor; b_{10} 35–50°, n_D^{20} 1.5002, turpentine odor; b_{10} 71–80°, n_D^{20} 1.5142, turpentine odor; b_{10} 80–105°, n_D^{20} 1.5617, kerosene odor; b_8 105–155°, n_D^{20} 1.596; b_{10} 160–90°, n_D^{20} 1.63, very viscous, odor of burnt rubber. The low-boiling fractions are very nearly identical with Lebedev's dimer and α-tetramer (*C. A.* **9**, 798). MeC : CH, for which a method of prepn. from Na acetylide and Me_2SO_4 is given, first isomerizes to I, which then polymerises in its customary manner. The relationship of CH : CMe to the 3-C system has been

developed and the classification of I and CH : CMe as of the keteno-ynol type has been suggested because of its similarity to the keto-enol type. C. J. WEST

Dichloroacetylene. ERWIN OTT, WALTER OTTMEYER AND KURT PACKENDORFF. *Ber.* 63B, 1941–4(1930).—ClC : CCl (I) can be obtained in 65% yield by passing the vapors of $Cl_2C:CHCl$ at 130° over solid granulated KOH previously dehydrated until it solidifies about 200°. If all local superheating is avoided by using an elec. oven, the prepn., contrary to Ottemeyer's observations (*Diss. Münster*, 1926), is without danger. Pure I is a mobile liquid with the same disagreeable odor as the di-I compd. When it issues through H_2O into the air it at once ignites and burns with deposition of much soot, but if it is strongly dild. with CO_2 or N it forms in the air white smoke rings and a distinct $COCl_2$-like odor is perceptible. If a vessel filled with the vapor is opened, a violent explosion occurs. Such explosions are also brought about by slight superheating above the optimum temp. (130°) for its formation. In dil. Et_2O solns. (5–10 wt. %), autoxidation even by O is very slow, but solns. in $(CHCl_2)_2$ react instantly with air or O with formation of a mist and a hissing sound as when H_2O is dropped into hot fat. The autoxidation gives chiefly $COCl_2$, CO and CO_2. No $(COCl)_2$ could be detected with certainty. The addn. of halogens points strongly against an acetylidene structure for I. Br is added in dil. CCl_4 soln. as vigorously as O, forming a product identical with that obtained by bromination of ClCH:CHCl. I adds slowly in dil. Et_2O soln. to form a faintly yellowish *diiodide*, m. 70°, different from the product, m. 2.5–3°, obtained by Howell and Noyes by chlorination of IC : CI. The 2 compds. are very probably *cis-trans* isomers. C. A. R.

The relative loading of the molecules of alcohols, aldehydes, ketones and carbohydrates and their solubility. M. A. RAKUZIN. *Biochem. Z.* 226, 133–8(1930).—Interesting theoretical considerations. S. MORGULIS

The action of ethylmagnesium bromide and oxidants on diethyl polysulfides. A. VARONI. *Atti accad. Lincei* 11, 905–9(1930).—In 2 previous papers (*C. A.* 23, 4927, 5158) the prepn. and probable constitution of di-Et polysulfides are given. In order to help substantiate these formulas, the action of Grignard reagents, as well as oxidizing agents on them, has been studied. Results with the first of these were inconclusive as the mols. were disrupted with formation of monosulfides, mercaptan, and free S. However, with oxidizing agents trisulfoxides were obtained. Dil. HNO_3 produces *di-Et trisulfoxide*, EtSOSOSOEt by adding the acid drop by drop to any of the polysulfides (*tri-*, *tetra-*, *penta-*), and then distg. under 20 mm. pressure at 154–5°. It is a liquid with a very bad odor, sol. in H_2O, EtOH and Et_2O, and is reduced by Zn and acids to a mercaptan, d_4^{20} 1.2844. Using fuming HNO_3, *di-Et disulfone*, $EtSO_2SO_2Et$, is formed from the disulfide, and the *trisulfone* $EtSO_2SO_2SO_2Et$ from the higher derivs. These sep. from the reaction liquid by crystn., and m. 50° and 32°, resp., d_4^{20} 1.3035 and 1.5048, resp. The non-formation of any deriv. higher than the tri-deriv. strengthens the theory that the trisulfide has a constitution —S—S—S—, while the higher derivs. have constitutions —S—S—S and —S—S—S or —S—S—S—.



A. W. CONTIERI

Continuous hydrocarbon nitration process, with special reference to the Buhtz mixer. VON BEZOLD. *Nitrocellulose* 1, 171–3(1930); cf. *C. A.* 24, 5714. E. M. S.

Preparation of nitromethane. ISAMI HIRANO. *J. Pharm. Soc. Japan* 50, 869–71 (1930).—$ClCH_2CO_2Na$, prepd. by treating $ClCH_2CO_2H$ (200 g.) in water (400 cc.) with Na_2CO_3 (120 g.), was treated in the cold with $NaNO_2$ (120 g.) in water (200 cc.) and satd. with NaCl and the reaction mixt. was steam distd. The crude product was dried over $CaCl_2$ and distd. with a small quantity of HgO. A yield of 52.7–53.1% was obtained. F. I. NAKAMURA

Sulfurous acid esters and their uses in syntheses. WALTER VOSS. *Metallbörse* 20, 1854–5(1930).—To prep. sym. $O:S(OR)_2$ (I), alcs. were decompd. by $SOCl_2$. By suitable reaction conditions, yields 3 times better than those given in the literature were obtained. I can be used as alkylating agent, *e. g.*, for Ph esters, and alkylating of aniline. I has advantages over dialkyl sulfates in the case of high alkyls. I and unsym. H_2SO_3 esters (II) differ, II sapong. in acid soln. very slowly, in alk. soln. rapidly, the reverse being true of I. The reaction $SO(OR)_2 + H_2O = SO_2 + 2ROH$ can be used for coupling, *e. g.*, the formation of carboxylic acid esters, and alcs., of acetals of aldehydes and ketones, of glucosides from sugars and alcs. Betaine can be formed from I and amino acids. E. M. SYMMES

The identification of aliphatic amines. A. NYASSNA. *Ing. Chim.* 15, 40–54

(1930).—N. has detd. the consts. of the HCl salt, chloroplatinate, picrate, chloroaurate, picrolonate and styphnate of *mono-, di-* and *trimethylamine, mono-, di-* and *triethylamine, mono-, di-* and *tripropylamine, isopropylamine, amylamine, isoamylamine, hexylamine, heptylamine, octylamine, allylamine, betaine* and uses the m. p. and cryst. form as means of identification. P. THOMASSET

Distillation of Grignard reagents. HENRY GILMAN AND ROBERT E. BROWN. *J. Am. Chem. Soc.* 52, 4480–3(1930).—In connection with studies on the following systems present in solns. of Grignard reagents: $2RMgX \rightleftharpoons R_2Mg + MgX_2$ and $RMgX \rightleftharpoons R^- + {}^-MgX$, it is shown that some RMgX compds., or their equivs., can be distd. in a stream of Et_2O. With MeMgI there was slight evidence of distillate in about 1 week; with EtMgBr and EtMgI there was no evidence of distillate until about the 10th day. With PhMgBr some Ph_2 was isolated. The high-vacuum sublimation of RMgX compds. gives R_2Mg compds. Of the 3 R_2Mg compds. which were sublimed, Me_2Mg was most volatile; Bu_2Mg was less volatile than Et_2Mg. C. J. WEST

Thermal decomposition of gaseous germanium tetraethyl. RAY L. GEDDES AND EDWARD MACK, JR. *J. Am. Chem. Soc.* 52, 4372–80(1930).—The thermal decompn. of gaseous $GeEt_4$ in the temp. range 420–50° is about 98% homogeneous and unimol. down to a pressure of about 8 cm. At about 7 cm. the value of the velocity const. begins to fall off, but the addn. of H gas to the reaction system does not raise the const. appreciably. The energy of activation is about 51,000, with a possible error of several thousand calories, and the velocity const. is given by the equation, $\ln k = 32.88 - 51{,}000/RT$. The no. of active degrees of freedom calcd. at the pressure where the velocity const. begins to fall off is between 8 and 10. The reaction yields metallic Ge; analysis of the gases from the decompn. shows essentially the products obtained by pyrolysis of C_4H_{10}. Added H and C_2H_4 enter into hydrogenation and polymerization reactions in the gaseous system. Added CO_2 cuts down the velocity const., but N, He and A have little, if any, effect. It seems justifiable to measure the course of this decompn. by pressure changes; the pressures were measured with quartz and pyrex membrane manometers. C. J. WEST

Boron. II. Action of lithium on ethylamminoboron trifluoride. CHARLES A. KRAUS AND EARL H. BROWN. *J. Am. Chem. Soc.* 52, 4414–8(1930); cf. *C. A.* 23, 5124.—Ethylamminoboron trifluoride is aminolyzed in $EtNH_2$; this soln., treated with 3 atoms metallic Li, gives LiF, H_2 and boron triethylimine, $B(NHEt)_3$; this is a liquid readily sol. in $EtNH_2$, appreciably volatile at room temp. and readily hydrolyzable by H_2O vapor. An app. is described for the reaction with Li. C. J. WEST

Methyltin derivatives. VI. Reaction between chloroform and sodium trimethyl stannide in liquid ammonia. CHARLES A. KRAUS AND ARTHUR M. NEAL. *J. Am. Chem. Soc.* 52, 4426–33(1930); cf. *C. A.* 24, 1617.—$CHCl_3$ and Me_3SnNa in liquid NH_3 give Me_3Sn and *di-trimethyl stannyl ethylene* (I), b. 194–5°; I is inactive toward Br at room temp., but in boiling CCl_4 bromination takes place slowly; NH_3 ppts. *diammino-dimethyltin dibromide*, the reaction being $I + 4Br_2 = 2Me_2SnBr_2 + 2MeBr + 2C_2H_2Br_2$. Reduction of I with Na in liquid NH_3 gives an equimol. mixt. of Me_3SnNa and $CH_2{:}CHSnMe_2Na$, along with CH_4 and $NaNH_2$. On adding MeI to this mixt. there is produced a mixt. of Me_4Sn and *trimethylvinyltin*, which has not yet been obtained pure. CCl_4 reacts readily with Me_3SnNa, the chief product being Me_3Sn; Et_3SnNa reacts similarly. C. J. WEST

Olefinic acids. III. Homologs of teraconic, terebic and pyroterebic acids. Further evidence of the effect of two γ-alkyl groups on three-carbon tautomerism. REGINALD P. LINSTEAD AND JASON T. WM. MANN. *J. Chem. Soc.* 1930, 2064–73; cf. *C. A.* 24, 5286.—The striking stability toward alk. reagents of pyroterebic acid, its Et ester and the related Me ketone has provided the only evidence of the large effect of 2 γ-alkyl groups in favoring the β,γ-phase of a 3-C system. Confirmatory evidence of this general principle is now reported from a study of $MeCH_2CMe{:}CHCH_2CO_2H$ (I). Condensation of 72 g. MeEtCO and 174 g. $(CH_2CO_2Et)_2$ with dry EtONa in Et_2O gives a mixt. of 45 g. $MeCH{:}CMeCH(CO_2H)CH_2CO_2H$ (II), m. 141°, and 10 g. $MeCH_2CMe{:}C(CO_2H)CH_2CO_2H$ (III), m. 186° (Stobbe, *Ann.* 282, 280(1894)). II, by Stobbe's method, yields β-bromo-β,γ-dimethylbutyrolactone-α-acetic acid, m. 160–1°, which yields mixed products on reduction with Zn and AcOH or with Na-Hg. Heating II or III with 48% HBr or 50% H_2SO_4 gives a mixt. of γ-methyl-γ-ethylisoparaconic acid (IV), m. 128°, probably identical with Stobbe's acid, m. 125–6°, and *γ-methyl-γ-ethylparaconic acid* (V), m. 146°. V was also obtained by hydrolysis of Et γ-hydroxy-β-carbethoxy-γ-methylhexoate, b_{15} 150–70° (not further purified), obtained in 33 g. yield from EtMgI and Et acetosuccinate; prepn. of V from *sec*-butylsuccinic acid by oxidation was abandoned as no appreciable quantity of the

intermediate ester, $MeCH_2CHMeC(CO_2Et)_2CH_2CO_2Et$, could be prepd. $MeCH_2CHMeCHO$ (VI), b. 92–3°, was prepd. from MeEtCHMgBr and $H(CO_2Et)_3$ in about 25% yields; *semicarbazone*, m. 103°. γ-Methyl-γ-ethylglycidic ester, obtained in 56% yield from MeEtCO and $ClCH_2CO_2Et$ with dry EtONa, b_{17} 91–5°, gives quant. a Na salt, the free acid from which, on slow distn. *in vacuo*, gives some 15% of crude VI. V (23 g.), heated as rapidly as possible, distils without charring at 260°, giving 6.7 g. of *γ-methyl-Δβ-hexenoic acid* (I), b_{12} 118°, $d_4^{16.7}$ 0.9644, $n_D^{16.7}$ 1.4512 (on standing 6 weeks there results 25% of high-boiling material), and 3.9 g. of γ-methyl-γ-ethylbutyrolactone, b_{10} 103–4°, $d_4^{16.5}$ 0.9983, $n_D^{16.5}$ 1.4460. VI, $CH_2(CO_2H)_2$ and C_5H_5N, kept 4 days at room temp. and then heated some hrs. on the H_2O bath, give 80% of *γ-methyl-Δα-hexenoic acid* (VII), b_{18} 125°, does not solidify at −15°, $d_4^{20.3}$ 0.9441, $n_D^{20.3}$ 1.4526; acid chloride, b_{11} 65–6°; *anilide*, m. 110°; *p-toluidide*, m. 92°. The equil. mixt. of I and VII contains 77% of I and the mobility $10(k_1 + k_2)$ was 3.1 (t in hrs.). The equilibrated VII, treated by the process of partial esterification, readily yielded I. I gives an acid chloride, b_{16} 64–8° (contains traces of Cl compds.); *anilide*, m. 91°.

C. J. West

Rearrangement and transformation of oleic acid. K. H. Bauer. *Metallbörse* 20, 1912–3(1930).—Oleic acid (I) at 180° with $ZnCl_2$ gives γ-stearolactone, a hydroxystearic acid, m. 83°, and an isoöleic acid. If I is heated with $ZnCl_2$ in AcOH for 16–20 hrs., there results an isoöleic acid, m. 42°, and a hydroxystearic acid, m. 77–9°. Oxidation indicates that a Δ^{10}-isoöleic acid is formed. The two isomeric dihydroxystearic acids obtained by oxidation of I with $KMnO_4$, on heating at 180–200°, split off H_2O, giving the so-called estolide; on further heating at 300° there results 10-ketostearic acid in 60–70% yields.

C. J. West

Unsaturation phenomena of acetylenic acids and esters. III. Constitution of some mercury derivatives. Wm. Whalley Myddleton, Arthur W. Barrett and John H. Seager. *J. Am. Chem. Soc.* 52, 4405–11(1930); cf. *C. A.* 21, 3348.—Me octinecarboxylate and $Hg(OAc)_2$ give a *Hg compd.*, $Me(CH_2)_5C(OHgOAc):C(HgOAc)\text{-}CO_2Me$; decompn. with concd. HCl gives about 25% of Me β-ketononoate, b_{23} 137.5°, which shows 13.5% of the enolic form 1 hr. after isolation. The Hg deriv. is very slightly sol. in hot EtOH and neutral aq. $FeCl_3$ gives in about 1 min. a faint reddish violet color. PhC : CCO_2Et gives a *Hg compd.*, $C_{13}H_{16}O_7Hg_2$; decompn. with HCl gives about 27% of ketonic compd., which contains 20% of the enolic form after 1 hr. The cold EtOH soln. gives in a few secs. a deep reddish violet color with 2 drops aq. $FeCl_3$. 1-Heptine gives the *Hg compd.*, $C_{13}H_{20}O_7Hg_3$; HCl gives about 13% of MeCOAm. 1-Octine gives the *Hg compd.*, $C_{14}H_{22}O_7Hg_3$; concd. HCl gives 14% of $MeCOC_6H_{13}$. PhC : CH and PhC : CCO_2H give *Hg compds*, $C_{14}H_{14}O_7Hg_3$ and $C_{13}H_{11}O_7Hg_{2.5}$, which give BzMe with HCl. The Hg deriv. of stearolic acid with Cl and Br in $CHCl_3$ gives the *chloro-* and *bromoketostearic acids*, viscous oils (Na, Li and K salts, soapy; Ca, Ba and Pb salts, cheese-like solids; Me and Et esters do not distil at 2 mm.; reduction gives 10-ketostearic acid). The Hg deriv. of behenolic acid gives the *13-chloro-* and *13-bromoketobehenic acids*, viscous oils. The Hg salt of Me octinecarboxylate and Br give *Me dibromoketononoate*, b_{14} 169°. PhC : CCO_2Et, as the Hg deriv., and Br give *Et benzoyldibromoacetate*, b_{15} 194°. The Hg deriv. of 1-heptine and Br give *tribromomethyl Am ketone*, $b_{2.5}$ 120°. The Hg deriv. of 1-octine and Br give the corresponding *hexyl ketone*, $b_{6.5}$ 137°. PhC : CH as the Hg deriv. reacts very slowly at low temps. PhC : CCO_2H as the Hg deriv. and Br give the *ω-tribromoacetophenone*, b_{14} 174°. 10,11-Undecinoic acid (Hg deriv.) and Cl give quant. trichloroketoundecoic acid, viscous oil (Me and Et esters could not be distd. at 2 mm.); 20% NaOH gives $CHCl_3$ and Me sebacate.

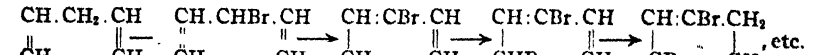
C. J. West

The polymerization of methyl esters of highly unsaturated fatty acids. III. The polymerization products. K. Kino. *J. Soc. Chem. Ind., Japan* 33, Suppl. binding 305–10(1930); cf. *C. A.* 24, 3487.—Heating of the Me esters of acids with 4 or 5 double bonds in a H_2 atm. at temps. ranging from 230° to 290° is thought to result in the selective formation of polymers with a tetra-C ring which are probably not dimers. In the case of acids with 3 double bonds a dimeric homolog with a tetra-C ring is probably formed. The formation of the tetra-C ring is probably facilitated by the presence of many double bonds. IV. **Attempt to isolate the ester with a tetra-C ring formed by the intra-combination of double bonds in a molecule.** *Ibid* 311–2.—No conclusive results were obtained.

L. F. Audrieth

Replacement of positive hydrogen by halogen. I. Fritz Straus, Leo Kollek and Walther Heyn (in part with Ruth Köhnel). *Ber.* 63B, 1868–85(1930).—When CH : CH, HC : CC : CH and their derivs. contg. H on the triply bound C atom are

treated with aqueous hypochlorites or hypobromites the H atoms are replaced with surprising rapidity and smoothness by halogen. The reaction takes place only in alk. soln.; the hypohalites were generally used in 0.5–0.7 *N* solns. in the presence of 4 mols. free alkali, but the amount of the latter can be increased to 8 mols. without markedly influencing the velocity of the reaction. In such strongly alk. soln. any hydrolysis of the salts is excluded and the transformation can be only a reaction of the hypohalite ion: $RC:CH + XO' \longrightarrow RC:CX + HO'$. The velocity of the reaction of the hypohalites varies with the nature of the halogen inversely as their stability; the hypochlorite requires for half-transformation about 10 times as long as the hypobromite, while the hypoiodite, judging from the work of Biltz and Küpper, reacts practically instantaneously. That the reaction is dependent upon the positive nature of the replaced H atom and not on some peculiarity in the finer structure of the C:C union is shown by the fact that the reaction takes place equally readily with the positive H in cyclopentadiene (I) and the closely related indene (II), but because of the migratory property of the unsatd. bonds which is characteristic of these compds., the reaction does not stop at the first stage; in I all 6 of the H atoms are at once replaced by halogen, and in II 3 H atoms are replaced. The reaction can be conceived as passing through the following intermediate stages, a common characteristic of which is a tendency of the unsatd. bond to shift as much as possible to C atoms already carrying halogen:



In spite of their complexity, the reactions proceed with extraordinary rapidity, especially with I; when the soln. of I in petroleum ether is shaken with the KOBr soln., the heavy crystals of the hexabromide (III) begin to sep. in about 10 min. and the yield surpasses 50%. With indene, which, however, requires about 50 hrs. for complete reaction, the yield reaches 70%. Fluorene, in which the unsatd. bonds of the cyclopentadiene ring are anchored in the aromatic systems, does not undergo the reaction. The relative velocities with which the different compds. react can be compared only to a very limited extent. Only a part of them are H_2O-sol. and expts. in heterogeneous systems involve many sources of error because of irregularities in shaking, in the degree of emulsification, etc., and therefore no curves are given. Some of the differences observed are so great, however, that they must have a meaning; *e. g.*, heptine reacts at least 10 times more slowly than PhC:CH, the velocity of whose reaction is of the same order of magnitude as that of the *tert* acetylenecarbinols of the type $R_2C(OH)C:CH$. The new method affords a materially simpler and in some cases the only means of prepg. the halogen-substituted simple acetylenes, and has made it possible to fill in 2 gaps: ClC:CCO_2H (IV) and ClC:CCl (V) (after this work had been completed, it was found that Böeseken and Carrière (*C. A.* **8**, 3296) had already prepd. V by heating $(CCl_2:CClCO_2)_2Ba$, and Ott and Ottemeyer (Ottemeyer, *Diss. München*, **1926**) have also obtained it by distn. of $CCl_2:CHCl$ over KOH, but they state that the method is dangerous and unreliable). V is formed smoothly from C_2H_2 and hypochlorite ions but a greater excess of free alkali is required than in any other case studied. It is a liquid b. 32° which explodes with unbelievable violence on the slightest contact with O, although it shows no other evidence of special instability and is stable to light. The dangerous explosions which have sometimes occurred in the purification of C_2H_2 with hypochlorite were likely due to the formation of V. The hypochlorite solns. were generally prepd. by passing Cl into 12.5% KOH in ice until litmus was just bleached and then dilg. with an equal vol. of 2 *N* KOH, the KOBr solns. from 25 cc. Br, 180 g. KOH and 800 cc. H_2O at 0°. When C_2H_2 is passed into the KOCl soln. undild. with KOH violent explosions occur; these cease if an equal vol. of 12.5% KOH is first added to the KOCl, but there is no apparent further reaction (manifested by the odor, slight turbidity and peculiar crackling) unless the added KOH corresponds to an equal vol. of 25% soln. V, prepd. by passing a mixt. of C_2H_2 and N_2 into the KOCl-KOH soln. in ice, seps. as an oil solidifying in CO_2-Me_2CO in needles, m. —66° to —64.2°, b_{748} 32–3°. It explodes violently in contact with air; if the C_2H_2 is passed a short time into the KOCl until a slight turbidity is formed and the soln. is shaken with air, there are observed a characteristic crackling and (in the dark) distinct sparks due to little explosions; when enough of the V vapor has collected over the soln. and the test tube is shaken, a long flame shoots out with a whistling sound; N_2 laden with the V vapor forms in the air thick white fumes with a $COCl_2$-like odor. In (halogen-free) Ilosvay soln. there is formed a yellow turbidity, rapidly increasing and changing

to orange and, in about 10 min., yielding the red-brown Cu acetylene; $AgNO_3$ in H_2O or alc. gives white curdy ppts. more or less sensitive to light and not formed in the presence of NH_4OH. V is not sensitive to light (Mg ribbon at a distance of 15 cm.). In excess of CCl_4 it forms C_2Cl_6 after 9 hrs. and with Br water it gives $(CClBr_2)_2$, m. 209–10° (sealed capillary). BrC:CBr, m. —25° to —23°, gives $(CBr_2:)_2$, m. 55–7°, with Br in $CHCl_3$ under H_2O, and $(CBrI:)_2$, m. 93° (crude), with I. *Chloropropiolic acid* (IV) (5.8 g. from 20 g. CH:CCO_2H), m. 69–70°, reddens tropeolin and blues Congo in even very dil. soln., gives no yellow ppt. with Ilosvay soln. even when dil. AcOH is added, gives red Cu acetylene when boiled, produces deep, purulent, slow-healing lesions on the skin and is quite toxic (80 mg./kg., subcutaneously, of the Na salt killed rabbits in 3 hrs.). When once isolated, IV is stable for months, but it rapidly decomps. into ClC:CH, CO_2 and $CH_2(CO_2H)_2$ when boiled in aq. $Ba(OH)_2$ under H. The conversion into $CH_2(CO_2H)_2$ is also effected by cold alkalies. With concd. HCl on the H_2O bath it gives *β,β-dichloroacrylic acid*, m. 76–7°. BrC:CCO_2H (yield, 74%) m. 84–6° after careful drying *in vacuo* over H_2SO_4; fresh prepns. melt lower, apparently because of the existence of a hydrate; with Br it gives $Br_2C:CBrCO_2H$, m. 116–8°. PhC:CBr (yield, 87.7%) b_{13} 88–9°; in its prepn. K stearate is added to facilitate emulsification. 1-Bromo-1-heptine (50% yield), b_{13} 57–7.5°, b_{758} 164–5°; 0.2 cc. administered by mouth to a 3.5-kg. dog produced a condition of semi-sleep for 0.5 hr. *Dialkylbromoethinylcarbinols*, RR'C(OH)C:CBr: *Di-Me*, b_{15} 68°, d_4^{20} 1.4577, d_4^{25} 1.4505; *methylethyl*, $b_{14.5}$ 76.5°, d_4^{20} 1.3849, d_4^{25} 1.3783; *di-Et*, $b_{14.5}$ 87°, m. 16–7.5° (*p-nitrobenzoate*, yellowish, m. 75.5–6°; *p-nitrobenzoate* of the Br-free carbinol, m. 54–7.5°); *methyl-tert-butyl*, $b_{14.5}$ 89°, m. 38–9°, does not autoxidize even in O, has a surprising tendency to rapidly absorb H_2O to form a *hemihydrate*, m. 52–2.5°. *1-Bromoethinylcyclohexanol* (yield, 94–5%), m. 55.5–6.5°, b_{12} 113.5–4°, $b_{0.2-0.4}$ 89–90°; *p-nitrobenzoate*, faintly yellowish, m. 90.5–1°, reduced by $TiCl_3$ to the *p-aminobenzoate*, m. 127–7.5° (*p-nitrobenzoate* of the Br-free carbinol, m. 66–6.5° (cor.); *p-aminobenzoate*, m. 97–8.5° (cor.)). *1-Chloroethinylcyclohexanol* (yield, 90%), m. 51.5–2°, b_{13} 98°. **III**, deep yellow, m. 86–7°, $b_{0.25}$ 147° without decompn. when distd. in small amounts, mol. wt. in C_6H_6 522.4. *Hexachloride* (yield, 44%), b_1 78–9°, mol. wt. in C_6H_6 251. *1,1,3-Tribromoindene*, m. 104.5–5°. *1,1,3-Trichloroindene*, m. 76°, b_{18} 134°. **II. Dihalogenodiacetylenes.** Fritz Straus, Leo Kollek and Heinrich Hauptmann. *Ibid* 1886–99.—Aq. hypohalite solns. are almost immediately rendered turbid by diacetylene, and the *dichloro-* (I) and *dibromodiacetylene* (II), like the di-I compd. (III), sep. in long needles; they m. 2–3°, 49–50° and 101.2°, resp., and explode 73°, 67° and 102°. The explosion temp. of I is that of a solid, black-brown transformation product into which the melt changes with increasing color as the temp. is raised, while II and III likewise darken on fusion but explode while still in liquid form. On account of their instability I and II were not analyzed but were identified by their halogen addn. products $(CI:CCII)_2$ (IV), $(CBr:CBr_2)_2$ (V) and $(CI:CBrI)_2$ (VI). The halogen adds symmetrically to both double bonds; otherwise only 1 form of each could be produced, while as a matter of fact a homogeneous product is obtained only when the entering halogen is the same as that already present (V and the $(CI:CI_2)_2$ previously described). IV, VI and $(CBr:CIBr)_2$ (VII) are not homogeneous (theoretically 3 *cis-trans*-isomers are possible); because of their very similar solubilities the isomers were not always isolated (2 forms of VI, 1 of IV). The dihalogenodiacetylenes are subject to both autoxidation and polymerization; the velocity of both processes increases with increasing electroaffinity of the halogen. III takes up O hardly perceptibly; after many days the increase in wt. was only 0.3–0.5% (corresponding to about 0.1 atom O), and the change which the mol. undergoes is almost exclusively polymerization. I and II, on the other hand, react very energetically with the dild. O of the air and polymerization occurs only when O is excluded. When a thin layer of an Et_2O soln. of II is allowed to evap. the needles which sep. disappear in a few min. with formation of a characteristic mist, and leave no residue; if the heat of reaction is sufficient to melt the material which has not yet reacted, it quickly explodes. Among the gaseous reaction products are hydrolyzable Br and O_3. The limited availability of diacetylene was a great obstacle in carrying out these expts. which, however, gave the impression that the halides of diacetylene are less dangerous to handle than those of C_2H_2. However, both series behave so similarly that they must have similar structures. The unlikelihood of a structure $Cl_2C:C:C:C<$ for such stable compds. and the fact that, according to the principles of acetylide chemistry, such a structure on halogenation would first be satd. at the end to form a compd. $Cl_2C:C:C:CX_2$, which on addn. of 2 more halogen atoms could not yield stereoisomeric forms without a migra-

tion of the end halogen atoms, lead the authors to retain the sym. structure for the dihalogenoacetylenes and -diacetylenes; the newer conceptions of polar atoms and the doctrine of activated states of the mols. seem to offer enough possibilities to explain the properties of these compds. The polymerization phenomenon is especially characteristic in the cryst. forms. If the pure white needles of III are allowed to stand, they change in 10–14 days, without alteration in cryst. form, through yellow to brown-black, with metallic luster, become practically insol. in Et_2O, and are not visibly attacked by Br in $CHCl_3$ or I in Et_2O. Their I content decreases slightly (from 84.09 to 82–3%) and they increase in wt. 0.3–0.5%, as already stated. In this condition the crystals are highly explosive and sensitive to friction and shock. If they are allowed to stand still longer, however, the sensitivity decreases and after 3–4 months they can be quietly powd. and at most deflagrate weakly when touched with a hot wire. II undergoes the same change, but more rapidly (within 24 hrs.), and I even more rapidly (with I, it was not noticed whether it passes through an intermediate stage of high sensitivity). All these compds. are stabilized by the process of soln.; I, II and III can be recovered unchanged after 8 days in Et_2O, petroleum ether or C_6H_6, and $(C:CCO_2H)_2$ (VIII) is stable for weeks in Et_2O in the dark. Both C_2I_2 and III, however, undergo a peculiar disproportionation when heated in soln. III gives $(CI:CI_2)_2$ but in far less amount than is demanded by the equation $3C_4I_2 = C_4I_6 + 8C$, and the accompanying black insol. product contains 70% and more of I and in some cases is still explosive; the disproportionation is evidently accompanied by polymerization. The C_4I_6 can be obtained almost quantitatively after boiling 2.5 hrs. in Et_2O, petroleum ether and alc., and to the extent of about 50% from MeCN or C_6H_6; after boiling 18 hrs. in C_6H_6 only 16% can be recovered. $(C:CH)_2$ reacts like C_2H_2 with alkylmagnesium halides, but much more easily and smoothly, since it dissolves in Et_2O, to form the bis(magnesium halide) which can be used for the prepn. of derivs. of the $(C:CH)_2$. In this way were obtained VIII (yield, 5%) and glycols of the type $[C:CC(OH)RR']_2$ (IX), which occur in 2 stereoisomeric forms when R and R′ are different; the compd. with R = R′ = H could not be obtained (from HCHO); that with R = R′ = Me, unlike the C_2H_2 analog, has no pharmacol. action. These glycols are quite stable and can even be distd. in a high vacuum. The ester of VIII could not be prepd. Attempts to prep. diphenyltetraacetylene from C_2I_2 with PhMgBr resulted in an almost quant. interchange of the I and MgBr: $C_2I_2 + 2PhMgBr \longrightarrow 2PhI + C_2(MgBr)_2$. *1,4-Dichloro-1,2,3,4-tetraiodobutadiene* (IV), lemon-yellow, m. 155–7°. *1,1,2,3,4,4-Hexabromobutadiene* (V), m. 52–4°. *1,4-Dibromo-1,2,3,4-tetraiodobutadiene* (VI), lemon-yellow prisms, m. 160–2°, and needles, m. 128–30°. III (yield of crude product, 92%), gives with Br in $CHCl_3$ *1,4-diiodo-1,2,3,4-tetrabromobutadiene* (VII), yellowish leaves and needles which could not be sepd., m. 57–60°. *3,5-Octadiine-2,7-diol* (IX, R = H, R′ = Me), from $(C:CMgBr)_2$ and AcH, m. 108–9°, $b_{9.3}$ 94–136° (partial decompn.), changes after several days into a violet polymer, insol. in the usual solvents, even when heated; Lespieau's isomer, m. 68°, could not be isolated from the residual oil. *2,7-Dimethyl-3,5-octadiine-2,7-diol*, obtained in 69% yield with Me_2CO instead of AcH, m. 129–30°. *2,7-Di-Ph analog*, obtained in 40% yield although in the prepn. of the Grignard compd. the reagents were used in the proportions calcd. for HC:CMgBr, prisms, m. 195°, mol. wt. in camphor 291.6; the mother liquors yielded needles, m. 142–3°. Earlier attempts to regenerate $(C:CH)_2$ from the $CHBr_2CBr_2CBr:CHBr$ by removal of the Br had resulted in the formation of $(CH:CH_2)_2$ and a small amount of a substance which, by analysis of its Cu and Ag compds., has now been identified as $CH_2:CHC:CH$. This is due to the fact that, unlike $(CH:CH_2)_2$, $(C:CH)_2$, in spite of its lower b. p., is to a large extent held back by the refluxing solvents (Et_2O, Me_2CO) and thereby subjected to a further (hydrogenation) reaction; if the hexabromides are heated only a short time in alc. with Zn, the soln. contains $(C:CH)_2$, which can be isolated almost quantitatively as the Cu compd. This removes the last doubt as to the bromides being related to $(C:CH)_2$ and having the open structure. C. A. R.

Decomposition of ethylene glycol in the presence of catalysts. I. Vanadium pentoxide as catalyst. Nathan L. Drake and Thomas B. Smith. *J. Am. Chem. Soc.* 52, 4558–66(1930).—The reaction C_2H_4 (g.) + $0.5O_2$ (g.) + H_2O (l.) = $(CH_2OH)_2$ is thermodynamically sound, since $\Delta F_{298} = -40{,}957$ cal. If a catalyst could be found which would render possible the production of the oxide, the synthesis of $(CH_2OH)_2$ from C_2H_4, air and H_2O should be possible. This is the beginning of a study of the effect of catalysts on the decompn. of $(CH_2OH)_2$. In the presence of V_2O_5 the principal products of decompn. are AcH and C_2H_4; the use of a fresh catalyst favors C_2H_4 formation while AcH is formed in about equal amts. by fresh or used catalysts. The

mols. formed by a fresh and a used catalyst at 360° are: CO_2 0.0045, 0.0023; C_2H_4 0.0196, 0.0145; CO, 0.0071, 0.0044; AcH, 0.0040, 0.0436; AcOH, 0.0033, 0.0019. An app. is described for the reaction; the results of various runs under different conditions of temp. are given in curves. C. J. WEST

Ether and ester. III. Diethylene dioxide. J. VAN ALPHEN. *Rec. trav. chim.* **49**, 1040–4(1930).—In a previous communication v. A. has shown that the formation of water and ether from EtOH is an equil. reaction, which is catalyzed by H (or H_3O) ions and by salts of weak bases and strong acids, especially anhyd. $Fe_2(SO_4)_3$ being an excellent catalyst (*C. A.* **24**, 4757). On distg. glycol with 4% H_2SO_4 Favorski obtained diethylene dioxide [*J. Russ. Phys.-Chem. Soc.* **38**, 741–55(1906)], the formation of which was explained in the same way as the formation of ether from alc. by Williamson. This assumption is, however, improbable for Fe III chloride and sulfate and Al sulfate also transform the glycol into diethylene dioxide. The dioxane obtained from glycol with anhyd. $FeCl_3$ was contaminated with a chlorinated product which could not be removed by distn., while the yield was only small on heating glycol in a sealed tube at 155–60° with $Fe_2(SO_4)_3$, much tarry material being formed. Much better yields were obtained by a continuous method: anhyd. $Fe_2(SO_4)_3$ (6 g.) was mixed with glycol (20 cc.) and to the boiling mixt. glycol was added (150 cc.) drop by drop as quickly as the liquid distd. The $Fe_2(SO_4)_3$ is reduced in this process to $FeSO_4$ which, however, shows the same catalytic activity. Dioxane is not split by HNO_3 at low temp.; on adding abs. HNO_3 to frozen dioxane at —10° or to the well-cooled soln. in CCl_4 a cryst. addn. product, m. 14°, is obtained, consisting of 3 mols. of dioxane with 4 mols. HNO_3 and thus being probably 2 mols. of dioxane dinitrate, crystg. with 1 mol. dioxane of crystn. When Br acts upon dioxane at a higher temp. in the presence of $FeBr_3$, only water, HBr and $(CH_2Br)_2$ were obtained along with a large quantity of tarry products. C. F. VAN DUIN

Decomposition of mercaptans in alkali solutions. E. C. BILLHEIMER AND E. EMMET REID. *J. Am. Chem. Soc.* **52**, 4338–44(1930).—An app. has been developed and a quant. method of analysis established for the investigation of the decompn. of mercaptans in alk. soln. The mercaptans decomp. in a definite and reproducible manner, 3 simultaneous reactions taking place: $RSH + 2NaOH = ROH + Na_2S + H_2O$; $2RSH + 2NaOH = R_2S + Na_2S + 2H_2O$; $EtSH + 2NaOH = C_2H_4 + Na_2S + 2H_2O$. In the case of BuSH, about half of the product is decompd. in 2 hrs. at 260° with 3 *N* NaOH; using these conditions the following figures were obtained for the % of total decompd. and R_2S formed: Et 55.4, 20; Pr 52.2, 23; Bu 49.6, 16; iso-Bu 36.2, 16; Am 42.9, 23; C_6H_{13} 37, 8; C_7H_{15} 35, 30; iso-Pr 65.4, 8; *sec*-Bu 59.1, 4; *sec*-Am 56, 11; *sec*-C_6H_{13} 48.8, 7; *sec*-C_7H_{15} 47, 33. The octyl and nonyl mercaptans yielded insol. Na derivs. The total decompn. decreases as the no. of C atoms increases; the sec. mercaptans react more rapidly than the corresponding primary derivs. With very dil. alkali the % of alkyl sulfide is high when it is compared with the total decompn. At 250° in 4 hrs. BuSH gives slightly less decompn. than at 260° in 2 hrs., showing that the reaction has about the usual temp. coeff. The proportion of Bu_2S formed is somewhat higher at the lower temp. In pure H_2O the % of mercaptan reacted was found to be practically 0. C. J. WEST

The chlorination of formylmethionic acid. H. J. BACKER. *Rec. trav. chim.* **49**, 1054–6(1930).—The chlorination of $HCOCH(SO_3H)_2$ easily leads to the formation of *formylchloromethionic acid;* on passing Cl into 1.3 *N* aq. $HCOCH(SO_3K)_2$ (cf. *C. A.* **23**, 3209) on the water bath, the K formylchloromethionate, $C_2H_3O_8ClS_2K_2$, may be obtained by the addn. of EtOH to the concd. soln. in 67% yield. In this compd. the 1 mol. water of crystn. probably is chemically bound to the aldehyde group as in chloral hydrate. This salt consumes exactly 1 mol. of alkali at room temp. in the course of 0.5 hr. with the formation of $CHCl(SO_3H)_2$ and may be estimated quantitatively in this way. The presence of the aldehyde group can be shown by the formation of an *oxime*, $C_2H_3O_7NS_2ClK_2$, and of a *semicarbazone*, $C_3H_4O_7N_3S_2ClK_2$. The reaction with alkali, mentioned above, affords an easy method for the prepn. of $CHCl(SO_3H)_2$, which so far was obtained only as a secondary product in the sulfonation of $ClCH_2CO_2H$ (*C. A.* **24**, 4760); the $CHCl(SO_3H)_2$ was isolated as the strychnine salt, which, on decompn. with KOH, is converted into the di-K salt, which crystallizes without water of crystn. in monoclinic plates or with $2H_2O$ in triclinic plates. C. F. VAN DUIN

Bromomethanetrisulfonic acid. H. J. BACKER AND K. H. KLAASSENS. *Rec. trav. chim.* **49**, 1045–7(1930).—A comparison of simple polycarboxylic and polysulfonic acids shows that the latter are more stable, *e. g.*, malonic acid loses readily CO_2 on heating its aqueous solution to 68°, while methionic acid is stable, even at much higher temperatures. While methanetricarboxylic acid is only known as the Et ester, meth-

anetrisulfonic acid is a quite stable substance. The authors have made an attempt to prepare methanetetrasulfonic acid by the action of K sulfite on bromomethanetrisulfonic acid; the desired reaction, however, does not take place but a reduction occurs with the formation of methanetrisulfonic acid. *Bromomethanetrisulfonic acid* was prepared by heating methanetrisulfonic acid in 2 *N* aqueous solution with 10% excess of bromine in a sealed tube at 150° during 8 hours; it was isolated as the Pb salt, which was converted into the free acid by means of H_2S and then into the Ba salt; yield 40%. The *free acid* crystallizes with $3H_2O$, $CH_3O_9S_3Br.3H_2O$, m. 179°; *Ba salt* $(CO_9S_3Br)_2$-$Ba_3.8H_2O$; at 25° 100 g. of water dissolve 4.19 g. of this salt; *La salt*, $CO_9S_3BrLa.7H_2O$; *Tl salt*, $CO_9S_3BrTl_3$; *K salt*, $CO_9S_2BrK_3.H_2O$; 100 g. of water dissolve at 25° 1.816 g. of the anhydrous salt. Crystallographic properties of the K salt (P. Terpstra): tet- [illegible] form (111); (111):(11$\bar{1}$) = 63° 13′; (111):(1$\bar{1}$1) =

24 hours gives a solution containing SO_4 ions, while on cooling the [illegible] trisulfonic acid, $CHO_9S_3K_3.H_2O$, is obtained, thus showing that a reduction has taken place.

C. F. VAN DUIN

Mercaptomethanetrisulfonic acid. H. J. BACKER. *Rec. trav. chim.* **49**, 1048–53 (1930).—$C(SO_3H)_4$ cannot be prepared by the interaction of $BrC(SO_3H)_3$ with sulfites (Backer and Klaassens, preceding abstr.); the present paper deals with the attempted prepn. from $HSC(SO_3H)_3$. On passing Cl into CS_2 at 10°, using some I as a catalyst, Cl_3CSCl is obtained (cf. Rathke, *Ber* **3**, 858(1870); Albrecht, *Ann.* **161**, 129(1872)); during the 1st part of the reaction $CSCl_2$ is most probably formed, which in the 2nd part, is converted into Cl_3CSCl with considerable increase of the vol. The crude product contains some S_2Cl_2 but can be easily purified by 2 distns. with steam; it b. 147.5–8° (yield 54%), d_4^{15} 1.698. This compd. with 5 mols. of K_2SO_3 at 60–70° yields the *K mercaptomethanetrisulfonate*, $CHO_9S_4K_3.2H_2O$ (cf. Albrecht, *loc. cit.*) (yield 80%), soly. in water at 25°, 3.21%; crystallographic properties of (P. Terpstra): triclinic pinacoidal class Ci; $\alpha = 100° 8'$; $\beta = 82° 7'$; $\gamma = 94° 54'$; a:b:c = 1.167:1:0.9512; forms: (001); (010); (100); (1$\bar{2}$1); ($\bar{2}$11); (111); (2$\bar{1}$2); ($\bar{2}\bar{2}$1); angles: (100):(010) = 84° 27′; (100):(111) = 62° 17′; (010):($\bar{2}$11) = 64° 29′; (010):(111) = 44° 52′; (001):($\bar{2}$11) = 53° 20′; (111):($\bar{2}$11) = 75° 33′; (010):(001) = 82° 16′; (100):(001) = 96° 59′; (111):(2$\bar{1}$2) = 58° 22′; (212):(1$\bar{2}$1) = 42° 35′; (001):(2$\bar{1}$2) = 46° 51′; (100):(1$\bar{2}$1) = 76° 17′; the sharp bissectrices are nearly perpendicular to (001); $2e$ = 69°; the crystals are not piezoelectric. The oxidation of $HSC(SO_3H)_3$ was attempted with Br at 15° and 50°, with hypobromite, with Cl at 15° or 95°, with hypochlorite and with K_2CO_3 and Cl, but in every case $CH(SO_3H)_3$ was obtained. For details the original paper is to be consulted.

C. F. VAN DUIN

Synthesis of β-glycerides. MAX BERGMANN AND NEAL M. CARTER. *Z. physiol. Chem.* **191**, 211–21(1930).—β-Monoglycerides of fatty acids have not hitherto been prepd. A method is now described in which the cyclic α,α′-benzalglycerol is acylated on the β-OH and then the benzal group removed by catalytic hydrogenation. The yield of β-glyceride is 80% or better. The mixt. of isomeric benzalglycerols obtained by condensation of glycerol with BzH was treated with dry HCl in the cold to rearrange the α,β′- into the α,α′-form and a 90% yield of the latter was thus obtained. The product can be purified by sublimation. Its β-Bz deriv. was hydrogenated in EtOH with Pd catalyst and evapd. *in vacuo* to crystn., yielding 98% of *β-benzoylglycerol*, m. 72.5°. The latter can be condensed again with BzH to form the original substance. A similar condensation can be made with MeAc in the presence of $CuSO_4$, yielding 80% of *β-benzoyl-α,α′-isopropylideneglycerol*, m. 33°. When this is mixed with the isomeric α-benzoyl-α′,β-isopropylideneglycerol, m. 34.5°, liquefaction occurs. Acetylation of α,α′-benzylideneglycerol (I) with Ac_2O and pyridine gave 94% of *β-acetyl-α,α′-benzylideneglycerol*, m. 101°. Hydrogenation converted this into *β-acetylglycerol*, a viscous oil, $b_{0.2}$ 177–8°. Condensation of I with palmityl chloride in the presence of pyridine gave a mixt. of 2 products. The product, which was more difficultly sol. in petr. ether, was identified as *β-palmityl-α,α′-benzylideneglycerol* (II), m. 63.5°. The other more sol. substance was probably an isomeric form. Hydrogenation of II yielded *β-palmitylglycerol*, m. 69°. The latter may be converted back to II by condensation with BzH. Condensation of α-palmitin gave 63% of *α-palmityl-α′,β-benzylideneglycerol*, m. 35°. A similar condensation of β-palmitin with MeAc gave 75% of *β-palmityl-α,α′-isopropylideneglycerol*, m. 44°. When this condensation was performed

in the presence of HCl and Na_2SO_4 instead of $CuSO_4$ a rearrangement occurred with formation of 72% of α-palmityl-α′,β-isopropylideneglycerol, already described by Fischer, *et al.* (*C. A.* **15**, 684). A. W. Dox

Cobalt complexes of thioglycolic acid. Leonor Michaelis and Maxwell P. Schubert. *J. Am. Chem. Soc.* **52**, 4418–26(1930).—When a Co salt is mixed with a buffer around p_H 6–10 a pink ppt. is formed which is perfectly stable in air; the slightly sol. pink Co complex of pyrophosphate is not oxidized by air, in contrast to the analogous ferro complex. A mixt. of Co salt and phosphate buffer, contg. the slightly pink ppt., mixed with $SHCH_2CO_2H$ in a N atm. gives a green color, very sensitive in the air; on exposure to air, the soln. rapidly consumes O, simultaneously turning brown. In a mixt. of 1 atom of Co and 2 mols. $HSCH_2CO_2H$, 0.25 mol. of O is used with no, or no appreciable, residue of H_2O_2, during the first, rapid stage of the oxidation. A $HSCH_2CO_2K$ soln. and $CoCl_2$ in KH_2PO_4 and KOH give a deep red-brown color, from which the *salt*, $[Co(SCH_2CO_2)_2KH]_2.0.5H_2O$ (I), crystallizes in 75% yield. With $BaCl_2$ I gives the *salt*, $Ba[Co(SCH_2CO_2)_2H]_2.0.5H_2O$. I (15 g.) in 75 cc. H_2O, slowly treated with 3.5 cc. concd. HCl, gives the *acid K salt*, $KH[Co(SCH_2CO_2)_2H]_2.0.4H_2O$; with further addn. of HCl there results the free complex *acid*, $[Co(SCH_2CO_2H)_2]_2.0.3.5H_2O$. All of these complexes are quite stable and H_2S, KOH and $K_4Fe(CN)_6$ do not ppt. Co; they are also stable at 140° for a short time. The structure of these complexes is discussed. The bearing of these constitutions on the heavy metal catalysis of the oxidation of thio acids is pointed out. C. J. West

The behavior of polypeptides containing proline toward erepsin and the trypsin-kinase complex. Emil Abderhalden and Otto Zumstein. *Fermentforschung* **12**, 1–19(1930).—A series of dipeptides was prepd. in which proline carries the terminal CO_2H. The method consisted in coupling a haloacyl halide with *l*-proline and amination of the resulting haloacylproline with NH_4OH. A complication encountered was the formation of hydroxyacylprolinamide which had to be sepd. from the dipeptide, and also in some cases a racemization of the proline. The amt. of amide obtained increased with the size of the haloacyl halides used, *e. g.*, 5–7% with $ClCH_2COCl$, 13% with MeCHBrCOBr, 28–30% with EtCHBrCOBr, and 70–80% with $Me_2CHCH_2CHBrCOBr$. In contrast to other $Me_2CHCHBrCO$ amino acids, the proline deriv. was aminated with great ease, 71% of the Br being replaced in 2 days. When proline Me ester was condensed with haloacyl halide and the product aminated by alc. NH_3 both the expected anhydride and also the dipeptide ester were obtained. *l*-Proline in *N* NaOH was condensed with $ClCH_2COCl$ to form *chloroacetyl-l-proline*, m. 112–3°, which on amination with 25% NH_4OH yielded *glycolyl-l-prolinamide*, m. 90°, and *glycyl-l-proline*, $[\alpha]_D^{18}$ —86.21°. By the same procedure, proline + MeCHBrCOBr ⟶ *dl-α-bromopropionyl-l-proline* (I), m. 137–8°, ⟶ *dl-α-hydroxypropionyl-l-prolinamide*, m. 109–10°, *dl-alanyl-dl-proline*, m. 280° and *dl-alanyl-l-proline*, $[\alpha]_D^{18}$—92.68°. The Me ester of I + NH_3 in MeOH ⟶ *dl-alanyl-l-proline Me ester*, m. 89–93°, and *dl-alanyl-l-proline anhydride*, m. 114–5°, the anhydride and dipeptide ester occurring in the proportion 1:2. Proline + *dl*-EtCHBrCOBr ⟶ *dl-α-bromobutyryl-l-proline*, m. 120–3°, ⟶ *dl-α-hydroxybutyryl-l-prolinamide*, m. 76–8°, *dl-α-aminobutyryl-l-proline*, $[\alpha]_D^{18}$ —45.4°, and *dl-α-aminobutyryl-dl-prolinamide*, m. above 300°. Proline + *dl*-PrCHBrCOBr ⟶ *dl-α-bromovaleryl-l-proline*, m. 85–7°, ⟶ *dl-α-hydroxyvaleryl-l-prolinamide*, m. 60°, *dl-norvalyl-dl-proline*, m. 258–9°, and *dl-norvalyl-l-proline*, $[\alpha]_D^{18}$ —56.25°. Proline + *dl*-$Me_2CHCHBrCOBr$ ⟶ *dl-α-bromoisovaleryl-l-proline* (not obtained cryst.) *dl-α-hydroxyisovaleryl-l-prolinamide*, *dl-valyl-dl-proline*, m. 275°, and *dl-valyl-l-proline*, $[\alpha]_D^{18}$ —36.66°. Proline + BuCHBrCOBr ⟶ *dl-α-bromocaproyl-l-proline*, m. 69–70°, ⟶ *dl-α-hydroxycaproyl-l-prolinamide* (not purified), and *dl-norleucyl-l-proline*, m. 225–6°. Proline + $Me_2CHCH_2CHBrCOBr$ ⟶ *dl-α*-bromoisocaproyl-*l*-proline (II) (previously described) ⟶ *dl-α-hydroxyisocaproyl-l-prolinamide*, m. 124°, and *dl-leucyl-l-proline*, m. 211–2°. The Me ester of II treated with NH_3 in MeOH gave *dl-leucyl-l-proline Me ester* in 85% yield; an oily residue evidently consisted of a mixt. of amide and anhydride. These dipeptides and some of the amides and haloacylprolines were tested for enzymic hydrolysis. Trypsin-kinase attacked none of the dipeptides, and erepsin only glycylproline to a slight extent. Bromoisocaproyl-*l*-proline was hydrolyzed by trypsin-kinase, while bromopropionyl-*l*-proline remained unaltered. Neither enzyme attacked hydroxycaproyl-*l*-prolinamide. A. W. Dox

The behavior of *N* sodium hydroxide, erepsin and trypsin-kinase toward polypeptides built up from glycine. Emil Abderhalden and Jolan Heumann. *Fermentforschung* **12**, 42–54(1930).—A study of the hydrolysis of glycine peptides, from the

dipeptide to the hexapeptide inclusive, has already been reported (*C. A.* **22**, 426, 1572). The series has now been extended from there on to the decapeptide. The usual method of coupling the next lower peptide with $ClCH_2COCl$ and aminating the product was unsuccessful beyond the heptapeptide because of insoly. of the substance in dil. alkali. The difficulty was overcome by dispersing the peptide in 50% LiBr, then adding NaOH, dilg. with H_2O and finally adding the $ClCH_2COCl$. The $ClCH_2CO$ deriv. thus obtained was best aminated by mech. shaking of its suspension in liquid NH_3. New derivs. described are *chloroacetylpentaglycylglycine* (74% yield), sinters and becomes yellow at 225° *hexaglycylglycine* (84% yield), sinters above 230°. ⟶ *chloroacetylhexa-*[illegible] ⟶ *heptaglycylglycine* (74% yield) ⟶ *chloroacetylheptaglycylglycine* (74% yield) ⟶ *octaglycylglycine* (85% yield) ⟶ *chloroacetyloctaglycylglycine* (79% yield) ⟶ *nonaglycylglycine* (70% amination, but the product could not be completely purified). *β-Naphthalenesulfonylhexaglycylglycine* was obtained in 50% yield from the heptapeptide and β-$C_{10}H_7SO_2Cl$ in the usual manner. None of these higher peptides were attacked by erepsin at p_H 7.8, but the hexapeptide was partially hydrolyzed at p_H 8.4. All of the $ClCH_2CO$ derivs. were hydrolyzed to some extent by trypsin-kinase at p_H 7.8, but to a less extent, if at all, at p_H 8.4. The polypeptides were all resistant to trypsin-kinase. When dispersed in LiBr and brought to *N* by NaOH the rate of hydrolysis at 37° increased with increasing length of the peptide chain. The β-$C_{10}H_7SO_2$ deriv. was more resistant to alkali than the unsubstituted hexapeptide. A. W. Dox

Further comparative studies on the influence of *N* alkali, erepsin and trypsin-kinase on polypeptide-like compounds containing β-aminoisovaleric acid. Emil Abderhalden and Fritz Reich. *Fermentforschung* **12**, 20–41(1930).—Aside from the optical antipodes of naturally occurring amino acids, β-alanine is hitherto the only exotic amino acid that has been introduced into peptide chains for the purpose of testing the specificity of enzymes. A series of peptides has now been prepd. in which β-aminoisovaleric acid (I) represents the exotic component. This acid was prepd. by heating β,β-dimethylacrylic acid with a large excess of NH_4OH under pressure. It was coupled with various haloacyl halides and the products aminated in the usual way to the corresponding dipeptides, which were then built up further into polypeptides. Or, to place the exotic acid at the other end of the chain, the ordinary amino acids or their peptides were coupled with β-bromoisovaleryl chloride and the products aminated as usual. I + $ClCH_2COCl$ ⟶ *chloroacetyl-β-aminoisovaleric acid* (not obtained cryst.) ⟶ *glycyl-β-aminoisovaleric acid* (II), decomps. 210°. I + $Me_2CHCH_2CHBrCOCl$ ⟶ *dl-α-bromoisocaproyl-β-aminoisovaleric acid*, m. 104–5°, ⟶ *dl-leucyl-β-aminoisovaleric acid* (III), m. 195–8° (decompn.). III + $ClCH_2COCl$ ⟶ *chloroacetyl-dl-leucyl-β-aminoisovaleric acid*, m. 125–30°, ⟶ *glycyl-dl-leucyl-β-aminoisovaleric acid*, m. 200°. II + $Me_2CHCH_2CHBrCOCl$ ⟶ *dl-α-bromoisocaproylglycyl-β-aminoisovaleric acid* (not crystd.) ⟶ *dl-leucylglycyl-β-aminoisovaleric acid*, decomps. 225°, ⟶ *chloroacetyl-dl-leucylglycyl-β-aminoisovaleric acid*, m. 170°, ⟶ *glycyl-dl-leucylglycyl-β-aminoisovaleric acid* (IV), sinters 165° and decomps. 175°, ⟶ *dl-α-bromoisovaleryl-glycyl-dl-leucylglycyl-β-aminoisovaleric acid*, a viscous oil, ⟶ *dl-valylglycyl-dl-leucyl-glycyl-β-aminoisovaleric acid*, m. 193–8° (decompn.). *β-Bromoisovaleryl chloride* (V), b_{20} 60–2°, was prepd. by satg. $Me_2C{:}CHCO_2H$ with HBr to $Me_2CBrCH_2CO_2H$ and treatment of the latter with $SOCl_2$. V + *dl* leucylglycine ⟶ *β-bromoisovaleryl-dl-leucylglycine*, sinters 105° and m. 120°, ⟶ *β-aminoisovaleryl-dl-leucylglycine* (VI), m. 125°. V + *dl*-leucylglycyl-*dl*-leucine ⟶ *β-bromoisovaleryl-dl-leucylglycyl-dl-leucine*, sinters 100° and m. 145°, ⟶ *β-aminoisovaleryl-dl-leucylglycyl-dl-leucine*, m. 125–30° (foaming). V + IV ⟶ *β-bromoisovalerylglycyl-dl-leucylglycyl-β-aminoisovaleric acid*, m. 112–4°, ⟶ *β-aminoisovalerylglycyl-dl-leucylglycyl-β-aminoisovaleric acid* (VII), sinters 180° and m. 185° (evolution of gas). $Me_2CHCH_2CHBrCOCl$ + VI ⟶ *dl-α-bromoisocaproyl-β-aminoisovaleryl-dl-leucylglycine*, an oil, ⟶ *dl-leucyl-β-aminoisovaleryl-dl-leucylglycine*, sinters 230° and decomps. 245°. Enzyme expts. showed that β-aminoisovaleric acid inhibited the action of amino- or carboxy-polypeptidase according to whether it was linked through its NH_2 or CO_2H to the polypeptide chain. The expectation that VII, because of its analogy to *d*-leucylglycyl-*l*-leucylglycyl-*d*-leucine, would be amenable to hydrolysis by the trypsin complex was not fulfilled. Such hydrolysis would support the assumption of an imino-polypeptidase capable of attacking a polypeptide at an intermediate linkage. It is possible that different exotic components may offer different degrees of resistance, or that the enzyme-substrate compd. may be so stable that the usual H ion concn. is inadequate for hydrolysis. Erepsin was inert toward all of these peptides. Trypsin-kinase attacked the 2 tetrapeptides in which the terminal CO_2H was on leucine and glycine, resp. All

were partially hydrolyzed by *N* NaOH, except the dipeptide *dl*-leucyl-β-aminoisovaleric acid. A. W. Dox

The preparation of propylalanine and of propylpeptides in general. Max Frankel and Sonja Kuk. *Biochem. Z.* **226**, 221–32(1930).—For the details of the prepn. by way of Br derivs. the original paper must be consulted. S. Morgulis

Reduction of *l*-cystine to *l*-cysteine. Erich Gebauer-Fuelnegg. *J. Am. Chem. Soc.* **52**, 4610–1(1930).—A brief outline is given for the reduction of *l*-cystine in CO_2-free H_2O and 1–1.5 times its wt. of Al-Hg. C. J. West

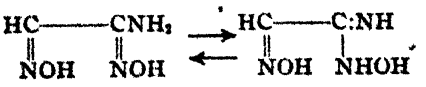
Reduction of cystine in liquid ammonia by metallic sodium. Vincent du Vigneaud, L. F. Audrieth and H. S. Loring. *J. Am. Chem. Soc.* **52**, 4500–4(1930).—Cystine is sol. in liquid NH_3 and can be reduced readily by Na in this medium to cysteine. Details of the reduction and isolation of the base are reported. Benzylcysteine may be prepd. by adding $PhCH_2Cl$ directly to the liquid NH_3 soln. of the reduction product. Four atoms of Na are required to reduce 1 mol. of cystine. C. J. West

Dioximes. LXIV. G. Ponzio and F. Baldracco. *Gazz. chim. ital.* **60**, 415–29 (1930); cf. *C. A.* **24**, 3774.—Because of the uncertainty which has existed for many yrs. regarding the structure of α- and β-chloroglyoxime (I and II, resp.), expts. were undertaken by P. and B. to throw further light on the problem The results show that it is impossible to assign to I and II configurations which are in accord with the theory of Hantzsch and Werner. The results, moreover, confirm the conclusions of earlier expts. (cf. *C. A.* **24**, 3488). I was prepd. by modifying the method of Hantzsch (cf. *Ber.* **25**, 705(1892)) so that a 50% yield was obtained. Chloral hydrate (50 g.), added to very concd. aq. $NH_2OH.HCl$ (63 g.) and Na_2CO_3 (48 g.), let stand 4–5 hrs., made ice-cold, aq. NaOH (54 g. in 100 cc.) added, acidified with concd. H_2SO_4, dild. with water, made alk. with NH_4OH, 20% aq. $Ni(OAc)_2$ added until pptn. is complete (avoiding excess), filtered, the ppt. treated with H_2SO_4, extd. with Et_2O, the Et_2O eliminated from the ext., and the residue recrystd. from water, yields I. I, dissolved in a little HCl and Et_2O, let stand, evapd. and the residue recrystd. from xylene, yields 100% of II, m. 168° (decompn.) (cf. 161° of Hantzsch, *loc. cit.* and 164–74° of Steinkopf, *C. A.* **4**, 2277; **5**, 3234). Contrary to Atack (*C. A.* **7**, 3291) and to Hieber and Leutert (*C. A.* **23**, 4692), aq. $Ni(OAc)_2$ and aq. II in the presence of HOAc do not form a ppt. but only a green soln., whereas all other β-glyoximes (considered by supporters of the Hantzsch and Werner theory as *anti*-forms and by Chugaev as *syn*-forms) form complex salts of the type $(DH)_2Ni$, insol. in dil. AcOH. In the absence of AcOH, the green liquid becomes brown red, then turbid, evolves HCN and finally ppts. a small quantity of brown-yellow flocculent ppt., while the liquid contains the Cl ion. A mixt. of alc II and alc. $Ni(OAc)_2$ is green at first, and becomes brown-red after several hrs., but does not form a ppt. even on dilu. with water. Treatment of aq. II with Br forms *chlorobromoglyoxime*, $ClC(:NOH)C(:NOH)Br$, which will be described in a forthcoming paper. NH_3 passed into alc. II, evapd., the residue heated with C_6H_6, and the filtered ext. cooled, ppts. $HC(:NOH)C(:NOH)NH_2$ (III) (cf. Steinkopf, *C. A.* **4**, 2277). II, agitated with NaOAc in 50% AcOH and the product isolated by treatment with $Ni(OAc)_2$ and NH_4OH, yields $HC(:NOH)C(:NOH)OH$ (cf. *C. A.* **21**, 1097). II and BzCl (calcd. proportions), heated for some time at 100° and the product recrystd. from $CHCl_3$, yields *β-2-benzoylchloroglyoxime*, $HC(:NOBz)C(:NOH)Cl$ (IV), m. 165°. IV in Et_2O and 5% aq. Na_2CO_3 ppts. $HC(:NOBz)C_7N_2O_2C(:NOBz)H$ (cf. Wieland, *C. A.* **19**, 2807; Steinkopf, *C. A.* **4**, 2277), which is also formed in smaller yield by heating IV in water at 100°. This reaction is then analogous to that between $MeC(:NOH)C(:NOH)Cl$ and BzCl (cf. Avogadro and Vianello, *C. A.* **21**, 1099). IV, Ac_2O and NaOAc yield, after crystn. of the product from EtOH, *β-2-benzoyl-1-acetylchloroglyoxime*, $HC(:NOBz)C(:NOAc)Cl$, m. 120°. IV, heated with excess BzCl at 100° and the product crystd from EtOH, yields β-$HC(:NOBz)C(:NOBz)Cl$ (V), m. 165° (cf. Wieland and Kitasato, *C. A.* **2**, 4674). V is also formed by prolonged heating of II with excess BzCl and recrystg. from glacial AcOH, or by isomerization of α-dibenzoylchloroglyoxime (VI) in anhyd. Et_2O by HCl in Et_2O. A method of prepn. of VI better than that of Wieland and Kitasato (*loc. cit.*) is to dissolve I (5 g.) in water (100 cc.) contg. a little AcMe, add BzCl (16.5 g.), make ice-cold, add 10% NaOH (100 g.) and recrystallize from EtOH or glacial AcOH. W. and K. report that V is decompd. by cold alc. KOH, with liberation of Cl ions. However, NH_3 passed through ice-cold V in EtOAc ppts. NH_4Cl and leaves III in soln., which shows substitution of Cl and complete hydrolysis On the other hand, V in EtOAc agitated with a little 6 *N* NH_4OH forms *β-2-benzoylaminoglyoxime*, $HC(:NOBz)C(:NOH)NH_2$ (VII), showing substitution with only partial hydrolysis. VII is more readily prepd. by agitating IV in Et_2O with 6 *N* NH_4OH, washing with water, eliminating the solvent and recrystg.

from dil. EtOH. It m. 157–8°, and in EtOH it gives a brown-red color with $FeCl_3$. VII and Ac_2O yield, after crystn. of the product from dil. EtOH, *β-1-acetyl-2-benzoyl-aminoglyoxime*, $HC(:NOBz)C(:NOAc)NH_2$, m. 145–6° (softening a few degrees below). LXV. G. Ponzio. *Ibid* 429–36.—The expts. complete the intended study of halogeno- [illegible] The for-

NH_4OH is analogous to the formation of [illegible] (:NOH)C(:NOMe)Me (cf. Thilo, *C. A.* **23**, 3902) and both of these reactions are in turn analogous to the formation of MeC(:NOBz)C(:NOBz)Me from MeC(:NOBz)Ac (cf. Diels and Stern, *C. A.* **1**, 1987). In a forthcoming paper will be discussed the kinetics of the reaction: $2RC(:NOH)COR' \longrightarrow RC(:NOH)C(:NOH)R' + RCOCOR'$, which represents a new method of formation of glyoximes, of great importance in connection with the theory of Hantzsch and Werner. MeC(:NOH)C(:NOH)Cl, treated with cold Ac_2O or heated with AcCl and the product recrystd. from EtOH, yields *diacetylmethylchloroglyoxime* MeC(:NOAc)C(:NOAc)Cl, m. 129°; treated in ice-cold AcOEt with NH_3 gas it forms NH_4Cl and MeC(:NOH)C(:NOH)NH_2 (cf. *C. A.* **16**, 2676). According to the literature, $MeC(:NOH)C_2N_2O_2C(:NOH)Me$ (I) has 3 isomeric forms (cf. *Ann.* **277**, 327(1893); **238**, 231(1894); **309**, 241(1899); **310**, 246 (1899); **328**, 214(1903); P., *C. A.* **18**, 661), and if, as is probable, the 1st isomer (the compd. of Tryller, cf. *Ann.* **310**, 246(1899)) is identical with the diacetylglyoxime peroxide dioxime of P., the same phenomenon observed with $HC(:NOH)C_2N_2O_2C(:NOH)H$ (II) is true of I. The isomer of II is attributed by Wieland (who considers $R(C_2N_2O_2)R$ peroxides as $R[O(C_2N_2O)]R$ furoxans) to the different spatial position of the oximic OH, but it is not impossible that it may be due to a difference in the structure of the $C_2N_2O_2$ group. The problem is of importance for the constitution of peroxides which, in spite of Wieland, is not yet explained. Further work on this subject is promised. To complete the series of halogen derivs. of HC(:NOH)C(:NOH)H, Br (calcd. quantity) was agitated with aq. HC(:NOH)C(:NOH)Cl (cf. above), let stand, and the ppt. recrystd. from a mixt. of Et_2O and petr. ether, which yields *chlorobromoglyoxime*, ClC(:NOH)C(:NOH)Br (III), m. 222–3° (decompn.), partially decompd. by boiling water. III reacts in water with $PhNH_2$ with formation of PhNHC(:NOH)C(:NOH)NHPh (cf. Wieland, *C. A.* **4**, 329). Dissolved in Ac_2O and the excess of the latter evapd. *in vacuo* over KOH, III forms a *di-Ac deriv.*, ClC(:NOAc)C(:NOAc)Br, which, recrystd. from EtOH, m. 160–1°. A method of prepn. of ClC(:NOH)C(:NOH)Cl (IV) more convenient than that of Steinkopf and Jurgens, (*C. A.* **5**, 3234) or Houben and Kauffman (*C. A.* **8**, 111) is to pass Cl through ice-cold glyoxime (5 g.) in 10% HCl (150 cc.) until permanently yellow, and let stand 12 hrs., which ppts. 5 g. of IV. Houben and Kauffmann (cf. *C. A.* **8**, 111) prepd. ClC(:NOBz)C(:NOBz)Cl (V) from IV, and from V they prepd. a compd. (VI) with the same m. p. as $H_2NC(:NOH)C(:NOH)NH_2$ (VII), but from this latter they could not obtain a di-Bz deriv., so they concluded that VI was not VII but a spatial isomer of the ordinary form of VII. The expts. of P., however, show that the diaminoglyoxime obtained by the action of NH_3 on the di-Ac deriv. of IV is chem. and phys. identical with VII prepd. by the method of Fisher (*Ber.* **22**, 1931(1889)). The errors in the expts. of H. and K. (*loc. cit.*) arise from the peculiar behavior of VII toward Ac_2O. If VII is dissolved in boiling Ac_2O and the soln. cooled immediately, VII crystallizes unaltered, and only by boiling 10 min. and pouring in water is the di-Ac deriv. obtained. Prolonged heating forms oxalenediazoöximediethenyl, $Me(C_2N_2O)_2Me$, whose formation is complete in 24 hrs. This last compd. cannot be isolated by the methods described in the literature, and it is necessary to pour the reaction product into water, neutralize with Na_2CO_3, ext. with $CHCl_3$, evap., wash the residue with Et_2O and recrystallize from boiling water, which gives a product, m. 165–6°. LXVI. G. Ponzio and E. Durio. *Ibid* 436–48.—The expts. which deal with acyl derivs. of $HC(:NOH)C(:NOH)NH_2$ (I), show that it is impossible to assign to I a configuration which is in accord with the theory of Hantzsch and Werner. I was prepd. by Steinkopf (*C. A.* **4**, 2277) and S. and Bohrmann, (*C. A.* **1**, 1979), but was not obtained pure. It can, however, be purified by dissolving in Et_2O, pptg. with HCl gas, decompg. the HCl salt with NH_4OH and crystg. from water. Thus obtained, it has the *compn.* $C_2H_5O_2N_3.H_2O$, loses water slowly on exposure to air or rapidly at 40–50°, and the anhydride m. 145.5° (decompn.). In aq. soln. with $Ni(OAc)_2$ it forms the *complex salt*, $C_4H_8O_4N_6Ni$, bright red. $(CO_2H)_2$ in Et_2O added to I in Et_2O ppts. the *oxalate* of I, $HC(:NOH)C(:NOH)NH_2.H_2C_2O_4$, m. 159°. Concd. HCl and KOCN, added to aq. I, let stand and the ppt. recrystd. from water yield, *ureidoglyoxime*, $HC(:NOH)C(:NOH)NHCONH_2$, m. 157° (decompn.), does not form a Ni salt. HC(:NOBz)C(:NOH)Cl in Et_2O agitated with N[illegible]

forms $HC(:NOBz)C(:NOH)NH_2$ (II) (cf. above), and in a similar way was prepd. $HC(:NOBz)C(:NOBz)NH_2$ (III), also described previously (same reference). I, benzoylated by the method of Jacobs and Heidelberger (*C. A.* **11**, 2329), *i. e.*, I (4 g.) in glacial AcOH (30 cc.) treated with satd. aq. AcONa (30 cc.) and then, after making ice-cold, with BzCl (6.5 g.), and the product crystd. from boiling water, forms the *1-Bz deriv.* of I, $HC(:NOH)C(:NOBz)NH_2.H_2O$ (IV), m. 134–7°, loses its water *in vacuo;* the *anhydride* m. 146–7°; does not give any color with $FeCl_3$. III and cold Ac_2O yield, after crystn. of the product from EtOH, *1-benzoyl-2-acetylaminoglyoxime*, $HC(:NOAc)C(:NOBz)NH_2$ (V), m. 166–7°. BzCl (3.6 g.), added dropwise to I (1 g.) in 10% NaOH (11.5 cc.) and the product recrystd. from EtOH or C_6H_6, yields the *di-Bz deriv.* of I, m. 186–7°, also formed by adding BzCl to II or IV and then adding dropwise concd. AcONa. IV, Ac_2O and a little AcONa, refluxed gently for a short time, water added, steam-distd. and the product recrystd. from EtOH, yields *3-cyano-5-phenylazoxime* (*3-cyano-5-phenylfuro(ab$_1$)diazole*), $\overset{\frown}{NCC:N.O.CPh:N}$ (VI), m. 62°. It is also formed similarly from III or V and Ac_2O. Alc. VI (1 mol.) and alc. Na (1 atom) heated 3–4 hrs. at 100°, evapd., the residue (a mixt. of $H_2NCO(C_2N_2O)Ph$ (see later) and NCNNaBz) treated with water, filtered, the filtrate acidified with H_2SO_4, and the ppt. recrystd. from EtOH, yields NCNHBz (VII). The formation of VII from VI confirms the structure of VI, and the reaction is analogous to that of Boeseken and van Lennep with 3-acyl-5-arylaminoazoximes (cf. *Rec. trav. chim.* **31**, 1961(1912)). It is explained by assuming that the acid is first formed: VI + $2H_2O$ ⟶ $\overset{\frown}{HO_2CC:N.O.CPh:N}$ (VIII) + NH_3; VIII then loses CO_2: VIII $\xrightarrow{-CO_2}$ $\overset{\frown}{HC:N.O.CPh:N}$, and the latter, like all mono-substituted azoximes, is unstable and isomerizes to VII. The *compd.* $H_2NCO(C_2N_2O)Ph$, to be described later, is a secondary intermediate product. VI, let stand several days with HCl (d. 1.19), dild. with water, filtered, the residue freed of unaltered VI by steam distn. and the residue recrystd. from boiling EtOH, yields *3-carboxy-5-phenylazoximeamide*, $H_2NCO(C_2N_2O)Ph$, m. 159–60°; heated with alc. Na it evolves NH_3 and CO_2 and forms NCNNaBz. H_2S, passed into alc. VI at 50–60°, dild. with water, and the product recrystd. from $CHCl_3$, yields *3-carboxy-5-phenylazoximethioamide*, $H_2NCS(C_2N_2O)Ph$, yellow, m. 171–2° (decompn.). Prepd. by the method of Houben and Kauffmann (*C. A.* **8**, 111), $HC(:NOAc)C(:NOAc)NH_2$, m. 82° (not 70–2° as reported by H. and K.), decompd. to I by cold aq. NaOH. Prepd. by the method of Steinkopf (*C. A.* **4**, 2277) or more simply by treating I with Ac_2O and AcONa, pouring into water and recrystg. from water, $HC(:NOAc)C(:NOH)NHAc$ (IX), m. 154° (not 142–50° as reported by S.). Contrary to S., it does not in water give any color with $FeCl_3$, but the color appears if it is heated in water, as a result of hydrolysis. IX (5 g.) and 20% aq. NaOH (20 cc.), heated gently, dild. with water, acidified with HCl and the product recrystd. from water or EtOH, yields *N-acetylcyanoformamidoxime*, NCC(:NOH)NHAc (X), m. 186°. The formation of X from IX is explained on the assumption that the reaction is analogous to that of the formation of PhC(:NOAc)C(:NOH)NHAc (cf. *C. A.* **17**, 3875), *i. e.*, AcOH is first eliminated from IX, forming $\overset{\frown}{HC:N.O.N:CNHAc}$, and the latter isomerizes (like all mono-substituted furazans) to X. Benzoylation of X in 10% NaOH, with crystn. of the product from EtOH, yields *N-acetyl-O-benzoylcyanoformamidoxime*, NCC(:NOBz)NHAc, m. 149°. A discussion of the reactions involved in these various syntheses shows the contradictions which arise if the attempt is made to assign any kind of configuration to I, the inadequacy of the theory of Hantzsch and Werner, and the necessity of substitution for this theory some less general one. The properties of I can be explained only by a tautomerism between the 2 dioximic and oximinohydroxyamidinic formulas, which is represented by the equil.:



C. C. Davis

Alcoholysis of certain 1,3-diketones and β-ketonic esters. Walter M. Kutz and Homer Adkins. *J. Am. Chem. Soc.* **52**, 4391–9(1930); cf. *C. A.* **24**, 5722.—The amt. of $AcCH_2CO_2Et$ to be obtained from the reaction mixt. is the same irrespective of whether it is synthesized from AcOEt and EtONa or remains from the alcoholysis of $AcCH_2CO_2Et$ mol. equiv. to the amt. of EtONa used in the synthetic reaction. All attempts to make similar detns. on the synthesis and alcoholysis of 1,3-diketones

have failed because no conditions have been found under which homogeneity would be maintained during the synthesis and alcoholysis. The rates of alcoholysis at 60° of CH_2Ac_2, CH_2AcBz, $PhCH_2CHAc_2$, $EtCHAc_2$, $(PhCH_2)_2CAc_2$, $PhCH_2CHAcBz$, $AcCH_2CO_2Et$, $AcCHEtCO_2Et$, $AcCH(CH_2Ph)CO_2Et$, $AcCEt_2CO_2Et$ and $AcC(CH_2Ph)_2CO_2Et$ were detd. in the presence of various ratios of EtONa. The keto esters were found to be more stable than the diketones toward alcoholysis for a given ratio of EtONa. Substitution on the C atom between the 2 CO groups very considerably increased the rate of alcoholysis in the presence of EtONa. This effect reached its max. in the case of the diacyldialkylmethanes, which underwent alcoholysis hundreds of times as rapidly as the diacylmethanes. When the 6 diketones whose reactivity was measured in the presence of both HCl and EtONa were arranged in the order of decreasing reactivity with respect to alcoholysis in the presence of HCl, they were found to be arranged (with 1 exception) in the order of increasing reactivity toward alcoholysis in the presence of EtONa. Et_2CBz_2, which is incapable of enolization, readily underwent alk. alcoholysis and hydrolysis. These facts taken in conjunction with the parallelism between the extent of enolization and rate of acid alcoholysis offer support to the hypothesis of Bradley and Robinson that alk. cleavage of 1,3-diketones takes place through the reaction of the CO rather than of the enol form of the diketone. C. J. West

Course of addition of sodium enol alkyl malonic esters to α,β-unsaturated esters. Arthur Michael and John Ross. *J. Am. Chem. Soc.* **52**, 4598–609(1930); cf. *J. prakt. Chem.* 35, 349(1887); 37, 496(1888).—The course of addn. of $CHMe(CO_2Et)_2$ to crotonic and cinnamic esters varies with the amt. of EtONa used. In the presence of small amts. of EtONa the addn. proceeds with H and $-CMe(CO_2Et)_2$ as addendum components. In the presence of a mol. equiv. of EtONa the addn. proceeds with Me and $-C(CO_2Et):C(ONa)OEt$ as addendum components. These results rigorously prove the correctness of Thorpe's conclusions (*J. Chem. Soc.* **77**, 923(1900)) that the addn. of $NCCH:C(ONa)OEt$ to $CH_2:CMeCO_2Et$ takes place with migration of the H atom and that the addn. of $MeC(CN):C(ONa)OEt$ to $Me_2C:CHCO_2Et$ takes place with the migration of the Me group. The original should be consulted for the mechanism of these reactions and explanations of the results. Condensation of $CHNa(CO_2Et)_2$, $[EtO_2CCH:C(ONa)OEt]$ and $MeCH:CHCO_2Et$ with a small amt. of EtONa gives *95%* of the Et ester, b_2 144°, of *β-methyl-γ-carboxyglutaric acid*, m. 139°; the Et ester in EtONa and EtOH gives with MeI the Et ester, b_2 160°, of $MeCH[CMe(CO_2H)_2]CH_2CO_2H$, m. 167° (Thorpe and Young, *J. Chem. Soc.* **83**, 358(1903)); further attempts to methylate the ester caused only cleavage into $MeCH:CHCO_2Et$ and $CMeNa(CO_2Et)_2$. The enol form of $CMeNa(CO_2Et)_2$ and $MeCH:CHCO_2Et$, condensed with 1/6 mol. EtONa, give an Et ester, b_2 155°, sapon. to a mixt. of approx. 90% β,γ- and 10% *α,β-dimethyl-γ-carboxyglutaric acids* (I); using 1 mol. equiv. of EtONa the main product was the *Et ester*, b_2 148–50°, of I, m. 145°; distn. of I gives a mixt. of *cis-* and *trans*-dimethylglutaric acids. Distn. of the β,γ-acid gives the same products. Further methylation of the Et ester of I gives the *α,β,γ-tri-Me deriv.*, b_2 164°; the free *acid* (II) did not crystallize. The action of EtONa upon the Et ester of the β,γ-acid causes some cleavage and also gives the Et ester of I. I was also formed by the addn. of $CHNa(CO_2Et)_2$ to Et tiglate; larger quantities were prepd. by the use of $NCCHNaCO_2Et$. Et α,β-dimethyl-γ-cyanoglutarate and EtONa, treated with MeI, give the *Et ester*, b_2 160°, of α,β,γ-trimethyl-γ-cyanoglutarate; hydrolysis gives II. Heating at 160° for 30 min. splits off CO_2, giving a mixt. of the *cis-* (III) and *trans-*forms (IV) of α,β,γ-trimethylglutaric acid; III, m. 125°, was sepd. by conversion into the anhydride and then into the *imide*, m. 90°; IV could not be crystd. *β-Phenyl-γ-carboxyglutaric acid* m. 137°; methylation of the Et ester in EtONa in Et_2O gives a mixt. of cleavage products and also the *Et ester* (IV), b_2 194°, of *γ-methyl-β-phenyl-γ-carboxyglutaric acid*, m. 188° (decompn.) and 148°, on standing several days the lower-melting changing into the higher-melting form. Condensation of $CMeNa(CO_2Et)_2$ and $PhCH:CHCO_2Et$ with a small amt. of EtONa gives V; with 1 mol. equiv. of EtONa there results the *Et ester*, b_2 185–8°, of *α-methyl-β-phenyl-γ-carboxyglutaric acid*, which exists in 2 forms, m. 171° and 145°; these were also obtained by hydrolysis of *Et α-methyl-β-phenyl-γ-cyanoglutarate*, b_2 185–7°, obtained from $PhCH:CMeCO_2Et$ and $NCCHNaCO_2Et$. C. J. West

Thermal data on organic compounds. IX. Study of the effect of unsaturation on the heat capacities, entropies and free energies of some hydrocarbons and other compounds. George S. Parks and Hugh M. Huffman. *J. Am. Chem. Soc.* **52**, 4381–91(1930); cf. *C. A.* **24**, 4755.—Data on the specific heats are given for fumaric, maleic and succinic acids, 2-pentene, trimethylethylene (I), pentane (II), cyclohexene

(III), methylcyclohexane (IV), diisobutylene (V), stilbene, dibenzoylethylene and dibenzoylethane. The heats of fusion were detd. as follows: I, m. 138.9°K, 25.74 cal. per g.; II, m. 143.4°K, 27.75; III, m. 169°K, 9.57; IV, m. 146.2°K, 16.24; V, m. 172°K, 16.83. III has a transition temp. of 138.7°K, the heat of transition being 11.86 cal. per g. The entropies of 11 of the compds. have been calcd. from these heat-capacity data. In general the entropy of an unsatd. substance was found to be slightly less than that of the corresponding satd. compd. The corresponding free energies have also been calcd. The free-energy change in dehydrogenation reactions was found to vary greatly and it is apparent that the effect of unsatn. in detg. the free energy value of an org. compd. is very sp. C. J. WEST

Carbon dioxide cleavage of pyruvic acid. I. Preliminary experiments. UNO BOKLUND. *Biochem. Z.* **226**, 56–61(1930).—$AcCO_2H$ can be decompd. into CO_2 and AcH, this reaction being catalyzed by various NH_2 compds. This decarboxylation takes place even in dil. aq. solns. at room temp. The H-ion concn. is very important in detg. the degree of catalysis, the NH_2 compds. having a very definite p_H optimum for their activity. This reaction is in many respects similar to the enzymic decarboxylation of $AcCO_2H$. S. MORGULIS

Influence of hydrogen ions on the Fenton reaction. W. H. HATCHER AND M. G. STURROCK. *Can. J. Research* **3**, 214–23(1930).—By means of cond. measurements of the reaction mixt. when tartaric acid is oxidized by H_2O_2 in the presence of $FeSO_4$ as catalyst the course of the reaction was followed. Conclusion: The very small yields of dihydroxymalcic acid result from the inactivation of the catalyst by the relatively strong acid formed. Rearrangement to an isomer of dihydroxymaleic acid prevents quant. sepn. The existence of the tautomeric keto form of dihydroxymaleic acid was clearly indicated. The yield of dihydroxymaleic acid will be increased in this reaction when some compd. is found which will reduce the $\left[\overset{+}{H}\right]$ and at the same time shift the equil. in favor of the enol form. J. W. SHIPLEY

Direction of addition of hydrogen bromide to α-methyleneglutaric acid. JOHN WM. BAKER. *Proc. Leeds Phil. and Lit. Soc. Sci. Sect.* **2**, 115–9(1930).—By addn. of HBr to α-methyleneglutaric acid von Pechmann and Röhm in 1901 obtained a Br acid which on reduction gave α-methylglutaric acid. It was not detd. whether the Br was attached to the α-C forming α-bromo-α-methylglutaric acid (I), or in the Me group forming α-bromomethylglutaric acid (II). According to the theory of Burton and Ingold (*C. A.* **22**, 2556) II should be correct. Baker attempted to make I by direct methods. By boiling γ-cyano-γ-valerolactone with abs. EtOH satd. with HBr a good yield was obtained of Et α-hydroxy-α-methylglutarate (III), b_8 115°, n_D^{20} 1.4375. III was also prepd. by treating crude Et γ-cyano-γ-hydroxyvalerate in similar manner and also by the action of EtI on Ag α-hydroxy-α-methylglutarate. By bromination of III by PBr_5 in benzene a Br-ester was obtained which when distd., even under reduced pressure, rapidly eliminated EtBr, leaving the lactonic ester (IV) $MeC(CO_2Et).CH_2.CH_2.CO.O$, b. 265°, b_{14} 142°. IV was also formed from III by distg. twice at atm. pressure. By hydrolysis of III or IV the lactonic acid, m. 73°, was prepd. B. concludes I is too unstable to be prepd. and that the acid of von P. and R. must have been II. L. E. GILSON

Urea formation. I. Urea formation from amino acids through catalytic oxidation on carbon. MINORI ARAI. *Biochem. Z.* **226**, 233–6(1930).—Glycocoll, alanine, asparagine, glutaminic acid, phenylalanine and arginine, as well as glycylglycine, glycine and phenylalanine anhydrides are oxidized in the presence of O_2 to urea by shaking with C for a long time. To demonstrate the urea as the dixanthylurea ppt. the mixt. must be first heated to 100° with 1 cc. 10% $(NH_4)_2SO_4$. If the expt. is carried out in the presence of NH_4OH the ppt. of urea is obtained directly with a no. of amino acids, but an extra amt. is also formed after heating with the $(NH_4)_2SO_4$. The effect of the NH_4OH is not due to the OH-ions as this is not obtainable with NaOH. S. MORGULIS

Thermal requirements and operating characteristics of the urea autoclave. K. G. CLARK AND V. L. GADDY. *Ind. Eng. Chem.* **22**, 1084–77(1930). Cf. Krase, Gaddy and Clark, *C. A.* **24**, 2111.—From the thermal requirements under operative and non-operative conditions the heat of reaction of $2NH_3$ and CO_2 to form a kg. of urea was found to be 128.2 ± 8.7 kg.-cal. at 36.5% conversion. High Si-Cr-Ni steels resisted corrosion in the autoclave. L. P. HALL

Pyrimidines. CXVI. An improved technic for the synthesis of *N*-alkyl derivatives of thymine. TREAT B. JOHNSON. *Ber.* **63B**, 1974–6(1930).—Bachstez (*C. A.* **24**, 3760), in establishing the identity of orotic acid (I) with Wheeler's uracil-4-carboxylic

acid (II) by comparison of characteristic derivs. of I, used certain alkyl derivs. which he prepd. in different ways. Esterification with MeOH and EtOH yielded the corresponding normal esters, but treatment of the Ag salt with alkyl halides gave entirely different products which he assumed to be *N*-derivs. He describes no expt., however, which is contrary to the assumption that these alkyl derivs. are imido esters of the type NH.CO.N:C(OMe).CH:CCO_2H. It has been found in J.'s lab. that pyrimidines with alkoxy groups may show wide variations in stability; some are readily isomerized by heat or by the action of alkyl halides into *N*-alkyl isomers (cf. Hilbert and J., *C. A.* **24**, 3016). Schmidt-Nickels and J. (following abstr.) have made a similar observation on thymine derivs. The reaction is useful in prepg. alkyl derivs. of known structure and may aid in establishing the constitution of the derivs. of I prepd. by B. C. A. R.

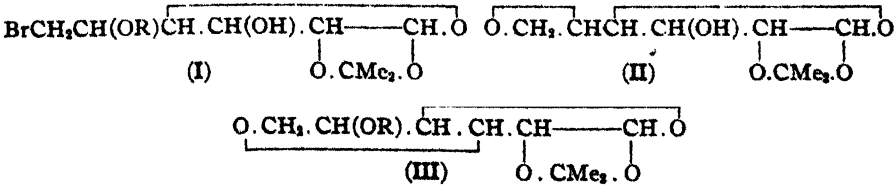
Pyrimidines. CXVII. Method for the synthesis of nucleosides. G. E. Hilbert and T. B. Johnson. *J. Am. Chem. Soc* **52**, 4489–94(1930); cf. preceding abstr.—2,6-Dimethoxypyrimidine and acetobromoglucose, heated at 50° for 48 hrs., give 3-methyluracil and 23–32% of *2-keto-6-methoxy-3-(tetraacetylglucosido)pyrimidine* (I), m. 220–1°; at room temp. the yield after 2 weeks is only 5%; at 80° the crystn. starts in a few hrs. but the yield is only 9%; if equiv. amts. of the reactants are used the yield is not only very poor but the product is difficult to obtain pure. I in abs. MeOH and dry HCl in abs. EtOH give 97% of *3-glucosidouracil* (II), crystg. with 0.5 mol. H_2O, m. 207–9° (decompn.); $[\alpha]_D^{23}$ 21.4° (H_2O); it does not reduce Fehling soln. after boiling with HCl; Ac_2O and AcONa give the *tetra-Ac deriv.*, m. 154–5°. II and Br-H_2O give the *5-Br deriv.*, decomps. 238°, $[\alpha]_D^{25}$ 10.3° (H_2O). Catalytic reduction of II gives the *4,5-dihydro deriv.* (III), decomps. 238°, $[\alpha]_D^{24}$ 9.3° (H_2O); hydrolysis gives 4,5-dihydrouracil and glucose. Since II is not hydrolyzed by dil. acid and III is, their behavior is similar to uridine and its 4,5-dihydro deriv.; this is believed to be the strongest direct exptl. evidence yet obtained in favor of the structure of uridine being 3-ribosidouracil. **CXVIII. Molecular rearrangements in the thymine series.** W. Schmidt-Nickels and T. B. Johnson. *Ibid* 4511–6.—2,6-Dichloro-5-methylpyrimidine, m. 25–6°, and EtONa give the *2,6-di-MeO deriv.* (I), m. 61°; heating at 200° for 48 hrs. causes rearrangement into 1,3-dimethylthymine, m. 155°. I and MeI at room temp. give *2-keto-3,5-dimethyl-6-methoxypyrimidine*, m. 144°; warming with HCl gives quant. 3-methylthymine, m. 291°. *2,6-Diethoxy-5-methylpyrimidine* (II), m. 36°, is stable when heated at 200° for 48 hrs.; with MeI there results *2-keto-3,5-dimethyl-6-ethoxypyrimidine*, m. 111°, converted by dil. HCl to 3-methylthymine; with EtI there results the corresponding *3-ethyl-5-methyl deriv.*, m. 78°, and yielding with dil. HCl *3-ethylthymine*, m. 223°; Et-Br could not replace EtI. I and bromoacetoglucose give 3-methylthymine. Chloroacetoglucose does not react with I or II. II and bromoacetoglucose give a compd., m. 316°, which was not further examd. C. J. West

Rhamnose (mannomethylose) derivatives. E. Votoček, F. Valentin and F. Rac. *Collection Czechoslov. Chem. Communications* **2**, 402–13(1930); cf. *C. A.* **23**, 2719.—Anhyd. crystals of *dl*-rhamnose (I), m. 151.3–3.0°, are obtained by the concn. of an alc. soln. of equal wts. of *l*- (II) and *d*-rhamnose (III). I being anhyd. shows that the mol. of water in II and III is water of crystn. as in the case of glucose monohydrate, and not constitutive water as claimed by Rayman. Reduction of III with Na-Hg gives *d*-rhamnitol, m. 123°, $[\alpha]_D$ —12.4° in water; *dibenzylidene deriv.*, m. 207°, $[\alpha]_D$ 60.7° in $CHCl_3$. IV obtained from II has the same phys. consts. Contrary to Bertrand's rule (*Ann. chim. phys.* [8], **III**, 181–8(1904)), neither II nor α- or β-rhamnohexitol is oxidized by the sorbose bacteria (V) although mannitol is readily attacked, and it is concluded, therefore, that the oxidizing action of V is detd. not only by stereochem. configuration but further by the homologous series to which the alc. belongs. β-Rhamnohexose prepd. according to Fischer and Morrell (*Ber.* **27**, 382) could not be crystd. but gives a cryst. *monobenzylidene deriv.*, m. 233–4°, $[\alpha]_D$ 50.8 in $CHCl_3$. Crystallographic data are given for I. Frederick C. Hahn

Structure of carbohydrates and their optical rotatory power. W. N. Haworth. *Nature* **126**, 238–9(1930); cf. *C. A.* **23**, 1881.—The article is a criticism of two publications on the same subject by Hudson (cf. *C. A.* **24**, 2726–7). The author argues that Hudson is assigning differing structural formulas to explain the anomalies arising from his hypothesis concerning optical rotation and carbohydrate structure at the same time that he is seeking to test that hypothesis. As a test of Hudson's scheme, the author hydrolyzes 4-glucosido-α-methylmannoside and 4-galactosido-α-methylmannoside by means of emulsin, in which case no ring change should occur. The product formed is the ordinary α-Me mannoside ($[\alpha]_D$ 79°) which has a 1,5-ring and not Hud-

son's hypothetical α-Me mannoside ($[\alpha]_D$ 125°). Since this is Hudson's pivotal compd. to which he assigned a 1,4-ring, the author concludes that "the whole of Hudson's rival formulas for mono- and disaccharides become meaningless." A. WIEBEN

Acetonesugars and other compounds of the carbohydrates. XX. Synthesis of methylated cellobiose. Crystalline methylcellotriose from cellulose. Gentiobiose from amygdalin. KARL FREUDENBERG, CARL CHR. ANDERSEN, YUKICHI GO, KARL FRIEDRICH AND NELSON W. RICHTMYER. *Ber.* **63B**, 1961–6(1930); cf. *C. A.* **23**, 2940 (*C. A.* **16**, 3635; **19**, 2034; **22**, 4106, will henceforth be designated as Papers XVII, XVIII, XIX).—In the methylation of cellobiose or β-Me cellobioside, heptamethyl-β-methylcellobioside (I) can be obtained in perfectly homogeneous cryst. form and the efforts to synthesize methylated cellobiose were therefore directed to obtaining this compd. 2,3,6-Trimethyl-β-methylglucoside (II), m. 58–9°, was prepd. in 6 g. yield by converting 12 g. 2,3,6-trimethylglucose with HCl in Et_2O into the 1-chloride and treating the latter with MeOH and Ag_2CO_3. Tetramethylglucose 1-chlorohydrin (III), b_1 100–20°, was obtained in 6–7 g. yield from 6 g. tetramethylglucose with HCl-Et_2O. The condensation of II with III was effected by stirring in $CHCl_3$ with Ag_2CO_3; the monosaccharide derivs. were readily removed by distn. up to 150° under 1 mm.; the higher-boiling fraction (150–205°) yielded 7% of I, m. 86°, $[\alpha]^{18}_{578}$ —16° (±1°) in H_2O. The part remaining after removal of the crystals remained liquid more than 1 yr.; it was *d*-rotatory and can, therefore, have been only a heptamethyl-β-methylmaltoside or a trehalose or isotrehalose deriv. As a matter of fact III alone with Ag_2CO_3 in $CHCl_3$ gives an oily permethylated disaccharide almost free of Cl and with $[\alpha]^{18}_{578}$ 52° (MeOH, 5% soln.). Heptamethylbenzylcellobioside in AcOH with Pt sponge takes up about 4 mols. H_2; the *heptamethylcellobiose*, m. 105 10°, shows mutarotation in 1% H_2O soln., $[\alpha]_{578}$ 53° ⟶ 40°. *Decamethyl-β-methylcellotrioside*, obtained by treating absorbent cotton with Ac_2O-AcOH-H_2SO_4 and repeatedly methylating the alc.-insol. product with Me_2SO_4 (30 g. from 7 100-g. portions of cotton), $b_{0.08}$ 216–20°, m. 115°, $[\alpha]^{20}_{578}$ 9.8° (±0.5°), mol. wt. in camphor 608. Amygdalin in 50% alc. with Pt sponge and H gives gentiobiose, identified as the osazone. **XXI. Some experiments with anhydroglucose.** KARL FREUDENBERG, HANS TOEPFFER AND SYED H. ZAHEER. *Ibid* 1966–9.—It has been found that acetoneglucose 6-bromohydrin (I, R = H) with Ag_2O gives an acetone-anhydroglucose, m. 133° (previously given as 126°) to which was assigned the structure II since Ohle, v. Vargha and Erlbach had given the structure III (R = H) to an isomer, m. 56°, obtained from ditoluenesulfonylacetoneglucose. III has now been obtained by acetonation of Fischer and Zach's 3,6-anhydroglucose (IV) with the aid of H_2SO_4, thus confirming its structure. In the meantime Ohle and v. Vargha have found that II can be readily prepd. from toluenesulfonylacetoneglucose and identified it as an ethylene oxide. II reacts in an unexpected manner with acetobromoglucose, which smoothly adds at the ethylene oxide union to form the same bromodisaccharide V (I, R = $C_6H_7O_5Ac_4$) which had been obtained from I and acetobromoglucose. The corresponding I compd. is obtained from V with NaI or from II with acetoiodoglucose. The remaining HO group in V can be acetylated, but, as before, all efforts to replace the halogen by HO failed; the only definite halogen-free transformation product obtained was an anhydrodisaccharide to which is ascribed the structure VI (III, R = $C_6H_{11}O_5$). III (2 g. from 2.5 g. IV), $[\alpha]^{21}_D$ 31.09° (H_2O); *p*-toluenesulfonate, m. 133°. Acetate of V (10 g. from 8 g. II shaken with Ag_2CO_3 in CCl_4, followed by treatment of the product in C_5H_5N with Ac_2O), m. 169°, $[\alpha]^{18}_D$ —59.75° in $(CHCl_2)_2$. *I analog*, $C_{25}H_{35}O_{15}I$, m. 193°, $[\alpha]^{20}_D$ —76.62° in $(CHCl_2)_2$; 2 g. with $Ba(OH)_2$ in aq. alc. on the H_2O bath gives 0.8 g. *5-glucosidoacetone-anhydroglucose* (VI), m. 130°, $[\alpha]^{20}_D$ 20.16° (H_2O). Acetoiodoglucose, m. 109°, was obtained in 45 g. yield from 50 g. pentaacetylglucose in cold Ac_2O slowly treated with HI (d. 1.7).



XXII. Cyclic acetates in the sugar group. KARL FREUDENBERG AND HELLMUT SCHOLZ. *Ibid* 1969–72.—Haworth, Hirst and Müller attempted to explain the exist-

ence of the remarkable, alkali-stable monoacetate of Fischer, Bergmann and Rabe's Me rhamnoside by assuming a special steric arrangement. B. and S. believe it can be explained on structural chem. grounds by assigning to the compd. the structure (I) of a cyclic acetate. Along with the 2 known heptaacetylchloromaltoses, which presumably have the normal structures, F. and his collaborators had found a 3rd isomer which, in the light of the views prevailing at the time, was assumed to be a "γ-form." When the structure of maltose was later established by Haworth, such a furoid γ-structure was excluded, since the 4-position in maltose is occupied. If, however, the above views as to the rhamnoside are correct and are applicable to maltose also, the 3rd chloromaltose would have the structure II (X = Cl), the heptaacetylmethylmaltoside (III) derived from it the corresponding structure (X = OMe), and the "Me maltoside" (IV) (III with the six AcO groups replaced by HO) obtained from these compds. would still contain an alkali-stable AcO group which at the time had been overlooked. As a matter of fact, the MeO content (7.8%) of the amorphous IV agrees better with that calcd. for the new formula (7.8%) than with the calcd. value (8.7%) for a Me maltoside. The correctness of the new formulas is established by the fact that the well-crystd. III contains an AcO bound differently from the other 6; when it is boiled in alc. with K stearate, only six AcO groups distil over as AcOEt and the 7th is split off only with $MeC_6H_4SO_3H$; the IV, obtained from III with aq. NH_3, likewise splits off an AcO group when boiled in alc. with $MeC_6H_4SO_3H$. II on long contact with C_5H_5N apparently changes into a ketene acetal, —CH(OAc).CH———CH.O—, and $C_5H_5N.HCl$,

O C(:CH_2).O

for the mixt., which at first is not attacked by $KMnO_4$ in Me_2CO, reduces the $KMnO_4$ after it has stood some days at 20°. In view of these results in the maltose series, there can be no doubt as to the correctness of the structure I for the rhamnoside, which has also been established directly by Braun (see following abstr.). In the meantime, Bott, Haworth and Hirst have independently reached the same conclusion (*C. A.* **24**, 4270).

MeCH.CH(OH).CH(OH).CH———CH.O
O.CMe_2.O
(I)

$AcOCH_2$CH.CH($OC_6H_7O_5Ac_4$).CH(OAc).CH———CH.O
O.CMeX.O
(II)

C. A. R.

A new isomerism in the sugar group. EMIL BRAUN. *Ber.* **63B**, 1972–4(1930); cf. preceding abstr. and *C. A.* **24**, 4509.—AcOH and its esters with non-absorbing alcs. have in the ultra-violet a characteristic absorption which is to be ascribed to the C:O group. If "γ-acetylmethylrhamnoside" (I) is a $MeC(OH)_3$ deriv.,

MeCH.CH(OH).CH(OH).CH——CH.O
O.CMe(OMe).O

this characteristic form of the ordinary AcOH absorption should disappear or at least be replaced by a qualitatively different form; its absorption should lie in the region of even shorter wave lengths. Such proved to be the case. The absorption coeff. χ of MeOAc (in hexane) in the region measured is almost 10 times as large as that of I (in alc.), the difference in the logs being 1. This effect cannot well be explained by difference in the solvents or by other phys. influences. For the γ-triacetylmethylrhamnoside, with 2 ordinary AcO groups, the curve for the log χ is about 0.30 unit higher than that for MeOAc, corresponding to 2 mols. MeOAc (log 2 = 0.30). For I and acetoneglucose (II), which, outside of the non-absorbing sugar residue, differ only in that I contains OMe instead of 1 of the Me groups in II, the absorption curves in H_2O almost coincide between 2100 and 1950 A. U., and only in the longer wave lengths do they show a distinct difference. The chem. behavior of I and II is also worthy of note; both are exceedingly non-sensitive to strong alkalies but quite sensitive toward dil. acids. From these results it may be affirmed that I and the triacetate are derivs. of $MeC(OH)_3$. Whether acetobromorhamnose is also a $MeC(OH)_3$ deriv. or whether a rearrangement occurs during the conversion into I with MeOH or quinoline cannot be stated, but at some stage the ordinary Ac group on C atom 2 must react with C atom 1 to form a $MeC(OH)_3$ deriv. C. A. R.

The water-soluble degradation products of lignin. II. HERMANN FRIESE. *Ber.*

63B, 1902–10(1930); cf. *C. A.* 24, 1090.—In a continuation of the earlier work it was found that Ac_2O-AcOH (1:1) contg. 9–10 vol. % H_2SO_4 can convert wood meal in a few days practically quantitatively into completely H_2O-sol. products; if the mixt. is now dild. with 1.5–2 parts $CHCl_3$, the lignin part can readily be shaken out with H_2O without any sugar acetates going over into the H_2O. The product so obtained is a mixt. of substances of different mol. wts., all contg. organically bound S and forming salts, *i. e.*, they are SO_3H acids. It has the av. compn. C 38.7, H 4, S 10–4, and MeO 6–9%, and is also sol. in MeOH, AcOH and Ac_2O; in hot MeOH, however, it is partially esterified. The Ba salt, prepd. with $BaCO_3$, unlike the deep dark brown free acid, is yellowish brown; it is readily sol. in H_2O but can be freed only with difficulty from the last traces of the salt of $HO_3SCH_2CO_2H$, formed from the Ac_2O and H_2SO_4. The Ba salt cannot be fractionated by pptn. from H_2O with alc. The free acid, however, can be sepd. into numerous fractions ranging in compn. from C 55, H 5.85, S 2.55, MeO 13.5%, to C 23.76, H 4.17, S 19.98, MeO 4.5%. The soly. in H_2O decreases with increasing C content and disappears completely when the S content falls to 2%. All the prepns. contg. more than 40% C lose their soly. almost completely on long standing over P_2O_5 or when dried in an oven. Flocculation does not occur, however, even on long standing. When the aq. soln. is filtered through hide powder, 50–60% of the substance is retained. Lignin prepd. by Freudenberg's method behaves in the same way toward the Ac_2O-AcOH-H_2SO_4 mixt., except that about 50% remains undissolved; it nevertheless takes up 5.67% S and the C content falls correspondingly to 48.84%. Only after long treatment with 4 *N* NaOH on the H_2O bath does it completely dissolve. Of the original material, 6% becomes $CHCl_3$-sol., contains 69% AcOH and is optically active (undoubtedly carbohydrate acetates); 40% becomes H_2O-sol., contains C 49.29, H 4.57, S 10, MeO 8.5%, and can be sepd. into 2 parts of the same compn. The free acid cannot be acetylated, and only by treatment of the Ba salt (20.26% Ba) with Ac_2O can 20.76% AcOH be introduced. The anal. results correspond to the formula $C_{12}H_{18/14}O_7S$ or $C_{12}H_8O(OMe)(OH)_2SO_3H$, a dihydroxybenzenesulfonic acid with one HO group etherified with a trihydroxybenzene and the other with MeOH. On the well-founded assumption that true SO_3H acids are formed in this degradation, the parent substance in lignin must be of aromatic, phenolic nature, for sugar and furan complexes do not react in this way. A part of the H_2SO_4 and Ac_2O react to form $AcOSO_3H$ which rearranges into the stable $HO_2CCH_2SO_3H$ which, according to Schneider and his collaborators, reacts with phenol ethers to form Me ketones and pyranhydrones. A no. of phenol derivs. was accordingly treated with the Ac_2O-AcOH-H_2SO_4 mixt., and wood meal and lignin were treated with $HO_2CCH_2SO_3H$. The latter acid in Ac_2O only partially hydrolyzed the polysaccharides in pine-wood meal, without sulfonating the lignin or making it sol. Freudenberg lignin likewise formed no H_2O-sol. product, but 4 g. yielded 0.8 g. of a yellowish $CHCl_3$- and Et_2O-sol. sirup with phenolic odor, contg. C 75.65, H 8.45, MeO 1.73 and no S. This rather surprising result points to a new kind of lignin degradation without sulfonation and the expt. will be repeated on a larger scale. The results of the treatment of phenol derivs. with Ac_2O-AcOH-H_2SO_4 will be dealt with in detail later All multivalent phenols and their ethers are quantitatively converted into the corresponding SO_3H acids. The formation of Me ketones and pyranhydrones was not observed. Phenol derivs. with side chains, like anethole, behave in the same way. Phenolic aldehydes, however, behave differently. Piperonal in a few hrs. gives almost quantitatively a blue-violet, S-free, cryst. condensation product and vanillin yields a dark red substance. The presence of both phenolic and aldehyde groups, therefore, prevents sulfonation, although 1 such group alone does not; PhCH:CHCHO yields a SO_3H acid. These facts seem to establish that lignin is closely related to phenol derivs. C. A. R.

Constitution of lignin. XIII. Separation of aldehydes and ketones by means of β-naphthylamine hydrochloride. PETER KLASON. *Ber.* 63B, 1981–3(1930); cf. *C. A.* 24, 4510.—Expts. with most of the aldehydes which can be bought in the market showed that when treated in H_2O or alc. with β-$C_{10}H_7NH_2$.HCl (I), often along with some HCl, they all condense, whereas ketones (Me_2CO, $C_6H_{11}COMe$, allylacetone, $Me_2CHCOMe$, $(CH_2COMe)_2$, $ClCH_2COMe$, PhCOMe, PhCOEt, *p*-$MeOC_6H_4COMe$) do not react. The lignin reactions with salts of aromatic bases are, therefore, true aldehyde reactions and the formation of the yellow $C_{10}H_7NH_2$ salt of lignosulfonic acid is likewise the result of an aldehyde reaction. With a glucose soln. I has to be boiled several hrs. before any reaction can be observed, and even after a day it is minimal. In 1–0.1 *N* HCl at room temp., no reaction is noted in the course of several days, but on the H_2O bath it takes place in 1–2 days, depending on the strength of the acid, with formation of an insol. substance looking somewhat like peat and having the compn.

of an *anhydro(glucosetri-β-naphthylamine)*, $C_6H_9O_5(NHC_{10}H_7)_3$. It can be methylated or acetylated only to an insignificant extent, is only incompletely broken down by hot concd. HCl and on heating decomps. without melting. *Anhydro(arabinosetri-β-naphthylamine)* and *anhydro(xylosedi-β-naphthylamine)* are obtained in the same way. Heated with a sugar soln. these anhydro(sugartrinaphthylamines) change into anhydro(sugardinaphthylamines). The formation of these compds. seems clearly to be preceded by a hydrolysis of the CH....CH(OH).O group in the sugar to —CH(OH)....-$CH(OH)_2$ which by loss of H_2O forms the aldehyde and this then reacts normally with the I. XIV. *Ibid* 1983–5.—K. had found with Fagerlind that about 2% of the dry wt. of wood can be dissolved out with H_2O alone in the form of 2 compds., one sol. in alc., with the compn. of coniferyl alc. and a mol. wt. of 231 (calcd. 180), and the other sol. in alc., which was thought to be a dimeric hydroxyconiferyl alc. (I). This view has subsequently been materially changed, chiefly as the result of the observation that the compd. gives strong lignin reactions and that the aliphatic part of lignin contains methylated HO groups. The compd. must, therefore, be a dimeric guaiacolpropyleneglycolaldehyde, isomeric with I. K. had also found that a part of the lignin can be dissolved out by boiling with alc. contg. H_2SO_4 or HCl. Holmberg assigned to the substance thus obtained the compn. $C_{40}H_{40}O_{12}$ 2EtOH. According to Freudenberg, lignin contains H_2O in the aliphatic chain and the formation of H.'s compd. might be represented by the equation $C_{40}H_{40}O_{12}.H_2O + 2EtOH = C_{40}H_{42}O_{12}(OEt)_2 + H_2O$. Later, however, K. found that when the sulfite cooking is moderate lignosulfonic acid has the compn. $C_{30}H_{30}O_9.H_2SO_3$. Using $C_{30}H_{30}O_9$ to represent lignin, the formation of the H. compd. could be represented by the equation $C_{30}H_{30}O_9 H_2O + EtOH = C_{30}H_{32}(OH)OEt$. The anal. and mol. wt. results agree better with this formula than with that given by H. It must be assumed, therefore, that in the alcoholysis of wood there are formed hemi-acetals of trimeric coniferaldehyde. Similarly, the anal. values for H.'s lignotetrathioglycolic acid agree well with the calcd. values for $C_{30}H_{32}O_9(SCH_2CO_2H)_2$. It may be stated, therefore, that when native polymeric lignin is so far broken down by acids that free aldehyde complexes are produced the latter can combine with alcs., phenols and mercaptans as well as with H_2SO_3. C. A. R.

The questionable existence of the so-called diamylose. ARTHUR MIEKELEY (WITH E. BEHGE). *Ber.* **63B**, 1957–61(1930).—M. has attempted in vain to convert α-tetraamylose (I) into "α-diamylose" (II) by Pringsheim's method. He always obtained only the acetate of I, irrespective of whether the acetylation was carried out in the presence of $ZnCl_2$ or of C_5H_5N; removal of the Ac regenerated unchanged I with the correct mol. wt. Furthermore, he obtained for pure I and its acetate consts. different from those given by P.; those for the acetate agree, within the limits of exptl. errors, with those of the supposed II. Finally, M. found that I can be obtained in crystals of the compn. $C_{24}H_{40}O_{20}.4H_2O$ or exactly the same as that of P.'s II, $C_{10}H_{20}O_{10}.2H_2O$. The I. $4H_2O$ showed $[\alpha]_D^{22}$ 133.8° (H_2O); anhyd., 147.3°. Its acetate m. 153–4° (cor.), $[\alpha]_D^{18}$ 103.8° (AcOH). *Octabenzoate* of I, obtained in 66% yield with BzCl in C_5H_5N, m. 209° (cor.), mol. wt. in PhOH 1446. C. A. R.

Action of hydrofluoric acid on starch. BURCKHARDT HELFERICH, ARNO STÄRKER AND OTTO PETERS. *Ann.* **482**, 183–8(1930); cf. *C. A.* **24**, 721.—The action of anhyd. HF on dry starch in a Ag crucible at −20° for 0.5 hr. and removal of the HF by a stream of air at room temp. gives 85% crude *amylan*, which, purified through the Ac deriv., analyzes for $(C_6H_{10}O_5)_x$, $[\alpha]_D^{21}$ 144.4°; the reduction of Fehling soln. corresponds to a content of 0.25% glucose; the compd. is easily sol. in H_2O but differs from cellan in that it is insol. in the ordinary org. solvents, including C_5H_5N; heating with Ac_2O in C_5H_5N gives the *tri-Ac deriv.*, $[\alpha]_D^{18}$ 142.5°, sol. in $CHCl_3$, very difficultly sol. in Et_2O. Maltose and HF give *maltan*, $(C_6H_{10}O_5)_x$, $[\alpha]_D^{21}$ 145° (H_2O); *tri-Ac deriv.*, $[\alpha]_D^{17}$ 141.3°. Amylan in HF shows $[\alpha]_D^{14}$ 110°; mercerized cotton shows $[\alpha]_D^{14}$ 1.2°. C. J. WEST

Composition and structure of mesquite gum. ERNEST ANDERSON AND LOUISE OTIS. *J. Am. Chem. Soc.* **52**, 4461–70(1930).—Mesquite gum is the inorg. salt of an org. compd. consisting of 4 mols. of arabinose, 3 mols. of galactose and 1 mol. of methoxyglucuronic acid united with the loss of 7 mols. of H_2O. This pure acid was prepd. by Ehrlich's method and its compn. substantiated by prepn. of 3 degradation products. Hydrolysis of the gum with 3% H_2SO_4 at 80° gives the Ca salt of methoxyglucuronic acid joined to 3 mols. of galactose with the loss of 3 mols. of H_2O; with 2 mols. of galactose with the loss of 2 mols. of H_2O and with 1 mol. of galactose with the loss of 1 mol. of H_2O. The compn. of the first 2 salts was further verified by oxidizing them and

obtaining the Ca salt of methylglucuronic acid joined to 2 mols. of galactose and 1 mol. of galactonic acid with the loss of 3 mols. of H_2O and a salt contg. only 1 mol. of galactose. A tentative structural formula of this complex org. acid is given. C. J. WEST

Composition of Salkowski's araban. C. L. BUTLER AND LEONARD H. CRETCHER. *J. Am. Chem. Soc.* **52**, 4509–11(1930).—The araban of Salkowski is not a simple polymer of arabinose but contains arabinose, galactose, rhamnose and glucuronic acid in about the same proportion as they are present in ash-free gum arabic. Comparative analyses give for araban and arabic acid: pentose (as arabinose) 28.8, 34.3; Me pentose (as rhamnose hydrate) 12.7, 14.2; hexose (galactose) 41.1, 42.1; uronic acid (glucuronic) 19.5, 15.5. C. J. WEST

Extraction of sapropel with various organic solvents. B. K. KLIMOV, V. A. LANIN AND B. I. IVANOV. *Zhur. Prikladnoĭ Khim.* **3**, 631–2(1930).—Mixts. of alc. and C_6H_6 were used. Acids found were: $C_{27}H_{54}O_2$ (m. 80.5°), $C_{28}H_{56}O_2$ (m. 81.5°), $C_{29}H_{58}O_2$ (m. 83.0°), alcs.: $C_{26}H_{74}O$ (m. 83°; acetate m. 68°), $C_{30}H_{62}O$ (m. 68°; acetate m. 54°). This shows close relationship to the bitumen of brown coal. V. K.

Use of nickel as a catalyst for hydrogenation. HOMER ADKINS AND HOWARD I. CRAMER. *J. Am. Chem. Soc.* **52**, 4349–58(1930).—The active Ni catalyst was prepd. by a development of the method of Rather and Reid (*C. A.* **9**, 2653). Et_2O may be used as a solvent up to 197° if the pressure is above 40 atm. and MeOH to 240° if the pressure is above 80 atm. The other common solvents may be used to even higher temps. with similar pressures. Methylcyclohexane is an excellent solvent. Results are reported for 45 representative compds. The HO group of alcs. is in general quite resistant to catalytic reduction but if the HO group is on a C atom to which is attached a benzenoid ring, its replacement by H takes place at 125° or lower. If the HO group was in the β-position with respect to the ring, the rate of its reduction was retarded very greatly. $PhNH_2$ absorbed H more slowly than did the other benzenoid compds. studied. The pyridinoid ring in quinoline is rapidly reduced at temps. from about 125° upward. The benzenoid ring requires a considerably higher temp. for its reduction. The use of Ni permits selective reduction between 2 reducible groups through control of the temp. of hydrogenation; this has been achieved with CH_2AcBz, PhCOEt, benzoin, benzil, Ph_2CO, $PhCH_2CN$, *o*-MeC_6H_4CN and isonitrosopropiophenone when the CO, CN or oxime group is reduced without affecting the benzenoid ring. At 175–200° complete reduction of these compds. occurs. By a similar temp. control it is possible to reduce the pyridinoid ring in quinoline, α- or γ-pyridylphenylethylene and α-benzylpyridine without reducing the benzenoid ring. C. J. WEST

Chemical behavior of some benzenoid hydrocarbons in the Tesla discharge. JAMES B. AUSTIN AND IAN A. BLACK. *J. Am. Chem. Soc.* **52**, 4552–7(1930).—The Tesla discharge in the vapors of C_6H_6 and its simple derivs. causes chem. action with the formation of 2 types of compds.: first, brown shellac-like compds. contg. O which are left in the discharge tube and appear to be condensed mols. of a phenolic type; second, relatively simple mols. which condense in well-defined crystals. In this latter class, Ph_2 is produced from C_6H_6 and $(PhCH_2)_2$ from PhMe; isomers of these compds. are also formed. The low and high refractive indices of $(PhCH_2)_2$ are approx. 1.53 and 1.74. C. J. WEST

Synthesis of propenylbenzene. L. BERT AND M. RAYNAUD. *Compt. rend.* **191**, 454–5(1930); cf. *C. A.* **24**, 2434.—To 4 mols. of finely divided Na suspended in PhMe at 110°, 1 mol. of $PhCH_2CH:CHCl$ was added, drop by drop, and agitated for 1 hr. $PhCH:CHCH_3$ was isolated. No $PhC:CMe$ or $PhCH_2C:CH$ was found among the products. Further studies are to be made to find a clue as to the mechanism of the reaction. I. M. LEVINE

A parallelism between the mobility of hydrogen in the benzene nucleus and the mobility of chlorine in the side chain. S. C. J. OLIVIER. *Rec. trav. chim.* **49**, 996–1001 (1930); cf. *C. A.* **18**, 48; **24**, 4273.—Previous investigations on the velocity of hydrolysis of several benzyl chlorides have shown that the position of a substituent in the benzene nucleus has the same influence on the reactivity of halogen atoms in the side chain as on the H atoms of the nucleus as regards further substitution. These researches were confirmed by Shoesmith and Taylor (*C. A.* **21**, 572) for the substituents F, OMe and azoxy; the present paper deals with the CN and $CONH_2$ groups, with which the same rule was confirmed again. The $CONH_2$ group is *m*-orienting (Taverne, *Rec. trav. chim.* **16**, 253(1897)) and in a mixt. of equal vols. of water and acetone the following pseudomonomol. reaction consts. were found for the hydrolysis of the compds. $C_6H_4(CH_2Cl)CONH_2$: the *m*-compd. at 60°, $K = 0.000203$ and the *p*-compd. $K = 0.000146$; at 50° the *m*-compd. $K = 0.000077$ and the *p*-compd. $K = 0.000055$. The *o*-compd. could not be investigated as it reacts quickly with the formation of a

cyclic compd. For the CN group, Flürscheim and Holmes have found that it is *m*-directing, the nitration of PhCN giving 88% of *m*-$O_2NC_6H_4CN$ (*C. A.* **22**, 4488) and here again it was found that the *m*-deriv. $C_6H_4(CN)CH_2Cl$ is hydrolyzed more quickly than the *o*- and *p*-isomerides, the following figures being obtained: at 60°: for the *m*-compd. K = 0.000062; for the *p*-compd. K = 0.000058, and for the *o*-compd. K = 0.000049; at 50°: for the *m*-compd. K = 0.0000237; for the *p*-compd. K = 0.0000214 and for the *o*-compd. K = 0.0000181. The CN group is more negative than the $CONH_2$ group, the reaction proceeding more slowly with the cyanobenzyl chlorides than with the $CONH_2$ substituted ones, and it appears again that with strongly negative substituents the influence of the position of the group is only small, the same applying also for the nitro group. The prepn. of *m-cyanobenzyl chloride* was already described (*C. A.* **17**, 3489), m. 68–8.5°; that of *p-cyanobenzyl chloride* (*loc. cit.*), m. 80–1°; while *o-cyanobenzyl chloride* was prepd. from *o*-toluidine by analogous methods, m. 59.5–60.5°. *m-Chloromethylbenzamide* was prepd. according to Reinglass (*Ber.* **24**, 2417(1891)), m. 129.5–30°, while the *p-amide* was obtained by sapon. of the nitrile according to Mellinghoff (*Ber.* **22**, 3211(1889)), m. 181–2°. C. F. VAN DUIN

Naphthenic acids, their use and importance. SOMMERFELD. *Rev. gen. Mat. Color* **34**, 55–6(1930). S. K. FORD

The structure of the absorption resonators of organic chromophores. IV. Determination of the number and geometrical arrangement of electrons in a common resonator. DAN RĂDULESCU, V. ALEXA AND F. BĂRBULESCU. *Z. physik. Chem.*, Abt. B., **8**, 365–9(1930); cf. *C. A.* **24**, 89.—The optical properties of crocetin, which is equiv. to a naphthacene mol. opened out into a chain, confirm the structure of the naphthacene common resonator previously proposed. **V. Factors which cause a loss of sharpness of the characteristic absorption bands of a common resonator.** DAN RĂDULESCU AND A. GEORGESCU. *Ibid* 370–81.—Changing substituent groups affects ionization and solvation, and thereby modifies the characteristic absorption bands. The effect of *o*-substitution is greater than that of *p*-substitution. The negative polarity of a Me group exceeds that of a Cl atom. **VI. Chromophore characteristics of the nitro group and the structure of its resonator.** DAN RĂDULESCU AND VASILE ALEXA. *Ibid* 382–94.—The absorption spectra of derivs. of 1,4-dihydroxyphthalazine show that the color of the nitro compds. cannot be attributed to salt formation. Therefore, the NO_2 group can exist in at least 2 electromeric forms. One of these forms, with a negatively polarized N atom, absorbs in the visible range of the spectrum, whereas another form, with a positive N, absorbs in the ultra-violet exclusively. **VII. Polarity of the nitro group in organic derivatives, and the existence of metaquinones.** *Ibid* 395–402.—A combination of the theory outlined in the preceding abstr., and the theory of induced polarity in the C_6H_6 ring gives a satisfactory account of the chem. and optical properties of *s*-$C_6H_3(NO_2)_3$ and its derivs. ALBERT L. HENNE

Pyrolysis of allylanilines. F. L. CARNAHAN AND CHARLES D. HURD. *J. Am. Chem. Soc.* **52**, 4586–95(1930).—$PhNHCH_2CH:CH_2$ (I), b_{23} 115°, b_{745} 218°, heated in a sealed tube at 275° for 12 hrs., gives $PhNH_2$, a gas and a non-volatile tar. When the vapor of I was passed through a pyrex tube at 600° at such a rate that the contact time was 2.5 min., a similar but more deep-seated pyrolysis occurred. I (14 g.) gives nearly 5 g. $PhNH_2$, 2.3 g. of unidentified liquid, 0.5 g. C_6H_6, 2.3 g. tar and 1.3 l. gas (H, olefins, paraffins). At 700° and a contact time of 39 sec., 50 g. I gives 5–7 l. gas, 4.5 g. C_6H_6, 19 g. $PhNH_2$, 1–2 g. quinoline, 7 g. of other liquids and 8 g. of residue. The gas contained 0.7% CO_2, 1.3 g. unsatd. hydrocarbons sol. in 62.5% H_2SO_4, 24% C_3H_6, 18.1% C_2H_4, 4.9 g. O, 15.9% H, 0.6% CO, 34.5% paraffins and N. *Allyl-p-toluenesulfonanilide*, m. 69.3° (cor.). $PhN(CH_2CH:CH_2)_2$, b_{18} 123°, b_{45} 148°, b_{745} 239–40°, n_D^{23} 1.5556; on refluxing 0.146 mol. for 48 hrs., the temp. fell from 240° to 228.5°; 1 l. of gas was evolved; the principal products were 0.104 mol. tar, 0.038 mol. C_4H_6, 0.035 mol. $PhNH_2$ and 0.011 mol. I. A similar resin was obtained by the action of acrolein on $PhNH_2$. *p*-$EtOC_6H_4NH_2$ (*p-toluenesulfonyl deriv.*, m. 110° (cor.)) and $CH_2:CH-CH_2Br$ give *diallyl-p-phenetidine*, b. 164–5°, d_4^{23} 0.9921, n_D^{23} 1.5458. Refluxing 0.138 mol. for 48 hrs. gives 0.080 mol. tar, 0.062 mol. C_3H_4 and 0.091 mol. *p*-$EtOC_6H_4NH_2$. In no case was $CH_2:CHMe$ observed. Mechanisms for the reactions are discussed. C. J. WEST

Degradation of quaternary ammonium salts. II. THOMAS S. STEVENS. *J. Chem. Soc.* **1930**, 2107–19; cf. *C. A.* **23**, 2117.—The generality of the reaction $BzCH_2NMe_2(CH_2Ph)X \xrightarrow{NaOH} BzCH(CH_2Ph)NMe_2$ has been further studied; the replacement of the $PhCH_2$ radical by *m*-$BrC_6H_4CH_2$, *p*-$MeOC_6H_4CH_2$, $PhCH_2CH_2$, benzo-

hydryl or 9-fluorenyl, of the phenacyl group by *p*-bromophenacyl or of the Me_2N system by piperidinium does not prevent the migration. The benzohydryl and fluorenyl radicals wander so readily that the quaternary salts cannot be isolated. The process is shown to be an intramol. one by acting on a mixt. of phenacyl-*m*-bromobenzyldimethylammonium and *p*-bromophenyl bromides with EtONa. Under similar conditions the rates of transformation of the 2 substances separately are of the same order of magnitude and the mixt. yields only the rearrangement products corresponding to the individual salts; further the reaction takes place in alk. solns. (NaOH, KOH, EtONa, NH_3) but not in a neutral medium. Preliminary velocity measurements show that the reaction is unimol. in abs. EtOH-EtONa; the values suggest that the benzyl radicals are detached as anions. *m-Bromobenzyldimethylamine picrate*, orange, m. 139–41°. *Phenacyl-m-bromobenzyldimethylammonium bromide*, from *m*-$BrC_6H_4CH_2NMe_2$ and $BzCH_2Br$, m. 140–3°. *ω-Di-methylamino-ω-m-bromobenzylacetophenone*, m. 72–3°, slowly resinifies on standing; *picrate*, bright yellow, m. 141–3°; the methosulfate rapidly decomps. on boiling, giving *phenyl m-bromostyryl ketone*, m. 84–5°, also formed from *m*-BrC_6H_4CHO and BzMe in MeOH-KOH; H_2SO_4 gives a yellow color, changing to cherry red on addn. of HNO_3. *p*-$MeOC_6H_4CH_2NMe_2$ gives a *picrate*, deep yellow, m. 103–5°. *Phenacyl-p-methoxybenzyldimethylammonium bromide*, m. 133–6°; *picrate*, deep yellow, m. 112–3°. *ω-Dimethylamino-ω-p-methoxybenzylacetophenone*, pale yellow, m. 52–4°; *picrate*, dark yellow, m. 143–5°; the methosulfate with KOH gives $PhCOCH:CHC_6H_4OMe$-*p*. $PhCH_2CH_2NMe_2$ gives a *picrate*, yellow, m. 134–7°. *Phenacyl-α-phenylethyldimethylammonium bromide*, m. 155–7° (decompn.). The crude rearrangement product contained the α- and β-isomers approx. in the ratio 4:5, the picrates were sepd. by recrystg. the product from dil. AcOH, which yields preferentially the α-form, or from Me_2CO-light petroleum from which the β-form sepd. most readily. *ω-Dimethylamino-ω-α-phenylethylacetophenone*, α-form, m. 111–2° (*picrate*, yellow, m. 186–7°); *β-base*, bright yellow, m. 111–3° (*picrate*, pale yellow prisms or deep yellow nodules, m. 174–6°); the α-form is unchanged by heating at 100°, while the β-form was completely changed into the α-form. *ω-Bromo-ω-α-phenylethylacetophenone*, m. 76°, with Me_2NH in EtOH gives the above β-form. *Benzohydryldimethylamine*, m. 68–9°; *picrate*, yellow, m. 196–8°; *HBr salt*, m. 215°, crystals with 1 mol. H_2O. $BzCH_2Br$ gives *ω-dimethylamino-ω-benzohydrylacetophenone*, pale yellow, m. 167° (decompn.); the methosulfate, with alkali, gives ω-benzohydrylideneacetophenone. 9-Fluorenyldimethylamine gives a *HBr salt*, m. 204–6°; *ω-dimethylamino-ω-fluorenylacetophenone*, pale yellow, m. 145–8° (decompn.); if the prepn. is carried out in hot C_6H_6, the main product is *fluorenylideneacetophenone*, deep yellow, m. 137–40°, also obtained from the *Br deriv.*, m. 111–3°, decomps. 160°, of fluorenylacetophenone and aq. Me_2NH. *p-Bromophenacylbenzyldimethylammonium bromide*, m. 188–91°. *p-Bromo-ω-dimethylamino-ω-benzylacetophenone*, pale yellow, m. 106–7°; *HCl salt*, m. 235–8° (decompn.); decompn. of the methosulfate gives *p*-BrC_6H_4CO-$CH:CHPh$. *Phenacylbenzylpiperidinium bromide*, m. 135–8° (decompn.), crystals with 1 mol. H_2O. *ω-Piperidine-ω-benzylacetophenone*, m. 80–1°; *picrate*, deep yellow, m. 185–7° (decompn.). III. Thomas S. Stevens, Wm. W. Snedden, Eric T. Stiller and Thomas Thomson. *Ibid* 2119–25.—Replacement of the Ph group by Ac does not prevent the above rearrangement. $ClCH_2Ac$ and $PhCH_2NMe_2$ in C_6H_6 give *acetonylbenzyldimethylammonium chloride*, m. 75–7°, crystals with 1 mol. H_2O; *picrate*, dark yellow, m. 141–3°; heating the chloride with *N* NaOH gives *α-dimethylamino-α-benzylacetone*, whose picrate, yellow, m. 140–4°. *Carbethoxymethylbenzyldimethylammonium chloride*, m. 176° (decompn.), hygroscopic; *picrate*, yellow, m. 126–8°; no rearrangement occurs by heating the chloride with NaOH or EtONa, the ester being hydrolyzed to the free *acid*, whose *picrate*, bright yellow, m. 146–8°. $ClCH_2CN$ and $PhCH_2NMe_2$ in cold Et_2O give a viscous gum, from which was prepd. *cyanomethylbenzyldimethylammonium picrate*, bright yellow, m. 140–3°; this does not rearrange with NaOH, but the CN group is hydrolyzed to CO_2H. *p-Bromobenzyldimethylamine-HCl*, m. 219–20°; *di-p-bromobenzyldimethylammonium picrate*, deep yellow, m. 165–7°. *Phenacyl-p-bromobenzyldimethylammonium bromide*, m. 193°; heating with excess 2 *N* NaOH gives *ω-dimethylamino-ω-p-bromobenzylacetophenone*, m. 61°; *picrate*, dark yellow, m. 149–50°. *Phenacyl-p-nitrobenzyldimethylammonium bromide*, m. 169–71°; heating on the H_2O bath for 7 min. with excess *N* NaOH gives some $(p\text{-}O_2NC_6H_4CH_2)_2$ and *p*-$O_2NC_6H_4Me$ and about 60% of *ω-dimethylamino-ω-p-nitrobenzylacetophenone*, light yellow, m. 79–82° (picrate, yellow, m. 144–5°); stronger alkali or prolonged heating gives *p*-$O_2NC_6H_4CH:CHBz$. *Phenacylbenzylmethylamine*, b_{15} 195–205°; *picrate*, yellow, m. 137–8°. *Benzyl-p-bromobenzylmethylamine*, b_{20} 194–6°. The salt $BzCH_2N(CH_2C_6H_4Br)MeXCH_2Ph$ could not be obtained. C. J. West

Reaction mechanism of formazyl formation. II. M. BUSCH AND RICHARD SCHMIDT. *Ber.* **63B** 1950–2(1930), cf. *C. A.* **20**, 2992.—v. Pechmann observed that aldohydrazones of secondary hydrazines yield no formazyl compds. with diazonium salts but was unable to offer any explanation of this anomalous behavior. Busch and Pfeiffer later showed that in the formazyl syntheses the diazonium compd. first adds to the NH group of the hydrazone and the resulting diazohydrazide rearranges into the stable formazyl: $RNHN{:}CHR' + R''N_2OH \longrightarrow RN(N{:}NR'')N{:}CHR' \longrightarrow RNHN{:}C(N{:}NR'')R'$. They afterward found that Bamberger had reported (*Ber.* **29**, 1387(1896)) that free *p*-nitroisodiazobenzene hydroxide combines with PhMeNN:CHPh to the formazyl $PhMeNN{:}C(N{:}NC_6H_4NO_2)Ph$. As this is directly contrary to the above conception of the mechanism of the formazyl synthesis, Bamberger's work has been repeated and his exptl. results have been confirmed, but his interpretation was incorrect. The product is in reality an azo compd., $O_2NC_6H_4N{:}NC_6H_4NMeN{:}CHPh$ formed by coupling on the Ph nucleus of the $PhMeNNH_2$. This is shown by the following facts: (1) I is hydrolyzed by dil. H_2SO_4 to BzH; (2) on reduction it gives *p*-$C_6H_4(NH_2)_2$ and a primary aromatic amine. $H_2NC_6H_4NMeN{:}CHPh$. Furthermore, the hydrazone of $Ph(PhCH_2)NNH_2$ behaves in the same way, giving a *compd.* $O_2NC_6H_4N{:}NC_6H_4N(CH_2Ph)N{:}CHPh$ (I), while that of $(PhCH_2)_2NNH_2$ gives not a trace of azo compd., probably because $(PhCH_2)_2NN{:}CHPh$ contains no nucleus capable of coupling. I, obtained in 5% yield, red, m. 199–200°. C. A. R.

Constitution and reactions of the isomeric diazo hydrates. ANGELO ANGELI. *Ber.* **63B**, 1977–80 (1930); cf. *C. A.* **24**, 81.—Reply to Hantzsch (*C. A.* **24**, 4001). C. A. R.

Organo-antimony compounds. IV. Stibonic acids derived from certain local anesthetics. SUDHIR C. NIYOGY. *J. Indian Chem. Soc.* **7**, 577–87(1930).—An attempt to prep. the 6 possible isomeric nitro and amino derivs. of $PhCH_2OBz$ with a view to obtaining the corresponding stibonic acid for use in the treatment of kala-azar. *Benzyl 2-nitrobenzoate* was prepd. by the addn. of $PhCH_2OH$ in pyridine to *o*-$O_2NC_6H_4COCl$ made by the action of $SOCl_2$. It is reduced by Al-Hg in moist ether to *benzyl 2-aminobenzoate-HCl* (I) m. 162–3° *3-Amino isomer* (II), m. 199–200°, was obtained by satg. the alc. NH_3 soln. of the nitro compd. with H_2S, evapg. to dryness, and refluxing with Cu powder. *4-Amino salt* (III), m. 90–1°, was similarly produced. *2-Nitrobenzyl benzoate*, m. 101–2°, was prepd. by condensing BzCl in pyridine with 2-$O_2NC_6H_4CH_2OH$ obtained by the action of KOH on the aldehyde. Moist ether and Al-Hg reduced it to *2-aminobenzyl benzoate* (IV), m. 144–5°. 3-$O_2NC_6H_4CH_2OH$, converted by PCl_5 to the chloride, when condensed with BzONa, gave *3-nitrobenzyl benzoate*, m. 71–2°, which on reduction yielded *3-aminobenzyl benzoate-HCl* (V), m. 198–9°. *4-Nitrobenzyl benzoate*, m. 94–5°, was similarly prepd., but the reduction was unsuccessful. I, II and III were converted into the corresponding sodium stibonates by diazotizing in HCl, and adding $SbCl_3$. The yellow addn. product was suspended in water, cooled to 5°, and made alk. with 5% NaOH. The stibonic acid was pptd. with H_2SO_4, and after washing was neutralized with NaOH. C. R. ADDINALL

Aromatic arsenic compounds containing sulfur groups attached to the nucleus. I. Sulfonic acids and their derivatives. HARRY J. BARBER. *J. Chem. Soc.* **1930**, 2047–53.—A systematic investigation is proposed of the applicability to As compds. of the methods available for the introduction and transformation of S groups; the possibility that the trypanocidal activity of As compds. is in some way connected with the SH group present in animal tissue makes the prepn. of such compds. containing S groups and SH groups in particular of considerable interest. 3-$NH_2C_6H_4AsO_3H_2$, diazotized and treated with K Et xanthate, gives a poor yield of *3-sulfophenylarsonic acid*, prisms, very sol. in H_2O; it is unlikely that it can be prepd. by Bechamp's method (Krishna and Krishna, *C. A.* **24**, 1096). It seems probable that direct sulfonation only occurs with the simple $HOC_6H_4AsO_3H_2$. The 4-HO deriv. (30 g.), heated for 1.5–2 hrs. at 100° with concd. H_2SO_4, gives 15 g. of the *3-sulfo deriv.*, giving a wine-red color with $FeCl_3$; the 2,4-$(HO)_2$ deriv. gives the *5-sulfo deriv.*, giving a red color with $FeCl_3$. The 4-NH_2, 4-AcNH, 3,4-HO(AcNH) and 4-Cl derivs. failed to give sulfonation products, even under most drastic conditions. The use of $ClSO_3H$ has no advantage over H_2SO_4. The Bart reaction appears not to be applicable to $H_2NC_6H_4SO_2H$; however, *p*-$H_2NC_6H_4SO_2Me$ gives 36% of *4-methylsulfonylphenylarsonic acid*. 2-$IC_6H_4AsO_3Na_2$ (350 g.), 140 g. Na_2SO_3 and a trace of $Cu(OAc)_2$, concd. until the soln. had a b. p. of 106–10° and then boiled for 1 hr., give 90–5% of the *Ba salt*, plates, of *2-sulfophenylarsonic acid*, prisms. *2-Iodo-5-aminophenylarsonic acid*, prisms results in 65% yield by reducing the NO_2 deriv. with $Fe(OH)_2$; *Ac deriv.*, prisms crystg. with 1 mol. H_2O; Na_2SO_3 gives the *2-sulfo deriv.*, fibrous needles; the Ac deriv. was not obtained pure. 2-Br- and

4-$IC_6H_4AsO_3H_2$ do not react under these conditions. 2-$HO_3SC_6H_4AsO_3H_2$ is not changed by boiling with 25% H_2SO_4 or NaOH; the Na salt (20 g.) with 10 cc. PCl_3 and 40 g. PCl_5 gives probably *2-chlorosulfonylphenylchlorohydroxyarsine*, which did not solidify and is slowly hydrolyzed by cold H_2O to *2-chlorosulfonylphenylarsenious oxide* (I) (70–5% yield), oxidized by H_2O_2 to the *arsonic acid;* with NH_4OH and H_2O_2 the oxide gives *2-sulfonamidophenylarsonic acid*, square plates; *thiolacetamide deriv.*, m. 171–3°; the *2-sulfonanilino deriv.* of the oxide is amorphous; $HSCH_2CONH_2$ gives *di(carbaminomethyl)-2-sulfonanilinophenylthioarsonite.* The oxide and excess HI and a little Et_2O give *2-sulfonanilinophenyldiiodoarsine*, yellow prisms. *2-Sulfonanilinophenylarsonic acid*, square plates, results by oxidation of the oxide or the action of $PhNH_2$ on the Cl deriv. I and Na_2SO_3 in H_2O give 80% of *2-sulfinophenylarsenious oxide*, prisms; on titration in $NaHCO_3$ it absorbs 2 atoms I; *Ag salt*, amorphous; MeI in MeOH, followed by oxidation, gives *2-methylsulfonylphenylarsonic acid*, prisms. C. J. WEST

Boron-carbon linkage. I. Oxidation and nitration of phenylboric acid. ARTHUR D. AINLEY AND FREDERICK CHALLENGER. *J. Chem. Soc.* 1930, 2171–80.—The existence in phenylboric acid (I) of an incomplete octet with only 6 electrons, Ph:B:OH, with ·· OH renders a discussion of its structure and reactions of particular interest. The formula is not Ph:B⋮O nor Ph:B ⟶ O, since a compd. of this formula is obtained on dehydrating I. I reacts readily at the ordinary temp. with Cl- or Br-H_2O, with I in KOH and with H_2O_2, giving benzene halides and PhOH, the halogens appearing to react in the form HOX. I readily gives C_6H_6 when heated with 50% NaOH, with H_2O under pressure or boiling concd. HCl. I and hot satd. HgBr give PhHgBr. $CuCl_2$ and I, boiled some hrs., give 85% of PhCl; $CuBr_2$ gives PhBr; $Cu(CN)_2$ gives PhCN (7%), the other product probably being C_6H_6. I and $CdBr_2$, boiled 6.5 hrs., give C_6H_6 (78%); $ZnCl_2$ gives 84% C_6H_6. Nitration of I in H_2SO_4 below —7° gives *m-nitrophenylboric acid* (II), m. 273° (decompn.); with $CuCl_2$ II gives *m*-$ClC_6H_4NO_2$; $HgCl_2$ gives *m*-$O_2NC_6H_4HgCl$; Br in H_2O gives *m*-$BrC_6H_4NO_2$; H_2O_2 gives *m*-$O_2NC_6H_4OH$. The yield of II is about 70%; the presence of *o*- and *m*-NO_2 isomers was shown by the formation of some 2,4-$(O_2N)_2C_6H_3Br$ on nitration of the mixt. of $BrC_6H_4NO_2$ obtained from the crude nitration product. Hot aq. solns. of $BeCl_2$, $MgCl_2$ and $CaCl_2$ do not react with I. I does not react with hydroferrichloric acid and, therefore, is probably almost devoid of basic properties. C. J. WEST

Forced reaction between anils and *p*-thiocresol. Reducing action of the mercapto group. HENRY GILMAN AND J. B. DICKEY. *J. Am. Chem. Soc.* **52**, 4573–6(1930).—In continuation of studies on the unique 1,4-addn to a conjugated system which is part aliphatic and part aromatic, $Ph_2C:NPh$ and PhCH:NPh were heated with *p*-MeC_6H_4SH. No 1,4-addn. was observed. Instead the MeC_6H_4SH acted as a reducing agent and was converted to $(p\text{-}MeC_6H_4S)_2$. It also reduces PhN:NPh but not $PhNO_2$ or Ph_2CO. *p*-MeC_6H_4SMgI does not react with the anils. C. J. WEST

Dinitration of monosulfonated *m*-chlorophenol and the sulfonation and subsequent further nitration of 3-chloro-2- and -6-nitrophenols. HERBERT H. HODGSON AND ARNOLD KERSHAW. *J. Chem. Soc.* **1930**, 2169–71.—*m*-ClC_6H_4OH (12.8 g.) in 10 cc. concd. H_2SO_4, treated with 32 g. oleum (25% SO_3) below 15° and after 1 hr. with 8.8 cc. HNO_3 in 30 cc. oleum below 20° gives, after hydrolysis in a current of stream, 4.6 g. of the 2,6-$(NO_2)_2$ deriv. and 10.2 g. of the NH_4 salt of the 2,4-deriv.; sulfonation at 100°, followed by nitration and hydrolysis as above, gives 14 and 2.4 g., resp., of the 2,4- and 2,6-$(NO_2)_2$ derivs. 3,2-$Cl(O_2N)C_6H_3OH$ with oleum (30% SO_3) at 20° gives *K 3-chloro-2-nitrophenol-4-sulfonate*, light yellow needles, crystg. with 2 mols. H_2O; nitration of the reaction mixt. gives a mixt. of the *K salts* of *3-chloro-2,6-dinitrophenol-4-sulfonate* and *3-chloro-2,4-dinitrophenol-6-sulfonate*, yellow plates and deeper yellow needles; hydrolysis gives 4.1 and 2.7 g. of the 3,2,6- and 3,2,4-$Cl(O_2N)_2C_6H_2OH$. 3,6-$Cl(O_2N)C_6H_3OH$ and oleum give the *4-sulfonic acid deriv.*, whose *K salt*, pale fawn prisms, crystallizes with 2 mols. H_2O. Nitration gives 3,2,6-$Cl(O_2N)_2C_6H_2OH$. *K 3-chloro-2,6-dinitrophenyl-4-sulfonate*, yellow plates; it decomps. with great violence on being heated. 3,4-$Cl(O_2N)C_6H_3OH$ is completely destroyed during attempted sulfonation. C. J. WEST

Action of aromatic alcohols on aromatic compounds in the presence of aluminum chloride. V. Benzylation of *o*-cresol. R. C. HUSTON, H. A. SWARTOUT AND GLADYS K. WARDWELL. *J. Am. Chem. Soc.* **52**, 4484–9(1930); cf. *C. A.* **21**, 1982.—*o*-MeC_6H_4OH and $PhCH_2OH$ with $AlCl_3$ give as the main product the 4-benzyl deriv., b_5 167–9°, m. 49.5–50.5° (*6-Br deriv.*, b_5 182–4°; Bz deriv., m. 54–5°); a 2nd product is the 6-benzyl deriv., b_5 150–2°, m. 49.5–50.5° (*4-Br deriv.*, b_5 187–9°, m. 63–4°; Bz deriv.,

b_5 216–8°); a 3rd product was the 4,6-dibenzyl deriv., b_5 225–7°. *o*-MeC_6H_4ONa and $PhCH_2Cl$ in PhMe give an excellent yield of the 6-benzyl deriv. C. J. WEST

Action of monochlorodimethyl ether on magnesium benzyl chloride. ARTHUR C. BOTTOMLEY, ARTHUR LAPWORTH AND ARTHUR WALTON. *J. Chem. Soc.* 1930, 2215–6.—D. R. P. 154,658 (1904) states that $PhCH_2MgCl$ and $ClCH_2COMe$ give $MeC_6H_4CH_2OMe$. Reëxamn. of the reaction shows that a little *o*-$MeC_6H_4CH_2OMe$ is formed but that it is accompanied by *p*-$MeC_6H_4CH_2OMe$ and a very much larger quantity of $PhCH_2CH_2OMe$, as well as other products of higher b. p. C. J. WEST

Chlorimines. III. Decomposition of certain aromatic ald-chlorimines to form nitriles. Method for the preparation of nitriles from aldehydes. C. R. HAUSER AND A. G. GILLASPIE. *J. Am. Chem. Soc.* 52, 4517–9(1930); cf. *C. A.* 24, 5739.—Aromatic ald-chlorimines react with EtONa or KOH in EtOH to give nitriles; the following yields were obtained (yields for the first 3 are reported for both reagents and are practically the same): anisal, 94; *o*-chlorobenzal, 85; piperonal, 96; 2-chloro-5-nitrobenzal, 82; *p*-chlorobenzal, 60; *m*-nitrobenzal, 82; *o*-nitrobenzal, 70. *o*-Chlorobenzalchlorimine at 0° is completely decompd. within 1.5 mins., while anisalchlorimine is only 45% decompd. after 2 min. and is completely decompd. after 5 min. This represents a method for the prepn. of nitriles from aldehydes, since the latter are readily converted into ald-chlorimines. C. J. WEST

Production of benzaldehyde from benzyl chloride. P. SHORUIGIN, I. KIZBER AND E. SMOL'YANINOVA. *Zhur. Prikladnoĭ Khim.* 3, 721–6(1930); cf. *C. A.* 23, 4186.—Boiling of $PhCH_2Cl$ with aq. $Ca(NO_3)_2$ yields 60–5% BzH and 10% BzOH. The reaction consists of 3 phases: sapon. of $PhCH_2Cl$ with water, displacement of HNO_3 from $Ca(NO_3)_2$ by the HCl formed, and oxidation of the $PhCH_2OH$ produced by HNO_3. The presence of Al or Cu hinders the last reaction. Free HNO_3 can be substituted for its salts. $PhCH_2ONO_2$ is a by-product which on heating with water yields BzH and BzOH. In the absence of water it does not decomp. below 140°. V. K.

Catalytic production of acetophenone. I. G. LAKOMKIN. *Zhur. Prikladnoĭ Khim.* 3, 555–72(1930).—PhCOMe was obtained by interaction of AcOH and BzOH in presence of ThO_2 or MnO catalysts. The amt. of catalyst used affects the yield only if the acid vapors are not preheated. The yield increases with the increase in the reaction temp. up to 600° but then falls off sharply. This increase in yield is less marked if the vapors are preheated. Expts. show that preheating of the reacting vapors is highly important for most economical operation on a com. scale. MnO is a better catalyst than ThO_2. V. KALICHEVSKY

Chlorine derivatives of vanillin and some of their reactions. L. CHAS. RAIFORD AND J. G. LIGHTY. *J. Am. Chem. Soc.* 52, 4576–86(1930).—2-Aminovanillin through the diazo reaction gives 88% of the *2-Cl deriv.* (I), m. 128–9°; *oxime*, m. 157–8°; *p-bromophenylhydrazone*, brown, m. 144–6°; *semicarbazone*, crystals with 1 mol. EtOH, m. 220–1°; *bisbenzidine*, orange, m. 224–6°. Direct chlorination of vanillin gives 92% of the 5-Cl deriv. (II), m. 163°; excess Cl gives some 2,5- and 2,6-di-Cl derivs. II was characterized by the *oxime*, m. 172°; *p-bromophenylhydrazone*, yellow, m. 161°; *semicarbazone*, m. 201°; *bisbenzidine*, yellow, m. 252–4°. II, Ac_2O and AcONa, boiled 3 hrs., give the *Ac deriv.*, light yellow, m. 201°, of *3-methoxy-4-hydroxy-5-chlorocinnamic acid*, m. 235–6°. 3,4-$MeO(OAc)C_6H_3CH(OAc)_2$ with Cl gives 91% of the *6-Cl deriv.* (III), m. 143–4°, hydrolyzed by KOH to *6-chlorovanillin* (IV), m. 167–8°; *oxime*, m. 178°; *p-bromophenylhydrazone*, pale brown, m. 174°; *semicarbazone*, m. 241°; *bisbenzidine*, yellow, amorphous, decomps. 263°; Br in AcOH and AcONa gives the *5-Br deriv.*, m. 214°. 6-Bromovanillin and Cl in $CHCl_3$ give the *5-Cl deriv.*, m. 202°. Nitration of III gives 61% of *acetyl-2-nitro-6-chlorovanillin*, m. 81–2°, becomes lemon-yellow in the light; hydrolysis gives *2-nitro-6-chlorovanillin*, m. 155–7°; reduction with $FeSO_4$ gives 92% of the *2-NH_2 deriv.*, yellow, m. 192–3°, which yields, through the diazo reaction, 40% of *2,6-dichlorovanillin* (V), m. 139–40°; *oxime*, m. 141°; *semicarbazone*, m. 213°; *bisbenzidine*, red, amorphous, m. 232°. II and Ac_2O in AcOH give nearly quant. the *Ac deriv.*, b_5 167–72°, m. 67°; HNO_3 gives nearly quant. the *2-NO_2 deriv.*, crystg. with 1 mol. EtOH, m. 95–6°; KOH gives *2-nitro-5-chlorovanillin*, pale yellow, m. 137°; *2-NH_2 deriv.*, light brown, m. 136–7°; *2,5-dichlorovanillin*, m. 179° (83% yield); this also results on further chlorination of I; *oxime*, m. 158°; *p-bromophenylhydrazone*, m. 158°; *semicarbazone*, crystg. with 1 mol. H_2O, m. 228°; *bisbenzidine*, yellow, m. 254–5°. Refluxing II with Ac_2O contg. a little concd. H_2SO_4 gives 97% of *3-methoxy-4-acetoxy-5-chlorobenzal diacetate*, m. 115–6°; excess of Cl in AcOH and AcONa gives the *5,6-di-Cl deriv.*, m. 117–8°; hydrolysis gives *5,6-dichlorovanillin*, m. 192°; *oxime*, m. 203° (decompn.); *p-bromophenylhydrazone*, yellow, m. 163–4°; *semicarbazone*, m. 237°; *bisbenzidine*, yellow, decomps. at 289°. V and SO_2Cl_2 in $CHCl_3$

give 31% of *2,5,6-trichlorovanillin*, m. 154°; *oxime*, m. 173°; *semicarbazone*, m. 219°. V and Br in AcOH give 96% of the *5-Br deriv.*, m. 167°. In no case was there obtained more than 1 of the stereoisomeric oximes demanded by theory; the one obtained, probably the *anti*-form, could not be transmuted by HCl. C. J. West

Quantitative investigation of the Schotten-Baumann reaction. F. A. Menalda. *Rec. trav. chim.* **49**, 967–95(1930).—When an acid chloride is allowed to react with an alk. mixt. of water and alc., part of it is converted into the ester, alk. hydrolysis taking place at the same time with the formation of the salt of the corresponding acid. In the latter reaction 2 equivs. of alkali are consumed against only one in the former and thus the amount of ester formed may be derived easily from the amount of alkali used in both the simultaneous reactions. In order to investigate this reaction more closely, the following procedure was adopted. A thin-walled glass tube was filled with a small amount of the acid chloride, sealed hermetically and brought into the desired reaction mixt., contg. a slight excess of alkali and cooled down to the desired temp. After having broken the glass tube with a glass rod the mixt. was shaken vigorously for several min. until the acid chloride had disappeared and then 25 cc. were titrated after several intervals of time. As time goes on, the amount of alkali diminishes by the hydrolysis of the ester initially formed and the total amount of ester hydrolyzed was detd. by extrapolation from the figures obtained in 3 consecutive titrations. *A. The effect of temp. on the quantity of ester formed in the reaction.*—With BzCl, NaOH and 10% EtOH, 60.6% ester was obtained at 0°, 60.4% at 2.5°, 57.0% at 10°, 52.2% at 17.5°, 44.0% at 25°, 40.3% at 32.5°, and 26.1% at 47.5°. With 20% EtOH, 65% of ester was obtained at 25°, and 81.8% at 0°; with 30% EtOH, 76% at 25°, and 86.8% at 0°, with 50% EtOH, 83% at 25° and 93.8% at 0°; with 70% EtOH, 87% at 25° and 95.3% at 0°. The following results show that alterations in temp. have the same effect in MeOH as in EtOH: with 2% MeOH, 59% ester was obtained at 25° and 76.6% at 0°; with 5% MeOH, 77% at 25° and 90.4% at 0°; with 10% MeOH, 86% at 25° and 93.4% at 0°, with 20% MeOH, 93% at 25° and 94% at 0°. Again the same result was obtained with AcCl and MeOH and thus it may be concluded *that in the Schotten-Baumann reaction the yield of ester is greater the lower the temp.* This result is in agreement with the observations of previous investigators (cf. Houben-Weyl, *Methoden der org. Chemie* II, 501(1922) (cf. *C. A.* **17**, 1968); Brühl, *Ber.* **36**, 4272(1903)) and confirms the work of Caudri (*C. A.* **23**, 4647) on the reaction of Ac_2O on aq. alcs. *B. The effect of the nature of the acid chloride used on the quantity of ester formed in the reaction* — With $PhSO_2Cl$, NaOH and EtOH the following results were obtained at 0°: with 10% EtOH, 28% ester, with 20% EtOH, 45.6%; with 30% EtOH, 64.5%; with 50% EtOH, 81.2%; with 70% EtOH, 88.3%. With AcCl consistent results could not be obtained at 0° and therefore expts. with this acid chloride were carried out at 25°: with 10% EtOH, 4.8% ester was obtained; with 20% EtOH, 8.0%; with 30% EtOH, 22.7%; with 50% EtOH, 34.8%; with 70% EtOH, 52.1%. These figures show that the amount of ester formed under various exptl. conditions increases in the order: AcCl, $PhSO_2Cl$, BzCl and it could be shown that the same order holds with sucrose and MeOH. At 0°, BzCl gives 88.4%, 93.0% and 96.8% ester with 1%, 2% and 5% sucrose solns. while $PhSO_2Cl$ gives 76.6%, 82.3% and 96.4% ester under the same conditions. With AcCl at 25°, 2.5% MeOH gave 1.3% ester; 5% MeOH, 5.1%; 10% MeOH, 8.6%; 20% MeOH, 17.3%; 50% MeOH, 41.3%; 80% MeOH, 69.2%. From these results the following rule was deduced: *When an acid chloride reacts with an alc. A to give more ester than a second chloride, it will give more ester than the second chloride with an alc. B. C. The effect of concn. and the nature of the alc. on the quantity of ester formed.*—In addn. to the expts. already described, the following results were obtained with BzCl: 1% $PhCH_2OH$, 45.7% ester; 2% $PhCH_2OH$, 63.4% ester; 1% allyl alc., 37.6 ester; 2% allyl alc., 45.3% ester; 10% allyl alc., 72.8% ester; 1, 2 and 5% glycerol, 76.3, 86.6 and 91.2% ester; 1, 2 and 5% sucrose, 88.4, 93.0 and 96.8% ester; 0.5% phenol, 98% ester. It is at once obvious that different kinds of alcs. give very different yields of ester under the same exptl. conditions; on converting the alc. % into mol. OH %, the amount of ester formed increases in the order: EtOH, allyl alc., MeOH, $PhCH_2OH$, glycerol, sucrose, phenol. The polyhydric alcs. investigated so far are benzoylated easily whereas phenol is converted almost quantitatively into the Bz ester. In all the cases investigated the amount of ester increases with increasing concn. of the alc. The following conclusion is drawn: *When an alc. gives more ester with an acid chloride A than another alc., the same applies with another acid chloride B. D. The effect of concn. and the nature of the alkali on the quantity of ester formed.*—Small alterations in the concn. of alkali have but a small effect on the yield of ester but in general the amount of ester decreases with increasing excess of alkali used, although

the influence of this factor is not considerable. Both at 0° and at 25°, KOH gives a somewhat larger yield of ester than NaOH, the difference being small. In this connection attention is drawn to the expts. of Tasman (*C. A.* **22**, 240, 584) and Caudri (*C. A.* **23**, 3393) on the hydrolysis of phthalide with different alkalies, Tasman finding K = 12.1 at 25° with KOH and Caudri 14.07 with NaOH. From the foregoing results it follows that the following conditions are to be maintained in the prepn. of esters by means of the Baumann-Schotten reaction in order to obtain high yields of ester: (1) the temp. must be as low as possible; (2) the acid chloride must be added in portions to prevent the sudden evolution of heat; (3) KOH should be used in preference to NaOH, although the latter gives excellent results; (4) the alkali must be as concd. as possible; (5) in order to prevent hydrolysis the ester is to be removed from the reaction mixt. as quickly as possible; (6) an excess of acid chloride is to be used to obtain a reasonable yield of ester, as a rule 1.2–1.5 times the calcd. amount being necessary. In order to obtain better yields, acetone is sometimes used as a solvent in the reaction, but at 25° the following amounts of ester were formed from acetone: with 25% acetone, 8% ester; with 50% acetone, 18% ester, with 65% acetone, 25% ester; with 80% acetone, 36% ester. In mixts. of acetone and alkali an equil. is established between acetone and diacetone alc. (Koelichen, *Z. physik. Chemie* **33**, 129(1900)), but as the same results were obtained with acetone-alkali mixts. which were kept in the ice chest for 2 days in order to obtain the equil. mixt. with diacetone alc. and with the same mixts. freshly prepd., the conclusion is drawn that the reaction is not due to the diacetone alc., but to the acetone itself, which has reacted in the enolic form. The Schotten-Baumann reaction may be used also for the detn. of the strength of alc.-water mixts. and for the quant. estimation of phenols, as was shown experimentally for phenol and resorcinol. A more complicated application of the reaction to quant. analysis would be the detn. of MeOH in mixts. of MeOH and EtOH after having constructed a graph for such mixts. of known compn.

C. F. VAN DUIN

Keto-enol equilibrium of ethyl α-phenylacetoacetate. HOWARD W. POST AND GLADYS A. MICHALEK. *J. Am. Chem. Soc.* **52**, 4358–62(1930).—A method is given for the prepn. of $AcCHPhCO_2Et$, which is a modification of that of Beckh (*Ber.* **31**, 3160 (1898)). Reliable data from Br titration of this ester show that it has an enol content at equil., room temp., in pyrex glass, of 28.6%. A mechanism is suggested for this series of reactions. Data on the enol content, obtained from a detn. of the mol. refraction, show 137.13%, obviously unreliable. $AcCHPhCO_2Et$ b_{11} 145–7°, d_4^{20} 1.0850, n_D^{20} 1.5130. The increase in enol content of the α-Ph ester over that of the unsubstituted ester is ascribed to the greater electronegativity of the Ph over H and the abnormally large value obtained by the refractive index, to the presence of the anomalous C_6H_6 ring.

C. J. WEST

Reaction between quinone and cinnamic aldehyde under the influence of light. G. BARGELLINI AND LYDIA MONTI. *Gazz. chim. ital.* **60**, 474–8(1930).—Reactions between quinone (I) and various aldehydes already described by Klinger (cf. *Ann.* **249**, 137(1888); **382**, 211(1911); *Ber.* **24**, 1340(1891); **31**, 1214(1898)), all of which followed the same course, suggested an analogous reaction with PhCH:CHCHO (II) and its derivs., which would constitute a method of formation of chalcones. The reaction proceeded otherwise, however, for by the action of light I was reduced to hydroquinone, II was oxidized to cinnamic acid (III), and these 2 products then combined, *i. e.*, the reaction is analogous to that between phenanthrenequinone and certain aldehydes (cf. Klinger, *loc. cit.*). I (10.8 g.) and II (13.2 g.) in C_6H_6 (100 cc.) exposed in a sealed glass tube to sunlight for 1 month (May-June), the insol. deposit steam-distd. to remove traces of I and II and the residue (10 g.) washed with SO_2 soln. and recrystd. repeatedly from dil. EtOH, yields *hydroquinone cinnamate*, *p*-HOC_6H_4OCOCH:CHPh (IV), yellowish, m. 172–3°, sol. in concd. H_2SO_4, it is repptd. from its cold dil. NaOH soln. by CO_2 or HCl, whereas it cannot be repptd. from its dil. NaOH soln. after the latter has been boiled. On exposure to air, alk. solns. of IV blacken. With I (2 mols.) and II, or with I and II (2 mols.), the reaction led only to IV as before. Control tests of the same mixts. kept in darkness showed no reaction. IV (5 g.), EtI (10 g.) and KOH (5 g.) in EtOH refluxed 5 hrs., evapd., the residue dissolved in water, extd. with Et_2O, the ext. evapd., and the residue recrystd. from dil. EtOH, yields *p*-$C_6H_4(OEt)_2$. The alk. soln. which has been extd. with Et_2O acidified, extd. with Et_2O, the ext. evapd. and the residue crystd. from boiling water yields III. IV (5 g.), AcONa (10 g.) and Ac_2O (50 cc.), refluxed 6 hrs., poured into water and the ppt. recrystd. from dil. EtOH, yields the *mono-Ac deriv.* *p*-$AcOC_6H_4OCOCH$:CHPh, yellowish, m. 121–2°, is reduced in

EtOH by H with Pd black, with formation of the compd. $C_{17}H_{16}O_4$, which, crystd. from dil. EtOH, m. 84–6°. C. C. DAVIS

Mercuration of β-resorcylic acid. REUBEN B. SANDIN AND JACOB M. ZEAVIN. *J. Am. Chem. Soc.* **52**, 4369–72(1930).—β-Resorcylic acid and $Hg(OAc)_2$ in hot glacial AcOH, heated a few min. and poured into H_2O, then dried at 100° for 12–24 hrs., give 95% of the *anhydro-5-hydroxymercuri deriv.*, which gives with I in AcOH 5,2,4-I(HO)$_2$-$C_6H_2CO_2H$. An excess of $Hg(OAc)_2$ in EtOH-AcOH gives 95% of the *anhydro-3-hydroxymercuri-5-acetoxymercuri deriv.* results; I gives the 3,5-di-I deriv. In alk. soln. there results 80% of *anhydro-3,5-dihydroxymercuri deriv.*, brown. The color of the anhydro derivs. indicates the possibility of quinoid structure. C. J. WEST

Mellitic acid and its derivatives. HANS MEYER AND HARRY RAUDNITZ. *Ber.* **63B**, 2010-8(1930); cf. *C. A.* **8**, 3032.—Mellitic acid (I) is obtained in the following % yields: from Bohemian graphite ground in a Plauson colloid mill, 10; yellow graphitic acid (1.3 g. SiO_2 and 0.5 g. $Fe(OH)_3$ in 8.5 g.) 50; Staudenmayer and ordinary pyrographitic acid, 35; beechwood charcoal ground in a colloid mill, 8; animal charcoal, 6; sugar charcoal, 26. An excellent raw material is the "Carboraffin" of the Aussiger Verein f. chem. u. metallurg. Produktion; the I can be obtained dependably in 32–40% yield as the NH_4 salt by slowly adding 200 g. of the charcoal to 1600 cc. HNO_3 (d. 1.5–1.52), heating 24 hrs. on the H_2O bath, refluxing 70–80 hrs. with 0.2% vanadic acid, adding 100–200 cc. concd. HNO_3 and boiling until the soln. is light yellow (if the soln. is still dark after 20 hrs., 100 cc. concd. H_2SO_4 is added and the boiling is continued). The soln. is evapd. and, if no H_2SO_4 has been used, the residue is powd. and dried at 125° until free of HNO_3; if H_2SO_4 was used the soln. is concd. until foaming ceases and the I is pptd. with H_2O. The crude I is converted into the NH_4 salt and purified through the cryst. light green *Cu salt*. *Phenolmellitein*, from I, PhOH and $SnCl_4$ at 115–20°, reddish yellow sandy powder, sol. in alkalies with blood-red color, also sol. in concd. H_2SO_4, alc., Et_2O and AcOEt; its action on the surviving small and large intestine of the cat is quantitatively the same as that of phenolphthalein. *Pyrogallolmellitein* (II), from I and pyrogallol at 160°, blue-black amorphous powder sol. in alkalies with dark violet, in concd. H_2SO_4 with deep brown color, gives with Me_2SO_4-KOH a *hexapyrogallolmellitein dodecamethyl ether*, light brown powder insol. in H_2O and alkalies, sol. in H_2SO_4 with brown color. In H_2SO_4 at 190°, II yields *mellitcerulein*, black powder sol. in KOH with corn flower-blue color. Mellitic trianhydride (III) is readily obtained from I with AcCl in sealed tubes at 120° or with boiling Ac_2O, and the dianhydride with $SOCl_2$ (or with Ac_2O if the boiling is limited to 0.5 hr.). III, if pure, is readily converted by $AlCl_3$ and C_6H_6 at 90–5° into *tribenzoylbenzenetricarboxylic acid*, faintly yellow hydrated powder, giving with boiling $SOCl_2$ the *pseudotrichloride*, m. 239° (the true *trichloride*, prepd. with PCl_5, is a brown viscous oil); *tri-Me ester*, amorphous powder. The anhydride and *p*-$C_6H_4(OH)_2$ stirred with Na-$AlCl_3$ at 200° yielded a black *hexahydroxyanthratriquinone*, sol. in H_2SO_4-H_3BO_3 with blue color and characteristic absorption bands at 665, 605, 565μμ, and forming a brownish yellow acetate. *Phenolpyromellitein* (IV), from pyromellitic acid, PhOH and $SnCl_4$ at 115–20°, faintly pink powder holding approx. 2 mols. H_2O at 140°, decomps. above 180°, behaves toward alkalies and H_2SO_4 like phenolphthalein, insol. in dil. acids; *tetraacetate*, insol. in Na_2CO_3, sol. in hot KOH; *tetra-Me ether*, yellowish white powder, m. below 100°, insol. in alkalies, rapidly hydrolyzed by concd. H_2SO_4; *tetra-Et ether*, yellowish; *octa-Br deriv.*, from IV in boiling alc. slowly treated with Br in AcOH, faintly yellowish powder easily sol. in alkalies with violet-blue, in H_2SO_4 with red color; excess of Br gives a yellowish powder contg. approx. 16 atoms of Br. III gives with high-boiling solvents intense colors due to the formation of mol. compds. (1:1), a large no. of which have been isolated. The dianhydride also forms such compds. but they can be isolated only if the solvent (like $PhNO_2$) does not boil too high; otherwise the dianhydride changes into III. In this way it was shown also that I itself is partly dehydrated in solvents of a sufficiently high b. p. The colors produced by III with some 60 substances are listed. The *naphthalene compd.* forms orange-red, the *anthracene compd.* dark blue, the *phenanthrene compd.* brick-red and the *veratrole compd.* light brown crystals. C. A. R.

The diterpenes kaurene and mirene. J. R. HOSKING. *Rec. trav. chim.* **49**, 1036–9 (1930).—Up to the present moment 11 diterpenes have been found in essential oils but only for α-camphorene is the C skeleton known (Ruzicka and Stoll, *C. A.* **18**, 1829). According to Kondakov and Saprikin (*C. A.* **20**, 3453) the naturally occurring diterpenes should be hydrogenated $C_{10}H_8$ or phenanthrene derivs. and therefore both the cryst. diterpenes kaurene and mirene were investigated more closely. The hydrogenation of kaurene with Pt black in AcOEt at room temp. or with Pt oxide in AcOH gives *dihydrokaurene*, m. 86–7°, d_4^{106} 0.9282, n_D^{100} 1.4912; the dihydro compd. does not give

any color with $C(NO_2)_4$ in $CHCl_3$ nor does it take up any more H on prolonged hydrogenation, even after reactivation of the catalyst according to Willstätter. In the same way mirene was converted into *dihydromirene*, m. 73–4°, which behaves also as a completely satd. compd. It thus follows that kaurene and mirene contain only 1 double bond and that a system of 4 C rings is present. On heating kaurene with its own wt. of Se at 340–50° during 30 hrs. 50% of a hydrocarbon, m. 79–81°, was obtained together with an oil, which, on repeated treatment with Se, gave a 2nd crop of the same hydrocarbon. The latter could be identified as *pimanthrene* by the m. p. of the *picrate*, 130–1°, and of the *styphnate*, m. 157–8°, as well as by the formation of a red quinone, m. 166°, by oxidation with CrO_3, the quinone and other derivs. being identical with the derivs. from pimanthrene, obtained by dehydrogenation of *d*-pimaric acid (Ruzicka and Balas, *C. A.* **17**, 3026) and of agathenedicarboxylic acid (Ruzicka and Hosking, *C. A.* **23**, 3711). C. F. VAN DUIN

Dependence of optical rotatory power on chemical constitution. VIII. Stereoisomeric (*d*-, *l*- and *dl*)*p*-phenylene-, 1,4-naphthylene-, *p,p'*-diphenylamine-, *p,p'*-diphenylmethanebisiminocamphors, *p*-phenylene-, *p,p'*-diphenylmethanebisaminocamphors, *p*-diphenylamineiminocamphors and *p*-diphenylamineaminocamphors and their derivatives. BAWA KARTAR SINGH AND BHUTNATH BHADURI. *J. Indian Chem. Soc.* **7**, 545–74(1930); cf. *C. A.* **24**, 4968.—In reducing the imino to amino compds. there is an enormous decrease in optical rotatory power. The influence of solvents shows that optical rotatory power does not in any case run parallel to the dielec. consts. of the solvents. The rotatory dispersion of Ac derivs. of *p,p'*-diphenylaminebisiminocamphors, of *p*-diphenylamineaminocamphors in all solvents tried and of *p*-diphenylaminocamphors in all solvents except pyridine is simple but others are complex or anomalous. The phys. identity of enantiomers is experimentally proved. By the m.-p. method some of the *dl*-forms are shown to be compds., some mixts. A. P. SACHS

Bromine derivatives of some polyphenols. G. GALLAS AND M. ALONSO. *Anales soc. espan. fis. quim.* **28**, 967–1002(1930).—Oxidation of PhOH and naphthols by $FeCl_3$, $KMnO_4$, etc., appears to link the 2 nuclei in the *o*- or *m*-, but not the *p*-position. *o,o'*-Biphenol, like *o,o'*-binaphthol, is difficult to purify and exact phys. consts. are lacking. Bromination of the 2 biphenols is easy, the *p*- more so than the *o*-compd., whose Br derivs. are likewise difficult to purify. Cold bromination is at times the max. possible. In other cases the deriv. corresponds to the amt. of Br used. The Br is in the *o*- or *p*-position to the OH. The Br derivs. can be oxidized as easily as the original compds., giving quinones of intense color. Condensation reactions are varied. Like the diphenols, the mol. can be broken by certain reducing agents. Alkalies replace Br, giving new polyphenols. Sepn. is incomplete. E. M. SYMMES

Stereochemical study of biphenyl-2,2'-disulfonic acid. VIII. W. M. STANLEY AND ROGER ADAMS. *J. Am. Chem. Soc.* **52**, 4471–6(1930); cf. *C. A.* **24**, 4014.—On the basis of x-ray data there is a possibility of the resolution of $(2\text{-}HO_3SC_6H_4)_2$; however, this was found impossible, from which it appears that the SO_3H group is not sufficiently large to interfere with a H atom and prevent free rotation; it is also possible that the SO_3H group may have a more compact structure than was supposed or the H atom may be smaller as a blocking group than has previously been assumed. The *brucine salt* of $(2\text{-}HO_3SC_6H_4)_2$, m. 245–8°, $[\alpha]_D^{20}$ —33.2°; the *quinine salt*, m. 191–3°, $[\alpha]_D^{20}$ —85.9°; the *morphine salt*, m. 261–7°, $[\alpha]_D^{20}$ —74.6°. Fractionation of these salts from several different solvents gave no indication of resolution. The 4,4'-di-NH_2 deriv. yields a *strychnine salt*, m. 310–8° (decompn.), $[\alpha]_D^{20}$ —22.4°; *brucine salt*, m. 311–4° (decompn.), $[\alpha]_D^{20}$ —20°; these could not be resolved. C. J. WEST

Mixed catalysts in the Friedel and Crafts reaction. Yield of benzophenone from benzoyl chloride and benzene using ferric chloride-aluminum chloride mixtures as catalysts. W. A. RIDDELL AND C. R. NOLLER. *J. Am. Chem. Soc.* **52**, 4365–9 (1930).—The yield of Ph_2CO prepd. from BzCl and C_6H_6 with $FeCl_3$-$AlCl_3$ is approx. the mean of that obtained using pure $FeCl_3$ and pure $AlCl_3$. The $FeCl_3$ has a detrimental action which is apparently due to the acceleration or inauguration of an unknown side reaction. The results are given as curves. C. J. WEST

Synthesis of cyclic compounds. VII. Stereoisomeric β,γ-diphenyl-adipic acids. MARIAM P. OOMMEN AND ARTHUR I. VOGEL. *J. Chem. Soc.* 1930, 2148–54; cf. *C. A.* **24**, 3225.—Reduction of 100 g. PhCH:$CHCO_2Me$ with 150–200 g. moist Al-Hg (cf. Henle, *Ann.* **384**, 16(1906)) gives 30–5 g. $PhCH_2CH_2CO_2H$, 22–3 g. of Me *meso*-β,γ-diphenyladipate (I) and 15–6 g. of the *dl*-ester (II). I m. 175°; hydrolysis gives the free acid, m. 270–1°, which could not be resolved by brucine, strychnine or quinine. *Et ester* m. 116°. The *acid chloride* m. 187°. II m. 73–4°; hydrolysis gives the *dl*-

acid, m. 185–6°. The action of Ac_2O on the 2 acids is described, the products resembling those obtained by H. The *dl*-acid was resolved by means of the brucine salt. The *d-acid* m. 200–1°, $[\alpha]^{20}_D$ 14.36° (*c* 3.09 in abs. EtOH); the *l-acid* is found in the more sol. fraction; the soly. of the *d*- and *l*-acids is greater than that of the *dl*-acid.
C. J. WEST

Reaction between triphenylmethyl, magnesium and a small amount of magnesium halide. The composition of the Grignard reagent. W. E. BACHMANN. *J. Am. Chem. Soc.* **52**, 4412–3(1930).—A small quantity of MgI_2 or $MgBr_2$ can suffice to convert Ph_3C and Mg to the Mg deriv. of Ph_3C. The reaction takes place in 2 steps: $2Ph_3C + Mg + MgX_2 = 2Ph_3CMgX$; $2Ph_3CMgX = MgX_2 + Ph_3CMgCPh_3$. The latter step makes the MgX_2 available for continuous reaction.
C. J. WEST

Superacid solutions. IV. Determination of the strength of weak bases and pseudo bases in glacial acetic acid solution. J. B. CONANT AND T. H. WERNER. *J. Am. Chem. Soc.* **52**, 4436–50(1930); cf. *C. A.* **22**, 4035.—A spectrophotometric study has been made of the acid-base equil. in solns. of crystal violet in buffered glacial AcOH solns. The extinction coeff. was measured at intervals of 10 mμ from 470 to 680. Data are given for the fundamentals chosen for the violet, green and yellow forms; also for the dissocn. consts. of crystal violet from spectrophotometric data at 25° in urea-H_2SO_4, urea-$HClO_4$ and acetoxime-H_2SO_4 buffers. The change of pK'_1 for crystal violet with change in ionic strength is shown in the form of curves; this effect is very marked; the total change of pK'_1 from the limiting value at $\mu = 0$ to $\sqrt{\mu} = 0.5$ is about 2.6 p_H units. In the more concd. solns. there are sp. effects depending on the nature of the neutral salt. These effects are larger than the corresponding effects in H_2O because of the low dielec. consts. of AcOH; the natures of both the cation and anion of the neutral salt are important. An electrometric study of weak bases and pseudo bases in glacial AcOH reveals the large effect of changing ionic strength, also noted in the spectrophotometric study. The following apparent pK' values for pseudo bases at 25° in glacial AcOH are reported (bases in 0.05 *M* soln. titrated with H_2SO_4 $\mu = 0.2$ with $Me_3NHSO_3C_6H_4Ne$-*p*): Ph_3COH —1.47; $C_{10}H_7CPh_2OH$ —1.25; $(MeOC_6H_4)_2CHOH$ —1.14; $MeOC_6H_4CPh_2OH$ —0.59; phenylxanthanol 1.91; dinaphthoxanthanol 2.40 $(MeOC_6H_4)_3COH$, 2.56. The effect of added H_2O on the apparent consts. of a no. of weak pseudo bases is reported. A method is outlined for obtaining significant values for the relative basicity of the "halochromic carbinols."
C. J. WEST

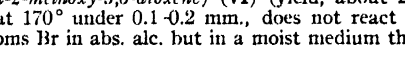
Chlorophenol red. WILTON C. HARDEN. *J. Am. Chem. Soc.* **52**, 4611(1930).—Repeated crystn. of chlorophenol red by soln. in hot H_2O, acidifying with HCl and concg. to the point of crystn., gives a sample with 7.60 S and 16.60% Cl; it forms small, fine, greenish-brown crystals and gives an entirely different color in buffer solns. than samples heretofore examd. The alk. color, besides being much more intense, contained more blue and less red than the com. samples.
C. J. WEST

Quinonoid structure of some triphenylmethyl salts. LEIGH C. ANDERSON. *J. Am. Chem. Soc.* **52**, 4567–72(1930).—The quant. absorption spectra of Ph_3COH, Ph_3CCl, $(Ph_3C)_2SO_4$ and Ph_3CClO_4 in Me_2SO_4 and of Ph_3CSO_4H and Ph_3CClO_4 in H_2SO_4 and $HClO_4$, resp., are reported. The data obtained from the absorption spectra of these salts constitute evidence in favor of the hypothesis that the sulfate, acid sulfate and perchlorate exist in a quinonoid modification in their solns. in Me_2SO_4, H_2SO_4 and $HClO_4$, resp.
C. J. WEST

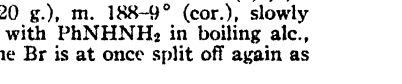
Oxidation processes. III. Oxidation of α-ketoles with Fehling solution. ARNOLD WEISSBERGER, WALTER SCHWARZE AND HEINRICH MAINZ. *Ann.* **481**, 68–80(1930); cf. *C. A.* **24**, 3236.—The oxidation of benzoin by alk. Cu tartrate is unimol. and the reaction velocity is proportional to the concn. of free alkali, *i. e.*, alkali in excess of the 2 mols. concerned in forming the $Cu(OH)_2$ complex; the velocity is independent of the concn. of Cu salt and is, therefore, not a measure of the direct reaction with the oxidizing agent. It is suggested that the slowest phase of the complete reaction (*i. e.*, that detg. the velocity) is the transformation of the ion —OCHPh.COPh into the ion of stilbenediol —OCPh:CPhOH, and this is confirmed by the small differences observed in the resp. velocities of oxidation by Fehling soln. and of autoxidation, where large concn. differences of the available oxidizing agents obtain. The effect of substituents follows the same rule as in the case of autoxidation, the rate of oxidation with Fehling soln. thus also being related to the electrolytic dissocn. of the ketole.
C. J. WEST

Cycloacetals of benzoin and their rearrangement. MAX BERGMANN AND GEORG WEIL. *Ber.* **63B**, 1911–7(1930).—Fischer obtained quantitatively from benzoin (I) and MeOH-HCl an ether (II) which, since it can still form an oxime, must have the structure PhCOCH(OMe)Ph. From what is known of the chemistry of hydroxy-

cyclohexanone, such ethers are not formed directly from the HO ketones but through the dimol. lactolides (cycloacetals) by rearrangement. Cycloacetals of I were not known up to the present, however. According to Irvine and his collaborators the action of MeOH-HCl on I is quite complicated, giving considerable amounts of 2 compds., $C_{29}H_{24}O_3$ (III) and $C_{30}H_{28}O_4$ (IV); III with HCl gives I and II, but IV cannot be converted into either I or II. Since both III and IV yield tetraphenylfuran with fuming HI, Irvine and McNicoll assigned furoid structures to them and concluded that they play no role in the formation of II. B. and W. have now established, however, that IV is the dimol. *Me cycloacetal* (V) of I; hot *N* HCl converts it practically quantitatively into I in a few min. if a little PhOH is added to facilitate its soln., and, on the other hand, it yields II almost quant. with MeOH satd. with HCl. To III is assigned the structure VI of an unsatd. cycloacetal; like V, it can be converted quantitatively into II and with O_3 it yields PhCOCH(OBz)Ph and BzOH. The structure VI also explains the observation that with Br in aq. solvents are obtained about equal parts of Bz_2 and I. The difference between the results of Fischer and of Irvine is due to the fact that with about 30% HCl in MeOH both V and VI are readily obtained but with highly satd. HCl-MeOH (50%) they are completely changed into II. The structure VI is also supported by a series of further reactions, especially catalytic reduction; with Pd sponge as catalyst, the reduction does not stop with satn. of the double bond but all the O is reduced away; a similar reduction can be effected with I and II but the yield of $(CH_2Ph)_2$ is not as large. With hot aq. *N* HCl in the presence of PhOH, VI is completely hydrolyzed in a few min., yielding, not I like V, but about equimol. amounts of Bz_2 and $PhCOCH_2Ph$, together with other substances. This, therefore, is a case of an oxidation-reduction in which VI represents the dimol. intermediate product. *Dibenzoin bis(methyl lactolide)* (*2,3,5,6-tetraphenyl-2,5-dimethoxydioxane*) (V), obtained in 30–5 g. yield from 100 g. I, m. 296° (cor.) (I. gives 285°), slowly sublimes at 200° under 0.2 mm., mol. wt. (Bleir-Kohn) 473–83. *Anhydrodibenzoin Me lactolide* (*2,3,5,6-tetraphenyl-2-methoxy-5,6-dioxene*) (VI) (yield, about 20 g.), m. 188–9° (cor.), slowly sublimes at 170° under 0.1–0.2 mm., does not react with $PhNHNH_2$ in boiling alc., adds 2 atoms Br in abs. alc. but in a moist medium the Br is at once split off again as HBr.



(V)



(VI)

C. A. R.

Reduction of *p*-dimethylaminobenzil. SANFORD S. JENKINS, JOHANNES S. BUCK AND LUCIUS A. BIGELOW. *J. Am. Chem. Soc.* **52**, 4495–9(1930).—*p*-$Me_2NC_6H_4COBz$, further reduction in abs. EtOH gives 90% of *p-dimethylaminohydrobenzoin* (II), m. 112° (all m. ps. cor.). Heating II with AcOH-HCl gives 70% of *α-p-dimethylaminodesoxybenzoin* (III), m. 128° (*oxime*, m. 139°). I with Sn and HCl gives a mixt. of *β-p-dimethylaminodesoxybenzoin* (IV), m. 164° (*oxime*, m. 142°) and III. Catalytic reduction of III gives *α-p-dimethylaminostilbene hydrate*, m. 78°, while IV gives the *β*-isomer, m. 60° (Sachs and Sachs, *Ber.* **38**, 515 (1905)). Heating either form with AcOH and HCl gives *p*-$Me_2NC_6H_4CH{:}CHPh$, m. 148°, reduced to *p-dimethylaminodiphenylethane*, m. 63°; the *methiodide* m. 260–2° (uncor.). C. J. WEST

Rearrangements of brominated naphthalenes by aluminum chloride. H. LOHFERT. *Ber.* **63B**, 1939–41(1930).—As is well known, reactions in the presence of $AlCl_3$ cannot be used for detg. constitutions because $AlCl_3$ readily brings about migrations of the substituents. No such rearrangements had hitherto been observed with the dihalogenonaphthalenes, but L. came across such a case in attempting to convert 1,2-$C_{10}H_6Br_2$ with AcCl and $AlCl_3$ in CS_2 into aceto-1,2-dibromonaphthalene (I). The desired I (m. 146°) was formed only in small amount; the products were, depending on the conditions, either 1,4-$C_{10}H_6Br_2$, m. 83° (20–30% yield), and I, or 1,5-$C_{10}H_6Br_2$, m. 131° (50% yield) and unchanged 1,2-$C_{10}H_6Br_2$. The AcCl plays a role in the reaction only through the HCl formed from it, *i. e.*, the rearrangement can be effected with $AlCl_3$ and HCl alone. It suffices to pass dry HCl into the boiling CS_2 soln. contg. $AlCl_3$ in suspension to bring about the migration of the *β*-Br atom to the *α*(5)-position or the *α*-Br atom to the *β*(6)-position. In most cases was formed 2,6-$C_{10}H_6Br_2$, in a few cases only 1,5-$C_{10}H_6Br_2$. Attempts to direct the Br atoms to the *α,α*- or *β,β*-positions by varying the conditions were without success. C. A. R.

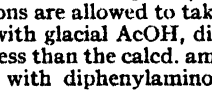
Preparation of 1-naphthoic nitrile from 1-naphthylamine. JOHN A. MCRAE. *J. Am. Chem. Soc.* **52**, 4550–2(1930).—Contrary to the statement of Whitmore and Fox (*C. A.* **24**, 106), 1-$C_{10}H_7CN$ may be obtained in 25–35% yields from 1-$C_{10}H_7NH_2$

by the Sandmeyer reaction. The Korczynski method (*C. A.* **14**, 2919; **21**, 77) did not give sensibly greater yields than the ordinary Sandmeyer process, but by adding the acid diazo soln. to KCN-$Ni(CN)_2$ contg. sufficient alkali to neutralize the free acid of the diazo soln., the nitrile has been obtained in yields of 58–60%. Exptl. details are given. C. J. West

Anthraquinone derivatives as precipitants for bases. Walther Zimmermann. *Z. physiol. Chem.* **192**, 124–30(1930).—Sulfonic acids of anthraquinone and several of its OH derivs. were examd. as precipitants for alkaloids and various bases of natural occurrence. The cryst. products described and analyzed are *guanidine alizarindisulfonate*, m. 259°, *creatinine anthrarufindisulfonate*, m. 333° (decompn.), *creatine anthrarufindisulfonate*, m. 310° (foaming), *lysine purpurinmonosulfonate*, decomps. 249°, *putrescine purpurinmonosulfonate*, m. 258°. A. W. Dox

Purification of phenanthrene. Frank L. Cohen and Ulysse Cormier. *J. Am. Chem. Soc.* **52**, 4363–4(1930).—Crude phenanthrene (I) (5 kg.), dissolved in 12 l. 95% EtOH and cooled to 15°, gives 4–4.3 kg. gray material, m. 105–10°: 1 kg. of this product in 6 l. EtOH, treated with 120 g. concd. HNO_3 and refluxed 1.25–1.5 hrs., gives 800–900 g. of red flakes, m. 93–6°; distn. at atm. pressure and recrystn. from EtOH gives 30–45% pure I (based on the crude I); over 80% of the solvent can be recovered. C. J. West

Action of hydrazides. IV. Condensation of diarylaminoguanidines with phenanthraquinone and some of its derivatives. Satish Chandra De and Devendra Nath Dutt. *J. Indian Chem. Soc.* **7**, 537–44(1930); cf. *C. A.* **24**, 4781.—The object of D. and D. was to det. the effect of diminishing the basicity of the amino group in the $-C(:NH)NH_2$ of aminoguanidine by certain aryl substitution products as regards the action on phenanthraquinones. When the monoxime of phenanthraquinone or its substitution products is condensed with the various diarylaminoguanidines in alc. the hydrazone oximes are formed in good yield by the elimination of a mol. of water. When the same reactions are allowed to take place in glacial AcOH, or when the hydrazone oximes are heated with glacial AcOH, different products are formed. These compds. contain 2 atoms of N less than the calcd. amt., elemental N having been evolved. Phenanthraquinone (I) reacts with diphenylaminoguanidine (II) in alc. to form phenanthraquinone-diphenylaminoguanidine (III) m. 240°. The monoxime of III, m. 158°, on heating in AcOH for 4–5 hrs., yields a product m. 180° (decompn.), which analyzes for $C_{27}H_{18}N_2$. This would indicate a loss of $HONH_2$ and N_2 from the oxime. The formula suggested is

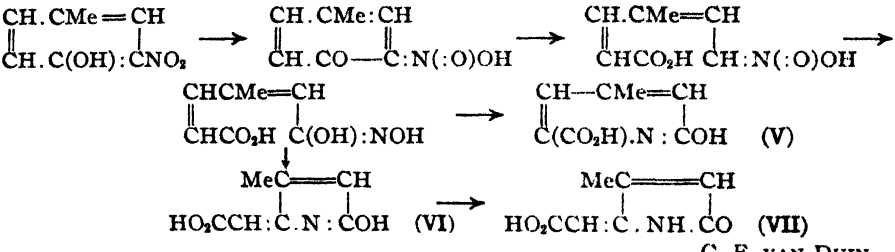


The loss of $HONH_2$ and N_2 seems rather consistent throughout the series studied. 2-Nitrophenanthraquinone (IV) with II gives the 2-nitro deriv. of III, m. 238°, whose oxime, m. 233°, decomps. as indicated above after heating in AcOH for 6 hrs. giving a compd. m. 193°. The corresponding 2,7-dinitro compd. m. 235°, and yields an oxime, m. 245°, which decomps. in AcOH and then m. 202°. I with di-*p*-tolylaminoguanidine (V) in alc. gives a compd. m. 236°, yields an oxime, m. 227°, which decomps. on heating 6 hrs. in AcOH to lose the equiv. of CH_3ON_3, and then m. 156°. IV with V in alc. forms a compd. m. 228°, and its oxime is also reported as m. 228°, but the N increased from 14.55 to 16.82%. Heating 6 hrs. in AcOH caused the oxime to lose CH_3ON_3; the product m. 190°. The corresponding 2,7-dinitro compd., m. 263°, yields an oxime, m. above 300°, which loses CH_3ON_3 in AcOH and then m. 223°. I with di-β-naphthylaminoguanidine (VI) forms a compd. m. 240°, yields an oxime, m. 235°, which loses H_3ON_3 in AcOH, and m. 245°. IV with VI, forms a compd. m. 200°. The 2,7-dinitro compd. m. 270°. Anal. data are given for all compds. reported. John B. Entrikin

Chemistry of furfural. Preparation of tetraethyldiaminodiphenylfurylmethane hydrochloride and of diphenylfurylmethane. S. A. Mahood and Helen F. Aldrich. *J. Am. Chem. Soc.* **52**, 4477–80(1930).—$PhNEt_2$, furfural and $ZnCl_2$, heated at 100° for 11 hrs., give 31% of the *leuco base* of *tetraethyldiaminodiphenylfurylmethane*, light yellow, m. 78°; oxidation with PbO_2 in acid soln. gives the *HCl salt*, dark green, dyes silk a yellower color than malachite green and in the lighter tones gives a clear bright green; the dyed samples are fast to washing but fade on exposure to light. Diphenylfurylcarbinol, obtained in 85% yield from PhMgBr and Et pyromucate, on reduction with Zn in AcOH at 70° gives 95% of *diphenylfurylmethane*, m. 51° (cor.). C. J. West

The by-product from the action of concentrated sulfuric acid on 3-nitro-4-hydroxy-

toluene. I. J. RINKES. *Rec. trav. chim.* **49**, 1002–5(1930).—Pauly, Gilmour and Will (*C. A.* **8**, 1736) and Pauly and Will (*C. A.* **13**, 573) have shown that the chief product of the action of concd. H_2SO_4 on 3,4-$O_2N(HO)C_6H_3Me$ is the semi-lactone of β-methylmuconic acid. To the extent of 5% of the wt. of the starting material a by-product is obtained which is considered by these investigators to be a γ-methyl-α-pyridone-α′-carboxylic acid. This product should be formed by ring closure by the N atom combining with the C atom in position 5, but it may be assumed with equal justification that the C atom 6 is involved in this process. Doubt was thrown on the accuracy of the pyridine formula on account of the very poor yields of decarboxylated product obtained by the removal of CO_2 while pyridinecarboxylic acids as a rule give excellent yields in this reaction. In order to differentiate between the 2 formulas the amide of VII was broken down with NaOCl in MeOH; if the pyridine formula V be correct an aminopyridine deriv. should be produced but if the pyrroline formula VII be correct, an aldehyde should be obtained as follows: $RCH{:}CHCONH_2 \longrightarrow RCH{:}CHNHCO_2Me \longrightarrow RCH_2CHO$. The latter reaction appeared to take place and this result could be confirmed by the oxidation of the acid VII, citraconimide being obtained. The acid VII was first converted into its Me ester in the usual way and then into the amide, m. 214°, with concd. ammonia at 5°, the latter reaction being complete in 7–8 days. The suspension of this amide in MeOH was treated with NaOCl soln. at −5°, yielding *Me 2-keto-4-methyl-Δ³-pyrroline-5-methinecarbamate*, m. 187–8°, which on sapon. with $Ba(OH)_2$ and evapn. of the filtrate *in vacuo*, gave a soln. which immediately gave cryst. ppts. with *p*-$O_2NC_6H_4NHNH_2$ in 50% AcOH or with semicarbazide, thus proving the presence of a C:O group. The oxidation of the acid VII with the calcd. amount of CrO_3 (3 atoms of O) at 40° gave citraconimide, m 107–8°, by repeated extn. of the reaction mixt. with ether; it was identical with an authentic specimen, prepd. from citric acid. These results prove that the by-product from the action of concd. H_2SO_4 on 3,4-$O_2N(HO)C_6H_3Me$ is to be considered as *2-keto-4-methyl-Δ³-pyrroline-5-methincarboxylic acid.*



C. F. VAN DUIN

Action of Grignard reagent on *N*-methylpyrrolidone. New synthesis for substituted pyrrolines. R. LUKEŠ. *Collection Czechoslov. Chem. Comm.* **2**, 531–44(1930).—*N*-Methylsuccinimide and H_2SO_4 are electrolyzed at 15° and 0.1 amp./cm.². Pptn. of H_2SO_4 by $Ba(OH)_2$, filtration, drying *in vacuo*, distn. at 85° and 15 mm. gives *N*-methylpyrrolidone (I), b. 200–1°, $d_4^{9.8}$ 1.0450, $n_D^{9.8}$ 1.47118. I with 2MeMgBr, after being decompd. with H_2O and made alk. with $Ba(OH)_2$, is steam distd. The distillate is made acid with HCl. The aq. layer is evapd. *in vacuo*, added to alc. $NaClO_4$, filtered and crystd. The crystals are decompd. by NaOH, dissolved in Et_2O, dried over NaOH and distd. at 45 mm. and 56–7°. The product, 1,2-dimethyl-Δ²-pyrroline, b. 120–30° in H_2 atm.; the picrate m. 238°; the $HAuCl_4$ salt m. 135°, 182° or 200°. The mother liquor from the $HClO_4$ treatment is made alk. with NaOH and distd. Alc. picric acid gives a picrate which is dissolved in H_2O, acidified with HCl, shaken twice with $PhNO_2$, once with Et_2O, evapd. to a sirup, treated with NaOH, extd. with Et_2O, dried and distd. The 1,2,2-trimethylpyrrolidine b. 130–5°. In the same way is prepd. 1-methyl-2-ethyl-Δ²-pyrroline, b_{10} 40–1° in H_2, d_4^{11} = 0.8779, n_D^{11} 1.49452; its $HClO_4$ salt m. 209°; its $HAuCl_4$ salt m. 115–7°; 1-methyl-2,2-diethylpyrolidine b. 168°; its H_2PtCl_6 salt m. 235°; its $HAuCl_4$ salt m. 159–63°; 1-methyl-2-propyl-Δ²-pyrroline b_{30} 82°; $HClO_4$ salt; 1-methyl-2,2-dipropylpyrrolidine b_{738} 206.8°; its picrate m. 130°; 1-methyl-2-phenyl-Δ²-pyrroline, b_{16} 112° in H_2, d_4^{11} 1.0083, $n_D^{11.4}$ 1.57578; its HCl salt m. 96°; its $HClO_4$ salt m. 117–8°; its $HAuCl_4$ salt with 1 mol. H_2O, m. 95–7°; and its picrate, m. 140–1°, have also been prepd.

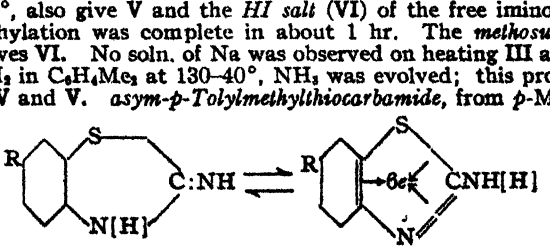
V. F. HARRINGTON

Constitution of metallic complexes of indigo coloring matters. HANS MACHEMER. *J. prakt. Chem.* **127**, 109–68(1930); cf. *C. A.* **24**, 4297.—An extensive review is given of

the previous work on metallic complexes of indigotin and related coloring matters with special reference to their constitution. The absorption bands, 607, 605 and 591$\mu\mu$, of indigotin (I) in C_5H_5N, $CHCl_3$ and $C_6H_4Me_2$, resp., disappear on shaking solns. of indigotin with dry metallic acetates at the ordinary temp. but reappear on addn. of small quantities of acid or of alc. When I is treated with $Cu(OAc)_2$ in dry $C_6H_4Me_2$ at 100° or in dry C_5H_5N soln., the Cu complex is formed and 2 mols. AcOH are eliminated. The Fe^{++} complex of I is formed by reaction between $Fe(OAc)_2$ and I in dry C_5H_5N in dry N atm. I reacts with MeOH-NaOH at room temp. to give the *compd.* $C_{16}H_{10}O_2N_2.NaOH$; shaking the soln. for 12 days there results the *compd.* $C_{16}H_9O_2N_2Na.NaOH$. Et indigotinmalonate yields complexes with *Cu*, *Ag* and $SnCl_4$ ($C_{21}H_{13}O_4N_2.SnCl_3$), bluish black. Indigotinphenyl acetate, $Cu(OAc)_2$, and concd. NH_4OH in C_5H_5N and EtOH give the *Cu complex*. Desoxyindigo with $SnCl_4$ in PhMe gives the complex, $C_{16}H_{11}ON_2.SnCl_3$, deep black-green. 1-Naphthalene-2-indoleindigo yields a *Cu complex*, $C_{36}H_{20}O_4N_2Cu$, blue-black; *Co complex*, blue-black; *$SnCl_3$ complex*, black. 2-Naphthalene-2-indoleindigo yields a *$SnCl_3$ complex*, whose C_5H_5N soln. is green. 3-Hydroxybenzene-2-indoleindigo gives a *$SnCl_3$ complex*, black. 2-Thionaphthene-2-indoleindigo and $SnCl_4$ in $C_6H_4Me_2$ give the dark blue *$SnCl_3$ complex*. 1-Hydroxyanthraquinone in EtOH and a concd. metallic acetate soln. in 10–15% NH_4OH soln. give the *Cu* and *Co complexes;* heating with K in $C_6H_4Me_2$ at 150–200° gives the *K complex*. The anhydrophenylacetates of indigotinmalonic ester, of indigotinphenylacetate and of 2-naphthalene-2-indoleindigo form *mol. compds.* with $SnCl_4$; no metallic complex salts could be prepd. Indole does not react with finely divided Ag or Cu in dry C_5H_5N but reacts readily in C_5H_5N with metallic acetates in NH_4OH to give *complexes* with Ag ($C_{19}H_{15}N_2Ag$) and Cu; $Hg(OAc)_2$ gives the compd. $HgOH.C_{19}H_{15}N_2.2Hg(OAc)_2$. Indole, fuming HNO_3, $NaNO_2$ or $AmNO_2$ in AcOH give the *nitrate*, yellowish red, may be recrystd. from AcOH. Dil. H_2SO_4 in dil. HCO_2H gives the *sulfate*, carmine-red. A table gives the halochromic behavior of the indigoid dyes.

C. J. WEST

Unsaturation and tautomeric mobility of heterocyclic compounds. III. Effect of substituents on the mobility of the aminobenzothiazole system and on the bromination of *sym*-diarylthiocarbamides. Ultra-violet absorption of mobile and of static semicyclic amidines of the benzothiazole group. ROBERT FERGUS HUNTER AND JOHN WM. THOMAS JONES. *J. Chem. Soc.* 1930, 2190–213; cf. *C. A.* 24, 4036.—In a study of the tautomerism of substituted 1-aminobenzothiazoles with the object of ascertaining the effect of polar conditions on the behavior of sym. semicyclic triad systems, the 5-substituted bases (I $\rightleftharpoons$ Ia), in which the *p*-substituent to the nuclear N atom can act by virtue of electronic displacements partly similar to those which operate in aromatic substitution, were chosen as the starting point. *p*-$MeC_6H_4NHCSNHAc$ (II), m. 142°, treated with Br at 0° and reduced with H_2SO_3, gives *1-imino-2-acetyl-5-methyl-1,2-dihydrobenzothiazole*, yellow, m. 192°; heating with concd. HCl for 24 hrs. gives 1-amino-5-methylbenzothiazole (III) (I, R = Me). II and Br in $CHCl_3$, refluxed for a few min., give the *hydrotribromide*, $C_{10}H_{10}ON_2S.HBr.Br_2$, orange, m. 149° (decompn.); reduction gives the 1-Ac deriv. (IV) of III, m. 216°, identical with the acetylation product of III. III (5 g.) and Me_2SO_4 give an oil which, with Ac_2O, gives a mixt. of IV (1.15 g.) and *1-acetimido-2,5-dimethyl-1,2-dihydrobenzothiazole* (V), m. 168°. MeI and III, heated for 10 hrs. at 100°, also give V and the *HI salt* (VI) of the free imino base, m. 290° (decompn.); methylation was complete in about 1 hr. The *methosulfate* of III, m. 160°; satd. KI gives VI. No soln. of Na was observed on heating III and Na in $C_6H_4Me_2$; with $NaNH_2$ in $C_6H_4Me_2$ at 130–40°, NH_3 was evolved; this product with MeI gives a mixt. of IV and V. *asym-p-Tolylmethylthiocarbamide*, from *p*-MeC_6H_4NHMe.-



(I) (Ia)

HCl and KSCN in H_2O for 12 hrs., m. 109°; bromination in $CHCl_3$ and reduction with H_2SO_3, followed by acetylation, gives V. IV and Me_2SO_4, heated 10 min., give V. *sym-p-Tolylmethylthiocarbamide*, m. 126°, with Br in $CHCl_3$, gives the *hydrotetrabromide*, orange-red, m. 90° (decompn.), of *1-methylamino-5-methylbenzothiazole* (VII), m. 152°, obtained by treatment with H_2SO_3 and NH_3; heating the bromide in EtOH gives *3-bromo-1-methylamino-5-methylbenzothiazole* (VIII), m. 165°, whose structure was

established by the following synthesis. 3,4-$BrMeC_6H_3NH_2$, CS_2, EtOH and S, boiled for 5 hrs., give *sym-di-m-bromo-p-tolylthiocarbamide*, m. 163°. heating with Ac_2O for 2 min. gives *m-bromo-p-tolylthiocarbimide*, m. 53°; condensation with $MeNH_2$ gives *sym-m-bromo-p-tolylmethylthiocarbamide*, m. 162°; bromination in $CHCl_3$ gives **VIII**. Bromination of **VII** in $CHCl_3$ gives a *hydrotribromide*, red, m. 137° (decompn.), of **VIII**. The *Ac deriv.* of **VII** m. 162°. **III** and PhSCN in abs. EtOH give *sym-5-methylbenzothiazolylphenylcarbamide*, m. about 310°. *p*-$EtOC_6H_4(Ac)NCSNH_2$, m. 144°, and Br give a *hydrotetrabromide*, orange, m. 139° (decompn.), reduced to *1-imino-2-acetyl-5-ethoxy-1,2-dihydrobenzothiazole*, yellow, m. 147°; concn. HCl gives **III**. *p*-$EtOC_6H_4NHCSNHAc$ and Br in $CHCl_3$ give *1-acetamido-5-ethoxybenzothiazole*, m. 244°. 1-Amino-5-ethoxybenzothiazole and Me_2SO_4, heated 10 min., give *1-imino-5-ethoxy-2-methyl-1,2-dihydrobenzothiazole*, straw-colored, m. 147°. *sym-p-Ethoxyphenylmethylthiocarbamide*, m. 129°, yields with Br *1-methylamino-5-ethoxybenzothiazole*, m. 145°. *asym-Acetyl-p-bromophenylthiocarbamide*, m. 157°, isomerizes to the stable *sym-form*, m. 205°, at its m. p.; the action of Br on these compds. appears to be of an oxidizing nature, since H_2O_2 gives the same product, m. 234°, which is S-free. Methylation of 5-bromo-1-aminobenzothiazole gives 5-bromo-1-imino-2-methyl-1,2-dihydrobenzothiazole, m. 102–4°, whose Ac deriv. m. 219°. *asym-Acetyl-p-chlorophenylthiocarbamide*, m. 157°; the *sym-isomer* m. 186°; Br has an oxidizing action, giving a S-free compd., m. 227°. 5-Chloro-1-aminobenzothiazole (**IX**), Me_2SO_4 and then Ac_2O give *5-chloro-1-acetylimino-2-methyl-1,2-dihydrobenzothiazole*, m. 197°. *sym-p-Chlorophenylmethylthiocarbamide*, m. 214°, with Br gives the *1-McNH deriv.* of **IX**, m. 214° (*Ac deriv.*, m. 175°). Heating *p*-$O_2NC_6H_4NHCSNH_2$ and Br in $CHCl_3$ and reduction or nitration of 1-aminobenzothiazole (**X**) gives the *5-NO_2 deriv.* (**XI**) of **X**, orange, m. 243° (*Ac deriv.*, pale yellow, m. 292°). Methylation of **XI** gives *5-nitro-1-imino-2-methyl-1,2-dihydrobenzothiazole*, pale yellow, m. 167° (*Ac deriv.*, pale yellow, m. 292°), also obtained by direct nitration. *5-Nitro-1-methylaminobenzothiazole*, pale yellow, m. 272° (*Ac deriv.*, pale yellow, m. 241°), results by direct nitration. 1-Anilinobenzothiazole (**XII**) (*picrate*, yellow, m. 223°) and Me_2SO_4, heated 10 min., give a mixt. of *1-phenylmethylaminobenzothiazole*, isolated as the *picrate*, yellow, m. 185° (also obtained from 1-chlorobenzothiazole and PhNHMe) and *1-phenylimino-2-methyl-1,2-dihydrobenzothiazole picrate*, yellow, m. 223°. The 4'-Br deriv. of **XII** with Me_2SO_4 gives a *Me deriv.*, m. 105° (*picrate*, yellow, m. 242°). *p-Ethoxy-sym-diphenylthiocarbamide*, m. 148°, with Br in CS_2 gives *4'-ethoxy-1-anilinobenzothiazole*, m. 166°, also obtained from 1-chlorobenzothiazole (**XIII**) and *p*-$EtOC_6H_4NH_2$. *p-Nitro-sym-diphenylthiocarbamide*, pale yellow, m. 141°, with Br, or **XIII** and *p*-$O_2NC_6H_4NH_2$ give *4'-nitro-1-anilinobenzothiazole*, orange, m. 212° (*Ac deriv.*, pale yellow, m. 172°). *1-Chloro-5-methylbenzothiazole* (**XIV**), b_{15} 148–52°, is conveniently prepd. from **III** through the Sandmeyer reaction; with $PhNH_2$ there results the *1-anilino deriv.*, m. 158° (*picrate*, yellow, m. 216°). *1-Anilino-4'-methylbenzothiazole*, m. 177° (*picrate*, pale yellow, m. 238°). Bromination of *p*-$MeC_6H_4NHCSNHPh$ gave products m. 145–200°, from which neither of the expected anilinobenzothiazoles could be isolated. *sym-p-Ethoxyphenyl-p-tolylthiocarbamide*, m. 137°, with Br in $CHCl_3$ and the product shaken with H_2SO_3 gives *3-bromo-1-anilino-4'-ethoxy-5-methylbenzothiazole*, m. 156°. *p*-$EtOC_6H_4NH_2$ and **XIV** give *1-anilino-4'-ethoxy-5-methylbenzothiazole*, m. 171°. *sym-p-Bromophenyl-p-tolylthiocarbamide*, m. 187°, on bromination gives *4'-bromo-1-anilino-5-methylbenzothiazole*, m. 209° (*picrate*, yellow, m. 251° (decompn.)), also obtained from **XIV** and *p*-$BrC_6H_4NH_2$. *sym-p-Nitrophenyl-p-tolylthiocarbamide*, yellow, m. 175°, with Br gives *4'-nitro-1-anilino-5-methylbenzothiazole*, orange, m. 265°, also obtained from **XIV** and *p*-$O_2NC_6H_4NH_2$. *sym-p-Bromo-p'-ethoxydiphenylthiocarbamide*, m. 169°, with Br in $CHCl_3$ gives *4'-bromo-1-anilino-5-ethoxybenzothiazole*, m. 198°; if CS_2 is used and the heating is continued for 5 min., there results probably the *3,4'-di-Br deriv.*, m. 226°. *p*-$EtOC_6H_4NH_2$ and 1-chloro-5-bromobenzothiazole give the *1-anilino deriv.*, m. 199°. *sym-p-Chloro-p'-bromodiphenylthiocarbamide*, m. 187°, with Br in CS_2 gives *4'-chloro-5-bromo-1-anilinobenzothiazole*, m. 218°, also prepd. from *p*-$ClC_6H_4NH_2$. *sym-p-Bromo-p'-nitrodiphenylthiocarbamide*, yellow, m. 186°, with Br in $CHCl_3$ gives *5-bromo-4'-nitro-1-anilinobenzothiazole*, yellow, m. 259°. *p*-$BrC_6H_4NHCSNHPh$ and MeI in MeOH, refluxed 10 min., give the *S-Me deriv.*, m. 78°; further heating with MeI produces no change but Me_2SO_4 for 15 min. gives *S-methyl-sym-phenylmethyl-p-bromophenylthiocarbamide*, m. 93°. *p*-BrC_6H_4SCN and PhNMe give *sym-phenylmethyl-p-bromophenylthiocarbamide*, m. 156°; Me_2SO_4 gives the *S*-Me deriv. $CS(NH_2)_2$ and Br in EtOH give a Br deriv., m. 191° (decompn.); in CS_2 there results a *perbromide*, red, which evolves HBr on standing, giving the above Br deriv. Absorption spectra are given for **III**, **IV**, **V** and **XII**. The ultra-violet absorption curve of **XII**

in EtOH resembles the curves of III and IV at equimol. concns. for wave lengths between 2450 and 2700 A. U. and simulates the absorption curve of V from 2800 to 3300 A. U.
C. J. WEST

Isoxazoline oxides. X. Reduction. E. P. KOHLER AND A. R. DAVIS. *J. Am. Chem. Soc.* **52**, 4520–8(1930); cf. *C. A.* **24**, 3013.—$PhCH(CHPhNO_2)CH_2COC_6H_4OMe$ (K. and Allen, *C. A.* **22**, 1333) on bromination in hot $CHCl_3$ gives a mixt. of *α-anisoyl-α-bromo-β,γ-diphenyl-γ-nitropropane* (I), m. 165°; elimination of HBr by C_5H_5N in boiling EtOH gives 92% of *3,4-diphenyl-5-anisoylisoxazoline oxide* (II), m. 158°; II does not reduce $KMnO_4$ in Me_2CO and is not affected by $Na_2Cr_2O_7$ in boiling AcOH; it liberates I from KI in AcOH and liberates Cl and NOCl when heated with PCl_5. Rearrangement of II by heating for 1 hr. with AcOK in MeOH-AcOH or by shaking I with a mixt. of MeOH, H_2O, NaOH and Et_2O until soln. results and acidifying with AcOH gives *3,4-diphenyl-5-hydroxy-5-anisoylisoxazoline* (III), m. 177°; Na_2O_2 oxidizes it to anisic acid and diphenylisoxazolone; *benzoate*, m. 173°. *α-Anisyl-γ,δ-diphenylbutanetrione oxime* (IV), m. 110° (decompn.), results by the action of alkali on II or III or directly from I if the reaction mixt. is acidified with cold HCl; the yellow IV crystallizes with 1 mol. Et_2O; boiling IV in MeOH with AcOK and AcOH gives III; a drop of HCl added to the $CHCl_3$ soln. gives *2-anisal-3-keto-4,5-diphenylpyrrolenine oxide*, purple, m. 182° (decompn.). The final degradation product of the action of weak bases or dil. alkalies on the above compds. is *3,4-diphenyl-5-anisoylisoazole* (V), m. 156°. With Zn and AcOH II and III give very sparingly sol. substances which are evidently condensation as well as reduction products; V readily combines with 2 atoms of H, giving the carbinol $C_{22}H_{19}O_3N$, m. 146°; oxidation with $Na_2Cr_2O_7$ in AcOH gives V. Hydrogenation with H and Pd of III and IV gives only complex products. Catalytic reduction of II gives a mixt. of 55% VI, 20% of VII, 5% of VIII and 20% of an oil, composed largely of secondary product. *3,4-Diphenyl-5-(α-hydroxy-4-methoxybenzyl)-isoxazoline oxide* (VI), m. 170°, which seps. first from the MeOH soln.; it liberates I from KI and Cl from PCl_5; oxidation with $Na_2Cr_2O_7$ in AcOH gives II; cleavage of VI with KOH in MeOH gives *p*-$MeOC_6H_4CHO$ and *diphenylisoxazole* (IX), m. 91°. The filtrate from VI gives a mixt. of prisms and needles, which were sepd. by hand. The prisms are a *stereoisomer* (VII) of VI, m. 160°, which shows the same behavior as VI. The needles (X) are $PhCH(CHPhNO_2)CH_2COC_6H_4OMe$. Catalytic reduction of VI gives *α,β-diphenyl-γ,δ-dihydroxy-δ-anisylbutylamine*, m. 208°. These results show quite conclusively that the H combines far more rapidly with the CO group than it does with any part of the system C:NO. The structure of IX was established by the action of O_3, the product being hydrolyzed to β-benzil monoxime. Alk. cleavage of IX gives $PhCH_2CO_2H$ and PhCN.
C. J. WEST

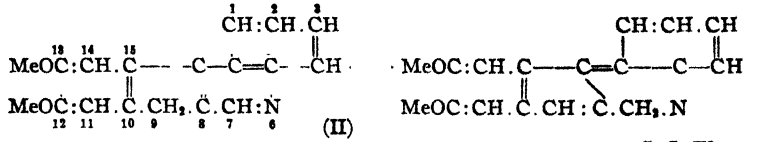
Rotenone. IX. Alkali fusion of some derivatives of rotenone. H. L. HALLER AND F. B. LAFORGE. *J. Am. Chem. Soc.* **52**, 4505–9(1930); cf. *C. A.* **24**, 5038.—Derritol (I), isoderritol, rotenol, dihydroxyrotenonic acid and isodihydroxyrotenonic acid on alkali fusion yield isotubaic acid (II); dihydroderritol Me ether yields dihydrotubaic acid (III); rotenonic acid, as well as several other derivs. of rotenone in which the lactone group is opened by catalytic reduction, did not give II or III on fusion with alkali. Compds. which give II or III contain the lactone group or this group has been opened by hydrolysis. The conclusion is drawn that the HO group resulting from the opening of the lactone ring is necessary for the formation of II or III. The fact that rotenol gives II contradicts the theory that cleavage of the mol. takes place at the ketone group. The nucleus of II does not exist in I as such, but is a secondary decompn. product; perhaps it does not exist in rotenone. **X. Cleavage of derritol and rotenol.** L. E. SMITH AND F. B. LAFORGE. *Ibid* 4595–8.—Methylderritolic acid with $KOH-H_2O_2$ gives a *trimethoxyphenylacetic acid*, m. 93°; this may be the 2,3,5- or 2,3,6-deriv. Oxidation with alk. $KMnO_4$ gives the next lower homolog, a *trimethoxybenzoic acid*, m. 78–80°; *amide*, m. 173°. Dihydrorotenolic acid with $KOH-H_2O_2$ gives the *acid*, $C_{12}H_{14}O_5$, crystg. with 1 mol. H_2O, m. 91–2°, contg. the 2 MeO groups of rotenol; this is named *netoric acid;* it gives no test for a phenol and does not reduce Fehling soln.
C. J. WEST

Stereochemistry of phenylpyridine compounds: The preparation and investigation of 2-(2-carboxy-6-chlorophenyl)pyridine-3-carboxylic acid and 3-(2-carboxyphenyl)-6-phenylpyridine-2,4-dicarboxylic acid. X. CATHERINE CASSELS STEELE AND ROGER ADAMS. *J. Am. Chem. Soc.* **52**, 4528–35(1930); cf. *C. A.* **24**, 5738.—The possibilities of optical isomerism in the phenylpyridines as compared with the diphenyl series is discussed. $8-ClC_{16}H_6NH_2$ by the Skraup synthesis gives 20% of *10-chloro-α-naphthoquinoline* (I), bright yellow, m. 81.5–2°; oxidation of 10 g. I with neutral $KMnO_4$ at 100° gives 5 g. of *2-(2-carboxy-6-chlorophenyl)pyridine-3-carboxylic acid*, m. 252–6°

(decompn.); the following salts were prepd.: *distrychnine*, m. 171–3°, $[\alpha]_D$ —21.37°; *dibrucine*, m. 168–70°; *dimorphine*, m. 200–4°, $[\alpha]_D$ —69.06°; *monocinchonine*, m. 154–6°, $[\alpha]_D$ 75.2°; *dicinchoninine*, m. 194–6°, $[\alpha]_D$ 117.8°; *monoquinine*, m. 152–5°, $[\alpha]_D$ —58.89. Various fractions showed no sign of resolution. α-Phenyl-β-naphthoquinoline-γ-carboxylic acid, m. 290°, on oxidation with $KMnO_4$, gives 74% of *3-(2-carboxyphenyl)-6-phenylpyridine-2,4-dicarboxylic acid* (II), m. 202°; *monostrychnine salt*, did not crystallize readily; *distrychnine salt*, m. 238° (decompn.), $[\alpha]_D$ —8.57°; *dibrucine salt*, m. 225°; *monocinchonine salt*, m. 174–6°, and then with further decompn. at 200–4°, $[\alpha]_D$ 75.26°; these salts appear to exist in only 1 form. II yields a *trichloride*, m. 127–30°; the tri-Bu ester could not be crystd.; the *trimenthyl ester*, which could not be crystd., showed $[\alpha]_D$ —38°.

C. J. West

Synthesis of isoindenoquinolines. I. George R. Clemo and Herbert J. Johnson. *J. Chem. Soc.* 1930, 2133–8.—The present interest in quinoline derivs., particularly as antimalarials, together with the fact that 4-keto-1,2,3,4-tetrahydroquinoline (I) has a local anesthetic action, made it of interest to attempt to convert the latter into isoindenoquinolines (II) with a view of testing the physiol. action. Boiling 5 g. of I with Ac_2O in Et_2O for 18 hrs. gives 5.6 g. of the *1-Ac deriv.* (III), m. 94°. I (5.8 g.) and 6.8 g. of $3,4\text{-}(MeO)_2C_6H_3CHO$ condense in EtOH-NaOH to give 10 g. *4-hydroxy-3-homoveratrylquinoline* (IV), m. 225°; H_2SO_4 gives a faint purple color; bromination in AcOH gives the *6'-bromoveratryl deriv.*, m. 233°. IV (0.5 g.) and 2 cc. concd. H_2SO_4, allowed to stand overnight, give 0.7 g. of the *6'-sulfonic acid*, m. 308° (decompn.); ring closure does not take place. IV (8 g.) in 24 cc. $POCl_3$, heated at 100° for 12 hrs., gives 7.3 g. of the *4-Cl deriv.*, m. 96°; the *methiodide*, orange, m. 208° (decompn.); Br in $CHCl_3$ gives the *6'-Br deriv.*, m. 112°, while in AcOH there results a mixt. of the Br deriv. and the *di-Br deriv.*, light yellow, m. 220° (decompn.); attempted efforts to close the ring failed. I and $3,4\text{-}(MeO)_2C_6H_3CHO$ in AcOH, satd. with dry HCl, give *4-keto-3-veratrylidene-1,2,3,4-tetrahydroquinoline* (V), light red, m. 177–8°; concd. H_2SO_4 gives an intensely magenta soln.; EtOH-NaOH gives IV. III and $3,4\text{-}(MeO)_2C_6H_3CHO$, condensed in AcOH with HCl, give the *1-Ac deriv.* of V, bright yellow, m. 164°; catalytic reduction with Pd charcoal in AcOH gives *4-keto-1-acetyl-3-homoveratryl-1,2,3,4-tetrahydroquinoline*, m. 89°; concd. H_2SO_4 gives an intense reddish brown soln.; the *oxime* m. 208°; heating in 80% H_2SO_4 for 30 min. on the H_2O bath gives a mixt. of 2 forms of *12,13-dimethoxyisoindenoquinoline* (II), very faintly yellow prisms from MeOH, m. 193–4°, and brownish red prisms, in addn. to the yellow form, from C_6H_6, m. 193–4°; both forms give a violet fluorescence in C_6H_6 or Et_2O, while in com. abs. EtOH the fluorescence is intense green, changed to violet on the addn. of a trace of K_2CO_3; concd. HNO_3 gives a non-fluorescent deep yellow soln.; H_2SO_4 and HCl give yellow solns. with intense green fluorescence.



(II)

C. J. West

Friedel and Crafts reaction with 8-hydroxyquinoline. Konomu Matsumura. *J. Am. Chem. Soc.* 52, 4433–6(1930).—8-Hydroxyquinoline (43.5 g.), 25 g. AcCl and 400 g. $PhNO_3$ with $AlCl_3$ at 70° for 12 hrs. give 45% of the *5-Ac deriv.* (I), m. 112–2.5°; $FeCl_3$ gives a green color; *HCl salt*, yellow, m. 284–5° (decompn.); *acid sulfate*, yellow, m. 248° (decompn.); *picrate*, yellow, m. 188–9°; *chloroplatinate*, m. 275° (decompn.); *methiodide*, yellow, m. 210° (decompn.); *oxime* (II), m. 193°. The structure of I was proved by the Beckmann rearrangement of II, which gives 5-acetamido-8-hydroxyquinoline, m. 216–7.5°. The *5-chloroacetyl deriv.* was similarly prepd. in 36% yield and m. 158–9°; $FeCl_3$ gives a green color; reduction with Fe in EtOH-HCl gives I; *HCl salt*, yellow, m. 287° (decompn.); *acid sulfate*, yellow, m. 263° (decompn.); *picrate*, yellow, m. 179°; *chloroplatinate*, yellow, m. 275° (decompn.). The *5-Bz deriv.*, m. 118–9°, results in 77% yield; *HCl salt*, yellow, m. 252–60°; *acid sulfate*, yellow, m. 219–20°; *picrate*, yellow, m. 143–5°; *methiodide*, garnet-colored, m. 199.5° (decompn.); *oxime*, m. 147–8°; the Beckmann rearrangement gives the known 5-BzNH deriv., m. 237–8°. 8-Benzoyloxyquinoline, in 90% yield from BzCl in the cold; *HCl salt*, yellow, m. 124°; no condensation product was obtained with $AlCl_3$.

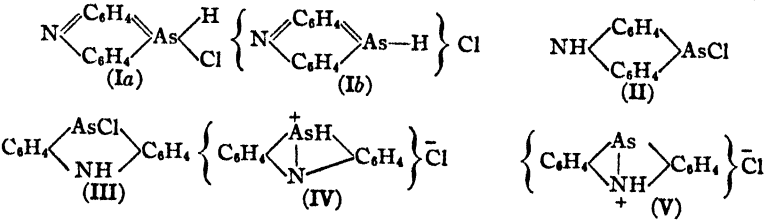
C. J. West

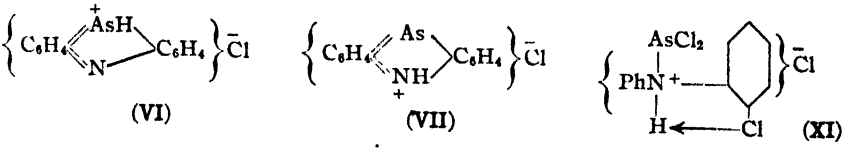
α-Chlorophenazine. FRITZ WREDE AND OSKAR MÜHLROTH. *Ber.* **63B**, 1931–5 (1930).—The surprising ease with which pyocyanine can be synthesized from α-hydroxyphenazine (*C. A.* **24**, 121) made it desirable to study the reaction with other α-substituted phenazines, which hitherto have hardly been available. The intention was to prep. an α-halogen deriv. in which the halogen was afterward to be replaced by other elements and groups. Various attempts to prep. the *α-chlorophenazine* (I) directly by the usual methods failed, nor could it be obtained from the HO compd. with P halides under the most varied conditions. It was finally obtained by a method analogous to that used in synthesizing the MeO compd., *viz.*, by coupling 3-chloro-*o*-quinone (II) with *o*-$C_6H_4(NH_2)_2$. The proposed replacement of the Cl by other substituents met with but little success. The I did not react in the slightest with alkali bromides and iodides or with NH_3 (in H_2O or alc. or in pure liquefied form); with $NaNH_2$ in boiling xylene it gave phenazine but none of the NH_2 deriv.; only with alc. K_2S or KSH at 160° did it give almost Cl-free, S-contg. products which, however, could not be obtained in pure cryst. form and gave no definite products on reduction. 2,3-$(HO)_2C_6H_3Cl$, m. 47°, was obtained in 16 g. yield from 250 g. *o*-$C_6H_4(OH)_2$ slowly treated in dry Et_2O below 5° with 310 g. SO_2Cl_2, and was oxidized to II with Ag_2O in Et_2O. The I (about 3 g. from 6 g. $(HO)_2C_6H_3Cl$), S-yellow, m. 122–3°, mol. wt. in camphor 204.5–219.6, is very slightly basic, dissolves in concd. H_2SO_4 with blood-red color changed to yellow by H_2O, in concd. HCl with orange-yellow color with sepn. of I when dild., is quite stable toward acids and alkalies, is hardly attacked by HNO_3, volatilizes without decompn. under 10 mm. and sublimes with slight decompn. under atm. pressure, is somewhat volatile with steam. *Chloroaurate*, yellow-red, m. about 232° (decompn.); *chloroplatinate*, red-yellow, does not m. 295°; *perchlorate*, golden yellow. C. A. R.

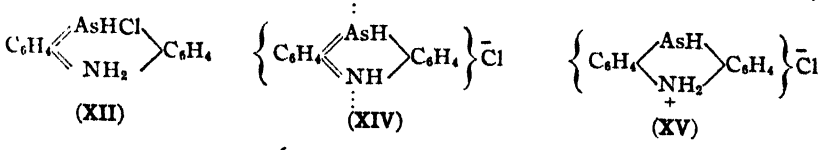
The constitution and properties of 10-chloro-5,10-dihydrophenarsazine and some derivatives. CHARLES S. GIBSON, JOHN D. A. JOHNSON AND (the late) DUDLEY C. VINING. *Rec. trav. chim.* **49**, 1006–35(1930).—Recently Kappelmeier (*C. A.* **24**, 2438) has expressed the view that the constitution of 10-chloro-5,10-dihydrophenarsazine is more adequately expressed by formula I (a or b) than by II (cf. Gibson and Johnson, *C. A.* **23**, 4473). The 1st formal proof that the substance possesses formula II was given by Gibson and Burton (*C. A.* **20**, 1606), who also showed that the original method of prepn. of these phenarsazine derivs. was strictly limited and could not be applied even to the nitro and carboxy compds. (cf. Burton and Gibson, *C. A.* **21**, 1252; Gibson and Johnson, *C. A.* **22**, 400). As to the existence of the *N*-Me deriv. which Wieland and Rheinheimer (*C. A.* **15**, 2633) claimed to have obtained in small quantity by the condensation of Ph_2NMe with $AsCl_3$, Gibson and co-workers were only able to isolate from this reaction a small quantity of 10-chloro-5,10-dihydrophenarsazine (*C. A.* **20**, 1606; **23**, 3446, 4704), while the desired synthesis was also unsuccessful as was also the methylation of the parent compd. The present authors have already shown (*C. A.* **23**, 4473) that the constitution of 10-chloro-5,10-dihydrophenarsazine may be represented by the formulas III, IV, V, VI or VII, the compd. being probably best represented by IV or V, which might be in equil., although no definite proof can be advanced in favor of the trans-annular bond formulas as against the *o*-quinonoid formula. Whereas all tervalent As derivs. in this series are colored except the *N*-acyl derivs., the quinquevalent As derivs. are colorless, unless a chromophoric group is present. Having adopted the trans-annular bond for 10-chloro-5,10-dihydrophenarsazine, it seems clear that the color of this substance must be assocd. with the presence of this bond, since those derivs. in which the presence of this bond is precluded, such as the *N*-acyl derivs., are colorless. It is therefore necessary that 2 types of derivs. be assumed, those without the trans-annular bond (the "true dihydrophenarsazines" according to Kappelmeier, *l. c.*) and those with the trans-annular bond, which are salts. The structure III may be preserved by acetylation of the H atom of the NH group or this H atom may be bound to the N by its forming part of a chelate ring, provided a suitable group is present, as, *e. g.*, the NO_2 in the 4-position. If 10-chloro-5,10-dihydrophenarsazine does not contain the NH group, it must be capable of reacting in this form since the *N*-acyl derivs. are so readily formed by the usual reactions. From the formulas IV and V and from the formulas VI and VII the former are to be preferred since As displays a remarkable tendency to pass into the "onium" condition; then the 10-Cl compd. must have a formula which allows of the free migration of the H atom from N ⟷ As. If the N and As are intimately connected this wandering will be facilitated and this is an important reason for the adoption of the trans-annular bond formula. On prepg. 10-chloro-5,10-dihydrophenarsazines from substituted diphenylamines and $AsCl_3$, the formation of an addn. compd. is often observed (change of color and evolution

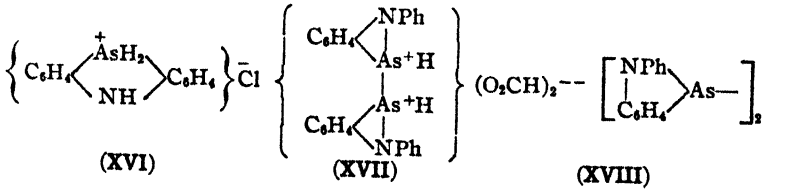
of heat on simple mixing). It was now found that the following compds. condense: Ph_2NH, *o-*, *m-* and *p*-MeC_6H_4NHPh, 2,4′-, 2,3′-, and 4,4′-$MeC_6H_4NHC_6H_4Me$, *α-* and *β*-$C_{10}H_7NHPh$, $(\alpha\text{-}C_{10}H_7)_2NH$, $(\beta\text{-}C_{10}H_7)_2NH$, *p*-tolyl-*α-* and *β*-naphthylamine, *m-* and *p*-$H_2NC_6H_4NHPh$, *m-* and *p*-ClC_6H_4NHPh, 4,4′-, 3,4- and 3,5-dichlorodiphenylamine, $(p\text{-}PhNHC_6H_4)_2$, $(p\text{-}4\text{-}MeC_6H_4NHC_6H_4)_2$, *m-* and *p*-$C_6H_4(NHPh)_2$, and $(p\text{-}HOC_6H_4)_2NH$. No condensation was obtained with: Ph_2NMe, *o*-$H_2NC_6H_4NHPh$, *o-*, *m-* and *p*-$O_2NC_6H_4NHPh$, 4,4′-, and 2,4-diaminodiphenylamine, $(p\text{-}O_2NC_6H_4)_2NH$, *o*-$ClC_6H_4NHPh$, 2,4- and 2,5-$Cl_2C_6H_3NHPh$, $(2,4\text{-}Cl_2C_6H_3)_2NH$, $(2,4\text{-}Br_2C_6H_3)_2NH$, Ph_2NAc, $HCONPh_2$, Ph_2NBz, *o*-$C_6H_4(NHPh)_2$ and dicyclohexylamine. The halo-diphenylamines fall into 2 classes, those with at least 1 halogen atom in the *o*-position to the NH group, which do not condense, and those which have not and which do condense with $AsCl_3$. Nitro derivs. as a rule do not condense and the compds. which do react all possess alkyl or phenylene substituting groups; the absence of a reaction is sometimes to be ascribed to steric hindrance. As a working hypothesis for the mechanism of the condensation the scheme $\{Ph_2\overset{+}{N}H(AsCl_2)\}\bar{C}l$ (VIII) ⟶ Ph_2NAsCl_2 (IX) ⟶ IV is accepted, a N-As bond being formed in the first stage of the reaction. A nitro group, in virtue of its strongly negative character, would prevent the formation of the primary compd. and a *N*-acyl group would act similarly. The absence of a condensation reaction when at least one Cl atom is present in the *o*-position to the NH group is ascribed to the formation of a chelate ring (XI). The red color of the soln., obtained by Wieland and Rheinheimer (*l. c.*) by the reduction of 10-chloro-5,10-dihydrophenarsazine with Zn in AcOH disappeared on further reduction and reappeared on addn. of the starting product; it was therefore suggested that the completely reduced soln. contains the compd. XII, while the colored soln. contains the quinhydrone substance XIII (= III + XII). Razuvaev, however, considers these colored compds. to be of the meriquinonoid type XIV (*C. A.* **23**, 3708, 4474; **24**, 1114, 2132). The existence of such a compd. having an odd no. of valency electrons in the mol. must for the present be considered doubtful. Neither is the formula XII in accordance with modern views on quinquevalent N and it is suggested that the formula of the completely reduced substance should be represented by XV or XVI, the absence of color being due to the absence of the trans-annular bond. In an attempt to isolate the deeply colored reduction product of 10,10′-oxybis(5,10-dihydrophenarsazine) a soln. of this compd. in HCO_2H was allowed to stand for several days in a closed flask. Amorphous material first sepd. and, later, dark reddish brown prisms (substance A) in moderate yield, m. 320°. This substance dissolves in *cold* HCO_2H with a crimson color and, on warming with AcOH, yields 10-aceto-5,10-dihydrophenarsazine. On heating A in air it loses HCO_2H with the formation of a yellow residue (substance B) which has the same compn. as 10,10′-bis(5,10-dihydrophenarsazine) and which reacts with Br to give 10-bromo-5,10-dihydrophenarsazine. On hydrolysis substance A gives 2 different oxy-compounds, depending on the conditions of the hydrolysis. On boiling with a mixt. of EtOH and concd. NH_4OH is obtained cream-colored 10,10′-oxybis-(5,10-dihydrophenarsazine), which dissolves in cold HCO_2H with an orange color, becoming crimson on warming, while on shaking with acetone and NH_3 for 30 min. a lemon-yellow oxide is pptd. which dissolves in cold HCO_2H with the immediate production of a crimson color. In the former case aerial oxidation would appear to have taken place, while in the latter case a new oxy compd., $C_{24}H_{20}ON_2As_2$, is formed which is converted into the ordinary oxy compd. by boiling in alc. in an open vessel, oxidation taking place. On allowing substance B in HCO_2H to stand for several days, the crimson color gradually fades and a brilliant scarlet compd. (C) gradually seps., which, on treatment with hot alc.-NH_3 is converted into ordinary 10,10′-oxybis(5,10-dihydrophenarsazine). In view of the fact that on boiling of the HCO_2H soln. the latter substance is completely reduced to $HCONPh_2$ and As_2O_3 (Razuvaev, *l. c.*) it would appear that the As-C linking is not very strong and in connection with this fact the formulas XVII, XVII and XIX are suggested for the substances A, B and C and formula XX for the new oxy deriv. The color of partly reduced solns. of dihydrophenarsazine is explained by assuming the presence of substance A or of its ion. *2,4-Dinitrodiphenylamine-6′-arsonic acid*, m. 223–50, was pred. on boiling 2,4-$(O_2N)_2C_6H_3Br$, *o*-$H_2NC_6H_4AsO_3H_2$, K_2CO_3 and a trace of Cu powder in AmOH during 5 hrs. On treating this acid in a boiling mixt. of EtOH, concd. HCl and a trace of I with SO_2, it is converted into *2,4-dinitrodiphenylamine-6′-dichloroarsine*, m. 151–2°. In the same way *4-hydroxydiphenylamine-6′-arsonic acid*, m. 197–8° (vigorous decompn.), was prepd. from *p*-BrC_6H_4OH and *o*-$H_2NC_6H_4AsO_3H_2$. The methods given in the literature for the prepn. of 2,4-$(H_2N)_2C_6H_3NHPh$ giving unsatisfactory results, this compd. was prepared by

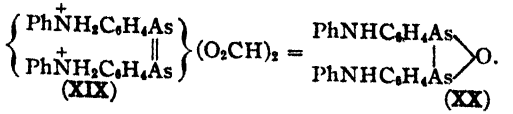
reduction of 2,4-$(O_2N)_2C_6H_3NHPh$ with Fe fillings and AcOH in 50% EtOH. *m-Bromophenylarsonic acid*, prepd. by the Bart reaction from *m*-$BrC_6H_4NH_2$, m. 180–1°; for details the original paper is to be consulted. This acid was converted into *m-bromophenyldichloroarsine*, b_{18} 165°, on treating in hot concd. HCl, contg. a trace of HI, with SO_2. Attempts to condense Ph_2AsCl with MeEt malonate were unsuccessful, Ph_2AsO_2H being obtained. On refluxing Ph_2AsO_2H in $SOCl_2$ for 4 hrs., the acid is transformed into *diphenylarsine trichloride;* for the same reaction with $PhAsO_3H_2$ the $SOCl_2$ is to be purified by distn. over white beeswax and to be dild. with benzene, the reaction being too vigorous without diln. With the precautions mentioned in the original paper, $HCl.NH(C_6H_4)_2AsCl_3$, m. 105–6° in a sealed tube, is obtained. The action of HCl on 10-chloro-5,10-dihydrophenarsazine at high temps. gives appreciable quantities of $AsCl_3$ and Ph_2NH. On refluxing a benzene suspension of 10,10′-thiobis(5,10-dihydrophenarsazine) with $Hg(CN)_2$ for 6 hrs., this compd. is transformed into *10-cyano-5,10-dihydrophenarsazine*, m. 223–4°. The action of HF on











the 10-Ac compd. in AcOH gave a yellow microcryst. material, contg. AcOH of crystn. and having the compn. $[NH(C_6H_4)_2AsF]_2.AcOH$, m. 285–7°; in the same way *10-aceto-5,10-dihydrophenarsazine picrate*, m. 170–4°, was prepd. On *rapidly* cooling a satd. soln. of 10-iodo-5,10-dihydrophenarsazine in benzene, a mol. compd. with benzene seps. in highly colored red scales with a green reflex. *10-Thiocyano-5,10-dihydrophenarsazine*, m. 238–40°, may be obtained from the Cl compd. and KCNS; from low-boiling solvents it usually crystallizes in yellow needles and from high-boiling solvents as a mixt. of yellow and red needles, while from *o*-$C_6H_4Cl_2$ and CCl_4 only red needles are obtained. All these different prepns. melt at the same temp. The Cl compd. reacts with Ag_2SO_4 in EtOH to give *10,10′-sulfato-bis(5,10-dihydrophenarsazine)*, which, however, could not be sepd. from the AgCl formed simultaneously; on the other hand the 10-Ac compd. is converted into 2 sulfates on treatment in boiling AcOH soln. with

concd. H_2SO_4. The bright red sulfato deriv. seps. from the boiling soln. while the more sol. yellow compd. is obtained on cooling. There may be a fundamental difference between these 2 forms since the red compd. gives an intense crimson color on warming with HCO_2H while the yellow form gives no color with this reagent. When 10,10′-oxybis(5,10-dihydrophenarsazine) in C_6H_6 is treated with Cl_3CCO_2H, *10-trichloroaceto-5,10-dihydrophenarsazine*, m. 159–60°, is obtained in pale green plates. From the 10-Ac compd. and anhyd. $(CO_2H)_2$ in AcOH, *10,10′-oxalatobis(5,10-dihydrophenarsazine)* was prepd., m. 295–300°. *10-Formo-5,10-dihydrophenarsazine*, m. 315–20°, is obtained from the 10,10′-oxy compd. and boiling HCO_2H; on heating this compd. in air at 110° for some time, the oxide **XX** is formed. The expts. on the substances A, B and C, already described briefly, are described in detail, for which reference is made to the original paper. On boiling the solution of 10,10′-oxybis(5,10-dihydrophenarsazine) for 10 min., *10,10′-bis(5,10-dihydrophenarsazine)* is formed by reduction. *Phenyl-α-pyridylamine* could not be prepd. according to Chichibabin (*J. Russ. Phys.-Chem. Soc.* 50, 497(1920)) from α-aminopyridine and PhBr, but with PhI the reaction proceeds readily. The product, however, shows an indefinite m. p. and it is therefore suggested that the phenylation of α-aminopyridine leads to phenyl-α-pyridylamine as well as to *N*-phenyl-α-pyridoneimide. While phenyl-α-pyridylamine does not condense with $AsCl_3$ in o-$C_6H_4Cl_2$, di-α-pyridylamine, when treated in the same way, gives a small yield of a microcryst. powder, which does not belong to the dihydrophenarsazine type and which was not investigated further. The reaction between $PhAsCl_2$, $AlCl_3$ and $ClCH_2COCl$ in CS_2 only gives $PhCOCH_2Cl$, de-arsenication having taken place.

C. F. VAN DUIN

Strychnine alkaloids. V. Degradation experiments with dihydrobrucine. HEINRICH WIELAND AND WALTER GUMLICH. *Ann.* 482, 50–5(1930); cf. *C. A.* 24, 4046.—Dihydrobrucine, warmed with 1:1 HNO_3 at 50° for 0.25 hr., gives *dihydrocacotheline nitrate*, $C_{21}H_{23}O_7N_3 \cdot HNO_3$, yellow-red, in almost quant. yield; Br in HBr on the H_2O bath gives the *dihydro acid*, $C_{19}H_{24}O_6N_2$, whose *IIBr salt* is obtained in 30% yield; the free acid shows $[\alpha]_D^{23}$ —2.9° (1.04% aq. soln.); catalytic reduction gives quant. the *tetrahydro acid*, $C_{19}H_{26}O_6N_2$, $[\alpha]_D^{23}$ 17.7° (2.09% aq. soln.). *Dihydrobrucine methiodide*, crystg. with 1 mol. H_2O, m. 290° (decompn.), results by the use of MeI or of Me_2SO_4 followed by KI; the free base forms a strongly alk. aq. soln., from which the base seps. as pale yellow scales; heating at 176° causes a marked change in the base but no volatile base is formed. Heating dihydrobrucine with MeONa for about 20 min. gives 30–5% of the *hydrate*, $C_{23}H_{30}N_2O_5$, pale yellow, m. 240° (decompn.), $[\alpha]_D^{28}$ —183.7° (0.1117 g. in 4.2317 g. $CHCl_3$), contg. 1.3 atoms active H; *methiodide*, bright yellow, does not m. 290°; Ag_2O gives a strong base, decompg. about 240°; the *HCl salt* appears to crystallize with 1 mol. H_2O.

C. J. WEST

Chellol glucoside. PAUL FANTL AND SALEM IBRAHIM SALEM. *Biochem. Z.* 226, 166–79(1930).—The alc. extn. of the seeds of the umbelliferous plant *Ammi visnaga* yields about 3 g. per kg. of a substance which m. sharply 175° and has been identified as a glucoside that on acid hydrolysis gives $C_6H_{12}O_6$ and $C_{13}H_{10}O_6$. It gives a single mono-Ac compd. and still contains the lactone O, judged by the yellow color it develops with concd. HCl. On hydrolysis with alkali it yields a compd. $C_{11}H_{10}O_4$, which is in combination with an acid identical with Fischer's *d*-glucosidoglycolic acid. The former product of the alk. hydrolysis contains a MeO group, is sol. in strong alkali from which it can be pptd. by acid, even CO_2. It gives an intense green color with $FeCl_3$ which indicates the probable presence of a phenolic OH group. It also contains one C:O group which can be demonstrated with NH_2OH. Three structural formulas are suggested for the glucoside, and their merits are discussed.

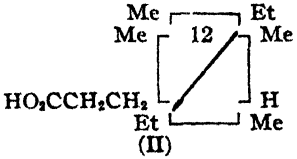
S. MORGULIS

Picrocrocin, the bitter principle of safran. H. E. W. LUTZ. *Biochem. Z.* 226, 97–128 (1930).—In acid hydrolysis of picrocrocin no CO_2 is formed in appreciable amts., but HCHO has been identified. The mol. wt. of the picrocrocin is 324.2, and the formula for its semicarbazone $C_{11}H_{17}ON_3$, m. 172.6°, has been corroborated. The safran camphor $C_{10}H_{14}O$ can be hydrogenated in the presence of Pt oxide to an odorless deriv. $C_{10}H_{16}O$, thus showing that it contains a double bond. From considerations of mol. wt. detns. on picrocrocin it seems probable that the glucoside contains only a single mol. of *d*-glucose. From the data of the elementary analysis, mol. wt. detns. and of the hydrolysis of the picrocrocin which yields a mol. of camphor $C_{10}H_{14}O$, a mol. of *d*-glucose, and HCHO it is suggested that the formula $C_{17}H_{28}O_8$ best fits the known facts.

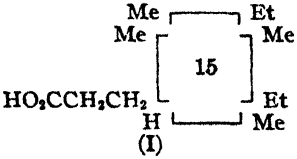
S. MORGULIS

Syntheses of porphyrins. XXXI. Syntheses of further pyrroporphyrins. H. FISCHER AND HERBERT BERG. *Ann.* 482, 189–213(1930); cf. *C. A.* 24, 5762.—Al

though the pyrroporphyrin obtained from the degradation of cellulose, transformed into the monopropionic acid, has been shown by synthesis to be pyrroporphyrin 15 (I) (cf. table in *Ann.* **473**, 213), it seemed of interest to synthesize the isomeric *pyrroporphyrin 12* (II). 2-Carboxy-3-methyl-4-bromo-5-formylpyrrole (2.1 g.) and 1 g. cryptopyrrole, stirred with 1 cc. AcOH and the solid mass treated with 2 cc. 48% HBr, give 3 g. of *4,3',5'-trimethyl-4'-ethyl-3-bromo-5-carboxypyrromethene-HBr*, orange, decomps. above 130°; the free base is easily decompd.; Br in HCO_2H in the cold gives *4,3',5'-trimethyl-4'-ethyl-3,5-dibromopyrromethene-HBr* (III), steel-blue from AcOH, Cu-colored needles from Me_2CO, decomps. 175°. III (5.5 g.) and 4.5 g. 3,5,3'-trimethyl-4-ethyl-4'-propionic acid-5'-bromopyrromethene-HBr, intimately mixed and added to 20 g. pyrotartaric acid at 130°, then heated gradually to 150° during 1.25–1.5 hrs. give II and the *Br deriv.* (IV), sepd. by fractional extn. from EtOH by 2.5% HCl (II) and 10% HCl (IV); the yield is about 10%.

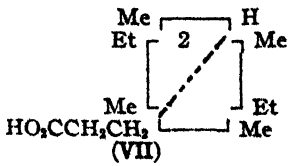


(II)

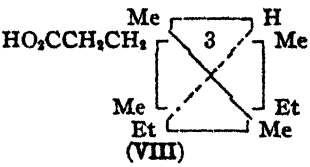


(I)

II has an acid no. of 1.3. Excess AcOH-$Fe(OAc)_2$, followed by NaCl, gives *pyrrohemin 12*, $C_{31}H_{32}O_2N_4FeCl$, steel blue. II with MeOH-HCl gives a *Me ester*, m. 242° (cor.); the *hemin*, $C_{32}H_{34}O_2N_4FeCl$, bluish black, m. 260° (cor.). IV has an acid no. of 7.5. The spectra of II and IV are identical with those of the corresponding derivs. of I. *Cu salt*, $C_{31}H_{31}O_2N_4BrCu$, red needles; *Me ester*, m. 304° (cor.), acid no. 9 (*Cu salt*, red needles, m. 259° (cor.)). 4,3',5'-Trimethyl-3-ethyl-4'-bromo-5-carboxypyrromethene-HBr with Br in HCO_2H gives *4,3',5"-trimethyl-3-ethyl-5,4'-dibromopyrromethene-HBr* (V), green leaflets, blackens at 215°. 2-Carboxy-3-methyl-4-ethyl-5-formylpyrrole and cryptopyrrolecarboxylic acid in a little EtOH, treated with 48% HBr, give *3-ethyl-4,3',5'-trimethyl-5-carboxy-4'-propionic acid-pyrromethene-HBr*, yellowish red, decomps. 170°; warming in AcOH-Br at 70° gives *3-ethyl-4,3',5'-trimethyl-5-bromo-4'-propionic acid-pyrromethene-HBr* (VI), cinnabar-red, decomps. 216°. Heating a mixt. of V and VI with pyrotartaric acid at 130° gives 10% of pyrroporphyrin 2 (VII), acid no. 1.3; the *hemin*, $C_{31}H_{32}O_2N_4FeCl$, forms dark blue tablets; *Me ester* of VII, m. 229° (cor.); its *hemin*, black-blue, m. 265°. The *bromopyrroporphyrin 2*, which is also formed, crystallizes in red rods; its acid no. is 7.5; *Cu salt*, red needles; *Me ester*, m. 291° (*Cu salt*, red, m. 235° (cor.)). 4,3',5'-Trimethyl-3-ethyl-5-bromo-4'-propionic acid-pyrromethene-HBr and III give a mixt. of *pyrroporphyrin 3* (VIII) and the *Br deriv.* (IX). VIII gives a *Me ester*, m. 219° (cor.). The corresponding *hemin* crystallizes in black-blue rods; its *Me ester*, black-blue, m. 274° (cor.). IX yields a *Cu salt*, red needles; *Me ester* m. 254° (cor.) (*Cu salt*, red, m. 230° (cor.)).



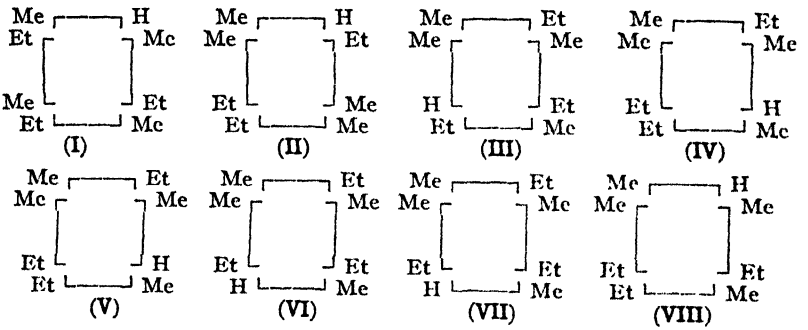
(VII)



(VIII)

2-Carboxy-3-methyl-4-propionic acid-5-formylpyrrole and 2,4-dimethylpyrrole with AcOH and HBr give *4,3'5'-trimethyl-3-propionic acid-5-carboxypyrromethene-HBr*, red, m. 168°; with 3,4'-diethyl-4,3'-dimethyl-5-bromo-5'-bromomethylpyrromethene-HBr there results VIII. The HCl mother liquors from the synthesis of II and VIII are neutralized with NaOH, extd. with Et_2O, washed with H_2O and 10% NaOH and shaken with 5% HCl, which removes *deuteroetioporphyrin* II (X), acid no. 1.75, while 10% HCl exts. the *Br deriv.*, red, acid no. 8 (*Cu salt*, red needles); X forms a *hemin*, bluish black. Heating VI at 130° with pyrotartaric acid and raising the temp. to 170° during 15 min. gives 15% of mesoporphyrin II (XI), whose Me ester m. 228°. Hemopyrrolecarboxylic acid aldehyde and opsopyrrole in EtOH give *3-propionic acid-4,5,3'-trimethyl-4'-ethylpyrrolemethene-HBr*, brown, decomps. 178°; the *5'-Br deriv.*, deep red, decomps. 204°. This likewise gives XI on heating with pyrotartaric acid. 3,5,3'-Trimethyl-4-ethyl-4'-propionic acid-pyrromethene-HBr and MeOK, heated 1.5 hrs. at 180–5° in a bomb tube, give coproporphyrin I, whose Me ester m. 248°. XXXII.

Introduction of the hydroxymethyl, the methyl malonacid and the propionic acid residues into porphyrins. H. FISCHER AND HANS-JOACHIM RIEDL. *Ibid* 214–25.—Deuterohemin (2 g.) in 200 cc. $ClCH_2OMe$ and 15 cc. $SnCl_4$ (added during 5 min. to the cooled soln.), allowed to stand 10 min. at room temp. gives quant. the *FeCl deriv.* of *1,3,5,8-tetramethyl-6,7-dipropionic acid-2,4-dihydroxymethylporphin*, which, crystd. from AcOH, contains 1 Ac group; sapon. occurs during the reaction, for the test for the MeO group is negative. With AcOH-HBr at 40° the Fe is removed; the residue with MeOH at 50° gives the *ether ester* (I), $C_{36}H_{42}O_6N_4$, m. 202° (a 2nd sample m. 215°; the lower-melting form, on standing several months, m. 212°); total reduction of I with AcOH-HI and PH_4I gives 2,3,4-trimethylpyrrole. I gives an *iron salt*, m. 241°. I and AcOH-HBr in a sealed tube at room temp. for several days give *dibromomethyl-deuteroporphyrin-HBr*, very hygroscopic prisms. The Br deriv. from 0.2 g. I and 8 cc. AcOH-HBr in 90 cc. dry Me_2CO, shaken with $CHK(CO_2Et)_2$ from 2 g. acid, gives 0.25 mg. of *1,3,5,8-tetramethyl-2,4-di(methyl malonate)-6,7-dipropionic acid-porphin*, m. 202°; the *Et ester* m. 161°; the spectra of the 2 esters are identical. The *Fe salt* of the Me ester sinters 165°, m. 200°. **XXXIII. Syntheses of pyrroetioporphyrins I, II, III, IV, VI and VIII and of a dimethyldiethylporphin.** H. FISCHER AND ANTON SCHÖRMULLER. *Ibid* 232–51.—There are 8 isomeric pyrroetioporphyrins, of which V and VII have been previously synthesized (*C. A.* **23**, 5191; **24**, 4048). A mixt. of



4,3',5'-trimethyl-4'-ethyl-3-bromo-5-carboxypyrromethene-HBr and 3,4'-dimethyl-4,3'-diethyl-5-bromomethyl-5'-bromopyrromethene-HBr, heated with succinic and pyrotartaric acids 45 min. at 145–50°, the resulting product dissolved in AcOH-HCl, poured into a large vol. of Et_2O and extd. with 3.5% HCl to remove the etioporphyrin and then with 10% HCl, gives the *Br deriv.* of I; the Br is removed by dissolving in C_5H_5N and EtOH-KOH, adding Pd-$CaCO_3$ and $N_2H_4 \cdot H_2O$ and heating 45 min. on the H_2O bath; I m. 335°. The *Br deriv.* of III results from the methene of brominated hemopyrrole and the brominated methene from 2,4-dimethyl-5-formylpyrrole and opsopyrrole; the *Cu salt* forms red needles, m. 323° (decompn.); III m. 330°. 2,3-Dimethyl-5-formylpyrrole and hemopyrrole with HBr in EtOH give a good yield of *4,5,4',5'-tetramethyl-3'-ethylpyrromethene HBr* (IX), orange with green surface luster, m. 230° (decompn.); with 4,4'-dimethyl-3,3'-diethyl-5,5'-dibromopyrromethene-HBr, this yields II (1,4,5,8-tetramethyl-3,6,7-triethylporphin), m. 330–2°; *Cu salt*, scarlet-red needles, m. 263°. 3,3'-Dimethyl-4,4'-diethyl-5,5'-dibromopyrromethene-HBr and IX give IV (1,3,5,8-tetramethyl-2,6,7-triethylporphin), needles, m. 327°; *Fe salt*, black leaflets, slowly decomps. about 330°; *Cu salt*, rods, m. 333°. Pyrrole-α-aldehyde (X) and cryptopyrrole in AcOH-HBr give *3,5-dimethyl-4-ethylpyrromethene-HBr*, yellow, m. 193° (decompn.); Br in AcOH gives the *di-Br deriv.*, darkens 200°, does not m. 300°; heating with succinic and pyrotartaric acids at 190–210° for 30 min. gives *1,5-dimethyl-2,6-diethylporphin* (XI), m. 310°, acid no. 3. X and hemopyrrole give *4,5-dimethyl-3-ethylpyrromethene-HBr*, reddish yellow, m. 197°; *di-Br deriv.*, m. 145°; heating with the acid mixt. gives XI; the *hemin* forms black-violet rods (*Cu salt*, needles, m. 312°). The action of oleum on XI is discussed and the spectra of the products are given. Furfural and cryptopyrrole in Et_2O-HBr give a *methene-HBr*, green, m. 157° (decompn.). Thiophene-α-aldehyde gives the *methene-HBr*, $C_{13}H_{16}NSBr$, yellow, m. 133°, which could not be brominated. 2,4-Dicarbethoxy-3-methyl-5-formylpyrrole and $CH_2(CO_2H)_2$ in EtOH-$PhNH_2$, heated 15 hrs. on the H_2O bath give *2,4-dicarbethoxy-3-methylpyrrole-5-acrylic acid*, m. 244°; reduction with Na-Hg gives the propionic acid, m. 209°. *3,5-Dicarbethoxy-4,3',5'-trimethyl-4'-ethylpyrro-*

methene-HBr, brownish yellow, m. 160–2°; the free *base* forms reddish yellow needles, m. 107°. *2,5-Dicarbethoxy-4,3',5'-trimethyl-4'-propionic acid-pyrromethene HBr*, yellow, m. 137–8° (decompn.). C. J. WEST

Zymosterol. II. F. REINDEL AND A. WEICKMANN. *Ann.* **482**, 120–9(1930); cf. *C. A.* **24**, 624.—Crude zymosterol acetate, contg. ergosterol, is treated in Et_2O with Br and $AcOONH_4$ in AcOH, giving *zymosterol acetate dibromide* (I), m. 168–9° (cor.), $[\alpha]_{5461}$ —9.7° (*c* 1.119), which can be crystd. only from indifferent solvents. Sapon. gives the *dibromide*, m. 157–8°, $[\alpha]_{5463}$ 7.1° (*c* 0.418). The Br may be removed from I by Zn and AcOH at room temp., giving the acetate, m. 102–4°, $[\alpha]_D$ 33.6°, $[\alpha]_{5462}$ 38.9° (*c* 1.119); this is sapond. to free zymosterol (II), m. 107–10°, crystg. with 1 mol. H_2O, $[\alpha]_D$ 52.2°, $[\alpha]_{5463}$ (*c* 1.063); *benzoate*, m. 125–7°, clears at 130°, $[\alpha]_D$ 44.6°, $[\alpha]_{5463}$ 51.5° (*c* 1.001); the ultra-violet absorption curve of pure II is given. II in abs. EtOH is unchanged after being subjected to the action of ultra-violet light for 2 hrs.; a crude sample contg. ergosterol shows a marked increase in rotation after the action of the light for periods from 1 to 8 hrs. α-Dihydrozymosterol with HCl in $CHCl_3$ gives a *β isomer*, m. 99–100°, $[\alpha]_{5463}$ 32.1° (*c* 0.430), which is pptd. by digitonin; the Ac deriv. m. 74–5°; catalytic reduction gives *zymostanol*, m. 139–40°, crystallizes with 2 mols. H_2O and is pptd. by digitonin, $[\alpha]_{5463}$ 20.6° (*c* 0.241); *acetate*, m. 130–1°, crystals with 1 mol. MeOH. Oxidation of II with CrO_3-AcOH gives *zymostadienone*, m. 162–4° (cor.); *oxime*, m. 238–40° (cor.). C. J. WEST

Stigmasterol and its empirical formula. HÅKAN SANDQVIST AND J. GORTON. *Ber.* **63B**, 1935–8(1930).—On the basis of analyses of degradation products, Windaus and Brunken concluded that stigmasterol (I) has the compn. $C_{30}H_{50}O$, while S. and G.'s analyses of the I, its acetate (II) and acetate tetrabromide (III) point to the compn. $C_{29}H_{48}O$. Of the published analyses of its halogenated derivs., many agree better with the C_{30}- and some with the C_{29}-formula. The mol. wt. (432) for II in $C_{10}H_8$ found by Windaus and Hauth does not serve to establish which of the 2 formulas is correct (calcd. mol. wts. 468 and 454, resp.). Attempts to det. the mol. wt. in camphor by Rast's method gave values which varied tremenduously, the av. being about 471. The di-CO_2H acid obtained from I has the compn. $C_{30}H_{52}O_4$ (equiv. wt. 238) or $C_{29}H_{50}O_2$ (equiv. wt. 231); W. and B. by titration found 231, and S. and G. by the quant. sapon. method applied by Vesterberg and Vesterberg to betulin found for II, as the av. of 4 concordant titrations of II, an equiv. wt. of 452.3 (calcd. for $C_{31}H_{50}O_2$, 454.4). This seems to establish the C_{29}-formula for I. The III m. 202–3° (cor., decompn.), $[\alpha]_D$ —40° ($CHCl_3$, *p* 5). II m. 144.0–4.6°, $[\alpha]_D$ —55.0°. I, m. 169–70°, $[\alpha]_D^{22}$ —51.0° (*p* 4.8). C. A. R.

Synthesis of nervonic acid. J. B. HALE, W. H. LYCAN AND ROGER ADAMS. *J. Am. Chem. Soc.* **52**, 4536–9(1930).—Synthesis has shown that nervonic acid (Klenk, *C. A.* **19**, 2695; **21**, 44) is the *cis*-form of erucylacetic acid. Erucyl bromide and $CHNa(CO_2Et)_2$ give 78% of *Et erucylmalonate*, $b_{0.001}$ 203–7°; hydrolysis and heating to 175° give erucylacetic acid or nervonic acid; fractional crystn. gives the *cis*-form (I), m. 39–9.5°, and the *trans*-form (II), m. 61°. I is identical with Klenk's acid. I is transformed into II by melting over dil. HNO_3. Reduction of either I or II gives tetracosanoic acid (III), m. 83–4°. A mixt. of I and II gives an *Et ester* b_1 233–4°; reduction gives the Et ester of III, m. 55–6°. C. J. WEST

Sterols of yeast. II. HEINRICH WIELAND AND G. A. C. GOUGH. *Ann.* **482**, 36–49(1930), cf. *C. A.* **23**, 4948.—In continuing the examn. of the sterol fraction of yeast, the following new products have been isolated. *Episterol*, $C_{27}H_{44}O$, m. 135–6°, $[\alpha]_D^{20}$ 6.2° (0.0376 g. in 2 cc. $CHCl_3$), takes up 1 mol. of H_2O on standing in the air 1 month, *Bz deriv.*, m. 161–3°, $[\alpha]_D^{20}$ 11.8° (0.0436 g. in 2 cc. $CHCl_3$). *Anasterol*, m. 157–9°; $[\alpha]_D^{25}$ —8.1° (0.030 g. in 2 cc. $CHCl_3$); *benzoate*, m. 180–2°, $[\alpha]_D^{24}$ —13.8° (0.030 g. in 2 cc. $CHCl_3$). A product, m. 105° (decompn.), contg. much zymosterol, on crystn. from EtOH, transformation into the benzoate and further crystn. from Me_2CO, gives a *benzoate*, m. 158–60°, $[\alpha]_D^{27}$ —4.4° (0.1144 g. in 5 cc. $CHCl_3$), of a *sterol*, m. 144–6°, $[\alpha]_D^{25}$ —33.8° (0.0266 g. in 2 cc. $CHCl_3$). The mother liquor of this sterol gives *hyposterol*, m. 100–2°, $[\alpha]_D^{20}$ 12.5° (0.0385 g. in 2 cc. $CHCl_3$); *benzoate*, m. 119–21°, clears 138°, $[\alpha]_D^{25}$ 19.1° (0.0812 g. in 5 cc. $CHCl_3$); *p-nitrobenzoate*, m. 154–5°, clears 180°, $[\alpha]_D^{27}$ 26.7° (0.1068 g. in 5 cc. $CHCl_3$); *dihydro deriv.*, m. 123–5°, $[\alpha]_D^{21}$ 31.2° (0.0256 g. in 2 cc. $CHCl_3$). The Salkowski, Liebermann-Burchard and Tortelli-Jaffe color reactions are given by ergosterol, zymosterol, anasterol, episterol, hyposterol and the sterol, m. 144–6°. Absorption spectra are also given. C. J. WEST

Montignie's isomer of cholesterol, and the effect of heat on cholesterol. YOSHIO KAISHIO AND JOHN ADDYMAN GARDNER. *Biochem. J.* **24**, 1047–50(1930).—K. and G.

could not confirm Montignie's claim (*C. A.* **24**, that he had prepd. a new isomer of cholesterol. BENJAMIN HARROW

Degradation acid of ergosterol. FRITZ REINDEL AND KARL NIEDERLÄNDER. *Ann.* **482**, 264–79(1930).—Oxidation of 10 g. ergosterol by 150 cc. HNO_3(d. 1.4) by gently boiling about 100 hrs. gives up to 2.5 g. of an *acid*, $C_8H_8O_6$ (I), best freed from the accompanying NO_2 compds. by extn. of the cold satd. aq. soln. with 2 vols. Et_2O, cooking with charcoal and pptg. the acid with HCl or by sublimation at 0.01 mm. Hg at 150–200°, or heating with a little Ac_2O and decompg. the anhydride with 10% NaOH; I crystallizes with 1.5 mols. H_2O, m. 268°; it contains 3 atoms active H; the Na and K salts are difficultly sol. in H_2O; the acid $PhNH_2$ salt, slightly sol. in MeOH, is characteristic. The *anhydride* is formed as above and m. 268°. Attempts to split off the CO_2 groups gave the anhydride or caused total decompn. of the acid. I is stable toward all oxidizing agents but CrO_3-H_2SO_4, which completely oxidizes it. I cannot be catalytically reduced. The *acid $PhNH_2$ salt*, $C_8H_8O_6.2PhNH_2.2H_2O$, m. 300°; the *trianilide* m. over 300° and forms a *mol. complex* with $PhNH_2$, brick-red, m. above 300°. I in abs. MeOH, treated with dry HCl for about 15 min., gives the *mono-Me ester*, m. 150–2°; at 120° the ester loses 1 mol. MeOH, giving the anhydride; soln. in 10% NaOH causes sapon. If the reaction is continued for 8–10 days there results the *di-Me ester*, m. 140–3°. CH_2N_2 in Me_2CO gives the *tri-Me ester*, m. 123–4°, also obtained from the mono-Me ester and CH_2N_2; reduction gives an oily compd.; partial sapon. with MeOH-KOH gives an isomeric *Me ester*, m. 172°, which also yields an anhydride at 120°. The tri-Me ester and MeMgI give a non-cryst. carbinol, probably $C_6H_5(CMe_2OH)_3$, oxidized by CrO_3 in AcOH to the *compd.*, $C_{11}H_{12}O_3$, m. 235°, which forms a *mol. compd.* with *p*-$O_2NC_6H_4NHNH_2$, citron-yellow, m. 138–9°. In comparative expts. with 3 g. sterol and 45 cc. HNO_3 (d. 1.4), heated 30 hrs. and then concd. to 10 cc., ergosterol, its acetate and irradiated ergosterol gave 0.35, 0.3 and 0.03 g. acid while α- and β-ergostenol, ergostanol, cholesterol, zymosterol and sitosterol acetate gave no acid. From the decompn. products of the action of O_3 on ergosterol acetate there were isolated a small amt. of isocaprylaldehyde, $C_6H_{12}O$ (as the semicarbazone) and methylglutaric acid (as Ag salt). C. J. WEST

Methylation of phenols by methyl sulfate. A suggested mechanism. HERBERT H. HODGSON AND JOSEPH NIXON. *J. Chem. Soc.* 1930, 2166–8.—A comparative study of the usual method of methylation (aq. alk. soln. with Me_2SO_4) and of the method proposed by Haworth and Lapworth (reaction in $C_6H_4Me_2$ with K_2CO_3) gave the following results: PhOH 65, 0; *o*-MeC_6H_4OH 71.4, 0; *m*-isomer 82, 0; *p*-isomer 71.3, 0; *o*-$O_2NC_6H_4OH$ 47, 71.5; *m*-isomer 65, 65; *p*-isomer 55.5, 79.6; *o*-ClC_6H_4OH 72.5, 14; *m*-isomer 81, 28; *p*-isomer 81, 9; 6,2-$Cl(O_2N)C_6H_3OH$ 19.5, 75; 2,4-isomer 8, 86; 4,2-isomer 0, 75; 2,5-$Me(O_2N)C_6H_3OH$ 0, 0; 4,2-isomer 9, 73; 2,6-isomer 18, 41.5; 4,2,6-$FI_2C_6H_2OH$ 40, 9.7; 4,2,6-$FBr_2C_6H_2OH$ 53, 53; 4,2,6-$FCl_2C_6H_2OH$ 10, 60. An electronic interpretation is given to account for the differences observed in the 2 methods. C. J. WEST

Production of the methylglyoxal and pyruvic acid step of alcoholic sugar cleavage as a demonstration experiment (NEUBERG, KOBEL) **11A**. Acids of montan wax (HOLDE, *et al.*) **21**. Phosphatides (KLENK) **11A**. The sorption of H_2S by K benzenesulfonate and a thiohydrate of this salt (LANGE, LEWIN) **2**. Action of hypoiodite solution on cellulose preparations (HESS, *et al.*) **23**. Hg recovery from aqueous sludges (Brit. pat. 332,106) **18**.

Cyclic hydrocarbons by reduction of oxygenated compounds. N.-V. DE BATAAFSCHE PETROLEUM MAATSCHAPPIJ. Brit. 331,199, Feb. 8, 1929. Compds. such as phenols, cresols, furfurol and cyclohexanol are converted into the corresponding cyclic hydrocarbons by heating under pressure with H (or a gas mixt. contg. H) or substances such as steam and CO which yield H under the reaction conditions, in the presence of a catalytic mass comprising finely divided absorption carbon or coal such as finely divided brown coal intimately mixed with Mo or Mo compds. Several examples with details are given.

Separating olefins. C. G. HARRIS and IMPERIAL CHEMICAL INDUSTRIES, LTD. Brit. 331,787, Oct. 24, 1929. Olefins such as C_2H_4 and C_3H_6 are sepd. by means of a solid adsorbent such as active C, previously charged with a vapor such as water vapor, having an affinity for the adsorbent greater than that of one of the olefins to be sepd. and less than that of the other.

Polymerizing olefins. N.-V. DE BATAAFSCHE PETROLEUM MAATSCHAPPIJ. Brit. 331,186, March 18, 1929. C_2H_4 and its homologs are polymerized by heating them

under pressure without catalysts but in the presence of an inert liquid such as mineral oils, vegetable oils and their products, *e. g.*, C_2H_4 is heated with paraffin oil to 420° under 45 atm. pressure. The treatment may be applied to cracked petroleum products or destructive hydrogenation products of olefinic character.

Diolefins from alcohols. S. V. Lébédev. Brit. 331,482, Jan. 30, 1929. Alcs. such as EtOH, MeOH and PrOH are heated in the presence of a dehydrating catalyst and a dehydrogenating catalyst (suitably ZnO and Al_2O_3 at 400°), preferably under reduced pressure. The reaction products may be passed into Br after cooling, the bromides fractionally distd. and the residual tetrabromide converted into butadiene as by reduction with ZnO in alc. soln. Cf. *C. A.* 24, 1390.

Gelatinized alcohol. H. Ohle. Brit. 331,922, April 12, 1929. K salts of the sulfuric acid half esters of α- and β-diacetonefructose, which may be used for gelatinizing alc., are made by treating α- or β-diacetonefructose at low temps. (suitably −15°) with pyridine and chlorosulfonic acid. After standing, excess pyridine may be distd., the residue absorbed by warm potash soln. and on cooling to 0° the K salt seps.

Aldehydes from alcohols. I. G. Farbenind. A.-G. Brit. 331,883, April 11, 1929. Aldehydes and H are produced by passing vapors of alcs. such as EtOH, BuOH or PrOH over Cu which has been prepd. from Cu carbonate or other compds. by reduction at temps. below redness, activated with oxides such as those of Cr, Mn, Mg and Zn or phosphates such as secondary Na phosphate or tertiary Ba phosphate.

Aldehydes from α-oxides. I. G. Farbenind. A.-G. Brit. 331,185, March 18, 1929. Oxides such as 1,2-propylene oxide, 2,3-butylene oxide or ethylene oxide are passed in vapor form at elevated temps. (suitably 150–450°) over catalysts comprising oxyacids of elements of the 5th or 6th periodic groups or anhydrides or salts of such acids, such as Mg pyrophosphate mixed with kieselguhr or a catalyst formed from Ce sulfate and $Ba(OH)_2$ or from Cu carbonate and Mg NH_4 phosphate. Various details and examples are given.

Esters from glycerol and higher fatty acids. I. G. Farbenind. A.-G. Brit. 332,267, March 18, 1929. In esterifications such as that of olive oil fatty acids with glycerol, the liquid materials are caused to flow, while being heated, through a tower filled with coke or other suitable contact material of large superficial area, under reduced pressure and in the presence of esterification catalysts. App. and various details of procedure are described.

Ethyl esters. Arthur R. Cade (to Carbide and Carbon Chemicals Corp.). U. S. 1,781,050, Nov. 11. Et_2SO_4 is caused to react with a Na salt of an org. acid such as Na benzoate in the presence of ethyl benzoate or other suitable solvent substantially free from water, comprising a preformed portion of the ester to be prepd.

Metal amino carbonyls. Philip S. Danner and John E. Muth (to Standard Oil Co. of Calif.). U. S. 1,780,643, Nov. 4. By heating the reacting materials in a closed vessel there may be obtained Fe diethylamino pentacarbonyl from Fe pentacarbonyl and diethylamine, and substances of equiv. nature to the Fe diethylamino pentacarbonyl which can be produced by the reaction of other metal carbonyls such as Fe tetracarbonyl, Fe nonacarbonyl, Co tricarbonyl, Co tetracarbonyl, Ni tetracarbonyl, Mo hexacarbonyl, etc., and other NH_3 compds. including NH_3 and the aliphatic and aliphatic-aromatic amines, etc.

Nitriles. I. G. Farbenind. A.-G. Brit. 332,258, March 18, 1929. Acetonitrile and its homologs (which may be hydrogenated or hydrolyzed to obtain amines or acids) are obtained by passing mixts. of C_2H_2 with NH_3 or amines over a compd. or mixt. of compds. of metals of the second to seventh group of the periodic system, not reducible under the conditions of working, at a velocity not exceeding 50 l. of C_2H_2 per hr. per l. of catalyst, at temps. of 200–600° (usually about 400° in various examples given). A small quantity of moisture improves the life of the catalyst and for the latter there may be used $ZnSO_4$ on silica gel, oxides of Zn and Th on silica gel, Zn and Cr oxides or $ZnCl_2$, etc. Numerous details of procedure are given. Cf. *C. A.* 24, 3249.

Phenol compounds from dihydroxydiphenylmethane derivatives. Hans Jordan (to Chemische Fabrik auf Actien vorm. E. Schering). U. S. 1,778,858, Oct. 21. A deriv. of 2-hydroxydiphenylmethane is treated with H under pressure in the presence of a hydrogenation catalyst such as a Ni catalyst contg. Bi, at a temp. of about 160° until 2 H atoms have been fixed. Examples are given of the production of phenol and *p*-ethylphenol from *p*-dihydroxydiphenylmethylmethane, *p*-cresol and PhOH from *p*-dihydroxydiphenylmethane and *p*-benzylphenol and PhOH from *p*-dihydroxytriphenylmethane.

Organo arsenic and antimony compounds. H. J. Barber and May & Baker,

LTD. Brit. 331, 869, March 8, 1929. One mol. proportion of an arsinic or stibinic acid is condensed with 4 mol. proportions of an org. mercapto compd., of which 2 mol. proportions serve to reduce the quinquevalent As or Sb to tervalent form while the remainder then condenses with the reduction product to form the thioarsenite or thioantimonite. Examples are given of the production of 8-acetylamino-3-hydroxy-1,4-benzisoxazine-6-dicarboxymethylthioarsenious acid, *N*-phenylglycinamide-4-dicarboxymethylthioarsenious acid, 3-amino-4-hydroxyphenyldicarbamidomethylthioarsenious acid, 4-aminophenyldicarbethoxymethylthioarsenious acid, 3-amino-4-hydroxyphenyldi-β-amino-β-carboxyethylthioarsenious acid, 8-acetylamino-3-hydroxy-1,4-benzisoxazine-6-di-β-hydroxyethylthioarsenious acid, 2-hydroxy-5-acetylaminophenyldicarboxymethylthioarsenious acid, 4-aminophenyldicarbamidomethylthioantimonious acid and 4-chlorophenyldicarbamidomethylthioantimonious acid.

Triaryl phosphates. WILFRID GIBSON and CHARLES R. HENSHAW (to Imperial Chemical Industries, Ltd.). U. S. 1,781,225, Nov. 11. Purification of a crude triaryl phosphate is effected by treatment with oleum contg. about 20% free SO_3.

Concentrating aliphatic acids such as propionic acid. SOC. ANON. DES DISTILLERIES DES DEUX-SÈVRES. Brit. 331,637, March 20, 1929. The process for concg. HOAc as described in Brit. 312,046 (*C. A.* **24**, 863) is applied to the concn. of solns. of other aliphatic acids; *e. g.*, propionic acid may be extd. with Bu propionate and the ext. dehydrated by distn. with an entraining liquid consisting of a petroleum fraction b. 138–40°; or aq. formic acid may be extd. with Am formate and distd. with heptane. Various details of distn. and sepn. of the distn. products are described.

Naphthalene-2,3-dicarboxylic acid. I. G. FARBENIND. A.-G. Brit. 332,122, Sept. 10, 1929. See Fr. 682,474 (*C. A.* **24**, 4306).

Acetyl-Cleve's acid. WALTER M. RALPH (to National Aniline & Chemical Co.). U. S. 1,778,914, Oct. 21. Reaction is effected between Cleve's acid and glacial HOAc in the presence of a salt of HOAc such as NaOAc.

Acetylene recovery from gaseous mixtures. P. H. HULL and IMPERIAL CHEMICAL INDUSTRIES, LTD. Brit. 331,610, April 20, 1929. The gaseous mixts. are washed with glycol diacetate or an aq. soln. of H_2SO_4 and $HgSO_4$ or other suitable C_2H_2 solvent in a plurality of stages, with increase of pressure between the stages while the partial pressure of C_2H_2 is maintained at 2 atm. or lower. Various details of procedure are described.

Acetylene recovery from gaseous mixtures. G. F. HORSLEY, F. ROFFEY and IMPERIAL CHEMICAL INDUSTRIES, LTD. Brit. 331,654, May 24, 1929. In a process which may be carried out in stages, a solvent for C_2H_2 is used comprising glycol monoformate, glycol mono- and di-alkyl ethers, glycerol mono- and diacetates, Et lactate or similar compds.

Acetone from acetylene. JEROME MARTIN and IGNACE J. KRCHMA (to Commercial Solvents Corp.). U. S. 1,779,676, Oct. 28. A gaseous mixt. comprising C_2H_2 and an excess of water vapor is passed, at temps. of 275–725° (suitably about 500°) over catalysts such as one initially comprising ZnO, Cr oxide, Fe oxide and $ZnCl_2$.

Benzaldehyde and other oxidation products of toluene. GAS LIGHT & COKE CO., W. G. ADAM, W. V. SHANNAN and M. CUCKNEY. Brit. 331,525, Jan. 29, 1929. A reaction mixt. contg. an excess of toluene is used (suitably in admixt. with water vapor and effluent gases from the reaction) in production of benzaldehyde or benzoic acid or both, a small quantity of maleic acid also being formed. Numerous details of app. and procedure are given.

2-Hydroxy compounds of pyridine. CURT RÄTH (to Schering-Kahlbaum A.-G.). U. S. 1,778,784, Oct. 21. A halopyridine or a deriv. having non-saponifiable substituents is treated with acid-reacting saponifying agents such as HCl (preferably by heating, suitably at about 150°), as in the production of 2-hydroxy-5-nitropyridine from 2-chloro-5-nitropyridine, 2-hydroxypyridine from 2-chloropyridine, 2-hydroxy-5-chloropyridine from 2,5-dichloropyridine or of 2-hydroxy-3-chloro-5-nitropyridine from 2,3-dichloro-5-nitropyridine (details of the production of each of which are given).

Apparatus for polymerization of butadiene, vinyl bromide, styrol, indene, etc. I. G. FARBENIND. A.-G. Brit. 331,265, March 23, 1929. The chamber in which the polymerizing agent is contained is combined with a compensating chamber not contg. such agent into which the liquid may distil in the event of violent reaction and from which it may be returned after cessation of the violent reaction. Various details of app. are described.

11—BIOLOGICAL CHEMISTRY

PAUL E. HOWE

A—GENERAL

FRANK P. UNDERHILL

Production of lenticular opacities by ultra-violet radiation in the presence of certain salts. MARIE A. HINRICHS. *Proc. Soc. Exptl. Biol. Med.* **27**, 535–8(1930).—The expts. included the exposure to ultra-violet radiation of excised lenses in 0.1% to 1% solns. of NaCl and $CaCl_2$, of eyes of intact living frogs, and of lenses of developing chick embryos. The primary effect of radiation is probably a surface phenomenon which involves the change in permeability to salts or their ions, with a subsequent pptn. of lens proteins. Ca is more effective in producing opacity than Na. C. V. BAILEY

The cholesterol content of the blood and ultra-violet light. T. ORNSTEIN. *Compt. rend. soc. biol.* **103**, 190–1(1930).—Treatment of 25 patients with ultra-violet light had no effect on the cholesterol content of the blood; the variations were within physiol. limits. B. C. BRUNSTETTER

Comparative investigations on the cleavage of peptones and polypeptides by the enzymes of the pancreas. R. SCHÖNFELD-REINER. *Fermentforschung* **12**, 67–127 (1930).—The enzymic cleavage of several peptones, the 2 dipeptides glycylglycine and *dl*-leucylglycine and the tripeptide *dl*-leucylglycylglycine, by variously treated macerations and by a dry prepn. of pancreas, was compared under different conditions for the purpose of detg. the enzyme carriers involved. The system of dipeptide cleavage could be distinguished from that of higher peptide or peptone cleavage, by Fodor's method of acid coagulation and by the sepn. of the dry prepn. into an insol. and a sol. portion. The acid coagulum and the insol. portion of the prepn. were found to be the enzyme carriers in the cleavage of dipeptides and of the dipeptide complex of peptone. The filtrate from the acid coagulum and the sol. portion of the prepn. were active toward the tripeptide and the peptones exclusively. In the autolysis of this sol. portion the power of dipeptide cleavage subsequently develops, apparently by autocatalysis. Kinetic measurements showed that fresh macerations give a linear reaction in the peptone cleavage, while aged macerations and acid filtrates give a parabolic reaction. This is attributed to the different natures of the carriers concerned. The optimal p_H of peptone cleavage by the sol. portion of the pancreatin prepn. is 7.58, while that of dipeptide cleavage by the insol. portion is 7.96 and that of peptone cleavage by the same portion is 8.00. The aging of macerates yields autolytic decompn. products which accumulate even in the digestion of substrate. Under favorable conditions these products exert a promoting influence on peptone cleavage, but they invariably inhibit dipeptide cleavage. Dialysis reverses this effect, and by removal of the sol. substances brings about an inhibition of peptone cleavage and an increase in dipeptide cleavage. A preliminary treatment with glycine influences both peptone and dipeptide cleavage according to the enzyme medium, the temp. and the quantity present. An attempt was made to interpret uniformly the multiplicity of phenomena on the assumption of different enzyme carriers or exchange of carriers. Despite the differentiation between cleavage of dipeptides and that of higher peptides and peptones, the view that sp. enzymes exist for both activities is rejected on theoretical grounds. A. W. DOX

Experimental studies on nuclein metabolism. XXV. Specificity of the Dische color reactions with diphenylamine and carbazole for the purine and pyrimidine nucleosides of thymonucleic acid. MARIANNE ANGERMANN AND FRANZ BIELSCHOWSKY. *Z. physiol. Chem.* **191**, 123–5(1930); cf. *C. A.* **24**, 4794.—Dische's inference (*C. A.* **24**, 1879) that the sugar linked to purine bases is different from that linked to pyrimidines could not be corroborated. The difference in color reaction is due to the fact that the nucleoside linkage of pyrimidines is much more resistant to hydrolysis than that of purines. The great advantage of Dische's Ph_2NH reaction in contrast to the orcinol reaction is that it distinguishes between yeast and thymonucleic acid and their decompn. products. Possibly the blue color obtained with thymonucleic acid and thymosine, as contrasted to the green color with yeast nucleic acid and its nucleosides, is a reaction characteristic of desoxy sugars. Digitalis leaves, which are said to contain a desoxy sugar, gave a Ph_2NH reaction in which the color was more bluish than the green obtained with ordinary sugars of the glucose and arabinose type. A. W. DOX

Remarks on the paper of Angermann and Bielschowsky: The question of the specificity of Dische's color reactions for the purine and pyrimidine nucleosides of thymonucleic acid. ZACHARIAS DISCHE. *Z. physiol. Chem.* **192**, 58–60(1930).—The failure

of A. and B. to obtain the identical color reactions described by D. is due to a departure from the optimum conditions of concn. and time of heating. Their conclusion that the carbazole reaction of thymonucleic acid is not due to the carbohydrate of the pyrimidine nucleosides but to other components is erroneous. Yeast nucleic acid which contains the same components except the carbohydrate and the thymine gives a color reaction 35% less intense. By heating thymonucleic acid 3 hrs. at 135° the carbohydrate is converted into levulinic acid and the other constituents are left intact, yet the color reaction of this hydrolyzate is neg. The carbohydrate responsible for the carbazole reaction is probably present as an unknown nucleotide. This might also explain why removal of carbohydrates by extg. liver and kidney with Cl_3CCO_2H, dissolving the residue in 2% NaOH and pptg. the nucleic acid with HCl, yields a filtrate which gives an intense carbazole reaction and a neg. Ph_2NH reaction. The filtrate probably contains the same substances which are responsible for the carbazole reaction of thymonucleic acid. Cf. preceding abstr. A. W. Dox

Plasmalogen. II. A convenient method for the preparation of plasmal; cleavage of plasmalthiosemicarbazone. M. Behrens. *Z. physiol. Chem.* **191**, 183–6(1930); cf. *C. A.* **23**, 1912.—Plasmal, the mixt. of higher aliphatic aldehydes obtained by decompn. of the plasmalogen present in a lipoid emulsion from horse meat, was previously sepd. by steam distn. This procedure is laborious and time-consuming because the distn. must be made with a large no. of small portions separately, and is open to the objection that the product thus obtained may represent secondary decompn. products. A more satisfactory and convenient method of prepg. plasmal consists in warming the emulsion to 40°, acidifying with 5 *N* H_2SO_4 (20 cc. per l.) and allowing to stand 4 hrs. in the thermostat. The mixt. is then neutralized by shaking with 10 g. $CaCO_3$, 2 g. of $H_2NCSNHNH_2$ is added, and the mixt. shaken frequently during 2–3 days. It is evapd. *in vacuo*, the residue dissolved in Et_2O and dild. with EtOH. The centrifuged soln. is pptd. with alc. $AgNO_3$, the ppt. dissolved in Et_2O and repptd. by EtOH. The Ag compd. is suspended in EtOH, decompd. by H_2S, and the filtrate pptd. by addn. of H_2O. The resulting plasmal thiosemicarbazone is dried *in vacuo* over H_2SO_4, extd. with Et_2O and recrystd. from EtOH and from xylene. The yield from 1 l. of emulsion is 1–1.5 g. of a product, m. 106–7°. The thiosemicarbazone may be hydrolyzed and the plasmal obtained therefrom by steam distn. in the presence of 2 *N* H_2SO_4; the product is collected on a cotton wad and the latter extd. with EtOH. A. W. Dox

The intermediary metabolism of histidine. II. S. Edlbacher, J. Kraus and N. Scheurich. *Z. physiol. Chem.* **191**, 225–42(1930); cf. *C. A.* **20**, 3722.—Histidase has thus far been found only in the liver and its purification is too far from complete to make possible the quant. isolation of all the products resulting from its action on histidine. The unit arbitrarily selected is the quantity of enzyme which liberates 8 cc. of 0.02 *N* NH_3 from 20 cc. of a histidine soln. in 6 hrs. The 1st step in purification of the enzyme consists in centrifuging the aq. suspension, the entire quantity of enzyme remaining in the soln. Adsorption on $Al(OH)_3$ and kaolin from acid medium, followed by elution with Na_2HPO_4, increases the purity 2.5 times with recovery of 40% of the original activity. Histidase retains its activity after several days in the thermostat. Attempts to remove impurities by trypsin digestion destroyed the activity. Dialysis caused a sepn. into less active components which regained the full activity when recombined. The decompn. of histidine by histidase is an anaerobic process. The products are $2NH_3$, 1 *d*-glutamic acid and probably $1CH_2O_2$. Since the cleavage does not involve an asymmetric C it may be assumed that *l*-histidine and *d*-glutamic acid belong to the same steric series. Other products such as urea and CO_2 are in all probability not formed. The cleavage undoubtedly occurs through intermediate stages, the most plausible one being pyrrolidonecarboxylic acid. Histidase is highly specific. It hydrolyzes only the naturally occurring *l*-histidine, and is without action on imidazole, imidazolyllactic acid, imidazolylethylamine, methylhistidine and probably also carnosine and histidine Me ester. A. W. Dox

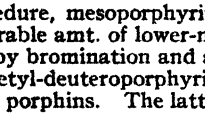
Enzymic cleavage of lecithin. Hazel King, Earl J. King and Irvine H. Page. *Z. physiol. Chem.* **191**, 243–50(1930).—Exts. of various organs, especially intestine and kidney, hydrolyze lecithin emulsions at an optimum p_H of 7.4–7.6 with a splitting off of H_3PO_4. The concn., both of substrate and of enzyme, has a special influence on the extent of hydrolysis, so that beyond a certain limit an increase in concn. results in decreased cleavage. Exts. of bone and liver contain very little lecithin-splitting enzyme. This is noteworthy in view of the high content of phosphatase in bone ext. A. W. D.

The porphyrins. XXVI. Hemoporphyrin. H. Fischer, Hans Helberger and Georg Hummel. *Z. physiol. Chem.* **191**, 251–61(1930); cf. *C. A.* **24**, 4794.—Willstätter's hemoporphyrin, obtained by treatment of hematoporphyrin with alc.

KOH in the presence of MgO and removal of the Mg from the phyllin thus formed, is shown to be a mixt. instead of an individual substance. At least 3 reactions are involved in the process of prepn. First there is formation of mesoporphyrin in good yield by the reducing action of the alcoholate. There is also a partial splitting off of 1 or both CHOHMe and replacement by H. The product here is deuteroporphyrin. In addn. to this cleavage reaction whereby both CHOHMe side chains are removed, a combination of the 2 reactions results in formation of the 2 isomeric porphins, where 1CHOHMe is replaced by H and the other reduced to Et. This is shown by their oxidation to a mixt. of methylethylmaleic imide and citraconimide. In the prepn. of hemoporphyrin by Willstätter's procedure, mesoporphyrin was isolated without difficulty. There was also present a considerable amt. of lower-melting esters representing at least 3 porphyrins. This was shown by bromination and acetylation of the hemoporphyrin, which yielded dibromo- and diacetyl-deuteroporphyrin, and also the Ac derivs. of the 2 tetramethylethyldipropionic acid porphins. The latter are derivs. of etioporphyrin III.

A. W. Dox

The artificial building up of bones and teeth. I. Preparation of glycine-hexol salt, or glycine-phosphato calcium carbonate. Th. Gassmann. *Z. physiol. Chem.* **192**, 61–9(1930); cf. *C. A.* **23**, 1652.—The main constituent of bones and teeth,



can be prepd. not only with Na_2HPO_4, as previously shown, but also with glucose-phosphoric acid and the H_3PO_4 obtained therefrom by enzymic cleavage, if the synthesis is performed at body temp. of 38–40°. At the same time glycine can be united to this compd. The glycine-hexol salt, $(Ca[(HO)_2Ca]_3)CO_3.NH_2CH_2CO_2H$, was also prepd., but this is less sol. in distd. H_2O. Glycine cannot be leached out from either of these compds. by distd. H_2O. Both syntheses are best performed by the use of natural ice water, in which a P compd. is present. The stability of the glycine addn. products is regarded as an affirmative answer to the long-debated question whether or not the org. substance of bones and teeth is in chem. combination with the phosphatocalcium carbonate.

A. W. Dox

The active group of liver catalase. Karl Zeile and Harry Hellström. *Z. physiol. Chem.* **192**, 171–92(1930).—The catalse activity of hemin, recently reported by Kuhn (*C. A.* **21**, 3061) and others, has suggested a possible connection between the catalase of animal and plant tissues and the porphyrin-Fe complex which invariably accompanies it. However, the activity of the purest liver catalase is some 10,000 times greater than that of the same quantity of hemin, so that if a porphyrin-Fe complex is essential to the enzymic activity it must be of a specific nature. A proportionality should then exist between enzymic activity and porphyrin Fe content of the prepn. as shown by its hemochromogen spectrum. In detg. this ratio it is important to use prepns. that have been freed from hemoglobin and its decompn. products. This was accomplished by emulsifying the liver ext. with $CHCl_3$, adding EtOH to 50% and centrifuging. The hemoglobin then forms a solid cake between the 2 liquid phases. The aq. layer contains all of the catalase and shows no hemoglobin spectrum, but after treatment with NaOH, pyridine and $Na_2S_2O_4$ it gives a strong spectrum of hemochromogen. This indicates the presence of a porphyrin-Fe complex independent of the occurrence of hemoglobin. The spectrum of this porphyrin resembles that of alk. hematin except for a uniform displacement toward the red. Unlike hemin, it does not give the hemochromogen spectrum with $Na_2S_2O_4$ and pyridine or Na_2HPO_4, but requires the addn. also of alkali; hence the complex is present in a combined form. Addn. of KCN to the catalase soln. gives an absorption spectrum with 2 bands in the green while the red absorption disappears, thus differing from the corresponding hematin HCN spectrum. A similar difference is noted in the spectrum changes after addn. of H_2S. Various adsorption treatments were given the catalase prepn. to det. whether the ratio between catalase reaction const. and porphyrin-Fe content remains const. or whether a sepn. can be effected. Treatments with $Al(OH)_3$, $Fe(OH)_3$, $Zn(OH)_2$, animal charcoal, kaolin and repeated dialysis failed to alter this ratio of approx. 2500. The porphyrin-Fe complex thus appears to be the carrier of the catalase function. Further evidence is the fact that after partial inactivation the ratio is restored by $Al(OH)_3$ adsorption. The ratio is 10^6 greater than that of ordinary porphyrin-Fe complexes; hence the complex assocd. with the enzyme is highly specific. Treatment of the catalase soln. with a quantity of HCN equiv. to the porphyrin-Fe present suppresses the activity and gives

a quant. spectrum of the HCN compd. Dissocn. of the compd. by diln. restores the original spectrum and the catalase activity at the same rate. Inactivation by H_2S is also reversible. On the other hand, inactivation by $HgCl_2$ is a protein pptn. phenomenon and is not reversible. A. W. Dox

The action of adenosinemonophosphoric acids and adenosinetriphosphoric acid on dehydrogenation processes by plant and animal enzymes. HANS J. DEUTICKE. *Z. physiol. Chem.* **192**, 193–216(1930).—The Thunberg methylene blue method was applied in a study of the dehydrogenase present in the seeds of the jute plant (*Corchorus capsularis*), with org. phosphoric acids as O- donors. The reduction to leuco base through the action of enzyme is accelerated by the hexosediphosphoric acid from muscle as well as that from yeast. The hexosediphosphoric acid which is formed spontaneously in the press juice of glycogen-rich dog muscle and that which is formed in the press juice of rabbit muscle in the presence of NaF had precisely the same influence on the enzyme reaction as the hexosediphosphoric acid from yeast. The methylene blue reduction which occurs after addn. of a boiled ext. of muscle is due to adenosinetriphosphoric acid. There is no evidence of the presence of hexosediphosphoric acid in the freshly dissected muscle. Muscle adenylic acid, which itself does not bring about the reduction of methylene blue, accelerates the reaction in a specific manner if added in low concn. after addn. of hexosediphosphate and especially of hexosemonophosphate (lactacidogen), while it is without influence on the reaction velocity after addn. of adenosinetriphosphate. In higher concns. its action is always inhibitory after addn. of these substances. The action of yeast adenylic acid, on the other hand, is exclusively inhibitory. Dehydrase solns. from muscle are also considerably activated by adenosine-triphosphoric acid in their power to decolorize methylene blue. In this respect adenosinetriphosphoric acid is superior to the hexosediphosphoric acids. With the animal dehydrase solns., in contrast to those from *Corchorus* seeds, the single addn. of muscle adenylic acid (not yeast adenylic acid), inosic acid and the pentosephosphoric acid prepd. therefrom, accelerates the methylene blue reduction. A. W. Dox

Phosphatides. I. The fatty acids of the cephalin fraction of the brain. E. KLENK. *Z. physiol. Chem.* **192**, 217-32(1930).—A complete removal of cerebrosides and sphingomyelin from the cephalin fraction is not possible. The sepn. was therefore accomplished by a mild hydrolysis which split off the fatty acids from the cephalin but left the cerebrosides and sphingomyelin unaltered. The K salts of the satd. fatty acids sep. from the Et_2O soln. and consist mainly of stearic acid with possibly some palmitic acid. The unsatd. acids were esterified with MeOH and H_2SO_4 and the Me esters fractionated by distn. *in vacuo* between 150° and 190°. The 4 fractions thus obtained were hydrogenated with Pd-$BaSO_4$ catalyst, sapond. with *N* KOH in MeOH, and the free acids liberated. These satd. acids were esterified, their esters fractionated and sapond., and the free acids recrystd. They consisted of stearic and behenic acids in the proportions of about 3 to 1. The intermediate member of the series, arachidic acid C_{20}, was not present. This should result from hydrogenation of arachidonic acid, the occurrence of which has been reported by Levene and Rolf (*C. A.* **16**, 3911). The no. of double linkages in the C_{22} acid before hydrogenation has not been accurately detd. The Br content of the Et_2O-insol. Br addn. product and the I no. of the Me ester of the unsatd. acid indicate at least 4 and possibly 5 double linkages. With 5 double bonds the acid would be isomeric and probably identical with the $C_{22}H_{34}O_2$ acid obtained by Tsujimoto (*C. A.* **15**, 1227) from fish oils. Reduction of the Br addn. product gave behenic acid. From 35 g. of cephalin fraction there were obtained 0.2 g. palmitic acid, 8.6 g. stearic acid, and 2.9 g. of behenic acid. Of the stearic acid 3.8 g. belongs to the satd. and 4.8 g. to the unsatd. fraction, while the behenic acid belongs entirely to the unsatd. fraction of the fatty acids. A. W. Dox

Further studies in the formation of a histamine-like substance from histidine by irradiation with ultra-violet light. FRIEDRICH ELLINGER. *Arch. exptl. Path. Pharmakol.* **153**, 120–7(1930); cf. *C. A.* **24**, 1130.—Irradiation of even dry histidine results in the formation of a substance with pharmacol. properties like those of histamine. Such irradiated histidine prevents the decompn. of histamine by ultra-violet light, because of a yellow tint in the soln. H. EAGLE

Physiological and chemical experiments with ultra-violet rays through glass and also a method of evaluation. H. VALENTIN. *Pharm. Ztg.* **75**, 982–4, 995–8, 1005–8 (1930).—A study has been made of certain chem. and biol. effects produced in a school, hospital and prison on plant and animal organisms, also on a variety of chemicals, by ultra-violet light passed through ordinary and special glass. With pupils subjected to such treatment, a marked darkening of the skin and slight increase in well-being were noted. No increase in hemoglobin count could be detected. With plant seeds behind

ultra-violet glass a notable increase in the germination process was observed. Rapidity of growth, however, was only 10% greater than in plants under ordinary glass. Ultra-violet rays inhibit markedly and even cause recession in the growth of fungi and yeast cultures. Changes in a large no. of chem. compds. are largely effected by ultra-violet light, which, however, is not the sole "chem. active" rays. Certain decompns. are produced by the visible sunlight. There are at present many different brands of glass permitting the passage of ultra-violet rays, but in varying degree. The suggestion is therefore made that the quality of any such glass be definitely ascertained prior to purchase. A criticism is made of the glass (ultravit) installed in the municipal institutions of Königsberg, as possibly explaining the not altogether satisfactory results obtained in the schools and on plants. Of all the varieties of glass investigated, that of Schott und Gen. (Uviolglas) proved to be the best and cheapest. The value of an ultra-violet glass may be detd. as follows: In a crystg. dish (*a*) contg. a few cc. of KNO_3 soln., cover with the sample of glass plate under examn., sealing the circle of contact air-tight with desiccator fat. Into a SiO_2 flask (*b*) introduce also a like amt. of KNO_3 soln. and close this air-tight. Now expose both containers in the open about 1 week or 10 min. to the rays of an analytical quartz lamp. Thereupon det. with Gries' reagent and a control soln. of KNO_3 colorimetrically the amt. of nitrite formed. In the soln. (*a*) about 75% of the HNO_2 formed in (*b*) should be present. W. O. E.

Effect of Röntgen and radium irradiation on metabolism of women with carcinoma of the uterus. E. O. GAESSLER. *Strahlentherapie* **37**, 361–77(1930).—In carcinoma of the uterus the metabolic disturbances consist in a lowering of the alkali reserve, and of the surface tension, in an increase of the plasma vol. and of the total albumin, of the fibrinogen and of globulin, also an increase of the blood fat and the K; often even amino acids, lactic acid and blood sugar are considerably increased. Röntgen rays ordinarily increase the alkali reserve; they always increase the vol. of the plasma and the albumin of the plasma. Fibrinogen, globulin and albumin show a varying behavior. The Röntgen irradiation regularly produces an increase in the Ca content of the blood. There is a regular decrease in cholesterol, in the surface tension and in the blood fat. The radium treatment also increases the plasma vol.; sometimes it increases the fibrinogen and globulin, but as a rule it does not exercise a regular influence upon the metabolism of the patient. F. R. GREENBAUM

The elimination of nitrogen in urine after Röntgen and radium ray treatment. GUNTHER K. F. SCHULTZE. *Strahlentherapie* **37**, 642–58(1930).—S. studied the elimination of N in the urine of patients that were treated with Röntgen and Ra-rays. He found that after Röntgen-ray treatment in about 50% of the cases a distinct increase of the N elimination in the urine occurred. This increase would be stronger if a Ra treatment had preceded this Röntgen radiation about 3 to 4 weeks. After Ra treatment in all cases an increase of the elimination of N in the urine occurred. This increase was found to be more const. and greater than that after Röntgen radiation. S. in contrast to other investigators found that the creatinine N is not responsible for the increased elimination of the total N. This observation of the increased elimination of N in the urine is not as yet suitable for a prognosis of the disease, as it is too inconst., depending upon the types of diseases, the technic of radiation and the doses. F. R. GREENBAUM

The blood-sugar regulation under Röntgen rays. A. HELD. *Strahlentherapie* **38**, 27–39(1930).—H. distinguishes between general action of the rays on the blood-sugar regulation and the direct action of the sugar transformation in the irradiated region. The direct action of the rays upon the blood-sugar regulation, which is shown in hyperglucemia, is due to reaction products formed by the action of the rays. This can be demonstrated by the re-injection of the blood of the patient, who has been radiated, in his own blood stream, which will also produce hyperglucemia. The causative factors seem to lie in the increased H-ion concn., the transmineralization and the degeneration products of albumin. The direct action of the rays is examd. by the comparison between the content of the blood sugar in the capillaries (arteries) and the veins of the radiated and non-radiated rear extremity. H. demonstrated that the muscle cells take active part in the blood-sugar regulation. In the region of absorption of the rays a relative hyperglucemia will occur, which can be considered as direct action of the rays. H. believes the influence of the rays is due to a change in permeability, to the oxidative metabolism, to the process of formation of lactic acid and to the diastatic process. No abs. proof for any one of these changes is offered by H.'s expts. F. R. GREENBAUM

The biologic action of Röntgen rays. PH. ELLINGER AND E. GRUHN. *Strahlentherapie* **38**, 58–97(1930).—The authors studied the action of secondary rays of various kinds upon photographic emulsions and *Bacterium prodigiosum*. The blackening effect of secondary rays upon a photographic plate depends upon the density of the

primary rays, that is, the blackening effect of secondary rays increases with increasing density of primary rays. It also depends upon the atom no. of the secondary rays, namely, it increases with increasing atom no. Filter expts. with Al foils showed that the effect of secondary radiation upon the photographic plate depends upon the high permeability of the secondary rays, which most likely is produced by fluorescent rays of various series. Cultures of *Bacterium prodigiosum* are only damaged by primary Röntgen rays of various wave lengths when the doses exceed 500R. In the region of 1000 to 3000R the bacteria are killed with increasing dosage. However, a certain percentage even survives with doses as high as 15000R. If secondary rays of high atom no., however, are employed a rapid destruction of the bacteria occurs, even with small doses of primary rays and with doses of about 300R complete inhibition and sterilization occurs. Primary rays with varying wave lengths have the greatest inhibition action at medium wave length. With secondary rays the inhibitive action increases with increasing wave length. The bactericidal action of pure primary rays depends to a slight extent upon the density of the rays. Rays with a smaller density produce a greater effect than rays with greater density. Secondary rays do not depend upon the density of the primary rays. The bactericidal action of the secondary rays increases with increasing atom no. The bactericidal active rays possess very small permeability. They are absorbed by a layer of air of 4–5 millimeters. The most active rays have the least permeability. Conclusion: The bactericidal actions of the Röntgen rays are based primarily upon photoelectrons of first and second order. The bactericidal action of secondary rays remains at a dilution of secondary rays to about 1%. F. R. G.

The sensibilizing action of hemato porphyrin toward Röntgen rays. N A. PODKAMINSKII. *Strahlentherapie* **38**, 98–102(1930).—P. found that hematoporphyrin acts as a sensibilizer for Röntgen rays. After injection of hematoporphyrin and succeeding Röntgen ray treatment subacute and chronic forms of the "Röntgen disease" analogous to the "light disease" have been observed. The sensibilizing action of hematoporphyrin can be expected wherever an action of Röntgen rays upon hematoporphyrin occurs, and therefore favorable results may be expected not only on the surface but also on deeply imbedded organs. F. R. GREENBAUM

The relation of cholesterol metabolism and the after-effects of x-ray treatment. RUDOLF HUMMEL. *Strahlentherapie* **38**, 308–314(1930).—H. points out that, after Röntgen treatment of patients, a decrease of the cholesterol content of the serum occurs. In some cases there is also an increase. The decrease of the cholesterol in the serum does not go parallel with the after-effects of the x-ray treatment. The decrease of the cholesterol in the blood seems to coincide with the after-effects of the x-ray treatment. In using "Colsil" (a drug prepd. by Landshoff & Meyer, Germany) only in 1/4 of the cases intoxication of the x-ray treatment could be obtained. F. R. GREENBAUM

Inactivation of pancreatic lipase by heat. IVOR H. MCGILLIVRAY. *Biochem J.* **24**, 891–904(1930).—The p_H of optimum stability of purified pancreatic lipase does not coincide with its "optimum p_H" (that is, the p_H, of optimum activity upon a substrate). The optimum thermal stability is in the region of p_H 6.0, whereas the "optimum p_H" is 8.0. The heat inactivation of purified lipase has a relatively low value (46,000 calories). BENJAMIN HARROW

Specific refraction increments of serum albumin and serum globulin. GILBERT S. ADAIR AND MURIEL ELAINE ROBINSON. *Biochem. J.* **24**, 993–1011(1930).—The n of a protein soln. is greater than that of pure water, and the difference between the refractions of the protein soln. and the solvent is equal to the protein concn. in g. per 100 cc. soln., multiplied by a const. (which is known as the specific refraction increment (*s.r.i.*)). Various samples of purified horse serum albumin, prepd. by Hopkins' method (*J. Physiol.* **25**, 306(1900)), showed a const. *s.r.i.*, unaffected by recrystn. The theoretical significance of *s.r.i.* is discussed. BENJAMIN HARROW

Action of pepsin on gelatin. ROBERT K. CANNAN AND EDWARD MUNTWYLER. *Biochem. J.* **24**, 1012–20(1930).—With the aid of H electrode titration curves, it is shown that peptic acid results in the hydrolysis of peptide linkages between the α-amino and α-carboxyl-groups. BENJAMIN HARROW

Chemistry of estrin. IV. The chemical nature of crystalline preparations. GUY F. MARRIAN. *Biochem. J.* **24**, 1021–30(1930); cf. *C. A.* **24**, 5315.—The substance isolated, m. 264–6°, is strongly *d*-rotatory ($[\alpha]_{5461} = +38°$), and has the mol. formula $C_{18}H_{24}O_3$. It is weakly acid, being sol. in alkali and pptd. by CO_2. Three OH groups can be acetylated. From the base-binding power and approx. p_K of the substance, 1OH group is acidic. The phenol color reactions are pos. Conclusion: A hydroxyphenyl radical is present in the mol. The substance obtained from an alk. soln. with CO_2 is

identical with that obtained by sapon. of the acetate. It is not appreciably volatile at 165° and 0.001 mm. Hg. BENJAMIN HARROW

Action of arsenate on hexosephosphatase. MARJORIE GIFFEN MACFARLANE. *Biochem. J.* **24**, 1051–7(1930).—Hexosemono- and di-phosphate can be hydrolyzed by washed dried yeast in the absence of coenzyme. The accelerating action of arsenate on the rate of production of phosphate from hexosediphosphate takes place only in the presence of yeast ext. BENJAMIN HARROW

Production of the methylglyoxal and pyruvic acid step of alcoholic sugar cleavage as a demonstration experiment. CARL NEUBERG AND MARIA KOBEL. *Ber.* **63B**, 1986–9 (1930).—The nearly quant. conversion of hexose to methylglyoxal (I) and pyruvic acid (II) as postulated as a step in the Neuberg fermentation mechanism has been accomplished *in vitro*. Since the first step of the process is the phosphorylation of the hexose by the action of a coenzyme and since the same or a closely related enzyme brings about further changes in I after its formation, the expt. must be begun with hexosediphosphate and the coenzyme removed or weakened to permit I to accumulate. The destruction of coenzyme is accomplished by adding a plasmolyzing agent to the mixt. of Mg hexosediphosphate (III) and fresh top yeast. I or II results as the main product according as the ratio between the amt. of yeast is smaller or greater in proportion to substrate, resp. Thirty cc. 8% soln. of III with 0.5 g. fresh top yeast and 1–2 cc. toluene in a glass-stoppered flask were kept at 37° in a thermostat for 1–2 days. A 10-cc. sample was removed, protein pptd. with 2 cc. 20% trichloroacetic acid, filtered and the I pptd. with 2 cc. of a soln. of 0.5 g. of 2,4-dinitrophenylhydrazine in 30 cc. 2 *N* HCl. After 1–1½ hrs., during which period no osazones of hexose had yet pptd., the methylglyoxal-bis-2,4-dinitrophenylhydrazone was filtered and washed with ½ *N* HCl and water. Traces of pyruvic acid hydrazone were washed out with 20% soda soln. The procedure for obtaining mainly II was identical except that 6 times the quantity of yeast or 3 g. was used. The pyruvic acid 2,4-dinitrophenylhydrazone was isolated by dissolving the first ppt. in 3–5 cc. of 20% soda soln., filtering and repptg. by neutralizing with ½ *N* HCl. Since yeasts vary in activity, a longer period of reaction is required by some to give a good yield. The formation of II involves oxidation of one-half the hexose at the expense of the other half so that glycerol is produced with II. R. C. HOCKETT

Vitamin content of marine plankton. F. S. RUSSELL. *Nature* **126**, 472(1930).—In April, May and June most of the plankton animals in Plymouth (England) waters live at depths below 10–15 meters; in July, August and September certain species previously found only in the deeper layers become abundant right up to the surface, where irradiation can occur. This seems significant in view of the findings of Belloc, Fabre and Simmonet (cf. *C. A.* **24**, 4794) that plankton sterols collected in July were biologically active, whereas those collected in April acquired biological activity only after irradiation. LOUISE KELLEY

Specific properties of protease and amylase from the standpoint of adsorption phenomena. I. Comparative relation between Taka-diastase and pancreatin. FUMIWO HEMMI AND GORO INAMI. *Bull. Agr. Chem. Soc. Japan* **5**, 49–54(1929).—Adsorption of protease and amylase from Taka-diastase and pancreatin by kaolin and $Al(OH)_3$ was studied with particular regard to the p_H of the dispersion medium. The enzymes of Taka-diastase were adsorbed by $Al(OH)_3$ in amts. 2 to 4 times greater than from pancreatin. Adsorption diagrams with variations in amts. of adsorbent, change of p_H, and acid concn. are given. W. D. LANGLEY

Castor-bean lipase. V. Action of ultra-violet rays on the vegetable oils, from the viewpoint of enzymology. ETUSO TAKAMIYA. *Bull. Agr. Chem. Soc. Japan* **5**, 71 (1929); cf. *C. A.* **24**, 3523.—The change in velocity of hydrolysis of cotton-seed oil by lipase as a result of irradiation was observed. The diminished activity of the enzyme corresponds to that brought about by ozonization, and it is considered that the ultra-violet rays act merely as an ozone generator. W. D. LANGELY

The influence of the photodynamic action of trypaflavine and ultra-violet rays on hair growth. MILIO FERNÁNDEZ BLANCO. *Semana méd.* (Buenos Aires) **1930**, II, 1021–8.—Trypaflavine and eosin have no photodynamic action after injections in white rats. Ultra-violet rays showed no influence on the hair growth. A. E. MEYER

Secretion of digestive enzymes. PIETRO ALBERTONI. *Arch. ital. biol.* **83**, 128–9 (1930).—Expts. with diastase prepns. injected intravenously fail to indicate that these enzymes reappear in the saliva. It is therefore maintained that there is no justification for assuming that digestive enzymes circulate through the system. Whenever these appear in a secretion they are the specific products of different glands. S. M.

The arbutase content of Bacillus mycoides. HELENE GLINKA-CHERNORUTSKA. *Biochem. Z.* **226**, 62–6(1930).—*B. mycoides* when grown on substrate contg. arbutin

splits it into hydroquinone and glucose. The enzyme arbutase is firmly attached to the bacterial cells so that it cannot be obtained by means of the usual methods for the isolation of intracellular enzymes. S. MORGULIS

The mobility of ions in gelatin gels and in nerve substances. VI. The thickness and nature of the semipermeable membranes in irritable tissues. Calculation on the basis of experimental data of the distance traversed by the ions in the first phase of the irritation. V. V. EFIMOV. *Biochem. Z.* **226**, 129–32(1930); cf. *C. A.* **24**, 3026.—Under the influence of an electric impulse causing irritation of the nerve the OH ions traverse a distance of 7.6×10^{-7} cm. or approx. the diam. of a hemoglobin or starch mol. S. MORGULIS

Studies on erepsin. H. A. OELKERS. *Biochem. Z.* **226**, 185–94(1930).—$CaCl_2$ and $MgCl_2$, beginning with a concn. of 0.003 mol., exert an inhibiting effect on the cleavage of alanylglycine by intestinal erepsin at p_H 7.8, and completely suppress in a concn. of 0.5 mol. NaF in concns. of 0.001 to 0.100 mol. and NH_4SCN in concns. of 0.0008 to 0.021 mol. have no effect on the cleavage at p_H 7.8. Both alanine and glycocoll considerably diminish the rate of hydrolysis. S. MORGULIS

Studies on the adsorption of cholesterol. LIDIE LEPIN. *Biochem. Z.* **226**, 195–202(1930).—In studying the adsorption of colloidal cholesterol by charcoal in the presence of HCl or AcH it was found that the adsorption of the cholesterol sol depends upon the amt. of adsorbed acid. The peptization of cholesterol increases with alky. It is believed that in the alk. medium the cholesterol suspension changes chemically, presumably to a metacholesterol. S. MORGULIS

Hydrogen-ion concentration of the interior of the cell of Fusarium lini B. and of yeast. VII. Mechanism of enzyme action. S. MAHDIHASSON. *Biochem. Z.* **226**, 203–8 (1930).—The H-ion concn. of the cell interior of *Fusarium lini* B. and of yeast was detd. by means of microinjections and in the former was found to be p_H 6.0–6.1, while in the latter p_H 5.9–6.0. This finding is in agreement with the results of other observers who showed that the max. enzymic activity also occurs at p_H 6.0. S. MORGULIS

Studies on the structure of silk fibroin. II. EMIL ABDERHALDEN AND HANS BROCKMANN. *Biochem. Z.* **226**, 209–20(1930); cf. *C. A.* **23**, 5478.—Previous analyses of the benzoyl group in benzoyl fibroin compds. have been checked and corroborated by means of halogen detns. on halogenbenzoyl-fibroin compds. Crude silk fibroin fibers treated with 2 *N* NaOH yield in blank detns. benzoyl values whereas this is not the case when purified fibroin is used. *d,l*-Leucylglycine heated to 160–170° for 7 hrs. with *N* NaOH gives in blank detns. a 1.32% benzoyl content. Silk fibroin fibers benzoylated with PhCOCl in pyridine contains more easily hydrolyzable benzoyl than those benzoylated in water. The amt. of benzoyl does not change with the duration of treatment but the fibers become weaker, and such fibers also have a poorer staining capacity. The staining ability can be restored by splitting off the benzoyl groups with dil. alk. Benzoylation can also be accomplished by heating silk fibroin with $PhCO_2H$ in pyridine. Tussa silk is insol. in LiBr and is not acted on by PhCOCl in pyridine. Under the influence of diazomethane on silk fibroin products are formed whose MeO content agrees well with the tyrosine. Under prolonged action, however, the MeO gradually increases to a const. value. The per cent of OH and NH_2 groups which can be calcd. from the MeO and methylimide content of the completely methylated fibroin agree with the values obtained from the benzoyl content. Previous treatment of silk fibroin with *N* NaOH yields products which on benzoylation give the same results as before the alk. treatment, but after a 22 hr. previous treatment an alc.-insol. product is formed characterized by a high content of easily and difficultly saponifiable benzoyl. Silk fibroin dispersed in H_2O is digested by dog stomach juice or by trypsin. Erepsin acts only after preliminary peptic digestion. Most of the trypsin is hydrolyzed by the tryptic digestion. S. M.

Proteolytic cellular enzymes of Egyptian mummies (about 3000 years) and of the mammoth (30,000 to 100,000 years). O. STEPPUN AND XENIA UTKINA-LYUBONTZOVA. *Biochem. Z.* **226**, 237–42(1930).—The 3 characteristic optima at p_H 4.0, 5.5 and 7–8 which have been observed for the intracellular proteolytic enzymes of various living organisms for casein are also corroborated for the Egyptian mummy and the mammoth, *i. e.*, organisms which have been in a state of preservation for 3000 to 100,000 years. The present-day cellular enzymes therefore digest mummy or mammoth proteins as well as the cell substrate of any living organism. Each enzyme of the proteolytic system of the cell is adapted to act upon a certain substrate but the source of the substrate does not matter, and all are equally well digested. S. MORGULIS

Studies on glyoxalase. FUTOSHI SAKUMA. *J. Biochem.* (Japan) **12**, 247–79 (1930).—The glyoxalase content of the liver is highest, the other tissues contg. 30–60% as much as the liver. In animals kept under normal conditions the glyoxalase content

of the tissues varied very little. The chief difference between the cold- and warm-blooded animals is that the former have only half as much glyoxalase in the liver as the latter. When the tissues of the animals have been deprived continuously of their sugar their glyoxalase content likewise was definitely diminished, but the liver lost the enzyme slower than any other tissue. The study of the glyoxalase content of germinating soy beans shows that the glyoxalase content increases rapidly up to the seventh or eighth day and then decreases, the increase being ascribed to the increase of coenzyme rather than that of the enzyme itself. By successive treatment of animal tissues with alc. and ether a dry glyoxalase prepn. was made which could be kept unchanged for at least 4 weeks and represented at least 70% of the original tissue activity. The enzyme could be effectively extd. from the dry powder by shaking with a neutral liquid for an hr. or two depending upon the temp. On dialyzing in a collodion bag against distd. H_2O the glyoxalase soln. lost its activity in 5 hrs. but this could be definitely restored by adding boiled tissue juice. Glucose or polyglucides contg. glucose accelerated the activity of dialyzed or non-dialyzed samples of glyoxalase, which other hexoses did not do. Phosphate inhibited the glyoxalase activity. Guanine and its derivs. and amino acids cause a rapid disappearance of methylglyoxal directly with the production of NH_3 and CO_2. S. MORGULIS

The reactions of cyanide with globin hemochromogen. M. L. ANSON AND A. E. MIRSKY. *J. Gen. Physiol.* **14**, 43–54(1930).—Cyanide reacts with globin hemochromogen (1) without displacing or competing with globin or (2) by displacing globin. The 1st compd. is probably a typical hemochromogen; the 2nd is probably a compd. of cyanide with cyanide hemochromogen. C. H. RICHARDSON

The effect of low pressures on cell oxidation. S. F. COOK. *J. Gen. Physiol.* **14**, 55–70(1930).—The O_2 intake of yeast is reduced to a greater extent by low barometric pressure than by corresponding reduction of the partial pressure of O_2 at atm. pressure. Certain *in vitro* oxidation systems do not show this effect of low pressures. The CO_2 production of yeast is not affected by low pressures. The inhibition of tissue oxidation caused by CO is removed by lowering the pressure. A method for measuring tissue oxidation at reduced barometric pressure is described. C. H. RICHARDSON

The arginine and prearginine groups in edestin. HENRY S. SIMS. *J. Gen. Physiol.* **14**, 87–97(1930).—The dissocn. index of the 3rd group of arginine is $pK_3' = 12.5$ (cf. Schmidt, Kirk and Appleman, *C. A.* **24**, 5577). Titration data of edestin in very alk. solns. indicate a group with titration index $p_{G'} = 12.0$ but present in much smaller quantity than can account for the arginine found on hydrolysis. The theory that the combination of strong base or strong acid with proteins is produced by the formation of salts with "extra groups" of those tervalent acids which can be isolated from the protein, except arginine, is supported by the data. Arginine contributes to the titration curve in much smaller quantity than is found on hydrolysis. This deficiency in the arginine group may be accounted for by the basic group in proteins which have a titration index of $p_{G'} = 3.8$ to 4.6, and which yields arginine on hydrolysis. This may be called prearginine. C. H. RICHARDSON

The combination of edestin with hydrochloric acid. DAVID I. HITCHCOCK. *J. Gen. Physiol.* **14**, 99–103(1930)—Measurements of e. m. f. of cells without liquid junction of the type Ag, AgCl, HCl + protein, H_2, indicate that when dissolved in 0.1 *M* HCl 1 g. edestin (or more probably *edestan*) combines with a max. of 13.4×10^{-4} equivs. of H^+ and 3.9×10^{-4} equivs. of Cl^-. Methods are described. C. H. RICHARDSON

The free energy of glucose and of tripalmitin. HENRY BORSOOK AND HOWARD M. WINEGARDEN. *Proc. Nat. Acad. Sci.* **16**, 559–73(1930).—From the free energy data of Parks, Kelley and Huffmann (*C. A.* **23**, 4877) the theoretical max. work obtainable under physiol. conditions by oxidation of glucose and tripalmitin is computed to be 1.01 and 0.98 of the resp. heats of combustion. For tripalmitin, $-\Delta F_{310} = -211{,}000$ cals. Conversion of tripalmitin into glucose involves a loss of about 21% of the theoretical max. work obtainable, and since the observed difference between the efficiency of carbohydrate and fat, as fuel in animals, is about 11% (cf. Krogh and Lindhard, *C. A.* **14**, 3099), part of the released energy must be available for work, or else fat is utilized as such for muscular work. In plants this is probably not the case (cf. Terroine, Trautmann, and Bonnet, *C. A.* **21**, 3216). K. V. THIMANN

Constitution and electrochemical behavior of protein (PAULI) 2. The variation of electrical resistance with applied potential. II. Thin collodion films (BLINKS) 2. Zwitterions. I. Proof of the Zwitterion constitution of the amino-acid molecule (HARRIS) 2. CO_2 cleavage of pyruvic acid (BOKLUND) 10. Further comparative studies on the influence of *N*-alkali, erepsin and trypsin-kinase on polypeptide-like compounds containing β-aminoisovaleric acid (ABDERHALDEN, REICH) 10.

B—METHODS AND APPARATUS

STANLEY R. BENEDICT

A micro determination of blood sugar. R. B. GIBSON. *Proc. Soc. Exptl. Biol. Med.* 27, 480-3(1930).—The detn. is made on 0.2 cc. of blood obtained from a finger tip puncture. Protein and non-sugar reducing substances are pptd. by using about 2.5 times the amt. of Na tungstate and H_2SO_4 over that in the original Folin-Wu procedure in proportion to the vol. of blood used. The arseno-tungstate sugar reagent with added formaldehyde of Benedict (*C. A.* 19, 2352) develops the color which is permanent. The detailed prepn. of the required 5 standard solns. is given along with a table of blood sugar values from colorimetric readings when the standard is set at 10 mm. In 107 specimens of apparently normal venous blood the blood sugar values varied from 66 to 122 mg. with an av. of 91 mg. per 100 cc. of blood. C. V. BAILEY

Sugar in 0.02 cc. blood by the method of Folin and Malmros. J. F. MCCLENDON. *Proc. Soc. Exptl. Biol. Med.* 27, 773-5(1930).—In order to make duplicate detns. on blood from a cut finger the method of Folin and Malmros (cf. *C. A.* 23, 4492) was applied with the following technic: measure 0.02 cc. of blood in a blood pipet and blow it into 2 cc. tungstic acid soln. in a 5 cc. test tube; rinse the pipet, stir for 1 min. and centrifuge. Transfer 1 cc. of the clear fluid to a 5 cc. graduated tube, and 5 cc. of the standard sugar soln. to another 5 cc. tube. Add to each tube 0.4 cc. of $K_4Fe(CN)_6$ soln. and 0.2 cc. of cyanide-carbonate soln. Boil 8 min., cool in running water 1 min., add 1 cc. of ferric iron-ghatti soln., shake and let stand 1 min. Dil. to 5 cc. with H_2O and make 10 colorimetric readings as rapidly as possible. C. V. BAILEY

Vital staining with methyl red. ROBERT CHAMBERS. *Proc. Soc. Exptl. Biol. Med.* 27, 809-11(1930).—Samples of normal sea water p_H 8.4 were brought to a p_H of 5.0 and 6.0 by the addn. of NaH_2PO_4. Several drops of Clark and Lub's standard 0.4% aq. soln. of methyl red were added to the samples and also to normal sea water. Mature starfish eggs were immersed in the various samples for periods up to $^1/_2$ hr. and then washed in sea water of the same p_H. Eggs from samples of p_H 8.4 and p_H 6 were unstained; those in samples of p_H 5.0 were brilliantly and diffusely colored yellow and contained red granules; this color disappeared when the cells were washed in sea water at a p_H above 6. C. V. BAILEY

The determination of the p_H of blood serum with quinhydrone electrode. MARTIN E. HANKE. *Proc. Soc. Exptl. Biol. Med.* 27, 972-3(1930).—The electrode vessel consists of 2 ordinary glass tubes which fit snugly one inside the other, a rubber connection which holds the tubes in any desired relative position, and a Pt wire sealed into the inner tube. The inner tube contains Hg through which metal contact to the Pt wire is made. The outer tube is 8 cm. long with a 4 mm. lumen giving a total capacity of about 1 cc. By moving the inner tube, fluid is drawn up or expelled from the outer tube. In use the vessel is filled to the 0.2 cc. mark with a clear satd. soln. of quinhydrone in boiled neutral distd. H_2O. Then at a time noted with a stopwatch, serum is drawn up to the 0.4 cc. mark, also a bubble of air for rapidly mixing the solns. The vessel is clamped upright in a beaker contg. satd. KCl and the potential is read at 30, 40, 50 and 60 seconds. An illustrative calcn. is given. C. V. BAILEY

The colorimetric determination of phenols in feces. MME. JONCKHEERE-DEBERGH AND R. GOIFFON. *Compt. rend. soc. biol.* 103, 485-7(1930).—The filtrate obtained after the addn. of tungstic acid to a 10% diln. of feces is treated with $ZnCl_2$ and Na_2CO_3; the $ZnCO_3$ retains sulfides which otherwise interfere with the development of a blue color by the Folin-Denis phenol reagent. The av. phenol content of feces (wet wt.) is 40 mg. per 100 g. (25-125). A low phenol content in the feces has been found assocd. with a high NH_3 content, and a large amt. of phenol with an amt. of org. acids indicating a predominance of fermentations. B. C. BRUNSTETTER

The antimony electrode and the hydrogen electrode. M. VERAIN AND MLLE. TOUSSAINT. *Compt. rend. soc. biol.* 103, 611-2(1930).—The Verain design of the H electrode and the Vlès type of Sb electrode were compared on more than 100 detns. of p_H of blood: in 55% of the cases, the difference was 0.02 p_H or less; 23% gave a difference of 0.03 p_H; 11%, a difference of 0.04 p_H, while in 11% of the cases, the difference was from 0.05 to 0.10 p_H. B. C. BRUNSTETTER

Quantitative blood analysis. M. WAGENAAR. *Pharm. Weekblad* 67, 1093-1100 (1930); cf. *C. A.* 24, 3258.—For identification of blood stains on clothing and estn. of the quantity present, application is made of the fact that blood contains N and Fe in the ratio of approx. 60:1. The stained fabric is analyzed for N and Fe, also an equal area of the unstained portion of the same material, for deduction as a blank. If the values so obtained for N and Fe have a ratio of 60:1, the stain in all probability consists

of blood. Each 30 mg. of N and 0.5 mg. Fe corresponds to 1 g. of blood. The great advantage of this procedure is that the result is independent of the condition of the blood stain, whether the sample is old, decompd., faded by sunlight or strongly heated. A. W. Dox

Acetylcholine and choline from animal organs. I. Preparation from beef blood. J. Kapfhammer and C. Bischoff. *Z. physiol. Chem.* 191, 179–82(1930).—Five l. of beef blood was treated with 8 g. of $C_2H_2O_4$, poured into 15 l. of 96% EtOH, and the filtrate concd. *in vacuo* to 150 cc. The soln. was then treated with 20% CCl_3CO_2H, shaken with Et_2O, evapd. again and finally pptd. with 100 cc. of 4% Reinecke acid. The resulting ppt. of acetylcholine reineckate was washed with H_2O, EtOH and Et_2O. The yield was 2.05 g. from 25 l. of blood. The product was converted into the Au salt by dissolving in 50% MeAc, treating the soln. with Ag_2SO_4 and $BaCl_2$ and pptg. the concd. filtrate with $AuCl_3$. Three recrystns. effected a sepn. into the chloroaurates of choline and acetylcholine, the latter being the more difficultly sol. in H_2O. A. W. D.

A new rapid method for the determination of total fatty acids in feces. Erhard Glaser and Oskar Kahler. *Z. physiol. Chem.* **191**, 187–92(1930).—The method consists in boiling 1 g. of the dry, or proportionally more of the moist, feces 0.5 hr. with 5 cc. of 20% aq. KOH, adding 15 cc. EtOH and filtering. This extn. is repeated twice with the residue, and the combined filtrates are evapd. The evapn. residue is dissolved in hot H_2O and transferred to a Gerber butyrometer. This soap soln. is now treated with an equal vol. of concd. H_2SO_4 (10.5 cc.) and 0.05 g. KOCl. After the evolution of gases ceases 1 cc. of AmOH contg. Sudan dye is added and the app. centrifuged. The red fat layer consists of free fatty acids, including those originally present as such and those formed by sapon. of the fat. The butyrometer stem may be calibrated with stearic acid so that 1 scale division is equiv. to 0.01 g. acid or 0.0104 g. of triglyceride. A. W. Dox

A simple Stromuhr (apparatus for measuring rate of blood current). Robert V. Werz. *Arch. exptl. Path. Pharmakol.* **151**, 168–71(1930). H. Eagle

Methods of testing gastric function. III. The frequency and recognition of gall in siphoned gastric contents. L. Dinkin and Z. Lichtig. *Klin. Wochschr.* **9**, 1499–1501(1930); cf. *C. A.* **24**, 5775.—Duodenal regurgitation into the stomach causes pptn., color tints and lowering of surface tension. A yellow tint in the gastric contents indicates recent regurgitation; heavy flocculi indicate an emptying of the gall bladder. A very blue or green discoloration indicates duodenal regurgitation into the stomach occurred several hours before lavage. The absence of discoloration in the Ewald test meal is probably due to adsorption of the gall substances on the particles. The use of dyes in the test meal, or *particulate* matter, is therefore discouraged. H. Eagle

Examination and evaluation of urine in the apothecary shop. Hans Kaiser. *Süddeutsche Apoth. Ztg.* 70, 519–22(1930).—An address. W. O. E.

A new apparatus for determining the coagulation time of blood. Albert Fischer. *Arch. ges. Physiol.* (*Pflügers*) **225**, 737–9(1930). Arthur Grollman

Potentiometric determination of cystine and cysteine. Kageyu Yamazaki. *J. Biochem.* (Japan) **12**, 207–22(1930).—With the potentiometric titration it was found that pure cystine and cysteine solns. can be accurately titrated with $NaBrO_3$ either in the presence or absence of Br^-. In the presence of other amino acids, however, as in a protein hydrolyzate the titration with $NaIO_3$ in the presence of I_2 is more accurate. Temp. and acidity of the soln. play an important role because of the fact that these factors det. the extent to which cysteine is oxidized to cystine or to cysteinic acid, and thus affects the ratio of the 2 products. The rate of titration with the I_2 also exerts some action, more cystine being formed when the oxidation is carried out slowly while more cysteinic acid results in a rapid oxidation. Tryptophan is the only amino acid which influences definitely the titrating value of cysteine by $NaIO_3$, probably because of its own oxidation in the presence of the cysteine. S. Morgulis

The nature of the Gram compound and its bearing on the mechanism of staining. Allen E. Stearn and Esther Wagner Stearn. *J. Bact.* **20**, 287–95(1930).—The cell wall theory of the Gram reaction mechanism in its ordinary form necessitates the existence in the decolorizer soln. of large dye-mordant mols. Absorption spectra indicate the presence of only free I and free dye in solns. of methyl violet-I ppt. in both alc. and acetone. The b. p. elevation of a soln. of this ppt. in acetone indicates complete dissocn. into I and dye. These data do not contradict the chem. mechanism previously proposed by the authors. John T. Myers

Micro method for the determination of highly unsaturated fatty acids (Tangl) 7.

Apparatus for regulating the supply of oxygen for respiration at high altitudes.

JESSE E. ESHBAUGH. U. S. 1,779,840, Oct. 28. Structural features of a device comprising a pressure-reducing valve, etc.

C—BACTERIOLOGY

CHARLES B. MORREY

The lipoids of tubercle bacteria. XVI. The composition of the total extractable fat of tubercle bacteria. R. J. ANDERSON AND ERWIN CHARGAFF. *Z. physiol. Chem.* **191**, 157–65(1930); cf. *C. A.* **24**, 2490.—The total fat capable of extn. by PhMe from tubercle bacteria cultivated on sterile bouillon was sepd. into unsaponifiable wax, carbohydrates, H_2O- and EtOH-sol. cleavage products and fatty acids. The aq. soln. after the sapon. contains glycerol and probably $PrCO_2H$. The fatty acids consist of satd. solid, satd. liquid and unsatd. acids. The unsatd. acids are in part hydrogenated only with difficulty. The satd. liquid fatty acids contain tuberculostearic acid $C_{18}H_{36}O_2$ and phthioic acid $C_{26}H_{52}O_2$. These 2 acids are accompanied in small quantity by a series of liquid satd. acids, one of the higher members having a titration value equiv. to $C_{40}H_{80}O_2$ and sp. rotation in Et_2O of 8.0°. **XVII. The occurrence of an unsaturated hexacosanic acid in the fat of tubercle bacteria.** *Ibid* 166–71.—The difficultly hydrogenated unsatd. fatty acids of the total extractable fat of tubercle bacteria were catalytically hydrogenated and the Me esters of the reduced acids distd. in a high vacuum. The lower fractions consist mainly of stearic acid. A small quantity of palmitic acid may also be present. The highest-boiling fraction contains a *hexacosanic acid* $C_{26}H_{52}O_2$, with m. p. 82–2.5°, which could not be raised by numerous operations. Conclusion: The fat of tubercle bacteria contains an unsatd. hexacosanic acid which, since on hydrogenation it apparently does not yield the hexacosanic acid 88–9°, must have a branched C chain. **XVIII. A polysaccharide from the lipoids of the tubercle bacteria.** ERWIN CHARGAFF AND R. J. ANDERSON. *Ibid* 172–8.—The carbohydrate fraction obtained by sapon. of the crude lipoids with alc. KOH was dissolved in H_2O, pptd. by excess of basic Pb acetate, the ppt. decompd. by H_2S and the filtrate evapd. to a sirup. Addn. of EtOH then pptd. an amorphous yellowish white powder, which decompd. 190° without melting, showed $[\alpha]_D^{23}$ 42.28°, and contained 2.92% ash, mainly phosphate. Hydrolysis by refluxing 2.5 hrs. with 5% H_2SO_4 yielded mannose (identified as phenylhydrazone), *d*-arabinose (identified as benzylphenylhydrazone), *d*-galactose (identified as methylphenylhydrazone), and inositol (isolated as such). The occurrence of *d*-arabinose is noteworthy, since the *l*-isomer is the form usually found in nature.

A. W. DOX

Oxidation-reduction potentials in relation to bacterial growth. I. Oxidation-reduction potential of sterile meat broth. BERT C. J. G. KNIGHT. *Biochem. J.* **24**, 1066–74(1930).—The electrode potentials have been compared with those indicated by Clark's O/R dyes. It is found that the 2 methods do not indicate the same potential level, a dye indicating a more neg. potential than would be shown by an electrode in broth alone. **II. Method of poising the oxidation-reduction potential of bacteriological culture media.** *Ibid* 1075–9.—A method is described whereby the oxidation-reduction potential of bacteriol. culture media can be held const. BENJ. HARROW

A note on the "zone phenomenon" in human sera: a comparison of antitularense with antiabortus sera. R. R. SPENCER. *U. S. Pub. Health Repts.* **45**, 2383–5(1930); cf. *C. A.* **24**, 4334.—In the series of 54 antiabortus sera showing zones, there were 4 showing a middle zone. Not one of the 65 antitularense sera showing a zone produced a middle zone. In the antiabortus series the prezones were usually wider than in the antitularense series. Of the 2000 sera tested, 329 were pos. against *P. tularensis* and 179 were pos. against *A. abortus*. The technic employed is given and results are tabulated.

J. A. KENNEDY

Carbamide-containing culture media. III. ALB. J. J. VANDEVELDE. *Natuurwetenschap. Tijdschr.* **12**, 141–5(1930); cf. *C. A.* **24**, 2488.—Pure cultures of *Bact. lact. acidi*, *Bact. fluorescens* or mixts. of both produced less acid in sterile milk to which carbamide had been added than in milk without this addn. With *Bact. lact. acidi* the reaction finally turned alk. because of the production of NH_3 from the carbamide. *Bact. fluorescens* produced small quantities of lactic acid.

F. DE LEEUW

The appearance of bacteriophage in mixtures of bacteria and pancreas preparations. MARIE THOMAS. *Z. Immunitäts.* **63**, 521–36(1929).—Mixts. of com. pancreas prepns. and bacteria may give rise to bacteriophage when neither the prepn. nor the bacteria alone will develop it. But this method of producing bacteriophage is not const. or certain. Only one prepn. was active with one strain of dysentery bacillus. J. H. L.

Carbohydrate metabolism of the organisms of the genus Mycobacterium. MAL-

COLM H. MERRILL. *J. Bact.* **20**, 235–86(1930).—Detn. of carbohydrate utilization by these organisms, by noting the appearance of acid in the media, is indefinite and impracticable. The reaction curves when *Myco. leprae* and *Myco. phlei* are grown in mannitol broth and *Myco. chelonei* grown in glucose broth are sufficiently characteristic for differentiation but are so profoundly influenced by slight environmental changes that they may lose their value. The reaction changes in plain and carbohydrate broth tend toward progressive increase in alky. This change is less rapid in the presence of utilizable carbohydrates. Detns. of carbohydrates indicate a rather wide utilization. Increase in alky. is assocd. with increase in NH_3, and is usually directly proportional. NH_3 production was distinctly less for a given amt. of growth in the presence of utilizable carbohydrate, and here the reaction change was less. The higher the concn. of carbohydrate, within the limits of growth, the less the increase in NH_3 and the change in reaction. The NH_3 content of the media varied directly as the p_H with each organism. There is no accumulation of carbohydrate cleavage products, the effect on p_H being due wholly to alteration of protein cleavage. This is different from the conditions with other bacteria. There is no inhibition of growth by products of carbohydrate cleavage as with other bacteria. The amt. of CO_2 formed varies directly with the growth of the organisms in both carbohydrate-contg. and carbohydrate-free media, and was much more than that possible from the carbohydrate disappearing. Much more was formed per mg. of NH_3 in the presence of utilizable carbohydrate. Removal of CO_2 from the atm. did not inhibit growth appreciably. The organisms could not be grown anaerobically. If the carbohydrate mol. is attacked it is completely oxidized to CO_2 and H_2O without the accumulation of demonstrable intermediate products. JOHN T. MYERS

Rennin production by Bacillus prodigiosus (Serratia marcescens). G. CORINI. *J. Bact.* **20**, 297–8(1930).—The rennin which is produced differs from calf rennin in that it acts on heated, even autoclaved, milk, and in being highly thermostable since it can be destroyed at 100° only if heated for more than 15 min. JOHN T. MYERS

The use of the Schardinger reaction for the differential diagnosis of B. pestis and B. pseudotuberculosis rod. Pfeifferi. N. IVANOVSKII AND T. SASSYKINA. *Zentr. Bakt. Parasitenk.*, 1 Abt., **117**, 535–9(1930).—Both organisms reduced methylene blue (Schardinger reaction), but the reaction is weaker with *B. pestis*. The quant. reaction will differentiate between the organisms. JOHN T. MYERS

Differential staining of dead and living bacilli. FRIEDRICH WILHELM BICKERT. *Zentr. Bakt. Parasitenk.*, 1 Abt., **117**, 548–51(1930). JOHN T. MYERS

The growth-promoting action of hydrogen sulfide on diphtheria bacilli. FRIEDRICH A. LENTZE. *Zentr. Bakt. Parasitenk.*, 1 Abt., **118**, 51–9(1930).—Diphtheria bacilli in mixed cultures produced larger colonies and had better metachromatic granules than when in pure culture. These organisms produced volatile org. compds. such as amines and in particular H_2S, the latter in concns. of 1:100,000 to 1:10,000. These concns. of H_2S produced the same results as in mixed cultures. H_2S does not act as a foodstuff but stimulates bacterial metabolism. It has a very slight similar effect on pseudo-diphtheria bacilli. JOHN T. MYERS

The growth of paratyphoid-like organisms on synthetic culture media. KARL L. PESCH AND FRIEDRICH-ELIZABETY KOCH. *Zentr. Bakt. Parasitenk.*, 1 Abt., **118**, 129–36(1930). JOHN T. MYERS

The carbon metabolism of the Shiga-Kruse dysentery bacillus. F. W. WIEHMANN. *Zentr. Bakt. Parasitenk.*, 1 Abt., **118**, 150–2(1930).—C can be assimilated from only a small no. of compds. JOHN T. MYERS

A study of the bactericidal action of ultra-violet light. III. The absorption of ultra-violet light by bacteria. FREDERICK L. GATES. *J. Gen. Physiol.* **14**, 31–42 (1930); cf. *C. A.* **24**, 2490.—The conclusion of previous investigators that the shorter the wave length of ultra-violet light the greater the bactericidal action is erroneous. Max. bactericidal efficiency is reached between 260 and 270 mμ. The reciprocal of this abiotic energy curve suggests sp. light absorption by a single essential substance in the cell. This substance is probably not uniformly distributed throughout the cell protoplasm. Methods are described for detg. the absorption curve of intact bacterial cells, and curves for *Staphylococcus aureus* and *Escherichia coli* are given. Further work is in progress. C. H. RICHARDSON

Killing of colon bacilli by x-rays of different wave lengths. RALPH W. G. WYCKOFF. *J. Exptl. Med.* **52**, 769–80(1930); cf. *C. A.* **24**, 5789.—X-ray beams of wave lengths lying in the range between 4 and 0.5 A kill *E. coli* in a semilogarithmically linear fashion; that is, 1 absorption of any of these radiations is sufficient to kill. Though death results from a single absorption, only about 1 hit in 4 with Ag K and 1 in 60 with Ag L radiation

is deadly. The course of curves constructed from these expts. suggests that the portion of the bacterium which is essential to its continued life has a total approx. 0.01 of the cell vol. For Cu and harder radiations the biol. action of the rays is proportional to their measured air ionization. The same biol. change with the softer Cr K and Ag L x-rays seem to require a somewhat more intensely ionizing beam. C. J. WEST

Formation of CH_4 from CO and H by bacteria (LIESKE, HOFMANN) **21.** Sugar solutions derived from peat [used for cultivation of microörganisms] (Brit. pat. 332,235) **18.**

D—BOTANY

THOMAS G. PHILLIPS

The iodide-splitting capacity of the Phaeophyceae. HARALD KYLIN. *Z. physiol. Chem.* **191**, 200–10(1930).—The I volatilization by marine algae, reported by other investigators, was studied more in detail with *Laminaria digitata* collected off the west coast of Sweden. If the exptl. conditions are planned so as to duplicate as closely as possible the natural conditions, such volatilization of I cannot be demonstrated. However, under certain conditions, *e. g.*, treatment of the leaf surface with distd. H_2O, it is possible to detect I volatilization. Only the living thallus parts have this property, and immediately after death of the organism it disappears. The necessary factors for the reaction are iodides, iodide-oxidases and O. In the *Laminaria* species both iodides and their oxidases are present and as soon as these factors are brought together under favorable conditions, free I is liberated. Both of these factors occur in the superficial cells, but only when the iodides pass out into the outer wall does the reaction occur. The free I is therefore formed in the outer wall of living superficial cells. The enzyme is thermolabile and is inactivated by heating 1 min. on a boiling water bath. A dried prepn. obtained from surface scrapings retains its activity after 10 min. contact with concd. AcOH, or 5 min. contact with 5% HCl or H_2SO_4. The problem of I volatilization is in reality a question of permeability. Among the factors which accelerate the reaction are small doses of Et_2O or $CHCl_3$, a faintly acid reaction and distd. H_2O. These factors facilitate the release of iodides, but at the same time kill the organism more or less rapidly. The diffusion is influenced also by the natural variations, between 2.5 and 3.0%, of the salt content of sea water. The lower concn. causes a diffusion of the salt constituents of the surface cells into the outer membrane where the liberation of I occurs.
A. W. Dox

Biochemistry of the smut diseases of cereals. III. The copper adsorption of the spores of loose smut of oats (Ustilago avenae (Pers.) Jens). ALEXANDER TERENYI. *Z. physiol. Chem.* **192**, 274–80(1930); cf. *C. A* **24**, 1883.—The spores of oat smut adsorb 1.2–50% more Cu from $CuSO_4$, $Cu(OAc)_2$ and $Cu(NH_3)_4SO_4$ solns. than those of wheat smut. The Freundlich formula: $x = R(C - x)^n$ is valid here also. These spores are much less sensitive to the Cu adsorbed in the spore walls, since 3% of adsorbed Cu is required to inhibit germination, as contrasted with 0.5% for the wheat smut spores. After 15 min. treatment with the Cu solns. the germinating power of the spores can be restored by HCl; in this respect their behavior is the same as that of the wheat smut. Unlike the wheat spores, however, they do not regain their germinating power after a 24 hr. treatment with Cu followed by HCl, indicating that the adsorbed Cu has penetrated into the inner layers. Treatment with $Cu(NH_3)_4SO_4$ destroys both kinds of spores.
A. W. Dox

Light and the plant. JOH. RICHTER. *Pharm. Zentr.* **71**, 545–9(1930).—A discussion of the various factors affecting plants most profoundly in the presence and absence of light, notably in the production of chlorophyll. W. O. E.

Some aspects of the chemistry of green leaf cells. HUBERT B. VICKERY. *Sci. Monthly*, Nov. 1930, 408–21. E. H.

Chemical examination of the seeds of Cassia tora, Linn. I. H. SUBBA JOIS AND B. L. MANJUNATH. *J. Indian Chem. Soc.* **7**, 521–6(1930).—The leaves, seeds, roots and stems of the shrub *Cassia tora* are used in medicines. The seeds have previously been shown to contain a glucoside of a substance that resembles emodin, to which the medicinal properties have been ascribed. In a petr. ether ext. of the seeds the following compds. have been found: oleic, linoleic, palmitic and lignoceric acids, and sitosterol. A further study is being made. AMY LEVESCONTE

Some notes on lavender. ÉTABLISSEMENTS ANTOINE CHIRIS. *Parfums de France* **8**, 227–40(1930).—In French and English. The general botanical characteristics of lavender, its morphological and biol. variations and general considerations on its cultivation, harvesting and treatment are given. The superiority of lavender concrete over the distd. oil is brought out. A. PAPINEAU-COUTURE

Studies on penetration of dyes with glass electrode. IV. Penetration of brilliant cresyl blue into Nitella flexilis. MARIAN IRWIN. *J. Gen. Physiol.* **14**, 1–17(1930); cf. *C. A.* **21**, 1131.—Studies on the p_H value of the sap of *N. flexilis* by means of the glass electrode show that brilliant cresyl blue penetrates the vacuoles in the form of free base and upon gaining contact with the sap is at once partly converted to dye salt. The resulting increase in p_H value of the sap is due to the presence of the dye and not to some other alk. substance When the cell protoplasm is squeezed into the sap the p_H of the mixt. is higher than that of pure sap but the behavior of the mixt. in respect to the dye is similar. **V. Why does azure B penetrate more readily than methylene blue or crystal violet?** *Ibid* 19–29.—Further expts. show that azure B penetrates the vacuoles of *N. flexilis* chiefly as free base. Crystal violet exists only in one form between p_H 5 and 9.2. It does not alter the p_H of the sap at the concns. used. With azure B and methylene blue the rise in p_H of a mixt. of sap and protoplasm is not so pronounced as with sap when the dye penetrates into the vacuoles. The behavior of living cells to these dyes is explained by a theory of "multiple partition coeffs." previously described. Cf. *C. A.* **22**, 1612, 4580; **23**, 4243. C. H. RICHARDSON

The accumulation of electrolytes. I. The entrance of ammonia into Valonia macrophysa. WM. C. COOPER, JR. AND W. J. V. OSTERHOUT. *J. Gen. Physiol.* **14**, 117–25(1930).—NH_4Cl in sea water enters cells of *Valonia* reaching a concn. in the sap of over 40 times that in the sea water. It seems to enter as undissocd. NH_3 or NH_4OH reaching a pseudoequil. in which activity of undissocd. NH_3 (or NH_4OH) is the same inside and outside. When it first enters the cell the p_H of the sap rapidly increases but soon reaches a max. and then declines. There is a simultaneous increase in halide in the sap which does not parallel the NH_3 accumulation but reaches an equil. and remains const. The increase in NH_3 content of the sap is accompanied by a decrease in K concn. The entrance of NH_3 decreases the sp. gr. of the sap so that the cells rise to the surface and grow as floating organisms. The growth of these cells is increased. C. H. R.

The influence of copper sulfate on the growth of Piricularia oryzae, with special reference to the temperature as an environmental factor. T. ABE. *Ann. Phytopath. Soc. Japan* **2**, 171–96(1930); *Rev. Applied Mycol.* **9**, 555.—Addn. of Cu sulfate in concns. of $^1/_{400}$ to $^1/_{6,000}$ mol. to the agar medium of *Piricularia oryzae* stimulated development of the fungus at 28°. The optimum temp. for mycelial growth in this strain is 28° and at temps. of 20, 24, 32 and 36° the stimulatory action of Cu sulfate was not apparent. Conidial formation was retarded at all temps. in inverse ratio to the amt. of Cu sulfate at concns. above $^1/_{6,000}$ mol., under which conditions chlamydospores were formed at all the temps. tested, while the color of the colonies underwent striking changes. O. E. SHEPPARD

Chlorophyll deficiency. H. v. EULER AND O. MORITZ. *Arkiv. Kemi, Mineral. Geol.* **10A**, No. 11, 1–15(1930); cf. *C. A.* **23**, 3483, 5213; **24**, 1134, 3534.—Although albino cotyledons of barley show only $^2/_5$ as much catalase as the normal there is no difference in activity between the yellow mutant of Nilsson-Ehle and the normal. In the pumpkin the catalase activity parallels the ability of the etiolated cotyledons to become green. There is no parallelism, however, between the chlorophyll content of green leaves and their catalase activity. J. J. WILLAMAN

The variation of electrical resistance with applied potential. III. Impaled *Valonia ventricosa* (BLINKS) **2.** Dark field microscopy with polygonal illumination (SPIERER) **2.** The oil-bearing Royal Palm tree seed of the West Indies (HEIM DE BALSAC, *et al.*) **27.**

E—NUTRITION

PHILIP B. HAWK

Vitamin D and the antirachitic activation of foods by irradiation with ultra-violet light. F. L. GUNDERSON. *Cereal Chemistry* **7**, 449–55(1930).—Rickets is believed to occur to the extent of 70 to 90% of the infant population and together with dental caries constitutes one of the most widely occurring phys. imperfections of mankind. This situation is in large part due to the limited consumption of vitamin D, which condition is caused by its limited occurrence in natural foods. Most foods can be antirachitically activated by exposure to ultra-violet light such as that of a Hg vapor or C arc lamp. Potency thus imparted is believed to be due to an intramol. rearrangement in the ergosterol mol. Antirachitic potency of irradiated foods is highly stable to ordinary storage and household cooking but is subject to destruction at some of the higher temps. combined with certain other variable factors existent in com. baking. The exact degree of stability cannot be predicted; it must be detd. With rigid biol.

control to insure a desirable and definitely known degree of antirachitic activation the irradiation of foods has large possibilities for improving the human diet. L. H. B.

Cereals and mineral metabolism. M. S. FINE. *Cereal Chemistry* **7**, 456–65 (1930).—Rats were fed for long periods on diets contg. 60% whole wheat, and 60% oats with suitable variations in the Ca:P ratios in 2 series. By means of x-ray examns. progressive bone changes were observed. It is concluded that occurrence or non-occurrence of rickets on both these grain diets can be controlled by proper adjustment of the Ca:P ratio within wide limits of consumption levels of these elements. Evidence of spontaneous cures on rachitogenic wheat diets is presented. With a comparable oat diet there is less tendency toward such spontaneous cure. Growth and food consumption were better on the wheat than on corresponding oat diets. These differences are in harmony with data reported by Mellanby, by Steenbock, Black and Thomas and by Burton. L. H. BAILEY

Glycogen formation in rats. III. Diets containing 87.5 per cent of total calorific value in lactose, glucose and sucrose. ESTHER M. GREISHEIMER AND OLGA H. JOHNSON. *Proc. Soc. Exptl. Biol. Med.* **27**, 769–70(1930).—The rats fed on the lactose diet developed diarrhea and ate less than rats on the other diets. The feeding periods varied from 16 to 18 days. The liver glycogen averaged 3.15 ± 12% on the lactose diet, 4.89 ± 0.21% on the glucose, and 4.89 ± 0.2% on the sucrose. If lactose were as easily digested and absorbed as the other sugars, glycogen would be as readily formed from lactose as from glucose or sucrose. **IV. Diet containing 87.5 per cent of total calorific value in maltose.** *Ibid* 770–1.—The liver glycogen formed on the maltose diet was considerably higher than that formed on the control diet. C. V. BAILEY

Increased resistance of rachitic rats fed irradiated food. ELIZABETH CHANT ROBERTSON AND JOHN R. ROSS. *Proc. Soc. Exptl. Biol. Med.* **27**, 999–1002(1930).—Of 89 rats fed a rachitic diet including nonirradiated whole wheat, 5% survived a *per os* enteriditis infection, as compared with 30% survival of 94 rats fed a similar diet including irradiated whole wheat. C. V. BAILEY

The development and growth of dogs raised with an artificial milk containing visceral proteins. MAURICE RENAUD. *Compt. rend. soc. biol.* **103**, 232–4(1930).—The following ration gave excellent growth of young puppies over a period of 7 to 60 days; milk serum, 1000; cream, 40; casein, 20; milk albumin, 10; beef tissue (liver, spleen, brain, blood), 30; and to guard against vitamin deficiency, fruit juice and yeast. The vigor was fully as good as that of controls fed on the mother milk. B. C. BRUNSTETTER

The effect of irradiated ergosterol on the white corpuscles of rabbit blood. A. C. FRASER *Compt. rend. soc. biol.* **103**, 461–2(1930).—Toxic doses of irradiated ergosterol (15–25 mg. per kg.) given daily to the rabbit *per os* cause a decrease in the no. of lymphocytes in the blood, and an increase in the no. of neutrophile polynuclears and of monocytes. B. C. BRUNSTETTER

Further experiments on irradiated ergosterol. A. WINDAUS. *Nachr. Ges. Wiss. Göttingen Math.-physik. Klasse* **1930**, No. 1, 36–57(1930); cf. *C. A.* **24**, 4518.—Vitamin D was found to be a low-melting oil, having a slight neg. rotation and an absorption band at 270 A. U. It is stable in soy oil but decomps. slowly *in vacuo* without solvent. It is rapidly decompd. by heating at 150°, by excessive irradiation, by O_2, or by treatment with NaOEt. In the last case a dihydro alc. originates which may amount to 50% of vitamin prepn. This compd. has no absorption bands above 240 A. U. The prepns. of vitamin D also contain a toxic substance which is probably distinct from the antirachitic factor although the prepns. most active in curing rickets are at the same time most toxic. The toxic compd. has no absorption band above 260 A. U. but has a characteristic one at 247. A compd. with absorption bands at 280–290 A. U. and a cryst. alc. having no lines above 240, both of which are strongly dextro-rotatory, also originate from vitamin D. H. J. DEUEL, JR.

Investigations on irradiated ergosterol. ADOLPH WINDAUS. *Nachr. Ges. Wiss. Göttingen Geschäft Mitt.* **12**, 47–53(1929–30).—A report of earlier work. H. J. D., JR.

The group of water-soluble vitamins and their relationship to each other. II. The significance of alkaline heamatin, age of rats, and the composition of diet in vitamin-B deficiency. W. KOLLATH. *Arch. exptl. Path. Pharmakol.* **150**, 236–55(1930); cf. *C. A.* **24**, 1887.—Alk. hematin, and apparently also deuterohemin, added to a vitamin-poor diet which usually initiates a scurvy-like disease, cause 76% of young rats to develop beriberi, as compared to a normal incidence of 10%. Older rats have a much greater spontaneous incidence of beriberi (54.5%) on this same diet. Iron salts do not have this effect. Casein, extd. with 96% alc. or 1% HCl, does not affect this hematin-induced beriberi. It is suggested that the importance of hematin as a food factor is that it causes anaerobiosis in the intestine by catalyzing the oxidation of unsatd. fatty

acids. It is noteworthy that a buffered enzyme mixt. added to a vitamin-poor diet doubled the life of the animals, and that no characteristic disease syndrome developed.
H. EAGLE

Comparative value of different kinds of molasses in lamb-fattening rations. GEO. E. MORTON. *Colo. Agr. Expt. Sta., Report for 1929*, 16(1930).—Lamb-feeding expts. have indicated a higher value for beet molasses than for cane molasses when proper care is exercised in gradually introducing the beet molasses into the ration. With the new Ba process for extg. addnl. sugar from Steffens discard molasses, a new final discard molasses is produced. This molasses contains a higher % of carbohydrates than the Steffens molasses but more of the sugar is raffinose. The tests are being continued.
C. R. FELLERS

Observations on a diatom (Nitzschia closterium W. SM) as a source of vitamin A. BASHIR AHMAD. *Biochem. J.* **24**, 860–5(1930).—*Nitzschia* and the oil obtained from it are good sources of vitamin A. The extd. oil gives a pos. reaction with $SbCl_3$. Carotene is probably responsible for the greater part of the biological activity of the oil.
BENJAMIN HARROW

Vitamin A of butter. RICHARD A. MORTON AND ISIDOR M. HEILBRON. *Biochem. J.* **24**, 870–3(1930).—Non-saponified fraction from butter contains carotene, vitamin A, and an unidentified substance (selective absorption at 272$\mu\mu$). BENJAMIN HARROW

Carotene and vitamin A. The transformation of carotene into vitamin A as shown by a study of the absorption spectra of rat-liver oils. NORMAN S. CAPPER. *Biochem. J.* **24**, 980–2(1930).—The liver oil of rats suffering from vitamin A deficiency shows no absorption band at 325$\mu\mu$; but the liver oil of similar rats which had been cured by addn. of carotene to the diet did show this absorption band. The band at 325$\mu\mu$ is attributed to vitamin A. Carotene does not show this band. Vitamin A has therefore been synthesized *in vivo* from carotene. BENJAMIN HARROW

Effects of cystine diet on keratin composition in rabbit wool. JOHN BARRITT, ALBERT T. KING AND JAMES NICHOL PICKARD. *Biochem. J.* **24**, 1061–5(1930).—No differences in S content in fur were found between the control rabbits and those fed on the cystine-rich diet. BENJAMIN HARROW

The chemical constitution of the carotenoid pigments and the relation of carotene to vitamin A. A review. JOHN M. GULLAND. *Chemistry and Industry* **49**, 839–47 (1930). E. H.

A new basis for evaluating the calcium and phosphorus content of diets. JOSEF SCHNEIDER. *Chem. Listy* **24**, 181–5(1930).—If a normal human body receives Ca and P in the same ratio in which it deposits these 2 elements in its ash depots which for bone is Ca:P::1:0.444, and if the quantity of Ca taken in during a 24-hr. period lies between 1 and 1.33 g., no vitamin D or radiation of the body or food is necessary. Foods in which this ratio is approached are: lemons, oranges, celery, cauliflower, cabbage, milk, turnips, cheeses, cream and carrots. The Ca:P ratio here ranges from 1:0.417 to 1:0.821. Diets may also include bone in which the Ca:P ratio is very favorable for absorption. Certain races (Tartars, Arabs) base their diet upon milk and its products without involving vitamin D; the Ca:P ratio is close to that of the body and no disturbance is encountered. Only in diets in which the Ca:P ratio becomes 1:1.06 or 1:1.4, etc., does the vitamin begin to function. FRANK MARESH

The significance of bile acids in the carbohydrate metabolism. VIII. The mechanism of the hypoglucemic action of bile acids. KANEJI TSUJI. *J. Biochem.* (Japan) **12**, 139–60(1930).—Administration of bile acids lowers the fasting blood-sugar concn. in rabbits. This hypoglucemic effect can be prevented by sectioning the splanchnics, which leads to the conclusion that the bile acids paralyze the sympathetic. Similarly, the antagonistic effect of the bile acids on the adrenaline hyperglucemia is prevented by splanchnectomy. Long after this operation adrenaline glucosuria fails to appear with or without administration of bile acids, because of the lowering of the threshold for sugar excretion. Following the sectioning of the vagus nerve small doses of bile acid have either no influence or actually lower the hypoglucemic action, whereas large doses increase it. Since this hypoglucemic effect can be increased also by K ions, it is concluded that the bile acids stimulate the parasympathetic. The bile acids inhibit the nerve impulses from the sugar center in the medulla oblongata. The bile acids then exert their action through the autonomic nerves either by direct action on the liver or indirectly through the effect on the adrenals, and aid in regulating the carbohydrate metabolism by inhibiting the mobilization of glycogen and promoting its formation in the liver and muscles. S. MORGULIS

Further observations on the relation of carotene to vitamin A. J. C. DRUMMOND, B. AHMAD AND R. A. MORTON. *J. Soc. Chem. Ind.* **49**, 291–6T(1930).—Carotene, in

doses as low as 0.005 mg., promotes growth in rats depleted of vitamin A. Previous failure to demonstrate this was due to the use as a vehicle of purified Et oleate whose oxidation affected the carotene. Paraffin oil, hydrogenated cottonseed oil, and Et laurate are stable vehicles and the latter is recommended. The vitamin A of plant foodstuffs is probably carotene. Growth tests with liver fat from rats fed carotene indicate that the latter is converted into vitamin A which is probably a colorless substance, since the activity of the fat is greater than that indicated by its yellow color. The growth-promoting activity, however, was much less than was expected from its chromogenic value ($SbCl_3$). Future methods for the assay of vitamin A will probably be spectrometric. A sample of palm oil was a rich source of vitamin A. Dihydro-α-crocetin which produces a blue color with $SbCl_3$ cannot replace vitamin A in the diet.

BERNARD L. OSER

The toxic effects of irradiated ergosterol. J. C. HOYLE. *J. Pharmacol.* **38**, 271–89 (1930).—Rats on a synthetic diet fed large amts. of irradiated ergosterol show marked loss in wt., and deposits of Ca in walls of blood vessels, kidneys and heart muscle. When the animals are on a bread and milk diet, these toxic effects are absent, although there is a slight loss in wt.

C. RIEGEL

The importance of magnesium in human nutrition, and its influence in the formation of cancers. CARLO MARCHI. *L'Alimentazione* **1**, 8–14(1930).—See *C. A.* **24**, 5062.

R. SANSONE

Morphological changes of the fore-stomach of the mouse due to feeding upon specific diets. TOKUJI HIRATA. *Sei-i-kwai Med. J.* **49**, No. 4, 1–26 (English abstract 1–6)(1930).—The effect of 13 different combinations of the diet having deficient vitamin A upon the fore-stomach of mice was analyzed morphologically. Hyperkeratosis was observed, although in a lesser degree than in the albino rat.

S. TASHIRO

Degradation acid of ergosterol (REINDEL, NIEDERLÄNDER) 10.

G—PATHOLOGY

H. GIDEON WELLS

Identity of animal anaphylaxis and human allergy (protein hypersensitiveness). BRET RATNER AND HELEN LEE GRUEHL. *Proc. Soc. Exptl. Biol. Med.* **27**, 574–6(1920).—The blood of a human asthmatic and the blood of an asthmatic guinea pig can passively sensitize the normal human skin and normal guinea pigs. Hypersensitiveness in man and anaphylaxis in the lower animal are fundamentally dependent on a common anaphylactic antibody.

C. V. B.

Insusceptibility of the albino rat to experimental amyloidosis. B. L. ROBINSON AND H. S. THATCHER. *Proc. Soc. Exptl. Biol. Med.* **27**, 580–2(1930).—Nitrose injection produced amyloid in 46.6% of mice; it was ineffective in adrenalectomized rats and even in cases where infection was present.

C. V. BAILEY

Further observations on hemagglutination by tumor extracts. K. LANDSTEINER. *Proc. Soc. Exptl. Biol. Med.* **27**, 813–4(1930).—Six g. of rat sarcoma was ground with 5 cc. H_2O and poured into 25 cc. of boiling water slightly acidified with 3 drops of 5% AcOH. The suspension was heated to boiling, cooled, centrifuged and the supernatant fluid neutralized and evapd. to dryness by a special technic which avoids oxidation. The dry material was dissolved in 5 cc. saline soln. contg. 0.2% cysteine This soln. had a stronger activity than the original tumor ext.; it agglutinated rabbit blood instantly and in contrast to the original ext. it agglutinated also the blood of sheep, horse and guinea pig.

C. V. BAILEY

Observations on intestinal obstruction following the intravenous injection of particulate material. OWEN H. WANGENSTEEN AND H. HAMILTON COOKE. *Proc. Soc. Exptl. Biol. Med.* **27**, 957–8(1930).—The reticuloendothelial system of the rabbit was partially blocked in its phagocytic activity by daily intravenous injections of a colloidal prepn. of graphite; in such rabbits the time of survival, following complete intestinal obstruction 10 cm. from the ileocecal valve, was definitely shortened. C. V. B.

Influence of the medium on malignant cell division. R. REDING AND A. SLOSSE. *Ann. bull. soc. roy. sci. med. nat., Bruxelles* 1929, 232–59.—A review of Reading's theory of the origin of cancer as due to an alkalosis of tissue fluids. *Alkalosis*, resulting in lowering of blood Ca, and assocd. with glucemia, creates a medium favorable to rapid cell division and leads to malignancy. Alkalosis is found to precede the onset of cancer; it diminishes following any temporary improvement brought about by irradiation, operation or parathyroid hormone, and reappears following relapse. Relatives of cancer patients or patients predisposed to cancer exhibit a moderate alkalosis.

R. BEUTNER

The origin and nature of antitoxins and antibodies in general. G. RAMON. *Japan Med. World* 10, 66–74(1930).—The antitoxins and antibodies in general find their origin in the formation of humoral complexes formed from substances furnished by the organism and from elements derived from the sp. antigen by physicochem. or simpler phys. processes carried out in the medium of the blood. RACHEL BROWN

Cobra venom, rendered inactive by the action of ultra-violet light, has lost its immunizing power. ANDRÉ ARTHUS. *Compt. rend. soc. biol.* 103, 130–2(1930).—A soln. of cobra venom (2 mg. dry residue per cc.) in 1% saline soln. was mixed with an equal vol. of 2% gelatin soln. The addn. of gelatin prevents the flocculation of the venom which otherwise occurs several hrs. after exposure to ultra-violet light. Irradiation was given for 2 hrs. at a distance of 60 cm. The effect of the treatment was to destroy both the toxicity and the antigenic power of the cobra venom. B. C. BRUNSTETTER

Investigations of intertissue p_H in diabetes insipidus. G. MARINESCO, O. SAGER AND E. SORU. *Compt. rend. soc. biol.* 103, 171–2(1930).—The tissue p_H of 4 normal subjects was 7.12–7.14; the tissue p_H of 4 cases of diabetes insipidus was 6.95, 7.02, 7.03 and 6.67. The appearance of a very acid tissue p_H is a sign of cachexia and is due to acid substances resulting from an abnormal metabolism. B. C. BRUNSTETTER

Blood phosphorus, inorganic and lipoidal, in hyperthyroidism. C. I. PARHON AND M. CAHANE. *Compt. rend. soc. biol.* 103, 284–5(1930).—The results obtained by feeding dried thyroid gland to 5 rabbits and 2 dogs indicate after comparison with analyses on control animals that hyperthyroidism tends to increase inorg. P and to decrease lipoidal P. B. C. BRUNSTETTER

The blood sulfur in hyperthyroidism. C. I. PARHON AND M. CAHANE. *Compt. rend. soc. biol.* 103, 191–2(1930).—Dried thyroid gland (2–12 g. per day) was fed to 6 dogs over a period of 21–38 days, resulting in a loss of weight of 1.3–3.9 kg. The av. total S in the blood before treatment was 0.085 g. per 1000 (0.052–0.118); after treatment, the av. was 0.056 g. per 1000 (0.038–0.075). Two rabbits were given 0.3 g. of dried thyroid per day for 12 days: the total blood S before treatment was 0.046 and 0.056 g. per 1000; after treatment, it was 0.054 and 0.073 g. per 1000. B. C. B.

The effect of magnesium hyposulfite on serological flocculation reactions. E. TECHONEYRES AND MLLE. S. PILLEMENT. *Compt. rend. soc. biol.* 103, 674–5(1930).—The addn. of 0.4 cc. of $N/1$ MgS_2O_3 to 0.8 cc. of serum suppresses or considerably diminishes the flocculating action of perethynol. Lumiere's observation that alk. hyposulfites tend to dissolve colloidal ppts. is quantitatively confirmed. B. C. BRUNSTETTER

The anatomical localization of uremia in the experimental renal insufficiency of the dog. M. FRANKE. *Compt. rend. soc. biol.* 102, 1086–8(1929); cf. *C. A.* 22, 3220.—Previous work is summarized and extended. Exptl. renal insufficiency in dogs was produced by the injection of $HgCl_2$ and of $UO_2(NO_3)_2$. Confirming previous conclusions, the increased concn. of residual N in the blood is paralleled by lesions of the epithelia of the renal tubules; the renal glomeruli are intact. B. C. BRUNSTETTER

Phosphatide deposition in the spleen cells in Niemann-Pick disease compared with the lipoid chemistry of Gaucher disease and of Schüller-Christian disease. EMIL EPSTEIN AND KARL LORENZ. *Z. physiol. Chem.* 192, 145–70(1930).—The 3 main types of general lipoidoses, the Niemann-Pick, the Gaucher and the Schüller-Christian diseases are characterized by very definite chem. findings. The term "general lipoidoses" taken in its broadest sense includes all those disease conditions in which there have developed extensive deposits of lipoids in various organs, or lipoid deposits in organs and cells which form a functionally interdependent system. In all lipoidoses the substances deposited consist of complex lipoid-fat mixts. Each type, however, is characterized by the predominance of a definite lipoid. Four types may be distinguished: (1) phosphatide lipoidosis of the Niemann-Pick type, by the Et_2O-sol. lecithin and presumably also by hitherto undifferentiated Et_2O-insol. but EtOH-sol. phosphatides; (2) cerebroside lipoidosis (hepatosplenomegaly) of the Gaucher type, by the cerebroside kerasin, in individual cases possibly also by a related cerebroside; (3) cholesterol lipoidosis of the Schüller-Christian type, by cholesterol and its esters; (4) cholesterol xanthomatoses of skin, mucosae and internal organs, assocd. with diabetes or icterus, and not included in the preceding groups. The chemistry and phys. chemistry of the lipoids characterizing the individual disease types, especially in their influence on the colloidal dispersion of the lipoids concerned, are of the utmost importance in detg. the symptoms and prognosis of the disease. The application of lipoid chemistry has done much to elucidate the pathology of general lipoidoses but the greatest problems of chemism and origin still await solution. A. W. DOX

The chemistry of hypertrophy and atrophy of muscles. I. Tension and relaxation of skeletal muscles. H. WASSERMEYER AND A. ROHRBACH. *Arch. exptl. Path. Pharma-*

kol. **150**, 133–45(1930).—Rabbit muscles (quadriceps and sartorius) kept under moderate tension for days show moderate hypertrophy, accompanied by delayed postmortem vigor, better function, no increase in glycogen, or in postmortem splitting off of NH_3. In atrophy caused by keeping the muscle under maximal tension there is accelerated splitting off of NH_3: in atrophy caused by keeping the muscle relaxed there is no sudden formation of NH_3, but an appreciably increased glycogen, decreased lactic acid and accelerated appearance of rigor. These results indicate that there is some qual. difference in the muscular hypertrophy caused by tension and by exercise. The change in glycogen:lactic acid ratio in relaxation atrophy is possibly due to decreased tonus.
H. EAGLE

The permeability of red cells for chloride ion in diabetes. KONRAD LANG. *Arch. exptl. Path. Pharmakol.* **152**, 168–76(1930).—Increased CO_2 tension in blood usually causes Cl^- to move from the plasma to the red cells. In diabetics, the amt. transferred is only $^1/_2$ the normal amt., possibly because of decreased permeability of the erythrocytes. Following insulin, the degree of Cl shift increases, presumably because of return of permeability toward the normal value. No analogous sugar migration could be demonstrated.
H. EAGLE

The iron content of the organs in icterus. HANS HORSTERS. *Arch. exptl. Path. Pharmakol.* **152**, 198–209(1930).—The normal Fe content of the skin is 10.5 mg./1000 g., increased 100% and more in cases of icterus with a pos. intracutaneous blue test (*i. e.*, blue color in a postmortem $K_3Fe(CN)_6$ skin wheal). Splenic and hepatic Fe content also increase; the proportion of bivalent Fe in the liver is sometimes strikingly increased. Gall bladder bile of such icteric subjects contains 6.1–9.5 mg. % of Fe. The jaundice is due to toxic injury to liver parenchyma. In contrast, the cases with obstructive jaundice and a neg. blue test usually show a lowered Fe content in the skin (5.8 mg. % instead of 10.5), a low proportion of Fe^{++} to Fe^{+++} in the liver, and as high as 17 mg. % of Fe in gall bladder bile. Cases of aplastic anemia show a high proportion of Fe^{++} in the liver and spleen, indicative of marked blood destruction. Skin Fe is highest in the fetus (45 mg. %), yet the $K_3Fe(CN)_6$ test is either neg. or weakly pos., indicating Fe^{+++}.
H. EAGLE

Influencing the sugar metabolism by operative procedures. I. The sectioning of the vegetative nerves in the ligamentum hepatoduodenale in the normal dog. F. DEPISCH, R. HASENÖHRL AND L. SCHÖNBAUER. *Klin. Wochschr.* **9**, 1437–43(1930).—The mild disturbance of sugar metabolism caused by partial extirpation of the pancreas can be partially (in one case completely) cured by sectioning the nerves; there is, however, no effect upon the severe diabetes caused by subtotal pancreatectomy. Periarterial sympathectomy of the vessels of all 4 extremities also causes an improvement in mild cases, possibly because of a neurogenic effect upon sugar content in tissues.
H. EAGLE

Experiments in the demonstration of a carcinolysin in the blood serum of cancerous patients. HERMANN LEHMANN-FACIUS. *Klin. Wochschr.* **9**, 1504 (1930).—Heated carcinoma cells are lysed by the serum of cancerous individuals, apparently because of a reaction with alc.-sol. components of the carcinoma cells.
H. EAGLE

Note on the possible mechanism of diphtheria toxoid formation. LESLIE F. HEWITT. *Biochem. J.* **24**, 983–92(1930).—When diphtheria toxin is incubated with CH_2O, the toxic properties disappear, leaving the antigenic function practically unimpaired. Of the amino N present in fresh diphtheria toxins some 85% remains free in completely detoxified toxoids prepd. by incubation with CH_2O. Maintenance of toxins under reducing or oxidizing condition failed to preduce toxoid. No evidence that toxoid formation is due to the disappearance of free NH_2 groups has been obtained. Some possible mechanisms are discussed.
BENJAMIN HARROW

The mechanism of sugar excretion. I. Glucose. TSANG-G. NI AND POUL B. REHBERG. *Biochem. J.* **24**, 1039–46(1930).—According to the filtration-reabsorption theory, the mechanism of glucosuria must be the failure of the reabsorption to increase as fast as the filtration of sugar increases with rising blood sugar. The percentage of sugar in the reabsorbed fluid varies within wide limits.
BENJAMIN HARROW

Changes in the amount of blood chloride during asphyxiation. I. TAKESHI SASO. *J. Biochem.* (Japan) **12**, 161–85(1930).—During acute asphyxia the chlorides of the whole blood increase appreciably almost within the first min. and continue to do so until death. This is also the case in the plasma, the decrease in plasma chlorides so often observed in animals dying from asphyxia being a postmortem phenomenon. When the animal is asphyxiated slowly the Cl of the whole blood increases gradually, reaching a max. in 10–20 min., then remaining unchanged until death occurs. As the plasma Cl, however, becomes too low, the whole blood Cl also diminishes some-

what but still remains above the initial level to the very end. In prolonged asphyxia the plasma Cl increases during the first 10–20 min., then decreases gradually and just before death falls to a subnormal level. If, however, death results within 30 min. the Cl is affected exactly as was the case in acute asphyxia. In the early phase of prolonged asphyxia, especially that produced by pneumothorax, there is an initial drop in the Cl of blood and plasma. This is attributed to an hyperventilation alkalosis. In acute asphyxia the Cl increase in whole blood resulted from the increased Cl content of the red cells, and plasma and from the relative increase in the plasma vol. due to a reduction in the no. of red cells. In prolonged asphyxia the increased Cl content of the whole blood in the early stages is due to the rise in Cl of the red cells and of the plasma, but subsequently to the high Cl content of the cells alone. In acute asphyxia the no. of red cells is always diminished, while in prolonged asphyxia there is always an increase in the cells. In neither case is the hemoglobin content changed. S. M.

The citric acid content of urine in acidosis and alkalosis. Otto Österberg. *Biochem. Z.* **226**, 162–3(1930).—The normal citric acid output in the urine per day is 0.2 to 7.0 g. Abnormally low values for citric acid are found in cases of serious kidney insufficiency or in acidosis. In chronic uremia no citric acid can be found at all, and in diabetic coma only traces are found. On the contrary, the citric acid output is greater following the administration of $NaHCO_3$. S. Morgulis

Fagopyrism. A biochemical investigation and a critical study of its pathogenesis. H. E. W. Lutz and G. Schmid. *Biochem. Z.* **226**, 67–96(1930).—Fagopyrism or "buckwheat sickness" has been studied on carefully made exts. which have been tested on animals. The presence of a fagopyrum anthocyanin in the flower of the plant is very probable. The buckwheat chlorophyll which is present intact in the ether exts. is not the pathogenic factor of the photosensitivity resulting from the buckwheat. The plant after extn. with alc. is inactive photobiologically but it is also an insufficient food. The aq. portion of the alc. ext. of the flower causes severe intoxication in guinea pigs which is manifest as injury to the central nervous system. A study of the relation of the pathogenesis of fagopyrism to the source and intensity of the light as well as the duration of the illumination shows that this obeys the Bunsen-Roscoe law, and must therefore be a photochem. phenomenon. Feeding with whole buckwheat seeds does not lead to the appearance of beriberi symptoms either in pigeons or in guinea pigs. When the alc. ext. of fagopyrum flowers was dild. with isotonic NaCl to reduce the alc. content to 30% and injected subcutaneously into guinea pigs, these developed secretory conjunctivitis in the unpigmented but not in the pigmented eyelid because of the increased photosensitivity. S. Morgulis

The water-soluble phosphatides of bacteria. M. Eisler and Z. v. Gulaesy. *Zentr. Bakt. Parasitenk.*, 1 Abt., **117**, 500–5(1930).—Twenty-four hr. digestion of typhoid and mouse typhoid bacilli in distd. water at 20° gave a product, probably protein free, which was sol. in water and pptd. by alc. It contains choline and is analogous to the water-sol. phosphatides which have been extd. from plant cells. Intravenous injection of this substance from typhoid bacilli in rabbits produced a serum which gave strong complement binding and agglutination reactions with *B. typhosus* and weak ones with *B. typhi murium*. The substance from mouse typhoid also gave stronger reactions with the homologous organism. John T. Myers

Anaphylaxis against lipoids. M. N. Lebedeva and L. B. Levinson. *Zentr. Bakt. Parasitenk.*, 1 Abt., **117**, 519–35(1930).—Serum from guinea pigs sensitized to hog serum causes contraction of perfused intestine, while normal guinea pig serum does not. Lecithin increases the contraction with sensitized serum but has the same effect in the case of non-sensitized serum. There was no evidence of antigenic power on the part of lecithin. Serum plus lecithin has no more desensitizing action than serum alone. John T. Myers

The influence of lead on agglutinin and precipitin formation in animals already treated with lead. Friedrich-Wilhelm Bickert. *Zentr. Bakt. Parasitenk.*, 1 Abt., 118, 159–63(1930); cf. *C. A.* **24**, 656.—In animals previously immunized and treated with Pb by subcutaneous injection of a 5% soln. of $Pb(OAc)_2$ and the titer allowed to drop, the titer came back up more quickly than in control animals not treated with Pb. John T. Myers

The sugar utilization by trypanosomes (in vitro at 37°) and its meaning in the pathology of trypanosome infections. P. Regendanz. *Zentr. Bakt. Parasitenk.*, 1 Abt., 118, 175–86(1930).—Trypanosomes *in vitro* in blood-serum mixts. utilize sugar. There is little difference between pathogenic and non-pathogenic varieties. J. T. M.

The hemotoxin in Sarcosporidia. Shinichi Sato. *Zentr. Bakt. Parasitenk.*, 1 Abt., 118, 189–96(1930).—See *C. A.* **24**, 5858. John T. Myers

Blood normals for cattle; some pathological values. JOHN ALLARDYCE, R. H. FLEMING, F. L. FOWLER AND R. H. CLARK. *Can. J. Research* 3, 120–4(1930).—Samples of cattle blood were analyzed and the concns. of 10 constituents detd., *i. e.*, cholesterol, sugar, non-protein N, urea N, amino acid N, creatine, creatinine, Ca, inorg. P and chlorides. The normal range for these was found to be nearly the same as that in human blood. Changes in feed from corn to sunflower silage markedly influenced the cholesterol content. Blood samples of cattle suffering from red water, tuberculosis, abortion, blood poisoning, malignant growths and pyelonephritis were analyzed and the constituents were in general within the normal range. Tables accompany the paper. J. W. SHIPLEY

A few colloidal chemical characteristics of rabbit blood as effected by Bordet's bacillus. SETSUNOSUKE TAKAHASHI. *Sei-i-kwai Med. J.* 49, No. 1, 116–30 (German abstract 7–8)(1930).—When *B. pertussis* (I) is injected into the rabbit vein, the sedimentation velocity of the blood increases soon after the injection, and gradually decreases to the normal after 10 days. The colloidal instability of the serum also undergoes similar changes. These changes are greater and more persistent when greater amts. of I are used. There are also considerable changes in resistance against saline and saponin solns. S. TASHIRO

Accelerating action of the blood coagulation by eclampsia urine. KIKUZO SAKURAI. *Sei-i-kwai Med. J.* 49, No. 4, 27–37 (English abstract 6–7)(1930).—It was shown before (cf. *C. A.* 24, 5833) that an injection of the placental ext. into the blood of rabbits results in an appearance of the blood coagulant in the urine. S. examd. the urine of the normal and various pathol. cases for presence of the blood coagulant. The results show that in the first place, normal nitrogenous urinary constituents such as urea, uric acid, creatinine and hippuric acid do not accelerate blood coagulation. Neither normal nor nephritic urine that contains different amts. of albumin accelerates the blood clotting. The urine of eclampsia patients taken during or after the attack shortens the coagulation time of the blood 50–75%, while that of pregnant women excreting a large amt. of albumin does not contain any coagulant. Conclusion: During pregnancy the tissue fibrinogen of the placenta must go into the mother's blood; and if the amt. goes above a certain limit by some unknown metabolic disturbances, an eclamptic attack may occur, followed by an excretion of the tissue fibrinogen of the placenta by the kidney. S. T.

Relationship between diphtheria toxin and blood sugar. TAMOTSU USUI. *Sei i-kwai Med. J.* 49, No. 4, 38–50 (German abstract 7–8)(1930).—Relationship between diphtheria toxin on the blood sugar was investigated with clinical and exptl. materials, blood sugar being detd. by Bang's method. The value of the first detn. of each of 13 light cases (3–96 hrs. after the onset of the disease) lies between 0.0795 and 1.337%, slightly higher than that of the normal. The subsequent analysis of the blood of the same patients during the course of the disease shows practically no difference from that of the normal. The blood sugar of 5 more serious cases shows much greater amts. (0.1513–0.2258%); and of these, the more favorable ones were those whose blood sugar returned to the normal within a few days. The effects of the toxin on the exptl. animals (guinea pig and rabbit) are much more marked, but this hyperglucemia is found only when the toxin or the organisms are injected subcutaneously, the intravenous injection showing no effect at all. Whether or not this toxin has a specific action on the blood sugar is a question, but U. believes that the diphtheria antitoxin lowers this hyperglucemia to a certain degree. S. T.

Studies on the sedimentation velocity of the red blood corpuscles. I. KEIZO MIYOSHI. *Sei-i-kwai Med. J.* 49, No. 6, 1–12 (English abstract 1)(1930).—The factors influencing the sedimentation velocity (I) of the rabbit blood corpuscles are analyzed by using Westergren's method. The results show that the presence of hydrosols such as gelatin and agar agar in the blood plasma increase I, although gum arabic is strangely indifferent. This accelerating effect of the hydrosols occurs even without the plasma present. The plasma accelerates I more than the serum. Of the blood proteins isolated from the blood, the fibrinogen accelerates I most, next serum globulin and serum albumin least. Conclusion: The accelerating factor of I exists in both the plasma and corpuscles. II. *Ibid* 13–34 (English abstract 1–2).—The sedimentation velocity (V) of the red corpuscles is detd. to see if it has any relationship to the cholesterol content of the serum (C). V of the blood of 50 pulmonary tuberculosis patients is 3–11 times faster than that of the normal, while C is on the av. 118 mg. per 100 cc. serum, which is within the limit of the normal. In pregnant women, the increase of C does not occur till the 4th month, while V is markedly increased in the second month. In 50 cases of beriberi, where the av. C is below normal (88 mg.), the av. V is normal.

When the rabbits are fed with lanolin in such an amt. as to increase C 4–7.5 times, their V is the same as that before the feeding. *In vitro*, an addn. of cholesterol to the blood increases V, while that of lecithin retards it. With a ratio of these two in 10:1, V is still accelerated, while a 3:1 ratio retards it. The analysis of the blood of 50 patients, whose V varied considerably, showed no relationship between V and the ratio between C and lecithin. Conclusion: Neither the increase of the ratio as suggested by Kürten and Linzenmeier nor the abs. value of C as suggested by Grossmann and Adberhalden can be responsible for V. S. TASHIRO

Experimental fibrous osteodystrophy (ostitis fibrosa) in hyperparathyroid dogs. HENRY L. JAFFE AND AARON BODANSKY. *J. Exptl. Med.* 52, 669–94(1930).—Parathyroid ext. (parathormone Collip) can be injected into puppies in increasing amts. for long periods without fatal results. Thus time is allowed for bone changes to develop. Long-continued injection leads to progressive decalcification and resorption of the existing bone, to fibrous replacement of the marrow and to the production of the other features characteristic of ostitis fibrosa. Deformities eventually appear. It is safe to assume that the bone changes produced by hyperparathyroidization have the same pathogenesis as those observed in clinical cases believed to be instances of hyperparathyroidism—that is, cases with a neg. mineral balance and decalcification of the skeleton. C. J. WEST

Comparison of the chemical alterations in the blood of rats infected with pathogenic and non-pathogenic trypanosomes. RICHARD W. LINTON. *J. Exptl. Med.* 52, 695–700(1930).—Blood samples from rats infected with *Trypanosoma lewisi* give normal values for lipoid P, lecithin, CO_2-combining capacity and liver glycogen. When these results are compared with the results of similar expts. with *T. equiperdum* infections, on the basis of the concn. of trypanosomes in the blood, it is found that the pathogenicity of the latter organism does not depend upon its nos. as affecting the blood but that it must be in some other way injurious to the host. Whether the injury is due to a true toxin, an endotoxin or mech. interference, is not yet known. C. J. WEST

Serology of syphilis. I. Mechanism of the flocculation reactions. HARRY EAGLE. *J. Exptl. Med.* 52, 717–38(1930).—The lipoid antigen used in the serum diagnosis of syphillis, when colloidally dispersed in water, forms a relatively stable amphoteric suspension with predominantly hydrophilic properties. Although the colloidal particles flocculate at their isoelec. pt. (p_H 1.9), in more alk. reaction the neg. surface potential prevents their cohesion and must be depressed to 1–5 mv. before visible flocculation is obtained. The amt. of electrolyte necessary to depress this surface charge below its crit. value decreases somewhat with increasing concn. of the sol, but is uniformly large. In normal serum hydrophilic protein is adsorbed, forming a protective film around the individual lipoid particles, with a corresponding change in the cataphoretic potential and the isoelec. point toward those of serum protein; the crit potential is not affected and the lipoid remains as stable away from its isoelec. point as in the absence of serum. When the lipoid antigen is added to syphilitic serum, in addn. to this loose absorption of normal protein it combines more or less irreversibly with a specifically altered fraction of the serum globulin (reagin), demonstrable in the washed ppt. both chemically and by sensitization expts. Like adsorbed normal serum, it depresses the surface potential and causes a shift in the isoelec point, but there the similarity ends. The reagin-globulin is rendered water-insol. by its firm combination with the lipoid. The hydrophobic films of reagin have 5 times as great an affinity for each other as the original lipoid surfaces. The reagin-globulin on the lipoid particle can adsorb ("fix") complement; when this protein film is destroyed by heat coagulation the complement-fixing property is lost. The complete analogy between the flocculation reactions for syphilis and the so-called sp. reactions suggests that like agglutinins, precipitins, etc., reagin-globulin represents an antibody response to products of infection. **II. Physical basis of the Wassermann reaction.** *Ibid* 739–46.—The substance in syphilitic serum which is responsible for the Wassermann reaction is assocd. with the globulin fraction of serum. Every pos. Wassermann is accompanied by microscopic or submicroscopic aggregation, which is not an essential feature of the reaction; conversely, after every pos. flocculation test, the washed ppt. will fix complement. An excess of antigen removes both flocculating and complement-fixing substances completely. Heating the lipoid-reagin ppt. to 100° for 1 min. destroys the sensitizing film of reagin-globulin; the avidity for complement disappears simultaneously. Both the flocculating and complement-fixing properties of syphilitic serum are therefore detd. by the same substance, a sp. altered fraction of the serum globulin, reagin. The Wassermann reaction is thus entirely analogous to complement fixation by any antigen-antibody complex. **III. Explanation of the fortifying effect of cholesterol upon the anti-**

gen as used in the Wassermann and flocculation tests. *Ibid* 747–68.—When cholesterolized antigen is dropped into an excess of H_2O, the rapid flocculation of cholesterol (I) crystals is prevented by the fact that, as tiny aggregates form, they adsorb a protective surface of hydrophilic lecithin (*i. e.*, antigen) which endows the particles with its own stable surface properties and thus prevents further aggregation. The colloidally dispersed antigen-I particles have approx. the same isoelec. point, crit. potential and coagulation value as pure antigen particles of the same concn. This adsorption of antigen by the I nucleus is probably detd. by the fact that the former has a lower surface tension against H_2O; at any rate, many surface-active substances cause a similar stable dispersion of I. The colloidal suspension formed by antigen alone is very finely dispersed. I causes a marked increase in the no. of the particles which exceed the limits of dark field visibility, out of all proportion to its mass. The particles remain discrete until the I:antigen ratio exceeds 1:1, when slight microscopic aggregation is observed; microscopic flocculation is seen only when this ratio exceeds 5:1, when there is not sufficient antigen to act as an efficient protective colloid. I therefore causes a coarsened dispersion of antigen by forming a relatively large nucleus upon which antigen is adsorbed. The larger the antigen particle the greater is its avidity for regain per unit surface or mass. The coarsened dispersion caused by I completely explains the greater sensitivity of the cholesterolized antigen in complement fixation. From the consideration of the unsatisfactory nature of I as a sensitizer for antigen, among which is its slight soly. in EtOH, a group of substances have been developed, to be reported later, which make possible an antigen which is 2–10 times as efficient in the Wassermann test as any now available. C. J. WEST

H—PHARMACOLOGY

A. N. RICHARDS

Effect of thyroxine upon normal, hypophysectomized and thyroidectomized tadpoles. BENNET M. ALLEN. *Proc. Soc. Exptl. Biol. Med.* **27**, 35–7(1929).—*Rana aurora* tadpoles, kept for 4 months after the removal of the thyroid gland anlage or the buccal anlage of the hypophysis, metamorphosed rapidly and to an equal degree with controls when placed in thyroxine solns. of 1–500,000, 1–1,000,000 and 1–2,000,000 concns. for periods of 11 to 15 days. C. V. B.

Effect of morphine sulfate by mouth on oxygen consumption in normal humans. H. H. ANDERSON. *Proc. Soc. Exptl. Biol. Med.* **27**, 102–3(1929).—The oral administration of morphine sulfate in doses of 0.1 mg. to 0.5 mg. per kg. body weight was followed within 1 hr. by a slight decrease in O_2 consumption. C. V. BAILEY

Effect of amytal anesthesia on glucose tolerance. J. M. D. OLMSTED AND GEORGE GIRAGOSSINTZ. *Proc. Soc. Exptl. Biol. Med.* **27**, 103–6(1929).—In the dog under amytal anesthesia the pyloric sphincter is kept so tightly closed that sugar introduced into the stomach cannot pass into the duodenum and so be absorbed; absorption from the duodenum itself is greatly diminished. These findings indicate paralysis of the parasympathetic autonomic nervous system. C. V. BAILEY

Exogenous arginine as the precursor of creatine in the dog. R. LORIMER GRANT, ADAM A. CHRISTMAN AND HOWARD B. LEWIS. *Proc. Soc. Exptl. Biol. Med.* **27**, 231–3 (1929).—In the dog, arginine by mouth for 35 days had no effect on the excretion of urinary creatine or creatinine; small doses of creatine by mouth caused a prompt increase in the output of both of these catabolites. C. V. BAILEY

Effect of sodium amytal on the hyperglucemia due to morphine. SELLING BRILL. *Proc. Soc. Exptl. Biol. Med.* **27**, 265–7(1930).—In the dog, Na amytal given intraperitoneally in a dose of 50 mg. per kg. of body wt. greatly inhibited the hyperglucemia induced by the subcutaneous injection of morphine sulfate, 10 mg. per kg. of body wt., given 20 min. later. C. V. BAILEY

Toxicity of acetarsone (stovarsol) and its calcium and sodium salts on oral administration to rabbits and cats. HAMILTON H. ANDERSON AND CHAUNCEY D. LEAKE. *Proc. Soc. Exptl. Biol. Med.* **27**, 267–70(1930).—The min. lethal dose of com. acetarsone given orally to the cat and to the rabbit is between 125 and 175 mg. per kg. of body wt. This is about 4 times the recognized toxicity and indicates the necessity of a revision of the recommended therapeutic dose. The Ca and Na salts of acetarsone seem to be equally toxic. C. V. BAILEY

Observations on the formation of wheals. III. The participation of an unidentified tissue substance. H. L. ALEXANDER, W. K. WEAVER AND F. S. MCCONNELL. *Proc. Soc. Exptl. Biol. Med.* **27**, 486–7(1930).—In the dog, wheals following the intradermal injection of histamine plus skin ext. were larger than those made by histamine alone. C. V. BAILEY

Fractionation of Australian snake venoms. I. Venom of death adder (Acanthophis antarcticus). C. H. KELLAWAY, M. FREEMAN AND F. E. WILLIAMS. *Australian J. Exptl. Biol. and Med. Sci.* **6**, 245–60(1929).—Heating the proteose fraction of the venom caused a diminution of activity. Quant. fractionation of the venom by extn. with 45% EtOH is unattended by any loss of total activity of the venom. When injected subcutaneously in mice or guinea pigs the insol. fraction has but little of the toxicity of the whole venom whereas it possesses all the coagulant activity. The sol. fraction contains the "neuro-toxic" principle, which has a curare-like action. The hemolytic activity is evenly distributed in both fractions, whereas more of the substance which stimulates plain muscle is present in the sol. fraction. Both fractions are equally toxic by intravenous injection in mice and guinea pigs. B. C. A.

A bactericidal study of the value of mercurochrome as a vaginal antiseptic with particular reference to its use in obstetrical cases. H. W. MAYES AND SILKA ULLIAN. *Surgery, Gynecol. Obstet.* **51**, 345–52(1930).—The use of mercurochrome as a vaginal antiseptic during labor reduces the bacterial count of the birth canal. J. B. B.

Sodium amytal-nitrous oxide anesthesia for thyroidectomy. FRANK B. RAMSEY AND WENDELL D. LITTLE. *Surgery, Gynecol. Obstet.* **51**, 352–5(1930).—Na amytal is useful in the preoperative prepns. of patients in thyroid cases to render them free from apprehension. Adequate anesthesis may then be obtained by the use of N_2O with sufficient O to prevent cyanosis. J. B. BROWN

Tribromethyl alcohol (avertin) anesthesia. CHARLES S. WHITE AND JOSEPH KREISELMAN. *Surgery, Gynecol. Obstet.* **51**, 361–4(1930).—The use of tribromethyl alc. with gas or novocaine combines in the highest degree excellence and safety in anesthesia. J. B. BROWN

Aqueous diuresis. L. AMBARD AND F. SCHMID. *Compt. rend. soc. biol.* **101**, 180–2 (1929).—An intestinal diuretic homone was prepd. as follows: 1 kg. of mucosa from beef small intestine was acidified with 40 cc. of 10 *N* H_2SO_4, treated with 1 vol. of acetone and heated to 70° for 2 hrs. Five vols. of acetone were added to the filtrate; the ppt. was taken up in 50 cc. H_2O and neutralized; 3 vols. of acetone were added. The resulting ppt. was rejected; the ppt. obtained by adding 4 vols. of acetone to the filtrate was retained. The min. effective dose, given to anaesthetized rabbits, was 0.2 mg. per kg.; the vol. of urine was doubled. The effect of small doses is very rapid. Beside the diuretic action, a lowering of the blood pressure (3–4 cm. Hg) was observed; the polyuria, however, is not related to the shock. The ext. had no effect on human subjects. Exts. of kidney and spleen were inactive. B. C. BRUNSTETTER

The venoms of Oxyuranus maclennani and of Pseudechis scutellatus. C. H. KELLAWAY AND F. ELEANOR WILLIAMS. *Australian J. Exptl. Biol. and Med. Sci.* **6**, 155–74(1929).—The lethal subcutaneous dose of *Oxyuranus* venom ranged from about 1 to 0.1 mg. per kg. from monkeys, rabbits, guinea pigs, to rats. The lethal intravenous dose was much smaller. The venom causes intravascular clotting, is only feebly hemolytic, but powerfully neurotoxic. The venom of *Pseudechis* has only $^1/_{10}$ to $^1/_5$ of the toxicity of the former. It is powerfully anticoagulant and hemolytic but only feebly neurotoxic. H. L. D.

Experimental studies on the water economy of the skin by means of the wheal test. II. Effect of substances applied locally onto the skin or acting from the blood, upon the resorption of the intracutaneous saline wheal. D. ADLERSBERG AND A. PERUTZ. *Arch. exptl. Path. Pharmakol.* **151**, 129–45(1930); cf. *C. A.* **24**, 4814.—Xylene hastens and EtCl delays resorption when applied locally to the skin. Amyl nitrite, theophylline and pituitrin given systemically all accelerate resorption. The effect of the first 2 substances is probably due to vasodilatation; that of the pituitrin, as well as the protracted effect of theophylline, must be due to some obscure tissue factor. Pituitrin, given simultaneously with either of the other two, causes a mutual cancellation with no observable effect, a paradox which is unexplained; possibly there is a central effect. **III. The effect of centrally acting drugs (hypnotics) on the resorption of the intracutaneous saline wheal.** *Ibid* 257–66.—Narcotics affecting either the cerebral cortex (methane, paraldehyde) or brain stem (chloretone) do not affect velocity of resorption. The former do not affect the accelerating action of theophylline or pituitrin. Chloretone, however, accentuates the action of theophylline, presumably by preventing the central vasoconstrictor effect of the drug, allowing the peripheral vasodilatation by the xanthine ring. Chloretone inhibits the accelerating action of pituitrin, indicating that the latter acts upon the central nervous system. **IV. Clinical contributions.** *Klin. Wochschr.* **9**, 1165–8(1930); cf. *C. A.* **24**, 4814.—The velocity of absorption was detd. in a no. of pathol. conditions. A case of diabetus insipidus, in a condition of great thirst, showed an enormously accelerated resorption time (3 min.) lengthened

to 35 min. after a few days on an unlimited water supply. In fever, diabetes and Basedow's disease, there is increased resorption. Pituitrin, despite the vasodilation it causes, brings about increased resorption, possibly because of a direct extravasal action upon the tissues. Amyl nitrate increases the velocity of resorption only in the upper half of the body, corresponding to the areas where it causes vasodilatation. Pain accelerates resorption, possibly because of the effect on the vegetative nervous system. H. E.

Further studies on permeability and narcosis. K. J. ANSELMINO AND E. HOENIG. *Arch. ges. Physiol. (Pflüger's)* **225**, 56–68(1930).—A study was made of the effect of alc. and urethan anesthetics on the permeability of the red corpuscle towards glycerol, erythritol, arabinose, xylose, glucose and mannose. The results are explicable on the assumption that the narcotics are adsorbed on the cell membrane so as to alter the effective pore diams. ARTHUR GROLLMAN

Relations between pituitary and pancreas. B. A. HOUSSAY. *Endokrinologie* **5**, 103–16(1929); *Physiol. Abstracts* **14**, 582–3.—The relations are treated under the following groups: (1) antagonistic action between pituitary ext. and insulin; (2) action of pituitary ext. on the secretion of insulin; (3) action of insulin on the structure and the secretion of the pituitary; (4) increase of the sensitiveness of pituitariless animals to the action of insulin; (5) changes in the pancreas in animals deprived of their pituitary; (6) pancreas-diabetes and extirpation of the pituitary. Numbers (1) and (4) are considered to be the most certain and the most significant of these relations. E. C. K.

The influence of urea upon blood clotting. I. Thrombin clotting. J. H. FOULGER AND C. A. MILLS. *Am. J. Physiol.* **94**, 51–9(1930).—Urea, added to blood, produces at least 3 effects: (1) In low concns. it accelerates clotting by the liberation of reserve supplies of thrombin precursors (cephalin and prothrombin). (2) In higher concns. (5 g. per 100 cc.) it retards clotting by delaying the union of thrombin with fibrinogen. (3) In still higher concns. (8 g. per 100 cc.) it delays or inhibits clotting by peptizing the fibrin and so preventing its orientation into the solid structure of clot. J. F. L.

The effect of intravenous injection of calcium lactate upon gastric secretion. G. R. COWGILL AND T. L. RAKIETEN. *Am. J. Physiol.* **94**, 165–9(1930).—Variations in blood Ca, produced by intravenous injection of Ca lactate, did not affect the rate of gastric secretion in gastric pouch dogs. J. F. LYMAN

The physiological action of the venom of the honey bee (Apis mellifera). H. E. ESSEX, J. MARKOWITZ AND F. C. MANN. *Am. J. Physiol.* **94**, 209–14(1930).—The physiol. reactions to the bee venom closely approximate those of rattlesnake venom. It produces fall in blood pressure, contraction of virgin guinea pig uterus, occlusive bronchospasm, intradermal reactions similar to that of histamine, hemolysis and inhibition of the isolated perfused rabbit heart. J. F. LYMAN

Hemolysis of the erythrocytes of amphibia. H. A. CHARIPPER. *Am. J. Physiol.* **94**, 278–84(1930).—The hemolytic action of saponin, Na taurocholate and Na oleate on amphibian erythrocytes was studied. Time-diln. curves, resistance values and the microscopic appearance of the cells in the presence of the lysin are reported. J. F. L.

The effect of liver on the blood-sugar level and on the sugar excretion of depancreatized dogs. M. T. DE PENCIER, S. SOSKIN AND C. H. BEST. *Am. J. Physiol.* **94**, 548–52(1930).—The feeding of raw liver to depancreatized (diabetic) dogs did not cause a decrease in blood sugar or a decrease in sugar excretion through the kidneys. J. F. LYMAN

The mechanism of adrenaline action. VII. Changes in the glycogen, lactic acid and phosphate content of muscle. GERTY T. CORI. *Am. J. Physiol.* **94**, 557–63 (1930); cf. *C. A.* **24**, 4835.—After the administration of adrenaline to rats there was: (1) a decrease in muscle glycogen; (2) no change in phosphocreatine of the muscle; (3) a slight decrease in inorg. phosphates; and (4) a marked rise in the lactic acid content of the blood and muscle. J. F. LYMAN

Determination of circulation time. T. KOPPANYI AND A. LIEBERSON. *Am. J. Physiol.* **94**, 564–7(1930).—The injection of 0.25 mg. of adrenaline-HCl (1:1000) into the left common carotid artery of the cat was followed usually within 1 sec. by max. dilatation of the left pupil, and from 6 to 9 secs. later by dilatation of the right pupil. The time between the pupillary responses in the eyes is thought to represent total circulation time. J. F. LYMAN

The effect of adrenaline on muscle glycogen in the absence of the liver, and a modification of the operation for liver removal. W. M. FIROR AND G. S. EADIE. *Am. J. Physiol.* **94**, 615–8(1930).—The administration of adrenaline to cats after the removal of the liver had no apparent effect on the rate of glycogen disappearance from the muscle nor on the rate of decrease in blood sugar. Conclusion: Adrenaline has no

peripheral action on muscle glycogen or on the rate at which glucose leaves the blood. J. F. LYMAN

The revival of comatose adrenalectomized cats with an extract of the suprarenal cortex. W. W. SWINGLE AND J. J. PFIFFNER. *Science* 72, 75–76(1930).—An ext. which is low in adrenaline and solids has been prepd. from the suprarenal cortex of beef. This is capable of keeping adrenalectomized cats alive for a hundred days (an arbitrarily selected period after which the treatment is discontinued). This ext. will also revive cats in a comatose condition after the removal of the adrenals and bring them into a normal condition in about 70 hrs. C. M. M.

Plasma calcium and inorganic phosphorus following intravenous injection of parathyroid extract: A study on the source of mobilized calcium. CHIAO TSAI AND FONG-YEN HSU. *Chinese J. Physiol.* 4, 265–72(1930).—The intravenous injection of Collip's parathyroid ext. results in a rise in the plasma Ca and inorg. P in dogs. The rise of Ca occurs immediately but the rise of P begins 2 hrs. after the injection. The recovery of P is slower than that of Ca. The ratio of the abs. value of increase of these 2 constituents is approx. 2:1, supporting the hypothesis that the mobilized Ca and P are derived from $Ca_3(PO_4)_2$ of bone. L. A. MAYNARD

The effect of intravenous injection of sodium oxalate and citrate on the concentration of plasma calcium and inorganic phosphorus. CHIAO TSAI AND FONG-YEN HSU. *Chinese J. Physiol.* 4, 273–87(1930).—The intravenous injection of either Na oxalate or Na citrate into normal dogs causes an immediate drop in plasma Ca. The oxalate causes the larger drop. With both salts a rapid recovery occurs. Administration of these salts to thyroparathyroidectomized dogs, prevented from tetany attack by Ca lactate and milk powder or Ringer-lactate injection, causes a further drop of plasma Ca. The recovery is extremely slow. The injection of the Na citrate to both normal and thyroparathyroidectomized dogs is followed by a brief period of convulsions. This does not occur with Na oxalate. Parallel to the drop in Ca following citrate and oxalate injection there is a slight depression of plasma inorg. P. During the recovery of Ca the P level is much elevated, the elevation being greater in the normal animals. L. A. MAYNARD

Resistance of omnivorous and vegetarian rats against certain poisons. TUNG-TOU CHEN AND C. PAK. *Chinese J. Physiol.* 4, 289–94(1930).—Omnivorous and vegetarian rats are equally resistant to strophanthin and strychnine sulfate subcutaneously injected. Vegetarian rats are twice as resistant to ephedrine-HCl and slightly more resistant to morphine-HCl, NaCN and CH_3CN. L. A. MAYNARD

Studies on the mode of fixation of cocaine hydrochloride on the nerve fibers. JEAN REGNIER AND GUILLAUME VALETTE. *Compt. rend.* 190, 1453–4(1930); cf. *C. A.* 23, 3979, 4743.—It has been shown that the lowering of chronaxie of nerve fibers by cocaine is not proportional to concn. of poison. By plotting the concn. of soln. against fall of chronaxie a parabolic curve is obtained. It is thought that the cocaine is fixed upon nerve fiber by a process of adsorption. To test this hypothesis, it is first shown that fixation of cocaine-HCl on animal charcoal follows the adsorption equation of Freundlich. Then the fixation of cocaine-HCl on nerve fibers is tested. When the values for mol. concn. of cocaine are plotted against the no. of mols. of cocaine fixed per g. of nerve fiber, a parabolic curve is obtained. The curve which expresses the relation between the logs. of the preceding values is rectilinear. By using the mean value of the angles formed by this latter curve with the abscissa as axis, the tangent is equal to 0.52. Thus this tangent corresponds to $1/n$ of the logarithmic expression for the adsorption curve: $\log x/m = K + 1/n \log C$. The rapidity of fixation, the form of the curve, and the value of $1/n$ indicate that cocaine is fixed upon nerve fiber by a process of adsorption. N. M. NAYLOR

Chemical burns. RENÉ CHESNEAU. *Bull. soc. ind. Rouen* 58, 254–7(1930).—An outline is given of the chem. and physiol. action on skin-burns of various chemicals, with methods of treatment and the principles applying in each case. For burns due to acids and alkalies, washing with large amts. of H_2O is recommended: for phenol burns, EtOH or a soln. of Na_2SO_4; for cyanides, $KMnO_4$ or NH_4 polysylfide; for Na, removal of the Na followed by washing with H_2O and tannic acid; for P, a soln. of $CuSO_4$ followed by H_2O with a little $Mg(OH)_2$; for metallic salts, $NaHCO_3$ followed by tannic acid; for chromic acid, Na polysulfide followed by tannic acid. Several agents for treating ordinary burns are mentioned, including tannic acid, which acts as a destroyer of alkalies, an antiseptic and a coagulant. The treatment of eye-burns is also described. I. H. ODELL

Charcoal treated with atropine in digestive therapeutics. LEFÈVRE. *Semana méd.* (Buenos Aires) 1930, II, 133–5.—Atropine, absorbed on charcoal, is recommended

for the treatment of spasms of the intestine. Its action is local only and general poisoning is impossible. A. E. MEYER

The pharmacology of Xysmalobinum. J. M. WATT. *J. Pharmacol.* **38**, 261–70 (1930).—M. l. d. and clinical symptoms of poisoning in the frog, cat, rabbit and dog are described. The glucoside causes slowing of the heart, constriction of blood vessels, rise in blood pressure. It causes strong constriction of the isolated intestine and uterus of rabbit, guinea pig and cat, and of the bladder of the cat and guinea pig. Contraction of the bronchi in the intact animals causes severe respiratory embarrassment. The glucoside produces diuresis in the rabbit and cat and increased salivation in the dog. C. RIEGEL

Investigation of insulin-like properties of uvursin, oxycatalyst and Solanum sanitwongsei berries. M. LOUISA LONG AND FRITZ BISCHOFF. *J. Pharmacol.* **38**, 313–25(1930).—None of the prepns. had hypoglucemic properties in rabbits. Oxycatalyst caused kidney and liver damage as shown by the blood chemistry (urea N, amino acid N), and histological study. C. RIEGEL

Magnesium oxide as an aid to the antipyretic action of phenacetin in dogs. J. E. WINTER, C. H. RICHEY AND H. G. BARBOUR. *J. Pharmacol.* **38**, 343–7(1930).—Phenacetin and MgO by stomach tube had an antipyretic effect on rabbits receiving hay infusion. The results suggest a synergic effect. C. RIEGEL

Further studies on the effect of morphine sulfate, atropine sulfate, and hyoscine hydrobromide upon the intact intestine in unanesthetized dogs. C. M. GRUBER, W. W. GREENE, C. S. DRAYER AND W. M. CRAWFORD. *J. Pharmacol.* **38**, 389–400 (1930).—In dogs with Thiry-Vella fistulas, morphine abolishes the decreased tonus produced by atropine. Atropine abolishes the increased tonus produced by morphine. Hyoscine has the same effect as atropine. C. RIEGEL

Further observations on the effect of pituitary extract and morphine sulfate upon excised dog's intestine. CHARLES M. GRUBER AND GARRETT PIPKIN. *J. Pharmacol.* **38**, 401–10(1930).—Small doses of pituitary ext. caused increased tonus, while large doses caused a decrease in tonus. Morphine increased tonus and occasionally the height of contraction. C. RIEGEL

The immediate anti-diuretic action of pituitary extract. JAMES B. ROSS AND R. L. STEHLE. *J. Pharmacol.* **38**, 451–60(1930).—In dogs with permanent bladder fistulas, and with a catheter in one ureter to the renal pelvis, administration of pituitary ext. caused immediate cessation of urine flow on both sides, and flow was resumed later at approx. the same time on both sides. The same diminution of secretion occurred even if no fall in blood pressure took place. Conclusion: Ureteral spasm is not the chief factor in causing the anti-diuretic effect. C. RIEGEL

The action of pituitary extract upon blood pressure. B. B. RAGINSKY, JAMES B. ROSS AND R. L. STEHLE. *J. Pharmacol.* **38**, 473–80(1930).—The results of Gruber on the effect of pituitary ext. on blood pressure in unanesthetized animals are confirmed. In dogs under chloretone anesthesia pituitary causes a rise in blood pressure, unaffected by vagotomy. With very large doses cardiac failure causes a fall in pressure following an initial rise. In dogs under ether there is a mixed effect detd. by the depressant cardiac action and vasoconstrictor action. With Na luminal the cardiac action usually predominates. C. RIEGEL

Studies on the colloid chemistry of antisepsis and chemotherapy. I. The mode of combination of antiseptic dyes with proteins. ARTHUR D. HIRSCHFELDER AND HAROLD N. WRIGHT. *J. Pharmacol.* **38**, 411–31(1930).—A viscose sac contg. distd. water was placed in a soln. contg. egg albumin and a dye (crystal violet, malachite green or brilliant green), and the amt. of dye diffusing into the sac during 7–8 days estd. colorimetrically. The difference between the amt. of dye diffused and the total amt. equals the amt. held back by protein. The results followed the Freundlich adsorption isotherm equation, and the conclusion was that the dye is adsorbed on the protein rather than chemically bound by it. **II. Does the fraction of an antiseptic which has been adsorbed on protein still exert an antiseptic action?** HAROLD N. WRIGHT AND ARTHUR D. HIRSCHFELDER. *Ibid* 433–49.—The reduction of antiseptic efficiency (as measured by ability to inhibit gas production in a yeast-sugar mixt.) of crystal violet, malachite green or brilliant green in the presence of egg albumin is not parallel to the amt. of dye adsorbed on the protein, *i. e.*, the fraction of dye adsorbed exerts some antiseptic action. The concn. of dye and CO_2 production by yeast in a given time are related by the expression $1/M_2 - M_1 \log C_1M_1/C_2M_2 = K$, where M_1 and M_2 are the amts. of gas produced at concns. C_1 and C_2. C. RIEGEL

Hibernation of the thirteen-lined ground squirrel, Citellus tridecemlineatus (Mitchill). IV. Influence of thyroxine, pituitrin and desiccated thymus and thyroid on

hibernation. GEORGE E. JOHNSON AND VIRGINIA B. HANAWALT. *Am. Naturalist* **64**, 272–84(1930).—"The feeding of desiccated thymus and thyroid in large doses to 27 and 23 animals, resp., resulted in no definite increase or decrease in the tendency of ground squirrels to hibernate when subjected to cold temps. The injection of thyroxine and pituitrin in doses which were, resp., 225 and 450 times the human dose on the basis of relative wts., produced no change in tendency to hibernate in 66 and 116 animals, resp., in comparison with the same no. of controls. The animals were subjected to cold temps. after the injections. The expts. indicate that the secretions of the thymus, thyroid and posterior pituitary are not important agents in the production or prevention of hibernation." G. SCHWOCH

The pharmacological activity of pyrrole and of the pyrryl alkyl ketones. General action in the frog. ANGELO RABBENO. *Arch. intern. pharmacodynamie* **35**, 377–421; *Chem. Zentr.* **1929**, II, 1318; cf. *C. A.* **23**, 3978, 4743.—In expts. with frogs R. compares the pharmacol. action of pyrrole with that of α-acetyl-, α-propionyl-, α-butyryl- and α-benzoylpyrrole. These ketones act qualitatively like the mother substance. The stage of excitability of the motor reflexes is soon followed by a slowly descending central paralysis. Death occurs because of the arrest of cardiac activity. In pyrrole both effects are of the same order of magnitude, while in the ketones the narcotic effect prevails. The toxic and the min. narcotic effects increase with increasing mol. wt. in the sense of an exponential function, but in a different manner. The pharmacol. activity is directly proportional to the b. p. of the substances examd.; it is inversely proportional to the m. p. and to the solubilities in water. With the ketones the toxic effect increases in the ratio $1:2:2^2$, while the narcotic effect increases in the ratio 1:5:10. Thus the mixed pyrrole ketones and aromatic ketones have the narcotic action in common, but they differ quantitatively because in the series of the mixed aromatic ketones the activity decreases with increasing mol. wt., while it increases with the pyrrole ketones. G. SCHWOCH

The influence of spleen, thyroid and insulin on the carbon dioxide content and on the hydrogen-ion concentration of the blood. II. The influence of insulin and the mutual relation between insulin and spleen. K. ICHIKAWA. *Folia endocrinol. Japon.* **5**, 1–2; *Chem. Zentr.* **1930**, I, 246.—After injection of 0.33 units of insulin per kg. rabbit the CO_2 content and the p_H of the blood decrease first and then increase to values beyond the normal level. When 0.33 units of insulin and glucose (1.5 g. per unit of insulin) are injected the CO_2 content rises immediately to beyond the normal level in the majority of the cases. The p_H changes in the same manner as after insulin alone. The extirpation of the spleen has an inhibiting action on the decrease or increase of blood CO_2 and p_H produced by insulin or insulin-glucose. G. SCHWOCH

The influence of the various endocrine organs on the hyperglucemia and lactic acid of the blood in chronic cyanide poisoning. I. Y. ODA. *Folia endocrinol. Japon.* **5**, 11–2; *Chem. Zentr.* **1929**, II, 1560–1.—Repeated subcutaneous injection of 1% KCN soln. (daily 2–6 mg. KCN per kg.) always causes an increase of sugar and lactic acid in the blood of rabbits. Simultaneous injection of insulin inhibits the increase. The blood of normal rabbits contains 10–15 mg. % lactic acid. **II.** *Ibid* 12–3; *Chem. Zentr.* **1929**, II, 1561.—Adrenaline and adrenal cortex ext. (Interrenin) inhibit or nullify the increase in blood sugar and lactic acid after chronic administration of KCN. The sensitivity of the rabbits against KCN is greatly increased by choline. G. S.

The relation between internal secretion and urea formation in the liver. I. The action of insulin. K. MORI. *Folia endocrinol. Japon.* **5**, 13; *Chem. Zentr.* **1929**, II, 1172.—The amt. of urea in the liver is augmented after peroral administration of NH_4HCO_3; under these conditions insulin injections augment the urea formation. At body temp. *in vitro* the aq. ext. of pulped liver is able to form urea from NH_4HCO_3. The urea-forming ability of pulped liver is intensified by addn. of insulin. **II. The action of various endocrine products.** *Ibid* 14; *Chem. Zentr.* **1929**, II, 1172–3.—The formation of urea from NH_4HCO_3 by pulped liver is inhibited by adrenaline; it is suppressed by thyroid ext., and it is augmented by testis, ovarian and corpus luteum exts. G. SCHWOCH

The effect of repeated glucose injections on the sugar tolerance of rabbits and on the blood sugar of rabbits treated with adrenaline or insulin. Y. ODA. *Folia endocrinol. Japon.* **5**, 16–7; *Chem. Zentr.* **1929**, II, 1173.—The behavior of the blood sugar of rabbits toward injection of $^1/_{10}$ to $^1/_7$ units of insulin or $^1/_2$ mg. of adrenaline per kg. was detd. before, during and after an injection series, in which 7 to 40% glucose solns. were injected for 6 to 40 days. The glucose administration intensified the insulin hypoglucemia and inhibited the adrenaline hyperglucemia. This effect lasted for a long time after the last glucose injection. G. SCHWOCH

The relation between thyroid and quinine with respect to the oxidase reactions of the organs. K. Mori. *Folia endocrinol. Japon.* 5, 21–2; *Chem. Zentr.* 1930, I, 244.—Feeding rabbits for several days with 0.2 g. quinine-HCl per day inhibits the oxidase reaction in the organs examd. (heart, kidney and liver). The diminution of the oxidase reaction does not occur in the thyroid-fed animal with simultaneous administration of quinine. Therefore quinine is believed to have an antagonistic action to the thyroid with respect to the oxidase reaction. G. Schwoch

The inhibiting influence of quinine on certain actions of the thyroid. Experimental studies on tissue respiration, metamorphosis and metabolism. T. Kambi. *Folia endocrinol. Japon.* 5, 22–3; *Chem. Zentr.* 1930, I, 244.—Thyroid ext. increases the respiration of liver and kidney sections of mice, while quinine inhibits it; under proper conditions the effects of both substances nullify each other completely. The acceleration of the metamorphosis of larvae of *Rana japonica* is inhibited by quinine. Quinine administered once or over a long period lowers the gaseous metabolism in larvae of *Bufo* fed with thyroxine. The tissue respiration and the anaerobic glucolysis of the intestinal loops of *Bufo* larvae fed with thyroxine increase considerably in the early stage. Quinine inhibits both reactions. G. Schwoch

The effect of choline on the nitrogen metabolism and on the salt elimination in the urine. K. Aoki. *Folia endocrinol. Japon.* 4, 24–5; *Chem. Zentr.* 1929, II, 1176; cf. *C. A.* 23, 2214.—Choline-HCl in doses of 10–20 mg. was injected for 4 to 5 days into dogs in the state of N equil. Total N, NH_3 and creatine were excreted in increased amts.; also the elimination of Me_2CO and $AcCH_2CO_2H$ was generally augmented. The salt excretion increases in the same proportion as the total N; thus the ratio Na-Cl:N remains unaltered. G. Schwoch

Pharmacological investigations on the local anesthetic S. F. 147 (Sandoz). Otto Gessner. *Narkose und Anästhesie* 2, 129–47; *Chem. Zentr.* 1929, II, 1319.—S. F. 147 is *N*-diethylleucinol *p*-aminobenzoate linked to methanesulfonic acid. The soln. is distinctly acid (p_H 5.107 in 0.1% soln.); it cannot be neutralized by $NaHCO_3$ without the formation of a ppt. Compared systematically with novocaine the toxicity of S. F. 147 was 4.5 times higher. It has a strongly hemolytic effect and is toxic to the heart in a pronounced degree. On account of these disadvantages G. disapproves of S. F. 147 despite the fact that according to Winterstein (*C. A.* 23, 3773) its effect in local anesthesia is 4 times higher than that of novocaine. G. Schwoch

The effect of yohimbine on the blood sugar and on the hyperglucemia and glucosuria produced by sympathetic poisons. Tetuzô Imahasi. *Okayama-Igakkai-Zasshi* 40, 1149–50; *Chem. Zentr.* 1929, II, 1313.—Yohimbine in small doses has no noteworthy effect on the blood sugar; in larger doses it produces a slight hyperglucemia. It inhibits almost completely the hyperglucemia and glucosuria produced by adrenaline. The hyperglucemia produced by diuretin, which probably is of central origin, is not influenced. Also the hyperglucemia produced by glucose infusion and Ca administration is not affected. Yohimbine inhibits the diuresis following the administration of diuretin and glucose. Thus to some extent its action is similar to that of ergotamine. G. Schwoch

Further studies on the action of yohimbine on the blood sugar. Tetuzô Imahasi. *Okayama-Igakkai-Zasshi* 40, 1347–8; *Chem. Zentr.* 1929, II, 1313; cf. preceding abstr.—In studying the action of yohimbine with respect to other forms of hyperglucemia in rabbits it was found that the hyperglucemia produced by pilocarpine, nicotine and diabetic puncture is distinctly reduced. The action of insulin is intensified. In the dog the normal blood sugar is distinctly reduced by yohimbine, while its action is weaker in the pancreatectomized dog. The hyperglucemia induced by large doses of yohimbine is not of central origin, since it also occurs after splanchnectomy. G. Schwoch

The influence of some drugs on fatal poisoning by tetrodotoxin. Tetuzô Imahasi. *Okayama-Igakkai-Zasshi* 40, 2464; *Chem. Zentr.* 1929, II, 1321.—Tetrodotoxin (fugu poison) exerts its toxic action on the central nervous system and on the peripheral motor app. The central action is intensified by picrotoxin, physostigmine, guanidine and adrenaline. It is very little inhibited by caffeine, xestetone and coramine. Lobeline and glucose have the best antidotal effect; cardiazole and glucose are effective to a lesser degree. G. Schwoch

Amino alcohols. III. The potentiation of the pressor action of adrenaline by arylpropanolamines. James C. Munch and Walter H. Hartung. *J. Am. Pharm. Assoc.* 19, 356–61(1930); cf. *C. A.* 24, 4773.—Medium-sized dogs anesthetized with morphine and chloretone were used. The effects of ephedrine and its homologs upon the subsequent pressor effects of adrenaline were studied. Phenylpropanolamine, its *p*-hydroxy and *p*-methyl derivs. and methylamino deriv. (ephedrine) given intrave-

nously to dogs in doses of 1–3 mg. per kg. potentiate the pressor action of adrenaline. Homologous amino alcs. in which the aliphatic side chain is decreased or increased do not show this potentiation. The degree of potentiation varies with the dose administered. Doses between 1 and 3 mg. per kg. doubled the action of adrenaline. Oral administration in doses which do not increase the blood pressure does not show any potentiating action. Because of this potentiation, caution is necessary in the administration of adrenaline following these products. L. E. WARREN

The influence of magnesium sulfate on the secretory activity of the digestive glands. I. On the gastric, intestinal and pancreatic secretions. W. HORSLEY GANTT AND GEO. V. VOLBORTH. *Am. J. Med. Sci.* 179, 375–80(1930).—A 30% soln. of $MgSO_4$ acts in the stomach as a mild irritant, producing a very small flow, which is usually alk. In a few expts. with the pancreatic secretion there was a slight increase in the pancreatic juice which began immediately after giving the $MgSO_4$ through the stomach tube. There was a copious secretion of the intestinal glands all along the small intestine, produced by the local contact of $MgSO_4$ with isolated loops of intestine. This occurred in the upper and lower duodenum and in the ileum and jejunum. **II. On the biliary secretion.** W. HORSLEY GANTT. *Ibid* 1, 380–5.—Results of other workers were confirmed, a flow of bile often coming from both the biliary passages and gall bladder after $MgSO_4$ was introduced through a stomach tube. When $MgSO_4$ was put directly into the duodenum bile was rarely produced and there was never any increase in the gall bladder pressure. R. C. WILLSON

Electrocardiographic study of the vagotropic action of adrenaline injected intravenously. M. PETZETAKIS AND VLACHLIS. *Arch. mal. coeur* 23, 333(1930); *J. Am. Med. Assoc.* 95, 828.—Results indicate that while adrenaline is amphotropic it possesses a predominant vagotropic action; verification was made by jugular tracings. Electrocardiographic study indicated a slowing of the cardiac rhythm accompanied by atrioventricular dissocn. R. C. WILLSON

The reaction of the central nervous system to experimental urea intoxications. BERNARD J. ALPERS. *Arch. Neurol. & Psychiat.* 24, 492–508(1930).—Doses of 1–2 g. urea were injected subcutaneously daily until the total dosage reached 16.25–37.25 g. urea; in 1 instance the dosage was 53.25 g. Deep intoxication resulted but more profound effects followed the intravenous injection of urea and human urine. The animals reacted in different ways, some exhibiting loss of appetite and wt. after small doses and others resisting large doses. Three of eight rabbits showed mild changes in the nervous system and one gave evidence of a severe intoxication. In these cases the cerebral white matter was more severely injured than the gray. R. C. WILLSON

The blood electrolyte changes in narcosis, with special references to calcium and potassium. S. KATZENELBOGEN. *Arch. Neurol. & Psychiat.* 24, 525–41(1930).—The blood chemistry was studied in rabbits during narcosis by ether and by diallylbarbituric acid. The CO_2-combining power of the plasma was increased in 5 of 10 expts and in 2 of 10 controls. Inorg. P decreased in 6 of 10 expts. and in 3 of 10 controls. Mg content followed closely the changes in P content, there being a decrease in 6 of 10 expts. and in 2 of 10 controls. K was decreased in 70.6% as compared with a decrease in 34.9% of the controls. An increase was observed in K in 9.8% and no marked change in 17.6%. Ca decreased in 55 of 58 expts., the decrease being within the limits of exptl. error in 3 instances; no change was found in 3. R. C. WILLSON

Investigations on synthetic ephedrine, with regard to antagonistic action toward insulin. A. BREMS AND C. HOLTEN. *Bibliotek for Laeger* 122, 137(1930); *J. Am. Med. Assoc.* 95, 312.—Synthetic ephedrine (equal parts of active and of inactive ephedrine) in nontoxic doses has no definite effect on the fasting blood sugar in normal and in diabetic persons, but after injections of insulin it retards the fall of the blood sugar; the effect is weak or uncertain where the fall of blood sugar is slight and considerable where it is marked. The oral administration of 2 mg. of synthetic ephedrine per kg. is always followed in normal persons by a protracted rise in the systolic blood pressure of 20 to 30 mm. Hg, while the diastolic pressure, pulse rate and respiration are practically unchanged. This dose is followed by const. leucopenia, relative neutropenia and lymphocytosis. R. C. WILLSON

Phosphate elimination in urine in normal and in diabetic persons after administration of insulin. S. GØRTZ. *Bibliotek for Laeger* 122, 159–97(1930); *J. Am. Med. Assoc.* 95, 382.—Phosphate elimination in the urine was decreased after a subcutaneous injection of insulin; there was also a decrease in the titrable acidity and in several cases the elimination of NH_3. In diabetic persons with acidosis there may be a marked increase in the 24-hr. phosphate elimination, which disappears with the administration of insulin. R. C. WILLSON

Response of blood guanidine base concentration in normal individuals and in patients with liver injury to the ingestion of methylguanidine sulfate. READ McL. ELLSWORTH. *Bull. Johns Hopkins Hosp.* **47**, 106–12(1930); cf. *C. A.* **24**, 3272.—The administration of 200 mg. methylguanidine sulfate by mouth did not produce in normal individuals a rise of blood guanidine base concn. in 4 hrs. In 8 cases of diffuse liver injury, the initial blood guanidine base was slightly elevated and ingestion of this amt. of guanidine salt produced a conspicuous rise of the blood guanidine.
R. C. WILLSON

The effect of intravenous injections of insulin. T. E. HESS THAYSEN. *Hospitalstudende* **73**, 357–71(1930); *J. Am. Med. Assoc.* **95**, 461.—After intravenous injection of insulin in 21 diabetics, the blood sugar curve was normal in the mildest cases, and the graver the case, the more abnormal was the blood sugar curve. R. C. W.

The action of electrolytes on the heart. JOHN FIDDES, H. LAWRENCE STOKES AND S. E. ALLISON. *Med. J. Australia* **1**, 835–40(1930).—The hearts of guinea pigs and rabbits, freshly killed, were immersed in Ringer's soln. With a $CaCl_2$ concn. of 0.04% the rate of beat was 84; with 0.01% it decreased to 78. The duration of the individual beat was practically the same, but the amplitude was decreased to less than one-half in the weaker soln. When the Ca was increased to 0.1% the heart beat became more and more tonic and tended to stop in the contracted state or semisystole Strong KCl (0.1%) slowed the heart considerably and caused auriculoventricular block When the perfusion was changed to 0.01% the heart rate was increased, block removed and beat strengthened. The p_H of the infusion was gradually changed from p_H 6.5 to 7.8. The amplitude was less, the duration of the beat less or unchanged in the acid perfusion; the interval between beats was longer. At p_H 6.5 complete block set in, the ventricle beating slowly with its own rhythm. R. C. WILLSON

Reactions of the liver to carbon tetrachloride. A. M. LACQUET. *Proc. Staff Meetings Mayo Clinic* **5**, 215–6(1930).—One injection of 0.25 cc. CCl_4 given by stomach tube to a normal rat produced central necrosis and fatty degeneration of the liver. The maximal lesion was reached after 24 hrs. and the liver was completely regenerated after 2 weeks. Repeated injections induced typical cirrhosis. R. C. WILLSON

The response of explanted embryonic cardiac tissue to adrenaline and acetocholine. CECILE MARKOWITZ. *Proc. Staff Meetings Mayo Clinic* **5**, 241(1930).—The excised hearts of embryo chickens were either studied in Locke's soln. or explanted according to the method of Carrel and Maxinow. Adrenaline and acetocholine exerted their typical effect on embryos 6 days old and older. The action of the drugs became less as the age of the embryo decreased. R. C. WILLSON

Action of bile salts on development of icteric bradycardia. E. THOMAS. *Rev. Med. Suisse Romande* **50**, 207–12(1930); *J. Am. Med. Assoc.* **95**, 164.—From rabbit studies it is concluded that neither alone nor in combination does Na glycocholate or Na taurocholate influence the rhythm of cardiac contraction. This is also true of the total ext. of bile, although a concn of 10% is lethal. R. C. WILLSON

The examination of cresyl-bearing extracts of ginger (VALAER) **17**. The formation and the constitution of Pb-Na thiosulfate (ODDO, MINGOIA) **6**. Synthesis of isoindenoquinolines (CLEMO, JOHNSON) **10**.

I—ZOÖLOGY

R. A. GORTNER

The preparation of salamander alkaloids from the skin gland secretion of Salamander maculosa. O. GESSNER AND K. CRAEMER. *Arch. exptl. Path. Pharmakol.* **152**, 229–37(1930).—Methods of obtaining pure salamander alkaloids are described.
H. EAGLE

Physiology of insects. EVERETT F. PHILLIPS. *Ann. Entomol. Soc. Am.* **23**, 525–30(1930).—Review.
C. H. R.

Chemical stimulation by alcohols in the barnacle, the frog and Planaria. WM. H. COLE AND J. B. ALLISON. *J. Gen. Physiol.* **14**, 71–86(1930).—Methanol, ethanol, propanol and butanol were tested for stimulating efficiency upon the barnacle (*Balanus tintinabulum*), the frog (*Rana pipiens*) and *Planaria dorotocephala*. Concns. of the successive alcs. in the series necessary to produce given stimulating effects followed the geometrical series, $1 : a^{-1} : a^{-2} : a^{-3} : a^{-4} : \ldots\ldots$, a representing some real no. In the frog and *Planaria*, the relationship between the log. of the concn. necessary to produce a given effect and the reciprocal of the reaction time is, within certain limits, linear. The concn. effect may be expressed by an equation which contains 2 consts., one characteristic of the alc. series, the other characteristic of the process of stimulation by alc. in any animal.

The ratio of the latter const. for successive alcs. represents a in the above geometrical series. Stimulation by alcs. in these expts. is due to energy changes at the receptive surfaces brought about by a definite orientation of the resp. alc. mols. Increase in stimulating efficiency as the no. of CH_2 groups increases is probably due to the action of the non-polar portion of the alc. mol. as the polar group remains practically const. throughout the series. In homologous series of org. compds. stimulating effects will be produced either by the polar or non-polar group depending upon which one becomes dominant in effect or to a combination of the two. C. H. RICHARDSON

12—FOODS

F. C. BLANCK AND H. A. LEPPER

The danger of demineralization of food. T. LANG. *Schweiz. Med. Wochschr.* **8**, 219-23(1930); *Bull. Hyg.* **5**, 612.—L. detd. the mineral content when vegetables were cooked in 1% salt soln. Ninety-three % of the K was lost, but the Na content was increased, in one case nearly 23 times as much. The Ca content was very much greater when cooked in the salt soln. than when H_2O was used. Cooking in 15% salt prevents the loss of minerals. GEORGE R. GREENBANK

"Blown tins" in the canned food industry. HENRI CHEFTEL. *Chimie & industrie* **24**, 544-8(1930).—A review of the various causes of "blown tins" and of the methods used for testing the liability to "blowing" of canned foods. Bibliography of 18 references. A. PAPINEAU-COUTURE

Methylene blue in tinned peas. DOUGLAS HENVILLE. *Analyst* **55**, 629(1930).—A note on the use of this dyestuff in Belgian "Green Peas." W. T. H.

Wheat protein test digestion studies. CLAUDE F. DAVIS. *Cereal Chemistry* **7**, 518-25(1930).—With extra-high heat for protein digestion, precautions should be taken in increasing the initial sulfate concn. of the digest, to speed up the time of digestion, especially with the Gunning method. With extra-high heat the Kjeldahl method gives a more stable condition for the NH_3 residue than the Gunning method in high sulfate concn. With extra-high heat and approx. the highest safe initial sulfate concn. protein digestion by the Kjeldahl method is 15 to 20 min. faster than by the Gunning method. L. H. BAILEY

The gluten and non-gluten proteins. M. J. BLISH. *Cereal Chemistry* **7**, 421-7(1930).—Flours vary not only in the amt. of protein but in the compn. of protein. Differences in compn. are probably due to variations in the distribution of the individual proteins and to the varying proportions in which they occur. The ratio of non-gluten to gluten protein appears to be the chief basis of variation. Of the several individual proteins occurring in wheat flour, gliadin is the only one whose chem. individuality has been established with any degree of certainty. Its ratio to the total protein appears to be fairly const. in most flours. Aside from gliadin, there are probably several other proteins, as suggested by the work of Osborne. However, there is strong evidence for the belief that these proteins have not yet been reliably identified or characterized. Trustworthy and dependable methods for the identification and quant. sepn. of individual flour proteins other than gliadin are not available. It is possible to demonstrate strong tendencies toward certain types of chem. constitution and properties, but beyond this the evidence is uncertain and indefinite. L. H. BAILEY

Studies on the qualities of combined wheats as affected by type of bin, moisture and temperature conditions. I. F. C. FENTON AND C. O. SWANSON. *Cereal Chemistry* 7, 428-48(1930).—Probably 1/2 of the wheat in the Southwest (U. S. A.) is now harvested by means of the combine. How to store this wheat so it will keep sound and free from damage until it is milled into flour is a big problem. These studies were undertaken to help solve this problem. Eleven bins each of approx. 500 bu. capacity were used. They were built of concrete, wood and steel, and of different shapes, *i. e.*, square and circular. Some were waterproofed both inside and out, others only on the outer surface. The ventilation was also different in different bins. Elec. resistance thermometers were installed in each bin to indicate temps. during storage. Observations of moisture content of wheat were made as it ripened and during harvesting. Some of the wheat became so warm during storage that it was necessary to move it to another bin to avoid serious damage. The grain was judged for market damage, rancidity and germination. Moving the wheat to prevent serious damage or total damage, when it became too warm, proved quite effective. As a rule the lower the moisture content of the wheat the less rancidity. High rancidity generally developed when the

moisture content was 15% and above. Rancidity also seemed to result from heating. High rancidity was also assocd. with poor baking results. L. H. BAILEY

Variation in properties of acetone extracts of common and durum wheat flours—A preliminary report. A. W. WALDE AND C. E. MANGELS. *Cereal Chemistry* 7, 480–6 (1930).—The acetone exts. of wheat flour are comparatively low in P content. The durum ext. has a higher sapon. no. and ester no. than the common wheat ext. Both exts. show, to some extent, the properties of drying oils. The durum wheat ext. has the highest I no. A sterol is present in common wheat which is relatively insol. in acetone at low temps. L. H. BAILEY

Proteolysis in bread doughs. W. E. BROWNLEE AND C. H. BAILEY. *Cereal Chemistry* 7, 487–517(1930).—Fermentation of the doughs was inhibited at varying lengths of time up to 5 hrs. by freezing in a refrigerator at $-17 \pm °$. The frozen doughs were then ground to a fine powder for further manipulation. Doughs which have been frozen, as above, were dehydrated with acetone, dried and ground to the fineness of flour. Comparisons were made between freshly mixed doughs prepd. by the freezing method and the original flours as to the amt. of total protein peptized by 3 saline solns. Standard patent flour dough and the same flour behave almost identically on such treatment while clear flour dough and the same flour behave differently. Saline soln. peptization of doughs fermented varying lengths of time indicated no change in the proteins as fermentation progressed. Distd. water and buffer soln. peptization demonstrate the effect of H-ion concn. on the peptization of flour proteins. Acetone dehydration does not affect the proteins as the same results were obtained from acetone-dehydrated doughs as from frozen doughs. Addn. of small quantities of proteases effects no change in peptization of dough proteins with salt solns. $SnCl_2$ pptns. of the true proteins reveal no proteolysis during fermentation of an ordinary bread dough, but show slight cleavage of the gluten proteins in doughs to which Diamalt is added. Cu sulfate ppts. more protein material than $SnCl_2$ but does not reveal any proteolysis during fermentation of an ordinary bread dough. Substantial changes in doughs to which pepsin was added were revealed by this method. Alc. pptn. of the proteins in a water ext. yields a ppt. low in N content and this fraction is not altered by fermentation. The N fractions sepd. by Hausmann's method are not altered by ordinary dough fermentation of 5 hrs. Viscometric methods demonstrate changes in fermenting doughs but the method needs considerable standardization before it can be of any use in studying proteolysis in bread doughs. A pptn. of the native proteins with trichloroacetic acid and of the proteoses by Na sulfate reveal no changes in the gluten proteins with fermentation. Fermentation does not affect the chem. structure of the gluten proteins so far as can be detected by any methods used in this study. L. H. BAILEY

A method for testing for ropiness of bread. H. H. BUNZELL AND MARION FORBES. *Cereal Chemistry* 7, 465–72(1930).—Rope, an infection of bread by *B. mesentericus* whose spores survive baking temp., has long been a dread of the baking industry. Bread infected by this organism will, on hot damp summer days, develop a soft, sticky, clammy crumb, having a yellowish discoloration. These symptoms develop in 36–72 hrs. B. and F. have developed a method to det. with a fair degree of accuracy the extent to which active rope organisms are present in bread. Catalase is an enzyme present in certain animal tissues and more generally in plant tissues, capable of bringing about the rapid decompn. of H_2O_2 to water and O. The catalase activity may be measured by detg. the change in pressure as a result of liberated O. Illustrations are shown of the app., used in the authors' method, for detg. this increased pressure. While the enzyme catalase may be present in numerous microörganisms, it is believed that *B. mesentericus* or allied organisms are the only ones present which under practical conditions will survive baking temps. Hence, by detg. the catalase activity the authors believe that they have a reliable index of the presence of the organisms responsible for the development of rope. L. H. BAILEY

The A. O. A. C. gasometric method for the determination of carbon dioxide in baking powder. J. R. CHITTICK, F. L. DUNLAP AND G. D. RICHARDS. *Cereal Chemistry* 7, 473–80(1930).—The A. O. A. C. official gasometric method for baking powder gives remarkably concordant results in the hands of different operators, and results which are very closely in agreement with the actual total CO_2 present. The assertions of Hertwig and Hicks that a correction for vapor tension must be applied is not borne out by these authors' results. Whatever vapor tension effect is produced by the liquid in the reaction flask is closely compensated for (in those working temps. generally experienced in the lab.) by the CO_2 dissolved in the liquid. L. H. BAILEY

Freshness of milk. K. L. PESCH AND U. SIMMERT. *Milchwirtschaft. Forsch.* 8, 551–75(1929).—An indicator for the detn. of p_H is described. Reasurin is added to

milk, which is held at 20°; the longer the time of reduction to a red color the greater is the freedom from bacteria. GEORGE R. GREENBANK

Mobile milk laboratories. THOMAS PARRAN. *Am. J. Pub. Health* **20**, 1219–20 (1930). J. A. KENNEDY

Pasteurization of milk without cooling in India. C. E. MACGUCKIN. *J. Central Bur. Animal Husbandry & Dairying India* **3**, 67–75(1929).—Pasteurization by the holding method without cooling is a thoroughly practical, beneficial, economical and reliable method of handling milk in India, provided the factors necessary for success are strictly carried out. K. D. JACOB

A practical method for fat determination in milk. BALWANT SINGH. *J. Central Bur. Animal Husbandry & Dairying India* **3**, 76(1929).—The method previously described (*C. A.* **23**, 5514) is modified as follows: To 17.6 cc. of milk contained in a Babcock bottle add 5 cc. of Fehling soln. and 2 cc. of a mixt. of 4 parts of MeOH and 1 part of AmOH. Place the bottle in water at 80° and shake thoroughly every min. until the liquid is red. Finally, shake vigorously and allow the bottle to stand in the bath for 3 min. longer. Then add hot water slowly till the fat column rises sufficiently in the neck of the flask to be read. Twirl the bottle in the palms of the hand to disentangle any fat globules from the soln. below. The bottle should be cooled somewhat before the percentage of fat is read off. K. D. JACOB

Further work on the refractometer in milk analysis. G. D. ELSDON. *Analyst* **55**, 618–25(1930).—As the result of considerable comparative work, which is described, the conclusion is drawn that the $CuSO_4$ method of producing milk serum is, on the whole, as useful as any that has been devised. It is true that the milk must be fresh. The phosphotungstic acid method has the advantage that no rise in refraction occurs in the early stages of souring but the removal of the albumin results in a lowering of the value obtained, which may be a disadvantage. When the sour serum method is used, the souring should be carried out at a uniform temp. and the refraction should be taken as soon after complete clotting as possible. A list of further references to the use of the refractometer in milk analysis is given. W. T. H.

Viscosity of milk and milk products. W. MOHR AND F. OLDENBURG. *Milchwirtschaft. Forsch.* **8**, 429–61, 576–92(1929).—A study is made of different forms of viscometers, in which considerable variation is found. The authors prefer the Lawaczeck. Detns. were made with milk having acidity occurring naturally and that resulting from added acid. GEORGE R. GREENBANK

Determination of chlorine and sugar in small quantities of milk. F. MUNCHBERG. *Milchwirtschaft. Zentr.* **59**, 161–3(1930).—Cl is detd. by heating 1 cc. of the sample to boiling with 2 cc. of halogen-free HNO_3 (d. 1.40) and 1 cc. of 0.1 *N* $AgNO_3$ or 5 cc. of 0.02 *N* $AgNO_3$. A 10% soln. of $KMnO_4$ is added to the boiling liquid until it clears. The liquid is cooled by the addn. of 30 cc. of distd. water and the excess Ag titrated with 0.02 *N* NH_4CNS. The addn. of 0.5 cc. of satd. Fe NH_4 alum soln. before titration provides an indicator. Sugar is detd. by adding 1 cc. of 20% CCl_3COOH to 10 cc. of the sample, shaken well and filtered through a dry filter. The rotation observed by a Zeiss polarimeter multiplied by 2.2 gives the percentage of sugar. The results are lower than those given by the iodometric methods of detg. sugar. G. R. G.

The catalase of milk. I. Determination of milk catalase by potassium permanganate titration. I. ZAVKOVSKII AND P. ALEKSEEV. *Fermentforschung* **12**, 55–66 (1930).—In the detn. of the catalase content of milk by various forms of app. in which the vol. of liberated O is measured, the values obtained vary within rather wide limits and are not comparable with each other. The detn. can be made, however, with rapidity, convenience and great accuracy by the $KMnO_4$ titration method, as follows: To 2 cc. of fresh milk add 98 cc. H_2O and 5 cc. of 0.3% H_2O_2, mix thoroughly and allow to stand 30 min. at room temp. A 2nd sample of the same milk which has been boiled and cooled is given the same treatment for the blank detn. After 30 min. add to each mixt. 5 cc. of 10% H_2SO_4 and titrate with 0.1 *N* $KMnO_4$, until the rose color persists for 15 sec. A fading of the color after a longer time is not due to the action of $KMnO_4$ on H_2O_2 but to oxidation of other constituents of the milk. After deduction of the blank the catalase value of the milk may be expressed in mg. of O per 100 cc. On account of the inaccuracy of the gasometric method, the catalase values reported in previous investigations need revision. A. W. DOX

Alkali number of the ash of cow milk with special reference to fodder and lactation period. A. SCHNECK AND B. GORGEL. *Milchwirtschaft. Zentr.* **59**, 49–53, 65–70, 81–85, 97–101(1930).—There has been considerable variation in the analysis of the constituents of milk ash, especially the Na value. The alkali no. K_2O/Na_2O has been given anywhere from 3.85 to 13.02%. Earlier values range from 2 to 4, but more recent work

by Nottbohm (*C. A.* **23**, 4509) gives an av. value of 6 with a max. value of 10. This value was detd. on milk from stall-fed cows receiving special diets which had low, normal and high mineral values. The authors use the perchlorate method throughout which gives results in good agreement with those given by the platinichloride method. Mixed milk from 10 cows gave 2.2–2.4; colostral milk gave 1.2–1.5 and had a low K value. The Ca values for different animals varied considerably, in one case being 25–30% above the av. Studies on one cow during lactation showed normal compn. after 4 days with a gradual decrease in K as the lactation period progressed. Dosing with carbonates of Na, K and Ca showed nothing of value. No change in the Ca content was observed during lactation. GEORGE R. GREENBANK

Kohn's method of distinguishing pure cow milk from pure goat milk. A. JANOSCHEK. *Z. Fleisch. Milchhyg.* **40**, 93–5(1929).—The method consists of a comparison of the rate of soln. of the pptd. casein in H_2SO_4. The acid ppts. the casein of the goat milk in a finer state of division and it dissolves more rapidly. The method has been found reliable for fresh untreated milks, but cannot be applied to sour milk or to sour milk neutralized by soda, or to milk preserved by HCHO. GEORGE R. GREENBANK

The fluctuation of p_H in koumiss from mare's milk. Changes in the specific gravity and in the quantity of fat and amino nitrogen in koumiss. K. S. ARKHIPOV. *Arkh. Biol. Nauk* **30**, 475–85(1930).—"The p_H of the koumiss from mare's milk fluctuates between 4.3 and 3.4 according to the temp. and the duration of keeping. Adding 5% of Na_2CO_3 affects the p_H. The quantity of amino N fluctuates between 0.084% in strong koumiss or leaven and 0.064% in weak koumiss, according to the temp. and the duration of fermentation. The sp. gr. of the leaven fluctuates from 1.005 to 1.007; the sp. gr. of a non-fermented mixt. of milk and leaven is 1.020–1.016; the sp. gr. of a mixt. that had fermented for 24 hours at a temp. of 10° (weak koumiss) is 1.015–1.011, and of a mixt. that had fermented for 48 hrs. at the same temp. is 1.005–1.007. The quantity of fat in koumiss varies according to the quantity of fat in the milk and according to the duration of fermentation of the koumiss." W. A. PERLZWEIG

The effect of some oil cakes on milk secretion. N. S. AYYANGAR, CHOUDHURY KARM RASUL, S. KARTAR SINGH, D. B. KOLHE AND LALCHAND SIKKA. *J. Central Bur. Animal Husbandry & Dairying India* **3**, 77–91(1929).—In the first expt., linseed cake, country coconut cake and expeller coconut cake were compared. Linseed cake appeared to produce a slightly larger vol. of milk than either coconut cake, but the increase in vol. was due only to diln., the milk from cows fed on coconut cake being distinctly richer in fat. There was no pronounced difference in milk from cows fed on the 2 varieties of coconut cake. In the second expt., linseed cake, peanut cake and cottonseed cake were compared. Peanut cake and cottonseed cake produced equal amts. of milk, both being slightly superior to linseed cake. Cottonseed cake was slightly superior to the other cakes in fat production, and produced milk contg. consistently higher percentages of N. II. AJEET SINGH GILL, ALAM SINGH, A. GOPALAKRISHNAYYA NAIDU AND AYANNA KELAPANDA. *Ibid* **4**, 7–22(1930).—Results previously obtained were confirmed. K. D. JACOB

Xylene value of adulterated butter. E. HANKE AND F. DEUTSCHMANN. *Milchwirtschaft. Forsch.* **8**, 525–32(1929).—The min. permissible value of pure butter is given as 18.0 when the van Raalte xylene test is used. GEORGE R. GREENBANK

Variations in the component fatty acids of butter due to changes in seasonal and feeding conditions. THOMAS P. HILDITCH AND JOHN J. SLEIGHTHOLME. *Biochem. J.* **24**, 1098–1113(1930); cf. *C. A.* **23**, 1963.—The influence of added fat in the diet of cows is of a minor order compared with that due to other causes. Profound changes in fatty acid composition appear to be caused by conditions such as the change from outdoor to indoor life, the general character of the diet, and seasonal changes in temp. BENJAMIN HARROW

The value of hydrogen-ion concentration in the study of cheese, especially Tilsiter cheese. M. SCHULTZ. *Molkerei Ztg.* (Hildesheim) **44**, 527–8(1930).—A quinhydrone method of detg. the p_H is described. The rind decreases in acidity until in old cheese it is almost neutral. For a complete study samples must be taken from different zones. Mild ripe Tilsiter gave a p_H of 5.2–5.6 in the center; at 5.7–5.82 at this zone it had a bitter taste. A review of the literature on p_H measurement, kinds of cheese and the errors involved in these measurements is included. GEORGE R. GREENBANK

Do fu: An oriental food. JOSEPH S. HEPBURN AND KEUM SUNG SOHN. *Am. J. Pharm.* **102**, 570(1930).—The oriental food, known as *do fu* in Chinese and as *doo pu* in Korean, is a soy bean prepn. The beans are soaked with twice their vol. of cold water for 24 hrs., then ground with the water. The resulting mass is filtered through a coarse linen bag. The white milky filtrate is heated in a vessel, with occasional stir-

ring, until it begins to foam. Then a satd. soln. of NaCl is added until coagulation is complete. The coagulated mass floats on the brine, is collected, placed in a linen bag and subjected to pressure with a light wt. for 2 or 3 hrs. to remove the adherent liquid. The resulting cake is kept in an ice box or in cold water. A sample of *do fu* was found to have the following percentage compn.: total solids 13.37, moisture 86.63, ether ext. 4.65, crude fiber none, crude protein 4.22, ash 0.59 and N-free extractives 3.91. W. G. GAESSLER

A new method for the preservation of fruit juices, sweet must, etc. A. MEHLITZ. *Konserven Ind.* **1930,** 306–7, 321–2.—The juice is centrifuged 5 min. at 3500 r. p. m., decanted, clarified by digestion at 45° with a strong enzymic ext. of *Aspergillus oryzae* and then run through an asbestos pre-filter, filtered through a Seitz E K germ filter and preserved aseptically. F. P. GRIFFITHS

The effect of heat on chocolate pastes in causing caramelization of their component sugars. RAOUL LECOQ. *J. pharm. chim.* [8], **11,** 522–9(1930).—From complete analyses of 4 grades of com. chocolate before and after being treated in a heated mixer, it is concluded that heating of chocolate pastes at temps. from 50° to 120° causes very pronounced "caramelization" (*A*) of sugars, manifesting itself in increased proportion of reducing sugars, chiefly at the expense of the initial sucrose content. *A* seems to depend on the length of treatment and the temp. It is produced to a lesser extent during the prepn. of com. brands requiring lower temps., but is especially evident in superheated "fondant" chocolates. The quantity of reducing sugars in terms of invert sugar may here exceed 25% of the initial sucrose. S. WALDBOTT

Role of fiber in poultry feeding. E. T. HALNAN. *Fertiliser, Feeding Stuffs & Farm Supplies J.* **15,** 559–60(1930).—Fowls cannot digest pure cellulose but can digest a certain portion of the fiber in various plant products, the percentage varying from 5 for wheat to 21 for white cabbage. Approx. 7% of the fiber in uncooked peas can be digested while the fiber in cooked peas is completely indigestible. Fiber depresses the digestibility of the N-free ext. but has no effect on the digestibility of the protein and fat. The chief value of fiber-contg. foods is their utilization for the purpose of regulating the vol. capacity of the ration, and so automatically fixing the wt. of food consumed daily by birds on a free food system. K. D. JACOB

Feeding experiments at Hosur, 1926, 1927 and 1928. F. J. WARTH. *Mem. Dept. Agr. India, Chem. Ser.* **11,** 53–72(1930).—From extensive digestion trials, the nutritive values of the typical spear grass products—prime hay, mature hay, early cut hay and silage—have been evaluated and the starch equiv. values of the feeding test rations detd. The early cut hay and silage were much more digestible than mature hay and gave much greater increases in the live wt. of animals. K. D. JACOB

The ground nut. S. D. TIMSON. *Rhodesia Agr. J.* **27,** 15–38(1930).—Analyses of peanut seeds, shells, vines and oil cake are tabulated. A. L. MEHRING

Soy bean extraction residues from different methods of treatment (MALKOMESIUS, SCHRAMM) **27.** The oil-bearing royal palm tree seed of the West Indies (HEIM DE BALSAC, *et al.*) **27.** Chinese tung oil seeds (ANON.) **26.** The physical chemistry of starch and bread making (KATZ) **2.** Antiseptics and food-preservatives (Brit. pat. 331,274) **17.**

Apparatus for heating and cooling foods, etc. EDGAR B. NICHOLS (to Pfaudler Co.). U. S. 1,780,794, Nov. 4. Structural features.

Apparatus (with specially constructed heating or cooling-coils) for treating foods, etc. EDGAR B. NICHOLS (to Pfaudler Co.). U. S. 1,778,810, Oct. 21. Structural features.

Apparatus for agitating the contents of containers such as foods, paints, etc. WM. H. BROOKS and WALTER PAGE. U. S. 1,780,333, Nov. 4. Structural features.

Apparatus of the "holding type" for pasteurizing milk, etc. C. O. HOLMBERG and C. A. LÖFGREN. Brit. 331,783, Oct. 12, 1929. Structural features.

Apparatus for evaporating and deodorizing milk, cream, etc. CHRIS M. PETERSON (to Ward Dry Milk Co.). U. S. 1,778,959, Oct. 21. Structural features of an app. for spraying the liquid into contact with heated tubes.

Timing device for cream testers. PAUL L. COOL and BUOL F. COOL (52% to Howard McDaniel). U. S. 1,780,377, Nov. 4.

Margarine. A. K. EPSTEIN. Brit. 331,562, Feb. 5, 1929. See U. S. 1,707,800 (*C. A.* **23,** 2510).

Regenerating used cooking fats and oils. MILLARD BRANDT (to Darco Corp.). U. S. 1,781,661, Nov. 11. A batch of the used material in the liquid state is percolated through a body of coarse-grained, highly activated, adsorbent carbon, which during

the percolation is maintained at a temp. near that of boiling water, and the carbon is then exposed to the air while at about the same temp. and then reused.

Lactic beverage. WILLARD J. SCHOLL (to Malt-O-Matic Corp.). U. S. 1,781,249, Nov. 11. A lactic beverage is prepd. which at a temp. below 0° is of creamy consistency and contains minute bubbles of air and minute particles of ice, the beverage having a d. of about 0.5.

Chocolate. EARL B. WORKING. U. S. 1,781,672, Nov. 11. A small proportion of lecithin is incorporated in a chocolate mass to prevent "graying."

Incorporating condiments with ground meats. HUGH E. ALLEN (one-half to Albert G. McCaleb). U. S. 1,781,154, Nov. 11. The meat is treated with a minor quantity of essential oils of spices and oleoresins of peppers and with a major quantity of "semi-pulverulent" sugar acting as a carrier.

Storing fruits and vegetables. E. MILANI. Brit. 332,209, Feb. 16, 1929. Fresh, ripe fruits and vegetables are sealed in a container in the presence of CO_2 or other inert gas and the container is minutely vented prior to or very soon after the product generates its own gas and begins to sweat. The vented container is preferably stored at a low temp. (suitably about 0°). Examples are given of the treatment of strawberries, apricots and pears.

Pectin preparations. A. LEO. Brit. 331,295, April 15, 1929. Pectin and sugar are so combined that subsequent soln. of the pectin in water or fruit juice precedes the soln. of the sugar, *e. g.*, sugar particles may be sprayed with a pectin soln. and the coating dried on them, and if desired this prepn. may be mixed with powd. citric acid or the like, the soln. of which may be retarded by a thin coating of paraffin. Various details and modifications of compns. and procedure are described.

Apparatus for drying fish meal, beets, etc., by heated air currents. WM. H. HASLAM. U. S. 1,779,470, Oct. 28. Structural features.

Dehydrating vegetable materials such as root or surface crops. BRYNAR J. OWEN (to Sugar Beet and Crop Driers, Ltd.). U. S. 1,781,473, Nov. 11. Heated air of relatively low humidity is passed through a mass of the material and the temp., pressure and rate of flow of the air are so coördinated with the mass of the material that exothermic reactions will take place in the material and will furnish part of the latent heat of vaporization necessary for the drying, and so that the total heat available will suffice to prevent condensation within the material but will be insufficient to afford any substantial degree of superheat to the vapor discharged from the material.

Use of dried seaweed as a preservative packing material, etc. FISADCO, LTD., and W. H. HASLAM. Brit. 331,546, April 2, 1929. Finely divided dried seaweed such as that prepd. as described in Brit. 303,591 (*C. A.* **23**, 4513) may be sprinkled over fish, meat, fruit, vegetables or hides or other materials as a preservative, packing or deodorant. Fish offal or excrement thus treated may be used as *fertilizer*.

13—GENERAL INDUSTRIAL CHEMISTRY

HARLAN S. MINER

The relation between chemical industry and research. RICHARD WILLSTÄTTER. *Chem.-Ztg.* **54**, 793–5(1930). E. H.

Solvent recovery by absorption in *m*-cresol, silica gel and activated carbon. FRITZ OHL. *Kunstseide* **12**, 239–41(1930).—Absorption methods for the recovery of solvents depending on the use of *m*-cresol (I), silica gel (II) and activated C (A-Kohle) (III) are compared and discussed. Methods using I or II are the most important for the *rayon industry*. I possesses the disadvantage of forming a resin with the solvents, which decreases the efficiency as the absorption proceeds. This difficulty may be partially overcome by adding tetralin to I. II gives a very pure solvent. Its absorption capacity is much better at lower temps. (0°). One of its disadvantages is the high water content of the solvent recovered. With III an absorption temp. of 35–40° is required and a high steam consumption is needed to drive out the absorbed solvent. Also, the use of a protective gas is necessary since at ratios of 2–3% C dust or 4–5% solvent self ignition may occur. Another disadvantage of the C process is its property of forming by-products such as aldehyde, mesityl oxide and pyranton, which are sepd. only with difficulty from the alc. or acetone. The degree of purity of the recovered solvent amounts to only 60–75%. The recovery of aliphatic, halogen derivs. by the C method is unsatisfactory because of the formation of condensation products with the liberation of HCl. FREDERICK C. HAHN.

Uniform description of graded materials and the evaluation of their fineness. M. SPINDEL. *Tonind.-Ztg.* **54**, 1385–6, 1401–3(1930). For a given fineness modulus the surface areas of the aggregates are const. and any change in modulus on grinding gives a direct measure of the work performed. Proposal is made to set up a metric fineness modulus with sieve openings of 1, 10, 100, 1000 . . . . 10^5 microns as a basis and divide each range into 5 divisions, the log. of whose openings shall be 1.0, 1.2, 1.4, 1.6 . . . 5.0 which correspond to the fineness moduli of gradings of aggregate whose av. size corresponds to that sieve opening. This system can then be applied to *cement* and other fine materials. F. O. ANDEREGG

Carbon monoxide concentration in garages. A. S. LANGSDORF AND R. R. TUCKER. *Heating, Piping and Air Conditioning* **2**, 695–7(1930).—The air in a large closed-door garage in St. Louis, Mo., was sampled during a winter cold spell and analyzed for CO by the I_2O_5 method. The concns. of CO varied between 1.34 and 2.71 parts per 10,000, depending on the location in the building. The highest concn. was from the office. During this period the workmen suffered more or less discomfort especially when the temp. fell below the usual av. The highest concn. of CO permissible for exposure for any length of time is not more than 1 part in 10,000. J. W. SHIPLEY

Intoxications caused by a homolog of aniline in a fly-paper plant. B. ROSENTHAL-DEUSSEN. *Arch. Gewerbepath. Gewerbehyg.* **1**, 380–96(1930); *Chimie & industrie* **24**, 586.—R.-D. observed numerous cases of intoxication produced by a homolog of $PhNH_2$, the clinical symptoms being the same as those of intoxication by $PhNH_2$. Women are apparently more sensitive than men, and all the cases observed related to women. As intoxication was more frequent in winter (less ventilation) it is recommended to increase the ventilation, and also to maintain the temp. at about 12°. But the intoxications can be prevented entirely only by suppressing completely the use of the toxic compd. in the fly paper. A. PAPINEAU-COUTURE

Mode of action of sodium peroxide in the isolation gas mask canister. G. STAMPE AND E. HORN. *Z. ges. Schiess-Sprengstoffwes.* **25**, 419–22(1930).—The decompn. of the contents of the canister of the isolation gas mask is discussed in detail. It is shown that certain used, hydrated Na_2O_2 prepns. give off O spontaneously for a long time before reaching an equil. A. L. KIBLER

Merits of carbon dioxide as a refrigerant. F. P. MACNEIL. *Power* **72**, 653–4 (1930).—A total heat diagram for CO_2 is given and its practical use explained. D. B. DILL

Testing physical properties of materials by oscillations of flexure of test pieces. O. FÖPPL. Brit. 332,299, April 24, 1929. App. is described.

Testing the flammable conditions of gaseous mixtures containing hydrocarbons and oxygen. NORMAN J. THOMPSON. U. S. 1,779,569, Oct. 28. In testing mixts. such as air contg. volatile solvent vapor, a sample is continuously withdrawn from the mixt. and is subjected to continuous combustion, and the increase in temp. produced by the combustion serves to indicate the fractional proportion of the amount of heat produced by the combustion relatively to the const. amount of heat produced by continuous combustion of any hydrocarbon gases at the lower limit of explosive strength of the hydrocarbon gases with air. App. is described.

Column-still operation for fractional condensation and use of vapors for generating power. A. LOSEV, P. GOTTLIEB and L. L. HAUPT. Brit. 331,485, Dec. 11, 1928. Vapors such as those of hydrocarbon oils are successively passed through chambers of a fractional condensing column with intervening reciprocating engine and turbines for generating power and assisting in the condensation. Numerous structural details are described.

Purifying air containing cyanogen chloride. PAUL O. ROCKWELL. U. S. 1,781,664, Nov. 11. Moisture is removed from the air and assocd. toxic gases (suitably by $CaCl_2$) and the gas is then passed through dry, granular, inorg., alk. material such as active C and NaOH. The process may be carried out by use of canisters, details of which are described.

Gas-protective or breathing filter. HERMANN STELZNER (to Otto H. Dräger). U. S. 1,781,254, Nov. 11. Structural features.

Temperature indicator for refrigerators, etc. EDWARD S. HALSEY. U. S. 1,779,066, Oct. 21. Structural features.

Use of methylene chloride as a refrigerant. WILLIS H. CARRIER (to Carrier Engineering Corp.). U. S. 1,781,051, Nov. 11. Evapn., compression and condensation of the methylene chloride is effected under a pressure at all times not materially greater than atm. pressure, in order to prevent leakage. App. is described.

Apparatus for detecting ammonia gas in refrigerating plants, etc. LOUIS A. HAVENS, JR. U. S. 1,780,483, Nov. 4. Structural features.

Insulating wires for electrical machinery, etc. I. G. FARBENIND. A.-G. Brit. 331,203, March 18, 1929. Details are given of the production of coatings of resinous condensation products obtained from other dicarboxylic acids or thioether dicarboxylic acids and polyhydric alcs. as described in Brit. 327,722 (*C. A.* **24**, 5173).

Sheathing cables with lead. KABELFABRIK A.-G. Brit. 331,301, Feb. 7, 1929. Sheathed cable from a lead press is cooled by winding on a drum at least partially immersed in cold water.

Fiber board. ROGER W. CUTLER and JOSEPH R. COOLIDGE, 3RD (to Montan, Inc.). U. S. 1,779,532, Oct. 28. Air is forced under pressure into the microscopic cells and pores of unvulcanized fibrous material such as fiber board and while the air is still held in the material under pressure it is impregnated with a melted waxy material such as Montan wax which remains hard and brittle at high atm. temps. but is sufficiently fluid at a temp. of 120° to be forced into the pores and cells of the material; the imprisoned air is then permitted to expand and thereby eject a portion of the impregnating material, followed by cooling and hardening. The product is suitable for *elec. insulation*, etc.

14—WATER, SEWAGE AND SANITATION

EDWARD BARTOW

London water supply (Annual Report, 1929). ALEXANDER HOUSTON. *Surveyor* **78**, 169–70(1930).—The bad taste of water in some places was eliminated by addn. of NH_4 sulfate and Cl. Prefiltration of water increased bacterial quality 100 to 1000 fold. The value of chem. tests was emphasized. Hot-water drinkers object to cloudiness of the boiled water. H. suggests that the water be heated just to boiling.
A. L. ELDER

Surface water supply of Hawaii, July 1, 1925, to June 30, 1926. MAX H. CARSON, *et al.* *U. S. Geol. Survey Water-Supply Paper* **635**, 145 pp.(1930). E. H.

The water purification system of Helsingfors. ALBIN SKOG. *Tekn. Foren. i Finland Forhandl.* **50**, 177–81(1930).—The purification system is based on sedimentation with Al sulfate, followed by rapid sand filters. Eight filters of the Jewell type with a total area of 21 sq. m. are used. The sand depth is 105 cm. and the grain size 0.5 mm. which is supported by a 20 cm. layer of coarse sand. These are washed once per 24 hrs. for a period of 10–15 min. The hardness has been kept at about 2.0° on the German scale, particularly since electricity has supplanted steam as power for industrial purposes. The optimum alum requirements are 55–100 g. of 17% Al_2O_3 per cu. m. In the summer a settling period of 2.3–2.9 hrs. is required and in winter 4.5–5.7 hrs. An addnl. 2 hrs. settling period is required to reduce the bacterial count. The settling takes place in 3 basins in series which are cleaned once a month. Liquid Cl has been used since 1928. Chlorophenol tastes occasionally cause trouble but their origin has not yet been detd.
H. C. DUUS

Water purification in factory operation. FRITZ HOYER. *Chem.-Tech. Rundschau* **45**, 842, 862(1930).—Air-cleaned filters are used chiefly for factory and boiler-feed water purification and the series is so connected that single elements can be cleaned without interrupting filtration. Filters adapted for cleaning water under pressure have thin filter layers and can be cleaned in 20–40 sec. Settling basins are applicable for waters contaminated by heavy suspensions which sep. readily. These are operated more economically when the water enters in a slow stream. Coagulating agents such as alum may be added. Removal of Fe from water consists of aerating to produce flocculation, production of contact action and removal of flocculent material by filtering. Hardness is reduced by filtration through artificial zeolites or Permutit, which permits reduction of hardness in uncontrolled hard waters to zero. The prepn. and recovery of *Permutit* after use are discussed. Dissolved gases are removed from boiler-feed waters by heating to reduce their soly. or by vacuum treatment in the cold.
E. PICKERING

Water purification with aluminum sulfate. W. PRANN. *Chem.-Tech. Rundschau* **45**, 881(1930).—The choice of coagulating agents for water purification prior to filtration requires exact investigation of the water if alkalies or Fe salts are to be used. The best coagulant is tech. $Al_2(SO_4)_3.18H_2O$. This is strongly hydrolyzed in aq. soln. with the pptn. of $Al(OH)_3$, and has an acid reaction. Its soly. in water between 0 and 100° is given. The amt. used should vary between 20 and 80 mg. per l. depending

on the character of the water. Alkali may be added soon or immediately after the $Al_2(SO_4)_3$. After settling the water is run through a gravel filter. E. PICKERING

Phenolphthalin and pyrocatechol-*o*-carboxylic acid reactions for the determination of the "activity" of mineral waters. L. FRESENIUS AND H. LEDERER. *Biochem. Z.* 226, 139–46(1930).—The reactions by these reagents in no manner indicate that the inorg. components of natural mineral waters are in a specially "active" condition, as these reactions are also obtained with artificial waters. S. MORGULIS

The salinity of the water of the bay of Palmo de Malorka in 1929 and new data on densimetry of ocean water. FRANCISCO DE P. NAVARRO AND FRUTOS A. GILA. *Inst. Espan. Oceanografia. Notas y Resúmenes*, Ser. 2, No. 44, 28 pp.(1930).—Assuming that the tables of Knüdsen are valid for oceanographic work and for work in marine biology, N. and G. propose to det. the salinity and density of sea water "in situ" by taking refractometric observations at 0°, instead of using the chlorovolumetric method. In conducting the studies of the salinity and densities of the water throughout the bay samples were taken through the year at different depths and detns. made. It is concluded that variations in the density of the bay water depend more upon temp. than upon salinity. Some cases of abnormal stratification were observed where the density of the upper layers was greater than that of the lower, although the difference seldom reached the fourth decimal. These cases of abnormal stratification are characteristic of homogeneous water and are due equally to factors of temp. and a salinity contributing to the production of the phenomenon of "sea calmness." B. S. LEVINE

Further studies on the thermophilic digestion of sewage solids. H. HEUKELEKIAN. *Sewage Works J.* 2, 219–27(1930).—Studies of the influence of temp., seeding and reaction control on the thermophilic digestion of fresh sewage solids indicate that liming accelerates decompn. and makes possible a reduction in the quantity of seeding material without prolonging the period of digestion; seeded mixts. can be digested in 12–14 days and if limed the amt. of seeding material may be reduced or the load of fresh solids may be increased without materially retarding digestion; the digestion of solids without seeding sludge requires about 25 days if the p_H values of the solids are controlled so as not to drop below 7.0; digestion is somewhat more rapid at 55–60° than at 45–55°. Above 60° the digestion is retarded; gas yield per g. raw volatile matter added, volatile matter reduction and decompn. of nitrogenous substances are greater under thermophilic conditions than at lower temps.; solids concentrate to a higher extent at high temps. than at lower. E. HURWITZ

Factors in sludge digestion. MARSHALL LUNDIE. *Surveyor* 78, 165–7(1930).—Results of investigations at Pretoria, South Africa, are reported. The optimum temp. for sludge digestion is about 27°. Most rapid digestion is obtained if fresh solids are seeded before acidity develops. Material contg. 18% solids digested most rapidly. It was found unnecessary completely to digest sewage sludge to produce an inoffensive sludge. Ash contents of raw sludge, partially digested sludge, and fully digested sludge were 19.6, 31 and 42–46%, resp. A. L. ELDER

Observations on two-stage sludge digestion. A. M. BUSWELL, G. E. SYMONS AND E. L. PEARSON. *Sewage Works J.* 2, 215–8(1930).—Observations made during the study of the effect of two-stage sludge digestion showed that fermentation is very rapid at first. It results in the decompn. of the simpler compds. and the production of a large quantity of gas. After fermentation is complete the sludge undergoes a ripening process during which it loses its water-binding properties. It is suggested that a complete digestion process can best be carried out in a sep. sludge digestion tank consisting of a relatively small primary tank designed to allow 6 to 8 days detention and equipped with devices to prevent scum and foam formation, followed by a secondary tank of sufficient size to permit the necessary ripening to a state where it will drain on sand beds. Such a design would result in economies in construction and operation. E. H.

Field experiments on the digestion of sewage sludge at Baltimore. C. E. KEEFER AND W. RUDOLFS. *Sewage Works J.* 2, 199–213(1930).—These expts. dealt with the effect of reaction control on the rate of sludge digestion. Daily charges of previously settled sewage solids, having a p_H of about 5.0, were added to an uninsulated, unheated sep. sludge digestion tank. The results of the expt. indicate that by raising the p_H from approx. 5.1 to 7.3 a much larger amt. of material can be digested in a given time. Sludge which had not been adjusted to proper p_H and which had not been seeded did not digest even over a period of time as long as 850 days. E. HURWITZ

The oxygen requirements of the activated [illegible]

AND E. W. [illegible]

of absorption of O by activated sludge, in the amts. and periods of aeration commonly used, is fairly uniform, and varies directly in proportion to the weight of the sludge; (2) the rate of absorption of O varies, further, in proportion to the content of org. matter in the sludge; (3) the rate of absorption of O by activated sludge from the North Side Treatment Works of the Sanitary District of Chicago averaged approx. 7.0 mg. of O per g. of sludge per hr.; (4) mixts. of sewage plus sludge absorb O in proportion to the weight of sludge, but with increasing amts. of sludge most of the O-demanding material is coagulated or adsorbed by the sludge so that very little O is required for the unadsorbed material in colloidal or true soln. The subsequent rate of oxidation of the coagulated material in the sludge is slow and comparatively uniform. The sludge passes through many cycles of aeration before it is removed, and during these successive aerations the org. matter is slowly oxidized; (5) based on the reduction of biochem. O demand the results obtained do not indicate that the period of aeration and amt. of sludge vary inversely, as has been claimed. Small quantities of sludge reduce the biochem. O demand of sewage as rapidly as large amts. Reaeration of sludge is indicated, however, when small quantities are used because of the shorter period of retention; (6) adjustment of the rate of air supply should be governed by the amt. of sludge in the aeration tanks. With large amts. a fairly uniform rate is desirable. Rates of aeration in proportion to the biochem. O demand of sewage, as has been recommended by some investigators, are greatly modified by the O requirements of the sludge. E. H.

Purification of sewage by the activated sludge process. Results obtained with Oviedo sewage in a laboratory installation. LUIS VALDÉS. *Anales soc. españ. fís. quím.* 28, 932–43(1930).—In a Sierp process (*C. A.* 20, 1292) lab. app. Oviedo sewage was mixed with activated sludge in a 4:1 ratio and aerated. With a treating period of 6 sec. and at 10 l. of air per l. of sewage the effluent was quite clear and innocuous. The biochem. O_2 consumption in 5 days was 10 mg. per l. The drop in bacteria count was almost 90%. A Cl addn. of 2 mg. per l. sufficed for complete disinfection. The activated sludge contained 96.22% H_2O and the compn. of dry material was mineral 48.3, org. 51.7, N 4.78, H_3PO_4 3.02%. E. M. SYMMES

Is the use of carbon tetrachloride dangerous from a sanitary standpoint? K. B. LEHMANN. *Zentr. Gewerbehyg. Unfallverh.* 17, 123–33(1930); *Chimie & industrie* 24, 587–8(1930).—From a general discussion of the question L. concludes that, while the use of CCl_4 as a fire extinguisher is subject to certain limitations, its other industrial uses do not give rise to any great hazards. A. PAPINEAU-COUTURE

Preventing the harmful action of gases and waste waters containing phenols in the operation of gas producers (FELDHAHN) 21. The determination of lime in sugar factory juices by Blacher's method (BÖTTGER) 28. Chemical characteristics of cement pipe lining (CHAPPELL) 20.

Purification of water with use of activated carbon. MILLARD BRANDT (to Darco Corp.). U. S. 1,781,314, Nov. 11. The C is disposed in a previous bed of highly activated, firm, elec.-cond., O-absorbing particles in a container such as iron or steel and the container is electrically insulated (as by a rubber or bakelite lining) from the bed in such a way as to prevent the C from forming galvanic couples with oxidizable metals when the app. is in use, thus to make O adsorbed by the C available for reaction with impurities in the water. Various details of app. are described.

Distilling boiler-feed water. P. JOHANNSSON. Brit. 331,778, Oct. 7, 1929. Boiler-feed water is evapd. by use of waste or exhaust steam which has been superheated in a pipe system by waste heat from the boiler furnace. App. is described.

Filter bed suitable for sewage disposal plants. ANDREW LENDBRINK. U. S. 1,780,791, Nov. 4. Structural features.

Drying sewage sludge. WM. W. HARRITT (one-half to Leavitt L. Keene). U. S. 1,779,810, Oct. 28. Various details of app. and procedure are described.

Incinerator for garbage, etc. SOLOMON SPECTOR. U. S. 1,778,919, Oct. 21. Structural features.

15—SOILS, FERTILIZERS AND AGRICULTURAL POISONS

J. J. SKINNER

The influence of chemistry on the development of agriculture. F. HONCAMP. *Landw. Vers. Sta.* 110, 133–55(1930).—An address. J. R. H.

Significance of p_H and calcium content of soil and simple laboratory methods for

their determination. F. LEMKE. *Deut. Zuckerind.* 55, 559–62(1930).—L. discusses sand, clay and loam, classifies soils as to lime content, treats of the colloidal chem. aspects and cites references.

J. F. LEETE

Determination of hydrogen-ion concentration of soils by the quinhydrone method. I. Some factors influencing the p_H values. A. ITANO, S. ARAKAWA AND A. MATSUURA. *Bull. Agr. Chem. Soc. Japan* 5, 73–4(1929).—A definite amt. of air-dried soil is placed in a flask, and an equal wt. of neutral distd. H_2O is added (with humic or volcanic soil 1.5 wt.). The stoppered flask is shaken for 5 min. and the soln. is filtered through neutral paper. To 15 cc. of the filtrate is added 0.05 g. of quinhydrone, and the detn. is made as usual.

W. D. LANGLEY

Information regarding the composition of Montenegro soil types. E. BLANCK AND H. KEESE. *Chem. Erde* 4, 157–66(1929).—The comparison of a no. of soil analyses shows that the presence of a red color is not always indicative of a typical "red-soil." A high humus content may produce an unexpected chocolate or brownish color in a true red soil. The SiO_2, Al_2O_3, Fe_2O_3 and humus contents of soils obtained from various localities are compared with those of a typical red soil obtained from North Montenegro.

A. E. MIX

"Single value" soil properties. A study of the significance of certain soil constants. III. Note on the technic of the Keen-Raczkowski box experiment. J. R. H. COUTTS. *J. Agr. Sci.* 20, 407–13(1930); cf. *C. A.* 24, 189.—A description is given of a modified technic for the Keen-Raczkowski box expt., which is believed to be as accurate as, and more convenient than, the one employed earlier. The results obtained for pore space by the new method are very nearly the same as those with the older method. The old and new results obtained for water retention and swelling are not the same, but are related to one another by simple linear expressions, and correlations with other soil properties deduced from the old data are applicable also to the new. **IV. A further note on the technic of the "box" experiment.** B. A. KEEN. *Ibid* 414–6.—Preliminary exptl. results suggest that, like the wt. per unit vol., the swelling is a function of the degree of packing to which the material is subjected during the filling of the box. The fact that such inert material as pptd. silica can show a "swelling" when satd. with moisture raises the question as to how far imbibitional moisture is concerned in the vol. expansion of soil.

P. R. DAWSON

Soil valuation and examination. A. VON NOSTITZ. *Landw. Jahrb.* 71, 837–54 (1930).—A study of the effect of the use of hard water for sedimentation, of a no. of methods of dispersion and the fluctuations of temp. during the process studied. The relationships between the mech. compn. and water relationships are also considered.

GEORGE R. GREENBANK

The indirect determination of various soil characteristics by the hydrometer method. G. JOHN BOUYOUCOS. *Soil Science* 30, 267–72(1930); cf. *C. A.* 24, 5405.—Exptl. results are presented which tend to show that soil material which the hydrometer method dets. at the end of 15 min. and designates as total colloids of the soil has a close relationship to moisture equiv. and unfree H_2O of soils. Fourteen soils with colloidal contents varying from 10.4 to 65% are studied. The close relationship between the phys. characteristics of the soils studied makes possible their rapid detn. by the hydrometer method. The wilting coeff. appears also to be determinable indirectly by the hydrometer method.

M. S. ANDERSON

Determination of soil acidity. A. H. ERDENBRECHER. *Deut. Zuckerind.* 55, 541–8 (1930).—The following detns. were made on various soils: p_H of suspension water, p_H of K chlorate ext., Ca need according to Daikuhara, Ca need according to Kappen, acid consumed when 30 g. was suspended in 75 cc. 0.1 *N* H_2SO_4, detn. of *Azotobacter* content.

J. F. LEETE

A new method of estimating total carbonates in soils. AMAR NATH PURI. Imperial Inst. Agr. Research, Pusa, *Bull.* 206, 7 pp.(1930).—Stir 10 g. of soil with 100 cc. water in a conical flask and add 0.2–0.5 g. $CaSO_4$. Heat the mixt. to boiling, add 10 cc. of 0.1 *N* $AlCl_3$, shake and add 10 drops of a 1% alc. soln. of bromothymol blue. After vigorous shaking, the suspension is allowed to settle and the color of the supernatant liquid is noted. A yellow color indicates the presence of less than 1% of carbonates, while a green to blue color indicates more than 1%. Ten drops of a 1% alc. soln. of bromocresol green is then added and the color again noted. A golden yellow color indicates the absence of carbonates. If carbonates are present the contents of the flask are heated to boiling and titrated with 0.5 *N* H_2SO_4. The titration is complete when the supernatant liquid assumes a golden yellow color which persists on boiling the suspension for 2 min. and allowing to settle for 1–2 min. The method is sufficiently accurate for routine field and lab. detns.

K. D. JACOB

Determination of carbonates in soil. C. J. SCHOLLENBERGER. *Soil Science* **30**, 307–24(1930).—See *C. A.* **24**, 4347. M. S. ANDERSON

The determination of the readily available phosphorus of soils. EMIL TRUOG. *J. Am. Soc. Agron.* **22**, 874–82(1930).—It is suggested that the terms readily available and difficultly available be used in place of available and unavailable in referring to the P of the soil in relation to its availability to plants. The former probably exists as Ca phosphate and the latter as basic ferric phosphate. A rapid analytical method is proposed in which a 0.002 *N* soln. of H_2SO_4, buffered with $(NH_4)_2SO_4$ to a p_H of 3, is used in the proportion of 200 cc. of solvent to 1 of soil to ext. the readily available P of the soil. This high ratio probably lessens refixation of dissolved phosphates and more closely represents plant removal of P. The soil is agitated in contact with the solvent for 30 min. The P is then detd. directly in the filtered ext. by means of the Denigès colorimetric method. For general farming in Wisconsin there should be a min. of 75 lb./acre of readily available P for the heavier soils and 50 lb. for the lighter sandy soils. For garden and special crops this limit should be raised to 150 lb.
J. R. ADAMS

Some carbon-nitrogen relations in soils. WILBUR R. LEIGHTY AND EDMUND C. SHOREY. *Soil Science* **30**, 257–66(1930).—Analytical data obtained from 176 samples of soils from 63 locations in 12 states show the C:N ratio is highly variable. With few exceptions the ratio is highest in the surface soil and becomes less at lower levels. The values found vary between the extremes 3.5:1 and 35.1:1, relatively few values lying outside the limits 7:1 and 15:1. The C:N ratio gives some indication of the availability of org. matter as food for microörganisms. A ratio as high as 20:1 is indicative of a fair supply of decomposable org. matter. while a ratio of 10:1 or less indicates org. matter in a well-advanced stage of decompn. The data show the futility of attempting to calc. the org. matter by multiplying the total N by the factor 20 as has been proposed. M. S. ANDERSON

Studies on the carbon and nitrogen cycles in the soil. I. Introductory. H. J. PAGE. *J. Agr. Sci.* **20**, 455–9(1930).—A résumé of previous work on soil org. matter, particularly "humic matter," introducing a series of papers to follow. **II. The extraction of the organic matter of the soil with alkali.** C. W. B. ARNOLD AND H. J. PAGE. *Ibid* 460–77.—The alkali extn. of the org. matter from the soils of certain plots of the permanent expts. on Barnfield and Broadbalk at Rothamsted, receiving resp. org. manure, artificial fertilizers and no fertilizer treatment, was studied, together with colorimetric examn. of the exts. for the comparison of the content of humic matter. In spite of the different cultural and fertilizer treatments which the different plots had received, there was a marked similarity in the properties of the org. matter of these soils, with respect to its behavior on extn. with cold and hot dil. NaOH, and the color intensity of the org. matter in the exts. For both soils the org. C values for the soils themselves and for the exts. are very markedly higher in the plots to which manure was applied, both in the surface soil and subsoil. The excess of org. matter in the subsoil of manured plots is shown to be due to carrying down from the surface soil. The greater part of the C sol. in cold alkali is extd. in 4 hrs., only a slight increase occurring after 8–16 hrs. Extn. with hot alkali dissolves about 2 times as much C as cold and prolongation of the hot extn. beyond 3 hrs. produces no appreciable increase. The results appear to indicate that the org. matter of these soils is present in 3 forms, 1 readily sol. in cold alkali, another only slowly sol. in cold dil. alkali, but rapidly sol. in hot alkali and a 3rd which is insol. in hot dil. alkali. The org. C extd. from the surface soils is more deeply colored than that of the corresponding subsoils and is most deeply colored in the exts. from the surface soils receiving annually heavy applications of manure. The org. C in the exts. from the subsoils of the plots receiving no manure or artificial fertilizers is the least intensely colored of all. The wet combustion method used for the detn. of org. C in the soils and their exts. is described in detail in an appendix. **III. The formation of natural humic matter.** M. M. S. DU TOIT AND H. J. PAGE. *Ibid* 478–88.—Expts. are described in which the decompn. of various plant materials (wheat straw, clover hay, corn cobs and sawdust) and of purified prepns. of plant constituents (lignin, cellulose, xylan, xylose, starch, glucose and protein) was studied during rotting under neutral aerobic conditions in the presence of soil organisms, with relation to the formation of humic matter. Decompn. was followed analytically by estg. the surviving constituents of the plant materials. The degree of humification was estd. indirectly by comparing the tint of a freshly prepd. hot strong NaOH ext. of the material with that of a fresh NaOH soln. of an estd. humic acid prepn. The relative order of rates of rotting, as measured by loss of total org. matter, was, for the plant materials, in descending order: clover, straw, corn cobs, sawdust, *i. e.*, in order of protein content.

There was no direct relation to the relative content of furfuroids, sugars or cellulosic materials. The formation of humic matter bore a much more const. relation to the change in "lignin value" than it did to the changes in content of the other groups of plant constituents estd. P. R. DAWSON

Normal magnesium carbonate in comparison with "light" and "heavy" oxides and carbonates in the soil. W. H. MACINTIRE AND W. M. SHAW. *J. Am. Soc. Agron.* 22, 919–34(1930).—Comparative lysimeter expts. were run for 4 yrs. on 5 magnesic materials at 8-ton and 32-ton CaO-equiv. rates. The cryst. carbonate, $MgCO_3.3H_2O$, gave the greatest Mg outgo for both rates. At the 8-ton rate the greater losses from the other materials came from the "heavy" forms of oxide and carbonate and the losses from each oxide approximated those from the corresponding carbonate. At the 8-ton rate the Mg outgo from the carbonate was greater than that from the 32-ton "light" carbonate but this in turn was smaller than the outgo from the 32-ton rate of the "light" oxide. All magnesic materials depressed the outgo of CaO, the 32-ton addns. being approx. twice as effective as those of the 8-ton addns. The annual and total carbonate-bicarbonate leachings were parallel to the relationships shown for total Mg. All addns. caused a material repression in K_2O outgo, the heavier ones producing the greater repression. Sulfate outgo was uniformly enhanced by every material at both rates. Nitrification was accelerated by the 8-ton addns. of oxides and pptd. carbonates especially during the first yrs., the carbonates being more effective. At this rate the cryst. carbonate showed no accelerative effect while at the 32-ton rate it was repressive. The nitrate leachings from the "light" oxide and carbonate at the 32-ton rate were only about 70% of the outgo from the untreated soil. Plants grown after magnesic addns. showed smaller assimilation of Ca and K. J. R. ADAMS

Base-exchange property of organic matter in soils. W. T. MCGEORGE. Ariz. Agr. Expt. Sta., *Tech. Bull.* 30, 181–213(1930); cf. *C. A.* 23, 1980.—Twenty soils collected from various parts of the U. S. were examd. chemically, particularly as to org. constituents. The exchange capacity of highly org. soils is approx. a linear function of the % of C in the soil. There is no relation between the N or N-C ratio and the exchange capacity of highly org. soils. Base exchange in highly org. soils takes place in chemically equiv. proportions. With H_2O_2 as a reagent for destroying org. matter in soils, the loss in exchange capacity is approx. a linear function of the amt. of org. matter destroyed. This loss in exchange capacity is due to a destruction of the org. matter which functions in base-exchange reactions, *i. e.*, the active org. fraction is not simply rendered passive as happens when it is treated with solns. of Al salts. Digestion with H_2O_2 does not affect the replacement capacity of natural bentonites but destroys a definite part of the exchange capacity of synthetic zeolites. H_2O_2 is of value for the approx. detn. of the exchange capacity of the org. matter of soils by a "difference method." Lignin, lignocellulose and lignohemicellulose or related bodies function largely as the exchange compds. of soil org. matter. Lignin from corncobs, lignin from soil (prepd. by extn. with alc. NaOH), synthetic humus and lignohemicellulose (prepd. by extg. the soil with aq. NaOH) all showed a definite chemical equiv. exchange capacity. The tervalent Al ions of $Al_2(SO_4)_3$ or $AlCl_3$ cannot enter the org. exchange complex and replace the bivalent or univalent ions absorbed by the lignin or lignin-like bodies. There is a partial loss in replacement capacity of lignin-like bodies when they are leached with a soln. of $AlCl_3$, which loss is restored by treating the soil with a basic hydroxide or the soln. of a salt, such as an acetate, which will yield OH ions by hydrolysis. The investigation is being continued. C. R. FELLERS

Relationship between soil reaction, distribution of meadow plants type and yield of meadows. KLAPP. *Landw. Jahrb.* 71, 807–35(1930).—Optimium ranges are studied for soil reaction using a no. of meadow plants. For the majority of the plants the growth p_H range is of such width that the characterization of soil reaction by classification of the natural flora is indecisive. Highest hay yields are obtained at a p_H of 5.0–6.8, with a preponderance of the better feeding plants in the less acid areas. G. R. G.

Interrelation of nutrients and soil reaction on growth and inoculation of alfalfa. M. C. SEWELL AND P. L. GAINEY. *Soil Science* 30, 297–305(1930).—Alfalfa grown in pots contg. quartz sand and nutrient solns. indicate that soil reaction within the range of p_H 4.5 to 7.0 is a minor factor in affecting the growth of alfalfa, provided all the needed nutrients are supplied. Reaction may be an important factor in symbiotic fixation under conditions of limited nutrients. M. S. ANDERSON

Local variation of soil acidity in relation to soy bean inoculation. GEO. Z. DOOLAS. *Soil Science* 30, 273–87(1930).—Greenhouse pots of Putnam soil are prepd. by treating certain zones of the soil with reagents such as NaOH, H_2SO_4 and $Ca(OAc)_2$. Soy beans are grown in these pots and the influence of the treated zones is studied as affect-

ing root growth and nodulation. Soil areas as acid as p_H 3.8 to 4.6 depress nodulation and produce root injury. Areas of about p_H 5.6 show healthy root segments but sparse nodulation. Apparently healthy plants grow in soil-contg. areas as acid as p_H 4. However, if the entire root system is in soil as acid as this, abnormalities of growth are observed. Nodule organisms retain their viability in all soil media with degrees of acidity ranging from p_H 3.8 to 8.3. M. S. ANDERSON

Determination of the nutrient requirement of soils by field and pot experiments. E. A. MITSCHERLICH. *Landw. Jahrb.* 71, 445–67(1930).—A comparison is made of the contents and fertilizer requirements of a no. of soils by pot and field expts. The errors of the 2 methods are discussed. The first approximation to the effect law offers a satisfactory means of examn. GEORGE R. GREENBANK

The Atterberg consistency constants: factors affecting their values and a new concept of their significance. L. D. BAVER. *J. Am. Soc. Agron.* 22, 935–48(1930).—The Atterberg consts., (*a*) upper plastic limit, (*b*) lower plastic limit and (*c*) plasticity no. are affected by a no. of factors. Plasticity increases with the content of disk-shaped, colloidal particles in the soil. Soils contg. a high percentage of clay or colloids possess high plasticities. A low SiO_2-sesquioxide ratio of the colloidal material extd. from soils is assocd. with a low plasticity range on the moisture scale. The bivalent cations tend to increase the plasticity by raising both plastic limits; the K ion decreases plasticity and lowers both plastic limits and the Na ion lowers both plastic limits but increases plasticity. Org. matter causes plasticity to occur at high moisture contents. Max. adhesion occurs at a moisture content close to that of the upper plastic limit and is proportional to the plasticity no. The moisture range over which adhesion takes place and the moisture content at which max. adhesion occurs appears to be functions of the plasticity no. The range of max. compressibility is approx. the same as the plasticity range on the moisture scale and this max. compressibility is a logarithmic function of the plasticity no. The max. resistance offered by a soil to the passage of chisels is a logarithmic function of the plasticity no. A double logarithmic relationship exists between the plasticity no. and that moisture content at which the resistance of a soil to the passage of chisels begins to increase rapidly. From this and previous work the Atterberg consistency consts. appear to be a means of predicting the values of the dynamic properties of any plastic soil. J. R. ADAMS

Nitrogen and organic matter as related to soil productivity. W. L. POWERS AND R. D. LEWIS. *J. Am. Soc. Agron.* 22, 825–32(1930).—N and total C show marked increases after 16 yrs. from irrigation, crop rotation or manuring. This increase does not change the ratio between the N and C. The nitrate-supplying power of the soil appears to increase. Soil N and total C are related to crop yield, net profit/acre and H_2O cost of dry matter. J. R. ADAMS

The liming of soils in Cis-Ural and Trans-Ural regions. G. A. MALANDIN AND V. N. KOTOVA. *Trav. inst. recherches biol. univ. Perm* 3, 1–64(in English 64–71)(1930).—The territory of U. S. S. R. taken as a whole, as well as its part—Ural region, with regard to the soil cover, exhibits a great variety, and therefore the liming requires special attention. The soils are in need of lime to a degree which varies not only with various soil belts, but also within the same belt. The need of soils for lime was detd. by the degree of satn. of the soil with bases (according to the value V). This last is detd. by the formula $V = S/T\ 100$, as it is understood by Kappen, where S stands for the sum of adsorbed bases and T, for the max. adsorption of bases by soil at its treatment by hydrolytic alkali salt. The value S was detd. by the method of Kappen (the treatment of soil by 0.1 N HCl). The results obtained by the method of Kappen were compared with those obtained by the method of Gedroits (the treatment of soil by 1.0 N NH_4Cl). The data compared show a definite dependence of the exactness of the method of Kappen on the value S. The interdependence of the methods of Kappen and Gedroits as regards S allows one to establish corrections for S values, obtained by the method of Kappen. L. JACOVLEFF

The use of the antimony electrode in the control of cane juice defecation and for measuring the hydrogen-ion concentration of soils. N. GALVEZ. *Philippine Agr.* 19, 219–27(1930).—A method of cane juice clarification by intermittent liming is proposed which requires an Sb electrode and an indicator but no potentiometer recorder. The Sb electrode in connection with a satd. HgCl cell has the advantage over other electrodes for cane juice and soil detns. of cheapness, strength, ease of cleaning, quick response and accurate results when used continuously for at least 3.5 hrs. The av. probable error in p_H is about 0.08. In a series of tests the max. deviation from the true p_H was 0.3, which was obtained with a tarnished electrode that had been used in many different solns. without cleaning. A. L. MEHRING

Seasonal variation in the number of two species of Rhizobium in soil. J. K. WILSON. *Soil Science* 30, 289–96(1930).—Studies were made of the occurrence of *Rhizobium trifolii* and *R. leguminosarum* in plats at different times of the year. The nos. of *Rhizobium* organisms varied from as few as one in 50 g. of soil to as many as 100,000 per g. The nos. tended to be greatest in June and in Oct., and least in winter. M. S. ANDERSON

Decomposition of superphosphate in the soil and the effect of superphosphate on the reaction of the soil. NEUMANN. *Das Superphosphat* 6, 149–51(1930).—Water-sol. P_2O_5 is fixed in the soil principally by reaction with $CaCO_3$ to form $CaHPO_4$ and $Ca_3(PO_4)_2$, which are pptd. in an extremely fine state of division and can be utilized readily by plants. Superphosphate has no effect on the p_H of the soil. K. D. JACOB

A comparison of some effects of blast-furnace slag and of limestone on an acid soil. F. H. CRANE. *J. Am. Soc. Agron.* 22, 968–73(1930).—From greenhouse and lab. tests it was found that on the gross ton basis 100-mesh limestone was somewhat superior to 100-mesh slag in its effects on red clover growth and soil reaction. On the basis of $CaCO_3$ equiv., as detd. by titration with phenolphthalein as indicator, the 2 materials had nearly the same effectiveness. The $CaCO_3$ equiv. computed from the contents of total Ca and Mg was a less satisfactory measure of relative effectiveness as compared with clover yields and effects on soil reactions than the $CaCO_3$ equiv. obtained by titration. Four-ton applications of granulated slag gave results approx. equal to those from 1 ton of 100-mesh slag. J. R. ADAMS

The effect on plant growth of treating soils with copper-carrying pyrite. H. V. SMITH. *J. Am. Soc. Agron.* 22, 903–15(1930).—The addn. of waste pyrite carrying 1.26 to 1.63% Cu to 9 different soils causes an increase in the sulfate content of the soils, a lowering of the p_H value of the acid soils, and little or no change in the p_H of the alk. soils. The pyrite in the quantities used causes no Cu toxicity but in certain soils causes too high concns. of sol. salts for the best growth. Soils not originally well supplied with CaO become too acid for optimum plant growth. The S in both the Jerome and Nacozari pyrites is capable of fairly rapid oxidation to sulfate. Pyrite, carrying small quantities of Cu, can be applied to calcareous soils in fairly large amts. Acid soils should be treated with care, unless CaO also is used. J. R. ADAMS

Further studies on the fixation of atmospheric nitrogen by Azotobacter. KEN IWASAKI. *Biochem. Z.* 226, 32–46(1930).—In fluid cultures of *Azotobacter* cell division is stopped in low O_2 tensions and N_2 fixation is stimulated. The energy yield of oxidation is thereby increased for brief periods of time. In the presence of NH_4 salts the N_2 fixation ceases. Humin solns. increase the rate of growth and of respiration extraordinarily. These humin solns. are prepd. as follows: 100 g. of garden soil washed 3 times with HCl is shaken for 2 hrs. with 10% KOH and centrifuged. On acidifying this scln. with strong HCl a ppt. is formed which is centrifuged off, redissolved in KOH and pptd. again with *N* HCl. After repeating this twice the ppt. is suspended in 100 cc. H_2O to which enough KOH is added to dissolve the humin. The soln. is exactly neutralized with acid. Expts. show that humin has a great influence upon the assimilation of N but not on the N fixation, as it continues to produce its typical effect also in the presence of NH_4 salts. S. MORGULIS

Time of seeding small grains after tobacco and saving of nitrate. P. E. KARRAKER. *J. Am. Soc. Agron.* 22, 890–5(1930).—After the tobacco was cropped the plats were seeded to barley or wheat. The soil content of the nitrate accumulated during the growth of the tobacco was very effectively reduced by a large growth of early-seeded barley. Wheat seeded at or after the usual time was comparatively ineffective in this respect. J. R. ADAMS

Rate of loss of replaceable potassium by leaching. O. C. MAGISTAD. *Soil Science* 30, 243–56(1930).—Synthetic K zeolites when leached with distd. H_2O and the successive portions of leachate analyzed for K give data which can be expressed by an equation of the type $\log [A/(A-Y)] = KV^p$, where A is the absorptive capacity in milliequivs., K is a const., Y the loss in milliequivs., V the vol. in liters and p a factor which may vary for different zeolite materials. For artificial zeolites and noncalcareous soils the value for p is about 0.6 to 0.7. Calcareous soils give somewhat higher values for this factor, indicating a much slower rate of loss of K. It seems probable that for soils of a particular series a single set of consts. may hold fairly well, and that the use of an equation contg. these consts. would enable one to est. the rate of loss of K over periods of several years. M. S. ANDERSON

Progress in the fertilizer industry (phosphoric acid fertilizers) in the years 1925–1929. G. WICHERN. *Chem.-Ztg.* 54, No. 84, *Fortschrittsber.* 81–6(1930). E. H.

Fertilizer problems and analysis of soils in California. D. R. HOAGLAND. Calif.

Agr. Expt. Sta., *Circ.* **317**, 16 pp.(1930).—A general discussion of phys. and chem. properties of Calif. soils. C. R. FELLERS

World conditions as to chemical plant foods. C. C. CONCANNON. *J. Chem. Education* **7**, 2634–44(1930); cf. *C. A.* **24**, 4884. E. H.

Laboratory determination of the phosphoric acid and potash requirements of plants according to Neubauer's method. K. SOLON. *Deut. Zuckerind.* **55**, 557–8(1930).—The method is a combination of vegetation expts. and soil analysis. The optimum vegetation time is 14–15 days. J. F. LEETE

The importance of the water-soluble phosphoric acid in superphosphate. DIX. *Das Superphosphat* **6**, 139–42(1930).—The superiority of water-sol. phosphates as fertilizers for certain crops, such as the sugar beet, is largely due to the fact that the P_2O_5 can be used immediately by the young plants, thereby stimulating the root development and increasing the ability of the plant to use the less sol. forms of P_2O_5. K. D. J.

Use of superphosphate, ammonia-superphosphate and potash-ammonia-superphosphate mixtures on winter crops. GERLACH. *Das Superphosphat* **6**, 135–7(1930).—Superphosphate and mixts. contg. superphosphate can be used for the fertilization of winter crops grown on light sandy soils, without danger of loss of the H_2O-sol. P_2O_5 by leaching. Application of lime or marl does not decrease the fertilizer value of the P_2O_5. K. D. JACOB

Potash shale as a source of potassium for growing plants. HARRY C. HEATH. *Bot. Gaz.* **90**, 121–50(1930).—The use of untreated shale showed that considerable benefit is derived from it by plants grown in potash-deficient soils, especially peats. Shale, roasted with limestone or gypsum, may prove a valuable fertilizer in applications of 2 tons or more per acre. BENJAMIN HARROW

The Neubauer analysis and its relation to field experiments. KARL HESSE. *Landw. Vers. Sta.* **110**, 1–31(1930).—The fertilizer needs ascertained by the germinating plant method on single culture beds agree well with the results of field expts. The agreement is better with K_2O than with H_3PO_4. Inconsistent results found at many expt. stations are due to variation in the methods of carrying out the Neubauer analysis. The exposure to light of the germinating plants and the prepn. of the soil are important factors. A N fertilizer does not change the absorption of food materials by the germinating plants. JOHN R. HILL

Fertilizing rubber trees. FIRMAN E. BEAR. *Rubber Age* (N. Y.) **28**, 25–6(1930).—The merits of NH_4 phosphate are reviewed and discussed. C. C. DAVIS

Winter cover crop experiments at the Pee Dee Experiment Station. E. E. HALL, W. B. ALBERT AND S. J. WATSON. S. C. Agr. Expt. Sta., *Circ.* **42**, 14 pp.(1930).—Field expts. showed the following yields in lb. of N per acre: hairy vetch 92, Monantha and Hungarian vetch 83 and 62, Austrian winter peas 53, Austrian winter peas, limed and fertilized 142 and Canada field peas 19. The latter proved unsuitable as a winter cover crop because of winter killing. C. R. FELLERS

The fungicidal properties of certain spray-fluids. VII. W. GOODWIN, H. MARTIN AND E. S. SALMON. *J. Agr. Sci.* **20**, 489–97(1930); cf. *C. A.* **20**, 2223; **24**, 1697.—The fungicidal properties of solns. contg. S in polysulfide form were tested by application to the conidial stage of *Sphaerotheca humuli* growing upon young hop leaves. When 2 samples of Na_2S_x solns. prepd. in the lab. and 2 samples of com. prepns. were applied with 1% soft soap as the spreader, solns. contg. 0.5% polysulfide S were fungicidal. With 0.5% gelatin as the spreader, fungicidal strength did not begin to be attained until the concn. of polysulfide S reached 0.11%. Two lab. prepns. of K_2S_x behaved like the Na_2S_x solns., when applied at the same concn. of spreader and polysulfide S. Four samples of CaS_x solns., including 1 com. lime-sulfur, and 2 lab.-prepd. BaS_x solns., proved almost or quite fungicidal at concns. of 0.11% polysulfide S when applied with 0.5% gelatin. Solns. of CaS_x differing widely in the relative amts. of total and thiosulfate S behaved as fungicides in accordance with the polysulfide S content only. The fungicidal efficiency of the polysulfide S is independent of the base with which it is combined. The results confirm the view that the polysulfide S content is a measure of the fungicidal power of spray fluids of the polysulfide class. P. R. DAWSON

Effect of certain hydrocarbon oils on the transpiration rate of some deciduous fruit trees. VICTOR W. KELLEY. Univ. Ill. Agr. Expt. Sta., *Bull.* **353**, 581–600(1930); cf. *C. A.* **24**, 4350.—Satd. (highly refined, white) and unsatd. (colored) petroleum oils retarded the transpiration rates of apple, pear, peach, plum and sour cherry about 50–75% of the normal. When oil emulsions were sprayed on the upper surfaces of leaves transpiration was not affected; when applied to the lower surfaces a marked retardation resulted. Spraying both surfaces had no more effect than spraying the lower surfaces. The effect was greater on old than on young leaves, and increased with increase of oil

concn. in the spray. The lowest concn. used (0.5% oil) caused a definite decrease in rate. The stomata of leaves which have been sprayed on the under surface with oil emulsions do not open as widely as those of unsprayed leaves, possibly because of a reduction of sol. carbohydrate in the sprayed foliage which lowers the turgidity of the guard cells. No const. difference in effect on transpiration between satd. and unsatd. oils was noticed; the effect is probably phys. rather than chem. The influence on transpiration rate is soon apparent and measurable 30 min. after application of the oil spray and continues a long time. *Conclusion:* Oil sprays should be used with caution. Highly refined (white) oils may not guarantee against injury. The under sides of leaves should not be sprayed unless it is essential for the control of insects. Oil sprays should not be applied when the humidity is very high. C. H. RICHARDSON

Seed-grain disinfection experiments with chemicals during the years 1925 to 1929 and hot water disinfection of barley. I. JØRSTAD AND A. E. TRAAEN. *Meldinger Norges Landbruks.* **1930,** 1–56; *Rev. Applied Mycol.* **9,** 638–9.—A full account is given of the use of a large no. of both liquid and dry chem. prepns. against wheat bunt, covered smut of barley, loose and covered smut of oats and barley stripe in the disinfection of seed grain in the official Norwegian expts. O. E. SHEPPARD

Investigation on the toxic action of copper-containing compounds on bees. BORCHERT. *Berl. tierärtz. Wochschr.* **1930,** 84; *Rev. Applied Mycol.* **9,** 664–5.—Cu-contg. plant protectives (Cu sulfate and basic Cu carbonate) plus sugar and honey water were fed to bees in varying concns. and the concn. at which 25% were killed was detd. The toxic dose of 5 Cu-contg. fungicides was 8.8 millionth g. Since these disinfectants are naturally bitter and not as a rule artificially sweetened, the danger to bees from their use may be considered negligible. O. E. SHEPPARD

Killing field weeds with chlorates. C. J. WILLARD. Ohio Agr. Expt. Sta., *Bimonthly Bull.* **146,** 158–68(1930).—From 1 to 4 lb. per sq. rod applied as a water spray was very effective in destroying such weeds as quack grass (*Agropyron repens*), Canada thistle (*Cirsium arvense*) and poison ivy (*Rhus toxicodendron*). Usually from 1 to 3 sprayings are required for complete eradication. The soil is only temporarily sterilized, and the following crops are usually uninjured. Because of the fire hazard, $NaClO_3$ must be handled very carefully. C. R. FELLERS

Moringa aptera seed from Egypt [as fertilizer] (ANON.) **27.** Determination of K in very dilute solutions and in soil extracts (WRANGELL.) **7.** Quantitative spectral analysis [of K in soils] by means of x-rays (v. HEVESY) **3.** Dhupa kernels from India (ANON.) **27.** Chinese tung oil seeds [as fertilizers] (ANON.) **26.** The utilization of the [world] over-production of molasses [as fertilizer] (CLAASSEN) **28.** Treating sulfate minerals such as alunite, etc. (Brit. pat. 331,552) **18.** Sulfonylchlorides [as insecticides] (Brit. pat. 331,596) **25.** HCN and its use in fumigation (U. S. pat. 1,780,196) **18.** Stable diazo compounds (Brit. pat. 332,227) **25.** Use of dried seaweed as a preservative packing material (Brit. pat. 331,546) **12.**

Fertilizer and sodium bicarbonate. SOC. CHIMIQUE DE LA GRANDE PAROISSE (Azote et produits chimiques). Brit. 331,451, Nov. 20, 1928. $NaNO_3$ and KCl are caused to react to form KNO_3 and NaCl and this mixt. is treated with CO_2, NH_3 and water to form $NaHCO_3$ and NH_4Cl (and, if untransformed $NaNO_3$ is present, also forming NH_4NO_3) and the $NaHCO_3$ is separately recovered from the other materials which form a mixed fertilizer. Various details and modifications of procedure are described.

"Double superphosphate." WM. B. KING (to Armour Fertilizer Works). U. S. 1,780,620, Nov. 4. A slurry of ground phosphate rock and dil. H_3PO_4 soln. is concd. by heat to a thick liquid only, the liquid is allowed to set to a solid condition after termination of the heating action, and the solid material is dried.

Apparatus and procedure for sterilizing, disintegrating and drying waste fish material, etc. W. H. HASLAM. Brit. 332,241, April 16, 1929.

_____ coating materials such as insecticides. JAMES R. NEILSON (one-half to Earl M. Morley). U. S. 1,781,188, Nov. 11. A plastic mixt. of a material such as Pb arsenate together with gum arabic and brown sugar and water is molded into forms such as thin blocks which provide a substantially constant surface area as they dissolve away, and the molded material is subjected to the action of water under pressure.

Disinfectant for control of seed and plant diseases. MAX ENGELMANN (to E. I. duPont de Nemours & Co.). U. S. 1,780,008, Oct. 28. A mixt. is used comprising a thiosulfate such as that of Na, together with ethyl mercuric chloride or other suitable

Hg compd. of the general formula R-Hg-X, in which R is an alkyl group and X is an acid group. Cf. *C. A.* **24**, 5928.

Organic mercury compounds suitable for use as seed disinfectants. E. I. DUPONT DE NEMOURS & Co. Brit. 331,494, Jan. 21, 1929. A Hg salt such as $HgCl_2$ or $Hg(OAc)_2$ is caused to react with Et_4Pb, Ph_4Sn, Et_3PbCl, tetrabenzyl-Sn or similar alkyl, aryl or aralkyl deriv. of a quadrivalent metal above Hg in the electrochem. series (or with the reaction products of a Na-Pb alloy and alkyl sulfate or the like). Several examples are given. Cf. *C. A.* **24**, 5928.

16—THE FERMENTATION INDUSTRIES

C. N. FREY

Production, application and detection of methanol and isopropyl alcohol. K. BODENDORF. *Apoth. Ztg.* **45**, 1141–4(1930).—An address dealing with both the earlier and present methods of manuf., their various uses and methods of detection.

W. O. E.

The influence of the p_H value of the medium on alcoholic fermentation. I. L. CASALE. *Ann. chim. applicata* **20**, 336–53(1930).—The max. velocity of fermentation occurs when the p_H value of the medium is between 3.3 and 4.0; the max. yield of EtOH is obtained with p_H 2.8 and 5. In all cases the sugars are completely utilized, except at p_H 2.8 initial value and 2.6 final value. In this case the enzymes multiplied as usual, but activity of the zymase is arrested. The yield of lactic acid is higher with high original p_H values, while the formation of volatile acids is fairly const. **II. Influence of the reaction products of fermentation on the velocity of multiplication of yeast cells.** *Ibid* 353–7.—Because the reaction products in fermentation are acids, they retard fermentation, except in cases where the medium is originally alk. **III. Alcoholic fermentation in liquids with high hydrogen-ion concentration.** *Ibid* 357–61.—At concn. of p_H below 2.5 cell multiplication and enzyme action are arrested, while the activity of other enzymes, as those of lactic and formic acids, as well as AcH, persists. The presence of AcH in strongly acid media is not, therefore, an intermediate product in alc. fermentation, but is, rather, the product of another enzyme; possibly it is derived from lactic acid, as suggested by Schade. A. W. CONTIERI

Selective fermentation. I. Alcoholic fermentation of glucose, fructose and mannose mixtures. HARRY SOBOTKA AND MIRIAM REINER. *Biochem. J.* **24**, 926–31 (1930).—All types of yeast preferred glucose to fructose at a rate of 2:1 or higher.

BENJAMIN HARROW

The economic significance of lowering the cost of yeast and alcohol production from molasses. H. CLAASSEN. *Deut. Zuckerind.* **55**, 935(1930).—A discussion.

J. F. LEETE

Electricity in fermentation and storage vats. A. HALLERMANN. *Wochschr. Brau.* **47**, 279–82(1930).—H. describes his experience on Al vats embedded in reënforced concrete, with a layer of pitch and wrapped in jute. Iron-coated and vat-varnished attemperating coils were used; the outlet pipes were made of bronze and were protected from the Al by insulation. Although the concrete remained entirely dry and the iron embedded therein was not rusted there are possibilities for galvanic currents to pass the fermenting vat. Measurements showed that there is no complete insulation between vat walls and attemperating coils and 8 milliamps. were recorded on the ammeter. According to Faraday's law but 100 g. Al would be used up per annum in a unit of 5 vats, compared with the total weight of 2200 kg. of the entire outfit. It has to be considered, however, that the 8 milliamps. recorded were detected under most favorable connections to the current since all connections were carefully cleaned when the measurements were made. The embedding, however, could be improved. S. JÓZSA

Electricity in vessels (in brewing). S. JAKOB. *Wochschr. Brau.* **47**, 285–9(1930).—Galvanic corrosion in metal vats is discussed. Data are given showing the amts. of Fe, Al and Cu used up by currents of different strengths (0, 1, 1, 0, 10, 20 and 100 milliamps.). Measurements on a 140 hl. vat with a surface of 26 sq. m. equipped with a Cu swimmer of 1.6 sq. m. surface showed about 2 milliamps. which would use up 48 g. Al per annum. Elec. currents can also be observed in other brewing vessels as, *e. g.*, in mash tubs, filter tubs and straining vats. The conditions for corrosion in a straining vat are very favorable, the iron floor being about 10 mm. below the bronze draining surface. The lifetime of the iron floor is much shorter than that of the draining floor. J. describes the Toat oxidimeter, advocating its application to corrosion studies. This instrument is also useful for the detn. of insulating efficiency of different types of pitch. S. J.

Influence of carbon dioxide on fermentation by yeast. HOFMANN. *Wochschr. Brau.* **47**, 228–30(1930).—There has been much uncertainty as to whether alc. fermentation is brought to a standstill by high concns. of CO_2. A brief review of the earlier works on this subject is given (Prandtl, Foth, Hansen, Stockhausen and Windisch; Kolkowitz, Lieske and Hofmann). The main difficulty in such expts. is the compulsory use of very high pressure, and under such conditions some other factors also may come into play. Parallel expts. with H showed that fermentation ceased at 150 atm. pressure. H. concludes that there is no doubt that CO_2 dissolved in high concns. inhibits fermentation. S. JÓZSA

Modification of the degree of fermentation and of the respiration quotient of yeast. O. MEYERHOF AND KEN IWASAKI. *Biochem. Z.* **226**, 16–31(1930).—The influence of the *z*-factor discovered by Euler in yeast ext. has been studied on the fermentation of live yeast in N_2 or O_2. Under conditions of opt. concn. the anaerobic fermentation of *Saccharomyces ludwigii* is 100–200% greater than in a sugar-phosphate soln., and 100% greater for pressed yeast. The effect of the yeast ext. can be detected even in a diln. of 1:1000. At the same time the oxidation quotient is greatly increased although the respiration is unchanged. The effect increases with a rise in temp. and is scarcely noticeable at 10°. The increase in fermentation activity is independent of the sugar concn. The *z*-factor is present in the live yeast and is given off to the medium, especially in the presence of sugar and O_2. For this reason the anaerobic fermentation is considerably increased in a yeast suspension shaken for several hrs. with an oxygenated sugar-phosphate soln. from which the yeast suspension has been centrifuged off. The expts. also indicate that this *z*-factor is continuously produced and given off to the medium by the yeast. S. MORGULIS

Germ-removing filter applied in brewing. F. HARDER. *Wochschr. Brau.* **47**, 305–9(1930).—The Seitz E. K. filter has been successfully used in the wine industry for several years and its application in the brewing industry is emphasized. The app. tested had 80 filter layers, each 30 cm. (1 ft.) in diam. The handling is very simple and easy. The pressure required varies according to the condition of the beer and ranges from 1.5 to 3.0 atm. A detailed filtering expt. on pale beer is described. The costs per hectolitre (about 25 gallons) are 0.5 R.M. (12.5 cents). The stability of beers was found to be greatly increased; even spoiled beers were improved remarkably. A beer filtered through this E. K. filter is, however, very sensitive to further infection probably because of certain protective substances removed by filtration. S. JÓZSA

Technology of malting. IV. Cold and warm flooring method. E. JALOWETZ. *Brau- und Malzindustrie* **1**, 1–5(1930).—The influence of temp. on the decompn. of carbohydrates and protein during malting has been studied. The malting of the same Hanna barley was carried on with proper operations in 2 different ways, (1) at cold (10–13°) and (2) warm (20–22°) flooring temp. The 2 resulting malts were mashed in the usual way in the lab. and the worts were investigated for ext., dextrin, sol. albumins, formol- and ammoniacal N, acidity and increase in color. The malt which was produced in the cold way was richer in all these constituents than the "warm" one. The same detns. were made on the germs and their compn. was found to be parallel with that of the corresponding malt. Thus decompn. of protein and carbohydrates progressed within certain limits with lower temp. More protein was made sol. in the "cold" malt and passed over into the germs. Accordingly the germs of the cold malt showed a higher content of total and sol. N. Conclusion: It seems partly possible by proper adjustment of temp. during malting to regulate the albumin content of malts being produced from barleys rich in protein. Tables showing detailed analysis are included. V. **Influence of the composition of steep water.** *Ibid* **2**, 25–7.—Steeping expts. were carried out on the same barley with 4 different waters, 3 of which had been artificially prepd.: (1) well water, (2) lime and gypsum water, (3) lime water and (4) gypsum water. Ext., acidity, sol. albumins, formol- and ammoniacal N and increase in color were detd. in the worts and in the germs. The results showed that the mineral compn. of steep water had no effect on the constituents and character of the malt. The only exception was a remarkable increase in color after boiling with hops in the malts treated with alk. water. Tables with analysis are given. S. LAUFER

The p_H value of wines: conservation and chalking. VALENTINO MORANI AND LUIGI MARIMPIETRI. *Ann. chim. applicata* **20**, 313–35(1930).—In a previous paper (*C. A.* **24**, 2541) it was shown that the curve of neutralization of wine acids, measured potentiometrically, shows a sharp inflection when mineral acids had been added. It is now shown that even when chalk is added to neutralize added mineral acids, that this addn. can be detd. by the variation in the p_H value, which is always low compared to that of unadulterated wines. The potentiometric method is thus useful here. A no. of

tables of p_H values corresponding to measured electromotive forces are included.
A. W. C.

Volatility of magnesium acetate in wines. W. E. PATTERSON AND J. W. BAWTENHEIMER. *Can. Chem. Met.* **14**, 287–8(1930).—De-acetization of wines of good quality but which are rendered unpalatable by acetic condition is studied. Sufficient $MgCO_3$ must be added completely to neutralize all acid, fixed and volatile. Fifty % excess of the $MgCO_3$ equiv. is required to reduce the total acidity to zero. A study of 3 types of wines with wide differences in acid content shows that Mg acetate, in the absence of a hydrolyzing agent, such as tartaric acid, is volatile to a relatively small degree.
W. H. BOYNTON

The protein-tannin compound (in beer). B. D. HARTONG. *Wochschr. Brau.* **47**, 295–7(1930); cf. *C. A.* **24**, 2233.—H. concludes that the beer contains a certain colloid composed of protein, tannin and silicic acid, which further contains adsorbed ions. These colloids will be pptd. if the colloid stability is disturbed for any reason. The ppt. has the same compn. as the colloid compd. This coagulated compd. is a combination of protein and tannin. H. found that the ratio protein : tannin is always the same in the coagulated ppt. for the same type of beer. The pptd. matter was analyzed; a high ash content was found; and the amt. of N obtained was much less than could be expected for pure protein.
S. JÓZSA

Seed grain disinfection experiments with chemicals during the years 1925 to 1929 and hot water disinfection of barley (JØRSTAD, TRAAEN) **15.**

Denaturing alcohol with butyl chloride. WM. J. BANNISTER (to Commercial Solvents Corp.). U. S. 1,779,687, Oct. 28. About 1–5% of the BuCl is added. Brucine sulfate also may be added.

Citric acid by fermentation. FRANZ KANHÄUSER (to Montan- und Industrialwerke vorm. Joh. Dav. Starck). U. S. 1,779,001, Oct. 21. For effecting the fermentation of carbohydrate material such as sucrose or other sugar by mold fungi such as *Aspergillus niger*, the mold stock is cultivated in alternate stages including cultivation in a solid culture medium such as gelatin or agar agar, cultivation in liquid culture media under conditions corresponding to industrial fermentation, and cultivation on vegetable culture media contg. org. acids and vitamins followed by use of the mold stock for the industrial fermentation.

17—PHARMACEUTICAL CHEMISTRY

W. O. EMERY

The lavender essence industry in Italy. PAOLO ROVESTI. *Industria chimica* **5**, 1116–25(1930).—An outline of the present status of this industry is given. A. W. C.

Simple preparation of anesthetic ether from commercial ether. L. M. V. D. BERG. *Pharm. Weekblad* **67**, 1029–33(1930).—Com. ether is shaken 1 min. with an equal vol. of tap water, the H_2O drawn off and the operation twice repeated. The Et_2O is then dried 24 hrs. over $CaCl_2$ and distd. over an elec. lamp. The yield is 52% of a product which meets all the Pharm. requirements of anesthetic ether. A. W. DOX

Copper contamination of some iron preparations. F. GRENDEL. *Pharm. Weekblad* **67**, 1050–2(1930).—Detns. of Cu in 16 of the Fe prepns. listed in the Dutch Pharm. gave values ranging from 0.01 to 0.80 mg. per 10 g., with the notable exception of Ferrum pulveratum, where the Cu content was 6.0 to 7.5 mg. per 10 g. The bearing of these traces of Cu on the treatment of anemia is discussed. A. W. DOX

The efficacy of commercial preparations of anterior lobe of hypophysis. S. JANSSEN, A. LOESER AND P. NOETHER. *Arch. exptl. Path. Pharmakol.* **151**, 175–87(1930).—The criteria used were the ability of the exts. to cause follicular growth, ripening and formation of corpora lutea in infantile female rats, and to inhibit ovulation in the hen. All the com. prepn. tried (11) were completely ineffective; moreover, all depressed the blood pressure of the cat, an effect not observed in fresh active aq. exts. H. EAGLE

Powdered anterior lobe of hypophysis and the ovary. II. Quantitative titration of the efficacy. S. JANSSEN AND A. LOESER. *Arch. exptl. Path. Pharmakol.* **151**, 188–96 (1930).—The criterion recommended in testing the efficacy of an ext. is the proportion of animals which give pos. results with a measured quantity. So measured, anterior lobe of cattle, dried in acetone and kept over P_2O_5, had practically the same efficacy as fresh glands.
H. EAGLE

Experiments in the physiological titration of belladonna extract and other drugs with atropine-like effect. L. JENDRASSIK AND G. WILL. *Arch. exptl. Path. Pharmakol.* 153, 94–108(1930).—The atropine content of any prepn. can be detd. by its effect upon the amplitude of contraction of surviving rabbit intestine kept in a fluid with const. pilocarpine concn. So titrated, *l*-hyoscyamine is twice as strong as atropine; homatropine is only $^1/_{10}$ as strong. On testing new exts., the physiol. method gives results closely approximating those obtained by chem. analysis. In old atropine or hyoscyamine exts. the physiologically demonstrable substances are only a fraction of the total alkaloid content. H. EAGLE

Chemical characterization of drugs. IX. Sinistrin and mucilage in bulbus scillae. L. ROSENTHALER AND R. KOHLI. *Apoth. Ztg.* 45, 1097–9(1930); cf. *C. A.* 24, 465.—An exptl. study showing that the sinistrin obtained exists in 2 forms; it is not split by enzymes nor pptd. by tannin, HBr or silicotungstic acid; it does not possess the characteristics of a mucilage. The latter substance does not occur in the parenchyma but occurs rather in the raphidiferous cells. For localization studies, sections of scilla are boiled several times in dil. alc., the solvent is evapd., $Sr(OH)_2$ added to the exhausted section and the section immediately observed under the cover glass, whereupon sinistrin-Sr will appear in the parenchyma cells. W. O. E.

Acidimetric estimation of theobromine in diuretin, calcium diuretin and other theobromine preparations. HEINRICH BOIE. *Pharm. Ztg.* 75, 968–9(1930).—Dissolve 0.5 g. of the sample in 100 cc. hot H_2O, and add 15 cc. 0.1 *N* H_2SO_4. Expel the CO_2 from the acid soln. by boiling, cool to 40°, add 1.5 cc. phenol red soln. as indicator, render distinctly acid with 2 to 3 cc. 0.1 *N* NaOH soln., then titrate to an acid reaction with 0.1 *N* H_2SO_4. To the resulting soln. add 20 cc. (an excess) 0.1 *N* $AgNO_3$ soln. and titrate the liberated HNO_3 with 0.1 *N* NaOH to a distinctly deep violet-red tone. From the no. of cc. of 0.1 *N* NaOH thereby consumed, calc. the amt. of theobromine Ag (or theobromine) formed. Only a few min. is required for the above operation on account of its simplicity and dependability. Similarly, other derivs. of theobromine can be detd. The results obtained in the examn. of some 23 different samples are reported. W. O. E.

Examination of surgical dressings for presence of germs. C. A. ROJAHN AND WALTER SCHILL. *Apoth. Ztg.* 45, 1183–6(1930).—Results obtained in this investigation indicate that the com. brands of surgical dressings examd. are practically sterile, this condition having been effected by an appropriate combination of antiseptic and aseptic sterilization. W. O. E.

Majoles. E. UBRIG. *Apoth. Ztg.* 45, 1186–9(1930).—This contribution to the standardization of vials (Majole being the term applied by manufacturers to the standardized type of vial) is an attempt to show the ideal type and character of the standard vial, and to describe (by illustration) the various operations of manuf., filling, sealing and labeling. W. O. E.

The problems of the pharmacopeia for the physician, apothecary and drug industry. E. STARKENSTEIN. *Pharm. Post* 63, 445–8, 453–6, 465–70, 477–83, 489–96(1930).—An address. W. O. E.

Adulteration of cortex granati. GUNDIS ROTTER. *Pharm. Monatshefte* 11, 173 (1930).—A recently observed adulteration of this drug is reported which involves manipulation of the genuine product with brick powder or red clay. W. O. E.

Examination of the active constituents of Asarum europeum from the chemical medico-legal standpoint. JULIUS ORIENT. *Pharm. Monatshefte* 11, 174–6(1930).—*Asarum* root contains 2 principal constituents, an aromatic deriv. asaron and asaron oil (several fractions) of undetd. constitution. Animal expts. show asaron does not possess a local action when applied externally, but exercises a narcotic effect when administered internally *per os* or subcutaneously, being non-toxic and eliminated from the body. The oil, however, is toxic, producing hyperemia in all the organs, inflammation of the kidneys and uterus, and finally death, a fact explaining its use to some extent as a popular abortifacient. In the event of possible intoxication from *Asarum* root, a histological and microchem. examn. should be made of any residual plant particles. Asaron oil can be detected in urine and stomach contents by chem. tests. W. O. E.

Reactions of morphine and other alkaloids of opium. LAD. EKKERT. *Pharm. Zentralhalle* 71, 550–1(1930); cf. *C. A.* 23, 2532.—The reagent employed is a soln. of 1 g. *p*-dimethylaminobenzaldehyde in 1 cc. concd. H_2SO_4; on treating 0.1 mg. morphine with 1 drop of this reagent, a blood-red color immediately develops. Codeine, ethylmorphine, heroine and cryptopine behave similarly. The artificial products eukodal, laudanon, narkofin and parakodin develop reddish brown tones at first, changing on diln. with H_2O to more decided red colors. W. O. E.

Reactions of sulfonal and trional. LAD. EKKERT. *Pharm. Zentralhalle* **71**, 550 (1930).—On treating 0.01 to 0.02 g. of the sample (sulfonal) with a like amt. of resorcinol in 0.3 cc. concd. H_2SO_4 in a test tube, heating very carefully over a small flame, to the appearance of rose-red, red-brown, green, then dilg. the cooled soln. with 5 cc. H_2O, and rendering ammoniacal, a rose-red color will persist. Similar treatment of trional leads to a brownish yellow to reddish brown color. W. O. E.

Roumanian peppermint oil and the rise of this industry in Roumania. ELEMER KOPP. *Pharm. Zentralhalle* **71**, 577–82(1930).—A comprehensive study of the oils obtained over yearly periods beginning with 1925, the results thereby obtained being arranged for comparative purposes in tabular form. W. O. E.

Preparation of sulfureted balsam-like masses from wood tar. E. PALLAS. *Pharm. Zentralhalle* **71**, 609–11(1930); cf. *C. A.* **24**, 4382.—One of the 2 types of tar obtained in the destructive distn. of wood, notably that termed "Essigteer," yields on repeated extn. with hot H_2O, and subsequent treatment with SO_2 and $Ca(OH)_2$, with final evapn. to the desired sirupy consistency, a clear product possessing high antiseptic activity toward the lower organisms, notably bacteria. W. O. E.

Testing of ampoule glass for alkalinity. CONRAD STICH. *Pharm. Ztg.* **75**, 482 (1930).—Criticizing the official Ger. method, S. suggests a test involving treatment of the inner surface of the ampoules (80) with 0.01 *N* HCl and 1 drop of methyl red for 15 min. at 100° in a water bath. The liquid is then withdrawn and observed in a 100-cc. cylinder for retention of the red color. W. O. E.

New Brazilian Pharmacopeia. KARL MEYER. *Pharm. Ztg.* **75**, 941–7(1930).—A crit. review of this new revision, more particularly of the general and special divisions. W. O. E.

Keeping qualities of quinine. R. DIETZEL AND K. SÖLLNER. *Pharm. Ztg.* **75**, 955–7(1930).—The keeping qualities of quinine-HCl in aq. soln. have been studied when exposed for varying periods to diffused daylight, as also to that of short wave length when delivered by the quartz lamp. Short-time exposure effects little change; longer time (up to 60 days) produces more profound changes in the compn. as shown in the plotted curves. Continual exposure leads to the formation of a new, as yet undetd. *substance*, possibly a dimeric condensation product involving the union of 2 mols. of quinine through the ethylene bridge of the quinuclidine ring, in some way similar to the transition of cinnamic to truxillic acid. The new substance has a lower rotatory power than quinine. W. O. E.

Economic drug testing. II. Determinations. L. ROSENTHALER. *Pharm. Ztg.* **75**, 1087–8(1930); cf. *C. A.* **24**, 686.—The following procedure is suggested for estg. the alkaloids in powd. cinchona bark: Cover 0.2 g. of the sample in a 10-g. medicine bottle with 0.1 g. HCl and 1 g. H_2O, immerse in a boiling water bath, then shake the closed container 5 min. vigorously. When cold add 1.5 g. $CHCl_3$, again shake vigorously, add 0.5 g. NaOH soln., shake again 1 min. Now add 2.5 g. Et_2O and 0.2 g. tragacanth, shaking the mixt. 1 min. Pour 2.5 g. of the clear liquid into a 100 cc. flask, add 1 cc. 0.1 *N* HCl and 50 cc. of H_2O, then heat on the water bath to expel the Et_2O and $CHCl_3$. After cooling, fill to the mark with H_2O, withdraw 12.5 cc. of the liquid to a measuring cylinder, add 1 cc. Mayer's reagent, dil. to 20 cc. with shaking, pour into a test tube and compare with a test tube of like diam. contg. 1 mg. quinine treated as above. When the mixt. in the 1st test tube shows equal turbidity with the 2nd, then the sample of cinchona taken contains at least 6.5% of alkaloid. W. O. E.

Estimation of minute quantities of tannins. I. G. OBERHARD AND A. V. SCHALBEROWA. *Pharm. Ztg.* **75**, 970–1(1930).—The method employed involves the use of strips of specially prepd. gelatin-$FeCl_3$ paper, subsequently treated with varying amts. of a 0.1% soln. of gallic acid in a series of test tubes. A filtered soln. of the unknown is distributed in varying dilns. (1:5, 1:10, etc.) among 3 to 5 test tubes, into each of which is introduced a strip of the prepd. paper and allowed to stand for a period of 60 min.; preferably at the same time the control series is prepd. Comparison with the latter permits an estimate of the amt. of tannin in the sample under examn. W. O. E.

Pharmacological detection of poisons. P. PULEWKA. *Süddeutsche Apoth.-Ztg.* **70**, 517–8(1930).—The application of certain pharmacol. tests for poisons is advocated in pharmaceutical practice, notably in the detection of nicotine, veratrine, strychnine, morphine, atropine, etc., to which end suitable provision should be made in pharmaceutical curricula. W. O. E.

Examination of ergot. FISCHER AND HORKHEIMER. *Süddeutsche Apoth.-Ztg.* **70**, 518–9(1930).—The advisability of treating the drug with petr. ether for removal of the fats is emphasized as a preliminary to an estn. of the alkaloids. The authors' experience

in the examn. of certain samples of ergot is described, notably in cases of substitution. Of 15 different samples of the crude drug, 9 failed to conform with requirements of the DAB 6. W. O. E.

A chemical study of psyllium seed. JOSEPH S. HEPBURN AND THOMAS L. LAUGHLIN, JR. *Am. J. Pharm.* **102**, 565-8(1930).—Psyllium seed has the following percentage compn.: total solids 91.50, moisture 8.50, crude fat 6.40, total ash 3.16, insol. ash 2.95, sol. ash 0.21, crude protein 17.83, crude fiber 11.50, N-free extractives 52.61, pentosans 9.85 and galactans 0.31. Alky. of sol. ash, 6.48 cc. of *N* acid required to neutralize the ash yielded by 100 g. of total solids; alky. of insol. ash, 41.72. Reducing sugars were not present. The crude gum was tasteless and odorless and contained 16.45% pentosan and 0.02% galactan. The gum was boiled with 50 times its wt. of H_2O, filtered through linen and 5 cc. of the soln. used in each of the following tests: 1 cc. 25% $FeCl_3$ soln. produced a marked darkening in color which disappeared on addn. of 15 cc. of 50% alc.; no ppt. was formed; 1 cc. U. S. P. Pb subacetate soln. produced a curdy ppt.; 2 cc. 10% $CuSO_4$ soln. produced a transient mahogany color; further addn. of an excess of 5 cc. 5% soln. of NaOH produced a voluminous flocculent bluish green ppt. which did not dissolve on boiling; 2 cc. of 5% KOH soln. followed by shaking produced a yellow froth; several drops of Lugol's I soln. produced no change save the color due to the presence of I (starch and erythrodextrins therefore were absent); 10 cc. of 95% alc. produced only a faint turbidity on mixing; in a few moments a marked flocculent ppt. appeared, at first filling the whole tube and gradually depositing on the bottom; 5 cc. of 36% HCl and boiling darkened the soln. and imparted to it a faint purple tinge; 5 cc. of concd. H_2SO_4 and boiling produced only a caramel odor; the odor of org. acids was not noticed; 5 cc. of 85% H_3PO_4 produced, on boiling a darkening of color, and the evolution of a fragrant odor; the odor of org. acids did not appear; Fehling soln. was not reduced; 5 cc. of 2% borax soln. produced no change; repetition of this test with 5 cc. of 4% soln. of borax gave the same result; 5 cc. of 10% Pb acetate soln. produced a slimy, flocculent, voluminous, pale yellowish green ppt. A bibliography is appended. W. G. GAESSLER

The examination of cresyl-bearing extracts of ginger. PETER VALAER. *Am. J. Pharm.* **102**, 571–4(1930).—Examn. of adulterated fluidexts. of ginger which acted specifically on the lower motor neurons of human beings and caused paralysis showed the presence of a cresol compd. found to be in the ester form as tri-*o*-tolyl phosphate to the extent of about 2% by vol. When this adulterated ginger is evapd. at low temp. to a small vol. by a downward current of air there are formed 2 distinct layers: one a yellow upper layer in which was found some alc., water and diethylene glycol; the lower black layer contained principally tri-*o*-tolyl phosphate, rosin oil, oils and resins of ginger and a small quantity of an unidentified tar-like substance. No trace of the ordinary poisonous substances (mineral and alkaloidal) or of denaturants used in complete or specially denatured alc. was found. Tri-*o*-tolyl phosphate is obtained by washing the black lower layer described above first with water and then with approx. 5% NH_4OH. The residue is submitted to fractional distn. with high vacuum. The fraction coming off at the proper temp. is purified by redistn. and the phys. and chem. consts. are detd. Although it was certain early in this work that the tritolyl phosphate was present to the extent of about 2%, it almost escaped blame because reference books on therapeutics failed to list this ester as a poison or to mention that it would cause paralysis. A bibliography is appended. W. G. GAESSLER

Report of committee on drug market to the Pennsylvania pharmaceutical association annual convention. *Am. J. Pharm.* **102**, 575–82(1930).—A compilation of accumulated items of value and particularly those instances of adulteration and inferiority that are continually being met by those actually engaged in drug distribution, pharmaceutical mfg. and analytical research. W. G. GAESSLER

The tinctures of cinchona. I. A preliminary report. AARON LICHTIN. *Am. J. Pharm.* **102**, 583–90(1930).—The following method and menstruum are proposed as a result of studies in making a therapeutically active and stable prepn.: Moisten the bark with acetone and macerate for 24–48 hrs. Transfer the bark to a percolator and percolate with acetone until 5 cc. of the percolate mixed with 10 cc. distd. water and one drop of gelatin test soln. gives a faintly greenish, slightly opalescent liquid. Remove the bark from the percolator and dry it on a water bath at a temp. not exceeding 60°. Now prep. a tincture by the U. S. P. method using a menstruum of 4 vols. of alc. and one of water (78% alc.). In the receiving vessel place glycerol (7.5% of the vol. of tincture being prepd.) and complete percolation to the desired vol. Such a procedure, it is believed, yields a tincture with the cause of pptn. of the hydrolyzing tannins removed or almost completely so. A bibliography is appended. W. G. GAESSLER

Progress in tobacco chemistry and the production, manufacture and use of tobacco. RICHARD KISSLING. *Chem.-Ztg.* **54**, No. 84, *Fortschrittsber.* 95–8(1930). E. H.

Testing the efficacy of bactericidal and bacteriostatic reagents for use in specific chemotherapeusis. B. S. LEVINE. *J. Lab. Clin. Med.* **16**, 52–8(1930).—A review is made of the methods used in testing antiseptics for regulatory purposes and it is pointed out that in regulatory work specific conditions cannot be taken into consideration since these may be as variable and numerous as the individual cases to which any of the com. antiseptics is to be applied. In practical chemotherapeusis the investigator is concerned not so much with a particular reagent as with a definite set of conditions under which an infection flourishes. To meet such conditions rationally a generalized plan is outlined in which the isolation of the etiologic microörganism and the detn. of the p_H of the exudates of the infected area are of primary consideration. It is concluded also that for the present all application of an intravenous character, except in syphilis and the like, must be suspended until experimentation develops more hopeful prospects.

B. S. LEVINE

Pharmacognostic study on the cod-liver oil of Japanese Dorches ("Tara"). V. VI. K. KAWAI. *J. Pharm. Soc. Japan* **50**, 809–35, 843–50(1930); cf. *C. A.* **24**, 5427.

F. I. NAKAMURA

Chinese drug, "P'u-hwang." Y. KIMURA. *J. Pharm. Soc. Japan* **50**, 843–50 (1930); German abstr. 111–2.—K. isolated an oil (I) from *Typha angustata* (yield 10%). I (100 g.) when treated with 10% Na_2CO_3 soln., washed with Et_2O, and acidified with HCl gave (II) (yield 30 g.). II (20 g.) was dissolved in 3% alc. HCl (200 cc.), refluxed for 3 hrs., cooled, neutralized with Na_2CO_3 soln., washed with NaCl soln. and the alc. soln. removed and extd. with Et_2O, dried over $CaCl_2$, and fractionated at 12 mm., after removal of Et_2O, into the following constituents: **III** b. 193–6° (2 g.), **IV** b. 196–203° (9 g.), **V** b. 203–7° (2 g.), **VI** b. 207–210° (5 g.), **VII** b. 210° (1 g.), and residue (1 g.). III, IV and VI after sapon with 10% alc. KOH gave palmitic and stearic acids m. 62° and 69°, resp. The unsaponifiable part of I on treating with C_6H_5COCl gave *α-typhasterol benzoate* **VIII**, m. 148–8°, $[\alpha]_D^{15} - 23.56°$. **VIII** on hydrolysis gave *α-typhasterol*, $C_{27}H_{46}O$, m. 133–4°, $[\alpha]_D^{15} -59.83°$; *α-typhasterolacetate*, $C_{27}H_{45}OCOCH_3$ m. 119–20°, $[\alpha]_D^{15} -41.12°$.

F. I. NAKAMURA

Japanese peppermint oil. V. The high-boiling constituents of Japanese pepper mint oil (1). EINOSUKE SHINOZAKI AND T. NAGAZAWA. *Rept Osaka Ind. Research Lab. Japan* **11**, No. 9(1930); cf. *C. A.* **23**, 4298. -The high-boiling fraction (above 240°) was sapond. by the usual method and the following constituents were isolated: *l*-menthone, *l*-menthol, menthol, sesquiterpene and *dl*-sesquiterpene alc. **VI. The high-boiling constituents of Japanese peppermint oil (2).** *Ibid* No. 10.—The chief acid constituents of the high-boiling Japanese peppermint oil are, either in free or combined state, formic, acetic, isovaleric and caproic acids. Also in *J. Soc. Chem. Ind., Japan* **33**, Supp. binding 420,421 (1930).

F. I. NAKAMURA

Recent investigations on essential oils. ANON. *Bull. Imp Inst.* **28**, 281–4(1930). -*I. Petitgrain oil from Tanganyika.*—A sample of oil distd on Mkumbara Sisal Estate, Tanga, gave the following results: d_4^1 0.8957, $[\alpha]^{17.5} -5.95°$ n_D^{29} 1.460, acid value 0.7 ester value 159.4, esters (as linalyl acetate) 55.8%, soly. in 80% alc. at 15° turbid soln. even with 12 vols. These figures are generally similar to those of the com. S. American product, except as regards α which corresponds with that of French petitgrain. *II. Orange oils from South Africa.*—Three samples of oil of sweet (Valencia) oranges prepd. at Pretoria had phys. consts. corresponding to those of com. expressed sweet orange oils.

A. PAPINEAU-COUTURE

Sodium arsenate solution. E. V. CHRISTENSEN. *Arch. Pharm. Chem.* **87**, 327–34 (1930).—"Acidi Arsenicosi," 3.2 g. weighed to ±5 mg., and Na_2CO_3, 5.5 g., are dissolved in 500 cc. H_2O. To the cooled soln. is added 75 g. 3% H_2O_2, very slowly and with stirring. This is then brought to boiling and kept there for 15 min., again cooled and made up to 5 l. The prepn. contains 0.202% $Na_2HAsO_4.7H_2O$.

A. R. ROSE

Physicochemical analysis of a Eucalyptus globulus essential oil. T. BATUECAS, AND E. MORALES. *Anales soc. españ. fis. quím.* **28**, 1036–44(1930).—Eucalyptus oil is used as a flotation agent in Pb and Zn ore sepn. and in medicine. A Santander sample had d_4^{16} 0.9192, $d_4^{21.5}$ 0.9148, temp. coeff. of d. 0.00080, $n_D^{19.3}$ 1.4664, cineole content 56.5%, b. 168–190°, sol. in EtOH in all proportions, H_2O trace, f. p. below —20°, flash point 47.0°, heating value 9112–9705 cal., Engler viscosity between 20.8° and 52.6°, 1.18–1.06.

E. M. SYMMES

Tigogenin, a digitalis sapogenin. WALTER A. JACOBS AND ELMER E. FLECK. *J. Biol. Chem.* **88**, 545–50(1930).—Gitogenin from the crude saponin collected in the course

of the prepn. of cardiac glucosides from the leaves of *Digitalis purpurea* is contaminated by tigogenin. Sepn. of tigogenin is effected by petr. ether and proves to be $C_{28}H_{48}O_3$. It is a secondary alc. and yields ketone, $C_{26}H_{40}O_3$. It also yields monoacetate and monobenzoate. W. H. TIFFANY

Toilet creams and other toilet preparations. R. M. GATTEFOSSÉ. *Chemist and Druggist* **112**, 784-5(1930).—For superior face creams and face powders, naturally bleached, granular white beeswax is preferable to artificial compds., *e. g.*, stearates. Mix beeswax 5, starch 10, impalpably powd. kaolin 5, talc 5 parts, coloring and perfume to suit, then powder finely and sift. For cold cream a mixt. of beeswax 2, oil (a mixt. of white vegetable oil and petroleum oil) 20, glycerol 5–10, H_2O contg. a small quantity of powd. soap 10–20 parts may be used. Synthetic perfumes should be used only in conjunction with a more or less large % of natural essential oils or floral exts. S. W.

Ointment bases. Practical notes on the preparation of medicaments of this class and their absorption. HERBERT SKINNER. *Chemist and Druggist* **112**, 795(1930).—An ointment primarily suitable for *absorption* is the following modification of the Brit. Pharm. Codex *unguentum lanolini oleosum:* (*a*) Powd. tragacanth (No. 40) 2.5, (*b*) glycerol 20.0, H_2O 100.0, (*c*) hydrous wool fat 250, (*d*) oleic acid 30.0 parts. Stir *a* with *b* and H_2O to a smooth cream, heat to boiling and mix it into *c* previously mixed with *d*. Vegetable oils are good diluents, but coconut oil is regarded as a skin irritant. *Unguentum cetacei*, Brit. Pharm. **1914**, is an excellent *protective* ointment. As an ointment base for general use by the dermatologist, *unguentum paraffini*, Brit. Pharm. **1914**, in which white wax is replaced by twice its quantity of wool fat, may be employed. S. WALDBOTT

American indigenous drugs. S. B. PENICK, JR. *Chemist and Druggist* **112**, 846-7(1930).—The production, collection and marketing of botanical drugs in the U. S. are described; with photographs. S. WALDBOTT

Occurrence of kolacatechin in tormentilla root and in oak bark. II. P. CASPARIS AND K. REBER. *Pharm. Acta Helv.* **4**, 189-92(1929); cf. *C. A.* **24**, 5110.—Stabilized tormentilla root yields 0.14%, non-stabilized 0.08% of kolacatechin (*A*). Fresh stabilized oak bark yields 0.09%, com. official drug 0.06% of crystd. *A*. S. WALDBOTT

Examination and evaluation of urine in the apothecary shop (KAISER) **11B.** Some notes on lavender (ÉTABLISSEMENTS ANTOINE CHIRIS) **11D.** Cinchona (VAN DER WIELEN) **2.** Titrating Na arsenate solutions (CHRISTENSEN) **7.** Advancement in analytical investigation by means of ultra-violet rays (FRANK) **7.** Organo-antimony compounds. IV. Stibonic acids derived from certain local anesthetics (NIYOGY) **10.** Sulfonylchlorides (Brit. pat. 331,596) **25.**

Formulary of Manufactured Products and Industrial Specialties of Pharmacy. Paris Libraire Polytechnique de Ch. Béranger. 149 pp. F. 18. (Reviewed in *Bull soc. ind. de Mulhouse*, **96**, 552.)

Veterinary medicine. T. LEAHY. Brit. 332,464, Sept. 26, 1929. A remedy, stated to be suitable for hypodermic injection into cattle for the treatment of contagious abortion, rheumatism and "debility," comprises "lysol," liniment of iodine and turpentine.

Antiseptics and food-preservatives. T. SABALITSCHKA and NÄHRMITTELFABRIK J. PENNER A.-G. Brit. 331,274, March 28, 1929. See Fr. 678,165 (*C. A.* **24**, 3576).

Organo-arsenic compounds. PARKE, DAVIS & CO. Brit. 331,195, Dec. 22, 1928. Therapeutic products such as Na 3-amino-4-hydroxyphenylarsinic acid tetrathioglycolate, Na phenylglycinamide-4-arsinic acid tetrathioglycolate, Na 3-nitro-4-hydroxyphenylarsinic acid dithioglycolate, and the mono-cysteine derivs. of arsanilic acid and of phenylglycinamide-4-arsinic acid are prepd. by the interaction of an org. arsinic acid or salt with a mercaptocarboxylic acid or salt.

Imino ethers (intermediates for pharmaceutical compounds). K. F. SCHMIDT and P. ZUTAVERN. Brit. 331,947, April 19, 1929. Hydrazoic acid is allowed to act on carbonyl compds. such as cyclopentanone, acetone or cyclohexanone in the presence of catalytic acids such as HCl or H_2SO_4, P_2O_5, PCl_3, $POCl_3$, $ZnCl_2$ or thionyl chloride, and of ales., to produce imino ethers. Several examples are given.

Betaine thiocyanate. RUDOLF BERENDES and LUDWIG SCHÜTZ (to Winthrop Chemical Co.). U. S. 1,780,860, Nov. 4. This compd., colorless crystals m. 167° with decompn.) is suitable for use as a *therapeutic agent* in promoting elimination of urea and of NaCl and may be made by reaction of the base and acid.

Alkaline earth metal salts of arsenobenzene derivatives. RICHARD WERNER and ALBERT ROTHMANN (to Winthrop Chemical Co.). U. S. 1,779,649, Oct. 28. For the treatment of tumors and protozoan diseases, salts of Ca or other alk. earth metals are prepd. from starting compds. such as 3-ω-sulfomethylamino-3'-amino-4,4'-dihydroxyarsenobenzene, 3,3'-ω,ω'-disulfomethylamino-4,4'-dihydroxyarsenobenzene or other arsenobenzene derivs. contg. strongly acid groups, such as di-*p,p'*-glycinearsenobenzene or diformaldehydebisulfitearseno-(1-phenyl-2,3-dimethyl-4-amino-5-pyrazolone).

Skin cream for preventing sunburn. JACQUES RISLER (to Risler Corp. of America). U. S. 1,779,891, Oct. 28. Phosphorescent Zn sulfide is mixed with about 10 times its quantity of a cream base made by heating and mixing together stearic acid 170, glycerol 210, distd. water 569 and a 10% aq. NH_3 soln. 50 and adding to the mixt. when cold 1 part of violet essence.

Dentifrice. M. OGAWA. Brit. 332,142, Oct. 30, 1928. See Fr. 683,752 (*C. A.* **24**, 5113).

18—ACIDS, ALKALIES, SALTS AND SUNDRIES

E. M. SYMMES

Manufacture of chromic anhydride for electroplating. N. P. LAPIN AND L. N. GOLTZ. *Zhur. Prikladnoĭ Khim.* 3, 667–8(1930).—Dissolve 1 kg. $Na_2Cr_2O_7.2H_2O$ (technical) in 2.5 l. water, settle, decant and add 2.5 l. $H_2SO_4.H_2O$ with const. stirring. Leave for 24 hrs., decant the acid and dry the crystals by centrifuging. The yield is 82%, compared to 70% when HNO_3 is used. V. KALICHEVSKY

Manufacture of potassium nitrate and hydrochloric acid. V. I. NIKOLAEV. *Zhur. Prikladnoĭ Khim.* 3, 653–65(1930).—Chemically pure KNO_3 is obtained by mixing 74.56 g. KCl with 126 g. HNO_3 in 200–300 cc. water. The mixt. is distd. and the residue (101 g. KNO_3) dried at 110–20°. The fumes evolved can be used for conversion of further quantities of KCl into KNO_3 until the HCl/HNO_3 ratio is below 2.3 by wt. A com. installation is described, which permits complete utilization of HNO_3 and full recovery of HCl. V. KALICHEVSKY

Production of iodine from the red phyllophora of Black Sea. N. D. AVERKIEV. *Zhur. Prikladnoĭ Khim.* 3, 589–604(1930); cf. *C. A.* **17**, 3574.—The red phyllophora growing in the Black Sea contains more I than any other sea-weed in the world. The manuf. is described in detail and further development of the industry is urged. V. K.

Graphite in 1920. JEFFERSON MIDDLETON. Bur. Mines, *Mineral Resources of the U. S. 1929*, Pt. II, 41–9(preprint No. 4, published October 1, 1930). E. H.

Silica in 1929. ESTELLE R. PHILLIPS AND J. A. DORSEY. Bur. Mines, *Mineral Resources of the U. S. 1929*, Pt. II, 35–40(preprint No. 3, published September 30, 1930). E. H.

Inorganic and organic decolorizing agents. LEOPOLD SINGER. *Chem.-Ztg.* **54**, No. 84, *Fortschrittsber.* 98–108(1930).—A review. E. H.

The commerce of isinglass. HALE & SON. *Chemist and Druggist* **112**, 848–9 (1930).—A survey is made of the industry of which London is the com. center. With photographs. S. WALDBOTT

Desulfurizing gas (U. S. pat. 1,779,024) **21**. Fertilizer and $NaHCO_3$ (Brit. pat. 331,451) **15**.

Hydrocyanic acid and its use in fumigation. HANS LEHRECKE (to Roessler & Hasslacher Chem. Co.). U. S. 1,780,196, Nov. 4. A finely divided addn. product of HCN and iron chloride with an excess of the iron chloride is suitable for use by exposure to moist air for generating HCN. $CaCl_2$ or $MgCl_2$ also may be added. U. S. 1,780,197 relates to a similar mixt. with the further addn. of NaOCl which serves to generate cyanogen chloride as a warning agent. U. S. 1,780,198 describes stabilizing liquid HCN against polymerization or decompn. by adding $AlCl_3$ or other suitable inorg. compd. of a strong acid capable of hydrolysis under the conditions of storage of the material.

Evaporating caustic alkali solutions. R. M. WINTER and IMPERIAL CHEMICAL INDUSTRIES, LTD. Brit. 332,250, Jan. 16, 1929. Concn. is effected by evapg. in vessels formed of, or lined with, an alloy of Ni with Cu or Cr substantially free from Fe.

Alkaline earth molybdates. I. G. FARBENIND. A.-G. Brit. 331,472, Dec. 8, 1928. In the production of molybdates such as those of Mg or Ca, by treating fully roasted molybdenite with solns. or suspensions of the alk. earth hydroxides, the reaction is effected (preferably at the b. p.) in a soln. of but very slight alk. reaction, by gradual

addn. of the hydroxide. Excess of hydroxide (which causes formation of sol. molybdates) is avoided.

Cellular products from alkali metal silicates. J. W. BATTERSBY. Brit. 331,989, May 17, 1929. Readily sol. alkali silicates, in solid, colloidal, water-contg. form are heated to 200–500° to form cellular slabs or molded articles, the time of heating being regulated to produce the desired degree of expansion. Various fillers may be added and the operation may be effected in a mold and may be carried out in 2 stages with intermediate crushing.

Cyanamides. STICKSTOFFWERKE GES. (to N. Caro and A. R. Frank). Brit. 332,468, Oct. 1, 1928. In prepg. cyanamides of the alk. earth metals and of Mg as described in Brit. 279,812 (*C. A.* **22**, 3024) and Brit. 281,611 (*C. A.* **22**, 3497) by passing mixts. of NH_3 and CO over compds. of the metals which form oxides on heating, the reaction is carried out in the presence of substances which do not decompose NH_3 but act as catalysts for the water-gas reaction; Cu or Ag or their salts may be used for this purpose, and the reaction chamber may be formed of these metals. S compds. such as Na_2SO_4 may be added to avoid decompn. of NH_3 and the use of $CuSO_4$ with limestone or the like is mentioned.

Sulfates. O. KASELITZ and KALI-FORSCHUNGS-ANSTALT GES. Brit. 331,674, June 17, 1929. Concd. solns. of sulfates such as those of Na, Mg, Cd, Fe, Co, Ni or Mn, or the crystd. sulfates with or without addn. of previous mother liquors, are heated to temps. at which the soly. becomes practically nil (suitably about 200°), and the salt and liquor mixts. are sepd. without any appreciable reduction of pressure to obtain a product contg. little or no water of crystn. and the heat energy of the liquors is recovered.

Treating sulfate minerals such as alunite, etc. D. MAWSON. Brit. 331,552, April 4, 1929. Compds. such as alunite, jarosite, copiatite and carphosiderite are decompd. by treatment with NH_3, forming a sulfate soln. and leaving a residue contg. $Al(OH)_3$ or $Fe(OH)_3$. Free NH_3 in the soln. may be neutralized with H_2SO_4 or HNO_3 and sol. phosphate added if desired to produce *fertilizer salts* and alumina may be made from the residue.

Barium monoxide. G. T. SHINE. Brit. 331,878, Feb. 11, 1929. A retort construction is described suitable for the production of BaO from $BaCO_3$ and C.

Separating calcium and magnesium chlorides. ALBERT K. SMITH and CARL F. PRUTTON (to Dow Chemical Co.). U. S. 1,780,098, Oct. 28. In the purification of $CaCl_2$ contg. $MgCl_2$ in quantity less than that equiv. to a mol. proportion of 2:1, a soln. of the chlorides is concd. to effect crystn. of the hydrated double chloride $MgCl_2.2CaCl_2.6H_2O$ and the crystals formed are removed.

Slaking lime. WM. H. HENDERSON. U. S. 1,780,821, Nov. 4. An app. and mode of operation are described involving establishing an upwardly moving body of aq. liquid having a progressively decreasing regulated rate of flow, adding, countercurrentwise, quicklime contg. hydratable and sol. solids and an insol. residue in regulated amounts and at a regulated rate, thoroughly agitating and promoting hydration and soln. of the hydratable and sol. substances in a lower zone, effecting hydraulic segregation of the insol. residue and removing the latter at the base of the app. and removing aq. liquid and suspended solids at the top.

Carbon disulfide. IMPERIAL CHEMICAL INDUSTRIES, LTD., W. B. FLETCHER, T. S. WHEELER and J. MCAULAY. Brit. 331,734, Aug. 21, 1929. Hydrocarbons such as CH_4 are heated with S vapor at temps. above 1100°, at which no C oxysulfide is formed. Hydrocarbon-contg. gases such as coal gas, coke-oven gas or gases from hydrogenation of carbonaceous material may be used as starting material and may be dild. with H or other inert gas. Various details of procedure are described.

Cyanogen chloride. JOHANN P. SCHMITTNÄGEL (to National Aniline & Chemical Co.). U. S. 1,779,984, Oct. 28. NaCN is treated with Cl in the presence of an inert solvent such as CCl_4 or $C_2H_2Cl_4$ and EtOH. A temp. of about 0° is suitable.

Activated ferric oxide. G. E. SEIL. Brit. 332,259, April 15, 1929. Ferruginous material such as iron borings, iron ore or "aniline sludge" is mixed with an alk. material such as "fished salt" or Na or K carbonate, either dry or in concd. soln., and the mixt. is heated, the alkali ferrite formed is quenched and ground, the alk. soln. is filtered off and ferric oxide remains which may be used in *gas purification*, as a *filter medium*, *accelerator with rubber*, or as a *catalyst*, after washing out alk. compds.

Magnesium sulfate from waste water of artificial silk factories, etc. E. ROPOLFO. Brit. 331,648, May 21, 1929. Waste waters which may contain $MgSO_4$, Na_2SO_4, $ZnSO_4$ and H_2SO_4 are treated with milk of lime to ppt. $CaSO_4$, $Mg(OH)_2$ and $Zn(OH)_2$ (suitably after preliminary neutralization of free H_2SO_4 with dolomite or calcined dolomite); the soln., freed from the ppt., is evapd. to cryst. Na_2SO_4; the ppt. is dispersed in water,

treated with CO_2 at a temp. of 50–60° to form a soln. of $MgSO_4$ up to a concn. of 20° Bé., and the $MgSO_4$ is crystd. from the sepd. soln.

Potassium nitrate. P. HÖFER and KALI-FORSCHUNGS-ANSTALT GES. Brit. 332,359, June 13, 1929. KNO_3 is formed by reaction of KCl on the nitrate of a readilyhy drolyzable metal such as that of Al or Fe, and the hot mixt. may be cooled to sep. KNO_3. The mother liquor is evapd. with evolution of HCl, either until nitrous gases begin to escape or until most of the Cl has been expelled from the soln.; water, KCl and HNO_3 or N oxides are added to restore the original concn., the soln. is cooled, KNO_3 is sepd. and the operations are repeated.

Potassium nitrate and chloride and sodium nitrate. I. G. FARBENIND. A.-G. Brit. 331,236, March 25, 1929. Salt mixts. contg. these compds. are treated for their sepn. with liquid NH_3 which may contain NH_4NO_3 to avoid use of high pressures and to vary the soly. of the salts. Various details are given. Cf. *C. A.* **24**, 4361.

Purifying zinc sulfate solutions. ROYALE H. STEVENS, GERALD C. NORRIS and WM. N WATSON (to Rhodesia Broken Hill Development Co.). U. S. 1,778,087, Oct. 21. Metallic impurities such as Cu, Cd, Ni and Co are pptd. by treating the soln. with Zn xanthate or other compd. of a deriv. of dithiocarbonic acid of the type MS.CS.OR, in which M is a radical, the compd. of which is appreciably sol. in the Zn soln. under treatment, while R is an org. radical.

Purification of zinc sulfate solutions. SOC. MINIÈRE ET MÈTALLURGIQUE DE PENARROYA. Brit. 331,886, Jan. 30, 1929. See Fr. 683,810 (*C. A.* **24**, 5116).

Separating arsenic, antimony and tin from their mixed salts. CHARLES A. HEBERLEIN (to American Smelting and Refining Co.). U. S. 1,779,272, Oct. 21. In sepg. Na stannate from a mixt. with other salts including Na arsenate, the mixt. is treated with water in such quantity and at such temp. that only part of the Na stannate will dissolve to insure complete insoly. of the other salts. Cf. *C. A.* **24**, 1708.

Mercury recovery from aqueous sludges. R. RILEY, S. W. ROWELL and IMPERIAL CHEMICAL INDUSTRIES, LTD. Brit. 332,106, Aug. 21, 1929. Sludges obtained in prepg. acetaldehyde from C_2H_2 with Hg salts as catalysts are treated with water and Cl, the $HgCl_2$ soln. formed is sepd. and the Hg preferably is pptd. as oxide, which may be dissolved in dil. H_2SO_4 for further use as a catalyst. Hg remaining in the sludge may be recovered by sublimation.

Carbon black and lamp black. G. C. LEWIS. Brit. 331,821, April 4, 1929. A hydrocarbon-contg. gas such as natural gas is heated to a temp. (suitably 600–850°, depending on the character of the gas) at which the hydrocarbon constituents react chemically but without the production of free C, the resulting mixt. is cooled by expansion to a temp. not below that at which any constituent condenses out, and the resulting mixt. is subjected to incomplete combustion. The heating app. may have Ni or Fe walls, and various details of the app. and operation are described.

Substantially pure finely divided carbon. DANIEL GARDNER. U. S. 1,780,154, Nov. 4. In obtaining substantially pure impalpable C, impure material such as beech or oak wood charcoal is reduced to impalpability, boiled at ordinary pressure with caustic alkali soln. of high concn. to solubilize any silica in the material and to render lime, magnesia, alumina, Ti oxide and the like amenable to extn. with hot HNO_3, solids are sepd. from the alkali soln. and washed with water and the washed solids are further treated with strong HNO_3 at an elevated temp., the solid product is sepd. and again washed, again reduced to a state of impalpability and heated to about 1000–1300° to expel org. impurities and eliminate moisture. The product is suitable for use as a *pigment*.

Tunnel kiln suitable for activating carbon. OSCAR L. BARNEBEY and MERRITT B. CHENEY. U. S. 1,778,747, Oct. 21. Structural features.

Catalysts for ammonia oxidation. I. G. FARBENIND. A.-G. Brit. 331,728, Aug. 17, 1929. A Pt group metal (which may be deposited on a support such as porcelain balls) is provided with a coating of finely divided Rh or a mixt. of Rh with another Pt group metal.

Catalysts for oxidation of toluene, etc. GAS LIGHT & COKE CO., W. G. ADAM, W. V. SHANNON and M. CUCKNEY. Brit. 331,535, Jan. 29, 1929. Catalysts such as a mixt. of Fe vanadate and Fe oxide are formed into a coherent mass with a small proportion of asbestos fibers serving as a binder. The material may be formed into rods and then broken up into short cylinders.

Apparatus for exothermic catalytic gas reactions. HANS HARTER. U. S. 1,779,092, Oct. 21. An app. suitable for *synthesis of* NH_3 or oxidation of NH_3 to produce HNO_3 comprises a pressure-sustaining tube of considerable length enclosing a plurality of elongated reaction chambers having nearly the same cross-section as the tube and

arranged in a continuous row, with means for distributing the reagent gases over and withdrawing the reaction products from the chambers in parallel.

Apparatus for exothermic catalytic gas reactions. A. O. JAEGER (to Selden Co.). Brit. 331,468, Dec. 22, 1928. An app. suitable for the *production of* SO_3 and which also may be used in *org. oxidations*, NH_3 *purification, reductions, hydrogenations, condensations,* the *water-gas process* or *HCN synthesis* comprises one or more layers of catalyst cooled by the reaction gases, followed by one or more layers of catalyst cooled by means other than the reaction gases issuing from the first-mentioned layer or layers, as by an independent cooling medium or by preliminary contact with the reaction gases. Various structural details of outer and inner tubes, etc., are described. Cf. *C. A.* **24**, 532.

Condensation products from glycerol and sebacic acid, etc. HERMAN A. BRUSON (to Resinous Products & Chemical Co.). U. S. 1,779,367, Oct. 21. Condensation of glycerol with adipic or sebacic acids results in products of soft rubbery character suitable for use with nitrocellulose or other cellulose esters for forming compns. of good flexibility, elasticity and toughness. Other acids such as pimelic, suberic and azelaic acids yield similar condensation products with glycerol. Condensation is effected in three stages: (1) formation of a thin sirup, sol. in acetone; (2) formation of an intermediate product, a tacky, rubbery mass sol. in acetone or EtOAc but insol. in C_6H_6; and (3) a final product, a soft, flexible, elastic and very tough solid, insol. in the common org. solvents.

Slag product suitable for molded articles. SAMUEL F. WALTON (to Exolon Co.). U. S. 1,781,204, Nov. 11. Finely divided slag with a siliceous glaze including an oxide of definite color is used with a binder of phenolic resin.

Homogeneously porous meerschaum-like artificial products. KURT RIPPER (to Kunstharzfabrik Fritz Pollak G. m. b. H.). U. S. 1,779,047, Oct. 21. Condensation products such as those formed from urea and CH_2O are dild. with a large proportion of a dispersion medium but short of the quantity which would prevent gelatinization and gelatinization is then effected at a temp. not substantially above 50°, followed by volatilization of the dispersion medium which takes place without substantial diminution of volume so that a uniform porosity of the mass results.

Waterproof adhesive. JAMES B. MULLADY. U. S. 1,779,613, Oct. 28. Na silicate 6–10 oz. is mixed with water 3 bbls. and during the mixing there is gradually added a mixt. formed from casein 1 lb., hydrated lime 3.25 oz. and borax 2–4 oz.; the mixt. is stirred until it begins to thicken, allowed to stand for about 20 min and again stirred for about 10 min.

Adhesive or size. J. TAYLOR and A. V. KELLER. Brit. 331,428, Aug. 29, 1929. After condensing urea, thiourea or substituted ureas or their derivs. with a solid anhyd. polymer of CH_2O in the presence of water or steam, the resulting soln. is concd. at not above 90° to obtain a transparent gel which may be used in soln. or made into wafers or dried and powdered, with or without addn. of various auxiliary or modifying substances.

Causing adhesion of articles such as parts of shoes. JAMES CAVANAGH (to United Shoe Machinery Corp.). U. S. 1,779,368, Oct. 21. The faces of the articles to be united are coated with rubber-latex cement, the coatings are allowed to dry until they are non tacky and the coated faces are then pressed together.

Preparing a decolorizing clay. WALTER S. BAYLIS (to Filtrol Co. of Calif.). U. S. 1,781,265, Nov. 11. An initial batch of an activatable clay is treated with a highly ionized inorg. acid such as H_2SO_4 and after this a larger quantity of raw activatable clay is added and the mixt. is subjected to a temp. sufficient to eliminate substantially all water of crystn. and free acid from the clay.

Piezoelectric crystals. C. W. HANSELL and MARCONI'S WIRELESS TELEGRAPH CO., LTD. Brit. 332,451, Sept. 12, 1929. Wear of a piezo elec. crystal is reduced by passing a stream of gas between the crystal and its electrodes, thus reducing or eliminating contact and maintaining the temp. of the crystal const. by regulating the temp. of the gas. Various details of app. and procedure are described, and air, H or He may be used in a closed-circuit system.

Machinable composition nonconductive of electricity. MARC DARRIN (to F. N. Burt Co., Ltd.). U. S. reissue 17,867, Nov. 11. Reissue of original pat. No. 1,644,711 (*C. A.* **21**, 4036).

Tarnish-resisting silverware. DANIEL GRAY, RICHARD O. BAILEY and WM. S. MURRAY (to Oneida Community, Ltd.). U. S. 1,779,809, Oct. 28. A metal such as Sn, Al, Ca, Mg, Bi, Pd, Zn or Sb having a shielding action with regard to tarnishing is absorbed in the surface portion of the silver, as by alternate electrodeposition and heating together of the metals. Cf. *C. A.* **24**, 3207, 5119.

Dialyzing and pervaporating membranes. PHILIP A. KOBER. U. S. 1,779,942, Oct. 28. A cellulose deriv. such as nitrocellulose and a protein material such as gelatin

are dissolved in a common solvent, *e. g.*, glacial HOAc, and a membrane is formed from the soln. by removing the solvent, and the membrane is treated with a liquid such as water.

Film-forming surfaces. G. FRENKEL. Brit. 332,254, Feb. 18, 1929. A film-forming surface is prepd. by coating a drum or band (which may be formed of metal) with a plastic compn. such as a cellulose acetate compn., synthetic resin, rubber or gelatin and applying over this a smooth metal coating (which may be produced by spraying). Various details and modifications of compns. and procedure are described.

Opaque films. NON-INFLAMMABLE FILM CO., LTD., and D. J. P. PHILLIPS. Brit. 331,214, March 25, 1929. Two films are superposed, one of which contains finely divided metallic powder such as Au or Al while the other contains an ordinary filler or opaque coloring material such as ZnO. Cellulose esters or ethers or regenerated cellulose may be used and various details and examples are given.

Films for wrapping, etc. G. FRENKEL. Brit. 332,256, Feb. 18, 1929. A metal film is formed or placed between layers of cellulose acetate compn or similar dielectric material. Various modifications of manuf. are described.

Transfers. E. HENTSCHEL. Brit. 331,761, Oct. 18, 1928. A transfer for use with dry heat to effect detachment of the design from its backing with simultaneous rendering of a coating on the design adhesive from the heat has the design formed with a film of cellulose ester which may be used with a backing of paper coated with wax, printed with a collodion bronze powder mixt. or the like or overlaid with a stamped-out colored cellulose ester film. A thin film of resin such as dammar or mastic, which becomes adhesive when heated, is then applied.

Transfers. ARTHUR J. LAWS. U. S. 1,780,021, Oct. 28. A removable base sheet of paper is coated with a water-sol. adhesive substance and a nitrocellulose material is applied to the coated surface, the material is printed upon and the film and printed matter are coated with a second soln. such as a varnish and pigment mixt. having no solvent properties with respect to either the first film or printed matter, to cause ink pigments to be engaged between the transparent first coating and the substantially opaque second coating (the second coating forming a permanent part of the transfer).

Sugar solutions derived from peat. I. G. FARBENIND. A.-G. Brit. 332,235, March 11, 1929. Sugar solns. obtained by acid hydrolysis of peat are freed from humous substances by treating the solns. with voluminous non-alk. agents of large superficial area such as inorg. oxides or hydrates having a gel structure or charcoal or metal salts which decompose with water only partially and give water-sol. salts with humic acids such as Fe chlorides or Mn salts or Al sulfate, Pb acetate, active carbon, colloidal silicic acid or alumina. The material may be adjusted to a p_H of 5 to 8 and odorous substances may be removed by Cl, SO_2, CH_2O or "chloramin." The purified solns. may be used for *cultivation of microörganisms.*

Etched printing surfaces. J. DREYER and J. MYKLEBUST. Brit. 332,045, July 1, 1929. In forming flat positive printing forms for offset printing, an impression is made in greasy ink upon a thin Zn, Al or other suitable metal plate, which is then etched and may be used either for offset printing direct or as a master plate for making transfers for producing duplicate plates.

Intaglio printing surfaces. R. KLINGER. Brit. 332,276, April 16, 1929. Parts of a metallic surface to be etched are provided with a granulation which is etched into the depth by protecting the sides of the grain while leaving the apexes as well as the bottoms of the spaces between the individual grains exposed to the action of the etching medium. Various details of procedure involving use of an Fe chloride soln. as etching medium are described.

Printing plates. A. R. TRIST. Brit. 331,220, March 25, 1929. A plate with mercurized non-printing areas is prepd. from a plate with an electrolytically deposited Ni layer on Cr over a Cu base, a colloidal resist being formed on the Ni, the exposed parts of which are dissolved by an etching fluid adapted to harden the colloidal layer, followed by dissolving the exposed Cr by a fluid which will not affect Ni, replacing the Cr by an amalgam of a noble metal, and final removal of the remaining Ni and colloidal material. Numerous details and modifications of procedure are described

Pastel receiving surface. HERMAN E. BRAEG (one-third to Bernard J. Preston). U. S. 1,780,113, Oct. 28. A base of fibrous material such as paper, cloth or cardboard is provided with a coating of a monochromatic mixt. comprising SiC, garnet and quartz powder of uniform depth.

Backing for stencil sheet. SHINJIRO HORII. U. S. 1,780,391, Nov. 4. A backing sheet for a dry-process stencil sheet is formed of a firm stiff paper treated with a coating

compn. including a non-drying oil and a hardening material such as a wax, copal or ester gum.

Emulsified compositions such as those for making waterproof sheets, etc. LESTER KIRSCHBRAUN. U. S. 1,781,645, Nov. 11. Fibrous pulp is mixed with a normally adhesive bituminous waterproofing material dispersed in an aq. vehicle contg. soap and rendered non-adhesive by incorporation with an agent such as colloidal clay in quantity less than would substantially impair the waterproofing properties of the bituminous waterproofing material; a sheet is formed from the mixt. and is dried to cause the bituminous material to resume its adhesive condition and waterproof the fibers.

Sound records. RADIO CORP. OF AMERICA AND GRAMOPHONE CO., LTD. Brit. 331,278, April 3, 1929. A master, carrying ink or other material, is prepd. from a sound record to be duplicated and is used for printing a duplicate sound record upon a suitable carrier by a printing process which may involve transfer of the ink, etc. Various details of compns. and procedure are given.

Detergent. WARREN T. REDDISH (to Twitchell Process Co.). U. S. 1,780,144, Oct. 28. An oil-sol. mineral oil sulfonate is chemically combined with a stable water-sol. amine such as triethanolamine.

Liquid of low freezing point suitable for use in automobile cooling systems. OTTO JORDAN (to I. G. Farbenind. A.-G.). U. S. 1,780,927, Nov. 11. A monoalkyl ether of a glycol such as the methyl ether of ethylene glycol is mixed with water. Glycols, glycerol, alcs., etc., may also be added.

Liquid for use in hydraulic brake systems. ROBERT M. BAGLEY (to R. M. Hollingshead Co.). U. S. 1,779,460, Oct. 28. Ethylene glycol mono-ethyl ether is used with about an equal quantity of a relatively inert oily substance sol. therein, such as castor oil and glycerol.

Composition for making lines on tennis courts, roads, etc. W. T. BELL and J. F. BENNETT. Brit. 331,207, March 23, 1929. A filler of ground porcelain or pottery is mixed with a binder of white cement, plaster of Paris and water to form a plastic paste, or a dry mixt. may be formed and moistened after rolling in place.

Preserving cut flowers. I. G. FARBENIND. A.-G. Brit. 332,278, April 17, 1929. There is added to the water used a sol. salt of Ag or Cu such as the nitrate, sulfate or acetate of Ag, which acts as an antiseptic, and a sugar or polyhydric alc. and other nutrients and porous materials such as silica gel also may be added, and mixts. for addn. to the water may be prepd. in tablet form. Lactic acid, dihydroxyacetone, asparagine and salts of K, NH_4 and Mg are among the nutrients mentioned which may be used.

Device for distributing fire-extinguishing foam. HANS BURMEISTER (to Pyrene-Minimax Corp.). U. S. 1,780,168, Nov. 4. Structural features.

Apparatus for producing fire-extinguishing foam from two dissimilar liquids such as aluminum sulfate and sodium bicarbonate solutions. PAUL W. PRUTZMAN. U. S. 1,781,298-9-300, Nov. 11. Various structural features of app. adapted for mounting on a motor vehicle.

Devices for producing fire-extinguishing foam from water and pulverulent chemicals. JAMES A. MCCRACKEN. U. S. 1,781,292-3-4-5, Nov. 11. Al sulfate, $NaHCO_3$ and licorice may be used with water in the app.

19—GLASS, CLAY PRODUCTS, REFRACTORIES AND ENAMELED METALS

G. E BARTON, C. H. KERR

Specific heat, thermal conductivity and adiabatic temperature change in the softening range of glasses. G. TAMMANN AND H. ELSNER V. GRONOW. *Z. anorg. allgem. Chem.* 192, 193–209(1930).—The specific heat of Se glass increases sharply at 30° from 0.09 to 0.13, and that of rosin not so sharply in the interval 26–30° from 0.3 to 0.4. The thermal cond. of Se glass diminishes rapidly from 29° to 34°, that of rosin at about the same range, and salicin at 44–47°. The change in temp. on rapid compression and expansion was measured at several temps.; the difference between the observed and calcd. values was interpreted as showing that slow processes are at work in the highly viscous substances. T. H. CHILTON

The dependence upon temperature of some elastic properties in the softening range of glasses. G. TAMMANN AND R. KLEIN. *Z. anorg. allgem. Chem.* 192, 161–78 (1930).—The rebound of a ball dropping on a plate changed sharply in the softening range of rosin, salicin and phenolphthalein, but the temp. of sharp change was not

identical with that for the change of other properties, and varied with the height of fall. The hardness measured by observation of the width of the depression caused by a loaded sphere also changed, but the temp. where it begins to decrease was lower than that at which brittleness disappears. The appearance of cracks produced by scratching with a steel point is characteristic, and may be used to det. the change from a glass to a viscous liquid, but the effect is dependent on the angle, speed and loading of the point. T. H. CHILTON

The behavior of glasses in their softening interval. G. TAMMANN. *Z. Elektrochem.* **36**, 665-75(1930); cf. *C. A.* **24**, 4908.—A summary of previous work. L. W.

Chemical and mineralogical composition of stalactites from two glass factories. D. S. BELYANKIN. *Bull. acad. sci. union rep. soviet. social*, Classe sci. phys.-math., **1930**, 257–65(summary in French); cf. *C. A.* **24**, 477.—Stalactites from the Vélikodvorsky and the Droujnayat-Gorka plants were studied. Chem. analyses of the furnace lining (Dinas brick), the glass and the stalactites, resp., of the former were: SiO_2 93.82, 71.87, 90.35; (Al, Fe)$_2O_3$ 2.43, 2.03, 2.33; MnO —, 0.13, 1.19; MgO 0.09, —, 0.15; CaO 2.38, 14.69, 3.19; (Na, K)$_2$O 0.12, 11.58, 2.79%. For the latter the values were: SiO_2 93.73, 73.18, 88.01; (Al, Fe)$_2O_3$ 4.75, 1.84, 2.76; CaO 1.48, 8.20, 6.77; (Na, K)$_2$O —, 16.78, 2.19. The stalactites from the former were composed of tridymite, cristobalite and monoclinic pyroxene; those from the latter were composed of tridymite and pseudowallastonite. Four photomicrographs are reproduced. W. L. HILL

Color tinge of glass without decolorizing agent. HANS JEBSEN-MARWEDEL AND ALFRED BECKER. *Sprechsaal* **63**, 874-8(1930).—The color tinge of glass, so far as it depends upon the Fe content, is principally a function of the O_2 pressure of the batch. C. H. LORIG

The solubility of bottle glass in water as a function of time and temperature. CARL SCHMID. *Sprechsaal* **63**, 759-62(1930).—The soly. in H_2O of a bottle glass contg. SiO_2 62.2, CaO 13.3, Al_2O_3 9.8, Fe_2O_3 0.9, Mn_3O_4 0.3, Na_2O 9.8, and K_2O 3.6% was detd. over a temp. range of 25–90°. No marked soly. of the glass was observed after 3 days in H_2O at 90°. Variations in soly. were observed from changes in elec. cond. of the H_2O. Glass of the above compn. is highly resistant to H_2O. C. H. LORIG

The determination of the limiting temperature for the cooling of machine-made bottles during the annealing in the Simplex-Lehrs system. A. I. SHILIN. *Sprechsaal* **63**, 893-9(1930).—The temp. drop during processing on the foretable of the Lynch machine on the av. amounts to 12° per sec. at the bottom and 23° per sec. at the upper part of the bottles. The actual temp. drop on the conveyor is never more than 2° per sec. A large amt. of data and 15 curve diagrams are given. C. H. LORIG

An improved method for determining the tensile strength of unfired clays. STUART M. PHELPS AND VANCE CARTWRIGHT. *J. Am. Ceram. Soc.* **13**, 845-9(1930).—The test piece, which is cast or pressed, is cylindrical and has a collar of low-melting alloy cast around each end for proper gripping. C. H. KERR

Transverse strength of ball clay-sand and ball clay-flint mixtures. L. P. COLLIN. *J Am. Ceram. Soc.* **13**, 876-83(1930).—Tests of dry transverse strength on 30 ball clays, with 50% each of ball clay and flint, and ball clay and standard silica sand showed that flint mixts. gave the more consistent results. Flint or other fine-grained non-plastic should be used instead of standard silica sand in a revised tentative method of detg. dry transverse strength. The method of forming test bars should be improved and the rate of applying load should be further studied. C. H. KERR

Altering the properties of heavy clays by the use of electrolytes. TAJAMUL HUSAIN. *J. Am. Ceram. Soc.* **13**, 805-16(1930).—Tannic acid, HCl, Na_2CO_3 and $CaCl_2$ were tried. The results varied greatly with different clays. Data are given in great detail. C. H. KERR

Stiff-mud die troubles. ELLIS LOVEJOY AND H. B. HENDERSON. *J. Am. Ceram. Soc.* **13**, 787–93(1930). C. H. KERR

The relation of Brinell hardness and transverse strength to the compressive strength of building brick. J. W. MCBURNEY. *J. Am. Ceram. Soc.* **13**, 823-30(1930).—Neither relationship is sufficiently exact to permit calcn. of compressive strength. C. H. KERR

Recent patent literature on the manufacture of silica brick. FRIEDRICH REINHARDT. *Tonind.-Ztg.* **54**, 1373(1930). F. O. A.

A unit analysis of feldspar. E. E. PRESSLER. *J. Am. Ceram. Soc.* **13**, 850–5 (1930).—The sample is sintered at 850° for 2 hrs. The alkalies are detd. on the filtrate from the insol. group. C. H. KERR

Correcting tenderness of a shale by chemical treatment. HAROLD E. SIMPSON. *J. Am Ceram. Soc.* **13**, 817-22(1930).—Use of H_2SO_4, up to 10% concn., increased the

dry modulus up to 250% but the color was bleached. Use of 0.25% HCl and 0.25% tannic acid increased the dry modulus 42 and 72%, resp. Org. binders, as Bindex and glutrin, gave 100% increase. Na_2CO_3 (2%) and $BaCO_3$ (1%) showed 60 and 45% increase, resp. Molasses plus yeast improved machining and green strength. Finer grinding (to pass 28-mesh) and aging (1 week) increased the dry modulus 76%. Bush Creek Shale was used in the tests. C. H. KERR

Vapor glazing and color flashing of Pre-Cambrian shales. H. L. LONGENECKER. *J. Am. Ceram. Soc.* **13**, 794–804(1930).—Pre-Cambrian shales will take a satisfactory Zn vapor glaze and are suitable for color flashing to produce brown, purple and black bricks. Procedures at the Seaboard Shale Brick and Tile Co., Monroe, N. C., are described. C. H. KERR

Discoloration in burnt kaolin. BERNHARD NEUMANN. *Sprechsaal* **63**, 757–8 (1930).—Discolorations appear as light gray-blue, shell-like zones and yellow to brown-like bands. The former results from the pptn. of C during the decompn. of CO penetrating the kaolin; the latter results from the concn. of Fe_2O_3 in these areas. C. H. LORIG

The use of waste gypsum molds. PETER P. BUDNIKOV AND V. M LEZHOEV. *Sprechsaal* **63**, 717-21(1930).—See *C. A.* **24**, 3336. C. H. LORIG

Body calculations by graphical means. JOSEPH WOLF. *Sprechsaal* **63**, 657–9, 679-81, 697-700(1930).—Mineral compns. of ceramic bodies are calcd. graphically by (1) rectangular coördinates or (2) equilateral triangles. C. H. LORIG

A study of pan grinding. J. W. MELLOR. *Trans. Ceram. Soc.* (England) **29**, 271-9(1930). H. F. K.

Progress in ceramics in the year 1929. M. MIELDS. *Chem.-Ztg.* **54**, No. 84, *Fortschrittsber.* 86 95(1930). E. H.

Air conditioning in ceramics. H. B. MATZEN AND C. E. PARMELEE. *J. Am. Ceram. Soc.* **13**, 856 64(1930). C. H. KERR

The modern porcelain and china plant. HEINZ TIVES. *Sprechsaal* **63**, 737–41 (1930). C. H. LORIG

The cause and prevention of certain brown stains on semivitreous tableware. G A. LOOMIS. *J. Am. Ceram Soc.* **13**, 871 3(1930).—Stains were due to reduction of Fe in the sand in which the ware was imbedded during the bisque burn. C. H. KERR

Forming pressure of dry-pressed refractories. II. The effect of pressure variations on fired properties. RAYMOND E. BIRCH. *J. Am. Ceram. Soc.* **13**, 831–44(1930); cf. *C. A.* **24**, 2565. C. H. KERR

Woodall-Duckham continuous circular tunnel kiln. ARTHUR N. TARRANT *Trans. Ceram. Soc.* (England) **29**, 280-7(1930). H. F. K.

A rapid-fire tunnel kiln designed for small production. A L. DONNENWIRTH. *J. Am. Ceram. Soc.* **13**, 865–70(1930).—The firing time is 2 hrs. The temp. is cone 17. C. H. KERR

Methods for the determination of the firing range of vitreous enamels used in wet-process enameling. C. J. KINZIE. *J. Am. Ceram. Soc.* **13**, 896–9(1930). C. H. KERR

Observations of causes of inconsistent results in commercial fineness tests of porcelain enamels. H. G. WOLFRAM. *J. Am. Ceram. Soc.* **13**, 884–6(1930). C. H. K.

Causes for hair crack formation in iron enamel. R. WEINIG. *Sprechsaal* **63**, 723 4(1930). C. H. LORIG

Aluminum fluoride in cast iron enamels. ALAN L. GORMLY. *J. Am. Ceram.* 13, 900-2(1930).—AlF_3 can be used to replace cryolite. C. H. KERR

A comparison of results obtained with an impact machine [for sheet iron and cast iron enamels]. RICHARD H. TURK. *J. Am. Ceram. Soc.* **13**, 887–93(1930).—The old method of striking the enamel with or against a hard object is unreliable. A pendulum type of machine, able to deliver a 4 ft.-lb. blow, was used. The reverse side, not the test side, was subjected to the blows. Data are given. C. H. KERR

The development and use of a simple consistency pipet for use in the adjustment and control of enamel slips. C. J. KINZIE AND C. H. COMMONS. *J. Am. Ceram. Soc.* 13, 894–5(1930).—The pipet is described with structural details. C. H. KERR

Notes on casting slip. LESLIE SAMPLE. *J. Am. Ceram. Soc.* **13**, 874–5(1930).—Viscometer control proved unreliable. The "cup" casting test was used instead. C. H. KERR

Physiological and chemical experiments with ultra-violet rays through glass (VALENTIN) **11A. Electrical porcelain** (GILLETT) **4.**

Apparatus for feeding mold charges of molten glass. WM. T. BARKER, JR. (to Hartford-Empire Co.). U. S. 1,780,550, Nov. 4. Structural features.

Apparatus for feeding mold charges of molten glass. KARL E. PEILER (to Hartford-Empire Co.). U. S. 1,781,340, Nov. 11. Structural features.

Apparatus for delivering mold charges of molten glass. LEONARD D. SOUBIER (to Owens-Illinois Glass Co.). U. S. 1,778,775, Oct. 21. Structural features.

Apparatus for delivering mold charges of molten glass. UNITED GLASS BOTTLE MANUFACTURERS, LTD., and T. C. MOORSHEAD. Brit. 332,053, July 9, 1929. Structural features.

Apparatus for sheet glass manufacture. ENOCH T. FERNGREN (to Libbey-Owens-Ford Glass Co.). U. S. 1,781,452, Nov. 11. Structural features.

Forming blown glassware. ROBERT J. BEATTY (to Federal Glass Co.). U. S. 1,781,565, Nov. 11. App. and various details of operation are described.

Forming stemmed and footed glassware. WILBERT S. WILLIAMS and DAVID L. MIDDENDORF (to Federal Glass Co.). U. S. 1,778,743, Oct. 21. Mech. features.

Conveyor for passing bottles or other glassware through annealing leers. PERCY Q. WILLIAMS. U. S. 1,778,742, Oct. 21. Structural and elec. control features.

Forming and annealing glass sheets. CHARLES HEUZE (to American Bicheroux Co.). U. S. 1,780,590, Nov. 4. Mech. features.

Roller-way leer for annealing glass sheets. SIMPLEX ENGINEERING CO. Brit 331,927, April 13, 1929. Structural features.

Glassware-annealing leer. RICHARD LAFRANCE (to Owens-Illinois Glass Co.). U. S. 1,778,763, Oct. 21.

Glass transmitting ultra-violet rays of sunlight. BERNARD LONG (to Soc. anon. des manufactures des glaces & produits chimiques de Saint-Gobain). U. S. 1,779,176, Oct. 21. Glass is formed contg. less than 0.02% ferric Fe and contg. Mn 0.05–0.50%.

Colored glass. F. WEIDERT (to Deutsche Gasglühlicht-Auer-Ges.). Brit. 320,946, Dec. 15, 1928. See Fr. 684,705 (*C. A.* **24**, 545).

Glass insulators. DAVIDGE H. ROWLAND (to Locke Insulator Corp.). U. S. 1,780,246, Nov. 4. In making insulators of glass with permanently attached metal suspending devices, the glass is molded about the suspension device and an elec. current is passed through the latter to heat it during the molding and until the glass has set. Various structural details are described.

Laminated glass sheet material. H. A. GARDNER. Brit. 332,234, March 11, 1929. Sheets of glass are united by a non-brittle binder comprising a synthetic resin of the toluene-sulfonamide-aldehyde type. Various details and examples are given.

Uniting sheets of glass and cellulose derivatives. T. W. HOLT. Brit. 332,385, July 4, 1929. Mech. features.

Uniting glass sheets with sheets of celluloid or similar material. JAMES H. SHERTS and ROBERT E. HAMILL (to Duplate Corp.). U. S. 1,781,084, Nov. 11. The assembled sheets are submerged in a bath of pyroxylin solvent and the temp. is raised to a point at which the plastic sheets are softened and pressure is applied to the bath. App. is described.

Glass-tank furnace. GEORGE W. BATCHELL. U. S. 1,780,164, Nov. 4.

Recuperator furnace for glass tanks, etc. W. A. MORTON. Brit. 331,315, May 3, 1929.

Glass furnace heated by oil burners, etc. A. A. LAMBERTI and A. E. J. HOOPER. Brit. 331,881, March 11, 1929. Structural features.

Tunnel kilns for ceramic ware. H. M. ROBERTSON. Brit. 331,224–5, May 9, 1928. Structural features.

Applying coatings to porcelain vases or other articles. G. M. BROWN and H. T. WYSE. Brit. 331,201, Feb. 19, 1929. Various details are given of the use of floating films of coating materials which may include a pigment in a vehicle such as boiled linseed oil thinned with a volatile solvent, cellulose deriv. lacquers, printers' ink, ox-gall and water, etc., as in the manuf. of paper with marbled effects.

Refractory material. JEGOR I. BRONN. U. S. 1,780,114, Oct. 28. A highly refractory material adapted to form blocks when heated is formed by mixing Ca aluminate cement and a Cr ore such as chromite. Cf. *C. A.* **24**, 479.

Corrugated refractory bricks for lining hot blast stoves, etc. VEREINIGTE STAHLWERKE A.-G. Brit. 332,092, Aug. 9, 1929. Structural features.

Enamel ware. OSCAR HOMMEL. U. S. 1,779,273, Oct. 21. Iron or steel ware is coated with Co carbonate, the coating is transformed to Co oxide on the surface (suitably by heating) and an enamel coating is applied over the film of Co oxide. Oxides of Ni or Mn also may serve as the preliminary coating.

20—CEMENT AND OTHER BUILDING MATERIALS

J. C. WITT

Portuguese standard specifications for cement. ANON. *Tonind.-Ztg.* **54**, 1319 (1930).—Similar to the German specifications. For use in contact with the sea water, specimens stored in sea water must meet the standard specification and after 84 days such storage must have 23 kg./sq. cm. tensile and 350 compressive strength. F. O. A.

A suggested method for proportioning and determining the compositions of cement slurries. TYRRELL B. SHERTZER. *Rock Products* **33**, No. 21, 70–1(1930).—The method consists of computations of chem. analyses in terms of lime equivs. R. W.

Slag cement. P. P. BUDNIKOV. *Stroitelnuie Materialui* (*Building Materials*) No. 2, 18–22(1930).—In fusing cast iron, slags are obtained which consist of double silicates of lime and alumina. When these slags are cooled suddenly hydraulic granular slags are obtained. The prepn. of hydraulic cements from slags is based on the fact that amorphous silicic acid contained in slags forms insol. hydrates of silicates and aluminates when mixed with lime and water. The lime content of slag is very important as the greater it is, the better is the cement. Slags poor in lime must have a high content of alumina to produce good slag cements. A high content of silica makes slag inert for the reaction. Ca sulfate always contained in slag changes into gypsum on hardening and is not injurious. Slag cements have a great advantage over portland cement as they are less affected by salts. Slag concrete is also less affected by salts as this concrete contains only very little uncombined lime. The resistance to pressure of portland slag cement after 28 days is 600–650 kg./sq. cm. and its resistance to breaking is about 38 and more kg./sq. cm. M. V. KONDOIDY

Slate as a raw material and fuel in cement industry. RAKOVSKII. *Stroitelnuie Materialui* (*Building Materials*) No. 4, 23–8(1930).—R. describes investigations made to det. whether Russian slates (compn. given) may be used as raw material and fuel for the prepn. of clinker. Data on the clinker obtained are given. It is noted that the solidity of this clinker is somewhat lower than the solidity required by standards for clinker. M. V. K.

Ashes absorbed by cement clinker. H. MOSCHITZ. *Tonind.-Ztg.* **54**, 1430–1 (1930).—The dust removed from a cement kiln was about 3% of the total charge of raw materials plus ash. Almost all of this dust was ash and most of it escaped from the chimney. The clinker, made from thickened slurry, takes up about 40% of the ash. F. O. A.

The chemistry of portland cement manufacture. II. Effect of sulfur and its compounds. ALTON J. BLANK. *Concrete* (*Mill Section*) **37**, 81–3, 89–90(1930); cf. *C. A.* **24**, 5962.—S in raw materials or absorbed from fuel leads to difficulty in burning and unsoundness of cement if the amt. becomes sufficiently large. R. W.

German standard specifications for portland cement, iron portland cement and blast-furnace cement. ANON. *Tonind.-Ztg.* **54**, 1292–6(1930).—The tensile strength test is given less weight than previously. Specifications for high early strength cements are 25 and 250 at 3 days with water storage and 40 and 500 at 28 days combined storage in kg./sq. cm. for tensile and compressive, resp. The 3 cements are on a par except as to definition. F. O. ANDEREGG

Methods for calculating raw pastes in the production of portland cement. I. A. ALEKSANDROV. *Stroitelnuie Materialui* (*Building Materials*) No. 1, 8–16(1930).—A discussion and review of different methods for calcg. pastes of portland cement illustrated by tables and diagrams. M. V. KONDOIDY

Influence of sand additions on the mechanical properties of portland cement. A. V. FILOSOFOV. *Stroitelnuie Materialui* (*Building Materials*) No. 1, 16–21(1930).—Tests were made to obtain a "sand cement" contg. 0–30% sand, portland cement clinker and gypsum (2% of the weight of the clinker). The chem. compn. of these materials is given and tests are described. The results are tabulated and show that addns. of up to 20% of sand to portland cement do not lower its resistance to pressure and that addns. of sand do not influence the setting time of cement. M. V. K.

Influence of clay additions on the mechanical properties of portland cement. A. V. FILOSOFOV AND F. A. SOROMITIN. *Stroitelnuie Materialui* (*Building Materials*) No. 1, 21–3(1930).—Investigations were made on portland cement with addns. of 0–30% clay. Data on the fat brick-clay used and clinker with an addn. of 4% gypsum are given and tests described. The results are given in tables and showed that the setting time is not influenced by the quantity of clay although pastes with clay set quicker than pure cement contg. 4% gypsum. The mech. solidity of cements is lowered

in proportion to the clay content, but on the other hand, the density of cement is increased. Unfired clay cannot be used as addn. to portland cement. M. V. K.

Dusting of portland cement clinker. KATSUZO KOYANAGI. *Rock Products* **33**, No. 24, 66–8(1930).—Dusting of clinker takes place in segregated portions rich in $2CaO.SiO_2$. RAYMOND WILSON

Chemical characteristics of cement pipe lining. E. L. CHAPPELL. *Ind. Eng. Chem.* **22**, 1203–6(1930).—The protection of iron water pipes by linings of cement depends upon alky. of the lime in the cement next the iron wall and upon the blanketing effect of the cement layer. Protective layers made of northern natural cements in contact with city water for some 50 years were found to have lost all lime, which had been replaced by Fe hydroxide to give complete protection. The corrosion rate of Fe can be reduced by covering with a layer of silica sand which becomes cemented together by the Fe hydroxide. This protective effect varies with the thickness of the silica layer. Lime leaching out increases the hardness of the water and so a cement has been developed high in Fe and silica and low in lime for this special purpose. F. O. A.

Analyses of complicated concrete mixes. J. L. HEITZMAN. *Rock Products* **33**, No. 23, 62–4(1930).—Methods for the analyses of cinder, slag and other portland cement concretes are described. RAYMOND WILSON

Shrinkage and expansion of concrete while hardening. P. FILOSOFOV AND A. M. SHCHEPETOV. *Stroitelnuie Materialui* (*Building Materials*) No. **2**, 22–9(1930).—The authors review tests made to det. the shrinkage and expansion of concrete while hardening and describe their own tests which showed that: (1) The properties of the cement, sand and aggregates used are of great importance for the shrinkage of concrete; quick setting cements and cement of high qualities have a greater shrinkage. (2) The fatter is the concrete the greater is the shrinkage. (3) A damp environment weakens the phenomenon of change of vol. of concrete during hardening. M. V. KONDOIDY

Waterproofing of concrete structures. H. R. LORDLY. *Trans. Soc. Eng.* (London) **1929**, 55–93.—Tarry solns. should be applied to the surface when warm. A processed artificial gypsum acting as a carrier for tannin is added to portland cement to make it waterproof. It also acts as a catalytic agent to promote hydration of the silicates and aluminates. Mixts. are given for cement laid under water, used to stop leaks from the inside, and repairing underwater damage to ships. ANN NICHOLSON HIRD

Trass of Karadag. C. SHCHUKIN. *Stroitelnuie Materialui* (*Building Materials*) No. **2**, 29–35(1930).—The deposits of trass in U. S. S. R. are found only in Crimea. It is a volcanic tufa contg. the so-called "active silicic acid" which gives trass its hydraulic properties. The results of the chem. analyses of trass are tabulated and compared to German and Italian trass. They showed that the green Russian trass contg. 71% silicic acid is especially appropriate for use in cements. Tests made with such cements showed that after hardening 3 years, the solidity of trass cements was much greater than that of portland cement and it continued to increase. The most valuable property of trass is that it prevents the injurious action of sea water on concrete by the action of its "active silicic acid" which absorbs the surplus lime and forms cryst. silicates of Ca insol. in water. The compn. of Russian trass portland cement and its properties are tabulated.

M. V. KONDOIDY

Emulsifying action of asphalt fillers. A. R. EBBERTS. *Rock Products* **33**, No. 24, 53–5(1930).—Silica, Fe oxide and gypsum promote the formation of asphalt in water emulsions. Limestone, $MgCO_3$, $Ca(OH)_2$, $Mg(OH)_2$ and portland cement promote the formation of water in asphalt emulsions. The latter class of fillers is best suited for paving mixts. RAYMOND WILSON

Use of the filtration method in volumetric analysis, particularly in the analysis of portland cement (BUCHERER, MEIER) **7**. Basic slags from blast furnaces and their utilization for manufacturing cement (BUDNIKOV, LEZHOEV) **9**. Study of colonial wood from Spanish Guiana (BATUECAS) **21**. Uniform description of graded materials and the evaluation of their fineness (SPINDEL) **13**. Colloidal nature and water content of clays (BERRIDGE) **2**.

Cement. J. C. G. SPERNI. Brit. 332,282, April 18, 1929. A magnesian cement (such as one produced by finely powdering together burnt magnesite and dry unburnt clay or by burning magnesite and clay together) is mixed with 5–25% by volume of Mn oxide, to produce a hard-setting cement. Fillers such as sand, sawdust, "fiber," cork, leather waste or pigments may be added.

Portland cement. FREDERICK W. HUBER. U. S. 1,781,232, Nov. 11. A raw material such as phosphatic marl, which contains Ca phosphate in substantial amounts

and in which the mineralizing components are in too small quantity to produce good cement by burning with argillaceous material at the usual cement burning temp. followed by pulverizing, is mixed with argillaceous material and with an Fe oxide material to bring the total Fe content up to above the chem. equiv. of the phosphate radical present, and the mixt. is burned at a temp. which will convert all the phosphate into Fe phosphate, leaving an excess of Fe oxide, and the product is ground to a fine powder.

Portland cement. F. S. WATT. Brit. 332,322, May 7, 1929. A fine spray of slurry is caused to pass through the hottest part of the flame in a kiln to produce a clinker in a fine state of subdivision. App. and various details of operation are described.

Portland cement. BRITISH PORTLAND CEMENT MANUFACTURERS, LTD., S. G. S. PANISSET and W. S. HANNAH. Brit. 331,584, April 6, 1929. In order to produce a white cement, the raw materials, immediately after the calcining process, are treated with a reducing agent (such as coal dust or paraffin oil spread on a surface onto which the hot clinker is allowed to fall), followed by immediate cooling to prevent reoxidation.

Cement for cementing off oil wells, etc. RICHARD BUHMAN. U. S. 1,781,267, Nov. 11. A usual cement mix is treated with $CaCl_2$ to serve as a dehydrating agent and with $FeCl_3$ which will react with the cement to form addnl. $CaCl_2$ and a hydroxide which acts as an initial set-retarding agent.

Rotary kiln suitable for burning cement. ROBERT W. P. HORN and JACOB H. NISSLEY. U. S. 1,779,626, Oct. 28.

Porous concretes. MOSLER SAFE CO. Brit. 332,356, June 11, 1929. A heat insulation suitable for use in safe linings is prepd. by mixing a vermiculite material such as jeffersite, kerrite or maconite (which preferably has been heated to open out the scales) with a binder such as portland cement or plaster of Paris, with or without addn. of diatomaceous earth or a similar material.

Waterproofing and permitting hydrolysis in concrete. GEORGE C. MARTIN. U. S. 1,779,481, Oct. 28. Neat concrete is poured and while still wet there is applied to its surface asphalt heated sufficiently to cause steam in the concrete to promote quicker soln. of the retarding substances in the cement of the concrete.

Bituminous concrete pavement. DONALD M. HEPBURN (to Amiesite Asphalt Co. of America). U. S. 1,779,067, Oct. 21. Mineral aggregate comprising clean, graded broken stone is coated by agitating it with a bituminous cement in fluent mobile condition and in excess of the quantity which would remain on the aggregate if it were not for the agitation, and, while continuing the agitation, clean sandy fines are added insufficient appreciably to reduce the voids in the finished pavement but sufficient to prevent running off of the fluent bituminous cement on cessation of the agitation, thus producing a loose material suitable for transporting and subsequently compacting on a roadway. Cf. *C. A.* **24**, 706, 3341.

Surfacing roads with concrete and bituminous material. S. J. L. ROBINSON and J. C. MANN. Brit. 332,388, July 6, 1929. Small fragments of pitch, bitumen, asphalt or the like are distributed in an open mosaic fashion over the surface of concrete before setting, and are tamped or rolled flush with the concrete. The bituminous material may be mixed with screened cement applied for finishing if desired.

Asphalt paving composition. JAMES S. DOWNARD. U. S. 1,781,105, Nov. 11. A cooled granulated mixt. of asphalt and sand is treated with a $CaCl_2$ soln. in order to prevent adhesion of the granulated mixt. during storage or transportation and the material is subsequently rendered adhesive by treatment with NH_4 oxalate before application to a roadway.

Paving material. ERNEST A. YOUNG and GLENN H. ALVEY (to Uvalde Rock Asphalt Co.). U. S. 1,779,954, Oct. 28. A mass of crushed rock asphalt of graded sizes proportioned to give a minimum of voids is treated with a flux, and there is added to the mixt. a crushed rock which is harder than the rock asphalt and is of sizes and quantity to create voids in the total mixt. U. S. 1,779,955 (ERNEST A. YOUNG) describes a method of laying a pavement comprising spreading a loose layer of crushed asphalt rock, sized and proportioned to give a balanced mixt. with a minimum of voids, spreading over this layer a scattered layer of crushed stone harder than the first layer and comprising a one-sized aggregate substantially the size of the coarser rock asphalt aggregate, the layers being then compacted together. Cf. *C. A.* **24**, 4373.

Blocks and walls of x-ray-proof material. DAVID H. BARRY. U. S. 1,780,107–8, Oct. 28. Structural features.

Laminated wall board. PHILIP W. CODWISE (to Certain-teed Products Corp.). U. S. 1,780,743, Nov. 4. A pulp is formed by beating with water a mixt. of paper waste about 35%, wood flour 35% and ground wood 30%; the pulp is formed into plies.

several plies are compressed between plies of sized wood-pulp screenings and sawdust to form a coherent layer with rough surfaces and a thickness of about 0.08 in. and several layers thus formed are cemented together to form a rigid board suitable for use as a plaster-base board.

Sheet material for panelling, etc. D. SINCLAIR. Brit. 331,573, April 2, 1929. Sheet material such as "Celotex" formed by pressing or rolling bagasse or similar fibrous material is impregnated with shellac or artificial resin varnish, compressed to expel excess liquid and baked under pressure (suitably at about 200° for 45–60 min.). Material for elec. shielding may be similarly formed with interposition of Cu gauze or other suitable cond. material between two sheets of the impregnated board. Various details and modifications of manuf. are described.

Laminated soundproof, fireproof and waterproof sheet material. R. ARNOT. Brit. 331,561, Feb. 4, 1929. One or more layers of balsa wood or other suitable fibrous material are provided with outer coverings such as thinner asbestos sheets, cement, metal, parchmentized fireproofed fiber or canvas and synthetic resins, sol. silicate or portland cement may be used in uniting the materials.

Asphalt-impregnated roofing. LOWELL F. LINDLEY. U. S. 1,779,175, Oct. 21. A heavy felt is impregnated with an asphaltic waterproof compn. stiff at summer sun temp., the impregnated felt is coated with a layer of adhesive asphalt, grit is embedded in the coating and the sheet is corrugated lengthwise into arcuate corrugations and is cut transversely. App. is described.

Apparatus for saturating sheet material such as roofing felt with asphalt, etc. HILDING A. SJODAHL (to Patent and Licensing Corp.). U. S. 1,778,733, Oct. 21. Structural features.

Veneering lumber with a film of heat-curable material such as bakelite. LOUIS T. FREDERICK (to Continental Diamond Fibre Co.). U. S. 1,779,426, Oct. 28. A film of an adhesive such as glue is interlaid between a surface such as lumber and a roughened veneer sheet such as laminated paper and bakelite with a cured surface, and the materials are united under pressure.

21—FUELS, GAS, TAR AND COKE

A. C. FIELDNER

The inorganic constituents of fuel and their importance for modern furnace technic. W. REERINK AND K. BAUM. *Die Wärme* **53**, 746–51, 766–71(1930); cf. *C. A.* **23**, 5301.—Recent expts. concerning the inorg. constituents of fuel ash indicate a clear distinction between coal ash and lignite ash with regard to their compn. and fusion characteristics. The detn. of the m. p. of both types of ash by the use of Seger cones yields unreliable results. The method of Bunte and Baum (*C. A.* **22**, 1457) offers in contrast the possibility of obtaining fusion curves which are reproducible and which allow the initial softening and course of the fusion process to be distinguished clearly. It is important that the ash for testing be prepd. in a uniform manner. The ashing temp. should not exceed 800° for coal and 700° for lignite. The atm. should be strongly oxidizing and the combustible content should be reduced to less than 0.5%. As the result of several hundred tests, it is shown that essentially 3 different types of fusion curves appear. The effect of Fe oxide in the ash is discussed. It is shown that with the conditions of the mixed atm., a low-melting ferrosilicate, fayalite, is formed. The principal cause of ash fusion at low temps. must be regarded as the Fe oxide content which, if it amounts to more than 15–20% and if a corresponding amt. of free silica is present, is responsible for slag formation in the conditions of the mixed atm. An ash of higher Fe oxide content but low silica may not melt at a low temp. (below 1200°). Further expts. indicate the influence of alkali and alkali earth salts on the fusion process of lignite ash. The question of grate-bar attack is briefly considered. The relationships between type of furnace and ash and between the type of coal and its ash is as yet largely unexplained.

ALLEN S. SMITH

Determination of the calorific value of solid substances. W. A. ROTH. *Brennstoff-Chem.* **11**, 46–7(1930).—Paraffin oil is suggested as a secondary standard in detg. the water equiv. in calorimetric measurements. If it is added to substances difficult to ignite or to use in pellet form, combustion is easily effected. It is also of value in inorg. oxidations and reductions in calorimeter bombs. Volatile substances are sealed in glass capsules and covered with paraffin oil. The paraffin oil for calorimetric purposes is obtainable from Schering-Kahlbaum A.-G. Berlin with a heating value of 10,990 ± 2 cal./g.

F. W. JUNG

Refining of benzene. Action of chlorine on crude benzene. T. RABEK. *Brennstoff-Chem.* **11**, 189–92(1930); cf. *C. A.* **24**, 4923.—For satisfactory motor-fuel uses, it is not necessary to remove all constituents barred by the H_2SO_4 test and Br no. from light-oil fractions of coal-tar and scrubbings of coal gas. Discoloration in the H_2SO_4 test is shown to be also due to constituents other than unsatd. compds., *e. g.*, S compds. of the thiophene type and showing the isatin reaction. It was not proved that resin-forming constituents which lower the heat value also give the test. The Br no. actually gives unsatd. compds. When the benzene is treated with Cl, the unsatd. constituents are attacked first and then the S compds., while the benzene itself remains unchanged. The distribution of unsatd. compds. is shown graphically with distn. and chlorination data. The absence of unsatd. compds. and impurities in intermediate fractions suggests refinement by simple fractionation. F. W. JUNG

The hydrogenation of fuels. M. G. LEVI, C. PADOVANI AND A. MARIOTTI. *Ann. chim. applicata* **20**, 361–404(1930).—An outline is given of the Bergius process for hydrogenating liquid and solid fuels. Several expts. in hydrogenating Italian fuels by this method are described. The authors find that Fe_2O_3 and Ni_2O_3 catalyze the reaction, but note that Bergius discards the use of catalysts. A. W. CONTIERI

Plassmann process of low-temperature carbonization. D. BROWNLIE. *Brennstoff-Chem.* **11**, 44–6(1930); cf. *C. A.* **24**, 4376.—The Plassmann-C. T. G. plant under construction at Barking near London is described. Three units of the type at the Prosper plant but with revolving parts interchanged are each to give a daily throughput of 65–67 tons of washed coking coal of 25–35% volatile content and 5–6% ash. This is to be carbonized at 500–600° in 4.5–6 hrs., giving 26–3400 cu. ft. gas per ton, 40% of which is to be used in heating, and a dust-free tar. Anthracite fines washed by the Lessing process to 1.5% ash may be added up to 25%. "Colconite" of 7.5% ash is to be sold unsized as a smokeless domestic fuel. F. W. JUNG

Low-temperature carbonization [of coal] in thin layers. H. MANTEL. *Brennstoff-Chem.* **11**, 150–1(1930); cf. *C. A.* **23**, 4329.—The app. of Brit. pat. 301,907 (*C. A.* **23**, 4329) is described with diagram. A large throughput of pulverized or fine coal or lignite is carbonized in 1–2 mm. layers at 350–80° by rapid heat transfer from a rotating annular hearth plate heated from below. A dust-free and undiluted gas and an uncracked truly low-temp. tar are produced. F. W. JUNG

Analyses of coals and other solid fuels. J. H. H. NICOLLS AND C. B. MOHR. Can. Dept. Mines, Mines Branch, *Rept.* **712**, 36–56(1930).—Analyses of 181 samples of solid fuel are given. ALDEN H. EMERY

Observations concerning organic and other forms of sulfur in coals containing large amounts of sulfur. J. H. H. NICOLLS AND E. SWARTZMAN. Can. Dept. Mines, Mines Branch, *Rept.* **712**, 28–35(1930).—Extn. of coal with 3% HCl or H_2O shows: (1) oxidation of pyritic S to form sulfates of Fe takes place in regular increments in successive treatment; (2) aq. extn. promotes more oxidation than HCl; (3) CO_2 over the extn. retards oxidation; (4) temp. increase retards oxidation; (5) inorg. sulfide S is evolved from certain coal samples following addn. of HCl; (6) dil. HNO_3 may dissolve a little org. S; (7) S described as "pyritic" is better described as "sulphide"; (8) coal will not promote reduction and so inhibit the oxidation of pyrite; (9) variations of the usual method for detg. sulfate brought distinct changes, none of particular magnitude. Digestion with HNO_3 (sp. gr. 1.12) showed (1) org. S is often lost during digestion so the most suitable method for its estn. is by subtraction of inorg. S from total S; (2) the originally proposed method for detg. humus S is probably unreliable. A. H. E.

Distribution of sulfur in the combustion of coal and coke. I. TRIFONOV AND E. RASHEVA-TRIFONOVA. *Brennstoff-Chem.* **11**, 165–9(1930).—Analytical data are presented showing the distribution of S in various inorg. compds. in coal and coke before and after combustion. The inorg. S-free coal and coke used were prepd. from a Bulgarian coal which was pulverized, washed by a flotation treatment with a CCl_4-xylene mixt. of sp. gr. 1.30 and shaken with HNO_3 of sp. gr. 1.20. The effects of combustion at different temps. upon various ash constituents, inorg. S compds. and combinations of these in 10 and 15% mixt. with the coal and coke are given. F. W. JUNG

Effect of addition of dolomite on carbonization and combustion of coal (sulfur distribution). I. TRIFONOV AND E. RASHEVA-TRIFONOVA. *Brennstoff-Chem.* **11**, 185–8 (1930); cf. preceding abstr.—By means of 10% mixts. of dolomite with representative coals, S distribution before and after carbonization and degasification, at 900° in a Krupp-steel retort, and combustion have been further studied. No specific influence upon carbonization yields was found but the difference noted in distribution was greater than that obtained with equiv. mixts. of dolomite constituents. The retention of S by the ash is attributed to a protection by $CaCO_3$ upon $MgSO_4$ formed, $MgCO_3$ alone not

retaining S on combustion. In slow coking, $MgCO_3$ retained less S than did $CaCO_3$, the reverse being true in rapid coking; this is explained by the greater alky. of $CaCO_3$ in reaction with H_2S. In many instances, the coke was strengthened by the dolomite addn.; this was attributed to cementation. The S content of ash was the same whether produced by coking followed by ashing or by direct ashing. F. W. JUNG

Iodine content of coal. E. WILKE-DÖRFURT AND H. RÖMERSPERGER. *Z. anorg. allgem. Chem.* **186**, 159–64(1930).—Ignition of a mixt. of powd. coal and K_2CO_3 results in loss of I_2 by volatilization. Good results are obtained by heating 30 g. of finely powd. coal with 1.5 g. of K_2CO_3 and 400 cc. of 50% alc. for 8 hrs. at 270–80° in an autoclave, whereby all the I_2 is rendered sol. The soln. is filtered and evapd. to dryness, the residue heated gently to carbonize org. matter and extd. with water, and the C sepd. by filtration; this procedure is repeated until a colorless filtrate is obtained in which the I_2 is detd. volumetrically by Winkler's method (*C. A.* **11**, 3070). The I_2 contents of 12 mid-European coals were found to vary from 0.85 to 11.17 mg. per kg., but no relation could be established between the age of a coal and its content of I_2. It is calcd. that, based on a consumption of 1200 million tons of coal per annum, about 7 million kg. of I_2 is returned to circulation on the earth's surface. B. C. A.

Heat evolved on the treatment of different varieties of coal with concentrated sulfuric acid or nitric acid. D. J. W. KREULEN. *Brennstoff-Chem.* **11**, 41–3(1930).—The Burstin-Winkler type of calorimeter was used to det. the heats of oxidation of various coals, coal constituents and forms of C, 0.5 g. of 50-mesh dry coal being treated with 10 cc. of 95% H_2SO_4 or 50% HNO_3 and the results were calcd. ash-free. With HNO_3, values increased 30–130 cal./g. with increase in volatile content of the coal but with H_2SO_4 results were less uniform perhaps because of oxidation of substances other than volatile constituents. Preheating the coal to 125–150° increased the heat of oxidation but preheating to 175° decreased it. The heats of oxidation of vitrain and clarain were the highest of the banded constituents; durain was next, while those of fusain were very small and similar to those obtained with wood charcoal. F. W. JUNG

Effects of prolonged weathering on the friabilities of certain coals. J. H. H. NICOLLS AND E. SWARTZMAN. Can. Dept. Mines, Mines Branch, *Rept.* **712**, 27–8 (1930).—Samples of 4 Alberta domestic coals and 1 Scotch semianthracite were exposed for 3 years. None underwent any great disintegration The first year showed most change. ALDEN H. EMERY

A comparison of pulverized coal and stokers in industrial plants. SAMUEL M. GREEN. *Power* **72**, 722–5(1930). Installation costs and manufacturer's performance guarantees are compared. D. B. DILL

Production of fuels from brown and waste bituminous coals in the Lurgi plant. O. HUBMANN. *Brennstoff-Chem.* **11**, 219–22(1930).- The American and Canadian Lurgi plants with improved carbonizing units capable of 200 tons per day uninterrupted throughput at temps. increased from 800° to 900° are described. By use of small coal from which fines have been screened for boiler fuel a coke of lower ash is obtained The tar which has been reduced in free C to 0.5% yields an oil rich in phenols and 30–50% pitch which can be increased by oxidation of the tar. Reenforced when needed with coal-tar or asphalt pitches, the hot atomized pitch is used in briquetting the pulverized coke, the amt. necessary having been decreased from 9–10% to 6.5–7.5%. The rectangular briquet has been found easier to make than the egg-shaped and possesses many advantages as a domestic fuel. Because of the method of carbonizing in a vertical stack by direct contact with the heating gases which contain SO_2 formed from the H_2S in the coal gas, the S content of the coke is 2% but this is 70% non-combustible. The larger sizes may be sold directly as fuel. Coke analyses for various carbonizing temps. and a schematic diagram of the process are given. F. W. JUNG

Distribution of carbon, hydrogen, nitrogen, sulfur and oxygen in the hydrogenation products of an eocene brown coal. I. VON MAKRAY. *Brennstoff-Chem.* **11**, 61–4(1930).—Analytical data for original materials and resulting gas, oil, liquor and residue are given showing the distribution of these elements in combinations in the hydrogenation of coal ' in presence of Fe_2O_3. Distribution is also shown diagrammatically. F. W. JUNG

Brown coal as a raw material for gas production. W. HAUSWALD. *Brennstoff-Chem.* **11**, 151–2, 172–4(1930).—The practicability of domestic gas production from brown coal by various methods is examd. The use of existing, *e. g.*, vertical, high-temp. ovens involves actions of alk. ash on retort walls, flash-back tendencies of coke on discharging and the expensive cracking of the tar over the briquetted coke to raise the gas B. t. u. Low-temp. methods mean the subsequent cracking of the gas over the coke,

giving a gas too high in sp. gr. and CO for safety. Satisfactory gas production is possible in generators of suitable design. F. W. JUNG

Acids of montan wax. II. D. HOLDE, W. BLEYBERG AND H. VOHRER. *Brennstoff-Chem.* **11**, 128–32, 146–8(1930); cf. *C. A.* **23**, 5561.—The fatty acids previously sepd. and believed to be iso-acids of octocosoic acid have been subjected to further purification, by repeated recrystns. from benzine, acetone and chloroform, and by fractional micro distn. under 0.04–0.2 mm. Hg pressure. The m. p. after correction agrees closely with that for octocosoic acid ($C_{28}H_{56}O_2$, m. 89°); this is confirmed by the x-ray analysis. From the mother liquor of the montan acid crystns. hexacosoic acid (m. 85.9°) was isolated; this, while not agreeing in m. p. with synthetic hexacosoic acid ($C_{26}H_{52}O_2$, m. 88.2°), was identified by a mixed-m.-p. detn. Behenic ($C_{22}H_{44}O_2$) and tetracosoic ($C_{24}H_{48}O_2$) acids were also believed to be present. The acids derived from montan wax are all believed to contain an even no. of C atoms and normal C cha ns; the penta-, hepta- and nonacosoic acids are concluded to be equimol. mixts. of these. This agrees with previous observations with peanut oil, beeswax, etc. F. W. JUNG

Naphthalene removal by means of tetralin. ZUMBUSCH. *Gas u. Wasserfach* **73**, 977–8(1930). - A discussion of the phys. laws underlying naphthalene removal from gas distribution systems by means of tetralin. Statements made by Weissenberger (*C. A.* **24**, 5464) are qualified to read: (1) For quick removal of old naphthalene deposits the quantity of tetralin used should be increased in summer. (2) For avoiding the formation of new naphthalene deposits the tetralin installation should be operated in winter, but may be shut down during the summer, after old deposits are removed. R. W. R.

Saskatchewan lignite. J. P. DE WET. *Canadian Mining J.* **51**, 1012–4(1930).—A new mining plant at Estevan gives a cheap clean fuel for Saskatchewan and Manitoba. W. H. BOYNTON

Under-water storage of Saskatchewan lignite. J. H. H. NICOLLS AND E. SWARTZMAN. Can. Dept. Mines, Mines Branch, *Rept.* **712**, 25–6(1930).—Lab. tests of various exposures of lignite and anthracite are given. As long as the lignite was under water it was apparently unchanged. On exposure to the atm. it behaved like a fresh sample and rapidly checked. Analyses show little change. ALDEN H. EMERY

Report of preliminary carbonization and briquetting tests on lignite from northern Ontario. R. A. STRONG. Can. Dept. Mines, Mines Branch, *Rept.* **712**, 7–12(1930).—Lignite analyzing moisture 39.9, ash 7.3, volatile matter 26.8, fixed C 26.0 and S 3.0% with a heating value of 6170 B. t. u. (10,265 on dry basis) was carbonized at 600°. The char yield was 37% and analyzed ash 16.5, volatile matter 7 4, fixed C 76.1, S 4.2% and heating value 12,860 B. t. u. The gas yield was 3430 cu. ft. per ton; it had a density of 0 91 and a heating value of 444 B. t. u per cu. ft. The tar yield was 5.5 gals. per ton, sp. gr. 1.065 1.3 lb. $(NH_4)_2SO_4$ per ton was also obtained. Tar analyzed as follows: 0–225°, 40.5%, 1.015 sp gr.; 225–255°, 28.4%, 1.033 sp. gr.; pitch, 27.7% Fraction I analyzed: phenols 74.0, bases 1.3, neutral oil 24.7, unsatd. substances 44.0%. Fraction II analyzed: phenols 63.0, bases 0.0, neutral oil 37.0 and unsatd. substances 33.0%. Gas analyzed: CO_2 35.3, illuminants 0.5, CO 11.6, CH_4 32.0, H_2 14.4 and N_2 6.2%. Briquets made with 9% asphalt stood handling well. A. H. E.

A new proposal for the determination of moisture in peat burned under the steam boiler. A. P. KOSMIN. *Die Wärme* **53**, 775–7(1930).—A method for detg. the moisture in peat by analysis of the gaseous combustion products is theoretically treated. The practical importance of this method can only be proven through direct expt. ALLEN S. SMITH

Lignins of some peat-forming plants of a sphagnum peat. II. G. STADNIKOV AND A. BARISHEVA. *Brennstoff-Chem.* **11**, 169–71(1930); cf. *C. A.* **24**, 5463.—The compn. of lignins isolated from sphagnum mosses and cotton grass, *Eriophorum vaginatum*, is compared with that from depths of 0.5–2.0 m. from a peat bog. That obtained at 1.5 m., supposedly pure sphagnum peat, has a greater C content because of the action of coal-formation processes. Structural formulas of similarity have been detd. for the lignins of cotton grass and peat from 1.5 and 2.0 m. depths. Sphagnum lignins are transformed into humic acids more rapidly than that of cotton grass because of their greater reactivity as shown by their behavior in water. The resistance of wood and cotton grass lignins is due to the colloidal nature rather than to antiseptic action of resins, the C_6H_6-alc. extn. of *Sphagnum parvifolium* being greater than that of *E. vaginatum*. The theory of the transformation of wood substances in coal fossils is strengthened by data showing loss of $-OCH_3$ groups with increasing bog depth and peat age. F. W. J.

Study of colonial wood from Spanish Guiana. T. BATUECAS. *Anales soc. españ. fis. quim.* **28**, 944–58(1930).—Moisture, ash, elementary analysis, heating value and apparent d. of *Aucoumea klaineana* (okume), *Risophora mangle* (mangle), *Lophira*

procera (palo de hierro), *Saccoglottis gabonensis* (osuga), *Disthemonanthus benthanianus* (oguemina) and *Musanga smithii* (palomero or parassolier) were detd. C. and H were detd. by the H. ter Meulen and J. Heslinga method. Apparent d. was detd. by a volumeter (*Physikalisch-chemische Praktikumaufgaben*, 1928), slightly modified. Detns. on *Eucalyptus globulus* are included. E. M. SYMMES

Formation of methane from carbon monoxide and hydrogen by bacteria. R. LIESKE AND E. HOFMANN. *Brennstoff-Chem.* **11**, 208–12(1930).—Sludge of sewage, ditches and stagnant water contains long, Gram-positive, non-spore forming, sometimes incompletely stained, bacilli without cilia of the lactic acid type which bring about the reaction, $CO + 3H_2 \longrightarrow CH_4 + H_2O$ and which are believed to be those of Söhngen (*C. A.* **4**, 2954). The CO and H of pure gas mixts., illuminating gas and fuel gas have been converted to CH_4 in closed vessels at temps. of 16–33° with yields of as high as 97% in 2–3 weeks. Sludge or a colloidal medium is needed in the process which also produces some N and removes the O in the gas as H_2O. No nutriment is necessary when org. matter is present in the sludge. Passing the gas over the cultures in a continuous stream trebled the CO content instead. F. W. JUNG

(Gas) generator supervision. F. KRETZSCHMER AND J. MÖLLER. *Die Wärme* **53**, 763–5, 784–7(1930).—Generator resistance, charge resistance, steam flow, gas temp., gas pressure and gas analysis are discussed and explained with reference to the importance in gas generator operation. The principles of the measurement of the quantities are given. ALLEN S. SMITH

Natural gas in Saskatchewan. G. S. HUME. *Can. Mining J.* **51**, 991–4(1930).—Four conditions considered necessary for the presence of natural gas in com. quantities are: (1) presence of a source rock that might yield natural gas; (2) presence of suitable porous rocks in the strata assocd. with the source beds; (3) presence of a suitable geological structure to cause the accumulation of natural gas in local concns. such as would yield com. supplies when the gas-bearing horizon is encountered by the drill; and (4) presence of a suitable cover over the natural gas-bearing horizon to prevent the escape of the gas after concn. Dirt Hills, south of Moose Jaw, and an extension of the Ribstone area into Saskatchewan are regarded as a favorable area. W. H BOYNTON

The Munich method for determining heat distribution inside a gas oven. HERMANN KOELSCH. *Gas u. Wasserfach* **73**, 998–9(1930).—Drawing paper coated by brushing with a soln. of 120 g. $Na_2CO_3.10H_2O$ per l. of distd. water and dried under tension may be used to indicate the temp. variation in gas-heated (baking) ovens, at temps. between 140 and 250°. Before using the paper is fastened in a frame. Details of the test are given. Other heat-sensitive materials were tested but the above was found to give the best results. R. W. RYAN

The new horizontal (small) chamber oven plant at Waren (Müritz). G. O. EICHNER. *Gas u. Wasserfach* **73**, 950–2(1930).—Details are given of the new gas plant at Waren, which uses 6 small vertical chamber ovens, of the Pintsch and Otto type, 3500 mm. long, 1000 mm. high and with an av. width of 300 mm. The charge is 650 kg. and the coking time 12 hrs. R. W. RYAN

Physical basis and method of operation of the Progas-Union (gas) governor of 1929. E. FREI AND C. BARCKMANN. *Gas u. Wasserfach* **73**, 967–73(1930).—The design and phys. basis of the Progas-Union governor are discussed with a mathematical analysis. Curves are given which show the gas-pressure variations before and after the governor. R. W. RYAN

Temperature control in exothermic gas reactions. O. ROELEN. *Brennstoff-Chem.* **11**, 68–70(1930).—A discussion. F. W. JUNG

Chemical reactions in the Petit process (of gas purification). W. TER-NEDDEN. *Brennstoff-Chem.* **11**, 67–8(1930).—A description is given of the operation, with equations and equilibrium data, to explain the reactions occurring in the various stages of the process whereby K_2CO_3, H_2S being removed from the gas as KSH, is satd. with CO_2 to expel H_2S, the resulting $KHCO_3$ being decompd. with heat to the original K_2CO_3. A flow-diagram is given. F. W. JUNG

Preventing the harmful action of gases and waste waters containing phenols in the operation of gas producers. FELDHAHN. *Zentr. Gewerbehyg. Unfallverh.* **17**, 122–3 (1930); *Chimie & industrie* **24**, 587.—In the heating of large furnaces (for metallurgy, ceramics, etc.) with purified lignite producer gas, the tar must be removed from the gases and then cooled in a scrubber with a counter-current of water. The scrubber waters contg. phenols are generally cooled in a reflux condenser by being finely subdivided in direct contact with the air. This results in harmful action when the waters are discharged into water courses, and moreover their odor is disagreeable to the neighborhood. To overcome these drawbacks, F. suggests that the waters from the scrubber

be cooled in tubular coolers and then returned to the scrubber for the purification of the gas, while the tubular coolers are surrounded by fresh water which is passed through a reflux condenser. The scrubbing and cooling waters are thus kept entirely sep., which prevents the escape of bad odors as the waters contg. phenols are no longer cooled in the reflux condenser; moreover, they cannot contaminate the cooling water and can be withdrawn from the cycle when the phenol content has reached a given point.

A. PAPINEAU-COUTURE

Position of activated carbon process for benzene recovery from coke-oven and illuminating gas. E. REISEMANN. *Brennstoff-Chem.* **11**, 226–9(1930); cf. *C. A.* **15**, 1031, 2540.—Details and a schematic diagram of the Bayer process are given with exptl. data of a recent English installation. The outlook for this method of recovery is discussed.

F. W. JUNG

Removal of sulfur dioxide from flue gases. A. THAU. *Brennstoff-Chem.* **11**, 222–6(1930).—The necessity and various methods of combustion- and flue-gas analysis are discussed. An exptl. app. working with the gases of a Northumberland (3.9% S) and a Scottish (1.23% S) coal, the S content of whose gases varied from 1 to 5 mg. per cu. m. expressed as H_2SO_4, is described. The treatment completely removed SO_2 and SO_3 with a H_2O scrubbing of 12–14 sec. contact duration corresponding to H_2O requirement of 45–58 tons per ton coal. With hot water, oxidation of SO_2 to SO_3 takes place and the wash water does not later give off SO_3. Neutralization methods using lime, because of cost and dust, were not studied. Ests. of SO_2 production at the Battersea power station near London are given together with diagrams of suggested scrubbers.

F. W. JUNG

Use of coal-tar oil for heating industrial furnaces. H. LUHN. *Brennstoff-Chem.* **11**, 192–3(1930).—A discussion and answer of objections against substitution for other fuel oils. Analytical, combustion and cost comparisons are made in favor of coal-tar oil as used in the latest installations employing preheating of both fuel and atomizing air.

F. W. JUNG

Nature of the coking process. F. FISCHER. *Brennstoff-Chem.* **11**, 64–6(1930).—A description and discussion of the effects upon the coking of coal by humic substances and solid and oily bitumens. Primary (decompn. of bitumen) and secondary (coking of tar) carbonization are defined. The comparative effect upon coke structure using hot-oven charging and the reheating to 1100° of semi-coke as well as the coking of non-caking coals under pressure to overcome the effect of insufficient oily bitumen are also discussed.

F. W. JUNG

Heat economy of coke ovens. K. BAUM. *Brennstoff-Chem.* **11**, 47–51(1930).—The heating efficiency of coke ovens obtained by both the detn. of heat losses and sectional heat concns. is discussed together with the influence of end temp., heating rate, coal moisture content, etc., upon the heat of carbonization. The heat of carbonization for an oven, while useful, should not be taken as an absolute index of heating efficiency. Improvements in design and operation technic are recommended to increase the heating efficiency. Isothermal diagrams are given showing variations in the progression of heating in various sections of the charge and differences in end temp. in 2 types of ovens.

F. W. JUNG

Heat economy of coke ovens. O. PEISCHER. *Brennstoff-Chem.* **11**, 112–13 (1930).—The factors detg. heat efficiency and economy in coal carbonization as given by Baum, (cf. preceding abstr.) are discussed. In regard to uniformity of heating, to prevent undue cracking of gas and tar and decompn. of NH_3 in upper section of oven, a vertical temp. gradient is desirable. Quality of the product should also be considered. Reply. K. BAUM. *Ibid* 113–14.

F. W. JUNG

Determination of the reducing power [of coke, etc.] by Agde and Schmitt's method. W. J. MÜLLER AND W. COURARD. *Brennstoff-Chem.* **11**, 125–8(1930).—Improvements and refinements in app. and procedure, such as a const.-head device for uniformity of CO_2 flow, a combustion tube designed to reduce dead spaces and permit truer temp. control, and a more accurate analytical buret system are described. Curves for various cokes, wood- and activated-charcoals are given showing reducing power and residual gas vols. for different particle sizes.

F. W. JUNG

Beet sugar molasses prices and molasses utilization [as power fuel] (CLAASSEN) **28.** Progress report on waste sulfite liquor (HOWARD) **23.** Refining light oil from coal distillation (U. S. pat. 1,779,944) **22.** Activated ferric oxide (Brit. pat. 332,259) **18.** Plastic coating materials from tars, etc. (Brit. pat. 331,846) **26.** Separating waxy materials from distillates, etc. (U. S. pat. 1,779,287) **22.** Apparatus for demulsifying oils and tars containing water by heat, baffling and gravity (U. S. pat. 1,781,257) **22.**

Fuel briquets. HENRY F. MAUREL (to Maurel Investment Corp.). U. S. 1,780,205, Nov. 4. Fuel suitable for use in furnaces is prepd. by subjecting carbonaceous materials such as pulverized coal to froth-flotation concn., reducing the moisture in the concentrates to form a heavy paste, mixing the latter with a suitable liquid hydrocarbon material such as a heavy asphalt base oil and finally baking the mixt.

Mixed liquid or semi-solid gelatinous fuels. AMERICAN COALINOIL CORP. Brit. 332,343, May 25, 1929. Mixts. consisting of finely divided solid fuels suspended in liquid fuels are stabilized by a material obtained by neutralizing with alkali all the product formed by blowing an oxidizing gas through a hydrocarbon oil heavier than kerosene in the presence of a catalyst such as an oleate, stearate or palmitate of a metal such as Al, Mn, Co or Zn. Numerous details and examples are given

Motor fuel. H. MENZ, W. STEFFEN and E. JAAKS-MÜNCHFBERG. Brit. 331,966, April 30, 1929. Tetrahydronaphthalene 50–55, sulfonated castor oil 10 and water 35–40 contg. sulfite lye 5 parts, or similar mixts. are stated to be suitable for use with a "hot spot" vaporizing device.

Fuel for internal-combustion engines. PHILIP S. DANNER and JOHN E. MUTH (to Standard Oil Co. of Calif.). U. S. 1,779,061, Oct. 21. A fuel suitable for use under high compression comprises a hydrocarbon material such as gasoline and a metal amino carbonyl compd. such as Fe diethylaminopentacarbonyl.

Operating internal-combustion engines with still hot pulverized coking products as fuel. HANS WAHL and ALBERT FISCHER (to I. G. Farbenind. A.-G.). U. S. 1,781,485, Nov. 11. An app. is described for pulverizing hot freshly coked material such as that derived from brown coal and feeding the pulverized material to an engine.

Use of inert gases in crank cases of internal-combustion engines to prevent explosions. ALLGEMEINE ELEKTRIZITÄTS-GES. Brit. 332,137, Oct. 20, 1928. An inert gas such as N or exhaust-engine gas may be used, with or without admixt. with a gas of distinctive odor such as NH_3 or mercaptan, to serve as a warning in case of leakage

Air filter for internal-combustion engines, etc. H. AUSTIN Brit. 331,718, July 31, 1929. Structural features.

Destructive hydrogenation. C. F. R. HARRISON and IMPERIAL CHEMICAL INDUSTRIES, LTD. Brit. 331,548, April 2, 1929 H for use in destructive hydrogenation of coal, oils, etc., is heated under pressure by converting a portion of it into CH_4 by an exothermic reaction with CO in the presence of a catalyst A gas mixt. obtained from water gas by partial oxidation and removal of CO (leaving about 3–5% of the CO) may be used and the CH_4 formed may be removed from the gas by washing with oil. Numerous details of procedure are described.

Destructive hydrogenation. C. F. R. HARRISON and IMPERIAL CHEMICAL INDUSTRIES, LTD. Brit. 331,817, April 2, 1929. Vapors produced from the destructive hydrogenation of carbonaceous materials such as coal and oils in the liquid phase are superheated in the absence of hydrogenating catalysts, and then passed, together with H, over a hydrogenating catalyst at a temp. lower than that of the superheating stage The superheating may be effected by contact with heating masses such as Al or Zn or their compds. and the catalysts for the final stage may include Fe, Ni, Mo, Cr, Sn or their compds. Various examples and details of procedure are given.

Destructive hydrogenation. C. F. R. HARRISON, H. W. STRONG and IMPERIAL CHEMICAL INDUSTRIES, LTD. Brit. 332,246, April 17, 1929. In destructive hydrogenation of coal or the like under high pressures, an aq. soln. of the catalyst such as Ni nitrate or NH_4 molybdate is sprayed over the material, which may then be mixed with oil and hydrogenated in the usual manner. Various details of procedure are described.

Destructive hydrogenation. I. G. FARBENIND. A.-G. Brit. 331,916, April 11, 1929. Products leaving a destructive hydrogenation chamber in gaseous form are washed and the vapors simultaneously condensed by contact, while still under pressure, with a washing oil such as a hydrocarbon oil of high b. p., destructive hydrogenation products or the like. An example is given of the destructive hydrogenation of a middle oil fractionated from a brown coal low-temp.-distn. tar at a temp. of 450–70° under 200 atm. pressure in the presence of a catalyst prepd. from molybdic acid and ZnO, a washing oil b. about 200° being sprayed into the gaseous mixt. leaving the reaction chamber.

Destructive hydrogenation. I. G. FARBENIND. A.-G. Brit. 332,251, Jan. 17, 1929. Heating of the material in reaction tubes or chambers is effected by external gaseous heating media having temps. at least 100° higher than the reaction temp. but below 800° and a uniform flow of heat to the charge is obtained either by scraping off coke deposits from the interior of the reaction tubes or chambers or by surrounding the tubes with a baffle or mantle to effect uniform heat distribution. Various details of app. and operation are described.

Destructive hydrogenation. I. G. FARBENIND. A.-G. Brit. 332,336, May 15, 1929. Substances of high mol. wt. are removed from carbonaceous liquids such as middle oils, by adsorbents such as silica gel or alumina gel, and are destructively hydrogenated at elevated temp. and pressure while assocd. with the adsorbent. The adsorbent preferably carries a catalyst such as molybdic acid. Various details of procedure are given.

Thermal decomposition of finely divided carbonaceous solids. FRIEDRICH BARTLING. U. S. 1,781,659, Nov. 11. The material is subjected to destructive distn. while held in surface adhesion on a device such as a metal conveyer by an electrostatic charge. App. is described.

Apparatus for low-temperature carbonization. J. E. HACKFORD. Brit. 331,193, Dec. 21, 1928. A series of travelling carbonizing tubes is lined with paper pulp or other suitable medium to prevent sticking of the charge. Various details of construction and operation of the app. are described.

Low-temperature carbonization of solid fuels. C. PAMART. Brit. 331,497, March 2, 1929. For the production of semi-coke in granular or pulverulent state, the fuel is preheated to 300–350°, then partially oxidized and finally carbonized at 500–600° in a retort such as described in Brit. 268,613 (*C. A.* **22**, 1461).

Rotary retort for low-temperature carbonization, drying, etc. I. G. FARBENIND. A.-G. Brit. 331,879, Feb. 11, 1929.

Retort for carbonizing coal. T. M. DAVIDSON. Brit. 331,906, April 8, 1929. A tapered hollow structure extends into the fuel space so as to form a cavity in it through which the gases are withdrawn, and so as to cause arrangement of the charge in thin layers; this structure is arranged to be lowered for discharge of the coke, and various structural features are described.

Carbonizing non-bituminous or anthracite coals. G. M. F. F. MASCART. Brit. 331,850, April 8, 1929. Coal contg. not more than 14% of volatiles, agglomerated with not more than 7% of pitch, is subjected to a progressive carbonization for 9–10.5 hrs. at temps. rising from about 500° to about 900–930° (suitably in an externally heated retort) with injection of steam or with gas freed from by-products circulated upwardly through the material to generate H from the CH_4 present.

Carbonizing coal, etc. WALTER E. TRENT (to Trent Process Corp.). U. S. 1,781,613, Nov. 11. The material is passed through a distg. zone in individual charges in sep. containers attached to a conveyer and each container is provided with a heat-storage element such as a cast iron block which is preheated and supplies sufficient heat for the carbonization of the charge in the container. App. is described. U. S. 1,781,614, relates to distn. of finely divided coal by introducing it to a stream of combustion-supporting gas such as air and effecting partial combustion of the coal in the gas to generate sufficient heat to remove volatiles from and carbonize the comminuted coal; the carbonized coal particles are sepd. by discharging a portion of the lighter carbonized particles in suspension in the gas stream and withdrawing the remaining portion of the carbonized particles substantially undild. by the gas. App. is described. Cf. *C. A.* **24**, 4377.

Wet separation of coal, etc. C. W. H. HOLMES and BIRTLEY IRON CO., LTD. Brit. 331,841, March 8, 1929. Preliminary to sepn. of coal, ore, etc., from assocd. shale or other gang by immersion in a liquid of intermediate sp. gr. such as $CaCl_2$ soln. or $ZnCl_2$ soln., the material is sprayed with paraffin oil, crude varnish or other suitable coating substance to minimize wetting of the mineral by the sepg. liquid.

Gravity separation of coal with a calcium chloride solution. RUDOLF LESSING. U. S. 1,780,830, Nov. 4. Various details of app. and operation are described.

Improving the appearance of discolored coal. ERNEST V. COLLINS, JR. (to Delaware, Lackawanna & Western Coal Co.). U. S. 1,781,102, Nov. 11. The coal is treated with a soln. of NH_4 persulfate. U. S. 1,781,103 specifies the use for the same purpose of a soln. of HCl and $TiCl_3$. Cf. *C. A.* **24**, 1961.

Apparatus for "clouderizing" powdered fuel with air for combustion in furnaces or internal-combustion engines. C. H. VERITY. Brit. 331,221, March 12, 1929. Structural features.

System for conjointly burning relatively high-grade pulverized coal and relatively coarse low-grade fuel in furnaces. ARTHUR V. ADAMSON (to International Combustion Engineering Corp.). U. S. 1,778,744, Oct. 21. The different fuels are admitted to the furnace in alternately arranged streams of flattened configuration.

Preheating coal for coking. FRANZ PUENING (to Koppers Co.). U. S. 1,781,079, Nov. 11. Coal is subjected to preheating at a temp. in excess of 100° and which may be up to about 315° and the sensible heat of the preheated coal within the temp. range

mentioned is used for evapg. moisture from wet coal supplied for subjection to the preheating medium in advance of treatment with the latter. App. is described.

Bleached montan wax product. WILHELM PUNGS and MICHAEL JAHRSTORFER (to I. G. Farbenind. A.-G.). U. S. 1,780,633, Nov. 4. A bleached montan wax comprising esters and salts of the acids contained in the wax (the salts being present in quantity less than 25% the wt. of the wax) is prepd. by esterification with glycol or glycerol and is suitable for use in "shoe creams," etc. Cf. *C. A.* **24**, 2276.

Desuperheating steam. BRITISH ARCA REGULATORS, LTD., and T. LINDSAY. Brit. 331,361, June 12, 1929. Water which is to be brought into direct contact with steam to be desuperheated is first preheated by indirect contact with the steam.

Apparatus for purifying distillation gases such as those from coal, lignite, peat or tar. ALFRED JOSEPH (to Compagnie internationale pour la fabrication des essences et petroles). U. S. 1,780,159, Nov. 4. Various details are described of an app. in which purifying material such as Ni on a porous carrier for treating the hot gases is placed in an annular chamber, the inner and outer walls of which both serve for radiating heat.

Desulfurizing fuel gases. S. G. WATSON, D. M. HENSHAW and W. C. HOLMES & Co., LTD. Brit. 332,147, Oct. 15, 1929. Before removal of S by use of reagents such as suspensions or solns. of metallic oxides in alkalies, the hot gases are preliminarily treated with hygroscopic substances such as $CaCl_2$ soln. (which may have been previously used for removing moisture from purified gas) under such conditions as not to reduce the gas temp. below that at which the S-removing reaction proceeds satisfactorily, *e. g.*, 35–40°. Various details of treatment are described.

Desulfurizing gas. FREDERICK W. WERNER and ERNEST T. JOHNSTON. U. S. 1,779,024, Oct. 21. Producer or by-product coke gas or other gas contg. H_2S and N is purified by *forming Ca sulfide* and *synthesizing* NH_3 by bringing the gas into contact with CaO at a reacting temp. of dull redness. App. is described.

Gas-producer operation. H. J. F. PHILIPON. Brit. 332,366, June 15, 1929. In an ash-melting gas producer, the proportion of fixed C to the wt. of the charge is about 30%, and slag is formed from high ash content fuels or by addns. of substances having a base of silica, alumina or lime, a fusible slag being formed with a SiO_2 to CaO ratio of 0.9. The blast may be varied to produce temps. of 400–800° and low-grade cast iron may be added and transformed into siliceous cast iron free from S. Fe ores also may be added, as may also those of other metals, and various details and modifications of procedure are described.

Gas producer and boiler furnace operation. T. R. WOLLASTON. Brit. 331,488, March 27, 1929. Gas from a water-jacketed gas producer such as described in Brit. 316,749 (*C. A.* **24**, 1962) passes to one or more eccentrically arranged burners for heating a steam generator which is adapted to be heated by radiant heat and convective heat, various details of construction and operation being described.

Producer gas. REID POWER DEVELOPMENT CO., LTD., and J. W. HINCHLEY. Brit. 332,007, May 30, 1929. In production of a gas high in CO, gases from a lime kiln are passed through a producer and the quantity of gas or air or both admitted to the kiln and the quantity of air admitted to the producer are controlled according to the temp. in the kiln or in the producer. Various details of app. are described

Mixed oil and water gas. H. G. TERZIAN (to Humphreys & Glasgow, Ltd.). Brit. 331,756, Jan. 3, 1929. In operation of a carbureted water-gas set, after the air blast, oil is vaporized in the carburetor and superheater and passed back through the fuel bed, which is subsequently steamed, deposited carbon being removed. Various details of plant construction and operation are described. Cf. *C. A.* **24**, 2584.

Water gas. SYDNEY J. MCAULIFFE (to Fuller Lehigh Co.). U. S. 1,780,759, Nov. 4. Various details of app. and operation are described for gasifying pulverized coal and steam in admixture and suspension as a thin vertical sheet heated on both faces and the bottom edge.

Apparatus and heat-exchange system for liquefying gases such as constituents of natural gas. LEON B. STRONG (20% to Frank G. Campbell). U. S. 1,780,250, Nov. 4.

Waterless gas holder. W. BLAKELEY and FIRTH BLAKELEY SONS & CO., LTD. Brit. 331,266, March 25, 1929.

Waterless gas holder. FREDERICK H. WAGNER (to Bartlett Hayward Co.). U. S. 1,781,256, Nov. 11.

Cracking coal-tar constituents. MICHAEL MELAMID. U. S. 1,779,486, Oct. 28. Coal tars contg. both high b. p. constituents and lighter oils which can be cracked at comparatively low temps. are atomized with a H-contg. gas into a zone contg. a liquid metallic catalyst such as molten Sn, Bi or Sb and brought into contact with the catalyst at a temp. of about 300–400° to effect vaporization and cracking; unvaporized con-

stituents of high b. p. are continuously removed from the cracking zone and the gaseous products of the cracking are separately removed.

Centrifugal tar separator for separating tar from oil and steam, etc., under vacuum. GEORGE W. WATTS (to Standard Oil Co. of Ind.). U. S. 1,781,618, Nov. 11. Structural features.

Coke oven. ARNOLD BECKERS. U. S. 1,780,992, Nov. 11. Structural details.

Coke-oven battery. JOSEPH VAN ACKEREN (to Koppers Co.). U. S. 1,780,803, Nov. 4.

Vertical coking retort. JOSEPH BECKER (to Koppers Co.). U. S. 1,779,958, Oct. 28.

22—PETROLEUM, LUBRICANTS, ASPHALT AND WOOD PRODUCTS

W. F. FARAGHER

Sources and distribution of major petroleum products, Atlantic Coast states, 1929. E. B. SWANSON. Bur. Mines, *Information Circ.* **6396**, 9 pp.(1930).—Atlantic Coast states received 177,063,000 bbls. of crude petroleum in 1929, an increase of 2,542,000 bbls. over 1928. This was from the following sources: tankers from Gulf Coast ports 56.38, tankers from foreign ports 38.97, tankers from California ports 0.38, withdrawal from foreign crude stocks 0.18, by pipeline from Illinois and Appalachian fields 3.30, and by pipeline from Mid-Continent fields 0.79%. This material was used as follows: domestic crude run to stills 59.97, foreign crude run to stills 37.41, burned directly as fuel 0.87, added to stock 0.38, exported 0.50%. These states received 133,831,000 bbls. of gasoline in 1929, an increase of 13,479,000 bbls. over 1928. The source of this material was as follows: Atlantic Coast refineries 43.23, tankers from Gulf Coast 31.99, tankers from Calif. ports 16.73, foreign ports 5.29, from Appalachian refineries 2.53, by tank cars from other areas 0.23%. Of this 92.17% was consumed in the Atlantic Coast states. ALDEN H. EMERY

The cracking of petroleums. ANDRÉ GRAETZ. *Chimie & industrie* **24**, 271–9, 526–43(1930).—A review dealing with the theory of cracking phenomena (effects of temp., time of treatment, pressure, reaction medium, chem. constitution of the hydrocarbons and their thermal dissocn.), describing the more important cracking processes which have found com. application, and discussing the probable evolution of the cracking industry in the near future. A. PAPINEAU-COUTURE

Crack Mexican stock at low pressures. G. EGLOFF AND E. F. NELSON. *Oil and Gas J.* **29**, No. 25, 38(1930).—In a com. run a Dubbs unit cracking Mexican kerosene was operated continuously for 23 days. The plant produced 64.9% of motor fuel of 60% benzene equiv., at 300 lb. pressure and 892°F. The same type of cracking units is handling residual stocks and heavy crude oils, with only minor changes in operating conditions. The cracked distillate is treated by the "split-plumbite" process, using 4% by wt. of acid. J. R. STRONG

A study on the oxidation phenomena of insulating mineral oils. I. S. MIZUSHIMA AND T. YAMADA. *Researches Electro-Tech. Lab., Tokyo, Japan* No. **291**, 18 pp.(1930).—A slight portion of S amounting to 0.1% was added to a refined white transformer oil and the oil was then tested for oxidation during 100 hrs. under the pressure of 86 cm. of Hg at 120°. The test of the oil without S was carried out parallel with this test. The oil without S oxidized readily, but the one with S added did not appreciably. Alkyl sulfides and mercaptans, when added to the oil, give the same antioxidation effect, while thiophene does not. Therefore M. and Y. consider that the stability toward oxygen of oils that are not highly refined must be attributed to the influence of S compds. contained in them. It is, however, another problem how the addnl. S influences the oils which are not highly refined and which produce sludge when oxidized There are 2 conflicting opinions with respect to the effect of S upon the sludge-forming character of the oil; namely, that it is acceleration, and that it is retardation. The authors' expts. made with 7 different kinds of oil show that in all cases the oil with 0.2% of S added formed more sludge than the oil without S added. Transformer oils that produce a large amt. of sludge always contain certain amts. of S and unsatd. compds. The authors also investigated the role of these S and unsatd. compds. in the oil in the formation of sludge. To obtain the oil with some unsatd. compds. but free from S, highly refined transformer oils were submitted to cracking at high temp. With the oils thus treated oxidation tests were carried out with and without addn. of S. In the cracked oil without S, sludge did not form, whereas acidity formation and the other phenomena which prove that oxidation has taken place remained nearly the same as in the un-

cracked oil; the cracked oil to which S was added gradually darkened in color, though its acidity did not increase, and finally the oil pptd. a remarkable quantity of sludge. The authors consider, therefore, that both the S and the unsatd. compds. are essential for the formation of sludge in the oil. W. OGAWA

Equipment and processes of crude oil dehydration. M. E. GARRISON. *Petroleum World and Oil Age* **27**, No. 10, 66–70, 137–8(1930).—The use of the Cottrell treater for de-emulsifying crude oils by passing the emulsion down through the elec. field between the shell and the central rotating shaft, bearing horizontal disks, involved serious fire risk and heavy losses of light oil fractions. The Petreco "H.F." (horizontal field) treater is closed and the oil enters at the bottom, clean oil collecting and being taken out at the top. The cone-shaped electrodes on the central shaft are moved up and down a short distance. A. c. is used and the water particles, becoming oppositely charged, coalesce. EMMA E. CRANDAL

Precautions necessary for cleaning sour crude storage tanks. R. B. ROAPER. *Natl. Petroleum News* **22**, No. 43, 47-B(1930). —All lines into the tank are blanked. The oil and some residual matter are floated out by a high-pressure stream of H_2O. The tank is steamed for 36–72 hrs. before the tank tester takes a sample for H_2S and combustible gases. Bottom plates are removed and the bottom settling is scraped out. The tanks are finally sand-blasted if necessary to remove FeS. R. W. KELLY

Physical analysis of oil sands. P. G. NUTTING. *Bull. Am. Assoc. Petroleum Geol.* **14**, 1337–49(1930).—A new form of precision pycnometer and new methods, together with a simple method of measuring permeability, are described. Common sources of error and the interpretation of results are discussed in some detail. A. H. E.

Oil shale from Picton County, Nova Scotia. A. A. SWINNERTON. Can. Dept. Mines, Mines Branch, *Rept.* **712**, 13–24(1930). —Oil shales from 6 beds were assayed. Yields in gal. per ton, analyses of oil shale, shale oil, gas, spent shale and a products balance are given for each sample. ALDEN H. EMERY

Disintegration of kukkersite in organic liquids. K. LUTS. *Brennstoff-Chem.* **11**, 148–50(1930).—This and other oil shales exhibit swelling tendencies, gas evolution, and subsequent disintegration of structure upon immersion in various org. solvents. Gas pressure produced by penetration into capillaries, the size of which has been calcd., is believed responsible. The compn. of sieved residue fractions is given. The speed of disintegration is proportional to the heat of wetting and also depends on the surface tension. Russian, Estlandish and Scottish shales and bituminous limestone have been investigated with ether, acetone, $CHCl_3$, C_5H_5N, CS_2, EtOAc, MeOH, EtOH, aniline, benzine, petroleum, acetophenone, nitrobenzene and C_6H_6. F. W. J

Some characteristics of absorption oils and factors governing their use. C. D. GARD. *Petroleum World and Oil Age* **27**, No 10, 82–6, 93, 95(1930).—It can be shown by calcn., with the aid of a Kremser absorption factor, that, for the same gasoline production, only 64.5% as much absorption oil of 42° A. P. I gravity is necessary as if the oil were of 35° A. P. I. gravity. It is very important for efficiency of absorption that operations be so conducted as to leave no C_4H_{10} fraction in the lean oil. When high-pressure and low-pressure absorbers are used in combination, the high-pressure oil-gas ratio can be so adjusted by expt. as to give max. absorption of C_4H_{10}. E. E. C.

Gasoline survey for 1928. P. V. ROSEWARNE AND R. J. OFFORD. Can. Dept. Mines, Mines Branch, *Rept.* **712**, 57–68(1930). —Analyses are given of 77 samples of gasoline collected from 13 Canadian cities in Aug., 1928. The quality was superior to that sold in the 3 previous yrs. The variation in quality was slightly less than that in 1927. The quality was also superior to that of gasoline sold in the U. S. in July, 1928. ALDEN H. EMERY

Gas flow charts for the calculation of main line capacities. M. V. COUSINS. *Petroleum Eng.* **2**, No. 2, 186, 188, 189(1930).—Three simplified charts for the calcn. of pipe line characteristics are presented. CHAS. WIRTH

Inorganic lubricants. III. Mixtures of aqueous liquids with non-reacting solids. WILLIS A. BOUGHTON. *J. Am. Chem. Soc.* **52**, 4335–6(1930); cf. *C. A.* **24**, 4382.—Successful lubricants for ground-glass surfaces can be made by suspending finely divided non-reacting solids in aq. solns. of hygroscopic salts. Kaolin or graphite suspensions in a $CaCl_2$ soln. gave the best results. EMMA E. CRANDAL

Vegetable oils (as lubricants) for airplanes and automobiles. N. CHAMPSAUR. *Chimie & industrie* **24**, 519–25(1930).—A discussion of the merits of vegetables oils (more particularly olive, colza and peanut) for the lubrication of airplane and automobile engines, from both the technical and the (French) national standpoints. Following a review of the theory of the lubricating power of oils, to show the superiority of vegetable over mineral oils, results are given of preliminary bench and road tests with

olive oil which showed, among other advantages, that the motor developed more power than with mineral oil; this oil is also more unctuous, has a better viscosity-temp. curve (lower ratio of viscosities at low and high temps.), and has better decarbonizing properties. The only drawback noted was the relatively high solidifying pt., which requires special precautions when starting up the motor in cold weather. A. P.-C.

The manufacture of soluble cutting compounds. S. J. CAPLAN. *Petroleum Eng.* 2, No. 2, 95(1930).—Formulas for a sol. cutting oil and a sol. cutting paste are given. CHAS. WIRTH

The estimation of gritty constituents in greases. EWALD PYHÄLÄ. *Petroleum Z.* 26, *Motorenbetrieb und Maschinen-Schmierung*, No. 9, 3-4(1930).—A grease of excellent quality appears, when molten, as a clear, homogeneous, viscous liquid that contains no suspended matter. No gritty material should be present. No method for the detn. of solid impurities in greases has been included in the report by the German Assocn. for Testing of Technical Materials; a method has, therefore, been devised for the quant. estn. of all the important constituents. The grease (20 g.) is thoroughly shaken with petr. ether (I). A part dissolves, the soaps are suspended in another layer while the grit, lime and sand settle out. This layer is sepd. by decantation and filtration, washed, dried and weighed. The soln. layer and filtrate are refluxed with alkali and the free acid content is detd. Distn. of the soln. leaves the mineral oil originally in the grease as a residue. The soaps are taken up in warm 96% alc. The sol. soaps are retained when the alc. is distd. off. The alc.-insol. soaps, removed by filtration, washed, dried and weighed, are suspended in I. Upon acidification, an inorg. sludge, SiO_2 or H_2SiO_3, settles out. The wt. of the sludge is subtracted from that of the insol. soaps to obtain the true content of the latter. A com. grease so analyzed contained 3.8% SiO_2, signifying that a soap contg. Na_2SiO_3 or a silica-gel residue was used in its manuf. The grit was observed when the grease was rubbed between the fingers. I. M. LEVINE

***l*-Rotatory turpentine from Pinus sylvestris.** V. KRESTINSKIĬ AND L. BAZHENOVA-KOZLOVSKA. *Zhur. Prikladnoĭ Khim.* 3, 681-9(1930).—The turpentine had the following compn.: α-pinene 69%, camphene 5, carene fraction 14.5, phellandrene 1.5, alcs. and sesquiterpenes 10. All components were *l*-rotatory. V. KALICHEVSKY

Composition of turpentines from Pinus sylvestris. V. KRESTINSKII, A. LIVEROVSKII AND V. MALMBERG. *Zhur. Prikladnoĭ Khim.* 3, 533-40(1930); cf. *C. A.* 23, 4564.—Turpentine distd. in the presence of alkalies had the following consts.: d_{20} −0.8660; α_D +13.64°; coeff. of rotatory dispersion α_V/α_J = 1.13 and α_F/α_C = 2.01; n_D^{20} 1.47163; dispersion $n_g - n_c$ = 0.01624. Careful fractionation showed the presence of only 2 hydrocarbons: α-pinene and Δ^3-carene. The latter was *l*-rotatory. The residue from turpentine distn. had a cryst. structure. It was washed with alc. and recrystd. from $CHCl_3$ contg. MeOH. A fairly good yield of small white crystals (m. 51°) was obtained. Similar crystals from the last alc. washings had m. p. 53–4°. Their empirical formula was detd. as $C_{10}H_{20}$. A small quantity of another cryst. substance (m. 90°) was also detected in the alc. washings. The steam-distd. turpentine (d_{20} 0.860, α_D +12.60°; α_V/α_J = 1.087; α_F/α_C = 1.99) contained 68% α-pinene, 19% Δ^3-carene, 3% alcs., 10% sesqui- and poly-terpenes and residue. Differences in chem. compn. of these samples from those previously reported are due to the relative freshness of stumps used in this work. V. KALICHEVSKY

Composition of the alcoholic fraction of turpentines. V. KRESTINSKII, F. SOLODKII AND G. TOLSKII. *Zhur. Prikladnoĭ Khim.* 3, 691-8(1930); cf. *C. A.* 22, 4564.—The alc fractions of turpentines from *Pinus sylvestris* contain α-pinene, Δ^3-carene, *d*-camphor, probably terpinenol-4, a satd. alc., a sesquiterpene (m. 82–3°) and apparently cadinene (m. 114–5°) as well as other components. The work is being continued. V. KALICHEVSKY

Technical method for manufacturing terpinol from Russian turpentines. A. K. SHUMEIKO. *Zhur. Prikladnoĭ Khim.* 3, 541-53(1930).—The use of 65% H_2SO_4 is recommended. The max. permissible temp. is 5°. The yield is approx. the same for H_2SO_4: turpentine ratios of 1:1.5-4.0. Good contact speeds up the reaction. Complete directions are given. V. KALICHEVSKY

The danger of explosion in the overcompression of tar oils by means of compressed air (LEYMANN, WEBER) **24.** Preparation of sulfuretted balsam-like masses from wood tar (PALLAS) **17.** A new viscometer (Schaffer) **1.** Polymerizing olefins (Brit. pat. 331,186) **10.** Apparatus for separating oil from gas (U. S. pat. 1,780,101) **1.** Pressure filter for filtering oil (U. S. pat. 1,780,663) **1.** Destructive hydrogenation (Brit. pat. 331,548) **21.** Cement for cementing off oil wells, etc. (U. S. pat. 1,781,267) **20.** Pressure filter for oil (U. S. pat. 1,780,723) **1.**

Fractionation of petroleum oils. EUGENE H. LESLIE and EDWIN M. BAKER. U. S. 1,780,977, Nov. 11. Oil is introduced into a section of a fractionating column in which ascending vapor comes into intimate contact with descending liquid. Condensed vapor is introduced at the top of the app. and liquid is collected in the sections and liquid products are independently withdrawn from one or more sections. The liquid residue from the fractionating column is distributed over a confined packing zone such as one filled with rings or jackstones to volatilize a portion of the liquid residue and the unvolatilized portion is allowed to pass through another confined packing zone, and steam is injected into the liquid flowing from the packing zones and volatilized vapors thus formed are passed into the bottom of the fractionating column. Various details of app. are described.

Electric apparatus for dehydrating petroleum oils. HAROLD C. EDDY (to Petroleum Rectifying Co. of Calif.). U. S. 1,779,695, Oct. 28. Structural features.

Petroleum still and furnace setting. DAVID S. JACOBUS (to Babcock & Wilcox Co.). U. S. 1,779,434, Oct. 28. Various structural details are described of a still setting comprising superposed drums and a bank of heating tubes.

Fractional condensation of petroleum and other vapors. A. LOSEY, P. GOTTLIEB and L. L. HAUPT. Brit. 331,526, Oct. 10, 1928. Vapors from the distn. of petroleum, oil shale, coal, wood, tar, etc., are passed into a heat engine to develop power and then further passed successively through a condensate sepg. chamber and through turbines and intermediate condensate sepg. chambers further to develop power and sep. fractions of successively higher b. p. An arrangement of app. is described.

Breaking petroleum emulsions of the water-in-oil type. MELVIN DE GROOTE and LOUIS T. MONSON (to Wm. S. Barnickel & Co.). U. S. 1,780,343, Nov. 4. A demulsifying agent is used comprising wood sulfite liquor material and a sulfonic demulsifying material such as a propylated naphthalenesulfonic acid. Cf. *C. A.* **24**, 4145 and following abstr.

Breaking petroleum emulsions of the water-in-oil type. MELVIN DE GROOTE, LOUIS T. MONSON and ARTHUR F. WIRTEL (to Wm. S. Barnickel & Co.). U. S. 1,780,344, Nov. 4. A demulsifying agent is used comprising an amylated aromatic compd. such as an NH_4 amylated aromatic sulfonate characterized by capability of producing an insol. ppt. with a sol. alk. earth salt. U. S. 1,780,345 describes the use of a demulsifying agent contg. a substituted aromatic detergent-forming sulfonic compd. of the type X F R SO_3 Z, in which X is a polycyclic aromatic nucleus, F is a detergent-forming org. residue, R a residue of an alc. contg. less than 12 C atoms and substituted in the aromatic ring, and Z a "H ion equiv." Cf. *C. A.* **24**, 4145 and preceding abstr.

Cracking petroleum oil. ROBERT T. POLLOCK (to Universal Oil Products Co.). U. S. 1,781,128, Nov. 11. Decompn. of the oil is effected in more than 2 successive stages and in each stage at least 3 products are formed: gasoline-like constituents, intermediate products and residual products. The gasoline-like constituents and residual products formed in each stage are removed and in each succeeding stage the cracking of the intermediate products only of the preceding stage is continued. Various details of app. and procedure are described.

Cracking asphaltic or other petroleum residues. J. H. BREGEAT. Brit. 331,531, March 27, 1929. Oils of lower b. p. are obtained from materials such as asphaltic petroleum residua, low-temp. carbonization tars, acid sludges from petroleum refining, waxes and natural asphalts by heating in a retort to 350-460° with continuous agitation, with or without addn. of abrasive material, returning the distillate b. above 300° to the retort and regulating the distn. so that the hourly products comprise 5-14% by wt. of the retort contents. Various details and modifications of procedure are described.

Cracking heavy hydrocarbons. EUGENE A. PRUDHOMME (to Soc. international des procédés Prudhomme (S. I. P. P.). U. S. 1,780,536, Nov. 4. An atomized charge such as a heavy oil is cracked alternately in one of a pair of heated chambers contg. a catalytic purifier such as a metal or "oxymetallic" catalyst and the resulting products are condensed and sepd. from residual gases. The mass of hydrocarbon material to be atomized is heated by returning the heavy fractions of the condensed products to the mass, and the residual gases are employed for atomizing the charge; coke deposited during the cracking is burned in one chamber while the cracking operation is carried out in the other chamber, and the heat thus generated is employed for heating the residual gases. App. is described.

Conversion of heavy hydrocarbons. ADOLPHE A. F. M. SEIGLE. U. S. 1,779,828, Oct. 28. In a method comprising a preheating stage for vaporizing the raw hydrocarbons, a main heating stage with regular and gradual heating of the vapors formed in the preheating stage, these vapors and the gases also produced are successively sub-

mitted to the action of catalyzers such as turnings of Fe, Al, Cu and ferro-Ni, the max. temp. being 500–700° and the pressure being below 1.2 kg. per sq. cm.; the gases and vapors from the heating stage are subjected to successive cooling stages in the first of which the cooling medium used is boiling water at such a superatm. pressure that the sudden drop in the temp. of the gases and vapors through the first cooling stage will be substantially between 250° and 450°. U. S. 1,779,829 describes a generally similar process in which the condensate of each cooling stage from the second stage on is reheated and revaporized and again submitted to the action of the previous cooling stage. App. is described.

Apparatus for cracking hydrocarbons by use of heat and electric discharges. Louis B. Cherry (to C and C Developing Co.). U. S. 1,779,356, Oct. 21. A conduit for the passage of hydrocarbon vapors and gases embodies several reaction tubes connected in series, heating flues arranged longitudinally and exteriorly of the tubes and provided with means for independent temp. control and with means for maintaining high-frequency elec. discharges in the tubes.

Apparatus for fractionating and cracking hydrocarbon oils. L. DeFlorez. Brit. 331,940, April 17, 1929. Numerous details of construction and operation are described.

Cracking hydrocarbon oils. Carbon P. Dubbs (to Universal Oil Products Co.). U. S. 1,779,465, Oct. 28. Untreated oil is brought into contact with cracked oil vapors just following cracking of the latter in the vapor phase; following this, the oil is subjected to a mild cracking temp. in a heating zone and then delivered to a vaporizing zone from which vapors and liquid oil are removed before the cracking operation has proceeded to the extent of forming coke; vapors from the vaporizing zone are subjected to a cracking temp. while in the vapor phase to supply the cracked oil vapors for treating incoming untreated oil. App. is described. Cf. *C. A.* **24**, 3108.

Cracking hydrocarbon oils. C. P. Dubbs. Brit. 331,569, March 5, 1929. In the operation of a cracking app. comprising a heating coil, sepg. zone and dephlegmator, with continuous withdrawal of residual oil, polymerization of residual oil in the sepg. zone is controlled by keeping the level of the oil as low as possible and by regulation both of the rate of withdrawal and dissipation of heat. Numerous details of app. and procedure are described.

Cracking hydrocarbon oils. G. F. Forwood, J. G. Taplay and United Kingdom Oil Co., Ltd. Brit. 332,285, April 18, 1929. Oil to be cracked is passed in vapor phase and under low pressure (suitably 30–40 lbs. per sq. in.), mixed with steam, through a conversion chamber contg. a heated catalyst (suitably at a temp. of 450–650°) consisting of a porous vegetable charcoal impregnated with Na Al silicate. Various details are given of the app. used and method of prepg. the catalyst.

Cracking hydrocarbon oils. Eugene C. Herthel and Edward W. Isom (to Sinclair Refining Co.). U. S. 1,781,390, Nov. 11. Oil is forced from a bulk supply tank, through a heater and back to the supply tank and is maintained at a cracking temp. throughout the cycle; vapors from the bulk supply are passed through a reflux tower and reflux from the latter is pumped into the oil circulating from the bulk supply tank at a point between the main circulating pump and the heater. App. is described. Cf. *C. A.* **24**, 5148.

Fractional distillation of hydrocarbon oils. Claude W. Watson (to Texas Co.). U. S. 1,780,286, Nov. 4. The oil is passed through a battery of series-connected stills provided with fractionating towers in which the oil is exposed to progressively increasing temps.; vapors from the stills are subjected to fractionation in the fractionating towers, and vapors from the first several stills are condensed and collected to form a distillate contg. the more volatile constituents of the oil charge; the charge is divided into a larger and a smaller portion, the smaller portion is introduced as a reflux medium to those fractionating towers corresponding to the stills from which the distillate fractions mentioned are obtained, and the larger portion of the charge is introduced into the first still of the series. Various details of app. are described.

Apparatus for distilling hydrocarbon oils. Harry G. Schnetzler (to Standard Oil Co. of Ind.). U. S. 1,779,918, Oct. 28. For dividing material such as naphtha condensate into definite proportions for partial refluxing, a horizontal weir is provided over which the liquid flows and a plurality of partitions adjacent the weir spaced at predetd. distances divide the flow over the weir; the withdrawal of the divided flow of liquid may be regulated by valved conduits. Various details of the app. are described.

Dehydrating hydrocarbon oils. Wm. L. Palmer (to National Dehydrator Corp.). U. S. 1,781,076, Nov. 11. A relatively rapid short oscillatory motion is imparted to a flowing stream of oil contg. water (suitably by oscillating plates mounted on a shaft) in order to effect demulsification. App. is described.

Desulfurizing hydrocarbon oils. CLARENCE J. FRANKFORTER (to Frankforter Oil Process, Inc.). U. S. 1,780,873, Nov. 4. Liquid hydrocarbon oils and distillates contg. S and S compds. are treated with water gas or other gas contg. H activated by contact with a heated material such as platinized pumice and the materials are subjected to further activation together in contact with heated material such as a Ni-Cr elec. resistance to convert the major portion of the S and S compds. present into volatile sulfides and the latter are sepd. App. is described.

Apparatus for extracting hydrocarbon oils with alcohol. THEODORE A. WERKENTHIN (to Solar Refining Co.). U. S. 1,781,420, Nov. 11. An app. is described adapted for passing heavy petroleum oil into an extracting vessel under automatic control and feeding substantially anhyd. alc. in vapor form to extract the oil; a portion of the vaporized alc. is passed into a condenser employing a cooling medium such as water and the temp. of the cooling medium is automatically controlled so that the alc. vapors will be condensed only at a predetd. temp., the condensed alc. being returned to the extn. vessel. U. S. 1,781,421 relates to an extn. process carried out in this manner in similar app. Cf. *C. A.* **24**, 4146.

Distilling mineral oil. FRANK TINKER (to Sinclair Refining Co.). U. S. 1,779,222, Oct. 21. One stream of raw oil is passed through a fire-heated heating zone into a mixing zone and heated to distn. temp in the heating zone; a hot oil mixt. including this heated raw oil is passed from the mixing zone to a sepg. zone, residuum is discharged from the sepg. zone, vapors are taken off from the sepg. zone and these vapors are partially condensed by heat exchange with an independent stream of the same raw oil, and this heated independent stream of raw oil is introduced into the mixing zone where it merges with the first-mentioned oil stream. An arrangement of app. is described.

Converting mineral oils into products of lower boiling point. HERBERT R. ROWLAND (to C & C Developing Co.). U. S. 1,779,402, Oct. 21. Vapors of the oil are subjected to the action of a high-tension a c discharge of frequency not exceeding 10,000 cycles per sec. at a temp. favorable for conversion of the vapors into products of lower b. p., and the products of lower b. p. are separately recovered. App. is described.

Refining light oil from coal distillation. JOSEPH J. LAWTON (to Semet-Solvay Co.). U. S. 1,779,944, Oct. 28. The crude light oil is washed with H_2SO_4, the resulting acid sludge is sepd. from the washed oil, the oil is treated with NH_3 to neutralize residual acid, and low b. p. constituents are sepd. from the neutralized oil by direct steam distn. in the presence of neutralization liquid, thus breaking up emulsions present and preventing the decompn. and volatilization of any S compds. present in the neutralized oil.

Heat-exchange apparatus suitable for use in oil refining, etc. JOHN P. RATHBUN (to Westinghouse Elec. & Mfg. Co.). U. S. 1,779,890, Oct. 28. Structural features.

Flue-gas-recirculating apparatus for oil-refining shell stills. HARRY A. ATWATER. U. S. 1,779,405, Oct. 28. Structural features.

Furnace for burning acid sludge. FRANK J. MCDEVITT. U. S. 1,780,653, Nov. 4.

Destructive hydrogenation. H. W. STRONG and IMPERIAL CHEMICAL INDUSTRIES, LTD. Brit. 331,816, April 2, 1929. Vapor of higher b. p. oils such as middle oils is passed with H over a catalyst mass of Fe coated with Zn and then over a porous mass of Fe_2O_3 or equiv., such as a product produced by heating Fe_2O_3 in H at 500°. Pressures of at least 20 atm. and temps. of 400° or higher are preferred. Various details of app. and procedure are described.

Destructive hydrogenation. H. G. WATTS and IMPERIAL CHEMICAL INDUSTRIES, LTD. Brit. 331,509, April 2, 1929. "Benzines" produced in destructive hydrogenation are condensed and the gases are simultaneously washed and freed from lower paraffinic hydrocarbons by cooling the products under pressure in intimate contact with the condensed "benzines" (suitably in a packed tower, which, with assocd. app., is described).

Destructive hydrogenation. I. G. FARBENIND. A.-G. Brit. 331,558, Jan. 7, 1929. Distillable materials such as petroleum oils are destructively hydrogenated under a pressure of at least 20 atm. in the presence of a catalyst contg. at least three different constituents, an oxide of group 2 of the periodic system, or of group 3 or a compd. of the latter of suitable character, together with oxides, hydroxides or sulfides of different metals such as Co, Ni and metals of groups 5 and 6. Several examples with details of procedure are given.

Refining "cracked gasoline." EUGENE C. HERTHEL (to Sinclair Refining Co.). U. S. 1,781,388, Nov. 11. In a process comprising passage of the gasoline vapors through an adsorptive catalyst such as fuller's earth where the polymers thus produced

exceed 3% by liquid volume of the refined gasoline product, the raw cracked gasoline vapors are passed through the catalyst and polymerization of undesirable unsatd. components is thus effected without sepn. or discharge of the polymers from the operation, and the total resulting vapor mixt. including the polymers is then passed directly to a rectifying zone and constituents including polymers and of higher b. p. than desired in the gasoline are condensed and light constituents from the condensed polymer mixt. are vaporized in the rectifying zone in a rectifying column (various features of app. being described).

Column and plate apparatus for fractional distillation of gasoline or other materials. WAYNE Z. FRIEND (to Baltimore Gas Engineering Corp.). U. S. 1,780,818, Nov. 4. Structural details.

Tanks for fuels such as gasoline tanks of aircraft. HERMAN T. KRAFT (to Goodyear-Zeppelin Corp.). U. S. 1,779, 397, Oct. 21. A layer of rubber compn. is placed over a frame of open construction and the inner surface of the rubber is coated with a material insol. in hydrocarbons, such as gelatin, leaving the inner surface of the framework (which may be formed of metal bars) directly exposed to the fuel.

Separating greasy and waxy materials from distillates, etc. JOHANN K. PFAFF, KURT BÖTTGER and ADOLF SIEWEKE (to Deutsche Gasolin A.-G.). U. S. 1,779,287, Oct. 21. See Fr. 677,385 (*C. A.* **24**, 3110).

Paraffin. AKTIEBOLAGET SEPARATOR-NOBEL, N. O. BACKLUND and K. G. MALM. Brit. 331,961, April 26, 1929. Paraffin is sepd. from liquid hydrocarbons by chilling, diluting, and centrifuging in a centrifuge arranged for mechanically carrying away the paraffin, as described in Brit. 296,805 (*C. A.* **23**, 2567), and after this the liquid is passed through a centrifuge without a mech. conveyor to sep. further paraffin, the latter centrifuge being run at a higher speed than the first. Various details of app. and operation are described.

Apparatus for heating oils to remove water from them. JAMES J. FEARIS. U. S. 1,781,632, Nov. 11. Various details are described of app. which may be heated by steam and is suitable for the treatment of petroleum.

Apparatus for demulsifying oils and tars containing water by heat, baffling and gravity. FREDERICK H. WAGNER (to Bartlett Hayward Co.). U. S. 1,781,257, Nov. 11. Structural features

Bituminous emulsions. GEORGE S. HAY (to Flintkote Roads, Inc.). U. S. 1,778,760, Oct. 21. An aq. dispersion is formed comprising bitumen-pitch particles as the dispersed phase and water as the continuous phase, and contg. in the external phase substantially less than 10% of water-sol. org. nonelectrolyte such as glycerol or allyl alc. capable of suppressing the freezing point of the emulsion so as to prevent injury to the emulsion due to freezing (although freezing may occur) at temps. below 0°.

Edge filter for oil of motor vehicles. BRITISH TOOL & ENGINEERING CO., LTD., and A. JONES. Brit. 331,815, April 2, 1929. Structural features.

Lubricant. JOHN A. HIGGINS (to Emma Higgins). U. S. 1,780,157, Nov. 4. A composite lubricant which is suitable for use at high or low temps. comprises a mixt. of about 1 lb. of rubber dissolved in gasoline, about 25 gals. of a neutral mineral lubricating oil and about 8 oz. of coconut oil, added to and mixed with about 50 gals. castor oil mixed with about 50 gals. of cottonseed oil.

Lubricant. OTTO C. SCHMIDT. U. S. 1,780,315, Nov. 4. A lubricant suitable for use on roll necks in cold roll-steel mills comprises paraffin wax, petroleum oil and sheep-wool grease. Soda, lime and soapstone may also be added.

Lubricants. FELTON S. DENGLER (to Texas Co.). U. S. 1,781,444, Nov. 11. Lubricants which are suitable for use under high pressures are prepd. by reducing a paraffin base crude petroleum by distn. without substantial decompn. until the residue has a flash test within the range of about 190° to 250°, the residual oil being then immediately brought into contact with a current of air at temps. between about 205° and 270°, in order to effect a desired degree of limited oxidation.

Lubricant suitable for use in drawing and die-pressing. FRANK F. STAMBERG (to Standard Oil Co. of Ind.). U. S. 1,781,607, Nov. 11. Oil such as straw oil is mixed with green acid soap, colloidal clay and water.

Apparatus for deaerating lubricants by vacuum treatment. DRYSDALE & CO., LTD., and J. W. W. DRYSDALE. Brit. 331,950, April 22, 1929. Structural features.

"Chatterless" lubricating oil. THEODORE W. DOELL and EDWIN N. KLEMGARD (to Standard Oil Co. of Calif.). U. S. 1,781,167, Nov. 11. A complex Pb salt of unsatd fatty acids and naphthenic-like acids such as Pb oleate and naphthenate is dissolved in lubricating oil to form a lubricant suitable for use in automobile engines with planetary transmissions.

Reconditioning used lubricating oil. W. D. HARRIS and R. V. AYCOCK. Brit. 331,290, April 10, 1929. See U. S. 1,745,167 (*C. A.* **24**, 1498).

Reconditioning used lubricating oils such as those from internal-combustion engines. J. C. PATRICK. Brit. 331,876, April 10, 1929. After removing water (suitably by settling), the water-free oil is heated and agitated with H_2SO_4, the oil is sepd. from sludge and the volatile constituents are vaporized by heating to a temp. below that at which the oil would be distd. or cracked, an adsorbent such as fuller's earth is added and the supernatant oil is drawn off. CaO or BaO may be added to the fuller's earth.

Purifying used oil such as that from steam turbine lubrication. LEO D. JONES (to Sharples Specialty Co.). U. S. 1,778,831, Oct. 21. Used oil carrying sludge, water-sol. impurities and impurities which are sol. in the oil at higher temps. and which ppt. at temps. to which it is cooled for re-use is treated with water and cooled, and then centrifuged. An arrangement of app. is described.

Filter and electro-magnet device for separating metallic particles from oil used in lubricating internal-combustion engines. ARCHIE M. NIVEN (to Continental Motors Corp.). U. S. 1,778,910, Oct. 21.

Conditioning waste for use as journal-box packing. EDWIN S. PEARCE (to Railway Service and Supply Corp.). U. S. 1,779,010, Oct. 21. Unoiled waste is subjected to a gaseous medium such as heated air and then to a liquid medium such as oil, both of which serve for removing lint. U. S. 1,779,011 describes a process in which treatment with lubricating oil serves to sep. lint.

Reclaiming used journal-box waste. EDWIN S. PEARCE (to American Laundry Machinery Co.). U. S. 1,779,104, Oct. 21. The waste is soaked in a bath of hot oil and centrifuged while still hot. App. is described.

23—CELLULOSE AND PAPER

CARLETON E. CURRAN

The celluloses from different natural sources. NAOHIKO MATSUNAMI. *Chem. News* **141**, 200–1(1930).—See *C. A.* **24**, 5479. E. J. C.

Method for determining the degree of purity of cellulose fibers. M. FREIBERGER, Z. v. VASS AND L. HONIG. *J. Soc. Dyers Colourists* **46**, 111–8(1930).—The present methods of detg. the degree of purity of cellulose fibers are discussed and 2 new quant. methods given. In Method I the material is extd. with boiling caustic soda and this ext. is oxidized with $K_3Fe(CN)_6$ and the excess of the latter back titrated with thiosulfate. The $K_3Fe(CN)_6$ used is termed the ferricyanide no. and the equiv. is termed the O no. For materials with lower ferricyanide nos. Method II is used. In it the material is heated in an open test tube with caustic soda and $K_3Fe(CN)_6$ and the excess of the latter back titrated. It is assumed that oxidation in these methods is limited to the easily sol. reducing compds. present in the modified cellulose. Charts and tables of results and the effect of variations in the process on the results are included. T. G. H.

Old and new conceptions of cellulose constitution and their experimental basis. KURT HESS. *Kolloid-Z.* **53**, 61–75(1930).—H. leans to the conception of cellulose as represented by Meyer and Mark (*C. A.* **23**, 1263) who modify the formula of E. Fischer and B. Tollens in the light of modern data. ARTHUR FLEISCHER

The use of nitrogen tetroxide in the nitration of cellulose. L. A. PINCK. *Ind. Eng. Chem.* **22**, 1241–3(1930).—A method has been developed for the nitration of cellulose with N_2O_4. The factors influencing the degree of nitration have been studied. Sufficient data have been obtained for the prepn. of any of the nitric esters of cellulose used in commerce. PAUL S. BILLINGTON

Action of hypoiodite solution on cellulose preparations. K. HESS, K. DZIENGEL AND H. MAASS. *Ber.* **63B**, 1922–7(1930).—Bergmann and Machemer have recently proposed a method of detg. the av. mol. wt. of cellulose prepns. which is based on the oxidizing action of 0.1 *N* hypoiodite soln. (*C. A.* **24**, 2877). They assume that the I no. (cc. 0.1 *N* I consumed by 1 g. substance) corresponds to the oxidation to CO_2H of the CHO group of the end glucose member of a primary valence chain. A prerequisite of such a method of detg. mol. wts. is the homogeneity of the prepns., and it is by no means certain that the cellulose prepns. in question are homogeneous, since they tenaciously retain cellobiose, among other substances. Moreover, since the prepns. are of unknown constitution, it is difficult to establish a basis for the process and a series of assumptions must be made, the correctness of which it is not easy to test. The reac-

tion with cellulose prepns., unlike that with sugars, which B. and M. used for comparison, is heterogeneous, and the I nos. found represent mol. wts. only on the assumption that the undissolved or colloidally dispersed phase reacts molecularly with the reagent according to the stoichiometric relation $RCHO + O = RCO_2H$. Weltzien and Nakamura found that the Cu no. cannot be used in studies of the constitution of cellulose prepns. because it depends on the degree of dispersion of the cellulose in the Cu soln. This led the authors to test the applicability of the I no. method. In the first place, with a biosan acetate m. 260–70°, $[\alpha]_D^{20}$ —16.0°, AcOH content 62.32% sapond. in the usual way with 2 *N* NaOH in alc. (ash content of the sapon. product 0.1%), it was found that the I no. increased from 3.73 after the 20 min. prescribed by B. and M. to 6.94 after 16 hrs. Again, if the sediment is carefully washed with H_2O after the titration and again treated with the alk. I soln. it once more uses up I, and this is also true if the sediment, after washing, is dried in a high vacuum over P_2O_5 at 100° before being again titrated, although in this case the amount of I consumed is smaller. To test the applicability of the I no. method advantage was also taken of the fact that the less pure carbohydrate prepns. remain dissolved or nearly dissolved in dil. NaOH if they are first dissolved in more concd. NaOH and then correspondingly dild. An acetate which in 0.5 *N* NaOH gave an I no. of 5.74 yielded a value of 7.33 when dissolved in half the same vol. of *N* NaOH and then dild. with an equal vol. of H_2O, and the carbohydrate recovered from the latter expt. again consumed I when once more treated with the reagent. C. A. R.

Effect of concentrated sulfuric acid on cellulose. TETSUKICHI KATAYAMA AND M. SENGOKU. *Repl. Osaka Ind. Research Lab., Japan* **11**, No. 7(1930).—The effect of various concns. of H_2SO_4 upon the phys. and chem. properties of cellulose has been studied. F. I. NAKAMURA

The saccharification of cellulose according to Scholler. E. GUNDERMANN. *Centr. Zuckerind.* **38**, 835–6(1930).—A discussion. J. F. LEETE

Existence of the cellobiose residue in cellulose. W. N. HAWORTH, E. L. HIRST AND H. A. THOMAS. *Nature* **126**, 438(1930).—Under mild conditions of treatment at low temps., fully methylated methylcellobiose undergoes cleavage to give a diacetylhexamethylcellobiose, which is readily transformed into cryst. heptamethyl-β-methylcellobioside. The exptl. conditions under which this deriv. of cellobiose is isolated preclude its occurrence as a reversion product of the reaction. Moreover, the yield of the cryst. β-cellobioside is equal to that of cellobiose octaacetate obtained by the direct acetolysis of cellulose. These facts increase the evidence for the view that cellobiose is preformed in cellulose. LOUISE KELLY

Cellulose acetate and acetate rayon from wood pulp. FRITZ OHL. *Kunstseide* **12**, 189–91(1930); *Jentgen's Rayon Review* **2**, 224–6(1930).—Expts. are described on the prepn. of cellulose acetate from wood pulp (I) and the spinning of rayon therefrom. Although the results are of a preliminary nature, they show that the acetylation of I is possible. The properties of the pulp required for this purpose are different from those required for the manuf. of viscose and moreover the properties of the rayon may be favorably affected by suitable spinning conditions. I which was used in the acetylation was first freed from tar and fat by treatment with a mixt. of equal parts of EtOH and CCl_4, from pentosans with hot 6% NaOH soln. and finally with 17.5% NaOH soln. O. points out that the qualities of cotton that are important from the standpoint of acetate rayon are difficult to control and that, if only a correct procedure is found for the acetylation, it should not be difficult to produce consistently a suitable cellulose of standard quality from I and at the same time gain chem. and economic advantages. FREDERICK C. HAHN

Strained viscose threads—a chemical test and its mechanism. A. J. HALL. *Rayon Record* **4**, 1099–101(1930).—H.'s belief is that the residual S is made more accessible by the stretching for reaction with the alk. $AgNO_3$. A. K. JOHNSON

Rayon—today and tomorrow. ROBERT E. HUSSEY AND PHILIP C. SCHERER, JR. *J. Chem. Education* **7**, 2543–70(1930). E. H.

Rayon of fine denier. A HERZOG. *Kunstseide* **12**, 170–3, 221–2(1930); *Jentgen's Rayon Review* **2**, 202–5, 238–40(1930).—On the av., cuprammonium rayon (I) filaments are the finest in cross-section, but several of the nitro rayons (II) examd. were finer than I. Fluctuations in the titers of fibers were the greatest with II and smallest with cellulose rayon (III), I and viscose rayon (IV) being intermediate in this regard. Variations in the titer are greater than the degree of irregularity in the diam. of single filaments As regards fullness of cross-section the following order exists: III > IV > II > I. A comparison is given of the various dimensions of various artificial and natural fibers. FREDERICK C. HAHN

Spinning machine for fine rayon. E. SCHURZ. *Kunstseide* **12**, 234–8; *Jentgen's Rayon Review* **2**, 205–9(1930).—A review and discussion of the mechanism of spinning and a description of the construction of a spinning machine for fine rayon. F. C. H.

Progress report on waste sulfite liquor. GUY C. HOWARD. *Ind. Eng. Chem.* **22**, 1184–5(1930).—The process consists of a fractional pptn. by a lime reagent by which the liquor is sepd. into an inorg. product for use in making fresh liquor, an org. product for boiler fuel, and a tail-liquor effluent which is discharged into the sewer. P. S. B.

"Bontaka" fiber from Madagascar—its value as a paper-making material (HEIM DE BALSAC, *et al.*) **25.** Röntgen rays in fiber research (MARK) **25.** The physical chemistry of starch and bread making. IV. Paste formation in starch and mercerization of cellulose (KATZ, DERKSEN) **2.** Solvent recovery by absorption in *m*-cresol, silica gel [in the rayon industry] and activated C (OHL) **13.** Dialyzing and pervaporating membranes (U. S. pat. 1,779,942) **18.** Cr- or Cr-alloy-plating of paper-making apparatus (Brit. pat. 331,196) **9.** Impregnating cellulosic material with synthetic resins (Brit. pat. 331,851) **26.**

α-Cellulose. LAURI I. L. DURCHMAN. U. S. 1,780,347, Nov. 4. Wood chips are cooked with black and white sulfate liquor with the addn. of Na_2SO_3 in the proportion of 0.8–1.0% based on the air-dry wt. of the wood chips, and the cooking is continued for a longer time than is usual in the sulfate process, thus increasing the α-cellulose content, followed by treatment of the pulp with a soln. contg. 2–6% NaOH and 2–6% NaCl.

Cellulose acetocrotonates. SOC. DES USINES CHIMIQUES RHONE-POULENC. Brit. 331,260, Dec. 31, 1928. Cellulose or a "near transformation product" is treated with crotonic anhydride in the presence of HOAc and a catalyst with or without a solvent or diluent, to produce mixed esters of various compns. and properties. Various details and examples are given. Cf. *C. A.* **24**, 5306.

Fibrous sheet material from cellulose partially converted into xanthate. JAMES C PEABODY and ALFRED BROWN (to Frank B. Hopewell, trustee). U. S. 1,781,668, Nov. 11. Fibrous material such as wood-pulp fiber is incompletely converted into cellulose xanthate to convert the fibers into a swollen condition and render them gelatinous and insol. in water or dil. NaOH soln., and the material may be formed into sheets as in paper manuf.

Cellulose esters. FRANZ BECKER, HEINRICH HEIMANN and ALFONS BAYERL (to I. G. Farbenind. A.-G.). U. S. 1,780,151, Nov. 4. A cellulosic material such as cotton is treated with HNO_3 vapor, and then treated with an esterifying agent such as Ac_2O, HOAc and H_2SO_4. The preliminary treatment with HNO_3 serves to facilitate production of cellulose esters of a very low viscosity.

Films of cellulose esters and ethers, etc. G. FRENKEL. Brit. 332,255, Feb. 18, 1929. The first layer of a composite film is made so thin (suitably about 0.01 mm) as to require a very short time for drying and after being stripped from its support is used as a carrier band for addnl. layers, which may comprise various cellulose esters or ethers, shellac, resin, etc.

Threads and filaments of cellulose acetate or other cellulose organic esters or ethers. BRITISH CELANESE, LTD., H. DREYFUS and W. I. TAYLOR. Brit. 331,229, Dec. 20, 1928. Products of increased strength are produced, in a process involving use of a counter-current of evapg. medium in the spinning cell, by applying a uniform controlled stretch where the product still contains residual solvent and is in a semi solid or plastic condition (preferably while contg. 20–40% solvent). App. is described.

Cellulose ether esters. I. G. FARBENIND. A.-G. Brit. 331,903, March 28, 1929. A cellulose ether contg. 0.5–1.5 alkyl groups (calcd. on the mol. $C_6H_{10}O_5$) and comprising also a small proportion of benzylcellulose is acetylated with Ac_2O in the presence of HOAc as solvent together with a small quantity of a customary catalyst such as H_2SO_4. Instead of the benzylcellulose, a substituted benzyl deriv. such as a nitro- or bromo-benzyl cellulose may be present. "Monoethyl-1½-acetylcellulose" contg. about 1% of benzyl, obtained by this method, is sol. in acetone, acetic ester and chlorinated hydrocarbons and suitable for the manuf. of films and threads.

Cellulose ethers. MAX HARTMANN (to Soc. anon. pour l'ind. chim. à Bâle). U. S. 1,777,970, Oct. 7. Alkali cellulose is caused to react with an aliphatic monohaloalkylamine such as chloroethyldiethylamine. Numerous examples are given.

Viscose. SAMUEL WEIN (one-half to Nathan Raff). U. S. 1,779,521, Oct. 28. After forming a sol. cellulose xanthogenate, S compds. are removed from the product

before pptg. the viscose, as by treatment to form insol. compds. contg. Zn. Various details of procedure are described.

Treating freshly spun viscose fiber cakes. LEWIS A. PALEY. U. S. 1,779,103, Oct. 21. Sol. impurities are washed from the cakes with water and they are then treated with a hot soln. contg. Na_2CO_3 in order to remove resins, org. S compds., etc. App. is described.

Artificial silk from viscose. THEODOOR KOCH. U. S. 1,781,018, Nov. 11. Viscose is used contg. PhCl which serves to reduce the luster of the product. $C_6H_4Cl_2$ may also be used.

Artificial silk, etc. BRITISH CELANESE, LTD., and G. H. ELLIS. Brit. 332,187, Jan. 5, 1929. Various products comprising cellulose esters or ethers are incorporated, during or after their production, with a solvent or gelling agent and subjected to a treatment with substantially dry steam to improve their resistance to the delustering action of hot aq. liquids or steam. Numerous details and examples are given.

Centrifugal box, etc., for spinning artificial silk in practically continuous operation. WM. P. DREAPER. U. S. 1,780,346, Nov. 4. Structural features.

Treating black liquor from soda and sulfate pulp manufacture. EDWARD G. GOODELL. U. S. 1,779,535, Oct. 28. Partially concd. black liquor is sprayed into heated gaseous medium to form a dried powder of substantially the same org. content as the liquor, the powder is burned in a sep. operation and the heat developed is utilized in dehydration of further quantities of the liquor. App. is described.

Treating black liquor from pulp manufacture. EDWARD G. GOODELL. U. S. 1,779,768, Oct. 28. A solid product is prepd. consisting of compressed solid constituents of black liquor substantially unchanged in chem. compn. and suitable for transport.

Treating black liquor from pulp manufacture. LINN BRADLEY and EDWARD P. MCKEEFE (to Bradley-McKeefe Corp.). U. S. 1,779,226, Oct. 21. Black liquor from pulp manuf. with use of NaOH as cooking liquor is sulfited with $NaHSO_3$ to form Na_2SO_3 and the sulfited liquor is incompletely causticized, to produce a soln. contg. both NaOH and Na_2SO_3 and which may be used for further wood digestion. NaOAc may be recovered by concn. and crystn. Cf. *C. A.* **24**, 4158.

Dehydrating black liquor from pulp manufacture. EDWARD G. GOODELL. U. S. 1,779,536, Oct. 28. A dried black liquor product and concd. black liquor in finely divided form are heated and the resulting volatile gases are burned so as to heat a steam generator; hot gaseous products of combustion, in a sep. operation, are passed into contact with concd. black liquor in finely divided form substantially to dehydrate the black liquor without substantial change in its org. content and without substantially satg. the gaseous medium, the dehydrated black liquor is recovered as a finely divided practically moisture-free powder, and the unsatd. gaseous medium is passed into contact with relatively unconcd. black liquor to effect its concn. and the powder and a portion of the concd. black liquor are supplied for the first-mentioned heating step. An arrangement of app. is described.

Regenerating black liquor from pulp manufacture. EDWARD G. GOODELL. U. S. 1,779,537, Oct. 28. A portion of black liquor is subjected to spray burning under oxidizing conditions in a zone closely above and near the surface of a bed composed of the solid products of combustion of the black liquor and spray-dried black liquor solids when introduced as such in admixture with Na_2SO_4 (the black liquor solids when introduced being substantially dry and of high org. content) and heat of combustion from the org. material present serves for driving off water from the sprayed black liquor to permit its combustion without use of other fuel, while the org. matter present under the conditions obtaining serves for reduction of sulfate present to sulfide. An arrangement of app. is described.

Cellulose pulp. HARRY L. HORN (to Bagasse Development, Inc.). U. S. 1,780,750, Nov. 4. Materials such as bagasse, straws, grasses, wood or cornstalks are simultaneously cooked, beaten and electrically and chemically treated to prepare a pulp suitable for *paper* or *rayon manuf.*

Cellulose pulp. HARRY L. HORN (to Bagasse Development, Inc.). U. S. 1,779,971, Oct. 28. Material such as bagasse, straws, grasses, wood or cornstalks is digested with water and steam and treated with an elec. current in an app. which is described.

Digestion of fibrous materials such as wood chips. THOMAS L. DUNBAR. U. S. 1,781,447, Nov. 11. In digestions such as the treatment of wood chips with sulfite liquor, side relief liquor is caused to flow from a digester undergoing cooking directly into a digester undergoing filling, and the side relief liquor is utilized for packing the chips evenly in the digester. An arrangement of app. is described.

Wood fiber. GEORGE A. RICHTER (to Brown Co.). U. S. 1,780,539, Nov. 4.

Previously liberated wood fiber of non-coniferous origin such as that from beech or birch is digested at about room temp. in a soln. of alk. compds. such as NaOH soln. in order to improve the softness, tear resistance and suitability of the material for use in *rayon manuf.*

Wood pulp high in α-cellulose. LAURI I. L. DURCHMAN. U. S. 1,781,449, Nov. 11. In order to render water-sol. incrusting substances in chemical wood pulp such as that obtained by the sulfate or soda process, the pulp is treated for 4 to 6 hrs. at 20 to 60 lbs. pressure with a soln. contg. 2–5% NaOH and 1–3% Na_2SO_3.

Bleaching wood pulp. GEORGE A. RICHTER and MILTON O. SCHUR (to Brown Co.). U. S. 1,780,943, Nov. 11. Unbleached sulfite pulp is treated with Cl water and then bleached in a bleach liquor maintained distinctly alk. throughout the bleaching, such as in hypochlorite soln. contg. NaOH and contg. sufficient "bleach" to whiten the pulp.

High-speed rotary-disk mill for producing wood pulp, etc. BAUER BROS. CO. Brit. 331,567, March 5, 1929. Structural features.

Sulfite pulp. GEORGE A. RICHTER (to Brown Co.). U. S. 1,780,842, Nov. 4. Raw cellulosic materials such as wood chips are heated under pressure with a soln. comprising sulfurous acid and $(NH_4)_2SO_4$ and which may contain other NH_4 and Na salts.

Sulfite paper pulp. ROBERT B. WOLF. U. S. 1,780,638, Nov. 4. In the recovery of acid in the sulfite-pulp process, a const. pressure is maintained in the relief line from the digester, the gases and liquids are cooled and are then discharged from the relief line into an acid absorbing medium. App. is described.

Beater for paper pulp. ALBERT J. ALLISON (to Simonds Worden White Co.). U. S. 1,778,710, Oct. 21. Structural features.

Paper-pulp beater. WALTER N. SHERWOOD. U. S. 1,780,845, Nov. 4. Structural features.

Storage tank, with agitating pump, etc., for liquids such as paper pulp. JOSEPH E. BOND. U. S. 1,780,166, Nov. 4. Structural features.

Pulp beating or refining "engines" of the Jordan or similar type. T. D. NUTTALL and BENTLEY & JACKSON, LTD. Brit. 331,992, May 21, 1929. Structural features.

Paper-making apparatus. EDWARD J. CROWSON. U. S. 1,779,087, Oct. 21. Structural features.

Paper-making apparatus. W. H. MILLSPAUGH. Brit. 332,125, Sept. 14, 1929. Structural features.

Suction cylinders for paper-making apparatus. H. BANNING. Brit. 332,170, Jan. 24, 1929. Structural features.

Composition for waterproofing paper. CHARLES S. SHELTON. U. S. 1,778,964 Oct. 21. ZnO 12, Pb oxide 3, dammar gum 5 and a mixt. of benzol and petroleum-ether about 82 parts.

Paper carrying ornamental or protective substances, etc. I. G. FARBENIND. A.-G Brit. 331,707, July 22, 1929. Coloring or loading materials, suspensions of fibers, etc., for security paper or the like, are applied (by feed pipes of an app. which is described) to paper pulp at a place on the wire cloth of the paper making app. at which no matting of the pulp has taken place.

Apparatus for continuous drying of webs such as coated paper. CARLE J. MERRILL. U. S. 1,779,611, Oct. 28. Structural features.

Coated paper. WM. W. MCLAURIN. U. S. 1,780,793, Nov. 4. The greater part of the surface of one side of paper is coated with a relatively hard non-adhesive material such as a mixt. of clay, blanc fixe, satin white, coloring and sizing which facilitates printing, and an adjacent portion of the surface is coated with a softer non-adhesive material such as a similar mixt. contg. also glycerol or glucose which facilitates folding. App. for coating is described.

Coated paper. CHAMPION COATED PAPER CO. Brit. 331,578, April 5, 1929. In the prepn. of a coated paper suitable for book and magazine printing, a coating mixt. in a plastic condition (suitably formed from clay 200 lbs. and 15 gals. of a soln. of casein 1.5 lbs. per gal. of ammonia water, made up to a total of 30 gals., together with 0.5 gal. of water-soap mixt. contg. 20% of NH_4 stearate) is applied to the surface of the paper and is partly or completely hardened on the surface of the paper in contact with a polished Cr surface or other suitable material to give a smooth finish to the coating on the paper. Various details of different materials which may be used are given.

Colored or tinted parchment paper. ROBERT I. COWEN. U. S. 1,780,616, Nov. 4. The formed paper is passed through an acid bath in which is dissolved a dye and the

paper is then passed through a water bath to wash out acid present in the paper. Several examples are given.

Marbling paper and similar processes. G. M. BROWN. Brit. 332,190, Feb. 15, 1929. In marbling paper or in other similar operations, the material traverses past a fixed station over a trough contg. a liquid medium, such as water or a soln. of Carragheen moss, on which a film of pigment, varnish or lacquer (or a mixt. of these of different colors) is floated so that successive portions of the length of the material come into contact with the liquid and take up coating substances. App. is described and various examples given of the substances used for coating.

Marking carbon paper. HAROLD W. A. DIXON (to Columbia Ribbon & Carbon Mfg. Co.). U. S. 1,780,007, Oct. 28. The desired mark is applied to the supporting paper or tissue in an alkali soln. such as an alc. soln. of NaOH or KOH and the paper or tissue is thereafter coated with carbon ink.

Rubberized paper. ERNEST HOPKINSON (to Mechanical Rubber Co.). U. S. 1,779,772, Oct. 28. After removing moisture from a web of paper pulp, a top size is applied contg. dispersed rubber, and the web is dried to form a sheet.

24—EXPLOSIVES AND EXPLOSIONS

CHARLES E. MUNROE

A new method for the preparation of tetryl. LOUIS DESVERGNES. *Chimie & industrie* (Paris) **24**, 785–93(1930).—Tetryl has heretofore been made by nitration of dimethylaniline. D. obtains it by nitration of monomethylaniline. An account is given of several methods of making the monomethylaniline of its step-by-step nitration, and of the several products obtained. CHAS. E. MUNROE

Determination of the explosive limits of gases and gas mixtures. H. LÖFFLER. *Brennstoff-Chem.* **11**, 145–6(1930).—A *micro-gas calorimeter* is described, consisting of a vacuum-jacketted glass explosion sphere contg. the thermometer bulb and the spark-gap of a flashlight-cell operated induction coil using an A-filled indicator tube. Capillary tubing with suitable stopcocks connects the sphere with a calibrated water-jacketed buret, Hg leveling bottle and CaO tube with porous glass filters. Less than 10 cc. of gas is required for calorimetric analysis with an error not greater than 0.33%. Explosive limits of gas-air, gas-O_2 and complete combustion mixts., CO_2 content of gases before and after combustion, and measurement of pressure reductions due to condensation of H_2O formed can be detd. A schematic diagram of the app. is given together with graphical data showing the progression of explosive limits of the gas evolved from a Fischer-Schrader coal-assay retort. F. W. JUNG

The danger of explosion in the overcompression of tar oils by means of compressed air. LEYMANN AND H. WEBER. *Zentr. Gewerbehyg. Unfallverh.* **17**, 134–9(1930); *Chimie & industrie* **24**, 587(1930).—The causes of these explosions are as yet but little known; they are ascribed either to the evolution of heat which causes decompn. of the lubricating oil, or to the fact that the Fe sulfide is heated to redness. In certain cases, however, absence of Fe sulfide was noted. In 3 such cases studied by L. and W. the preponderating factor was really Fe sulfide. In 1 case the real cause of the explosion lay in the introduction of water in the boiler; this sudden introduction of water can be prevented by the use of water separators. These explosions can be prevented by using N or some other gas contg. no readily exchangeable O for compressing the oil, or by compressing it by means of a pump instead of a gas. To avoid the formation of Fe sulfide as much as possible, the app. can be Pb-lined; Fe sulfide can also be eliminated from the washing oils by centrifuging and by treating with the min. quantity of Pb oxide. Attempts were also made to decrease the heating to redness of the Fe sulfide by the use of liquid paraffin or other very adherent oil with high b. p. A. PAPINEAU-COUTURE

Report on the causes and consequences of an explosion at Lyme Colliery, Haydock, England. F. H. WYNNE. Mines Dept. H. M. Stationery Office, London, 1930, 23 pp.—An excellent description of a mine explosion due to fire damp set free and ignited by a blast in the coal. It contains a verbatim record of an eye witness to the firing of the shot who survived the accident which is a most extraordinary event. CHARLES E. MUNROE

Sea batteries for firing submarine mines (Brit. pat. 332,265) **4.** Electrodes for sea batteries for firing explosive mines (Brit. pat. 332,233) **4.**

Liquid oxygen explosives. HERBERT C. BUGBIRD. U. S. 1,779,530, Oct. 28. Carbonized lignin residues are leached substantially to free them from alk. and water-sol. substances and the residue is used as an absorbent for liquid O to form an explosive.

Liquid oxygen explosives. HERBERT C. BUGBIRD. U. S. 1,781,214, Nov. 11. In prepg. an absorbent for liquid O, leached carbonized lignin residues are treated with a void-filling material such as carbon black.

Priming composition for explosives. JOSEPH D. MCNUTT (to Winchester Repeating Arms Co.). U. S. 1,779,820, Oct. 28. PbO_2 20–40, $Ba(NO_3)_2$ 3–10, Hg fulminate 30–45 and pentaerythritol tetranitrate 3–15%. U. S. 1,779,821 specifies $Ba(NO_3)_2$ over 40, Hg fulminate about 35, a Pb thiocyanate about 16, $BaCO_3$ 2 and charcoal 2%. Cf. following abstr.

Priming mixture for explosives. JOSEPH D. MCNUTT (to Winchester Repeating Arms Co.). U. S. 1,779,851, Oct. 28. Hg fulminate (contg. 16% water) 475, $Ba(NO_3)_2$ 240, Sb sulfide 255, trinitrotoluene 30 and diphenylamine 0.5–2 parts. Cf. *C. A.* **24**, 5160–1 and preceding abstr.

Gelignite and gelatin dynamite. ROY L. HILL (to Atlas Powder Co.). U. S. 1,778,718, Oct. 21. Pelleted alkali metal nitrate is used as an ingredient.

Smokeless powder. FRANCIS I. DUPONT (to U. S. F. Powder Co.). U. S. 1,780,911, Nov. 11. A colloidal nitrocellulose propellant powder is formed which contains a substance of water-sol. but non-solvent character such as glycerol which serves to stabilize the moisture content.

Blasting cartridges containing solid carbon dioxide and heating and firing devices. D. HODGE. Brit. 332,196, April 11, 1929. Structural features.

Coating cartridges with ceresin or other hard waxy materials. JOHN D. PEDERSEN. U. S. 1,780,566, Nov. 4. Preheated metal cartridges are passed through a bath of a soln. of the coating material and thence through a drying chamber.

Hand grenades. R. OSTERMEYER. Brit. 331,804, Jan. 25, 1929. A hand grenade fired by a slow-time fuse carries an auxiliary charge for generating an irritant such as tear gas, which is ignited before the bursting charge (with the intent of preventing an enemy from picking up the grenade and throwing it back).

25—DYES AND TEXTILE CHEMISTRY

L. A. OLNEY

Interesting sources of natural dyestuffs. C. D. MELL. *Textile Colorist* **52**, 460–3, 535, 538–9, 551, 603–5(1930); cf. *C. A.* **24**, 4935.—The color changes in the fruit of the pica pica, which is a member of the Sterculiaceae family, are described. The chem. nature of these coloring substances is not known. The following are discussed as possible sources of natural dyestuffs: the several species of the North American walnuts for brown dyes; the eucalyptus for dyes and tannin; the *Cordia myxa* of India for a green dye; the European larch for tannins and dye; red sandalwood for a red dye; the *Carapa* species for tannin and dyes; the lignum vitae trees for blue and green dyes; the teak tree for a yellow dye; the mangrove swamps of the Philippine Islands for tannin; the bark of the *Soymida* of India for dyes and tannins. R. K. WORNER

Should the dyestuffs industry seek new dyes? P. J. SISLEY, JR. *Tiba* **8**, 1034, 1045, 1169–73(1930).—A brief review of the various types of dyeing, discussing the dyes that are still wanting or those that should be replaced by others better suited for the purpose. The dyeing of wool, cotton, silk, viscose rayon, acetate rayon and mixed fabrics is treated. A. PAPINEAU-COUTURE

Newer dyes for acetate rayon. GEORG RUDOLPH. *Kunstseide* **12**, 198–9; *Jentgen's Rayon Review* **2**, 216–7(1930).—A discussion of the dyeing properties of the Celliton dyes. FREDERICK C. HAHN

Dyestuffs for rayon—progress of British dye industry. ANON. *Rayon Record* **4**, No. 20, 1049–53(1930).—A résumé based on a report of the British Dyestuffs Industry Development Comm. Numerous British patent no. references are given. A. K. J.

Dyes and textiles in Britain, 1930. JAMES MORTON. *Chemistry and Industry* **49**, 818–26(1930). E. H.

Indigo. KENNETH MACKENZIE. *Dyestuffs* **31**, 33–8(1930).—The properties and application of indigo are given. CHAS. E. MULLIN

Note upon the coupling of diazonium compounds with 2-methoxy-3-naphthoic acid. G. B. JAMBUSERWALA AND F. A. MASON. *J. Soc. Dyers Colourists* **46**, 339–41(1930).—

Diazonium salts will couple with the alkyl ethers of phenolic substances in glacial acetic acid soln., the product being usually a mixt. of the methoxy and hydroxy dyestuff. MILTON HARRIS

Rapid fast colors in the printing of textiles. H. GÜRTLER. *Tiba* **8**, 1233–9(1930).—An outline of the possible applications of Fast Rapid Colors in the printing of textiles, describing the technic of their use under various conditions. A. P.-C.

Color standardization will not impair branding in color. WALDON FAWCETT. *Am. Dyestuff Reptr.* **19**, 684–6(1930).—Mass color, that is, color that envelops substantially the whole of an article of commerce, cannot be registered in the Patent Office. However, it is common practice to register a relatively narrow cap, ring or band of color. MILTON HARRIS

Patent law and the dyer. C. HOLLINS. *J. Soc. Dyers Colourists* **46**, 333–7(1930).—The advantages and disadvantages of patenting a dye or dyeing process are given. MILTON HARRIS

Matching colors by machinery. J. F. SPRINGER. *Textile Colorist* **52**, 466–70 (1930).—A description and discussion of the "Colorscope," recently developed by H. H. Sheldon (*C. A.* **24**, 5596) and W. A. Schneider. R. K. WORNER

Modern practices in dyeing, bleaching and finishing. M. A. GOLRICK. *Cotton* **94**, 1013–6, 1217–20(1930). R. K. WORNER

Some bad dyeing and its causes. NOEL D. WHITE. *Textile Colorist* **52**, 452–3, 486(1930).—Examples are cited of poor dyeing due to hard water, iron in the water, impurities in the water not removed by filtering system, and incomplete removal of soap. R. K. WORNER

Sulfur color dyeing. E. P. DAVIDSON. *Proc. Am. Assoc. Textile Chem. Colorists* 1930, 249–52; *Am. Dyestuff Reptr.* **19**, 709–12(1930).—S dyes are decidedly sensitive to variations in temp., vol. and duration of dyeing. Goods or yarn should be boiled in soda ash or caustic soda and sulfonated castor oil for cleansing. S color dyeings may be oxidized by air, Na perborate or a mixt. of Na dichromate and acetic acid. The most important operation is washing after dyeing. Washing in 1–2% of Na acetate will prevent tendering. MILTON HARRIS

Dyeing of acetate rayon. HERBERT BRANDENBURGER. *Kunstseide* **12**, 173–7, 223–8(1930); cf. *C. A.* **24**, 1985.—A discussion of acetate rayon dyes from the standpoint of fastness to water and washing, and to light. Dyes produced by diazotization appear to be the best in regard to fastness to water and washing, suspension dyes (I) and water-sol. dyes (II) being inferior and almost of like value. From the standpoint of light fastness, however, I is the best, II being next. FREDERICK C. HAHN

Dyeing of acetate rayon. HERBERT BRANDENBURGER. *Jentgen's Rayon Review* **2**, 209–16, 251–4(1930).—See *C. A.* **23**, 4575. FREDERICK C. HAHN

The function of electrolytes in the dyeing of cotton by means of substantive dyes. P. LIVET. *Tiba* **8**, 263–73, 391–7, 527–33, 651–63, 775–87, 907–17, 1023–9, 1155–9 (1930).—The 1st part of the article is devoted to a review of the present status of our knowledge of the constitution of cotton cellulose and of the various published works which gives an insight into the nature of solns. of substantive dyes; the 2nd part is devoted to personal exptl. results. *Modifications undergone by the cotton fiber during dyeing.*—The effect of temp. was not studied because, at the present time, there is no satisfactory method available for the purpose. By Meunier and Rey's method for the investigation of swelling (centrifuging under given conditions, weighing, drying and weighing again), it was found that 0.1–1.0 *N* $Ca(CNS)_2$ and NH_4CNS at atm. temp. reduced the swelling slightly as compared with that produced by distd. H_2O; Na_2CO_3 gave similar results, both alone and in the presence of varying quantities of NaCl. Wetting agents ("Nekal," at a concn. of 0.02%) appreciably reduced the swelling, particularly in the presence of NaCl. By analogy from the behavior of gelatin gels, it is concluded that the permeability of cotton toward diffusible ions and mols. and the rate of diffusion of the latter increase with the degree of swelling of the cotton. *Method for the detn. of substantive dyes in soln.*—The method adopted consists essentially in titrating with $TiCl_3$. *An app.* is described by which the various solns. (including the indicator) are kept in an atm. of CO_2 and the titration is carried out at the b. p. in an atm. of CO_2. Dyes which are completely decolorized by $TiCl_3$ can be titrated directly, as described by English (*C. A.* **14**, 3794) and serve as indicator. If the dye is not completely decolorized by reduction with $TiCl_3$, an excess of the latter is added and the excess titrated with ferric alum, a 0.1% soln. of methylene blue which has been exactly decolorized with $TiCl_3$ being used as indicator. The indirect method is preferable to the direct, particularly with dye baths contg. reduction products of the dyes having

undergone prolonged heating in the presence of salts in the course of the dyeing process. The method is fairly rapid, as 8–12 detns. can be carried out in 1 hr. *Action of electrolytes on soln. of substantive dyes in the cold and at boiling temp.*—Comparison of the pptg. action of NaCl, NaOAc and Na_2SO_4 on Congo red and benzoazurine G showed that, for equal normalities, AcONa had the greatest pptg. power, followed in order by NaCl and Na_2SO_4. The inactivity of Na_2SO_4, particularly towards Congo red, is remarkable and is contrary to the theory of Biltz (Biltz and von Vegesack, *C. A.* **4**, 3038), according to which the pptg. power of an electrolyte should increase with its degree of dissocn. Na_2CO_3 was found to have a pptg. power considerably greater than that of Na_2SO_4 but slightly less than that of NaCl, which also contradicts Biltz' theory, as Na_2CO_3 is less dissocd. than Na_2SO_4. NaOH was not found to have any greater protective or dispersive power than Na_2CO_3. Though it might seem logical to admit that those dyes which have the smaller particles and diffuse more rapidly are less sensitive to the action of electrolytes, expts. with chrysophenine (mol. wt. 680, diffuses very rapidly), diamine blue 2B (mol. wt. 916, diffuses with medium rapidity) and Congo red (mol. wt. 696, does not diffuse appreciably) on the one hand, and with NaCl, Na_2SO_4 and NaOAc on the other, showed that this is not the case, and that the action of the electrolytes in any particular case depends on the nature of the dye. *Effect of the progressive addn. of electrolytes during the dyeing of cotton: effect of the nature of the water used for washing.*—The quantity of dye fixed with increasing quantities of electrolyte increases, rapidly at first, and then more and more slowly, finally reaching a max. at fairly high concns. of electrolyte. All the electrolytes studied had about the same effect on the amt. of dye fixed when added during the dyeing at the same mol. concn. In spite of its alky , Na_2CO_3 does not behave differently from the other salts and does not modify the rate of fixation of the dye on the fiber. Variations, due to electrolytes, in the quantities of the dyes which are fixed on the cotton are caused by the effect of the salts on the size of the particles of dye. It is curious to note that the differences observed in the effect of different electrolytes on solns. of substantive dyes, which effect is certainly due to variations in the size of the dye particles, are not felt in the course of the dyeing. The nature of the water used for washing after dyeing affects the quantity of dye fixed. When Rhone water is used, more dye is fixed than when distd. water is used, the difference being due to the Ca salts present in the natural water. The amt. of dye which bleeds out during washing increases with the concn of electrolyte in the dye bath. On studying the effect of the cation of the electrolyte, no appreciable difference was observed in the action of K, Na and NH_4 salts of the same acid; it would seem, however, that K gave the max. and Na the least fixation. *Effect of electrolytes on the dyeing of mercerized cotton.*—The swelling of mercerized cotton in water and the quantity of dye which it fixed increases with the concn. of the mercerizing soln., which confirms the results obtained by Knecht with benzopurpurin 4B. The increase in swelling is considerable as compared with the increase in tinctorial affinity. *Comparative effect of electrolytes on the dyeing of boiled, immunized and sthenosized cotton* —Immunized cotton and sthenosized cotton, which swell much less in water than the alkali-cellulose or the cotton cellulose from which they were prepd., fix very little color on dyeing. On the other hand, the fixation of substantive dye is not directly proportional to the swelling power of the fiber. *Dyeing in the cold with substantive dyes.* —On dyeing at atm. temp. the amt. of dye fixed is the same as in operating hot, but the rate of fixation is much slower. *Irreversibility of fixation of substantive dyes by cotton and theory of dyeing in this particular case.*—From the preceding results L. concludes that the dyeing of cotton by substantive dyes cannot be explained exclusively by means of any of the theories admitted so far, and he considers that: (1) Part of the dye, possibly the greater portion, is fixed by diffusion of the ions into the thickness of the fibers and by internal polymerization which is favored by a higher Na-ion concn. inside the fiber than outside. At this point the state of swelling of the fibers comes into play, for the greater the swelling the easier and more rapid will be the diffusion of the dye. (2) Pseudo-adsorption, or superficial dyeing, also comes into play, chiefly in the fixation of the larger particles. (3) It is undisputable that the free alc. OH groups exert at least some attraction, as shown by the difference in the behavior toward substantive dyes of ordinary cotton and of immunized cotton. A. PAPINEAU-COUTURE

Dyeing of fast colors on loose wool, shoddy, slubbing and pieces. JOHN EMGE. *Dyestuffs* **31**, 17–22(1930).

CHAS. E. MULLIN

Emulsions—their preparation and applications. ALAN A. CLAFLIN. *Am. Dyestuff Reptr.* **19**, 697–700(1930).—The value of the colloid mill is pointed out. The prepn. of cleansing emulsions using volatile solvents, as xylene, dichloroethyl ether *o*-dichlorobenzene, are given. In throwing oil for silk and knitting oils for silk and rayon

the necessary lubrication must be detd. Phenol and cresols reduce surface tension of oils. MILTON HARRIS

The efficiency of the hydroextractor. FRED. GROVE-PALMER. *Am. Dyestuff Reptr.* **19**, 681–4(1930).—The efficiency of the hydroextractor depends on the quantity of liquid in the batch at the time of loading; the size of the cage; the no. of revolutions per min.; the fiber and the weave of the cloth; the temp. of the liquid and of the dyehouse. MILTON HARRIS

Functions of a laboratory in a finishing plant. J. A. CLARK. *Cotton* **94**, 1318–9, 1324(1930).—The functions discussed are (1) control of operations; (2) control of chem. supplies; (3) exptl. technical development; and (4) furnishing technical advice. R. K. WORNER

The isoelectric point and its relation to textile chemistry. T. G. HAWLEY, JR., AND M. HARRIS. *Am. Dyestuff Reptr.* **19**, 720–1(1930); cf. *C. A.* **24**, 2154.—The isoelectric point is defined and discussed. Dyeing, degumming and soly. of silk and wool are explained in terms of the isoelec. point. MILTON HARRIS

Spectroscopic investigation of the mineral constituents of textiles. SAMUEL J. LEWIS. *Am. Dyestuff Reptr.* **19**, 686–8(1930).—The spectrograph is a means for analyzing materials in 3 senses: general analysis such as can be readily detected by chem. means; the detection of traces of elements in complex material in cases where chem. analysis is difficult or impossible; the simultaneous ready recognition of the unsuspected element along with those which are familiar. MILTON HARRIS

Kinds and causes of odors in textiles. GEO. RICE. *Textile Colorist* **52**, 454, 486 (1930).—A discussion of the many causes of unpleasant odors in woolen textiles. R. K. WORNER

Röntgen rays in fiber research. H. MARK. *Kunstseide* **12**, 214–20(1930); *Jentgen's Rayon Review* **2**, 196 202(1930).—A review of the development of the application of x-ray analysis to fibrous materials, giving diagrams for ramie, flax, cotton cellulose, mercerized cellulose, viscose and cellulose acetate rayons. The applications of x-rays in this connection are discussed under 3 headings: analytical differentiation of various types of fibers, detn. of fiber properties and structure analysis. FREDERICK C. HAHN

"Bontaka" fiber from Madagascar: its value as a textile and as a paper-making material. F. HEIM DE BALSAC, G. S. DAGAND, H. HEIM DE BALSAC, L. LEFÈVRE, A. PARVEAUD AND O. ROERICH. *Bull. agence gén. colonies* **23**, 600–16(1930).—The anatomo-histological characteristics of the stem and fibers are described. Bontaka tow is constituted of beautiful cellulosic fibers of remarkable length, strength and even flexibility; but it is of no value as a textile on account of the anatomical arrangement of the fibers, because even mild chem. treatment liberates the ultimate fibers, while mech treatment such as carding results in irregular tearing of the parenchyma which holds the fibers together. The compn. of the tow on the dry basis (H_2O 8.71%) was ash 2.46, fats and waxes 0.70, cellulose 53.40%. The compn. of the ash was: MnO_2 12.54, Fe_2O_3 6.12, CaO 64.63, MgO 13.00, SiO_2 2.90, SO_3 0.81%. The lignin is very difficult to eliminate by means of Br and NaOH, 6 treatments being required for proper isolation of the cellulose. Bontaka cellulose contains 89% of normal (or cotton) cellulose; the lignin contains 39% of pentosans (calcd. as pentoses) together with traces of hexosans and some methoxylated complexes. The dimensions of the elementary fibers are: av. length about 50 mm., diam. 0.025–0.060 mm. (av. 0.035), diam. of lumen from practically nonexistent to 0.015 mm.; they are rather stiff, strong and elastic. Cooking the tow 8 hrs. under a pressure of 3 kg. with a 6° Bé. NaOH soln. (42 g. per l.) yielded 56% of light brown, air-dry pulp, which bleached very easily with NaOCl, and gave white sheets which were rough to the touch, had little rattle and possessed very high tensile strength, folding endurance and tearing resistance. The great length of the fibers, however, rendered the prepn. of hand-made sheets very difficult and would make the stock very difficult to handle on the paper machine. A.P.-C.

Hibiscus fibers from India and Iraq. ANON. *Bull. Imp. Inst.* **28**, 284–9(1930).—A sample of *H. sabdariffa* var. *altissima* resembled both jute and *H. cannabinus* in general character and contained about the same amt. of cellulose. Five samples of *H. cannabinus*, all grown on the Rustam Exptl. Farm, Iraq, consisted of 4 of Deccan hemp of the Indian red-stemmed variety and 1 of a local strain cultivated in certain regions of Iraq. The first 4 were of saleable quality, the most valuable being 2 that were cut during the flowering period, while the local strain sample was considerably inferior and might not be worth shipment. A. PAPINEAU-COUTURE

The technic of the bleaching of flax. E. DUTOIT. *Tiba* **8**, 673–7, 799–805, 917–28,

1047–51, 1161–7(1930).—A detailed discussion of the different methods of bleaching flax under various conditions. A. PAPINEAU-COUTURE

The value of textile-testing instruments for white and colored fabrics. H. D. MARTIN. *Textile Colorist* **52**, 455–6, 487(1930).—Attention is called to methods and app. for testing shrinkage, heat transmission, air permeability, fading, weather effects, launderability, "fatigue," etc. R. K. WORNER

The absorption of tannic acid by cellulose acetate silk. P. E. KING AND A. R. SAHASRANAM. *J. Soc. Dyers Colourists* **46**, 118–21(1930).—The absorption power of acetate and viscose rayons for tannic acid in various strengths and in different times is compared. Results, in figures and graphs, indicate that cellulose acetate absorbs about $^1/_6$ of the tannic acid in a given soln. The difference in % of absorption between 1 hr., 2 hrs. and overnight soaking is relatively slight (2% in 50% soln.). Viscose rayon absorbs slightly less than $^1/_2$ of the tannic acid in strengths up to a 14% soln., approaching closer to $^1/_3$ thereafter up to a 50% soln. The differences in absorption between 2-hr. and overnight soaking were about 1% (from 50% soln.). Tannin-mordanted cellulose acetate shows differences in action with basic dyes, some dyeing and others not (malachite green shows no difference with increased amts. of tannic acid or of dye). A. K. JOHNSON

Preparation of artificial silk and cotton unions for printing. J. R. HANNAY. *J. Soc. Dyers Colourists* **46**, 337–9(1930).—The most difficult problem of the printer is to obtain a satisfactory white. Artificial silk can be obtained in a satisfactory state by a simple soap scour but the cotton warp cannot be readily whitened if a long boil is ruled out. Good whites are obtained by bleaching but unfortunately the bleach so thins the handle that it is not easy to obtain a satisfactory finish. Bleaching in the warp is too expensive an operation. MILTON HARRIS

Desizing of cotton materials. A. S. HALL. *Textile Exporter* **3**, No. 36, 28–9 (1930).—A discussion and comparison of the advantages of enzyme products and *activin* in desizing. CHAS. E. MULLIN

The mildew problem with cotton and wool materials. A. J. HALL. *Am. Dyestuff Reptr.* **19**, 663–7(1930).—The nature and causes of mildew are discussed. Shirlan (aniline + salicylic acid ⟶ salicylanilide) is considered the most satisfactory antiseptic now and should eventually displace $ZnCl_2$, which for so many years has been used and considered the safest antiseptic to employ. Among the advantages which it possesses are its lack of volatility, its inertness to heat and metals, its absence of odor and color, and the fact that it does not react with cotton or a large no. of such dyes as are usually applied to this fiber. II. *Ibid* 717–9.—Microörganisms usually flourish most satisfactorily under moist conditions. The formation of color stains by action of bacteria on wool does not always indicate attack of the wool substance but may indicate a change in dyeing properties. Mildew troubles due to mold fungi are more important than those due to bacteria. Mold fungi flourish under slightly acid conditions. MILTON HARRIS

The wool dyer's violets. G. RAEMAN. *Dyer Calico Printer* **64**, 216–7, 267–9, 329–30, 391–2, 453–4, 529(1930).—A review of the violets available for dyeing wool, including a brief discussion of their chemical, dyeing and fastness properties, recipes for applying them and some historical notes of interest. R. K. WORNER

Protection of the workmen and of the neighborhood in the fur industry from the chemical standpoint. E. LOHMANN. *Zentralbl. Gewerbehyg. Unfallverh.* **17**, 99–106 (1930); *Chimie & industrie* **24**, 586–7.—A discussion of the various operations carried out in the treatment of furs, indicating the chem. hazards and the means of preventing or overcoming them. A. PAPINEAU-COUTURE

Eczema caused by dyeing with ice reds. L. R. MAYER. *Arch. Gewerbepath. Gewerbehyg.* **1**, 408–14(1930); *Chimie & industrie* **24**, 586.—By studying 4 cases of acute eczema which affected part of the operators of a plant which dyed with ice reds M. found that it depended on hypersensitiveness of the affected persons to free diazonium bases and to a substance which is formed when the N base is combined with a naphthol compd. This hypersensitiveness can also extend to other cases where it seems likely that the toxic agent is the free diazonium base. The precautions which should be taken to prevent these cutaneous affections consist in the use of rubber gloves, covering the hands and arms with lanolin, and the neutralization of alkalies on the skin whenever the latter comes in contact with alk. liquors. A. PAPINEAU-COUTURE

Fire-resisting rayon goods. FRED. GROVE-PALMER. *Am. Dyestuff Reptr.* **19**, 715–6(1930).—The old method consists of 10% Na phosphate, 2% Na tungstate and $^1/_2$% NH_4Cl. For heavy cloths are used 6 lbs. of NH_4Cl, 3 lbs. NH_4 phosphate in 6

gallons of water. For fireproofing and waterproofing, Na phosphate followed by a 5% soln. Al acetate is used. MILTON HARRIS

First-aid fire extinguishing for dyeworks. J. W. BLACKMAN. *Dyer, Calico Printer* 64, 351(1930).—A brief description of the 3 usual types of hand-operated chem. fire extinguishers, namely, the soda-acid, the foam and the CCl_4. R. K. WORNER

Fighting fires in dyeworks. WILFRID EVANS. *Dyer, Calico Printer* 64, 347 (1930).—The use of foam is advocated. R. K. WORNER

Analytical methods for textile soaps (LEVITT) 27. $MgSO_4$ from waste of artificial-silk factories, etc. (Brit. pat. 331,648) 18. Condensation products of china wood oil and phenol (U. S. pat. 1,779,345) 26. Apparatus for deodorizing hair, feathers, etc., with ozone (Brit. pat. 331,845) 1.

Dyes. I. G. FARBENIND. A.-G. Brit. 331,697, July 10, 1929. Halogen derivs. of *N*-dihydro-1,2,2′,1′-anthraquinoneazines are purified by treatment in H_2SO_4 soln. with MnO_2 or other Mn oxides higher than MnO. Production and purification may be carried out in a combined operation. Examples are given.

Azo dyes. I. G. FARBENIND. A.-G. Brit. 331,247, March 21, 1929. Azo dyes are made in substance or on the fiber or other suitable substratum by coupling any diazo-, tetrazo-, or diazo-azo compd. free from sulfonic or carboxylic groups, with a 2-(2′-hydroxy-3′-naphthoylamino)-5-halo-1,4-dimethoxybenzene. Several examples are given of dyes giving orange-brown and various red shades.

Azo dyes. I. G. FARBENIND. A.-G. Brit. 332,208, Jan. 15, 1929. Azo dyes insol. in water are made in substance, on the fiber or on a substratum, by coupling a diazotized *o*-aminobenzophenone or a deriv. of the latter contg. no sulfo, carboxy or nitro group, with a coupling component such as an arylide of 2,3-hydroxynaphthoic acid or diacetoacetic arylides. The products are fast to bucking, Cl and light. Several examples are given.

Azo dyes. I. G. FARBENIND. A.-G. Brit. 332,319, May 3, 1930. A diazo-, tetrazo- or diazo-azo compd. is coupled with a 4-(2′-hydroxy-3′-naphthoylamino)-diphenylamine in substance or on a substratum. Dyes thus formed from tetrazodianisidine when treated with Cu compds. are faster than similar dyes from other arylides. Several examples are given.

Metal compounds of azo dyes. FRITZ STRAUB, JOSEPH GYR and OTTO KAISER (to Soc. anon. pour l'ind chim. à Bâle). U. S. 1,779,298, Oct. 21. Numerous examples are given of the production of complex metal (such as Cu, Cr, Co or Ni) compds. of azo dyes contg. cyanuric nuclei by condensing cyanuric halides with compds. which have reactive H atoms attached to O, S or N, at least one of such compds. being a complex metal compd. of an azo dye, *e. g.*, the Cu compd. of the monoazo dye from diazotized 4-sulfo-6-amino-1-phenol-2-carboxylic acid and α-naphthylamine and similar metal compds. may be used as components with aniline and the like, producing products of various colors.

Disazo dyes. IMPERIAL CHEMICAL INDUSTRIES, LTD., R. BRIGHTMAN and W. L. B. WELLACOTT. Brit. 331,839, March 5, 1929. Disazo dyes suitable for dyeing regenerated cellulose rayon even shades are made by (1) tetrazotizing 3,3′-diaminodiphenylurea or substitution products other than hydroxy, carboxy or sulfonic derivs. and coupling with a sulfonic or carboxylic acid of a phenol or a naphthol and a 1,8-dihydroxynaphthalenesulfonic acid or an *N*-substituted deriv. in equimol. proportions; or, (2) by treating with phosgene equimol. proportions of the dyes obtained by (*a*) coupling diazotized *m*-nitroaniline or *m*-aminoacetanilide or substitution products other than hydroxy carboxy and sulfonic derivs., with a carboxylic or sulfonic acid or a phenol or a naphthol and reducing or hydrolyzing, or (*b*) coupling the same diazo components as in (*a*) with a 1,8-dihydroxynaphthalenesulfonic acid or a 2,8,6-acid or a *N*-substituted deriv. of the latter and reducing or hydrolyzing. Several examples are given.

Vat dyes. I. G. FARBENIND. A.-G. Brit. 331,842, March 9, 1929. Aryl ethers of leuco compds. of vat dyes are obtained by heating the leuco compds. or the vat dyes themselves in the presence of reducing agents such as metals, with alkali phenolates, preferably in an inert solvent or excess of phenol. Examples are given of the treatment of pyranthrone and of flavanthrone, the metal used being Zn, Cu or Fe. The products may also be obtained from intermediate compds. which are convertible into hydro compds. of the vat dyes under the conditions employed. The products obtained may be used as *dye intermediates*, for effecting purification of dyes, and in some cases for dyeing directly.

Vat dyes. PAUL NAWIASKY and ARTUR KRAUSE (to General Aniline Works). U. S. 1,780,836, Nov. 4. See Ger. 485,790 (*C. A.* **24**, 1989).

Vat dyes of the anthraquinone series. WALTER MIEG (to General Aniline Works). U. S. 1,781,238, Nov. 11. Vat dyes dyeing cotton in the vat from reddish gray to olive-brown shades are prepd. by acting with a condensing agent of an acid character such as concd. H_2SO_4, chlorosulfonic acid and a mixt. of 3–5 parts of $AlCl_3$ and 1 part of NaCl or 3–25 parts of pyridine on a dianthraquinonylamine contg. an acridone ring which is substituted by at least one halogen atom and contg. at least one acylamino group. The condensation is carried out at a temp. of about 10–40° and higher when the condensation is effected by means of H_2SO_4 or chlorosulfonic acid and at 130–160° and higher when a mixt. of $AlCl_3$ and NaCl or pyridine is used as condensing agent. Examples are given, in which, as starting materials, there are employed the dianthraquinonylamine deriv. obtained by the condensation of equimol. proportions of trichloroanthraquinoneacridone, and the amino compd. obtained by the reduction of a nitrated chloroanthraquinoneacridone.

Vat dyes of the anthraquinone series. I. G. FARBENIND. A.-G. Brit. 331,620, April 30, 1929. Yellowish brown dyes are formed by the action on a β-mercaptan compd. of the anthracene series such as 2-mercaptoanthracene with an anthraquinone-2-carboxylic acid such as 1-chloroanthraquinone-2-carboxylic acid, substituted in the 1-position by halogen or a nitro or diazo group, and treating the anthrylthioanthraquinone-2-carboxylic acid obtained with an acid condensing agent to form the corresponding thioxanthone compd. Mercaptoanthracenes are made by reducing the corresponding mercaptoanthraquinones and the latter are obtained by reduction of the corresponding disulfonyl chlorides of anthraquinone.

Acid dyes of the phenonaphthosafranine series. PAUL LAEUGER (to the firm J. R. Geigy S. A.). U. S. 1,779,279, Oct. 21. Dyes giving good blue tints fast to light and alkalies are obtained by the further sulfonation of safranine-16-monosulfonic acids such as those which may be made from the corresponding isorosinduline-6-sulfonic acids by exchanging the 6-sulfo group for an unsym. *N*-alkylated *p*-phenylenediaminesulfonic acid, in which the *o*-position to the free amino group is occupied by the sulfo group. Various details are given for the manuf. of the safranine-16-monosulfonic acids from starting materials such as 6-sulfo-3-ethylbenzylisorosinduline, 6-sulfo-3-methylbenzylisorosinduline, 6-sulfo-3-ethylphenylisorosinduline, 6-sulfo-3-methylphenylisorosinduline or any other isorosinduline-6-sulfonic acid, with 1-methyl-2-ethylamino-5-aminobenzene-4-sulfonic acid preferably used in form the sodium salt or 1-methyl-2-methylamino-5-aminobenzene-4-sulfonic acid, 1-ethylbenzylamino-4-aminobenzene-3-sulfonic acid, 1-diethylanimo-4-aminobenzene-3-sulfonic acid or any other unsym. *N*-alkylated *p*-phenylenediaminesulfonic acid having its *o*-position to the free amino group occupied by the sulfo-group.

Acid wool dyes. I. G. FARBENIND. A.-G. Brit. 331,217, March 25, 1929. Compds. such as 1-diazo-4-bromoanthraquinone-2-sulfonic acid or the diazo compd. of 1-amino-4-phenylaminoanthraquinone-2-sulfonic acid are treated with amines such as aniline, hexahydroaniline and monoethylaniline, first forming diazoamino compds. which decompose with evolution of N into substances in which the 1- or the 4-position or both of the anthraquinone nucleus are occupied by the substituted amino group. Catalysts such as Cu, Zn, Mg or their compds. and inert diluents such as C_6H_6 or $PhNO_2$ may be used. Examples are given. Cf. *C. A.* **24**, 4941.

Acid wool dyes. I. G. FARBENIND. A.-G. Brit. 332,203, April 15, 1929. A 1-amino-4-haloanthraquinone-2-sulfonic acid is condensed with an aminonitrile of the benzene series, *e. g.*, *m*-aminobenzonitrile (which with 1-amino-4-bromoanthraquinone-2-sulfonic acid in the presence of soda and Cu_2Cl_2 gives a reddish blue dye). The 1-amino-3-cyano-4-(and 5)-methylbenzenes give greener dyes.

"Amplifying" aniline dyes. MARY B. PARRISH. U. S. 1,780,981, Nov. 11. An aniline dye is "predigested" in the presence of pancreatin, ox gall, NaCl, citric acid, HOAc and acetone and the resulting mass is boiled with a mixt. of soap and tinctures of vegetable fixatives including camomile flowers, hyssop, ground cedar wood and myrrh and the mass is permitted to cool to "blood heat" and is then "redigested" by adding pancreatin, gelatin, acetone, ox gall, NaCl and HOAc at "blood heat" and the resulting product is permitted to "ferment" in a warm room for about 2 weeks, then mixed with dextrin and the mixt. is baked at "bread baking temp." until a product of crisp consistency is obtained, which is suitable for dyeing when redissolved in water.

Anthraquinone dyes. IMPERIAL CHEMICAL INDUSTRIES, LTD., A. SHEPHERDSON and W. W. TATUM. Brit. 331,952, April 22, 1929. Anthraquinone dyes are formed by condensing a 4-halo-1-aminoanthraquinone-2-sulfonic acid with a *p*-diamine in the

presence of a Cu oxide catalyst. A dye giving level greenish shades on wool is obtained by boiling Na 4-bromo-1-aminoanthraquinone-2-sulfonate with *p*-phenylenediamine, Na_2CO_3, water and Cu oxide, and pptg. the dye with HOAc.

Sulfide dyes. MAX WYLER (to Imperial Chemical Industries, Ltd.). U. S. 1,779,508, Oct. 28. Nitroaceto-*p*-xylidide is heated with 2 or more mol. proportions of benzidine and with S, to form a dye which dyes cotton orange shades from a sulfide bath.

Dye compositions. W. KRITCHEVSKY, H. C. PRUTSMAN and E. MORRILL. Brit. 331,491, Dec. 31, 1928. Dye compns. suitable for home use comprise a sol. dye and an alkylated naphthalenesulfonic acid or salt of such an acid, and there may also be added various assistants such as mordants, fillers, penetrators, diluents or solvents, various examples of which are given. Cf. *C. A.* 24, 2612.

Reddish derivative of flavanthrone. BIRKETT WYLAM, JOHN E. G. HARRIS and JOHN THOMAS (to Scottish Dyes, Ltd.). U. S. 1,779,791, Oct. 28. Leucoflavanthrone is treated, at a temp. of 50° or higher (suitably about 60°) and in the presence of a tertiary org. base such as pyridine with a reagent such as an alkylsulfuric acid halide, *e. g.*, methylsulfuric acid chloride, and the melt is extd. with a dil. alkali such as Na_2CO_3. The product dyes cotton and wool scarlet from a slightly alk. bath, changing to yellow with acid oxidizing agents.

Dyes and intermediates. I. G. FARBENIND. A.-G. Brit. 331,269, March 26, 1929. A 1,9-pyrazoleanthrone,1,9-thiazoleanthrone or 1,9-anthrapyrimidone contg. a methyl group in the 2-position is treated with an alk. condensing agent such as caustic alkali in water or alc.; the 2-methyl group appears to be attacked and products are formed in which 2 mols. of starting material are linked through an ethylenic linkage —CH : CH— and which may serve as *dyes* or *intermediates*. Several examples are given.

Dyes and intermediates. I. G. FARBENIND. A.-G. Brit. 332,316, May 1, 1929. A 1-haloanthraquinone-2-carboxylic acid is treated with hydrazine (preferably in the presence of a diluent such as pyridine) and the pyrazoleanthrone-2-carboxylic acid thus obtained is converted to the acid chloride and condensed with an aromatic hydrocarbon or halogen deriv. of such a hydrocarbon to produce 2-aroylpyrazoleanthrones, and alkylation or aralkylation on the N atoms of the pyrazole ring may be effected. The products contg. a free imino group in the pyrazole ring and a halogen atom in the aryl residue *o*- to the keto group may be converted into vat dyes by treatment with acid-binding agents such as KOAc or Na_2CO_3.

Dye intermediates. I. G. FARBENIND. A.-G. Brit. 331,597, April 10, 1929. β-Naphthylaminophenoxyaliphatic acids are obtained by treating a β-naphthol or β-naphthylamine or substitution product of either with a sulfite and a 3- or 4-aminophenoxyaliphatic acid or deriv. Several examples are given of the production of intermediates in this manner and of their use in manuf. of azo dyes with other components.

Dye intermediates. I. G. FARBENIND. A.-G. Brit. 332,192, March 15, 1929. 5,8-Dihalo-1,2-benzanthraquinones are prepd. from 2-α-naphthoyl-3,6-dihalobenzoic acids by treatment with non-sulfonating acid condensing agents such as H_3PO_4, P_2O_5, $ZnCl_2$ or $AlCl_3$. $PhNO_2$ may be used as a vehicle. The prepn. of the 5,8-dichloro and 5,8-dibromo derivs. is described. It is stated that if H_2SO_4 is used as condensing agent a 5,8-dichloro-1,2-benzanthraquinonesulfonic acid is obtained, and by acting on a 2-α-naphthoyltetrahalobenzoic acid, sulfonation without ring closure occurs.

Dye intermediates. IMPERIAL CHEMICAL INDUSTRIES, LTD., and M. WYLER. Brit. 331,687, June 27, 1929. Aminoxylenol and its *N*-acyl derivs. are formed by nitrating 1,3-dimethyl-2-acylaminobenzene, reducing, diazotizing and converting into the hydroxy compd. An example is given of the use of 1,3-dimethyl-2-acetylaminobenzene as starting material.

Dye intermediates (anthraquinone derivatives). R. J. LOVELUCK, E. G. BECKETT, J. THOMAS and SCOTTISH DYES, LTD. Brit. 331,537, Dec. 28, 1928. Products formed by oxidizing an *o*-amino-β-sulfonic acid of anthraquinone with $K_2S_2O_8$ in H_2SO_4 are treated with a halogenating agent such as $NaClO_3$ and HCl to replace the sulfonic group by halogen, and on reduction with Na hydrosulfide or H_2S and NH_3 or neutral hydrosulfite the corresponding *o*-aminohalogen derivs. are formed. Various examples are given.

Dye intermediates from halobenzoylbenzoic acids. JOHN THOMAS and HUGH A. E. DRESCHER (to Scottish Dyes Ltd.). U. S. 1,779,221, Oct. 21. In the production of compds. such as 4'-(sulfo)-2-benzoylbenzoic acid, a (4'-halo)-2-benzoylbenzoic acid is treated with a sol. sulfite such as Na_2SO_3 in aq. soln. at a temp. of about 180° and under a corresponding pressure. A Cu salt promotes the reaction. The process is not restricted to halobenzoylbenzoic acids in which the halogen is attached to the

benzene nucleus not contg. the carboxylic acid substituent, but can be applied to halo-2-benzoylbenzoic acids and their derivs. generally, including those contg. halogen in the benzene nucleus to which is attached also the carboxylic acid substituent such as halogenated benzoyl-*o*-benzoic acids, which are made by condensing halogenated phthalic anhydride with benzene and its derivs. The 4'-(sulfo)-2-benzoylbenzoic acid can be converted, by condensing agents such as H_2SO_4, into the anthraquinonesulfonic acid.

Condensation products of the benzodiazine series. WINFRID HENTRICH, MAX HARDTMANN and RUDOLF KNOCHE (to General Aniline Works). U. S. 1,780,879, Nov. 4. Compds. such as 2,4-di(4'-hydroxynaphthyl)quinazoline, 4-(4'-hydroxynaphthyl)-quinazoline and 4(4'-methoxyphenyl)quinazoline are produced by reaction in the presence of $AlCl_3$ between a halobenzodiazine contg. at least one halogen atom in the diazine nucleus such as 2,4-dichloroquinazoline or 4-chloroquinazoline and an aromatic phenolic compd. such as 1-hydroxynaphthalene, or by causing suitable aromatic Mg halide compds., *e. g.*, alkoxyphenyl Mg bromide, in ethereal soln. to react upon halogenated benzodiazine contg. the halogen in the diazine nucleus. The products are generally high-melting or infusible yellowish powders which are insol. in water, sol. in org. solvents with a yellowish coloration. They may be used as *intermediate products in the manuf. of dyes.* Cf. *C. A.* **24**, 3381.

Stable diazo compounds. I. G. FARBENIND. A.-G. Brit. 332,227, April 16, 1929. Diazonium salts of complex metallic fluoric acids are made by causing complex acids such as Ti, Al, Sn and Sb hexafluoric acids or their salts to react with a diazonium compd. such as tetrazotized dianisidine or diazotized 4-aminoazobenzene or *m*-nitro-aniline. The products may be used in *dyeing* and *printing* and in *combating insect pests.*

Sulfonyl chlorides. I. G. FARBENIND. A.-G. Brit. 331,596, April 10, 1929. Aromatic amino sulfonyl chlorides and their nuclear substitution products, suitable for use as *dye intermediates*, synthesis of *pharmaceutical products*, manuf. of auxiliary compns. for use *in dyeing*, and as *insecticides*, are made by causing chloro sulfonic acid to act on an aromatic primary aminosulfonic acid or a nuclear substitution product. Examples are given of the treatment of 4-chloroaniline-3-sulfonic acid, 2,5-dichloroaniline-4-sulfonic acid, 4,5-dichloroaniline-4-sulfonic acid, 4-amino-1-methylbenzene-3-sulfonic acid, 2-chloro-4-amino-1-methylbenzene-5-sulfonic acid, 3-chloro-2-amino-1-methyl-benzene-5-sulfonic acid, 1,3-dimethyl-4-aminobenzene-5-sulfonic acid, 1,3-phenylenedi-amine-4,6-disulfonic acid, 1-amino-3-hydroxybenzene-6-sulfonic acid, 1-naphthyl-amine-7-sulfonic acid, aniline-*o*-sulfonic acid and similar starting materials to produce the corresponding sulfonyl chlorides.

Dyeing animal fibers. J. S. WILSON, L. J. HOOLEY, J. THOMAS and SCOTTISH DYES, LTD. Brit. 332,232, Jan. 16, 1929. Materials such as wool or silk are dyed or printed by means of sulfonic acids of vat dyes (which are applied by a vatting process) such as those of the anthraquinone, indigo and arylidoquinone series. Protecting agents such as cresol, phthalic anhydride, "Protectol," sulfite cellulose liquor or assistants such as "Dispersol" or "Nekal A" may be used and various details, examples and modifications of procedure are described. Dye prepns. such as those prepd. as described in Brit. 332,249 may be used.

Dyes. J. S. WILSON, L. J. HOOLEY, J. THOMAS and SCOTTISH DYES, LTD. Brit. 332,249, Jan. 16, 1929. Sulfonic acids of vat dyes suitable for dyeing animal fibers by the process described in Brit. 332,232 (preceding abstr.) are made by replacing the halogen in halogenated vat dyes by the sulfonic group, through the action of sulfites, as by treating 3,3'-dichloroflavanthrone, Caledon Orange 4R, Caledon Orange RRK, 3,3'-dichlorodianthraquinonedihydroazine or the like with phenol and Na_2SO_3, in finely divided aq. suspension.

Dyeing and printing with vat dyes. PHILIPPE BRANDT and KARL GLENZ (to Durand & Huguenin S. A.). U. S. 1,779,305, Oct. 21. An ester salt of a leuco vat dye, a suitable oxidizing agent such as $NaClO_3$ and a substance capable of forming acid when heated are applied to the goods, followed by steaming, in the presence of an aromatic amino compd. contg. a neg. salt-forming group, such as Na sulfanilate. Cf. *C. A.* **24**, 1749.

Dyeing various textile materials. BRITISH CELANESE, LTD., and W. I. TAYLOR. Brit. 332,290, Jan. 11, 1929. In producing intermittently colored, multi-colored or cross-dyed effects on filaments, yarns or other forms of textile materials such as cotton, silk, wool or various artificial silks, a mech. reserve (such as a melted mixt. of refined peanut oil and hardened whale oil) is applied at intervals to the material while in motion. Various details and auxiliary treatments are described.

Dyeing and printing wool. I. G. FARBENIND. A.-G. Brit. 332,202, April 15, 1929. Wool is dyed with a monoazo dye obtained by coupling diazotized 4-nitro-1-amino-

benzene-2-sulfonic acid with a sulfonic acid of β-amino- or an *N*-alkyl-β-aminonaphthalene and discharge printed in a usual manner.

Dyeing filaments, yarns, straws, ribbons, etc., of extruded cellulose acetate or other cellulose esters and ethers. BRITISH CELANESE, LTD., and W. I. TAYLOR. Brit. 332,263, Jan. 11, 1929. Intermittently colored, multi-colored or cross-dyed effects on subsequent dyeing are obtained by applying a saponifying agent at intervals along the length of the material while it is in motion, preferably continuously with production, for which purpose various alkali solns. may be used. App. and various details of procedure are described.

Dyeing organic derivatives of cellulose. GEORGE RIVAT, ERNEST CADGENE and CAMILLE DREYFUS (to Celanese Corp. of America) U. S. 1,779,494, Oct. 28. Materials such as mixed fabrics contg. cellulose acetate are treated with a concd. soln. of a ferric salt such as $FeCl_3$ in order to prepare them for dyeing with logwood or the like.

Dyeing regenerated cellulose materials. IMPERIAL CHEMICAL INDUSTRIES, LTD., and R. BRIGHTMAN. Brit. 331,822, April 5, 1929. Dyeing in level shades is effected by use of dyes obtainable by coupling a tetrazotized mono- or di-sulfonic acid of 4,4'-diaminodiphenylurea with 2 mols. of a sulfonic, or carboxylic, acid deriv. of a phenol, naphthol, naphthylamine or *N*-substituted naphthylamine or with 1 mol. of such a component and 1 mol. of an aminonaphtholsulfonic acid or an *N*-substituted deriv. (similar dyes being also obtainable by other processes). Numerous examples are given. Cf. *C. A.* **24**, 5510.

Mordanting and dyeing cellulose HENRY DREYFUS. U. S. 1,779,464, Oct. 28. Materials such as cellulose acetate are treated with solns. of aliphatic acid salts of mordant metals such as Al acetate, lactate or acetolactate.

Dyeing "viscose silk." I. G. FARBENIND. A.-G. Brit. 331,612, April 22, 1929. The dyeing properties of "viscose silk" are improved by treating the freshly finished material, while still wet, with ammoniacal Cu oxide solns. free from caustic alkali and contg. up to 0.3% Cu, until a small percentage of the dry wt. of the material has dissolved. Various details and examples of procedure are given.

Coloring for fabrics such as silk. ANTON PICAREFF (to Anton Picareff Art Studios, Inc.). U. S. 1,780,314, Nov. 4. An aq. coloring soln. is formed from a basic dye, together with gum acacia and tannic acid.

Dyeing pelts, hairs, feathers, etc. PAUL VIRCK (to General Aniline Works). U. S. 1,778,819, Oct. 21. The material is treated with an aq. soln. of 2-(3'-aminophenylamino)naphthalene-HCl and with an acid nitrite soln. (producing a dyeing "between rose and yellow") or other similar naphthalene derivs. may be used which contain as a substituent a 3-aminoarylamino group of the benzene series. 2-(4'-Methyl-3'-aminophenylamino)naphthalene produces a similar dyeing and 2'-(4-methyl-3-aminophenylamino)-7-hydroxynaphthalene produces a reddish brown dyeing. Similar dyeings are obtained from corresponding naphthalene derivs. substituted in the benzene nucleus by halogen. Cf. *C. A.* **24**, 5167.

Decolorizing dyed fabrics. W. KRITCHEVSKY. Brit. 331,194, Dec. 22, 1928. A mixt. is used which is formed of (*a*) a sulfoxylate formaldehyde salt or a hyposulfite or Zn dust, (*b*) a solid acid or salt of acid reaction such as tartaric acid or $NaHSO_3$, and (*c*) a small quantity of Na isopropylnaphthalenesulfonate or similar compd. The mixt. may be supplied in small packages in dry form, and dissolved at the time of use.

Apparatus for dyeing, bleaching or other treatments of loose yarns or bobbins. F. G. SCHUMACHER and J. J. MÜLLER. Brit. 331,706, July 20, 1929. Structural features.

Apparatus for dyeing tubular textile webs with their ends sewn together in endless formation. H. LOESER. Brit. 332,180, Jan. 5, 1929. Structural features.

Apparatus for washing, dyeing or other liquid treatments of cakes of artificial filaments in a rotatable box. HORACE J. HEGAN and EDWARD HAZELEY (to Courtaulds Ltd.). U. S. 1,779,313, Oct. 21. Structural features.

Vat and associated apparatus for washing or other liquid treatments of lengths of fabric. FLORENT HINNEKENS (to Van Vlaanderen Machine Co.). U. S. 1,781,391, Nov. 11. Structural features.

Dye vat with a liquor-circulating propeller. C. F. KRANEY and HEINZE MASCHINENFABRIK A.-G. Brit. 331,520, Dec. 28, 1928. Structural features of an app. in which freely floating pieces of material are moved in alternate directions in the liquor.

Roller and vat apparatus for dyeing fabrics. HANS NABHOLZ. U. S. 1,780,628, Nov. 4. Structural features.

Preparing fabrics containing wool for dyeing. DEUTSCHE WOLLENWAREN MANUFAKTUR A.-G. Brit. 331,529, March 21, 1929. The process described in Brit. 308,605

(*C. A.* **24**, 511) is modified by applying the treatment with solvents to the materials previous to weaving them.

Ventilating system for dye-houses, etc. HALL & KAY, LTD., H. KAY, J. H. HALL and P. KAY. Brit. 332,387, July 6, 1929.

Finishing yarns or fabrics. FRANCIS J. STOKES. U. S. 1,779,831, Oct. 28. Air is removed from the material in the standard form of package in which it is produced, such as cops, cones, bobbins or spools, the material is treated in a vacuum, with liquid such as dye or other soln., the pressure is raised at least to atm. pressure and the material is sepd. from surplus liquid and is centrifuged while treated with additional liquor such as dye soln. or water.

Use of ethylene chloride for degreasing textile materials. WILHELM PFAFFENDORF (to General Aniline Works). U. S. 1,780,885, Nov. 4.

Bleaching and stripping textile materials. BRITISH RESEARCH ASSOCIATION FOR THE WOOLEN & WORSTED INDUSTRIES and A. T. KING. Brit. 332,389, July 6, 1929. In bleaching and stripping of dyes there is used a mixt. of $NaHSO_3$ or $KHSO_3$ and Na_2SO_3 or K_2SO_3 contg. about 2 mol. proportions of bisulfite to each mol. proportion of normal sulfite, such that when the soln. is dild. to 2% SO_2 it has a p_H of about 6.8. Strong solns. of this character produce a glossy effect and fiber damage is minimized by satg. the soln. with NaCl or Na_2SO_4.

Hypochlorite composition for bleaching. LLOYD T. HOWELLS (to Elec. Smelting & Aluminum Co.). U. S. 1,779,274, Oct. 21. A compn. suitable for bleaching textile materials is formed from a sol. fluosilicate such as that of Na and a hypochlorite compd. such as NaOCl.

Preventing shrinking of wool. LEIGHTON B. SMITH and CHARLES E. RUBY. U. S. 1,781,415, Nov. 11. An alk. soln. for treating wool comprises an alkali metal hypochlorite and a salt of a weak acid and a strong base such as $NaHCO_3$ which serves as a buffer electrolyte.

Brocade effects on fabrics comprising cellulose acetate. CAMILLE DREYFUS and WM. R. BLUME (to Celanese Corp. of America). U. S. 1,780,645, Nov. 4. The fabric is locally delustered, a paste is then applied comprising cellulose nitrate, a softening agent, a pigment and a solvent for the cellulose nitrate which is a non-solvent for the cellulose acetate (such as alc. and ether) and the fabric is then subjected to a relustering treatment. Other similar treatments involving other cellulose derivs. are described.

Moiré scratch patterns in cellulose acetate fabrics. ALEXANDER MILHOMME (to Progressive Silk Finishing Co.). U. S. 1,781,296, Nov. 11. A pattern is scratched on the fabric while in folded moistened condition, and the fabric is then dried and subjected to heat and pressure.

Relustering artificial silk, etc. BRITISH CELANESE, LTD., and G. H. ELLIS. Brit. 332,231, Jan. 5, 1929. Textile materials comprising various cellulose esters or ethers have their luster increased or restored, or are protected from the action of delustering agents such as hot aq. media, by treatment with substantially dry steam. Various details and examples are given.

Apparatus for treating artificial silk or wool tufts, etc., with liquids for washing or other purposes. SNIA-VISCOSA. Brit. 332,003, May 27, 1929. Structural features.

Woven bag fabrics, etc., made of coco fiber yarns. R. G. H. VAN DER JAGT. Brit. 332,136, Oct. 6, 1928. Various details of manuf. are described.

Apparatus for steaming and drying fabrics, etc. HERMANN MALY. U. S. 1,778,863, Oct. 21. Structural features.

Treating waste spun or woven artificial silk materials. ADOLPH L. BURLIN. U. S. 1,781,317, Nov. 11. See Brit. 322,608 (*C. A.* **24**, 2899).

Preparing animal hair for felting. RICHARD HAYNN (to General Aniline Works). U. S. 1,779,363, Oct. 21. Before felting, the hair is treated with a F compd. such as K bifluoride which serves to improve the felting properties.

Dry-cleaning fabrics. LLOYD E. JACKSON. U. S. 1,778,948, Oct. 21. In a process with repeated application of soap-bearing naphtha, the detergent power of the used naphtha is restored by testing quantitatively for free acid and for water and adding alkali and water in sufficient quantities to restore the material to approx. its original condition.

Coatings for fabrics, etc. V. SCHOLZ and ATLAS AGO CHEMISCHE FABRIK A.-G. Brit. 332,266, March 13, 1929. Coating compns. are prepd., either (1) by dissolving solid linoxyn in a suitable org. solvent (such as by use of alc., benzene, xylene, toluene, MeOAc, EtOAc, tetralin, C_2HCl_3 or mixts. of these, suitably with heat and pressure), mixing the resulting soln. with a turgescent or dissolved nitrocellulose or other suitable cellulose ester or ether, and removing the solvent of the nitrocellulose or like material;

or, (2) by kneading the linoxyn with the turgescent or dissolved cellulose deriv., removing the solvent and working up the product as by heat and pressure, to form a transparent solid product which may be dissolved in org. solvents. The products may be mixed with dyes, fillers, etc., and applied to fabrics by rollers, presses, etc.

Rubberizing fabrics (use of non-explosive gas mixtures in the apparatus). FIRESTONE TYRE & RUBBER CO., LTD. Brit. 331,594, Jan. 10, 1929. In an app. for passing fabric through a bath of rubber dissolved in benzene and drying it in a chamber contg. an inert gas such as CO_2 or producer gas, the proportion of producer gas to benzene is detd. by submitting streams of the producer gas and of the gaseous content of the drying chamber simultaneously to a device for comparing their thermal conductivities. Various details of app. are described.

Fungus-proof and waterproof rubber-coated fabric. FRANK A. MCDERMOTT and FOREST J. FUNK (to E. I. du Pont de Nemours & Co.). U. S. 1,779,258, Oct. 21. The fibers of a fabric such as mine ventilating tubing are impregnated with a soln. contg. not less than 1% by wt. based on the fabric of a slightly water-sol., non-volatile, heavy-metal salt of an org. acid having fungicidal properties, such as Zns alicylate or benzoate, and, after evapn. of the solvent, the fabric is then coated with rubber.

Aircraft fabric. ISADORE M. JACOBSOHN and STARR TRUSCOTT. U. S. 1,779,846, Oct. 28. A base fabric such as light-wt. cloth is coated with a compn. comprising gelatin, glycerol and rubber dissolved in C_6H_6 which is mech. spread on the fabric. U. S. 1,779,847 describes the coating of fabric with a film of cuprammonium cellulose, insolubilizing this coating by an acid coagulant, and then immersing in a glycerol bath, to render the fabric flexible and impermeable to gases. Cf. *C. A.* **24**, 2617.

Balloon fabric. KARL HUERTTLE (to Goodyear-Zeppelin Corp.). U. S. 1,779,395. Oct. 21. Pieces of gas-tight material such as goldbeater's skin are treated with a coloring substance such as a dye to increase their visibility, and subsequently united with textile material with the edges of the pieces overlapped.

Balloon fabric. WM. C. CALVERT (to Goodyear Tire & Rubber Co.). U. S. 1,779,388, Oct. 21. A fabric is provided with a plurality of coatings the inner layers of which consist essentially of rubber and the outer layers of gelatin, with an outer ply of regenerated cellulose adhering to the gelatin-contg. layers. Cf. *C. A.* **24**, 976.

Balloon fabric. CLARENCE M. CARSON (to Goodyear Tire & Rubber Co.). U. S. 1,779,389, Oct. 21. A light, closely woven fabric is coated with a mixt. of gelatin and vulcanized latex. Cf. *C. A.* **24**, 2312.

Water-soluble product from fatty acids of wool fat. ALFRED THAUSS and GUSTAV MAUTHE (to General Aniline Works). U. S. 1,780,252, Nov. 4. A product which is suitable for use in *dyeing* and *leather manuf.* is obtained by treating the fatty acids of wool fat with sulfuric acid monohydrate in the presence of a phenol such as PhOH.

Sulfonating wool fat in the presence of a phenol. GUSTAV MAUTHE and ALFRED THAUSS (to General Aniline Works). U. S. 1,780,027, Oct. 28. By treating wool fat with H_2SO_4 in the presence of a phenol such as PhOH, a cresol, a chlorophenol or a naphthol there is obtained a semi-solid friable mass, that on boiling with water forms a stable emulsion that gives a clear soln. when rendered alk.; the product may be salted out from its solns. and is suitable for use in the *textile* and *leather industries*.

26—PAINTS, VARNISHES AND RESINS

A. H. SABIN

Chalking (of paints). RICHARD KEMPF. *Farben-Ztg.* **36**, 20–2(1930).—The causes of chalking lie not only in the phys. and chem. changes undergone by the pigment and binder individually but also in the reactions between these 2 ingredients. G. G. S.

New fire-preventive paints. R. SCHWARZ AND K. WULF. *Farbe u. Lack* **1930**, 502.—While no paint exists that will render wood non-flammable, many do retard the burning. A method of test is given. A piece of wood is painted with the exception of one side and one end. After the paint is dry, the flame is applied to the angle between the two unpainted surfaces. The behavior of the flame on reaching the painted portions is then noted. Water glass is probably the best and cheapest fire-retardant material to use in paints. G. G. SWARD

Two new devices for testing paints. ERICH STOCK. *Farben-Ztg.* **36**, 24(1930).—A small vise made of glass blocks for use in examn. of cross sections of paint films is described. A viscometer consisting of a brass cup with a small orifice in the bottom is described. A special feature is a gate for starting and stopping the flow of the liquid G. G. SWARD

Exposure tests on white paints. KENNETH A. NAGEL. *Am. Paint J.* **15**, No. 2, 24–6(1930).—A preliminary report of paints exposed in 1930 and a summary of the condition of 17 paints exposed in various vehicles in 1929 are given. Of all the pigment combinations used, Pb carbonate gives the best appearance in raw linseed oil; but little difference in boiled oil was observed. From the standpoint of checking and chalking, boiled oils produce better films than raw oil. In general, the pigments were rated in the following order, best, lead carbonate, titanox, lithopone, zinc oxide, poorest.
G. G. SWARD

The evaluation and compilation of the methods used in accelerated testing of protective coatings. E. H. KESSLER. *Am. Paint & Varnish Mfrs' Assoc., Circ.* No. 370, 548–64; *Am. Paint J.* **14**, No. 52C, 25; *Paint, Oil & Chem. Rev.* **90**, No. 18, 14–7; *Oil, Paint & Drug Reptr.* **118**, No. 19, 63–4(1930).—A no. of replies to a questionnaire on accelerated testing (not necessarily involving light) are abstracted. Incomplete data of exposure results on 18 widely varying materials using out-of-doors exposures and 5 accelerated weathering machines are given. A bibliography is attached. G. G. S.

A study of two-coat spray painting on different woods. P. D. BUCKMINSTER. *Am. Paint & Varnish Mfrs.' Assoc., Circ.* No. 370, 533–42; *Am. Paint J.* **14**, No. 52D, 26; *Paint, Oil & Chem. Rev.* 90, No. 17, 73–6; *Oil, Paint & Drug Reptr.* **118**, No. 19, 61–2(1930).—There is given a preliminary report on exposures of house paints on a fence duplicating beveled-siding house construction. Northern white pine, Sitka spruce, cypress and redwood were used in panels 8 by 6 ft. Weathering has not yet proceeded far enough for a report.
G. G. SWARD

Color control in the paint plant. M. REA PAUL AND J. P. ST. GEORGE. *Am. Paint & Varnish Mfrs.' Assoc., Circ.* No. 370, 418–36; *Am. Paint J.* **14**, No. 52B, 8; *Paint, Oil & Chem. Rev.* **90**, No. 17, 63–7; *Oil, Paint & Drug Reptr.* **118**, No. 19, 54(1930).—Drifts in the spectral distribution curves of 4 representative paints are shown to take place both with paints stored in the can and with dry films. These curves may be used as guides in the restoration of the color of the paints. The av. tolerances permitted by 200 consumers in a series of grays ranged from 1 to 6.5% for grays of brightness of 7.5 to 40%, resp.
G. G. SWARD

Causes of floating of pigments in paints and enamels. C. A. HOLKESVIK. *Am. Paint & Varnish Mfrs.' Assoc., Circ.* No. 370, 477–91; *Am. Paint J.* **14**, No. 52D, 27; *Paint, Oil & Chem. Rev.* **90**, No. 17, 77–80; *Oil, Paint & Drug Reptr.* **118**, No. 19, 57–8(1930).—Floating or flooding of pigments is a concn. of one of the ingredients of a pigment mixt. of a paint at the surface to produce a different color from the interior of the film. If the appearance is uniform, the term flooding is used; if non-uniform, the term floating is used. Some of the causes of floating are difference in degree of dispersion of the pigment ingredients or difference in the solubilities of some of them, *e. g.*, Prussian blue in a chrome green. The finely dispersed pigment or soln. is then carried to the surface of the film by the convection currents created by the evapn. of the thinner. The ability of rosin to reduce floating troubles (*C. A.* **24**, 513) is ascribed to the rapid setting of gloss oils contg. it. Floating caused by soly. may be avoided or reduced by incorporation of pigments which adsorb the sol. ingredient. Unequal dispersion of solids may be overcome by proper selection or by protracted grinding.
G. G. SWARD

Synthetic resins in enamels and house paints. L. K. SCOTT, E. J. PROBECK AND OTTO MILETI. *Am. Paint & Varnish Mfrs.' Assoc., Circ.* No. 370, 437–50; *Am. Paint J.* **14**, No. 52A, 31; *Paint, Oil & Chem. Rev.* **90**, No. 17, 84–6; *Oil, Paint & Drug Reptr.* **118**, No. 19, 60–1(1930).—Exposure tests were conducted on enamels, by using as vehicles glyptals of I, linseed fatty acid; II, tung oil fatty acid; III, corn oil; IV, castor oil types; and V, an amberol-tung oil 30 gallon varnish. The glyptals gave superior results with respect to gloss retention and cracking of films. V collected less dirt than the others because of more chalking. The av. order of the best qualities for the glyptals was I, II, III, IV last. Glyptals used in house paints also proved superior to linseed oil vehicle but the exposures had not progressed to a stage that differentiated between the types.
G. G. SWARD

Investigation of metallic soaps. II. The effect of soaps in paints. J. T. BALDWIN. *Am. Paint & Varnish Mfrs.' Assoc., Circ.* No. 370, 492–506; *Paint, Oil & Chem. Rev.* **90**, No. 17, 87–90; *Oil, Paint & Drug Reptr.* **118**, No. 19, 56(1930); cf. *C. A.* **24**, 519.—The settling characteristics and consistencies of the paints referred to above for periods up to 9 to 15 months are recorded. With many soaps, the paints became solid, but with others, the consistency passed through a max. as aging proceeded and returned to the original value at the end of the period. Basic carbonate of Pb and lithopone possessed the most desirable aging properties.
G. G. SWARD

Oil absorption of pigments. R. SCHOLDER. *Farbe Lack* 1930, 478–9.—Review. G. G. SWARD

What is Persian red? K. WURTH. *Farbe Lack* 1930, 504.—Persian red was originally applied to an iron oxide pigment of a particular color obtained from Persia, but it now indicates color only and may be applied adjectively to any pigment. G. G. SWARD

Microscope tests on iron oxide colors. H. WAGNER. *Z. angew. Chem.* 43, 861–4 (1930).—See *C. A.* 24, 5513. E. J. C.

Grinding of dark para toner. C. ROSS ELLIOTT, *et al.* *Am. Paint & Varnish Mfrs.' Assoc., Circ.* No. 370, 451–60; *Am. Paint J.* 14, No. 52D, 27; *Paint, Oil & Chem. Rev.* 90, No. 17, 68–70; *Oil, Paint & Drug Reptr.* 118, No. 19, 54(1930).—A dark para toner was ground by 3 different operators in stone mills and in 4 different types of liquids, *viz.*, raw and boiled linseed oils, a long oil and a short oil varnish. Acid nos. as high as 16 and temps. as high as 79° had no deleterious effects on the pastes. No advantage was gained by sweating the pastes before grinding nor, in most cases, by passing the material through the mill more than twice. G. G. SWARD

The "aridyne"—a standard unit of drying power. COURTLAND F. CARRIER. *Am. Paint & Varnish Mfrs.' Assoc., Circ.* No. 37, 510–9; *Am. Paint J.* 14, No. 52D, 25; *Paint, Oil & Chem. Rev.* 90, No. 17, 71–3; *Oil, Paint & Drug Reptr.* 118, No. 19, 58–9(1930); cf. *C. A.* 24, 3660.—The word "aridyne," meaning drying power, is suggested as a name for the drying-power equiv. to that of a lead drier contg. 0.064 oz. of Pb. G. G. SWARD

Blown linseed oil, sulfo-linseed oil and sulfo-tung oil. A. HOLLANDER. *Farben-Ztg.* 36, 118–20(1930).—The superior waterproofness of films of sulfo-oils and blown oils is ascribed to a twofold gel structure which is present in the liquid oil. In addn. to the structure due to ordinary at. valence forces there is superimposed one due to mol. valence forces. S in particular is bound to the oil mols. by the latter. I and acid nos. obtained during aging of films of blown and sulfo-oils are given in support of the above theory. G. G. SWARD

Chinese tung oil seeds. ANON. *Bull. Imp. Inst.* 28, 267–73(1930).—A sample of nuts of *Aleurites fordii* from China consisted of 46% shell and 54% kernels. The latter contained 4.5% H_2O and on extn. with petr. ether yielded 55.9% (58.5% on the dry basis) of a yellow oil having the following characteristics: d_{16}^{15} 0.9428, acid value 0.44, sapon. value 192.3, I no. (Wijs, 3 hrs.) 179.2%, unsaponifiable matter 0.9%, n_{40} 1.5155, heat test (Browne) 11 min., solidifying pt. of fatty acids 30.0°. These agree with the requirements of the British and American specifications, except that the unsaponifiable is slightly above the max. desirable. The residual meals left after extn. of the oil from the entire kernels and the whole nuts, resp., had the following compn.: H_2O 10.3, 9.2; crude proteins 37.9, 22.4; fat 0.4, 0.5; N-free ext. 35.9, 20.9, crude fiber 7.8, 42.1; ash 7.7, 4.9; nutrient ratio 1:1.0, 1:1.0; food units 132, 78. They would be valuable as *feeding stuffs*, provided they are proved harmless to animals; and both meals would be suitable for use as *fertilizers*. Two samples of nuts of *Aleurites montana* from China consisted of 43.5 and 47.5% shell and 56.5 and 52.5% kernel. The latter contained 4.5 and 5.9% H_2O and 59.8 and 56.3% oil (62.6 and 59.8% on dry basis). The oils had the following characteristics: d_{16}^{15} 0.9381, 0.9405; acid value 12.1, 1.5; sapon. no. 191.5, 192.6; I no. (Wijs 3 hrs.) 163.1, 170.0; unsaponifiable matter 0.6, 0.7; n_{40} 1.506, 1.509; heat test (Browne) 24, 20.5 min.; solidifying pt. of fatty acids 38.2, 41.1°. These agree with the requirements of the British and American specifications, except that the n is lower and the time required for polymerization considerably greater. The compn. of the residual meal from the extn. of the kernels only was: H_2O 9.7, 12.8; crude proteins 37.9, 47.9; fat 1.6, 0.7; N-free ext. 33.4, 24.7; crude fiber 7.1, 6.8; ash 10.3, 7.1%; nutrient ratio 1:1.0, 1:0.5; food units 132, 146. The compn. of the residual meal from the extn. of the whole nuts in 1 sample was: H_2O 10.1, crude proteins 15.9, fat 0.8, N-free ext. 19.3, crude fiber 49.1, ash 4.8, nutrient ratio 1:1.3, food units 61. Provided that the meal from the kernels possesses no toxic properties it should prove of value as a *feeding stuff*, but the meal from the undecorticated nuts would be of much less value. Both meals should be suitable for use as *fertilizers*. A. PAPINEAU-COUTURE

The blooming of varnish films. WILHELM KRUMBHAAR. *Am. Paint & Varnish Mfrs.' Assoc. Circ.* No. 370, 520–32; *Am. Paint J.* 14, No. 52A, 30; *Paint, Oil & Chem. Rev.* 90, No. 17, 59–62; *Oil, Paint & Drug Reptr.* 118, No. 19, 59–60(1930).—Blooming is defined as an iridescence which sometimes appears on fresh varnish films. It is probably due to cryst. oxidation products of the drying varnish and occurs most frequently in rapidly changing atms., such as drafty corridors, etc. Pb, Co and Zn have a tendency

to produce blooming but Ca and Mn do not. To be non-blooming a linseed oil-rosin varnish must contain at least 3 parts of oil to 2 parts of rosin. On the other hand, tung oil behaves as a resin and no amt. will prevent bloom. Sierra Leone, Congo, Brazil, Manila and Kauri gums permit bloom, the amts. increasing with the type of resin in the order named. "Running" does not decrease the tendency. Synthetic resins and ester gum also permit blooming. High cooking temps., *e. g.*, over 400°F., do not prevent blooming. The nature and manner of using thinners have no effect except that blooming may occur if used at temps. over 400°F. G. G. SWARD

Effect of method of application on durability of spar varnish. C. F. CARRIER. *Am. Paint & Varnish Mfrs.' Assoc., Circ.* No. 370, 507–9; *Paint, Oil & Chem. Rev.* 90, No. 17, 91(1930).—Boiled linseed oil and varnish seem to be of equal value as primers under varnish. Both are superior to lithopone-ocher or lead-zinc paints. Cf. *C. A.* 24, 514. G. G. SWARD

Colors for lacquers. J. C. ALSEE. *Ind. Finishing* 6, No. 11, 28, 33(1930).—A brief discussion of the qualities to look for in the choice of colors for lacquers. Permanency, oil absorption, opacity and grinding technic are dealt with in particular. D. THUESEN

Various grades of lacquer nitrocellulose. A. OTT. *Nitrocellulose* 1, 173–7(1930).—Tables of characteristics of all grades available in Germany are shown. E. M. S.

Resin studies. VII. ERICH STOCK. *Farben-Ztg.* 36, 69–70(1930); cf. *C. A.* 24, 4409.—The acid no., sapon. no., sintering pt., m. p., ash and soly. in a few common liquids and their behavior when subjected to capillary analysis are given for earth resin, camphor resin and Siam damar. G. G. SWARD

A new color test for rosin. H. C. COHEN. *Farben-Ztg.* 36, 121(1930).—When chlorosulfonic acid in $CHCl_3$ (1:5 by vol.) is added to a soln. of rosin in $CHCl_3$ a violet-red color is produced. Ester gum and the albertols give a rose-red color. Tung, linseed and stand oils do not interfere. G. G. SWARD

Analytical methods for textile soaps (LEVITT) **27.** Dhupa kernels from India (ANON.) **27.** Apparatus for agitating the contents of containers such as foods, paints, etc. (U. S. pat. 1,780,333) **12.** Oxidizing mixed fats, oils, waxes and resins (U. S. pat. 1,780,632) **27.** Substantially pure finely divided C (U. S. pat. 1,780,154) **18.**

Cold water paint. LEON H. LARSON (to Kalbfleisch Corp.). U. S. 1,781,019, Nov. 11. Ca aluminate and Ca caseinate are suspended in an alk. aq. soln. such as lime water.

Mixing paint. HENRY H. MAPOTHER, JR. (to Vacuum Process Corp.). U. S. 1,781,648, Nov. 11. Finely ground dry pigments are subjected to a vacuum and then mixed with a liquid vehicle and uniformly dispersed while maintaining the vacuum. App. is described.

Apparatus for mixing and grinding ingredients of paints. JOSEPH B. CARPER. U. S. 1,781,435, Nov. 11. The materials are circulated from and returned to a tank with stirring arms, by a gear pump which serves also for grinding the paint ingredients together.

Disk mill for grinding paints, inks, etc. DISC BAR MILLS, LTD., and E. A. WHITE. Brit. 331,762, Sept. 17, 1929. Structural features.

Antifouling or insecticidal paint. ROBERT Q. MCGREGOR. U. S. 1,779,183, Oct. 21. White lead, lead oxide, Paris green, glycerol and linseed oil are used together.

Preparing metal surfaces such as those of automobile bodies for painting. JAMES H. GRAVELL (to American Chemical Paint Co.). U. S. 1,781,507, Nov. 11. The metal is coated with H_3PO_4 and then treated with a material such as Na_2HPO_4 adapted to convert the H_3PO_4 into a NaH phosphate. Cf. *C. A.* 24, 4175.

White pigment. EDWARD C. HOLTEN (to Sherwin-Williams Co.). U. S. 1,778,975, Oct. 21. An intimate mixt. is formed comprising a zinc-lead pigment and a Ti oxygen compd.

Litharge. EDGAR KNAPP and CARL G. ALLGRUNN (to Niagara Sprayer Co.). U. S. 1,779,003, Oct. 21. Air is forced up through molten Pb to effect partial formation of PbO and the PbO floating on the surface is continuously skimmed off as it is formed and conveyed to a finishing furnace where it is stirred in contact with O. App. is described.

Lithopone. SACHTLEBEN A.-G. FÜR BERGBAU UND CHEMISCHE IND. Fr. 684,212, Oct. 30, 1929. Lithopone contg. an excess of BaS is calcined without oxidation and cooled in water contg. sol. sulfates but no compds. of Zn, Ca or Mg, to make it resistant to the weather.

Reducing the zinc oxide content of lithopone. AXEL B. LAFTMAN (to Grasselli Chem. Co.). U. S. 1,780,559, Nov. 4. In making lithopone, an aq. soln. contg. $ZnSO_4$ is treated with an aq. soln. contg. Ba sulfide to form a slurry contg. crude lithopone and any HOAc-sol. compds. assocd. with the ppt. are transformed into water-sol. compds. by treatment with a small proportion of acid; the acidified slurry contg. water-sol. Zn compds. is treated with a quantity of Ba sulfide calcd. to react with the water-sol. Zn compds. for production of addnl. crude lithopone.

Coating surfaces such as wood or metal with varnishes containing cellulose derivatives. ERICH RICHTER and WALTER BECKER (to I. G. Farbenind. A.-G.). U. S. 1,778,813, Oct. 21. The surface is prepd. by the application of an intermediate coating of a soln. of a cellulose deriv. such as cellulose dilaurate or mono-acetate-distearate in which at least one OH group of the cellulose mol. is esterified by a higher fatty acid.

Coating surfaces with nitrocellulose varnishes. HANS F. SCHULZ. U. S. 1,780,844, Nov. 4. Surfaces such as wood or metal are coated with a primary binding layer contg. nitrocellulose of a N content above 12.6% and with overlying layers of lower N content than the primary layer, which serves to provide good adhesion of the coatings.

Coating metal surfaces with varnish-like materials containing metal powder. W. BAUR. Brit. 331,550, April 3, 1929. In the coating of iron or other surfaces, powd. metal such as Al or brass is used suspended in a varnish-like liquid which on heating hardens and is burned in to the surface after hammering, rolling or pressing to flatten out the particles of the coating metal. As the vehicle there may be used a product formed by heating castor oil with ZnO or a varnish prepd. by esterifying a copal or other suitable resin with glycerol and dilg. with linseed oil or MeOH and turpentine. Addnl. metal as foil or powder may be applied before the hammering or other mech. treatment.

Coating compositions. WALTER E. LAWSON (to E. I. du Pont de Nemours & Co.). U. S. 1,780,652, Nov. 4. Tetrahydrofurfuryl alc. is used as a solvent with a polymerized vinyl compd. such as a polymer of vinyl chloride or vinyl acetate.

Coating magnesium and its alloys. H. SUTTON, A. J. SIDERY, L. F. LE BROCQ and C. BRAITHWAITE. Brit. 331,853, April 8, 1929. A coating (which forms a suitable base for paints, enamels, varnishes and lacquers) is obtained on Mg or its alloys by immersion in a heated neutral or acid aq. soln. contg. chromates and dichromates of an alkali metal together with a compd. or salt of Al such as K alum. A temp. of 95–100° is suitable, and various details of the treatment are described.

Coating paper or other surfaces with synthetic resins. THEODORE F. BRADLEY (to American Cyanamid Co.). U. S. 1,780,375, Nov. 4. A surface such as paper is treated with an aq. soln. of a water-sol. salt such as the NH_4 salt of a "polybasic acid-polyhydric alc. resin" such as a resin formed from linseed oil fatty acid-glycerol phthalate and the treatment may be followed by drying to render the material insol.

Coating furniture, etc., with artificial resins. F. OEHRING. Brit. 331,870, April 5, 1929. Furniture, boxes, etc., for indoor or outdoor use and which may be formed of wood, metal, "xylolite" or paper-like or ceramic materials are coated or lined with artificial resin plates carrying on the back an intermediate veneer which may be attached by cold casein glue or liquid artificial resin.

Lacquers containing cellulose derivatives. ANGELO KNORR (to I. G. Farbenind. A.-G.). U. S. 1,780,883, Nov. 4. Lacquers are formed contg. cellulose derivs. in which the H of at least one OH group of the cellulose is substituted by alkyl or acyl, *e. g.*, nitrocellulose, ethyl cellulose or cellulose dilaurate, together with dioxane and a liquid hydrocarbon material such as toluene, C_6H_6, etc.

Lacquers and plastics from cellulose derivatives. IMPERIAL CHEMICAL INDUSTRIES, LTD. and B. W. FOSTER. Brit. 331,837, Jan. 3, 1929. Substantially anhyd. materials for manuf. of *lacquers, celluloid-like material, floor coverings, leather substitutes*, etc., are prepd. by kneading water-wet cellulose esters and ethers with a plasticizing and softening medium including a volatile gelatinizing agent (which may be a water-miscible or partly miscible solvent such as ethylene glycol ethyl ether, Et lactate and MeOAc or a water-immiscible solvent such as BuOAc and $CHCl_3$, or mixts. of these two types), which effects sepn. of the water substantially without evapn. so that it can be poured off. Non-volatile gelatinizers and various modifying agents may be added, and various details and examples of procedure are given.

Diethylene glycol ester of abietic acid. GEORGE M. NORMAN (to Hercules Powder Co.). U. S. 1,779,710, Oct. 28. This compd. is made by heating diethylene glycol with rosin and is suitable for use in *lacquers* and *varnishes*.

Plastic coating materials from tars, etc. FRANKFURTER GASGES. and H. W. HOFLZER. Brit. 331,846, April 4, 1929. In prepg. material for use in *lacquers* or other

coatings or binding agents, coal tar, lignite tar, coumarone resin or the like is heated with a sulfurous ext. obtained from spent sulfurous gas purification materials (suitably by extn. with CS_2 or with C_2HCl_3 or by extraction *in situ* with the use of tar oil or tar oil vapor from the tar employed in the process). Catalysts may also be used such as Fe chlorides, Mn sulfate, Na_2SO_4, NaOH, H_2SO_4 or polymerized CH_2O (which in some instances may be derived with the S from the same material by use of a suitable extracting medium).

Condensation product of China wood oil and phenol. ALFRED THAUSS and GUSTAV MAUTHE (to I. G. Farbenind. A.-G.). U. S. 1,779,345, Oct. 21. China wood oil and phenol are caused to react in the presence of dil. H_2SO_4 and the reaction mass is treated with concd. H_2SO_4. A resinous product is obtained which in the form of its alkali metal salts is easily sol. in water, and suitable for treating textile materials.

Impregnating cellulose material with synthetic resins. MAGNASCO, ROGGERO & Co. Brit. 331,851, April 8, 1929. Wood shavings, leaves, woven fabrics or other cellulosic material is treated successively with a 1% NaOH soln. at 100° and with an aq. soln. of an oxidizing acid such as a mixt. of 5% H_2SO_4 and HNO_3, washed and dried after each treatment, and finally neutralized with NH_3, then impregnated with a synthetic resin soln. or with ingredients which form a synthetic resin, heated and pressed to produce an insol. form of the resin, while preserving the original texture of the material

Resinous products from tar and pitch. G. T. MORGAN, F. S. SINNATT and D. D. PRATT. Brit. 331,542, Feb. 4, 1929. Pitch such as that remaining after a distn. of high- or low-temp. tar or the insol. portion left by treating tars with light petroleum is treated with a solvent such as ether, C_6H_6 or low-temp. tar spirit, the soln. is sepd. from undissolved matter and is pptd. with petroleum or the solvent may be evapd. from it. Constituent resins may be obtained from the soln. by (1) extn. with NaOH soln. or NaOH and brine, followed by carbonation and acidification to obtain resinols and resinoic acids, (2) extn. with inorg. acids followed by decompn. with alkali to obtain resinamines, (3) evapn. of the soln. to leave a residue of resinenes. The crude fractions may be purified by dissolving in org. solvents and repptg. with petroleum. Various details of procedure are described.

Substituted guanidine-aldehyde condensation product. CHARLES M. STINE (to E. I. du Pont de Nemours & Co.). U. S. 1,780,636, Nov. 4. A product which is suitable for manuf. of molded articles comprises an infusible synthetic resin contg. a polymethylol-substituted guanidine which may be prepd. by heating a guanidine salt or deriv. with CH_2O soln. Several examples are given.

Synthetic resin. BORIS N. LOUGOVOY. U. S. 1,779,551, Oct. 28. A product which is substantially colorless is obtained from phenol, CH_2O and urea, incorporated with $(CH_2)_6N_4$.

Linoxyn-like products. V. SCHOLZ and ATLAS AGO CHEMISCHE FABRIK A.-G. Brit. 332,257, March 13, 1929. Linseed oil or other suitable drying or non-drying oil contg. unsatd. groups or their fatty acids is blown with air or other O-contg. gas until no further oxidation or polymerization can take place by this means and the product is then kneaded with air to carry the oxidation and polymerization still further and produce a light colored, granular material of relatively high m. p. The process may be carried out in the presence of a small proportion of a catalyst such as PbO or Pb linoleate at temps. of 60–150° and the kneading may be at a temp. of about 100°. Org. bases such as aniline, naphthylamine or urea may be added during the blowing or kneading, as may also resins, pigments, fillers, etc. Numerous examples and details of procedure are given.

27—FATS, FATTY OILS, WAXES AND SOAPS

E. SCHERUBEL

Composition of the fatty acids present as glycerides in the liver oil of the thresher shark (Alopoecia vulpes). JOHN A. LOVERN. *Biochem. J.* **24**, 866–9(1930).—Further evidence is presented to show that there is a relation between the amt. of squalene present in the non-glyceride portion of the oil and the nature of the fatty acid constituents (cf. *C. A.* **24**, 5520). BENJAMIN HARROW

Sunflower seed from Southern Rhodesia. ANON. *Bull. Imp. Inst.* **28**, 272–274–6(1930).—Six samples of different varieties of seeds were examd. to ascertain which was most suitable for cultivation, and gave the following results: H_2O 6.6–7.6, oil 24.1–29.6% (26.1–31.8% on the dry basis), acid value of the oil 0.5–0.9. A. P.-C.

Soy-bean extraction residues from different methods of treatment. PH. MALKO-

MESIUS AND W. SCHRAMM., *Landw. Vers. Sta.* **110**, 33–47(1930).—The content of the digestible protein of soy-bean meal varies partly with the raw material and partly with the method of extn. The fat and lecithin contents depend only on the method of extn. The most useful basis of purchase is the content of protein plus fat. JOHN R. HILL

The oil-bearing royal palm tree seed (Credoza regia H. B. and K.) of the West Indies. F. HEIM DE BALSAC, G. S. DAGAND, H. HEIM DE BALSAC, L. LEFÈVRE, J. MAHEU AND A. PARVEAUD. *Bull. agence gén. colonies* **23**, 815–33(1930).—The botanical characteristics of the tree, the structure of the seed and the microscopic characteristics of the oil cake are described. The seed consists of 39% shell and 61% kernel. Extn. of the crushed seed with Et_2O yield 20% of fat, corresponding to 32% on the kernels (one test gave 40%). Characteristics of the fat: white, semi-solid, of soft consistency at 18–20°; the solid portion is white and the supernatant oil pale yellow; at 25° it is completely liquid and of a beautiful straw color; it is easily supercooled and can remain liquid at 0°; sapon. no. 215, I no. 44.5, Reichert-Meissl no. 3.7, Hehner no. 90.1, Ac no. 21.4, acid no. 20.5, glycerol 6.8%, mono- and di-glycerides present, unsaponifiable matter (consisting of phytosterol and a light yellow coloring matter) 0.6%, d_0 (solid) 0.935, d_{20} (liquid) 0.923, m. 24.5°, solidifying pt. 20.3°, elaidin test pos., O absorption 1.5% in 7 days, hexabromides none, heat tests—Maumené (H_2SO_4) 41°, S chloride 51°, Br 13°; resins none, alkaloids none, glucosides none. Color reactions: H_2SO_4 gives red, rapidly turning dark brown; H_2SO_4-HNO_3 gives dark brown in the cold. and blackish brown after heating 5 min. at 100° and cooling; HNO_3 gives no coloration; NH_4OH gives a thick, white emulsion; NH_4OH and Hg give a thick, white emulsion; Ac_2O does not give the characteristic fugitive violet coloration produced by resins. Characteristics of the fatty acids: sapon. no. 238, neutralization no. 238, mean mol. wt. of total acids 235, mean mol. wt. of solid acids 233, mean mol. wt. of liquid acids 300, Ac no. 23.8, lactone-anhydrides none, volatile sol. acids (as butyric) 2.1%, solidfying pt. of total acids 24.2°, m. p. of total acids 21°, solidifying pt. of solid acids 27.8°, m. p. of solid acids 28.7°, I no. of solid acids 3.7, I no. of liquid acids 58.1, satd. fatty acids (consisting of stearic 28, myristic 35, palmitic 37%) 48%, satd. fatty acids (exclusively oleic) 52%, hydroxylated fatty acids present. The compn. of the residue from the extn. of the crushed seed was: H_2O 12.10, ash 5.21, crude protein 8.07, reducing sugars 5.64, nonreducing sugars 2.08, starch trace, saccharifiable carbohydrates (mannocellulose and others) 32.30, crude fiber 12.04, undetd. 22.56%. The fat is similar to the fats of the coconut, particularly the palm group; it is suitable for *food purposes* and for *soap making;* the solid portion can be sepd. for use as a food and the liquid portion for soap making; the oil cake is suitable as a stock food. A. PAPINEAU-COUTURE

Moringa aptera seed from Egypt. ANON. *Bull. Imp. Inst.* **28**, 276–9(1930).—The seed consisted of 51.2% shell and 48.8% kernel. The latter contained 4.9% H_2O and yielded 50.0% oil, equiv. to 52.6% on the dry basis and to 24.4% on the whole seed as received. The oil had: d_{15}^{15} 0.9151, n_{40} 1.461, acid value 0.5, sapon. value 188.2, I no. (Wijs, 3 hrs.) 71.2%, unsaponifiable matter 0.5%, solidifying pt. of fatty acids 28.1°. The oil is very similar to that of *Moringa pterygosperma* and has very similar consts., except the solidifying pt. of the fatty acids which is much lower with *M. aptera*. The compn. of the residual meal was: H_2O 8.7, crude proteins 48.6, fat 2.6, N-free ext. 28.0, crude fiber 6.6, ash 5.5%, nutrient ratio 1:0.7, food units 156. It is free from cyanogenetic glucosides, but probably contains alkaloids and saponin, which would prevent its use as feeding stuff; it would be suitable for use as a *fertilizer*. A. P.-C.

Dhupa kernals (Vateria indies) from India. ANON. *Bull. Imp. Inst.* **28**, 279–81 (1930).—The kernels contained 7.6% H_2O. Extn. with petr. ether (b. 40–60°) yielded 21.4% of greenish white, fairly soft fat, having a very slight odor; extn. of the residue with Et_2O and then with Me_2CO yielded 3.0 and 7.2% of brittle, resinous exts. Extn. of the kernels with benzine (b. 90–110°) yielded 22.8% of greenish cream fat, greener than that obtained with petr. ether, but otherwise of similar character. Extn. of the kernels with trichloroethylene yielded 22.6% of a cloudy brown fat which, after filtration, was brownish cream. The petr. ether ext. gave the following results on analysis: d_{15}^{100} 0.8585, m. p. 34.2°, acid value 1.0, sapon. value 190.3, I no. (Wijs, 3 hrs.) 45.9%, unsaponifiable matter 0.9%, n_{40} 1.4588, solidifying pt. of fatty acids 52.7°. These results agree with the figures previously recorded by various investigators, except that the I no. in the present instance is somewhat higher. The residual meal from the petr. ether extn. was light brown, had a strong bitter taste, and had the following compn.: H_2O 8.8, Et_2O ext. 4.1 (contg. Et_2O-sol. substance other than fat), crude proteins 6.2, N-free ext. 73.8 (including resinous matter sol. in Me_2CO), crude fiber 5.0, ash 2.1%, nutrient ratio 1:13.4, food units 100, cyanogenetic glucosides none, alkaloids none. Because of the

low percentage of proteins and its bitter taste it would be unsuitable for use as a feeding stuff and could be employed only as a *fertilizer*. A. PAPINEAU-COUTURE

The evaluation of Turkey-red oils by their properties. H. POMERANZ. *Am. Dyestuff Reptr.* 19, 672–4(1930).—The requirements of Turkey-red oils are discussed. MILTON HARRIS

New commercial emulsifying agents. H. BENNETT. *Ind. Eng. Chem.* 22, 1255–6 (1930).—See *C. A.* 24, 4415. E. C. K.

Analytical methods for textile soaps. BENJAMIN LEVITT. *Am. Dyestuff Reptr.* 19, 667–71(1930).—Methods of analyzing for moisture, free caustic, carbonate, Na silicate, total alkali and total fat, unsaponifiable matter and glycerol are given. Methods for titer and I value of fatty acids are discussed, also a detn. of Rosin. M. H.

Analysis of soap containing water glass. K. SCHERINGA AND J. W. AHRLICHS. *Pharm. Weekblad* 67, 1070–2(1930).—Soap powders occasionally contain water glass. In the analysis of such prepns., a sepn. of soap from carbonate and silicate is usually attempted by means of EtOH. This sepn. is, however, troublesome and incomplete. For detn. of SiO_2 a convenient procedure is to ignite a 5 g. sample in a porcelain dish over a free flame until the evolution of inflammable gas ceases. The residue is acidified and boiled, then collected on a filter and weighed. Repeated evapn. with HCl is unnecessary. The wt. of SiO_2 found multiplied by 1.3 gives the wt. of dry water glass. A. W. Dox

Investigation of metallic soaps (BALDWIN) **26.** Acids of montan wax (HOLDE, *et al.*) **21.** Pressure filter for filtering oil (U. S. pat. 1,780,663) **1.** Pressure filter for oil (U. S. pat. 1,780,723) **1.**

Synthetic fats. T. P. HILDITCH. Brit. 331,880, March 11, 1929. A mixt. of fatty acids contg. about 35–65% of satd. fatty acids and the balance unsatd. fatty acids is esterified by heating with a deficiency of glycerol (suitably under reduced pressure). Examples are given of the production of mixed fats resembling lard, tallow and mutton tallow.

Oxidizing mixed fats, oils, waxes and resins. WILHELM PUNGS (to I. G. Farbenind. A.-G.). U. S. 1,780,632, Nov. 4. A retort is charged with inert heat-cond. material such as Raschig rings and a mixt. to be oxidized such as resin or China wood oil and lignite wax is fed into the retort to a point below the top of the inert charge so that when the mixt. swells during the reaction it will be in contact with the inert material, and a strong current of air is passed through the mixt. at a temp. of about 160–70° to effect oxidation. App. is described.

Sulfonated hydroxy fatty acids. I. G. FARBENIND. A.-G. Brit. 330,904, March 18, 1929. Higher unsatd. hydroxy fatty acids or their esters such as castor oil are treated with gaseous SO_3 while stirring and cooling (preferably in the presence of an org. solvent or diluent such as CCl_4, perchloroethane, C_2Cl_6 or C_2HCl_3). The SO_3 may be passed over the material in a current of dry inert gas such as air or N, and if desired the acids or esters may be preliminarily treated with sufficient H_2SO_4 monohydrate or chlorosulfonic acid to esterify the hydroxy groups, followed by the treatment with SO_3.

Copra drier. RAMON TAN (to Filomena Arias). U. S. 1,780,047, Oct. 28. Structural features.

Soap cakes with an outer solid shell and a filling of soap of spongy structure. ROBERT S. BLAIR. U. S. 1,780,330, Nov. 4. Various details of manuf. are described.

Spray-drying soap. EARL P. STEVENSON and BEN B. FOGLER (to Arthur D. Little, Inc.). U. S. 1,779,516, Oct. 28. Particles of an atomized fluid soap soln. are subjected to the drying effect of a heated air current and the particles are sepd. by gravity from the heated air current at a predetd. stage of the drying process and cooled by falling through a current of suitably conditioned air. App. is described. U. S. 1,779,517 relates to a soap product made up of discrete particles having a void-defining shell of puffed soap as obtained by spray desiccation, the soap substance of which contains at least 15% moisture.

Soap threads. ADOLF WELTER. U. S. 1,779,301, Oct. 21. See Brit. 319,807 (*C. A.* 24, 2627).

Soap threads, flakes and strips. A. WELTER. Brit. 331,268, March 26, 1929. Soap powder (formed by atomizing liquid soap) is pressed into threads, flakes or strips, with or without addn. (to the liquid soap before atomizing) of waterglass, borax, soda or K_2CO_3. Various details of procedure are described.

28—SUGAR, STARCH AND GUMS

J. K. DALE

Beet crop and sugar yield now and before the war. G. MIKUSCH. *Deut. Zuckerind.* **55**, 585–7(1930).—Statistical tables. J. F. LEETE

Discrepancies between the statistically reported and the true calculated world sugar production. BARTENS. *Deut. Zuckerind.* **55**, 581–5(1930).—Discussion and tables from 1905 to 1906 and from 1929 to 1930 are given. J. F. LEETE

The sugar industry and social conditions in Java. O. ARRHENIUS. *Deut. Zuckerind.* **55**, 595–600(1930). J. F. LEETE

Experiences in the 1929 campaign. E. TROJE. *Deut. Zuckerind.* **55**, 549–54 (1930).—The sugar loss during 53 days storage of beets was 0.018–0.035%. Other figures for processing are given. J. F. LEETE

Large-scale experiments to compare the method of Düwell and Solon for determining the natural alkalinity with that of the Institut für die Zucker-Industrie. H. DÜWELL AND K. SOLON. *Centr. Zuckerind.* **38**, 834–5(1930).—A reply to Böttger (cf. *C. A.* **24**, 5531.) J. F. LEETE

Report (93) on the most important work in the field of pure sugar chemistry published in the first half of the year 1930. E. O. VON LIPPMANN. *Deut. Zuckerind.* **55**, 984, 1029–30, 1053(1930); cf. *C. A.* **24**, 5524.—A review. J. F. LEETE

Production of sugar in the Berliner Tiergarten. K. ULRICH. *Deut. Zuckerind.* **55**, 569–76(1930).—Expts. relating to production of maple sugar in the year 1797 are described. J. F. LEETE

Mechanical experimentation in sugar factories. E. VIEWEGH. *Z. Zuckerind. Čechoslovak. Rep.* **54**, 418–24(1930). J. F. LEETE

The determination of sugar by the Bertrand method. G. BRUHNS. *Centr. Zuckerind.* **38**, 1018–9(1930); cf. *C. A.* **24**, 5524.—Among other things the exptl. data given show that acidified solns. of iron yield lower results than neutral solns. J. F. L.

Continuation and conclusion of the discussion of the Oxford process. F. CHAMMIER, O. SPENGLER, KÖHLER AND H. CLAASSEN. *Deut. Zuckerind.* **55**, 381–4(1930); *C. A.* **24**, 5528. J. F. LEETE

The valuation of raw sugar according to its affinability by the method of the Institut für Zucker-Industrie. O. SPENGLER. *Deut Zuckerind.* **55**, 533–4(1930).—A discussion showing how the increasing use of the short color method results in better sugar. In the campaign 1926–27 only 800 samples were examd. while over 8000 examns. are expected for the 1929–30 campaign. The av. color value is now 4.21 against 3.2 in 1926–27. J. F. LEETE

Computation of the sugar production in raw sugar factories. Q. JEDLIČKA. *Z. Zuckerind. Čechoslovak. Rep.* **54**, 447–8(1930).—A discussion with computations. J. F. LEETE

Control of the work on low purity (sugar) products. E. TROJE. *Deut. Zuckerind.* **55**, 141–2(1930).—A discussion. J. F. LEETE

Control of the work on low purity (sugar) products. P. KÜHLE. *Deut. Zuckerind.* **55**, 301–2(1930).—A discussion. J. F. LEETE

The magnitude of contraction in impure sugar solutions and its influence on the difference between true and apparent purity. P. KÜHLE. *Centr. Zuckerind.* **38**, 736–9, 762–4(1930).—Theoretical discussion, exptl. data, computations, tables and diagrams. K. concludes that there is a const. relation between true and apparent purity, that the varied non-sugars present in juices cause the seeming lack of const. relation and that it is the Brix table, not the sp. gr. of impure sugar, which is the cause of high sp. gr. of sugar solns. J. F. LEETE

The volumes of sugar solutions at various temperatures. L. KARAS. *Z. Zuckerind. Čechoslovak. Rep.* **55**, 15–6(1930).—K. recalcd. Gerlach's table to 5 decimals, taking the vol. at 20° instead of 17.5° as unity. The new table is reproduced. J. F. L.

Centrifuging of sugar juices. P. HONIG AND W. F. ALEWYN. *Mededeel. Proefsta. Javasuikerind.* **1930**.—Results of expts. on subjecting sugar juices to centrifugal force during crop 1928 and 1929 are reported. The largest type of a de Laval machine was used, developing 6000 r. p. m. and a sludge capacity of 10–14 kg. The best results were obtained when the molasses was diluted to 70 Brix and heated to 65°. Comparative tests with a small lab. separator showed that when 80% of the suspended matter was removed the av. increase in purity of sulfitation sirup was 0.3, and of diluted final molasses 4 points. In judging the effect of sepn. the increase in purity is not the main point; therefore, for every test there was detd. the amt. of sepd. product, the analyses of

the product, weight of the sludge and analyses of the sludge. Not one of the exptl. installations was large enough to make a complete factory test, but at Beran and Tjoekir it was concluded that the molasses strikes purged better when as much as possible of the molasses drawn in had been centrifuged. Sepg. draw-in molasses for the third strikes is considered to be the most advantageous as even after centrifuging or filtering thick juice there is always a further flocculation upon concn. Lab. tests showed that sepg. had a large influence on the quality of the sugar and on the centrifugal work. The results of analyses of sludges showed a big difference between carbonatation and defecation mills; CaO in sludge of defecation mills was 35% and of carbonatation mills 92%. P. R. P.

The properties and composition of the slow- and rapid-settling mud particles in first saturation juice. H. CLAASSEN. *Centr. Zuckerind.* **38**, 1066(1930).—No difference was found in size, shape or chem. compn. of the lower and upper layers of the ppt. J. F. LEETE

Catalytic influences in the coloration of alkaline sugar liquors on heating. O. SPENGLER AND F. TÖDT. *Z. Ver. deut. Zuckerind.* **80**, 673–89(1930).—The coloring of alk. sugar juices on being heated is increased by traces of Fe salts, and decreased by the addn. of a very small quantity of KCN. This finding leads to the assumption that the coloring of sugar juices is catalyzed by Fe. Further expts. in which the liquid-air boundary was altered confirmed this belief. A significant decrease in coloration was also obtained by using Na_2SO_3 and $Na_4P_2O_7$. The question whether the destruction of sugar is likewise catalyzed by Fe was tested by observing the decrease in polarization. Result: Catalytic influences in all probability play a part in sugar destruction, but exptl. demonstration is not possible for several reasons. F. CAMPS-CAMPINS

The determination of lime in sugar factory juices by Blacher's method. K. SOLON. *Deut. Zuckerind.* **55**, 457–8(1930).—S. discusses the oxalate-permanganate method and those of Pellet and of Blacher. Exptl. data show that the 3 methods give results identical to the third decimal. Blacher's method is recommended for rapidity and for the fact that alky. can be detd. in the same sample; disadvantages are the lesser accuracy and the necessity of neutralizing the soln. to phenolphthalein. **Reply.** S. BÖTTGER. *Ibid* 700.—B. states that the method is suitable only for the *detn. of hardness in water.* J. F. LEETE

Lime determination in technical cane sugar juices and molasses with soap solution. M. VAN DER KREKE AND K. DOUWES DEKKER. *Mededeel. Proefsta. Javasuikerind.* **1930**.—The authors refer to the work of Spengler and Brendel (*C. A.* **23**, 539) who recommend CaO detn. in juices by soap titration. At the expt. station a series of comparative tests was made to det. the CaO as CaC_2O_4 or by pptn. with soap. Applied to molasses the results agree satisfactorily; with juices, however, a difference of 20% is found. This difference may be due to Mg salts or to absorbed ingredients. The results are best for carbonatation juices. P. R. P.

Density and concentration determinations in the Java sugar industry. K. DOUWES DEKKER AND TH. J. D. ERLEE. *Mededeel. Proefsta. Javasuikerind.* **1930**.—In analytical and other chem. work in Java beginning with crop 1931 the true cc. with a normal temp. of 27.5° will be employed instead of the Mohr cc. to comply with the resolutions of the international commission in Paris in 1900 and to simplify the purchasing of glassware. The polarizations will continue to be reported at 20°. The principles of the detns. of sp. gr., concn. and standardization of measuring instruments are discussed. P. R. P.

Some noteworthy results of testing varieties of sugar cane in Cuba and their significance for the beet-sugar industry of Europe. R. E. GROTKASS. *Centr. Zuckerind.* **38**, 789–90(1930).—Tables show the value of cane selection in increasing sugar yield per acre. G. therefore recommends intensive selection of beets. J. F. LEETE

Results of the sugar-beet experiments carried on by the association of agricultural, forestry and industrial-agricultural experiment stations in Czechoslovakia during the year 1929. F. CHMELAŘ AND J. ŠIMON. *Z. Zuckerind. čechoslovak. Rep.* **55**, 1–8(1930). J. F. LEETE

Should beet roots be dried immediately or should the sugar be recoverd first? E. TROJE. *Deut. Zuckerind.* **55**, 747–8(1930).—Discussion and calcns. Conclusion: Immediate drying is profitable only when very high prices for dried beets are coincident with very low prices for sugar. J. F. LEETE

A suggestion for a device for working up beet roots. J. HAMOUS. *Z. Zuckerind. čechoslovak. Rep.* **54**, 424(1930).—A description with sketch is given. J. F. LEETE

Results of experiments in beet-sugar factories. BERNER. *Centr. Zuckerind.* **38**, 787–9(1930).—A summary of results of expts. dealing with evaporators, driers, plant efficiency, heat balance, etc., in a group of factories. J. F. LEETE

The determination of the true sugar content of beets in the sugar factory. V. MAREŠ. *Z. Zuckerind. čechoslovak. Rep.* **54**, 442–7(1930).—See *C. A.* **24**, 2629. J. F. LEETE

Steam consumption in sugar beet diffusion. J. HAMOUS. *Z. Zuckerind. čechoslovak. Rep.* **54**, 409–10(1930).—A discussion with calcns. J. F. LEETE

Steam consumption in the (beet) sugar factory. J. HAMOUS. *Z. Zuckerind. čechoslovak. Rep.* **54**, 497–8(1930).—A discussion with calcns. is given. J. F. LEETE

Drying with waste gases in beet-sugar factories. W. BURGDORFF. *Centr. Zuckerind.* **38**, 1043–7(1930).—A discussion with computations. J. F. LEETE

A critical study of a plant for drying sliced sugar beets with waste gases. R. C. HENNINGER. *Z. Zuckerind. čechslovak. Rep.* **54**, 696–8(1930); cf. *C. A.* **24**, 6051. J. F. LEETE

The influence of the weather on the development of young beets and on beet diseases. V. STEHLÍK. *Z. Zuckerind. čechoslovak. Rep.* **54**, 683–9, 691–6(1930). J. F. LEETE

Technical aspects of the re-using of water (in sugar factories). G. HRUDKA *Deut. Zuckerind.* **55**, 66–8, 890–2(1930).—A discussion with schematic diagrams of the cycles. J. F. LEETE

Experiments in defecation by means of pressure and a small quantity of lime. H. FRIEDRICH. *Z. Zuckerind. čechoslovak. Rep.* **55**, 14–5(1930).—A discussion. J. F. LEETE

Affination. J. WIESNER. *Z. Zuckerind. čechslovak. Rep.* **54**, 504–6(1930).—A discussion and description of a process (patent pending). J. F. LEETE

The pulverizing of sugar. H. FASOL. *Centr. Zuckerind.* **38**, 926–7(1930).—A practical discussion. J. F. LEETE

The pulverizing of sugar. W. TAEGENER. *Centr. Zuckerind.* **38**, 856–9, 880–2 (1930).—A technical and mathematical discussion. J. F. LEETE

Contribution to the study of cooler-crystallizers. P. HONIG AND W. F. ALEWYN. *Mededeel. Proefsta. Java Suikerind.* **1930**.—Different types of crystallizers are described. Expts. at Goedo with the LaFeuille and at Poerwodadi with the Werkspoor crystallizer, which is a continuous app., are described. The effects of cooling on the product and on the purity of the final molasses is discussed. For massecuites of high purity coolers with large cooling capacity are recommended but for the low grades a smaller unit will be sufficient, as they do not stand rapid cooling. A long crystallizer with a water spray on the outside is sufficient for low-grade massecuites. P. R. P.

The determination of invert sugar, especially in the presence of a large amount of sucrose. G. BRUHNS. *Deut. Zuckerind.* **55**, 422–3; 486–7(1930); cf. *C. A.* **24**, 1537.—A description of methods and exptl. data. J. F. LEETE

Experiments in sweetening-off mud presses. PÜTTER. *Deut. Zuckerind.* **55**, 539–40(1930).—Methods are described. In a sweetened-off mud press 0.5% sugar was found, which corresponds to 0.035% calcd. on the beet. J. F. LEETE

The utilization of the (world) over-production of molasses. H. CLAASSEN. *Deut. Zuckerind.* **55**, 1009–10(1930).—A discussion of molasses as *fertilizer*. J. F. LEETE

(Beet sugar) molasses prices and molasses utilization. H. CLAASSEN. *Deut. Zuckerind.* **55**, 536–8 (1930).—Germany faces the problem of utilizing the last $^1/_2$ of her molasses production in 1930. C. advocates the manuf. of power alc., as the existing tariff authorizes the enforcement, if necessary, of the regulation according to which importers or inland producers of benzine and benzene may be compelled to admix abs. alc. France has found that 50 parts of gasoline (benzine) and 50 parts of abs. alc. make a satisfactory *power fuel*. J. F. LEETE

The manufacture of rice starch. A. E. WILLIAMS. *Ind. Chemist* **6**, 387–9(1930). E. H.

The use of the Sb electrode in the control of cane juice defecation and for measuring the H-ion concentration of soils (GALVEZ) **15**. The importance of the water-soluble P_2O_5 in superphosphate (DIX) **15**. The saccharification of cellulose according to Scholler (GUNDERMANN) **23**. The economic significance of lowering the cost of yeast and alcohol production from molasses (CLAASSEN) **16**. Action of HF on starch (HELFERICH, *et al.*) **10**.

——— **sugar juice.** J. FRIEDRICH. Brit. 331,308, April 24, 1929. See Fr. 673,847 (*C. A.* **24**, 2631).

Refining raw sugar. J. B. TALBOT-CROSBIE and H. WISE. Brit. 331,314, April

30, 1929. A sugar soln. derived from desiccated beet or other sugar-contg. plant material is used as a solvent for raw sugar to be refined.

Nitrostarch. OSCAR A. PICKETT (to Hercules Powder Co.). U. S. 1,779,825, Oct. 28. A nitrated starch of relatively low viscosity and a high degree of soly. and stabilization is prepd. by the simultaneous swelling and nitration of starch of normal d.

29—LEATHER AND GLUE

ALLEN ROGERS

The German tanners school at Freiberg i. Sa. ANON. *Ledertech. Rundschau* **22**, 69–72, 85–6(1930).—Annual report. I. D. C.

Report of the committee on qualitative tannin analysis. O. GERNGROSS. *Ledertech. Rundschau* **22**, 98–9(1930).—A review. I. D. C.

The fluorescence test of tannins. C. VAN DER HOEVEN. *Collegium* **1930**, 414–9.—The fluorescence colors are given of 62 solns. of tannins and syntans both before and after addn. of acid and alkali. I. D. CLARKE

Determination of the optimum relations in tanning with extracts of Rhus cotinus L. and Carpinus duinensis Scop. at different p_H values. A. N. ANFIMOFF AND A. P. PISSARENKO. *Collegium* **1930**, 419–27.—Samples of *Rhus. cotinus* L. and *Carpinus duinensis* Scop. were collected near the Black Sea in 1928. The former contained 16.3% of pyrogallol tannin and 16.82% of sol. nontannin; the latter contained 8.77% of pyrogallol tannin and 22.24% of sol. nontannin (H_2O 13%). p_H values were 4.12 and 3.92, resp. Exts. of both materials were most stable at p_H 4–5, and were pptd. by alkali; pptn. started at p_H 6 and was nearly 75% complete at p_H 8. The best leather was produced at about p_H 5. I. D. CLARKE

The value of the barks of "Cay-Xu" (Aegiceras majus Goertn.-Myrsin) and of "Chu-Me" (Phyllanthus emblica L.-Euphorb.) from Tonquin as tanning materials. F. HEIM DE BALSAC, J. MAHEU, L. LEFÈVRE AND A. PARVEAUD. *Bull. agence gén. colonies* **23**, 710–22(1930).—"Cay-Xu" bark contains: H_2O 15.27, tannin 6.60, nontannin H_2O-sol. 15.90, H_2O-insol. 62.23%. The saponin content (calcd. from reducing sugars after inversion in the autoclave) is 7.80%. Tanning tests gave a poor quality of leather. The tannin is almost exclusively catechuic, with only traces of pyrogallic tannin. "Chu-Me" or "Me-Rung" bark contains: H_2O 15.17, tannin 16.64, nontannin H_2O-sol. 5.76, H_2O-insol. 62.43%. There are no reducing sugars either before or after inversion under pressure. The tannin is almost exclusively catechuic, with but very little pyrogallic tannin. Tanning tests gave fairly satisfactory results, the leather lacking somewhat in flexibility, but having a soft grain. The ext. obtained at 100° is brownish red, and for some purposes it might be advisable to decolorize it.
A. PAPINEAU-COUTURE

Hide swelling in the light of the method of expressing water. H. OWRUTSKY. *Collegium* **1930**, 427–30; cf. *C. A.* **22**, 696.—Pieces of hide in a frame between paper, glass and wood squares were left for 10 min. under a 10-kg. wt. The loss of H_2O was detd. by wt.; thickness measurements were not conclusive. Pieces plumped in H_2O lost the most on pressing; HCl caused the greatest swelling. I. D. CLARKE

Safety limit on acid [in leather]. F. C. HILBERT. *Leather Manuf.* **41**, 177–8, 184–5(1930).—Pieces of sole leather, soaked in H_2SO_4 solns. to give % H_2SO_4 = 0.38 to 3.85 in the leather (Procter-Searle method), were dried and aged and observed for 9 months. At 4 months, leather showed loss of strength when $H_2SO_4 \geq 1.9\%$; at 9 months, leather showed loss of strength when $H_2SO_4 \geq 1.0\%$; all samples with added acid showed more or less darkening. From this work H. concludes that 0.50–0.75% H_2SO_4 should be the max. permitted in sole leather, preferably less if the leather is to be stored any long time. Arguing from the fact that belting, and bag, case and strap leathers are expected to last much longer than a shoe sole, he concludes that the max. limit for H_2SO_4 in such leathers should be 0.15–0.20%. H. B. MERRILL

Impregnated chrome sole leather. E. BAUMGARTNER. *Ledertech. Rundschau* **22**, 73–4(1930).—Impregnated chrome-tanned sole leathers were quite variable but wore longer than vegetable-tanned leather. They were not slippery in wet weather and only one sample lost appreciable impregnating material in boiling water under a 4-kg. wt.
I. D. CLARKE

Chemical changes in gelatin resulting from the method of storage. KENNETH V. THIMANN AND ALBERT B. PAGE. *Biochem. J.* **24**, 1058–60(1930).—Moist storage produces a gelatin chemically different from the normal dry-stored product. B. H.

The fine structure of gelatin micelles. O. GERNGROSS. *Ledertech. Rundschau* **22**, 99–100(1930).—A review. I. D. CLARKE

Quick determination of the moisture content of glue and gelatin. A. G. BELOUSOVA, M. A. TIMOKHINA AND A. M. BELOUSOV. *Zhur. Prikladnoĭ Khim* **3**, 741–6(1930). —A vacuum drying oven at 105° is used and analysis is made on weight basis. V. KALICHEVSKY

Advancement in analytical investigation by means of ultra-violet rays (FRANK) **7**. Estimation of minute quantities of tannins (OBERHARD, SCHALBEROWA) **17**. Use of dried seaweed as a preservative packing material, etc. (Brit. pat. 331,546) **12**. Lacquers and plastics from cellulose derivatives (Brit. pat. 331,837) **26**. Water-soluble product from fatty acids of wool fat (U. S. pat. 1,780,252) **25**. Sulfonating wool fat in the presence of a phenol (U. S. pat. 1,780,027) **25**.

Tanning agents from dried chlorinated products of degraded lignite. I. G. FARBENIND. A.-G. Brit. 332,204, April 15, 1929. The dried chlorinated product of degraded lignite and other materials such as described in Brit. 284,670 (*C. A.* **22**, 4778) and Brit. 323,781 (*C. A.* **24**, 3345) is extd. with an org. solvent such as acetone or crude wood spirit contg. 3% H_2O and the resulting soln. is evapd. or pptd. by addn. of a salt of a weak acid, a base or an org. precipitant and the ppt. is dried. Various details are given.

Tanning compositions. I. G. FARBENIND. A.-G. Brit. 331,216, March 25, 1929. Sol. tanning compns. are obtained by condensing 3 mol. proportions of resorcinol or pyrogallol with 1–1.5 mol. proportions of benzaldehyde or a substitution product such as *o*-chlorobenzaldehyde, in an aq. medium and in the presence of a small proportion of acid such as HCl or H_2SO_4, and interrupting the reaction by neutralizing the acid when little or none of the phenol can be detected with $FeCl_3$. Several examples with details are given.

Tanning composition. ALBRECHT SCHMIDT (to I. G. FARBENIND. A.-G.). U. S. 1,780,983, Nov. 11. An emulsion of an animal fat such as train oil, wool fat or tallow in an aq. soln. of dimethylcellulose is used in various tanning or fat-liquoring processes.

Tanning hides. I. G. FARBENIND. A.-G. Brit. 332,270, April 15, 1929. Tanning agents are prepd. by incorporating Cl-contg. water-sol. products from degraded lignite with gelatin-pptg. water-sol. condensation products of hydroxyaryl compds. and aldehydes contg. no sulfonic groups such as the products obtained by condensing di- and poly-hydroxybenzene with CH_2O or acetaldehyde. Vegetable tanning agents may also be added to the tanning mixt., or the components may be allowed to act on the hides in succession.

Tanning hides. B. QUENDT. Brit. 332,262, Jan. 10, 1929. Tanning of hides with vegetable substances such as quebracho ext. is promoted by a preliminary treatment with a soln. of a water-sol. non-sulfonated condensation product of an aromatic amine such as aniline or dimethylaniline with CH_2O or the like, which may be used together with alum, and NaCl or Na_2SO_4 or both. Details and examples are given.

Enzymic products. CHARLES J. M. M. LEPETIT (to Röhm & Haas Co.). U. S. 1,779,243, Oct. 21. In the production of enzymic products such as those suitable for preparing hides for tanning, a mold culture such as a culture of *Aspergillus oryzae* on bran, shorts, middlings or ground oil-meal cakes is treated with plasmolyzing and dehydrating salts such as anhyd. Na_2SO_4 (which serves as a drying agent) mixed with $NaHCO_3$ and H_3BO_3. A stable dry powder can be thus obtained.

Dressing leather. BRUNO REWALD. U. S. 1,779,012, Oct. 21. Leather is impregnated with material including a phosphatide-like material from vegetable matter, oily material and albumin, *e. g.*, a product from soy beans, train oil and various auxiliary ingredients.

Impregnating leather with rubber, etc. C. G. SHAW. Brit. 331,263, Feb. 19, 1929. Leather is impregnated with rubber cement, with or without fillers, and vulcanization is effected with S and an ultra-accelerator such as piperidine pentamethylenedithiocarbamate or Zn ethylxanthate.

Fancy leather. A. EHRENREICH and R. TANDLER. Brit. 331,241, March 26, 1929. Skins of terrestrial or marine animals having external protuberences such as shagreen are treated to fix the shagreen to the skin, as by use of tanning substances or CH_2O, and are then treated with substances such as láctic acid or HCl with addn. of salt to dissolve mineral constituents, and are finally tanned.

Cementing leather surfaces together. WILLIS A. GIBBONS (to General Rubber Co.). U. S. 1,779,808, Oct. 28. Leather surfaces are prepd. for joining with each other by treatment with artificial aq. dispersions of rubber and with NH_3.

Imitation leather (cloth coated with a nitrocellulose composition containing castor oil). IMPERIAL CHEMICAL INDUSTRIES, LTD., and H. J. TATTERSALL. Brit. 331,814, March 7, 1929. Rancidity of the castor oil is prevented by treating it with a reagent such as peracetic acid in sufficient proportion to attack the trilinolein constituent of the oil. Linseed oil, cottonseed oil and other oils also may be similarly treated; various proportions and details of coating compns. are given.

30—RUBBER AND ALLIED SUBSTANCES

C. C. DAVIS

Notes from the rubber industry. T. L. GARNER. *Brit. Plastics* **2**, 125, 139 (1930).—A brief review and discussion of several recent papers. C. C. DAVIS

The coloring of rubber. F. JACOBS. *Rev. gén. caoutchouc* **7**, No. 64, 17–21(1930); cf. *C. A.* **24**, 4958, 5535.—In conclusion the use of org. colors in air bags, water bottles and other molded products, and colored hard rubber is described. C. C. DAVIS

"Cheaply black," a new, economical pigment for rubber mixtures. R. DITMAR. *Caoutchouc & gutta-percha* **27**, 15177–8(1930).—"Cheaply black" is a gray-black powder, with d. 2.2, which does not adsorb S or accelerators during vulcanization, and which can be more easily mixed than ordinary gas black. Representative formulas for various types of products are given to show the utility of this material. C. C. DAVIS

Mineral black as a reënforcing filler. PHILIP SCHIDROWITZ AND MAURICE PHILPOTT. *Kautschuk* **6**, 197–9, 204–7(1930).—Mineral blacks, which in general are obtained from slates and from fossil products contg. C., have not heretofore been used as reënforcing fillers in the rubber industry. A recently discovered mine in Devonshire, England, contains deposits of mineral black which has about 66% of mineral substances (especially clay and silica) and 33% of finely divided anthracite, and a method has been developed for refining this black to increase its C content and to render it suitable as a rubber filler. The equipment permits large-scale production of a refined black contg. approx. 66% C and 33% mineral substances. Expts. have shown that this product has considerable reënforcing action, is equal or superior to lamp black in this respect, and is about 40% as effective as the best gas blacks The tests from which these conclusions are drawn are described in detail. C. C. DAVIS

Results of a questionnaire on smoke-curing of rubber. R. G. FULLERTON. Rubber Research Inst. Malaya, *Quart. J.* **2**, No. 2, 69–100(1930).—The inquiry was conducted to obtain comparative figures of the efficiency of various types of smokehouses and of fuel consumption, the results of which are described in detail. C. C. DAVIS

Crystallized rubber. RALPH F. WOLF. *Rubber Age* (N. Y.) **28**, 79–80(1930).—Expts. on the prepn. of a cryst. rubber being carried on at the U. S. Bur. of Standards are described. Cryst. rubber has been found to consist of small transparent plates. To obtain such a product, ordinary rubber must be highly purified and then crystd. from Et_2O at a very low temp. This cryst. rubber has not been analyzed in a final way, but analyses indicate that it is not C_5H_8. Rubber can be distd. at 100° *in vacuo* with no apparent change. C. C. DAVIS

The thermodynamics of rubber. II. Temperature change of rubber under adiabatic stretching. D. S. ORNSTEIN, J. WOUDA AND J. G. EYMERS. *Rubber Chemistry & Technology* **3**, 403–8(1930).—See *C. A.* **24**, 3922. C. C. DAVIS

Compression of rubber. Some experimental results. F. JACOBS. *Rubber Age* (N. Y.) **27**, 653(1930).—English version of *C. A.* **24**, 4957. C. C. DAVIS

Service tests on rubber belts. E. G. KIMMICH. *Rubber Age* (N. Y.) **27**, 479–80 (1930).—The tests show the influence of pulley diam., tension, no. of plies, belt speeds, etc., on ply sepn. during service. C. C. DAVIS

Standardization of ozone testing. E. P. KEARSLEY. *Rubber Age* (N. Y.) **27**, 649–52 (1930).—English version of *C. A.* **24**, 4957. C. C. DAVIS

Method for preparing microsections of rubber. TRACEY F. STEELE. *Ind. Eng. Chem.*, Anal. Ed. **2**, 421–2(1930).—The method which is described and illustrated involves freezing with liquid air the specimen mounted in basswood (*Tilia americana*) Uncured and cured mixts. of all kinds except very soft ones can be readily examd. by this method. C. C. DAVIS

Hard-rubber dust, and some of its applications. FRANK BATH. *Rev. gén. caoutchouc* **7**, No. 64, 7–10(1930); cf. *C. A.* **24**, 4959.—Molds and molding problems are discussed. C. C. DAVIS

Rubber-making machinery. ANON. *Engineering* **130**, No. 3367, 95–8; No. 3369,

165–7; No. 3371, 225–7; No. 3373, 289–90(1930).—A review and discussion, illustrated with pictures and diagrams, of some of the most important modern machinery and its operation. C. C. DAVIS

Anti-friction bearings in rubber-mill equipment. W. B. MOORE. *Rubber Age* (N. Y.) **27**, 589–92(1930). C. C. DAVIS

Use of madder lake in accelerated rubber mixings. R. DITMAR AND O. FUHRMANN. *Caoutchouc & gutta-percha* **27**, 15172–3(1930).—Under proper conditions beautiful red vulcanizates can be obtained with madder lake (alizarin pptd. on Al_2O_3). In the base mixt.: pale crepe 100, S 3, ZnO 10, whiting 30, madder lake 5.44, the most attractive color in a press-cure at 152° was obtained with "Z-88" as accelerator. "Vulcafor VI" gave the next best results. With these accelerators beautiful reds were obtained. Madder lake cannot be used in S_2Cl_2 cures. C. C. DAVIS

Preservation of rubber goods by antioxidants. T. L. GARNER. *Chem. Age* (London) **23**, 252–3(1930); cf. *C. A.* **23**, 1772, 4101.—A general review. C. C. D.

Toxic substances in the rubber industry. XIII. Arsenic and its compounds. P. A. DAVIS. *Rubber Age* (N. Y.) **27**, 477–8(1930); cf. *C. A.* **24**, 4423. **XIV. Cadmium and its compounds.** *Ibid* 593–4. **XV. Ethyl acetate.** *Ibid* **28**, 27–8. C. C. DAVIS

Accelerators of vulcanization. F. JACOBS. *Caoutchouc & gutta-percha* **27**, 15165–72(1930).—The com. names, manufacturer, chem. names and formulas and the relative activities of 53 accelerators are given. C. C. DAVIS

Vulcanization accelerators. A survey of the patent literature of the last few years. I. ALADIN. *Gummi-Ztg.* **44**, 2534–5(1930). **II.** *Ibid* 2577–8. **III.** *Ibid* **45**, 15–7. IV. *Ibid* 67–8, 111–4. C. C. DAVIS

Ultra-accelerators. G. DUMONTHIER. *Rev. gén. caoutchouc* **7**, No. 64, 23–4(1930); cf. *C. A.* **24**, 3674.—Formulas are given to show the utility of tetramethylthiuram monosulfide ("Thionex") in rubber mixts. for footwear. C. C. DAVIS

The influence of zinc oxide on the action of the principal accelerators of vulcanization. The preparation of transparent vulcanized rubber. R. THIOLLET AND G. MARTIN. *Rubber Age* (N. Y.) **28**, 29–30(1930).—English version of *C. A.* **24**, 5179. C. C. DAVIS

Overflow during vulcanization, its dependence upon inactive and active fillers and errors in previous calculations on the specific gravity of vulcanizates resulting from it. RUDOLF DITMAR AND KARL H. PREUSSE. *Rubber Age* (N. Y.) **27**, 595–6(1930).—English version of *C. A.* **24**, 5180. C. C. DAVIS

Fertilizing rubber trees (BEAR) **15.** Activated ferric oxide (Brit. pat. 332,259) **18.** Rubberizing fabrics (Brit. pat. 331,594) **25.** Impregnating leather with rubber, etc. (Brit. pat. 331,263) **29.** Lining stills with rubber (Brit. pat. 331,838) **1.**

Dispersing rubber in water. WM. B. PRATT (to Dispersions Process, Inc.). U. S. 1,780,657, Nov. 4. Rubber is dissolved with NH_3 in a solvent such as C_6H_6 and the soln is mixed with water and the solvent removed by distn. to obtain a dispersion similar to latex. A stabilizer such as sulfonated castor oil may be used. Cf. *C. A.* **24**, 264.

Electrodeposition of rubber. WM. A. WILLIAMS. U. S. 1,778,841, Oct. 21. There is added to an alk. latex an electrolyte such as NH_4Cl which will not in itself readily cause coagulation but which in conjunction with suitable electrodes such as Zn and C immersed in the mixt., and directly and conductively connected with each other externally, will act as a self-excitant, setting up an electromotive force in the circuit sufficient to effect deposition of the rubber or similar material upon the anode without production of gas bubbles at the anode. Cf. *C. A.* **24**, 4665.

Electrophoretic deposition of rubber, etc. DUNLOP RUBBER CO., LTD., D. F. TWISS and R. G. JAMES. Brit. 331,563, Feb. 7, 1929. The H-ion concn. is increased in the presence of suitable protective colloids such as casein, hemoglobin, saponin, egg albumin, gelatin or licorice to such a degree that the charge on the particles is reversed without causing coagulation. A p_H of 0 to 5 may be used, and numerous details of procedure are described.

Preserving rubber. ALBERT M. CLIFFORD (to Goodyear Tire & Rubber Co.). U. S. 1,779,390, Oct. 21. Vulcanization is effected in the presence of a reaction product of piperidine and α-, β- or chloronaphthol.

Use of phenyl-α-naphthylamine to render rubber resistant to deterioration from age. JAN TEPPEMA (to Goodyear Tire & Rubber Co.). U. S. 1,781,306, Nov. 11. About 2% or less of phenyl-α-naphthylamine or a similar compd. may be added.

Continuous process of forming sponge-rubber strips. BENJAMIN B. FELIX (to Featheredge Rubber Co.). U. S. 1,780,122, Oct. 28. Mech. features.

Rubber plates containing embedded cords. HERMANN DEBOR. U. S. 1,781,370, Nov. 11. Substantially uniform pressure is applied about the entire periphery of cords to reduce their diam. to less than the normal diam. and they are then embedded in rubber.

Uniting fibrous materials with metals, etc., by use of rubber. LORIN B. SEBRELL (to Goodyear Tire & Rubber Co.). U. S. 1,781,649, Nov. 11. See Brit. 310,461 (*C. A.* **24**, 752).

Substituted thiuram polysulfides. GEORGE S. WHITBY (to Roessler & Hasslacher Chem. Co.). U. S. 1,780,545, Nov. 4. Tetraalkyl polysulfides which may be used as *accelerators in rubber vulcanization* are produced by treating salts of dialkyldithiocarbamic acid such as Na dimethyldithiocarbamate with S chloride.

Condensation products of aldehydes and amines (rubber vulcanization accelerators). IRA WILLIAMS and WALDO B. BURNETT (to E. I. du Pont de Nemours & Co.). U. S. 1,780,326, Nov. 4. Condensation products of undefined mol. structure are produced by condensation of 1 mol. proportion of an amine such as aniline, butylamine, ethylamine, *o*-tolyldiguanide, ethylaniline, ethylenediamine or the like with a plurality of mol. proportions of an aldehyde such as acetaldehyde, propionaldehyde, butyraldehyde, heptaldehyde, crotonaldehyde, citral, acetaldol or α-ethyl-β-propylacrolein, etc. Numerous examples and details of making these products are given. U. S. 1,780,334 relates to condensation of similar starting materials in the presence of acid substances.

Rubber vulcanization accelerators. I. G. FARBENIND. A.-G. Brit. 331,885, April 11, 1929. Compds. mentioned as accelerators include mixed disulfides formed from μ-benzothiazyl *p*-nitrophenyl disulfide, 4-methoxy-6-chloro-2-benzothiazyl *p*-nitrophenyl disulfide and 4,6-dichloro-2-benzothiazyl *p*-nitrophenyl disulfide, by heating together the 2 reacting materials in the presence of a solvent such as C_6H_6 or toluene.

Rubber vulcanization accelerators. WINFIELD SCOTT (to Rubber Service Laboratories Co.). U. S. 1,779,715, Oct. 28. See Can. 298,698 (*C. A.* **24**, 2918).

Mold for curing rubber tires. PARRY KELLER (to Goodyear Tire & Rubber Co.). U. S. 1,781,658, Nov. 11.

Mold for vulcanizing tires. PARRY KELLER (to Goodyear Tire & Rubber Co.) U. S. 1,779,396, Oct. 21. Structural features.

Apparatus for vulcanizing tires. J. A. SPENCER-SMITH. Brit. 331,698, July 10, 1929. Structural features.

Apparatus for vulcanizing inner tire tubes. RALPH W. HUTCHENS and ARNOLD R. KRAUSE (to Gillette Rubber Co.). U. S. 1,781,393, Nov. 11. Structural features.

Apparatus for vulcanizing tire casings. WILBUR F. WIRGMAN, JR., and MOSES E. TEDROW (to Goodyear Tire & Rubber Co.). U. S. 1,779,385, Oct. 21. Structural features.

Apparatus for vulcanizing rubber soles of footwear, etc. LIVERPOOL RUBBER CO., LTD., F. AMENDE and T. R. DIBDIN. Brit. 331,187, March 20, 1929. Structural features.

Rubber vulcanization. WILLIS A. BOUGHTON. U. S. 1,781,492, Nov. 11. An ammoniacal suspension of rubber is treated with a gas comprising a hydride of an element of the "S family" the atomic wt. of which is at least as great as that of S, such as H_2S, in excess of the quantity required to react with the NH_3. This serves to form a product which may be prepd. on cloth, paper, pulp, etc., as a waterproofing, or in other forms.

Rubber vulcanization. DONALD H. POWERS (to E. I. du Pont de Nemours & Co.). U. S. 1,780,149, Oct. 28. An accelerator is prepd. by condensing 2 mols. of an aliphatic aldehyde having 7 C atoms or less such as heptaldehyde with about 2 mols. of an aliphatic amine such as methylamine and causing the resulting condensation product to react with 1–2 mols. of CH_2O while cooling to prevent overheating.

Rubber vulcanization accelerator. WINFIELD SCOTT (to Rubber Service Laboratories Co.). U. S. 1,780,604, Nov. 4. Phenyl-*p*-piperidylphenylguanidine is used as an accelerator.

Vulcanizing rubber. LORIN B. SEBRELL (to Goodyear Tire & Rubber Co.). U. S. 1,779,375, Oct. 21. There is used as an accelerator a reaction product of mercaptobenzothiazole with a condensation product of a straight-chain aldehyde and an amine of the formula RNH_2 in which R is a benzene group, such as crotylideneaniline. Cf. *C. A.* **24**, 3926.

CHEMICAL ABSTRACTS

Vol. 25. JANUARY 20, 1931 No. 2

1—APPARATUS AND PLANT EQUIPMENT

W. L. BADGER

Electrically operated water bath with extraction apparatus. A. BEHRE. *Chem.-Ztg.* **54**, 763–4(1930). J. H. MOORE

Rapid cooling device. RUDOLF KOHLMANN. *Chem.-Ztg.* **54**, 764(1930). J. H. MOORE

An improved Victor-Meyer molecular-weight apparatus. MILDRED M. HICKS-BRUUN. *Bur. Standards J. Research* **5**, 575–83(1930).—Berthelot's method of limiting d. is made use of in detg. the mol. wt. of hydrocarbons, eliminating to a large extent the effects of departure from the perfect gas laws. A modified Victor-Meyer mol.-wt. app. and the technic employed in its use are described. The modification avoids the difficulties of local temp. differences and permits measurements at 2 pressures, 1 atm. and 0.5 atm. Expts. with hydrocarbons gave mol. wts. differing from the theoretical by the following deviations: benzene, 0.2%; hexane, 0.24%; naphthalene, 0.06%. ALLEN S. SMITH

Cock without packing-gland for the acid industry. HEINRICH OEITINGER. *Chem. Fabrik* 1930, 486.—The cock is made of "Antacid" and the construction is similar to that of stoneware cocks. J. H. MOORE

A form of condenser for use with high-boiling point liquids. GEORGE W. MCCREA. *J. Chem. Education* **7**, 2963–5(1930). E. H.

A condenser for low-temperature evaporation of water. H. M. EVANS, R. E. CORNISH AND J. C. ATKINSON. *J. Am. Chem. Soc.* **52**, 4334–5(1930).—An app. is described in which H_2O may be distd. at about 7°. J. H. MOORE

A design of metal x-ray tube. N. S. GINGRICH. *Rev. Sci. Instruments* **1**, 691–3 (1930). E. H.

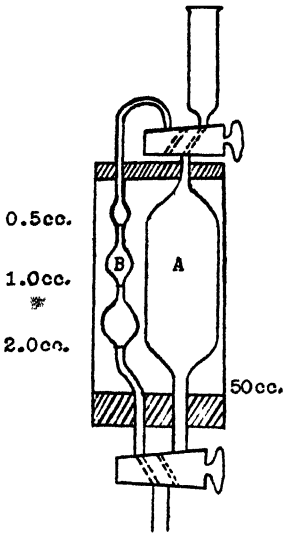
A vacuum-tube potentiometer applicable for use with glass electrodes of high resistance. DELAFIELD DUBOIS. *J. Biol. Chem.* **88**, 729–41(1930).—A modification of Stadie's potentiometer (*C. A.* **23**, 4598) is described, a screen-grid vacuum tube at low grid voltage being used. Drifts of potential do not occur with this set-up. K. V. T.

Combined use of the photoelectric cell and projection microscope. ALFRED SAVAGE AND M. C. JAMIESON. *Can. J Research* **3**, 322–26(1930).—The combined use of a projection microscope, a red dye (fuchsin) and a photoelec. cell insensitive to red light to measure rapidly the size of cells is described. Colored cells (uredospores of *Puccinia gramivis* and red blood cells), interposed between the incident light and the photoelec. cell, affected the illumination in proportion to the size of the cell and intensity of the stain. The photoelec. current was found to be inversely proportional to the sizes of the images and at low magnification was measured by the deflections of a sensitive galvanometer. J. W. SHIPLEY

A new apparatus for electrometric volumetric analysis with electron tubes. E. BERL, W. HERBERT AND W. WAHLIG. *Chem. Fabrik* 1930, 445–6, 458–60.—A description of an app. designed by the authors, with operating directions and 6 references. J. H. MOORE

Determination of carbon and hydrogen. EDGAR STANSFIELD AND JOHN W. SUTHERLAND. *Can. J. Research* **3**, 318–21(1930).—The authors describe a combustion tube modified to secure complete combustion of coal with the least liability to error. The combustion tube can be easily emptied, cleaned and repacked and because none of the reagents comes in contact with the walls of the tube it has, with reasonable care, a long life. CuO and contact Pt are used, the former in a porcelain boat. An electrically, internally heated quartz tube is used instead of the customary CuO diffusion spiral. A thermocouple is permanently installed in the transparent quartz tube, thereby insuring accurate temp. control. The paper includes a diagram of the combustion tube accompanied by a full description of its operation. It may be used for the detn. of H_2 and O_2 in any org. material. J. W. SHIPLEY

A new form of apparatus for determination of gases by manometric measurement. HSIEN WU. *Proc. Soc. Exptl. Biol. Med.* 27, 883–5(1930).—The apparatus (Fig. 1) differs from that of Van Slyke (cf. *C. A.* 18, 3615) in that 2 chambers are used, one for the extn., the other for measuring the gas. It is used essentially in the same way as the Van Slyke app. It is superior in that the measuring chamber is always clean, the calibration is more accurate, the gas as repeatedly extd. is stored in chamber *B* and the total vol. ascertained at one reading, fractional analyses of the extd. gas can be done by absorbing with various reagents in chamber *A* and the residual gas measured in *B*, the vacuum reading for the same kind of soln. is const., irrespective of the vol. used for extn. C. V. BAILEY



The measurement of a rapidly fluctuating flow of gas. J. S. KING AND B. H. WILLIAMS. *Dept. Sci. Ind. Research, Fuel Research Tech. Paper* No. 27, 18 pp.(1930).—Full details, with cuts and charts, of the construction, calibration and operation of a *device* for photographically recording the flow of *water-gas* made, and the air supplied during the blow, based on the pressure drop across an orifice. The method is quite simple and the results seem satisfactory. J. H. MOORE

Differential ebullioscope provided with a dephlegmator and its application. W. SWIETOSLAWSKI. *Roczniki Chem.* 10, 570–8(578 French)(1930).—A differential ebullioscope with a dephlegmator is described suitable for the study of the purity of single liquids as well as azeotropic and eutectic substances. The same app. is modified for the study of small quantities of liquids. An arrangement for the regulation of filling the ebullioscope is outlined. The ebullioscope is used for the study of ebullition temp. t_H and condensation temp. t_B of a substance. If the liquid (single, azeotropic or eutectic substance) does not contain any impurities, both temps. t_H and t_B are identical. On the other side, a difference $\Delta t > 0$ is observed when the liquid contains impurities. Several substances were examd.: 3 samples of MeOH (Poulenc, Riedel-de Haën, synthetic), benzene (Merck), toluene (Merck, for ebullioscopic investigations), CS_2. In all cases studied the difference Δt was greater than 0, except with C_6H_6 and CS_2. An example of detn. of the quantity of H_2O in the azeotropic Me_2CO-CS_2 is also cited. J. KUČERA

Apparatus for the determination aboard ship of the salinity of sea water by the electrical conductivity method. FRANK WENNER, EDWARD H. SMITH AND FLOYD M. SOULE. *Bur. Standards J. Research* 5, 711-32(1930).—An elec. salinity bridge is described which furnishes a convenient means for the detn. of the salinity of samples of sea water as they may be collected. The app. consists essentially of a Wheatstone bridge, cond. cells adapted to filling and emptying without removal from the thermostat, and measuring instruments, all built into a single cabinet suited to severe sea conditions. Effects of polarization and differences in temp. coeff. are reduced by using 2 similar cells filled with sea water in adjacent arms of the bridge. A supply of standard sea water was used for frequent standardization. Three sets of equipment have been built and used on various expeditions with satisfactory results. The instrument compares well in performance with titration measurements, is capable of individual measurements accurate to within 0.02% and is well adapted to the measurement of total salt. ALLEN S. SMITH

Electric tube furnace for laboratory use, especially for microelementary analysis. P. A. THIESSEN. *Chem. Fabrik* 1930, 493–5.—The refractory tube of Al silicate, or other material, has parallel channels lengthwise in the inner wall, open on the inside and contg. the spiral heating wires. The heat is thus radiated directly on the combustion tube instead of being transmitted through the refractory tube. Operating directions for microanalyses and other uses are given, with 7 references. J. H. MOORE

A microfurnace for temperatures above 1000°. H. S. ROBERTS AND G. W. MOREY. *Rev. Sci. Instruments* 1, 576–80(1930).—The accuracy and limitations of the microfurnace as a tool for the investigation of phase relations and m. p. at high temps. are discussed. The furnace consists essentially of a strip of platin-rhodium bent in the form of a U. A source of const. current is described. The 2 major sources of error in measuring the temp. of a substance on the strip, which may be minimized by calibration, are (1) differences in temp. between top and bottom of the charge and (2) uncertainties in

the detn. of the true temp. of the strip. The upper limit for a single strip is about 1850°. The lower limit is that of the optical pyrometer. Readings at sharp m. p. were duplicated within 10° at temps. above 1400°. ALLEN S. SMITH

A simple substitute for a Kipp generator. FRANK LANE. *J. Chem. Education* **7**, 2583(1930).—The app. is quickly made from 2 wide-mouth bottles and glass tubing. J. H. MOORE

Another hydrogen sulfide generator. W. A. MANUEL. *J. Chem. Education* **7**, 2608(1930).—The app. is made from two 250-cc. leveling bulbs connected with rubber tubing. J. H. MOORE

Maintenance of a standard of electromotive force: Notes on standard Weston cells. A. NORMAN SHAW AND H. E. REILLEY. *Can. J. Research* **3**, 473–89(1930).—A detailed procedure for the maintenance of a standard of voltage to within 1 or 2 parts in a million is described. A summary of data on standard cells is included. J. W. S.

Apparatus for determining tendency of coal and other materials for spontaneous combustion (KREULEN) **21.** Self-carbureting of industrial gases from brown coals (FREUND, BECKER) **21.** Gas generator and burner suitable for utilizing liquid fuels (U. S. pat. 1,783,564) **21.**

Rotary filter. EDWARD W. W. KEENE. U. S. 1,783,937, Dec. 2.

Air filter. MASCHINEN- UND WERKZEUGFABRIK KABEL VOGEL & SCHEMMANN. Ger. 506,488, Nov. 22, 1929. Means is described for joining a no. of filter plates in zig-zag fashion, so as to form pockets.

Apparatus for filtering air and other gases. FRIEDRICH CLASEN and HEINRICH LENCKERSTORF (to Maschinenfabrik Beth, A.-G.). U. S. 1,784,339, Dec. 9. Structural features.

Bag filter for filtering air or other gases. I. L. BRAMWELL, C. W. H. HOLMES and BIRTLEY IRON CO., LTD. Brit. 332,601, Jan. 23, 1929. Structural features.

Filter suitable for treating gases or vapors. ALBERT SCHREMPP. U. S. 1,783,143, Nov. 25.

Automatic resistance-controlled air and gas filter. HANS E. BIRKHOLZ (to American Air Filter Co.). U. S. 1,783,181, Dec. 2. Structural features.

Air-cleaning device (suitable for use on automobiles). HERMAN B. ANGLEMEYER. U. S. 1,781,742, Nov. 18. Structural details.

Apparatus for cleaning air-filter cells. JOHN R. MCCONNELL and ALBERT S. LEWIS, JR. (to American Air Filter Co.). U. S. 1,783,194, Dec. 2. Structural features.

System of material circulation through associated filter units, to effect filtration and cleaning of the filters. LEWIS L. DOLLINGER (to Staynew Filter Corp.). U. S. 1,784,278, Dec. 9. Various details of filter construction and operation are described.

Filter-sand washing apparatus. MORRIS L. BAYARD and MINOR HARVEY. U. S. 1,784,798, Dec. 9. Structural features.

Liquefaction and rectification system for separating constituents of gaseous mixtures such as air. CLAUDE C. VAN NUYS and JOSEPH L. SCHLITT (to Air Reduction Co.). U. S. 1,784,120, Dec. 9. App. and various details of procedure are described.

Apparatus for separating entrained particles from gases. FRIEDRICH EICKHOLT. U. S. 1,784,664, Dec. 9. Structural features.

Apparatus for separating solid particles from gas streams. WALTER M. COOK (to International Combustion Engineering Corp.). U. S. 1,783,357, Dec. 2. Structural features.

Filter for cleaning fluids such as naphtha. PAUL W. MORGAN (to Morgan Cleaners Equipment Co.). U. S. 1,783,444, Dec. 2. Structural features.

Continuous-pressure filter and cake-discharging apparatus. JASPER A. MCCASKELL. U. S. 1,784,372, Dec. 9. Structural features.

Apparatus for degasifying liquids, particularly liquid fuels. ALFRED LANSER. Ger. 506,040, Apr. 11, 1928.

Apparatus for separating entrained liquid from vapors such as produced in concentrating juice or sirup. JAMES HAMILL. U. S. 1,784,627, Dec. 9. Structural features.

Apparatus for gravity separation and recovery of oils and grease from garage waste, etc. W. G. MORSE. Brit. 332,569, Feb. 23, 1929. Structural features of an app which may be steam heated.

Apparatus for separating lump materials of different electric conductivities. BARTHEL GRANIGG. Ger. 494,092, Feb. 9, 1927.

; gravity.
B. L. BOURKE and BIRTLEY IRON CO., LTD. Brit. 332,583, Jan. 23, 19 Structural features.

Apparatus for separating materials of different specific gravities such as minerals by the action of vibration and air currents. KENNETH DAVIS (to Peale-Davis Co.). U. S. 1,782,391–2, Nov. 18. Structural features.

Helical mixing apparatus for liquids. MASCHINENFABRIK AUGSBURG-NÜRNBERG A.-G. Ger. 504,629, June 14, 1929.

Apparatus for indicating mean temperature. MARSHALL TAYLOR. U. S. 1,782,106, Nov. 18.

Heat indicator suitable for use with engine-cooling systems. HERMAN SCHLAICH. U. S. 1,784,756, Dec. 9. Various details are described of a device, the temp.-responsive element of which may be inserted in the hose of an internal-combustion engine-cooling system.

Photoelectric cell. SOC. DES USINES CHIMIQUES RHÔNE-POULENC. Brit. 332,733, July 12, 1929. The cathode and an auxiliary electrode may consist of K deposited on supports or on a glass envelope, with a filling of A at low pressure. Various details of operation are described.

Electric discharge devices. A. A. J. CROWNE. Brit. 332,734. July 4, 1929. A cathode is used comprising a radio-active substance such as U and a photoelec. substance such as Rb or K. Various details of manuf. and operation are described.

Electric discharge devices. M-O VALVE CO., LTD., and D. A. RANKIN. Brit. 332,695, June 12, 1929. For producing a high thermionic emission characteristic without increasing the thermal emissivity, cathodes with a core such as W wire are provided with a white coating produced by applying a white oxide of a volatile metal such as ZnO which is afterward subjected to the vapor of an alk. earth metal such as Ba (which may be produced in the valve by decompg. Ba azide by heating) so that part at least of the oxide is reduced (the reduced Zn being evapd.).

Apparatus for freezing ice cream, egg yolks and whites, processing oils, salves, confections, etc. CLARENCE W. VOGT (to Vogt Instant Freezers, Inc.). U. S. 1,783,864–5–6–7, Dec. 2.

Indicating variations in density of gases. HERBERT H. DOW (to Dow Chemical Co.). U. S. 1,782,032, Nov. 18. Alternating opposing blasts of the gas under test and of another gas of substantially constant d. are directed on a device such as a bladed rotor movable in either direction, so that the movement of this device indicates the d. of the gas undergoing test. Various details of app. are described.

Gas-storage cylinders (for holding gas under pressure). CHESTERFIELD TUBE CO., LTD., and S. B. N. HILL. Brit. 332,556, April 22, 1929. Structural features.

Alarm device for operating a signal on the escape of poisonous or explosive gases such as illuminating gas. ANDERS H. OLSSON and PER D. PETERSON. U. S. 1,783,974, Dec. 9.

Tower and plate apparatus for contact of liquid and gas such as in gas scrubbing or absorption. FREDERICK H. WAGNER (to Bartlett Hayward Co.). U. S. 1,782,862, Nov. 25. Structural features.

Apparatus for degasifying liquids such as oils and fluid insulating materials, by spraying in vacuum. SOCIETÀ ITALIANA PIRELLI and L. EMANUELI. Brit. 332,542, April 19, 1929. Structural features.

Combined spray-drying and gas-combustion apparatus. INGENUIN HECHENBLEIKNER (to Chemical Construction Corp.). U. S. 1,782,822, Nov. 25. A spray-drying chamber with an apertured upper wall carries a superposed combustion chamber for generating and supplying hot gases to the drying chamber through the apertured upper wall of the latter. Various details of construction are described.

Apparatus for spray-desiccation of liquids or similar operations. BEN F. UHL (Industrial Spray-Drying Corp.). U. S. 1,782,054, Nov. 18. Various details of app. and mode of operation are described.

Evaporating apparatus suitable for liquids. HARLAN W. HOW (to Buffalo Foundry & Machine Co.). U. S. 1,782,143, Nov. 18. Structural features.

Bone-char-drying apparatus. JAMES HAMILL and JOHN F. TADDIKEN. U. S. 1,784,626, Dec. 9. Structural features.

Drying tunnel and apparatus for passing materials through the tunnel. ALLGEMEINE ELEKTRIZITÄTS-GES. (to International General Electric Co.). Brit. 332,491, Nov. 3, 1928. Mech. and elec. control devices are described.

Storage vessel for viscose and like masses. WOLFF & Co. KOMM.-GES. AUF [illegible] and WILHELM NASCHOLD. Ger. 506,147, Aug. 22, 1929.

Bin and hopper suitable for feeding powdered or lump chemicals. ELMER E. HARPER. U. S. 1,783,423, Dec. 2.

Apparatus suitable for various chemical or evaporating operations. FRANZ LAPPE, EDWIN KOCH, MATHIAS PIER and HANS SAUER (to I. G. Farbenind. A.-G.). U. S. 1,783,726, Dec. 2. The app. is formed of iron which has been treated at high temps., and under conditions precluding oxidation, with a gas (such as H at 900°) capable of forming gaseous compds. with the impurities such as O, S and C originally present in the metal (this treatment rendering the iron resistant to corrosion).

Optical system for illuminating opaque objects for microscopic examination. HARRY S. GEORGE (to Electro Metallurgical Co.). U. S. 1,784,425, Dec. 9.

Crucibles. WILLIS R. WHITNEY (to General Elec. Co.). U. S. 1,784,647, Dec. 9. In making crucibles, suitable for elec. induction furnaces, having an inner heating resistor and an outer heat refractory layer, the crucible is molded from a mixt. of heat-refractory material such as fireclay and powd. resistance-heating material such as graphite and the resistance-heating material is then burned out of an outer layer of the heat refractory material so as to leave an inner heating resistor.

Oil- or coal-fired tilting crucible furnace. J. W. PENICUD. Brit. 332,701, June 17, 1929.

Double-walled rotary muffle furnace. "SACHTLEBEN" A.-G. FÜR BERGBAU UND CHEM. IND. (Johann Küppers, inventor). Ger. 506,145, Mar. 25, 1926.

Stack recuperator suitable for use with open-hearth furnaces. WALTER J. KELLY, MILTON P. BURNS and ARCHIE BARR. U. S. 1,782,430, Nov. 25. Structural features.

Regenerative heating and smelting furnace, fired with coal dust. FRIEDRICH SIEMENS A.-G. Ger. 506,353, Mar. 2, 1927.

Sealing means for rotary tube furnaces, etc., rotating in a stationary casing. FRIED. KRUPP GRUSONWERK A.-G. Ger. 489,486, May 21, 1927. Addn. to 464,675.

Change-over valve for regenerative furnaces. MAX SCHNURPFEIL. Ger. 506,187, July 6, 1929.

Combustion chamber for pulverulent fuels. WILFRED R. WOOD. Ger. 506,462, Dec. 3, 1925. This corresponds to Brit. 253,895.

Burner with internal combustion chamber for a gas-heated annealing furnace. MAX NUSS. Ger. 504,733, Apr. 1, 1926.

Under-blast traveling grate. L. & C. STEINMÜLLER. Ger. 506,461, Aug. 25, 1928.

Device for air-cooling furnace grates. ALEXEJ LOMSCHAKOFF and PETER DMITREVSKI. Austrian 119,137, Apr. 15, 1930.

Rotary kiln. E. G. STONE. Brit. 332,761, Aug. 6, 1929.

Revolving tube kiln cooler. SOCIÉTÉ D'EXPLOITATION DES PROCÉDÉS INDUSTRIELS CANDLOT. Ger. 504,585, Nov. 3, 1929. Addn. to 483,687.

Tunnel kiln suitable for use with oil or gas burners. H. M. ROBERTSON. Brit. 332,619, Jan. 23, 1929.

Gas burner. HERRY E. KERR (to Barber Gas Burner Co.). U. S. 1,781,784–5, Nov. 18.

Gas burner. FREDERICK H. WILLCOX and EDGAR P. EVERHARD (to Freyn Engineering Co.). U. S. 1,781,796, Nov. 18.

Gas burner for furnaces. JOSEPH L. GIACOMINO (to Carl W. Gibson). U. S. 1,782,683, Nov. 25.

Gas burner. GARNET W. MCKEE. U. S. 1,783,195, Dec. 2.

Portable heat-exchange device suitable for use as a heater or cooler. JEAN B. D. L. CHARDARD (to Risler Corp. of America). U. S. 1,783,355, Dec. 2. Structural features.

Heat-exchange apparatus suitable for conditioning air. FRANK BATTER. U. S. 1,781,913, Nov. 18.

Heat-exchange apparatus for use with sulfurous gases, etc. HENRY F. MERRIAM (to General Chemical Co.). U. S. 1,782,435, Nov. 25. Structural features.

Heat-exchange apparatus suitable for cooling oils with water or for various other purposes. STANLEY J. CHUTE (to Griscom-Russell Co.). U. S. 1,782,409, Nov. 25. Structural features.

Pressure-relieving apparatus for autoclaves. THOMAS GRISWOLD, JR. (to Dow Chemical Co.). U. S. 1,783,163, Nov. 25.

Condenser suitable for use in the production of mercury. EMANUEL W. HARTMAN. U. S. 1,783,286, Dec. 2. Structural features.

Acetylene generator. EWALD LÜTSCHEN. Ger. 504,547, Jun. 15, 1926. Details of construction.

Acetylene generators. JACOB KNAPPICH. Ger. 504,776, Feb. 19, 1929. To prevent piling and clogging of the spent CaC_2, the water container is provided with 2 staggered endless conveyors which catch the CaC_2 and finally drop it on an inclined plate leading to a lower receptacle.

Thermostatic electric switch. HOWARD D. MATTHEWS (to Westinghouse Elec. & Mfg. Co.). U. S. 1,783,179, Dec. 2. Structural features.

Thermostatic control for electric apparatus. EDWIN A. RUTENBER (to A. J. Lindemann & Hoverson Co.). U. S. 1,783,309, Dec. 2.

Thermostatic device suitable for use with various apparatus. MAX MASON (30% to Louis B. Slichter, 30% to Donald L. Hay and 10% to Donald C. Slichter). U. S. 1,782,045, Nov. 18. Structural features.

Thermostatic control for ovens heated by gas or electricity. ARTHUR W. WALKER. U. S. 1,783,320, Dec. 2. Structural features.

Thermostat suitable for operating dampers, etc. JAMES J. LAWLER. U. S. 1,783,574, Dec. 2. Structural features.

Thermostatic control device for heating systems. FRED I. RAYMOND. U. S. 1,784,538, Dec. 9. Structural features.

Thermostatic valve-control device. WM. F. SEARLE, JR. (to Fulton Sylphon Co.). U. S. 1,784,077, Dec. 9. Structural features.

Thermostatic valve-control device. JAMES J. LAWLER. U. S. 1,784,734, Dec. 9. Structural features.

Thermostatic valve. EDGAR J. LEACH (to Time-O-Stat Controls Co.). U. S. 1,783,730, Dec. 2.

Thermostatic valve. WM. W. CARSON, JR. (to Fulton Sylphon Co.). U. S. 1,784,041-2, Dec. 9.

Thermostat. THOMAS R. CLARK (to Fulton Sylphon Co.). U. S. 1,784,045, Dec. 9.

Thermostatic valve. JEAN V. GIESLER (to Fulton Sylphon Co.). U. S. 1,784,053-4-5 and U. S. 1,784,057-8-9-60-1-2-3, Dec. 9.

Thermostatic valve. JEAN V. GIESLER, WM. W. CARSON, JR., and THOMAS R CLARK (to Fulton Sylphon Co.). U. S. 1,784,056, Dec. 9.

2—GENERAL AND PHYSICAL CHEMISTRY

FREDERICK L. BROWNE

J. M. van Bemmelen. W. P. JORISSEN. *Chem. Weekblad* **27**, 598-9(1930).—**Significance of the work of J. M. van Bemmelen in regard to the knowledge of the soil.** D. J. HISSINK. *Ibid* 600-3. **Colloid chemical investigations of van Bemmelen and his influence on the development of modern colloid chemistry.** H. G. BUNGENBERG DE JONG. *Ibid* 603-6. E. C. K.

Karl Daniel. W. BÖTTGER *Chem.-Ztg.* **54**, 869(1930).—Obituary. E. H.

Ludwig Moser. F. BÖCK *Z. angew. Chem.* **43**, 1001-2(1930).—Obituary. E. H.

Thomas Messinger Drown R. D. BILLINGER. *J. Chem. Education* **7**, 2875-86 (1930).—A biography. E. H.

Francis Perry Dunnington. CHAS. L. REESE. *Ind. Eng. Chem.* **22**, 1408-9 (1930).—Biography with portrait E. C. K.

Jean de Meun and alchemy. FREDERIC WALKER. *J. Chem. Education* **7**, 2863-74(1930). E. H.

A new alchemical handbook of the period around 1300. EDMUND O. VON LIPPMANN. *Chem.-Ztg.* **54**, 869-71(1930). E. H.

Scotland's contribution to chemistry. JAMES C. IRVINE. *J. Chem. Education* **7**, 2808-28(1930). E. H.

Making laboratory work in general chemistry effective. R. K. CARLETON. *J. Chem. Education* **7**, 2913-5(1930). E. H.

A convenient system of water thermostats for laboratory instruction. ROBERT TAFT. *J. Chem. Education* **7**, 2953-62(1930). E. H.

The making and use of tetrahedron models. R. HARMAN ASHLEY. *J. Chem. Education* **7**, 2904-12(1930). E. H.

Reform of chemical nomenclature. IX. G. SIBONI. *Boll. chim. farm.* **69**, 761-70. X. *Ibid* 849-52, 855-7(1930); cf. *C. A.* **24**, 5545. G. SCHWOCH

The Gibbs-Helmholtz formula. S. E. GARCÍA SUBERO. *Anales soc. espan*

fis. quím. **28**, 1089–97(1930); cf. Palacios, *C. A.* **24**, 2924. **Reply.** J. Palacios, *Ibid* 1098–9(1930).—Polemical. E. M. SYMMES

New fixed point in thermometry. OTTO REDLICH AND GUSTAV LÖFFLER. *Z. Elektrochem.* **36**, 716–22(1930).—With a Pt resistance thermometer the transition points of $NaNO_3.Na_2SO_4.10H_2O$ to $NaNO_3.Na_2SO_4.H_2O$ and of $Na_2SO_4.10H_2O.NaCl$ to $Na_2SO_4.H_2O.NaCl$ were measured as 13.154° ± 0.0011° and 17.878° ± 0.0022°, resp. The eutectic point of KCl with ice was found to be −10.646° ± 0.0025°. L. P. H.

Physical technic in inorganic chemical technic. P. GMELIN. *Chem. Fabrik* 1930, 433–4, 446–9, 457–8, 469–72.—A discussion of the work of the physicist in problems of control and safety in operation, plant investigations, phys. devices and processes for research and plants labs., with 20 charts and cuts and 32 references. J. H. MOORE

"Practical" atomic weights. R. J. MEYER AND F. STRUWE. *Z. angew. Chem.* 43, 928–30(1930).—"Air at. wts." have no advantage over "vacuum at. wts." in chem. analysis. Cf. *C. A.* **24**, 5252. L. P. HALL

Influence of the size of the slit on the absolute value of the effective cross section. OTTO BEECK. *Z. Physik* **64**, 727(1930); cf. *C. A.* **24**, 4191.—Correction of an error. The size of the slit has no effect on the effective diam. if Ramsauer's two-cage method is used. EGON BRETSCHER

The photochemical primary process. H. SPONER. *Z. angew. Chem.* **43**, 823–30 (1930).—A review with a tabulation of spectroscopically detd. heats of dissocn. C. E. P. JEFFREYS

Selective solubility of hydrocarbons in aniline. YA. KHISIN. *Neftyanoe Khozyaistvo* **18**, 996–9(1930).—Extn. with aniline removes C_6H_6 or unsatd. hydrocarbons completely from their mixts. with synthetic satd. hydrocarbons. Only half the naphthenes are removed from their mixt. with satd. hydrocarbons even after 10 extns. with equal vols. of aniline. A. A. BOEHTLINGK

Proof of the impossibility of spontaneous magnetization. A remark on the theory of Weiss-Heisenberg. N. S. AKULOV. *Z. Physik* **64**, 559–62(1930).—If spontaneous magnetization existed, reversing the sense of magnetization in the direction of highest magnetizability in a single crystal of Fe would cause the magnetic vector to pass through directions of higher magnetic energy. This energy difference is much larger than the energy losses due to hysteresis, which is vanishingly small for pure Fe. E. B.

Theory the magnetization curve. II. The magnetization of nickel wire under strong tension. R. BECKER AND M. KERSTEN. *Z. Physik* **64**, 660–81(1930).—A corrected formula is derived on the bases of the theory previously advanced (*C. A.* **24**, 5191) for the energy of a distorted cubic lattice and the curve of magnetization as function of the tension. The applied magnetic field is obtained. For high tension Z, the field necessary to produce magnetic satn. is proportional to Z and the magnetostriction is $^3/_2$ times larger than for metal free from tension. Expts. support these conclusions. EGON BRETSCHER

The magnetic characteristic of iron crystals. WALTHER GERLACH. *Z. Physik* 64, 502–6(1930).—The coercive force of single crystals of Fe vanishes if the crystals are chemically and physically pure (free from internal tension). The energy losses on magnetization, resulting from hysteresis, disappear completely. EGON BRETSCHER

The variation of resistance of thin layers of bismuth in a magnetic field. FRIEDRICH GROSS. *Z. Physik* **64**, 520–36(1930).—The variation of the resistance of thin layers of Bi (up to 6μ thick) in a magnetic field depends upon the method of its prepn. To obtain high sensitivity, the Bi is sublimed *in vacuo* on a film of glass which is kept just below 270° (m. p. of Bi). The variation of resistance amounts in this case to 90% in a field of 28,300 gausses. Low sensitivity is caused by gas occlusion. The Bi layers thus obtained are always cryst. (sometimes orientated) as shown by x-ray reflection. E. B.

The structure of thin layers of bismuth. WILHELM BÜSSEM, FRIEDRICH GROSS AND KARL HERRMANN. *Z. Physik* **64**, 537–46(1930); cf. preceding abstr.—Bright thin layers of Bi consist of crystallites which are orientated (fiber structure); the gray modification contains the crystals in random orientation. The lattice is rhombic and possesses the same parameters as ordinary Bi. EGON BRETSCHER

A new phenomenon in the change of resistance in a magnetic field of single crystals of bismuth. L. SHUBNIKOW AND W. J. DE HAAS. *Nature* **126**, 500(1930); cf. *C. A.* 24, 4435, 4678–9. ARTHUR FLEISCHER

A simple, accurate method for measuring the diamagnetic susceptibility of dissolved substances. SIMON FREED AND CHARLES KASPER. *Phys. Rev.* **36**, 1002–4(1930).—A very accurate quasi-null method is described. Independent runs with NaI soln. agreed within ±0.06%. BERNARD LEWIS

The dielectric constant of gaseous hydrogen cyanide and its dipole moment.

KARL FREDENHAGEN AND FRITZ MASKE. *Z. physik. Chem.*, Abt. B, **10**, 142–8(1930).—The dielec. const. of vapor from liquid HCN held between 3° and 15°, superheated to 30–200° was measured. The condenser was built within a glass tube, and the whole was inserted in an oven and submitted to high-frequency e. m. f. The results are given graphically and the dipole moment is calcd. as 2.1×10^{-18} e. s. u. G. M. EVANS

Dipole moments of the *o*-dihalobenzenes. ERNST BERGMANN, LEO ENGEL AND STEFAN SANDOR. *Z. physik. Chem.*, Abt. B, **10**, 106–20(1930).—The moments of all 10 *o*-dihalo- and the 4 monohalobenzenes are calcd. These are carefully compared with values of other investigators and those from x-ray investigations. An increase over the normal 60° angle between the halogens is found in the *o*-compds. This increase amounts to 9° in the difluoro- and increases to over 37° in the diiodobenzenes. GREGG M. EVANS

Ultrasonic velocity and absorption in oxygen. W. H. PIELEMEIER. *Phys. Rev.* **36**, 1005–7(1930). BERNARD LEWIS

Specific-heat charts for gases. A. C. HALFERDAHL. *Chem. & Met. Eng.* **37**, 686–7(1930). E. H.

Note on the pressure variation of specific heats of gases derived from compressibility data. L. G. HOXTON. *Phys. Rev.* **36**, 1091–5(1930).—The rate of variation of c_p with pressure at const. temp. calcd. from p-v-T data is compared with the rate of variation detd. by direct expt. in the cases of O_2 and air over a pressure range of 20 to 100 atm. at 26°. The calcd. rates are of the same order of magnitude as the exptl. but are sensitive to methods of handling the equations of state and the variation in the coeffs. of the latter. Conclusion: The rates cannot be calcd. as accurately as they can be measured directly. BERNARD LEWIS

A new method of measuring the variation of the specific heats (c_p) of gases with pressure. E. J. WORKMAN. *Phys. Rev.* **36**, 1183–90(1930).—A method is described in which the ratio of c_p at a high pressure to c_p for the same gas at a pressure of 1 atm. is detd. The method is based upon the continuous-flow principle and avoids the necessity of measuring gas flow and heat input. Measurements were made with com. O_2 at a mean temp. of 26° and at pressures ranging from 15 to 100 atms. B. L.

The thermodynamic treatment of chemical equilibria in systems composed of real gases. II. A relation for the heat of reaction applied to the ammonia synthesis reaction. The energy and entropy constants for ammonia. LOUIS J. GILLESPIE AND JAMES A. BEATTIE. *Phys. Rev.* **36**, 1008–13(1930); cf. *C. A.* **24**, 5593 and following abstr.—The energy const. and entropy calcd. from data on the NH_3 synthesis equil. are, resp., —10058.1 $Cal._{15}$ per mole and —16.6491 $Cal._{15}$ per degree per mole. Values are given for the usual thermodynamic function at 0° and 1 atm. in the system of H_2, N_2 and NH_3. A rational and simple relation is given for the variation of ΔH with both pressure and temp., and the heat absorbed in a chem. reaction at const. pressure in systems composed of real gases. Values of the heat are computed for several pressures and temps. for the NH_3 synthesis reaction. BERNARD LEWIS

The thermodynamic treatment of chemical equilibria in systems composed of real gases. III. Mass-action effects. The optimum hydrogen : nitrogen ratio for ammonia formation in the Haber equilibrium. LOUIS J. GILLESPIE AND JAMES A. BEATTIE. *J. Am. Chem. Soc.* **52**, 4239–46(1930); cf. preceding abstr.—By means of equations previously developed, the optimum initial and equil. ratios of H_2 to N_2 for NH_3 formation at 500° at pressures up to 1000 atm. are calcd. Although the optimum equil. ratio is as low as 2.68 at 1000 atm. with no A present, the % NH_3 at this optimum ratio exceeds that at the ratio 3 by less than 0.1%. At all pressures, the yield when pure N_2 is used is about 0.6% greater than when atm. (A-contg.) N_2 is used. ELLIOTT J. ROBERTS

Studies in intensive drying. E. JUANITA GREER. *J. Am. Chem. Soc.* **52**, 4191–4201(1930).—Expts. show that C_6H_6 dried 3 years with P_2O_5 in a fused glass app. shows no change in vapor pressure with respect to normal C_6H_6 in same app. C_6H_6, CCl_4 and CS_2 dried with activated SiO_2 gel show vapor pressure decreases in 24 hrs. comparable with results of others on these intensively dried liquids. Evidence supports the theory that vapor pressure decreases are due to removal of traces of H_2O in normal liquids. Calcn. from soly. data shows that the partial pressure of H_2O in C_6H_6 deviates greatly from Raoult's law. Partial pressures of H_2O in C_6H_6 at 20.89° were measured. S. L.

Thermal conductivity of liquids. J. F. DOWNIE SMITH. *Ind. Eng. Chem.* 22, 1246–51(1930).—A general equation for thermal cond. of electrically non-conducting liquids is derived from the following data on thermal cond.: 95 and 98% EtOH at 30°, CO_2, $C_6H_5CH_3$ and isoamyl alc. at 30° and 75°, 4 kinds of hydrocarbon oil at 30°, 75° and X. °, isopropyl alc., C_6H_6, *p*-cymene, *n*-hexane and *n*-octane at 30° and 60°. The app. Bridgman's concentric cylinders (*C. A.* **18**, 1227). L. P. HALL

Dynamic azeotropism. GEORGETTE SCHOULS. *Bull. sci. acad. roy. Belg.* [5], 16, 628–45(1930).—Math. treatment of irreversible distn. of liquids based on de Donder's work on affinity. Two-phase, liquid–gas systems of 1 or 2 components are considered. The subjects discussed include distn. of pure substances and mixts., generalization of the Duhem-Margules equation, heat of reaction, azeotropic equil. and dynamic azeotropism.
G. M. MURPHY

Investigation of the structure of organic liquids in the interior and on the surface. J. J. TRILLAT. *Z. Physik* 64, 191–213(1930); cf. *C. A.* 24, 5234.—A thin film of the liquid was irradiated with Cu K_α radiation and the scattered x-rays were received on a photographic plate. Tension was 27,500 v., current 10 ma., time of exposure 1 hr. The compds. studied were homologous series of *fatty acids* and *alcs.* and some *triglycerides*. To study the surface orientation of the mols., the beam of x-rays touched tangentially the surface of a drop of the liquid. *Results. I. Interior structure of liquids.*—A large intensive ring corresponding to a period of intensity of 4–4.6 A. U. is always found in first and in some cases even in second order. It is attributed to the cross dimension of the mols. The inner ring must be due to the longitudinal dimension of the C chain as it varies with the no. of C atoms belonging to it. A continuous ground which spreads from the center of the plate and corresponds to a variable distance of the scattering elements is attributed to assocn. It is especially pronounced in the lower fatty acids and alcs., less so for the higher members and the triglycerides. *II. Surface structure of liquids.*—The aliphatic acids with the C atoms C_{10}, C_{12}, C_{14} and the alcs. C_9 and C_{11}, C_{10} and C_{12} are oriented in the surface of the liquid. The increase of length of the C chain per atom is about 1 A. U.
EGON BRETSCHER

The uniaxial direction of crystalline liquids. D. VORLÄNDER AND JOSEF FISCHER. *Ber.* 63B, 2506–10(1930); cf. *C. A.* 24, 4198.—About 21 prepns. out of 110 formed cryst. liquid layers, uniaxially directed and optically pos. The mol. structure, monotropy, enantiotropy and extent of the liquid seem to be of little importance. The more important factors are: presence of decompn. products, surface of the glass, temp. and viscosity. Whether the cryst. liquid layers grow out of the amorphous melt on cooling or on warming from the crystals is of importance. α-Anisalaminonaphthalene-α'-azobenzoic acid ester III exhibits a new phenomenon, forming an undercooled resin-like conglomerate, which may be called a cryst. solid optically anisotropic glass. M. E. L.

New observations on quartz. R. WEIL. *Compt. rend.* 191, 380–2(1930); cf. *C. A.* 24, 5002.—Most quartz crystals have birefringent regions revolving about a binary axis. This birefringence causes tiny parallel lines to show on the non-adjacent faces. When crystals are etched with HF, numerous tiny canals form which are oriented the same as the markings on the birefringent regions. AMY LEVESCONTE

The mosaic structure of crystals. F. ZWICKY. *Helv. Phys. Acta.* 3, 269–98 (1930); cf. *C. A.* 24, 1005, 3410.—The properties of a crystal are divided into 2 classes, those that depend only on the type of crystal lattice (d., sp. heat, coeff. of expansion, compressibility) and those that are detd. mainly by the grosser structure of the crystal (tensile and dielec. strength, ion cond., limit of elasticity). The theory of accidental microscopic cracks is rejected and replaced by the suggestion of a superstructure (mosaic structure), *i. e.*, a periodic variation of d. It is shown by calcn. (especially for a heteropolar crystal of the cubic system) that a crystal with superstructure possesses a lower energy than an ideal one, if cross contraction is taken into account and the polarizability of its constituents is sufficiently great. The period of superstructure of NaCl is found to be about 20 lattice consts. (110 A. U.). If the building atoms are not centrosymmetrical, a superstructure of a second type may be expected. The weak asymmetry of complex at. systems, in general, is pointed out, if the partners possess an asymmetry themselves (*e. g.*, asymmetric form of the water mol.) and the existence of monomol. films (acetic acid on a water surface) on a liquid is explained in these terms. E. B.

X-ray investigation of manganese. EINAR ÖHMAN. *Svensk Kem. Tids.* 42, 210–6(1930).—The cube edge of α-Mn measures 8.894 ± 0.005 A. U. and β-Mn, 6.300 ± 0.003 A. U. The spectrographs of α and β do not interfere with one another.
A. R. ROSE

X-ray investigations of modifications of manganese. EINAR ÖHMAN. *Metallwirtschaft* 9, 825–7(1930).—X-ray crystal structure evidence for the existence of α-, β- and γ-manganese is reviewed. X-ray photographs and tables of the angles of diffracted lines are given for α- and β-manganese. MALCOLM DOLE

Measurements with the help of liquid helium. X. Electric resistance of some alloys. W. MEISSNER. *Z. Physik* 64, 581–3(1930); cf. *C. A.* 24, 5565.—The resistance of Seemans' (*C. A.* 24, 5196) Cu-Au and Ni-Mn alloys was detd. as a function of the temp. EGON BRETSCHER

The variation of the electric conductivity of platinum on degassing in high vacuum and charging with hydrogen. KLARA WEIL. *Z. Physik* **64**, 237–47(1930).—The resistance of Pt increases when loaded with H_2. EGON BRETSCHER

The dependence of the counter-potential on the strength of the field and the true conductivity of ion crystals. O. BERAN AND F. QUITTNER. *Z. Physik* **64**, 760–76 (1930).—The counter potential of NaCl and KCl is measured between 100° and 200° in a field up to 28,000 v. immediately (10^{-3} to 10^{-6} seconds) after breaking the connection to the charging potential. In contradistinction to Joffé's assumption (cf. *Z. Physik* **48**, 288(1928)) the true cond. increases with the field. The temp. variation of the const. and the true cond. obey van't Hoff's formula. A zero compensation method is used to measure the counter-potential and a Helmholtz pendulum to release the contacts. EGON BRETSCHER

The theory of supraconductivity of elements. II. The fundamental idea of the origin of supraconductivity. Z. A. EPSTEIN. *Z. Physik* **63**, 640–59(1930); cf. *C. A.* **24**, 5197.—Between atoms in supraconductors local regions are assumed within which adjoining atoms exert no influence so that electrons moving therein are not deflected. If D is the force directing the oscillation of an atom in the metal lattice and v is the at. vol., $D\beta v^{2/3}$ should be const. and is found to be so for all supraconductors. The theory provides explanations for such characteristic properties as threshold value of current and field, temp. variation of the threshold value and the influences of elastic deformation and of impurities. EGON BRETSCHER

Variation in resistance of a nickel wire that is heated while under tension. S. ARZIBUISHEV AND V. J. U. YUSHAKOV. *Z. Physik* **64**, 405–10(1930).—The resistance of a Ni wire that is heated while under tension decreases at first, reaches a min., and then increases again. This phenomenon disappears at the Curie point, showing that it is connected closely with ferromagnetism. EGON BRETSCHER

A new method for determining transport numbers of solid substances. W. JOST AND H. SCHWEITZER. *Z. physik. Chem.*, Abt. B, **10**, 159–60(1930).—The calcns. were made (details not given) from the lineal expansion under influence of the current, with correction for thermal expansion, for cylinders of NaCl. At 560° $n_{Na} = 0.85$; at 600°, 0.45; and at 650°, 0.35. GREGG M. EVANS

Thermodynamic study of surface tension, affinity and rate of adsorption. VI. RAYMOND DEFAY. *Bull. sci. acad. roy. Belg.* [5], **16**, 598–605(1930); cf. *C. A.* **24**, 5589.—Math. In a system in equil. any arbitrary portion constitutes a sep. equil. The equil. conditions and the surface tension equations of Gibbs are obtained. *Ibid* 741–54.—Math. The formula of Kelvin which relates the vapor tension of a liquid to the radius of curvature of the surface is generalized for the partial pressure of a multicomponent system in terms of fugacity. The topics treated include influence of liquid surface curvature on the condensation pressure of a vapor mixt., on the partial pressure of inert gas mixts., liquid mixts. and two-phase liquids. G. M. MURPHY

Sexl's theory of adsorption. A. GANGULI. *Z. Physik* **64**, 81–3(1930).—Sexl's adsorption formula (cf. *C. A.* **22**, 866) is identical with that of Kar-Ganguli (*C. A.* **24**, 2656). EGON BRETSCHER

Determination of the adsorbed gaseous film on a metallic surface by means of a balance. J. STROHHÄCKER. *Z. Physik* **64**, 248–61(1930).—Air is adsorbed on gold in a unimol. layer as shown by direct weighing. The balance had a sensitivity of 2.6 10^{-6} g. The metal loses the adsorbed gases in a vacuum of 10^{-5} mm. in the course of 30 hrs. EGON BRETSCHER

The sorption of carbon tetrachloride at low pressures by activated charcoal. II. Isothermals at 25°. A. J. ALLMAND AND R. CHAPLIN. *Proc. Roy. Soc.* (London) **A129**, 235–51(1930). **III. Isoteres.** Discussion. *Ibid* 252–66; cf. *C. A.* **23**, 1331.—The isothermal sorption of CCl_4 vapor on 6 different activated charcoals, at pressures from 0.1 to 0.001 mm. of Hg, was investigated. The charcoals were degassed at 110° or 800°. The isotherms were not reversible. Strong hysteresis occurred unless a large amt. of vapor was sorbed before the desorption and resorption measurements. The sorbed vapor slowly displaces CO_2 and permanent gases (largely CO) from the C surface. Reversibility of the isotherms was approached rather closely if this procedure was followed, and allowance made for the partial pressures of the displaced gases. Degassing at 800° was not effective for removing all residual gas, although CO_2 was completely eliminated. Steam-activated charcoals are the best sorbents for CCl_4 vapor at low pressures. Sorption isoteres were obtained from 0° to 90°. The mol. heat of sorption, calcd. from the slope of the isoteres, decreases with increasing amt. of vapor sorbed until a value of 14.6 cal. is reached. It remains const. at this value over a range of 10–20 mg. sorbed per g. of sorbent (depending on the charcoal used). This step is followed

by further increase in the heat of sorption with amt. sorbed. Charcoal evacuated at 800° gives a smooth curve without the step. The adsorption potential of the C surface appears to vary from point to point. The high-potential centers especially are initially poisoned by residual O, which is gradually displaced as CO_2 and CO by the action of the sorbate. C. W. WILSON

Theory of Brownian motion. G. E. UHLENBECK AND L. S. ORNSTEIN. *Phys. Rev.* **36**, 823–41(1930). BERNARD LEWIS

Benzene dispersions of basic soaps of nickel and iron. B. C. SOYENKOFF. *J. Phys. Chem.*, **34**, 2819–38(1930).—*Ni* and Fe^{+++} *stearates*, prepd. from the chlorides and Na stearate in aq. soln., contain basic soaps and uncombined acid. The Ni soaps thus obtained are insol. in C_6H_6 (I) if the free stearic acid (II) is removed. Ni stearate prepns. of more uniform compn. and behavior result from Ni acetate and II at 100° *in vacuo*. Low diffusibility (corresponding to mol. wt. of 18,000 or more), Tyndall cone, gel formation, etc., show that the basic Ni soaps form colloid dispersions in I which are stabilized by II. Fe stearate prepns., on the other hand, are more sol. in I, do not require the addn. of II for stability and form more highly dispersed systems (mol. wt. from ebullioscopic measurements about 2500). The d.-compn. curves of both the Ni and Fe soaps in I are rectilinear. The sp. cond. of II in I is too low to account for the peptizing action of II on basic Ni stearate on the basis of ionic adsorption; therefore peptization and colloid stability are possible in the absence of ions. The lower fatty acids (lauric, caproic) have a greater stabilizing effect than II. B. SOYENKOFF

Micellar equilibria and equilibria of Donnan. J. DUCLAUX AND R. TITÉICA. *Rev. gén. colloïdes* **8**, 251–9(1930); cf. *C. A.* **24**, 10.—The Donnan theory of the equil. of membranes is tested by a series of expts. A study of the hydrosols of $Fe(OH)_3$, $Th(OH)_4$, $FeCl_3$, $K_4(CuFe(CN)_6)_2$, Congo red and caramel showed that the compn. of the ultra-filtrate is independent of the pressure of filtration, the concn. of the micelles, the nature of the ultra-filtration membrane and of the e. m. f. of filtration. A heterogeneous equil. is attained. C. W. SONDERN

The constitution of soluble protein substances as reversible, dissociable component systems. S. P. L. SØRENSEN. *Kolloid-Z.* **53**, 102–24(1930).—The exptl. and theoretical work on other substances of high mol. wt. are compared. The exptl. work on sol. proteins is reviewed and explained by considering a protein as a mixt. of components which are held together by secondary valences, a view similar to Meyer and Mark's theory of the constitution of cellulose. Also in *Compt. rend. trav. lab. Carlsberg* **18**, 1–124(1930). ARTHUR FLEISCHER

The depolymerization of inulin. HANS H. SCHLUBACH AND HORST ELSNER. *Ber.* **63B**, 2302–4(1930); cf. *C. A.* **24**, 2729.—Reply to E. Berner (*C. A.* **24**, 5730). B. concluded that the degradation of inulin (I) as carried out by many workers and observed by cryoscopic measurements is not real but only apparent and is due to the adsorption of solvents with which the compd. has been treated so that the mol.-wt. detns. give too low a value. It is pointed out that the difructose anhydride isolated from squills differs from I but is identical with the degradation product obtained by Vogel and Pictet by heating I in glycerol. The relative ease with which I hydrolyzes throws doubt upon its stability at 120°. Moreover, a sample heated in glycerol, 7 times pptd. from alc.-ether and dried for 12 hrs. at 111° at 0.001 mm., gave no qual. test for either alc. or glycerol. Further evidences that degradation actually occurs are: the change in such phys. consts. as sp. rotation caused by heating I in glycerol and the possibility of sepg. the product into fractions. R. C. HOCKETT

Dissociation of calcium citrate. WALDO J. WILEY. *Biochem. J.* **24**, 856–9(1930).—Cond. measurements agree well with titration of citric acid and $Ca(OH)_2$. The degree of dissocn. at different dilns. is calcd. BENJAMIN HARROW

Mobility of an iron-containing ion. II. Influence of substitution in the outer sphere upon complex iron ions. FRANZ HÖLZL. *Monatsh.* **56**, 79–96(1930); cf. *C. A.* **24**, 2939.—The influence of substitution in complex iron cyanide ions, etc., upon the mobility of the complex ion was studied. GREGG M. EVANS

The relation between ionic charge and size. G. v. HEVESY. *Z. physik. Chem.*, Abt. A, **149**, 472–4(1930).—Diffusion const. of uni-, bi- and tervalent ions obtained from the data of Kohlrausch, Heydweiler and Lorenz agree fairly well with diffusion consts. calcd. according to *Nernst's method*. The H and OH ions were not considered. FRANK URBAN

Further investigations on the kinetics of gaseous oxidation reactions. R. FORT AND C. N. HINSHELWOOD. *Proc. Roy. Soc.* (London) **A129**, 284–99(1930); cf. *C. A.* **24**, 3699.—The rates of oxidation of CH_4, MeOH and HCHO were studied by the static method, at various temps. and partial pressures of reactants. In all cases an initial

induction period was observed. During this period the concn. of intermediate products increased until they were oxidized as fast as they were formed. The reaction products are mostly CO and steam, with very little CO_2. The concn. of combustible gas influenced the reaction rate greatly, but the concn. of O had little effect. The rate increased with greater concn. of combustible gas. The heats of activation of the oxidation of CH_4, MeOH and HCHO are 61,500, 62,500 and 20,600 cal., resp. A chain mechanism is postulated, in which the chains end only at the walls of the vessel. Increasing the surface of the vessel decreased the reaction rate. This is a contrast to the behavior of C_6H_6, in which it was found that the chains ended principally in the gas unless the vessel was very small. An adsorbed layer of O on the walls probably plays an important part in breaking the chains. A theory based on these assumptions agrees in general with exptl. results. C. W. WILSON

Contribution to the thermodynamics and kinetics of heterogeneous equilibria. CH. SLONIM. *Z. Elektrochem.* 36, 439–53(1930); cf. *C. A.* 23, 4631.—Large differences between exptl values for the formation of hydrates from their oxides plus water and values calcd. from pressure measurements of thermal decompn. indicate more complicated changes in nature than are usually assumed. Lines of Röntgen spectra of analcite, chabasite, natrolite, harmotome and stilbite were examd. and found to be similar for the first dehydrated form. The lines changed, however, on further heating. The decompn. of $CaCO_3$ was studied. The differences are accounted for by a "pseudo structure form," which results from the first change during thermal decompn. L. P. HALL

The lead–silver system. F. YOLDI. *Anales soc. españ. fís. quím.* 28, 1055–65 (1930).—Thermal relations of the Pb–Ag system contg. 1.50–10% Ag, previously neglected, were studied, and primary and eutectic crystn. found. This double crystn. is lacking only in the 2.19–2.51% region, thus fixing as eutectic the compn. Pb 97.70–Ag 2.30%. A complete photomicrographic study is shown. Conclusion: Miscibility is complete in a liquid state. E. M. SYMMES

An introduction to chemical catalysis in homogeneous systems. ROBERT LIVINGSTON. *J. Chem. Education* 7, 2887–2903(1930). E. H.

Heterogeneous catalysis and chemical sorption. ERWIN SAUTER. *Z. Elektrochem.* 36, 874–81(1930)—A general theoretical review of the subject. S. LENHER

Studies of the catalytic action of subdivided metals. V. Adsorption isotherms and the state of the adsorbed hydrogen. B. FORESTI. *Gazz. chim. ital.* 60, 516–9 (1930); cf. *C. A.* 23, 4615.—From exptl. data of Kistiakowsky, Flosdorf and Taylor (*C. A.* 21, 3535) relations are deduced between the vols. of H adsorbed by active Cu and by annealed Cu and the pressures (from 0.03 to 0.3 mm of Hg). These relations are of the type $L = K\sqrt{p-m}$. If m is neglected, the relations become quadratic, in which case the most active centers would be satd. by H atoms, in the case of both active Cu and annealed Cu. This is in contrast to measurements of the differential heats of adsorption which have already been carried out on the same samples. On the other hand it is possible to foresee quadratic relations on the basis of a mol. adsorption, even at low pressures. C. C. DAVIS

The heat of formation of molecular oxygen. L. COVELL COPELAND. *Phys. Rev.* 36, 1221–31(1930); cf. *C. A.* 24, 3702.—An app. is described for producing at. O_2 and directly detg. the heat of formation of mol. O_2. The expts. were conducted in the pressure range 0.1 to 0.55 mm. Hg. The heat of formation is given as 131,000 ± 6000 cal. per g. mol. wt. Several of the properties of at. O_2 were investigated, including the possibility of long-lived metastable states. BERNARD LEWIS

The heat transfer coefficient for aqueous solutions of sodium chloride, calcium chloride, magnesium chloride, and "Reinhartin" at turbulent flow in tubes. K. LINGE. *Z. ges. Kälte-Ind.* 37, 194–6(1930).—The heat transfer coeff., α, $= 1750(1 + 0.017t)\cdot[1 - c(\gamma - 1)]\frac{w^{0.87}}{d^{0.13}}$, where w is the velocity in m./sec.; d is the tube diam. in m.; t is temp.; γ is the sp. gr. in kg./cu. m.; α is in $\frac{\text{kg.-cal.}}{\text{sq. m. per degree per hr}}$. The values of c for these solns., at temps. of −30° to +10°, are given as: H_2O, 1; NaCl (to −21°), 1.2; $CaCl_2$, 1.5; $MgCl_2$, 2.4; "Reinhartin," 1.8. F. D. ROSSINI

Remark on the thermal dissociation of nitrous oxide. C. N. HINSHELWOOD *Z. physik. Chem.*, Abt. B, 10, 157–8(1930).—Polemical with Volmer and Kummerow (cf. *C. A.* 24, 4980). GREGG M. EVANS

An improved Victor-Meyer molecular-weight apparatus (HICKS-BRUUN) 1. A micro furnace for temperatures above 1000° (ROBERTS, MOREY) 1. Polarization of the Raman radiation and crystal structure (MATOSSI) 3.

3—SUBATOMIC PHENOMENA AND RADIOCHEMISTRY

W. ALBERT NOYES, JR.

Estimation of thermochemical quantities from spectroscopic data. J. FRANCK. *Z. Elektrochem.* **36**, 581–9(1930); cf. *C. A.* **24**, 4221. L. P. HALL

Optical phenomena from the standpoint of the extreme theory of light quanta. EMIL KLEIN. *Z. Physik* **64**, 431–8(1930). EGON BRETSCHER

The extension of the equations of the electromagnetic field. B. LAGUNOV. *Z. Physik* **64**, 425–30(1930). EGON BRETSCHER

The quantum theory of chemical forces. MAX BORN. *Z. Physik* **64**, 729–40 (1930).—Heitlers' theory of chem. valency is derived without using the methods of group theory. EGON BRETSCHER

Application of the method of infinite determinants to the calculation of the eigenvalues in the Stark effect. K. BASU. *Z. Physik* **64**, 708–13(1930). E. B.

Application of integral equations to diffraction and the proper frequencies in the electromagnetic theory of light. W. STERNBERG. *Z. Physik* **64**, 638–49(1930). E. BRETSCHER

Equations of motion of the electron. USAKU KAKINUMA. *Proc. Phys.-Math. Soc. Japan* [3], **12**, 159–66(1930).—Math. MALCOLM DOLE

The matrix mechanics of the spinning electron. G. TEMPLE. *Proc. Cambridge Phil. Soc.* **26**, 496–506(1930). E. H.

Thread-shaped, visible electron rays. E. BRÜCHE AND W. ENDE. *Z. Physik* **64**, 186–90(1930).—It is possible to obtain non-divergent visible electron rays of 100–200 v., $^1/_4$ sq. mm. cross section and 1 m. length from a glowing cathode with suitably chosen emission and gas pressure. The high usefulness of these rays, especially for the study of magnetic fields, is pointed out. EGON BRETSCHER

Diamagnetism in metals. L. LANDAU. *Z. Physik* **64**, 629–37(1930).—Free electrons possess, according to the quantum theory, a diamagnetism which is $^1/_2$ of the paramagnetism due to the spin. The possible influence of this effect on electrons in a metal or paramagnetic insulator is discussed. EGON BRETSCHER

A representation of the diagram of the elements according to Corbino. A. MAZZUCCHELLI. *Gazz. chim. ital.* **60**, 531–4(1930).—The diagram of Corbino (cf. *Nuovo cimento* **61**(1923)), in which the elements are arranged according to the quantum nos. of the electrons, can be developed further by utilizing the subsidiary quantum no. l as well as the principal quantum no. n. When the diagram is turned 90° (mutual change of abscissa and ordinate) so that the heterologic elements are arranged in horizontal lines instead of vertically, an arrangement resembling the ordinary Mendelyeev table is obtained. This gives a system which shows the genetic dependence of the periodic system on the quantistic distribution of the electrons around at. nuclei. The newly arranged table of elements is shown, and is discussed in detail. C. C. DAVIS

A simple graphic method for the evaluation of Debye-Scherrer diagrams. WERNER EULITZ. *Z. Physik* **64**, 452–7(1930).—The lattice const. may easily be obtained without any calcn. from the scattering angles by means of a nomographic diagram. The advantages of the method are restricted to crystals of the cubic system. E. B.

A method of obtaining the Hull-Debye-Scherrer pattern of cathode rays. KYUZI MATUKAWA AND KEN'ICHI SHINOHARA. *Proc. Phys.-Math. Soc. Japan* [3], **12**, 171–5 (1930).—Pt, Au and Ag sputtered on glass plates were investigated with cathode rays. Fine diffraction rings were obtained and tables of their values are given. M. D.

The ionization of gases by x-rays of short wave length. KLAUS SCHOCKEN. *Z. Physik* **64**, 458–64(1930).—Monochromatic x-rays (reflected from calcspar) are allowed to fall into an ionization chamber contg. O_2, A or MeCl. The ionization current for the different gases is measured as function of the pressure. The total ionization current I is partly due to the photoelectrons ($I_p = N^3\rho\ a$, N effective at. no., ρ density of the gas) and partly to recoil electrons ($I_r = b\rho$). From 2 observations the relative contribution of photoelectrons as function of the wave length (between 0.139 and 0.421 A. U.) is obtained. For $\lambda > 0.35$ A. U. I_r becomes negligible. EGON BRETSCHER

Scattering of x-rays by water and aqueous solutions. WILLIAM GOOD. *Helv. Phys. Acta* **3**, 205–48(1930).—A thin film of water or an aq. soln. of a salt (LiCl, $CaCl_2$, $(NH_4)_2SO_4$, K_2CO_3, KCl, KBr, KI, $BaCl_2$) is irradiated with Cuα radiation. By taking account of the absorption as function of the angle of scattering, 2 diffraction rings are obtained for water, one resulting from intramol. interference; the other is attributed to small ice crystals (assocd. water mols.) suspended in the liquid. The scattered intensity is given diagrammatically for every salt soln. EGON BRETSCHER

Passage of the electric current through solid paraffin in the dark and while irradiated by Röntgen rays. V. M. TUCHKEVICH. *Ann. Physik* [5], **6**, 622–36(1930).—Continuing work previously reported from the same lab. (cf. Nasledov and Sharavskii, *C. A.* **24**, 779, 5551) and using similar app., T. has measured the cond. of solid paraffin in layers 1.3, 5, 10, and 20 cm. in thickness between Al electrodes 5.5 cm. long and 0.5 mm. in thickness in the dark and while being irradiated by x-rays from a W anticathode at 25°. The current was detd. by measuring the time required to charge an electrometer to a certain potential. In the dark the magnitude of the current decreased very rapidly at first and then almost imperceptibly, giving indication that a residual current was present. The principle of similarity of B. and I. Kurchatov (*J. Russ. Phys.-Chem. Soc. Phys.* **61**, 332(1930)) was confirmed in paraffin within the limits of exptl. error, which were not small. The irradiated paraffin, like the ceresin of previous workers, showed a much greater conductance than the same substance in the dark. The time necessary to reach a max. after beginning of irradiation is dependent upon the thickness of the layer but is independent of the time elapsing between turning on current and irradiating the sample. During irradiation the current passing is proportional to all the potential gradients measured (max. 12,000 v./cm.) *i. e.*, Ohm's law is valid. The principle of similarity also holds. A diagram of the app. and data in the form of curves are given. E. R. SCHIERZ

Intensity of total scattering of x-rays by monatomic gases. Y. H. WOO. *Nature* **126**, 501–2(1930).—Raman's (*C. A.* **23**, 3853) and Compton's (*C. A.* **24**, 3425) method of calcn. is changed so that the calcn. of the intensity of the total scattering depends on the evaluation of the radial charge distribution of the electrons in the atom. This involves the assumption of $4\pi r^2 Zp(r)dr$ as the probable no. of electrons between r and dr. ARTHUR FLEISCHER

Extension and intensity of Debye lines or rings as function of the dimensions of the tube focus, the camera and the preparation. W. BUSSE. *Z. Physik* **63**, 227–44 (1930).—The calcn. is limited to a small or very high absorption coeff. of the sample The intensity of a Debye line is obtained as function of the breadth and length of the focus of the tube and the distance from the center of the line. A max. abs. intensity results, if the breadth of the focus is such that the natural breadth of the line is doubled. EGON BRETSCHER

β-Radiation and energy principle. J. KUDAR. *Z. Physik* **64**, 402–4(1930).—To explain the existence of the continuous β-ray spectrum and the well-defined decay const., it is assumed that the β-particle possesses a sharp energy inside the nucleus equal to the mean energy of the β-ray spectrum. The law of the conservation of energy is supposed to hold only statistically. EGON BRETSCHER

The discrete range groups of H particles from aluminum. I. Dependence of the yield and the energy of the H particles on the primary energy. H. POSE. *Z. Physik* **64**, 1–21(1930).—An Al-foil is bombarded with α particles whose energy is varied by interposing a screen between the radioactive prepn. and the Al. The H rays leaving the Al in the same direction are detected in an ionization chamber. Of the 3 groups of H rays previously reported (*C. A.* **24**, 5219), 2 are only observed if the energy of the α rays is of a characteristic narrow limited magnitude. Faster and slower α particles do not give rise to the ejection of an H particle. The last group of H particles is produced irrespective of the primary energy of the α rays. EGON BRETSCHER

The theory of atom disintegration. GUIDO BECK. *Z. Physik* **64**, 22–33(1930). The theoretical explanation of the exptl. results of Pose (cf. preceding abstr.) is given. For a certain characteristic energy of the α particle, a resonance effect occurs inside Gamov's potential trough, which leads to a transition of an α particle to a lower energy level and to the emission of an H particle of definite velocity. There are also possible transitions of α particles to levels of the continuous spectrum with transfer of the energy to H particles. No distinct energy is necessary for a process of this type. For both cases the angular distribution of the H particles is calcd. EGON BRETSCHER

The theory of molecular forces in dipole gases. H. MARGENAU. *Z. Physik* **64**, 584–97(1930).—The second virial coeff. is calcd. with quantum mechanics. For high temp. ($kT \gg h^2/8\pi^2 A$, A = moment of inertia) the classical formula results. Approximations for low temp. are obtained and an elegant quantum mech. deduction of the Langevin-Debye formula for the polarization of a dipole gas is given. E. B.

Exchange of electrons by slow ions. II. H. KALLMANN AND B. ROSEN. *Z. Physik* **64**, 806–16(1930); cf. *C. A.* **25**, 26.—To demonstrate charge transfer directly, a secondary ring electrode with neg. potential (—3 v.) surrounds the receiver of a K. and R. mass spectrograph. The beam of original fast ions is not deflected by the weak field due to the ring electrode, but the slow ions resulting from charge transfer

are collected on it. The charge on this electrode measures the degree of charge transfer. Previous results are confirmed. Ions exchange electrons easily with atoms of the same kind (A^+ in A, N_2^+ in N_2), but the exchange is negligible with atoms of different energy of ionization. (A^+ in N_2, N^+ in A.) N^{++} is partly converted to N^+. Details are given to distinguish between the reactions $A_f^{++} + A_s = A_f^+ + A_s^+$ and $A_f^{++} + A_s = A_f + A_s^{++}$. ($s$ and f refer to slow and fast particles.) The interaction of Hg^{++} and Hg^+ with Hg and N_2 is briefly mentioned. EGON BRETSCHER

Energies of the C—I and C—Br bonds. T. IREDALE AND A. G. MILLS. *Nature* 126, 604(1930).—The long wave length limit at 3340 A. U. and maxima at about 2550 A. U. for ultra-violet absorption bands from Me, Et and iso-Am iodides and bromides is taken to mean dissocn. into a halogen atom and an alkyl residue. From these data the energy has been calcd. as 64 cal. for the C—I and 91 cal. for the C—Br bonds. GREGG M. EVANS

The question of the separation of isotopes. K. P. YAKOVLEV. *Z. Physik* 64, 378–91(1930).—A fine beam of pos. rays is sepd. into the isotopes by elec. and magnetic deflection. The ray consisting now of particles of uniform mass enters an evacuated bulb closed with a very fine film of glass. It is calcd. that approx. 0.03 cu. mm. of Ne^{20} and Ne^{22} have under the given exptl. conditions been collected. The spectra differ less than 0.006 A. U. EGON BRETSCHER

The intensities of doublet lines according to Dirac's theory. K. BECHERT. *Ann. Physik* [5], 6, 700–20(1930).—A derivation of expressions for the intensities of doublet lines on the basis of Dirac's theory. The Hönl-Sommerfeld intensity formulas (*C. A.* 19, 1988) are shown to result from these expressions for a Coulomb field and small relativity corrections. For increasing values of the relativity corrections the expressions show deviations from the Hönl-Sommerfeld formulas. C. C. KIESS

Notes on the spectra of ten bright-line stars of classes B and A. PAUL W. MERRILL. *Astrophys. J.* 72, 98–110(1930).—Peculiarities are described in the spectra of 10 stars which exhibit bright H lines. C. C. KIESS

The spectrum of gamma Geminorum (class A). SEBASTIAN ALBRECHT. *Astrophys J.* 72, 65–97(1930).—The wave lengths have been detd. of more than 900 absorption lines in the spectrum of γ Gem. between 4250 and 4723 A. U. These, for the most part, have been identified with lines emitted by the neutral and singly ionized atoms of H, Mg, Fe, Ti, Cr, Mn, V, etc., many of the strong lines being due to the ionized atoms. C. C. KIESS

The Stark effect of aluminum and carbon. YOSHIO ISHIDA AND M. FUKUSHIMA. *Sci. Papers Inst. Phys. Chem. Research* (Japan) 14, 123–43(1930)(in English).—Elec. fields of 300–500 kv./cm. were employed to observe the Stark effect for lines of Al and C. Tables give the results obtained for Al I between 3961 and 2204 A. U.; and for C II between 4267 and 2574 A. U. C. C. KIESS

Terms of the arc and spark spectra of chromium. C. C. KIESS. *Bur. Standards J. Research* 5, 775–9(1930).—Tables of terms of Cr I and Cr II are given which account for nearly all the lines of these spectra likely to prove of phys., chem. or astrophysical importance. The terms of Cr I belong to the septet, quintet and triplet systems; those of Cr II belong to the sextet, quartet and doublet systems. All the terms given conform to those required by theory. C. C. KIESS

Intensity measurements in the copper arc. L. S. ORNSTEIN AND D. VERMEULEN. *Z. Physik* 64, 657–9(1930).—The intensity ratio of the Cu lines: 1^2S-2^2P_1 and 1^2S-2^2P_2 as function of the intensity of current has a max. at 0.9 amp. This inconstancy of the ratio points to pronounced self absorption that has been overlooked by Nottingham (*C. A.* 23, 2356). EGON BRETSCHER

The hyperfine structure of the lithium-II spectrum. P. GÜTTINGER. *Z. Physik* 64, 749–59(1930).—The hyperfine structure of the $2s$-$2p$ line of ortho Li^+ can be explained if the nuclear spin has the value $i = (3/2)\ (h/2\pi)$. EGON BRETSCHER

The Doppler effect in slow hydrogen canal rays. FRANZ NEY-VALERIUS. *Ann. Physik* [5], 6, 721–38(1930).—The app. and method for observing the Doppler effect of slow canal rays in H are described. The potentials applied to the tubes ranged from 400 to 1200 v. The max. velocity of the effect was observed to agree closely with that derived from the cathode potential drop by means of the relation $\frac{1}{2}\ mv^2 = Ve$. Between 400 and 1000 v. 2 velocity max., v_1 and v_2 were observed. It was found that the ratio $v_2:v_1$ decreased with increasing pressure in the tubes. Between 1000 and 1200 v. 4 max. were observed. These are attributed to the existence in the canal rays of the ions H_1^+, H_2^+, H_3^+ and H_4^+. With tubes at higher pressures two velocities corresponding to neg. canal rays were observed. These are attributed to the particles H_1^- and H_2^-, moving in a direction opposite to that of the pos. ions. C. C. KIESS

The Stark effect of the resonance line of mercury and its relation to magnetic fields. PAUL BRAZDZIUNAS. *Ann. Physik* [5], 6, 739–71(1930).—The app. and method used for detg. the min. Stark effects of the Hg line 2536.7 A. U. have been described by Schein (*C. A.* 23, 4888). It was found that an elec. field of 100,000 v./cm. causes a red shift of the perpendicular components of 5.4×10^{-4} A. U., and that a field of 140,000 v./cm. was required to produce a shift of 1.9×10^{-4} A. U. in the parallel component. The displacements were found to be proportional to the square of the field. With a superposed magnetic field parallel to the elec. field there appeared a quenching of the Stark effect after the magnetic field attained a definite magnitude. The same was noted when the magnetic and elec. fields were crossed. C. C. KIESS

The impact broadening of the rotation-oscillation spectra of gases. VLADIMIR LAZAREV. *Z. Physik* 64, 598–605(1930).—The broadening effect of gases (air, A, HCl, HBr) on the absorption lines of HCl and HBr in the infra-red is only due to damping by impact and not to mutual coupling. EGON BRETSCHER

Deformation of electron shells. II. Absorption spectrum, molecular volume and refraction of certain rare earth salts. P. W. SELWOOD. *J. Am. Chem. Soc.* 52, 4308–16(1930); cf. *C. A.* 24, 4986.—The mol. vol. of aq. soln. of $Nd(NO_3)_3$ and $NdCl_3$ increases with concn.; the mol. refraction increases for the nitrate and decreases for the chloride. The absorption spectra shift toward the red, indicating deformation of the Nd ion in concd. soln. For $Pr(NO_3)_3$ and $Sm(NO_3)_3$ the spectrum shifts toward the red; for $Eu(NO_3)_3$ and $GdCl_3$ no shift is noted. Solns. of $Ho(NO_3)_3$ and $Er(NO_3)_3$ displace the spectrum toward the blue with increasing concn. G. M. MURPHY

Residual rays of univalent and bivalent fluorides. O. REINKOBER AND M. BLUTH *Ann. Physik* [5], 6, 785–92(1930).—The residual rays of several fluorides were isolated by the original method of Rubens. The results of the wave-length measurements are 35.8μ for NaF; 48.6μ for TlF; 40.7μ for Sr_2F; and 50.7μ for Ba_2F. These results make the data for the fluorides comparable with those already found for the chlorides and bromides. C. C. KIESS

The behavior of the bands of nuclear oscillation of the ammonium radical in the transition range. LISELOTTE WILBERG. *Z. Physik* 64, 304–24(1930).—The optical transparency of solid NH_4Cl for light from 0.8μ to 16μ at room temp. and at $-50°$ is measured in continuation of the work of Hettner and Simon (cf. *C. A.* 23, 1058). Three types of absorption bands are found at: I. 3.2 and 7μ, whose intensity does not vary with temp. II. 3.5, 4.25, 4.45, 4.90 and 5μ; the intensity increases considerably with decrease in temp. III. 6.8–6.95μ intensity decreases with decreasing temp. The bands at 5.6μ and 6.95μ exhibit at $-30.3°$ a discontinuous change of intensity. Interpretation of the exptl. results: Two states *a* and *b* with different energies are possible I belongs to *a* and *b*, II to *a* and III to *b*. EGON BRETSCHER

Polarization of the Raman radiation and crystal structure. F. MATOSSI. *Z. Physik* 64, 34–8(1930).—The polarization of the Raman radiation for different crystal positions of *calcspar* and $NaNO_3$ is compared. From the theory (classical) of Mandelstam, considerations of symmetry and the exptl. results, it is concluded that the CO_3 groups are equilateral and are always arranged in antiparallel pairs. E. B.

Raman effect and molecular structure. II. B. TRUMPY. *Z. Physik* 64, 777–8(1930); cf. *C. A.* 24, 5229.—The Na salts of fumaric acid (I), maleic acid (II), mesaconic acid (III) and citraconic acid (IV) give in aq. soln. (15%) the following Raman lines (I): 1277, 1407, 1656 cm.$^{-1}$; (II) 1405, 1646 cm.$^{-1}$; (III) 2930, 1652, 1447, 142[illegible] 1398, 1294 cm.$^{-1}$; (IV) 2916, 1653, 1449, 1401, 1267, 1210 cm.$^{-1}$. The intensities of corresponding lines differ for the various salts. EGON BRETSCHER

Raman effect in hydrogen sulfide. S. BHAGAVANTAM. *Nature* 126, 502 (1930).—Liquid H_2S shows an intense sharp line shifted by 2578 wave nos. from the exciting Hg radiation. Gaseous H_2S shows a more diffuse line shifted 2615 wave nos. The liquid H_2S line is at the same position as that observed for the org. hydrosulfides. ARTHUR FLEISCHER

Splitting of the frequency of light scattered by liquids and optical anisotropy of molecules. E. GROSS. *Nature* 126, 603–4(1930).—In scattering of light by liquids the 2 inner components and the unmodified line are polarized, but outer ones are not. Expts. with CS_2, H_2O, Et_2O, EtOH and ArCl show that in strongly depolarizing liquids these outer lines are intensified. This result is attributed to optical anisotropy of the mols. themselves. GREGG M. EVANS

Form of optical absorption bands in solutions. WERNER KUHN AND E. BRAUN *Z. physik. Chem.*, Abt. B, 9, 426(1930); cf. *C. A.* 24, 5630.—Addn. of a literature reference to a previous article. J. B. AUSTIN

The scientific foundations of photochemistry. MAX BODENSTEIN. *Z. angew. Chem.* 43, 819–23(1930).—A brief review. C. E. P. JEFFREYS

Observations by positive-ray methods on the breaking-down and the building-up of hydrocarbons in discharge tubes. O. EISENHUT AND R. CONRAD. *Z. Elektrochem.* 36, 654–62(1930).—Using a perfected pos.-ray app., the authors investigated CH_4, mixts. of $CH_4 + O_2$, mixts. of $CO_2 + H_2$, C_2H_6, C_2H_4 and C_2H_2. With CH_4, the decompn. products (exclusive of H_2) were CH, CH_2 and CH_3; the built-up products were C_2, C_4, C_2H, C_2H_2, C_2H_4 and C_2H_6. (In the preceding and in the following the pos. ionic charge has been omitted.) Mixts. of CH_4 and O_2 gave CH_3, CH_2, CH and C (masses 15–12) and built-up products C_2 to C_2H_6 (24–30); CO (28) was very strong; C_2O (mass 40) was also observed. In contrast to these results are the results with CO_2 and H_2. Here CH, CH_2 and CH_3 are built-up products; very faint lines corresponding to masses 24–27, 29 and 30 were observed; CO and O were also observed. C_2H_6 gives decompn. parabolas for masses 29–24, 15–12 corresponding to C_2H_5 to C_2 and CH_3 to C, resp.; lines above mass 36 are purely built-up products. C_2H_4 is decompd. into 27–24 (C_2H_3 to C_2) and 14–12 (CH_2-C); 29, 30, 36–42 are built-up products. C_2H_2 gives C_2H, C_2, CH and C as decompn. products and C_2H_3, C_2H_4, C_2H_5, C_2H_6, C_3, C_3H, C_4H and even higher, as built-up products. LOUIS WALDBAUER

Photochemical polymerization of acetylene. S. C. LIND AND R. S. LIVINGSTON. *J. Am. Chem. Soc.* 52, 4613–4(1930).—The complete radiation of a quartz Hg arc was used. The reaction vessel was 3 cm. deep. The reaction velocity was proportional to the pressure of C_2H_2 up to 30 cm. pressure; at higher pressures it tended to become const. Comparison of the rate at 12° and 39° gives a value for the 10° temp. coeff. of 1.25, which may be largely the temp. coeff. of the light absorption. Light of wave length 2537 A. U. and longer is not effective. A weighted av. of $M/h\nu$, for 3 detns., is 7.4 ± 2.5, the uncertainty being due to the pptn. of cuprene on the walls of the reaction cell. C. J. WEST

Investigations on the photochemical decomposition of tartaric acid in presence of citric acid. TITO PAVOLINO. *Giorn. farm. chim.* 79, 310–3(1930).—Solns. of α-hydroxy acids in the presence of U salts, when exposed to sunlight, decompose slowly, giving rise to formation of HCO_2H and of the resp. aldehydes or ketones. Under these exptl. conditions tartaric acid yields glyoxal and citric acid yields acetone. Glyoxal was identified by means of the reaction occurring on addn. of $PhNHNH_2$: a yellow ppt. of phenylglyoxal osazone is formed, which soon changes its color to a wine-red, probably because of the oxidative effect of the U salt. When p-$H_2NHNC_6H_4SO_3H$ is used instead of $PhNHNH_2$, the soln. assumes an intense golden-yellow color. Based on these findings a method was elaborated for the *detection of tartaric* acid in a soln. of citric acid. The soln. to be examd., after addn. of a U salt, is exposed for at least 30 min. to sunlight or a light source of similar intensity. A few drops of $PhNHNH_2$ (or a corresponding quantity of a 5% soln. of its acetate) is added. The pos. outcome of the osazone reaction as described above indicates the presence of tartaric acid. The reaction appears to be sp., since it was not given by any of the other aliphatic α-hydroxy acids examd. G. SCHWOCH

Photochemical reaction between sodium nitrite and iodine. A. K. BHATTACHARYA AND N. R. DHAR. *J. Indian Chem. Soc.* 7, 709–15(1930).—The reaction $NaNO_2 + I_2 + H_2O = 2HI + NaNO_3$ is found to be bimol. in the dark, and the temp. coeff. is 2.7 between 30° and 40°. The temp. coeffs. of the light reaction vary from 2.07 for λ = 4725 A. U. to 2.35 for λ = 8500 A. U. The quantum efficiency varies from 36 to 119 at different temps. and wave lengths. C. E. P. JEFFREYS

Chemical reactions promoted by light. L. VECCHIOTTI AND G. ZANETTI. *Gazz. chim. ital.* 60, 479–86(1930).—A preliminary note. To obtain information on the action of $PhNO_2$ (I) on org. compds. under the influence of light, a field already investigated by Ciamician and Silber (*Gazz. chim. ital.* 33, 354(1903); 36, 174, 176, 190, 197 (1906)), (1) I and $C_{10}H_8$ (II), (2) I and PhMe (III) and (3) I and cinnamic acid (IV) were exposed in an atm. of N to radiation for 6 months (May–Nov.) and the reaction products analyzed. With I (100 g.) and II (20 g.) the only reaction was that of Lustgarten (*Monatshefte* 3, 720), a trace of β-naphthol being the only product identified. With I (100 g.) and III, BzOH (20 g.) and p-$HOC_6H_4NH_2$ (V) were obtained, showing that the side chain of III is oxidized, while I forms V according to the reaction of Ciamician and Silber (*loc. cit.*). I and IV react differently, several products being obtained, including BzOH, CO_2, PhNHBz (VI), PhN(:O):NPh (VII) and o-HOC_6H_4N:NPh (VIII). The reaction with I and IV is explained by rupture of the double bond of IV with formation of BzH and $OHCCO_2H$, which then oxidize to BzOH and $(CO_2H)_2$, resp. By further oxidation IV passes to CO_2. $PhNO_2$ is reduced to PhNO. The formation of

VI, VII and VIII is explained by reference to the explanation of Ciamician and Silber (*Rend. accad. Lincei* [5] **14**, 265(1905)) for the action of $PhNO_2$ on BzH. Thus VI by decompn. of IV to BzH and oxidation of the latter: $PhNO_2 + BzH \longrightarrow VI + 2BzOH$, or in the following way: $PhNO + 2BzH \longrightarrow VI + BzOH$. VII may be formed thus: $2PhNO + BzH \longrightarrow VII + BzOH$, or by analogy with the reaction of PhNO and PhHNOH (cf. *Ber.* **35**, 1606(1902)) thus: $PhNO + Ph(HO)NBz$ (IX) $\longrightarrow$ VII + BzOH. VIII may be formed from VII by transposition (cf. H. M. Knipscheer, *Rec. trav. chim.* **22**, 1–30(1903)) or thus: PhNO + IX $\longrightarrow$ VIII + BzOH. When the expts. were repeated in darkness, there was no reaction with II and III, while IV forms BzOH and VII. C. C. DAVIS

Photochemical formation of chlorine dioxide from chlorine monoxide in carbon tetrachloride solution. ROSCOE G. DICKINSON AND CECIL E. P. JEFFREYS. *J. Am. Chem. Soc.* **52**, 4288–97(1930).—It was found that the decompn. of Cl_2O by the wave length 4358 A. U. in CCl_4 soln. was accompanied by the formation of considerable ClO_2. In solns. 0.014 to 0.054 *M* in Cl_2O, the initial rate of formation of ClO_2 was found to be about 0.35 mol. per quantum absorbed. The initial rate of decompn. was found to be at least 1.8 mols. of Cl_2O per quantum absorbed. C. E. P. JEFFREYS

Photochemical reduction of tungstic and molybdic acids. S. GHOSH AND A. K. BHATTACHARYA. *J. Indian Chem. Soc.* **7**, 717–21(1930).—The photochem. reduction of molybdic and tungstic acid sols by EtOH was found to follow the zero-mol. law. The velocity consts. were found to decrease when the sol was allowed to age, but increased to a value greater than that for a fresh sol when the sol was heated to 70° for 8 min. The sols become less active photochemically in the presence of univalent ions. The order in which the cations affect the velocity consts. is given as Rb > K > Na > Li. C. E. P. JEFFREYS

Chemical reactions in infra-red radiations. II. A. K. BHATTACHARYA AND N. R. DHAR. *J. Indian Chem. Soc.* **7**, No. 8, 677–85(1930); cf. *C. A.* **23**, 5414.—Sixteen reactions including the reaction of $N_2H_4.HCl$ and I_2; NH_2OH and I_2, and decompn. of Na cobalitinitrite were found to be accelerated by radiations of wave length 8500 A. U. Four reactions including the first 2 mentioned were studied in radiation of mean wave-length 7304 A. U. The quantum efficiencies of all the reactions increase with increase in temp., the temp. coeff. being less than those for the corresponding dark reactions. It was shown photographically that a 1-cm. layer of $K_2Cr_2O_7$ soln. (satd.) in a Co-glass cell cuts off all radiation shorter than 8000 A. U. The authors believe that these expts. show that radiation plays an important part in chem. reactions, and strengthen the radiation hypothesis of chem. change. C. E. P. J.

The photochemistry of alkali and silver halide crystals. R. HILSCH AND R. W. POHL. *Z. Physik* **64**, 606–22(1930).—The absorption spectra of alkali halide crystals show below 250 mμ discrete states of energy which become perfectly clear at —183°. AgCl possesses a broad band spectrum without fine structure, which is not altered by temp. The absorption spectrum of the centers of color in an alkali halide crystal is clearly different from the absorption spectrum of pure crystal. For *AgCl* and *AgBr* both types of spectrum overlap. From the absorption const. for the max. of absorption and the wave length, the no. of color centers is calcd. on the basis of dispersion theory and it is shown that both the latent image of a photographic plate and the coloring of irradiated alkali halide crystals are due to a concn. of one color center to 10^{-6}–10^{-7} salt mols. Furthermore it is shown that the quantum yield amounts to 0.33–0.4 color centers per photon. The reverse process occurs simultaneously with the production of color centers and is also independent of the wave length in the alkali halide crystals; but for AgCl only that part of the absorption curve is lowered which corresponds to the wave length of the incident light. With alkali halides the color centers consist of alkali atoms. *Tl salts* behave practically in the same way as Ag salts. E. B.

The influence of temperature on the absorption spectra of alkali halides. H. FESEFELDT. *Z. Physik* **64**, 623–8(1930).—The absorption max. of *RbBr* (186 mμ) and of *KI* (211 mμ) vary linearly with temp. This frequency shift cannot completely be accounted for by thermal expansion as the observed value is about 4 times larger than that calcd. Details of the measurement of the absorption coeff of a very thin layer of alkali halide (deposited on quartz in a high vacuum) in the ultraviolet between 180 and 280 mμ are given. EGON BRETSCHER

Some more absorption spectra of chemically simple halide crystals. HANS FESEFELDT. *Z. Physik* **64**, 741–8(1930); cf. preceding abstr.—$PbCl_2$, $PbBr_2$, PbI_2, TlCl, TlBr, TlI, AgCl, $CdCl_2$, $CdBr_2$, CdI_2, $ZnCl_2$, $BaBr_2$, $NiCl_2$, $NiBr_2$, NiI_2, $CoCl_2$, $CoBr_2$, CoI_2, InCl possess band spectra (diagrammatically given for each salt) which cannot be resolved even at —183°. EGON BRETSCHER

Condensation of hydrocarbons by electrical discharge. Comparison with condensation by α-rays. S. C. LIND AND GEORGE GLOCKLER. *J. Am. Chem. Soc.* **52**, 4450–61(1930).—The condensations of CH_4, C_2H_6, C_3H_8, C_4H_{10} and C_2H_4 have been studied in the elec. discharge. It is found that these reactions are quite similar to the condensations caused by α-rays. The following factors give evidence of this similarity of reaction: (1) pressure changes as function of time; (2) free H produced during the reaction; (3) relative amt. of H and CH_4 in the H-CH_4 fraction of the resultant gases; (4) the % of liquid conversion; (5) the av. compn. of liquid condensate; (6) the % of the hydrocarbons reacted. All of these factors are quite similar for both types of condensations and it is argued that both types of reaction must be caused by the same mechanism. A reaction scheme is discussed on the basis of the ion cluster theory. The usual ideas are amplified in one respect in that it is assumed that the larger mols. are ionized not only by electron impact but also by electron exchange. C. J. WEST

The Ra in aquatic organisms (VERNADSKII) **11D.** Breaking up natural petroleum emulsions or other colloid systems by use of rays of short wave length (U. S. pat. 1,783,471) **3.**

Radioactive preparations. ALOIS FISCHER. Ger. 506,377, Sept. 1, 1927. See Brit. 278,347 (*C. A.* **22**, 2514) and 285,467 (*C. A.* **22**, 4726).

Lamp emitting ultra-violet radiation. MILAN W. GARRETT (to Westinghouse Lamp Co.). U. S. 1,783,643, Dec. 2. Electrodes which may be formed of W or Mo and between which a discharge may be passed are placed in an envelope such as quartz or special glass contg. A or other suitable monatomic gas with an admixt. of N.

4—ELECTROCHEMISTRY

COLIN G. FINK

Electrical apparatus for the coreless induction furnace. N. R. STANSEL. *Iron Steel Eng.* **7**, 519–24(1930).—An induction furnace is a transformer. The general course is a primary circuit supplied with power at const. voltage and const. frequency and a short-circuited secondary circuit formed by a charge of metal in refractory crucible. The output of this transformer is heat developed by currents induced in the secondary circuit. The magnetic flux of a coreless induction furnace is small and the charge in that flux is rapid. The frequencies used for coreless induction furnaces, in size 50 kw. and above, in metal-melting service range from 480 cycles to 2000 cycles. A frequency of 960 cycles has been adopted as standard for steel-melting furnaces in sizes up to 1000 kw. The corresponding voltages in use range from 440 to 1800 v. The standard for the 960-cycle steel-melting furnace is 800 v. The power factor of a coreless induction furnace is low, 5–15%. At the frequencies used the capacitor is more efficient, less costly, with lower operating and maintenance costs than synchronous condensers. The capacitor is designed primarily for a given micro-farad for operation at a given voltage. The voltage rating dets. the thickness of the dielectric between the electrodes. Factors influencing their design are pointed out. W. H. BOYNTON

The development of the electric resistance furnace. W. J. MILLAR. *Metal Ind.* (London), **37**, 459–62(1930). E. H.

Analysis of electric heat treating of high-grade axes. WIRT S. SCOTT. *Elec. J.* **27**, 511–14(1930).—This is an analysis of the hardening and tempering of axes at the Warren Axe & Tool Co. and shows the comparison in operating conditions between gas-fired and electrically heated furnaces. The summarized monthly costs of heat treating indicate a net profit of $524.10 per month when elec. heat is used. A. D. S.

A small laboratory electric furnace. EUGENE F. COLEMAN. *J. Chem. Education* **7**, 2720–1(1930).—Directions are given for making the app. from a flower pot and a *conical* heating element from a household elec. heater. It may be run at about 1300° for as much as 1 hr. without injury. J. H. MOORE

Manganese in electrolytic zinc practice. OLIVER C. RALSTON. *Eng. Mining J.* **130**, 375–8(1930).—An analysis of available data and a crit. study of the available evidence that formed a considerable part of the testimony in the case of Electrolytic Zinc Process *vs.* French's Complex Ore Reduction, hinging on the validity of a Canadian patent. *Ibid* 510–2.—Points of the testimony in the suit are given. W. H. B.

Applications of the photoelectric cell to chemical analysis and control. H. M.

PARTRIDGE. *Ind. Eng. Chem., Anal. Ed.* 2, 207–13(1930).—A bibliography on photoelec. cells and their uses is included. See *C. A.* 24, 4991. D. K. ALPERN

Electrolytic preparation of arsine and stibine. M. HLASKO AND M. MASLOWSKI. *Roczniki Chem.* 10, 240–7(247 French)(1930).—The best conditions were detd. for the production of AsH_3 and SbH_3 by electrolysis of aq. concd. solns. of AcONa (acidified with AcOH) with an As or Sb cathode, resp. The output of either increased rapidly with increase in current, the p. d. between the electrodes remaining const. Increasing the voltage applied to the cell but keeping the current the same diminished the yield of AsH_3 or SbH_3. The best yield of SbH_3 was obtained with a cathode c. d. of 14 amp./sq. dm. Conclusion: The electrolytic method for the prepn. of AsH_3 and SbH_3 is not practical. J. KUČERA

An electroösmotic theory of the electrolytic rectifier. A. A. DOBIAŠ, L. I. KRAMP AND O. P. LEBEDINSKAYA. *Z. Physik* 61, 852–72(1930); *Bull. acad. sci. union rep. soviet. social. Classe sci. phys. math.* 1930, No. 3, 235–55(in German).—This is a repetition and extension of work previously published by D. (*Memoires Inst. Agron. Empereur Pierre I à Voronège* III(1908)).—According to the authors the electrode during the formative period becomes covered with a porous insulating membrane. The formation of this membrane continues until the electroösmotic pressure can overcome the electrostatic attraction between the electrolyte and the electrode. The mechanism of the valve or rectifying action is probably the following: during the active phase the electrolyte is in contact with the electrode and a current passes; during the inactive phase the electrolyte moves through the membrane away from the electrode causing a great decrease in cond. Because of the fact that Ta electrodes did not show this effect, probably because of the acidic nature of the membrane, the authors refrain from saying that their explanation, important though it is, is the only one which will be able to explain the phenomenon. Exptl. data obtained by the use of Al electrodes in 0.1 *M* solns. of $NaHCO_3$, KOH, LiOH, $AlCl_3$, HCl and HNO_3 are given. E. R. SCHIERZ

Investigation of the electric conductivity of sodium chloride crystals. BORIS HOCHBERG AND ANTON WALTHER. *Z. Physik* 64, 392–401(1930).—The temp. variation of elec. cond. σ from 25° to 250° can be represented by the expression $\sigma = A^{(-B/T)}$; the current is due to the migration of the Na ions. Between 550° and 800° a second term is necessary to take account of the contribution of the Cl ions to cond. A special switch has been constructed to measure the current immediately (10^{-3} sec.) after the potential has been applied to the crystal to avoid the interference of polarization effects. EGON BRETSCHER

Electric discharges in crystals. LYDIA D. INGE AND ALEXANDER F. WALTHER. *Z. Physik* 64, 830–44(1930).—A sudden discharge is allowed to pass through a crystal plate placed between a flat and a pointed electrode. The path of the discharge is studied as function of the symmetry and temp. of the crystal and the sign of the potential and illustrated by a great no. of photographs. The crystals investigated are *rock salt, sylvite, fluorspar, calcite, aragonite, beryl, barite.* EGON BRETSCHER

Dissociation of carbon dioxide through influence of electrical discharge at diminished pressure. FRANZ FISCHER, HANS KÜSTER AND KURT PETER. *Brennstoff-Chem.* 11, 300–4(1930); cf. *C. A.* 23, 3861, 4326.—By use of app. previously described, the dissocn. and the elec. efficiency were detd. for dry and wet CO_2 at various flow rates, pressures and current densities. The effects of these variations are shown graphically together with temp. variations in different parts of the discharge tube. The dissocn. of dry CO_2 reached a max. of 42% at 40–60 mm. Hg pressure, 2.0 kw. discharge and 100–150 l./hr. flow. It increased sharply to this point with increasing pressure and flow, then slowly decreased linearly with flow. Increasing c. d. also increased the dissocn., dry gas showing the greater effect. Recombination to reform CO_2 took place rapidly in the presence of H_2O vapor. Efficiency increased with increasing rates, as much as 18% efficiency being obtained at 550 l./hr., the remaining energy going into heat loss. Temps. varied between 700° and 1200° with current and pressures of 30–100 mm. Hg, increasingly linearly with the latter. Variations of rate or H_2O vapor had no effect with const. pressure and c. d. Little O_2 was found in the decompd. CO_2. Dissocn. was believed divided between thermal and elec. effects. F. W. JUNG

Preparation of a large-current quartz mercury-vapor lamp. TSUNESABURÔ ASADA. *Proc. Phys.-Math. Soc. Japan* [3], 12, 167–70(1930).—Novel features of this lamp include a vacuum-tight seal of an Fe-Ni electrode into the quartz and a brine-cooled steel anode which extends into the interior of the lamp, thereby keeping the temp. from rising too high. This lamp may carry a current of 20 amp. MALCOLM DOLE

The constricted mercury arc. R. H. CRIST. *J. Am. Chem. Soc.* 52, 4237(1930).—

Directions are given for making an arc that will run at 4–5.5 amps. and 20–5 v. per sq. cm. for over 30 hrs. with fairly const. intensity. J. H. MOORE

A geometrical analysis of open carbon arc phenomena. W. CRAMP AND A. P. JARVIS. *J. Inst. Elec. Eng.* (London) **68**, 1301–12(1930).—The behavior of a C arc is developed geometrically and proved experimentally. From this the conditions governing the musical arc are deduced and the growth of arc oscillations is traced. Geometrical methods are employed because no direct integration of the differential equations is possible. A. D. S.

Preparation of carbon for the electrical use. VI. Studies on pulverized carbon for the transmitter (3). GENKICHI ICHINOSE. *Rept. Osaka Ind. Research Lab., Japan* 11, No. 8(1930). F. I. NAKAMURA

The radiation distribution of antennae in vertical planes. R. M. WILMOTTE. *J. Inst. Elec. Eng.* (London) **68**, 1191–1204(1930).—Distribution in a vertical plane was obtained by measuring in an airplane the strength of a received signal from an excited antenna on the ground. Substantial agreement was obtained between theory and expt., the discrepancies increasing with the frequency. A. D. S.

Electrical porcelain. II. J. K. GILLETT. *Electrician* **105**, 588–9(1930); cf. *C. A.* **25**, 37.—This instalment deals with tests for porosity, the effect of glazes on mech. and thermal properties, and breakdowns caused by cementing. A brief bibliography is included. W. H. BOYNTON

Electrical resistance of Ni and permalloy wires as affected by longitudinal magnetization and tension (MCKEEHAN) **9**. Apparatus and operation for making hollow rubber articles by electrodeposition from aqueous rubber dispersions (U. S. 1,783,435) **30**. Apparatus for dehydrating petroleum emulsions by electric treatment (U. S. pat. 1,783,595) **22**. Crucibles (U. S. pat. 1,784,647) **1**. Ferricyanides (Ger. pat. 504,501) **18**.

Electric dry-cell battery. GEORGE W. HEISE and ERWIN A. SCHUMACHER (to National Carbon Co.). U. S. 1,784,592, Dec. 9. A cell is described with Zn and Cu electrodes, a Cu oxide depolarizer coöperating with the Cu cathode, a caustic alkali electrolyte in gel form and cellulosic fibers reënforcing the electrolyte gel.

Dry-cell electric battery cores. JOSEPH M. HENDERSON (to Burgess Battery Co.). U. S. 1,781,688, Nov. 18. Mech. features of manuf.

Electric storage battery. M. KUGEL. Brit. 332,660, May 3, 1929. Addnl. phosphoric acid required to maintain the strength of the electrolyte described in Brit. 280,197 (*C. A.* **22**, 2889) is supplied by introducing into the electrolyte a solid substance which will produce H_3PO_4 such as phosphates of Ca, Mg, Al, Ba, Zn, Cd or Pb (which may be in the form of tablets, sticks, balls or cubes), or solid metaphosphoric acid may be used, as may also products formed by adding small quantities of metal oxides to H_3PO_4. The solid material may also be used with H_2SO_4 for producing the electrolyte originally used in the battery.

Sealing on covers of storage batteries. HERBERT H. ALDRICH and JOHN L. RUPP (to Wubco Battery Corp.). U. S. 1,784,216, Dec. 9. A cover of bituminous compn. is applied to a container of the same material and the adjoining faces of the cover and container are joined by fusion of the edges and ironing of the joint.

Galvanic element. MANNESMANN LICHT A.-G. (Karl Stamm, inventor). Ger. 504,638, Apr. 14, 1926. The waste lye from the production of high % K salts in the K industry is used as the electrolyte.

Electrodeposition of gold. HEINRICH PAWECK and ROBERT WEINER. Austrian 119,022, Apr. 15, 1930. A bath is used contg. alkali or alkali carbonate and considerably higher proportions of $K_4Fe(CN)_6$ and Au than those hitherto taken, *e. g.*, $K_4Fe(CN)_6$ 200 and Au 20 g. per l. A high c. d., *e. g.*, 5 amps. per sq. dm., is also applied, and the bath is stirred and warmed in known manner. When insol. anodes are used, the bath is replenished with a salt prepd. by adding $HAuCl_4$ to a hot concd. soln. of $K_4Fe(CN)_6$, then adding Na_2CO_3, filtering off the pptd. Fe and crystg. the soln.

Apparatus for electrodeposition of metal on metal tubes. FRANCIS G. MARTIN and WILLIAM RAMSEY (to J. Stone & Co., Ltd.). U. S. 1,783,885, Dec. 2. Structural features.

Apparatus for electrodeposition of metals such as nickel, iron and copper. JACK HOLLINS (to Imperial Chemical Industries, Ltd.). U. S. 1,782,614, Nov. 25. Structural features.

Electroplating apparatus. CONSTANTINE G. MILLER. U. S. 1,781,791, Nov. 18. Structural features.

Chromium plating. JOHN F. K. MCCULLOUGH and BENJAMIN W. GILCHRIST (to *Ternstedt Mfg. Co.). U. S. 1,781,789, Nov. 18. With a Cr chloride plating bath there is incorporated an addnl. material such as $AlCl_3$ which combines with the OH ions to prevent deposition of Cr hydroxide on the articles being plated. Cf. C. A. 24, 791.*

Electrolytic cell for deposition of iron. ROBERT D. PIKE. U. S. 1,782,909, Nov. 25. Various details are given with reference to a cell with alternating anode and cathode compartments, and with disc cathodes mounted on a shaft for rotation and dipping into the electrolyte.

Electrolytic plant for making iron sheets or tubes or figured iron, with endless-band cathode and anode. ÖSTERREICHISCHE-ALPINE MONTANGES. Austrian 119,031, Apr. 15, 1930.

Removing salts from water, etc., by electrolysis. JEAN BILLITER. Austrian 119,209, Apr. 15, 1930. The liquid to be purified is supplied to the middle compartments of a 3-compartment cell series, the distance between the diaphragms limiting each middle compartment being less than 1 cm.

Tarnish-resisting coatings comprising chromium and silver. DANIEL GRAY, RICHARD O. BAILEY and WM. S. MURRAY (to Oneida Community, Ltd.). U. S. 1,782,092, Nov. 18. Articles are electroplated in a bath contg. a Ag compd. such as Ag chromate together with Cr sulfate and at least 3% of chromic acid, using an anode such as Pb and maintaining an excess of Ag salt in contact with the bath.

Refining aluminum electrolytically. PAUL L. HULIN (to Soc. anon. compagnie de produits chimiques et electrometallurgiques Alais). U. S. 1,782,616, Nov. 25. Refining is effected in an app. contg. 3 superposed layers in a state of fusion: an anode of a dense alloy of the metal to be extd. such as an alloy of Al with Cu, a halogenated bath such as cryolite, alumina, AlF_3 and BaF_2 forming the electrolyte, and a light metal such as pure Al forming the floating cathode, with a horizontal frame of refractory material or C surrounding the anode, a horizontal frame of insulating material contg. the electrolyte and a frame composed substantially of C surrounding the cathode and insulated from an outer metal shell.

Chlorine fixation or recovery in electrolytic processes. EDWIN O. BARSTOW (to Dow Chemical Co.). U. S. 1,781,830, Nov. 18. In the electrolysis of fused compds. such as NaCl and $MgCl_2$, Cl is exhausted while admitting air and the resulting mixt is treated with an agent such as SO_2 and water for selectively retaining the Cl.

Electrode (formed largely of corrugated sheet aluminum) for electrolytic condensers. RALPH D. MERSHON. U. S. 1,784,532, Dec. 9. Structural features.

Precipitating electrode for electric gas-cleaning plant. SIEMENS-SCHUCKERTWERKE A.-G. (Richard Heinrich, inventor.) Ger. 506,434, June 11, 1929. Addn. to 424,834.

Cathodes for electric discharge vessels. ALLGEMEINE ELEKTRIZITÄTS-GES. Ger. 506,459, Apr. 2, 1926. In prepg. cathodes which are to be heated indirectly and comprise a metal coating on a non-conducting oxide, the finely powd. metal is pasted with a sufficiently viscous inert liquid and applied to the oxide, the liquid is evapd. and the powd. metal is sintered on. Electron-emitting substances may be included in the coating. Addnl. details are described.

Electric-furnace for heating metal articles. RANDAL E. TALLEY (to George J. Hagan Co.). U. S. 1,783,155, Nov. 25. Various details are described of a furnace with a hearth which may be tilted and simultaneously jarred. U. S. 1,783,156 relates to a rotary-hearth heat-treating app.

Electric furnace for melting aluminum, etc. FRANZ LINNHOFF (to Ajax Electrothermic Corp.). U. S. 1,782,359, Nov. 18. Details are given of a furnace the upper portion of which is heated by elec. induction and the lower portion of which is heated by resistance heating.

Electric resistance furnace adapted for hardening metals by nitrogenization. ADOLF FRY (to Nitralloy Corp.). U. S. reissue 17,874, Nov. 18. Reissue of original pat. No. 1,661,694 (*C. A.* 22, 1286).

High-frequency electric induction heating system for zone-hardening steel articles such as rolls. JAMES R. ADAMS. U. S. 1,783,764, Dec. 2. The speed of the heating operation is regulated by the rate of power input and the depth of penetration of the hardening heat is regulated by the frequency of the current and rate of power input.

Electrically heated furnace for annealing metal sheets, wire, etc. METALLGES. A.-G., H. VON FORSTER and E. LAY. Brit. 332,656, May 3, 1929. Structural features.

Electric-resistance muffle-furnace construction suitable for heat treating drills, etc. ARTHUR IMBERY (to Globar Corp.). U. S. 1,784,670, Dec. 9.

Charging apparatus for circular electric furnaces. PAUL L. J. MIQUET. U. S. 1,784,699, Dec. 9. Structural features.

Arc smelting furnaces. DEMAG A.-G. Ger. 506,303, Dec. 20, 1928. A furnace having a rotatable cover, through which the electrodes are carried, is provided with means for raising the cover before each rotation.

Electrically heated apparatus for roasting coffee, cocoa, ores, etc. ROBERT H. TALBUTT and FREDERICK A. ALLNER. U. S. 1,782,946, Nov. 25. Structural features.

Electric condenser. MICHAEL POLANYI and STEPHAN VON BOGDANDY. U. S. 1,784,611, Dec. 9. Alternate thin layers of materials such as metal and dielectric material are pptd. in quick succession on a common support such as a rotating drum (suitably by spraying). App. is described.

Electrolytic condensers. RALPH D. MERSHON. U. S. 1,784,674, Dec. 9. An electrolyte such as borax and H_3BO_3 soln. is held in a Cu vessel and filmed anodes such as Al are immersed in the electrolyte. Inactive parts are made of non-filming metal such as Cu and a unidirectional current may be passed through the electrolyte to electroplate out injurious metals. Various structural details are described.

Conditioning electric switches. ROBERT A. MILLIKAN and ROYAL W. SORENSEN (to Calif. Institute of Technology). U. S. 1,784,302, Dec. 9. Contacts, which may be formed of Cu or W, are mounted in a gas-tight chamber and the chamber is exhausted to a pressure lower than the pressure at which gases are conductive, an elec. potential is imposed on the contacts and they are opened to establish an arc between them, and expelled occluded gases are exhausted. U. S. 1,784,303 relates to power circuit interrupters which may be similarly prepd. and the electrodes of which are sufficiently free from occluded gases to have the capacity of producing a fractional cycle arc only when the electrodes are sepd. while carrying a power current.

Mercury-vapor lamps. DEUTSCH ENGLISCHE QUARZSCHMELZE GES. and THERMAL SYNDICATE, LTD. Brit. 332,744, July 22, 1929. In lamps open to the atm., escape of Hg vapor is prevented by causing it to pass into a vessel contg. a material which either absorbs or combines with it such as Au leaf or powder or Au-coated metal foil. Various structural details are described.

Electric incandescent lamps. PATENT-TREUHAND-GES. FÜR ELEKTRISCHE GLÜHLAMPEN (to General Electric Co., Ltd.). Brit. 332,506, July 1, 1929. Parts of the lamp to be covered by the cap are roughened during sealing to secure adhesion to the cap (suitably by jets of acid fumes, by blowing powd. glass against the softened glass of the lamp or by introducing etching gases into some of the heating flames, use of P hydride, B hydride and boric acid esters being mentioned).

5—PHOTOGRAPHY

C. E. K. MEES

The reversal of amateur films. A. SEYEWETZ. *Chimie & industrie* Special No., 382–3(March, 1930).—See *C. A.* **24**, 2070. A. PAPINEAU-COUTURE

The Eberhard effect in relation to photographic photometry. N. VALENKOV. *Z. wiss. Phot.* **27**, 236–67(1930).—The Eberhard effect is in a high degree dependent upon the sharpness of the photographic picture. For the straight line portion of the H. and D. curve, the effect is proportional to the difference of the densities between the pictured object and the surrounding field. If the surface of the picture is large, the Eberhard effect shows an edge effect which is never wider than 1.5 mm. Pictures smaller than 3 mm. in diam. show increased densities through the Eberhard effect. The effect is independent of the form of the picture. Very fine grain photographic emulsions show no Eberhard effect. With increasing grain size, this effect increases. For x-rays there is almost no effect. Increase in density due to the Eberhard effect is in all cases very small. Development with metol-hydroquinone and KBr did not show any more difference in the effect than development with ferrous oxalate. The effect is independent of the intensity of the light source. It has little significance for both astrophotometry and spectrophotometry; for x-rays, especially, it has no significance whatever. A. P. H. TRIVELLI

Reactions produced in the various processes for the solution of the silver image. A. SEYEWETZ. *Chimie & industrie* Special No., 378–81(March, 1930).—See *C. A.* **24**, 3718. A. PAPINEAU-COUTURE

The determination of traces of silver in photographic layers. F. LÜHR. *Z. wiss. Phot.* **27**, 283–303(1930).—For the titration of the dissolved Ag there is used a modified

electrometric differential method of Cox, who used this for acidity and alky. detns. Titration takes place in 2 burets within 2 electrolytically connected containers, one of which contains a little excess of titration soln. The equiv. point is expressed by a very sharp max. of the p. d. By applying Ag electrodes and 0.0001 *N* KI soln., it is possible to det. 0.001 mg. Ag. A. P. H. TRIVELLI

Paper for photographic purposes (Brit. pat. 332,743) 23.

Photography. KALLE & CO. A.-G. Ger. 506,413, Aug. 30, 1929. Layers contg. org. light-sensitive compds., of the kind ordinarily developed with Ag or noble metal salt solns. by known phys. methods, are exposed and then developed with one or more of the customary toning baths contg. heavy metal salts. In this way, a wide variety of colors can be attained. Thus, gelatin paper sensitized with Na anthraquinone-β-sulfonate may be exposed and developed in a bath contg. a U salt. One or more toning salts may also be incorporated in the layer or deposited on the reverse side of the paper, etc., in which case development may be effected with water alone.

Photography. I. G. FARBENIND. A.-G. (Bruno Wendt and Hans Bincer, inventors). Ger. 506,100, May 12, 1929. Bleach-out layers sensitized with thiourea derivs., *e. g.*, diethylthiosinamine, are fixed by decompg. the sensitizer with H_2SO_3 or bisulfite and, if desired, removing the reaction product from the layer, *e. g.*, by means of a cloth moistened with benzene. Cf. *C. A.* **24**, 4996.

Diazotype photography. NEULIPA G. M. B. H. FABRIKATION NEUZEITL. LICHTPAUSPAPIERE. Ger. 506,412, Oct. 29, 1929. Prints on paper sensitized with a diazo compd. are developed by pressing on to a dry hectograph mass contg. a coupling component. An example is given.

Diazotypes. F. VAN DER GRINTEN. Brit. 332,552, Feb. 22, 1929. Sizing material such as milk, casein, albumins, soap, lime, chalk or flour are incorporated in the developer or applied to the prints after development, in order to prevent the spreading of ink lines subsequently drawn on the prints. Substances such as glue, gelatin or sugar also may be added, and examples are given of the treatment of supports sensitized with 1-diethylamidobenzene-4-diazonium chlorostannate or 1-diisoamylamidobenzene-4-diazonium chlorostannate. Cf. *C. A.* **24**, 796.

Development of diazotypes or other treatments of films with gas. CELLOPHANE, SOC. ANON. Brit. 332,631, Feb. 21, 1929. Uniform treatment of films with NH_3 or other gas is facilitated by rolling up with the films a gas-permeable band of paper, cloth or the like. Various details of gas treatment and gas removal are also described.

Light-sensitive layer. JOHN EGGERT, RICHARD SCHMIDT and BRUNO WENDT (to Agfa Ansco Corp.). U. S. 1,782,259, Nov. 18. An ethylene deriv. forming *cis-trans*-isomerides, such as maleic acid or *trans*-dibenzoylethylene, is used for sensitizing.

6—INORGANIC CHEMISTRY

A. R. MIDDLETON

Hydrates of oxides and of mineral salts. L. HACKSPILL AND A. P. KIEFFER. *Ann. chim.* [10], **14**, 227–82(1930).—With a view to detg. the mechanism of the reaction and to explaining, if possible, any existing anomalies, H. and K. studied the dehydration *in vacuo* of a series of hydrates of oxides and of mineral salts. The method used consisted in heating the hydrate *in vacuo* and measuring the loss of H_2O by reading the pressure established in the app. The values of the pressure and the temp. were recorded automatically. Dehydration curves for the substances studied are given. With hydrated Cr_2O_3 dehydration begins at ordinary temp. and continues gradually up to 550°, where it is complete. The curve obtained is characteristic of amorphous hydrates. Although analysis gave the formula $Cr_2O_3.3H_2O$ for the substance, it is a hydrate with a variable proportion of H_2O; it is a dry gel up to 26% H_2O. Therefore, it cannot be given the formula of a definite hydrate. An attempt to prep. $Bi(OH)_3$ by pptg. a soln. of $Bi(NO_3)_3$ with NH_4OH in the cold gave a product with the formula $(Bi_2O_3)_2.N_2O_5.H_2O$. Since other attempts to prep. the hydroxide were unsuccessful, H. and K. state that the existence of this compd. is very doubtful. Orthoboric acid, $B_2O_3.3H_2O$, is stable up to 90°. At 100° the decompn. becomes explosive and 95% of the total H_2O is lost, forming B_2O_3 contg. a little H_2O of adsorption. All the H_2O is gone at 250°. Only this third part of the curve is reversible. Metaboric acid, $B_2O_3.H_2O$, was prepd. by dehydrating ortho-

boric acid in a current of H_2O vapor at 135°. The dehydration curve is analogous to that of orthoboric acid, with the exception that the crit. temp. of dehydration is higher, the difference being due to the induction period. Both acids are perfect hydrates. $BeO.H_2O$ loses no H_2O up to 190°. At 190–200° there is a short induction period, followed at 200° by a rapid decompn. and loss of 80% of the H_2O present. Between 220° and 700° the rest of the H_2O is removed. This is H_2O of adsorption, and this part of the curve is not reversible. For each max. temp. at which the substance was heated, there was obtained an adsorption curve which showed that the higher the temp. the less the adsorption for a given temp. This can be explained only by a change in the phys. state of the substance by polymerization. BeO when heated alone does polymerize, and its state of polymerization is more advanced as the temp. is raised. Therefore $BeO.H_2O$, once dehydrated, cannot be formed again. $CdO.H_2O$ is stable up to 120°. There is then a period of induction followed by rapid dehydration from 160° up. Eighty-eight % of the H_2O is lost. Some of the H_2O remains fixed (as H_2O of adsorption) and is removed slowly up to 600°. At the same time polymerization of the CdO occurs. $ZnO.H_2O$ is less stable. *In vacuo* at 20° $ZnO.0.16H_2O$ is formed, the H_2O being fixed by adsorption. Dehydration thereafter is slow and continuous, and complete at 550°. Polymerization occurs here also, so that $ZnO.H_2O$, once dehydrated, cannot take up H_2O to give $Zn(OH)_2$. With $MgO.H_2O$ dehydration begins at 300° and is rather rapid. Ninety % of the H_2O is lost, and the remainder is removed gradually between 360° and 700°. H. and K. note that artificial brucite, freshly prepd., is dehydrated more easily than natural brucite. $Na_2O.B_2O_3.4H_2O$ loses some of the adhering H_2O at ordinary temp. The hydrate is then stable up to 110°. After a short induction period dehydration continues at 120° with a loss of 50% of the H_2O, giving $Na_2O.B_2O_3.2H_2O$. The rest of the H_2O is lost between 130° and 150°. The last 2 H_2O play a role entirely different from that of the first 2. They must enter into the constitution of the borate, and are "H_2O of semi-constitution." $Na_2O.B_2O_3.4H_2O$ should therefore be written $[Na_2O.B_2O_3.2H_2O].2H_2O$. The monoborates come from the acid $B_2O_3.3H_2O$ or H_3BO_3, the formula of orthoboric acid. Therefore they are not metaborates, as has been assumed previously, but diacid salts of orthoboric acid. $Na_2O.B_2O_3.5H_2O$ was prepd. The dehydration curve showed that 20% of the H_2O is fixed in an unstable manner, and that the salt is $Na_2O.B_2O_3.4H_2O$, to which adheres some of the mother liquor of the soln. from which it was crystd. (cf. Atterberg, *Z. anorg. Chem.* **48**, 371(1906) and Dukelski, *Ibid* **50**, 1(1906)). The dehydration curve of borax has 3 parts. From 20° to 60° there is an induction period, followed by abrupt, almost explosive, decompn. of the hydrate at 60° with loss of 80% of the H_2O. The last 20% of the H_2O is removed with difficulty; dehydration is gradual and is complete at 400°. The last 2 H_2O must enter into the constitution of the salt. The formula of borax is therefore $[Na_2O.(B_2O_3)_2.2H_2O].8H_2O$. The dehydration curve of $Na_2O.(B_2O_3)_2.5H_2O$ shows a horizontal part followed by a slow decompn. which becomes explosive at 120°. Sixty % of the H_2O is lost. The remaining 40% is removed slowly; the salt is completely dehydrated at 400°. It has 3 H_2O of hydration and 2 H_2O of semi-constitution. $Na_2O.(B_2O_3)_2.4H_2O$, a borate called kernite, is stable below 60°; at this point 32% of the H_2O is lost abruptly. The curve then shows a level section up to 116°, at which point 18% of the original H_2O is lost. The remaining $2H_2O$ are removed with more difficulty, and dehydration is not complete until the temp. is above 400°. The salt therefore has 2 H_2O of crystn. and 2 H_2O attached in a different way. The 2 abrupt losses of H_2O indicate that the salt is a mixt. of 2 hydrates. Further study led H. and K. to the conclusion that kernite is a mixt. of 3 hydrates in the proportion: $4[Na_2O.(B_2O_3)_2.10H_2O]$, $6[Na_2O.(B_2O_3)_2.5H_2O]$, $15[Na_2O.(B_2O_3)_2.2H_2O]$. The mixt. of these 3 hydrates forms a homogeneous, transparent crystal. $K_2O.(B_2O_3)_2.4H_2O$ is stable up to 100°. At this temp. dehydration occurs abruptly with removal of 50% of the total H_2O. The last 2 H_2O are removed gradually up to 400°, and are therefore H_2O of semi-constitution. $Cs_2O.(B_2O_3)_2.5H_2O$ is stable up to 70°, and then loses 60% of its H_2O. The other 2 H_2O are lost gradually between 70° and 400°, and are therefore H_2O of semi-constitution. The alk. diborates should be written $[M_2O.(B_2O_3)_2.2H_2O].nH_2O$. They come from an acid with the formula $(B_2O_3)_2.3H_2O$. $Na_2O.(B_2O_3)_2.10H_2O$ is stable up to 75°, where dehydration begins and continues until 80% of the H_2O has been lost. The remaining 2 H_2O are removed slowly up to 350°, and therefore enter into the constitution of the mol. $K_2O.(B_2O_3)_2.8H_2O$ is stable up to 105°, where 75% of the H_2O is lost. The remaining 2 H_2O are removed slowly, and are H_2O of semi-constitution. The formula should therefore be written $[K_2O.(B_2O_3)_2.2H_2O].6H_2O$. $Rb_2O.(B_2O_3)_2.8H_2O$ is stable up to 80°. An induction period is followed by rapid dehydration at 100° and loss of 6 H_2O. The other 2 H_2O are removed gradually be-

tween 120° and 300°, and are H_2O of semi-constitution. $Cs_2O.(B_2O_3)_5.8H_2O$ is stable up to 70°, where 6 H_2O are lost. The other 2 H_2O are H_2O of semi-constitution. All the pentaborates therefore probably contain 2 H_2O of constitution and the formula should be written $[M_2O.(B_2O_3)_5.2H_2O].nH_2O$. They are derived from an acid $(B_2O_3)_5.3H_2O$ or $H_3B_5O_9$. $MgSO_4.7H_2O$ begins to lose H_2O at ordinary temp. *in vacuo*. After an induction period, the loss is more rapid and 5 H_2O are lost, giving $MgSO_4.2H_2O$. The remaining 2 H_2O are removed slowly in 2 steps, which would indicate the existence of $MgSO_4.H_2O$. This hydrate has 5 H_2O of hydration and 2 H_2O of semi-constitution, which are combined differently. At ordinary temp. *in vacuo* $CoSO_4.7H_2O$ loses 5 H_2O. The remaining 2 H_2O are removed slowly between ordinary temp. and 320°, and are H_2O of semi-constitution. $NiSO_4.7H_2O$ behaves very much as the Co salt. Dehydration of $FeSO_4.7H_2O$ *in vacuo* begins at ordinary temp. but is not very rapid When 1.2 H_2O remain, there is a change in the direction of the curve and the rest of the H_2O is removed more slowly. A more exact study showed that because the rate of dehydration is very slow, $FeSO_4.2H_2O$ begins to decomp. in the presence of $FeSO_4.7H_2O$. This explains the value $FeSO_4.1.2H_2O$. The last 2 H_2O are H_2O of semi-constitution. With $BeSO_4.4H_2O$ dehydration begins at 60° and after an induction period becomes rapid at 90° with loss of 50% of the H_2O. Dehydration is then slow and complete only at 320°. The 2 H_2O of semi-constitution seem to be fixed with different affinities, for the curve indicates the possibility of $BeSO_4.H_2O$. $MnSO_4.4H_2O$ has a period of induction beginning at ordinary temp. The reaction is rapid above 60° and $MnSO_4.H_2O$ is formed. The last H_2O is removed slowly between 100° and 250°, and is H_2O of semi-constitution. Dehydration of $CuSO_4.5H_2O$ begins at ordinary temp. *in vacuo*. The period of induction lasts up to 70°, where dehydration becomes rapid, giving $CuSO_4.H_2O$. The pressure then remains const. up to 180°, where the last H_2O is removed. The salt contains 5 H_2O of hydration. For $3CdSO_4.8H_2O$ the period of induction begins at ordinary temp. and continues up to 80°, where dehydration is rapid, giving $CdSO_4.H_2O$. The pressure remains const. up to 105°, where the last H_2O is removed. A little H_2O of adsorption is held up to 200°. With $CaSO_4.2H_2O$ there is no dehydration up to 60°, where the induction period begins. At 80° dehydration is rapid, and 2 H_2O of hydration are lost. Only a little H_2O of adsorption (0.1 H_2O) remains at 100°, and is lost between 100° and 150°. The 2 H_2O are H_2O of hydration. $Al_2(SO_4)_3.18H_2O$ loses 2 H_2O *in vacuo* to give $Al_2(SO_4)_3.16H_2O$, which is stable up to 50°. After an induction period, dehydration becomes rapid above 70° and gives $Al_2(SO_4)_3.6H_2O$. The remaining 6 H_2O (H_2O of semi-constitution) are removed slowly between 100° and 450°. Violet Cr sulfate, $Cr_2(SO_4)_3.18H_2O$, loses 9 H_2O *in vacuo* without heat, giving $Cr_2(SO_4)_3.9H_2O$, which is stable up to 80°. The induction period then occurring continues up to a little above 100°, where dehydration becomes rapid and results in the formation of $Cr_2(SO_4)_3.3H_2O$. The last 3 H_2O are removed slowly and are H_2O of semi-constitution. A bend in the curve above 200° corresponds to $Cr_2(SO_4)_3.2H_2O$. The green Cr sulfate, $Cr_2(SO_4)_3.6H_2O$ (see Recoura, *Bull. soc. chim.* [3], 7, 200(1892)), loses 6 H_2O slowly over the interval from ordinary temp. up to 400°. These 6 H_2O are H_2O of constitution. Above 400° the salt begins to decompose. The violet sulfate dried at 100° gives a green powder with 6 H_2O. This powder does not give the same dehydration curve as the preceding Cr sulfate, and therefore the 2 are not identical. The one obtained from the violet salt is partially dehydrated $Cr_2(SO_4)_3.9H_2O$. For $CuSO_4.K_2SO_4.6H_2O$ the induction period is followed by rapid dehydration at 60°, giving $CuSO_4.K_2SO_4.2H_2O$. The last 2 H_2O are lost at 100°, and dehydration is complete at 120°. The 6 H_2O are H_2O of hydration. $ZnSO_4.K_2SO_4.6H_2O$ behaves as the preceding salt and is a perfect hydrate. Dehydration of $Al_2(SO_4)_3.K_2SO_4.24H_2O$ begins at ordinary temp. *in vacuo*, and after an induction period becomes rapid at 70° with loss of 18 H_2O. The last 6 H_2O behave like H_2O of semi-constitution, and dehydration is complete at 400°. The examn. of the dehydration curves has given valuable information as to the state in which the different mols. of H_2O are fixed. On the basis of the results, H. and K. classify them in 5 groups, instead of the 4 generally accepted: (1) H_2O of occlusion, which is found between the cryst. leaflets in the state of a satd. soln. Removal of this H_2O is continuous but slow. (2) H_2O of adsorption, conditioned by the state of the substance. It is found on the surfaces of the crystals; when the latter are infinitely small, one obtains gels. Removal of this H_2O is slow and continuous, but varies with the concn. (3) H_2O of crystn. which, being part of a cryst. lattice, involves by its removal the disintegration of the crystal. Its removal occurs abruptly at a fixed temp., which varies slightly with the conditions of the expt. (4) H_2O of semi-constitution, which seems to be an integral part of the mol. although its removal, however difficult, does not involve the decompn.

of the anhyd. salt. (5) H_2O which has always been called "water of constitution." It cannot be eliminated without complete breaking-up of the mol. of which it is a part. This H_2O cannot be detected by the method used in these expts., but can be obtained by difference. The same salt may contain 2 or more of the 5 varieties of H_2O just mentioned. One or more mols. of H_2O may pass from one method of fixation to another, *e. g.*, from adsorption to crystn., and *vice versa*. The same mol. of H_2O may be classed differently according to the point of view. The 3 H_2O of boric acid and the 2 or 3 H_2O of orthophosphoric acid are H_2O of crystn. according to the definition of H. and K., but from the purely chem. point of view it is difficult not to consider them as H_2O of constitution. The results show that the reversibility of dehydration is far from being as general as supposed by Debray. This study has not definitely settled the problem of the constitution of hydrates, but it has permitted a better interpretation of phenomena known for a long time. It has enabled the authors to establish or confirm the existence of certain definite hydrates and that of a basic nitrate of Bi. LOUISE KELLEY

The anhydrous lower bromides of titanium. RALPH C. YOUNG AND WALTER C. SCHUMB. *J. Am. Chem. Soc.* **52**, 4233–9(1930).—*Ti tribromide* (I) is obtained as nonvolatile, blue-black crystals by reduction of $TiBr_4$ (II) with H in a "hot-cold" tube. Above 350° I reacts rapidly with HBr, forming II and H. At 400° I decomposes to II and *Ti dibromide*. This latter compd. is black, very reactive, ignites on exposure to moist air and dissolves in H_2O with evolution of H. Heated above 500° decompn. to Ti and II ensues. Above 160° reaction with HBr gives I and II. Ti reacts with HBr forming, at 300°, the lower halides, at 450°, chiefly II. At 300° II in a sealed tube with Ti, Hg or Ag is partially reduced to I. Dissolved in C_6H_6 II is reduced to I by Ag and Hg. In the latter case the reaction is practically quant. B. A. SOULE

Cupric perchlorate. R. PORTILLO AND L. ALBERTOLA. *Anales soc. españ. fís. quím.* **28**, 1117–24(1930).—$Cu(ClO_4)_2$ was prepd. by the action of $HClO_4$ on $CuCO_3$. Crystn. gives pure $Cu(ClO_4)_2.7H_2O$; dried over P_2O_5 it forms $Cu(ClO_4)_2.6H_2O$. Hydrates contg. 4 and 2 H_2O were also prepd. With the hexahydrate $d_4^{23} = 2.225$, soly. 54.3%, mol. heat of soln. −4.6 cal., heat of formation in soln. +64.7 cal. A table of degrees of cryoscopic dissociation is given. E. M. SYMMES

The cupramines (II). Amines of cupric perchlorate. R. PORTILLO. *Anales soc. españ. fís. quím.* **28**, 1125–44(1930); cf. *C. A.* **24**, 308.—$Cu(ClO_4)_2.4NH_3.2H_2O$, $Cu(ClO_4)_2.4NH_3$, $Cu(ClO_4)_2.6NH_3$, $Cu(ClO_4)_2.5NH_3.2H_2O$, $Cu(ClO_4)_2.4NH_3.H_2O$, $Cu(ClO_4)_2.4NH_3.2H_2O$ and $3Cu(ClO_4)_2.10NH_3$ were prepd., the last 4 being new compds. For each, the *d.*, soly., cryoscopic dissocn., and heat of soln. were detd. E. M. S.

The polyiodides of cesium. II. Iodine and cesium iodide. T. R. BRIGGS. *J. Phys. Chem.* **34**, No. 10, 2260–6(1930); cf. *C. A.* **24**, 5248.—The necessary data for construction of the phase diagram for I_2-CsI have been detd. from 60° up to the b. p. of the satd. melt (303°). B. ps. of mixts. of known compn. together with analyses of the melt at known temps. constitute the exptl. criteria. The eutectic temp. for 18 mol. % CsI is fixed at 71.5 ± 0.1°. The presence of 4 solid phases I_2, CsI_4, CsI_3 and CsI is confirmed, but none of these polyiodides is stable at the m. p. A pronounced change of phase is detected at 208–211°, below which temp. the compd. $CsI.I_2(CsI_3)$ appears. H. R. MOORE

The preparation of sulfur hexafluoride and some of its physical properties. WALTER C. SCHUMB AND E. LEE GAMBLE. *J. Am. Chem. Soc.* **52**, 4302–8(1930).—F, prepd. by electrolysis of KHF_2 in a Monel metal generator with graphite anode, formed SF_6 on interaction with S. The properties of the purified product were: vapor pressure of the solid, 760 mm. at −63.8°; m. p. −50.8 ± 0.2°; vapor d. at 20° and 753.5 mm., 6.093 g./l.; relative d. (air = 1), 5.10$_6$. B. A. SOULE

7—ANALYTICAL CHEMISTRY

W. T. HALL

Principal organic reagents used in inorganic chemistry. H. GRISOLLET AND M. SERVIGNE. *Ann. chim. anal. chim. appl.* **12**, 321–31(1930).—The uses of cupferron, benzidine, dicyandiamidine, nitron, dimethylglyoxime, Na nitroso-2,3,6-naphtholdisulfonate, α-benzil dioxime, benzoylmethylglyoxime, α-furil dioxime and oxalenediuramidoxime, $(NH_2CONHC{:}(NOH))_2$, are outlined in this instalment of a carefully prepd. paper. W. T. H.

Hydroxylamine as a precipitating agent. J. CASARES ROLDÁN. *Anales soc. españ. fís. quím.* **28**, 1080–3(1930).—With Fe, Cr, Zn, Al, Cd, Ni and Co the ppts.

formed by NH_2OH are analogous to those formed by NH_4OH. With Pt there is a ppt. like that formed from H_2PtCl_6 and NH_2OH. With Cu characteristic ppts. are formed. NH_2OH and colloidal $Cu_2Fe(CN)_6$ give a compd. of green fluorescence in the dark and blue fluorescence in sunlight. E. M. SYMMES

Quantitative method of spectrographic analysis. PIERRE URBAIN. *Bull. soc. chim.* [4], **47**, 1183–8(1930).—See *C. A.* **24**, 2961. E. C. K.

Quantitative analysis of steels by spectrum analysis. F. TWYMAN AND A. A. FITCH. *Engineering* **130**, 635–6(1930).—See *C. A.* **24**, 5256. E. C. K.

Historical notes on the Reinsch test (for arsenic). HENRY LEFFMAN. *Analyst* **55**, 684(1930).—The original date of publication and some of the earliest papers mentioning the test are given. W. T. H.

Determination of bismuth in lead ores by internal electrolysis. ELLA M. COLLIN. *Analyst* **55**, 680–2(1930).—The following method is satisfactory for most ores, although in some cases special treatment may be necessary for the attack of the ore. Boil 1–2 g of the finely crushed sample for 10 min. with 25–50 cc. of concd. HCl. If the action is slow add about 1 g. of Zn and heat a little longer. Evap. the soln. to dryness and bake on the hot plate to remove most of the free HCl. Take up the residue in 5 cc. of 7.5 *N* HNO_3. Dil. with hot water, filter and wash with hot 5% HNO_3. If any considerable residue other than siliceous material remains, it is best to give it another treatment with HNO_3. To the soln. add 2% $KMnO_4$ until it is no longer decolorized, to make sure that all Sb is quinquevalent. Add 1 g. of $NH_2OH.HCl$ and electrolyze in the internal electrolysis app. at 80–85° (cf. Collin, *C. A.* **24**, 3726). Dissolve the combined ppts. of Bi and Cu in HNO_3 and sep. the Cu from Bi in the usual manner by means of NH_4OH and $(NH_4)_2CO_3$. Dissolve the Bi ppt. in 7.5 *N* HNO_3 and deposit the Bi by internal electrolysis. If the Bi content is very low the colorimetric detn. of Bi with KI is preferable to the second electrolysis. W. T. H.

Examination of bismuth for tellurium. H. TÖPELMANN. *Z. anal. Chem.* **82**, 284–5(1930).—Te frequently occurs as an impurity in metallic Bi and it is sometimes desirable to det. quickly the approx. Te content of a sample of Bi. If more than 0.001% of Te is present, it is easy to detect and det. semi-quantitatively by means of spectral analysis. Exact details are given for carrying out the test. If less than 0.001% of Te is present, the $SnCl_2$ test is useful. In many cases it is desirable to combine the 2 methods. Expts. with different electrodes are described and the influence of foreign elements on the results is discussed. W. T. H.

Electrodeposition of copper from solutions containing tartaric acid and chloride. HANS HÖLEMANN. *Z. anal. Chem.* **82**, 273–6(1930).—In a previous paper (*C. A.* **24**, 4728) H. has shown that the discharge potentials of Cu and Sb lie so close together that it is impossible to sep. them in HCl soln. By adding tartaric acid, whereby the Sb is converted more completely into a complex anion than it is in the presence of HCl alone, it is now shown that good deposits of Cu can be obtained in the presence of Sb but, unfortunately, Sb begins to deposit before the deposition of the Cu is complete. W. T. H.

Some observations on the estimation of silicon in pig and cast iron. H. W. KEEBLE. *Iron and Steel Ind. and Brit. Foundryman* **3**, 367–8(1930). C. H. LORIG

Iodometric determination of thallium in the presence of ferric iron. The determination in the cadaver. R. FRIDLI. *Deut. Z. ges. gericht. Med.* **15**, 478–88(1930).—Finely ground cadaver (50–100 g.) was digested in concd. NaOH (10 g.) to a homogeneous paste and ignited over a free flame. The cooled ash was then neutralized, made slightly acid with H_2SO_4 and heated on the water bath for 30 min. The mixt. was filtered so that the filtrate plus washings did not exceed 200 cc. Twenty cc. of this filtrate in a 50-cc. beaker was treated with Br-H_2O (few drops); and 2 g. $Na_2HPO_4.12H_2O$ and 5 cc. of 50% H_3PO_4 were added. After 10 min., 0.5 g. KI was added. In the presence of 0.1 mg. Tl the soln. turned yellow, 0.2 mg. produced a slight turbidity and with 0.5 mg. or more there was a marked sepn. of TlI. If Fe^{+++} is present, 10 g. $Na_2HPO_4.12H_2O$ and 20 cc. of 50% H_3PO_4 are added to the remaining 180 cc. of filtrate. Oxidation was produced by Br-H_2O, excess of which was avoided by the addn. of 2 cc. of 5% phenol soln. After the iodometric titration, the TlI was filtered off, dissolved by Cl-H_2O, the soln. evapd. to dryness and Tl detd. in the residue. FRANCES KRASNOW

Determination of small quantities of oxygen in gases. H. R. AMBLER. *Analyst* **55**, 677–80(1930).—The combustion of H_2 in excess of O_2 with the aid of a red-hot Pt wire is a well-known method for detg. H_2 (Dennis and Hopkins). The expts. here described are based on the reverse procedure for the detn. of O_2. In mixts. contg. only O_2, H_2 and N_2, the method is suitable for all proportions of O_2 up to about 4%, which is the explosion limit. The results are accurate within about 0.01% of the total vol. of

gas used in the test. If oxides of C are present, however, the accuracy is reduced. W. T. H.

A modification of iron oxide analysis using diphenylamine indicator. WALLACE K. GIBSON. *Rock Products* 33, No. 22, 66(1930).—The use of a "titrating solution" contg. 100 cc. 71% H_3PO_4 and 434 cc. concd. H_2SO_4 per l. is recommended. Cf. *C. A.* 23, 5557. RAYMOND WILSON

Potentiometric study of the reaction between ferrocyanide and sodium nitrite. JESÚS VÁSQUEZ ROMÓN. *Anales soc. españ. fis. quím.* 28, 1045–9(1930).—In the reaction $Na_4Fe(CN)_6 + NaNO_2 + H_2SO_4 = Na_3Fe(CN)_6 + Na_2SO_4 + NO$ there is a break in the potential curve at the equiv. point. It is possible to det. $NaNO_2$ with $Na_4Fe(CN)_6$ or *vice versa*. E. M. SYMMES

A Kjeldahl method for determining nitro nitrogen in aromatic compounds. M. WEIZMANN, J. YOFE AND B. KIRZON. *Z. physiol. Chem.* 192, 70–2(1930).—The method is based on reduction of the NO_2 group by Zn dust, and is applicable to micro detns. In a 100-cc. Kjeldahl flask treat 0.1–0.2 g. of the dry substance with 5 cc. fuming H_2SO_4 (contg. 7% SO_3) and 2 g. of Zn dust. Avoid too rapid development of heat by adding the Zn slowly. A strong odor of H_2S is soon apparent. Place a small funnel in the neck of the flask and allow the mixt. to stand several hrs., preferably overnight. Add a few crystals of $CuSO_4$ and K_2SO_4 and gradually heat the flask. After 5–6 hrs. apply the full flame and continue heating 6–20 hrs. until the mixt. is decolorized completely. When cool rinse the flask with 10 cc. H_2O, add an excess of 33% NaOH and 10 cc. more H_2O, distil the NH_3 as usual into 10–20 cc. 0.1 *N* H_2SO_4 and titrate the excess acid with 0.1 *N* NaOH and dimethyl red. The quantity of Zn used should be at least 4 times the theoretical. By this procedure good results were obtained in the analysis of *o*- and *p*-$O_2NC_6H_4OH$, α-$C_{10}H_7NO_2$ and picric acid. A. W. DOX

Determination of ethylene oxide in gas mixtures. W. DECKERT. *Z. anal. Chem.* 82, 297–307(1930).—Mixts. of C_2H_4O (*A*) and CO_2 are used under the name of *T-gas* for killing insects. When *A* reacts with HCl glycol chlorohydrin is formed, one mol. of *A* reacting with 1 of HCl. The reaction can be made the basis of a volumetric method for detg. *A* in a gas mixt. By passing the gas through a 22% NaCl soln. in 0.1 *N* HCl all of *A* is absorbed and excellent results are obtained by titrating the excess HCl if the soln. is first heated; or the diminution in vol. of the gas after treatment with HCl-NaCl soln. can be used as basis for the analysis. For a practical analysis of air that has been sprayed with *A*, pass a slow stream of the air (1 l. in 4 min.) through 0.1–0.001 *N* HCl until at least 0.44 mg. of *A* has been absorbed. Then heat the soln. to about 70° and titrate the excess acid with NaOH, methyl orange being used as indicator. One cc. of 0.1 *N* HCl = 4.4 mg. of *A*. W. T. H.

Determination of amino acids with the aid of physicochemical methods. H. LEY AND B. ARENDS. *Z. physiol. Chem.* 193, 131–44(1930).—The Cu complexes of various amino acids show more or less characteristic absorption in the visible spectrum. Those of aliphatic monoamino acids have an intense blue color; those of simple diamino acids, *e. g.*, $NH_2CH_2CHNH_2CO_2H$, are reddish violet. These salts undergo practically no electrolytic dissocn., since the metal is linked to the amino acid by both primary and secondary valences. Except at very high dilns. the molar extinction, measured in a spectral photometer with monochromatic light, is independent of the concn. Extinction curves are given for the Cu complexes of glycine, alanine, $Me_2CNH_2CO_2H$, $NH_2CH_2CH(NH_2)CO_2H$, proline and hydroxyproline. The presence of alkali salts, *e. g.*, NaCl, has practically no influence. Dissociable Cu salts, however, *e. g.*, $CuSO_4$ and $CuCl_2$, greatly diminish the extinction coeffs. of the complexes. For mixts. of 2 complexes the extinction is the sum of the sep. extinctions; hence the concn. of the 2 components can be calcd. from a simple equation. Detns. made in this way of several mixts. of glycine and alanine gave results in close agreement with the theoretical. A. W. DOX

Determination of naphthalene in mixtures with phenols and anthracene. MARIANO MARTÍNEZ CASTILLA. *Anales soc. españ. fis. quím.* 28, 1084–8(1930).—Phenols do not interfere with formation of picrates of hydrocarbons unless more than 50% are present. For the Knublauch method (*C. A.* 11, 3198; 13, 70) to give quant. results with hydrocarbons it is necessary to take into consideration the fact that the 0.002% picric soln. should be added in the necessary quantities to eliminate by washing the calcd. excess of picric acid. Results obtained with anthracene were unsatisfactory. E. M. S.

Extension of micrometric analytical methods to the determination of lactose. J. MA. CLAVERA AND F. MORENO MARTÍN. *Anales soc. españ. fis. quím.* 28, 1066–79(1930).—The Hagedorn-Jensen method (*C. A.* 17, 2721) of glucemia detn. is used in connection with a table prepd. by analyzing known solns. of lactose. The method requires only 0.5 hr. and 0.5 cc. of sample. E. M. SYMMES

The carbazole reaction for carbohydrates and related compounds. JOSEPH S. HEPBURN AND MICHAEL LAZARCHICK. *Am. J. Pharm.* **102**, 560–4(1930).—The test may be made in 3 different ways: (1) Place 1 cc. of the soln. to be tested in a test tube, add 2 cc. of concd. H_2SO_4 (sp. gr. 1.84), mix, cool to room temp., add 0.1 cc. of 0.5% soln. of carbazole in alc., mix, cool to room temp., place in a bath of boiling water and heat for 10 min. (2) Proceed as in (1) but increase the vol. of concd. H_2SO_4 used to 4 cc. (3) Place 1 cc. of the soln. to be tested in a test tube, add 4 cc. of concd. H_2SO_4, mix, cool to room temp., place in a bath of boiling water, heat for 10 min., remove from the bath, cool to room temp., add 1 cc. of distd. water, mix, again cool to room temp., add 0.1 cc. of the alc. soln. of carbazole, once more cool to room temp., place in a bath of boiling water and heat for 10 min. This test has been applied, in all 3 modifications, to freshly prepd. aq. solns. of the following carbohydrates and closely related compds.: monosaccharides: xylose, dextrose, galactose and levulose; disaccharides: maltose, lactose, sucrose; polysaccharide: starch (corn); glucosides: amygdalin, digitonin, esculin, phlorhizin, salicin; hydroxy acids: gluconic acid (as its Ca salt), mucic acid (as its NH_4 salt), β-hydroxybutyric acid, acetoacetic acid (as its Et ester). With the exception of β-hydroxybutyric acid (0.842% aq. soln.), xylose, esculin and salicin (0.5%), phlorhizin 0.1% and mucic acid (0.1%), the initial expt. with each compd. was made with 1% aq. soln. Each of the 17 compds. was also tested at concns. of 0.1, 0.01, 0.001 and 0.0001%. The results are recorded in a table which shows for each compd. the color (if any) given in each procedure at each of the specified concns. The colors usually produced by solns. contg. 0.1% or less of the carbohydrate or related compd. were blue, purple, lilac, or violet. With a single exception, green appeared only when procedure (2) was used; it then was yielded by lactose, esculin and salicin in concns. of 0.01% or less, and by the 4 hydroxy acids in concns. of 0.1% or less. Procedures (1) and (3) tended to give results in agreement with each other, but differing at times from those given by procedure (2). The carbazole reaction by all 3 modifications were entirely neg., *i. e.*, its limit had been exceeded and no color formed, with 0.0001% solns. of the 4 monosaccharides, sucrose, cornstarch, digitonin, phlorhizin and mucic acid, and with 0.001% solns. of maltose, β-hydroxybutyric acid, and acetoacetic ester, while the reaction was still pos. with 0.0001% solns. of esculin, salicin and Ca gluconate. With lactose and amygdalin, the limit of the test varied with the procedure, the limit being exceeded with 0.0001% solns. in procedure (1) and with 0.001% solns. in procedures (2) and (3). The carbazole reaction may serve as a group reaction. However, the colors produced by any one of the compds. used were not sufficiently characteristic to distinguish it from the other compds. in the group studied. W. G. GAESSLER

Radiometric microdetermination of sugar. RUDOLF EHRENBERG. *Biochem. Z.* **226**, 250–2(1930).—In sugar analysis according to Hagedorn-Jensen's method, $K_4Fe(CN)_6$ is detd. radiometrically, whereby a difference of 10^{-5} mg. glucose can be detected. Expts. were carried out with known amts. of glucose in concns. ranging from 1.5 to 9×10^{-3} mg. Of these solns. 0.2 cc. was mixed in centrifuge tubes with 0.5 cc. of a mixt. of 0.01 *N* $K_3Fe(CN)_6$ and Na_2CO_3 and kept 15 min. in a boiling water bath. After cooling 0.5 cc. 0.002 *N* $Pb(NO_3)_2$ charged with ThB was added. (The $Pb(NO_3)_2$ soln. contains 0.5 cc. glacial AcOH per 20 cc.). After centrifuging, 0.5 cc. is removed, evapd and tested electrometrically. Controls with H_2O are carried out at the same time. The activity is then expressed in equiv. glucose quantities. For detns. on blood, 0.1 cc. is placed on a small wad of dry, alc.-extd. cotton packed in the bottom of a small test tube. To the dry blood is added 1 cc. 96% alc. and after 1 hr. also 1 cc. H_2O. After some time this is transferred to a 5 cc. vol. flask, and the cotton re-extd. with 1 cc. H_2O twice. The vol. is made up to 5 cc., 0.2-cc. samples being used for the detn. as already described. S. MORGULIS

The differentiation of cyclic monophenols and monoamines from polyphenols and polyamines. AUGUSTIN MARENZI. *Ann. de Farm. y Bioquim.* **1**, 99–105(1930).—M. describes a method for the differentiation of these compds. by the use of phenol reagent (phosphotungstic and phosphomolybdic reagent) and uric acid reagent (phosphotungstic reagent). Methods for the prepn. of the reagents are described in detail. B. S. LEVINE

A reaction for distinguishing between neutral and basic lead acetate. WALTER A. MUNDT. *Ann. de Farm. y Bioquim* **1**, 119–20(1930).—H_2O_2 is used as the reagent. In the presence of basic lead acetate (as little as 1–3000) a yellow lead peroxide is formed. No reaction takes place with the neutral compd. B. S. LEVINE

Tests for madar juice (Calotropis gigantea) and for snake venom. D. N. CHATTERJI. *Analyst* **55**, 683–4(1930).—Digest the suspected material with abs. alc. for an hr. under a reflux condenser. Distil the ext. with the addn. of a little 1/3 *N* H_2SO_4. The

distillate has a characteristic fruity odor which should be compared with that obtained from a sample known to be madar juice. To the residue obtained from the extn. with alc., add concd. HCl; if madar juice is present, a greenish blue color develops, which changes to brown and violet and which disappears on heating or on standing. To detect snake venom, the serum test which depends upon making an aq. soln. and injecting it into a frog, is recommended. If the frog dies det. the lethal dose of ext. and mix it with twice its vol. of freshly prepd. antivenine (serum immunized against cobra and Russell's viper venom) and incubate for 1 hr. Then treat two more frogs, side by side, one with a lethal dose of the untreated ext. and the other with the same dose which has been immunized. W. T. H.

8—MINERALOGICAL AND GEOLOGICAL CHEMISTRY

EDGAR T. WHERRY AND J. F. SCHAIRER

Pseudo-eutectic textures. WALDEMAR LINDGREN. *Econ. Geol.* **25**, 1–13(1930).—The peculiar intergrowth of sulfide minerals which simulate the eutectic texture in metals is held by L. to indicate replacement, rather than simultaneous deposition, as often believed. Material selected for study was an intergrowth of tennantite, $Cu_6As_2S_6$, and stromeyerite, $(Cu, Ag)_2S$. The intergrowths are described in detail, and structural features shown by figures. L. shows that in the pseudo-eutectic texture, stromeyerite replaces tennantite. Other examples of such pseudo-eutectic textures are given, all the minerals replaced being soft and no cases being known among harder minerals. It is thought that the pseudo-eutectic texture always represents a replacement of one soft mineral by another, in its typical development independent of structural lines in the host. Where the guest mineral assumes a microcryst. structure there are no pseudo-eutectic intergrowths. Locally either of the minerals may be in excess. Replacement of stromeyerite by Ag is also described. ALICE W. EPPERSON

Occurrence and relations of alabandite. D. F. HEWETT AND OLAF N. ROVE. *Econ. Geol.* **25**, 36–56(1930).—Alabandite has been found in Ariz., Nev., Colo., Mont. and various foreign countries. Analyses of ore from Ariz. show about 28% Mn content. In many cases the ores have been worked as sources of Ag. Ore from the St. Anthony vein in Nev. contains 70–270 oz. of Ag per ton. Minerals found assocd. with alabandite in various regions are tabulated. A tendency is indicated toward successive deposition of silicate, sulfide and carbonate of Mn, the latest mineral being formed in part at the expense of those which preceded it. Such alterations of Mn silicate and sulfide to carbonate seem to be due to aq. solns. ALICE W. EPPERSON

The character of the ruby structure. E. ZSCHIMMER. *Sprechsaal* **63**, 832–5, 852–4(1930).—A lecture. C. H. LORIG

Preliminary note on the Lillaverke meteorite. NILS ZENZÉN. *Geol. Fören. Förh.* **52**, 366–9(1930).—A non-luminous meteorite fell May 11, 1930, at Lillaverke, Småland, Sweden. It is a stone weighing 6862 g., sp. gr. 3.1, covered with a dull black crust and looking like a chondrite. WILHELM SEGERBLOM

The computation of the probable value of ore reserves from assay results. S. J. TRUSCOTT. *Bull. Inst. Mining Met.* No. **313**, 15 pp.; No. **314**, 3–24(1930).—See *C. A.* **24**, 4737. ALDEN H. EMERY

Economic geology and allied sciences in ancient times. CORNELIO L. SAGUI. *Econ. Geol.* **25**, 65–86(1930).—The economic geologist was the leader among early Greek technicists. Prospecting was carried on by the Phoenicians. Ancient appliances for ore dressing, smelting, etc., are described and illustrated. Greek theories as to geologic phenomena did not agree, but structural geology and petrology were not unknown. ALICE W. EPPERSON

The Engels copper deposits, California. ADOLPH KNOPF AND C. A. ANDERSON. *Econ. Geol.* **25**, 14–35(1930).—The theory of igneous origin of these deposits in Plumas Co., Calif., has met with strong denial. The gangs consist of altered rocks, showing actinolitization, biotitization, and recrystn. of feldspars and quartz. Deposition of bornite and chalcopyrite lasted longer than that of magnetite and ilmenite, the sulfides occurring in fissures in the oxides only rarely. It is indicated that conditions during the forming of the ore were much like those prevailing during the deposition of contact-metamorphic Cu ores. The ore-forming conditions were pneumatolytic, the rocks characteristically looking fresh and unaltered. After the period of main deposition of the oxides and sulfides, lower-temp. (hydrothermal) alteration affected the ore bodies locally, chlorites and zeolites being formed. This juxtaposition of high-temp. minerals with low-temp. ones is a remarkable feature of these deposits. A. W. E.

The iron deposits of the Sierra de Imataca, Venezuela. GUILLERMO ZULOAGA. *Econ. Geol.* **25**, 99–101(1930).—These deposits have been considered of the same type as those of Minas Geraes, in Brazil. Z. thinks the richer Fe deposits have, in part at least, been introduced into the sediments, although there was probably some Fe present which was later redeposited. ALICE W. EPPERSON

Supergene cassiterite in tin veins. F. R. KOEBERLIN. *Econ. Geol.* **25**, 91–9 (1930).—K. discusses the "supergene" cassiterite in Bolivian tin veins and takes issue with Singewald's conclusions (*C. A.* **23**, 4168) that Bolivian cassiterite is insol. and hence there was no supergene cassiterite enrichment. Evidence is given in favor of supergene enrichment having occurred. ALICE W. EPPERSON

Mineral deposits in the Ural mountains. A. J. ZHILIN. *Keram. i Steklo* **6**, 353–6 (1930).—Z. describes investigations made to det. the possibility of using the enormous deposits of nepheline, sodalite, and other minerals of the Ural mountains for the glass and silicate industries of U. S. S. R. The chem. compn. of the minerals is given. M. V. KONDOIDY

Beryl in Manitoba. J. S. DE LURY. *Canadian Mining J.* **51**, 1015–8(1930).—An address dealing with the substantial nature of recently discovered deposits of beryl and with necessary progress in prepg. the metal from the ore and adapting it to the uses of industry before a steady sale can be developed. W. H. BOYNTON

Classification and specifications of siliceous sands. RALPH TUCK. *Econ. Geol.* **25**, 57–64(1930).—In summarizing definitions of sand, size of grain is held to be the most important factor. Sand is defined as an aggregate of unconsolidated or loosely coherent minerals or rock fragments that range in size from 1/500 to 1/8 in. Sand and sandstone are distinct materials. Lack of uniform specifications for sand for varied uses leads to much confusion. Presence or absence of clay and uniformity of grain size are the most common properties emphasized in such specifications. A detailed scheme of classifications of siliceous sands is given, including specifications for sand for the following uses: filter sand, glass, sand blast, stone sawyer's sand, grinding and polishing, for Carborundum, potter's sand, chem. and metallurgical uses, pulverizing, traction sand, sand-oil roads, stucco, roofing, concrete, sand-lime brick, asphalt pavements and flooring, cushion sand, brick mortar, stonemasonry mortar, fire or furnace sand, core sand, plaster, R.R ballast, sand-clay roads, foundry sands. Sieve tests of characteristic sands are given. ALICE W. EPPERSON

Lignin theory [of the origin of coal]. H. BODE. *Brennstoff-Chem.* **11**, 81–6(1930).—A discussion of the biol. and geological contradictions of Fischer and Schrader's lignin theory (*C. A.* **17**, 2489–92), *e. g.*, bactericidal effect of humic acids on organisms decompg cellulose and evidences of cellulosic plant structures in coal. Plates and sections are shown. F. W. JUNG

Lignin theory of the origin of coal from the biological point of view. R. LIESKE *Brennstoff-Chem.* **11**, 86–90(1930).—Reply to Bode (cf. preceding abstr.) contending recent work indicates humic acids not inhibitive to bacterial action and explaining survival of plant structures in coal. F. W. JUNG

Origin of coal according to the present position of biological investigation. R. LIESKE. *Brennstoff-Chem.* **11**, 101–5(1930); cf. preceding abstr.—A discussion of the biological stages in the formation of peat whereby first aerobic, then anaerobic, organisms decompose hydrolyzable plant constituents, the non-hydrolyzable, as lignin, becoming constituents of coal. F. W. JUNG

Origin of coal according to the present position of chemical investigation. W. FUCHS. *Brennstoff-Chem.* **11**, 106–12(1930); cf. *C. A.* **24**, 2858.—A crit. discussion of literature on plant sources of coal and chem. processes involved in transformation. Analytical data are given in support of the theory of chem. changes whereby the lignin content increases with cellulose disappearance, the source and chem. compn. of the lignin detg. the nature of the coal ultimately formed. F. W. JUNG

Asaphus limestone (Ordovician) in the drill hole of Lagedi (Eesti). K. ORVIKU *Sitzb. Naturforsch.-Ges. Univ. Tartu* **36**, No. 3–4, 180–9(1930).—The stratigraphy to a depth of about 36 m. is discussed, and chem. analyses of 8 samples are given. The compn. of the building, Echinosphaerites and Vaginatum limestone layers, resp., was: quartz 3.56, 4.61, 6.63; silicate loam 1.22, 1.40, 4.13; Fe_2O_3 0.20, 0.56, 0.44; $FeCO_3$ 0.92, 1.74, 1.02; $MnCO_3$ 0.13, 0.24, 0.07; $CaCO_3$ 84.36, 67.40, 72.31; $MgCO_3$ 8.65, 9.98, 10.73; NaCl trace, 0.21, 0.12; $Ca_3P_2O_8$ 0.53, 3.00, 1.78; FeS_2 trace, 0.05, trace; $CaSO_4$ 0.00, trace, 0.00; ignition loss 0.10, 0.15, 0.12%. The structure of the stone is discussed briefly. W. L. HILL

Organic matter, phosphorus and vanadium in the Black Sea deposits. A. D. ARKHANGELSKII AND E. V. KOPCHENOVA. *Bull. acad. sci. union rép. soviét. social* 1930,

205–15.—**Org. matter, P and V content of some Black Sea sediments in the process of deposition were detd., and the relation between the C content and other elements, particularly P and V, present was studied.** Recent deep sea deposits were found to be rich in org. matter (polybitumen, carbohydrates, gaseous hydrocarbons). In the pores and fissures of deep sea deposits (upper Euxinian) were found drops of yellowish transparent oily fluid, and also vaseline-like particles. Analyses showed that P_2O_5 is derived not from the org. matter but from the fragmentary part of the deposits. No P accumulation was found in the H_2S zone. The upper layers of this zone show higher P content derived from certain organisms; however, this is possibly decompd. into gaseous compds. and returns into the water whence it was taken up by the organisms. In the shallow ooze deposits accessible to O the conditions are more favorable to a considerable concn. of P. In some of the Fe-Mn-rich concretions 2.10–6.83% P_2O_5 was found. Analyses of deep sea deposits (gray clay, intermediate clay-lime ooze, lime ooze and black ooze) for CO_2 of carbonates, C of org. substances, and V_2O_5 show that the V content varies from 0.01 to 0.06%, and is related to the org. matter content. Evidently V compds. are extd. from the sea water by certain organisms in the process of their life activities.

B. N. DANILOFF

Mineralogical study of certain soils of the Akhmangan plateau in Armenia. Z. N. NEMOVA. *Bull. acad. sci. union rép. soviét. social., Classe sci. phys.-math.* 1930, 157–75.—The main problem was to study the dependence of the mineralogical compn. of the soils on the underlying rocks, and to follow the changes of the minerals which took place under the influence of natural processes. N. found that the minerals in the soils of the region do not correspond to the mineralogical compn. of the underlying rocks, and therefore cannot be considered as products of their disintegration. Part of the minerals, as for instance, hypersthene, aegirite, and partly plagioclase, are probably of volcanic origin. Others, as for instance, plagioclase, glaucophane, and probably mica, were formed by the mech. action of water. Besides these 2 groups, minerals are found that were formed by sedimentary processes, *e. g.*, spheroidal calcite, chalcedony, etc.

L. JAÇOVLEFF

Milling methods of the American Zinc Co. of Tennessee (STRACHAN) **9.**

9—METALLURGY AND METALLOGRAPHY

D. J. DEMOREST, H. W. GILLETT AND RICHARD RIMBACH

Metallurgical laboratories of the Ontario Research Foundation. RICHARD RIMBACH. *Metals and Alloys* 1, 816–8(1930). A. J. MONACK

Some metallurgical problems connected with the possible use of very high steam temperature. I. II. J. H. G. MONYPENNY. *Metallurgia* 2, 22–5, 46–8. E. J. C.

Fansteel Products Company, Inc. ANON. *Ind. Eng. Chem.* 22, 1409–12(1930). E. C. K.

The International Nickel Company of Canada, Limited. ANON. *Canadian Mining J.* 51, 1034–5(1930).—A brief outline is given of the development of the Frood property. **General description—mines, smelters and refineries.** DONALD MACASKILL. *Ibid* 51, 1036–7. **The mines.** OLIVER HALL. *Ibid* 51, 1038–41.—These mines furnish 4/5 of the world's Ni. **The mill.** W. T. MACDONALD. *Ibid* 51, 1042–6.—Selective flotation discards waste and makes 2 smelter feeds. **The smelter.** R. M. COLEMAN. *Ibid* 51, 1047–52.—The smelter units comprise essentially the roasters, the reverberatories and the converters, with the necessary complementary equipment. A coal-pulverizing plant is a sep. small unit. A flow sheet of the roasting and smelting plant is shown. **The copper refinery.** J. K. BRYAN. *Ibid* 51, 1052–7.—A brief description includes an outline plan and flow sheets of the Cu refinery and of the Ag refinery. **Sulfuric acid and niter cake plants.** W. H. DE BLOIS. *Ibid* 51, 1057–9.—Niter cake is employed in the sepn. of Ni and Cu. W. H. BOYNTON

Milling methods and costs at Presidio Mine of the American Metal Co. of Texas. VAN DYNE HOWBERT AND FRED E. GRAY. *Am. Inst. Mining Met. Eng. Tech. Publ.* No. 368, 20 pp.(1930).—150 tons of oxidized and siliceous ore are treated per day by gravity sepn. and cyaniding. An av. analysis of the ore is given as 19.7 oz. Ag, 0.02 oz. Au, 2.5% Pb and 4.87% Zn. The ore is crushed and the —10-mesh material is tabled to produce a Ag-Pb concentrate analyzing 296 oz. Ag, 0.52 oz. Au, and 43.4% Pb. The tailings are combined with the +10-mesh material to be reduced in a tube mill in circuit with a classifier. The classifier discharge, which is 97% minus 100 mesh, is cyanided.

The combined recoveries amount to 90.3% of the Ag, 97% of the Au and 34.3% of the Pb. Cost data are given for the different steps in the process. C. L. READ

Milling methods of the American Zinc Company of Tennessee, Mascot, Tennessee. C. B. STRACHAN. Bur. Mines, *Information Circ.* **6379**, 12 pp.(1930).—The Mascot concentrator treats 1900 tons of Zn ore per day by gravity concn. and flotation. In 1929 heads averaged 2.90% Zn, concentrate 60.19%, with a recovery of 90.15%. The ore consists of sphalerite, dolomite, calcite, pyrite, quartz and a small quantity of greenockite, and analyzes: $CaCO_3$ 48.11, $MgCO_3$ 35.36, SiO_2 8.73, Al_2O_3 1.04, FeO 1.33 and ZnS 5.43%. ALDEN H. EMERY

Milling practice at San Francisco Mines of Mexico, Ltd. GLENN L. ALLEN. *Am. Inst. Mining Met. Eng., Tech. Publ.* No. **371**, 24 pp.(1930).—Description of mill and methods of concg. used in handling 1100 tons of ore per day. A typical analysis of the ore is given as Pb 8.5, Zn 10.5, Cu 0.63, Fe 4.0, insol. 35, CaO 5.5, CaF_2 14, S 7%, and Au 0.9 g. and Ag 240 g. per metric ton. The ore is reduced in a cone crusher and rod mills. It is then tabled to produce a high Pb-Ag concentrate. The tailings are then put through rod mills and classifiers, the feed to the flotation cells being 70% minus 200 mesh. Pb is floated in an alk. circuit of p_H 7.8-8.2; cresylic acid, xanthate, cyanide, $ZnSO_4$ and at times Na_2S being used. In floating the Zn, the p_H of the circuit is increased to 9.0–9.4 and creosote oil, Cu sulfate and xanthate are used. Typical analyses of the finished products are: Pb concentrate 3.91 g. Au, 1291 g. Ag, 63% Pb, 10.4% Zn and 2.8% Cu; Zn concentrate, 1.0 g. Au, 263 g. Ag, 1.8% Pb, 54.6% Zn and 1.3% Cu; tailings, 0.26 g. Au, 41 g. Ag, 0.3% Pb, 1.3% Zn and 0.1% Cu. Total metal recoveries amount to Au 77, Ag 87, Pb 97, Zn 91 and Cu 88%. C. L. READ

Japanese gold dredging enterprise. H. S. LITTLE. *Eng. Mining J.* **130**, 513–4 (1930).—A Yuba-type dredge is operated by the Mitsubishi Kogyo Co. near Kintei, Province of Zeuralhudo, Korea. W. H. BOYNTON

The flotation of chalcopyrite in sea water. A. K. BURN. *Bull. Inst. Mining Met.* No. **314**, 10 pp.(1930).—A description is given of the mill at Tocopilla, Chile. The ore for concg. assays 4% Cu. The flotation concentrates are retreated twice; final concentrates assay 27.5% Cu. The circuit is slightly alk. (p_H 8). Cresylic compds. lose their frothing power in sea water. Sea water apparently permits flotation of a distinctly coarse concn. ALDEN H. EMERY

Flotation reagents. BERNARD W. HOLMAN. *Bull. Inst. Mining Met.* No. **314**, 53 pp.(1930).—The bearing of soly., chem. and electrochem. action, simple adsorption, differential ionic adsorption, H-ion concn., surface area, surface structure, mass action, diln., dissocn. or ionization, soln. pressure, chem. equil., abnormal surface energy, parachors, valence bonds and structural orientation and constitution on the behavior of chem. flotation reagents are considered and the effects of certain reagents in practice are discussed. ALDEN H. EMERY

Effect of dissolved substances on gravity concentration. F. J. TROMP AND E. BEYERS. *J. Chem. Met. Mining Soc. S. Africa* **31**, 43–4(1930); cf. *C. A.* **24**, 3200.—Discussion. ALDEN H. EMERY

Trend of ore hunting in the United States. AUGUSTUS LOCKE AND PAUL BILLINGSLEY. *Eng. Mining J.* **130**, 565–6(1930).—"The new art, concerned with more remote ore, emphasizes not veins and faults only, but various marginal phenomena of mineral areas. Also, it seeks to build up such a broad and complete picture that new centers of ore deposition may be indicated by the general relationships, though direct indication by outcrop or other means be totally lacking." W. H. BOYNTON

Microscopic examination of ores. P. ERIMESCO. *Eng. Mining J.* **130**, 529 (1930).—The reflecting microscope is an indispensable aid to the geologist. A few microscopic examns. are pointed out and 4 photomicrographs shown. W. H. B.

Note on the agglomeration of fine ore from the iron mines of Rouen. EMILE FOURNIER. *Rev. ind. minérale* **235**, 435–8(1930).—The procedure of agglomeration adopted is a fritting process preceded by briquetting at high pressure. The briquetting causes an intimate contact of the minerals and they cohere at a temp. which is just below the sintering temp. By this coherence of the particles without sintering or fusion, the briquets obtained are very strong but the intermol. porosity is preserved. This product is ideal for metallurgical treatment. The briquets are pressed in a Couffinhal press which exerts simultaneous pressure on 2 faces of the briquet. The pressure is not stated. The briquets are then fired in a Cockerill tunnel furnace fired with powd. coal. A temp. of 1350° is maintained in the combustion zone when the briquets remain for 18 min. The installation at Rouen consists of 2 tunnel furnaces 70 m. long. The capacity is 220 tons per day. The briquets are bluish in color and have a strength of more than 100 kg./sq. cm. They have a porosity of 30% by vol. measured by water absorption.

The use of these briquets in the place of ore permits an increase of 20% in furnace capacity and a diminution of 17% in coke consumption. R. S. DEAN

Washing Mesabi iron ores. S. A. MAHON AND T. B. COUNSELMAN. *Eng. Mining J.* **130**, 519–21(1930).—Changes made over the original flow sheet involve: (1) the replacement of the "turbos" and tables with bowl classifiers; (2) the introduction of secondary crushing for further liberation of silica from the coarser sizes; and (3) the tendency toward the use of abrasive screening on much of the material formerly treated in the 25-ft. log washers. Several tables, and flow sheets for the original process, for bowl classification or secondary crushing, and with the Dorr washer are shown. W. H. BOYNTON

Resistance of iron ores to decrepitation and mechanical work. T. L. JOSEPH AND E. P. BARRETT. *Am. Inst. Mining Met. Eng., Tech. Publ.* No. **372**, 15 pp.(1930).—Samples of ore were rotated in a kiln for $1^1/_2$ hr. periods. The av. decrease in av. particle size amounted to 18% when worked at room temp. and 38.1% when the temp. of the kiln was raised to 1400°F. during the $1^1/_2$ hr. period. This procedure is suggested as a method of detg. the relative amt. of potential flue dust production, as a test for ores to be screened and sintered and as a method of selecting ores for mixing in a blast furnace to obtain better gas-solid contact in the stack. Limestone was resistant to both cold and hot working. Imported Mn ore was little affected by cold working but greatly changed by hot working. C. L. READ

Retreatment of Mother Lode (California) carbonaceous slime tailings. EDMUND S. LEAVER AND JESSE A. WOOLF. Bur. Mines, *Tech. Paper* **481**, 20 pp.(1930).—See *C. A.* **24**, 2971. ALDEN H. EMERY

Mechanical cupola charging. CLEMENT A. HARDY. *Iron Age* **126**, 1306–8(1930). E. H.

The largest blast furnace in the British Empire. J. HENDERSON. *J. Chem. Met. Mining Soc. S. Africa* **31**, 42–3(1930); cf. *C. A.* **24**, 3202.—Discussion. A. H. E.

Combustion of blast-furnace gas. T. J. ESS. *Blast Furnace & Steel Plant* **18**, 1613–8(1930).—Blast-furnace gas is discussed with relation to characteristics, uses, cleaning and burning. C. L. READ

Carbon in the blast-furnace well. WM. MCCONNACHIE. *Blast Furnace & Steel Plant* **18**, 1629–30(1930).—From available data, it is concluded that not all the C reaching the level of the tuyères in the furnace is consumed by the O of the blast but that a portion of the O is supplied by the ore. C. L. READ

The influence of moisture due to leaking tuyères on blast-furnace conduct. C. D. ABELL. *Foundry Trade J.* **43**, 247(1930).—The moisture in the blast varies. The "winter" av. is about 0.40 lb./cu. ft. and the "summer" av. about 0.60 lb./cu. ft. It is the only source of moisture which continually dils. the reactions of the blast furnace. Moisture causes the formation of the Fe- and Mn-spinel oxides instead of the normal spinels (hercynite). Specific figures indicate losses of Fe due to excessive moisture on the assumption that equil. is obtained. Since this never proves practical, the figures simply indicate how disastrous the reactions can become, for it tends to give fusible scouring silicates, with the consequent occurrence in the hearth of pieces of apparently unreduced ore consisting mainly of Fe_2O_3 and it also accounts for the "slushy" or pasty character of the Fe cast when the furnace is running irregularly because of the presence of Fe_3O_4 in the iron. The direct results of excessive moisture are a regular-working low-temp. iron, with excess of S and oxide, combined with poor fuel economy and an increase in the rate of furnace driving with lessened production. A factor of prime importance in this respect is the greater rate of combustion of H_2 from the H_2-CO mixt. of the upper zones with attendant disorganization of the CO dissocn. reactions upon which the furnace depends for regular economic working. The extent of the possible reactions is a function of the rate of driving, and the only remedy is to introduce more fuel and extra blast, if danger is suspected from a leaking member. A. believes that 6–50 lb. water /1000 cu. ft. of blast is beneficial in most cases by producing a certain amt. of oxide in the iron. Above this figure it becomes a source of trouble. W. H. B.

Basic open-hearth slag as a valuable blast-furnace material. J. F. HORAK. *Iron Age* **126**, 980–1, 1046(1930).—Basic open-hearth slag contains about 20% SiO_2, 42% CaO, 7.5% MgO, 7.5% MnO, 1.3% Fe and 3% Al_2O_3, and the resultant increase in Mn in the pig iron due to its use is distinctly advantageous. These advantages may be summed up as follows: there is a better refining operation in the furnace resulting in cleaner, better steel, it shortens the time of the heat resulting in a greater output, and cuts the fuel consumption to the ton of steel. The amt. of basic open-hearth slag that may be charged is limited because of its P content, making its use an economic question. It should make a valuable artificial *building* and *road-making material*. W. H. B.

Another porphyry copper in the making. GEO. J. YOUNG. *Eng. Mining J.* **130**, 522–4(1930).—The developments of the Bagdad Copper property near Hillside, Ariz., its prospects and reserves and details of pilot-plant construction and operation are briefly outlined. A flow sheet of the concg. mill and exptl. hydrometallurgical plant is shown. W. H. BOYNTON

Origin and effect of inclusions in steel. B. M. LARSEN. *Metals and Alloys* **1**, 819–25(1930); cf. *C. A.* **24**, 5698.—A review. A. J. MONACK

X-ray investigation of metals in the U. S. S. R. E. F. BACHMETEW. *Metals and Alloys* **1**, 828–30(1930). A. J. MONACK

The magnetic properties of metals. FRANCIS BITTER. *Phys. Rev.* **36**, 978–84 (1930). BERNARD LEWIS

Molybdenum and its technical applications. SIEGFRIED L. MALOWAN. *Chem.-Ztg.* **54**, 893–4(1930). E. H.

Röntgenographic analysis of the system: lithium–silver. S. PASTORELLO. *Gazz. chim. ital.* **60**, 493–501(1930).—The present paper shows that it is possible to study a binary system by the röntgenographic method without recourse to thermal analysis. There is no previous literature on Li-Ag alloys, but Quercigh (cf. *C. A.* **5**, 638) and Mathewson (cf. *C. A.* **5**, 2786) have published data on Na-Ag alloys. The present expts. show that Li behaves very differently from Na with Ag, for it forms intermol. compds., and thus behaves more like Mg than Na (cf. S. F. Zemczuznuzy, *Z. anorg. Chem.* **49**, 405(1906); Owen and Preston, *C. A.* **21**, 855). The alloys were prepd. by heating Ag and Li together in an atm. of A in a Ni-Cr steel crucible. For alloys rich in Li it was necessary to heat around 700°, and for those with a low Li content around the m. p. of Ag. Around 500° fused Li reacts violently with Ag, especially if the latter is finely divided, with evolution of heat, indicating the formation of intermol. compds The x-ray data, which are tabulated in detail, show the formation of the *compd.* AgLi, which has a cubic lattice of the CsCl type with a = 3.225 A. U., corresponding to d. = 5.68. The existence of another compd. was also established, with the probable compn $AgLi_3$. The diagram of state shows that, with alloys contg. 80–100% Li, eutectic mixts of Li with $AgLi_3$ are present. No alteration of the Li lattice was observed, and therefore Ag is not sol. in Li in any proportion. With 52–76% Li, 2 compds. exist, while with less than 48% Li, mixts. of AgLi and Ag are present. There was no alteration in the Ag lattice, so that no solid solns. of Li in Ag are formed. C. C. DAVIS

The rearrangement of a solid metallic phase. U. DEHLINGER AND L. GRAF. *Z. Physik* **64**, 359–77(1930).—X-ray diagrams of a Cu-Au alloy (50 at. % Cu and 50 at. % Au) show that the transition of the modification consisting of cubic mixed crystals to the tetragonal system passes through a well-characterized intermediate phase of definite lattice const. and tetragonal symmetry, though the atoms are only partly ordered. The elec. cond. is found to be parallel with the structural change. Though the cubic and the tetragonal modifications are very soft, the intermediate state is exceedingly hard. The transition of the cubic phase to the tetragonal intermediate state must be due to the valency electrons. EGON BRETSCHER

Measurements of elasticity with x-rays. G. SACHS AND J. WEERTS. *Z. Physik* **64**, 344–58(1930).—The change of the lattice const. of a "Duraluminium" rod of oblong rectangular cross section on bending on the convex side is found to be proportional to the sagging. The ratio of the main dilatations is found from the spectrogram. Precision of the lattice const. is $\pm 3.10^{-4}$ A. U. EGON BRETSCHER

Acid open hearth or basic? K. R. BINKS. *Iron and Steel Ind. and British Foundryman* **4**, 53–4(1930).—The same phys. properties can be attained by both types of steel if precautions in manuf. are taken since the material in both types of open-hearth furnaces is exposed to similar influences during the melt down. C. H. LORIG

Thickness of the oxide film which produces temper color on iron. MASAWO KURODA. *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) **14**, No. 267, 145–52(1930).—A part of the tarnished surface of a piece of mild steel, which had been colored dark blue by heating to 400°, was removed by light polishing, so as to obtain the yellowish brown color that corresponds to the temper color of lower heating. The thickness of the film, thinned by the polishing, was measured by the interference method and the value of 40.5μ obtained. Calcns. are given for the refractive index of the film. Two photographs are included, one in color of the tempered Fe with a part of its oxide film thinned by polishing, and the other, showing the interference fringes, produced between the sample and optically flat glass. DOWNS SCHAAF

The resistance of wrought-iron vessels to fluorosulfonic acid. HANS J. BRAUN. *Metallbörse* **20**, 2134(1930).—From the results obtained on testing the resistance of a wrought-iron retort to $HFSO_3$ at ordinary temp., at 130° and at 150° it is concluded

that wrought-iron vessels are sufficiently resistant to this acid. The method of testing is described. D. THUESEN

Nickel-copper-chromium cast iron (Monel cast iron, Nimol). M. WAEHLERT AND H. OSTERMANN. *Chem. Fabrik* **1930**, 377–8, 386–8, 402–4.—Losses of Nimol under acid and atm. corrosion, the analyses, structure, Brinell and losses of 15 alloys prepd. by W. and O. are discussed. J. H. MOORE

Practical application of the sulfur prints of R. Baumann. HUGO PATSCH. *Die Giesserei* **17**, 853–4(1930).—The S print method of Baumann is used for making prints of chilled and gray Fe casting surfaces contg. fine cracks. Repeatedly printing the same spots gives prints which are progressively weaker. By moistening the cracked surface with dil. H_2SO_4 and using AgBr paper which has been soaked in 5% H_2SO_4 a sharp, dark print is again obtained. J. BALOZIAN

Stability of cementite and the various forms of carbon. G. PHRAGMEN. *Jernkontorets Ann.* **114**, 431–42(1930).—A crit. review of the literature. Conclusion: The evidence indicates that cementite becomes stable at higher temps. H. C. DUUS

The heterogeneity of steel and the relationship of macrographic examination. ROGER POWELL. *Iron and Steel Ind. and Brit. Foundryman* **3**, 369–71; **4**, 29–31(1930).—Roughly classified, heterogeneity encountered in steel of miscellaneo are mech. defects, crystal growth and chem. segregation. Mech. defects are mainly pipes, roaks and seams. C. H. L.

Resistance of steels to abrasion by sand. SAMUEL J. ROSENBERG. *Bur. Standards J. Research* **5**, No. 3, 553–74(1930).—Various C steels contg. 0.08–1.29% C were tested in the normalized, annealed and hardened state. Three testing devices were used: (1) the ball mill, (2) the sand blast and (3) the Brinell machine. The ball mill proved very unsatisfactory. The sand blast was a rapid and accurate abrading medium which, however, differentiated insufficiently between steels of widely differing durability. The Brinell machine in which a stream of sand is passed between the specimen and a rotating disk gave generally reliable results. It was shown that the resistance to wear increased with the hardness. An increase in the annealing temp. resulted in a slight increase in resistance to wear, the effect being more marked in a low-C steel than in a high-C steel. The mechanism of the wear consists in the removal of small particles accompanied by severe local straining. There is no evidence that the grains are torn off in their entirety. A no. of photomicrographs, tables and diagrams are included. H. S. VAN KLOOSTER

Secondary quench of supercooled steels and stability of austenite. PIERRE CHEVENARD AND ALBERT PORTEVIN. *Compt. rend.* **191**, 523–5(1930).—A special steel of 1.5% C and 2% Cr was made austenitic by quenching from 1180° and tempered for 7 hrs at temps. varying from 100° to 700°. The microstructure, expansion, hardness, magnetism and elec. resistance were plotted as a function of the drawing temp. Below 330° and above 500° the behavior was identical with that noted previously for the steel of 1.5% C and 2% Mn (cf. *C. A.* **24**, 5697). When tempered above 350° the austenite produces on subsequent cooling martensite and at the same time becomes more and more decarburized. The hardness attains a secondary (and higher) max. between 400° and 500°. The first increase in hardness with a max. value at 330° is ascribed to the structural change austenite $\longrightarrow$ α-phase + cementite, while the second increase represents a physicochem. hardening due to martensite formation. H. S. v. K.

The mechanism of hardening steel. G. KURDYUMOV AND G. SACHS. *Z. Physik* 64, 325–43(1930); cf. *C. A.* **24**, 4746.—Austenite (γ-iron) chilled from 1100° to room temp is partially converted into a tetragonal modification, as shown by x-ray diagrams (Debye-Scherrer) from a rotating rod of the material. The dark ground of the films points to considerable irregularities in the arrangement of the atoms of the crystal lattice. Tempering leads to formation of martensite. The lattice distortion (continuous ground) diminishes with increasing temp. and time of tempering. The relative orientation of the crystals of the austenite modification, the tetragonal phase and the γ-iron has been found and the possible course of the rearrangement is discussed. EGON BRETSCHER

The nature of remanence and the losses by hysteresis. N. S. AKULOV. *Z. Physik* 64, 817–29(1930).—It is shown theoretically that single ferromagnetic crystals do not possess remanence or losses due to hysteresis. These are only found in polycryst. aggregates with internal strain. To obtain therefore a *ferromagnetic alloy* with low hysteresis losses the internal strain has to be small and the single crystals of the alloy should not possess magnetostriction. The magnetic properties of *permalloy* and *perminvar* are discussed on this basis. EGON BRETSCHER

Influence of aluminum on technical brass alloys. EDMUND R. THEWS. *Cons. Chem. Met.* **14**, 322–3, 325(1930).—Al represents one of the most useful addn. agents

when added in the correct proportions and under correct conditions. Al_2O_3 is responsible for the misgivings regarding the value of Al in brasses. Al tends to produce the valuable properties of bronzes, to increase the tensile strength, and d., increase resistance to corrosion, and in small quantities in Zn-rich brass alloys to create a freedom from Zn vapors. The production of Al-brass castings free from Al_2O_3 must be viewed from 3 angles: (1) prevention of the introduction of excessive quantities of oxide in the melt, (2) removal of the oxide from the melt previous to casting and (3) casting in a manner preventing the introduction of Al-Al_2O_3 skins into the castings. Cu should be deoxidized before the addn. of Zn and Al. While the presence of Al_2O_3 cannot be completely avoided in the bath, the addn. of a small quantity of phosphor-Cu directly previous to casting causes the oxide to float and they are easily removed. Bottom-pouring tends to minimize agitation of the bath and the introduction of dross to secure high-grade Al brass out of the brass scrap charged. A brief bibliography is appended. W. H. BOYNTON

Diffusion in cast bismuth-antimony alloys. G. MASING AND H. OVERLACH. *Wiss. Veröffentlich. Siemens Konzern.* **9**, 331–8(1930).—Phenomena leading to increased outer dimensions and formation of a cavity within are studied. F. D. ROSSINI

X-ray investigations on copper-arsenic alloys. NOBUYUKI KATOH. *Bull. Chem. Soc. Japan* **5**, 275–82(1930).—Data are given for powder x-ray photograms of Cu–As alloys with 19.6% As, 30.86% As cooled slowly and 30.86% As quenched from 630° The dimensions of the elementary cube for the upper and lower limits of homogeneity for β-Cu with approx. 29.1% As are calcd. MALCOLM DOLE

Tungsten and its alloys. R. CAZAUD. *Aciers speciaux* **5**, 423–7(1930).—A review. A. J. MONACK

Cupola melting of bronze. E. R. DARBY. *Metals and Alloys* **1**, 812–13(1930). A. J. MONACK

Electrical resistance of nickel and permalloy wires as affected by longitudinal magnetization and tension. L. W. MCKEEHAN. *Phys. Rev.* **36**, 948–77(1930). BERNARD LEWIS

New investigations on the hardening of lead, tin, cadmium and zinc at different temperatures. ALFRED MOLNAR. *Rev. métal.* **27**, 522–34(1930).—See *C. A.* **24**, 4749. E. C. K.

Heat treatment, ball hardness and allotropy of lead. F. HARGREAVES. *Metal Ind.* (London) **37**, 397–400(1930).—See *C. A.* **24**, 5693. E. C. K.

The temperature dependence of crystal plasticity. II. W. FAHRENHORST AND E. SCHMID. *Z. Physik* **64**, 845–55(1930).—It was previously found (*C. A.* **24**, 3147) that the slip energy is independent of temp. and stretching velocity with Cd crystals The same result was obtained with single crystals of *Zn* (slip energy 0.97 cal/g.). Diagrams relating slip and slip tension are given for the temp. from —253° to 250°. A higher temp. recrystn. disturbs these regularities. Below —83° rupture occurs by splitting along a basal face. EGON BRETSCHER

Some observations on the thickness of hot-dipped zinc coatings as actually measured with micrometer calipers. WALLACE G. IMHOFF. *Am. Metal Market* **37**, No. 226, 5, 9(Nov. 22, 1930).—The thickness of the coating was measured by micrometer readings and checked by calcg. the thickness from the known area and the total wt. of Zn deposited. The tests were made on galvanized iron water pails and results are tabulated. Measured thicknesses on different samples averaged 0.0041–0.0043 in. and the calcd. 0.0024–0.0030 in., indicating an alloy bond of 0.0013–0.0017 in. W. H. B.

The destructive action of molten zinc, at and above zincing (galvanizing) temperatures, upon metals and alloys. XI. The action upon non-metallic materials—general summary. WALLACE G. IMHOFF. *Am. Metal Market* **37**, No. 203, 11 (Oct. 21, 1930); cf. *C. A.* **24**, 5705.—A thermometer casing was coated with vitreous enamel and tested in the galvanizing bath. From a com. standpoint vitreous enamels gave the highest resistance to the action of molten Zn under galvanizing conditions. A complete summary is made in 23 subdivisions and it is concluded that nothing has so far been found that entirely withstands the corrosive action of molten Zn at galvanizing temps. W. H. BOYNTON

Metal corrosion by fuel. S. P. USPENSKII AND N. I. LADUIZHNIKOVA. *Neftyanoe Khozyaistvo* **19**, 264–77(1930).—Metal plates were cut 4 × 4 cm., cleaned with emery paper, washed with petr. ether, dried with filtering paper and weighed. One plate of each metal was then placed in 200 cc. beakers filled with Krasnodar aviation gasoline, Grozny aviation gasoline, Grozny II grade gasoline, motor benzene, acetone, CS_2, refined C_2H_5OH, refined CH_3OH, com. C_2H_5OH and com. CH_3OH. Another series of plates was half immersed, and a third series of plates was placed above the liquids. All beakers were hermetically sealed and left for a few months. The ppts., if

any, as well as the liquids were analyzed for metals. Only the Grozny aviation gasoline did not have any corrosive action. The effect of the other fuels is given in the table: Loss in mg. per sq. cm.

	In liquid				In vapors				Duration
	Pb	Cu	Brass	Fe	Pb	Cu	Brass	Fe	months
Krasnodar	9.4	.....	.....	.....	.....	..	..	...	7
Motor benzene	48.9	3.2	5.7	10.9	.....	..	..	...	8
Grozny II	12.2	.....	.....	.....	.....	..	..	...	7
Acetone	28.3	37.2	20.2	9.8	5.0	..	..	...	8
CS_2	23.9	18.0	.....	.....	5.0	..	..	...	10
C_2H_5OH refined	90.1	.....	.....	...	24.0	..	..	...	9
CH_3OH refined	706.9	5.4	5.6	....	127	..	..	6.7	9
C_2H_5OH com.	191.3	13.6	36.4	290.9	12.0	..	..	...	9
CH_3OH com.	1148	1013	1292	43.6	194	4	3	7	9

A. A. BOEHTLINGK

How to prevent rust. PIETRO CHIARIA. *Giorn. farm. chim.* **79**, 316, 319–21 (1930).—A review of the ordinary methods is given. G. SCHWOCH

Electric welding in carbonization plants and gas works. W. KÜRSCHNER. *Brennstoff-Chem.* **10**, 468–9(1929).—Advantages of elec. welding over riveting for these applications are discussed. F. W. JUNG

Corrosion of riveting and welding in combustion and chemical practice. O. GROSS. *Brennstoff-Chem.* **11**, 133–4(1930). F. W. JUNG

Strengthening the soldering of tramcar wires. A general study of solders. J. NAVARRO ALCÁCER. *Anales soc. expañ. fís. quím.* **28**, 1050–4(1930).—Photomicrographs are shown of the original trolley wire, after soldering to the support, and after rapid chilling after soldering. The solder used was a low-melting Cu-Zn-Ag mixt. Low heat and rapid quenching improve the wearing properties of the wire. E. M. S.

Beryl in Manitoba (DE LURY) **8**. Apparatus for separating materials of different specific gravities such as minerals by the action of vibration and air currents (U. S. pat. 1,782,391–2) **1**. Bleaching and other treatments of fabrics (Brit. pat. 332,718) **25**. Apparatus suitable for various chemical or evaporating operations (U. S. pat. 1,783,726) **1**. Electrically heated apparatus for roasting ores, etc. (U. S. pat. 1,782,946) **4**.

Froth flotation ore separation. GEORGE H. WIGTON. U. S. 1,783,206, Dec. 2. A pulp of oxidized ore such as ore from the Tintic district, Utah, is subjected to a flotation operation in the presence of the reaction product of an alc. soln. of α-naphthylamine or other amino compd. and P_4S_{10}. U. S. 1,783,207 specifies the use of the reaction product of an O-free aromatic amino compd. such as α-naphthylamine and *o*-toluidine and P_4S_{10}.

Method and apparatus for gravity separation of ores or other materials with an agitated mixture of liquid and solid of intermediate specific gravity. THOMAS M. CHANCE. U. S. reissue 17,873, Nov. 18. Reissue of original patent No. 1,685,521 (*C. A.* **22**, 4679).

Froth flotation mineral concentration. LOCKWOOD W. FERRIS. U. S. 1,784,280, Dec. 9. Ores such as those contg. Cu silicate minerals are subjected to heat alone without addn. of reagents to decompose the Cu silicates, and the heated material is then subjected to froth flotation.

Concentrating ores, etc. HARALD SKAPPEL. Ger. 504,487, Feb. 26, 1924. See Brit. 211,895 (*C. A.* **18**, 2122).

Ore-concentrating apparatus. CLAUDE N. BIELENBERG. U. S. 1,781,971, Nov. 18. Structural features.

Ore-concentrating table. FREDERICK C. DYER. U. S. 1,781,810, Nov. 18. Structural features.

Apparatus for leaching and washing ores by use of gas. ALBERT B. STEVENS. U. S. 1,783,591, Dec. 2. Structural features.

Apparatus suitable for agglomerating and roasting minerals. ALEXANDRE DE SAMSONOW (to Soc. pour l'enrichissement et l'agglomeration des minerals, Soc. Anon.). U. S. 1,784,658, Dec. 9. Structural features.

Apparatus for wet classification of solids such as low-grade iron ore. HARRY W. NEWTON (to Dorr Co.). U. S. 1,784,246, Dec. 9. Structural features.

Preparing copper ores for leaching. CARL E. CARSTENS (to Anaconda Copper

Mining Co.). U. S. 1,782,841, Nov. 25. About 4 to 5% by wt. of moisture is added to crushed oxide ores of Cu contg. fines, prior to introduction into a leaching vat, in order to prevent segregation of fines.

Conveyer tube (with insulation and water jacket) for use with heated ore, etc. JOHN W. HORNSEY (to Granular Iron Co.). U. S. 1,782,423, Nov. 25. Structural features.

Recovering volatile metals from slags, etc. ULYSSES A. GARRED (to Anaconda Copper Mining Co.). U. S. 1,782,418, Nov. 25. See Fr. 638,638 (*C. A.* **23**, 366).

Treating barytes. CASPAR P. DE LORE and BRACK B. MCHAN (McHan to De Lore). U. S. 1,783,778, Dec. 2. In the treatment of acid bleached barytes ore, the ore is washed with a wash water contg. a sufficient quantity of a reducing agent such as sulfurous acid to prevent oxidation of the metallic salt present with the barytes and to convert insol. salts into sol. form so that the product may be washed free from impurities.

Separating cobalt and iron from solutions such as those obtained by lixiviating roasted pyrites. NILS E. LENANDER (to Orkla Grube-Aktiebolag). U. S. 1,783,046, Nov. 25. Ferrous Fe in the soln. is oxidized with an alkali metal chlorate, the ferric Fe is pptd., and Co is then recovered from the soln.

Metallurgical plant. GRANULAR IRON CO. Ger. 506,340, July 1, 1927. A plant is described for the manuf. of Fe and other metals by reduction of their oxides without fusion. The plant comprises a no. of rotary drums in which the ore is successively preheated, reduced and cooled.

Method and apparatus for fusing pulverulent masses, especially blast-furnace dust. ADRIEN DAWANS. Ger. 506,350, Aug. 5, 1927.

Apparatus for continuous indication and recording of the temperature of molten iron at a pouring spout. HARRY W. DIETERT (to U. S. Radiator Corp.). U. S. 1,784,420, Dec. 9.

Purifying pig iron. KONRAD HOFMANN (to Fried. Krupp A.-G.). U. S. 1,782,923, Nov. 25. See Brit. 312,361 (*C. A.* **24**, 819).

Preparing foundry molds by use of impacts and pressure. M. GRINDAL. Brit. 332,712, June 3, 1929. App. is described.

Mold for casting metals. WM. G. GOODWIN. U. S. 1,783,285, Dec. 2. Structural features.

Casting and heating ingots. C. A. PARSONS. Brit. 332,654, May 3, 1929. Heat is supplied to the top surface of the ingot principally toward the periphery (suitably by hot gases or a high-frequency induction coil). App. is described.

Iron casting composition. RUDOLF SCHENCK. Ger. 506,352, Sept. 24, 1927. A compn. suitable for casting into machine parts, etc., is prepd. by fusing Fe_2O_3 with Fe poor in C so that the mass contains 21–25% of O. Addns. of other oxides, *e. g.*, MgO, MnO or CaO, may be made.

Apparatus for casting zinc slabs, etc. DANIEL M. GRAY and JOHN J. WILLIAMS (to Hazel-Atlas Glass Co.). U. S. 1,782,920, Nov. 25. A vacuum pump serves to degasify and transfer the molten metal.

Recovery of tin from residues of tin-plate manufacture. JEHAN LALEY (to Les petits fils de Francois de Wendel & Cie). U. S. 1,784,490, Dec. 9. See Fr. 661,818 (*C. A.* **24**, 1072).

Filtering and dust collecting apparatus suitable for treating smelter gases. INGENUIN HECHENBLEIKNER (to Chemical Construction Corp.). U. S. 1,782,823, Nov. 25 Structural features of an app. comprising a holder with internal transverse grid structure, the holder being substantially filled with a granular mass such as sand fed in cyclic manner.

Furnace with two hearth units, suitable for volatilizing roasting of ores, etc. FREDERICK L. PRESTON. U. S. 1,784,109, Dec. 9. A hood is provided shiftable endwise of the furnace, for use with either unit of the hearth, and a common heating chamber extends beneath both hearths.

Furnace for the production of pure tin direct from the ore. CAYZER TIN SMELTING CO. (Pty), LTD. Ger. 505,722, June 17, 1928. The powd. Sn ore mixed with C is placed on a porous hearth made of spongy Fe obtained by reducing Fe ore with C in the furnace just prior to the introduction of the Sn ore.

Blast furnace. JAMES P. DOVEL (to G. P. Dovel). U. S. 1,783,416, Dec. 2.

Rotary-hearth furnace suitable for heat treatments. ALAN D. DAUCH (to George J. Hagan Co.). U. S. 1,782,956, Nov. 25. Structural features.

Rotary case-hardening furnace. ERNST GOERIG. U. S. 1,784,427, Dec. 9. Structural features.

Protecting inside walls of metallurgical furnaces with steam. HENRY F. EASTER (to American Smelting & Refining Co.). U. S. 1,783,284, Dec. 2. The inside walls of furnaces are protected from the scorifying action of the contents of the furnace by providing a coating of steam on the inside wall without substantially changing the normal operating atm. throughout the body of the furnace. A furnace construction is described.

Furnace for annealing elongated metal blanks, tubes, etc. GRANT B. SHIPLEY and HENRY ALINDER (to International Nickel Co.). U. S. 1,782,481, Nov. 25.

Heat treatment suitable for annealing brass, iron, steel, etc. JOHN R. CAIN (to The Richardson Co.). U. S. 1,784,221, Dec. 9. In a liquid annealing medium, such as Pb and superposed hydrocarbon oil, a temp. gradient is maintained ranging from a temp. at least as high as that necessary to effect the desired heat treatment to a temp. at least as low as will permit withdrawal of a heat treated article to the air without danger of formation of scale or oxide on the article; an article under treatment is advanced from a cooler portion of the liquid medium to a heat treating zone where it is kept for the desired heat treatment, and then withdrawn through a cooler portion of the liquid medium. App. is described.

Furnace and endless conveyer for heat-treating articles such as universal joint parts. HORACE L. WAISNER (to Mechanics Universal Joint Co.). U. S. 1,782,451, Nov. 25.

Apparatus for conveying articles through heat-treating furnaces. GEORGE F. BEACH (to Ryan, Scully & Co.). U. S. 1,782,335, Nov. 18. Structural features.

Quenching tank suitable for use in cooling metal tools after heat treatment. HAROLD W. FLETCHER (to Hughes Tool Co.). U. S. 1,784,095, Dec. 9.

Electric immersion heaters in vats of metal-pickling solution. WM. C. SIEFERT and GEORGE W. PAWEL (to International Nickel Co.). U. S. 1,782,482, Nov. 25. Structural features.

Etching precious metals. JAMES C. MCFARLAND (to Wadsworth Watch Case Co.). U. S. 1,783,663, Dec. 2. A Cr plating is applied to serve as a resist for the etching fluid for the precious metal, and the exposed surface of the precious metal is etched while the plating design serves as a resist; the Cr plating is then removed. Cf. *C. A.* **24**, 2104.

Local case-hardening of iron and steel. FRANZ KRUŠEK. Austrian 119,023, Apr. 15, 1930. A paste to be applied to the parts that are not to be hardened comprises pipe clay, glass meal and asbestos meal bound with an aq. soln. of crude sugar.

Steel. FRANZIE ANTOINETTE DE SILVA and CHARLES GEO. CARLISLE. Ger. 506,351, Aug. 18, 1927. See Brit. 290,442 (*C. A.* **23**, 812).

Rolling mill for rolling metals. WILLIAM F. DETWILER (to Allegheny Steel Co.). U. S. 1,781,809, Nov. 18.

Special alloy rolling-mill guides. MARVINE GORHAM (to Michigan Steel Casting Co.) U. S. 1,783,148, Nov. 25. Portions of guides subjected to the wear of highly heated bars and billets are formed of an alloy of Fe together with Ni 32–38, Cr 13–17, C 0.35–0.65, Si 0.9–1.4 and Mn 0.85–0.95%.

White alloy suitable for general use as a substitute for nickel-plated brass. CHARLES PHILIPPOSSIAN. U. S. 1,783,139, Nov. 25. An alloy which is readily worked has the approx. compn. Cu 66.554, Ni 18.2, Zn 14.5, Mg 0.19, Al 0.19, Cd 0.098, Si 0.078 and Mn 0.19%. Cf. *C. A.* **24**, 583.

White metal. OSKAR GRÜNBAUM. Austrian 118,864, July 15, 1928. Addn. to 109,161 The alloy described in Austrian 109,161 (*C. A.* **22**, 4452) is modified by replacing part of the Zn by Cd.

White metal. N. V. TINKOPER HANDELMAATSCHAPPIJ. Ger. 506,082, Nov. 11, 1926 Mo 0.1–3, Sn 3–16, Ni 0.5–15, Fe 0.1–1 and Cu 96.3–65%.

Aluminum alloy. HORACE C. HALL and TENNYSON F. BRADBURY (to Rolls-Royce, Ltd.). U. S. 1,782,300, Nov. 18. See Brit. 323,353 (*C. A.* **24**, 2977).

Special alloy poppet valves. WARREN NOBLE. U. S. 1,784,640, Dec. 9. Heads of poppet valves for internal-combustion engines are made of a binary alloy of Ag 90% and a hardening agent such as Mg 10% to give high heat cond. and wear-resisting characteristics.

Refining alloys of magnesium or alkaline earth metals electrolytically. ALFRED CLAUDE JESSUP. Ger. 504,508, Sept. 12, 1926. A layer of readily fusible compd., such as chlorides of the metals, is placed on the layer of fused metal floating on the surface of the electrolyte, to protect it against the air.

Improving the resistance to corrosion of magnesium and its alloys. ADOLF BECK and GUSTAV SIEBEL (to I. G. Farbenind. A.-G.). U. S. 1,783,770, Dec. 2. Materials

contg. at least 8% Mg are treated with a boiling aq. soln. of dichromates for about at least an hr.

Device for the accurate preparation of amalgams. RICHARD LESSMANN. Ger. 504,551, Mar. 15, 1929.

Coating articles of ferrous metal. FREDERICK M. BECKET (to Electro Metallurgical Co.). U. S. 1,784,570, Dec. 9. Articles are heated in contact with a mixt. contg. a fluosilicate such as that of Na and an alloy of Fe, Cr and Si until cementation is effected.

Coating zinc and cadmium. ALADAR PACZ. U. S. 1,784,106, Dec. 9. For producing coatings on Zn and Cd, which are of preservative and decorative character, a non-alk. dipping soln. is used contg. a sol. molybdate such as NH_4 molybdate and a second sol. salt such as $(NH_4)_2SO_4$ which is non-alk. and does not ppt. Mo.

Apparatus for coating wire with copper, etc., after treatment with acid. CHARLES D. JOHNSON (to Johnson Steel & Wire Co.). U. S. 1,783,429, Dec. 2. An app. is described for treating wire with an acid bath, a coating bath and a washing bath and also with an air jet.

Detecting faults in articles such as rails, cables, wires or tubes by apparatus comprising electric magnetizing coils operating on alternating current. HELMUT CHAPUZEAU AND OTTO EMERSLEBEN (to Neufeldt & Kuhnke Betriebsges. m. b. H.). U. S. 1,782,462, Nov. 25.

Thick-walled electrically welded metal pressure vessels. RICHARD STRESAU (to A. O. Smith Corp.). U. S. 1,784,080, Dec. 9. Various details of annealing and mech. treatment and final heat treatment to relieve stresses are described, adapted to the manuf. of app. such as that for use in *oil cracking*.

Electric welding of metals. BORIS S. ROBINOFF, SUMNER E. PAINE and WRIGNOL E. QUILLEN (to National Tube Co.) U. S. 1,782,316, Nov. 18. A groove is formed along the seam to be welded, flux is placed in the groove, a metal electrode is moved along the groove and an arc is drawn causing the flux to melt and causing molten metal from the electrode to be deposited through the melted flux. App. is described.

Electric arc-welding apparatus. FULTON LANE and HARRY J. MORGAN (to P. L. and M. Co.). U. S. 1,784,015, Dec. 9. Mech. and elec. features.

Rod for use in arc welding or cutting. J. B. GREEN (to Franklin M. Warden). U. S. 1,783,013, Nov. 25. A filler material such as a metal rod is coated with compds. of W and U oxides, such as a product formed from U oxide and Na tungstate. Cf. *C. A.* **24**, 333.

Soldering flux. HARRY C. MOUGEY (to General Motors Research Corp.). U. S. 1,783,925, Dec. 2. $ZnCl_2$ and water are used together with a water-sol. oil solvent such as di-, tri- and tetra-ethylene glycol, Et and Bu carbitol, the mono-acetates of ethylene and diethylene glycol and of the methyl and ethyl ethers of ethylene glycol, Et lactate, Et oxybutyrate and di-acetone alc.

10—ORGANIC CHEMISTRY

CHAS. A. ROUILLER AND CLARENCE J. WEST

The history of stereochemistry; a memorial on the death of J. A. Le Bel. E. WEDEKIND. *Z. angew. Chem.* **43**, 985–6(1930). E. H.

Bivalency of carbon. IV. Halogen displacements from *sym*-tetrabromo- and -chloroethane and tribromo- and -chloroethylene. ALLAN M. WARD. *J. Chem. Soc.* **1930**, 2143–8; cf. *C. A.* **24**, 2749.—No Br displacement takes place from $(CHBr_2)_2$ in EtOH at 15° and 25° but 1 Br atom is displaced instantaneously at these temps. in the presence of NaOH or EtONa, CBr_2:CHBr being formed. The same velocity coeff. should therefore be obtained by using $(CHBr_2)_2$ and CBr_2:CHBr, which was the case, the reaction being bimol. The velocity coeffs. for NaOH and EtONa are the same; the temp. coeff. for the range 15–25° is about 4.5. $(CHCl_2)_2$ behaves similarly, 1 Cl atom being displaced instantly from $(CHCl_2)_2$ by NaOH or EtONa but further displacement at 15–25° was very slow and kinetic expts. were therefore not carried out. C. J. WEST

Isoprene sulfone. ERNEST EIGENBERGER. *J. prakt. Chem.* **127**, 307–36(1930).—prene (10 g.) and 100 cc. Et_2O, satd. with SO_2 and heated 5 hrs. in the H_2O bath, give of *isoprene sulfone (2-methyl-2-butene, sulfone < 1,4 >)* (I), m. 63–3.5°, decomps. 5°. I is stable toward 0.5 *N* NaOH during 15 min. boiling. In neutral or nearly neutral media, titration with $KMnO_4$ proceeds in such a way that nearly 2

mols. O are consumed per mol. sulfone before the oxidation is noticeably slowed up, with the formation of a monobasic acid; a by-product of the reaction is an oxidative degradation with the formation of H_2SO_4. Details of the oxidation under various conditions are reported; a product of the oxidation is the *disulfone*, $C_{10}H_{20}O_8S_2$, m. 130°. I (10 g.) and 13 g. Br in 20 cc. CCl_4 give 19 g. of the *dibromide* (II), m. 127°. Boiling the latter with H_2O gives the bromohydrin (*3-bromo-2-methylbutan-2-ol sulfone* < *1,4* >), m. 67–8°; $BaCO_3$ splits off HBr and SO_2; MeONa in MeOH appears to give a di-Me ether; with excess 5.5 *N* MeONa in MeOH there results *3-methoxy-2-methyl-2-butene sulfone* < *1,4* >, b_{13} 1.0°, m. 44–5°; Br in $CHCl_3$ gives *2,3-dibromo-3-methoxy-2-methylbutane sulfone* < *1,4* >, m. 151–2°; sapon. of the enol ether gives *2-methylbutan-3-one sulfone* < *1,4* >, m. 180°; *phenylhydrazone*, m. 167°. The ketone is easily saponifiable by *N* alkali, giving *4-hydroxy-2-methylbutan-3-one-1-sulfinic acid*, giving with $PhNHNH_2$ a *$PhNHNH_2$ salt* of the *osazone*, decomps. without melting. II and MeOH-NaOH give a thick oil, which polymerizes to a yellow *2-methyl-2,3-butadiene sulfone* < , > , $(C_5H_6(OH)_2O_2S)_x$, which does not react with Br. Oxidation with $KMnO_4$, using 4.2 atoms O per mol., gives a product analyzing approx. $C_{3.5}H_7O_{6.5}S$; with 2.5 atoms O there results a product which with $PhNHNHH_2$ gives a *$PhNHNH_2$ salt*, $C_{28}H_{26}O_3N_6S$, which gives with dil. alkali the *K salt* of the *osazone*, $C_{17}H_{19}O_3N_4K$; hot HCl and neutralization gives the *K salt* of a *monohydrazone*, $C_{11}H_{13}O_4N_2SK$; the *semicarbazone*, $C_6H_{10}O_5N_3SK$, was not obtained pure. With 5.7 atoms O, there results a compd. which yields a *phenylhydrazine salt* of an *osazone*, $C_{21}H_{24}O_3N_6S$. C. J. West

Decomposition of the acids of peanut oil with the use of a new principle in fractional distillation. Ernst Jantzen and Carl Tiedcke. *J. prakt. Chem.* **127**, 277–91 (1930).—A column is described for fractional distn. in high vacuum and a device is developed for measuring the m. p. of the distillate during the distn. The working of this app. is illustrated by the sepn. of the Me esters of palmitic and stearic acids. The high-melting acids of peanut oil are sepd. by means of this app into eicosanic, docosanic and tetracosanic acids Thus the presence of the 1st two acids is confirmed and the presence of tetracosanic acid is made certain for the 1st time. No evidence is found for the presence of acids of odd C atoms or branched chains. It is therefore improbable that isobehenic or lignoceric acids are present in peanut oil. The following m. ps. are reported for synthetic products contg. C_{18}, C_{20}, C_{22} and C_{24}: Acid, 69.2°, 74.8–75.0°, 79.8–80°, 83.4–84.0°. Ph ester, 52°, 58.5°, 62.8–3.2°, ——. Alc., 59°, 65–5.2°, 70.8°, ——. Iodide, 34°, 41.5–2°, 47.8–8.0°, ——. C. J. West

Degradation of ethylenebissulfonylacetic acid in alkaline solution. Sulfinoacetic acid and hydroxyethylsulfonylacetic acid. J. A. Reuterskiöld. *J. prakt. Chem.* **127**, 269–76(1930).—$(CH_2SO_2CH_2CO_2H)_2$ in 140 cc. H_2O, treated with a little more than 1.5 equivs. of 4 *N* NaOH and allowed to stand 24 hrs., gives a mixt. of *sulfinoacetic acid* (I) and *hydroxyethylsulfonylacetic acid* (II). I is pptd. from the neutralized soln. by $SrCl_2$ as the *Sr salt*, crystals with 0.5 mol. H_2O; distn. of a soln. of the salt with H_2SO_4 gives AcOH; oxidation with H_2O_2 gives $HO_3SCH_2CO_2H$; the *Ag salt* of I was also prepd. In neutral and alk. soln. I is stable, even after short warming; in acid soln. at low temps., SO_2 is split off at once; even at —20° in Et_2O SO_2 is split off, giving AcOH. At —70° a rather stable soln. of I may be prepd. in Me_2CO. From the mother liquor, II is sepd. as the *Pb salt*, which crystallizes with 1 mol. H_2O. The free II m. 87–9°. Bromination of a soln. of II gives *dibromomethylsulfonylethyl ether*, m. 126.5–7.5°. C. J. West

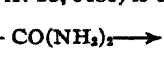
Conductivity measurements of the comparative rates of hydrolysis of lactones derived from simple sugars. Sydney R. Carter, Walter N. Haworth and Robert A. Robinson. *J. Chem. Soc.* **1930**, 2125–33.—Data are given for the cond. of various lactones over a period of days (until a const. value is obtained); the values obtained for the equil. % agree well with the values previously obtained by polarimetric measurements. The lactones studied were: tetramethyl-γ- and -δ-mannonolactones, tetramethyl-γ- and -δ-gluconolactones, tetramethyl-γ- and -δ-galactonolactones, trimethyl-δ-rhamnonolactone, trimethyl-γ- and -δ-arabonolactones, trimethyl-γ- and -δ-xylonolactones, mannono-γ- and -δ-lactones, glucono-γ- and -δ-lactones and galactono-γ-lactone. The relative rates of hydrolysis of the 2 series are also shown as curves. The lowest rate found among the δ-lactones is several times as great as the highest rate among the γ-series. C. J. West

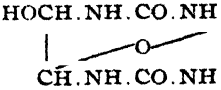
Some salts with *p*-, *o*- and *m*-quinoid structure. VII. R. Ciusa and L. Musajo. *Gazz. chim. ital.* **60**, 486–92(1930).—From 3 nitrophenylhydrazones of $AcCO_2H$ which were described in an earlier paper (*C. A.* **18**, 2138) numerous mono-metallic salts were prepd. with the object of ascertaining whether any of the salts might have a complex structure. Such a structure might indicate the existence of rings with more than 6 atoms, with participation of secondary valences in the closing of the ring. This struc-

ture is probably characteristic of salts of *p*-nitrophenylnitromethane (cf. Hantzsch, *Ber.* 40, 1533). The existence of internal complex salts is also probable in the case of alk. salts of derivs. of benzoyl- and acetylmethylphenylhydrazine, for while the salts of PhNMeN:C(OH)Ph are colorless, those of methyl(or ethyl)benzoyl-*p*-nitrophenylhydrazine are red (cf. *C. A.* 21, 1251). The *o*-nitrophenylhydrazone and its Na and K salts have already been described (Ciusa and Rastelli, *C. A.* 17, 1449). Prepd. by addn. of aq. $AcCO_2H$ (4 g.) to warm *m*-$O_2NC_6H_4NHNH_2$ in dil. AcOH, cooling and recrystn. of the ppt. from EtOH, *m-nitrophenylhydrazone* is yellow and m. 226°. The *p*-nitrophenylhydrazone and its Na and K salts have already been described (cf. Fischer, *Ann.* 253, 64; Hyde, *Ber.* 32, 1215; Ciusa and Rastelli, *loc. cit.*). Of the other salts described in the present paper, some were prepd. by the action of the hot hydrazone on aq. solns. or suspensions of the carbonate. On cooling the filtered soln, the salts crystd. Others were prepd. by double decompn. of alk. salt solns. of the hydrazones and solns. of the metallic salts. The NH_4 salts were prepd. by passing dry NH_3 into suspensions of the phenylhydrazones in abs. EtOH, and adding to the alc. soln. twice the vol. of Et_2O, which caused crystn. of the NH_4 salts. All the salts correspond to the general formula $Me(MO_2C)C:NNHC_6H_4NO_2$. The following data give the color (and in some cases other information) of the particular salts of the *o*-nitro-, *m*-nitro- and *p*-nitrophenylhydrazone of $AcCO_2H$, resp.: *NH_4*, brilliant yellow, yellow (m. 210–11°), yellow; *Li*, yellow, yellow, yellow; *Na*, already described (*loc. cit.*), yellow, already described (*loc. cit.*); *K*, already described (*loc. cit.*), lustrous (from AmOH), already described (*loc. cit.*); *Mg*, yellow (from water), yellow (from water), yellow (from water); *Ca*, yellow, yellow, yellow (from water); *Sr*, yellow, yellow (from water), yellow (from water) *Ba*, yellow, yellow (from water or EtOH), (from water); *Ni*, green-yellow, green-yellow (from water), green-yellow; *Co*, brick-red, intense yellow (from water), brick-yellow; *Cr*, golden yellow, yellow (from water), orange-yellow; *Mn*, yellow (from water), yellow (from water), yellow; *Al*, light yellow (from water), light yellow (from water), yellow; *Fe*, ——, the ferrous and ferric salts decomp., ——; *Hg*, yellow, yellow (from dil. cold solns.), decomps. easily; *Ag*, yellow (blackens in light), yellow (blackens in light), brick-red (lighter flesh-red when dry); *Cu*, yellow, green-yellow, green-yellow. In general the salts are yellow even where the metals usually form salts of other colors. The properties, particularly the differences in color of the *o*-, *m*- and *p*-derivs., of the Co salt of the *o*-nitrophenylhydrazone deriv. and the Ag salt of the *p*-nitrophenylhydrazone deriv. suggest a complex structure. The absence of any indication of complex salt formation among the *m*-derivs. is accounted for by the fact that the rule of Angeli is true only of *o*- and *p*- derivs. C. C. Davis

Derivatives of *dl*-asparagine. S. Berlingozzi and G. Carobbi. *Gazz. chim. ital* 60, 573–82(1930); cf. B., *C. A.* 23, 1620.—In the previous expts. there were obtained from the 2 rotatory asparagines 2 different series of acyl derivs. of the compn. $H_2NCOCH_2CH(CO_2H)NHCOR$, which are enantiomorphic. With these, attempts were made to obtain the *dl*-forms by direct union of the antipodes. Such tests gave positive results in 2 cases, while in the 3rd case the results were uncertain. With the object of clearing this uncertainty, the expts. were repeated under better conditions and were also extended to other acyl derivs. of the rotatory asparagines. Besides this, the d. and other consts. and the crystallographic characteristics of the compds. were studied. The results of the expts. confirm in general the formation of the *dl*-forms in all cases, so that in spite of the rotatory asparagines showing no tendency to form *dl*-forms under ordinary exptl. conditions, their acyl derivs. behave quite differently. *Expt.*—An improved *method for the prepn. of dl-$ClCH_2CONHCH(CO_2H)CH_2CONH_2$*, which gives a higher yield than in the previous work, involves dissolving each of the 2 antipodes (2 g.) in water (20 cc.) at approx. 30°, mixing the solns., evapg. very slowly at 30°, and recrystg. the residue from water, which yields 3.5 g. of *hydrated dl-chloroacetylasparagine*, $ClCH_2CONHCH(CO_2H)CH_2CONH_2 . H_2O$, m. 105°, loses its H_2O of crystn. at 60°, d_{15} 1.560; its aq. soln. is optically inactive; its crystals are triclinic (pinacoidal class), *a*:*b*:*c* = 0.9068:1:0.8617, mol. vol. 145.23. The *d*- and *l*-chloroacetylasparagines both m. 150°, d_{15} 1.538; their crystals are monoclinic (sphenoidic class), *a*:*b*:*c* = 0.7876:1:0.4281, mol. vol. 135.59. *dl*-$BzNHCH(CO_2H)CH_2CONH_2$, prepd. by the method previously described, m. 184°, d_{15} 1.433; its aq. solns. (Na salt) are optically inactive, its crystals are monoclinic (prismatic class), *a*:*b*:*c* = 0.8865:1:0.5929, mol. vol. 164.76. The *d*- and *l*-benzoylasparagines m. 189°, d_{15} 1.474, mol. vol. 160.18; their aq. solns. have $[\alpha]_D^{20}$ 36.4°. No success was had in obtaining crystals of the *d*- and *l*-forms large enough for thorough crystallographic analysis. *d*-Asparagine in *N* NaOH (calcd. quantity), agitated with $PhSO_2Cl$ (calcd. quantity) in Et_2O (added in small portions alternated with corresponding quantities of *N* NaOH), and acidified,

ppts. *d-benzenesulfonylasparagine*, $PhSO_2NHCH(CO_2H)CH_2CONH_2$, m. 163°, d_{18} 1.434; its crystals are monoclinic (sphenoidic class), $a:b:c$ = 0.7557:1:0.7105; its *Na salt* in water is optically inactive. In the same way from *l*-asparagine was prepd. *l-benzenesulfonylasparagine*, m. 163°, d_{18} 1.434; its crystals are monoclinic (sphenoidic class), $a:b:c$ = 0.7557:1:0.7105; its *Na salt* in water is optically inactive. An aq. soln. of the Na salts of the *d*- and *l*-forms (equimol. quantities) ppt. after acidification *dl-benzenesulfonylasparagine*, m. 172°, d_{18} 1.559; its crystals are monoclinic prisms but were too minute to be analyzed crystallographically, mol. vol. 174.59. C. C. Davis

Action of glyoxal on urea; new methods of formation of hydantoin. H. Pauly and Heinr. Sauter. *Ber.* **63B**, 2063–9(1930).—von Lippmann had observed that the juice of the pale sprouts growing from beets in moist warm weather contains hydantoin (I); if Klein's view that the urea circulating in the juice of plants combines with the aldehydes formed in the CO_2 assimilation (*C. A.* **23**, 5486) is correct, the formation of I might be represented by the scheme $(CHO)_2 + CO(NH_2)_2 \longrightarrow$  (II) $\longrightarrow$ I.

This reaction can be readily carried out *in vitro* and explains why $(CHO)_2$ has not hitherto been detected in plant juices, for the condensation to II occurs in H_2O without the aid of reagents or heat and is apparently irreversible. The dehydration of the monourein II to I is easily effected with hot HCl. II is identical with the product obtained in small amt. by Franchimont and Klobbie by the decompn. of dinitroglyoxaldiurein. In the presence of HCl (*i. e.*, conditions under which the known diurein (III) is formed), there is obtained a *compd.* $C_6H_{10}O_6N_4.3H_2O$ (IV), to which is assigned the structure  . Like II, it takes up 2, and only 2, atoms Na from 10% aq. NaOH, and whereas I can condense with another mol. of urea to form III, IV cannot. Repetition of the work of Behrend, Meyer and Rusche (*Ann.* 339, 5 (1905)) has shown that their supposed compds. $C_{11}H_{18}N_8O_{10}$ and $C_{10}H_{16}N_{12}O_{10}$ were very impure mixts. of IV with III or I. *2-Oxo-4,5-dihydroxyimidazole tetrahydride* (II) (21 g. from 50 cc. of a soln. of 18.75 g. $(CHO)_2$ with 24 g. urea concd. *in vacuo* to a thin sirup and stirred with MeOH), m. 146°; *di-Na salt*. IV, prepd. by cautiously mixing 100 cc. of 38% $(CHO)_2$ soln. with 22.5 g. urea in 50 g. HCl (d. 1.14) and sepg. from the somewhat less basic III with 27% HCl, chalky powder, m. 95–7° (when anhyd., it carbonizes without melting); *di-Na salt*. With boiling HCl, both II and IV give I. *Glyoxalbis(carbethoxyimide)*, from $(CHO)_2$ or its sulfate with 2 mols. urethan in HCl (d. 1.08) on the H_2O bath, microcryst. powder with no m. p. *Glyoxaldithiourein*, from $(CHO)_2$ or its sulfate with 2 mols. $CS(NH_2)_2$ in dil. HCl, tablets with no m. p. C. A. R.

New synthesis of creatine and alacreatine. Harold King. *J. Chem. Soc.* **1930**, 2374–7.—$H_2NCH_2CO_2H$ (7.5 g.) in 100 cc. *N* KOH and 21.7 g. $HN:C(NH_2)SMe.HI$, slowly evapd., give 10.2 g. glycocyamine, $H_2NC(:NH)NHCH_2CO_2H$; heating with concd. HCl 6.5 hrs. at 150° gives 74% of glycocyamidine-HCl, m. 213°. In a similar manner alanine gives 65% of alacreatine, whose *picrate*, yellow, m. 187°. Sarcosine gives 40% of creatine, whose *picrate* m. 218–20°. C. J. West

Unsaturated anhydrosugars. IV. 2-Oxygalactal and the preparation of kojic acid (2-hydroxymethyl-5-hydroxy-γ-pyrone). Kurt Maurer and Artur Müller. *Ber.* **63B**, 2069–73(1930); cf. *C. A.* **24**, 2112.—The synthesis of kojic acid (I) from glucose was described in Paper III. A similar synthesis has now been effected from galactose. 2,3,4,6-Tetraacetyl-2-oxygalactal (II) shows the same properties as the oxyglucal; like the latter, it loses its Ac groups when treated with $PhNHNH_2$, yielding galactosazone. Oxidative cleavage of the double bond with $KMnO_4$ gives the K salt of acetylated lyxonic acid, converted by sapon., through the Pb salt, into lyxonolactone (III). II takes up Cl in abs. Et_2O, forming, among other products, a dichlorotetraacetyl-2-oxygalactal, which could not be obtained in cryst. form but with Ag_2CO_3 and H_2O yielded the beautifully crystd. tetraacetylgalactosone hydrate (IV). IV reduces Fehling soln. at room temp., decolorizes cold $KMnO_4$ and shows mutarotation. With NaOH it forms galactosone, yielding galactosazone with $PhNHNH_2$ at 20°. With C_5H_5N-Ac_2O, IV gives the diacetate of I in good yield. It is worthy of note that, although the arrangement of the substituents on C atom 4 is the reverse of that in the glucose deriv., this does not interfere with the splitting off of the AcOH from IV. II, obtained in 3–4 g. yield from 40 g. acetobromogalactose, m. 111°, $[\alpha]_D^{18}$ 5.03° (EtOH).

9.90° (MeOH), —3.84° ($CHCl_3$), —12.68° ($(CHCl_2)_2$). K lyxonate, m. 166°, $[\alpha]_D^{19}$ (0.1732 g. in 8.65 cc. 0.1 *N* HCl made up to 10 cc.) 8.91° immediately after soln., 41.73° (const.) after 7 days. IV (2.2 g. from 5 g. II), m. 96°, $[\alpha]_D^{20}$ 45.68° ($CHCl_3$; no mutarotation). In aq. solns. its rotation slowly decreases: $[\alpha]_D^{20}$ in H_2O 98.90° decreasing to 1.35° in 105 days, in NH_4OH 80.77° changing to 4.55° in 88 days, in HCl 113.17° changing to 3.42° in 75 days. C. A. R.

Highly polymerized compounds. XXXIX. Cellulose. H. STAUDINGER, K. FREY, R. SIGNER, W. STARCK AND G. WIDMER. *Ber.* 63B, 2308–16(1930); cf. *C. A.* 24, 5717.—A review with 68 references. **XL. Viscosity measurements on polysaccharides and their derivatives.** H. STAUDINGER AND O. SCHWEITZER. *Ibid* 2317–30.—Data are given for inulin, lichenin and starch in $HCONH_2$, acetylcellulose in CCl_4 and *m*-MeC_6H_4OH, cellulose benzyl and Me ethers in CCl_4 and the Me ether in H_2O, and for nitrocellulose in BuOAc. 78 references are given. **XLI. Molecular-weight determinations on acetylcelluloses.** H. STAUDINGER AND H. FREUDENBERGER. *Ibid* 2331–43.—The relative viscosity of acetylcellulose decreases from 213 to 2.26 when the acetylation time is increased from 6 to 120 hrs. at 60° and from 20.9 to 3.11 when the time is increased from 0.75 to 6.25 hrs. at 80°; the corresponding changes in mol. wts. are from 18,400 to 2200 and from 8200 to 2200. Other data are given for products prepd. by different methods. The nature of the colloidal solns. of cellulose acetates is discussed. C. J. WEST

Chemistry of the three-carbon system. XXV. Effect of the methyl group on the tautomerism of acids and ketones of the cyclopentane and cyclohexane series. GEO. A. R. KON AND RAM SIMHA THAKUR. *J. Chem. Soc.* 1930, 2217–31; cf. *C. A.* 24, 3213.—α-Cyclohexylidenepropionic acid gives an *anilide*, m. 126°, and a *p-toluidide*, m. 161°; α-Δ¹-cyclohexenylpropionic acid, b_1 120–4°, m. 38°, $d_4^{20.6}$ 1.0332, $n_D^{20.6}$ 1.48405; Et ester, b_{19} 111°, $d_4^{19.7}$ 0.9660, $n_D^{19.7}$ 1.4627; anilide, m. 123–4°; *p-toluidide*, m. 108°; the equil. mixt. contains 32% α,β-acid; the mobility is approx. 0.0075. 2-Methylcyclohexylideneacetic acid m. 68.5°; *amide*, m. 112°; *anilide*, m. 99°; 2-methyl-Δ¹-cyclohexenylacetic acid yields an *amide*, m. 138°, and an *anilide*, m. 143°; the equil. value is about 11.3% α,β-acid; the mobility is 0.15 and the half-change period 59 hrs. 3-Methylcyclohexylideneacetic acid, m. 90°; *amide*, m. 143–4°; *p-toluidide*, m. 136°; 3-methyl-Δ¹-cyclohexenylacetic acid, m. 38°; the equil. mixt. contains about 8% of α,β-acid; the mobility is 0.27 and the half-change period is about 26 hrs. 4-Methylcyclohexylideneacetic acid, m. 66°; *p-toluidide*, m. 119°; 4-methyl-Δ¹-cyclohexenylacetic acid, m. 42–3°; *p-toluidide*, m. 111°; the mean equil. value is about 7%; the mobility is 0.42, the half-change period 17 hrs. α-Methyl-Δ¹-cyclopentenylacetic acid b_1 113–5°, $d_4^{19.4}$ 1.0366, $n_D^{19.4}$ 1.47497; the Et ester b_{10} 82–3°, $d_4^{18.4}$ 0.9616, $n_D^{18.4}$ 1.45393; the mean equil. value is 38% of α,β-acid; the mobility is 0.58 and the half-change period 14 hrs. The α-Me group causes appreciable shifting of the equil. towards the α,β-side in both the cyclopentane and the cyclohexane series; it also retards the mobility of the system so greatly that only approx. measurements were possible in some cases. The introduction of a Me group in the cyclohexane ring has a general slight retarding effect on the mobility but it has practically no effect on the position of equil. which is displaced towards the β,γ-side to a slight extent. All attempts to prep. the α,β-isomer of α-methyl-Δ¹-cyclohexenylacetone by the Blaise-Maire or Grignard reaction were fruitless. The same is true of the 2-Me isomer; condensation with $CHNa(CO_2Et)_2$ in EtOH gives *Et 2-methylcyclohexanespirocyclohexane-3,5-dione-6-carboxylate*, m. 134°. *3-Methylcyclohexylideneacetone*, b_{6-7} 91–3°, $d_4^{18.3}$ 0.9235, $n_D^{18.3}$ 1.48571; *semicarbazone*, m. 191°. 3-Methyl-Δ¹-cyclohexenylacetone, b_{7-8} 86–8°, $d_4^{16.8}$ 0.9200, $n_D^{16.8}$ 1.46986; the equil. mixt. contains about 25% α,β-isomer. Condensation of the β,γ-ketone with $CHNa(CO_2Et)_2$ gives a product which is hydrolyzed to *3-methylcyclohexanespirocyclohexane-3,5-dione*, m. 135–6°. *4-Methylcyclohexylideneacetone*, b_9 94°, $d_4^{16.8}$ 0.92694, $n_D^{16.8}$ 1.48594; *semicarbazone*, m. 176–7°. 4-Methylcyclohexenylacetone, b_8 85°, $d_4^{16.3}$ 0.9178, $n_D^{16.3}$ 1.46836. The equil. mixt. contains about 13.5% α,β-isomer; the mobility varies from 600–700. *4-Methylcyclohexanespirocyclohexane-3,5-dione*, m. 168°. α-Methylcyclopentylideneacetone, b_{11} 95.5–6°, d_4^{19} 0.9601, n_D^{19} 1.49737; α-methyl-Δ¹-cyclopentenylacetone, b_{10} 74°, d_4^{19} 0.9216, n_D^{19} 1.4635; the equil. mixt. contains 64% α,β-isomer; the mobility is about 3000. Condensation with $CHNa(CO_2Et)_2$ by heating 4 days gives a small amt. of an oily ester hydrolyzed to *cyclopentanespiro-2-methylcyclohexane-3,5-dione*, m. 118–9°. The introduction of an α-Me group displaces the equil. in these ketones

toward the β,γ-side in both cyclohexane and cyclopentane series, *i. e.*, its effect is the reverse of that observed in the acids. It does not appear to affect mobility to a great extent. The effect of the Me group in the *m*- and *p*-position of the cyclohexane ring is not very pronounced; but in the *o*-position it appears to exercise considerable influence in the stabilization of the β,γ-phase to the almost exclusion of the α,β.
C. J. WEST

Action of reduced nickel and hydrogen on aromatic hydrocarbons under high pressure and temperature. TORU OGAWA AND TOSHIO YOKOTA. *Bull. Chem. Soc. Japan* **5**, 266–75(1930).—C_6H_6 (100 g.) and 5 g. reduced Ni and H, heated 1 hr. at 470° under pressure of 80 atm. at 0°, showed a depression of H of 35 atm. at 0° (2.7 mol. %); the gas in the autoclave contained 98.5% H, 1.2% N, 1.4% satd. hydrocarbons and 0.1% CO; the liquid reaction product (92%) was cyclohexane, which is stable under the above conditions. C_6H_6 and Ni, heated with H at 500° and 100 atm., gave 28% gas, 41% liquid hydrocarbons and 14% coke; the gas consisted of 94.5% CH_4 and 5.5% H; the liquid boiled from 48 to 320° and contains C_6H_6 and PhMe. C_6H_6 at 200° and 100 atm. for 2 hrs. and then at 500° for 3 hrs. gives 5.4% CH_4 and a mixt. of cyclopentane, methylcyclopentane and cyclohexane. Pure $C_{10}H_8$, heated with H at 460–500° and 80 atm., with or without Fe_2O_3 or CuO, showed no reaction; with Ni there resulted 5% CH_4 and 91% of a liquid, composed of C_6H_6 homologs and tetralin. Tetralin, treated as in the case of $C_{10}H_8$, gives 5.6% CH_4 and 92% of a liquid consisting of C_6H_6 homologs and decalin. Decalin gives cyclohexane and its homologs.
C. J. WEST

Action of fuming sulfuric acid on hexane, cyclohexane and some of their derivatives. GEO. N. BURKHARDT. *J. Chem. Soc.* **1930**, 2387–99.—When an excess of hexane (I), cyclohexane (II) or methylcyclohexane (III) is stirred vigorously with fuming H_2SO_4 (35 or 65% SO_3) at 0–10° for 4–5 hrs., practically the whole of the SO_3 is used in the reaction which takes place. In most of the smooth reactions, about 1 mol. SO_2 was formed per mol. of hydrocarbon attacked; it is clear that the oxidation of some of the H of the hydrocarbon is an important part of the reaction but it is not clear whether this is the primary reaction or whether sulfonation precedes oxidation. Cyclohexanesulfonic acid is very readily oxidized by 20% oleum under similar conditions and it appears that sulfonation can occur without oxidation. The general nature of the products formed was deduced from the chem. properties and analyses of the mixed Ba salts and sulfonyl chlorides. The Ba salt of the hydrolyzed product from I contained 2 mol. proportions of disulfonate per mol. of monosulfonate; 5% of the I chains were unsatd. and it appears that about 30% of the I chain contained a HO group; the HO groups were very largely or entirely in the form of H_2SO_4 esters in the first product. Similar proportions of the corresponding alicyclic sulfonic acids were formed from II together with a small % of $PhSO_3H$. Cyclohexene and concd. H_2SO_4 give some cyclohexanol and Ba cyclohexyl sulfate; with 35% oleum only the Ba salt was isolated. Cyclohexanol and 25% oleum, followed by 70% oleum, give polymerized cyclohexene and a Ba salt, probably contg. a large proportion of sulfatosulfonic acid and perhaps disulfonic acid. Cyclohexanol (IV) and 12% oleum below 20° or $ClSO_3H$ in $PhNMe_2$ give *cyclohexylsulfuric acid*, whose *Na salt*, plates, crystallizes with 1 mol. H_2O and *Ba salt*, brilliant plates, with 4 mols. H_2O. The salts are rapidly hydrolyzed to IV by boiling dil. mineral acid but not readily below 80–90°; it is unaffected by boiling neutral aq. $KMnO_4$ in 15 min. and in dil. soln. is only rapidly attacked by CrO_3-H_2SO_4 mixt. at the b. p. The salts of cyclohexanesulfonic acid are discussed.
C. J. WEST

New orientation rule and the anomaly of the nitroso group. DALZIEL L. HAMMICK AND WALTER S. ILLINGWORTH. *J. Chem. Soc.* **1930**, 2358–64.—The facts as to the orienting influence of single atoms and groups present in the C_6H_5 nucleus on further substitution can be expressed, without any theoretical implications whatever, by the following rule: If in the C_6H_6 deriv. PhXY, Y is in a higher group of the periodic table than X, or if, being in the same group, Y is of lower atomic wt. than X, then a 2nd atom or group of atoms that enters the nucleus will go in the *m*-position to the group XY. In all other cases, including that in which the group XY is a single atom, a 2nd entering atom or group goes to the *o*- and *p*-positions. The effect of ionic charges on XY is given by the statement that a positive charge directs *m*- and a negative charge directs *o*- and *p*-. Examples are given of the application of the rule. The 1 apparent exception to this rule is the NO group, since nitration and bromination of PhNO in CS_2 and CCl_4 give *p*-derivs. PhNO in CS_2 over the range studied has an av. degree of assocn. of 18%; in dil. soln. in AcOH it is entirely unimol. PhNO in CS_2 gives the *p*-Br deriv rapidly at —5°; negative results were obtained in AcOH; after 24 hrs. Br and

PhNO in AcOH contg. excess AcONa give a *tribromoazoxybenzene*, m. 123°. It thus appears that the rapid production of *p*-substituted PhNO occurs only when expt. shows that the PhNO is present to some extent in the bimol. form. The solid equil. curve for AcOH-PhNO shows no indication of compd. formation. Expts. indicate that the reactivity of the halogen in the Br-substituted PhNO is in accordance with the view that the NO group is *m*-directing when present in the unimol. form. C. J. WEST

Reaction between keto-anils and Grignard reagents and the tautomerism of aliphatic keto-anils. WALLACE F. SHORT AND JOHN S. WATT. *J. Chem. Soc.* **1930**, 2293–7.—Aliphatic keto-anils react with MeMgI in Am_2O to give 1 mol. CH_4 and, since practically the whole of the anil may be recovered by decompn. of the resulting Grignard complex, these anils must be capable of reacting in the enamic form: :C:CRNH.-Aryl. Acetone anil (I), m. 23.5°, d_4^{20} 1.0087, n_D^{20} 1.5886 (supercooled); PhMgBr and 13 g. I give a product which, decompd. with NH_4Cl, gives 3 g. C_6H_6, $PhNH_2$ and a little I in the fraction b_{18} up to 128° but the main fraction is pure I. The product from I and EtMgBr reacts with Me_2SO_4 to give CH_2:CMeNMePh, b_{18} 146°, d_4^{20} 1.0030, n_D^{20} 1.5856. I, $PhCH_2Cl$ and C_6H_6 give the *HCl salt*, m. 195° (decompn.), of *benzylisopropenylaniline*, m. 22–3°; the HCl salt is immediately decompd. by cold dil. Na_2CO_3. The values of $[R_L]_D$ indicate that I exists mainly in the enamic phase and is the first simple instance of the tautomeric system :CHC:N ⟷ :C:C.NH. PhC(:NPh)-Me and PhMgBr give dypnone anil, m. 97° (cf. Plancher and Ravenna, *Atti. accad Lincei* 15, ii, 555(1906)), which results from the condensation of 2 mols. PhC(:NPh) Me under the influence of the Grignard reagent, since EtMgBr gives the same product. Benzophenone anil is recovered after its vigorous reactions with Grignard reagents. C. J. WEST

Compounds with iodoform, bromoform and chloroform with quaternary and ternary salts. IV. WILHELM STEINHOPF AND HERBERT TEICHMANN. *J. prakt. Chem.*. 127, 337–56(1930); cf. *C. A.* 20, 2815.—$Et_2Ph(PhCH_2)NI$, m. 120°, gives *compds.* with CHI_3, yellow, m. 120°, with $CHBr_3$, m. 114–6°, and with $CHCl_3$, m. 105°. $Me_2(PhCH_2)_2NI$ yields a *compd.* with $CHBr_3$, light yellow, m. 108°. $(PhCH_2)_3NHI$, m. 189°, for which a convenient method of prepn. is given, gives a *compd.* with $3CHBr_3$, m. 82°. *Diethylbenzylphenylarsonium iodide*, m. 149°, in 100% yield from Et_2PhAs and $PhCH_2I$, gives a yellow *compd.* with CHI_3, m. 122°, and a yellow *compd.* with $CHBr_3$, m. 113°. *Ethylbenzyldiphenylarsonium iodide*, m. 178°, gives a bright yellow *compd.* with CHI_3, m. 101–8° (could not be crystd. from EtOH), and a pale yellow *compd.* with $CHBr_3$, m. 125–55°. Et_3SI and CHI_3 give a light yellow *compd.* in the ratio 2:3, m. 127°; this also results from Et_3SOH and CHI_3. The *compd.* $Et_3SI.CHI_3$ results on mixing the components in mol. ratios and m. 139°; recrystn. from EtOH gives the compd. m. 128°. Only 1 *compd.* results with $CHBr_3$ (1:1), m. 98–100°. Me_2SI (m. 208–13°) and CHI_3 form a *compd.* in the ratio of 1:2, m. 152°; the compd. with $CHBr_3$ decompd. so easily that it was not analyzed. The *compd.* $Me_2EtSI.2CHI_3$, yellow, m. 136°; the *compd.* $Me_2EtSI.CHBr_3$ m. 35–40° and is decompd. by cold H_2O. Choline iodide and CHI_3 give a *compd.* in the ratio of 2:3, m. 195°. *Trimethylaminoacetic acid-HI*, $C_{10}H_{23}O_4N_2I$, m. 240–1° (decompn.). A table of known addn. compds. is given. C. J. WEST

Polynitroarylnitroamines. I. 2,4,6-Trinitrophenylnitroamine. WM. W. JONES AND FRANCIS G. WILLSON. *J. Chem. Soc.* 1930, 2277–9.—Nitration of *p*-$H_2NC_6H_4SO_3H$ in H_2SO_4 at 15°, stirring for 24 hrs. and standing for 48 hrs. at 20°, gives 75% of *2,4,6-trinitrophenylnitroamine* (I), yellow, deflagrates between 80–110°; the alk. soln. is deep purple-red, from which well-defined salts can be isolated. The constitution is shown by the conversion into the Me deriv., m. 115–20°, with Me_2SO_4; by its decompn. in the Lunge nitrometer with quant. liberation of NO_2; by its formation from picramide (II) by nitration; and by the formation of II, in practically quant. yield, when dissolved, with an equimol. amt. of 2,4-$(O_2N)_2C_6H_3NH_2$, in cold concd. H_2SO_4. Nitration of 2,6-$(O_2N)_2C_6H_3SO_3H$ gives 55% of I. Nitration of *p*-$O_2NC_6H_4NH_2$ likewise gives I (cf. Macciotta, *C. A.* 24, 4279). C. J. WEST

Action of ferric chloride on *o*-, *m*- and *p*-toluidine. WM. H. PATTERSON. *J. Chem. Soc.* 1930, 2401.—*o*-$MeC_6H_4NH_2$ with HCl and $FeCl_3$ gives a dark bluish green ppt. with purple reflex; the *m*-isomer gives a brown color and then a ppt.; the *p*-isomer gives an intense plum-red color. The reaction of the *m*-isomer with excess $FeCl_3$ at room temp. is complete after 28 days; the wt. of the ppt. is about half that of the toluidine; the ppt. obtained after 7 days from a mixt. of the *o*- and *p*-isomers (69.5% of the former) is 32% of the wt. of the *o*-isomer; the content of the *p*-isomer in the

residual mixt. is 37.6%. These complexes contain no Fe and burn without melting when heated in air. C. J. WEST

Tertiary arylalkylphosphines. I. IVOR K. JACKSON, WALTER C. DAVIES AND WM. J. JONES. *J. Chem. Soc.* 1930, 2298–301.—The following derivs. were prepd. from *p*-$EtC_6H_4PCl_2$ or *p*-$MeOC_6H_4PCl_2$ and the proper Grignard reagent: *p-Ethylphenyldipropylphosphine*, b_{21} 157°, d_4^{25} 0.9147, n_F^{25} 1.5370, n_D^{25} 1.5255, n_C^{25} 1.5208; *dibromide*, oily. The *di-Bu deriv.* b_{15} 176°, d_4^{25} 0.9042, n^{25} 1.5319, 1.5208, 1.5162 for F, D and C; the *dibromide* is oily. The *di-Am deriv.* b_{18} 201°, d_4^{25} 0.9022; *mercurichloride*, m. 95°. *p*-Ethylphenylmethyldipropylphosphonium hydroxide is an oil; the soln. reacts alk. and ppts. the difficultly sol. metallic hydroxides from solns. of their salts; the *chloroplatinate*, yellow, m. 195°; the corresponding *di-Am deriv.*, yellow, m. p. unsharp. *p-Methoxyphenyldipropylphosphine*, b_{17} 165°, d_4^{25} 0.9738, n^{25} 1.5477, 1.5352, 1.5301 for F, D and C; *dibromide*, thick liquid; *mercurichloride*, m. 134°. The *methiodide* m. 60°. The *di-Bu deriv.* b_{16} 190°, d_4^{20} 0.9600, n^{25} 1.5389, 1.5274, 1.5226 for F, D and C; *methiodide*, m. 86°. The hydroxide is an oil, which yields a *chloroplatinate*, yellow, m. 196°. The *di-Am deriv.* b_{18} 202°, d_4^{25} 0.9382, n^{25} 1.5289, 1.5178, 1.5132 for F, D and C; *dibromide*, m. about 85°; *mercurichloride*, m. 114°; methiodide, oily; *chloroplatinate*, yellowish brown, m. 153°. The rate of oxidation of these phosphines is comparatively slow. The at. refractivity for P, calcd. from the above values of *n*, ranges from 10.15 to 10.65, which, compared with the value of 9.47 for Et_3P, shows the great optically exaltative effect of the linking of the Ph group to P. C. J. WEST

Action of hydrobromic acid on certain arsonic acids. MONTAGUE A. PHILLIPS. *J. Chem. Soc.* 1930, 2400–1.—Boiling the following benzenearsonic acids with 3–4 times their wt. of HBr (d. 1.445) gives the following products: 3,4-$O_2N(H_2N)$, 4,2-Br-$(O_2N)C_6H_3NH_2$ (97%); 4,3-$O_2N(H_2N)$, 5,2-$Br(O_2N)C_6H_3NH_2$ (96%); 3,4-O_2N-(MeNH), 4,2-$Br(O_2N)C_6H_3NHMe$ (92%); *4-nitro-3-methylamino*, yellow plates, 5,2-$Br(O_2N)C_6H_3NHMe$ (80%); 3,4-$O_2N(HO)$, mixt. of polybrominated nitrophenols, from which 20% of 2,4,6-$Br_2(O_2N)C_6H_2OH$ was isolated; 3,4-$H_2N(HO)$, 4,2-$Br(H_2N)$-C_6H_3OH (about 20%); 3,4-AcNH(HO), the same product as before; 4,3,5-H_2N-$(O_2N)_2$, 4,2,6-$Br(O_2N)_2C_6H_2NH_2$ (96%). No decompn. occurred with the 6,3-O_2N-(H_2N) deriv. The 4,3-$O_2N(HO)$ and 2,3-$O_2N(HO)$ derivs. gave mixts. which could not be sepd. C. J. WEST

Direct meta-substitution in the toluene nucleus. JOHN B. SHOESMITH AND JOHN F. MCGECHEN. *J. Chem. Soc.* 1930, 2231–6.—The reaction between Me_3CCl and PhMe with $AlCl_3$ gives *m*- and *p*-$Me_3CC_6H_4Me$ in the ratio of 62:38; in the presence of $FeCl_3$ the ratio is 67:33; in the presence of $PhNO_2$-$AlCl_3$, 67:33; details of the analysis are given, 1 method being based on the marked difference in the solubilities of the *Ba sulfonates* of the hydrocarbons. BuCl and PhMe with $AlCl_3$ give a mixt. of *m*- and *p*-$MeEtCHC_6H_4Me$ in the ratio of 75:25. The synthesis of these 2 compds. from *m*- and *p*-$MeC_6H_4C(OH)MeEt$ is described. *m-sec-Butyltoluene-?-sulfonyl chloride* b_{11} 164–5°; *anilide* m. 120.5–1°; the corresponding *p-derivs.* b_{12} 162–4° and m. 124.5–5°, resp. C. J. WEST

Aromatic sulfonyl fluorides. II. WILHELM STEINKOPF AND PAUL JAEGER. *J. prakt. Chem.* 128, 63–88(1930); cf. *C. A.* 21, 3603.—In the first work it was shown that the sulfonyl fluorides were stable toward H_2O, acids and NH_4; it is now shown that they are also stable toward metals such as Cu and Mg. *m*-$IC_6H_4SO_2F$ and Cu, heated 6 hrs. at 200–30°, give 54% of *3,3'-biphenyldisulfonyl fluoride*, m. 133–4°; Cl-SO_3H gives the chloride, m. 127–8.5°. *2-Iodotoluene-4-sulfonyl fluoride*, m. 35–6°, results from the NH_2 deriv. through the diazo reaction; with Cu at 220° there results 41% of *2,2'-dimethylbiphenyl-5,5'-disulfonyl fluoride*, m. 146–7°; with Me_2NH in EtOH there results the *dimethylamide*, m. 244–7°. *2-Iodoanisole-4-sulfonyl fluoride*, m. 58–8.5°; Cu at 220° for 10 hrs. gives *2,2'-dimethoxy-5,5'-biphenyldisulfonyl fluoride*, m. 205.6°. Aminomesitylenesulfonyl fluoride, m. 62°, results by the reduction of the NO_2 deriv. by Sn and concd. HCl. *Dinitromesitylenesulfonyl fluoride*, m. 157–8°, results quant. on nitrating with HNO_3-H_2SO_4 at 20–5°; reduction gives the *di-NH_2 deriv.*, m. 142–3°. $PhSO_2F$ and MeMgI in Et_2O give *methylphenyl(phenylsulfonyl)sulfanic acid*, $PhSO_2SMe(O_2H)Ph$, m. 123–4°, stable at 260–300° (*K salt; Me ester*, m. 102–3°), and $MeSO_2Ph$, m. 87–8°. $PhSO_2F$ and PhMgBr give Ph_2 and Ph_2SO_2. 2,4-$(FO_2S)_2$-C_6H_3Me and PhMgBr give a mixt. of *2,4-di(phenylsulfone)toluene*, m. 192°, and *tolyl-(2- or 4-phenylsulfone)-4- or 2-diphenylsulfonic acid*, decompg. 125–6°. 3-$H_2NC_6H_4$-SO_2F in EtOH, concd. H_2SO_4 and $AsCl_3$, treated with $NaNO_2$ at 5–10°, give *phenylarsonic acid-3-sulfonyl fluoride*, m. 160°; the *amide* does not m. 300°; reduction of

the acid with SO_2 in HCl gives the *dichloride*, b_{10} 183–4°, m. 42°; with $AlCl_3$ in CS_2 there results *phenyldichloroarsine-3-sulfonyl chloride*, b_{10} 200–5°, m. 61–2.5°. *Diphenylarsinic acid-3-sulfonyl fluoride*, m. 150–2° (34.8% yield); reduction gives 81% of *diphenylchloroarsine-3-sulfonyl fluoride*, b. (high vacuum) 168–79°. 2,4-$Me(FO_2S)$-C_6H_3OH in FSO_3H, heated 2–2.5 hrs. at 80–90°, give 15% of *2,2'-dimethylphenylene-o-sulfonylide-4,4'-disulfonyl fluoride*, decomps. over 240°. The *m*-isomer and FSO_3H, heated 2 hrs. at 80–90°, give *m-cresoldisulfonyl fluoride* (I), 3,2,4- or 3,4,6-$Me(FO_2S)_2$-C_6H_2OH, m. 125–6.5°; *NH_4 salt*, m. 163–5°; liquid NH_3 at room temp. for 3 days gives *m-cresoldisulfonamide*, m. 244–5.5°; I and concd. HNO_3 give the *NO_2 deriv.*, light yellow, m. 99–100°. 4,3-$HO(FO_2S)C_6H_3Me$ and FSO_3H, heated 2 hrs. at 80–90°, give 65% of *4,4'-dimethylphenylene-o-sulfonylide-6,6'-disulfonyl fluoride*, decomps. 260–5°; treated with liquid NH_3 for 3 days, there results *3-hydroxytoluene-3,5-disulfonamide*, m. 219.5–20.5°. 3,5-$Me_2C_6H_3OH$ and FSO_3H 6 hrs. at 0° give a *sulfonyl fluoride*, m. 107–8°; liquid NH_3 gives a *sulfonamide*, m. 161–2°. 2,4-$Me_2C_6H_3OH$ gives a *sulfonyl fluoride*, b. (high vacuum) 71–3°; attempts to prep. a disulfonyl fluoride gave *4,6,4',6'-tetramethylphenylene-o-sulfonylide*, decomps. 243–5°. *o*-ClC_6H_4OH gives 30% of a *sulfonyl fluoride*, m. 83–4°. $PhSO_2F$ and BzONa, heated 16 hrs. at 240°, give a mixt. of Bz_2O and BzF, which with $PhNH_2$ gives BzNHPh. C. J. West

The nitration process. III. Nitration of *o*- and *m*-cresol. Stig. Veibel. *Ber* **63B**, 2074–82(1930); cf. *C. A.* **24**, 4512.—Using the same methods as in the nitration of PhOH, the following results were obtained with *o*- and *m*-cresol at 25°. The dropping pipet held 470 × 10^{-4} mol. of the *o*-cresol (liquefied by adding 11 g. H_2O to 200 g. of the cresol) and 480 × 10^{-4} mol. of the *m*-cresol. The yields are expressed in mol × 10^{-4}. In designating the nitrocresols, the HO group is taken as being in position 1.

	HNO_3 *N*	HNO_2 *N*	Time hrs.	6-NO_2 deriv.	4-NO_2 deriv.	Condensation product	Total
o-Cresol	1	0.001	0.5	153	207	108	468
			3	217	222	27	476
		0.003	0.5	196	220	47	463
			3	225	226	17	468
	1.5	0.001	0.5	216	212	43	471
			2	230	218	24	472
		0.003	0.5	222	217	31	470
			2	225	218	29	472
	2	0.001	0.5	223	211	36	470
			1.5	207	208	58	473
		0.003	0.5	212	206	44	462
			1.5	211	211	50	472
	3	0.001	0.5	181	198	72	451
			1	187	192	72	451
		0.003	0.5	185	196	77	458
			1	187	193	81	461
m-Cresol	1	0.001	0.5	78	186	185	449
			3	146	229	73	448
		0.003	0.5	104	200	162	466
			3	141	226	71	438
	1.5	0.001	0.5	132	239	116	487
			2	159	258	52	469
		0.003	0.5	139	250	92	481
			2	161	261	42	464
	2	0.001	0.5	143	250	70	463
			1.5	162	264	46	472
		0.003	0.5	147	263	66	476
			1.5	161	264	48	473
	3	0.001	0.5	149	264	49	462
			1	156	265	45	466
		0.003	0.5	145	262	49	456
			1	149	261	40	450

The yields of condensation product are based on the assumption of a mol. wt. of 227, corresponding to a dimethylindophenol. With *o*-cresol, the yield of nitrocresols at first increases in the more dil. HNO_3 (1–1.5 *N*) with increase in the length of dropping and that of condensation product decreases, whereas in the more concd. HNO_3 (2–3

N) the reverse is true; this difference is probably due to a nitration of the condensation product, with consequent increase in its wt., in the more concd. acid. The av. value of the ratio [increase 6-NO_2 deriv.]/[increase 4-NO_2 deriv.] is 3.61:1. Assuming that 3.61/4.61 = 0.78 of the nitrocresol part of the condensation product was on the way to the formation of the 6-NO_2 deriv. and 1/4.61 on the way to the formation of the 4-NO_2 deriv., the yields of the NO_2 derivs. found should be corrected by the addn. of 0.39 and 0.11, resp., of the condensation product; when so corrected the ratio of 6- to 4-nitro deriv. becomes 0.965, 1.07, 1.08, 1.06 in 1, 1.5, 2 and 3 *N* HNO_3, resp. In the nitration of *m*-cresol, 2 *o*-NO_2 derivs. are formed, but in this paper they were detd. together and are reported as the 6-NO_2 deriv. The titration of the *p*-compd. (4-nitro-*m*-cresol) with Br is not as accurate as that of the other nitrophenols studied and a correction factor, depending on the excess of Br used, must be applied. The ratio increase 6- to increase 4-NO_2 deriv. is 1.56 and the yields of 6- and 4-NO_2 derivs. found should be corrected by the addn. of 0.3 and 0.2, resp., of the condensation product. The cor. ratio 6- to 4-NO_2 deriv. becomes 0.655, 0.64, 0.625, 0.605 in 1, 1.5, 2 and 3 *N* HNO_3, resp. The chief results of this investigation are that the nitration of *o*-cresol yields the 6- and 4-NO_2 derivs. in about the ratio 1:1. The ratio is not changed by changes in the initial concn. of the HNO_3 but seems to increase slightly with increasing concn. of the HNO_3. With *m*-cresol the yield of 6-NO_2 + 2-NO_2 to 4-NO_2 deriv. is 2 3 and is not influenced by changes in the concn. of the HNO_3 and HNO_2.

C. A. R.

Influence of the sulfur atom on the reactivity of adjacent atoms or groups. IV. Direct polar effects. G. Macdonald Bennett and A. Neville Mosses. *J. Chem. Soc.* 1930, 2364–9; cf. *C. A.* 24, 1339.—Previous work has shown that the HO group situated in the δ-position to a S atom was much more reactive with HBr than 1 in the γ-position. The possibility that the hydroxy sulfide might have been converted directly into the cyclic sulfonium hydroxide before reacting with HBr is disposed of by the fact that $PhS(CH_2)_4OH$ has no tendency to ring closure at 100°; a 2nd possibility that the hydroxy sulfide might have been converted into the sulfonium bromide without the intermediate formation of the open-chain bromo sulfide is disposed of by the comparative reaction of HCl upon the γ- and δ-compds.; The γ-deriv. reacted to the extent of 3.7%, while the δ-compd. gives 33.2% of *1,4-diphenylthiolbutane*, m. 85°, also obtained by the action of PhSNa on $PhS(CH_2)_4Cl$ in EtOH. $PhS(CH_2)_3OH$ and $PhS(CH_2)_4OH$ with excess fuming HBr at room temp. show about 1.16% conversion into the bromo sulfides, while $PhS(CH_2)_4OH$ gives *phenyltetramethylenesulfonium bromide*, analyzed as the *bromoaurate*, dark red, m. 120° (decompn.). The direct polar effect of the Me group is discussed.

C. J. West

The constitution of some dibromophenetidines. G. Bargellini with Lydia Monti and Antonio Grippa. *Gazz. chim. ital* 60, 559–72(1930); cf. *C. A.* 24, 4771.—Both as a continuation of earlier expts. on the prepn. of dichlorophenetidines (*Gazz. chim. ital.* 59, 16(1929); cf. *C. A.* 23, 1630) and because of the contradictory results obtained by Staedel (*Ann.* 217, 67(1883)) and Jackson and Fiske (*Ber.* 35, 1130(1902)) on the prepn. and properties of 2,6,4-$Br_2(H_2N)C_6H_2OEt$ (I), expts. were carried out on the prepn. of the di-Br derivs. of phenetidine by the method used for the di-Cl derivs., and the prepn. of derivs. of these dibromophenetidines. 2,6,4-$Br_2(O_2N)C_6H_2OH$ (II) was prepd. by the method of Möhlau and Uhlmann (*Ann.* 289, 94(1896)). $Na_2S_2O_4$, added slowly to aq. alk. II on a boiling water bath until the liquid remains permanently colorless, cooled, acidified with AcOH and the ppt. recrystd. from boiling C_6H_6, yields I, m. 191–3°. I (3 g.), AcONa (2 g.) in EtOH (30 cc.) and $ClC_6H_3(NO_2)_2$ (2.3 g.), refluxed 3 hrs., cooled, and the ppt. recrystd. repeatedly from boiling EtOH, yield *1-hydroxy-2,6-dibromo-2,4'-dinitrodiphenylamine*, red, m. 213–5°, which is easily electrified by rubbing with glass. When refluxed, I and piperonal (III) (equimol. quantities) in EtOH form a black resinous product, probably through oxidation of I. But I (2 g.) and III (1.1 g.) heated without solvent at 100° in CO_2 for 2–3 hrs., the product dissolved in boiling EtOH and cooled, ppts. *piperonal-2,6-dibromo-4-aminophenol*, yellowish, m. 150–2°. I and BzH in EtOH also form a black resin, but I and BzH (equimol. quantities), heated in CO_2 at 100°, the product dissolved in boiling petr. ether, cooled, and the ppt. purified by repeating this process, form *benzylidene-2,6-dibromo-4-aminophenol* (IV), 3,5,4-$Br_2(HO)C_6H_2N:CHPh$, rose color, m. 94–5°. Excess EtI (10 g.), added to a mixt. of IV (10 g.), KOH (2 g.) and EtOH (30 cc.), refluxed 4–5 hrs., the EtOH removed by distn., the residue dissolved in water, extd. with Et_2O, the ext. evapd., the oily residue (which could not be purified) hydrolyzed by refluxing with HCl (1:1) for 30 hrs., dild. with water, extd. with Et_2O to remove BzH and other unaltered products, the aq. soln. neutralized with NH_4OH, steam-distd., and the distd. product recrystd.

from boiling petr. ether, gives a small yield of **I**, m. 108°. The analysis and m. p. show that this is identical with the compd. of Jackson and Fiske (*loc. cit.*). Attempts to obtain a higher yield of I by modifying the conditions described above, by heating with EtI in a closed tube and by using Et_2SO_4 instead of EtI, gave very small yields. Aq. $AgNO_3$, added to **II** in dil. NH_4OH, filtered, washed with water, the residue refluxed with excess alc. EtI for 2–3 hrs., filtered, the filtrate evapd., and the residue recrystd. from EtOH, yields *dibromo-p-nitrophenetole* (**V**), yellowish, m. 59°. **V** (20 g. in 200 cc. of EtOH), NaS (40 g.) and S (5 g.), refluxed 4–5 hrs., evapd., the residue dissolved in water, steam-distd., and the distillate purified by crystn. from petr. ether, yield 2,6,4-$Br_2(H_2N)C_6H_2OEt$ (**VI**), m. 107–8° (cf. Jackson and Fiske, *loc. cit.*). To avoid the formation of a di-Ac deriv., **VI** in C_6H_6 was treated with AcCl (calcd. quantity) in C_6H_6 and the ppt. recrystd. from dil. EtOH, which yields 2,6,4-$Br_2(AcHN)C_6H_2OEt$, m. 198° (cf. Fuchs, *Monatsh.* **38**, 331). A higher yield of 3,5,6-$Br_2(H_2N)C_6H_2OEt$ (**VII**) than that obtained by the method of Fuchs (*Monatsh.* **38**, 113, 331) was obtained by adding Br (24 g.) in $CHCl_3$ (50 cc.) to phenetidine (10 g.) (keeping the mixt. ice-cold), evapg. on a water bath, steam-distg. the residue, and purifying the distillate by crystn. from dil EtOH, which yields 7 g. of **VII**, m. 79°. No condensation products of **VII** with BzH, **III**, $ClC_6H_3(NO_2)_2$, etc., could be obtained, which is in accordance with the behavior of 3,5,6-$Cl_2(H_2N)C_6H_2OEt$, *i. e.*, the 2 halogen atoms in *o*-position to NH_2 exercise a steric hindrance, in the face of which the NH_2 is incapable of reacting with the compds. mentioned. **VII** in C_6H_6 and AcCl (the calcd. quantity or a little more) in C_6H_6 form a ppt. which, recrystd. from dil. EtOH, yields the mono-Ac deriv. (**VIII**) of **VII**, softens at 130°, m. 144° (cf. Fuchs, *loc. cit.*). **VII**, boiled with excess Ac_2O for a few min., poured into water and the ppt. recrystd. from EtOH, yields a *di-Ac deriv.* of **VII**, $C_{12}H_{13}O_3NBr_2$, m. 91–2°, heated with NH_4OH or aq. KOH it forms **VIII**. **VII** (1 g.), BzCl (1 g.) and C_6H_6 (10 cc.), refluxed 3–4 hrs., evapd., the residue washed with aq. $NaHCO_3$ and recrystd. from EtOH, yield *benzoyl-3,5-dibromophenetidine*, m. 186–8°. Br (18 g.) in AcOH (30 cc.), added to phenacetin (**IX**) (10 g.) in AcOH (30 cc.) (keeping cold), let stand several hrs., heated 20–30 min. on a water bath, poured into water, and the ppt. purified by recrystn. from EtOH after boiling with animal charcoal, yields *acetyl-2,5-dibromophenetidine* (*2,5-dibromophenacetin*), 3,6,4-$Br_2(AcHN)C_6H_2OEt$ (**X**), m. 170°. **X** can also be prepd. by a method similar to that for 2,5-dichlorophenacetin (cf. *Gazz. chim. ital.* **59**, 16(1929)). A mixt. of Br (13 cc.) and 40% aq. NaOH (20 cc.) (keeping the soln. cool), dild. with water until pptn. is complete, the ppt. purified by crystn. from EtOH after boiling with animal charcoal, yields **X**. According to the conditions of crystn., 2 different forms of **X** are obtained, which m. 169–71° and which can be transformed into one another. From concd. solns. and with rapid cooling, a cryst. needle form is obtained, and from dil. alc. solns. and with slow cooling a rhombohedric form is obtained. **X** (6.5 g.) in AcOH (50 cc.) and concd. HCl (50 cc.), refluxed 4–5 hrs. and cooled, ppts. *2,5-dibromophenetidine-HCl*, m. 225–6°. This, treated with NH_4OH and the product purified by steam distn. and crystn. from dil. EtOH, yields the free *base* (**XI**), m. 55–6°. Satd. alc. picric acid with alc. **XI** forms the *picrate* of **XI**, yellow, m. 143–5°. BzCl (1.5 g.) and **XI** (3 g.) in C_6H_6 (15 cc.), heated 2 hrs. on a water bath, filtered, the residue washed with aq. $NaHCO_3$ and recrystd. from boiling EtOH, yield *benzoyl-2,5-dibromophenetidin*, m. 145–7°. **XI** (2 g.) and **III** (1 g.) in EtOH (20 cc.), refluxed 4–5 hrs., cooled, and the ppt. recrystd. from boiling EtOH, yield *1-ethoxy-2,5-dibromopiperonalaniline*, light yellow, m. 143–5°. **XI** (2 g.), $ClC_6H_3(NO_2)_2$ (1 g.), AcONa (2 g.) and EtOH (20 cc.), refluxed 5–6 hrs., dild. with water, steam-distd., and the resinous residue purified by repeated crystns. from boiling EtOH, give a small yield of *1-ethoxy-2,5-dibromo-2',4'-dinitrodiphenylamine*, brick-red, m. 145–65° (decompn.). **X** (5 g.) and HI (25 cc. of d. 1.7), refluxed 6–7 hrs., poured into water contg. $NaHSO_3$, neutralized with NH_4OH, and the ppt. recrystd. from boiling C_6H_6, yield *2,5-dibromo-4-aminophenol* (**XII**), yellowish, m. 195–7°; its solns. in boiling water and in hot EtOH become rapidly red (decompn.). Concd. $K_2Cr_2O_7$, added to **XII** in cold dil. H_2SO_4, filtered, washed, and the residue steam-distd., yields 2,5-dibromoquinone, m. 185–6° (cf. *Monatsh.* 1, 346(1880); *Ann.* 209, 113(1881)).

C. C. Davis

Preparation of the optically active phenylmethylcarbinols. Armand J. H. Houssa and Joseph Kenyon. *J. Chem. Soc* 1930, 2260–3.—The crystn. of the brucine salt of the H phthalic ester of PhMeCHOH is a convenient method for prepg. the *l*-alc. The *d*-alc. can be obtained only in small amts. by this method, but the H phthalic ester from the mother liquor, on treatment with CS_2, gives a product which, converted into the free *d* + *dl* alc., furnishes a convenient starting point for the prepn. of the *d*-alc. by the succinate method. *l*-PhMeCHOH H phthalate m. 81–2°, $[\alpha]_{5461}^{20}$ 39.8° (EtOH, *c*

5.1220), —59.7° (CS_2, *c* 8.4800), 1.23° ($CHCl_3$, *c* 6.5100); the brucine salt m. 152° (decompn.), $[\alpha]^{17}_{5461}$ —45.7° (Me_2CO, *c* 5.100), $[\alpha]^{18}_{5461}$ —47.7° ($CHCl_3$, *c* 5.085); the free alc., b_{14} 93°, $[\alpha]^{18}_{5461}$ —13.27°, $[\alpha]^{20}_{5893}$ —10.94°, $[\alpha]^{20}_{4358}$ —28.06°; 1.3 mols. *di*-ester gives 0.27 mol. of *l*-alc. of max. activity. C. J. WEST

Mercuration of some polyhydroxybenzaldehydes and their monomethyl ethers. THOMAS A. HENRY AND THOMAS M. SHARP. *J. Chem. Soc.* 1930, 2279–89.—2,4-(HO)$_2$C$_6$H$_3$CHO and 2 mols. Hg(OAc)$_2$ react normally to give the *3,5-diacetoxymercuri deriv.*, faintly pink, does not m. 300°; the *3,5-dichloromercuri deriv.*, needles, decomps. 260°; Br in AcOH converts it into *3,5-dibromoresorcylaldehyde* (I), m. 204° (cor.); I (5% in 10% aq. KI) gives the *3,5-di-I deriv.*, m. 168° (cor.). Methylation of I gives a mixt. of the *2,4-di-MeO deriv.*, m. 101–2° (cor.), the 4-MeO deriv., m. 96–7°, and the 2-MeO deriv., m. 172–4° (cor.). Mercuration of 2,3-, 2,5- and 3,4-(HO)$_2$C$_6$H$_3$CHO is followed by oxidation but the oxidation products could not be isolated. Isovanillin gives a product which was converted into *2-acetoxymercuriisovanillin*, does not m. 300°; the *chloromercuri compd.* m. 255–6°; the bromomercuri compd. is converted by Br in AcOH to *2-bromoisovanillin* (II), m. 211–2°. Bromination of isovanillin gives a mixt. of II and the *6-Br deriv.* (III), whose *monohydrate* m. 112–4° (cor.). II with MeI and MeONa gives *2-bromo-3,4-dimethoxybenzaldehyde*, m. 80° (cor.), sublimes slowly at 70° *in vacuo;* oxidation gives 2,3,4-Br(MeO)$_2$C$_6$H$_2$CO$_2$H, m. 203–4° (cor.), sublimes slowly at 120° *in vacuo*. The structure of III was similarly established, all the products being known. 2,4-HO(MeO)C$_6$H$_3$CHO and Hg(OAc)$_2$ in EtOH contg. a little AcOH give *3-acetoxymercuri-2-hydroxy-4-methoxybenzaldehyde*, m. 159–60° (cor.); the corresponding bromomercuri compd. with Br in AcOH gives *3-bromo-2-hydroxy-4-methoxybenzaldehyde*, m. 119–21° (cor.), sublimes at 100° *in vacuo;* phenylhydrazone, m. 166–7° (cor.); further bromination gives the 3,5-di-Br deriv. 2,5-HO(MeO)C$_6$H$_3$CHO yields a product which was transformed into the *3-chloromercuri deriv.*, m. 242–3° (cor., decompn.), which appears to crystallize in rosettes of yellow flat needles from solns. below 50°, in yellow spherical crystals from solns. above 50° and in hair-like yellow needles when the solns. evap. spontaneously at room temp.; with Br this yields 3,2,5-Br(HO)(MeO)C$_6$H$_2$CHO, m. 110 1° (cor.). *o*-Vanillin yields an acetoxymercuri deriv., which, dried at 100° *in vacuo*, loses its Ac group and gives *2,5-anhydro-5-hydroxymercuri-2-hydroxy-3-methoxybenzaldehyde;* Br gives 5,2,3-Br(HO)(MeO)C$_6$H$_2$CHO, m. 127–9°. The Hg deriv. of vanillin, on treatment with Br, gives 5-bromovanillin, m. 166–9° (cor.). 2,4,6-(HO)$_3$C$_6$H$_2$CHO and Hg(OAc)$_2$ give a compd. contg. 2 atoms Hg, probably $C_7H_4O_5Hg_2$. C. J. WEST

Benzoic esters and electronic affinities of radicals. II. The halogenoalkyl benzoates. AHMAD ZAKI. *J. Chem. Soc.* 1930, 2269–72; cf. *C. A.* 22, 2376.—In Part I comparison was made between the orienting powers of various alkyl radicals as exhibited in the alkyl benzoates; the effect of a halogen in the alkyl group is now considered. The nitration of the esters, the hydrolysis of the products and the subsequent analyses were carried out as in Part I. BzOCH$_2$Cl, b_2 104–6°; nitration gives a 98.2% yield, of which 81.9% is *m*-isomer. BzOCH$_2$CH$_2$Cl, b_{18} 138.8°, b_{762} 255–7°; nitration, 96.9%, 75.8% *m*-isomer. *γ-Chloropropyl benzoate*, b_{15} 155–6° (75% yield); nitration, 98.5%; 77.3% *m*-isomer. BzOCH$_2$CH$_2$Br, b_{15} 147–9°; nitration, 98.7%; 71.5% *m*-isomer. BzOCH$_2$CH$_2$CH$_2$Br, b_{18} 164.5–5.5°; nitration, 99%; 72.8% *m*-isomer. *β-Iodoethyl benzoate*, b_{17} 161–3° (80% yield); on nitration this liberates I. The effect of Cl is greater the nearer the Cl is to the nucleus; the Br esters occupy a place between the corresponding normal and Cl esters and show the alternation exhibited by the other 2 series. C. J. WEST

***p*-Azobenzenesulfonic acid and *p*-mononitro-*p*-azobenzenesulfonic acid.** FRANZ PERKTOLD. *Monatsh.* 56, 247–52(1930).—*p*-HO$_3$SC$_6$H$_4$N$_2$Ph results in 90–100% yield by heating 20 g. PhN$_2$Ph in 120 g. oleum (8–10% SO$_3$) from 90° to 130–5°; prolonging the time of heating does not influence the yield but heating at 140–50° decreases it considerably; the acid crystallizes with 3 mols. H$_2$O; the anhyd. acid has no definite m. p.; the *Na salt* crystallizes with 4 mols. H$_2$O; the Mg and Ca salts are characterized by their insoly.; the *urea salt* was also prepd., as were the *PhNH*$_2$ (1.5 mols. H$_2$O), the *o*- and *p-MeC*$_6$*H*$_4$*NH*$_2$ and *α*- and *β-C*$_{10}$*H*$_7$*NH*$_2$ *salts*. *p*-O$_2$NC$_6$H$_4$N$_2$C$_6$H$_4$SO$_3$H-*p* results by nitration of the above acid at 75°; it crystallizes with 3 mols. H$_2$O; the *urea*, *PhNH*$_2$, *β-C*$_{10}$*H*$_7$*NH*$_2$ and other *salts* were prepd.; with Br in AcOH at 130–50° there appear to be formed a BrC$_6$H$_4$N$_2$C$_6$H$_4$NO$_2$ and a compd., m. 208°, probably 2,6,4-Br$_2$(O$_2$N)C$_6$H$_4$NH$_2$. The soly. of the above salts at approx. room temp. is reported and the probable use of these acids in *anal. chem.* is discussed. C. J. W.

Isomeric monohydroxyphenylalanines. II. Some halogen-substitution products

and their reactions. WM. P. DICKINSON AND PHILIP G. MARSHALL. *J. Chem. Soc.* 1930, 2289–93; cf. *C. A.* **23**, 4684.—The synthesis of dibromo- and diiodo-*o*- and *m*-hydroxyphenylalanines was attempted by the condensation of the appropriately substituted benzaldehydes with glycine anhydride (I) but difficulty was experienced in the purification of the products and in the hydrolysis and reduction the halogen was removed. However, 3.1 g. I, 15.5 g. 3,5,2-$Br_2(HO)C_6H_2CHO$, 10 g. AcONa and 25 g. Ac_2O, heated 12 hrs. at 40°, give 7.9 g. of a mixt., sepd. by crystn. from AcOH in which the *cis*-isomer is very sol., into the *trans*-, decomps. above 300°, and the *cis* form, m. 287°, of *2,5-diketo-3,6-di(3',5'-dibromo-2'-acetoxybenzylidene)piperazine;* reduction with Zn in AcOH gives the *benzyl deriv.*, m. 275°. In the same way the *4'-Ac deriv.* was obtained as pale yellow needles, but no individual product was obtained on reduction. *Bromo-m-hydroxyphenylalanine*, m. 260° (decompn.), was obtained by Zeynek's method (*C. A.* **16**, 1412); the *o-HO deriv.* m. 256°. *Diiodo-m-hydroxyphenylalanine*, m. 230° (decompn.), was prepd. from the acid in NH_4OH (d. 0.880) with 32% I in KI; HCl salt, m. 194°; the *o-HO deriv.* m. 211°; HCl salt, m. 214° (decompn.). *2,5-Diketo-3,6-di-m-acetoxybenzylpiperazine*, m. 191–2°; hydrolysis gives *m*-hydroxyphenylalanine; $FeCl_3$ gives a pale reddish violet color in the cold; all monohydroxyphenylalanines and their halogen derivs. give an orange-yellow to brown color on being warmed with $FeCl_3$. C. J. WEST

Constitution of cetraric acid. GEORG KOLLER AND EHRENFRIED KANDLER. *Monatsh.* **56**, 234–8(1930); cf. *C. A.* **24**, 355.—The same aldehyde is obtained on the degradation of cetraric acid, capraric acid and atranorin and 4,2,6-$Me(HO)_2C_6H_2CHO$. The other possible aldehyde, 3,4,2,6-$Me_2(HO)_2C_6HCHO$, has not been isolated in pure form but its existence has been shown by methylation. C. J. WEST

Constitution of capraric acid. GEORG KOLLER AND WALTER PASSLER. *Monatsh.* **56**, 212–33(1930).—Capraric acid (I) (Hesse and Zopf, *J. prakt. Chem.* **92**, 439(1915)), $C_{24}H_{30}O_{12}$, is a tri-CO_2H acid, contg. a free HO group, 2 Ac groups and a CHO group. The *Ac deriv.* of I is formed by the action of Ac_2O in C_5H_5N. The presence of 3 CO_2H groups is shown by heating I with HI at 150°; the action of MeMgI liberates CH_4 equiv. to 4 HO groups. I and CH_2N_2 give a *compd.* contg. 4 MeO groups, the 2 Ac groups being intact. In the action of Me_2SO_4 on I, the 2 Ac groups are also replaced, giving a *hexa-MeO deriv.* I gives a yellow *phenylhydrazone*, $C_{30}H_{36}O_{11}N_2$, and a yellow *anilide*, $C_{14}H_{13}O_2N$. The action of Zn dust and NaOH in H_2O and a H atom upon I gives an *aldehyde*, $C_8H_8O_3$, m. 122–3, whose *oxime* m. 188° and *anilide* m. 206°; the *di-Me ether* m. 92–3° (*oxime*, m. 215–6°); oxidation of the ether gives 4,3,5-$Me(MeO)_2C_6H_2CO_2H$; therefore, the above aldehyde is 4,3,5-$Me(HO)_2C_6H_2CHO$. The liquid di-Me ether accompanying the ether, m. 93°, is oxidized to *1,2-dimethyl-3,5-dimethoxybenzoic acid*, m. 185° (*Me ester*, m. 40–1°), whose structure was established by the synthesis of *1,2-dimethyl-3,5-dihydroxybenzoic acid*, m. 159–60°, from 1,2,3,5-$Me_2C_6H_2(OH)_2$ and methylation. The mother liquor of the aldehydes contained orcinol. C. J. WEST

Constitution of hydrangenol and phyllodulcinol. III. Synthesis of hydrangenol. YASUHIKO ASAHINA AND JUNTARO ASANO. *Ber.* **63B**, 2059–63(1930); cf. *C. A.* **24**, 3008.—3-Methoxyphthalic anhydride (I), heated with *p*-$MeOC_6H_4CH_2CO_2H$ and NaOAc according to the Gabriel method for prepg. benzalphthalides, gives, in poor yield, *7,4'-dimethoxybenzalphthalide* (II) which dissolves in hot alkali to form $MeO(HO_2C)C_6H_3COCH_2C_6H_4OMe$, easily reduced to $MeO(HO_2C)C_6H_3CH(OH)CH_2C_6H_4OMe$ which on acidification gives *7,4'-dimethoxybenzylphthalide* (III), not identical with the di-Me ether of hydrangenol. When III in KOH in hot MeOH is evapd. to dryness and heated to 200° *in vacuo*, it loses Me and CO_2, yielding methylhydrangeaic acid, 3,2-$HO(HO_2C)C_6H_3CH{:}CHC_6H_4OMe$ (IV), which at 180° forms methylhydrangenol (8-hydroxy-4'-methoxy-3-phenyl-3,4-dihydroisocoumarin) (V). Attempted demethylation of III, IV or V with halogen acids led to formation of tars, but by heating them a long time with alkali *in vacuo* at 230°, taking up in H_2O and acidifying, there was obtained a mixt. of IV and hydrangeaic acid (VI) which on cautious heating at 180° gave a mixt. of the corresponding lactones, hydrangenol (VII) and its Me ether (V). Soln. of the mixt. in hot dil. alkali converts the VII into VI and V into $HO(HO_2C)C_6H_3CH_2CH(OH)C_6H_4OMe$ (VIII), and acids ppt. the VI unchanged while VIII regenerates V, thereby becoming Na_2CO_3-insol. The VI at 180° readily rearranges into VII. 3-Hydroxyphthalic acid was prepd. from the 3-NO_2 compd. according to Bernthsen and Semper and converted with MeI and Ag_2O in Et_2O into $MeOC_6H_3(CO_2Me)_2$, the free acid of which (4 g.) with AcCl and Ac_2O on the H_2O bath gave 3.3 g. I, m. 160°. II (0.07 g. at most from 3 g. I), yellowish, m. 183°, sol. in cold alkalies with deep red

color. **III** (0.75 g. from 1 g. II), m. 108°, sol. in hot alkalies and repptd. unchanged by acids. C. A. R.

Optical activity and the polarity of substituent groups. XVI. Application of the Thorpe-Ingold valency-deflection hypothesis to optically active compounds. H. Gordon Rule and John Harrower. *J. Chem. Soc.* 1930, 2319–28; cf. *C. A.* **24**, 5745.—The influence of *gem*-dialkyl groups, CR_2, on the rotatory power of *l*-menthyl esters of the type $XCR_2CO_2C_{10}H_{19}$ has been examd. The increasing proximity of X and $CO_2C_{10}H_{19}$ resulting from the changes $CH_2 \longrightarrow CMe_2 \longrightarrow CEt_2$ leads to a marked fall in the rotations of the menthyl malonates (X = $CO_2C_{10}H_{19}$), to a rise in the values of the H malonates (X = CO_2H), and to a fall in those of the corresponding Na salts (X = CO_2Na). The depression following the conversion of the acids into their Na salts increases continuously in magnitude from the malonate to the diethylmalonate. These observations are in agreement with the known influence of the substituents X in the *p*- and *o*-substituted benzoic esters, on the assumption that the characteristic *o*-effects are related to the proximity of X to the ester grouping. The MeO esters (X = MeO) exhibit a continuous rise from the methylene to the *gem*-di-Et compd. and thus present no parallel to the characteristic depression occasioned by the MeO group in *l*-menthyl *o*-methoxybenzoate. *l-Menthyl dimethylmalonate*, b_2 210–2°, $d_4^{14.5}$ 0.9712, [*M*] —177.5°, —230.9°, —438.7° for λ = 6708, 5893, 4358 (this order is followed below); data are also given for EtOH and C_6H_6 solns. Partial hydrolysis gives the *H dimethylmalonate*, pale yellow, $d_4^{17.5}$ 1.029, [*M*] —131°, —172°, —342°; data are given for EtOH and C_6H_6 solns. and for the Na salt in EtOH. The *diethylmalonate* m. 52–3°, d_4^{20} 0.9705, [*M*] —181°, —236.2°, —452.3°. The *H diethylmalonate* is a pale yellow, very viscous sirup, d_4^{20} 1.013, [*M*] $_{5461}$ —224.7°. The *α-methoxyisobutyrate* b_{10} 124–6°, d_4^{20} 0.9466, [*M*] —127.9°, —168.1°, —328.2°. The *α-methoxy-α-ethylbutyrate* b_8 139–41°, $[\alpha]^{18}_{5461}$ −76.58°. C. J. West

Organic sulfur-nitrogen unions. Eugen Riesz, A. Lorenz, Ch Myschalow and O Strakosch. *Monatsh.* **56**, 239–46(1930).—This work is a continuation of the study of the oxidation of the S-N union. All of the following compds. gave negative results when treated with 30% H_2O_2 or $Na_2Cr_2O_7$ in AcOH; either the original compd. was recovered or the compd. was more or less completely degraded. *sym-Bis(4-chloro-2-nitrobenzenesulfonyl)benzidide*, m. above 290° (decompn.), from 2 mols each of 4,2-$Cl(O_2N)C_6H_3SO_2Cl$ (I) and (p-$H_2NC_6H_4$)$_2$ in hot Et_2O. p-$H_2NC_6H_4OH$ in hot Et_2O gives *4-chloro-2-nitrobenzenesulfonyl-4'-hydroxyanilide*, m. 92–3°; the *2'-HO deriv.* m. 122–3°. p-$C_6H_4(NH_2)_2$ (2 mols) gives *sym-bis(4-chloro-2-nitrobenzenesulfonyl)-1',4'-diaminobenzene*, m. 250° (decompn.). One mol. I and 2 mols. p-$C_6H_4(NH_2)_2$ give *1'-amino-4'-(4-chloro-2-nitrobenzenesulfenyl)aminobenzene* (II), dark brown, m. 161°; the diazo soln. with β-$C_{10}H_7OH$ gives a dark red dye. Condensation of 2 mols. II with 1 mol. 4,2-$Cl(O_2N)C_6H_4SCl$ in AcOEt gives (*4-chloro-2-nitrobenzoylsulfonyl*)-(*4'-chloro-2'-nitrobenzenesulfenyl*)-*1",4"-diaminobenzene*, m. 164–6° (decompn.). I (2 mols) and 2 mols. o-$C_6H_4(NH_2)_2$ in benzine give *sym-bis(4-chloro-2-nitrobenzenesulfonyl)-1',4'-diaminobenzene*, m. 92–4° (decompn.); using 1 mol. I, there results a *compd.*, yellow-green, m. 143°, which may be *1'-amino-2'-(4-chloro-2-nitrobenzenesulfonyl)-aminobenzene*, although the S values indicate the loss of 1 mol. H_2O. *1'-(Dimethylamino)-4'-(4-chloro-2-nitrobenzenesulfonyl)aminobenzene*, m. 125°. 4,2-$Cl(O_2N)C_6H_4SCl$ and 2 mols. m-$H_2NC_6H_4OH$ in Et_2O give *4-chloro-2-nitrophenylsulfur-3'-hydroxyanilide*, red, m. 158°; with m-$C_6H_4(NMe_2)_2$ there results *1'-(dimethylamino)-3'-(4-chloro-2-nitrophenylsulfur)aminobenzene*, red, m. 148°. C. J. West

Optically active diphenylhydroxyethylamines and isohydrobenzoins. III. Optically active diphenylethylene oxides. John Read and Ishbel Grace Macnaughton Campbell. *J. Chem. Soc.* **1930**, 2377–84; cf. *C. A.* **24**, 609.—In order to decide between the configurations I and II for diphenylhydroxyethylamine (I) and isodiphenyl-



hydroxyethylamine (II), 2,3-diphenylethylene oxide (III) was prepd. from an optically active base of each type, through the corresponding $PhCH(OH)CH(NMe_3OH)Ph$, *dl*- and *l*-II each gave a *cis*-III, m. 42°. *d*-I gave a trimethylammonium iodide, m. 145°, $[\alpha]_D$ 92.4° (MeOH, *c* 1.6290); with Ag_2O there resulted a *l-trans*-III, m. 69–70°, $[\alpha]_D$ 306° (abs. EtOH, *c* 1.3060), —311° (MeOH, *c* 0.5320), —287° (PrOH, *c* 0.5180), —279° (isoPrOH, *c* 0.5110), —249° ($CHCl_3$, *c* 0.5205), —291° (Me_2CO, *c* 0.5655),

—313° (AcOEt, *c* 0.5020), —374° (C_6H_6, *c* 0.4985); some values are given for $[\alpha]_{5461}$. On standing in ordinary abs. EtOH the rotation gradually changed with the formation of *l-isohydrobenzoin Me ether*, m. 45–50°, $[\alpha]_D$ —34.6° (EtOH, *c* 0.5640). A $CHCl_3$ soln. of the *l*-oxide (0.2008 g.) and 1 equiv. of HCl gave $[\alpha]_D$ —233°, which did not change on standing. With 5 and 10 equivs. of HCl there is a change in rotation and the original oxide could not be recovered. *d-trans*-III, prepd. as the *l*-deriv., m. 69–70°, $[\alpha]_D$ 310° (abs. EtOH, *c* 0.5170). *dl-trans*-III also m. 69–70°; the equimol. mixt. of the *d*- and *l*-forms also m. 69–70°, but other mixts. m. less definitely; values are given for 45–100% of the *l*-form. Further study of the oily product of the action of HNO_2 on I or II indicates that the main constituent is a chem. inert and optically inactive product of polymerization contg. C, H and O only. C. J. West

Reducing action of a Grignard reagent. Harold Burton. *J. Chem. Soc.* 1930, 2400.—Benzilamide and *p*-MeC_6H_4MgI in AmOH, heated 8 hrs., give $Ph_2CHCONH_2$ but no *p*-$MeC_6H_4C(OH)Ph_2$. In Et_2O the amide was recovered unchanged after 8 hrs. heating. C. J. West

Organic sulfur compounds. XVII. Sulfur-containing analogs of hexaphenylethane and triphenylmethyl. Alexander Schönberg and Theodor Stolpp. *Ann.* 483, 90–107(1930); cf. *C. A.* 24, 2746.—$Ph_2(PhS)CCl$ and Hg in C_6H_6, shaken for 52 hrs. in the dark, give 57.2% of $Ph_2C{:}CPh_2$ and a larger amt. of $Ph_2C(SPh)_2$, m. 137°. $Ph_2(o\text{-}O_2NC_6H_4S)CCl$ and Hg in C_6H_6 give Ph_2CO, a small amt. of $(o\text{-}O_2NC_6H_4S)_2$ and $(o\text{-}O_2NC_6H_4S)_2CPh_2$. 9-Chloro-9-phenylmercaptofluorene with Hg in C_6H_6 gives *α,β-diphenylmercapto-α,β-dibiphenyleneëthane* (I), m. 220° (decompn.), which gives no halochromism with concd. H_2SO_4; the compd. gives a *mol. compd.* with AcOEt; thermal decompn. of I at about 230° gives a mixt. of $(C_6H_4)_2C{:}C(C_6H_4)_2$ and Ph_2S_2; boiling 2.5 hrs. in BzOEt gives only the hydrocarbon, which is also obtained by the action of light on a C_6H_6 soln. 9-Chloro-9-(*o*-nitrophenylmercapto)fluorene with Hg in C_6H_6 gives *α,β-di-o-nitrophenylmercapto-α,β-bidiphenyleneëthane*, yellow, m. 165–7° (decompn.); the compd. is very sensitive to heat, the decompn. products being fluorenone and a little $(o\text{-}O_2NC_6H_4S)_2$. 9,9-Dichlorofluorene and PhSH in C_6H_6 in CO_2, heated 20 hrs., give the *diphenylmercaptole of fluorenone*, m. 115°, becomes deep red at 220°; the *di-o-nitrophenylmercaptole* (II), yellow-brown, m. 159–60°. Thermal decompn. of II gives fluorenone and a little $(o\text{-}O_2NC_6H_4S)_2$. Thermal decompn. of $Ph_2C(SC_6H_4NO_2)_2$ gives Ph_2CO and $(o\text{-}O_2NC_6H_4S)_2$. $(C_6H_4)_2C(SPh)_2$ at 240° gives Ph_2S_2 and $(C_6H_4)_2C{:}C(C_6H_4)_2$. **XVIII. Thermal rearrangement of thionocarbonic esters into thiolcarbonic esters. 2. Formation of disulfides from phenols.** Alexander Schönberg, L. v. Vargha and Werner Paul. *Ibid* 107–14(1930).—$(p\text{-}MeC_6H_4O)_2CS$, m. 136°, heated 15 min. at 300°, gives *di-p-tolyl thiolcarbonate*, m. 109°; with 4 mols. NaOH in dil. EtOH there results $(p\text{-}MeC_6H_4)_2S_2$, m. 47°. Dithymyl thionocarbonate was prepd. by 2 methods. Thymol (15 g.) in 5% NaOH, treated gradually with 11.5 g. $CSCl_2$, and the resulting $Me_2CHC_6H_3MeOCSCl$ treated with an additional 15 g. thymol, gives 14.5 g. of the ester, m. 85°; 25 g. thymol in C_6H_6, treated with 1 mol $CSCl_2$ and, after a few min. cooking, with 52 g. C_5H_5N, gives 12 g. ester. Heating the ester in N at 300° gives nearly quant. *dithymyl thiolcarbonate*, pale yellow, m. 58–9°; dil. NaOH gives *dithymyl disulfide*, light yellow, m. 63°. *o*-HOC_6H_4Ph (2 mols., 50 g.) in EtOH-KOH and $CSCl_2$ in C_6H_6 give 6.5 g. *di-o-biphenyl thionocarbonate*, pale yellow, m. 106°; rearrangement at 300° and the action of NaOH in EtOH gives a mixt. of *o*-HOC_6H_4Ph and *o*-HSC_6H_4Ph, oxidized by H_2O_2 to *di-o-biphenyl disulfide*, m. 116°. $CS(OPh)_2$ with HgO gives $CO(OPh)_2$. C. J. West

Configurations of the benzil monoximes. Thomas W. J. Taylor and Marcia Sarah Marks. *J. Chem. Soc.* 1930, 2302–7.—The solubilities in C_6H_6 of *α*-benzil oxime from 28.6° to 127–8° and of the *β*-oxime from 33.5° to 103° are reported, from which the nominal heats of soln. are calcd. Analysis of the results indicate clearly that the stereochem. configurations of these oximes are those proposed by Meisenheimer and thus supports the view that, in this case at least, the Beckmann transformation involves the groups in the *anti*-position to one another. Improved methods for the prepn. and purification of these oximes are described. C. J. West

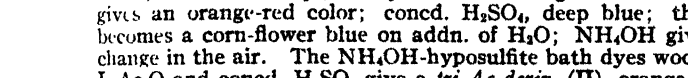
Preparation of 4-nitronaphthalene-1-sulfonyl chloride. W. Brunetti. *J. prakt. Chem.* 128, 44–6(1930).—4,1-$O_2NC_{10}H_6NH_2$, diazotized and poured into satd. H_2SO_3 with stirring (Cu catalyst), gives *4-nitronaphthalene-1-sulfinic acid*, yellow, m. 131°; an alk. soln., treated with Cl, gives 4,1-$O_2NC_{10}H_6SO_2Cl$, m. 99°. C. J. West

Condensation of aldehyde and phenols. IV. *o*-Chlorobenzaldi-β-naphthol. Otto Dischendorfer. *Monatsh.* 56, 261–71(1930); cf. *C. A.* 22, 3656.—*o*-ClC_6H_4CHO and β-$C_{10}H_7OH$ in AcOH-HCl give *2-chlorobenzaldi-β-naphthol* (I), m. 184–5° (decompn.); *Na salt; diacetate*, m. 198–9°; *dibenzoate*, m. 241–2°; *Me ether*, m. 192–

3°. I in EtOH and NaOH with Br gives the *dehydro deriv.*, bright yellow, m. 258°; cold concd. H_2SO_4 gives a deep yellow color, changing to brown-red on warming. I, heated with AcOH and HCl, gives *meso-2-chlorophenyldinaphthopyran* (II), m. 221°; this also results by adding concd. H_2SO_4 to a mixt. of *o*-ClC_6H_4CHO and β-$C_{10}H_7OH$ in AcOH. II in AcOH, treated with MnO_2 and concd. HCl and heated 15 min., then treated with solid $FeCl_3$, gives *meso-2-chlorophenyldinaphthopyrylium chloride ferrichloride* (III), golden red, m. 215°; the *mercurichloride*, red with green luster, m. 261–2° (decompn.); *perbromide*, dark red, m. 189–91° (decompn.); *perchlorate*, red with green luster, m. 293–4° (decompn.). III with Me_2CO gives *meso-2-chlorophenyldinaphthopyranol*, m. 221°; *Et ether*, m. 236° (slight decompn.); *Me ether*, m. 242° (slight decompn.); *di-NO_2 deriv.*, light yellow, m. 290°. C. J. West

Phytochemistry. VI. Allobetulin. Otto Dischendorfer and Hugo Juvan. *Monatsh.* **56**, 272–81(1930); cf. *C. A.* **23**, 2961.—Apoallobetulin, m. 200–1°, which is obtained from allobetulin and PCl_5 in $CHCl_3$, also results in about 5% yield from betulin with Pd and active C or in 64% yield by treating betulin with fuller's earth in boiling $C_6H_4Me_2$ or in 8% yield by heating without a solvent at 210–60°. Similarly was prepd. *apohydroxyallobetulin*, m. 309°, $[\alpha]_D^{20}$ 79.9° (0.02819 g. in 1.198 g. $CHCl_3$). Allobetulone and *m*-$O_2NC_6H_4CHO$ in AcOH, satd. in the cold with HCl, yield the *m-nitrobenzylidene deriv.*, m. 137–9°. Oxidation of hydroxyallobetulin in AcOH with CrO_3 gives 50% of *hydroxyallobetulone* (I), m. 341–2°, $[\alpha]_D^{20}$ —6.25° (0.03277 g. in 1.3583 g. C_6H_6); *oxime*, m. 333–7° (decompn.); *semicarbazone*, m. 301° (decompn.). Oxidation of I in AcOH with fuming HNO_3 gives hydroxyallobetulinic acid, m. 283–4° (decompn.); the anhydride of this acid yields 30% of a *mono-Br deriv.*, m. 315° (decompn.); this is also obtained by brominating the free acid. C. J. West

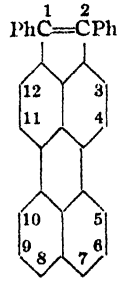
Fungus dyestuffs. IX. Constitution of thelephoric acid. Fritz Kögl, Hanni Erxleben and Ludwig Jänecke. *Ann.* **482**, 105–19(1930); cf. *C. A.* **24**, 3245.—The thelephoric acid (I) was obtained from *Thelephora palmata* by extn. with C_5H_5N in 0.5% yield on the dried material; I is a nearly black powder with a slight metallic luster, without a m. p., nearly insol. in all org. solvents except C_5H_5N; concd. H_2SO_4 gives an orange-red color; concd. H_2SO_4, deep blue; the wine-red soln. in C_5H_5N becomes a corn-flower blue on addn. of H_2O; NH_4OH gives a blue soln.; alk. solns. change in the air. The NH_4OH-hyposulfite bath dyes wool and cotton a violet color. I, Ac_2O and concd. H_2SO_4 give a *tri-Ac deriv* (II), orange-yellow, decomps. 330°; reduction with Zn in AcOH and AcONa gives *pentaacetylleucothelephoric acid*, does not melt. Catalytic reduction of I, followed by methylation with CH_2N_2, gives *heptamethylhexahydrothelephoric acid*, m. 246°; the mother liquor gives a yellow compd., m. 237°, and also a colorless compd. Zn distn. of II gives *7-phenanthryl-1*(or *2?*)*butadiene*, $C_{18}H_{14}$, m. 125°, oxidized by $KMnO_4$ to phenanthrene-2-carboxylic acid, m. 254°. Oxidation of I with H_2O_2 in 0.1 *N* NaOH gives *1-hydroxybenzene-2,4,5-tricarboxylic acid* (III), m. 241° (decompn.), which was synthesized from pseudocumenesulfonic acid. Oxidation of the hexahydro deriv. of I with H_2O_2 gives the same acid and also adipic acid. Oxidation of I with CrO_3 gives III and a *trihydroxybiphenyltetracarboxylic acid*, m. 290°; decarboxylation of this acid gives *4,3',6'-trihydroxybiphenyl* (IV), m. 234°, oxidized by H_2O_2 to *p*-$HOC_6H_4CO_2H$. *p-Methoxyphenylquinone*, m. 110°, on reduction and demethylation, gives IV. These facts lead to the formula



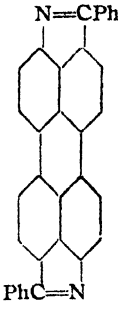
for I. C. J. West

Perylene and its derivatives. XXIX. Degradation of perylene to benzanthrone. Alois Zinke and Rudolf Wenger. *Monatsh.* **56**, 143–52(1930); cf. *C. A.* **24**, 2126.—In the oxidation of perylene with CrO_3 in H_2O (heating 6 hrs.) there results, in addn. to perylene-3,10-quinone and anthraquinone-1,5-dicarboxylic acid, a small amt. of *1,9-benz-2-anthrone-5,10-dicarboxylic anhydride* (I), brown needles, which is extd. by 4% aq. NaOH and pptd. by HCl; it may be crystd. from $PhNO_2$ or sublimed *in vacuo* in a CO_2 stream. The concd. H_2SO_4 soln. of I is a bright golden brown with a yellow fluoresence; the hyposulfite bath is at first violet, then changes to a wine-red and a dark brown, which becomes a bright yellow-brown on boiling and shows a strong green fluorescence. I also results from the quinone in concd. H_2SO_4 and MnO_2. The Na salt from I, pptd. with ice-cold HCl, gives the free *acid* (II), light yellow; crystn. from $PhNO_2$ gives I; *Ca salt*, ocher-yellow; NH_4OH gives the *imide*, brown-yellow, sol. in concd. H_2SO_4 with a gold-brown color and a pale yellow fluorescence; NaOH gives a yellow-brown color without fluorescence; the hyposulfite bath is blood-red and then violet; *di-Me ester*, from the Ag salt and MeI, yellow, m. 190–1°. I and Br in $PhNO_2$

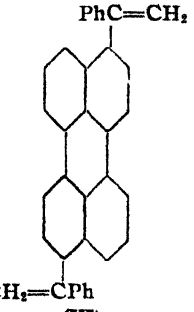
give a *di-Br deriv.*, light yellow, which gives I on crystn. from $PhNO_2$; similarly, II gives a *di-Br deriv.*, light yellow. Zn distn. of I gives benzanthrene, identified as its oxidation products. **XXX.** A. ZINKE AND OTTO BEBBDORF. *Ibid* 153–62.—Perylene and BzCl with $AlCl_3$, after 20–4 hrs. at room temp., give a mixt. of the *3,9*-(I) and *3,4-di-Bz derivs.* (II), sepd. by extg. the first with $C_6H_4Me_2$; the residue crystd. from $PhNO_2$ gives II, yellow to brown-red, m. 329–30°, sol. in 1000 parts boiling AcOH and 300 parts boiling $C_6H_4Me_2$, easily sol. in $PhNO_2$; concd. H_2SO_4 gives a green soln. with a strong, fiery blood-red fluorescence. Reduction of II with amalgamated Zn and concd. HCl gives *1,2-diphenylaceperylene* (III), dark brown-red with violet luster, m. 315–



(III)



(IV)



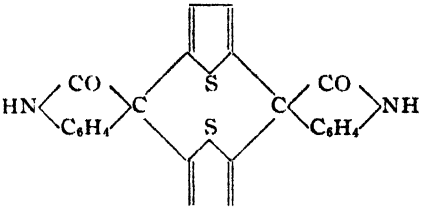
(VI)

6°. II and Br in AcOH give the *compd.* $C_{34}H_{19}O_2Br$, yellow, m. about 326–30°. I with KNO_2 and H_2SO_4 in AcOH gives the *4,10-di-NO_2 deriv.*, red needles; reduction with hyposulfite gives the *compd.* $C_{34}H_{18}N_2$ (IV), dark green needles with violet-blue luster; concd. H_2SO_4 gives a deep blue color, as does AcOH; Br gives a *tetra-Br deriv.*, blue. II also gives a *di-NO_2 deriv.*, red needles from $PhNO_2$, brown leaflets from $C_6H_4Me_2$. II and MeMgI give the *tert. alc.* $C_{36}H_{28}O_2$ (V), light yellow, m. 277°; heating with AcOH gives the hydrocarbon $C_{36}H_{24}$ (VI), yellow, m. 257–8°. Diacetylperylene yields a *di-NO_2 deriv.*, $C_{24}H_{14}N_2O_6$, red needles, giving a deep green soln. in concd. H_2SO_4. (WITH H. KOLMAYR.) Perylene and chloroacetyl chloride give with $AlCl_3$ in CS_2 a *di-(chloroacetyl)perylene*, brown needles with a green metallic luster, giving a blue soln. in concd. H_2SO_4, which shows a red fluorescence on heating, the soln. turning greenish blue. **XXXI.** ALFRED PONGRATZ AND ANDRIJ HALABARDA. *Ibid* 163–78.—Perylene and *m*-MeC_6H_4COCl with $AlCl_3$ give *di-m-toluylperylene*, yellow, m. 248–50°, sol. in concd. H_2SO_4 with a violet-blue color; the *p-isomer*, yellow-brown, m. 340–1°; concd. H_2SO_4 gives a bluish green soln. with red fluorescence; the same compd. is obtained with or without CS_2. Perylene-3,9-dicarbonyl chloride (I) and *o*-$C_6H_4Me_2$ with $AlCl_3$ give *3,9-di-o-toluylperylene*, orange-yellow, m. 270–3°, sol. in concd. H_2SO_4 with a violet-blue color; the *m-isomer*, yellow, m. 262–4°; the *p-isomer*, brownish red, m. 247–9°. I and anthracene give the compd. $C_{50}H_{28}O_2$, orange-yellow, does not m. 360°; concd H_2SO_4 gives a violet-blue color; phenanthrene gives the *compd.* $C_{50}H_{28}O_2$, yellow, does not m. 360° and gives a greenish blue soln. in concd. H_2SO_4. I and $PhNH_2$, gently warmed, give the *dianilide* (II), light yellow, giving an orange color in concd. H_2SO_4; the *di-o-chlororanilide* (III), yellow, m. 342–5°; I and PhNHMe give the *compd.* $C_{36}H_{26}O_2N_2$, yellow, m. 270–2°, and gives a yellow-brown soln. in concd. H_2SO_4; it is unchanged by PbO_2 in boiling $PhNO_2$. PbO_2 and II, boiled 1 hr. in $PhNO_2$, give the *compd.* $C_{34}H_{20}O_2N_2$, brown-red needles; similarly III gives a *compd.*, red needles. I and β-aminoanthraquinone in $PhNO_2$ at 180–90° give the *compd.* $C_{50}H_{26}O_6N_2$, brown-red needles. I is not brominated by Br or at least the product on recrystn. from BzCl is unchanged I. Perylene-3,9-dicarboxylic acid (1 g.) and 1 g. Br at room temp. give the *mono-Br deriv.*, yellow needles, does not m. 360°; this also results with Br in $PhNO_2$; in concd. H_2SO_4 there results a *tetra-Br deriv.*, yellow needles; the *di-Et ester* from I, m. 275–6°, gives a *di-Br deriv.*, yellow, m. 248–50°; heating with $PhNH_2$ splits off the Br, giving the free ester. Heating the acid, CuCN and quinoline 1 hr. gives perylene.

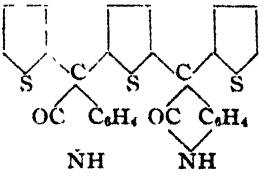
C. J. WEST

Thiophene series. XXI. Indophenin. WILHELM STEINKOPF AND JOHANNES ROCH. *Ann.* **482**, 251–64(1930); cf. *C. A.* **20**, 2854.—This study was undertaken to det. if possible the structure of indophenin (I). The Grignard reagent from bromothiophene with $CuCl_2$ in abs. Et_2O gives 44% of dithienyl (II), m. 33°; 2,5-dibromo-

thiophene gives 38% of *5,5'-dibromo-2,2'-dithienyl*, m. 143°. 2-Bromo-5-methylthiophene gives 12% of *5,5'-dimethyl-2,2'-dithienyl*, m. 67°. II (5 g.) in 500 cc. C_6H_6 and 5 g. isatin in 100 cc. concd. H_2SO_4, shaken 2 min. at 0–3° and then poured into 3 l. H_2O, give 4 g. *bis(α-ketodihydro-β-indolidene)tris(α-dithienyl)* (III), olive-green, with no m. p., difficultly sol. in $C_6H_4Me_2$, quinoline, tetralin, C_5H_5N and PhOH; concd. H_2SO_4 gives a blue soln., from which H_2O ppts. a violet-blue compd., sol. in NH_4OH. III also results by heating the 2 compds. with $ZnCl_2$ 2 hrs. at 100°. *p-Nitrobenzoyl deriv.*, dark green; *p-bromobenzoyl compd.* II and bromoisatin in concd. H_2SO_4 at 0° give *cyclic bis(α-ketodihydro-β-bromoindolidene)bis(α-dithienyl)*, blue amorphous product; with $ZnCl_2$ at 100° there results *bis(α-ketodihydro-β-bromoindolidene)tris(α-dithienyl)*, olive-green. Thiophene (2.1 g.) and 3.7 g. isatin, heated with 5 g. $ZnCl_2$ 2 hrs. at 100°, give 1.2 g. of a product resembling indophenin in its reactions; with alk. hyposulfite there results a red-brown bath with an intense green fluorescence; warming at 60° for 10 min. and filtering gives (after repeating the operation 6 times) 40–50% of an insol. *compd.*, $C_{28}H_{18}O_2N_2S_3$, olive-green, has no m. p., which may have the structure IV. Consideration of the structure of I leads to the following:



(I)



(IV)

C. J. West

N-**Substituted oxindoles and isatins.** R. Stollé, R. Bergdoll, M. Luther, A Auerhahn and W. Wacker. *J. prakt. Chem.* **128**, 1–43(1930).—$PhNHCOCH_2Cl$ and $AlCl_3$ give 85% of oxindole, m. 127°. *o*-$MeC_6H_4NHCOCH_2Cl$ and $AlCl_3$, heated 1.5 hrs. at 225–30°, give *7-methyloxindole*, m. 200°; the 5-Me deriv. m. 168°. *m*-$C_6H_4(NH_2)_2$ and $(ClCH_2CO)_2O$ in Et_2O give *bis(chloroacetyl)-m-phenylenediamine*, m. 212°; this could not be condensed with $AlCl_3$ to an oxindole ring. *Bromoacetyl-β-naphthylamine*, m. 134°. *Chloroacetyl-α-aminoanthraquinone*, yellow, m. 218°; *trichloroacetyl deriv.*, yellow, m. 234°. None of these derivs. could be condensed by $AlCl_3$. $PhNMeCOCH_2Cl$ and $AlCl_3$ at 180° give 1-methyloxindole, m. 88°; HNO_2 gives the *3-isonitroso deriv.*, yellow, m. 189°; BzH gives the *3-benzylidene deriv.*, m. 71°; Br and KBr give the *5-Br deriv.*, m. 133° (*oxime*, yellow, m. 225°; *3-p-dimethylaminobenzylidene deriv.*, red, m. 212°); bromination in hot H_2O gives the *5,7-Br_2 deriv.*, m. 200° (*3 dimethylaminobenzylidene deriv.*, dark red, m. 208°; *3,3-Cl_2 deriv.*, m. 182°, by the action of $CO(OCl)_2$ in EtOH). 1-Methyl-3,3-dichlorooxindole, m. 149°; *5-Br deriv.*, m. 155°. 1-Ethyloxindole (I) and $NOC_6H_4NMe_2$ with EtONa in EtOH give *1-ethyl-3-p dimethylaminoanilisatin*, dark brownish gray with green luster, m. 170°; hot EtOH-HCl gives quant. 1-ethylisatin. I and Br in ice-cold CCl_4 give a *di-Br addn. product*, m. 74° after washing with Et_2O; on warming the CCl_4 soln., there results the 3,3-di-Br deriv., light yellow, m. 95°; Br-H_2O with I in CCl_4 gives the *5-Br deriv.* (II), m. 108°; with $NOC_6H_4NMe_2$ there results *1-ethyl-5-bromo-3-p-dimethylaminoanilisatin*, dark red, m. 174°. I and 3 mols. Br in CCl_4, on standing 14 days at room temp., give the *3,3,5-tri-Br deriv.*, pale yellow, m. 144°. 1-Phenyloxindole (III), heated with *N* NaOH for 2 hrs., gives *o-anilinophenylacetic acid*, m. 114°. III in CCl_4, shaken with Br-H_2O, gives the *5-Br deriv.*, m. 162°; with $ONC_6H_4NMe_2$ there results *1-phenyl-3 bromo-3-p-dimethylaminoanilisatin*, dark red with green luster, m. 180°. The *5,5-Br_2 deriv.* of III, pale yellow, m. 162° (decompn.). III and Br in boiling CCl_4 give the *3,3-Br_2 deriv.* (IV), yellow, m. 131°; boiling with 1 equiv. of III in CCl_4 for 10 hrs. gives the *3-Br deriv.*, pale yellow, m. 98°; heating at 280° gives 1,1'-diphenylisoindigotin. Heating IV with 1 mol. Br in CCl_4 for 4 hrs. (Fe as catalyst) gives the *3,3,5-tri-Br deriv.*, m. 168°. III and 4 mols. Br in CCl_4, boiled 20 hrs., give *3,3,5,7-tetra-Br deriv.*, m. 172°. *Dichloroacetyldiphenylamine*, m. 79°; *dichloroacetylmethylanilide*, m. 69°; these could not be condensed to oxindole derivs. by $AlCl_3$. *Trichloroacetyldiphenylamine*, m. 86°, with $AlCl_3$ in CS_2 gives the 3,3-Cl_2 deriv. of III, m. 117°; it also results from III and $Ca(OCl)_2$. PhNHMe and $(COCl)_2$ in Et_2O give *N-methyloxanilyl chlo-*

ride, PhNMeCOCOCl, m. 30°; the *anilide* m. 105°; the chloride and ... give 1-methylisatin (V), m. 135°; it also results from 1-methyl-3,3-dichlorooxindole (VI) by heating with EtOH-H_2O NaOH. The 1-Br deriv. of V, m. 170°, results in the same way from the 5-Br deriv. of VI, while the 5,7-Br_2 deriv. gives 1-methyl-5,7-dibromoisatin, m. 175°. *Diethyloxanilide*, m. 93°. *Ethyloxanilide*, m. 116°. 1-Ethyl-5-bromoisatin, m. 145°, results from 1-ethyl-5-bromo-3-*p*-dimethylaminoanilisatin and concd. HCl or from 1-ethyl-3,3,5-tribromooxindole with EtOH-NaOH. *Diphenyloxanilyl chloride*, m. 70°; cooking with H_2O gives *diphenyloxamidic acid*, m. 146°. 1-Phenylisatin (VII), m. 138°, is formed, among other ways, from *1-phenyl-3-p-dimethylaminoanilisatin*, dark brownish gray, m. 174°, and EtOH-HCl; *oxime*, light yellow, m. 221°. VII and warm NaOH give *Na pl* ... The *5-Br deriv.* ... with *N* NaOH ... *Na 1-* ... 156°

$AlCl_3$ in CS_2 gives *1-phenyl-3,...* ... rk red, m. 214°; in 1 case there resulted *1-α-naphthylisatin*, reddish yellow, m. 176°. *Phenyl-β-naphthylaminooxalyl chloride* (IX), turns deep red at 100° and m. about 225°; the free acid m. 221°; *Et ester*, m. 103°; *anilide*, m. 219°. Warming VIII with alk. H_2O_2 gives *1-phenylaminonaphthalene-2-carboxylic acid*, m. 236°. Na 1-phenyl-4,5-benzoisatinate and H_2O give the isomeric *2-phenylaminonaphthalene-1-carboxylic acid*, reddish brown, m. 146° (decompn.). IX, heated 1 hr. at 130°, gives 1-phenyl-5,4-benzoisatin, m. 229°; this does not show the indophenin reaction. $(\beta\text{-}C_{10}H_7)_2NH$ and $(COCl)_2$ give *di-β-naphthylaminooxalyl chloride*, rose, m. about 266°; the free *acid* m. 169° (decompn.); *Me ester*, m. 141°. *Et ester*, m. 110°; *amide*, m. ...

3-hydr ... dark ... red, m. ... *droxyisoindigotin*, m. 172°; warming with concd. H_2SO_4 or boiling with ... diphenylisoindigotin, m. 314°; warming with AcOH and concd. HNO_3 gives phenylanthranilic acid, m. 182°. The 5-Br deriv. of III and *p*-$ONC_6H_4NMe_2$ in boiling AcOH give *1,1'-diphenyl-5,5'-dibromoisoindigotin*, dark red-violet, does not m. 360°. VII and β-hydroxythionaphthene in EtOH-Na_2CO_3 give *3-(phenylindole)-2'-(thio* ... (C_6H_5CO)$_2O$ heated at 200°, give

gives the *acid*, $C_{22}H_{15}O_4N$, yellow, ... Na 1-phenylisatinate at ... gives the Na salt of 9-acridylcarboxylic acid, m. 295°. In the formation of the 5-Br deriv. of VII there is also formed a small amt. of *7-bromoacridine-9-carboxylic acid*, yellow, m. 278°. 2,7-Dimethylacridine results as a by-product of the action of $(COCl)_2$ on $(p\text{-}MeC_6H_4)_2NH$. VIII, warmed with NaOH, gives 5,6-benzacridine-9-carboxylic acid, m. 286°; heating at 300° gives 5,6-benzacridine, m. 108°. 1-Phenyl-4,5-benzisatin and NaOH give *7,8-benzacridine-9-carboxylic acid*, yellow, m. 276° (decompn.); heating at 280° gives 7,8-benzacridine, m. 131°. 1,2,7,8-Dibenzacridine-9-carboxylic acid, m. 232°, results from 1-β-naphthyl-4,5-benzoisatin; *Na salt*, pale yellow needles.

C. J. West

Reactivity of positivized hydrogen atoms. IV. Oxido-oxazoles. W. Dilthey and J. Friedrichsen. *J. prakt. Chem.* 127, 292–306(1930); cf. *C. A.* 23, 5176.—The following *4,5-dimethyloxidooxazoles* were obtained by condensation of AcC(:NOH)Me with the proper aldehyde in AcOH-HCl: 2-Ph, m. 103–4°; tetrahydrate, m. about 60°; HCl salt, m. 188° (cf. Diels and Riley, *C. A.* 9, 2250). *2-(4-methoxyphenyl)*, m. 141°; *dihydrate*, m. 80°. *2-(2-Hydroxyphenyl)*, m. 105–6°. *2-(3,4-Methylenedioxyphenyl)*, m. 175–6°. *2-(3-Nitrophenyl)*, yellow, m. 159–60° (decompn.); the *4-NO_2 isomer*, yellow, m. 199–200°. *2-Styryl*, m. 131°; HCl salt, m. 185°. *2-(2,4-Dihydroxyphenyl)*, m. 225–6°. Benzoylacetyl 2-monoxime and BzH give *2,5-diphenyl-4-methyloxidooxazole*, m. 153°, crystals with 1 mol. H_2O; the HCl salt m. 180–5°; *p*-$MeOC_6H_4CHO$ gives the *2-(4-methoxyphenyl) deriv.* (I), m. 156–7°, crystg. with 3 mols. H_2O; *o*-HOC_6H_4CHO gives the *2-(2-hydroxyphenyl) deriv.*, yellow, m. 130–1°;

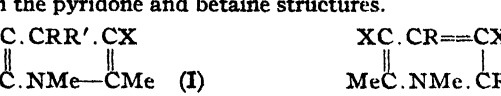
piperonal gives the *2-(3,4-methylenedioxyphenyl) deriv.*, m. 168–70°; the *3-*, *2-* and *4-nitrophenyl derivs.* are yellow and m. 176–7° (decompn.), 157–8° and 188–9°, resp. BzH and α-BzC(:NOH)Ph in AcOH-HCl give *2,4,5-triphenyloxidooxazole* (II), m. 170–1°, crystals with 3 mols. H_2O; β-BzC(:NOH)Ph gives the same product. *p*-$MeOC_6H_4CHO$ gives *2-(4-methoxyphenyl)-4,5-diphenyloxidooxazole*, m. 194–5° (60% yield); *2-(3-nitrophenyl) deriv.*, yellow, m. 178–9° (60% yield). Reduction of I with Zn and AcOH gives *2-(4-methoxyphenyl)-4-methyl-5-phenyloxazole*, m. 77–8°. II gives 2,4,5-triphenyloxazole, m. 114–5°. The mechanism of these condensations is discussed.
C. J. West

1,3,4-Triazoles. Kashmiri Lal Bhagat and Jnanendra Nath Ray. *J. Chem. Soc.* **1930**, 2357–8.—$BzNHNHCOCH_2Ph$ and $PhNH_2$, heated with $ZnCl_2$ at 180–90° for 3 hrs., give *1,2-diphenyl-5-benzyl-1,3,4-triazole*, m. 200°; similarly *m*-$MeC_6H_4NH_2$ and *p*-$MeOC_6H_4NH_2$ give, resp., the *2-phenyl-1-m-tolyl deriv.*, m. 240°, and the *2-phenyl-1-p-methoxy deriv.*, m. 225°. $(NHBz)_2$ and *p*-$MeC_6H_4NH_2$ give *2,5-diphenyl-1-p-tolyl-1,3,4-triazole*, m. 296–7°, and a *compd.*, m. 115°, which has not been identified. Similarly, *p*-$MeOC_6H_4NH_2$, *m*-$MeC_6H_4NH_2$ and *p*-$EtOC_6H_4NH_2$ give, resp., the *1-p-MeO deriv.*, m. 246–7°, the *1-m-tolyl deriv.*, m. 250°, and the *1-p-EtO deriv.*, m. 215°. BzNHNHAc and $PhNH_2$ give PhNHBz. These triazoles are rather weak bases and do not form stable salts with acids. The pharmacol. properties will be published elsewhere.
C. J. West

Diphenylene oxide series. II. Nicholas M. Cullinane. *J. Chem. Soc.* **1930**, 2267–9; cf. *C. A.* **18**, 1655.—Nitration of diphenylene oxide gives 80% of the $2\text{-}NO_2$ deriv., m. 182°, since on reduction the $2\text{-}NH_2$ deriv. (90% yield, m. 94°) yields, through the Sandmeyer reaction, a *2-Cl deriv.* (I), m. 104°, identical with the product obtained as follows: *5-Chloro-2-aminodiphenyl ether*, gray, m. 44°, obtained by reduction of the NO_2 deriv., yields a diazo compd., which, heated with 50% H_2SO_4, yields I. The isomer, m. 110°, formed in small quantities in the nitration, must be the $1\text{-}NO_2$ deriv.
C. J. West

Dihydropyridine derivatives and pyridones. K. v. Auwers (with W. Susemihl and E. Wolter). *Ber.* **63B**, 2111–9(1930).—In the course of his investigations of pyridone methides and dipyridyls Mumm prepd., among other compds., a series of dihydropyridine derivs., part of which, according to M., have the structure I, others the structure II (R and R′ = H, alkyl or aryl, X = CO_2Et), while the structure of still others was left an open question. As the 2 groups of substances should differ distinctly from each other in their spectrochem. behavior it seemed possible that the structure of these compds. might be established optically. Some of the compds. could not be used because they were too deeply colored, and for the same reason the dispersion of most of them could not be detd., as the Hβ and Hγ lines could not be read. However, the data obtained suffice for the drawing of certain conclusions. Below are given, resp., the temp. (t°) and the values for EΣ for α, D, β-α, at t° and for D at 20°. Di-Et *sym-N*-methyldihydrocollidinedicarboxylate (I), 99.5°, 1.79, 1.95, 128%, 1.65. Di-Et *sym-N*-methyl-γ-isobutyldihydro-α,α′-lutidinedicarboxylate (I), 99.8°, 1.41, 1.54, 102%, 1.25. Di-Et *asym-N*-methyldihydrocollidinedicarboxylate (II), 18.9°, 1.98, 2.25, ——, 2.25. Di-Et *asym-N*-methyl-γ-ethyldihydro-α,α′-lutidinedicarboxylate (II), 66.0°, 2.20, 2.49, ——, 2.3. γ-Iso-Bu homolog (II), 18.2°, 1.82, 2.08, ——, 2.1. Di-Et *N*-methyl-2,4,4,6- or 2,2,4,6-tetramethyldihydropyridine-3,5-dicarboxylate, 66.9°, 0.92, 1.06, ——, 0.9. Di-Et *N*-methyl-2,3,6-trimethyl-4- or 2-phenyldihydropyridine-3,5-dicarboxylate, 100.0°, 1.00, 1.25, ——, 0.95. As was expected, both groups show powerful exaltations. It was also to be expected that the unsym. compds. with their accumulated (*gehäufte*) conjugation C:C.C:C.C:O would show stronger exaltations than the sym. compds. with the simple conjugation C:C.C:O, even though the latter occurs twice in the mol. The above values show beyond doubt that the last 2 compds. are sym. dihydro derivs. For 2 pyridones were found the values: *N*-methyl-4,6-dimethyl-3-acetyl-5-carbethoxy-α-pyridone, 100.6°, 1.34, 1.43, 87%, 1.15; *N*-methyl-6-methyl-4-isobutyl-3-acetyl-5-carbethoxy-α-pyridone, 100.0°, 1.00, 1.25, ——, 0.95. In view of the new conjugation in these compds., the results were surprisingly low. There is a difference of opinion, however, as to the structure of these compds.; in addn. to the hydroxy and keto forms, betaine-like formulas have also been suggested for these compds. and their *N*-alkyl derivs. It therefore became necessary to investigate spectrochemically a few simple pyridones and derivs. In the following list, the first 4 compds. are certainly *O*-ethers of hydroxypyridines, and for the 5th, β-hydroxypyridine, there is no possibility of a tautomeric form; for α-hydroxypyridine the exaltations are calcd. for both the keto and the enol form; the last 2 compds. are certainly *N*-alkyl derivs. The values given are, resp., for t°, EΣ for α, D, β-α, γ-α,

at t°, and for D at 20°. α-Ethoxypyridine, 16.3, —0.49, —0.50, 12%, 13%, —0.5; β-isomer, 18.0°, —0.41, —0.42, 16%, ——, —0.4; γ-MeO compd., 22.2°, —0.74, —0.76, 7%, 7%, —0.75; γ-PhO compd., 67.3°, 0.03, 0.02, 12%, 15%, —0.15; β-HO compd., 16.9°, —0.69, —0.68, 22%, ——, —0.7 (in quinoline); α-HO compd. 99.6°, 0.28, 0.36, 50%, ——, 0.05 for enol form, 99.6°, 1.21, 1.32, 55%, ——, 1.0 for enol form (in $C_{10}H_7Me$); *N*-ethyl-α-pyridone, 19.8°, 0.54, 0.64, 56%, ——, 0.65; *N*-methyl-γ-pyridone, 21.6°, 0.68, 0.77, 37%, 40%, 0.75 (in quinoline). The consts. of the *O*-ethers, as expected, show a weakening by the substituents of the strong depression characteristic of C_5H_5N. The generally accepted view that β-hydroxypyridine is a true HO compd. is confirmed. On the other hand, the α-isomer cannot be a phenol; its consts. show that its structure corresponds rather to that of the *N*-alkylpyridones. The fact that these simple pyridones show the same low exaltations as the more complicated derivs. mentioned above indicates that this is a general property of such compds. It appears less striking when it is considered that conjugated systems whose double bonds lie entirely or partly in a ring regularly produce lower exaltations than in open-chain compds. Thus, α-pyrone gives 20.7°, 0.97, 1.05, 71%, 84%, 1.05, and γ-pyrone 66.6°, 0.95, 1.00, 43%, 47%, 0.85. Even so, it is a question whether the low exaltations of the pyridones are actually the result only of their ring structure. It would be desirable to test their spectrochem. behavior on the basis of a betaine structure, but this cannot be done with any certainty as the at. refractions of O and N in such compds. is not known. The same is true of intermediate (*Zwitter*) ion formulas, representing a condition between the pyridone and betaine structures.



(I) (II)

C. A. R.

Derivatives of 4-methyl-, 4,6-, 4,7- and 4,8-dimethyl-2-hydroxyquinolines. Isidore E. Balaban. *J. Chem. Soc.* **1930**, 2346–54.—Starting with certain 2-hydroxyquinolines, aminotetrahydroquinolines were prepd. for biol. examn. in malaria. Nitration of 2-hydroxy-4-methylquinoline in concd. H_2SO_4 at room temp. gives quant. the *6-NO_2 deriv.* (I), m. 340° (decompn.); this was also obtained from *p*-$O_2NC_6H_4NHCOCH_2Ac$ and concd. H_2SO_4. Oxidation of I with $KMnO_4$ gives 5-nitrobenzoxazolone, m. 242°. Refluxing I with PCl_5 and $POCl_3$ for 1 hr. at 160° gives the *2-Cl deriv.*, pale brown, m. 207°. Reduction of I with $SnCl_2$ and concd. HCl gives 63.5% of the *6-NH_2 deriv.*, pale yellow, m. 315°; *HCl salt*, needles, do not m. 310°; *Ac deriv.*, m. 314°. *2-Hydroxy-4-methylquinoline-6-arsonic acid*, in 18% yield from the NH_2 deriv. by the Bart-Schmidt reaction, crystals with 1 mol. H_2O; the Mg, Ca and Ba salts are cryst. 2-Hydroxy-4,6-dimethylquinoline gave the following derivs.: *3-NO_2 deriv.*, m. 294°; *2-Cl deriv.*, yellow, m. 157°; *3-NH_2 deriv.*, m. 264° (*HCl salt*, yellow, m. 240°; *Ac deriv.*, m. 270°). Derivs. of 2-hydroxy-4,7-dimethylquinoline: *6-NO_2 deriv.*, darkens about 280° with partial decompn., sparingly sol. in AcOH; oxidation gives 5-nitro-4-methylbenzoxazolone, m. 233°; *2-Cl deriv.*, m. 164°; *6-NH_2 deriv.*, blackens at 320° (45% yield); *HCl salt*, does not m. 320°; *Ac deriv.*, does not m. 320°; *6-arsonic acid*, boat-shaped needles, not melted at 320° (4.1% yield); the Mg, Ca and Ba salts are cryst. The *8-NO_2 deriv.*, yellow, m. 226° (oxidation gives *3-nitro-4-methylbenzoxazolone*, brown, m. 236°); *2-Cl deriv.*, m. 156°; *8-NH_2 deriv.*, m. 255°; *HCl salt*, crystg. with 1 mol. H_2O, m. 257° (decompn.); *Ac deriv.*, crystals with 2 mols. H_2O, m. 266°. Derivs. of 2-hydroxy-4,8-dimethylquinoline: *6-NO_2 deriv.*, m. 310° (decompn.) (81% yield); (oxidation gives *5-nitro-3-methylbenzoxazolone*, pale yellow, m. 249°); *2-Cl deriv.*, pale yellow, m. 195°; *6-NH_2 deriv.*, pale yellow, m. 288° (54.4% yield), *HCl salt*, yellow, does not m. 320°; *Ac deriv.*, plates, do not m. 320°; *6-arsonic acid*, crystals with 0.25 mol. H_2O (9.6% yield); the Mg and Ba salts are cryst. Oxidation of 2-hydroxy-4-methylquinoline gives benzoxazolone, crystals with 1 mol. H_2O, m 142°. Tests are reported for the arsonic acids on mice infected with *T. equiperdum*

C. J. West

Comparison of the directive powers of elements having consecutive atomic numbers. II. Mononitrations of 2-phenylquinoline and its methosulfate. Raymond J. W. Le Fèvre and Faqir Chand Mathur. *J. Chem. Soc.* **1930**, 2236–41; cf. *C. A.* **24**, 1378.—*2-Phenylquinoline methosulfate* (I), m. 142–3.5°, in 85% yield from 2-phenylquinoline (II) and Me_2SO_4 by boiling 2 hrs.; *methopicrate* (III), yellow, m. 138–9°. Nitration of I at 0° gives 97% of the *m*-NO_2 deriv. of III, m. 181–2°; boiling with concd. HCl gives the *methochloride*, whose hydrated form m. 52°, gives off H_2O at 120–30° and then m. 204–5°; heating at the m. p. for 0.5 hr. gives 2-*m*-nitrophenylquinoline.

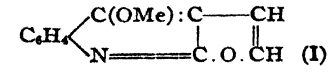
m. 123–4°. Nitration of II gives about 60% of the *p*-NO_2 deriv., light yellow, m. 129–31°, and about 30% of the *m*-NO_2 deriv. The *p*-NO_2 deriv. was synthesized from *p*-$O_2NC_6H_3CH{:}CHCHO$, $PhNH_2$ and concd. HCl; the *o-NO₂ deriv.*, m. 121–3°, was similarly synthesized. Attempts to synthesize 4-phenylquinoline failed. C. J. W.

Action of lithium alkyls upon acridine and several other alkali organic reactions in the acridine series. Ernst Bergmann, Ottilie Blum-Bergmann and Alfred Freiherr von Christiani. *Ann.* **483**, 80–9(1930).—Acridine and the Li deriv. of PhBr give 9,10-dihydro-9-phenylacridine, m. 170°; *p*-$MeOC_6H_4Br$ gives the *9-p-anisyl deriv.*, m. 183–4°; *o*-MeC_6H_4Br gives the *9-o-tolyl deriv.*, m. 185–6°; the *m-isomer* m. 148–9°; α-$C_{10}H_7Br$ gives the 9-α-naphthyl deriv., crystals with 1 mol. C_6H_6, m. 123° (decompn.); in attempting to remove the C_6H_6 H is evidently split off, since the product gives a deep yellow color with concd. H_2SO_4. Isoquinoline and PhLi give a product b_{14} 195–200°, m. 80°; *1-phenylisoquinoline picrate*, yellow, m. 165°. *p*-$MeOC_6H_4Li$ gives 1-*p*-anisylquinoline, whose *picrate*, yellow, m. 191°. Reduction of methylacridone with Na in AmOH or the action of MeLi on 9,10-dihydroacridine gives *10-methyl-9,10-dihydroacridine*, m. 93–5°. Catalytic reduction of acridine-9-carboxylic acid gives the 9,10-dihydro deriv., m. 205°; the 2 *Me esters* m. 128–30° and 160–2°, resp. The di-Li deriv. of methylacridone and Ph_2CCl_2 give *9-benzohydrylidene-10-methyl-9,10-dihydroacridone oxide*, m. 242°. C. J. West

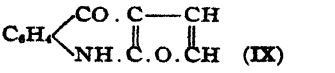
Phthalazines. II. Joti Sarup Aggarwal, Ishwar das Khera and Jnanendra Nath Rây. *J. Chem. Soc.* **1930**, 2354–7; cf. *C. A.* **24**, 120.—The synthesis of phthalazines was extended to the prepn. of substances analogous to papaverine. Veratraldehyde (I) and $PhCH_2CONHNH_2$, heated with abs. EtOH contg. a little NaOH, give quant. *α-phenylacetyl-β-veratrylidenehydrazine* (II), m. 171–2°; heating with AmOH satd. with HCl or with $POCl_3$ in $CHCl_3$ gives *6,7-dimethoxy-1-benzylphthalazine*, yellow, m. 191–2°. Reduction of II with 3% Na-Hg gives *α-phenylacetyl-β-4,5-dimethoxybenzylhydrazine*, m. 129–30°. The following compds. were prepd. in a similar manner: *α-Phenylacetyl-β-piperonylidenehydrazine*, m. 210°; *6,7-methylenedioxy-1-benzylphthalazine* (III), m. 203–4°. *α-Phenylacetyl-β-p-methoxybenzylidenehydrazine*, m. 167°; *7-methoxy-1-benzylphthalazine* (IV), m. 168–9°; *picrate*, m. 208–9°; *α-phenylacetyl-β-p-methoxybenzylhydrazine* (V), m. 98–9°. *α-Phenylacetyl-β-m-methoxybenzylidenehydrazine*, m. 107–8°, is not converted into a phthalazine by the usual treatment; the *benzyl deriv.* m. 94–5°. The corresponding *o-MeO derivs.*, m. 141–2° and 79–80°. *α-Phenylacetyl-β-benzylidenehydrazine*, m. 148–9°; *benzyl deriv.*, m. 113–4°. 3,4-$(MeO)_2C_6H_3CH_2CO_2Et$ and $N_2H_4.H_2O$ give *3,4-dimethoxyphenylacetylhydrazine*, m. 115–6°; condensation with I and ring closure with $POCl_3$ give *6,7,3′,4′-tetramethoxy-1-benzylphthalazine*, m. 192–3°; *picrate*, m. 186–7°; this is without action on tubercle bacilli. V and $CuSO_4$ in EtOH yield the *Cu complex*, $C_{32}H_{14}O_{10}N_4SCu$, bluish green silky needles; acylhydrazines do not ppt. Cu quant. from solns. contg. less than 0.5% Cu. Hydrolysis of IV by heating with *o*-$C_6H_4(CO_2H)_2$ in EtOH at 100° for 6–8 hrs. and treatment with $PhNHNH_2$ gives *4-methoxy-2-phenylacetylbenzaldehyde diphenylhydrazone*, m. 122–3°. Similarly, III gives a *diphenylhydrazone*, m. 104–5°. C. J. West

The alkaloid of Shimmia repens, Nakai. Yasuhiko Asahina, Tatsuo Ohta and Mototaro Inubuse. *Ber.* **63B**, 2045–51(1930).—Surprisingly enough, *Skimmia repens*, Nakai, does not contain skimmianine, the alkaloid of *S. Japonica*, Thunb., but a base $C_{12}H_9O_2N$ (I) which proved to be identical with dictamnine obtained by Thoms from European *Dictamnus* roots. T. assigned to his compd. the compn. $C_{12}H_{11}O_2N$, but the present authors were unable to confirm this on a sample prepd. from Korean *Dictamnus*. Like T., they found one MeO group in I. I is unchanged by boiling MeI in an open dish but in a sealed tube rearranges into an isomer, *isodictamnine* (II), which splits off no Me by the Zeisel method. With EtI I gives *homoisodictamnine* (III), which likewise contains no alkoxyl group. With $KMnO_4$ I gives an aldehyde, *dictamnal*, $C_{11}H_9O_3N$ (IV), and an acid, *dictamninic acid*, $C_{11}H_9O_4N$ (V), which with concd. HCl or HBr splits off Me and CO_2 and forms 2,4-dihydroxyquinoline. Since V is not identical with *2-methoxy-4-hydroxyquinoline-3-carboxylic acid* (VI), it must be the 4,2-isomer. As I reacts with neither acylating nor C:O reagents, it very probably contains an ether O atom. I is therefore assigned the structure VII. Heated with BzCl and Bz_2O, it gives *N-benzoylnordictamnine* (VIII), sapond. by alc. KOH to *nordictamnine* (IX), also obtained directly from I with HBr. As N-free constituent was obtained a cryst. compd. m. 120° which, in spite of the similarity in m. ps., is apparently not identical (mixed, m. p.) with the fraxinellone of Thoms and Dambergis (*C. A.* 24, 2236). I (135 g. from 95 g. air-dry powd. leaves moistened with 10% Na_2CO_3 and extd. with petr. ether at 50°, the ext. then being shaken out with 5% HCl and the

acid soln. made alk. with Na_2CO_3 and extd. with $CHCl_3$), m. 132–3°, mol. wt. (Rast) 191.3; picrate, yellow, m. 165°; HCl salt, m. about 170° (decompn.). II, m. 188°, turns yellow and then brownish in the light, shows faint blue-violet fluorescence in alc. III, needles with 3 H_2O, m. about 80°, loses 2.5 mols. H_2O *in vacuo* and m. 143°; anhyd., it m. 150°. VIII (0.6 g. from 1 g. I, BzCl and Bz_2O at 130–5°), m. 165°. IX, m. 249°, gives II with alk. Me_2SO_4. IV (0.5 g. from 5 g. I), m. 259–60°, slowly sol. in alkalies; *phenylhydrazone*, yellow, m. 228°. V (yield, 3.0–3.5 g.), m. 260° (decompn.). VI (1 g. from 5 g. *o*-$O_2NC_6H_4COCH(CO_2Me)_2$ in alc. with Zn and HCl gas), m. 225°, gives a deep violet-red color with alc. $FeCl_3$. According to Thoms, Wolff, using a soln. of 0.05 g. I.HCl in 10 cc., "faintly turbid because of a slight sepn. of the free base," found the toxic dose for white mice to be about 0.33 mg./kg. body wt. and for *Rana esculenta* about 0.125 mg. The present authors find that 3 mg. pure I.HCl dissolves only partially in 0.8 cc. of 0.1 *N* HCl, so that W.'s soln. must have contained considerable free HCl. The lethal dose of I.HCl (H_2O suspension) for white mice was found to be at least 0.7 mg./g. and for *R. esculenta* 0.35 mg., and the same effects were obtained with about 0.4 and 0.15 mg. HCl, resp. I is therefore apparently not so toxic as has hitherto been assumed.



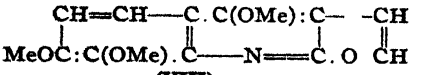
(I)



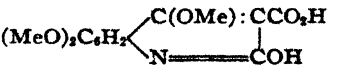
(IX)

C. A. R.

Skimmianine. Yasuhiko Asahina and Mototaro Inubuse. *Ber.* 63B, 2052–6 (1930).—In connection with the study reported in the preceding abstr., Honda's work on the chemistry of skimmianine (I) has been repeated. His results have, in general, been confirmed and the compd. obtained did not depress the m. p. of a sample of H.'s prepn. Its compn., however, is $C_{14}H_{13}O_4N$, not $C_{22}H_{29}O_9N_4$. It contains 3 MeO groups and with MeI in a sealed tube yields an isomeric *isoskimmianine* (II) with only 2 MeO groups. The similarity in behavior of I and dictamnine indicates that the former is a di-MeO deriv. of the latter, a view supported by the almost identical absorption spectra of the 2 compds. I forms no Ac deriv., oxime or semicarbazone. $KMnO_4$ oxidizes it to an aldehyde, *skimmianal*, $C_{13}H_{13}O_6N$ (III), and *skimmianinic acid* (IV), and the IV with hot concd. HCl loses Me and CO_2 to form a *compd.* $C_{11}H_{11}O_4N$ (V) which yields a red *NO deriv.* (VI). On the other hand, II with hot concd. HBr gives a di-HO *compd* $C_{12}H_9O_4N$ (VII) which yields a diacetate and with alc. $FeCl_3$ forms a green color changed to wine-red by Na_2CO_3. V proved to be identical with the synthetic *7,8-dimethoxy 2,4-dihydroxyquinoline* (see following abstr.); I must, therefore, have the structure VIII and IV the structure IX. In addn. to the N-free skimmetin (umbelliferone), there was obtained a compd. m. 120° identical with that isolated from *Skimmia repens*. I (52 g. from 75 kg. air-dry leaves), cryst. powder or finely granular pyramids from alc. on rapid, light yellowish quadrangular columns on slow crystn., m. 176°, mol. wt. (Rast) 243–59; picrate, yellow, m. 195–7° (decompn.). II, m. 185°. VII, m. 218°; *diacetate*, m. 183°, gives no color with alc. $FeCl_3$. III, m. 238°, insol. in cold alkali and in Na_2CO_3 but sol. in hot alkali; *phenylhydrazone*, yellow, m. 210°. IV, m. 248°. V, m. 250°, easily sol. in alkali carbonates. VI, yellow-red, m. 247° (decompn.). The soln. which Honda used for his toxicity expts. contained many unknown substances besides I and it is not certain that the characteristic toxic action observed by him is to be ascribed to I exclusively.



(VIII)



(IX)

C. A. R.

Dimethoxy-2,4-dihydroxyquinoline. Yasuhiko Asahina and Sokichi Nakanishi. *Ber.* 63B, 2057–9(1930); cf. preceding abstr.—6- (I) and 2-nitro-3,4-dimethoxybenzoic acid (II) were prepd. from vanillin by the Pschorr and Sumuleanu method and converted with PCl_5 into the *chlorides* (III and IV) which were condensed with $CH_2(CO_2Et)_2$ by the Bischoff method to the *di-Et nitrodimethoxybenzoylmalonates* (V and VI) and these with Sn and hot HCl yielded *6,7-* (VII) and *7,8-dimethoxy-2,4-dihydroxyquinoline* (VIII). VIII proved to be identical with the product obtained from skimmianine. II, yellow, m. about 130°. V, brownish oil giving a deep red color with alc. $FeCl_3$. VII, does not m. 320°; *NO deriv.*, dark red, m. about 266° (decompn.). IV, m. 78°. VI, m. 108–10°, gives a red color with alc. $FeCl_3$. VIII, m. 250°; *NO deriv.*, violet-red, decomps. 248°.

C. A. R.

Sinomenine and disinomenine. XIX. Reduction of sinomenine and dihydrosinomenine with sodium amalgam. KAKUJI GOTO AND SHINGO MITSUI. *Bull. Chem. Soc. Japan* **5**, 282–90(1930); cf. *C. A.* **24**, 4044.—Dihydrosinomenine (I) is easily prepd. by catalytic reduction of sinomenine with Pd charcoal and H; it m. 198°, $[\alpha]_D^{25}$ 193.58° ($CHCl_3$), $[\alpha]_D^{24}$ 33.06° (dil. HCl); oxime, m. 211° (decompn.); semicarbazone, m. 209° (decompn.); methiodide, m. 268° (decompn.), soly. in H_2O at room temp. 0.34%. Reduction of I with Na-Hg (corresponding to 4 H) gives mixed crystals of *demethoxydihydrosinomeninol* (II) and demethoxydihydrosinomenine. Reduction of this mixt. with 5% Na-Hg (corresponding to 8 H) gives about 12.5% of pure II, m. 142° (decompn.), $[\alpha]_D^{30}$ 46.8° (MeOH); *methiodide*, m. 280°. The mother liquor of the above mixed crystals gives about 5% of *dihydrosinomeninol*, m. 162°, $[\alpha]_D^{30}$ 1.93° (MeOH); *methiodide*, decomps. 249°, $[\alpha]_D^{28}$ —6.73° (H_2O). This also results in 50% yield by the reduction of I in 6% AcOH with 5% Na-Hg (corresponding to 6 H). Reduction of sinomenine in AcOH with 5% Na-Hg (corresponding to 10 H) gives 30% of *sinomeninol*, m. 127°, $[\alpha]_D^{28}$ —23.7° ($CHCl_3$); *methiodide*, m. 272° (decompn.); catalytic reduction gives the dihydro deriv., m. 162°. C. J. WEST

A synthesis of *dl*-tetrahydropapaverine worthy of note for phytochemistry. ERNST SPÄTH AND FRANZ BERGER. *Ber.* **63B**, 2098–102(1930).—Robinson has suggested that the papaverine alkaloids may be formed by the condensation of an α-3,4-dihydroxyphenyl-β-aminoethane (formed from an NH_2 acid or otherwise) with $3,4\text{-}(HO)_2C_6H_3\text{-}CH_2CHO$ to norlaudanosine which then undergoes further simple transformations into the alkaloids. An attempt has been made to confirm this view by using, instead of phenols, their Me ethers. Homoveratraldehyde, prepd. by ozonization of eugenol Me ether, was allowed to react with homoveratrylamine; the next step (ring closure with HCl) offered difficulties because (1) the Schiff base was not sufficiently stable toward HCl, and (2) the aldehyde is rapidly resinified by HCl. Nevertheless, S. and B. were able to obtain 8% *dl*-tetrahydropapaverine. C. A. R.

Dealkylation of tertiary amines by organic acids. II. Nicotine. JULIUS v. BRAUN AND KARL WEISSBACH. *Ber.* **63B**, 2018–26(1930); cf. *C. A.* **24**, 2993.—From the results reported in the first paper, it was concluded that *N*-methylpyrrolidine heated with org. acids would not, as with BrCN, undergo ring cleavage almost exclusively but would chiefly, if not exclusively, exchange the *N*-Me group for the acid radical. The same behavior was to be expected of nicotine (I). Neither with BrCN nor with BzCl does it undergo any transformation leading to its conversion into nornicotine (II). M. and M. Polonovski had apparently effected such a conversion some years ago (*C. A.* **22**, 429) by the action of Ac_2O on the *N*-oxide but as their product, as indicated by its properties (rapid darkening and resinification in the air, difficult crystallizability of the salts), must have been at best very impure, v. B. and W. therefore undertook to bring about the conversion by their method and, after a no. of orienting expts., effected their object with relative ease. When I is gently boiled with acids like BzOH or $PhCH_2CH_2CO_2H$, 2 reactions take place: (1) opening of the ring and addn. of an acid residue to form the compd. $C_5H_4NCH(OH)CH_2CH_2CH_2NMeR$ (R = acyl radical), which by loss of H_2O gives the *N*-acylmetanicotine, $C_5H_4NCH{:}CHCH_2CH_2NMeR$ (III), and (2) normal formation of acylnornicotine (IV). III and IV, the relative amounts of which depend on the exptl. conditions, cannot be sepd. by distn. and the same is true of the secondary amines (V and VI) resulting from their sapon. V, however, adds HCl or HBr at the double bond at 150°; the resulting *Cl compd.* (VII) is quite stable, but the *Br compd.* (VIII), to which is assigned the structure $C_5H_4NCH_2CHBrCH_2\text{-}CH_2NHMe$, changes by intra- and extramol. loss of HBr into an Et_2O-insol. mixt. of HBr salts. The II is unchanged by the HBr treatment and can be isolated (through the *N*-NO deriv., if necessary) in quite pure form. The II so obtained is quite different from the product of the Polonovskis; it is characterized by its stability and forms well crystd. salts of definite m. p. Acid and alkyl groups can readily be introduced on the sec. N atom; the Et and allyl homologs of II obtained in this way are described in the present paper. These, as well as the Ac deriv. of II and II itself, differ from I in their pharmacol. action. I and 1 mol. BzOH yield 10% of a mixt., $b_{0.5}$ 210–20°, of III and IV (R = Bz). VII is so stable that it can be distd. in part without decompn. at 126–30° under 0.2 mm., while VIII decomps. so rapidly at room temp. that even the dil. Et_2O soln. becomes turbid and deposits oil droplets in 1 hr. When boiled with $PhCH_2CH_2CO_2H$, it yields the $PhCH_2CH_2CO$ derivs. of II, V and $C_5H_4NCH(OH)\text{-}CH_2CH_2CH_2NHMe$ (IX), $PhCH_2CH_2CO_2Et$, $PhCH_2CH_2CONHMe$ and, apparently, some free V and II. The longer the heating is continued, the smaller is the yield of

III and IV, and increase in the temp. favors reaction (1) at the expense of (2). II is obtained in 20% yield from $PhCH_2CH_2CO_2H$ gently boiled with 4–5 mols. I for 2.5 hrs. at a temp. not above 250–5°; it b. 266–7°, b_{12} 139–40°, d_4^{19} 1.044, [α] around —5.5° (probably some racemization occurs during the prepn.); *picrate*, m. 188–90°, depresses the m. p. of the picrate of V (163°) to 130–40°; *picrolonate*, m. 239–40°; HCl salt, oily; *chloroplatinate*, dark red, darkens 270°, decomps. 295°; *chloroaurate*, yellow, m. 217°; *NO deriv.*, yellow oil, $b_{0.5}$ 190–2°, whose *chloroplatinate* m. 190° and *methiodide*, hygroscopic, m. 144°. *Ac deriv.* of II, obtained with Ac_2O on the H_2O bath, faintly yellow, b_{12} 212–4°, $[\alpha]_D^{20}$ —3.24° (C_6H_6); *picrate*, light yellow, m. 151°; *chloroplatinate*, darkens 200°, decomps. 245°; *methiodide*, m. 201°. *Nornicotylurea*, from II in HCl with 1 mol. KCNO, m. 164–6°; *chloroplatinate*, red, darkens 250°, decomps. 270°. *Phenylthiourea*, m. 171°. The *HO base* IX, obtained in the prepn. of II, faintly yellow, $b_{0.5}$ 160–2°; *picrate*, m. 127–8°. The unchanged I recovered in the prepn. of II is to a large extent racemized ([α] —50° to —100°). *N-Ethylnornicotine*, from II and 1 mol. EtI in alc. (25% yield), b_{12} 127–8°; *HCl salt*, extremely hygroscopic; *chloroaurate*, yellow, decomps. 203°; *picrate*, m. 174–6°. *N-Allylnornicotine*, b_{12} 136–7°; *picrate*, m. 180–2°; *chloroaurate*, decomps. 145–8°; *chloroplatinate*, light orange, darkens 230°, decomps. 255°. C. A. R.

Resin of Garcinia mangostana L. Otto Dragendorff. *Ann.* **482**, 280–301 (1930).—The dried secretion of *Garcinia mangostana* L. (40 g.) on extn. with C_6H_6 gives 18 g. crude α-mangostin (I), 1.2 g. β-mangostin (II), 1.6 g. of a sterol (III) and 0.4–0.5 g. of an ethereal oil (IV). III, $C_{27}H_{46}O$, b_{11} 270°, m. 105–6°; Ac deriv., m. 113°. IV, $C_{15}H_{24}$, b_{11-12} 105°. I, yellow, m. 180–1°, sol. in 2 *N* NaOH, the yellow-brown soln turning darker in the air; concd. H_2SO_4 gives an orange-red soln.; $FeCl_3$ gives a grass-green color. Analysis and mol.-wt. detns. indicate the formula $C_{16}H_{16}O_4$ or $C_{16}H_{18}O_4$ for I; it contains 2 active H atoms. II, lighter yellow than I, m. 175.5°. Reduction of I gives a *tetrahydro deriv.*, b. 260°(high vacuum); Me_2SO_4 in 2 *N* NaOH gives an *α-Me deriv.*, m. 106°; an Ac deriv. could not be prepd. I and II give the same methylmangostin (V), m. 123°. I, boiled a short time with Ac_2O, gives a *mono-Ac deriv.*, yellow, m. 112°; boiling with Ac_2O and AcONa for 4 hrs. gives a *di-Ac deriv.*, yellow, m. 117°. V, AcONa and Ac_2O, boiled 3 hrs., give an *Ac deriv.*, m. 193–4° I and boroacetic anhydride in Ac_2O give *α-monoacetylmangostin boroacetate*, golden yellow, m. 206–7°. The *β-isomer*, golden yellow, m. 188°. V yields a *boroacetate*, yellow, m. 219°. I is unchanged after heating with 3% MeOH-KOH at 180° for 2 hrs. or by boiling with 30% MeOH-KOH for 3 hrs. A KOH melt gave only $BuCO_2H$ and AmOH. Oxidation expts. have thus far given no definite information as to the constitution of I or II. C. J. West

Syntheses of 4-carbolines. Ernst Späth and Edgar Lederer. *Ber.* **63B**, 2102–11(1930).—As harmine is at present of interest as a therapeutic agent, it seemed desirable to apply to the synthesis of other carbolines the method which had been devised for harmine (*C. A.* **24**, 2462). Tryptamine (I) or a substituted I is acylated on the primary N by heating with an org. acid or anhydride, and the *N*-acyl deriv. is converted with P_2O_5 in boiling xylene into the 5,6-dihydro-4-carboline which is subsequently dehydrogenated with Pd sponge to the 4-carboline. P_2O_5 proved far superior to HCl in aq. or abs. MeOH or to $POCl_3$ for the ring closure. Only in the prepn. of 4-carboline itself did the use of P_2O_5 prove unsuccessful; even in boiling tetralin *N*-formyltryptamine gave only 2% dihydro-4-carboline. To overcome this difficulty in prepg. 4-carbolines with no 3-substituent, an attempt was made to use in Kermack, Perkin and Robinson's method (condensation of tryptophan with HCHO and oxidation of the intermediate product with CrO_3) the more readily available I instead of tryptophan, but there was obtained neither 4-carboline with HCHO nor harman with AcH. The synthesis was effected, however, by condensing the tryptamine with HCHO to tetrahydro-4-carboline and dehydrogenating the product. Under the same conditions as used by K., P. and R. with tryptophan, moderate yields of the tetrahydro compd. can be obtained, to be sure, but by a systematic study S. and L. have been able to increase the yield to 65%. An excess of HCHO and too strong acidity must be avoided. Short heating suffices for the condensation to the Schiff base but not for the cyclization to the tetrahydrocarboline. The dehydrogenation was effected with Pd sponge, as with the dihydro compds., but temps. less than 200° had to be used to avoid the formation of compds. of high mol. wt. and high sublimation point. A series of 4-carbolines was prepd. to test the applicability of the method. *3-Ethyl-5,6-dihydro-4-carboline* (II) (0.45 g. from 0.65 g. I and $EtCO_2H$), m. 172–3°; *picrate*, m. 226° (foaming). *3-Ethyl-4-carboline* (III), from the dihydro compd. and Pd sponge at 170°, m. 194–5°. *3-Pr homolog*

of II (1.01 g. from 0.985 g. I), m. 182–3° (*picrate*, m. 231° (decompn.)); of III, m. 211–2° (the HCl salt shows strong blue fluorescence in dil. soln.). *3-iso-Pr homolog* of II (0.32 g. from 0.6 g. I), m. 178–9° (*picrate*, m. 232–5° (blackening)); of III, m. 162–3°. *3-Ph analog* of II (0.168 g. from 0.3 g. I through the *N*-benzoyltryptamine, m. 137–8°), m. 221–2° (*picrate*, m. 240° (foaming)); of III, m. 246–7°. *1-Methyltryptamine* (IV), from $PhNMeNH_2$, $H_2NCH_2CH_2CH_2CH(OEt)_2$ and $ZnCl_2$ at 180°, $b_{0.2}$ 140–70° (bath temp.); *picrate*, yellow, m. 180–1°. IV absorbs CO_2 from the air, forming a cryst. carbonate. *1-Methylharmalan* (0.116 g. from 0.3 g. IV treated with Ac_2O and then with P_2O_5), m. 91–2° (*picrate*, m. 245° (foaming)), dehydrogenated by Pd sponge to *N-methylharman*, m. 102–3°. *1-Methyl-3-ethyl homolog* of II (0.22 g. from 0.4 g. IV), b_1 160–200° (*picrate*, m. 195° (foaming)); of III, m. 124–5°. *5-Methoxytryptamine*, from *p*-$MeOC_6H_4NHNH_2$ and $H_2NCH_2CH_2CH_2CH(OEt)_2$, m. 120–1°; *picrate*, ruby-red, m. 214–5° (foaming). *10-Methoxyharmalan*, m. 208–9°; *10-methoxyharman*, m. 273–4°. *7-Methoxytryptamine*, from *o*-$MeOC_6H_4NHNH_2$, m. 135–6°. *12-Methoxyharmalan*, m. 182–3° (*picrate*, blackens 290°); *harman*, m. 239–40°. *3,4,5,6-Tetrahydro-4-carboline* (V) (65% yield from 0.1 g. I in 6 cc. dil. H_2SO_4 (2 vols. H_2SO_4: 250 vols. H_2O) and 3 drops of 40% HCHO heated 1 min. on the H_2O bath, cooled, made alk., extd. with Et_2O, evapd. and refluxed 45 min. in the above dil. H_2SO_4), m. 207–8°, gives with Pd sponge at 165° 4-carboline, m. 197–8° (VI). *1-Me deriv.* of V, $b_{0.3}$ 140–70°; of VI, m. 108–9°, shows strong blue fluorescence in dil. HCl soln. (*picrate*, m. 258° (foaming)). *10-MeO deriv.* of V, m. 223–4°. *12-MeO deriv.*, m. 217–8°; *picrate*, m. 217–8°. C. A. R.

Porphyrin syntheses. XXXIV. Synthesis of isouroporphyrin I. H. Fischer and Reinhold Siebert. *Ann.* **483**, 1–17(1930); cf *C. A.* **25**, 110—F. and Heisel (*C. A.* **22**, 1132) prepd. isouroporphyrin II by treating 4,4′-dimethyl-3,3′-di-β-methylmalonic acid-dipyrrylmethane-5,5′-dicarboxylic acid with HCO_2H at 40°; the present work describes the prepn. of an isomeric compd. *2,4-Dimethyl-5-carbethoxypyrryl-3-β-methylmalonic acid*, m. 192°, results by the hydrolysis of 7 g. of the di-Et ester with 2.5 g. NaOH in 80 cc. EtOH; *di-Me ester*, m. 127°. Further hydrolysis gives *2,4-dimethyl-5-carboxypyrryl-3-β-methylmalonic acid* (I), decomps. 85°; *tri-Me ester*, m. 125°; partial esterification was not effected. A cold soln. of I in MeOH, treated with HCl for 30 min., gives the *methene-HCl*, $C_{26}H_{33}O_8N_2Cl$, golden yellow, decomps. 211°. I in AcOH with Br-AcOH gives *3,4′-di-β-methylmalonic acid-4,3′,5′-trimethyl-5-bromopyrromethene-HBr*, yellow, decomps. 181°; *tetra-Me ester*, yellow, m. 113°; *HBr salt*, decomps. 202°; *Cu complex*, $C_{48}H_{56}O_{16}N_4Br_2Cu$, needles with green metallic luster, decomps. 152°; *Zn complex*, decomps. 149°; *Ni salt*, needles with metallic luster, decomps. 147°; *Cd salt*, decomps 115°; *Mn salt*, decomps. 153°; *Co salt*, blue metallic luster, decomps. 151°. Heating with satd. HCO_2H-HBr 6 days at 45–50° gives the *tetra-Me ester* of *isouroporphyrin* I, m. 284° and giving a sharp depression with the ester of natural uroporphyrin and isouroporphyrin II; *Cu complex*, $C_{48}H_{52}O_{16}N_4Cu$, m. 289°; heating with 1% HCl 4 hrs. at 180° gives coproporphyrin I. The new compd. is thus *1,3,5,7-tetramethyl-2,4,6,8-tetramethylmalonic acid-porphin*. C. J. West

Crystalline irradiated products from ergosterol and dehydroergosterol. A. Windaus, J. Gaede, J. Köser and G. Stein. *Ann.* **483**, 17–30(1930).—Ergosterol in EtOH, subjected to the action of Hg light at about 75° for 50 hrs., gives a mixt. of *suprasterol I* (I) and *II* (II), sepd. as the allophanates, of which that of I seps. first from C_6H_6. I m. 104°; the Liebermann-Burchard color reaction is olive-green; chloral hydrate at 100° gives a very deep red-violet color; the reactions with Cl_3CCO_2H, $AsCl_3$ and $SbCl_3$ are not characteristic. I appears to be less sensitive to air than ergosterol and vitamin D; yet it is slowly changed in the air, turning yellow and having a lowered m. p.; it is not changed by ultra-violet light; I may be distd. at 0.002 mm. and 190° without change; it is not changed by Na and EtOH. *Benzoate*, m. 96°, $[\alpha]_D^{18}$ −50.0° ($CHCl_3$); *allophanate*, amorphous, m. about 219°, $[\alpha]_D$ −40° ($CHCl_3$). II, m 110°, $[\alpha]_D^{19}$ 62.9° ($CHCl_3$), $b_{0.005}$ 190°; the color reactions are like I. II is not reduced by Na and EtOH. *Oxalate*, m. 165°, $[\alpha]_D^{17}$ 75.3° ($CHCl_3$); *allophanate*, m. 224°, $[\alpha]_D^{18}$ 80° ($CHCl_3$). Catalytic reduction with Pt oxide appears to give a dihydro deriv; further reduction with Pt and AcOH at 70° gives a satd. alc. and a hydrocarbon but ergostanol and epiergostanol were not found. I and II do not show a general absorption beyond 250 mμ. The 2 new compds. are not pptd. by digitonin. Photodehydroergosterol gives a *benzoate*, m. 160°, $[\alpha]_D^{18}$ 134.1° ($CHCl_3$); *phenylurethan*, m. 130°, $[\alpha]_D^{18}$ 98.7° ($CHCl_3$). Catalytic reduction of the Ac deriv. gives a *tetrahydro Ac deriv.*, $C_{29}H_{46}O_2$, m. 106°, $[\alpha]_D^{18}$ 3.8°; the *tetrahydro deriv.* m. 123°, $[\alpha]_D^{18}$ 26° ($CHCl_3$); *benzoate*,

m. 82–3°, $[\alpha]_D^{18}$ 50.2° ($CHCl_3$). The *compd.* $C_{28}H_{28}O_4$, m. 257°, is also obtained in the action of light on dehydroergosterol. C. J. West

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A sterol-like compound from the sepals of the sunflower (Zechmeister, Tuzson) 11D. Sphingomyelin (Merz) 11A. Investigation of the structure of organic liquids in the interior and on the surface (Trillat) 2. Salts and esters of humic acids (Fuchs, Horn) 21.

Heterocyclic bases and nitriles. I. G. Farbenind. A.-G. Brit. 332,623, Feb. 22, 1929. Unsatd. hydrocarbons such as C_2H_2, butadiene, or aldehydes such as acetaldehyde, or mixts. contg. them, together with NH_3 or aliphatic or aromatic amines such as $PhNH_2$, $PhNMe_2$ or the like, are passed in the presence of steam and preferably at temps. of 300–500° (and suitably under pressures up to 20 atm.) over catalysts free from S and S compds. and contg. compds. of metals of the second to seventh groups of the periodic system, at a rate of at least 10 l. of unsatd. hydrocarbon or aldehyde or both per hr. per l. of catalyst. As catalysts there may be used: bauxite, metal oxides such as those of Cd, Al, Zr, Th, Sn, V, Bi, Mo or W or combinations of these with metals such as Cd, Pb, Sn, Sb or Bi. Various examples are given of the production of mixts. contg. quinoline or pyridine bases, nitriles, picolines, etc., suitable for use as solvents, for denaturing alc., destroying "pests," etc. Cf. *C. A.* 24, 2468.

Ethers. N.-V. de Bataafsche Petroleum Maatschappij. Brit. 332,756, Aug. 1, 1929. Aliphatic alcs. contg. at least 2 C atoms in the mol. are heated under pressure in the presence of a dehydration catalyst such as Al oxide or sulfate or Th oxide, at a temp. not exceeding 400° (preferably below 300°). Examples are given of the production of diethyl ether, dipropyl ether (with some propylene), diisopropyl ether, dibutyl ether and diisobutyl ether from the corresponding alcs. The ethers may be used in solvents for *nitrocellulose lacquers*, as in a mixt. comprising butyl ether 10, isopropyl ether 10, toluene 50, EtOH 10, EtOAc 10 and xylene 10%.

Nitro- and amino-aryl ethers. I. G. Farbenind. A.-G. (Arthur Zitscher, inventor). Ger. 506,339, Dec. 25, 1926. *o*-Nitrophenylaryl ethers are prepd. by the action of alkali phenolates or naphtholates on *o*-dinitro compds. of the C_6H_4 series in the presence or absence of solvents or diluents. Reduction by the usual methods yields the corresponding *o*-aminodiaryl ethers, which are *dye intermediates*. Thus, a mixt. of 3,4-dinitro-1-chlorobenzene and PhOK, warmed for 1 hr. on the water bath, yields *5-chloro-2-nitrodiphenyl ether*, m. 85°, reducible to *5-chloro-2-aminodiphenyl ether*, m. 40–41°. Other examples are given also describing the prepn. of (*interalia*) *5-methyl-2-nitrodiphenyl ether*, m 63.5–64.5°, *5,2',5'-trichloro-2-nitrodiphenyl ether*, m. 97–98°, and *5,2',5'-trichloro-2-aminodiphenyl ether*, m. 74–75°.

Vinyl ethers. I. G. Farbenind. A.-G. Brit. 332,605, March 22, 1929. Vinyl monohalides or their homologs contg. at least 1 H atom connected to the C atom of the double bond which is free from halogen are treated with aliphatic, cycloaliphatic or aliphatic-aromatic alcoholates or phenolates in the presence of org. diluents, or mixts. of alcs. with oxides or hydroxides of alkali or alk. earth metals may be used instead of alcoholates, and alcs. or phenols may serve as diluents. Examples are given of the prepn. of vinyl methyl ether, vinyl butyl ether, vinyl phenyl ether, vinyl *o*-cresyl ether, vinyl *m*-cresyl ether, vinyl α-naphthyl ether, vinyl β-naphthyl ether, ethyl isopropenyl ether and ethyl 1,2-dimethylvinyl ether. 2-Chloro-β-butylene (used in prepg. ethyl 1,2-dimethylvinyl ether) is made by splitting off HCl from 2,3-dichlorobutane by use of KOH. Cf. *C. A.* 24, 5306.

* **Aminonaphthol ethers.** Arthur Zitscher (to General Aniline Works). U. S. 1,784,408, Dec. 9. Aminonaphthol ethers are obtained by treating hydroxynaphthalenecarboxamides with alkylating agents and subjecting the ethers of naphtholcarboxamides, thus obtained, to the action of alkali metal salts of HOCl or HOBr according to Hofmann's decompn. reaction. 2,3-Aminonaphthol methyl ether crystallizes from ligroin as colorless brilliant needles, m. about 107°. 2,1-Aminonaphthol ethyl ether crystallizes from alc. as brilliant colorless lamellae, m. 48–9°. 2,6-Aminonaphthol benzyl ether crystallizes from toluene as colorless lamellae, m. about 176°. 2,6-Aminonaphthol methyl ether m. about 156–7°.

Aromatic hydroxy aldehydes. Gustav Reddelien, Hans Langer and Hugo Pfannenstiel (to Winthrop Chemical Co.). U. S. 1,783,584, Dec. 2. See Ger. 494,432 (*C. A.* 24, 2755).

Esters of monocarboxylic acids. I. G. Farbenind. A.-G. (Johannes Brode and Georg Käb, inventors). Ger. 506,437, Mar. 1, 1929. Addn. to 445,565. Ger. 445,565

describes the manuf. of monocarboxylic acids by treating dicarboxylic acids or their anhydrides in the vapor phase and at a raised temp. with steam in the presence of a catalyst, *e. g.*, a metal oxide, silicate or stable carbonate. This process is now modified by using an alc. vapor instead of steam, whereby esters are obtained directly. Thus, a mixt. of MeOH and phthalic anhydride vapors dild. with N, passed over ZnO at 380°, yields methyl benzoate. Other examples are given also.

1-Sulfoaryl-5-pyrazolone-3-carboxylic acid esters. I. G. FARBENIND. A.-G. (Heinz Eichwede and Erich Fischer, inventors). Ger. 504,771, Nov. 28, 1924. See U. S. 1,766,813 (*C. A.* **24**, 4306).

Alkylated phenols. HANS JORDAN (to Chemische Fabrik auf Actien vorm. E. Schering). U. S. 1,782,966, Nov. 25. In reactions such as production of *p*-isopropylphenol and phenol (from *p*-dihydroxydiphenyldimethylmethane), production of 2-methyl-4-isopropylphenol and *o*-cresol (from 4-dihydroxy-3-dimethyldiphenyldimethylmethane) and production of *p*-isobutylphenol and phenol (from *p*-dihydroxydiphenylmethylethylmethane), hydrogenation is effected at a temp. of about 160° and in the presence of a slow-acting hydrogenation catalyst such as a Ni catalyst contg. Bi.

Hydrogenation products of alkylated phenols. HANS JORDAN (to Chemische Fabrik auf Actien vorm. E. Schering). U. S. 1,782,621, Nov. 25. Isopropylcyclohexanol is produced by treating *p*-dihydroxydiphenyldimethylmethane with H under pressure at 170° in the presence of a Ni catalyst contg. Mn until 14 H atoms have been fixed, and subjecting the product to fractional distn. Examples also are given of the production of 1-methylcyclohexanol and 1-methyl-4-isopropylcyclohexanol from 4-dihydroxy-3-dimethyldiphenyldimethylmethane and of the production of 4-isobutylcyclohexanol and some cyclohexanol from *p*-dihydroxydiphenylmethylethylmethane, by similar hydrogenation. Cf. *C. A.* **24**, 4521.

Metal carbamates. I. G. FARBENIND. A.-G. Brit. 332,584, March 20, 1929. The process of producing metal carbamates previously described is modified by the reaction upon a soln. or suspension of a metal compd. (such as NaCl, $CaCl_2$ or $Ca(OH)_2$, BaO, $Zn(NO_3)_2$ or K compds.) in an inert liquid such as EtOH, MeOH or other alc., formamide or liquid NH_3 (which may contain NH_4NO_3 or a small proportion of water), of NH_4 carbamate, to produce the carbamate of the metal, a compd. of which is used. Cf. *C. A.* **24**, 5115.

Alkyl formates. RUDOLF WIETZEL (to I. G. Farbenind. A.-G.). U. S. 1,782,591, Nov. 25. In the manuf. of an alkyl formate such as methyl formate, a liquid aliphatic alc. such as MeOH is acted on with a gas comprising CO together with a substantial amount of an inert gas such as H or N. Purified producer gas may be used. Cf. *C. A.* **24**, 3516.

Alkyl chlorides. JOHN FREI (to E. I. du Pont de Nemours & Co.). U. S. 1,784,423, Dec. 9. In making an alkyl chloride such as EtCl a mixt. of an aq. HCl soln. and an alc. such as EtOH is heated to above 110° in the presence of $FeCl_3$ while permitting the escape of the water vapors formed.

Tetraalkylated thiuram disulfides. HAROLD S. ADAMS and LUDWIG MEUSER (to Naugatuck Chemical Co.). U. S. 1,782,111, Nov. 18. Tetramethylthiuram disulfide is made by treating dimethylamine with CS_2, oxidizing the alkyl dithiocarbamate thus formed to tetramethylthiuram disulfide with H_2O_2 and simultaneously causing the liberated dimethylamine to be converted into addnl. alkyl dithiocarbamate by the addn. of excess CS_2 and oxidized to tetramethylthiuram disulfide until substantially all the dimethylamine has been converted, and recovering tetramethylthiuram disulfide from the reaction mixt. Other tetraalkylated thiuram disulfides may be similarly produced. Various details of procedure are given. U. S. 1,782,112 relates to similar processes.

Splitting sulfo groups from anthraquinonesulfonic acid derivatives. ROBERT E. SCHMIDT (to General Aniline Works). U. S. 1,782,747, Nov. 25. A compd. such as *p*-dimethylaminoanthrarufin-2,6-disulfonic acid is treated in substantially neutral soln. with Na hyposulfite, and the resulting hydro compd. is treated with an alk. agent such as NaOH. Numerous examples of similar reactions are given, with details of procedure.

Substituted guanidines. RALPH V. HEUSER (to American Cyanamid Co.). U. S. 1,784,442, Dec. 9. In the formation of substituted guanidines such as methylphenylguanidine, cyanogen chloride (free from substantial amounts of Cl and HCl) is brought into contact with a secondary arylalkylamine and reaction between the materials is effected in a single operation. Several examples are given.

Guanidine derivatives. J. D. RIEDEL-E. DE HAËN A.-G. (Karl Heinrich, Slotta Rudolf Tschesche and Erich Hesse, inventors). Ger. 504,996, Feb. 24, 1928. These

are prepd. by the action of guanidine or its salts on thiocyanates of the formula R-N:C:S (where R = an aliphatic or substituted aromatic residue) in soln. in the warm. In an example, guanidine thiocyanate and methyl mustard oil are dissolved in anhyd. alc. Na is added and the soln. heated in a water bath. The residue is taken up in water and the soln. treated for 3–4 hrs. with CO_2. The carbonate of methylguanylthiourea is pptd. in a 75% yield. The free base m. 159°. Other examples are given.

Guanidine derivatives. SCHERING-KAHLBAUM A.-G. (Herbert Schotte, inventor). Ger. 506,282, Oct. 29, 1926. Highly alkylated guanidines are prepd. by heating salts of alkylamines or alkylenediamines having 5 or more C atoms in the mol., with approx. an equimol. amt. of cyanamide or its derivs. Thus, isoamylamine sulfate, warmed for 6 hrs. with an alc. soln. of cyanamide, yields isoamylguanidine sulfate, m. 266°. Other examples are given also. Cf. *C. A.* **24**, 4307.

Anthraquinone derivatives. I. G. FARBENIND. A.-G. (Georg Kränzlein, Martin Corell, Heinrich Vollmann and Emil Hausdörfer, inventors). Ger. 506,440, Sept. 10, 1927. Addn. to 495,335. The method of Ger. 495,335 (*C. A.* **24**, 3249) is extended to the prepn. of 2-haloanthraquinone-3-carboxylic acids from 3-aminoanthraquinone-2-sulfonic acid and its substitution products. Examples are given.

Anthraquinone derivative. I. G. FARBENIND. A.-G. (Georg Kränzlein and Heinrich Vollmann, inventors). Ger. 506,439, Dec. 10, 1926. *α-(2-Carboxyphenyl)anthraquinone*, m. 236°, is obtained as the sole product of oxidation when *Bz*-1,2-benzobenzanthrone is treated in the warm with CrO_3 in AcOH soln. An example is given.

Perylene derivatives. FELICE BENSA. Ger. 506,281, Aug. 18, 1925. 3,9-Dicyanoperylene, m. above 360°, is prepd. by heating 3,9-dichloro- or 3,9-dibromoperylene with CuCN. The reaction may be effected in the presence of a solvent, *e. g.*, pyridine or quinoline, and under these conditions a monochloromonocyanoperylene, m. 316°, is obtainable from the dichloro compd. Pressure may also be applied. Examples are given.

Naphthalene derivatives. I. G. FARBENIND. A.-G. (Richard Herz, Werner Zerweck and Fritz Schulte, inventors). Ger. 506,444, Dec. 10, 1926. Addn. to 505,322. The treatment of *o*-cyanonaphthalenesulfonic acids described in Ger. 505,322 (*C. A.* **24**, 5766) is now applied to 1-cyanonaphthalene-4-sulfonic acid and its nuclear substitution products. The reactions may be effected in an open vessel or under pressure. Examples are given.

Mono- and di-halogen-substituted naphthalene derivatives. EDGAR C. BRITTON and WM. R. REED (to Dow Chemical Co.). U. S. 1,784,267, Dec. 9. Naphthalene is subjected to not more than the theoretically required proportion of a halogen such as Br or Cl in a liquid vehicle such as benzene, toluene, a xylene or a chlorobenzene (suitably with a catalyst such as Fe in effecting the production of α-chloronaphthalene, etc.).

Acetic acid from methanol and carbon monoxide. HENRY DREYFUS. U. S. 1,784,583, Dec. 9. MeOH and CO are heated together under substantially atm. pressure to between 100° and 500° (generally 200–350°) in the presence of a catalyst comprising a metal the acetate of which decomposes with formation of HOAc at temps. such as are employed. As catalysts, there may be used oxides, acetates, methylates or other suitable compds. of Cu, Sn, Pb, Zn or finely divided metals such as Zn, Al or Cu.

Chloroacetic acid. HORST BRÜCKNER. Ger. 506,280, Feb. 26, 1927. AcOH is chlorinated at a raised temp. in the presence of a catalyst comprising a mixt. of red P, chlorides of P and I. An example is given.

Aromatic carboxylic acids. I. G. FARBENIND. A.-G. (Friedrich Hans, inventor). Ger. 506,438, Feb. 5, 1926. Addn. to 494,110. The method of Ger. 494,110 (*C. A.* **24**, 2759) is now extended to the oxidation of aromatic aldehydes in general to the corresponding acids. Examples are given.

Acetylene from methane. R. M. WINTER, P. H. HULL, J. FERGUSON and IMPERIAL CHEMICAL INDUSTRIES, LTD. Brit. 332,731, July 12, 1929. CH_4, or gases contg. CH_4, are mixed with O or air and the mixt. is passed through a reaction zone (suitably a silica tube without packing) at a temp. above 1000°. The proportion of O is kept as high as possible while avoiding explosion, and H in the mixt. is desirable. A gauze or mass of metal turnings is used to prevent back-firing.

Acetaldehyde. I. G. FARBENIND. A.-G. Brit. 332,635, April 22, 1929. A mixt. of C_2H_2 and steam is passed over a catalytic mass free from water of hydration, comprising Al oxide activated by one or more dehydrogenating catalysts such as Cd or Zn oxides or sulfides or mixts. of these with chromate, tungstates or molybdates. Examples are also given involving the use of Ni or Co oxides with Al oxide and also in-

volving the use of Cu and Fe sulfides, etc. Temps. of 150–500° are suitable. Cf. *C. A.* **24**, 5768.

Ethylamine. I. G. FARBENIND. A.-G. (Rudolf Wietzel, inventor). Ger. 479,079, Apr. 4, 1925. C_2H_4 and NH_3 are caused to react at a raised temp. and pressure in the presence of a catalyst, *e. g.*, the product obtained by reducing NH_4 molybdate in H. An example is given.

Phenols. HANS JORDAN, WALTER SCHOELLER and REINHARD CLERC (to Chemische Fabrik auf Actien vorm. E. Schering). U. S. 1,784,599, Dec. 9. In producing a satd. phenol such as thymol, H under pressure and in the presence of a hydrogenation catalyst is caused to act at a temp. of 180–320° on a product obtained by condensation in the presence of an acidic condensing agent such as HCl of an alkyl phenol such as *m*-cresol and an aliphatic ketone such as acetone.

Cresol recovery from aqueous solutions. HERMANN SUIDA. U. S. 1,784,711, Dec. 9. An aq. soln. contg. cresol such as that obtained in HOAc concn. is treated with C_2HCl_3, the soln. of C_2HCl_3 and cresol is sepd. from the water and the C_2HCl_3 and cresol are sepd. from each other by distn.

Borneol and limonene. YOSHIO TANAKA and TSUTOMU KUWATA. U. S. 1,784,165, Dec. 9. Pinene or a material contg. pinene is treated with org. acids (such as oxalic acid at 50–100°) in the presence of silica gel as a catalyst, the limonene is distd. and the remaining borneol ester is saponified.

Thymol. WALTER SCHOELLER, HANS JORDAN and REINHARD CLERC (to Chemische Fabrik auf Actien vorm. E. Schering). U. S. 1,784,598, Dec. 9. The product obtained by condensing a crude cresol (substantially a mixt. of *m*- and *p*-cresol) and acetone in the presence of an acid-condensing agent such as HCl is heated (suitably at a temp. of about 300°) to effect decompn. and the decompn. product is treated with H in the presence of a hydrogenation catalyst until 2 H atoms have entered into combination, and the resulting mixt. of thymol and *p*-thymol is subjected to careful fractional distn. Cf. *C. A.* **24**, 4307.

Urea. HARRY C. HETHERINGTON and HERBERT J. KRASE (to Arthur B. Lamb, trustee). U. S. 1,782,723, Nov. 25. In a continuous process for producing urea by heating NH_3 and CO_2 under pressure, the NH_3 and CO_2 which are not converted to urea are sepd. from each other and are then separately returned to the urea-forming system.

Refining anthracene. CHARLES J. THATCHER. U. S. 1,782,488, Nov. 25. Impure anthracene is ground with a solvent such as CCl_4 in such proportion as selectively to dissolve impurities such as oils and phenanthrene and the resulting soln. is sepd. from the purified anthracene. Carbazole may be subsequently removed from the residue.

11—BIOLOGICAL CHEMISTRY

PAUL E. HOWE

A—GENERAL

FRANK P. UNDERHILL

A criticism of Einthoven's law in electrocardiography. ERNEST B. ZEISLER. *Proc. Soc. Exptl. Biol. Med.* **28**, 12–5(1930).—The discussion develops the theorem: A necessary and sufficient condition for Einthoven's law is that Einthoven's triangle be equilateral. It has been repeatedly claimed that this law held *exactly* in electrocardiography. This is obviously an erroneous statement; the line of a lead changes as the elec. axis moves; it may never be in the same plane as the line joining the 2 electrodes; an electrocardiographic lead does not record accurately the projection on a single line of the cardiac potential. The law holds approx. and is of practical use. This refutation is for the sake of scientific accuracy. C. V. BAILEY

The question of the individuality of erepsin. EMIL ABDERHALDEN AND ELLA VON EHRENWALL. *Fermentforschung* **12**, 223–30(1930).—Erepsin prepns., which are entirely free from trypsin, hydrolyze chloroacetyl-*d*-alanine and chloroacetyl-*dl*-leucine but not chloroacetyl-*l*-tyrosine. On the other hand, erepsin-free trypsin prepns. hydrolyze chloroacetyl-*l*-tyrosine and chloroacetyl-*dl*-leucine but not chloroacetyl-*d*-alanine. Thus far no other haloacylamino acids have been hydrolyzed by trypsin-free erepsin. From the biol. point of view it is difficult to see what significance would be attached to an enzyme specific for a substance like chloroacetylalanine which does not occur in nature. The affinity between enzyme and substrate must be especially great

in this instance. It remains to be seen whether an enzyme can be sepd. from erepsin, which would be active toward chloroacetyl-*d*-alanine but leave di- and polypeptides unaltered. Such a sepn. has already been accomplished in the trypsin complex. It has been shown that the specificity of certain enzymes alters with aging. Thus a trypsin prepn. which initially showed no ereptic action readily hydrolyzed leucylglycine after having been kept 1–3 months. Similarly an erepsin prepn. lost its power of hydrolyzing leucylglycine and became active toward tetrapeptides. Perhaps such changes are due to alterations in the inhibitory substances originally present, or else accessory substances undergo changes whereby new activities develop. A. W. Dox

The activator Z and its relation to the growth factor of yeast, bios and the vitamins B. Torb Philipson. *Z. physiol. Chem.* **193**, 15–45(1930).—The discovery of the specific fermentation activator Z (Euler and Swartz, *C. A.* **19**, 525) and the subsequent identification (Eastcott, *C. A.* **22**, 3897) of inositol as a component of bios suggest the desirability of comparing the properties of Z with those of bios and vitamin B_1, and of detg. the role of inositol. After successive treatments of the dialyzate with $Pb(OAc)_2$, $Ba(OH)_2$ and $HgSO_4$, a procedure which ppts. B_1 quantitatively, the Z activity remained entirely in the filtrates. This demonstrates the non-identity of Z with B_1. The methods by which bios is sepd. into bios I and II, *viz.* pptn. by $Ba(OH)_2$ and EtOH, and pptn. by $Pb(OAc)_2$, were applied to the dialyzate contg. Z. The latter, like bios II, remained entirely in the filtrate, but unlike bios II it showed no growth-promoting action. Bios and Z are therefore not identical. Furthermore, addn. of inositol to the filtrate did not confer any growth-promoting properties. The Z activator is rather easily sol. in concd. EtOH, about 3000 units dissolving in 1 l. of 95% EtOH. By pptg. the dialyzed Pb filtrate with $HgCl_2$ and adding NaOH to p_H 10 a partial sepn. is effected. The sum of the sep. activities of the 2 fractions thus obtained is approx. equal to the activity of the original soln. The activity of the combined fractions, however, is less than that of the original soln. Addn. of inositol to fraction II compensates the loss of activity incurred by the removal of fraction I. It appears, therefore, that activator Z is not an individual substance. Whether its components have an additive effect, or a mutual influence in the sense of enzyme and coenzyme, is not yet detd. A. W. D.

Acetyl bases from proteins. Niels Troensegaard, Fritz Wrede and H. G. Mygind. *Z. physiol. Chem.* **193**, 49–55(1930); cf. *C. A.* **20**, 3017.—Finely powd. dry protein was treated with HBr in AcOH, whereby the greater part was dissolved, then the mixt. was refluxed with successive portions of AcCl, evapd. to a sirup, and the latter heated in an oil bath with Ac_2O and NaOAc. The evapn. residue was extd. with Et_2O, the residue dissolved in AcOH and treated with Et_2O to ppt. the acetylprotein, and the latter given a further acetylation treatment. The combined Et_2O exts. contg. the "acetyl bases" were evapd. and fractionated *in vacuo*. The first fraction up to 100° at 15 mm. consisted mainly of AcOH, Ac_2O and $AcNH_2$. Fraction II from 80° to 130° at 0.3 mm. contained some Ac_2NH and Ac_3N, and a *base* $C_{10}H_{14}N_2O_2$ which was isolated as the *chloroaurate*, m. 193°. The HCl salt of this base gave no ppt. with EtOH or with alc. $H_4Fe(CN)_6$, an oily ppt. with picric acid, a copious ppt. with phosphotungstic acid, neg. reactions for NH_2, MeO and MeNH, neg. diazo and Millon reactions, and no acyl deriv. with *m*-$O_2NC^6H_4COCl$ or $PhSO_2Cl$. Fraction III, obtained from 130° to 200° at 0.3 mm., yielded a *base* $C_8H_{11}N_3O$, which was isolated as the *chloroaurate*, m. 184° (decompn.). It formed a *chloroplatinate* which blackened at 260° without melting; a *hydrochloride* which gave pos. diazo and Zimmerman reactions, and neg. biuret, Van Slyke, Millon, MeO and MeNH tests; and a *m-nitrobenzoyl deriv.*, m. 185°. Both bases were obtained from serum globulin, serum albumin, globin, fibrin and casein. Gliadin gave only the C_5 base, while silk fibroin gave neither one. The yield of bases averaged 0.5% of the protein. A. W. Dox

Sphingomyelin. Wilhelm Merz. *Z. physiol. Chem.* **193**, 59–87(1930).—Sphingomyelin was prepd. from human brain and purified until the P:N ratio was 1:2. Its properties agreed with those described by Levene, except that $[\alpha]_D$ was 5.31–5.83° instead of 7.5–8.2°. Catalytic hydrogenation increased the rotation to 12.85°, and acetylation of the hydrosphingomyelin gave an Ac deriv. with Ac content in agreement with that calcd. on the basis of 1OH. All evidence thus far substantiates the structural formula proposed by Levene. The only uncertainty is in regard to the fatty acid component. An elaborate fractionation was made by fractional extn. with MeAc in which sphingomyelin is difficultly sol., but all 6 fractions showed approx. the same compn. All contained the 3 acids, stearic, lignoceric and nervonic. Conclusion: Sphingomyelin is a mixt. of 3 substances differing only in their fatty acid component. These 3 sphingomyelins are of the same structure as the cerebrosides except that they contain a phosphoric acid choline ester in place of galactose. A. W. Dox

The influence of a mash of onions on the formation of Liesegang's rings. A. Th. Czaja. *Biol. Zentr.* 50, 577–81(1930).—The disturbance on the formation of Liesegang rings in gelatin can be observed with all parts of the onion (*Allium cepa*). It is due to the action of allyl sulfide and of allyl thiocyanate. Mitogenetic irradiation has nothing to do with this observation. A. E. Meyer

Essential oil and mitosis. B. P. Tokin and A. S. Baranenkowa. *Biol. Zentr.* 50, 633–6(1930).—The division of embryonic cells is stimulated by essential oil from onions. The corresponding observations, as obtained with a mash from onions (*Allium cepa*), may be obtained by the action of the essential oil and not by the supposed mitogenetic irradiation. A. E. Meyer

Enzymic destruction of histidine. Fr. Kauffmann and E. Mislowitzer. *Biochem. Z.* 226, 325–37(1930).—The NH_3 production from histidine by pulp and glycerol exts. from liver of guinea pigs, rabbits, cats and dogs has been studied experimentally, with the general result that the splitting off of NH_3 can be attributed to the action of a desamidase. S. Morgulis

Effect of animal charcoal on glucose in the presence of dehydrating intermediate bodies. Fritz Zuckerkandl and Louise Messiner-Klebermass. *Biochem. Z.* 226, 395–400(1930).—Glucose is not affected if it is heated alone with animal charcoal, but disappears if this is done in the presence of *p*-phenylenediamine or some other aromatic amine, and a difficultly sol. condensation product is formed which is adsorbed on the charcoal. Similarly, glucose is attacked by amino acids in the presence of charcoal. In both cases apparently the amino groups change to imino groups which dehydrate the glucose. It is supposed that in the organism also quinone or imino-forming groups attack the glucose mol. as a first step in the degradation of glucose. S. Morgulis

Studies on the thermolability of enzymes. I. Behavior toward heating of peroxidase extracts purified by ultrafiltration. A. Bach and B. Wilensky. *Biochem. Z.* 226, 482–8(1930).—Reddish peroxidase exts. freed as nearly as possible of non-colloidal components by ultrafiltration are more heat resistent than the original ext. At boiling temp. both the colloidal ultrafiltration residue and the original ext. are equally inactivated but the former regenerates its activity quickly. The degree of regeneration decreases with the duration of the boiling. After 10 min. heating in the boiling water bath the regenerated activity attains a max. after 1–2 hrs. which is only 40% of the original activity, whereas the untreated ext. shows no regeneration at all. The colloidal ultrafiltration residue is irreversibly inactivated only after 5 hrs. heating in the boiling water bath. S. Morgulis

A new enzymic oxidation action (metaoxidase). I. Boas. *Biochem. Z.* 227, 135–9 (1930).—The oxidative enzymes of plants are inactivated by dil. org. or inorg. acids, but on neutralization their activity is restored, but metaoxidase is irreversibly inactivated under similar conditions. Animal products which are rich in oxidases are lacking in metaoxidase. Furthermore while the oxidase and peroxidase contents of various plants are not materially affected by keeping them in 3% H_2O_2, the metaoxidase on the contrary is completely destroyed. The metaoxidase is easily sol. in H_2O, also in dil. alc. or glycerol, but insol. in concd. alc., ether, Me_2CO, $CHCl_3$ or petr. ether. The activity of the enzyme is not destroyed by very dil. acids but is rapidly lost when the acidity is sufficient to change Congo red to blue. Dil. alkalies do not decrease its action. The enzyme is extraordinarily resistant to undercooling. It is distinguished from the phenolases by the following characteristics: The tyrosinase reaction with benzidine is from reddish brown to black (melanin); this change is greatly accelerated by a little H_2O_2. The metaoxidase reaction is rose or cherry-red at the start, becoming gradually darker but never black. Apples, pears, plums, cherries, peaches, apricots or celery give only the metaoxidase but no tyrosinase reaction. Tyrosinase is not taken up either by ether, Am alc. or $CHCl_3$, but the reaction product of metaoxidase after standing with these reagents can be sepd. out by shaking, and they give the characteristic rose or deep red color. S. Morgulis

Method for the preservation and embalming of corpses merely by penetration of antiputrefying gases into the organism without introduction of any liquid in the blood vessels. M. Pietri. *Ann. méd. légale criminol. police sci.* 10, 578–81(1930).—In the Deternitas method, the corpse is placed on a linen mattress which contains 5 kg. of sawdust with 500 g. each of vegetable charcoal, $KMnO_4$, camphor and naphthalene, and which has been sprinkled with 2.5 l. of a mixt. of equal parts of thymol, formalin, alc. and benzoic acid. The coffin is then hermetically sealed. Not only is putrefaction prevented, but even if it has reached an advanced stage, after 3 days all signs of putrefaction have disappeared and the corpse recovers its normal *postmortem* appearance. A. Papineau-Couture

Protein coagulation and its reversal. Improved methods for the reversal of the coagulation of hemoglobin. A. E. MIRSKY AND M. L. ANSON. *J. Gen. Physiol.* **13**, 477–81(1929–30).—Methods are described for the prepn. of sol. cryst. hemoglobin from hemoglobin denatured by HCl or trichloroacetic acid. The yield is about 75%. The coagulation of hemoglobin is probably reversible. C. H. RICHARDSON

Descendence and biochemistry. PAUL KRÜGER. *Biol. Generalis* **6**, 483–570 (1930).—A lecture. More than 2 pages of references are given. G. SCHWOCH

Hypotheses on biological radiations. PAOLO IACCHIA. *Rass. clin. terap. sci. affini* **29**, 66–9(1930). G. SCHWOCH

Intestinal nucleotidase. P. A. LEVENE AND ROBERT T. DILLON. *J. Biol. Chem.* **88**, 753–69(1930).—The comparative rates of sepn. of free phosphate ion from org. combination by means of intestinal nucleotidase of dogs are studied. Hexosemonophosphate, derived from β-diacetone fructose, and glycero phosphate are the most rapidly hydrolyzed, the latter being taken as standard. The amt. of enzyme capable of liberating 1 mg. P as phosphate from glycero phosphate substrate in the first hour is adopted as the unit of activity. This effect is independent of substrate concn. The phosphate is detd. colorimetrically (Kuttner and Cohen, *C. A.* **22**, 606). Uridinephosphoric acid is split as rapidly as many sugar esters (0.8 times the standard rate); adenylic and inosinic acids are split more slowly, and yeast thymonucleic acid is split about 10 times as slowly. Simple acetone pptn. of the intestinal secretion increases the activity 15-fold. K. V. THIMANN

Diastatic activity of honey (LAMPITT, *et al.*) **12**. The sterilization of flour and of enzymes in powdered form (VAN DE VELDE) **12**.

B—METHODS AND APPARATUS

STANLEY R. BENEDICT

The detection of albumose in urine. FRANZ ERBEN. *Wiener klin. Wochschr.* **43**, 1091–2(1930).—Heating with sulfosalicylic acid produces an irreversible ppt. with coagulable protein. A ppt. in the cold which dissolves on heating may be an albumose or Bence-Jones protein. D. B. DILL

Detection of acetone compounds in urine. PH. HORKHEIMER. *Pharm. Ztg.* **75**, 592–4(1930); cf. *C. A.* **24**, 3525.—A review of the more important methods for detecting AcMe, $AcCH_2CO_2H$ and $CH_3CHOHCO_2H$, with some suggestions for carrying out the more promising tests. W. O. E.

A new rapid method for the determination of magnesium with one cubic centimeter of blood, without preliminary elimination of calcium. SHUN ICHI YOSHIMATSU. *Tohoku J. Exptl. Med.* **14**, 29–35(1930).—The Mg is pptd. as Mg hydroxyquinoline complex from deproteinized blood filtrate by addn. of alc. soln. of *o*-hydroxyquinoline. The ppt. is dissolved in HCl and a colorimetric detn. is made with phenol reagent and carbonate soln. as in a phenol detn. L. E. GILSON

Methods for determining the sexual hormone of men. P. DE FREMBERY, J. FREUD AND E. LAQUEUR. *Arch. ges. Physiol.* (*Pflügers*) **225**, 740–1(1930).—The stimulation of growth in the capon's comb by the male hormone is utilized for its quant. estn. ARTHUR GROLLMAN

Absorption ratios of biological stains. W. C. HOLMES AND A. R. PETERSON. *Am. Dyestuff Reptr.* **19**, 689–92(1930).—See *C. A.* **24**, 4314. MILTON HARRIS

Nature of the blood sugar. LEWIS B. WINTER. *Biochem. J.* **24**, 851–5(1930).—The blood sugar of the rabbit was isolated as α-glucose. The proteins are first pptd. by the Folin-Wu reagents, the filtrate is concd. and Pb acetate added. The mixt. is centrifuged, the clear soln. is cooled, made alk. to ammonia and again centrifuged. The treatment with Pb acetate and NH_3 is repeated. The Pb ppt. is washed with 80% alc. and decompd. with 2 *N* H_2SO_4. The material is centrifuged, and 4 vols. alc. are added to the clear soln. The material is centrifuged, the soln. is cooled in ice, and baryta in CH_3OH is added. The Ba compd. is sepd. in the centrifuge, the ppt. is suspended in 80% alc. and decompd. with CO_2. The ppt. is filtered off and the soln. evapd Eighty % alc. is added, insol. material filtered off, and the soln. is allowed to evap. slowly over H_2SO_4. The colorless sirup which is left begins to crystallize on stirring. The crude product is twice recrystd. from MeOH, m. p. 145–146°. Analysis (%): C 39.73, 39.87; H 6.71, 6.64; $C_6H_{12}O_6$ requires C 40.00, H 6.66. The optical activity, mol. wt. detn. and the prepn. of the phenylosazone, as well as the pentaacetate, support the view as to the formula of the substance. BENJAMIN HARROW

Carbohydrate metabolism of normal and tumor tissue. I. A method for the

measurement of the respiratory quotient. FRANK DICKENS AND FRANTISEK SIMER. *Biochem. J.* **24**, 905–13(1930).—The O_2 consumed and CO_2 produced are detd. by readings on the same manometer. The measurement is made on thin slices of tissue, suspended in CO_2-free Ringer soln., buffered with phosphate and in equil. with pure O_2. The CO_2 formed is absorbed by $Ba(OH)_2$. The diminution in pressure which occurs is used for the calcn. of respired O_2. After a definite time an excess of strong acid is added, and the CO_2 is given up from the $Ba(OH)_2$, phosphate and tissue. The resulting pos. pressure is used for the calcn. of the total CO_2 at the end of the expt. This figure, corrected for the CO_2 content at the beginning of the expt., gives the amt. of CO_2 formed in respiration. BENJAMIN HARROW

A sensitive test for cysteine. ROBERT FLEMING. *Biochem. J.* **24**, 965–6(1930).—Cysteine-HCl reacts readily with dimethyl-*p*-phenylenediamine-HCl when heated with $FeCl_3$, giving a deep blue color; the color is stable. BENJAMIN HARROW

Colorimetric determination of cystine by means of the uric acid reagent. CLAUDE RIMINGTON. *Biochem. J.* **24**, 1114–8(1930).—A modification of Folin's method (*C. A.* 23, 4402). To 2 cc. cystine soln., or vol. equivalent to about 1 or 1.5 mg. cystine, add 1 cc. of 20% Na sulfite (Merck's) and wait a min. Add 8 cc. of 3 *N* Na_2CO_3 soln., 5 cc. 40% urea soln., mix and run in 4 cc. of Folin and Marenzi's uric acid reagent. After 5 min. make up to 25 cc. (or 50 cc. if preferred) with 3% Na sulfite (Merck's) soln. and proceed with the colorimetric comparison. BENJAMIN HARROW

Determination of blood sugar. I. Critical analysis of the reduction of alkaline copper reagents by glucose and other substances. SIDNEY L. TOMPSETT. *Biochem. J.* **24**, 1148–63(1930).—The amt. of reduction of the Shaffer-Hartman alk. Cu reagent is greater when carried out in N_2 than in air. When the K salts are not incorporated in the reagent but are added as a sep. soln. after reduction, the reduction is the same in N_2 and in air. The amt. of reduction by glucose of alk. Cu solns. contg. $CuSO_4$, tartaric acid and Na_2CO_3 depends on the relative concns. of the 2 latter substances. Bicarbonates can replace tartrates in alk. Cu solns. Uric acid, creatinine and urea do not affect blood-sugar detns.; but, under certain conditions, glycine, aspartic acid, glutamic acid, tryptophan and cystine do. The modified alk. reagent suggested is (1) $CuSO_4.5H_2O$ 10 g.; tartaric acid 15 g.; Na_2CO_3 (anhyd.) 80 g.; all 3 dissolved in 1 l. (2) Na_2CO_3 (anhyd.) 40 g.; tartaric acid 7.5 g.; KI 10 g.; K iodate 0.7 g.; K oxalate 18.4 g.; all dissolved in 1 l. To run a detn. in a 3 × 1″ centrifuge tube 10 cc. of a protein-free blood filtrate and 10 cc. of (1) are mixed. This is heated in a boiling water-bath for 15 min. It is then cooled and centrifuged. The supernatant fluid is removed and the Cu_2O washed twice with distd. water. Ten cc. of (2) is added to the Cu_2O, followed by 10 cc. *N* H_2SO_4. The whole is well stirred to dissolve the Cu_2O and then titrated with 0.0125 *N* thiosulfate. A blank is run using distilled water. One mg. glucose = 3.3 cc. 0.125 *N* thiosulfate. **II. Effect of different deproteinizing agents upon the estimation of blood sugar.** *Ibid* 1164–71.—By the use of the method suggested above, the sugar content of tungstic acid filtrates is detd. completely. Non-sugar substances present in the filtrates do not affect the results. BENJAMIN HARROW

New method for the separation of the products of protein hydrolysis. MARY AGNES BURNISTON BRAZIER. *Biochem. J.* **24**, 1188–98(1930).—The sepn. is based on the different solubilities of the Cu salts of the amino acids in different solvents. 93.5% of the hydrolyzate from zein was traced. BENJAMIN HARROW

Influence of electric polarization upon the stainability of nerve. K. SATO. *Folia Anat. Jap.* **7**, 33–43(1929); *Stain. Tech.* **5**, 154.—Bethe's method of elec. polarization was used to study the stability of the sciatic nerve of the frog. In the cathodic portion, the stainability was generally weak. Reaction of the dye, unequal distribution of fibrillar acid or the nature of the electrode made no difference. The d. of the tissue at both poles is very important from the standpoint of the phys. theory of staining. At the deep staining anodic portion not only the axis cylinders, but also connective tissue and nuclei were condensed while at the less staining cathodic portion, they were loosened. In general, loose tissue which is fluid will not satisfactorily hold any stain, while those which are compact and poor in fluid do not lose the stain already imbibed. The difference in d. of the tissue at both poles is caused by some vital phenomenon during electrification. The latter is absent in narcotized, poisoned or heated nerves. The difference in stainability is influenced by the intensity and duration of the elec. current, by the nature of the medium in which the nerve prepn. is kept, and by the temp. During the passage through the tissue, K ions travel to the cathode faster than Ca ions. The ratio K/Ca becomes greater than normal, and it decreases at the anode. This may explain why the tissue becomes loose at the cathodic and dense at the anodic portion. K enhances the cathodic effect and makes the difference of d. and stainability

of the tissue more pronounced, while Ca inhibits the effect and minimizes the difference. C. R. FELLERS

Determination and preparation of cystine. Y. OKUDA AND T. KOBAYASHI. *Bull. Agr. Chem. Soc. Japan* **5**, 65–7(1929); cf. *C. A.* **20**, 1094.—The original method proposed by O. for detn. of cystine is compared with the modified method suggested by Teruuchi and Okuda. With gelatin and added cystine, the recovery of cystine by the original method was 99.3–99.9, whereas by the modified method it was 87.8–89.5%. A procedure is given for the sepn. of cystine from hair. The crystn. of tyrosine is retarded in the presence of NH_4OAc at p_H 4.5, whereas that of cystine is not affected. W. D. LANGLEY

Biochemical gravimetric methods. II. Gravimetric determination of potassium on a torsion balance. L. JENDRASSIK AND P. PETRÁS. *Biochem. Z.* **226**, 381–6(1930); cf. *C. A.* **24**, 3527.—K is pptd. as $K_2Na[Co(NO_2)_6].6H_2O$ with the pptg. reagent of de Koninck. The ppt. is collected on a small weighed filter which is dried at 105° and again weighed by means of a torsion balance which has a capacity of 500 mg. To avoid losses of ppt. the edge of the filter is covered with a satd. soln. of paraffin in ether (dild. 1:20 with ether before using). An empirical correction of 0.5 mg. for the paraffin must be introduced. The wt. of the ppt. multiplied by 0.1574 gives the quantity of K. For urine analysis, 5 cc. K-free *N* NaOH is added to 100 cc. urine and this is warmed at 60° for 20 min. to remove NH_3. Neutralized with AcH the urine is placed in a volumetric flask and its original vol. restored by addn. of water. With urines contg. albumin it is advisable to remove this first by pptn. with 1 vol. of 10% Pb acetate and 9 vols. urine. Of the urine so prepd. 4 cc. is used for a detn. The results are accurate to ± 3%. S. MORGULIS

Iodization of peptone. P. BRUNO. *Giorn. farm. chim.* **79**, 308–9(1930).—By heating 360 g. of a peptone (Peptone Terapeutico Società l'Industria di Prodotti Biochimici di Favria) with 100 g. I in 350 cc. H_2O in a water bath B. obtained products which did not contain free I and which were completely sol. in H_2O. G. SCHWOCH

Studies on the plasma calcium-raising principle of bovine parathyroid glands. I. A method of preparation and some observations on the yield, solubility and stability of the product. WILBUR R. TWEEDY. *J. Biol. Chem.* **88**, 649–57(1930).—The glands are extd. 20 min. with 3% HCl at 70°, the filtered ext. is neutralized, treated with cold acetone and pptd. with 2.5% CCl_3COOH. The centrifuged ppt. is dried *in vacuo* at room temp., and extd. with $CHCl_3$ until free from fat. The yield is 1.2–2.9 mg. per gland, of a powder which does not lose activity on storing 8 months, is half inactivated on heating 10 days at 100°, and entirely inactivated by 36 hrs. exposure to a Hg vapor arc, by heating 20 min. at 70° with ½% HCl in alc., or by suspending 1 hr. in abs. alc. satd. with HCl gas at 10°. The soly. in 0.9% NaCl is in some cases increased by suspension in aq. acid alc. and repptn. with Et_2O. The product is sol. in 94% HOAc but not in the anhyd. acid, insol. in (though not pptd. by) pyridine, and 10% sol. in phenol or *o*-cresol. K. V. THIMANN

The determination of inorganic sulfate in serum. ROGER S. HUBBARD. *J. Biol. Chem.* **88**, 663–8(1930).—The method previously described (*J. Biol. Chem.* **74**, v 1927) and modified by Wakefield (*C. A.* **23**, 4239) is given in detail. K. V. T.

The determination of peptic activity; an examination and application of the Gates method of proteolytic enzyme titration. ALFRED GILMAN AND GEORGE R. COWGILL. *J. Biol. Chem.* **88**, 743–52(1930).—The Gates method (*Proc. Soc. Exptl. Biol. Med.* **24**, 936, 1926–7) is developed and given in detail. About 0.5 cc. of the soln. at p_H 2 is placed in a cylindrical cell, made by cementing a ring of Cu wire to a glass square with paraffin, and roofed with a fragment of photographic film developed to a standard opacity. After allowing to digest 10 min. at 25°, the resulting opacity of the film is detd. by a colorimeter, and the peptic activity expressed in terms of the standard, com. pepsin diluted 1:10,000. Ten detns. can be made per hr. The method is best applicable to very high dilns. of the enzyme. K. V. THIMANN

Radiometric microdetermination of sugar (EHRENBERG) 7. Combined use of the photoelectric cell and projection microscope (SAVAGE, JAMIESON) 1.

C—BACTERIOLOGY

CHARLES B. MORREY

A method for the purification of bacteriophage. C. E. CLIFTON. *Proc. Soc. Exptl. Biol. Med.* **28**, 32–3(1930).—Fifty cc. of a suspension of *Staphylococcus* bacteriophage in Martin's broth is stirred for 1 hr. with 50 cc. of a 3.5% suspension of $Al(OH)_3$.

This is collected on a Buchner funnel and washed 5 times with distd. H_2O. The washed alumina mass is stirred for 1/2 hr. with 50 cc. of 0.5% soln. of $(NH_4)_2HPO_4$ and kept at 32° overnight. The alumina is filtered off by suction and the bacteriophage is recovered in the filtrate with but slight loss of activity. The filtrate does not give the ordinary color tests for protein and no ppt. was formed by 1/2 or by complete satn. with $(NH_4)_2SO_4$. C. V. BAILEY

The present status of lactenin. F. S. JONES AND H. S. SIMMS. *Science* **72**, 456–7 (1930); cf. *C. A.* **24**, 1405.—Lactenin is a bacteriostatic substance in milk. It prevents the growth of the mastitis streptococcus for 6 hrs. but after this growth is rapid because of the adaptation of the streptococcus to lactenin. It is assocd. with proteins. The activity is maintained after months in the refrigerator. The lactenin-contg. material in concd. form is quite insol. because of its combination with $Ca_3(PO_4)_2$. Dried prepns. are 200 to 500 times as active as dried skimmed milk. It contains only C, H, O and N. RACHEL BROWN

Some chemical changes accompanying the growth of bovine tubercle bacilli on Long's synthetic medium. ALICE G. RENFREW, KATHERINE M. HARING AND TREAT B. JOHNSON. *Am. Rev. Tuber.* **22**, 116–20(1930); cf. *C. A.* **24**, 137.—Growths of bovine tubercle bacilli, of human and avian tubercle bacilli and of timothy bacilli were followed for a period of 16 weeks. Carbohydrate combinations, as judged by the Cu-reducing properties of the cultures, made their appearance after the third week of growth. The analytical values for reducing sugars after hydrolysis were much higher with bovine bacilli than for avian and timothy cultures, but less than half the value detd. for the human strain, H37. H. J. CORPER

The nature of the growth-promoting principle in the potato in the cultivation of bacteria and especially of the tubercle bacillus. NAO UYEI. *Am. Rev. Tuberc.* **22**, 203–17(1930).—Practically all of the active principles in the potato are to be found in the residue of the potato after its extn. with the common org. solvents, such as acetone, alc. or ether. Investigation of the effects of the various elements known to be present in the potato revealed 2 classes of stimulants for the growth of tubercle bacilli. One class is represented by inositol, maltose and glucose, and is termed metabolic stimulants, because they stimulate the growth of tubercle bacilli only when the bacilli are present in large nos., while the other class of stimulant is represented by sol. starch and dextrin, and is termed reproductive stimulants, because they stimulate the growth of tubercle bacilli not only when these are in large nos., but also in small nos. Glycogen does not appear to possess the property of stimulating the growth of tubercle bacilli *in vitro*, and future studies will be required further to elucidate this. H. J. C.

Do bacteria contain sterols? H. v. BEHRING. *Z. physiol. Chem.* **192**, 112–3 (1930).—Pure cultures of *E. coli* and diphtheria bacilli, which had been cultivated on a sterol-free petone-agar medium, were hydrolyzed and tested for sterols by the usual color reactions and by digitonin pptn. Not a trace of sterol was found. Sterols are therefore not essential to life. They are probably concerned with functions which make their appearance a little higher up in the evolutionary scale. A. W. DOX

Growth of anaerobes in bile media containing malachite green and brilliant green. CHARLES F. POE AND NORMAN F. WITT. *J. Am. Water Works Assoc.* **22**, 1365–73 (1930).—The dyes referred to in concns. greater than 1:100,000 in lactose broth inhibit anaerobic growth, with the exception of *C. welchii* which requires at least 1:20,000 concn. to prevent gas formation. Results are not so good when bile is added. With 5% bile, 1:20,000 brilliant green and 1:30,000 malachite green are necessary and as the percentage of bile increases the inhibition power of these dyes decreases. D. K. FRENCH

The formation of pigment by Bacterium prodigiosum (Serratia marcescens). W. MOYCHO. *Compt. rend.* **191**, 497–9(1930).—This pigment "prodigiosine" is the best known of all bacterial pigments. It has the formula $C_{20}H_{25}N_3O$. M. found that the pigment is formed after the greatest development of the culture. In the first 2 to 3 days, while the bacteria are growing, very little pigment is perceptible, but when the bacteria cease to multiply, prodigiosine is formed. It is apparently formed at the death of the bacteria. This prodigiosine needs for its formation, besides death and autolysis of the cell, the presence of O. M. demonstrates this by removing O from the atm. by means of KOH and pyrogallol and in spite of a great disappearance of bacteria, no prodigiosine is formed. It is also not formed in abundant but young cultures, which have been killed by ether, chloroform or if heated at 70°. However, the addn. of oxygenated water to cultures killed in this way favored the appearance of prodigiosine. F. R. GREENBAUM

Fermentation of rice straw by Bacillus acetoethylicus. VINAYAK NARAYAN PAT-

WARDHAN. *J. Indian Chem. Soc.* 7, 531–6(1930).—Previous work has shown that *Bacillus acetoethylicus* will ferment 2 or 3% pentose solns. forming alc. and acetone, and some formic and acetic acids. In this work, this organism was trained to ferment 7% pentose solns. from hydrolyzed rice straw. In this concn., however, the alc.-acetone yield was too low to make the process practical. In order to train the bacillus to ferment these high concns. it was necessary to include a small quantity of hexose in the medium whenever the pentose concn. was raised. AMY LEVESCONTE

The effect of the initial reaction of Raulin's medium upon the culture of Sterigmocystis nigra. (Preliminary note.) CONSTANTINO LOPARDO, JUAN B. MARGARA AND JOSE DEL VECCHIO. *Ann. farm. bioquim.* 1, 111–8(1930).—*Sterigmocystis nigra* cultivated at 37° in Raulin's medium of reaction from p_H 1.9 to p_H 6.7 produces an increasing acidity in the medium to a max. of p_H 1.8 which it reaches on the third day. The acidity then begins to decrease. B. S. LEVINE

Problems of the nitrogen cycle. II. Further studies on the proteolytic activity of microbes. ALEXANDER JANKE AND HANS HOLZER. *Biochem. Z.* 226, 243–9(1930); cf. *C. A.* 24, 396.—Expts. were made on normal bacteria and molds and those weakened by a previous treatment with $CHCl_3$. It was found that decompn. of casein proceeds more vigorously with normal than with $CHCl_3$-weakened individuals in the so-called liquefying organisms, whereas the opposite effect was noted in non-liquefying organisms. Conclusion: The proteolytic enzymes occur as exoenzymes in the former and as endoenzymes in the latter. S. MORGULIS

The lecithinase of bacteria and the problem of the bacteriolysis of acid-fast bacilli in lecithin emulsions. TADAO TODA. *Centr. Bakt. Parasitenk.*, I Abt., 117, 489–94 (1930).—Many bacteria split lecithin because of the formation of a lecithinase. The lecithinase produced by *Salmonella paratyphi* and *Serratia marcescens* works best at 40°. Its action is not lost when the bacteria are killed by heat. Complete disintegration of acid-fast bacilli by lecithin emulsions was not observed. Probably the loss of the acid-fast property in lecithin emulsions is due largely to the splitting off of fatty acids by the lecithinase. JOHN T. MYERS

Bacteriological contribution to the knowledge of endocarditis lenta. Transformation of Streptococcus viridans into a hemolytic streptococcus. ANNA PINELLI. *Pediatria Rivista* 38, 959–66(1930).—Blood cultures were carried out on a child affected with endocarditis lenta. The examns. on the 58th and 48th day before death revealed the presence of *Streptococcus viridans*, while on the 20th day before death only a hemolytic streptococcus was found. Evidence is presented that the *S. viridans* had been transformed into the hemolytic form. G. SCHWOCH

The pathogenicity of strains of the Löffler bacillus isolated from children affected with diphtheria during the last epidemic. A. SIGNA. *Pediatria Rivista* 38, 1047–57 (1930).—Diphtheria strains were isolated from cases treated in the Pediatric Clinic of the Univ. of Palermo during the epidemic of 1928–9. The detn. of their virulence and toxicity and the comparison of these data with those obtained by Gerbasi in the same institute from cases of the epidemic 1922–3 showed that the pathogenic properties of the strains isolated in 1928–9 are considerably greater than those of the strains isolated in 1922–3. This is perhaps a contributing factor to the increase in fatalities which have resulted from diphtheria during the last few years. G. SCHWOCH

The bacteriological chemistry of the heavy metals. E. A. COOPER AND S. D. NICHOLAS. *J. Soc. Chem. Ind.* 49, 386–8T(1930).—In general Cd compds. are bactericidal. $CdCO_3$ and CdS readily form stable sols, but the phosphate and molybdate do not, while the behavior of Pb salts is the reverse. The bactericidal action of the complex pyrophosphates of the heavy metals with Na was detd. by their effect on the dissolved O absorption of a sewage effluent, as measured by Winkler's method. Na mercurous and Na cadmic pyrophosphates are active in concns. of 1:1,000,000 and 1:10,000, resp. At high dilns. the corresponding Pb compd., and also Pb acetate, crotonate, and maleate definitely stimulate bacterial activity. K. V. THIMANN

D—BOTANY

THOMAS G. PHILLIPS

Nutrient assimilation and growth of buckwheat (Fagopyrum esculentum). A contribution to the t-yield law of higher plants. K. MAIWALD. *Z. Pflanzenernähr. Düngung u. Bodenk.* 17A, 12–42(1930).—The assimilation of nutrients and the formation of matter by the buckwheat were tested in pot expts. The absorption of the N was proportionately more rapid than the total growth of the buckwheat plant as measured by the formation of the total dry matter. The CaO assimilation increased proportionately with the formation of dry matter. However, the assimila-

tion of N had a parallel in the development of some parts of the plant; thus, the formation of dry matter of leaves and roots followed exactly the total N assimilation. With some deviations, the formation of leaf surfaces follows the N assimilation also. Expressed in proportional nos., at 50% of the final dry wt. production, the N assimilation and the development of leaves and roots are about 95% of their maximum; the leaf surface about 80%—or an excess of from 30 to 45% for these growing parts on the basis of the total dry matter at the time. The data for CaO assimilation deviate at most 3-6% of the relative formation of the total dry matter. Except at the point of greatest assimilation, the relative amts. of N assimilation and the amt. of leaf- and root-growth are closely correlated during 10 growing periods. Except for the deviations noted, the hastened N assimilation amounting to 55% and a 15% assimilation of CaO in the stems at one stage the exptl. data of 8 different growth elements of buckwheat show a completely uniform relationship to relative time of growth. The different growth elements are: total dry matter of plant, total N, leaf surface, dry matter of leaves and of roots, N in the leaves and in the stem, and CaO assimilation in the stem. The S-formed curve with relationship to time is obtained. Attempts are made to apply the Robertson growth formulas. R. M. BARNETTE

Studies on the photosynthesis of some plants of Central Asia. S. P. KOSTUICHEV AND E. K. KARDO-SUISOEVA. *Bull. acad. sci. union rép. soviét. social,* Classe sci. phys.-math. **1930,** 467–98.—K. and others have recently (*Planta* **5,** 696(1928)) described a new method for studying photosynthesis, giving the app. used. The results of these studies were expressed in curves where CO_2 assimilated by the leaf is plotted against time, the observations usually extending over a period of 24 hrs. Frequently identical curves were obtained with different eaves, even of diverse species, indicating the indirect influence of external factors. It was shown that most of the results of earlier investigations must be rejected because they were carried out with leaves sepd. from the mother plant. Also it is quite possible that observations were made with leaves taken for study at different points in the daily curve, making comparisons of doubtful value. It was also shown that calcn. of photosynthetic results on a basis of unit leaf surface is inaccurate, and on the weight of the leaf wholly untenable. Moreover, it appeared that in some of the earlier work the leaves were undernourished because of the use of a too slow stream of air, and hence could not develop the complete energy of photosynthesis. The previous expts. of K. and his co-workers were carried out under moderate climatic conditions. As these did not permit the observation of very sharp fluctuations in the daily course of photosynthesis, nor of maximal yields of synthesized products or evolutions of CO_2 in the light, it was thought desirable to carry out similar expts. under more extreme conditions. Central Asia was chosen as a region of typical hot and dry climate. The present results are a direct expression of the analytical data, not depending on any arbitrary modes of calcn., and they were obtained with plants living under natural conditions. With some grasses the CO_2 assimilation amounted to 250 mg. per sq. dm. for 12 hrs., with max. hourly value of 60 mg. Astonishingly sharp leaps in the curves were sometimes observed, with evolutions of CO_2 as high as 25 mg. per sq. dm. and lasting as long as 4 hrs. Grasses, *e. g., Andropogon halenpensis,* in irrigated regions, give enormous daily yields of org. substances per unit leaf surface since with them photosynthesis continues w th great energy in the afternoon hrs. All of the irrigated plants continued working in the afternoon hrs., and a midday decrease was noticed only with the clovers and lucerns. The daily production is very large, and with excess moisture in the soil the plants do not suffer from sun exposure. With xerophytes very sharp fluctuations were observed, gigantic but short-lived flashes of photosynthesis alternating with brief but energetic evolutions of CO_2. With *Cousinia pseudomollis* in the early afternoon hrs. in a period of great sultriness an enormous flash of photosynthesis occurred, giving 60 mg. per sq. dm. per hr. The daily curve for *Alhagi camelorum* shows maxima and unusually sharp transitions from energetic assimilation to energetic evolution of CO_2. With the xerophytes there is also considerable variation from day to day. The causes for the large evolutions of CO_2 in full sunlight have not yet been investigated. Tables of analytical data and curves are given.
LEWIS W. BUTZ

The transfer of the products of photosynthesis. V. A. CHESNOKOV AND E. N. BAZUIRINA. *Bull. acad. sci. union rep. soviét. social,* Classe sci. phys.-math. **1930,** 499–511.—Sachs' method of measuring the energy of photosynthesis by detg. the increase in dry wt. of a given leaf is criticized. C. and B. combine Sachs' method with the direct detn. of photosynthesis in a current of air. The increase in dry wt. was detd. by using not less than 80 half-leaves with an av. area of 300 sq. cm. Photosynthesis was detd. (cf. preceding abstr.) in the daylight hrs., exposures lasting 2–4 hrs. The assimilated CO_2 was calcd. to sugar, and the increase in dry wt. of the re-

maining half of the leaf so estd. The difference gave the value for the transference. Expts. with *Solanum tuberosum* continued over 36 hrs., the change in dry wt. being detd. over 4 hrs. and the figures for photosynthesis were likewise calcd. for this period. The increase in dry wt. continued up till 4–6 P. M. when transference began to exceed photosynthesis The max. assimilation is in the 2 hrs. just before noon, and transference does not appear till the evening hrs. after which it continues all night. The photosynthetic curve has 1 max. With the pea, similar expts. show that assimilation occurs only in the morning, and the ratio between the increase in dry wt. and the intensity of assimilation is less than with the potato. In the pea the photosynthetic max. corresponds to the point of max. transference. Toward evening the amt. of transference decreases, but a small transference continues throughout the night. In the morning it again increases. The cause for the different daily courses of assimilation and transference in the potato and the pea is uncertain. They may be assocd. with the difference in compn. of the leaf carbohydrates, those of the pea being predominantly sol., and those of the potato insol. LEWIS W. BUTZ

A sterol-like compound from the sepals of the sunflower. L. ZECHMEISTER AND P. TUZSON. *Z. physiol. Chem.* **192**, 22–4(1930).—By extn. of 1 kg. of dried sepals of the sunflower (*Helianthus annuus*) with C_6H_6, evapn. of the solvent, extn. of the residue with Et_2O and treatment with KOH in MeOH, addn. of petr. ether and shaking out with 85% MeOH, addn. of H_2O and shaking out with Et_2O, and finally pptn. of the $CHCl_3$ soln. with petr. ether and recrystn. of the ppt. from MeOH, a *sterol-like substance* was obtained in colorless nacreous crystals. The substance has the formula $C_{21}H_{36}O_2$, m. 243°, $[\alpha]_D^{20}$ 40.4°, is unsatd. and gives various sterol reactions, but is not pptd. by digitonin. Its oxidation product with CrO_3 could not be crystd., but yielded a cryst. semicarbazone m. 263° and a cryst. phenylhydrazone m. 210°. A. W. D.

The atomic weight of potassium from plant ash. H. H. LOWRY. *J. Am. Chem Soc.* **52**, 4332–3(1930).—To check the hypothesis of selection of K with an at. wt. of 41 by plants (cf. *C. A.* **24**, 1885) the K:Cl ratios for KCl from the ash of cotton seed hairs and wheat flour were detd. by pptn. with $AgNO_3$. The at. wts. found, 39.111 ± 0.013 and 39.091 ± 0.016, resp., indicated no separation of isotopes by plant growth. L. P. HALL

Studies on hemicelluloses. II. The hemicelluloses of maize cobs. ISAAC A PREECE. *Biochem. J.* **24**, 973–9(1930); cf. *C. A.* **24**, 5480.—Of the four fractions prepd., (1) yields on hydrolysis xylose and a uronic acid; (2) and (3) yield varying proportions of xylose, uronic acid and methylpentose; and (4) yields arabinose, uronic acid and methylpentose. BENJAMIN HARROW

Studies in photosynthesis. I. The formaldehyde hypothesis. EUSTACE C. BARTON-WRIGHT AND MONTAGU C. PRATT. *Biochem. J* **24**, 1210–6(1930).—Klein and Werner's claim (*C. A.* 20, 2519–20) that formaldehyde is the first product of photosynthesis is denied. **II. The first sugar of carbon assimilation and the nature of the carbohydrates in the narcissus leaf.** *Ibid* 1217–34.—Evidence is presented to show that the first sugar of photosynthesis is a hexose and not sucrose. BENJAMIN HARROW

Chemistry of the white rots of wood. I. Effect on wood substance of Polystictus versicolor (Linn) Fr. WM. G. CAMPBELL. *Biochem. J.* **24**, 1235–43(1930).—The pentosans of wood substance and lignin are the first components to be attacked. As decay advances the rate at which pentosans are depleted is diminished, and preferential attack is made on the cellulose proper as well as on the lignin. B. H.

Effect of moisture supply on development of Pyrus communis. ALDEN F. BARSS. *Bot. Gaz.* **90**, 151–76(1930).—Flower clusters were more abundant on trees given more than the min. quantity of water. Abscission of blossoms and partly developed fruits were more pronounced where least water was available. Abundance of water was accompanied by increases in all types of vegetative growth and in length of the growing season. Following changes in the water supply, alteration in the metabolic processes may be due to phys. or nutritional causes or both. BENJAMIN HARROW

The isolation and reactions of a chlorophyllase preparation. HERBERT MAYER. *Planta, Abt. E., Z. wiss. Biol.* **11**, 294–330(1930).—The following method gave a more active chlorophyllase prepn. than that of Willstätter: 500 g. of fresh leaves was ground in 1.5 l. of H_2O together with sand and a small quantity of $CaCO_3$ and the mass was then centrifuged at a high speed for 5 min. The liquor was then poured off and mixed with 2 vols. acetone and allowed to settle after which the soln. was decanted and the residue transferred to a hard filter where it was washed with H_2O-free acetone until the filtrate was colorless. When the residue was dried in a vacuum desiccator, the yield was approx. 15 g. The activity of chlorophyllase was detd. by the addn. of 0.5 g. of the prepn. to 4 mg. of pure chlorophyll in 6 cc. of 66% acetone. Of many kinds of leaves tested *Heracleum* and *Lamium* gave the highest activity, reaching max. values

in May and Sept. and at an optimum p_H of approx. 6.0. After treatment of the leaves with electrolytes, reactivation of the enzyme was obtained by the addn. of 0.1 *M* solns. of alk. and alk. earth chlorides, $KMnO_4$, $ZnSO_4$ and $FeSO_4$, confirming Willstätter's results with $CaCl_2$. Decreased activity resulted with the addn. of $CuSO_4$ but KCN produced complete inactivation. A previous treatment of the tissue with a mixt. of HCl and NH_3 for 2 hrs. allowed of a subsequent treatment with HCl without reducing the enzyme activity. Heating leaf tissue to 60° for 10 min. caused a marked reduction in activity. In variegated leaves the chlorophyllase activity was not proportional to the chlorophyll content. Although leaves grown in total darkness contained less chlorophyllase than leaves in normal light, there was only slightly less in leaves bleached by temporary darkening and no decrease in permanently shaded leaves. A. E. H.

Occurrence of mannitol in spike disease of Santalum album (Linn.). M. SREENIVASAYA. *Nature* **126**, 438(1930); cf. *C. A.* **23**, 3250.—Crystals of mannitol have been obtained from the aq. ext. of the spiked leaf of sandal, in a quantity equal to 2–3% of the green material. Mannitol was found in 15 samples of the diseased plant, but in no healthy samples. The results indicate that mannitol is one of the metabolic products of the virus. LOUISE KELLEY

Aucuba or yellow mosaic of the tomato. BERNARD D. BOLAS AND W. F. BEWLEY. *Nature* **126**, 471(1930).—Infection of tomato plant with aucuba affects the removal of starch from the leaves, the change varying with the stage of infection. B. and B. have suggested a sequence of metabolism based on the results of their study. L. K.

The radium in aquatic organisms. V. VERNADSKII. *Compt. rend.* **191**, No. 10, 421 3(1930); cf. *C. A.* **24**, 3706, 5773.—Expts. show that during the season of max. flowering of different varieties of *Lemna*, the Ra concn. of the surrounding water is negligible while that of the living plant varies from 1.3×10^{-11} to 2.0×10^{-12} parts of Ra per 100 of plant. The decompn. of water by the Ra ceases or diminishes as the Ra from the water is concd. in the plant. N. M. NAYLOR

The production of ethyl alcohol and acetaldehyde by apples in relation to the injuries occurring in storage. I. Injuries to apples occurring in the absence of oxygen and in certain mixtures of carbon dioxide and oxygen. MEIRION THOMAS. *Ann. Appl. Biol.* **16**, 444–57(1929); cf. *C. A.* **20**, 1830.—Under anaerobic conditions, apples suffer from "invasive alc. poisoning," assocd. with an accumulation by anaerobic zymasis of more than 0.3% EtOH in the tissues. CH_3CHO never reaches more than 0.006% in apples showing this type of injury. In gas mixts. contg. CO_2 and O_2 apples undergo CO_2 zymasis at once if the CO_2 concn. > 50%, or in variable time according to the age of the apples if the CO_2 concn. is 20–30%. CO_2 zymasis is usually followed by internal aldehyde poisoning when the CH_3CHO concn. > 0.01%, and by "invasive aldehyde poisoning" when it is > 0.03%. No more than 0.08% EtOH is found in apples suffering from either form of aldehyde poisoning. The injuries are probably caused by CH_3CHO. In mixts. of CO_2 and O_2, CO_2 being about 3% and O_2 concn. subnormal, zymasis does not occur and the life of apples in storage is prolonged. When the CO_2 concn. is between 13 and 20% in such gas mixts. an internal browning (brown-heart) sometimes occurs, the cause of which is not known. As EtOH and CH_3OH poisoning of apples results from improper ventilation during storage, analysis of the apples for these compds. may show whether proper ventilation has been neglected. C. H. R.

The change in composition of winter-cabbage (Brassica oleracea Arephala) during the winter months. ISTVAN WEISER AND VICTOR V. KURELEC. *Wiss. Arch. Landw.*, Abt B, *Tierernahr. Tierzucht* **2**, 422–6(1930).—The leaves and stalks of winter-cabbage were sepd., weighed, chopped and dried and analyses made for ash, crude and pure protein, crude fat, crude fiber, N-free ext. and invert sugar in the leaves and stalks once each month from Nov. to April. There were no significant variations from month to month. S. GORDON ROSE

Effect of radiant energy on growth and sporulation in Colletotrichum phomoides. A. H. HUTCHINSON AND M. R. ASHTON. *Can. J. Research* **3**, 187–99(1930).—A fungus, *Colletotrichum phomoides*, was exposed to ultra-violet radiation and the effects produced were noted. A detn. of the normal growth curve, of the effect of irradiation on growth and the formation of acervuli and on spores suspended in sterile H_2O was made with (*a*) the full light from the quartz Hg light and (*b*) various monochromatic lines of the spectrum from a monochromatic illuminator. The lines of the Hg arc spectrum were found to fall into 3 groups, those which cause const. retardation of growth, those which cause const. stimulation and those which cause primary retardation followed by stimulation. Spore production in general was found to be hastened by the monochromatic light causing retardation or extreme stimulation of growth while light which moderately stimulates growth had little effect on spore production. An optimum duration was shown for the illumination causing the accelerated development of spores. Continued

retardation of growth was shown by the wave lengths 4960–4916, 3028–3022, 2804, 2054 and 1849 A. U. Retardation followed by stimulation was shown by 6152, 3132–3126, 3821, 2700 and 2967 A. U. General stimulation was caused by 5819–5769, 3656–3650, 3342 and 4078–3984 A. U. Wave length 4359 A. U. does not affect the rate of growth appreciably. Yeast and *Paramecium* responded to the effect of irradiation in a manner similar to *Colletotrichum*. J. W. SHIPLEY

Ionic exchange between plant cells and salt solutions. PAUL GENAUD. *Rev. gén. colloïdes* **8**, 241–50(1930); cf. *C. A.* **24**, 879.—A study of the distribution of mineral ions in the living cell and its environment. Expts. carried out on yeast cells showed that pos. ions penetrate easily into the cell, replacing the pos. ions already in the cell according to the law of mass action. Cells are penetrated easily by Pb^{++} and Ca^{++}, and not by Cu^{++}. Bivalent ions penetrate more easily than univalent. Two hypotheses are given: (1) the cell membrane and the cell vacuole behave like insol. org. acids exchanging their cations for those of the environing medium until an equil., due to mass action, is obtained; (2) the cellular membrane is constituted of mols. which are arranged in a certain regular order, so that the intermol. spaces are quite delimited. The results were based on chem. analyses and microscopic examns. of the cells. C. W. SONDERN

Studies on the photosynthesis of marine algae. I. Photosynthetic rates of Enteromorpha linza, Porphyra umbilicalis and Delesseria sinuosa in red, green and blue light. A. BROOKER KLUGH. *Contributions Can. Biol. Fisheries* (N. S.) **6**, Nos. 1-6, 41–63(1930).—The rates of photosynthesis of a green alga from the surface, a red brown alga from half-tide level and a magenta-red alga from 18 m. depth were compared by colorimetric measurement of the p_H change due to the using up of CO_2 (Osterhout and Haas, *C. A.* **12**, 1307) when exposed to sunshine. Corning red, green and blue filters, brought to equal intensity in the active range of the spectrum, were used and the light intensity was reduced to within the range of response of the plant The comparative rates found for *E. linza* were: in the red, 1.80, green, 0.16, blue 1.16; for *P. umbilicalis* 2.46, 1.65 and 1.65, resp., and for *D. sinuosa* 1.35, 1.25 and 1.05, resp. This agrees with the transmission of light by sea water previously detd. (Klugh, *Ecology*, **8**, 90 (1927)). Red is absorbed most and green least, the light at 18 m. depth being almost pure green. K. V. THIMANN

A method for the estimation of the acid-base balance in the ash of plants. DONALD E. FREAR. *J. Biol. Chem* **88**, 675–81(1930).—To 2 g. plant material are added 20 cc. distd. H_2O and 25 cc. of a soln. contg. 25 g. $Mg(NO_3)_2$ per 100 cc. After evapg. to dryness the residue is ashed at 250° for 15 min. and then at 500° for about 30 min., cooled, 60 cc. *N* HNO_3 added and after 3 hrs'. boiling the excess acid titrated with NaOH For the blank 1 g. sugar is used. No S and only a trace of Cl are lost in the vapor The results agree closely with the figures for acid-base balance derived from elementary analysis of the tissue concerned. K. V. THIMANN

E—NUTRITION

PHILIP B HAWK

A contribution to the knowledge of calcium metabolism. II. The relative fecal output of calcium in growing pigs fed exclusively on grain products. A. WESTERLUND *Skand. Arch. Physiol.* **60**, 204–20(1930); cf. *C. A.* **24**, 1145.—A study has been made on the effect on Ca elimination in the feces of the Ca–Si ratio, Ca–fat ratio, Ca–P ratio, Ca–Mg ratio, K–Na ratio, the basic and acid equivs. of the food ash, the Ca consumption and of the wt. of the exptl. animals The study is really a statistical treatment of the exptl. data obtained by Forbes and his co-workers. Conclusion: The limiting factors for the utilization of Ca are a deficiency in Na, P, fat and basic equivs. or of an excess of Si in the animals' food. S. MORGULIS

Blood findings in albino rats suffering from lack of vitamin A. R. G. TURNER *Proc Soc. Exptl. Biol. Med.* **27**, 1006–10(1930).—The amts. of uric acid, non-protein N, creatinine, urea N, chlorides, sugar, hemoglobin and red cells in the blood of xerophthalmic animals are practically the same as those in normal controls. C. V. B.

A note on the effect of the oral administration of irradiated ergosterol on the calcium concentration of the blood serum in pulmonary tuberculosis. JACOB KAMINSKY AND DORIS L. DAVIDSON. *Am. Rev. Tuberc.* **22**, 48–52(1930).—The ingestion of 20 drops of viosterol daily for 7 days was followed by a considerable rise of the serum Ca concn. in patients, and in some cases the higher Ca level shows a tendency to persist for some time after the drug is discontinued. No attempt is made in this study to record observations on the general effect of irradiated ergosterol in pulmonary tuberculo-

sis, but this is reserved for further studies on a larger series of cases. It is believed that in irradiated ergosterol there exists a new means of influencing Ca metabolism, and this may prove of value in pulmonary tuberculosis. H. J. CORPER

Irradiated cod-liver oil and eosin in pulmonary tuberculosis. C. J. HILDEBRAND. *Am. Rev. Tuberc.* **22**, 53–6(1930).—In view of the fact that eosin has been used at various times to enhance the curative effects of ultra-violet light, H. used for treatment in a case of pulmonary tuberculosis irradiated cod-liver oil and eosin with striking beneficial results. H. J. CORPER

Studies on the effect of muscular exercise in beriberi. III. The oxygen debt, oxygen requirement and the changes in respiratory quotient, respiratory volume and carbon dioxide output through muscular exercise. ENAJI HAYASAKA AND ROKURO INAWASHIRO. *Tôhoku J. Exptl. Med.* **14**, 53–71(1930); cf. *C. A.* **23**, 3252.—The O debt is increased. The rise of respiratory quotient during muscular exercise is slight, but becomes very remarkable 5 min. after cessation of exercise, rising considerably above 1. This indicates that non-neutralized lactic acid is accumulated in the exercised muscles during the latter part of the exercise and poured into the blood after cessation, liberating CO_2 from the bicarbonates. In beriberi the CO_2 output during exercise is increased less than in health and this increase returns more slowly to the resting value, so that recovery from fatigue is prolonged. **IV. Influence of muscular exercise on the intermediate water exchange.** ENAJI HAYASAKA. *Ibid* 72–84.—Though in beriberi patients the blood is concd. by muscular exercise, the effect is slighter than in the same patients after recovery or in healthy subjects. The permeability of the capillary walls for serum protein is increased, especially in the dropsical form of beriberi. The swollen tissue is further expanded by muscular exercise, but after cessation it gives up water into the blood profusely and shrinks. **V. Influence of muscular exercise on the lactic acid metabolism.** ENAJI HAYASAKA. *Ibid* 85–92.—The amt. of lactic acid accumulated in the body immediately after muscular exercise is augmented in beriberi. Samples of cubital venous blood showed a max. lactic content about 10 min. after leg exercise (5 min. running in a treadmill). Normal subjects showed analogous results after sufficiently violent exercise. In beriberi the lactic acid resynthesis of the muscles kept quiet during the exercise is apparently decreased after cessation. This is an important cause of the retarded recovery to the resting value. L. E. GILSON

The after-effects of large doses of Vitasterol. W. HEUBNER. *Klin. Wochschr.* **9**, 775(1930); *Bull. Hyg.* **5**, 697.—Contrary to the results of Schmidtmann H. finds no lasting effect of feeding Vitasterol (vitamin D) or any increased susceptibility to spontaneous infections. Rabbits fed on this material lost weight the first month but gained later. They were all killed in good health, but on postmortem examn. showed widespread pathol. conditions in the walls of the arteries. In spite of these findings he claims there are no ill effects of feeding large doses for a short time. G. R. G.

The experimental production of bladder stone in rats. R. MCCARRISON. *Far East Assoc Trop. Med. 7th Congr. India* **3**, 345–6(1927); *Bull. Hyg.* **5**, 699; cf. *C. A.* **22**, 103, **23**, 1956; **24**, 3814.—Diets were principally those of areas where stone is common among the inhabitants of India. The cereal varied from 80 to 100% of the diet. All the diets produced stone except 2 which contained milk to the amt. of $^2/_3$ oz. daily per rat. White flour did not produce stone to any greater extent than oatmeal or whole wheat. This shows that stone is not due to a "toxamin" in the oat meal or whole wheat. The stones were composed of phosphates of Ca and Mg with traces of oxalate, but no uric acid was present. GEORGE R. GREENBANK

Avitaminosis and the digestive system. III. H. E. NEVER AND B. MASSURY. *Arch. ges. Physiol.* (*Pflügers*) **225**, 582–90(1930); cf. *C. A.* **24**, 5801.—Vitamin-free diets contg. no fats produced only slight disturbances in the digestive system of dogs. Considerable digestive disorders resulted when fats were added to the diet. A. G.

The exhaustion of insulin-forming power by carbohydrate overfeeding. F. VERZÁR AND A. VON KÚTHY. *Arch. ges. Physiol.* (*Pflügers*) **225**, 606–12(1930).—Several weeks overfeeding of dogs with sugar resulted in glucosuria, hyperglucemia and a delay in the alimentary hyperglucemic curve. These manifestations of insulin deficiency continued for about a week after the cessation of the carbohydrate overfeeding. A. G.

The effect of the catamenial cycle on the specific-dynamic action of foods. A. SZARKA. *Arch. ges. Physiol.* (*Pflügers*) **225**, 620–6(1930).—The specific dynamic action of food, in the white rat, is a function of the ovarian cycle. It varies inversely with the basal metabolism. ARTHUR GROLLMAN

The effect of the chlorophyll content of the food on blood formation. A. ZIH. *Arch. ges. Physiol.* (*Pflügers*) **225**, 728–36(1930).—Chlorophyll has a decided hematopoietic action when administered to rabbits either alone or in the food. Overdoses

may cause a decrease in the blood cells. When rabbits are transferred to a chlorophyll-free diet, their red-blood-cell count diminishes. ARTHUR GROLLMAN

Heat stability of the (anti-dermatitis, "anti-pellagra") water-soluble vitamin B_2. II. HARRIETTE CHICK AND ALICE MARY COPPING. *Biochem. J.* **24**, 932–8(1930); cf. *C. A.* **24**, 5801.—An ext. made from washed brewer's yeast by boiling in dil. AcOH, after being heated at p_H 2.5 for 4 hrs. at 119° (soln. *a*), retained its power to cure the skin infection in rats due to deprivation of vitamin B_2 when used in doses equiv. to 0.5 g. yeast (dry weight). When the same ext. was heated at p_H 10 3–9.6, no curative properties could be shown. Growth of rats ran parallel with changes in the condition of the skin; growth was restored, with soln. (*a*) but not with soln. (*b*). B. H.

Vitamin C and the rat diet. GLADYS ANNIE HARTWELL. *Biochem. J.* **24**, 967–72 (1930).—Addn. of vitamin C to a synthetic diet shows no improvement as to growth or reproduction. BENJAMIN HARROW

The nutritive value and digestibility of silage from clover. V. A. SKVORTZOV. Trudui Vologod. Molochno-Khozyaistv. Inst., *Bull.* No. **81**, 29–51(1929).—Two cows were put on a test diet for 40 days, divided into 2 20-day periods. The feed consisted of weighed quantities of hay, oat straw, beet pulp, middlings, linseed oil cake and sunflower cake. The unconsumed feed and the manure were carefully collected and samples for analyses taken daily. Fifteen kg. of clover silage was fed daily during the second period. During the second period clover silage increased the digestibility of cellulose by 1.56%, of N-free ext. substances by 1.71%, but it decreased the digestibility of proteins by 3.78%, of albumin by 5.85%, and of fat by 2.36%. The ash constituents suffered the greatest loss in their indigestibility. When compared with green roughage the clover silage gave just as good results. The paper has 11 tables showing the compn of the various materials used in the feeding expts. J. S. JOFFE

An account of the products of exchange in feeding clover silage. M. YA AKSENOVA. Trudui Vologod. Molochno-Khozyaistv. Inst., *Bull.* No. **81**, 55-60(1929).—Addn. of silage to a dairy ration decreased the coeff. of digestibility of nitrogenous substances even though the protein ratio remained the same, for the feed both with and without silage. Apparently the silage stimulates the splitting off of exchange products For this purpose analyses were made on the N exchange products from the manure of exptl. dairy cows fed for 2 consecutive 20-day periods without and with silage, resp. Two g. samples of manure were treated with 1 g. of pepsin in 450 cc. of water and incubated for 48 hrs. After 16, 24 and 48 hrs. 10 cc. of 10% HCl was added. The ppt. was filtered and N detd. It was found that silage feeding increased the quantity of exchange products: epithelial cells, remnants of digestive juices, etc. By recalcg. the digestibility coeff. of the protein when silage was fed with due consideration for the increase in the split products of metabolic exchange it was established that the crude protein from the feed with silage was just as digestible as without silage. A detn. of the acidity of the manure from both—with and without silage—feeding expts. showed no difference. J. S. JOFFE

The calorific value of silage. M. YA. AKSENOVA. Trudui Vologod. Molochno-Khozyaistv. Inst., *Bull.* No. **81**, 63-7(1929).—In connection with the feeding experiments (see preceding abstracts) mentioned the calorific value of the various feeding materials as well as of the manure voided by the cows was determined. The following values (in large calories) were obtained for 1 kg. of dry substance: clover hay—4610.2 clover silage—4678, oat straw—4451.3, beet pulp—4518.8, wheat middlings—4770, linseed meal—5242.9, sun flower seed meal—5312.5. The calorific value of the manure voided in 24 hours was determined for both cows for each period separately; during the first feeding period (no silage) one cow gave off in the form of manure 19393.3 large calories, the other 20757.9 calories; during the second period (with silage) the figures for the corresponding cows were 22009.1 and 22110.3 calories. From the calorific values the coefficients of digestibility have been calculated, as well as the starch equivalent values of silage. The physiologically useful energy per kg. of clover silage was found to be 2426.6 large calories. J. S. JOFFE

Old and new emphasis in the teaching of nutrition. MARY SWARTZ ROSE. *J. Home Econ.* **22**, 878–84, 977–82(1930).—A review. AMY LEVESCONTE

Utilization of milk and inorganic calcium and phosphorus. MYRA T. POTTER AND MARTHA M. KRAMER. *J. Home Econ.* **22**, 923–4(1930).—The food, feces and urine of 2 women were analyzed during 2 three-day periods. In the first period raw milk furnished most of the Ca; in the second period mostly inorg. Ca and P were used, with the butter and acid-washed casein content of the diet increased. The Ca and P were retained equally well in both periods. AMY LEVESCONTE

Studies on diets and nutrition. II. The diet of adolescents from 6 to 15 years of age.

L. DE CARO AND M. LAPORTA. *Arch. sci. biol.* (Italy) **15**, 172–202(1930).—**An analysis** is made of 20 diets given to boys. This is a part of a general investigation, the results of which will serve as a basis for solving the problem of a rational diet for the Italian people. The work is being done under the auspices of the Italian National Research Council. PETER MASUCCI

Vitamin investigations on grass. H. VON EULER AND MARGARETA RYDBOM. *Svensk Kem. Tids.* **42**, 219–23(1930).—A review on vitamins A and D of grass and hay and their bearing on milk and butter. A. R. ROSE

The bone marrow in rachitis and in anemia pseudoleucemia infantum. S. BARBERI. *Pediatria Rivista* **38**, 1089–1111(1930).—The peripheral blood and the bone marrow were examd. in 25 cases of pronounced rachitis, 12 cases of pseudoleucanemia, and 2 cases of leucanemia. In the bone marrow the av. ratios of immature white cells to immature red cells and the av. ratios between immature white cells and mature white cells were (1) in rachitis 1:1.43 and 1:1.68, resp.; (2) in pseudoleucanemia and leucanemia 1:2.97 and 1:2, resp. The histopathological changes, which indicate myelopoietic and erythropoietic hyperactivity, were of the same type in all 3 diseases. B. suggests that rachitis and pseudoleucanemia are probably caused by the same group of factors, *i. e.*, by chronic infections and intoxications. Numerous references are given. G. S.

Experimental studies on a relation between nutrition and growth of transplanted tumor in rats. TOKUJI HIRATA. *Sei-i-kwai Med. J.* **49**, No. 1, 131–46(English abstract 8–10)(1930).—Sixty rats were divided into 4 groups. The restricted diet group (I) was fed with 2 g. unpolished rice, 1 g. vegetable, and 1 drop of cod-liver oil every other day. X-ray group (II) received the mixt. of the same food as (I) but in unlimited quantity and treated with x-ray (75 kv.) for 3–9 min. once or several times until the animals showed a sign of weakening. The cod-liver oil group (III) received the same foods as II, but were not subjected to x-ray treatment. Non-cod-liver oil group (IV) had the same diet as III minus cod-liver oil. After being fed with these diets for 8–12 days, they were inoculated with Flexner strain of rat carcinoma, and continued to be fed with the same diet. The results show that III and IV had more tumor growth than I and II. Conclusion: A poor state of nutrition hinders the growth of transplanted tumor, while a good nutritional state accelerates the proliferation of the tumor cell. S. TASHIRO

Quantitative differentiation of vitamins A and D. II. H. C. SHERMAN AND H. K. STIEBELING. *J. Biol. Chem.* **88**, 683–93(1930); cf. *C. A.* **21**, 2493.—For detn. of vitamin A the amt. of food necessary to produce in young rats a gain in wt. of 3 g. per week is considered to be the best standard. For vitamin *D* the most satisfactory measure is the amt. necessary to produce a degree of calcification midway between the minimum, on diets free from vitamin D, and the max., on diets rich in the vitamin, calcification being detd. by the ash content of the fresh femurs. These units avoid errors due to storage of vitamins in the young rats. K. V. THIMANN

Antirachitic substances. X. The relation of the isoergosterols to vitamin D. WARREN M. COX AND CHARLES E. BILLS. *J. Biol. Chem.* **88**, 709–13(1930); cf. *C. A.* 23, 1163.—The absorption band at λ 248 mμ, ϵ 16,000, previously shown to be common to the several isoergosterols (*C. A.* **23**, 1163) is given by an alc. soln. of ergosterol which has been irradiated until its antirachitic potency begins to decline, and is hence thought to be due to an early degradation product of vitamin D, related to the isoergosterols. Unlike vitamin D, however, the substance is not pptd. by digitonin. K. V. THIMANN

F—PHYSIOLOGY

E. K. MARSHALL, JR.

Acid and alkali in health and disease. S. W. CLAUSEN *J. Chem. Education* **7**, 2850–62(1930). E. H.

Interaction between substances in tissue extracts and blood sera. Effects of mixtures of these substances on coagulation of blood. E. L. BURNS, F. H. SCHARLES AND L. F. AITKEN. *Proc. Soc. Exptl. Biol. Med.* **27**, 492–5(1930).—Const. amts. of kidney exts. and blood sera were incubated at 34° for periods up to 80 min., 1 cc. of heparized blood plasma was added and the time necessary for coagulation noted. In controls 0.9% NaCl was used in place of blood serum. Dog, goose and chicken heparized plasma were used and serum and kidney exts. were taken from the human, dog, rabbit, ox, sheep, goose and chicken. Accelerating and inhibiting coagulating substances develop in combinations of sera and exts.; the inhibiting substances are most effective when homologous factors are combined. C. V. BAILEY

Adsorption of glucose-galactose mixtures in the intestine. HARRY SOBOTKA AND

MIRIAM REINER. *Proc. Soc. Exptl. Biol. Med.* **27**, 576–9(1930).—Rabbits fasted 48 hrs. were narcotized with ether, a loop of the small intestine was clamped off and 50 cc. of 10% glucose-galactose mixt. was injected into the loop. Three samples were withdrawn at ½-hr. intervals and analyzed polarimetrically and by Hanes' modification of the Hagedorn-Jensen method. The rate of adsorption from this mixt. was slightly greater for galactose. C. V. BAILEY

Effects of low oxygen pressure on respiratory phenomena. ROBERT GESELL, CHARLES BRASSFIELD, HUGO KRUEGER, HAYDEN NICHOLSON AND MARIE PELECOVICH. *Proc. Soc. Exptl. Biol. Med.* **27**, 849–50(1930).—Eight % O_2 mixts. were given for 30 min. to dogs anesthetized with morphine and urethan; O_2 consumption was at first decreased and later increased to slightly above normal; this increase was probably due to the muscular effort of augmented ventilation, which also caused an abnormal elimination of CO_2. On readministration of room air, ventilation rate and CO_2 elimination decreased; O_2 consumption remained above normal. During the low O_2 pressure period the CO_2 capacity of the blood was at first decreased and later returned to normal or above; similar changes, but to a less degree, occurred in the blood lactic acid. Both during and after the test period the lactic acid of the muscle was greater than that of the blood and still greater than the amt. in the testicle. The H-ion concn. of arterial blood decreased during the test and later increased above the normal level. The results indicate a direct respiratory stimulating action of O_2 deficiency, independent of increased H-ion concn. C. V. BAILEY

Experimentally induced intermenstrual bleeding in ovariectomized monkeys. WILLIAM P. MADDUX. *Proc. Soc. Exptl. Biol. Med.* **27**, 873–4(1930).—Two adult ovariectomized macaques were given intravaginal doses of ovarian hormone ("*amniotin*," E. R. Squibb & Sons) over a period of 12 days; a total of 375 rat units was given to each animal. From the 10th to the 13th day, erythrocytes were in the vaginal contents. The result is attributed to a therapeutic substitution for the endrocrine function of the ovaries. C. V. BAILEY

Excretion of urea in the rabbit at different age periods. K. S. CHOUKE. *Proc. Soc. Exptl. Biol. Med.* **28**, 43–5(1930).—Renal excretion of urea in the rabbit is very low at birth and gradually increases with the advancing age of the animal even when wt. increase is prevented by an insufficient amt. of an adequate diet. Urea excretion varied directly with the protein and amino acids of the diet, as previously detd. by Christman and Lewis (cf. *C. A.* **17**, 3889). C. V. BAILEY

Rate of respiration in erythrocytes. ROBERT RAMSEY AND CHARLES O. WARREN *Quart. J. Exptl. Physiol.* **20**, 213–29(1930).—Erythrocytes, both nucleated and non-nucleated, respire at a rate comparable to that of other resting tissues (30 to 70 cu. mm./g./hr.). The rate of O consumption in the intact animal is probably higher than that found in the expts. The O consumption is temporarily increased upon hemolysis of the erythrocytes by lytic agents because of an increase in metabolism accompanying a liberation of cell contents. The material which respires is not limited to microscopic particles alone, for the Berkefeld filtrate of a hemolyzed red cell suspension shows considerable respiratory activity. RACHEL BROWN

The inhibition of estrus by corpus luteum extracts. J. S. PATEL. *Quart J Exptl. Physiol.* **20**, 245–62(1930).—Kythin inhibits estrus by producing pseudo-pregnancy conditions in the injected mice. The inhibition of estrin can be obtained for a long period (40 days in some cases) without causing any permanent injury to the ovaries Preliminary expts. show that the estrus is prevented by the inhibition of estrin secretion from the ovary whose reactivity to the estrogenic stimulus of the pituitary is reduced but not removed. The response of the vagina to estrin is also slightly reduced. There is no neutralization of estrin by kythin. It is probable that the kythin also acts on the pituitary, inhibiting the secretion of the estrogenic substance of the pituitary, a condition similar to that found during pregnancy. RACHEL BROWN

The endocrine basis of mating in the mouse. B. P. WIESNER AND L. MIRSKAIA. *Quart. J. Exptl. Physiol.* **20**, 273–9(1930).—No mating was observed in untreated ovariotomized mice. Mating was induced in ovariotomized mice by injections of follicular juice and of cornifying exts. prepd. from pregnancy urine. Mating is assumed to be an effect of the cornifying α-factor conditioned by a higher threshold than cornification. RACHEL BROWN

The effect of hyperthyroidism and castration on the serum calcium of the guinea pig. ANATOLE BLINOFF. *Compt. rend. soc. biol.* **103**, 187–8(1930).—The following av. values for Ca (g. per 1000) in guinea-pig sera were obtained: normal, 0.123 (0.100–0.150); castrated, 0.121 (0.096–0.156); hyperthyroid, 0.128 (0.106–0.145); hyperthyroid and castrated, 0.132 (0.106–0.154). B. C. BRUNSTETTER

The effect of hyperthyroidism and castration on cholesterolemia in the dog. ANATOLE BLINOFF. *Compt. rend. soc. biol.* **103**, 188–9(1930).—The av. cholesterol content (g. per 1000) of the blood of 21 normal dogs was 1.75; of 14 castrated dogs, 1.80; of 8 hyperthyroid dogs, 1.23; of 8 dogs, castrated and hyperthyroid, 1.44. Feeding thyroid gland to dogs results in a decrease in blood cholesterol, proportional to the intensity and the duration of the treatment. The decrease in blood cholesterol in dogs, castrated and hyperthyroid, is less pronounced than in hyperthyroid dogs. B. C. B.

The glycogenic reserves of the heart. M. LOEPER AND A. LEMAIRE. *Compt. rend. soc. biol.* **103**, 209–10(1930).—Iodized gum followed by histological examn. was used to study the distribution of glycogen in the heart of the snail, guinea pig, rabbit and calf. Glycogen is found only in quite fresh material. The cells of the bundle zone appear to be glycogen glands, distributing glycogen to the adult fibers of the myocardium. B. C. BRUNSTETTER

The amylase of the heart. M. LOEPER, A. LEMAIRE AND J. TONNET. *Compt. rend. soc. biol.* **103**, 211(1930).—Glycogen in the muscle fibers disappears very quickly after death; the glycogen of the primitive fibers disappears much more slowly. The transformation to glucose is anaerobic. The press juice of 25 g. of cardiac muscle added to 25 cc. of 1% starch paste resulted after 24 hrs. in the formation of 1.46 g. glucose per 1000. The ventricular muscle ext. contains more amylase than exts. of the septa and bundle. B. C. BRUNSTETTER

The alkaline reserve of the horse in the course of successive bleedings. D. BROCQ-ROUSSEU, GALLOT AND G. ROUSSEL. *Compt. rend. soc. biol.* **103**, 212(1930); cf. *C. A.* **23**, 5223.—Successive bleedings are without effect on the alk. reserve of the blood of the horse. B. C. BRUNSTETTER

Regional variations of cardiac lipides. M. LOEPER, J. TONNET AND MLLE. LEBERT. *Compt. rend. soc. biol.* **103**, 321–2(1930).—Cholesterol and total lipides were detd. as parts per 1000 (dry wt.) in the atrioventricular zone (I) and in the ventricular myocardium (II) of the ox-heart. The cholesterol content of I was 12.5, 12.0; of II, 10.75, 9.0; the total lipides content in I was 15, 16.8; in II, 35, 25. B. C. BRUNSTETTER

Regional variations of sulfur in the heart. M. LOEPER, A. LESURE AND J. DE SÈZE. *Compt. rend. biol. soc.* **103**, 322–3(1930).—The right auricle (I), the auriculoventricular septum (II) and the left ventricle (III) were analyzed, the results being expressed in parts per 1000 (dry wt.): total S, I, 4.78; II, 4.90; III, 4.80; neutral S, I, 4.46; II, 4.50; III, 4.44; oxidized S, I, 0.32; II, 0.40; III, 0.36; total protein, I, 53; II, 40; III, 56. B. C. BRUNSTETTER

An excess of serum cholesterol in animals receiving an injection of urine from pregnant women. C. I. PARHON AND MME. T. CAHANE. *Compt. rend. soc. biol.* **103**, 453–4 (1930).—The injection of urine from pregnant women into female rabbits increased the serum cholesterol; injections of urine from non-pregnant women or from males had no effect. B. C. BRUNSTETTER

The distribution of urea in trichloroacetic acid filtrates. E. DELCOURT-BERNARD. *Compt. rend. soc. biol.* **103**, 500–3(1930).—The first portions of filtrates of blood treated with trichloroacetic acid very often have a higher concn. than succeeding portions. The av. difference expressed as a per cent of the min. was 36%. For the detn. of urea by the hypobromite method in urgent cases demanding speed, centrifuging the protein ppt. is recommended. B. C. BRUNSTETTER

The part of the lipides in the refractometric determination of serum proteins. CH. ACHARD, A. GRIGAUT AND A. CODOUNIS. *Compt. rend. soc. biol.* **103**, 679–81(1930).—The detns. of serum proteins by refractometry give higher figures than detns. on the same materials using a gravimetric method (alc. pptn.; cf. *C. A.* **24**, 4315). This difference becomes greater in sera rich in lipides and may amount to 2–3%. B C. B.

A study of the chloride-sodium ratio in blood sera of normal humans. M. LAUDAT AND A. GRANDSIRE. *Compt. rend. soc. biol.* **103**, 683–4(1930).—Detns. of Cl and Na were made on the blood sera of 11 normal cases. The av. Na content was 3.40 g. per l. (3.35–3.50). The av. Cl/Na ratio was 1.10 (1.07–1.13). B. C. BRUNSTETTER

Some facts concerning the reducing substances of the blood. A. BOIVIN AND H. NEBENZAHL. *Compt. rend. soc. biol.* **103**, 695–8(1930).—There is the same amt. of reducing substances within a limit of 10% in filtrates from tungstic and trichloroacetic acid pptns. and in the ultrafiltrate using collodion whether laked blood or plasma is used. In whole blood there are diffusible reducing substances which are pptd. by $Zn(OH)_2$. The ultrafiltrate, either before or after hydrolysis, shows after the action of yeast (which is centrifuged off after 5 min.) a considerable decrease in the amt. of reducing substances not pptd. by $Zn(OH)_2$, accompanied by a notable increase in the

amt. of reducing substances which are pptd. by $Zn(OH)_2$. Yeast can cause considerable changes in the nature of non-adsorbed substances. B. C. BRUNSTETTER

The female sexual hormone. IV. The pure preparation of the follicular hormone from gravid urine. ADOLF BUTENANDT. *Z. physiol. Chem.* **191**, 127–39(1930); cf. *C. A.* **24**, 2783.—With the "crude oil" obtained by extg. the acidified gravid urine with Et_2O or other org. solvents as starting material, the prepn. of the pure hormone involves 4 successive steps. The oil which contains 30,000 mouse units per g. is dissolved in 50% MeOH and extd. with high-boiling petr. ether. As much as 60% of the impurities, including BzOH and cholesterol, are thus removed. The H_2O-MeOH phase is dild. with 3–4 vols. of H_2O and extd. with Et_2O. Evapn. of the Et_2O leaves an oil contg. 1–200,000 mouse units per g. in nearly quant. yield. In the 2nd step this oil is dissolved in 60% EtOH and shaken with C_6H_6. Evapn. of the C_6H_6 phase then leaves an oil contg. 3–500,000 units in 85–90% yield. The 3rd step takes advantage of the lactone character of the hormone. The oil from the C_6H_6 extn. is heated 3 hrs. with dil. HCl in EtOH-H_2O to insure complete conversion to the "neutral" form, and various acid impurities are then removed by shaking with Na_2CO_3. The residual soln. is shaken with NaOH, whereupon the hormone goes into soln. as a Na salt, and the neutral impurities are then shaken out with Et_2O. Addn. of acid now changes the hormone back to its neutral form which is again extd. with Et_2O. The residue from evapn. of this Et_2O ext. contains 1 2,000,000 units per g., yield 75%. The 4th and final step in the purification consists in fractional distn. in a high vacuum (0.02–0.03 mm.), by use of a Hg vapor pump and cooling with MeAc + CO_2. During a slow sublimation over a period of 60 hrs. the crystals collect in the neck of the retort between 130 and 150°. These show an activity of 7–8,000,000 units per g. with a yield of 64%. Recrystn. from EtOAc + petr. ether and finally from EtOAc gives crystals 1–2 cm. long, m. 250–1°, and activity of 8–10,000,000 units. **V. Physical and chemical properties of the crystallized follicular hormone.** *Ibid* 140–56.—The crystd. hormone has a const. m. p. 250–1°, $[\alpha]_D^{18°}$ 156°, absorption max. in the ultra-violet at 283–5 mμ, and empirical formula $C_{18}H_{22}O_2$. It is easily sol. in EtOH, MeAc, $CHCl_3$ and C_6H_6, less sol. in Et_2O and EtOAc and very difficultly sol. in petr. ether. From its soln. in EtOH or MeAc it is pptd. crvst. by H_2O, from EtOAc, $CHCl_3$ or C_6H_6 by petr. ether. One cc. of satd. aq. soln. contains 150 mouse units; hence in 100 cc. there is at most 1.5 mg. of substance. The hormone gives no characteristic color reactions with the usual sterol reagents or with $FeCl_3$. It is sensitive to atm. O, especially in EtOH soln., losing 1/3 of its activity in 2 months and changing into a brown resin. In stoppered containers the solid keeps indefinitely. The activity is 8–40,000,000 mouse units per g., depending on the method of testing. One O is present as OH, the other as ketone. The soly. in alkali, formerly attributed to a lactone structure, is probably due to enolization of the CO group. Treatment with $NH_2OH.AcOH$ yields a cryst. *oxime*, decompg. 230°. The PhNCO deriv. has only 1/4 the original activity, the estrus appearing more slowly and lasting longer. The *Ac deriv.*, m. 126°, prepd. with Ac_2O and pyridine, and the *Bz deriv.*, m. 211–2° (decompn.), prepd. with BzCl and NaOH, have the same activity as the original substance, but the effect is slower and more prolonged, probably because of a gradual hydrolysis in the organism. Catalytic hydrogenation removes O from the CO and saturates 3 double bonds, yielding a *cryst. substance*, $C_{18}H_{30}O$, m. 104°. The structural hydrocarbon, $C_{18}H_{30}$, would contain 8 H less than a satd. paraffin, which might indicate the presence of 1 aromatic nucleus or 4 hydrogenated rings in the mol. A. W. DOX

Fate of choline in the organism. IRVINE H. PAGE AND ERICH SCHMIDT. *Z. physiol. Chem.* **191**, 262–72(1930).—The choline content of serum averages 3 mg. per l., with wide variations for individual sera. When choline is added to active serum and the biol. assay performed immediately, or when added to serum previously heated 0.5 hr. at 56° and assayed after 7 hrs. a loss of 10–20% is observed. If, however, the choline is added to active serum and the assay performed after a lapse of several hrs. the loss is much greater, depending on the concn. and the duration of contact. Addn. of choline to liver press juice or to exts. prepd. from dry powd. liver also resulted in a considerable loss, but here the time factor was of less influence. The loss is not due to an enzyme since it occurs under conditions where an enzyme would be destroyed or would not have time to act. A. W. DOX

The circulatory hormone. VI. The inactivation of callicrein. H. KRAUT, E. K. FREY AND E. WERLE. *Z. physiol. Chem.* **192**, 1–21(1930); cf. *C. A.* **24**, 4541.—The inactivation of callicrein, previously noted when blood serum was added, occurs also on addn. of exts. from lymphatic glands, parotid gland, spleen, liver and spinal cord of cattle, spleen exts. from sheep and goat and human lymph. The inactivator was not

present in any of the other organs examd. A comparison of the properties of the inactivator from blood and that from glands shows some differences which, however, can be traced to other substances accompanying the inactivator in the blood. All inactivator prepns. are destroyed by kinase-free trypsin; hence the inactivator is a polypeptide. Exts. of animal organs contain the inactivator in much greater purity than blood, and the purity can be raised still further by EtOH pptn. Of the purest prepn. 6 γ was sufficient to neutralize the activity of one callicrein unit. Such solns. are therefore especially suitable for the study of the inactivation reaction. The quantity of inactivator required for the inactivation of callicrein depends on the H-ion concn. It is smallest at p_H 8–11, while at p_H 5 no inactivation can be detected. The inactive compd. may be re-activated by acidifying. For detg. the inactivation capacity of prepns. an adjustment to the p_H optimum by addn. of $NaHCO_3$ is necessary. The inactivation is a time reaction, the velocity of which depends on the quantity of inactivator. With a quantity just sufficient the reaction lasts at least 0.5 hr. The equil. of the inactivation reaction at the p_H optimum lies on the side of the inactive compd. However, if a large excess of the inactivator has not been used a small fraction of free callicrein can still be detected. A. W. Dox

Urea formation in the animal body. I. Introduction. S. Salaskin. *Z. physiol. Chem.* **192**, 25–7(1930).—The importance of the problem is pointed out, as also the lack of present knowledge concerning the site of urea formation, precursory substances and fate of the urea itself. The plan outlined for an extensive investigation includes expts. with organ pulp and press juices, perfusion expts. with surviving organs, animal expts. under normal and pathol. conditions and expts. with embryos in various stages of development. **II. Urea formation in surviving organs and in their press juice.** S. Salaskin and L. Soloviev. *Ibid* 28–44.—Autolyzates of liver pulp were examd. with a view to detg. the relationship between urea accumulation and simultaneous arginine cleavage. These detns. show that the total urea formed in liver autolysis under the usual conditions is attributable to the arginine-arginase system. It appears that autolysis of other organs also, under the usual exptl. conditions, results in urea formation by the same process. The curve of urea formation shows an abrupt rise at the start followed relatively soon by a flattening out. The retardation in urea accumulation cannot be attributed to disappearance of the arginase, since the enzyme is present to the very end in the autolyzate, nor to a lack of arginine as a source of urea. It seems to be occasioned either by a weakening of the proteolysis or by impeded splitting off of the residual arginine in the protein mol. The possibility is not excluded that under altered exptl. conditions other substances through the action of other enzyme systems may be sources of urea. A. W. Dox

The significance of saturated sterols in the organism. I. R. Schönheimer, H. v. Behring, R. Hummel and L. Schindel. *Z. physiol. Chem.* **192**, 73–6(1930).—Attempts to convert cholesterol into coprosterol by bacterial putrefaction *in vitro* have thus far been unsuccessful. Nevertheless, it is probable that such reduction occurs in the intestine where conditions are more favorable than *in vitro*. Cholesterol in its natural environment, as *e. g.*, in eggs and brain tissue, was inoculated with fecal matter and incubated 2 months under both aerobic and anaerobic conditions, but the increase in satd. sterols was within the limit of exptl. error. A brief summary is given of the more important results reported in the following papers. **II. Method for the quantitative separation of unsaturated and saturated sterols.** R. Schönheimer. *Ibid* 77–86.—Satd. sterols differ from unsatd. sterols (dihydrocholesterol and coprosterol) in that they give the Salkowski and the Lifschütz color reactions and add I. Where the unsatd. sterols largely predominate in a mixt., neither the colorimetric detn. nor the I no. affords a reliable est. of the amt. of satd. sterol present. The new method is based on the fact that cholesterol forms a dibromide which is not precipitable by digitonin. Since the satd. sterols, as also digitonin, are scarcely attacked by a dil. Br soln., they can thus be detd. practically quantitatively in the presence of a large excess of cholesterol. The sterol prepn. to be examd. is dissolved in 100–120 parts of purest warm 96% EtOH and cooled in ice. An alc. soln. of Br (approx. *N*) is added from a buret during continuous stirring. The Br soln. should be freshly prepd. since it rapidly loses strength, but is more stable if 30% LiBr is added. Br is added until the supernatant liquid over the pptd. bromide has a light yellow color. A large excess must be scrupulously avoided. The pptd. cholesterol dibromide is filtered off on a porous glass filter and washed with cold EtOH. After 1.5–2.0 hrs. an excess of digitonin is added to the filtrate. Since digitonin prepns. which are not quite pure take up some Br, the digitonin soln. may be treated with a slight excess of alc. Br before using, or else a further addn. of Br may be made after adding the reagent. The soln. is kept in the

dark for 48 hrs., then the ppt. is filtered and washed with EtOH and a large vol. of Et_2O. If the cholesterol dibromide is not completely washed out the ppt. becomes brown or black on drying. The digitonide is dried in an oven at 100°, or better *in vacuo* at 60°, and weighed. The presence of 1% dihydrocholesterol in cholesterol is easily recognized. With less than 4% present the error is 20–30%, but above 8% or when the satd. sterols predominate, as in prepns. from feces, the values obtained are almost theoretical. Other unsaponifiable substances do not interfere unless present in large quantity. For detn. of unsatd. sterol the sample is pptd. directly with digitonin and deduction made of the satd. sterol detd. as above. **III. Demonstration and identification of dihydrocholesterol as admixture with body cholesterol.** *Ibid* 86–93.—All cholesterol prepns., com. as well as lab. products, after bromination yield a filtrate from which a ppt. may be obtained with digitonin. This is due to the presence of 1–2% satd. sterol. The amt. remains unchanged even after 10 recrystns. of the cholesterol from EtOH. Mixts. of cholesterol with dihydrocholesterol cannot be sepd. by repeated recrystn., while mixts. with coprosterol show a loss of satd. sterol with each crystn. The satd. sterol was isolated from gallstone cholesterol by bromination of the EtOH soln. in the cold, filtering off the cholesterol dibromide and pptg. the mother liquor with 1% digitonin soln. The digitonide was recrystd. from MeOH and decompd. by boiling xylene. The product thus obtained gave no Salkowski reaction and no oxycholesterol reaction. It was purified by 8 hrs. refluxing with xylene and Na, pptg. with digitonin and liberating again with xylene, and finally identified as dihydrocholesterol, m. 140.5°, $[\alpha]$ 33.54°. Evapn. of the mother liquor from the digitonin pptn., removal of the digitonin by Et_2O extn. and crystn. of the residue from petr. ether, gave ε-cholestanol, m. 168°, an isomer resulting from the rearrangement of dihydrocholesterol. No evidence could be obtained, however, of the presence of coprosterol or its rearrangement product, pseudo-coprosterol. Similar treatment of com. cholesterol, also of cholesterol prepns. from human liver and from beef ovaries, yielded 1–2% of a satd. sterol with the properties of dihydrocholesterol, but no coprosterol could be obtained. **IV. The saturated** [illegible] **sterols from various organs.** R. SCHÖNHEIMER, H. v. BEHRING AND

[illegible] id boiled with 15% HCl in a current of CO_2 or O-free N until they were just dissolved. The soln. was shaken with Et_2O in large separatory funnels and the ext. worked up in the usual way. Each warming or boiling must be done in the presence of an inert gas, otherwise oxidation occurs with development of a dark color which obscures the end point of the bromination. The product should contain no pigmented material except lipochromes which are easily destroyed by Br. The Et_2O extn. from organs dried *in vacuo* and powdered is not quant. Fluids such as bile and blood were treated with NaOH instead of HCl. The total cholesterol was detd. in an aliquot by the digitonin method and the satd. sterols were detd. by the method outlined above. The materials analyzed were com. cholesterol, gallstones, brain, liver, suprarenal, bile, kidney, aorta, large and small intestine, blood and lymph glands. Satd. sterols were invariably found, the quantity varying from 1 to 5% of the total sterol. No organ showed any noteworthy storage. The highest values were obtained with atherosclerotic aorta, where fat masses had for a long time been isolated from metabolic processes. In the living organism satd. sterols are invariably assocd. with the unsatd. sterols. The proportion of satd. sterol is still greater in plants. The sterols from calabar beans, peas and rice contained 6–16% unsatd. sterols. This is to be expected since plants, in contrast to animals, have no means of excreting the satd. sterols and a greater accumulation occurs. **V. Can saturated sterols be absorbed? Remarks on the behavior of the lymph of the thoracic duct during fat and sterol absorption.** H. v. BEHRING AND R. SCHÖNHEIMER. *Ibid* 97–102.—When mice were fed coprosterol or dihydrocholesterol and the carcasses analyzed after removal of the digestive tract, the satd. sterol content was the same as that in the controls receiving normal diet. It was noted incidentally that mice have a much higher satd. sterol content (6–10% of the total sterols) than other animals thus far examd. Another procedure consisted in collecting chyle through a fistula in the thoracic duct of dogs after feeding coprosterol or dihydrositosterol, and analyzing for satd. sterols. The quantity found was altogether negligible. In some expts. the cholesterol present in the chyle was greater than the quantity of total sterols fed, indicating a reabsorption of cholesterol from the bile excreted into the intestine. The sterol of the thoracic duct is the purest cholesterol, with respect to satd. admixtures, thus far isolated from organs. Satd. sterols are not absorbed from the digestive tract. **VI. The excretion of saturated sterols.** R. SCHÖNHEIMER AND H. v. BEHRING. *Ibid* 102–11.—By diverting the feces through an artificial anus the secretion of the cecum was collected and examd. for unsatd. sterols. Dihydrocholesterol

was isolated and identified but no coprosterol was found. It appears that dihydrocholesterol is normally excreted, but unlike cholesterol it cannot be reabsorbed. In the presence of feces the cholesterol thus excreted, as also the alimentary cholesterol, undergoes a bacterial reduction to coprosterol. The same accumulation of unsatd. sterol was found in ovarian dermoid cysts where the quantity in one instance was as great as 77% of the total sterol present. A. W. Dox

The question of ester absorption. Rudolf Schönheimer and Rudolf Hummel. *Z. physiol. Chem.* **192**, 114–6(1930).—To det. whether fats can be absorbed directly through the intestinal wall without first undergoing hydrolysis, a fat or ester should be fed which has characteristic properties capable of recognition in the body tissues, and components which are not alien to the organism. Such an ester is cholesteryl oxalate. Preliminary tests showed that the feeding of cholesteryl palmitate, stearate and oleate to mice results in a storage of these esters in the liver. After a 14-day period of feeding cholesteryl oxalate along with desoxycholic acid to mice the cholesterol content of the livers had increased to 5.34% from the normal value of 0.52–0.67%. However, no trace of oxalic acid could be found after sapon. On the other hand, the urine contained considerable oxalic acid whereas that of the control animals contained none. It is evident that the cholesteryl oxalate first undergoes sapon., then the cholesterol is absorbed and deposited in the tissues, while the oxalic acid is excreted through the kidneys. A. W. Dox

The specificity of sterol absorption, depending on constitution. R. Schönheimer, H. v. Behring and R. Hummel. *Z. physiol. Chem.* **192**, 117–23(1930).—The absorption of various sterols was detd. by feeding the sterol in daily doses of 5 mg. along with 5 mg. of desoxycholic acid to mice over a 15-day period and examg. the liver for increase in sterol content. The plant sterols, sitosterol, stigmasterol and brassicasterol, gave no increase in sterol content of the liver. Of the 3 pairs of isomers, cholesterol and allocholesterol; dihydrocholesterol and coprosterol; ε-cholestanol and pseudocoprosterol, where the isomerism is due to spatial arrangement at C_1, only cholesterol showed unmistakable evidence of absorption. A slight increase in liver sterol after feeding allocholesterol may be attributed to the ease with which the latter rearranges to cholesterol, probably before absorption occurs. The other 4 sterols are satd., and as was to be expected, no absorption occurred. These sterols may be grouped into isomeric pairs in 2 ways, according to differences in configuration at C_1 or at C_4 where the OH occurs. The absorption specificity of cholesterol is quite remarkable. Slight alterations in spatial configuration, and especially satn. of the double linkage, render the substance incapable of absorption. A. W. Dox

The glucolysis of red blood corpuscles. Werner Burger. *Arch. exptl. Path. Pharmakol.* **150**, 298–307(1930).—The rates of anaerobic glucolysis of nucleated and non-nucleated cells are approx. the same; however, acrobic respiration prevents this fermentative process of nucleated cells completely, but only partially prevents that of non-nucleated cells. Although this anaerobic glucolysis is very slow as compared with that of other tissues it is of the same order of magnitude if calcd. on the basis of stroma weight rather than total corpuscle weight. Because young cells are particularly glucolytic, blood glucolysis is higher in pathol. conditions involving blood regeneration: a similar relationship had already been found by Warburg for aerobic respiration. H. Eagle

Comparative investigations of the physiological thermal regulation in increased body temperature following higher external temperature, in fever and in heat stroke. Robert Stigler. *Arch. exptl. Path. Pharmakol.* **152**, 68–90(1930).—A crit. review of the literature. A gradual rise in external temp. is better tolerated than a sudden change: repeated swings increase the efficiency of the regulating mechanism. It has not been possible, however, to raise the body temp. permanently to a higher level by adjusting the external temp. in any species except rodents. The efficiency of the thermal regulating mechanism can be tested by the time required for the artificially induced hyperpyrexia to return to normal. It is because of this that the negro is more resistant to overheating than whites. Exogenous hyperthermia is not endured nearly as well by mammalia (including humans) as the hyperpyrexia of fever (to be discussed in a later paper). The methods employed by rodents to combat exogenous heat are polypnea, vasodilatation in skin, loss of water through lungs, skin and nasal secretion. H. Eagle

Investigation on lactic acid formation in stomach. Franz Delhougne. *Arch. exptl. Path. Pharmakol.* **152**, 160–7(1930).—Dogs' gastric mucosa inflamed by repeated local treatments with C_2H_5OH or $AgNO_3$ can produce as high as 200–700 mg. % of lactic acid from a sugar soln., the amt. being proportional to the time the sugar soln. is left

in the stomach. The excised mucosa can produce lactic acid *in vitro*. The active enzyme may be that of the leucocytes present in the inflamed area. H. EAGLE

Action current of the heart under various mechanical and physiochemical conditions. G. EISMAYER AND H. QUINCKE. *Arch. exptl. Path. Pharmakol.* **152,** 177–84(1930). H. EAGLE

Effect of pancreatic hormone when the physiological passage through the liver is experimentally excluded. F. MEYTHALER AND E. STAHNKE. *Arch. exptl. Path. Pharmakol.* **152,** 185–97(1930).—The pancreatico-duodenal vein is anastomosed to the right renal vein of dogs, following right nephrectomy. By this means the pancreatic secretion passes directly into the greater circulation, without passing through the liver. Abnormally low blood sugar values (50–68 mg. %) are then observed during a 5 months observation period as contrasted with normal values of 0.085–0.110 mg. %. The hyperglucemia following the ingestion of 100 mg. of glucose is minimal, no more than 20–40 mg. instead of the normal 70–100 mg., and is followed by a very pronounced and very long hypoglucemia. Similarly, adrenaline causes a very slight increase. The entire carbohydrate regulatory mechanism is very labile. Very brief periods of hunger, small quantities of insulin or the stimulation of the insulin-app. by ingestion of sugar cause a very marked hypoglucemia; blood sugar may be 0–20 mg. %, without the animals developing any symptoms. Histologically, liver shows an abnormally large glycogen deposition. The somewhat similar results obtained in dogs with Eck fistula would thus be due to direct passage of insulin into the major circulation rather than to partial exclusion of the liver. The absence of adrenaline hyperglucemia in these animals is considered due to an antagonistic action between adrenaline and insulin, both being in the greater circulation, with the insulin apparently more powerful H. EAGLE

Pig stomach fat. JOSEPH S. HEPBURN AND WARREN L. TRESLER. *Am. J. Pharm.* **102,** 569(1930).—A sample of pig stomach was found to contain 4.60% of crude fat or ether ext. A sample of the fat was found to contain the following consts.: I no. (Hanus method) 29.9, sapon. no. 184.3, Hehner no. 90.5; sol. acids 0.06 calcd. as per cent butyric acid, $n_{27.5}$ 1.4663. W. G. GAESSLER

The effect of painful stimuli on the internal secretion of the pancreas and the blood sugar. V. S. SIMNITZKII, A. A. VISHNEVSKII AND S. A. SATVORNITZKAYA. *Arch. ges. Physiol.* (*Pflügers*) **225,** 648–53(1930).—After adrenalectomy, painful stimuli cause a drop in blood sugar. After pancreatectomy, such stimuli cause a hyperglucemia. The reflex arc through which painful stimuli cause these changes consists of the *splanchnic* pathways to the adrenals which mobilize sugar and the *vagal* pathways to the pancreas which stimulate insulin formation. ARTHUR GROLLMAN

The influence of hypophyseal activity by stimulation of the hypothalamus. I. P KARPLUS AND O PECZENIK. *Arch. ges. Physiol.* (*Pflügers*) **225,** 654–68(1930). A. G.

The amylolytic activity of rabbit sputum. E. FISCHL AND R. H. KAHN. *Arch. ges. Physiol.* (*Pflügers*) **225,** 694–8(1930).—The amylolytic activity of rabbit sputum is due to the parotid secretion. Hunger increases the amylolytic activity but prolonged starvation causes a decline in this activity. The amylolytic activity is proportional to the solid content of the saliva. ARTHUR GROLLMAN

The calcium deposit. K. L. SCHNITZER *Arch. ges. Physiol.* (*Pflügers*) 225, 705–10(1930).—The lime deposits of frogs diminished in size after extirpation of the thymus. ARTHUR GROLLMAN

The humoral transmission of impulses from the cardiac nerves. XIII. The distribution of the vagal materials between auricle and ventricle in the frog and mammal. E. ENGELHART. *Arch. ges. Physiol.* (*Pflugers*) **225,** 721–7(1930). A. G.

The effect of the female sexual hormone, menformone, on the plumage of birds. J. FREUD, S. E. DE JONGH AND E. LAQUEUR. *Arch. ges. Physiol.* (*Pflügers*) **225,** 742–68(1930).—Plumage in birds is controlled by the sexual hormone and can be varied by injection of these hormones. Menformone changed the plumage of roosters or male pheasants to that of the hens. ARTHUR GROLLMAN

The relation between the lactic acid content of the blood and fatigue. N. P. RIABUSCHINSKY. *Arch. ges. Physiol.* (*Pflügers*) **226,** 79–85(1930).—Static work, even when continued to exhaustion, does not result in an increase in the lactic acid content of the blood. Dynamic work is essential for its production. Arterial stasis causes an inappreciable increase in lactic acid. ARTHUR GROLLMAN

The respiratory metabolism and body form. E. BRENDLE. *Arch. ges. Physiol.* [illegible] -The respiratory metabolism is relatively greater in small rats than in large ones. It, as well as the sp. dynamic action, decreases with

obesity development. The N content of rats of different sizes is proportional to their wt. ARTHUR GROLLMAN

Urine formation in the frog kidney. XXI. Observations of the cilia in the neck of the tubule. R. HÖBER AND G. ORZECHOWSKI. *Arch. ges. Physiol.* (*Pflüger's*) **226**, 164–70(1930); cf. *C. A.* **24**, 5818.—Ciliary activity in the neck of the tubule is still active despite the cessation of urine formation after poisoning with narcotics or cyanide. ARTHUR GROLLMAN

Oxidation in central and peripheral nervous tissue. ERIC G. HOLMES. *Biochem. J.* **24**, 914–25(1930).—Various types of tissue that compose the central nervous system have different rates of O consumption. The activity of gray matter is greater than that of white matter. The amts. of indophenol oxidase and of cytochrome run parallel to each other. The O uptake of gray matter is increased in the presence of glucose. This is due to the conversion of glucose to lactic acid. If this conversion is prevented by the addn. of fluoride, the increase does not occur. BENJAMIN HARROW

Stability of watery solutions of the oxytoxic principle of the pituitary gland. JOHN H. GADDUM. *Biochem. J.* **24**, 939–44(1930).—The results are summarized in a nomogram which gives the amt. of destruction to be expected when a soln. of any given p_H is heated for any given time at any given temp. BENJAMIN HARROW

Properties of the comb-growth-promoting substance obtained from testes and urine. EDWARD C. DODDS, ALAN GREENWOOD, HAMISH ALLAN AND ERIC J. GALLIMORE. *Biochem. J.* **24**, 1031–8(1930).—The method of measuring comb growth is critically discussed. The max. length of the comb is measured. Besides increase in comb length, another criterion of activity is the development of scarlet papillations on the otherwise dry scaly comb and the simultaneous sloughing off of the dry scales in these areas. Pepsin, trypsin and oxidation destroy the active material, but boiling with acid and alkali does not. The hormone is sol. in benzene, and the benzene soln. may be washed with *N* Na_2CO_3, *N* HCl, and 10% KOH, without, apparently, any loss of potency. When dissolved in 50% alc., the active substance can be completely extd. with light petroleum. The hormone can be distd. in high vacuum, but first it has to be purified and dried. When injected into male castrated rats or mice the atrophied seminal vesicles regain their normal size. The exts. from testes do not produce estrus. BENJAMIN HARROW

Lactic acid oxidation in brain with reference to the "Meyerhof cycle." ERIC G. HOLMES AND CHARLES A. ASHFORD. *Biochem. J.* **24**, 1119–27(1930).—There is no synthesis of carbohydrate from that portion of the lactic acid which disappears but is not accounted for by O_2 uptake. BENJAMIN HARROW

The cause and significance of the decrease of urea in the blood during pregnancy. H. VAN DER HOEVEN. *Nederland. Maandschr. Geneeskunde* **17**, 123–64(1930).—The decrease in urea content of the blood during pregnancy is caused by the existing hyperthyroidism, the thyroid gland stimulating the kidney to such an extent that more urea is eliminated. The urea content can be decreased by giving thyroid ext. During the last few weeks of pregnancy the urea content increases to normal. In case pregnancy lasts longer than 40 weeks the urea content begins to increase during the 38th to 40th week. The emesis and the pregnancy-intoxication are etiologically entirely different. The first is stimulated by a strong hyperfunction of the thyroid, while the second is caused by a deficiency of hyperthyroidism. If, during pregnancy, the urea content of the blood is more than 150 mg. per l., thyroid ext. must be given until the urea content is lower than that amt. As long as the kidney tissue is not damaged, every pregnancy-intoxication as well as abortus can be prevented and cured by administering thyroid ext. J. C. JURRJENS

Investigations on the influence of the sympathicus on the contraction decline of fatigued skeletal muscle. HANS CHARLET. *Z. Biol.* **90**, 299–312(1930). F. K.

Investigations on the mode of action of the sympathetic nerves on striated muscle. EDGARD MICHOL. *Z. Biol.* **90**, 313–26(1930). FRANCES KRASNOW

Glycogen metabolism. WILDER D. BANCROFT AND GEORGE BANCROFT. *Proc. Natl. Acad. Sci.* **16**, 651–7(1930).—Mainly polemical concerning the conversion of glycogen (I) to $MeCHOHCO_2H$ (II) when muscle is contracted, and the reverse reaction during recovery. The main conclusions are: (1) The oxidation and conversion of II are 2 simultaneous reactions and not a coupled reaction. (2) The conversion is a reversible reaction in which enzymes are involved. (3) The equil. is displaced because a stimulated muscle adsorbs less I than does a muscle at rest. (4) Adsorption of I is recovered faster in the presence of O. (5) Cancerous tissue may have lost the ability to adsorb I. This is possibly an accompaniment and not a cause of cancer.

Alc., $CHCl_3$ and other narcotics displace I from proteins and cause the formation of II.
I. M. LEVINE

Investigations on the metabolism of the heart. I. The content of various phosphates in the heart muscle of various animals. KAORU MONONOBE. *Folia Pharmacol. Japon.* 10, No. 1, Opera orig., 13–27(1930)(in German).—Because of discrepancies in the literature on the P content of heart muscle and striated muscle, M. began an investigation to det. the total P and the distribution of the P into inorg., phosphagen and lactacidogen. P expts. were performed on toads, turtles, cats, guinea pigs, rabbits and pigeons. After killing the animals by bleeding, skeletal muscles and the heart were quickly removed, dried from blood by filter paper and P estns. made by the method of Lohmann. In cold-blooded animals during the winter sleep, the phosphagen P content rises, and with the exception of the total P in ventricular muscle of the toad and turtle being the highest, the inorg. P has its lowest value. The lactacidogen P lies midway. Inorg. and lactacidogen P of the heart muscle of turtles and toads shows no variation, whereas the phosphagen P in the toad hearts is greater than that in turtle hearts. The various P contents of toad hearts vary with the season. The inorg. and lactacidogen are increased in summer, but the phosphagen and total P are very much decreased. Skeletal muscle in the same animal shows a far higher P content of various phosphates than heart muscle, but the partition is approx. the same. Pigeon hearts have larger quantities of P than guinea pig hearts, while rabbits have much less. The partition of the P in rabbit, guinea pig and pigeon hearts varies a great deal in these animals. **II. The seasonal variation of various phosphate quantities in heart and skeletal muscle of the toad.** *Ibid* 10, No. 2, Opera orig., 29–38(1930)(in German).—Emden drew attention to the seasonal variation in lactacidogen P in the skeletal muscle of *Rana esculenta* and *Rana temporaria*. These expts. of M. report the monthly variation over 1 year in the various phosphates found in heart and skeletal muscle of toads. Inorg. P averaged about 65 mg. % in heart muscle. The max. amt. is found in July and the min. in February. The same P is max. in skeletal muscle in August and reaches the min. in December. The August value is 170% of the December. The lactacidogen P averages about 77 mg %. Its max. is reached in June and the min. in December (63 mg. %). The max. value is 150% of the min. In skeletal muscle the P reaches its max. in August (117 mg. %), and its min. in December (70 mg. %). The glycogen content in toad liver reaches its highest value in January, but suffers a sudden drop in the next 2 months. After hibernation, the quantity diminishes. The phosphagen P content of heart muscle reaches a max. in January (101 mg. %), and its min. in June (45 mg. %). In skeletal muscle the max. value is found in February and the min. in June. The max. is 230% of the min.
G. H. W. LUCAS

Experimental investigation into the appearance of protein in bile. TSUNEO MATSUDA. *Japan J. Gastroenterology* 2, 130–47(1930).—The liver is injured by CCl_4, $CHCl_3$, toluylenediamine, P, As and alcs. with the excretion of protein in the bile. Org. dyes do not cause protein excretion unless they are very injurious. Protein is also found in the bile after mech. damage to the liver. No protein is produced by satg Kupffer's cells with India ink.
C. M. MCCAY

The influence of the extirpation of the suprarenal capsule on the amylolytic power of the saliva and blood. TULLIO GAYDA. *Arch. sci. biol. (Italy)* 15, 162–71(1930).—As a result of the extirpation of the suprarenal capsule in the rabbit, the amylolytic power of the blood serum increases progressively until death. This increase fits in perfectly with the diminution of such power after adrenaline injections as detd. in previous studies. The amylolytic power of the saliva does not undergo any changes after the extirpation of the suprarenal capsule. The increase in the amylolytic power of the serum following the extirpation of the suprarenal capsule is due to the lack of adrenaline, which normally aids in the emigration of amylase from the blood to the various organs, or inhibits its passage from the organs to the blood.
PETER MASUCCI

The fat of the blood and the fat of the milk during lactation. CH. PORCHER AND L. MAYNARD. *Le Lait* 10, 601–13, 765–82(1930).—A study is reported of the total fatty acids and unsaponifiable matter in the blood plasma of dry and milking cows. These constituents exhibit only small variations from day to day and at different hrs. in the same day. While the values for fatty acids and unsaponifiable matter vary for different individuals, the ratio between them tends to remain const. There is a parallel increase in both these lipides following parturition. Variations of 100% and more frequently occur in the percentage of fat in the milk obtained in consecutive milkings. Despite these large variations the blood lipides studied rarely vary more than 20% and the av. variation is much smaller. No correlation is evident between the per-

centage of fat in the milk and the level of blood lipides at the time the milk is being secreted. L. A. MAYNARD

The surviving liver-pancreas preparation. OSCAR CANTONI. *Biochim. terap. sper.* 17, 325-42(1930).—Blood, after artificial circulation through a liver-pancreas prepn., showed the following chem. changes: higher fatty acids in fasting animals, none, in alimentary lipemia a decrease; in both, the m. p. of the fats is lowered and the I value is increased. The cholesterol decreases. The O is high and CO_2 low; the quotient < 1. The urea increases during the circulation. A. E. MEYER

The hypotensor substance of the pancreas. PIERRE GLEY AND N. KISTHINIOS. *Presse méd.* **38**, 502-3(1930).—The rabbit is not sensitive to peptone poisoning. A mixt. of choline, histamine and peptone produces an increase of blood pressure in the atropinized rabbit in urethan anesthesia. If the peptone is substituted by pancreatic ext. a decrease is observed. The pancreas principle is not identical with peptone. A. E. MEYER

The experimental determination of sex and sexual sterility by means of hormones. B. PANIZZA. *Arch. ital. biol.* **83**, 90-9(1930).—An homologous graft of testicular tissue in not too large an amt. into the peritoneum of a guinea pig previous to impregnation dets. with a great deal of probability the prevalence of the female sex among the new born When the graft exceeds a certain proportion the fetus develops insufficiently or abnormally and the ovary suffers from lesions which are probably responsible for the frequency of abortion and sterility. S. MORGULIS

New investigation of the function of the adrenals. GAETANO VIALE. *Arch. ital. biol.* **83**, 130-6(1930).—Dogs have survived the removal of the second adrenal 18 to 190 hrs. Their blood did not produce any vasomotor response, and did not exert any toxic action. In animals surviving the longest there was a lowering of the alk. reserve of the blood but no change in the p_H. Neither the surface tension, osmotic pressure, protein content, uric acid or Ca concn. show any marked changes, but the viscosity is increased. The hemoglobin content and the no. of red and white cells increase progressively until the death of the latter. The eosinophiles increase particularly. The cholesterol of the blood diminishes while the lecithin always increases. The decrease in the choline content of muscles and cord of adrenalectomized animals is very striking. It is suggested that the medulla of the gland produces adrenaline while the cortex produces choline, 2 antagonistic hormones, so that the adrenal gland has actually a double function. S. MORGULIS

Studies on the assumed occurrence of pulmonary lipodieresis. OSCAR CANTONI. *Arch. ital. biol.* **83**, 154-60(1930).—Expts. on dogs receiving much fat either by mouth or as an intravenous injection fail to give any evidence of the participation of the lung in the fat metabolism. S. MORGULIS

In vitro experiments on the combined peptic-tryptic digestion and the digestibility of certain foods. A. RONCATO. *Arch. ital. biol.* **83**, 180-9(1930).—The curve of peptic digestion with natural foodstuffs has a more or less S-shape somewhat like an autocatalytic curve. The fact that Rona found that the curve was a line with a const. slope of decrement is attributed to the substrate in his expts. which was purified protein The rate of tryptic digestion also when preceded by peptic digestion is greatest with meat. S. MORGULIS

Changes in osmotic pressure of muscle during fatigue and rigor. O. MEYERHOF. *Biochem. Z.* **226**, 1-15(1930).—The lowering of the f. p. of fatigued muscles or of muscles in rigor was detd. by means of a specially designed thermoelectric cryoscope, and these detns. were supplemented with complete analyses of the simultaneous formation of lactic acid and the cleavage of creatine-H_3PO_4, pyrophosphate, and NH_3; also the formation of hexosemono- and di-phosphate esters. In cases of extreme fatigue and rigor the f.-p. depression was about 30% greater than could be accounted for from the known, decompn. processes. S. MORGULIS

Studies on parenteral resorption. V. The resorption of the dye Trypan blue from subcutaneous connective tissue. N. OKUNEV. *Biochem. Z.* **226**, 147-56(1930); cf. *C. A.* **20**, 3466.—Trypan blue does not accumulate in the blood nearly as much after subcutaneous, as it does after intraperitoneal, injection. Probably the rich supply of lymphatics of the diaphragm is more or less responsible for this difference. However, the curves of absorption by either way are remarkably similar and this leads to the conclusion that similar physiol. processes det. both. The subcutaneous resorption of the Trypan blue is definitely influenced by heat, cold, adrenaline or mustard plaster, all of which affect the local blood and lymph circulation. The subcutaneous resorption of the Trypan blue from an inflammatory region shows that this is increased in the initial stage and slowed up in the advanced stage of the inflammation. This

slowing up of the resorption in the core of the inflammation is a protective reaction.
S. MORGULIS

Effect of parathyroid extract on blood phosphatase. IRVINE H. PAGE AND M RESIDE. *Biochem. Z.* **226,** 273–7(1930); cf. *C. A.* **24,** 5363.—Overdosage with parathyroid ext. causes considerable increase in the activity of the serum phosphatase in dogs.
S. MORGULIS

The so-called specific dynamic action of foodstuffs. II. The effect of carbohydrates on the oxygen consumption of isolated cells. Z. HORN AND G. ONODY. *Biochem. Z.* **226,** 286–96(1930); cf. *C. A.* **23,** 4726.—Dextrose, levulose and galactose solns. increase the O_2 consumption of goose erythrocytes but no regular proportionality could be observed between this increase and the concn. of the added glucide. It is argued from this that the specific dynamic effect of carbohydrate in the higher organism is likewise due to a direct action of the foodstuffs on the cells. **III. Effect of blood serum on the oxidation of erythrocytes.** Z. HORN. *Ibid* 297–307.—The O_2 consumption of goose erythrocytes suspensions in Fleisch's soln. is considerably increased through the addn. of mere traces of blood serum, whether of the same or some other species. There is a proportionality between the rise in the O_2 consumption and the amt. of serum added especially in human, rabbit or goose serum, but less markedly so in dog serum. The sugar concn. of the serum used was of no importance in raising the O_2 consumption. The factor in the serum responsible for the rise in O_2 consumption of erythrocytes is thermostable, and is probably a mixt. consisting of dialyzable and non-dialyzable components. **IV. Effect of hormone on cell respiration.** *Ibid* 308–14.—Thyroxine alone or in combination with serum does not alter the O_2 consumption of goose erythrocytes; neither is the effect of serum from thyroidectomized rabbits in any way changed. Insulin alone or in combination with serum has no effect on the O_2 consumption of the erythrocytes, and does not exert any influence on this when it is being increased by means of carbohydrates. The factor in the serum responsible for the increased metabolism of the red cells is therefore neither thyroxine nor insulin. S. MORGULIS

Serum calcium level with special regard to the sexual apparatus of cattle. W. FREI AND MACK A. EMMERSON. *Biochem. Z.* **226,** 355–80(1930).—Calves have a higher serum Ca than fully grown animals, the Ca being somewhat higher in heifers. In cows the serum Ca decreases with age. During estrus the serum Ca is somewhat higher than during the interestrum. The serum Ca curve for an individual cow presents a fall before estrus and a sharp rise during estrus but drops again at its close or soon after. During the corpus luteum phase the Ca rises slightly once more. Pregnant cows have a lower serum Ca than non-pregnant. Castration seems to cause a lowering of the serum Ca in the male but a rise in the female. Cystic degeneration of the ovarian follicles produces an increase in serum Ca. This anomaly is frequently accompanied by nymphomania characterized by a hypersympathecotomy, which is assocd. with an accumulation of Ca both in the blood and tissues. The normal function of the ovary is to lower the Ca content of the tissues, *i. e.*, to produce a vagotonic effect. Nymphomania in cows cannot therefore be regarded simply as the result of ovarian hyperfunction but at most as a temporary hyperoöphoria or perhaps a dysfunction of the germ gland. Injections of progynon produce in cows a lowering of the serum Ca lasting several hrs., whereas sistomensin or anterior hypophysis ext. produces an opposite effect. S. MORGULIS

Influence of Infusoria on the digestion of ruminants. A. VERENINOV, M. AND T VINOGRADOV AND M. DIAKOV. *Biochem. Z.* **226,** 387–94(1930).—The presence of Infusoria in the rumen of the ruminant stomach has an unfavorable effect on the digestion of org. substances, of N and cellulose. S. MORGULIS

The cholesterol content of normal and eclamptic placentas. HELENE GOLDHAMMER. *Biochem. Z.* **226,** 401–3(1930).—The av. cholesterol content of the normal placenta is 0.91% and of eclamptic placentas 0.65% of the dry substance. S. M

Studies on the physiology of the glands. CXXI. Further studies on the function of the thymus. Action of thymocrescin on growth. LEON ASHER AND WIKTOV W. NOWINSKI. *Biochem. Z.* **226,** 415–28(1930); cf. *C. A.* **24,** 5362.—An aq. ext. of thymus, the thymocrescin, is prepd. by the following method: The fresh thymuses from calves, carefully sepd. from adhering fat and connective tissue, are finely cut and extd. with 3 times its wt. of pure acetone for 5–6 hrs. in a refrigerator, the mixt. being stirred frequently. The acetone is pressed out through a fine linen cloth and the residue is dried until all acetone has evapd. The dry residue is extd. 5–7 hrs. with ether in a Soxhlet app., then left under ether for 48 hrs. and again dried until every trace of ether has evapd. The dry residue is rubbed up with 2–3 times its quantity of H_2O and the swollen thymus particles are transferred to a flask contg. 6–8 times H_2O. The extn. is con-

inued for 2–4 days, the extn. is filtered cold, then evapd. in a drying app. at low temp. ntil a greenish slimy mass remains. Subcutaneous injections of an amt. correspond- ng to 20 mg. dry substance are entirely non-injurious and prevent the loss of body vt. for 14 days of rats on a vitamin-free diet or may even occasion a new rise in wt. f added directly to the vitamin-free diet, the thymocrescin soln. may occasion at first, or a considerable time, a vigorous growth. **CXXII. The iron metabolism of normal nd splenectomized animals under the influence of reduced pressure.** LEON ASHER ND RUDOLF KALBERMATTEN. *Ibid* 429–40.—In normal guinea pigs the Fe excretion s somewhat higher when the animals are maintained at a low pressure. Following plenectomy the Fe excretion under the reduced pressure is markedly increased, and his may persist for a long time or the Fe excretion may gradually readjust itself. These acts support the view that the spleen is an organ for Fe metabolism; furthermore, hat under the demands of the lowered pressure other organs may compensate for the pleen in regulating the Fe excretion. **CXXIII. Electrolyte exchange between tissues nd blood under the influence of specific diuretics. A contribution to the study of liuresis** LEON ASHER AND WERNER RIESEN. *Ibid* 441–56.—A method has been de- ised to perfuse the entire mass of intestines of the frog, with the nerves intact, the eart acting as the motor force. The perfusion with 3% gum arabic and 20% serum an be maintained for hrs. without causing the least edema. The addn. of a specific luretic to the perfusing fluid caused an increase in the electrolyte content of the per- usate. It was also found that in animals with the innervation intact the electrolyte ncrease in the perfusate was 1½ times as great as in the absence of the innervation. Conclusion: The diuretics act directly on the tissues and their effect depends largely n the vegetative nervous system impulses. S. MORGULIS

The effect of irradiated ergosterol and of parathyroid hormone on tissue phospha- ases. WALTER HEYMANN. *Biochem. Z.* **227**, 1–5(1930).—The glycerophosphatase nd the hexosediphosphatase of bones are inhibited in their action *in vitro* to a much reater extent than the phosphatases of kidney or intestine. Under the influence of rradiated ergosterol, the phosphatase activity *in vitro* is unchanged; ultra-violet radia- ion has caused inhibition of the enzymes in about 40% of the tests; while parathormone nhibited the activity of both enzymes of the bone epiphyses. S. MORGULIS

Glucolysis and phosphoric acid production in the red blood cells of different species. W. A. ENGELHARDT AND M. LIUBIMOVA. *Biochem. Z.* **227**, 6–15(1930).—Cleavage of H_3PO_4 compds. is a const. occurrence in erythrocytes. Glucolysis is accompanied by new formation of H_3PO_4 compds. According to the extent of H_3PO_4 cleavage the rythrocytes of various animals arrange themselves in the following series: cow < goat, orse < dog, pig < man, guinea pig < rabbit, which corresponds in general to the inorg. P content (except the pig). According to their glucolytic ability the cells are arranged n this series: cow < goat < horse < guinea pig < man < rabbit, so that a close simi- arity between the 2 can be noted. The pig erythrocytes again are an exception be- ause they do not glucolyze at all. The coeff. of mols. found H_3PO_4/mols. sugar dis- ppearing varies for different animals. For the goat, cow and horse it is 0.2 0.3; for nan, dog, guinea pig and rabbit it is 0.5–1.0, the latter being evidently a limiting value. S. MORGULIS

Ortho- and pyro-phosphate in the aerobic and anaerobic metabolism of the red blood ells. W. A. ENGELHARDT. *Biochem. Z.* **227**, 16–38(1930).—Non-nucleated erythro- ytes can be changed to a predominantly aerobic metabolism under the influence of nethylene blue. When the residual glucolytic power is depressed by NaF considerable uantities of H_3PO_4 become organically bound in the methylene blue respiration. Re- ression of the respiration of nucleated bird erythrocytes leads to a quick increase in norg. H_3PO_4, which is not the result of induced cleavage of H_3PO_4 compds. but of a ailure to resynthesis which respiration normally induces. The pyrophosphate is con- idered the most important source of the H_3PO_4. It is assumed that the cleavage of H_3PO_4 proceeds continuously in the cells, even under aerobic conditions, but that res- iration holds back the hydrolytic process, as can be demonstrated directly by the erobic resynthesis of pyrophosphate following its anaerobic cleavage. This is sup- osed to be a phenomenon common to all cells. S. MORGULIS

Does lactacidogen (hexosemonophosphoric acid) decompose during muscle con- traction? K. LOHMANN. *Biochem. Z.* **227**, 39–50(1930).—The decompn. of lactacido- en in the course of a single twitch has not been demonstrated, though the Embden hexosemonophosphoric ester may be lactacidogen in the sense that it *can* produce lactic cid. The only doubtful point is whether in muscle contraction this ester *must* be the source of the lactic acid. S. MORGULIS

Further studies on muscle contraction without lactic acid formation. EINAR

LUNDSGAARD. *Biochem. Z.* **227**, 51–83(1930); cf. *C. A.* **24**, 1899.—*Muscles poisoned with monoiodoacetic acid do not produce lactic acid during contraction. Phosphagen hydrolysis is definitely related to the work done in a single twitch or in tetanic contraction.* Curarization of the muscle poisoned with monoiodoacetic acid does not alter these values for phosphagen hydrolysis; likewise the chronaxy of the poisoned muscles is normal and is altered by curare exactly as it would be in a normal muscle. However, following the monoiodoacetic acid poisoning the anaerobic resynthesis of the phosphagen does not take place. Muscles only moderately poisoned performed more work with a smaller diminution in the phosphagen content in O_2 than in N_2, so that oxidative phosphagen resynthesis must have occurred. There is no evidence that pyrophosphate was hydrolyzed during work and development of rigor. S. M.

The change in reaction of active muscle. F. LIPMANN AND O. MEYERHOF. *Biochem. Z.* **227**, 84–109(1930).—By means of the manometric method it is shown that under anaerobic conditions the muscle reaction is so altered as would be expected from the creatine-H_3PO_4 hydrolysis, on the one hand, and from lactic acid formation on the other. This effect is also modified somewhat by NH_3 formation, esterification, etc. For this reason during the early part of anaerobic fatigue in the presence of a high CO_2 tension there is a gradual alkalinization followed later by an acidification In muscles poisoned with monoiodoacetic acid there is only alkalinization which reaches a max. value and remains unchanged. But in both normal and poisoned muscles the alterations in the acid-base equil. corresponds with those calcd. from the changes of the CO_2 pressure. S. MORGULIS

The metabolism of the acting, fluoride-poisoned muscle. F. LIPMANN. *Biochem. Z.* **227**, 110–5(1930).—When frogs, *Rana temporaria*, are poisoned by a sufficient NaF injection to give a concn. of about 0.025 *M* the muscles contract with a greatly diminished production of lactic acid. The effect is similar to that of the monoiodoacetic acid, although unlike this the action of the NaF develops at once and is reversible. In these NaF-poisoned muscles there is an increased decompn. of phosphagen, hydrolysis of adenylpyrophosphoric acid and extensive esterification of hexose with H_3PO_4. The poisoned muscles become rigid after a few contractions. S. MORGULIS

The metabolism of the acting carbohydrate-poor cold-blooded muscle. SEVERO OCHOA. *Biochem. Z.* **227**, 116–34(1930).—The carbohydrate metabolism of muscles from frogs made glycogen-poor with insulin was compared with their tension capacity both in O_2 and N_2. The muscle made practically carbohydrate-free by insulin cannot completely cover the tension work performed through the oxidation of carbohydrate Under these conditions the anaerobically produced lactic acid corresponds to the carbohydrate still present. The phosphagen hydrolysis is then relatively large, but there is no satisfactory evidence that the energy not accounted for by lactic acid formation is derived from the phosphagen cleavage. S. MORGULIS

The catalytic action of blood hemins and chlorophyll hemins. OTTO WARBURG AND FRITZ KUBOWITZ. *Biochem. Z.* **227**, 184–99(1930).—Rabbit red cells, washed with 0.9% NaCl and suspended in a mixt. consisting of 8.5 vol. *M*/2 Na_2HPO_4 + 1.5 vol. *M*/2 KH_2PO_4 + 24 vol. 0.9% NaCl, were used to det. the O_2 consumption. One cc. of the suspension glucolyzes 0.17 mg. glucose per hr. at 38° aerobically and about 0.25 mg. anaerobically. The respiration is completely stopped by 0.001 *N* HCN The addn. of spirographis- or copro-hemin had no effect and that of ordinary blood hemin had a small effect. Pyrrohemin agglutinates the red cells in salt soln. but not when they are suspended in isotonic glucose soln. It raises the O_2 consumption of the cells, especially in the presence of glucose but the respiratory quotient shows that the glucose is incompletely oxidized to pyruvic acid. The pyrrohemin respiration is strongly inhibited by CO both in the light and in the dark. Another chlorophyll hemin, the pheophorbid- a-hemin, accelerates the respiration of the red cells about 20 times but in the absence of glucose its effect soon wears off. Its effect is inhibited by CO very much as in the case of the pyrrohemin. The hemins cause the formation of methemoglobin in variable amts. even when acting on intact red cells, and this formation is stimulated by HCN. The methemoglobin causes the oxidation of glucose whereby its tervalent Fe becomes bivalent Fe. However, there is no definite relationship between the catalytic effect of the hemins and their methemoglobin formation. The idea of a catalytic mechanism is developed according to which the autoxidizable Fe of hemin reacts with O_2, being converted to Fe^{+++} which reacts with the non-autoxidizable Fe^{++} of hemoglobin. S. MORGULIS

Studies on blood sugar. II. P. RONA AND W. FABISCH. *Biochem. Z.* **227**, 205–20 (1930); cf. *C. A.* **24**, 1899.—New exptl. evidence is adduced to show that the normal blood sugar in man detd. by the Hagedorn-Jensen method is about −4% the same as

when detd. gasometrically by the fermentation procedure with *B. coli*. The same correspondence was observed in the blood sugar detns. by both procedures in adrenaline hyperglucemia in rabbits. In human diabetics there were in some instances differences which could not be attributed to methodical errors. In hypoglucemic shock in the rabbit the blood sugar values by the Hagedorn-Jensen method were invariably too high as compared with the same by the fermentation procedure. S. MORGULIS

Determination of the catalase content of blood. E. BACH. *Biochem. Z.* **227**, 221–9(1930).—It is pointed out that in dild. blood the catalase must be detd. soon after the removal of the blood, otherwise one should use defibrinated blood. To avoid the destruction of the catalase by the H_2O_2 a very dil. soln. should be used, and the p_H equilibrated through the use of buffers. The monomol. equation is employed in calcg. the relative amt. of catalase. S. MORGULIS

The putrefaction and reduction of sterol with special reference to the conditions in the intestine of the infant. GEORG BISCHOFF. *Biochem. Z.* **227**, 230–6(1930); cf. *C. A.* **24**, 4825.—Even on a pure milk diet there is considerable reduced sterol in the feces which runs parallel to the clinically observable intestinal putrefaction. Small quantities are found also in the stool of breast-fed infants or in other non-putrefactive stools, but in this case the substance is dihydrocholesterol and not coprosterol. Of course, in babies on a milk diet with putrefactive stools the amt. of coprosterol is never as high as on a meat diet. Coprosterol is evidently not absorbed. S. M.

The influence of thymus on growth and the preparation of an active thymic substance, the thymocrescin. LEON ASHER. *Endokrinologie* **7**, 321–7(1930).—The prepn. of thymocrescin is described which stimulates vigorously the growth of young rats on a deficient diet. It affects the Ca metabolism. S. MORGULIS

Distribution of iodine in normal and in iodine-treated hyperthyroid thyroid glands. Studies on iodine metabolism. IV. GULBRAND LUNDE AND K. WÜLFERT. *Endokrinologie* **7**, 327–63(1930); cf. *C. A.* **23**, 3270.—The I_2 of the thyroid gland consists of 3 fractions: a water- and acetone-sol., a water-sol. acetone-insol. and a water-insol. fraction. The water-sol. moiety is probably inorg. I, but it is possible that it is formed only postmorten or in the process of prepn. The acetone-insol. fraction is a protein iodide compd. and is the active substance of the thyroid. In preoperative treatment of primary thyreotoxicosis with Lugol's soln. the colloid-rich, I_2-poor gland is transformed into one poor in colloid and rich in I_2, while at the same time the blood also becomes richer in the protein-iodide content. The preoperative treatment, however, does not enrich the gland with the protein iodide compd., at any rate not sufficiently to bring this up to the normal, and in fact the protein-iodide content still remains far below that of normal glands. In cases which have been treated for many months with Lugol's soln. the I_2 distribution in the gland is almost normal, although these patients still show the clinical picture of severe thyreotoxicosis. In 2 cases of thyroid cancer the I_2 content, especially the water-sol. protein-iodide fraction, was greatly diminished. It is suggested that perhaps a chem. analysis of the gland in addn. to the histological examination may be essential for diagnosis. Continuous fever apparently also causes a rearrangement in the I_2 distribution, the water-insol. fraction generally increasing very much under this condition. S. MORGULIS

Studies on the physiology of pregnancy. KARL V. FEKETE. *Endokrinologie* **7**, 364–9 (1930).—Pregnancy serum can so modify the chem. structure of the hormone of the posterior hypophysis lobe that it will no longer stimulate the contractions of the gravid uterus. Especially in the last 2 months of pregnancy is the effect of the serum great, 1 cc. being sufficient to inactivate 0.5–0.6 Vögtlin units of Glanduitrin. At the same time it is also found that the gravid uterus undergoes such alterations that its musculature no longer responds to the posterior pituitary hormone which has been acted upon by the pregnancy serum. S. MORGULIS

The cystine and cysteine content of human hair. TETSUTARO TADOKORO AND HANAKO UGAMI. *J. Biochem.* (Japan) **12**, 187–93(1930).—The cystine content of the terminal part of the hair is lower than that of other parts. It is also less in the hair of young men with powerful growth than of old men. But while the cystine content varies with age, the cystine/N ratio is practically const. The melanin content of black hair is much greater than that of white hair, and the black hair also has a high cystine and low N content. The cysteine–cystine ratio is higher in the hair of young men than in hair from old men. Also it seems that the hair of young people contains glutathione which is scant in the hair of older people. S. MORGULIS

Biochemical studies on the auriculo-ventricular junctional system of the heart. II. The metabolic activity. KAGEYU YAMAZAKI. *J. Biochem* (Japan) **12**, 223–34 (1930); cf. *C. A.* **23**, 4737.—The auriculo-ventricular junction of the heart shows a

higher dehydrogenase and oxidase activity than the rest of the heart muscle. Its sulfhydryl content is lower, and it consumes less O_2 than the heart muscle. All this indicates that the metabolic activity of the Tawara bundle is inferior to that of the heart muscle. **III. The phosphatide and cholesterol content.** *Ibid* 235–9.—The auriculo-ventricular bundle of Tawara of the ox heart has a lower phosphatide content than the heart muscle, while the cholesterol content is very nearly the same for both. **IV. Studies on the anaerobic oxidation of the auriculo-ventricular system.** *Ibid* 241–6.—The auriculo-ventricular bundle of the heart is very resistant to cyanide, and can still consume to a certain extent O_2 when poisoned with $M/2500$ KCN. The bundle continues its automatic contraction in Locke's soln. free from O_2. S. M.

The alcohol content of the blood under different conditions. P. I. Tuovinen *Skand. Arch. Physiol.* **60**, 1–134(1930).—The exptl. subjects consumed usually 60 cc. alc., except one subject who only took 40 cc. doses. The blood alc. concn. of the same person even under uniform conditions is not the same, though following the consumption of alc. the variations are more regular in nature. If alc. is taken with food the blood alc. concn. becomes much lower than when taken on an empty stomach. Also, if alc. is taken during or after a meal it causes a slower rise with a lower final level in the blood alc. concn. than if taken before the meal. Furthermore, a mixed meal inhibits the effect of consumed alc. on the blood alc. concn. more than a meal of the same caloric value but consisting of either protein, carbohydrate or fat alone. The latter is particularly ineffective. The consumption of dil. alc. (5 to 20%) produces a greater rise in the blood alc. concn. than stronger alc. solns. of 40 and 60%. However, an hr. later the effect of the stronger alc. solns. upon the blood alc. level is often greater than that of the more dil. solns. The strength of the alc. soln. affects the blood alc. concn. even in the presence of food. The sensation exerted by alc. is proportional to the strength of the alc. soln. and although subjects vary in this respect the initial sensation appears when the blood contains about 0.006 to 0.010% alc. In general, this sensation is greater after the consumption of dil. than of strong alc. solns S. M.

Survival of the dried isolated salivary gland. O. V. Nikolaev. *Zhur. exptl Biol. Med.* **13**, 126–30(1929).—The isolated salivary gland of the dog can be restored to functional activity by soaking in and perfusing with Ringer-Locke soln. even after the gland had lost 75% of its wt. through desiccation. The secretory cells and the vessels react to electrolytes, $CaCl_2$ and KCl or poison like nicotine as they did in the fresh gland, though not as energetically. The blood vessels are, however, more resistant than the secreting tissue. S. Morgulis

The mechanism of the transformation of pyruvic acid to lactic acid in the liver. Mme. Y. Khouvine, E. Aubel and L. Chevillard. *Compt. rend.* **191**, 446–8(1930) cf. *C. A.* **24**, 5353.—Expts. to det. the influence of pyrophosphate upon the transformation of pyruvic acid to lactic acid in liver were carried out as follows: Hashed liver was suspended in Ringer soln. Sep. digestion tests were made in the presence of Na pyrophosphate, Na pyruvate and both in the same test. The digestion took place at p_H 7.4, 39°, for 4 hrs. It is shown that the pyrophosphate favors the reduction of pyruvic acid by the formation of more lactic acid. (This confirms the work of Warburg.) Na pyrophosphate decreases the CO_2 formed in the digestion test of liver with Na pyruvate. It decreases very slightly the consumption of O. In aerobic expts. without pyrophosphate, if the CO_2 due to pyruvate is suppressed, the same ratio of lactic acid to CO_2 was found as in these expts., which shows that lactic acid is formed directly by reduction of pyruvic acid. The work indicates that the reaction is not due to a xanthine-oxidase of the liver but to some enzyme which helps pyruvic acid to accept H. N. M. N.

Assimilation of starch and the formation of glycogen by rumen Infusoria. Filippo Usuelli. *Wiss. Arch. Landw.*, Abt. B, *Tierernähr. Tierzucht.* **3**, 4–19(1930); cf. *Z vergleich. Physiol.* **4**, 305(1926).—The contents of sheeps rumen were placed in a thermostat at 37°, rice, corn, potato and wheat starch were added, and the percentage of the Infusoria contg. starch and glycogen was detd. by fixation with formalin, imparting an I_2 color with Lugol soln., and counting the Infusoria by means of a Zeiss counting chamber (cf. *Z. Tierzücht. Züchtungsbiol. Tierernähr.* **12**, 31(1928). Starch assimilation attains a max. in 4 hrs., glycogen formation in 6 hrs. Different starches gave widely different max. values, which were shown to be due to differences in the size of the starch grains. Similar detns. were made on the contents of the sheeps rumen after feeding starch to the sheep. This expt. gave higher max. values than those obtained in the thermostat. W. Gordon Rose

Normal variations in the calcium content of the blood of dairy cattle. L. S. Palmer and C. H. Eckles. *J. Dairy Sci.* **13**, 351–9(1930); cf. *C. A.* **24**, 4827.—A biometric study was made on 60 sets of blood samples, each set representing 3 consecutive days.

taken from 24 cows at monthly intervals over a period up to 4 months. Considered as a whole correlation coeffs. are fairly high but they are decidedly lower than those for the inorg. P of the same samples. There are marked day to day variations which are due to an undetd. cause. F. L. SEYMOUR-JONES

The biometry of calcium and inorganic phosphorus in the blood plasma of dairy cattle. Application of results to bone mineralization. L. S. PALMER, R. A. GORTNER AND RACHEL RUDE. *J. Dairy Sci.* **13**, 360–7(1930); cf. preceding abstr.—A study of the available data for dairy cattle shows that while fair to high correlation exists between the Ca and phosphate of the blood plasma on successive days, no correlation exists between the Ca and inorg. phosphate. "No biologically significant amt. of Ca phosphate occurs in the blood. The mineralization of bone is not explainable on the basis of a mere pptn. of bone salts from body fluid." F. L. SEYMOUR-JONES

Studies on the physiology of the pyrimidines. III. The intermediary metabolism of uracil. LEOPOLD R. CERECEDO. *J. Biol. Chem.* **88**, 695–700(1930); cf. *C. A.* **24**, 4083.—About half the N of isobarbituric and isodialuric acids, when fed in small quantities to dogs, is metabolized to urea. At the same time the ethereal S in the urine increases at the expense of the inorg. S. Conclusion: Part of the above acids are excreted directly as sulfates. K. V. THIMANN

Diffusible non-protein constituents of blood and their distribution between plasma and corpuscles. OTTO FOLIN AND ANDREA SVEDBERG. *J. Biol. Chem.* **88**, 715–28 (1930).—The av. proportion of sugar in the corpuscles to that in the plasma is about 60%, and in diabetes 70%. For urea, creatinine, uric acid and amino N the proportions are 80, 75, 22 and about 30%, resp., in normal persons. To correspond with equal concn. in the water of the cells and plasma (cf. Ege and Roche, *C. A.* **24**, 2482) the proportion of each solute should be 80%. Analyses of the non-protein N of unlaked blood are given, and it is held that this should be more useful than laked blood in the future for clinical analyses. K. V. THIMANN

G - PATHOLOGY

H. GIDEON WELLS

Liver autolysis in vivo. EDMUND ANDREWS AND LEO S. HRDINA. *Proc. Soc. Exptl Biol. Med.* **27**, 987–8(1930).—Autolyzed ground liver was sterilized and introduced into the peritoneal cavity of the dog. An overwhelming *Bacillus welchii* peritonitis resulted. In some way, the ordinary flora of the intestine, as represented by the Welch bacillus, were allowed to pass through the intestinal wall and infect these masses of sterile liver. Concd. aq. exts. of fresh and of autolyzed liver caused similar peritonitis. Liver repeatedly extd. with boiling H_2O, boiling $CHCl_3$, alc. and ether mixts and even purified liver proteins induced this peritonitis. Exts. of autolyzed liver, dialyzed in collodion bags, did not cause fatal peritonitis when injected intraperitoneally. C. V. BAILEY

Effect of drying in air on the goiter-producing substance in cabbage. DAVID MARINE, EMIL J. BAUMANN, BRUCE WEBSTER AND ANNA CIPRA. *Proc. Soc. Exptl. Biol Med.* **27**, 1025–6(1930).—Cabbage was steamed for 0.5 hr. and the juice expressed under 450-lb. pressure. The resultant cake was dried in an atm. drum drier or by exposure to a current of air at room temp. for about 36 hrs. The prepns. were moistened and fed to rabbits in proportion to body wt. for about 20 days. Controls were fed with steamed-pressed cabbage which had not been dried. The test rabbits remained normal, the controls developed thyroid hyperplasia. C. V. BAILEY

Serological studies in experimental poliomyelitis. CLAUS W. JUNGEBLUT. *Proc. Soc. Exptl Biol. Med.* **28**, 7–9(1930).—To each of 3 test tubes contg. 1.5 cc. of a 5% saline ext. of monkey brain and cord tissue, were added, resp., 0.2 cc., 0.15 cc. and 0.1 cc. of the test serum. The vols. were made up to 2 cc. with 0.4% NaCl soln. and after standing for 1 hr., 0.075 cc. of 1% gold chloride soln. was added to each tube. Observations were made at the end of 1 hr. and after standing overnight. With 23 normal monkey sera, pptn. in the first 2 tubes was complete in 78.2% and partial in 21.8%. With 66 sera from poliomyelitic monkeys pptn. in the first 2 tubes was absent in 81.8% and partial in 18.2%. The nature of the phenomenon has not been detd. C. V. B.

Toxin-antitoxin reactions on the surface of collodion particles. JULES FREUND. *Proc. Soc. Exptl. Biol. Med.* **28**, 65–70(1930).—Collodion particles treated with diphtheria toxin were flocculated by diphtheria antitoxic horse serum. This flocculation was reduced considerably when toxin heated for 2 hrs. at 55° was used. Collodion particles treated with formalin toxoid were also flocculated by antitoxin and previous heating of the toxoid did not affect the flocculation phenomenon. Toxin-treated parti-

cles injected into the skin of guinea pigs produced redness, edema and necrosis; inflammation was prevented when antitoxin was injected simultaneously. Collodion particles treated with *tetanus* toxin were not flocculated by antitoxin; animal experimentation showed that the toxin was adsorbed by the particles and was neutralized by high dilns. of antitoxin. C. V. BAILEY

Study in post-operative blood chemistry. EDMUND ANDREWS AND KNUTE REUTERSKIOLD. *Ann. Surgery 92, 786–99(1930).*—*Blood chem. studies were made in patients 24 to 36 hrs. after operation. No significant changes were found in the leucocytes, blood pressure, temp., pulse, blood sugar, H_2O content of the blood, chloride or CO_2. Marked changes were found in the Aldrich-McClure test indicative of tissue thirst The permeability of the skin was increased. Profound changes in the mineral salt* balance were noted. The K:Ca ratio often fell below 1. RACHEL BROWN

Pleural effusions. MAX PINNER AND GEORGINE MOERKE. *Am. Rev. Tuberc.* 22, 121–83(1930).—Expts. on rabbits show that the normal pleura is highly permeable in either direction for the constituents of the blood. In patients under pneumothorax treatment for pulmonary tuberculosis and with pleural effusions, a marked decrease of the pleural permeability is shown by actual expts. and must be assumed to exist from the results of chem. studies of the blood and the pleural effusion. Neither chem. nor cytological, nor serological data afford *per se* dependable diagnostic or prognostic criteria The failure of resorption of pleural effusion cannot be explained by their chem. constitution; it must be due to an alteration in pleural permeability. H. J. CORPER

Serum-calcium in pneumonoconiosis. MARTIN J. SOKOLOFF AND A. CANTAROW. *Am. Rev. Tuber.* 22, 449–54(1930).—In a group of 31 patients with pneumonoconiosis, 15 of whom had an assocd. active tuberculous lesion, the serum Ca ranged from 7.98 to 14.81 mg. per 100 cc., being above normal in 26 patients, subnormal in 1 and normal in 3. The serum-Ca level bore no relation to the incidence or activity of the complicating tuberculous process. The hypercalcemia in pneumonoconiosis is in all likelihood dependent upon the increase in the CO_2 tension of the blood, which is an inevitable consequence to the pulmonary lesion. H. J. CORPER

Further studies on the nature of the processes underlying the Abderhalden reaction. EMIL ABDERHALDEN AND SEVERIAN BUADZE. *Fermentforschung* 12, 129–79(1930), cf. *C. A.* 24, 1131.—The highly specific character of the Abderhalden reaction is further illustrated by expts. in which testicular and ovarian material was injected into castrated male and female dogs. Irrespective of the sex of the animal and the source of the glandular material, the urine excreted during the first 24 hrs. contained enzymes that were specific toward the particular substrate that had been used in the treatment. The serum of the same animals gave a neg. reaction when the usual technic was employed but the reaction became pos. when a more concd. enzyme prepn., obtained by drying the serum and extg. with 0.9% NaCl, was used. The sp. enzyme does not originate in the corresponding organ, since it can thus be developed after removal of the organ There is undoubtedly an intimate relationship between the occurrence of enzyme action after parenteral administration of substances alien to blood and the numerous immunity reactions. Peptones prepd. from testicular or placenta proteins produce the same specific response, *i. e.*, the urine gives a pos. Abderhalden reaction with the corresponding substrate, provided the peptone is of high mol. wt. such as that obtained by brief hydrolysis of the protein with an equal vol. of 70% H_2SO_4 at 37°. If, however, the hydrolysis is carried further by more concd. acid and longer digestion, the peptone loses its specificity and fails to produce a specific enzyme. Similar observations were made with peptones prepd. from carcinoma proteins. An apparent exception to the specific response is the frequent occurrence of a non-specific protease which attacks certain proteins like casein, fibrin, edestin and pumpkin seed protein, which are readily amenable to enzymic proteolysis. The serum of an animal sensitized to a particular substrate, or the enzyme-contg. ppt. from the urine, when injected into a 2nd animal results in the excretion of urine with the same specificity and sometimes greater activity. Similarly, gravid human serum injected into a dog gives rise to urine with a specific reaction toward placenta substrate. In all expts. of this nature it is important to withdraw the serum sample while the animal is fasting, and to use only the morning urine. It is important also to maintain the animals in a healthy condition, with uniform diet and carefully regulated water consumption, otherwise complications may arise in the development of specific defensive enzymes. A. W. DOX

Chemical investigation of the precipitate from hemoglobin and anti-hemoglobin-serum and remarks on the nature of the antibodies. FRIEDRICH BREINL AND FELIX HAUROWITZ. *Z. physiol. Chem.* 192, 45–57(1930).—The ppt. from hemoglobin and anti-hemoglobin serum contains 2–8% lipoids, 5–10% salts and an org. residue which

gives a typical protein analysis of C 50.7, H 7.4 and N 17.7%. The bulk of the ppt. consists of a protein which resembles the globulin of the immune serum; on hydrolysis it yields the same quantities of tyrosine, cystine and arginine. The antigen content of the ppt. depends on the conditions of pptn. With low hemoglobin concns. (1:1000–1:200,000) the ppt. consists of 6–11% hemoglobin; with higher concns. the hemoglobin content rises to 24% of the lipoid-free ppt. The lipoids of the ppt. resemble those lipoids which are pptd. with the globulins on half satn. of the serum with $(NH_4)_2SO_4$. They contain neither cholesterol nor phosphatides nor cerebrosides in demonstrable quantities. On hydrolysis they yield fatty acids. The variable quantity of these lipoids suggests that they represent merely concomitant substances which are of no particular significance for the pptn. In the formation of antibodies it is probable that the antigens exert a disturbing influence in an earlier stage of the process of globulin formation, so that the non-specific components (amino acids and peptides) are built up into a specific globulin mol. Antibodies are thus globulins which, under the disturbing influence of antigens, have been formed in place of the normal globulins. The antibody is held in soln. by salts, and like the globulins it is pptd. when the salts are removed by dialysis. The precipitin reaction should therefore not be regarded as a pptn. reaction between 2 sol. substances. It is a reaction between antigen and the sol. salt compd. of the insol. antibody. Possibly the antigen displaces the salts from the surface of the antibody and this may be one of the causes of pptn. The precipitin reaction can be further complicated by the protective colloid effect of the albumins, and by the presence of several active groups in the antigen or antibody mol., thus binding several mols. of whichever reacting substance is present in excess. A. W. Dox

Urochrome and urochromogen in healthy and urotuberculous urine. Masanoshin Saheki. *Tohoku J. Exptl. Med.* **14**, No. 1, 36–43(1930).—Weiss (*C. A.* **17**, 1033, 1666) devised a method for the detn. of urochromogen in the urine and suggested that since it is increased in tuberculosis its detn. might be used as a method of diagnosis. Saheki examd. the urine of 16 healthy males, ages 11 to 64 yrs., using Weiss' method. The urochromogen was found to vary between such extremely wide limits as to have no practical diagnostic value. L. E. Gilson

The hematopoietic substance of anemic serum. A. Zih. *Arch. ges. Physiol.* (*Pflügers*) **225**, 613–9(1930).—The serum of animals rendered anemic by bleeding contains no bilirubin. After 24 to 36 hrs., hemoglobin can be demonstrated in the sera of about half of the anemic animals. The hematopoietic activity of such sera is due to the presence of this hemoglobin. Normal sera, in which hemolysis has occurred, also show this hematopoietic activity. Arthur Grollman

The passage of dye mixtures through normal and poisoned kidneys. P. Steffanutti. *Arch. ges. Physiol.* (*Pflügers*) **226**, 148–63(1930).—The rate at which dyes are excreted by the glomerulus and tubule differs. Hence injection of mixts. of dyes results in their partial sepn. by the kidney. Comparison of the manner in which such dyes are excreted by pathol. kidneys with the normal permits the detn. of the site of injury in the kidney. Arthur Grollman

Effect of cryptorchidism and of castration on the chemical composition of rats. Vladimir Korenchevsky and Marjorie Dennison. *Biochem. J.* **24**, 954–60(1930).—The amt. of intra-abdominal fat was increased and the N content decreased in both cryptorchid and castrated animals. Benjamin Harrow

Disturbance of metabolism produced by bony and non-bony injury, with notes on certain abnormal conditions of bone. David P. Cuthbertson. *Biochem. J.* **24**, 1244–63(1930).—In normal healing fracture cases the metabolism of Ca showed but little change. There was, however, a marked loss of N, P and S. The S:N and P_2O_5:N ratios suggested that the material catabolized was probably muscle. B. H.

Standardization of cholesterolized alcoholic beef heart antigen for use in complement-fixation procedures employing warm preliminary incubation. B. S. Levine. *Am. J. Syphilis* **14**, 500–5(1930).—Only fresh beef heart freshly ground and rapidly dried should be used in the prepn. of antigen exts. The cholesterol *content of the antigenic dose* should always be the same for any particular complement-fixation procedure. The antigenic titer for any particular complement-fixation method should be of a fixed value. An antigen used in any particular complement-fixation modification is to be regarded with reasonable assurance as of the same standard as the one in prior use only after it has yielded a reasonable no. (50 or 100) of pos. and neg. concordant results. B. S. Levine

The thyro-parathyroid graft and calcemia. J. F. Lewis and Rebecca Gerschmann. *Ann. farm. bioquim.* **1**, 89–98(1930).—The lobes of the thyroid with the corresponding parathyroid were removed under anesthesia in 5 to 10 min. As soon as the

effects of tetani due to hypocalcemia became manifest a lobule of the thyroid with parathyroid was grafted on to the circulatory system. The blood Ca then became increased, the blood P decreased and the tetany disappeared. By removal of the graft the condition can again be reversed. The assocn. of the parathyroid is essential to the production of the described effects. B. S. LEVINE

The influence of hyperglucemia on the amylolytic power of the saliva and blood. TULLIO GAYDA. *Arch. sci. biol.* (Italy) **15**, 147–59(1930).—The aim of the investigation was to study the behavior of the amylolytic power of the saliva and blood serum when the animal is under conditions opposite to those produced by insulin. The hyperglucemia produced in the rabbit by a subcutaneous injection of glucose or adrenaline, or by a puncture of the floor of the 4th ventricle, is accompanied by an increase of the amylolytic power of the saliva. When the hyperglucemia disappears, the amylolytic power returns to normal. Under the same conditions the amylolytic power of blood serum does not undergo any changes, except perhaps a slight diminution after the injection of adrenaline. The increase in the amylolytic power of the saliva, which follows hyperglucemia, is in all probability due to the hyperinsulinemia caused by the hyperglucemia. PETER MASUCCI

Sweat and nutrition. MAURICE BOIGEY. *Presse méd.* **38**, 357–8(1930).—M. deals with the compn. of sweat in normal and pathol. conditions and the methods of producing sweat in therapeutics. A. F. MEYER

Observations on human tetany. I. Spontaneous tetany in adults. HARALD A. SALVERSEN. *Acta Med. Scand.* **73**, 511–25(1930).—In one case of idiopathic tetany a low blood Ca was observed. The case was under observation for 3 years. Tetany occurred only during the winter months, and there was a spontaneous rise in blood Ca in the spring. Ultra-violet radiation produced normal blood Ca and general improvement. The case was regarded as a chronic hypoparathyroidism. In another case the low blood Ca was the cause of tetany and diarrhea and was due to a temporary parathyroid insufficiency which finally disappeared under Ca treatment. In a third case, in a patient with pancreatic diarrhea adiposa, the tetany was not of hypocalcemic origin but was probably due to low Cl. S. MORGULIS

The mitogenetic radiation of blood and urine of healthy and sick persons. WERNER W. SIEBERT. *Biochem. Z.* **226**, 253–6(1930).—It is claimed that the urine like the blood of healthy persons emits mitogenetic radiation which is absent in blood and urine from sick individuals. S. MORGULIS

The Gurwitsch radiation of human blood and its bearing upon the diagnosis of carcinoma. HEINRICH GESENIUS. *Biochem. Z.* **226**, 257–72(1930).—Expts. corroborate the findings of Gurwitsch-Salkind of the different types of radiation produced by normal and by pathol. blood. With the yeast as an indicator, it was found that carcinoma blood manifests a very weak radiation effect or none at all. This is also true of the blood of severe anemias. The loss of radiation of the blood has been found in carcinoma patients even before cancer could be detected by any other means. S. MORGULIS

Cholesterol and lipoid phosphorus in experimental hydrophobia. D. ZUVERKALOV AND I. GOLDENBERG. *Biochem. Z.* **226**, 278–85(1930).—The infection of the central nervous system accompanying hydrophobia produces in the first days hypercholesteremia, which may be due to the disturbance in the water content resulting from starvation. But the rise in the blood lipoid P is the most characteristic change which occurs from the moment of infection and persists until the animal dies. S. M.

A chemical method for measuring carcinolysis. R. WILLHEIM AND KURT STERN *Biochem. Z.* **226**, 315–24(1930).—Freund and Kaminer have shown that blood serum from normal persons unlike that of carcinoma patients can dissolve tumor cells. This reaction, which carried out microscopically involves many errors, is now proposed to be carried out chemically because in the cytolysis fat-like substances are set free giving characteristic color reactions with neutral red. Fat detns. by Bang's method give generally similar results. S. MORGULIS

Comparative studies on the action of ultra-violet light on complement, amboceptor, agglutinin, the Wassermann reaction and the precipitating property of serum in vitro. ALEXANDER HASSKÓ. *Biochem. Z.* **226**, 462–81(1930).—Complement, the antibodies in Wassermann pos. sera, amboceptor, agglutinin and precipitin all equally lose their specific activity partly or completely under the influence of ultra-violet radiation, this depends upon the diln. of the protein, its colloidal properties and various other conditions. The pptn. of egg albumin through antihorse-serum is prevented sooner than the pptn. by neoarsphenamne and egg albumin radiated for 9 hrs. is non-precipitable by neoarsphenamine. S. MORGULIS

Biochemical studies on endemic goiter in Hungary on the basis of the iodine deficiency theory. J. Bodnar and Johann Straub. *Biochem. Z.* **227**, 237–44(1930).—In the Bodahegyközség district 82% of the school children and 24.6% of the entire population suffer from endemic goiter. The drinking water of the district contains 0 to 1γ I_2 per l. and the amt. of I_2 consumed with the food in one child was 15.8γ per day. The daily urine of sick children contained 8γ I_2 whereas that of normal children and adults contained 35γ I_2. S. Morgulis

The determination of the urinary sugar content in diabetes in relation to the 24 hour quantity and to the specific gravity of the urine. Michael Breitmann. *Endokrinologie* **7**, 369 71(1930).—A correlation between the amt. of sugar in the urine and its vol. and sp. gr. can be worked out from the formula: $x = 0.4 + 0.4\sqrt{y-20}$, where x = % of sugar, y = the product of l. of urine by the last 2 digits of the sp. gr. value. It is also possible to det. the urine quantity from the % of sugar and sp. gr., or the sp gr. from the % of sugar and the 24-hr. urine vol. by means of the formula: $y = 6.25x^2 - 5x + 21$. S. Morgulis

Protective action of cholesterol against the shocks produced by flocculating. Auguste Lumière and Mme. R. H. Grange. *Compt. rend.* **191**, 423–5(1930).—It has been shown that shocks provoked by intravascular injection of such compds. as hexylresorcinol and certain sulfonic derivs. of naphthalene could be suppressed by previous injection of an oily soln. of cholesterol. It was thought that anaphylactic shock of the type due to flocculation by baryta or India ink could also be suppressed by cholesterol. The solns. were prepd. by 2 methods: (*a*) The serum of a male rabbit is used after successive injections of oily soln. of cholesterol during a month. The serum contains about 1.9 parts cholesterol per 1000. (*b*) The serum of a normal rabbit is satd. with cholesterol; about 1.5 parts per 1000 is absorbed. It was shown that when doses of India ink or baryta were mixed with 0.6 cc. of this cholesterol serum, the shock normally produced by these flocculates is markedly decreased. N. M. N.

The isoelectric state of tuberculins. M. A. Linnikova. *Arkh. Biol. Nauk* **30**, 187–90(1930).—The isoelec. pts. of tuberculins produced from human and bovine types were studied by means of detg. max. pptn. at varying p_H values. For tuberculins used in medical practice the isoelec. pt. varied from 3.83 to 5.1, while those in veterinary use gave values of 3.9–4.4. W. A. Perlzweig

Content of proteins, electrolytic dissociation and surface tension of blood serum in tuberculous children during the tuberculin shock. Ignazio Gatto. *Pediatria Rivista* **38**, 1112–21(1930), cf. *C. A.* **24**, 5064. Ten allergic infants with active tuberculous foci were injected with tuberculin. Blood samples taken before injection and at the height of the febrile reaction were examd. for protein content, electrolytic dissocn. and surface tension. At the height of the fever the protein content was diminished in most cases, while electrolytic dissocn. and surface tension did not undergo const. changes. G. Schwoch

The behavior of fibrin in the anemias. E. M. Mondini. *Pediatria Rivista* **38**, 1062–74(1930).—The detn. of the fibrin content of plasma from 10 normal children gave values between 0.331 and 0.412% with an av. of 0.368%. The fibrin was diminished in pseudoleucemic splenic anemia, in anemia of the hypoplastic type, and in the anemia caused by the Leishman parasite. In general the reduction in fibrin content was proportional to the degree of anemia. The fibrin was increased in secondary anemia assocd. with metapneumonic empyema, and in a child with tuberculosis in the 2nd stage. Normal fibrin values were found in Werlhof's disease and in posthemorrhagic anemia. The findings suggest a possible relation between bone marrow and fibrinogen formation. G. Schwoch

Experimental hyperparathyroidism in guinea pigs leading to ostitis fibrosa. Aaron Bodansky, John E. Blair and Henry L. Jaffe. *J. Biol. Chem.* **88**, 629–47(1930).—The effect of parathyroid hormone on the serum Ca and P of guinea pigs is much more marked after 60 hrs. fast than in fed animals, because of the basic character of the diet, and to this effect the neg. results of McLeod and Taylor (*C. A.* **19**, 3524) and others are due. Injection of 10–20 units per 100 g. body wt. raised the serum Ca, considerably in young animals, and slightly in adults, above the normal value of 10.5 mg. per 100 cc. In all cases the max. effect was observed 24 hrs. after injection. In fasting animals the serum P was markedly raised—more in young than in adults; in fed animals the serum P was almost unchanged. Bone lesions after injection were observed in the young but not in the adult. After continued small injections, doses of 100 units could be given without extreme hyperphosphatemia, and in these cases bone resorption of Na typical ostitis fibrosa lesions were produced. K. [illegible] of body wt. [illegible] imals were given

Lipemia in hemorrhagic anemia in rabbits. A. Hecht-Johansen

88, 669–73(1930); cf. Ellerman and Meulengracht, *Ugesk. Laeger* 79, 1287(1917). The % hemoglobin, lipoid content, serum protein and colloid osmotic pressure (cf. Krogh and Nakazawa, *C. A.* 22, 600) of the blood of rabbits in hemorrhagic anemia were detd. Onset of lipemia was coincident with the lowest osmotic pressure, which remained const. at about 270 mm. water. The protein content was unchanged throughout. K. V. THIMANN

The distribution of acid-soluble phosphorus compounds in tumor tissue. K. W. BUCHWALD. *J. Cancer Research* 14, 536–44(1930).—A fractionation of the acid-sol. phosphates of 3 types of tumors was carried out. The orthophosphate and Ca contents of the tumors were low when necrotic material was excluded from the analysis. When the necrotic areas could not be removed completely inorg. phosphates and Ca were often very high. Phosphocreatine could not be detected in tumor tissue. "Pyrophosphate," sol. and insol. Ba esters showed a similar distribution in tumor tissue as in normal tissue. The total lipide and lecithin-cephalin P content of tumor tissue was not particularly high when compared with that of liver and kidney. H. G. W.

Changes in the blood chemistry in malignant disease with special reference to carbohydrate tolerance and alkalosis. PAULINE BEREGOFF. *J. Cancer Research* 14, 559–67(1930).—A series of 300 patients was studied in whom the blood showed a tendency toward alkalosis, low carbohydrate tolerance, deficiency in Ca and a low CO_2 content. All bloods of cancer patients examd. in these expts. exhibited a pos. carbohydrate curve and a tendency to alkalosis. However, pos. carbohydrate curves were obtained in other pathol. states such as hyperthyroidism, acromegaly and diabetes but in these conditions no alkalosis was demonstrable. As an indication of the presence of malignant disease a pos. carbohydrate curve is significant only in the presence of alkalosis. Examn. of the blood of 25 individuals not suffering from cancer yielded a neg. carbohydrate curve in every instance and the p_H of the bloods was within normal limits. The concn. of the ionized Ca averaged 22.6 mg. per l. It would appear from these expts. that the carbohydrate tolerance test and the H-ion concn. are of greater value in eliminating the presence of malignant disease than of proving its existence. H. G. WELLS

Observations on the courses of different types of Bright's disease, and on the resultant changes in renal anatomy. D. D. VAN SLYKE, EDGAR STILLMAN, EGGERT MÖLLER, W. EHRLICH, J. F. MCINTOSH, L. LEITER, E. M. MACKAY, R. R. HANNON, N. S. MOORE AND CHRISTOPHER JOHNSTON. *Medicine* 9, 257–386(1930).—An exhaustive study correlating the results of chem. study, particularly of the blood, with the anatomical and clinical features of nephritis; several years of study in the hospital of the Rockefeller Inst. are summarized. Their observations support the view of Volhard and Fahr and of Addis that the 3 types of Bright's disease are essentially different in their genesis and pathol. nature: the hemorrhagic or glomerular, marked primarily by glomerular inflammation, with hematuria and usually diminished renal function (even in the acute stage); the sclerotic disease, marked primarily by pathol. changes in the small arteries of the kidneys (and usually other organs), with hypertension as the first sign and diminished renal function only as a terminal phenomenon; the degenerative disease or diseases, called nephrosis, marked primarily by degenerative changes in the kidneys, without hypertension and with hematuria. The diagnoses have been made chiefly on the basis of observations of the urea-excreting power of the kidneys, measured by the blood urea clearance (cc. of blood cleared of urea by 1 minute's excretion), of the hematuria, blood pressure, plasma protein content, proteinuria and edema. In acute hemorrhagic nephritis the prognosis was found to be independent of the severity of the disturbances during the first weeks, with the single exception of the plasma albumin content. The majority of cases in which this fell to a low level became chronic. Intensity of hematuria, proteinuria and degree of hypertension had no apparent relation to the probability of recovery. Fall of the renal function to as low as 10% of normal, measured by the blood urea clearance, was found not inconsistent with apparently complete recovery. The majority of cases showed during the first 2 months a decided fall in renal function measured by the blood urea clearance. In all these cases which recovered or improved, however, the blood urea clearance began to rise within 4 months after the acute hemorrhagic onset. The occurrence or non-occurrence of this rise in renal function constituted the most definite single prognostic sign. The tendency to non-cardiac edema was found to parallel approx. the fall in albumin content of the blood plasma, except during the first weeks of acute hemorrhagic nephritis. Edema during this period was repeatedly observed even when the plasma protein remained normal. The edema was, however, moderate and temporary unless by neoarsphenamin deficit developed. In all stages of nephrosis plasma deficit and

tendency to edema occurred together. In arteriosclerotic renal disease plasma proteins were never markedly reduced, and only cardiac edema was observed. Of the different features of the disease that were followed, the blood urea clearance proved to be the most closely related to the onset of final renal failure. The renal function, measured by the clearance, could apparently remain indefinitely at 10% of normal without uremia; but when it fell to below 5% uremia occurred and was usually fatal.
H. G. WELLS

The action of various lipoids on the growth of mouse cancer. P. RONDONI. *Z. Krebsforsch.* **32**, 417–24(1930).—Injection of cholesterol increases, and of lecithin decreases growth, especially pure lecithin. Some unknown acetone-sol. exts. of organs are also more or less inhibitory. Removal of cholesterol from tissue exts. by pptg. with digitonin does not increase the inhibitory effect, but injection of digitonin into mice depresses tumor growth. H. G. WELLS

Experimental tar cancer. C. C. TWORT AND J. M. TWORT. *Z. Krebsforsch.* **32**, 491–519(1930).—A summarization of results in over 45,000 expts., which presents much information concerning the conditions under which tar produces cancer, but no consideration of the chem. nature of the agent inciting cancer. H. G. WELLS

Biochemistry of the Rous sarcoma in fowls. I. Biophysics. 4. Hydrogen-ion concentration. FRANT. KOBLIHA. *Z. Krebsforsch.* **32**, 544–65(1930).—By means of quinone electrodes, controlled by H electrodes, K. detd. the p_H in blood in serum, and in exts. of tumors and normal tissues. No characteristic alterations were found in the blood, but the serum after the 15th day was more alk. because of influx from the tumor tissue. The organ exts. also showed no characteristic changes. Muscle tissue at the site of injection of either tumor tissue or normal tissue becomes acid because of the inflammatory reaction; but after 6 days growing tumors produce an alk. reaction. The muscle tissue about the growing tumor has a strongly acid reaction while the tumor grows more alk. with age. Measurement of p_H has no clinical diagnostic value.
H. G. WELLS

H—PHARMACOLOGY

A. N. RICHARDS

Comparison of effects of various preparations of anterior pituitary gland on thyroid of guinea pig. LEO LOEB AND R. B. BASSETT. *Proc. Soc. Exptl. Biol. Med.* **27**, 490–2 (1930).—Anterior pituitary glands of cattle were dried and powdered; 5 g. of the powder was extd. with 100 cc. of 0.5% AcOH or with 100 cc. of 0.1% NaOH soln. for 24 hrs. in the ice chest; the fluid was filtered, brought to p_H 7.8, refiltered and passed through a Seitz bacterial filter. Sets of guinea pigs were given daily intraperitoneal injections of 1 cc. of either the acid or the alk. exts. over a period of 7 days. On each day the thyroid gland from 1 pig of each set was removed and examd.; hypertrophy followed with surprising rapidity; the max. increase in mitotic activity occurred on the 3rd day and the max. hypertrophy of the acinus cells and absorption of colloid was reached on the 6th day. Acid and alk. exts. acted in a similar manner and larger doses had no added effect. The thyroid of the rat responded but slightly to the above injections. C. V. B.

Oral administration of anterior pituitary tablets and our laboratory preparations on compensatory hypertrophy of thyroid gland. LEO LOEB AND WALTER J. SIEBERT *Proc. Soc. Exptl. Biol. Med.* **27**, 495–7(1930).—Subtotal thyroidectomy was performed on 54 guinea pigs; one group was fed Armour & Co.'s anterior pituitary substance; another group was fed an equal amt. of dried fresh anterior pituitary glands obtained from the slaughter house. After 20 or 30 daily feedings the remaining parts of the thyroid glands were examd. Armour's tablets largely prevented compensatory hypertrophy; the dried fresh glands did not have this effect. C. V. BAILEY

The influence of constant intravenous injection of adrenaline on blood sugar of rats. C. F. CORI AND G. T. CORI. *Proc. Soc. Exptl. Biol. Med.* **27**, 560–1(1930).—In the amytalized rat 0.0002 mg. of adrenaline per min. is the smallest rate of intravenous injection which produces a definite rise in blood sugar; and 0.001 mg. per kg. per min. is the minimal rate to produce changes in blood pressure. The carbohydrate metabolism and the vascular system are less sensitive to adrenaline in the rat than in the rabbit, and decidedly less sensitive than in man. C. V. BAILEY

The effect of experimental hyperphosphatemia on calcium and phosphorus excretion. J. D. BOYD, H. M. HINES AND GENEVIEVE STEARNS. *Proc. Soc. Exptl. Biol. Med.* **27**, 766–8(1930).—Dogs were given intravenous injections of 50% soln. of Na glycerophosphate in amts. equiv. to 0.1 g., 0.25 g., 0.5 g. and 1.0 g. per kg. of body wt. The prepn. contained 11% of P and no inorg. phosphate. Control animals were given

Na phosphate in amt. equiv. to 0.5 g. of Na glycerophosphate per kg. Regardless of the size of the dose, 40–60% of the injected P was excreted in the urine within 1 hr.; $^2/_3$ of this was excreted in the first half hr. Even with the smaller doses part of this was excreted as an org. compd.; the amt. so eliminated increased with the dosage. Ca excretion was increased roughly proportionally to the amt. of P administered. With the larger doses *serum* Ca was definitely decreased. Moderate or severe tetany followed the inorg. P injection in the controls; twice this amt. of Na glycerophosphate was required to produce similar symptoms. The alkali reserve and serum chloride values remained normal. C. V. Bailey

Effect of posterior pituitary lobe extracts on the intestine of man and animals. H. A. Carlson. *Proc. Soc. Exptl. Biol. Med.* **27**, 777–9(1930).—Com exts. of posterior pituitary gland have a definite stimulating effect upon the human colon and small intestine, especially when given intravenously. In the dog these effects are inconstant; stimulation is rather exceptional. The intestine of the rabbit is more responsive to pituitary ext. than that of either the dog or the cat. C. V. Bailey

Effect of continued administration of iodine on the growth of the albino rat. Lafayette B. Mendel and Hubert Bradford Vickery. *Proc. Soc. Exptl. Biol. Med.* **27**, 806–9(1930).—Nine male albino rats were fed a diet consisting of casein 35%, cornstarch 37%, lard 15%, butter fat 9%, Osborne-Mendel salt mixt. 4% (*C. A.* **12**, 1310) plus 10 drops of cod-liver oil and 0.2–0.3 g. of dried yeast daily. Twelve test rats were given in addn. 1.107 mg. of KI daily for periods of 200–400 days. The av. rates of wt. increase were approx. equal for test and control animals and histologically the thyroid glands were of similar structure. Prolonged administration of I in doses of approx. 3.3 mg. daily per kg. is apparently harmless C. V. Bailey

Effect of sodium salicylate on intradermal reactions of rabbits. O. E. Hagebush and R. A. Kinsella. *Proc. Soc. Exptl. Biol. Med.* **27**, 922–4(1930).—Daily intravenous injections of 0.2 g. per kg. of Na salicylate in 5% aq. soln. suppressed the allergic dermal reactions of rabbits to filtrates of hemolytic streptococcus. C. V. Bailey

The effect of ether and chloroform on kidney function in dogs with obstructive jaundice. B. Dalton, L. Sperling, H. Dvorak and O. H. Wangensteen. *Proc. Soc. Exptl. Biol. Med.* **27**, 961–2(1930).—Terminal anuria occasionally accompanies protracted obstruction of the common bile duct. No evidence was obtained to indicate that the administration of ether or $CHCl_3$ impaired the kidney function in an animal with complete obstructive jaundice. C. V. Bailey

The excretion of xylose by glomerular and aglomerular kidneys. Norman Jolliffe. *Proc. Soc. Exptl. Biol. Med.* **28**, 5–6(1930).—In fish with aglomerular kidneys only the faintest traces of xylose appear in the urine following intramuscular or intravenous injection of xylose. In fish with glomerular kidneys injected xylose is readily recovered in the urine. C. V. Bailey

Differentiation of the in vivo and in vitro actions of tissue extracts. C. A. Mills. *Proc. Soc. Exptl. Biol. Med.* **28**, 18–21(1930).—The tissue fibrinogen consisted of the purified globulin fraction of fresh calf lung exts. Certain batches after weeks of storage lost their clot-promoting activity entirely on intraperitoneal injection into the rabbit, although they retained their full activity *in vitro;* ultra-violet light irradiation of the fresh tissue fibrinogen had a similar effect. Treatment with Lloyd's reagent removed the factor effective in *in vitro* expts. without decreasing the *in vivo* potency. The tissue fibrinogen, boiled vigorously for a few min. and filtered, retained its *in vitro* clotting effect but gave a marked inhibition of clotting when injected intraperitoneally. Evidently the fibrinogen contained 2 distinct clot-promoting substances. C. V. B.

Specific soluble substances of the pneumococcus in the blood in penumonia. Harold L. Amoss. *Proc. Soc. Exptl. Biol Med.* **28**, 23–5(1930).—The specific sol substances of 3 types of pneumococcus were found in the concd. filtrate or ultrafiltrate of the patients blood serum, in 1 case as early as 13 hrs. after the intial chill. In 6 out of 7 cases the blood culture was neg. The test requires less time than the sputum culture or the mouse method; it has no advantage over the sputum ext. method. The details of 2 methods are given. C. V. Bailey

Effect of tar on experimental teratoids in the rat. F. A. McJunkin. *Proc. Soc. Exptl. Biol. Med.* **28**, 25–6(1930).—A 1–1000 stock diln. of a thick ether ext. of coal tar was made in 5% gelatin, and higher dilns. were made with 1% gelatin. About $^1/_2$ an embryo was drawn directly into a syringe, mixed with an equal vol. of tar soln. and injected into the subcutaneous groin tissue of $^3/_4$ grown rats. After periods of 20 to 150 days the rats injected with 1–500,000 diln. of tar showed distinct teratoid growth, teratoids occasionally followed the 1–200,000 diln., and were absent when dilns. of 1–25,000 were used. No malignant transformations were found. C. V. Bailey

Pyloric occlusion from sulfuric acid. HERBERT A. BRUCE. *Ann. Surgery* **92**, 897-9(1930).—Report of a case in which the pathol. condition caused by H_2SO_4 taken by mouth was confined to the stomach and relieved by operation. R. B.

Alkalosis due to pyloric stenosis simulating nephritic uremia. DAMON B. PFEIFFER. *Ann. Surgery* **92**, 900-9(1930).—The treatment of alkalosis consists in restoring the chem. balance of the blood plasma. The diminished chlorides should be restored by the administration of salt soln. and glucose should be given to protect against protein destruction. RACHEL BROWN

The effect of parathyroid extract injected into cerebrospinal fluid. I. I. NITZESCU. *Compt. rend. soc. biol.* **102**, 1123-5(1929). Injection of 1.0-2.5 cc. (20-50 units) of parathyroid ext. into the cerebrospinal fluid of dogs was followed in 7 cases by an increase in blood Ca of 1.8-3.0 mg per 100 cc.; in 2 cases, the increases were 0.9 and 1.0 mg., and in another case, no change resulted. Injection of saline soln. produced no effect. The hemoencephalic barrier is permeable to the parathyroid hormone (which is not the case with insulin). B. C. BRUNSTETTER

The impermeability of the placenta to the substance in the anterior lobe of the hypophysis active on the thyroid gland. MAX ARON. *Compt. rend. soc. biol.* **103**, 151-2 (1930).—An aq. ext. of the anterior lobe of the hypophysis when injected into the guinea pig causes the excretion of colloid in its thyroid gland, the newly born guinea pig being particularly sensitive. Large doses of the aq. ext. were injected into pregnant guinea pigs at various stages of gestation; the thyroid gland of the mother always showed a marked change, but no reaction was produced in the thyroid of the fetus. Therefore the placenta is impermeable to the active principle. B. C. BRUNSTETTER

The early variations of hepatic and of muscular glycogen in the normal dog under the influence of insulin. F. RATHERY, R. KOURILSKY AND MLLE. S. GIBERT. *Compt. rend. soc. biol.* **103**, 307-8(1930). The injection of insulin (20-90 units) into dogs causes a marked drop of hepatic glycogen. A decrease of 46% was evident 15 min. after injection. The decreases in liver glycogen in 13 dogs ranged from 30 to 85%; the min. was obtained by an injection of 60 units in the portal vein and the max. when 60 units were given by ordinary intravenous injection. The amt. of glycogen present before injection does not influence the decrease after injection. There is no relation between the decrease in the amt. of glucose in the blood and that of glycogen in the liver. The decrease of muscle glycogen is less than that of liver glycogen and is often slight in quantity. B. C. BRUNSTETTER

Adrenaline and the heart of the mollusc. O. V. HYKES. *Compt. rend. soc. biol.* **103**, 360-3(1930).—The heart action of *Physa fontinalis*, a fresh water mollusc, and *Pleurotrachea mutica*, a marine mollusc, was studied *in situ*. For the latter, dilns. of 1:10,000 to 1:100,000 were used; large doses lower the no. of heart beats per 30 sec., which become irregular, the heart finally stopping in diastole; moderate doses increase the frequency of heart beat, which is followed after a time by arrest. There is an increase in tonus. For the former animal, a diln. of 1:10,000 often causes a decrease in frequency of pulsations, followed by arrest of the heart. Dilns. of 1:1,000,000 cause an increase in tonus, strengthening of contractions and increase in frequency of heart beat. B. C. BRUNSTETTER

The effect of colloidal magnesium hydroxide and of sodium thiosulfate on leucocytes. J. LEBDUSKA AND F. CERVINKA. *Compt. rend. soc. biol.* **103**, 366-8(1930).—Phagocytosis of *B. coli* by leucocytes of horse blood is greatly increased (*e. g.*, 250%) by the addn. of 0.01-0.0001 *N* solns. of colloidal $Mg(OH)_2$ or $Na_2S_2O_3$. B. C. B.

The stimulating effect of adrenaline on muscular oxidation. ULF. V. EULER. *Compt. rend. soc. biol.* **103**, 445-6(1930); cf. *C. A.* **24**, 4858.—By use of Warburg's method, it was found that adrenaline in concns. from 10^{-8} to 10^{-14} stimulated oxidation in muscles. The increase in general was about 25%. To demonstrate this increase in muscles cut into fragments, the surrounding gas mixt. must be low in O_2; E. used 98% N_2 and 2% O_2. No increase was noted in whole muscles deprived of sympathetic innervation, but an increase occurs after the addn. of glycerophosphate. B. C. B.

The effect of adrenaline on acid-base equilibrium and on ionic calcium. M. CAHANE AND I. ORASTEANU. *Compt. rend. soc. biol.* **103**, 447-8(1930).—Repeated injections of adrenaline into dogs result in a compensated acidosis: the av. p_H of the blood before injection was 7.42, and after injection, 7.40; while the av. alk. reserve before injection was 41.77 and after injection, 36.48. After injections, oscillations of p_H were observed. The av. ionic Ca of the blood was 27.60 g. per 1000 before injection, and 31.90 g. per 1000 after injection. Adrenaline seems to act in the same manner as the thyroid on the acid-base equil., the effect of the thyroid being slow and lasting, and that of adrenaline, rapid and transient. B. C. BRUNSTETTER

Calcium chloride in the prevention of pleural effusions in artificial pneumothorax. LOUIS BOONSHAFT. *Am. Rev. Tuberc.* 21, 640–3(1930).—$CaCl_2$ prevents pleural effusions in artificial pneumothorax in almost all cases. It helps the absorption of pleural effusions when present, and obviates repeated pleural punctures. H. J. CORPER

Modern methods of narcosis. ERWIN DOMANIG. *Wiener klin. Wochschr.* 43, 1026–31(1930).—Brief descriptions are given of the use of $(C_2H_5)_2O$ *with* CO_2, of *solästhin*, N_2O, *avertin* and *pernocton*. Avertin is an amylene hydrate soln. of a $C_2H_2Br_3OH$ prepn. D. B. DILL

The influence of haloacetic acid poisoning on the solubility of muscle proteins. GUSTAV EMBDEN AND ERNST METZ. *Z. physiol. Chem.* 192, 233–44(1930).—The gastrocnemius muscle of frogs poisoned with $BrCH_2CO_2H$ and ICH_2CO_2H and protected from rigor by severing the plexus ischiadicus shows a marked change in the soly. of the proteins as compared with the normal muscle. In a phosphate buffer of definite normality and H-ion concn. the protein soly. is greatly diminished, the decrease amounting to about 20% of the normal value. A further decrease occurs after muscular work performed under elec. stimulation. The soly. changes are accompanied by alterations in the colloidal state of the muscle proteins. A. W. DOX

The behavior of benzenesulfonylmethyl-11-aminoundecylic acid in the animal body. TAKESHI HOSODA. *Z. physiol. Chem.* 192, 264–7(1930).—Two dogs were given subcutaneous injections of $PhSO_2NMe(CH_2)_{10}CO_2H$ as Na salt, one receiving repeated small doses over an 8-day period and the other receiving a 10 g. dose at one time. The product isolated from the urine was 54 and 57%, resp., of $PhSO_2NMe(CH_2)_2CO_2H$. No intermediate products were obtained. It is assumed that the breakdown of the C_{11} chain to a C_3 residue results from 4 successive β-oxidations. A. W. DOX

Further experimental contributions to the pharmacology of the acid oxidation products of cholesterol and of ergosterol. HANS SEEL. *Arch. exptl. Path. Pharmakol.* 150, 198–220(1930).—Unlike the neutral oxidation products, the acid oxidation products of cholesterol are moderately toxic, the lethal dose being 160–1000 mg. per kg. for frogs and 200–1500 mg. per kg. for mice. The most toxic is the chlorodicarboxylic acid $C_{27}H_{46}ClO_4$; the least, the satd. ketomonocarboxylic acid $C_{26}H_{44}O_3$; other acids formed are $C_{27}H_{40}O_8$, $C_{27}H_{42}O_5$, $C_{27}H_{44}O_6$, $C_{27}H_{44}O_4$ and $C_{27}H_{44}O_8$. There is necrosis at the site of injection, anemia of internal organs, intravasal hemolysis, intestinal hemorrhages and cessation of heart in systole. *In vitro*, these acids cause hemolysis at concns. of 1:2000–1:200,000 and an increase in the permeability of animal membranes. Irradiation of either cholesterol or ergosterol in the presence of O_2 causes the formation of water-sol substances with similar biological toxicity, but no antirachitic properties. H. E.

Madder as a chemical and biochemical reagent. ADOLF BAUER. *Arch. exptl Path. Pharmakol.* 151, 172–4(1930).—Growing rabbits, fed on madder, have a reddish tint in skeletal bones; urinary calculi are also red; both are due to combination of Ca CO_3 with the coloring material. H. EAGLE

Experiments in the absorption, distribution in the organism and excretion of rivanol, as well as its photodynamic effect. OTTO SCHAUMANN. *Arch. exptl. Path. Pharmakol* 151, 197–218(1930).—Injected intravenously, most of rivanol quickly disappears from the blood, to be excreted eventually in the bile and urine. In the body it is most concd in the liver and the tubuli contorti of the kidney, the organs concerned in excretion. It is not found in cerebrum or placenta; only minimal quantities can be demonstrated in the fetus or amniotic fluid after massive injections. Given perorally, it is quickly absorbed by carnivora only, to be taken up by liver and excreted in bile without reaching major circulation. Its toxicity, unlike that of porphyrin, is not increased by exposing the injected animals to light. H. EAGLE

The specific-choleretic action of cinchophen. KURT FRANKE. *Arch. exptl Path. Pharmakol.* 151, 219–31(1930).—Cinchophen and atophanyl cause as high as a three-fold increase in excretion of an hepatatrophic dye (eosin) through the bile in dogs, cats and rabbits, without increasing the secretion of bile. Larger quantities cause increased vol. of bile, but decreased dye excretion, because of a toxic action of the drugs upon liver cells. Decholin causes an increased flow of bile without affecting dye excretion. Cinchophen also hastens the diffusion of the dye *in vitro* from blood serum into a gelatin gel. H. EAGLE

The effect of thyroxine upon the regulation of body temperature. I. SUSI GLAUBACH AND ERNST P. PICK. *Arch. exptl. Path. Pharmakol.* 151, 341–70(1930).—Previous administration of thyroxine to rabbits and guinea pigs prevents the hyperpyrexia caused by subcutaneous injection of luminal sodium, but accentuates the hyperpyrexia induced by tetrahydro-β-naphthylamine-HCl or cocaine in rabbits. Thyroxine inhibits the hyperpyretic action of the former upon guinea pigs; they die with pulmonary

edema. Luminal given to rabbits treated with thyroxine prevents the synergistic action of the latter with tetrahydro-β-naphthylamine-HCl. Thyroxine has no effect upon the hypopyretic action of antifebrin and quinine; they can protect thyroxine-treated rabbits from a fatal dose of tetrahydro-β-naphthylamine-HCl. Morphine has no such protective action. H. EAGLE

Salyrgan diuresis and blood supply through the kidneys. ANNELIESE SCHLOB. *Arch. exptl. Path. Pharmakol.* **152**, 27–33(1930).—Ten % salyrgan injected intravenously (0.06 g./kg.) into dogs causes increased (twenty-fold) excretion of water and salts of about 1½–2 hrs. duration. Hedonal has very little effect upon this diuresis; chloralose inhibits or prevents it entirely, while "Numal" cuts it down to about ¼ its usual effect. The normal blood supply through the kidney is 1–7 cc. per g. Kidneys artificially perfused with blood show less diuresis upon injection of salyrgan than normal dogs; but the degree of diuresis seems to be independent of the blood supply. H. EAGLE

The acute effect of neoarsphenamine upon circulation. II. The cause of the circulatory effect. OTTO KRAYER. *Arch. exptl. Path. Pharmakol.* **152**, 50–66(1930).—Solns. of neoarsphenamine exposed to air undergo oxidation, with a shift toward acid reaction in 20–40 min., and probably, a coarsened state of dispersion, with a tendency to flocculate. Such oxidized solns. may ppt. more strongly with serum *in vitro* than the fresh soln. Injected intravenously, these oxidized solns. cause injury to the vessel walls, which occasionally leads to pulmonary edema, particularly in heart-lung prepn. There is increased resistance to blood flow, because of these histological changes in vessel walls, increased viscosity of circulating fluid, and possibly because of vasoconstriction. H. EAGLE

The partition of amino acids in the blood during chloroform narcosis and in anemic animals. Is there a correlation between the osmotic resistance of the red blood cells and the partition of the amino acids in the blood? A. SIMON AND E. ANNAU. *Arch. exptl. Path. Pharmakol.* **152**, 129–41(1930).—During $CHCl_3$ narcosis, blood amino acids usually increase, and the ratio of plasma amino acid to cell amino acid usually increases. There is no correlation between the osmotic resistance of red cells and their amino acid content. Following the removal of a large quantity of blood from rabbits and dogs, the $\frac{\text{cell amino N}}{\text{plasma amino N}}$ ratio usually decreases during the regeneration period. H. EAGLE

Investigations in the effect of yeast nucleic acids upon metabolism. HELMUTH REINWEIN. *Arch. exptl. Path. Pharmakol.* **152**, 142–59(1930).—Ingestion of nucleic acids by dogs causes decreased metabolism, occasionally even below the basal metabolic rate. Glycocoll has no effect upon blood amino acids. The specific dynamic effect of glycocoll meat can be decreased by nucleic acid. Pyrimidine nucleotides are quite toxic. H. EAGLE

The effect of adrenaline and of substances related to adrenaline upon vascular tonus. A. SCHRETZENMAYR. *Arch. exptl. Path. Pharmakol.* **152**, 210–28(1930).—As tested by the Ganter method in cats narcotized with urethan, adrenaline, ephedrine, ephetonine and tyramine, all cause increased vascular tonus, and not vasdilatation, as has been supposed. The action is due to the effect upon sympathetic nerve endings in the muscle layers of the vascular wall, and is therefore overcome by gynergen. The effects of these various drugs differ only quantitatively. H. EAGLE

Uzara. III. The convulsive effect of some uzara substances on the frog. O. GESSNER AND HERMANN SCHROTER. *Arch. exptl. Path. Pharmakol.* **152**, 238–49(1930); cf. *C. A.* **24**, 5068.—The toxic effect of uzara upon the frog is due both to some unrecognized substances not pptd. by tannin, and some glucosides and split products pptd. by tannin. Of the latter, one of the most active is the aglucone uzaridin, causing fibrillary twitchings and convulsions by its central action on the medulla oblongata, and strychnine-like reflex convulsions by its action on the spinal cord. Its split products are relatively ineffective. The chief alkaloid of uzara is the water-sol., cryst. uzarin, with a very similar effect; there is a second water-sol. glucoside uzaren. Uzarenin, a water-sol. aglucone, has only a paralytic effect. The only pharmacol. effect following the ingestion of uzara might be a tonic effect, as only a little is absorbed following peroral administration, and these highly active constituents are present in but slight concn. H. EAGLE

Investigations in the toxicology of sodium thiocyanate. GERT TAUBMANN AND RUDOLF HEILBORN. *Arch. exptl. Path. Pharmakol.* **152**, 250–6(1930).—The thiocyanate ion has a specific toxic action, quite apart from the CN ion, causing death in convulsions in 4–7 days when given to rabbits *per os* in doses of 0.1–0.2 g. per kg. twice a day. There is gradual anemia, albuminuria, and urobilinuria before death. No histological changes are found. It decreases the contractility of isolated muscle. H. EAGLE

Contributions to the pharmacology of gold compounds. I. B. v. ISSEKUTZ AND M. LEINZINGER. *Arch. exptl. Path. Pharmakol.* **152**, 288–305(1930).—A characteristic property of $NaAuCl_4$ is its great affinity to protein; it ppts. serum protein, agglutinates red cells, and inhibits the swelling of gelatin. Its diffusibility is very low, and its hemolytic activity is greatly inhibited by serum. It affects surface tension of water only slightly, is not lipoid sol. and is adsorbed by particles of India ink. $KAuCN_4$, on the other hand, is very capillary-active, slightly lipoid-sol. and freely diffusible. Its partition coeff. between red cells and water is 2, but between red cells and serum it is 1.1 because of combination with serum protein. It does not hemolyze red cells or inhibit swelling of gelatin, and is absorbed by charcoal, but only weakly by India ink. Sanocrysin has somewhat intermediate properties. An org. combination is not firmly bound and dissociates readily (electrolysis; reduction; H_2S in acid reaction). Such compds are not lipoid-sol., are readily adsorbed, and are bound by serum protein, particularly albumin. Only krysolgan was hemolytic; the others are only moderately bound by red cells. Liver perfused with solns. absorbs a large quantity. Like $AuCl_4$, such substances can inhibit blood coagulation. **II.** B. v. ISSEKUTZ AND Z. DIRNER. *Ibid* 306-17.—Au chloride is a protoplasmic poison for unicellular organisms; in vertebrates, however, it is bound by protein at the site of injection. Sanocrysin is less active upon bacteria, but can inhibit growth; it is more toxic for vertebrates. $KAuCN_4$ is most antiseptic, particularly against tubercle bacilli, probably because of the action of CN groups in inhibiting oxidation. It has no particular affinity for these bacilli. Its toxic action is very evident with frogs and rats, and is only slightly counteracted by Na thiosulfate or oxantin. Org. Au compds are very weakly toxic for bacteria, yeast or paramecia. Krysolgan and triphal are about as toxic as sanocrysin for frogs, while solganol is only about one-tenth as toxic. **III.** B. v. ISSEKUTZ AND I. MÉHES. *Ibid* 318-40.—Neutralized $AuCl_3$ has a tonotropic action upon isolated frog heart, causing a max irreversible systolic contracture in 1:2000 concn. Part of the Au is bound by the heart muscle; a similar effect is produced on gastrocnemius muscle. Microscopically, it is seen to act as an astringent. The salt is bound by blood serum, diminishing its effect upon the heart. Other Au prepns. have practically no effect upon isolated heart. Injected intravenously into frogs mesentery, it does not cause capillary paralysis. In the Laewen-Trendelenburg prepn. it causes vasoconstriction even in the presence of blood serum, with inhibition of edema formation. Injected into cats it causes a fall in blood pressure because of cardiac dilatation and decreased pulse vol., and increased frequency of respiration, with respiratory paralysis when more is used; cardiazole may remove the inhibition. Krysolgan and solganol act similarly, but are weaker. Au chloride increases the tonus of the isolated intestine; others are ineffective, with the exception of Au cyanide, which decreases tonus. H. EAGLE

Experimental cardiac damage by coronary vasconstriction and the action of drugs upon it. RICHARD ROSSLER. *Arch. exptl. Path. Pharmakol.* **153**, 1–35(1930).—From 0.1 to 0.3 cc. of pitressin causes extreme vasoconstriction of the coronary vessels of a dog in Starling heart-lung prepn. with resultant cardiac damage due to insufficient blood supply. The left ventricle is the first to be affected, causing an increase in pulmonary pressure; the right auricle may then be affected, causing complete insufficiency and auricular fibrillation. Complete recovery may follow if normal circulation is resumed in a short time. Second injections of pitressin have no effect, and tiny doses may protect against damage by a large dose. Previous administration of histamine, eutonon, morphine or papaverine does not protect against pitressin but 1-mg. histamine may restore a damaged heart by causing coronary dilatation. 0.1 mg. of adrenaline during the constriction causes cardiac death. Papaverine has the remarkable property of preventing subsequent damage by pitressin, as well as instantaneously stopping the pitressin contracture; this is due to both coronary dilatation and direct action upon cardiac muscle. Ephetonine is synergistic with papaverine in this protective action, causing powerful stimulation of musculature and increased coronary blood flow.
H EAGLE

The effect of certain analeptics upon the circulation. II. GREMELS. *Arch. exptl Path. Pharmakol.* **153**, 36-49(1930).—Cardiazole, coramine and hexetone are ineffective in decompensation involving the heart. Their therapeutic use is indicated solely in pure vascular insufficiency, as they cause increased blood pressure by acting upon the vasomotor center. H. EAGLE

Renorenal reflexes. PAUL BLATT. *Arch. exptl. Path. Pharmakol.* **153**, 67-78 (1930).—Mech. or elec. stimulation of the lower third of a ureter in cats or rabbits causes vol. changes in both kidneys. The reflex to the other kidney can be prevented by section of the cervical cord. Thermal or sensory stimulation of the skin of one side

of the abdomen causes vol. changes in both kidneys. A new oncometric method is described. H. EAGLE

The mechanism of the action of insulin. A. A. SCHMIDT. *Arch. exptl. Path. Pharmakol.* **153,** 79-93(1930). -A brief review of the recent literature is included. The confusing data as to whether the insulin effect consists of increasing the glycogen in liver or in muscles, or whether it causes glycogenolysis, or whether it affects oxidation of carbohydrates, are discussed. Data are presented which indicate that insulin causes glycogenolysis in the liver, and an increased absorption of glucose from the circulation by the muscles. H. EAGLE

Experimental investigations in the pharmacology of salyrgan. IV. Studies in the chemistry of salyrgan. KNUD O MULLER. *Arch. exptl. Path. Pharmakol.* **153,** 109-19(1930). - Salyrgan is a stable Hg complex, which does not liberate free Hg ions in soln. In acid reaction, it forms very slightly sol. salyrganic acid; even CO_2 gas suffices to bring about the change. Free Hg ions can be demonstrated in solns. of the salyrganic acid by measuring the potential against a Hg electrode. NaCl increases the soly. of the salyrganic acid, probably by forming a complex salt. Injected into the body, most of the salyrgan is excreted unchanged; in acid urine, it is excreted as the salyrganic acid-NaCl complex H. EAGLE

The influence of lecithin upon the carbohydrate metabolism. GUIDO IZAR AND SAVERIO CONSTANTINO. *Klin. Wochschr.* **8,** 1624(1930). - The subcutaneous injection of an aq. suspension of lecithin, lutein and cholesterol esters (Bioplastina) into adults causes a significant hyperglucemia, reaching a max. in 60-120 min., and returning to normal values within 5 hrs. HARRY EAGLE

Precipitates of colloidal silver in inflamed tissue. H. KOLLER-AEBY. *Kolloid-Z.* **53,** 101-2(1930). Colloidal Ag soln. injected intravenously ppts. Ag selectively on the inflamed tissue. The intensity of the pptn. is to a certain degree proportional to the degree of the inflamed condition. The ppt. is lacking in non inflamed tissues. ARTHUR FLEISCHER

The causation of lathyrism in man. H. W. ACTON AND R. N. CHOPRA. *Far East Assoc. Trop. Med. Trans. 7th Congress Brit. India* **3,** 444-8(1927); *Bull. Hyg.* **5,** 620.—A review of the theories given by other authors as to the cause. Feeding expts. and isolation of alkaloids indicate that the weed akti (*Vicia sativa*) contains an alkaloid which causes lathyrism. Akti, a common contaminant of *Lathyrus sativa*, misleads many by placing the cause on the latter. An injection of 50 mg. of the impure base from akti caused paralysis in guinea pigs. Ducks fed *Lathyrus sativa* without akti showed no bad effect, when 2 g. to the kg. was added paralysis occurred in 45 days. G. R. G.

The cryptotoxic power of various salts of saturated acids of the acyclic series. H. VINCENT. *Compt. rend.* **191,** 463-5(1930). V. has shown that Na oleate, palmitate and margarate neutralize completely in very small doses the microbe toxins, such as tetanus, diphtheria and dysentery toxins. V. then studied the Na salts of the fatty acids and found those with C_1, C_2 and C_3 non active. C_4, possesses antitoxic properties. The acid with C_5 has only a feeble power, and C_7 is still weaker. C_6, is quite active, C_8 is more active than C_7 but less than C_6. The power of C_9 is very weak. The Na caprate approaches the antitoxic activity of C_8. The undecylic acid has a very powerful cryptotoxic power, while C_{13}, C_{14}, C_{15}, C_{17}, C_{18} acids possess only very feeble antitoxic power because of their poor soly. Among the higher members, Na palmitate possesses considerable cryptotoxic power. The Na salts of satd. fatty acids in soln. possess very unequal cryptotoxic powers. This power does not seem to depend upon the no. of C atoms (odd or even) nor upon the m. ps. of the acids, nor upon the degree of soly. of the salt nor upon certain phys. properties (soly., consistency, etc.). F. R. G.

The action of adrenaline on the coronary arteries. S. DUCRET. *Arch. ges. Physiol. (Pflügers)* **225,** 680-5(1930). -The dilatation of the coronary arteries, which is induced by adrenaline, is max. when the artery is under a suitable state of tonus. This dilatation is also affected by p_H, $[Ca^{++}]$, temp., O_2 content of the perfusing fluid and varies with the age of the animal. $BaCl_2$ causes contraction of the coronaries. A. G.

The effect of paraldehyde, chloralose and amylene hydrate on the vagal action on the heart. F. PLATTNER AND C. L. HOU. *Arch. ges. Physiol. (Pflügers)* **225,** 686-93 (1930). -Paraldehyde, chloralose and amylene hydrate enhance the effect of vagal stimulation or of acetylcholine on the frog heart. Paraldehyde and chloralose inhibit the splitting of acetylcholine by heart exts. *in vitro*. ARTHUR GROLLMAN

The action of vagal materials and acetylcholine on the isolated ventricle of the frog heart. A. LÁNCZOS. *Arch. ges. Physiol. (Pflügers)* **225,** 710-20(1930).—Vagal materials (*i. e.*, the hormone which is supposed to be liberated by vagal stimulation) and

acetylcholine affect the ventricle most when the auricles are still attached and have no effect if part of the ventricle has been cut away. ARTHUR GROLLMAN

Action of cinchona and certain other alkaloids in bird malaria. JOHN A. GOODSON, THOMAS A. HENRY AND JOHN WM. SCOTT MACFIE. *Biochem. J.* **24**, 874–90(1930).—Among the alkaloids tested on canaries infected with *Plasmodium inconstans*, only those of the cinchona series were of value. Among the natural cinchona alkaloids, the most active was hydroquinone. Activity is restored to quitenine and the analogous carboxylic acids were derived from quinidine, cinchonidine and cinchonine, by esterification. BENJAMIN HARROW

Comparison of the effects of arginine and thyroxine upon tumour growth-rate in the mouse. ESMÉ GILROY. *Biochem. J.* **24**, 1181–7(1930); cf. *C. A.* **24**, 5061.—Thyroxine retards the rate of tumor growth. The substitution of arginine for thyroxine causes a renewal of rapid growth. BENJAMIN HARROW

Action of insulin on the glycogen distribution in normal animals. MAURICE W GOLDBLATT. *Biochem. J.* **24**, 1199–1209(1930).—Liver glycogen increases after the injection of insulin into starving rabbits. Under the conditions described, it is considered that glycogen formation from endogenous sources is definitely increased. BENJAMIN HARROW

Pharmacological action of certain phenol esters, with special reference to the etiology of so-called ginger paralysis. (Second report.) MAURICE I. SMITH, E. ELVOVE AND W. H. FRAZIER. *U. S. Pub. Health Rept.* **45**, 2509–24(1930); cf. *C. A.* **24**, 4849.—A pharmacol. study of the action of the phosphoric acid esters of the phenols and some of the cresols has shown conclusively that tri-*o*-tolyl phosphate, and in so far as the present evidence goes, it alone, can produce in exptl. animals a sp. type of motor paralysis of the extremities in every sense comparable with that which occurred recently in human victims who drank of an adulterated fluidext. of Jamaica ginger. Some of the differences in species susceptibility to tri-*o*-tolyl phosphate previously reported appear now to be due to differences in its absorbability from the alimentary canal. Certain other differences in species susceptibility cannot yet be accounted for on the basis of our present limited knowledge of the manner of action of this poison in the animal body. Pharmacol. evidence has been presented to show conclusively that the adulterated fluid ext. of Jamaica ginger used for beverage purposes, resulting in an epidemic of partial paralysis, contained tri-*o*-tolyl phosphate to the extent of about 2%. The chem. evidence obtained confirms the pharmacol. evidence and fully harmonizes with it. The etiologic relationship of tri-*o*-tolyl phosphate to the recent epidemic of so-called ginger paralysis is thus definitely established. J. A. KENNEDY

Nitrobenzene poisoning with general blood coagulation and hemorrhagic encephalitis. EDUARD GÜNTZ. *Deut. Z. ges. gericht. Med.* **15**, 461–9(1930).—Nitrobenzene, administered to bring on menses, produced a narcotic-like unconsciousness from which the patient awoke spontaneously. The following day she became cyanotic and icteric and experienced difficulty in breathing. Post-mortal examn. showed complete blood coagulation and an hemorrhagic encephalitis. FRANCES KRASNOW

The distribution of arsenic in the body especially after many poisonous doses. S. BLUMENFELDT. *Deut Z. ges. gericht. Med.* **15**, 501–21(1930).—Analyses of As in the stomach, intestines and liver fail to give a lead as to whether one or many doses have been taken. If As poisoning is suspected, the hair should be analyzed because there is an accumulation in the hair. If the stomach contains large quantities of As, whereas only a little is found in the hair, the case is one of acute As poisoning. F. K

Poisoning by autumn colchicum seeds. O MEZGER AND W. HEESS. *Deut Z. ges. gericht. Med.* **15**, 522–8(1930).—The animals (mice and cats) showed poisoning which reached fatality very gradually (a characteristic of colchicum). Besides this the animals suffered severe vomiting and diarrhea and on autopsy there was inflammation of the stomach and intestines. FRANCES KRASNOW

Parathyroid and fluoride hypocalcemia. REBECCA GERSCHMANN. *Ann. farm bioquim.* **1**, 77–84(1930).—G. confirmed that extirpation of the thyroid and parathyroid glands occasions a reduction in the blood Ca. The onset in the reduction is prompt, and the diminution may continue for 48 hrs. The injection of 30 mg. of NaF per kg. of body weight produces a reduction in the blood Ca in 24 hrs. At the end of the 3rd to 4th hrs. a rise becomes manifest which lasts for 24 hrs., never reaching the original Ca content. The hypocalcemia is usually accompanied by an increase in the blood P. In parathyroidectomized dogs the reduction in the blood Ca is greater than in those receiving F, and no rise in the Ca is observed in the former. G. assumes that the function of the parathyroid gland is to maintain the blood Ca at a normal level. B. S. L.

The parathyroid and the hypocalcemic curve. REBECCA GERSCHMANN. *Ann.*

farm. bioquim. **1**, 85–8(1930).—Ca solns. were injected into normal and operated dogs. The blood Ca curves were identical in all animals so far as the general character of the curves is concerned, but the return to the normal Ca blood content was slower in the dogs parathyroidectomized within 24 hrs. of the experimentation. B. S. LEVINE

Potassium thiocyanate in the treatment of hypertension. LEO M. MAGUIRE. *U. S. Vet. Bur. Med. Bul.* **6**, 978–9(1930).—Four cases were treated with the drug. The cases had essential hypertension carefully diagnosed. As a result of the drug administration the blood pressure was reduced and there was a general feeling of well-being, except when the blood pressure was reduced too low. Discontinuance of the drug administration was followed by a return of hypertension to the original level. Conclusions: KCNS reduces arterial hypertension. It may be of marked value in impending or actual cerebral hemorrhage. Its effects are not permanent. B. S. L.

The influence of synthetically prepared thyroxine on the growth of explanted tissue. TOMOSADA SATO. *Acta Schol. Med.* **13**, 39–44(1930).—Earlier studies have shown that a single hormone in the body is not independent in its action. Expts. on cultivated tissue have shown that thyroid hormone has an important influence on the growth of tissue, and S. has undertaken to det. the effect of synthetic thyroxine. Heart tissue from chicken embryo, lung from rabbit embryo and chicken myxosarcoma were used. For pure fibroblast, pieces of heart from chicken embryo 8 days old were employed. Fragments about 0.5 min. in diam. were cultivated in homologous plasma, embryo tissue fluid or milk ext. contg. medium. Carrel culture flasks were used and solid and fluid media were tried. Increase in growth was measured by a vertical projection app. and a planimeter every 24 hrs. for about 7 days. The synthetic thyroxine accelerates the growth of heart tissue and fibroblast from chicken embryo and lung tissue from rabbit embryo. In suitable concn. it accelerates the growth *in vitro* of chicken myxosarcoma. G. H. W. LUCAS

Some recent chemotherapeutical investigations. FRANK L. PYMAN. *Chemistry and Industry* **49**, 757–60(1930).—A review. G. H. W. LUCAS

Electrographic investigation on the copper action on the isolated heart and ventricular strips of the frog. KIKUO OGUI. *Folia Pharmacol. Japon.* **10**, No. 1, Opera orig. 1–10(1930)(in German).—Cu is a very strong heart poison. Evidence shows that it has a depressant action, but O. began his expts. to observe any changes in the electric processes in the heart as measured by the electrocardiograph. Expts. were conducted by the Straube moist chamber method. From the electrogram of the isolated heart it is apparent that the P-R interval is unchanged. The ventricular electrogram shows a lowering of the R and T wave with a weakening of ventricle contraction and a lengthening of the T wave with a diminution in frequency. The R wave point broadens. The T wave is generally lower, and undergoes such peculiar changes as are seldom seen. The form of the electrogram is not influenced by atropine. Changes in ventricular strips are practically those observed in the whole heart in the electrogram and mechanogram. However, with the strips, the rise in frequency is sooner observed. The strips are poisoned more quickly. O. enters into a long discussion of the changes occurring in the various waves of the electrogram and the electrical changes occurring in the heart during Cu poisoning. References and electrograms are given. G. H. W. LUCAS

The pharmacology of urochloralic acid with special regard to the diuretic action of the sodium salt of this acid. HIRONDO MATSUSHIMA. *Folia Pharmacol. Japon.* **10**, No. 1, 23–48, Breviaria 2–3(1930).—Camphor, phenol, chloral hydrate, menthol, thymol, BzOH, etc., after combining with glucuronic acid in the body, are excreted in the urine in this non-toxic form. The diuretic action of urochloralic acid was studied along with the other reactions in the body. In small quantity it causes an increase in tonus in the rabbit heart and thus a decrease in contraction height. In large doses the tonus falls and the contraction strengthens. Changes in the rate are scarcely perceptible. Isolated ear and coronary vessels in rabbits and vessels in the extremities in frogs are dilated. A diuresis occurs in rabbits together with a small rise in blood pressure. There is evidence of a hydremia. Kidney vessels are dilated. The action is peripheral, for the phenomenon is present in rabbits after section of the splanchnics and the vagus in the neighborhood of the colliac ganglion. Its diuretic action is evident in toads, even after ligature of the portal vein. G. H. W. LUCAS

The difference of action of atropine and of adrenaline on the rabbit intestine excited by digitalein and strophanthin. MASAO TAKEDA. *Folia Pharmacol. Japon.* **10**, No. 2, 147–57, Breviaria 9(1930).—A large no. of parallel expts. have been carried out on strips of rabbit intestine stimulated by Ba, digitalein and strophanthin with atropine and adrenaline. The depressant action of atropine on the intestine after the stimulation by the above poisons is weaker, the stronger the exciting effect of the poison, and

after large doses is actionless. The adrenaline effect is also diminished after the poisons. The adrenaline effect is not noticeable when the intestine is intensively stimulated. If the diminution of the adrenaline effect is evident, Ba shows itself the strongest, strophanthin is weaker and digitalein is weakest, which is evidence that the manner and mechanics of the action of these poisons are not quite similar. The adrenaline effect against these drugs is essentially the same as against pilocarpine, acetylcholine and physostigmine, but the atropine effect is different. The sympathetic stimulation by direct excitement of the intestine musculature still is able to exert an important influence. G. H. W. Lucas

Pharmacological study on the geometrical isomerism of deoxidized tetrahydrosinomenine in comparison with sinomenine. Hiroshi Koika. *Folia Pharmacol. Japon.* **10**, No. 2, 158-74, Breviaria 10(1930). -The geometrical isomers of deoxidized tetrahydrosinomenine form amorphous brownish black salts with HCl, which are easily sol. in water. Sinomenine produces in frogs, mice and rabbits increased reflex excitability, convulsions and following this, disturbance of motility and respiratory paralysis The increased reflex action of sinomenine is much weakened in the reduced product and thereby the depressant action is much in the foreground. The reduced product is more poisonous. Vessels in the frog's leg and ear vessels in the rabbit are first dilated by perfusion with this product and then constricted with weak solns., but are always constricted by strong solns. In rabbits, a transient decrease in blood pressure is produced, but the heart is only damaged by large doses The respiratory center is stimulated by small doses in various animals, but is depressed by large doses. The reduction product depresses the automatic movements of the surviving rabbit intestine and uterus. After fever puncture in rabbits, it reduces fever. The oxidase action on fresh plant cells is promoted by a small quantity of the poison, but hindered by large quantities. Paramecia are injured by it G. H. W. Lucas

Physiological investigation on the embryonic chicken intestine. Hidenari Machii *Folia Pharmacol. Japon.* **10**, No. 2, 175-90, Breviaria 11(1930). Embryonic chicken intestine 4 to 20 days old was fed in physiol. salt soln., in Ringer's, Locke's and Tyrode solns. at temps of 35–43°, and spontaneous movements were observed through a lens The behavior, as well as the movements, can be sepd. into 5 parts. The isolated intestine remains almost without movement until about the 6th embryonic day The opt. temp. for spontaneous movement is 40. In later study it was found that in Locke or Tyrode nutrient media an opt. temp. of 40-41° was observed in Locke soln. from the 14th day, and in Tyrode from the 12th. The greater the departure of the exptl. temp. from the opt. the more unfavorable was the effect on the intestine movement. In Tyrode soln. the movements were strongest, in Locke a little weaker, in Ringer still weaker and weakest in the physiol. saline *Ibid* 191-201, Breviaria 12 The effect of drugs on isolated chicken intestine nourished in Tyrode soln. at 40° was observed by use of a lens. Pilocarpine in a 6-day embryo produces no stimulation. Movement is seen first in a 7-day embryo and the pilocarpine stimulation is evident after that At 7 days the adrenaline effect is almost nil, but at 8 days is quite apparent, and is always intense. Nicotine always shows a stimulation at 6 days, and with the progressive evolution of the intestine, becomes more sensitive. Ba is active at 5 days. From these data it is apparent that nerves as well as musculature in the embryonic chicken intestine increase in their sensitivity to drugs with their development G. H. W. Lucas

Neutralizing action of cystine against arsphenamine and quicksilver intoxications. Sanaye Fujino. *Folia Pharmacol. Japon.* **10**, No. 2, 202-62, Breviaria 12 3(1930) - Cystine is believed to be the only amino acid contg. S. After varying amts. of cystine ($^1/_2$, $^1/_3$, $^1/_5$ or $^1/_{10}$ of the lethal dose) were injected into the abdominal cavity, lethal doses of arsphenamine or Hg were given intraperitoneally or intravenously after a certain length of time. Cystine showed a marked neutralizing action after 6 to 54 hrs., and the majority of animals survived when it was given 24-54 hrs before arsphenamine or Hg. Histological findings after $^1/_{10}$ to 2 or 3 times the lethal dose of cystine showed after large amts. a hyperemia in the kidneys, a slight dilatation of uriniferous tubuli and Bowman's capsules. Small quantities of cystine showed little change. The amt. of ethylsulfuric acid in the urine was the same whether cystine was injected prior to arsphenamine and Hg or not. Glutathione was estd. in liver, pancreas, kidneys and blood 1 to 72 hrs. after cystine injection. A great increase was found in the liver, reaching a max. in 24 hrs. Pancreas and kidneys showed some increase, reaching a max. in 24 hrs. also, but blood was unchanged. There seems a close relationship between the amt. of glutathione in the liver and the intensity of the neutralizing action *Ibid* 263-87, Breviaria 14.—It was suggested by the above investigation, that cystine changed to glutathione in the body, and this fact led to expts. with cysteine which more

closely resembles glutathione, in a series similar to that with cystine. Its neutralizing action was quite obvious. Its action against arsphenamine and Hg was most intense when the 2 drugs were given in a mixt. or simultaneously. The action of cysteine is quite different from cystine. G. H. W. LUCAS

Antiphlogistic action through drugs. HIROSHI SUZUKI. *Folia Pharmacol. Japon.* 10, No. 3, 289–308, Breviaria 15(1930).— Inflammation was produced in rabbits' eyes by placing in the conjunctival sac, oil of mustard, antipyrine, quinine, eryeon, salicylic acid and sinomenine and rabbit serum acted antiphlogistic to the mustard inflammation, while casein, streptococcus serum, streptococcus vaccine and staphylococcus vaccine showed practically no action. G. H. W. LUCAS

Antiphlogistic action through drugs to the inflammation produced through heat and cold. HIROSHI SUZUKI. *Folia Pharmacol. Japon* 10, No. 3, 309–32, Breviaria 15–6 (1930). —Inflammation was produced in rabbits' eyes by the instillation of hot olive oil at 180° into the lower conjunctival sac. Antipyrine, quinine, eryeon and salicylic acid, injected subcutaneously prior to the olive oil treatment, possessed antiphlogistic action. Sinomen and rabbit serum have only a slight action in the initial stage, but in later stages they were quite efficient. Streptococcus serum showed some action in early stages. Casein, streptococcus and staphylococcus vaccine were almost valueless. Following inflammation produced by EtCl, practically all of the above drugs showed only a weak antiphlogistic action G. H. W. LUCAS

The pharmacological action of carpainic acid and the ethyl esters of carpainic acid. KENJON KYU. *Folia. Pharmacol. Japon.* 10, No. 3, 333–60, Breviaria 16–7(1930).— Carpainic acid and the Et ester have been prepd. by Barger from carpain. It has an imino group in which the N and the carboxyl group form a lactone ring. Both the acid and the ester depress the central nervous system and cause slight convulsions in mice and rabbits. In frogs the acid only is active. The m. l. d. of the acid for frogs is 2 mg. per g., for mice 10 mg. per g.; whereas 0.5 mg per g. of the ester is fatal to both. In rabbits 200 mg. of the acid per kg. intravenously shows no effect, but 30 mg. per kg. of the ester is fatal. The ester is also very toxic to the respiratory center, 10 to 15 mg. per kg. causing cessation of respiration. The acid does not affect blood pressure in rabbits, but the ester always produces a fall, because it is a heart poison. On frog muscle, the ester is about 10 times as depressing as the acid. Both drugs constrict vessels in frogs' hind legs, but dilate ear vessels in rabbits. Both drugs act directly on smooth muscle organs and earthworm muscle. The earthworm muscle is stimulated, whereas rabbit intestine is depressed by small doses. Small and moderate doses stimulate rabbit uterus but large doses depress it In a nerve muscle prepn. of the frog gastrocnemius the motor nerve endings and the muscle are paralyzed in the same manner, the ester being twice as active as the acid. Carpain and the ester are about equal in their action The weak action of the acid is due to the presence of the carboxyl group G. H. W. LUCAS

The detoxication of adrenaline through the reticulo-endothelium apparatus. I. TOKANOSUKE UEMORI. *Folia Pharmacol. Japon* 10, No. 3, 361–79, Breviaria 18 (1930). Rabbits were injected with India ink in the ear vein or the mesenterial vein, and 8 hrs. afterward the effects of adrenaline on blood pressure were accurately measured The min. active dose of adrenaline had diminished after administration of the ink, the intensity of the rise in blood pressure was increased, and increased still more after successive injections of the ink. This adrenaline action is closely related to the amt of ink particles in the reticulo-endothelium system. Greater adrenaline activity is obtained by injection in the ear vein than in the mesenterial before the blockade by the ink; the latter greater effect is produced by injection in the mesenterial vein If the Congo red index, according to *Adler* and *Reimann*, be estd. in normal rabbits and in others treated once or four times with ink, it is noticed that the index rises a little in the treated ones. The C particles in the reticulo-endothelium system influence in varying degrees adrenaline detoxication and Congo red index. G. H. W. LUCAS

Experimental study on the influence of poisonous gases upon the pigment-excreting function of the liver and the kidneys. I. Carbon monoxide. HYAKUICHI YAGATA. *Japan. J. Gastroenterology* 2, 169–77(1930). Adult rabbits were forced to inhale CO. The rate of elimination of coccin 2B, azorubin s, eosin a, phenolsufonephthalein and azococheneal through the bile and urine was then detd. colorimetrically. The CO poisoning decreases the powers of elimination of both the kidneys and liver. Bile decreases in amt. and turns brown during inhalation of CO but reverts to normal after inhalation stops. If the liver is injured with $CHCl_3$ or P in rabbits the excretion of dyes by the kidneys is increased but this compensating function fails after CO poisoning. The liver, although poisoned, increases its excretion. If kidney poisons such as K

chromate or U nitrate are injected before CO is inhaled, there is no compensation. Both organs fail in the dye secretion. The excretion of dyes provides addnl. evidence that CO inhalation does not cause chronic poisoning. C. M. McCay

The pharmacological action of pyrrole and of pyrryl alkyl ketones. V. Experiments on striated muscle. Angelo Rabbeno. *Arch. sci. biol.* (Italy) **15**, 107–46(1930); cf. *C. A.* **25**, 145.—Pyrrole provokes in striated muscle (frog gastrocnemius) a double lasting contraction, characterized by a rapid reversible phase in which the muscle maintains its excitability (contracture) and by a second slow irreversible phase in which the muscle becomes inexcitable (rigidity). The pyrryl alkyl ketones provoke a contraction in which the 2 phases are graphically fused; among these the butylpyrrole is the most active. The contraction by pyrrole which takes place in an analogous manner in the homologous muscles is increased by curarization especially during the rigidity, while it is not influenced by atropine or eserine. The contracting action of nicotine is added to that of pyrrole. Pyrrole and its ketone derivs. diminish the capacity of the muscle to do its work. By the combined action of pyrrole (also pyrryl alkyl ketones) and heat, contracture takes place at much lower temps. than the controls (heat alone). The terminal contraction, however, is not hastened. The heat contracture may be preceded, according to the dose of the drug used, by a precontractural contraction or by an initial lengthening. It is suggested that the seat of action of these drugs is in the muscular substratum and not in the myoneural elements; they do not act on the connective structure of the muscle. Peter Masucci

Gold salts in diabetic patients with tuberculosis. Maurice Villaret, L. Justin-Besançon and René Cachera. *Presse méd.* **38**, 218–9(1930).—Au salts have an unfavorable effect. A. E. Meyer

The cholagog action of aromatic acids. Etienne Chabrol, R. Charonnet, Maurice Maximin, J. Porin and M. E. Piettre. *Presse méd.* **38**, 433–6(1930).—The bile secretion is increased by the action of naphthoic acid, 3-hydroxy-2-naphthalenecarboxylic acid, Na *m*-hydroxybenzoate and phloroglucinol. The action of Na salicylate is uncertain. $C_6H_5CO_2Na$, Na *p*-hydroxybenzoate, tribromophenol and tetraiodophenolphthalein are inactive. Conclusion: The CO_2H group is essential for the effect, but a second CO_2H group has no further influence. The combination of several nuclei, increase of the mol. wt. and presence of OH groups increase the effect, but it is not a strict law. A. E. Meyer

Acute bismuth poisoning. Rodolfo Dassen and Juan C. Rey. *Semana méd.* (Buenos Aires) **1930**, II, 1152–7.—A fatal case of poisoning after a single injection of a therapeutic dose of Bi is reported. A. E. Meyer

The barbituric derivatives in the treatment of tetanus. Raúl F. Vaccarezza, Carlos A. Videla and José Peroncini. *Semana méd.* (Buenos Aires) **1930**, II, 1177–91.—The diethylallylisopropylbarbiturate of Et_2NH (somnifen) was used in 25% soln. for intravenous injection of 2 cc. up to 3 times a day. Besides, antitoxin was given. A remarkable suppression of the grave symptoms was obtained. A description of 7 cases is given. A. E. Meyer

Pharmacological action of sea water injected intravenously. A. Rabbeno. *Arch. ital. biol.* **83**, 73–85(1930); cf. *C. A.* **24**, 892.—Intravenous injection of sea water is toxic, 144 cc. per kg. being sufficient to kill a rabbit. As the rate of injection increases the lethal dose also becomes greater. The toxicity curve resembles very much that of a 0.598 *M* soln. of NaCl, though the toxicity of the latter is lower. The production of urine is increased and the per cent of Cl progressively rises. There was no glucose in the urine, and even where glucosuria existed prior to the injection it diminished and finally disappeared altogether as the injection proceeded. A soln. of NaCl, other things being equal, exerts a much stronger diuretic action and causes a greater Cl excretion than the sea water. S. Morgulis

Clinical investigations into the effect of intravenous injection of insulin. III. The blood-sugar curve in diabetics. Th. E. Hess Thayssen. *Acta med. scand.* **73**, 408–24 (1930); cf. *C. A.* **24**, 2195, 4866, 5380; **25**, 148.—In mild cases of diabetes the blood-sugar curve following the intravenous injection of 12 units of insulin is normal. The curve presents a more or less rapid drop to the lowest level, the assimilation curve, which is followed by a sharp rise, the restoration curve. In severe diabetics the curve becomes more abnormal as both the assimilation and restoration lines tend to flatten out. The flattening of the assimilation line is due to the fact that in the diabetics the lowest blood-sugar level is reached slower, this delay apparently increasing with the severity of the condition. The assimilation index, by which is meant the amt. of glucose assimilated per min. expressed in per cents of the initial blood sugar value, varied from 2.1 to

0.3, and is independent of the initial sugar level, presence or absence of acidosis, or fasting for 3 days. It is lower the more severe the diabetic condition. Patients with an assimilation index of 2.1–1.1 are able to assimilate sufficient carbohydrate and enough calories in their food without insulin. Patients with an assimilation index of 1.0–0.7 required a moderate dose of insulin to keep their urine free of sugar or acetone on the same diet. When the assimilation index was 0.7–0.3 massive doses of insulin were needed to keep the morning urine sugar free or to cause acidosis to disappear. S. M.

Clinical investigations into the effect of intravenous injection of insulin. IX. Gastric secretion in normal individuals. KAJ ROHOLM. *Acta med. scand.* **73**, 472–92 (1930).—Studies of the fasting gastric content obtained by continuous suction have been made on a no. of patients with normal stomach function. In 9 patients the amt. of secretion, free acid, total acid and pepsin were detd., while in 16 patients the same detns. were carried out after an intravenous injection of 12 international units of insulin. The insulin stimulated the gastric secretion both quantitatively and qualitatively. In 13 of the 16 subjects the acidity curve runs a typical course, reaching a max. 1 hr. after the insulin injections. By regulating the blood sugar level it has been possible to show that the gastric secretion must be regarded as a hypoglucemic symptom, the level of 40–50 mg. % being the threshold value at which the gastric secretion is produced.
S. MORGULIS

Biochemistry of iodine and arsenic pyridone derivatives. A. BINZ, C. RÄTH AND K. JUNKMANN. *Biochem. Z.* **227**, 200–4(1930).—Pyridine and 2-pyridone have the same toxicity. The introduction of H_3AsO_4 in the 5 position or of AcH in the NH group detoxicates the compds., I in the 5 position makes 2-pyridone somewhat more toxic but the addn. of AcH in the NH group gives rise to an I compd. which is even less toxic than the As deriv. S. MORGULIS

Influence of potassium, calcium, strontium, barium and magnesium salts on the respiration of isolated kidney tissue. JESAIAS LEIBOWITZ. *Biochem. Z.* **226**, 338–54 (1930).—The addn. of Ca salts to the NaCl either increased the respiration or had no effect, but in no instance did it produce inhibition, the kidneys of different animals responding in a characteristic manner. In every instance the Ca in the nutritive medium acted against the lowering of respiration resulting when the tissue is kept in the nutritive medium. Sr, Ba and Mg also stimulate respiration and more or less in the same degree as Ca. Optimum results were obtained with 30% of the "normal" addn. of $CaCl_2$, $SrCl_2$, $BaCl_2$ or $MgCl_2$. Even increasing the concn. of these salts 5 times had practically no effect, except with $BaCl_2$ when the respiration dropped 6–12%. No marked effect was exerted on the respiration by the addn. of K to the NaCl soln., not even when the K concn. was increased several times. K protects the respiratory function similar to the Ca, but the preserving power of Ca is greater than that of an equimol. concn. of K. The addn. to Ringer's soln. of $MgCl_2$ in concns. of 0.001 to 0.005 % always stimulated respiration; concns. 0.04 to 0.10% generally exerted an inhibiting effect on the respiration, while concns. 0.01–0.02% sometimes stimulated and sometimes inhibited it. The concn. of 0.01% $MgCl_2$ is regarded as being intermediate between the respiratory stimulating or inhibiting action of $MgCl_2$. The stimulating effect of Ca, Sr, Ba and Mg ions was shown to manifest itself at p_H 6.9 to 7.8, and this is also true for the action of K. S. MORGULIS

Parental resorption of colloids. III. M. MURATA. *Biochem. Z.* **226**, 457–61 (1930). -Intravenous injections of diastase, like that of urease, cause a rise in the blood-diastase content lasting several hrs. Diastase injected subcutaneously is not found in the blood serum, nor does it pass into the blood following intraperitoneal injection of even large doses. S. MORGULIS

The bilirubin-forming ability of the surviving spleen from dogs treated with thorium dioxysol. SUSUMU TSUNOO AND HIDEO NAKAMURA. *J. Biochem* (Japan) **12**, 133–8 (1930).—The reticulo-endothelial system of dogs was blocked by means of intravenous injections of a 5% ThO_2 colloidal soln. in combination with 5% glucose. The exptl. results show that this affects very markedly the ability of the spleen to produce bilirubin.
S. MORGULIS

Further studies on the influence of splanchnectomy on the sugar-excretion threshold. YOSHIO IWANAGA. *J. Biochem.* (Japan) **12**, 195–205(1930).—Double splanchnectomy leaves the threshold of sugar elimination almost unaltered. If the operation is not complete a rise in the sugar-excretion threshold may be produced because of the irritation of the sympathetic which can be abolished entirely by ergotamine. Acetylcholine raises very markedly the blood sugar value as well as the sugar-excretion threshold in normal animals, but following complete sectioning of the splanchnics acetylcholine

loses this effect, which leads to the conclusion that this substance produces its action through central stimulation of the sympathetic. S. MORGULIS

The use of sodium ricinoleate in bacterial hypersensitiveness of the intestinal tract. ROGER S. MORRIS AND STANLEY E. DORST. *Ann. Internal Med.* **4**, 396–7(1930).—All of 70 patients obtained marked relief and 40 became symptom free. J. T. M.

The intrinsic rhythm of the turtle heart studied with a new type of chronograph, together with the effects of some drugs and hormones. ALFRED L. LOOMIS, E. NEWTON HARVEY AND C. MACRAE. *J. Gen. Physiol.* **14**, 105–15(1930).—The effects of adrenaline, ephedrine, thyroxine, α- and β-pituitary hormone, insulin, nicotine and atropine on the turtle heart are described. Temp., p_H and O_2 supply were held const. for 36 hrs. Methods and app. are described. C. H. RICHARDSON

Therapeutic use of urease in phosgene poisoning. SVEN E. SVENSSON. *Svensk Farm. Tids.* **34**, 493–7, 509–14, 565–7(1930).—Urease in aq. ext. from soy bean loses its activity rapidly. By adding 1 drop C_6H_5Me per 50 cc. ext. the activity is held 7 days Animals poisoned with $COCl_2$ respond favorably to intravenous injections of urease exts. preserved with C_6H_5Me. The antidote action is hastened by simultaneous injection of $CO_2(NH_2)_2$. A. R. ROSE

Further studies on the effects of the rectal administration of insulin. Contribution to the knowledge of absorption in the terminal tracts of the intestine. G SALVIOLI AND G CORBINI. *Pediatria Rivista* **38**, 921–36(1930), cf. *Ibid* **37**, No. 14.—Introduction by rectum of small doses of insulin dild. with saline soln. into the terminal part of the intestine produced a lowering of the blood sugar in nurslings and small infants; with regard to duration and intensity the hypoglucemia was comparable to that produced by subcutaneous injection of insulin. With older children and adults the rectal administration was effective only when the insulin was introduced into the higher levels of the intestine. The therapeutic results obtained with insulin administration by rectum in 36 children were not encouraging. G SCHWOCH

Investigations on the metabolism in the circulatory shock. III. The potassium and calcium level in the peptone shock. E. SCHIFF, H ELIASBERG AND A. MAZZEO *Pediatria Rivista* **38**, 1158–61(1930); cf. *C. A* **24**, 4862.—Five dogs fasting for 24 hrs., in which a peptone shock had been produced, showed a 2–4 fold increase in serum K The serum Ca was slightly or moderately augmented. The increases were very distinct 5 min. after injection of the peptone. The values returned to normal after 30 to 60 min. G. SCHWOCH

Investigations on the physiological action of cerebrin. R. MONTEZERMOLO. *Rass clin. terap. sci. affini* **29**, 1–18(1930).—M. studied the effect of cerebrin injections on the growth, blood picture and wt. and lipoid content of various organs of rabbits. Subcutaneous injections daily of 0.05 g. cerebrin in 1 cc. physiol. NaCl soln. were administered to 2 young male rabbits (I); the total amt. of cerebrin injected was 1.5 g. Two other rabbits (II) were injected daily with 0.1 g. cerebrin; in these animals the total amt. injected was 3 g. Two rabbits served as the controls The animals were sacrificed 8 days after the last injection. The cerebrin injections caused the following changes The growth was slightly accelerated in I and distinctly retarded in II. The no. of red blood cells was considerably augmented; the increase was proportional to the quantity of cerebrin injected and amounted to more than 2 millions in II. This increase was maintained even after cessation of the injections. The hemoglobin was increased, though not in proportion to the increase in erythrocytes. A leucocytosis appeared which increased with the increasing no. of injections and which was still noticeable 3–5 days after cessation of the injections In the leucocyte formula the ratio between lymphocytes and polynuclear cells, which was 50:43 5 in the controls, was changed to 71.25:25 The blood sugar remained unaltered. The wt. of all the organs examd. differed considerably from that of the controls; these changes were proportional to the quantity of cerebrin injected. The most conspicuous increases were observed in spleen, adrenals, thyroid, kidneys and testicles. The wt. of the liver was slightly increased in I, but was diminished in II. The chem. analysis of the brain revealed that lecithin and cerebrin were augmented, while cholesterol was diminished. With the liver an increase in fats and lecithin and a diminution of cholesterol was observed. Numerous tables, graphs and references are given. G. SCHWOCH

The synergism between calcium and magnesium. Experiments on the frog heart. ALBERTO CABITTO. *Rass. clin. terap. sci. affini* **29**, 57–62(1930). A frog heart was isolated, mounted on a Straub cannula and perfused with Ringer soln. Addn. of 0.01% $MgCl_2$ caused an increase in the intensity of the systoles. A similar increase was noted on addn. of 0.01% $MgCl_2$ to a Ringer soln. rich in Ca ($CaCl_2$ 0.07%). Addn. of $MgCl_2$

to Ringer solns. contg. an insufficient quantity of Ca restored the normal cardiac activity. The cardiac function, which had been arrested by perfusion with Ca-free Ringer soln., was not restored when 0.005–0.06% $MgCl_2$ was added. However, when to such a Mg-contg. Ringer soln. was added a very small quantity of $CaCl_2$ (0.005%), which in itself was insufficient to restore the cardiac function, the heart systoles reappeared and became normal in frequency and intensity. Conclusion: Ca can be partly, but not completely, substituted by Mg. G. SCHWOCH

Desinsulinized pancreas extracts. O. DA RIN. *Rass. clin terap. sci. affini* **29**, 70–9(1930).—Three patients with hypertension and 2 patients with angina pectoris were treated with Gley and Kisthinios' desinsulinized pancreas exts. (*C. A.* **24**, 4856). Only a slight, transitory reduction in blood pressure was observed, which according to D. is explained by the presence of peptone in the ext. The mechanism of the fall in blood pressure is similar to that obtained with exts. from other organs. The beneficial action which the prepn. had in some cases is probably due to the presence of min. quantities of insulin or to the stimulation of the pancreas induced by the ext D. holds that insulin acts on the blood pressure by means of a mechanism different from that of the desinsulinized pancreas exts. A bibliography is given. G. SCHWOCH

The treatment of the anemias with bone marrow extracts. GIACOMO PARENTI AND DARIO BARBIERI. *Rass. clin. terap. sci. affini* **29**, 192–208(1930).— Rabbits were made anemic by subcutaneous injections daily of 1–2 cc. of a 0.5% soln. of $PhNHNH_2$.HCl for 10 days. Part of these rabbits were then injected with a glycerol ext. of bone marrow; the other part was left untreated After 10 days the red blood cells and the hemoglobin had reached normal or almost normal values in the treated rabbits; also the leucocyte formula had become more or less normal. Only a slight improvement with regard to these factors was observed in the untreated animals. Rabbits injected simultaneously with $PhNHNH_2$.HCl and the ext. developed less serious symptoms of anemia or none at all. Seven cases of anemia are reported in which the administration of the ext. by mouth or by subcutaneous injection produced a distinct improvement in the subjective condition and in the blood picture of the patients. G. SCHWOCH

Claude Bernard's theory of narcosis. WILDER D. BANCROFT AND GEORGE H. RICHTER. *Proc. Natl. Acad. Sci.* **16**, 573–7(1930).—The theory that anesthesia is due to reversible coagulation of the proteins of the sensory nerves is thought to be supported by the fact that strychnine, $HgCl_2$, and HCN produce, when in high diln., increased irritability instead of narcosis, thus intermediate stage occurring as the proteins approach the point of instability. In confirmation of the reversibility, yeast cells coagulated by 2% Am ale. were brought back to normal transparency on removal of the ale. K. V. T.

Action of cinchona alkaloids in malaria. T. A. HENRY. *Chemistry & Industry* **49**, 786(1930).—Results of preliminary work indicate that quinine and quinidine are more efficient than cinchonine in treating bird malaria. The value of cinchonidine, however, is still uncertain Of the derivs. of quinine tried, the most promising is hydroquinine which in these preliminary tests gave better results than any other drug examd. On oxidation, quinine is converted into an acid, quitenine, which is inactive in malaria, but it is now shown that activity is regained when the acid is esterified and that, in a series of such esters, activity is slowly increased as the series is ascended, the Bu and Am esters being curative instead of merely retarding the development of the malarial parasite. Alstonia alkaloids have shown some activity in bird malaria, while akuamma and greenheart bark have shown none. R. P. WALTON

Mechanism of the action of arsenicals. HAROLD KING. *Chemistry & Industry* **49**, 786–7(1930).— K. considers that thiol groups in the body, such as cysteine, react with arsenoxides forming thioarsinites, the reaction being: $R.AsO + 2HS.R' \rightleftharpoons R.As(SR')_2 + H_2O$. K. and Gough have shown that such thioarsinites are slowly hydrolyzed by water to regenerate the original oxide and thiol compd. The thioarsinites are thus believed to constitute a tissue depot for gradual liberation of the oxide which is toxic to trypanosomes. **Reply.** H. J. BARBER. *Ibid* 802.—Because of the rapidity of the action of thioarsinites on trypanosomes, B. considers that the mechanism is not a slow hydrolysis to the oxide as suggested by King, but that the more probable mechanism is the surface adsorption of the thioarsinite followed by its preferential absorption of O. R. P. WALTON

1,3,4-Triazoles (BHAGAT, RAY) **10.** Derivatives of 4-methyl-, 4,6-, 4,7- and 4,8-dimethyl-2-hydroxyquinolines (BALABAN) **10.**

12—FOODS

F. C. BLANCK AND H. A LEPPER

Wyatt William Randall (1867-1930). F. C. BLANCK. *J. Assoc. Official Agr. Chem.* 13, No. 4, ii–iv(Nov. 15, 1930).—An obituary with portrait.

A. PAPINEAU-COUTURE

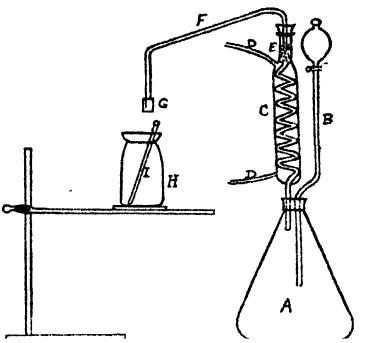
Report on (the analysis of) coloring matters (used) in foods. C. F. JABLONSKI. *J. Assoc. Official Agr. Chem.* 13, 412–6(1930); cf. *C. A.* 24, 431.—The results obtained in collaborative work on the previously described method for the sepn. and *detn. of amaranth and tartrazine* were by no means accurate, but indicated that with more experience with the technic better results may be expected. Results obtained to date on the sepn. and *detn. of fast green FCF* from other coal tar dyes permitted in foods are briefly described. The sepn. of guinea green B from fast green FCF and light green SF yellowish is based on the facts that: (1) all 3 dyes are sol. in α-dichlorohydrin; (2) fast green FCF and light green SF yellowish are not extd. to any great extent by AmOH even from *N* HCl soln., while guinea green B is almost completely extd. by AmOH from a 5% NaCl soln. or from a weak acid (*N*/16 HCl). Sepn. of fast green FCF from light green SF yellowish is based on the fact the former reacts with Br with the formation of a blue soln., while the latter, under similar treatment, is destroyed. The following technic was followed: to 25 cc. of 1% fast green FCF in a 250-cc. beaker add H_2O to 70 cc., acidify with 4 cc. concd. HCl, heat to boiling, gradually add 25 cc. of 0.1 *N* bromide-bromate soln. with vigorous stirring, boil 5 min., evap. the soln. on a steam bath to about 1/4 the original vol., add 5 cc. concd. NH_4OH (to prevent carbonization), evap. to dryness and transfer with H_2O to a 250-cc. volumetric flask The following changes occurred during these operations: addn. of HCl produced a greenish soln., which was changed by the bromide-bromate at first to a brownish yellow and later to a deep blue, while NH_4OH made a purplish soln. The soly. of the resulting color soln. in AmOH was materially altered, as it was almost completely extd. from *N*/16 HCl. Wool dyed from a slightly acid soln. of the dye, with a deep blue-black shade which was stripped and redyed with a reddish black. *Spot reactions of the dyed wool:* concd. HCl, light green; concd. H_2SO_4, brown; 10% NaOH, reddish brown, concd NH_4OH, violet-blue. *Reaction of the aq. soln.:* Addn. of a small quantity of H_2O, blue-black; addn. of a large amt. of H_2O, reddish blue; HCl to aq. soln., greenish blue; AcOH to aq. soln., blue; strong NH_4OH to aq. soln., bluish red; 10% NaOH to aq. soln., orange-brown. A soln. of 25 cc. of 1% light green SF yellowish, treated similarly, produced a brownish yellow coloration. Expts. carried out by this method on mixts. in known proportions of the 2 dyes indicated that 4% of fast green FCF can readily be detected in mixts. with light green SF yellowish, while quantities as low as 0.4% of fast green FCF can be detd. only after extg. with AmOH, removing the decompn. products, dilg. with petr. ether, and extg. the color by means of dil. NH_4OH. Efforts to estimate the color by means of standard $TiCl_3$ were not entirely successful.

A. PAPINEAU-COUTURE

Report on (the determination of) preservatives (in foods). WYATT W. RANDALL. *J. Assoc. Official Agr. Chem.* 13, 409–12(1930).—From a discussion of Monier-Williams method for the *detn. of SO_2 in foods* and of Fitelson's work on the comparison of this method with the official A. O. A. C. method, it is recommended that the Monier-Williams method be adopted as tentative method and that it be studied collaboratively with a view to its substitution for the present official method. A. PAPINEAU-COUTURE

Report on (the determination of) arsenic in foods. W. C. TABER. *J. Assoc Official Agr. Chem.* 13, 417–22(1930).—A method is required suitable for the detn. of 0.2–10 mg. As, intermediate between the amts. determinable by the Gutzeit and the standard insecticide methods. The method suggested by Smith (*C. A.* 6, 3381) is based on the fact that when AsH_3 is passed into a $HgCl_2$ soln., there may be formed arsenides and other As and Hg compds. that are titrated with an I soln.; the reaction with I is essentially a titration from AsH_3 to As_2O_5 according to the equation: $2AsH_3 + 16I + 5H_2O = As_2O_5 + 16HI$. The method is particularly suitable for the detn. of As-spray residues on fruit, and may be applied in the field by working directly on the soln. obtained by washing 1–2 lb. of fruit with 300–500 cc. of 3% HCl or 3% NaOH. The following technic was developed: If the NaOH wash is used, neutralize and add 10–20 cc. concd. HCl in excess; place the acid or acidified wash in *A* (750-cc. capacity), add 10 cc. of reducing agent (KI, H_2O, concd. HCl and $SnCl_2$), heat to boiling, cool to about 80°, connect the app. as shown in the figure placing in *H* 10 cc. of 5% $HgCl_2$ dild. to 100 cc., loosen the stopper of *A*, quickly pour in 25 g. of granulated

30-mesh Zn, insert the stopper at once, make sure the app is tight (because of the highly poisonous nature of AsH_3); the reaction should start vigorously within a few min., add further amts. of the HCl soln. of reducing agent through *B* at such a rate as to ensure a lively reaction and a fast evolution of *H*, let the reaction continue for about 1 hr. or until the Zn is all used; disconnect at *G*, to the contents of *H* add 10 cc. of 15% KI to form the sol. $KI.HgI_2$, add an excess of about 25% of standard I (the requisite excess is judged by the color developed by the I); run in a standard As soln. to slight excess, using starch indicator, add 1 g. $NaHCO_3$, and titrate back with standard I. The difference between the total vol. of I and As solns. used × the As equiv. of the I = amt. of As. The As_2O_3 equiv. of the I soln. when titrating AsH_3 to As_2O_5 is 1/4 that when titrating As_2O_3 to As_2O_5; approx. 0.01 *N* is suitable. Good results were always obtained when using pure solns., but with fruit washes the recovery varied from 86.8–106.5%, due doubtless to the org. matter present. Comparison of the method with the Gutzeit method on sprayed fruit gave fairly good agreement, but the Gutzeit was somewhat lower, particularly with high As contents. The proposed method may be used successfully when applied to the acid digestion of various food products. It is being studied further with a view to overcoming interference of org. matter.



Arsenic Apparatus

A—Distillation flask, 750-cc. capacity.
B—Tube and separatory funnel for admitting acid.
C—Worm condenser
D—Tube for condensing water.
E—Cotton impregnated with lead acetate
F—Tube for conveying gas into mercuric chloride solution
G—Rubber connection for the tube I in H.
H—Half-pint milk bottle for mercuric chloride solution

A PAPINEAU-COUTURE

Report on (the determination of) copper (in foods). REED WALKER. *J. Assoc. Official Agr. Chem.* **13**, 426–7(1930).—The present tentative A. O. A. C method was found to be unsatisfactory because: (1) the wet digestion used in destroying org. matter is trustworthy but tedious; (2) the pptn. of the Cu with H_2S is tedious and of doubtful value for such small quantities of Cu; (3) digestion of the CuS ppt. and filter paper with HNO_3 and H_2SO_4 leads to high results. As a substitute for wet digestion, ashing in an elec. muffle proved satisfactory. Pptn. of Cu with satd $Na_2S_2O_3$ instead of H_2S and ignition of the CuS instead of digestion in HNO_3 and H_2SO_4 gave promising results, the most satisfactory procedure being as follows: Neutralize the soln. (obtained either by wet digestion or by dissolving the ashed sample in HCl) with NH_3, add 5 cc. concd. H_2SO_4, dil. to 200 cc., boil 1 min., cautiously add 10 cc. of satd. $Na_2S_2O_3$, boil until the ppt. coagulates and the liquid is practically clear, filter, wash with hot H_2O, ignite the ppt. in an elec. muffle at dull red heat, dissolve in 1 cc. HNO_3 (d. 1.12), transfer to a 100-cc. Erlenmeyer flask, evap. to dryness on a steam bath, dissolve in 20 cc. H_2O, add excess NH_4, boil till the soln. turns light brown, add a slight excess of AcOH, boil 1 min., cool to room temp., add 2 g. KI dissolved in enough H_2O to make the final soln. 50 cc. (including the standard $Na_2S_2O_3$ used in titrating), titrate with 0.01 *N* $Na_2S_2O_3$, adding 2 cc. of freshly prepd. 1% starch soln. near the end of the titration.

A. PAPINEAU-COUTURE

Report on (the determination of) boron (in foods). O. F. KRUMBOLTZ. *J. Assoc. Official Agr. Chem.* **13**, 422–3(1930).—The present official A. O. A. C. method for the detn. of boric acid in fertilizers gave recoveries of 95–7%. The MeOH recovered for use in subsequent detns. was found to have carried off about 5% of the H_3BO_3. This error is considerably reduced by using a large excess of alkali; but too much alkali dissolves a little of the H_3BO_3 from the glass. A method based on the use of superheated steam, as originally suggested by P. Chiyevskii (*Arch. sciences Genève* [3], **12**, 146(1884)) has been developed; superheated steam is obtained by passing steam from an outside source through a coiled tube in an electrically heated Cu cylinder contg. vapors from a boiling kerosene fraction sufficient to heat the steam to 180–90°; through the top of the cylinder is set a large test tube contg. the H_3BO_3 to be distd. The method gave recoveries of 99.5–100.2% of pure H_3BO_3 or acidulated borax. When org. matter is present, the sample must first be rendered alk., ashed at low red heat, and then acidified

and distd. Some of the simpler mixts., *e. g.*, dextrose and H_3BO_3, gave recoveries of 99.0-99.7%; with wheat flour a loss of several % of H_3BO_3 was noted, indicating a greater retention of B by the ash. The method is being studied further. A. P.-C.

Report on (the determination of) tin (in foods). U. Liddel. *J. Assoc. Official Agr. Chem.* **13**, 423-5(1930).—Present methods of detg. Sn in foods are briefly reviewed critically, and the drawbacks of the present tentative A. O. A. C. methods are outlined. The following method has given satisfactory results after the Sn was in soln. and org. matter removed: Adjust the vol. of the soln. to 100 cc. by evapn or diln., add 57 cc. concd. HCl to make the acidity of the soln. 4 *N*, add 2 drops of 1% $SbCl_3$ and then approx. 0.2 g. reduced Fe powder, boil till the Fe is completely dissolved (keeping the flask covered with a funnel), add a small piece of marble, cool quickly in ice to about 20°, add an excess of standard I soln., and immediately titrate the excess I with 0.2 *N* $Na_2S_2O_3$. Bibliography of 22 references. A. Papineau-Couture

Fermentations in the food industries. F. C. Blanck. *Ind. Eng. Chem.* **22**, 1166-8(1930).—A survey is given of the fermentation processes involved in the prepn of various foods such as bread, tea, coffee, cocoa, sauerkraut, pickles, vinegar, sauces, olives, cheese, etc. The value of these food products and the relation of the chemist and micro-biologist to the problems of production are briefly mentioned. C. N. F.

Report on (the analysis of) cereal products. J. A. LeClerc. *J. Assoc. Official Agr. Chem.* **13**, 433-8(1930); cf. *C. A.* **24**, 432. A brief review of the progress accomplished by the Assoc. in 1928-9 on the analysis of cereal products, and discussion of the reports of the associate referees (see following abstracts). A. P.-C.

Report on sampling of flour. H. Runkel. *J. Assoc. Official Agr. Chem.* **13**, 439 (1930); cf. *C. A.* **23**, 212.—It is recommended that the official A. O. A. C. method for sampling flour be studied collaboratively with respect to other detns. than that of water, and that a "metal" (instead of "steel") trier be specified. A. Papineau-Couture

Report on gasoline color value and ash determination in flour. D. A. Coleman *J. Assoc. Official Agr. Chem.* **13**, 439-42(1930); cf. *C. A.* **23**, 213.—It was ascertained from prominent cereal chemists that the detn. of gasoline color in flour is rarely used in any practical way by any of the large mills (in the U. S.), in a crude way it is sometimes used by those interested in the sale of flour-bleaching equipment to demonstrate the efficiency of their products, and in a limited way by certain plant breeders to test approx. the carotene content of wheat and flour. Moreover, new and more precise methods for detg. color can be devised. The Walters method for the detn. of ash (*C. A.* **24**, 1676) was compared with the A. O. A. C. method and with this method modified by the use of glycerol-alc., on 4 straight-grade flours milled from hard red spring, hard red winter, soft red winter, and white wheat, resp. Temps. of 750°, 800° and 850° were used in the Walters method. With the hard wheat flours, fairly close comparisons were obtained by use of Walters method at 800-50° and the A. O. A. C. method with soft red winter wheat flour difficulty in ashing was experienced at all temps.; all the temps. used were too high for ashing the white wheat flour. On repeating the detns. with 3 g. of flour and 6 cc. of La soln., somewhat better results were obtained, but the necessity of using different ashing temps. for certain classes of flour was again apparent: hard red spring, hard red winter and soft red winter flours ashed in fairly good form at 800-50°, but comparable results in ashing the white wheat flour were obtained at temps. not in excess of 750°. The ashing crucibles were found to change wt. after each test in a manner that might seriously affect the results, but it was not detd. whether this was due to the high temp. of ashing or to a combustion of the elements of which the crucible was made with the La_2O_3 or the oxides in the flour ash. A. Papineau-Couture

Report on (the determination of) glutenin in flour. M. J. Blish. *J. Assoc. Official Agr. Chem.* **13**, 442-3(1930); cf. *C. A.* **24**, 432.—A brief outline of the results recently obtained by B. and Sandstedt concerning the nature of glutenin (*C. A.* **24**, 897). A. Papineau-Couture

Report on (the determination of) flour-bleaching chemicals. G. C. Spencer *J. Assoc. Official Agr. Chem.* **13**, 447-9(1930); cf. *C. A.* **24**, 433.—Two samples of commercially bleached flour, one by the "Beta-Chlora" and the other by the "Agene" process, were analyzed collaboratively by the Seidenberg method (*C. A.* **22**, 1197). The "Beta-Chlora" bleached flour yielded 227-284 p. p. m. of Cl (av. 263 p. p. m.), and the "Agene" flour 0.0-11.9 p. p. m. (av. 5.0). Analysis by the same method of 6 samples of unbleached flour showed 0.0-24.9 p. p. m. of Cl. Adoption of the method as tentative is recommended. A. Papineau-Couture

Report on foreign methods for testing flour. C. H. Bailey. *J. Assoc. Official Agr. Chem.* **13**, 449-55(1930).—The A. O. A. C. and the Greek official methods for

detg. the acidity of flour differ in that the former exts. with H_2O and expresses as lactic acid, while the latter exts. with 85% alc. and expresses as H_2SO_4. The ratio of the results obtained by the 2 methods varies considerably, the factors required to convert Greek acidity into A. O. A. C. acidity being as follows: 0.05% by Greek method, factor 6.0; 0.10%, 4.2; 0.15%, 3.3; 0.20%, 2.4. Despite these complications, the results obtained by either method serve as a reasonably adequate basis for estg. the probable percentage as detd. by the other method. A brief survey is made of past activities of the A. O. A. C. in connection with the detn. of acidity in flour, and it is recommended that the collaborative study of this detn. be reopened with a view to (*a*) ascertaining the fundamental sources of variability in the application of the tentative A. O. A. C. method, and (*b*) comparing these results with those obtained by alc. extn. such as used in the present Greek method. A. PAPINEAU-COUTURE

Report on sampling and determination of moisture in bread. L. H. BAILEY. *J. Assoc. Official Agr. Chem.* **13**, 455-7(1930); cf. *C. A.* **24**, 433.—Previous observations on the lack of uniformity of distribution of moisture in a loaf of bread were confirmed, and it is therefore recommended that an entire loaf of bread be taken as a sample for the detn. of moisture. A. PAPINEAU-COUTURE

Report on hydrogen-ion determinations (in flour). C. H. BAILEY. *J. Assoc. Official Agr. Chem.* **13**, 444-5(1930), cf. *C. A.* **23**, 213. A collaborative comparison of the use of the quinhydrone electrode and the H electrode in the electrometric detn. of the p_H value of flour by the A. O. A. C. tentative method showed that the variability was about the same by the 2 methods. It is concluded that the quinhydrone electrode is suitable for this detn.; but it should be noted that the sensitivity of the potentiometer set-up is diminished when the ordinary quinhydrone electrode is substituted for the usual types of H electrodes. A. PAPINEAU-COUTURE

Report on (the determination of the) diastatic value of flour. ARNOLD H. JOHNSON. *J. Assoc. Official Agr. Chem.* **13**, 445-6(1930), cf. Tague, *C. A.* **24**, 433.—It is shown that the diastatic activity of flour increases with the degree of fineness to which it is ground and also that extn. of a flour with Et_2O gives a flour of higher activity than the unextd. flour; as the extd. flour appears much finer than the unextd. flour, the apparent increase in activity might be attributed to increased susceptibility of the substrate to diastasis. It was thought that by extg. flours with Et_2O all flours would become of the same particle size, hence would provide a uniform substrate, and differences in sugar-producing power would be due entirely to differences in diastatic activity and not to differences in susceptibility of substrate to diastasis. Two flours milled from the same wheat, but ground so that one had about twice the diastatic activity of the other, were extd. with Et_2O with the hope that the 2 flours would then have the same diastatic activity; both flours, however, increased in diastatic activity in about the same ratio. It was found that the optimum H-ion concn. for diastatic activity varies with different flours, and that the differences are not due to the different electrolyte contents of the flours. A. PAPINEAU-COUTURE

Report on (the determination of) crude fiber in alimentary pastes and in air-dried baked cereal products. W. F. STERLING. *J. Assoc. Official Agr. Chem.* **13**, 457 (1930).—The technic of the official A. O. A. C. method for detg. crude fiber in flour was found to be entirely satisfactory for detg. crude fiber in air-dried baked cereals and in alimentary pastes and its adoption as official for these materials is recommended. A. PAPINEAU-COUTURE

Report on experimental baking tests. M. J. BLISH. *J. Assoc. Official Agr. Chem.* **13**, 458-66(1930); cf. *C. A.* **24**, 433.—Following Harrel's investigation (*C. A.* **24**, 1749), B. undertook a series of tests with 6 experienced collaborators, the results of which are given in detail. There was fairly satisfactory agreement as to the nature of the differential between loaves baked with and without the addn. of 1 mg. of $KBrO_3$, to the extent that nearly all treated loaves showed a decrease in vol., any lack of agreement in this connection being more in degree than in kind. As was to be expected from the fact that there were fewer collaborators and they were presumed to have had extensive experience in the use of the method, there was far more encouraging concordance of results in the present series than in Harrel's. It is expected that ultimately all factors, with the possible exceptions of yeast and atm. pressure, will be under satisfactory and uniform lab. control. The factors of mixing, molding, ovens and yeast are probably the more prominent contributors to the difficulties that are being encountered under present circumstances. Continuation of the coöperative work on this problem with the Am. Assoc. of Cereal Chemists is recommended. A. P.-C.

Report on (the determination of) water-soluble protein, unsaponifiable matter, ash and total solids in flour and alimentary pastes. SAMUEL ALFEND. *J. Assoc.*

Official Agr. Chem. **13**, 467–9(1930); cf. *C. A.* **24**, 434.—It is recommended that the tentative acid-hydrolysis method for fat and the tentative methods for lipoids and lipoid P_2O_5 in alimentary pastes be definitely adopted as official Collaborative study during 3 yrs of the tentative F. A. C. method for the detn. of unsapon. matter in the fat of alimentary pastes, baked cereal products and flour has given results lacking in uniformity, and the method should be studied to det what factors are causing irregularities in the results. The effect of NaCl in the detn. of alc.-precipitable N in flour and alimentary pastes was investigated. Adding the alc. before the NaCl sometimes gave higher results and sometimes had no effect on the results; when NaCl was omitted entirely, the ppt. formed more slowly, but it gave as high results if allowed to coagulate overnight, as when NaCl was used, while in some cases the results were distinctly higher when NaCl was omitted. The rise in temp. caused by the addn. of alc apparently had no influence on the formation of the ppt. Good check results are difficult to obtain, because of difficulty in packing the ppt. on centrifuging, and also because of the frequent formation of a colloidal soln. which passes through the filter pad; and A. concludes that the present method is not reliable for all samples. Use of 1.2% NaCl soln. for extn. of the proteins from the sample is a decided improvement, but work along this line was discontinued because this method yields higher results, and all the authentic data available are based on water-sol. N The use of asbestos or of $CaCO_3$ for improving the packing of the alc. ppt. on centrifuging and the subsequent filtration is practically useless; Al_2O_3 cream gives an excellent pack from which the clear liquid can be poured off readily, but its use gives much higher results. The logical step is to add Al_2O_3 cream to the aq. ext. just before filtration, which gives a somewhat clearer soln. for flour or noodles, but with powd. whole egg and liquid egg it changes a muddy filtrate into a sparkling clear soln The difference between the quantities of alc.-precipitable N in the solns. before and after clarification is striking (no figures are given), the results for the clarified solns. being lower than the usual values, particularly with egg samples. A. PAPINEAU-COUTURE

The sterilization of flour and of enzymes in powdered form. III. J. J. VAN DE VELDE. *Bull. sci. acad. roy. Belg.* [5], **16**, 585–91(1930); cf. *C. A.* **14**, 3112.—For sterilization the powd materials were placed in sterile Petri dishes and covered with pure, freshly distd. CS_2. The dishes were placed in a large metal oven, kept at atm temp., and the CS_2 was allowed to evap. spontaneously. The crusts of material formed during evapn. of the CS_2 were loosened from the dish and pulverized with a sterile spatula. The dishes with their contents were then placed in a glass desiccator, through which a current of air, dried and sterilized by passage through concd. H_2SO_4, was led to remove all traces of CS_2. All odor of CS_2 was gone after one day. Tests made upon amylase after this treatment showed that (1) its hydrolyzing properties had not been affected; (2) it was sterile; and (3) it was susceptible to easy infection, *e. g.*, with *B. fluorescens liquefaciens*. After treatment with CS_2, pepsinase was found to have somewhat more active enzymic properties than before; it was sterile, but easily reinfected. LOUISE KELLEY

Standardization of milk with skim milk powder for the manufacture of Cheddar cheese. H. C. HANSEN AND D. R. THEOPHILUS. *Concentrated Milk Industries* **1**, No. 1, 44–6(1930).—Milk was standardized to fat : solids-not-fat ratios of 1 : 2.6, 1 : 2.8 and 1 : 3.0 with spray-dried skim milk and successfully manufactured into Cheddar cheese. The 1:3.0 ratio often gave a H_2O content above and a fat content below the legal limit F. L. SEYMOUR-JONES

Importance of the solubility of milk powders. J. C. MARQUARDT. *Concentrated Milk Industries* **1**, No. 1, 41–2(1930).—The age of ice cream and cream cheese was found to affect their quality more than the age or soly. of skim milk powder used in their manuf. Powder soly. had no effect on cream cheese quality When highly insol powders are used, ice cream texture is improved by high pasteurization temps F. L. SEYMOUR-JONES

Sweet cream—some practices to guard against. H. H. SOMMER. *Concentrated Milk Industries* **1**, No. 2, 16–7(1930).—An av. of 15 samples showed for per cent cream acidity by different methods (*A*) 9-cc. pipet, not rinsed, 0.096; (*B*) 9-cc. pipet, rinsed with 9-cc. H_2O, 0.085; (*C*) 9-g. cream, 0.107; (*D*) calcd. from acidity of skim and the per cent fat in cream 0.811. In neutralizing cream with $NaHCO_3$ it is necessary to boil off CO_2 to obtain a true titration. F. L. SEYMOUR-JONES

Sweet cream. The prevention of cream plugs. H. H. SOMMER. *Concentrated Milk Industries* **1**, No 3, 11–2, 23(1930).—Cream plugs contg. 65–70% fat are due to rise of fat globules and not to surface evapn. Their formation depends on serum viscosity and size of fat globules. Coalescence or clumping of globules, particularly

by agitation of the milk or cream between 50° and 95°, favors plug formation. The addn. of citrates decreases the tendency to form plugs, presumably by increasing the charge on, and hence the electrostatic repulsion between the fat globules. Low-pressure homogenizing (200-1000 lb.) can be used as a remedy for plugs. F. L. S.-J.

Variation in the analytical indices of butter caused by changes due to aging. F. Arnaudo and A. Soldi *Ann. chim. applicata* **20**, 405-9(1930).—Analyses of 20 samples of butter kept for periods up to 14 months show that the Zeiss index of refraction drops from 0 2 to 2.2 units; the Reichert-Meissl no. 0.4 to 7.2 units; while the total free acids may increase by amts. corresponding to over 100 cc. *N* alkali /100 cc. A. W. Contieri

Report on (the analysis of) eggs and egg products. Samuel Alfend. *J. Assoc. Official Agr. Chem.* **13**, 405-9(1930); cf. *C. A.* **24**, 437.—Further collaborative work on the *detn. of ash* on liquid whole egg, liquid yolk and powd. dried whole egg gave results which were somewhat better than those obtained the previous year and which, considering the nature of the product and the difficulty of ashing, are considered quite satisfactory, though there was a max. variation of 0.24% in the results on powd. dried egg. The method for the *detn. of H_2O-sol. protein precipitable by 40% alc.* cannot be relied upon to give concordant results on the same sample at different times or to yield the same kind of ppt. and of soln. on 2 samples run side by side. One source of error is the frequent presence in the aq. soln. of a very fine suspension which comes through the filter and is frequently carried down in the subsequent alc. pptn., causing high results; another is the failure of the ppt. to coagulate, leading to loss of N by passage of the fine ppt or colloidal suspension through the filter pad. Alumina cream carries down the ppt completely in a short time, leaving a clear soln. which can be poured off without the necessity of filtering it through asbestos The results are considerably higher when Al_2O_3 cream is used, which is due partly to better packing of the ppt., partly (in some cases at least) to the carrying down of finely suspended material which otherwise comes through the filter mat in the aq. extn., and possibly also to adsorption by the Al_2O_3 cream of alc.-sol. protein which the subsequent washing fails to remove Egg exts. pptd in the absence of NaCl give distinctly lower results, and in some cases even fail to give any ppt. With flour and noodles, on the other hand, pptn. in the absence of NaCl gives results as high as or higher than those obtained by pptn. from a 1 2% NaCl soln. Practically the same results are obtained whether the NaCl is added before or after the addn of alc It is necessary to allow 12-18 hrs. for coagulation of the ppt. in the presence of NaCl, and longer when no NaCl is added. Further collaborative work on the *detn. of total solids in eggs*, in which all collaborators worked on the same samples, showed that close agreement is obtainable by different analysts by the vacuum oven method (drying at 98°) on liquid whole egg, liquid egg yolk and powd dried whole egg Results by the rapid air-oven method (drying 3 hrs. at 112-7°) showed a greater variation, but the av. values checked closely with those by the vacuum oven method, except with powd dried egg, with which air-drying yielded uniformly high results. A. Papineau-Couture

Report on (the analysis of) meat and meat products. R. H. Kerr. *J. Assoc. Official Agr Chem.* **13**, 478(1930); cf. *C. A* **24**, 438.—Preliminary expts. have indicated that, if proper precautions are taken, total water in meats and meat products can be detd. by drying at 125° with an accuracy comparable with that of the official A. O. A. C method, and within a time period of 2-3 hrs. The method will be studied collaboratively. A. Papineau-Couture

The determination of purines in meat extracts. Adolfo Escudero and Gregorio Waisman *Semana méd.* (Buenos Aires) 1930, II, 1436-8.—A 10% soln of the ext. is treated by the method of Folin and Wu, to remove the proteins. The purines are detd by the method of Krueger-Smid with $CuSO_4$ and $NaHSO_3$ for pptn. A. E. M.

Report on (the analysis of) fruit products. H. J. Wichmann. *J. Assoc. Official Agr Chem.* **13**, 427-31(1930).—In an effort to make them more exact, the previously reported methods for the *analysis of fruit ash* (cf. Tilden *C. A.* **22**, 122; **23**, 217; **24**, 438) were altered somewhat by conducting the pptns. at approx. p_H values detd. by color changes with bromocresol green, the results in the main being satisfactory. In studying the inversion which occurs in the drying method of detg. total solids in sweetened fruit juices, Kathryn Bryn confirmed that an asbestos or sand absorbent reduces the amt of inversion in the drying of a soln. of sucrose and tartaric acid, thus giving closer agreement with the actual % of solids and solids detd. by refractive methods. This is true regardless of the materia of the drying dishes; the smaller amt. of inversion in presence of an absorbent is therefore apparently due to the greater sepn. of the mols of sugar and acid and not to the catalytic action of the material of the dish. The

inverting action of citric acid (which is a weaker acid than tartaric acid) will be studied next; and it was found that citric acid loses all its H_2O of crystn. *in vacuo* at 70°. In view of the results obtained by Myers and Baker (*C. A* **24**, 4340), the effect of a definite p_H and curtailment of time of boiling in the alc. ppt., pectic acid and ash percentages should be studied for a variety of fruits and not only in citrus albedos; the possible effect of sugar on the extn. of pectin should also be studied. A. P.-C.

The extraction of pectin from lemon pulp. P. Leone. *Ann. chim. applicata* **20**, 433-44(1930).—Pectin is extd. from the pulp with 5% HCl, which at the same time hydrolyzes the sugars present which may then be fermented. Pectin is repptd. with 95% EtOH, this EtOH being recovered later. The EtOH obtained from the fermentation serves to replace that lost in the process, thus making the process practical commercially. A. W. Contieri

Heat transfer of foods during freezing and subsequent thawing. I. Temperature changes in sugar solutions, sweetened fruit juices and other liquids. M. A. Joslyn and G. L. Marsh *Ind. Eng. Chem* **22**, 1192-7(1930).—Detns. were made of the rate of temp. change of H_2O, sugar solns., pectin solns., and fruit juices in No 10 tin cans, during freezing at −17.8° and thawing at 21.1°. The rate of change varied with the sp. heat of the soln., the heat cond., the f. p., and the amt. of ice that formed. Heat transfer depended chiefly on conduction. With increasing sugar concn. the initial rate of cooling was increased, the f. p. was lowered, the period of const. temp was shortened and the rate of cooling of the frozen product was decreased. Viscosity had no appreciable effect. Amy LeVesconte

Report on (the analysis of) flavors and non-alcoholic beverages. J. W. Sale. *J. Assoc. Official Agr. Chem.* **13**, 475-7(1930); cf. *C. A.* **24**, 440.—Collaborative work on the Parker and Hiltner method (*C. A.* **12**, 1908) for the colorimetric *detn. of citral* in oils and exts. gave results which agreed well with one another, and also with those obtained the previous yr. on the same samples. Adoption of this method as official is recommended. The Radcliffe and Swan method (*C. A.* **22**, 1747) for the *detn. of total aldehydes* was compared collaboratively with the Kleber method; and it was found that in its present form (described in detail) it gives appreciably higher results than the Kleber method. Further collaborative work should be done before it can be adopted but S. considers that it is possible to make certain modifications to improve it. A. Papineau-Couture

Diastatic activity of honey. L. H. Lampitt, F. B. Hughes and H. S. Rooke. *Analyst* **55**, 666-72(1930).—To obtain further information concerning the general characteristics of the amylases present in honey, the effect of varying conditions of acidity on the activity of the dextrinogen-amylase and of the saccharogen amylase, the effect of change in temp. on these at the optimum p_H, the effect of time of reaction in the detn. of the saccharogen-amylase and the stability of these amylases were studied. As a result of considerable experimentation, the following conclusions were drawn: Honey diastase behaves like other enzymes under varying conditions of temp and p_H, the optimum p_H being 4.7-5.3. The max. dextrinogenic power is obtained at 38-45° and at 10-60° the optimum p_H is the same whatever the temp. may be. The amt of reducing sugars produced by the saccharogen-amylase increases with the time but after 16 hrs. the rate of increase is very slow. The optimum p_H for the saccharogen amylase is also about 5.3. Below p_H = 4.0 or above p_H = 9.0, both of the enzymes are destroyed but at p_H = 4-6 the dextrinogenic activity appears to be stable. On account of the variation in the diastatic activity of honey, measurements of this activity cannot be relied upon to detect adulteration or the heating of honey. W. T. H.

Determination of fat in chocolate. C. E. Wiseman. *Analyst.* **55**, 684-5(1930). The Gottlieb method for detg. fat in sweetened condensed milk can be adapted to the analysis of chocolate by immersing the aq. NH_3 suspension of the chocolate in boiling water for 5 min. Later, somewhat more alc. than usual is necessary and the extn. flask must be weighed after the removal of most of the fat. W. T. H.

A chocolate adulterated in an exceptional manner. Giovanni Issoglio *Giorn. farm. chim.* **79**, 314-6(1930).—The analysis of a sample of adulterated chocolate gave the following result: H_2O 27.00, ashes 1.14, fat 10.22, total carbohydrates 58.00 and extractive substances 5.00%. The fat was partly composed of coconut butter. The chocolate reacted alk. to indicator paper, because of the presence of an admixt. of Na_2CO_3, which was apparently added to prevent the breaking-up of the cacao-water emulsion. Part of the sol. carbohydrates consisted of technical glucose. The chocolate contained a considerable quantity of salicylic acid G. Schwoch

The influence of clover silage on the milk production of dairy cattle. E. Ya. Borisenko. Trudui Vologod. Molochno-Khozyaistv. Inst., *Bull.* No. **81**, 71-103

(1929).—The chem. analyses of the feed, the daily rations, the milk records, temp. records, milk fat analyses and solids are given in series of tables. From the data thus obtained the correlation coeff. for a daily milking was calcd. for the feed given with and without the silage. An analysis of the data shows that silage feeding increases the production of milk. It has but very little effect on the percent of fat in the milk. No change in the total N of the urine or the milk was found with or without silage feeding. J. S. JOFFE

Organization of the international union for furthering production and utilization of drug, spice and related plants (HIMMELBAUR) **17.** Emulsions and suspensions of various kinds (Brit. pat. 332,533) **13.** Electrically heated apparatus for roasting coffee, cocoa, etc. (U. S. pat. 1,782,946) **4.** Apparatus for freezing ice cream, egg yolks and whites, etc. (U. S. pat. 1,783,864 5-6-7) **1.** Purifying yeast after use for fermentation (U. S. pat. 1,783,521) **16.** Apparatus for separating entrained liquid from vapors such as produced in concentrating juice or sirup (U. S. pat. 1,784,627) **1.**

Preserving foods. HERMANN ALEXANDER VERLOOP. Ger. 506,227, Oct 9, 1928. The vessel contg. the food is evacuated as far as possible, and the residual O is converted into ozone. App. is shown.

Milling flour. LOUIS E. SMITH (to Hart-Carter Co.). U. S. 1,784,762, Dec. 9. The whole grain is subjected to a crushing compression to crack the bran and break down the endosperm (some of the endosperm being pressed into the form of flakes), the middlings portion of the resulting stock is subjected to a multiplicity of non-uniform compressional impacts by which the endosperm and flakes from it are further reduced to, or toward, flour form without materially disintegrating the bran flakes, and the bran is sepd. from the flour Arrangement of app is described.

Treating milk. F. H. FAULDING & CO., LTD. Brit. 332,595, April 24, 1929. See Australia 19,016 (*C. A* **24**, 3576). Brit. 332,597 relates to similar compns. in granular form for addn to milk.

Thermostatic device suitable for control of milk pasteurizers. BYRON J PEPPER. U. S. 1,784,465, Dec. 9. Structural features.

Preserving milk by successive treatment with carbon dioxide, oxygen and nitrogen. I. HOFFS and A. REPPMAN. Brit. 332,641, April 26, 1929 App is described.

Preserving milk and milk products and mixtures. W. R. B. ST. J. GATES, J. LYONS & CO. AND COW & GATE, LTD. Brit. 332,669, May 14, 1929. A small proportion (suitably about 1.5%) of glycerol or other polyhydric alc. such as dimethylene and trimethylene glycol or propylene glycol is added to prevent development of rancidity in milk, dried milk, cream, butter, etc.

Preserving butter and margarine. AKT.-GES. FÜR MEDIZINISCHE PRODUKTE. Brit. 332,806, Sept. 9, 1929 See Ger. 502,290 (*C. A.* **24**, 4874).

Coloring material for oleomargarine, butter, etc. JACOB SCHAUB (to Best Foods, Inc.). U. S. 1,783,154, Nov. 25. A dry coloring material is prepd. by dissolving a dye in a volatile solvent carrier, absorbing the colored soln. by porous material such as starch and then evapd. the solvent.

Preserving egg yolk. C. H. BOEHRINGER SOHN (Alfred Häussler, inventor). Ger. 506,095, Mar. 24, 1929. Liquid egg yolk is treated with a preservative, *e. g.*, PhCOOH or its salts, and a buffer compd or mixt. such as will maintain the H-ion concn in the range p_H 4.5–7, *e. g.*, disodium citrate or a phosphate buffer mixt. An example is given. Cf. Ger. 494,363 (*C. A.* **24**, 2812).

Oven and associated apparatus for toasting and shredding materials such as cereal foods. JOHN L. KELLOGG (to Kellogg Co.). U. S. 1,783,434, Dec. 2 Structural features.

Food from unripe corn. HARRY A. ERYSIN and KRIKOR B CHICKERING. U. S. 1,782,960, Nov. 25. Ears of corn in the milk stage are roasted until the kernels are thoroughly dry, the roasted kernels are shelled from the cob and are ground into meal.

Apparatus for sterilizing figs or other dried fruits. JOHN G. TYLER, CHARLES C. TAYLOR and WM. S. JOHNSON (to Calif. Peach & Fig. Growers Association). U. S. 1,782,522, Nov. 25. A foraminous belt carries the material through a heat-insulated chamber supplied with hot air from an adjacent auxiliary compartment.

Apparatus for continuous roasting of coffee. ALBERT K. REHE (one-half to Reginald A Kucich). U. S. 1,783,673, Dec. 2. Structural features of an app. with elec. heaters.

Food for animals. HUGO REIK. Austrian 119,039, April 15, 1930. Food for

animals is mixed with a pure culture of microörganisms capable of breaking down the unassimilable constituents. Thus, a culture of cellulose-splitting bacteria may be added to fodder.

13—GENERAL INDUSTRIAL CHEMISTRY

HARLAN S. MINER

Science and modern industry. WM. J. POPE. *Chemistry & Industry* **49**, 966–70 (1930). E. H.

How to approach the problem of joint costs in chemical industry. THEODORE J KREPS. *Chem. Met. Eng.* **37**, 678–80(1930). E. H.

Chemical engineering memoranda. XII. Exchange of heat: heaters and coolers. CHARLES H. BUTCHER. *Ind. Chemist* **6**, 404–7(1930); cf. *C. A.* **24**, 5185.—This discussion includes: the principle on which the diam. of tubes in heat exchangers should be selected, duty of heat exchangers, types, tube proportions and spacing, disposition of liquids in the system and the methods of developing formulas and making the necessary calcns. for typical cases to det. prevailing temp. conditions, film coeffs. for transfer of heat, overall coeff. and mean temp. difference. E. G. R. ARDAGH

The physical characteristics of industrial powders. H. MARSHALL. *Can. Chem. Met.* **14**, 314–6(1930).—According to their mode of prepn., powders fall into the following classification: (1) ground igneous rocks or glasses and stamped metallic powders, (2) ground earths and rocks of softer types, (3) pptd. powders, (4) calcined powders and (5) sublimed powders and "fume" pigments. Points discussed include: wetting, the settling of powders from liquids, the theory of liquid films, emulsification of powders, adsorption phenomena, and the manuf. and packing of powders. A bibliography is appended. W. H BOYNTON

An analysis of mechanical methods of dust collection. MARCEL A. LISSMAN *Chem. Met. Eng.* **37**, 630–4(1930).—A math. analysis of the principles governing the particle movement. E. M. SYMMES

Bulking properties of microscopic particles. PAUL S ROLLER. *Ind. Eng. Chem.* **22**, 1206–8(1930).—Investigation of anhydrite, gypsum, portland cement and chrome yellow in fine powder form showed that bulkiness, or vol. per unit wt., increases with decrease in particle size below a crit. diam. For particles greater than the crit. diam. the bulkiness was const. It was found that the voids per g., V, is related to the diam. of the particle in the same functional way for all the powders examd. A rapid method has been devised for estg. mean particle size of microscopic powder from a knowledge of its curve of bulkiness *vs.* particle diam., providing suitable correction is made for powders above 1 micron surface mean diam. L. T. FAIRHALL

The removal of water during concentration. A. ALISON. *Ind. Chemist* **6**, 402–7 (1930).—In order to shorten the time required to calc. the amt. of H_2O to be removed in drying or concg. operations the use of a nomograph is recommended. An illustration and description of the nomograph are given and also its method of construction and an example illustrating its use. E. G. R. ARDAGH

Observations and notes on the effect of methanol antifreeze on health. R R SAYERS AND W. P. YANT. *Bur. Mines, Information Circ.* **6415**, 7 pp.(1930).—Practically continuous exposure to low concns. and short intermittent exposure to high concns. of methanol cause no apparent harm. Continuous exposure to high concns will cause serious poisoning. Methanol is poisonous when taken internally. ALDEN H. EMERY

Fatalities due to vitiated air produced by oxidation of vegetable refuse. ARNOLD R. TANKARD AND DOUGLAS J. T. BAGNALL. *Analyst* **55**, 673–6(1930).—The fact that vegetable substances, in the presence of air and moisture, may undergo a process of autoxidation in unventilated spaces, gradually producing a lethal mixt. of gases, was demonstrated by the death of 3 workmen in a deep manhole which received the sub-soil drainage from low-lying and water-logged, trenched land. Analysis of the sump air showed 88% N, 10.6% CO_2 and only 1.4% O by vol. The workmen collapsed immediately on reaching the bottom of the sump. W. T. H

C black in rubber insulating compounds (CURTIS, MCPHERSON) **30.**

Liquefying and separating constituents of air or other gas mixtures. KARL F R. MEWES. U. S. 1,781,693, Nov. 18. App. and various details of heat-transfer, etc., are described.

Recovery of volatile hydrocarbons. ANTON WEINDEL. Ger. 504,731, Feb. 4, 1927. The hydrocarbon vapor, mixed with a gas stream, is passed into the PhOH-contg. water obtained in the dry distn. of bituminous materials (*e. g.*, NH_3 water from coking and gas plant, etc.), at a high temp. The water is cooled, causing the hydrocarbons absorbed to sep. These are removed and the liquid is used again.

Breaking up natural petroleum emulsions or other colloid systems by use of rays of short wave length. ABRAHAM M. HERBSMAN. U. S. 1,783,471, Dec. 2. Emulsions, foams, smoke and other disperse systems are treated with rays such as those from a quartz Hg vapor lamp, x-rays, cathode rays, canal rays or rays from radioactive substances. App. is described suitable for treating petroleum emulsions to effect sepn.

Emulsions and suspensions of various kinds. P. FREEDMAN. Brit. 332,533. April 15, 1929. High-frequency vibrations produced by electrically excited piezoelec. crystals (which may be directly in contact with the ingredients or may be in an envelope filled with liquid to transmit the vibrations) are utilized in the prepn. of products such as *mayonnaise, aq. suspensions of S, dispersions of guncotton in AmOAc*, etc. Various details of the prepn. of mayonnaise are given.

Dispersions. AUGUST CHWALA. Ger. 504,598, May 22, 1928. Substances insol. or almost insol. in water, with the exception of phosphates or arsenates of alk. earth or heavy metals, are dispersed mechanically in water by using as peptizers alkali pyro or meta-phosphates or arsenates. In examples, substances such as titanium white, $CaCO_3$, lithophone, zinc white and kaolin are dispersed by using pyrophosphates or pyroarsenates as peptizers. Cf. *C. A.* **24**, 2560.

Pumping liquids against high pressure. I. G. FARBENIND. A.-G. (Albert Berenbruch, inventor). Ger. 506,240, May 9, 1929. A method and app. are described for recovering the energy imparted to the liquid. The pressure of the liquid is imparted, by means of a membrane or piston, to a second liquid, in such a manner that the latter counteracts the high pressure.

Coating and impregnating webs of flexible material such as fabric or paper. EMIL WEINHEIM. U. S. 1,784,797, Dec. 9. In making webs from several layers of material such as cloth or paper, each layer is treated separately with a waterproofing compn., several layers are combined into a single web, and compn. is applied between the layers. App. is described.

Annealing. FRIED KRUPP. A.-G. (Otto Hengstenberg, inventor). Ger. 504,650, May 31, 1929. A method of arranging the objects in the annealing kiln is described.

Respirator supplied with auxiliary oxygen. E. DRAGER (to O. H. Drager). Brit. 332,502, Dec. 15, 1928. Structural features of an app. suitable for use at high altitudes.

Heat insulation. HAROLD W. GREIDER (to Philip Carey Mfg. Co.). U. S. 1,782,383, Nov. 18. Various details are given of the prepn. of molded products from materials such as magnesia and asbestos mixts. mixed with water carrying air or other gas bubbles to give porosity.

Porous heat insulation. HAROLD W. GREIDER (to Philip Carey Mfg. Co.). U. S. 1,782,384, Nov. 18. A semi-fluid or plastic mixt. is formed of materials such as magnesia mixts. and water, alkali such as NaOH is dissolved and gas is generated by adding CaC_2 coated with an oily, resinous, waxy or org. fatty acid substance which reacts with the alkali to form a stabilizing agent for the foam bubbles present, and the material is molded under pressure with expulsion of water from the mold.

Electric insulation. BAKELITE CORP. Brit. 332,594, April 23, 1929. Laminated materials such as those formed from paper or cloth and a hardened synthetic resin binder are surfaced with an elec. non-cond. layer substantially free from C-contg. materials, such as asbestos in the form of paper, cloth or loose fibers which may be treated with Na silicate.

14—WATER, SEWAGE AND SANITATION

EDWARD BARTOW

Water supply and distribution. GÜLICH. *Gas u. Wasserfach* **73**, 961–7(1930).—Modern uses have caused an enormous increase in water consumption. State surveys should be made as to available water supplies, water-bearing strata and the geological features of a given area to avoid future water famines as far as possible. Surface water supplies previously considered unusable may not be treated in a satisfactory manner, but avoidable contamination should be lessened. Several municipalities may well combine their systems for better handling of peak demands and emergencies. Water meters are desirable. The normal (German) water consumption of 80–

82 l. per capita, including industrial uses, may increase to 150 l. in hot dry weather, because of increased use for cooling foods, sprinkling, etc. Leaks cause enormous losses, up to 30–40% in old systems. R. W. RYAN

The Wanaque waterworks project. ARTHUR H. PRATT. *J. New England Water Works Assoc.* **44,** 387–450(1930).—The water supplied will be soft and of good quality; aeration for the elimination of tastes and odors is provided. The article is largely engineering in character. D. K. FRENCH

Technical features of the old Magdeburg waterworks on the Elbe. OTTO KOENIG. *Gas u. Wasserfach* **73,** 933–4(1930).—The mech. equipment is described. The quantity of free Cl in the water is controlled by the Olszewski-Sperling app. which automatically indicates the reaction of the treated water with *o*-tolidine and Zn iodide-starch soln. at definite intervals. $AlCl_3$ is used as the pptg. agent in the treating plant as it gives a quicker and better ppt. than alum, especially when pre-chlorination is used. All chemicals are handled in one building. Quick sand filtration and slow sand filtration are both used and methods of cleaning sand given. Sufficient active charcoal is added to the slow sand filter to give a layer 0.2 mm. thick on its surface and this adsorbs some org. substances, phenols, etc., so that the resultant water has a satisfactory taste, odor and color. R. W. RYAN

Water supply and dams in Japan. ALLEN HAZEN. *J. New England Water Works Assoc.* **44,** 451–7; *Water Works Eng.* **83,** 285–6, 320(1930).- The high rainfall in Japan makes possible ample storage of run off in small catchment areas. Many cases are cited where coagulation, filtration and chlorination are part of the treatment. D. K. FRENCH

Illinois River studies. C. S. BORUFF. *Ind. Eng. Chem.* **22,** 1252–5(1930); cf. *C. A.* **19,** 1745; **22,** 2630; **24,** 4105. A comparative sanitary survey of the middle portion of this river for the summers of 1929–30 is given. The data indicate that biol. O demand, dissolved O and bacteriol. load of a polluted stream are affected directly by the vol. of pollution, dilu., aeration from flow rate and by available O content. As would be expected the low water season of 1930 showed a greater pollution than that for 1929; this is based upon a lower O content and higher bacteriol. counts as criteria. Interesting curves are given. EDWARD S. HOPKINS

Filtration of Chicago water supply. LORAN D. GAYTON. *J. West. Soc. Eng.* **35,** 343–62(1930).—A rept. of the results of 2 yrs.' operation of the exptl. filtration plant built by the city of Chicago to det. whether its public water supply can be made safe and palatable. Among the main facts brought out to date are: (1) Lake Michigan water may be made perfectly clear and pure by filtration at a cost about the av. for other cities; (2) water of the highest purity is procured; (3) the water produced since Dec. 1928 excels in tests and purity the most palatable spring water; (4) water containing an abundance of microorganisms may be handled without difficulty; (5) the handling of water with high microscopical counts involves nothing that has uncertainties, (6) a method for the complete elimination of taste-producing compds. has been perfected (7) a method for handling highly polluted water has been developed; (8) the water treatment best suited will partially soften it; (9) the value of the water carried away from the exptl. plant by the public for drinking purposes is over the entire operating cost of the exptl. plant. The plant and special app. are described and numerous tables and charts shown. W. H. BOYNTON

Computation of mineral water analysis. L. FRESENIUS AND O. FUCHS. *Z. anal. Chem.* **82,** 226–34(1930).—The formulas proposed by L. Grünhut, which are given in König's *Handbuch*, are replaced by new ones which are considerably simpler. The H-ion concn. is used in place of certain empirical factors proposed by G. A table is given to show the effect of temp. upon the ionization consts. of the weak acids likely to be present and this permits an approx. correct calcn. of the condition of the weak acids at the temp. of the mineral-water spring. W. T. H.

Hydrion concentration of rain and potable water. M. C. POTTER. *Nature* **126,** 434–5(1930).—A study of the H-ion concn. of the rainfall in New Milton, England, over a period of 1½ years showed wide variations in p_H values. The rain carried by winds direct from the sea was practically neutral, while that from the direction of towns or long stretches of country tended to be acid. The data indicated that wide variations in p_H are to be expected in the rain falling upon plants. The p_H value of the surface moisture on living plants may have an important effect upon the microorganisms present. Samples of potable water taken from wells and public supplies in England gave p_H values varying from 5.0 to 9.0. LOUISE KELLEY

Shallow sedimentation basins. WILFRED F. LANGELIER. *J. Am. Water Works Assoc.* **22,** 1484–9(1930).—As the result of experience with a 1⅛-mile tunnel for subsi-

dence and sedimentation it is concluded that, in general, long, narrow and shallow basins are superior to those having greater depth and breadth. D. K. FRENCH

Hard Texas water satisfactorily softened for domestic use. ROY MASSINGILL. *Am. City* **42**, 149(1930).—The Hico, Texas, well water supply is softened by the Graver cold process using 3.05 lb. lime, 1.4 lb. soda ash and 0.25 lb. $Na_2Al_2O_4$ per 1000 gal. of water. Hardness is reduced from about 19 to 3 grains per gal. of water, and Fe is removed. The operation of the softening process whereby the chemicals are fed into the softening tank proportional to the flow of water is described. The softened water flows by gravity to 2 pressure filters and then to a 250,000 gal. covered concrete storage tank. It is then pumped to an elevated tank for distribution. Costs are given. C. H. BADGER

The use of barium aluminate in water softening. ANTONY SETON *Eng. and Boiler House Rev.* **44**, 54-6(1930).—Previous work (*C. A.* **24**, 1687) has shown that a combination of the properties of Ba and Al salts for water softening is of value in that pptn of the sulfate as well as that of Ca and Mg can both be accomplished by it. This paper indicates the chem. properties of Ba aluminate in such a procedure and suggests possible use for it as a replacement for Na aluminate. Com Ba aluminate can be obtained in powd form which is 38-40% water sol. This has an approx. compn of $11BaO.8Al_2O_3$ Lab studies indicate that from 1.5 to 2 times the theoretical amt of aluminate is needed for pptn of $CaSO_4$, $Ca(HCO_3)_2$, $MgSO_4$ and $MgCl_2$ which is 80-95% complete. Mixts. of $Ca(HCO_3)_2$ and $CaSO_4$ were pptd. by the amt. necessary for the HCO_3 alone, thereby reducing the ratio in practical water softening to that of the theoretical value of the coagulant With a mixt. of Mg salts 1/4 of the theoretical amt was adequate. The study is to be continued under industrial conditions. EDWARD S. HOPKINS

Chemical and mechanical utilization of activated carbon in water purification. W. S. BUHRMAN AND H. B. CRANE. *J. Am. Water Works Assoc.* **22**, 1399-1413(1930).—The C treatment is simple, easy of operation and inexpensive. Especial reference is made to "Hydrodarco"—the C used by the authors Several types of equipment for C treatment are described, as well as the means of application to existing plants D. K. FRENCH

Discussions of papers on activated carbon. PAUL HANSEN, R. A. HOOT, ROBERT SPURR WESTON, CHARLES P. HOOVER, W. A. HELBIG AND E. B. SHOWELL. *J. Am. Water Works Assoc.* **22**, 1462-75(1930).—The discussion emphasizes the positiveness of carbon for removal of taste and odor There is still much work to be done, largely with reference to revivification A downward rate of 2.0 gal. per sq. ft. per min. through a bed of Darco at Chester was effective The patent situation seems clear for general use of C. The theoretical reaction of C is outlined. One case where C was ineffective is described D. K. FRENCH

Activated carbon for the removal of taste and odor. GEO. D. NORCOM AND R. I. HOOD. *J. Am. Water Works Assoc.* **22**, 1414-37(1930).—A great many expts. are described involving the production of a drinking water free from appreciable odor or taste. Darco seemed superior to Nuchar or Minchar. The conditions under which different grades gave the best results are outlined. Regeneration by steam can be made very nearly complete, and the conditions giving the most complete improvement are described. Activated C can also be effectively used with certain trade wastes. D. K. FRENCH

Further observations on the use of activated carbon in removing objectionable tastes and odors from water. JOHN R. BAYLIS. *J. Am. Water Works Assoc.* **22**, 1438-61(1930); cf. *C. A.* **23**, 3765.—The results of 17 months' operation of an exptl. C unit are described in detail. Fairly deep beds gave the best results; the direction of flow is immaterial. While higher rates may be used with downward flow, more frequent washing is necessary. Methods of revivification are not yet completely satisfactory Super chlorination followed by dechlorination with active C gives the most complete satisfaction. The article is quite complete. D. K. FRENCH

Control of microscopic organisms in public water supplies, with particular reference to New York City. F. E. HALE. *J. New England Water Works Assoc.* **44**, 361-85 (1930) For controlling microscopic growths and eliminating their assocd. odors and tastes, $CuSO_4$ is most generally used. Cl is also effective and can be introduced when $CuSO_4$ cannot. The bulk of the article describes the various methods of application for the most uniform distribution and most effective action. D. K. FRENCH

Open reservoirs and the sanitary control of tap samples. C. LEROY EWING AND EDWARD S. HOPKINS. *J. Am. Water Works Assoc.* **22**, 1495-1505(1930).—*B. coli* in tap samples comes either directly from the reservoirs or indirectly from bacteria-bearing slime in the pipe lines, which from time to time is broken away and carried to the

taps. Regular chlorination of the reservoirs has greatly improved conditions. D. K. FRENCH

Significance of B. coli in water. J. KISTER. *Tech. Gemeindeblatt* **33**, 219–21 (1930).—A review of procedures for identifying *B. coli* in water. Utilization of *B. coli* tests are of great value in detg. its suitability for drinking purposes. A. L. E.

Comparison of the Dominick-Lauter presumptive test with "standard methods" test for B. coli in water. HAROLD W. LEAHY. *J. Am. Water Works Assoc.* **22**, 1490–4(1930).—A much higher percentage confirmation was obtained with the medium than with standard lactose broth. In general the new Dominick-Lauter medium which is described was found far superior to the standard procedure for the detection of *B. coli* in water. D. K. FRENCH

Some notes on the pretreatment of evaporator feed water. HUGO A. HAUPT *J. Am. Water Works Assoc.* **22**, 1345–50(1930).—Pretreatment is considered economically advantageous and necessary. Carbonate hardness reduction is the principal problem. The so-called "vaccination-process" converts carbonates into chlorides by means of HCl. Rules laid down by German users and producers of evaporators, both for construction and operation, are given. D. K. FRENCH

Action of purified feed water on the boiler equipment of the Thermo-Technical Institute. A. N. RUMYANTZEV. *Izvestiya Teplo-Tekh. Inst.* (*Trans. Thermo-Tech. Inst. Russia*) **1930**, No. 1, 12–21.—A soda-lime treatment of boiler-feed water assures a satisfactory performance of the boilers. O present in the condensate which is recycled is very detrimental to the boiler equipment. A sampling method for O detn. is described. A. A. BOEHTLINGK

Filtering materials for water and sewage works. WILLIAM E. STANLEY, *et al Proc. Am. Soc. Civil Eng.* **56**, 1851–92(1930); cf. *C. A.* **24**, 182.—This is a progress report of a comm. from the Sanitary Eng. Div. seeking to obtain information relating to the characteristics and kinds of stone for use in trickling filter beds in sewage plants The proper size of sand for water filtration is also being investigated. By use of the *unstandardized* Na_2SO_4 test for accelerating the time of disintegration of such stone comparative studies were made by 13 com. labs. throughout the country. A detailed description with tables of results is given. These tables are of practical value to those operating or designing trickling sewage-filter beds. EDWARD S. HOPKINS

The great sewage disposal plant of Berlin-Stahnsdorf. F. LANGBEIN. *Z. Ver. deut. Ing.* **74**, 1349–58(1930).—The article shows the detailed construction and engineering of the plant. Twenty-one blue-print plans are shown. RUSSELL C. ERB

Sludge problems in South Africa with special reference to sludge digestion. MARSHALL LUNDIE. *Surveyor* **78**, 497(1930); cf. *C. A.* **25**, 157.—Sludge digestion is optimum at 27–30°. Lime was added to the sludge until the p_H was 7.3–7.4. The digested sludge contained 80–90% moisture. The dry digested sludge contained N_2 3, P_2O_5 2.8, CaO 2.5 and potash 4% A. L. ELDER

Cost analysis of an activated-sludge sewage-treatment plant. WEBSTER L. BENHAM. *Am. City* **42**, 129–31(1930).—The old sewage-plant at Frederick, Okla., consisted of a screen and grit chamber, reverse-flow Imhoff tank, sludge-drying bed and chlorinating chamber. The plant was inadequate, and had been rearranged and did not function as originally intended. The new plant, designed for a 0.4 m. g. d. flow, consists of a screen chamber with overflow weir to by-pass storm water; a preliminary settling tank with hopper bottom connected to an outlet pipe from which settled sludge is pumped once a day through "Simplex" mech. surface aerators to 4 aeration tanks and 1 sludge aeration tank; a final settling tank equipped with a Dorr mech. clarifier for continual removal of settled sludge, a part of which is returned to the aeration tanks through the manually controlled sludge division box and the remainder to the sludge digestion tank which was converted from the Imhoff tank; a sludge-drying bed, the effluent from which goes to a creek, and a pump house. The clarified effluent from the final settling tank is chlorinated to overcome public prejudice. The capacities of the tanks, the periods of detention and the approx. daily elec. power requirements are tabulated. The av. daily cost is $2.03 and the cost per 1000 gal. at 400,000 gal. per day is $0.0051. The total cost of the plant and outfall sewers was approx. $35,000. C. H. B.

Guiding principles of the activated sludge process. T. CHALKLEY HATTON *Civil Eng.* **1**, 31–7(1930).—A review of the engineering and operating principles of this process based upon the work at Milwaukee. EDWARD S. HOPKINS

Contributions on sewage examinations. HERMANN BACH. *Gesundh.-Ing.* **53**, 512–6(1930); cf. *C. A.* **24**, 2819.—The standard procedures used for detg. permanganate O demand, dissolved O, biochem. O demand and relative stability of sewage are outlined. A. L. ELDER

A new reactivation of sludge without compressed air. LEINER. *Gesundh.-Ing.* **53,** 500–2(1930).—L. describes a hollow cylinder used to rotate the sewage and aerate it at the surface. The corrugated surface of the cylinder aids in increasing surface exposed and rate of circulation of the sewage. A. L. ELDER

Treatment of floating scum and gas from sludge-digestion tanks. M. PRÜSS. *Gesundh.-Ing.* 53, 548–53(1930).—Gas is collected and utilized. Floating scum causes considerable trouble. Spraying of incoming sludge and recirculation of partly digested sludge keep the floating scum at a min. A. L. ELDER

Observations on surface scum in Emscher tanks in the Ruhr district. K. IMHOFF. *Tech. Gemeindeblatt* 33, 203–6(1930).—Observations on 27 tanks are reported. Data for these plants are summarized. In general, surface sludge is a function of exposed area of the tank surface. Gas collectors have been placed on 21 of the 28 tanks. A. L. ELDER

The permissible load of sewage in streams. MAHR. *Tech. Gemeindeblatt* 33, 189–94(1930).—An attempt is made to develop an equation by which one could calc. the permissible load of sewage in a stream. The quantity of both dissolved and undissolved materials present in the sewage must be known, as well as the biochem. O demand of the waste, the quantity of diln. water and amt. of reaeration in the stream. A. L. ELDER

Some experiences with trade effluents. J. HURLEY. *Surveyor* **78,** 493–5(1930).—Treatment of gas liquors with aluminoferric at the rate of 0–15 grains per gallon improved the quality of the effluent but slightly. Twenty % solns. of dye waste in water could be decolorized by use of 5 grains per gallon of aluminoferric. Limestone filters surfaced with clinkers proved most effective in treating mixts. of industrial wastes and domestic sewage. The Shipley urban district has taken over a contract with the various industries to treat the industrial wastes. A. L. ELDER

Two-stage tanks for waste containing phenol in Hattingen. FRANZ FRIES. *Tech. Gemeindeblatt* **33,** 206–10(1930).—Drawings are given of the plant designs. Raw waste contg. 45.4 mg. per l. of phenol was so well purified that the effluent contained only traces of phenol. A. L. ELDER

The ozone plant for the assistance of the ventilating arrangement in the legislative building at Dresden. H. HOSCHMIEDER. *Gesundh.-Ing.* **53,** 499–500(1930).—Ozone has been satisfactorily used to purify and recondition air in this building. A. L. E.

Ventilation of cinemas: some medical aspects. W. S. WALTON. *J. Roy. Sanitary Inst.* **50,** 686–91(1930).—CO_2 as high as 0.54% was found in one theater. The CO_2 was detd. by Pettenkorfer's method. For physiol. comfort he recommends that the temp. be kept at 58–68°F., the wet bulb temp. 5–6°F. lower than the dry bulb, and the CO_2 content of the air be kept at less than 20 parts per 10,000 parts of air. A. L. ELDER

A condenser for low-temperature evaporation of H_2O (EVANS, *et al.*) **1.** Organic matter, P and V in the Black Sea deposits (ARKHANGELSKII, KOPCHENOVA) **8.** Ti acid sulfate (U. S. pat. 1,783,684) **18.** Catalytic zeolites (U. S. pat. 1,782,353) **18.**

Purifying water with activated carbon. ROY L. HILL (to Darco Corp.). U. S. 1,782,850, Nov. 25. A natural water is mixed with a very small proportion of activated C, and the water contg. the C in suspension is then given a slow rotational velocity which may be about one or two turns per hr. about the axis of a cylindrical tank, to produce an accelerated settling of the carbon. App. is described. Cf. *C. A.* **25,** 158.

Apparatus suitable for distilling water, etc. WILLIAM S. ELLIOTT. U. S. 1,782,959, Nov. 25. Structural features.

Apparatus for softening water by treatment with base-exchange material. FRANK W. MILLER (one-half to Ira J. Wilson). U. S. 1,783,255, Dec. 2. Structural features.

Apparatus for softening water with zeolites. ROBERT O. FRIEND. U. S. 1,783,466, Dec. 2. Structural features.

Apparatus for deaerating water by cascading and steam treatment. W. BOBY and W. BOBY & Co. Brit. 332,678, May 23, 1929. Structural features.

Apparatus for carbonating water. FREDERICK NEUSCHAFER and HARRY BOTWIN. U. S. 1,782,511, Nov. 25. Structural features.

Apparatus for separating oil, etc., from water. DEUTSCHE ABWASSER-REINIGUNGS-GES. M. B. H. (Otto Mohr, inventor). Ger. 506,074, Mar. 19, 1929.

Apparatus for filtering sewage. JOHN PUGLIESE. U. S. 1,783,341, Dec. 2. Structural features.

Apparatus for filtering liquid materials such as sewage and industrial effluents.

CHARLES T. CABRERA (to Electro Dialyzer Corp.). U. S. 1,784,132, Dec. 9. After upward filtration, filtered liquid passes into an annular trough surrounding the filter where it may be agitated and aerated. Various structural details of the app. are described. Cf. *C. A.* **24**, 1254.

Apparatus for treating sewage with activated sludge. FRIEDRICH SIERP and FRANZ FRIES. Ger. 506,337, June 25, 1927. Addn. to 486,071 (*C. A* **24**, 1919).

15—SOILS, FERTILIZERS AND AGRICULTURAL POISONS

J. J. SKINNER

Studies on the chemistry of soils. LUDWIG WOLF. *Z. angew. Chem.* **43**, 922–8 (1930).—In studying the compn. of soils, the old method consists in first screening the soil particles below 2 mm. size into fractions: 2–0.2, 0.2–0.1, 0.1–0.05, 0.05–0.01 mm and less than 0.01 mm. diam. The first 3 fractions consist mainly of sand and W. proposes to designate these fractions as the passive part of the soil and the smaller 2 fractions as the active part. For practical purposes soils can be characterized by their sand content. A new method is proposed for elutriation analysis of soils consisting in centrifuging the soil particles in aq. medium. The centrifuge consists of 3 chambers sepd from each other by means of concentric screen walls. These screens divide the particles in 3 sizes: those larger than 0.08 mm., 0.18–0.12, and 0.12–0.05 mm. diam. Particles less than 0.05 mm. size pass out with the H_2O from the third chamber. Thus the passive part of the soil is retained in the drum and is divided into 3 fractions, while the active part comes out separately. The whole process takes only 15 to 40 min. The CaO requirement of the soils is detd by the p_H content. Soils contg. an excess of CaO will have a p_H characteristic for H_2O satd. with $CaCO_3$. In this way, soils giving a p_H greater than 9 show an excess of $CaCO_3$, while those contg. a p_H less than 9 are deficient in $CaCO_3$. More accurate and consistent results are obtained when p_H measurements are made on the finer or active fraction of the soil which is not retained in the centrifuge. The Daikuhara value of soils for Al Fe salt hydrolysis is found to depend on the p_H value. This fact is proven by a series of expts. Electroosmosis has the same effect as the H ion on kaolin and Al_2O_3, the carriers of Al salts in the soils, in increasing their tendency to replace K from its salts, thus increasing the Daikuhara value of the soils. S. L. M.

The essential component of the acid soil of Japan and a theory of its actions. N. KAMEYAMA AND S. OKA. *Caoutchouc & gutta-percha* **27**, 15239–40(1930).—See *C. A.* **24**, 3328. C. C. DAVIS

An improved soil sampler. I. J. PESSIN. *Science* **72**, 459–60 (1930).—A sampler described composed primarily of a 1 in. galvanized pipe which has a $\frac{3}{4}$ in. slit along its length. One edge of the slit has a cutting edge and the other is dull. In practice the tool is simultaneously thrust into the ground and gradually turned. When withdrawn from the soil it carries a cylindrical core of slightly compacted soil, whose phys. structure is but slightly affected. J. R. ADAMS

Predetermination of soil corrosion. J. F. PUTNAM. *Oil and Gas J.* **29**, No. 26, 158, 159, 187(1930).—A simple ammeter-voltmeter test can be used to predet. the corrosiveness of soil. The method gives close correlation with corrosion experience. CHAS WIRTH

Carbon dioxide production in sands and soils in the presence and absence of amebae. D. WARD CUTLER AND L. M. CRUMP. *Ann. Appl. Biol.* **16**, 472–82(1929).—CO_2 production from soil and sand cultures contg. a species of bacterium with and without amebae was studied. CO_2 production and bacterial nos. are correlated if amebae are not present or are present only in very small nos. The bacteria are more efficient as producers of CO_2 when their nos. are not increasing, less efficient when their nos. are increasing. This is not true of young cultures. Each bacterium becomes less efficient as the population increases in density. The amebae cause a decrease in CO_2 production in sands contg. peptone, an increase in sands contg. mineral salt soln. with glucose or soil ext. C. H. RICHARDSON

Will synthetics completely displace organic ammoniates? G. P. WALTON. *Chem. Met. Eng.* **37**, 619–22(1930).—The progressive decline in the use of org. N in com. fertilizers since the World War has fallen primarily on animal tankage, dried blood, cottonseed meal and fish scrap. Any upward trend will probably cause an increase in the production of fertilizer from municipal sewage and garbage, fish offal, peat and nitrogenous "tankages" from addnl. crude ammoniates and waste materials. J. R. ADAMS

Absorption of phosphoric acid by plants. R. RUDEL AND KLEBERGER. *Das Superphosphat* **6**, 163–6(1930).—The relative values of superphosphate, Rhenania phosphate and Thomas meal as sources of P_2O_5 were detd. in a 3-year field expt. with summer barley. P_2O_5 absorption was more rapid and complete from superphosphate and Rhenania phosphate than from Thomas meal, particularly during the earlier stages of growth. For the mature plants the relative absorption was 100:91:77, while just after blooming it was 100:74:60. In the same order, the total relative yield of mature grain and straw was 100:98.5:96.5, while the relative yield of grain was 100:96.5:91.5. The phosphatic materials gave identical yields of mature straw. K. D. JACOB

Absorption of phosphoric acid by plants from air-dry and heated soils of different acidities, as determined by the Neubauer method. KARL SCHUMANN. *Das Superphosphat* **6**, 180–2(1930).—In expts. with 9 varieties of plants on 3 types of soils, larger amts of P_2O_5 were absorbed, in general, from soils heated for 24 hrs. at 80 100° than from the air-dry soils, as detd. by the Neubauer method. The largest amts. of P_2O_5 were absorbed from the soil having a p_H of approx. 6, and absorption of P_2O_5 from this soil was affected more by heating than with soils having higher and lower p_H values. The highest abs. absorption of P_2O_5 was obtained by the use of lupine as a test plant, rye giving the next best results. K. D. JACOB

Absorption of phosphoric acid and potash in Neubauer plant germination experiments. A. HOCK. *Das Superphosphat* **6**, 167–72(1930).—Some of the factors involved in the absorption of P_2O_5 and K_2O by plants, as detd by the Neubauer method, were investigated. In pure sand culture, complete absorption of K_2O was obtained when 25 mg. of K_2O was applied in the form of KCl. With 50 mg. of K_2O 90% absorption was obtained, and with 100 mg 83%. An abs. max absorption of 85 mg. was obtained from 150 mg. of K_2O. Approx 70% of the P_2O_5 was recovered when 15 mg. of P_2O_5 was used in the form of Na_2HPO_4. The percentage recovery decreased rapidly as the amt. of P_2O_5 was increased, being only 20% with an application of 75 mg. of P_2O_5. When P_2O_5 and K_2O salts were used together higher recoveries of both were obtained than when each was used alone in equiv. amts., the absorption of P_2O_5 being affected much more than that of K_2O. Addn of $NaNO_3$ markedly increased the recovery of P_2O_5 but did not greatly affect the absorption of K_2O. $CaCO_3$ depressed the absorption of P_2O_5 but had no effect on the K_2O. Higher recoveries of both P_2O_5 and K_2O were obtained when the salts were added to the lower sand layers than when they were added to the upper layers. K_2O and P_2O_5 were not absorbed in equiv. amts. from KH_2PO_4, the former being absorbed in the greatest quantity. As detd. by the amts. of P_2O_5 absorbed, $Ca_3(PO_4)_2$ was less than 50% as effective as equiv. quantities of CaH_2PO_4. K. D. JACOB

Brief study [of reasons for] beneficial action of brown coal upon development of cultivated plants. A. KISSEL. *Braunstaff-Chem.* **11**, 257–60(1930).—The use of org. constituents of coal in agricultural fertilization is discussed. Relative growth rates of wheat planted upon untreated soil and soil treated with pulverized coal have been detd. and are shown graphically. Explanation of the responsibility of coal decompn. for these effects is attempted with soil temp. studies, relative data are also shown by graphs. F. W. JUNG

The fertilizer treatment of the cane crop. P. J. CILLIERS. *S. African Sugar J.* **14**, 543–7(1930). A scheme for the fertilizer treatment of the cane crop in South Africa is outlined. The length of time of cultivation and the fertility of the soil are taken into consideration. Various fertilizer mixts. and rates of application are given. The large phosphate requirements are emphasized. From 6 to 10% of potash, depending on the soils, is necessary. Where N is lacking application of $NaNO_3$ should be profitable. F. W. MARSH

Fertilizing experiments on Hevea. III. J. GRANTHAM. *Arch. Rubbercultuur* **14**, 353–6(1930)(in English 345–50), cf. *C. A.* **22**, 477.—The present paper gives further results during the last 3 yrs of the "2nd nitrate manuring expt.," in addn. to new expts. on red liparite tuff soil. The nitrate fertilizing resulted in increased yields in all cases. On the red soil, with combined N and phosphate fertilizing the beneficial effect was proved to be due to the N and not to the P. C. C. DAVIS

Effects of certain alkaloids, glucosides and other substances upon the infectivity of the mosaic tobacco juice. T. FUKUSHI. *Trans. Sapporo Nat. Hist. Soc.* **11**, 59–69(1930); *Rev. Applied Mycol.* **9**, 747.—The virus of tobacco mosaic proved remarkably resistant to various kinds of alkaloids. It resisted a satd. soln. of aconitine and nearly satd. solns. of morphine sulfate, strychnine sulfate, salicin (all at 2%), phlorhizin (3%), brucine (1%), digitalin (2%) and amygdalin (5%) for 5 days. Mustard oil and digitalin (2 and 5%, resp.), destroyed the virulence of the mosaic juice in 5 days. Nicotine

(3%) caused a marked reduction in the virulence of the mosaic juice in 3 hrs. and destroyed it in 3 to 5 days and the same effect was produced by atropine (1%) in 3 days and at 2% in 1 to 3 days. Saponin (2%) failed to reduce the infection of the virus and 10% soln. did not completely destroy it in 5 days. O. E. SHEPPARD

Vegetable oils as fungicides. H. MARTIN AND E. S. SALMON. *Nature* **126**, 58 (1930).—On powdery mildew of the hop (*Sphaerotheca humuli*) greenhouse expts. showed that 0.5% emulsions of olive, sesame and cottonseed oils and 2.0–3.0% emulsions of rape oil were completely fungicidal while 2.0% emulsions of castor oil were not. 0.5% soft soap was the emulsifier used. It was found that the emulsifier had a marked effect upon the toxicity of the spray. Many vegetable oils in comparatively high concns. showed no injurious effects on the foliage. F. W. MARSH

Investigations on the fungicidal action of sulfur. IV. Third progress report. B. T. P. BARKER. *Ann. Rept. Agr. and Hort. Res. Sta., Long Ashton, Bristol for 1929* 130–48(1930); *Rev. Applied Mycol.* **9**, 732–3; cf. *C. A.* **23**, 5267.—In further attempts to identify the reducing substance or substances formed by living plants which culminates in the reduction of S to a sulfide it was observed that yeasts were especially effective and pressed yeast was found as a satisfactory substance to study. Evidence indicated that the reducing mechanism can function apart from the organism, whether living or dead. The evidence indicates that the sulfuring of a plant leads to the formation of a S compd. more or less resistant to temps. up to 100° but which is decompd. on the addn. of a mineral acid when H_2S is liberated. The reducing factor retains its activity after treatment with an alkali but loses it on treatment with dil. H_2SO_4. Conclusion: The S reducing action takes place outside the organism and is effected by means of a substance or substances emerging from the plant. The H_2S would account for the fungicidal value of S. In a foot note it is stated that further results point to a glutathione (probably identical with the hypothetical "philothion" of de Rey-Pailhade) as the reducing factor. O. E. SHEPPARD

Dry corrosives containing copper. F. X. SCHWAEBEL. *Z. Pflanzenkrankh. u. Pflanzenschutz* **40**, 113(1930).—Cu salt "W," a basic $CuCl_2$, is recommended as a cheap, effective dry corrosive for combating seed smut (*Tilletia*). C. W. SONDERN

Copper and mildew. G. VILLEDIEU. *Prog. agr. vit.* **94**, 373–6(1930).—Expts. were conducted on immunization and the use of powders in combating mildew, oidium, cochylis and eudemis. A material which will inactivate the mildew diastase is being sought. Cu, in the proper chem. form, was introduced into some plants. Newly developed foliage on these plants was much superior to that on untreated specimens but in August the treated plants were in poor condition because of mildew invasion. The use of ammoniacal salts makes the vines more susceptible to mildew through an exaggeration of the foliage growth. F. W. MARSH

Spraying experiments for black spot and powdery mildew. H. A. TURNER AND W. J. DOWSON. *Tasmanian J. Agr.* [N. S.] **1**, 101–2(1930); *Rev. Applied Mycol.* **9**, 725. —Spraying with a carbide mixt. (2 lb. Cu sulfate, 12 oz. Ca carbide and 40 gals. water was compared with spraying with lime sulfur and Bordeaux on Jonathan, Dunn and York apples in Tasmania. The results compared very favorably, especially when the carbide mixt. was applied at the green tip stage, with the rest. The important advantages of the carbide mixt. are its ease of prepn., its greater adhesiveness as compared with lime sulfur, and the fact that it did not cause leaf scorch though there was some russeting. O. E. SHEPPARD

The effect of copper sulfate on tomato plants. O. OWEN. *Ann. Appl. Biol.* **16**, 430–7(1929).—This is a study of the effect of Cu in the soil on tomatoes at various stages of growth. The addn. of $CuSO_4$ increases the rate of germination, but total germination is unaffected and subsequent growth is not satisfactory. The toxicity of Cu is greater in the form of $CuSO_4$ than as "Chestnut compd." (a mixt. of 11 parts $(NH_4)_2CO_3$ and 2 parts $CuSO_4$ dissolved in water in the amt. of 1 oz. mixt. in 2 gallons). When used to control "damping off" of tomato seedlings and foot rot Chestnut compd. is harmless to the soil. The addn. of new soil around the stems and the application of $Ca(OH)_2$ are beneficial when the soil has become poisoned with Cu. Small quantities of $CuSO_4$ in the soil have no effect on the no. of seeds per fruit and on the ability of the seeds to germinate but the seedlings subsequently produced are commercially unsatisfactory. C. H. RICHARDSON

The determination of the degree of incrustation of the disinfectant on dusted seed grain. G. HILGENDORFF. *Nachrichtenbl. Deut. Pflanzenschutzdienst* **10**, 33(1930); *Rev. Applied Mycol.* **9**, 707.—The dusted seed is shaken repeatedly with ether to remove the disinfectant, which is recovered by evapn. The residue is dissolved in AcOH, the As oxidized by Br water and the Cu content detd. by titration with Na thiosulfate after

the addn. of KI. If the Cu content of the disinfectant is known the amt. of the disinfectant used can readily be calcd. The method accounts for 95% of the disinfectant adhering to the seed grain when tillantin is used and H. claims it is equally applicable for tutan, Cu carbonate and like dusts. O. E. SHEPPARD

Nicotine in grape growing. L. FERRÉ. *Rev. vit.* **73**, 178–84(1930).—Microchem. detns. by the method of Bertrand and Jauillier showed that nicotine used as an insecticide on grapes soon disappeared; this was due in wet weather to the action of the rain and, in dry weather, to volatilization. Conclusion: Nicotine may be thus used without the slightest disadvantage. F. W. MARSH

Results of experiments with sodium nitrate on some varieties of wheat. P. AURIUEL. *Prog. agr. vit.* **94**, 210–1(1930).—$NaNO_3$ increased the yields, especially of straw, from all plots when applied during a 3-month period at the rate of 200 kg. per hectare. F. W. MARSH

Contributions to the control of potato wart. J. LEMMERZAHL. *Phytopath. Z.* **2**, 257–320(1930); *Rev. Applied Mycol.* **9**, 738–9.—Soil disinfection by the use of crude benzene at the rate of 500 cc. per 3500 cc. soil, 3% formalin at the same rate, 3% cresolsulfonic acid at the same rate and chloride of lime at the rate of 12 g. per 3500 cc. soil was used in greenhouse expts. All methods were partially effective but none gave complete control in the field. Crude benzene (28 l. per sq. m.) was the most satisfactory, followed by 1% formalin (35 l. per sq. m.). O. E. SHEPPARD

Significance of the work of J. M. van Bemmelen in regard to the knowledge of the soil (HISSINK) 2.

Selectively sterilizing soil. CHARLES HARNIST. Ger. 506,484, Feb. 28, 1923. Compns. which promote the growth of anaerobic, N-assimilating bacteria, but destroy aerobic organisms, are prepd. by heating waste vegetable materials, *e. g.*, wood shavings, with alkali or alk. earth salts of oxygenated acids of S in the presence of water, if desired under pressure, and filtering off the soln. A suitable compn. may also be prepd. from sulfite cellulose lye by treating it with NH_3 and SO_2 in turn, in order to remove constituents having resinous, gelatinous and tanning properties, the residual soln. being the desired product. The action of the products is ascribed to the presence of lower oxygenated acids of S. Fertilizers, etc., may be added to the compns. Examples are given.

Phosphatic fertilizer. A. HOLZ and T. VAN D. BERDELL. Brit. 332,750, July 30, 1929. See Can. 303,903 (*C. A.* **24**, 5419).

Phosphate fertilizers. ARMOUR FERTILIZER WORKS. Brit. 332,639, April 25, 1929. See Fr. 674,443 (*C. A.* **24**, 2538).

Phosphates and other fertilizing salts. F. UHDE. Brit. 332,803, Oct. 25, 1928. An alkali or NH_4 sulfate is added to raw phosphates treated with HNO_3, thus pptg. $CaSO_4$, and a Mg salt such as $MgCl_2$ from the potash industry is added prior to or subsequent to removal of the $CaSO_4$ (or $MgSO_4$ may serve both functions). NH_3 may be added and various details and modifications of the procedure for prepg different products are described.

Organic iron compound suitable for use as a plant stimulant. HENRY BLUMENBERG, JR. and JOHN H. BLUMENBERG. U. S. 1,783,694, Dec. 2. Comminuted cellulose material such as sawdust is treated with an aq. Fe sulfate soln. and the impregnated material is heated until it assumes a dark brown or black color.

Stimulant and parasite-destroyer for plants; fertilizer. PAUL SCHMIDT. Ger. 506,485, May 20, 1927. A ground mixt. of quicklime and $MgCl_2.6H_2O$ is left to react, without addn. of H_2O as such, until a dry product contg. $Mg(OH)_2$, Mg_2OCl_2, Ca_2OCl_2, and $CaCl_2$ is obtained. The product may be emulsified and applied by spraying.

Insecticides. I. G. FARBENIND. A.-G. (Carl Taube and Hans Kükenthal, inventors). Ger. 506,085, Nov. 27, 1928. Compds. contg. a CNS and a thioether group are used, alone or with the usual addns. Suitable compds. are *1-methylthiol-4-methylthiocyanomethylbenzene*, m. 55°, and *1-methylthiol-4-chloro-2-thiocyanomethylbenzene*, m. 60°, each prepd. by the action of alc. NH_4CNS on the corresponding halogen compd. Cf. Ger. 501,135 (*C. A.* **24**, 4578).

Insecticides, etc. CHEM. FAB. LUDWIG MEYER. Ger. 506,428, Sept. 12, 1929. Insecticidal or fungicidal dusting powders comprising PhOH, an inert filler, and a readily vaporized substance, *e. g.*, nicotine or a Hg compd., are prepd. with the use of cryst. PhOH, which is melted and mixed with the filler, etc.

Finely divided sulfur mixture suitable for use on plants or trees. HENRY BLUMEN-

BERG, JR. U. S. 1,783,695, Dec. 2. A mixt. of S 90 and H_3BO_3 10% is heated to 130–300° to produce a powdery product which may be used as an *insecticide* and *fungicide*.

Fungicidal composition for treating seeds. HEINRICH RÖSSNER, ADOLF STEINDORFF and KASPAR PFAFF (to Farbwerke vorm. Meister Lucius and Bruning). U. S. 1,783,200, Dec. 2. A metal-contg fungicidal compd. such as Cu carbonate 30 is mixed with an inert "extender" such as kieselguhr 32–48, a resin sulfonate 30–40 and an oily material such as spindle oil, bone oil or train oil about 2–3 parts. Cf. *C. A.* **24**, 196.

Disinfectant for seeds. MAX ENGELMANN (to E. I. duPont de Nemours & Co.). U. S. 1,783,377, Dec. 2. See Brit. 329,672 (*C. A.* **24**, 5928).

Insecticide. ALBERT HARTZELL (to Boyce-Thompson Institute for Plant Research, Inc.). U. S. 1,781,841, Nov. 18. Minute particles of colloidal sublimed S are carried in an emulsion of fish-oil soap and water. Cf. *C. A.* **24**, 5104.

Sulfurous insecticides for treating plants. J. STODDART. Brit. 332,638, April 25, 1929. A soln. of S (suitably in CS_2) is added to finely divided kaolin to produce a product contg. 10% or less of S and the solvent is driven off; or solid S may be added to kaolin and the mixt. then heated to above the vaporizing point of S.

16—THE FERMENTATION INDUSTRIES

C. N. FREY

Some modern developments and future possibilities in the industrial application of fermentation phenomena. T. K. WALKER. *Chemistry and Industry* **49**, 946–8(1930). E. H.

The chemical approach to problems of fermentation. ELLIS I. FULMER. *Ind. Eng. Chem.* **22**, 1148–50(1930).—The nature and complexity of the chem. changes brought about by the action of microorganisms on carbohydrates are pointed out. The influence of the environment on the phys. and chem. changes is discussed. A chart is given which shows the interrelationships existing between the substrates and the products of fermentation. Fermentation products are not always degradation products. Synthesis may be involved. Synergism, or the effect of different organisms growing together which bring about chem. reactions not taking place when the organisms are grown alone, is discussed. C. N. FREY

Development of the butyl-acetonic fermentation industry. C. L. GABRIEL AND F. M. CRAWFORD. *Ind. Eng. Chem.* **22**, 1163–5(1930).—The history of the development of the butyl-acetonic fermentation industry is presented. An outline of the commercial processes used is given. The uses of the products of fermentation are discussed. The rationalization of the industry by the development of uses for all the by-products is briefly discussed. C. N. FREY

Influence of catalytic elements on alcoholic fermentation. II. M. ROZENBLAT AND A. MARCH. *Biochem. Z.* **226**, 404–14(1930).—In the absence of nutritive substances no metal element accelerates the yeast fermentation; apparently the metals merely stimulate the growth of yeast which in turn causes an increase in fermentation. Alc. fermentation occurs even in the presence of a high concn. of the metals, exceeding very greatly the concn. necessary completely to paralyze the development of yeast. Thus with Co this concn. may be 100 times as great. Likewise, the series of metals in the order of their paralyzing action on the zymase system of the yeast differs from that in the order of their effect upon the growth of yeast. Ni is the most toxic from both points of view. Ni > Fe > Co, Mn is the order of their effectiveness on the zymase, which is also like their effectiveness on pepsin. The Fe^{+++} is a more efficient paralyzer than Fe^{++}, and in a 0.2% concn. of the former less than $1/_{20}$ as much sugar is fermented as of the latter. S. MORGULIS

Ethyl alcohol. A. A. BACKHAUS. *Ind. Eng. Chem.* **22**, 1151–3(1930).—The origin of the EtOH industry is described. A table showing the increased growth of the industry since 1907 and the uses of industrial alc. is included. The process used in carrying out large fermentations of molasses mashes is described. The theory of alc. fermentation as developed by Harden and by Neuberg is discussed. C. N. FREY

Lactic acid. J. F. GARRETT. *Ind. Eng. Chem.* **22**, 1153–4(1930).—The history of the lactic acid industry in America is given. Lactic acid is produced by comparatively high temp. fermentation, the raw materials usually consisting of cane or beet sugar, corn starch or corn sugar. A pure culture of lactic acid bacteria is usually employed. The recovery is conditioned by the product desired, whether for technical purposes or for use as a food product. The uses of lactic acid are briefly discussed. C. N. F.

Report on (the analysis of) vinegar. ARTHUR M. HENRY. *J. Assoc. Official Agr. Chem.* **13**, 471–5(1930).—Addn. of 1 g. of sugar in the *detn. of ash* in vinegar by the A. O. A. C. method reduces the no. of water treatments, reduces the time required for ashing, and improves the character of the charred residue and the final ash. The use of MgO cream and neutral $Pb(OAc)_2$ (with removal of excess Pb) for clarifying vinegar in the *detn. of polarization* has very little, if any, effect on the reading, the variations being within the exptl. error; the use of vegetable decolorizing carbons gives wide variations and a tendency to give a + error. Clarification with neutral $Pb(OAc)_2$ and removal of excess Pb is considered the best method. In the *detn. of glycerol*, a 1% $PhNH_2$ soln. in concd. H_2SO_4 has been used satisfactorily as inside indicator instead of $K_4Fe(CN)_6$ as outside indicator in the final titration. A. PAPINEAU-COUTURE

Discolorations in vinegar. HEINRICH KREIPE. *Deutsche Essigind* **34**, 425–7 (1930).—Certain discolorations observed from time to time in vinegar may be ascribed to Fe and tannin. W. O. E.

The concentration of musts. M. J. DUBAQUIÉ. *Prog. agr. vit.* **94**, 369–71(1930).—Concn. increases the food value of wine and decreases the amts. to be marketed. Acidity is not increased. Economies are discussed. F. W. MARSH

Application of adsorption to the sterilization of wines. PHILIPE MALVEZIN. *Prog. agr. vit.* **94**, 262–4(1930).—The addn. of kieselguhr to wine, subsequently centrifuged, greatly increased the disease organisms pptd. and left the liquid free from them. Adsorption phenomena induced by the addn. of kaolin resulted in a sterilization of the wine, when filtered, without effecting vitamins, etc., and chem. properties. Also in *Bull. soc. chim.* **47**, 1194–6(1930). F. W. M.

The study of hybrid wines. E. KAYSER. *Rev. vit.* **73**, 279–81(1930), cf. *C. A.* **24**, 2541. Analyses by the usual methods were made on several hybrid wines. F. W. M.

Treatment of wines with ozonized air. P. MARSAIS. *Rev. vit.* **73**, 311–4(1930).—Six different types of wine, including a white wine whose fermentation was stopped at 1% with S, were treated with ozone mixed with air in various proportions, regulated by the ozonator power input. The rapidity of the reactions was increased with higher wattages but the final results were the same at points of 36–60 w. The alc. contents changed but little; volatile acids remained const. or decreased somewhat; while the fixed acids did not change. The color of the red wine became lighter in intensity. The quantities of sulfurous anhydride found free and combined varied with the amt. and rate of current application. Iron salts were pptd. The taste of a hybrid wine was markedly modified. Yeasts, certain disease producing organisms and acetic bacteria did not multiply in treated wine. The *Mycoderma vini* developed in partly filled samples. Careful filling would probably obviate these. The taste was flat directly after treatment but the savory and odorous characteristics reappeared on standing.
F. W. MARSH

The evolution of "tourne" in cement vats. FONZES-DIACON. *Prog. agr. vit.* **94**, 87–9(1930). Chem. analyses of wine samples taken in June from a 30-yr. old cement vat show that the development of the disease ("tourne") was from the top to the bottom, in contrast to its usual action. This is attributed to the poor heat cond. of the thick bottom walls and the better heat transmission of the thinner walls at the top. A favorable temp. for biological action is thus maintained at the top. F. W. MARSH

The boiling of worts. LOUIS LOTTIN. *Bull. assoc. élèves inst. sup. fermentations Gand* **31**, 286–8(1930). A brief address. A. PAPINEAU-COUTURE

The ratio between the solid content and the specific gravity in wort and beer extract. C. N. RIBER. *Kgl. Norske Videnskab. Selskabs Skrifter* **1929**, No. 2, 1–22.—The solid content of wort and beer is very difficult to det. directly on evapn. to const. wt. because the last traces of water are difficult to expel from the sirupy residue. For this reason breweries have for a long time detd. the sp. gr. only and from a table read off the corresponding content of sugar. It has been assumed that the ratio between the sp. gr. and the percentage of solids in these liquids is the same as that for aq. sugar solns. This assumption only holds for approx. values and the table, constructed by Balling for this purpose, was found to be inaccurate for sugar also. In previous work (*Christiania Videnskab. Selskabs Skrifter, I. Math. naturv. Klasse* **1897**, No. 5) it was shown that on drying the ext. absorbed in filter paper in rotating, evacuated tubes const. wt. could be reached at a temp. low enough to avoid destruction of the residue. The values thus found showed that the solid content at a certain sp. gr. was not the same for all kinds of beer and wort, but the differences were so small that they could be disregarded. In the most unfavorable cases the deviation for 10% exts. did not exceed 0.1%. A standard table was worked out which could be used for all kinds of exts. Special tables were given for cases where a greater accuracy was required. All weighings were re-

duced to vacuum; otherwise an inaccuracy of about ±0.0003 in the sp. gr. could occur, while this must be kept below ±0.0001. The original standard table which was based on d_{15}^{15} is in the present work recalcd. to d_{20} and the values g. per l. ext. are given besides g. per 100 g. ext. in accordance with the international analysis convention of 1912. A new *pycnometer with counterbalance* had been constructed (*Chem.-Ztg.* **27**, 94(1903)) with which the circumstantial calcns. in reducing the weighings to vacuum were avoided The pycnometer may also be employed for liquids lighter than water. By means of a special arrangement the abs. sp. gr. may be detd. in a few min. with an accuracy of ±0.0001. D. THEUSEN

Turbidity (of beer) due to yeast. P. PETIT. *Brasserie & malterie* **20**, 209–12, 225–8(1930).—A discussion of the importance of proper filtration in the prevention of the development of turbidity in bottled beer due to the development of yeasts. At the present time double filtration, with a very close filter mass for the 2nd filtration, generally gives quite good results, but with no abs. assurance of the complete elimination of all the yeast cells; and it is suggested that builders of filters should develop a type that would eliminate all cells in a single filtration. A. PAPINEAU-COUTURE

The p_H value of beer. CH. DE GRONCKEL. *Bull. assoc. élèves inst. sup. fermentations Gand* **31**, 289-300(1930).—A study of the effects of the various factors affecting the

[illegible] the temp. of fermentation produces a slight increase in the free acidity of the beer. (4) Buffering of the worts in the p_H range over which alc. fermentation takes place seems to be the only factor having a preponderating influence on the phenomenon; it is necessary not to exceed a definite degree of buffering so as not to reduce the free acidity at the end of fermentation and the stability of the beer which depends on it. (5) The amino acids are the chief buffers of the wort; as long as they are present in such amts. as to be completely assimilated by the yeast, they increase the free acidity at the end of fermentation, but if an excess remains which has not been assimilated, they act as buffers and oppose any increase in the H-ion concn. From a brief discussion of the means available for controlling the amino acid content of the wort, de G. considers that the principal one consists in low-temp. malting; moreover, proper aeration during fermentation facilitates more complete assimilation of the N, which has the 2-fold advantage of decreasing the amt. of yeast foods in the finished beer, and of decreasing the amt. of buffer compds., thus facilitating an increase of the H-ion concn. to the optimum (p_H about 4.0). A. PAPINEAU-COUTURE

History and development of the modern yeast industry. CHARLES N. FREY *Ind. Eng. Chem.* **22**, 1154–62(1930).—A brief history of the yeast industry is given Various theories of fermentation which have arisen during the course of the development of the industry are described. The development of the ammonia-molasses process is discussed. The uses and biological properties of yeast are given. C. N. FREY

Fermentations in the food industries (BLANCK) **12.** Monosaccharide material from hydrolysis of starch liquor (U. S. pat. 1,784,402) **28.**

Concentrating aqueous alcohol. CARL HANER (to Publicker, Inc.). U. S. 1,783,086, Nov. 25. An alkali hydroxide is dissolved in the aq. alc. mixt.; it is heated and a distillate of higher alc. content than the const. b. p. mixt. is condensed and removed from the system; a distillate of lower alc. content is thereafter condensed and removed from the system, and the distn. is stopped with sufficient alc. and water remaining with the alkali hydroxide to keep it in liquid condition at the temp. of distn.

Ethyl alcohol gel. HEINZ OHLE and JOHANNA OTHMAR-NEUSCHELLER. U. S. 1,783,133, Nov. 25. Gels from which the alc. can be sepd. by heating or compressing are prepd. by use of alkali metal or alk. earth metal salts of the sulfuric acid half esters of acetone derivs. of sugars and multivalent alcs. such as diacetone-glucose, diacetone-galactose, α- and β-diacetone-fructose and acetone-glycerol.

Fermenting fruit materials, etc., for producing alcoholic liquors. WINCENTY MATZKA. U. S. 1,781,788, Nov. 18. For the fermentation of materials such as fruit culls or residues such as those of pineapple, lemons, oranges or grape fruit (preferably with added sugar and in a slightly acid medium), a ferment is used which does not destroy the natural aroma of the vegetable material and which has been prepd. by propagation in a body of aq. liquor of the same character as that to be fermented. Various details for prepg. a Saccharomycetes culture and its use in the main fermentation process are described.

Yeast. JOHN H. BARRINGTON (to Standard Brands, Inc.). U. S. 1,784,618, Dec. 9. A process is described in which a mixed molasses and grain mash is soured by lactic fermentation, yeast is propagated with acration in a nutrient soln. prepd. from the soured mash, with addn. of aq. NH_3 during one stage of the propagation and of $(NH_4)_2SO_4$ during a later stage, to keep the acidity of the yeast nutrient medium within suitable limits selectively inhibiting infection without inhibiting yeast growth materially. Various details of procedure are described. Cf. *C. A.* **24**, 461.

Purifying yeast after use for fermentation. GUSTAVE T. REICH. U. S. 1,783,521, Dec. 2. Yeast which has become contaminated by use in the fermentation of materials such as black strap molasses is dild. and sepd. by sedimentation into an upper portion contg. yeast of higher protein value and a lower portion contg. yeast of lower protein value together with impurities resulting from the previous use of the yeast, and these portions are separately collected and dehydrated, and may be used in *feed for animals*. An arrangement of app. is described.

17—PHARMACEUTICAL CHEMISTRY

W. O. EMERY

Some of the uses of normal saline solution infusion in canine practice. H. CALVIN REA. *J. Am. Vet. Med. Assoc.* **30**, 612–6(1930).—NaCl soln., 0.9%, is a valuable therapeutic agent in canine practice. RACHEL BROWN

Experiments on magnesium sulfate as a general anesthetic. O. W. JOHNSON. *J. Am. Vet. Med. Assoc.* **30**, 644–5(1930).—$MgSO_4$, 20%, is a general anesthetic for small animals. RACHEL BROWN

Examination of cascara tablets. W. F. WOUTMAN. *Pharm. Weekblad* **67**, 1230–3 (1930).—Report of a more or less superficial examn. of 15 samples. A. W. DOX

So-called skin function oils and other nostrums. W. PEYER, H. IFFINGER AND C. BLINDOW. *Apoth. Ztg.* **45**, 1493–4(1930).—Of the many so-called skin function oils on the market some 12 different prepns. have been examd. with respect to their constituents and phys. properties, the results being presented in tabulated form. W. O. E.

Evaluation of sodium nitrite via D.A.-B. G. FRERICHS. *Apoth. Ztg.* **45**, 1507–8 (1930).—A crit. commentary of the official Ger. method, with suggestions for its improvement. W. O. E.

Estimation of arsenic in drug mixtures. G. WEISSMANN AND S. BABITSCH. *Pharm. Zentralhalle* **71**, 721–4(1930).—Of 6 different procedures examd. for estg. As in drug mixts., that of Andrews and Farr was found best suited to the purpose in question, provided certain modifications are introduced, as the use of a hypophosphite as reducing agent following the addn. of perhydrol. W. O. E.

Reactions of g- and k-strophanthin. LAD. EKKERT. *Pharm. Zentralhalle* **71**, 724–5 (1930).—On adding 1 drop of H_2O and 3 drops of concd. H_2SO_4 to 0.005 g. of g-strophanthin, the mixt. becomes brick-red, gradually fading to green on warming. Under like treatment, k-strophanthin develops a brownish to olive-green and finally brown color. With a mixt. of 1 drop of 1% alc. furfural and 1 drop of concd. H_2SO_4, the g-glucoside develops a brownish, the k-glucoside a deep indigo-blue color. W. O. E.

Evaluation of liquor aluminii acetico-tartarici D.A.-B.6. RICHARD HOLDERMAN. *Pharm. Ztg.* **75**, 1331–2(1930).—Weigh exactly 1 g. of the sample, add 1 cc. AcOH and 100 cc. H_2O, then warm in a beaker to 60–65°. Now treat with about 50–60 cc. of hydroxyquinoline acetate soln., or until this reagent is in excess, then heat to boiling and add 3–5 g. NaOAc in 15 cc. H_2O. After 2–3 min. filter through a Gooch crucible, washing the ppt. first with hot H_2O and then with cold H_2O until the filtrate runs colorless. Dry at 105–10° to const. weight. Calcns. are given on the results obtained with controls indicating the amt. of Al acetotartrate should correspond to about 55% with the above method. W. O. E.

Glucosides of digitalis lanata Ehrh. C. MANNICH, PAUL MOHS AND W. MAUSS. *Arch. Pharm.* **268**, 453–76(1930).—Recent investigations of this species show it contains 4 active glucosides, characterized as lanadigin (lanata glucoside I), lanata glucoside II, lanata glucoside III (digitalinum verum) and lanata glucoside IV. Lanadigin forms colorless needles or prisms of the probable compn. $C_{41}H_{66}O_{17} + 4H_2O$, difficultly sol. in $CHCl_3$ and H_2O, yielding the digitoxose reaction of Keller-Kiliani. Heated quickly it m. 245°, $[\alpha]_D^{20}$ 33.3°. Hydrolytic scission with alc. HCl gives *lanadigigenin*, $C_{23}H_{34}O_5$, isomeric with gitoxigenin, probably identical with digoxigenin of Sidney Smith. Lanata

glucoside II appears to represent a mol. compd. of lanadigin with a 2nd glucoside, which yields the scission product digitoxigenin. The 3rd glucoside from *Digitalis lanata* appears to be identical with digitalinum verum of Kiliani. Lanata glucoside IV crystalizes in needles m. above 225°, $[\alpha]_D^{20}$ 5.50°. The relatively difficult scission with alc. HCl yields an optically inactive genin. The physiol. action is considerably less than that of the other 3 glucosides. W. O. E.

Radix saponariae. E. Gilg and P. N. Schürhoff. *Arch. Pharm.* **268,** 476–85 (1930).—The present study is essentially botanical. W. O. E.

Examination of essential oils. Kurt Bodendorf. *Arch. Pharm.* **268,** 486–91 (1930).—For purposes of characterization, some 15 different essential oils have been examd. as follows: Dissolve 0.6 to 0.8 g. of the sample in 25 cc. benzoic peroxide-$CHCl_3$ mixt. (so adjusted that 1 cc. = about 10 cc. 0.1 *N* $Na_2S_2O_3$); after 18 and 24 hrs. withdraw 5 cc. for admixt. with acidified KI soln., and titration (after 0.5 hr.) with 0.1 *N* $Na_2S_2O_3$. No considerable difference should exist between the values obtained in the 2 titrations. For calcg. the O no. the last value obtained should be used. W. O. E.

Abnormalities in perbenzoic acid oxidations. Kurt Bodendorf. *Arch. Pharm.* **268,** 491–9(1930).— In the investigation of a series of essential oils it developed that α,β-unsatd aldehydes could only with great difficulty be oxidized with perbenzoic peroxide, *i. e.*, cinnamic aldehyde is only attacked very slowly, while the oxidation of cinnamic ale proceeds quite normally. Cinnamic acid and its esters (Me, Et, Pr, iso-Pr and Bu) are, according to Boeseken, barely affected by perbenzoic acid. The same is likewise true of crotonic aldehyde. With α,β-unsatd. ketones the reactivity of the peracid is not entirely inhibited but markedly limited. BzCH:CHAc reacts very slowly with perbenzoic acid; dimethylpyrone does not react at all. In general, the reactivity of ethylene bonds toward the peracid (whether carboxyl, ester, aldehyde or ketone groups) is either markedly curtailed or entirely annulled. W. O. E.

New methods for the colorimetric estimation of alkaloids. C. A. Rojahn and Rudolf Seifert. *Arch. Pharm.* **268,** 499–520(1930).— An attempt has been made so to effect alkaloidal detns., that by means of a general precipitant the alkaloid can be isolated and its amt. detd. colorimetrically. Thus, with picric acid, 4 of the alkaloids studied, strychnine, quinine, emetine and cinchonine, were detd. In this connection NH_4 picrate only is used as the colorimetric indicator. The above 4 alkaloids may also be detd. by the use of silicotungstic acid and phosphotungstic acid. For evaluating the W component use is made of its reduction to tungsten blue. With Mayer's reagent only strychnine and emetine of the 4 named alkaloids could be detd. This reagent is thereupon evaluated by pptn. of the Hg as colloidal sulfide. Expts. with Dragendorff's reagent were unsuccessful. H ferrocyanide can be used in detg. strychnine, the ferrocyanide component being detd. in a limited way by the Cu ferrocyanide test, as also by the Prussian blue reaction. From the standpoint of accuracy, it appears that the colorimetric method is in many cases superior to the gravimetric. The utility of the colorimetric method increases as the amt. of alkaloid decreases. With larger amts. of alkaloid available, the gravimetric method is to be preferred. W. O. E.

Alkaloid-glucoside found in Solanum aviculare. Alfred A. Levi. *J. Soc. Chem. Ind.* **49,** 395–6T(1930).— The common New Zealand shrub known as the "bulli bulli" (Maori, "Purapura," *Solanum aviculare*) has a reputation among the local population for being poisonous, although the ripe berries were used by the early colonists for making jam. An examn. of the plant led to the isolation of a glucoside-alkaloidal substance from the green berries and in smaller proportion from the leaves. In its general properties it resembles ordinary solanine from potatoes, but its behavior on hydrolysis with acids proves conclusively that it is not identical with solanine. The name *purapurine* is suggested for the substance (chloroplatinate, chromate, iodide and bromide, for the most part too unstable for analysis); persistent boiling with HCl yields *purapuridine*, and apparently a hexose. W. O. E.

Examination of castor oil. Walter Meyer. *Suddeutsche Apoth.-Ztg.* **70,** 586 (1930).—An unusual sample of alleged Oleum ricini D.A.-B.6 is described which failed to give all the prescribed tests for an official product. In examg. this commodity special attention should be given its behavior on cooling to 0°, especially on the appearance of cryst. flakes after rubbing with a glass rod, and finally on further cooling whether a buttery opaque mass results. On shaking the sample with a like vol. of H_2O, no acid reaction should be perceptible. W. O. E.

Iron medication. Conrad Stich. *Suddeutsche Apoth.-Ztg.* **70,** 592–3(1930). A brief account of certain ancient devices for the prepn. and administration of Fe compds (as developed by impaling fruit with iron nails, digestion of nails in wine, etc.). W. O. E.

Germicidal powers and capillary activities of certain pure constituents of essential oils. ERIC K. RIDEAL, A. SCIVER AND N. E. G. RICHARDSON. *Perfumery Essential Oil Record* **21**, 341-4(1930).—As in many cases the essential oils examd. contain besides the one or more active ingredients, certain substances somewhat variable in amt. and of unknown compn., it was thought desirable to carry on the investigation with some of the pure constituents of essential oils, deferring to a later date the investigation of the causes of the exceptions noted. Accordingly, detn. of the Rideal-Walker PhOH coeffs. of the pure constituents has been effected, after converting them into soap emulsions. The data thereby obtained are reported in the present paper. W. O. E.

Reactions of thiophene. LAD. EKKERT. *Pharm. Zentralhalle* **71**, 625-6(1930).—Certain color tests for thiophene are reviewed, and the behavior of uric acid toward thiophene-contg. C_6H_6, as noted by Denigès, made the basis for a reversible test. On adding to 0.01 g. alloxan 5 drops of concd. H_2SO_4 and then 1 drop of thiophene soln. (1 drop thiophene in 10 cc. abs. alc.), a blue color develops. On adding 2 drops thiophene soln. to 0.01 g. alloxan in 5 drops of H_2O, then following with 1 cc. cond. H_2SO_4, a blue color results. Variations of this procedure are also described, likewise the behavior of thiophene toward CH_2O, p-$(Me)_2C_6H_3CHO$, and β-naphthol in the presence of concd. H_2SO_4. W. O. E.

Reactions of antifebrin and phenacetin. LAD. EKKERT. *Pharm. Zentralhalle* **71**, 626-8(1930); cf. *C. A.* **24**, 3081. A description of the various color changes obtained after hydrolyzing antifebrin and phenacetin with HCl, coupling with α- and β-naphthol, resp., and oxidizing with chloramine or bleaching powder. W. O. E.

Contraction of spirit denatured with acetic acid. HEINRICH KREIPE. *Deutsche Essigind.* **34**, 392-5(1930). The phenomenon (contraction) observed in diluting 96% (by vol.) spirit with H_2O (or 1% AcOH) to about 40% strength is discussed, and the exptl. results obtained are compared with Hayck's contraction tables. W. O. E.

Reactions of homatropine and novatropine. LAD. EKKERT. *Pharm. Zentralhalle* **71**, 642(1930). See *C. A.* **24**, 5051. W. O. E.

Microchemical localization of phloroglucinol and its derivatives in plant material and drugs. ANNELIESE NIETHAMMER. *Pharm. Zentralhalle* **71**, 673-5(1930).—N. shows how the tests specified by Mohsel. (vanillin HCl and $(NH_2)_2C_6H_3CHO$-H_2SO_4) can be successfully used in the identification of phloroglucinol, if, in addn., resort is had to sublimation of a small piece of the material in a Klein-Werner app. under reduced pressure, the glucosidic substance being present in such cases as phloroglucotannoid. W. O. E.

Color reactions of anesthesine. LAD. EKKERT. *Pharm. Zentralhalle* **71**, 677 (1930). The various color changes resulting from treatment of anesthesine with such reagents as HNO_3 + β-naphthol (or α-naphthol), resorcinol, $Ca(OCl)_2$ + NH_3, chloramine + PhOH, etc., are discussed. W. O. E.

Color reactions of cinchophen and neocinchophen. LAD. EKKERT. *Pharm. Zentralhalle* **71**, 678(1930).—On the addn. of a few drops of fuming HCl to 0.01–0.02 g. cinchophen or neocinchophen, a blood-red or dichromate-red results. If the mixt. is then made alk. with NaOH soln. the colorless liquid remains clear with cinchophen, while with neocinchophen the likewise colorless liquid becomes clouded, later becoming clear. The former is sol. in NaOH soln. while neocinchophen at first remains undissolved. Milky cloudiness also develops on the addn. of 0.5 cc. fuming HCl to a few cg. of neocinchophen in 0.5 cc. strong EtOH, followed by NaOH soln. W. O. E.

Etrat, a new type of drug. H. ESCHENBRENNER. *Pharm. Ztg.* **75**, 1215(1930).—Etrates are non-hygroscopic, medium granulated (without the dust of crude drugs) prepns. possessing both taste and color of the parent drug. The prepn. involves extn. of the crude drug with a variety of solvents, the resulting exts. being united and dried under special precautions to avoid decompn., then redistributed over and in the exhausted marc as vehicle. W. O. E.

Etrat, a new highly active type of drug. CLEMENS GRIMME. *Pharm. Zentralhalle* **71**, 685-9(1930); cf. preceding abstr. W. O. E.

Phillyrin. FINN KOLLE AND TRYGVE HJERLOW. *Pharm. Zentralhalle* **71**, 705-8 (1930). Because of certain discrepancies in the data reported by Bertagnini and Eykman on the glucoside phillyrin, K. and H. have undertaken anew the examn. of this substance. Phyllyrin is an α glucoside possessing d-rotation, yielding on scission with α-glycosidase and rhamnodiastase (not however with emulsin) glucose and cryst. phillygenin. On hydrolysis with dil. acids in alc. soln. a cryst. aglucone and α-ethylglucoside resulted, which latter on further action of dil. acids yielded β-glucose and EtOH. W. O. E.

Reactions of salicylic acid and salol. LAD. EKKERT. *Pharm. Zentralhalle* **71**, 744

(1930).—On mixing 0.01 to 0.02 g. salicylic acid and 0.002 g. $NaNO_2$ with 0.5 cc. H_2O, followed by underlaying with 1 cc. concd. H_2SO_4, a red ring develops at the zone of contact and on shaking the mixt. becomes blood-red. Diln. with H_2O causes no change in color, while diln. with NaOH soln. produces a grass-green color. Na salicylate, Bi salicylate, secondary Hg salicylate, and acetylsalicylic acid behave like the free acid. Like treatment of salol leads to the red color of salicylic acid and the green of PhOH. W. O. E.

Ergot question. BERTA SAIKO-PITTNER. *Pharm. Monatsh.* **11**, 245–7(1930).—An address dealing essentially with products occurring in ergot and their probable specific effect on the animal economy. W. O. E.

Organization of the international union for furthering production and utilization of drug, spice and related plants. W. HIMMELBAUR. *Pharm. Monatsh.* **11**, 247–8 (1930).—A report. W. O. E.

Estimation of potassium guaiacolsulfonate in sirups. W. SCHÖBEL. *Pharm Ztg.* **75**, 1232–3(1930).—A commentary on the official Ger. method, as also on various procedures suggested by other workers, in connection with an outline of 2 methods based on the detn. of the sulfonic group. W. O. E.

Simplification of the method for estimating morphine in opium by use of the centrifuge. CONRAD STICH. *Pharm. Ztg.* **75**, 1233–4(1930).—The method described is essentially that given in the Swiss. Pharm. W. O. E.

Ammonia liniments and sapo kalinus. O. SCHMATOLLA. *Pharm. Ztg.* **75**, 1234 (1930).—The tendency in certain quarters to use indifferent oils (poppy, castor, etc.) in the prepn. of this liniment is criticized. To evaluate the product, weigh into a small cylinder graduated in 0.1–0.2 cc. 10 g. of the sample, add about 6–7 cc. dil. HCl and exactly 5 cc. C_6H_6 or benzine, close with a cork stopper and shake vigorously. After standing a short time the oily layer should amount to 13.5–13.6 cc W. O. E.

Examination of Spiritus saponatus. STOLDT. *Pharm. Ztg.* **75**, 1234(1930).—A com. sample had d. 0.9287, dry residue 15.46%, free alkali 1.7%, as compared with d 0.9265, dry residue 12.12%, free alkali 0.0%. W. O. E

Diacolation of condurango bark. H. BREDDIN. *Pharm. Ztg.* **75**, 1261–2(1930) Diacolation is the term applied to a special type of percolation in series or battery form In the present instance B. employs 3 tubes 65 cm. long and 3.5 cm. inner diam The method of treating the several charges is described in detail, as also the results thereby obtained. W. O. E.

Scientific pharmacy. XVI. Sterility of injection solutions. RAPP. *Pharm Ztg.* **75**, 1288–91(1930); cf. *C. A.* **24**, 4897.—A second instalment of an article discussing the question of sterility of injection solns., inclusive of app. used in effecting suitable sterilization and data obtained in the examn. of a series of solns. designed for injection W. O. E.

Rationalization of salve containers. I. G. OBERHARD. *Pharm. Ztg* **75**, 1301 (1930).—Certain suggestions are offered relative to types of containers (illustrated) best suited to contain salves. W. O. E

Faex medicinalis. ERNST RICHTER. *Apoth. Ztg.* **45**, 1447(1930).—The evaluation of medicinal yeast with respect to catalase may be improved as follows: Triturate 0.1 g of the sample with 2.4 g. powd. sugar. Overlay 0.1 g. of this mixt. on a soln. of 0.1 g benzidine in 1 cc. AcOH + 10 cc. 3% H_2O_2. The sugar dissolves and after 10 sec. there appears on the surface of the liquid a light blue foamy wreath when examd. in reflected light and against a white background. Dissolve the benzidine in the AcOH by gentle heating, cool and add the H_2O_2 very slowly so that only traces of the base are pptd. W. O. E

Fabrication of tablets. RAPP. *Süddeutsche Apoth. Ztg.* **70**, 631 3(1930).—A discussion of certain manipulations incident to tablet manuf., inclusive of certain formulas W. O. E

Diacolation of extraction aurantii fluidum. H. BREDDIN. *Pharm. Ztg.* **75**, 1320–1 (1930).—The article discusses all essential manipulations necessary to prepg. this ext by use of a series of tubes with their resp. charges and percolates. W. O. E.

Evaluation of liquor aluminii acetici D.A.-B.6. RICHARD HOLDERMANN. *Pharm. Ztg.* **75**, 1332(1930).—The procedure followed is identical with that previously described (hydroxyquinoline method for Al acetotartrate) with the exception that instead of 1 g of the sample 2 g. is taken. The amt. of Al hydroxyquinoline ppt. obtained should correspond to about 7.5% basic Al acetate. W. O. E.

Determination of quinine in dragée and in ampoules. EM. J. EMMANUEL. *Z. anal. Chem.* **82**, 296–7(1930).—Of *dragée*, place 2 or 3 pieces in a funnel, and dissolve away any paraffin by washing 3 times with 10 cc. portions of petr. ether. Evap. to

dryness in a weighed dish, dry at 80° and weigh the residual paraffin. Dry the residual pellets, pulverize in a mortar and digest at 50–60° with 50 cc. of 1% HCl, added gradually. Transfer to a separatory funnel and wash out with 1% HCl. To the soln. add 20 cc. of 10% NaOH and ext. the liberated quinine 3 times with 20% $CHCl_3$. Evap. the $CHCl_3$ soln. on the water bath and dry at 100° (preferably *in vacuo*) to const. wt. A dragée of 0.2 g. should contain not less than 0.163 g. of quinine monohydrochloride, 0.146 g. of the bihydrochloride or 0.118 g. of quinine bisulfate. To det. the quinine hydrochloride content of small *ampoules*, wash out the contents of one of these vials into the separatory funnel and treat as with 3 cc. of 10% NaOH and then with $CHCl_3$ as above. An ampoule of 0.4 g. should contain not less than 0.32 g. of the quinine salt. W. T. H.

The use of iron salts in the identification of morphine. LUIS ROSSI. *Ann. farm. bioquim.* **1**, 106–10(1930).—The bluish coloration given by morphine and its salts in the presence of $FeCl_2$ is due to the Fe ion. Concd. solns. of Fe alum (NH_3 and K) are the most suitable reagents because of their stability. When possible, the solid salts may be used in the presence of $BaSO_4$. B. S. LEVINE

The acidity of aromatic waters. E. CONDUCHÉ AND F. GRÉGOIRE. *Bull. sci. pharmacol.* **37**, 529–37(1930).— The value of orange flower water is higher, the larger the difference between the acidity before and after filtration. Fresh distillates have a p_H 5.8, aging changes it toward 7. This is caused by the action of air and of fungi. A. E. MEYER

The anatomical study of the root of Platycodon grandiflorum and Adenophora arten. T. MUNESADA AND S. KAWAKAMI. *J. Pharm. Soc. Japan* **50**, 945–50(1930). F. I. NAKAMURA

The pharmacognostical study of cod-liver oil of Japanese Dorsches ("Tara"). VII, VIII and IX. K. KAWAI. *J. Pharm. Soc. Japan* **50**, 951–98(1930); cf. *C. A.* **24**, 5427. F. I. NAKAMURA

Oil of lavender in pharmacy. R. NAVES. *Parfums de France* **8**, 259–72(1930) (in French and English).—A review of the therapeutic properties of oil of lavender, and of the analytical consts. prescribed by the principal pharmacopeas, which are critically discussed. A. PAPINEAU-COUTURE

The origin of pharmacy. Historical review of the development of the art of preparing pharmaceuticals and preparations resembling pharmaceutical compounds. G. B. INVERNI. *Giorn. farm. chim.* **79**, 356–8, 361–2, 365–70, 373–80, 383–8, 391–2, 395–6(1930). G. SCHWOCH

Utilization of by-products from saccharin manufacture (HERZOG) **27.** Apparatus or processing oils, salves, confections, etc. (U. S. pat. 1,783,864–5–6–7) **1.**

Pharmaceutical preparations. I. G. FARBENIND. A.-G. Ger. 504,681, Oct. 7, 1927. Therapeutically active prepns. are formed by combining alkaloid bases with hydroxylated diaryl ketone-carboxylic acids. Thus, 2-(4'-hydroxybenzoyl)benzoic acid is combined with 3-phenyldehydroquinazoline to give a product m. 187–90°. Other examples described the combination of hydroxy- or dihydroxybenzoylbenzoic acid with such alkaloid bases as ephedrine, yohimbine, morphine, novocaine and hydrastinine.

Synthetic drugs. KNOLL A.-G. CHEM. FAB., GUSTAV HILDEBRANDT and ERWIN LEUBE. Ger. 506,279, Nov. 30, 1926. The amide and ureide of α-bromo-β,β-diethylpropionic acid are prepd. from the acid or its anhydride or halides by the customary methods. Examples are given. The amide m. 79–80°; the ureide m. 139°. They have *sedative properties.*

Synthetic drugs. SCHERING-KAHLBAUM A.-G. (Walter Schoeller, Erich Borgwardt, and Hans G. Allardt, inventors). Ger. 506,443, Mar. 3, 1925. Auromercapto acids are prepd. by the action of auric salts on org. mercapto acids in the presence of SO_2. Thus, 4-amino-2-mercaptobenzenecarboxylic acid, treated in HCl soln. with H_2SO_3 and $KAuBr_4$, yields 4-amino-2-auromercaptobenzenecarboxylic acid. Cf. *C. A.* **24**, 2241.

Medicinal liquid-petrolatum-agar-water emulsion. LEON A. WILSON (one-half to Edwin L. Yewell). U. S. 1,784,324, Dec. 9. In prepg. the emulsion, water and agar are boiled together, mixed with mineral oil and the mixt. is agitated until cool.

Antiseptic liquids. G. PANSINI. Brit. 332,520, Jan. 17, 1929. An aq. soln. of NaOCl or other alkali metal hypochlorite is satd. with O_3 produced electrolytically. Various details of app. and procedure are described.

Permanently sterilized and stable sero-vaccines. GEORG MAYER. Ger. 505,707, Apr. 3, 1927. Young cultures, *e. g.*, of *Staphylococcus* and serum products, *e. g.*, pleural exudation, are shaken together and treated with ultra-violet light in closed quartz vessels. The autolysis of the product is suspended for a period according to the length of treatment with the ultra-violet light.

Diacetyl-3,3'-diamino-4,4'-dihydroxy-5,5'-diiodoarsenobenzene. ALEXANDER D. MACALLUM. U. S. 1,782,432, Nov. 25. This compd. is made by the reaction of Na hyposulfite at 55-60°, in an inert atm., on acetyl-3-amino-4-hydroxy-5-iodophenylarsonic acid and is a lemon-yellow solid, sol. in acetone, PhOH, benzaldehyde and pyridine, and suitable for use as a *trypanocide*.

Acetyl-*k*-strophanthidin. SCHERING-KAHLBAUM A.-G. (Wilhelm Neumann, inventor). Ger. 506,045, April 6, 1928. See Brit. 323,973 (*C. A.* **24**, 3249).

Bismuth hydroxide. I. G. FARBENIND. A.-G. Brit. 332,504, Dec. 3, 1928. An aq. soln. of a Bi salt is pptd. by an alkali such as NH_3, and adherent water is removed from the ppt. after filtration by first washing with a solvent which is more volatile than and sol. in water (such as EtOH, MeOH or acetone) and then washing with a second volatile solvent (such as EtCl, ether or $CHCl_3$) and then evapg. the residue of the second solvent. A product is obtained which is suitable for use, when suspended in oil, in the treatment of syphilis.

Mercury compound of *m*-cresol, etc. DUNCAN M. COPLEY and JOHN P. SNYDER (to Norwich Pharmacal Co.). U. S 1,782,090, Nov. 18. Various details are given of the prepn. of an antiseptic and germicidal compn. consisting of the hydroxymercuri substitution product of a mixt. of a plurality of cresol isomers one of which is *m*-cresol, with $HgCl_2$, the product being a cream-white powder, substantially odorless, insol in water, alc. and cold dil. HCl or cold dil. HNO_3, but readily sol. in dil. KOH or NaOH solns, free from inorg chlorides and having a bacteriostatic potency twice that of $HgCl_2$ in equal ratios of diln. The product contains the inner anhydride of hydroxymercuri-*m*-cresol and chloromercuri-anhydrohydroxymercur-*m*-cresol.

Menthols. SCHERING-KAHLBAUM A.-G. (Walter Schoeller, Hans Jordan and Reinhard Clerc, inventors). Ger. 506,044, Aug. 17, 1926. See Brit. 276,010 (*C. A.* **22**, 2379).

Infra-red element for therapeutic lamps and holders. ERNEST SUTER and JULIUS NUETZI. U. S. 1,782,218, Nov. 18. An insulating core with a spiral groove carries a coiled resistance wire extending into the groove and a screen coating for the wire consisting of "aloxide," neutral magnetic Fe oxide black, "silicon soda" and "red phosphor Zn oxide."

Disinfectants. CORNELIUS KELETI. Ger. 504,603, Aug. 7, 1926. A disinfecting, tanning or cosmetic prepn. is prepd. by leading halogen into a mixt. of aldehyde and soap. Halogenated oil may be used instead of halogen, and one or more salts of heavy metals may be added.

Cosmetics. CHEM. FAB. JOHANN A. WÜLFING. Ger. 499,251, Oct. 12, 1926. The high-mol. degradation products of keratinous materials are used as cosmetics, alone or with the customary addns. The degradation products may be prepd. by hydrolyzing keratinous materials with alkali until they have lost their structure, and pptg. the products with acid.

18—ACIDS, ALKALIES, SALTS AND SUNDRIES

E. M. SYMMES

Nitric acid produced from ammonia by modified pressure system. GIACOMO FAUSER. *Chem. Met. Eng.* **37**, 604-8(1930).— The advantages of NH_3 oxidation under pressure are shown in theory and practice. The best conversion is at 850°, with 9.5% NH_3 content when air only is used. At any pressure there is an optimum velocity of mixt. for the best conversion. Conversion was 91% at 4 atm., *vs.* 95-96% at atm. pressure. Under pressure a Pt gauze can oxidize more NH_3, but gain in the amt. of Pt used does not wholly justify the loss of NH_3 under pressure, which represents more than interest and amortization. The addnl. expense of Pt is compensated partly by saving in oxidizing equipment. Regeneration of Pt gauze is necessary after 6-7 months in atm. oxidation, but under pressure the period is shorter and cleaning more difficult. The presence of Fe is very harmful. To avoid difficulties due to resistance to flow and heat removal in absorption towers, an absorption system of horizontal spray tanks with external cooling is used. E. M. SYMMES

Dehydration of silicic acid by ignition. BERNHARD NEUMANN. *Z. angew. Chem.*

43, 882–3(1930).—On heating SiO_2 from 200° to 1000° the H_2O content falls from 6.6 to 0.0%, and simultaneously adsorption of the crystalloid dye diminishes. Adsorption of Au sol in xylene rises as the temp. of ignition rises. Abnormalities occur from 600° to 900°, because of the change of α-quartz to β-quartz at 575°, and β-quartz to β-tridymite at 870°. E. M. SYMMES

Commercial production of anhydrous aluminum chloride. C. WURSTER. *Z. angew. Chem.* **43**, 877–80(1930); cf. McAfee (*C. A.* **23**, 4301).—The literature is reviewed. Production of $AlCl_3$ from Al ores continuously, without external heat, is possible, heat of chlorination being sufficient. Shaft furnaces are used on the countercurrent principle, with tight Fe outside jackets and a lining of ceramic material stable to Cl and $AlCl_3$ at high temp. Between the 2 there is heat-insulating kieselguhr. CO and Cl are fed into the bottom, anhyd. clay or bauxite is fed continuously at the top, and a residue high in SiO_2 removed continuously from the bottom. $AlCl_3$ and CO_2 leave the top, passing to air- or H_2O-cooled cylinders having discharge devices. At first the contents are heated to about 500° by producer gas, then cold CO and Cl blown in. The internal temp. is kept at about 900°. Furnaces have operated continuously for years without relining, as compared to the 100 days given in the literature. After some time of operation, temp. in the lower part of the furnace drops, because cold gas meets material low in Al, giving poor extn. To avoid this, Cl is first converted to $COCl_2$, then led into the bottom of the furnace at 500°. If CO is unavailable, coal can be used in the bauxite briquets. The product contains $AlCl_3$ 97, $FeCl_3$ 2.5, $TiCl_4$ 0.5, yellow-brown, coarse crystals. E. M. SYMMES

Ammonium chloride. F. FREITAG. *Chem. Trade J.* **87**, 477–9(1930).—A review of modern mfg. methods, with especial attention to the difficulties of the direct process of uniting the gases, NH_3 and HCl, the modified NH_3-soda process, and the salt-sulfate methods. Analytical control and the various forms of sal-ammoniac are discussed. W. H. BOYNTON

Zinc meta-arsenite. C. MARSHALL TAYLOR. *Canadian Mining J.* **51**, 1121–3 (1930).—$Zn(AsO_2)_2$ is prepd. from Zn acetate and $HAsO_2$. It is very sparingly sol. in H_2O, but readily sol. in the body juices of any of the com. wood-destroying fungi. Its advantages as a wood preservative are: it is odorless, colorless, paintable, permanent and it burns less readily than untreated timber. A formula for timber costs (*Coal Age*, Nov., **1928**) is $A = \frac{PR(1+R)N}{(1+R)N-1}$, where A = annual charge including interest and amortization, P = rate of interest expressed decimally and N = life in years. The av. life untreated is 3 yrs.; treated 8–10 yrs., and permanent and semi-permanent timber destroyed by crush = 20%. W. H. BOYNTON

Esters of phosphoric acid as substitutes for camphor. A. BRESSER. *Industria chimica* **5**, 740–2(1930); cf. *C. A.* **24**, 1214.—A summary of some of the esters of phosphoric acid proposed and used as camphor substitutes. They are distinguished by being odorless, very stable, much less flammable and not discoloring in sunlight, *e. g.*, triphenyl, tricresyl, trinaphthyl phosphates, thiophosphates corresponding to $(PhO)_3PS$, phosphoric acid esters of di- and tetrachlorophenol, di- and tetrachlornaphthol, the corresponding Br_2, I_2, F compds., and tribenzylphosphate, $(PhCH_2)_3PO_4$. Patent references are given. A. W. CONTIERI

Evaluation of active carbons. E. BERL AND W. HERBERT. *Z. angew. Chem.* **43**, 904–8(1930).—Air-vapor satn., C_6H_6 heating, C_6H_5OH adsorption, molasses, $HgCl_2$ adsorption and methylene blue tests are investigated and criticized. A modification of the latter by altering the amt. of methylene blue so as to give a final concn. of 1 g. per l. is advocated for greater accuracy. The Duboscq colorimeter can give a 15% error with comparison columns varying by 2:1. E. M. SYMMES

Production of carbon black from propane. W. B. PLUMMER AND T. P. KELLER. *Ind. Eng. Chem.* **22**, 1209–11(1930).—C black as good as that made from CH_4 may be made from hydrocarbons as high as C_3H_8, but this may not be true for higher liquid hydrocarbons. The basic flame reactions are the same for CH_4 and C_3H_8. The function of the channels is mainly cooling, as shown by heating the same to 650°. There is a lower limit of desirable cooling of channels. Complete removal of the channels does not reduce the yields as much as expected, and produces a lower grade of C black. The type of C black made is not much affected by the surrounding atm., and is, therefore, detd. by the conditions within the flame. E. M. SYMMES

Carbon black, lampblack and bone black—their properties and industrial application. CHARLES H. BUTCHER. *Chem. Trade J.* **87**, 399–401(1930).—The manuf. of lampblack, of vegetable black, of carbon black or gas black and bone black are outlined

and means of distinguishing between lampblack and carbon black is mentioned. The detns. of moisture, hygroscopicity of carbon black, sp. gr., degree of fineness, bulking value, presence of oil and grease, and of grit are outlined. W. H. BOYNTON

Bromine and iodine. PAUL M. TYLER AND AMY B. CLINTON. Bur. Mines, *Information Circ.* 6387, 26 pp.(1930).—Description, uses, occurrence, methods of extn., history, world production, domestic production, imports, duties, foreign industry, markets and prices of Br and I are given. A 2 pp. bibliography and numerous footnote references are shown. ALDEN H. EMERY

Preparation of lanthanum from Swedish cerite. Separation of lanthanum-ammonium nitrate. Spectrographic analysis of lanthanum oxide obtained. R. LLORD Y GAMBOA. *Anales soc. españ. fís. quím.* 28, 1145–52(1930).—La_2O_3 was prepd. by calcining double La-NH_4 nitrate, obtained by long-continued fractional crystn. La_2O_3, Pr_2O_3 and Nd_2O_3 were prepd. from only 24-g. samples. The purity of the product was detd. by the spectroscope. E. M. SYMMES

Various processes for the extraction of magnesium from dolomite. LIVIO CAMBI. *Giorn. chim. ind. applicata* 12, 438–41(1930).—Methods of extn. of Mg from dolomites abundant in Italy are reviewed, particularly the method using HNO_3 and calcined dolomite. Electrometric titration with HNO_3 shows 2 breaks, $Ca(NO_3)_2$ forming first, then $Mg(NO_3)_2$, giving a method for fractional sepn. of these salts. The reactions take place readily at temps. above 50°. A sample whose original compn. was MgO 20.78, CaO 31.2, Al_2O_3 + Fe_2O_3 0.43, CO_2 46.82% was sepd. so that the product was MgO 98.91%, CaO 0.39%, Al_2O_3 + Fe_2O_3 trace. A serious problem is the recovery of HNO_3 from the calcination of the nitrates. A. W. CONTIERI

Producing sulfur at Newgulf. GEORGE H. REID. *Chem. Met. Eng.* 37, 668–72 (1930). E. H.

Diatomaceous earth. ROBERT CALVERT. *J. Chem. Education* 7, 2829–49(1930). E. H.

Armenian pumice stone. S. OTAROV. *Stroitelnuie Materialui* (*Building Materials*) No. 1, 69–70(1930).—The description and chem. compn. of large deposits of pumice stone in Russian Armenia are given. The quality of this pumice stone makes it suitable for *bricks, pumice cement* and *prepn. of green glass.* M. V. KONDOIDY

Color reaction of Japanese acid clay toward malachite green leuco base hydrochloride. NAOTO KAMEYAMA AND SHUMPEI OKA. *J. Soc. Chem. Ind. Japan* 33, Suppl. binding 335–6(1930); cf. *C. A.* 24, 1940.—The original clay beds contained pockets of brownish black material, previously found distributed through the clay, and which gave spotted color reactions. This contaminating material was impure pyrolusite. E. M. SYMMES

Gypsum and gypsum products. W. A. FELSING AND A. D. POTTER. *J. Chem. Education* 7, 2788–2807(1930). E. H.

Emulsions and suspensions of various kinds (Brit. pat. 332,533) 13.

Sulfuric acid. HUGO PETERSEN. U. S. 1,781,954, Nov. 18. Sulfurous acid gases to be oxidized are passed with nitrous vitriol of at least 55° Bé. strength, vertically through packed reaction spaces, the flowing resistance in which is so regulated as to correspond to a pressure ranging from 0.25 to 6.0 mm. water-column for each meter of vertical flow, and the nitrous strength of the vitriol at the bottom of the spaces is kept within a limit of at least a quarter of the nitrous strength at the top of the spaces. An arrangement of app. is described.

Colloidal silicic acid. ALEXANDER P. OKATOV. U. S. 1,783,304, Dec. 2. A process is described involving reaction of Na silicate with HCl treatment of the gel. with solns. of salts of polybasic acids together with NH_3. Cf. *C. A.* 24, 693.

Ammonia-air mixtures suitable for use in nitric acid manufacture. HARRY PAULING. U. S. 1,784,074, Dec. 9. An arrangement of app. is described for producing a uniform mixt. of NH_3 and air, comprising a liquid circulating system, an NH_3 absorber in the system, means for forcing an air current into the NH_3 soln., and automatic control devices for controlling the circulation of the liquid actuated by variations in sp. gr. of the soln.

Wax bottles suitable for holding hydrofluoric acid. DANIEL FAUERBACH (to General Chemical Co.). U. S. 1,784,686, Dec. 9. Various details of manuf. are described.

Separating acidic gases. ROBERT R. BOTTOMS (to Girdler Corp.). U. S. 1,783,901, Dec. 2. See Fr. 685,992 (*C. A.* 24, 5898).

Acid phosphate plant. INGENUIN HECHENBLEIKNER (to Chemical Construction Corp.). U. S. 1,782,821, Nov. 25. In an excavator plant, a den is provided for contg. material to be excavated, with a rotary cutter movable into and from the den and so designed that rotation of the cutter disk causes a suction of air from the outer face of the disk toward the operating face. Various details of construction are described.

Catalytic apparatus for ammonia synthesis or other exothermic reactions. O. PIETTE and UNION CHIMIQUE BELGE, SOC. ANON. Brit. 332,532, April 12, 1929. Various details are given of an app. with concentric tubes and an elec. resistance heater.

Treating ammoniacal liquors. DWIGHT R. MEANS (to Pittsburgh Plate Glass Co.). U. S. 1,781,987, Nov. 18. In recovery of NH_3 from liquor contg. fixed NH_4 compds. including NH_4Cl, unpulverized quicklime contg. some unburned limestone is supplied in quantity sufficient to decompose the fixed NH_4 compds., at one end of a mixing app., to which the liquor is supplied counter-currentwise; the quicklime and assocd. unburned limestone gradually work downwardly and is suspended in the liquor and the unburned limestone then settles and segregates in its lower portion and is removed; the liquor contg. the suspended lime is then subjected to distn. to obtain NH_3. App. is described.

Alkali cyanides. SYLVIAN COULIER. Ger. 504,535, Nov. 3, 1925. These are prepd. by treating the gases obtained by the dry distn. of nitrogenous materials in the presence of alkali compds. with carboniferous materials. The distn. residue may be used as the latter material. The distn. temp. should not exceed 500°. In examples, old leather, leather waste and tanning residues, or de-sugared molasses is used as the starting material.

Ferricyanides. JOSEF SCHRÖTER. (Wilhelm Gluud, Konrad Keller, Walter Klempt and Cläre Dieckmann, inventors). Ger. 504,501, July 6, 1928. Addn. to 502,883. Ferricyanides are prepd. by treating a ferrocyanide soln. with a weak acid, or with a mixt. of weak acid and a stream of O-contg. gas under pressure, and subjecting the resulting soln. to electrolytic oxidation. In an example, $Ca_2FeC_6N_6$ is heated to 100° in an autoclave at 50 atm. with a CO_2-air mixt. The electrolytic oxidation of the resulting soln. gives $Ca_3[Fe(CN)_6]_2$.

Alkali metal hydroxides. ERNST HEINZE (to I. G. Farbenind. A.-G.). U. S. 1,784,066, Dec. 9. An amalgam of alkali-forming metal is agitated with water by use of a stirrer composed of C material such as graphite or coke.

Double fluorides. I. G. FARBENIND. A.-G. Ger. 506,127, Mar. 29, 1925. Addn. to 443,007, 461,136 and 479,400 (*C. A.* **23**, 4782). In mfg. double compds. of AlF_3 and alkali fluorides as described in the prior patents mentioned, it is found that a small excess of F ions is permissible, without necessarily reducing Fe to the ferrous state, provided that free mineral acid is present. Examples are given.

Solutions of per-compounds. ÖSTERREICHISCHE CHEM. WERKE G. M. B. H. Austrian 119,036, Mar. 15, 1930. Solns. of peroxides, per-salts and per-acids, particularly bleaching solns., are stabilized by addn. of an alkali pyrophosphate together with an alkali chloride and (or) an alkali silicate. Thus, a 30% H_2O_2 soln. may be treated with $Na_4P_2O_7.10H_2O$ 2.5 and NaCl 1%, the usual acidity of the soln. being restored by addn. of H_2SO_4.

Metallic nitrates. FRIEDRICH A. HENGLEIN (to I. G. Farbenind. A.-G.). U. S. 1,783,647, Dec. 2. Nitrates are formed by the action of O upon nitrites such as those of K or Zn in the presence of water and an alkali metal hydroxide under superatm. pressure and at a temp. above 150°.

Chromium compounds. CHEM. FAB. GRÜNAU LANDSHOFF & MEYER A.-G. (Hans Fahnrich, inventor). Ger. 506,436, June 5, 1926. Alkali chromoxalates in which part of the oxalic acid residue is replaced by SO_4, and to which the formulas given below are assigned, are prepd. by the reaction of an alkali hydroxide, $Cr(OH)_3$, $(COOH)_2$, and H_2SO_4 in the mol. proportions corresponding to the formulas, and evapg. the soln. obtained. Like products are obtainable by substituting another polybasic org. acid for oxalic acid. Examples are given.

$$\left[\begin{matrix} C_2O_4 \\ CrSO_4 \\ (H_2O)_2 \end{matrix}\right] Na \qquad \left[\begin{matrix} (C_2O_4)_2 \\ CrSO_4 \end{matrix}\right] Na_3 \qquad \left[\begin{matrix} C_2O_4 \\ Cr(SO_4)_2 \end{matrix}\right] Na_3$$

Zinc compounds. METALLGES. A.-G. (Freiherr Conway von Girsewald, Hans Weidmann, and Erich Stahl, inventors). Ger. 506,343, Dec. 14, 1926. This relates to the recovery of Zn from the poor lyes obtained by roasting ores contg. Zn and Cu under chloridizing conditions, and extg. with water. The lyes are first freed from Cu by a method not involving the introduction of an addnl. metal into the lye, *e. g.*, by pptn. as CuCl, and are then cooled to sep. Na_2SO_4. The residual lye is used to ext. a further amt.

of roasted ore, and the process is repeated until, after sepg. Cu and Na_2SO_4, a lye rich in Zn is obtained, from which Zn is recovered as ZnS, basic $ZnSO_4$, etc.

Readily soluble stable hypochlorite. PAUL R. HERSHMAN (one-fourth each to C. O. Sethness, C. H. Sethness and Paul Rudnick). U. S. 1,784,286, Dec. 9. Ca hypochlorite is mixed with NaOAc in the presence of moisture, and the product is then dried. Cf. *C. A.* **24**, 209.

Deacidifying ammonium sulfate. KELLNER & FLOTHMANN G. M. B. H. Ger. 504,534, Apr. 24, 1927. The $(NH_4)_2SO_4$ soln. is passed down a tower in which perforated plates fixed to a central axis rotate, and is simultaneously subjected to the action of basic gas or vapor. The app. is described.

Refining antimonic lead sulfate. ALEXANDER STEWART (to C. L. Constant Co.). U. S. 1,783,986, Dec. 9. In the refining of antimonic Pb sulfate in a weak H_2SO_4 soln., hydrolysis of the Sb is prevented by maintaining the soln. at a sufficiently high concn. of SO_4 ions by addn. of a sulfate of an alkali metal.

Barium hydroxide. KALI-CHEMIE A.-G. (Fritz Rothe and Friedrich Rüsberg, inventors). Ger. 506,275, Aug. 10, 1926. $Ba(OH)_2$ is prepd. by decompg. Ba silicates with H_2O under pressure at a temp. above 100°. A large excess of water need not be used, so that solns. suitable for direct crystn. are obtained. Dil. solns. of $Ba(OH)_2$ may be used for the decompn. Examples are given. Cf. *C. A.* **24**, 5115.

Conversion of calcium nitrate or other salts into globular or similar shapes. BODO HAAK (to I. G. Farbenind. A.-G.). U. S. 1,782,038, Nov. 18. The fused salt is dropped into a cooled non-solvent liquid such as CCl_4 set into rotation about a vertical axis within the liquid. App. is described.

White anhydrous calcium sulfate. CHARLES B. DURGIN, ARTHUR B. GERBER and PAUL LOGUE (to Swann Research, Inc.). U. S. 1,783,417, Dec. 2. Ca phosphate is added to hydrated $CaSO_4$ and the mixt. is heated to about 760° to produce a product formed mainly of $CaSO_4$ (which may contain about 5% of Ca phosphate) suitable for *use in dentifrices*, etc.

Iron carbonyl. ALWIN MITTASCH and CARL MÜLLER (to I. G. Farbenind. A.-G.). U. S. 1,783,744, Dec. 2. Metallic iron with its surfaces free from oxide is treated with a gas contg. CO under a pressure not exceeding 50 atm. and at an elevated temp. and the gas is passed over the metal at such speed that the carbonyl formed is substantially carried away as formed. Cf. *C. A.* **24**, 3613.

Hydrogen peroxide. JAMES B. PIERCE, JR. (to Barium Reduction Corp.). U. S. 1,781,859, Nov. 18. SrO_2 is added to a soln. of a mixt. of acids such as H_2SO_4 and HCl, one of which forms a relatively insol. Sr salt and the other a relatively sol. Sr salt (the second-mentioned acid being present in small proportion).

Magnesium carbonate. VEREIN FÜR CHEMISCHE UND METALLURGISCHE PRODUKTION. Ger. 506,635, Oct. 24, 1925. Addn. to 505,304. The method of decompg $KHCO_3.MgCO_3.4H_2O$ with H_2O described in Ger. 505,304 (*C. A.* **24**, 5948) is modified in that the double salt is only partially decompd., by treatment with H_2O at a low temp., before the MgO or $Mg(OH)_2$ is added.

Magnesium chloride. I. G. FARBENIND. A.-G. (Wilhelm Moschel, inventor). Ger. 506,276, Oct. 5, 1928. See Fr. 682,303 (*C. A.* **24**, 4361).

Manganous phosphate. N. V. MAATSCHAPPIJ TOT EXPLOITATIE VAN DE PARKER OCTROOIEN "PARKER RUST PROOF." Ger. 504,568, Apr. 5, 1927. $Mn_3(PO_4)_2$ for the prepn. or regeneration of a rust-proofing bath is obtained by dissolving Fe-Mn in H_3PO_4 and oxidizing the resulting $Fe_3(PO_4)_2$ and $Mn_3(PO_4)_2$ soln. to ppt. $FePO_4$, the unchanged $Mn_3(PO_4)_2$ remaining in soln.

Disodium pyrophosphate. METALLGES. A.-G. (Freiherr Conway von Girsewald and Hans Weidmann, inventors). Ger. 506,435, May 18, 1929. A concd. soln. of H_3PO_4 is treated with the appropriate amt. of NaCl and evapd. *in vacuo* at a temp. rising to 180–200°, whereby the formation of insol. metaphosphate is avoided. An example is given.

Colloidal silver iodide. HARRY S. KEELAN (to E. R. Squibb and Sons). U. S. 1,783,334, Dec. 2. An insol. Ag salt such as AgCl in colloidal soln. is subjected to reaction with an iodide of an alkali-forming metal such as NaI.

Strontium oxide in flake form. JAMES B. PIERCE, JR. (to Barium Reduction Corp.). U. S. 1,782,830, Nov. 25. SrO in the form of flakes is obtained by heating pptd. $SrCO_3$ with ashless carbon black at 1200° in a closed muffle. The SrO is especially suitable for making SrO_2.

Titanium acid sulfate. FOORD VON BICHOWSKY (to Titania Corp.). U. S. 1,783,684, Dec. 2. By reaction under specified conditions between H_2SO_4 and Ti nitride or cyanonitride with slow addn. of HNO_3, and evapn. of the filtered soln., a semi-solid

product is obtained of the formula $H_2SO_4.Ti(SO_4)_2.4H_2O$ which reacts with K_2SO_4 in aq. soln. to form a white powder of the formula $4K_2SO_4.5TiOSO_4.2TiO_2$. By use of $NaNO_3$ instead of HNO_3, there is obtained a product of the approx. compn. $NaHSO_4.Ti(SO_4)_2.18H_2O$. The acid sulfates of Ti can replace Al sulfate for the *treatment of water or sewage* or for use as a *mordant*, can be used in *paper manuf.*, as a *desiccating agent* in chem. laboratories or for *drying gases*, or as a source for producing other Ti compds. by electric reduction or other methods.

Zinc oxide. FREDERIC E. PIERCE. U. S. 1,781,702, Nov. 18. A Zn-bearing ore is smelted in a reducing atm. in a reverberatory furnace in the presence of C and such other substances as will form a slag with the ore impurities, and the Zn vapor produced is led into a combustion chamber and treated with air to effect oxidation and cooling, and the ZnO is sepd. from other gaseous products. App. is described.

Catalytic converter apparatus suitable for oxidizing sulfur dioxide. INGENUIN HECHENBLEIKNER (to Chemical Construction Corp.). U. S. 1,782,824, Nov. 25. Converters connected in cascade are provided with an interposed cooler for the gases, the operation of which is controlled by the temp. in the first converter. Various structural details are described.

Mechanical furnace for making alkali sulfate from alkali chloride and sulfuric acid. KARL EHRENFRIED. Ger. 506,348, Aug. 22, 1926.

Hydrogen. C. F. R. HARRISON and IMPERIAL CHEMICAL INDUSTRIES, LTD. Brit. 332,571, April 19, 1929. In a cyclic process carbonaceous material such as coke is first heated to about 1500° by blowing with air, and CH_4 or similar hydrocarbon is then blown in until the temp. falls to about 1100° with production of H and C, and finally steam is blown in until the temp. falls to about 900° with production of water gas from which a further quantity of H may be obtained by catalysis with steam; the steps are then repeated, and the process may be carried on in conjunction with the destructive hydrogenation of coal or the like by which large quantities of CH_4 are produced. An app. is described.

Hydrogen. I. G. FARBENIND. A.-G. (Hans Bähr, inventor). Ger. 506,041, May 4, 1929. In the manuf. of H or gas mixts. contg. H by alternately oxidizing a metal, *e. g.*, Fe, with steam, with or without air, and reducing the oxide, sintering of the mass during the reduction stage is prevented by effecting the reduction with powd. or granular carbonaceous material in conjunction with indifferent or reducing gases. Preferably, the mass is kept in motion in both the reduction and oxidation stages, *e. g.*, by blowing the gases through the mass so that the latter is whirled about, or by the use of rotary tube furnaces, shaft ovens or the like. Suitable addns. may be made to the mass in order to obtain useful by-products. Thus, if CaO is added to a mixt. of Fe ore and powd. coal, there is obtained after reduction a mixt. of Fe with a product which can be worked up into *cement;* the mixt. may be sepd. magnetically or by winnowing.

Hydrogen. FREDERICK T. SNYDER. U. S. 1,781,935, Nov. 18. A hydrocarbon gas such as natural gas or gas from coal or oil is passed in contact with refractory material of increasing temp. with exclusion of air, the max. temp. of the material being above the decompn. temp. of the gas, and then through material of decreasing temp. Decompn. with C deposition is effected near the material of max. temp., and the deposited C is subsequently burned with heated air to re-heat the material, and part of the heat of the products of combustion is absorbed in the part of the refractory material with which the gas comes initially into contact. App. is described.

Rectification system for obtaining hydrogen from gas mixtures by partial liquefaction. GEORGES CLAUDE (to Société l'air liquide (Soc. anon. pour l'étude et l'exploitation des procédés Georges Claude)). U. S. 1,782,287, Nov. 18. App. and various details of operation are described.

Rhenium. SIEMENS & HALSKE A.-G. Brit. 332,627, Nov. 22, 1928. In extg. rhenium from minerals such as columbite, gadolinite or magnetic pyrites, HCl or H_2SO_4 may be used as a solvent and the rhenium then pptd. as sulfide as with H_2S (together with other sulfides so pptd.). The sulfide ppt. may be redissolved in HNO_3, followed by pptn. of constituents other than rhenium with NH_4NO_3 and H_3PO_4 or a phosphate, and repptn. with H_2S, with a final fractional sublimation, reduction by H, heating in O, reduction, fractional volatilization, and reoxidation of the sublimates repeatedly to sep. the rhenium. Fractional sublimation of mixed chlorides also is mentioned.

Sulfur. I. G. FARBENIND. A.-G. (Paul Koppe and Günther Robbel, inventors). Ger. 506,042, Mar. 27, 1929. See Fr. 681,629 (*C. A.* **24**, 4362).

Sulfur recovery from alkali metal polysulfide solutions. HELLMUTH LANGHEINRICH (to I. G. Farbenind. A.-G.). U. S. 1,783,725, Dec. 2. See Ger. 495,182 (*C. A.* 24, 3331).

Sulfur from pyrites. RAYMOND F. BACON. U. S. 1,782,225, Nov. 18. Fe pyrites is heated to 600–700° in a rotary retort and treated with steam at about this same temp. and the hot gaseous product (contg. S and H_2S) is treated with SO_2 at 600–700° and the elemental S thus formed is condensed, without substantial condensation of the steam, the exhaust gases of the condensing operation are reheated by heat from the hot gases leaving the retort, further heated to 600–700° by excess heat from the retort heating device, and the reheated gases are reintroduced into the retort for further reaction with Fe pyrites. Cf. following abstr. and *C. A.* **24**, 4596.

Sulfur from iron pyrites. RAYMOND F. BACON. U. S. 1,782,226, Nov. 18. A partial elimination of S from iron pyrites is effected by treatment with steam at an elevated temp. (suitably about 600–700°), thus forming a gaseous product contg. S and H_2S, and a further removal of S from the residual Fe sulfide of the pyrites is then effected by oxidation at an elevated temp. (suitably by the action of air) to produce a gas contg. SO_2; these 2 gaseous products are then caused to react with each other and the S formed is condensed. Cf. preceding abstr. and *C. A.* **24**, 4596.

Mold for casting sulfur. WILHELM VON DIETERICH (to Rhenania-Kunheim Verein Chemischen Fabriken A.-G.). U. S. 1,784,769, Dec. 9. A tubular mold of metal such as Al is provided with a longitudinal expansion slit and with a device for normally holding the slit closed.

Active carbon. ALGEMEENE NORIT MAATSCHAPPIJ. Ger. 504,636, April 24, 1925. Active C with a high adsorptive capacity is formed in granular or molded form by mixing activated C with inorg. adsorptive agents or activatable carboniferous material in liquid form or in soln., granulating or pressing the paste so formed and then heating to glowing. In the example, active C is mixed to a paste with sulfite lye and lime, pressed and heated.

Activated carbon. RUDOLF DEFRIS and ROBERT WÄLDER. U. S. 1,783,110, Nov. 25. See Fr. 666,647 (*C. A.* **24**, 1476).

Adsorbent decolorizing carbon ground to particles of about 2μ to 9μ size. JOHANNES VAN LOON. U. S. 1,782,493, Nov. 25.

Dissociating hydrocarbons such as acetylene for producing carbon black and hydrogen. JOSEF MACHTOLF (to Chr. Hostmann-Steinberg'sche Farbenfabriken G. m. b. H.). U. S. 1,782,540, Nov. 25. An app. is described in which a portion of the solid product is sepd. by settling while the remainder of the solid is blown through the dissocn. chamber with the gases for retreatment and further recovery.

Regenerating adsorption material such as active carbon or gels. VITALIS PANTENBURG (to American Lurgi Corp.). U. S. 1,784,536, Dec. 9. A column of the material is passed through a heat zone and an inert gas such as CO_2 or N is passed into the column near the end where the material enters the heat zone, and gaseous products are withdrawn from an intermediate portion of the column. App. is described.

Inorganic adsorbents. JOHN T. TRAVERS, CHARLES H. LEWIS and OLIVER M URBAIN (to Ohio Sanitary Engineering Corp.). U. S 1,783,396, Dec. 2. A tervalent metal salt of condensed orthosilicic acid, such as kaolinite, is mixed with a carbonaceous material such as sawdust and a soln. of an alkali metal silicate is added to the mixt., a dil. soln. of a strong acid such as H_2SO_4 is incorporated with the mass, followed by drying and ignition. The product is suitable for recovery of benzene or other solvent vapors.

Absorbent suitable for removing tobacco oils from smoke. CLARENCE W. ANDREWS. U. S. 1,784,566, Dec. 9. An absorbing material is prepd. by steaming vegetable material such as fibrous cotton and immersing it in hot caustic soda soln. and then boiling in water, drying and treating successively with boric acid and milk of magnesia

Use of furnace flue dusts as adsorbents. HEINRICH B. RÜDER (to Lurgi-Ges. fur Wärmetechnik m. b. H.). U. S. 1,784,543, Dec. 9. Flue dust from the combustion of lignite or other furnace flue dust is used as an adsorbent, preferably after classification into material of different grades and characteristics by fractional elec. pptn. or other suitable method, and suitably after a supplementary activation or extn. treatment.

Catalysts. ERNEST B. MILLER and GERALD C. CONNOLLY (to Silica Gel Corp.). U. S. 1,782,857, Nov. 25. A hydrogel such as that of silica is treated with a substance such as $Cu(NO_3)_2$ or NH_4 vanadate which is capable of conversion into a catalytic agent by heating; the impregnated hydrogel is converted into a hard porous gel, and the gel is heated to effect production of the catalytic agent.

Catalysts for hydrogenation reactions, etc. KARL MARX, HERMANN BEHNCKE and KARL BRODERSEN (to I. G. Farbenind. A.-G.). U. S. 1,783,662, Dec. 2. A soln. of a Co, Cu or Ni salt such as Ni sulfate or chloride is treated with H under at least 20 atm. pressure (suitably 30–40 atm and at a temp. of about 100°) in the presence of NH_3 or an

org. base or acid amide. Use of urea, pyridine, tri-ethanolamine, aniline and methylamine is mentioned, and a highly active catalyst may be obtained.

Catalytic zeolites. ALPHONS O. JAEGER and JOHANN A. BERTSCH (Jaeger to Selden Co.). U. S. 1,782,353, Nov. 18. A large no. of detailed examples and modifications of procedure are given for producing catalytic zeolites of different compns. and of their use in catalyzing various reactions, with or without various diluents, etc.

Condensation products of urea with formaldehyde, etc. I. G. FARBENIND. A.-G. Brit. 332,634, April 19, 1929. Solns. or dispersions obtained by condensing urea or its derivs. such as thiourea or methyl urea, with CH_2O or its polymers in the presence of an org. solvent, or the corresponding products obtainable from mono- or dimethylol-urea or -thiourea, are freed from org. solvents and volatile constituents by steam distn. The condensation is preferably effected in the presence of a small proportion of an acid-reacting substance such as HCl or oxalic acid, urea nitrate or $NaHSO_4$, or buffer substances or mixts. such as maintain a p_H of 6.0–5.2. Numerous examples and details of procedure and mixts. of the products with other substances for different purposes are described. Cf. *C. A.* **24**, 5118.

Condensation products from polyvinyl esters. I. G. FARBENIND. A.-G. (Arthur Voss, inventor). Ger. 506,148, Jan. 18, 1927. Resinous or oily products suitable as varnish bases, insulators, etc., are prepd. by heating polymerized vinyl esters of lower aliphatic acids with acids of high mol. wt. or their esters, *e. g.*, resin acids, stearic acid, oils and fats. Thus, polymerized vinyl acetate and colophony, heated gradually up to 250° under reduced pressure, yield a clear resin insol. in alkalies and EtOH but sol. in C_6H_6 and linseed oil. Other examples are given also.

Products from alginic acid suitable for making molded articles. LAURIE L. BURGESS (to Plastic, Inc.). U. S. 1,782,887, Nov. 25. Reaction is effected between alginic acid and a hydrocarbon material such as paraffin wax and the product is rendered plastic by addn. of an alkali such as NH_3 or NaOH and may be molded. Finely divided metals also may be added.

Adhesive. WILLY O. HERRMANN and WOLFRAM HAEHNEL (to Consortium für Elektrochemische Industrie). U. S. 1,784,008, Dec. 9. An adhesive which is suitable for joining various materials comprises alc.-sol. polymerized vinyl acetate and a softening agent such as isobutyl phthalate and solvent such as MeOH. Use of polymerized vinyl butyrate is also described. Cf. *C. A.* **24**, 1477.

Soft rubber-like composition. EFFIE H. MOSS. U. S. 1,784,070, Dec. 9. A compn. suitable for use in sealing joints is formed from linseed oil 2 teaspoonfuls, lime 1 teaspoonful, water 1.5 oz., isinglass 1 teaspoonful, soap soln. 1 teaspoonful, tincture of benzoin 5 drops, grease 1/4 teaspoonful and mercury 1 drop.

Mica tubes and sheets. ARTHUR LLOYD (to Bakelite, Ltd.). U. S. 1,784,737, Dec. 9. Mica is used with a binder comprising a condensation product of a phenol, a urea and an aldehyde.

Artificial gems. I. G. FARBENIND. A.-G. Ger. 506,146, Aug. 27, 1927. Artificial gems having a high refractive index and small dispersion are prepd. by fusing a mixt. of 1 mol. of MgO with 2–3.5 mols. of Al_2O_3 in app. of the kind customarily used in the art. The precautions necessary to obtain optically homogeneous products are referred to. Examples are given.

Magnetic cores. KARL EISENMANN and FRIEDRICH BERGMANN (to I. G. Farbenind. A.-G.). U. S. 1,783,560, Dec. 2. See Brit. 320,016 (*C. A.* **24**, 2847). U. S. 1,783,561. See Brit. 319,854 (*C. A.* **24**, 2847).

Coloring slate granules. HARRY C. FISCHER (to Philip Carey Mfg. Co.). U. S. 1,782,648, Nov. 25. The slate is wet with a soln. of a dichromate such as $Na_2Cr_2O_7$ in the presence of a metallic salt such as $FeSO_4$ which will react with the dichromate to form a jell, and the materials are then heated to dehydrate the jell and at least partially to convert it to oxides. U. S. 1,782,649 specifies the use of a dichromate together with Fe sulfate and a third compd. such as $CuSO_4$ which on heating of the materials decomposes with formation of a pigment. Cf. *C. A.* **24**, 4373.

Detergents. HENKEL & CIE. GES. Brit. 332,530, Feb. 5, 1929. A compn. suitable for cleaning Al and other metal household utensils comprises Na_3PO_4 and waterglass, with or without addn. of sand, soda, soap or other cleanser. Cf. *C. A.* **24**, 5119.

Washing and emulsifying agents. CARL A. AGTHE. Ger. 506,338, June 14, 1925. Sol pyrophosphates are used, alone or in conjunction with other washing, etc., agents not having bleaching properties.

Wetting, etc., agents. I. G. FARBENIND. A.-G. (Curt Schuster, inventor). Ger. 506,960, May 5, 1926. Addn. to 501,303 (*C. A.* **24**, 4906). Sulfonic acids (or their

salts) from halogenated, non-alkylated aromatic hydrocarbons are used as wetting or emulsifying agents, or *soap substitutes*. Examples are given.

Projection screen. DAVID F. NEWMAN (to Trans-Lux Daylight Picture Screen Corp.). U. S. 1,783,973, Dec. 9. A base such as cloth, paper or glass is provided with a coating formed from latex together with a diffuser such as casein, ZnO, Ca tungstate, NH_4 fluosilicate or LiF.

Metal sound records. F. H. SANBORN. Brit. 332,617, Jan. 23, 1929. Highly polished metal surfaces are used such as Al, Cu, brass or pewter with a lubricant such as paraffin or oil rubbed into the surface. Brit. 332,618 also relates to similar records.

Dialytic membranes. LEONARDO CERINI. Austrian 119,033, April 15, 1930. Vegetable fibrous material, *e. g.*, cotton or paper, which is to be used for making membranes for the osmotic purification of caustic alkali lyes, is treated with a soln. of an org. or inorg. salt of an alk. earth or earth metal, whereby it is converted into an alkali-insol. hydrocellulose. Treatment with a 10–12% soln. of $MgCl_2$ at 60–70° is suitable. The treatment may be preceded by treatment with concd. alkali soln. and followed by treatment with a resin soln.

Microphone diaphragms. H. E. HOLMAN and H. A. M. CLARK. Brit. 332,723, July 6, 1929. The surface of the diaphragm in immediate contact with the C granules forming the variable resistance is roughened by a coating of non-metallic granular material, the protuberances of which are united to each other and to the diaphragm. A mica or metal diaphragm may be coated with a film of cement carrying C or Carborundum granules, and the use of sand or ground glass also is mentioned.

Kiln suitable for burning limestone spalls. MARY E. SQUIRE. U. S. 1,783,632, Dec. 2.

Packing for plungers, rods and shafts. DAVID R. YARNALL and JOSEPH KILDARE (to Yarnall-Waring Co.). U. S. 1,783,762, Dec. 2. A molded packing ring comprising asbestos, graphite and rubber is held by an inner ring of Ni alloy.

Luting material. ROBERT B. MCCARTY (to Gulf Refining Co.). U. S. 1,782,932, Nov. 25. A luting suitable for use with app. handling free Cl comprises fine ground burnt clay 65° and 40° Bé. NaOH soln. 35%.

Poisons for warm-blooded animal pests. F. HOFFMANN-LAROCHE & CO., A.-G. Brit. 332,797, Sept. 19, 1928. Poison is prepd. contg. compds. such as the methylcarbamic ester of *m*-hydroxyphenyltrimethylammonium iodide stabilized by addn. of tartaric acid or HCl, etc. Mention is also made of the use of corresponding urethans, in which the I is replaced by some other salt-forming group.

Apparatus and system of operation for producing and delivering fire-extinguishing foam. WALTER PALMER (to Amdyco Corp.). U. S. 1,782,366, Nov. 18.

System for generating fire-extinguishing foam. DUNCAN W. PATTERSON (to American LaFrance and Foamite Corp.). U. S. 1,784,680, Dec. 9. Various details of app. and procedure are described.

19—GLASS, CLAY PRODUCTS, REFRACTORIES AND ENAMELED METALS

G. E. BARTON AND C. H. KERR

Glass masses. S. L. MANEVICH-ALMAZOV. *Keram. i Steklo* **6**, 350–2(1930).—M describes investigations made to det. the properties of glass masses prepd. from different kinds of clays, lime, dolomite, phosphorite and sand. The compns. of several batches are given and the properties of the masses obtained are tabulated. The thermal stability of the samples obtained is good and they have a low coeff. of expansion. Their chem. stability is higher than the stability of ordinary lime-alkali glass. M. V. K.

Testing safety glass. H. D. MURRAY AND D. A. SPENCER. *Ind. Chemist* **6**, 399–401(1930).—The process of mfg. safety glass is described briefly, and the properties a good safety glass should possess are discussed. Testing should be carried out under conditions most closely resembling those encountered in practice. A striker mechanism for delivering blows powerful enough to shatter the glass is described (2 cuts) and 4 photographs of different types of fracture are given. The tests recommended (together with the methods of carrying them out) are (1) fracturing test, (2) penetration test, (3) crushing test, (4) heating test, (5) coloration test, (6) edge-sealing test.

E. G. R. ARDAGH

Dimensional changes caused in glass by heating cycles. A. Q. TOOL, D. B. LLOYD AND G. E. MERRITT. *Bur. Standards J. Research* **5**, 627–46(1930).—Dimensional

changes produced by subjecting glasses to heating cycles approaching the annealing range are investigated. Expansion-temp. curves were obtained for a medium flint glass. Samples were tested which had previously received one or another of several different heat treatments. Heating cycles were employed in the tests which made it possible to det. the magnitude of the so-called "permanent" changes in length which are caused either by the annealing or the "disannealing" which may result from the heat treatment imposed on the glass by the heating cycle. The length and sp. vol. are decreased by annealing and increased by disannealing. These effects are related to certain ice-point shifts observed in thermometers, a discussion of which is included.
ALLEN S. SMITH

Observations of temperature of annealing chambers for hollow ware. R. D. CHANDORKAR AND K. R. RANGAIYENGAR. *J. Indian Ceram. Soc.* **2**, 98–103(1930).—Data are given of the observed temps. of the annealing chambers ordinarily used in the glass works. The coal consumption is also stated. Details of an exptl. chamber and data obtained are given. JOHN M. LADINO

Decolorization and melting investigations. SILBERT GUSS. *Sprechsaal* **63**, 812-7 (1930). C. H. LORIG

Electrical porcelain (GILLETT) **4.** Armenian pumice stone (OTAROV) **18.**

Apparatus for feeding mold charges of molten glass. MERTON A. STEELMAN (to Hartford-Empire Co.). U. S. 1,784,763, Dec. 9. Structural features.

Apparatus for forming molded glass articles. RICHARD LA FRANCE (to Owens-Illinois Glass Co.). U. S. 1,783,191, Dec. 2. Structural features.

Apparatus for forming molded glassware such as bottles. LEONARD D. SOUBIER (to Owens-Illinois Glass Co.). U. S. 1,783,201, Dec. 2. Structural features.

Glass-pot-filling apparatus. WM. E. BARNES (to Pittsburgh Plate Glass Co.). U. S. 1,783,459, Dec. 2. Structural features.

Apparatus for making blown glassware. R. F. HALL. Brit. 332,622, Jan. 28,1929. Structural features.

Heating molten glass by electric resistances, for sheet-glass manufacture. JOHN L. DRAKE (to Libbey-Owens-Ford Glass Co.). U. S. 1,781,917, Nov. 18. Structural and elec. features.

Apparatus for sheet-glass manufacture. WM. L. MONRO (to Window Glass Machine Co.). U. S. 1,782,972, Nov. 25. Structural features.

Tank furnace, rolls and electric heating system for sheet-glass manufacture. HARRY F. HITNER (to Pittsburgh Plate Glass Co.). U. S. 1,783,473, Dec. 2. Structural and electrical features.

Circular glass furnace with rotary sole. ARTHUR BRANCART. Ger. 506,468, Oct. 12, 1928.

Leer for annealing glassware. PERCY Q. WILLIAMS (to Owens-Illinois Glass Co.). U. S. 1,783,208, Dec. 2.

Method and plant for cooling glass objects. FRITZ ECKERT. Ger. 506,386, Jan. 18, 1928.

Preventing weathering, clouding and tarnishing of glass surfaces. KIYOSHI KAMITA (to Asahi Glass Co., Ltd.). U. S. 1,782,169, Nov. 18. The surface of glass is treated with an acid gas at a temp. between about 150° to 315°, the gas used being a mixt. of gas ordinarily present in the leer and added gas such as SO_2, SO_3, H_2S, Se oxide, Cl, HCl, Br, HNO_3 or CO_2.

Apparatus for manufacture of "splinterless" glass comprising united sheets of glass and cellulose acetate or similar material. JOHN JEFFRAY. U. S. 1,782,852, Nov. 25.

Uniting cellulose ester and glass sheets. TRIPLEX SAFETY GLASS CO., LTD., and J. WILSON. Brit. 332,551, April 20, 1929. The glass is coated with gelatin with or without an enamel or cement and the sheets are brought together while immersed in an inert or non-solvent liquid of high b. p. with or without an admixt. of a solvent or plasticizer of high b. p. and the sheets are united by heat and pressure. Various details of temps. and liquids used are given.

Apparatus for uniting sheets of glass with an intervening sheet of "pyralin" or the like under pressure in a rubber bag. JAMES H. SHERTS (to Duplate Corp.). U. S. 1,783,985, Dec. 9. Structural features.

Impregnating bricks with thermoplastic materials such as bitumen. ANDREAS J. M. STOFFELS and HERMAN T. VAN DER WISSEL. U. S. 1,784,164, Dec. 9. Bricks or the like are first preheated and the different sides of the preheated material are

then impregnated to a different extent under pressure by cooling at those sides of the material where a less intensive impregnation is desired. App. is described.

Ceramic products. VICTOR M. GOLDSCHMIDT. U. S. 1,782,295, Nov. 18. In the production of products such as strong refractory materials, in which mixts. of Mg hydrosilicates other than talc are used with substances rich in Mg such as magnesite, the mixts. are heated to temps. at which Mg orthosilicate is formed without fusion (suitably about 1300°).

Firing ceramic ware. A. S. WATTS. Brit. 332,692, June 7, 1929. Ceramic products such as dental porcelain is fired in a continuous kiln and successively subjected to biscuiting, vitrifying, glazing and annealing, with a temp. drop after either or both the biscuiting and vitrifying operations and an abrupt temp. drop after the glazing and preceding the annealing operation. App. is described.

Pottery mold. WM. J. MILLER. U. S. 1,784,373, Dec. 9.

Porcelain insulators. DAVIDGE H. ROWLAND (to Locke Insulator Corp.). U. S. 1,784,392, Dec. 9. In the manuf. of porcelain insulators of the type having a portion provided with granular material such as fired crushed porcelain united thereto, glazing liquid is applied to this portion to coat the granular material.

Emery wheels. L. BRUNELLI, G. CARRA and F. SOFIA. Brit. 332,524, Feb. 21, 1929. See Fr. 669,965 (*C. A.* **24**, 1952).

Grinding wheels of bonded abrasive materials. THURE LARSSON (to Norton Co.). U. S. 1,783,727–8–9, Dec. 2. Structural features.

Bituminous dispersion. RICHARD W. LEWIS. U. S. 1,783,365, Dec. 2. Portland cement is used as dispersing agent in prepg. aq. bituminous dispersions suitable for use as coating or bonding agents, etc. U. S. 1,783,366 relates to dispersions prepd. by mixing bitumen, $Al(OH)_3$ paste, clay and water.

Opacifier for enamels THOMAS H. MCKEOWN (to Roessler & Hasslacher Chem Co.). U. S. 1,783,738, Dec. 2. A mixt. of Na antimonate 3 and Sn oxide 1 part is used in the production of a white enamel. U. S. 1,783,739 and U. S. 1,783,740 also give formulas of enamels contg. this opacifier together also with other ingredients such as feldspar, flint, borax, H_3BO_3, $NaNO_3$, cryolite, fluorspar, $BaCO_3$, Pb_3O_4, whiting and ZnO, in specified proportions.

Coating metals, etc., with enamel, glass, etc. AUGUST PAHL. Ger. 468,556, Feb. 26, 1925. The article to be coated is heated by a blowpipe flame, and the powd. coating material is blown on to the article and fused *in situ*. The blast for the coating material may be sep. from that for the flame. App. is shown.

20—CEMENT AND OTHER BUILDING MATERIALS

J. C. WITT

Petrographic investigation of alumina cement. KATSUZO KOYANAGI. *J. Soc. Chem. Ind., Japan* **33**, Suppl. binding 352–8(1930)(in German).—The main component of $CaO \cdot xAl_2O_3$ cement crystallizes in the form of a spherulite, $3CaO \cdot 2Al_2O_3$ m. about 1300°, which is in addn. to the Ca aluminates proposed by Rankin. E. M. S

A review of revised A. S. T. M. specifications for paving brick. F. H. JACKSON *Am. City* **42**, 139(1930).—The rattler test is discussed. C. H. BADGER

Armenian pumice stone (OTAROV) **18.** Basic open-hearth slag as a valuable blast furnace material (HORAK) **9.** Zn meta-arsenite (TAYLOR) **18.** Asaphus limestone (Ordovician) in the drill hole of Lagedi (ORVIKU) **8.** Setting and hardening of cements for stopping oil wells (KEMMER, BALAN) **22.** Phosphate fertilizers [cement production from residue] (Brit. pat. 332,639) **15.** H (Ger. pat. 506,041) **18.**

Portland cement. JOHN A. MILLER and EDMUND P. NEWHARD. U. S. 1,784,462, Dec. 9. A mixt. of raw materials for making portland cement comprising at least two ingredients of different hardness such as limestone and shale is subjected to dry grinding comprising a preliminary reduction operation, a grinding into relatively fine and relatively coarse particles, and a sep. fine grinding of the two sep. portions of the material. An arrangement of app. is described.

Preparing uniform mixtures of materials such as cement and asbestos. JOHN C. MACILDOWIE (to Asbestos Wood & Shingle Co.). U. S. 1,781,728, Nov. 18. App. and various mech. details are described.

Accelerating hardening of cement. WALTER KIRCHNER (to Chemische Fabrik

Grünau, Landshoff & Meyer A.-G.). U. S. 1,782,471, Nov. 25. A mixt. of substantially equal quantities of $CaCl_2$ and $AlCl_3$ is added, as an accelerator, while working portland cement mixts.

Rotary cement-burning kiln. AXEL V. JENSEN (to F. L. Smidth & Co.). U. S. 1,781,845, Nov. 18. Structural features.

Concrete, etc. R. CROSS. Brit. 332,604, Feb. 25, 1929. To so-called "gelatinizing clays" (defined as including bentonite, "chemically treated clays," natural and artificial hydrated silicic acids, and pptd. hydrates such as $Al(OH)_3$) there are added a substantially smaller quantity of materials of approx. the same p_H in water as an equal wt. of MgO, such as portland cement, magnesia cement, furnace slag, alk. earth phosphates or silicates, aluminates or MgO itself. Oil 10–15% also may be added and the mixt. thus prepd. added to portland cement to form *waterproof concrete*. A paint may be made of the untreated clay and cement, with or without oils (drying or non-drying), asphalt, pigments, etc. Fibrous materials may be added for making roofing, etc., and road compns., mortars, etc., are described and formulas given.

Bituminous emulsions for use on roads, etc. R. LICHTENSTERN. Brit. 332,591, April 22, 1929. Material such as petroleum asphalt is mixed with about 1–3% (or more, up to 20–25%) of Trinidad or Bermuda asphalt or Montan wax and a hot soln. of caustic alkali; the products are miscible with water, and break down less rapidly on admixture with road-making or building materials.

Material for conduit construction. JOHN F. MAKOWSKI (to Fireproof Wall Co.). U. S. 1,783,178, Dec. 2. Conduits such as those for underground elec. cables are formed from a mixt. of soapstone 2, clay 1.5 and cement 1 part.

Building blocks. IRVING J. SMITH. U. S. 1,782,748, Nov. 25. A hardened product is formed from a mixt. of water-satd. cinders of uniform size, an inert filler the main ingredient of which is $CaCO_3$ together with cement and water.

Porous building material. ALBIN V. CARLSON. U. S. 1,782,460, Nov. 25. A "foundation mass," *e. g.*, santorin earth, puzzuolana, trass or pumice, contg. at least one of the compns. Fe_2O_3, Al_2O_3 and SiO_2, is mixed with sufficient unslaked lime to produce a porosity on slaking, with small pores throughout the entire mass, and other substances such as NaOH and Zn, Fe or Al or a metal carbide are added to facilitate gas generation and pore formation in reaction with the lime and water.

Porous bricks, etc. HANNS WEEH. Austrian 119,045, April 15, 1930. In the manuf. of porous bricks, etc., from a mixt. of cement and Al, with or without CaO, sand, etc., better results are obtained by including kieselguhr in the mixt.

Artificial marble. ALBERT SOMMERFELD. Ger. 506,116, July 24, 1925. Sep. portions of cement or the like are impregnated with solns. of different mineral salts that react to form colored compds. and the portions are coarsely mixed while damp and pressed.

Apparatus for coating roofing felt shingles, etc. CHESTER R. MACDONALD (to Patent and Licensing Corp.). U. S. 1,783,575, Dec. 2.

Treating roofing material such as felt shingles with asphalt, etc. CHESTER R. MACDONALD (to Patent and Licensing Corp.). U. S. 1,783,849–50, Dec. 2. App. and various details of operation are described.

Kiln suitable for drying lumber. JAMES A. WORDEN. U. S. 1,783,030, Nov. 25.

Apparatus for drying and conditioning lumber, etc., in circulated air currents of regulated humidity. GORDON D. HARRIS (to Industrial Dryer Corp.). U. S. 1,784,727, Dec. 9. Structural features.

Coloring wood. ADOLF SCHWARZENBERG. Austrian 119,047, April 15, 1930. See Fr. 666,961 (*C. A.* **24**, 1197).

21—FUELS, GAS, TAR AND COKE

A. C. FIELDNER

Fuel problems at Second World Power Conference. A. SANDER. *Brennstoff-Chem.* 11, 340–2, 360–1, 375–8, 398–9(1930). F. W. JUNG

Determination of moisture in solid fuels. M. DOLCH. *Brennstoff-Chem.* **11**, 429–32, 478(1930).—Errors inherent in present standard and other methods are discussed. The cryohydric method proposed depends upon the temp. rise resulting when abs. alc. which has been boiled with the material to be tested is mixed with suitable liquid hydrocarbon. From 10 to 20 g., depending upon the H_2O content, of < 3 mm. mesh is boiled with 100 ± 0.1 g. abs. alc. for 5 min. After cooling, the alc. is

quickly poured through a dry folded filter, the first of the filtrate discarded, and 20.0 cc. added to an equal quantity of hydrocarbon in a special mixing tube fitted with a thermometer. The temp. rise of the mixt. gives the H_2O content by employing a curve previously plotted with measured amts. of H_2O. The results obtained with the cryohydric method for representative coals and cokes on comparison with other methods show the latter vary greatly from the true moisture content. The use of the method for moisture detn. of tar, etc., is shown. F. W. JUNG

The sulfuric acid test for motor benzene. F. KNÖTTNER. *Brennstoff-Chem.* **11**, 432–5(1930); cf. *C. A.* **24**, 4913.—Tabulated data as sp. gr., distn. range, H_2SO_4 test, Br no. and evapn. residue are given for C_6H_6, toluene, xylene and a large no. of motor fuels to show the possibility of substituting an evapn. test for the H_2SO_4 test. A method of evapn. through heating in a current of air has been developed. A 20 mg. residue limit for 200 cc. is suggested. F. W. JUNG

Heating values of various woods from European Russia. L. A. MARZHETZKII. *Izvestiya Teplo-Tekh. Inst.* (*Trans. Thermo-Tech. Inst. Russia*) **1930**, No. 4, 65–77.—Heating values of woods preliminarily dried for 2.5 hrs. at 105° were detd. in a calorimeter bomb. They were for linden tree 5.075–5.096; for birch tree 4.822–4.831; for poplar tree 4.685–4.695; for pine tree 4.893–4.896 and for spruce-fir tree 5.001–5.300 calories. The analytical procedure, sampling and calcns. are given in detail. A. A. B.

Chemical and microscopical investigations of the coals from the Witbank and Ermelo coal fields. P. E. HALL. *J. Chem. Met. Mining Soc. S. Africa* **31**, 44–8(1930), cf. *C. A.* **24**, 4915, 5133, 5969.—Discussion. ALDEN H. EMERY

The hydrogenation of South African coal. P. N. LATEGAN. *J. Chem. Met. Mining Soc. S. Africa* **31**, 50–3(1930); cf. *C. A.* **24**, 2859–60, 5133.—Discussion. A. H. E.

Analytical characteristics of coals. W. FUCHS. *Brennstoff-Chem.* **11**, 332–4 (1930).—Analytical methods are discussed and grouped according to the aim of characterization: ultimate analysis for elements; proximate analysis for technically important constituents; decompn. analysis for detg. chem. combinations as bitumens, humic constituents, etc.; and at. groupings. The last are tabulated for analytical characteristics and methods of detn. F. W. JUNG

Apparatus for determining tendency of coal and other materials for spontaneous combustion. D. J. W. KREULEN. *Brennstoff-Chem.* **11**, 261–2(1930).—The app. of Hofer is described with detailed drawings whereby the material is heated in current of O_2 in a cylindrical Al block, the kindling temp. being obtained by a N_2 thermometer in the tested material. In testing coal, a sample 10–20 mesh per cm. is prepd. from the briquetted finely powd. coal and placed upon Cu gauze resting in a 20 mm. vertical boring in the block which is also fitted with a thermometer well and O_2 preheating passages. A microburner permits heating rates of 1°/min. and a flowmeter is used to maintain const O_2 flow. In order to eliminate misrepresentation from sieving, the coal used is briquetted from a finely powd. av. sample. In testing oils, graded pumice stone is used as absorbent. It is also possible to collect and analyze the gases evolved. F. W. J.

Apparatus for determining plastic range of bituminous coal. R. KATTWINKEL. *Brennstoff-Chem.* **11**, 329–30(1930).—App. and procedure are described. Powd. or briquetted coal in a transparent quartz tube is placed in an Al cylinder, having an observation slit and thermometer well, and is heated with a microburner rapidly to 250°, then 5°/min. The temp. at which bitumens decomp. is indicated when oils condense on the stopper and in the outlet tube. The softening point is indicated by the start of swelling and the solidification point by the end of swelling. The stopper is then removed and heating continued 10 min. at 520° to det. the weight of semi-coke. Results agree with those obtained by previous methods. Semi-coke yields are within 1–2% of those by the Fischer assay. Results are given for a dozen coals. F. W. JUNG

Investigation using Geipert [coal distillation] apparatus. F. SCHUSTER. *Brennstoff-Chem.* **11**, 471–3(1930).—By use of various German coals, comparisons are made with results obtained by other methods. Limits of duplicability in G.'s test are shown by examn. of results from duplicate operators and app. Gas vol., calorific value and compn., coke analysis and calorific value are compared with that obtained by the Münchener method and in coking practice. Conclusion: The fast heating rate in G.'s retort produces more heavy hydrocarbons than practice; the distn. time is longer in comparison; the final coke temp. is too high whereby coke is poor in H, and (S + N + O); and the vertical retort permits cracking of refluxing tar. F. W. JUNG

Mineral constituents of coal and their influence on ash determination. F. SCHUSTER. *Brennstoff-Chem.* **11**, 237–9(1930); cf. *C. A.* **24**, 4374.—Studies of the ash content and constituents of nine gas coals have been made; variations of CO_2 content are taken as indicating changes in ash compn. The actual ash alky. was less

than that for the CaO calcd. from the CO_2 content of each ash, the analyses showing that some CO_2 was combined with Fe. Muffle construction preventing contamination during ashing with the heating gases or the use of elec. heating in a H_2S-free atm. is recommended with CO_2 as well as S detns. in coal analysis. F. W. JUNG

Sulfate content of coal ash. F. SCHUSTER. *Brennstoff-Chem.* **11**, 262–3(1930); cf preceding abstract.—To explain previous findings, the original sulfate content of the coals has been detd. and compared with that obtained through ashing in an atm. freed from S compds. The greater part of the ash sulfate content was shown to come from the S compds. in the coal which were apparently catalytically oxidized to sulfate by other ash constituents. The sulfate formation increased with the carbonate content of the coal. A suggested formula for detg. the true ash content of coal from constituents: % true ash = % ash + % CO_2 + (% FeS_2 × 0.335) + % SO_3. In complete coke analysis, a total of > 100% is obtained, increasing with carbonate and Fe content of original coal, because of the oxidation of Fe^{++} to Fe^{+++} and to the sulfate. F. W. JUNG

Coal-tar pitch as binder for bituminous coal briquets. Briquet strength. A. SPILKER AND G. BORN. *Brennstoff-Chem.* **11**, 307–18(1930).—History and previous work upon briquetting of bituminous and brown coal are reviewed, the effects of various factors in binding, as H_2O content, etc., being discussed. By use of octagonal and rectangular briquets made under uniform conditions and dried to const. wt. the effects of coal particle size, mixts. of various sizes, and amt. of pitch binder upon breaking and tensile strength and cohesion have been detd. and are shown graphically. Normal variations in particle size produced changes in strength greater than did 25% variations in binder amt., the finer sizes producing the strongest briquets. With the fine sizes also, increase in pitch content from 6 to 8% produced enormous increases in cohesive strength as detd. by tumbler test. Increases in strength of 20% followed increasing fineness and uniformity of distribution of the ground pitch. Low-melting pitches gave greater cohesive but lower breaking and tensile strength. High-vacuum pitches were good binders. The term "Facherzahl" (Fz) or Diversion no. is introduced to indicate extent of variation from the av. in strength tests. F. W. JUNG

Dry cleaning of coal in England. KENELM C. APPLEYARD. *Am. Inst. Mining & Met. Eng. Tech. Publ.* No. **374**, 34 pp.(1930). E. H.

Comparisons of methods for determining the caking power of coal. G. AGDE AND A. WINTER. *Brennstoff-Chem.* **11**, 394–6(1930).—By use of progressive mixts. of a high volatile and an anthracite coal, the caking index has been detd. by the methods of Meurice-Kattwinkel, Meurice-Gabinsky and Marshall-Bird. Variations from averages are shown and results are compared graphically. Results from a single method are only comparative for similar coals and mixts. The Marshall-Bird test proved the most reliable. F. W. JUNG

Berginization of some coals and tars. N. A. OKLOV, V. V. TISHCHENKO AND N. D. LIKHACHEV. *Zhur. Prikladnoĭ Khim.* **3**, 699–719(1930).—Berginization expts. were carried out in a 3 l. bomb, provided with a pressure gage and an inserted Cu-constantan thermocouple, rotating at 30–50 revolutions per min. It was electrically heated first with a strong current to raise the temp. to a required height and later with a current just to keep this temp. const. Moscow Pobedinskii coal heated to 400–480° without a catalyst and at an original H_2 pressure of 50 to 90 atm. produced after 1–5 hrs. heating 0.36% gases, 8.32–19.7% oil and up to 78% solid substances. Bobrikovskii coal under similar conditions yielded in the presence of ZnO, Al_2O_3 or FeO catalysts 2.1–2.3% gases, 14–19% oil and 65.3–68.8% solid substances. Shchekinskii coal produced with or without catalysts ($NaHCO_3$) 2.64–2.92% gases and 12–21% oil. The Bobrikovskii distillate contained 23.75% gasoline. Under the above conditions Balkashit yielded 75–78% of an oil when hydrogenated with a kaolin catalyst. Barsas coal yielded 42% without catalyst; with NH_4 molybdate, 98 atm. cold H_2 pressure, 1½ hrs. heating at 435–440° it gave 37.2% oil; with the same catalyst, 96 atm. H_2 pressure, for 1½ hrs., at 440–450°, 43.2% oil; at 93 atm., 1 hr. 40 min. at 430–445°, 38%; at 115 atm., 1½ hrs. at 435–450° in the presence of CoO catalyst, 41%; at 120 atm., 1½ hrs. at 435–450° and NH_4 molybdate catalyst, 47% oil, the residue being an almost pure ash. Sugar charcoal with $ZnCl_2$ catalyst, 85 atm., 420–445°, 2 hrs. 20 min. yielded a condensate of 0.9803 sp. gr. The coal used in hydrogenation contained an av. of 35% ash and 5% H_2O. Bobrikovskii coal mixed with a berginized 200–300° fraction subjected to 240–270°, 90–100 atm. cold H pressure for 2 hrs.–3 hrs. 55 min. yielded 20% of oil in addn., while Shchekinskii coal mixed with anthracene oil under similar conditions yielded 23% of oil, leaving 68% ash and residues. Oil obtained from berginized Barsas coal was again hydrogenated, yielding up to 32.85% of a cut boiling below 150°, 30% at 150–230°, 10.7 at 230–300° and a residue intermingled with paraffin crystals. Gases

obtained in the berginization of Barsas and Pobedinskii coals contained 0.5 and 15% CO_2, 0.7 and 3.8% CO, 0.5 and 0.4% C_nH_{2n}, 51 and 85.5% H_2, 12.5 and 25.8% C_nH_{2n+2}, 0.3 and 4% N_2. The H_2O of hydrogenation contains NH_3. Impure phenols contg. S compds. were hydrogenated in the presence of a Mo catalyst pptd. on pumice stone. The reaction was more complete than with C. P. phenols, which indicates that S compds. present in the impure phenol have a catalytic action. The light oil obtained had, in both cases, a pleasant gasoline-like odor and was composed of 67% of cycloparaffins. Xylenol, *o*-cresol and hydroquinone were also hydrogenated in the presence of Mo catalyst. A great no. of tables and other data are given for which the original should be consulted. A. A. BOEHTLINGK

The determination of aromatic unsaturated and naphthene hydrocarbons in light oils and motor spirits. A. B. MANNING AND F. M. E. SHEPHERD. *Dept. Sci. Ind. Research, Fuel Research Tech. Paper* No. 28, 14 pp.(1930); cf. *C. A.* 23, 3802.—In an attempt to develop an improved method of analysis of light oils from coal carbonization small quantities of oil were vaporized with air and passed through a suitable reagent, the increase in weight of which was detd. It was found that 98% H_2SO_4 contg. 2–3% of Ag sulfate was an entirely satisfactory reagent for the detn. of aromatic hydrocarbons in mixts. contg. no unsatd. hydrocarbons. Where unsatd compds. are present the mixt. is first nitrated with nitrosulfuric acid. The unsatd compds. are converted to CO_2, water and products sol. in water or in aq. NaOH. The aromatic compds. are isolated and detd. as nitro derivs. The naphthene content of a light oil may be roughly detd. by the aniline point of the residual oil from which the unsatd. and aromatic hydrocarbons have been removed. Expts. on the catalytic dehydrogenation of naphthenes to aromatics followed by absorption with nitrosulfuric acid indicated that this is a more accurate method for the detn. of naphthenes. The methods used are described in detail. D. F. BROWN

Salts and esters of humic acids. W. FUCHS AND O. HORN. *Brennstoff-Chem.* 11, 372–5(1930).—K salts of various German humic and nitro-humic acids have been prepd. by treating the acids with alc. KOAc soln. as well as by sapon. of methylated humic acids with alc. KOH. Comparisons of the K content of the latter with the methoxyl ester content of the methyl deriv. were in satisfactory stoichiometrical agreement. The salt formation of the original non-methylated acids frequently bound more K than subsequent formation of carboxylates indicated, participation of phenolic hydroxy groups being believed responsible. Particulars in regard to constitution and reactions of humic and nitro-humic acids are also given. F. W. JUNG

Catalytic reduction and hydrogenation of phenols with hydrogen under pressure. H. TROPSCH, B. HLAVICA AND O. WEINSTEIN. *Brennstoff-Chem.* 11, 449–52(1930) cf. *C. A.* 20, 2063.—In the high-pressure reduction of cresols at 460–80° and pressures to 240 kg./sq. cm , MoS_3 has been found most efficient, giving a nearly complete reduction to hydrocarbons. The efficiency of $Ni(OH)_2$ is strongly affected by the presence of S. The phenols are reduced by a hydrogenation of the hydrocarbons formed more with Ni than with Mo catalysts. Cyclic alcs. are not produced. Of the large no. tried, $ZnCl_2$, $Al(OH)_3$, $(NH_4)_3VO_4$, $Cr(OH)_3$, UO_3, $Co(OH)_2$ and NiS were excellent catalysts; ZnO, basic Cu chromate, WO_3 and $Fe(OH)_3$ were of no account. Comparative exptl. data for the catalysts used are tabulated together with analytical data for the reaction products obtained. F. W. JUNG

Determination of phenols (acid oils) in gas- and low-temperature carbonization liquors. E. KRES. *Brennstoff-Chem.* 11, 369–71(1930).—Comparative results are given for several liquors. Previous methods, which are briefly discussed, are used and also one developed by K. The method is described in detail and consists of: removing the phenols by distg. from the filtered liquor to which has been added $CuSO_4$ soln. and dil H_2SO_4. The phenols are then detd. by bromination or colorimetrically. Modifications for various liquors are also given. F. W. JUNG

New developments in mechanical purification of coal gases. A. THAU. *Brennstoff-Chem.* 11, 416–8, 435–8, 455–9(1930).—Gas purification and methods are discussed. The processes of Smith, Bartling and Feld are described in detail with diagrams. Comparative operation data for the last method are given for NH_3 and C_6H_6 recovery as contrasted with that of one of the more common types of today. F. W. JUNG

Self-carbureting of industrial gases from brown coals. M. FREUND AND E. BECKER. *Brennstoff-Chem.* 11, 335–7(1930).—An app. is described with a diagram whereby brown coal producer tar and pitch are cracked by dropping through a vertical tube, filled with Fe filings, mounted in an elec. furnace. Analyses of the gas obtained at temps. 470–1200° indicated gasification of highest thermal efficiency occurred between 750° and

800°, being 37% for the pitch obtained by vacuum distn. of the tar and 48% for the tar. Pressure and raw material had less effect than cracking temp. F. W. J

Gases in Makat. F. A. TREBIN AND P. I. LUCHINSKII. *Neftyanoe Khozyaĭstvo.* 18, 789–92(1930).—The compn. of gases analyzed by the Hempel-Winkler method is by vol.:

	Horizon	Unsatd. hydrocarbons	Other hydrocarbons	H_2	CO_2	H_2S	$[O_2]$	N_2, etc.	Total rare gases	Heavy rare gases	Light rare gases
Borehole No. 105	upper	——	73.4	—	2.4		3.7	20.5	0.284	0.277	0.007
Borehole No. 123	first	——	94.9	—	——	——	0.3	4.8	0.031	0.020	0.011
Borehole No. 202	first		94.9	—	0.1	——	0.3	4.7	0.016	0.008	0.008

A. A. BOEHTLINGK

Natural gas. V. A. SOKOLOV. *Neftyanoe Khozyaĭstvo.* **18,** 793–6(1930).—The compns. of natural gases from Surakhanui, Grozny and Dagestanskie Ogni are, resp., air 1.0, 1.0, 1.0; CO_2 18.2, —, 7.5; CH_4 77.5, 51.8, 89.0; C_2H_6 2.0, 10.7, 1.9; C_3H_8 0.8, 25.1, 0.6; C_4H_{10} 0.5, 8.8, 0.6; gases higher than butane from Grozny natural gas are 1.9. Burrell's, Shepperd-Porter's and Aston's gas analysis app. are described in detail. A. A. BOEHTLINGK

Possible utilization of natural gas for the production of chemical products. HAROLD M SMITH. Bur. Mines, *Information Circ.* **6388,** 5 pp.(1930); cf. *C. A.* **24,** 2270.—A chart shows the products obtainable from natural gas by oxidation, pyrolysis and chlorination and the uses of each. These products and (in parenthesis) the compds. derived therefrom are: oxidation—water gas, H_2, MeOH, acetone, formaldehyde (bakelite); pyrolysis—H_2 (NH_3), C_2H_4 (C_2H_5OH, $C_2H_3Cl_2$, $C_2H_2(OH)_2$), C_3H_6 (isopropyl alc.), C_4H_8 (secondary Bu alc.), anthracene (alizarin), naphthalene (indigo), $C_2H_2(CH_3CHO)$, butadiene (rubber), C_6H_6 (resorcinol), C_7H_8 (saccharin), xylene and C black; chlorination—CH_3Cl, CH_2Cl_2, $CHCl_3$ and CCl_4. ALDEN H. EMERY

Chemical application for methane from natural gas. A. A. CHEREPENNIKOV. *Neftyanoe Khozyaĭstvo* **18,** 796–9(1930).—A review of the literature comprising chlorination, oxidation, water-gas reaction, reaction with CO and CO_2, decompn. into C and H_2, prepn of higher hydrocarbons, prepn. of carbides and prepn. of HCN. A. A. B.

Problems of removing hydrogen sulfide from Turner Valley gas. F. R. STALEY. *Petroleum Eng.* **2,** No. 2, 67–8(1930).—Large quantities of natural gas are desulfurized by scrubbing with a soda soln. CHAS. WIRTH

Studies on the development of Dakota lignite. I. Aqueous tension of the moisture in lignite. IRVIN LAVINE AND A. W. GAUGER. *Ind. Eng. Chem.* **22,** 1226–31(1930).—A study of the desorption and adsorption of H_2O vapor by 3 N. D. lignites by the desiccator method has shown: (1) loss of moisture is accompanied by decrease in vapor pressure; (2) vapor-pressure lowering of these 3 lignites varies but little and is similar to that for wood; (3) in drying for storage there is little need to reduce H_2O below 16%; (4) marked hysteresis occurs; (5) increase of temp shifts the dehydration curve toward the region of lower H_2O content; (6) the sorption of H_2O by lignite is by surface adsorption and capillary condensation; (7) the abnormal vapor pressures and the hysteresis may be explained by the colloidal structure of the lignite; (8) the capillary radii vary from 56.73×10^{-7} cm. near satn. to 0.3×10^{-7} cm. near the dry condition; (9) the av. latent heat of vaporization (20° to 40°) is 609.1 cal. per g. **II. Sorption of water vapor by lignite, peat and wood.** MAURICE LARIAN, IRVIN LAVINE, C. A. MANN AND A. W. GAUGER. *Ibid* 1231–4.—A study of the desorption and adsorption of H_2O vapor by N. D. lignite, Minn. peat and birch wood by the desiccator method showed: (1) the shapes of the vapor pressure *vs.* moisture curves are similar for all; (2) the peat and wood will dry to a lower moisture content than lignite at any given vapor pressure; (3) hysteresis is present in all 3, but is greatest for lignite and least for birch; (4) 50% of the bound H_2O is held in capillaries < 7.4 mμ in the peat, 5.6 mμ in the birch wood, 3.7 mμ in the lignite and 1.8 mμ in German brown coal. ALDEN H. EMERY

Action of organic solvents on Wattenbach bright pitch-coal, with especial reference to tar yield. C. STAEMMLER. *Brennstoff-Chem.* **11,** 281–2(1930).—Bitumen extn. of the dried coal with various solvents gave: C_6H_6 for 10 hrs., 8.7%; aniline, 53.3%, tetralin for 2 hrs. 7 times, 36.3%; the part extd. by aniline was more easily decompd. than that by tetralin. Comparison of Fischer assay tar yields of the original coal (tar 22.50%) with coals incompletely extd., *i. e.*, 18.32% by tetralin, 20.37% by tetralin then aniline and 43.04% by aniline showed 16.32, 10.80 and 16.00% tar, resp. The tar from the extd. coal was thin and poor in paraffins. Complete removal of the aniline prior to assaying was impossible, 12.50% being recovered in the carbonization. The addn. of 33 and 50% tetralin to the coal before carbonization did not affect the tar

yield, nor did aniline, phenol or petroleum oil, although the last increased the gas yield some. Humic acid detns. on tetralin- and aniline-extd. coals showed 9.72 and 5.03% ash-free, resp., because of their soly. in aniline. Humic acids carbonized gave only traces of tar. A short list of the literature covered is appended. F. W. JUNG

Formation of benzine and tar from ethylene by heating at atmospheric pressure without catalysts. H. WATERMAN AND A. TULLENERS. *Brennstoff-Chem.* **11**, 337–40 (1930).—Light oil, tar, unsatd. compds. in gas and C yields obtained by passing C_2H_4 through a heated quartz tube were detd. for temps. of 600° to 900° and are shown graphically with the Br no. of the light oil. Analytical data are given for the tar, beginning to form at 650° with max. of 24% at 800°, and the light oil beginning at 600° with max. of 13% at 750°. The C formation began at 700° and was 58% at 900°. The Br no. fell from 123 at 650° to 0 at 900°, possibly because of the formation of aromatic compds. The app. is shown diagrammatically. F. W. JUNG

Cracking and destructive hydrogenation of peat tar. B. K. KLIMOV AND V. A. LANIN. *Zhur. Prikladnoĭ Khim.* **3**, 727–40(1930).—Destructive hydrogenation carried out in a stationary bomb was about 5 times longer than that in a rotating retort. Up to 30% of products boiling below 200° and 35% of coke were obtained when cracking low-temp. carbonization peat tar in a rotating autoclave. The amt. of H_2 admitted into the bomb while hydrogenating the above tar was insufficient for a complete hydrogenation; this resulted in the formation of coke even in the presence of Al_2O_3, $Al(OH)_3$, Cr_2O_3, Mn_2O_3, SnO_2 and CuO. ZnO, FeO and particularly NiO and CoO are better hydrogenation catalysts; in their presence H is consumed before cracking starts. Coke is not formed in the presence of NiO and CoO. A gasoline yield of 27% was attained when hydrogenating at 100 atm. and 450°. This yield decreased to 20% after acid-alkali treatment of the distillate. An increasd in temp. increased the yield of light products, gases and coke, which was also true for prolonged heating. One hundred and ninety-eight l. H_2 was required to hydrogenate one kg. of tar. A yield of 37% of a kerosene fraction was obtained through hydrogenation which contained 30% phenols 5.4% bases and 14% unsatd. compds. A repeated hydrogenation brings the gasoline yield up to 48%; after the usual acid-alkali treatment, the yield of gasoline (d. 0.760) is 35%. A. A. BOEHTLINGK

Alcohol fuels. E. W. STEINITZ. *Automobiltech. Z.* **33**, 707–8(1930).—A general discussion on alc.-gasoline fuel mixtures. A. A. BOEHTLINGK

Production of strong coke by addition of tar in low-temperature carbonization of brown coal. C. STAEMMLER. *Brennstoff-Chem.* **11**, 413–4(1930).—The comparisons of cokes obtained by the carbonization in the Fischer Al retort of 1:1 mixts. of coal and generator tar show that the oxidation of the tar with air, MnO_2 or PbO_2 being used as catalyst, produces a strong well-caked coke. Examn. of the oxidized tar itself failed to reveal significant alteration, nor did oxidation of a generator light-oil. Although the coke is improved, the cost is unjustified. F. W. JUNG

Determination of specific gravity and macro-pore volume of coke and other porous substances. G. STADNIKOV. *Brennstoff-Chem.* **11**, 330–1(1930).—Replacement of apparent sp. gr. methods is proposed by a method which permits calcn. of micro-pore vol. by difference from the sp. gr. obtained from the powd. material. Coke is impregnated with paraffin (m. 50°) by evacuating 5–6 hrs. at 100° and cooling under 1.5–2 atm. CO_2 pressure. A piece is cut therefrom, and weighed (P_2), the vol. (V) of which is detd. in a special pycnometer. Paraffin is then extd. with benzine (b. 70°), a Soxhlet app. being used; it is evapd. under diminished pressure and weighed (Q). The macro-pore vol. is detd. as vol. (V_1) of paraffin, from its wt. (Q) and sp. gr. The true sp. gr. of coke is obtained as $(P_2-Q)/(V-V_1)$. Results are given for a no. of cokes, semi-cokes from coals and various peats, pressed coke dust, and wood charcoal which show micro-pore vol. of gas and metallurgical coke as negligible but appreciable in semi-coke. F. W. JUNG

Determination of "lump-density" of coke by surface paraffining. F. HOFFMANN *Brennstoff-Chem.* **11**, 297–9(1930).—True and apparent sp.gr. and the sources of error in the past and present methods are discussed. The proposed new method consists of: immersing weighed (E) pieces of coke in a paraffin bath at 125°, cooling the bath to 75°, then removing the coke, draining and weighing (F), a thin coating some mm. in depth being obtained; detg. the weight (G) of a 2-l. beaker, contg. an alc.-H_2O mixt. of sp. gr. (D), in which the coke is immersed, and fitted with immersing weights and a needle-point level indicator. The weight of the beaker, etc., without the coke, filled to the leveling point, is taken as (C). The sp. gr. (S) then = $(E \times D)/(C + F - G)$; it can be detd. to within ±0.1–0.2% with a few pieces totalling less then 0.5 kg. F. W. J.

Recovery of phenol from coke-oven gas liquor in relation to the best-known proc-

esses of by-product recovery. H. WIEGMANN. *Brennstoff-Chem.* **11**, 285–8, 304–6 (1930).—Schematic diagrams are given to indicate the incorporation of phenol recovery units in direct, semi-direct and indirect by-product recovery systems. Flow capacities are given for various installations to show possible recoveries. F. W. JUNG

Conversion of methane in coke-oven gas into acetylene by electrical discharge. K. PETERS AND A. PRANSCHKE. *Brennstoff-Chem.* **11**, 239–47(1930); cf. *C. A.* **23**, 4326.—The effects of rate of gas flow, pressure, tube charge and design, c. d., electrode design and position, and CH_4 concn. in gas used, upon C_2H_2 production under diminished pressure are investigated, curves being given for the effects of the variables upon the side reactions. The energy required for lab.-scale conversion in the reaction $2CH_4 \longrightarrow C_2H_2 + 3\ H_2$ has been reduced by improvements from 31 to 12 kw. hrs. per cu. m. C_2H_2, the efficiency of the elec. discharge being 38%. In addn., the exhausting pump required 2–3 kw. hrs. At 12 kw. hrs. input the gas rate was 100 l. per hr. and produced 5% C_2H_4, 9% being produced at an input of 44 kw. hrs., both using gas contg. 25% CH_4. With gas contg. > 50% CH_4, the C_2H_4 produced enters into further syntheses.

F. W. JUNG

Beneficial action of brown coal upon development of cultivated plants (KISSEL) **15**. Determination of C and H (STANSFIELD, SUTHERLAND) **1**. Metal corrosion by fuel (USPENSKII, LADUIZHNIKOVA) **9**. Is the presence of rubber in coal possible? (ECK) **30**. Lignin theory [of the origin of coal] (BODE) **8**. Lignin theory of the origin of coal from the biological point of view (LIESKE) **8**. Origin of coal according to the present position of biological investigation (LIESKE) **8**. Origin of coal according to the present position of chemical investigation (FUCHS) **8**. Electric welding in carbonization plants and gas works (KÜRSCHNER) **9**. H (U. S. pat. 1,781,935) **18**. Alarm device for operating a signal on the escape of poisonous or explosive gases such as illuminating gas (U. S. pat. 1,783,974) **1**. Use of furnace flue dusts as adsorbents (U. S. pat. 1,784,543) **18**. Apparatus for degasifying liquids, particularly liquid fuels (Ger. pat. 506,040) **1**.

Hydrocarbon motor fuel. BENJAMIN FIXMAN. U. S. 1,781,872, Nov. 18. A raw heavy mineral oil is heated to conversion temp. under pressure and the oil and its conversion products are brought into intimate contact with a separately heated recycle oil, and the resulting hydrocarbon mixt. is released at a reduced pressure which will enable liquid components of the mixt. to vaporize; C is removed from the vapor by electromagnetic treatment, and hydrocarbons of the desired character for motor fuel are sepd. from those requiring recycling. App. is described.

Dust-fuel furnace burner. STEITZ & CO. G. M. B. H. Ger. 504,546, Mar. 8, 1927.

Distilling solid carbonaceous materials. FREDERICK T. SNYDER. U. S. 1,781,934, Nov. 18. An "autothermic" retort is fed with material such as oil shale, coal, wood waste or garbage and distn. is effected by contact with hot non-oxidizing gas. The solid residue from the distn. is burned in the base of the retort to supply this non-oxidizing gas and the heat required for distn. and the vapors evolved are fractionally condensed and the heavier fractions are injected at a point above the zone of combustion into the solid material undergoing distn., to act as part of a cooling fluid and to undergo cracking and distn.; uncondensed gases are heated and are injected at a point above the point of injection of the heavier condensates. App. is described.

Distilling carbonaceous material such as wood, lignite, coal, shale, etc. HENRY L. DOHERTY. U. S. 1,781,871, Nov. 18. The fuel is passed downwardly in a column through a shaft retort counter-current to a hot gas which does not support combustion, and volatilized products and gases may be removed from any portion selectively at the upper portion of the column to effect uniform distribution of the hot gas over the cross section of the fuel column. App. is described.

Fuel briquets. JAMES S. FORD and FREDERICK MURRAY. U. S. 1,784,665, Dec. 9. See Brit 329,437 (*C. A.* **24**, 5466).

Fuel briquets from wood charcoal. C. DEMOULIN. Brit. 332,815, Sept. 23, 1929. Wood charcoal is used with a binder of wood-tar pitch emulsified with a heated alk. soln. such as Na_2CO_3. Various details of manuf. are described.

Continuous vertical oven for drying and baking briquets. THEODORE NAGEL. U. S. 1,782,244, Nov. 18. Structural features.

Mechanical device for regulating combustion according to the composition of the combustion gases. SIEMENS-SCHUCKERTWERKE A.-G. (Karl Eisenzapf, inventor). Ger. 506,075, Feb. 28, 1926.

Apparatus for carbonizing coal with use of a saline heating bath. JOHN MITCHELL (to Charcolite Corp.). U. S. 1,784,676, Dec. 9. Structural features.

Tubular retort with a helical internal rotor, for carbonizing coal. OTTO H. HERTEL (to Old Ben Coal Corp.). U. S. 1,783,190, Dec. 2. The retort is externally heated in several sep. zones, and the rotor is provided with internal compartments for heating (also in zones and suitably by use of burners within the rotor). Cf. *C. A.* **24**, 4920.

Preparing pulverized coal for use as fuel. WALTER RUNGE and EDWIN A. PACKARD (to International Coal Carbonization Co.). U. S. 1,783,982, Dec. 9. Pulverized coal is subjected to a preliminary heat treatment in an oxidizing atm. under conditions to drive off only a small percentage of the hydrocarbon volatile constituents but such that the treated coal particles lose their sharp edges and are given a smooth and rounded surface and also slightly increased in size, and the material is then carbonized while suspended in a gaseous medium substantially inert with respect to the coal and with a temp. in the carbonizing zone sufficient to effect a low-temp. carbonization and drive off a substantial part of the hydrocarbon volatile content of the coal and produce a semi-coke with particles mainly of hollow spheroidal form, and the semi-coke is withdrawn and crushed. App. is described. U. S. 1,783,983 (WALTER RUNGE) relates to a semi-coke produced in a generally similar manner, and also describes app.

Dehydrating moist solid fuels such as raw brown coal. HANS A. VON STADEN and ANTON HOEHN (to I. G. Farbenind. A.-G.). U. S. 1,783,757, Dec. 2. A mixt. of raw brown coal and tar is heated to about 150° under a pressure of about 5 atm. and liquid water is sepd.

Low-temperature distillation of lignite. KOHLENVEREDLUNG A.-G. Ger. 506,126, Mar. 6, 1926. In the low-temp. distn. of loose dried lignite in vertical, indirectly heated retorts having inclined guiding surfaces, the tendency of the lignite to overshoot or overflow into the oven openings is counteracted by removing fine dust from the charge before or during its introduction into the retort

Apparatus for generating and superheating steam. HANS GLEICHMANN (to Siemens-Schuckertwerke Ges. m. b. H.). U. S. 1,784,426, Dec. 9.

Tubular steam generator and superheater. CHARLES U. SAVOYE (to Babcock & Wilcox Co.). U. S. 1,782,585, Nov. 25. Structural features.

Plant for generation of high-pressure superheated steam. FRITZ FLATT (to Akt.-Ges. der Maschinenfabriken Escher Wyss & Cie.). U. S. 1,781,836, Nov. 18. Structural features.

Apparatus suitable for steam generation or other heat-exchange operations. WALTER D. LA MONT and ALFRED F. ERNST (to La Mont Corp.). U. S. 1,783,724, Dec. 2. Structural features.

Tube and header heat-transfer apparatus suitable for use as a steam generator. EDWIN W. JONES (to Babcock & Wilcox Co.). U. S. 1,782,574, Nov. 25. Structural features.

Apparatus for flushing out scale from jackets of internal-combustion engines by use of reagents such as sodium phosphate. WALTER N. MOORE (to Three-M Mfg Co.). U. S. 1,783,478, Dec. 2. Structural features.

Absorption of ammonia and hydrogen sulfide. I. G. FARBENIND. A.-G. (Christian J. Hansen, inventor). Ger. 504,640, Jan. 8, 1926. NH_3 and H_2S are absorbed from gas mixts. by passage through a soln. contg. $(NH_4)_2SO_3$ and NH_4HSO_3, the mol. proportions of NH_3 and SO_2 being so arranged that the NH_3 and SO_2 tension of the soln is at about its lowest value.

Removing sulfur compounds from gases such as coal, water or producer gases. GUSTAV WIETZEL, JOSEF JANNEK and FRITZ FRIED (to I. G. Farbenind. A.-G.). U. S. 1,782,590, Nov. 25. The gas, together with sufficient O-contg. gas such as air to effect oxidation of the S compds. to O compds. of S, is passed over an active catalyst comprising a metal other than an alkali metal and a metalloid from groups 5 and 6 of the periodic system other than O, *e. g.*, a granular alloy of Fe 67, P 22 and Si 11% at a temp. which may be about 400°, and the S oxides formed are combined with NH_3 proportioned to form the corresponding NH_4 salt and the latter is sepd. Active charcoal also may be used as catalyst at 260°.

Desulfurizing gases. I. G. FARBENIND. A.-G. (Theodor Hoffmann and Fritz Overdick, inventors). Ger. 506,043, May 28, 1929. In desulfurizing gases by washing in a tower with a liquid that reacts with H_2S and liberates S, the sepn. of S from the suspension is facilitated by so collecting the liquid that the small quantities of gas occluded by the S are not sepd. Suitably, the flow of the suspension is gently arrested by inclined surfaces arranged at the foot of the tower, and the suspension is led to a sump, wherein the S collects on the surface. App. is shown.

Desulfurizing hot gases. ERICH WILL. Ger. 504,548, May 16, 1923. The gases are passed over basic minerals at high temps. in a regenerative furnace. A layer of

magnesite may be arranged between the basic minerals and the chamber lining. The chamber may be lined with limestone at the 700–1100° zone.

Gasifying fuels by heating in a fused salt bath. THEODOR LICHTENBERGER, LUDWIG KAISER and FRANZ MEYER. Ger. 493,475, April 17, 1927.

Treating wash waters of fuel distillation gases. WALTER KNOTHE. Ger. 506,021, July 14, 1929. A cyclic process is described for the treatment of water used in washing gases from the low-temp. distn. of fuels, particularly lignite. The water is freed from phenols by filtering through lignite ash, then treated with gases contg. CO_2, to remove $Ca(OH)_2$ and fix free NH_3, clarified, and then treated with the decarbonated gases after the latter have been passed in counter current to the water in the dephenolizing stage.

Fuel gas. KARL KOLLER. Austrian 119,040, April 15, 1930. In the method in which a producer is fed with a cooled mixt. of air and flue gases satd. with water vapor, the temp. at which the mixt. is satd. is regulated, so as to maintain a const. H content in the gas produced. Thus, the satn. may be effected by passing the mixt. of air and flue gases in counter current to warm water from the cooling jacket of the producer.

Water gas. THOMAS W. STONE (to Western Gas Construction Co.). U. S. 1,784,765, Dec. 9. The fuel bed of a generator is blasted with air to incandescence and the resulting air-blast gases are passed successively in sep. parallel streams through a single shell carburetor and a single shell superheater in which the air-blast gases are burned; the air blast is shut off and steam is passed successively through the superheater, carburetor and incandescent fuel in the generator, and the water gas generated is passed back through the carburetor and superheater to a gas receiver; the steam flow is then reversed to generate water gas before again bringing the fuel bed to incandescence and the water gas formed is similarly passed through the carburetor and superheater. App. is described.

Liquid volatile hydrocarbons from natural gas. SAMUEL C. CARNEY (to Shell Petroleum Corp.). U. S. reissue 17,898, Dec. 9. See original pat. No. 1,768,827 (*C. A.* 24, 4625).

Gas generator and burner suitable for utilizing liquid fuels. EDMUND A. GARRETT (one-half to Francis C. Schwab). U. S. 1,783,564, Dec. 2. Structural features.

Gas generator or producer. ERNST SCHUMACHER. U. S. 1,781,765, Nov. 18. Structural details.

Gas producer (with a rotary fuel shell and rotary ash pan). ANSON K. BRADLEY (to Morgan Construction Co.). U. S. 1,782,677, Nov. 25.

Valve-control system for gas producers. BAMAG-MEGUIN A.-G. Brit. 332,783, Oct. 27, 1928. Structural features.

Waterless gas holder. FREDERICK H. WAGNER (to Bartlett Hayward Co.). U. S. 1,782,861, Nov. 25.

Waterless gas holder. FREDERICK H. WAGNER (to Bartlett Hayward Co.). U. S. 1,782,949, Nov. 25.

Combustible gas and coke. HARRY F. SMITH (to Gas Research Co.). U. S. 1,781,766, Nov. 18. A continuous charge of material such as coal is maintained within a retort, and the outer zone of the charge of ignited material is blasted with air to incandescence to generate heat for raising the temp. of the contiguous central zone of material to drive off volatile constituents from it; the central zone is concomitantly blasted with steam. App. is described. U. S. 1,781,767 relates to a gas-producer construction, a portion of the producer being surrounded by a water boiler for generating steam for the gas-producing operation.

Gas or coke-oven wall. FRITZ TOTZEK. U. S. 1,782,638, Nov. 25.

Coking-retort oven. JOSEPH BECKER (to Koppers Co.). U. S. 1,784,414, Dec. 9.

Device for charging coke ovens with pressed coal. HEINRICH KOPPERS A.-G. Ger. 506,124, June 23, 1928.

Horizontal regenerative chamber oven. KOKSOFENBAU UND GASVERWERTUNG A.-G. Ger. 489,345, April 13, 1924.

Finely divided puffed porous coke. ALFRED H. WHITE (to Regents of the University of Michigan). U. S. 1,782,556, Nov. 25. Finely crushed material such as coal is carried through a retort, the walls of which are heated to substantially above 700°, while the particles are maintained out of contact with an appreciable amount of air, so that the particles are subjected to destructive distn. completely to carbonize the finest particles and partially to carbonize the larger particles. App. is described.

Coking pitch. HEINRICH KOPPERS A.-G. Ger. 506,141, July 6, 1928. A trough or basin contg. the pitch is heated externally until the pitch has fused, whereupon the container is closed by a cover to which a heating tube is attached so as to be embedded in the pitch. Addnl. details are given, and app. is shown.

22—PETROLEUM, LUBRICANTS, ASPHALT AND WOOD PRODUCTS

W. F. FARAGHER

Compressibility and thermal expansion of petroleum oils in the range 0° to 300°. R. S. JESSUP. *Bur. Standards J. Research* **5**, 985–1039(1930). E. H.

Removal of sulfur from petroleum products. M. NAPHTALI. *Brennstoff-Chem.* **11**, 282–5, 375(1930).—The problems encountered in purifying petroleum products and gases are discussed. The H_2SO_4 and NaOCl processes of removing S from motor fuels are compared for effectiveness, cost and advantages. Recently developed processes of gas purification are described. F. W. JUNG

Investigation of Sakhalin crude oils. S. S. NAMETKIN AND E. M. SHAKHNAZAROVA. *Neftyanoe Khozyaĭstvo* **19**, 290–1(1930); cf. *C. A.* **24**, 230.—Crude oil from the Ekhabi district and Kadzussa No. 2 well had a sp. gr. of 0.9066; E_{50} 1.3; Abel-Pensky flash 31°, excise resins 22% and a cold test below —18°. It contained about 28% of a fraction boiling below 200°, 25% of kerosene, and a residue which is suitable for prepg. lubricating oils. Oil from the well Kadzussa No. 3 had a sp. gr. of 0.874; E_{50} = 1.2; flash —8°; excise resins 24% and a cold test below —20°. It contained 11% of gasoline of 0.776 sp. gr., 35% of kerosene of 0.867 sp. gr. and a high proportion of lubricating oils; a high-quality asphalt was obtained from the residue. A. A. BOEHTLINGK

Rationalization of crude-oil production. S. A. ANNENSKII. *Neftyanoe Khozyaĭstvo* **18**, 768–73(1930).—Wells low in crude-oil production should be left under gas pressure to increase the yield of crude oil. (1) The radius of drainage will be increased leading to an increase in the suction area proportional to the square of the radius. (2) The horizontal pressure in the strata will increase toward the well bottom as the result of static pressure of the gas, the oil thus becoming less viscous and therefore moving faster toward the shaft. (3) The amt. of the gas discharge decreases, thus leading to a lowering of the adhesion and the resistance of sand particles against the oil flow. (4) The counter pressure does not permit the gas to accumulate on the walls of the casing and therefore makes for free access of the oil to the shaft. (5) The wells are kept clean and water is kept out. (6) The gas factor is kept down to 65–86 cu m. per ton of oil, thus prolonging the life of the well. (7) The gas being discharged in the form of bubbles along the casing increases the production. A. A. BOEHTLINGK

Bright stocks from Grozny crude oil. A. N. SAKHANOV, L. G. ZHERDEVA AND G. V. POLYANSKAYA. *Neftyanoe Khozyaĭstvo* **18**, 800–5(1930).—Bottom oils, constituting about 50% of Grozny paraffinic fuel oil, of 0.960 sp. gr., E_{100} = 7.58, Holde cold test 45°, and excise resins 60%, were diluted with ligroin (1 1) and treated with H_2SO_4 (15%). This yielded 50% of a greenish oil, which was treated with 25% of fuller's earth at 65–70°, diluted again with ligroin, cooled down to —28°, centrifuged, the solvent evapd. with steam. The yield was 35.5% of a bright stock of 0.921 sp. gr., E_{100} 3.9, flash point 281° and cold test 3.5°; 3.5% of ceresin (m. 69°); and 3.5% of oil sepd from the petrolatum obtained by centrifuging. Heavier bottom oils produced a still lower yield of bright stock. However, when treating the fuel oil (mazout) under similar conditions only 24.2% was lost by treatment with H_2SO_4. Centrifuging the oil layer yielded 37% of petrolatum (on the fuel oil) which contained all the paraffins. This treated fuel oil which had an E_{50} of 7.38 was steam distd., yielding high-quality lubricating oils and bright stock. A vacuum distn. of the treated oil produced 16% of a bright stock of E_{100} = 5.18, 6% of machine oil, 5% of spindle oil, 23% of petrolatum, 11% of gas oil. The loss was 39%. The petrolatum after steam and a vacuum distn. yielded about 20% of paraffin. 2.7% of ceresin was recovered from the residue. A. A. BOEHTLINGK

Crude oil from gushers in Maikop. M. A. BESTUZHEV AND P. A. MALASHKIN. *Neftyanoe Khozyaĭstvo* **18**, 965–70(1930).—Crude oil from the layer *e* was subjected to the usual refining treatment. It contains some paraffin, 37–38% of a fraction b. below 200° and 15–16% of a kerosene fraction of 0.837 sp. gr. Lubricating oils obtained by vacuum distn. did not meet the specifications and the loss by treatment amounted to 60%. The asphalt prepd. from the residue was also below standard. Cracking, however, yielded 24% of gasoline, 66% of fuel oil and 10% of gas; with recycling a total yield of 37% of cracked gasoline was attained, together with 48% of fuel oil and 15% of gas. A. A. BOEHTLINGK

Apparatus for the determination of specific gravity of clay solutions used in rotary drilling. P. N. CHEKANOV, K. P. PONOMAREV AND N. N. MARKELOV. *Neftyanoe Khozyaĭstvo* **18**, 953–8(1930).—A lab. app. is described. A. A. BOEHTLINGK

Research problems in the oil industry and naphthology. A. N. SAKHANOV. *Neftyanoe Khozyaĭstvo* **19**, 163–7(1930).—A general article on technical, scientific, chem. and economic problems. A. A. BOEHTLINGK

Oxidizability of mineral oils. B. G. TUICHININ AND K. I. IVANOV. *Neftyanoe Khozyaĭstvo* **18**, 979–91(1930).—Baku gas oil treated with 12% of H_2SO_4 (monohydrate) added in 3 portions, followed by a washing with tap water, can be oxidized with O_2 at 15 atm. by heating at 150° for 3 hrs. to a sapon. no. of 104.3, while a treatment with 6% of oleum (10% SO_3) under identical conditions yields an oil of 63 sapon. no. after the above oxidation test. An addnl. treatment of the oil with 50% alc. soln. and washing with tap water increases the oxidizability considerably. If the treated oil still contains small quantities of naphthenic acids it should be washed with 50% alc. and water. A treatment with 253% of the amt. (by wt.) of SO_2 and evapn. of the SO_2 from the oil gives a sapon. no. of 112.6 after oxidation. The addn. of naphthenic acid salts of K, Na, Li, Fe and Mn to an acid-treated oil increases its oxidizability. The above oxidation method is used in detg. the stability of oils. A. A. BOEHTLINGK

Recent methods of utilizing waste refinery fuels. I. L. A. MEKLER. *Natl. Petroleum News* **22**, No. 46, 151–8(1930).—Heavy fuel oil is burned successfully by having the fuel line properly designed and by using valves and burners with large passages. Acid sludge is used most successfully in mixts. with liquid fuel. **II.** *Ibid* No. 47, 51–60.—Petroleum coke can be burned as powd. fuel by methods used with other similar fuels. The most important factor in burning refinery gas is to sep. out any liquid in the gas. R. W. KELLY

Continuously working agitators for treating crude-oil products. K. B. KOSTRIN. *Neftyanoe Khozyaĭstvo* **19**, 278–89(1930).—A description of known equipment used in the petroleum industry, with 44 literature references, is given. A. A. BOEHTLINGK

Pumping viscous fuel oils. V. S. YABLONSKII, P. P. SHUMILOV AND V. M. POKROVSKII. *Neftyanoe Khozyaĭstvo* **19**, 242–50(1930); cf. *C. A.* **24**, 952.—Paraffinic fuel oil of +35° congealing point was pumped through a pipe line warmed internally by heated gas oil passed through a concentric pipe inserted over the full length of the fuel-oil line, which was 477 m. long. Expansion joints, connections, heat transfer, etc., are discussed in detail. A. A. BOEHTLINGK

Content of naphthenic acids in Emba crude oil and its distillates. T. VUISTAVKINA. *Neftyanoe Khozyaĭstvo* **18**, 1000(1930).—Emba crude oil and its distillates were treated with a 2–3° Bé. soln. of NaOH. The table gives the % of naphthenic acids recovered, etc

	Acid no. in mg. KOH	% acids sepd.	Their acid no. in mg KOH	Theoretical yield naphthenic acids	Mol. wt of naphthenic acids
Dossor crude oil					
Sample 1	——	0.43	150	——	——
Sample 2	1.42	0.74	153	0.92	——
Kerosene distillate	0.76	0.18	257	0.29	218
Gas oil	1.12	0.36	232	0.48	241
Vaseline distillate	2.35	0.93	197	1.97	284
Transformer oil distillate					
Sample 1	2.66	1.13	174	1.52	321
Sample 2	2.79	1.44	162	1.8	——
Spindle oil distillate	2.5	1.32	158	1.58	354
Machine distillate					
Sample 1	1.94	0.4	120	1.61	466
Sample 2	2.08	1.42	138	1.5	406
Exhauster oil					
Light	1.86	0.77	201	0.92	276
Heavy	2.8	0.88	175	1.6	320

The alkali-treated oil was extd. with petr. ether and the naphthenic soaps were decompd. with H_2SO_4. The naphthenic acids were easily sol. in alc. and ether. Their soaps dissolved in H_2O lather freely on shaking. The yield of naphthenic acids from sludge was considerably lower. In refinery practice the neutralized sludge is salted out with

NaCl, whereby a viscous greenish mass of 0.952 sp. gr. is obtained, which is composed of 28% of H_2O, 43.5% of oil, 2.49% of dry residue (from machine-oil distillate and "Avtol" M); 18% of H_2O, 61.8% of oil, 1.37% of dry residue and 7.9% of naphthenic acids from heavy lubricating oils; 38% of H_2O, 42.7% of oil and 18.3% of naphthenic acids from vaseline oils. A. A. BOEHTLINGK

Pumping preheated paraffinic fuel oil through the Petrovskii pipe line. A. A KASHCHEYEV. *Neftyanoe Khozyaĭstvo* 19, 251–63(1930).—Fuel oil of 31° cold test was preheated to 67° and pumped through an 8-in. pipe line 42 km. long. The temp. of the discharged oil was 35° and no difficulties in pumping were experienced. A. A. B.

Setting and hardening of cements used for stopping oil wells. KEMMER AND BALAN. *Siroitelnuie Materialui* (Building Materials) No. 2, 35–41(1930).—Tests were made to ascertain the influence of water contg. petroleum and petroleum emulsions on the setting and hardening of cements used for plugging oil wells. Addns. of 5, 10 and 15% of petroleum (the compn. is given) were made. The results of these are tabulated and show that: (1) small addns. of petroleum (5%) do not influence the qualities of cement; (2) only cements of high quality, which harden quickly, can be used for plugging wells. M. V. KONDOIDY

Mixing fuel oils. N. I. CHERNOZHUKOV AND A. M. GUTZAIT. *Izvestiya Teplo-Tekh. Inst.* (*Trans. Thermo-Tech. Inst. Russia*) 1930, No. 4, 54–9.—Fuel oil mixts. composed of oils with different congealing points can be homogenized by heating with open steam and simultaneously agitating with cold air. The air can be admitted through the water-discharge line in the storage tank. A. A. BOEHTLINGK

Viscosities of fuel oils. N. I. CHERNOZHUKOV AND A. M. GUTZAIT. *Izvestiya Teplo-Tekh. Inst.* (*Trans. Thermo-Tech. Inst. Russia*) 1930, No. 2, 36–40.—The viscosity of paraffinic fuel oil is influenced by the nature of the heat treatment applied before congealing and is not influenced by a new heat treatment carried out on congealed fuel oil. To eliminate the effects of previous treatments of the fuel oil, heating to 100° should precede the cold test. A. A. BOEHTLINGK

Interlocked distillation controls are development of trend-analysis. A. E. KROGH AND H. BARNETT. *Natl. Petroleum News* 22, No. 46, 131–6(1930).—A method has been devised whereby 3 trend-analyzing controls have been interconnected to produce the desired result. Two of these instruments prep. an elec. current for the automatic control of a valve by the third. R. W. KELLY

Steam in rectification of petroleum products. A. TREGUBOV. *Azerbaĭdzhanskoe Neftyanoe Khozyaĭstvo* 1929, No. 12, 37–51; cf. *C. A.* 22, 952.—Complete calcns. are given. Satd. steam produces a very small temp. interval within the rectifying column, the temp. being below the b. p. of H_2O. It is able to carry over large amts. of petroleum vapors and reflux oil. The fractionating efficiency of the column is lowered, the consumption of heat is increased and a considerable load is thrown on the condensers. Superheated steam has an entirely different effect and in its presence the fractionation of the oil proceeds under conditions which are comparable to those when fractionation is carried out in the absence of H_2O vapors. V. KALICHEVSKY

Distillation of petroleum in refineries of Batum. E. FROLOV. *Azerbaĭdzhanskoe Neftyanoe Khozyaĭstvo* 1930, No. 9, 46–50.—The plant, including 2 flow sheets, is described. V. KALICHEVSKY

Artificial aging of mineral oils. F. EVERS AND R. SCHMIDT. *Brennstoff-Chem.* 11, 214–9(1930).—Various methods of testing insulating and turbine oils are discussed. A new method has been developed whereby electrolytic O_2 is absorbed at 100° by a measured amt. of oil distributed over SiO_2 gel impregnated with Fe_2O_3 as catalyst. The amt. of O_2 absorbed is detd. at intervals of 100 min. by measuring the current passing through the electrolytic cell. The rate of absorption, which is graphically almost a straight line, is taken as the aging const. With the O_2 absorbed expressed in amp.-min. and the time in min., the aging const. of a good insulating oil, *i. e.*, the tan of the line, averages 0.13 with a permissible max. of 0.21. The concn. of catalyst giving the highest aging const. was used, 0.01 mol. per mol. of SiO_2 gel. CuO and Fe_2O_3 were of equal effect but PbO was weaker and caused the formation of secondary aging products. The aging const. is mathematically related to the tar and sapon. nos. Sketches and details of the app. and procedure are given with graphs of exptl. results. F. W. JUNG

Corrosive action of naphthenic acids in the petroleum of Maikop. A. VUIBOROVA. *Azerbaĭdzhanskoe Neftyanoe Khozyaĭstvo* 1930, No. 9, 117–21.—Naphthenic acids and not the S compds. are responsible for corrosion of refinery equipment working on the Maĭkop crude oils. V. KALICHEVSKY

New shell still batteries of Azneft. N. EGIAZAROV AND K. KOSTRIN. *Azerbaĭ-*

dzhanskoe Neftyanoe Khozyaĭstvo **1930**, No. 9, 95–101.—A complete description is given including drawings, temps. at various points of the system, properties of the intermediate and final products, etc. The installation consists of 9 shell stills divided into 3 batteries. Gasoline, kerosene, gas oil and mazout are the final products. V. K.

New vapor-phase cracking process for high-compression fuel. NORMAN W. KRASE. *Chem. Met. Eng.* **37**, 624–5(1930); cf. Ziegenhain, *C. A.* **24**, 5992.—The Pratt vapor-phase cracking process is briefly described. In this process gas oil, preheated in heat exchangers to about 450°F., is passed through a heating coil, the lower or convection section of which is made of low-C steel boiler tubes and the top, or high-temp. radiant section, of high Cr-Ni steel. The oil vapors in the coil reach a temp. of 1100°F. and are discharged into an evaporator together with fuel oil heated to about 550°F. by coils in the upper portion of the evaporator. Vapors from the evaporator pass through an exchanger to preheat the incoming fuel oil and enter a bubble tower at about 550°F. Vapors from the bubble tower pass to a condenser, and cycle stock is withdrawn from the bottom of the tower. The process (U. S. Patent 1,752,264) is claimed to produce directly a motor fuel of 85% benzene equiv. A semi-com. unit processing about 300 bbl. per day is in operation at the plant of the Lubrite Refg. Co. at East St. Louis. D. F. BROWN

Action of sulfuric acid on the lightest products obtained in vapor-phase cracking of crude oil. M. B. MARKOVICH AND V. V. PIGULEVSKII. *Neftyanoe Khozyaĭstvo* **18**, 627–40(1930).—The "amylene" fraction contg. an av. of 43% of dissolved gases was subjected to H_2SO_4 treatment at —45°. The whole was shaken for 2 days and fractionally distd. through a dephlegmator immersed in a cooling mixt. of —40°, the gases so obtained were measured, and the mixt. was gradually heated to 25°, whereby all butylenes and divinyls were distd. off. The acid and the hydrocarbon layer were then sapond. separately by the usual methods. It was found that 75 and 66% acid dissolve more polymers than 85% acid. The low temp. prevailing during the sapon. acted favorably on the yield of alcs. It was made possible by adding H_2SO_4 to ice. M and P. succeeded in converting 12.8–25.5% of the gas into alcs., corresponding to 61% of the gaseous olefins. They recommend a sepn. of fractions and separate treatment of the individual components. A. A. BOEHTLINGK

Cracked gases obtained in vapor-phase cracking and their utilization. M. B. MARKOVICH. *Repts. of the Sci.-Tech. Council of the Oil Ind. Session of the Refinery Section in Baku in 1929.* **1930**, I, Cracking 61–88; cf. preceding abstr. A. A. B.

Vickers cracking unit. YU. E. BOGOSLOVSKII AND A. N. MARGULOV. *Repts. of the Sci.-Tech. Council of the Oil Ind. Session of the Refinery Section in Baku in 1929*, 1930, I, Cracking 7–44.—A complete description of the unit is given, including changes made after unsuccessful trial runs. A vapor-phase treating plant for refining the gasoline with fuller's earth is a part of the unit. Complete flow sheets showing yields of various oil products are given. Analyses of the products are shown. Improvements of the process are specified and causes of troubles are discussed. A. A. B.

Semi-cracking. K. P. LIKHUSHIN. *Repts. of the Sci.-Tech. Council of the Oil Ind. Session of the Refinery Section in Baku in 1929*, **1930**, I, Cracking 45–60.—Surakhanui paraffin-base fuel oil of 0.8861 sp. gr., E_{50} = 2.86, Brenken flash 132° and cold test of +12°, was cracked in a Pintsch-gas producer, yielding 9.68% gasoline of 0.8051 sp. gr., 67.5% of a fuel oil of 0.8779 sp. gr., E_{50} = 1.65 and —15° cold test; 10% of gas which contained 2.5–6.2% CO_2, 27–38% heavy hydrocarbons, 1.3–1.6% O_2, 1.2–1.4% CO, 44.1–49.1% CH_4, 0–9.2% H_2 and 5.8–15.6% N_2 (by difference). Cracking in a coil heated to 500° yielded a fuel oil of 0.878 sp. gr. and —5° to —7° cold test, as well as gasoline and other products. The velocity of flow of the fuel oil through the coil was 0.2 to 0.3 m. per sec. This expt., undertaken on a small refinery scale was made to ascertain the feasibility of prepg. commercially a fuel oil which could be easily pumped through pipe-lines over long distances in cold weather. A. A. BOEHTLINGK

Influence of high pressure and the amount of cracking on the yields and the character of cracked gasolines. A. N. SAKHANOV AND M. D. TILICHEEV. *Repts. of the Sci. Tech Council of the Oil Ind. Session of the Refinery Section in Baku in 1929*, **1930**, I, Cracking 89–94.—Cf. *C. A.* **24**, 5889. A. A. BOEHTLINGK

Cracking process without coke formation. M. NAPHTALI. *Brennstoff-Chem.* **11**, 247–9(1930); cf. *C. A.* **23**, 2820, 3340.—The operation of the "Carburol" process is described in detail by a schematic diagram. Yield data of crude motor spirit, heavy oil and gas are given for various gas oils, mazout, etc., for both stages of the cracking process. The oil, cracked in a uniformly heated coil, is mixed before sepn. of C and after passing an expansion valve, with fresh oil. This mixt. is transferred to a dephlegmator which returns the intermediate fractions for a second cracking. F. W. J.

Effect of time and temperature in treating cracked distillate. R. B. PIERCE. *Natl. Petroleum News* **22**, No. 46, 121–30(1930).—For the best reduction of S, best color, and lowest formation of H_2SO_4 compds., the acid and oil should be contacted for 3 to 5 min. Acid formation was reduced and color was very much improved by using 20% of steam during the distn. Storage before rerunning improves the color and reduces the formation of acid at the rerun stills. A low-temp. treat gives better color and less formation of acid derivs. but a higher-temp. treat gives lower S. Settling time increases the formation of acid compds. and lowers the color, but lowers S only slightly.
R. W. KELLY

Floor-tube radiant section increases cracking plant throughput. JOHN POWER. *Natl. Petroleum News* **22**, No. 45, 51–5(1930).—At the refinery of the Texas Pacific Coal and Oil Co. at Fort Worth, a floor-tube radiant section has increased the daily cracking capacity by 250 bbls. The only changes necessary in the plant were to increase the speed of the pumps, increase the chamber outlet from $1^1/_2$ to $2^1/_2$ in. on the low-pressure side, and increase the size of the running lines. The length of runs was decreased from 35 to 30 days but it is believed that this loss can be corrected by changes in the plant.
R. W. KELLY

The problems of the determination of aromatic hydrocarbons in cracked gasolines. M. D. TILICHEEV AND M. P. MASINA. *Neftyanoe Khozyaĭstvo* **18**, 641–6(1930) H_2SO_4 acts more vigorously on aromatic hydrocarbons in presence of olefins. Ninety % H_2SO_4 is too weak to remove olefins but it attacks the aromatic hydrocarbons quite noticeably. Ninety-eight % acid removes the olefins and aromatic hydrocarbons completely at 0°. It can be used to remove the aromatic hydrocarbons at room temp. while fuming H_2SO_4 is not recommended because it causes an excessively high aniline point.
A. A. BOEHTLINGK

Blending natural gasoline to volatility specifications. R. G. ALDEN AND M. GAGE BLAIR. *Natl. Petroleum News* **22**, No. 46, 107–20(1930).—A no. of charts have been made by means of which predictions of the volatility of a blend of natural gasoline and blending naphtha can be made.
R. W. KELLY

Meaning of the gasoline distillation curve. G. EDGAR, J. B. HILL AND J. A. BOYD. *Oil and Gas J.* **29**, No. 26, 144, 256, 259(1930).—Motor-fuel volatility affects engine performance chiefly in the following ways: (1) ease of starting a cold engine; (2) tendency to interrupt operation because of vapor lock; (3) ease of acceleration; (4) relative ease of forming a dry mixt.; (5) tendency to cause crankcase diln. It has been shown that if the A. S. T. M. distn. curve is known, the characteristics of a fuel with regard to all 5 of these factors can be at least approx. calcd.
CHAS. WIRTH

Detonation of gasoline. N. A. BUTKOV. *Izvestiya Teplo-Tekh. Inst. (Trans Thermo-Tech. Inst. Russia)* **1930**, No. 2, 41–4.—A 650-cc. bomb provided with a pressure gage was charged with 2 cc. of fuel and filled with O_2 at a pressure of 5 atm. It was then heated in an oil bath to 250° for 90 min. It was found that substances more resistant to detonation are also more resistant to oxidation. Heptane and $C_{10}H_{22}$, which were oxidized to a great extent without an explosion, formed a large amt. of carbonaceous material insol. in C_6H_6 and in a C_6H_6-C_2H_5OH mixt. The product was acidic. The same changes occurred with ethyl ether, CS_2 and pinene. A 10% addn. of toluene to C_7H_{16} caused an explosion, which indicates a change in the character of the oxidation. Solid products and acids were not formed in this case. Alc. has a similar effect. The above conditions were identical with those existing in an automobile engine with a 5:1 compression ratio. Expts. carried out at 285° made it possible to obtain a finer classification of antidetonants. Heavy gasolines have a high antiknock value and are easily oxidized. The properties of a fuel were further characterized by the compn. of the combustion gases, *i. e.*, by the proportion of O and fuel and other reaction products left in the bomb.
A. A. BOEHTLINGK

Shirak crude oil. V. N. KHUDAKOV. *Neftyanoe Khozyaĭstvo* **18**, 543–50(1930). Crude oil produced in Shirak (Caucasus) has a sp. gr. of 0.8074–0.885 and a flash pt. 0°; it contains 15% of gasoline of 0.7307 sp. gr., 35% of kerosene of 0.8074 sp. gr. and 50% of residue of 0.9023 sp. gr. The production at present is small.
A. A. B.

Condensation of hydrocarbons. B. K. TARASOV AND N. V. POPOVA. *Neftyanoe Khozyaĭstvo* **18**, 992–5(1930); cf. *C. A.* **24**, 3347.—A cracked gasoline boiling below 200° and cracked gasoline to which 10% of C_6H_6 was added were treated with 90% H_2SO_4 at 0°, distd. and the fractions treated with 98% H_2SO_4. These fractions were free from unsatd. and aromatic hydrocarbons, the latter being found only in the higher fraction polymers that were formed by this treatment. In the presence of 60% of unsatd. hydrocarbons, only $^1/_3$ is converted into acid-sol. compds. while $^2/_3$ undergoes a further change. In this operation the main part is condensed with aromatic hydro-

carbons and satd. hydrocarbons also are formed. Eighty % acid produces slight condensation unsatd. with aromatic hydrocarbons and a few acid-sol. compounds are formed. A. A. BOEHTLINGK

Antiknock fuels. L. EDELEANU AND W. GROTE. *Brennstoff-Chem.* **11**, 212–4 (1930); cf. U. S. Pat. 1,661,566 (*C. A.* **22**, 1461).—Antiknock agents for motor fuels and the possibility of obtaining a fuel with good characteristics entirely by suitable methods of refining are discussed. By adding to the fraction of the motor benzine boiling below 175°, the aromatic and unsatd. hydrocarbons extd. with liquid SO_2 from the fraction boiling above 175°, the blend has an antiknock value that compares well with that obtained by the addn. of $Pb(Et)_4$ and ethylene dibromide to the same motor benzine. Curves are shown. F. W. JUNG

Illuminating properties of commercial kerosene. M. P. KORSAKOV. *Neftyanoe Khozyaĭstvo* **18**, 975–8(1930).—Heavy kerosene can be used in ordinary lamps provided that the font is of a flat shape. This construction keeps the oil level comparatively stable and causes the oil to burn with a uniform flame. A. A. BOEHTLINGK

Properties of Grozny commercial kerosenes. A. I. VORONOV AND H. I. LOGVINOVA. *Neftyanoe Khozyaĭstvo* **18**, 971–4(1930).—Kerosene fractions of various origins were mixed and treated in the usual manner. Because of a sharper sepn. of gasoline, the kerosene was short in light fractions in comparison with the usual kerosene. Tests carried out with various burners showed that the illuminating power and other properties were satisfactory when using the "Kosmos" burner with a modification that permitted heating the kerosene. A. A. BOEHTLINGK

Shale oil industry in Scotland. RAGNAR WINBLADH. *Svensk Kem. Tids.* **42**, 236–49(1930). A. R. ROSE

The uniformity of Esthonian oil shale layers. K. LUTS. *Sitzb. Naturforsch.-Ges. Univ. Tartu* **36**, 9–26(1929).—Samples of Esthonian shale from Kokoloki, Wanamoisa, Kunda concessions, Kochtel, Kucker, Iisaku and Tudulinu, which cover the entire Esthonian shale deposit, represent a fair av. This established the presence of one profile which is composed of layers A, B, C, D, E, F, G and H. Bituminous lime layers are present between B and C, and D and E. This shale belongs to the class of sapropelites, according to the chem. compn. of the org. substance which is as follows: C 76.5–76.7, H 9.1–9.2, S 1.7–2.2, Cl 0.5–0.7 O, N 12.2–11.2%. The ash in unweathered shale has these compns.: Layer E, SiO_2 30.8, Fe_2O_3 5.5, Al_2O_3 10.7, CaO 40.1, SO_3 7.9, MgO 1.5, $K_2O + Na_2O$ 3.7%. Layer B, SiO_2 28.8, Fe_2O_3 7.2, Al_2O_3 6.8, CaO 42.9, SO_3 9.3, MgO 1.8, $K_2O + Na_2O$ 3.6%. The ash content varies with the degree of weathering, it averages 50% for air-dry layers, the highest being, for the layer D, 63–65%, and the lowest, for layer E, 36–40%. The oil yield in a Fischer retort was for A 27, for B 34, for C 32, for D 19 and for E 36%. The oil yield, calcd. on the org. substance is for A 55, for B 69, for C 66, for D 56, for E 66, for F 61, for G 66 and for H 66%. Calorimetric detns. were made and a large no. of tables is given. A. A. B.

The composition and properties of the higher fractions of Esthonian shale oil and their possible application as lubricating oils. J. HÜSSE. *Sitzb. Naturforsch. Ges. Univ. Tartu* **36**, 127–50(1929).—The crude shale oils and distillates differ greatly from crude petroleum oils and their distillates. The lower-boiling constituents are similar to fractions of cracked crude oil, while the higher-boiling oils, the lubricating-oil fractions, are distinguished by a higher lubricating value and by a lower resistance to heat and air. They also have a higher viscosity (at lower temps.) than lubricating oils from crude petroleum oils. The distillates are high in S and O compds. and contain Cl. O compds. are represented by phenols, carbonic acids and bases. O compds. decrease with decrease in the boiling points of the fractions. The neutral oils contain esters, hydroxyl and carbonyl compds., as well as other O compds. which were not detd. The last statement is true of S and Cl compds. The oils are highly unsatd. and therefore very unstable. Up to 35% of neutral oils was obtained by a vacuum distn. which yielded 25–30% of refined oils. Treatment with reagents causes polymerization and condensation but not oxidation. Tables and other data are given. A. A. BOEHTLINGK

Gaseous products of shale retorting. Their composition and possible utilization. ALFRED W. NASH. *J. Inst. Petroleum Tech.* **16**, 626–34(1930).—See *C. A.* **24**, 3105. E. C. K.

Effect of temperature on formation of fatty acids in oxidation of paraffin wax. I. GUIF AND A. PLOTKO. *Azerbaĭdzhanskoe Neftyanoe Khozyaĭstvo* **1930**, No. 9, 108–16.—Increase in velocity of the air blown through heated paraffin wax has almost no effect on the total amt. of acids formed, but decreases the yield of acids sol. in petr

ether, increases the yield of oxy acids and decreases the mol. wt. of the oxidation products. Similar effects are produced by increasing the time of oxidation to over 30 hrs. at 150°. Increase in temp. increases the velocity of oxidation and the yield of acids insol. in petr. ether. At 125° oxidation is rather slow, the yield of oxy acids diminishes and the mol. wt. of the oxidized products decreases in comparison with higher-temp. runs. At 175° the reaction velocity is high but a considerable amt. of oxy acids is formed, the color of the products is poor and the loss is high. Expts. show that 150° is the best temp. for oxidation of paraffin wax to fatty acids as the yield and the mol. wt. of the acids formed are relatively high. Some oxy acids are, however, produced, but their yield can be controlled by discontinuing oxidation of the wax at the proper time. Oxidation of the unsaponifiable residue from the oxidized paraffin wax for 13 hrs. at 150° failed to yield oxy acids. High oxidation temps. have an unfavorable effect on the color of the acid formed. V. KALICHEVSKY

The action of treating on the oxidizability and oiliness of lubricating oils. N. I. CHERNOZHUKOV AND A. M. GUTZAIT. *Neftyanoe Khozyaĭstvo* **18**, 806–17(1930).—Emba spindle oil had the highest oiliness when treated with 15% of fuller's earth. The degree of wetting is independent of the acidity of the oil. The color of the oil is directly proportional to the amt. of fuller's earth used. A treatment with 5% of SiO_2 gel is equiv. to treatment with 18% of fuller's earth. Oxidation tests carried out by blowing O_2 at 120° through oil showed that Emba distillate forms a ppt. of asphaltic character after being treated with fuller's earth at 50°, while Baku spindle-oil distillate seps. hydroxy acids under the above conditions. A fuller's-earth treatment together with air agitation at 150° is more efficient and absorbs the asphalt more rapidly. Both oils on being treated with 3% of H_2SO_4 produce a stable product provided that the suspended matter has sufficient time to settle out. An addnl. treatment with 10% alc. soln. improves the stability. A stable oil is then obtained after fuller's-earth treatment. A quite stable Emba spindle-oil distillate is obtained after treatment with 1% of acid and 2% of silica gel, while for Baku distillate 1% of acid and 2–3% of fuller's earth are required. The addn. of 1% of sulfonic acids to Baku machine oil makes it resistant against oxidation. Eighty % of fuller's earth is required to stabilize Baku distillate if this is the only treatment. Residual fuel oil (mazout) was treated with 10% of H_2SO_4 at 60° and the upper layer taken out and treated with 10–15% of fuller's earth at 200° for $^1/_2$ hr. A stable oil was obtained. A. A. BOEHTLINGK

Bituminous pipe coatings. RUSSELL R. BRANDT. *Metal Cleaning and Finishing* **2**, 799–802(1930).—Coal-tar pitch, if used for a protective coating, should be refined by distn. to remove light oils. This operation will render the tar more resistant than asphalt, although it is affected by changes in temp. This defect can be overcome to some extent by a more thorough refining of the tar and also by a careful blending with drying oils or with other pitches. Several brands of bituminous coating on the market have a coal-tar base and show real merit. Coal tar primer coats seem to give quite satisfactory results if they are coated with a proper finish. Care must be taken in applying a cold-cut primer of this type because the solvents will usually flash at or below room temp. Furthermore, air bubbles are easily entrapped and porous coats result. Natural asphalts, as they are taken from the lakes, differ considerably in character and do not, even after refining, have the desired characteristics. They must be blended, usually with other asphalts, to produce the desired consistency and temp. range. Petroleum pitch is a compd. which has the properties of an asphalt. The manuf. can be regulated so as to give a product that meets the required specifications. Two or more asphalts of this type may be blended or a natural asphalt incorporated, to give certain desired characteristics. In coating the pipes with bituminous materials other than primers, the method of dipping is ordinarily used. Various methods are described in detail. In the manuf. of emulsions of asphalt and water, lately appearing on the market, the asphalt is broken up into particles with a diam. of $^1/_{5000}$–$^1/_{10,000}$ in. in the presence of H_2O and a small % of an inert mineral colloid such as clay. This material has the consistency of cup grease, but may be thinned with H_2O. It may be applied by brushing or preferably by spraying. When the water evaps., after application the min. particles of asphalt coalesce and give a uniform film of pure asphalt. D. T.

Surface tension-temperature curves of asphalt bitumens and similar products. F. J. NELLENSTEIJN AND N. M. RODENBURG. *Kolloid-Chem. Beihefte* **31**, 434–46 (1930).—Surface tension-temp. relationships were detd. according to the Jäger drop method on the micelles and on the medium and the interfacial tension between the micelles and the medium for 6 different bitumens. In all cases the surface tension was found to decrease with increase in temp., the curve showing a sharp break at the melting point. The app. and method used are described in detail. D. F. BROWN

Organic matter, P and V in the Black Sea deposits (ARKHANGELSKII, KOPCHENOVA) **8.** Breaking up natural petroleum emulsions or other colloid systems by use of rays of short wave length (U. S. pat. 1,783,471) **13.** Preserving rubber (Brit. pat. 332,764) **30.** Distilling carbonaceous material such as wood, lignite, coal, shale, etc. (U. S. pat. 1,781,871) **21.** Apparatus for gravity separation and recovery of oils and grease from garage waste, etc. (Brit. pat. 332,569) **1.** Thick walled electrically welded metal pressure vessels [for oil cracking] (U. S. pat. 1,784,080) **9.** Filtering paper (U. S. pat. 1,784,509) **23.** Recovery of volatile hydrocarbons (Ger. pat. 504,731) **13.**

Storage of petroleum liquids containing volatile fractions. THOMAS S. COOKE and JOHN E. ROUSE (to Standard Oil Co. of Ind.). U. S. 1,783,701, Dec. 2. Vapor lines from storage tanks are provided with enlarged sections contg. a flame-arresting material such as a permeable mass of metal. Various structural features are described.

Treating petroleum oils containing sulfur. GEORGE J. ZISER and JAMES H. OSMER (to Standard Oil Co of Calif.). U. S. 1,784,215, Dec. 9. The oil is treated with an aq. soln. of a Cu salt such as a Cu NH_4 salt contg. dissolved O. App. is described.

Revivifying spent clays used for decolorizing and clarifying petroleum oils. WIRT D. RIAL and WHITFORD R. BARRATT (to Richfield Oil Co. of Calif.). U. S. 1,782,744, Nov. 25. The spent material is washed with a solvent such as naphtha to remove petroleum-oil constituents, and the coloring matter is then extd. from the clay with a solvent obtained from acid sludge by sepg. the water-sol. constituents, and the treated clay is hydrated.

Solvents from partial oxidation products of petroleum. JOSEPH H. JAMES (to Clarence P. Byrnes, trustee). U. S. 1,782,963, Nov. 25. Partial oxidation products contg compds. in the range from alcs. to org. acids are fractionated up to about 300° to 325°, and sepd. into different portions. U. S. 1,782,964 relates to the use of a selective solvent such as alc. for sepg. different portions of similar partial oxidation products.

Treating hydrocarbon materials such as sulfur-containing petroleum oils with hydrogen. DONALD L. THOMAS. U. S. 1,781,826, Nov. 18. Materials such as oils to be desulfurized are brought into intimate contact with substantially dry, O-free, electrified atomic H previously produced in an elec. arc so that reaction between the material treated and the H takes place in a zone out of the direct influence of the arc. App. is described.

Dewaxing petroleum oil. LEO D. JONES (to Sharples Specialty Co.). U. S. 1,784,525, Dec. 9. In dewaxing petroleum oil which contains cryst. wax and amorphous wax, the temp. of the oil is reduced and the wax is removed which ppts. in amorphous form while the oil contains those impurities which naturally occur in petroleum oil and which cause all of the wax pptd. in the oil by reduction of temp. to be in the amorphous state. Various details of procedure are described.

Alkaline treatment of petroleum vapors. RAYMOND C. WHEELER and PAUL W. PRUTZMAN U. S. 1,784,262, Dec. 9. A mixt. of oil vapors and steam is brought into contact with NaOH soln. without substantial condensation of the petroleum vapors, thus producing a reaction product substantially insol. in the soln., and a body of the soln. is maintained in continuous contact with the vapor mixt. and at such concn. as to neither evolve nor absorb a material quantity of steam during the treatment. Contact of the soln. with the vapors is effected (in an *app.* which is described) by cyclic counterflow, and the reaction product is withdrawn from the body of the soln. without discontinuing the operation.

Apparatus for dehydrating petroleum emulsions by electric treatment. JOHN T. WORTHINGTON (to Petroleum Rectifying Co. of Calif.). U. S. 1,783,595, Dec. 2. The emulsified material to be treated is introduced within an inner perforated rotatable electrode and passed through the perforations of this electrode into a surrounding drum which constitutes the other electrode.

Condenser suitable for use in petroleum distillation. PHILIP B. SADTLER (to Swenson Evaporator Co.). U. S. 1,783,369, Dec. 2.

Fractional extraction of petroleum hydrocarbons with alcohol. THEODORE A. WERKENTHIN (to Solar Refining Co.). U. S. 1,783,203, Dec. 2. Oil is successively extd with alc. at an elevated temp. which, however, does not exceed the b. p. of the alc., and each successive alc.-extn. product is cooled to a low temp. to decrease the soly. of the oil in the alc. and permit the oil to settle out, the cooling being so effected as to allow about 1–3% of alc. to be retained in the oil to decrease its viscosity and permit it to be easily pumped, and the oil is cold-pressed in the presence of the alc. so that crystal formation of the wax is improved. An arrangement of app. is described. Cf. *C. A.* 24, 4146.

Cracking petroleum oils. CARBON P. DUBBS (to Universal Oil Products Co.). U. S. 1,783,228, Dec. 2. Oil is passed through a series of stills of successively increasing temp., vapors are taken off from each still and passed to a reflux condenser individual to each still, and the reflux condensate sepd. from the vapors is passed to a still of higher temp. than that from which they were derived; vapors not condensed in the reflux condenser connected to a still of higher temp. are passed directly through the reflux condenser connected to a still of lower temp. and vapors are finally taken off from the reflux condenser connected to the still of lower temp. An arrangement of app. is described. U. S. 1,783,229 describes an app. and process in which oil is passed through a narrow annular passage adjacent to the walls of the still where the oil is subjected to a cracking temp., followed by the discharge of the heated oil from this narrow passage to a main interior chamber of the still where it is maintained out of contact with the oil being heated in the narrow passage; vapors from the main chamber are subjected to reflux condensation and reflux condensate is returned to the narrow passage; residuum is withdrawn from the interior chamber and the app. is maintained under superatm. pressure. Cf. *C. A.* **24**, 3637.

Cracking petroleum oil. GUSTAV EGLOFF and JACQUE C. MORRELL (to Universal Oil Products Co.). U. S. 1,783,231, Dec. 2. Oil is heated to a conversion temp. in a heating zone such as pipe coils in a furnace and passed to a conversion zone such as an insulated tank where it is maintained in a body with dephlegmation and condensation of evolved vapors and passage of uncondensed gases through an adsorbent substance such as charcoal which takes up vapors entrained by the gases; the adsorbed substances are driven off by treating the adsorbent material with heated gases of combustion from the heating zone so regulated as to relieve the substance of adsorbed products and the products thus driven off are condensed. App. is described. Cf. *C. A.* **25**, 198.

Cracking petroleum oil. ROBERT T. POLLOCK (to Universal Oil Products Co.). U. S. 1,783,259, Dec. 2. Oil is subjected to cracking temp. and pressure (suitably in a pipe coil), high-boiling fractions of the evolved vapors are sepd. from the low-boiling fractions in the form of a condensate, and the condensate while still hot is subjected to increased cracking temp. and pressure; another body of oil is simultaneously distd., evolved vapors are sepd. according to their b. ps. and the condensate thus formed is commingled with the oil in one of the pressure zones. App. is described. Cf. *C. A.* **25**, 198.

Cracking hydrocarbons. GEORGE C. HARGROVE and WALTER B. MONTGOMERY (to Gasoline Products Co.). U. S. 1,784,065, Dec. 9. A stream of heavy hydrocarbons is forced under pressure through a cracking app. and raised to a cracking temp., and the supply of the heavy hydrocarbon material is shut off whenever the deposition of C renders it desirable to remove it and the heavy hydrocarbons in the app. are displaced by a relatively light hydrocarbon distillate, the supply of heat to the app. is then shut off and the pressure on the material then in the app. is reduced. An arrangement of app. is described.

Cracking hydrocarbons. JOSEPH G. HAWTHORNE (to Walter M. Cross). U. S. 1,782,686, Nov. 25. Oil is raised to a conversion and vaporizing temp. in a primary heating zone such as pipe coils and the vaporized material is reheated and superheated under reduced pressure in a sep. zone, the vapors are cooled to a predetd. temp. selected to effect sepn. of the heavier liquid and lighter vapor constituents in a sepg. stage, the vapor constituents are subjected to reflux condensation, and vapors not condensed in the refluxing are subjected to a final condensation. Heavier liquid divided out in the sepg. stage is diverted from the system, and a balanced pressure is maintained between the hydrocarbon vapors within the conduits in the superheating zone and the combustion gases in the enclosure surrounding the conduits, in order to permit use of conduits of refractory ceramic material. Various details of app. are described.

Cracking hydrocarbons in liquid phase. JOHN C. BLACK (to Gasoline Products Co.). U. S. 1,782,676, Nov. 25. A primary supply of material is heated by a furnace to cracking temp. and the material is then discharged into a carbon-pptg. and reaction chamber, and throughout the cracking system there is maintained sufficient pressure to prevent vaporization of the hydrocarbons; simultaneously, there is heated in a tubular heater such as a pipe coil a secondary supply of hydrocarbon material in the terminal combustion spaces of the primary heating furnace, also under pressure to prevent substantial vaporization. Various details of app. are described. Cf. *C. A.* **24**, 5147.

Cracking hydrocarbon oils. EDWIN W. BEARDSLEY and MYRON W. COLONY (to Petroleum Conversion Corp.). U. S. 1,784,126, Dec. 9. A heated carrier gas such

as residual gases, comprising H and CH_4, and steam, is introduced into a reaction chamber where it mingles with vapor of the oil to be converted; conversion products from the reaction chamber are passed through a heat exchanger, with sep. vaporization of the incoming hydrocarbon material and passage of the produced vapor in heat-exchange relation with the products of reaction in the heat exchanger and thence into the reaction chamber. The heat-carrier gas entering the cycle is passed into heat-exchange relation with the products in another heat exchanger and thence to a gas-heating device and to the reaction chamber to serve as a heating agent. Reaction products are condensed. Details of app. arrangement are described. Cf. *C. A.* 24, 4385.

Cracking hydrocarbon oils. JOHN E. BELL and EDWARD W. ISOM. (to Sinclair Refining Co.). U. S. 1,782,056, Nov. 18. Oil is passed through a heating coil in which it is heated to conversion temp. and is discharged into an enlarged conversion chamber and vapors from the latter are passed to a dephlegmator; reflux condensate from the dephlegmator is returned to the heating coil, vapors from the dephlegmator are condensed and the distillate collected; unvaporized oil from the conversion chamber is circulated through an independent heater in which it is subjected to a lower temp. than the oil in the heating coil and thence back to the conversion chamber, and superatm. pressure is maintained on the oil undergoing conversion. App. is described.

Cracking hydrocarbon oils. DAVID G. BRANDT (to Doherty Research Co.). U. S. 1,784,087, Dec. 9. A body of oil is maintained in a cracking zone and oil from this zone is passed through a heating zone such as heating tubes at a relatively high velocity so that a portion of the oil is vaporized; unvaporized oil is passed at a relatively low velocity from the heating zone directly into the body of oil in the cracking zone, and the vapors from the heating zone are passed independently from the heating zone and are caused to percolate through the body of oil in the cracking zone. App. is described.

Cracking hydrocarbon oils. WM. BRINK and GEORGE L. HESS (to General Oil Products Co.). U. S. 1,783,697, Dec. 2. Small quantities of a heated topped oil are delivered to a large body of oil, a portion of which continuously flows through a horizontal lower drum and past C settling chambers and then up through towers of smaller diam.; this latter portion of the oil is heated to a cracking temp. and the partially cracked oil is discharged at an angle to the larger body of oil so as to create a froth at the oil level, and vapors arising from the main body of oil are condensed. App. is described.

Cracking hydrocarbon oils. RICHARD J. DEARBORN (to Texas Co.). U. S. 1,783,010, Nov. 25. Oil is passed through a heating coil in which it is heated to substantially cracking temp., delivered to a cracking drum where a body of oil collects, and oil is simultaneously cracked in vapor phase and the resulting cracked vapors and gaseous products are passed in indirect contact with the body of oil mentioned to maintain a cracking temp. in it and effect cracking of the oil in liquid phase. App. is described. Cf. *C. A.* 24, 6001.

Cracking hydrocarbon oils. JACQUE C. MORRELL and HARRY P. BENNER (to Universal Oil Products Co.). U. S. 1,783,257, Dec. 2. Oil is heated to cracking temp. under pressure (suitably in pipe coils) and discharged to a reaction zone such as an expansion chamber maintained under superatm. pressure, sepd. vapors are removed and unvaporized oil is separately removed from the reaction zone, pressure on the unvaporized oil is reduced to effect partial distn., resulting vapors are refluxed and the reflux condensate is directly injected into the oil in the reaction zone to prevent C from settling out. An arrangement of app. is described.

Cracking hydrocarbon oils. HORACE K. ROGERS (to Sinclair Refining Co.). U. S. 1,781,884, Nov. 18. A gas and vapor mixt. is taken off from the cracking operation, including vapors of the desired product, the desired product is condensed from the mixt., and the gases and vapors then remaining uncondensed are scrubbed with an absorbent menstruum and the latter with its absorbed constituents is passed in indirect heat-exchange relation with the gas-vapor mixt. from which the desired product is condensed, thus vaporizing absorbed constituents from the menstruum. An arrangement of app. is described.

Cracking hydrocarbon oils. JOSEPH H. WELCH. U. S. 1,784,562, Dec. 9. A hydrocarbon material is heated at a cracking temp., vapors are withdrawn from the heating zone and passed in finely divided condition through a body of heated liquid hydrocarbon material such as fresh stock in a reflux system, and entrained oil and C particles are sepd. from the hydrocarbon vapor centrifugally, the vapor is passed through another body of heated hydrocarbon liquid, followed by fractionation and condensation. App. is described.

Cracking and refining hydrocarbon oils and vapors. ROY CROSS (to Cross Development Corp.). U. S. 1,782,808, Nov. 25. Fractionated vaporous material from the reflux-

ing stage of a cracking system is directed through a bed of a metal compd. such as Cu or Fe or their oxides or other compds. having an affinity for the S compds. in the hydrocarbon vapors, and thence through a bed of highly adsorbent material such as charcoal or clay for further purification. An arrangement of app. is described.

Apparatus for cracking hydrocarbon oils. CARBON P. DUBBS (to Universal Oil Products Co.). U. S. 1,783,185, Dec. 2. A vapor chamber receives products of conversion from a cracking coil in a furnace and a reflux condenser is connected with the vapor chamber. Raw oil is admitted to one of a pair of tanks through a valve actuated by the level of oil in the tank; light residue is discharged from the vapor chamber, and there is supplied to the cracking coil a mixt. of oil from the raw oil tank, light residue from the vapor chamber and reflux condensate from the reflux condenser. Independent means is provided for passing heavy residue from the vapor chamber to the other tank, and discharge of oil from the tank is controlled by the oil level. Various details of construction are described.

Converting hydrocarbon oils into products of lower boiling point. EDWARD E BARTELS (to Standard Oil Co. of Ind.). U. S. 1,782,160, Nov. 18. Oil is heated to conversion temp. in a pipe coil or the like through which it is passed at such a rate as to prevent substantial deposition of coke, is maintained at conversion temp. to effect the desired conversion, vapors formed are dephlegmated in countercurrent to reflux condensate, and all of the fresh oil entering the system is passed in indirect heat conductive relation with uncondensed vapors from the dephlegmating chamber in a reflux condensing zone, condensate thus formed is sepd. and a controlled portion of the condensate is returned to the dephlegmating chamber and the remainder of the condensate is discharged together with the uncondensed vapors into a condenser, and feed stock preheated by the vapors is charged into the pipe-coil heater or like device. App. is described.

Distilling hydrocarbon oils. JEAN DELATTRE-SEGUY (to Universal Oil Products Co.). U. S. 1,782,809, Nov. 25. A relatively thin film of oil is caused to flow by gravity over an unheated inclined surface and a distg. heat is applied solely to the upper surface of the film without heating the film from below, evolved vapors being removed and condensed. App. is described. U. S. 1,782,810 relates to a process involving passing oil to be distd. in a relatively wide shallow stream over an inclined plate and simultaneously heating the upper surface of the film by heat radiated from a hot molten bath such as molten Pb or molten glass. App. is described. U. S. 1,782,811 relates to cracking hydrocarbon oils by flowing the oil in a relatively thin film through a cracking zone maintained under superatm. pressure and applying to the flowing film a cracking heat radiated from a heating surface spaced away from the film, so that carbon deposition within the cracking zone will not interfere with transfer of heat to the film. App. is described.

Distillation of hydrocarbon oils. GEORGE W. WATTS, PHILIP L. KRAUEL and THOMAS E. STOCKDALE (to Standard Oil Co. of Ind.). U. S. 1,784,561, Dec. 9. Superheated steam is supplied to a gradually expanding passage (the temp. of the steam being reduced as it travels through the passage) and oil is supplied to the at least partially expanded steam where the temp. of the steam is less than 500°, steam and oil carried by it are discharged into a conduit at reduced pressure (the conduit being of substantially larger cross-section than the steam passage) and the mass of vapors and oil are caused to pass in steady flow through the conduit before sepn. is effected. App. is described. Cf. *C. A.* **24**, 2592.

Centrifugal dewaxing of hydrocarbon oils. ARTHUR R. GREIG (to Texas Co.). U. S. 1,782,467, Nov. 25. In centrifuging chilled oil to sep. wax, a heating medium such as steam or hot water is periodically introduced into the centrifuge during its operation, at the point where the wax-bearing oil is normally introduced, to remove accumulations of solidified wax and moisture from the working surfaces of the app. App. is described.

Dewaxing mineral oils. ELI F. BURCH (to Crew Levick Co.). U. S. 1,782,028, Nov. 18. A mixt. of chilled mineral oil contg. wax in suspension is continuously introduced into a centrifugal separator bowl by which the wax is sepd. as an outer layer surrounding the oil; a gaseous heating medium such as steam is applied to the outer surface of the separator bowl to melt the wax, and wax and oil are separately discharged. App is described.

Mineral oil composition suitable for use in transformers, as a lubricant or for treating cables, etc. CHARLES F. KAEGEBEHN (to R. T. Vanderbilt Co.). U. S. 1,784,359, Dec. 9. A "fraction of 1%" (suitably about 0.2–0.5%) of a hydroxybiphenyl such as

4-hydroxybiphenyl is added to mineral oil in order to render it more stable to light, air and elec. action.

Increasing the productivity of oil wells. PAUL E. WORKMAN. U. S. 1,784,214, Dec 9. An electrode insulated from the ground is introduced into the well and immersed in water present in the well and an elec. current of sufficient strength to effect electrolysis of the water is supplied to the electrode.

Apparatus for separating oil from natural gas at oil wells. MEINHARDT H. KOTZEBUE (to Trumble Gas Trap Co.). U. S. 1,782,783, Nov. 25. Structural features.

Tube-still furnace suitable for oil treatment. HENRY THOMAS (to Sun Oil Co.). U. S. 1,782,885, Nov. 25.

Gasoline filter. MARTIN E. E. DARDANI (to New England Filter Corp.). U. S. 1,784,622, Dec. 9.

Filter for gasoline, etc. GEORGE F. THOMAS and OTTO J. HERB (to Alemite Corp.). U. S. 1,781,964, Nov. 18. Structural features.

Oil filter suitable for use with internal-combustion engines. CHARLES W. MCKINLEY (to A C Spark Plug Co.). U. S. 1,783,924, Dec. 2.

Lubricant suitable for use in internal-combustion engines. ROSCOE E. CLOUGH (to Castorlube Refining Co.). U. S. 1,782,501, Nov. 25. Castor oil is heat treated at a temp. not exceeding about 310° until no more than 4.2% of the total wt. of the oil has been removed under atm. conditions, and the treated castor oil is mixed with mineral oil in various proportions.

Lubricant and cooling composition suitable for preventing "hot boxes" on railway cars. FRANK C. BROEMAN (to National Products-Supply Co.). U. S. 1,784,220, Dec. 9. One hundred lb. K vegetable-oil soap contg. 60% of water is mixed with water 30, neat's foot oil 3, graphite 3, coconut oil 3 and stearic acid soap 6.25 lb.

Petroleum asphalt. GENE ABSON (to Chicago Paving Laboratory, Inc.). U. S. 1,782,186, Nov. 18. In the conversion of petroleum residuum to blown asphalt having a higher penetration for a given m. p. than can be obtained from the same residuum without treatment, the residuum is incorporated with a relatively small quantity of an inorg. non-alk. earth metallic salt such as chloride of Zn, Fe, Cu or Sb which is nonvolatile at blowing temps. (in insufficient quantity to effect cracking at blowing temps.), and the residuum is heated and blown with air.

Methanol from pyroligneous acid liquor. JESSE M. COAHRAN. U. S. 1,784,270, Dec 9. MeOH is distd. off from the liquor and fractionated to a concn. above substantially 27% (Tralle's scale), the product is dild. with water sufficiently to cause the dissolved oils to pass out of soln., and the oils are filtered out. An arrangement of app. is described.

Absorption of acetic acid. VEREIN FÜR CHEM. INDUSTRIE A.-G. (Eduard Löw, inventor). Ger. 504,722, Feb. 5, 1926. AcOH is absorbed from the vapors given off in the carbonization of wood by passing the vapors into a suspension of porous "acetone-ash" (the residue left by heating $(AcO)_2Ca$ to form acetone) in water or in $(AcO)_2Ca$ soln.

23—CELLULOSE AND PAPER

CARLETON E. CURRAN

Fifty years of German cellulose industry. R. O. HERTZOG. *Z. angew. Chem.* **43**, 1017–8(1930). E. H.

The year's technical developments in rayon manufacture. HAROLD DEWITT SMITH. *Textile World* **78**, 1490–3(1930). RUBY K. WORNER

Reduction of the viscosity of nitrocellulose in manufacture. HANNS SCHMIDT. *Nitrocellulose* **1**, 169–71(1930); cf. Milliken, *C. A.* **24**, 2597. E. M. SYMMES

Investigation of cotton and cellulose for nitrocellulose plants. M. STEUDE. *Nitrocellulose* **1**, 193–5(1930).—A review. E. M. SYMMES

Highly polymerized compounds. XXXIX. Cellulose (STAUDINGER, *et al.*) **10.** Highly polymerized compounds. XLI. Molecular weight determinations on acetylcelluloses (STAUDINGER, FREUDENBERGER) **10.** Ti acid sulfate (U. S. pat. 1,783,684) **18.** Storage vessel for viscose and like masses (Ger. pat. 506,147) **1.**

Cellulose. I. G. FARBENIND. A.-G. (Rudolf Müller and Karl Horst, inventors). Ger. 506,229, Aug. 23, 1927. Ligneous materials are opened up by treatment at a temp.

not exceeding 45° with a $Ca(OCl)_2$ soln. contg. at least 2% of active Cl and maintained feebly alk. with $Ca(OH)_2$, the soln. being taken in the exact amt. required for the complete oxidation of the lignin. Examples are given.

Cellulosic material from sugar cane. EUGENIO A. VASQUEZ (to Vazcane Process, Inc.). U. S. 1,782,751, Nov. 25. An abraded sugar cane from which substantially all sugar has been removed is suitable for manuf. of paper, pulp board, etc. App. and details of treatment are described.

Rotary suction-filter drum for cellulose manufacture. MASCHINENFABRIK BUCKAU R. WOLF. A.-G. Ger. 504,706, May 7, 1926.

Preparing cellulosic material for esterification. CAMILLE DREYFUS and GEORGE SCHNEIDER (to Celanese Corp. of America). U. S. 1,783,184, Dec. 2. Cellulosic material such as cotton linters or purified wood pulp is subjected to a vacuum and treated, while under reduced pressure, with a heated lower aliphatic acid such as formic, acetic, butyric or propionic acid until all portions of the material are in suitable condition for esterification.

Sulfonated cellulose derivatives. I. G. FARBENIND. A.-G. (Georg Kränzlein, Arthur Voss and Franz Brunnträger, inventors). Ger. 504,630, Sept. 11, 1926. Alkali cellulose is treated with sulfonic acids of aralkyl halides. In the example, cotton is kneaded with alc. NaOH for 2 hrs. and sulfonated with Na α-chloro-*o*-toluenesulfonate

Cellulose esters. BRITISH CELANESE, LTD., and CELANESE CORP. OF AMERICA Brit. 332,607, April 17, 1929. Various cellulosic materials are rendered more reactive to esterification by pretreatment with org. acid anhydrides such as Ac_2O or propionic anhydride either alone as liquid or mixed with a liquid hydrocarbon material such as C_6H_6 or as a vapor which may be dild. with air, N or CO_2, and after this pretreatment the material is preferably (but not necessarily) given a further pretreatment with org. acid (preferably one serving in the subsequent esterification after addn. of a condensing agent). Numerous details of procedure are described. Brit. 332,608 involves a modification of the pretreatment, in which the cellulosic material is first treated with one or more org. acids and then with one or more org. acid anhydrides with or without org. acids, and also describes numerous details of procedure.

Cellulose ester films. SAMUEL E. SHEPPARD and JAMES G. MCNALLY (to Eastman Kodak Co.). U. S. 1,784,758, Dec. 9. Substantially flat laminated films comprise at least 2 laminae with their grain at an angle to each other.

Mixed organic acid and nitric esters of cellulose. FRANZ BECKER (to I. G. Farbenind. A.-G.). U. S. 1,783,771, Dec. 2. A cellulosic material such as cotton is treated with an org. esterifying agent such as Ac_2O in the presence of an acylation catalyst such as H_2SO_4 which will not react with HNO_3 in the course of the process, and, after partial esterification, the intermediate product is reacted on with HNO_3. The product is suitable for *film manuf.*

Acetylcellulose composition suitable for films, lacquers, etc. OSKAR LOEHR (to I. G. Farbenind. A.-G.). U. S. 1,783,176, Dec. 2. Acetylcellulose is used with an ester of a polyglycol such as diethyl eneglycol dibenzoate, and a solvent and diluent such as acetone and cyclohexanone.

Partly hydrolyzed cellulose acetate. SAMUEL I. VLES. U. S. 1,782,796, Nov. 25. A soln. of cellulose triacetate (suitably with use of glacial HOAc as the solvent) is treated with dil. H_2SO_4 at a temp. of about 20° for about 6 days. The product thus obtained gives solns. with acetone of a viscosity about $1^1/_2$ times that from a somewhat shorter treatment.

Mercerized wood fiber for conversion into derivatives such as nitrocellulose. MILTON O. SCHUR and ROYAL H. RASCH (to Brown Co.). U. S. 1,783,313, Dec. 2. A mercerized wood fiber suitable for nitration is prepd. by treating a product such as wood-fiber tissue with NaOH soln. of mercerizing strength. Cf. *C. A.* **24**, 2290.

Apparatus for preparing viscous mixtures such as solutions of cellulose or its esters. WM. L. SMITH (to Viscose Co.). U. S. 1,782,370, Nov. 18. Structural features.

Viscose for artificial silk manufacture. F. STEIMMIG and ERSTE BÖHMISCHE KUNSTSEIDEFABRIK A.-G. Brit. 332,628, Feb. 28, 1929. In order to control the rate of ripening of viscose to which substances such as multivalent alcs. or sugars have been added (which have a coagulating action and also tend to diminish oxidation of the H_2S), there is added to the viscose either substances that retard ripening such as sulfites, amides or imides, or an arsenite or a mixt. of such substances, such as Na arsenite and urea.

Artificial textile products (of reduced luster) from viscose solutions. THEODOR KOCH (to Algemeene Kunstzijde Unie N.-V.). U. S. 1,784,014, Dec. 9. In prepg. a soln. of viscose contg. PhCl (which may be used with $C_6H_4Cl_2$) for spinning into arti-

ficial silk threads with reduced luster and of a size below 6 denier, the soln. is emulsified (suitably by a homogenizing app.) to such an extent as to form particles of PhCl of a diam. which is a function of the denier number of the threads to be produced (which diam. varies according to the formula $D^2 = c(a^2 + a)$, in which D is the denier no., a the largest allowable diam. of the particles in microns, and c is a const. (which for normal viscose is about 0.67). Cf. *C. A.* 25, 205.

Exchangeable filter suitable for artificial-silk-spinning apparatus. WALDEMAR ZUR LÖWEN (to American Bemberg Corp.). U. S. 1,784,103, Dec. 9. Structural features.

Pumping unit for artificial-silk-spinning apparatus. CHARLES W. LAWSER (to Wicaco Machine Corp.). U. S. 1,783,439, Dec. 2. Structural features.

Apparatus for dry spinning cellulose derivative solutions for artificial silk manufacture. HENRI F. NIOGRET (to DuPont Rayon Co.). U. S. 1,782,581, Nov. 25. A cell which may be heated is directly connected by a single large aperture with a condenser which may be cooled.

Artificial filaments. BENNO BORZYKOWSKI. Ger. 492,279, Sept. 19, 1922. Fine filaments are manufd. by spinning fresh or only slightly ripened viscose, having a cellulose content of 10% or more, into a feebly acid bath with high salt content, the filaments being stretched before they are converted into cellulose hydrate.

Cooking cellulosic materials to obtain fiber. GEORGE A. RICHTER (to Brown Co.). U. S. 1,781,733, Nov. 18. Material such as wood chips is cooked in a soln. of Na_2CO_3 to dissolve a portion of its cementitious content and is then cooked in a soln. of Na sulfide to effect fiber liberation.

Fibrous material from sugar cane. JOAQUIN J. DE LA ROZA, SR. (to Bagasse Products Corp.). U. S. 1,782,869, Nov. 25. The fibrous part of the cane is treated with substantially neutral water at a temp. (suitably about 160°) sufficient to remove or transform most of the substances combined with the fibrous part, the treatment being effected in the substantial absence of air. The product is suitable for *paper manuf.* and other uses. Cf. *C. A.* 24, 2880.

Bleaching vegetable-fiber pulp. DENNIS C. ANDREWS (to Northwest Paper Co.). U. S. 1,782,800, Nov. 25. Bleach liquor is caused to flow through a relatively quiescent slurry of pulp at normal pressure and temp. and maintained in contact with the pulp to effect the desired bleaching. An arrangement of app. is described.

Wood pulp. JOSEPH H. WALLACE (to Pine Waste Products, Inc.). U. S. 1,781,712, Nov. 18. In pulp manuf., excess moisture is removed from a mass of wood chips by treating the mass with steam in the presence of heated gases, and the mass is then immediately transferred to a digester. App. is described.

Refining wood pulp. GEORGE A. RICHTER and MILTON O. SCHUR (to Brown Co.). U. S. 1,784,161, Dec. 9. Unbleached wood pulp is treated with an oxidizing agent such as $Ca(OCl)_2$ or Cl until the residue from this treatment shows a max. α-cellulose content and this residue is then digested in an alk. liquor such as dil. hot NaOH soln. under such conditions as further to increase the α-cellulose content and produce a fiber well adapted for *paper-making;* the digested pulp is then bleached. Cf. *C. A.* 24, 3648.

Apparatus for producing and refining wood pulp by grinding and screening. LINUS A. BRAUN. U. S. 1,784,039, Dec. 9. Structural features.

Circulating apparatus (with an upright Venturi tube) for wood-pulp digesters. ALBERT G. NATWICK. U. S. 1,784,197, Dec. 9. Structural features.

Digester for decomposing vegetable fibers for paper manufacture. GASTON AMÉDÉE MOURLAQUE. Ger. 504,613, Sept. 11, 1927.

Paper. HEINRICH EGGERS (5% each to Alexander Orgovan, Otto S. Leszay and Irving Matusoff). U. S. 1,782,382, Nov. 18. Fibrous plant material such as stalks, leaves, husks or shells together with a mixt. of waste paper and powd. chalk is subjected to the action of a soln. of NaOH in a closed converter under superatm. pressure, in order to obtain a paper-making material.

Paper. KÖNIGSBERGER ZELLSTOFF-FABRIKEN UND CHEMISCHE WERKE KOHOLYT A.-G., HEINRICH KIRMREUTHER and WALTER COLDITZ. Ger. 504,705, June 24, 1928. In working up wood and other fiber into pulp in water, sufficient acid or acid salt is added to reach the neutral point of methyl orange, to prevent sepn. of the Fe compds. in the fiber, and so prevent ultimate discoloring.

Filtering paper. WALTER S. BAYLIS (to Filtrol Co. of Calif.). U. S. 1,784,509, Dec. 9. A filtering paper which is suitable for filtering and decolorizing oils, gasoline, etc., contains an acid-activated clay which contains no free acid.

Dewatering paper, etc., sheets. ALOIS DANNINGER, HERBERT SCHMOLKA and RICHARD KASTNER. Austrian 118,876, Apr. 15, 1930. In dewatering paper, etc.,

sheets by repeated pressing, the sheet is heated, before the last pressing, by radiation devices not in contact with the sheet, *e. g.*, by elec. heating lamps. This reduces the viscosity of the water, so that more is extd. by the final pressing.

Paper-making apparatus. HARRY LIEBECK (to Scott Paper Co.). U. S. 1,781,928, Nov. 18. Structural features.

Paper-making apparatus. WM. H. MILLSPAUGH (to Paper & Textile Machinery Co.). U. S. 1,783,969–70, Dec. 9. Mech. features.

Paper-making apparatus. FRIEDRICH SCHIEBUHR (to Siemens-Schuckertwerke A.-G.). U. S. 1,784,545, Dec. 9. Mech. features.

Wet-felt for paper machine. RICHARD KASTNER. Ger. 506,409, Dec. 18, 1927.

Press roll for use in paper manufacture. MAX WENZEL. U. S. 1,783,868, Dec. 2. Structural features.

Paper-coating composition. DONALD B. BRADNER and CHARLES H. MILLIGAN (to Champion Coated Paper Co.). U. S. 1,781,716, Nov. 18. Clay or other mineral pigment is used with a chlorinated protein adhesive such as chlorinated casein.

Recording paper suitable for typewritten impressions, etc. CHARLES W. MAYER and EVERETT F. SILLER. U. S. 1,783,442, Dec. 2. A deeply colored paper stock is covered with a waxy crystd. coating of contrasting color and with an outer layer of inert powder such as talc.

Paper for photographic purposes. G. T. LANE (to Kodak, Ltd.). Brit. 332,745, March 1, 1929. Paper suitable for use as a support for photographic emulsions is prepd. by sizing wood-pulp fiber (preferably having an α-cellulose content greater than 90% in the beater) with a saponified satd. fatty acid having an I no. less than 40 (and preferably less than 5). A size from triple-pressed stearic acid is suitable and the size may be pptd. with salts such as Al sulfate, $MgSO_4$, $CuSO_4$ or K, NH_4 or Cr alum.

Filter paper. FRED W. MANNING (to Filter Fabrics, Inc.). U. S. 1,782,785, Nov 25. In making filter paper, cellulose fibers, with or without asbestos, etc., are dispersed in an inert liquid (such as an oil, glycerol or a sugar soln.) having sufficient surface tension completely sep. to the fibers for filtration purposes 1,782,784 describes an app. and procedure for filter sheet manuf.

Use of bagasse in wall board manufacture. WM. L. S. WILLIAMS (to Hawaiian Cane Products, Ltd.). U. S. 1,782,755, Nov. 25. The fibrous portion is sepd. from the pith portions of bagasse, and the fibrous portion is digested (suitably with Ca(OH)$_2$ under steam pressure) to produce a clear fiber. The pith portion is cooked with water to effect the desired degree of hydration, and the resulting stocks are mixed.

Apparatus for making felted fiber board. EDWARD S. SHEPERD (to Albert D Stewart). U. S. 1,782,214–15, Nov. 18. Structural features.

24—EXPLOSIVES AND EXPLOSIONS

CHARLES E. MUNROE

Measuring the coefficients of thermal expansion of some explosives. TROV. *J. Chem. Ind.* (Moscow) **6**, 1686–8(1929).—Coeffs. of thermal exp, detd. for T. N. T., dinitronaphthalene, picric acid, molten mixts. of picric naphthalene and picric acid-naphthalene by means of a modified Dulo method. The quant. compn. of the above mixts. is not given. The meth are described. These data do not appear in either the "International Crit. Landoldt-Börnstein's Phys. Chem. Tables. ROBERT

Absolute amount of radiant heat emitted during gaseous explosions. AND K. TAWADA. *Trans. Faraday Soc.* **26**, 600–5(1930).—During the ex mixt. of H_2 and O_2 in a narrow, cylindrical bomb 2.83% of the heat of co radiated through a quartz window, and 23.94% during explosion of a dry and O_2 in the same bomb through a fluorite window. The latter result agr obtained by Garner and Roffey (*C. A.* **23**, 4406) indirectly. The large radiation from the CO–O_2 explosion on drying the gases is probably chemil E. M.

Detonation of solid explosives. W. E. GARNER. *Trans. Faraday Soc* (1930).—From consideration of mol. layers of the space lattice of Rb azide a is derived for the rate of reaction on detonation. E. M.

Inflammability of hydrogen. XI. Prevention of flame propagation in air mixtures by wire gauze. YOSHIO TANAKA AND YAZABURO NAGAI. *J. Ind., Japan* **33**, Suppl. binding 361–4(1930); cf. *C. A.* **24**, 4394.—Extinctio

ropagating in H_2-air mixt. by wire gauze is easier if explosion suppressors, such as $SnMe_4$, $PbMe_4$, C_6H_6, are present in small amts., due to the rise in theoretical flame-ropagation temp. of H_2 so caused. The speed of flame is higher at a distance from the oint of ignition than near it, so that at the distant point a finer gauze is necessary.
E. M. SYMMES

Blasting cast-iron retorts. LOHR. *Nitrocellulose* **1**, 195-6(1930).—The retort was illed with water. The charge was 500 g. of compressed gun cotton, detonated by 50 g. f gelatin dynamite and a blasting cap. E. M. SYMMES

Initiating explosives. ALFRED HEINEMANN. *Nitrocellulose* **1**, 196-8(1930).—A eview. E. M. SYMMES

Ignition of carbon monoxide-oxygen mixtures: the effect of impurities. A. KEITH ...EWER AND W. EDWARDS DEMING. *J. Am. Chem. Soc.* **52**, 4225-33(1930).—The elation $VP = k$ of ignition voltage and pressure of a $2CO-O_2$ mixt. holds also for ex-losive mixts. of O_2 with EtOH, Et_2O and CS_2. k is different for each mixt. Impurities resent are pos. and neg. catalysts; the former lower ignition voltage and the latter aise it. Vapors that burn to H_2O as 1 product are pos. catalysts if present in small uantities, and neg. catalysts if present in large amts. Pos. action of a catalyst is due o H_2O formed before ignition of the main mixt. If sufficient O_2 is present, all impurities which form H_2O are pos. catalysts. The hyperbolic, quant. relation $(V-b)(p+a) = c$ s derived, where $p + a$ is the pressure of the explosive mixt. added as impurity, V gnition voltage and b, c are consts. for each catalyst. E. M. SYMMES

Emulsions and suspensions of various kinds (Brit. pat. 332,533) **13.**

Nitrocellulose propellant explosive. CHARLES H. KECK. U. S. 1,784,189, Dec. 9. n colloiding nitrocellulose, it is incorporated with a nitroaromatic such as T. N. T. to which has been added only sufficient solvent to carry the nitroaromatic material into oln. and the material is subjected to pressure and heat.

Projectiles for signaling or illuminating purposes. LOUIS L. DRIGGS, JR., and HENRY B. FABER. U. S. 1,782,291-2, Nov. 18. Structural features.

"Salute." ALBERTO CIMOROSI. U. S. 1,783,999, Dec. 9. A container such as asteboard and a sawdust mixt. carries a charge of explosive material such as a mixt. of $KClO_4$, Al and Sb "sulfate" within which is a charge of coloring matter and the device provided with a fuse.

Loading detonator tubes. CLIFFORD A. WOODBURY (to E. I. du Pont de Nemours Co.). U. S. 1,783,372, Dec. 2. The tubes are charged with a mixt. of at least 2 xplosives, at least one of which, such as T. N. T. or erythritol tetranitrate, m. below 100°, nd the charge is heated at least sufficiently to melt the explosive of low m. p. and is hen allowed to solidify by cooling. The other portion of the charge may be formed of tetryl."

25—DYES AND TEXTILE CHEMISTRY

L. A. OLNEY

Azo dyes and their intermediate products. II. Reduction splitting of eriochrome ack and the 1,6-diamino-2-naphthol-4-sulfonic acid (formed). PAUL RUGGLI, A. ERMANN AND F. KNAPP. *Helv. Chim. Acta* **13**, 748-56(1930).—The formula of iochrome black T (Geigy & Co.) was established as Na 1-(1-hydroxy-2-naphthylazo)-nitro-2-naphthol-4-sulfonate. By reduction with $SnCl_2$ it yielded 2-amino-1-naphthol and *1,6-diamino-2-napthol-4-sulfonic acid* which were identified by a series of reac-ns **III. 6-Amino-2-naphthol-4-sulfonic acid as a dyestuff component.** PAUL GLI AND ARTHUR ZIMMERMANN. *Ibid* 756-63.—This is a continuation of *C. A.* **24**, The 2,6,4-$HO(H_2N)C_{10}H_5SO_3H$ described therein was coupled with aniline, *p*-aniline, dehydrothiotoluidinesulfonic acid, aminoazobenzenesulfonic acid, and zidine, yielding a series of red, brown, or black dyes. The corresponding 2,6,4-$(NO_2)C_{10}H_5SO_3H$, coupled with sulfanilic acid or *p*-nitroaniline, yielded orange-red (on wool). **IV. Monoacetyl-1,5-naphthalenediamine and its coupling.** PAUL GGLI AND FRANZ KNAPP. *Ibid* 763-8.—Acetylated 1,5-$NO_2(NH_2)C_{10}H_6$ was reduced Fe and AcOH to 1-amino-5-acetamidonaphthalene. This when coupled with sulfanilic acid gave only the *o*-compd., with reference to the NH_2 group, instead of expected *p*-compd., thus illustrating the rule that the occupation of the *peri*-position prevents substitution in the *p*-position. L. E. GILSON

Naphthalene green V. FRANZ FRISCH. *Helv. Chim. Acta* **13**, 768–85(1930).—The literature on the constitution of this dye is reviewed. By a special synthesis F. establishes a new structural formula. The 2 SO_3H groups of the naphthyl radical are in the 3,6-position with reference to the substituted methyl C and not in the 2,7-position as heretofore believed. The properties of 1-naphthylamine-2,4,7-trisulfonic acid and its salts are discussed. L. E. GILSON

Modern trends in bleaching and dyeing rayon-wool fabrics. H. L. ARIENTE. *Textile World* **78**, 1522–3(1930). R. K. WORNER

Dyeing and delustering hosiery. NOEL D. WHITE. *Textile World* **78**, 1520–1 (1930).—General and practical. R. K. WORNER

Still-bath method of boiling-off hosiery has marked advantages. HERBERT C. ROBERTS. *Textile World* **78**, 1679(1930). R. K. WORNER

What's patentable in textile manufacture? CHARLES W. RIVISE. *Textile World* **78**, 1330–2, 2134–7(1930).—Discussion with illustrations taken from the textile field. R. K. WORNER

Angora rabbit wool—its conversion into yarn. GEORGE HENDRICKS. *Textile World* **78**, 1338–9(1930). R. K. WORNER

The extensibility of cotton hairs. GEO. E. COLLINS. *J. Textile Inst.* **21**, 316–24T (1930).—The extension and recovery of single hairs from a sample of cotton previously soaked in NaOH soln. to smooth out the convolutions were observed at a series of humidities ranging from 0 to 100%. Measurements were made of the mean diam. and length, initially, after loading and after removal of the load. The results are given in tables and by diagrams. R. K. WORNER

The length changes of cotton hairs in solutions of caustic soda. MARY A. CALVERT. *J. Textile Inst.* **21**, 293–310T(1930).—The shrinkage of single cotton hairs in NaOH solns. of definite concns. was studied and the changes in length are shown graphically and in tables. The effect on the width was also observed in some cases. Scoured, raw, $CHCl_3$-extd. and mechanically treated hairs were studied under no load; under loads applied after shrinkage, under no load; and under loads maintained throughout the shrinkage. R. K. WORNER

The swelling of cotton hairs in water and in air at various relative humidities. GEO E. COLLINS. *J. Textile Inst.* **21**, 311–5T(1930).—A study of the desorption and absorption of cotton hairs shows a close parallelism between the extent of the dimensional changes and the amt. of the absorption, at least over the temp. range of 20–100° studied. The changes in area and in length of cotton hairs for relative humidities ranging from 100% (water) to 0% (obtained by drying with P_2O_5) and again to 100%, relative to dimensions at 0% relative humidity are tabulated. A max. av. swelling of 48.6% was obtained for cotton hairs at 100% relative humidity. The temp. of the H_2O has little effect on the amt. of swelling within the limits of 20–120° studied. R. K. WORNER

A new method for measuring and classifying raw-silk nature. WARREN P. SEEM. *Textile World* **78**, 1774–6(1930); cf. *C. A.* **24**, 4399.—The term "nature" is used to represent the inherent qualities of raw silk, namely, strength, elongation, cohesion and hand. An illustrated description is given of the "inclined-plane scrigraph" developed by Julius Kayser & Co., and built by H. L. Scott Co., Inc. The machine measures elongation, elasticity, fatigue and nature at a standard tension; and it also measures strength and elongation at the breaking stress. R. K. WORNER

Making rayon cross sections in three minutes. KEN G. NIBLACK. *Textile World* **78**, No. 17, 49(1930).—A slit $1/4$ in. long is cut in $1/2$-in. squares of black paper "quite a bit heavier than wrapping paper." The fibers are pulled into this slit and cut off with scissors, about $1/8$ in. on each side of the paper. The slips are then fastened to slides with rubber cement, and, when set, the protruding fibers are cut off with a razor blade. R. K. WORNER

Determination of moisture and oil in rayon. D. S. CHAMBERLIN, B. L. HATHORNE AND R. E. SARGENT. *Textile World* **78**, 1674–5(1930).—An approx. 30 g. sample of rayon is placed in a 500-cc. flask with a ground glass top. From 125 to 150 cc. xylene is poured over the sample so that it is well wetted. The distn. is carried on slowly until about 80 cc. of xylene and H_2O have passed over. The collecting flask, a calibrated Goetz tube, is filled to the 100 cc. mark and centrifuged. The moisture as H_2O is read directly in cc. and the percentage of moisture in the original sample calcd. For detg. the oil content, the sample is extd. with sulfuric ether in a Soxhlet extractor, and the sample then dried in the air oven at 103° C. Original wt. − wt. H_2O − wt. dry fiber = wt. oil in rayon. The method for detg. moisture is considered accurate to 0.1%. R. K. W.

Removing spots and stains from rayon fabrics. E. R. DONALDSON. *Textile*

World **78**, 1334–6(1930).—A brief description is given of the properties, uses and effect on fabric, dyestuffs and sizings of various solvents used for removing stains from the synthetic fabrics. R. K. WORNER

Recent developments in processing viscose-rayon fabrics. A. J. HALL. *Textile World* **78**, 1516–8(1930). R. K. WORNER

Present-day methods of rayon sizing. ARTHUR K. JOHNSON. *Textile World* **78**, 1500–2(1930). R. K. WORNER

Staple rayon and rayon waste in the woolen and worsted industries. HENRY R. WOODWARD. *Textile World* **78**, 1512–4(1930). R. K. WORNER

Rayon waste in the cotton mill. CHARLES A. WESTON. *Textile World* **78**, 1515 (1930). R. K. WORNER

Fungus dyestuffs (KÖGL, *et al.*) **10.** Filter for cleaning fluids such as naphtha (U. S. pat. 1,783,444) **1.** Ti acid sulfate (U. S. pat. 1,783,684) **18.** Nitro- and amino-aryl ethers (Ger. pat. 506,339) **10.**

Dyes. IMPERIAL CHEMICAL INDUSTRIES, LTD. Ger. 501,232, April 14, 1929. See Brit. 315,905 (*C. A.* **24**, 1745).

Dyes. I. G. FARBENIND. A.-G. (Hermann Wagner, Adolf Kuchenbecker and Richard Huss, inventors). Ger. 506,073, Dec. 14, 1927. Violet water-insol. dyes are prepd. by coupling with arylamides of 2,3-hydroxynaphthoic acid the diazo compds. from dialkyl, diaryl or diaralkyl ethers of 6-aroylamino-4-aminoresorcinols. Numerous examples are given.

Azo dyes. KARL THIESS (to General Aniline Works). U. S. 1,784,398, Dec. 9. Yellow dyes of good fastness to fulling and to light are obtained by coupling the diazo compd. of a 4,4′-diaminotriphenylmethane deriv. contg. at least 1 halogen atom in each of the 3 benzene nuclei with a 1-halosulfoaryl-3-alkyl-5-pyrazolone or a substitution product, or by coupling a 1-halosulfoaryl-3-alkyl-5-pyrazolone or a substitution product with the diazo compd. of a 4,4′-diaminotriphenylmethane which has in each of the amino contg. benzene nuclei a halogen atom and a methyl group in *o*-position to the amino groups and which has no halogen in the benzene nucleus free from an amino group. Several examples are given of the production of greenish yellow dyes.

Disazo dye. LEON W. GELLER (to National Aniline & Chemical Co.). U. S. 1,782,682, Nov. 25. By subjecting a mixt. of 4-hydroxy-4′-aminoazobenzene-5-carboxylic acid and 2,2′-dimethyl-5-alkoxy-4-aminoazobenzene-5′-sulfonic acid in the presence of Na_2CO_3 to the action of phosgene, a mixed dye is obtained which dried and pulverized and in the form of the Na salts is a reddish brown powder sol. in water, dyeing unmordanted cotton reddish yellow to greenish yellow shades which can be discharged to white with discharging agents.

Trisazo dyes. HAROLD E. WOODWARD (to E. I. du Pont de Nemours & Co.). U. S 1,784,617, Dec. 9. An amino-azo compd. prepd. from an aromatic amino sulfonic acid such as 1,3,6-anilinedisulfonic acid and α-naphthylamine-7-sulfonic acid and an aromatic amino compd. such as α-naphthylamine to which coupling can take place in the position *p*- to the amino group is diazotized and the resulting diazo azo compd. is coupled to *p*-aminobenzoyl-2-amino-5-naphthol-7-sulfonic acid or other aromatic amino compd. to which coupling can take place in the position *p*- to the amino group, followed by diazotizing and coupling the resulting diazo disazo compd. to compds. such as *p*-aminobenzoyl derivs. (or *p*-aminobenzoyl-*p*-aminobenzoyl derivs.) of aminonaphthol-sulfonic acids. The resulting trisazo dyes may be developed to green tetrakisazo dyes of good fastness to light and washing.

Vat dyes. FELICE BENSA. Austrian 119,032, April 15, 1930. Vat dyes are prepd. by electrolyzing solns. of perylene diketones. Thus, a soln. of dibenzoylperylene in concd. H_2SO_4 may be electrolyzed with a current of 0.1–0.5 amps. at 3.5–4 v., a dye giving violet shades on cotton being obtained. The concn. of the H_2SO_4 should be kept const. throughout the process.

Green vat dyes. WALTHER PENECKE (to Felice Bensa). U. S. 1,783,137, Nov. 25. 1,12-Perylenequinone is condensed with benzoyl chloride by use of $AlCl_3$ at a temp. of 140–80°.

Anthraquinone vat dyes. I. G. FARBENIND. A.-G. Brit. 332,579, March 25, 1929. Bromo-3,4,8,9-dibenzopyrene-5,10-quinones are used as starting materials in a process as described in Brit. 308,617 (*C. A.* **24**, 507). Vat dyes thus formed may be converted into other vat dyes by treating them with acid condensing agents such as H_2SO_4, chlorosulfonic acid or $AlCl_3$. Several examples are given.

Anthraquinonethioxanthone vat dyes. ARTHUR LÜTTRINGHAUS and FILIP KAČER

(to General Aniline Works). U. S. 1,783,659, Dec. 2. Dyes giving strong yellow shades of good fastness on cotton from a hyposulfite vat are obtained by causing ring formation to take place, by treatment with dehydrating agents, in those ethers of mercaptoanthraquinonecarboxylic acids which are obtainable by the condensation, for example, of 2 mol. proportions of a 1-chloroanthraquinone-2-carboxylic acid with 1 mol. proportion of a 2,6- or 2,7-dimercaptoanthraquinone (which may be obtained, for example, by boiling a 2,6- or 2,7-dichloroanthraquinone, resp., with alcoholic Na sulfide or polysulfide), or by the condensation of 2 mol. proportions of a 1-mercaptoanthraquinone-2-carboxylic acid with 1 mol. proportion of a 2,6- or 2,7-tetrazoanthraquinone sulfate, or by the condensation of 2 mol. proportions of a 1-diazoanthraquinone-2-carboxylic acid with 1 mol. proportion of a 2,6- or 2,7-dimercaptoanthraquinone.

Vat dyes of the benzothionaphthene series. KARL THIESS and ERNST FISCHER (to General Aniline Works). U. S. 1,783,592, Dec. 2. A dye producing corinth tints on cotton of better fastness to boiling and washing than various other dyes of the same class is produced by heating 5,6-benzo-7-chloro-3-keto-1-thionaphthene with 4,5-benzo-3-keto-1-thionaphthene *p*-dimethylamino-α-anil in a solvent such as glacial HOAc.

Isatin-carbazole compound vat dye. MAXIMILIAN P. SCHMIDT and OTTO LIMPACH (to General Aniline Works). U. S. 1,783,588, Dec. 2. See Ger. 501,626 (*C. A.* **24**, 4941).

Reduction products of vat dyes. EDUARD MÜNCH (to General Aniline Works). U. S. 1,784,379, Dec. 9. See Ger. 489,725 (*C. A.* **24**, 2305).

Triarylmethane dyes. I. G. FARBENIND. A.-G. Brit. 332,560, April 22, 1929. Triarylmethane dyes or their leuco compds. are prepd. by the reaction on an α- or β-haloethylbenzene with a primary or secondary aromatic amine, condensing the secondary or tertiary amine produced (or a sulfonic acid deriv. thereof) with an aromatic aldehyde, ketone or hydrol (or with formaldehyde and an aromatic tertiary amine) and if necessary oxidizing any resulting leuco compd. to the dye in usual manner. Several examples are given.

Acid dyes of the phenonaphthosafranine series. PAUL LAEUGER (to J. R. Geigy S. A.). U. S. 1,782,356, Nov. 18. Acid dyes fast to alkali are obtained by condensing an unsym. *N*-alkylated *p*-phenylenediaminesulfonic acid having a sulfo group in *o*-position to the primary amino group, with a phenonaphthazonium sulfonic acid having an alkyl group attached to the *meso* azine-N atom. Cf. *C. A.* **25**, 214.

Naphthoquinone derivatives. I. G. FARBENIND. A.-G. (Karl Schirmacher and Konrad Renn, inventors). Ger. 506,442, May 29, 1927. 7-Acylamino-1,4-naphthoquinones are prepd. by oxidizing 7-acylamino-1-naphthols or their substitution products with CrO_3 at a low temp. Examples are given describing the prepn. of *(inter alia) 7-acetamido-1,4-naphthoquinone*, decompg. 228–30°, and *7-benzoylamino-1,4-naphthoquinone*, decompg. above 232°. The products are *intermediates for dyes.*

Colloidal solutions and pastes of dyes, pigments, etc. I. G. FARBENIND. A.-G. Brit. 332,557, April 22, 1929. Zinc white, Helio Bordeaux BL or other dyes or pigments are dispersed in org. solvents of the polymerization products of butadiene or its homologs contg. alkyl radicals in the 1- or 1,4-positions, to which natural rubber or other polymerization products also may be added. Details of prepn. are given and products are obtained which may be applied as coating compns. by spraying, brushing or dipping and may be hardened by heating (in the presence of O or of vulcanizing agents if desired).

Color lakes. GELLERT ALLEMAN (to Sun Oil Co.). U. S. 1,781,772, Nov. 18. A water-sol. dye such as "Lithosol Rubine B powder" and an aq. soln. of a water-sol. metal salt such as $CaCl_2$ adapted to ppt. the soap are added to a water-sol. fatty acid soap derived from petroleum. Various examples, details and modifications of procedure are described.

Diazo solutions for ice colors. I. G. FARBENIND. A.-G. Brit. 332,630, March 27, 1929. A solid aryldiazonium fluoborate is dissolved in an aq. soln. of a neutral salt of NH_4 or of a metal of the first or third group of the periodic system (the basic residue of the salt having a greater affinity to hydrofluoboric acid than to the acid residue of the salt), the soln. contg. no acid or acid salt but if desired being mixed with neutral salts serving as dyeing assistants or diluents. Several examples are given.

Dyeing cellulosic fibers. ALBERT BODMER (to Heberlein & Co., A.-G.). U. S. reissue 17,894, Dec. 2. See original pat. No. 1,694,526 (*C. A.* **23**, 718).

Dyeing cellulose esters and ethers. BRITISH CELANESE, LTD., G. H. ELLIS and W. B. MILLER. Brit. 332,624, Feb. 23, 1929. Black dyeings are obtained by oxidizing aniline on the material in the presence of a chemically equiv. quantity of inorg. acid, and in the presence of addnl. inorg. or org. substances of acid reaction such as HOAc or $AlCl_3$. Various details and examples are given involving the use of padding agents, oxidizing

agents such as $NaClO_3$ and oxidation catalysts such as salts of V, Cu or Fe, and of the production of discharge or resist effects.

Dyeing cellulose esters and ethers. I. G. FARBENIND. A.-G. (Hermann Wagner, Adolf Kuchenbecker, Richard Huss and C. Erich Müller, inventors). Ger. 509,401, Jan. 18, 1928. Violet dyeings are produced by coupling with 2,3-hydroxynaphthoic acid, or its arylamino derivs., the diazo compds. from diaryl or dialkyl ethers of 4-amino-6-acylaminoresorcinols or their substitution products. Coupling is effected on the substance to be dyed. Examples are given.

Dyeing materials such as cellulose acetate or similar cellulose esters. HENRY DREYFUS. U. S. 1,783,607, Dec. 2. The material is dyed with a coloring compd. comprising at least one aliphatic hydroxy thioether grouping. Several examples are given.

Dyeing regenerated cellulose materials. IMPERIAL CHEMICAL INDUSTRIES, LTD., and R. BRIGHTMAN. Brit. 332,545, April 19, 1929. Level shades ranging from orange or red to bluish violet and blue are obtained by use of secondary disazo dyes produced from a monoamine of the benzene series not contg. a nitro group (alk.) coupled with an aminonaphtholsulfonic acid and with an end component. Numerous examples are given.

Dyeing artificial filaments, ribbons, etc. BRITISH CELANESE, LTD., and W. I. TAYLOR. Brit. 332,565, Jan. 11, 1929. Continuously with the production of the material by extrusion, dyes are applied at intervals along the lengths of the material. App. and various details of procedure are described.

Printing fabrics. CAMILLE DREYFUS. U. S. 1,783,606, Dec. 2. A fabric to be printed such as silk, wool, cotton or rayon is sprayed with a solvent for the dye, on a transfer medium, and the wetted fabric is applied to a transfer medium having a dye that is capable of dyeing the fabric to be printed under pressure, so that the dye on those portions of the transfer medium which come into intimate contact with the wetted fabric will be dissolved out and will combine with the fabric to color the latter. An arrangement of app. is described. Cf. *C. A.* **24**, 2898.

Printing wool with ester salts of leuco compounds of vat dyes. WALTER TAUSSIG (to Durand & Huguenin Akt.-Ges.) U. S. 1,784,768, Dec. 9. See Ger. 486,174 (*C. A.* **24**, 1991).

Treating yarn in packages with liquids for dyeing or other purposes. JOHN C. HEBDEN (to Dyeing Processes Corp.). U. S. 1,783,908, Dec. 2. Mech. features.

Apparatus for dyeing or other treatments of yarn. JAMES H. THOMPSON (to Walker & Davis, Inc.). U. S. 1,784,399, Dec. 9. Structural features.

Treating textile fibers. LEON LILIENFELD. Austrian 119,200, April 15, 1930. Cotton and other vegetable textile fibers, or fabrics made therefrom, are strengthened and lustered by treatment with a warm or hot alkali sulfide soln. of not less than 25% strength, calcd. as Na_2S. Examples are given. Cf. *C. A.* **24**, 3911.

Treating fabrics such as those with cellulose acetate pile. GEORGE H. ELLIS, HENRY C. OLPIN and ERIC E. WALKER (to Celanese Corp. of America). U. S. 1,783,608, Dec. 2. A fabric with a pile of material such as cellulose acetate filaments and a backing of other material such as cotton, wool or silk or regenerated cellulose is softened and weakened in selected areas of the fabric (suitably by use of a selective solvent or swelling agent) and the weakened pile filaments are afterward removed while in substantially undissolved state and in filament form (suitably by brushing or plucking), to produce ornamental effects.

Bleaching and other treatments of fabrics. F. BARKER, E. BARKER and P. V. BARKER. Brit. 332,718, July 3, 1929. The material is passed through kiers for liquid treatments while festooned in movable carriers over bars which may be formed of a steel alloy contg. C 0.35, Mn 0.25, Si 0.30, S 0.01, P 0.015, Ni 8 and Cr 18%. Various details of the app. are described.

Apparatus for washing, bleaching or dyeing hanks or spinning cakes of artificial silk. JOSEPH VON DER DRIESCH (to Fr. Küttner A.-G.). U. S. 1,783,103, Nov. 25. Structural features.

Washing artificial fibers wound on perforated bobbins. BENNO BORZYKOWSKI. U. S. 1,783,493, Dec. 2. Washing liquid is drawn inwardly through the material by suction within the bobbin in an app. which is described.

Drying and finishing lengths of fabric. M. LENDERS. Brit. 332,500, Nov. 25, 1929. Mech. features.

Artificial yarns of cellulose acetate, etc. BRITISH CELANESE, LTD., and W. I. TAYLOR. Brit. 332,527, March 21, 1929. Yarns, threads or filaments of cellulose acetate or other cellulose derivs. are subjected to a vacuum treatment after spinning to

remove residual solvent (which is recovered). The process may be accompanied by heating and supply of small quantities of air or other suitable gas or humidification, and various details of procedure are described.

Composition for preserving knitted textile fibers. LEIELLA MORRIS. U. S. 1,781,730, Nov. 18. A compn. which may be used for treating silk hosiery, etc., is prepd. from alum 2, $MgSO_4$ 1 and NaCl 1 part, mixed with warm water.

Apparatus for mercerizing textile fabrics. W. MYCOCK & CO., LTD., and W. MYCOCK. Brit. 332,751, July 31, 1929. Structural features.

Weighting silk. R. CLAVEL. Brit. 332,778, March 16, 1929. The process described in Brit. 266,640 (*C. A.* **22**, 690), modified as described in Brit. 283,019 (*C. A.* **22**, 3997), is further modified by immersing the silk yarn or fabric in a metal salt bath such as $SnCl_4$, squeezing out excess soln., and then transferring to an acid fixing bath without intermediate washing, deacidification or neutralization. As fixing bath there may be used a soln. of NaH_2PO_4 to which acids or acid salts or protective agents may be added, or a bath prepd. from Na_2HPO_4 with HCl or other suitable acid or acid salt to produce an acid reaction. After rinsing the material may be given a final treatment with a bath contg. soap and waterglass. Cf. *C. A.* **24**, 3657.

Protecting wool. I. G. FARBENIND. A.-G. Ger. 506,432, Aug. 1, 1925. Bacterial attack of wool, particularly wool stored damp after an alk. washing, etc., treatment, is prevented by treating the wool with Cr or Zn salts at about 50°. Suitable salts are basic Cr–Mg sulfate, or $K_2Cr_2O_7$ with bisulfite. Examples are given.

Mothproofing wool, fur, etc. I. G. FARBENIND A.-G. (Max Weiler, Karl Berres, Berthold Wenk and Hermann Stötter, inventors). Ger. 506,989, Oct. 11, 1928 Addn. to 503,256. The method of Ger. 503,256 (*C. A.* **24**, 5169) is modified by using hydroxy-di- or -tri-arylmethane compds. prepd. by condensing aldehydes with phenols other than those specified in the prior patent, or with naphthols or their derivs. contg. indifferent substituents. Examples are given.

Plant with centrifugal apparatus for recovery of fats from emulsions such as wash waters of wools. JEAN A. L. ROZIERES (one-half to Soc. française de centrifugation). U. S. 1,782,974, Nov. 25. Structural features and details of operation are described.

Waterproof fibrous articles. HAROLD L. LEVIN (to Flintkote Co.). U. S. 1,782,855, Nov. 25. A waterproofing material such as an asphalt dispersion is added to an aq. stock of fibrous material and fixation of the waterproofing material upon the fibers is effected by a fixing agent formed *in situ* in the mixt. such as by use of Na silicate and alum at the isoelec. point of the fixing agent; the mixt. thus prepd. is forced against a foraminous mold to form articles of desired shape.

Felting. CHARLES D. PARKS. U. S. 1,782,764, Nov. 25. Fur such as that for hat manuf. is treated with an alk. soln. of an oxidizing agent such as an aq. soln. of H_2O_2 and NaOH to attack the wax on the fibers, the fur is dried, formed into a bat, and the bat is treated with an aq. acid soln. such as HOAc or H_2SO_4 soln. and felted while applying such a soln. U. S. 1,782,765 describes a similar process in which an alkali such as NaOH is used for the preliminary treatment.

Retarding fading of vegetable materials. EDGAR W. GEISLER (to R. H. Comey Brooklyn Co.). U. S. 1,783,114, Nov. 25. A soln. of a thiosulfate such as $Na_2S_2O_3$ is applied to materials such as straw braid for hat manuf.

26—PAINTS, VARNISHES AND RESINS

A. H. SABIN

Chalking (of paints). II. Experiments in determining the degree of chalking by the "stamping" method. RICHARD KEMPF. *Farben-Ztg.* **36**, 171–2(1930); cf *C. A.* **24**, 5513; **25**, 219.—The value of K.'s device is illustrated by photographs of results obtained on various types of paint. The app. also reveals cracks in paint and irregularities in brushing paints. G. G. SWARD

The usefulness of zinc green in paints. M. BERGER. *Farbe u. Lack* 1930, 501, 515, 527.—Green pigments using $ZnCrO_4$ as the yellow ingredient are characterized by good hiding power and brilliance. The new method of pptg. $ZnCrO_4$ from hot solns. results in a grit-free pigment which is readily mixed dry with blue pigments in the prepn. of greens. For easy brushing and non-floating, the soft steel blues should be used with $ZnCrO_4$. Zinc greens are very sensitive to alkalies but are probably 4 to 5 times as light proof as chrome greens. This stability may be due to the non-darkening of Zn salts in H_2S atms., or to traces of dichromate which may reoxidize any ferrocyanide that

has been reduced photochemically. Soly. in H_2O and low tinting strength are disadvantages of zinc green. It loses its brilliance in water paints. It should not be used with high acid resins as soaps may be formed. G. G. SWARD

A dressing plant for "Bideford Black." HUMPHREYS M. MORGANS. *Bull. Inst. Mining Met.* No. 314, 9 pp.(1930).—A flotation plant for black ocher is described. The raw ocher has 70% ash. The concd. ocher may contain 60–70% that is volatilizable, chiefly C, and 30–40% SiO_2 + Al_2O_3. Reagents (lb. per ton) are creosote 0.9–1.10, cresylic acid 1.5–1.75, and xanthate 0.2–0.27 for primary flotation and pine oil 0.09–0.135 for retreatment. Power consumptions are: primary grinding and classifier 20, flotation plant and thickener 50, Oliver filter plant 27, dryer 23, Hardinge mill 70 and air sepn. 21 h. p. ALDEN H. EMERY

Colloidal-chemical studies of the drying process of linseed oil. HERBERT FREUNDLICH. *Farbe u Lack* 1930, 526.—Examn. of raw, blown and boiled linseed oils for polarization of light, plasticity and ultramicroscopic particles did not yield direct evidence of colloidal states. If linseed oil be classed as a gel, study of the diffusion of its oxidation products through it might yield valuable data. G. G. SWARD

Detecting adulteration of wood oil from Indo-China (abrasin oil) with castor oil and peanut oil. ERICH STOCK. *Farben-Ztg.* 36, 173(1930).—A wood oil from Indo-China with the following consts.: sp. gr. 0.935, acid no. 8, n_{19} 1.512, and sapon. no. 193 was mixed with varying proportions of castor oil, peanut oil and both. From the detn. of the above consts., definite conclusions regarding the compn. of the mixts. could not be drawn. G. G. SWARD

Phenol resinoids in oil varnishes. V. H. TURKINGTON, R. C. SHUEY AND W. H. BUTLER. *Ind. Eng. Chem.* 22, 1177–80(1930).—Distinctly new types of phenol-condensation products have been developed which are sol. in drying oils without the use of rosin or an inactive ingredient to promote soly. They range from dark brown to practically colorless resins and are sol. in China wood oil; most of them are sol. in linseed oil. Useful properties of phenol resins are: durability, rapid drying, toughness, waterproofing, alk. resistance and acid resistance. The methods employed in testing these resinoids are outlined, the data tabulated on 8 varnishes and the results discussed. W. H. B.

A note on the determination of the melting point of resins. M. RANGASWAMI. *J. Oil & Colour Chem. Assoc.* 13, 287(1930).—The Hg method of Durrans (cf. *C. A.* 23, 4355) is adapted for small samples by melting 0.2 g. of the resin in a 17 cc. porcelain crucible. After cooling, about 25 g. Hg is added, a thermometer is inserted in the Hg and the crucible heated at the rate of 2° per min. until the resin appears at the surface of the Hg. The requirements as to amt. of Hg or exact shape of the crucible are not rigorous and good precision is claimed. G. G. SWARD

Resenoplast. KRUSE. *Farbe u. Lack* 1930, 550.—Resenoplast (compn. not given), a proprietary product combining the properties of both resin and plasticizer for use in nitrocellulose lacquers, is a yellowish brown viscous material with a mild odor and an acid no. of 14.5. It is characterized by extreme resistance to ultra-violet light, alkalies and alc. It is sol. in most of the nitrocellulose solvents, but only slightly so in aliphatic alcs. and hydrocarbons. The proportions to use in lacquers are indicated. G. G. SWARD

Resin of *Garcinia mangostana* L. (DRAGENDORFF) 10. Ethers (Brit. pat. 332,756) 10. Colloidal solutions and pastes of dyes, pigments, etc. (Brit. pat. 332,557) 25. Condensation products from polyvinyl esters (Ger. pat. 506,148) 18.

Roof paint. MICHAEL M. CONNOLLY. U. S. 1,783,702, Dec. 2. Coal tar 20, gasoline 5 and alc. 1 part.

Pigment. DAVID V. AULT. U. S. 1,784,411, Dec. 9. A clay-like material contg. sericite in a naturally-occurring, finely divided condition is dried and the finely divided sericite is sepd. from the gritty particles (suitably by air sepn.).

Black pigment from peat. STATE IMPORT AND EXPORT TRADING OFFICE "GOSTORG." Austrian 119,013, April 15, 1930. See Brit. 307,861 (*C. A.* 24, 212).

Apparatus for grinding pigments, etc. EUGENE DE ROZIERES. U. S. 1,781,808, Nov. 18. Structural features.

Manifolding with ink-forming reagents. EDWIN R. GILL, JR. U. S. 1,781,902, Nov. 18. Contacting sheets carry reagents such as gallic acid and an Fe salt with glycerol which under the action of pressure react to form an ink.

Preventing spontaneous combustion of spray residues of coating compositions such as those containing nitrocellulose. EARLE C. PITMAN (to E. I. du Pont de Nemours

& Co.). U. S. 1,782,126, Nov. 18. The spray residue is treated with an anti-oxidant such as hydroquinone or tannic acid in dil. soln.

Alumina lacs. I. G. FARBENIND. A.-G. (Fritz Baumann, inventor). Ger. 504,599, Aug. 1, 1928. Anthraquinonedisulfonic acid dyes are stirred into the alumina lac. Examples mention Na quinizarine-2,6-disulfonate and Na anthraquinone-1-hydroxy-4-amino-2,8-disulfonate as dyes used.

Method and apparatus for drying lacquered goods, etc., with a circulating current of hot air. LUFTHEIZUNGS- UND ABGASVERWERTUNGS-G. M. B. H. (Walter Oparsky, inventor). Ger. 506,121, Sept. 22, 1927.

Coating metal articles with lacquer. JAMES S. GEORGE and ROGER S. SPERRY (to Scovill Mfg. Co.). U. S. 1,783,188, Dec. 2. App. and various details of procedure are described, for submerging the articles in a bath of the coating material, withdrawing the articles substantially at the same rate as the excess coating drains from them, and drying.

Shellac composition for phonograph records, etc. RICHARD E. SUMNER (to Calco Chemical Co.). U. S. 1,781,711, Nov. 18. A shellac binder is used with a filler such as cotton flock and a mineral filler and with an azine base dye such as nigrosine base or inulin base.

Coating composition. ROY H. KIENLE and LESTER V. ADAMS (to General Elec Co.). U. S. 1,783,364, Dec. 2. An alkyd. resin such as a glycerol phthalic acid resin is dissolved in an org. liquid solvent such as acetone and the soln. is brought into contact with an alkali such as CaO in solid, granular form, and basic mineral matter such as ZnO, Ti oxide or basic Pb carbonate is suspended in the resulting soln. The product is suitable for coating metals, porcelain, etc.

Apparatus for applying and baking coatings such as insulating enamel on wire. RICHARD D. JESSUP (to Western Elec. Co.). U. S. 1,782,425, Nov. 25. Structural features.

Cement-coated wire. J. BIRCHARD GREEN (to Chicago Steel and Wire Co.) U. S. 1,783,613, Dec. 2. Coating material such as a naphtha soln. of China wood oil and glycerol ester gum is applied to the wire in coil form and the coated wire is dried while suspended on a rotating support upon which it is constantly changing its position.

Resinous coating for metals. STANTON I. CHARLESWORTH and ARCH W. HARRIS U. S. 1,782,341, Nov. 18. A compn. adapted to form a hard resinous coating on metal or other surfaces comprises a resinous base consisting of the residue remaining after the distn., up to 300° under approx. 28 in. of vacuum, of the pure still residue remaining after the distn. of the light oils recovered from by-product coke-oven gas, this resin base being mixed while molten and hot with approx. 30% by wt. of benzene or other light oil products. App. is described.

Rosin oil. JOSEPH N. BORGLIN (to Hercules Powder Co.). U. S. 1,782,401, Nov. 25. Wood rosin is heated in the presence of about 0.05–1.0% of a B compd. such as H_3BO_3, B oxide or a borate which reacts with impurities and is then subjected to destructive distn. (suitably under reduced pressure).

Cracking rosin. GUSTAV EGLOFF and HARRY P. BENNER (to Universal Oil Products Co.). U. S. 1,783,230, Dec. 2. In cracking rosin in the presence of water, the mixt. is introduced into a still and subjected to heat and pressure to raise its temp. to above 480° and to generate a vapor pressure exceeding 5000 lb. per sq. in. to convert a substantial portion of the mixt. into a light oily product which may be used in *paints*. App. is described.

Removing color from rosin. WM. B. LOGAN (to Newport Co.). U. S. 1,782,267, Nov. 18. A rosin soln. is treated with a light colored metal halide such as $SnCl_4$, $SnCl_2$ or $AlCl_3$ capable of forming an insol. compd. with the coloring substances in the rosin, and the ppt. formed is sepd. from the rosin soln. Cf. *C. A.* **24**, 3387–8.

Mixed esters of colophony, etc. HERMAN A. BRUSON (to Resinous Products & Chemical Co.). U. S. 1,783,165, Nov. 25. Tough and flexible products are obtained by heating together colophony or other acidic resin or "gum" such as Congo or Manila gums, a polyhydric alc. such as glycerol or ethylene glycol and an acid such as adipic acid, pimelic acid, suberic acid, azelaic acid or sebacic acid. The products may be used with nitrocellulose, etc., in making lacquers or other products and maintain their flexibility even at a temp. of —5°. U. S. 1,783,166 describes the plasticizing of phenol aldehyde resins by incorporating with them a condensation product of glycerol or other suitable polyhydric alc. and sebacic acid or one of the other similar specified acids. Products are thus obtained which form tough films. U. S. 1,783,167 describes the production of rubber-like products by heating castor oil with polyhydric alcs. such as glycerol and an acid such as sebacic, adipic or azelaic acid, with or without a drying oil such as linseed oil. Various examples with details of procedure are given. U. S. 1,783,-

168 describes the manuf. of similar products with use of fatty acids of castor and linseed or China wood oils instead of the oils themselves, together with a polyhydric alc. such as glycerol and an acid such as sebacic acid. The products are suitable for plasticizing nitrocellulose and may be used as coatings on various materials.

Floor covering. CARLETON ELLIS (to Ellis-Foster Co.). U. S. 1,784,135, Dec. 9. A satd. felt suitable for transport in rolls carries an adherent tread "veneer" contg. nitrocellulose, a glyceride resin, and a finely divided fire-retarding mineral substance such as hydrated $CaSO_4$.

Floor-covering material. CARLETON ELLIS (to Ellis-Foster Co.). U. S. 1,784,799, Dec. 9. A waxed paper base is provided with a plastic adherent tread layer comprising nitrocellulose with a plasticizer and filler. U. S. 1,784,800 specifies the use of a base such as asphalt-impregnated felt with a covering layer of nitrocellulose, plasticizer, volatile solvent, wax and filler dried at a temp. above that at which the wax dissolves freely in the volatile solvent. U. S. 1,784,801 relates to a similar waterproofed base coated with a figured coating comprising pigment, nitrocellulose and a small proportion of wax. U. S. 1,784,802 specifies forming the tread layer of nitrocellulose compn. with a non-uniformly textured surface. U. S. 1,784,803 specifies similar material with a textured white surface which may be produced by rolling hardened plastic fragments such as nitrocellulose compn. into the surface. U. S. 1,784,804 relates to similar material with a color-variegated surface.

Floor-covering material. BORIS N. LOUGOVOY (to Ellis-Foster Co.). U. S. 1,784,805, Dec. 9. A highly waxed paper support impregnated with wax substantially free from dark color carries a tread layer of nitrocellulose compn.

Linoleum. LINOLEUM MFG. CO., LTD., and A. C. MCKISSOCK. Brit. 332,543, April 19, 1929. Various details are given relating to production of tile pattern linoleum "enriched" with pieces cut from a patterned linoleum.

Resinous condensation product. ANDRE H. V. DURR (to Compagnie nationale de matieres colorantes et manufactures de produits chimiques du Nord, réuniés établissements Kuhlmann). U. S. reissue 17,878, Nov. 25. See original pat. No. 1,739,447 (*C. A.* 24, 982).

Synthetic resins. BAKELITE CORP. Ger. 504,682, May 2, 1926. See Brit. 267,736 (*C. A.* 22, 1245).

27—FATS, FATTY OILS, WAXES AND SOAPS

E. SCHERUBEL

Preparation of pure fatty acids of higher molecular weight occurring in nature. D. HOLDE AND W. BLEYBERG. *Z. angew. Chem.* 43, 897–902(1930); cf. *C. A.* 24, 5520.—This is a review of the work by Holde and others on the prepn. of pure fatty acids, showing that the "heptadecanic acid" is a mixt. of palmitic and stearic acids, proving that the higher satd. acids are normal acids with the exception of isovaleric acid, and establishing the fact that natural fats contain closed series of the higher satd. acids differing by C_2; thus, beeswax contains $C_{28}H_{56}O_2$, neocerotic, m. 77.8°, $C_{27}H_{54}O_2$, cerotic, m. 82.5°, $C_{29}H_{58}O_2$, montanic, m. 86.8°, and $C_{31}H_{62}O_2$, melissic acid, m. 90.0°; peanut oil contains C_{20} and C_{22} acid and mountain wax C_{26}, C_{28} and higher acids. These results were obtained by fractional pptn. with Mg acetate, by micro-fractional distn. in high vacuum, by examg. the mother liquor as long as it showed a different m. p. from that of its crystals and by comparison with synthetically prepd. pure acids. One of the criteria for the purity of an acid of C_{18} to C_{28} is its brittle, coarsely cryst. nature on solidification after fusion; mixts. of acids would form a coherent mass with smooth lustrous surface and microcryst. structure. P. ESCHER

Simple methods for the preparation of pure palmitic and stearic acids in any desired quantity. HUGO DUBOVITZ. *Chem.-Ztg.* 54, 814(1930).—D. preps. pure palmitic acid from Chinese vegetable tallow (*Stillingia*) by sapong. and acidifying, or by Twitchells process, presses the acids cold, then warm, and dissolves them in an equal amt. of 90% (by wt.) alc. Upon solidification of the alc. soln. the cakes are pressed cold and hot and the remaining alc. is driven off at 100°. The resulting product is pure palmitic acid, showing a titer of 62.6°, I no. 0.45 and an acid no. 219.2. Stearic acid is prepd. in analogous manner, using shea butter acids as a starting material, the final product showing a titer of 69.7°, I no. 0.41, acid no. 197.5 and unsapon. matter 0.10%. Stearic acid may also be prepd. from olive oil by liberating its acids, removing palmitic acid by pressing at low temp., hydrogenating the resulting oleic acid until its I no. sinks to 35–40

and then treating this product in the same manner as the Chinese tallow. These methods are in com. use. P. ESCHER

Determination of total fatty acids. A. K. CHURCH. *Soap* **6**, No. 3, 31–3(1930).—A modified Stokes flask is used in place of the usual separatory funnel. This flask is 8 in. high, 3 in. in diam. at the bottom and 2 in. in diam. at the widest point of the bulb above the shoulder. Below the shoulder it has a capacity of 125 cc. and above the shoulder a capacity of 50 cc. Five g. of soap is dissolved in water and washed into the flask, making the total vol. about 75 cc. After heating, 10 cc. 1:1 HCl is added and the flask heated under a reflux until the fatty layer is clear. It is cooled and 30 cc. of ether added and then 10% NaCl soln. until the ether and water layers are just above the shoulder of the lower part of the flask. The siphon is inserted so that the turned up end of the tube projects about $^1/_8$ in. above the H_2O layer. The forefinger of one hand is placed over the end of the short tube and the other hand over the upper part of the flask. The ether soln. will siphon off into a weighed 150 cc. flask. The soln. is washed with ether to a total vol. of 90 cc. which is then evapd. and the flask dried and weighed. The combined alkali is titrated after adding 100 cc. alc. The total soap is detd. by evapg. the alc., drying and weighing. The unsaponifiable matter is detd. separately by dissolving the soap in 50% alc. and extg. with petr. ether. Rosin is detd. by Wolff's method except that the modified Stokes flask is used. Results with different soaps using the Stokes flask, the A. C. S. method with separatory funnel, and the method whereby the fatty acids are weighed directly all agree closely. E. SCHERUBEL

Which drying method leads to a reliable fatty acid determination in soaps? J. DAVIDSOHN. *Chem. Umschau Fette, Oele, Wachse u. Harze* **37**, 293–6(1930).—D. compares the Hefelmann-Steiner method (*Z. öffentl. Chem.* **1898**, 393), which titrates the total fatty acids and weighs them as K soaps, with the Goldschmidt method which dries the ether soln. of the total fatty acids at room temp. with anhyd. Na_2SO_4, evaps. at 50–60° and weighs the acids. D.'s series of lab. tests by drying the acids at 100° show appreciable losses in the tallow-coconut oil soaps and thus confirms the accuracy of the Goldschmidt method. In another series D. hastens evap. of the ether by an air blast and thereby shortens the time in reaching const. wt. P. ESCHER

Oleic acid rancidity. IV. Isomeric oleic and elaidic acids and erucic and brassidic acids. K. TÄUFEL AND E. SPIEGELBERG. *Chem. Umschau Fette, Oele, Wachse u. Harze* **37**, 281–4(1930).—The above fatty acids were exposed to air in daylight and darkness, and the resulting changes measured by the intensity of the Kreis reaction and the increase in wt. Elaidic and brassidic acids remained practically unchanged; the oleic acid which had been exposed to light began to increase in wt. and to show a more intense Kreis test after 2 weeks; oleic acid in darkness increased in wt. only after 4 months and the Kreis color increased little. Erucic acid did not change in the dark, and the sample which had been exposed to light increased in wt. only after 8 months, with a neg. Kreis test. P. ESCHER

American cherry-kernel oil. GEO. S. JAMIESON AND SAMUEL I. GERTLER. *Oil and Fat Ind.* **7**, 371–2, 387(1930).—The oil contains 87% of unsatd. acids and 7.7% of satd. acids which consist chiefly of palmitic and stearic acids along with small quantities of arachidic and myristic acids. The unsatd. fraction consists of oleic and linolic acids. The refined oil after more than a year was found to be in excellent condition; and it should prove useful as a salad oil and in the manuf. of cosmetics. E. SCHERUBEL

Investigations on sulfonated oils. VIII. Solubilities of ricinoleic acid sulfuric ester and its alkali salts in hydrochloric acid and salt solutions. KINZIRO WINOKUTI. *J. Soc. Chem. Ind., Japan* **33**, Suppl. binding 342–4(1930); cf. *C. A.* **24**, 1756.—The soly. of pure ricinoleic acid sulfuric ester and that of its alkali salts in HCl and various salt solns. were detd. at 25 ± 0.02°. The results are tabulated. A new modified process of the ether-brine method is given for the samples which are scarcely or not at all salted out by concd. brine, by acidifying first with HCl to transform the alkali salts into acid salts and the soaps into fatty acids; the sepn. of brine is facilitated without any bad effect upon the analytical results. With respect to the washing process of sulfonated oils in their manuf., it is shown that if Glauber's salt soln. is used the loss of the sulfuric esters will be small, but when brine is used some loss must be expected. In the process of sepg. the ricinoleic acid sulfuric ester or its homologous substances from their H_2O soln., it is shown that when inorg. salts such as alkali chlorides or sulfates are used as double decompg. and salting out reagents, almost quant. results will be obtained. **IX. Properties of sulfonated oils on the market.** KYOSUKE NISHIZAWA, KINZIRO WINOKUTI AND SYOZI IGARASI. *Ibid* 344–9.—Five sulfonated oils from Germany and 2 from Japan were studied. The relative viscosity increases with increase of concn. The relation between the concn. and the surface tension decreases with increase of concn. The

influence of the concn. on the relative surface tension against kerosene is similar to that stated above. Stability against turbidity by the addn. of acid depends on the concn. and in one case it increases its value with increase of concn. The stability against turbidity by the addn. of $CaSO_4$ increases with increase of concn. From the study on normal and acid salts of pure H_2SO_4 ester of ricinoleic acid it was thought that the properties of sulfonated oils will be controlled with the degree of neutralization. The results of the authors confirm this. The differences in properties between sulfonated oils on the market and those just neutralized generally coincide with those between normal and acid salts of H_2SO_4 ester of ricinoleic acid. Fourteen graphs are given.
E. SCHERUBEL

Soap solutions. VIII. Protective activities of soaps on Congo rubin sol. JIRO MIKUMO. *J. Soc. Chem. Ind., Japan* **33**, Suppl. binding 369–70(1930); cf. *C. A.* **23**, 4841.—Rubin nos. of various pure soaps (Na salts of valeric, caproic, heptylic, caprylic, nonylic, capric, lauric, myristic, oleic and ricinoleic acids) on a Congo rubin sol after addn. of KCl were measured at 25°. C_{12} exhibits some protective activity. C_{10} and C_9 soaps have poor activities and the color change of rubin sol is quick; C_8 has the poorest activity. Moderately concd solns. of C_7 by itself reveal a distinct coagulating tendency upon rubin; 0.4 *N* solns. of C_6 and C_5 soaps are almost equiv. to 0.16 *N* KCl in their coagulating activities upon 0.01% rubin. C_8 is the lowest soap. Solns. below C_7 have too little colloidality; they are rather pure common electrolytes in low concns., and consequently the antagonistic coagulating effect of Na^+ prevails over the peptizing activity of soap itself. It is preferable to exclude these salts of lower fatty acids from the soaps in the manuf practice. The protective activity of soap on a hydrophobic sol seems to be related to its adsorptive activity.
E. SCHERUBEL

Is fat extraction of raw bones possible with liquid solvents? G. GÜNTHER. *Chem.-Ztg.* **54**, 761–2(1930).—It is impossible to ext. raw bones completely with liquid benzine and the extd. bones may become moldy; they further require steaming to remove the solvent Benzine extn. is feasible with oil seeds but bone structure prevents thorough penetration in the raw bones.
P. ESCHER

Twitchell reagent. IV. Effect of the addition of electrolytes on the colloidal property of the reagent on the market. KYOSUKE NISHIZAWA, RYUZIRO ASADA AND BUNTYU SAKUMA. *J. Soc. Chem. Ind., Japan* **33**, Suppl. binding 349–52(1930); cf. *C. A.* **24**, 3915.—The effect of common electrolytes at 25°, 60° and 95° on Idrapid was measured with Ostwald's viscometer for viscosity and for surface tension with Traube's stalagmometer. Strong acids have a more marked effect than weak acids on the surface tension, and the salts of strong acids act in the same manner. With Kontakt and Pfeilring at 95°, the influence of electrolytes on viscosity is similar to that with Idrapid. The lowering of the temp. causes results depending on the salting out property of the electrolyte but the relation to viscosity and surface tension is similar to that at 95°. The effect of weak acids decreases viscosity and surface tension and is harmful to the fat-splitting power of the reagents. Six graphs are given.
E. SCHERUBEL

Component glycerides of stillingia (Chinese vegetable) tallow. T. P. HILDITCH AND J. PRIESTMAN. *J. Soc. Chem. Ind.* **49**, 397–400T(1930).—The fatty acids present are mainly palmitic 57–69, oleic 21–34, myristic 3–6 and stearic 1–3%. The Am. sample examd. contained 27.6% of fully satd. glycerides (largely tripalmitin), and over 60% of mono-oleo-disatd. glycerides, chiefly oleodipalmitins. The solidifying temp. varies widely in different samples, that of the Am. sample being 48.2°.
E. SCHERUBEL

Rapid determination of total fat. II. CLARENCE P. HARRIS. *Oil and Fat Ind.* **7**, 383–4, 387(1930); cf. *C. A.* **24**, 5519.—Instead of an analytical balance, 100-g. samples are weighed on a balance accurate only to 0.1 g. With cacao powder or chocolate liquor about 2 in. of the beaker is filled with the solvent and the mixt. stirred after which the soln. is filtered through a Büchner funnel with shredded asbestos. The soln. is then tested with a special hydrometer standardized at 20° and having a temp. correction scale making accurate readings possible between 17° and 23°. For use on cottonseed meal the method is simpler, requiring only that 80% will pass through a 60-mesh sieve. All of the solvent is weighed at once and the entire operation, exclusive of grinding the sample, requires 10 min. The results agree well with the standard A. O. A. C. method.
E. SCHERUBEL

Use of promotors in the hydrogenation of fats and vegetable oils. V. S. SADIKOV. *Zhur Prikladnoĭ Khim.* **3**, 573–84(1930).—Small quantities of CeO_2 when added to a NiO catalyst decrease the activity of the latter when hydrogenating vegetable oil while an addn of La_2O_3 acts as an accelerator without increasing the amt. of hydrogenated oil. A theory is developed that the first portion of the catalyst added is required to overcome the influence of impurities present in any oil and that a second addn. is required for the

actual hydrogenation. The influence of various other promotors and protectors in hydrogenation is studied on seal fat, its esters and distillates which are mixed with paraffin and glycerol, also on oleic acid and sun-flower oil. A. A. BOEHTLINGK

Application of the thiocyanate number. IV. Analysis of soy-bean oil. WASABURO KIMURA. *J. Soc. Chem. Ind., Japan* **33**, Suppl. binding 325(1930); cf. *C. A.* 23, 4838; 24, 4898.—By use of Kaufmann's thiocyanate method and the Pb salt-alc. method for analysis, a soy-bean oil from the Hônen Oil Co. showed the following compn.: satd. acids 11.8, oleic 25.9, linolic 58.8, linolenic acid 3.8%. The original oil had an acid no. 1.66, sapon. no. 195.04, ester no. 193.38, I no. (Hanus) 133.79, thiocyanate no. 79.71, unsapon. 0.54%, I no. of fatty acids 139.8 (Wijs), 139.2 (Hanus), thiocyanate no. 83.1. P. ESCHER

Utilization of by-products from saccharin manufacture. W. HERZOG. *Chem. Umschau Fette, Oele, Wachse u. Harze* **37**, 296–8(1930); cf. *C. A.* **24**, 6021.—It is suggested that *p*-toluenesulfonamide be utilized by converting it into *N*-chloro-*p*-toluenesulfonamide and chloramine, a H_2O-sol. powder, contg. 25.2% active Cl, valuable as a *disinfectant* and *bleaching agent*. Similar compds. have been prepd. from *p*-sulfamylbenzoic acid, also a by-product of saccharin manuf. In the fat industry chloramine is used as a preservative in amts. of 0.05%. It may also be used as a reagent in place of I in the detn. of the Hübl I no., since the values obtained with it are in close agreement with the Hübl nos. P. ESCHER

Extraction and rejuvenation of used bleaching earth. B. HASSEL. *Seifensieder-Ztg.* **57**, 722–4(1930).—Petr. ether, free from aromatic compds., gives the best results in the factory, except for castor oil; ether usually exts. too much non-fatty material. Comparative data are given for rejuvenated earth from linseed, coconut, cottonseed, castor and cylinder oil and from tallow. Rejuvenation of expensive bleaching earth will pay for itself; other cases are doubtful. P. ESCHER

Relation between the properties of soaps and the degree of unsaturation of fatty acids. I. Surface tension and detergent power of the soap solutions of C_{18} acids. MASAWO HIROSE AND TSUNEO SHIMOMURA. *J. Soc. Chem. Ind., Japan* **33**, Suppl. binding 337–8(1930).—Surface tensions of 0.025–2.0% Na soap solns. of stearic, oleic, linoleic and linolenic acids were measured at 10–80° by P. L. du Nouy's app. and the detergent powers tested with lanolin indigo cloth. At high temps. the surface tension increases with the no. of double bonds of the fatty acids, stearic acid giving the lowest value. At low temps. the same tendency is observed with soaps of unsatd. acids, but the stearate has the highest value. With the stearate, transformation into gel and crystal becomes more marked with increase in concn., while the soaps of unsatd. acids become turbid by dilu. The detergent power of soaps of unsatd. acids decreases with increase of unsatn. of fatty acids; that of stearate at high temps. is greater than the corresponding values of other soaps; but the value for stearate at low temps. is smallest. The soaps of more highly unsatd. acids are not satisfactory in detergent power, though the change of color and the odor may be prevented by adding antioxidant. At low temps. the soaps of highly unsatd. acids have the tendency to approach oleate in detergent power. With concns. below 1% the detergent power at 10–80° increases with the concn. The detergent power and surface tension of various soaps are mutually related only at the same concn. and temp. After a long exposure to air, stearate and oleate solns. remain odorless, linoleate evolves odor and linolenate evolves offensive odor. The soaps of C_{20} and C_{16} acids show the same tendency as the C_{18} acids. **II. Drop number and relative viscosity of the soap solutions of C_{18} acids.** *Ibid* 338–40.—The drop nos. of 0.025–2.0% soap solns. at 10–80° were measured by Hillyer's stalagmometer, with a petroleum fraction b. 150–200°. Except stearate, drop nos. generally increase with fall of temp. and the increase of concn. With concns. above 0.5% the drop no. increases with increase of unsatn. of fatty acids up to linolate while linolenate has a smaller drop no. than linolate. In a concn. below 0.25% oleate shows a max. drop no. while linolate has a smaller value. Detergent power of the soap soln. detd. by lanolin indigo cloth decreases with the increase of double bonds of fatty acids and is mutually related to the surface tension of the soap soln., but no definite relation is found between drop no. and detergent power. In relative viscosity, stearate stands highest and the soaps of unsatd. acids have smaller values. With the concn. below 2% no marked difference in viscosity is observed among the soaps of various degrees of unsatn.; with 1% soln. the linolate shows the largest value, while with 1.5% soln. the linolenate shows the largest value. **III. Lathering power of the soap solutions of C_{18} acids.** MASAWO HIROSE AND SABURO KITAJIMA. *Ibid* 340–1.—Stearate soln. of high concn. solidifies below 40°, and in low concn. the lathering is nearly nil. Lathering vol. rises with the increase of the double bond of the fatty acid, concn. and temp., but the lather stability shows a reverse tendency. Lather-

ing no. decreases with the increase of the double bond and rise of temp. As regards concn. influence, oleate passes through a max. at about 1% while linolate decreases with the decrease of concn. Sp. vol. of lather shortly after shaking rises with the increase of double bonds, but the corresponding values after 10 min. show a reverse relation. In general, the higher the degree of unsatn. the larger the vol. of lather, which, however, becomes more unstable. Oleate is the most moderate in its soap character of the soaps of C_{18} acids. Among the soaps of C_{22} or C_{24} acids, the soaps of the fatty acids with 2 double bonds are likely to show the best property. With the soaps of C_{18} acids the influence of unsatn. on the detergent power and the lowering of surface tension is similar to the case of lathering no. but contrary to lathering vol. E. SCHERUBEL

Solubilities of soaps in water. JIRO MIKUMO. *J. Soc. Chem. Ind., Japan* **33**, Suppl. binding 367–8(1930); cf. *C. A.* **24**, 1757.—The effects of the presence of highly sol. lower satd. fatty acid soaps or very sol. unsatd. fatty acid soaps upon the solubilities of sparingly sol. higher satd. fatty acid soaps were studied with various binary mixts. at 20°. Clear soap solns. prepd. by warming were kept in a thermostat for 3 to 15 days and then filtered; portions of the filtrate were treated with HCl and the fatty acids analyzed for their constituents. Solubilities, mols. per l.: Na myristate 4.8×10^{-4}, Na palmitate $4.8 - 5.2 \times 10^{-4}$, Na stearate $0.9 - 1.4 \times 10^{-4}$, Na arachidate $1.3 - 1.4 \times 10^{-4}$, Na behenate $1.2 - 1.5 \times 10^{-4}$. The exptl. temp., the m. p. of the fatty acids of class II soaps (caproates, etc.) and the concns. of their solns. exert great influence upon the solubilities of class I soaps (stearates, etc.). Soaps II always diminish the solubilities of less sol. homologous soaps I at lower temp. by salting out I, while at high temp. (50°) they can increase the solubilities of I by peptization. Common crystalloidal solns. have a retarding tendency upon the solubilities of I because of Na^+ effect acting in predominancy. Soaps III (oleates) in moderate concns. increase the solubilities of soaps I through mutual adsorption at 20° while at 0° Na oleate has no dissolving effect upon Na stearate. In any case mixed soaps in soln. exert colloidal influence upon each other; either one component is expelled from the soln. phase or they go together into the liquid phase through mutual adsorption. Soaps II or III always remain more or less in solid phase with I in some complex colloidal form. E. SCHERUBEL

Continuous saponification of neutral fat with ammonia under pressure. H. KEUTGEN. *Seifensieder-Ztg.* **57**, 697–9(1930).—K. refers to Barth's paper (*C. A.* **24**, 2220) on sapon. under pressure with NH_3, producing fatty acids, glycerol and $(NH_4)_2SO_4$. He doubts the advantages claimed for it. P. ESCHER

Determination of the cleansing power of soaps. E. BOSSHARD AND H. STURM. *Chem.-Ztg.* **54**, 762–3(1930).—A new washing test is described in which 25 mg. Fe_2O_3 is deposited upon 1 sq. dm. of woolen flannel and the moist test piece is hung on a rotating glass rod (100 r. p. m.) in a 2.5 l. beaker; it is washed in a 1% soln. of the washing compd. at 90° for 15 min. and rinsed in distd. H_2O at 90° for 15 min. The test piece is dried, ashed and the Fe_2O_3 detd. *Results.*—A settled soap washes best with a 0.4% soln.; at 90° the cleansing effect is twice as great as that at 25°; addn. of perborate lowers the cleansing effect; soaps contg. fat solvents show 10–20% better cleansing power than soaps without them. P. ESCHER

The Mackey test. H. WOLF AND R. HEILINGÖTTER. *Chem. Umschau Fette, Oele, Wachse u. Harze* **37**, 284–6(1930).—Presence of metallic soaps in the oil to be tested may cause a temp. increase in the Mackey test and since the free acid of an oil may easily form a soap when in contact with the metal gauze of the app., W. and H. suggest the use of brass on Pt gauze which expts. have shown to be free from any catalytic influence. They also advise the placing of the thermometer bulb in the exact center of the satd. cotton and give detailed direction for this. P. ESCHER

Reciprocal influence of soaps and perfumes. E. L. LEDERER. *Seifensieder-Ztg.* 57, 687–8, 703–4, 749–50(1930); cf. *C. A.* **24**, 4948.—*II. Influence of soaps on perfumes. A.*—Through the soap body. (*a*) At neutrality. Some 90 synthetic and natural compds. are tabulated with reference to keeping quality in soaps with less than 0.04% free alkali. The presence of linseed oil, deodorized by-product fats or more than 15% coconut oil diminish or change the character of perfumes; aulepine, coumarin and other aldehydes, ketones and lactones will not keep in the presence of heliotropin, cinnamaldehyde, hydroxycitronellal, isoeugenol, indole, vanillin, phenylacetaldehyde, etc. (*b*) Excess of alkali. When the alky. reaches 0.04% or more, the esters begin to saponify and change their odor; also vanillin, heliotropin, coumarin, indole, skatole and civet. Eugenol, isoeugenol and oil of cloves weaken in strength, while methyl-, ethyl- and benzylisoeugenol are more resistant toward alk. soaps. (*c*) Lack of alkali or the presence of unsapond. fat endangers the perfume greatly; resins or unsaponifiable substances do not. *B.*—Mech. and temp. influence. (*a*) Milled soaps.

Granite rolls permit losses of the more volatile perfumes, especially when the temp. increases. Cooled steel rolls are preferable. (*b*) Settled and non-settled soaps. The perfume should be added at the lowest possible temp.; benzaldehyde, citronellol and safrole or cedar-wood oil are useful. Non-settled soaps require special care because the temp. may rise while free alkali is still present. The alc. in glycerol soaps may influence the character of the perfume somewhat, but a large no. of perfumes may be used for these soaps: anisaldehyde, calmus oil, cedar-wood oil, citronellol, geranium oil, etc. Cold-made soaps have the least choice in perfumes; benzaldehyde, terpineol, citronellol, geraniol, xylol, musk, etc., are useful. *C.*—Changes by air and light. Terpenes and sesquiterpenes may resinify and alc. and aldehydes may easily become oxidized to non-odorous acids. Anthranilic methyl ester, bromostyrene, coumarin and thymol are not light-proof. Anisaldehyde, benzaldehyde, benzyl alc., geraniol, indole, phenylethyl alc., cinnamaldehyde and cinnamic alc. are either not proof or incompletely proof against air. Anethole, citral, eugenol, isoeugenol, heliotropin, phenylacetaldehyde, terpineol and vanillin are not proof against light or air. *III. Influence of the perfume substance upon the soap body; A.*—Technically pure soaps. (*a*) Color changes. Definite color changes have been observed with a no. of perfumes although the nature of the reaction is not accurately known. A table of 18 substances is given causing a yellow or brown color, among them anisaldehyde, benzaldehyde if not free from Cl, eugenol and isoeugenol, heliotropin, indole and vanillin; 21 substances are tabulated which cause no color change, among them are benzyl acetate, benzyl alc., bornyl acetate, citronellol, geraniol, ionone, linaloöl, terpineol, thymol and cinnamic alc. Fifty ethereal oils are likewise tabulated for permanence and discoloration. (*b*) Rancidity. Terpenes and sesquiterpenes are blamed for rancidity in soaps through autoxidation. The following substances act as antioxidants: benzyl benzoate, sandalwood oil, safrole, thymol, eucalyptal, benzoin, storax, guaiacum, myrrh and hyposulfites. P. ESCHER

Decomposition of the acids of peanut oil with the use of a new principle in fractional distillation (JANTZEN, TIEDCKE) **10.** Plant with centrifugal apparatus for recovery of fats from emulsions such as wash waters of wools (U. S. pat. 1,782,974) **25.** Preserving rubber (Brit. pat. 332,764) **30.** Washing and emulsifying agents (Ger. pat 506,338) **18.** Wetting, etc., agents (Ger. pat. 506,960) **18.**

Continuous apparatus for extraction of fats, etc., from animal carcasses, food refuse, etc. A. SOMMERMEYER. Brit. 332,637, April 24, 1929. Structural features of a digester and sepg. app.

Apparatus (with baffles) for separating fat from gases. GORDON W. F. CATLIN. U. S. 1,784,418, Dec. 9. Structural features.

Distilling column for distillation of fatty acids with steam. HERMANN BOLLMANN. U. S. 1,781,745, Nov. 18.

Stabilized fatty acid glycerides. CHARLES F. KAEGEBEHN (to R. T. Vanderbilt Co.). U. S. 1,784,360, Dec. 9. A small proportion (suitably about 0.4%) of a phenol having a nuclear H atom substituted by an aryl group, such as 2- or 4-hydroxybiphenyl is added to a material such as a com. fat or triolein, tristearin or tripalmitin in order to prevent decompn. from influence of light, heat, etc.

Press for expressing juices or liquids from oil-bearing seeds or other materials. OTTO RIEMANN. U. S. 1,782,273, Nov. 18. Structural features.

Apparatus for cooking oleaginous materials such as cotton seeds preparatory to oil extraction. JOSEPH DAVIDSON (to Davidson-Kennedy Co.). U. S. 1,782,714, Nov. 25. Structural features of a steam-cooking app. with superposed compartments.

Oil from cashew-nut shells. EDWARD R. HUGHES (to Harvel Corp.). U. S. 1,784,628, Dec. 9. The nuts are subjected to a sudden change from about normal temp. to about the charring temp. to produce an explosive pressure in the cellular structure by which the liquid is forced from the shell, followed by cooling before charring can take place. An arrangement of app. is described.

Soap powder. A. WELTER. Brit. 332,590, April 22, 1929. Liquid grain soap is heated by injection of compressed steam, and then atomized under the pressure prevailing in the treating vessel (solid electrolytes having a salting-out action such as NaCl or caustic alkali being added before heating, and if desired, the lower aq. layer being sepd. after stratification and before atomization of the upper soap layer). Various details of procedure are described.

Soap powder. A. WELTER. Brit. 332,599, April 22, 1929. In atomizing liquid grain soap heated to above 100°, compressed air or other non-condensing gas is pumped

into an autoclave contg. the soap before or at the beginning of the heating. Formation of crusts on the inside of the vessel is prevented.

Cleansing composition. ADOLF MÜLLER. Ger. 506,306, June 13, 1928. Kieselguhr that has been mixed with suitable binders, *e. g.*, kaolin and water glass, and sintered at about 1000°, is incorporated into soap.

28—SUGAR, STARCH AND GUMS

J. K. DALE

Storage experiments with raw (beet) sugar; emphasizing the relation between behavior on storage and affinability. O. SPENGLER AND ST. BÖTTGER. *Z. Ver. deut. Zuckerind.* **80**, 690–709(1930).—A review is given. Exptl. studies on temp. and relative humidity were made to det. the conditions under which the affinability of raw sugar remains unaltered on storage. Two types of sugar were used. *A* was dark colored, high in org. non-sugars, had high phenolphthalein alky., contained invert sugar and was of low rendement. *B* was light colored, of high rendement, lower in org. non-sugars and had lower phenolphthalein alky. These sugars were left in contact with air of different humidities at const. temp., 15° or 25°. By plotting % water content of the sugar *vs.* time, and color of sugar *vs.* time of storage, it was shown that the water content and the color value remained practically const. at a relative humidity of about 54 for *A* and of 59 for *B*. Temp. rise increased the rate of change, but did not affect the final result High relative humidity caused the absorption of H_2O by the sirup film on the sugar crystals, resulting in a more ready removal of this film in affination. *A* absorbed more water than *B*, for its lower purity sirup film exerted a lower vapor pressure than that of *B*. Low humidity caused low H_2O content, darkening of color and difficult affining. Samples of *A* and *B* stored at their resp. optimum humidities showed no change of color or H_2O content. Conclusion: Raw sugar of less than 2% H_2O content can be stored at 50–60% relative humidity without change in H_2O content or affinability, and as temp. has practically no effect on the equil., the relative humidity of the storage house can be readily adjusted (*e. g.*, by heating the air). Dried as well as moist sugars attain to the equil. value after about 2 to 3 weeks storage at the optimum relative humidity though the moist sugars give up their excess moisture slowly Notes on ash, org. non-sugars, invert sugar and polarization changes are given. The optimum relative humidity for white sugar storage is found to be about 60%, while that for raw sugars is 50–55%. F. CAMPS-CAMPINS

Sulfur dioxide in Natal sugar. D. J. COGHILL. *S. African Sugar J.* **14**, 565–75 (1930).—Three methods are in general use: the S stain method (*C. A.* **21**, 1199), titration with I (*Ibid*) and distn. in acid soln. with subsequent oxidation to H_2SO_4 (*C. A.* **21**, 2510). The 1st of these is applicable only to very small quantities of SO_2, and it has not been used in this investigation. The 2nd is carried out by C. as follows: Fifty g. of the sugar is dissolved in 150 cc. H_2O with gentle warming. Cool to room temp. and mix with another 100 cc. H_2O. Add 20 cc. of 5% NaOH soln., agitate the flask until the soln. clears and acidify with an excess of H_2SO_4. Immediately run in 10–20 cc. 0.02 *N* I soln.; there should be an excess of at least 5 cc., which is titrated back with 0.032 *N* $Na_2S_2O_3$ soln., with starch indicator. For the distn. method, as used by C., 100-g. sugar is dissolved in 100 cc. recently boiled and cooled tap water. A round flask is used in which 500-cc. water and 10 cc. concd. HCl are placed. The flask carries a funnel with stop cock for the sugar soln., an inlet tube for CO_2 and a reflux condenser set upward at an angle of about 45°; the upper end of the condenser is connected with 2 absorption vessels, each of which contains 10 cc. H_2O_2 (20% by vol.). CO_2 is passed through the app., and the contents of the flask are boiled for 5 min. Then the sugar soln. is run in from the funnel at such a rate that all of it is passed in 30 min. It is finally washed through with a little water. The water for the condenser is cut off and the distn. continued, always in a current of CO_2, until the upper end of the condenser becomes hot. Then the CO_2 gas is stopped, the tube between condenser and absorption tubes rinsed down and the entire contents of the absorption tubes are transferred to a beaker where they are titrated with 0.1 *N* NaOH, with bromophenol blue (0.1% soln. in alc.) as indicator. A blank is run on the H_2O_2, and a correction applied for it. The 2 methods were used on 104 samples of various types of Natal sugars, and the detailed results are tabulated. The I titration method gave 14 to 488 mg. per kg. of SO_2, and the distn. method 4 to 370 mg. Fifteen % of the samples contained over 70 mg. per kg., by the distn. method. The I method gave higher results, because the sugars contain volatile

compds., other than SO_2, which act on I. This was shown by distg. and passing the vapors first through H_2O_2 and then through I. Some of the I was reduced, but no H_2SO_4 could be detected as the reaction product. The SO_2 content of the sugars diminishes during storage. Bibliography of 9 references. F. W. ZERBAN

The natural residual alkalinity (of beet sugar liquors). v. MORGENSTERN. *Centr. Zuckerind.* **38**, 996–7(1930).—A discussion. J. F. LEETE

Recommendations for the utilization of the heat ordinarily lost in the low-temperature waste gases (in beet sugar factories). H. CLASSEN. *Deut. Zuckerind.* **55**, 892–4 (1930). J. F. LEETE

The fertilizer treatment of the cane crop (CILLIERS) **15**. Utilization of by-products from saccharin manufacture (HERZOG) **27**.

Diffusion apparatus for extraction of sugar from beets, cane, etc. CHARLES CAMUSET. U. S. 1,782,603, Nov. 25. Structural features.

Sugar-drying apparatus. DAVID K. RICHARDS. U. S. 1,782,177, Nov. 18. Structural features.

Crystalline dextrose. WM. B. NEWKIRK (to International Patents Development Co.). U. S. 1,783,626, Dec. 2. Normal anhyd. dextrose crystals are crystd. from an aq. dextrose soln. contg. 93% or more dextrose without addn. of seed, and the crystg. magma is maintained at a temp. (suitably about 50°) favorable to the formation of the anhydride and in movement so as to effect a uniform dispersion of the solid-phase dextrose throughout the mass. Cf. *C. A.* **24**, 2631.

Inverting sucrose solutions. LEONARD WICKENDEN (to John J. Naugle). U. S 1,783,551, Dec. 2. Material such as an affination sirup is treated with a monosaccharide sugar-contg. sirup contg. invertase. Numerous details of the treatment, clarification in successive stages, etc., are described.

Starch products. INTERNATIONAL PATENTS DEVELOPMENT CO. Brit. 332,680, Dec. 26, 1928. See Fr. 676,181 (*C. A.* **24**, 3128).

Monosaccharide material from hydrolysis of starch liquor. THEODORE B. WAGNER. U. S. 1,784,402, Dec. 9. A product which consists of a mixt. of dextrose and non-gummy dextrins may be produced by converting starch liquor by acid hydrolysis to a point at which the dextrins have lost their gummy and mucilaginous condition, and is suitable for use in *producing baker's yeast.*

Solubilizing gums. GEBR. JENTZSCH A.-G. (Heinz Perndanner and Josef Hackl, inventors). Ger. 506,037, June 3, 1928. Vegetable gums that swell but do not dissolve in water, *e. g.*, gum from *Sterculia urens*, are rendered sol. in water by treatment while in the swollen state with a water-sol. hypochlorite or the Na salt of *p*-toluenesulfochloroamide or its homologs. The treatment may be effected at ordinary or raised temp. An example is given.

29—LEATHER AND GLUE

ALLEN ROGERS

Some physical properties of leather. H. BRADLEY. *J. Intern. Soc. Leather Trades Chem.* **14**, 516–23(1930).—A discussion of the significance of such properties as sorption of water vapor, absorption of and permeability to liquid water and air permeability. H. B. MERRILL

Study of the dyes suitable for dyeing synthetic tanned leather (leathers tanned with syntans). GEO. F. KNOWLES. *J. Intern. Soc. Leather Trades Chem.* **14**, 562–7 (1930).—Acid dyes differ much among themselves in their capacity to be fixed by leather tanned with syntans while all basic dyes are very readily taken up. Those acid dyes that give satisfactory fixation on syntan-tanned leather all contain some basic groups H. B. MERRILL

Estimation of insoluble matter in tanning extracts. E. STIASNY. *J. Intern. Soc Leather Trades Chem.* **14**, 542–62(1930).—See *C. A.* **24**, 6059. H. B. MERRILL

Problem of tannage. LOUIS MEUNIER AND KHOA LE VIET. *J. Intern. Soc. Leather Trades Chem.* **14**, 524–36(1930); cf. *C. A.* **24**, 2634, 4652.—In support of the theory that tannage consists essentially of depolarization of hydrophylic groups in general and the NH_2 group in particular, it is shown (1) that the wt. of water absorbed by hide powder from air at a given relative humidity is decreased when the powder is tanned by exposure to vapor of quinone or HCHO; (2) that the viscosity of gelatin

soln. is markedly lowered by the addn. of small quantities of quinone (below the pptn. point); (3) that skin tanned with a wide variety of agents (Br, H_2CrO_4, $CrCl_3$, $KMnO_4$, syntans, 2-bath Çr-tannage) loses its ability to retain water of plumping. The action of $KMnO_4$ is believed to be an oxidation: $R—CH—NH_2—COOH + O = R—CHO + NH_3 + CO_2$. H. B. MERRILL

Technic of the electrometric method for measuring the p_H value of chestnut extract with the quinhydrone electrode. A. DE LA BRUÈRE. *J. Intern. Soc. Leather Trades Chem.* **14**, 567–73(1930).—Details for prepg. the quinhydrone and calomel electrodes and for making the measurements are given. The tannin soln. should contain not less than 1% quinone; the concn. of tannin is immaterial. H. B. MERRILL

Control of p_H value of official hide powder. A. JAMET. *J. Intern. Soc. Leather Trades Chem.* **14**, 540–2(1930).—The p_H value of the hide powder infusion prepd. in accordance with the official method for testing hide powder is somewhat affected by the kind of filter paper employed, some papers being slightly acid and others slightly alk. The p_H value of the KCl soln. used for the infusion should be more rigidly defined. H. B. MERRILL

Standardization of hide powder. V. Calculation of "official" (mean) results from data submitted by members of the hide powder committee. H. G. BENNETT. *J. Intern. Soc. Leather Trades Chem.* **14**, 537–40(1930); cf *C. A.* **24**, 6057.—The application of the Chauvenet criterion to det. whether divergent results should be rejected or included in the av. is advocated. H. B. MERRILL

Ornamenting "leather cloth." IMPERIAL CHEMICAL INDUSTRIES, LTD., and G. E. SCHARFF. Brit. 332,602, Jan. 23, 1929. A self-cracking enamel is applied having a base of cellulose deriv. such as nitrocellulose sol. in org. solvents and contg. a high proportion of pigments or fillers or both (suitably 3 to 30 times the wt. of the cellulose deriv.) with a quantity of softening and plasticizing ingredients (if any) less than that which would render the coating sticky if the proportion of pigment were such as is normally present in ordinary non-cracking enamels. Examples are given of white and black cracking enamels.

30—RUBBER AND ALLIED SUBSTANCES

C. C. DAVIS

Historic facts relating to the chemistry of rubber. I. L. KONDAKOV. *Rev. gén. caoutchouc* **7**, No. 65, 7–13(1930).—A crit. review and discussion of a recent book by Memmler (*Handbuch der Kautschukwissenschaft*, Leipzig, 1930; cf. *C. A.* **24**, 2638). C. C. DAVIS

The influence of increasing proportions of different loadings on the shrinkage effect of uncured rubber mixtures and the determination of their behavior on calendering. RUDOLF DITMAR AND KARL H. PREUSSE. *Caoutchouc & gutta-percha* **27**, 15212–4 (1930).—If rubber is mixed with a filler on an ordinary roll mill and is then removed quickly, the sheet shrinks both transversely and longitudinally with corresponding increase in thickness. This phenomenon must not be confused with the de Visser effect (cf. *Diss. Delft*, **1925**). This shrinkage was studied on a micro-mill, where various quantities of whiting, ZnO, C black and SiO_2 gel were incorporated in 10 g. of rubber and sheets 2 mm. thick were removed as quickly as practicable. The roll temp. was 30° The contours of the sheets were traced on parchment paper and the shrinkage was then followed. With whiting, the shrinkage was the same for all proportions, and above 20% crimping was negligible and sheets 2 mm. thick could be calendered. With ZnO, shrinking was the same up to 50% and then increased greatly. Above 30° there was no crimping, and calendering to 2 mm. was possible. The greater the proportion of C black the smaller the shrinkage, and above 30% crimping ceased and calendering to 2 mm. was possible. With increasing proportions of SiO_2 gel shrinking became rapidly smaller, above 40% there was no shrinkage, and above 10% there was no crimping and the mixt. could be calendered 2 mm. thick. In general, the expts. show that very absorbent fillers decrease the shrinkage effect and render the mixts. more readily calendered. C. C. DAVIS

Some aspects of double refraction and structure in rubber. B. W. ROWLAND. *Ind. Eng. Chem.* **22**, 1182–4(1930).—The present work includes a no. of observations of double refraction in rubber under compression and also in a stretched state, and attempts to interpret the behavior in terms of the Wiener theory of micellar double

refraction. The exptl. evidence shows that (1) the micelle in distorted rubber is anisotropic and exhibits a pos. rod-like type of double refraction, (2) upon stretching, the micelle orients itself with its long axis in the direction of stretching, and (3) upon compression the micelle orients itself as a rod-like structure perpendicular to the direction of compression. The idea is advanced that stretching involves an intimate distribution of the sol. viscous hydrocarbon within the interstices of the elongated gel phase, which tends toward an optical homogeneity of the mass and a loss of distinction between the 2 phases. The double refraction of artificially polymerized isoprene resembles closely that of natural rubber. Natural color photographs show the similarity of double refraction in rubber to that of a uniaxial crystal. The n values of both natural rubber and of synthetic rubber (polymerized isoprene) are 1.5350 (Abbé refractometer). C. C. DAVIS

X-ray investigations on rubber. EMIL OTT. *J. Am. Chem. Soc.* **52**, 4612(1930); cf. *C. A.* **20**, 2428.—A sample of crepe rubber gave a distinct x-ray pattern on the first exposure, which became increasingly sharper with each exposure; simultaneously the opaqueness of the milky spot increased; these show increase in particle size and progressing crystn. Evidently rubber under the influence of x-rays behaves like gutta-percha under ultra-violet light (Kirchhof, *C. A.* **23**, 1525). C. J. WEST

A study of gutta-percha and balata by means of x-ray spectra. H. HOPFF AND G. V. SUSICH. *Rev. gén. caoutchouc* **7**, No. 65, 23–6(1930).—A survey of the expts. of Clark (*C. A.* **20**, 3837), Hauser (*C. A.* **22**, 697) and Ott (*C. A.* **20**, 2428) shows agreement in only 2 respects: *viz.*; that (1) gutta-percha (I) and balata (II) are already cryst. in the unstretched state, and (2) the lattice of gutta-percha and balata is different from that of rubber. To settle the discrepancies in the work of these investigators, unpurified and purified I and II of different origins were tested in the unstretched and in the stretched state at different temps. (0–140°). It was found that only the hydrocarbon is cryst., and if allowance is made for the amorphous ring of the impurities in I or II then it is immaterial whether purified or unpurified substances are exposed to the x-rays in spectrographic tests. The spectra showed that the hydrocarbons of I and of II are identical, but different from that of natural rubber. The hydrocarbon of I and II exists in 2 polymorphous modifications, the transformation point of which is approx. 60°, and depends upon the impurities. The modification which is stable at room temp. (gutta-α) is cryst. even in the unstretched state. The modification which is stable above 60° (gutta-β) is, on the contrary, amorphous in the unstretched state, like rubber at room temp. By stretching while hot it becomes cryst., oriented and gives a fiber diagram. From the fiber diagrams of stretched and cooled samples an identity period of 4.7 and 9.4 A. U., resp., can be calcd. The presence of these 2 modifications explains at least in part the contradictory results of Clark, Hauser and Ott. Though the transformation of gutta-α into gutta-β takes place readily upon heating, it is not easy to pass from gutta-β to gutta-α by simple cooling. The heated samples show a marked tendency to remain amorphous for a long time, as with glass, and when at length they crystallize, gutta-β (stable at high temp.) is more often formed. The latter can, however, be transformed into gutta-α if it is dissolved and repptd. at a lower temp. than the point of transformation. As this is a discontinuous phenomenon, samples which give a mixed diagram are often obtained I and II were purified by dissolving the com. products in $CHCl_3$ contg. 2% piperidine, filtering, pptg. by addn of acetone and extg. the ppt. with acetone until free of resins. Also in *Kautschuk* 6, 234–7(1930). C. C. DAVIS

Phenomena of the mechanical deformation of rubber. H. MARK AND E. VALKO. *Rev. gén. caoutchouc* **7**, No. 64, 11–6; *Gummi-Ztg.* **44**, 2077(1930).—The deformation of rubber is in general reversible and elastic, and involves a reversible hardening, in contrast to the irreversible deformation of crystals. It is most easily shown by x-ray expts. that the mol. phenomena are quite different in the 2 cases, and that the elongation of rubber can be explained by intramol. and intermol. changes. In the 1st case, the mols. do not change in form, whereas in the 2nd case the atoms in the mol. rearrange themselves in a new way. On the basis of the concept of fibrous primary valence chains, Meyer, Fikentscher and Mark have developed a model of the rubber mol. with which the mech. behavior of rubber can be satisfactorily explained on an intermol. basis. This model conforms to the elastic thermodynamic, röntgenographic and chem. properties. However, to correlate these properties on a quant. basis, it is necessary to employ the very same material throughout, and this the present paper attempts to do. The expts. were carried out with raw rubber from ammoniacal latex, a soft vulcanizate with a high rubber content and a tire tread mixt. with a high gas black content. The breaking tests were made at —195° (liquid N), and it was found that the differences at room

temp. in the tensile strength of samples previously stretched to varying degrees also held true at —195°. In an approx. way the strength of a given sample depended upon the preliminary elongation, and gutta-percha behaved in a similar way. In contrast to the earlier work, the present expts. do not show at the temp. of liquid air any high extensibility of previously stretched samples. The mol. mechanism of the resistance to rupture depends in all probability upon a micellar orientation. At rupture either the individual mols. can break (in which case the interlocked primary valence chains loosen and slide apart), or whole bundles of parallel primary valence chains, *i. e.*, micelles, slide apart. The latter phenomenon is the more probable. During stretching micelles of crystd. rubber are formed in increasing numbers, which behave like a filler in the remaining uncrystd. rubber. Since highly stretched raw rubber is almost completely crystd. and possesses about 10 times the strength of unstretched rubber, it may be assumed that the strength of the cryst. phase is 10 times as great as that of the amorphous phase. The strength of stretched rubber would accordingly be the sum of the strengths of the amorphous and cryst. portions present in a cross section. At room temp. rubber can be stretched several hundred %, but at the temp. of liquid air its ultimate elongation is less than 10%. A study of the tensile properties of raw rubber between 20° and —80° showed a sudden transition at —67°. At room temp. the ultimate elongation of raw rubber was approx. 900% and the tensile strength approx. 30 kg. per sq. cm. At —20° the ultimate elongation was the same, but the tensile strength was 10 times as great. Samples stretched in the cold showed an extraordinarily great elastic after effect. At —40° and —60° no essential changes were observed, and only between —60° and —70° did any appear. In the latter case the rubber broke without any elongation. At sufficiently low temps., there was a characteristic elastic limit of the stress, at which the resistance to deformation was greater than the resistance to rupture. This was the *temp. of brittleness*, which lay between —65° and —72°, according to the rate at which the stress was applied. Below this brittleness point, stretched rubber developed cracks, which appeared like white milky streaks, and which were visible even after warming. Above this temp. of brittleness, stretched samples became milky and turbid but remained homogeneous, and after release of the stress became transparent again. To explain this phenomenon, it may be assumed that upon lowering the temp. the intermol. vibrations of the spiral mol. became slower, so that the coiled position became stabilized. Simultaneously the viscosity increased. At a sufficiently low temp., the state of equil. within the stretched mol. became so well stabilized that the force necessary to overcome this equil. became greater than that of the cohesion between mols., and rupture without elongation occurred. Near the brittleness point there was in definite zones a stretching of the mol., but in the neighboring regions changes in position were no longer possible because of the high viscosity and the material became porous and absorbed gases. Also in *Kautschuk* 6, 210 5(1930). C. C. DAVIS

Study of the mechanical deformation of vulcanized rubber. P. PRACHE. *Caoutchouc & gutta-percha* **27**, 15003–8, 15046–9, 15125–8(1930).—A review and discussion of all types of mech. deformation of rubber, with a new study of the influence of 2 or more forces acting in different directions (the deformation of an inflated object distended by internal pressure). C. C. DAVIS

Change of electrical properties of rubber and gutta-percha during storage under water. HARVEY L. CURTIS AND ARNOLD H. SCOTT. *Bur. Standards J. Research* **5**, 539–52 (1930).—Samples of rubber and of gutta-percha were stored under water for about 7 yrs. and elec. measurements were made periodically to det. the effect of aging on their resistivities, dielec. consts. and powers. The dielec. const. was measured under 3 different conditions, *viz.*, an a. c. of 60 cycles, a pulsating d. c. with 0.6 sec. charge and 0.1 sec discharge, and a pulsating d. c. with 0.6 sec. charge and 1 sec. discharge. In all cases the dielec. consts. increased with time, unless failure was near. A sample was considered to have failed when its capacitance could no longer be measured. Changes in the resistivity and in the power factor varied from sample to sample. The approach to failure was first indicated by the resistivity. By plotting the time that a sample had been under observation against the resistance of the sample, it was found that the curves of the sample which failed showed a break or a marked change in direction several months before actual failure. Similar curves of the power factor and d. c. dielec. const. showed breaks at a later time. The time interval between the break in the resistivity curve and the breaks in the other curves was a function of the rate of decrease of the resistivity. This latter decrease has been ascribed to the formation of fine holes through the material, and this explanation was confirmed by microscopic examn. of microtome sections of the samples which failed. These sections showed

fern-like figures which projected into the rubber. All of the samples which failed were of a tubular form, with water electrodes both inside and outside the tubes. Some Cu salts were inadvertently allowed to form inside the tubes, and the catalytic action of these Cu salts accelerated the aging and probably altered its character. C. C. DAVIS

The determination of sulfur in rubber. J. G. MACKAY. *J. Soc. Chem. Ind.* 49, 401–3T(1930).—The difficulties encountered in the routine use of the method already developed for detg. total S (cf. *C. A.* **24**, 4423) have necessitated a modification so that the following procedure is recommended: Introduce the sample (0.25 g. of soft vulcanizate or 0.15 g. of hard rubber) in a small glass tube into a Kjeldahl flask contg fuming HNO_3 (10 cc. of d. 1.50), $HClO_4$ (5 cc. of d. 1.54) and Br (0.5 cc.), warm until oxidation is complete (using a water condenser), replace the condenser with a tube, boil gently until the nitric products are removed and the liquid is almost colorless (if it does not clear, cool, add 1–2 cc. of $HClO_4$ and heat), transfer to an evapg. dish, add pure NaCl (2 g.), evap. to dryness, add concd. HCl (10 cc.), evap. to dryness, moisten with 2 *N* HCl (2–3 cc.), dil. with water, filter, dil. to 250 cc., heat to boiling, ppt. with boiling 0.2 *N* $BaCl_2$ (50 cc.) (adding all at once), and proceed in the conventional way. When the rubber contains Pb, it is recommended that the $PbSO_4$ be detd. by the method of Hay (cf. Mackay, *C. A.* **24**, 4423). When Sb is present, add before pptg. $BaSO_4$ a sufficient vol. of satd. K Na tartrate to keep the Sb in soln. *Free S.*—The method does not take into consideration acetone-sol. S compds. (cf. Kelly, *Rubber Age* 1920, 520; cf. *C. A.* **14**, 3167), but is claimed to destroy more completely the org. ext. Ext the finely ground sample (1 g.) with boiling acetone for 6 hrs., evap. the solvent, dry at 90°, add fuming HNO_3 (10 cc. of d. 1.50), $HClO_4$ (5 cc. of d. 1.54) and Br (0.5 cc.), warm gently for 30 min., boil 15 min. to complete soln. (end of frothing), add NaCl (1 g.), evap. to dryness, add concd. HCl (10 cc.), evap. to dryness, and det. the sulfate in the residue by the method of Hintz and Weber (cf. *Z. anal. Chem.* **45**, 31(1906)) In spite of the new method being more rapid, it is just as precise as the older well-known methods. C. C. DAVIS

Action of zinc oxide containing iron in rubber mixtures. R. DITMAR AND K. H. PREUSSE. *Caoutchouc & gutta-percha* **27**, 15219–20(1930).—Comparative tests of some of the phys. properties of vulcanized mixts. of pale crepe 100, S 3, mercaptobenzothiazole 1, ZnO 30 and increasing proportions of Fe_2O_3 (0–30) showed that up to 2% the color effect is the only appreciable one and that with the higher proportions Fe_2O_3 acts merely as an inactive filler. C. C. DAVIS

The viscosity of rubber solutions under the influence of benzoyl peroxide. A contribution to methods for determining inorganic fillers, etc., in rubber mixtures. G. FROMANDI. *Rubber Age* (N. Y.) **28**, 197–8(1930).—English version of *C. A.* **24**, 4956. C. C. DAVIS

Is the presence of rubber in coal possible? LEO ECK. *Gummi-Ztg.* **45**, 287 (1930).—Comments on supposed discoveries of rubber in coal by Kindscher (*C. A.* **18**, 2862), Jurasky (*C. A.* **23**, 1844) and Hoffmann and Kirchberg (*Brennstoff-Chem* **11**, 389(1930)). C. C. DAVIS

Toxic substances in the rubber industry. XVI. Guanidine compounds. P. A. DAVIS. *Rubber Age* (N. Y.) **26**, 143–4(1930); cf. *C. A.* **25**, 233.—The guanidines most used as accelerators are relatively innocuous, and with proper ventilation and safety measures there should be no trouble. C. C. DAVIS

Carbon black in rubber insulating compounds. H. CURTIS AND A. T. MCPHERSON. *Ind. Eng. Chem.* **22**, 1258–9(1930).—Comments on an article by Boggs and Wiegand (cf. *C. A.* **24**, 4958).—The results of C. and McP. are not at variance with those of B. and W. **Reply.** C. R. BOGGS AND W. B. WIEGAND. *Ibid* 1259–60. C. C. DAVIS

Fertilizing experiments on *Hevea* (GRANTHAM) **15.** Soft rubber-like composition (U. S. pat. 1,784,070) **18.**

Conservation of rubber latex. KURT SCHUSTER and HEINRICH HOPFF (to I. G. Farbenind. A.-G.). U. S. 1,783,057, Nov. 25. See Ger. 503,645 (*C. A.* **24**, 6063).

Adhesive from rubber latex. GUSTAVE S. MATHEY (to Johnson & Johnson). U. S. 1,784,740, Dec. 9. In prepg. an adhesive suitable for use on surgical dressings, etc., refined latex emulsion is subjected to repeated concn. such as by shaking with gum tragacanth in the presence of an agent such as Na silicate giving an alk. reaction, a germicidal agent such as CH_2O is added, and the stock is heated in the presence of preservatives to reduce it to a jelly-like mass upon cooling and the cold mass is strained to liquefy it so that it will not jell again.

Preserving rubber. S. I. STRICKHOUSER (to Naugatuck Chemical Co.). Brit.

332,489, Nov. 26, 1928. **Cracking of rubber on exposure to air and light is retarded** by treatment with an α-diketone such as benzil, phenanthraquinone or furil (0.5% of which may be added to the rubber mixt. before vulcanization, added to latex or applied in soln. to the surface of the vulcanized articles).

Preserving rubber. J. TEPPEMA (to Goodyear Tire & Rubber Co.). Brit. 332,764, Nov. 26, 1928. A *preservative for use with rubber, transformer oils, soaps*, etc., comprises the reaction product of a naphthol such as β-naphthol with an aldehyde such as CH_2O, acetaldehyde, butaldehyde, crotonaldehyde or benzaldehyde.

Rubber composition. P. H. W. CLOUD. Brit. 332,537, April 19, 1929. Rubber is mixed with a large proportion of animal fibers (such as 4 times as much wool, flocks, mungo, etc.) and with fillers such as whiting and other usual ingredients such as S, ZnO and an accelerator, and the mixt. is vulcanized at a temp. below that which would carbonize the fibers.

Heat-plastic composition. HAROLD GRAY (to B. F. GOODRICH Co.). U. S. 1,782,036, Nov. 18. A compn. which may be used for bonding rubber to other materials comprises a heat-plastic rubber isomer having a less chem. unsatn. than rubber and a Pb salt of a higher fatty acid such as Pb oleate. Various other specified ingredients may be used.

Heat-plastic rubber derivatives. HARRY L. FISHER and HERBERT A. WINKELMANN (to B. F. Goodrich Co.). U. S. 1,782,140, Nov. 18. A dialkyl sulfate (suitably about 10% or more of Et_2SO_4) is incorporated with rubber and the mixt. is heated (suitably to about 125–140° for 8 hrs.) to produce a thermoplastic product, which is of tough stable character.

Compounding rubber with paracoumarone resin and sulfur. STUART P. MILLER (to Barrett Co.). U. S. 1,782,693, Nov. 25. Paracoumarone resin with a m. p. between 78° and 95° is melted, mixed with S and the resulting soln. is added to rubber.

Isomerizing rubber. I. G. FARBENIND. A.-G. Brit. 332,762, Aug. 6, 1929. Rubber is treated with P oxyhalides or mixts. of these with P halides or other suitable agents decompg. rubber, such as P oxybromide, together with PCl_5 (suitably in the presence of an org. liquid inert to the P compds. and having a dissolving or swelling action on rubber, such as benzine or benzene). Thermoplastic products and transparent films may be obtained.

Apparatus and operation for making hollow rubber articles by electrodeposition from aqueous rubber dispersions. PAUL KLEIN and ANDREW SZEGVARI (to American Anode Inc.) U. S. 1,783,435, Dec. 2. A quantity of the aq. dispersion is confined in contact with a mold-forming surface of the exterior contour of the article to be produced, electrodeposition is effected with use of a cathode immersed in the dispersion, and gases formed at the cathode are oxidized to inhibit their entrainment in the rubber layer deposited.

Sponge rubber. DUNLOP RUBBER CO., LTD., W. H. CHAPMAN, D. W. POUNDER and E. A. MURPHY. Brit. 332,525, March 21, 1929. Aq. dispersions of rubber or the like which have been rendered capable of gelling on heating or in the cold after a definite and controllable time interval are converted into a froth (suitably by adding soap or saponin and blowing with air) while still remaining reversible and are subsequently caused to set to an irreversible mass. Several examples with details of procedure are given.

Sponge rubber. DUNLOP RUBBER CO., LTD., E. A. MURPHY and E. W. B. OWEN. Brit. 332,526, March 21, 1929. Frothing substances such as soaps, casein, licorice or saponin are added to aq. rubber dispersions (preferably highly concd. and viscous) and a froth is formed (as by stirring or blowing with gas) without destroying the reversible character of the dispersion, and the froth is caused to set (as by gentle heating) to an irreversible form. Vulcanizing ingredients may be added and the sponge vulcanized after setting.

Rubberizing fibrous material such as woven, knitted or felted fabrics. ERNEST HOPKINSON. U. S. 1,784,523, Dec. 9. Articles such as gloves, bathing shoes, etc., may be superficially treated with water-repellant material such as a rubber cement contg. lithopone, ZnO, S and paraffin to prevent substantial penetration by water, and then provided with a relatively thick coating by a single coating operation with concd. latex contg. low-temp. curing ingredients, followed by curing, thus retaining a good flexibility.

Uniting rubber coverings with sheet steel as in automobile running-board manufacture. BUDD BRONSON (to Ohio Rubber Co.). U. S. 1,784,780–1–2, Dec. 9. Mech. features.

Use of hard rubber for outer surfaces of reels for winding thread. F. CLOUTH

RHEINISCHE GUMMIWARENFABRIK A.-G. Brit. 332,812, Sept. 18, 1929. Metal parts may be coated with hard rubber.

Rubber vulcanization accelerator. HARRY O. CHUTE. U. S. 1,782,713, Nov. 25. As an accelerator, there is employed a reaction product of a cyanamide, CH_2O and an amine, *e. g.*, thiocarbanilide, toluidine or aniline.

Rubber vulcanization accelerator. MAX BÖGEMANN and HERMANN FRIEDRICH (to I. G. Farbenind. A.-G.). U. S. 1,783,216, Dec. 2. As an accelerator, there is used a mixt. of di- and poly-amines obtained by reaction of NH_3 upon ethylene dichloride.

Rubber-vulcanization accelerator. HAROLD A. MORTON. U. S. 1,784,703, Dec 9. A condensation product of α-ethyl-β-methylacrolein with an amine such as aniline, neutralized with abietic acid, is used with rubber, ZnO and S.

Use of mono- and di-carbalkoxydiarylthioureas as accelerators in rubber vulcanization. CECIL J. T. CRONSHAW and W. J. S. NAUNTON (to British Dyestuff Corp., Ltd.) U. S. 1,782,842, Nov. 25. Use of the diethyl deriv. is particularly mentioned.

Rubber vulcanization. WINFIELD SCOTT (to Rubber Service Laboratories Co.). U. S. 1,784,498, Dec. 9 Vulcanization of rubber with S is effected in the presence of an accelerator comprising a reaction product of a dichloroacetate and a mercaptobenzothiazole and preferably also a guanidine vulcanization accelerator. Cf. *C. A.* 25, 234.

CHEMICAL ABSTRACTS

Vol. 25. FEBRUARY 10, 1931 No. 3

1—APPARATUS AND PLANT EQUIPMENT

W. L. BADGER

Recent progress in instrument design. EZER GRIFFITHS. *Chemistry and Industry* **49**, 1044–8(1930). E. H.

Laboratory devices. CURT MÜCKENBERGER. *Chem.-Ztg.* **54**, 889–90(1930).—Various uses of elec. heating in distn. and to prevent crystn. in condensers or to avoid explosions are mentioned. J. H. MOORE

A microbalance of new design. G. R. STANBURY AND N. TUNSTALL. *J. Sci. Instruments* **7**, 343–9(1930).—The app. was designed for weighing *wool fiber* or *pieces of yarn*. Details are given, with 1 cut, and it is discussed mathematically. Cf. King, *Trans Faraday Soc.* **25**, 451–7(1929). J. H. MOORE

Resistance thermometers for chemists. CHAS. G. MAIER. *J. Phys. Chem.* **34**, 2860–8(1930).—Details for the construction, calibration, method of using for greatest precision and method of calcg. temps. are given for thermometers of Cu for use below 100°; also a modified type for general lab. use is described, and 8 references are given. J. H. MOORE

Measurement of surface temperatures. WM. F. ROESER AND E. F. MUELLER. *Bur. Standards J. Research* **5**, 793–802(1930).—A contact pyrometer consisting of a gold disk to which chromel and alumel thermocouple wires were soldered is described. This is satisfactory for temps. up to 705°. A compensated contact thermometer in which the contact is heated to the same temp. as the surface to be measured is also described. This enables precise measurements below 205° to be made. M. D.

An integrating photometer for x-ray crystal analysis. B. WHEELER ROBINSON. *Proc. Roy. Soc.* (London) **A130**, 120–33(1930).—Improvements of the α-ray photometer developed by Astbury (*C. A.* **21**, 3310; **23**, 3404) are the power of adjustment of the tissue *in situ*, a better method of current measurement, the ability to exchange apertures and to change the position of the ionization chamber with reference to the source. Measurements of the intensities of reflections of copper K_α radiation from several planes of anthracene crystals are given as typical examples. M. D.

Oxygen bomb calorimeter. EDGAR STANSFIELD AND JOHN W. SUTHERLAND. *Can. J. Research* **3**, 464–72(1930).—A stainless steel Scholes bomb made by G.C ussons, Ltd., Manchester, and using rubber gaskets proved highly satisfactory. After 2 years of use the bomb was found to be as bright and smooth inside as out. By cutting down the steel ignition posts and substituting a Pt wire triangle for the crucible support, the time for temp. equil. to be attained was reduced to 5 min. A new calorimeter equipment, a simplified method for correcting Beckmann thermometer readings and a description of a vacuum cup calorimeter are included in the paper. J. W. SHIPLEY

A new pipet viscometer. J. ROMNEY. *Chemistry and Industry* **49**, 986–8(1930).—The dimensions and method of operating are given for a simple glass app. which requires only about 25 cc. of lubricating oil to give satisfactory results. When 4 are mounted in a thermostat 1 operator can make 3 times as many detns. as are possible with a Redwood, and cleaning requires only 20–60 sec. J. H. MOORE

The determination of corrections for Redwood viscometers. GUY BARR. *J. Sci. Instruments* **7**, 359–61(1930).—The National Phys. Lab. method of detg. corrections is described and illustrated by a chart. J. H. MOORE

Nitrocellulose filter cloths. HANS GRADL. *Chem.-Ztg.* **54**, 871–2(1930).—A filter cloth made from 12% N nitrocellulose lasted 4 years. Raising the N content of natural fibers increases the durability in acids and Cl. Nitrated cotton filter cloth cannot be used with 40% H_3PO_4, but filter cloth woven from nitrated cotton fiber can. Weaving must be done while moist. E. M. SYMMES

A method of filling a siphon barometer. SEVERIANO GOIG. *J. chim. phys.* **27**, 452–4(1930).—The detailed directions are illustrated by 1 cut. J. H. MOORE

The centrifugal action in the use of horizontal as compared with vertical centrifugals. G. OEHLER. *Chem. Fabrik* **1930**, 510.—An explanatory supplement to *C. A.* **24**, 4428. J. H. MOORE

The technic of vacuum evaporation and distillation. HANS N. NAUMANN. *Chem. Fabrik* **1930**, 505–7; cf. *C. A.* **25**, 1.—Descriptions and directions are given for operating various lab. app. with water jet pumps in which the distillate is either collected or permitted to escape with the water. The advantages of a capillary boiling tube of V2A steel are mentioned, and a bibliography is given J. H. MOORE

A note on the purification of mercury. A. O. JONES. *Chemistry and Industry* **49**, 437–8T(1930).—Figure 2 of the Record app. (*C. A.* **23**, 2605) is greatly improved by substituting a narrower tube for the wide up-take tube *C*, giving smaller droplets of Hg. J. H. MOORE

Double-pole double-throw mercury switch. GLENN H. DAMON. *J. Phys. Chem.* **34**, 2627–8(1930).—The app. was developed to perform better all the functions of the knife-edge switch. To eliminate breakage it is made of bakelite or similar material. The middle part of the long contact chamber is depressed, giving a neutral point when the switch is in a horizontal position. It may be operated automatically. J. H. M.

Superheated steam instead of air for blowing. A 1785 proposal worthy of confirmation. MAX SPETER. *Chem.-Ztg.* **54**, 829(1930).—A description of melting furnaces blown by superheated steam. E. M. SYMMES

Safe handling of unfired pressure equipment. M. E. BONYUN. *Chem. Met Eng.* **37**, 695–6(1930).—Design and inspection of containers and relief valves are described. E. M. SYMMES

Laboratory extraction apparatus (Soxhlet type). SCHALWA ZINZADZE. Ger. 507,360, Jan. 19, 1929.

Test tube. JOHANNES HOPPE. Ger. 507,359, Nov. 18, 1927. A tube for testing gases evolved on treating a solid with acid, etc., is formed with a side pocket near the top into which the testing reagent is introduced. The pocket has a small hole for the escape of the gases, and in use the solid is placed in the tube, the acid, etc., is added, and the mouth of the tube is closed.

Temperature indicators, particularly for superheaters. COMPAGNIE DES SURCHAUFFEURS (SOC. ANON.). Fr. 686,622, Dec. 13, 1929.

Photometer. ASKANIA-WERKE A.-G. VORM. CENTRALWERKSTATT DESSAU UND CARL BAMBERG-FRIEDENAU (Walter Brecht, inventor). Ger. 507,086, Oct. 25, 1927. The app. is particularly intended for detg. the thickness of suspensions of fibrous materials from the amt. of light absorbed.

Filter sieves suitable for use with liquids or gases. AUGUST PAHL. U. S. 1,786,361 Dec. 23. A metal screen such as one formed of woven wire is provided with a covering coat of particles of absorbent material such as charcoal or lime secured by "Liquid glass," gum or other suitable adhesive.

Device for filtering air or other gases. ANDERS JORDAHL (to American Air Filter Co.). U. S. 1,786,208, Dec. 23. Structural features.

Heatable swinging stirrer for rotary filters. MASCHINENFABRIK BUCKAU R. WOLF A.-G. Ger. 505,887, Mar. 16, 1927.

Filter press. LOUIS REVEL. U. S. 1,785,494, Dec. 16.

Apparatus for stripping filter cakes from filter screens. JOSEPH V. ZENTHOEFER (to Oliver United Filters, Inc.). U. S. 1,785,237, Dec. 16.

Apparatus for gravity separation of liquids such as oil and water. IGNAZ MÜLLER. U. S. 1,784,943, Dec. 16. Structural features.

Apparatus for separating liquid particles from steam, etc. GRANT D. BRADSHAW (to Blaw-Knox Co.). U. S. 1,785,931, Dec. 23. Structural features.

Drum centrifuges for purifying liquids. RAMESOHL & SCHMIDT A.-G. Fr. 686,372, and 686,373, Dec. 10, 1929.

Electron tube. SIEMENS-SCHUCKERTWERKE A.-G. (Rudolf G. Berthold, inventor). Ger. 504,839, Nov. 9, 1924. Details of construction.

Vacuum tubes by the absorption of gas by alkali or alkaline earth metals. INTERNATIONAL GENERAL ELECTRIC CO. Ger. 505,702, Mar. 24, 1926. The metals are present as gauze.

Indirectly heated thermionic cathodes. WESTINGHOUSE LAMP CO. Brit. 333,011, June 24, 1929. In the construction of a heating element surrounded by an insulator such as quartz, porcelain or "isolantite," erosion and consequent failure of the heating filament, due to deleterious gases such as water vapor and C oxides evolved by the insulator, are prevented by providing a protecting material (such as Cr, Zr, Th, U,

Ta, B, Si, V or Ti) between the filament and the insulator to absorb and retain the gases. Cr is preferably used, and various details of manuf are described. Cf. *C. A.* 24, 2386

Laminated metal hammers for impact pulverizing mills. FRED J. BULLOCK (to Papec Machine Co.). U. S. 1,785,435, Dec 16 Mills of the impact or hammer type are provided with hammers arranged to operate through travel in the plane of lamination, formed with outer laminae which are relatively hard such as steel, iron or other metal and one or more intermediate laminae which are relatively soft.

Apparatus for humidifying and conditioning air. CARROLL E. LEWIS (to Lewis Corp.). U. S. 1,785,741, Dec. 23. Structural features.

Apparatus for condensing vapors and separating gases therefrom. RENÉ MERCIER. Ger. 507,127, Jan. 26, 1927. An indifferent liquid is supplied to a no. of rotors on a common shaft, analogous to the vanes of a rotary pump, the rotors being so constructed that the liquid escaping from some of them condenses the vapors but has an insufficient velocity to carry along the accompanying gases, which are led away by liquid from the other rotors.

Apparatus for separating entrained liquid from vapors. RUHLANDWERK A.-G. Ger. 507,063, April 13, 1927.

Centrifuge for separating liquids or solids from gases. MASCHINENFABRIK BAUKAU R. WOLF. A.-G. Ger. 505,514, Jan. 7, 1930. Details of construction and operation.

Counter-current apparatus for treating liquids with liquids or gases. WALTHER FELD & Co G M. B. H. and RICHARD GISNER Ger. 507,315, Aug. 29, 1928. The app comprises a no. of beaters and baffles superposed on a common shaft.

Apparatus for mixing liquids with gases or vapors. G. SCHUY NACHF. A.-G. (Theodor Schmiedel, inventor). Ger. 505,793, May 20, 1928. Details are given.

Screw propeller apparatus for mixing liquids. FRIEDRICH DUWE (to Maschinenfabrik Augsburg-Nürnberg A.-G.). U. S. 1,786,009, Dec. 23. Structural features.

Apparatus for mixing and sampling liquids. FAIRRIE & Co., LTD., and G. FAIRRIE. Brit 332,919, April 30, 1929. Structural features.

Apparatus for emulsifying liquids. Deutsche Orriswerke G. m. b. H. Ger. 505,890, Nov. 20, 1927. Structural details are given.

Apparatus for concentrating liquids. AKTIEBOLAGET SVENSKA MASKINVERKEN. Ger 507,064, Sept. 2, 1927. The app. is of the type in which a hollow rotary heating member is arranged in the container for the liquid.

Apparatus for determining the viscosity of liquids. LOUIS SCHOPPER. Ger. 504,882, Mar. 2, 1928. The viscosity is detd. by a system swinging in the liquid.

Apparatus for measuring the color and turbidity of materials especially liquids. HEINRICH THIELE. Ger. 505,587, Nov. 20, 1928. A light-sensitive device, such as a thermocolumn or K cell and an elec. measuring device are incorporated in the app.

Condensation vessel or chamber for chemical works. FIRMA C. CONRADTY. Ger. 504,908, July 22, 1928. The structure is ma le of C or graphite.

Apparatus suitable for drying or purifying air, oxygen, acetylene or other gases under pressure. ISAAC H. LEVIN (to Gas Industries Co.). U. S. 1,785,273, Dec. 16. Structural features.

Shaft drier for granular goods. MASCHINEN- UND ELEKTROBAU G. M. B. H. Ger. 501,830, Aug. 21, 1928.

Shaft drier for lac coatings, sand molds, etc ALLGEMEINE ELECKTRIZITÄTS-GES. Ger 501,066, Nov. 6, 1928. Addn. to 485,985 (*C. A.* 24, 995).

Plate drier for lignite, chemicals, etc. BÜTTNER-WERKE A.-G. (Wilhelm Krisch, Alfred Rumberg and Hans Giesswein, inventors). Ger. 505,606, Nov. 30, 1927.

Apparatus for drying, heating or evaporating various materials. W. HOBSON. Brit. 332,951, Feb. 27, 1929. An app. is described having chambers each provided with tubes to contain the material and a movable bottom to facilitate discharge. The material in one chamber is heated by a medium such as steam and the material in the other chamber is treated by the waste products arising from the material in the first chamber. Various details of construction are described.

Evaporating plant. ALBERT WINANDS. Ger. 507,067, July 24, 1928. The plant comprises a series of evapg. vessels and means for heating the vapors from each vessel before passing them to an adjacent vessel.

Circular current gas purifier. ZIMMERMANN & JANSEN G. M. B. H. Ger. 505,515, Aug 25, 1927. Details of construction and operation.

Water-feed-control apparatus for moistening air or other gases. SOUTHWORTH MACHINE Co. Brit. 333,848, Dec. 10, 1928. A hygrometric device controls a water-supply valve. Various details of construction are described.

Spray jet and baffle plate gas-washing apparatus. T. CARTWRIGHT. Brit. 333,317, May 21, 1929. Structural features.

Time-controlled wet gas meter suitable for use with recording gas calorimeters. SCIENTIFIC & PROJECTIONS, LTD., C. FAIRWEATHER, G. L. WINDERS and W. H. B. HALL. Brit. 333,292, May 11, 1929. Structural features.

Pressure-controlled valve. R. SMITH. Brit. 333,653, May 27, 1929. Steam pressure may be used to control supply of gas to the heater of a vulcanizer or other app

Temperature-compensating device for "Salinometers" determining solution concentrations by electric resistance measurements. EVERSHED & VIGNOLES, LTD., and C. E. PERRY. Brit. 333,727, Aug. 2, 1929. Structural features are described of a thermostatic device which alters the dimensions of the liquid column, the elec. resistance of which is measured.

Apparatus for endothermic reactions. SOC. D'ÉTUDES & DE RÉALISATION DIT "ERÉAL" S. A. Fr. 686,462, Dec. 12, 1929. An app. is described for carrying out strongly endothermic reactions such as dissocns., reductions or combinations taking place at very high temps. A reaction vessel is used which is heated exteriorly by dipping into a heating mass in ignition such as the incandescent mass of a gas producer, and interiorly by an element, preferably gaseous, compatible with the reactions in the vessel, superheated immediately before its introduction into the vessel, by its passage in the said heating mass.

Device for indicating the presence of poisonous gases in the atmosphere. FRIEDRICH FREITAG. Ger. 506,795, Apr. 25, 1929. A bimetal bow with one end attached to an alarm relay is embedded in a catalytic Pt-asbestos mass which imparts temp changes to the bow to cause the alarm to sound, if CO, coal gas, H, etc., are present in the air.

Degreasing device. ALEXANDER WACKER GES. FÜR ELEKTROCHEMISCHE INDUSTRIE M. B. H. (Georg Wolff, inventor) Ger. 504,910, Jan. 30, 1927. The app. contg. org solvents and heating and cooling devices is described.

Purifying and degreasing device for objects of metal, glass, celluloid, etc. ALEXANDER WACKER, GES. FÜR ELEKTROCHEMISCHE INDUSTRIE G. M. B. H. (Georg Wolff, inventor). Ger. 505,980, July 19, 1927. Details of the app. are described. A solvent of high vapor density *e. g.*, CCl_4, C_2HCl_3, etc., is used.

Covers for luminous bodies. GERTRUD EPPINGER NÉE HELLNER Ger. 505,872, June 26, 1928. Covers or shades for luminous bodies used in lighting are formed from the condensation products of multivalent alcs. and polybasic acids or anhydrides, *e. g.*, from glycerol and phthalic acid anhydride. The product may be treated with a softening agent such as oil or oleic acid and may be colored with dyes.

Tubular condenser. INGERSOLL-RAND CO. Brit. 332,946, April 29, 1929.

Filling material for reaction towers, etc. CHEMISCHE FABRIK CURTIUS A.-G. (Fr. A. Weber, inventor). Ger. 488,886, June 13, 1928. See Fr. 676,558 (*C. A.* **24**, 2921).

Wall construction for reaction towers such as those used for gas and liquid contact operations. FREDERICK J. BOWMAN (to Grasselli Chemical Co.). U. S. 1,785,178, Dec. 16. The joints between the wall blocks drain toward the inside of the tower and are widened at the outside of the walls to form grooves and ledges.

Device for feeding solid reagents to a reaction vessel. FRITZ NIEHAUS. Ger. 507,041, Feb. 21, 1929. The app. is intended particularly for supplying precipitant, etc., to water which is to be purified.

Atmospheric cooling tower. GUY T. MARTIN (to Fluor Construction Co.). U. S. 1,786,076, Dec. 23. Structural features.

Tower for purifying gases by liquid sprays from atomizing disks. SAMUEL C. CULLER. U. S. 1,786,150, Dec. 23.

Devices for indicating and recording the quality or density of smoke. FRANK SAWFORD and FRANK SAWFORD, JR. U. S. 1,785,392-3, Dec. 16. Various details are described of devices utilizing a light-sensitive device such as a photoelectric cell.

Apparatus for generating smoke screens from materials such as white phosphorus. NICHOLAS E. OGLESBY. U. S. 1,785,744, Dec. 23. Structural features.

Acetylene generator (water to carbide type). I. G. FARBENIND. A.-G. Ger. 507,445, June 25, 1929.

Furnace plant. DEUTSCHE BABCOCK & WILCOX DAMPFKESSEL-WERKE A.-G. Ger. 505,816, June 14, 1929. Details are given of a device for removing the ash into a water quencher.

Rotary furnace for the evaporation of solutions. CHEMISCHE WERKE VORM. H. & E. ALBERT (Carl Frenkle, inventor). Ger. 504,811, Jan. 12, 1927. Structural details.

Underblast furnace, with supplementary air supply. ALEXEJ LOMSCHAKOFF and PETER DMITREVSKI. Ger. 507,444, June 24, 1928.

Regenerative hearth furnace. WITKOWITZER BERGBAU- UND EISENHÜTTEN-GEWERKSCHAFT and CARL SALAT. Ger. 506,341, Feb. 26, 1927. Addn. to 500,792 (*C. A.* **24**, 4670). Details of operations are given.

Open-hearth regenerative furnace. JOHN O. GRIGGS. U. S. 1,785,549, Dec. 16.

Annealing furnace for tubes. "ILVA" ALTI FORNI & ACCIAIERIE D'ITALIA. Ger. 504,864, Nov. 26, 1927. Details are given.

Annealing muffle furnace. ALFRED G. LOBLEY and BIRMINGHAM ELECTRIC FURNACES, LTD. Ger. 505,691, Jan. 11, 1929. Details.

Rotary plate furnace for annealing. EMIL F. RUSS. Ger. 505,901, Mar. 20, 1925.

Furnace for thermal treatment of magnetic materials. SOC. ANON. UGINE-INFRA. Ger. 507,069, May 25, 1929. A furnace for continuous treatment is described, in which the materials are moved forward electromagnetically and are heated up to the temp. at which they lose their magnetic properties.

Recuperator furnace with parallel adjacent flue-gas canals. ENGELBERT JUNGEBLODT. Ger. 489,754, Nov. 23, 1928.

Device for preventing sweating of metallic recuperative furnace air heaters. MAX and ERNST HARTMANN. Ger. 505,934, June 23, 1927. Details of construction.

Coal-dust furnace. ALLGEMEINE ELEKTRIZITÄTS-GES. and FRIEDRICH MÜNZINGER. Ger. 504,221, Aug. 30, 1925. Addn. to 486,841. The furnace of 486,841 (*C. A.* **24**, 1257) has a side air chamber and a lower ash chamber cooled by fuel gas.

Coal-dust furnace. FRIED. KRUPP A.-G. Ger. 510,821, June 16, 1929. Details of the air supply are given.

Coal-dust furnace. GEWERKSCHAFT ORANGE. Ger. 505,510, Feb. 13, 1926. Details of the combustion chamber.

Coal-dust furnaces. SIEMENS-SCHUCKERTWERKE A.-G. (Wilhelm Abendroth, inventor). Ger. 510,896, Oct. 9, 1927. Details of leading the coal dust into several burner-supply tubes.

Coal-dust-furnace plant. SOCIÉTÉ D'ÉLECTRICITÉ DE LA RÉGION DE VALENCIENNES-ANZIN. Ger. 505,679, May 21, 1927. Details of construction and arrangement.

Coal-dust furnace burner with an inner nozzle for supplying the dust-air mixture. ADOLF STEINBRÜCKNER. Ger. 504,814, April 12, 1927.

Supplying air to an incinerating or calcining muffle furnace. HANS VOLCKMANN and KARL LUDWIG. Ger. 506,627, Oct. 30, 1928. Details are given.

Supplying air to an incinerating or calcining muffle furnace. HANS VOLCKMANN and KARL LUDWIG. Ger. 508,111, Jan. 21, 1930. Addn. to 506,627. Further details are given of supplying air in the furnace of 506,627 (preceding abstr.)

Annular kiln. CARL ROST. Ger. 487,934, May 8, 1928. Details of heating by blowing in fuel.

Annular kiln. CARL ROST. Ger. 497,879, Sept. 7, 1928. Addn. to 487,934 (preceding abstr.). Details of heating by blowing in fuel.

Fuel-charging device for annular furnaces. ADOLF AUER & Co. Ger. 504,988, Aug. 24, 1929.

Reverberatory furnace roof. W. ALBERTS. Brit. 332,850, July 4, 1929.

Suspended reversing device for a travelling-grate furnace. L. and C. STEINMÜLLER. Ger. 504,963, Feb. 11, 1928.

Travelling grate for furnaces with a broad hearth. JOHANN PLACZEK. Ger. 504,962, Jan. 25, 1926.

Mechanical draft regulator. CHRISTIAN HÜLSMEYER. Ger. 507,443, April 1, 1926. The device operates according to the pressure difference before and behind the boiler.

Gas burner. FRANCIS J. CANCIANICH. U. S. 1,786,396, Dec. 23.

Gas burner. W. E. N. CLARK and ELECTROLUX, LTD. Brit. 333,269, April 1929.

Gas burner. FRANK X. HAMBERGER. U. S. 1,785,900, Dec. 23.

Apparatus and system for atomizing and burning fuel oil. HENRY ADAMS. U. S. 1,785,804-5, Dec. 23.

Vertical retort for carburizing finely comminuted materials. F. E. HOBSON. Brit. 333,563, May 13, 1929.

Heat-exchange apparatus suitable for heating water by waste gases. F. K. WOODROFFE. Brit. 333,397, Aug. 14, 1929. Structural features.

Heat-exchange coil device suitable for heating water. HERBERT G. ULLMAN. U. S. 1,785,159, Dec. 16. Structural features.

Electric water heater. S. NUSSBAUM. Brit. 333,791, Oct. 7, 1929. Structural features.

Thermostatic control systems for hot water or other heating systems. FRED I. RAYMOND. U. S. 1,785,425–6, Dec. 16.

Thermostatic control device suitable for control of electric circuits. ALBERT PENN (to Penn Electric Switch Co.). U. S. 1,786,083, Dec. 23. Structural features.

Thermostatic and pressure-actuated control devices for liquid fuel and gas burners. M. KNUPFFER. Brit. 333,613, May 16, 1929. Structural features.

Thermostatic valve for regulating the feed of fuel oil to burners. BUCKEYE INCUBATOR CO. Brit. 333,145, June 7, 1929. Structural features.

Thermostatic control device suitable for operating through flexible shafts. CHAS. L. RAYFIELD (to Rayfield Mfg. Co.). U. S. 1,785,787, Dec. 23. Structural features.

2—GENERAL AND PHYSICAL CHEMISTRY

FREDERICK L. BROWNE

Pierre Auguste Adet. LYMAN C. NEWELL. *J. Chem. Education* **8**, 43–8(1931).—Biography with portrait. E. H.

Jöns Jakob Berzelius. R. WINDERLICH. *Z. physik. chem. Unterricht* **42**, 193–203 (1929).—Biographical sketch on the occasion of B.'s 150th anniversary. M. BEBER

Moses Gomberg. ALFRED H. WHITE. *Ind. Eng. Chem.* **23**, 116–7(1931).—A biography with portrait. E. C. K.

Chemistry in prehistoric American arts. FLORENCE M. HAWLEY. *J. Chem. Education* **8**, 35–42(1931). E. H.

The progress of American chemistry since the outbreak of the World War. WM A. HAMOR AND LAWRENCE W. BASS. *Ind. Eng. Chem.* **23**, 10–14(1931). E. C. K.

Statistics of 1927 for chemistry teaching. FRIEDRICH HOFMANN. *Z. physik. chem. Unterricht* **42**, 74–9(1929).—Figures for production of coal, pig iron, steel, oil, bauxite, Al, Cu, Pb, Zn, Sn, Ni, Hg, Ag, Au, Pt, Na salts and K salts are given. M. B.

Statistical data for 1928 for chemistry teaching. FRIEDRICH HOFMANN. *Z. physik. chem. Unterricht* **43**, 75–9(1930).—Figures for production of coal, pig iron, raw steel, petroleum, Pb, Cu, Zn, Sn, Al, lime and H_2SO_4 are given. M. BEBER

The teaching load of college chemistry instructors. AXEL L. JOHNSON. *J. Chem. Education* **8**, 115–27(1931). E. H.

The training of teachers in service. B. S. HOPKINS. *J. Chem. Education* **8**, 95–102 (1931). E. H.

Present status of teacher training in the United States. BEN W. FRAZIER. *J. Chem. Education* **8**, 63–83(1931). E. H.

The qualifications of chemistry teachers in colleges and universities. NEIL E GORDON. *J. Chem. Education* **8**, 88–95(1931). E. H.

The qualifications of chemistry teachers in secondary schools. WILHELM SEGERBLOM. *J. Chem. Education* **8**, 83–8(1931). E. H.

Report of the committee on preparation of high-school chemistry teachers. A. J. CURRIER. *J. Chem. Education* **8**, 102–6(1931). E. H.

More effective individual laboratory instruction in general inorganic chemistry. II. An experiment on molecular weights. W. E. BRADT. *J. Chem. Education* **8**, 152–9 (1931); cf. *C. A.* **24**, 32. E. H.

Student experiments in chemistry. R. WINDERLICH. *Z. physik. chem. Unterricht* **42**, 79(1929).—Expts. dealing with osmosis, ozone and the origin of H_2S in illuminating gas are described. M. BEBER

Some experimental data on time reactions for student exercises. WALFRIED SEEGER. *Z. physik. chem. Unterricht* **43**, 215–8(1930).—The reactions between H_2O_2 and HI and $HBrO_3$ and HI are used. Data are given. M. BEBER

An atomic model contest for high-school students. WALTER B. DYE. *J. Chem. Education* **8**, 140–2(1931). E. H.

Practical introduction of the conception of chemical equilibrium and mass action. ALFRED WEIS. *Z. physik. chem. Unterricht* **42**, 151–60(1929).—Class expts. to demonstrate these two concepts are described. M. BEBER

The amorphous state and molecular movement. BERNHARD BATSCHA. *Z. physik. chem. Unterricht* **43**, 159–62(1930).—Molecular movement in the amorphous state is demonstrated by the fluorescent and phosphorescent glassy melts obtained by melting traces of fluorescein with either tartaric or citric acid. These amorphous prepns. gradually become crystalline, the rate of change being dependent on temp. M. B.

A brief lesson in the chemistry of pig iron. G. T. FRANKLIN. *J. Chem. Education* 8, 143–8(1931). E. H.

A modification of the standard high-school experiment on the destructive distillation of soft coal. GUSTAV L. FLETCHER AND IRVING FINE. *J. Chem. Education* **8**, 150–1(1931). E. H.

The distillation of petroleum as a teaching experiment. H. ZEITLER. *Z. physik. chem. Unterricht* **42**, 160–3(1929).—Simple expts. to prove that petroleum is a mixt. whose higher-boiling fractions have higher sp. gr. and darker color than the lower ones, are described. Reference is made to other demonstrations using the fractions obtained, *e. g.*, surface tension, viscosity, rate of vaporization, refining. M. BEBER

The composition of nitric acid and the analysis of nitrate. P. RISCHBIETH. *Z. physik. chem. Unterricht* **42**, 111–4(1929).—The ratio $H_2O:NO:O = 1:2:3$ is demonstrated by decomposing concd. HNO_3, whose HNO_3 content is detd. preferably by titration either before or after the expt. with baryta soln., with a soln. of HCl contg. an excess of Fe and setting free NO. The excess Fe is titrated with 0.1 *N* permanganate and from this the O_2 liberated is calcd. The NO is collected and measured. H_2O is detd by subtracting O_2 and NO from the total HNO_3 used. The procedure is suggested as a method for the analysis of nitrates. M. BEBER

The synthesis of magnesium sulfide. L. DOERMER. *Z. physik. chem. Unterricht* **42**, 70–4(1929).—After a study of the reaction the following conclusions are reached: The syntheses of Mg, Ca and Al sulfides by heating powdered S and metal in a test-tube are dangerous explosion expts., the performance of which, because of their slight teaching value, should cease. If they are to be carried out, not more than 1 g. of the mixt should be used; a plate-glass enclosed hood should be used, closed on the spectator side and half-open on the other, with care taken against the entrance of people into the room on this side. The test-tube should be at least 50 cm. from the glass on the observer's side. After placing the Bunsen burner under the test-tube the experimenter should immediately retreat to safety. M. BEBER

The synthesis of urea from carbon monoxide and ammonia as a teaching experiment. P. RISCHBIETH. *Z. physik. chem. Unterricht* **42**, 212–3(1929).—CO is converted to $COCl_2$ and this is treated with NH_4OH. M. BEBER

Synthesis of ethyl mercaptan with officinal ethyl chloride. SIGBERT GENELIN. *Z. physik. chem. Unterricht* **43**, 80–1(1930).—About 1/4 stick of KOH is dissolved in about 20 cc. C_2H_5OH and the soln. satd. with H_2S. A few cc. of C_2H_5Cl is now squirted in and the flask corked. KCl begins to ppt. and the odor of mercaptan is noticed in about an hr. When the reaction is complete the mercaptan separates out as an oil on addn. of H_2O. M. BEBER

Mineralogy in the school. W. FLÖRKE. *Z. physik. chem. Unterricht* **43**, 198–203 (1930).—A criticism of the tendency to place mineralogical and crystallographic concepts in the background in the teaching of chemistry. A method for the development of the subject is given. M. BEBER

The education of Spanish women in chemistry. MARY LOUISE FOSTER. *J. Chem. Education* **8**, 30–4(1931). E. H.

Chemistry laboratory fees. V. F. PAYNE AND LYDA MAY SMILEY. *J. Chem. Education* **8**, 133–9(1931). E. H.

The metastability of matter and our so-called physical-chemical constants. ERNST COHEN *Z. physik. Chem.*, Abt. A, **150**, 418–20(1930); cf. *C. A.* **24**, 1259.—Regnault recognized the fact that many of the systems he investigated were mixts. of stable and unstable forms. ARTHUR FLEISCHER

The principle of the inaccessibility of the absolute zero. HEINRICH MACHE. *Phil Mag.* [7], **10**, 931–7(1930).—Polemical with Kolosovskii (cf. *C. A.* **24**, 2946). Nernst should receive credit for the third law of thermodynamics. A. F.

The nature of friction. P. E. SHAW. *Phil. Mag.* [7], **9**, 628–39(1930).—Triboelectricity and friction are 2 aspects of the same phenomenon. In all cases of solid contact, solid combination takes place on contact. Charging of both surfaces occurs when they sep. In friction, the work is the work performed in total elec. sepn. plus the work in deformation of the surface structure. The law of friction is limited in application and becomes invalid for extreme surface curvatures as well as for extreme loading. ARTHUR FLEISCHER

Frictional electricity. P. E. SHAW. *Phil. Mag.* [7], **9**, 577–83(1930).—To discharge a rod, use the surrounding zone of a flame to prevent damage to the charged rod. When glass is rubbed with silk, the pos. charge is due to the presence of an org. film. If properly cleaned, a neg. charge appears on the glass. Charges obtained on rubbing like bodies are due to difference in surface strains. The theory of polar struc-

ture of atoms and mols. with the resultant orientation in surface films should prove important in explanations of phenomena in triboelectricity. ARTHUR FLEISCHER

Friction of dry solids in vacuo. P. E. SHAW AND E. W. L. LEAVEY. *Phil. Mag* [7], **10**, 809–22(1930).—The friction between rods of Fe, Ni, Cu, Ag, Al and soda-glass was detd. from 15° to 350°. The results are higher than those obtained by Tomlinson (cf. *C. A.* **24**, 2924). The coeff. of friction must be defined in terms of the history and phys. condition of the reacting surfaces. ARTHUR FLEISCHER

Temperature measurements with a platinum resistance thermometer to 1100°. HELMUT MOSER. *Ann. Physik* **6**, 852–74(1930).—A resistance thermometer was constructed of very pure Pt wire (for which $R_{100}/R_0 > 1.390$) 0.5–0.6 mm. diam. wound upon notched porcelain supports and surrounded by an unglazed ceramic material (*K-Masse*) impervious to gases at 1200°. Temps. were measured up to 1100° (the solidification point of Au 1063°) with an accuracy of 0.1°. Between 0° and 1100° the dependence of resistance on temp. is expressed by the formula $t = [100(R_t - R_0)/(R_{100} - R_0)] + \delta\{(t/100)[(t/100)-1]\} + \gamma\{(t/100)[(t/100)-1][(t/444.60)-1]\}$, the consts. of which, R_0, R_{100}, δ and γ, are detd. by calibration at the ice point 0.000°, steam point 100.000° m. p. of S 444.60° and m. p. of Au 1063°. Usually $\delta < 1.500$ and $\gamma > 0.004$. The changes occurring in Pt at high temps. do not influence the temp. measurements if the corresponding R_0 is detd. after each R_t (cooling thermometer to 0° during 15 min.) and if the value $R_t - R_0$, considered as independent of the temp., be substituted in the formula. This rule, in part derived from Mathiessen's rule, is valid with $[R_{100}/R_0] > 1.390$ if R_0 does not vary more than the quiv. of ±0.05° from the values at which the consts. were detd. This thermometer is to be preferred to the Pt/Pt 10% Rh because of its greater accuracy. E. R. SCHIERZ

The photographing of cooling curves. H. D. CROCKFORD AND A. E. HUGHES. *J. Phys. Chem.* **34**, 2624–6(1930).—An app. is developed for photographing cooling curves. The method is accurate to 0.1° and the photographic curves show the mechanism of supercooling much better than do the ordinary thermometric curves. H. W. L.

The motion of flames in closed vessels. C. W. STEPHENSON. *Trans. Faraday Soc.* **26**, 577–87(1930); cf. *Fuel*, **7**, 195, 245, 300, 336, 408, 449, 502, 526(1928).—A math. consideration of prior work. E. M. SYMMES

The place of beryllium and magnesium in the periodic system. PAUL PFEIFFER, THEODOR FLEITMANN AND RUDOLF HANSEN. *J. prakt. Chem.* **128**, 47–62(1930).—The α-naphthalenesulfonates of Be, Mg, Zn and Cd contain 4 or 6 mols. H_2O while Ca and Sr salts add little H_2O. The complex salts of Be, Mg, Zn and Cd with NH_3 are similar. The β-naphthalene-, benzene- and *p*-toluene-sulfonates group themselves similarly except that the *p*-toluenesulfonate of Ca forms a tetrahydrate. The coördinate valence no. of Be may be 6 from the crystal lattices of Be sulfonates. Also the sulfates, double nitrates and such oxides as $Al_2O_3 \cdot BeO$ suggest the grouping of Be and Mg with the Zn family. Mg and Zn form inner salts of pyrocatechol and porphyrin, while the alk earths do not. Only in their nitrides and heats of combustion, do Be and Mg come nearer the alk. earths. The prepn. of 28 sulfonates is described in detail. M. E. L.

The conduction of electricity in liquid dielectrics. D. H. BLACK AND R. H. NISBET *Phil. Mag.* [7], **10**, 842–62(1930); cf. *C. A.* **22**, 4240.—The conductivities of 2 highly purified paraffin oils were measured. Departures from Ohm's law occurred at high stresses in sufficiently thin films. The gas theory is able to account for all of the facts. ARTHUR FLEISCHER

Dielectric polarization of some pure organic compounds in the dissolved, liquid and solid states. S. O. MORGAN AND H. H. LOWRY. *J. Phys. Chem.* **34**, 2385–432 (1930); cf. *C. A.* **22**, 3572.—The dielec. consts., ds. and *n*s of CH_3Cl, CH_2Cl_2, CH_3Br and CH_3I were detd. in dil. solns. of either hexane or CCl_4 or both. The calcd. moments agreed with the values detd. by others for these substances in the gaseous state. In addn. the dielec. consts. and ds. were detd. for $CHCl_3$, CCl_4, C_2H_5Br, *p*-$C_6H_4Cl_2$, C_6H_6, C_6H_{14}, CH_3Cl, CH_2Cl_2, CH_3Br and CH_3I in the pure liquid and solid states and the components of polarization for these substances calcd. A no. of condensers were designed to det. the dielec. const. of liquids and solids and their use in direct capacity measurements is discussed. An equation is presented which represents the dependence of the dielec. const. of the Me halides upon temp. The ds. of the Me halides are nearly linear functions of temp., while the conductance and power factor of CH_3Cl and CH_2Cl_2 are functions of both temp. and frequency. H. W. LEAHY

The influence of high voltage on the dielectric constant of liquids. HERMANN GUNDERMANN. *Ann. Physik* [5], **6**, 545–73(1930).—It was found experimentally that the dielec. const. decreases as the square of the voltage. The decrease is greater for a large dielec. const. but is not as great as the simple theory of Debye requires. Mixts. of

polar liquids do not give an av. value for the constituents. Mixts. of polar liquids and benzene show specific effects that were detd. as a function of concn., for the pairs butanol-benzene and ethanol-benzene. The latter pair behaved anomalously. This is attributed to assocn. FRANK URBAN

The exchange of energy between gas atoms and solid surfaces. J. K. ROBERTS. *Proc. Roy. Soc.* (London) **A129**, 146–61(1930).—Expts. on the accommodation coeffs. of He with W and Ni surfaces were made under conditions that gave results for catalyst surfaces free from adsorbed gas. The values obtained, 0.05 to 0.07 for W and 0.08 for Ni, are lower than those for gas-covered surfaces. J. B. AUSTIN

A new application of azeotropism. MAURICE LECAT. *J. Phys. Chem.* **34**, 2508–18 (1930).—A new method of azeotropic analysis of org. compds. is described. P. H. E.

A method for determining critical constants and its application to biphenyl. J. M. CORK. *Rev. Sci. Instruments* **1**, 563–8(1930).—A method is described that gives directly the crit. temp. and crit. vol. or d. as well as liquid and vapor d. at all temps. The crit. pressure may be obtained from a vapor pressure-temp. curve by using the vapor pressure at the crit. temp. Three Pyrex glass tubes contg. the substance to be examd. were mounted on a Cu block in a furnace consisting of a resistance-wound Pyrex glass cylinder. The liquid levels were read by a cathetometer. Observation of the meniscus levels in the 3 tubes expressed in terms of vapor and liquid vol. gave 3 simultaneous equations from which liquid and vapor d. were evaluated. For biphenyl the crit. pressure is 31,400 mm. Hg, crit. temp. 528° and crit. d. 0.343 g./cc. ALLEN S. SMITH

Influence of the size of the grain upon the dissociation pressure of solids. Red mercuric oxide. Iceland spar. J. KRUSTINSONS. *Z. physik. Chem.*, Abt. A., **150**, 310–6(1930).—Red HgO and ground Iceland spar were sepd. into 4 fractions by sieves and the dissocn. temp. was measured at pressures up to 900 mm. in a vertical dissocn. compensated app. It was again established that the dissocn. temp. of the smallest grains differs markedly from that of the larger. The surface tension for HgO, calcd. from the Thomson formula, is 750,000 dynes/cm. and for Iceland spar, 120,000 dynes/cm. It is shown that Valeton's conception, that macroscopic crystal surfaces all have the same soly., does not apply to their thermal dissocn. pressures. (Cf. *C. A.* **15**, 983.) MARY E. LEAR

Electrical conductivity of glasses. The system B_2O_3 + Na_2O. S. A. SHCHUKAREV AND R. L. MÜLLER. *Z. physik. Chem.*, Abt. A, **150**, 439–75(1930); cf. *Protokoll der Chem. Abtl. Russ. Phys. Chem. Ges.* **32**, No. 7, 10(1926).—The cond. of Na_2O-B_2O_3 glasses contg. 0.01 to 33.83% Na_2O, cast in the form of disks, was measured at temps. from 25° to 300°, Na amalgam electrodes being used. For each glass the results are expressed by the equation, $\ln K = -(A/T) + B$, A and B being consts. given in the following table:

%Na_2O	A	B
0.01	25,070	12.80
0.043	24,710	14.62
0.73	26,790	21.36
2.74	29,170	26.25
5.2	22,450	14.07
5.9	21,050	11.95
7.27	17,140	5.43
12.60	13,800	3.18
16.9	11,600	4.33
25.0	9,103	3.04
25.27	9,103	3.04
30.8	8,204	3.45
32.4	8,204	3.45

The isotherms for increasing Na_2O content show a slow increase with a sudden jump in the curve, corresponding with the crystn. limits of the glass. In glass, ions are present and are sepd. by excess B_2O_3. ARTHUR FLEISCHER

Crystal forms of fatty acids. YOSHIO TANAKA, RYÔNOSUKE KOBAYASHI AND KENJI SHIMIZU. *J. Soc. Chem. Ind. Japan* **33**, Suppl. binding 364–5(1930).—The fundamental crystal of fatty acids is a rhomb whose adjacent angles are 70 ± 1° and 110 ± 1°. It exhibits double refraction and parallel extinction, and has 3 crystal axes parallel to 3 vibration axes, like solid paraffin. Paraffin hydrocarbons aggregate in the direction of their angles, fatty acids in the direction of their sides.

E. M. SYMMES

A note on the representation of crystal structure by Fourier series. W. L. BRAGG AND J. WEST. *Phil. Mag.* [7], **10**, 823–41(1930); cf. *C. A.* **23**, 3398.—The double Fourier series representation of the Hartree model of the NaCl crystal is compared with the actual x-ray photograms. The use of the incomplete series leads to an image of crystal structure which has defects similar to those produced by optical diffraction. The numerical aperture in x-ray analysis must be defined as 2 sin Θ_0. A. F.

Lattice distortions in glide planes indicated by an x-ray investigation of rock salt. WOLFGANG BERG. *Wiss. Veröffentlich. Siemens-Konzern* **9**, 119–43(1930).—Study of some structural features of certain crystals has been aided by the production of photographs of the exterior surfaces, obtained by simple reflection of a beam of directed monochromatic x-rays. With rock salt these pictures show fairly regularly arranged light and dark striae, of which part are parallel to the cube edges and part to the surface diagonals. Very similar striations may be artificially produced by compression of the crystals, which have been subjected to heat treatment. Consequently the striations appearing in natural crystals seem to be the result of gliding and the corresponding traces of glide planes upon the cube surfaces. The study of the behavior of the striations aids in the detn. of the lattice deformations occurring in the glide planes. The observation of the striae also furnishes a very sensitive method of establishing glide planes and their orientations in single crystals. The method is expected to prove useful with metal crystals. C. J. HUMPHREYS

X-ray investigation in the sulfur-selenium system. I. The rhombic mixed crystals of sulfur and selenium. F. HALLA AND F. X. BOSCH. *Z. physik. Chem.*, Abt. B, **10**, 149–56(1930).—Rhombic mixed crystals of S and Se, prepd. from solns. in CS_2 satd. with one or both components, were subjected to measurements of d., surface angles and ratio of axes. The sepn. of the (111) lattice planes was detd. by the Bragg method of x-ray analysis. Crystals were examd. contg. varying amts. of Se up to more than 7%. The linear dimensions of the elementary solid increase with the Se content. Consequently the mixed crystals have a statistical distribution of components. The measurement of the ratio of the at. radii of S and Se yields a value in satisfactory agreement with the estimate of V. M. Goldschmidt. The mixed-crystal form depends upon the activation of the S. C. J. HUMPHREYS

Study of the system: HgO–SO_3–H_2O. M. PAIĆ. *Bull. soc. chim.* [4], **47**, 1254–9 (1930).—See *C. A.* **24**, 4208. E. C. K.

Solution of mixed crystals sodium chloride–silver chloride in pyridine, and x-ray investigation of these mixed crystals. M. LE BLANC AND J. QUENSTÄDT. *Z. physik. Chem.*, Abt,. A, **150**, 321–48(1930).—The rate of extn. of AgCl by pyridine from mixed crystals of NaCl and AgCl seems to change continuously with the compn., although the rate decreases rather abruptly as the mol. fraction of NaCl is increased beyond 5/8. The expts. revealed no definite "resistance limit" for any compn., bringing new evidence that Tammann's claims in this regard are not correct. While the amt. of AgCl dissolved in a given time decreased with increasing NaCl content small quantities of AgCl were extd. from crystals contg. more than 90% NaCl. In such cases the extn. appeared to proceed indefinitely without approaching an end point, and the amt. dissolved could be increased greatly by reducing the size of grain. X-ray diagrams of the mixed crystals showed no lines other than those of a NaCl lattice, only the lattice const. varied with the compn.; the departures from Vegard's additive relation were fairly small. Conclusion: There is no preferred arrangement of Na and Ag atoms in (Na, Ag)Cl, but rather a haphazard distribution. L. ONSAGER

The conductivity and density of chromic acid solutions. H. R. MOORE AND W. BLUM. *Bur. Standards J. Research* **5**, 255–64(1930).—The cond. and d. of CrO_3 solns. having the compn. CrO_3 99.75, Cr_2O_3 0.11, SO_4 0.017, alkali salts 0.10, and insol. 0.02% were detd. for concns. up to 10 *M*. The d. was found to be a linear function of the concn. and the cond. increased to a max. at 5 *M* and then decreased. Data are given for 0°, 25° and 45°. The position of the max. varies with the temp.; thus the optimum cond. occurs at concns. of 4.1, 4.8 and 5.0 *M* for temps. of 0°, 25° and 45°, resp. H. R. MOORE

Iodine and potassium iodide. T. R. BRIGGS AND W. F. GEIGLE. *J. Phys. Chem.* **34**, 2250–9(1930).—Curves are given illustrating the temp.-concn. data from cooling curves of I_2-KI mixt. and soly. data are presented from analyses of the liquid phase. The 2 mixts. of 40 and 60 mol. % KI used were not homogeneous above 82°, but this does not prove the existence of solid polyiodides. The soly. of KI in liquid I_2 is almost independent of temp. up to 190°. Temp. arrests do not connote polyiodide formation, but are due merely to sepn. of salt. There is no evidence for the existence of KI_3 as a stable solid above 25°. H. R. MOORE

The boric acid problem. WILDER D. BANCROFT AND HERBERT L. DAVIS. *J. Phys. Chem.* **34**, 2479–507(1930).—Evidence is presented against the theory that H_3BO_3 is activated by various substances through formation of compds. The evidence points rather to soly. phenomena involving increased dissocn. of the H_3BO_3 and abnormal effects of the H_3BO_3 solns. on the optical rotation and other properties of the hydroxy substances. H. W. LEAHY

The relation between gas charge and the adsorption of electrolytes by activated charcoal. IV. The adsorption of acids by degassed and by hydrogen-saturated charcoal. R. BURSTEIN, A. FRUMKIN AND D. LAVROVSKAYA. *Z. physik. Chem.*, Abt. A, **150**, 421–38(1930); cf. *C. A.* **22**, 8; **23**, 3614.—The previous measurements are extended to higher acid concns. For HCl adsorption on platinized and H_2-treated charcoal the adsorption is independent of the amt. of Pt. With platinized and H_2-treated charcoal H_2SO_4 shows pos. adsorption at a concn. of 0.8702 equivs. per kg. of soln., HCl at 0.6285 and HBr at 0.1152. ARTHUR FLEISCHER

A new method for the determination of sorption isothermals of vapors as charcoal. L. J. BURRAGE. *J. Phys. Chem.* **34**, 2202–17(1930).—The new method consists in satg. a known wt. of charcoal with vapor at a definite temp. and pressure, reweighing and then passing dry air through the charged charcoal column at a known rate. The container is reweighed at frequent intervals when the flow of gas is interrupted. The weights of sorbed vapor per unit weight of charcoal thus found (q) are plotted against (V) the total vol. The relation $q = K \cdot V^n$ prevails for CCl_4 and H_2O vapor isothermals. Retentivity curves are given and tangents $-(\partial q)/\partial v)T$ drawn for different values. The test may be modified to yield true sorption isothermals and may be applied generally to sorption of vapors by solids. H. R. MOORE

Adsorption at crystal-solution interfaces. V. Effect of adsorbed dye on the lattice size of potassium alum crystals. F. G. FOOTE, F. C. BLAKE AND W. G. FRANCE. *J. Phys. Chem.* **34**, 2236–40(1930); cf. *C. A.* **24**, 2656.—The lattice consts. for pure K alum and alum dyed with diamine sky blue are 12.082 A. U. and 12.078 A. U., resp., thus refuting previous reports that dye causes a change in crystal form. Hence it appears that adsorbed dye does not affect the plane spacing, and is probably adsorbed interstitially rather than on individual planes. H. R. MOORE

Capillary activity of organic substances in aqueous salt solutions. P. P. KOSAKEVICH AND N. S. KOSAKEVICH. *Z. physik. Chem.*, Abt. A, **150**, 370–80(1930).—Li halides enhance the effect of phenol, *o*-cresol, thymol and menthol on the surface tension of water. The max. concn. of the active substance in the surface layer does not depend on the concn. of salt in the soln. Rideal's relation: $FA/RT = (B/RT)F + x$, where $F = \sigma_0 - \sigma$ = surface-tension depreciation, and A = area per mol., applies to all the solns. investigated, except menthol. The activities (fugacities) of phenol in salt solns. are calcd. from the surface-tension data in good agreement with direct measurements. L. ONSAGER

The state of water and the active surface of Japanese acid clay. YOSHIO TANAKA AND MITSUO NAKAMURA. *J. Soc. Chem. Ind. Japan* **33**, Suppl. binding 365–6(1930).—Dehydration of Japanese acid clay was followed by the thermobalance continuously from room temp. to 1200°, and the results compared with those from SiO_2 gel, Al_2O_3 gel, kaolin and Japanese acid clay treated with HCl. The H_2O content of air-dried Japanese acid clay is less than that of clay in equil. with air satd. at 20°, but the states of hydration above 100° are almost the same. The H_2O of the clay evolved at 450–500° is still somewhat reversible. The SiO_2 gel dehydration curve showed no bend at 450° (*J. Chem. Soc.* **53**, 59(1888)) but was straight from 150 to 600°. In Al_2O_3 gel dehydration there was no level corresponding to $Al_2O_3.3H_2O$, $Al_2O_3.2H_2O$ or $Al_2O_3.H_2O$. Dehydration of gels is continuous in temp. rise. E. M. SYMMES

An investigation of the limits of the colloidal state of the calcium phosphates in the presence of several electrolytes and organic compounds. L. K. LAPINSKII. Vologda Molochno-Khozyaistvo Inst. (Vologda Dairy Inst.), *Bull.* **76**, 7–30(1929).—The results of a series of expts. are summarized: (1) The electrolytes NaCl, Na_2SO_4, KCl and $Na_3C_6H_5O_7$ stabilize satd. colloidal solns. of $CaHPO_4$ and $Ca_3(PO_4)_2$; $Na_3C_6H_5O_7$ is most effective. (2) Addns. of these electrolytes, with the exception of $Na_3C_6H_5O_7$, after the formation of $CaHPO_4$ or $Ca_3(PO_4)_2$ (by adding a soln. of $CaCl_2$ to either Na_2HPO_4 or Na_3PO_4) do not produce conditions for stabilization. (3) Milk sugar added before the formation of $CaHPO_4$ and $Ca_3(PO_4)_2$ also produces stable conditions. (4) Gelatin added before or after the formation of $CaHPO_4$ or $Ca_3(PO_4)_2$ has a protective effect J. S. JOFFE

Highly polymerized compounds. XLIII. The streaming double refraction of colloid molecules. R. SIGNER. *Z. physik. Chem.*, Abt. A, **150**, 257–84(1930); cf. *C. A.*

25, 280.—Numerous solns. of polymerized org. substances which consist of rod-like mols. show important double refraction. The strength of this anisotropy depends upon concn. The specific double refraction $(n_\gamma - n_\alpha)/G.\eta$ is a const., characteristic for each substance. The colloid particles show partly pos. and partly neg. specific refraction in relation to their length. The optical characteristics of several polymers can be explained by their chem. constitution. M. E. LEAR

A study of the influence of hydrolysis temperature on some properties of colloidal ferric oxide. II. The stability. GILBERT H. AYRES AND C. HARVEY SORUM. *J. Phys. Chem.* **34**, 2629–35(1930); cf. *C. A.* **24**, 2657.—The flocculation values of Fe_2O_3 sols prepd. at different temps. showed no regular variation with temp. Stock sols, however, after being heated to various temps. were less stable toward a flocculating electrolyte, the higher the temp. of heating. High temps. produced sols of a red-orange color with very opaque liquids. The decrease in stability and increase in turbidity resulting from raising the temp. are ascribed to decreased hydration of the sol rather than to increase in particle size. P. H. EMMETT

Titania gel. A comparison with silica gel. SIMON KLOSKY. *J. Phys. Chem.* **34**, 2621–3(1930).—The prepn., adsorptive capacity and catalytic activity of TiO_2 gel and SiO_2 gel are compared. TiO_2 gel is a poorer adsorbent and catalyst support than SiO_2 gel. P. H. EMMETT

Fractionation of gliadin. G. HAUGAARD AND ARNOLD H. JOHNSON. *Compt. rend trav. lab. Carlsberg.* **18**, No. 2, 132 pp.(1930); cf. *C. A.* **24**, 2507.—It is desirable to prove whether or not proteins which act as pure chem. substances toward ordinary reagents are "co-pptn." systems, as defined by Linderstrøm-Lang (*C. A.* **23**, 5083), in which the components are combined in a mutually reversible manner, so that the system behaves as a single substance as regards osmotic effects. Accordingly, an attempt reversibly to fractionate gliadin by cooling its solns. is described. Values for p_H of EtOH-H_2O solns are calcd. from H electrode values just as for H_2O solns. Corrections to be added to the *quinhydrone electrode* were 0.37 p_H for 60% EtOH by vol (= 52.2% by wt.), 0.33 for 47.5% and 0.39 for 67.5% EtOH by vol. For gliadin, α_{Hg579} = about −94°, based on the concn. 1 g. per 1 cc. in a 10-cm. tube. Under all circumstances, gliadin was *l*-rotatory. At low concns. of salts, the pptn. temp. was increased, while at higher concns. it was lowered. The p_H of min. soly. was 7.3, whereas the isoelec. pt. seemed to be 7.10. Studies of various factors affecting soly. and viscosity were made, and osmotic pressures were detd. also. After acid hydrolysis of the gliadin, analyses were made for humin, NH_3, arginine, amino N, total acid and basic groups, tyrosine and tryptophan. Hydrolysis with enzymes was also studied. A crit. study of the equil. between gliadin, alc., and water at 0° is reported. From all the relationships studied, it appears that gliadin is a reversibly fractionable co-pptn. system. W. D. LANGLEY

Phase-rule studies on the proteins. III. Quinquevalent nitrogen in organic compounds. 2. WILDER D. BANCROFT AND C. E. BARNETT. *J. Phys. Chem* **34**, 1217–53(1930); cf. *C. A.* **24**, 2944, 3794 and following abstr.—The addn. of HCl by compds. contg. 2 atoms of N in the mol. is discussed. $C_6H_4(NH_2)_2$, the ethylenediamines, N_2H_4, nicoteine, cuscohygrine, sparteine, quinine, quinidine, cinchonine, cinchonidine, cinchotine, hydrocinchonidine, hydroquinine and cupreine add 2HCl each. The amidines, quinazoline, $PhNHNH_2$, urea, biuret, succinimidine, uramil, uracil, antipyrine, nicotine, nicotimine, strychnine, brucine, hypaphorine, harmine and pilocarpine add only 1HCl each. In general, when the 2N are attached to the same C atom, only 1HCl can be added. **IV. Quinquevalent nitrogen in organic compounds. 3.** *Ibid* 1930–46.—The addn. of HCl by compds. contg. 3 atoms of N in the mol. is discussed. The ethylenetriamines, triaminophenol, triaminoresorcinol and diaminoacridine add 3 HCl. Chrysaniline, phenotripyridine, hydrazotriazene, hydrazomethyltriazene, histidine and histamine add 2HCl, while guanidine and its derivs., the triazines and aminouracil add only 1HCl. Considering the linkage :C.O.C: as equiv. to a keto linkage, one can predict that neither caffolide, allocaffolide, apocaffeine, isocyanuric acid nor cyamelide will add any HCl and that melamine will add 3HCl. R. C. R.

Phase-rule studies on the proteins. V. WILDER D. BANCROFT AND C. E. BARNETT. *J. Phys. Chem.* **34**, 2433-71(1930); cf. preceding abstr.—With the same methods as used previously it is shown that when there are more than 4 N atoms in the mol., the exceptions to theory are more numerous than when only 2 or 3 N atoms are present. Thus the safranines, triaminotriethylamine, triaminopyrimidine and tetraaminopyrimidine, add less than 4HCl. On the other hand hexamethylenetetramine and tetraaminobenzene add 4HCl. Biguanide and *p*-tolylguanide have 5N atoms, but add only 2HCl. Benzenetriphenazine adds 1HCl, but has 3N atoms. While xanthine, theophylline and theobromine crystallize with 1HCl each, caffeine adds 2HCl.

Tetraethyl- and tetramethyltetrazones add only 1HCl as does 1-methyltriazole, but 3-hydrazotriazole forms a dihydrochloride. Arginine adds $2HNO_3$. Guanazol forms 2 hydrochlorides at the side-chain N. Urazole, aminourazole and alloxantin do not add HCl. There are no peptide linkages in zein. Perchloric acid gives 2 compds. with triphenylamine, $(C_{18}H_{15}N)_2.HClO_4$ and $C_{18}H_{15}N.HClO_4$. No necessary connection exists between hydrolysis consts. in aq. soln. and ability to react stoichiometrically with HCl. R. H. FERGUSON

The solubility of naphthalene in some aliphatic alcohols. ARTHUR A. SUNIER. *J. Phys. Chem.* **34**, 2582–97(1930).—The soly. of $C_{10}H_8$ in MeOH, EtOH, *n*-PrOH, iso-PrOH, *n*-BuOH, iso-BuOH, *sec*-BuOH and *tert*-BuOH was detd. by the synthetic method at 20–70°. Regularities were found in the solubilities of the normal alcs. The influence of small quantities of H_2O (about 2%) on the soly. of $C_{10}H_8$ in MeOH and EtOH was also studied. The results indicate that small quantities of H_2O may lead to results as much as 20% too low. H. W. LEAHY

The reciprocal influence of sodium sulfate and potassium sulfate on their solubilities in water. EDWARD J. SALTSTROM AND G. McP. SMITH. *J. Phys. Chem.* **34**, 2241–9(1930).—Data are given for the solubilities of K_2SO_4 in H_2O and in solns. of Na_2SO_4 up to 2.0 wt. *N*, and for pure Na_2SO_4 solns. and Na_2SO_4 in solns. of K_2SO_4 up to 1.20 wt. *N*. The solubilities increase sharply up to 1.00 wt. *N* of added salt. Evidence of double salts of the type $x\ Na_2SO_4, y\ K_2SO_4$ was found. The data are interpreted in the light of Noyes and Harkins' postulate of intermediate ions of the type KSO_4^- and Brønsteds' thermodynamic principles for the equality of activity coeffs. for salts of the same type. H. R. MOORE

The solubility of sodium chloride in saturated solutions of sodium chlorate. WU MA NA. *Lignan Sci. J.* **9**, 91–6(1930).—The soly. of NaCl, both in mols. per l. and mols. per mol. H_2O, decreases with rising temp. in the presence of excess $NaClO_3$. The concn of NaCl in mols. per l. at 99.6° is 0.1180, at 93.0° 0.1231, at 86.1° 0.1307, at 85.8° 0.1317, at 76.1° 0.1491, at 75.8° 0.1494 and at 60.4° 0.1823. J. B. AUSTIN

Mutarotation in pure and in mixed solvents. JITENDRA NATH RAKSHIT. *J. Phys. Chem.* **34**, 2539–48(1930).—The mutarotation of morphine-HCl, codeine-HCl and narcotine-HCl was measured in H_2O, EtOH and mixts. of both. Conclusions: Mutarotation may be due to reaction between solute and solvent. All the mols. of a solute are under the simultaneous reversible influence and action of mols. of both solvent in proportion to their nos. in the field. H. W. LEAHY

The relationship between the refractive index of solutions of variable concentrations and the change in state of the dissolved substance. A method for the study of the changes in state of dissolved substances. MAX FRANKEL. *Biochem. Z.* **227**, 304–18(1930).—There is a strict proportionality between the concn. and the *n* of a soln. provided that the state of the solute remains unchanged within this range of concn. If assocn. occurs the *n* falls below the calcd. value, and in dissocn. exceeds it. However, if the assocn. or dissocn. keeps pace with the changes in concn. the direct proportionality of the *n* values is retained. A method of extrapolation is described whereby one can det. whether the solute has undergone a change in the dispersion state within the concn. range investigated. S. MORGULIS

Optical activity and salt effect. P. A. LEVENE AND ALEXANDRE ROTHEN. *J. Phys. Chem.* **34**, 2567–81(1930).—The optical activity of mandelic acid, α-methylglucoside and sucrose in the presence of alkali halides and hydroxides was studied. In general the alkali compds. increased the mol. rotation. However, the mol. rotation of the mandelate ion was the same at zero concn. regardless of the alkali compd. present. H. W. LEAHY

Electrical conductivity of very dilute solutions in antimony trichloride. Z. KLEMENSIEWICZ AND (MISS) Z. BAL. *Roczniki Chem.* **10**, 481–91(491 French)(1930).—The elec. conductivities of a no. of very dil. solns. (5×10^{-5}–10^{-2} *N*) in fused $SbCl_3$ were detd. The results agree well with previous measurements in more concd. solns. (*C. A.* **19**, 2156). Particularly according to Gosh the linear relation between the logarithm of equiv. cond. $ln\mu$ and cube root of the concn. $\sqrt[3]{\eta}$ was exactly verified for uniunivalent salts. The behaviors of the chlorides (common anion with that of the solvent) and the bromides (both anions different) are identical. The cond. for multivalent electrolytes is much smaller and its relation with the concn. more complicated. J. K.

The influence of volume and buffer value of a solution on the buffer value of another solution. GIUSEPPE RUSSO. *Boll. soc. ital. biol. sper.* **5**, 759–62(1930). P. M.

The chloroplatinate-chloroplatinite electrode. EDGAR R. SMITH. *Bur. Standards J. Research* **5**, 735–40(1930).—The e. m. f. of the cell formed by immersing a Pt electrode in 0.1 *N* KCl soln. contg. relatively small concns. of K_2PtCl_4 and K_2PtCl_6 was

measured at 35° against the 0.1 *N* calomel electrode. E. m. f. values were extrapolated to pure 0.1 *N* KCl soln. The equation $E = E_0 - (RT/2F)\log_e(m_1/m_2) + k\sqrt{\sigma}$, in which k is a const. and σ is the ionic strength of the soln., represents the exptl. data for values of $[m_1(K_2PtCl_4) + m_2(K_2PtCl_6)]$ ranging from 0.001 to 0.01, and gives a value of 0.4573 v. for E_0 in 0.1 *N* KCl. From the value of E_0 and the known change in heat content, the change in thermodynamic potential, change in entropy and the equil. were calcd. The results compare favorably with those of Miller and Terrey (cf. *C. A.* **21**, 2094). ALLEN S. SMITH

The platinum-hydrogen electrode. MARG THALINGER AND M. VOLMER. *Z. physik. Chem.*, Abt. A, **150**, 401–17(1930).—The anodic behavior of the Pt-H_2 electrode (cf. Sankine, *C. A.* **22**, 2870) is similar to the passivity phenomenon of metals. The effect of impurities usually occurring in H_2 is merely to change the fluctuations and periods. Impurities do not cause the phenomenon. By a study of the amalgamation of Pt surfaces it is shown that the effect is due to a monatomic O_2 film, which is not optically determinable. ARTHUR FLEISCHER

Cells with liquid-liquid junctions. III. Cells with a bridge of concentrated potassium chloride. A. UNMACK AND E. A. GUGGENHEIM. *Kgl. Danske Videnskab Selskab Math.-fys. Medd.* **10**, No. 8, 1–24(1930); cf. *C. A.* **24**, 5580.—The e. m. fs. of cells of the type H_2/soln. *S*/3.5 *N* KCl/0.1 *N* KCl, HgCl/Hg (*S* = dil. HCl, dil. alkali or a buffer) were measured by Bjerrum and Unmack, *C. A.* **24**, 2361. New measurements of this type were made in the light of Guggenheim's conclusions concerning the conditions for reproducibility and stability in cells with liquid-liquid junctions (*C. A.* **24**, 5580). Special care was taken in the present measurements to obtain, by having the liquid-liquid junction in the side-tube of the H electrode, the cylindrical symmetry of the junction which G. found so important. The initial values of the e. m. fs. agreed with those given by B. and U., within their exptl. error of several tenths of a mv. The e. m. fs. generally changed a few tenths of a mv. in the first 15–30 mins., but always reached a steady value reproducible to about 0.1 mv., and stable for a whole day. The sharper the initial junction, the sooner was the steady state reached. The values also agreed (where tested) with similar cells having a liquid-liquid junction of the free diffusion type designed by G. (loc. cit.). When cylindrical symmetry of the junction was deliberately avoided the e. m. fs. were erratic (several mv.). Cells of the type (*a*) Hg/HgCl, 0.1 *N* KCl/3.5 *N* KCl/0.1x*N*HCl + 0.1 $(1-x)$*N* *R*Cl/H_2 (*R* = alkali metal., x varied from 0.05 to 1.0) were studied for comparison with B. and U.'s measurements, and cells of the type (*b*) Hg/HgCl, 0.1 *N* KCl/3.5 *N* KCl/0.01x*N* HCl + 0.01 $(1-x)$*N* LiCl/H_2 (x varied from 0.10 to 1.00) were studied to compare the observed values with those calcd. theoretically. The greatest deviation observed between the 0.1 *N* KCl calomel cells used was 0.3 mv., while 3.5 *N* KCl calomel electrodes were found to be less stable and slightly less reproducible. The e. m. f. of the combination Hg/HgCl, 3.5 *N* KCl/0.1 *N* KCl, HgCl/Hg, "as long as the left-hand electrode was fairly newly prepd.," was found to be 83.1 ± 0.2 mv. at 18°. The curves obtained by plotting $E - (RT/F)\log_e C_{H^+}$ against the ratio of H-ion concn. to total anion or cation concn. are regular. A thermodynamic discussion of the e. m. fs. of such cells is given, and the conclusions are compared with the exptl. results. A method for computing E_s (the salt effect potential) in cells of type (*b*) (above) is given. E. B. S.

The theory of hydrogen overvoltage. T. ERDEY-GRUZ AND M. VOLMER. *Z. physik. Chem.*, Abt. A, **150**, 203–13(1930).—During the building up of overvoltage, as long as no evolution of H_2 occurs, the H ions are not discharged by the current at the electrode in marked amts. but arrange themselves in the double layer. A theory of overvoltage is developed which gives the abs. value of the const. $b = d\eta/d\log I = 0.116$ from the Tafel equation. The temp. relations and the decline in overvoltage after breaking the current agree with this value. MARY E. LEAR

The state of equilibrium. VERNON BOSMAN. *J. Chem. Met. Mining Soc. S. Africa* **31**, 28–37(1930). ALDEN H. EMERY

The equilibrium diagrams of the iron tungsten system. SHUZO TAKEDA. *Tech. Repts. Tôhoku Imp. Univ.* **9**, 447–61(1930).—See *C. A.* **24**, 3471. E. C. K.

The Le Chatelier-Braun principle. I. A thermodynamic proof. HENRY S. FRANK. *Lingnan Sci. J.* **9**, 81–90(1930).—This principle is discussed with applications to salt solns. A general function φ, useful in setting up a criterion of equil., is defined by the equations $\partial\varphi/\partial\eta_2 = 0$ and $\partial^2\varphi/\partial\eta_2^2 > 0$ which together constitute the necessary and sufficient conditions that the system shall be in stable equil. with respect to small changes in η_2, the variable describing the position of the equil. φ may be the Lewis free energy, the Helmholtz free energy or the entropy, depending on the conditions

of the change. If $\pi_1, \pi_2, \pi_3 \ldots \pi\eta$ are the arbitrarily fixed parameters of the system, stable equil. is defined by $(\partial\varphi/\partial\eta_2)_{\pi_r\pi_s} = 0$ and $(\partial^2\varphi/\partial\eta_2^2)_{\pi_r\pi_s} > 0$. If π_r is altered by $d\pi_r$, π_s remaining const., then $\partial^2\varphi/\partial\eta_2$ remains pos. by hypothesis and the first condition becomes $(\partial^2\varphi/(\partial\eta_2\partial\pi_r))d\pi_r$. If both the parts of this last quantity > 0, η_2 decreases as equil. is restored. But since $\partial^2\varphi/\partial\eta_2\varphi\pi_r = (\partial/\partial\eta_2)(\partial\varphi/\partial\pi_r) > 0$ this decrease in η_2 is the change which, operating alone would have decreased $(\partial\varphi/\partial\pi_r)_{\pi_s}$. If $\partial^2\varphi/\partial\eta_2\partial\pi_r$ is neg. the same result follows. In either case a neg. $d\pi_r$ causes a shift which, acting alone, increases $(\partial\varphi/\partial\pi_r)_{\pi_s}$. Therefore, when any system in stable reversible equil. is subjected to a change $d\pi_r$ in any detg. parameter, other parameters remaining const., the equil. shifts in a way that, acting alone, causes a change in $(\partial\varphi/\partial\pi_r)_{\pi_s}$ of sign contrary to $d\pi_r$. Various statements of this principle are discussed but a completely satisfactory one is not given. J. B. AUSTIN

Equilibria in the iron–hydrogen–oxygen system. Indirect calculation of the water-gas equilibrium constant. P. H. EMMETT AND J. F. SHULTZ. *J. Am. Chem. Soc.* **52**, 4268–85(1930).—The equil. const. $K = P_{H_2O}/P_{H_2}$ for the reaction $FeO + H_2 = Fe + H_2O$ was detd. by a flow method. At 600, 700, 800, 900 and 1000°, K is, resp., 0.332, 0.422, 0.499, 0.594 and 0.669. For the reaction $Fe_3O_4 + H_2 = 3FeO + H_2O$ K is 1.18 at 700° and 2.37 at 800°. The water-gas consts., calcd. by combining these Fe–H–O equil. values with those for the Fe–C–O system, agree excellently with consts. measured directly by Neumann and Kohler. P. H. EMMETT

Kinetics of permanganate reduction by formaldehyde in neutral solution. JOSEF HOLLUTA AND AUGUST MUTSCHIN. *Z. physik. Chem.*, Abt. A, **150**, 381–400(1930).—In neutral soln. HCHO ordinarily reduces $KMnO_4$ to MnO_2; but a great excess causes further reduction to Mn_2O_3. The reaction appears to be of the second order; but initial irregularities indicate catalysis by intermediate or final products. The disturbance is attributed to H ions from HCOOH, which occurs as an intermediate product in the reaction L. ONSAGER

Velocity of decomposition of diazo compounds in water. VI. E. YAMAMOTO. *J. Soc. Chem. Ind. Japan* **33**, Suppl. binding 358–60(1930).—The velocity const. of *m*-nitrobenzenediazonium chloride at 0° is 4.0×10^{-8}, temp. coeff. = 13,600; *p*-nitrotoluene-*o*-diazonium chloride 6.8×10^{-7} and 12750, *p*-nitrobenzenediazonium chloride 6.9×10^{-4} and 14,150, resp. E. M. SYMMES

Some consideration of a simple phase-rule study. HERBERT L. DAVIS. *J. Chem. Education* **7**, 2675–86(1930).—Phase-rule methods are outlined for getting at the compn. of solid phases in three-component systems. By applying these methods to the system, boric acid–tartaric acid–H_2O, it is shown that tartaric acid increases the soly. of boric acid in water over ten-fold, while boric acid doubles the soly. of tartaric acid. No compd. forms at room temp., the 2 substances crystg. together at the invariant point. R. H. FERGUSON

Studies on the mechanism of ammonia synthesis over iron catalysts. P. H. EMMETT. *J. Chem. Education* **7**, 2571–83(1930).—A résumé is given of all published work on the mechanism of catalytic synthesis of NH_3 and on the effect of promoters on the activity of Fe catalysts. P. H. EMMETT

Effect of copper and lead ions upon the rate of decomposition of hydrogen peroxide at various acidities. HARRY W. RUDEL AND MALCOLM M. HARING. *Ind. Eng. Chem.* **22**, 1234–7(1930).—The rate of decompn. of 30% H_2O_2 at varying acidities in the presence of varying concns. of Cu and of Pb ions was investigated. The rate increases with p_H; traces of Cu ion markedly accelerate, whereas Pb ions inhibit the decompn. P. H. EMMETT

The effect of water upon the decomposition of ethyl alcohol at the surface of nickel. W. WALKER RUSSELL AND ROBERT F. MARSCHNER. *J. Phys. Chem.* **34**, 2554–66(1930).—Over a wide range of concns. H_2O increases the amt. of alc. decompd. and decreases the % of aldehyde decompd. The Ni catalysts decreased in activity while in use but were reactivated by treatment with H at 350°. H. W. LEAHY

The thermochemistry of sulfur. III. W. A. ROTH, R. GRAU AND A. MEICHSNER. *Z. anorg. allgem. Chem.* **193**, 161–75(1930); cf. *C. A.* **24**, 2930, 2946.—The heat of oxidation of gaseous SO_2 by dil. H_2O_2 solns. at 20° was detd. calorimetrically as + 74.84 ± 0.05 kg.-cal. per mol. The heat of dissocn. of H_2O_2 at 20° is 22.70 ± 0.03 kg.-cal. per mol. With the aid of these values the following heat effects are calcd.: $SO_2 + {}^1/_2O_2 = SO_3$ (l) + 33.66 ± 0.06 kg.-cal., $SO_2 + {}^1/_2O_2 + H_2O$ $(l) = H_2SO_4$ anhyd. + 54.88 ± 0.05 kg.-cals. $S_{rh} + 1^1/_2O_2 = SO_3$ (l) + 104.57 ± 0.07 kg.-cal. $S_{rh} + 1^1/_2O_2 + H_2O$ $(l) = H_2SO_4$ anhyd. + 125.79 ± 0.10 kg.-cal. $S_{rh} + 2O_2 + H_2 = H_2SO_4$ anhyd. + 194.1 ± 0.1 kg.-cal., where SO_3 (l) means liquid SO_3 and S_{rh} means rhombic S. Old values for these reaction heats are critically discussed and are found in general to be too high.

Attempts to det. the heat of formation of SO_2 and SO_3 by burning S in a bomb to a mixt. of both oxides failed because of analytical difficulties. J. B. AUSTIN

Heats of dilution and heats of solution of potassium nitrate, potassium chloride, rubidium fluoride and calcium sulfate at low concentrations. J. LANGE AND J. MONHEIM. *Z. physik. Chem.*, Abt. A, **150**, 349–69(1930).— The heats of diln. of KNO_3, RbF and $CaSO_4$ at 25° and of KNO_3 at 12.5° were measured with an adiabatic differential calorimeter. The heats of soln. were also detd., integral and partial heats of soln. being calcd. from the combined data. In addn., partial and apparent *sp. heats* of KNO_3 solns. were calcd. from the temp. dependence of the heats of soln. L. ONSAGER

Some problems in the conduction of heat. GEORGE GREEN. *Phil. Mag.* [7], 9, 241–60(1930); cf. *Phil. Mag.* [7], **3**, 784–800(1927); **5**, 701–20(1928).—The wave-train method of solving problems is applied to heat conduction in a uniform medium. ARTHUR FLEISCHER

Thermal decomposition of the system calcium sulfide and calcium sulfate. J. ZAWADZKI AND I. KOWALCZEWSKI. *Roczniki Chem.* **10**, 501–8 (508–9 French)(1930).— Transformation of 4 $CaSO_3$ into $CaS + 3\ CaSO_4$ takes place slowly and probably is incomplete. According to the phase rule $CaSO_3$ is not one of the phases of possible equil. The thermal decompn. $CaS + 3\ CaSO_4 \longrightarrow 4\ CaO + 4\ SO_2$ is complicated by secondary processes which take place with the liberation of S—always when SO_2 acts on CaO. The static method makes it possible to measure the total pressure of gas (SO_2 + S) by driving out the gases of the reaction with a current of N_2 and, after detg the content of SO_2, calcg. the partial pressure of SO_2. By combining these data the partial pressures of SO_2 and S in equil. with the system $CaS + CaSO_4 + CaO$ were detd. J. KUČERA

The heat of combustion of salicylic acid. P. E. VERKADE AND J. COOPS, JR. *J. Phys. Chem.* **34**, 2549–53(1930).—Polemic with Keffler (*C. A.* **24**, 3422). P. H. E.

3—SUBATOMIC PHENOMENA AND RADIOCHEMISTRY

W. ALBERT NOYES, JR.

An acoustical interpretation of the Schrödinger wave equation. R. B. LINDSAY. *Phil. Mag.* [7], **10**, 863–72(1930). A. F.

Axial orientation of light emission and atomic structure. VIII. Oriented and polarized x-ray radiation from a crystal. J. STARK. *Ann. Physik* [5], **6**, 637–62 (1930); cf. *C. A.* **24**, 5600.—The axial orientation of an electron drop from the lowest Ne shell into the He shell of a Br atom is a property which is characteristic of the structure of the atom. An axial orientation of the intensity and polarization of secondary *K*-radiation from the Br atoms in dibromoanthracene has been demonstrated experimentally. This leads to the conclusion that the electrons in the outer shell of the Br atom are oriented in certain equil. positions with respect to a singular axis. It follows that in a crystal of dibromoanthracene the axes of the Br atoms are at least approx. parallel; and that, therefore, the mols. in this crystal show a parallel orientation, at least with respect to the Br-Br axis. This can be possible only if the valence field shows an axis which is at least approx. parallel to the axis which dets. the arrangement of electrons in the interior of the at. shell. Further expts. will be undertaken with Hg_2Cl_2 and TiO_2 crystals, with the intention of confirming the above findings on other crystals. FRANK URBAN

Axial orientation of light emission and atomic structure. IX. Axial orientation of valence fields of the carbon and nitrogen atoms. J. STARK. *Ann. Physik* [5], **6**, 663–80(1930); cf. preceding abstract.—The axial arrangement of the C valence electrons is in entire agreement with the theory of von Baeyer (1885). The 5 valence electrons of the N atom are of 3 types: 2 metalloid electrons of electronegative character which can remain inactive; one valence electron of weakly electropositive character which can dissoc. electrolytically in the quinquevalent linkage of the N atom; and 2 metalloid valence electrons of amphoteric character which engage other valence electrons in the tervalent or quinquevalent linkage of the N atom. The change in the nature of the weakly electropositive electron is conditioned upon the axial linkage of the 2 electronegative valences. Sommerfeld's theorems of swarming electrons are entirely incompatible with chem. experience. They rest on the dogmatic interpretation, far removed from reality, by him and others of a differential equation, to which previously Schrödinger had given a different interpretation. FRANK URBAN

The relation of electronic waves to light waves, to light quanta and to Planck's law.

J. J THOMSON. *Phil. Mag.* [7], **9**, 1185–94(1930).—An electron is considered as consisting of 2 parts, a core of neg. electricity equal to e and a system of waves surrounding the core. The velocity of the core is equal to the group velocity of the waves in its neighborhood. With this assumption an equation is derived which is shown to be identical with Planck's law. The energy and mass of a light quantum are calcd. by consideration of the moment of momentum of a light quantum about its axes. A. F.

Absorption measurements of the x-ray general radiation. LAURISTON S. TAYLOR. *Bur. Standards J. Research* **5**, 517–38(1930).—Cu absorption curves for heterogeneous x-rays were studied as a possible means of detg. the quality of radiation. A standard and 2 thimble ionization chambers were used. The log Cu absorption curves for heterogeneous high-voltage x-radiation do not become straight for filtrations up to 3 mm. Cu when measurements are made with a standard ionization chamber. Absorption measurements made with the thimble chamber are subject to error from the chamber "wall effect." Half-value layers and effective wave lengths derived from the 3 sets of results were compared. The "effective wave length" as derived from the slope of the absorption curve and the "half-value layer" are about equally sensitive to changes in quality at least up to 3 mm thickness of filter. The absorption coeff. obtained with a standard thickness of Cu (or Al) is recommended as the simplest general method of describing the quality of a heterogeneous beam of x-rays for therapeutic uses. On the basis of the effective wave length detns. it is found that, contrary to the accepted views, the greater part of the highly filtered energy is not concd in the W K lines.
ALLEN S. SMITH

Investigations on the artificial disintegration of some elements. C. PAWLOWSKI. *Compt. rend.* **191**, 658–60(1930).—By the retrograde method C, Si, S, Fe, Zn, Al, Mg, Ag and Pb were investigated. Po was the source of the α-particles. The results were in accord with those of Bothe and Fränz (*C. A.* **24**, 1791). L. D. ROBERTS

Remarks on the fine structure of α-radiation. JEAN THIBAUD. *Compt. rend.* **191**, 656–8(1930).—Two mechanisms for the emission of γ-rays are considered: the displacement of pos. charges between the intra-nuclear energy levels; emission by variation of the energy of nuclear rotation (analogous to the emission of the spectra of mols.).
L. D. ROBERTS

Processes for extracting radium from carnotite. H. A. DOERNER. Bur. Mines, *Report of Investigations* **3057**, 35 pp.(1930); cf. *C. A.* **24**, 1325.—The economic and technical aspects of the production of Ra from carnotite are bound up with the production of V and to a lesser extent with that of U. Ores now worked for V waste Ra in the slime. If the tailings were deslimed, dewatered and stored the Ra would be saved in a low-cost concentrate. Ra concentrates are always in the form of slime. It is, therefore, more difficult to recover Ra from concentrates than from ore of the same grade. All processes consume large amts. of chemicals and require many operations. No proved process stands out above the others as to metallurgical efficiency or costs of operation. V recovered from carnotite of low Ra content will pay for mining, concn. and recovery of V. This is not true for high-Ra ores of the same V content because of scarcity and greater mining costs. Low-grade ores may therefore offer the best opportunity for cheaper Ra. The HNO_3-modified method for Ra recovery (*C. A.* **22**, 3348) seems to be the best for treatment of slime concentrates. Several new but untried processes are interesting. In one, SiO_2 is volatilized as the fluoride; Ra recovery is reported to be complete and all expensive reagents are regenerated. A bibliography and list of patents are included.
ALDEN H. EMERY

A note on the formation of long-lived active molecules in hydrogen subjected to the action of α-particles from radon. EDWARD C. TRUESDALE. *J. Phys. Chem.* **34**, 2472–8(1930).—Repetition of the work of Duane and Wendt on the activation of H_2 by α-particles revealed no evidence for the existence of any long-lived active H, such as H_3. The rate of recombination of the H ions and electrons formed is so great as to prevent any reactivity toward S 0.1 sec. or longer after their formation. The formation of small quantities of H_2S could be detected only, when the S was present in the reaction sphere surrounding the radon.
P. H. EMMETT

Passage of an electron beam through a field-free enclosure. F. L. ARNOT. *Proc. Roy. Soc.* (London) **A129**, 361–77(1930).—An investigation of the fields set-up by the passage of an electron beam through an otherwise field-free enclosure is described. The app. used in one series of expts. is discussed in detail. Many curves are given. The essential object was the investigation of the pos. ions formed along the path of the electron beam. The curves apply to the following: angular distribution of the pos. ions; variation of intensity of peak at 90° with electron-beam current; velocity distribution of pos. ions.; relation between velocity of pos. ions and velocity of elec-

trons; relation between velocity of ions and electron current. The results are discussed. The investigation was also made by use of a Langmuir probe electrode. The whole of the enclosure through which the electron beam passes is found to be filled with a gas of slow electrons having a Maxwellian velocity distribution corresponding to a temp. of several thousand degrees K. WILLIAM E. VAUGHAN

The exchange of energy and electrons between neutral particles under conditions of resonance in collisions of the second kind. H. BEUTLER AND W. EISENSCHIMMEL, *Z. physik. Chem.*, Abt. B, **10**, 89–105(1930).—It follows from a conservation law deduced from quantum mechanics by E. Wigner that, upon the exchange of energy resulting from collisions of the second kind under conditions of resonance, the term multiplicity is unchanged. This means that a simultaneous inter-system combination accompanied by an interchange of terms in both colliding particles is preferred to the occurrence of the inter-system combination in the one and a permitted intra-system transition in the other. This has been experimentally proved in the transfer by collisions of the energy of excited Kr to Hg. It has been shown that the process represented by equation (1) is preferred to (2) by a factor of 30: (1) $(2^3P_2)_{Kr} + (1^1S_0)_{Hg} = (1^1S_0)_{Kr} + (5^3D_n)_{Hg} + 0.038$ v. (2) $(2^3P_2)_{Kr} + (1^1S_0)_{Hg} = (1^1S_0)_{Kr} + (5^1D_2)_{Hg} + 0.033$ v. Similarly (3) is preferred to (4) by a factor of about 3. (3) $(2^3P_1)_{Kr} + (1^1S_0)_{Hg} = (1^1S_0)_{Kr} + (6^3D_3)_{Hg} + 0.019$ v. (4) $(2^3P_1)_{Kr} + (1^1S_0)_{Hg} = (1^1S_0)_{Kr} + (6^1D_2)_{Hg} + 0.017$ v. The verification of the conservation law is explained by the interchange of 2 electrons with anti-parallel spin between 2 neutral particles, the spin direction being preserved. The interchange mechanism is called upon to explain by electron collision the excitation function of Hg terms. It is expected to be significant in the explanation of such chem. reactions as the splitting of H_2 by electron collision and by excited Hg, and also the transformation of para- into ortho-hydrogen. C. J. HUMPHREYS

The mobility of ions in pure gases. A. M. TYNDALL AND C. F. POWELL. *Proc. Roy. Soc.* (London) **A129**, 162–80(1930); cf. *C. A.* **23**, 4134.—A *new all metal-glass app* with a high resolving power for ions of different mobilities, which can be subjected to rigorous heat treatment, has been used in making the measurements. Results with this app. for pos. ions agree with Langevin's law. Expts. with He and N emphasize the great importance of small traces of impurity on the mobility of pos. ions. The absence of "normal" neg. ions is not an adequate criterion of purity. The highest value for the pos. ion in He greatly exceeds those of previous workers but is of the order of magnitude of the value deduced from classical kinetic theory for the mobility of a pos He ion moving through He. J. B. AUSTIN

An improved form of standard ionization chamber. LAURISTON S. TAYLOR AND GEO. SINGER. *Bur. Standards J. Research* **5**, 507–16(1930).—A modification of the open-air parallel-plate ionization chamber, readily portable and adapted to field use as a secondary standard, is described. In this chamber, narrower guard plates supplemented by a guard wire system across the ends of the chamber are used. The wires are so spaced that x-ray scattering from them is negligible. The results of direct comparison between this chamber and the primary standard indicate that the rontgen is reproducible by the former with the same accuracy as by the latter. The problem of diaphragming is identical for the 2 chambers, and for a given tube the same inverse-power law holds for both. Like the standard chamber, the new chamber requires no correction for differences in x-ray quality. ALLEN S. SMITH

The role of barium in vacuum tubes. J. A. BECKER. *Bell. Lab. Record* **9**, No 2, 54–8(1930).—The electron current which is produced from a heated Pt wire coated with a single layer of Ba atoms is enormously greater than that from a wire of either Pt or Ba alone. Theoretical considerations are deduced to account for this and similar phenomena. R. H. FERGUSON

The effect of systematic surface treatment on the photoelectric emission from metals. R. H. HANSTOCK. *Phil. Mag.* [7], **10**, 937–44(1930). ARTHUR FLEISCHER

Electric discharge in rare gases and its application to lighting. M. LAPORTE. *Rev. gén. sci.* **41**, 543–8(1930).—Discussion of reasons, both chem. and phys., why rare gases are superior to others in the operation of luminous tubes. FRANK URBAN

The effects of gases on photoionization of cesium by line absorption. F. L. MOHLER AND C. BOECKNER. *Bur. Standard J. Research* **5**, 399–410(1930); cf. *C. A.* **24**, 4703.—The collisions of excited Cs atoms with foreign atoms change the state of excitation and modify the probability of ionization. Thus the photoelec. ionization of Cs vapor by radiation of wave length greater than the series limit is modified by the presence of H, He and H. Photoionization was measured as hitherto by using the neutralizing effect of pos. ions on a thermionic current. Curves giving photoionization as a function of wave length show that the ratio of the ordinates at any λ is a measure of the

ffect of gas, whose chief action is reduction of the amplification factor of the space-harge tube by an unknown amt. The no. of ions produced by direct ionization is un-hanged. H. R. MOORE

Fine structure of zinc lines in the visible and ultra-violet regions. WALI MOHAM-IAD AND PREM NATH SHARMA. *Phil. Mag.* [7], **10**, 916–21(1930); cf. *C. A.* **22**, 2885; 3, 3560.—Lines from 6362.58 to 2756.53 A. U. have been analyzed. A. F.

Hyperfine structure in some spectral lines from highly ionized atoms of thallium nd bismuth. GUSTAF ARVIDSSON. *Nature* **126**, 565–6(1930).—Hyperfine structure as been observed in the extreme ultra-violet by using a grating of 1.5 m. radius at razing incidence so that the dispersion at 800 A. U. is 2.6, and at 1400 A. U., 3.4 A. U./-nm. Measurements are given for 8 Tl lines and for 4 Bi lines characteristic of doubly r trebly ionized atoms. It is expected that measurements of hyperfine structures will be an aid in classifying spectra from some highly ionized heavy atoms. W. F. M.

A method of measuring excitation potentials of spectral lines and its application to the many-lined spectrum of hydrogen. W. FINKELNBURG, E. LAU AND O. REICHEN-HEIM. *Z. Physik* **61**, 782–91(1930).—An arrangement whereby it is possible to obtain spectrum lines of different excitation potentials in different lengths is described. It s based on the observation that under certain conditions the spectra emitted in the os. column of a gas discharge are sepd. according to excitation potential, the exten-sion of various lines into the Faraday dark space being inversely proportional to their excitation. This "excitation dispersion" permitted development of a method for mea-suring the excitation potentials of individual lines. Tested by the classified lines in the H_2 spectrum the av. error is detd. to be ± 0.1 v. Excitation values are given for 42 H_2 lines in the region 4379–6091 A. U.; they indicate the presence of a new spectral term. W. F. MEGGERS

The absorption spectrum of lithium vapor. R. W. FRANCE. *Proc. Roy. Soc.* (London) **A129**, 354–60(1930).—Accurate values of the wave lengths for 31 members of the principal series of Li are obtained by photographing them in absorption with a grating spectrograph giving a dispersion of 4.3 A. U./mm. in the first order. The best value for the limit of the series derived from the Hicks formula is 43486.76 ± 0.28 $^{-1}$, corresponding to a wave length 2298.837 ± 0.015 A. U. W. F. MEGGERS

The second spark spectrum of krypton. D. P. ACHARYA. *Indian J. Physics* **5**, 385–405(1930); cf. *C. A.* **24**, 2049.—A list of wave lengths of Kr III, many of which are new, is given, extending from 4404 A. U. to 1930 A. U. Many of these lines have en classified as combinations between terms whose identity is not yet established. By means of the irregular-doublet law the prominent ^5P term, and the ^5S and ^5D terms which combine with it, have been found. From the value 254,718 cm.$^{-1}$ which these terms give for the N_2 level an ionization potential of 31.4 v. is derived for Kr^{++}. C. C. KIESS

Band spectrum of antimony oxide. B. C. MUKHERJI. *Nature* **126**, 725(1930).—ands showing a doublet structure, and therefore attributed to the neutral Sb oxide ol, have been observed in the spectral region 3250 A. U. to 6700 A. U. Some of ese bands have been classified as members of at least 3 systems with origin at 29,619, 480 and 24,203 cm.$^{-1}$. C. C. KIESS

Spark spectra of bismuth, Bi II and Bi III. Evidence of hyperfine structure. J. C. cLENNAN, A. B. MCLAY AND M. F. CRAWFORD. *Proc. Roy. Soc.* (London) **A129**, 79–88(1930).—Wave lengths in the spectrum of a condensed discharge in heated i vapor have been measured from 7050 A. U. to 2000 A. U. and those in the spectrum a condensed spark between Bi electrodes in H between 2000 A. U. and 1340 A. U. lany of these lines have been classified as members of Bi II and Bi III. The Bi III rms are doublets; those of Bi II are singlets and triplets. Lines with hyperfine struc-ure have been observed in both spectra, which was to be expected because the Bi ucleus is known to have an angular momentum of $4.5\,h/2\pi$. The lowest term of Bi III, $6^2P_{1/2}{}^\circ$, has not been found, but is placed at approx. 205,400 cm.$^{-1}$, which gives an ioniza-on potential of 25.4 v. The lowest term of Bi II is $6p^2\,{}^3P$, but its abs. value is as yet nknown. C. C. KIESS

The spectrum of doubly ionized thallium. P. PATTABHIRAMAYYA AND A. S. RAO. *ndian J. Physics* **5**, 407–16(1930).—A list of classified lines of Tl III extending from 001 A. U. in the infra-red to 995 A. U. in the extreme ultra-violet is presented. The nes represent combinations between doublet and quartet terms arising from the addn. f *s*, *p*, *d*, electrons to the ions d^{10} and d^9s. C. C. KIESS

Measurement of the spark spectrum of iodine. WOLFRAM KERRIS. *Z. Physik* **61**, 74(1930); cf. *C. A.* **24**, 2048. W. F. MEGGERS

Measurement of the spark spectrum of iodine. LEON AND EUGENE BLOCH. *Z. Physik* **61**, 873(1930); cf. *C. A.* **23**, 2655. W. F. MEGGERS

The spectrum of trebly ionized selenium. K. R. RAO. *Nature* **126**, 568(1930). W. F. MEGGERS

Absorption of light by gaseous, liquid and solid xenon. J. C. MCLENNAN AND R. TURNBULL. *Proc. Roy. Soc.* (London) **A129**, 266–83(1930).—The absorption of O is discussed. The possibility that the mols. of Hg in the liquid and solid states remain unassocd. just as in the vapor state is considered; this raises the question as to whether or not very thin films of liquid Hg or solid Hg would show absorption bands corresponding to the 2 wave lengths, 2537.72 A. U. and 1849.6 A. U. It was attempted to det. this but no definite results were obtained. Xe was next utilized. Resonance lines appear at 1293 and 1469 A. U. A fluorite spectrograph was employed; H was contained therein. Schumann plates were used with a light source of a condensed spark between Au electrodes in an atm. of H. Two types of cells fitted with fluorite windows were designed, one for low pressures, the other for high (up to 50 atms.). The construction of these is described in detail. The procedure is detailed. The expts. show that at a pressure of 2 mm. of Hg the absorption appears as a line at 1469 A. U. As the pressure increased the absorption widened out into a band and at 50 atms had a width of 156 A. U. The data are tabulated for all pressures. The plates are shown. Preliminary expts. with liquid and solid Xe are given. New cells were designed. The long-wave-length limit of absorption is 1990 A. U., a quartz spectrograph being used. With a fluorite instrument the long-wave-length limit was detd. as 1783 at a temp. of —110° for the liquid and approx. 1800 for the solid (a colorless, glass-like substance). Further work is promised on this subject. WILLIAM E. VAUGHAN

The λ3400 band of phosphorus hydride. R. W. B. PEARSE. *Proc. Roy. Soc.* (London) **A129**, 328–54(1930).—The band lying between 3371 and 3485 A. U., attributed to PH was photographed in the 2nd order of a 10-foot grating with a scale of 2.7 A. U. per mm. Wave lengths and estd. intensities are given for 310 lines. The band has been completely analyzed into 27 branches and is believed to afford the most complete data at present available for a $^3\Pi \longrightarrow {}^3\Sigma$ transition. The fine structure arising from the $^3\Sigma$ level has been resolved and the observed sepns. are compared with Kramers' theoretical formula; good agreement is obtained. The $^3\Pi$ levels are found to be inverted. An approx. estn. of the electronic energy sepns. between the component levels shows that they are not equally spaced but that $^2\Pi_2 - {}^2\Pi_1 = -121$ cm.$^{-1}$, while $^2\Pi_1 - {}^2\Pi_0 = -111$ cm.$^{-1}$. W. F. MEGGERS

Spectroscopic researches on nitric oxide and nitrogen peroxide. MAURICE LAMBREY. *Ann. phys.* **14**, 95–183(1930); cf. *C. A.* **24**, 549.—The absorption spectrum of NO was photographed by means of a small quartz spectrograph, with H as a source of continuous spectrum. It is composed of 2 systems of doublets of unequal intensity. The most intense doublets have edges facing longer waves; they comprise system γ extending from 2368.6 A. U. to 1871 A. U. The others, weaker and degraded in the opposite sense, comprise system β extending from 2210.5 A. U. to 1908 A. U. The initial state is the same for all these doublets; it is described as ^2P, the normal state of the NO mol. The final state for the γ system is a ^2S state; for the β system, a ^2P level. The coeff. of absorption of NO was measured between 2400 and 2100 A. U. Outside of the β and γ bands there is general absorption such that for a tube of const. length the optical density is proportional to p^n where p is the pressure and n ranges from 1.5 to 2. The introduction of a foreign gas produces a considerable increase in the absorption coeff. General absorption increases also with temp. The ultra-violet absorption spectra of nitrogen peroxide consists of 2 wide bands attributable to N_2O_4 and some bands of complex structure ascribed to NO_2. W. F. MEGGERS

The ultra-violet absorption of alkali and alkaline earth halides; zinc iodide, cadmium bromide, cadmium iodide, mercuric bromide, and mercuric iodide in aqueous and nonaqueous solutions. EKBERT LEDERLE. *Z. physik. Chem.*, Abt B, 10, 121–41 (1930).—The electron affinity spectra of aq. and alc. solns. of the alkali and alk.-earth halides have been measured down to 1860 A. U. Results of a study of the effect of temp. and of different solvents are presented. These results may all be explained on the hypothesis offered by Franck and Scheibe. The halides of the elements of the 2nd sub-group of the periodic system are only partially dissocd. in non-aq. solns.; their absorption spectra are ascribed to the mols. The work supports the conclusion indicated by the observations of Terenin that the photoreaction in the case of HgI_2 leads to HgI + I, in which case both dissocn. products can appear in the excited state. C. J. HUMPHREYS

Gaseous combustion in electric discharges. V. Spectroscopic examination of the

cathodic **combustion of carbonic oxide.** G. I. FINCH AND H. H. THOMPSON. *Proc. Roy. Soc.* (London) **A129,** 314–9(1930); cf. *C. A.* **24,** 300.—Spectroscopic examn. of the elec combustion of CO and O was carried out with a quartz instrument. The procedure is similar to that employed in earlier papers (*C. A.* **23,** 4896). Electrodes of Ag, Pt, Cu, Ni, Mg and W were used. The spectrograms show that CO mols. are excited, not ionized, that the CO bands are superimposed on a faint continuous background in the "detonating gas," and that the metals are sputtered as atoms. In pure O the spectrograms revealed O_2^+, O and O^+. These results necessitate a revision of the mechanisms proposed in earlier papers, which postulate prior ionization of the CO.
WILLIAM E. VAUGHAN

Combination of nitrogen and hydrogen activated by electrons. G. F. BRETT. *Proc. Roy. Soc.* (London) **A129,** 319–27(1930).—The earlier work of Caress and Rideal (*C. A.* **21,** 3548) is extended with improvements upon the technic used. The rate of reaction of H and N in a 3:1 mixt. has been studied as function of the speeds of the electrons used to activate the mols. The method consists essentially in detg. the change in pressure produced by freezing out the products of the reaction; a Pirani gage was used. The various curves are given. The rate of reaction increases markedly at electronic speeds corresponding to 17.0, 18.5, 20.5, 24.5 and 27.0 v.; these steps are related to the production of N_2^+, H and H^+, N_2^{++}, N and N^+, N and N^+ and (or) H and H^+, resp.
WILLIAM E. VAUGHAN

Geometrical inversion in light. BHADRAMUKH K. VAIDYA. *Proc. Roy. Soc.* (London) **A129,** 299–313(1930).—Quantum efficiencies for the inversion of the following geometrical isomers have been detd.: maleic and fumaric acids, citraconic acid, *o* coumaric acid, cinnamic and isocinnamic acids. All materials were purified by recrystn. or extn. The source used was an Hg arc with suitable filters; 3130 A. U. was the av. wave length used in all calcns. Energy measurements were made with a thermopile-galvanometer set-up. The absorption spectra of the solns. were detd. The courses of the reactions in all cases were followed by cond. measurements. Mol. conductivities were detd. for all of the solutes and the data are listed. Concns. of the solutes in the photochem. expts. vary between 0.002 and 0.01 *M*. There is some very slight variation in the results depending upon concn. Quantum efficiencies: maleic acid, 0.01 *M*, 0.048, 0.005 *M*, 0.052; fumaric, 0.01 *M*, 0.117; 0.005 *M*, 0.083; citraconic, 0.01 *M*, 0.18, 0.005 *M*, 0.22; coumaric, 0.005 *M*, 0.031; 0.002 *M*, 0.023; cinnamic, 0.003 *M*, 0.61, 0.002 *M*, 0.53; isocinnamic, 0.003 *M*, 0.21; 0.002 *M*, 0.15. Theoretical discussion is given.
WILLIAM E. VAUGHAN

Spectrophotometric investigation of the action of light on silver nuclear hydrosols. II. Silver nuclear hydrosols and derivatives. A. GALECKI AND R. SPYCHALSKI. *Roczniki Chem.* **10,** 492–500 (500 German)(1930); cf. *C. A.* **23,** 1572.—Quant. spectrophotometric investigations have proved that the action of ultra-violet light on Ag nuclear hydrosols is a reaction of the first order. The temp. coeff. is 1.2–1.3. J. K.

Constitution of the aqueous pink and blue cobaltous chloride solutions. II. Spectrometric research (BRDIČKA) **6.** Photochemical oxidation of lactic acid (BURNS) **10.** An integrating photometer for x-ray crystal analysis (ROBINSON) **1.** Absorption spectra of the γ-pyrones and pyroxonium salts (GIBBS, *et al.*) **10.** Lattice distortions in glide planes indicated by an x-ray investigation of rock salt (BERG) **2.**

Apparatus for irradiating liquids with ultra-violet rays. N.-V. PHILIPS' GLOEILAMPENFABRIEKEN. Brit. 332,977, May 13, 1929. The liquid is passed through an irradiation chamber in which it flows around an elec. discharge tube which may be of helical shape and may contain Hg and A. Various structural details are described.

Ionization chambers for Röntgen rays. HANS KÜSTNER. Ger. 504,220, Mar. 2, 1928. Addn. to 490,656 (*C. A.* **24,** 2056).

4—ELECTROCHEMISTRY

COLIN G. FINK

The development of the calcium carbide industry and of that of its by-products. JEAN GORNOSTAI-POLSKY. *J. four elec.* **39,** 369–71; 411–4(1930).—A review.
C. G. F.

The electrodeposition of cobalt-nickel alloys. I. S. GLASSTONE AND J. C. SPEAKMAN. *Trans. Faraday Soc.* **26,** 565–74(1930).—A paper dealing with the influence of:

(1) H-ion concn., (2) c. d., and (3) stirring, on the compns. of Co-Ni alloys deposited from various mixed solns. of Co and Ni sulfates at 15°. The c. ds. ranged from 0.0028 to 5–6 amp./sq. dm. The compn. of the alloy at low c. ds. was found to be almost independent of the diln. of the soln. and is not influenced to any marked extent by stirring. The alloys always contained relatively more Co than did the electrodes. The decrease of Co content at increased c. ds. has been correlated with the impoverishment of the catholyte in the Co ion, on account of their preferential deposition. Diln. causes a marked decrease, while stirring partially eliminates it. The compn. of the initially deposited alloys is independent of the H-ion concn. of the soln.; the current efficiency for metal deposition increases with increasing p_H; and the effect of impoverishment of the electrolyte is observed at lower c. ds. Acetate ions appear to have no influence on the relative tendencies for Co and Ni to deposit from solns. of the mixed sulfates. Also in *J. Electroplaters and Depositors Tech. Soc.* **6**, 49-57. W. H. BOYNTON

Addition agents in copper electrotyping solutions. R. O. HULL AND W. BLUM. *Bur. Standards J. Research* **5**, 767–73(1930).—The effects of glue, dextrin, urea and phenol as addn. agents in Cu electrotyping solns. were investigated. *Phenol* in the form of phenolsulfonic acid was most satisfactory, permitting harder electrotypes to be produced in much shorter time. It is effective over a wide range of concn. and its effects persist over a long period of operation. Operating conditions are suggested. ALLEN S. SMITH

Plating tank rheostats. M. M. ROSE. *Metal Ind.* (N. Y.) **28**, 473–4(1930).—Factors affecting the heating and ampere-carrying capacity of tank rheostats are noted. Most tank rheostats are designed for a 3-v. drop, so that on a 6-v. bus current, with rated amp./capacity flowing through the rheostat, the voltage drop in the rheostat will be 3 v., giving 3 v. across the tank. It is indicated that: (1) a rheostat designed for a 3-v. drop should be liberally constructed so as to withstand the max. overload to which it may be subjected, and (2) amp. current-carrying capacity should be provided in the resistors and also in the conductors and contact surfaces. A math. proof of the factors involved is based on the formulas covering Ohm's laws and the equiv. resistance of parallel and series circuit. Because of the different classes of work encountered in the same tank and with the same rheostat, the voltage drop may reach 4–4½ v. The rheostat chosen should have a liberal ampere overload capacity, and solid contacts securely fastened together. The ideal arrangement of the rheostat is illustrated and shows the method of making contact between grids and toggle switch W. H. BOYNTON

Normal potential of beryllium. MILDA PRYTZ. *Z. anorg. allgem. Chem.* 193, 113–8(1930).—Dil. Be amalgams were prepd. by electrolysis and their potentials detd. against aq. solns. of $BeCl_2$. The p. d. between the amalgam and metallic Be was measured by means of a propylamine soln. of Be acetylacetonate. The normal potential of Be calcd. from these investigations was found to be: Be/Be^{++}; $E_o = 1.9$. H. STOERTZ

The nickel-iron storage battery. MANUEL SEVILLANO. *Ing. y construccion* (Madrid) **7**, 566–72(1929); **8**, 19–23(1930).—Construction details and complete charge and discharge characteristics are given. E. M. SYMMES

A new carbon arc lamp for industrial applications. W. C. KALB. *J. Am. Inst Elec. Eng.* **49**, 1031(1930).—A powerful C arc lamp (110–220 volt a. c. or d. c.) with a long burning period to be used chiefly for *ultra-violet* light radiation is described. One trim of carbons operating at 45 amp. arc current will burn continuously for 12 hrs. The carbons are *cerium*-cored and produce a light very close to natural sunlight. At 60 amp. current the c. p. equals 30,000. With "C" carbons, cored with salts of Fe, Ni and Al, the ultra-violet radiation exceeds that of sunlight. C. G. F.

The modern theory of dielectrics. L. G. CARPENTER. *World Power* **14**, 391–6 (1930).—A review dealing in particular with Debye's extension of dielectric theory to include polar mols. C. G. F.

Corona loss measurements on a 220 kilovolt-60 cycle, 3-phase experimental line. JOS. S. CARROLL, LELAND H. BROWN AND D. P. DINAPOLI. *J. Am. Inst. Elec. Eng.* **49**, 987–92(1930).—Tests show that the corona loss on new cleaned Cu conductors is the same as that for new cleaned Al conductors. Other data on the choice of conductor are given. C. G. F.

Transformers for electric furnaces. M. G. MARTY. *J. four elec.* **39**, 378–80, 415–8(1930). C. G. F.

Ultra-violet radiation in industry (DORCAS) **13.** **Industrial uses of ultra-violet** (FREE, CLARK) **13.** **Electrolysis of Grignard solutions** (FRENCH, DRANE) **10.** Elec-

trical porcelain (GILLETT) **19.** NH_4Cl (Brit. pat. 333,098) **18.** Electrically driven spinning pot for artificial silk (Ger. pat. 507,302) **23.** Cu and Zn recovery from waste alloy materials (U. S. pat. 1,785,247) **9.** Linings for electric induction furnaces (Brit. pat. 333,582) **19.** Rubber deposition from dispersions (Brit. pat. 333,331) **30.** Mixing fiber and fillers with bituminous material [for molded battery boxes] (U. S. pat. 1,785,-910) **18.** Coating metals with a thick homogeneous covering of rubber by electrophoretic methods (Ger. pat. 505,824) **30.**

Electric batteries. NATIONAL CARBON CO., INC. Fr. 686,162, Dec. 5 1929. In the manuf. of batteries, particularly dry batteries, having a metal anode and a carbonaceous cathode, a conductive paste contg. a solid halogen deriv. of NH_4, *e. g.*, NH_4Cl, is introduced into the space between the electrodes.

Electric battery. W. HASSE. Brit. 333,639, May 21, 1929. A battery depolarizer is made by pressing a wet mixt. of pyrolusite, soot, graphite and a binder into a block and then pulverizing the block. More graphite may then be added and the material pressed around a carbon electrode. Various details of battery manuf are described.

Dry cell electric battery. WALTER B. SCHULTE (to Burgess Battery Co.). U. S. 1,785,981, Dec. 23. Structural features of high-voltage batteries.

Machine for paraffinizing the carbon pencils of dry battery elements. HERMANN A. BUMKE G. M. B. H. Ger. 489,945, Dec. 16, 1927.

Storage battery. CARL H. O. LUBECK. U. S. 1,785,202, Dec. 16. Structural features.

Storage battery. PRITCHETT & GOLD & E. P. S. Co., LTD., and H. M. GENESE. Brit. 332,875, Dec. 21, 1929. Structural features.

Storage-battery plates. HENRY P. DODGE (to Luthy Battery Equipment Co.). U. S. 1,785,939, Dec. 23. Exhausted lead battery plates are ground by directly subdividing the unmelted plates; a paste is formed directly from the ground material; this paste is forced into a grid; and the product is rendered uniformly porous by charging.

Separator plate for storage batteries, etc. ABRAHAM S. BEHRMAN. U. S. 1,784,-981, Dec. 16. Silica gel mixed with a binder such as rubber cement is used for separators of batteries or other electrolytic cells.

Storage-battery separator. RAYMOND C. BENNER and NEWCOMB K. CHANEY (to Prest-O-Lite Storage Battery Corp.). U. S. 1,786,328, Dec. 23. Separators are formed with a fabric such as loosely woven material embedded in bonded fiber such as rubber-bonded fiber. Cf. *C. A.* **24,** 1301.

Storage-battery electrodes. H. ELSNER. Brit. 332,841, March 26, 1929. Structural features.

Storage-battery electrodes. I. G. FARBENIND. A.-G. Brit. 332,884, Feb. 5, 1929. The process described in Brit. 325,581 (*C. A.* **24,** 3955) is modified by the use of graphite which has been freed from impurities, especially Fe, as by boiling with HCl or other suitable acid and then treating with alkali.

Cell cap and hydrometer in associated construction for storage batteries. CHARLES F. LINEBARGER. U. S. 1,785,963, Dec. 23.

Float-controlled electrolyte-supply device for storage batteries. S. J. RUBINSTEIN. Brit. 333,291, May 10, 1929.

Galvanic cell. GEORGE W. HEISE and CLARENCE W. BROKATE (to National Carbon Co.). U. S. 1,786,406, Dec. 23. Various structural details are described of a cell with a caustic electrolyte such as NaOH, a depolarizing oxide cathode, and an area such as sand or alundum fragments exposed to the electrolyte and having a rough surface favoring crystn. of compds. of the anode metal such as Zn compds.

Selenium cell. W. PRIOR and C. CRISP. Brit. 333,293, May 11, 1929. The electrodes are wound on a cylinder or rod and the Se is spread over the entire cylindrical surface so that on rotation the surface exposed to illumination may be constantly changed. Various details and modifications of construction are described.

Selenium cell. C. ZEISS. Brit. 332,877, Jan. 7, 1929. Structural features of a cell in which 2 interlacing Pt electrodes are fixed on a base such as glass or quartz, the Se being contained in a groove in the base between the 2 electrodes. Various details of manuf. are described.

Selenium cell. V. K. ZWORYKIN (to Westinghouse Elec. & Mfg. Co.). Brit. 333,116, Nov. 6, 1928. A closed container of transparent material carries on its inner surface a deposit of Au so thin as to be almost transparent and on this layer is deposited a layer of Se of such dimensions as to absorb at least one-half of the incident light,

backed by a layer of reflecting metal such as Ag of such thickness as to be almost opaque. The Au and Ag layers are connected with electrodes. Various details of manuf. are described.

Electroplating. ROBERT J. PIERSOL. U. S. 1,785,389, Dec. 16. An elec. system is described for utilizing rectified current from an a. c. line.

Electroplating ceramic articles. PORZELLANFABRIK KAHLA, ZWEIGNIEDERLASSUNG FREIBERG. (Werner Hofmann, inventor). Ger. 507,218, May 12, 1929. To render the articles conductive, a metal layer is fused on at the edge of the article, or of the part to be plated, while to the remainder a conductive coating, *e. g.*, of graphite, is applied by painting and drying

Tank for chromium plating. C. ROY GLEASON. U. S. 1,784,987, Dec. 16. A tank for electrodeposition of Cr is formed of any suitable material, such as steel, with a lining of Pb and an inner lining of glass.

Metal coatings such as chromium on steel sheets or other articles. COLIN G. FINK and CHARLES H. ELDRIDGE (to Chemical Treatment Co.). U. S. 1,786,398, Dec. 23. Articles such as steel sheets, etc., are provided with a relatively thin coating of metal such as Cr by electrodeposition, the plate is exposed to gas at sub-atm. pressure, and plating is then resumed to produce a coating free from "pin-hole" defects. App. is described.

Electrodeposition of gold and silver. A. MOZER. Brit. 333,462, Dec. 11, 1928. The metals are deposited from their O-free I compds. such as solns. of Au or Ag iodides contg. also KI. Various details are given.

Gold leaf manufacture by electrodeposition. W. F. GRUPE. Brit. 333,246, May 3, 1929. Numerous details of app. and procedure are described by which Au may be plated on a Ag-faced carrier which is subsequently sepd. after transfer to a suitable paper support or the like.

Electrolytic preparation of alloys. ERNST KELSEN. Ger. 505,968, Aug. 17, 1928. Alternating layers of the metals to be alloyed are deposited on a rotating cathode passing through the various baths.

Separating aluminum from its alloys. RICHARD MÜLLER. Ger. 505,965, Dec. 1, 1928. Pure Al is sepd. by electrolysis of a fused salt mixt. at temps. above the m. p. of the alloy and below that of pure Al. The alloy is used as the anode.

Apparatus for the electrolytic separation of tin from its alloys. LUIGI UGHETTI LA CORSA. Ger. 505,967, Dec. 28, 1928. The cathode is constructed as a trough in which the anode lies. Cf. *C. A.* **24**, 791.

Apparatus for production of metal salt solutions. FRIEDRICH M. KÖHLER. Ger. 481,898, June 5, 1926. An app. is described for the direct production of metal salt solns. from ores, alloys, foundry residues and similar metal waste by aq. electrolysis. The electrodes have alternating flanges to help prevent the formation of a cathode deposit.

Zinc. URLYN C. TAINTON. Fr. 686,336, Dec. 9, 1929. Deposits of Zn of great purity and high ductility are obtained electrolytically by using an anode composed of an alloy of Pb with a small proportion of a metal which is electroneg. with respect to Pb, preferably Ag, and carrying out the electrolysis in the presence of an inorg. colloid such as H_2SiO_3, with the addn., if necessary, of an org. colloid such as gum arabic.

Metal blocks. SOCIÉTÉ "LE NICKEL." Ger. 505,966, July 1, 1927. Metal blocks are produced by the electrolytic deposition of the metal on a wire core of the same metal.

Acetylene from methane. I. G. FARBENIND. A.-G. Brit. 332,917, April 24, 1929. Various details are given for the production of C_2H_2 from CH_4 or gases contg. at least 20% CH_4 in an elec. arc (suitably an arc furnace of the Schönherr type). An example also is given of the use of a mixt. contg. both CH_4 and H to produce C_2H_2 and C_2H_4. Cf. *C. A.* **25**, 39.

Metallized paper or fabrics. KARL KEY. (Carl Müller, inventor). Ger. 505,995, June 5, 1928. The paper or fabric is coated with a binding material to which an electrolytically pptd. thin metal layer is caused to adhere. The binding material contains a very finely divided substance, *e. g.*, a dispersion of metal or metal oxide. Cf. *C. A.* **24**, 2063.

Oxidizing plates for copper oxide rectifiers. SIEMENS-SCHUCKERTWERKE A.-G. (Hans Gerdien, inventor). Ger. 505,811, Oct. 25, 1927. The Cu plates are subjected to the action of high-frequency elec. current of such strength that they are raised to the temp. requisite for oxidation in a fraction of a minute. Cf. *C. A.* **24**, 2062.

Coating the oxide layer of a metal oxide rectifier with metal. SIEMENS SCHUCKERTWERKE A.-G. (Felix Baron von Kleist, inventor). Ger. 505,812, Jan. 8, 1929. The

oxide layer is covered with a perforated plate of good elec. cond., *e. g.*, Cu, and the whole then sprayed with a good conducting metal such as Sn.

Dielectric for electric condenser. SPRAGUE SPECIALTIES CO. Brit. 332,899, March 28, 1929. Porous material such as paper is impregnated with material such as paraffin, ceresin, "halowax" or a synthetic phenolic resin which also forms very thin interposed layers. Various details of manuf. are described.

Electrically heated rotating furnaces for the reduction of ores. BO M. S. KALLING and CARL VON DELWIG. Fr. 686,262, and 686,263, Dec. 7, 1929.

Electric induction furnace. N. R. DAVIS, P. G. H. BURBRIDGE and ASSOCIATED ELECTRICAL INDUSTRIES, LTD. Brit. 333,254, May 8, 1929.

Electric induction furnace. HIRSCH, KUPFER- UND MESSINGWERKE A.-G. Brit. 333,155, Oct. 15, 1928.

Electric induction furnaces. PIERRE VIRY. Ger. 507,442, Dec. 13, 1928. To ensure regularity of heating, the means for feeding the articles to be heated is driven from the converter group generating the heating current. This corresponds to Brit. 302,235.

Electric induction furnace for melting metals. MAGNUS UNGER (to General Elec. Co.). U. S. 1,786,322, Dec. 23. Structural features.

Electric induction furnace suitable for volatilizing metals such as lead and zinc from ores, etc. MARCEL FOURMENT. U. S. 1,786,202, Dec. 23. Structural features.

Electric oven, operated with high-frequency induction current. JEGOR I. BRONN. Ger. 507,074, Mar. 20, 1926.

Electric resistance furnace. C. L. IPSEN and A. N. OTIS (to British Thomson-Houston Co., Ltd.). Brit. 333,457, Oct. 23, 1928. Structural features.

Reduction furnace for producing aluminium. VEREINIGTE ALUMINIUM-WERKE A.-G. Ger. 506,584, Dec. 18, 1928. A hole or depression, of the same size as the anode, is formed in the furnace wall below the anode so that during the process of electrolysis, a cathode of the same size is formed.

Electrodes. BERTHOLD REDLICH. Ger. 505,813, July 31, 1929. Addn. to 447,678. Electrodes with a metal covering formed to avoid unequal side action are covered with pressed spiral bands joined by broad welded seams.

Electrode operating devices for electric furnaces. FLODINJERN AKTIEBOLAG. Brit. 333,318, May 21, 1929. Structural features.

Machine for producing carbon electrodes. HANS BLACHE. Ger. 498,668, April 3, 1929.

Arc lamp electrodes. COMPAGNIE LORRAINE DE CHARBONS, LAMPES ET APPAREILLAGES ÉLECTRIQUES. Ger. 507,234, Mar. 17, 1927. Arc-lamp electrodes for high current strengths are made from a C mass to which are added B_2O_3 and refractory metal oxides such as MgO, ThO_2, Al_2O_3 or blue oxide of W, as well as the customary addns. of oxides and fluorides of rare earth metals. Examples and addnl. details are given.

Cleaning gases electrically. SIEMENS-SCHUCKERTWERKE A.-G. Ger. 507,520, Aug. 15, 1925. Addn. to 488,155 (*C. A.* **24**, 2066). An app. is described for preventing accumulation of dust on the insulators. Cf. Ger. 505,686 (*C. A.* **24**, 5648).

Electrical precipitation of dust from gases. METALLGES. A.-G. and LODGE-COTTRELL, LTD. Brit. 333,427, Sept. 23, 1929. To stabilize the cleaning of gases from revolving furnaces, the gas is fed to the elec. pptn. app. at a temp. above 150°, which is sufficiently high to increase the cond. of the dust, while reducing the velocity of the gas through the elec. field to about one-half that required when cleaning the gas at lower temps. A suitable temp. range for cement-kiln gas is 200–250°.

Removing dust from gases. SIEMENS-SCHUCKERTWERKE A.-G. Brit. 333,048, June 1, 1929. Prior to electrostatic dust pptn., gases are treated with steam produced by adding water to the products of combustion of a gas flame. App. is described.

Apparatus for purifying gases by electric precipitation. HEINRICH F. J. NOLZE. U. S. 1,785,592, Dec. 16. Structural and elec. features.

Electric gas purifier. "ELGA" ELEKTRISCHE GASREINIGUNGS-G. M. B. H. Ger. 505,516, Feb. 16, 1929. Details of securing the electrodes.

Device for scraping the precipitate from the electrodes of electric gas purifiers. SIEMENS-SCHUCKERTWERKE A.-G. Ger. 490,951, Mar. 25, 1924.

Electric gas-cleaning apparatus. HERTHA MÖLLER NÉE WEBER, ARNOLD LUYKEN, GERTRUD LUYKEN, ERNST LUYKEN, NORA LAMPING NÉE MÖLLER, ILSE VOGG-CASTENDYK, IRMGARD FREUDE NÉE CASTENDYK, FRITZ-KARL CASTENDYK, HENDRICH LUYKEN, GERDA LUYKEN, ELISABETH LUYKEN AND JOHANN LUYKEN. Ger. 507,316, Oct. 17, 1924.

Electric gas-purification chamber. SIEMENS SCHUCKERTWERKE A.-G. (Curt Gerhardt, inventor). Ger. 505,796, Nov. 26, 1927.

Electrical gas-purification plant. SIEMENS-SCHUCKERTWERKE A.-G. (Fritz Müller, inventor). Ger. 505,673, July 17, 1925. The app. is designed for use with inflammable gases, or gases contg. inflammable dust, and has a hinged safety cap cover.

Electric gas-purification plant. WITKOWITZER BERGBAU- UND EISENHÜTTEN-GEWERKSCHAFT and GEORG RASCHKA. Ger. 501,720, Feb. 22, 1928. Addn. to 467,040 (*C. A.* 23, 4899). Details of knocking app. for cleaning the electrodes.

Electrical gas-purification plant. METALLGESELLSCHAFT A.-G. (Eugen Engert inventor). Ger. 505,794, July 10, 1929. Details of cleaning the ppt. from electrodes.

Electrical gas-purification plant. OSKI A.-G. (Erich Oppen, inventor). Ger. 505,795, Feb. 27, 1926. Details of cleaning the ppt. from the electrodes.

Electrical thermometer suitable for remote indication. JOSEPH W. ALLEN. U. S. 1,784,922, Dec. 16. Structural features.

5—PHOTOGRAPHY

C. E. K. MEES

Effect of keeping on the spectral sensitivity and fog of commercial plates. L. KUTZLEB. *Kinotechnik* 12, 507(1930).—Of the various plates examd. for color sensitivity those not optically sensitized were the least affected by keeping for 12 months in a dry, airy room. Plates of high color sensitivity suffered a decrease in sensitiveness at all wave lengths, while plates of low color sensitivity showed a decrease only in the region of ordinary, and an increase in the region of extra, sensitivity. When kept for 12 to 18 months, about half of the plates examd. showed slight addnl. fog; of the rest, color-sensitive plates suffered most. From a study of the curves obtained when fog was plotted against increasing time of development 2 classes could be distinguished that in which the curves for the fresh and stored plates were roughly parallel, and that in which the fog of the stored plate increased much more rapidly with time of development than that of the fresh plate. L. G. S. BROOKER

Latent sensitivity of silver salts in solution. G. ZELGER. *Sci. ind. phot.* 1, 361 (1930).—A soln. of AgBr in Na_2SO_3 was found after exposure to light to be developable The addn. of a small quantity of gelatin increases the sensitivity of the soln. The sensitivity is confined almost entirely to the ultra-violet. Once exposed, the soln need not be developed immediately. The sensitometric curves are similar in shape to those obtained for Ag gelatin emulsions. Many more easily examd. Ag solns. were found to be sensitive. The sensitivity increases as p_H increases from 7 to 8, and then becomes const. Short heating followed by cooling does not increase developability, but long heating gives colloidal Ag particles. These act only feebly as nuclei. NH_4Cl and KBr increase developability; sensitizing dyes have no effect. Certain S compds act as desensitizers. L. A. STAIB, JR.

Hypersensitizing and ultrasensitizing of mosaic screen plates. L. D. TALAMON *Phot. J.* 70, 452(1930).—Lumière Pantochrome is the only sensitizing dye which, unaided, gives correct rendering of color for these plates, and it is recommended to beginners. Ammoniacal $AgNO_3$ is added to the dye bath, full particulars being given The plates are exposed through an esculin screen During development Aurantia Lumière is recommended as a desensitizer, or else Basic Scarlet N. L. G. S. B.

Insolubilizing action of formalin on gelatin and its increase in the presence of fixed alkali. R. NAMIAS. *Prog. fot.* 37, 188-90(1930). —In view of the increase in the insolubilizing action of formalin in the presence of carbonates, the following formula is recommended for rapid drying of negatives: CH_2O 100 cc., K_2CO_3 100 g., water 1 liter C. E. K. MEES

Concentration paradoxes. LÜPPO-CRAMER. *Kinotechnik* 12, 441(1930). —It has been found previously that dil. solns. of *p*-phenylenediamine base had a more destructive action on the latent image on certain plates than more concd. solns. The author also found that plates washed free from KBr are acted upon to a less extent and that they do not show the above concn. anomaly. He concludes that the destruction of the latent image depends upon the presence of both KBr and *p*-phenylenediamine. If the concn. of *p*-phenylenediamine is too high, it is adsorbed to the Ag halide grains to the exclusion of the KBr from the sphere of action. Consequently, dil. solns. are more effective than concd. solns. The hydrochloride of *p*-phenylenediamine does not show the concn. anomaly. Chlorohydroquinone closely resembled *p*-phenylenediamine in the concn. effect. M. W. S.

Photography. HEINRICH KÜHN. Ger. 505,447, Dec. 20, 1929. A method of overcoming extremes of contrast is described. Two negatives obtained after different periods of exposure, neither alone yielding a useful picture, are combined and printed as one after the more fully exposed negative has been treated, at the development stage or later, so that it shows an image in only a feeble density of the middle tones and high lights.

Photography. I. G. FARBENIND. A.-G. (Gustav Reddelien and Werner Müller, inventors). Ger. 507,022, Aug. 20, 1929. Addn. to 454,839, 465,902 and 467,818 (*C. A.* 23, 572). *N*-Hydroxyethyl derivs. of 2,4-diaminophenol or *N*-monoacyl-2,4-diaminophenol, excepting compds. having two C_2H_4OH groups attached to one N atom, are used as developers. Nuclear substitution products of these compds., other than nitro substitution products, may also be used. Suitable solns. are described by way of example. Cf. *C. A.* 25, 258.

Photography. FRIEDRICH LIERG. Ger. 504,892, Aug. 28, 1929. A process is described for obtaining positives, especially for cinematograph films, in natural colors by employing two or more different light-sensitive layers of Ag halide emulsion inseparably laid on each other. Chemically active material such as $MgCO_3$ or $CuCO_3$ is added to one or more or all of the layers to hinder the spreading of the reaction products (e. g., $Fe_4(FeC_6N_6)_3$, $Cu_2FeC_6N_6$, $Mg_2FeC_6N_6$) of the layers into each other when the Ag picture is developed, and to enable the colors in the various layers to be developed without running.

Color photography. H. HERZOG and C. HERZOG (trading as J. Herzog & Co.). Brit. 333,668, June 4, 1929. Component negatives for the production of color photographs consisting of superposed components produced on ready colored material by a tanning development method are printed on transparent supports coated with gelatin emulsions dyed with non-diffusing colloidal and highly transparent dyes such as mono-, di- or tetra-azo dyes (of which various examples are given). In developing the prints, a large proportion of sulfite is added to a developer such as pyrocatechin.

Color photography. F. LIERG. Brit. 333,697, July 2, 1929. Three inseparable layers of Ag halide emulsion, which may have intervening gelatin layers, are exposed and converted into color component images, the gelatin in each layer being rendered insol. after the production of the color image so as to protect the layer against further action during the treatment of the images in the other layers. Various details of procedure are described for successive production of the different color images.

Color photography. E. WOLFF-HEIDE. Brit. 332,893, Jan. 28, 1929. Photographic emulsions treated with sensitizers, such as pinacyanol, in colloidal solns. whereby a superficial layer is rendered color sensitive, are exposed through the transparent support and, after development and fixing, are treated with a soln. such as a U intensifier until the exposed gelatin in the superficial layer has been hardened. A yellow filter may be used for the exposure or the emulsion may be dyed yellow. The negative is treated with ferric NH_4 oxalate and HCl, washed, and immersed in Na hyposulfite soln., and the red values of the negative assume a transparent blue-green color. Before printing positives from the negative, the latter is immersed in a 5% soln. of pina-type blue D (which is absorbed by the soft gelatin in the superficial image layer) and is placed in contact with the positive film under water in the dark room. After exposure, development and fixing, the emulsion is hardened by a soln. of alum or the blue picture fixed by a mordant, and photographically exposed parts are colored red by converting the Ag image to a Ag-U compd. and dyeing with a basic color, or the AgBr picture is converted to AgI and then colored. A slight yellow color may be applied to the entire picture. Various other details and modifications of procedure are also described. Cf. *C. A.* 24, 4474.

Diazotype photography. KALLE & Co. A.-G. Ger. 507,171, April 28, 1929. Addn. to 487,247 (*C. A.* 24, 2072). For the production of pictures on oil cloth and like materials, the diazo compds. from *p*-aminodiphenylamine and its derivs. are deposited on the cloth with the aid of reagents that wet or are absorbed by the cloth, e. g., EtOH, acetone or C_6H_6. A small quantity of a lacquer may be added to the diazo compd. soln. The coupling component required for development may be used in soln. in water or an org. solvent. An example is given.

Rotary light filter for color cinematography. M. B. DUPONT. Brit. 333,505, Feb. 8, 1929.

Optical system, etc., for color cinematography. A. PILNY. Brit. 332,844, Oct. 30, 1928.

Photographic dye-impression process. UVACHROM A.-G. FÜR FARBENPHO-

TOGRAPHIE. Brit. 333,392, Feb. 16, 1929. In producing pictures in color by the dye-impression process from a hardened gelatin relief, dyes of a sp. degree of dispersion, such as may be obtained by dialysis, are used to color the relief and the latter is treated with distd. water to remove adsorbed particles of dye of low dispersion. Various details and modifications, auxiliary treatments, etc., are described.

Photographic toning process. F. LIERG. Brit. 333,361, July 8, 1929. Transformation of a Ag photographic image is effected by converting the Ag into an insol. compd. such as a Ag halide and then treating with a soln. contg. a complex-forming solvent such as manganic thiocyanate or thiosinamine and with a reagent which immediately reppts. the Ag as an insol. compd. such as $K_4FeC_6N_6$ or Seignette salt or Na phosphotungstate. Sulfonic acids such as hydracid 1,8-aminonaphthol-3,6-disulfonic acid may be used to produce a Ag compd. of the acid which may be converted into an azo dye. Use of thiocarbamide also is described.

Photographic sensitive layers. KALLE & Co., A.-G. Brit. 333,820, Nov. 3, 1928. An aryl azide such as azido-salicylic acid (prepd. by the action of Na azide on diazo-salicylic acid) which forms a dye under the action of light is incorporated in a layer of material such as gelatin. After exposure under a negative, unchanged azide is washed out. The color may be modified by addn. of acids, bases or metallic salts.

Photographic sensitive materials. I. G. FARBENIND. A.-G. Brit. 333,654, May 27, 1929. Sensitive layers for copying transparent colored pictures or for making anaglyphs are produced by dispersing into fine particles liquefied org. colloids contg light-sensitive substances and powders of water-insol. dyes or pigments insensitive to light and applying the particles to a sticky layer on a substratum. The exposed layers may be developed with a non-tanning developer, fixed and the particles contg. free Ag hardened (suitably with quinone), the layer being then transferred to a support and developed with water. Or, after development and fixing, Ag, together with gelatin and dye assocd. with it, may be removed in a bath of $CuSO_4$, H_2SO_4, H_2O_2 and KBr. Various other details and modifications of procedure also are described.

Photographic paper. KALLE & Co. A.-G. (Maximilian P. Schmidt and Walther Spietschka, inventors). Ger. 470,088, Dec. 11, 1927. The manuf. of light-sensitive paper from diazo compds. of aminonaphtholcarboxylic acids is described. In the example, paper is soaked with a soln. of 1-diazo-2-hydroxy-3-naphthoic acid in NaOH and dried. If exposed below a negative and washed with water, a blue-black print on a pure white ground is obtained.

Composite photographs such as those for cinematographic films. W. D. WALKER. Brit. 333,010, June 24, 1929. A transparent film of the background illuminated from the rear is photographed in superposition behind a film of the foreground illuminated from the front, in which the image is opaque but reflective of light. To render the images on the foreground film opaque, the emulsion side is coated with a mixt. contg. a colloid such as gelatin, a chromate or dichromate and a white pigment. In contact with the Ag of the image the colloid becomes insol., binding the pigment (the mixt. being then washed from the Ag-free parts of the film). Various details and modifications of procedure are described.

Photographs on chromated gelatin layers. NIKOLAUS LEBEDENKO. U. S. 1,785-635, Dec. 16. The exposed layer is subjected to treatment with a vapor atm. supersatd. with steam, followed by the usual washing and staining treatments.

Drying photographic layers. ZEISS IKON A.-G. (Hans Tappen, inventor). Ger. 507,021, Feb. 21, 1930. In drying colloidal photographic layers by treatment with EtOH or like dehydrating agent, better results are obtained by adding to the EtOH, etc., a non-hygroscopic softening agent for the colloid. An addn. of 0.1% of urea or 1% of salicylic acid is suitable.

Apparatus for developing photographic prints by gases. ADOLF LANGSNER. Ger. 505,742, Jan. 3, 1928. Details of arrangement.

Removing scratches and indentations from the backs of celluloid cinematograph films. OKO-PANZER FILM-ERNEURUNGS- UND VERWERTUNGS G. M. B. H. Ger. 505-841, Mar. 26, 1929. The back of the film is treated with a levelling layer of moistened nitrocellulose lac which drys transparent. A second layer of moisture-free nitrocellulose lac is added and the whole warmed till the layers flow into each other and unite with the body of the film.

6—INORGANIC CHEMISTRY

A. R. MIDDLETON

Decomposition of nitrates and nitrites of metals showing different valences. I. C. MONTEMARTINI AND E. VERNAZZA. *Industria chimica* **5**, 1260–6(1930).—When $Fe(NO_3)_2$ is heated it decomposes as follows: $2Fe(NO_3)_2 \longrightarrow 2FeO + 4NO_2 + O_2$; but as the FeO is oxidized and water of crystn. is always present up to 100°, the net reaction is $3Fe(NO_3)_2 + 7H_2O \longrightarrow 3Fe(OH)_3 + 5HNO_3 + NO$. The ferric hydroxide is not present as such but rather as $Fe_2O_3.H_2O$, identical with the oxide described by Pean de Saint-Gilles, which is insol. in acids. A. W. CONTIERI

The pyrogenous decomposition of alkaline earth bromates. HACKSPILL AND WINTERER. *Compt. rend.* **191**, 663–5(1930).—The alk. earth bromates when heated yield the corresponding bromide and O_2. The decompns. were measured in an app. which permitted the pressure to be recorded graphically as the temp. was raised. The curves show an inflection point near 300°, above which the evolution of O_2 is more rapid than that at lower temps. The isolation of the perbromate in the heated material, however, was not possible below the inflection temp. This fact indicates a direct decompn into the bromide at all temps., the slow reaction at low temps. being due to a period of induction. At the inflection temp. the reaction becomes explosive in nature H. F. JOHNSTONE

Bismuth oxide. J. FEISER. *Metall u. Erz* **27**, 585–9(1930).—By use of a loss in weight method, the vapor pressure of Bi_2O_3 was detd. up to 1300°, measurable volatility beginning at 950°. The b. p. of Bi_2O_3 was calcd. by the method of Ramsay and Young to be 1890°. Above 1350°, Pt is attacked by molten Bi_2O_3 with decompn. of the oxide. Complete destruction of the Pt vessel takes place at 1450°. H. STOERTZ

Bismuth separation from lead-containing materials as bismuth oxychloride. W. HERIEL. *Metall u. Erz* **27**, 557–60(1930).—The oxychloride method is applicable with any Bi content while the sulfate method can only be used with a Bi range of 0.02–0.05%. In the oxychloride method, 24 hrs. standing will facilitate the sepn. of Pb from the soln H. STOERTZ

Formation and composition of chloride of lime. Reply to Hugo Ditz. BERNHARD NEUMANN. *Z. Elektrochem.* **36**, 934–6(1930).—Cf. *C. A.* **24**, 1592, 3959. E. M. S.

Constitution of the aqueous pink and blue cobaltous chloride solutions. II. Spectrometric research. R. BRDIČKA. *Collection Czechoslov. Chem. Comm.* **2**, 545–58 (1930).—It has been previously shown (*C. A.* **24**, 5642) that reversible electrodeposition of Co occurs only in the blue solns. of $CoCl_2$, and at potentials about 0.30 v. more pos. than the deposition potentials given by the pink solns. These results were explained by postulating the formation of complexes. The present paper deals with the spectrographic analysis of the solns. used previously for the detn. of deposition potentials. The absorption spectra were obtained by a continuous automatic method (cf. *C. A.* **24**, 3441). The results (8 reproductions are given) show that a 10-fold diln. of the $CoCl_2$ causes a 10-fold change in the amt. of the blue component. The deposition potentials also indicated that a 10-fold change in the $CoCl_2$ concn. caused a 10-fold change in the activity of the cobaltous ions. The effect of increased temp. was found to be identical with the effect of increase of $CoCl_2$ concn. The blue color of cobaltous solns. is due to complexes, in which the Co^{++} ions assoc. with Cl, forming complexes of the type $CoCl_n^{(n-2)--}$, *e. g.*, $CoCl_4^{--}$. From the shifts of the extinction curves given by the blue solns. it is shown that the concns. of the substance causing the absorption in the red region are proportional to the concns. of $CoCl_2$, and, therefore, to the concn. of the complexes from which Co deposits reversibly at the dropping Hg cathode. Fajans' theory, of the dependence of light absorption on the deformability of the electronic shell of anions when they become deformed in the elec. field of cations, is used to explain the change from the pink color to the blue color in $CoCl_2$ solns. EDWARD B. SANIGAR

Solubility of silver iodide in solutions of alkali iodide in acetone. FREDERICK K. V. KOCH. *J. Chem. Soc.* **1930**, 2385–6.—While AgI is practically insol. in Me_2CO, more than 3 g. of AgI is sol. in 50 cc. 0.1 *N* NaI-Me_2CO; it thus appears that 3 mols. AgI are taken up per mol. of alkali halide. The soly. of NaBr in Me_2CO at 25° is 0.08 g. per 100 cc.; NaCl is practically insol. Appreciable quantities of AgCl and AgBr dissolve, however, in solns. of NaI in Me_2CO, so that the above cannot be used as a quant. method of sepn. Results for the sp. cond. at 25° of NaI in Me_2CO, both before (k_1) and after (k_2) satn. with AgI, show that k_1 in both cases (2 expts. recorded)

is greater than k_2 and may be explained by assuming a decrease in the mobility of the anion, $I(IAg)_3^-$. C. J. WEST

The binary system lithium oxide–silica. F. C. KRACEK. *J. Phys. Chem.* 34, 2641–50(1930).—Mixts. of highly purified Li_2CO_3 and selected quartz were studied over the range 46–100 wt. % of SiO_2. Differential heating curves for samples up to 67% SiO_2 and a quenching method for higher ratios indicated 3 compds.: Li_4SiO_4 (I), Li_2SiO_3 (II) and $Li_2Si_2O_5$ (III). The first decomposes at 1255°, *i. e.*, below its m. p. The I-II eutectic is at 55.3% SiO_2 and 1024°. By both methods II melts at 1201 ± 1°. Its liquidus curve meets the incongruent m. p. curve of III at 1033° and 80.1% SiO_2, within 0.05% of the compn. of III. The III-tridymite eutectic is at 80.2% SiO_2 and 1028°. B. A. SOULE

The interaction between nitrogen trichloride and nitric oxide at —150°. II. Further evidence for the formation of nitrogen dichloride and of mono-oxygen-dinitrogen dichloride. WM. A. NOYES. *J. Am. Chem. Soc.* 52, 4298–301(1930).—The interaction between NCl_3 and NO was investigated at —150° and was found to proceed approx. according to the equation $NCl_3 + 3NO = 2NOCl + N_2O + Cl$. The reaction is considered to take place in 4 steps, the intermediate products being NCl_2, N_2OCl_2 and N_2OCl. Attempts to isolate these intermediates were not successful. (Cf *C. A.* 23, 1339. C. L. READ

X-ray study of the products obtained by the action of the halogen acids on the mercury sulfates and the melting-point diagram of the system mercuric iodide and mercuric sulfate. M. PAIĆ. *Compt. rend.* 191, 941–3(1930).—Gaseous HCl and HBr acting on $HgSO_4$ at temps. of 130° and 105°, 250°, resp., liberate free H_2SO_4 and form $HgCl_2$ and $HgBr_2$ as proved by x-ray analysis. Evapn. to dryness of solns. of $HgSO_4$ and $3HgO.SO_3$ in the halogen acids produces the same effects. Heating the residue to 300° causes the complete sublimation of $HgCl_2$ and $HgBr_2$. In the case of HgI_2, a compd. having the compn., $HgSO_4.HgI_2$, crystallizes on cooling. A diagram of the fusion of HgI_2 with $HgSO_4$ is given. MALCOLM DOLE

Formation of pyroarsenates. ARTHUR ROSENHEIM. *Z. anorg. allgem. Chem.* 193, 73–5(1930); cf. *C. A.* 24, 5250.—The prepn. of $Ba[Cu(As_2O_7)]$, $Ba[Cu(PO_4)_2]$ and $Cd_2As_2O_7$ is reported and the method given. WILLIAM E. VAUGHAN

The reaction between iodic acid (alkaline iodates) and hypophosphorous acid, phosphorous acid, or their salts. I. V. HOVORKA. *Collection Czechoslov. Chem Comm.* 2, 559–70(1930).—Theoretical consideration is given to the various equations advanced to explain the oxidation of H_3PO_3 and H_3PO_2 by HIO_3. It is shown that in acid soln. of the alkali salts of H_3PO_3 and H_3PO_2 the I_2 liberated in the first stages of the reaction oxidizes further quantities of H_3PO_3 and H_3PO_2 (cf. Vitali, *Boll. chim. farm.* 37, 545(1898); 38, 201(1899); Gmelin-Kraut, Handb. d. anorg. Ch 1909, I, 2, 3621(cf. *C. A.* 2, 3038); *Giorn. chim. farm.* 59, 1105(1910)). The first part of the work is a quant. study of the reaction, while the second is a study of the reaction in the presence of substances giving insol. iodides (*e. g.*, perchlorates of Pb, Ag, Hg^{++}) and thus removing the I as formed. Pb allows I to be formed, while in the presence of Ag or Hg the oxidation is less; this is due to HIO_3 rather than to the Ag or Hg salt. Hg chlorate oxidizes both phosphorous acids to phosphoric acid, while Ag chlorate oxidizes principally H_3PO_2 to phosphoric acid. Thus the presence of a Hg^{++} salt during the reaction is important during analysis. In the reaction between NaH_2PO_2 and KIO_3 in acid (dil. H_2SO_4) soln., about 80% of the oxidation occurs in the first 15 min.; the completion of the reaction is slow and may take 4 hrs. with boiling if the excess of iodate is small. Increase in acidity increases the reaction velocity, while increasing the amt. of oxidizing agent speeds up the reaction most in the most acid solns., particularly during the first hr. of boiling. Gentle boiling is not so efficient as rapid boiling. The above results hold also for the oxidation of phosphites, except that the oxidation of the phosphites is slower. Oxidation of the hypophosphites is also more rapid than that of phosphites under similar conditions at ordinary temps The slowness of the oxidation of the lower acids of P is explained by Orlov's supposition that 2 forms of mols., active and inactive, exist. The active form takes part in the reaction, but only exists in the soln. in small quantities. The facts observed show that in the first stage of oxidation, H_3PO_2 passes to H_3PO_3 (cf. Mitchell, *C. A.* 14, 3353). It has been shown that KIO_3 is reduced by NaH_2PO_2 in alk. soln.; with Na_2HPO_3 the formation of I_2 was not observed. EDWARD B. SANIGAR

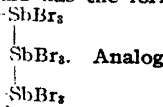
Iso- and heteropoly acids. XX. Paratungstates. ARTHUR ROSENHEIM, ARTHUR WOLFF, JOACHIM E. KOCH AND NELSON SIAO. *Z. anorg. allgem. Chem.* 193, 47–63 (1930); cf. *C. A.* 17, 3144.—Boiling solns. of alkali paratungstates are sharply titratable with alkali with phenolphthalein as indicator. The formula of Na paratungstate has

been detd. as $5Na_2O.12WO_3.28H_2O$; the soly. of this salt has been measured over a range from 0 to 73°. In this range no other hydrate exists. "Two-kernel" ions are postulated for some of the paratungstates. In boiling soln. a two-kernel ion of the formula $[H_4(W_2O_7)_3(WO_4)_6]^{XIV}$ gives rise to the "single-kernel" ion $[H_2(WO_4)_6]^X$. It is also shown that NH_4 paratungstate exists as a 7- or 11-hydrate; the transition temp. is approx. 50°. The soly. of this salt has been detd. between 17 and 70°. Potentiometric titrations of Na tungstate solns., Na paratungstate and Na metatungstate have been carried out with HCl and NaOH. Paratungstate ions are unstable and exist in acidified solns. in equil. with tungstate ions. Metatungstate ions are more stable and are formed slowly by complex reactions. The hypothetical structure of the paratungstate and metatungstate ions is discussed. **XXI. Several heteropolytungstates.** ARTHUR ROSENHEIM AND ARTHUR WOLFF. *Ibid* 64–72.—The following compds. are reported: $9Na_2O.8As_2O_3.16WO_3.55H_2O$; $7(NH_4)_2O.2As_2O_3.18WO_3.18H_2O$; $4BaO.2As_2O_3.9WO_3.21H_2O$; $7K_2O.As_2O_3.18WO_3.24H_2O$; $3^1/_2(NH_4)_2O.As_2O_3.18WO_3.45H_2O$; the guanidine salt, $5(CN_3H_6)_2O.As_2O_3.18WO_3.41H_2O$; $2BaO.Sb_2O_3.11WO_3.18H_2O$; $6(NH_4)_2O.Sb_2O_3.18WO_3.38H_2O$; $6(CN_3H_6)_2O.Sb_2O_3.18WO_3.31H_2O$; $8K_2O.Sb_2O_3.19WO_3.37H_2O$; $2^1/_2(NH_4)_2O.2Sb_2O_3.10WO_3.12H_2O$; $3K_2O.2Sb_2O_3.10WO_3.6H_2O$; $2^1/_2(CN_3H_6)_2O.2Sb_2O_3.10WO_3.6H_2O$; $2^1/_2BaO.2Sb_2O_3.10WO_3.18H_2O$; $4Na_2O.P_2O_3.12WO_3.33H_2O$; $4K_2O.P_2O_3.12WO_3.34H_2O$ and $2(NH_4)_2O.P_2O_3.12WO_3.33H_2O$. W. E. V.

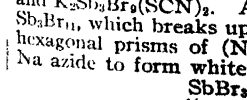
Theory of metal hydrate ions. PAUL PFEIFFER, THEODOR FLEITMANN AND TOSHI INOUE. *Z. anorg. allgem. Chem.* **192**, 346–65(1930).—The chem. structure of hydrated metallic ions was studied by prepn. of Ni, Cu, Zn and Cd salts of α- and β-naphthalenesulfonic acids and benzene- and toluene-sulfonic acids. These are related to Werner's salts of the type $[Ni(NH_3)_6]SO_4$, $[Ni\ en_3]SO_4$, $[Ni\ en_2(CH_2)_2]SO_4$, or $[Ni\ en(OH_2)_4]SO_4$, in which en represents an org. base; in this work it is generally ethylenediamine. The following are some of the compds. prepd.: $[Ni(OH_2)_6](O.SO_2.C_{10}H_7\alpha)_2$, $[Ni\ en(OH_2)_4](O.SO_2.C_{10}H_7\alpha)_2$, $[Ni\ en_2(OH_2)_2](O.SO_2.C_{10}H_7\alpha)_2$, $[Ni\ en_3](O.SO_2.C_{10}H_7\alpha)_2$, $[Cu\ en(OH_2)_4](O.SO_2.C_{10}H_7\alpha)_2$, $[Cu\ en_2(OH_2)_2](O.SO_2.C_{10}H_7\alpha)_2$, $[Cu\ en_2(OH_2)_2](O.SO_2.C_{10}H_7\beta)_2$, $[Cu(OH_2)_6](O.SO_2.C_6H_5)_2$, $[Zn\ en_3](O.SO_2.C_{10}H_7\alpha)_2$, $[Zn(NH_3)_4](O.SO_2.C_{10}H_7\alpha)$, $[Cd(NH_3)_6](O.SO_2.C_{10}H_7\alpha)_2$, $[Cd(OH_2)_6](O.SO_2.C_{10}H_7\alpha)_2$. The expts. also demonstrate that many Cu salts can be prepd. in which the Cu atom has the normal coördination no. of 6. H. STOERTZ

Increase in the rotation of tartaric acid by zirconium and hafnium in alkaline solution. J. H. DE BOER AND EMMENS. *Rec. trav. chim.* **49**, 955–61(1930).—Rimbach and Schneider (*Z. physik. Chem.* **44**, 481(1903)) have shown that the sp. rotation of ammoniacal tartrate solns. is increased by $ZrOCl_2$. Evidently Zr tartrate complexes are formed. de B. and E. find that the increase varies with the ratio of Zr to tartrate and is decreased by excess of alkali. With Hf, the increment of the rotation is slightly affected by the ratio of Hf to tartrate, but strongly influenced by excess of alkali. By controlling certain conditions, this change in rotation may be used in the *estn. of Zr-Hf mixts.* J. H. REEDY

Polymolecular bromoantimony compounds. A. CH. VOURNAZOS. *Z. anorg. allgem. Chem.* **192**, 369–82(1930).—$SbBr_3$ is found to form complex compds. with other bromides by interaction in acetone soln. Alkali bromides are insol. in acetone but readily dissolve in acetone solns. of $SbBr_3$ to form complexes of the type of $K_2Sb_3Br_{11}$. The mixt. is heated on the steam bath under a reflux condenser and is then allowed to evap. in a vacuum desiccator over H_2SO_4. The yellow cryst. residue is dried to const. weight and has the form of rhombic prisms. It is assumed to have the structure:



Analogous compds. of Na, Li and Cd are formed, and it is also possible to combine $SbBr_3$ with other halides to form such compds. as follows: $K_2Sb_3Br_9I_2$, $K_2Sb_3Br_9F_2$. KNO_3 or KSCN can be used in place of K halide, forming $K_2Sb_3Br_9(NO_3)_2$ and $K_2Sb_3Br_9(SCN)_2$. As confirmation of the structure, electrolysis indicates the anion, Sb_3Br_{11}, which breaks up to give $SbBr_3$ and Br_2. In attempting to prep. the NH_4 salt, hexagonal prisms of $(NH_4)_2SbBr_5.2H_2O$ sep. out. $SbBr_3$ is also found to react with Na azide to form white, cryst. $NaSb_3Br_9N_3$. This is believed to have the structure:



The authors believe that similar compds. can be prepd. with As and Bi. H. STOERTZ

Cobaltic cobalticarbonate. CLEMENT DUVAL. *Compt. rend.* **191**, 615–6(1930).—By eliminating light and alkali, *cobaltic cobalticarbonate*, $[Co(CO_3)_3]Co$, was prepd by treating a soln. of $CoCl_2.6H_2O$ with satd. $NaHCO_3$ and H_2O_2. R. C. R.

Double salt formation among the carbonates and bicarbonates of sodium and potasssium. A. E. HILL. *J. Am. Chem. Soc.* **52**, 3813–7(1930); cf. *C. A.* **23**, 4126.—Isothermal studies at 25° and 35° of the system $K_2CO_3 + 2\ NaHCO_3 \rightleftharpoons Na_2CO_3 + 2\ KHCO_3$ in water indicate the existence of the compd. $K_2CO_3.2KHCO_3.3/2\ H_2O$ and the tetragene salt $K_2CO_3.NaHCO_3.2H_2O$ as solid phases. L. F. AUDRIETH

Hydrated potassium sesquicarbonate, $K_2CO_3.KHCO_3.3/2\ H_2O$. A. E. HILL. *J Am. Chem. Soc.* **52**, 3817–25(1930); cf. *C. A.* **23**, 4616.—Isotherms for the ternary system K_2CO_3–$KHCO_3$–H_2O at 5°, 25°, 35° and 50° indicate the existence of the double salt $K_2CO_3.2KHCO_3.3/2H_2O$ stable in contact with soln. from —9.2°, its lower transition temp., to above 50°, but within a very narrow range of concns. L. F. A.

The combination of sucrose with boric acid. Considerations based upon variations of acidity of boric acid in the presence of sugar (VOICU, AXENTE) **10.**

7—ANALYTICAL CHEMISTRY

W. T. HALL

Some forgotten tests in analytical practice. O. SCHMATOLLA. *Chem.-Ztg* **54**, 831 (1930).—The flame test for Sn with HCl vapors was described by S in 1901. A test for benzoyl compds. with Fe^{++} and H_2O_2 was described by S. in 1912. These tests are discussed briefly. W. T. H

Simple and accurate methods for colorimetric analysis. FRIEDRICH L. HAHN AND RUDOLF KLOCKMANN. *Z. angew. Chem.* **43**, 993–5(1930).—The exact matching of shades is difficult but it is comparatively easy to estimate whether a soln. is lighter or darker than another. Instead of making the colorimetric comparison depend upon a single, final reading, it is recommended to compare the unknown soln. with standards at some 8 or 10 different dilns. This is accomplished easily in about 5 min. by having the soln. to be tested in a buret and adding more water from another buret after each comparison until finally the soln. is so dil. that a satisfactory comparison cannot be made. The method is described in detail and illustrated by data obtained in the colorimetric detn. of Cr. W. T. H

Use of a zinc wire spiral as a Jones reductor. G. FREDERICK SMITH AND JOSEPH RICH. *J. Chem. Education* **7**, 2948–52(1930).—Zn wire, approx. 3 mm. in diam. and coiled into a spiral, can be amalgamated and used in place of the Jones reductor, especially for the detn. of Fe. The reduction is complete in 30 min. in the presence of 6–10% concd. H_2SO_4 by vol. W. T. H

Quantitative application of the analytical quartz lamp, especially in wine analysis. A. HEIDUSCHKA AND E. MÖHLAU. *Pharm. Zentralh.* **71**, 689–91(1930).—A new comparative scale is suggested involving the use of the Na deriv. of saccharin, for which the following advantages are claimed: convenient and exact prepn. by direct weighing of the powd. substance; abs. freedom from the hygroscopicity and variability possessed by different brands of glycerol; better agreement in the luminescence tone of the saccharin scale as compared with that of the wine filtrate; no change in luminescence intensity of the saccharin types during a 4-month period of observation. The data obtained in 2 series of expts. are reported. W. O. E.

Importance of particle size in samples of certain metallurgical materials. J. A SCHERRER AND G. E. F. LUNDELL. *Bur. Standards J. Research* **5**, 891–5(1930).—The experience of the Bur. of Standards in prepg. uniform standard samples of metals and alloys has shown very clearly that the small- and large-sized particles often differ in compn. It is frequently necessary to separate the sample into 3 or more parts by sieving without loss by dusting, to weigh each portion and to take a proportionate part of each for the analysis. Some data are given to illustrate the errors likely to result from improper sampling. W. T. H.

Determination of carbon in high-sulfur steels by direct combustion. H. A. BRIGHT AND G. E. F. LUNDELL. *Bur. Standards J. Research* **5**, 943–9(1930).—If a steel contains 0.13–0.33% S, from 2 to 10% is obtained as SO_2 by burning the steel in O_2 and the remainder as SO_3. Both of these gases will be absorbed and weighed with the CO_2 unless precautions are taken to remove them. The various ways by which chemists have attempted to remove SO_2 and SO_3 were subjected to critical study and as a result of the study a modified combustion train is recommended. It consists of a porce-

lain combustion tube about 48 cm. long with an internal diam. of 2.5 cm. but with the exit end sharply reduced to 6–8 mm. outside diam. No asbestos packing is used, but a 3–4 cm. roll of oxidized Cu gauze is placed in the 700–800 zone of the exit. The gauze becomes coated with Fe_2O_3 and $CuSO_4$ and must be renewed occasionally. The gas from the tube is passed through a specially designed absorption tube contg. 8–10 ml. of 50% aq. CrO_3 soln. in one arm and a 9–10-cm. column of closely packed asbestos in the other. All the SO_2 is removed by the CrO_3 and some, but not all, of the SO_3, is condensed during the passage through the tube. The gas then passes to a similar tube contg. 97% H_2SO_4 in the first arm and asbestos in the other. The gas next passes through a 12-cm. U-tube contg. anhydrone, which serves to finish the drying of the gas and also to remove the last traces of SO_3. The CO_2 is then absorbed in a Fleming tube contg. ascarite and anhydrone. W. T. H.

Electrometric titration of chromium in steel and in ferro-chrome. FRITZ SPINDECK. *Chem.-Ztg.* **54**, 890(1930).—The potentiometric detn. of the end point for the reduction of CrO_4^{--}, after oxidation with persulfate and reduction of MnO_4^- with HCl, is recommended. Complete directions are given for carrying out the titration with Mohr's salt. W. T. H.

Determination of silicon in steel and iron. H. WOLF AND R. HEILINGÖTTER. *Chem.-Ztg.* **54**, 878–9(1930).—Some 18 expts. are described which show that the SiO_2 obtained by a single evapn. is always a little low when either H_2SO_4 or HCl is used. With the former, the purity of the SiO_2 is usually higher and with the latter treatment with HF to det. the impurities is more important. W. T. H.

Occlusion of lead and copper in non-ferrous alloys by metastannic and metantimonic acids. SALVADOR DEL MUNDO. *Philippine J. Sci.* **43**, 403–7(1930).—A study of the adsorption or occlusion of Pb by $(H_2SnO_3)x$ and $(HSbO_3)x$ shows that 1–3% of Pb is occluded in the analysis of white metals rich in Pb and 0.1–0.5% in alloys rich in Sn. A given method of attack gives const. results. To avoid such errors, the following method is advised for the detn. of Pb in white metals: Treat 0.5 g. of sawings with 10 cc. of concd. H_2SO_4. When decompn. is complete, cool, dil. with 50 cc. of cold water, filter and wash. Dissolve the impure $PbSO_4$ ppt. in hot NH_4OAc soln. and det. Pb as $PbCrO_4$ in the usual way. W. T. H.

Separation and determination of lead and mercury or lead and copper. H. FUNK AND J. SCHORMÜLLER. *Z. anal. Chem.* **82**, 361–5(1930).—Because of the slight ionization of $HgCl_2$, a soln. of $Hg(NO_3)_2$, which of itself gives a ppt. when treated with $K_2Cr_2O_7$ soln., will not do so if some alkali chloride is first added. The following procedure, therefore, serves for the detn. of Pb in the presence of Hg. To the soln. contg. a little HCl or HNO_3 add NaOAc and a little dil. HOAc. To the clear soln. add 50 cc. of 5% NaCl soln. and dil., if necessary, to 100 cc. Heat nearly to boiling and ppt. the Pb as $PbCrO_4$ by adding 5 cc. of hot, 5% $K_2Cr_2O_7$ soln. Cool, filter and either weigh the $PbCrO_4$ ppt. or det. the CrO_4 content iodometrically. Wash the ppt. with cold, 1–2% HOAc, add 5–10 cc. of alc. to the filtrate and boil till the excess chromate is reduced completely. Cool and det. the Hg as sulfide. If the soln. to be analyzed contains mercurous salt, it will be pptd. as Hg_2Cl_2 upon the addn. of NaCl. In such a case add Br water until the ppt. dissolves and then continue as above. A procedure similar to the above can serve for the sepn. of Pb and Cu. The Cu can be detd. in the filtrate, after reduction of excess chromate, by pptn. as $Cu_2(CNS)_2$ and bromometric analysis of the ppt. W. T. H.

Determination of zinc present as oxide, silicate, ferrite, sulfate and sulfide. V TAFEL AND G. SILLE. *Z. angew. Chem.* **43**, 948–51(1930).—In the by-products obtained in the production of Zn in the dry way, the element is present as ZnO, $ZnSO_4$, Zn_2SiO_4, $ZnFe_2O_4$ and ZnS and the problem discussed in this paper concerns the detn. of Zn in each of these forms. As a result of many expts. concerning the soly. of these constituents, the following scheme of analysis is recommended: *I. Preliminary assay.*—(*a*) Det. the total Zn content in the usual way (Galetti). (*b*) Det. the total S after Na_2O_2 fusion. *II. Sepn. of various constituents.*—Of Zn blende take at least 2 g., of flue dust 4 g., all of which should pass through bolting cloth. (*a*) *Detn. of water-sol. Zn* ($ZnSO_4$). Mix the sample with 500 cc. of water, stir 1 hr. at room temp. and 1 hr. at the b. p. Filter and det. both Zn and SO_4 in the aq. ext. (*b*) *Detn. of metallic Zn and ZnO.*—Treat the residue from (*a*) with 400 cc. of Muspratt's soln. (320 g. NH_4Cl, 640 cc. concd. NH_4OH and 1040 cc. water), stir, let stand 8 hrs. and filter. Stir the residue for 2 hrs. with 300 cc. of boiling Muspratt soln. Filter, unite the 2 filtrates and det. the Zn content in the usual way. (*c*) *Detn. of Zn present as silicate.*—Treat the residue from (*b*) at the b. p. for 1 hr. with 500 cc. of 6% AcOH, filter and det. both Zn and SiO_2. For the former detn., take an aliquot part of the soln., evap. to dryness with

HCl, take up in HCl, filter off SiO_2 and det. the Zn after removing the Fe. (*d*) *Detn. of Zn in* $ZnFe_2O_4$.—Remove the residue from (*c*) from the filter, ash the filter and add to the residue; mix it in a Ni crucible with 4 g. of carbonate-free NaOH, cover with 4 g. more of NaOH add 10 cc. of alc., cover the crucible and heat very slowly over an asbestos plate, finally raising the temp. to redness and maintaining this temp. for 10 min. Digest the melt with 400 cc. of hot water, filter and det. the Zn in the water ext. (*e*) *Detn. of Zn present as ZnS.*—Treat the residue from (*d*) with HCl and det. the Zn in the usual way, taking care to remove all foreign elements that interfere. W. T. H.

Colorimetric micro determinations. I. Determination of bismuth, aluminum and zinc. M. Teitelbaum. *Z. anal. Chem.* **82**, 366–74(1930).—The following method gives good results in the detn. of 0.05–0.5 mg. of Bi in the presence of as much as 80 mg. of Cd or Zn. Measure out the soln. to be analyzed from a microburet or pipet into a small centrifuge tube and add 3–4 mg. of solid pyrogallol or 2–3 drops of a freshly prepd. 4% soln. Heat to about 70° and add 0.33 *N* NH_4OH until a distinct turbidity is noticeable. Now heat just to boiling, add 1–2 drops of thymol blue (0.1% soln. in 20% alc.) and treat with NH_4OH until the soln. is alk. to this indicator. The soln. should now have a vol. of about 1.5 cc. Heat 10 min. in a boiling water bath, which causes the ppt. of $BiO_3C_6H_3$ to settle. Allow to cool, dil. to about 5 cc. and centrifuge for 10 min. at 2000–2500 r. p. m. Decant off the clear liquid, stir up the ppt with 5 cc. of water and centrifuge again, repeating the process, if necessary, with 2 cc. of water. Dissolve the ppt. in 1 cc. of 4 *N* HCl and rinse into a small flask with 15–20 cc. of water. Add 0.5–1 cc. of Folin's reagent (4 g. phosphomolybdic acid and 20 g. Na tungstate heated with 10 cc. of 85% H_3PO_4 and 150 cc. water for 2 hrs. with reflux condensation; after the boiling, cool, dil. to 200 cc. and filter if necessary) and about 6 cc. of cold satd. Na_2CO_3 soln. Dil. to 30 cc. and after 25 min. compare the color with that similarly produced with known quantities of Bi. *Detn. of Bi as hydroxyquinoline derivative.*—Treat the Bi soln. in a centrifuge tube with 2 drops of 0.5% Na tartrate soln., add 2 drops of phenolphthalein soln. (0.1% in alc.) and 0.33 *N* NH_4OH until alk. to this indicator. Then add 1 drop of 3% HOAc. Heat the soln. (about 1 cc. in vol.) to about 70° and add 4 drops of 0.5% oxine acetate soln. Heat just to boiling and neutralize with 0.2–0.3 cc. of satd. NaOAc soln. Heat 10 min. on the water bath and continue as described in the previous method, eventually dissolving the oxine ppt. in 0.5 cc. of 2 *N* HCl and treating with Folin's reagent. The method is sensitive and serves for the detn. of 0.005–0.05 mg. of Bi. *Detn. of Al or Zn with hydroxyquinoline* (*oxine*).—Treat the slightly acid soln. (p_H = about 3) with 0.3–0.5 cc of satd. NaOAc soln. and with 3–4 drops of 0.5% oxine acetate soln. Heat 15 min. in the water bath and proceed as above described. Excellent results were obtained with 0.0018–0.32 mg. of Al and with 0.0081–0.083 mg. of Zn. With the Zn detn. use methyl orange as indicator and add the oxine acetate soln. after heating to 70°. W. T. H.

Volumetric estimation of mercury. O. Pročke. *Collection Czechoslov. Chem. Comm.* **2**, 593–608(1930).—The various methods which have been proposed for the volumetric detn. of Hg are discussed and the method of Denigès is studied and improved. The soln. of mercuric salt, at a vol. not greater than 50 cc. and contg. less than 0.5 g. Hg, is made alk. by adding an excess of 10% NH_3 soln., 25 cc. of 0.2 *M* KCN and 1 cc. of 0.1 *N* KI. The soln. is titrated with 0.1 *N* $AgNO_3$ to the beginning of turbidity and then dild. to 100 cc. and more $AgNO_3$ is added until a permanent turbidity results. At the final equil. $Hg(CN)_3^-$ is formed and not $Hg(CN)_4^{--}$ as assumed by Denigès. W. T. H.

A new colorimetric micro method for determination of sulfur in sulfides, sulfates, etc. I. St. Lorant. *Z. physiol. Chem.* **193**, 56–8(1930); cf. *C. A.* **24**, 1402.—The method is discussed in the light of an addnl. year's experience. The reagents were found to be unaltered and still serviceable. The S value of the K_2SO_4 test soln., however, decreases if the glass of the container is not sufficiently resistant. In the prepn. of the "acid mixt." it was noted that red P varies considerably in its S content and in its behavior on boiling. The boiling of this mixt. need not be continued until all S is removed but may be interrupted when 2 successive Caro tests, 1 hr. apart, give the same intensity of light blue. The wash liquid is good for 60 detns. instead of 10 as previously stated. Porcelain beads may be dispensed with in the distn. since the red P serves their purpose. Low results, due to decompn. of HI adhering to the walls of the app. from the previous day, especially in the presence of sunlight, may be avoided by bubbling the N gas more rapidly. The numerical factor should be increased from 116 to 130, corresponding to a higher blank value. Aside from nitrates, which are abundantly present, no other substance appears to influence the detn. With a 10

cc. receiver a minimum of 0.0005 mg. S may be detd. by this method. The error does not exceed 5%. A. W. Dox

Method for a determination of helium and neon simultaneously present in gases. V. A. Sokolov. *Neftyanoe Khozyaistvo* 19, 292–7(1930).—The app. for gas detns. by Moureux, Mac Lennan, Cady and Mac Fralan, and Khlopin and A. A. Lukashuk are described in detail, also their application. The detn. of each component in a Ne-He mixt. by the difference in their sp. gravities and a new balance constructed by the authors is explained. A. A. Boehtlingk

Gas analysis and the different absorbers. A. Noel. *Ing. chim.* 13, 223–6 (1929).—N. describes the advantages of the Hankus, Heinz and Nowicky absorbers for gas analysis. P. Thomasset

Gas-analytical determination of carbon monoxide. Egbert Dittrich. *Z. angew. Chem.* 43, 979–80(1930).—The method of detg. CO by treating the gas with oleum and I_2O_5 applies essentially only to gases which do not contain higher paraffins and even then the SO_3 content of the oleum should not exceed 10% if the absorption of H_2 is to be prevented. On the other hand, the presence of higher paraffins does not have appreciable effect upon the detn. of CO by ammoniacal Cu_2Cl_2 soln. The I_2O_5-oleum method does not seem to have any advantages with respect to either time or accuracy W. T. H.

New volumetric determination of orthophosphoric anions. Angel del Campo. *Anales soc. españ. fis. quim.* 28, 1153–8(1930).—In dil. AcOH, benzidine phosphate is sufficiently insol. to allow detn. of P_2O_5. The white, silky ppt. is washed immediately on the filter paper until neutral, the whole placed in water, and titrated with 0.1*N* Na_2CO_3 and phenolphthalein. Other P anions, or saccharose, do not interfere, permitting analysis of sirups. E. M. Symmes

Titrimetric determination of primary arsonic acids. Harold King and Geo. V. Rutherford. *J. Chem. Soc.* 1930, 2138–43.—Since the arsonic acids do not usually possess characteristic sharp m. ps., there is need for some simple and rapid means of identifying these compds. A study is reported of titrations of 17 acids with thymol blue in the presence of an equal vol. of satd. NaCl and with thymolphthalein with satd. and half-satd. NaCl. Without the NaCl the end point is reached too early and is not sharp. Thymol blue is not satisfactory because the color change at the turning point is not as clear and as brilliant as with thymolphthalein and certain arsonic acids exert a sp. action of the thymol blue, resulting in an abnormally low titer. Thymolphthalein gives values slightly above the theoretical. C. J. West

Oxidation of various gases by means of copper oxide, lead chromate and cobalt oxide. John R. Campbell and Thomas Gray. *J. Soc. Chem. Ind.* 49, 450–3T (1930).—When H_2 or C_2H_4 is present together with CH_4 in a gas mixt., the external temp. to which the furnace must be raised is lower, probably on account of the heat generated by the burning of the more readily oxidizable gas. The expts. with CH_4 indicate the undesirability of using fused $PbCrO_4$ because of the danger of not burning the CH_4 completely; it is less effective than CuO and cannot be regenerated by merely heating in O_2. Although C_2H_4 is often a negative catalyst, this is not the case with respect to the combustion of CH_4. CoO alone is only about as efficient as CuO. W. T. H.

Combustion of methane by means of copper oxide. John R. Campbell and Thomas Gray. *J. Soc. Chem. Ind.* 49, 432–7T(1930).—The results of many expts. show that at temps. below 400° with sufficiently long contact, CH_4 and CuO react to give an appreciable quantity of CO_2. Below 525°, the reaction proceeds very slowly. Above 525°, the time of contact has considerable effect upon the quantity of CO_2 formed and reaches a max. at about 600°, above which temp. the effect of varying times of contact is much less marked. At temps. above 700° the rate of oxidation is very rapid and complete combustion is effected in 7 min. W. T. H.

Influence of various catalysts in promoting the oxidation of methane by means of copper oxide. John R. Campbell and Thomas Gray. *J. Soc. Chem. Ind.* 49, 447–50T (1930).—For oxidizing CH_4 at temps. from 475 to 600° the following reagents were used: CuO alone, activated by alternate reduction with H_2 and reoxidization immediately before each expt., CuO mixed with a suspension of Cu_2Cl_2 and water and dried, the Cu_2Cl_2 content of the mixt. being 13.8%, CuO similarly treated with a suspension of NH_4VO_3 and water, CuO with 2% CoO made by heating CuO and $Co(NO_3)_2$, CuO impregnated with 2% MnO_2. The graphs plotted with temp. as abscissas and % CH_4 burned as ordinates are straight lines with CuO alone or with CuO impregnated with Cu_2Cl_2, but are curves for the mixts. contg. oxides of V, Co or Mn; this indicates that the mechanism in the case of the Cu_2Cl_2 as catalyst is different from that

of the oxide catalysts. Cu_2Cl_2 proves to be the most efficient catalyst but becomes less effective when it is heated above its m. p. (430°). At temps. above 650°, free H_2 reduces the chloride so that it is inadvisable to exceed this temp. in combustion analyses for C and H with this catalyst unless care is taken to make sure that all HCl is oxidized. For the detn. of N by the Dumas method, no such precaution is necessary and Cu_2Cl_2 can be regarded as an ideal catalyst for these detns Of the other catalysts, CoO is the most efficient and the others can be arranged in the following order: MnO_2, NiO, V_2O_5. The effectiveness of V_2O_5 proved to be a function of the amt. present and the same probably holds for the other catalysts. W. T. H.

New method for the volumetric determination of the methoxyl and ethoxyl groups. FRANZ VIEBÖCK AND ADOLF SCHWAPPACH. *Ber.* **63B**, 2818–23(1930).—A smaller app. than that usually employed is shown. The decompn. flask of 6 cc. capacity is 8 cm. tall with a bulb of 28 mm. diam. and a neck of 10 mm. It has a narrow side arm to serve for the introduction of CO_2. The flask is connected with a condenser about 10 cm. long with a top piece which is 5.6 cm. high and 20 mm. wide. From a side arm in the top piece connection is made with an absorption tube which is about 20 mm. wide and 10 cm. tall. The latter is connected to a second absorption tube which in turn leads to an open absorption tube. For washing the gas the top piece is provided with 5 cm. of a dense layer of fine P. In the first absorption vessel are placed 6–7 drops of Br_2 and about 10 cc. of a soln. prepd. by dissolving 20 g. of KOAc in 200 cc. of glacial AcOH; about one-third is allowed to flow into the second absorption tube The open tube contains HCO_2H and a little NaOAc. At the start 5 cc. of HI and about 0.2 g. of coarse P powder are placed in the decompn. flask and 20–50 mg. of the org substance is introduced. The analysis is carried out in the usual way a heating bath at about 140° being used. At the end of an hr. all of the alkyl iodide will be driven off The absorbents are dild. with water and excess Br_2 is removed by treatment with HCO_2H The soln. is then made acid with H_2SO_4, a little KI is added and the liberated I_2 titrated with $Na_2S_2O_3$. The method depends upon the conversion of the methoxyl and ethoxyl groups to alkyl iodide, oxidation of the iodide to iodate and reduction of the iodate by iodide and acid. The results obtained in the analysis of some 15 org. compds. indicate that the method is excellent. W. T. H.

The bromo-potentiometric titration of β-naphtholsulfonic acids in presence of each other. II. Mixtures containing crocein acid. STANLEY D. FORRESTER AND DAVID BAIN. *J. Soc. Chem. Ind.* **49**, 423–5T(1930); cf. *C. A.* **25**, 55.—Detailed directions are given for the detn. of Schaeffer and R salts in the presence of croccin or G salts. The method depends on the fact that the presence of sufficient H_2SO_4 prevents the bromination of β-naphtholsulfonic acids contg. a sulfonic acid group in the 8-position. To 50 cc. of soln. to be titrated, add 20 cc. of concd. H_2SO_4, cool, add 10 cc of 20% KBr and titrate at 30° with a soln. contg. 5.567 g. of $KBrO_3$ per l. W. T. H.

Cupro-potassium carbonate solution in the determination of reducing sugars. H. A. SCHUETTE AND JENNETTE N. TERRILL. *J. Am. Chem. Soc.* **52**, 4960–4(1930) cf. *C. A.* **24**, 2402.—In a reinvestigation of the so-called cupro-K_2CO_3 soln. of Soldaini as modified by Ost and by Nyns, there have been obtained data on the dextrose equivs of 4 forms of this reagent of a Cu content lying between the limits of 19.1 and 39.3 mg per cc. These data are presented in the form of math. expressions and are pertinent to a temp. of 48.9° maintained for 2.5 hrs. It was also found that this sugar, under the above conditions, has a reducing action upon that modification by Beyersdorfer which contains but 0.8 mg. of Cu per cc. This observation casts some doubt upon the acceptance of this soln. as a selective reagent for levulose when both are present in the same soln. Math. expressions also have been derived for calcg. the levulose-Cu equivs. of another reagent of this type (Cu content 4.03 mg. per cc.) when either 1 of 3 modes of reduction is used, the relevant variants being time and temp. so adjusted as to bear to each other a relationship which is approx. an inverse one. It has been pointed out that no very material differences exist in the levulose equivs. of a given wt. of CuO when the latter is pptd. by either one of these procedures. C. J. WEST

Increase in the rotation of tartaric acid by Zr and Hf in alkaline solution (DEBOER, EMMENS) 6.

Detecting carbon monoxide. ALBERT WOLFF. Ger. 507,462, Jan. 15, 1927 In detecting CO in gas mixts. by bringing the mixt. into contact with I_2O_5 at a raised temp and then testing it for free I, the I_2O_5 is mixed with a catalyst, *e. g.*, Pt sponge, in order to reduce the reaction temp. App. including a steam-heated container for the I_2O_5 is shown.

8. MINERALOGICAL AND GEOLOGICAL CHEMISTRY

EDGAR T. WHERRY AND J. F. SCHAIRER

The Wood light in the identification of minerals. F. VIGNOLO LUTATI. *Industria chimica* **5**, 15–9, 1222–5(1930).—The Wood light has been tried on a large variety of minerals as a possible means of identification. In only a few instances, calcite, celestite, certain diamonds, fluorite, hydrozincite, ruby, both natural and synthetic, and zircon, was there any luminescence or fluorescence noted; this was not sufficiently characteristic to identify the mineral. A. W. CONTIERI

A study of the crystal structures of native copper. H. C. H. CARPENTER AND M. S. FISHER. *Bull. Inst. Mining Met.* No. **314**, 33–5(1930); cf. *C. A.* **24**, 2693.—Discussion. ALDEN H. EMERY

The ternary system: sodium silicate–ferric oxide–silica. N. L. BOWEN, J. F. SCHAIRER AND H. W. V. WILLEMS. *Am. J. Sci.* [5], **20**, 405–55(1930).—A study of the crystn. equil. in the system $Na_2O.SiO_2$–Fe_2O_3–SiO_2, obtained by the quenching method, is presented in detail. The equil. diagrams show the existence of 2 ternary compds. whose compns. lie within the triangle: acmite ($Na_2O.Fe_2O_3.4SiO_2$) and a new hexagonal compd. ($5Na_2O.Fe_2O_3.8SiO_2$). A third compd. ($6Na_2O.4Fe_2O_3.5SiO_2$) lies outside the triangle but overlaps somewhat with its field. Acmite melts incongruently with sepn. of hematite at 990°; the new hexagonal compd. melts congruently at 838°. Because of the incongruent melting of acmite there result some very interesting crystn. courses in mixts. rich in acmite. In certain mixts. hematite may be crystd., react with liquid and recrystallize. This introduces markedly different alternative courses of crystn. from the same original liquid. With strong fractionation the final liquid attains the lowermost eutectic, at which acmite, Na disilicate and quartz are formed. A discussion is given of the application of these results to petrology. Volatile components are not necessary for quartz crystn. The production of an Fe-rich residual liquid during crystn. of basaltic magma under certain conditions is no bar to the production of a siliceous-alkalic residual under other conditions. ALDEN H. EMERY

The mineral production of India during 1929. L. LEIGH FERMOR. *Records Geol. Survey India* **63**, pt. 3, 281–357(1930).—Accurate production figures for the following are given. Sb, chromite, coal, Cu, diamonds, Au, ilmenite, Fe, jadeite, Pb, magnesite, Mn, mica, monazite, Ni, petroleum, ruby, sapphire, spinel, salt, saltpeter, Ag, Sn, W, Zn, zircon. Less full particulars are given for agate, alum, amber, apatite, asbestos, barite, bauxite, Bi, borax, building materials, clays, copperas, corundum, fuller's earth, gypsum, kyanite, ocher, quartzite, refractory materials, serpentine, soda and steatite. ALDEN H. EMERY

The geology of the Mergui district. RAO BAHADUR S. SETHU RAMA RAU. *Memoirs Geol. Surv. India* **55**, Pt. 1, 62 pp.(1930).—After a description of the geology, the occurrence and origin of the Sn and wolfram ores are discussed. In addn. the following economic minerals occur: stibnite, arsenopyrite, Bi ores, chalcopyrite, molybdenite, galena, Au, monazite, salt and gas. ALDEN H. EMERY

Preliminary report on the Groundhog River area. A. R. GRAHAM. *Can. Mining J.* **51**, 1175–6(1930).—Au and Cu prospects in Keewatin rocks west of Kaniskotia are discussed, also geological features of the territory. W. H. BOYNTON

Preliminary report on the limestones of northern and western Ontario and of the Prairie Provinces. M. F. GOUDGE. Can. Dept. Mines, Mines Branch, *Rept.* **710**, 1–18 (1930). ALDEN H. EMERY

Preliminary report on molding sands in eastern Canada. C. H. FREEMAN. Can. Dept. Mines, Mines Branch, *Rept.* **710**, 47–52(1930). ALDEN H. EMERY

The gypsum industry of Canada. L. HEBER COLE. Can. Dept. Mines, Mines Branch, *Rept.* **714**, 164 pp.(1930); cf. *C. A.* **24**, 5944.—The following subjects are discussed: gypsum occurrences in 9 provinces; testing, technology and uses of gypsum and gypsum plasters; the gypsum industry; statistics of production; and the possibilities of export trade for Canadian gypsum. ALDEN H. EMERY

The salt industry of Canada. L. HEBER COLE. Can. Dept. Mines, Mines Branch, *Rept.* **716**, 116 pp.(1930).—The following subjects are discussed: salt occurrences in the Maritime Provinces, Ontario and Western Canada; mineralogy and technology of salt manuf.; the allied industries using salt (Na_2CO_3, Na_2SO_4, Cl, NaOH, H_2, HCl); and the salt industry of Canada. ALDEN H. EMERY

Chemical examination of lignite. W. FUCHS. *Brennstoff-Chem.* **11**, 205–8(1930); cf. *C. A.* **25**, 266.—A discussion of lignite formation, including a comparison of analytical data of lignite constituents. As the cellulose contents decrease, the contents of

—OCH_3 and of lignin increase, the lignic acids formed from the latter then changing into humic acids and humates. High bitumen content apparently retards these changes. Graphic trends of these progressive transformations of wood into brown coal are shown by plotting the constituents mentioned. Conclusion: Lignites are remains of woody parts of plants from which brown coal is formed; the inter-relations are shown graphically. F. W. JUNG

Biological investigation into occurrence of wood remains in an alluvial forest bog. R. LIESKE. *Brennstoff-Chem.* **11**, 350–2(1930).—A morphological and bacteriological study is made of tree and root remains found near Dortmund, showing extensive loss of org. substance and decompn. through anaerobic reaction without appreciable change in form or structure. Pressure effects were not found. Bacteria colonies of fluorescent groups similar to those of brown coal seams were present in interior sections. F. W. J.

Chemical investigation of anaerobically decomposed woods. W. FUCHS. *Brennstoff-Chem.* **11**, 352–4(1930); cf. preceding abstract.—A further investigation of material from Dortmund bog with analytical data to show gradual disappearance under anaerobic reaction of cellulose accompanied by increase in lignin. Recent literature on anaerobic decompn. is reviewed briefly. F. W. JUNG

Origin of petroleum. FRANZ FISHER. *Brennstoff-Chem.* **11**, 354–8(1930).—Recent work and its relation to theories of inorganic and org. origin, and secondary formation from fossil matter are discussed. F. W. JUNG

Transformation of fatty acids during geological periods. IV. G. L. STADNIKOV AND Z. I. VOZZHINSKA. *Brennstoff-Chem.* **11**, 414–6(1930); cf. *C. A.* **23**, 4426; **24**, 5261.—Extns. and chem. study of *balchaschite*, consisting of the alga *Botryococcus braunii*, shows its great similarity to coorongite, Siberian boghead and cannel coals. Microscopic comparisons with "pila rossica" from boghead coals, and "karpinskii" from Moscow cannel coal indicate little change in form from the original algae, but the relationship of the coals is not explained. F. W. JUNG

Hornfelses from Kenidjack, Cornwall. CECIL E. TILLEY AND JOHN S. FLETT *Summary of Progress Geol. Survey Gt. Brit.* 1929, Pt. II, 24–42.—The dominant rock types are dolerite hornfelses rich in green hornblende, and cordierite hornfelses rich in anthophyllite and frequently contg. abundant cummingtonite. Seven types including 2 of pneumatolytic origin are recognized, described fully, and compared with similar rocks of other regions. T. and F. discuss at some length the origin of these hornfelses, and present evidence in support of the hypothesis that the original dolerite intrusions have been subject to extensive decompn. by atm. weathering in which Ca and a large part of the alkalies, especially Na, have been removed. W. L. HILL

The presence of vanadium in Spanish rocks and minerals. S. PIÑA DE RUBIES. *Anales soc. españ. fis. quim.* **28**, 1110–6(1930).—V was found in peridotites, basalts, limburgites, pyroxenites, granites, labradorites, quartzites, schists, sea sand, clay and recent meteorites, and in many Bi, Mn, and Sn ores. If Ti is present, V is also, and *vice versa*. E. M. SYMMES

Some factors of solidification in relation to metallurgical and geological problems. S. W. SMITH. *J. Chem. Met. Mining Soc. S. Africa* **31**, 77–9(1930); cf. *C. A.* **24**, 3970, 5004, 5675.—Discussion. ALDEN H. EMERY

The Aldermac mine, Rouyn, Quebec (ALDERSON, MACKAY) **9.** China clay (VAN HORN) **19.** Unanswered questions in the biochemistry and geochemistry of I (REMINGTON) **11A.**

9—METALLURGY AND METALLOGRAPHY

D. J. DEMOREST, H. W. GILLETT AND RICHARD RIMBACH

Iron ore, pig iron and steel in 1929. HUBERT W. DAVIS. Bur. Mines, *Mineral Resources of the U. S. 1929*, Pt. I, 5–44(preprint No. 2, published October 22, 1930). E. H.

Gold, silver, copper, lead and zinc in Colorado in 1928. CHAS. W. HENDERSON. Bur. Mines, *Mineral Resources of the U. S. 1928*, Pt. I, 817–72(preprint No. 26, published October 21, 1930). E. H.

Gold, silver, copper, lead and zinc in the eastern states in 1929. J. P. DUNLOP. Bur. Mines, *Mineral Resources of the U. S. 1929*, Pt. I, 73–8(preprint No. 5, published November 12, 1930). E. H.

Antimony in 1929. PAUL M. TYLER. Bur. Mines, *Mineral Resources of the U. S. 1929*, Pt. I, 45–56(preprint No. 3, published October 22, 1930). E. H.

Platinum and allied metals in 1929. HUBERT W. DAVIS. Bur. Mines, *Mineral Resources of the U. S. 1929*, Pt. I, 57–71(preprint No. 4, published October 28, 1930). E. H.

Trend of ore hunting in the United States. AUGUSTUS LOCKE AND PAUL BILLINGSLEY. *Eng. Mining J.* **130**, 609–12(1930); cf. *C. A.* **25**, 268.—Indicators of valuable outcrops are discussed under the headings of: (1) leached outcrop, (2) oxidation slump, (3) mineralization slump, (4) igneous slump, (5) the igneous mineralizer, (6) the ore pipe in bodies of disseminated sulfide, (7) mineral zoning, (8) impervious roof, (9) strong-rock or weak-rock boundary, (10) post-ore cover, and (11) the district backbone. W. H. BOYNTON

Preliminary report on Goudreau and Michipicoten areas. E. S. MOORE. *Canadian Mining J.* **51**, 1224(1930).—Gold developments of the season and drilling of iron ore deposits are very briefly outlined. W. H. BOYNTON

History of Rammelsberg mining. W. BORNHARDT. *Metall u. Erz* **27**, 581–5 (1930).—A short survey of the technical and economic development of Rammelsberg mining H. STOERTZ

The Aldermac mine, Rouyn, Quebec. W. P. ALDERSON AND A. A. MACKAY. *Canadian Mining J.* **51**, 1190–3(1930).—Cu, S and Fe are to be produced from the ores of this mine. The geology, type and grade of ore-bodies, tonnage, and the saving to Canada of using pyrite in place of S for acid are discussed. W. H. BOYNTON

Modern methods of concentrating minerals. CH. BERTHELOT. *Rev. métal.* **27**, 535–43(1930).—A review of flotation methods. H. S. v. K.

Concentration tests on tailings from the washing plants of the Mesabi Range, Minnesota. F. D. DEVANEY AND WILL H. COGHILL. Bur. Mines, *Rept. of Investigations* 3052, 23 pp.(1930).—The current tailings from western Mesabi washing plants contain about 20% Fe, but through natural concn. by wind and water the bulk of the tailings in the sludge ponds now contains 45–50% Fe. Roasting the sludge-pond tailings, followed by magnetic concn., yields a concentrate contg. about 64% Fe, 0.042% P, and 8% SiO_2 with an Fe recovery of 97%. The tenor of the non-magnetic tailing is about 5% Fe. By classification and tabling a concentrate was produced assaying Fe 61, P 0.0343 and SiO_2 8.85%, with Fe recovery 82%. Tailings contain about 30% Fe. ALDEN H. EMERY

The effect of dissolved substances on gravity concentration. F. J. TROMP AND E. BEYERS. *J. Chem. Met. Mining Soc. S. Africa* **31**, 77(1930); cf. *C. A.* **24**, 3200.—Discussion. ALDEN H. EMERY

Concentration of the Mesabi hematites. E. W. DAVIS. *Mining & Met.* **11**, 518–20(1950).—The following generalizations on the beneficiation of Mesabi ores are listed (1) The concentrate should contain no more than 9% SiO_2 and 60% or more Fe (2) Fe recovery should be over 85%. (3) At least half of the concentrate should require no sintering. (4) Radical changes in structure and analyses of the ores should not seriously affect the grade of concentrate produced. (5) The plant should be centrally located. (6) The plant should be capable of expansion to a capacity of 1,000,000 tons of concentrate during a shipping season. (7) Total treatment costs should not exceed $1 per ton of ore shipped, with present prices of Fe ore. High-grade low-silica ores are being depleted and conservation methods must soon receive careful consideration. A magnetic roasting and concn. flow sheet is shown and the cost of magnetic roasting discussed. W. H. BOYNTON

Laboratory concentration of the Missouri iron ores of Iron Mountain and Pilot Knob. F. D. DEVANEY AND S. R. B. COOKE. Bull. School of Mines and Metallurgy, Univ. of Mo., *Tech. Series* **11**, No. 3, 38 pp.(1930).—Iron Mt. ore is a complex mixt. of hematite, garnet, quartz, calcite and other minerals. Because of the high sp. gr. of the garnet, gravity concn. of this ore is difficult and yields, at best, only a medium-grade concentrate. Magnetic concn. of the roasted ore gives high recoveries and high-grade concentrates provided the ore treated is finer than 28-mesh. For satisfactory roasting, the ore must be crushed to a fine size and roasted at 600° or more. Pilot Knob ore is essentially an intimate mixt. of hematite and quartz. It does not conc. readily and apparently the only means of producing a satisfactory product is magnetically to conc. the magnetically roasted ore. This requires grinding to 150-mesh or finer in order to eliminate the SiO_2. ALDEN H. EMERY

Chemistry of leaching covellite. JOHN D. SULLIVAN. Bur. Mines, *Tech. Paper* 487, 18 pp.(1930).—Covellite can be leached with $Fe_2(SO_4)_3$. The rate of soln. was virtually the same for −100 +200 mesh covellite in solns. contg. 1 and 2% of Fe^{+++};

also for —10 +28 mesh material in 0.5–2% Fe^{+++} soln. The rate was practically independent of acid strength for the first 8 days, when the Fe^{+++} concn. remained const. at 1%. H_2SO_4 in the presence of air attacked covellite at $^1/_2$ the rate of $Fe_2(SO_4)_3$. Increased temp. markedly increased soln. rate. Artificial covellite produced by leaching chalcocite dissolved at a much faster rate than natural covellite. A. H. E.

Agglomeration and leaching of slimes and other finely divided ores. JOHN D. SULLIVAN AND ALFRED P. TOWNE. Bur. Mines, *Bull.* **329**, 60 pp.(1930).—Cu in concentrator tailings can be recovered by agglomerating the ore and leaching by the open-drainage trickle method. Coarse material must be added to the sand and slimes to act as a nucleus upon which the fine material can build. About 10% moisture is necessary. Solns. percolated freely through agglomerated ore contg. up to 30% —200-mesh material with 90% extn. of acid-sol. Cu and 80% of total Cu when the ratio of oxidized to sulfide Cu was approx. 1:1. By recirculation, Cu concn. was built up to 61 g. per l. Expts. were conducted on all scales up to 12 tons. ALDEN H. EMERY

Use of thermodynamical data to study the chemical reactions of metallurgical processes. R. S. DEAN. Bur. Mines, *Information Circ.* **6395**, 12 pp.(1930).—Examples are given to show how, by the application of thermodynamic results, new methods are proposed for deoxidation of Cu, production of Zn and sepn. of Zn and Cd. A. H. E.

Oxidation of copper in reverberatory furnace refining and the significance of the oxide test. P. SIEBE. *Metall u. Erz* **27**, 549–57(1930).—Operating conditions are followed by a photomicrographic study. During the oxidation and at the beginning of the reduction period long dendrites in the eutectic ground mass indicate a high degree of purity while short dendrites and round Cu_2O inclusions indicate an impure melt with high Sn content as well as Sb, As and Pb as impurities. In a hypereutectic exptl. melt Sb and As cause a balling together of the eutectic and a shortening of the dendrites. Strong overheating causes larger dendrites and high cooling velocity produces a finer sepn. of the eutectic. Microscopic study of the oxide specimen indicates the type of impurities and the Cu_2O content. H. STOERTZ

Care and maintenance of fuel-fired furnace linings in the non-ferrous foundry. H. E. WHITE. *Trans. & Bull. Am. Foundrymen's Assoc.* **1**, 644–53(1930).—Causes of failure, types of linings available and proper installation are discussed. SiC appears to be the most popular plastic lining. Mullite and other alumina-silica materials are finding increased favor. B. A. SOULE

Refractory-maintenance cements in the non-ferrous foundry. H. E. WHITE. *Trans. & Bull. Am. Foundrymen's Assoc.* **1**, 654–65(1930).—W. briefly considers various types of cements, their application, proper use and effect on power cost. A graph for computing economical limits of lining maintenance is given. The desirable properties of a cement are elasticity, mech. strength, high softening point, resistance to abrasion, disintegration, slagging and spalling, low shrinkage, long vitrification range and workability. B. A. SOULE

Theory of Cowper's recuperative furnace. L. THIBAUDIER. *Rev. métal.* **27**, 544–59 (1930). H. S. v. K.

Gas mixtures for multi-fuel-fired furnaces. JOSEPH F. SHADGEN. *Iron Age* **126**, 1374–5, 1436(1930).—A discussion of the mixing of blast-furnace, producer, coke-oven and natural gases and the application of the mixts. to metallurgical processes. C. L. READ

Blast-furnace gas as a metallurgical fuel. JOSEPH F. SHADGEN. *Iron Age* **126**, 1287–9(1930).—A discussion of the application of blast-furnace gas to such metallurgical furnaces as coke ovens, open-hearth furnaces, soaking pits and annealing and drying furnaces. C. L. READ

Presidential address. J. HENDERSON. *J. Chem. Met. Mining Soc. S. Africa* **31**, 58–63(1930).—A broad survey of *rationalization on the Fe, steel and coal industries of S. Africa.* ALDEN H. EMERY

Fundamental and applied research on the physical chemistry of steel making. C. H. HERTY, JR. Bur. Mines, *Rept. of Investigations* 3054, 12 pp.(1930).—H. gives a summary of the work of the Bureau of Mines on deoxidation of steel with Si, Al, Mn, Mn-Al, Al-Si and Mn-Si; slag viscosity; equil. between C and Fe oxide; effect of inclusions on rolling steel; deoxidation of steel in the open-hearth; research on acid open-hearth steel; and analytical methods developed. ALDEN H. EMERY

Some factors of solidification in relation to metallurgical and geological problems (SMITH) **8.** Preliminary report on molding sands in eastern Canada (FREEMAN) **8.** Discharge device for rotary furnaces for burning cement, etc., or smelting ores (Ger. pat. 504,966) **20.**

Ore treatment. FRANZ REUTER. Ger. 506,949, Jan. 19, 1924. App. for the disintegration of mineral mixts. into their components by a current of water is described.

Ore flotation. STUART P. MILLER (to Barrett Co.). U. S. 1,785,742, Dec. 23. As a flotation reagent there is employed a mother liquor comprising α-naphthylamine and other constituents of crude α-naphthylamine, obtained by forming a soln. of crude α-naphthylamine in an org. solvent, partially crystg. the α-naphthylamine content of the soln. and sepg. the crystals.

Apparatus for ore classification. THOMAS A. DICKSON (to Colorado Iron Works Co.). U. S. 1,785,302, Dec. 16. Structural features.

Ore-roasting apparatus. BERZELIUS METALLHÜTTEN GES. Brit. 333,461, March 27, 1929. The grate bars of a circular Dwight-Lloyd type blast-roasting app. are replaced by pervious receptacles contg. agglomerate so arranged that the agglomerate remains in the receptacles during the normal operation of the app.

Apparatus for mineral classification by currents of water. ANTOINE FRANCE. U. S. 1,785,679, Dec. 16. Structural features.

Roasting ores. METALLGESELLSCHAFT A.-G. (Hans Klencke, inventor). Ger. 502,586, June 5, 1929. Sulfide ores, especially Zn blende, are thoroughly roasted in two stages, loam being mixed with the ore before or during the first stage.

Reducing ores. HERBERT WITTEK. Ger. 502,197, July 28, 1926. Addn. to 487,560 (*C. A.* **24**, 1836). Ores are reduced by using the heat evolved in the prepn. of cyanides or nitrides and optionally using the residual materials therefrom as reducing agents.

Apparatus for combined ore-reduction and hydrocarbon refining. WM. H. SMITH. U. S. 1,785,427, Dec. 16. An elec. resistance heater is positioned intermediate the ends of a retort for receiving one or more streams of continually moving ore such as iron oxide ore and oil. U. S. 1,785,428 describes a process in which metallic oxides such as Fe oxides are reduced and hydrocarbons are cracked without melting the charge, by adding heavy hydrocarbon to the charge, continuously feeding it through a fixed temp. zone under cracking conditions and removing the cracked hydrocarbon products at a suitable point of the app. and reducing the ore without melting. Catalysts may be used.

Treating titanium ores. I. G. FARBENIND. A.-G. (Johannes Brode and Carl Wurster, inventors). Ger. 507,151, Dec. 17, 1925. In working up Ti ores by treatment with concd. HCl in the warm in the presence or absence of a catalyst, the HCl consumed in the reaction is replaced by continuous or intermittent introduction of HCl gas, which may or may not contain a small quantity of H_2O. The mother liquors obtained, after sepg. the hydrated $FeCl_2$ that is pptd. on cooling, may be used to treat a further amt. of ore, and HCl may be recovered from the Fe salt in known manner.

Treating manganiferous materials. KURT E. DITTMANN and KARL FAERBER. Ger. 505,584, Jan. 20, 1928. Finely divided moistened Mn-contg. ores, waste, slime, etc., are subjected to the action of SO_2, the heat developed by the reaction only being employed. The $MnSO_4$ so formed is obtained by evapn. and roasted with C, and the SO_2 resulting is used to treat further manganiferous material. The process may be carried out in a closed continuously operating system.

Tin from ores, etc. EDGAR A. ASHCROFT. U. S. 1,786,386, Dec. 23. In the reduction of Sn oxide, carbon and finely divided Fe are used together, the Fe serving as a reducing agent. Use of Zn, Al, Mg, Ni and Sn alloys, etc., is also mentioned. Cf. *C. A.* **24**, 2100.

Metallic material with fibrous structure. KAISER-WILHELM-INSTITUT FÜR EISENFORSCHUNG E. V. Ger. 506,477, May 19, 1928. Addn. to 493,905. Part only, *e. g.*, the surface, of the material (*e. g.*, wood) is metallized by the method of 493,905 (*C. A.* **24**, 2711), instead of the whole, by localized heating.

Mixture of metallic with non-metallic materials. BRAUNSCHWEIGER HÜTTENWERK G. M. B. H. Fr. 686,493, Dec. 12, 1929. See Ger. 483,604 (*C. A.* **24**, 693).

Cementation of metals. AMERICAN CYANAMID CO. Fr. 686,628, Dec. 13, 1929. A bath of molten materials for the cementation of metals contains a halide of an alk. earth metal, a halide of an alkali metal and a minor proportion of an alk. earth cyanide. The alk. earth halide is preferably at least 50% of the wt. of the mixt.

Metal founding. HIRSCH, KUPFER- UND MESSINGWERKE A.-G. (Otto Götze, inventor). Ger. 505,511, Dec. 22, 1927. A water-cooled ingot mold formed of thin plates, for casting metal plates for subsequent rolling, is described.

Ladle suitable for use in casting aluminum and magnesium. W. T. COLLYER. Brit. 333,384, Aug. 1, 1929. A special partition is provided to prevent pouring out of the scum.

Casting metals such as iron and steel. J. E. FLETCHER. Brit. 333,494, Jan. 10, 1930. Molds are sufficiently preheated that when the iron or steel has been poured and has cooled to the recalescence temp., the sand or other surface of the mold will have been heated to the same temp.

Mold for casting metals such as copper billets. WM. F. EPPENSTEINER (to American Metal Co.). U. S. 1,785,941, Dec. 23. Structural features.

Foundry cores. K. MICHAELIS (to A. Stahn). Brit. 333,385, April 16, 1929. Cores of porous material such as sand are rendered superficially gas-tight by impregnation or coating with an inorg. material which will melt at the casting temp. (and preferably at the drying temp.), such as boric or phosphoric acid or borax and $Na_2S_2O_3$.

Molding hollow articles of metal. CLINTON B. PIKE. Ger. 505,576, Dec. 28, 1928.

Molding metal tubes and rods. WARSTEINER UND HERZOGLICH SCHLESWIG-HOLSTEINISCHE EISENWERKE A.-G. and KURT MÜHLBRADT. Ger. 505,526, Nov. 23, 1928. Details of the app.

Recovery of copper. I. G. FARBENIND A.-G (Werner Busch, inventor). Ger. 505,826, April 26, 1928. See Fr. 673,921 (*C. A.* 24, 2415).

Copper and zinc recovery from waste alloy materials. HARVEY M. BURKEY and DANIEL L. OGDEN (to American Metal Co., Ltd.). U. S. 1,785,247, Dec. 16. Alloy material such as brass or bronze is smelted and resulting Zn-bearing fume is sepd. from the gases produced, the fume is leached with a solvent for Zn such as a carbonated ammoniacal liquor and the Zn is recovered from the soln. thus formed. The Cu and other metals may be recovered electrolytically.

Refining copper. ÉTABLISSEMENTS MÉTALLURGIQUES DE RIS-ORANGIS. Fr. 686,641, Dec. 14, 1929. The oxide of Cu necessary for the refining of Cu is obtained outside the refining bath by treating the dross from a previous refining operation with a mixt. of a sulfide and an alkali salt, and roasting the sulfide formed.

Cadmium. HANSON H. MONROE (to Grasselli Chemical Co.). U. S. 1,785,139, Dec. 16. Material contg. Cd and Zn such as "Cd sponge" is treated with molten caustic alkali in the presence of a carbonaceous reducing agent such as coke in order to recover the Cd largely sepd from Zn.

Titanium, etc. W. MATHESIUS and H. MATHESIUS. Brit. 333,816, Nov. 1, 1928. In producing homogeneous Ti or ferro-Ti melts by an alumino-thermic process, regular deposition of the regulus is facilitated by addn. of chromates, tungstates, manganates, permanganates or uranates either of light metals such as the alkali metals or alk. earth metals or of heavy metals such as Fe, Ni, Co, Mn, U, W, Mo or V (in which latter instances the metal passes into the Ti or ferro-Ti regulus produced).

Titanium dioxide. I. G. FARBNIND. A.-G. (Friedrich Raspe and Paul Weise, inventors). Ger. 504,843, Sept. 2, 1928. Ti ores are treated with H_2SO_4 to separate TiO_2. The residue is subjected to a mech. flotation and returned to the H_2SO_4 treatment.

Ferromolybdenum and ferrotungsten. PAUL SCHWARZKOPF. U. S. 1,786,393, Dec. 23. Molybdic acid or tungstic acid of very fine grain and "maximum surface" development is evapd. from molten ore and the acid vapors are introduced directly into a bath of iron contg. a reducing agent.

Lamelliform metal powder such as that for bronze paints. EMIL PODSZUS (to Hartstoff-Metall A.-G. (Hametag)). U. S. 1,785,283, Dec. 16. A lustrous metal product suitable for use in the manuf. of bronze paints is prepd. by subjecting the finely comminuted metal to continual impact between a large number of tiny steel balls by imparting to the latter a revolving motion, as in a drum provided with internal partitions.

Furnaces for treating ores, etc. EUGENIO SOMOZA Fr. 686,519, Nov. 21, 1929. In furnaces for treating or fusing ores, metals, slags, etc., condensing galleries and chimneys are replaced by aspirators to which the gases and smoke are led by pipes and which pump them to purifiers. Cf. *C. A.* 24, 3746.

Metallurgical roasting furnace. BALZ-ERZRÖSTUNG G. M. B. H. Ger. 505,583, Nov. 24, 1927. Details of the air supply and air cooling.

Cupola furnace. J. E. FLETCHER and BRITISH CAST IRON RESEARCH ASSOCIATION. Brit. 333,322, May 24, 1929. Various details are described of a furnace with main and supplementary tuyères, with air-supply control effected at the main tuyères only.

Apparatus (associated with a cupola) for desulfurizing cast iron. LAVERNE W. SPRING (to CRANE CO.). U. S. 1,785,503, Dec. 16. Structural features.

Blast furnaces. VEREINIGTE STAHLWERKE A.-G. Ger. 505,962, Nov. 28, 1929. Details of rendering the outlet airtight.

Blast-furnace operation. F. HEYD. Ger. 507,321, June 6, 1928. Steam is supplied at a point above the fusion zone of the furnace, to react with the CO in the furnace. Gases contg. H may be supplied at the same time in the region of the hearth.

Blast-furnace tuyère. F. D. BROWN, G. B. RICHARDS and T. J. ROBERTS. Brit. 333,095, Oct. 1, 1929.

Apparatus for raising the pressure of the air blast in blast furnaces, etc. ASKANIA-WERKE A.-G. VORMALS CENTRALWERKSTATT DESSAU and CARL BAMBERG-FRIEDENAU. Ger. 486,651, Feb. 1, 1929.

Continuously moving lower delivery device for blast furnaces. FIRMA E. SCHWENK. Ger. 504,989, Sept. 28, 1927.

Device for holding back dust in blast furnaces. JULIUS STOECKER. Ger. 471,885, Oct. 11, 1927.

Apparatus for separating dust from blast- and shaft-furnace gases. VEREINIGTE STAHLWERKE A.-G. and HEINRICH RÖSENER. Fr. 686,477, Dec. 12, 1929.

Dust collection from gases such as blast-furnace gas. CLARK T. MORSE and EDWARD L. HOGAN (to American Blower Corp.). U. S. 1,785,453, Dec. 16. Dust-laden gas is subjected to centrifugal action in an app. at successively lower levels in paths of successively smaller diam. and moisture-laden dust is then discharged by gravity downwardly through the center of the stream, with upward discharge of the gas. App. is described.

Port construction and gas burner or open-hearth furnaces. GEORGE F. DOWNS and HERBERT F. MILLER, JR. U. S. 1,786,293, Dec. 23.

Fusion furnace for the production of steel. HERMANN MOLL. Fr. 686,436, Dec. 11, 1929.

Furnace for heating metals, etc. H. SCHAEFER. Brit. 333,192, Feb. 1, 1929. A combustible gas or a supporter of combustion, which has been raised to a high temp. in one element of a reversible heater, is passed through a chamber contg. the materials or articles to be heated, and after this is mixed either with a supporter of combustion or with a combustible gas, resp., and burned in the other element of the heater. Various details of construction are described.

Furnace suitable for heat-treating articles such as steel sheets moved through the furnace on a conveyor. RALF S. COCHRAN (to Surface Combustion Co.). U. S. 1,784-812, Dec. 16.

Furnace for the continuous thermal treatment of metal wires or bands. SELAS A.-G. Ger. 507,332, Feb. 15, 1928.

Hearth furnace for treating metals. MILTON W. ARROWOOD (to Universal Engineers, Inc.). U. S. reissue 17,908, Dec. 23. Reissue of original pat. No. 1,617,510, (*C. A.* **21**, 1093).

Rotary case-hardening furnace, with feeding screw. HEINRICH GESSLEIN. Ger. 507,423, Aug. 13, 1927.

Annealing furnace for metals. RUST FURNACE CO. Fr. 686,624, Dec. 13, 1929.

Rolling and annealing sheet metal such as steel. ALEXANDER PATERSON. U. S. 1,785,786, Dec. 23. The metal is reduced while at a temp. within the "blue short" zone and then annealed at a temp. within the growth range.

Apparatus for sintering metals. JOHN E. GREENAWALT. Ger. 506,582, Dec. 15, 1928. Details are given.

Iron. I. G. FARBENIND. A.-G. (Alwin Mittasch, Carl Müller and Eduard Linckh, inventors). Ger. 493,874, July 6, 1926. Addn. to 485,639 (following abstr.). In the prepn. of pure Fe by the thermic decompn. of $Fe(CO)_4$, the undiluted $Fe(CO)_4$ in liquid or vapor form is brought into contact with hot liquids or fused substances. Thus liquid $Fe(CO)_4$ is dropped into paraffin oil heated to 270°. The Fe liberated forms a fine powder suspended in the oil.

Iron. I. G. FARBENIND. A.-G. (Alwin Mittasch, Carl Müller and Eduard Linckh, inventors). Ger. 485,639, Dec. 16, 1924. Pure Fe is prepd. by the thermic decompn. of $Fe(CO)_4$ vapor diluted with other gases. The $Fe(CO)_4$-contg. gases are led over small heated metal bodies or through heated liquids. In the example, a mixt. contg. N and 40% $Fe(CO)_4$ vapor is led over iron turnings at 250–300°.

Iron. I. G. FARBENIND. A.-G. (Alwin Mittasch, Walther Schubardt and Carl Müller, inventors). Ger. 500,692, May 24, 1925. Addn. to 485,639. The method of producing pure Fe by the thermic decompn. of $Fe(CO)_4$ described in 485,639 (preceding abstr.) is modified by using a chamber heated to 400–900° without the heated metal or liquid. The decompn. of the $Fe(CO)_4$ takes place at the walls of the chamber where pure Fe is deposited.

Case-hardening iron. CARL HUMMEL. Ger. 507,206, Aug. 19, 1926. See Brit. 312,759 (*C. A.* **24**, 817).

Etching iron objects. WERK ROTHAU DER EISENWERKE A.-G. and FRITZ EISEN-

KOLB. Ger. 497,942, Feb. 28, 1926. Fe and its alloys are etched by a HCl or H_2SO_4 bath contg. a small quantity of albumin decompn. products.

Applying cast iron heads to steel stems in the manufacture of articles such as internal-combustion engine poppet valves. CLARENCE W. MILLER and RICHARD E. BISSELL (to Thompson Products, Inc.). U. S. 1,785,137, Dec. 16. The steel member is recessed and preheated while rotating and a flux is applied to the recess during preheating and prior to oxidation, and molten cast iron is deposited on the fluxed preheated recess while continuing the rotation, and the article is then quenched while the rotating is continued. App. is described.

Chilling cast steel and other alloys by the introduction of air into the annealing chamber at the end of the annealing process. HERMANN & SOHNE G. M. B. H. Ger. 498,813, Jan. 26, 1928. Details of the app.

Steel purification. LUSIFER PRODUCTS CO. Brit. 332,890, Jan. 21, 1929. Subsequent to the main finishing reactions, steel is purified by admixt. with the molten mass (preferably after removal of the main finishing slag but before solidification) of less than 1% of finely divided slag-forming materials consisting mainly of alumina, *e. g.*, a mixt. of Al_2O_3 80, SiO_2 4 and Fe_2O_3 16 parts. The purifying materials may be added in the ingot mold. Cf. *C. A.* 24, 1612

Rolling alloy steel. HOWARD M. GIVENS, FRANCIS B. FOLEY and JOHN L. COX. U. S. 1,786,297, Dec. 23. In rolling alloy steels that are strongly martensitic in character, rolling is effected within a range of temp., the upper limit of which is substantially above its crit. temp. on heating and the lower limit of which is substantially above its crit. temp. on cooling, and this is followed by cooling, without rolling, to a temp. below its crit. temp. on cooling, then reheating to a temp. not above its crit. temp. on heating, and the rolling is completed while cooling from the reheating temp.

Low-carbon chrome steel. FRANK O. KICHLINE (to Bethlehem Steel Co.). U. S. 1,785,199, Dec. 16. Comminuted pig iron contg. C is intimately mixed with crushed chrome ore and slag-forming material, and the mixt. is fused in an elec. furnace to effect reduction of Cr from the ore by the action of C in the pig iron.

Nickel-chromium steels. W. H. HATFIELD and H. GREEN. Brit. 333,237, Feb. 5, 1929. Austenitic Ni-Cr steels contg. Cr 10–25% and Ni 25–5% are rendered incorrodible by heating, after polishing and grinding or other suitable treatment, to 100–400° (200° in an example given) and then cooling either quickly or slowly. The alloys may also contain addnl. metals such as Mo, W, Cu, Al, Zr, V and Ti.

Strain hardening manganese steel. FRANK A. FAHRENWALD (to American Manganese Steel Co.). U. S. 1,784,865, Dec. 16. Spaced conchoidal elevations are formed upon a surface of the steel, and after heat treatment of the steel, and while the steel is cool, these elevations are depressed into the body of the casting.

Work-hardened manganese steel castings. FRANK A. FAHRENWALD (to American Manganese Steel Co.). U. S. 1,784,866, Dec. 16. A tool with a rounded end is pressed at spaced intervals into a cool casting after the latter has been heat treated.

Silicon steel. VERE B. BROWNE. U. S. 1,784,811, Dec. 16. By treatment such as refining with Al under a special Ca aluminate slag, silicon steel is prepd. contg. at least about 3% Si and having a watt loss value exclusive of cutting strains of less than 0.5 watts per lb. as indicated by the standard Epstein test and also having a relatively high permeability.

Alloys. ABRAHAM BIELINKI and JEAN J. COOMANNS. Ger. 484,557, May 8, 1929. In the prepn. of Cu-Zn-Ni alloys, especially those contg. about 56% Cu, 30% Zn and 14% Ni, small quantities of H_3BO_3, K_2CO_3, NaH_2BO_3, $NaHCO_3$, $K_2Cr_2O_7$, Al_2O_3 dust, pitch and $K_4Sb_2O_7$ are added to the molten metal. A small quantity of Bi may also be added.

Alloy. OTTO KAMPS. Fr. 686,475, Dec. 12, 1929. An Al alloy suitable for pistons contains Al, Th, Ni and Mn. An example contains Ni 0.3–1.5, Th 0.05–0.9, Ce up to 6.8, Cu 90, Mn 0.4–0.8 and Al the rest. The alloy is refined by tempering it from a temp. of 480–535° in a bath of $BaCl_2$ and afterward heating to a temp. of 50–300°.

Ductile heat-treated aluminum alloy. NOAK V. HYBINETTE (to Hybinette Patents Corp.). U. S. 1,785,774, Dec. 23. A highly ductile fully heat-treated Al alloy "commercially free" from inter-cryst. corrosion and suitable for stamping from sheet form contains Zn 0.5–1.0, Mg 0.5–1.0, Cd 0.05–0.15 and Cu, Ni, Co, Mn, Cr, W and Mo not exceeding 0.25% each or a total of 0.50%.

Coloring aluminum and alloys. ALADAR PACZ. Ger. 487,754, Jan. 19, 1929. Objects of Al and its alloys, especially Al-Si, are colored by using solns. of molybdates in the presence of Sb compds. Salts of HF or H_2SiF_6 or $(COOH)_2$ or mixts. may be used.

Thus, an Al piece is colored by immersion in a hot soln. of Sb_2O_3, $(NH_4)_2MoO_4$, Na_2SiF_6 and $(COONH_4)_2$.

Coating aluminum or its alloys. ALADAR PACZ. Ger. 508,207, May 13, 1928. Addn. to 480,995. In giving Al and its alloys a fast coating of color by the method of 480,995 (*C. A.* **23**, 4924), Zn salt is added to the non-ammoniacal color bath, contg. also molybdates and salts of HF and H_2SiF_6.

Bronze alloys. G. BÄRTGES. Brit. 333,442, Oct. 2, 1929. Alloys contg. Al 7–13 and Fe 2–6%, the remainder being Cu, are formed by melting the metals with slag-forming materials such as alkalies or borax and deoxidizing agents such as Na, K or Mg, pouring the melt, and, after solidification, remelting under a covering of the slag produced in the first melting, with further addn. of deoxidizing agents such as Mg.

Bronze. GERHARD STRATENWERTH. Ger. 505,963, April 21, 1928. Bronze suitable for machine bearings consists of 97% Cu, 2% W and 1% V.

Alloy of copper, manganese and zinc. JONATHAN N. WHITE. U. S. 1,785,372, Dec. 16. An alloy which is suitable for thermostatic bellows, etc., comprises Cu 93–95, Mn 1.00–1.25%, the remainder being Zn.

Alloys of copper, nickel and iron. W. P. DIGBY. Brit. 333,774, May 30, 1929. In forming an alloy contg. Cu 25–45 and Ni 5–15%, the remainder being Fe with or without addn. of Cr up to 20% the quantity of the Fe, the constituents may be melted in a gas, coke or oil-fired furnace and the product finished in an induction furnace or the entire manuf. may be carried out in an induction furnace. Mn may be added 5 min. before pouring and Mg may be added just before pouring. Cf. *C. A.* **24**, 2714.

Magnesium or its alloys. THE DOW CHEMICAL CO. Fr. 686,335, Dec. 9, 1929. Mg or its alloys are freed from non-metallic impurities such as those obtained in the electrolytic vat by heating in a large bath with a convenient flux such as $MgCl_2$ to which NaCl is added to lower its m. p. The metal is partially melted and is agitated in the bath to reunite the particles of metal, which is then cleaned with the flux. Cf. *C. A.* **24**, 2714.

Molding magnesium and its alloys. I. G. FARBENIND. A.-G. Fr. 686,642, Dec. 14, 1929. In making molded objects from Mg or its alloys in sand molds, the protective substances used are composed of substances or mixts. of substances which contain NH_4F fixed in a complex form or conjointly with a substance of acid reaction. Thus, a mixt. of NH_4F or $(NH_4)_2SiF_6$ with a substance fixing NH_3, such as oxalic acid, may be used.

Nickel-iron alloys. JOHN H. WHITE (to Bell Telephone Laboratories, Inc.). U. S. 1,785,060, Dec. 16. There is added to an alloy of Fe and Ni, while it is molten, an amount of another alloy of Ni and a substance such as Ta or (Cb in smaller quantity than the Ni) such that the Ta or Cb will have a mass less than 1% of the total Ni-Fe content of the resulting alloy. The product may be readily forged without impairing its permeability.

Thorium alloys. KEMET LABORATORIES CO. Ger. 505,964, Dec. 23, 1926. See U. S. 1,732,326 (*C. A.* **24**, 51).

Inhibitors for use with pickling solutions in treating metals. WM. S. CALCOTT and IRA E. LEE (to E. I. du Pont de Nemours & Co.). U. S. 1,785,513, Dec. 16. In processes such as the treatment of steel with a dil. H_2SO_4 soln., attack of the soln. on the free metal is inhibited by a very small proportion of a compd. such as thiophenol, thio-β-naphthol, benzylmercaptan, isoamylmercaptan or isopropylmercaptan. An addn. of only 0.03% of the inhibitor may suffice.

Coating materials. OTTO SPRENGER PATENTVERWERTUNG JIROTKA M. B. H. Ger. 492,707, Mar. 16, 1928. Addn. to 442,766. The method of coating objects made of Al or Al alloys described in 442,766 (*i. e.*, by immersion in a bath of heavy metal salt soln. to which alkali carbonate alone or with alkali chromate is added) is modified for giving Zn coatings to Al or Mg-free Al alloys, by adding borax to the soln. of Zn salt.

Coating metals. EUGEN VOPEL. Ger. 505,728, July 17, 1927. Holes in Fe articles to be coated, *e. g.*, zinced, are covered with paper treated with a soln. of alc., gelatin, NaCl and $K_3FeC_6N_6$.

Cadmium coatings. LEOPOLD ROSTOSKY and ERICH LÜDER. Ger. 504,888, Oct. 18, 1928. In producing a Cd coating on metals and alloys in a molten bath, a flux is used consisting of a mixt. of heavy metal halides with halides of light metals or their related elements in the first, second and third groups of the periodic table. An example mentions a flux consisting of KCl 25, $MgCl_2$ 20, NaCl 20, $ZnCl_2$ 33 and NH_4Cl 2%.

Lead shot plated with other metal such as copper. EDWIN PUGSLEY (to Winchester Repeating Arms Co.). U. S. 1,785,493, Dec. 16. Globules of molten Pb are dropped

into a soln. of a metallic salt such as $CuSO_4$ contg. a metal such as Fe adapted to replace the metal of the salt when Pb is dipped in the soln., to effect formation of Pb shot and plating of the shot with the metal of the salt used.

Tinning apparatus suitable for tinning the edges of strip stock. HARRY W. BUNDY (to Bundy Tubing Co.). U. S. 1,785,762, Dec. 23. Structural features.

Galvanizing wire, etc. SPEZIALFABRIK FÜR ALUMINIUMSPULEN UND -LEITUNGEN G. M. B. H. Ger. 497,943, Oct. 23, 1927. Details of app. for coating wire, etc., with Al or Al alloys.

Galvanizing hollow bodies. METALLWARENFABRIK JOHANN JÄCKLE. G. M. B. H. Ger. 505,979, Feb. 20, 1929. Details of the app.

Arrangement for galvanizing the insides of long hollow bodies. WILHELM A. F. PFANHAUSER. Ger. 497,941, Mar. 15, 1929.

Iron zincing pans. OTTO MIDDERMANN. Ger. 505,678, Dec. 13, 1928. The sheet Fe walls of the pans are rendered non-porous, *e. g.*, by an C_2H_2 burner.

Removing lead coatings from articles such as cold-drawn steel rods or tubes. KIEL B. BOWMAN (to Republic Steel Corp.). U. S. 1,785,245, Dec. 16. The Pb coating is oxidized (suitably by the action of $NaNO_3$ at 410°) and the oxidized coating is then removed with an acid such as HCl or HNO_3.

Metal coatings on wood, stone, etc. HERMANN MAYR. Ger. 505,508, Aug. 4, 1928. The objects are coated with a prepn. made by fusing and cooling metal powder 40–70, wax 60–90, powd. graphite 60–90, pptd. chalk 100–150, water glass 180–220 and casein 40–70 parts.

Welding copper. W. ANDREWS and IMPERIAL CHEMICAL INDUSTRIES, LTD. Brit. 333,466, Nov. 2, 1929. A welding rod suitable for use in welding Cu by the C_2H_2 or similar gas-welding process is formed of Cu together with a small proportion of Ag (suitably 0.5%) and deoxidant such as P, coated with a deoxidant and a flux such as a mixt. of feldspar with a deoxidant alloy contg. Mg, Mn and Si. Various details and examples are given with formulas of mixts. used.

Welding steel pipes or tubes. AIR REDUCTION CO. Brit. 332,869, Dec. 10, 1928. Strip metal or open-seamed tubes are heated to a relatively high temp., above redness, in a furnace and the edges are then progressively welded together while supplying reducing gas to remove scale or oxide and protect the tube from reoxidation until it cools. App. and various details of procedure are described.

Welded chemical apparatus, etc. W. ANDREWS and IMPERIAL CHEMICAL INDUSTRIES, LTD. Brit. 332,894, Jan. 29, 1929. Welded app. is made from Cu contg. a small proportion of a deoxidant such as P, Si, B or Cd, and welding may be effected electrically or by gas with a composite welding rod contg. Cu alloyed with Ag and a deoxidant (suitably with use of a flux which may be formed of microcosmic salt 45, powd. borax glass 35–45, H_3BO_3 up to 10, Mg silicate 6, PbO 3 and LiF 1%).

Plant for utilizing and vaporizing liquid oxygen for welding, etc. PETITS FILS DE F. DE WENDEL ET CIE. Brit. 332,833, June 7, 1929. Structural features.

Soldering flux. HAROLD J. BARRETT (to Grasselli Chemical Co.). U. S. 1,785,173, Dec. 16. A polymerized org. ester of vinyl alc. such as polymerized vinyl acetate is used in soft soldering.

Soldering flux. HARRY P. CORSON (to Grasselli Chemical Co.). U. S. 1,785,180, Dec. 16. A sulfonated vegetable oil is used in soft soldering, *e. g.*, sulfonated corn, castor or cotton-seed oils or their Na and NH_4 salts. U. S. 1,785,181 relates to a flux comprising $ZnCl_2$ and an aldehyde such as CH_2O, acetaldehyde, butyraldehyde, propionaldehyde, α-ethyl-β-prophylacrolein, aldol or benzaldehyde.

Soldering flux. HARRY B. DYKSTRA (to Grasselli Chemical Co.). U. S. 1,785,115, Dec. 16. A chlorinated resin is used as a flux in soft soldering.

Soldering flux. GEORGE LUTZ (to Grasselli Chemical Co.). U. S. 1,785,131, Dec. 16. $ZnCl_2$ is used with a sulfonated vegetable oil compd. such as sulfonated castor oil in soft soldering.

Soldering flux. HOWARD S. MCQUAID (to Grasselli Chemical Co.). U. S. 1,785,134, Dec. 16. An ethanolamine is used in soft soldering of tin plate, etc. U. S. 1,785,135 specifies the use of an org. amine soap such as an ethanolamine oleate or aniline oleate as a soldering flux in soft soldering.

Soldering flux. WM. SCHWEITZER (to Grasselli Chemical Co.). U. S. 1,785,147, Dec. 16. $ZnCl_2$ is used with a sulfonated mineral oil.

Soldering flux. EDWARD A. TAYLOR (to Grasselli Chemical Co.). U. S. 1,785,155, Dec. 16. $ZnCl_2$ is used with an alkyl naphthalenesulfonic acid compd. such as propyl- or butyl-naphthalenesulfonic acids or their salts or the corresponding benzyl- or cyclohexyl naphthalenesulfonic compds.

10—ORGANIC CHEMISTRY

CHAS. A. ROUILLER AND CLARENCE J. WEST

An introduction to the practice of organic chemistry. GARFIELD POWELL. *J. Chem. Education* **8**, 107–14(1931). E. H.

New laboratory preparations for the course in organic chemistry. II. Decane from amyl bromide by the Wurtz reaction. HARRY F. LEWIS AND MARTHA TRYON. *J. Chem. Education* **7**, 2712–4(1930); cf. *C. A.* **24**, 2424.—Details of the reaction $AmBr + 2Na = Am_2 + 2NaBr$ are given, the yield being 55–65% of a product b. 170–4° (cor.). C. J. WEST

Polymerization and ring formation. VII. Normal paraffin hydrocarbons of high molecular weight prepared by the action of sodium on decamethylene bromide. WALLACE H. CAROTHERS, JULIAN W. HILL, JAMES E. KIRBY AND RALPH A. JACOBSON. *J. Am. Chem. Soc.* **52**, 5279–88(1930); cf. *C. A.* **24**, 5725.—The action of Na on $Br(CH_2)_{10}Br$ in Et_2O gives a mixt. of paraffins of the general formula $H[(CH_2)_{10}]_nH$; by fractional distn. in the mol. still and by crystn., the following individuals have been isolated from this mixt.: eicosane, triacontane, *tetracontane* (I), *pentacontane* (II), *hexacontane* (III), *heptacontane* (IV). I, $C_{40}H_{82}$, m. 80.5–1°, b. 150° at 10^{-3} mm.; II, $C_{50}H_{102}$, m. 91.9–2.3°, b. 200°; III, $C_{60}H_{122}$, m. 98.5–9.3°, b. 250°; IV, $C_{70}H_{142}$, m. 105–5.5°, b. 300°. The residue remaining from the sepn. of the hydrocarbons named amounts to about 25% of the total and is composed of still higher members of the same series which it has not yet been possible to sep. The mechanism of the reaction is discussed. **VIII. Amides from ε-aminocaproic acid.** W. H. CAROTHERS AND GERARD J. BERCHET. *Ibid* 5289–91.—$(H_2N)(CH_2)_5CO_2H$, heated at 210–20°, or its Et ester, heated to 160–200°, reacts with itself both intra- and intermolecularly and yields the 7-ring *lactam* (I) (about 30%) and a *polyamide* (II) (about 70%); II is a hard gray wax, sol. in $HCONH_2$, m. 212–4°; II is quant. hydrolyzed in 6 hrs. by boiling concd. HCl to the original acid; partial hydrolysis of II gives polyaminocaproylaminocaproic acids; boiling II with concd. HCl for 1 hr. gives 50% unchanged II and a sol. product, yielding a *p*-$MeC_6H_4SO_2$ deriv. corresponding with the formula $C_7H_7SO_2[NH(CH_2)_5CO]_3NH(CH_2)_5CO_2H$. Mol.-wt. detns. in PhOH gave values from 800–1200 and it may be assumed that II contains at least 10 mols. of the acid. No I can be obtained from II by heating to a high temp. in high vacuum. C. J. WEST

The chemical constitution of the hydrocarbons of Echinacea angustifolia. ESLI LONGWORTH WOODS. *Am. J. Pharm.* **102**, 611–30(1930).—The oil was found to be optically inactive, d_{15} 0.801 and n^{20} 1.4480, yellow in color. Distn. of 100 cc. of oil gave 5 cc. below 260°, 77 cc. from 260–8° and 15 cc. from 268–306°. Tables show the b. p. range and the consts. of each fraction and also the b. p., vol. and d. of each refractionation under reduced pressure. The unsatd. hydrocarbon was found to absorb but little O with the formation of a peroxide. The reaction of BzO_2H with the oil followed by hydration with dil. H_2SO_4 was found to result in the formation of at least 3 different products. (1) Erythrol (C 64.86 and 64.57%, H 11.52 and 11.36%; theory for $C_{15}H_{28}(OH)_4$ 65.21% C and 11.59% H). (2) Solid m. 135–6° and resembling the erythrol closely in general phys. properties. It differs in being insol. in hot $CHCl_3$ and in hot C_6H_6. Analysis: C 66.4 and 65.86%, H 10.36 and 10.87%. (3) A viscid brown oil obtained as the main product of the reaction, showed a proportion of C and H corresponding to the erythrol less one mol. of H_2O. Acid value 24.8 and sapon. value 134.8. Analysis: C 69.37 and 69.17%, H 11.48 and 11.39%; theory for $C_{15}H_{27}(OH)_3$ 69.76% C and 11.62% H. Following is a summary of the degradation products obtained in both the aq. and the acetone $KMnO_4$ oxidations (quantities are based on 100 g. of oil): with 300 g. $KMnO_4$ in H_2O (reaction became very slow after addn. of this proportion of $KMnO_4$), unchanged oil recovered 15–20 g., CO_2 trace, AcOH appreciable, hexoic and heptoic acids 10–15, myristic acid 1–1.5, unsatd. acid $C_{13}H_{24}O_2$ none, dihydroxytridecylic acid 0–1, adipic acid 3–4, pimelic acid 1–2, brown viscid acid trace, oxalic acid none; with 570 g. $KMnO_4$ in acetone, unchanged oil recovered 3–5, CO_2 large amount (from oxidation of acetone itself), AcOH large amt. (from oxidation of acetone itself), hexoic and heptoic acids 33–35, myristic acid 5–6, unsatd. acid $C_{13}H_{24}O_2$ 5, dihydroxytridecylic acid 3, adipic acid 6–7, pimelic acid 16–20, brown viscid acid 16, oxalic acid trace. In the light of the various products which have now been obtained, the structure for the hydrocarbons of oil of echinacea suggested by Bischoff (*C. A.* **19**, 874), $C_{15}H_{28}$, an aliphatic tetrahydrosesquiterpene with 2 double bonds (a possible structure $C_5H_{11}CH{:}CHCH_2CH{:}CHC_5H_{11}$ in which the pentyl groups are of an iso character was suggested, although the evidence was insufficient to establish this formula), must be modified with respect to the

positions of the double bonds. The following formula might be accepted as satisfactorily accounting for the four main degradation products, hexoic, heptoic, adipic and pimelic acids: $Me_2CH[CH_2]_3CH{:}CH[CH_2]_5CH{:}CH_2$. Heptoic and pimelic acids would result from the complete oxidation of the double bonds, and hexoic and adipic acids, resp., might be formed by the further oxidation of these primary products. On the other hand, it may be assumed that all 4 of these acids are primary oxidation products of the oil, resulting from 2 isomeric hydrocarbons which differ in the position of one double bond: $Me_2CH[CH_2]_2CH{:}CH[CH_2]_5CH{:}CHMe$ and $Me_2CH[CH_2]_3CH{:}CH[CH_2]_4CH{:}CHMe$. The 1st compd. would yield hexoic and pimelic acids on oxidation and the 2nd compd., heptoic and adipic acids. The unsatd. acid obtained from the reaction in acetone may be regarded as derived from either of the above formulas by complete oxidation of the double bond nearest the end of the chain: $Me_2CH[CH_2]_3CH{:}CH[CH_2]_6CO_2H + HOAc$. The dihydroxytridecyclic acid would represent the next step in the oxidation: $Me_2CH[CH_2]_2CH(OH)CH(OH)(CH_2)_6CO_2H$. The presence of these 2 intermediate compds., and the apparent absence of any 8- or 9-C compds. of a similar nature, among the degradation products, may be taken as indicating to some extent the mechanism of the reaction. The double bond nearer the end of the chain in the original compd. would appear to be more readily attacked by the oxidizing agent, and to be completely oxidized before the second double bond is affected. Since myristic acid could not be obtained by oxidation from a hydrocarbon $C_{15}H_{28}$ with 2 double bonds, its presence among the degradation products necessitates the assumption of a more satd. compd. in the original oil, a straight chain compd. with one double bond, $Me[CH_2]_{12}CH{:}CH_2$. The myristic acid could be isolated quantitatively from the reaction mixt. with a fair degree of accuracy, and was obtained in practically the same proportion in all reactions. From the amt. of this acid obtained it would appear that the original oil contains from 5 to 10% of the more satd. hydrocarbon. It is further evident from this study that the hydrocarbons of oil of echinacea are not to be regarded as polymerization products of isoprene. Ruzicka (*Ueber Konstitution und Zusammenhange in der Sesquiterpenreihe*, Monograph, 1928) has pointed out that the structures of certain aliphatic as well as the cyclic sesquiterpenes may be regarded as derived from the polymerization of 3 isoprene mols. The chain of an aliphatic sesquiterpene formed by the polymerization of 3 isoprene mols. would necessarily have 3 branches: $CH_2{:}CMe{-}CH_2CH_2CH{:}CMeCH_2CH_2CH{:}CMeCH{:}CH_2$. Such a structure cannot be harmonized with the results of the present investigation. To explain the formation of these hydrocarbons in the plant by the decarboxylation of fatty acids, according to the generally accepted view for non-terpene hydrocarbons, the preëxistence of branched-chain acids must be presumed. The straight-chain hydrocarbon, of which the myristic acid is the oxidation product, might be formed by the decarboxylation of β-tridecylacrylic acid, $Me[CH_2]_{12}CH{:}CH\boxed{COO}H$. The acids from which the other hydrocarbon or hydrocarbons, mentioned above, could be obtained in the same manner must be of an iso character, $Me_2CH[CH_2]_2CH{:}CH[CH_2]_6CH{:}CHCH_2\boxed{COO}H$. The brown viscid acid from the $KMnO_4$ oxidation closely resembles the oil from the BzO_2H reaction in phys. character, and probably bears a close structural relationship to it. W. G. G.

Pyrolysis of propylene. Charles D. Hurd and Richard N. Meinert. *J. Am. Chem. Soc.* **52**, 4978–90(1930).—$MeCH{:}CH_2$ is rapidly decompd. at temps. above 600° in pyrex or quartz. The gaseous products are largely H, CH_4 and C_2H_4 with smaller amts. of C_2H_2 and C_2H_6. Aromatic liquids (C_6H_6, PhMe, etc.), comprise approx. 25% of the total reaction products. The reaction has been shown to be predominantly homogeneous and unimol. A mechanism for the reaction is suggested. Under comparable conditions in monel metal, decompn. of $MeCH{:}CH_2$ begins at a much lower temp., namely, 350°. The products are largely C and H and the reaction is autocatalytic. As compared with isobutylene, $MeCH{:}CH_2$ has been shown to undergo an almost identical type of pyrolysis. C. J. West

Hexa-*ω-tert*-butylpropinylethane and some new acetylenic compounds. I. L. Ozanne and C. S. Marvel. *J. Am. Chem. Soc.* **52**, 5267–72(1930); cf. Gillespie and Marvel, *C. A.* **24**, 4756.—$BrCH_2CBr{:}CH_2$ and Me_2CMgCl (1.33 mols.) in Et_2O give 45–62% of *4,4-dimethyl-2-bromo-1-pentene* (I), b. 135–8°, d_4^{20} 1.030, n_D^{20} 1.4630. With $NaNH_2$ in a mineral oil and $C_6H_4Me_2$ at 160–5°, there results 37–45% of *4,4-dimethyl-1-pentine* (II), b. 73–5°, d_4^{20} 0.7154, n_D^{20} 1.4028; *Hg compd.*, $C_{14}H_{22}Hg$, m. 125–6.5°. II and EtMgBr, followed by $CO(OEt)_2$ give 68% of *tri-ω-tert-butylpropinylcarbinol* (III), m. 50–1°. The action of AcBr on III, followed by mol. Ag, gives 24% of *hexa-ω-tert-butylpropinylethane* (IV), m. 127.5–8.5°; IV turns yellow on standing in the air for a few hrs.;

at 0° it remains colorless for over 1 week. A dry Et_2O soln. reacts almost instantly with KNa to give a red metal alkyl; IV does not react with 1% Na-Hg and the results with 40% Na-Hg were inconclusive. The metal alkyl could not be converted to a cryst. acid with CO_2 followed by a mineral acid. I on ozonization gives $Me_3CCH_2CO_2H$, whose *p-bromophenacyl ester* m. 81–1.5°. IV and O_2 give the same acid (28% yield). II and EtMgBr, followed by Ph_2CO, give 85% of *ω-tert-butylpropinylbiphenylcarbinol*, $b_{0.4}$ 135°, m. 55–6°; PCl_5 in petr. ether gives the *bromide*, light brown liquid, yielding with mol. Ag *sym-di-ω-tert-butylpropinyltetraphenylethane*, m. 116–8°; this gives a red color with KNa, but the metal alkyl could not be converted into the corresponding acid. II, EtMgBr and BzOEt give *di-ω-tert-butylpropinylphenylcarbinol*, $b_{0.4}$ 135–7°, d_4^{20} 0.9325, n_D^{20} 1.5080. Cyclohexylpropine, EtMgBr and Ph_2CO give *diphenyl-ω-cyclohexylpropinylcarbinol*, $b_{1.1}$ 210–5°, d_4^{20} 1.058, a_D^{20} 1.5750. *Phenyl-di-ω-cyclohexylpropinylcarbinol*, $b_{0.017}$ 180–5°, d_4^{20} 1.014, n_D^{20} 1.5390. C. J. WEST

Synthesis of 1,4-pentadiene. PAUL N. KOGERMAN. *J. Am. Chem. Soc.* **52**, 5060–5(1930).—An improved method and app. are described for the prepn. of CH_2:CHBr in 85% yield from $(CH_2Br)_2$ and EtOH-KOH. $CH_2(CH{:}CH_2)_2$ was prepd. by the action of Mg upon CH_2:$CHCH_2Br$ and CH_2:CHBr at atm. pressure and under a pressure of 260–270 mm. The yield of the tetra-Br deriv. is about 22%; best results are obtained with the use of a Mg-Cu alloy, finely ground. Regeneration of $CH_2(CH{:}CH_2)_2$ was effected by Mg, about 73% being obtained; the pure product b_{756} 25.8–6.2°, d_4^{20} 0.6594, n_D^{20} 1.3883. The supposed liquid tetrabromide is formed in comparatively small quantities or it may isomerize on distn. C. J. WEST

Highly polymerized compounds. XLIV. Polyvinyl bromide. H. STAUDINGER, M. BRUNNER AND W. FEISST. *Helv. Chim. Acta* **13**, 805–32(1930); cf. *C. A.* **24**, 5717.—Vinyl bromide, pure or in PhH, was polymerized in 12–35 days by sunlight and very rapidly by ultra-violet rays. In an atm. of pure H_2 polymerization does not readily occur. The polymerized product is a mixt. of several compds. Heated with $ZnEt_2$ in xylene it yielded ethane and a somewhat unsatd. hydrocarbon sol. in org. solvents, mol. wt. between 1890 and 3100. The same product and CH_4 are obtained when $ZnMe_2$ is used. It is thought that the hydrocarbon has a structure similar to rubber but with only about half as many double bonds. Polyvinyl bromide reduced with Zn and AcOH in xylene gives a mixt. of products, one of which is a satd. hydrocarbon with a mol. wt. of about 220. Reduction with HI and red P gives a mixt. of what are apparently paraffins contg. from 40 to 100 or more C atoms. **XLV. Asymmetric polydichloroethylenes.** H. STAUDINGER AND W. FEISST. *Ibid* **13**, 832–42.—The polymerized substance is a mixt of compds. which are fully satd. chains built up of from about 50 to 100 mols. of CH_2:CCl_2. Reduction with HI and red P gives a mixt. of paraffins contg. 36–160 C atoms. Reduction with Zn dust, glacial AcOH and HCl gas yields an insol. substance contg. about half as much Cl as the original polymer. Heated with $PhNH_2$, HCl splits off and a brown substance sol. in PhH is obtained which consists possibly of long chains of $-CH_2—C(:NC_6H_5)—$ units. L. E. GILSON

Cacodylates and methylarsonates. G. C. GUALDONI. *Giorn. farm. chim.* **79**, 78–9, 82–3(1930).—The usual methods of prepn. and of qual. and quant. analysis of Na cacodylate and Na methylarsonate are described. G. SCHWOCH

Electrolysis of Grignard solutions. H. E. FRENCH AND MARY DRANE. *J. Am. Chem. Soc.* **52**, 4904–6(1930).—Et_2O solns. of iso-AmMgCl were subjected to electrolysis with anodes of various metals and cathodes of Pt. Anodes of Al, Zn and Cd were dissolved off as the result of electrolytic action. Those of Bi, Au, Ni, Ag and Sn were not attacked. The amt. of Al which went into soln. was approx. equiv. to the quantity of current passing through the cell. In several cases where the anode was not attacked, an amt. of iso-AmMgCl equiv. to the amt. of current passing through the cell was decompd. C. J. WEST

Magnesium dialkyls. An historical note on the first preparation of an alkylmagnesium halide. HENRY GILMAN AND ROBERT E. BROWN. *J. Am. Chem. Soc.* **52**, 5045–8(1930).—A description is given of some general properties of Mg dialkyls prepd. from Mg and Hg dialkyls and RMgX prepd. from alkyl iodides and Mg (with no solvent). The first RMgX or its equiv. was prepd. by Hallwachs and Schafarik in 1859 in the absence of Et_2O but the use of Et_2O by Grignard first made possible the extensive applications of these compds. C. J. WEST

Morphology of substances of high molecular weight. I. Fiber formation with polyoxymethylenes. HANS W. KOHLSCHÜTTER. *Ann.* **482**, 75–104(1930).—The sublimates of certain polyoxymethylene prepns. are found to be composed of fibers which,

formerly regarded as relatively simply built up, being oriented along the length of the mol., are actually very diverse in nature; they are classified as complicated structural forms the character of which depends on a fine gradation of chem. differences. Polyoxymethylene (I), when heated with a trace of H_2SO_4, dissoc. into gaseous HCHO and trioxymethylene (II); the latter accelerates the repolymerization of HCHO. Moreover, supercooled II (m. 64°) dissolves HCHO and when the soln. crystallizes the meanwhile polymerized product seps. in a definitely oriented way and an aggregate of more or less pronounced "fiber structure" results. II may also sep. from the gaseous phase in needle crystals; the I formed by the condensation of HCHO on the surface will then also possess an orientation. In either case the II occupies the role of framework, a macroscopic fiber consisting of a pseudomorph of I on a II crystal II can itself undergo a kind of lattice conversion, by which it approximates in its properties to complex I and then forms an integral part of the fiber structure This change occurs under the influence of the polymerizing HCHO even during crystal growth and leads to particularly stable I fibers of stable uniform inner structure By systematic variation of the sublimation conditions it has been possible to reproduce all degrees of phys., chem. and morphological differences. C. J. West

Polymerization and condensation. VI. 5,6-Dihydroxyhexanone. P. A. Levene and A. Walti. *J. Biol. Chem.* **88**, 771-98(1930); cf. *C. A.* **22**, 274, **24**, 341.—The condensations of 5,6-dihydroxy-2-hexanone (I) are comparable to those of dihydroxyacetone previously studied. It probably consists of cylic and straight-chain forms in equil. The di-Ac deriv. is a straight chain, the Me deriv. is cyclic. It readily yields an unstable desoxydisaccharide on standing. The polymerization compd. of Hibbert and Timm (*C. A.* **17**, 3861) is probably produced by the anhydride formation giving rise to a double bond which causes the substance to polymerize, and the polymerization of the desoxyglucoses may be analogous, since I is a model of a desoxy sugar. I was prepd. via α-acetyl-δ-chloro-γ-valerolactone by Traube and Lehmann's method (*Ber.* **34**, 1971(1901)) (yield 70%), $b_{0.3}$ 120°, $[M]_D$ 32.81; calcd for cyclic form 32.40, for chain 32.97. The diacetate (II) $b_{0.6}$ 112–4°, $[M]_D$ 52.00; calcd. for cyclic form 51.13, for chain 51.7. From 1 g. II was obtained 1.3 g. *semicarbazone*, m. 112° (decompn.), confirming the straight-chain formula. To a soln. of 10 g. I in 100 g. dry MeOH contg. 0.5% HCl, dry Ag_2CO_3 was added after 4 hrs. and 10 g. *methylcyclo-5,6-dihydroxy-2-hexanone* (III) distd. off, $b_{1.5}$ 66–9°, $[M]_D$ 36.97; calcd. for cyclic form 37.13; *acetate* b_{16} 102–4°. To 18 g. III were added 50 g. Ag_2O and 150 g. MeI in 4 portions; the mixt. was heated 5 hrs., extd. with Et_2O and fractionated, giving 9.4 g. *dimethylcyclodihydroxy-2-hexanone*, b_{17} 74°, $[M]_D$ 41.72 (calcd. 41.87), and 1.2 g. of an *anhydrodihydroxyhexanone*. From I, on standing, was obtained 33 g. of a *dihydroxyhexanonyldihydroxyhexanone* (IV), $b_{0.3}$ 175 80°. Acetylation of IV gave *diacetyldi(dihydroxyhexanone)anhydride*, $b_{0.2}$ 170–80°. From 1.7 g. was obtained 1.2 g. of *methylcyclodihydroxyhexanone*, like III, b_{15} 101–3°. *Hibbert and Timm's compd.*; 9 g I and 0.009 g. H_2SO_4 were heated 4 min. at 155° and the resin kept at 100° under reduced pressure. It had the compn. of an anhydride but gave a monoacetate, not distillable. By heating 40 g. I 4 hrs. at 150°, cooling every 2–3 hrs., and distg. at 1 mm. into a freezing mixt., extn. with Et_2O and fractionation, the *monomol. anhydride* was obtained, b_{20} 40°, mol. wt. 121.7, $[M]_D$ 28.57; calcd. for two O rings 28.79, for double bond 30.41 The double ring was confirmed by the parachor. By acetylation of the reaction mixt. before distg., the monoacetate (V) was obtained, b_2 58°, $[M]_D$ 39.55; calcd. for double bond 39.77. From the receiver was also isolated an *anhydrodihydroxyhexanone acetate*, b_1 50–53°. Reduction of 1 g. V with 35 cc. H_2 by means of 0.05 g. Adams catalyst gave 0.5 cc. of *dihydro deriv.*, b_{12} 95°. On heating 20 g. I 3 times for 3.5 hrs. at 150°, and distg. at 230°, a *polymerized anhydride* was obtained. The acetate was not distillable. MeOH contg. 0.5% of HCl gave a *MeO deriv.* Hydrogenation of 7 g. I in 40 cc AcOH with 1800 cc. H_2 in presence of 0.12 g. Adams catalyst, evapn. of the acid, extn. with Et_2O and fractionation, gave 3 g. of a *monohydroxyhexanone*, b_{14} 70–3°. The monoacetate b_{11} 88°, $[M]_D$ 40.32; calcd. for cyclic form 40.24, for chain 40.81. K. V. Thimann

Urotropine. S. Akai and H. Kataoka. *J. Pharm. Soc. Japan* **50**, 850–63(1930).—A general review on the prepn. and use of urotropine including exptl. data. F. I. N.

The action of organomagnesium compounds upon crotonic anilides, substituted in the nitrogen. N. N. Maxim and N. Ioanid. *Bul. soc. chim. Romania* **12**, 28–32 (1930).—M. and I. allowed substituted anilides of crotonic acid to react with organomagnesium compds. and obtained anilides of the corresponding satd. acid with a yield of about 50–60% according to the equation: $MeCH{:}CHCONRPh \xrightarrow{R'MgX} MeCHR'\text{-}CH_2CONPhR$ and if these were treated with 40% HBr, the corresponding satd. acids

were obtained: $MeCHR'CH_2CONPhR \xrightarrow[H_2O]{HBr} MeCHR'CH_2CO_2H$. As starting materials, M. and I. used the methyl- and the ethylanilide of crotonic acid, which were obtained by allowing PhNHMe and PhNHEt to react upon crotonyl chloride. Ethyl- and phenylmagnesium bromide were the Grignard reagents used. In this way, M. and I. prepd. and described MeCH:CHCONMePh, the ethylanilide, and, by the action of EtMgBr upon the methylanilide, the methylanilide of β-methylvaleric acid. 40% HBr transforms this into the $MeCHEtCH_2CO_2H$. The action of PhMgBr upon the $MeCH:CH_2CONMePh$ gave the methylanilide of β-phenylbutyric acid and this with 40% HBr furnished $MeCHPhCH_2CO_2H$ and finally they allowed EtMgBr to act upon the MeCH:CHCONEtPh, giving the ethylanilide of β-methylvaleric acid which through hydrolysis with 40% HBr furnished $MeCHEtCH_2CO_2H$.

F. R. GREENBAUM

A substance contained in the expressed liquid from olives. F. TRAETTA-MOSCA AND M. VENEZIA. *Ann. chim. applicata* 20, 449–51(1930).—A cryst. product has been obtained by extg. the expressed liquid from olives, after freeing from oil, with EtOH. It is sol. in water, insol. in org. solvents, m. 164°. The mol. wt., Ac deriv. and phenylhydrazone (of the product after oxidation with HNO_3) indicate a product $C_8H_{14}O_8$ + H_2O (crystn.). It is optically inactive, and is not a reducing agent. A. W. C.

The α-oxidation of acetaldehyde and the mechanism of the oxidation of lactic acid. JAMES B. CONANT AND CARL O. TONGBERG. *J. Biol. Chem.* 88, 701–8(1930); cf. *C. A.* 24, 1080.—From the oxidation of HAc by 0.2 *M* $Ce_2(SO_4)_3$ in 0.5 *N* H_2SO_4 at 80° about 10% of glycolaldehyde *p*-nitrophenylosazone was isolated, together with traces of $(CHO)_2$, the bulk of the products being HCO_2H and CO_2. Oxidation of lactic acid under similar conditions yielded 8% of the osazone, together with $OHCCO_2H$, HCO_2H and HCHO. The first step in the oxidation of HAc, whether produced from lactic acid or not, is considered to be introduction of O in the α-position. A similarity to *in vivo* processes and the possible polymerization of the intermediate compds. to carbohydrates are suggested. K. V. THIMANN

Photochemical oxidation of lactic acid. G. RICHARD BURNS. *J. Am. Chem. Soc.* 52, 5272–8(1930).—When lactic acid is decompd. by ultra-violet radiations in a soln. contg. dissolved O the chief products are CO_2, AcH, a peroxide and AcOH. Neither EtOH nor $AcCO_2H$ is formed. On the basis of the CO_2 evolved the O used was 118%, peroxide formed 32%, $AcCO_2H$ 0, CO 0.4%. As the oxidation was continued for longer periods the CO_2 given off equaled the O used. The amt. of peroxide in the soln. remained const. after the 1st hr. of oxidation but the aldehyde concn. increased. The products isolated by distn. were AcOH 75% (on CO_2), AcH 28%, HCHO 1%, HCO_2H not more than 0.4%. When the soln. was allowed to stand for 48 hrs. before analysis, an additional 12% of CO_2 was evolved, the peroxide content dropped to 10% and the aldehyde to 12%. The quantum yield in this reaction is several times that of the decompn. reaction without O. C. J. WEST

The behavior of polyhydroxy acids upon heating. K. H. BAUER AND A. EBERLE. *Z. angew. Chem.* 43, 902–4(1930).—The 2 dihydroxystearic acids, m. 133° and 98°, $CH_3(CH_2)_7CH(OH)CH(OH)(CH_2)_7CO_2H$, yield estolides on heating to 200° and at 300° again are split into dihydroxystearic acid and ι-hydroxyoleic acid, which as enol rearranges to form ι-ketostearic acid. The low acid no. of the estolide indicates that 5 or more mols. of dihydroxystearic acid are involved in its formation. Sativic and linusinic acids do not form the corresponding di- and triketostearic acids, but form products of lower acid and ester no. and a higher I no. Expt. details are given.

P. ESCHER

Preparation of ω-amino acids. I. Benzenesulfonylmethyl-ι,κ-aminoundecylic acid from ι,κ-undecylenic acid. BONIFAZ FLASCHENTRÄGER. *Z. physiol. Chem.* 192, 245–8(1930).—Normal aliphatic acids with a terminal unsatn. are well adapted to the prepn. of ω-amino acids. Undecylenic acid in petroleum ether was satd. at 0° with dry HBr to a yield of 86% of κ-bromoundecylic acid, m. 57°. This was dissolved in abs. EtOH and heated 5 hrs. under pressure at 90–110° with 37.5% alc. $MeNH_2$, yielding 74–6% of *κ-methylaminoundecylic acid*, m. 136–7°. Treatment of the latter with $PhSO_2Cl$ and NaOH gave 71–6% of *κ-benzenesulfonylmethylaminoundecylic acid*, m. 47–8°. **II. The one-sided breakdown of sebacic acid to θ-aminopelargonic acid according to Jeffrey-Hofmann.** BONIFAZ FLASCHENTRÄGER AND FRITZ GEBHARDT. *Ibid* 249–52.—The Hofmann reaction for converting an amide into an amine is applicable to the amide grouping of an "amic" acid. Sebacamic acid in MeOH was treated slowly in the cold with Br and MeONa, then the mixt. was refluxed 15 min., cooled and acidi-

fied with HCl. Diln. with H_2O pptd. *θ-carbomethoxyaminononylic acid*, m. 77°, in 74% yield. Hydrolysis of this urethan acid was effected by refluxing with concd. HCl until no turbidity appeared on cooling. The crude HCl salt of the amino acid was converted, by treatment with NaOH and $PhSO_2Cl$, into 99% of *θ-benzenesulfonylaminononylic acid* ($PhSO_2$ deriv. of θ-aminopelargonic acid), m. 85°. **III. The one-sided breakdown of higher normal dicarboxylic acids to ω-amino acids according to Naegeli-Curtius. Breakdown of sebacic acid to θ-aminopelargonic acid.** BONIFAZ FLASCHENTRÄGER AND FRIEDRICH HALLE. *Ibid* 253–7.—Another method of converting a dibasic acid to an ω-amino acid consists in treating the monoester monochloride with NaN_3, decompg. the azide into the isocyanate and hydrolyzing the latter to the amino acid ester HCl salt. $EtO_2C(CH_2)_8COCl$ was heated with NaN_3 in dry xylene until the evolution of N had ceased. The product was 94% of crude *Et θ-carbonimidopelargonate*, a yellow oil which was not purified or analyzed. By hydrolysis with 37% HCl this isocyanate yielded 85% of crude *Et θ-aminopelargonate-HCl*. In sapong. the ester with 0.2 *N* NaOH a by-product obtained was *carbonylbis(θ-aminopelargonic acid)*, $CO[NH(CH_2)_8CO_2H]_2$, m. 158°. The aminopelargonic acid was converted into the $PhSO_2$ deriv., m. 85°, identical with that described in the preceding paper. **IV. The one-sided breakdown of higher normal dicarboxylic acids to ω-amino acids according to Naegeli-Curtius. Breakdown of 1,21-heneicosanedicarboxylic acid to φ-aminobehenic acid.** BONIFAZ FLASCHENTRÄGER, BEN BLECHMAN AND FRIEDRICH HALLE. *Ibid* 257–63.—The 2nd of the above methods was applied to the C_{23}-dibasic acid obtained from Japan wax (*C. A.* **24**, 5725). By partial sapon. with the calcd. amt. of 0.2 *N* alc. NaOH, the di-Et ester $(CH_2)_{21}(CO_2Et)_2$ was converted into *mono-Et heneicosanedicarboxylate*, m. 83.3°. The yield of 38.6% was increased to 64% by reworking the residues. Treatment with $SOCl_2$ converted the acid ester into the acid chloride ester, *1-carbethoxyheneicosane-21-carboxylyl chloride*, m. 59.9° (yield 100%). This was treated in xylene with NaN_3, and the resulting isocyanate hydrolyzed by HCl to 65.8% of *φ-aminobehenic acid-HCl*, from which the *free amino acid*, m. 167°, was obtained by treatment with alc. NaOH. Its *$PhSO_2$ deriv.*, prepd. in 55.3% yield, m. 114.5°. A by-product of the azide decompn. was 18.5% of *carbonylbis(φ-aminobehenic acid)*, $CO[NH(CH_2)_{21}CO_2H]_2$, m. 110°.

A. W. DOX

Physicochemical investigation of amino acids. IV. V. VI. TOKUZO YAGINUMA. *J. Soc. Chem. Ind., Japan* **33**, Suppl. binding 372–4, 374–5, 376–7(1930) (In German); cf. *C. A.* **24**, 4762.—Et *α-l*-leucine-HCl m. 119°, *d*-rotary, long plates, b[010], m[110], 1[160] shape of the 3 crystal faces varying, rhombic, bisphenoidal, $a:b:c = 0.5263:1:2.8433$, $\alpha = 1.4962$, $\beta = 1.4978$, $\gamma = 1.5318$, $2V = 26.25'$, axial plane *c*[001], bisectorix *a*-axis, double refraction positive. Et *β-l*-leucine-HCl m. 134°, *d*-rotary, crystals usually thin plates whose end surfaces are right angles or derivs. thereof, optical extinction with both edges of right angle parallel, axis- and interference figures sym. in relation to diameter parallel to above edges, in oil immersion both axis apexes near the end of this diameter transparent, double refraction negative. Pr *l*-leucine-HCl is isodimorphous, conversion temp. below 52°, as shown by direct observation of *α-* and *β*-crystals in winter by polariscope and by soly. in C_3H_7OH. Pr *α-l*-leucine-HCl m. 108°, *d*-rotary, smooth plates, rectangular, 3-sides, trapezoid-shaped or 5-sided, all derivs. of the rectangular, or smooth prisms, *r*[101], rhombic, bisphenoidal, $a:b:c = 0.6963:1:0.6332$, double refraction negative, axis angle $V = 32°38'$, 1 middle line (?) *c*-axis, axial plane *a*[100], $\alpha = 1.4919$, $\beta = 1.4978$, $\gamma = 1.5128$. Pr *β-l*-leucine-HCl m. 136°, *d*-rotary, generally similar to the *α*-deriv., crystals flat rectangles, or triangular, trapezoidal, 5-sides or parallel 6-sided derivs. thereof, always developed from the *r*[101] surfaces, rhombic, bisphenoidal, $a:b:c = 0.9428:1:0.8880$, double refraction negative, axial angle $V = 5°54'$, axial plane *a*[100], 1 middle line (?) *c*-axis, axial dispersion $\gamma<\rho$, $\alpha = 1.4964$, $\beta = 1.4966$, $\gamma = 1.5021$.

E. M. SYMMES

The rotatory power of configuratively related substances. WERNER KUHN, KARL FREUDENBERG AND IRENE WOLF. *Ber.* **63B**, 2367–79(1930).—Rotation dispersion curves for related substances are analyzed in the ultra-violet portion of the spectrum. The substances studied are derivs. of halo fatty acids, such as N_2CMeCO_2Me and the dimethylamide. It is established that the optical rotation of a compd. is the sum of the amts. of rotation of the individual bands of the substituents but special wt. is to be given the weak and medium strong bands lying nearest the visible. Varying a substituent changes the rotation in its anisotropic bands and its vicinal effect, modifying the amts. of rotation of the other substituents. The vicinal effect is the disturbance in rotation caused by the presence of other atoms in the mol. A method for detg. the configuration of a compd. by comparison of optical displacements in steric series is explained. The compds. must be very closely related.

MARY E. LEAR

Bromine chloride; the action of mixtures of chlorine and bromine on aliphatic diazo compounds. THOMAS W. J. TAYLOR AND LANCELOT A. FORSCEY. *J. Chem. Soc.* **1930**, 2272–7.—Cl and Br react very rapidly and energetically with aliphatic diazo compds., a mol. of N being expelled and a mol. of the halogen taking its place. N_2CHCO_2Et and the equiv. of an equimol. mixt. of Cl and Br give a mixt. of dihalogen esters, the fraction b_{30} 80–5° yielding with NH_4OH $ClBrCHCONH_2$, m. 129°; that this was not a mixt. of $Br_2CHCONH_2$ and $Cl_2CHCONH_2$ was shown by the behavior of mixts. of these on melting. The results indicate that the equil. $Br_2 + Cl_2 \rightleftharpoons 2BrCl$ lies over the right-hand side. $PhCN_2Bz$, m. 81.8° (decompn.), with Cl and Br, resp., gives $PhCCl_2Bz$, m. 60°, and $PhCBr_2Bz$, m. 111°; *chlorobromodeoxybenzoin*, m. 85°, results from desyl chloride and Br in AcOH; m.-p. curves are given for the 2 halogen derivs. and for an equimol. mixt. of these 2 with varying amts. of the ClBr deriv. $PhCN_2Bz$ and Br + Cl give a mixt. of about 80 mol. % of the ClBr deriv. and 10 mol. % of each of the Cl_2 and Br_2 derivs. The same figures express the proportions of the mols. in the equil. $Br_2 + Cl_2 \rightleftharpoons 2BrCl$. C. J. WEST

Comparative investigations on the cleavage of the CONH linkage in polypeptides and related compounds, in which the NH_2 or COOH group is variously substituted, by dilute alkali, erepsin and trypsin-kinase. EMIL ABDERHALDEN AND EUGEN RIESZ. *Fermentforschung* **12**, 180–222(1930).—The study of the influence of substitution in the NH_2 or CO_2H of amino acids and peptides on their rate of hydrolysis by alkali and by proteolytic enzymes has been extended to include a greater variety of substituents. In general the derivs. were prepd. by well-known reactions, but in some cases the desired product was not obtained owing to secondary reactions which yielded other products, which, however, were identified and included in the tests. The amide linkages present in these substances include the following types: SO_2-NH, S-NH, CO-NH, ArCO-NH, Ar-NH, CO-NHAr, SO_2-NH-CO, and CO-NH-CO. *p-Cresoldisulfonyl-dl-leucylglycine*, m. 140°, was prepd. by shaking *p*-cresoldisulfonyl chloride in Et_2O with 2 mols. of *dl*-leucylglycine in dil. Na_2CO_3. In the reaction between *m*-cresoltrisulfonyl chloride and *dl*-leucylglycyl Me ester the product, instead of having a dipeptide on all 3 SO_2 groups, was *m-cresoldi(sulfonyl-dl-leucine)mono(sulfonyl-dl-leucylglycine)* (I), m. 117–20°, *i. e.*, 2 of the dipeptide mols. had undergone hydrolysis. A similar condensation of *m*-cresoltrisulfonyl chloride with *dl*-leucine Et ester yielded *m-cresoltrisulfonyl-dl-leucine Et ester*, m. 60°. Hydrolysis of this ester and also of I yielded the same product, *m-cresoltrisulfonyl-dl-leucine*, m. 80–120°. *o*-Cresoldisulfonyl chloride and glycine Et ester in Et_2O condensed to form *o*-cresoldisulfonylglycine Et ester, an oil which on sapon. yielded *o-cresoldisulfonylglycine*, m. 128°. *m*-$HO_2CC_6H_4SO_2Cl$ in MeAc condensed with glycine in *N* NaOH to form *m-glycinesulfonylbenzoic acid*, m. 178°; with *dl*-leucine to form *m-dl-leucinesulfonylbenzoic acid*, m. 187°, and with *dl*-leucylglycine to form *m-dl-leucylglycinesulfonylbenzoic acid*, m. 190°. Condensation of $EtSO_2Cl$ with *dl*-leucylglycine by shaking in Na_2CO_3 soln. yielded, instead of the expected ethanesulfonyldipeptide, the corresponding anhydride, *viz.*, *bis(ethanesulfonyl-dl-leucyl)-N-diketopiperazine*, m. 140°. In the reaction between leucylglycine Me ester and $BrCH_2CH_2SO_2Cl$, the usual coupling was accompanied by a ring formation in which HBr was split off, yielding a halogen-free ester, $C_{11}H_{20}O_5N_2S$, m. 117°. Aspartic acid in *N* NaOH condensed readily with hippuryl chloride to *benzoylglycylaspartic acid*, m. 191°. *o*-$O_2NC_6H_4SCl$ in Et_2O condensed with glycine Et ester to *o-nitrophenylthioglycine Et ester*, m. 83°, and with *dl*-leucine Et ester to *o-nitrophenylthioleucine Et ester*, m. 90°. 1,3,4-$Cl(NO_2)C_6H_3SCl$ in Et_2O condensed with leucine Et ester to *chloronitrophenylthio-dl-leucine Et ester*, m. 99°; in $CHCl_3$ with *dl*-leucylglycine Me ester to *4-chloro-2-nitrophenylthio-dl-leucylglycine*, m. 128–30°, and its *Me ester*, m. 97–100°; while in aq. NaOH with *dl*-leucylglycine the products isolated were $[Cl(NO_2)C_6H_3S]_2O$, $[Cl(NO_2)C_6H_3S]_2$, $Cl(NO_2)C_6H_3SONa$ and leucylglycine; with *dl*-leucine in aq. Na_2CO_3 the product was *chloronitrophenylthio-dl-leucine*, m. 126°. *dl*-α-Bromoisocaproylglycine was condensed with $PhNH_2$ in the presence of NaOAc to *phenyl-dl-leucylglycine*, m. 139°. *dl*-Leucylglycine in aq. $NaHCO_3$ and $(O_2N)_2C_6H_3Cl$ in EtOH yielded *dinitrophenyl-dl-leucylglycine*, m. 150–2°, and *dinitrophenetole*, m. 87°. Cystine-HCl and $(O_2N)_2C_6H_3Cl$ with *N* NaOH yielded *dinitrophenylcystine*, m. 156°, and dinitrophenetole. *p*-$H_2NC_6H_4COCl$ and *dl*-leucylglycine gave *p-aminobenzoyl-dl-leucylglycine*, decomps. above 250°. This formed a red dye when diazotized and coupled with 2,3,6-$C_{10}H_4(OH)(SO_3H)_2$. In the prepn. of the above *p*-$H_2NC_6H_4COCl$ from the amino acid and $SOCl_2$ a by-product was *p-aminobenzoyl-p-aminobenzoic acid*, m. above 300° (decompn.). This also yielded a red dye with HNO_2 and 2,3,6-$C_{10}H_4(OH)(SO_3H)_2$. Treatment of *dl*-leucylglycine Me ester in $CHCl_3$ with *p*-$H_2NC_6H_4COCl$ gave *p-aminobenzoyl-dl-leucylglycine Me ester*, m. 60°. Analogous derivs. obtained by similar condensations were *o-chlorobenzoyl-dl-leucylglycine*, m. 208–

10°, from the dipeptide and *o*-ClC_6H_4COCl; *o-nitrobenzoyl-dl-leucylglycine*, m. 231°, from the dipeptide and *o*-$O_2NC_6H_4COCl$; and *o-nitrobenzoyl-dl-leucine*, m. 145°, from leucine and *o*-$O_2NC_6H_4COCl$. Reduction of both of these $C_6H_4NO_2$ derivs. with Zn dust and AcOH yielded the same *o-aminobenzoyl-dl-leucine anhydride*, m. 255°; an attempt to methylate the latter with CH_2N_2 was unsuccessful. *o-Nitrobenzoylglycine*, m. 190°, was obtained from *o*-$O_2NC_6H_4COCl$ and glycine in *N* NaOH, and reduced by Zn dust and AcOH to *o-aminobenzoylglycine anhydride*, m. 320° (decompn.). *dl-α-Bromoisocaproyl-o-aminobenzoic acid*, m. 110°, was similarly prepd. from $Me_2CHCH_2CHBrCOBr$ and *o*-$H_2NC_6H_4CO_2H$, and aminated by NH_4OH to *dl-leucyl-o-aminobenzoic acid anhydride*, m. 185° (HCl salt decomps. 215–20°). Methylation of the latter by CH_2N_2 gave a *N-Me deriv.*, m. 105°, for which 4 isomeric formulas are possible. A by-product of the amination was *α-hydroxyisocaproyl-o-aminobenzoic acid*, m. 146°. Both of the anhydrides above named contain 7-membered rings. The 2nd anhydride was condensed with $ClCH_2COCl$ to *chloroacetyl-dl-leucyl-o-aminobenzoic acid*, m. 176°. Other derivs. obtained by direct condensation with *o-* or *p*-$H_2NC_6H_4CO_2H$ were: *chloroacetyl-o-aminobenzoic acid*, m. 185°, aminated to *glycyl-o-aminobenzoic acid*, m. 215–20° (decompn.); *dl-α-bromoisocaproyl-p-aminobenzoic acid*, m. 173°, aminated to *dl-leucyl-p-aminobenzoic acid*, m. 220°, and a by-product, *α-hydroxyisocaproyl-p-aminobenzoic acid*, m. 193–5°. *dl*-Leucyl-*p*-aminobenzoic acid was condensed with $ClCH_2COCl$ to *chloroacetyl-dl-leucyl-p-aminobenzoic acid*, m. 217°. *p*-$MeC_6H_4SO_2NH_2$ was condensed with $ClCH_2COCl$ to *p-toluene-N-chloroacetylsulfonamide*, m. 88–9°, and the latter aminated to *p-toluene-N-glycylsulfonamide*, m. 207°. This was condensed with *dl*-$Me_2CHCH_2CHBrCOBr$ to *p-toluene-N-bromoisocaproylglycylsulfonamide*, m. 137°. *m*-$HO_2CC_6H_4SO_2NH_2$ and $(ClCH_2CO)_2O$ gave *m-chloroacetylsulfamidobenzoic acid*, m. 212° (decompn.). This was aminated with NH_4OH and the crude glycyl deriv. was coupled with *dl*-$Me_2CHCH_2CHBrCOBr$ to *m-(dl-α-bromoisocaproylglycylsulfamido)benzoic acid*, m. 174°. An attempt to couple 2-nitro-4-chlorophenylthioamide with $ClCH_2COCl$ yielded the sulfoxide and disulfide of the former, and di(chloroacet)imide, m. 195°. The latter was aminated to *diglycineimide*, isolated as the HCl salt. $BzNH_2$ and $ClCH_2COCl$ gave *N-chloroacetylbenzamide*, m. 157°, which could not be aminated. Urea and $ClCH_2COCl$ gave *chloroacetylurea*, m. 180°, which on treatment with NH_4OH yielded hydantoin. Condensation of taurine with *dl*-$Me_2CHCH_2CHBrCOBr$ and amination of the crude oily intermediate gave *dl-leucyltaurine*, m. 285°. In general the hydrolysis of a polypeptide by *N* NaOH is impeded by the introduction of a SO_2R into the NH_2, whether the R is aromatic or aliphatic. The *m*-cresoltrisulfonyl deriv. is an exception in this respect. On the other hand, the thio derivs. are more readily hydrolyzed than the parent peptides. Ph on the NH_2 impedes hydrolysis, but if the Ph carries NO_2 groups the hydrolysis is accelerated. If the SO_2 is substituted in the CO_2H instead of the NH_2 no inhibition occurs. In such derivs. there is cleavage of both peptide and sulfonamide linkages. Compds. which contain a CONHCO grouping (chloroacetylbenzamide, chloroacetylurea, diglycineimide) are very labile toward alkali. The stability of compds. contg. both SO_2NH and CO_2H is not due wholly to the presence of 2 acid groups, since benzoylglycylaspartic acid is readily hydrolyzed. Erepsin hydrolyzed both leucyl-*p*-aminobenzoic acid and leucyltaurine, showing that exotic components do not inhibit hydrolysis if the natural component carries a free NH_2. Substitution in the CO_2H, even if the substituent carries a free CO_2H (BzOH derivs.) inhibits polypeptide hydrolysis by trypsin-kinase. Factors which influence the alkali cleavage of polypeptides are not only the nature of the substituent group, but also its state of oxidation (difference between SO_2NH and SNH), its place of entrance (NH_2 or CO_2H), its acidity or basicity as detd., *e. g.*, by NO_2 groups, and finally multisubstitution as illustrated in the cresoltrisulfonyl deriv. A. W. Dox

The configuration of the halopropionic acids and the alanines. Karl Freudenberg, Werner Kuhn and Ilse Bumann. *Ber.* 63B, 2380–90(1930).—The optical displacement principle is formulated as follows: Derivs. of α-substituted fatty acids or other compds. with a center of asymmetry (which are analogous among themselves, contain no labile H and can be observed without solvents) undergo a change of rotation in the same direction if the substituents corresponding to each other are varied in such manner as to produce a great change in direction of rotation. The rotations $[M]_{578}^{20}$ of the Me esters, chlorides and dimethylamides of α-azido-, α-chloro-, α-bromo- and α-iodopropionic acids and of benzoyl-, acetyl- and toluenesulfonyl-lactic acids are tabulated. The directions and amts. of the rotation of the substituent groups are compared and the vicinal rule is applied. Mary E. Lear

The splitting off of halogen by dilute alkali from stereoisomeric haloacylamino acids and their behavior toward erepsin and trypsin-kinase. Emil Abderhalden and

FRIEDRICH SCHWEITZER. *Fermentforschung* 12, 231–43(1930); cf. *C. A.* 24, 3024.—The 2 racemic pairs *A* and *B* from *dl*-α-bromopropionyl-*dl*-norvaline have previously been shown (*C. A.* 24, 3024) to split off Br at different rates under the influence of dil. alkali. The 4 individual isomers have now been prepd. and their rate of Br cleavage detd. *dl*-Norvaline was converted into the formyl deriv. by 4 treatments with HCO_2H, the brucine salt sepd. into its isomers, the brucine removed by treatment with *N* NaOH and extn. with $CHCl_3$ and Et_2O, and the formyl group split off by 10% HCl. *l*-Norvaline was coupled with $BrCH_2COBr$ to *bromoacetyl-l-norvaline*, m. 92°, $[\alpha]_D^{20}$ 9.2°, and *d*-norvaline to *bromoacetyl-d-norvaline*, m. 95°, $[\alpha]_D^{20}$ —8.6°. In a similar manner *l*-α-*bromopropionyl-l-norvaline*, m. 110°, $[\alpha]_D^{22}$ —9.0°, *l*-α-*bromopropionyl-d-norvaline*, m. 105°, $[\alpha]_D^{20}$ — 18°, *d*-α-*bromopropionyl-d-norvaline*, $[\alpha]_D^{22}$ 8.5°, and *d*-α-*bromopropionyl-l-norvaline*, $[\alpha]_D^{22}$ 15°, were prepd. *dl*-α-*Bromopropionyl-dl-leucine* was also prepd. from *dl*-MeCHBrCOCl and *dl*-leucine and sepd. by crystn. into its isomeric pairs *A*, m. 149–50°, and *B*, m. 118–9°. *dl*-α-*Bromoisocaproyl-dl-valine* was likewise sepd. into *A*, m. 130–2°, and *B*, m. 173–4°. The rate of Br cleavage at p_H 8.4 was detd. for all of these prepns. The interesting observation is that the *dd*- and the *ll*-forms of bromopropionylnorvaline undergo cleavage at the same rate, as also the *ld*- and the *dl*- forms. The last 2, however, have a much higher rate of cleavage than the 1st 2 These rates correspond exactly with those of the *A* and *B* pairs of isomers. The different rates of cleavage by trypsin-kinase, previously reported, are now shown to be in error. The detns were made by titration and represent merely the splitting off of Br by the alkali. Detns. by the Van Slyke method show that no other hydrolysis occurs. The 2 isomers of bromoacetylnorvaline, in which only 1 asym. C is present, showed no difference in rate of Br cleavage by NaOH From the bromopropionylleucines the rate of Br cleavage was greater with *B* than with *A*. On the other hand, trypsin-kinase hydrolyzed *A* more rapidly than *B*. Br was split off more rapidly from bromoisocaproylvaline *A* than from *B*, while trypsin-kinase attacked neither. A new method is thus presented for detg. the identity of isomeric racemic pairs of haloacylamino acids. The *dd*-, *ll*-pair splits off halogen more rapidly than the *dl*-, *ld*-pair. A. W. DOX

The optical rotation of *l*-cystine. Determination of its value for the sodium and mercury lines and of the temperature factor. GERRIT TOENNIES AND THEODORE F. LAVINE. *J. Biol. Chem.* 89, 153–66(1930).—An apparently pure sample of *l*-cystine can be prepd. by systematic fractionated repptn. from acid soln. at different H-ion concns. For identification purposes the Hg line is more convenient and accurate and gives the value $[\alpha]_{Hg}^{29} - 241.87 \pm 0.15°$. The value $[\alpha]_D^{29} - 205.1 \pm 0.2°$ is 10° lower than the one recently reported by Andrews (*C. A.* 20, 3158) but is in agreement with observations of several of the earlier investigators. The av. temp. coeff. between 20–30° was found to be —2.06° $[\alpha]_D$ for —1° against 1.7° $[\alpha]_D$ found by Andrews. This temp. factor is unusually large. An apparently straight line relation between temp. and rotation was found. A. P. LOTHROP

Sugar degradation in alkaline medium with and without the simultaneous action of oxidative reagents. F. FISCHLER AND J. REIL. *Biochem. Z.* 227, 140–56(1930).—An attempt has been made to find the stoichiometric relation between the degradation of sugar and the reducing power of the Cu salts, by adjusting the method to avoid the results of extreme sensitivity of AcCHO to alkali. This, however, was not successful, partly because the AcCHO production is not uniform and partly because of various disturbing circumstances, like caramel formation. By diminishing the OH-concn. the degradation of the sugar may be more simplified but now the distillate contains AcHO and HCHO instead of AcCHO and the residue H_2CO_3, AcH and HCO_2H. AcCHO distd. under similar conditions gives the same products as hexose. The oxidative destruction of sugar in alk. medium with the aid of H_2O_2, $KMnO_4$, etc., proceeds through 3-C chain compds., of which AcCHO is the one of primary significance. S. M.

A simple procedure for obtaining methylglyoxal solutions. EDUARD HOFMANN AND CARL NEUBERG. *Biochem. Z.* 226, 489–91(1930).—To 3 g. of AcCH : NOH in 50 cc. H_2O, at 0°; 4.4 g. of HSO_3NO_2 crystals is gradually added so that the temp. does not exceed +3°. The soln. is now carefully warmed to about 40°, when N_2O escapes violently. When the gas evolution has ceased the soln. is shaken several times with ether to remove any residual AcCH:NOH, the ether is evapd. and the AcCHO is distd. off on a paraffin bath at 140–50°. As concn. of the soln. is to be avoided 20 cc. H_2O is added before the distn. has progressed too far. The concn. of the first 0.2 of the distillate is about 2%, that of the next 0.4 1.4% and of the remaining portion 0.4%. S. MORGULIS

The transformation of acetoacetic acid by methylglyoxal. II. M. HENZE AND R. MÜLLER. *Z. physiol. Chem.* **193**, 88–96(1930); cf. *C. A.* **24**, 4267.—The Ba salt of $AcCH_2CO_2H$ reacts with AcCHO, forming probably an aldol of the formula $AcCH(OH)\text{-}CHAcCO_2H$, and this when acidified loses CO_2 and yields a hydroxydiketone, *2,5-diketo-3-hexanol*, b_{12} 113.5°, which partially rearranges to an isomeric form m. 95°. This ketol possesses the properties of a 1,4-diketone (pyrrole reaction) and of an α-ketol (easy oxidation). Ag_2O oxidizes it to AcOH, while NaOBr removes the terminal Me groups, leaving malic acid. It forms a *p-bromophenylhydrazone*, m. 181°, a *p-nitrophenylhydrazone* (I), m. 198°, and a *semicarbazone* (II), m. 210° (decompn.). I and II readily lose H_2O and undergo ring closure to the corresponding pyrazole derivs. which m. 254° and 254° (decompn.), resp. Of biol. interest is the fact that this ketol represents the synthesis of a 6-C chain contg. 1 less H_2O and 2 less O than glucose. A. W. DOX

Halogenated derivatives of pyruvic acid. M. GARINO, A. CERESETO, M. BERNI AND M. BRAMBILLA. *Gazz. chim. ital.* **60**, 582–92(1930).—In view of the peculiar instability of $AcCO_2H$ (I) and its halogen derivs., already discovered by G. (cf. *C. A.* **17**, 1624, 1625), a systematic study of all the halogen derivs. which could be obtained in a state of purity was begun. It was found that 1 H atom of the Me in I was easily replaced by Cl, that a 2nd H atom of the Me group was replaced only with difficulty, and that it was impossible to replace the 3rd H atom by Cl in the latter case, even with the aid of catalysts, sunlight and ultra-violet radiation. Following the directions of Schreder (cf. *Ann.* **177**, 282(1875)) $Cl_3CC(OH)_2CO_2H$ was obtained instead of Cl_3CCOCO_2H. On the other hand, Br can replace 2 or 3 H atoms and I 3 H atoms of the Me group of I. Mono-Br derivs. in the early literature (*Ber.* **1**, 265(1868-9); *Ann.* **177**, 282(1875)) were found to be erroneously described. The halogen derivs. of I form stable condensation products, except in the case of the mono-Cl and tri-I derivs., which hydrolyze. The tri-substituted derivs. hydrolyze most easily, forming with hot water derivs. of $CHCl_3$ and $(CO_2H)_2$, and the higher the at. wt. of the halogen involved the more pronounced is this tendency to hydrolyze. In a dry atm. or *in vacuo*, free Br and I are liberated. $ClCH_2COCO_2H$ (II), prepd. by the method already described (*C. A.* **17**, 1624, 1625), crystallizes either as such or with 1 H_2O. With H_2O it is very stable when solid below 15°, decomps. very slowly at 25° (formation of HCl and CO_2) and decomps. in a few days at 40°. The anhyd. form is less stable and can be kept only below 15°. Its aq. soln. is the most stable of any of the halogen derivs., but nevertheless decomps. slowly. Data show the quantity of HCl formed in this soln. as a function of the time and temp. for 5 and 40% solns. at 0°, 25° and 40°. Freshly prepd. II can be dild. greatly with water without its undergoing hydrolysis. The dissocn. const. K is 0.00626. After some time hydrolysis begins and increases progressively. This hydrolysis may be explained by reference to the explanation of Wolff for I (cf. *Ann.* **317**, 6(1901)); 2 II $\longrightarrow$ $ClCH_2C(CO_2H)(OH)CHClCOCO_2H \longrightarrow ClCH_2\text{-}\overline{C(CO_2H).CHCl.CO.CO.O}$ + $H_2O \longrightarrow CH_2(OH)\overline{C(CO_2H).CHCl.CO.CO.O}$ + HCl, and $\overline{CH_2.C(CO_2H):CCl.CHOH}$ + CO_2, which explains the evolution of HCl and CO_2. The prepn. of $CHCl_2COCO_2H$ (III) has also been described (*loc. cit.*). The yield varies greatly (10–100%) with the freshness of the I used. III is unstable even when freshly prepd., and when dry evolves HCl at 30–5°, and in water it hydrolyzes immediately if concd. and if the temp. is above 20°. It may therefore be lost in part or completely during attempts to crystallize it. When kept 10–5 days at 10–2° in a dry condition from the time it is first crystd., it becomes stable and it can then be dissolved in water and recrystd. repeatedly even at 20–5° without much loss. Five % solns. begin to hydrolyze after 3 days at 25° and after 18 hrs. at 40° Solns. of 5–50% are more stable, evolve HCl after 5 days at 25° and after 30 hrs. at 40°. The stabilized form showed a dissocn. const. of 0.0078. $CHBr_2COCO_2H$ (VI) was prepd. by the method of Grimaux (*Bull. soc. Ann.* (1) **21**, 390(1874)). Freshly prepd., it is very stable and showed evidence of hydrolysis only after a considerable time (5% soln. after 24 hrs. at 25° and after 6 hrs. at 40°, and 5–50% solns. after 3 days at 25° and after 45 hrs. at 40°). It is stable when solid and shows no change in acidity or test for HBr, but the elec. cond. changes in such a way as to give evidence of slow decompn. which is confirmed by the fact that the older it is the lower the yields of products in which it is used as a starting material in the syntheses. When freshly prepd., the dissocn. const. is 0.1527, but this diminishes so that after 1 hr. it became 0.00737–0.00256 (depending upon the diln). $CHClBrCOCO_2H$ (V), prepd. as described in the earlier expts. (*loc. cit.*), has properties intermediate between those of III and IV. When freshly prepd., its dissocn. const. is 0.01076, but this changes with time, and low yields are obtained in syntheses in which it is used as a starting ma-

terial. Fresh solns. are stable even when very dil. and do not hydrolyze after several days. When kept below 50%, III, IV and V do not liberate the hydrohalogen acid or CO_2, so the changes which these compds. undergo are a result of simple condensation. On the other hand, in soln. they decomp. like II, except that the evolution of CO_2 takes place long after the beginning of hydrolysis and therefore represents an advanced state of decompn. CBr_3COCO_2H (VI), prepd by the method of Grimaux (*loc. cit.*), is difficult to obtain free of hydro acids because of the tendency to hydrolyze in soln., but once purified and crystd. it is stable, and in the solid state it does not undergo condensation. On the other hand, its solns. hydrolyze readily, and this hydrolysis increases with the diln. and with the temp. Above 60–5°, it is decompd. by water thus: $VI + H_2O \longrightarrow CHBr_3 + (CO_2H)_2$. Br (105 g.) added during 24 hrs. to II (50 g. in 50 cc. of water) at 50–60°, the soln. filtered through glass wool, the filtrate evapd. *in vacuo* to 0.5 its vol., the crystd. ppt. combined with the original residue, yields 80% of crude product from which only 5–6 g. of pure *chlorodibromopyruvic acid*, $CClBr_2COCO_2H$ (VII), can be obtained. Its solns. begin to decomp. at approx. 80° with the odor of $CHClBr_2$, while at higher temps. lachrymatory substances are evolved. It has no m. p. and decomps. when heated. It is sol. in its own wt of water at 15° and in about $^2/_3$ its wt. at 50°. It is quickly decompd. by alkalies, with formation of $CHClBr_2$. With KOH and thymol it gives a violet color In concd. soln. with $AgNO_3$ it ppts. the *Ag salt*, but in dil. soln. AgCl and AgBr are slowly formed. *In vacuo* and even in a desiccator, Br and then HBr and HCl are liberated, after a few hrs. when VII is freshly prepd. and after several days when it is old. VII remains in soln. several hrs. without hydrolyzing, but in boiling water it decomps. into $CHClBr_2$ and $(CO_2H)_2$. It can be heated in the dry state to 140–5° without decompn The various properties described apply to VII freshly prepd., but after a yr. or so it becomes highly resistant. $CCl_2BrCOCO_2H$ (VIII) has been described by Hantzsch (cf. *Ber.* **22**, 2851(1889)). To obtain a quantity sufficient for purification 50% aq. III at 80–90° is treated dropwise with Br. The yield of crude VIII is high, but most of it is lost in repeated crystns. Its m. p. is not well defined because fusion it decomps. partially at temps. which depend upon the rate of heating. With $AgNO_3$ VIII ppts. slowly AgCl and AgBr and in concd. soln. it forms the *Ag salt*, $CCl_2BrCOCO_2Ag$. When heated at 95–100° in concd. soln., VIII decomps. into $(CO_2H)_2$ and $CHCl_2Br$, and this decompn. is accelerated greatly by alkalies. It becomes more stable with age when kept in a fairly dry atm. In general the trihalogenated pyruvic acids are characterized by their perfect stability when kept in the solid state at room temp. (analyses after 1 yr. were exactly the same), but an increase in the resistance to hydrolysis as a function of the diln. and the temp. indicates some sort of change in the mols Solns. of the acids undergo 2 different decompns.: (1) one at moderate temps. which first forms hydro acids followed by further decompn. to CO_2 and hydro acids, and (2) one at higher temps. which forms $(CO_2H)_2$ and a halogenated deriv. of CH_4. Cl replaces 1 or 2 H atoms in I, but upon replacement of the 3rd H atom the mol. becomes extremely unstable. On the other hand, Br replaces 2 or 3 H atoms, and if only 1 H atom is replaced the mol. remains very unstable. I replaces all 3 H atoms, but it has been impossible to replace only 1 or 2 H atoms. All halogen derivs. of I in the solid state form more stable condensation products, except II (*loc. cit.*) and VI. Water decomps these halogen derivs. in a way which varies with the no. of H atoms substituted by halogen, and of the derivs. the trisubstituted derivs. hydrolyze most readily, and the greater the no. of halogen atoms present the greater the tendency to hydrolyze. In a dry atm. or *in vacuo* all Br derivs. liberate Br, and VI liberates I. C. C. Davis

Hydrogenation of acetoacetic ester and certain of its derivatives over nickel. Homer Adkins, Ralph Connor and Howard Cramer. *J. Am. Chem. Soc.* **52**, 5192–8(1930); cf. *C. A.* **25**, 89.—$AcCH_2CO_2Et$ (I) readily takes up 1 mol. equiv. of H over a Ni catalyst at temps. from 100–50°; if the hydrogenation is carried out in EtOH, $MeCH(OH)CH_2CO_2Et$ is formed practically quant.; in the absence of solvent or in Et_2O or methylcyclohexane, there is formed along with 2 parts of the ester, 1 part of a deriv., *Et β-(β'-hydroxybutyryloxy)butyrate* (II), b_{18} 154–6°, d_{28}^{25} 1.0678, n_D^{25} 1.4360; despite the fact that II is the ester of a sec. alc., it did not undergo alcoholysis at the temp. used for the reduction of I or in a boiling EtOH soln. of EtONa. II did undergo alcoholysis at 190° in the presence of a Ni catalyst. II appears to be formed through the reduction of 2 mols. of I with the elimination of 1 mol. of EtOH. This was postulated by Arndt and Nachtway as an intermediate in the formation of dehydroacetic acid (III) from I, so that the results here reported support their hypothesis. The Me deriv. of I behaved similarly, giving about 26% of *Et α-methyl-β-(α'-methyl-β'-hydroxybutyryloxy)butyrate*, b_{11} 155–8°, d_{28}^{25} 1.0332, n_D^{25} 1.4393. The α,α-di-Me and α-Me α-Et esters reduced

smoothly to the corresponding simple HO esters either with or without a solvent since there was no possibility of the formation of a complex ester analogous to that formed from the β-ketonic esters capable of enolization. III appears to give 4-heptanone as the chief product in hydrogenation over Ni (heptan-4-ol forms a 3,5-dinitrobenzoate, m. 64°; *α-naphthylurethan*, m. 79–80°). The use of H pressure in excess of 300 atms. appears not only very greatly to accelerate the rate of hydrogenation but to favor the formation of the ketone with a decrease in the products formed by hydrolysis and alcoholysis of the III. III undergoes a smooth alcoholysis to I at 190°. C. J. West

Decomposition of ethyl butylacetoacetate into caproic acid and methyl amyl ketone. Nathan L. Drake and R. W. Riemenschneider. *J. Am. Chem. Soc.* **52**, 5005–8 (1930).—Formation of $C_6H_{11}CO_2H$ from $AcCHBuCO_2Et$ in satisfactory yield is possible only in very concd. alkali. Increase in the alkali concn. from 51 to 59.5% of NaOH per 100 g. of soln. causes an increase in yield of acid from 30.5 to 57.7%; best yields of ketones were obtained in the more dil. solns. The optimum temp. for acid production is about 75°. At 75° and 59.5 g. of hydroxide per 100 g. of soln., little increase in yield of acid was obtained by using more than 8 mols. of hydroxide per mol. of ester but a decrease below 8 resulted in a very considerable drop in acid yield with a simultaneous rise in the yield of ketone. C. J. West

Levulinic acid and its esters. Peter P. T. Sah and Shao-Yuan Ma. *J. Am. Chem. Soc.* **52**, 4880–3(1930).—Details are given for the prepn. of levulinic acid from sucrose, the yield being about 150 g. from 1 kg. sucrose; the acid b_4 145°, b. 245–6°, m. 33–5°. The esters were prepd. by using an excess of the abs. alc. and a small amt. of HCl. Me, b. 191–3°, d_4^{20} 1.05113, n_D^{20} 1.4231, mol. refraction (Gladstone and Dale), 52.36, (Lorenz and Lorenz) 31.52 (this order will be followed for other esters); Et, 199–201°, 1.01336, 1.4225, 60.08, 36.17; *iso-Pr*, 203–5°, 0.98422, 1.4220, 67.79, 40.83; Pr, 214–6°, 0.98988, 1.4255, 67.96, 40.88; *iso-Bu*, 222–4°, 0.97047, 1.4264, 75.63, 45.48; *Bu*, 229–31°, 0.97452, 1.4290, 75.77, 45.53; *iso-Am*, 238–40°, 0.95921, 1.4310, 83.64, 50.23. *Semicarbazones: Me*, m. 142–3°; *Et*, m. 147–8°; *Pr*, m. 129–30°; *iso-Pr*, m. 141–2°; *Bu*, m. 102–3°; *iso-Eu*, m. 112–3°; *iso-Am*, m. 91–2° *Phenylhydrazones: Me*, m. 94–6°; *Et*, m. 103–4°; *Pr*, m. 88–90°; *iso-Pr*, m. 108–9°; *Bu*, m. 79–81°; *iso-Bu*, m. 84–6°; *iso-Am*, m. 70–2°. The phenylhydrazones are unstable toward O. C. J. West

Reactivity of atoms and groups in organic compounds. XI. The influence of the structure of the substituent on the temperature of decomposition of certain derivatives of malonic acid. James F. Norris and Ralph C. Young. *J. Am. Chem. Soc.* **52**, 5066–9(1930); cf. *C. A.* **24**, 1637.—The temps. have been detd. at which $CH_2(CO_2H)_2$ and certain of its alkyl derivs. break down into CO_2 and monobasic acids. The influence of the radicals studied on the decompn. temps is of the same order of magnitude as that found in the earlier study of the pyrolysis of Ph_3C alkyl ethers; the temp. is lowered in the 2 series as the radical is changed from Me to Et to Pr but rises when Bu is present. The Me_2CH radical derivs. in the 2 series decomp. at lower temps. than the Pr compds. In both series of compds. the decompn. temps. fall in the same order, with varying alkyl radicals, as the rates at which alcs. contg. the same radicals react with an acyl chloride. There appears to be a relationship between the effect of a radical on the lability of a bond as measured by the temp. of pyrolysis and the rate at which the bond is broken in a chem. reaction. C. J. West

Oxidation of some dibasic acids. W. H. Hatcher and W. H. Mueller. *Can. J. Research* **3**, 291–305(1930); cf. *C. A.* **23**, 1877.—The oxidation products when H_2O_2 reacts with malonic, tartronic, succinic, malic, tartaric, maleic and fumaric acids and the mode of oxidation are given in this paper. The rates of reaction indicate the comparability of satd. acids having the same no. of C atoms, the constancy of monohydroxylization in its velocity influence and the diverse effects of $[H^+]$. The mode of oxidation suggests in each case a complex through which decompn. occurs. The effects of geometrical isomerism and the ethylenic linkage are well marked. Peracid formation is considered to be a side reaction. Conclusion: Oxidizability is due to 2 or more of the following 3 factors: susceptibility to oxidation of the org. compd., reactivity of H_2O_2 to the kind of structure presented to it and ionic condition of the medium. J. W. S.

Catalytic reduction of carbon monoxide under ordinary pressure. VI. The hydrocarbon-forming action of iron catalysts. Shinjiro Kodama. *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) **14**, No. 269, 169–83(1930)(in German); cf. *C. A.* **24**, 4376.—Fe catalysts for synthetic hydrocarbons are of greater com. importance than those contg. Co. No exptl. details on Fe catalysts have yet appeared. Fe catalysts produce no H_2O; Co catalysts always, sometimes several times as much as hydrocarbon.

The CO_2 content of the reaction gas is about 20% when using Fe catalysts; with Co 5–10%. The unconverted reaction gas with Fe catalyst contains more CO than H_2; with Co the opposite. Fe catalysts give a colored oil; Co seldom a yellow, never a colored benzine. Fe catalysts require higher temp. than Co. Catalysts contg. mostly Fe withdraw O of the CO in the form of CO_2. Since CO is more decompd. than H_2, the H_2 content of the final gas is always greater than the CO content; with Co, *vice versa*. A catalyst contg. Fe 1, Cu 1, Na_2CO_3 0.02, gives the best yield, 1.8 cc. kerosene and 1.4 cc. benzine from 157.0 l. of gas, which is lower than that from Co-Cu catalysts contg. MgO or ZrO_2. Addn. of MgO to the Fe catalyst injured it. Without addn. of alkali an Fe-Cu catalyst forms only lower hydrocarbons. E. M. SYMMES

Some technical applications of aliphatic acids. FREDERICK CHALLENGER. *Ind. Chemist* **6**, 390-2(1930).—In this review of the literature, work concerning the following is discussed: adipic acid and its uses; acetonedicarboxylic acid; maleic and fumaric acids, their manuf. and conversion to malic acid; the production of certain aliphatic acids by molds. A bibliography is included. E. G. R. ARDAGH

Heptadecyladipamic acid and heptadecylsebacamic acid. BONIFAZ FLASCHENTRAGER AND HEINZ LACHMANN. *Z. physiol. Chem.* **192**, 268-73(1930).—The derivs. here described were prepd. with a view to detg. the mode of biol. oxidation of acylated amino acids with long hydrocarbon chain. Heptadecylamine-HCl was obtained from stearic acid by the Naegeli-Curtius and by the Jeffreys-Hofmann reactions (*vide supra*) and found to m. 163° instead of 158° (Naegeli *et al.*, *C. A.* **23**, 2418). It seps. from dil. aq. soln. as a gel. This when injected into the ventral lymph sac was fatal to frogs. Subcutaneous injection in rabbits and guinea pigs caused local necrosis, while intravenous injection was fatal, with symptoms of embolism. In Et_2O soln the free base takes up CO_2 to form a carbamic acid and this unites with the excess of base and a salt seps., *viz.*, *heptadecylamine heptadecylcarbamate*, $C_{17}H_{35}NH_2.C_{17}H_{35}NHCO_2H$, m. 99.5–102.5°. The $PhSO_2$-*deriv. of heptadecylamine*, m. 64.7°, was prepd. in 61.4% yield by the customary procedure. *Heptadecylamine gluconate*, $C_{17}H_{35}NH_2.CH_2(OH)(CHOH)_4CO_2H$, sinters 105° and m. 140°, was obtained in 55.4% yield by shaking an Et_2O soln. of the base with the calcd. quantity of 50% aq. gluconic acid. The base was coupled with $ClOC(CH_2)_4CO_2Et$ in Et_2O, forming 45.5% of *Et N-heptadecyladipamate*, m. 77–7.5°; the *free acid*, m. 120°, was obtained from the ester through the *Ba salt*, decomps. 198°. A similar coupling with $ClOC(CH_2)_8CO_2Et$ gave 40% of *Et N-heptadecylsebacamate*, m. 82°; *free acid*, m. 115°; *Ba salt*, decomps. 204°. All of these derivs. were very little sol. in H_2O and therefore not suitable for feeding expts. with animals. A. W. DOX

Synthesis of the *i*-hydroxyasparagines. A note on their dissociation constants. ROBERT K. CANNON. *Biochem. J.* **24**, 945-53(1930).—*i*-*para*- and *i*-*anti*-Hydroxyaspartic acids were synthesized from maleic acid by Dakin's method (*J. Biol. Chem.* **16**, 241) and reacted with NH_3 to give the diamide. When the diamide was allowed to stand with baryta partial hydrolysis occurred, with the formation of both α-acid *i*-hydroxyasparagines. These 2 last substances are differentiated by their Cu salts. The dissocn. consts. of the substances are summarized. BENJAMIN HARROW

A new synthesis of aspartic acid. MAX S. DUNN AND B. W. SMART. *J. Biol. Chem.* **89**, 41–50(1930).—Aspartic acid has been synthesized through the following reactions: Phthalimidomalonic ester ⟶ *Na phthalimidomalonic ester* (I) ⟶ *tri-Et ethane-α-phthalimido-α,α,β-tricarboxylate* (II) ⟶ aspartic acid-HCl ⟶ aspartic acid. II was obtained in 92% yield by the action of CH_2ClCO_2Et on I. I reacts readily with various org. halogen compds. but only with CH_2ClCO_2Et and $(CH_2Br)_2CH_2$ were stable addn. products formed. A. P. LOTHROP

The biuret reaction. II. The biuret reaction of di-acid amides. MARY M. RISING, JOSEPH S. HICKS AND GEORGINE A. MORRE. *J. Biol. Chem.* **89**, 1–25(1930); cf. *C. A.* **23**, 1115. —Reaction of a mol. with alkali and Cu ion to give the biuret reaction involves salt and complex ion formation and in a di-acid amide there must be 2 acid H atoms in each mol. for salt formation and 1 or more amine N atoms for complex ion formation. In addn. if substitution has been made in such a way as to render the amide so weakly basic that complex ion formation is prevented, or so weakly acid that salt formation is prevented, no biuret reaction can occur. An increase in the no. of C or N atoms sepg. the amide groups ("separation factor") also weakens the strength of the amides as acids so that salt formation is ultimately hindered. Thus, biuret, oxamide and malonamide readily show the reaction; mono- and sym. dialkylated oxamides show the reaction but unsym. and trialkylated oxamides do not; *N*-monoalkylated malonamides show the reaction while further alkylation of the malonamide mol. prevents it. The prepn. and properties of the following compds. are described: *Na Cu biuret, Na Cu malonamide, N-ethylmalonamide, Na Cu monoethyloxamide, Na Ni monoethyloxamide,*

Na Cu (sym.) diethyloxamide. Structural formulas for certain of these complexes are proposed. A. P. LOTHROP

Oxidation. III. Behavior of formyl-, acetyl- and benzoyl-thiosemicarbazide towards lead oxide. SATISH CHANDRA DE. *J. Indian Chem. Soc.* **7**, 651–4(1930); cf. *C. A.* **22**, 4123.—Formylthiosemicarbazide boiled with excess PbO in EtOH 1 day gives *2-amino-1,3,4-furodiazole* (I), m. 155°, in "very poor yield." The *5-Ph deriv.* (II) of I, prepd. in an analogous manner in "good yield," m. 245° (decompn.), and the *5-Me deriv.* (III), m. 183°. The *Ac deriv.* of III m. 180°, and the *Ac* and *Bz deriv.* of II, m. 223° and 203°, resp. No diazonium compds. can be isolated from I or III, but II yields *2-nitrosoamino-5-phenyl-1,3,4-furodiazole* (IV) which blackens at 103°. Reduction of IV with Zn in HOAc gives *2-hydrazino-5-phenyl-1,3,4-furodiazole*, isolated as its *benzylidene deriv.*, m. 243° (decompn.). II and $Ca(OCl)_2$ give *5,5'-diphenyl-2,2'-azo-1,3,4-furodiazole*, orange, m. 329–30°, which on reduction with $(NH_4)_2S$ yields *5,5'-diphenyl-2,2'-hydrazo-1,3,4-furodiazole*, m. 233°. A. F. SHEPARD

Reactions relating to carbohydrates and polysaccharides. XXXII. Constitution of sedosan (anhydrosedoheptose). HAROLD HIBBERT AND C. G. ANDERSON. *Can. J. Research* **3**, 306–17(1930); cf. *C. A.* **22**, 2141; **24**, 4628.—Methylation of sedosan gives a tetramethylsedosan which oxidized by HNO_3 yields an optically inactive trimethoxyglutaric acid. Esterification of the latter followed by treatment with anhyd. $MeNH_2$ gave an optically inactive methylamide, presumably trimethoxyriboglutarodimethylamide. No trace of the methylamide of inactive dimethoxysuccinic acid could be found. H. and A. conclude that sedose possesses a 2,6-O_2 ring and that sedose is an anhydrosedopyranose. The isolation of monotritylsedosan showed that sedosan has but one primary alc. group. Sedosan is therefore 2,7-anhydrosedopyranose. The epimerization of trimethyl-δ-arabonolactone into trimethyl-δ-ribonolactone apparently takes place only with great difficulty. The structure of sedosan is in harmony with its lack of tendency towards polymerization and this is in accord with the views of H. on the relation of structure to polymerization. J. W. SHIPLEY

The ring structure of methyl glucodesoside. P. A. LEVENE AND L. A. MIKESKA. *J. Biol. Chem.* **88**, 791–8(1930).—The assignment of a 1,5-ring structure to Me glucodesoside by Bergmann and Breuers (*C. A.* **23**, 3670) is confirmed by the prepn. of 2 different lactones, one from glucodesonic acid, and the other from Me glucodesoside. Since the former has the normal 1,4-structure, the latter is considered to be 1,5, and its instability is due to the reduced C atom. 2-Desoxyglucose was oxidized by $Ba(IO_3)_2$ (Goebel, *C. A.* **21**, 1967) to the Ba salt of *2-desoxy-d-gluconic acid*, (6.14 g. from 4 g. desoxy sugar); the free acid (I), m. 145° (uncor.). By heating a 2% soln. of I in a sealed tube 24 hrs. at 100°, concg. under reduced pressure, and extg. with C_6H_6 and then with acetone, was obtained *glucodesonic lactone* (II), m. 95–7° (uncor.), $[\alpha]^{25}_D = 68°$ (H_2O). From II by methylation, first in acetone and then in MeI, was obtained *trimethyl-d-glucodesonic lactone* (1,4), m. 62° (uncor.) $[\alpha]^{25}_D$ 21.5° (C_6H_6). Me 2-desoxyglucoside was prepd. according to Bergmann, Schotte, and Lechinsky (*C. A.* **16**, 2118), methylated at 50–60° with Me_2SO_4 and NaOH, extd. with $CHCl_3$ and the *trimethyl-d-methylglucodesoside* (III) distd., $b_{0.35}$ 86–90°. Treatment of III with excess Ag_2SO_4 in hot 0.1 *N* HCl, and extn. with Et_2O yielded *trimethyl-d-glucodesose*, m. 58–61°, $[\alpha]^{25}_D$ 59.5° at first (H_2O) and 33.1° at equil. (H_2O). From this, *Ba trimethyl-d-glucodesonate* was prepd. as I, $[\alpha]^{25}_D$ 18.1° (H_2O). The Ba was removed, and the soln. concd. under reduced pressure, and further concd. in acetone at 0.02 mm., and extd. with alc. to yield *trimethyl-d-glucodesonic lactone* (1,5), b. 137° (approx.), $[\alpha]^{25}_D$ 87.5° ($CHCl_3$), 88.2° (C_6H_6). K. V. THIMANN

Hexose monophosphates. Glucose 3-phosphate, glucose 6-phosphate and their bearing on the structure of Robison's ester. P. A. LEVENE AND ALBERT L. RAYMOND. *J. Biol. Chem.* **89**, 479–99(1930); cf. *C. A.* **23**, 1885.—The synthetic glucose monophosphate prepd. through diacetoneglucose is glucose 3-phosphate. It is not identical with Robison's ester (*C. A.* **17**, 1036) and therefore the latter cannot be glucose 3-phosphate. Through monoacetoneglucose it is possible to prep. an ester similar in many of its properties to the Robison ester and this ester is presumably glucose 6-phosphate. The m. p. of its osazone does not agree with that from the Robison ester but it is suggested that the latter ester may not have been prepd. in an entirely pure state. Further purification of the Robison's ester is now in progress in order to permit the comparison of its osazone and other derivs. with those of the synthetic 6-phosphate. A. P. LOTHROP

Chemical examination of the glucomannan obtained from "Konjak." KITSUJI NISHIDA AND HIDEO HASHIMA. *J. Dept. Agr. Kyushu Imp. Univ.* **2**, 277–360(1930).—The constitution of the glucomannan from "Konjak" is in dispute. According to

various investigators it consists of glucose, mannose and fructose in the relationships 1:2:0, 2:5:0, 2:3:1. The mannan studied by N. and H. was prepd. by 2 methods: (1) Hydrolysis of the powder from Konjak tubers with water under a pressure of 1–1.5 atm., pptn. of Cu mannan with Fehling soln., and decompn. of the Cu compd. with HCl, after which the glucomannan was filtered off, washed with alc. and ether and dried *in vacuo* over P_2O_5. (2) Hydrolysis by means of a 10% pancreatic soln. with PhMe at 35° over a period of 2 weeks, followed by the same treatment as in (1). The product was a finely divided white powder which did not reduce Fehling soln. The procedures employed in studying the constitution of this glucomannan were: quant. hydrolysis, acetylation, acetolysis and methylation. The hydrolysis was carried out with concd. HCl (d. 1.21–1.223) at 0–15° for 24 hrs. and with 1, 2, 5 and 10% HCl and H_2SO_4 at the temp. of boiling water. The sugar formed was detd. as glucose by the method of Bertrand. The % glucose varied from 102 to 108% (theoretical 111.1%), the best sugar yield being obtained with 2% HCl heated on a boiling-water bath for 25 hrs. It was concluded that fructose was not present on the basis of a neg. resorcinol test, a trace only of blue color with $(NH_4)_2MoO_4$ soln., and a detn. of aldose sugars (according to the method of Kolthoff (cf. *Z. f. Untersuch. d. Nahr. u. Genussmittel* 45, 131(1923). That the mannan is glucomannan, *i. e.*, that it consists of 2 mols. mannose and 1 mol. glucose, was concluded from the pptn. of mannose phenylhydrazone with $PhNHNH_2$ and from rotation data calcd. on the basis of the sp. rotation of glucose and mannose as compared with the total sugar as detd. by Bertrand's method. The acetylation of the mannan with Ac_2O in the presence of pyridine gave as chief product the monoacetate, while in the presence of $SnCl_2$ and $ZnCl_2$ it gave the triacetate (m. 187–90°, $[\alpha]^{15}_D$—21.5°, AcOH content 60.33–63.65%, and mol. wt. detd. in freezing $CHBr_3$ 2299–2382, indicating the probable formula $[C_6H_7O_2(OAc)_3]_9$). The acetolysis was carried out most satisfactorily when the proportions were as follows: 8 g. glucomannan, 40 g. Ac_2O, 46 g. glacial AcOH and 4 g. concd. H_2SO_4. The reaction mixt. was kept at 22–26.5° for 8–20 days. The course of the reaction may be represented as follows: Glucomannan acetolyzed ⟶ $C_{18}H_{21}O_5(OAc)_{11}$, (m. 95-110°, $[\alpha]^{20}$ 18°) which on sapon. with NH_3 in abs. MeOH ⟶ glucomannotrihexose (m. 217°, $[\alpha]^{20}_D$ —16°) ⟶ 2 disaccharides, glucomannobiose (m. 150-60°, $[\alpha]^{20}_D$ 10.5°), and mannobiose (m. 125–40°, $[\alpha]^{20}_D$ —7.9°), ⟶ mannose and glucose. Repeated methylation gave as high value 41.6% OMe. On hydrolysis of the methylated glucomannan with 1% HCl in MeOH and then oxidation with HNO_3 (d. 1.2) trimethylsaccharic acid lactone was obtained, indicating that 2,3,4- and not 2,3,6-trimethylglucose was the intermediate product. Other products found to be present were 2,3,6-trimethylmannonic acid lactone and 2,3,4-trimethylmannosaccharic acid lactone. Assuming a 5-membered ring for glucose and mannose, N. and H. postulated a nucleus with mannose linked through a 1,6-linkage to a 2nd mannose which in turn is linked to glucose, again through a 1,6-linkage, with the linkage to other groups probably through C 4 of the first mannose and C 1 of the glucose.

A. WIEBEN

Combination of sucrose with boric acid. Considerations based upon variations of acidity of boric acid in the presence of sugar. JULIU VOICU AND EUGENIA AXENTE. *Bul. soc chim. Romania* **12**, 61–70(1930).—A soln. of boric acid in the presence of sucrose (0.9 *M*) (30.78%) varies considerably in acidity, and one is forced to assume that this bisaccharide combines with boric acid. The existence of this combination is more apparent in more moderate dilns. of boric acid. The max. increase of acidity appears at $^1/_8$ mol. (1.03%) of H_3BO_3. At a concn. of $^2/_3$ mol. (4.13%) H_3BO_3 this increase of acidity hardly exists any more. In view of the fact that the boric acid exists in concd. solns. in the "tetra" form, in dil. soln. in the "ortho" form and in view of the weak tendency of sucrose to combine with H_3BO_3, one can explain satisfactorily this behavior of H_3BO_3 and sucrose. Every time when dealing with a boric acid-sugar combination which corresponds to an increase in acidity, one has to do with very moderate concns. of H_3BO_3. It seems from the graphic representations of these results that the boric acid in the presence of sucrose exists in the "orthoboric acid" form, which combines with the sugar. One is forced to assume that there is an influence which disturbs the tetraboric acid. This influence manifests itself the more as the compd. sugar-boric acid possesses a less acid character. The diagrams show us the acidity of the boric acids in various concns. and the acidity of the combination of boric acid-sugar, the concn. of which is unknown.

F. R. GREENBAUM

Synthesis of a carbon chain by means of enzymes. II. The study of carboligases. A. STEPANOV AND A. KUZIN. *Ber.* **63B**, 2473–6(1930); cf. *C. A.* **24**, 3600.—A series of expts. to make a suitable dry prepn. from beer yeast to use as a synthesizing agent is

described. A ppt. with alc. and acetone, dissolved in $(NH_4)_2SO_4$, adsorbed in $Al(OH)_3$ is chosen for measurement. Its activity does not diminish in 4 months, increases with its concn., increases with time of standing, decreases in the presence of $CHCl_3$ and is optimum at a temp. of 25–30°. The activity is measured by the synthesis of methyl-acetyl-carbinol from pyroracemic acid. MARY E. LEAR

Catalytic action at high temperature and under high pressure. II. Catalytic hydrogenation of aromatic nitro compounds. SHIGERU KOMATSU AND RYODO AMATATSU *Mem. Coll. Sci. Kyoto Imp. Univ.*, Ser. A, **13**, 329-36(1930); cf. *C. A.* **24**, 5718.—Pure $PhNO_2$, shaken 3.5 hrs. with a reduced Ni catalyst in an autoclave filled with H_2 at 50 atm. and heated to 100°, was quantitatively reduced to $PhNH_2$ Repeating at 200° and a H_2 pressure of 100 atm. at 15°, the products were $PhNH_2$ 5%, *cyclohexylamine* 78%, and dicyclohexylamine 7%; and substantially the same result was obtained by using $PhNH_2$ in place of $PhNO_2$. At 100° and 50 or 100 atm. *p*-nitrophenol gave a quant. yield of *p*-$H_2NC_6H_4OH$; at 160° the principal product was the aminocyclohexanol. At 50° under 30 or 100 atm. H_2 α-$C_{10}H_7NO_2$ was quantitatively reduced to α-$C_{10}H_7NH_2$; at 160° the product was mostly *α-aci*-tetrahydronaphthylamine. The latter compd. was also obtained from α-$C_{10}H_7NH_2$ at 150° and 30 or 100 atm. L. E. GILSON

Carbithioic acid studies. II. Cyclohexylcarbithioic acid and various derivatives. R. W. BOST AND W. W. WILLIAMS *J. Am. Chem. Soc.* **52**, 4991-2(1930); cf. B and Mattox, *C. A.* **24**, 1099.—*Cyclohexylcarbithioic acid*, from cyclohexyl bromide, Mg and CS_2, is a reddish brown liquid with a putrid odor, slowly decompg on exposure to air; it distils with decompn. *Ag salt*, brick-red, m. 163°; *p-toluidide*, m. 160°; *Me ester*, orange-red, b_3 90°; *Et ester*, orange-red, b_5 106°; *Pr ester*, orange red, b_5 106°; *Bu ester*, orange red, b_5 145°. Oxidation of the acid gives hexahydrobenzoic acid. The acid chloride and thioamide could not be prepd. C. J. WEST

Cymene. A preliminary study. J. ALFTHAN. *Finska Kemistsamfundets Medd* **36**, 90–108(1927).—2-Nitrocymenesulfonic acid had not before been prepd. from 2-nitrocymene. The nitro group directs, in general, the new substituents principally to the *m*-position, and the main product is 2-nitrocymene-6-sulfonic acid The best yield (70–80%) was obtained with 1.83 H_2SO_4 at 130°, blood charcoal being used to aid the sulfonation The 2-nitrocymenesulfonic acid was nitrated, but instead of the iso-Pr group being substituted with formation of trinitrotoluenesulfonic acid, dinitrocymene sulfonic acid was obtained. The sulfonation of 2,6-dinitrocymene gave neg. results. JOHN RYSELIN

Organic compounds of molybdenum. SIEGFRIED L. MALOWAN. *Arch. Pharm* **268**, 537–9(1930).—A series of expts with $MoCl_5$ and $PhNH_2$ (and *o*-$MeC_6H_4NH_2$, resp.) are described leading apparently to the formation of org. Mo derivs. of relatively stable (in the air) character, but as yet of undetd. constitution. W. O. E.

Derivatives of di- and tri-arylamines. RUDOLF JOSZT AND WACŁAW LEŚNIAŃSKI *Roczniki Chem.* **10**, 523–9(539–40 German)(1930). - The condensation of 2-phenyl amino-5-nitrobenzoic acid (I) and its salts and Et ester with PhI was studied and it was found that the phenylation of I with PhI gives only the decarboxylated compd., *p*-nitro-triphenylamine. The *4-nitrotriphenylamine-2-carboxylic acid* (II) sought could not be obtained by the condensation of *2-iodo-5-nitrobenzoic acid* (III) with Ph_2NH and, therefore, *2-methyl-4-nitrotriphenylamine* (IV) was prepd and subjected to oxidation. The following compds. were prepd.: III was synthesized from $Cl(O_2N)C_6H_3CO_2H$ which was heated with 5 parts aq. 25% NH_4OH at 150° in an autoclave giving nitroanthranilic acid (m. 274°, decompn.) in 95% yield. On diazotization and treatment with KI III (m. 197–8° (cor.)) was obtained in 92% yield. IV is formed by heating the correspond ing nitrotoluidine with an excess of PhI with the addn of K_2CO_3, $PhNO_2$ and Cu brass for 48 hrs., yield 83%; orange-yellow plates from AcOH, EtOH, m. 130.5–1.5°. II is formed in small amt. by oxidation of IV with CrO_3 in boiling AcOH soln. It crystallizes with 1 mol. EtOH, m. 100° with effervescence Besides the triarylamine deriv., *2-methyl-4-nitrodiphenylamine* (V) is formed on heating PhI with an excess of nitrotoluidine, in the presence of K_2CO_3, $PhNO_2$ and Cu for 12 hrs. Yield 50%, gold-yellow plates from benzene, m. 140–1°. On heating the nitro compd. in alc. with Sn and HCl *2-methyl-4-aminotriphenylamine* is formed, colorless needles from alc., m. 94–9°, b_4 227°. The HCl salt forms silvery shining white flakes, m. 217°. *Mono-Ac deriv.* is formed by short heating with Ac_2O at room temp., colorless crystals, m. 144–5.5°. The azo dye prepd. from diazotized V and β-naphthol is dark red, thick crystals with metallic luster, m. 186–8° (toluene). On coupling the diazotized base with chromotropic acid a violet-blue dye is formed. *2-Methyl-5-aminodiphenylamine* is formed by the reduction of the nitro compd. with Sn + HCl in alc., white needles from petroleum ether, m. 49–50°, b_4 196–9°.

HCl salt, m. 185–7°. *Mono-Ac deriv.* prepd. similarly as the triaryl compd., crystallizes from hot water in colorless needles, m. 139–40°. Characteristic color reactions with concd. H_2SO_4 were observed in all di- and tri-arylamine derivs. described. A green-blue color appears in the triaryl compds. exclusively; on the other hand, the yellow di-arylamine derivs. give red-violet solns. These color reactions can serve as a control for purity. J. KUČERA

Formation of a complex mixture of many RMgX compounds from the reaction between a simple RX compound and magnesium. HENRY GILMAN AND NINA B. ST. JOHN. *J. Am. Chem. Soc.* **52**, 5017–23(1930).—The carbonation of PhMgBr and of PhMgCl, each prepd. in the absence of Et_2O, gave in addn. to BzOH very small quantities of *p*-$PhC_6H_4CO_2H$. The formation of the latter acid is almost certainly due to free Ph radicals initially developed in the prepn. of PhMgX. Attention is directed to the theoretical and in some cases practical formation of a large and complex variety of Grignard reagents starting with a single and simple RX compd. Although the degree of these side reactions is fortunately very limited and in most cases insignificant, it emphasizes the difficulty or impossibility of prepg. absolutely pure compds. C. J. WEST

Valency problems of the quinquevalent electronegative phosphorus atom. I. LUDWIG ANSCHÜTZ AND FRITZ WENGER. *Ann.* **482**, 25–35(1930).—To throw light on the orientation and nature of the valencies of the quinquevalent electroneg. P atom (*i. e.*, as in compds. derived from P oxyacids with a quinquevalent central atom) an attempt has been made to resolve the compd. $[MeC_6H_3(O)_2P(O)_2C_6H_3Me]Cl$(I), which should exist in 2 forms if 4 of the valencies are disposed tetrahedrally. Homocatechol (II) and PCl_5 in dry Et_2O give *dihomocatechylphosphorus chloride* (I), very sensitive to moisture. With *l*-menthol in Et_2O I gives *l-di(4-methyl-1,2-phenylene)menthyl orthophosphate*, m. 65–70°; attempts to resolve the latter by fractional extn. were unsuccessful. Preliminary expts. with other substituted catechols have so far also been unsuccessful. II and $POCl_3$ in Et_2O give *homocatechylphosphorus chloride* (III), b_{11} 102°, m. 22–4°, a by-product is *4-methyl-1,2-phenylene phosphite*, b_{11} 265°. Chlorination of III gives the corresponding *trichloride*, b_{11} 158°, not obtained directly from II and PCl_5. Heating III with S at 190° gives *homocatechylphosphorus chlorosulfide*, $MeC_6H_3O_2PClS$, b_{11} 142–3°. C. J. WEST

The action of Grignard reagents on sulfonyl chlorides. RENÉ TRUCHET. *Compt. rend.* **191**, 206–9(1930). —Arylsulfonyl chlorides and RMgX give RCl together with sulfides, sulfoxides and sulfinic acids (cf. Gilman and Fothergill, *C. A.* **24**, 85). Apparently sulfones are only formed when R is aryl. Sulfones are not reduced by RMgX and T. explains the formation of sulfoxides by the interaction of RMgX with the sulfinate first formed. EtMgBr (22 g.) and $PhSO_2H$ (14 g.) give 5 g. of a mixt. of PhSOEt and PhSEt. A. F. SHEPARD

Orthanilic acid. V. V. SHARVIN, G. I. ARBUZOV AND S. L. VARSHAVSKII. *J. Chem. Ind.* (Moscow) **6**, 1409–12(1929).—The literature on *orthanilic acid* (*o*-$H_2NC_6H_4SO_3H$) is scant compared to that on sulfanilic and metanilic acids. The authors review the available literature and supplement it by the results of their own investigations. They selected for prepn. of the acid those methods which exclude the formation of isomers. Kreis's method (Ger. pat. 84,141; *Ann.* **286**, 377), involving the following steps: *PhNHAc* ⟶ *p-BrC₆H₄NHAc* ⟶ *5,2-Br(H₂N)C₆H₃SO₃H* ⟶ *orthanilic acid*, gave satisfactory results only after introduction of certain modifications into the published process. Thus, the sulfonation was carried out *in vacuo* at 168–170° with 93% H_2SO_4, however, about 10–12% of the initial *p*-bromoanilide remained unsulfonated. The elimination of Br by means of Zn dust in alkali soln. takes 15 hrs. instead of the prescribed 6. The yield of orthanilic acid is not less than 60%. Wohlfart's method (*J. prakt. Chem.* **66**, 551(1902)) involving the steps *o-O₂NC₆H₄Cl* ⟶ (*o-O₂NC₆H₄S*)₂ ⟶ *o-O₂NC₆H₄SO₃H* ⟶ *orthanilic acid*, also had to be modified. In the reduction step, the prescribed use of Zn dust had to be replaced by the common neutral reduction with Fe filings. The yield was 75%. Wohlfart's method is preferable to Kreis's because it requires fewer intermediate products and a shorter time (11 hrs. as against 30 hrs.). The method of Fierz-David, Schlittler and Waldmann (*C. A.* **23**, 4680) is also discussed. *Detn. of orthanilic acid* in a mixt. of its isomers is also discussed in detail. One method is conversion into the resp. *chlorosulfonamides* ($ClC_6H_4SO_2NH_2$) whose characteristic m. ps. are known. A visual test discovered by the authors is as follows: The orthanilic acid is diazotized and coupled to salicylic acid in alk. soln. If to the brown soln. is added, after 5–10 min., an excess of concd. HCl, a bright red ppt. is formed. A similar test on sulfanilic acid gives a pale yellow ppt.; on metanilic, a light brown. This test is applicable even to a mixt. of the isomers. The explanation is that

the HCl apparently dehydrates the azo compd. according to the equation: *p*-$HO_3SC_6H_4N{:}NC_6H_3(OH)CO_2H \longrightarrow SO_2.C_6H_4.NN{:}C_6H_2(CO_2H){:}O$. Concd. H_2SO_4 may be used instead of HCl, but is less desirable because of the heat developed. Glacial AcOH does not produce this result. Another test is to diazotize and couple to γ-acid (2,8,6-$C_{10}H_5(NH_2)(OH)SO_3H$). Under similar conditions of coupling, the dyestuff derived from orthanilic acid is readily salted out; the one from sulfanilic acid does not salt out, but ppts. upon acidification with HCl. This method may be used for *sepg.* the 2 isomers. The diazo compds. themselves differ in *o*- and *p*-$H_2NC_6H_4SO_3H$. Diazoörthanilic acid is somewhat more sol. and settles less readily to the bottom than diazosulfanilic. Also, the former has a tinge of yellow while the latter is pure white. *Phenylhydrazine-o-sulfonic acid* is not described in the literature. The authors prepd. it by reducing diazoörthanilic acid with $SnCl_2$ at about −8° to 0°; yield 68%. *1-o-Sulfophenyl-3-methyl-5-pyrazolone* is obtained from this by condensation with $AcCH_2CO_2Et$. The latter should be taken in excess, and the mass should be heated to about 120°. The resulting pyrazolone was coupled to *diazobenzene*. The dyestuff obtained possesses an exceptionally pure yellow shade, with a slight greenish tinge. Its fastness to light is considerably greater than that of tartrazine or fast-yellow. The dyestuff corresponding to tartrazine and derived from *o*-$H_2NNHC_6H_4SO_3H$ and hydroxytartaric acid is not fast to light. Sixteen azo dyes were prepd. with *orthanilic acid* (I) as component. These were as follows: (1) I ⟶ resorcinol; (2) I ⟶ resorcinol ⟵ *m*-xylidine; (3) I ⟶ resorcinol ⟵ benzidine ⟶ salicylic acid; (4) I ⟶ salicylic acid; (5) I ⟶ α-naphthol; (6) I ⟶ β-naphthol; (7) I ⟶ *p*-xylidine; (8) I ⟶ *p*-xylidine ⟶ β-acid; (9) I ⟶ dimethylaniline; (10) I ⟶ diphenylamine; (11) I ⟶ S-acid; (12) I ⟶ γ-acid; (13) I ⟶ Chicago acid ⟵ α-naphthylamine; (14) I ⟶ Chicago acid ⟵ benzidine ⟶ salicylic acid; (15) 2 mols I ⟶ terephthalyldi(5-hydroxy-7-sulfo-2-naphthylamide); (16) I ⟵ benzidine ⟶ naphthionic acid. Their colors do not differ much from the corresponding dyestuffs with sulfanilic acid. Their fastness to light is not great. Conclusion: About the only practical utility of I is in the prepn. of pyrazolone dyestuffs of the type of fast-yellow G; in this case the dyestuffs are more beautiful in shade and quite fast to light. The other azo dyes from I have hardly any technical value. DAVID KATZ

Potentials of some unstable oxidation-reduction systems. LOUIS F. FIESER. *J. Am. Chem. Soc.* 52, 4915–40(1930).—By means of a "discontinuous titration" method it has been possible to det. the oxidation-reduction potentials of systems which are so unstable that the half-life period for the decompn. of the oxidant is of the order of 0.1 0.5 min. With the systems formed by *p*-$H_2NC_6H_4OH$ and 2 of its *N* alkyl derivs. the variation of the potential with the H-ion concn. has been studied in the p_H range 1–8 and the basic dissocn. consts. have been detd. from the results. The term normal potential is defined as the p. d. between a dil. soln. of equimol. quantities of the oxidant and the reductant, when neither is ionized, and a H electrode in the same solvent.

Rounded Average Values

System named as reductant	Normal potential, E_0 Alc. v.	Water v.	Half-life (neutral soln.) Alc. v.	Water v.
p-Methylaminophenol	0.693	0.688	35.6	7.4
p-Benzylaminophenol	.703	.698	3.9	1.4
p-Aminophenol	.733	.728	3.9	1.1
p,p'-Dihydroxybiphenyl	.954	.....	1.6	...
p,p'-Dihydroxystilbene	.854	.....	1.1	...
p-Phenylenediamine	.783	(.801)	0.5	0.1
N-Methyl-*p*-phenylenediamine	.751	..	.5	

The potential of $O{:}C_6H_4{:}C_6H_4{:}O$ and its reduction product is the highest yet recorded for an org. system. The substitution of the NH group for the ketonic O progressively increases the affinity of the quinonoid substance for *H*. The $O{:}C_6H_4{:}NMe$ and $HN{:}C_6H_4{:}NMe$ are lower in potential than the parent substances by about the same amt.; a $PhCH_2$ group has much the same effect as Me. The ionization consts. for *p*-$H_2NC_6H_4OH$ and $NH{:}C_6H_4{:}O$ are not appreciably affected by the substitution of Me for H but they are both decreased by the substitution of a $PhCH_2$ group. The quinonimine in each case has a smaller dissocn. const. than its reduction product. There appears to be

System, named as reductant	First Basic Dissocn. Consts. Reductant K_r	pK_r	Oxidant K_o	pK_o
p-Aminophenol	5.6×10^{-9}	8.2	1.0×10^{-10}	10.0
p-Methylaminophenol	1.0×10^{-8}	8.0	1.0×10^{-10}	10.0
p-Benzylaminophenol	1.5×10^{-9}	8.8	9.0×10^{-12}	11.1
p-Aminodimethylaniline	3.9×10^{-8}	7.4	5.0×10^{-7}	6.3
o-Tolidine	6.2×10^{-10}	9.2	2.7×10^{-8}	7.6

little correlation between the velocity of decompn. and the acidity of the soln.; the only marked effect noted is that $O:C_6H_4:NH$ is decidedly more stable at p_H 7–8 than in more acidic solns. It is evident that the rate of reaction often varies considerably according to the nature of the soln. and the relative concns. of oxidant and reductant and that there is often a great difference in the behavior of closely related compds. The original should be consulted for the details of the method of procedure and for the data for the 7 systems studied. C. J. WEST

Indirect method of studying the oxidation-reduction potentials of unstable systems, including those from the phenols and amines. LOUIS F. FIESER. *J. Am. Chem. Soc.* 52, 5204–41 (1930).—The unstable systems formed by phenols or amines and the free radicals formed as their immediate oxidation products have been characterized by a new term called the crit. oxidation potential. This is the potential of some oxidizing soln. which will cause a certain small quantity of the amine or phenol to become oxidized in 5 min. when equiv. amts. of the sample and of the oxidizing agent are employed. This value, which may be detd. with reasonable accuracy, represents the potential at which the velocity of oxidation becomes vanishingly small and hence the result is influenced by the reaction rate to an extent which is insignificant. This has been demonstrated experimentally, for the crit. oxidation potential bears a definite relationship to the normal potential and it is influenced no more by temp. changes than is the latter quantity. The crit. oxidation potentials of over 70 compds. have been detd. and many relationships, conclusions and deductions pointed out in discussing the results. The following values for E_c (v.) at 25° are reported: PhOH 1.089, *o*-MeC_6H_4OH 1.040, *p*-MeC_6H_4OH 1.038, *m*-MeC_6H_4OH 1.080, 2,4-$Me_2C_6H_3OH$ 0.895, *p*-$HOC_6H_4CH_2CO_2H$ 1.051, *p*-$HOC_6H_4CH_2Ph$ 1.052, $(p\text{-}HOC_6H_4)_2CH_2$ 1.038, saligenin 1.052, *o*-HOC_6H_4Ph 1.038, *p*-HOC_6H_4Ph 1.036, *o*-$MeOC_6H_4OH$ 0.868, *p*-$MeOC_6H_4OH$ 0.848, *m*-$MeOC_6H_4OH$ 1.052, $(MeO)_2C_6H_3OH$ 0.760, *p*-HOC_6H_4OPh 1.030, cresol 0.825, eugenol 0.831, isoeugenol 0.757, *m*-$H_2NC_6H_4OH$ 0.894, *p*-$Me_2NC_6H_4OH$ 0.718, 2,4,6-$Cl_3C_6H_2OH$ 1.103, vanillin 1.080, pyrocatechol 0.742, *m*-$C_6H_4(OH)_2$ 1.043, nitrohydroquinone 0.697, esculetin 0.759, 1,3,5-$C_6H_3(OH)_3$ 0.799, 1,2,3-$C_6H_3(OH)_3$ 0.609, β-$C_{10}H_7OH$ 1.017, 2-$O_2NC_{10}H_7OH$ 1.141, 2-$HO_2CC_{10}H_6OH$ 1.065, 2-$NaO_3SC_{10}H_6OH$ 0.881, 5-$MeOC_{10}H_6OH$ 0.792, 1,3-$C_{10}H_6(OH)_2$ 0.754, 1,5-$C_{10}H_6(OH)_2$ 0.673, 2,3-$C_{10}H_6(OH)_2$ 0.812, 2,6-$C_{10}H_6(OH)_2$ 0.690, 2,7-$C_{10}H_6(OH)_2$ 1.007, anthranol 0.693, α-anthrol 0.602, β-anthrol 0.820, 1-phenanthrol 0.848, 2-phenanthrol 1.057, 3-phenanthrol 1.013, 9-phenanthrol 0.798, 2,6-dihydroxyphenanthrene 1.010, 3,6-isomer 0.832, $(p\text{-}HOC_6H_4)_2$ 0.882, *p,p'*-dihydroxystilbene 0.786, dioxindole 0.745, $PhNH_2$ 1.135, PhNHMe 1.053, PhNHEt 1.038, $PhNHCH_2Ph$ 1.057, Ph_2NH 1.008, $(p\text{-}EtOC_6H_4)_2NH$ 0.836, *p*-$MeC_6H_4NH_2$ 1.077, *p*-$MeOC_6H_4NH_2$ 0.892, *m*-tolylenediamine 0.864, PhCH:NHNHPh 0.791, PhN:NHNPh 1.058, $PhCH(NH_2)CO_2H$ 0.833, β-$C_{10}H_7NH_2$ 1.064, *p*-$H_2NC_6H_4OH$ 0.673, *p*-$C_6H_4(NH_2)_2$ 0.710, *p*-$H_2NC_6H_4NHPh$ 0.696, *p*-$HOC_6H_4CH(NH_2)CO_2H$ 0.603, PhSH 0.812, Me_2CHSH 0.819, mercaptobenzothiazole 0.785. C. J. WEST

Action of hydrogen sulfide on acid chlorides. I. Hydrogen sulfide and benzoyl chloride. LUDWIK SZPERL. *Roczniki Chem.* 10, 510–21 (521–2 French) (1930).—It has been found that H_2S reacts with BzCl at high temp. H_2S was passed through BzCl without using any solvent (*a*) as well as dissolved in decalin (*b*) and xylene (*c*) at 180–5° and 145°, resp. The following products were isolated in the reaction (*a*): HCl, S, BzOH, Bz_2S_2 (m. 135–6°), $PhCH(SBz)_2$ (I) and a small amt. of sulfurated substance, m. 28–30°; in the reaction (*b*): HCl, Bz_2S_2, smaller amt. of S, BzOH and I which was not isolated, however; in the reaction (*c*): HCl, Bz_2S_2, Bz_2S (m. 47–8°) and BzOH. These compds. are presumably formed by the direct action of H_2S on BzCl, by the reaction between BzCl and BzSH formed and by the reducing action of H_2S as well as BzSH. It has been observed that the m. p. found for Bz_2S_2 is higher than that given in the literature. It does not become red on heating as is the case in the presence of impurities as Na_2SiO_3, acid and normal alkali carbonates. By the action of $CdCO_3$ and $AgCO_3$ the sulfides of these metals are obtained. The colored substance formed in minute quantities could not be isolated. Prolonged heating of Bz_2S_2 with Na_2CO_3 gives

a profound change. No corresponding salts of BzSH were obtained by heating Bz_2S_2 in xylene with Mg, Ni, Al, Cu and Ag, only Hg giving a salt, white needles, decompg. at 90°. Bz_2S is obtained in a good yield by the action of dry BzSNa on BzCl in Et_2O. On heating with salt, Bz_2S becomes violet and changes to rose-orange after some time.
J. KUČERA

Chemical and physicochemical studies on methylglyoxal and its relation to the alkaline degradation of glucose. F. FISCHLER, H. HAUSS AND K. TÄUFEL. *Biochem. Z.* **227**, 156–70(1930).—Methylglyoxal can be purified by distn. over $BaCO_3$ under diminished pressure. The pure substance shows max. absorption in the ultraspectroscope at 2840 A. U. and a min. at 2400 A. U. Purest prepns. of glucose do not show any selective absorption, but under the influence of very dil. alkali after a while the absorption consts. of pure AcCHO appear. This absorption can be dissipated practically completely by the addn. of acid to a weak litmus reaction. Under the influence of alk. caramel quickly appears in the pure AcCHO solns. even in the cold and with a relatively low OH-concn., and at the same time lactic, acetic and formic acids are produced. The quant. production of these acids with different OH and AcCHO concns. was more or less proportional. So far attempts to obtain AcCHO from various lactates by dehydration have not succeeded.
S. MORGULIS

Some halogen derivatives of acyl- and alkylresorcinols. C. M. BREWSTER AND J. C. HARRIS. *J. Am. Chem. Soc.* **52**, 4866–72(1930).—This study was undertaken because of the germicidal and other properties of resorcinol derivs. Resacetophenone and Br in AcOH give *ω-dibromo-3,5-dibromo-2,4-dihydroxyacetophenone*, yellow, m. 110–10.5°; $FeCl_3$ gives a wine-red color; reduction gives 3,5,2,4-$Br_2(HO)_2C_6HEt$. Details are given of the prepn. of 2,4-dihydroxypropiophenone (I) and its 3,5-Br_2 deriv.; a *tri-Br deriv.* was also obtained with 2 5 times the amt. of Br required for a di-Br deriv.; it is yellow, m. 157–8°. I yields a *di-Cl deriv.*, m. 146 7°, when Cl is passed into an AcOH soln. In the prepn. of 2,4-dihydroxybutyrophenone (II), m. 68–70°, there is also obtained in some cases 20% of a compd. m. 111–2°; the *di-Cl deriv.* of II m. 110.5–1°. *3,5-Dibromo-2,4-dihydroxy-1-ethylbenzene*, m. 74°, was obtained by reduction of dibromoresacetophenone or by bromination of 2,4-$(HO)_2C_6H_3Et$; the *di-Cl deriv.*, m. 78–9°, could not be obtained pure by the chlorination method
C. J. WEST

A multivalent alcohol present in the seeds of Castanea vesca. F. TRAETTA-MOSCA AND M. VENEZIA. *Ann. chim. applicata* **20**, 445 8(1930).—By means of dialysis to remove all electrolytes, and then extg. with boiling EtOH, a crystallizable ext. was obtained from powd. dry chestnuts, *Castanea vesca*, sol. in water, insol. in common org. solvents, m. 164°, inactive to polarized light, and which does not reduce Fehling soln., or NH_3-$AgNO_3$. The ultimate analysis indicates polyhydric, 8-C alc. Acetylation yields a product m. 121°, whose analysis agrees for a product $C_8H_{11}Ac_7$; this is also confirmed by the analysis of the iodide, and by N_2 detn. on the phenylhydrazone, m. 195°, formed by oxidizing the alc. with HNO_3 and then adding $PhNHNH_2$. The same product, $C_8H_{14}O_5(PhNHN)_2$, is finally obtained if Br_2 is used as oxidizing agent.
A. W. C.

Kakishibu. VI. Potash fusion of methylshibuol. SHIGERU KOMATSU AND MASAO KURATA. *Mem. Coll. Sci. Kyoto Imp. Univ.*, Ser. A, **13**, 323-7(1930); cf. *C. A.* **23**, 2175.—Tetramethylshibuol (I) boiled with alc. KOH yielded gallic acid tri-Me ether and destetramethylshibuol (II), m. 299°. I fused with KOH at 200° yielded 10% of gallic acid 3,5-di-Me ether, small quantities of volatile acids, and 2 unidentified amorphous compds. II fused with KOH yielded gallic acid 3-Me ether, phloroglucinol, formic, acetic and butyric acids, and an amorphous substance insol. in alkali.
L. E. GILSON

The hydrogenation of methylphenyl- and methylbenzylcarbinols. With a note on the reduction of phenylated carbinols. P. A. LEVENE AND P. G. STEVENS. *J. Biol. Chem.* **89**, 471–7(1930); cf. *C. A.* **24**, 4008.—MeCH(OH)Ph on reduction undergoes a change in sign and so behaves like iso-PrCH(OH)Ph rather than EtCH(OH)Ph to which it seems more closely related. The reduction product of $MeCH(OH)CH_2Ph$, however, has the same sign of rotation. If the rule of Levene and Haller can be applied to cyclohexyl compds., then *d*-methyl- and *l*-ethylphenylcarbinols are configurationally related. Not only do secondary phenylated carbinols undergo reduction to hydrocarbons but primary and tertiary as well. If the hydrogenation of the Ph group is accomplished prior to the reduction of the OH, the latter then cannot be brought about by further treatment. With Ph_3COH, the hydrogenation stops after 1 Ph group has been hydrogenated but with Ph_2CHOH both Ph groups are reduced. Adam's Pt oxide catalyst was used, the solvent being glacial AcOH and the pressure of H_2 20–30 lb.
A. P. LOTHROP

Some esters of tribromomethylphenylcarbinol. J. W. HOWARD. *J. Am. Chem. Soc.* **52**, 5059–60(1930).—Freshly distd. BzH (37 g.) and 130 g. dry $CHBr_3$, treated with 4 g. powd. KOH during 0.5 hr., allowed to stand 2 hrs., treated with Et_2O and filtered and steam-distd., give 16–8 g. of $Br_3CC(OH)HPh$, m. 72.5–3.0°; acetate, m. 133°; *propionate*, m. 70.5°; *butyrate*, b_{220} 205–7°, d_{20}^{20} 1.779; *benzoate*, m. 146°.

C. J. WEST

α,β-Diphenylethyl ether and α-(*p*-methoxyphenyl)-β-phenylethyl ether. CORLISS R KINNEY AND W. GLEN BYWATER. *J. Am. Chem. Soc.* **52**, 4893-5(1930).—The action of N_2O_3 or of dry HCl on *p*-$MeOC_6H_4(PhCH_2)CHOH$ or the decompn. of the reaction product of $PhCH_2MgBr$ and *p*-$MeOC_6H_4CHO$ with concd. HCl gives *α-(p-methoxyphenyl)-β-phenylethyl ether*, m. 148-9°; oxidation gives BzOH and *p*-$MeOC_6H_4CO_2H$; distn. gives a compd., m. 107–8°, whose bromide m. 174–5°. *α,β-Diphenylethyl ether*, m. 130.5°, was similarly prepd. from $Ph(PhCH_2)CHOH$.

C. J. WEST

Oxidation of benzaldehyde. E. RAYMOND. *Compt. rend.* **191**, 616-8(1930).—Very pure BzH does not oxidize in an O atm., but traces of salts of Cu, Ag, Ni, Co and especially Mn catalyze the reaction enormously.

R. CHESTER ROBERTS

Reaction between the binary system magnesium + magnesium iodide and aromatic aldehydes. M. GOMBERG AND W. E. BACHMANN. *J. Am. Chem. Soc.* **52**, 4967-72 (1930).—BzH is reduced by a mixt. of Mg and MgI_2 to $PhCH(OMgI)(IMgO)HCPh$, thus using up 2 mols. of the aldehyde. The compd. so produced reacts immediately with a 3rd mol. of the aldehyde, with formation of the salts of benzoin and $PhCH_2OH$, $BzCH(OMgI)Ph$ and $PhCH_2OMgI$. The benzoinate salt suffers further partial, or complete, reduction by the binary system to tetraphenylerythritol and a polymer, or condensation product, of the latter. Other aromatic aldehydes are affected by the binary system, *i. e.*, by MgI, in a manner essentially similar to that in which BzH is affected.

Aldehyde reduced	Moles	g.	Alc. obtained	g.	Benzoin isolated as	g.
α-Naphth-	0.1	15.6	α-Naphthenyl	4.1	α-Naphthil	5.3
p-Tolu-	0.25	30.0	*p*-Methylbenzyl	7.5	*p*-Tolil	7.0
p-Anis-	0.25	34.0	*p*-Anisalcohol	10.0	*p*-Anisil	8.2
p-Bromobenz-	0.25	45.3	*p*-Bromobenzyl	11.3	4,4'-Dibromobenzil	13.0
p-Chlorobenz-	0.25	35.1	*p*-Chlorobenzyl	8.5	4,4'-Dichlorobenzil	8.4

C. J. WEST

ω,ω-Dihalogen derivatives of aryl aliphatic ketones of the type $ArCOCHX_2$, especially ω,ω-chlorobromo derivatives of the type $ArCOCHClBr$. I. RABCEWICZ-ZUBKOWSKI AND H. KAPLIŃSKA. *Roczniki Chem.* **10**, 541-68 (568-9 English)(1930).—By the action of KCN on $ArCOCH_2Cl$(Ar = aryl) and $ArCOCH_2Br$, resp., the following ketocyanides of the type $ArCOCH_2CN$ were obtained: *p*-$BrC_6H_4COCH_2CN$, m. 162.4–3.4° (pale pink); *p*-$IC_6H_4COCH_2CN$, m. 187.4–8.4° (pale green); *m*-$NO_2C_6H_4COCH_2CN$, m. 152.0–3.0° (pale yellow); *p*-$MeC_6H_4COCH_2CN$, m. 104.6–5.2° (colorless); 2,4-$Me_2C_6H_3COCH_2CN$, m. 80.1–81° (colorless); β-$C_{10}H_7COCH_2CN$, m. 127.6–8.2° (colorless); *p*-$ClC_6H_4COCH_2CN$, m. 129.5–130° (colorless). *Benzoyldibromoacetamide*, $PhCOCBr_2CONH_2$, m. 181.6–2.4° (colorless crystals), was isolated from the products formed during the bromination of $BzCH_2CN$. The following ketothiocyanates were obtained by the action of KSCN on $ArCOCH_2Cl$ and $ArCOCH_2Br$, resp.: $PhCOCH_2SCN$, m. 74.1–4.6° (colorless); *p*-$ClC_6H_4COCH_2SCN$, m. 138.6–9.2° (colorless); *p*-$BrC_6H_4COCH_2SCN$, m. 148.8–9.2° (pale pink); *p*-$IC_6H_4COCH_2SCN$, m. 154.0–5.0° (pale green); *m*-$NO_2C_6H_4COCH_2SCN$, m. 123.6–4.2° (pale yellow); *p*-$MeC_6H_4COCH_2SCN$, m. 106.2–6.8° (colorless); 2,4-$Me_2C_6H_3COCH_2SCN$, m. 80.8–1.0° (colorless); *p*-$MeOC_6H_4COCH_2SCN$, m. 124.2–4.8° (colorless); β-$C_{10}H_7COCH_2SCN$, m. 109.4–10.0° (colorless). All m. ps. are corrected. During the bromination of ω-$BzCH_2SCN$ a Br addn. product, $PhCOCH_2SCNBr_2$, is formed, a very unstable compd. crystg. from alc. and forming $(C_9H_6ONS)_x$.

J. KUČERA

Replacement of halogen by hydrogen in α-halo ketones under the influence of the Grignard reagent. C. HAROLD FISHER, THOMAS S. OAKWOOD AND REYNOLD C. FUSON. *J. Am. Chem. Soc.* **52**, 5036–40(1930).—$Me_2CBrCOBr$ and 1,3,5-$C_6H_3Me_3$ with $AlCl_3$ in CS_2 give 69.5% of *α-bromoisobutyrylmesitylene* (I), b_{24} 160–70°, m. 27°; bromination gives nearly quant. *α,3,5-tribromo-2,4,6-trimethylisobutyrophenone* (II), m. 106–7° (cor.) Nitration of I gives the *3,5-di-NO_2 deriv.*, m. 117.8–8.5°. II was also prepd. by direct bromination of 2,4,6-$Me_3C_6H_2COCHMe_2$. II and MeMgCl in Et_2O give 71% of *3,5-dibromo-2,4,6-trimethylisobutyrophenone* (III), m. 70–1° (cor.). Bromination of III gives II, which is again reduced to III by Zn and AcOH. II and EtMgBr also give III.

In the Grignard reaction the enolate $Br_2Me_3C_6C(OMgBr):CMe_2$ is assumed to be formed. Treatment of this enolate with CO_2 did not give an acid. C. J. WEST

Some γ-nitro-β-furylbutyrophenones. NATHAN L. DRAKE AND H. W. GILBERT. *J. Am. Chem. Soc.* **52**, 4965–7(1930).—Condensation of furfural (I) and BzMe by 10% NaOH gives furfuralacetophenone (I), b_7 179°, b_{764} 319° (considerable decompn.), m. 26°. *Furfural-p-bromoacetophenone*, b_{16-18} 210–7°, m. 80–1°. Condensation of $MeNO_2$ and I with MeONa gives *γ-nitro-β-furylbutyrophenone*, m. 49.5–50°; *p-Br deriv.*, m. 72–3° (75% yield). $PhCH_2NO_2$ and I give *β-phenyl-γ-nitro-β-furylbutyrophenone*, m. 153–3.5°; *p-Br deriv.*, m. 87–8.5° (29% yield). C. J. WEST

ω-Alkylalkoxyaminopropiophenones. RANDOLPH T. MAJOR. *J. Am. Chem. Soc.* **52**, 5294(1930).—ω-Alkylalkoxyaminopropiophenones exhibit only slight anesthetic action, at least when they are applied to the mucous membrane of the tongue. These were prepd. by refluxing 1 mol. equiv. each of BzMe and *O,N*-dialkylhydroxylammonium chloride, 2 mol. equivs. of trioxymethylene and 10 mol. equivs. of abs. EtOH for 24 hrs. *ω-Methylmethoxyaminopropiophenone*, b_{23} 159° (50% yield); HCl salt, m. 155°; *ω-ethylethoxy deriv.*, b_9 151–3° (18% yield). C. J. WEST

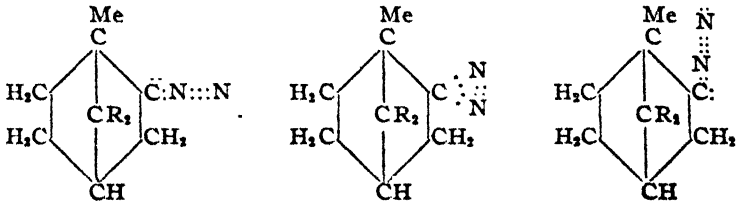
The action of benzoic peracid on substituted glucals. P. A. LEVENE AND ALBERT L. RAYMOND. *J. Biol. Chem.* **88**, 513–8(1930).—When 3-methylglucal and triacetylglucal are acted upon by BzO_2H, glucose derivs. are obtained and glucals substituted in position 4 treated likewise yield mannose derivs. It seems that addn. of hydroxyls to C atoms is directed by the character of groups attached to C atom 3. Results of expts. are given. W. H. TIFFANY

The action of several organic acids on *d*-α-pinene. MARCEL DELÉPINE, JEAN REISMAN AND EDOUARD SUAU. *Bull. soc. chim.* [4], **47**, 966–86(1930); cf. *C. A.* **19**, 648.—A continuation of research on the origin of fenchol in the reaction of org. acids with oil of turpentine. The repetition of previous investigations of others, using salicylic, oxalic and *o*-benzoylbenzoic acid with *d*-α-pinene from *Pinus halepensis*, $[\alpha]_D$ +48.3°, showed the invariable formation of fenchol. To test the relation existing between dissocn. const. and the reactivity of the acid with pinene, the action of mono- and dichloroacetic acids was investigated, their dissocn consts. being intermediate between those of salicylic and tetrachlorophthalic, and those of oxalic and picric acids. In general, after heating the acid chosen and the pinene together for some 50 hrs. in the neighborhood of 140°, the uncombined acid was titrated and then neutralized with NaOH. The hydrocarbons were removed by steam distn. and the remaining crude esters fractionally distd. when possible. After sapon., generally in the presence of EtOH, the solid and liquid alcs. were sepd. by centrifuging and recrystn. of the solid fractions from petr. ether (70°). The liquid alcs. may contain the 2 borneols (α and β), and the fenchols (α and β), each of them being in one predominant active form accompanied by a little of its optical antipode. The fenchol found was characterized by transformation into β-fenchone oxime, m. 123°, $[\alpha]_D$ 129.3° (in abs. alc.). The solid alc. was invariably a mixt. of borneol and isoborneol, the proportion of the latter being calcd. from observations of rotatory power in alc. and in toluene, and also by transformation into camphor by oxidation with a mixt. of 0.75 part of fuming HNO_3 and 2.25 parts of 36° Bé. HNO_3. The hydrocarbons obtained consisted of a mixt. of pinene, camphene, limonene and terpinolene and in a special case contained terpinene. When $ClCH_2CO_2H$ was used a fenchene was found. The pinene was transformed into pinonic acid; the pinene-camphene fraction was converted into HCl salts whose rotatory power could be examd. and then elevated by treatment with AcONa; limonene or the dipentene, recognized by their odor, were transformed into the tetrabromides; terpinolene was characterized by its b. p. and its inactive tetrabromide, m. 116–7°, and terpinene by its nitrosite m. 155°. From 100 g. of *d*-pinene heated with 40 g. salicylic, or 12.5 g. oxalic, or 50 g. *o*-benzoylbenzoic, or 25 g. chloroacetic, or 50 g. of dichloroacetic acid, 25.3, 26.0, 21.0, 16.0, 20.0 g. of purified alcs. were obtained. Conclusion: There are formed always, under given conditions, bornyl, isobornyl and fenchyl esters together with unaltered pinene, camphene, limonene, and the inversion products of the latter. Unusual quantities of fenchylic ester were obtained by the use of $ClCH_2CO_2H$ and in addn. it was possible to isolate a hydrocarbon considered to be a fenchene, attesting that the ester of α-fenchol is accompanied by the unstable ester of β-fenchol. C. R. ADDINALL

Pinene derivatives. G. GALLAS AND JOSÉ Mª. MONTAÑÉS. *Anales soc. españ. fís. quím.* **28**, 1163–1213(1930).—Pinene gave no camphene on heating to 150–200° with silex, active C, kieselguhr or Mn oxide, but dipentene was formed. Dichloropinane was prepd. in good yields by the action of Cl, and dibromopinane and pinene iodide similarly. Attempts to oxidize the latter sepd. I. Oxidation of pinene chloride

either failed or gave camphoric and ketopinic acids. Methods of prepn. of bornyl esters from pinene are reviewed. Pinene was oxidized to pinonic acid, which gave pinonic acid oxime, reduction gave the amine and HCl salt; the Bz deriv., when dehydrated, formed a new cyclic compd. which was not identified. In all reactions, alkalies increase resinification and impurities reduce yields. E. M. SYMMES

Optically active diazo compounds. Diazocamphane. ULRICH HEUBAUM AND WM. ALBERT NOYES. *J. Am. Chem. Soc.* **52**, 5070–8(1930).—This work was undertaken in order to get further evidence of the behavior of alicylic diazo compds. Diazocamphane (I) contains, besides the C atom which is connected with the diazo group, the 2 asym. C atoms of the camphor. It, therefore, can be expected to exist in 4 optically active modifications which give 2 pairs of optical antipodes and 2 pairs of stereoisomers I has been prepd. in Et_2O from the normal (II) and neobornylamines (III); the Et_2O solns. of both are deep red and extremely unstable and even below 0° decomp. with the evolution of N and the formation of the inactive tricyclene. The I is also very sensitive to H ions, even CO_2 favoring its decompn. Bornylurea from II yields a *NO deriv.*, yellow, m. 73–5° (decompn.), quite stable at 0° over P_2O_5; in forming the diazo compd. only 50% of the amine is used; the urethan was therefore used, whose NO deriv. is more unstable than that of the urea; with MeONa this yields the normal I, the reaction being carried out at —20°; a concn. of 0.56% in Et_2O showed α_{5440} 350°; values are given for λ from 6150 to 5300. III yields a neobornylurethan, m. 37°, α_D —28.0° (abs. EtOH), —31.2° (abs. Et_2O); NO deriv., α_D —18.5° (Et_2O); the neo-I obtained from this had, for a 0.44% soln., α_{5720} 466°; other values are given. The sp. rotation varies from 60° to 450° in various parts of the spectrum. The anomaly of the rotation in the green light is due to an absorption band located at about 5650 A. U., caused by the :CN_2 group. The shapes of the dispersion curves of the I prepd. from II and III are different, thus indicating a difference in structure of the diazo compds. concerned. Studying the decompn. of the I with HCl, a new *l*-bornyl chloride of $[\alpha]_D$ —33.2° has been prepd. from the normal I. The neo-I gave small amts. of a *d*-bornyl chloride. Both diazo compds., however, give mainly tricyclene, which indicates that they have partly the same structure. Their behavior is explained by the following formulas:



C. J. WEST

The magnesium compound of pinene hydrochloride. Action of ethyl formate. RENE BOUSSET AND MLLE. M. VAUGIN. *Bull. soc. chim.* [4], **47**, 986–1003(1930).—Solid pinene-HCl, $C_{10}H_{17}Cl$, m. 130°, considered as a mixt. of two 2-chlorocamphanes or as one of them, yields easily a Mg deriv. which gives the normally expected products with O_2, CO_2, SO_2, but which leads to complex mixts. with aldehydes, ketones, acid chlorides, etc. In particular, with BzPh, AcH, AcCl, bornylene was found, attesting to a remarkable reducing power of this Mg compd. To investigate this exceptional property of such an easily obtained optically active substance, having first verified that bornylene does not appear in the prepn. of the compd. on its hydrolysis, nor in the products of its oxidation or carbonation, the action of HCO_2Et on the compd. was studied. One mol. of pinene-HCl was converted into an ethereal Grignard soln. in a N atm. To this soln., cooled to —20°, 0.6 mol. of HCO_2Et was gradually added and the mixt. agitated for 24 hrs. at room temp. The hydrolysis was made in the usual manner and the excess Mg dissolved in dil. AcOH. The crude product (147 g.) yielded 49 g. of esters, 15 g. free alc., 36 g. bornylene, 15 g. camphane and 32 g. dibornyl. Under the operating conditions chosen the action of 1 mol. of HCO_2Et on 2 mols. $C_{10}H_{17}MgCl$ (I) may be considered as yielding 1 mol. $C_{10}H_{16}$, and 1 mol. $C_{10}H_{17}CH_2OMgCl$, a reaction using 68% of the initial HCl salt and giving an alc. $C_{10}H_{17}CH_2OH$ (II) with yields of 34%. II may be prepd. by the action of CO on I and reduction of the Et ester of the camphanecarboxylic acid (III) so formed, by the action of trioxymethylene on I, and by the use of HCO_2Et as above, and is termed camphanecarbinol. II is a white solid, m. 89°. *Phthalate*, m. 160–1°; *formate*, $n^{14.5}$ 1.475; *acetate*, b_{18} 127.5°, n^{18} 1.470; *p-nitrobenzoate*,

m. 126°. On oxidation in alk. $KMnO_4$ II gives camphanecarboxylic acid (III), m. 69–70°, the further oxidation of III to camphor, m. 178°, by alk. $KMnO_4$ being possible with poor yields. With the exception of the simple addns. of CO_2 and O_2, etc., to I, the action of HCONMePh and that of HCO_2Et seem the simplest and most fruitful, the action of HCONMePh and that of HCO_2Et seem the simplest and most fruitful, other reactions described previously only giving traces of terpene derivs. other than the hydrocarbons bornylene, camphane and dibornyl. C. R. ADDINALL

Production of synthetic borneol and camphor. J. SCHWYZER. *Pharm. Ztg.* **75**, 1275–6(1930).—The various operations involved in the production of the above products synthetically from α-pinene through its salicylate to borneol and camphor are discussed in detail, inclusive of the quant. yields. W. O. E.

Condensation of cyclanones. III. The abnormal condensation of dihydrocamphorone with benzaldehyde. R. CORNUBERT AND CHR. BORREL. *Bull. soc. chim.* [4], **47**, 958–66(1930); cf. *C. A.* **24**, 3997.—Dihydrocamphorone (α-methyl-α′-isopropylcyclopentanone) condenses with BzH under the influence of HCl to form a substance (V) having the compn. of a benzylidene compd. of methylisopropylcyclopentanone. This compd. is not identical with benzylidene-α,α-methylisopropylcyclopentanone. Me_2CO (125 g.) was dissolved in 500 cc. H_2O, contg. 30 g. NaOH to which soln. 50 g cyclopentanone was added and the mixt. stirred for 10 hrs. The soln. was dild., acidified with AcOH, and extd. with benzene. On removal of solvent and fractionation *in vacuo*, 26–7 g. isopropylidenecyclopentanone (I), b_{12} 80–82°, was obtained. Hydrogenation of I by $(HCO_2)_2Ni$ at 60° in alc., gave isopropylcyclopentanone (II), b_{40} 86°, $d_{15.5}$ 0.9044, $n_D^{16.6}$ 1.4451. By the use of $NaNH_2$ and MeI II was converted into methylisopropylcyclopentanone (III), b_{45} 97.5°, $d_{16.5}$ 0.9067, $n_D^{16.5}$ 1.4495. The condensation of III with BzH in the presence of HCl forms benzylidene-α,α-methylisopropylcyclopentanone (IV), m. 61°. The mixt. of IV and V, m. 61.5°, m. 46–7°. C. and B. discuss stereoisomeric modifications, enlargement of the ring, and ω,ω′(β or β′)-condensations to account for the non-identity of the 2 condensation products. C. R. ADDINALL

Stereochemistry of biphenyl compounds. XI. Preparation and resolution of 2-methyl-6-nitro-2′-carboxybiphenyl. R. W. STOUGHTON AND ROGER ADAMS. *J. Am. Chem. Soc.* **52**, 5263–7(1930), cf. *C. A.* **25**, 105.—2,3-$Br(O_2N)C_6H_3Me$ and *o*-$IC_6H_4CO_2Me$, heated with Cu bronze at 270–80° for 45 min. and at 300° for 15 min. and the resulting product sapond. by heating with 10% NaOH for 4 hrs., give 27% of *2-methyl-6-nitro-2′-carboxybiphenyl* (I), pale yellow, m. 171–2°. I was resolved by brucine. *l*-I, m. 174–5°, $[\alpha]_D^{20}$ 67.7°, *brucine salt*, crystals with 1 mol. H_2O, m. 169–75; anhyd., m. 173–5°, $[\alpha]_D^{20}$ 30.4° (hydrated form); this salt is less sol. than that of the *d*-I. *d*-I, m. 171–3°, $[\alpha]_D^{20}$ 63.1°, *brucine salt*, crystals with 1.5 mols. H_2O, m. 145–55°; anhyd., m. 172°; $[\alpha]_D^{20}$ −57.3° (hydrated form). In boiling BuOH or in AcOH, racemization took place partially over a period of 30–40 hrs.; in boiling NaOH partial racemization occurs in 4 hrs. The half-life period is calcd. to be: BuOH, 117°, 42 hrs.; AcOH, 118°, 34 hrs.; 0.1 *N* NaOH, 100°, 4.5 hrs. The acid is stable to racemization at room temp in any of these solvents. The properties are essentially in accord with what had been predicted from the x-ray data. C. J. WEST

Nitration of *sym*-diphenylethane. WM. H. RINKENBACH AND H. A. AARONSON. *J. Am. Chem. Soc.* **52**, 5040–5(1930).—$(4\text{-}O_2NC_6H_4CH_2)_2$ is obtained in 95% yields by slowly heating 35 g. $(PhCH_2)_2$ and 105 g. HNO_3 (d 1.42) to 70–80° and holding the temp. for 6 hrs.; the product m. 180.5° (cor.). $[2,4\text{-}(O_2N)_2C_6H_3CH_2]_2$ (I) is obtained in 90–5% yields by slowly adding 50 g. $(PhCH_2)_2$ to 500 g. 95% HNO_3 at a temp. below 30°, slowly raising the temp. to 70° during 2.5 hrs. and heating at this temp. for 4 hrs.; it m. 170.9° (cor.), is non-hygroscopic and explodes in 5 sec. at 380°; it is not detonated by the impact of a 2-kg. wt. falling 34 in. or by 0.4 g. Hg fulminate or by 0.4 g. tetryl with 0.23 g. Hg fulminate in the sand test; it is detonated with 0.40 g. cyclotrimethylenetrinitramine and 0.23 g. Hg fulminate and it crushes 21 g. sand as compared with 30 g by the same wt. of $(O_2N)_2C_6H_2Me$. Further nitration after a preliminary sulfonation (142 g. I and 100 g. 103% H_2SO_4, heated 4 days at 85°, 500 g. 95% HNO_3 added and heated at 85° for 2 days) gives *α-2,4,5-trinitrophenyl-β-2,4-dinitrophenylhydroxyethane*, pale cream, m. 187.3°; *Bz deriv.*, brown, m. about 200° (decompn.); oxidation with CrO_3 in AcOH gives 2,4,5-$(O_2N)_3C_6H_2CO_2H$ and 2,4-$(O_2N)_2C_6H_3CH_2OAc$. $[2,4,6\text{-}(NO_2)_3C_6H_2CH_2]_2$ is formed in very small amts. under even the most favorable conditions of nitration. C. J. WEST

Fluorene series. CH. COURTOT. *Ann. Chim.* [10], **14**, 5–146(1930).—C. reviews the work of C. and Geoffroy (*C. A.* **18**, 3186; **19**, 2657), of C. and Vignati (*C. A.* **21**, 1643, 1810, 3616) and C. and Bonnet (*C. A.* **20**, 2153), and extends the work in the

fluorene series. $NaNH_2$ and organomagnesium compds. react with fluorene so that an atom of H of the CH_2 group between 2 double bonds is replaced by Na or MgBr but Cl_2, Br_2, HNO_3 and H_2SO_4 react with a H on C atom 2. When substitution is continued in the fluorene or fluorenone mol. the 2,7-disubstituents are formed. The only exception observed was when 2,5- and 2,7-dinitrofluorene are formed simultaneously but the latter in 60% yield and the former in 23% yield. C. has more completely sepd. and purified the 2,7-dinitrofluorene than Morgan and Thomason (cf. *C. A.* **21**, 238) and finds it m. 334° instead of 269° as they report. The 2,6,7-trinitrofluorenone of Schmidt (*Ber.* **38**, 3760 (1905)) appears to have 2 nitro groups ortho to each other and is apparently an anomaly to the rule of substitution in benzene and naphthalene series but other examples are needed. Numerous attempts, however, to det. the orientation of trisubstituents, *e. g.*, *x*-nitro-2,7-disulfofluorene (I), and *x*-nitro-2,7-dibromofluorene (II), failed. The *Ba salt* (III) of I, was obtained as an orange-red powder in 60% yield by sulfonating 30 g. of fluorene with 120 g. 92% H_2SO_4 at 80°; adding 80 g. concd. H_2SO_4 and at 30° dropping in 10% excess of a mixt contg. 38% HNO_3, 12% H_2O and 50% H_2SO_4, shaking well at 50°, letting stand overnight and neutralizing with $BaCO_3$, filtering, concg. *in vacuo* to 100 cc. and pptg. with 95% alc. The *K salt* of I was obtained as an orange powder by treating III in H_2O with aq. K_2CO_3. The *Ba salt* of *x-amino-2,7-disulfofluorene* (white) was obtained by reducing III with Sn in acid soln. and with Fe in neutral soln. *2,7-Dibromo-x-nitrofluorene* (IV), obtained in 8.5 g. yield by adding 10 g. 2,7-dibromofluorene to a mixt. of 100 cc. glacial AcOH and 100 cc. HNO_3 (d. 1.5), yellow needles, m. 196°. *2,7-Dibromo-x-aminofluorene* (V), obtained in 80% yield by reducing 5 g. of IV in 200 cc. 95% alc. with 20 g. powd. Zn and 30 cc. 22% NH_4OH, m. 190°. *2,7-Dibromo-x-nitrofluorenone* (VI), obtained in 90% yield by dissolving 10 g. of IV in 400 cc. boiling glacial AcOH and adding 15 g. CrO_3, canary-yellow, m. 192°. *2,7-Dibromo-x-aminofluorenone* (VII), obtained in 66% yield by dissolving 5 g. of VI in 250 cc. of 95% alc. and 30 cc. 22% NH_4OH and passing a stream of H_2S into the hot soln., orange red, m. 255°. The *HCl salt* of VII was obtained as a yellow crystal by adding concd. HCl to VII in ether. *2,7-Dibromo-x-aminofluorenol*, obtained by dissolving 5 g. of VI in 250 cc. 95% alc., adding 30 cc. 22% NH_4OH and 25 g. powd. Zn and heating until colorless, m. 199°. The diazo compd. of 2-aminofluorene acts normally in the Sandmeyer reaction and enabled the prepn. of 2-chloro- (m. 97°), 2-bromo- (m. 111.5°), and 2 iodofluorenes (m. 128°) of certain constitution which were used as reference compds. in studying the products of direct halogenation. The halogen of fluorene derivs. may be replaced by NH_2 by the action of aq. NH_3 in presence of cuprous salts. This new method of prepg. amines in this series was used in proving that the above mentioned Sandmeyer reaction is normal. 2-bromofluorene (0.5 g.), prepd. from 2-aminofluorene, was heated with 20 cc. of 22% NH_4OH in presence of Cu_2Cl_2 in a sealed tube at 240° for 30 hrs., yielding 2-aminofluorene. Oxidation of fluorene derivs. with $KMnO_4$ at room temp. gives practically quant. yields of fluorenone derivs. Reduction of a substituted (either by halogen or sulfo group) nitrofluorenone yields aminofluorenones or aminofluorenols, depending on the reducing agent. 2-Aminofluorenones are more colored than with the amino group elsewhere. Other things being equal the 2,7-derivs. are the most intensely colored. The colored derivs. of aminofluorenols are more intensely colored than *corresponding* derivs. of aminofluorenones. The fluorenols with a substituent in the 2-position or different groups in the 2- and 7-position react with halogen acids to form halogen ethers. This generalizes the method of Kliegl (cf. *C. A.* **4**, 3232) and corrects the error of Schmidt and Bauer (*Ber.* **38**, 3751(1905)) who obtained 2-bromo-9-chlorofluorene on hydrolyzing the Ac deriv. of 2-bromofluorenol with concd. HCl but thought they obtained 2-bromofluorenol. Since direct nitration of fluorene or fluorenone gives only the 2-nitro derivs. an indirect method was necessary to prep. 4-nitrofluorenone. 4-Nitrophenanthrenequinone (VIII) was required as an intermediate and so much contradiction exists in regard to the mononitration of phenanthrenequinone (IX), that it was necessary to study this problem using various concns. of HNO_3 and different periods of reaction. Best yields of mononitro substituents were obtained by boiling IX for 3 min. with 69.8% HNO_3 but best yields of VIII were obtained by boiling 30 g. of IX with 900 cc. of 65.3% HNO_3 for 20 min., then pouring into 3 l. of ice water and treating the ppt. with 600 cc. of boiling alc. VIII goes into soln. and leaves the insol. 2-nitrophenanthrenequinone (X). The filtrate is evapd. to crystn. and the crystals purified by recrystn. from AcOH, m. 174–6°. VIII (7 g. (20%)) and 22 g. (61%) of X were obtained. VIII was used to prep. *4-nitrofluorenone* (XI), with some improvements on the method of Schmidt and Bauer (*Ber.* **38**, 3741(1905)). A 50% yield of 4-aminofluorenone (XII) was obtained by dissolving 5 g. of XI in 250 cc. alc., adding 30 cc. of 22% NH_4OH and passing in H_2S; purified as the HCl salt it m. 135–6°. *4-Amino-*

fluorenol was obtained by adding 25 g. powd. Zn and 30 cc. 22% NH_4OH to 5 g. of **XII** in 200 cc. alc. and refluxing until the soln. was colorless, pale yellow, m. 183–4°. C. has fixed the influence which different substituent groups in the fluorene and fluorenone mol. exert on the facility of opening the nucleus and passing to corresponding derivs. of Ph_2. With the mol. contg. a nitro group as a substituent the passage is impossible by alk. fusion. It is realizable fairly well but with bad yields with halogenofluorenones and is easily effected with the aminofluorenones. By alk. fusion of sulfofluorenes it is not possible to replace a sulfo group with a HO group without affecting, at the same time, the fluorene skeleton which is oxidized at the methylene group and yields substituted biphenylcarboxylic acids to a similar extent as it yields hydroxyfluorenes with HO groups in the same position as the sulfo groups were. The same thing happens in the case of fluorenone derivs. but the yield of biphenylcarboxylic acid is good whereas it is poor with fluorene derivs. This transformation into Ph_2 derivs. is positively a general property of the fluorene series and the apparent exceptions noted by Matthews and Hodgkinson (*J. Chem. Soc.* **43**, 166) and Schmidt, Retzlaff and Haid (cf. *C. A.* **6**, 2753) were due, in the first case to using impure fluorene and in the second to an erroneous interpretation of the products of reaction. The fluorenone nucleus is easily reconstructed by the action of dehydrants on the hydroxybiphenylcarboxylic acids. *Na* and *K salts* of *2-sulfofluorene* were prepared from aq. solns. of the acid and the carbonate. The soly. of K salt (**XIII**) is 6 g. per l. at 15° and 40 g. per l. at 78°; the aq. soln. fluoresces. The *K salt* of *2-sulfofluorenone* (**XIV**) was obtained in 103 g. yield by oxidizing 100 g. of **XIII** with aq. $KMnO_4$ at 25°, yellow plates from water. The *K salt* of *2-sulfofluorenone oxime* was obtained as citron-yellow plates. *2-Chlorofluorenone* was obtained in 7 g. yield from 10.7 g. of 2-aminofluorenone by the Sandmeyer reaction, orange-yellow crystals from alc., m. 123°. Schmidt and collaborators obtained 3 isomers of 2,7-disulfofluorene but C. has shown by formation of the sulfonyl chlorides that 2 of these are identical. The sulfonyl chlorides of two m. 225° alone or mixed and their sulfonamides m. 315° alone or mixed, whereas the *sulfonyl chloride of the third* m. 219° (or at 190° when mixed with either of the others) and an attempt to prep. its sulfonamide failed. The *K salt* of *2,7-disulfofluorenone*, citron-yellow, was obtained by oxidizing 2,7-disulfofluorene with $KMnO_4$ at 25° and characterized by formation of its citron-yellow *oxime*, and its *disulfonyl chloride*, citron-yellow, m. 221°. The *acid anhydride* of the *dibenzoate* of *4,4'-dihydroxy-2-carboxybiphenyl* with BzOH, $BzOC_6H_3(CO_2Bz)C_6H_4OBz$, was prepd. from the alk. fusion product of disulfofluorene and disulfofluorenone. These were found to be identical but both m. 153° and at 287° and appear to each contain space isomers, the stable form m. 287° and the less stable 153°. *x,2,7-Trisulfofluorene* was obtained in 95% yield as the *Ba salt* by treating 2,7-disulfofluorene with oleum. The *K salt* (**XV**) was prepd. from the Ba salt by double decompn. with K_2CO_3; its alk. soln. is intense green and the acid soln. is red. *x,2,7-Trichlorosulfonyl chloride*, obtained in 6.5 g. yield by treating 7.5 g. **XV** with 12 g. PCl_5, m. 214°. *x,2,7-Trisulfofluorenone* was obtained as the *K salt* by oxidizing **XV** with $KMnO_4$ in the cold, orange-yellow crystals from hot water. *2-Chlorofluorenol*, obtained by reducing the fluorenone with Zn and NH_4OH in alc. soln., m. 142°. *2,7-Diaminofluorenol*, obtained by reducing 2,7-dinitrofluorenone with Zn and NH_4OH in alc., m. 216°. *2,5-Diaminofluorenone*, obtained in 62% yield by reducing the dinitro compd. with H_2S in NH_4OH and alc., brownish red needles, m. 260–1°. *2,5-Diaminofluorenol*, obtained by reducing 2,5-dinitrofluorenone with Zn and NH_4OH in alc., m. 201°. *2,7-Dihydroxynitrosofluorenone* (**XVI**), obtained by diazotizing 2,7-diaminofluorenone and heating the product with water, dark red, m. 304–5°. Schmidt, Retzlaff and Haid (cf. *C. A.* **6**, 2753) thought they obtained *2,7-dihydroxyfluorenone* (**XVII**) by this method. C. prepd. **XVII** by dehydration of 4,4'-dihydroxy-2-carboxybiphenyl with $ZnCl_2$, m. 338°, easily sol. in alc. and in 0.1 *N* NaOH with blue color whereas **XVI** is almost completely insol. in alc. but sol. in 0.1 *N* NaOH with deep red color. C. treated **XVII** with HCl and $NaNO_2$ and succeeded in prepg. **XVI**, thus showing their relationship. *2,7-Dibromo-9-chlorofluorene*, was obtained by boiling 2,7-dibromofluorenol with concd. HCl, m. 154–5°. *2-Nitro-7-sulfofluorene* (**XVIII**), obtained in quant. yield by sulfonating 2-nitrofluorene with $H_2SO_4.H_2O$ at 20°, pale yellow, m. 250°. **XVIII** was characterized by its *Ca Na*, and *K salt* and by its *sulfonyl chloride*, m. 230°. The K salt is sol. in water to form the remarkably stable diazo salt from which the diazo group was eliminated to prove the position of the sulfo group. The *K salt* of *2-sulfo-7-nitrofluorenone* (**XX**) was obtained in 70 g. yield by sulfonating 60 g. of 2-nitrofluorene and oxidizing the product with $KMnO_4$. The *7-nitrofluorenone-2-sulfonyl chloride*, prepd. from [illegible] m. 240°.

Reduction of **XX** with H_2S in aq. NH_4OH yields *2-sulfo-7-aminofluorenone.* Alk. fusion of 2-bromofluorenone at 135–40° gives 20–5% of *4-bromo-2-carboxybiphenyl*, m. 165°. ODEN E. SHEPPARD

Fluorene series. KEIZO NAKAMURA. *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) **14**, 184–8(1930).—Having discovered the local anesthetic action of the 9-aminofluorenes, the first case of pharmacol. effect noted in the fluorene series, the synthesis of 9-methyl-, 9-ethyl- and 9-propylaminofluorenes was effected. In order to obtain more sol. compds., reduction of the nucleus of fluorene was attempted. With Adam's catalyst at atm. pressure, fluorenone oxime dissolved in AcOH took up 5 mols. electrolytic H_2, and gave, in addn. to hexahydrofluorene, 2 stereoisomeric amines, $\dot{C}_6H_4.CH.NH_2.\dot{C}_6H_{10}$, the more sol., *α*, m. 147–8°, b_8 130–1°, d_4^{18} 1.026, n_D^{18} 1.54108, and a less sol., *β*, m. 170–80°, b_{11} 134–5°, d_4^{24} 1.044, n_D^{24} 1.56189. Both compds. are oxidized by alk. $KMnO_4$ to phthalic acid, oxalic acid, CO_2 and NH_3; both absorb CO_2 from the air, and neither decolorizes Br solns. Their derivs. have different properties but have the same constitutions. By benzoylation with BzCl, *α-hexahydroaminofluorene* (I) gave two products, *α-N-benzoylhexahydroaminofluorene*, m. 170–1°, and *β-N-benzoylhexahydroaminofluorene*, m. 222–3°, whereas the latter was the only product on benzoylation of *β-hexahydroaminofluorene* (II). Both I and II give the same compd., m. 202–3°, on acetylation with AcCl. The conversion of hexahydroaminofluorene hydrohalides into perhydroaminofluorene hydrohalides on heating for 6 hrs. in a bomb tube at 150–60° is considered explicable in light of the above arrangement and is a convenient method of prepn. By crystn. of the bitartrates of I from dil. MeOH the base was resolved. Salts of I, *d*-I, *l*-I and II, and also those of the perhydro-9-aminofluorene are more sol. in H_2O than those of 9-aminofluorene and its homologs, and possess excellent local anesthetic properties. By the addn. of 8 mols. of H_2 to fluorenone oxime, with the aid of PtO_2-Pt as catalyst, and the addn. of dil. HCl, the HCl salt of *perhydroaminofluorene* was prepd., m. 323–4°; *acetate*, m. 189–90°; *picrate*, m. 210°; *d-bitartrate* (+*MeOH*), m. 191°; *chloroplatinate*, m. 238–9°; *N-benzoyl base*, m. 203–4°; *N-acetyl base*, m. 168–9°. Although 2 hexahydroaminofluorenes and a dodecahydroaminofluorene have been isolated in cryst. form by N., he notes the absence of the decahydrofluorene indicated by others. N. has prepd. 9-bromo-9-methylfluorene which when treated with Br gives the 9-bromo-9-bromomethylfluorene previously made by Wieland by the addn. of Br to biphenyleneethylene. C. R. ADDINALL

New series of halogenated sulfonephthaleins. WM. C. BOYD AND ALLAN W. ROWE. *J. Am. Chem. Soc.* **52**, 4954–9(1930).—*o*-Sulfobenzoic anhydride (108 g.) and 300 g. I, treated with 500 cc. fuming H_2SO_4 (50% SO_3) and heated at 110–20° for 5–10 hrs. and then at 175–80° for 30 min., gives 88% of the *tetra-I deriv.* (I), crystd. from EtOH-AcOH, decomps. 305–10°; $CHCl_3$ appears to form a compd., since crystals from this solvent m. 132°; the toxic dose for rabbits is 0.2 g. per kg. body wt. when injected intravenously; it is not bacteriocidal for *B. coli* except in very high concn. The *tetra-Br deriv.*, brown, m. 219°, was prepd. in a similar manner, the Br being added in portions at 80–170°. I, PhOH and $SnCl_4$, heated 8 hrs., give *phenoltetraiodosulfonephthalein*, reddish black, decomps. about 210°, changes in color from brownish yellow to wine-purple over a p_H range of 7.0–8.2; *tetra-I deriv.*, reddish brown, p_H range 6.2–7.0 but the color change is only from 1 shade of green to another; *tetra-NO_2 deriv.*, brown, decomps. 190°, p_H range between 6–7 but it is unsuitable for an indicator, *di-Ac deriv.*, light brown, m. 136°; *tetra-Br deriv.*, brown; the di-Na salt is practically insol. in H_2O. *o-Cresoltetraiodosulfonephthalein*, similar to the PhOH deriv., p_H range 8.8–9.6; *resorcinol deriv.*, black, alk. soln., red with splendid green fluoresence, p_H range 8–10 but it is of no value as an indicator; *salicylic acid deriv.*, rose-beige, p_H range 7.2–8.0; color change from yellow-brown to pink. Phenoltetrabromosulfonephthalein, reddish black, p_H range 7.2–8.0 with color change from light brown to purple quite sharp at 7.4; tetra-Br deriv., p_H range 5.6–7.0 but the color change is a series of shades of bluish green; *resorcinol deriv.*, black with greenish sheen, p_H range about 8–10. *Tetraiodosaccharin*, greenish yellow, does not m. 345°. C. J. WEST

Reducing action of compounds containing the group >CHOMgI. R. V. SHANKLAND AND M. GOMBERG. *J. Am. Chem. Soc.* **52**, 4973–8(1930).—To a still greater extent than the IMg salts of mono-HO alcs., the similar salts of hydrobenzoin and of substituted hydrobenzoins have been found effective in reducing satd. and unsatd., aromatic and aliphatic aldehydes to their corresponding primary alcs. Only 1 of the 2 alc. groups in the hydrobenzoins is involved in this reaction, the hydrobenzoins becoming oxidized by the aldehydes to benzoins, just as sec. alcs. become oxidized to

ketones. The mechanism of this oxidation-reduction reaction consists in the transfer of a H and MgI from the group :CHOMgI in the alc. to the CO group of the aldehyde. The results of this investigation supply further evidence in favor of Marshall's explanation in regard to the apparently anomalous formation of primary alcs. and ketones in the course of the Grignard reaction on aldehydes: *viz.*, the normally produced addn. product, RR'CHOMgI, is liable to become oxidized by the excess of aldehyde to the ketone RCOR' and the aldehyde reduced to RCH_2OMgI. Results are given for about 25 compds. C. J. WEST

Structure of *p*-dimethylaminobenzoin. SANFORD S. JENKINS, LUCIUS A. BIGELOW AND JOHANNES S. BUCK. *J. Am. Chem. Soc.* **52**, 5198–204(1930); cf. *C. A.* **25**, 100.—*p*-$Me_2NC_6H_4CH(OH)CONH_2$ and PhMgBr in Et_2O give 45% of *α-p-dimethylaminobenzoin*, m. 159–60° (cor.); oxidation gives the known *p*-dimethylaminobenzil, m. 115–6°; reduction gives the *α*-desoxybenzoin, m. 127–8°. *p*-$BrMgC_6H_4NMe_2$ and PhCH(OH)$CONH_2$ give 25% of the *β-p*-dimethylaminobenzoin (I), identical with the product obtained by the condensation of *p*-$Me_2NC_6H_4CHO$ with BzH in the presence of KCN; it, therefore, has the structure *p*-$Me_2NC_6H_4COCH(OH)Ph$. Reduction gives a mixt. of *α*- and *β*-desoxybenzoins; oxidation gives I. C. J. WEST

Naphthol studies. I. Bromination of 1,5-dihydroxynaphthalene. ALVIN S. WHEELER AND DAVID R. ERGLE. *J. Am. Chem. Soc.* **52**, 4872–80(1930).—1,5-$C_{10}H_6(OH)_2$ (I), m. 258°, and 2 mols. Br in AcOH at 80° give 76% of the *2,6-Br₂ deriv.* (II), does not m. 300°; *diacetate*, straw-yellow, m. 228°; *dibenzoate*, m. 262°; *di-Me ether*, m. 161°; *di-Et ether*, m. 148°. Oxidation of II with CrO_3 in AcOH gives *2,6-dibromo-5-hydroxy-1,4-naphthoquinone* (III), rich red, m. 202°; *acetate*, golden yellow, m. 148°; the pyroboroacetate could not be isolated; HNO_3 gives a yellow product, explodes 243°, which contains N but no Br. Reduction of III with Zn in AcOH gives *2,6-dibromo-1,4,5-trihydroxynaphthalene*, decomps. 157°, readily oxidized to III by $FeCl_3$. III and $PhNH_2$ give the *2-anilino deriv.*, m. 249°, needles of gun-metal luster, red by transmitted light. I (20 g.) and 19.5 g. Br in AcOH give a *2,6,8-Br₃ deriv.* (IV), m. 189° (decompn.) (70% yield); HNO_3 gives a Br-free compd., explodes 249°; *diacetate*, yellow, m. 174°; *dibenzoate*, m. 185°, clear 189°; di-Me ether, m. 149°; *di-Et ether*, m. 125°. Oxidation of IV gives *2,6,8-tribromo-5-hydroxy-1,4-naphthoquinone* (V), rich red, m. 196°; *monoacetate*, golden brown, m. 234°. 1,5-$C_{10}H_6(OAc)_2$ (10 g.) and 14 cc. Br give 19.5 g. *2,4,6,8-tetrabromo-1,5-dihydroxynaphthalene* (VI), does not m. 300°; 90 cc. boiling C_6H_6 dissolves 0.5 g.; it decomps. in solvents of higher b. p.; *di-Me ether*, m. 226°; *dibenzoate*, m. 268°; oxidation with CrO_3 gives V; HNO_3 gives a Br-free compd., chrome-yellow, m. 232° (decompn.). V and $PhNH_2$ in AcOH give the *6,8-dibromo-2-anilino deriv.*, dark red, m. 206°; reduction of V with Zn and dil. H_2SO_4 gives *2,6,8-tribromo-1,4,5-trihydroxynaphthalene*, flesh-colored, decomps. 140°; *triacetate*, m. 185°. V yields a *pyroboroacetate*, hexagonal plates with a green metallic luster, does not m. 300°. $C_{10}H_6(OAc)_2$ on bromination with 5 mols. Br in AcOH gives a mixt. of 5 g. of *2,6-dibromo-5-acetoxy-1-naphthol*, m. 173°, and 13 g. VI. *2,6-Dibromo-5-acetoxy-1-benzoyloxynaphthalene*, m. 164°. These naphthoquinones are isomeric with certain halogenated juglones but not identical with any. C. J. WEST

Resolution of 1-(α-1-piperidylbenzyl)-2-naphthol. WALLACE R. BRODE AND JOSEPH B. LITTMAN. *J. Am. Chem. Soc.* **52**, 5056–8(1930); cf. *C. A.* **24**, 2455.—1-(α-1-Piperidylbenzyl)-2-naphthol (I) may be resolved by *d*-camphorsulfonic acid (II). *l*-I, m. 201–2° (cor.), $[\alpha]_D^{27}$ —211° (0.2151 g. in 10 cc. C_6H_6), $[\alpha]_D^{28}$ —192° (0.2036 g. in 10 cc. $CHCl_3$); *d*-II *salt*, m. 184·5° (cor.), $[\alpha]_D^{28}$ 4.7° (0.9385 g. in 10 cc. $CHCl_3$); this salt seps. first from AcOEt. *d*-I, m. 199–200° (cor.), $[\alpha]_D^{31}$ 189° (0.2148 g. in 10 cc. C_6H_6). C. J. WEST

Anthrone series. I. The condensation of phthalide with aromatic compounds. AL STEYERMARK AND JOHN H. GARDNER. *J. Am. Chem. Soc.* **52**, 4884–7(1930).—Phthalide and C_6H_6 with $AlCl_3$, heated on the H_2O bath for 10 hrs., give 28% of anthrone, m. 152–4°. PhMe gives an oily mass from which no pure compd. could be isolated; oxidation of the crude product with AcOH and CrO_3 gives 2-methylanthraquinone; with $C_3H_5(OH)_3$ and 82% H_2SO_4 there results 2-methylbenzanthrone. The condensation takes place through the CH_2 and CO residues of phthalide resulting in the formation of a mixt. of isomers and rendering the method unsuitable for the synthesis of anthrones of definite structure. **II. Synthesis of some hydroxymethylanthrones.** *Ibid* 4887–92.—The reduction of 1-hydroxyanthraquinone and its homologs yields only the corresponding 1-hydroxy-9-anthrone. *α-(2-Hydroxyphenyl)benzoic acid*, m. 133.8–4.5°, results in 98% yield on reducing the corresponding Bz deriv. with Zn dust and NH_4OH; *2-hydroxy-3-methylbenzyl deriv.*, m. 158.2–9° (88%); *4-Me isomer*, m. 123–4° (77.6%);

5-Me isomer, m. 129–30° (84.5%). Dehydration with concd. H_2SO_4 gives the corresponding 1-hydroxy-10-anthrone, m. 241–2°, and the *2-*, *3-* and *4-Me derivs.*, m. 207.2–8°, 258–9° and 226.2–7°, resp. (yields, 82, 93, 66 and 97.5%, resp.). Reduction of the hydroxyanthraquinones with Sn and AcOH give 1-hydroxy-9-anthrone, m. 137.5–8°, and the *2-*, *3-* and *4-Me derivs.*, m. 136.2–7°, 158.2–9° and 167.4–8.2°, resp. (yields, 89, 94, 85 and 94%, resp.). Since the 9-anthrone derivs. are bright yellow and the 10-anthrone derivs. are colorless, the former may show benzenoid-quinoid tautomerism. Reduction of 2-methylanthraquinone gives 8.8% of 2-methyl-10-anthrone; the 9-isomer shows approx. the same soly. in many solvents. C. J. West

Synthesis of glucosidoferulic acid. Raymond M. Hann. *J. Am. Chem. Soc.*, **52**, 5049–51(1930).—Me ferulate in abs. EtOH, neutralized with KOH and treated at 0° with acetobromoglucose in Et_2O, gives 64% of *Me tetraacetyl-β-d-glucosidoferulate*, m. 142.3° (cor.), $[\alpha]_D^{20}$ —32.3° (0.2408 g. in 25 cc. $CHCl_3$); $Ba(OH)_2$ gives *β-d-glucosidoferulic acid* (*3-methoxy-4-β-d-glucosidocinnamic acid*), m. 198–9° (cor.), $[\alpha]_D^{21}$ —36.6° (0.2433 g. in 10 cc. abs. EtOH). C. J. West

Some new monosubstitution derivatives of retene. Gust. Komppa and Eric Wahlforss. *J. Am. Chem. Soc.* **52**, 5009–17(1930).—Attempts to chlorinate retene (I) at 120–30° and 170–80° and to brominate I in CCl_4 with or without I gave a mixt. of products but no definite product could be isolated. I and Cl in CCl_4 at 0° give 79.5% of a *mono-Cl deriv.*, $b_{747.6}$ 350–1°, d_4^{20} 1.1359; oxidation with CrO_3 in AcOH gives retenequinone. Boiling with EtOH-KOH and with quinoline did not split off HCl, nor was it replaced by NaI in Me_2CO or AcOH; no cryst. product was obtained on nitration or sulfonation. The Grignard reaction gave an oil, sol. in aq. NaOH. Attempts to prep. the Me deriv. with MeI were unsuccessful. I, $(COCl)_2$, $AlCl_3$ and CS_2 give a retenecarboxylic acid, m. 229–31° (Liebermann and Zsuffa, *C. A.* **5**, 2251, give 121–3°); the *Na salt* crystallizes with 5 mols. H_2O; *Me ester*, pale yellow, m. 96–7°; *amide*, m. 224–6°; oxidation with CrO_3 gives *retenequinonecarboxylic acid*, dark red, m. 237–40°. Attempts to prep. a cryst. NO_2 deriv. were unsuccessful. I (10 g.) and 10 g. H_2SO_4 (d. 1.84) at 99° for 5 min. give *A-retenesulfonic acid* (II), m. 188–9°; *NH_4 salt*; *Me ester*, m. 164–6°; oxidation with CrO_3 and neutralization with KOH gives *K A-retenequinonesulfonate*, red. The KOH fusion of II gives *A-retenol*, $C_{18}H_{17}OH$, yellow, m. 200–2°; *picrate*, ruby-red, m. 151–2°. $FeCl_3$ gives a slightly green color. If the sulfonation is carried out at 200° there results the *B isomer*, m. 121.3°; *NH_4 salt*, 0.1082 g. dissolve in 100 g. H_2O at 17°; *Na salt*, crystals with 3 mols. H_2O, 2 of which are lost at 110°; soly. of anhyd. salt, 0.0726 g. in 100 cc. H_2O at 17°; *K salt*, soly. 0.0824 g.; *Ba salt*, crystals with 2 mols. H_2O, soly. 0.0848 g.; *Sr salt*, crystals with 4 mols. H_2O, soly. 0.1016 g.; *Ca salt*, crystals with 4 mols. H_2O, soly. 0.1166 g.; *Cu salt*, light green crystals with 5 mols. H_2O, soly. 0.1572 g.; *chloride*, m. 146.5–8°; *amide*, m. 206–7.5°; *Me ester*, m. 117–9°; *K B-retenequinonesulfonate*, orange. *B-Retenol*, orange red, m. 145–6°; *Ac deriv.*, m. 132–4°. The *Na azobenzenesulfonate* is red, *dyeing wool and silk* a cherry-red. Attempts to acetylate I with AcCl with $AlCl_3$ gave no pos. results. C. J. West

The dissociable organic oxides. A dibromorubrene. Charles Dufraisse and Nicolas Drisch. *Compt. rend.* **191**, 619–20(1930).—$Ph_2C(OH)C:CC_6H_4Br$ was prepd. to obtain a brominated deriv. of rubrene, $C_{42}H_{28}$. Br_2. It was found to be quite similar to rubrene itself in color, absorption spectra, fluorescence, etc. It is also oxidized when irradiated in air to $C_{42}H_{26}Br_2O_2$, which is dissociable like oxyrubrene itself. R. C. R.

Furfural and its industrial applications. T. Hedley Barry. *Ind. Chemist* **6**, 479–81(1930). E. H.

The preparation of some ketones in the furan ring. N. N. Maxim. *Bul. soc. chim. Romania* **12**, 33–5(1930).—M. prepd. several ketones of the furan ring in the following way: The diethylamide of the pyromucic acid was prepd. from the acid chloride and $NHEt_2$. EtMgBr and PrMgBr were allowed to react upon the diethylamide, giving 80–85% of the corresponding ketones O.CH:CH.CH:CCOR. The Et and Pr furyl ketones so formed were found to be identical with those prepd. by Asahina and Murayama. The pyromucyl chloride was prepd. by treating the acid with $SOCl_2$ (yield 40%) or better with PCl_5 (yield 70–80%). F. R. Greenbaum

Influence of acid chlorides and of pyrrole on the color test for reactive organometallic compounds. Constitution of pyrrylmagnesium halides. Henry Gilman and Lloyd L. Heck. *J. Am. Chem. Soc.* **52**, 4949–54(1930).—Of the compds. studied only BzBr, $COCl_2$, $(COCl)_2$ and PCl_5 appear to interfere with the color test; in this connection evidence is presented for the attachment of the —MgX group to N in pyrrole-

magnesium halides. The ultimate disposition of substituents on the α-C atom is accordingly no proof for a —CMgX linkage. C. J. WEST

Synthesis of indolylbutyric acid and some of its derivatives. RICHARD W. JACKSON AND RICHARD H. MANSKE. *J. Am. Chem. Soc.* **52**, 5029–35(1930).—This work was undertaken to prep. indole derivs. for metabolism studies. Et cyclohexan-1-one-2-carboxylate and PhN_2Cl in KOH give a good yield of the mono-Et ester of the phenylhydrazone of α-ketopimelic acid, $HO_2CCH_2CH_2CH_2CH_2C(:NNHPh)CO_2Et$, orange, m. 142–3°; refluxing with EtOH-H_2SO_4 gives 38% (based on cyclic ester used) of the *Et ester*, m. 76°, of *γ-(2-carboxy-3-indolyl)butyric acid*, m. 193–4° (decompn.); *Me ester*, m. 64°; heating at 220–30° splits off CO_2, giving *γ-3-indolylbutyric acid*, m. 124°; *Me ester*, m. 73–4°; the acid is best prepd. through the Me ester; in its hydrolysis there is formed a small amt. of 2-keto-2,3,4,5-tetrahydrocarbazole, *hydrazide*, m. 112°; $NaNO_2$ in AcOH gives *di(γ-3-indolylpropyl)urea*, pale yellow, m. 124°; Me γ-3-indolylpropylcarbamate could not be crystd. but its structure was proved by its conversion into *γ-3-indolylpropylphthalimide*, pale yellow, m. 132°; hydrolysis gives γ-3-indolylpropylamine, whose HCl salt m. 170°. Reduction of Me β-3-indolylpropionate with Na and EtOH gives *γ-3-indolylpropyl alc.*, m. about 0°; *phenylurethan*, m. 94°; *picrate*, brick-red, m. 101°. *δ-3-Indolylbutyl alc.*, m. 32.3°; *phenylurethan*, m. 88°; *picrate*, ruby colored, m. 102°. A C_6H_6 soln. of the above azide, heated until the evolution of N was complete and then treated with gaseous HCl, gives 5% of *2-keto-2,3,4,5-tetrahydrohomo-3-carboline*, m. 220°. *δ-3-Indolylbutylmalonic acid*, m. 177°; the main product is tetrahydrocarbazole. The reactivity of the 2-H atom in the indole ring is emphasized in light of the formation of 2-ketotetrahydrocarbazole and tetrahydrocarbazole as by-products of certain reactions employed. C. J. WEST

A synthesis of tryptophol. RICHARD W. JACKSON. *J. Biol. Chem.* **88**, 659–62 (1930).—From indoleacetic acid (Majima and Hoshino, *C. A.* **20**, 758) the Me and Et esters were obtained, and reduced with Na (1) in MeOH according to Marvel and Tannenbaum (*C. A.* **17**, 260), followed by conversion to the picrate, alk. decompn. and extn. with Et_2O, and (2) in very carefully dried EtOH (Smith, *C. A.* **21**, 3345). The 2nd method gave an 81% yield. The product is identical with that obtained by Ehrlich's method from the action of yeast on tryptophan (*C. A.* **6**, 2427), and m. 58–9°. The *picrate* m. 100–1°, the *phenylurethan* m. 130–1° (all cor.). K. V. T.

Pseudo bases in the isoxazole series. III. E. P. KOHLER AND C. L. BICKEL. *J. Am. Chem. Soc.* **52**, 4943–9(1930); cf. *C. A.* **23**, 141.—The pseudo bases previously described have been derived from isoxazoles in which all available positions are filled with hydrocarbon residues; in all these cases the rearrangement of the true base resulted in a pseudo base in which the HO group occupies the 5-position. In order to det. whether this mode of rearrangement is altered by an acidic group in this position, ketonic isoxazole has been ethylated and the behavior of the resulting salts toward bases has been studied. $PhCH(CHPhNO_2)CHBrCOC_6H_4Cl$ (100 g.) and 100 g. AcOK in 500 cc. MeOH, boiled until bumping became serious, the product filtered and the operation repeated until no more isoxazole sepd., gave 98% of Ph C·C(COC$_6$H$_4$Cl).O.N:C-Ph, m. 165–6°; Et_2SO_4 at 125–30° for 2.5 hrs. gives the *N*-Et deriv., the soln. of which, heated with concd. HCl and an equal vol. of H_2O, gives the *acid sulfate*, $C_{24}H_{26}O_8NClS$, m. 192–3°; the *$FeCl_3$ salt* (I), $C_{24}H_{19}O_2NCl_4Fe$, yellow, m. 130.5° and 139.5°; only the higher-melting form could be obtained in later prepns. The *pseudo base* (II), Ph-C:CPh.C(OH)(COC$_6$H$_4$Cl).O.NEt, decomps. spontaneously but was obtained in small amts., m. 128° (decompn.), by treating I with $NaHCO_3$ in Et_2O-H_2O; HCl and $FeCl_3$ give I. Spontaneous decompn. of II gives ethyldiphenylisoxazolone. O_3 gives EtBr, BzOH, *p*-ClC$_6$H$_4$CO$_2$H and a yellow solid, m. 120–30°, which could not be purified. MeOH contg. a trace of KOH had no action on II and MeONa was too destructive. The action of $NaHCO_3$ on I in MeOH-Et_2O gives *p* ClC$_6$H$_4$CO$_2$H and 90% of *Me α,β-diphenyl-β-ethylaminocinnamate* (III), m. 102°; MeOH-NaOH gives the same products. The structure of III was established by the action of O_3, the products being BzOH and BzNHEt, m. 68–9°. Hydrolysis of III by concd. HCl gives desoxybenzoin and Bz-ether or whether cleavage precedes methylation, 3,4-diphenylisoxazole was ethylated, the *N-Et deriv.* yielding a *$FeCl_3$ salt*, pale yellow, m. 75–6°. The salt, shaken with C_6H_6 and NaOH until decompn. is complete, gives the *dimol. anhydride*, (O.NEt.CPh:CPh.CH-)$_2$O, m. 148°; neither the pseudo base nor its Me ether could be isolated. The anhydride or the salts with MeOH-NaOH give III. The formation of the open-chain ester represents

a novel transformation of pseudo bases in the isoxazole series, a transformation which can occur only when the 5-position is unoccupied or is occupied by a group that is easily removed by bases. C. J. WEST

Constitution of the so-called dithiourazole of Martin Freund. IV. Isomerism of hydrazodithiodicarboxamides, iminothiolthiobiazoles and iminothiobiazolones. SHAHA L. JANNIAH AND P. C. GUHA. *J. Am. Chem. Soc.* **52**, 4860–66(1930); cf. *C. A.* **19**, 988.—$H_2NCSNHNHC(SH):NH$ (I), m. 233° (5 g.), in 100 cc. 2 *N* HCl, boiled 10 min., gives the *isomer* [NHC(SH):NH] (II), m. 203°; both forms give the same compd. with Me_2SO_4. I with 2 *N* NaOH, allowed to stand 24 hrs. and then acidified, gives II; II is converted into I by heating at 120° for 4 hrs. Either I or II, boiled with concd. HCl for 10 min., gives *iminothioldihydrothiobiazole*, pale yellow, m. 234°; further heating with concd. HCl gives endoiminothiolthiobiazole, m. 244°, identical with the so-called dithiourazole of Freund (*Ber.* **28**, 946(1895)). The latter compd. is also formed from I or II by heating with 5 *N* HCl for 15 min. or by Ac_2O treatment of the thiobiazole with subsequent deacetylation. Similar cases of isomerism have been observed with the alkyl- and aryl-substituted mono- and dithiohydrazides. Absorption spectra curves are given for these compds. C. J. WEST

Absorption spectra of the γ-pyrones and pyroxonium salts. R. C. GIBBS, JOHN R. JOHNSON AND E. C. HUGHES. *J. Am. Chem. Soc.* **52**, 4895–904(1930).—The ultraviolet absorption spectra of γ-pyrone, dimethylpyrone, benzopyrone and xanthone in acid solns. are very similar to the spectra in neutral soln. These data lead to the conclusion that the formation of oxonium compds. in this series does not result in any profound change in the structure of the mol. The identity of the absorption spectra curves of dimethylpyrone in neutral and alk. media and their similarity to the curve in acid soln. preclude the possibility of an equil. existing between 2 different types of structure of the ring. A resemblance between the absorption spectra of dimethylpyrone and its salts and 1,2,6-trimethylpyridone, a compd. in which only the ketone structure is possible, and between those of xanthone and of xanthene and xanthydrol has been observed. On the other hand, it is noted that the spectrum of dimethylpyrone differs greatly from that of 4-methoxy-2,6-dimethylpyridine, an analogous compd. which has the benzenoid type of structure. From these observations the conclusion has been drawn that the structure of the pyrone and pyroxonium rings is best represented by a ketonic formula. The formulation of the salts of xanthydrol and of trimethylpyroxonium perchlorate as compds. of an oxonium type is open to question. C. J. WEST

Anthocyan and anthocyanidin. IV. Synthesis of 2-phenylbenzopyrylium salts. K. KONDO AND K. NAKAGAWA. *J. Pharm. Soc. Japan* **50**, 928–32(1930); German abstract 121–2; cf. *C. A.* **24**, 4038.—By using the method of Noller and Adams (cf. *C. A.* **18**, 2879) K. and N. prepd. *p-methoxyacetophenone* (I) from anisole and anhyd. AcOH. *ω-Bromo-p-methoxyacetophenone*, prepd. by brominating I, gave with $MeCO_2K$ *ω-acetoxy-p-methoxyacetophenone* (II). Methylation of *resacetophenone* (9 g.) with Me_2SO_4 gave the *di-Me ether* (III), m. 40° (yield 4.5 g.). *Resacetophenone* (1.1 g.) in alc. with EtI (3 g.) and KOH (1 g.) gave the *di-Et ether* (IV), m. 74° (yield 0.8 g.). I (2 g.) in AcOEt (50 cc.) dried over P_2O_5, when treated for 2 hrs. with salicylaldehyde (V) (1.2 g.) in the presence of dry HCl gave *4'-methoxy-2-phenylbenzopyrylium chloride*, $C_{16}H_{13}O_2Cl.2H_2O$, m. 86° (yield 1.6 g.). II (0.6 g.) with V (0.8 g.) as above gave *3-hydroxy-4-methoxy-2-phenylbenzopyrylium chloride*, $C_{16}H_{13}O_3Cl.2H_2O$, (yield 0.5 g.). III (1.45 g.) with V (1.1 g.) as above gave *2',4'-dimethoxy-2-phenylbenzopyrylium chloride*, $C_{17}H_{15}O_2Cl.2H_2O$, m. 116°. IV (0.46 g.) with V (0.3 g.) as above gave *2',4'-diethoxy-2-phenylbenzopyrylium chloride*, m. 91°. F. I. NAKAMURA

Dynamic stereochemistry. I, II. HANS ERLENMEYER. *Helv. Chim. Acta* **13**, 731–47(1930).—Part I reviews the literature and discusses the idea that a mol. formed within the "field of force" of another mol. is influenced in structure. Part II, "on the theory of asym. synthesis and the dependence of chem. structure on the state of aggregation," deals with the possible effect of asym. C atoms on each other. The cinnamic acid salts of optically active bases were prepd. and brominated, then the dibromocinnamic acid was liberated, purified, and its optical activity detd. When the salt of *d*-α-pipecoline was used the acid obtained was optically inactive as is the case when cinnamic acid is brominated alone, but using the salt of *d*-cinchotine (prepd. by hydrogenation of *d*-cinchonine) or glucamine, and repeating several times, the Br acid obtained showed an optical activity corresponding to a mixt. contg. 51.3 to 58.3% of the *d*-rotatory form. L. E. GILSON

Isoquinoline derivatives. II. Synthesis of 4-hydroxy-5-methoxytetrahydroisoquinoline and its derivatives. T. KONDO AND S. TANAKA. *J. Pharm. Soc. Japan* **50**, 923–8(1930); cf. *C. A.* **23**, 4227.—*o-Methoxybenzaldehyde* (20 g.) on treating with Me-

NO_2 (12 g.) and 20% $NaHCO_3$ (12 g.) for 15 hrs. gave *o-methoxyphenylnitroethanol* (I) (yield 25 g.). Reduction of I (20 g.) in alc. (80 cc.) (cf. *C. A.* **24**, 1631) gave *o-methoxyphenylethanolamine*, $C_9H_{13}O_2N$ (II), m. 119 20° (yield 13 g.), and a neutral compd., $C_{17}H_{19}O_4N$ (III), m. 146–6.5° (yield 1–1.5 g.). II forms the following salts: HCl salt (IV), m. 183°, Pt double salt, does not decomp. 350°. IV (5 g.) when treated with 30% HCl (30 cc.) and methylal (5 g.) at 60° for 4 hrs. gave *4-hydroxy-5-methoxytetrahydroisoquinoline*, $C_{10}H_{13}O_2N$; HCl salt, decomps. 140°; Pt double salt, decomps. gradually on heating; *methiodide*, decomps. 125°; *methochloride*, decomps. 160°. II is probably *1-(o-methoxyphenyl)-2-(o-methoxybenzylidene)oximino-1-ethanol* and on reduction gave *1-(o-methoxyphenyl)-2-(o-methoxybenzylamino)-1-ethanol*, m. 175°. F. I. NAKAMURA

Pseudo bases. I. Certain *N*-methylpyrazinium salts and their corresponding bases. JOHN G. ASTON. *J. Am. Chem. Soc.* **52**, 5254–62(1930).—In order to study the effect of ring conjugation certain pyrazine derivs. were prepd. in which a pseudo basic system formed a part of the pyrazine nucleus; the effect of reduced conjugation caused by partial hydrogenation of the nucleus was also studied. 2,2,5,5-Tetramethyldihydropyrazine and MeI in abs. Et_2O, allowed to stand 13 days at room temp., give 80.4% of *1,2,2,5,5-pentamethyldihydropyrazinium iodide* (I), m. 204° (decompn.); recrystn. from MeOH caused a drop in m. p. to 194° (decompn.). Similarly, hexamethyldihydropyrazine (II), heated with MeI at 85–100° for 3 days, gives 78% of *1,2,2,3,5,5,6-heptamethyldihydropyrazinium iodide* (III), m. 249° (decompn.). In each case the MeOH-BuOH mother liquor from the crystn. was red. At room temp. the yield of III is only 26%. I and KOH give 83% of the pseudo base, *1,2,2,5,5-pentamethyl-6-hydroxytetrahydropyrazine* (IV), m. 108–10°; IV is assocd. in C_6H_6 but shows normal mol. wts. in H_2O. IV liberates 1 mol. of CH_4 from 2 mols. MeMgI Measurement of the cond showed that there was no strong base present even at 0° immediately after mixing I and NaOH, the base formed having $K_b < 3 \times 10^{-5}$. In the pseudo basic system from I the equil. between the hydroxide form and IV is evidently established quite rapidly and is in the direction of IV. The behavior of I and IV on titration with acid is described. IV yields a *chloroplatinate*, m. 282° (decompn.) (63% yield); this was also obtained in 10% yield by shaking I with AgCl and adding H_2PtCl_6. III and KOH in H_2O give 79% of *1,2,2,3,5,5-hexamethyl-6-methylenetetrahydropyrazine* (V), $b_{6.5}$ 78–8.2°, which shows a normal mol. wt. in C_6H_6 and in H_2O gives a strongly basic soln whose elec cond. corresponds to a base with a basic dissocn. const. of $K_B = 4 \times 10^{-}$, the 2nd basic N in III is too weak to be titrated using Me orange as indicator Its behavior with acid indicates cleavage of the ring in alk. soln. The *chloroplatinate* of V m. 285° (decompn.), the large yield of the salt from III seems to indicate that it is a hydrated form of the salt of the quaternary base. Possible tautomeric systems arising from these bases are discussed and related to their behavior on titration and salt-forming properties No base corresponding to 1,2,5-trimethylpyrazinium iodide could be isolated.

C. J. WEST

Pyrimidines. CXIX. Determination of the constitution of alkylation products of phenyluracil and phenylhydrouracil. JANET EVANS AND TREAT B. JOHNSON. *J. Am. Chem. Soc.* **52**, 4993–5005(1930).—6-Phenyluracil (I) and MeI in MeONa give a mixt. of the *N-3-Me* (II) and the *N-1,3-Me_2 derivs.* (III), sepd. by extn. with $CHCl_3$. I, m. 228–30°, was also obtained by treating *N-3-methyl-6-phenyl-5,6-dihydrouracil* (IV), m. 149–50.5°, with Br in AcOH in a sealed tube. III, m. 122–2.5°. I and KOH give the *K salt*, decomps. above 300°. I and $ClCH_2CO_2Et$ with EtONa give *Et 6-phenyluracil-N-3-acetate*, m. 205–6°. Dil. KOH hydrolyzes this to the free *acid* (V), m. 304–5°; this also results from *Et 6-phenyl-5,6-dihydrouracil-3-acetate* (VI), m. 154.5–6°, and Br in a sealed tube. V and Me_2SO_4 give the *N-1-Me deriv.* (VII), m. 261 3°; *Me ester*, m. 157 7.5°; *Et ester*, m. 109–10°; this also results from *N-1-methyl-6-phenyluracil* (VIII), m. 194–5°, with $ClCH_2CO_2Et$ and EtONa. VII or its Me ester could not be reduced by catalytic methods or by HI. 6-Phenyl-5,6-dihydrouracil, m. 216–7°, was prepd. from $PhCH{:}CHCO_2H$ and $CO(NH_2)_2$ by heating 6 hrs. at 190° or from $PhCH(NH_2)CH_2CO_2H$, m. 215–6°, and KCNO; the Na salt with MeI gives IV. Hydrolysis of IV with $Ba(OH)_2$ in dil. MeOH for 100 hrs. gives *$MeNHCONHCHPhCH_2CO_2H$*, m. 178° (decompn.); hydrolysis at 150° for 72 hrs. causes complete degeneration of the mol. The main product of the action of $ClCH_2CO_2Et$ on the Na salt is VI. VI and Br in AcOH in a sealed tube give the *5-Br deriv.*, m. 259–61° (decompn.); prolonged heating with Br gives V. *6-Phenyl-5,6-dihydrouracil-N-3-acetic acid* m. 228–31°. *β-(α-Methylamino benzyl)-malonic acid*, decomps. 147°, is formed from PhCH:NMe and $CH_2(CO_2H)_2$; heating above the m. p. or warming the reaction mixt. on the H_2O bath gives *β-methyl-amino-β-phenylpropionic acid*, m. 168.5–9°; KCNO gives *β-phenyl-β-N-1-methylureido-propionic acid*, m. 165–7°, transformed by 10% HCl into *N-1-methyl-6-phenyl-5,6-*

dihydrouracil, m. 158–9.5°; *5-Br deriv.*, m. 214–5°; heating this at its decompn. point (215°) gives quant. **VIII**. *Et N-1-methyl-6-phenyl-5,6-dihydrouracil-N-3-acetate*, m. 70–1°.
C. J. WEST

Two new series of local anesthetics derived from piperazine. E. FOURNEAU AND B. SAMDAHL. *Bull. soc. chim.* **47**, 1003–16(1930).—Knowing that certain isocyclic amino alcs. of piperazine have very distinct anesthetic properties, two new series of analogous amino alcs. contg. aliphatic radicals have been prepd., and the stage at which the anesthetic action commences has been determined. Both series, one of the type $RMeC(OH)CH_2N.CH_2.CH_2.CH_2.CH_2.NCH_2C(OH)MeR$ and the other of the type

$ROCH_2CH(OH)CH_2N.CH_2.CH_2.CH_2.CH_2.NCH_2CH(OH)CH_2OR$, R = Pr to heptyl, have

been obtained in almost theoretical yields by heating 2 mols. of ethylene oxides of the

types $RR\overset{\frown}{C}.O.\overset{\frown}{C}H_2$ and $ROCH_2\overset{\frown}{C}H.O.\overset{\frown}{C}H_2$ with a mol. of piperazine and transformation of the products into di-HCl salts, the corresponding bases being liberated by the addn. of alkali. With litmus paper and congo red paper it has been possible to show the dibasic function of these bases. The sym. amino alcs. of piperazine should exist in 2 stereoisomeric forms, and the ethylene oxide ring should open in 2 ways, but in practice, in spite of repeated crystns. of the di-HCl salts and the picrates, only 1 form has been found save in the case of **IX** which may exist in 2 isomeric modifications. Series I. *Piperazinebis(propyldimethylcarbinol)-2HCl* (**I**). $PrMeC(OH)CH_2Cl$ prepd. by the action of

$MeCOCH_2Cl$ on PrMgBr was transformed into the ethylene oxide $PrMe\overset{\frown}{C}.O.\overset{\frown}{C}H_2$, b.108–10°, by agitation with strong NaOH. Twelve g. of the oxide was added gradually to 11.6 g. of fused piperazine hydrate, and the mixt. refluxed with stirring for 4 hrs. at 120–30°. The product was dissolved in ether, washed with water and acidified with 10% HCl, the aq. layer then being concd. *in vacuo*. Recrystd. from abs. alc., it m. 220–1° (decompn.). *Free base*, b_{13} 171. *Picrate*, m. 206° (decompn.). Anesthetic action of I on tongue—none. *Piperazinebis(butyldimethylcarbinol)-2HCl* (**II**). $BuMeC(OH)CH_2Cl$, b_{20} 84–6°,

transformed into $BuMe\overset{\frown}{C}.O.\overset{\frown}{C}H_2$, b_{20} 45–50°, as in the preceding case, combines with piperazine to form **II**, m. 221-2° (decompn.). *Free base*, b_{25} 188°. *Picrate*, m. 202°. II is slightly anesthetic. *Piperazinebis(isobutyldimethylcarbinol)-2HCl* (**III**), m. 221–2°,

formed from iso-$BuMe\overset{\frown}{C}.O.\overset{\frown}{C}H_2$, b_{754} 120–5°, is distinctly anesthetic on the tongue. *Free base*, b_3 181–3°. *Picrate*, m. 206 7° (decompn.). *Piperazinebis(isoamyldimethylcarbinol)-2HCl* (**IV**). iso-$AmMeC(OH)CH_2Cl$ was transformed into the ethylene oxide, b_{17} 62–4°, by agitation with alc. NaOH. After heating with piperazine the product was converted directly to **IV**, m. 228° (decompn.), strongly anesthetic. *Free base*, m. 57–8°. *Picrate*, m. 208–9°. *Piperazinebis(hexyldimethylcarbinol)-2HCl* (**V**), m. 230° (decompn.), from $Me(C_6H_{13})\overset{\frown}{C}.O.\overset{\frown}{C}H_2$, b_{20} 77–80°, is anesthetic on the tongue. *Free base*,

m. 36–8°. *Picrate*, m. 190–1° (decompn.). *Piperazinebis(heptyldimethylcarbinol)-2HCl* (**VI**), m. 228–9° (decompn.), from $Me(C_7H_{15})C.O.CH_2$, b_{18} 90–5°, is strongly

anesthetic. *Free base*, m. 40–1° Series II. *Piperazinebis(propylhydroxymethylmethylcarbinol)-2HCl* (**VII**). Propylhydroxychloropropanol, b_{13} 92–5°, prepd. by refluxing a mixt. of 2 mols. of PrOH and 1 of epichlorohydrin with the addn. of a little concd. H_2SO_4 was transformed by concd. NaOH into the ethylene oxide, b_{20} 75–7°. Two mols of the oxide were added little by little to 1 mol. of fused piperazine hydrate, and refluxed for 4 hrs. at 120–30° with stirring. After the removal of unreactive reagents by distn., the residue was dissolved in Me_2CO and gaseous HCl passed in to crystn. VII commences to decomp. 213°, m. completely 223°, not anesthetic on the tongue. *Free base*, b_{2-3} 209–11°. *Picrate*, m. 172–4° (decompn.). *Piperazinebis(butylhydroxymethylmethylcarbinol)-2HCl* (**VIII**), m. 227°, was similarly prepd. from the oxide, Bu-

$CH(OH)\overset{\frown}{C}H.O.\overset{\frown}{C}H_2$, b_{20} 79–80°, and was found to be distinctly anesthetic. *Free base*, b_{2-7} 226–8°. *Picrate*, m. 176–7°. *Piperazinebis(isobutylhydroxymethylmethylcarbinol)-2HCl* (**IX**). The isobutylhydroxychloropropanol, b_{20} 100–2°, and its corresponding ethylene oxide, b_{20} 58–60°, were prepd. as before. **IX**, m. 240°, is distinctly anesthetic. *Free base*, b_3 210–4°. *Picrate*, m. 177–9°. A less sol. modification of **IX** was isolated, m. 245°, whose picrate showed a different cryst. form, m. 238°, and which may be isomeric with **IX**. *Piperazinebis(isoamylhydroxymethylmethylcarbinol)-2HCl* (**X**), m.

220° (decompn.), is anesthetic, and was prepd. from the ethylene oxide $C_6H_{11}CH(OH)$-$\overline{CH.O.CH_2}$, b_{15} 78–82°, from the corresponding isoamylhydroxychloropropanol. *Free base*, m. 40–2°, *picrate*, m. 186° (decompn.). *Piperazinebis(hexylhydroxymethylmethyl-carbinol)-2HCl* (XI), m. 233° (decompn.), anesthetic, from $C_6H_{13}CH(OH)\overline{CH.O.CH_2}$, b_{20} 98–105°. *Picrate*, m. 181–2° (decompn.). *Piperazinebis(heptylhydroxymethyl-methylcarbinol)-2HCl* (XII), m. 238° (decompn.), from $C_7H_{15}CH(OH)\overline{CH.O.CH_2}$, b_{14} 125–30°, is very anesthetic on the tongue. *Picrate*, m. 180–1°. The physiol. tests show that the anesthetic value rises with the increase of mol. wt., having values compared to cocaine, of 0.05, 0.79 (iso) 0.08, 1.60, 10.0, 9.1, for Series I, and 0.00, 0.45 (iso) 0.05, 1.74, 8.3, 22.5, for Series II. All the substances irritate the mucous membranes and particularly the cornea. C. R. ADDINALL

The formation of a heterocyclic ring containing mercury atoms. LUIGI VECCHIOTTI. *Nature* **126**, 313(1930); cf. *C. A.* 23, 3447.—*o*-$C_6H_4Br_2$ and 2% Na-Hg, in the presence of EtOAc, give $C_6H_4\langle{}^{Hg}_{Hg}\rangle C_6H_4$ (I). Boiled with HOAc, I yields C_6H_6 and *o*-$C_6H_4(HgOAc)_2$. A. F. SHEPARD

The constituents of the Korean corydalis tuber. IV. J. Go. *J. Pharm. Soc. Japan* **50**, 933–40(1930); German abstract 122–4; cf. *C. A.* **24**, 620.—Five alkaloids of the Korean corydalis tuber have been reported (*loc. cit.*). The present paper deals with the 2 new compds. which have been isolated from the non-phenolic fraction. The compd., $C_{21}H_{25}NO_4$ (I), m. 124–5°, sol. in many org. solvents, insol. in petr. ether and water. I contains 4 MeO and 1 MeN groups. I is *l-glaucine*. The following salts are reported: $C_{21}H_{25}NO_4.HCl.3H_2O$, decomps. 243–6°, $[\alpha]_D^{22}$ −57.10°; $C_{21}H_{25}NO_4.HBr$, decomps. 241°, $[\alpha]_D^{17}$ −98.04°; *methiodide*, m. 224–5°, $[\alpha]_D^{17}$ −72.46°; *d-bitartrate*, m. 216–7°, $[\alpha]_D^{18}$ −44.12°; and *l-bitartrate*, m. 165°. I (1.5 g.) when treated with Bz_2O (7.5 g.) at 80–100° for 5 hrs. gave a Bz deriv., $C_{21}H_{24}O_4NBz$, m. 180–1°, $[\alpha]_D^{16}$ −99.46°; this cannot be hydrolyzed by 5% alc. KOH. I (2 g.) when treated with I_2 (4 g.) and alc. (60 g.) gave *dehydroglaucine iodide* (II), decomps. 187°. II on reduction with Zn and H_2SO_4 gave *l-glaucine iodohydroxide*, m. 125–6°, $[\alpha]_D^{18}$ −119.41°. G. suggests that I and *l-corydine Me ether* are isomers just as *glaucine* and *dimethycorytuberine* are isomers. **V.** *Ibid* 940–4; German abstract 124–5.—G. also isolated a compd., $C_{19}H_{17}NO_4$ (I), m. 201–2°, $[\alpha]_D^{17}$ −315. I contains a dioxymethylene group, but neither MeO nor MeN groups. *Methiodide*, m. 248–52°; *ethiodide*, m. 255–7°. In many respects I resembles *tetrahydrocoptisine*. I when treated with the Gaebel's reagent, followed by methylation with CH_2N_2, gave a compd. m. 141–2° which did not depress the m. p. of *l-tetrahydropalmatine*, obtained from *l-canadine* on similar treatment. G. suggests I is *l-tetrahydrocoptisine* (stylopine). F. I. NAKAMURA

Constitution of cannabinol, the active principle of hashish. I. FRANZ GERGEL AND R. WAGNER. *Ann.* **482**, 55–74(1930).—The residue from the extn. with EtOH or light petroleum of African hemp (*Cannabis africana*) after removal of acids and the hydrocarbon cannabene is distd. in a high vacuum. The pharmacologically active fraction (cannabinol (I)) $b_{0.05}$ 156°, $[\alpha]_D^{18}$ −108.5°, $n_{He}^{19.5}$ 1.547, d^{18} 1.0311. Neither the Ac deriv. (II), $b_{0.05}$ 180°, $n_{He}^{19.5}$ 1.529, nor the *Bz deriv.*, $b_{0.4}$ 170–80°, could be crystd. Dihydrocannabinol (III), $b_{0.25}$ 176–7 $n_{He}^{19.5}$ 1.54, closely resembles I; the *Ac deriv.* (IV), $b_{0.15}$ 162–4°, $n_{He}^{19.5}$ 1.5171 (obtained by reducing II or acetylating III), is pharmacologically active. I takes up 3 mols., III 2 mols. of Br, in each case with the formation of 2 mols. HBr. Reduction of I under pressure gives *perhydrocannabinol* (V), $b_{0.4}$ 145–55°, contains 8 H atoms more and 1 O less than I and is stable in the cold to oxidizing agents. With Millon reagent I and III give positive, II, IV and V negative reactions. Oxidation of I with $KMnO_4$ gives $C_5H_{11}CO_2H$ and isophthalic acid; oxidation of II gives C_5H_{11}-CO_2H; III also gives this acid and in addn., an *acid*, $C_{11}H_{10}O_4$, m. 202–3° (*Et ester*, m. 103–4°), possibly cannabinolactonic acid (cf. Wood, Spivey and Easterfield, *J. Chem. Soc.* **69**, 539(1896); **75**, 20(1899)), and a neutral substance, $C_{20}H_{30}O_2$, but with a mol. wt. of over 900; while the use of $KMnO_4$ in Me_2CO gives an acid, $Me(CH_2)_5\overline{CH.CH_2.CHCO_2H}$ (*anilide*, m. 148.5°), the structure being assigned because of the failure to reduce the anilide. Analyses indicate the formula $C_{20}H_{30}O_2$ for I but $C_{21}H_{30}O_3$ is not excluded. Attempts to account for the oxidation products lead to the following provisional struc-

tures for I, when 1 of Wood's suggested formulations of cannabinolactone is adopted, points of fission being indicated by dotted lines:

$$MeC_6H_4CH[CH_2]_3CH \,\vdots\, CH(OH)CH{-}\!\!-C: \,\vdots\, CH[CH_2]_4Me$$
$$\text{or } MeC_6H_4CH[CH_2]_2 \,\vdots\, C(OH)CH{-}\!\!-C: \,\vdots\, CH[CH_2]_4Me$$

The oxidation of I with HNO_3 in AcOH gives $C_6H_{11}CO_2H$ and nitrocannabinolactone, also obtained from II and III (cf. Wood). *γ-p-Tolylbutyrolactone*, m. 69°, results on reduction of *β*-toluylpropionic acid. Nitration gives a *nitrotoluylpropionic acid*, m. 149°, reduced to an *amino-p-tolylbutyrolactone*, m. 105°, not identical with aminocannabinolactone. C. J. WEST

Plant pigments. XXIII. Xanthophyll from dandelion petals. P. KARRER AND H. SALOMON. *Helv. Chim. Acta* **13**, 1063–7(1930); cf. *C. A.* **24**, 4789.—The dried dandelion petals (6 kg.) were extd. with petroleum ether at 30–50° for 24 hrs., the solvent removed, the residue hydrolyzed and extd. with Et_2O, the solvent removed, the residue taken up in MeOH, cooled in the refrigerator and filtered, the solvent removed, and the residual oil taken up in ligroin, from which upon cooling the pigment, assocd. with 4 g. of another *substance*, m. 247–8°, was obtained. The pigment (0.2 g.), m. 175–6°, shown to be xanthophyll by its absorption spectrum, was sepd. by its greater soly. in EtOH More could be obtained from the mother liquor. It had been previously found in the dandelion leaves (Schunck, *Proc. Roy. Soc. London* **72**, 165 (1903)). A carotenoid was also present in the petals but in such small amount that it was not isolated. **XXIV. The pigment in the forest and in the large garden blackberry.** P. KARRER AND B. PIEPER. *Ibid* 1067–70.—The pigment extd. from the forest blackberry with HCl in MeOH, pptd. with Et_2O and purified as the picrate (2.34 g. pure, 2–3 g. less pure from 10 kg. of berries), is identical with that obtained from the garden variety (4.67 g. pure and 2 g. less pure from 8 kg. of berries). It consists of a monoglucoside of a cyanidin, either identical to or an isomer of chrysanthemin or asterin (Robinson and Willstätter, *C. A.* **23**, 1645) found in asters and chrysanthemums. Hydrolysis of 0.5312 g. of the *pigment-HCl* prepd. from the *picrate* yields 0.3508 g. of the cyanidin, which is converted to 3,4-$(OH)_2C_6H_3CO_2H$ upon alkali fusion. **XXV. The constitution of lycopin and carotene.** P. KARRER, A. HELFENSTEIN, H. WEHRLI AND A. WETTSTEIN. *Ibid* 1084–99.—The structure of carotene (I) is $(Me_2C.CH_2.CH_2.CH_2.CMe{:}CCH{:}CHCMe{:}CHCH{:}\text{-}CHCMe{:}CHCH{:})_2$, and that of lycopin (II) is $(Me_2C{:}CHCH_2CH_2CMe{:}CHCH{:}CHCMe{:}\text{-}CHCH{:}CHCMe{:}CHCH{:})_2$. The facts in support of these formulas are: (1) Both compds. are optically inactive. (2) Oxidation of both with CrO_3 and $H_2Cr_2O_7$ yields 6 mols. of HOAc. (3) Oxidation of I with $KMnO_4$ gives 4.4 mols. of HOAc and $Me_2C(CO_2H)_2$ (III), $HO_2CCMe_2CH_2CO_2H$ (IV), $HO_2CCMe_2(CH_2)_2CO_2H$ (V), and $HO_2CCMe_2(CH_2)_2\text{-}Ac$ (VI). VI was isolated in very small yield, as the semicarbazone. II yields only IV besides 4.2–4.6 mols. of HOAc; it may be considered as being synthesized in the plant through a benzoin condensation of phytolaldehyde and dehydrogenation of the product. A suggested formula for I wherein the 2nd ring is given the structure $\text{-}CMe.CH_2.CH_2.CH_2.CMe{:}CMe$ is abandoned since its oxidation products, $MeC(CO_2H)_2\text{-}(CH_2)_3CO_2H$ and $MeC(CO_2H)_2(CH_2)_2CO_2H$ (VII) were not found although the oxidation of $HO_2C(CH_2)_2CMe(CO_2H)Ac$ led to a good yield of VII. A sym. formula, $(Me_2C{:}CH\text{-}CH_2CH_2CMe{:}CHCH_2CH_2CMe{:}CHCH_2)_2$ (VIII), is also suggested for *squalene* in contradistinction to the unsym. formula given by Heilbron, *et al.* (*C. A.* **23**, 3702). Not only does the formula VIII account for all the oxidation products found including the ketone $C_{19}H_{38}O$ (IX) which was given the structure of *3,7,11-trimethyl-15-hexadecanone* by H., without proof, but also accounted for the failure to find other products that should have been expected because of its unsym. constitution. K., H., W. and W. prove that the ketone is *2,6,10-trimethyl-15-hexadecanone* (X) (*semicarbasone*, m. 73–4°), which was synthesized from $Me_2CH(CH_2)_3CHMe(CH_2)_3CHMeCH_2CH_2OH$ (= ROH), through the compds. RBr, RMgBr, RCH_2OMe (with $ClCH_2OMe$), RCH_2Br and $RCH_2CH(CO_2R')Ac$ (with $R'O_2CCHNaAc$). Alkali splitting of the last compd. yields X. In the execution of the work, it was found that upon oxidation with $KMnO_4$ xanthophyll yields III and IV but no V, zeaxanthin IV, *α*-ionone 1.43 mols. of HOAc and *β*-ionone 1.25 of HOAc. With O_3, *β*-ionone gives V and equal proportions of VI and $AcCMe_2(CH_2)_2CO_2H$, the 2 latter isolated as the semicarbazones; with CrO_3, 1.71 mols. of HOAc were produced against 2 mols. from its isomer. **XXVI. More esters of xanthophyll.** P. KARRER AND SEICHI ISHIKAWA. *Ibid* 1099–1102.—The esters of xanthophyll are easily prepd. by treatment

of xanthophyll in pyridine with the acid chloride, and recrystn. from a MeOH-petroleum ether mixt. The *dipropionate* m. 138°, *dibutyrate* 156°, *divalerate* 128°, *dicaproate* 117°, *dienanthate* 111°, *dicaprylate* 108°, *dipalmitate* 89°. With the exception of the propionate (acetate m. 172°) the m. p. falls with increase in mol. wt. **XXVII. The methylation of xanthophyll.** P. KARRER AND BR. JIRGENSONS. *Ibid* 1102–3.—*Xanthophyll mono-Me ether*, m. 150°, is prepd. in a 30% yield by methylation of the *K salt* with MeI. The salt (not isolated) was obtained by addn. of xanthophyll (**XI**) in boiling PhMe to K and $EtC(Me)_2OH$ in PhMe. Attempts to prep. the *di-Me ether* failed. **XI** itself could not be methylated successfully with MeI mixed with Na_2CO_3, Ag_2CO_3 or Tl carbonate. **XXVIII. The pigment of the sand thorn berry (Sandorn-beere) (Hippophaes rhamnoides).** P. KARRER AND H. WEHRLI. *Ibid* 1104–5.—The pigment in the sand thorn berry was extd. with Et$_2$O after most of the H_2O had been removed by treatment with 90% alc., and pptd. with a MeOH-petroleum ether mixt. Upon hydrolysis, zeaxanthin was obtained in 0.1–0.2 g. yield from 6 kg. of berries, depending upon their ripeness. The ester itself could not be isolated. Zeaxanthin seems to be of common occurrence

I. M. LEVINE

Chlorophyll. XIII. Mesochlorin and oxymesoporphyrins. HANS FISCHER, HEINRICH GEBHARDT AND ALEXANDER ROTHHAAS. *Ann* **482**, 1–24(1930); cf. *C. A.* **24**, 5303.—Reduction of mesohemin or of the complex Fe salt of tetramethylhematoporphyrin (but not of mesoporphyrin, its di-Me ester or Cu salt) by Na and AmOH in H atm. affords, besides by-products (which include *mesohemin di-Am ester*, $C_{44}H_{56}O_4N_4$·FeCl), a perhydrochlorin (not purified), oxidized by FeCl$_3$ to *mesochlorin* (I), $C_{34}H_{40}N_4O_4$ or $C_{34}H_{42}N_4O_4$, m. above 300°; *di-Me ester*, m. 190–1° and depresses the m. p. of meso ester (**IX**). In acid or NH_4OH soln. I is stable to air but is converted in boiling MeOH-alkali into mesoporphyrin IX, the complex *Fe* and *Cu salts* of I are very sensitive to oxidation and on removal of the metal, mesoporphyrin (II) remains. Na-Hg converts I into a leuco compd., oxidized to the original substance and a trace of porphyrin; HI causes breakdown of the mol. Oleum converts I, according to the exptl. conditions, into mesorhodin or *anhydromesochlorin*, $C_{34}H_{38}O_3N_4$, m. above 280°, spectroscopically similar to phytochlorin *e*. Oxidation of II with $K_2S_2O_8$ in 75–80% H_2SO_4 gives a 3% yield of *dioxymesoporphyrin* (III), $C_{34}H_{38}O_6N_4$ or $C_{34}H_{40}O_6N_4$, blue violet prisms, m. above 275°, spectroscopically similar to the chlorins; *Fe salt*; *Cu salt*, bluish black, m. 278.5°; *di-Me ester*, bluish black, m. 188° (*Cu salt*, violet-blue, m. 203°); in 50% H_2SO_4 the reaction is more complex and 3 products have been isolated which are characterized by spectrographic data. Reduction of III with Na-Hg followed by reoxidation or treatment with HI or HBr in AcOH, yields only a trace of porphyrin and none is obtained by the use of MeOH-KOH or of HCO_2H. The latter reagent causes elimination of an O atom from III, with formation of *monooxymesoporphyrin* (IV), $C_{34}H_{38}O_5N_4$, spectrographically identical with III. IV also results on the sapon. of the di-Me ester of III; the Cu salt of III with concd. H_2SO_4 also gives IV. III and its ester with NH_2OH give the corresponding *derivs.* of IV, $C_{34}H_{39}O_5N_5$ and $C_{36}H_{43}O_5N_5$, m. 224.5°, resp. III contains 1.4 atoms of active H, decompn. of the Mg compds. from the detn. yields 2 substances differing in spectra from III (1 of these possibly corresponding with a by-product of the prepn. of IV in 50% H_2SO_4); the ester of IV gives an active H value of 1 and decompn. of the Mg compd. in this case gives yet a further spectroscopically distinct substance. NaOEt in a sealed tube converts both III and IV into I; the presence of O in the mol. thus has an activating effect on the porphyrin complex such as Fe has on the hemins. Oxidation of I by H_2O_2 gives not III but a porphyrin and a chlorin-like substance. The dioxyetioporphyrin, $C_{32}H_{38}O_2N_4$ (from etioporphyrin I and H_2O_2 in H_2SO_4), is spectroscopically identical with III. Protoporphyrin is reduced by the method of Busch to mesoporphyrin.

C. J. WEST

Clupein. II. K. FELIX AND A. LANG. *Z. physiol. chem.* **193**, 1–14(1930); cf. *C. A.* **24**, 376.—Clupein B, the product which was obtained in largest amt. in the fractionation of clupein into its 4 components A_1, A_2, B and C, was subjected to enzymic hydrolysis by trypsin-kinase and erepsin. It had previously been shown to consist of 8 mols. of arginine and 1 mol. each of alanine, serine, aminovaleric acid and proline. From the HCl salt of clupein B trypsin-kinase at p_H 8.4 split off 4 mols. of arginine, liberating 6 NH_2 and 6 CO_2H groups. Further hydrolysis by erepsin at p_H 7.8 then split off the remaining 4 arginine mols. and liberated 4 NH_2 and 5 CO_2H groups. Of the total 10 NH_2 and 11 CO_2H thus liberated, 8 of each are accounted for by the 8 arginine mols. The remainder belong to the monoamino acid residue. There is here 1 CO_2H in excess of the corresponding NH_2 groups, suggesting that a NH_2 is combined in non-peptide linkage. This remaining NH_2 is liberated by acid hydrolysis without further increase in the CO_2H.

A. W. DOX

Chemistry of the lipoids of tubercle bacilli. XXI. Polysaccharide occurring in the phosphatide from the human tubercle bacilli. R. J. ANDERSON AND E. GILMAN ROBERTS. *J. Am. Chem. Soc.* **52**, 5023–9(1930); cf. *C. A.* **25**, 128.—Hydrolysis of the phosphatide A-3 by hot dil. EtOH-KOH for 24 hrs. yields an alc. soap soln. of the fatty acids together with small amounts of free $C_3H_5(OH)_3$ and H_3PO_4, while an EtOH-insol. residue remains which consists of a mixt. contg. a complex org. H_3PO_4 and a neutral carbohydrate. The org. H_3PO_4, isolated as the Ba salt, analyzes for $C_9H_{20}O_{14}P_2Ba$, which might represent a mixt. of ordinary hexosemonophosphate (I) and glycerophosphate; that it does not contain I is evident from the fact that it does not reduce Fehling soln. until after it has been boiled for some time with an acid. The filtrate from the Pb ppt. of the phosphate yields an amorphous *maninositose*, has no definite m. p., $[\alpha]_D^{23}$ 57°, contains 2.33% P, which may or may not be an integral part of the carbohydrate. Hydrolysis yields mannose and inosite. C. J. WEST

Sterols. HÅKAN SANDQVIST AND JOHN GORTON. *Svensk Farm. Tids.* **34**, 457–62, 477–9(1930); cf. *C. A.* **24**, 5042; **25**, 113.—*o*-, *m*- and *p*-Cholesterol benzoates m. 150.9°, 141° and 189.9 192.8°, resp., becoming liquid crystals. These form clear to transparent melts at 156.2°, 174.6° and 261°, $[\alpha]_D^{21}$; *o*- 6°, *m*- 11.9°, *p*- 6.3°. The *o*-crystals are needles, the *m*- and *p*-crystals yellow plates. The purest of 9 prepns. of stigmasterol from the tetra-Br deriv. from soja bean crude sterols gave analysis indicating $C_{29}H_{48}O$. An acetate from this, m. 109°, $[\alpha]_D^{21}$ —51°, was sapond., and titrated and the mol. wt. calcd. as 452.3. A. R. ROSE

The addition power of cholic acid. STEFAN MINOVICI AND MIHAIL VANGHELOVICI. *Bul. soc. chim. Romania* **12**, 5-13(1930).—Cholic acid possesses the ability to form addn. compds. with certain org. substances, which addn. power is inferior to that of desoxycholic acid. M. and V. prepd. with quant. yields addn. compds. of cholic acid with nitrobenzene ($(C_{24}H_{40}O_5).PhNO_2$), aniline, amyl alc., benzaldehyde, *m* toluidine, benzyl alc., cholic acid triolein, and they also tried to prep. an addn. compd. of cholic acid with oleic acid, but failed to isolate this addn. compd. in pure form, while all the other compds. were isolated in pure form. All these compds., in contrast to the addn. compds. of desoxycholic acid, which are very stable, are very labile, are decompd. by water, alc. and NaOH, but they were obtained by washing out the excess of the org. compds. with a neutral solvent such as CCl_4, toluene, ligroin, etc. The soly. of these addn. compds. is greater than the free cholic acid, they usually are prismatic crystals, colorless and odorless. Exposed to air for only 12 hrs., decompn. will occur and, therefore, they must be kept *in vacuo*. F. R. GREENBAUM

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d-α-Aminonorvaleric acid (norvaline) a building unit of proteins (ABDERHALDEN, REICH) **11A.** Asymmetric ester hydrolysis by enzymes. V. Configuration specificity of liver esterase in its relation to enzyme complexes (Bamann, *et al.*) **11A.** Crystal forms of mono-basic fatty acids (Tanaka, *et al.*) **2.** Phase-rule studies on the proteins. III. Quinquevalent N in organic compounds (BANCROFT, BARNETT) **2.** A new application of azeotropism (LECAT) **2.**

Cyclic hydrocarbon synthesis. IMPERIAL CHEMICAL INDUSTRIES, LTD., T. S. WHEELER and J. MACAULAY. Brit. 332,998, June 4, 1929. A gas contg. unsatd. hydrocarbons such as C_2H_4 and C_2H_2 is heated "at a space velocity above 50 reciprocal min." By heating C_2H_4 to 1100° at a space velocity of 6400 reciprocal min. 30% of the gas is converted into a light oil and the exit gas contains 8% C_2H_2.

Saturated from unsaturated hydrocarbons. I. G. FARBENIND. A.-G. Brit. 333,511, April 2, 1929. Crude unsatd. hydrocarbons are converted into satd. hydrocarbons by hydrogenation in 2 stages. In the first stage catalysts are used contg. oxides or sulfides of metals of the second to seventh groups (preferably together with metals of the eighth group or heavy metals of the first group) and the treatment is continued until O, S, N and halogen compds. and resinifying substances present are rendered non-injurious (with or without some hydrogenation of the hydrocarbons under treatment), and in the second stage at least most of the hydrogenation of the purified hydrocarbons is effected in the presence of hydrogenating catalysts. A temp. of 300–60° is suitable for the first stage and oxides or sulfides of Mo or W and Ni or Co may be used as catalysts. Various details are given, with examples of treatment of solvent naphtha, a fraction from the destructive distn. of brown coal, a gas oil, naphthalene and anthracene.

Desulfurizing liquid hydrocarbons. STADTBERGER HÜTTE A.-G. and G. FELD, Brit. 332,910, Feb. 26, 1929. Desulfurization of hydrocarbon materials such as toluene or benzene is effected by treating them, in the absence of steam or H, with finely divided

Cu prepd. by pptn. from solns. of Cu salts by Fe or other suitable basic metal and subsequently heating the pptd. metal to above 100° without oxidation (in a reducing atm. if necessary). The treatment with Cu may be preceded by a partial removal of S by other methods. App. and various details of procedure are described.

Oxidation of sulfurous organic compounds. SILESIA VEREIN CHEMISCHER FABRIKEN (Walter Flemming and Hans Klein, inventors). Ger. 490,716, Oct. 20, 1925. Org. compds. contg. S, with the exception of dithiocarbamide acids are oxidized by solns. of polythionic acids or their salts. Thus, *p*-thiocresol in NaOH is treated with $Na_2S_5O_6$.

Products of hydrocarbons and sulfur dioxide. HERMANN STAUDINGER. Ger. 506,839, July 13, 1929. Monomol. reaction products from unsatd. hydrocarbons of the butadiene series with SO_2 are prepd. by the action of SO_2 on the hydrocarbon in the presence of anticatalyzers. Thus, 1 mol. butadiene contg. 1% hydroquinone is treated with SO_2 to give a polymerized sulfone. Several other examples are given.

Compounds containing ethylene linkages. RICHARD KUHN and ALFRED WINTERSTEIN. Ger. 505,632, Oct. 4, 1928. See Fr. 661,471 (*C. A.* **24**, 379).

Esters from aldehydes. CHARLES O. YOUNG (to Carbide & Carbon Chemicals Corp.). U. S. 1,785,166, Dec. 16. Al butoxide is used as a catalyst in the production of esters from aldehydes, *e. g.*, in the production of EtOAc from anhyd. acetaldehyde at temps. of −10° to +10°.

Aromatic hydroxy aldehydes. J. D. RIEDEL E. DE HAËN A.-G. Brit. 333,313, May 18, 1929. The mixt. of alkoxyvanillin and 4-alkoxymethyl ether of 1-propenyl-3,4-pyrocatechol, obtained by the alk. oxidation with nitro compds. of the alk. decompn. product of safrole, is sepd. by fractional condensation. The unoxidized propenyl compd., which is pptd. first, is alkylated, treated with dil. acids to remove the alkoxymethyl group and the resulting isoeugenol or homolog is oxidized to vanillin or its higher homologs. Various auxiliary treatments and modifications of procedure are also described.

Aliphatic amines. I. G. FARBENIND. A.-G. Brit. 332,868, Nov. 27, 1928. See Fr. 685,345 (*C. A.* **24**, 5765).

Dialkyl aromatic amines. GEORG LOCKEMANN. Ger. 503,113, July 30, 1924. Addn. to 491,856 (*C. A.* **24**, 2469). *N*-Dialkyl aromatic amines are obtained by treating secondary aliphatic aromatic amines with the higher homologs of CH_2O. Thus, monoethylaniline in H_2SO_4 is treated with CH_3CHO and Zn dust to give a 93% yield of *N*-diethylaniline.

Secondary and tertiary amines. I. G. FARBENIND. A.-G. Brit. 333,349, June 28, 1929. Secondary and tertiary amines are sepd. by adding phthalic anhydride in quantity corresponding to the secondary amine present, in the absence of a solvent, and sepg. the phthalamic acid formed by extn. with alkali, and then converting into the secondary amine. Examples are given of the sepn. of (a) mono- and di-ethylaniline, (b) mono- and di-methylaniline, (c) mono- and di-benzylaniline, (d) ethyldiphenylamine and diphenylamine and (e) hydroxyethyl-*p*-cresidine and dimethylaniline.

Aminoazo compounds. PAUL DIETERLE (to National Aniline & Chemical Co.). U. S. 1,785,769, Dec. 23. In making an aromatic aminoazo compd., an aromatic diazo compd. such as diazotized 3-aminobenzenesulfonic acid is coupled with an aromatic amino compd. such as diphenylamine in the presence of water and of an org. solvent such as $C_2H_2Cl_4$ which is immiscible with water (one of the coupling components being relatively insol. in water but sol. in the org. solvent used). Monopol oil may be used as a dispersing agent.

Stable mixtures containing halosulfonamide salts. CHEMISCHE FABRIK VON HEYDEN A.-G. (Curt Philipp, inventor). Ger. 504,997, Jan. 24, 1926. Aromatic sulfonamides are treated with hypohalites in the presence of water, the water being taken up as water of crystn. by added salts. In an example, *p*-toluenesulfonamide is mixed to a paste with $Ca(OCl)_2$ and water. $NH_4CO_3.NaCO_3$ is added to take up the water as water of crystn. Other examples are given.

Double compounds of quaternary salts of 3,6-diamino-10-alkylacridine. I. G. FARBENIND. A.-G. Fr. 686,606, Dec. 13, 1929. Double compd. of the salts of 3,6-diamino-10-alkylacridine with salts of 3,6-diaminoacridine (tertiary) are made by the reaction of either the quaternary salt with the tertiary or the quaternary acid salts with the 3,6-diaminoacridine base, or the quaternary bases with the acid salts of 3,6-diaminoacridine, or the acid salt or the monosalt of the quaternary base with the monosalt or the acid salt of the tertiary base, afterward neutralizing excess of acid with a basic agent Thus, 3,6-diamino-10-methylacridine is heated with a soln. of 3,6-diaminoacridine chlorhydrate, a soln. of the double compd. being obtained. Other examples are given.

Condensation products. I. G. FARBENIND. A.-G. (Ernst Korten, inventor). Ger. 505,475, Sept. 23, 1927. Addn. to 497,628. The condensation products from hydroaromatic ring ketones of the cyclohexane series and aromatic amines described in 497,628 (*C. A.* **24**, 4056) are sepd. either by fractionating the crude product, sepd. from excess of base, in a high vacuum, or by fractional crystn. of their salts from org. solns. Examples are given.

Dialkyl ureas. TENNEY L. DAVIS. U. S. 1,785,730, Dec. 23. In the prepn. of *sym*-dialkyl ureas, urea is heated in the presence of an aliphatic primary amine such as Me, Et or Bu amine to a temp. which may be about 160°.

Hydrogenated derivatives of biphenyl. I. G. FARBENIND. A.-G. (Ernst Korten, inventor). Ger. 505,476, Mar. 3, 1928. Addn. to 501,853. The method of 501,853 (*C. A.* **24**, 4792) for producing hydrogenated derivs. of biphenyl may be modified by carrying out the reaction at ordinary or high pressure, or *in vacuo*, or in the presence of catalyzers or diluents. Examples are given.

Nitriles. I. G. FARBENIND. A.-G. Fr. 686,648, Dec. 14, 1929. See Brit. 323,948 (*C. A.* **24**, 3249).

Formaldehyde derivatives. KARL FUCHS and ERNST KATSCHER. Ger. 505,687, Oct. 18, 1928. CH_2O derivs. substituted by SO_3H or halogen are obtained by the reaction of halosulfonic acids, *e. g.*, $ClHSO_3$, or their salts, esters or mixts., upon CH_2O, its polymers or derivs. The CH_2O may be treated with hydrogen halide and then with SO_3, fuming H_2SO_4, or pyrosulfite. Many examples are given. In one, $CH_2O_3SCl_2$ is obtained by treating paraformaldehyde with $ClHSO_3$. Others describe the prepn. of CH_2O_4S, $C_2H_4O_4Cl_2S$, and $C_2H_4OCl_2$.

***N*-Hydroxyethyl derivatives of 2,4-diamino-1-hydroxybenzene and its derivatives.** I. G. FARBENIND. A.-G. (Gustav Reddelien and Werner Müller, inventors). Ger. 505,323, Apr. 14, 1929. Addn. to 484,996 (*C. A.* **24**, 1121). These compds. are prepd. by condensing halohydrins of $C_2H_4(OH)_2$ or C_2H_4O with the desired diamino compd., in which one amino group has been acylated. The reaction may take place at ordinary or raised temps. and in presence or absence of bases, diluents, solvents or catalyzers. The product is then treated with acid. Thus, 2-acetylamino-4-amino-1-hydroxybenzene is heated with C_2H_4ClOH to give 2-acetylamino-4-hydroxyethylamino-1-hydroxybenzene. Other examples are given.

Pyridine derivatives. SCHERING-KAHLBAUM A.-G. (Curt Rath, inventor). Ger. 511,451, May 29, 1925. Addn. to 491,681 (*C. A.* **24**, 2472). The 3- or 5-iodo substitution products of pyridine are prepd. by treating acid solns. of 3- or 5-aminopyridine or derivs. with alkali nitrite in the presence of iodides, and with or without catalyzers such as Cu. Thus, a HCl soln. of 2-hydroxy-5-aminopyridine is treated with KI and $NaNO_2$ to give 2-hydroxy-5-iodopyridine, m. 191–193°.

Pyrazolone derivatives. I. G. FARBENIND. A.-G. (Friedrich Stolz and Walter Kross, inventors). Ger. 500,521, Mar. 1, 1929. Addn. to 479,348 (*C. A.* **23**, 4952). 1-Phenyl-2,3-dimethyl-4-dimethylamino-5-pyrazolone is prepd. by the action of H and CH_2O on the 4-nitro deriv. in the presence of a metal catalyzer. Cf. *C. A.* **24**, 2243.

Hydrazine compounds of the pyrazolone series. I. G. FARBENIND. A.-G. (Walter Hermann, Karl Streitwolf and Alfred Fehrle, inventors). Ger. 505,799, Apr. 8, 1928. These are formed by converting amino compds. of the pyrazolone series into hydrazine compds. by the usual methods. Examples are given describing the prepn. of 1-(4′-semicarbazide)phenyl-2,3-dimethyl-5-pyrazolone, and 1-(4′-hydrazino)phenyl-2,3-dimethyl-5-pyrazolone. Cf. *C. A.* **24**, 5045.

Naphthostyril derivatives. I. G. FARBENIND. A.-G. (Werner Zerweck, inventor). Ger. 507,128, July 9, 1927. Addn. to 471,269 (*C. A.* **23**, 2190) and 505,321 (*C. A.* **24**, 5767). Nuclearly brominated monobromonaphthostyril is prepd. by treating naphthostyril with the necessary amt. of Br. An example is given.

Aryl thiazoles. LORIN B. SEBRELL and JAN TEPPEMA (to Goodyear Tire & Rubber Co.). U. S. 1,785,656, Dec. 16. In prepg. an aryl thiazole such as 2-mercaptobenzothiazole, an *o*-nitroaryl hydrosulfide such as di-*o*-dinitrodiphenyl disulfide is reduced in soln. to the corresponding amino compd. and the latter while still in soln. is caused to react with CS_2 to complete the thiazole ring.

Dithiocarbamates. I. G. FARBENIND. A.-G. (Wilhelm Lommel, Theodor Goost and Hermann Friedrich, inventors). Ger. 498,280, May 24, 1927. Addn. to 495,628 (*C. A.* **24**, 3519). Dithiocarbamates with alicyclic residues are produced by treating dithiocarbamic acid salts obtained from alicyclic secondary bases and CS_2 with other salts. Thus, Na ethylhexahydro-*o*-tolyldithiocarbamate is treated with $ZnCl_2$. Other examples are given. Cf. *C. A.* **24**, 129.

Triaryl phosphates. WILFRID GIBSON, CHARLES R. HENSHAW and JOSEPH B.

PAYMAN (to Imperial Chemical Industries, Ltd.). U. S. 1,785,951, Dec. 23. See Fr. 681,177 (*C. A.* **24**, 4305).

Compounds of sodium and nitrogen. DEUTSCHE GOLD- UND SILBER-SCHEIDEANSTALT VORM. ROESSLER. Ger. 507,996, July 2, 1927. N-compds., such as amino, imino, amido and imido compds., are acted upon by NaH to produce compds. contg. N and Na. Thus, $PhNH_2$ is warmed with NaH to give PhNHNa. Other examples are given.

Concentrating acetic and formic acids. IMPERIAL CHEMICAL INDUSTRIES, LTD., and F. D. LEICESTER. Brit. 332,983, May 17, 1929. Concn. is effected by adsorption of the vapor in active C, or, with HOAc, by selective adsorption of the acid from liquid soln. Examples with details of procedure are given.

Acetic acid. DESTILACIJA DRVA D. D. Ger. 507,416, Sept. 29, 1928. Dil. AcOH is extd. in the cold with a mixt. of (1) a cyclic base which boils above 150°, is insol. or difficultly sol. in water, and can be acetylated only with difficulty, if at all, and (2) a water-repellant hydrocarbon oil b. above 150°. A suitable extg. agent comprises quinoline 1 and anthracene oil 1 part. Concd. AcOH is recovered by distg. the ext.

Acrylic acid chloride. I. G. FARBENIND. A.-G. Brit. 333,079, Sept. 14, 1929. β-Chloropropionic acid chloride vapor (suitably at temps. of 140–300°) is brought into contact with catalysts splitting off HCl such as $BaCl_2$, Al_2O_3 or bauxite or sherds of burnt clay or similar highly porous materials.

2-Hydroxy-3-nitropyridine-5-arsonic acid. SCHERING KAHLBAUM A.-G. (Arthur Binz and Curt Räth, inventors). Ger. 504,829, Aug. 6, 1926. 2-Hydroxy-3-nitropyridine-5-arsonic acid is prepd. by treating pyridine-5-arsonic acid substituted in the 2-position by, *e. g.*, Cl or OH, with a powerful nitrating agent such as red fuming HNO_3. Examples are given.

1-ω-Aminomethylnaphthalenesulfonic acids. WILHELM HERZBERG and HANS LANGE (to General Aniline Works). U. S. 1,785,955, Dec. 23. By treatment with such sulfonating agents as strong H_2SO_4 or fuming sulfuric acid, 1-ω-aminomethylnaphthalene yields 1-ω-aminomethylnaphthalene-2,4-disulfonic acid. There is first formed a mixt. of the 2-sulfonic acid, which is insol. in water, and the 4-sulfonic acid, which is easily sol. in water; these acids are easily sepd. from each other, on further sulfonation, whether individually or mixed together, they yield the 2,4-disulfonic acid. These acids are colorless compds. which yield the corresponding naphthaldehydesulfonic acids, for instance by transforming the benzyl compds. into the benzal compds. and treating the benzal compds. with an inorg. acid.

Acetaldehyde from acetylene. I. G. FARBENIND. A.-G. (Bernhard C. Stuer and Walter Grob, inventors). Ger. 504,862, June 25, 1914. C_2H_2 and water vapor are led over an Fe catalyzer at high temps. and pressure. The catalyzer is a compd. of Fe with H_2CrO_4, H_2WO_4 or H_2SiO_3. Co or Ni compds. may be used instead of Fe. Cf. *C. A.* **24**, 2474.

Acetaldehyde. I. G. FARBENIND. A.-G. (Walter Daniel, inventor). Ger. 507,795, Aug. 28, 1928. AcH is prepd. from C_2H_2 or gases contg. C_2H_2 by treating the gas with salts of Hg and NH_4 in presence or absence of free S. Thus, a gas contg. 6% C_2H_2 is treated with a soln. contg. water, H_2SO_4, HgO and NH_3 to give a 78% yield of AcH. Other examples are given. Cf. *C. A.* **25**, 304.

Acetone. HOLZVERKOHLUNGS-INDUSTRIE A.-G. Ger. 505,112, Dec. 12, 1924. Addn. to 503,571. In the prepn. of acetone from AcH and steam by the method of 503,571 (*C. A.* **24**, 5769), the AcH addn. is interrupted from time to time and the steam is led alone to the catalyzer.

Methyl and ethyl acetates. HOLZVERKOHLUNGS-INDUSTRIE A.-G. (Koloman Roka and Otto Fuchs, inventors). Ger. 507,205, Nov. 16, 1926. A mixt. of AcOH and MeOH or EtOH is heated to 150–200° under pressure in the absence of a catalyst, the ester being continuously removed from the mixt. by distn.

Dioxane. I. G. FARBENIND. A.-G. Ger. 507,761, May 7, 1926. Addn. to 500,223. The method of Ger. 500,223 (*C. A.* **24**, 4307) is modified by using dihydroxydiethyl oxide or a monoether thereof as the initial material, alone or mixed with one another or with glycol.

Dimethylolurea. POLLOPAS, LTD. Ger. 504,863, June 20, 1928. See *C. A.* **23**, 3236 (Brit. 299,487).

Hydrogenating naphthalene. J. VARGA. Brit. 333,453, Oct. 13, 1928. See Fr. 683,070 (*C. A.* **24**, 4523).

Naphthalene purification. GES. FÜR TEERVERWERTUNG, A. SPILKER and G. SPILKER. Brit. 333,352, July 1, 1929. Purification is effected by melting, washing with caustic alkali soln. and then distg. (suitably after leaching several times with water before the distn.).

Purifying crude anthracene. ALPHONS O. JAEGER (to Selden Research & Engineering Corp.). U. S. reissue 17,902, Dec. 16. Reissue of original pat. No. 1,693,713 (*C. A.* **23**, 851).

Hydroxyanthraquinones. SCOTTISH DYES, LTD. Ger. 507,210, Jan. 9, 1925. See Brit. 246,529 (*C. A.* **21**, 414).

2,7-Dinitroanthraquinone. I. G. FARBENIND. A.-G. (Robert E. Schmidt and Berthold Stein, inventors). Ger. 497,503, June 26, 1925. 2,7-Dinitroanthraquinone is prepd. by treating anthrone with concd. HNO_3 of at least 90% strength at low temps., and heating the intermediate product so obtained with glacial AcOH. An example is given. Cf. *C. A.* **24**, 3251.

4,10-Diaminoperylene. FÉLICE BENSA. Fr. 686,233, Dec. 6, 1929. 4,10-Diaminoperylene is made by reducing with an alkali sulfide or hydrosulfide 4,10-dinitroperylene suspended in a mixt. of alc. and aq. alkali lye.

2,4-Dihydroxyquinoline. I. G. FARBENIND. A.-G. (Hans Kämmerer, inventor). Ger. 505,798, Feb. 5, 1929. Malonic acid esters are condensed with aromatic amines in a high-boiling solvent to produce 2,4 dihydroxyquinoline. Examples are given. In one, α naphthylamine and diethyl malonate are condensed in $PhNO_2$.

Dihydromorphine. C. H. BOEHRINGER SOHN. (C. Schöpf and L. Winterhalder, inventors). Ger. 504,830, Feb. 16 1927. This is obtained by treating tetrahydrothebaine (obtained by the hydrogenation of thebaine salts) with a powerful dealkylating agent, *e. g.*, HBr. A mixt. of hydrogenated products of thebaine including the tetrahydro deriv. may be used as the starting material. Examples are given.

Butadiene and its homologs. I. G. FARBENIND. A.-G Fr. 686,446, Dec. 11, 1929. Butadiene and its homologs are made by passing vapors of unsatd. alcs. having 4 or more C atoms, preferably mixed with steam, over a dehydrating catalyst at a temp. of 150°. Examples are given of the prepn. of butadiene from allylic carbinol, and dimethylbutadiene from 2-methyl 2-penten-4-ol.

Vanillin. J. D. RIEDEL-E. DE HAËN A.-G. Ger. 507,796, Nov. 26, 1925. Addn. to 505,404. The mixt. of propenylcatechol monoalkoxymethyl ethers obtained from safrole or isosafrole in the process of Ger. 505,404 (*C. A.* **24**, 5770) is acidulated and then treated with org. solvents, or cooled, to sep. the 4 acyl-3-alkoxymethoxy-1-propenylbenzene (I) from the 4-alkoxymethoxy-3 acyl-1-propenylbenzene. The latter is saponif. with alkali and worked up as in Ger. 505,404, while I is warmed with acid to split off the alkoxymethyl residue, the product is methylated, and the isoeugenol obtained by warming with alkali is converted into vanillin in known manner. Addnl. details and examples are given.

Phenylmercuric acetate. CARL TAUBE (to Winthrop Chemical Co.). U. S. 1,780,094, Dec 23. Hg acetate is boiled for several hrs. in benzene to which has been added such a quantity of a high-boiling inert org. solvent having a b. p. of at least 150°, such as $PhNO_2$ and 1,2 dichlorobenzene, that the b. p. of the mixt. is raised to about 120–140°.

Sodium *p*-hydroxyphenylarsonate. UNION CHIMIQUE BELGE SOC. ANON. Brit. 333,023, June 7, 1929. This compd. is obtained from the product of reaction between PhOH and arsenic acid by first prepg. the Ca salt and then converting it into the Na salt (suitably by successive use of $CaCl_2$ and Na_2CO_3).

Lead tetraethyl. E. I. DU PONT DE NEMOURS & Co. Ger. 504,827, July 22, 1927. Alloys of Pb with K and Na are treated with EtCl. The alloy Pb(KNa) may be heated to 50–60° with the EtCl. Another preferred alloy contains K and Na in the proportions 1:9.

Magnesium 1-methyl-4-isopropylbenzenesulfonate. CHEMISCHE FABRIK VON HEYDEN A.-G. (Curt Philipp, inventor). Ger. 504,998, Mar. 17, 1928. Addn. to 466,-400 (*C. A.* **23**, 2191). The above and its substitution products are prepd. by treating the sulfonic acid with sol. Mg salts such as MgO, $Mg(OH)_2$ or $MgCO_3$. An example is given.

11—BIOLOGICAL CHEMISTRY

PAUL E. HOWE

A—General

FRANK P. UNDERHILL

The extent of goiter in Hungary and its connection with the iodine content of the drinking water. JOHANN STRAUB. *Z. Hyg. Infektionskrankh.* **111**, 472–9(1930).—The prevalence of goiter in Hungary was not found to be related to the I content of the drinking waters. RACHEL BROWN

Hemin, hematin and protoporphyrin. H. Fischer, A. Treibs and K. Zeile. *Z. physiol. Chem.* **193**, 138–66(1930).—A crystallographic study was made of protoporphyrin prepns. obtained by various methods. The characteristic crystal forms are profusely illustrated by drawings and photomicrographs. All of the pure prepns., both natural and synthetic, showed complete identity. Similar studies were made of hemin obtained by the various procedures for introducing Fe into protoporphyrin, and of the characteristic Teichmann crystals. Hematin, obtained by dissolving hemin in KOH and pptg. with AcOH, crystallizes from pyridine with 2 pyridine of crystn. Heating with AcOH and NaCl converts it back to cryst. hemin. Tetramethylhematoporphyrin was prepd. from synthetic hematoporphyrin, and diacetyldeuteroporphyrin ester from diacetyldeuterohemin, and their crystallographic properties are described. Other prepns. described are bromohemin and iodohemin from beef blood, from chlorohemin, and from protoporphyrin, with crystallographic data which establish the identity of the several prepns. Hemin prepns. obtained by treatment of protoporphyrin with $FeCl_3$, or crystd. in the presence of protoporphyrin, contain considerable porphyrin as shown by colorimetric dets.

A. W. Dox

Cleavage products from hydrogenated proteins. I. N. Troensegaard and M. G. Mygind. *Z. physiol. Chem.* **193**, 171–80(1930).—The authors' theory that proteins contain heterocyclic nuclei which on hydrolysis yield amino acids finds further corroboration in the isolation of 2 new bases from the hydrogenation products of acylated proteins. Because of their low H content these bases are obviously cyclic. Two such bases were previously obtained from serum globulin, serum albumin, globin, fibrin and casein (*C. A.* **25**, 306). The new bases herein described were obtained from gliadin, casein and globin. The protein was acetylated and then hydrogenated by Na and AmOH. The bases were extd. from the AmOH soln. by shaking with 30% NaH_2PO_4, the soln. was treated with K_2CO_3 and extd. with Et_2O; and the bases were pptd. as HCl salts. A partial sepn. was effected by distn. of the free bases *in vacuo*. The lowest-boiling fraction contained piperidine; the fraction b_{14} 90–130° contained the base $C_{11}H_{22}N_2$, isolated as the picrate; and the fraction $b_{0.2}$ 100–35° contained the base $C_{14}H_{22}O_2$, isolated as the styphnate. The last 2 were isolated in amts. corresponding to 0.2–0.4% of the N present in the acetylprotein. Both contain only tertiary N and combine with 2 mols. of monobasic acid. The *base*, $C_{11}H_{22}N_2$, forms a *picrate* which sinters 220° and decomps. 231°, a *chloroaurate* decompg. 197°, and a *Reineckate* m. 185°. The *base*, $C_{14}H_{22}N_2$, forms a *styphnate* which sinters 225° and m. with decompn. 234°, a *chloroaurate* m. 197° (decompn.), a *chloroplatinate* m. 257° (decompn.) and a *picrate* sinters 230° and m. 242° (foaming). The piperidine is not derived from the lysine component of proteins, since no piperidine could be obtained by a similar treatment of lysine itself, but was obtained from gliadin from which lysine is absent.

A. W. D.

Activator Z. VI. Tore Philipson. *Z. physiol. Chem.* **193**, 181–92(1930); cf. *C. A.* **25**, 306.—The purification of activator Z was undertaken with a view to obtaining a prepn. of high activity in the promotion of yeast growth. If boiled yeast ext. was used at the beginning the activity was increased 1.5 times by dialysis. Pptn. with $Pb(OAc)_2$ and $HgCl_2$ then increased the activity 2.5 times. By autolysis of bottom yeast a prepn. with higher initial activity was obtained and purified 2.5–3.0 times, so that its final purity on an abs. basis was twice as great as that of the prepn. from boiled yeast. It contained 10% N. The favorable conditions under which an 8-fold purification was previously accomplished by means of $Hg(NO_3)_2$ could not be reproduced. Autolyzates from both bottom and top yeast possess Z activity, but the former are twice as active as the latter. Before treatment with Hg salts the activator is very stable to acids and alkalies; after such treatment it becomes sensitive to alkalies.

A. W. Dox

***d*-α-Aminonorvaleric acid (norvaline) a building unit of proteins.** Emil Abderhalden and Fritz Reich. *Z. physiol. Chem.* **193**, 198–200(1930).—The discovery of norvaline as a component of globin (*C. A.* **24**, 3254) suggested the probability of finding this amino acid in other proteins also. It has now been isolated in 0.2% yield from casein by hydrolyzing the protein with HCl, distn. of the amino acid esters *in vacuo* and fractional crystn. of the fraction b_{12-16} 85–95°. The substance was identified by its sp. rotation 21.94°, and by the rate of amination of the $PrCHBrCO_2H$ prepd. by treatment of the amino acid with NOBr. The norvaline content of casein probably exceeds 1%.

A. W. Dox

The formation of a substance with histamine-like action from histidine on ultraviolet ray treatment and the significance of this process for the light erythema. F. Ellinger. *Strahlentherapie* **38**, 521–42(1930); cf. *C. A.* **25**, 120.—E. demonstrated that histidine is decarboxylated to histamine on irradiation with ultra-violet rays. An irradiated histidine soln. will excite the intestine of a guinea pig and the active prin-

ciple can be extd. with hot $CHCl_3$; this ext. also lowers the blood pressure. This points to the formation of histamine from histidine. The substance, however, could not be identified chemically and spectroscopically because of the very small yield. With 2 hrs. irradiation the formation of the new substance increased directly with the exposure. Between 2 and 4 hrs. no further action occurred. E. gives the following conception of the formation of a light erythema: A histamin-like substance is formed from histidine in the upper layer of the epidermis (perhaps even in the horn cells). This histamine substance has a very slow diffusion. It causes the first reddening and the picture of an increase of leucocytes in the vessels. There can be no doubt that this histamine-like substance is responsible for the erythema. F. R. G.

Lipase and its action. I. The synthetic action of pancreatic lipase in the system: oleic acid–glycerol–water–dissolved lipase. ERNEST A. SYM. *Biochem. J.* **24**, 1265–81 (1930).—Lipase acts at the phase interface in the system lipase–glycerol ext.–olcic acid. When the 2 phases are in contact with one another, at the beginning of the reaction lipase disappears from the aq. phase and accumulates at the phase interface. This process takes place in 2 ways. The first of these is of the nature of adsorption; the second probably depends on the formation of a membrane at the phase surface. The synthesis of olein involves a bimolecular reaction. The initial velocity of the reaction, but not the equil. const., is directly proportional to the concn. of enzyme in the aq. phase. BENJAMIN HARROW

The invertase accelerator of serum, with observations on other enzyme accelerators reported in serum. JOSEPH FINE. *Biochem. J.* **24**, 1282–93(1930).—Serum does not normally contain invertase. By intraperitoneal injections of invertase, the enzyme appears in the serum. Serum possesses the power of accelerating yeast invertase. BENJAMIN HARROW

Enzymic synthesis of raffinose. A. V. BLAGOVESHCHENSKII. *Biochem. J.* **24**, 1337–9(1930).—17.9712 g. galactose and 34.1765 g. sucrose were dissolved in 1000 cc. 80% acetone. One g. emulsin was added and the mixt. placed in a thermostat at 35° for 5 months. The rotation changed from +5.40° to +5.68°. The acetone was distd. off *in vacuo*, the soln. concd. to a sirup and extd. with boiling 96% alc. After a few days crystals of sucrose and galactose sepd. out. The mother liquor was evapd. and again extd. with alc. After a new crystn. of sucrose and galactose, the mother liquor was decanted and, after standing for some time, deposited small crystals. These crystals were washed with alc. and dried. 0.4117 g. was dissolved in 25 cc. water and after 24 hrs. gave, in a 2 dm. tube, a rotation $\alpha_D = +3.15°$, corresponding to the specific rotation $[\alpha]_D = +95.66°$. (For raffinose $[\alpha]_D = +104°$, for galactose +81°, and for sucrose +66.5°.) To this soln. emulsin was added. The rotation changed to +2.81° and after 10 days decreased to $\alpha_D = +2.34$. "These results give us the right to conclude that the action of emulsin on a soln. of galactose and sucrose in 80% acetone produces a compd. with the properties of raffinose." BENJAMIN HARROW

Uricase and its action. II. Bacterial nature of the action of uricolytic extracts and dialyzates. RICHARD TRUSZKOWSKI. *Biochem. J.* **24**, 1340–8(1930); cf. *C. A.* 22, 2178.—With the exceptions of systems contg. $CHCl_3$ or toluene, or of aseptically taken tissue, all the prepns. examd. contain bacteria. Many of the conclusions drawn in the earlier papers (*C. A.* **23**, 162; **24**, 5314) are invalid. **III. Comparison with activated charcoal. Contact nature of the action of uricase.** *Ibid* 1349–58.—The activity of exts. (suspensions) is assocd. with the presence of macroscopic fragments of cell debris. The process of biological uricolysis is one of contact catalysis on certain sp. macroscopic surfaces. **IV. Preparation and properties of ox-kidney uricase.** *Ibid* 1359–70.—Mixed kidney tissue is shaken with water contg. $CHCl_3$ for 2–3 hrs. The suspension is filtered through cotton wool and the filtrate is centrifuged. The residue is suspended in water and the suspension again centrifuged. The residue can be kept for 2 weeks (and probably longer) in an atm. satd. with water and toluene vapors. BENJAMIN HARROW

Behavior of glutathione in yeast. NORMAN U. MELDRUM. *Biochem. J.* **24**, 1421–7(1930).—The respiration of yeast may be reduced by 60–90% by narcotics or by cyanide. Glutathione does not reduce cytochrome in yeast, nor is it directly concerned in carbohydrate oxidation by yeast. BENJAMIN HARROW

Mode of action of tyrosinase. CAECILIA ELIZABETH MARY PUGH. *Biochem. J.* **24**, 1442–55(1930).—There is no evidence that tyrosinase can be obtained in a form which does not act on monohydric phenols in absence of some coenzyme or activator. Attempts to sep. tyrosinase into 2 enzymes have failed. BENJAMIN HARROW

Asymmetric ester hydrolysis by enzymes. V. The configuration specificity of liver esterase in its relation to enzyme complexes. EUGEN BAMANN, PAUL LAEVERENZ,

R. WILLSTÄTTER AND R. W. KUHN. *Ber.* **63B**, 2939-48(1930); cf. *C. A.* **24**, 2153.—The stereochem. activity of the enzyme can be influenced by prétreatment as well as by adding optically active foreign substances. An ammoniacal ext. of human liver esterase from the untreated dry prepn. after AcOH pptn. and dialysis splits the 2 components of racemic mandelic acid ester to about the same extent, while the ext. from a prepn. dried at 60–65° for several days or treated with toluene before adding ammonia attacks the *d*-ester more than the *l*-ester. The enzyme complex has probably undergone a change in its constitution by the union of the catalyst group with specific bodies from the decompn. of the enzyme or of attendant substances.

MARY E. LEAR

The preparation and some properties of the crystalline methemoglobin of the horse. MILTON LEVY. *J. Biol. Chem.* **89**, 173-83(1930); cf. *C. A.* **22**, 1986.—Three methods are described for the prepn. of cryst methemoglobin from horse blood, in 2 of which the oxidation is accomplished by the use of $K_3Fe(CN)_6$ and in the 3rd autoxidation of oxyhemoglobin occurs in the presence of EtOH. The methods are modifications of procedures previously described. The soly. of methemoglobin in phosphate buffer solns. depends on the ionic strength of the buffer in the same manner as does the soly. of oxyhemoglobin. The p_H of min. soly. is 6.8 at a const. ionic strength of 0.25. Methemoglobin is of the same *apparent* valence type as oxyhemoglobin. Oxyhemoglobin is thermodynamically unstable with respect to the formation of methemoglobin and O_2 and any detectable amt. of oxyhemoglobin spontaneously appearing in methemoglobin owes its origin to unknown reducing agents and not to the appearance of an equil. with O_2.

A. P. LOTHROP

Plasma phosphatase. I. Method of determination. Some properties of the enzyme. H. D. KAY. *J. Biol. Chem.* **89**, 235-47(1930).—A simple method is described for the estn. of the phosphatase content of blood plasma in which Na β glycerophosphate is used as the substrate. A plasma sample contg. *one-unit* of phosphatase is one of which 1 cc. will liberate 1 mg. of inorg. phosphate (expressed as P) in 48 hrs. at 38° and a p_H of 7.6. The quantity of enzyme in blood plasma is very small compared with the quantity in an equal wt. of kidney (1/300), intestine or bone. Both red and white cells contain more phosphatase than the plasma so that both hemolysis and the presence of leucocytes must be avoided. Plasma phosphatase has the same p_H for activity, 8.8 to 9.2, as that of the phosphatases of other mammalian tissues. Mg ions are a powerful stimulant to its activity with an optimum p_{Mg} between 1 and 2. Ca ions are mild inhibitors. The enzyme has been found to hydrolyze the following phosphoric esters: hexosediphosphate, synthetic α- and β-glycerophosphates, pyrophosphate, glycophosphate and guanine nucleotide. **II. The enzyme in disease, particularly in bone disease.** *Ibid* 249-66.—In normal individuals the plasma phosphatase varies from 0.1 to 0.21 unit. In cases of generalized bone disease, such as osteitis deformans, generalized osteitis fibrosa, osteomalacia and rickets (infantile, adolescent and renal) the values are much increased, rising to above 3 units which is more than 20 times the normal value. The increase may be correlated in general with the severity of the disease. There is, thus, a 3rd variable in addn. to Ca and inorg. P (long known to be affected in bone diseases) which suffers still greater changes than the other 2. These findings indicate a strong correlation between bone maintenance and phosphatase and this enzyme must be accepted as playing a very important role in bone formation, maintenance and pathology. Bibliography of 25 references.

A. P. LOTHROP

Glutelins. VI. The optical rotation of the glutelins of wheat, rye, barley, maize and rice. FRANK A. CSONKA, MILLARD J. HORN AND D. BREESE JONES. *J. Biol. Chem.* **89**, 267-73(1930); cf. *C. A.* **21**, 2718.—Values for the $[\alpha]^{20}$ of the following glutelins were obtained: wheat, α −85.1, wheat, β −76.6, rye −81.2, barley −111.1, corn, α −72.6, rice −65.1°. Racemization studies of the α- and β-glutelins of wheat and of gliadin indicated that they could all be referred to a hyperbolic curve, $y = ax^b + c$.

A. P. LOTHROP

Quantitative clinical and spectrophotometric comparison between natural and synthetic thyroxine. EGGERT MØLLER, CHR. N. J. GRAM AND S. A. SCHOU. *Acta Med. Scand.* **74**, 85-103(1930).—Synthetic thyroxine from Hoffmann-LaRoche and natural thyroxine from Harington were both found to give identical spectrophotometric curves, had the same I_2 content (65%) and produced the same rise in basal metabolism of a myxoedema patient. Abderhalden and Rossner's description of the spectrophotometric curve common to natural and synthetic thyroxine is confirmed. S. M.

The effect of short wave radiations on proteins. I. B. RAJEWSKY. *Biochem. Z.* **227**, 272-85(1930).—The effect of ultra-violet and Röntgen radiation on the protein

consists of a denaturing of the protein mol., a conglomeration of the denatured particles to large visible masses (coagulation) and finally a pptn. of the coarsely dispersed particles. The latent period of the reaction serves as a measure of the degree of reaction under definite conditions of intensity of radiation, temp. and protein concn. This relationship is expressed by $LZ = K(1 + (1/t))$, where K = const. and t is the duration of illumination. The active absorption takes place between 300 and 254 mμ. The reaction of the protein to ultra-violet radiation is essentially independent of the temp.; only the conglomeration of the denatured particles of the egg albumin is accelerated by a rise in temp., but the effect of the x-rays is greatly influenced by the temp., the increase in reaction velocity following an exponential curve, thus indicating a difference in the mechanism of the action of both types of radiation. **II. The relation between the radiation reaction of the protein and the radiation intensity of the ultra-violet rays.** WOLFGANG GENTNER AND KURT SCHWERIN. *Biochem. Z.* **227,** 286–303(1930).—The coagulating effect of ultra-violet radiation on a pure paraglobulin soln. was studied by detg. the no. of protein particles performing Brownian movements. The curves based upon the enumeration of these particles give the various characteristics of the reaction and thus serve as a relative measure of the radiation effect. Under the condition of equal total radiation energy the relationship between the radiation effect and radiation intensity is expressed by $I.\ T^{0.90}{}_4 = K$. S. M.

Studies on lactic acid fermentation of warm-blooded tissue. III. The fermentation of different sugars by rat liver. Its dependence on the nutritive condition of the experimental animal and of the season of the year. OTTO ROSENTHAL. *Biochem. Z.* 227, 354–84(1930); cf. *C. A.* **23,** 5478.—Although liver tissue may produce considerable quantities of lactic acid under anaerobic conditions, it ferments but poorly added glucose. The investigation was therefore undertaken to det. if other hexoses are fermented with greater speed, and for this purpose glycogen, sucrose, maltose, lactose, galactose mannose, glucose, fructose, Harden's hexosediphosphate, Neuberg's and Robison's monophosphate ester, glyceraldehyde and dihydroxyacetone were tested. Only fructose and the 2 trioses were fermented with greater velocity. Mannose is just barely fermented, but no more than glucose, while all other hexoses were practically ineffective. However, even with the 3 fermentable glucides the process occurred with any speed only with the liver of well-nourished animals, whereas with the livers from fasting animals the fermentation rate was not different from that of glucose. Furthermore, the fermentation capacity of the liver from both well-fed or starved rats varies with the season of the year, which is attributed to a different content of each liver of the fermentation activator. The dismutation of methylglyoxal was independent either of the nutritive condition of the animal or of the season, and is about fourfold the fermentability of either fructose or glyceraldehyde. S. MORGULIS

Demonstration and intensity of mitogenetic radiation. I. H. SCHREIBER AND W. FRIEDRICH. *Biochem. Z.* **227,** 386–400(1930).—By a special arrangement of app., capable of measuring the emission of one quantum in 200 sec., there has been complete failure to detect any radiation from multiplying yeast cells. S. M.

Studies on permeability. III. Cholesterol and lecithin in relation to the water and acid-base content. J. DAHMLOS AND A. SOLÉ. *Biochem. Z.* **227,** 401–28(1930); cf. *C. A.* **24,** 4063.—The idea is developed that lecithin + OH^- are the most potent synergistic factors in forming a water-permeable oil/water-dispersion system, while lecithin + H^+ are antagonistic to the formation of such a system. The lecithin + OH^- effect is greater than that of cholesterol + H^+. The idea is derived from the hypothesis that the action of the lipides on the penetration ability of water or water-sol. acids and bases depends upon the influence of these colloids together with the ions in detg. the oil/water or water/oil structure of the interfacial layer. Expts. were performed on rabbits with the view of testing this hypotheses, by injecting lecithin or cholesterol esters intravenously. Cholesterol-treated animals showed the largest urinary output, while the lecithin animals showed the lowest. Animals receiving twice an injection of 0.15 g. cholesterol in 40 cc. isotonic glucose soln. show hypercholesterolemia with most pronounced hydremia, while the administered water is thrown out through the kidneys. Both the serum and urine Cl reach a max. at that time. The exptl. hyperlecithinemia causes retention of water by the tissues, and a min. concn. of Cl in both urine and serum. If the rabbits are loaded with the same quantities of water contg. in addn. 0.8 g. NH_4Cl (= 0.53 g. Cl) per day, it is found that hypercholesterolemia under these conditions causes the tissues to throw off the excessive amt. of Cl together with water through the kidneys. Hyperlecithinemia, under similar conditions, leads to greater elimination through the kidneys than in expts. with water-loading alone, but still most of the water and Cl is retained in the tissues, and the blood is actually poorer in water than

in the control animals. Similar expts. were performed but the lecithin and cholesterol were not injected but the animals were given 1 g. daily of one or the other over a period of 3 months. When these rabbits were now loaded as before with water or with NH_4Cl solns. it was found that long-continued feeding of cholesterol causes a retention of water and Cl by the tissues, which is contrary to the effect of the parenterally administered cholesterol. Similarly, whereas the pareuterally administered lecithin caused a lowering of the serum and urine Cl concn. and a diminution of the water and Cl elimination through the kidney, the feeding of excessive amts. of lecithin resulted in a rise of the serum and urinary Cl concn. and in an increased Cl and water excretion. In fact, compared to the cholesterol-fed animals, the rabbits fed lecithin show that Cl and H_2O are thrown off by the tissues by way of the kidneys. Irradiated ergosterol has the same effect on the P concn. of serum and urine as cholesterol has on the Cl; only irradiated ergosterol acts the same way whether administered by intravenous injection or by feeding. The same effect can also be produced by non-radiated ergosterol, although the raising of the serum Ca follows the intravenous injection only of the radiated ergosterol

S. Morgulis

Unanswered questions in the biochemistry and geochemistry of iodine. Roe E Remington. *J. Chem. Education* **7**, 2590 9(1930).—By using available literature as a basis for the discussion, it is shown that there is need for further investigation of the relation of goiter prevalence to iodine consumption Some of the problems still unsolved relate to the biol. aspect, such as those concerned with the chem. nature of the thyroid hormone and its function in metabolism, those concerned with the biol requirement of I in nutrition, and those concerned with a comparison of the utilization by the body of iodine from different sources, such as org. I compds., milk and vegetables rich in I, and iodized salt. Other problems relate to the investigation of goiter prevalence with respect to seasonal variation of foods, the content of I in the soil and rocks of certain communities, and the possibility of obtaining I from sea spray. Many surveys of goiter prevalence with respect to certain conditions are inaccurate because of lack of control of diet, soil fertilization and other factors. N. M. Naylor

Molecular weight of egg albumin. II. In the presence of electrolytes. J. B. Nichols. *J. Am. Chem. Soc.* **52**, 5176 87(1930), cf. Svedberg and Nichols, *C. A.* **21**, 746.—Crystd. electrodialyzed egg albumin has a sedimentation const. of 4.06×10^{-13} cm./sec. at 30° but the diffusion const. is abnormal, approx. 0.6 of the required value on the basis of the sedimentation const and mol. wt The mol. is spherical and has a radius of 2.17 m.; it is practically identical in size and mass with that of Bence-Jones protein, although entirely different in chem. compn. The depression of the sedimentation const. arising from the Donnan effect in unbuffered solns. on either side of the isoelec. pt. of egg albumin is reported; the max depression occurs in the neighborhood of p_H 3. At a p_H of 1.16 in 0.1 *N* HCl, egg albumin is completely denatured and gradually forms a gel showing a distribution curve of gel clumps; the mean size corresponds to about 7 mols. per particle after 3 hrs. C. J. West

The p_H-stability region of egg albumin. Bertil Sjögren and The Svedberg. *J. Am. Chem. Soc.* **52**, 5187–92(1930). —By use of the ultracentrifugal methods in the study of the p_H-stability region of egg albumin, it is shown that in the p_H range 4–9 the protein is stable and homogeneous with regard to mol wt.; the mean value 34,200 is in good agreement with the previous detn. of Svedberg and Nichols, 34,500. Below p_H 4 and above 9 some of the mols. are split up into a non-centrifugible substance. The sedimentation const. of the centrifugible material is independent of p_H within the range 3–11 with a mean value of 3.54×10^{-13} at 20° The mol. frictional const. is 2.47×10^{-16} at 20°, which value is identical with the mol. frictional const. calcd. for a spherical mol. of the same mol. mass and density. The egg albumin mol., therefore, is spherical and has a radius of 2.17 mμ. At p_H values lower than 3, the sedimentation increases, indicating the formation of aggregates of denatured protein; at p_H values higher than 9 the sedimentation decreases, indicating the breaking up of the whole material. Both the acid and the alk. decompn. are accompanied by an increase in the light absorption. A comparison of egg albumin and Bence-Jones protein using the new value of the sedimentation const. for egg albumin shows a still closer agreement than was formerly found for the mol. consts. of these proteins. C. J. West

Soy-bean lecithin. I. The separation of α- and β-series. Bunsuke Suzuki and Yoshikuni Yokoyama. *Proc. Imp. Acad.* (Japan) **6**, 341–4(1930).—In the hydrolysis of 70 g. of the $CdCl_2$ salt of lecithin there were obtained 18.5 g. Ba glycerophosphate (35% of the β-acid), 16.3 g. of choline chloroplatinate (6.4 g. choline), 10.8 g. crude satd. acids and 14 g. crude unsatd. acids. The satd. acid was palmitic acid; the unsatd. acids contain about 47% oleic acid. Theoretically 70 varieties of lecithin are possible.

contg. 4 fatty acids. It is now found that the α- and β-lecithins may be sepd. by the greater soly. of the β-forms in warm Me_2CO. In the hydrolysis of the 2 forms the following % yields of acids were obtained, the value being for the α- and β-forms, resp.: palmitic 24.3, 20.1; dibromostearic 32.4, 53.8; tetrabromostearic 42.2, 24.8; hexabromostearic 1.1, 1.4. C. J. WEST

Bios (SUZUKI, *et al.*) **16.** Clupein (FELIX, LANG) **10.** The splitting off of halogen by dilute alkali from stereoisomeric haloacylamino acids and their behavior toward erepsin and trypsin-kinase (ABDERHALDEN, SCHWEITZER) **10.** Comparative investigations on the cleavage of the CONH linkage in polypeptides and related compounds, in which the NH_2 or COOH group is variously substituted, by dilute alkali, erepsin and trypsin-kinase (ABDERHALDEN, RIESZ) **10.** Sterols (SANDQVIST, GORTON) **10.** The influence of volume and buffer value of a solution on the buffer value of another solution (RUSSO) **2.**

Bile acids. CHEM. FAB. VORM. SANDOZ. Ger. 506,278, April 25, 1926. See Brit. 260,025 (*C. A.* **22**, 1375).

B—METHODS AND APPARATUS

STANLEY R. BENEDICT

The iodometric determination of homogentisic acid in urine. ERNST METZ. *Z. physiol. Chem.* **193**, 46-8(1930).—A discussion of the modifications of M.'s method (*C. A.* **22**, 4557) proposed by Lieb and Lanyar (*C. A.* **23**, 2998). The change from 0.1 *N* to 0.05 *N* soln. is unimportant, while detn. of homogentisic acid at higher dilns. requires a longer reaction time. The addn. of KI is, however, an actual improvement, and the correction for water of crystn. of the homogentisic acid used is conceded. A. W. DOX

Estimation of uric acid in urine by means of the absorption spectrum. J. EISENBRAND *Arch. Pharm* **268**, 520-36(1930).—The expts. described show that the quant. evaluation of the absorption spectrum with respect to urine lies in the ultra-violet between 250 and 400 mμ, constituting in all the cases examd., a reliable method for estg. uric acid in urine. The method involving pptn. of the uric acid via Hopkins fails in many cases. The approved method is; Treat 2 to 5 cc. of the sample in a 100-cc. flask with 10 cc 0.1 *N* NaOH soln., fill to the mark and filter (soln. I). Fill a like amt. of the sample into a 2nd 100-cc. flask, add 10 cc. 0.1 *N* HCl and fill to the mark (soln. II), then exam. both solns. spectrographically in suitable layers (0.5 cm.). For morning and noon urines a diln. of 1:20 suffices; for evening urines a diln. of 1:50 suffices. The difference of light absorption of the 2 solns. at 303 mμ, recalcd. to 1 cm. of undild. urine, gives the concn. of uric acid in accordance with the formula: c in mg./100 cc. = $D \cdot 2.58$, in which D represents the difference in light absorption of 1 cc. undild. urine in 0.01 *N* alkali and 0.01 *N* acid. W. O. E.

The application of the colorimetric determination of phosphoric acid in germinating plants by the method of Neubauer. K. PFEILSTICKER. *Z. anal. Chem.* **82**, 276-84 (1930). A careful study of the various factors influencing the colorimetric method of Denigès showed that if the directions concerning the prepn. of the reagents and the exact procedure in making the analysis are followed scrupulously, results can be obtained agreeing within 0.5 mg. of P_2O_5 when the solns. to be analyzed are prepd. by the Neubauer method Slight variations in the procedure cause errors so the original paper should be consulted for the exact details. The method is very rapid. W. T. H.

The gasometric determination of cysteine and cystine. HARRY D. BAERNSTEIN. *J. Biol. Chem.* **89**, 125-31(1930).—The method depends upon the specific oxidation of cysteine to cystine by a soln. of I in KI in the presence of 2 *N* acid. The excess of I is detd. gasometrically by a hydrazine titration in the app. of Van Slyke and Neill. The method is simple, rapid and accurate to about 4%. In the procedure for cystine, it is reduced to cysteine by treatment with Devarda's alloy in the presence of HCl. Colored or turbid solns. may be used and the method may be employed in enzyme studies as a partially hydrolyzed protein can be used with equal success. A. P. L.

Gasometric determination of oxygen and carbon monoxide in blood. JULIUS SENDROY, JR. AND S. H. LIU. *J. Biol. Chem.* **89**, 133-52(1930).—An improved technic is described for the detn. of O_2 and CO in a single blood sample by the use of the Van Slyke-Neill manometric app. The mixt. of $O_2 + CO + N_2$ extd. from blood is removed to a micro-Hempel pipet, where the O_2 is absorbed. The extn. chamber is then washed free of blood and the gases are returned for the completion of the analysis. The procedure equals in accuracy the Van Slyke-Robscheit-Robbins method (*C. A.* **21**,

2144), is less laborious and can be completed in 25 to 30 min. It also obviates the use of the special Harington-Van Slyke extn. chamber. A. P. LOTHROP

The specificity of the diazo reaction for the detection of bilirubin. EMILIO BECCARI. *Boll. soc. ital. biol. sper.* **5**, 671–4(1930).—Bilirubin, indole, scatole, tryptophan, tyrosine, adrenaline, pyrrole, dimethylethylpyrrole, adenine, guanine, xanthine, hypoxanthine, dihydroxyphenylalanine, histidine, proline, hydroxyproline and allantoin solns. in an acid and alk. reaction were treated with Ehrlich's reagent (*p*-diazobenzinesulfonic acid). Of these, pyrrole, tyrosine, histidine, adrenaline and dihydroxyphenylalanine gave color reactions which were indistinguishable from that given by bilirubin in an alk. medium. The diazo reaction for detg. bilirubin in blood may be of practical value clinically, but it is not sufficiently accurate for exact detns.. For more exact results, the oxidative methods should be used. PETER MASUCCI

Goria's method for determining the globulin-protein ratio in spinal fluids. GAETANO G. NOTO. *Boll. soc. ital biol. sper.* 5, 770 3(1930).—The method (*Riv. neurol.* 2, 199 (1929)) while simple is sufficiently accurate to give a clear idea on the condition of the fluid in question and on the relative amts. of globulin and albumin present. The values obtained by this method, however, are only relative. A ratio of 0/8 is obtained only in those fluids which present no pathol. characteristics. PETER MASUCCI

Method for decolorizing preparations impregnated by Cajal's photographic method. A. FRANCESCON AND R. CAMPOS. *Boll. soc. ital. biol. sper.* **5**, 780 1(1930).—The sections are freed from paraffin, passed through alc. and placed in Lugol's soln. for a few min. until the complete disappearance of Ag. The sections are washed in distd. water, and passed through a 5% soln of $Na_2S_2O_3$ until the brown coloration disappears; they are then washed thoroughly in tap water, stained with hematoxylin or Mallory and mounted in Canada balsam. The method is very rapid, easily applied and gives excellent results. PETER MASUCCI

A new color reaction of adrenaline and adrenalone. MARCEL PAGET. *Bull. sci. pharmacol.* **37**, 537–8(1930). Adrenaline-HCl in soln. 5:1000 gives with a 10% soln of NH_4 molybdate a reddish brown or amber color, that changes to a greenish fluorescence after addn. of NaOH. Adrenalone gives a yellow-orange pptn. or if less concd., a yellow color, that does not change to green with NaOH. A. E. MEYER

Determination of phosphatide-phosphorus in small quantities of serum by the gravimetric strychnine molybdate method. KÄTE KOCH. *Biochem. Z.* **227**, 334 9 (1930).—Solns. of Na_2HPO_4 with 3.6 0.36 mg. P_2O_5 were analyzed by the following procedure: The neutralized soln. was dild. to 60 cc. and treated with 20 cc. of the reagent. The latter is prepd. fresh by mixing 3 vols. of soln. I with 7 vols. of soln. II. Soln. I consists of 1 part of a soln. of 50 g. NH_4 molybdate in 150 cc. H_2O and 3 parts of HNO_3 made by dilg. 2 vols. of HNO_3, sp. gr. 1.4, with 7 vols. H_2O. Soln. II is made by dissolving 15 g. strychnine in 1 l. H_2O. The pptn. is allowed to proceed for 30 40 min., filtered off through an asbestos Gooch crucible, washed with ice cold pptg. reagent dild. 1:5 and finally with ice cold water until the wash water no longer reacts acid. The ppt. is dried at 105°; the wt. multiplied by 39 = P_2O_5. The soln. is best neutralized to phenolphthalein with 2 drops of a 1:400 soln. Perfect recovery resulted in these analyses. For the phosphatide-P_2O_5 detn. 2 cc. serum was measured into a beaker contg. a mixt. of 2 g. anhyd. $CaSO_4$ and 0.2 g. $CaCO_3$, and about 10 min. later 15 cc. anhyd. ether is added and after another 10 min. MeOH is added slowly and with stirring until no further pptn. of protein occurs. The mixt. is allowed to stand for a few min., when it is filtered into a small Kjeldahl flask, the ppt. being washed with about 100 cc. of a 4:1 ether-MeOH mixt. The ether MeOH mixt. is evapd. and the residue is digested with 1–2 cc. H_2SO_4 and perhydrol. The clear soln. neutralized with NH_4OH is acidified with 2 drops NH_4NO_3 and treated with 10 cc. of the pptg. reagent, the pptd. P_2O_5 being detd. as already described above. The wt. of the phosphatide-P_2O_5 from 2 cc. serum ranges between 12 and 25 mg. S. MORGULIS

Color reactions of thiolglyoxalines (thioliminazoles) with sodium diazobenzene-*p*-sulfonate. GEO. HUNTER. *J. Chem. Soc.* 1930, 2343-6; cf. *C. A.* **22**, 1985.—The previously described test for ergothioneine is a general one for the thiolglyoxaline ring provided it contains a free thiol group in the 2-position and has at least 1 of the 4- and 5-positions open or contg. a displaceable CO_2H group. A free iminic H may also be necessary. The presence of a thiol group in the 2-position alters the reaction of the glyoxaline ring with diazo compds. in such a way that its presence in soln. can no longer be detected by the glyoxaline diazo tests. That the thiol H plays a part in this interference and is responsible for the course of the reaction in this test is made evident. C. J. WEST

C—BACTERIOLOGY

CHARLES B. MORREY

Studies on Bacillus thermofibrinocolus N. sp. III. Production of volatile acid and alcohol. ARAO ITANO AND SATIYO ARAKAWA. *J. Agr. Chem. Soc. Japan* **6**, 248–56; *Bull. Agr. Chem. Soc. Japan* **6**, 17–18(1930); cf. *C. A.* **24**, 5327.—More cellulose is fermented in a test tube than in a 300 cc. flask although more volatile acid and alc. are produced in the latter. At 65°, the organism ferments 60–88% of cellulose supplied at the beginning, in 3–7 days, and produces 24–33% volatile acid, as AcOH and 3–12% alc., as EtOH of the cellulose fermented. The opt. temp. for the organism is 65°, and at 50° it ferments only 63% as much cellulose as is fermented at 65°. But the amt of volatile acid and alc. produced is rather large at 50°, compared to that at 65°. This may be due to the fact that some of the products are lost at the higher temp. or are used up in metabolism. Less cellulose is fermented under anaerobic conditions than under aerobic. A similar amt. of volatile acid is produced in both cases, but more than double the amt. of alc. under anaerobic conditions. The opt. concn. of peptone is 0.5%. The quantity of volatile acid produced parallels the quantity of peptone. The organism seems to require org. N for the production of both volatile acid and alc. With $CaCO_3$ added to the medium 64% of cellulose is fermented on the third day, while only 32% is fermented without $CaCO_3$; on the seventh day, 88% is fermented in the former and 46% in the latter. The production of both the volatile acid and alc. is greatest on the third day. **IV. Nitrogen metabolism.** *Ibid J. Agr. Chem. Soc. Japan* **6**, 257–60, *Bull. Agr. Chem. Soc. Japan* **6**, 18–19(1930).—In the presence of cellulose the quantity of ammonia N produced is irregular while the amino N increased steadily. In case no cellulose is present, both ammonia and amino N decreased after certain days. Consequently in the presence of cellulose, the quantity of amino acid can serve as an approx. index of proteolysis, and it seems to indicate that the organism contains a proteolytic enzyme. This confirms the expt. obtained by De Bord. Y. KIHARA

Quantitative determination of bacteriophage. ALBERT P. KRUEGER. *Science* **72**, 507–8(1930); cf. *C. A.* **24**, 3810. W. D. LANGLEY

The molecular size of the type III specific polysaccharide of pneumococcus. FRANK H. BABLES AND WALTHER F. GOEBEL. *J. Biol. Chem.* **89**, 387–94(1930).—The diffusion coeff. of the specific polysaccharide of Type III pneumococcus has been detd. and from this const. the mol. wt has been calcd. to be 118,000, a value as great as that of most proteins. This carbohydrate is a relatively strong acid so that if it were highly ionized in soln., the detd. mol. wt. would be too low; on the other hand if the mol. is highly hydrated, the value would be too large. A. P. LOTHROP

Gluconic fermentation. I. Bacterium hoshigaki var. rosea nov. Spec. TEIZO TAKAHASHI AND TOSHINOBU ASAI. *Proc. Imp. Acad.* (Japan) **6**, 348–51(1930).—See *C. A.* **24**, 4318. C. J. WEST

Chemistry of the lipoids of tubercle bacilli (ANDERSON, ROBERTS) **10.**

D—BOTANY

THOMAS G. PHILLIPS

The action of certain fungi on aldose solutions. I. A. ANGELETTI AND C. F. CERETTI. *Ann. chim. applicata* **20**, 424–33(1930).—The actions of (1) *Penicillium luteum* Wehmer, (2) *P. purpurogenum* Stoll, and (3) *P. luteum-purpurogenum* on *d*-glucose, *d*-mannose and *d*-galactose have been studied. *d*-Glucose forms 15.5 and 1.21% of gluconic acid with (1) and (2), resp. whereas (3) gives over 60%. *d*-Mannose show traces of acid with (1) and (2), and 9.35% with (3). *d*-Galactose is not acted upon by any of the 3 enzymes. A. W. CONTIERI

The estimation of the quality of seeds by their enzyme content. MARIA I. LISCHEWITSCH *Fermentforschung* **12**, 244–61(1930).—The catalase, amylase and protase contents of barley and wheat grown in Russia vary with the latitude of the locality where the crop is harvested. The enzyme content is greater in northern than in southern latitudes, except that higher elevation above sea level tends to counteract the effect of southern latitude. The difference is due to differences in the length of the growing season which det. the state of maturity of the seed. With the shorter season prevailing in northern latitudes and high elevations the enzymes of the seed have less time for conversion into their zymogenic or inactive forms. Peas and soy beans, on the other hand, showed no such variations in enzyme content. Possibly this fact has some connection with the more uniform chem. compn. of these seeds. The lipase content

as also the acid no. of ricinus seed is much higher for northern latitudes. Hemp seed shows a similar variation, while poppy, sunflower and mustard seeds are quite uniform in their lipase content. A. W. DOX

Carbon dioxide storage of fruits, vegetables and flowers. NORWOOD C. THORNTON. *Ind. Eng. Chem.* **22**, 1186–9(1930).—Fruits and vegetables held in storage for 3–7 days withstood, without apparent injury, concns. of CO_2 varying from 6 to 83% depending upon the variety tested. The concn. of CO_2 tolerated by each fruit and vegetable was detd. at 6 storage temps. varying from 0° to 25°. The tolerance of CO_2 was influenced by the ripeness, firmness and freshness of the plant organ. In general, the presence of an excess of moisture in the storage chamber was undesirable. The CO_2 treatment prolonged the life of the flowers by retarding the opening of the buds. Rosebuds when removed to warm air after a storage period in 15% CO_2 for 7 days at 3.3–10° lasted as well as untreated roses which had been in cold storage without CO_2 for 3 days. This treatment gave a possible gain of 4 days. The concns. of CO_2 tolerated by various varieties of flowers and ferns at 10° varied from 10% in Jersey's Beauty dahlia to 80% in *Asparagus plumosus*. C. R. FELLERS

The relative amounts of iodine-absorbing (reducing) material in various plants. DAVID MARINE, EMIL J. BAUMANN AND BRUCE WEBSTER. *J. Biol. Chem.* **89**, 213–9(1930); cf. *Proc. Soc. Exp. Biol. & Med.* **27**, 1029(1930).—Previous studies indicate that certain plants contain antigoitrous substances other than I and the antigoitrous effect seems to be proportional to the amt. of I-absorbing material in the plant. Approx. 30 plants have been investigated as possible sources of this material. To prevent oxidizing enzymes from destroying these reducing substances, they were destroyed by steaming at 97–100° for 30 min. "The relative amt of I-absorbing material in plants is highly variable in different species and in the same species at different stages of its growth and maturation. The reducing substances are present in greatest concn in the rapidly growing portions of the plant and fall off gradually or abruptly during maturation. There is some evidence of annual variations dependent upon climatic conditions. Of the plants included in the survey, skunk-cabbage and iris leaves have given high values, while garden vegetables in general have shown low values. Clover alfalfa and certain grasses also contain high concns. during the period of rapid growth. The I-absorbing material decreases slowly with storage and rapidly during drying. The physiol. importance of these reducing substances is still unknown and nothing is known of their fate in the plant." A. P. LOTHROP

The influence of monochromatic light on the action of Saccharomyces cerevisiae in the presence of glucose. GUIDO GUERRINI. *Boll. soc. ital. biol. sper.* **5**, 635–6(1930).—The yeast was innoculated into 5% glucose soln and the cultures were incubated in the dark, normal light and in light filtered through red, yellow, green and blue screens. The CO_2 liberated was greater in cultures exposed to the light than in cultures incubated in the dark; the CO_2 liberated varied according to the filtered light as shown in the table below:

	Light filtered across shield			
Time	Red c. c.	Yellow c. c.	Green c. c.	Blue c. c.
1 hr.	5.8	4.6	4.0	2.3
2 hr.	21.6	10.1	7.5	4.1
3 hr.	37.5	22.2	17.0	8.5
4 hr.	54.2	36.8	29.2	13.3

PETER MASUCCI

Biochemistry and histochemistry of fruits and seeds. II. Ripening and aging effects. ANNELIESE NIETHAMMER. *Biochem. Z.* **227**, 462–71(1930); cf. *C. A.* **24**, 4076.—CaC_2O_4 ppts. are frequently found in unripe fruits and seeds which generally disappear with the progress of ripening, being obviously utilized in the metabolism. In some fruits of certain families the cells become filled with inclusions in the event of overripening. The AcH content increases as the fruit ripens. Dry fruits and seeds show increasing amts. of AcH up to the time of their greatest germinating capacity. S. MORGULIS

The dry sickness of lemon trees and its causes. GUIDO AJON. *Riv. ital. essenze prof.* **12**, 226–36, 253–62(1930).—In the lemons from sound plants there is a large amt. of peroxidase and catalase, and little oxidase. A large amt. of peroxidase is present in the fresh wood and roots. The dry sickness is caused by an excess of oxidase and scarcity of org. compds. The excess is due to the fertilizers, irrigation and stronger oxidation. The moisture and ash content and the analyses of the ash of sound and

diseased plant parts are given. The compn. of the soil influences the sanitary conditions of the plants, and the disease is caused by a disturbance in their nutrition.
R. SANSONE

Physicochemical studies on the nature of drought resistance in crop plants. R. NEWTON AND W. M. MARTIN. *Can. J. Research* **3**, 336–83, 385–427(1930).—Factors affecting drought resistance include those concerned in absorption, transpiration, and wilt endurance. The colloidal properties of leaf-tissue fluids are believed to be important in water retention under drought conditions. These and other physicochem. properties have been detd. in a no. of cereals, grasses and other plants, in relation to known drought adaptations. Methods for the study of colloidal properties have also been investigated. Hydrophilic colloids bind water and increase the concn. of aq. solns., as shown by f.-p. detns. Dextrose is less effective than sucrose in demonstrating this phenomenon. Concn., quality, and state of dispersion or coagulation of colloids are factors affecting the degree of water binding. The extn. of plant-tissue fluids and the estn. of dry substance by a modification of the refractometric method are described. The hydrolysis of sucrose added to plant juice in the bound-water detn. is shown experimentally not to introduce serious errors. Storage of leaf tissue or press juice for a few hrs. even at 0° leads to changes in colloidal properties, but errors from this source are avoided by prompt handling. Cylindrical dialyzer sacs of 100 cc. capacity were found to require about 48 hrs. for dialysis of plant juice at 3°, with the water changed every hr. A gradual partial coagulation of colloids took place during dialysis, as shown by a decrease in refractive index, by an increase in gold no., and by sedimentation when centrifuged. Hydration and dispersion were not always related, though both were affected by H-ion concn. and by salts. Acid and alk. salts stimulated hydration less because of the opposing "salt effect." In the presence of the natural crystalloids, hydration was usually greater than in dialyzed juice. The osmotic pressure of the tissue fluids of crop plants has been found to vary with physiol. scarcity of water, but is not a reliable index of drought resistance. Bound-water content has been found more dependable; the cultivated wheats and several grasses have been satisfactorily arranged on this basis in the order of their drought resistance. The contrasting behavior of 2 poplar species, with reference to leaf fall and frost resistance, has also been explained. The sepn. of the colloids by dialysis and the detn. of their gold no. have been used as aids in interpreting the bound-water values. The method of measuring imbibition pressure by direct pressure on masses of leaves proved unsuitable. The rates of water loss by evapn. from cactus segments and detached leaves of 2 grasses, under controlled humidity conditions, proved the remarkable ability of the cactus to retain moisture, but in the grasses showed no relation to drought resistance.
J. W. SHIPLEY

Specific polysaccharides from fungi. H. D. KESTEN, D. H. COOK, E. MOTT AND J. W. JORLING. *J. Exptl. Med.* **52**, 813–22(1930).—From *Monilia psilosis*, Ashford, a monilia from crosio, one from intertrigo, a member of the genus *Willia*, obtained from an erosio interdigitalis, a stock strain of *Saccharomyces cerevisiae* and a strain of *Trichophyton gypseum* isolated from a trichophytosis of the hand a fraction has been obtained which appears to be essentially a polysaccharide. Tested by direct pptn. against the corresponding antisera the polysaccharides from the yeast-like fungi exhibit only partial specificity. Cross-precipitin reactions are frequent. By absorption of precipitin on the intact mycotic bodies, however, a relatively high degree of sp. precipitability can be demonstrated for the polysaccharides.
C. J. WEST

Plant pigments (KARRER, SALOMON) **10.**

E—NUTRITION

PHILIP B. HAWK

Some factors involved in the experimental production of pellagra in rats. I. Preliminary. VIOLET RUBY LEADER. *Biochem. J.* **24**, 1172–80(1930).—On a synthetic diet contg. rice starch and cane sugar pellagra could be induced in 17–25 days if the rats were first "run out" of vitamin B and then given just enough marmite to prevent polyneuritis. In the absence of cane sugar from the diet pellagra did not appear, but all the rats developed polyneuritis. Rats suffering from polyneuritis developed pellagra after the marmite dose was raised sufficiently to protect them from polyneuritis.
BENJAMIN HARROW

The acid-base relation of the organism with special reference to the urine. IV. Experimental acidosis and alkalosis. Effect of different forms of diet on acid-base excretion in the urine. D. SATKE AND R. BARTOLOMEY. *Wiener Arch. inn. Med.* **20**,

223–30(1930); cf. *C. A.* **24**, 5821-2.—The no. of cc. 0.1 *N* NaOH needed to titrate 100 cc. urine to p_H 7.4 is called the acid excess. The no. of cc. 0.1 *N* NaOH needed to titrate the urine excreted in 24 hrs. is called the total acid excess. Repeated examns. of the urine were made with the individual on normal diets and on special diets. In trials lasting 3 days a diet rich in protein caused very slight alterations in p_H of the urine, acid excess and total acid excess in the directions of acidity. A diet rich in carbohydrate caused only slight changes in p_H values of the urine or none at all. The acid excess and total acid excess decreased in most cases. A diet rich in fat seemed to have no effect as regards the acidity of the urine excreted. **V. Daily variations.** *Ibid* 472–82.—The acidity of the urine shows considerable variation during 24 hrs. It is lowest during the night and from morning on rises to a max. in the early afternoon. Directly after the main meal there is often but not always a slight fall in acidity but 1/2–3 hrs. after the meal the p_H of the urine is almost always high, and then falls in the evening hrs. The alterations in acidity of the urine are due to, in part, the decreased excitability of the respiratory center during sleep, leading to an increase of alveolar CO_2 tension, and an increased acidity of the urine. The secretion by the stomach of the gastric juice is the cause of the decrease in acidity of the urine a certain time after meals. The variations during the day probably also follow a rhythmic course. In many pathol. conditions, such as fevers, decompensated cardiac conditions, stomach and kidney diseases, the daily variations in acidity are much less marked than in normal conditions. HARRIET F. HOLMES

Black-tongue-preventive value of Minot's liver extract. JOSEPH GOLDBERGER AND W. H. SEBRELL. *U. S. Pub. Health Repts.* **45**, 3064–70(1930).—It appears that Minot's liver ext., given to dogs on a basic black-tongue-producing diet, in a daily dose equiv. to 100 g. of fresh liver, has a very definite delaying effect on the occurrence of symptoms, and when fed to dogs in an attack of black tongue has a very definite curative effect. The most reasonable explanation for this action seems to be that the liver ext carries the antipellagric vitamin with it. In view of the evidence presented, it seems that Minot's liver ext. is a fairly good source of the antipellagric vitamin, and given in larger quantity would be of value as a temporary expedient in the treatment of pellagra. J. A. KENNEDY

Vitamin D. I. Action of ozone and ultra-violet light rays on cholesterol and oils. ETSUO TAKAMIYA. *Bull. Agr. Chem. Soc. Japan* **5**, 72(1929); cf. *C. A.* **25**, 123. Ozone activated ergosterol similarly to ultra-violet rays. **II. Rickets and ozone.** *Ibid* 72–3.—Rats maintained upon the McCollum diet No. 3143, and thus made rachitic, were cured of their rickets by ozonized air without treatment with vitamin D or ultra violet rays. The relationship ergosterol + ozone = vitamin D is thus established. W. D. LANGLEY

The relation between alkali deficit and glucose tolerance in the dog. HARRY J. DEUEL, JR. AND MARGARET GULICK. *J. Biol. Chem.* **89**, 93–5(1930).—The rate of the removal of glucose from the blood in a well-fed dog having a decreased alk. reserve has been compared with that of the same animal under a similar dietary régime but having a normal alk. reserve. The alkali deficit was produced by the administration of NH_4Cl. It was found that a compensated acidosis is not in itself a factor which prevents ready removal of glucose from the blood. This removal proceeds in a perfectly satisfactory manner if sufficient carbohydrate has been fed 14 to 18 hrs. before the glucose test is given. A. P. LOTHROP

Arginine metabolism. I. The relation of the arginine content of the diet to the increments in tissue arginine during growth. C. WESLER SCULL AND WM. C. ROSE. *J. Biol. Chem.* **89**, 109–23(1930).—"Comparative studies have been made of the increase in tissue arginine incidental to growth and the arginine intake of rats upon an arginine-low diet. The results show that under the conditions employed, the increments in tissue arginine are 2 to 3 times as large as may be accounted for by the arginine ingestion. Evidently arginine may be synthesized by the organism of the rat and in this species is not an essential component of the diet." A. P. LOTHROP

Soft pork studies. IV. The influence of a ration low in fat upon the composition of the body fat of hogs. N. R. ELLIS AND J. H. ZELLER. *J. Biol. Chem.* **89**, 185–97 (1930); cf. *C. A.* **20**, 3027.—Hogs raised on a ration low in fat (0.5%) synthesized and stored fat at a normal rate and the lack of dietary fat did not appear to exert material influence on the degree of fatness. Even in young pigs hard satd. fat was formed and there was a gradual increase in satn. up to a wt. of approx. 100 lb. above which the body fat was extremely hard. Oleic, palmitic and stearic acids were the acids mainly present but small quantities of linolic, myristic and arachidonic acids were also found. The max. amt. of linolic acid was found in the suckling pig and there was a steady de-

crease up to a weight of 170 lb., this change appearing to account for the observed increase in satn. of the fat accompanying increase in wt. A. P. LOTHROP

The stability of vitamin G as measured by its growth-stimulating effect. N. B. GUERRANT AND W. D. SALMON. *J. Biol. Chem.* **89**, 199–211(1930).—The effect of heat, p_H, oxidation, reduction, deamination and ultra-violet irradiation upon the growth-promoting activity of vitamin G in yeast or yeast ext. has been investigated. Autoclaving yeast or exts. at 20 lb. and heating dry yeast at 120° for 4 hrs. caused some loss of their growth-stimulating effect. The passing of O_2 or H_2S through a hot concd. ext. for 4 hrs. had little or no effect. The decreasing effect of partial deamination seemed to depend upon side reactions rather than upon deamination of the free NH_2 groups. Irradiation of exts. concd. to a thick sirup, at a distance of 20 cm. from a Hg arc, caused some decrease in the growth-promoting effect. The destruction was greater in alk than in acid soln., the result apparently being the combined effect of the scpg. action of alkali and irradiation. A. P. LOTHROP

The effect of crude fiber on calcium and phosphorus retention. MARGARET A. BLOOM. *J. Biol. Chem.* **89**, 221–33(1930).—A high retention of Ca and P was observed on the control diet contg. spinach ash and no added crude fiber and on the same diet after crude fiber in the form of ashless filter paper had been added in an amt. equal to that in spinach rations and in amts. many times as great. A smaller retention occurred on the spinach ration, an effect not due to any unsuitableness in the ash, nor to cellulose as such, but to some other characteristic of the spinach Ca and P, such as their state of combination, lowering their availability. The effect of raw and cooked spinach was approx. the same. Bibliography of 23 references. A. P. LOTHROP

The antimony trichloride color reaction for vitamin A. III. The effect of concentration of reagent used, and the stability of the chromogenic substance to light. EARL R. NORRIS AND ANNA E. CHURCH. *J. Biol. Chem.* **89**, 421–35(1930); cf. *C. A.* **24**, 1409. At low color values the variation of the observed color with concn. of $SbCl_3$ is slight but even with color values of 5 to 8 units as suggested by Drummond, *et al* the variation of color with slight variations in concn of reagent is large. It is impossible to make comparisons with solns. of 30–35% $SbCl_3$ giving colors of 12–15 units. With high concns. of oil the color at 30 sec. with diffused light reflected from a dull white surface is different from that observed with direct illumination of higher intensity. The chromogenic substance of cod-liver oil or vitamin A is rapidly destroyed by light of wave length less than 500 $m\mu$ but is practically unaffected by longer wave lengths. The rate of destruction by light is accelerated by the presence of O_2. A. P. L.

The calcium content of striated muscle of rachitic animals. VICTOR G. HAURY. *J. Biol. Chem.* **89**, 467–9(1930).—The av. Ca content for the striated muscles of all the rachitic rats was found to be 41.6 mg. per 100 g. of dry muscle as compared with 74.6 mg. (56% higher) in the muscle of normal rats. The rachitic rats were fed a low-P high-Ca diet for 63 days and the normal rats received the same diet plus 1% NaH_2PO_4 and 1% Na_2HPO_4. A. P. LOTHROP

The behavior of the testicles and ovaries in beriberi pigeons on a diet of polished rice and pumpkin seeds. GIUSEPPE SANFILIPPO. *Boll. soc. ital. biol. sper.* **5**, 765–8 (1930). PETER MASUCCI

The alimentary specific dynamic action of the liver. VIRGILIO CHINI. *Biochim. terap. sper.* **17**, 365–71(1930).—The dynamic action of liver is different from that of meat. Generally, it is neg. where the meat has a pos. effect and *vice versa*. Beef liver has no effect. A. E. MEYER

The influence of irradiated ergosterol and of water-soluble vitamins on the development of the larva of Bufo vulgaris. PIETRO COCCHERI. *Biochim. terap. sper.* **17**, 372–8 (1930). The growth and metamorphosis of larva of *Bufo vulgaris* were inhibited by large doses of irradiated ergosterol. The addn. of H_2O-sol. vitamins restored the development. A. E. MEYER

Sugar metabolism in obesity. PEDRO B. LANDABURE. *Semana méd.* (Buenos Aires) **1930**, II, 1479–81.—In consideration of the frequency of diabetes in obese persons, L. recommends a glucose tolerance test. There is no direct relation between the degree of obesity and the hyperglucemia. A. E. MEYER

Studies on the destruction of β-hydroxybutyric acid in the organism in connection with the carbohydrate metabolism. FRITZ ROSENTHAL. *Biochem. Z.* **227**, 472–81 (1930). —Expts. were carried out on mice which were kept on a uniform diet and fasted 24–48 hrs. before the expt. Three hrs. after they received an intraperitoneal injection of β-hydroxybutyric acid they were quickly killed, frozen solid in a mixt. of ether and CO_2 snow, finely powdered and extd. with 100 cc. of very cold 66% alc. for 24 hrs. The residue was again extd. 1 hr. with 30–50 cc. 66% alc. per mouse, this process being re-

peated. The alc. exts. were evapd. and, after reëxtn. with water and appropriate treatment, were used for the detn. of carbohydrates and lactic acid. The alc.-extd. residue were extd. with H_2O, and this was used for the detn of glycogen. The β-hydroxybutyric acid were detd. in an aq. suspension of the finely powd. mouse substance which was deproteinized with tungstic acid (Folin-Wu procedure) and freed of carbohydrate with $CuSO_4$-$Ca(OH)_2$ as usual. Mice tolerate even 40 mg. of Na β-hydroxybutyrate, such a dose disappearing at the end of an hr. With an av. glycogen content of 70–80 mg. % the disappearance of the β-hydroxybutyric acid proceeds without any effect on either glycogen or carbohydrate content, but the destruction of the β hydroxybutyric acid goes on even under a condition of extreme carbohydrate depletion of the organism. Large doses of the acid, far in excess of the acetone content of the comatous organism, cause a diminution of the glycogen. This is considered a toxic phenomenon. No evidence was obtained of a gluconeogenesis from the fatty acid. S. MORGULIS

Studies on vitamin A and D. VIII. The relation between the chromogens of fish-liver oils to cholesterol, ergosterol and to the A and D vitamins. WM. KERPPOLA. *Skand. Arch. Physiol.* **60**, 311–9(1930). —Cholesterol purified with charcoal gives at first a neg. reaction with $SbCl_3$ and concd H_2SO_4 followed later by a red coloration, the same results being obtained with the cholesterol-digitonin compd. Through preliminary radiation of the cholesterol with ultra-violet a rose color is produced, changing to violet and blue and finally disappearing. When the cholesterol crystals obtained by treating the ether ext. of the unsapond. residue from cod-liver oil with cold MeOH are filtered in CO_2 or N_2 with exclusion of light or in red light, they give entirely different color reactions, and with $SbCl_3$ a strong blue which quickly changes to violet and rose. But if the crystals from MeOH are exposed to air and light they give the cholesterol reaction with $SbCl_3$. A no. of other expts. are recorded, all of which tend to show that the cholesterol fraction of the unsapond. portion of the cod-liver oil, recrystd. from MeOH in the absence of light or air, yields color reactions entirely unlike those obtained with ordinary cholesterol. Preliminary oxidation or illumination changes the reaction to that of ordinary cholesterol. The chromogenic substance is adsorbed by animal charcoal from which it can be removed by boiling with AcH. The chromogen is not pptd. by digitonin and crystallizes only in combination with cholesterol. The crystals contg. the chromogen dissolved in neutral fat, soap or liquid petrolatum can be kept unchanged in a cool dark place. Fed in this condition to rats whose basic diet is free from vitamin A the wt. of the animals rapidly increases and xerophthalmia can be cured provided the condition is not too far advanced. Furthermore the tissues regain their typical blue reaction with $SbCl_3$ which in the vitamin-A-free rats has faded out or has been completely lost. The blue color with $SbCl_3$ produced by the crystals seems to be proportional to their vitamin A potency, and the vitamin activity is lost when, through heating to over 70° or exposure to air and light, the original color reaction has been altered. The vitamin A potency remains even after the pptn. of the cholesterol with digitonin, which leads to the conclusion of the identity of the chromogenic substance and vitamin A. The fact that this color reaction can be obtained with the liver of rats fed on vegetable matter which does not give this reaction indicates that the organism can synthesize vitamin A from some provitamin substances, of which carotene is a representative. Although the nature of the vitamin A cannot yet be definitely detd., its soly., crystn. with cholesterol and specific color reaction with $SbCl_3$ all indicate that it is an easily oxidizable sterol probably related to or easily convertible to ergosterol, so that both vitamin A and D may be different forms of the same original substance. Evidence is given to support the contention that the vitamin A is related to ergosterol. S. MORGULIS

Preliminary study of the antirachitic properties of shrimp oil. F. P. BROOKS, ROY F. ABERNETHY AND F. C. VILBRANDT. *J. Am. Chem. Soc.* **52**, 4940–3(1930).—From the analysis of the blood and the bones of rats, it is found that shrimp oil has properties akin to cod-liver oil in that it tended to cure rachitic rats. In the first series the oil was as potent as the cod-liver oil; in a second series there was some cure, the decreasing effect probably being due to the increasing rancidity of the oil. C. J. WEST

Antirachitic action of cod-liver oil and irradiated ergosterol in parathyroidectomized and thymectomized rats. ALWIN M. PAPPENHEIMER AND CHARLES L. BUXTON. *J. Exptl. Med.* **52**, 805–12(1930). - Cod-liver oil and viosterol in therapeutic doses are antirachitic in the absence of the parathyroid gland, or of the thymus, or of both. C. J. WEST

Vitamins and tumor growth. IV. The vitamin B consumption by growing rat tumor. WARO NAKAHARA AND EIICHI SOMEKAWA. *Proc. Imp. Acad.* (Japan) **6**, 345–7(1930); cf. *C. A.* **24**, 3815.—The rate of the depletion of the reserve vitamin B

in rats under vitamin B deficient feeding is not significantly influenced by the development in such rats of very rapidly growing tumors. If growing tumors actively consumed vitamin B in the body of the host, it seemed that tumor-bearing rats should have markedly less vitamin B reserve than non-tumor-bearing ones. That such is not the case leads to the conclusion that the vitamin B requirement of growing tumors must be so small as to be negligible. C. J. WEST

G—PATHOLOGY

H. GIDEON WELLS

Further experience with a simple serum reaction for the diagnosis of pregnancy. E. MANOILOV. *Arch. Gynäkol.* **142**, 474-6(1930).—A method for the diagnosis of pregnancy by means of diuretin and Nile blue was described in *C. A* **24**, 4315. Up to date 2238 different sera have given pos. results of 94%. The reaction is a qual. one and can also be applied to the sera of animals (cows). HARRIET F. HOLMES

Studies on the carcinoma problem. VI. The behavior of the hydrogen-ion concentration. H. GUTHMANN AND P. WIRZ. *Arch. Gynakol.* **142**, 530-46(1930).—In cases of beginning carcinoma the p_H of the blood serum is shifted toward the acid side as compared with the p_H value of the blood serum of normal individuals. As the carcinoma progresses there is a shifting of the p_H toward the alk. side. It is probable that this shifting towards the alk. side is due to a compensated or over-compensated acidosis. In carcinoma cases therapeutic doses of x-rays after 6 hrs. cause a shifting of the p_H of the blood serum to the acid side and after 24 hrs. a shifting to the alk. side. Ultra-violet irradiation of women with mild chronic adnexitis caused an alkalosis without a preceding acidosis. It is probable that the shifting of the p_H to the acid side after x ray irradiation is due to a primary reaction of the x-rays on the deep-seated tissues and on the blood directly and that the alkalosis is secondary. After ultra-violet irradiation the alkalosis seems primary and arises in the skin. The alkalosis occurs at the same time with the onset of erythema and with changes in the K and Ca contents. HARRIET F. HOLMES

Mottled enamel in a segregated population. GROVER A. KEMPF AND FREDERICK S. MCKAY. *U. S. Pub. Health Rept.* **45**, 2923-40(1930).—No definite conclusions can be deduced at the present time other than that this enamel dystrophy occurs in certain areas in the U. S., and the etiological factors seem to be definitely assocd. with the *water supply* of these areas. Exposure of a child, during permanent enamel growth, to the environmental factors in an endemic area appears almost certain to result in the development of mottled enamel. There is included in this paper an extensive bibliography. J. A. KENNEDY

The mechanism of phlorhizin diabetes. II. The relationship between the nutritional state and the glucose tolerance. HARRY J. DEUEL, JR. *J. Biol. Chem.* **89**, 77-91(1930); cf. *C. A.* **21**, 3393.—"When a standard glucose meal was administered to fasting phlorhizinized dogs, the glucose tolerance curves obtained were distinctly of the diabetic type. When the same amt. of this sugar was given to the identical animals about 14 hrs. after the administration of a large dose of carbohydrate, the glucose tolerance was much increased as indicated by an early return of the blood sugar to the postprandial level and by the much smaller rise obtained above the initial level. The same qual. variations in response were noted in the same animals without phlorhizin when fasted as compared with that obtained 14 hrs after heavy carbohydrate feeding. These results are offered as addnl. proof that the action of phlorhizin is primarily renal in character and that no intrinsic impairment in the ability to oxidize carbohydrate exists under such conditions." A. P. LOTHROP

The nature of the sugar in four cases of pentosuria. A correction. ISIDOR GREENWALD. *J. Biol. Chem.* **89**, 501(1930); cf. *C. A.* **24**, 5857.—In designating the pentose G. did not observe the current practice. The xyloketose of the urine, as indicated by the rotation of its osazone, is derived from what is now known as *l*-xylose which has the configuration:

$$\begin{array}{l} CH_2OH \\ CO \\ HCOH \\ HOCH \\ CH_2OH \end{array}$$

A. P. LOTHROP

The resistance of red blood corpuscles to the hemolytic action of lysocithin in experimental scurvy. VIRGILIO GRONCHI. *Boll. soc. ital. biol. sper.* **5**, 637-8(1930).—During the early stages of the disease, the red blood corpuscles of the exptl. animals and of the normal controls showed no difference in their behavior toward hemolytic agents.

When the symptoms were most pronounced, the resistance of the red blood corpuscles was increased toward lysocithin but remained unaltered toward saponin. In the premortal stage there was a marked decrease in resistance to lysocithin. P. M.

The contents of certain mineral constituents in the blood during spinal shock. A. M. Di Giorgio. *Boll. soc. ital. biol. sper.* **5**, 798–800(1930).—In the period immediately following the transverse sectioning of the spinal medulla when the phenomena of shock are most pronounced, the Ca in the serum drops definitely below the normal; the inorg. P. does not vary appreciably, but the ratio Ca/P becomes markedly smaller. Peter Masucci

Serum lipase in the study of pancreatic lesions. Guido Melli and Angelo Lorenzi. *Minerva med.* **1930**, II, 361–70.—The detn. of pancreatic lipase in serum is useful in the diagnosis of pancreatic disturbances. The identification of the pancreatic lipase is based on its resistance to atoxyl and its lability toward quinine. Method: 1 cc. of serum is placed in each of 2 test tubes; to one is added $^1/_2$ cc. of 0.2% atoxyl soln.; to the other $^1/_2$ cc. of 0.2% quinine bisulfate soln. After $^1/_2$ hr. $^1/_2$ cc. distd. H_2O and 23.5 cc. tributyrin are added to the first tube. The soln. is placed in a stalagmometer and the no. of drops counted. Simultaneously, into the other tube is added $^1/_2$ cc. of 0.2% atoxyl and after $^1/_2$ hr. 23.5 cc. tributyrin and the no. of drops detd. as before. At the end of one hr. and $1^1/_2$ hrs. the no. of drops is detd. again. A pos. result is one in which the diminution of drops in the atoxyl tube is greater than that of the atoxyl + quinine tube.

Examples:

Material	Drops at first	Drops after 1 hr.	Difference	Diminution due to pancreatic lipase
(1)				
serum alone	136	88	48	
serum + atoxyl	136	128	8	
serum + atoxyl + quinine	136	128	8	0
(2)				
serum alone	140	93	47	
serum + atoxyl	140	135	5	
serum + atoxyl + quinine	140	140	0	5

In the above tests, no. 1 is neg. and no. 2 is positive. The test is specific and sensitive; a serum showing a diminution of 2–3 drops may be considered as pathological. Peter Masucci

Changes in azotemia and chloremia after surgical operations of the abdomen. M. Mairano. *Minerva med.* **1930**, II, 370–5.—The NaCl and non-protein N contents in the blood of 24 patients were detd. before and after abdominal operations. There was a diminution of the NaCl and an increase in non-protein N. These changes were slight in appendicitis and other simple operations but marked in the more serious ones (gastric ulcers, tumors, etc.). The resulting hypochloremia and hyperazotemia were not influenced by the anesthetic used. Peter Masucci

The serum proteins in dogs with experimental hyper- and hypo-thyroidism. Schmorl M. Ling and Hsi-Chun Chiang. *Chinese J. Physiol.* **4**, 375–9(1930).—The serum proteins of 3 dogs were studied during thyroid feeding and after thyroidectomy. No significant change in any protein fraction was observed. L. A. M.

Observations on human tetany. II. Postoperative tetany. Harold A. Salversen. *Acta Med. Scand.* **74**, 13–30(1930).—Five cases of tetany following thyroidectomy have been studied, of which 4 have been alive 3–4$^1/_2$ years after the operation. The symptoms of tetany were checked by means of oral administration of $CaCl_2$. In one type of case the serum Ca could be maintained at nearly the normal level by feeding $CaCl_2$ but tetany would occur at the usual crit. level of 7 mg. % as soon as the Ca medication was stopped. In an other type of case the organism adopts itself to a lower Ca level (even as low as 5 mg. %), so that no tetany occurs under ordinary circumstances but cataract may develop. The sugar tolerance, in one patient, was lower with a low Ca than with a high Ca level. Also, ultra-violet radiation caused a rise in serum Ca although the oral consumption was actually reduced. No difference was observed between the Ca of plasma or serum. S. Morgulis

Indicanemia and hyperindicanemia. S. Livierato and A. Simoneto. *Acta Med. Scand.* **74**, 59–84(1930).—The normal indican content of blood is 0.16 to 0.64 mg. % and this is unaffected by the use of narcotics or of purgatives. Increased indicanemia

was observed in cases of intestinal occlusion, in cases of liver insufficiency, in cases of extensive protein catabolism, and in kidney trouble, especially of the org. type.
S. MORGULIS

Tissue reaction and buffering in local anemias. N. OKUNEV. *Biochem. Z.* **227**, 319-25(1930).—Tying off of an artery produces not only local anemia but also marked acidosis of the affected region. This leads to the conclusion that the local acidosis due to skin implantation or adrenaline injection is likewise of a manifestation anemia. The local acidosis has been ascribed to the accumulation of CO_2 or to increased lactic acid production by anaerobic glucolysis due to lack of O_2. Possibly the latter fact explains the increased buffer value of the anemic tissue. Either restoration of the circulation or necrosis of the affected area is equally sufficient to correct the acidotic condition.
S. MORGULIS

Studies in cancer chemotherapy. VIII. The reaction of the fluid of rat sarcoma 10. L. C. MAXWELL AND FRITZ BISCHOFF. *J. Pharmacol.* **40**, 1-5(1930).—The acidity increases with the age of the tumor. Lactic acid content is high. The combined CO_2 is lower and the CO_2 tension higher than that of the blood.
C. RIEGEL

Potassium tellurite and its agglutination reactions. M. PERGOLA. *Boll. sez. ital. soc. int. michrob.* **1**, 177-93(1929); **2**, 35(1930).—Gosto has shown that K tellurite is reduced to metallic Te by microörganisms, on which the element is deposited, coloring them black and killing them. K tellurite can serve for agglutination reactions. The brown color of the agglomerated bacteria makes it easier to count them, and increases the sensitivity of the reaction. The method can be used for a diagnosis of typhoid in the first week. The agglutination is thus revealed from the first day of the illness.
R. SANSONE

Chemical and immunological properties of a species-specific carbohydrate of pneumococci. WM. S. TILLETT, WALTHER F. GOEBEL AND OSWALD T. AVERY. *J. Exptl. Med.* **52**, 895-900(1930).—Pneumococci contain a non-protein constituent which, on the basis of its chem. and immunological properties, appears to be a carbohydrate distinct from the type-sp-carbohydrate and common to the species. The product is amorphous, sol. in H_2O and insol. in org. solvents. Its immunological specificity was not impaired by the prolonged action of pepsin at p_H 2.0 nor by trypsin at p_H 8.1. A soln. (1:300) gave no Millon's test, no biuret test, no xanthoproteic reaction and no Hopkins Cole test; it gives no ppt. with Cl_3CCO_2H, tungstic acid, picric acid or sulfosalicylic acid. It is slowly hydrolyzed by HNO_2, with a corresponding loss in immunological activity and the appearance of reducing sugars.
C. J. WEST

Tuberculosis. I. Reaction of the connective tissues of the normal rabbit to lipoids from the tubercle bacillus, strain H-37. FLORENCE R. SABIN, CHARLES A. DOAN AND CLAUDE E. FORKNER. *J. Exptl. Med.* **52**, Suppl. 3, 3-72(1930).—The lipoid fractions from the tubercle bacillus contain maturation factors for monocytes, epithelioid cells and epithelioid giant cells. The most important component of the lipoids for biol. investigation is the phosphatide A-3, since this produces the most massive reaction toward epithelioid cells and epithelioid giant cells and also because it is the only partition of the lipoids which acts as an antigen. The stimulus to the formation of tubercles resides in certain fatty acids of high mol. wt. found in tubercle bacilli. These fatty acids are present in the 4 major partitions of the lipoids and this accounts in each instance for their sp. activity. The most potent fatty acid in the production of tubercles is that derived from the phosphatide. The purified, optically active phthioic acid obtained from the glyceride fraction, in small dosage, produces epithelioid cells but more non-sp. connective tissue; the optically inactive tuberculostearic acid is relatively inert. The sp. tuberculous tissues resulting from the intraperitoneal injection of the phosphatide from the tubercle bacillus undergo resorption. Beside the sp. reaction of the lipoids, these also produce a marked growth of non-sp. connective tissue cells, without, however, any reaction toward fibrous tissue in the acute stages. All the subfractions from the lipoids are irritating when injected into the peritoneal cavity, calling leucocytes into the tissues and stimulating clasmatocytic activity. The unsaponifiable substance from the purified wax is particularly active in producing an extreme general reaction of connective tissue cells. **II. Reaction of the connective tissues of the normal rabbit to a water-soluble protein and a polysaccharide from the tubercle bacillus, strain H-37; spontaneous pseudo-tuberculosis aspergillina as a complication in fraction testing.** C. A. DOAN, F. R. SABIN AND C. E. FORKNER. *Ibid* 73-87.—The water-sol. protein from the tubercle bacillus, when not denatured, is toxic to normal rabbits, inducing fever and hemorrhage when introduced intravenously but is not lethal except in massive doses. By the intraperitoneal route it is less toxic but calls forth a local response of leucocytes and phagocytes without any striking

proliferation of new connective tissue. A damage to endothelium is indicated by hemorrhage, chiefly in the bone marrow. Tuberculous guinea pigs succumb rapidly to protein 304 when given intraperitoneally. The polysaccharide is non-toxic when introduced intravenously in the normal animal; introduced intraperitoneally, on the other hand, it is irritative and each succeeding dose continues to elicit a fresh emigration of leucocytes from the vessels. Guinea pigs with extensive tuberculosis may die soon after subcutaneous or intraperitoneal injections of the polysaccharide. C. J. W.

I—ZOÖLOGY

R. A. GORTNER

Is the effect of thyroid and thyroxine upon the metabolic rate specific for vertebrates? WM. A. HIESTAND. *Proc. Soc. Exptl. Biol. Med.* **28**, 64–5(1930).—The CO_2 output of the wasp, *Polistes pallipes*, and of the roach, *Periplaneta australasiae*, was detd. before and after the feeding of Armour's desiccated thyroid and of Squibb's thyroxine crystals in a honey mixt. The results with desiccated thyroid in most cases were not significant. Thyroxine definitely increased the CO_2 output of the wasp, in 1 instance the rate was increased 650% for the 1st hr after feeding with a return to normal at the end of the 3rd hr. With roaches the results were less striking. Desiccated thyroid and thyroxine will increase the basal metabolism of organisms other than those having thyroid glands. The feeding of Lugol's soln. produced no marked change in the rate. C. V. BAILEY

Growth-promoting power for planarian worms of eosinophilic and basophilic cell groups in anterior pituitary. ROSALIND WULZEN AND ALICE M. BAHRS. *Proc. Soc. Exptl. Biol. Med.* **28**, 84–5(1930).—Newly regenerated planarian worms, *Planaria agilis*, were used. Diff. groups of 30 worms each were given 8 biweekly feedings of fresh rabbit liver, the outer light-colored portion of fresh beef anterior pituitary and the reddish inner core of the beef gland The liver-fed worms increased in length 83.5%; the 2nd group fed the outer acidophilic portion of anterior pituitary increased 55.5% and those fed the inner basophilic portion increased 10.6%. C. V BAILEY

The effect of temperature on the carbohydrate tolerance in Xenopus laevis (South African clawed toad). LOUIS P. BOSMAN AND HARRY SWARENSTEIN. *Quart. J. Exptl. Physiol.* **20**, 231–43(1930).—The normal blood sugar level in *Xenopus laevis* is about 44 mg. %. Injection of glucose causes a rise and return to normal in the blood sugar level, the rate depending directly on the temp. The extent of the increase at 20° is much greater than that at 10° which in turn is slightly less than that at 5°. The renal threshold of *Xenopus* approximates that of man. RACHEL BROWN

Cholesterol in earthworms. A DEWAELE. *Bull. sci. acad. roy. Belg.* [5], **16**, 592–7(1930).—In order to remove all org. material from the intestines of the earthworms, they were kept for 4 days in repeated changes of wet sand which had been heated previously to destroy org. matter The worms were then ground with sand and extd. with Et_2O. Cholesterol, m. 147.9°, Ac deriv. m. 114.3°, was isolated from the ext. The lower m. p. (142.3°) given for cholesterol by Dorée (*C. A.* **3**, 1187) was probably due to some phytosterol present in the intestinal contents of the animals used. Cholesterol is the only sterol in earthworms and is present in the fresh tissues to the extent of 0.0922%. LOUISE KELLEY

The limitations and significance of biological methylation processes. F. A. HOPPE-SEYLER. *Z. Biol.* **90**, 433–66(1930).—Trimethylamine oxide occurs regularly in the blood and urine of selachians. The concn. in the blood is considerable. Neither trimethylamine nor its oxide occurs in the muscle of fresh water teleosts, contrary to the findings in sea teleosts. The retention of metabolic products in these salt water forms is entirely impossible in fish of the same class living in fresh water. FRANCES KRASNOW

The absorption of fats and lipoids in the plaice. B. DAWES. *J. Marine Biol. Assoc. United Kingdom* **17**, 75–102(1930).—There is an increase in the fat content of the superficial epithelium of the fish stomach 30–50 hrs. after gastric digestion. There is a transference of the fat absorption from the stomach to the post-pyloric intestine when the frequency of feeding is increased C. M. McCAY

Growth and maintenance in the plaice. B. DAWES. *J. Marine Biol. Assoc. United Kingdom* **17**, 103–74(1930).—Two yr. old plaice were held in confinement and fed fresh mussels. The maintenance requirement of a 40 g. fish is about 2% of its body wt. of fresh *Mytilus edulis*. This maintenance requirement per unit of body wt. decreases as the fish grows. The efficiency of food conversion varies widely even in the same individual. C. M. McCAY

Spirographis hemin. OTTO WARBURG, ERWIN NEGELEIN AND ERWIN HAAS. *Biochem. Z.* **227**, 171–83(1930).—Blood was obtained from the worms *Spirographis*, each worm yielding about 0.1 cc. This was dild. 1:5 with H_2O and poured drop by drop with const. stirring into acidified Me_2CO (1 l. Me_2CO + 10 cc. *N* HCl), 100 cc. being used for each cc. of the blood soln. The globin-HCl seps. out as a white powder which is filtered off. The Me_2CO exts. contg. the hemin are evapd. under diminished pressure when the impure hemin crystalizes out, 6 cc. of the blood yielding 360 mg. globin-HCl and 12 mg. crude hemin. To purify this 60 mg. was shaken with acetone which removed 25% of the wt. The material was then mixed with 2 cc. pyridine, and after addn. of 5 cc. $CHCl_3$ heated on a water bath and filtered hot. The residue was washed with $CHCl_3$ + pyridine until the washings were no longer colored. These exts. were combined, condensed under diminished pressure and taken up with 20 cc. hot, NaCl-satd. AcH. The soln. was then filtered hot and left overnight in a cool place when the hemin crystals were formed; the total yield was 15 mg. The analyses correspond to the empirical formula $C_{32}H_{32}N_4O_3FeCl$. The *Spirographis* hemin contains 2 acid groups whose dissocn. const. is greater than 10^{-7} [mole/l.]; it conbines with only ½ as much H_2 as does ordinary hemin under the influence of Pd-H_2; a mole of it combines with 0.93 mole CO, and the CO combination has a max. light absorption at 410$\mu\mu$ unlike the CO-chlorocruorin which has a max. absorption at 440$\mu\mu$ The *Spirographis* hemin gives a similar hemochromogen reaction as does Fischer's phaeoporphyrin a_5 (575–590$\mu\mu$), and the hemochromogen is unstable. This may possibly necessitate a revision of the last point. S. MORGULIS

Oxygen consumption in the developmental stages of a cladoceran. VASIL OBRESHKOVE. *Physiol. Zoöl.* **3**, 271–82(1930).—Using the same technic as in an earlier study (*C. A.* **24**, 3059) O. detd. the rate of O_2 consumption of females of *Simocephalus exspinosus* at various stages in their development. The expts. were carried out at 25°. The rate of O_2 consumption in cc. × 10^{-7} per individual per min. was for the first instar young 5.6, third-instar young 34.7, first-brood mothers 121.6, third-brood mothers 166.2, fifth-brood mothers 202.8. O. then calcd. the size of the animals from their length, basing his calcns. on the assumption that the vols. of 2 similar but irregular bodies vary as the cube of their length. If the O_2 consumption of the first-instar young be represented by 100%, then the values calcd. for the other stages, size considered, are: third-instar young 96.4, first-brood mothers 52.1, third-brood mothers 50.8, and fifth-brood mothers 41.8%. Because of the parallelism between O_2 consumption and metabolic processes it is concluded from these results that senescence is progressive in the species examd. and that it is primarily a decrease in the rate of the dynamic processes of the individuals. G. SCHWOCH

The soluble proteins of the muscle tissue of the haddock. J. F. LOGAN. *Contributions Can. Biol. Fisheries* [N. S.], **6**, Nos. 1–6, 1–11(1930).—The sol. N extd. from haddock muscle by NaCl, neutral phosphate (KH_2PO_4:K_2HPO_4 = 1:2), and by water was detd. The results, after allowance was made for extractives, etc., appear to show the presence of both a water-sol. and a salt-sol. protein, which are pptd. slowly in the cold, and rapidly at 70°, at p_H 6 and 5, resp., and can be sepd. by this means. K. V. THIMANN

The role of chemical stimulation in the spawning reactions of Ostrea virginica and Ostrea gigas. PAUL S. GALTSOFF. *Proc. Natl. Acad. Sci.* **16**, 555–9(1930).—Rhythmic movement of the adductor muscle of the oyster, assocd. with spawning, can be induced by the addn. of a min. amt. of 0.01 mg. of male gonad tissue per l. water, and is independent of the concn. of added sperm above this amt. The latent period preceding the response is probably due to the necessity of ingesting the sperm. This is supported by the fact that the thermolabile substance in sperm, active in promoting spawning, does not pass into soln. The addn. of egg suspension induces sperm production by the male immediately, since the active (thermostable) substance in egg suspension is readily sol. in sea water. Males are also stimulated by the presence of sperm, and by rise in temp. to 27°. Spawning does not occur below 20° in *O. virginica* or 25° in *O. gigas*. K. V. THIMANN

12—FOODS

F. C. BLANCK AND H. A. LEPPER

The chemical composition of authentic samples of whole wheat flours and modified whole wheat flours. L. H. BAILEY AND S. C. ROWE. *J. Assoc. Official Agr. Chem.* **13**, 503–7(1930).—With a view to obtaining data which might be of value in differentiating

between the flour obtained by simply grinding the wheat berry, with nothing added and nothing taken away, and those flours in which the bran content is modified, 6 samples of hard red spring, durum, hard red winter, white and 2 soft winter wheats were carefully milled in the lab.; the following 3 divisions of each sample were then prepd. making a total of 18 samples for analysis: (*a*) the ground wheat berry, (*b*) the ground wheat berry sifted to effect a 10% by wt. bran removal, (*c*) the ground wheat berry plus bran to the extent of 10% of the wt. of the wheat. H_2O, protein, lipoids, sugars, starch, ash, CaO, MgO, crude fiber and pentosans were detd., and the following ratios were calcd.: CaO to MgO, starch to lipoids, starch to crude fiber, starch to ash, starch to pentosans and pentosans to ash. The data, which are tabulated, show that the crude fiber results indicate more definitely the removal or addn. of bran than do any of the other detns.; the pentosan detn. is next in this respect. The ratios of starch to crude fiber, starch to ash, and starch to pentosans are also valuable for distinguishing between the different classes of so-called whole wheat flours. The data given, while of value, should be extended by analyzing more samples, including a wider range of bran contents. A. PAPINEAU-COUTURE

The action of plant lecithin on the swelling and surface tension of glutin and the starches of flour. I. The investigation of agglutinants in cooking. W. ZIEGELMAYER. *Kolloid-Z.* **53,** 224–31(1930).—Swelling and viscosity measurements were made on noodles to which increasing amts of eggs were added. The agglutination effect of the eggs is due to their lecithin content. Lecithin prevents the syneresis of dough. In the absence of lecithin, swelling continues till sol formation occurs. The action of lecithin is due to its surface effect. ARTHUR FLEISCHER

The cause of beet odor and taste in milk and butter. P. POST. *Pharm. Weekblad* **67,** 1309–13(1930).—The offensive odor and taste of milk and butter, prevalent in the months of Oct. and Nov. in the best growing districts of Holland where the beet tops are used for cattle feed, are due to Me_3N derived obviously from the betaine present in the feed. It should be feasible to remove this Me_3N from the butter by washing with very dil. acid. A. W. DOX

The fat of ass milk. OTAKAR LAXA. *Ann. fals.* **23,** 474–5(1930).—The fat is a thick yellow liquid, solidifying at 2.5–3° and m. 12°, having sapon. no. 230.5, Reichert-Meissl no. 9.3, Wauters-Polenske no. 11.2, I no. 66.5, n_{40} 50 (presumably expressed in butyro-refractometer degrees). The compn. of the fat is: caprylic acid 2.57, caprinic acid 4.08, lauric acid 8.22, myristic acid 2.74, oleic acid 74.32, glycerol 8.07%. It is similar to mare milk, but contains less satd. acids and more caprinic and oleic acids; it contains neither butyric nor capronic acids, which are characteristic of the fats of ruminants. A. PAPINEAU-COUTURE

Report on (the analysis of) cacao products. J. O. CLARKE. *J. Assoc. Official Agr. Chem.* **13,** 481–2(1930).—The present tentative A. O. A. C. method for the *detn. of crude fiber* is satisfactory for material such as cocoa or bitter liquor where the factor for converting to the fat- and H_2O-free basis is comparatively small. With sweet chocolate and milk chocolate, the factor for calcg. the results to the H_2O-, sugar- and fat-free basis is about 10, and the factor is modified to a considerable extent by the errors in the detn. of fat and sucrose. The collaborative results reported in 1926 (Bailey, *C. A.* **21,** 285–6) were recalcd. to the fat-, H_2O- and sugar-free basis: the actual crude fiber detns. varied from 0.23 to 0.72%, and the recalcd. values from 5.11 to 15.82%; by use of the av. crude fiber actually detd. (0.49%) and the av. fat-free cacao mass (7.26%), an error of 1% either way in sucrose and in fat (H_2O, which in this case was unimportant being neglected,) might give 9.32 or 5.29% crude fiber on the H_2O-, fat- and sugar-free basis. This shows the extreme inaccuracy of the present tentative method with such materials. The method, consisting in detg. crude fiber on a weighed portion of the dried residue from extn. with H_2O, Et_2O and alc., gives much more concordant results. On the assumption that the H_2O-alc.-sol. matter of cacao is fairly const. (preliminary expts. indicate that it is in the neighborhood of 30%), the relatively arbitrary figures thus obtained can be converted to the usual basis; and even if the factor is somewhat variable, the method still yields more concordant results than the present tentative method. Cf. following abstr. A. PAPINEAU-COUTURE

Report on (the determination of) crude fiber in cacao products. MARIE L. OFFUTT. *J. Assoc. Official Agr. Chem.* **13,** 482–5(1930); cf. *C. A.* **24,** 440.—The H_2O-alc.-sol. material (*F*) of the dry Et_2O-extd. residue from 9 samples of cacao was 28.23–30.37%, av. 29.7%. Variation in the temp. of the H_2O used for extg. from 12° to 30° had no decided effect on the results, and room temp. can conveniently be used. The method for the detn. of crude fiber proposed in previous reports, is described in detail with certain modifications. The figures found for crude fiber (*D*) is converted to the for-

mal standard one (E) by the formula $E = D - (D \times F)$. Data are given showing the much closer agreement of results obtained by the proposed method than by the present tentative A. O. A. C. method. The value given above for F applies only to bitter and sweet chocolates, as a different method must be used for milk chocolates. The F for milk chocolate could be detd. in the same way as reported above for bitter and sweet chocolates; or the F already found might be used with some factor detd. for the amt. of milk not washed out in the prepn. of the residue. Work is being carried out along this line. A. PAPINEAU-COUTURE

"Tsing Mei," sirup-preserved plums, colored with basic copper acetate. JOHN E. S. HAN AND T. Y. CHAO. *Natl. Central Univ. Sci. Repts., Ser. A, Phys. Sci.* 1, 23–6 (1930).—Tsing Mei, a widely popular Chinese confectionery, contains an av. of 0.008% Cu. Whether this is harmful or dietetically beneficial is an open question. Calves' liver, in comparison, contains 0.0044% Cu. K. H. ENGEL

Preservation of raspberry juice with hydrofluoric acid. R. COHN. *Z. Untersuch. Lebensm.* 59, 422–8(1930); cf. *C. A.* 24, 4873.—The use of HF in the preservation of raspberry juice is defended. **Reply.** A. HANAK. *Ibid* 429–30. C. R. FELLERS

Toxicological aspect of the preservation of raspberry juice with hydrofluoric acid. P. DEUSSEN. *Z. Untersuch. Lebensm.* 59, 421–2(1930); cf. preceding abstr.—Hanak's statement (*C. A.* 24, 4873) that small quantities (0.006–0.009 g.) of HF are injurious to human health is questioned. The whole question is reviewed and the conclusion reached that addnl research is necessary definitely to settle the point. C. R. F.

Utilization of natural tomato pectin in catsup making. J. D. WILDMAN. *Canner* 72, 11–2(Dec. 20, 1930); cf. *C. A.* 24, 5890.—Tomato pulp made by the hot cook process, *i. e.*, cooked before cycloning, has a firmer consistency and gives a more satisfactory blotter test, than cold, crushed, cycloned tomatoes. By eliminating the skin and seeds, W. found a hot-process pulp was produced which had a desirable consistency and blotter test, indicating that the gummy substances and pectins in the seeds and skins are of little significance in catsup manuf. Pectic enzymes rapidly transform pectin into other substances when tomatoes are cold-crushed and pulped; this injurious effect does not occur when the hot-cycloning process is used. Six analyses show losses of 68–96% of the pectic acid content of tomatoes as a result of crushing in the cold as compared with pulping after a heat treatment. A full explanation of the behavior of tomato pectins must await further investigation. C. R. FELLERS

Report on spices and other condiments. (Methods for the analysis of salad dressings.) KENNETH C. BEESON. *J. Assoc. Official Agr. Chem.* 13, 480 (1930); cf. Andrew, *C. A.* 20, 78.—A comparative study of 3 different methods for the *detn. of lecithin* P_2O_5 in salad dressings showed that, regardless of what method of extn. is used, the detd. value for egg yolk and the calcd. value (obtained by detg. lecithin P_2O_5 in the eggs used) check very closely if the method of detg. the lecithin P_2O_5 in the salad dressing is the same as that used for the egg yolk. The tentative A. O. A. C. method for the *detn. of reducing sugars* is not entirely satisfactory because of the impossibility of breaking up the oil emulsion in some cases simply by extg. the sample with petr. ether, and the following method is proposed: to 20 g. of sample in a wide-mouth 4-oz. bottle add 10 cc. 95% alc. and 2 cc. concd. NH_4OH, heat to boiling on a steam bath, cool, ext. the oil with 80-cc. portions of petr. ether till the ext. is colorless (4 are usually sufficient), shaking, centrifuging and decanting each time, remove the petr. ether from the residue with a current of air, transfer the residue with H_2O to a 100-cc. volumetric flask, neutralize with HCl, add 5–10 cc. of a fresh soln. of metaphosphoric acid, and then proceed as in the present tentative A. O. A. C. method. The method will be studied collaboratively. A. PAPINEAU-COUTURE

The nutritive values of some typical Indian hays. F. J. WARTH. *Mem. Dept. Agr. India, Chem. Ser.* 11, 73–84(1930).—Data on the chem. compn. and digestibility of 30 typical Indian hays ranging in protein content between 1.96 and 18.16% are given. Graphic representation of the data showed that the digestibility of all the ingredients of a hay is related to its protein content, which fact can be utilized for estg. roughly the nutritive value of any hay of which the chem. compn. is known. It was found that the digestibility of the carbohydrates is at times seriously depressed through unknown causes. K. D. JACOB

The nutritive value of gram husk. F. J. WARTH AND LAL C. SIKKA. *Mem. Dept. Agr. India, Chem. Ser.* 11, 85–99(1930).—A comparative feeding expt. showed that, in the type of ration used, gram husk affects the ration much in the same way as wheat bran, both substances improving the consistency and palatability of the ration and both bringing about approx. parallel increases in food consumption and live wt. Di-

gestion expts. showed that gram husk possesses a distinctly lower starch equiv. than wheat bran and provides no digestible protein whatever. K. D. JACOB

Apples for livestock. W. J. SPAFFORD. *J. Dept. Agr. So. Australia* **34**, 122–3 (1930).—Chem. analyses of Australian apples are given together with their percentage digestibility. Feeding expts. show apples compare favorably with hay chaff and bran as feed for dairy cows. M. S. ANDERSON

The origin, composition and digestibility of bastard-saffron cakes and their food value for milk cattle. F. HONCAMP, C. EICHLER, W. HELMS AND E. REINMUTH. *Tierernähr.* **1**, No. 1, 3–29(1929).—Saffron cakes, frequently seen in commerce under the name of "Indian sunflower cakes," are the residue of the saffron fruit and are rich in the oils of the plant. Their compn. as obtained upon analysis of 3 samples of the dry substance is: protein 21.77–52.00, albumin 20.84–48.27, amides 0.93–3.73, non-N extractives 20.79–29.18, fat (ether extd.) 6.43–10.27, crude fiber 8.09–35.26, ash 7.36–8.78%. The compn. of the ash is: P_2O_5 0.96–2.43, CaO 0.64–0.87, MgO 0.03–0.05, K_2O 0.62–1.59, Na_2O 0.34–0.49, Cl 0.03–0.27, SO_3 0.18–0.26, insol. matter, 2.07–3.52%. The digestive coeff. for protein and fat of saffron cake is very high. With regard to its content of digestible albumin it is somewhat like the albumin-rich oil residue, though its starch content is less. Compared with peanut cakes, sunflower-seed cakes and soy bean meal, the use of saffron cakes is indicated for the production of milk in cattle. RUSSELL C. ERB

Transmission spectra of vanilla extracts (HARVEY) **17.** CO_2 storage of fruits, vegetables and flowers (THORNTON) **11D.** Apparatus for distillation of carbonaceous materials such as garbage (U. S. pat. 1,785,565) **21.**

Device for determining the water content of food, fuel, etc. JAKOB PRITZKER and ROBERT JUNGKUNZ. Ger. 504,940, Sept. 7, 1928.

Wheat-germ food. K. P. WANKLYN and F. STACEY. Brit. 332,847, Oct. 31, 1929. The wheat germ is maintained at a temp. of about 57° for 8 hrs. in a closed vessel under a vacuum of 20–27 in. Hg to remove moisture without damage to vitamins, etc., and may then be ground, granulated or flaked. An inert gas such as N or N peroxide may replace the air in the heating chamber.

Forming food products such as scrapple. CHARLES H. VOGT. U. S. 1,786,372, Dec. 23. Scrapple mixt. while hot is introduced into an imperforate molding receptacle, from which it is subsequently removed by a gaseous medium under pressure such as air applied between the molded scrapple and the wall of the receptacle.

Drying and damping device for grain, etc. EIJIRO SHIMIZU. Ger. 505,734, Aug. 14, 1929.

Bread. AUGMENTINE HOLDING S. A. Ger. 507,398, April 22, 1927. See U. S. 1,750,720 (*C. A.* **24**, 2512).

Cooling baked bread by latent heat of evaporation of atomized water. J. B. HILLARY, F. B. CORNWELL and BRAMIGK & CO., LTD. Brit. 333,572, May 8, 1929. App. and various details of procedure are described.

Baking powder. C. H. BOEHRINGER SOHN. Ger. 507,399, Dec. 2, 1926. The acid ingredient of baking powder consists of cryst. tartaric acid, of a granule size between 0.1 and 0.5 mm., which has been coated with paraffin or other protective substance, *e. g.*, by treatment in a rotary drum with the melted substance.

Granular calcium phosphate suitable for use in baking powder. HOWARD ADLER and GUY A. MCDONALD (to Victor Chemical Works). U. S. 1,785,473, Dec. 16. A mono-Ca phosphate contg. less than 0.5% Fe phosphate and 0.6–2.0% MgO may be prepd. by reacting on lime with H_3PO_4 in the presence of a small proportion of MgO.

Apparatus for sterilizing milk or similar liquids in bottles. A. GRAHAM-ENOCK and GRAHAM-ENOCK MFG. CO., LTD. Brit. 332,912, March 26, 1929. Structural features.

Apparatus for sterilizing milk or similar materials in bottles. A. GRAHAM-ENOCK and GRAHAM-ENOCK MFG. CO., LTD. Brit. 332,949–50, March 26, 1929. Structural features.

Butter. E. G. N. SALENIUS and E. S. SALENIUS. Brit. 333,233, May 7, 1929. Cream or whole milk is subjected to vacuum such that boiling takes place and the low-temp. ebullition works the cream into butter. App. is described.

Butter coloring. KARL J. MONRAD (to Chr. Hansen's Laboratory, Inc.). U. S. 1,786,256, Dec. 23. An oil-sol. green coloring substance is used to neutralize the red component of an orange coloring matter and thus lighten the color of an orange-colored butter.

Preserving eggs. DELASKA E. SEAWARD. U. S. 1,785,461, Dec. 16. Eggs are wrapped in a material such as paper which has been treated with an aq. $AgNO_3$ soln.

Sugar cane for blending with or coloring coffee. ALBERT E. KIENZLE. Ger. 504,913, Nov. 16, 1923. Addn. to 448,712.

Drying apparatus for coffee, etc. HENRI J. S. W. HOLMAN. Ger. 505,604, Aug. 22, 1928.

13—GENERAL INDUSTRIAL CHEMISTRY

HARLAN S. MINER

Grasselli medal award to Per K. Frolich. *Ind. Eng. Chem.* **23,** 111(1931). **Pressure as a tool in the chemical industry of the future.** PER K. FROLICH. *Ibid* 111–15. E. C. K.

Model experiments in chemical engineering. R. EDGEWORTH-JOHNSTONE. *Ind. Chemist* **6,** 482-4(1930). E. H.

Ultra-violet radiation in industry. M. J. DORCAS. *Ind. Eng. Chem.* **22,** 1244–6 (1930).—C arc lamps have been developed to make the industrial use of ultra-violet rays possible. The cost of operating the industrial lamp is about 20 cents per hr. M. C. ROGERS

Industrial uses of ultra-violet. E. E. FREE AND C. C. CLARK. *Elec. World* **96,** 873-4(1930).—A review covering the degree of success attained with different applications and the problems that need solution before progress is resumed. C. G. F.

A new way of testing materials. FRIEDRICH SCHUBERT. *Kautschuk* **6,** 207–10 (1930).—The method was developed to meet the daily needs of a practical test which would not have the disadvantages of the usual breaking test, which is usually of significance only in conjunction with other tests and which requires test pieces that cannot be obtained from many products. The *app.* is illustrated and the *technic* described in detail. The test, which is purely phys., involves mech. penetration of the tightly drawn sheet to be tested. C. C. DAVIS

Large-scale experiments with a regenerative chamber built for studying purposes. II. Determination of heat transference numbers and pressure losses in double obstructed and unobstructed grate packing. HANS KISTNER. *Arch. Eisenhüttenw.* **3,** 751–68(1930).—The heat transfer and pressure losses in a regenerator, built similarly to a Siemens-Martin air chamber, with the grating (5 × 2 × 2 m.) made of fireclay bricks (300 × 150 × 80 mm.) arranged in double obstructed (I) and unobstructed (II) grate packing, are investigated. It is shown that for II with $d = 0.0945$ m., $\alpha_k = 16.4\,w_0^{0.5}$ kcal./m.²hr.°C. (where α_k = heat transfer due to convection, w_0 = normal velocity (m./sec.) in the heating period during operation). Good agreement with expt. is obtained by calcg. with Schack's formula the heat transfer due to radiation through CO_2 and the steam in the waste gases. An approximation method (graphical-math.) is developed which can be used for any gas, the formula being: $\alpha_{TR} = (\alpha_{(CO_2+H_2O)} + \alpha_{corr.})\cdot m\cdot n$ kcal./m.²hr.°C. (where α_{TR} = total heat transfer due to radiation). From $\alpha = \alpha_k + \alpha_{TR}$, α may be detd. for II for any temp., velocity and gas and for any channel cross section. For I with a channel breadth of $d = 0.0945$ the total heat transfer is about 16% greater than that of II. The pressure lost by friction is proportional to the sq. of the normal velocity and inversely proportional to $\sqrt[4]{d}$. J. BALOZIAN

Regulating organic reaction under high pressure. P. H. GROGGINS AND R. HELLBACH. *Chem. Met. Eng.* **37,** 693-4(1930).—An automatic, highly-heated oil bath, with immersed autoclaves, is described. E. M. SYMMES

Intensities of odors and irritating effects of warning agents for inflammable and poisonous gases. S. H. KATZ AND E. J. TALBERT. Bur. Mines, *Tech. Paper* **480,** 37 pp (1930).—An odorimeter is described with which concns. of 10% vapor down to 1 part in 10^{13} parts of air could be obtained. Intensities of odors, of nasal irritations and of eye irritations produced by 55 substances at various concns. in air are presented. Trinitro-*tert*-butylxylene was most powerful as an odor at the lowest concns., being observed at 0.000051 part per million. Chloroacetophenone was the most powerful nasal and eye irritant, 0.021 and 0.0083 parts per million, resp., being required. ALDEN H. EMERY

Reduces cable ionization by super-vacuum process. S. J. ROSCH AND H. G. BURD. *Power* **72,** 1132-6(1930).—Occluded gases and H_2O are removed from cable insulating materials at a pressure of 1 mm. D. B. DILL

Dichlorodifluoromethane overrated as a refrigerant. JOHN E. STARR. *Power* **72**, 972(1930).—This substance is non-toxic but is not superior to CO_2. D. B. DILL

Waterproof impregnated braiding of electric conductors. E. KINDSCHER. *Gummi-Ztg.* **45**, 333–6(1930).—A mixt. of linseed oil and minium is the most commonly used material for waterproofing the cotton braid of elec. conductors, but though it is known that it owes its virtue to the formation of an impermeable film, the nature of this formation is not well understood (cf. Laufenberg, *C. A.* **24**, 1231). Accordingly expts. were carried out to learn more about the reaction and the nature of the products. This was of special interest because in preliminary expts. it was found that the formation of org. Pb compds. varied in an obscure manner. In the beginning a mixt. of "non-thickening" minium and linseed oil was let stand (with daily agitation) for about 7 weeks at room temp., and the product was analyzed. This analysis was effected by decanting the product, filtering the decanted oil, combining the latter with the residue from the decantation (after this residue had been extd. with acetone) and chilling or dilg. the combined oily product, which pptd. a mixt. of Pb and fatty acids. The residue from the extn. of the original residue with acetone, extd. with a mixt. of C_6H_6 and EtOH and then extd. again with acetone, left a solid brown residue consisting of org. Pb compds. The latter contained 46.1% Pb and 53.5% fatty acids, and when hydrolyzed with HCl in Et_2O the fatty acids contained 5.1% oxy acids insol. in petr. ether and 90.3% unsatd. acids. The quant. data show that, with 2100 g. of minium and 1500 g. of linseed oil, 119 g. of Pb reacted to form org. Pb compds. This is far higher than could be accounted for by the free fatty acids originally present in the oil, and since the acids recovered from the Pb salts had a relatively low content of oxy acids, the minium reacted with the glycerides of fatty acids in the linseed oil. Similar expts. with other mixts. of minium and linseed oil, some of the type of mixts. used for protective coatings, and in which a highly dispersed minium was used, showed that instead of being more reactive, the highly dispersed minium was less reactive than the "non-thickening" minium. Further tests with different types of minium (including a non thickening type contg. 82.3% Pb_3O_4, a com. type contg. 90.5% Pb_3O_4 and a highly dispersed type contg. 99.7% Pb_3O_4) proved that the reactivity with linseed oil depended not upon the Pb_3O_4 content, but upon the PbO content of the minium, the higher this PbO content the more reactive the minium. Thus with the 3 types mentioned parenthetically above, and by starting with 500 g. of linseed oil and 700 g. of minium, 36.88, 20.54 and 1.99 g. of Pb had formed org. Pb compds. from the oil after several months. In similar tests with 3 types of minium, all of the same particle size but contg. 28.9, 31.7 and 33.1% Pb_3O_4, resp., 82.7, 27.5 and 18.5 g., resp., of Pb reacted with the linseed oil after 9 weeks (1000 g. of minium and 800 g. of oil) (cf. Laufenberg, *loc. cit.*). Tests with thin films of mixts. of minium and linseed oil, such as employed in practice, showed the same relation between PbO content and reactivity. C. C. DAVIS

Recovery of volatile material from gas or vapor mixtures. CHEMINOVA GES. ZUR VERWERTUNG CHEMISCHE VERFAHREN M. B. H. Ger. 498,731, Apr. 28, 1927. The materials are recovered by using absorptives in an oil layer, *e. g.*, crude cresol and alc. in transformer oil.

Heating liquids with hot gases. WILHELM SCHWARZENAUER. Ger. 507,066, June 30, 1922. Efficient exchange of heat is brought about by using the liquid and the gases to operate a hydraulic compressor or mammoth pump. App. is shown.

Evaporating liquids. METALLGES. A.-G. Ger. 507,065, Mar. 24, 1926. The evapn. of liquids in a plant comprises an evaporator and a separator for solids arranged in advance of the evaporator and heated to a higher temp. The improvement consists in passing only a part of the liquid back from the evaporator to the separator from time to time. A no. of evaporators may be connected to a common separator. The evapn. of salt solns. which deposit $CaSO_4$ is referred to.

Distilling liquids. I. G. FARBENIND. A.-G. Fr. 686,368, Dec. 10, 1929. Liquids are distd. in a continuous manner by causing them to flow over interiorly heated tubes to which directing surfaces are fixed so that a fractionation of the liquid takes place during distn.

Distillation of foam-forming liquids, especially tars. ADOLF SPILKER. Ger. 506,545, Feb. 27, 1925. The distn. is carried out in an app. in which the liquid is led over a vertical series of plates against a current of vapor.

Dehydrating vegetable matter. I. G. FARBENIND. A.-G. (Hans Enderlein and Otto Ambros, inventors). Ger. 504,891, Aug. 9, 1929. The vegetable material is mechanically reduced to fibers before drying.

Catalytic reactions. I. G. FARBENIND. A.-G. Fr. 686,280, Dec. 7, 1929. Endo-

thermic catalytic reactions are carried out by heating the reaction vessels exclusively or principally with radiant heat. The walls of the reaction chamber are made of materials having a high heat-emitting power.

Cleaning liquid mercury. BURT L. NEWKIRK (to General Elec. Co.). U. S. 1,786,312, Dec. 23. For sepg. minute particles such as metal and oxide from liquid Hg the liquid material is passed through a filter bed consisting of material such as steel balls, gravel or wire screen which is not wet by the liquid and serves to divide it and provide a large surface area of material. App. is described.

Apparatus for liquefying gases by the expansion method. AUTOGEN-GASACCUMULATOR KRÖKL & HANSMANN G. M. B. H. Ger. 505,900, Jan. 19, 1927.

Liquefaction and rectification system for separating gases. SOC. L'AIR LIQUIDE (Soc. anon. pour l'étude et l'exploitation des procédés G. Claude). Brit. 333,127, Dec. 18, 1928. Various details of app. and operation are described.

Rectification system for separating oxygen and nitrogen from liquid air. ADOLF MESSER. U. S. 1,785,491, Dec. 16. Various details of app. and procedure are described.

Double-column apparatus for separating atmospheric oxygen and nitrogen. MESSER & CO. G. M. B. H. Ger. 505,676, Feb. 19, 1926. Details of the apparatus.

System for delivering gas under desired pressure from a supply of liquid gas. CHRISTIAN W. P. HEYLANDT. U. S. 1,786,159, Dec. 23. Various details of app. and operation are described.

Removing dust, etc., from air and gases. PNEUMATIC CONVEYANCE & EXTRACTION (1929), LTD. Ger. 505,889, Aug. 19, 1926. Details of the app.

Emulsions. BERTHOLD REDLICH. Ger. 502,237, Jan. 5, 1927. Addn. to 495,934 (*C. A.* **24**, 3580). Aq. emulsions of high concn. are prepd. by intimately mixing a powd. inorg. gel. of high adsorptive capacity, (*e. g.*, Al_2O_3, Fe_2O_3) except SiO_2, with insufficient of the liquid or soln. to be emulsified to exhaust its capacity, and stirring into water. Examples are given.

Aqueous emulsions of cresols, hydrocarbons, dyes, oils, fats, resins, etc. I. G. FARBENIND. A.-G. Brit. 333,587, March 15, 1929. As an emulsifying agent there are used residues obtained by the distn. of MeOH synthesized by the catalytic hydrogenation of C oxides (such as so-called "isobutyl oil," b. 150–280°) together with an alkyl naphthalenesulfonic acid or a salt or the product of combined sulfonation of palm oil and PhOH. *Insecticides* and compns. for other purposes may be thus prepd.

Insulating and construction materials. ERNST RUDIN and HEINRICH KOLLBRUNNER Fr. 686,469, Dec. 12, 1929. Insulating and construction materials are made by completely filling the pores of fibrous materials with pitch of low m. p., heating in a current of gas or air for a long time at a temp. below 150° so that the pitch of low m. p. is converted into a pitch of high m. p.

Insulating material such as copper wire. HENRY A. GARDNER. U. S. 1,786,340, Dec. 23. A moisture-proof elec. resistive wrapping comprises a sheet of cellulosic material such as regenerated cellulose carrying on each side an adhering layer contg. a cellulose ester such as cellulose acetate and a plasticizing resin such as one of the toluenesulfonamide-aldehyde series.

Insulating electric cables. I. G. FARBENIND. A.-G. Brit. 332,891, Jan. 24, 1929. Cables are coated with the rubber-like polymerization products of butadiene and vulcanization is effected at 100–150°; other ingredients are used such as MgO or lampblack and S, and the material may be mixed with natural rubber, anti-agers, accelerators, artificial resins, etc.

Coating electric cables. FELTEN & GUILLEAUME CARLSWERK A.-G. Brit. 332,880, March 16, 1929. In a high-tension submarine cable insulated with oil-impregnated paper, the protecting sheathing is formed of rubber which has been rendered impermeable to water, and a layer of oil-impermeable material is applied over the paper insulation. Various details of manuf. are described.

Impregnating paper-cable insulation. G. F. KENNEDY (to Hercules Powder Co.). Brit. 333,196, March 5, 1929. Paper taping is impregnated with a compn. contg. substantially pure and substantially unoxidized abietic acid (in any of its stereoisomeric forms) which may be mixed with 5–50% of a hydrocarbon oil.

Electric insulation. W. S. SMITH, H. J. GARNETT and J. N. DEAN. Brit. 333,290, May 10, 1929. Materials such as rubber, gutta-percha or balata are treated with urea or thiourea or their derivs., with or without a proteolytic enzyme such as pepsin or trypsin to convert proteins into water-sol. compds. which are removed by washing to improve the elec. properties of the material. The treatment of latex and of solid rubber is described. Cf. *C. A.* **24**, 2816.

Heat insulators. S. A. I. G. (SOC. ANON. INVENZIONI GUADAGNIN). Fr. 686,226,

Dec. 6, 1929. A heat insulator is made by mixing Na_2SiO_3 or K_2SiO_3, asbestos, cork, $MgCO_3$, refractory earth and hemp with the necessary amt. of water to form a paste for molding.

14—WATER, SEWAGE AND SANITATION

EDWARD BARTOW

Solubility of lead in the municipal water of Leipzig. STICH. *Pharm. Ztg.* **75**, 1262–3(1930).—The results are given which were obtained in a comparative series of expts. on the soly. of Pb shavings and pipe in various types of distd. water and that delivered in the mains of Leipzig. The results reported emphasize the necessity for const. control of municipal waters coming in contact with Pb conduits. W. O. E.

Titrimetric determination of calcium and magnesium in drinking water. M. E. STAS. *Pharm. Weekblad* **67**, 1245–59(1930).—The von Luck and Meyer method (*C. A.* **23**, 3037) for detg. the Ca and Mg content of river water, based on pptn. of Ca as oxalate and titration with $KMnO_4$ and pptn. of Mg as *o*-hydroxyquinoline salt and bromination thereof, is slightly modified for the detn. of Ca and Mg in drinking water where bicarbonate and Fe are frequently present. A. W. DOX

Rapid method of detecting and determining fluorine in mineral waters. J. CASARES AND R. CASARES. *Anales soc. españ. fis. quím.* **28**, 1159–62(1930).—Detection of F in mineral water rich in F is easy by evapn. of about 15 cc of the water in a porcelain dish on a water bath to dryness, and adding a little Ag_2SO_4 and glass powder, covering with a watch glass on which hangs a drop of 1% $Ba(OAc)_2$ soln. slightly acidified with AcOH, formation of Ba fluosilicate being observed by a microscope. The detn. of F is colorimetric. In a series of 120 cc. tubes, 100 cc of H_2O and increasing amts of NaF are placed. The samples are in another series To all is added 1 cc. concd. HCl, and after shaking, a few drops of a mixt. of equal parts of 0.17% Na alizarinsulfonate soln. and 0.87% $Zr(NO_3)_4$ soln. A comparison of colors shows the F content E. M. SYMMES

Methods for the determination of small quantities of active chlorine in purified waters. S. ANSELMI AND A. CALO. *Ann. chim. applicata* **20**, 410–24(1930).—A review of the colorimetric methods which have been used in detg. small quantities of Cl in waters. A. and C. prefer the *o*-tolidine method, which they find sensitive to 0.02 mg. Cl/l For concns. over 0.2 g. Cl/l., they recommend KI and starch and titrating with $Na_2S_2O_3$. A. W. CONTIERI

Experimental results in the purification of sewage waters with ozone. P. L. FIORANI. *Ann. igiene.* **40**, 593–600(1930).—A 2-l. sample of drainage water from a closet sink was treated with ozonized air for 5-min. periods four times a day for several days, with an interval of 1 hr. between treatments. The product was compared with an untreated sample kept during the same period. The ozonization removed the odor, brought about good sedimentation, lightened the color and killed all animal organisms. Bacteria were not greatly decreased. The liquid was sepd. from the sediment after treatment and was further ozonized. It became completely colorless, produced no more sediment, and was imputrescible. It contained slightly more dissolved organic matter than the control liquid. R. SANSONE

The extent of goiter in Hungary and its connection with the I content of the drinking water (STRAUB) 11A. Device for feeding solid reagents to a reaction vessel (Ger. pat. 507,041) 1.

Concentrating natural mineral waters. FRITZ MAYER. Ger. 504,807, July 18, 1928. The water is cooled to sep. ice till the required concn. is reached.

Cooling tower suitable for cooling water. REXFORD O. ANDERSON, ULYSSES S. RUDY and BENJAMIN M. GESSEL. U. S. 1,785,572, Dec. 16. Structural features.

Distilling water. G. E. HUGHES, A. H. WARING, J. E. BRAHAM and IMPERIAL CHEMICAL INDUSTRIES, LTD. Brit. 333,547, Feb. 24, 1929. In a multiple effect app. a plurality of falling films of impure water is subjected to indirect heating by steam, the condensed steam is passed to a flash boiler where its pressure is reduced, and steam thus produced is mixed with steam evolved from the falling films, and the mixt. is passed to the next effect. Various details of app. are described.

Apparatus for softening water by treatment with mineral reagents. EMIL G. DUDEN (to Wm. B. Scaife & Sons Co.). U. S. 1,784,893, Dec. 16. Structural features.

Base-exchanging material. S. A. KRÜGER. Brit. 333,844, Jan. 5, 1929. Clays of base-exchanging character are rendered more resistant to disintegration by the action of water, by calcination at 550–900° with exclusion of O or other oxidizing gases. A neutral or reducing flame may be used, or calcination effected in the presence of neutral or reducing gases.

Filter for water purification. JOSEF MUCHKA. Ger. 505,888, Sept. 23, 1928. Details of construction.

Purifying boiler-feed water. ROY O. HENSZEY. U. S. 1,786,113, Dec. 23. For maintaining boiler water at a low degree of concn., water is blown off from the boiler, make-up water is added to the boiler, and the amount of water blown off is regulated so that it is increased or decreased in proportion to the increase or decrease of the amount of make-up water added. App. is described.

Purifying waste water. FRIEDRICH SIERP and FERDINAND FRÄNSEMEIER. Ger. 504,993, Aug. 28, 1926. The water is purified by first treating with precipitants such as Fe or Al salts, and then by treating with biol. purifying agents which attack the coarser colloidal particles. Agents which attack the fine colloidal particles are added at a further stage, and the water is finally aerated.

Treating waste water. MAX KUSCH. Ger. 504,992, June 30, 1929. An app. is described for purifying waste water by biol. agents, comprising a series of overflow chambers and an aerating device.

Apparatus for treating waste water. C. OTTO & CO. G. M. B. H. Ger. 504,991, Dec 21, 1926. App. for washing PhOH out of phenolic waste water is described.

Oil trap for waste-water-purifying plants. KARL IMHOFF, FRIEDRICH SIERP and GEORG MAIER. Ger. 507,042, Dec. 3, 1926.

Pumping apparatus for sewage-disposal plants. THOMAS B. SIMS (to L. J. Wardlaw). U. S. 1,786,032, Dec. 23. Structural features.

15—SOILS, FERTILIZERS AND AGRICULTURAL POISONS

J. J. SKINNER AND M. S. ANDERSON

Soils of Missouri. M. F. MILLER AND H. H. KRUSEKOPF. Univ. Mo., Agr. Expt. Sta., *Bull.* **264**, 120 pp.(1929).—Missouri soils vary in lime requirement per acre from 0 to 5 tons. An av. of 500 soils shows 2500 lb. N, 1250 lb. of P_2O_5 and 28,800 lb. of K_2O in 2,000,000 lb. of surface soil. The soils are of many types and vary widely in fertility. The phys. and chem. properties of the several soil types are discussed. A soil map accompanies the bulletin. C. R. FELLERS

Determination of the accuracy of the rapid colorimetric method of Dirks by comparison with the results obtained by the germination method of Neubauer. C. DREYSPRING AND W. HEINZ. *Superphosphate* **3**, 253-7(1930).—In comparative expts. on 770 samples of soil, results by the Dirks colorimetric method for detg. readily available P_2O_5 compared favorably with those obtained by the Neubauer germination method in 87.1% of the tests, when the following scale was used to indicate the relative fertility of the soil as detd. by the Dirks method: 0–6 mg. P_2O_5 per 100 g. of soil poor in P_2O_5, 6–10 mg. P_2O_5—medium P_2O_5 content, over 10 mg. P_2O_5—rich in P_2O_5. K. D. JACOB

The determination of the replaceable bases and the base-exchange capacity of soils. H. D. CHAPMAN AND W. P. KELLEY. *Soil Science* **30**, 391–406(1930).—Soly. and decompn. processes in soils render the detn. of exchangeable bases somewhat inexact. The NaCl method, and the alc. KCl, or alc. $BaCl_2$ methods all give reasonably accurate results for the detn. of replaceable Ca in calcareous soils, provided other sol. or decomposable Ca compns. are absent. The base-exchange capacity of the soil can be detd. by digesting and leaching the sample with *N* $AcONH_4$ soln. This soln. brings about approx. complete replacement of H ions without the necessity of treating the sample with an excess of alkali. Neutral MeOH is useful for the removal of the occluded electrolyte. The absorbed NH_4 can be accurately detd. by aeration in the presence of Na_2CO_3. M. S. ANDERSON

Investigation on antimony electrode for determination of hydrogen-ion concentration. II. Determination of the hydrogen-ion concentration of soils. ARAO ITANO AND SATIYO ARAKAWA. *Ber. Ohara Inst. landw. Forsch. Japan* **4**, No. 3, 383–94(1930).—An investigation is made of the applicability of the Sb electrode in the detn. of H-ion concn. of soil and of water contg. H_2S. In buffer solns. the H-ion concns. detd. with the Sb electrode agreed with those by the H electrode within 0.2 p_H units. Shaking with the Sb electrode hastened equil.; from 10 sec. to 2 min. was required. Soil in a pasty

prepd. with 0.1 *N* KCl the H-ion values obtained were quite ... acid than those shown by the Sb electrode. The Sb electrode contg. H_2S, where the use of quinhydrone is unsatisfactory.

The influence of artificial soil acidification on the soil and plant growth. FREIIN VON OLDERHAUSEN. *J. Landw.* **78**, 241–87(1930).—The addn. of lime ir the base exchange of the weathered complexes of the soil but it cannot replace the plant food. With a higher degree of base exchange normal plant growth is hindered because in such a soil the content of foodstuffs is too strongly reduced. J. R. H.

Presence of uronic acids in soils. E. C. SHOREY AND J. B. MARTIN. *J. Am Chem. Soc.* **52**, 4907–15(1930).—Results are presented of the examn. of 11 samples of soil for the presence of uronic acid (I), according to methods adopted and in use for the detn. of these acids in vegetable products. The soils are from 8 localities and represent types varying from sandy loams contg. 0.82, 0.88 and 0.96% of org. C, to loams contg. 3.00 and 4.90% of org. C, a muck contg. 30% and a peat contg. 53% org. C. These soils varied in reaction from p_H 4.7 to 8.3. The I CO_2 varied from 0.07 to 1.80% of the soil and this, when calcd. to the equiv. I, varied from 0.308 to 7.94% of the soil. The I C calcd from these figures varied from 0.113 to 2.80% of the soil and this I C varied from 5.15 to 28.4% of the total org. C. The presence of uronic acids or complex substances contg them (polyuronides) was confirmed by the sepn from 2 of the soils of colloidal material having all the properties of such complexes This sepn. was made both by hot H_2O extn. and by extn. with dil. NaOH. The bearing of the presence of uronic acids in soils on certain analytical operations is pointed out These are the detn. of carbonate in soils and methods proposed for the proximate analysis of the org. matter of soils. C. J. WEST

The state of unsaturation of the soil in relation to its field behavior and lime requirement. P. E. TURNER. *Soil Science* **30**, 349–81(1930).—There is considerable evidence that H and Ca together account for the great majority of the exchangeable ions present in the soils of humid climates. The properties of soils appear to depend largely upon the relative proportions of exchangeable H and Ca as well as upon the abs. amts. of these elements. The satn. capacity and satn. deficit vary significantly depending upon whether 2-liter or 5-liter extns. are made of the samples (*C. A.* **17**, 3221). The field behavior of a soil is intimately related to its degree of unsatn. Soils unsatd. to the extent of only 12 to 28% are in good condition; those which are 30 to 35% unsatd. lie in an intermediate group as regards tilth, and those more than 38% unsatd. are all in poor condition. These values appear to be independent of the nature of the colloidal material and the degree of colloidality. A general tendency exists for the p_H value of the soil to decrease with increasing unsatn., but striking irregularities frequently occur. A comparison is made of the values for unsatn. by the procedure of Page and Williams (*C. A.* **21**, 469) and that of Hissink (*C. A.* **19**, 2718). A comparison is also made of the lime requirements of a series of soils as detd. by the method of unsatn. and the p_H value method of Hardy and Lewis (*C. A.* **23**, 5263). M. S. A

Relation of nitrates in soils to the response of crops to potash fertilization. I. Factors contributing to the unproductiveness of "alkali" soils in Illinois. O. H. SEARS *Soil Science* **30**, 325–47(1930).—Lab., greenhouse and field results indicate that the unproductiveness of the alkali soils of Illinois is due chiefly to a lack of available K and a concn. of nitrate N which is harmful. The total K of 3 soils varies from 0.75 to 0.83%. Its low availability is thought to be due to the presence of an alk. reaction. The addn. of straw as a mulch is much more effective in increasing crop yields than is the addn. of K salts. The presence of straw lowers the concn. of nitrates. The addn of ashes from an equiv. quantity of burned straw is much less effective. Horse manure is more valuable than cow manure on these soils, whereas the opposite condition obtains on soils where there is a deficiency of available N. Analyses of displaced soil solns. show the presence of 430–1532 p. p. m. of nitrate in the solns. at moisture contents varying between 22 and 31.9%. Soils treated with KCl show that 50–70% of the K applied is used in releasing Ca ions. Large applications of KCl result in proportionately larger increases in the K content of the displaced soln. than do the smaller applications. M. S. ANDERSON

The action and efficiency of various water-insoluble forms of phosphoric acid on different soils with special reference to their influence on the phosphoric acid content of the plants. M. CLEMM. *J. Landw.* **78**, 289–308(1930).—Fertilizing with P_2O_5 causes an increase in the absorption of P_2O_5 by plants. This increase is shown clearly in the P_2O_5 content of the grains. With loam soils rich in alkali and P_2O_5 there is no

definite increase in the straw. But with the poorer soils there is always an increase in the content of P_2O_5 even in the straw. JOHN R. HILL

The decomposition of lignified materials by soil microörganisms. MAX PHILLIPS, HERMAN D. WEIHE AND N. R. SMITH. *Soil Science* **30**, 383–90(1930).—A study is made of the selective decompn. by soil microörganisms of various constituents of cornstalks, oat hulls, corncobs and wheat straw. The results indicate a rapid decompn. of the pentosans and cellulose. The abs. quantity of lignin as well as the percentage lignin shows a decided decrease in the expts. The greatest loss occurs where urea is used as a source of N. Methoxyl, known to be a characteristic group of lignin, also decreases with the decompn. of the mass. Under suitable conditions the rate of decompn. of lignin may be as rapid as that of cellulose or of pentosans. M. S. A.

Investigation on Winogradsky's Azotobacter test as to its applicability to some rice-field soils in Japan. ARAO ITANO AND SATIYO ARAKAWA. *Ber. Ohara Inst. landw. Forsch. Japan* **4**, No. 3, 365–9(1930).—Fixation of N by *Azotobacter* from different soils was tested in liquid culture medium, and in silica gel. The N fixed in liquid culture was much less than that in the silica gel plates. The results showed no agreement between productivity of the soils and the *Azotobacter* test. The p_H values of the soils and their P contents appeared to play an important part in N fixation. Optimum p_H for rice crops is about 4.0. Very small quantities of N were fixed in soils more acid than p_H 6.0. M. S. ANDERSON

Cross inoculation with Rhizobium radicicolum. VICTOR BURKE AND NELSON J. HOHL. *Soil Science* **30**, 407–11(1930).— Legume tissue and ext. do not have bactericidal action on heterologous strains of *Rhizobium radicicola*. The ext. alone does not have a bacteriostatic action and probably the same is true of the tissue. Different strains, and different cultures of the same strain, vary in their rate of growth in legume ext. The rates of growth in homologous and in heterologous legume exts. are the same. M. S. ANDERSON

The watering of pot cultures by means of a suitable device. C. DREYSPRING. *Superphosphate* **3**, 245–53(1930). - The importance of close regulation of the water supply in pot culture expts is emphasized. A special truck equipped with a balance and water tank for use in the greenhouse is described and illustrated. K. D. JACOB

Crushing and grinding machinery for the (fertilizer) trade. ALAN WHATHAM. *Fertilizer, Feeding Stuffs and Farm Supplies J.* **15**, 691–4(1930).—An illustrated discussion of various types of crushing and grinding equipment suitable for fertilizers and fertilizer materials K. D. JACOB

Economical fertilization. JAR. SOUČEK. *Listy Cukrovar* **49**, 137–9(1930).—Nutritional elements in soil up to a depth of 20 cm. are replenished by elements in deeper layers; in well-limed soils, the P_2O_5 in strata 20–40 cm. below the surface of the soil is 75% as effective as the same P_2O_5 concn. in the 0–20 cm. stratum. In poorly limed soils the P_2O_5 in the 20–40 cm. stratum is equally or perhaps more effective as the P_2O_5 in the 0–20 cm. stratum. However, this P_2O_5 may be flooded off by wash water and lost to the plant. With K, the same concns. in both strata showed the K to be 33% more effective in the 0–20 cm. layer; N in the 0–20 cm. layer is more effective than in the 20–40 cm. layer. Potatoes were able to absorb less P_2O_5 from the lower stratum than sugar beets. Barley and potatoes absorbed less K from the soil than oats, sugar beets absorbed less P_2O_5 than grain. FRANK MARESH

The effect of phosphoric acid on the development of roots. JOHANNES GÖRBING. *Superphosphate* **3**, 257–61(1930).— Fertilization of summer wheat with superphosphate had a marked effect in promoting root development, augmenting, in particular, the formation of fine fibrous roots. K. D. JACOB

Lignin as a possible factor in lodging of cereals. JEHIEL DAVIDSON AND MAX PHILLIPS. *Science* **72**, 401–2(1930).—An excess of $NaNO_3$ (600 lb. per acre) applied to a wheat plot caused lodging of the grain and depressed considerably the ash and silica contents of the straw. But, contrary to expectations, the lignin content of the straw from the lodged grain was distinctly higher in every case than that from the control plot JOHN R. HILL

Mercury salts as disinfectants for seeds. VITTORIO CASABURI. *Industria chimica* **5**, 1251–60(1930).—C. proposes the use of Hg salts as satisfactory disinfectants for seeds, notably the Hg salts of 3 tanning materials, *i. e.*, methylenedinaphtholsulfonic acid, lignomethylenedisulfonic acid, and the latter acid neutralized with $K_2Hg(CN)_4$. A. W. CONTIERI

Aqueous emulsions of cresols, hydrocarbons, dyes, oils, fats, resins, etc. [as insecticides] (Brit. pat. 333,587) **13.** Fungicidal and insecticidal composition (U. S. pat. 1,785,074) **20.** Superphosphate (Brit. pat. 333,518) **18.**

Fertilizer. HYDRO NITRO SOC. ANON. Brit. 333,477, Dec. 1, 1928. See Fr. 685,276 (*C. A.* **24**, 5927).

Fertilizers. BAYERISCHE STICKSTOFF-WERKE A.-G. (Carl Ehrenberg and Hugo Heimann, inventors). Ger. 507,320, Jan. 15, 1929. Fossilized plants and like vegetable materials, *e. g.*, coal or lignite, are heated under pressure in an autoclave with NH_3 and air or other gas contg. O. A temp. of 200–250° and a pressure of 50 atm. are suitable.

Fertilizers. KALI-CHEMIE A.-G. (Fritz Rothe and Hans Brenck, inventors) Ger. 507,925, June 29, 1926. Addn. to 492,310 (*C. A.* **24**, 2827). The method of Ger 492,310 is modified, when using Na_2SO_4 and (or) NaCl as reagents, by limiting the amt. of SiO_2 to about 0.5 mol for each mol of P_2O_5. If the crude phosphate contains Ca not combined as phosphate, a further amt. of SiO_2 sufficient to convert such Ca into orthosilicate should be included

Fertilizers. ERNST FRANK. Ger. 507,068, Aug. 24, 1924. Crude phosphate is treated with HCl, the acid is then driven off by heating to about 100°, and the residue is heated at 140° with the intermittent addn. of small quantities of water. The product is sol. in citric acid.

Fertilizers comprising urea-calcium nitrate double compounds. I. G. FARBENIND. A.-G. Brit. 332,945, April 29, 1929. Urea is added to a soln. of $Ca(NO_3)_2$, followed by evapn. until the water content of the material is 5% or less, and solidification by spraying. Urea 2 to 7 mol proportions may be used for each mol. proportion of Ca $(NO_3)_2$.

Urea and fertilizers containing urea. I. G. FARBENIND. A.-G. Brit. 332,948, April 29, 1929. Substantially anhyd products are obtained by adding to a pure soln. of urea not over 15% of substances adapted to lower the solidification point of the anhyd. melt, preferably to 120° or lower, (such as di NH_4 phosphate, urea phosphate, K phosphates, mono-Ca phosphate, H_3PO_4, nitrates of Na, K or NH_4, KCl, NH_4 sulfate, formamide or acetamide), evapg. to a water content below 10% and spraying the material or running it as a thin stream into a liquid such as an oil or CCl_4 kept in motion.

Ammonium phosphate fertilizer composition. GUY H. BUCHANAN (to American Cyanamid Co.). U. S. 1,785,375, Dec. 16. Mono-NH_4 phosphate in a substantially dry condition is treated with NH_3. App. is described.

Ammonium phosphate fertilizer and sodium bicarbonate. SOC. CHIMIQUE DE LA GRANDE PAROISSE (Azote et produits chimiques). Brit. 332,864, Nov. 23, 1928. Na phosphate is treated with NH_3 and CO_2 and water to produce NH_4 phosphate suitable for use as fertilizer, and $NaHCO_3$. Various details and modifications of procedure are described, and initial materials may be used which contain nitrates.

Seed fungicide and disinfectant. HOWARD ADLER and GUY A. MCDONALD (to Victor Chemical Works). U. S. 1,785,472, Dec. 16. Cu oxalate and $CaSO_4$ are formed together, as by reaction of $CuSO_4$ with Ca oxalate in water.

Fungicide and insecticide. WALTER C. O'KANE. U. S. 1,786,125, Dec. 23. A compn. suitable for use on plants, etc., comprises a pyrethrum-impregnated hydrocarbon white oil carrying a colloidal Cu material or other suitable colloidal metal compd.

Insecticides. J. GUILLISSEN and UNION CHIMIQUE BELGE, SOC. ANON. Brit. 333,743, Aug. 19, 1929. The insecticidal principle of pyrethrum is extd. (suitably with petroleum ether), the solvent is distd. off, and the ext. is dissolved in another solvent (suitably in pyridine for agricultural purposes, or in Et lactate for domestic use).

Insecticides. I. G. FARBENIND. A.-G. (Karl Dobmaier, inventor). Ger. 507,118, Feb. 25, 1927. The insecticidal action of furfural is enhanced, and the difficulty of dispersing it in water is avoided, by using it in the form of a mol. compd. with an org. base, particularly an aliphatic amine or amino alc. Crude initial materials may be used. Examples are given. Cf. *C. A.* **25**, 373.

Insecticide. I. G. FARBENIND. A.-G. (Carl Taube, Wilhelm Schepss and Hans Kükenthal, inventors). Ger. 507,215, Mar. 25, 1928. Ethylene oxide is used, alone or mixed with other insecticides, indifferent materials, inflammability-reducing substances, irritants, etc. Examples are given.

Insecticide for use on trees. JOSEPH H. LAMBERT (to Standard Oil Co. of Ind.) U. S. 1,785,451, Dec. 16. A concd. tree-spray compn. suitable for dilu. and emulsification with water in large quantity comprises straw oil mixed with a small quantity of an oil-sol. sulfonic compd. derived from the treatment of heavy hydrocarbons with concd. H_2SO_4, small quantities of a water-sol. emulsifying soap, and a small quantity of an alc. such as denatured EtOH.

Treating wounds of trees and plants. IRVING E. MELHUS. U. S. 1,785,641,

Dec. 16. **The wounds are covered with a compn. comprising a fungicide such as $Hg(CN)_2$ and a soln. of a condensation product of furfural, cresol and a condensing agent in an org. solvent contg. furfural.**

16—THE FERMENTATION INDUSTRIES

C. N. FREY

Bios. VI–VII. BUNSUKE SUZUKI, KENJI MATSUSITA AND KUNIO AOKI. *Proc. Imp Acad.* (Japan) **6**, 334–6(1930); cf. *C. A.* **22**, 2570.—The effects of bios (1/5000) on 18 species of yeasts show that there are 3 classes of yeasts, those indifferent to bios, those that need bios for fermentation and an intermediate class which are capable of fermenting to the full extent if sufficient time is allowed but which act in a normal time with the addn of bios. With *Schizosacch. pombe* the addn. of bios did not cause the yeast to ferment normally, although this was brought about by the addn. of oryzanin from rice bran. The bios or oryzanin had little or no favorable effect upon *Sacch. exiguus, Sacch. marxianus* and *Zygosacch. major* but the yeasts were capable of fermenting "Koji ext." normally. *Aspergillus oryzae* is capable of synthesizing bios. VIII. B. SUZUKI AND YASUJI HAMAMURA. *Ibid* 337–40.—The details of the sepn. of an active fraction of bios from rice bran by extg. with 2% NaOH, pptn. with basic Pb acetate and extn. of the residue from the filtrate with MeOH, EtOH, pyridine, AmOH and EtOH are given, the yield being 10% of a compd. which was 10 times as reactive as the crude biose. It is a very hygroscopic amorphous powder, insol. in Et_2O, $CHCl_3$ and C_6H_6 and giving a yellow color with $FeCl_3$. An Ac deriv. could not be prepd. but BzCl gives a benzoate which was inactive; purification by fractional pptn. from decalin gives fractions m. 116–8°, 105–7° and 99–100°, contg. 3 Bz groups. This indicates that the compd. does not contain N and that 1 or more of the HO groups are in a ring formation. C. J. WEST

The fermentation of loganberry must. W. NEWTON AND R. J. HASTINGS. *Can. Chem. Met* **14**, 348, 353(1930).—"Secondary fermentation" is a real problem in the manuf. of loganberry wine, that may be offset by the addn. of NH_4 phosphate (primary) in the proportion of 227 g. to 378.5 l. loganberry must. The addn. of this salt creates more favorable fermentation conditions. Two optima concns. of primary NH_4 phosphate were found. W. H. BOYNTON

Technology of malting. VII. The nitrogen balance during malting. E. JALOWITZ. *Brau- und Malzindustrie* **4**, 65–8(1930); cf. *C. A.* **25**, 167.—There is no loss of N during malting. The sum of albumin or N content of the malt, the germs and of the N which has been dissolved in the steep water equals the N content of the barley. These results are obtained for barleys of any compn. and for any malting operation. VIII. **The influence of the method of kilning on the malt character.** *Ibid* 81–4.—The same green malt was kiln-dried at 3 different temps., the final temps. being 56–7°, 61° and 63.5° R. The phys. and chem. analyses showed but little difference, except in color, between the three malts. The expts. proved that the malt type is produced chiefly by the germination process. The method of kilning must be adjusted to the given green malt type. S. LAUFER

The wines of Comtat-Venaissin. JEAN BORDAS AND GASTON MATHIEU. *Ann. falsif.* 23, 151–67(1930).—The geographical and geological situation of species of grapes grown in the Côtes-du-Rhône and Comtat-Venaissin vineyards are described. Analyses of 42 wines are tabulated and briefly commented upon. A. PAPINEAU-COUTURE

Wine distillates and wine brandies. H. ZELLNER. *Z. Untersuch. Lebensm.* **59**, 177–(1930). Mainly polemical against Büttner and Miermeister (*C. A.* **24**, 4892–3). Reply. G. BÜTTNER AND A. MIERMEISTER. *Ibid* 433–4. C. R. FELLERS

Production of fuel gas by anaerobic fermentations (BUSWELL) **21.** Quantitative application of the analytical quartz lamp, especially in wine analysis (HEIDUSCHKA, MOHLAU) **7.** Denicotinizing tobacco by fermentation (Ger. pat. 507,194) **17.**

Aldehyde-free alcoholic liquids. HERMAN HEUSER. U. S. 1,785,447, Dec. 16. **A portion of alc. liquid contg. fusel oil or aldehydes is charged into a closed chamber and heated to evap. and remove its entire aldehyde contents together with a portion of the alc. content; a second portion of the material is similarly treated in a second chamber, and the aldehyde-free residue from the second chamber, while boiling, is discharged into the first chamber completely to fill the latter, the first chamber is sealed**

while its contents are at a boiling temp., its contents are subsequently cooled, and an O free gas such as N or CO_2 is permitted to enter the space formed by extn. of the contents of the chamber. App. is described

Distillation apparatus for alcoholic beverages. WILHELM KREMER. Ger. 507,407, Aug. 15, 1928.

Cleaning malt. GOTTFRIED JAKOB. Ger. 507,403, July 29, 1927. The uncrushed malt is treated with hot water or steam and then washed. Alkalies, acids, or solvents may be added to the water in the first stage.

Coloring brandy, etc. WILLY DEHMEL. Ger. 507,404, June 19, 1927. A coloring material for brandy, etc., is prepd. by heating a mixt. of refined corn sugar with small quantities of AcONa and H_2O until the melt becomes dark brown.

Method and apparatus for sifting and sorting yeast. BRAUEREI STERNBURG G. M. B. H. Ger. 507,401, Feb. 22, 1929.

Yeast. OLGA K. SAUER NÉE BUCHHOLZ. Ger. 507,402, May 10, 1927. Dry yeast is prepd. by inoculating a sterile nutrient soln. in a vessel connected to an air pump, allowing the culture to stand at a suitable temp. while removing CO_2 and EtOH from time to time by operating the pump, and finally drying the culture in the same way.

17—PHARMACEUTICAL CHEMISTRY

W. O. EMERY

The preparation of loco-"calorose." J. C. DE JONG AND N. KEULEMANS. *Pharm. Weekblad* **67**, 1299–30(1930).—Loco calorose, an invert sugar prepn. used for hypodermic injection, may be prepd. as follows: Dissolve 750 g. of sucrose by boiling with 225 cc. of H_2O in a 1-l. flask. Add 15 cc. of 0.1 *N* HCl and heat 1 hr. in a boiling water bath. Neutralize by adding 215 mg. of $Na_2CO_3.10H_2O$ in 5 cc. H_2O, and dil. to 1 l. The prepn. contains 70% invert sugar. When dild. 1:10 and sterilized by heating 1 hr. in a boiling water bath the soln. is isotonic with blood. A. W. DOX

The preparation of concentrated phosphorus solution. M. H. P. SITSEN. *Pharm. Weekblad* **67**, 1313–6(1930).—Directions are given for prepg. a stable 0.5% soln. of P in paraffin oil; less than the customary amts. of Et_2O and lemon oil are used as preservatives. A. W. DOX

Detection of added dextrin in succus liquiritiae. C. GRIEBEL AND F. WEISS. *Apoth. Ztg.* **45**, 1566–9(1930).—Since dextrin is usually present as a normal constituent of the succus (because of degradation of starch) in amt. up to 10%, any higher % of dextrin found in certain com. samples of this commodity would almost certainly indicate added dextrin. W. O. E.

Essential oils of Zieria Smithii (Andrews) and its various forms. A. R. PENFOLD. *J. Proc. Roy. Soc. N. S. Wales* **64**, 83–8(1930).—The chem. compn. of the essential oils from Queensland material has shown the principal constituents to be phenol ethers (70–80%), mainly safrole and a little methyleugenol, while the minor constituents present are *d*-α-pinene, sesquiterpenes, eugenol, stearic acid, etc. Material collected near Sydney showed methyleugenol to be the principal substance present to the extent of 95%, while oils distd. from leaves collected in Terrigal, N. S. W., contained mainly safrole, and from Toronto, N. S. W., the phenol ethers present were found to be a mixt. of elemicin and safrole. These oils undoubtedly represent a very remarkable series. Some of the minor constituents of the N. S. W. oils are of special interest; such a ketone as nopinone was sepd. and identified. W. O. E.

Revision of the German Pharmacopeia. FRANZ VIEBÖCK AND CORNELIA BRECHER. *Pharm. Monatsh.* **11**, 203–6(1930).—It is shown among other things that the method for detg. mustard oil in its present form is open to serious criticism. The iodometric estn. after conversion of the oil into thiourea yields the "actual" mustard oil content, a value smaller for oils distd. at ordinary pressure than when distd. *in vacuo*, since at ordinary pressure some of the oil is converted into thiocyanates. A rapid and easily executed acidimetric method is suggested wherewith one may det. both thiocyanate and mustard oil content. An addnl. method is likewise cited for detg. allyloxythiourea in the presence of mustard oil, the former product resulting rather quickly in the present type of mustard oil spirit. W. O. E.

Examination of galenical preparations in filtered ultra-violet light. F. GIRSTNER AND L. ZECHNER. *Pharm. Monatsh.* **11**, 221–4(1930).—The results obtained in the examn. of tinctures official in the Ger. and Austrian Pharmacopeias are recorded in tabulated form. W. O. E.

Water-soluble oils. KORNEL GÖLLNER. *Pharm. Monatsh.* **11**, 248–9(1930).—An address. W. O. E.

Vegetable nostrums and their control. W. PEYER. *Pharm. Monatsh.* **11**, 249–50(1930); cf. *C. A.* **24**, 1466. W. O. E.

Bacteriophagic principle as the foundation of pharmacognostic evaluation. ERHARD GLASER. *Pharm. Monatsh.* **11**, 250–4(1930).—An address including an extensive bibliography. W. O. E.

Saponins and their importance in pharmacy. W. POETHKE. *Pharm. Zentralhalle* 71, 753–61(1930).—An address. W. O. E.

Quinoline as microchemical reagent for certain heavy metals. F. M. KORENMAN. *Pharm. Zentralhalle* **71**, 769–72(1930).—The cryst. ppts. produced by quinoline (or its HCl salt) and certain salts of Bi, Hg, Cd, Cu, Zn, Pb and Co in admixt. are described and illustrated. W. O. E.

Estimation of morphine in opium and its preparations. LAJOS DAVID AND ISTVAN NOVAK. *Pharm. Ztg.* **75**, 1419–20, 1433–5(1930).—An exptl. study of several methods, notably that of Dietrich (NH_3 method), and of Debourdeaux (lime method), for estg. the alkaloid, the results of the investigation are presented in tabulated form. W. O. E.

Economic drug testing. XI. L. ROSENTHALER. *Pharm. Ztg.* **75**, 1372–3(1930); cf. *C. A.* **24**, 686, **25**, 169, 170.—Extn. methods for the estn. of caffeine in guarana and cola, and of the alkaloids in nux vomica by the use of immiscible solvents (H_2O and $CHCl_3$) in separatory funnels are outlined. W. O. E.

Evaluation of surgical dressings. MAX KINSCHER. *Pharm. Ztg.* **75**, 1388(1930).—The tests described are essentially for the purpose of estg. the free acid, if any, in absorbent cotton, through detn. of the p_H value. W. O. E.

Antimony in drug synthesis. HANS SCHMIDT. *Z. angew. Chem.* **43**, 963–70 (1930).—An address portraying the historical development of drugs contg. Sb as an essential component. W. O. E.

Ether—the use of potassium hydroxide in testing for aldehydes. L. W. GREEN AND R. E. SCHOETZOW. *Am. J. Pharm.* **102**, 652(1930).—The use of solid KOH instead of the test soln. in the test for aldehyde in ether is recommended for the new revision of the U. S. P. Tests of ether for anesthetic use show that if a stronger soln. (50%) is used instead of the normal test soln., or if solid KOH is used, the sensitiveness of the test is increased. 100 parts of aldehyde per million of ether appears to be the extreme limit of sensitiveness of the U. S. P. test. At that concn. the faintest kind of yellow color or tint is just discernible at the completion of the test, while in a test using solid KOH, a distinct and pos. yellow color is obtained. W. G. GAESSLER

Transmission spectra of vanilla extracts. ELLERY H. HARVEY. *Am. J. Pharm.* 102, 659–61(1930).—Curves plotted from tabulated results obtained from the detn. of the transmission spectra in the visible of vanilla exts. made according to an identical and commercially used process indicate that none of the exts. shows characteristic absorption bands; they merely show general absorption in the violet to green region of the spectrum. Of the beans, Tahiti gave the darkest and Tonka the lightest ext. The slopes of the curves parallel each other sufficiently to make the transmission spectra of no value in the identification of the bean used in making the ext. W. G. G.

Preliminary chemical examination of Aegele Marmelos of the Indian Bel. B. B. L. DIKSHIT AND S. DUTT. *J. Indian Chem. Soc.* **7**, 759–64(1930).—The Bel tree, one of the most important medicinal plants of India, was examd. to det. the nature of the active principle. Roots, bark, leaves, fruit and seeds were extd. in 50-g. portions with EtOH, $CHCl_3$, Et_2O, C_6H_6, H_2O, EtOAc and ligroin, and the exts. were examd. without further purification. Needles, m. 103°, were obtained from the ligroin ext. of the fruit. The new substance is named *marmelosin*. W. D. LANGLEY

Simple and quick micro methods for the analysis of tobacco. III. Microtitrational determination of the ash components affecting the burning capacity of the tobacco. J. BODNÁR AND LADISLAUS BARTA. *Biochem. Z.* **227**, 429–51(1930); cf. *C. A.* **23**, 3057. Five-tenths g. of the finely powd dry tobacco is ashed in a Pt dish, which requires only about 10 min.; this yields about 0.1 g. of ash. The K_2O content is detd. in the ash from 0.1 g. tobacco powder incinerated at a low heat. The ash dissolved in dil. HCl is made up to 25 cc., of which 2.5 cc. (= 10 mg. tobacco) is analyzed. To this are added 0.5 cc. 50% $NaNO_2$ and 0.5 cc. Na cobaltinitrite reagent, the cryst. ppt. being centrifuged off after 15 min. and washed 3 times with water. The K_2O is then detd. by titration with 0.02 *N* $KMnO_4$. In 15 samples the K_2O content varied from 1.62 to 3.55%. The Ca is detd. in the HCl soln. of the ash from 0.25 g. tobacco powder; to the turbid soln. 1–2 cc. dil. AcH is added and the vol. made up to 25 cc. The pptd.

basic Fe and Al acetates are filtered off. The Ca is pptd. in 5 cc. aliquots in a hot water bath with 0.5–0.8 cc. 2.5% $(NH_4)_2C_2O_4$. The pptd. CaC_2O_4 is washed, dissolved in 3–4 cc 10% H_2SO_4 and titrated with 0.02 *N* $KMnO_4$. The CaO content ranged from 4.36 to 8.75%. For the Cl detn. 2 g. tobacco powder is mixed in a Pt dish with 1 g. MgO and about 10 cc. H_2O, and after evapn. this is heated over a small flame. The white ash is dissolved in 10 cc. dil. HNO_3, transferred to a 50 cc. flask, mixed with 25 cc. 0.02 *N* $AgNO_3$ and made up to the mark. To 25 cc. of the filtrate is added 1 cc. ferric NH_4 sulfate and titrated as usual with 0.02 *N* NH_4SCN. The Cl content of tobacco ranged from 0.13 to 1.19%. For the P detn. 0.25 g. tobacco powder is ashed with 0.2 g. MgO, and the ash dissolved in dil. HNO_3 is dild. to 25 cc. To 1.5 cc. of the soln. in a centrifuge tube are added 1.5 cc of a soln. contg 200 g. NH_4NO_3 and 130 cc 50% HNO_3 in a vol. of 600 cc., then 1 cc. 10% NH_4 molybdate. Upon the formation of the ppt. 1–2 cc. 1% KNO_3 is added, the ppt. is centrifuged off and washed several times with 1% KNO_3 soln. To the washed ppt. are added 4 cc. 0.02 *N* NaOH and 0.5 cc. formalin (20 cc. formalin + 50 cc. H_2O + 1 cc. 1% phenolphthalein and enough 0.02 *N* NaOH to make alk., the vol. being made up to 100 cc.). The excess NaOH is titrated back with 0.02 *N* HCl. The P content of the tobacco ranged from 0.42 to 0.70%. For the S detn. the ash from 1 g tobacco powder is taken up in 1 cc. 10% NH_4OH and 1 cc. 3% H_2O_2 and evapd. on the water bath. This is repeated several times. The ash is then dissolved in dil HCl and the vol made up to 25 cc. In 5 cc. aliquots measured into centrifuge tubes the acidity is neutralized to methyl orange with 0.1 *N* NaOH The sulfate is pptd with 5 cc benzidine-HCl soln. and the ppt. is washed 3 times with water satd. with benzidine-H_2SO_4. The ppt. is then transferred to a small Erlenmeyer flask, boiled and titrated hot with 0.01 *N* NaOH, phenolphthalein being used. The sulfate content of different tobacco samples ranged between 0.69 and 1.60%. **IV. Simplified micro method for the determination of nicotine.** J. Bodnár and Vitéz L. Nagy. *Ibid* 452–6.—The new method consists in treating 1 g. tobacco powder with 1 cc 20% NaOH and 20 cc. ether-petr. ether mixt (1:1) and shaking this frequently for 2 hrs. Ten cc. of the water-clear ether-petr. ether soln. is evapd. on the water bath until 1–1.5 cc. of a thick, greenish brown residue is left. To this is added 10 cc. water and the nicotine is titrated with 0.01 *N* HCl, methyl red being used.

S. Morgulis

Constitution of amino alcohols as local anesthetics. IV. S. Kanao. *J. Pharm Soc. Japan* **50**, 911-22(1930), German abstr. 115 8; cf. *C. A.* **24**, 3832.—The present paper deals primarily with the synthesis of ephedrine and its derivs. Cf. Hyde, Browning and Adams (*C. A.* **22**, 3154), Manske and Johnson (*C. A.* **23**, 1404), and K. K Chen (*C. A.* **23**, 4535).

F. I. Nakamura

Study of the possible utilization of the oil of a species of odoriferous Helichrysum from Madgascar. F. Heim de Balsac, H. Labbé and H. Heim de Balsac. *Bull. agence gén. colonies* **23**, 964-77(1930).—A very detailed description is given of the botanical and structural characteristics of *Helichrysum benthami*, Vig. et Humbert, from the Amboimahasoa region of Madagascar. Oil obtained locally from the twigs was a clear, amber colored liquid with an odor of everlastings, it had d_{15} 0.890, d_{20} 0.888, α^{10} 25°20′, acid no. 14, sapon. no. 16 0, ester no. (as linalyl acetate) 5.60%, incompletely sol. in 9 vol of 80% alc. About 75% b. 155–70°, this fraction consisting of hydrocarbons, probably chiefly pinene It is not considered likely that the oil could be utilized either for perfumery or in soap making; but a more detailed chem. study on a larger quantity of oil should be carried out before drawing definite conclusions

A Papineau-Couture

The identification of alkaloids by precipitation. I. A natural classification of the alkaloids based on precipitation. Charles C Fulton. *J. Assoc. Official Agr Chem.* **13**, 491-7(1930).- A natural classification of the alkaloids based solely on pptn. from dil. solns. is possible. Amines and similar basic substances pptd. by the same reagents are included in the scheme. The key to the classification is the relative sensitivity of the different reagents to each alkaloid. For convenience, all other reagents are compared with phosphomolybdic acid. The classification so obtained corresponds in certain ways to the data of pptn. from 2% solns. and to the soly. in H_2O and the basic strength of the free alkaloids. The alkaloidal solns. required are practically never more concd. than 1:1000; hence, a few mg. of an alkaloid suffices for its classification and even for the tentative identification of an unknown. Fully developed and combined with microscopic tests, the system will ensure the identification of any pure alkaloid that has been studied, and not more than 5 mg. will ever be required. For details of the classification, insofar as it has been worked out, the original article should be consulted.

A. Papineau-Couture

Standardization of ergot. Comparative study of the chemical and biological methods of ergot assay. MAURICE I. SMITH AND E. F. STOHLMAN. *J. Pharmacol.* **40**, 77–96(1930).—The Broom and Clark (*C. A.* **18**, 153) and USP (cock's comb) methods and a colorimetric method of assay were compared. In general, satisfactory agreement was obtained. C. RIEGEL

Two new series of local anesthetics derived from piperazine (FOURNEAU, SAMDAHL) 10. Treating fish oils to obtain vitamin A (U. S. pat. 1,786,095) 27.

Therapeutic phosphinate solutions. I. G. FARBENIND. A.-G. Brit. 332,926, April 30, 1929. Stable, clear, sterilized solns. of salts of *p*-dialkylaminoaryl phosphinous acids (such as salts prepd. as described in Brit. 214,836 (*C. A.* **18**, 2715)) are prepd. by adding an acid-binding agent (such as a caustic alkali, sol. alk. carbonate, phosphate or acetate) to a soln. of the salt, or dissolving a mixt. of the salt and acid-binding agent and sterilizing the soln. Examples are given of the prepn. of solns. from the Na salts of 1-dimethylamino- and diethylamino-3-methylbenzene-4-phosphinous acids with use of Na_2CO_3.

Medicinal preparations. SOC ANON. POUR L'IND. CHIM. À BÂLE, W. MERKI and P. SCHEIDEGGER. Brit. 333,159, April 2, 1929. The process described in Brit. 285,856 (*C. A.* **23**, 242) for treating internal secretory organs of females by cooling with an inert refrigerating agent such as solid CO_2, pulverizing them (suitably with addn. of an agent which combines with water) and extg. the powd. material with a suitable solvent, is applied to the treatment of various other animal and vegetable materials for the production of physiologically active exts. From yeast there is obtained a liquid fraction which deposits crystals of ergosterol, and a deliquescent water-sol. portion. Treatment of hearts of warm-blooded animals, bone marrow, ox spleen and fresh blood, and anterior lobes of the hypophysis glands is also described.

Medicinal solutions containing calcium gluconate and other therapeutic substances. CHEMISCHE FABRIK VORM. SANDOZ. Brit. 332,840, Oct. 29, 1928. Stable supersatd. solns contg. Ca gluconate together with other substances are prepd. in the same manner as described in Brit. 314,460 (*C. A.* **24**, 1468). The Ca gluconate may be used as a 10% soln and among the addnl. substances which may be used are: NaCl, Na salicylate, gluconates of Sr, Cd, Ni and Fe, tartar emetic, codeine-HCl, quinine-HCl, caffeine, cotarnine-HCl, caffeine-Na salicylate, methylene blue, Trypan blue, 2-ethoxy-6,9-diaminoacridinium lactate, the methyl sulfonic acid salt of *p*-aminobenzoic acid-diethylaminoleucinol ester, $(CH_2)_6N_4$, glycerol, gelatin and glucose (general mention also being made of various other substances).

Synthetic drug. I. G. FARBENIND. A.-G. (Karl Streitwolf, Alfred Fehrle and Walter Herrmann, inventors). Ger. 501,390, Oct. 26, 1928 Addn. to 481,997 (*C. A.* 23, 5196). The drug 3,3′-dichloro-4,4′-dihydroxy-5,5′-diacetylaminoarsenobenzene is prepd. by acetylating 3,3′-dichloro-4,4′-dihydroxy-5,5′-diaminoarsenobenzene. An example is given. Cf. *C. A.* **24**, 3861.

Synthetic drugs. I. G. FARBENIND. A.-G. (Gustav Reddelien and Werner Muller, inventors). Ger. 503,031, Feb. 3, 1929. Addn. to 484,996 (*C. A.* **24**, 1121). *N*-Hydroxyethyl derivs. of 2-amino-1-hydroxybenzene are prepd. by treating the nuclear substituted products of the latter with halohydrins of glycol or C_2H_4O at ordinary or raised temps. and pressure and with optional presence or absence of bases, diluents, solvents or catalyzers. Examples are given.

Synthetic drugs. I. G. FARBENIND. A.-G. (Gustav Reddelien, Werner Müller and Georg Matzdorf, inventors). Ger. 503,134, July 13, 1929. Addn. to 484,996 (*C. A.* **24**, 1121). *N*-Hydroxyalkyl derivs of 4-amino-1-hydroxybenzene are prepd. by treating 4 hydroxyalkylamino-1-alkoxybenzene with H_2SO_4. Examples are given.

Sulfur-containing guanidine derivatives (pharmaceutical preparations). HERBERT SCHOTTE (to Chemische Fabrik auf Actien, vorm. E. Schering). U. S. 1,785,916, Dec. 23. β,β′-Diguanidodiethyl sulfide hydrobromide, m. 162-3°, readily sol. in water and less readily sol. in alc., is made by a process comprising effecting reaction of *S*-ethylisothiocarbamide-HBr with β,β′-diaminodiethyl sulfide. Details are also given of similar reactions of *S*-ethylisothiocarbamide-hydrobromide (and hydroiodide) with β-aminoethyl mercaptan, and of *S*-methyl-*N*,*N*′-dibenzoylisothiocarbamide with β,β′-diaminodiethyl sulfide in alc. (forming β,β′-di(*N*,*N*′-dibenzoylguanido)diethyl sulfide, a difficultly sol. powder). The products may be readily oxidized and are not resistant to concd. alk. solns. Cf. *C. A.* **25**, 304.

Protein-halogen-sulfur compounds. A.-G. FÜR MEDIZINSCHE PRODUKTE. (Ernst

Flater and Siegmund Frommer, inventors). Ger. 505,893, Aug. 7, 1926. To obtain the above medicinal products, blood serum is acted upon by a soln. of halogen and S in CS_2. Examples are given.

Extracting alkaloids. Georg Knoth. Ger. 500,294, June 28, 1929. Addn. to 497,630. The method of extg. alkaloids by steam distn. of an aq. mash described in 497,630 (*C. A.* **24**, 4121) is modified by incompletely distg. the alkaloid in the distg. column and obtaining the alkaloid from the liquid residues.

Mercury derivative of tetraiodofluorescein. Louis M. Roeg (to Brewer & Co.). U. S. 1,786,172, Dec. 23. Germicidal therapeutic compns. suitable for use on cuts and local infections comprise a neutral, stable alkali-metal salt of the mono-Hg deriv. of tetraiodofluorescein without any excess of alkali.

Antiseptics. F. Hoffmann-La Roche & Co. A.-G. Ger. 507,418, May 18, 1929. Tasteless and odorless antiseptics are prepd. by converting phenoxyphenols or their alkali salts into their carbonates or carbamates in the customary manner. Thus, hydroquinone phenyl ether in NaOH soln. may be treated with $COCl_2$ in C_6H_6. Examples are given.

Vitamin-rich products from yeast. Diamalt A.-G. Ger. 504,816, June 27, 1922. Yeast liquified with sugar without addn. of water is heated to 40–60° for several hrs. after which the temp. is raised to 85–110° for at least 1 hr.

Purifying harmine. E. Merck, Chem. Fab. Ger. 507,420, June 1, 1928. The crude alkaloid is treated in acid soln. at about 0° with a small quantity of $KMnO_4$.

Hormones. I. G. Farbenind. A.-G. Brit. 333,155, Feb. 5, 1929. The process described in Brit. 305,475 (*C. A.* **23**, 4778) for obtaining active substances from the whole hypophysis is modified by substituting for the hydrolysis by means of acid or alkali, a treatment with an enzyme, either by effecting autolysis or by the action of an added enzyme such as a suspension of *succus caricae papyaae*. Various details of modified procedures are described. Cf. *C. A.* **24**, 1938.

Fumigants for inhalation. T. W. F. Clark. Brit. 333,520, May 11, 1929. Active drugs for producing gases or vapors for inhalation are treated with a soln. of a fireproofing substance such as NH_4 phosphate, Na tungstate or NH_4Cl before admixt. with auxiliary substances for making compns in the form of powders, tablets or rods. An example is given of the use together of stramonium, lobelia, powd. tea and KNO_3, half the stramonium being satd. with a soln. of NH_4 phosphate and NH_4Cl and dried before admixt. with the other ingredients.

Sterilizing catgut sutures. R. Graf & Co., A.-G. Brit. 333,847, Dec. 14, 1928. After chem. sterilization by I in the usual way, suturing material is treated with a soln. contg. albumin or other protein (such as a meat broth) and then with alc., so that free I is removed and the material is rendered non-irritant. Various details of the treatment are given.

Dry preparation of surgical material such as catgut, etc. J. Pfrimmer & Co. Ger. 505,560, June 4, 1927.

Denicotinizing tobacco by fermentation. Neuerburg'sche Verwaltungsges. m. b. H. Ger. 507,194, June 30, 1927. The process is accelerated by irradiating the tobacco with light of short wave length (400 to 100$\mu\mu$). Addnl. details and examples are given.

18—ACIDS, ALKALIES, SALTS AND SUNDRIES

E. M. SYMMES

Chrome iron indispensable in nitric acid plant. E. St. P. Bellinger. *Chem. Met. Eng.* **37**, 691–2(1930).—Cr-Fe has many uses in NH_3-oxidation plants making 55–60% HNO_3. Addn. of about 18% Cr to low-C steel raises the resistance to corrosion but addn. of 1–8% helps little. C above 0.12% reduces the resistance. Small quantities of Si are essential. Heat treatment is an important factor. Tables and curves of losses of various samples of Cr-Fe in boiling 65% HNO_3 and its vapor are given. E. M. S.

The chamber process. XXI. Electric conductance method. Mototarō Matsui, Tadao Okamoto and Tōkichi Noda. *J. Soc. Chem. Ind. Japan* **33**, Suppl. binding 446–50(1930); cf. *C. A.* **24**, 4902.—N_2O_4 lost from the Gay-Lussac tower is due to excessive feeding of HNO_3. Automatic feeding devices exist (Bruno Waeser, Handbuch der Schwefelsäurefabrikation, 1018, 1930; cf. *C. A.* **24**, 3864). An automatic feed is described which depends upon nitrosity of the nitrose from the Gay-Lussac tower. Elec. resistance is influenced much more by variation in H_2SO_4 concn. than by nitrosity, so that the reaction N_2O_3 (from nitrose) + O_2 + H_2O = $2HNO_3$ was used. E. M. S.

Ammonium sulfate from gypsum. B. WAESSER. *Brennstoff-Chem.* **11**, 396–8, 418–20(1930).—Cost and production data are given and the outlook for two processes is discussed. F. W. JUNG

Dissociation of sodium chloride by steam in the presence of silica. E. BERL AND H. STAUDINGER. *Z. angew. Chem.* **43**, 1006–9(1930).—$2\ NaCl + H_2O + SiO_2 = Na_2SiO_3 + 2\ HCl - 68{,}820$ cal. The min. temp. for satisfactory yield is above 1000°. For 1 kg. NaCl about 20 kg. of steam is required. The ratio $NaCl\ 2 : SiO_2\ 1$ was used, but this can vary. Addn. of charcoal to the smelt, and one-third air to the steam, raises NaCl decompn. from 5.65 to 22.6% under given conditions. After 11 hrs. the smelt was free from NaCl. Dissocn. is rapid up to 90%. The max. yield was 97%, because of the volatility of NaCl. The process may be carried out in producer-gas generators operated at 1000–1100°. Addn. of CaO gives a continuous production of bottle glass. E. M. SYMMES

Determination of boiling points and distillation curves of hydrochloric acid-water mixtures. E. BERL AND H. STAUDINGER. *Z. angew. Chem.* **43**, 1019–22(1930).—Concd. HCl is used in the modern Willstätter-Bergius wood treatment, and in glass production from NaCl dil. HCl is formed (cf. preceding abstract). Boiling point and distn. curves of all strengths of dil. HCl were redetd. with the Berl-Samtleben app. (*C. A.* **16**, 2388). Tables of results do not differ markedly from those of Oemann (*C. A.* **19**, 594, 1615) and Carrière and Arnand (*C. A.* **19**, 1217). E. M. SYMMES

Properties and uses of helium. W. E. SNYDER AND R. R. BOTTOMS. *Ind. Eng. Chem* **22**, 1189–91(1930).—Helium is now available in com. quantities. Besides use in airships, He has possible uses in treatment of certain diseases when mixed with O_2, in metallurgy, because of high heat cond. as a heating or refrigerating medium, in easy septn. of solids formed by grinding, in drying, and in food preservation. The portable plant of the Helium Company is described. M. C. ROGERS

Physical characteristics and commercial possibilities of chlorinated biphenyl. CHESTER H. PENNING. *Ind. Eng. Chem.* **22**, 1180–2(1930).—Phys. properties of 2- and 4-chlorobiphenyl are given. Properties of the more highly chlorinated Ph_2 compds. (Aroclors) are also given. Increasing Cl content gives increase in viscosity, change in color from water-white to amber, and rise in m. p., b. p. and sp. gr. The heavier Aroclors will not ignite below their b. ps. Aroclor oils are non-drying and do not oxidize appreciably in air. Continued heating and cooling apparently do not change their properties. Com possibilities are in protective coatings, flame-proofing, molding compds., elec. insulation, adhesives, printing inks and artificial leather. M. C. ROGERS

Mining amosite asbestos in the Pietersburg District, South Africa. W. KUPFERBURGER. *Eng. Mining J.* **130**, 571–4(1930).—Amosite is an amphibole asbestos contg. principally Fe^{++} and SiO_2, with variable amts. of Al, CaO and MgO. In character of fibers, amosite closely resembles chrysotile. It is used extensively in 85% magnesia insulation products, in laggings and packings, in felted insulation products, in the manuf. of roofing shingles, and for asbestos cement board. W. H. BOYNTON

Feldspar in 1929. OLIVER BOWLES AND JEFFERSON MIDDLETON. Bur. Mines, *Mineral Resources of the U. S. 1929*, Pt. II, 83–93(preprint No. 8, published October 21, 1930). E. H.

Gypsum in 1929. R. M. SANTMYERS AND JEFFERSON MIDDLETON. Bur. Mines, *Mineral Resources of the U. S. 1929*, Pt. II, 105–18(preprint No. 10, published October 29, 1930). E. H.

Magnesium and its compounds in 1929. PAUL M. TYLER. Bur. Mines, *Mineral Resources of the U.S. 1929*, Pt. II, 119–39(preprint No. 11, published November 20, 1930). E. H.

Plastic cements, especially dental cements. OTTO RUFF, CURT FRIEDERICH AND WOLF ASCHER. *Z. angew. Chem.* **43**, 1081–7(1930).—To learn about the requirements the com. dental cements were tested. In both so-called phosphate and silicate cements, formation of phosphate is essential to hardening. The degree of plasticity depends mainly upon the relation of viscosity of the fluid and particle size of the powder. Improved cements comprised $ZnSiF_6$ or $MgSiF_6$ in place of phosphoric acid, and as powders BeO, ZnO and in part Al_2O_3. Others comprised oxides or silicates of rare earths, *e. g.*, a powder made by calcining at 1400° mol. proportions of La_2O_3 and SiO_2, chilling, and mixing the fine powder with Zn phosphate, with or without phosphoric acid. Hardening is accompanied by SiO_2 gel formation. E. M. SYMMES

Ornamental grasses and leaves. FRED. GROVE-PALMER. *Textile Colorist* **52**, 526–8, 559(1930).—Various treatments are described for preserving and ornamenting natural grasses, flowers and leaves. Directions are given for removing the natural

color by org. solvents, or bleaching with the usual reagents. Basic, acid and substantive dyes may be used; a few specific ones are suggested. The application of cellulose lacquers and electroplating are described. R. K. WORNER

Evaporating bore-hole water (KONSTANTINOV, *et al.*) **22.** NH_4 phosphate fertilizer and Na bicarbonate (Brit. pat. 332,864) **15.** The state of water and the active surface of Japanese acid clay (TANAKA, NAKAMURA) **2.**

Boric acid. CHEMISCHE FABRIK GRÜNAU LANDSHOFF & MEYER A.-G. Ger. 504,825, Oct. 23, 1929. B minerals contg. Mg are treated with H_2SO_4 and the H_3BO_3 is partly sepd. by cooling the soln. The $MgSO_4$ in the mother liquor is sepd. by evapn. and super satn. of the liquor with Na_2SO_4, the $MgSO_4$ being sepd. as a double Mg-Na sulfate. Na_3BO_3 or a B mineral such as kernite or rasorite, together with H_2SO_4, may be used instead of Na_2SO_4. The liquor so purified is rich in H_3BO_3.

Chromic acid. MARVIN J. UDY (to Electro Metallurgical Co.). U. S. 1,784,950, Dec. 16. An impure Na_2CrO_4 soln. or other solns. contg. sol. salts of chromic acid are treated with Pb sulfate to form Pb chromate, the latter is sepd. and is decompd. with H_2SO_4 of such a concn. (suitably about 50° Bé.) as to directly ppt Pb sulfate and simultaneously form a soln. of chromic acid substantially free from dissolved salts; the Pb sulfate is sepd. and the chromic acid recovered from the soln. Cf. *C. A.* **24,** 793.

Hydrocyanic acid. I. G. FARBENIND. A.-G. (Reinhold Fick, inventor). Ger. 476,662, Dec. 20, 1924. HCN is prepd by heating CH_2O to above 400° for less than 1 sec. ($^1/_{10}$ sec. is mentioned). Water-sepg., non-metallic catalyzers such as $AlPO_4$ may be present and the pressure reduced. Examples are given.

Hydrocyanic acid. I. G. FARBENIND. A.-G. (Eduard Münch and Fritz Nicolai, inventors). Ger. 477,437, Apr. 11, 1926. Addn. to 476,662 (preceding abstr.). The method of 476,662 for forming HCN from CH_2O or $HCOONH_4$ is modified by leading the vapor of the CH_2O or $HCOONH_4$ through metal tubes over metal catalyzers at temps. above 300°. Examples are given. Cf. *C. A.* **24,** 1185.

Phosphoric acids. SOC. D'ÉTUDES SCIENTIFIQUES ET D'ENTREPRISES INDUSTRIELLES. Fr. 686,402, Dec. 10, 1929. P in gases contg. CO, particularly in the vapors coming from the reduction of natural phosphates with C in the presence of SiO_2 or Al_2O_3, is oxidized by means of HNO_3 or nitrous vapors at 60–70° so as to oxidize the P practically completely without altering the CO. Substances such as phosphoric acid capable of favoring absorption of the P_2O_5 produced by the oxidation may be mixed with the HNO_3.

Nitric acid concentration. J. L. BENNETT (to Hercules Powder Co.). Brit. 333,264, Oct. 26, 1928. A mixt. of aq. HNO_3 and a dehydrating material such as H_2SO_4, H_3PO_4 or anhyd. Na_2SO_4 is passed in counterflow with a mixt. of steam and HNO_3 vapor to effect partial denitration of the former mixt.; the partially denitrated mixt. is heated to generate steam and HNO_3 vapor and a portion of the generated steam is used to denitrate further quantities of the acid mixt.; HNO_3 is sepd. from the balance of the steam generated, and the quantity of steam passing into the tower in which counterflow takes place is sufficiently limited to avoid unnecessary diln. of the concd. HNO_3. Various details of app. and its operation are described.

Concentrating nitric acid. HENRI A. M. G. MORIN. Fr. 686,543, Dec. 11, 1929. An app. either for concg. HNO_3 and simultaneously reconcg. the H_2SO_4 used, or for sepg. a sulfonitric mixt. into its elements, HNO_3, H_2SO_4, and water, has one column for the distn. of the HNO_3 and a second for the elimination of steam. It is heated over a furnace with injection of steam.

Separating sulfuric and nitric acids. I. G. FARBENIND. A.-G. (Christoph Beck and Helmut Weissbach, inventors). Ger. 507,317, Nov. 29, 1928. See Fr. 684,430 (*C. A.* **24,** 5440).

Sulfuric acid. METALLBANK AND METALLURGISCHE GES. A.-G. (Hans Woisin, inventor). Ger. 469,011, Oct. 21, 1927. Addn. to 370,369. Details are given of the contact and mixing chambers in the prepn. of H_2SO_4 from SO_2-contg. gases and O. Cf. *C. A.* **24,** 2248.

Acid- and alkali-proof containers. FRITZ AHRENS and HARZER ACHSENWERKE G. M. B. H. BORNUM AM HARZ. Ger. 484,894, May 19, 1925. Metal containers are rendered acid- and alkali-proof by coating with two layers of rubber, the under layer contg. a colloidal soln. of acid or acid-yielding material, *e. g.*, acid cellulose. The substance rubber surrogate (contg. oils sulfurized by S_2Cl_2) may also be used.

Gas-treating apparatus suitable for ammonia absorption, etc. WM. L. SPALDING (to National Aniline & Chemical Co.). U. S. 1,785,792, Dec. 23. A system is arranged

for circulating liquid in a cyclic path and for admitting hot gases into an upwardly circulating portion of liquid in the system to promote circulation and means is provided for cooling the upper part of this portion of liquid. Various details of app. arrangement are described.

Alkali metal carbonate and barium sulfate, etc. INTERNATIONAL INDUSTRIAL & CHEMICAL CO., LTD. Brit. 333,834, Nov. 21, 1928. See Fr. 678,977 (*C. A.* **24**, 3612).

Alkali orthophosphates. I. G. FARBENIND. A.-G. (Robert Griessbach and Adolf Rossler, inventors). Ger. 504,812, Mar. 10, 1926. In producing mono alkali orthophosphates by heating alkali chlorides with H_3PO_4, the reaction takes place between temps. of 120° and 250° and in a current of steam. Alkali sulfates or bisulfates or H_2SO_4 may be added. In an example, a mixt. of KCl and H_3PO_4 in mol. proportions 1:2 is heated to 180–185° in a current of steam for 1 hr. A 98.7% yield of HCl can be condensed and a product $KH_2PO_4.H_3PO_4$ seps. out. Other examples are given. Cf. *C. A.* 24, 4125.

Treating crude phosphate. CHEMIEVERFAHREN-GES. Brit. 333,797, May 28, 1928. See Fr. 682,028 (*C. A.* **24**, 4361).

Soluble phosphates. COMPAGNIE GÉNÉRALE DES SUPERPHOSPHATES PYRÉNÉES (Soc anon.). Fr. 686,502, Dec. 12, 1929. Sol. phosphates are made by subliming the P_2O_5 obtained by heating natural phosphates with SiO_2 at a high temp. in rotating furnaces, condensing and dissolving the P_2O_5 in known absorption app. and converting the phosphoric acid obtained to the mono- and di-Ca phosphates. The slag from the furnace is ground and added to the phosphates.

Superphosphate. L. ADELANTADO. Brit. 333,518, May 9, 1929. Superphosphate is rendered neutral to methyl orange by treatment with aq. or gaseous NH_3, lixiviated with water (which may be slightly acidified with H_2SO_4) and from the resulting liquor there may be crystd. mono-Ca phosphate admixed with some di-Ca phosphate, NH_4 phosphate and $(NH_4)_2SO_4$, and the crystals can be freed from NH_4 salts by washing. In a modified process, the Ca of the leach liquor may be pptd. while hot with H_2SO_4, the soln. of H_3PO_4 obtained purified with alc., filtration and distn. of the alc. or alk. sulfates may be added for production of alkali phosphates. Cf. *C. A.* **24**, 2230.

Cupricyanide compound. I. G. FARBENIND. A.-G. (Hermann Hagenest and Friedrich W. Stauf, inventors). Ger. 505,631, Sept. 4, 1928. See Fr. 680,690 (*C. A.* 24, 4127).

Alumina. TSUNEO SUZUKI, HIROSHI TANAKA and TORAO KURITA (to Zaidan Hojin Rikagaku Kenkyujo). U. S. 1,785,464, Dec. 16. Impure alumina contg. Si, Fe, ferro Si and Fe oxides as impurities is heated with a carbonaceous reducing agent such as charcoal to reduce the major portion of any Fe oxide present and the alumina is then treated with Cl and CO at an elevated temp. to remove volatile chlorides of Fe and Si.

Alumina. URBAIN B. VOISIN. Ger. 505,517, Dec. 23, 1928. Aluminiferous material such as bauxite is treated with H_2SO_4 and fluorides to produce crude $Al_2(SO_4)_3$ free from SiO_2. The crude $Al_2(SO_4)_3$ is treated with lime water and the pptd. $Al(OH)_3$ taken up with NaOH and worked up to Al_2O_3 in the usual way. Cf. *C. A.* **24**, 473.

Aluminum oxide. NORTON CO. Brit. 332,902, April 27, 1929. Al oxide substantially free from impurities such as Fe, SiO_2 and Ti is obtained by fusing aluminous materials such as calcined bauxite with C, Fe and Al sulfide (the latter not exceeding 3% the quantity of the aluminous material), the Al sulfide being preferably produced in the furnace by adding an Fe sulfide such as Fe pyrites. Some Al carbide, Al suboxide, metallic Al and ferro-Al are also produced, and the non-metallic part of the product is disintegrated (preferably by satd. steam), the fine material is dried, screened and subjected to magnetic sepn. and may then be treated with dry Cl at 500° to remove non-aluminous metals and $AlCl_3$. Any Ca remaining is removed by use of dil. acids.

Aluminum sulfate and nitrate. M. BUCHNER. Brit. 333,835, Nov. 24, 1928. For producing $Al_2(SO_4)_3$, $Al(NO_3)_3$ (which may be in the solid state) is treated with H_2SO_4 (preferably concd.) at temps. up to 300° (suitably either under reduced pressure or with introduction of air or steam). Various details are given for prepg. the $Al(NO_3)_3$. *App* may be used made of an alloy of Fe and Cr or Fe, Cr and Ni alloys such as "V2A."

Ammonium chloride. J. I. BRONN and CONCORDIA-BERGBAU A.-G. Brit. 333,098, Oct. 4, 1929. See Fr. 682,572 (*C. A.* **24**, 4594).

Ammonium sulfate and alkali sulfate. FERDINAND STEIN. Ger. 497,611, Nov. 12, 1924. Solns. to be used for the prepn. of $(NH_4)_2SO_4$ and alkali sulfate or their double salts are obtained by treating mineral salts contg. Na salts with excess of NH_3 and CO_2. The resulting liquid contains $(NH_4)_2CO_3$ and carbonates or bicarbonates of Na, Ca,

Mg, etc., which are worked up to sulfates. In the example, glauberite is treated with NH_3 and CO_2, giving a ppt. of $CaCO_3$ and Na_2CO_3 and a mother liquor contg. 26.5% $(NH_4)_2SO_4$, 5.1% $NaHCO_3$, 2.4% Na_2SO_4 and 66% water.

Calcium-alkali phosphates. A. MESSERSCHMITT. Brit. 333,805, Oct. 23, 1928. In production of Ca-alkali phosphates from raw phosphate mixts. as described in Brit 300,961 (*C. A.* **23**, 4027), with use of alkali sulfate and C, sufficient C is used completely to reduce the alkali sulfate and the mixt. of raw materials is so proportioned as to contain sufficient acidic compds. such as silica to bind any free alkali or alk. earth bases, so that the S is recovered in elemental form and a product is obtained which is free from sulfides.

Calcium cyanamide. I. G. FARBENIND. A.-G. Brit. 333,353, July 1, 1929. Ca cyanamide is rendered free from dust and non-caustic by mixing it with a solid NH_4 salt such as NH_4NO_3 or with solid phosphoric acid. Liberated NH_3 may be removed by heating to not above 150°. Various modifications of procedure are described. Cf. *C. A.* **24**, 5442.

Dicalcium phosphate. ERICH THILO (to Adolf Heicke). U. S. 1,786,097, Dec. 23. See Fr. 677,191 (*C. A.* **24**, 3091).

Solid carbon dioxide. K. C. PEGGS. Brit. 333,212, May 6, 1929. Liquid CO_2 is admitted through a valve into one end of a chamber closed at its other end by a block of solid CO_2 formed by the reduction of pressure on gas previously admitted and the block of solid CO_2 is progressively moved forward under the pressure behind it in a regulated manner. Various details of app. and operation are described.

Storage and transportation of solid carbon dioxide. CHARLES L. JONES and JOHN D. SMALL (to Dryice Equipment Corp.). U. S. 1,786,161, Dec. 23. Blocks of solid CO_2 are placed in a container such as a balsa-wood box together with addnl. solid CO_2 in such state of subdivision and so located in the container that most of it will evaporate before the shapes of the blocks are seriously impaired

Carbon disulfide. I. G. FARBENIND. A.-G. Brit. 333,090, Nov. 17, 1928. Retorts used for CS_2 manuf. are maintained free from slag-like residues, left after consumption of charcoal, by adding inert infusible substances (such as bauxite, pyrites, pumice, fire brick, clinkers, sand or coke) which mix with the charcoal slag to form a hard, easily removable mass. Cf. *C. A.* **24**, 4594.

Apparatus for chemical reactions such as carbon disulfide production. THOMAS GRISWOLD, JR. (to Dow Chemical Co.). U. S. 1,785,080, Dec. 16. An app. is described comprising an externally heated vertically disposed tubular reaction chamber, an externally heated vertically disposed tubular vaporizing vessel, and an externally heated horizontally disposed clean-out chamber below the reaction chamber and vaporizing vessel, sep. therefrom but in communication.

Magnesium chloride. I. G. FARBENIND. A.-G. Brit. 333,741, Oct. 4, 1928. Anhyd. $MgCl_2$ is obtained by the reaction of substances such as $MgCO_3$, MgO or $Mg(OH)_2$ with C and Cl by passing the Cl in uniform distribution through a loose mixt such as pieces of magnesite and pieces of wood or peat charcoal, at a temp. above the m. p. of $MgCl_2$, and immediately removing the molten $MgCl_2$ formed in a direction opposite to the flow of the Cl. App and various details of procedure are described Cf. following abstr.

Magnesium chloride. I. G. FARBENIND. A.-G. Ger. 502,646, Jan. 16, 1926. Anhyd. $MgCl_2$, alone or mixed with other salts, is prepd. by treating a fused mass contg. MgO or $MgCO_3$ and $MgCl_2$ and optionally other salts with gaseous HCl, $COCl_2$ or Cl and CO. The fused mass is allowed to flow freely over the filling bodies of a heated irrigating tower against a countercurrent of gas. Examples are given.

Chlorides. I. G. FARBENIND. A.-G. (Robert Suchy, Karl Staib and Wilhelm Moschel, inventors.) Ger. 509,601, Apr. 25, 1928. Addn. to 502,646. The method of 502,646 (preceding abstr.) is applied to the production of anhyd. oxide-free chlorides, especially $MgCl_2$, by fusing the oxide (*e. g.*, MgO) by elec. heating in an irrigating tower up which Cl is passed.

Nitrous oxide from ammonia. I. G. FARBENIND. A.-G. (Leo Schlecht and Alfred von Nagel, inventors). Ger. 503,200, Apr. 26, 1929. Addn. to 498,808. In the prepn. of N_2O by the oxidation of NH_3 at 200–500° as described in 498,808 (*C. A.* **24**, 4595), the current velocity of the gases is regulated so that the formation of NO and higher oxides of N is hindered. Catalyzers contg. Fe_2O_3, Bi_2O_3 and MnO_2 are used. Cf. *C. A.* **24**, 4362.

Phosphorus pentoxide. BAYERISCHE STICKSTOFF-WERKE A.-G. Ger. 506,543, May 29, 1929. P_2O_5 or H_3PO_4 and H are produced from P, PH_3 or lower oxidation products of P and H or P and H_2O by heating to high temps., *e. g.*, 450°, at ordinary

pressures over contact agents and in the presence of added H. In the examples, PH_3 and H_3PO_2 are used as the starting materials, and H is added at the rate of 10 l./hr.

Apparatus for crystallizing sodium carbonate or other substances. IMPERIAL CHEMICAL INDUSTRIES, LTD., and H. E. COCKSEDGE. Brit. 333,598, April 18, 1929. A soln. of the material to be crystd. is circulated down the center of a vessel provided with an annular partition and up through the annular space by a propeller, and crystals which have attained the desired size are removed through an elutriating tube attached to the bottom of the vessel. Various details of the app. and its operation are described.

Sodium sulfate. KALI-FORSCHUNGS-ANSTALT G. M. B. H. Ger. 505,891, and 505,892, May 18, 1923. A strakanite pptd. as in 445,608 or double salts pptd. in a similar way are stirred with rock salt at low temps., Na_2SO_4 and the resulting lye are used for the pptn. of further double salts with Na_2SO_4 (505,891). Thus, crude astrakanite is stirred with NaCl in water at 0° to give Na_2SO_4 and a lye contg. NaCl, $MgCl_2$ and $MgSO_4$. The double salt may be dissolved in hot water and the Na_2SO_4 obtained by crystn. (505,892).

Stannic hydroxide gel, etc. J. J. ETRIDGE and IMPERIAL CHEMICAL INDUSTRIES, LTD. Brit. 333,670, June 5, 1929. Stannic hydroxide gel is made by delayed pptn. of a soln. contg. a stannic salt by gradual addn. of NH_3 with const. stirring. Substances such as NH_4 vanadate may be added for the production of a mixed product contg. catalytic oxides such as those of V, and a product may be obtained suitable, after activation at 600°, for use as a catalyst in oxidizing SO_2.

Sulfur dioxide. AKTIESELSKAPET MALMINDUSTRI. Ger. 469,781, Nov. 1, 1927. Solns. of SO_2 are prepd. by absorption of SO_2 or roast-gases in liquids, under pressure. If roast gases are used, the air is admitted into the roasting furnace under pressure.

Furnaces for the production of sulfates and hydrochloric acid. HERMANN FRISCHER. Fr. 686,419, Dec. 11, 1929. Carbides, particularly SiC, corundum or substances having a basis of SiC, are used for the construction of muffles and elements such as pipes and agitators for furnaces used for the production of acids or acid substances or sulfates.

Rotary drum furnace for roasting sulfurous ores, etc. METALLGESELLSCHAFT A.-G. (Hans Klencke and Wilhelm Sonnemann, inventors). Ger. 505,863, Feb. 5, 1927. Details of construction.

Active carbon. METALLGESELLSCHAFT A.-G. Ger. 499,791, Dec. 14, 1924. C soaked with water is heated to glowing in a limited supply of air. Cf. *C. A.* **24**, 2558.

Active carbon. OSKAR SCHOBER. Ger. 506,424, Jan. 28, 1928. Addn. to 488,944 (*C. A.* **24**, 2255). The method of producing active C by heating carboniferous material to 500–800° in oxidizing gas (488,944) is modified by using a gas mixt. in which the partial pressure of the O is 38–115 mm. of Hg, and of the steam 76–380 mm., *i. e.*, a mixt. contg. at atm. pressure, 5–15% O and 10–15% steam, by vol. Cf. *C. A.* **24**, 3614.

Active carbon. CHEMISCHE WERKE CARBON G. M. B. H. Ger. 506,522, June 11, 1927. Carboniferous material is mixed with powd. sulfides and wood tar, molded, dried and heated to glowing. The wood tar may be mixed with sulfide solns. The molded product may be subjected to the action of activating gases during heating.

Active carbon. I. G. FARBENIND. A.-G. Fr. 686,322, Dec. 9, 1929. Active C is prepd. in grains by mixing a carbonaceous material with an org. binder such as gas tar and 2 inorg. substances, one of which is a non-hydraulic binder such as clay or kaolin while the other is chosen to lower the fritting temp. of the inorg. binder below 1000°, as is the case with NaOH or KOH. The mixt. is molded under pressure and heated and activated by gas or steam.

Cadmium. METALLGESELLSCHAFT A.-G. Ger. 505,582, June 19, 1929. Pure Cd is prepd. by heating anhyd. $CdCl_2$ with metallic Zn or Zn-Cd. The Zn may be stirred into fused $CdCl_2$ and the temp. so arranged that the $ZnCl_2$ formed distils off. In the case the temp. is kept at 400° for 1½ hrs. for Cd contg. 0.07% Zn is obtained.

Froth flotation concentration of feldspar. JOHN C. WILLIAMS and OMER W. GREEMAN (to Aluminum Co. of America). U. S. 1,785,992, Dec. 23. In concg. fluorspar values in fluorspar ore contg. substantial amounts of calcite, most of the slimes are removed, and a pulp is formed of the deslimed ore with oleic acid and a modifying agent such as cresylic acid to decrease the calcite-lifting properties of the froth.

Purifying materials such as quartz or feldspar, etc. CECIL R. B. YOUNG. U. S. 1,786,284, Dec. 23. The disintegrated material is treated with a liquid contg. H_2SO_4, HCl and oxalic acid to dissolve Fe, Mn, etc.

Decomposing siliceous minerals such as spodumene and feldspar. P. E. BILLINGHURST. Brit. 333,076, Sept. 9, 1929. The powd. material is forced by an air blast or current of steam along a feed tube and through a tube which may be of inverted U shape heated by a bath of molten metal to a temp. of 1500–1800° to volatilize alkalies,

An elec. induction furnace may be used and the material may be preheated to about 450° by an auxiliary heater. Infusible silicates are collected by settling in a tower and alkali is absorbed by water flowing over baffles. App. is described.

Fused silica articles. QUARTZ & SILICE SOC. ANON. Ger. 507,079, Feb. 16, 1927. See Brit. 266,711 (*C. A.* **22**, 849).

Treating limestone, etc. BAMAG-MEGUIN A.-G. Ger. 497,806, July 11, 1928. Limestone, carbonates and similar foaming acid-sol. substances are treated with solvent, *e. g.*, HNO_3, and the gases evolved are sucked into a container of liquid which can be used afterward as the solvent for further limestone, etc.

Condensation product from *m*-cresol and acetone. SCHERING-KAHLBAUM A.-G. (Walter Schoeller, Hans Jordan and Reinhard Clerc, inventors). Ger. 499,436, Oct 11, 1927. Addn. to 494,508 (*C. A.* **24**, 3517). The condensation is carried out in the cold.

Urea-furfurol condensation products. HANS KAPPELER. Ger. 507,419, July 12, 1928. See Brit. 293,872 (*C. A.* **23**, 1729).

Vegetable adhesive. IRVING F LAUCKS and GLENN DAVIDSON (to I. F. LAUCKS, Inc.). U. S. 1,786,209, Dec. 23. An adhesive which is suitable for use with veneers comprises the reaction products of a vegetable protein-contg. meal such as soy-bean meal, an alk. medium such as NaOH and a small proportion of a Zn compd. such as $ZnSO_4$.

Adhesive films and sheets. R. ARNOT. Brit. 333,194, Feb 27, 1929. Synthetic resins in the reactive state are used with carriers which may be initially solid or initially liquid and subsequently become solid, without addn. of solvents other than those present in, or resulting from, the manuf. of the components. The hydrophile resins made as described in Brit. 290,327 (*C. A.* **23**, 1002) are especially suitable for this use, and the solid carrier used may be paper, sheets of woven paper strands, cloth, asbestos paper or sheets, wood-pulp sheets, "cellulose," glass wool or fine wire netting. In drying the sheets the temp. must not exceed the setting point of the resin (a temp. of 60° usually being sufficient). Softeners, plasticizers, metal powders, etc., may also be added. The synthetic resins also may be mixed with materials such as viscose, cellulose acetate or nitrocellulose which in their initial state contain substances serving as solvents for the resin such as excess alkali in the viscose or HOAc in the cellulose acetate, and the mixts. formed into films. The films may be used as adhesives for uniting articles under the action of heat and pressure to convert the synthetic resin into insol. and infusible form. Numerous details, examples and modifications are described. Cf. *C. A.* **24**, 4597.

Plastic compositions such as putties and priming compositions. I. G. FARBENIND. A.-G. Brit. 333,304, May 14, 1929. A cellulose deriv. such as nitrocellulose or the like is kneaded with 3–10 times its wt of fillers such as slate meal and lithopone in the presence of softening agents and resins (such as dibutyl phthalate and gum mastic) and either without solvents or with easily volatile solvents, such as benzene and acetone, in quantity not exceeding 10% of the solids which disappear during the mixing, so as to produce a relatively dry mass, and the latter is prepd. for use by mixing with an org solvent such as BuOAc or glycol ethers, etc.

Paste for use on windows to prevent dimming by moisture. H. E. GRIFFITHS Brit. 332,966, Oct. 10, 1929. Soap (preferably carbolic soap) 1.25 lb. is mixed with glycerol 2 teaspoonfuls, water 1 pint and with spirit varnish or acetone to serve as a drying agent.

Waterproof cement. S. A. I. G. (Soc. ANON. INVENZIONI GUADAGNIN). Fr 686,193. A waterproof insulating cement is made from washed sand, plaster, resin, Al_2O_3, linseed oil and water.

Friction surface material of compressed cork. HERMAN F. BUSCH (to Armstrong Cork Co.). U. S. 1,786,190, Dec. 23. A material suitable for covering loom take-up rolls is formed with integral projections forming an irregular frictional surface, the planes of compression of the cork granules being at an angle to the working surface at the top of the projections.

Friction material for automobile brakes, clutches, etc. IZADOR J. NOVAK (to Raybestos-Manhattan, Inc.). U. S. 1,785,701, Dec. 16. Fibrous asbestos and a hardenable binder such as a rubber compn. are mixed to form a readily malleable mass through which the fibers are distributed and the mass is extruded through a die to form a non-laminated strip of the desired cross-section in which the fibers run in all directions; the product is dried to produce a flexible porous mass of somewhat greater thickness than that desired in the completed article, and the material is compressed and hardened. Cf. *C. A.* **24**, 4365.

Forming and curing brake bands, etc., comprising indurating material such as synthetic resin. THOMAS M. RUSSELL (to Russell Mfg. Co.). U. S. 1,785,391, Dec. 16. Various details of mech. and heat treatment are described.

Liquids for use in hydraulic brake systems, presses, lifting devices or other hydraulic apparatus. I. G. FARBENIND. A.-G. Brit. 333,200, April 26, 1929. Various glycols are mixed with sulfonation products of org. compds. contg. at least 6 C atoms in the mol. such as Turkey-red oils, sulfonic acids of castor oil, of oleic acid or propylated or butylated naphthalene, or of mineral or tar oils or their distn. residues; and there also may be added other substances such as alcs., water, ethers of glycols, etc. The mixts. are suitable for use at low temps.

Mixing fiber and fillers with bituminous material. CARL P. NELLIS and ARTHUR H. FLOWER (to Inland Mfg. Co.). U. S. 1,785,910, Dec. 23. Bituminous materials of different m. ps. are separately melted; the material of lower m. p. is passed as a relatively flat stream into a container while fibrous material such as cotton fiber is distributed on it; the bituminous material of higher m. p. is passed into the container as a similar stream to which finely divided filler such as diatomaceous earth is added, and the combined materials are kneaded to form a homogeneous mixt. suitable for making *molded battery boxes*, etc.

Porous fibrous products such as flower pots. DANIEL M. SUTHERLAND, JR. (to Better Packages, Inc.). U. S. 1,785,101, Dec. 16. Products such as flower pots or filters are formed of fibrous material such as paper fibers with interstices between the fibers and with a deposit of red gum serving as a binder for the fibers.

Light filter. CLARENCE E. GREIDER (to National Carbon Co.). U. S. 1,786,205, Dec. 23. A light filter which is transparent to ultra-violet rays to about 2900 A. U. comprises a film of a polymerized vinyl compd. such as polymerized vinyl acetate reënforced with a reticulated material such as wire mesh or woven fabric. The material is suitable for glazing windows.

Sound records. R. H. CHESTER. Brit. 333,175, May 3, 1929. Records are formed with 2 outer transparent plies such as transparent celluloid and a plurality of inner plies, 2 of which are formed of paper, carrying printed matter, sepd. by one or more opaque plies such as a core of opaque celluloid.

Sound records formed with magnetic powder. F. PFEUMER. Brit. 333,154, Feb. 5, 1929. Powd. magnetic material (such as may be prepd. by mixing an org. binder like molasses or sugar with soft iron powder and heating to effect caramelization, carbonization and conversion of the metal to steel, followed by quenching to effect hardening, drying and regrinding) is applied to a backing strip such as a cinematograph film. Iron contg. H prepd. electrolytically or ferro-Si or other suitable alloy of Fe or Ni also may be used.

Magnetic cores of loading coils, etc. GUSTAF W. ELMEN (to Bell Telephone Laboratories, Inc.). U. S. 1,784,827, Dec. 16. Cores of high initial permeability, high constancy of permeability and low hysteresis loss are formed of sep. portions of hard steel and an alloy of Fe and Ni such as "permalloy." Cf. *C. A.* **24**, 3209.

Magnetic material for transformer cores. WIEBOLD F. BRANDSMA, POPKO R. DIJKSTERHUIS, GERARDUS J. SIZOO and GOTTFRIED B. JONAS (to Radio Corp of America). U. S. 1,785,246, Dec. 16. Magnetic material such as plates contg. 50% Ni is partially decarbonized and partially oxidized to such an extent that the hysteresis curve is substantially straight.

Extrusion mold for bituminous materials such as that for conduits, expansion joints, etc. ANTHONY J. PFOHL. U. S. 1,785,457, Dec. 16. Structural features of a mold formed in part of Babbitt metal and which may be heated.

Stencil sheet. SHINJIRO HORII. U. S. 1,785,260, Dec. 16. A base of fibrous material such as Yoshino paper is coated with a compn. comprising a soln. of esters of polysaccharides, tempering agents and stabilizing coloring substances such as chrome yellow, toluidine red or Bismarck brown lakes which absorb the ultra-violet rays of the sunlight. Cf. *C. A.* **25**, 178.

Cleaning composition. WILHELM J. A. HUYZER. Fr. 686,170, Dec. 5, 1929. A cleaning compn. particularly for metals contains, *e. g.*, finely powd. magnesite 700, mineral oil 150, olein 30, denatured alc. 60, ammoniac 60 g. and thymol 1 drop.

Detergent composition containing volatile hydrocarbon material. LESTER KIRSCHBRAUN (to Frank L. Belknap). U. S. 1,786,249, Dec. 23. A volatile hydrocarbon material such as gasoline is dispersed in an aq. medium with a water-sol. saponaceous emulsifying agent to form a substantially permanent emulsion with the hydrocarbon as dispersed phase; the product is homogenized and has a viscosity suitable for extrusion from a tube.

Paint- and varnish-remover. JOSEPH J. MCEVOY and CHARLES H. UPSON. U. S. 1,785,417, Dec. 16. A mixt. is formed from ingredients such as NaOH 10.45, 40–42° Bé. water glass 9.14, water 69.55, copperas 0.71 and flour 10.15 parts.

Zinc-block treatment for preparing printing plates. FRIEDRICH ULLMANN. U. S. 1,785,606, Dec. 16. Zn blocks for carrying light-sensitive layers contg. Cr are preliminarily treated with an $AlCl_3$ soln., in order to prevent undesirable action of the plate on prepns. applied to it.

Dental cement. O. SIMON. Brit. 333,325, May 27, 1929. Water-repelling substances such as paraffin oil, wax, bitumen or castor oil are used as ingredients in making dental cements of the silicate or Zn phosphate types, and are incorporated with the acid used or with salts of Al, Ca, Mg, etc. Examples are given.

Plates for dental and medical uses. WALTER HENGSTMANN. Ger. 499,676, Aug. 18, 1929. The plates are made of a mixt. of cellulose ether, resin, synthetic resin and aliphatic dicarboxylic acids.

Chewing gum. CANADIAN ELECTRO PRODUCTS CO., LTD. Ger. 506,381, Oct. 30, 1927. See Brit. 280,247 (*C. A.* **22**, 3026).

Rat poisons. C. BALL. Brit. 333,216, May 6, 1929. A paste is formed contg. finely divided Zn phosphide dispersed in an oily or fatty vehicle such as benzoated lard or tallow, cottonseed oil, olive oil or mineral oil, and various other substances may be added such as baked maize meal, dried fish, fish meal, middlings, or crushed maize. Brit. 333,218 relates to poisons of similar compn. in the manuf. of which the poison ingredient is caused to adhere to the surface of cereal particles used with a minor proportion of an oily or fatty substance, so that the product is in the form of sep. non-coherent particles.

Fireproofing. I. G. FARBENIND. A.-G. (Rudolf Engelhardt, inventor). Ger. 507,104, May 3, 1927. Addn to 503,673. The material (*e. g.*, fabric) is treated with halogenated aromatic esters of H_3PO_3 and H_3PO_4, instead of the anilides of these acids, as mentioned in 503,673 (*C. A.* **24**, 6035). Trichlorophenyl phosphite is mentioned.

Fire extinguisher. ERWIN MÜLLER and NEUFELDT & KUHNKE G. M. B. H. Ger. 506,530, Oct. 31, 1926. The quenching fluid is a non-conductor of electricity, *e. g.*, CCl_4 or other hydrocarbon-halogen compd. driven out by compressed gas. The gas and fluid are sepd. by a liquid such as glycerol.

Apparatus for producing fire-extinguishing foam. FISHER L. BOYD (to National Foam System, Inc.). U. S. 1,785,723, Dec. 16. Structural features.

19—GLASS, CLAY PRODUCTS, REFRACTORIES AND ENAMELED METALS

G. E. BARTON AND C. H. KERR

Reactions in the melting of glass batches. G. TAMMANN AND W. OELSEN. *Z. anorg. allgem. Chem.* **193**, 245-69(1930).—The reactions for typical soda, lead and sulfate glass batches were detd. by means of heating curves combined with analytical data. For the soda glass 1000 parts of SiO_2, 400 parts of $CaCO_3$ and 300 parts of Na_2CO_3 were used. In the reaction the double carbonate $CaNa_2(CO_3)_2$ is first formed, beginning at about 600°. This is accompanied by evolution of CO_2. The eutectic of Na_2CO_3 and $CaNa_2(CO_3)_2$ then commences to melt and SiO_2 begins to react with this, more CO_2 being liberated with the formation of CaO and Na_2O. For the Pb glass Pb_3O_4, SiO_2 and K_2CO_3 are used. O_2 is first evolved (590°), after which PbO and SiO_2 form $PbSiO_3$ (580°). At 700°, any SiO_2 still present combines with K_2CO_3, liberating CO_2. K_2CO_3 dissolves in the Pb silicate eutectic at between 580° and 750° without decompn., CO_2 being evolved. The batch for the sulfate glass was comprised of 1000 parts of SiO_2, 400 parts $CaCO_3$, 400 parts Na_2SO_4 and 25 parts of sugar charcoal. The reactions are complex and are discussed very completely. Na_2SO_4 is reduced to Na_2S by C (740°), and this forms Na_2CO_3 and CaS by interaction with $CaCO_3$. The double carbonate, $CaNa_2(CO_3)_2$, is formed and this reacts with SiO_2 at 600° to give off CO_2. Na_2SO_4 and Na_2S react to form Na_2O and SO_2 which is evolved, and $CaSO_4$ and CaS in a similar manner form CaO and SO_2 (850°). This type of glass should become a clear melt at 1240°, but if insufficient reduction of Na_2SO_4 has occurred, galls are formed. This sepn. is caused by the presence of SiO_2. They can be removed mechanically or can be reduced by addn. of finely divided C. H. STOERTZ.

Changes in length of glass threads at elevated temperatures. IKUTARO SAWAI AND MORIO NISHIDA. *Z. anorg. allgem. Chem.* **193**, 133-43(1930).—Measurements were

made on a soda lime glass contg. 74.04% SiO_2, 9.48% CaO, 14.86% Na_2O, 2.44% (Al_2O_3 + Fe_2O_3), threads of 0.07, 0.17 and 0.27 mm. diam. being used. Variation in length was measured over a range of $\lambda = 10^8$ to $\lambda = 10^5$, in which λ is the coeff. of viscous traction. At 500° and lower, no shrinkage was observed even if no load was applied. Two bends are obtained in the curve of shrinkage velocity. A discussion of theory is included. H. STOERTZ

Clay in 1929. JEFFERSON MIDDLETON. Bur. Mines, *Mineral Resources of the U. S. 1929*, Pt. II, 95–104 (preprint No. 9, published November 1, 1930). E. H.

Ground clay as a plasticizing agent. A new use for clay. M. G. SPANGLER. *J. Am. Ceram. Soc.* **13**, 927–8(1930).—Tests of relative tensile strengths of mortars contg. $Ca(OH)_2$ or finely ground, raw clay showed no distinct difference between the two. C. H. KERR

Observation on the effect of silicon in clay bodies. S. F. WALTON AND E. L. HAUMAN. *J. Am. Ceram. Soc.* **13**, 935–40(1930).—Replacing grog by SiC increases transverse strength and thermal cond. Data on slag resistance are also given. C. H. KERR

Carbon and sulfur contents of certain Ohio common clays used in heavyware industries. GEORGE M. MACHWART AND JAMES R. WITHROW. *Ind. Eng. Chem.* **22**, 1224–5(1930).—Analysis of 28 Ohio clays successfully used in heavyware manuf. showed S varying from 0.01 to 0.84% and C from 0.28 to 3.01%. The av. was 0.12 S and 0.91% C. M. A. EDDY

China clay. FRANK R. VAN HORN. *Eng. Mining J.* **130**, 525–6(1930).—The geology, mining and dressing practice in the St. Austell district of Cornwall are briefly outlined. W. H. BOYNTON

Quantity of lime in a raw mixture for silicate bricks. A. TAL. *Stroitelnuie Materialui* (*Building Materials*) No. **2**, 63–6(1930).—The quantity of lime depends upon: (1) the porosity of the lime, its temp. of firing and its fineness; (2) the mech. and chem. compn. of the sand and the shape of grains, and the state of their surface; (3) homogeneity of the raw mixt.; (4) method of slaking the lime. Uncombined lime in a brick increases its solidity which increases in proportion to its uniform distribution in the brick, especially in the spaces between the grains. M. V. KONDOIDY

Slag bricks. B. EVALD AND N. VAGANOV. *Stroitelnuie Materialui* (*Building Materials*) No. **2**, 60–3(1930).—The authors describe different German and Russian methods for prepg. slag bricks. Data on their compn. and properties are given. M. V. KONDOIDY

Production of Dinas blocks in U. S. S. R. P. P. BUDNIKOV. *Stroitelnuie Materialui* (*Building Materials*) No. **1**, 27–36(1930).—Results of tests given in curves and tables show that the properties of Russian Dinas blocks are equal to those prepd. abroad. M. V. KONDOIDY

Tests on Dinas and grog blocks. OSKAR LEKHER. *Stroitelnuie Materialui* (*Building Materials*) No. **4**, 41–6(1930).—L. describes his investigations on the stability of refractory blocks to the action of slag and fused glass. A series of grog blocks, the chem. compn. of which is given, was tested in a gas kiln in which a grog crucible with holes at the bottom was put. The samples for testing were put into the crucible. The crucible was filled with a batch and the required temp. maintained. The fused glass dropped slowly from the bottom into water. Every 15 min. the crucible was filled with batch to keep the samples covered by the fused glass. For 3 hrs. the samples were subjected to the action of fused glass; then they were slowly cooled. The samples were broken into 2 parts and were investigated. This method is very simple; the test blocks can be heated to the different temps. required. The glass paste flowing from the crucible can also be investigated to ascertain the action of the Dinas or grog blocks on the glass batch. M. K. KONDOIDY

Slag corrosion of grog blocks by the action of fused peat ashes. D. S. BELYANKIN AND V. V. KLYITCHAREV. *Keram i Steklo* **6**, 383–7(1930).—The authors discuss several cases where grog blocks were greatly affected and, in some cases, entirely melted, by the slagging action of fused peat ashes. The compn. and properties of the grog blocks and peat used are given. Ashes produced by the burning of peat melt and flow down on the walls of the shaft and enter into the joints of the blocks. The melted ash forms glassy stalactites of dark green almost black color, or dark brown with a cryst structure. These glassy and cryst. stalactites are of a different chem. compn. The latter have not over 28% SiO_2, as high as 38% CaO, and up to 6.24% MgO. The glassy stalactites have up to 50% SiO_2, up to 19.2% CaO, and are almost free from P_2O_5. Conclusions: (1) The reciprocal action of grog and peat ashes in the gas-generating shaft begins to be noticeable between 1100° and 1200° and is especially sharp at 1300°

and higher. (2) Peat ashes present in the firing zone melt and, depending on the acidity of their melting compds., crystallize and form plagioclase, ghelenite, augite and calcareous orthosilicate, hypothetically. (3) The reciprocal action of grog and peat ashes begins with the penetration of the melted glassy ashes, and of the oxidized iron, lime and alkalies, into the joints of the grog. (4) The grog blocks change their chem. compn. near their surface and are characterized by a very high content in alkalies. The fusing temp. of such blocks is greatly lowered, to about 1150°. M. V. K.

Cost of feldspar. C. R. AMBERG. *J. Am. Ceram. Soc.* **13**, 923–6(1930).—The classification proposed is based on lb. of fluxing oxides per ton. C. H. KERR

Influence of iron borate on the rate of inversion of quartz in silica bricks. W HUGILL AND H. J. REES. *Trans. Ceram. Soc.* (England) **29**, 299–303(1930).—In silica brick fired to cone 17 it was found that Fe_2O_3 accelerated the rate of tridymite formation, while the presence of B_2O_3 at the same time had little or no addnl. effect on the rate of quartz inversion or tridymite formation. H. F. K.

The kiln of Grum-Grzhuimailo. G. SHTUIKGOLTZ. *Stroitelnuie Materialui* (*Building Materials*) No. 1, 58–62(1930).—A new kiln for firing bricks is described and compared with the Hofmann kiln. It is a rational annular kiln constructed on the hydraulic theory of the movement of gases. A system of intersecting pipes gives a correct motion to the gases and guarantees uniform heating and cooling of fired bricks, thus avoiding the chief defect of the Hofmann kiln. M. V. KONDOIDY

Advantages and use of a carbon dioxide meter on a forced down-draft periodic kiln as to temperature distribution. D. M. MCCANN. *J. Am. Ceram. Soc.* **13**, 944–6 (1930).—The CO_2 meter is used to (1) regulate forced draft, (2) maintain uniform pressure, (3) save fuel and (4) regulate time of firing. C. H. KERR

Servicing of kiln cars. H. SPURRIER. *J. Am. Ceram. Soc.* **13**, 929–30(1930). C. H. KERR

The ceramic engineer in Canadian industry. ROBERT J. MONTGOMERY. *Can. Mining J.* **51**, 1166(1930) W. H. BOYNTON

The use of the autoclave in testing ceramic products for resistance to crazing. R. G. MILLS. *J. Am. Ceram. Soc.* **13**, 903–14(1930).—Results indicate that the autoclave is of value in testing work. C. H. KERR

Improvements in the burning of ceramic ware. A. BIGOT. *Corriere ceram.* 11, 231–7(1930); cf. *C. A.* **24**, 5449.—Temp. distribution and measurement, structural features and heat balance are given. R. D. BUMBACHER

Acidproof ceramic products. P. P. BUDNIKOV. *Stroitelnuie Materialui* (*Building Materials*) No. 4, 46–52(1930).—B. describes the prepn., properties and qualities of acidproof ceramic products made from Russian clays. M. V. KONDOIDY

Systematic research to prevent soluble salts in the firing of ware. 1. A. SIMON AND W. VETTER. *Ber. deut. keram. Ges.* **11**, 12 25(1930).—The temps. at which different sol. salts cease to be sol. were detd. for certain clays. With one clay NaCl ceased to be sol. at 750°; $MgCl_2$ at 720°, $CaCl_2$ at 700°; Na_2SO_4 at 1000+°; K_2SO_4 at 1000+°, and $CaSO_4$ at 1000+°. These temps were somewhat higher for Zettlitzer kaolin and lower for a more vitreous clay. H. G. SCHURECHT

Information on white ware sagger bodies. JOHANNES MECKWITZ. *Sprechsaal* 63, 789–91, 809–12, 829–32, 849–51(1930).—Vagueness over the most suitable compn., prepn and method of manuf. of a sagger body still prevails. A systematic investigation was made to establish certain claims and properties of sagger bodies. Properties required are resistant against sudden temp. changes, mech. strength and stability. Stability against sudden temp changes is dependent upon the d. of the burnt clay mixt. For circular-oven operation the body should have a mech. strength of at least 250 kg. sq cm., and for tunnel-oven operation about 200 kg. sq. cm. The mech. strength is dependent on the d. of the body and the fineness of the fireclay. Softening should not be noticeable at 1200° to 1300°. Stability is increased by increasing the fineness and amt. of fireclay. C. H. LORIG

The control tests for sagger bodies. E. KIEFFER. *Ber. deut. keram. Ges.* **11**, 152–6 (1930). H. G. SCHURECHT

Advances in chemical stoneware construction. F. MÜLLER. *Ber. deut. keram. Ges.* **11**, 30–42(1930). H. G. SCHURECHT

Impact properties of china. EDWARD SCHRAMM AND F. P. HALL. *J. Am. Ceram. Soc.* **13**, 915–22(1930).—Diagrams and tables show results of impact tests on various china bodies. C. H. KERR

Influence of oxidizing and reducing atmospheres on refractory materials. III. Experiment with a refractory mixture containing added amounts of colloidal ferric hydroxide. A. E. J. VICKERS. *Trans. Ceram. Soc.* (England) **29**, 290–8(1930); cf. *C. A.*

22, 852.—Cones were made of refractory materials plus 0.29–3.67% colloidal $Fe(OH)_3$ and some C and H_2O. When these were fired so that the C and H_2O were expelled, no reduction in softening point was found in air or in N_2. If these are not expelled, the Fe acts independently of the atm. and lowers the refractoriness of the specimen. Water vapor produced the greatest lowering of the softening point, H_2, CO, SO_2 and CO_2 following in order of decreasing effect. The temp. of softening-point lowering is approx. proportional to the amt. of Fe_2O_3 present in the materials. H. F. K.

Practical testing of refractory products. E. STEINHOFF. *Ber. deut. keram. Ges.* 11, 1–11(1930).—The refractories carry a vertical load of 390 kg and the lateral pressure necessary to move the brick at high temps. indicates the quality of the mortar joint. H. G. SCHURECHT

Relation between the strength and temperature of some refractories. H. HIRSCH. *Ber deut. keram. Ges.* 11, 156–7(1930).—The strengths of 2 fireclay bricks were found to be 150–152 kg./sq. cm. at room temps., 117–231 kg./sq. cm at 800°, 345–354 kg./sq cm. at 1000°, 162–223 kg./sq. cm. at 1200° and 86–92 kg./sq. cm. at 1300°. H. G. SCHURECHT

The manufacture and use of dolomite refractories. F. HARTMANN. *Ber. deut. keram. Ges.* 11, 47–62(1930). —The use of dolomite in place of magnesite in some cases reduces costs Methods of dead-burning dolomite and making dolomite brick, also some properties, are given. H. G. SCHURECHT

Flux for chemical analysis of fused alumina refractories. EDGAR B. READ. *J. Am Ceram. Soc.* 13, 941–3(1930).—With 1 g. borax and 5 g Na_2CO_3 for a flux, only 1 fusion is needed. It is not necessary to eliminate the B by evapn with MeOH. Results are satisfactory for com. work. C. H. KERR

Abrasive materials in 1929. OLIVER BOWLES. *Bur. Mines, Mineral Resources of the U. S. 1929*, Pt. II, 65–81 (preprint No. 7, published October 25, 1930). E. H.

A laboratory method for grading abrasives. JOHN W. VANDERWILT. *Econ. Geol.* 24, 853–9(1929).—A series of connected siphons is used to grade abrasives as fine as 0.001 mm Convection currents are avoided by keeping the classifier at const. temp. ALICE W. EPPERSON

Refractory-maintenance cements in the non-ferrous foundry (WHITE) **9.** Care and maintenance of fuel-fired furnace linings in the non-ferrous foundry (WHITE) **9.** Purifying materials such as quartz or feldspar, etc. (U. S. pat. 1,786,383) **18.** Froth flotation concentration of feldspar (U. S. pat. 1,785,992) **18.**

Glass. SOCIÉTÉ LA RADIOTECHNIQUE. Ger. 505,782, Sept. 22, 1926. A readily fusible glass with a small coeff. of heat expansion, particularly suitable for elec purposes, is made from 75% silica and the rest H_3BO_3 and Na in the proportions 85:15.

Glass for reflectors. GLASHÜTTENWERKE VORM. J. SCHREIBER & NEFFEN. Ger. 505,947, Sept. 24, 1929. The glass is composed of layers of opal and crystal glass. The opal glass layers are formed by coloring transparent glass by S, Na_2SeO_4, CoO or MnO_2.

Glass purification. GEORGE C. COX and HENRY K. MCINTYRE. U. S. 1,785,888, Dec 23. A glass stock electrolyte is maintained at an optimum temp. by generation of heat within the electrolyte (suitably by electric a. c.) and an elec d. c. is passed through the electrolyte, effecting deposition of reduced metal at the cathode.

Suction gathering apparatus for glass working. KARL E. PEILER (to Hartford-Empire Co.). U. S. 1,785,209, Dec. 16. Structural features.

Method of making constricted glass tubes. FELIX MEYER. Ger. 507,213, June 18, 1926. Manipulative details are described. This forms part of Brit. 274,765.

Forming thin-walled glass articles such as bulbs, lamp chimneys and tumblers. THEODORE H. SLOAN (to Macbeth-Evans Glass Co.). U. S. 1,785,535, Dec. 16. Mech. features.

Sheet glass manufacture by use of stationary rollers. Y. BRANCART. Brit. 333-140, Feb. 4, 1929. Sheet-forming and stretching rolls, as well as their driving and cooling devices, are mounted on a frame which can be rocked about a horizontal axis in order to vary the slope of the path followed by the sheet between the upper and lower rolls. Various details of construction are described.

Apparatus for continuous downward drawing of sheet glass. CLIFFORD A. ROWLEY and JOSEPH A. REECE (to Libbey-Owens-Ford Glass Co.). U. S. 1,785,497, Dec. 16. Structural features.

Tempering glass sheets by air blasts or by use of adjacent cooling panels. SOC. ANON. DES MANUFACTURES DES GLACES ET PRODUITS CHIMIQUES DE ST. GOBAIN, CHAUNY

ET CIREY. Brit. 333,839-40, Aug. 7 and Aug. 8, 1929. Various details of app. and operation are described. Brit. 333,843 also relates to app. for tempering glass, as by sudden cooling after reheating.

Cooling glass sheets or plates after formation. A. BRANCART. Brit. 333,500, Feb. 23, 1929. A device such as a metal rod is used to loosen a glass plate or sheet from a support so that air is permitted to come between the support and sheet and prevent too rapid cooling on the side next the support. Various details of app. and operation are described.

Annealing glass sheets. CHARLES B. KINGSLEY (to Mississippi Glass Co.). U. S. 1,785,264, Dec. 16. App. and various details of procedure are described.

Tunnel furnace for annealing glass, etc. W. A. MORTON. Brit. 333,596, April 17, 1929. Structural features.

Apparatus for feeding glassware through annealing leers. IRVING SIMONIS (to Owens-Illinois Glass Co.). U. S. 1,785,534, Dec. 16. Structural features.

Non-splintering glass. JOHN NEWTON. Ger. 505,862, Feb. 1, 1928. See Fr. 648,085 (*C. A.* 23, 2797).

Reënforced glass. MARIA SCHMIDT. Fr. 686,271, Dec. 7, 1929. The celluloid and the contacting faces of the sheets of glass are coated with a vegetable or chem. resin and the whole is plunged into a bath composed of C_6H_6, xylene, $CHCl_3$, turpentine, cedar oil and other oils.

Sealing the edges of laminated reënforced glass sheets. JAMES H. SHERTS (to Duplate Corp.). U. S. 1,785,099, Dec. 16. The edges of a laminated product formed of 2 glass sheets with an intervening sheet of material such as pyroxylin compn. are submerged in a corrosive liquid such as concd. H_2SO_4 which will react with the material of the reënforcing sheet but not with the glass, to remove the edge portions of the reënforcing sheet and prepare the product for sealing the edges.

Laminated product of glass and celluloid. ROBERT W. HACKETT and ARTHUR G. WORRALL (to Louis J. Kolb, trading as Safetee Glass Co.). U. S. 1,785,696, Dec. 16. The border edges of the glass sheets extend beyond those of the celluloid and the groove thus formed is filled with a sealing compn.

Laminated sheets of glass and celluloid or like material. J. NEWTON. Brit. 333,242, Feb. 8, 1929. Sheets of glass of larger size than available sheets of celluloid or the like for intervening material are used with a plurality of sheets of the latter joined at their edges (suitably after chamfering and heating for 5–10 min. with a plasticizer or solvent such as a mixt. of alc 80 and AmOAc 20%). Various details of procedure are described for uniting the sheets of different materials by hot pressing.

Sand, clay, etc., used for glassmaking. CHANCE BROS. & CO., LTD. Fr. 686,426, Dec. 11, 1929. Fe is eliminated from sand or other material used for glassmaking by heating the sand and treating it with a reducing gas such as H, CO or SO_2, and simultaneously or subsequently with Cl.

Apparatus for testing the bonding strength of clays or other plastic materials. JOSEPH F. MACKIN. U. S. 1,785,521, Dec. 16. Material under test is compressed in a thin layer between 2 smooth metal surfaces and an adjustable weight serves to indicate the force required to sep. the 2 surfaces and intervening material under test. Various structural details are described.

Bricks. ANDRÉ GERSON. Fr. 686,248, Dec. 7, 1929. Hollow bricks are made from cinders, sand, cement and ochers, the sand and ochers being optional.

Brick, tile, etc., manufacture by extrusion, cutting and sanding. C. S. JILLINGS. Brit. 333,346, June 25, 1929. App. and various details of operation are described.

Ceramic products. MARSHALL LASLEY. Fr. 686,207, Dec. 6, 1929. In the prepn. of ceramic products, the org. substances are eliminated from the materials before the articles are formed by grinding the materials and heating in the presence of O. The heat is less than the heat used in the manuf. of the article.

Preventing efflorescence or scumming of ceramics. ARTHUR HOUGH and JOHN G. HARRISON (Hough to Harrison). U. S. 1,785,309, Dec. 16. Ba silicate is added to the material.

Supports for ceramic ware during firing. P. D'H. DRESSLER and GIBBONS BROS., LTD. Brit. 333,402, Aug. 20, 1929. Structural features.

Drying chamber for ceramic objects. MASCHINENFABRIK VORM. GEORG DORST A.-G. Ger. 505,605, Feb. 5, 1929.

Ceramic kilns. C. H. WECK, KOMM.-GES. Ger. 505,503, Jan. 13, 1929. Details of charging.

Tunnel kiln for ceramic objects. RENÉ M. D'ARLEUX and EMILE VIOLETTE.

Ger. 505,603, April 21, 1929. Addn. to 439,935. The kiln is heated by a compressed mixt. of air and generator gas.

Furnace for ceramic products. WILHELM ECKARDT & ERNST HOTOP G. M. B. H. Fr. 686,488, Dec. 12, 1929.

Tunnel kiln suitable for drying and burning molded ware. JOHN M. PILLATZKE. U. S. 1,786,364, Dec. 23.

Apparatus for molding quartz objects. DEUTSCH-ENGLISCHE QUARZSCHMELZE G. M. B. H. Fr. 686,342, Dec. 9, 1929.

Ceramic insulators. JOSEPH L. A. HILBRENNER. Ger. 504,869, Oct. 13, 1926. In the manuf. of these, clay, kaolin, alumina, ZnO and ZrO_2 are used with a flux or binding material formed by sintering together, MgO, ZnO and Al_2O_3.

Vitreous material suitable for making spark plugs or other electric insulating parts, etc. P. B. CROSSLEY. Brit. 333,240, Feb. 8, 1929. Finely ground mica and asbestos are used with relatively infusible materials such as porcelain, soda lime and lead glass and relatively fusible materials such as Pb salts (suitably the borate or borosilicate) and compound borates in which Pb oxide has been partially replaced by oxides such as those of Bi or of Zn, and at least part of the ingredients are used in a colloidal state of subdivision. When the mass contains over 30% of colloidal material it may be slip cast (preferably in porous molds). Zr oxide may be incorporated in the mixt. or applied to the surface of the product; colored metal oxides or opalizing agents such as Sn oxide or fluorides also may be added; and the finished articles may be glazed. Alloy steel molds with a Cr inner surface may be used for hot pressing the material.

Linings for electric induction furnaces. N. R. DAVIS, G. A. WOOD and ASSOCIATED ELECTRICAL INDUSTRIES, LTD. Brit. 333,582, May 15, 1929. The lining is graded axially so that material of least refractory character is arranged at the rim and the most refractory material is placed where the most rapid erosion tends to occur. The normal lining material comprises magnesite 65 and lime 35% and for the bottom of the furnace 6–7% borax is added. Erosion is likely to be most rapid about 6 in. from the bottom and at this location only 4% borax is used. The amount of borax may then increase up to 15% at the wash line, and at the rim 25% or more borax and 5% of dextrin may be added.

Abrasive and refractory products. PRESCOTT H. WALKER and SHERMAN S. KENYON (to Carborundum Co.). U. S. 1,785,102, Dec. 16. See Brit. 310,841 (*C. A.* **24**, 705).

Abrasive material from bauxite. JACOB S. MASIN and HAROLD E. WHITE (to Swann Research, Inc.). U. S. 1,786,016, Dec. 23. A charge of bauxite is furnaced with an excess of C to reduce substantially all the oxides of Si, Fe and Ti and a small percentage of the alumina present in the bauxite; the fused material is then cooled and there is formed a high-purity cryst. alumina embedded in a matrix of acid-decomposable character which after crushing may be removed by the action of H_2SO_4 and HF. Cf. *C. A.* **24**, 5959.

Abrasive disks. ALBERT J. DOERMANN. U. S. 1,785,437, Dec. 16. A mixt. comprising powd. abrasive and bakelite cement is placed in a mold with a layer of finely powd. abrasive on the bottom, and the material is baked.

Abrasive articles such as wheels. N. P. ROBIE and CARBORUNDUM CO., LTD. Brit. 333,409, Oct. 27, 1928. Products comprising abrasive grains bonded with artificial resin are made by mixing the grains with a liquid reactive resin contg. no volatile solvent, adding dry powd. reactive resin or other dry powd. material, molding under pressure and hardening by heating. Various compns. are described.

Vitreous enamels. CHARLES J. KINZIE (to Titanium Alloy Mfg. Co.). U. S. 1,785,777, Dec. 23. In the prepn. of a slip for vitreous enamels and glazes from mill liquor contg. alk. substances, the liquor is treated with a salt, such as Ti sulfate, of one of the metallic elements in Group 4, sub-group A, of the periodic classification having a mol. wt. below 100 to neutralize the alk. substances present and produce a hydrate ppt. of the element introduced as the added salt. This serves to give proper consistency to the slip.

20—CEMENT AND OTHER BUILDING MATERIALS

J. C. WITT

The cause of poor agreement between pure cement strength and sand mortar strength. K. KOYANAGI. *J. Soc. Chem. Ind. Japan* **33**, Suppl. binding 425–7(1930)(in German).—**Strength of pure cement is affected just as much by the quantity of water**

added as is sand mortar cement. There is an optimum water addn. for each. Pure cement strength is usually extraordinarily high with cements which withstand the water test but not the boiling test. The sand mortar strength of such cements is always low. Pure cement strength is affected somewhat by fineness; it is sometimes greater with coarse than with fine cements. Sand mortar strength is increased by fine grinding. Factors which raise the strength of pure cement are adverse to sand mortar cement strength; hence there is poor agreement. E. M. SYMMES

Injury to plaster due to osmosis. F. L. BRADY. *Nature* **126**, 684(1930).—If lime plaster is applied to bricks contg. $MgSO_4$, a semi-permeable membrane forms at the interface and $MgSO_4$ concentrates behind the membrane and crystallizes, eventually causing the plaster to bulge. ARTHUR FLEISCHER

A note on exploded wood for insulating and structural material. ROBERT M. BOEHM. *Trans. Am. Inst. Chem. Eng.*, New Orleans Meeting **1930**, 8 pp.(Adv. copy).—A discussion of the masonite process originally developed in connection with extn of naval stores from southern-pine lumber but now devoted to the manuf. of synthetic wood products. The various qualities and grades of masonite are described. At the present time the process is limited to long-leaf pine and southern gum, but almost any type of wood can be successfully used. The mfg. process is described. Essentially a gun is loaded with wood chips and high-pressure steam is introduced to soften the wood. The pressure is then increased to 1000 lb./sq. in., after which the wood is discharged from the gun and allowed to explode. The fibers are refined and made into boards. Modifications of the process in pressing, drying and surfacing give materials of different qualities. In connection with the manuf of Presdwood, it was found necessary to obtain smooth polished plates coated with Cr to impart the necessary finish and luster to the board The company had to install its own plant to plate with Cr and polish the 4.5 × 12.5-ft. plates needed for their work. Work is continuing in an effort to improve the product and cheapen the process. C. L. MANTELL

Wood preservation with zinc chloride finds place in textile industry. HARRY E TUFFT. *Textile World* **78**, 2125-7(1930).—The use of treated lumber wherever rot is likely to attack the untreated is advocated The fire hazard and the cost of maintenance are thus decreased. R. K. WORNER

Paving blocks with rubber tread portion (Brit. pat. 333,047) **30.** Extrusion mold for bituminous materials such as that for conduits, expansion joints, etc. (U. S. pat 1,785,457) **18.**

Cement. ELIAS R. WILNER (to Eddystone Cement Corp.). U. S. 1,785,508, Dec. 16. Lime and clay, shale or other suitable siliceous earths are separately heated to a relatively low temp. (suitably about 800°), mixed and ground together, and a jet of water or steam is introduced into the mixt under agitation.

Cement. H. BERRY. Brit. 332,925, April 30, 1929. Oxide or hydroxide of Ca or Mg is heated in an atm. contg. H_2SO_4 or H_2SO_3 and the resulting product is ground with a material such as waste slate, china clay, coal shale, sand, flint or other mixts of silica and alumina. The heating in the acid atm. may be combined with the step of calcining $CaCO_3$ or $MgCO_3$, or may be a secondary heating, and is preferably at a temp. of 700–900° and in the presence of steam. Preliminarily calcined material may be treated with an acid soln. such as one contg. H_2SO_4 and Al sulfate, and blast furnace slag may be used as an initial material.

Cement. JOACHIM HEMPEL. Fr. 686,455, Dec. 12, 1929. A cement having a high content of SiO_2 which is calcined below the temp. of agglutination and is composed of SiO_2 60–70, CaO 25–30 and $Al_2O_3.Fe_2O_3$ 4–5% is mixed in the proportion of 20–30% with ordinary portland cement for use where high resistance to the action of sea water or acids is necessary.

Cement. INTERNATIONAL CEMENT CORPORATION. Ger. 506,615, Sept. 29, 1927. Fr. 642,168 (*C. A.* **23**, 1239).

Cement. ANTONI EIGER. Ger. 504,965, Jun. 3, 1927. The hot water vapor waste from the wet manuf. of cement is used to preheat further raw materials.

Portland cement. GUY S. LAFORGE. U. S. 1,784,840, Dec. 16. A mixt. formed of raw calcareous material and raw argillaceous material with 10–50% of unground portland cement clinker is subjected to pulverization and is then calcined.

Discharge device for rotary furnaces for burning cement, etc., or smelting ores. FRIED. KRUPP GRUSONWERK. A.-G. Ger. 504,966, Nov. 12, 1927.

Apparatus for cement manufacture. RAY C. NEWHOUSE. U. S. 1,786,080, Dec. 23. A vertical stack is arranged for receiving hot gases from a rotary cement kiln, the open end of which extends into the stack, and a feeding device is provided for introducing a slurry of cementitious material in finely divided form into the upper portion of the stack so that it is collected in dried form in the lower part of the stack and introduced into the open end of the rotary kiln. Various details of app. are described.

Porous compounds. RHEINHOLD & Co. Fr. 686,345, Dec. 9, 1929. In the manuf. of materials of high porosity with the aid of gypsum, cement or lime or other substances solidifying with water or hardening in air, the use of hardening agents which also retard the solidifying phenomenon or even prevent it (such as sugar, glue, gelatin, soaps, gels, oils, grasses, bitumen or colloidal earths) is made possible to a far greater extent than up to the present by the addn. of products which accelerate the solidifying phenomenon such as sulfates, nitrates, chlorides, alums or org. acids or salts.

Road surfacing. MARCEL LEVY (one-half to Prodorite S. A.). U. S. 1,785,130, Dec. 16. A freshly tarred road surface is improved by scattering over it a dry bituminous stone powder obtained by impregnating powd. limestone 100 with bitumen 10–15 parts.

Bituminous emulsions for roads. C. G. FOX. Brit. 332,897, March 20, 1929. Spreading of bituminous emulsions on aggregate or on road surfaces is facilitated by treating the aggregate or road surface with solns. of pyridine or pyridine bases or by adding such solns. to the emulsions. A small proportion of a 0.5–2% soln. may be used, as may also industrial waste liquors contg. pyridine or pyridine bases. Cf. *C. A.* 24, 5457.

Bituminous compositions. N.-V. KONINKLIJKE STEARINE KAARSENFABRIEK GOUDA. Brit. 333,433, Feb. 4, 1929. Aggregate to be coated with bituminous emulsion is first coated with melted bitumen which may be thinned with petroleum. The emulsion used may contain stabilizers and a finely divided material such as cement.

Preserving natural or artificial stone, brick, etc. D. DEROS. Brit. 333,535, May 13, 1929. The material is treated with an aq. liquid in which is dispersed a protective colloid such as gum arabic, preferably while the liquid is hot, to saturate the capillary ducts of the material. It is stated that the colloid retains the deleterious salts present and draws them to the surface of the material, whence, after they dry, they may be removed by washing or brushing.

Composition suitable for use as a patching plaster, etc. CLEMENT K. STODDER. U. S. 1,785,053, Dec. 16. Plaster of Paris 32, dextrin 4 and volcanic ash 4 parts.

Water-resistant fiber product suitable for wall board, etc. WM. H. MASON (to Masonite Corp.). U. S. 1,784,993, Dec. 16. Unsized vegetable-fiber pulp such as that from wood waste is agitated with an excess of water and paraffin or the like m. about 50° and in the proportion of 0.5–10% the wt. of the dry fiber, and the water bath is maintained at a temp. sufficient to prevent congealing of the paraffin or like material during the agitation. Free water is then sepd. from the pulp.

Fire- and water-resistant fibrous product. HUGH M. SPENCER (to Upson Co.). U. S. 1,786,270, Dec. 23. Fibrous material such as wood pulp in fluid suspension is mixed with a fire-proofing salt such as NH_4 phosphate and paraffin-coated comminuted material such as clay or $CaSO_4$ to prepare a product which is suitable for *wall board* manuf.

Waterproofed felted fibrous sheet material. HAROLD L. LEVIN (to Flintkote Co.). U. S. 1,785,357, Dec. 16. Sheet material suitable for floor covering, etc., is formed of fibers, a filler such as sawdust, asbestine, clay and bone black and thermoplastic material such as asphalt fused on to the fibers; the fiber content of the sheet is so low as to be incapable, in the absence of the thermoplastic material, of fabrication into a felted form-sustaining sheet. Various modifications of compns. are described. Cf. *C. A.* 25, 422.

Kiln and air-circulating system for drying lumber, etc. C. GOODALL. Brit. 333, 403, Aug. 20, 1929.

Treating wood for preserving it, etc. ARTHUR P. ALLEN. U. S. 1,785,571, Dec. 16. Wood is impregnated with a saccharide soln. to which a mineral or vegetable oil is added to form an emulsion. NaF, fireproofing salts, latex, etc., also may be added.

Fungicidal and insecticidal composition. LEO P. CURTIN (to Curtin-Howe Corp.). U. S. 1,785,074, Dec. 16. Fibrous org. material such as wood to be preserved is impregnated with a soln. of As_2O_3 and with an aq. soln. of a base such as $Ba(OH)_2$ not in excess of one-third the molar equiv. of the oxide. The same substances are suitable for other fungicidal and insecticidal uses also when used in the specified proportions.

21—FUELS, GAS, TAR AND COKE

A. C. FIELDNER

Motor fuel survey of Alberta for 1930. P. V. ROSEWARNE AND H. McD. CHANTLER. Can. Dept. Mines, Mines Branch, *Memorandum Series* **42**, 13 pp.(1930).—Analyses are given of 122 samples. ALDEN H. EMERY

Alcohol automobile fuels. K. R. DIETRICH. *Automobiltech. Z.* **33**, 792–3(1930).—A discussion in connection with the addn. of a high percentage of a 99.6% alc. to gasoline and gasoline-benzene mixts. Precautions in handling and using it are also given. A. A. BOEHTLINGK

The use of sugar as a motor fuel. K. SÁNDERA AND J. ZFMAN. *Listy Cukrovar.* **49**, 147–9(1930).—Sugar (30 parts) was dissolved in a mixt. of EtOH (57 parts) and MeOH (13 parts) under pressure at 110–125° for several hrs. The sucrose dissolved and the soln. was filtered with activated charcoal. To increase the calorific value, NH_4NO_3, C_6H_6 0.2%, and eventually 3–5% C_6H_5OH were added. The mixt. burned (when volatilized) without leaving a coke. The sp. gr. is slightly over 1.0 and showed an insignificant acidity which was suppressed by NH_4NO_3. Prepns have kept for 3 years. The calorific value is 5940 cal. per g. Changes in motor design are necessary to adapt it to an internal combustion engine. FRANK MARESH

Heat of evaporation of fuels and a method for its determination. WAWRZINIOK *Automobiltech. Z.* **33**, 618–20, 644–6, 694–6, 764–6(1930).—The heat of evapn. of automobile fuels is detd. in an app. constructed by W. and described in detail. Fuels with high heat of evapn. and especially heavy fuels, such as gas oil, which tend to form droplets require a preheating of the fuel-air mixt. to assume a homogeneous mixt. A. A. BOEHTLINGK

Catalysis and its application to fuel chemical processes. HORST BRÜCKNER *Brennstoff Chem.* **11**, 358–9, 420(1930).—Present development is discussed. F.W. JUNG

The coal industry of South Africa. T. COULTER. *J. Chem. Met. Mining Soc. S. Africa* **31**, 75–6(1930); cf. *C. A.* **24**, 4374, 5133.—Discussion. ALDEN H. EMERY

Accelerated laboratory test for determination of slacking characteristics of coal. A. C. FIELDNER, W. A. SELVIG AND W. H. FREDERIC. Bur. Mines, *Rept. of Investigations* **3055**, 24 pp.(1930).—Lumps between 1.05 and 1.75 in. in size are air-dried at 30–35° for 24 hrs., cooled, immersed in H_2O at room temp. for 1 hr., drained, air-dried for 24 hrs., cooled and sieved on an 8-in. screen with 0.263-in. openings. The % of undersize is calcd. as the first cycle slacking index. The whole process is repeated and the cumulative % undersize calcd. as the second cycle slacking index. This can be repeated as many times as necessary. Results are given on the following coals: 11 Colorado bituminous, 5 Illinois bituminous, 2 Illinois subbituminous, 2 Kentucky bituminous, 2 Montana subbituminous, 1 New Mexico bituminous, 6 Pennsylvania bituminous, 1 Texas lignite, 17 Washington semibituminous, 123 Washington bituminous, 135 Washington subbituminous, 15 Wyoming bituminous, and 7 Wyoming subbituminous. ALDEN H. EMERY

The slacking of coal and its proper interpretation. S. W. PARR AND D. R. MITCHELL. *Ind. Eng. Chem.* **22**, 1211–2(1930).—The eight-cycle slacking test for coals is outlined and its application to lignite and bituminous coals is discussed. Two tables giving data from slacking tests applied to some Illinois and Iowa coals show wide divergences in percentages of fines through a 1/4-in. sieve when screened after each cycle and only at the end of the cycles, and on duplicate samples of the same coals. These coals charged with slacking propensities produced high grade cokes; hence such coals could not be lignitic in character. Apparently slacking as related to bituminous coals is directly dependent upon the thickness, distribution and porosity of the fusain bands, rather than, as with lignites, upon the absorptive property of the coal proper. Clay bands when they occur behave about the same as fusain when subjected to the slacking test. The slacking tests are inapplicable to bituminous coals as an indication of rank, but may serve as a measure of the fusain layers or the behavior of the coal under open storage conditions. One or 2 cycles would be sufficient to det. these characteristics and the 8 cycles of drying and wetting might give an index representative of the ultimate degradation of a particular coal when stocked for a long period of storage. W. W. HODGE

A study of the production of activated carbon from various coals and other raw materials. A. C. FIELDNER, R. E. HALL AND A. E. GALLOWAY. Bur. Mines, *Tech. Paper* **479**, 30 pp.(1930).—To obtain dependable activated C, coals must be ground,

mixed and briquetted. High-volatile coals must be given a preliminary carbonization at 650–750° as a max. before briquetting when a binder is to be used. The briquetted material is carbonized up to a max. temp. of 900°. Straight-run, high-temp., coal-tar pitch of low m. p. is a satisfactory binder. Blends of caking coal with non-caking material may be briquetted without a binder. The proper proportions have been detd. for such blends as will give hard and dense products with no swelling or some shrinkage during carbonization. In some cases a binder of petroleum oil may be used to advantage. A small quantity of carbohydrate gives a briquet of sufficient strength and adds to the general activity and particularly retentivity. High pressure in briquetting adds strength but not density to the carbonized product. The temp. during activation should usually be 925°. The lignites, the subbituminous coals of Wyoming and Colorado, the natural cokes, some bituminous coal from Illinois, Pocahontas coal, pitch coke and petroleum coke did not yield satisfactory absorbent C by the methods tried. Bituminous coal from Pennsylvania and W. Virginia and certain Utah coals gave a fairly satisfactory product. The best and most active C was obtained from anthracite coal with the highest C content and lowest ash, volatile matter and S. Although the rate of activation and ease of control of the process with coconut-shell C are advantageous, the C is not necessarily better and the activation is no more certain than with suitable coals. A bibliography of 50 references is given. A. H. E.

Occurrence of resin in Ruhr coal. E. Hoffmann and H. Kirchberg. *Brennstoff-Chem.* **11**, 389–94(1930).—Appearance and condition of the resin of Brassert coal do not indicate that it has been subjected to extremes of temp. or pressure in formation. The resin is sol. in C_6H_6 on warming, to 15–20% in acetone, and only slightly in alc. The acid no. is 8.5 and sapon. no. 84.66; they are very similar to those of amber. It does not sublime on heating; the content of volatile matter is 86%, with ash 0.1%. Petrographic examn. shows non-homogeneity characterized by streaks, inlays and net-like structure of fibrous coal and fusain. Plates, sections and reliefs are shown.

F. W. Jung

Control of coal for carbonizing plants. Hermann Koelsch. *Gas u. Wasserfach* **73**, 1047–50(1930).—Control methods for coal used by the municipal gas works at Munich are reviewed with respect to (1) sampling, (2) detn. of moisture and (3) methods of ash detn. Moisture is detd. by drying 2 kg. coal for 2 hrs. at approx. 100° in a vacuum oven. Tests indicated that no appreciable loss occurred in that time The increase in weight of dry coal samples during prolonged standing on an analytical balance was detd. as approx. 0.3% after 12 min., the rate of moisture absorption appearing to decrease after that time. Total moisture absorption in 24–48 hrs. reached 0.2 to 1.3% (the latter unusually high). R. W. Ryan

The combustibility of powdered coal as fuel of the coal-dust engine. Tetsuro Suwa. *J. Fuel Soc. Japan* **9**, 1199–1204(1930); Sect. 2, 100–2 (in English).—A lecture.

F. I. Nakamura

Coal-dust firing for small boiler plants. P. Rosin and R. Fehling. *Braunkohle* **29**, 817–27(1930).—Principles of burner construction, the development of marine and stationary dust burners (illustrations) and economics of dust firing are discussed.

K. H. Engel

Effect of excess air on chain-grate stoker operation. E. C. Cawrse. *Power* **72**, 1042–4(1930).—Under some conditions it is advisable to increase excess air above the min. consistent with good combustion of gaseous products. Charts give details of test runs. D. B. Dill

The significance of spores in the correlation of coal seams. I. The Parkgate seam, South Yorkshire Area. L. Slater, Marjorie M. Evans and Gladys E. Eddy. *Dept. Sci. Ind. Research, Fuel Research, Phys. and Chem. Survey of the Natl. Coal Resources* No. 17, 28 pp.(1930).—Microscopical examn. was made of a complete series of thin sections representing the coal seam from floor to roof. The spores encountered were classified according to size, shape and ornamentation and their frequency of occurrence was noted. The aim of the investigation was to det. whether a single spore type by its presence in any part of the seam or by its concn. in certain parts, or the distribution of the spores as a whole, is characteristic and would therefore serve as a basis of correlation. H. F. Johnstone

The cause of gas outbreaks in coal mines. Otto Ruff. *Z. angew. Chem.* **43**, 1038–40(1930).—CO_2 pressures up to 3 atm. may exist in coal seams. The soly. of CH_4 in coal is lower than that of CO_2. E. M. Symmes

From coal to gas. II. Fritz Schuster. *Gas u. Wasserfach* **73**, 1033–8(1930); cf. *C. A.* **23**, 5301.—A further study is made of the various combinations of coal-gas plants with water gas, complete gasification gas, etc. R. W. Ryan

Coal evaluation for gas works. W. SCHWEDER. *Gas u. Wasserfach* **73,** 1074 (1930).—A discussion of the factors involved in the evaluation of coal for gas works. Polemical with Mezger (*C. A.* **24,** 485, 709). **Reply.** R. MEZGER. *Ibid* 1075.
R. W. RYAN

The specific gravity and proximate composition of some Indian durains. L. LEIGH FERMOR. *Records Geol. Survey India* **63,** pt. 3, 358–77(1930); cf. *C. A.* **24,** 1488.—In a comparison of durain from 10 coal fields of the Gondwana age the following averages were obtained for caking and non-caking durain, resp.: moisture, 0.67, 3.76; volatile matter, 20.18, 23.45; fixed C, 44.63, 38.00; ash, 34.52, 34.79%; sp. gr., 1.628, 1.656; fuel ratio, 2.21, 1.62. A comparison of ash-free durain with its corresponding vitrain supports the theory that the vitrain acts as a dispersion medium with ash as the disperse phase. The av. ash-free caking durain and vitrain are, resp.: moisture, 1.03, 1.50; volatile matter, 31.05, 32.64; fixed C, 67.92, 65.86%; fuel ratio, 2.19, 2.01; sp. gr., 1.286, 1.267. The av. ash-free non-caking durain and vitrain are, resp.: moisture 5.68, 9.46; volatile matter, 36.55, 34.07; fixed C, 57.77, 56.47%; fuel ratio, 1.58, 1.68; sp. gr., 1.309, 1.298. Differences are probably due to the second disperse phase of vegetable detritus.
ALDEN H. EMERY

Hygrometric and psychrometric investigations and their application to brown coal drying. RUDOLF DÖRING. *Braunkohle* **29,** 760–8, 781–4(1930).—The hygrometer and psychrometer of the meteorologist have been adapted to the control of the drying process. They are suitable, in skilled hands, for lower temps. and with dust-free air. Relations between moisture content of air and coal are not simple. Hysteresis in the drying process proves that lignite coal is an inelastic gel.
K. H. ENGEL

Studies in the development of Dakota lignite. III. Drying of lignite without disintegration. IRWIN LAVINE, A. W. GAUGER AND C. A. MANN. *Ind. Eng. Chem.* 22, 1347–60(1930); cf. *C. A.* **25,** 397.—N. D lignite can be processed successfully by the Fleissner method (*C. A.* **23,** 958, 4553) under the following conditions: (1) satd. steam pressures not < 13 atm.; (2) a preheating period of approx. 40 min. in which the pressure is gradually increased to a max.; (3) a heating period of approx. 90 min.; (4) a release period of approx. 30 min.; (5) an aeration period of 1.5 hrs. with 312 l. of air per min. (preheated to 80°). Moisture can be reduced from 36 to approx. 16%. Phys tests indicate that the processed material will withstand handling without excessive breakage and has good weathering properties.
ALDEN H. EMERY

A new procedure for the determination of total acids in peat. E. SAUER AND H. J STEINMETZ. *Kolloid-Z.* **53,** 218–24(1930).- Tacke and Süchting's (*C. A.* **2,** 1587) $CaCO_3$ method is modified by the use of a $Ca(HCO_3)_2$ soln. The bicarbonate soln is prepd by passing CO_2 into a $CaCO_3$ suspension until satn. One g. of finely divided peat is weighed into a 400 cc. Erlenmeyer flask, 200 cc. of $Ca(HCO_3)_2$ soln. contg. 0.4 g. CaO per l. is added, the flask is stoppered and either shaken in a thermostat or allowed to stand with occasional stirring for 24 hrs. It is filtered rapidly and the filtrate titrated with 0.02 *N* HCl. The results are expressed in mg. of CaO per g. of air-dry peat When shaken, the final value is reached in 8 hrs. Neutral salts such as KCl have no effect on the results. Increased fineness of grinding increases the reaction velocity and slightly increases the final value. Increase in temp. is unfavorable because of the decompn. of the bicarbonate soln. The method is suitable for fibrous peats. The values found fluctuated from 20 to 30 mg. of CaO, with most of the values about 28
ARTHUR FLEISCHER

Evaluation of African torbanite. P. NIEMANN. *Brennstoff-Chem.* **11,** 469–71 (1930).—Analytical data, low-temp. carbonization yields and by-product analyses are given for bog-head coal from the Transvaal and Angola.
F. W. JUNG

Burning gas at Memphis Power and Light Plant. R. BRUCE. *Power* **72,** 1034–6 (1930).—Change from soft coal to natural gas resulted in 10% increase in continuous steaming rates besides savings in labor and a reduction of $^4/_5$ in furnace repairs.
D. B. DILL

British experience with low-grade city gas. NORMAN SWINDIN. *Chem. Met. Eng.* **37,** 680(1930).—Gas of not more than 400 B. t u gross heating value, when burned properly, may give better results than 500–600 B. t. u. gas under ordinary conditions. Low-grade gas can be made in a simple producer, with complete gasification of coal, or with low temp. a smokeless fuel can be made. A special gas burner is used.
E. M. SYMMES

Natural gas in 1929. R. B. HARKNESS. *Ann. Rept. Ont. Dept. Mines* **39,** pt. 5, 1–36(1930).—Detailed figures of gas production, consumption, leakage, etc., in Ontario for 1929 are given.
ALDEN H. EMERY

Summary report of analyses of natural gas from Turner Valley field in Alberta.

P. V. ROSEWARNE. Can. Dept. Mines, Mines Branch, *Memorandum Series* **43**, 5 pp. (1930).—Analyses of 26 well samples shows He trace–0.014, CH_4 85.0–89.8, C_2H_6 4.7–7.4, C_3H_8 3.2–4.0, C_4H_{10} 1.2–2.1, and C_5H_{12} + 0.5–1.7%. ALDEN H. EMERY

Long-distance transportation of natural gas. EDGARD G. HILL AND GEO. I. RHODES. *Trans. Am. Inst. Chem. Eng.*, New Orleans Meeting, **1930**, 26 pp. (Adv. copy.) C. L. MANTELL

Nomographs for gas calculations. ARRIGO BOEHM. *Gas u. Wasserfach* **73**, 1045–7 (1930).—Methods of prepg. nomographs for various equations are given, as well as examples of such nomographs. R. W. RYAN

Use of steam accumulators in gas works. E. PRAETORIUS. *Gas u. Wasserfach* **73**, 1118–20(1930).—Economies are described which are the result of the use of a Ruth steam accumulator in gas-works practice to equalize steam requirements. R. W. R.

Gas purification by cooling. STOLL. *Gas u. Wasserfach* **73**, 1102–4(1930).—Naphthalene, ammonia and water are removed from the gas by cooling it as close as possible to 0°. Plants have been installed at Hamborn and Linz, the first using absorption and the second compression cooling. At Linz cold, tar-free ammonia liquor is contacted directly with the gas. Temps. and ammonia concns. are given at several points in the system, before and after use of refrigeration. Costs are given. R. W. RYAN

Production of fuel gas by anaerobic fermentations. A. M. BUSWELL. *Ind. Eng. Chem.* **22**, 1168–72(1930).—B. describes expts. made to det. yields of fuel gas from fermentation of waste. Municipal waste contains nitrogenous material 25, fat 25, carbohydrates 25 and ash 25%, and is decompd. about 65% at 25° by bacteria. Exptl work on waste yielded 12.3 cu. ft. gas per lb. of solid digested in 7 to 8 days equiv. to 0.34 cu. ft. per capita. Gas produced analyzed CH_4 64, CO_2 28, H_2 3.4 and N_2 4.3%. Expts. with pure substances, fatty acids, proteins and carbohydrates give quant. yields of gas and a general formula is given for the reaction on acids of the aliphatic series. Results from a pilot plant operating on pith from corn stalks indicates that 5–10 cu. ft. of gas can be produced from 1 lb. of corn stalks. This corresponds to a yield of 1 year's supply of gas for 1 person from 1 acre of stalks. M. C. ROGERS

Humidity effects in the iron oxide process for the removal of hydrogen sulfide from gas. C. GORDON MILBOURNE AND WILBERT J. HUFF. *Ind. Eng. Chem.* **22**, 1213–24 (1930). The sulfiding and revivification of Fe oxide in gas works practice have been studied. Results from exptl. work show that a relative humidity of 65% at 38° is most favorable for sulfiding. Revivification is slower and higher humidities approach 100% but not high enough to cause deposition of water on the mass. Water hinders revivification. M. C. ROGERS

High-pressure hydrogenation of neutral and phenolic oil in low-temperature tar. SABURO TASHIRO AND S. ANDO. *J. Fuel Soc. Japan* **9**, 1206–14(1930); Sect. 2, 102–4 (in English).—An attempt was made to improve the properties of low-temp. tar by hydrogenation under high pressure. The hydrogenation of neutral oil of low-temp. tar is affected by pressure, temp. and time and each oil shows a definite temp. at which a vigorous reaction occurs. A similar reaction takes place during the hydrogenation of the phenolic part of low-temp. oil. Catalysts accelerate the reaction, Ni is most effective, followed by Fe and the activity of the catalyst is reduced by a poison such as S. The theory of the reaction was also proposed. F. I. N.

Tar emulsions and "cold tars." W. KÄRSTEN. *Teer & Bitumen* **28**, 437–40(1930).—Differences in sp. gr. must be overcome to make stable tar emulsions. "Dr. Raschigs Kiton," the first successful emulsion, contains 50% road tar, 10% petroleum asphalt, 10% clay and 30% water. The application of cold tars, which owe their fluidity to the addn. of solvent, requires a much smaller outlay in app. and labor than ordinary road tar. K. H. ENGEL

Tar separation and tar recovery from coke-oven gases. OTTO KREBS. *Teer & Bitumen* **28**, 517–22(1930). K. H. ENGEL

The effect of the rate of heating upon the properties of coke. T. SHIMMURA *J. Fuel Soc. Japan* **9**, 1183–98(1930); Sect. 2, 97–100(In English).—The quicker the heating the greater are the swelling and caking of coal while the slower the heating the more uniform is the cell structure of coke. The properties of coke depend upon the rate of heating. F. I. NAKAMURA

Determination of the reactivity of a coke to steam and carbon dioxide. ARTHUR KEY AND JOHN WM. COBB. *J. Soc. Chem. Ind.* **49**, 439–44T, 454T(1930).—An attempt is made to devise a method for finding reactivities from the data supplied by percent decompn which are obtainable experimentally and are already available in considerable numbers. The method of expressing reactivities depends on the following principle:

If two columns of a coke (*A*) are taken, identical in all respects except that one is of unit length and the other of length *n*, the second column will present *n* times the amount of the same kind of surface to the reacting gas, and its total reactivity will be *n* times that of the first column. If a column of unit length of another coke (*B*) decomposes as much gas as the column of length *n* of coke *A* under the same conditions, the total reactivities of the two columns will be equal, and since the percent decomposed by coke *B* of unit length is its specific reactivity, this must be equal to *n* times that of coke *A*. If the specific reactivity of coke *B* is unity, that of *A* is $1/n$, and this gives a definition of reactivity, as the reciprocal of the length of a standard coke under the same conditions. This argument is equally valid whether wt. or length of column is used as the basis of measurement. Standard wts. are used in this paper. Curves show the construction of the reactivity curves for the steam-carbon reaction at 900° F. (482°) and at 1000° F. (538°). The order of the CO_2-carbon reaction and that of the steam-carbon reaction are derived. The water-gas reaction and the retarding effect of H both have the effect of increasing the apparent order of the whole reaction and it seems probable that the primary reaction is of the first order. Curves have been constructed by the use of several cokes varying in reactivity; from these curves, the reactivity of any coke can be read off, when the % decompn. of gas effected by that coke has been measured. A brief discussion is included. W. H. BOYNTON

Relation between oven width, coking time and capacity. T. KURODA. *J. Soc. Chem. Ind. Japan* **33**, Suppl. binding 485-6(1930).—Solvay coke ovens 470 mm. wide were tested against some 370, 400 and 420 mm. wide. The net coking time was reduced proportionally to width, $t = T + K$, where t = coking time, T = time of carbonization only and K = time of loading and unloading. For large output, a width of 400 mm. is best. E. M. SYMMES

Gas mixtures for multi-fuel-fired furnaces (SHADGEN) **9**. Blast-furnace gas as a metallurgical fuel (SHADGEN) **9**. Chemical examination of lignite (FUCHS) **8**. Presidential address [rationalization in the Fe, steel and coal industries of S. Africa] (HENDERSON) **9**. Distillation of foam-forming liquids, especially tars (Ger. pat. 506,545) **13**. Device for determining the water content of fuel, etc. (Ger. pat. 504,940) **12**. Plate drier for lignite, chemicals, etc. (Ger. pat. 505,606) **1**.

Liquid fuels. I. G. FARBENIND. A.-G. Brit. 333,550, March 11, 1929. High b. p. constituents of distillable liquid carbonaceous materials such as tars or mineral oils or products derived from distn., destructive hydrogenation or cracking of coal, tars or mineral oils are treated with solvents (such as liquid SO_2, liquid NH_3 or a mixt. of cyclohexane and MeOH, or mixts. of all these) to sep. the materials into 2 portions, one richer and the other poorer in H, and the second portion is then treated with H under pressure (preferably with a catalyst immune to S poisoning) either alone or with carbonaceous substances such as part of the first portion sepd., to produce a "*non knocking*" *motor fuel*. Various details and examples of procedure are given. Cf. *C. A.* **24**, 2580.

Motor fuel. WALTER STEIGER. Ger. 505,929, April 8, 1928. An alc. fuel is carbureted with C_2H_2 by satg. a vegetable oil, *e. g.*, olive or castor oil, etc., with the C_2H_2 and spraying it into the alc. Crude petroleum may also be mixed with the vegetable oil. Cf. *C. A.* **24**, 2580.

Igniting fuel below the surfaces of liquids. WILHELM SCHWARZENAUER. Ger. 486,877, Feb. 24, 1927. Jets of finely divided solid fuel are ignited below the surface of liquids, for heating, decomposing, distg. or gasifying them, by one or more elec. arcs.

Fire-lighting fuel. A. E. DREW and A. WILKINSON, Brit. 333,398, Aug. 14, 1929. Shaped products from wood-pulp sheets are impregnated with waxes, oils, resins, paraffin, etc.

Destructive hydrogenation of carbonaceous materials. STANDARD OIL DEVELOPMENT CO. Fr. 686,220, Dec. 6, 1929. In the destructive hydrogenation of heavy materials having a basis of asphalt, a mass of this kind is kept at the decompn. temp. in the presence of H under a high pressure and in the presence of a solid catalyst. The ratio between asphalt and catalyst is kept below 1. The temp. is preferably 426-521° and the pressure above 25 atm. Details of the process are given.

Apparatus for distillation of carbonaceous materials such as coal, oil shale, peat, garbage or wood waste. FREDERICK T. SNYDER. U. S. 1,785,565, Dec. 16. A vertical distn. chamber comprises an upper evapg. section, an intermediate carbonizing section and a bottom cooling section. A conduit leads to the bottom of the cooling section to supply cooling gas; a second conduit leads to the bottom of the carbonizing

section to supply hotter gas; and a third conduit leads to the bottom of the evapg section to supply coal gas. A fourth conduit leads from the top of the distn. chamber for withdrawing all the gas supplied by the other conduits and the fourth conduit discharges into a heat exchanger connected with a condenser and a reflux connection is provided between the condenser and heat exchanger to deliver cooled gas from the condenser to the exchanger for reheating, and connections are provided between the heat exchanger and the first, second and third conduits for supplying them with reheated gas. Various details of the app. are described. Cf. *C. A.* **25**, 399.

Horizontal chamber retort for distilling solid fuel. Firma Carl Still. Ger. 505,775, Nov. 27, 1925. Details of construction.

Retort for low-temperature carbonization. W. A. Collis. Brit. 333,020, July 4, 1929. A retort is described which has a vertical and tapering lower part and an upper part which is inclined and provided with steps or terraces.

An improved occlusion device for preventing explosions in fuel-treating apparatus. Maschinenfabrik Buckau R. Wolf A.-G. Ger. 504,770, Mar. 28, 1929. Addn. to 496,644 (*C. A.* **24**, 3632). A description is given of an improved occlusion device placed between the drying chamber and conveying spiral of a lignite- or peat-treating app. to prevent explosions.

Briquetting. Emil Kleinschmidt. Ger. 467,321, Aug. 10, 1926. An app. is described for mixing fuel with a liquid binding material, such as fluid pitch for briqueting.

Apparatus for forming and baking fuel briquets. Wm. C. Carpenter. U. S. 1,785,827, Dec. 23. Structural features.

Fuel briquets. Metallges. A.-G. and O. Hubmann. Brit. 333,811, Oct. 29, 1929. Coarse and fine material such as coal or lignite is used together in making briquets, and the coarse portion of the material only is subjected to low-temp. carbonization. Various details of operation are described.

Briquets of inferior fuel with organic and inorganic binding material. Kommanditgesellschaft Emanuel Friedlaender & Co. Ger. 505,672, Nov. 28, 1926. The fuel is mixed with such substances as cement, $MgSO_4$, CaO, pitch, naphthalene, tar oil, etc., and pressed into molds.

Smokeless briquets. Trent Process Corp. Ger. 505,791, Jan. 6, 1929. The briquets are made from a mixt. of finely divided C and oil and are subjected to a two-stage heating process in absence of O before being burned.

Coal briquets. H. Alexander. Brit. 333,713, July 19, 1929. Coal (preferably a mixt. of small anthracite and bituminous coal) is heated in containers which are carried through a furnace (details of the app. being described) to produce gaseous distillates and tarry material which serves as a binder in making briquets. Cf. *C. A.* **24**, 5982.

Furnace for drying and distilling coal. Kohlenveredlung A.-G. Ger. 505,561, May 21, 1922. Details of construction.

Rotary plate retort for drying and distilling coal. Kohlenscheidungs-G. m. b. H. Ger. 506,541, Jan. 11, 1929.

Annular kiln for distilling coal in containers or for other chemical operations. Woodall-Duckham (1920), Ltd., and A. M. Duckham. Brit. 333,227, May 4, 1929.

Apparatus for charging coal or other granular material into containers or retorts. S. R. Illingworth and Illingworth Carbonization Co., Ltd. Brit. 333,597, April 18, 1929

Vertical apparatus for distilling and carbonizing solid carbonaceous materials such as lignite. Wm. W. Odell (to Northern Lignite Coal Co.). U. S. 1,785,645, Dec. 16. Structural features.

Montan wax. A. Riebeck'sche Montanwerke A.-G. (Theodor Hellthaler and Erich Peter, inventors). Ger. 505,815, July 16, 1927. Hot solns. of crude montan wax are cooled rapidly so that the pure wax esters and non-resinous parts are pptd. and sepd. from the resinous parts by filtration or decantation.

Distilling crude montan wax. I. G. Farbenind. A.-G. Ger. 505,927, May 12, 1929. The distn. takes place in the presence of absorbing agents such as active C, fuller's earth, unglazed earthenware, pumice stone, H_2SiO_3 gel, etc., the wax vapor being passed over or through these agents.

Waste water from bitumen manufacture. Curt Bunge and Heinrich Macura. Ger. 505,570, Dec. 1, 1927. Waste or distn. water from the working up of bituminous materials is purified with simultaneous production of *artificial resin*. The water is heated with aldehyde to attack such impurities as phenols, the resinous product being removed by flotation. Clarifying agents such as $Al_2(SO_4)_3$, $(AcO)_2Pb$, etc., may also be added.

Apparatus for separating light ash from flue gases. ALWIN BARTL. Ger. 505,932, Sept. 21, 1927. Details of construction and arrangement.

Gasification of solid fuel. CALEB DAVIES, JR. U. S. 1,784,985, Dec. 16. An app. is described comprising a rotary water-gas generator, a carbonizer above the generator connected to receive hot water-gas from the generator and to supply carbonized residue to it; the carbonizer is inclined and has a rotary mounting to effect continuous lifting and dropping of the fuel through the hot gases. A fuel preheater is also provided connected with the carbonizer.

Domestic gas-generating apparatus for producing gas from ignited carbonaceous fuel, air and moisture. HARRY F. SMITH (to Gas Research Co.). U. S. 1,785,820, Dec. 23.

Gas-producer operation. SOUTH METROPOLITAN GAS CO. and C. C. CARPENTER Brit. 332,921, April 30, 1929. To diminish loss of fuel during the clinkering period, the natural draft is replaced by a suction so controlled that the draft is kept above the minimum requisite for avoiding dangerous escape of hot gas through the clinkering doors. Good-quality gas is made during the clinkering period. Various details of producer construction and operation are described.

Gas producer. C. S. CHRISMAN (to Humphreys & Glasgow, Ltd.). Brit. 333,072, Oct. 18, 1928. Various details of construction are described of a producer in which the fuel bed is supported on an inverted conical rotary bosh provided with ribs to force fuel or ash downward.

Gas producer for use with bituminous fuel. H. HIDAKA. Brit. 333,021, July 4, 1929. A revolving coke-extn tube projects up into the producer and removes part of the coke, the remainder being gasified to produce an amount of water gas for production of a gas of the desired calorific value when mixed with the distn gas from the upper zone of the producer. Various details of the app and its operation are described

Gas producer with a rotatable body. JOHN F ROGERS (to Wellman Engineering Co.). U. S. 1,784,882, Dec. 16. Structural features.

Gas-producing furnace. C. OTTO & COMP G M. B. H. Ger. 503,814, Jan. 20, 1928. Details of the method of heating by means of upright heating canals.

Feed mechanism for gas producers. JOHN F. ROGERS (to Wellman Engineering Co.). U. S. 1,785,789, Dec. 23.

Fuel loaders for gas producers. CARL PFEIFFER. Ger 504,927, Mar. 24, 1929.

Steam-generating and heat-conserving system suitable for utilizing waste heat from water-gas plants. F. W. STEERE (to Semet-Solvay Engineering Corp.). Brit 333,472, Nov. 17, 1928. Gases are passed into a flash boiler, the steam from which is delivered to a heat-conserving body of water. Various details of app. and operation are described.

Water gas. A. BREISIG. Brit. 333,842, Dec 3, 1928. Part of the waste blast gases from a water-gas generator pass to a steam superheating regenerator above which a vaporizer is mounted and the remainder pass to a regenerator connected with a waste heat boiler. During the run the last-mentioned regenerator is swept over by a carrying gas (which may be part of the water gas produced) to supply the stored heat to the boiler so that the latter is heated both during blasting and steaming. Various details of app. are described.

Water gas. HENRY O. LOEBELL (to Henry L. Doherty). U. S. 1,785,519, Dec 16. In a process involving alternate blasting of a fuel bed with air and with steam water is introduced into a vaporizing zone during the steam blast period where it is substantially instantaneously converted to steam, the resulting steam is used for blasting the fuel and the supply of water thus used is automatically decreased at a predetd. time-controlled rate during the blasting period to maintain a substantially const. excess of steam in the water gas passing from the gas-making zone. App. is described.

Water gas. THEODOR LICHTENBERGER and LUDWIG KAISER. Ger. 493,675, Feb. 15, 1927. C and superheated steam are led into a bath of fused salt at about 800° to produce water gas.

Purifying gases. I. G. FARBENIND. A.-G. (Christian J. Hansen, inventor) Ger. 507,396, July 22, 1926. Addn. to 504,640. In the absorption of NH_3 and H_2S from gases, the greater amount of the NH_3 and H_2S is removed by washing with $(NH_4)_2S_2O_3$ soln. contg. NH_4 polythionate and H_2SO_3 soln. The remainder is removed by the method of 504,640 (*C. A.* **25**, 400).

Purification of distillation gas. CHEMINOVA GES. ZUR VERWERTUNG CHEMISCHE VERFAHREN M. B. H. Ger. 500,896, May 12, 1928. The gas is treated with such amount of naphthalene solvents at ordinary pressure, that the gas is satd. therewith. The solvent is liquefied by compression when the dissolved substances separate out and the purified gas escapes. Cf. *C. A.* **24**, 949.

Purifying coal gas. Soc. anon. ammonia. Ger. 507,301, Jan. 24, 1926. In removing H_2S, CO_2, etc., from coal gas by washing with water under pressure, the water contg. gas under pressure is used to drive a turbine or the like, which assists in supplying the water under pressure. App. is shown.

Coal-gas purification. Gewerkschaft M. Stinnes. Brit. 333,297, Feb. 6, 1928. In removing naphthalene from coal gas, the gas is compressed and bubbled through a naphthalene solvent such as naphthalene oil, benzene washing oil, steam-volatile portions of washing oil, tar oil or anthracene oil (suitably at 30° and 1.5 atm. pressure) and then cooled to ppt. solvent vapor and naphthalene. Cf. *C. A.* **24,** 2277.

Removing ammonia and hydrogen sulfide from coal gas. Heinrich Koppers A.-G. and Christian J. Hansen. Ger. 504,777, Apr. 6, 1928. For simultaneously washing out both NH_3 and H_2S, the gas is passed through a single liquid contg. FeS_2O_6 for absorbing NH_3 and H_2S in the stoichiometric proportion of 2:1, and $Fe(OH)_3$ for absorbing the excess of H_2S. To ensure the maintenance of the FeS_2O_6 and $Fe(OH)_3$ in the wash liquid, this is treated with H_2SO_3 and O (air).

Removing benzene from gases. Ges. für Linde's Eismaschinen A.-G. Ger. 478,927, May 21, 1925. Gases, especially coke-oven gases, are freed from C_6H_6 by submitting them to low temps., to condense the C_6H_6. The app. is described.

Removing naphthalene and carbon disulfide from gases. Gilbert E. Seil (to Koppers Co.). U. S. 1,785,365, Dec. 16. There is recirculated in the path of the flowing gas a solvent such as kerosene which will absorb both naphthalene and CS_2, portions of the solvent are withdrawn to reduce the amount of naphthalene contained in the recirculated body of solvent, and fresh solvent is added to maintain the solvent at a suitable state of purity, and the recirculated solvent is treated (suitably by an alc. or alkali soln.) to remove CS_2 from it and thus maintain its capacity for further absorption of CS_2. App. is described.

Removing carbon disulfide from gas. Walter J. Klaiber (to Koppers Co.) U. S. 1,785,415, Dec. 16. In a process of the general type described in U. S. 1,785,365 (preceding abstr.), an oil such as gas oil is used as the recirculated solvent, and an aq. alk. sulfide soln. is used for removal of CS_2 from the recirculated oil.

Gas holder. Bamagmeguin A.-G. Brit. 333,142, March 1, 1929. The roof of a gas holder of the floating disk type is covered with a material resistant to weather and normal stresses but easily collapsible without splintering in the event of an explosion, such as balloon fabric, celluloid or cellophane.

Combustible compositions. Asociacion de productores de Yodo de Chile. Brit. 333,364, July 11, 1929. See Fr. 680,116 (*C. A.* **24,** 3888).

Device for intensively mixing combustible gas with air. C. Otto & Co. G. m. b. H. Ger. 507,414, July 21, 1929. The device is intended particularly for the heating flues of *coke ovens*, etc.

Coking. Heinrich Koppers. Ger. 504,810, May 30, 1926. The method is described of charging the coal into the retort to avoid uneven distn.

Coke-quenching device. Woodall-Duckham (1920), Ltd., and James Wilson Rieber. Ger. 504,907, May 20, 1926. Details of arrangement.

Coking oven. Arthur Killing and Wilhelm Elbert. Ger. 505,630, May 31, 1928. Details of the door.

Coke-oven-heating wall. C. Otto & Co. G. m. b. H. Ger. 501,464, Aug. 4, 1927. Addn. to 498,730 (see following abstr.) Further details.

Coke oven. C. Otto & Co. G. m. b. H. Ger. 498,730, Nov. 29, 1925. Addn. to 480,740 (*C. A.* **23,** 5034). Details of an upright burner arrangement and heating walls for a gas-producing furnace.

Gas producers. C. Otto & Co. G. m. b. H. Ger. 505,458, July 29, 1927. Addn. to 498,730 (see preceding abstr.) Details of the burner arrangements for heating the walls.

Rotary plate coking oven. Trocknungs-, Verschwelungs- und Vergasungs-G. m. b. H. Ger. 504,824, Jan. 16, 1927. Details are given.

Rotary annular plate oven for carbonizing fuel. Trocknungs-, Verschwelungs- und Vergasungs- G. m. b. H. Ger. 505,886, May 6, 1927. Addn. to 504, 824 (preceding abstr.) Details of construction.

Method and apparatus for heating coking ovens having vertical heating flues. Carl Wessel. Ger. 507,295, Feb. 1, 1927.

Coke oven (especially relating to means for smoke removal). Joseph van Ackeren (to Koppers Co.). U. S. 1,785,748, Dec. 23.

Apparatus for charging coke ovens or similar retorts. Joseph van Ackeren (to Koppers Co.). U. S. 1,785,749-50-1, Dec. 23. Structural features.

Coke oven (especially relating to discharging and quenching apparatus). JOSEPH BECKER (to Koppers Co.). U. S. 1,785,760, Dec. 23. Structural features.

Coke-oven-discharging apparatus. WELLMAN SMITH OWEN ENGINEERING CORP., LTD., and S. STOCKDALE. Brit. 333,294, May 11, 1929. Structural features.

Apparatus for discharging vertical coking retorts, etc. F. J. WEST, E. WEST and WEST'S GAS IMPROVEMENT CO., LTD. Brit. 333,381, Aug. 1, 1929. Structural features.

22—PETROLEUM, LUBRICANTS, ASPHALT AND WOOD PRODUCTS

W. F. FARAGHER

Phenols of petroleum. E. HOLZMANN AND S. VON PILAT. *Brennstoff-Chem.* **11**, 409–13(1930).—Crude naphthenic acids from Boryslaw light-oil distillate contained 30% while the acids from Bitkòv distillate contained only 3.1% of phenols. The absence of PhOH in the extd. phenolic fraction of Boryslaw distillate was proved, but all 3 cresols, the 1,3,5- and 1,3,4-xylenols and β-naphthol were isolated, identified and detd. The 1,2,4-xylenol and a mesitol were tentatively identified. Phenolic compds. with long side-chains, as well as methoxy groups, were not found. In contrast to the naphthenic acids, the phenols could be detected in the alk. ext. of the original petroleum.

F. W. JUNG

Cracking of hydrocarbons. E. BERL AND RUDOLF LIND. *Petroleum Z.* **26**, 1027–42, 1057–70(1930).—Messel shale oil, paraffin m. 54–6°, $C_{10}H_{12}$, and $C_{10}H_8$ were subjected to a heat treatment in contact with catalysts, at atm. pressure. The charge was distd. and the vapors were conducted up through the catalyst contained in an electrically heated tube 30 mm. × 480 mm., thence through a fractionating column and condenser. Any condensate in the column was returned to the still for retreatment. The uncondensed vapors were led through a U-tube contg. activated charcoal. The oil recovered at this point was added to the distillate. (*A* will designate the distillate boiling below 200°; *B*, the distillate boiling above 200°; and *G*, the gas and loss.) In an empty iron tube the yields of *A* and *B* were better than those obtained in a Monel-metal tube. Of the catalysts used pumice had no effect. Activated charcoal gave the best results, by virtue, perhaps, of its adsorption of heavy, easily condensable hydrocarbons, retarding their progress through the cracking zone until they were cracked. The cracked products were then replaced by heavier hydrocarbons. At a given temp. both the yield and the quality varied with the rate of distn. With 50 g. of catalyst, 400 g. of paraffin yielded at 383–420°, 34.8% *A*, 5.7% *B*, and 57% *G* in a 6-hr. run, and 53.3% *A*, 9.5% *B*, and 30.7% *G* in an 8.5-hr. run. When the catalyst was reused for a second batch distd. in 8.5 hrs., the yields were 44.5% *A*, 19.3% *B* and 26% *G*. The content of olefins (*U*) and aromatic hydrocarbons (*Ar*) was higher in the faster run and in the expt. where the catalyst was reused. In general, the *U* and *Ar* increased as the distn. progressed while the H content of the gas dropped and *U* rose. The total distillate obtained from paraffin with the used catalyst was about equal to that obtained when the catalyst was fresh. This is not true in the cracking of the shale oil; in this case the activity of the charcoal dropped very rapidly and could not be restored by treatment with Me_2CO. Presumably the pores were filled with carbon or carboids of high mol. wt., insol. in Me_2CO. $C_{10}H_8$ was practically unchanged at 550° while $C_{10}H_{12}$ was converted to $C_{10}H_8$. The gases consisted of 75.5% of H_2 and 22.1% of paraffins + N_2. No olefins were present. Porcelain in the form of beads 3 mm. in diam. was not as active as charcoal, yielding 64 cc. of distillate at 492–518° in 10 hrs. as compared with 346 cc. at 468–506° in 8½ hrs. for the charcoal. The gasoline was much less paraffinic while the gases contained 50% of olefins and 2.1% of H_2 as compared with 2.3% of olefins and 39.4% of H_2 with the charcoal. In the presence of molybdic acid, the shale oil yielded 22% of *A*, 2.6% of *B* and 15.2% of *G*. When the catalyst was reused, the yield of *A* dropped to 14.4% but rose to 21.7% when the catalyst was reactivated by heating in a stream of air for 1.5 hrs. at 520–600°. The catalyst was prepd. by adsorbing, on pumice, a soln. of $(NH_4)_2MoO_4$ in a min. of hot H_2O, drying at 110° and heating to 500–50° in the presence of air. The MeOH catalyst (D. R. P. 441,433) showed little activity. For its prepn., 2 mols. of ZnO, 1 mol. of CrO_3 and 2 mols. of $MnCO_3$ were ground together with a little H_2O, dried, ignited, compressed with a hydraulic press and broken up in pieces. Expts. were conducted to det. the efficiency in the recovery of hydrocarbons adsorbed by activated charcoal. About 10 cc. of the hydrocarbon was adsorbed by the charcoal and driven off by steam at 130–135°. The losses were 0.43 cc., 0.32 cc., 0.45 cc. and 1.3 cc. for PhMe, $C_6H_4Me_2$, benzine boiling

at 100–110°, and that boiling at 60–70°, resp. These figures compare with an av loss of 0.45 cc. for C_6H_6. A review of cracking is also given, covering the theory of cracking in the liquid and the vapor phases and in the presence of catalysts, together with a short description of the app. and operation of the Burton, Dubbs, Cross, Holmes-Manley, Tube-and-Tank, and Carburol processes. I. M. LEVINE

Advance in the rational processing of crude oils (Seelig process). A. SALMONY-KARSTEN. *Petroleum Z.* **26,** 1015–21(1930).—In 1929, about ⅔ of the world's requirements of motor fuel was provided by cracking. The adoption of metal baths for heat transfer, as in the Blümner and Seelig processes, is an aid in avoiding coke formation. The Seelig process is based upon the belief that the best yields of gasoline are obtained when the oil is brought almost to the cracking temp. and then very rapidly heated to the temp. at which max. cracking takes place. A pressure of 35–40 atm. is used. Little coke has been found in practice. The process operates on various charging stocks and produces 68.5–70% of antiknock gasoline contg. 25% of aromatic hydrocarbons, 21–23% of residue from which 62% of oil of high viscosity could be made and 8–9% of gas, the heating value of which was 15,000 and 8,000 kg. cal. per cu. m. before and after stripping, resp. The operating loss is 2%. The process is economical of heat and can be operated economically in small units processing 50–100 tons daily. I. M. LEVINE

Hydrogenation of residues from Boryslaw crude oil. J. EHRLICH AND A. SZAYNA. *Petroleum Z.* **26,** 1043–6(1930).—A Boryslaw crude oil, from which the fraction b. to 220° was removed, was subjected to destructive hydrogenation without a catalyst for 220–320 min. at 435–52° with an initial H_2 pressure of 89–98 atm. The product was fractionated and the residue again hydrogenated. After fractionating and hydrogenating 3 times, the total yield of oil b. to 180°, based each time on the residue processed, was 23.32%, 16.4% and 16.1%. The benzine was heavier and contained less of paraffins and olefins but nearly 3 times as much of aromatic hydrocarbons and possibly more naphthenes. The d. of the residue rose from 0.907 to 0.929 while the cold test dropped from +26° to lower than −18°. This signified that paraffin had been decomposed. The residue from the last hydrogenation was subjected to a steam distn. Paraffin was still present. A residue of 10.3% of asphalt remained. PhOH was detected in the aq. distillate. The oil distillate was hydrogenated. A yield of 17.62% (temp. 430–50°) and 8.48% (temp. 435–40°) of benzine was obtained. From the 4 hydrogenations, averaging the yields at each step, 47.4% of benzine and 26.2% of residue and asphalt were obtained, based on the original topped crude oil. The gas and loss amounted to 26.4%. The gas was practically free from benzine. I. M. LEVINE

A new type of Surakhanui crude oil. L. GUKHMAN AND A. PLOTKO. *Azerbaidzhanskoe Neftyanoe Khozyaĭstvo* **1930,** No. 9, 102–3.—A nonparaffinic crude oil (unusual for Surakhanui) of the following compn. was obtained from the first well drilled into the sixth layer: sp. gr., 0.8812–0.8839; excise resins, 11.2–12%; fraction boiling below 150°, 0.44–1.62% of 0.7564–0.7665 sp. gr.; 150–300°, 39.7–40.6%, of 0.8368–0.8437 sp. gr., and 31–37° Abel-Pensky flash; fuel oil, 57.1–59.4% of 0.9071–0.9144 sp. gr., 5.08–5.97 E_{50} viscosity, 158–174° Brenken flash, 15.6–19% excise resins; cold test below, −20°. The crude oil contained gas oil 8.9, spindle oil 5.9, machine oil 10.0, cylinder oil 5.9 and residues 18.7%. It is very low in asphalt and requires only small quantities of reagents to produce high-grade com. products. About 30% of oils suitable for automobiles was obtained. A. A. BOEHTLINGK

Experiments with a refinery distillation of the new Surakhanui crude oil. R. PROZUMENTIK. *Azerbaidzhanskoe Neftyanoe Khozyaĭstvo* **1930,** No. 9, 122–3.—The results are similar to those obtained by Gukhman and Plotko (preceding abstr.). A. A. BOEHTLINGK

Preheating crude oil. P. VARDIKYAN. *Azerbaidzhanskoe Neftyanoe Khozyaĭstvo* 1929, No. 12, 73–6.—Crude oil preheated to 90° is passed through a heat exchanger constructed of a pipe into which a smaller pipe is inserted concentrically. The crude oil is heated to 116° by residues having a temp. of 245°, discharged from the last of a series of shell stills. The crude oil then enters the settling vessel where water and mud are sepd. The oil is then passed into the first still. A higher yield of distn. products and a smoother operation are claimed. Full calcns. are given. A. A. B.

Air investigation in refineries. I. LAPKIN AND G. EGOROVA. *Azerbaidshanskoe Neftyanoe Khozyaĭstvo* **1929,** No. 12, 76–8.—The content of hydrocarbon vapors in the air in various locations in refineries was detd. by adsorption in silica gel. In a still house was found a max. of 16.7 mg. of gasoline vapors in one l. of air. A. A. B.

Cracking value of straight-run and cycle gas oil. H. SYDNOR AND A. C. PATTERSON. *Ind. Eng. Chem.* **22,** 1237–40(1930).—Upon successive passes through the equip-

ment under the same operating conditions (1) the yield of gasoline, based on the feed stock for each pass, decreases; (2) the ratio of fuel-oil yield to gasoline yield increases; (3) the boiling range of the cycle gas oil produced is lowered; (4) the A. P. I. gravity corresponding to a given boiling range is lowered; and (5) a decided change in the chem. compn. of the cycle gas oils occurs, as indicated by the decrease in the aniline point. Conclusion: The cracking value of cycle gas oils, in terms of the products derived, decreases with successive passes through the equipment. A. H. E.

Evaporating oil-well water. S. KONSTANTINOV, V. MALUISHEK AND B. TUMILLO-DENISOVICH. *Azerbaidzhanskoe Neftyanoe Khozyaĭstvo* **1929**, No. 11, 82–91 and No. 12, 78–86.—It is claimed that I, Br, NaCl and $MgCl_2$ solns. obtained from oil-well waters can be concd. by passing them through brush-wood evaporators. The brine so obtained can be worked up by the usual methods. The sepn. of constituents can be effected at a cost far below their actual market value. A. A. BOEHTLINGK

Table for calculating the dynamic viscosity in centipoises from Engler degrees. M. FREUND. *Petroleum Z.* **26**; *Motorenbetrieb und Maschinen-Schmierung* **10**, 3–4 (1930).—Viscosity should be expressed in the c. g. s. system, since this would standardize the results obtained all over the world and thus aid in international commerce. Relative viscosity expressed in the arbitrary units adopted does not run parallel with the abs. viscosity and for two oils having the same viscosity in terms of any of the arbitrary units but a different d , the abs. viscosities are different. A table is given by which the abs. viscosity in centipoises can be calcd. from the viscosity in degrees Engler. For oils having a higher viscosity than 8° E., the formula $\eta = 7.6\ Ed$ is used, where η is the abs. viscosity in centipoises, E is degrees Engler and d is the density I. M. LEVINE

Distilling naphthenic acids. I. GUTT, L. IOANESYAN AND G. NOVRUSKHANOV *Azerbaidzhanskoe Neftyanoe Khozyaĭstvo* **1930**, No. 9, 138–9.—Crude oils when distd carry over naphthenic acids boiling up to 50° above the boiling range of the resp. petroleum cuts. Steam or vacuum distn. produces the same results. A. A. B.

Sources of error in the determination of boiling point and boiling range of commercial benzines by the method of Krämer and Spilker. W. MELZER. *Brennstoff-Chem.* **11**, 371–2(1930).—For 3 different grades of motor fuel, the effects upon boiling range caused by variations in flask-diam., wall-thickness and resultant distn. rates are shown in tabular form. F. W. JUNG

Progress toward a uniform method of measuring detonation. T. A. BOYD. *Ind. Eng. Chem.* **22**, 1301–2(1930).—Antiknock value is affected by carburetor setting, spark advance and temp. Standard variable compression and fixed compression engines are adopted. Standard fuels are *n*-heptane and isooctane, antiknock values being expressed in octane no. Speed, temp., compression, spark timing, atm. conditions, mixt. ratio, etc., will be standardized. E. M. SYMMES

Technical and economic significance of the Edeleanu refining process for the supplying of transformer, switch and turbine oils. FRITZ FRANK. *Petroleum Z.* **26**, 1046–7(1930).—See *C. A.* **24**, 5991. I. M. LEVINE

Sludge determination. L. GUKHMAN. *Azerbaidzhanskoe Neftyanoe Khozyaĭstvo* **1930**, No. 5, 97–100.—Errors in the Russian method of detg. excise resins are due to the high soly. of H_2SO_4 in the gasoline that is used for diluting heavy oil fractions The use of gas oil as a diluent is recommended. A. A. BOEHTLINGK

Lubricating oils. YU. E. EMMUIL. *Neftyanoe Khozyaĭstvo* **18**, 413–19(1930).—A heavy Binagadui asphalt-base crude oil contained 3% of second-grade gasoline, 10–12% of kerosene, 16–18% of gas oil and 58–60% of fuel oil (composed of machine oil 25–27%, cylinder oil No. 2 1–2%, gas oil grade 1 4–5%, black solar oil 26–28%) and bottom oils which yielded 92–95% of tar. The fuel oil used in the prepn. of lubricating oils had a sp. gr. of 0.9480, E_{50} viscosity 24.0, open-cup flash 150°, excise resins 58%, cold test below −18°, C 4.24%, S (by bomb) 0.349%, acidity (% SO_3) 0.157%, ash 0.024% and paraffin 0.420%. The distillates were treated with 92% H_2SO_4 and 1.5–2.0° Bé. soln. of water glass. Spindle oil, machine oil and cylinder oil obtained by vacuum-steam distn. consumed 6–7% H_2SO_4, 0.05% water glass, 0.4–0.5% NaOH, [illegible] treating operation. [illegible] 0.0000–0.0027, color scale 4.0–32.5, cold test below −14° to below −20°, acidity [illegible]% 0.0027–0.0105%, ash 0.00–0.003%, S (bomb) 0.217–0.262% and paraffin 0.014–0.280%. The oils were stable and transparent and met the resp. standards. The treating process with water glass is characterized by its cheapness, absence of emulsions and an easily pptg. acid sludge which is explained by the coagulating action of the water glass.

A. A. BOEHTLINGK

Origin of petroleum (FISHER) 8. Liquid fuels (Brit. pat. 333,550) 21. Apparatus for gravity separation of liquids such as oil and water (U. S. pat. 1,784,943) 1. Apparatus for combined ore-reduction and hydrocarbon refining (U. S. pat. 1,785,427) 9. Apparatus for distillation of carbonaceous materials such as coal, oil shale, peat, etc. (U. S. pat. 1,785,565) 21.

Petroleum oil conversion. WALTER M. CROSS (to Gasoline Products Co.). U. S. 1,785,073, Dec. 16. Oil is heated in a coil and passed to an enlarged chamber (both the coil and chamber being maintained under sufficient pressure to keep the oil in liquid condition), and an O-contg. gas such as air or O is added to the oil in the chamber to maintain the thermal conditions of conversion and to supply O to increase the "anti-detonating properties" of the product; heated oil from the conversion chamber is passed to a subsequent stage where the pressure is suitably reduced to distil off lighter fractions. App. is described.

Treating residues from distillation of petroleum oils with caustic soda. ARMAN E. BECKER and REGINALD G. SLOANE (to Standard Oil Development Co.). U. S. 1,785,242, Dec. 16. The residue is thinned with naphtha, washed with water and naphthenates are recovered from the wash water, and while in the presence of the naphtha the residue is treated with 66° Bé. H_2SO_4 at the rate of about 50 lb. per bbl. and sludge is removed after settling, followed by treatment with NaOH soln., washing and distg. off naphtha.

Distilling and cracking oils such as crude petroleum. EDWARD O. BENJAMIN. U. S. 1,784,956, Dec. 16. The oil is passed successively through a series of retorts, in each of which it is maintained at higher temps. and lower pressures than in the preceding retort; vapors are led off from each retort and their constituents are separately condensed; lighter condensate is segregated and heavier condensate is fed into a retort of higher temp. and lower pressure than that of the retort from which it was derived by injector action of higher-pressure gases. Various details of app. and operation are described.

Cracking hydrocarbon oils. N.-V. DE BATAAFSCHE PETROLEUM MAATSCHAPPIJ. Brit. 333,335, June 7, 1929. See Fr. 677,640 (*C. A.* **24**, 3353).

Cracking hydrocarbon oils. C. P. DUBBS. Brit. 332,913, March 27, 1929. In a cracking process of the general character described in Brit. 249,604 (*C. A.* **21**, 1006), polymerization of the residue is checked by controlling the reduction of pressure in the scpg. or reaction chamber by controlling the liquid level in this zone by regulating the speed of withdrawal of the residue, and by dissipating the heat from the residue immediately after its withdrawal, as by passing it through a cooling coil. App. and various details of operation are described. Cf. *C. A.* **25**, 199.

Continuously skimming and cracking hydrocarbon oils. JOHN W. COAST, JR., and GORDON T. GRANGER. U. S. 1,786,053, Dec. 23. A stream of charging stock is preheated in a reflux condenser by which the lightest fraction is vaporized from the stream, and the skimming operation is continued by forcing the unvaporized oil through a skimming still without substantial cracking of the oil; the resulting vapors are subjected to reflux condensation in the reflux condenser mentioned and the reflux condensate is forced through a cracking still to effect cracking of the condensate, the cracked condensate is vaporized and the cracked vapors are subjected to reflux condensation and the cracked reflux condensate thus formed is added to the reflux condensate produced in the skimming operation. App. is described.

Apparatus for cracking hydrocarbons. WALTER MILLER (to Continental Oil Co.) U. S. 1,785,042, Dec. 16. Various details are described of a dephlegmating and refluxing column from which mixed charging stock and reflux condensate is supplied to a cracking app.

Apparatus for cracking oils, evaporating various solutions, etc. I. G. FARBENIND. A.-G. Brit. 333,241, Feb. 8, 1929. Various details of app. are described provided with heated immersed stirrers which are made of such shape as to offer relatively small resistance to the liquid under heat treatment such as oil to be cracked or solns. or dispersions such as those of gelatin to be concd.

Pressure-control apparatus suitable for use with oil-cracking apparatus. THEODORE H. CARPENTER (to Gulf Refining Co.). U. S. 1,785,807, Dec. 23. Structural features.

Converting heavy into lighter hydrocarbon oils. N.-V. MIJNBOUW- EN CULTUURMAATSCHAPPIJ "BOETON." Brit. 333,553, Jan. 16, 1929. A soln. of $FeCl_3$ of 1.6 sp. gr. or other soln. of chlorides such as those of Zn, Cu, Al or Ni contg. at least 58% of the chloride is used for decolorizing and converting high b. p. hydrocarbon materials contg.

unsatd. compds. into lower b. p. products at temps. above 60° (preferably 70–100°), followed by distn. of the oil after removal of the salt soln. Examples are given of the treatment of crude petroleum.

Pyrolytic conversion of hydrocarbon oils. NATHANIEL E. LOOMIS, ALBERT H TOMLINSON and FRANK A. HOWARD (to Standard Oil Development Co.). U. S. 1,785,274, Dec. 16. A stream of oil is passed through a heating zone such as a pipe coil with temp., pressure and time conditions to effect substantial cracking and vaporization, then through a zone such as an insulated drum where the oil is held for a longer time and where relatively cool oil is introduced while still maintaining a cracking temp and fluid products are withdrawn together from the last-mentioned zone. App. is described.

Flash drum apparatus for distilling hydrocarbon oils. CLARKE C. MILLER (to Standard Oil Co. of Ind.). U. S. 1,786,357, Dec. 23. Structural features.

Purifying light hydrocarbon oil distillates. EDWARD B. HUNN (to Standard Oil Development Co.). U. S. 1,786,246, Dec. 23. A distillate such as sour cracked naphtha is treated with "doctor soln.," a low b. p alkyl disulfide such as Pr or Me disulfide is added, and the ppt. formed is sepd.

Cracking mineral oils. ARTHUR E. PEW, JR., and HENRY THOMAS (to Sun Oil Co.). U. S. 1,786,315, Dec. 23. Oil is passed to a cracking zone and thence is continuously circulated through a second cracking zone and back to the first cracking zone; a body of Hg is vaporized and the Hg vapor used to heat the second cracking zone, and vapors are continuously removed from the first cracking zone and treated in a fractionating device. App. and various details of operation are described Cf. *C. A.* **24**, 1498

Refining mineral oils, etc., containing sulfur. N.-V DE BATAAFSCHE PETROLEUM MAATSCHAPPIJ. Brit. 332,944, April 27, 1929. Gas oil or the like contg. S is refined by heating with H in the presence of a colloidal Mo compd. absorbed in or distributed on a finely divided material such as absorption C, under substantially non-cracking conditions (suitably at a temp. of 380° under pressure with a catalyst prepd. from an NH_4 molybdate soln. acidified with H_2SO_4, heated and reduced with H_2S, mixed with "Carboraffin," and dried) Cf. *C. A.* **24**, 1212.

Apparatus for purifying heavy mineral oils by treatment with liquid sulfur dioxide. ALLGEMEINE GES FÜR CHEMISCHE INDUSTRIE. Brit. 333,687, June 21, 1929. Structural features.

Device for bailing and taking samples from oil wells, etc. JOSEPH F. DORNACHER U. S. 1,786,152, Dec. 23. Structural features

Locating water strata in wells such as oil wells. GEORGE H. ENNIS (one-half to Robert V. Funk). U. S. 1,786,196, Dec. 23. An ionizable chemical such as NH_4Cl is dissolved in the water of the well, plates such as Cu and Zn are lowered into the soln. to form a voltaic cell and are moved through the soln while held in spaced relation, and the potential difference between the plates during the movement is recorded.

"Non-knocking" fuels for internal-combustion engines. I G. FARBENIND. A.-G Brit. 333,224, April 24, 1929. Motor fuels having a tendency to "knock" (other than fuels obtained by destructive hydrogenation of carbonaceous materials), such as "straight run gasoline," are blended with liquid products of the destructive hydrogenation of coal or of coal distillates in sufficient proportion (usually about 10–20%) to suppress "knocking" and other "anti-knock" agents may be conjointly used. Various examples are given.

Petrolatum. FRANCOIS LAVIROTTE (to Standard Oil Development Co.). U. S. 1,785,270, Dec. 16. Petrolatum of substantial purity is obtained by the reaction at an elevated temp. (suitably about 120–160°) of fuming sulfuric acid upon a petrolatum-contg. material assocd. with carbonizable substances to convert the latter into non-liquid carbonaceous products, and then effecting sepn.

Removing oils from paraffin masses by exudation. RICHARD NEUMANN. Ger. 505,926, Dec. 9, 1928. An app. for sweating and cooling the paraffin is described.

Lubricant for internal-combustion engines, etc. NELS C. BEIM. U. S. 1,784,899, Dec. 16. Substantially equal quantities of 2 grades of com. lubricating oil, such as "viscous stripped neutral" and bright stock, paraffin base, are injected under heavy pressure into a closed chamber so that thorough intermixture takes place; the mixt is subjected to a partial vacuum of approx. 10 lb., heated to about 220° to drive off a portion of the lighter fraction, followed by addn. to the residue of about 0.3% Mg stearate, and filtering. App. is described.

Still suitable for distilling volatile materials from used lubricating oils from internal-combustion engines in garages, etc. F. O. KRIEGER. Brit. 333,271, April 10, 1929.

Emulsions. DEUTSCHE ERDÖL-A.-G. (Friedrich Schick, inventor). Ger. 490,-

883, May 27, 1923. Mineral-oil emulsions for lubricating and drilling are prepd. by heating the oil with unsapond. montan wax, without addn. of soap soln. or salt soln.

Bituminous emulsions. JOHN A. MONTGOMERIE. Ger. 506,135, Dec. 31, 1927. See Brit. 300,414 (*C. A.* **23**, 4061).

Bituminous emulsions. C. G. FOX. Brit. 333,152, Feb. 4, 1929. Emulsification of materials such as tar or liquefied asphalt is effected by use of soaps assocd. with higher monohydric aliphatic alcs. The soaps and alcs. may be mixed together as such or may be derived by reaction of caustic alkali with a liquid animal wax such as sperm oil. Protective colloids or stabilizers may be added to the emulsions. Brit. 333,153 describes emulsification of similar bituminous materials by use of the products obtained by treating liquid marine animal waxes or fats contg. esters of monohydric aliphatic alcs. (such as sperm oil) with H_2SO_4 or H_3PO_4.

Bituminous emulsions. J. PARKER. Brit. 333,303, May 14, 1929. Aq. emulsions of coal tar oils, creosote, tar, petroleum oils, pitch bitumen, asphalt, etc., are prepd. by agitating a mixt. of casein, rosin, NaOH or KOH and water at 98–100° until complete saponification is effected, cooling to 95°, adding crude coal-tar naphtha at the same temp. under a reflux condenser and then adding the main ingredient heated to about the same temp.

Asphalt emulsions. P. LECHLER. Brit. 333,496, Feb. 2, 1929. A soln. of an alkali such as carbonate or hydroxide of Na or K is added to a molten mixt. of asphalt and a saponifiable substance such as a fatty acid, in successive quantities, of different concns., most of the alkali being added at an early stage of the process, preferably the first treatment. Various details of procedure are given.

23—CELLULOSE AND PAPER

CARLETON E. CURRAN

Determination of cellulose in straws. SAMUEL H. JENKINS. *Biochem. J.* **24**, 1428–32(1930). The cellulose is detd. by treating the straw with hot dil. alkali and acid and then with cold hypochlorite soln. BENJAMIN HARROW

A modification of the method for the differentiation of bleached and unbleached fibers. FRANK R. FILZ. *Paper Trade J.* **91**, No. 16, 49(1930).—The technic of the Bright staining method has been modified by staining at room temp., and by using the following stable soln. as soln. *C*: shake 0.5 g. of benzopurpurin 4B crude with 100 cc. EtOH, let the insol. matter settle, and decant. Two yrs.' experience with the method showed it to be sufficiently accurate for all ordinary purposes, while the time required for a detn. is only about 10 min. With this technic, unbleached fibers are stained the usual blue color, and bleached fibers are stained a delicate pink instead of a bright red. A. PAPINEAU-COUTURE

Pulping eastern hemlock by the sulfite process. II. The effect of different types of temperature curves. W. H. MONSSON AND G. H. CHIDESTER. *Paper Trade J.* **91**, No. 16, 50–2(1930); cf. *C. A.* **23**, 973.—Under the same conditions of pulping, the yield and strength of pulp obtained from eastern hemlock are lower than those obtained from white spruce, and the bleach requirement is higher. The yield per cord is consistently lower with hemlock than with spruce, which is partly accounted for by the lower solid wood content per cord. In order to obtain a high folding strength combined with a low bleach requirement, temps. much higher than 140° are undesirable. Results are given and discussed of comparative cooks of eastern hemlock with the so-called "straight-line," "concave" and "convex" types of temp. curves. For strong unbleached pulp either the "concave" or the "straight-line" type of temp. curve is satisfactory, and a 9½-hr. digestion with a final temp. of 148° gave good results. The max. temp. should be increased where a shorter cooking time is used and decreased when a longer time is allowed. For easy-bleaching pulp, either the "straight-line" type of curve, with the pulp held for some time at the max. temp., or a modification in which the temp. is increased more rapidly to 130° and then more slowly to a lower max. temp., should give the best results. For a 10½-hr. digestion, the "straight-line" curve should start from 115° in 2½ hrs., increasing at a uniform rate to 148° at the end of 9½ hrs., and then this temp. should be held for 1 hr. A satisfactory modification of this curve might be a uniform increase in temp. to 130° at the end of 4½ hrs., followed by a slower uniform increase to 143° at the end of 9½ hrs., with the temp. held at 145° for 1 hr. In applying these results commercially, the cooking time should be detd. by balancing the requirements of the mill for production, yield, strength and bleach requirement. For a high yield of strong easy-bleaching pulp, it seems

necessary to cook at least 12 hrs. For a shorter cooking time a low bleach requirement is obtained at the expense of yield, and very likely also at the expense of the strength of the pulp. A. PAPINEAU-COUTURE

United States patents on paper making: third quarter, 1930. C. J. WEST. *Paper Trade J.* **91**, No. 17, 41-2(1930).—A list by serial no. of patents relating to pulp and paper issued during July, Aug. and Sept 1930. Cf. *C. A.* **24**, 5483. A. P.-C.

The microscope in the paper mill. A LAMBRETTE. *Industrie papetière* **9**, 283–7, 351–5(1930).—A discussion of the errors which are liable to be made in the use of microscopes, especially with high magnifications, either through inexperience or through defective construction of the instrument, and of the precautions which should be observed in the selection and use of a microscope. A. PAPINEAU-COUTURE

Modern digester practice. GUS. ENDERLEIN. *Paper Mill* **53**, No. 43, 14–7 (1930).—A brief review of the evolution of digesters used for sulfite, soda and sulfate cooking. A. PAPINEAU-COUTURE

Investigation of a digester explosion at Berlin, N. H. W. B. VAN ARSDEL AND P. L. IRWIN. *Pulp Paper Mag. Can.* **30**, 471–3(1930); *Paper Trade J.* **91**, No. 18, 169–71(1930).—Although the results obtained so far in the investigation of the causes of the explosion of digester No. 16 at the Burgess mill of the Brown Co., at Berlin, N. H., on Aug. 12, 1930, do not permit of detg. the immediate cause until further information is available, sufficient evidence has already been collected to prove that some of the steel used in building this type of digester was faulty, probably embrittled in service. The single butt-strap construction used is now recognized to be of poor design. A. PAPINEAU-COUTURE

Williams' sizing process. F. M. WILLIAMS. *Paper Mill* **53**, No. 44, 16–7(1930).—The Williams' process of making rosin size consists essentially in crushing the rosin, grinding it to a soft paste with water in a pebble mill, and then adding the other constituents (alkali and protective colloids if desired), continuing the grinding process until the reactions or mixing is complete. The size is then dild. and filtered, and is ready for use or storing. A. PAPINEAU-COUTURE

The determination of p_H values and total acidity of paper. B. L. WEMHOFF. *Paper Trade J.* **91**, No. 14, 59–60(1920) — A progress report on the coöperative research on methods of detn. of p_H values and total acidity being conducted by the Bur. of Standards, Bur. of Chemistry and Soils and the Govt. Printing Office, Washington, D. C Preliminary data had indicated that no appreciable variation in results would be found by extg. the sample at 98° on a water bath and by boiling at 100° on an elec hot plate, but subsequent results gave varying results in different labs under slightly varying extn conditions. The data indicate that it is not feasible for different labs to obtain check results on the same ext. unless the detns. can be made within a few hrs. after the extn. is made; the variation in p_H values due to the lapse of time between extn. and detn. of the p_H value is particularly noticeable in glue-sized paper, indicating some colloidal effect. Results obtained with the H electrode, quinhydrone electrode and the Fawcett-Acree isohydric indicator method showed that the 3 methods check very well when the extns are made in the same manner. Colorimetric indicators adjusted to the mid-point of their ranges are probably sufficiently accurate for mill control work; but where accurate results are desired and colorimetric methods are preferred, isohydric indicators adjusted to 0.2 p_H intervals should be used. Extns. of samples of 2.5 and 3.75 g. of paper with 125 cc of water gave p_H values which agreed within rather close limits; detns. made on exts. of 1.25 g of paper showed a tendency toward slightly higher results. Detns. made on samples cut in 0.25-in. squares had a tendency to give slightly lower results than those on samples ground in the Swedish disintegrating mill. A. PAPINEAU-COUTURE

The development of paper manufacture from southern pines. R. H. STEVENS. *Trans. Am. Inst. Chem. Eng.*, New Orleans Meeting 1930, 5 pp.(Adv. copy).—The conditions for paper making in the South are reviewed and the development by large companies in southern states is pointed out. In the South today there are 12 large mills with a capacity of 540,000 tons a year, or approx. 52% of the entire national consumption of kraft papers. These mills employ the sulfate process, cooking with a soln. contg. NaOH and NaSH as active reagent. Several by-products are obtainable from the cooking process, *viz.*, turpentine, methanol and $(NH_4)_2SO_4$. Though all are reclaimed in some of the Swedish mills, only the turpentine is recovered in American plants. The mfg. operations and factors involved in their applications, as well as special adaptability of the paper products manufd. from southern pines, are briefly described. Also in *Chem. Met. Eng.* **37**, 734–5 (1930). C. L. MANTELL

Precision color-measuring apparatus. MONROE BARNARD AND PAUL MCMICHAEL.

Paper Trade J. **91**, No. 14, 55–8(1930).—A discussion of the merits of the A. P. C. (American Photoelectric Corp.) opacimeter and of the A. P. C. photoelectric spectrophotometer. The 1st enables one to measure the translucency of paper with a degree of accuracy within 0.5%. In the latter the various sources of error in the measurement of the spectral transmission or reflection characteristics of a substance have been eliminated or compensated for, and moreover the instrument is simple of operation and maintenance. With the 2 instruments one can secure the accurate data necessary to evaluate the several attributes of pulp and paper that influence ones concepts of their colors. A. PAPINEAU-COUTURE

Apparatus for distillation of carbonaceous materials such as wood waste (U. S. pat. 1,785,565) **21**. Tanning extracts (Brit. pat. 332,935) **29**.

Cellulose. FIRMA OTTO C. STRECKER. Ger. 505,401, Dec. 4, 1927. Addn. to 486,533 (*C. A.* **24**, 1511). Cellulose is obtained from disintegrated vegetable fiber by treatment with sulfo- or carboxylic acids or their metal salts, which yield sulfites or carbonates on heating with boiling lye. Examples are hydroxybenzene-sulfonic or -carboxylic acids.

Digestion of cellulosic materials. J. HOLMES and H. A KINGCOME. Brit. 333,426, Sept 20, 1929. In a continuous process for cellulose extn. from vegetable materials, the material is subjected to a graduated treatment by which the more easily hydrolyzable constituents are eliminated first and the more highly resistant lignone is treated with clean cooking liquor at the maximum digestion temp. for a final digestion, with a final counter-current washing. App. is described.

Treating cellulose before acetylating. SOCIÉTÉ DES USINES CHIMIQUES RHÔNE-POULENC. Ger. 505,610, Nov. 11, 1924. Air-dried cellulose, especially cellulose previously treated with alkali, is moistened with a small quantity of glacial AcOH so that it contains AcOH of strength 60–80%. The mass is then acetylated in the usual way.

Treating cellulose before acetylating. SOCIÉTÉ LYONNAISE DE SOIE ARTIFICIELLE AND PIERRE A. A. CHEVALET. Ger. 505,674, Dec. 23, 1926. The cellulose is treated with a mixt. of aq. HCOOH and H_2SO_4 or $ZnCl_2$ at reduced temps., *e. g.*, 15°.

Cellulose derivatives. SOC. ANON. POUR L'IND. CHIM. À BÂLE. Fr. 686,575, Dec. 13, 1929. New derivs. of cellulose which preserve the original structure of the fiber are prepd. by treating alkali cellulose with a mixt. of CS_2 and alkylating or aralkylating agents, then treating the products thus obtained with org. amines contg. at least one NH group. Thus, alkali cellulose is treated with a mixt. of $ClCH_2COOEt$ and CS_2, rinsed and then treated with an aq. soln. of piperazine. Other examples are given. Cf. *C. A.* **24**, 4156.

Nitrating cellulose. LOUIS A. PINCK. U. S. 1,784,945, Dec. 16. N oxides are passed into H_2SO_4 and the cellulosic material, such as filter paper or cotton, is then added and the reaction is carried to completion.

Nitrocellulose. ARTHUR HOUGH, JOHN R. DUFFORD and WM. C. LEONHARD. U. S. 1,785,030, Dec. 16. Nitrated paper parchment in substantially stable condition is obtained by nitrating the parchmentized paper and boiling with dil. NH_3 soln. It is suitable for use in *lacquers*, *celluloids* or *explosive manuf.*, etc.

Nitrocellulose. V. PLANCHON. Brit. 333,817, Jan. 18, 1929. Materials such as wood pulp sheets or compressed cotton, alfa, flax or straw are immersed, with the sheets a small distance apart from each other, in a nitrating bath which is kept cool during the first part of the treatment and then heated after the sheets are partially nitrated. Various details of app., temps. used, etc., are given.

Cellulose esters. CAMILLE DREYFUS. Fr. 686,332, Dec. 9, 1929. Cellulosic materials are made reactive in view of esterification, by first treating the materials with HNO_3 and a diluent and afterwards with an aliphatic anhydride. The diluent may be HCOOH or AcOH and the amt. of HNO_3 is preferably 1–2% of the wt. of the cellulose. The HNO_3 used in the first stage acts as catalyst for the esterification in the second stage.

Cellulose esters. U. S. INDUSTRIAL ALCOHOL CO. Fr. 686,491, Dec. 12, 1929. Org. esters of cellulose such as the acetate are prepd. in a phys. state favorable for their further treatment by the reaction of cellulose with an esterifying agent such as Ac_2O in the presence of liquid SO_2 as the reaction medium, in a closed vessel under pressure, and discharging the ester in soln. in the SO_2 into another vessel where the SO_2 is gasified suddenly, thus causing a disruptive action on the ester. A catalyst such as H_2SO_4 may be used in the esterification, and the cellulose acetate may be hy-

drated in the reaction medium under pressure before the pptn. An app. is described. Cf. *C. A.* **24**, 1508. Fr. 686,492 describes an app. for pptg. cellulose esters from solns or like mixts. capable of flowing, in which one or more currents of such a soln. are mixed with one or more currents of pptg. liquid (with or without one or more currents of steam) under such conditions that a constituent of the soln. is liberated or vaporized with disruptive effect on the ester. The soln. of ester may have incorporated with it a coagulant almost sufficient to bring the soln. to the point of pptn.

Mixed esters of cellulose. CHARLES S. WEBBER AND CYRIL J. STAUD (to Eastman Kodak Co.). U. S. 1,785,466, Dec. 16. Mixed esters are produced by treating an acyl cellulose such as hydrolyzed cellulose acetate in a soln. contg. an aromatic org. acid such as toluic acid having an ionization const. greater than 1.82×10^{-5}. Sp. examples also are given of the production of cellulose acetate mandelate and of cellulose acetate salicylate and general mention or particular disclosure is made of the production of mixed esters derived in part from tartaric, racemic, malic, glycolic, glyceric, pyruvic, α-keto-butyric, α-keto-valeric, α-keto-caproic, levulinic, the *o*-, *m*- and *p*-toluic acids, benzoic, mandelic and cinnamic acids. The cellulose aceto-toluate is sol. in cold 1,4-dioxan, and other mixed esters have varying solubilities.

Hydrolysis of cellulose acetate. KODAK PATHÉ (SOC. ANON. FRANÇAISE). Fr. 686,401, Dec. 10, 1929. Cellulose acetate is hydrolyzed or deacetylated by treatment with a soln. contg. phosphoric acid and H_2SO_4, the amt of phosphoric acid being greater than the amt. of H_2SO_4, and the sum of the 2 being less than 1% of the total soln. The temp. of the reacting mixt. is not above 40°.

Cellulose ethers. I. G. FARBENIND. A.-G. (Otto Leuchs and Eduard Dörr, inventors). Ger. 505,797, Nov. 9, 1926. In forming cellulose ethers, alkali hydroxide is present in the reaction vessel but sepd. from the reaction mass. The hydroxide extracts water from the mass to become liquid and flow into the reaction mass

Cellulose ethers. I. G. FARBENIND. A G Fr 686,598, Dec. 13, 1929. Mixed cellulose ethers are made by the reaction of a mixt. of a simple or substituted alkyl halide, satd. or not, and ethylene oxide or one of its homologs with alkali cellulose in the presence of a diluent and a catalyst Examples are given of the prepn. of benzyl oxyethylcellulose from $C_6H_5CH_2Cl$, ethylene oxide and alkali cellulose, and of propyloxyethylcellulose, PrCl being used

Plastic substances. I. G. FARBENIND A G Fr. 686,470, Dec. 12, 1929. Plastic substances are made from cellulose acetates by using as solvent a liquid alkylene oxide such as ethylene oxide, with or without a swelling agent for the cellulose ester

Apparatus for making seamless tubes of cellulose. KALLE & Co. A.-G. (Julius Voss, inventor). Ger. 507,357, Oct. 14, 1928.

Machine for the preparation of thin endless bands of cellulose derivatives. CELLON-WERKE ARTHUR EICHENGRÜN Ger. 505,861, Oct 21, 1924.

Viscose. I. G. FARBENIND. A.-G. (Harry Meyer and Wilhelm Eller, inventors) Ger. 504,732, Apr. 6, 1928 Addn. to 486,769 (*C. A.* **24**, 1980). In treating viscose to prevent the formation of heavy metal salts during its manuf. processes, the $(COOH)_2$ of 486,769 is replaced by org. hydroxy acids such as citric, tartaric or lactic acids, or their salts.

Artificial silk. HENRY DREYFUS Fr. 686,331, Dec. 9, 1929. In the manuf of artificial silk, particularly by the dry method, that part of the spinning nozzle which is exposed to the evapg. agent has an unpolished surface around the spinning opening or openings.

Artificial silk. MEINRAD F. THOMA. U. S. 1,785,823, Dec. 23. By subjecting artificial silk such as that made from viscose, cellulose acetate or cuprammonium cellulose to a treatment such as with warm softening and crinkling and hygroscopic substances fiber is obtained which produces yarns of silky soft feel and a strength about 25–40% higher than that of yarns made of untreated fibers. App. is described.

Artificial silk and similar products. BRITISH CELANESE, LTD., and W. I TAYLOR Brit. 333,504, Feb. 5, 1929. Filaments, ribbons, tapes or straws which are capable of being at least partially delustered as by treatment with moist steam, water or aq alc. are formed by extruding solns. in org. solvents of cellulose acetate contg. wetting agents (of which various types are listed as suitable) comprising org. carboxylic acids or org. sulfonic acids or sulfuric esters or their salts. Numerous details and modifications of procedure are described.

Artificial filaments. I. G. FARBENIND. A.-G. (Hans C. Stuhlmann and Fritz Mehns, inventors). Ger. 507,351, Nov. 17, 1928. Endless bundles of artificial filaments from viscose are subjected to strong tension, while still moist with acid, before washing and after-treating in a slack state in known manner.

Dry-spinning apparatus for artificial silk. SYNTHETA A.-G. Ger. 507,212, Feb. 9, 1928. Means for cooling the spinning nozzles and adjacent parts is described.

Driving means for artificial silk spinning pot. Soc. ANON. DES CONSTRUCTIONS ELECTRIQUES PATAY. Ger. 507,303, June 12, 1926.

Electrically driven spinning pot for artificial silk. ADOLPH H. RAILING and HARRY J. FLEY. Ger. 507,302, Mar. 20, 1927. See Brit. 286,927 (*C. A.* **23**, 514).

Disintegrating wood chips. GEORGE H. ELLIS (to Insulite Co.). U. S. 1,785,544, Dec. 16. The chips are passed between a pair of rollers submerged in liquid to force air out of the wood, the squeezed chips are then allowed to expand and absorb the liquid, and the liquid-soaked chips are immediately subjected to a second pressing operation quickly to force the liquid out of the chips to sep. the fibers. App. is described.

Pulping raw cellulosic material such as wood chips. GEORGE A. RICHTER (to Brown Co.). U. S. 1,784,849, Dec. 16. A confined pool of cooking liquor such as used in kraft pulp production is subjected to high temp. and pressure conditions and the liquor is added to the raw cellulosic material while displacing the air in the latter and causing it to escape into and displace liquor in the pool, and the confined charge is cooked with the liquor until pulped. App. is described. Cf. *C. A.* **24**, 2884.

Wood-pulp grinder (electric driving system). WILBUR L. MERRILL (to General Elec. Co.). U. S. 1,785,490, Dec. 16. Structural and elec. features.

Separator for wood pulp, etc. RUDOLF ERNST WAGNER. Ger. 507,586, Aug. 4, 1927. A centrifugal separator for wood pulp, cellulose and similar materials made into a pulp with water is described.

Digester for sulfite wood pulp. EINAR MORTERUD. U. S. 1,785,591, Dec. 16. Structural features.

Preparing fibers for wall-board pulp. TREADWAY B. MUNROE (to Celotex Co.). U. S. 1,785,840, Dec. 23. Raw fibrous material such as bagasse is cooked in the presence of chemical substances resulting from previous cooks and at a temp. and for a time sufficient to loosen fiber-encrusting material but insufficient to produce fibers suitable for paper making, the fibers are freed from their cementing tissues by forcible hydraulic action, and are recovered. App. is described.

Bleaching (raw materials for paper manufacture). I. G. FARBENIND. A.-G. (Hermann Wenzl, inventor). Ger. 500,201, May 18, 1926. Addn. to 498,856. The method of 498,856 (*C. A.* **24**, 4635) for HClO bleaching is modified by using Co, Cu and other metals for the catalyzer instead of Ni or Ni compds.

Paper. ERNST FUES. Ger. 504,953, Sept. 16, 1926. A method is described of coloring pergamin and similar highly glazed paper prior to the hot glazing.

Paper. OTTO H. SIDO and HERMANN WIEDERHOLD. Ger. 505,589, Aug. 18, 1929. Cellulose is prepd. by digesting wood, etc., with cyanides or cyanates, which, on sapon. with water, form NH_3. The NH_3 is recovered as a by-product.

Paper. AKTIESELSKAPET RAOUL PICTET OG F. THARALDSEN. Ger. 504,667, April 7, 1926. Cellulose is prepd. for paper manuf. by treating wood with an aq. soln. of SO_2 under a pressure of at least 8 atm. at about 120°.

Paper. I. G. FARBENIND. A.-G. (Kuno Franz and Carl Dankert, inventors). Ger. 505,994, Feb. 6, 1925. Paper is colored and embossed by moistening the glazed paper, pressing and producing the desired depth of color by the immersion method. Cf. *C. A.* **24**, 4635.

Paper making. R. MARX. Brit. 333,167, May 1, 1929. The felts or the felts and web at the wet end of a paper-making app. are passed through one or more heated zones to accelerate removal of moisture and to prolong the life of the wet felts. Various details of app. and operation are described.

Sizing paper. RAFFOLD INTERNATIONAL CORP. Brit. 333,620, May 17, 1929. Pulp stock is used having a carbonate filler and a paraffin emulsion mixed with the fibrous material. Alum may be added and rosin size may be used for emulsifying the paraffin. The emulsion and filler produce a stable flocculent ppt. which is non-sticky, non-agglomerant and ink-resistant. Numerous details and modifications of procedure are described. Cf. *C. A.* **24**, 2884-5.

Coating paper. CHAMPION COATED PAPER CO. Brit. 333,226, May 3, 1929. Paper is treated on either one or both sides with uncooked starch made into a slurry with water, with or without a pigment, and the adhesive properties of the starch are developed on the paper by heating. Various other auxiliary substances also may be used such as gum arabic, waxes, dyes and other coloring substances, and softening agents such as glycerol or castor oil. Cf. *C. A.* **24**, 501.

Coating and coloring paper webs. MEAD PUMP & PAPER CO. Brit. 333,034, July 15, 1929. A color layer is applied to a traveling sheet and then subjected to the ac-

tion of a smoothing and spreading roll rotating with such high peripheral speed (suitably about 650 ft. per min.) that a force resistant to adhesion of the color to the roll is developed and prevents irregular adhesion of the color.

Calender rolls for finishing paper. ARCHIBALD LADE (to B. F. Perkins & Son, Inc.). U. S. 1,785,265, Dec. 16. One of a pair of rolls is formed with a yielding surface comprising paper and asbestos laminations pressed together.

Sulfurized paper. ÉTABLISSEMENTS DALLE FRÈRES ET LECOMTE. Fr. 686,276, Dec. 7, 1929. Paper pulp which does not stand the action of H_2SO_4 at ordinary concn. is sulfurized superficially with acid of 45–55° Bé. The paper thus obtained may be impregnated with fatty substances and lends itself to suppling with glycerol, glucose, chlorides, gums, etc.

Removing water from piled sheets of wet pasteboard or the like. RICHARD KASTNER and HERBERT SCHMOLKA. U. S. 1,785,484, Dec. 16. A pile of sheets is pressed at ordinary temp., to remove a portion of the water, and an elec. a c. is passed through the sheets while the pile is subjected to pressure to supply heat, a further quantity of water is allowed to flow from the pile without increasing the pressure, the heat is then increased to raise the temp. and the pressure is reduced. App. is described.

Dyeing paper, cellulose, leather, wood, etc. I. G. FARBENIND. A.-G. (Hermann Köcher, inventor) Ger. 505,859, June 19, 1925. Addn. to 427,009. The process of 427,009 for producing water-fast colors on metals is extended to other materials such as paper, cellulose, leather and wood. The color is obtained by treating the material with tannin, or other water-sol. compds. with free phenolic OH groups with no dye character, mixed with a suspension of basic dye in acetone or other solvent which dissolves fat and mixes with water. The mixt. mentioned in the example consists of Rhodamine B, tannin, water, alc. acetone and shellac.

24—EXPLOSIVES AND EXPLOSIONS

CHARLES E. MUNROE

Production of explosives in the United States during the calendar year 1929. W. W. ADAMS AND L. S. GERRY. Bur. Mines, *Tech. Paper* **478**, 51 pp.(1930); cf. *C. A.* **24**, 3114.—Total sales of industrial explosives in 1929 were 509,708,300 lb., 7% more than 1928. These were divided into 120,045,650 lb. of black blasting powder, 326,993,276 lb. of high explosives other than permissibles, and 62,669,434 lb. of permissibles.

ALDEN H. EMERY

Smokeless powder grains: Causes and characteristics of structural variations. A. J. PHILLIPS. *Army Ordnance* **11**, 195–8(1930).—Photomicrographs are given of over 50 powder grains made with different components, in varied stages of decompn., some viewed by polarized and some by normal light and a brief discussion of each is given.

CHARLES E. MUNROE

Permissible methane detectors. A. B. HOOKER, W. J. FENE AND R. D. CURRIE. Bur. Mines, *Bull.* **331**, 30 pp.(1930); cf. *C. A.* **24**, 5978.—Comparative tests of the following CH_4 detectors are reported: Burrell, U. C. C., Martienssen and Wolf. The U. C. C. was the most accurate, although all were fairly so.

ALDEN H. EMERY

Toxic gases from 60 per cent gelatin explosives. G. ST. J. PERROTT, L. W. BABCOCK, C. D. BITTING AND G. W. JONES. Bur. Mines, *Tech. Paper* **482**, 30 pp.(1930).—Field tests showed that low percentages of toxic gases are produced by 60% gelatins when the explosives have O balances, including the wrapper, that vary within the limits of −2.5 to +2.5 g. per 100 g. of explosive. Further increase of the + O balance decreases only slightly the CO produced, but increases the oxides of N. CO production was not affected appreciably by the wetness of the bore hole or by the method of loading, O balance being the sole detg. factor. Storage over 8 months had no appreciable effect as compared with 1 month. The oxides of N were affected by the wetness of the bore hole, a wet hole giving 5 times as great an amt. of N oxides as a dry one. Oxides of N decreased rapidly with time after firing. The paper wrapper takes part in the reaction to the extent of 70–100%, depending on the O balance of the explosive. Comparison of field with lab. tests in (1) Bichel gage, (2) Crawshaw-Jones app. and (3) Hercules tank showed major agreement of all 3 with field results for CO, but wide divergence for N oxides, (3) being the best. Curves were prepd. from which the CO produced by 60% gelatins can be detd. direct from the CO/CO_2 ratio.

A. H. E.

Nitration of *sym*-diphenylethane (RINKENBACH, AARONSON) **10.** Nitrocellulose (U. S. pat. 1,785,030) **23.** The motion of flames in closed vessels (STEPHENSON) **2.**

Explosive. CHARLES H. WATERS (to Dumor National Chemical Co.). U. S. 1,786,046, Dec. 23. A chlorate such as $NaClO_3$ is used with liquid mononitrotoluol about 3 and liquid dinitrotoluene about 11 parts, to form an explosive which is suitable for stump or rock blasting. $NaNO_3$, $CaCO_3$ and sawdust also may be added.

Explosive detonator charges. K. F. PAUL (to Hercules Powder Co.). Brit. 333,539, Oct. 13, 1928. Diazonitrophenol is used in blasting detonators over a base charge which may contain the same substance, and an oxidizing salt such as $KClO_4$, $KClO_3$ or NH_4ClO_4 may be used in either the top or base charge. Other substances such as tetryl, TNT or picric acid may be used for the base charge.

Explosive detonator charges. E. M. SYMMES (to Hercules Powder Co.). Brit. 333,534, Oct. 13, 1928. Diazodinitrophenol is mixed with Pb azide, especially as a top charge over a base charge of tetryl, TNT or picric acid.

Blasting-explosive assembly. CARL D. PRATT (to Atlas Powder Co.). U. S. 1,785,529, Dec. 16. A main charge of a deflagrating but non-high explosive compn. such as granular blasting powder is provided with a longitudinal core with a minimum diam. of 0.75 in. consisting of a high explosive compn. such as dynamite comprising not less than 2% and not more than 50% of the total wt. of the assembly (the core extending entirely through the main charge).

Safety matches. I. G. FARBENIND. A.-G. (Theodor Spängler, inventor). Ger. 505,667, Aug. 26, 1927. The match heads contain binding material, $KClO_3$, S and cement, and the rubbing surface contains binding material, amorphous P and cement.

Waterproof matches. I. G. FARBENIND. A.-G. (Theodor Spängler, inventor). Ger. 505,668, July 4, 1928. The binding material consists of egg albumin dried and heated to render it insol. The match heads contain albumin, $KClO_3$, ZnO, glass powder, kieselguhr and $KHCO_3$. The rubbing surface contains albumin, amorphous P and Sb_2S_3.

Waste acid-separating apparatus for nitroglycerin plant. DYNAMIT A.-G. VORM. ALFRED NOBEL & Co. (Arnold Schmid, inventor). Ger. 502,150, Oct. 26, 1927. Addn. to 488,922 (*C. A.* **24**, 2297). Structural details.

25—DYES AND TEXTILE CHEMISTRY

L. A. OLNEY

Interesting sources of natural dyestuffs. C. D. MELL. *Textile Colorist* **52**, 682-4, 752-5, 777, 842-4(1930); cf. *C. A.* **25**, 208.—The following sources are briefly discussed: the pokeweed of Jamaica for a red dye; the bark of the common hornbeam tree, *Carpinus betulus*, for a yellow dye; the randia species for a blue dye; the bark of the tanekaha tree, *Phyllocladus trichomanoides*, of New Zealand, for tannin and a red dye; Guinea corn or great millet, *Andropogon sorghum*, for a red dye, the color principle of which is known as durasantalin; narra wood, *Pterocarpus indicus*, for a red dye, the color principle of which is known as narrin; the bark of the nance or malpighia of Mexico and Central America for tannin and a dyestuff which dyes silk and wool a coffee color; the cojoba of Venezuela, *Piptadenia peregrina*, for tannin and dyes for leather; goldenrods for a yellow dye; the barbados-flower, *Caesalpinia pulcherrima*, for tannin and yellow and red dyes; dandelions, *Taraxacum densleonis*, for a yellow dye; red cabbage, *Brassica oleracea capitata nigra*, for cauline, a purplish red coloring matter. The economic importance of the barks of the bibnoniaceae or trumpet-creeper family is also considered. R. K. WORNER

Development of rayon dyestuffs. I. Acetate rayon dyes. R. BRIGHTMAN. *Ind. Chemist* **6**, 500-1(1930). E. H.

Development of dyeing in Europe. J. F. SPRINGER. *Textile Colorist* **52**, 761-8, 777(1930).—Historical. R. K. WORNER

Italian dye industry. ELIZABETH HUMES. *Textile Colorist* **52**, 758(1930). R. K. WORNER

Pre-modern dyeing. J. F. SPRINGER. *Textile Colorist* **52**, 834-7(1930).—Historical. R. K. WORNER

A history of dyeing devices in ancient times. J. F. SPRINGER. *Textile Colorist* **52**, 610-4, 628-9(1930). R. K. WORNER

New processes in dyeing with Naphthol AS. W. CHRIST. *Bol. assoc. ital. chim. tes. col.* **6**, 184-8(1930).—On wetting cotton with Naphthol AS solns. there is reached a state of equil. between the amount of naphthol dissolved in the bath and the quantity taken up by the material that is independent of the relation between the wt. of the goods and vol. of bath. An important factor in dyeing

ıe Naphthol AS series is the product used for fixing the alkali. The goods trans- ... bath to the developing bath a certain quantity of NaOH ... itself to the coupling energy of the ... energy compds. with a more marked acid ... smaller coupling energy need a more nearly neutral medium. The products resulting must be indifferent. With Fast Violet Base B, Variamine Blue B and the Base of Fast Blues BR and BB, which have little coupling power, $ZnSO_4$ and $MgSO_4$ can be used The Zn salts react with slight acidity, having no retarding action with NaOH. The Zn hydroxide formed is neutral and leaves unaffected the stability of the diazo compds Mg is a stronger base, and its mineral salts have a neutral reaction, pptg. with NaOH as hydroxide, very little sol. and alk. Mg is, therefore, to be used where the Zn compds. stop complete coupling and a union with NaOH does not take place in the dye bath The neutral point is reached with AcOH after addn. of the theoretical quantity of NaOH with Al sulfate after 71% of the theoretical, with $ZnSO_4$ after 63%, with $MgSO_4$ after 7%. The neutrality continues with Al sulfate and $ZnSO_4$ until all the NaOH necessary for the double decompn. has been added The $MgSO_4$ solns. become alk. as soon as the neutral point has been passed. Zn and Al hydroxides do not act unfavorably on the dye bath, as does the Na acetate formed by AcOH. The alk. reaction of $Mg(OH)_2$ renders unstable the diazo solns. Zn and Al compds. reduce the absorption of cloth, causing uneven and lighter dyeings. The defect is more marked with diazo compds with high mol. wt. A little AcOH is advantageous. $Mg(OH)_2$ does not have the same objectional effect The difficulties with the alkali fixer can be avoided with Jellinek's process, based on passing the dry naphtholated cloth into a diazo soln. with much AcOH. This eliminates the NaOH, stopping the formation of the colors; the colors are then produced by passing into a Na_2CO_3 bath. The combination with the naphthol is complete also with bases of slight coupling power. The diazo soln. with excess of AcOH is stable, and the temp. of the developing bath can be brought with many bases to 35 40°, permitting a strong penetration. The coupling in the alk bath is nearly instantaneous. R. SANSONE

Something on the dyeing and charging of lined or ribbed silk fabrics, with possible future innovations. RAFFAELE SANSONE *Textile Colorist* **52**, 309-10, 342, 523-5, 559, 668-71, 710(1930).—A description is given of different types of machines for dyeing this type of material together with a discussion of the advantages of each machine R. K. WORNER

Selecting dyes for glove-silk dyeing. T. P SHERIDAN. *Textile Colorist* **52**, 814, 849(1930).—General and practical R. K. WORNER

Application of the azo dyes to viscose. MORRIS A. BARSKY. *Textile Colorist* **52**, 519–22, 557, 596–600(1930).—The purpose of this study was to investigate the various factors that enter into the production of the insol azo colors on viscose yarn, and the effect of these factors on the shade of the dyeings thus produced, in relation to their fastness to light and Cl_2. It was concluded that the time of coupling affects neither the shade nor the fastness, whereas the temp. affects both The higher the temp. of coupling the bluer and duller the resultant dyeing, and the more resistant to light and Cl_2. A more concd. padd liquor gives a heavier dyeing with an increased resistance to light and Cl_2. Increase of NaOH content of padd liquor has no practical effect on the shade, but increases the fastness slightly. Increase of Naphthol AS content changes the shade slightly and increases the fastness to Cl_2 appreciably. Light exposures of 10 hrs. or less affected yarns padded with β-naphthol, Naphthol AS, Naphthol AS-RL, Naphthol AW-SW, Naphthol AS-OL, and Naphthol AS-G, but on coupling with Fast Red B, the yarns padded with Naphthol AS or its immediate derivs. showed no difference between the exposed and unexposed parts. Padded yarns coupled in the presence of the most common metals showed no effect of the metal on the shade or fastness of the dyeing. A padding temp. of 55° and the following padd soln. for viscose yarns are suggested: 18 g. Naphthol AS, 6 g. NaOH, 24 g. Turkey red oil, 6 g. formaldehyde, per l. R. K. WORNER

Dyeing and finishing rayon. NOEL D. WHITE. *Cotton* **94**, 575–7, 581(1930); cf. *C. A.* **24**, 1743.—This article is based on practical experience. The first part deals with nitrocellulose rayon, the second with cuprammonium, viscose and cellulose acetate. R. K. WORNER

Dyeing canvas stock for "art moderne" store and house awnings. GEO. RICE. *Textile Colorist* **52**, 621–2(1930).—General discussion of the problems involved. Colored awnings are being produced both by dyeing the yarns or fabrics and by painting. R. K. WORNER

Fur dyeing. W. F. A. ERMEN. *Textile Colorist* **52**, 744–5, 825–6(1930).—Some of the more important fur dyes, their manuf. and method of application are briefly described. R. K. WORNER

Dyeing paper textiles. FRED. GROVE-PALMER. *Textile Recorder* **48**, No. 569, 61 3, 59(1930).—A general discussion of paper textiles, their use, manuf., dyeing and cleansing. R. K. WORNER

Colloid mills in the color shop. ALAN A. CLAFLIN. *Textile Colorist* **52**, 623–5 (1930).— An illustrated description of a com. paste type colloid mill and its applications in the textile industry. R. K. WORNER

The carbanthrene printing colors. GEO. M. BISHOP. *Textile Colorist* **52**, 680–1, 710(1930).—The advantages of these colors over the aq. pastes hitherto available are enumerated as follows: non-freezing, non-drying, homogeneous, non-settling, grit-free, more sol. leucos, superior penetration and superior leveling. Some formulas are given indicating the procedure followed in preg. stock and reducing pastes. R. K. WORNER

Color constants. F. P. GROAT. *Textile Colorist* **52**, 601–2, 629(1930).—A method of classifying color, using the 3 constants, hue, value and intensity, is described and proposed. R. K. WORNER

Mixing and matching of colors. GEO. WALLACE. *Textile Colorist* **52**, 672–4, 676–7(1930).—The application of the Colorscope is discussed. R. K. WORNER

Producing cheap bright colors on cotton. RAFFAELE SANSONE. *Dyer, Calico Printer* **63**, 85(1930).—The material is first dyed with a direct color and then with the basic dyestuff. A simple plant for this method is sketched and described. R. K. W.

How much should a dyer know about flax, hemp and China grass? GEO. RICE. *Textile Colorist* **52**, 550–1(1930).—Some of the properties of these fibers are briefly described R. K. WORNER

How much should a dyer know about bacteria in wool? GEORGE RICE. *Textile Colorist* **52**, 748–9(1930).—Practical. Various types of bacteria attack wool at different stages of its processing and also when the sheep is on the range. Some of the effects of bacterial attack are cited. R. K. WORNER

The treatment of water for bleaching and dyeing. C. D. BLACKWELDER. *Textile Colorist* **52**, 769–70(1930).—The type of troubles which an unsatisfactory water treatment can cause are briefly indicated. The importance of proper study of the particular supply to be treated and of the processes and chem. reactions taking place in the plant, prior to designing the plant and deciding on the chem. treatment to be applied, is stressed. R. K. WORNER

The kinetics of the chlorine bleaching process. HUGO KAUFFMANN. *Papier Fabr.* **28**, Tech. Wiss. Teil 557–9(1930).—In order to obtain improved understanding of technical bleaching operations, studies were made on (1) the rate of bleaching a dyestuff (phenolphthalein), (2) on the rate of autodecompn., and (3) on the rate of attack on cellulose (purified cotton) with hypochlorite solns. of various p_H values and neutral salt content. It was found that (1) decreased with increase in p_H, but was increased by certain neutral salt concns. Effect (2) followed the 2nd order reaction law exactly, and also showed important neutral salt influences. Effect (3) followed an entirely different law, however, being greater in alk. than in acid solns. The explanation is advanced that (1) and (2) depend on the HClO concn., while (3) is due to the complex ion $(ClOH{\cdot}ClO)'$. From known hydrolysis and dissocn. consts. it can be calcd. that effect (3) will reach a sharp max. in the range between Cl_2:NaOH mol. ratios of 1 1 and 1 2. This agrees strikingly with exptl. facts. On this basis a new *bleaching process* was evolved in which the fibers were first treated with acidified hypochlorite contg. 5–10 g./l. HCl in excess of that required to liberate all the HClO, and then with hot alk. peroxide. Cotton cloth was bleached by this process with no loss in strength. R. H. DOUGHTY

The great advantages of bleached fabrics. H. D. MARTIN. *Textile Colorist* **52**, 694–5(1930).—Chem., mech., sanitary and comfortable advantages are listed. R. K. WORNER

The bleaching of feathers and hair. FRED. GROVE-PALMER. *Textile Colorist* **52**, 606–7(1930). Practical directions are given for bleaching feathers and hair with $KMnO_4$ and with the vapors from H_2O_2. R. K. WORNER

Spectroscopic investigation of the mineral constituents of textiles. SAMUEL J. LEWIS. *Textile Colorist* **52**, 552–3(1930); see *C. A.* **25**, 211. R. K. WORNER

X-ray histological studies. I. Determination of the texture of individual ramie fibers by aid of the x-ray micro method. K. ECKLING AND O. KRATKY. *Z. physik. Chem.*, Abt. B, **10**, 368–70(1930).—The type of x-ray analysis formerly used requires

macroscopic objects and the diffraction picture so produced represents a summation effect arising from the entire object. In contradistinction with this method, biol. structure elements of microscopic proportions can also be photographed by aid of the x-ray micro method. The first histological investigation of this kind was undertaken for the purpose of detg. the texture of individual cells of ramie fiber. Narrow zones of the cross-section were illuminated and the usual diagram showing a fiber structure was always obtained It is concluded that any higher order structure showing radial or concentric symmetry is not present or at least is not clearly developed. C. J. H.

Textile fibers. AMBALAL J. PATEL. *Indian Textile J.* **40**, 507–10, 556–59(1930).—A compendium is made of the phys. and chem. properties of various textile fibers. H. H. MOSHER

Mineral oils on textile yarns. A. A. COOK. *Am. Silk J.* **49**, No. 12, 53–4, 72 (1930).—Petroleum oils possess better lubricating and penetrating powers for textile products than vegetable oils. When properly purified, mineral oils can be removed from rayon without difficulty, from silk by exercising certain precautions, and from wool only with considerable trouble. A blend of mineral and sulfonated oil (1–2) was found most satisfactory for textile purposes. H. H. MOSHER

Fundamentals of cotton piece goods finishing. THOMAS F. HUGHES. *Textile World* **78**, 2132–3, 2173(1930).—General. R. K. WORNER

Improved methods of processing enhance appearance of cotton-rayon fabrics. RAY COTTRELL. *Textile World* **78**, 2247–9, 2351–3(1930).—A review of modern trends in scouring, bleaching, dyeing, delustering, weighting, iron-proofing acetate yarns, wrinkel-proofing, etc. No marked discoveries have taken place, but rather a refinement of methods has resulted in improved appearance and handle of the finished fabric. R. K. WORNER

Sizing rayon yarns. R. H. SMITH. *Am. Silk J* **49**, No. 12, 76(1930).—A general article in which the phys. requirements for rayon size are listed. H. H. MOSHER

Sizing woolen warps. RINOLDI. *Wool Record and Textile World* **38**, 669–71 (1913).—General. H. H. M

The nature and condition of the sulfur in wool. G. SALOMONE. *Bol. Laniera* **43**, 992–5(1929).—S is a constituent of wool, and when eliminated the structure and tenacity of the fiber are changed. If the wool is treated with dil. alkalies to eliminate a small part of the S there is a change indicated by Becks $SnCl_2$ reagent or Pauly's diazobenzenesulfonic acid soln. Acids and alkalies produce cystine, cysteine, thiolactic acid, thioglycol, ethyl sulfide, Me and Et mercaptans and H_2S with wool. Cystine predominates. Some of the other compds. come from the decompn. of cystine. A part of the S in wool is present as bisulfide or org. sulfide, and a part in different combinations. The presence of S compds. in wool is proved by the easy oxidation of a portion of these. When wool is exposed for a long time to ultra-violet rays it becomes slightly acid, forming H_2SO_4. The S atoms in wool are therefore not all equally combined; there are 2 different sulfurized protein complexes, one with S easily decompd. by weak alkalies and oxidizing agents, and the other with S of strong stability, only detached when the total decompn. of wool is brought about with warm concd HNO_3, saltpeter or Na_2O_2 in a melted condition. R. SANSONE

The use of antiseptic agents for the prevention of mildew. L. L. LLOYD. *Dyer, Calico Printer* **63**, 689–90(1930).—A general discussion of the conditions favoring mildew growth. The anilide or naphthalide of salicylic acid is considered the most efficient reagent for its control. Shipment of textiles in a dry condition is advocated. R. K. WORNER

Wood preservation with Zn chloride finds place in textile industry (TUFFT) 20. Ornamental grasses and leaves (GROVE-PALMER) 18. Orthanilic acid (SHARVIN, *et al.*) 10. A microbalance of new design (STANBURY, TUNSTALL) 1. Some new monosubstitution derivatives of retene (KOMPPA, WAHLFORSS) 10.

Dyes. I. G. FARBENIND. A.-G. Brit. 333,573, May 10, 1929. Substantive *o*-carboxyazo dyes contg. Cu are made (1) by causing an agent yielding Cu to act on azo dyes obtainable from tetrazotized benzidine-3,3'-dicarboxylic acid and 2 mol. proportions of aryl- or aroyl-aminonaphtholsulfonic acids substituted by solubilizing groups in the aryl or aroyl groups, (2) by effecting the dye coupling in the presence of suitable agents yielding Cu, or (3) by adding a coppering agent when prepg. the dye bath. Numerous examples are given of the production of dyes giving reddish violet to blue shades.

Dyes. I. G. FARBENIND. A.-G. Brit. 333,762, Sept. 4, 1929. Chlorodimethoxydibenzanthrones are made by treating pure dimethoxydibenzanthrone (which may be formed as described in Brit. 181,304 (*C. A.* **16**, 3762)) in an org. solvent such as $PhNO_2$ with a chlorinating agent (such as sulfuryl chloride in the presence of Fe chloride to produce a green dye or in the addnl. presence of MgO or CaO to produce a yellower dye). Fe fluoride, $Fe_2(SO_4)_3$, Ni chloride, $CoCl_2$ and $SbCl_5$ also may be used as halogenating catalysts.

Dyes. I. G. FARBENIND. A.-G. (Georg Kränzlein and Paul Ochwat, inventors). Ger. 507,340, Sept. 8, 1927. The dyes obtainable from trianthrimides as described in Ger. 230,407 (*C. A.* **5**, 2733), 240,080 (*C. A.* **6**, 2177), 249,000 (*C. A.* **6**, 2851), and 251,350 (*C. A.* **7**, 267), are treated with H_2SO_4 at a low temp., and the products are oxidized, *e. g.*, with Cl water at 70–80°. New dyes giving brighter shades than the initial materials are so obtained. An example is given.

Dyes. I. G. FARBENIND. A.-G. (Paul Nawiasky, inventor). Ger. 507,345, Feb. 7, 1929. Addn. to 498,292 and 500,178. The *N*-dihydro-1,2,2′,1′-anthraquinoneazinesulfonic acid, described in Ger. 216,891 (*C. A.* **4**, 965), is rendered fast to Cl by treatment as described in Ger. 498,292 (*C. A.* **24**, 3907) and 500,178 (*C. A.* **24**, 4400). An example is given.

Dyes. I. G. FARBENIND. A.-G. Fr 686,165, Dec 5, 1929. Dyes of the 4,5,8,9-dibenzopyrene-3,10-quinone series contg. different atoms of halogen are prepd. by introducing into 4,5,8,9-dibenzopyrene-3,10-quinones contg. in the mol. one or more halogen atoms, one or more other atoms of halogen different from those already present. Examples are given.

Dyes. SOC. ANON. POUR L'IND. CHIM À BÂLE. Fr. 686,194, Dec. 6, 1929. Metallized dyes capable of dyeing vegetable, artificial and animal fibers are made by treating azo dyes answering to the general formula $(R^1—N=N—R^2—N=N—)_xR^3$, in which R^1 signifies an aromatic group not contg. OH, R^2 an aromatic group contg. in the *o*-position with respect to the second azo group, OR (in which R is an atom of H or a group capable of forming salts such as CH_2COOH and which besides is capable with the aid of the azo group and the R group of forming complexes with substances liberating metals), R^3 the group of a coupling component capable of coupling one or more times with diazo compds. and x is a whole no. Examples and a list of components with the colors obtained are given.

Azo dyes. I. G. FARBENIND. A.-G. Brit. 332,932, March 21, 1929. Azo dyes are formed in substance, on a substratum or on the fiber by combining any diazo, tetrazo or diazoazo compd. free from sulfonic and carboxylic groups with a 2-(2′-hydroxy-3′-naphthoylamino)-5-halo-1,4-diethoxybenzene. Examples are given of prepg. the dyes and intermediates

Azo dyes. I. G. FARBENIND A.-G. (Erwin Hoffa, Erwin Thoma and Hans Heyna, inventors) Ger. 501,106, Dec. 3, 1926. Addn. to 499,535. 2,5-Dimethyl-3,4-dihalo-1-diazobenzene is coupled with arylamides of 2-hydroxynaphthalene-3-carboxylic acid or β ketocarboxylic acid, instead of the 4,6-dihalo-1-diazobenzene of 499,535 (*C. A.* **24**, 4640).

Azo dyes. I. G. FARBENIND. A.-G. (Leopold Laska, Arthur Zitscher, Wilhelm Christ and Adolf Petzold, inventors). Ger. 508,585, Dec. 14, 1927. Azo dyes are produced by coupling 4-diazodiphenylnitrosamine (contg. no HSO_3 or COOH groups) with arylides of 2,3-hydroxynaphthoic acid, and then splitting off the nitroso group. Thus, cotton fabric is boiled with a soln. of 2-3-hydroxynaphthoyl-4-chloroaniline, Turkey red oil and KOH, after which 4-amino-4′-ethoxydiphenylamine, HCl and $NaNO_2$ are added. Finally Na_2CO_3 is added. This gives a garnet color to the cotton. A dye bath composed of the above liquor, soda, soap and Na_2S gives fast greenish blue tints to cotton. Many examples together with a long table showing diazo compds., coupling 2,3-hydroxynaphthoyl compds., and the colors the dyes produce before and after the separation of the nitroso group, are given.

Azo dyes. IMPERIAL CHEMICAL INDUSTRIES, LTD., and R. BRIGHTMAN. Brit. 332,954, April 29, 1929 Azo dyes giving even shades on regenerated cellulose materials are made by tetrazotizing a diamine such as α,β-4,4′-diaminodiphenylethylenediamine or other diamine of like type and coupling with salicylic acid or other suitable coupling component, or by diazotizing a deriv. of a similar diamine in which one of the amino groups is replaced by a nitro or acylamino group, coupling with any component not contg. a free amino group, reducing the nitro group or hydrolyzing the acylamino group, again diazotizing and coupling with another component. Various details are given of the production of the dyes and intermediates employed. Cf. *C. A.* **24**, 2891.

Azo dyes. IMPERIAL CHEMICAL INDUSTRIES, LTD., and R. BRIGHTMAN. Brit.

333,513, April 11, 1929. Trisazo dyes contg. at least 2 carboxylic groups or 2 sulfonic groups and suitable for dyeing regenerated cellulose materials in level shades are obtained by coupling tetrazotized 3-aminobenzene-1'-azo-4'-aminonaphthalene or a nuclear substitution product with 1 mol. proportion of a phenol, a naphthol or a carboxylic or sulfonic acid deriv. of these, and with 1 mol. proportion of the same or another component (other than a naphthol aryl ketone or an arylide of 2,3-hydroxynaphthoic acid), or by a described alternative process for producing the same dyes. Various examples are given. Cf. *C. A.* **24**, 6029.

Azo dyes. KARL THIESS (to General Aniline Works). U. S. 1,785,846, Dec. 23. Dyes of good fastness to light are produced either in substances or on the fiber by coupling the diazo compd of a 5-halo-2-amino-1-benzoic acid alkyl ester with a naphthylamide of 2,3-hydroxynaphthoic acid. Several examples of dyes producing various red tints are given, with details of manuf. Cf. *C. A.* **24**, 419.

Azo dyes of the benzidine series. BYRON L WEST (to National Aniline & Chemical Co.). U. S 1,785,799, Dec. 23. A dye producing bluish green shades from a neutral bath on cotton, wool, and silk may be produced by coupling one mol. proportion of tetrazotized benzidine with one mol. proportion of H-acid in an acid medium to form a diazoazo compd., then treating the diazoazo compd. thus obtained with an excess of diazobenzene in an alk. medium whereby a diazodisazo compd. is produced, filtering off the diazodisazo compd. suspending it in an alk. soln., heating said suspension to effect hydrolytic decompn. of said diazodisazo compd. and salting out the resulting coloring matter from said suspension Some closely similar starting materials yield similar dyes.

Azo dyes containing metals. FRITZ STRAUB and WALTER ANDERAU (to Soc anon pour l'ind. chim. à Bâle). U S 1,786,272, Dec. 23. 5,5'-Dihydroxy-7,7'-disulfo 1,2',1',2-dinaphthazine is combined with aromatic diazo compds. such as those of 4-chloro-2-aminophenol-6 sulfonic acid, 4-nitro-2-aminophenol-6-sulfonic acid, aniline-4-sulfonic acid, 4-chloro-2-aminodiphenyl ether or the like, and if sulfonated or unsulfonated diazo components are used which contain lake-forming groups, the dyes may be treated with a metal-yielding reagent such as a compd. of Cr, Cu, Fe, Mn, Sn, Al, Ni, Co, Ti, Ce or U. Numerous examples are given for producing dyes and metal compds. and derivs. dyeing various colors.

Forming azo dyes on the material to be dyed. I. G. FARBENIND. A.-G Brit 332,940, March 28, 1929. The fiber is impregnated with a dihydroxyquinoline contg. a naphthalene residue, a diphenyl radical or a residue of the benzene series which carries a substituent (such as an azo or a pseudoazimino group) increasing generally the affinity of aromatic compds. for vegetable fiber, and free from sulfonic, hydroxy and carboxylic groups, and development is effected with a diazo, tetrazo or diazoazo compd. free from sulfonic, carboxylic and hydroxy groups Various examples are given of the production of the dyes and intermediates and dyeings in yellow to red shades may be obtained.

Vat dyes. FELICE BENSA. Ger 505,521, Jan 13, 1929. New vat dyes are formed by treating chlorinated β-dinaphthol with concd. or fuming H_2SO_4. The dyes color cotton brown in an alk. vat, the shade turning to heliotrope on hanging. An example is given.

Vat dyes. FELICE BENSA Ger. 505,522, April 23, 1929; Fr. 686,344, Dec. 9, 1929. New vat dyes of the perylene series are formed by heating perylene-3,9-dicarboxylic acid chloride with aminoperylenequinone or aminoperyleneanthraquinone or derivs. Examples are given. In one, the use of β-aminoanthraquinone yields a yellow-orange dye for cotton and in another, 1-chloro-4-aminoanthraquinone a brown dye

Vat dyes. AZIENDE CHIMICHE NAZIONALI ASSOCIATE AND BELLONI & COLLI. Fr. 686,415, Dec. 10, 1929. Vat dyes are prepd by the reaction of SCl_2 on dibenzanthrone or isodibenzanthrone dissolved or suspended in a dehydrating solvent such as oleum, $ClHSO_3$ or SO_2Cl_2. Brighter colors are obtained by the addn. of small quantities of H_3BO_3 during the reaction. The dibenzanthrone may also be dissolved in indifferent solvents such as $PhNO_2$, $C_6H_3Cl_3$ in the presence of chlorides of Al, Fe, Cu, As or P

Vat dyes. W. G. WOODCOCK, E. G. BECKETT, J. THOMAS and SCOTTISH DYES, LTD. Brit. 333,191, Jan. 31, 1929. Vat dyes such as those of the anthraquinone class are purified by treating them with a hypochlorite (such as NaOCl) and H_3BO_3 or an acid or acid salt of substantially the same ionization value in dil. aq. soln. such as $NaHCO_3$. Examples are given of the treatment of Caledon brown R and 2,7-diphenyl-(1,2,5,6-dithiazoleanthraquinone).

Vat dyes. I. G. FARBENIND. A.-G. Brit. 333,165, April 22, 1929. Halo-4,5,8,9-dibenzopyrene-3,10 quinones, differing from the dyes described in Brit. 287,050 and

Brit. 287,845 (*C. A.* **23**, 525) and dyeing cotton more reddish brilliant shades than the unhalogenated initial materials, are obtained by allowing halogens or other suitable halogenating agents to act on 4,5,8,9-dibenzopyrene-3,10-quinone or its derivs. other than iodo derivs., in the presence of org. solvents or diluents, or in aq. suspensions, or in the absence of solvents, and preferably in the presence of halogenating catalysts. Numerous examples with details of procedure are given.

Vat dyes. I. G. FARBENIND. A.-G. Fr. 686,188, Dec. 6, 1929. Vat dyes are prepd. by treating with reducing agents the 2,2′-dimethyl-1,1′-dianthraquinonyls, or the 2,2′-dimethyl-*meso*-benzo(or naphtho)-dianthrones in which the H atoms of the CH_3 groups are replaced wholly or in part by substituents of the most diverse nature. If the compds. formed contain OH groups these are etherified. Several examples and formulas of the reactions are given, in which *meso*-anthraquinones and hydroxypyranthrones are formed as end products.

Vat dyes. I. G. FARBENIND. A.-G. Fr. 686,480, Dec. 12, 1929. Vat dyes are prepd. by introducing a halogen in known manner into the "*Bz*" ring of 4-amino-3-haloanthraquinone-1,2 acridones. The process may be carried out by decomposing in a convenient solvent the 1-amino-2,4-dihaloanthraquinones with haloanthranilic acids or their salts in the presence of an acid-binding agent and a catalyst such as $CuCl_2$, and treating the intermediate product with acid condensing agents such as H_2SO_4 or $ClHSO_3$. In an example, 1-amino-2,4-dibromoanthraquinone is heated with K 2-amino-3,5-dichlorobenzoate in cyclohexanol in the presence of $CuCl_2$. The free acid is obtained by boiling the product with HCl and is then condensed with H_2SO_4.

Vat dyes. I. G FARBENIND A.-G. (Max A. Kunz and Karl Köberle, inventors). Ger. 493,896, June 10, 1927 Nitrogenous dyes are prepd. by treating halodi- or haloisodi-benzanthrone or their derivs with polynuclear aromatic N-contg. compds. which have at least one replaceable H atom linked to the N, in the presence or absence of solvents, suspension agents, catalyzers or bases. Thus, tetrabromodibenzanthrone is treated with 1-aminoanthroquinone in the presence of $CuCO_3$, $PhNO_2$ and AcONa to give a grey-blue dye for cotton, from a blue vat. Several other examples are given.

Vat dyes. I. G. FARBENIND. A.-G. (Hugo Wolff, Max A. Kunz and Karl Köberle, inventors). Ger. 498,064 and 498,065, July 23, 1927 and 498,066, Aug. 19, 1927. Addns. to 489,957 (*C. A.* **24**, 2305). New vat dyes are produced by treating ethers of anthraquinonylamino-*Bz*-1-hydroxybenzanthrone with alkali (498,064), by treating the condensation products of halo-*Bz*-1,*Bz*-1′-dibenzanthronyl and 1-aminoanthraquinone or derivs, with alkali (498,065), or by heating tetrahalo-2,2′-dibenzanthronyl with aminoanthraquinone or derivs., in presence of bases and Cu or other metal compds. (498,066). Each patent gives examples and a table of starting materials and dyes produced. Cf. *C. A.* **24**, 4940, 4941.

Vat dyes. I. G. FARBENIND. A.-G (Paul Nawiasky and Emil Krauch, inventors). Ger. 498,067, Jan. 11, 1929. Addn. to 493,813 (*C. A.* **24**, 2893). 2-Halopyrazolanthrone is heated with 1 aminoanthraquinone or its substitution products in the presence of alk. condensing agents. Examples are given. Cf. *C. A.* **24**, 4168.

Vat dyes. I. G. FARBENIND. A.-G. (Hugo Wolf, Max A. Kunz and Karl Köberle, inventors) Ger. 500,324, Oct. 6, 1927. Addn. to 489,957 (*C. A.* **24**, 2305). 1′-Anthraquinonyl-2-aminobenzanthrone is treated with alk. agents, to produce a vat dye Several examples are given.

Vat dyes. I. G. FARBENIND. A. G. (Werner Zerweck, inventor). Ger. 507,343, May 10, 1928. Addn. to 485,961 The condensation product from haloanthanthrone and aminoanthraquinone, which contains a free amino group in the mol., is acylated, giving a vat dye. Examples are given.

Vat dyes. I. G. FARBENIND. A.-G. (Heinrich Neresheimer, inventor). Ger. 504,544, Oct. 27, 1928. Addn. to 504,016 (*C. A.* **24**, 5507). Green or olive vat dyes are prepd. by the action of acid condensing agents on derivs. of 2-benzanthronyl-1-aminoanthraquinone contg at least one aliphatic acylamino group, *e. g.*, 2-benzanthronyl-1-amino-4-acetamidoanthraquinone. Other new dyes may be obtained by splitting off the acyl group from the products, or from the products of Ger. 504,016, or by replacing the acylamino group with H or another substituent. Examples are given

Dispersing ester derivatives of vat dyes. L. J. HOOLEY, J. THOMAS and SCOTTISH DYES, LTD. Brit. 333,147, Jan. 30, 1929. Various compns. suitable for coloring wool or "acetyl silk" are prepd. by mixing ester derivs. of vat dyes with dispersing agents (various kinds of which are enumerated as suitable) and drying the mixt. Several examples are given.

Vat dyes and intermediates. I. G. FARBENIND. A.-G. (Robert E. Schmidt,

Berthold Stein and Kurt Bamberger, inventors). Ger. 507,342, Apr. 11, 1928. Addn. to 499,350. The products described in Ger. 499,350 (*C. A.* **24**, 4168) are obtained in simpler fashion by heating 2-amino-3-haloanthraquinone or its derivs. or substitution products with CuCN in an indifferent solvent until the nitrile intermediately formed is no longer detectable. Examples are given.

Vat dyes; intermediates. I. G. FARBENIND. A.-G. Fr. 686,341, Dec. 9, 1929. Condensation products which are vat dyes or intermediates for dyes are prepd. by treating with alk. condensing agents the products obtained by the action of aromatic *o* haloaldehydes with pyrazoleanthrone, 1,5-dipyrazoleanthrone and their ring-substituted products. Thus, the condensation product obtained from pyrazoleanthrone and *o*-chlorobenzaldehyde is heated with KOH in alc. A ring closure probably takes place with the formation of acridone compds. The sepd. product dyes cotton from the vat in orange-yellow shades. Other examples are given.

Anthraquinone dyes. CHEMISCHE FABRIK VORM. SANDOZ. Brit. 333,188, Nov. 21, 1928. Water-sol. anthraquinone ... amino-2-bromo-4-*p*-aminoacetanilidoanthraquinone or 1-amino-2-bromo-4-*p*-aminomethylacetanilidoanthraquinone with a sulfite, phenol and water under pressure at 130-140°. Complete substitution of Br is effected without splitting off the acyl group.

Acridone derivatives; dyes. I. G. FARBENIND. A.-G. Fr. 686,187, Dec. 6, 1929. New derivs. which are dyes are made by introducing halogen into acridones capable of forming vats, which contain besides one acridone ring at least 4 other rings. Thus, 1,2,5,6-diphthaloylacridone is chlorinated and brominated using I and Fe as a catalyst, giving a product which dyes cotton an orange-red from the vat. Similarly, the dye obtained from 2 mols. of 1-chloroanthraquinone-2-carboxylic acid and 1 mol. of benzidine is brominated to give a product which dyes cotton brown-red from the vat. Several other examples are given.

Anthanthrone derivatives. I. G. FARBENIND. A.-G. (Richard Herz and Werner Zerweck, inventors). Ger. 507,338, Oct. 14, 1926. *Hydroxyanthanthrones* are prepd. by the action of acid condensing agents, *e. g.*, H_2SO_4 or $ZnCl_2$, on hydroxy-1,1',8,8'-dinaphthyldicarboxylic acids, which may be obtained from hydroxynaphthostyrils (cf. Ger. 504,342, *C. A.* **24**, 5307). *Alkoxyanthanthrones* may be prepd. similarly from alkoxy-1,1',8,8'-dinaphthyldicarboxylic acids, or by alkylating the hydroxyanthanthrones. The products are *vat dyes* or *intermediates*. Examples are given. Cf. *C. A.* **24**, 3248.

Benzanthrone dyes. I. G. FARBENIND. A.-G. (Arthur Lüttringhaus, Heinrich Neresheimer, and Willy Eichholz, inventors). Ger. 507,339, Mar. 13, 1928. The condensation products prepd. by the method of Ger. 502,042 (*C. A.* **24**, 4942) are hydrolyzed with acid or alk. reagents, and the products so obtained are simultaneously or subsequently oxidized. Examples are given.

Phthalein dyes. IMPERIAL CHEMICAL INDUSTRIES, LTD., and M. WYLER. Brit. 333,016, June 27, 1929. 1-Hydroxy-3-amino-2,4-dimethylbenzene is condensed in the presence of H_2SO_4 with a 4-mono- or di-alkylamino-2-hydroxybenzophenone-2'-carboxylic acid followed by esterification of the free carboxyl group, or the acetylaminoxylenol may be used and the acetyl group removed during the process. Dyes are obtained which are suitable for application to tannin-mordanted cotton, wool and cellulose esters and ethers, and which give bright pigments with complex inorg. acids such as phosphotungstic acid. A bright bluish red dye is obtained in a specific example given.

Rhodamine dyes. IMPERIAL CHEMICAL INDUSTRIES, LTD. Ger. 507,236, Oct. 25, 1928. See Brit. 303,243 (*C. A.* **23**, 4577).

Sulfureted dyes. I. G. FARBENIND. A.-G. (Georg Kalischer and Werner Zerweck, inventors). Ger. 507,346, Feb. 23, 1929. Thiazole derivs. of the anthraquinone series, *e. g.*, the dyes obtained by the method of Brit. 189,367 (*C. A.* **17**, 2509), are purified by dissolving them in concd. H_2SO_4 and pptg. with water, or by dissolving out the impurities by grinding with 85% H_2SO_4. Examples are given.

Wool dyes. I. G. FARBENIND. A.-G. (Georg Kalischer and Ernst Honold, inventors). Ger. 507,341, Feb. 2, 1928. Red to violet wool dyes are prepd. by treating 1-amino-4-haloanthraquinone-2-sulfonic acids with mercaptans in the presence of an acid-binding substance. Some of the products dye acetate silk. Examples are given.

Dye compositions. J. S. WILSON, E. G. BECKETT, J. THOMAS and SCOTTISH DYES, LTD. Brit. 333,236, Feb. 2, 1929. Dry powders of anthraquinone "acetyl silk" dyes such as "Duranol Blue CB," "Duranol Orange G" or "Duranol Red 2B" are prepd. by mixing aq. pastes of the dyes with alkali soaps of higher fatty acids and subsequently drying at a temp. not above 50°. Other dispersing or solubilizing agents may be conjointly used, such as saponin sulfite cellulose waste liquor, formaldehyde-naphthalene-

sulfonic acid condensation products or naphthalenesulfonic acids. The drying may be effected *in vacuo* or in a stream of air.

Binding agent for dyes. OTTO BRATKE. Ger. 510,735, May 10, 1928. A binding agent for dyes consisting of sapond. linseed oil, chrome size, varnish and water, contains twice as much of the first-mentioned materials as water.

Pyranthrone derivatives (dyes and intermediates). ARNOLD SHEPHERDSON and SIDNEY THORNLEY (to British Dyestuffs Corp., Ltd.). U. S. 1,785,600, Dec. 16. Pyranthrone or a halogenated pyranthrone is condensed with hydroxylamine (in the presence of H_2SO_4 and $FeSO_4$) and amino compds. are thus obtained which dye cotton from an alk. hyposulfite vat deep brown and which also may serve as intermediates for the production of other dyes, as by acylation with reagents such as AcCl or benzoyl chloride which produce dyes giving different brown shades on cotton. Examples with details of procedure are given. U. S. 1,785,601 relates particularly to the acylated vat dyes as just mentioned.

Dyes and intermediates. D. A. W. FAIRWEATHER, J. THOMAS and SCOTTISH DYES, LTD. Brit. 333,146, Jan. 25, 1929. Ester derivs. are produced by treating the disulfuric ester of 2-aminoanthrahydroquinone or its derivs. having the 1-position free (*e. g.*, chloro derivs. or their sol. salts such as the Na salt) with an oxidizing agent such as $K_3FeC_6N_6$ in an acid medium not acid to Congo Red such as HOAc. From the products, compds. which are probably esters of hydroindanthrones may be sepd. in solid form by filtration, and sol. compds. giving green fluorescent solns. are isolated; the latter may be diazotized and coupled with β-naphthol, and the esters may be employed in dyeing and coloring. Several examples are given. Cf. *C. A.* **24**, 967.

Dyes and intermediates of the anthraquinone series. HEINRICH VON DIESBACH. Ger. 507,049, Sept. 22, 1927. New condensation products are prepd. by treating hydroxyanthraquinones with methylol or dimethylol compds. The condensation products may be sapond. in the presence or absence of oxidizing agents, the nature of the products then obtained depending on the conditions. In one example, 2-hydroxyanthraquinone, treated in H_2SO_4 soln. with methyloltrichloroacetamide while cooling, yields *1-trichloroacetylaminomethyl-2-hydroxyanthraquinone*, m. 215°. In another example, alizarin is treated with dimethylolurea to yield *α-(dihydroxyanthraquinonyl)-methyl-β-hydroxymethylurea*, decompg. 204°, which is converted, by heating with H_2SO_4 for a short time, into a dihydroxyaminomethylanthraquinone from which *lakes* dyeing wool in brown shades can be prepd. Numerous other examples are given also.

Dye intermediates. I. G. FARBENIND. A.-G. Brit. 333,173, May 2, 1929. Phenanthridone and its derivs. are prepd. by treatment of fluorenone or a deriv. with hydrazoic acid, suitably in the presence of an inorg. acid such as H_2SO_4 and an inert solvent such as benzene. N is evolved and the product is sepd. by pouring into water. The fluorenone oxime probably is first formed followed by the Beckmann change to give the corresponding phenanthridone. Several examples are given

Dye intermediates. I. G. FARBENIND. A.-G. Brit. 333,568, Feb. 15, 1929. Halogen, nitro and hydroxy substituents are introduced into benzanthrone-*Bz*-1-alkyl ethers having the *Bz*-2-position free so that the substituents enter this position. Several examples are given.

Dye intermediates. I. G. FARBENIND. A.-G. Brit. 333,666, June 4, 1929. 4-Aralkyl-1 naphthyl ketones are obtained by the action of carboxylic acid chlorides by the Friedel Crafts method on 1-aralkylnaphthalene or its substitution products which are unsubstituted in the 4-position, and by oxidation there may be obtained the corresponding naphthalene 1,4-di-ketones or 4-aroylnaphthoic acids. Several examples are given.

Dye intermediates. I. G. FARBENIND. A.-G. Brit. 333,667, June 4, 1929. 4-Benzoyl-1-naphthoic acid is made by oxidizing 4-methyl-1-naphthyl phenyl ketone with HNO_3. 4-Methyl-1-naphthyl methyl ketone when oxidized with NaOCl yields the 4-methyl-1-naphthoic acid and by oxidation with HNO_3 yields the 1,4-dicarboxylic acid. The 4-alkyl-1-naphthyl ketones are made from 1-alkylnaphthalenes and carboxylic acid chlorides by the Friedel-Crafts reaction.

Dye intermediates. I. G. FARBENIND. A.-G. Brit. 333,783, Sept. 28, 1929. *m*-Arylaminophenolcarboxylic acids are made by treating a dry alkali salt of a *m*-arylaminophenol with CO_2 with heating and use of pressure. The *m*-arylaminophenols in which the aryl group may contain substituents such as halogens, methyl or methoxy groups are prepd. by condensing resorcinol with arylamines. Various examples are given

Dye intermediates. I. G. FARBENIND. A.-G. (Georg Kränzlein, Heinrich Greune

and Willy Laßmann, inventors). Ger. 507,417, Oct. 20, 1928. **Trinitro-*p*-halobenzoyl-*o*-benzoic acids** are prepd. by treating *p*-halobenzoyl-*o*-benzoic acids with strong nitrating agents at a raised temp. Examples are given describing the prepn. of *trinitro-p-chlorobenzoyl-o-benzoic acid*, m. 238°, and *trinitro-p-bromobenzoyl-o-benzoic acid*, m. 256°.

Dye intermediates (monosulfuric esters of anthrahydroquinones). D. A. W. Fairweather, J. Thomas and Scottish Dyes, Ltd. Brit. 332,907, Jan. 23, 1929 Monosulfuric esters of anthrahydroquinones are prepd. by way of mixed 9,10-diesters in which one ester group is a sulfuric ester and the other an acetyl, benzoyl or other acyl group, by first reducing the corresponding anthraquinone in the presence of a metal or a tertiary org. base, treating the product with pyridine-SO_3 and an acylating agent for the formation of the sulfuric and acyl esters, and partially hydrolyzing the resulting mixed 9,10-diester to split off the acyl group. Several examples are given and the products may be used in dyeing "acetyl silk," wool and other materials and developed with an acid oxidizing agent.

Dyeing fabrics. I. G. Farbenind. A.-G. Brit. 332,986, May 22, 1929. White and colored discharges on ice colors are produced, *e. g.*, by a process in which goods impregnated with an arylide of 2,3 hydroxynaphthoic acid are dried, printed with a non-volatile acid agent, dried and developed with a diazo soln. of a base which does not combine in acid soln. with the arylide, such as 4-aminodiphenylamine (for white effects at the imprinted places) or (for colored effects) adding to the acid agent the diazo compd. of a base which combines in acid soln. Various examples and details are described, as is also a modified process in which an ester-salt of a leuco-vat dye is printed on the impregnated fabric with addn. of a salt such as NH_4 oxalate, $NaClO_3$, NH_4 vanadate and a thickener, followed by drying, steaming and development with a diazo compd.

Dyeing materials. D. A. W. Fairweather, J. Thomas and Scottish Dyes, Ltd. Brit. 333,506, Feb. 8, 1929 Various materials such as cotton, wool, silk and artificial silk, such as that made from viscose and cellulose esters, are dyed or printed by use of esters of reduced quinones or of reduced vat dyes, including indigoid dyes, contg. azo linkages, and the dyeings may be developed by hydrolysis and oxidation on the fiber or the dyes may be employed as azo dyes without development Cr compds may be used as mordants before or after development or chroming may be combined with developing by use of a chrome oxidizing agent. Numerous details and examples are given. Brit. 333,507 relates to the production of azo dyes (which may be thus employed) by diazotizing esters of reduced quinones, such as anthraquinones, and reduced vat dyes, including indigoid dyes, and coupling with usual components. Numerous examples are given.

Dyeing mixed materials. I. G. Farbenind. A.-G. Brit. 333,554, May 6, 1929. In dyeing mixed materials with substantive dyes, a reserve effect is produced on wool or silk by adding to the dye bath a water-sol. sulfonic or carboxylic acid amide or a deriv. or substitution product in which the H atoms of the amino groups are replaced wholly or in part by alkyl, aryl or aralkyl groups; *e. g.*, half-wool or half-silk is first dyed with Orange II and then in a bath contg Brilliant Benzo Blue 6B and the Na salt of bis-1,2-dichlorobenzene-4-sulfonylbenzidine-*m,m'*-disulfonic acid (the orange shade of the wool being unaffected by the blue cotton dye). Numerous other examples are also given. Brit. 333,559 describes the production of sulfonic acid amides and carboxylic acid amides suitable for such use, by condensing an aromatic sulfonic or carboxylic acid halide 2 mols. with an aromatic diamine 1 mol. (at least one of the reacting components being substituted in the *m*-position to the sulfonic or carboxylic acid halide or to the amino group) and gives several examples.

Dyeing regenerated cellulose materials. Imperial Chemical Industries, Ltd., and R. Brightman. Brit. 333,239, Feb. 7, 1929 Level blue dyeings are obtained by applying disazo dyes produced by coupling with a 1,8- or 2,8-aminonaphthol mono- or di-sulfonic acid a diazo compd of an aminoazo product obtained either by coupling a diazotized *p*-nitramine of the benzene series contg. at least one alkoxy group with a naphthol, a naphtholsulfonic acid or a *N*-substituted 2,8-aminonaphtholsulfonic acid and reducing the nitro group, or by coupling a diazotized *p*-aminoacetanilide contg. at least one alkoxy group with one of the same coupling components and hydrolyzing the acetylamino group. Numerous examples are given.

Dyeing regenerated cellulose materials. Imperial Chemical Industries, Ltd., and R. Brightman. Brit. 333,243, Feb. 8, 1929. Dyeing in level violet to blue to bluish green shades is effected by application of secondary disazo dyes of the type having as first component a naphthylaminesulfonic acid or an aminonaphtholsulfonic acid (other than 2,5,7-acid), as middle component a monoamine of the benzene series coup-

ling in *p*-position to the amino group, and as end component a 1,8-aminonaphthol-, mono- or di-sulfonic acid. Numerous examples are given. Cf. *C. A.* **25**, 421.

Dyeing regenerated cellulose materials. IMPERIAL CHEMICAL INDUSTRIES, LTD., R. BRIGHTMAN and W. L. B. WELLACOTT. Brit. 333,260, March 5, 1929. Dyeing in even shades is effected with dyes obtained by tetrazotizing 3,3′-diaminodiphenylurea or a deriv. (other than a carboxylic or sulfonic acid) and coupling with a phenol- or naphthol-sulfonic or -carboxylic acid and a naphthylamine-, naphthol-, dihydroxynaphthalene- or aminonaphthol-sulfonic acid or a *N*-substituted deriv. in equimol. proportions. Numerous examples are given.

Dyeing skins, etc. I. G. FARBENIND. A.-G. (Heinrich Wagner, inventor). Ger. 474,934, Mar. 18, 1926. A polychromatic effect is produced on skins, furs, etc., by vat dyes. The skin, etc., is moistened in places by alk. soln., dried, the adhering alkali removed, and the skin, etc., immersed in a neutral or weakly alk. vat dye.

Dying furs, hairs, feathers, etc. I. G. FARBENIND. A.-G. (Paul Virck, inventor). Ger. 503,989, Sept. 15, 1926. The goods are treated with an aq. soln. of salts of naphthalene derivs. which contain at least one 4-aminoarylamino group of the benzene series. The goods may be previously mordanted. An example mentions 2-(4′-aminophenylamino)-7-(4′-aminophenylamino)naphthalene for a violet-grey tint. Cf. *C. A.* **25**, 217.

Printing textiles. IMPERIAL CHEMICAL INDUSTRIES, LTD. Fr. 686,428, Dec. 11, 1929. Textiles contg. cellulose esters or ethers are printed with insol. dyes of the anthraquinone series by adding to the dyeing material hydroxyethylamines, particularly com. triethanolamine.

Yarn-dyeing machine. ADOLF THEWALT. Ger. 505,788, May 22, 1927.

Apparatus for dyeing piece goods. A. A. HUDSON. Brit. 332,979, May 14, 1929. Structural features.

Jigger-dyeing apparatus. J. MACE. Brit. 333,366, July 13, 1929. Various structural features are described.

Dye-jigger apparatus. ASSOCIATED DYERS & CLEANERS, LTD., and H. J. CRICK. Brit. 333,447, Oct. 9, 1929. A float in the dye liquor counteracts or takes up the tensional stress imposed on the material at each change in the direction of travel. Structural details are described.

Tenter frame, etc., for dyeing apparatus. LESTER C. SCOTT (to Two-Tone Corp.). U. S. 1,786,031, Dec 23.

Dyeing vat. W. SPINDLER A.-G. (Arpad Barényi, inventor). Ger. 505,789, Aug. 3, 1928. Details of construction.

Drying apparatus for dyes, iron and copper sulfate and other substances difficult to dry. ERNST DANNDBERG. Ger. 505,607, Mar. 5, 1929. The material is dried in a series of superposed shallow pans.

Transfers with a paper base. KAUMAGRAPH CO. Brit. 333,768, May 3, 1929. A design on a base such as paper is printed in a slowly-fusible compn. such as a compn. comprising a mixt. of ethyl or benzyl cellulose with a resin and a plastifier such as tritolyl phosphate, and is overprinted with a more readily fusible compn. such as rosin, beeswax and ultramarine, so that in transferring to a fabric (especially one with a complicated weave) by use of a hot iron the overprinting is transferred first and penetrates the fabric so that the slowly melting compn. cannot penetrate but lies on top of the fabric. Various examples of compns. are given.

Treating textiles. HENRY DREYFUS. Fr. 686,644, Dec. 14, 1929. Textiles of or contg. cellulose acetate having a high resistance to the action of warm delustering agents are made by submitting the textiles to a steaming operation.

Apparatus for singeing textiles. J. CHADWICK & CO., LTD., and F. SHARPLES. Brit. 333,084, Sept. 18, 1929. The singeing tube or plate of a singeing app. is made of SiO_2 and may be vitrified or its surface may be glazed, and it may be heated by gas, oil, hot air or an elec. heater.

Moistening and cooling hygroscopic materials, such as textiles. HEINRICH BRÜGGEMANN Ger. 504,822, May 28, 1927. The materials are cooled in a chamber filled with moisture-laden air.

Dressing and stage-dying machine for textiles. GEBRÜDER SUCKER MASCHINENFABRIK. Ger. 505,790, Aug. 7, 1926.

Drying device for loose textile fibers. HERMANN HAAS. Ger. 505,771, Nov. 26, 1927.

Bleaching textile fibers. FIRMA FR. KÜTTNER. Ger. 507,413, Oct. 14, 1926. Textile fibers are simultaneously bleached and brightened by treatment at 65–85° with aq. hypochlorite solns. contg. org. compds., such as soap, which impart a soft feel to the fibers.

Waterproofing textile materials. WALTER A. BRIDGEMAN (to Wilbur White Chemical Co.). U. S. 1,785,434, Dec. 16. A compn. for use in conjunction with Al sulfate in waterproofing textile fabrics comprises an emulsion of a fat solid at ordinary temps. such as oleostearin or tallow in an aq. soap soln. contg. a phenol.

Mercerizing fabrics. ZITTAUER MASCHINENFABRIK A.-G. Ger. 504,809, Dec. 1, 1925. The arrangement is described for passing the fabric through the mercerizing lye, and for removing the excess of lye.

Pile fabrics. COLLINS & AIKMAN CORP. Brit. 333,268, April 9, 1929. The free ends of pile threads projecting from a woven backing of a pile fabric are embedded in an adherent material (such as a rubber dispersion contg. a vulcanizer, an oxide and an accelerator, or a suitable viscose or pyroxylin soln. or rubber and glue or casein compns.) and the pile threads are cut from the original backing to form a new pile fabric with the new backing which may be subjected to coagulation, vulcanization or other suitable treatments.

Dressing artificial silk. I. G. FARBENIND. A.-G. (Alfred Thauss and Carl Posth, inventors). Ger. 505,629, May 30, 1926 Cellulose di- and poly-fatty acids and their salts are used as the dressing agents. Cellulosediacetic acid and its Na salt are mentioned in examples. Cf. *C. A.* **24,** 1992.

Weighting artificial silk yarn or fabrics. R. CLAVEL. Brit. 333,724, March 16, 1929. The weighting process described in Brit 277,602 (*C. A* **22,** 2663), modified as described in Brit. 280,094 (*C. A.* **22,** 3052), is further modified by treating the material with a metal salt soln., removing excess soln by centrifuging, squeezing or other suitable treatment, and then transferring to an acid-fixing bath which may contain a protective colloid without intermediate washing, deacidification or neutralization. Successive use of $SnCl_4$ and NaH_2PO_4 is described

Yarns and threads. H. DREYFUS. Brit. 332,903, April 29, 1929. Crepe or like effects are produced by use of a composite thread consisting of 2 threads, both of which are highly twisted but in opposite directions. Artificial silk, natural silk, cotton and wool may be used, and various details of manuf. are given

Artificial threads. HENRY DREYFUS. Fr 686,330, Dec. 9, 1929. The luster of artificial threads or filaments is reduced by submitting the threads, etc., to a rubbing action while they are in movement. The rubbing surfaces may be cloth contg. an abrasive.

Bobbins or similar yarn holders. EINSTEIN'S ELECTRO CHEMICAL PROCESS, LTD., and W. EINSTEIN. Brit. 333,309, May 14, 1929. Cores of bobbins or the like may be formed of compressed fibrous material, electroplated with Cu or Ni after coating with graphite and burnished, or may be rendered impermeable with waterglass followed by spray-coating with Pb, or may be sprayed with a suspension of graphite in Na silicate soln.

Washing yarns and fabrics. A RAYNER. Brit. 333,177, May 3, 1929. A soap-forming acid (such as com. olein emulsified with Turkey-red oil, gelatin and water) is first applied to the material, followed by treatment with dil. alkali to form soap *in situ*.

Washing and fulling yarn in skeins. EMIL MUNDORF. Ger. 495,710, Nov. 27, 1927. The yarn is fed between washing and fulling drums.

Apparatus for washing fabrics. JAKOB MAURER. Ger. 504,625, Feb. 26, 1929.

Washing fabrics. JAKOB MAURER. Ger. 506,538, Mar. 22, 1929. Addn. to 504,625 (preceding abstr.). Details of the apparatus

Apparatus for washing fabrics. JAKOB MAURER. Ger. 508,384 and 508,385, May 24, 1929. Addns. to 506,538 (preceding abstr.).

Cleansing solvents such as those used for "dry-cleaning." R. R. STOLLEY CORP. Brit. 333,217, May 6, 1929. The liquid to be cleansed is passed through a caustic soln., then through water or an aq. washing soln. to remove caustic, and finally over $CaCl_2$ or other suitable solid dehydrating agent Activated charcoal, potash or other cleansing agent may be placed on or over the caustic soln Cf. *C. A.* **24,** 2900.

Softening hard artificial fiber bands. I. G. FARBENIND. A.-G. (Adolf Kämpf, inventor). Ger. 505,818, July 27, 1928. Addn. to 491,619 (*C. A.* **24,** 2617). The bands are passed between alternating teeth on endless bands. Cf. *C. A.* **24,** 3658.

Apparatus for treating animal hair, feathers, etc., with ozone. AMERICAN HAIR & FELT CO. Brit. 333,197, April 4, 1929. The loose material is fed from a pneumatic conveyer into a treating chamber through which it passes downwardly in contact with an upward current of ozonized air. Various details of construction are described.

Anti-moth preparations. I. G. FARBENIND. A.-G. (Ernst Tietze, Wilhelm

Schepss and Winfrid Hentrich, inventors). Ger. 504,886, Sept. 14, 1927. Wool, fur, etc., are protected against moth and other pests by a prepn. contg. F compds. in which at least one F atom is coupled to a C atom. Examples mention 3-nitro-4-fluorobenzoic acid, CH_2FCOOH, 1-fluoronaphthalene-5-sulfonic acid and $C_6H_4F_2$.

Anti-moth preparations. I. G. FARBENIND. A.-G. (Johann Huismann and Hugo Schweitzer, inventors). Ger. 506,988, June 23, 1928. Wool, hides, pelts, furs, etc., are treated with amides of arylsulfonic acids or their derivs., in which a H atom of the NH_2 group is replaced by an alkyl, aryl or aralkyl group, for protection against moths. Many examples are given.

Halogenated hydroxyarylmethanes. I. G. FARBENIND. A.-G. Brit. 333,561, May 11, 1929. Hydroxyaralkyl alcs. or hydrols or their anhydrides, prepd. by condensing aldehydes (except aromatic hydroxyaldehydes and their sulfonic, carboxylic or sulfo-carboxylic acids) with *p*-halophenols or naphthols contg. a free *o*-position to the OH group and contg. no salt-forming group, are condensed with a further mol. proportion of the same or different *p*-halogenated phenol or naphthol. Products are obtained similar to those produced as described in Brit. 316,900 (*C. A.* **24**, 1993) which may be used for *protecting wool, fur or the like from moths*, etc. Several examples are given.

Mothproofing wool, etc. I. G. FARBENIND. A.-G. (Hermann Stötter, inventor). Ger. 507,097, Feb. 22, 1927. The goods are treated with a mixt. of a known mothproofing agent and a wetting agent of the sulfonic acid type.

Mothproofing wool, fur, etc. I. G. FARBENIND. A.-G. Brit. 333,583, May 15, 1929. The material is treated with an org. F compd. contg. at least one F atom attached to a C atom such as 1-fluoronaphthalene-5-sulfonic acid, 4,4'-difluorobiphenyl or fluoropseudocumene or the Na salt of 3-nitro-4-fluorobenzoic acid. Wetting agents and other auxiliary agents also may be used. Brit. 333,584 relates to the use as mothproofing agents of a hydroxybiphenyl or a deriv. contg. in the nucleus halo or alkyl groups, *e. g.*, *o,o'*-dihydroxybiphenyl dissolved in cyclohexanone and benzine or solns. such as those contg. 3,5,3',5'-tetrabromo(or tetrachloro)-2,2'-dihydroxybiphenyl, which may be used with wetting agents and other substances. Cf. *C. A.* **25**, 422.

Water-soluble product from fatty acids of wool fat. GUSTAV MAUTHE and ALFRED THAUSS (to General Aniline Works). U. S. 1,784,941, Dec. 16. Fatty acids of wool fat are treated with air at a temp. of 100–300° and the products are sulfonated in the presence of a phenol such as PhOH to form a product which may be used as an auxiliary substance in the prepn. of stable solns. of 2,3-hydroxynaphthoic acid arylides. Cf. *C. A.* **25**, 219.

26—PAINTS, VARNISHES AND RESINS

A. H. SABIN

New studies of the dispersion of paint materials (lakes). HANS HEBBERLING. *Farbe u. Lack* **1930**, 219–20, 537–8.—Iso-dispersed pigments are superior to hetero-dispersed but the advantage is lost as most pigments belong to the latter class. H. suggests that before pptg. lakes on a barytes base, the latter should be coated with a pigment such as lithopone. The softness and hiding power of lithopone would then be added to the properties of barytes. In the dispersion of lakes on barytes by grinding, better results are obtained by the wet process. H. cannot confirm an increase of fugitiveness with an increase in fineness of lakes. G. G. SWARD

Chalking of paints. HANS WOLFF. *Farben-Ztg.* **36**, 221–3(1930).—The progress of chalking of paint films was followed by the colorimetric detn. of molybdic acid, 1% of which had been incorporated with the pigment portion of the paint. Tinted paints chalk less than white ones, although not in proportion to the amt. of tinting material, *e. g.*, 0.1% lamp black was as efficient in reducing chalking as 0.5%. Chalking does not proceed uniformly throughout the life of the film, but is directly proportional to the distribution of the pigment in the film (cf. *C. A.* **23**, 1291). White lead paints chalk less than ZnO paints because, with the former, the layer next to the air is rich in pigment, but poor with the latter. Standoil paints chalk uniformly because distribution of pigment is uniform. G. G. SWARD

Selective adsorption by pigments. A study to explain chalking. C. P. VAN HOEK *Farben-Ztg.* **36**, 267–9(1930).—The weathering properties of the various metallic soaps do not account for the excellent weathering properties of paints contg. them. Expts. tend to show that some pigments are able selectively to adsorb fatty acids and their oxidation products. In such cases, the pigment particle becomes the center of a soft easily oxidized mass which chalks easily. On the other hand, basic

pigments react with the acidic products to form stable metallic soaps. Pigments which neither absorb ultra-violet light nor adsorb the decompn. products of the oils should prove to be the most weather resistant. ZnO fulfills these 2 requirements, but to be of practical use, brittleness and cracking must be avoided. Neither flocculation nor lack of wetting can explain chalking as both chalking and non-chalking pigments possess these properties. G. G. SWARD

Determination of tung oil in varnish-like products. JOHANNES SCHEIBER. *Farbe u. Lack* **1930,** 513–4, 524–5.—When linseed oil is heat treated, the double bonds of the linolic and linolenic acid constituents rearrange to form conjugated systems similar to those in tung oil. This fact increases the difficulty of detg. tung oil by methods involving the formation of insol. gels. To det. tung oil in the presence of such products, S. proceeds as follows: A 5 g sample is mixed with 10 g. sand. To this mix there is added, with const. stirring, 10 cc of a 5% soln. of $SnCl_4$ in $CHCl_3$, which converts the tung oil to a gel. The gel is stored in a desiccator for 24 hrs. and then extd. with ether. The wt. of the residue represents tung oil. In the presence of highly thickened linseed oil or of rosin, the above method is modified by the addn. of EtOAc before the $SnCl_4$ soln. and also by the use of EtOAc as the extn. liquid. In case of small quantities of tung oil or of non-gelling products, tung oil of known gelling properties is added and the proper correction made. EtOAc may be added in amts. sufficient to produce reasonably rapid gelling. Wolff's refractive index method (*C. A.* **24,** 1752) is not suitable because duration and temp. of heating oils have a varying effect on the refractive index, that for tung oil sometimes passing through a min. G. G. SWARD

Some notes on exposure tests. H. A. GARDNER, G. G. SWARD AND STANLEY LEVY *Am. Paint & Varnish Mfrs.' Assoc. Circ.* No. **372,** 21–7(1931).—The importance of multiple exposures on coatings is emphasized. G. G. SWARD

Permeability of surfacer films to air and water. W. TOELDTE. *Farben-Ztg.* **36,** 318–21, 364–6, 409–10(1930); cf. *C. A.* **24,** 2900.—The permeabilities of 24 lab. and com. surfacer films were measured with an app. similar to that described in *C. A.* **24,** 2900. In order to save time, measurements in some cases were made at pressures as high as 12 atm. Special equations were developed for reducing results at higher pressures to values at 1 atm. The linear speed of air through the films ranged from 1.2×10^{-2} to 6.8×10^{-7} cm./sec. Pb soaps and copal varnishes imparted less permeability than boiled linseed oil, slowly vaporizing benzines less than rapidly vaporizing ones, turpentine oil less than benzine. Pigments imparted decreasing permeability in the following order: chalk or slate flour, Fe oxides, white lead, red lead (ordinary), ZnO, lithopone and ZnS. Permeability to water was roughly detd. by placing powd. methylene blue between a glass plate and a film prepd. on sized paper, and a cc. of H_2O on the film, subsequently noting the interval of time for the blue to dissolve. In general, permeabilities of the films to air and to water were parallel, with the exception of films contg. red lead. In those cases the permeability to air varied greatly while that to water remained const. and relatively low. G. G. SWARD

Miscellaneous research on lacquers. A. W. VAN HEUCKEROTH AND J. R. STEWART, JR. *Am. Paint & Varnish Mfrs.' Assoc. Circ.* No. **371,** 1–20(1931).—Some phys. properties of nitrocellulose lacquers using diphenyl phthalate, dibenzyl phthalate, cresol carbonate and 12 vegetable oils as plasticizers are given. Of the first 3, lacquers using diphenyl phthalate possessed durability equal to that of lacquers using dibutyl phthalate. Exposures of the lacquers using vegetable oils had not progressed to the stage where their durabilities could be rated. The results of exposures on lacquers prepd. with various resins (*C. A.* **24,** 5515) are tabulated. An app. for drying nitrocellulose by passing air heated to 65–70° through it is described. It is shown how arithmetic-logarithmic graph paper may be used to predetermine the viscosities of binary mixts. of nitrocellulose of known viscosities. Accelerated and outdoor exposure tests were made on films of uniform thickness of lacquers prepd. with nitrocelluloses ranging in viscosity from 1/4 to 600 sec. Nitrocellulose of medium viscosity (4–15 sec.) imparted the max. durability. As a result of consistency detns. of widely varying materials with the Gardner mobilometer, and the du Pont-Parlin, the Pratt & Lambert and the General Electric viscosity cups, the authors prefer the mobilometer for lab. control work and the *P* & *L* cup for plant control work. G. G. SWARD

Oil (varnishes) or cellulose lacquers. H. KÖLLN. *Farben-Ztg.* **36,** 223–4(1930).—The advantages of oil varnishes, nitrocellulose lacquers, combinations of both and of processes using both are briefly reviewed. G. G. SWARD

Accelerated weathering of cellulose lacquers. OTTO MERZ. *Farben-Ztg.* **36,** 316–8, 362–4(1930).—Expts. were conducted with red, white and black lacquers before and after addn. of 33.3, 66.7 and 100% of ester gum based on the non-volatile binder.

Films on coarse black iron panels which had been primed and surfaced were exposed out of doors to 3 accelerated weathering devices differing only in the source of light. The 3 light sources were a Hg-in-quartz arc, a group of 3 "Vitalux" lamps and a 10 amp. C arc. In addn. the lacquers were subjected to a bending test which consisted in baking films on black iron panels (0.3 mm. × 5 cm. × 15 cm.) for 0, 0.25 and 0.5 hrs. and then bending over rods 1.5, 3 and 7.5 mm. in diam. The results were reported as no cracks, hair line cracks or cracks. As a criterion of weathering the panels were bent over the 7.5 mm. rod and the results reported as in the baking test. Weathering under the C arc and the baking-bending test over the 7.5 mm. rod gave the best correlation with outside weathering. G. G. SWARD

Report on naval stores. (Determination of toluene-insoluble matter in rosin.) F. P. VEITCH. *J. Assoc. Official Agr. Chem.* **13**, 488–90(1930).—The following method was studied collaboratively and gave results sufficiently satisfactory to warrant recommendation of its adoption as a tentative A. O. A. C. method: dissolve 50 g. of freshly powd. (10-mesh) sample in a 300-cc. beaker in 150 cc. C_7H_8 (free from H_2O and nonvolatile residue) with the aid of heat and occasional shaking, filter at once through a 25 cc Gooch crucible, if necessary repass the filtrate through the Gooch crucible till clear, wash the residue and outside of the crucible free from rosin with hot C_7H_8, dry to const. wt. at 105–10° (1 hr. usually suffices). A. PAPINEAU-COUTURE

Para-rubber-seed oil (JAMIESON, BAUGHMAN) **27.** Waterproof impregnated braiding of electric conductors (KINDSCHER) **13.** Nitrocellulose [in lacquers] (U. S. pat. 1,785,030) **23.** Finishing leather, rubber, etc. (Fr. 686,381) **29.** Lamelliform metal powder such as that for bronze paints (U. S. pat. 1,785,283) **9.** Forming and curing brake bands, etc, comprising indurating material such as synthetic resin (U. S. pat. 1,785,391) **18.** Waste water from bitumen manufacture (Ger. pat. 505,570) **21.**

Pigments. TITAN CO. A/S. Fr. 686,553, Dec. 11, 1929. Pigments of Ti compds. of high covering power are made by pptn. of insol. Ti compds. with $BaSO_4$, washing and calcining. The process is regulated to give a ppt. contg. 40–60% TiO_2. A P compd. may also be added.

Iron oxide pigments. GEBRÜDER GUTBROD G. M. B. H. CHEM. FAB. Ger. 507,348, June 28, 1927. Dried crude materials contg. FeS are treated with warm concd. H_2SO_4 and the sulfate so obtained is calcined

White pigments. SOC. MINIÈRE "LA BARYTINE." Fr. 686,440, Dec. 11, 1929. White pigments having a basis of TiO_2 are made by treating freshly prepd. TiO_2, or the soln. in the presence of which this oxide is pptd., with substances which transform part of the product into the colloidal state with very finely divided grains, and which disappear on calcination. Such substances include gelatin, starch and dextrin. Cf. C. A. **24**, 2903.

Naphthazarine derivatives. I. G. FARBENIND. A.-G. (Georg Kränzlein and Robert Welde, inventors). Ger. 507,347, Aug. 5, 1928. The naphthazarine intermediates obtainable by reduction of 1,8- or 1,5-dinitronaphthalene are treated with an aliphatic aldehyde, *e. g.*, CH_2O, AcH or aldol. Products useful as *pigment colors for varnishes*, etc., are obtained. An example is given.

Converting turpentine and pine-tar oils into heavier oils. EUGENE B. SMITH (to Edward W. Colledge, trustee for National Turpentine Products Co., *et al.*). U. S. 1,784,949, Dec. 16. For converting turpentine and pine-tar oils into heavier products adapted to serve as paint vehicles, their vapors are passed in contact with fuller's earth as a catalyst, the vapors are condensed, and the condensate is passed into contact with the fuller's earth catalyst to dissolve and remove the polymerized oil from it, and this procedure is repeated until the polymerized processed product attains a suitable viscosity and sp. gr. for use as a *paint vehicle*.

Emulsions of drying oils, varnishes, lacquers, etc. P. C. VAN DER WILLIGEN. Brit. 333,690, Nov. 6, 1928. Stable products suitable for use as paints, waterproofing agents or adhesives or in the manuf. of linoleum are prepd. by oxidizing emulsions of drying oils such as tung oil or lacquers or the like contg. them, in the presence of caustic alkali or NH_3 to keep the emulsion alk., or in the presence of buffer substances such as alkali phosphates or alk. metal or NH_4 carbonates, as by a current of O or air. Various details and examples are given.

Emulsified aqueous lacquer mixtures. I. G. FARBENIND. A.-G. Brit. 333,570, March 13, 1929. Water is emulsified with at least twice its volume of a cellulose deriv. lacquer which contains only constituents which are practically insol. in water and in

which most of the solvents b. below 150°; emulsification is effected so that the water is stated to be in the disperse phase. Several examples are given of compns. contg. nitrocellulose and solvents, modifying ingredients, synthetic resins such as urea and formaldehyde reaction products and the like, and ethyl cellulose.

β-Acetoxyethyl butyl phthalate, etc. HOYLANDE D. YOUNG. U. S. 1,786,404, Dec. 23. Various details and modifications of procedure are given for the prepn. of this compd. which may be used as a solvent in producing pyroxylin lacquers, as may also the corresponding butyryl compd. and various esters of similar type contg. alkyl or aryl groups such as Me, Et, Pr, Bu, Am, benzyl or tolyl and derived from either phthalic acid or other dibasic acids such as citric, succinic, tartaric, phenylmalonic, trimesic or succinylsuccinic acids. Formulas are given for pyroxylin lacquers contg. these esters.

Shellac-like mass. WALTER DUX. Ger. 504,828, Nov. 22, 1927. Higher aliphatic hydroxy fatty acids are combined with halogen addn. products of resinolic acids by heating. Alternatively, the reaction products of Cl on unsatd. higher fatty acids may be combined with hydroaromatic hydroxycarboxylic acids. The combination may be effected in the presence of catalyzers.

Apparatus for coating wire with enamel and for baking and hardening the coating. FRANK MARTINDELL (to Western Elec. Co.). U. S. 1,786,416, Dec. 23. Structural features.

Coating compositions containing nitrocellulose and an artificial rubber isomer, etc. CARL H. SIEVER. U. S. 1,785,367, Dec. 16. Compns. adapted for coating by dipping, brushing or spraying, producing coatings of good dielectric properties and which have the waterproof, tough qualities of nitrocellulose and the elasticity, flexibility and strength of rubber, are formed of a cellulose deriv. preferably nitrocellulose, and an artificial isomer of rubber obtained by heating rubber with H_2SO_4 or a suitable compd. such as a sulfonic acid or org. sulfonyl chloride, with addn. of solvents, plasticizing and other modifying agents, such as natural or synthetic resins, etc., if desired, or of stabilizing agents such as a condensation product of acetaldol with α-naphthylamine.

Coumarone and indene resins. I. G. FARBENIND. A.-G. Brit. 332,963, April 30, 1929. In the production of synthetic resins by treating crude solvent naphtha with borofluoro-fatty acids as described in Brit. 310,816 (*C. A.* **24**, 740), analogous compds. of B fluoride with hydroxy acids such as lactic acid or with unsatd. acids such as oleic acid are employed. These complex acids may be prepd. as described in Brit. 316,987 (*C. A.* **24**, 1927) and various details of procedure are given.

Molded articles of synthetic resins. A. V. KELLER. Brit. 333,763, Sept. 4, 1929. For decorating molded articles of synthetic resinous condensation products, a decorative sheet of paper or fabric impregnated with a viscous soln. of the intermediate condensation product contg. also an agent such as $(CH_2)_6N_4$ or an NH_4 salt for accelerating the preliminary drying is molded in or upon the article. Various details of procedure are described including the use of a resin formed from urea and CH_2O. A retarding agent may be added if desired, such as weak acid salts of alkali or alk. earth metals, to retain the impregnating soln. in viscous condition, prior to the addn. of the accelerating agent.

Synthetic resins. BAKELITE G. M B. H. (Fritz Seebach, inventor). Ger. 506,129, Feb. 18, 1925. See Brit. 247,957 (*C. A.* **21**, 660).

Synthetic resins. I. G. FARBENIND. A.-G. Brit. 333,166, April 25, 1929. Vinyl esters such as vinyl acetate are condensed in the presence of at least 5% by wt. of acid condensing agents (such as HCl, H_3PO_4, $FeCl_3$, $AlCl_3$, $ZnCl_2$, aniline-HCl or S chloride) with mono- or poly-hydric phenols or their mixts., and various other materials such as mineral, animal or vegetable oils, long-chain fatty acids or their esters, factis, cellulose esters, fillers and coloring substances may be added before or during the condensation. Condensation may be effected at temps. of 40-100° and the primary condensation products may be distd. *in vacuo* and subsequently hardened by heating with or without pressure.

Synthetic resin composition. THEODORE F. BRADLEY (to Ellis-Foster Co.). U. S. 1,785,930, Dec. 23. By heating a mixt. of glycerol, phthalic anhydride and castor oil to 200–300°, a product is obtained which is suitable for use with nitrocellulose in the manuf. of lacquers, etc.

Synthetic resins from aldehyde and urea or thiourea. BAKELITE GES. Brit. 332,964, Feb. 3, 1928. Molded articles are formed by mixing urea or thiourea, solid polymerized formaldehyde, and various fillers, coloring agents, water-binding substances and auxiliary materials while heated, and subjecting to pressing and further heating. Cf. *C. A.* **24**, 2624.

Urea-formaldehyde resins, etc. BAKELITE GES. Brit. 333,296, Sept. 13, 1928. In the production of shaped articles from urea or its derivs. and solid polymerized formaldehyde in fused org. compds. as described in Brit. 318,959 (*C. A.* **24**, 2624) and in Brit. 333,298 (following abstr.), any of the known catalysts for the condensation are added to effect acceleration or retardation of the reaction. For retardation, to maintain fluidity of the material for a longer time, basic catalysts are added such as NH_3, $Ca(OH)_2$, $(CH_2)_6N_4$ or Na_2CO_3, and for accelerators there are used acid catalysts such as citric acid, HOAc or HCl or urea nitrate; neutral catalysts usually also accelerate the reaction. Various details of procedure are given.

Urea-formaldehyde resins, etc. BAKELITE GES. Brit. 333,298, Sept. 11, 1928. Reaction between urea or its derivs. and solid polymerized formaldehyde is effected in a melt of a solid hydrocarbon or solid nitrated, chlorinated or hydrogenated product such as naphthalene, anthracene or chlorinated, nitrated or hydrogenated naphthalene. Various addns. may be made and shaped articles formed as described in Brit. 318,883 (*C. A.* **24**, 2624).

Artificial resins. THE BRITISH CYANIDES CO., LTD. Fr. 686,261, Dec. 7, 1929. Artificial resins are made by condensing phenols with aldehydes in the presence of a small proportion, *e. g.*, less than 10% of dicyanodiamide. Cf. *C. A.* **24**, 982.

Floor covering. ROBERT D. BONNEY and WM. Y. IRWIN, JR. (to Congoleum-Nairn, Inc.). U. S. 1,784,810, Dec. 16. A body of felt is satd. with waterproofing material such as asphalt. A facing coat of paint is applied to one side, forming a wearing surface and to the opposite side there is applied a backing coat comprising a thin coat of discrete particles of a metallic powder such as bronze powder, a flaky mineral substance such as mica and a pigmented bonding medium such as paint or varnish adhesively securing the film to the body and partially visible through the film.

27—FATS, FATTY OILS, WAXES AND SOAPS

E. SCHERUBEL

Cacao butter. VI. Extracted or pressed butter? H. P. KAUFMANN. *Chem. Umschau Fette, Oele, Wachse Harze* **37**, 305–11(1930); cf. *C. A.* **24**, 3663.—The highest grade of cacao butter is obtained by pressing the roasted and hulled kernels, while lower grades result from extg. the hulls, broken kernels, siftings and "germs," etc., with various solvents. Decided differences are observed between the pressed and extd. fats, but no definite analytical procedure has been developed to detect mixts. of them quantitatively; 5 samples of extd. butter which had been mixed with pressed butter showed the following analytical data:

	M.P.	n_D^{40}	I no.	Thiocyanate no.	Partial I no.
(1)	34.2	1.4573	36.53	33.86	31.42
(2)	34.0	1.4572	36.94	33.75	31 79
(3)	32.4	1.4585	39.80	35 34	32.08
(4)	33.46	1.4585	39.75	35.66	32.21
(5)	33.0	1.4580	40.63	36.06	33.61

Samples 3, 4 and 5 have a high n_D^{40}, and since the remaining consts. are also high, they might be condemned, but samples 1 and 2 fall within the usual limits of purity, although they are not pure pressed butter. P. ESCHER

Report on [the detection of coconut and palm kernel oils in] cacao butter. MARION M. JACKSON. *J. Assoc. Official Agr. Chem.* **13**, 486–8(1930); cf. Baughman, *C. A.* **23**, 217.—The previously described method (Baughman, *C. A.* **20**, 118) was studied collaboratively and found satisfactory. As it requires about 15% milk in cacao butter to produce a very faint opalescence, and as the cacao butter of milk chocolate usually runs 15% or less, a blank of 85% cacao butter and 15% butter fat ought to fulfill all the requirements for the test for cacao butter contg. 15% or less of milk fat, which would shorten and simplify the method as compared with the prepn. of a blank of cacao butter contg. the same amt. of butter fat as the sample to be analyzed. The latter procedure should be followed when there is more than 15% butter fat. A. P.-C.

Fatty acid distillation. Comparison of intermittent and continuous operation. OTTO KREBS. *Teer & Bitumen* **28**, 421–4, 440–3(1930). K. H. ENGEL

Solidifying points of binary mixtures of fatty acids and esters. L. A. BHATT, H. E. WATSON AND Z. H. PATEL. *J. Indian Inst. Sci.* **13A**, Pt. 11, 141–6(1930).—A knowledge of the solidifying points of binary mixts. of fatty acids or of their esters is

of value for detg. the proportion of the constituents in mixts. For the higher acids and esters the depression produced by adding a substance of higher m. p. than the solvent is very much greater than when the added substance has a lower m. p. The values of K (cryoscopic const.) for the same acid are not const. but seem to rise with rise in the mol. wt of the added acid. The depression produced by 100 g. of acid dissolved in 100 g. of solvent acid is not far from 23 when the added acid has the lower m. p. and is in the neighborhood of 40 when the converse is the case. This fact may be used as a rough method of estg. the amt. of impurity in an acid undergoing purification but is of no value for quant. work unless the impurity is a known acid. A table is given showing the solidifying points of binary mixts of acids and esters, also one giving depressions of solidifying points. E. SCHERUBEL

The Mackey test. STIEPEL. *Chem Umschau Fette, Oele, Wachse Harze* 37, 326-7(1930); cf. *C. A.* **24,** 5503.—Referring to Wolf and Heilingötter's article (*C. A.* **25,** 429) the removal of metallic soaps from the sample before testing is not necessary unless the actual cause of the temp. increase is desired; the proposed duration of 1½ hr. cannot be applied in all cases, the use of brass gauze should be rejected, employment of paper thimbles of fixed dimensions obviates the difficulties arising from metal and indefinite vol., the placing of the sample into the bath denotes the beginning of the test. P. FISCHER

Twitchell reagent. V. Change of the colloidal properties of a new reagent on the market. Divulsion D, by the addition of various substances. KYOSUKE NISHIZAWA AND BUNTYU SAKUMA. *J. Soc. Chem. Ind Japan* **33,** Suppl binding 412-4(1930); cf. *C. A.* **25,** 427. The influence of the addn of electrolytes on the reagent with respect to emulsifying power, viscosity and surface tension at 95 ± 0.2° was studied. The results show that it has properties similar to the 3 reagents previously studied. Divulsion D resembles Idrapid especially, but it is more easily salted out with strong electrolytes. **VI. Fat-splitting power of Divulsion D and the darkening of fatty acid.** KYOSUKE NISHIZAWA AND KIYOTA FUZIMOTO. *Ibid* 414-7. The addn of weak acids has a bad effect on the fat-splitting power of this reagent, but this power increases with the strength of the acids. The more easily the reagent is salted out the less effective is the fat-splitting. The addn. of salts of strong acids increases the emulsifying power, but reduces the fat-splitting power. The addn of glycerol or free fatty acid is also harmful to fat-splitting power of this reagent. The effect of agitation at 100 r. p. m. decreases its power to that of 45% at 500 r. p. m. The theory previously proposed that the harmful effect of the addn of salts was due to the salt formation of the reagent in soln. is applicable to this reagent as is also the theory that the addn of strong acids increases emulsifying power by hindering the salt formation of the reagent in soln. The color of the fatty acids increases with progressive fat-splitting, but in the presence of salts the decrease in the color intensity with progressive fat splitting is more remarkable. The color intensity of the fatty acids is almost equal with either H_2SO_4 or HCl. Divulsion D gives better colored fatty acids than Pfeilring or Kontakt but is inferior to Idrapid in this respect. The fat-splitting power is superior to Pfeilring or Kontakt and also to Idrapid in the presence of a small quantity of strong acids. E. SCHERUBEL

Investigations of olive oil. II. The acidity of olive oils. F. TRAVITA-MOSCA AND M. VENEZIA. *Ann. chim. applicata* **20,** 452-6(1930); cf. *C. A.* **20,** 3091.—Olives, when held at higher temps. for prolonged periods before extg. the oil, develop a higher degree of acidity. The highest acid contents result when the olives are held at 29-30° before extg. the oil. A. W. CONTIERI

Studies in Indian oil seeds. The types of Sesamum indicum. KASHI RAM. *Mem. Dept. Agr. India, Botanical Ser.* **18,** 127-47(1930).—Rough-surfaced seed of *Sesamum indicum* yields a lower percentage of oil than the smooth-surfaced seed, probably because of the greater percentage of husk in the rough-seeded varieties. The smooth-surfaced seed contains 47 to 51% of oil and the rough-surfaced seed 38 to 41%. The oil varies in color from pale yellow to dark amber, is odorless and does not become rancid. The oil is used for culinary and medicinal purposes and in the manuf. of soap and perfume. K. D. JACOB

New compounds produced during the hydrogenation of fish oils. II. Hydrocarbons 2. SEI-ICHI UENO AND RIICHIRO YAMASAKI. *J. Soc. Chem. Ind Japan* 33 Suppl. binding 451-2(1930); cf. *C. A.* **24,** 4947.—A further investigation was made of the fraction contg. the higher mol. wt. compds. from the mixed hydrocarbons obtained during the hydrogenation of fish oils. The results show that a considerable amt. of the satd. isohydrocarbon, $C_{19}H_{40}$, is present. E. SCHERUBEL

Koryo oil from Andropogon sorghum var. vulgaris, Hack. (Manchu). SEI-IC

[illegible] AND NOBUO KUZEI. *J. Soc. Chem. Ind. Japan* **33**, Suppl. binding 452–6(1930).— [illegible] oil as found were: d_{20} 0.9206, n_{40} 1.4659, sapon. no. 183, I no. 114, unsapon. 4.0%. The oil belongs to the semi-drying oils. The unsatd. acids consist of oleic and linolic acids in the proportion of 2 to 1. The satd. acids consist mainly of palmitic acid with a small quantity of myristic and stearic acids. The unsaponifiable contains hydrocarbons, higher alcs. and sterols. E. SCHERUBEL

Para-rubber-seed oil. G. S. JAMIESON AND W. F. BAUGHMAN. *Oil and Fat Ind.* **7**, 39–42(1930).— The % compn. found for this oil was: linolenin 20.5, linolin 32.9, [illegible] 5.5 palmitin, 7.3, stearin 9.1, arachidin, 0.3, unsapon. 0.8. The oil should be [illegible] to soy-bean oil for use in the *paint industry*. Com. samples of the oil have been found to have poor drying properties. The high free fatty acid content is thought to be responsible for this. If the oil is filtered soon after manuf. its acidity upon standing increases very slowly; but the seeds are so sensitive that they die shortly after maturity and a considerable portion of the fatty acids is liberated by the hydrolytic enzymes in the seeds. E. SCHERUBEL

Investigation of Japanese beeswax. I. General properties. HARUICHI IKUTA. *Chem. Ind Japan* **33**, Suppl. binding 467–71(1930).— The honey plants seem to have no connection with the consts. of beeswax. The differentiation of the general properties of European and Japanese beeswax depends on the species of bees. The ripened comb has a close connection with the chem. consts. of the beeswax. E. S.

Emulsifying agents for technical use. H. A. NEVILLE. *Am. Silk J.* **49**, No. 10, 4–6(1930).— A general article in which soaps and sulfonated oil are compared as emulsifying agents. The latter has been found to possess practical advantages over soap because of the greater stability and uniformity of its emulsions, its greater stability in acids, alkalies and hard water and its greater powers of dispersion and penetration. H. H. MOSHER

Reciprocal influence of soap and perfume. E. I. LEDERER. *Seifensieder-Ztg.* **57**, 631–4(1930). cf. *C. A.* **25**, 429. Electrolytes, NaCl, Na_2SO_4 and weak org. acids, are without action upon perfumes while benzoic acid is said to prevent rancidity. NaOH and to a lesser extent Na_2CO_3 are dangerous, especially toward eugenol, vanillin, heliotropin, coumarin, etc., both in regard to color and perfume. Nonelectrolytes are mostly neutral in their action except albuminoid and gelatinous substances which are deleterious. Glycerol is said to be beneficial, but the reason for this is not clear. Catalysts, Cu, Mn and Fe, are detrimental, especially in ultra-violet light. This latter action may be used as an accelerated test for the permanency of soap perfumes by exposing samples of perfumed and unperfumed soap to the action of ultra-violet light and noting any change in color or odor. Summary: The essential factors for permanency of odor and color are a neutral soap body, purity of the odoriferous agents, proper fixing agents and lab. tests for keeping quality. Appended are 9 perfume formulas for various types of toilet soaps. P. ESCHER

Solubility of metallic soaps of naphthenic, oleic and stearic acids. TEIKICHI YAMADA. *J. Soc. Chem. Ind. Japan* **33**, Suppl. binding 412(1930).— The soaps of 22 metals were tested for soly. in the common solvents. The oleates and naphthenates were similar in soly. except that Hg and Pb naphthenates are sol. in alc. while the oleates are [illegible]

	Solvent	Soly. at 5°.
Hg naphthenate	Alc.	Above 33%
Hg oleate	Alc.	Less than 0.1%
Pb naphthenate	Alc.	Above 29%
Pb oleate	Alc.	Less than 0.2%
Zn naphthenate	Acetone	Above 22%
Zn oleate	Acetone	Less than 0.4%

E. SCHERUBEL

Preparation and physical properties of α-monoglycerides. R. S. REWADIKAR AND H. E. WATSON. *J. Indian Inst. Sci.* **13A**, Pt. 11, 128–40(1930).— The α-monoglycerides of fatty acids with an even no. of C atoms from caprylic to stearic were made in a state of high purity and their densities, refractive indices, viscosities and surface tensions measured. The glycerides of the 4 higher acids exhibit 2 definite m. ps. corresponding with those of the 2 forms α and β. The rate of the change β ⟶ α increases with decrease in mol. wt. and is almost instantaneous with α-monolaurin. The solidifying point of the fused glyceride always lies below the m. p. of the α-form, indicating that the transformation β ⟶ α is not complete. E. SCHERUBEL

The problem of rancidity in soaps. F. WITTKA. *Seifensieder-Ztg.* **57**, 773–4 (1930).— A general review in which 2 types of rancidity are discussed, (1) by oxidation

of the unsatd. acids, and (2) the rancidity from after-sapon. of the coconut oil group in which free acids of low mol. wt. are said to be liberated, thereby causing a rancid odor. P. ESCHER

Spotted soaps: cause and prevention. E. U. BROEMME AND S. WARSCHAUER. *Seifensieder-Ztg.* **57**, 821–3(1930).—Rust spots are prevented by settling the NaOH lye before use and by chrome plating the steel dies or by using Nirosta steel dies. Rancidity spots are prevented by the use of sprays for introducing NaOH into the kettle to prevent lump formation; by the use of 15–18° Bé. NaOH in place of stronger lye, the use of boiling water in place of cold water, also introduced through the spray systems and only together with some caustic; by the use of labels free from bronze or other metallic colors; by preventing lubricating oil from dropping into the kettle and by cleaning the kettle before each charge. P. ESCHER

Apparatus for gravity separation of liquids such as oil and water (U. S. pat. 1,784,943) I. Water-soluble product from fatty acids of wool fat (U. S. pat. 1,784,941) 25.

Apparatus for obtaining fats from animal carcasses, etc. H. KRÜGER. Brit. 333,059, Jan. 2, 1929. An app. suitable for use with steam under pressure or with fat solvent vapors comprises a vapor-tight casing within which is mounted a rotary screening drum. Various structural details are described.

Apparatus for "dry-rendering" of fat-containing materials. WM. T. POWLING (to John W. Pittock). U. S. 1,785,361, Dec. 16. Various structural features are described.

Neutral fats and oils. OTTO JORDAN and GEORG KRAEMER (to I. G. Farbenind. A.-G.). U. S. 1,786,248, Dec. 23. Linseed, soy-bean, peanut or castor oil or other fats or oils contg. free acids are treated with an alkylene oxide such as ethylene oxide at 100–200° which serves to react with the free acids Catalysts are used such as acetates, phosphates or chlorides of alkali or alk. earth metals, Al_2O_3 or TiO_2. Cf. *C. A.* **24**, 983, 5522.

Removing oil and fat deposits from steam-heated drying chambers. LOTHAR WOLF and KARL KUNZE. Ger. 505,426, Oct. 19, 1929. Addn. to 478,637 (*C. A.* **23**, 4803).

Treating fish oils to obtain vitamin A. KATSUMI TAKAHASHI (to Zaidan Hojin Rikagaku Kenkyujo). U. S. 1,786,095, Dec. 23. A fish oil such as cod-liver oil is treated with an alk. soln. of alkali metal hydroxide to saponify the oil and convert the fatty acid constituents of the oil into alkali metal soaps; the alc. vitamin and soap mixt. thus obtained is treated with an alk. earth metal chloride to ppt. alk. earth metal soaps and the insol. soaps are sepd. from the alc. soln. of vitamin A by filtration.

Apparatus for decolorizing oils. CO-OPERATIVE WHOLESALE SOC., LTD., and ARTHUR GLOVER and CHARLES W. COUCHE. Fr. 686,442, Dec. 11, 1929. An app. is described for decolorizing palm oils, in which the oils are heated to a relatively high temp., *e. g.*, 250°, with exclusion of air. The oil is then passed to a heat exchanger. The addn. of $Pb(AcO)_2$ made the process more rapid. Cf. *C. A.* **24**, 5175.

Hardening paraffin, waxes, etc. WILHELM PUNGS and MICHAEL JAHRSTORFER (to I. G. Farbenind. A.-G.). U. S. 1,786,263, Dec. 23. Up to 10% of oxidation-bleached montan wax is added to substances such as paraffin, beeswax, tallow or spermaceti in order to produce products of higher m. p.

Soap. NEW PROCESS SOAP, LTD. Ger. 505,931, April 12, 1928. Details of a pivoted soap boiler.

Apparatus for producing shredded soap from semi-liquid soap. JULIUS A. SCHWANTES (to Colgate-Palmolive-Peet Co.). U. S. 1,785,532-3, Dec. 16. Various details of app. and operation are described relative to producing an air-current drying of soap shreds. Cf. *C. A.* **24**, 1535.

Soap powder. CLEMENT K. STODDER. U. S. 1,785,054, Dec. 16. A semi-plastic moisture-contg. soap stock is divided into pieces of large surface areas relative to their mass (as by extrusion to form strips) and these pieces are embedded in a dehydrated powd. alkali such as Na_2CO_3 having an affinity for the moisture in the soap stock and the mixt. is aged to permit the alkali to absorb a substantial proportion of the moisture and render the soap stock brittle, and it is then reduced to the desired degree of fineness. App. is described.

Soap press. RUEL A. JONES (to R. A. Jones & Co.). U. S. 1,785,312, Dec. 16.

29—LEATHER AND GLUE

ALLEN ROGERS

Report on [the determination of copper and zinc in] gelatin. R. M. MEHURIN. *J. Assoc. Official Agr. Chem.* **13**, 479(1930); cf. Berry, *C. A.* **21**, 286.—A simplified method, involving ashing of the sample and colorimetric estn. of the Cu, was devised and compared collaboratively with the alternative A. O. A. C. method which involves hydrolysis of the sample. The results were not considered sufficiently satisfactory to warrant a detailed report of the expts. and of the technic of the new method, but the latter gave more uniform results than the alternative A. O. A. C. method. From past experience with a similar method for the detn. of Cu and Zn in gelatin, M. believes that preliminary ashing of the sample and colorimetric estn. of Cu will result in considerable saving of time and, in the hands of the av. chemist, give greater accuracy in results than is obtained by hydrolysis of the sample and gravimetric or volumetric estn. of Cu. A. PAPINEAU-COUTURE

A note on the testing of gelatin for jelly strength. E. J. GUILD. *J. Soc. Chem. Ind.* **49**, 453–4T(1930).—For the test described below, it is necessary to have the gelatin broken into small pieces and well mixed. A moisture test is carried out with it. For the strength test, 15 g. of gelatin is soaked overnight in 250 cc. distd. water. The next morning it is drained off as far as possible, fresh distd. water is added and the whole melted at 50° and made to a vol. of 300 cc. After thorough soln. and mixing, the soln. is poured into a cylindrical flat-bottom glass vessel 2.5 in. in diam. and 4.5 in. deep. After another stirring with a glass rod, any froth is removed, the contents are allowed to set at a temp. of 18–20°, and the vessels are placed in an incubator or const.-temp. room at 15° and left overnight. The app. (similar to that described by Lawrie) consists of a hollow bulb of 1.8 cm. outside diam. forming one end of a tube 20 cm. in length and of 0.45 cm. internal diam., which is opened out at the other end to an inside diam. of 0.75 cm. A bung is bored to fit the top and serves as a wt. platform. To conduct the test, the skin of the jelly is broken to a depth of 2.5 cm. and the bulb inserted, the tube being maintained vertical, and capable of sliding easily downward, by slipping it into a split smooth cork fixed in a clamp attached to a retort stand. The bulb travels slowly down through the mass by placing wts. on the platform, followed by Hg, which is dropped into the bulb from a buret until the bottom of the bulb is within 1 cm. of the bottom of the vessel. When that occurs the tube is removed and wiped dry, and, with the wts., Hg and cork, is weighed as a whole and recorded. "Specific strength" of jelly is detd. from the formula $(S-4)/B^2$, where S = wt. necessary to penetrate the jelly, and B is the wt. of bone-dry gelatin. The method is accurate to 5–7%, which is close enough for comparative work. W. H. BOYNTON

Dyeing leather, etc. (Ger. pat. 505,859) **23.** Dyeing skins, etc. (Ger pat. 474,934) **25.**

Dehairing hides. GEORGE D. MCLAUGHLIN, GEORGE E. ROCKWELL, FREDERICK O'FLAHERTY and JOHN H. HIGHBERGER (to Tanners' Council of the U. S. A.). U. S. 1,785,092, Dec. 16. See Brit. 327,132 (*C. A.* **24**, 5178).

Tanning extracts. FORESTAL LAND, TIMBER & RAILWAYS CO., LTD., and R. O. PHILLIPS. Brit. 332,935, Jan. 25, 1929. Pulp and tanning exts. are simultaneously obtained from tannin-contg. woods by the action of an aq. soln. prepd. with $NaHCO_3$ 1 and Na_2SO_3 3 parts.

Water-soluble condensation products suitable for use as tanning agents. I. G. FARBENIND. A.-G. Brit. 332,960, May 1, 1929. The process described in Brit. 320,056 (*C. A.* **24**, 2634) is modified by causing a haloaralkyl halide to act on a hydroxy-aromatic hydrocarbon, with the addn. of a metal or metal salt catalyst, and sulfonating the product. Examples are given.

Tanning. E. STIASNY. Brit. 333,221, Jan. 28, 1929. The material is treated with a liquor contg. a water-sol. complex compd. of Al in which at least one radical of a carboxylic acid, or of an acid synthetic tanning agent, and one sulfurous radical, are combined with the Al. Solns. may be used contg. Al sulfate "or oleum," Na_2SO_4 and one or more substances contg. carboxylic compds. acid such as those of acetic, oxalic, lactic or citric acids or synthetic tanning substances such as formaldehyde-condensation products of aromatic sulfonic acids or the like; and other compds. such as NaCl,

Na_2CO_3 or sulfonated castor oil may be present. The treatment may be in successive baths, each of which contains only a portion of the substances used, and the tanning may be followed by stuffing with sulfonated Neat's foot oil and egg yolk.

Tanning. SIDNEY LE F. VARVEL. Fr. 686,383, Dec. 10, 1929. Skins or leather are tanned by immersion in a tanning bath, the skins being connected to a source of continuous current which is connected at the other end to the liquid, and the current is completed by a commutator until the tanning operation is complete

Leather tanning. HERBERT WITTEK. Ger. 480,701, Aug. 13, 1925. Tanning material for leather is obtained by sulfonating the water ext. of crude tar and isolating the part sol. in water. Thus, the ext. is treated with concd. H_2SO_4, allowed to cool, and, after standing, treated with ice water.

Tanning leather such as chamois or buckskin. AUGUST ERNST. U. S. 1,784,828, Dec. 16. The cleaned limed skins are agitated in a bath contg. CH_2O, and there is then added a mixt. contg. soap, moellon degras, sod oil, Glauber's salt and $NaHCO_3$, followed by further agitation of the skins in the bath until tanned.

Leather treatment. EDWIN S. MIX (to Hickok Mfg. Co.). U. S. 1,785,966, Dec. 23. The hide is stretched in one direction during the tanning operations to cause the major portion of the fibers of the hide to arrange themselves in that direction, and the surface of the leather is combed in such general direction to cut the transverse surface fibers and release the surface fibers to project in the direction of the combing.

Impregnating leather with synthetic resin compositions. J. TAYLOR and A. V. KELLER. Brit. 333,759, Aug. 29, 1929. Leather (or ground leather waste for making molded products) is impregnated with a concd. soln. of a condensation product of urea or a deriv. or of phenolic compds. with formaldehyde or other suitable aldehydic compd. and the soln. is allowed to dry. Various details for prepg. the solns. used are given.

Finishing leather, rubber, etc. IMPERIAL CHEMICAL INDUSTRIES, LTD. Fr. 686,381, Dec. 10, 1929. Leather, rubber or leather cloth is finished by the application of an adhering film of varnish prepd. by means of a resin formed by condensing a polyhydric alc. with a polybasic acid, the resin contg. also a fatty oil (including drying oils, semi-drying oils, castor oil as well as satd. fatty oils) or the corresponding fatty acid, or 2 or more of these added elements. The resin may also contain a cellulose ester or ether and (or) an aldehyde-phenol or aldehyde-urea resin.

30—RUBBER AND ALLIED SUBSTANCES

C. C. DAVIS

Water absorption of rubber compounds. H. A. WINKELMANN AND E. G. CROAKMAN. *Ind. Eng. Chem.* **22**, 1367–70(1930).— An accelerated base mixt. was compounded with different proportions of whiting, barytes, clay, ZnO, "thermatomic C" and gas black, resp., cured 20, 40, 60, 80, 100 and 120 min. at 141.7°, immersed in water at 28° and the % increases in wt. were detd. periodically for 30 days. The results may be summarized as follows: (1) With a given filler the water absorption is virtually independent of the proportion of filler added. (2) The water absorption diminishes with increase in the time of cure until it reaches a min. just after the optimum cure, following which it increases again (a tire tread mixt. showed the highest absorption at its optimum cure), showing in general that the water absorption of a vulcanizate varies with the time of cure. (3) Whiting and barytes increase the water absorption of overcured vulcanizates; the greatest water absorption was obtained with clay and ZnO; gas black had very little effect; and "thermatomic" C decreased the water absorption. (4) Salts such as metallic acetates increase water absorption, so such impurities in fillers (from the action of residual AcOH) may play a part in the water absorption of a vulcanizate. (5) Immersion of a tire tread vulcanizate in water for 30 days did not change the modulus or tensile strength but decreased the elongation, while the dried sample had the same modulus, a higher tensile strength, a lower elongation, the same resistance to tearing and a higher resistance to abrasion than before immersion. (6) The water absorption of a hard rubber diminished progressively with increase in the time of cure. (7) The water absorption of reclaimed rubbers cured with S varied considerably with the raw materials used and with the process of reclaiming. C. C. D.

Coating compositions containing nitrocellulose and an artificial rubber isomer, etc. (U. S. pat. 1,785,267) **26. Finishing rubber, etc.** (Fr. pat. 686,381) **29.**

Rubber. C. WALTER LEUPOLD. Ger. 505,825, July 25, 1928. Vulcanized rubber masses are produced by adding concd. sulfite-cellulose lye in addn. to the usual filling materials such as diphenylguanidine or MgO. The rubber so treated has a greater resistance to the action of light and air.

Rubber deposition from dispersions. DUNLOP RUBBER CO., LTD., and E. W. B. OWEN. Brit. 333,331, May 31, 1929. In making seamless multi-compartment articles such as purses, handbags or the like, formers with relatively adjustable parts are dipped into aq. dispersions of rubber or similar material, the formers are adjusted for the desired thickness of deposit, and coagulation of the deposited material is effected. Various details of app. and operation are described.

Coating metals with a thick homogeneous covering of rubber by electrophoretic methods. THE ANODE RUBBER CO., LTD. Ger. 505,824, May 2, 1926. Details are given of the app. for the pptn. of the rubber from a dispersion by an elec. current.

Preserving rubber. ALBERT M. CLIFFORD (to Goodyear Tire & Rubber Co.). U. S. 1,785,692, Dec. 16. About 1% of a compd. such as a dinaphthylnitrosoamine is added to the rubber. Cf. *C. A.* **25**, 233.

Preserving rubber. PAUL C. JONES (to B. F. Goodrich Co.). U. S. 1,784,838, Dec. 16. Rubber is treated with a tetraarylhydrazine in which at least one of the aryl groups is substituted, *e. g.*, with *N,N'*-di-*p*-anisyl-*N,N'*-diphenylhydrazine or a similar compd. 0.1–5.0%.

Treating rubber with hypochlorites, etc. E. HAZEL (to Naugatuck Chemical Co.). Brit. 333,391, Oct. 5, 1928. A latex (suitably one contg. formaldehyde and Nekal as preservative and stabilizing addns.) is treated with NaOCl or other suitable compd. of the general type formula M-halogen-O, in which M is H, an alkali or alk. earth metal or an org. radical such as Et, Am or *tert*-butyl. This treatment usually produces a permanent tackiness in the rubber laid down but when applied to a strongly ammoniacal latex a glazed non-tacky condition results. Creaming also may be facilitated and decompn. prevented. Various details and examples of treatment are given.

Rubber threads. DUNLOP RUBBER CO., LTD., E. A. MURPHY and D. F. TWISS. Brit. 333,005, June 13, 1929. Threads formed as described in Brit. 311,844 (*C. A.* **24**, 989–90) are passed through even-speed rollers when partially set, to produce flattened tape-like filaments or threads. The rollers may be rubber covered or engraved and the tapes may be coated with clay, whiting, etc., before drying, and may be used for winding golf-ball cores, etc.

Rubber articles. THE ANODE RUBBER CO. (ENGLAND), LTD. Fr. 686,285, Dec. 7, 1929 In the manuf. of articles from rubber or the like by drawing, immersion, impregnation, molding, electrophoresis, etc., starting directly from emulsions or aq. dispersions the emulsions or dispersions are mixed with variable amts. of one or more salts of hydrofluosilicic acid. Details of the process are given.

Reclaimed rubber. CHARLES H. CAMPBELL (to Peter Cooper Corps.). U. S. 1,786,149, Dec. 23. Rubber is reclaimed from rubber scrap by a devulcanizing process in which the rubber scrap is subjected to the action of cleavage products obtained from tanned leather during the process of devulcanization.

Rubberized textile sheets. HANS R. HAERTEL (to Thomas H. Dumper). U. S. 1,785,081, Dec. 16. Tacky rubber surfaces are coated with a soln. comprising a volatile solvent such as alc. and shellac and an ammoniacal soln. of a metal carbonate inert to rubber such as $MgCO_3$. U. S. 1,785,082 relates to the successive application of similar solns. U. S. 1,785,083 relates to the use of similar solns. but with application of the shellac soln. before application of the ammoniacal carbonate soln. U. S. 1,785,084 specifies use of shellac and $ZnCO_3$ dissolved in alc. and NH_3. U. S. 1,785,085 specifies successive use of shellac and a similar $ZnCO_3$ soln.

Liner fabric for use in rubber goods manufacture. PAUL BEEBE (to Goodyear Tire & Rubber Co.). U. S. 1,785,667, Dec. 16. A liner fabric is dipped in a soln. of soap in order to prevent adhesion.

Paving blocks with rubber tread portion. DUNLOP RUBBER CO., LTD., H. C. YOUNG, F. W. WARREN and F. H. TOOP. Brit. 333,047, July 29, 1929. A 3-layer block, with a tread portion of comparatively resilient rubber, a center layer of hard rubber of ebonite consistency and a base of bitumen and aggregate is formed with use of a rubber mixt. comprising crumb rubber, S and aq. rubber dispersion as described in Brit. 315,512 (*C. A.* **24**, 1764). Various details of manuf. are described.

Apparatus for testing cords such as those for tire manufacture. THOMAS B. BUFFUM (to Goodyear Tire & Rubber Co.). U. S. 1,785,690, Dec. 16. Structural features.

Rubber-vulcanization accelerators. I. G. FARBENIND. A.-G. Brit. 333,174, May

2, 1929. For accelerators, there are used condensation products of NH_3 and unsatd. aldehydes such as crotonic aldehyde, acrolein or substituted acrolein. Cf. *C. A.* 25, 234.

Vulcanization accelerators. The Rubber Service Laboratories Co. Ger. 504,923, Oct. 10, 1926. The accelerator consists of the condensation product of an aliphatic aldehyde with the reaction product of mercaptans or mercapto compds. and org. bases. Examples of suitable aldehydes are croton- or heptaldehyde, of a suitable base, guanidine and of suitable mercapto compds., benzoarylmercaptans.

Apparatus and gas-supply system for vulcanization of hollow rubber articles such as tire tubes and casings. Harold A. Denmire (to General Tire & Rubber Co.). U. S. 1,786,290–1, Dec. 23. Various details of app. and operation are described.

Vulcanizing organic isocolloids. Laszlo Auer and Nikita Strachovsky. Fr. 686,316, Dec. 9, 1929. Org. isocolloidal substances contg. acids of high mol. wt. or their derivs. are vulcanized by combining with the operation of sulfuration an application of steam, either during or after the sulfuration. In the application of the process to vulcanizing rubber, the rubber is first modified by treatment with appropriate agents, *e. g.*, as described in Fr. 652,796 or its patent of addn. 34,956.

Vulcanization of unsaturated organic compounds. Laszlo Auer and Paul Stamberger. Fr. 686,321, Dec. 9, 1929. Unsatd. org. compds. are vulcanized by first putting the S in dispersion in the substance to be vulcanized, which is then brought in contact with an aq. medium and submitted in this state to heat and pressure until the required degree of vulcanization is reached. The process may be applied to isocolloids by treating the isocolloids with vulcanization agents to obtain a first vulcanization, after which the above treatment is applied.

Rubber-like preparations. I. G. Farbenind. A.-G. (Carl Krauch and Martin Müller-Cunradi, inventors). Ger. 505,843, Oct. 21, 1927. Vehicle tires are formed of a rubber-like prepn. including polymerized butadiene. An example gives a mixt. of polymerized butadiene, soot, stearic acid, condensation product of aldol and α-naphthylamine, S, and piperidinepentamethylenedithiocarbamate. In another example, crude rubber is added.

Rubber-like product. Frederick C. Zobel. U. S. 1,786,281, Dec. 23. A mixt. of gum copal and hard wood-creosote oil (suitably in the proportions of 1 and 2 parts, resp.) is heated until a clear soln. is formed, and petroleum naphtha is then added to effect pptn. of a product which may be used for pencil mark erasers and has properties similar to rubber.

Rubber filling material. Max Buchner and Wilhelm Bachmann. Ger. 504,922, 1928. A highly active rubber filling material is prepd. from H_2SiO_3 by passing SiF_4 into water or aq. H_2SiF_6 in the presence of protective colloids such as gelatin, albumin, vegetable mucous, etc.

Gutta-percha, balata, etc. Willoughby S. Smith, Henry J. Garnett and John N. Dean. Fr. 686,535, Dec. 7, 1929. Gutta-percha, balata and like thermoplastic materials, natural or artificial, have their mech. properties improved and their fusion or softening point raised by heating them for a sufficient time at a temp. below that at which they would melt or soften. Cf. *C. A.* 24, 4960.

Treating gum exudates such as gutta-percha. Charles Martell (to Western Elec. Co.). U. S. 1,786,075, Dec. 23. A gum exudate such as gutta-percha is treated with a relatively small quantity of latex until a quantity of the gum in the latex has been absorbed by the gum exudate, which serves to improve the material.

CHEMICAL ABSTRACTS

Vol. 25. FEBRUARY 20, 1931 No. 4

1—APPARATUS AND PLANT EQUIPMENT

W. L. BADGER

Instantaneous clamp for a universal support. A. BARBOT. *Bull. soc. chim.* [4], 47, 1331–2(1930).—A simple, rugged, inexpensive clamp consisting of 3 pieces is described. It is quickly adjusted to hold app. of many sizes. J. H. MOORE

Filter manufacturers and their products. ANON. *Chem. Age* (London) 23, 377–84(1930).—Notes are given on the products of leading manufacturers of filtration plants and the principles which guide their development. E. H.

A new simple arrangement for fractional distillation in the laboratory. W. PRAHL. *Chem. Fabrik* 1930, 517–9.—The neck of a common long-necked fractionating flask is filled with glass rings and carries a Liebig cooler and thermometer at the top. The side arm carries a cock and is connected to a vertical cooler with a receiver at the bottom. After boiling, equil. is established, the cock is opened to allow the desired fraction of vapor to pass to the vertical cooler. In this way the ratio of the reflux condensate to the distillate may be made very high and a good sepn. attained. Cf. *C. A.* 24, 4194. J. H. MOORE

Modified balance for approximate and quick weighing. E. KARRER. *Ind. Eng. Chem., Anal. Ed.* 3, 112–4(1931).—The balance is an ordinary beam balance with a scale placed high above the beam. A spring is mounted directly beneath the beam, and in the spring are 2 adjustable studs. These studs barely make contact with the spring in the balanced state. In making a weighing, the right-hand scale pan is depressed to a definite point and then released quickly and carefully. If the weights on the 2 pans are equal, the index will be deflected to a point that may be called zero on the scale but will travel to a shorter or greater distance if the weight on the right-hand pan is smaller or larger than the wt. of the object. The scale can be adjusted in units of wt., length or vol. Such a balance is useful and rapid when a large no. of similar weighings have to be made. W. T. H.

A new automatic cryostat. A. I. SCHATTENSTEIN. *Z. anorg. allgem. Chem.* 193, 187–90(1930).—Temps. down to —70° may be maintained in a Dewar vessel contg. acetone, a stirrer and a thermal regulator, which controls a relay which in turn operates a solenoid. The latter raises and lowers a silvered double-walled cylinder, cooled by CO_2, which is suspended just above the Dewar vessel and from the bottom of which a Cu cone extends. When the bath tends to warm up, the cone is lowered into the acetone. When the temp. is low enough, the solenoid causes the cone to rise. An example is given of a 2.5-l. flask maintained at —33° with variations of ±0.01°. L. P. HALL

A simple continuous dialyzer. HARRY A. AITKEN. *J. Biol. Chem.* 90, 161–3 (1931).—A simple continuous dialyzer is described which can be constructed for vols. of about 10 to 15 cc. as well as for larger vols. It is so arranged that a relatively small vol. of the soln. to be dialyzed covers a large surface of membrane so that the process of dialysis is very much accelerated. A. P. LOTHROP

Micro-absorption tube with mercury seals. RALPH T. K. CORNWELL *Ind. Eng. Chem., Anal. Ed.* 3, 4–5(1931).—The fragile nature of the Kemmerer-Hallett tube (*C. A.* 21, 720) is overcome. J. H. MOORE

A manometer for the measurement of small pressure differentials at high pressures. JAMES H. BOYD, JR. *J. Am. Chem. Soc.* 52, 5102–6(1930).—Pressure differentials of 1 in. Hg at 3000 lb. per sq. in. are measured with an accuracy of 1 part in 1000 by elec. means. The readings are direct, and calibration and the use of very clean Hg are unnecessary. J. H. M

A simple attachment to ordinary U-tube manometers for maintaining constant pressure. J. A. VAN DEN AKKER. *Rev. Sci. Instruments* 1, 684–6(1930).—By using a transparent oil in the manometer the liquid column serves as a cylindrical lens. A Se cell is placed back of the manometer at the desired point, and a screen with a 1.0 mm.

hole placed between cell and oil column. When the column is above the hole, parallel rays from a 32 c.-p. lamp are spread by the oil lens over a larger area of the cell surface than when the meniscus is below. A thermionic-valve circuit, relays and a solenoid translate the resultant current difference into the opening of a tire valve for admitting gas. GREGG M. EVANS

Reliability of pyrometers. H. MOORE. *Pottery Gas.* **56**, 81–5(1931).—A discussion of the radiation pyrometer, how it functions, the main essentials to be observed in its construction and the reliability of temp. measurements obtained when using an instrument of the lens type versus one of the focusing-mirror type. The latter apparently gave more reliable readings. Uniformity of temp. in the furnace was important if correct readings were desired. R. A. HEINDL

Conductivity water. G. W. TOMPKIN. *Chemist-Analyst* **20**, No. 1, 16–7(1931).—Satisfactory water was obtained by leading the water from the lab. still to a distg. flask which was fed automatically by a float valve consisting of a glass tube, partially closed, in which was a loose-fitting glass rod carrying the glass float welded to the rod. The steam was led into an Erlenmeyer flask which was submerged in a water bath, whereby the steam was partially condensed. An automatic siphon removed the water when the flask was full. W. T. H.

Precision leveling bulb. WENDELL P. MUNROE. *Chemist-Analyst* **20**, No. 1, 20 (1931).—In obtaining readings with a gas buret and leveling bulb with Hg as confining fluid, it was found difficult to match the levels accurately because of the larger surface in the bulb. To obviate this difficulty a bottle with side arm was used in place of the bulb, and the bore of the side arm corresponded to that of the buret. W. T. H.

Practical salt-water-spray tank. LEOPOLD PESSEL. *Chemist-Analyst* **20**, No. 1, 15–6(1931).—Drawings are shown and directions given for making a salt-water-spray corrosion cabinet to be used in accelerated corrosion tests of metals. W. T. H.

Spray nozzle. JOHN C. CASE. *Chemist-Analyst* **20**, No. 1, 20–1(1931).—A specially designed nozzle which is not likely to become clogged is described for the salt-spray test. W. T. H.

Device for holding glass stoppers in place. P. G. HORTON. *Chemist-Analyst* 20, No. 1, 21(1931).—In work demanding an all-glass app. it is sometimes necessary to hold stoppers in place against pressure from within. A device is shown for using pipe straps, plaster of Paris and bolts whereby a neat and tight joint can be made very easily. W. T. H.

Pipet of special size for standardizing volumetric solutions. JOHN E. S. HAN. *Chemist-Analyst* 20, No. 1, 21(1931).—Pipets delivering 42.75–47.25 cc. are recommended in place of the usual 50-cc. pipet. W. T. H.

Simple distilling apparatus. R. STEVENS GIBBS. *Chemist-Analyst* **20**, No. 1. 22–3(1931).—The still is made with a 30-cc. glass beaker, a 300-cc. beaker and a 3.5-inch funnel. The liquid from which the volatile constituent is to be collected is placed in the larger beaker, the smaller beaker is suspended in the beaker and above the small beaker is the funnel, which has the stem cut off and has the apex fused together. During the distn. the funnel is filled with ice, the vapors condense on the under side and the condensate drops into the smaller beaker. The funnel fits in a collar at the top of the larger beaker. W. T. H.

Device for estimation of density of gems and small amounts of solids. EUGENE W. BLANK. *Ind. Eng. Chem., Anal. Ed.* **3**, 9–11(1931).—The device consists of a weight buret and a sep. tube (12 cm. tall and of 0.6–0.8 cm. bore) with a capillary side tube (1.0 mm. bore) which is provided with 2 marks to show the level of liquid in the main tube. The tube is filled with a suitable liquid (*e. g.*, ether) until it reaches the lower mark in the capillary, a weighed portion of sample is added and then enough liquid from the wt. buret to bring the level to the upper mark in the capillary. By subtracting the wt. of liquid required from the wt. required when no added substance is present, the wt. of liquid displaced by the solid is obtained. Then, since its d. is known, it is easy to compute that of the solid. The results are shown to be good by comparing the values obtained in this way with some 20 different materials of known ds. W. T. H.

Mill for small samples. W. H. COOK, E. P. GRIFFING AND C. L. ALSBERG. *Ind. Eng. Chem., Anal. Ed.* **3**, 102–3(1931).—Microanalytical methods for the analysis of homogeneous material have been unavailable to biological chemists because of the difficulty in grinding and sampling very small samples without loss of substance or moisture. A mill is here described, which can be obtained from A. H. Thomas of Philadelphia, which is capable of reducing samples such as individual wheat leaves without loss. The principle is similar to that of the Wiley lab. mill. A rapid shearing

effect is obtained by a hard knife with 4 blades cutting against another blade placed in the wall of the grinding chamber. W. T. H.

The vacuum fractionation of phlegmatic liquids. K. HICKMAN AND W. WEYERTS. *J. Am. Chem. Soc.* 52, 4714–28(1930).—A new still-head for high-boiling liquids with the thermometer placed in a large bulb and an automanometer side tube sealed in near the thermometer, and a butyl phthalate outside manometer are described, which will give true b. ps. at low pressures. Exptl. data are given. J. H. MOORE

Apparatus for experimentation on gas at the ultra pressure of 6000 kilograms per square centimeter. JAMES BASSET. *Compt. rend.* 191, 928–31(1930).—A description, with 3 cuts, is given of an app. for studying the phys. and chem. properties of gases, and which has operated satisfactorily for several hundred hrs. with H at 4–5000 kg. per sq. cm., and at internal temps. up to 1000°. Cf. *C. A.* 21, 3492. J. H. MOORE

Shelf to increase ashing capacity of laboratory electric furnace. RAYMOND HERTWIG. *Cereal Chemistry* 7, 556(1930).—The shelf is made of asbestos board $^3/_{16}$" thick. It is perforated with numerous holes $^1/_4$" in diam. to permit free circulation of the air. Four narrow strips of the asbestos board are fitted to the shelf edges with dovetail joints. These serve to support the shelf and hold it firmly in position. A diagram shows the construction. L. H. BAILEY

Precision of color temperature measurements under various observing conditions; a new color comparator for incandescent lamps (JUDD) 2.

KIRSCHBAUM, EMIL: **Dechema Monographien. Nr. 12, Bd. 2.** Berlin: Verlag Chemie, G. m. b. H. 40 pp. M. 5.

Porcelain filter for laboratory work. STAATLICHE PORZELLAN-MANUFAKTUR. Ger. 509,931, May 14, 1927.

Rotary-cell filter. FIRMA R. FÖLSCHE. Ger. 509,930, June 13, 1926. Details of construction.

Sack filters. FÉLIX GINSBACH. Fr. 688,212, Jan. 14, 1930. Means for cleaning is described.

Filter unit for tube well filters. OTTO LAUBNER. U. S. 1,787,634, Jan. 6. Structural features.

Air filter. JULIUS LEDERER (to American Air Filter Co.). U. S. 1,788,164, Jan. 6.

Air filter. JAMES J. PREBLE (to American Air Filter Co.). U. S. 1,788,171, Jan. 6.

Air-filtering device. EUGENE L. BARNES. U. S. 1,787,135, Dec. 30. Structural features.

Air-filtering device. FRANK A. DONALDSON. U. S. 1,787,235, Dec. 30. Structural features.

Apparatus for filtering air or gases. LUDWIG HONIGMANN. Fr. 687,742, Jan. 6, 1930.

Apparatus for separating gases by liquefaction. SOC. L'AIR LIQUIDE (SOC. ANON. POUR L'ÉTUDE ET L'EXPLOITATION DES PROCÉDÉS GEORGES CLAUDE). Fr. 687,479, Mar. 15, 1929.

Liquid filter. ALFRED GRØNNING. Ger. 509,929, Aug. 14, 1927. Details of construction.

Rotary filter for liquids. HUGO KOSCHMIEDER. Ger. 506,961, April 27, 1926.

Drum suction filter for separating suspended matter from liquids. FILTRATION ENGINEERS, INC. Ger. 507,789, June 11, 1927.

Filter suitable for filtering "dry-cleaning" solvents. JOHN H. HILLS (to Bousman Mfg. Co.). U. S. 1,787,577, Jan. 6. Structural features.

Vacuum filter for pulp, pastes, etc. GEORGES ANTOINE ALLEMAND. Fr. 687,477, June 7, 1928.

Filter press. PIERRE L. DORNER. U. S. 1,788,086, Jan. 6.

Filter press. MASCHINENFABRIK SANGERHAUSEN A.-G. Ger. 509,928, May 4, 1928. Details of closure are given.

Filter presses. JEAN RAUX. Fr. 686,713, Dec. 16, 1929. The usual cotton or hemp filter cloths are replaced by metallic filtering screens.

Filter-press leaf. WM. H. BACHELDOR (to Standard Oil Co. of Ind.). U. S. 1,787,100, Dec. 30.

Filter sheets. FRED W. MANNING (to Filter Fabrics, Inc.). U. S. 1,786,669, Dec. 30. A finely divided filtering substance such as cellulose fiber, asbestos or fuller's earth is deposited on a moving web of sheet material such as scrim in an app. described, against the influence of gravity (as by suction). Cf. *C. A.* 25, 416.

Gas calorimeter. H. P. LUPTON. Brit. 333,960, May 29, 1929. The inlet water may have its temp. raised before entry into the calorimeter by means of the heated delivery water. Various details of construction are described.

Distillation apparatus using the heat of the sun. SOC. LA DISTILLATION. Fr. 686,847, Mar. 7, 1929.

Stirring device. SCHERING-KAHLBAUM A.-G. (Walter Baensch, inventor). Ger. 509,701, Feb. 10, 1929. Addn. to 489,931 (*C. A.* **24**, 2011). The device is specially applicable to the hydrogenation of liquid materials.

Spiral polymetallic thermometer. THERMEX S. A. Swiss 137,673, Feb. 16, 1929. Addn. to 124,551.

Viscometer. I. G. FARBENIND. A.-G. (Adolf Kämpf, inventor). Ger. 508,605, Jan. 12, 1928. Details are given.

Viscometer with interfitted cup and ball surfaces. ANTHONY G. M. MICHELL. U. S. 1,786,574, Dec. 30. Structural features.

Containers, apparatus, etc., made from phenol-aldehyde resins and perforated metal supports. SÄURESCHUTZ G. M. B. H. Ger. 509,148, April 27, 1929. Manipulative details of the manuf. are described.

X-ray tube. MONTFORD MORRISON (to Westinghouse Elec. & Mfg. Co.). U. S. 1,787,699, Jan. 6.

Röntgen-ray tubes. F. ROTHER. Brit. 334,149, Dec. 24, 1929. Various details are described of tubes which may have a cathode of light metal such as Be or its alloys and an anticathode of pure radioactive metal such as U, Th or their alloys freed from gas.

Glowing-cathode Röntgen-ray tube. SIEMENS-REINIGER-VEIFA GES. FÜR MEDIZINISCHE TECHNIK M. B. H. Ger. 508,913, Mar. 14, 1928.

Light source for making photographic records of light-wave variations corresponding to electrical variations. THEODORE W. CASE (to Case Research Laboratory, Inc.). U. S. 1,788,355, Jan. 6. A bulb contg. inert gas such as He with a small proportion of N contains also an anode and a cathode, the end portion of which is surrounded by a spaced tube of insulating material, the entire exposed portion of the cathode being coated with an alk. earth material such as CaO and BaO which extends into and substantially closes the open end of the tube. Various structural details are described. Cf. *C. A.* **24**, 1587.

Preparing high-emitting low-temperature cathodes in electron tubes having metal shells with glass seals. FREDERICK S. MCCULLOUGH. U. S. 1,787,082, Dec 30 Various details of manuf. are described.

Electron-emitting filament. WM. B GERO (to The Canadian Westinghouse Co., Ltd.). Can. 306,285, Dec. 2, 1930. A refractory metal powder of the W, Mo, Ta class is compacted about a formed coherent body of Th, heat-treated to effect consolidation and then mechanically worked to filamentary form. Cf. *C. A.* **24**, 24.

Electron-emission material. JOHN W. MARDEN and HARVEY C. RENTSCHLER (to Westinghouse Lamp Co.). U. S. 1,787,694, Jan. 6. An electron-discharge device is provided with an active cathode such as Mo contg. about 1% of V, which serves to give high emission at moderate temps. for long periods.

Apparatus for feeding gases and vapors to illuminating tubes, etc. RALPH W. LOHMAN. U. S. 1,786,626, Dec. 30. Structural features.

Apparatus for gas analysis. AKTIEBOLAGET CARBA. Fr. 686,698, Dec. 16, 1929 An app. for the analysis of gas, *e. g.*, for the detn. of the content of CO_2 in furnace gases, etc., is provided with a gas filter of solid cryst. material, the exterior surface of which is sol. in water. The solid impurities in the gas are retained and afterward washed away by the detachment of the exterior surface of the substance due to its soln. in the moisture contained in the gas, the arrangement being such that the gas leaves the filter with a practically const. content of residual moisture. The filter is preferably cylindrical and has several filtering layers, the first of which is formed of cooking salt and the rest of wadding, etc.

Gas purifier. ALOYS SCHIRP. Ger. 507,518, Feb. 9, 1928. The gas current is propelled through a laminated filter by a fan.

Gas-washing apparatus. PNEUMATIC CONVEYANCE & EXTRACTION (1929), LTD Ger. 508,571, June 11, 1927. Details of construction.

Column for washing and absorbing gases. THE BARTLETT HAYWARD CO. Ger 507,517, Dec. 9, 1928. See Brit. 307,453 (*C. A.* **23**, 5066).

Apparatus for separating constituents of gases by adsorption in activated carbon or other materials. OSCAR L. BARNEBEY (to American Solvent Recovery Corp.). U. S. 1,787,714, Jan. 6. Structural features.

Specific-gravity balance (with a pair of hollow shells) suitable for use with gases. DAVID O. LIMA. U. S. 1,787,256, Dec. 30. Structural features.

Apparatus for liquefying gases by expansion. AUTOGEN GASACCUMULATOR KRÜKL & HANSMANN G. M. B. H. Ger. 507,799, Mar. 11, 1928. Addn. to 505,900 (*C. A.* **25**, 549).

Apparatus for effecting reactions between gases and liquids. WILHELM A. BODAMER. Ger. 509,367, Oct. 3, 1926. The app. comprises liquid-atomizing nozzles mounted on one or more rotary or stationary hollow shafts in a casing to which the gases are supplied.

Countercurrent apparatus for treating gases with liquids. CARL FRANKLIN BRAUN. Ger. 509,402, Mar. 5, 1927. See Brit. 291,527 (*C. A.* **23**, 1022).

Apparatus for introducing gas into liquids to form bubbles or foam. SCHAUMBAD— G. M. B. H. Ger. 507,621, Feb. 22, 1929.

Apparatus for treating liquids with liquids or gases. WALTHER FELD & Co. G. M. B. H. and RICHARD GISNER. Ger. 508,964, Feb. 5, 1929. Addn. to 507,315 (*C. A.* **25**, 441).

Apparatus for degassing liquids. SOCIETÀ ITALIANA PIRELLI. Ger. 508,904, Aug. 17, 1927.

Plate atomizer for cooling liquids, especially sulfuric acid. JACOB LÜTJENS. Ger. 507,886, Nov. 12, 1927.

Plate atomizer for liquids. JACOB LÜTJENS. Ger 508,794, May 8, 1928. Addn. to 507,886 (preceding abstr.). Further details of the device, which is particularly applicable for the *chamber process of mfg.* H_2SO_4, are given.

Centrifugal purifiers for liquids. JAMES W. ADAMS Fr 687,317, Dec. 27, 1929.

Apparatus for mixing liquids of different specific gravities. WALTHER FELD & Co. G. M. B. H. and RICHARD GISNER. Ger. 507,519, Feb. 5, 1929. The app. is designed to cause countercurrents of liquids to mix temporarily for the purpose of washing or absorbing.

Apparatus for determining the specific gravity of liquids. BAYERISCHE STICKSTOFF-WERKE A.-G. (Josef Merzkirch, inventor). Ger. 508,825, April 28, 1928. Details are given.

Apparatus for determining specific gravity of oils, etc. ALLEN A. VAN ORSDALE (to Brown Instrument Co.). U. S. 1,787,132, Dec. 30. Structural features

Valve for maintaining constant liquid height in tanks. CLARENCE F. PEITZMAN. U. S. 1,787,420, Dec. 30. Structural features.

Apparatus (with troughs and stirrers) for effecting evaporation of liquids or crystallization of salts, etc. RICHARD A. STOKES and EDWIN G. L. ROBERTS (to E. M. S. Industrial Processes, Ltd.). U. S. 1,788,352, Jan. 6 Various details of app. and operation are described.

Countercurrent columns for distillation and fractionation of high-boiling liquids. CARL H. BORRMANN. Ger. 509,927, May 13, 1928.

Apparatus with superposed evaporating trays suitable for distillation of oils and liquid solvents. LOUIS J. SIMON. U. S. 1,787,399, Dec. 30. Structural features.

Apparatus for distillation of hydrocarbons. CHARLES G. STUPP (to The Barrett Co.). Can. 304,942, Oct. 21, 1930.

Distillation apparatus for difficultly vaporizable liquids. I. G. FARBENIND. A.-G. (Hans A. von Staden and Albert Berenbruch, inventors). Ger. 508,393, Sept. 12, 1926. The liquid is sprayed by a rapidly rotating disk against the heated walls of the distn. vessel. Cf. *C. A.* **24**, 3931.

Device for dissolving solid materials. GUSTAV STOLZENWALD. Ger. 509,814, Jan. 7, 1930. The device is especially applicable to the *manuf. of* $CuSO_4$. The Cu is placed between two perforated plates and treated with acid. Air or vapor may be admitted.

Rotary drier. WM. A. HARTY and FRANK W. MOORE (to Harmor & Co., Inc.). U. S. 1,787,197, Dec. 30. Structural features.

Rotary drying drum with internal trickle plates. ALBERT GERLACH. Ger. 509,686, July 6, 1927.

Air heater for drying apparatus. MAX FIEDLER. Ger. 508,378, May 2, 1928.

Method and plant for drying and after-heating pulverulent materials. P. ROSIN. Ger. 509,361, Mar. 10, 1929. The materials are conveyed by hot gases.

Multi-stage drying apparatus. WERNER BRUNNSCHWEILER. Ger. 506,267, Feb. 9, 1927. Addn. to 505,017 (*C. A.* **24**, 5544).

Tray-type drying apparatus with lateral access of air. FRITZ HAAS. Ger. 508,465, April 12, 1929.

Channel drier for simultaneously drying goods of different sorts. FRITZ HAAS. Ger. 508,307, Feb. 12, 1928.

Method of operating vacuum drying apparatus including two air pumps and an interposed condenser. JULIUS PINTSCH A.-G. Ger. 508,464, Oct. 24, 1929.

Apparatus for drying filter cakes. PROCTOR & SCHWARTZ, INC. Fr. 681,373, Dec. 28, 1929.

Drying centrifuge with superposed conical covers. FRIED. KRUPP A.-G. Ger. 509,698, Feb. 20, 1926.

Plant for drying, moistening or disinfecting vegetable or fibrous materials, or removing dust therefrom. FRANZ OTT. Ger. 508,308, April 28, 1928. The plant is of the kind in which the materials are conveyed through a treating chamber between two endless bands.

Automatically regulating evaporating plant. ARCA-REGLER A.-G. Ger. 509,926, Mar. 3, 1926. Details are given.

Steam-heated apparatus comprising a number of digesters, evaporators, driers, etc., arranged in parallel. CURT ROSENBLAD. Ger. 508,255, Dec. 23, 1927. Details of the regulation of the steam supply are described.

Dehydrating press. HENRY M. HALLS. U. S. 1,787,821, Jan. 6. Structural features.

Apparatus for disseminating (from aircraft) insecticides or other materials in finely divided or powdered form. JOHN C. SAVAGE. U. S. 1,787,397, Dec. 30. Structural features.

Sedimentation apparatus or thickener. BERT E. DUTTON (to Dorr Co.). U. S. 1,787,437, Jan. 6. Structural features.

Decantation apparatus; water-softening apparatus. J. CASTEELS. Belg. 367,529, March 31, 1930. The liquid to be treated is discharged with a certain speed into the mass of previous deposits, so as to mix it intimately with them and take advantage of their catalyzing and activating action. The liquid is brought into a reservoir placed at a higher level than the decantation tank and is discharged through one or more tubes at the surface of the deposits which have settled at the bottom of the decantation tank.

Apparatus for separating ground solid materials of different degrees of fineness by air currents, etc. HENRY G. LYKKEN. U. S. 1,787,079, Dec. 30. Structural features.

Apparatus for separating coal and slate or other solids of different specific gravities by air currents, vibration and gravity. KENNETH DAVIS (to Peale-Davis Co.). U. S. 1,786,738–9–40, Dec. 30. Structural features and details of operation are described.

Apparatus for grading materials by air currents. THOMAS J. STURTEVANT (to Sturtevant Mill Co.). U. S. 1,788,361, Jan. 6. Structural features.

Apparatus for feeding reagents in ore flotation or other operations. GEO. G. THOMAS (to American Cyanamide Co.). U. S. 1,787,289, Dec. 30. Various details of construction and operation are described.

Fillers for towers, columns, etc. GERTRUD EPPINGER NÉE HELLNER. Ger. 508,062, Sept. 11, 1928. Fillers for washing towers, reaction vessels, fractionating columns, etc., are made of a synthetic resin, with or without a filling material.

Reaction columns. CHEMISCHE FABRIK CURTIUS A.-G. Fr. 688,139, Jan. 13, 1930. In reaction columns such as those used for the *manuf. of* H_2SO_4, a layer of filling material of fine grain is placed above and below a layer of coarser grain.

Fillers for absorption vessels, heat exchangers, etc. STELLAWERK A.-G. VORM. WILISCH & Co. Ger. 509,403, Apr. 30, 1927. Constructional features are described.

Distributing agent. SOC. ANON. POUR L'IND. CHIM. À BÂLE. Ger. 506,838, May 24, 1927. The distn. residue from benzaldehyde rectification is sulfonated, treated with $CaCO_3$ or Na_2CO_3 and the product used as a distributing agent.

Apparatus for making cement and other powdered or granular products. ROBERT POURBAIX. Fr. 687,624, Jan. 3, 1930.

Container for corrosive substances. FRANCIS H. BRAMWELL (to Imperial Chemical Industries, Ltd.). U. S. 1,787,101, Dec. 30. A container suitable for effecting evapns. or reactions is made with spaced walls, an outer wall which may be formed of iron or steel and an inner wall which is perforated and is provided with a non-corrodible lining such as Pb or rubber.

Apparatus for degreasing metallic objects by fat solvents. CHEMISCHES WERK ZÜRICH A.-G. Swiss 140,018, July 5, 1929. Addn. to 134,375 (*C. A.* 24, 1552).

Apparatus for testing constructional material by oscillations of flexure of test-pieces. GERD S. V. HEYDEKAMPF (to Otto Föppl). U. S. 1,787,525, Jan. 6. Structural details.

Device for preventing carrying over of air by fire-quenching gas currents. WALTER KIDDE & Co., INC. Ger. 506,631, July 30, 1924.

Furnace. C. SEMAL. Belg. 368,613, April 30, 1930. Structural features relating to a furnace for the combustion of liquid or gaseous fuels.

Grate furnace, with supplementary burners for pulverulent, liquid or gaseous fuel. FRITZ SIEDLE. Austrian 119,594, May 15, 1930.

Grate furnace, adapted for the alternate use of different fuels. BÜTTNER-WERKE A.-G. (Otto Engler, inventor). Ger. 508,069, Oct. 24, 1928.

Trough-shaped furnace with inclined auxiliary hearth. OTTO SCHENK and ROBERT KIESSLING. Ger. 507,668, Jan. 8, 1928.

Incinerating furnace. FRANCIS C EVANS. Ger. 508,981, June 29, 1929.

Roasting furnace with a broad traveling grate. WALTHER & CIE. A.-G. and MAX BIRKNER. Ger. 506,866, Aug. 15, 1925.

Partitioned rotary-tube furnace for heating solids in a series of stages. CONTINENTALE "L. & N." KOHLENDESTILLATION A.-G. Ger. 508,388, Mar. 23, 1928.

Rotating furnace for drying or baking mineral or organic materials. ALFRED BEAU. Fr. 686,708, Dec. 16, 1929.

Rotary, tiltable furnace heated by means of liquid fuel. "MÉTAF," SOC. ANON. Belg. 369,790, May 31, 1930. The furnace consists of 2 concentric cylinders, the inner one being rotatable about its longitudinal axis while the other one is fixed, and the combination can be tilted about a horizontal transverse axis. The combustion chamber is the space between the 2 cylinders; the burners are placed above the outer cylinder.

Muffle furnace with a generator below the muffle. PHILIPP HERRMANN. Ger. 506,824, June 24, 1927.

Fuel-heated muffle furnace, with supplementary electric heating. ALLGEMEINE ELEKTRIZITÄTS-GES. (Viktor Paschkis, inventor). Ger. 509,288, Feb. 9, 1929.

Furnaces burning powdered fuel. SOC. ANON. DES FOYERS AUTOMATIQUES. Fr. 687,603, Jan. 2, 1930.

Burner for powdered fuel. BABCOCK & WILCOX, LTD. Fr. 688,164, Jan. 13, 1930.

Fuel-dust furnace. ELEKTROWERKE A.-G. (Bernhard Krämer, inventor). Ger. 508,919, Sept. 3, 1927. Details of construction.

Coal-dust furnace. ZEITZER EISENGIESSEREI UND MASCHINENBAU A.-G. Ger. 509,961, Aug. 10, 1928. Details of an upright mixing chamber.

Coal-dust furnaces. ALLGEMEINE ELEKTRIZITÄTS-GES. (Corn. Happersberger and Max Kaplan, inventors). Ger. 509,797, Feb. 26, 1928. Details of a measuring and signaling device for the coal-dust distributor are given.

Burner for coal-dust furnace. KARL HUFSCHMIDT. Ger. 508,590, Feb. 7, 1928. Details of construction.

Coal-dust combustion apparatus for rotary furnace. L. & C. STEINMÜLLER. Ger. 508,238, Mar. 10, 1929.

Burners for heavy fuel. PAUL G. LINKE. Fr. 688,345, Jan. 16, 1930. Means is given for lighting and automatically feeding the burners.

Heavy-oil furnace. CHARLES PERDRISAT. Swiss 140,364, July 10, 1929.

Burner for heavy oil. KINICHI TANIMURA. Fr. 688,169, Jan. 13, 1930.

Regenerative furnace fired with liquid fuel. EDUARD MEZGER. Ger. 508,408, May 28, 1926.

Change-over valve for regenerative furnaces. MAX SCHNURPFEIL. Ger. 508,265, July 13, 1929.

Grating stones for storing heat in regenerative furnaces. WILHELM SCHWIER. Ger. 509,501, May 9, 1926.

Gas or oil burner. WM. A. J. KREAGER. U. S. 1,787,632, Jan. 6.

Furnace-gas burners. LUDOVIC HUPEZ. Fr. 687,453, Dec. 31, 1929.

Gas burner. H. GUHL. Brit. 334,070, March 29, 1929.

Gas-burner safety device for closing the supply valve when the flame is extinguished. JOHN W. MOOMAU (one-half to George W. Strauss). U. S. 1,788,063, Jan. 6.

Time-switch apparatus for gas burners. GUY B. COLLIER. U. S. 1,787,422, Dec. 30. Structural features.

Forwarding the fuel or roasting charge in a multi-stage roasting furnace. AKT.-GES. DANSK SVOVLSYRE- & SUPERPHOSPHATE-FABRIK and KAI WARMING. Ger. 506,-982, May 31, 1929.

Regulating the under-blast of furnaces. CHARLES H. SMOOT. Ger. 509,540, Oct. 9 1927.

Device for supplying additional air in furnace plant. EDUARD WEGMANN. Swiss 137 419, May 3, 1929.

A device for the introduction of air or an air-steam mixture into the combustion zone of a furnace. STELIAN W. WASILIKOTY. Ger. 509,959, Oct. 13, 1927.

Heat recuperator. KOHLENVERADLUNG A.-G. Ger. 508,409, July 10, 1928.

Heat exchanger. MASCHINENFABRIK ING. HANS SIMMON. Austrian 119,576, May 15, 1930. Addn. to 113,190 (*C. A.* **23**, 4109).

Heat-exchange apparatus. ARTHUR E. PEW, JR. (to Sun Oil Co.). U. S. 1,787,086, Dec. 30. Structural features.

Heat-exchange device. CLIFFORD E. SCOTT (to McQuay Radiator Corp.). U. S. 1,788,068, Jan. 6.

Electrical heating apparatus suitable for heating water in tanks. SIMON J. LONERGAN (to Bastian-Morley Co.). U. S. 1,787,450, Jan. 6. Structural features.

Electrical heater for water, dye liquors, etc. F. FOY. Brit. 333,869, Feb. 19, 1929. Structural features.

Electric heater for heating bad-conducting liquids to high temperatures. ALLGEMEINE ELEKTRIZITÄTS-GES. (Victor Paschkis, inventor). Ger. 508,915, Sept. 5, 1928.

Device for electrically heating gases and liquids. I. G. FARBENIND. A.-G. (Emil Fendt and Carl Schörg, inventors). Ger. 507,827, Mar. 16, 1927. The heating elements surround a tube through which the fluid is passed.

Acetylene generator. CHARLES DAVID. Fr. 686,826, Dec. 18, 1929.

High-pressure acetylene generators. EMIL WOLF, APPARATEFABRIK. Ger. 507,563, Oct. 11, 1929. Details of a valve for supplying water to the CaC_2.

Filling mass for high-pressure acetylene containers. AUTOGEN GASACCUMULATOR A.-G. Ger. 509,503, May 11, 1928. Horn meal is used as the filling material. Cf. *C. A.* **24**, 1205.

Thermostat suitable for valve or electric-circuit control, etc. JOHN J. KENNEY. U. S. 1,786,852, Dec. 30. Structural features.

Thermostatic device suitable for oil stoves. GEO. CRAIG. U. S. 1,787,146, Dec. 30. Structural features.

Thermostatic mixing valve for hot and cold water, etc. JAMES J. LAWLER. U. S. 1,788,112, Jan. 6. Structural features.

Thermostatic fan control for engine-cooling systems, etc. WALTER J. HUGHES. U. S. 1,787,041, Dec. 30. Structural features.

2—GENERAL AND PHYSICAL CHEMISTRY

FREDERICK L. BROWNE

Arnold Schmidt. A. HOENIG. *Z ges. Schiess- Sprengstoffw.* **25**, 403–4(1930).—Obituary. C. G. STORM

Franz Wald. J. BABOROVSKY. *Chem.-Ztg.* **54**, 905–6(1930).—Obituary. E. H

Balancing chemical equations. J. R. STONE. *Chemist-Analyst* **20**, No. 1, 11–4 (1931).—The method of balancing equations of oxidation and reduction used at Hiram College is explained. It is essentially that proposed by O. C. Johnson in 1889. W. T. H.

The course of climbing crystals. HANS ERLENMEYER. *Helv. Chim. Acta* **13**, 1006–8(1930).—The climbing of KCl crystals was investigated. Illustrations are given of needle or hair crystals up to 1 cm. in length which under the microscope are shown to have a capillary hollow space. Other crystal forms are also illustrated, including the customary cubic crystals with edge length up to 7.5 mm. The existence of the capillary hollow space is a possible explanation for the creeping of these crystals. M. McM.

Application of the ultra-short-wave method to the measurement of small capacities and dielectric constants. D. V. GOGATE AND D. S. KOTHARI. *Indian J. Physics* **5**, 417–28(1930); cf. *C. A.* **24**, 547.—The exptl. arrangement and method of calcn. of results are given in detail. The method is specially suited for accurate detn. of the temp. coeff. ARTHUR FLEISCHER

The dielectric constant of liquids. III. Aqueous solutions of some organic compounds. G. DEVOTO. *Gazz. chim. ital.* **60**, 520–30(1930); cf. *C. A.* **24**, 4194.—A further study is made of the influence of substances with high elec. moment on the dielec. const., ϵ, of solvents, cf. Blüh, *C. A.* **18**, 618; Fürth, *C. A.* **17**, 1579; Walden and Werner, *C. A.* **22**, 1718; Hedestrand, *C. A.* **22**, 3571; Thiel and Horn, *C. A.* **23**, 1027. Substituents in amino acids, especially NH_2, were studied. The app. was that of D. and Stevenson, *C. A.* **24**, 3934, which measures ϵ independently of cond. At 25° $d\epsilon/dc$ was found: for BzOH —67, $PhCONH_2$ —4.1, $(NH_2)_2CO$ 3.4, $(NH_2)_2CS$ 4.0, PhOH —6.6, $PhNH_2$ —7.6, PhNHAc —4, MeCN —1.7, $NH_2CH_2CO_2H$ 26.4, $PhNHCH_2CO_2H$ 32, $NH_2CHMeCO_2H$ 27, $NH_2C(CH_2CO_2H)HCO_2H$ 27, $NH_2C(CH_2CONH_2)HCO_2H$ 28. The CO_2H group depresses ϵ distinctly but OH, NH_2, CN and $CONH_2$ do not exert

specific effects. The close agreement of $d\epsilon/dc$ for the 5 amino acids is readily explained. From the acid and basic dissocn. consts. of aliphatic amino acids Bjerrum (*C. A.* **17**, 2379) concluded that the equil. $NH_2CH_2CO_2H \longrightarrow NH_3{}^+CH_2CO_2{}^-$ is displaced completely to the right. If there are the same no. of dipoles in the soln. and if the elec. charge and distance between poles are equal, the elec. moment and $d\epsilon/dc$ are approx. equal. The specific structure of the acid is then of secondary influence only because the elec. moment of the electron charge is 10 to 20 times the moment estd. for a mol. of the $NH_2CH_2CO_2H$ type. For $NH_3{}^+CH_2CO_2{}^-$ μ is approx. 30×10^{-18} while for $NH_2CH_2CO_2H$ $\mu < 3 \times 10^{-18}$, if the distance between 2 poles is assumed to be 6 A. U. Substituents alter these values by 1 or 2×10^{-18}. When the polar distance can be detd. accurately, calcn. of μ will define experimentally the relation between elec. moment and ϵ in a polar solvent. Hedestrand showed that the dielec. coeffs. of α- and β-alanine are 22 and 40.5, resp., the difference representing the effect of increasing the dipole arm by the length of the CH_2 group. If the 18 units corresponding to CH_2 groups are subtracted from the dielec. coeff. of α-alanine, $d\epsilon/dc$ is 3.5 to 4.0, which corresponds to an acid $NH_3{}^+CO_2{}^-$. This is carbamic acid in its polar form. Since the coeff. for urea is 3.5 to 4.0, urea in H_2O has the form $NH_3{}^+C(:NH)O^-$. Similarly thiourea is $NH_3{}^+C(:NH)S^-$. The coeff. of aspartic acid is of the same order of magnitude as the coeffs. for monobasic amino acids. The dissocn. consts. of the 2 carboxyl H atoms are distinctly different and the H atom farther from the NH_2 group is the more dissocd. C. C. DAVIS

The dielectric polarization of liquid mixtures. L. M. DAS AND S. C. ROY. *Indian J. Physics* **5**, 441–62(1930).—The moments of CCl_4-C_6H_5Cl and CCl_4-C_6H_5Br mixts. were detd. from 10° to 60°. The ds. were detd. in a special pycnometer. The curves are regular and the substances show the simplest type of assocn., increasing with concn. and temp. The results agree with those of Hojendahl and Smyth and Morgan. ARTHUR FLEISCHER

Change of the dielectric constant of ethyl ether with temperature. J. MAZUR. *Nature* **126**, 649(1930).—The dielec. const. of Et_2O, measured with high-frequency oscillations, increases from 4.18 at 30.6° to 12.39 at —105.4°. It then decreases very rapidly, and shows a distinct change at the m. p. Below —118.9° it has a nearly const. value of 2.04. ARTHUR FLEISCHER

Two modifications of liquid ethyl ether. M. WOLFKE AND J. MAZUR. *Nature* **126**, 684–5(1930); cf. preceding abstr.—Heating curves show that a change in liquid Et_2O occurs at —105.4°. This is the second case of liquid-phase modification observed (cf. Keesom and Wolfke, *C. A.* **22**, 1070). ARTHUR FLEISCHER

Polar characteristics of the COOH group in several fatty acids and in benzoic acid. (Dipole moment, association, solubility and electrochemical behavior.) GUNTHER BRIEGLEB. *Z. physik. Chem.*, Abt. B, **10**, 205–37(1930).—Dielec. measurements were made on C_6H_6 solns. of acetic, formic, propionic, butyric, isovaleric and benzoic acids at various concns. The dipole moments were calcd. on the basis of a double mol. in each case because these substances are strongly assocd. in C_6H_6. Dipole moments are HCOOH, 1.45×10^{-18}; AcOH 1.04; PrOH 0.88; BuOH, 0.93; isovaleric acid, 0.89; BzOH, 0.56. The effect of H_2O on the dielec. measurements was studied also. The soly. of H_2O in the solns. was detd. WILLIAM E. VAUGHAN

The magneto-optical dispersion of organic liquids. I. The magneto-optical dispersion of normal butyl alcohol, isobutyl alcohol and propionic acid. EMLYN STEPHENS AND E. J. EVANS. *Phil. Mag.* [7], **10**, 759–85(1930); cf. *C. A.* **21**, 2095; **22**, 2102.—The indices of refraction and dispersion were measured at 13° in visible and ultra-violet light. For BuOH, n varied from 1.400 at 0.6678μ to 1.441 at 0.2805μ, for iso-BuOH 1.396 at 0.6678μ to 1.438 at 0.2766μ and 1.387 at 0.6678μ to 1.419 at 0.3008μ. The results are expressed by the equation $n\delta\lambda^2 = K[\lambda^2/(\lambda^2 - \lambda_1^2)]^2$, where K is a const., δ is Verdet's const., λ is the wave length of the light used and λ_1 is the wave length corresponding to the free period of the resonators. Values of λ_1 and K are, resp., 0.1149μ and 0.005516 for BuOH, 0.1150μ and 0.00569 for iso-BuOH and 0.1051μ and 0.00500 for propionic acid. The magneto-optical dispersion of each liquid is caused by one band. If natural dispersion is due to the same band the equation reduces to $n^2 - 1 = b_0 + b_1/(\lambda^2 - \lambda_1^2)$, which is experimentally verified. b_0 and $b_1 \times 10^{10}$ are, resp., 0.9396 and 0.899 for BuOH, 0.9293 and 0.892 for iso-BuOH, and 0.9041 and 0.871 for propionic acid. An equation is derived from Larmor's theory for calcg. e/m. For BuOH e/m is 1.07×10^7, for iso-BuOH 1.11×10^7, and for propionic acid 1.00×10^7 e. m. u. K and λ_1 increase as the mol. wt. of the alc. increases. The position of the absorption band is displaced about 0.0016μ toward the red by the addn. of a CH_2 group. A. T.

The mixing of gases for reaction. T. H. CHILTON AND R. P. GENEREAUX. *Trans. Am. Inst. Chem. Eng.*, New Orleans Meeting (Advance copy) 1930, 19 pp.; *Chem. Met. Eng.*

37, 755-8(1930).—In technical gas reactions thorough mixing of the gases before reaction is usually essential for best efficiency. Various methods of mixing gases were studied. The exptl. method consisted in observing the flow of 2 streams of gas (generally air) in glass tubes, with smoke added to make one stream visible. The quality of mixing was judged by the distance downstream from the point of entrance at which the smoke appeared to be completely diffused. Mixing was considered good, for instance, when apparently completed within two or three diameters, and poor when it was evidently incomplete in this distance. Of course, after passage through a sufficient length, 15 or 20 diameters, the smoke appeared to be diffused in all cases. With an ordinary T-connection good mixing can be obtained by making the mass velocity of the added stream 2 to 3 times that in the main stream. Other directions or positions across the diam. have no advantage over this simpler method. C. L. MANTELL

The specific heats of gases at high pressures. II. Method and apparatus at high temperatures. NORMAN W. KRASE AND B. H. MACKEY. *J. Am. Chem. Soc.* 52, 5111-4(1930); cf. *C. A.* 24, 1554.—A const.-temp., adiabatic, flow *calorimeter* for measuring sp. heats of gases at high pressures and temps. is described. Typical sp. heat data for N at 500 atms. between 30° and 150° are given. P. H. EMMETT

The temperature variation of the viscosity of liquids and its theoretical significance. M. P VENKATARAMA IYER *Indian J. Physics* 5, 371-83(1930).—Raman's formula, $\eta = Ae^{B/T}$, for the change of the coeff of viscosity of liquids with temp. held for 87 diverse liquids with few exceptions The const. A is comparable with the viscosity of the vapor state and B is of the same order of magnitude as W/R, where W is the mol latent heat of fusion. The relationship between the consts. and chem. constitution is discussed. H. W. WALKER

Viscosity data in graphical form. RAYMOND P GENEREAUX. *Ind. Eng. Chem.* 22, 1382-5(1930).—Plots are shown whereby viscosities of liquids and gases may be read off at any desired temp. MALCOLM DOLE

Phenomena of adhesion on spherical objects. LOUIS AND SYKORA. *Ann combustibles liquides* 5, 565-72(1930).—The amt. of oil adhering to a spherical object increases with the viscosity and the d of the oil. For various materials the degree of change is not the same There are factors other than the phys. ones of the liquid and the solid concerned in the phenomena of adhesion. E. SCHOTT

Natural optical activity of liquids. HARALD VOLKMANN. *Z. physik. Chem.*, Abt. B, 10, 161-88(1930).—The dependence of rotation upon the refractive index as required by the Born-Gans theory of natural optical activity is confirmed by measurements made on solns. of *d*-limonene The solvents were common org. liquids. Expts were made with materials showing deviations from theory (menthone and camphor) and the discrepancies are attributed to forces acting between the mols., which are polar WILLIAM E. VAUGHAN

Connection between the melting curve and the composition of a binary mixture. K. POSTHUMUS. *Rec. trav. chim.* 49, 885-914(1930).—A theoretical treatment of the question of the mol. compn. of liquid mixts The original constituents of a binary mixt are assumed to combine to form a single new molecule, and the problem is developed from the standpoint of 3 component mixts. J. H. REDDY

Binary systems. II. J. H KOERS AND F. E. C. SCHEFFER. *Rec. trav. chim* 49, 915-54(1930); cf. *C. A.* 24, 4436.—Solid-liquid-gas equilibria, in which the solid contains 2 components are discussed in respect to (1) the change of free energy with the mole fraction, (2) direction of the curves and their significant points, (3) quadruple points. J. H. REDDY

Molecular and atomic volumes. XXIX. Three principles in the volume relationships of solid materials. WILHELM BILTZ. *Z. anorg. allgem Chem.* 193, 321-50 (1930).—A review of B.'s previous work with bibliography. Three principles are enunciated and illustrated: the principle of additivity, that of the influence of arrangement and method of combination on vol., and that of equality of vols. Two appendices treat of the existence of polymorphic modifications, and of the relation between atomic vol. and atomic structure. **XXX. The volume of crystallized nitrogen oxides at low temperatures.** WILHELM BILTZ, WERNER FISCHER AND ELISABETH WÜNNENBERG *Ibid* 351-66.—Ds. were detd. by a gas-volumetric method for N_2O, NO, N_2O_3 and N_2O_4, for N_2O_5, a pycnometer with liquid O_2 was used. The following values were obtained for d_{-195} and mol. vol., resp.: N_2O 1.604, 27.4; NO 1.566, 19.3; N_2O_3 1.782, 42.7, N_2O_4 1.979, 46.5; N_2O_5 2.175, 49.6. T. H. CHILTON

The vapor pressure of lithium. A. BOGROS. *Compt. rend.* 191, 800-1(1930); cf. *C. A.* 24, 5552.—The vapor pressure of Li was measured by the method of *C. A.* 24, 3708 and found to be 1.3, 2.2 and 3 mm. at 459°, 470° and 480°, resp. The following for-

mula holds between 450° and 575°: $\log p_{mm.} = -(6173/T) + 5.44$. The sepn. of two *isotopes* of Li is considered. M. McMAHON

Optical constants of manganese distilled in vacuum. J. B. NATHANSON. *J. Optical Soc. Am.* **20**, 593–6(1930).—A mirror made of Mn distd. *in vacuo* was used. The Mn was approx. 99.9% pure. The refractive index and the coeff. of absorption were detd. for wave lengths 4600 to 6800 A. U. From these the reflecting power was calcd. WILLIAM E. VAUGHAN

Freezing and flow points for glycerol, Prestone, denatured alcohol and methanol. J. C. OLSEN, AUSTIN S. BRUNJES AND J. W. OLSEN. *Ind. Eng. Chem.* **22**, 1315–7 (1930); cf. *C. A.* **20**, 96.—Aq. solns. having the same compn. by vol. give f. ps. in the ascending order MeOH, Prestone, denatured EtOH, glycerol (U. S. P.) and 60% glycerol. The f. p. curves for denatured EtOH and Prestone are very nearly alike up to a compn. of 40% by vol. The temp. at which a mixt. will still flow through an orifice 0.25 in. in diam. when crystals are present is usually only a few degrees lower than the f. p. of the corresponding liquid. CORNELIA T. SNELL

Activation energy of adsorption processes. HUGH S. TAYLOR. *J. Am. Chem. Soc.* 52, 5298–9(1930).—Preliminary statement. C. J. WEST

Catalysis and sorption. ERWIN SAUTER. *Kolloid-Z.* **49**, 450–8(1929).—A review; cf. *C. A.* **25**, 246. A. FLEISCHER

Adsorption from solution by ash-free adsorbent charcoal. VI. Adsorption of invertase. ELROY J. MILLER AND SELMA L. BANDEMAR. *J. Phys. Chem.* **34**, 2666–92 (1930); cf. *C. A.* **21**, 3147.—Samples of invertase from a com. soln. and from one specially prepd. (Hudson's method) were treated with purified blood charcoal. This was next boiled 1 hr. with sucrose soln. at p_H 4.0–4.2. The extent of inversion was detd. by the Schaffer-Hartmann technic. Com. invertase was almost completely adsorbed and 75–100% inactivated. The purified material reacted differently because of its lower acidity. Samples tested at various times during 2.5 years gave similar results but thereafter deterioration was rapid, perhaps because of increase in yeast gum. Gum arabic had the same effect on freshly prepd. invertase. Since this material, as usually prepd., is colloidal, the physical conditions during prepn. must be rigidly controlled. Many seemingly contradictory reports can be reconciled on the basis of adsorbed acids, alk. impurities, etc., in the charcoal. B. A. SOULE

The sorption of water vapor at low pressure by activated charcoals. I. A. J. ALLMAND AND R. B. KING. *Proc. Roy. Soc.* (London) **A130**, 210–7(1930).—The adsorption of H_2O vapor at 25° was measured for 6 specimens of activated charcoal at pressures between 0.1 and 0.001 mm. The final isotherms apparently were reversible. Two of the samples exhibited apparent satn. at about 0.02 mm. The value for the heat of adsorption of H_2O vapor on one sample of the charcoal as calcd. approx. from adsorption data taken at several temps. increased with decreasing amt. of material adsorbed, and was about 17,400 cals. per mol. for the adsorption of 3.28 mg. of water vapor per g. of charcoal. P. H. EMMETT

The sorption of carbon tetrachloride at low pressures by activated charcoals. IV. A. J. ALLMAND AND A. PUTTICK. *Proc. Roy. Soc.* (London) **A130**, 197–209(1930); cf. *C. A.* **25**, 244.—Increase in the adsorptive capacity of charcoal by prevacuation apparently is caused by removal of adsorbed O_2 rather than by increase in the total adsorptive surface of the charcoal. CCl_4 charged at a pressure of 1 mm. cleans up O adsorbed on chemically activated charcoal. Isotherms for the adsorption of CCl_4 on charcoal appear to be discontinuous. P. H. EMMETT

The swelling of charcoal. I. Preliminary experiments with water vapor, carbon dioxide, ammonia and sulfur dioxide. D. H. BANGHAM AND NAZIM FAKHOURY. *Proc. Roy. Soc.* (London) **A130**, 81–9(1930).—The linear expansion of a charcoal rod was measured simultaneously with the quantity of gas adsorbed by it. The linear expansion, x, is related to the amt. of gas adsorbed by the equation $x = ks/(S - s)$, where k and S are consts. and s is wt. of gas taken up per unit wt. of absorbent. The values of the latter const. for the four gases examd. represent nearly equal vols. of the normal liquids. The expansion caused by the adsorption of a given quantity of gas increases with temp. The expansion is represented as resulting from the pressure exerted by the adsorbed mols. at sharp reëntrant angles in the surface of the adsorbent. P. H. EMMETT

Surface tension of soap solutions and its relation to the thickness of adsorbed films. RONALD BULKLEY AND F. G. BENEDICT. *Bur. Standards J. Research* **5**, 951–6(1930).—The surface tension of solns. of Na oleate, palmitate and stearate when measured in the absence of CO_2 show no sharp min. as reported by Wilson and Ries (*C. A.* **18**, 924), but show a gradual decrease in value with time. This makes it unnecessary to adopt the

conclusion of Wilson and Ries that the surface of a soap soln. is a film with the properties of a plastic solid. MALCOLM DOLE

Wetting tension. WALTER HALLER. *Kolloid-Z.* **53**, 247–55(1930).—A review. A. FLEISCHER

The generality of the colloidal state. P. P. VON WEIMARN. *Kolloid-Z.* **53**, 246–7 (1930).—Polemical with Freundlich, (*C. A.* **24**, 3703). V. was the first to recognize the generality of the colloidal state. ARTHUR FLEISCHER

The dynamics of molecular movement. FRANZ RUSCH. *Z. physik. chem. Unterricht* **42**, 97–105(1929).—This is a math. paper dealing with the pressure law and the energy of ideal gases, dynamics of Brownian movement and the rotation of colloidal particles due to mol. impacts. M. BEBER

The stabilizing action of adsorption layers of surface-active substances on disperse systems. II. The stability of bubbles and drops at interfaces. P. REHBINDER AND E. WENSTRÖM. *Kolloid-Z.* **53**, 145–58(1930); cf. *C. A.* **24**, 2932.—The stability of bubbles of air for the interface soln.-gas was measured at 20°, in aq. AmOH, Na oleate and saponin solns. of varying concns. and with varying ages of the surface. The stability of bubbles was measured at dye soln.-Hg interface, saponin soln.-Hg, aq. saponin-toluene and stearic acid soln. in toluene-0.1 *N* NaOH. Foam stability in aq. saponin and AmOH solns. was measured. The bubbles showed a max. stability before the max. satn. of the adsorption layer occurred. The concn. at the max. is characteristic of the stabilizer and corresponds for different interfaces. This is true for stabilizers, such as saponin, which form solid surface films. ARTHUR FLEISCHER

The adherence capacity and sediment volume of microscopic particles. A. v. BUZÁGH. *Kolloidchem. Beihefte* **32**, 114–42(1930); cf. *C. A.* **24**, 3413, 4684.—Sediment vols. of homodispersed quartz of various-sized particles suspended in pure H_2O and in salt solns. show that in pure H_2O the vol. is independent of particle size but that in electrolytes the sediment vol. is greatly affected and increases with decreasing particle size. With large particles (radius > 100μ) the sediment vol. is no longer affected by solns. of electrolytes. The relation of sediment vol. to particle size is more pronounced the greater the adherence capacity. Alcs. of the aliphatic series increase the adherence capacity of quartz particles with increasing concn. In Et_2O, $CHCl_3$, CCl_4, C_6H_6 and toluene the sediment vols. of quartz particles are greater the greater the adherence capacity. The sine of the *break angle* of the sediment of quartz particles (16μ) in gelatin soln. increases up to a gelatin concn. of 0.01% and then decreases to a const. value at 0.025–0.050%. The protective action of lyophilic colloids is interpreted in the light of these expts. L. T. FAIRHALL

Measurement of polarization of the Tyndall beam of aqueous suspensions as an aid in determining particle size. THEODORE HATCH AND SARAH P. CHOATE. *J. Franklin Inst.* **210**, 793–804(1930).—It was previously shown (*C. A.* **23**, 3614) that the size distribution in particulate matter can be defined in terms of two statistical parameters: (1) the geometric mean diam. M and (2) the standard geometric deviation σ. The degree of polarization of the light scattered by aq. suspensions of finely divided quartz, granite or calcite (diam. 0.001–0.05 mm.) is a function of the arithmetic mean diam. and hence also of M and σ. This expression can be combined with that for the Tyndall beam strength (previously shown to be a function of M and σ) to det. both M and σ. The av. deviation of the calcd. from the experimentally detd. values of M and σ is about 10% for the above suspensions. OSCAR T. QUIMBY

Cataphoretic and nephelometric measurements on kaolin suspensions. ADOLF REIFENBERG. *Kolloid-Z.* **53**, 162–70(1930); cf. *C. A.* **23**, 2129.—The cataphoretic velocity and the amt. of kaolin transported to the anode space were measured for a kaolin suspension with particles 3.2μ *size*, in the presence of NH_4OH, $Ca(OH)_2$, NaOH and Na_2HPO_4. The concn. change was carried out nephelometrically by comparison with known suspensions. The greatest amt. was transported at the highest cataphoretic velocity at an optimum concn. of the electrolyte. The largest amts. are transported in the NaOH soln. ARTHUR FLEISCHER

Physicochemical properties of acid clay. V. Decolorization of petroleums by adsorption (1), (2), (3). KYÜHEI KOBAYASHI AND KEN-ICHI YAMAMATO. *J. Soc. Chem. Ind. Japan* **33**, Suppl. binding, No. 11, 428, 429–30, 430–1(1930); cf. *C. A.* **24**, 2352–3.—The Freundlich adsorption formula $x/m = \alpha C^{1/n}$, in which x = quantity of dissolved substance adsorbed, m = quantity of adsorbent, and α and n are consts., applies during the decolorizing of various petroleum distillates with Japanese acid clay. Decolorization takes place mainly by adsorption. The Freundlich formula applies also to the action of fuller's earth, Florida earth, German activated clay, SiO_2 gel, and Norit C, and holds true with C_6H_6 soln. of oil yellow and kerosene soln. of resins extd. from

machine oil. The orders of decolorizing action of acid clays, etc., upon different series of crude petroleums, their distillates, etc., are parallel to each other. Decolorizing powers of acid clays upon H_2O soln. of methylene blue or C_6H_6 or kerosene soln. of oil-sol. dyes, are not parallel to the case of petroleum distillates. An asphalt-kerosene soln. is adopted for evaluating acid clay. Decolorizing power of acid clay on petroleum is increased slightly by temp. rise from 15–95°. Acid clay dried at 125–50° has the greatest decolorizing action on petroleum. E. M. SYMMES

The reaction velocity in the formation of colloidal gold solutions by reduction with *d*-glucose and *d*-galactose. AUGUST L. BERNOULLI, MAX SCHENK AND RAHEL PINCZUK. *Helv. Chim. Acta* **13**, 1236–54(1930).—In the reduction of $HAuCl_4$ solns. by *d*-glucose and *d*-galactose, the rotation decreases rapidly with the time until an equil. is reached, where the rotation has a limiting value exactly proportional to the initial concn. of the sugar The sp. rotation for an equil. can be calcd. from Biot's law. The end value of the rotation and also the state of equil. are independent of the initial concn. of the $HAuCl_4$. Both sugars give similar results but *d*-galactose reduces more readily than glucose. The reaction is of the first order. The velocities $K_1 = (1/t)\ln[\varphi_0 - \varphi_\infty)/(\varphi - \varphi_\infty)] = 1.8356$ for galactose and 0.3191 for glucose. MARY E. LEAR

A study of the influence of hydrolysis temperature on some properties of colloidal ferric oxide. III. Viscosity and hydration. GILBERT H. AYRES AND C. HARVEY SORUM. *J. Phys. Chem.* **34**, 2826–40(1930); cf. *C. A.* **25**, 450.—Viscosity in sols prepd. at various temps. decreases with increasing temp. of prepn. Samples of stock sols heated to various temps. show lower viscosity and flocculation values, the higher the temp. to which they have been heated. Complete pptn. is effected at temps. of 170° to 190°. Both the relative viscosity and the flocculation value of the sols decrease on adding alc. or acetone. Since viscosity measurements indicate the degree of hydration and since the viscosity and flocculation value vary in the same manner with changes in temp. and with addn. of dehydrating agents, it is concluded that hydration is a factor in the stability of the Fe_2O_3 sols studied. **IV. Variation of density and relative viscosity with sol concentration.** *Ibid* **35**, 412–6(1931).—The d. of Fe_2O_3 sols varies linearly with the concn. of the dispersed phase and is not influenced by the temp. of prepn. of the sol. The viscosity of these sols increases with their concn. P. H. EMMETT

Fact and theory in colloid filtration. J. A. PICKARD. *Chem. Age* (London) **23**, 376–7(1930). E. H.

Amphoteric hydrated oxides, their aqueous solutions and crystalline compounds. X. The hydrolysis process and aggregation products in aqueous ferric salt solutions. GERHART JANDER AND AUGUST WINKEL. *Z. anorg. allgem. Chem.* **193**, 1–28(1930); cf. *C. A.* **24**, 1810, 3941, 4689.—Measurements were made of the diffusibility of solns. of $Fe(ClO_4)_3$ contg. $HClO_4$ and $NaClO_4$. The theory presented in the earlier paper is amplified. The diffusion coeff. is detd. for various H-ion concns. The hydrolysis gives rise to a series of intermediate products between monomol. $Fe(ClO_4)_3$ and polymol. $[Fe(OH)_3]_n$. The optical absorption of the ferric salt solns. at various H-ion concns. was detd. for wave lengths 2400 to 6000 A. U. In *N* $HClO_4$ the equil. mixt. contains $Fe(ClO_4)_3$, $Fe(ClO_4)_2OH$ and $(ClO_4)_2Fe.O.Fe(ClO_4)_2$. Other complex products are discussed. WILLIAM E. VAUGHAN

The precipitation potential of arsenic sulfide hydrosols in the presence of an excess of arsenic trioxide. SACHINDRA N. MUKHERJI. *Kolloid-Z.* **53**, 159–62(1930).—The cataphoretic velocity of As_2S_3 sols to which varying quantities of As_2O_3 were added was measured at 35° with added KCl and $BaCl_2$. In the absence of electrolyte the velocity decreases with increase in As_2O_3 content; in the presence of KCl the curve shows a max.; in the presence of $BaCl_2$ there is a decrease in the velocity with increasing $BaCl_2$ concn. ARTHUR FLEISCHER

The scattering of light in aqueous sodium silicate solutions. L. L. BURGESS AND K. KRISHNAMURTI. *Trans. Faraday Soc.* **26**, 574–7(1930); cf. *C. A.* **24**, 1578.—Technical Na silicate solns. with SiO_2/Na_2O ratios of 2:1 to 3.95:1 were dild. to 2 *M* with respect to SiO_2 and filtered to remove suspended matter. The light scattering of the 2.5:1 soln. was very slight, and increased with SiO_2 increase, at first, slowly and then very rapidly, indicating formation of colloidal complexes at the higher SiO_2/Na_2O ratios. ARTHUR FLEISCHER

Colloid-chemical studies on dyestuff sols. I. Sol formation of the Congo acids by washing peptization. R. TANAKA. *Kolloid-Z.* **53**, 200–5(1930); cf. *C. A.* **24**, 3649.—To prep. a concd. Congo-red sol, ppt. 1 l. of 0.5% Congo-red soln. by adding 250 cc. 0.1 *N* HNO_3 with rapid stirring. After several days' storage, decant the clear soln. and replace with water. Repeat this procedure till a strong blue color appears. Then dialyze the soln. for 10 days. Filter paper should be avoided because of the

introduction of small quantities of alkali, which cause a change in color. Cond. measurements at 25° show that peptization occurs when the cond. of the wash water reaches 0.000316 mho. Filtration velocity and viscosity measurements show that a swelling occurs before peptization. ARTHUR FLEISCHER

The observation of cataphoresis in nitrocellulose solutions. E. A. LANTZ AND O. A. PICKETT. *Ind. Eng. Chem.* 22, 1309–11(1930).—Cataphoresis was observed in nitrocellulose solns. by the method of Humphrey and Jane (*C. A.* 21, 846). The nitrocellulose was neg. charged. This charge was greatest in $(CH_3)_2CO$ and least in AcOAm. It decreased as the soln. aged, becoming negligible after a period of several weeks. CORNELIA T. SNELL

Solutions of gallic acid and tannin; influence of colloids on the crystal form and the solubility of gallic acid. L. E. STEENHUISEN. *Pharm. Weekblad* 67, 1269–81(1930).—Colloids such as tannin, gelatin, saponin and caramel materially increase the soly. of gallic acid in H_2O. When crystd. from such solns., crystals of gallic acid differ in form from those that sep. from pure solns. A modification of Flech's $Cu(OAc)_2$ method is proposed for volumetric *detn. of tannin* and *gallic acid*. A. W. DOX

Absorption of water by gelatin. IV. The influence of temperature. DOROTHY J. LLOYD. *Biochem. J.* 24, 1460–71(1930); cf. *C. A.* 23, 5082.—An examn. of the slope of the curves of swelling of gelatin, in the presence of various electrolytes and over a range of temp. from 0° to 25° shows that in any investigation of gelatin as a colloidal jelly only exptl. data obtained at lower temps. is of value. **V. Influence of calcium hydroxide.** WINIFRED B. PLEASS. *Ibid* 1472–8.—Gelatin swells more at higher temps. than at low. The p_H value at which max. swelling occurs depends on the temp. At 0° the max. occurs at p_H 11.5 and at 25° at p_H 10.5. The magnitude of swelling in solns. of $Ca(OH)_2$ is always less than that of the swelling in solns. of NaOH at the same temp. and p_H. BENJAMIN HARROW

General regularities of gelatin swelling in electrolyte solutions. K. RUDSIT. *Kolloid-Z.* 53, 205–18(1930).—In HCl and NaOH solns. 2 minima are found at p_H 4.7 and 8.0. Very close to the neutral point, a max. is found. This max. represents the p_H at which the swelling effects of the H and OH ions are equal, and is named the *isoergic point*. Swelling increases with temp., the effect being greater in HCl than in NaOH solns. because of the soly. of gelatin in NaOH with increasing temp. Swelling of gelatin in NaCl solns. at 0° is very similar to the acid-alkali behavior. In very acid or alk. solns. NaCl decreases the amt. of swelling. Comparison at like p_H shows that a salt may swell one colloid and shrink another. The results for various gelatins were independent of the p_H. Many measurements were made in the presence of LiCl, KCl and $CaCl_2$. ARTHUR FLEISCHER

X-ray studies of the structure of gelatin micelles. K. HERRMANN, O. GERNGROSS AND W. ABITZ. *Z. physik. Chem.*, Abt. B, 10, 371–94(1930).—Earlier work on substances of complex mol. structure, particularly gelatin, by x-ray methods is briefly reviewed. The work here reported is a study of the ring diffraction patterns obtained by the Debye-Scherrer method. The diffraction pattern of dry gelatin contains two more rings than were formerly known, making six in all. The diffraction angles and corresponding values of d, calcd. according to the Bragg equation, are given. The ring pattern for H_2O-soaked gelatin differs considerably from that given by dry gelatin and varies with the content of H_2O. Four rings were observed for which the values of d are given corresponding to the concn. of H_2O. Finally the effect of stretching films of gelatin was investigated. A complex diffraction pattern results in which part of the rings are replaced by symmetrically placed spots. The structural form for gelatin was worked out on the basis of the x-ray data, corresponding to that required by Meyer and Mark for other substances of complex mol. constitution. C. J. HUMPHREYS

The constitution of the soluble protein substances as reversible, dissociable component-systems. S. P. L. SØRENSEN. *Kolloid-Z.* 53, 170–99(1930); cf. *C. A.* 25, 245.—The prepn., soly. in $(NH_4)_2SO_4$ solns., and fractionation of egg albumin, horse serum albumin, horse serum globulin, casein and wheat gliadin are reviewed. The dissocn. tendency is defined by $\Delta s/(\Delta Z s_1)$, where s is the soly., Z is the amt. of protein and s_1 the soly. when 1 g. of protein is in equil. with a soln. contg. 100 g. of H_2O. The dissocn. tendency of egg albumin is very slight, while that of horse serum globulin is the highest yet found. Soly. expts. on sol. proteins are in reality distribution expts. between an aq. and a solid phase. ARTHUR FLEISCHER

The molecular constitution of certain intermetallic solid solutions at temperatures below that of the eutectic examined thermodynamically. F. H. JEFFERY. *Trans Faraday Soc.* 26, 587–8(1930); cf. *C. A.* 24, 2660. ARTHUR FLEISCHER

The molecular constitution of the solid solution of tin in lead at temperatures below

that of the eutectic. F. H. JEFFERY. *Trans. Faraday Soc.* 26, 588–90(1930); cf. preceding abstract.—The equation previously developed can be applied up to a content of 15% Sn as a dil. soln. Application to the data obtained by the elec. resistance method indicates that the Sn and Pb are present as monatomic mols. The fact that the equation can be applied at temps. from 180° to 130° is inconsistent with the assumption of an isothermal at 149–50° in the field investigated. ARTHUR FLEISCHER

Solid solutions, isomorphism and symmorphism among the oxides of bivalent metals. III. The systems: MnO–CdO and MnO–MgO. L. PASSERINI. *Gazz. chim. ital.* 60, 535–43(1930); cf. *C. A.* 23, 4124.—The possibility of forming solid solns. depends upon the difference between the diams. of the metal ions. For the other systems of bivalent-metal oxides already examd., complete soly. is found up to differences of approx. 13%, whereas for differences of 14–25% the soly. is only partial, and for greater differences no solid solns. are formed. For oxides that form partial solns., the quantity dissolved increases with decrease in the difference between the diams. of the metal ions. A variation was also found in the quantity of each of the 2 oxides dissolved to form the system, according to the ionic diams. of the metals, the oxide with the metal of greater diam. dissolving greater quantities than the other oxide. To confirm this generalization and to establish the limits of soly., the systems MnO–CdO and MnO–MgO were studied with x-rays. The relatively great difference in the atomic diams. of the component oxides suggested that the systems would show partial soly. With the system MnO–CdO, products obtained at higher temps., at which the vapor pressure of CdO facilitates diffusion, also were investigated. With both MnO–CdO and MnO–MgO, the solid solns. were prepd. by calcining at about 350° (and also at 700° for MnO–CdO) the solid solns. of the hydroxides obtained by simultaneous pptn. with KOH from solns. of the metal chlorides. For MnO–CdO, the products obtained at 350° with 10, 20, 35, 50, 65, 75 and 90% MnO were examd. In this case there is partial miscibility, and the MnO dissolves a max. of 21% of CdO and the CdO a max. of 26% of MnO. Heating the products with 25, 60, 65 and 75% of MnO to 700° resulted in an increase in the solvent power of the CdO, which became capable of dissolving 53% of MnO at this temp. For the system MnO–MgO, the products with 25, 50 and 75% of MnO were examd. Here, too, partial soly. was found, and the 2 limiting solid solns. contained 31% of MgO in MnO and 26% of MnO in MgO, resp. C. C. DAVIS

Solid solutions, isomorphism and symmorphism among oxides of tervalent metals. The systems: Al_2O_3–Cr_2O_3, Al_2O_3–Fe_2O_3 and Cr_2O_3–Fe_2O_3. L. PASSERINI. *Gazz. chim. ital.* 60, 544–58(1930); cf. preceding abstr.—The 3 systems were examd. with x-rays by the powder method. The solid solns., like the pure oxides, crystallize in the rhombohedric system. The products examd. were prepd. by calcining at approx. 600° the mixts. of hydroxides pptd. by an alk. hydroxide from solns. of the chlorides or sulfates. For Al_2O_3 the hexagonal cell showed $c/a = 1.366$, $a = 4.740 \pm 0.005$ A. U., $c = 6\,478 \pm 0.007$ A. U., $v = 125.1 \times 10^{-24}$ cc., d. 4 075; and the rhombohedric cell $a = 5.13 \pm 0.005$ A. U., $\alpha = 55°6' \pm 5'$. For Cr_2O_3 the hexagonal cell showed $c/a = 1.374$, $a = 4.950 \pm 0.005$ A. U., $c = 6.806 \pm 0.007$ A. U., $v = 143.4 \times 10^{-24}$ cc., d. 5.283, and the rhombohedric cell $a = 5.38 \pm 0.005$ A. U., $\alpha = 54°60' \pm 5'$. For Fe_2O_3 the hexagonal cell showed $c/a = 1.366$, $a = 5.020 \pm 0.005$ A. U., $c = 6.860 \pm 0.007$ A. U., $v = 148.6 \times 10^{-24}$ cc., d. 5.355, and the rhombohedric cell $a = 5.43 \pm 0.005$, $\alpha = 55°6' \pm 5'$. With Al_2O_3–Cr_2O_3 and Al_2O_3–Fe_2O_3 the miscibility of the component oxides is limited at the temps. studied, and the smaller the difference between the diams. of the metal ions, the greater the max. proportion of oxides dissolved. The axial ratios of the solid solns. formed are intermediate between those of the pure oxides. With Cr_2O_3–Fe_2O_3 there is complete miscibility in the solid state, and the axial ratios, deformations of the lattices and the d. are, within the limits of exptl. error, linear functions of the compn. The soly. in the solid state of the oxides of tervalent metals follows laws similar to those which govern the behavior of oxides of bivalent metals. C. C. DAVIS

Method for the determination of molecular weights in liquid ammonia. HAROLD H. STRAIN AND JAMES H. C. SMITH. *J. Am. Chem. Soc.* 52, 5291–3(1930).—The principle used is that 2 solns. in the same solvent confined with a common vapor phase will come to the same mol. concn. by diffusion of the vapor. With liquid NH_3 the time required to reach equil. was about 150 hrs. The rate of transfer varied from 0.1 to 1.0 cc. per day. That the method is correct in principle is shown by the fact that solns. contg. the same solute reached the same mol. concn. NH_4Cl appears to exist in the dimol. form in liquid NH_3. The low value for fructose is probably due to its reaction with the solvent. Results are given for 23 expts. C. J. WEST

Osmotic behavior of strong electrolytes in solution and the hydration of their ions. K. JAJANS AND G. KARAGUNIS. *Z. angew. Chem.* 43, 1046–8(1930).—A summary of an

investigation which will be published in detail in *Z. physik. Chem.* The molar depression of the f. p. of alkali halides in aq. soln. ($1M$/1000 g. H_2O) shows the same stepwise variation as their soly., heats of soln., tendency to form hydrates and osmotic coeffs. In general as the sepn. of ions of the crystal lattice by H_2O becomes easier, the ion-pair in soln. can be more easily sepd. and the osmotic activity increases. The relative hydrophilic action of the ions is the deciding factor in the osmotic activity of these salts. The greatest osmotic action is evidence by LiI, which has the smallest cation with the greatest hydration energy and the largest halogen-ion with the smallest hydration energy.
E. R. SCHIERZ

Diffusion, osmosis and osmotic pressure. WARREN C. HAWTHORNE. *Sci. Monthly* 1930, 535–42.—A review. E. H.

The conductivity and viscosity of solutions of lithium nitrate in certain binary alcoholic systems. J. L. WHITMAN AND D. M. HURT. *J. Am. Chem. Soc.* 52, 4762–70 (1930); cf. *C. A.* 22, 4034.—Measurements were made of the conductivities of $LiNO_3$ at 25° in the mixed solvents contg. various proportions of the following components: H_2O, EtOH, PrOH and iso-PrOH. The viscosities and ds. of the same pure solvent systems at 25° were also detd. LOUISE KELLEY

The effect of concentration and potential on the conductance of electrolytes in aqueous solutions in the presence of cane sugar. H. POSSNER. *Ann. Physik* [5], 6, 875–902(1930).—This investigation is an attempt to test the *Debye-Onsager* theory in a solvent of high viscosity by measuring the effect of concn. and external field (Wien's voltage effect) on the cond. The equiv. conductivities at 18° of KCl, NaCl, LiCl, K_2SO_4, Li_2SO_4, $MgSO_4$, $K_3Fe(CN)_6$, $K_4Fe(CN)_6$ and $Ba_3(Fe(CN)_6)_2$ in 50, 61.5 and 67% cane sugar solns. in equiv. concns. from 0.326 to 0.00064 were detd. by the Kohlrausch method with bright Pt electrodes. The higher the valence of the ion pair in the salt the lower is the concn. at which the cond. deviates from the straight-line relation. For salts of the univalent elements the relation holds for relatively high concns. Within the region in which the sq.-root law obtains the experimentally detd. values agree with those demanded by theory. The relatively high mobility of ions in concd. sugar solns. is attributed to decrease in ion radius resulting from decrease in hydration of the ion. By use of Wien's null method (cf. *C. A.* 23, 1043) it is found that, in the region where the sq.-root law holds and for fields of 100 kv./cm., the exptl. values ($A.10^{11}$) of the Wien effect agree with those calcd. by the *Onsager-Blumtritt* formula. At higher concns. and at higher potentials large deviations occur. The limiting effect is not reached, indicating that assocn. does not occur at the concns. studied. The dielec. const., D, for 67, 61.5 and 50% sugar solns., detd. by Nernst's compensation method, is 45, 50 and 60, resp. E. R. SCHIERZ

Spectrometric determination of the effect of a neutral salt on the dissociation of acetic acid. N. V. SIDGWICK AND L. A. WOODWARD. *Proc. Roy. Soc.* (London) A130, 1–16(1930).—By means of simple and flicker photometers with which color changes of methyl orange were measured, the H-ion concns. in AcOH and in AcOH plus KBr were measured and the dissocn. const. for AcOH was calcd. MALCOLM DOLE

A method of measuring the resistance of electrolytes at low frequencies. Comparison of electrolytic resistance at low and radio frequencies. J. A. C. TEEGAN. *Indian J. Physics* 5, 463–71(1930).—A new method of using the Hartley circuit is applied to the detn. of the resistances of $CuSO_4$ and NaCl solns. from 0.1 to 1 N with frequencies from 0.2×10^6 to 10^6. With Au electrodes no difference from the ordinary resistance could be detected with varying frequency. With Cu electrodes there was a gradual increase up to 10%. ARTHUR FLEISCHER

Recent developments in the colorimetric determination of hydrogen ions. F. R. MCCRUMB AND W. R. KENNY. *J. Soc. Chem. Ind.* 49, 425–6T; 427–31T(1930).—Of 40 indicators recommended for detg. the p_H of alk. solns. not more than 6 are reliable In most cases the colorimetric method can be made to satisfy the requirements of scientific accuracy or practical utility. The effects of foreign salts, temp. changes, proteins, buffer action, dichromatism and "off colors," and sp. reactions with the indicators themselves are discussed and illustrated by expts. W. T. H.

Concentration cells in ethyl alcohol. V. Cells without liquid junctions. J. R. PARTINGTON AND H. G. SIMPSON. *Trans. Faraday Soc.* 26, 625–34(1930); cf. *C. A.* 24, 2659.—Cells of NaI in EtOH without liquid junction were measured over the concn. range 0.002 to 0.1 N. The results indicate a much higher value for the activity coeff. than predicted on the basis of the Debye inter-ionic attraction theory. The observed e. m. fs. can be calcd. after correction of the concns. for the undissocd. fraction as detd. by the cond. ratio. MALCOLM DOLE

The acid and base constants of glycine from cells without liquid junction. HER-

BERT S. HARNED AND BENTON B. OWEN. *J. Am. Chem. Soc.* **52**, 5091–102(1930).—From the e. m. f. of cells without liquid junction contg. 0.1 *M* Na glycinate and glycine-HCl, the apparent dissocn. const. of glycine at 25° are $k_A^0 = 4.92 \times 10^{-3}$ and $k_B^0 = 5.56 \times 10^{-6}$. The activity coeffs. of the 0.1 *M* amphanion and amphcatin in NaCl soln. were calcd., their logarithms being linear functions of the ionic strength.
G. M. MURPHY

The ignition of mixtures of hydrogen and oxygen by quartz or porcelain at low pressures. HUBERT N. ALYEA AND F. HABER. *Z. physik. Chem.*, Abt. B, **10**, 193–204 (1930).—Combination of H and O at low pressures (10 to 200 mm. Hg) and at temps. ranging from 440° to 560° in quartz or porcelain vessels takes place at the walls. In a "wall-free" space or at Al walls the gases do not react. A porcelain surface that has been treated with H for a long period loses part of its ability to promote the reaction. Treatment of the surface with O increases its activity. WILLIAM E. VAUGHAN

Influence of foreign materials upon the reactivity of crystals in the molten condition. J. ARVID HEDVALL AND WALTER ANDERSSON. *Z. anorg. allgem. Chem.* **193**, 29–46(1930).—The influence of 0, 0.1, 1.0 and 5.0 mol.% $BaCl_2$ on the reaction, $BaO + PbCl_2 = BaCl_2 + PbO$, over the temp. range 228° to 298° was studied. The data reveal the inhibiting effect clearly. The reaction, $2CuCl + BaO = BaCl_2 + Cu_2O$, was also studied. Varying amts. of NaCl, KCl, RbCl and CsCl were added. The temp. ranged from 126° to 284°. The reaction velocity does not vary linearly with the amt. of the addn. Three cases are discussed: (1) formation of a solid soln. between the foreign body and one of the reactants, (2) non-formation of such a solid soln. and (3) formation of a melt. Extensive bibliography. WILLIAM E. VAUGHAN

The equilibrium between cerous and perceric salts. G. LEJEUNE. *Compt. rend.* **191**, 665–7(1930).—When a dil. alk. soln. of a Ce^{III} salt is oxidized by a current of air a brown color appears. In a partially oxidized soln., a Pt electrode shows a const. and reproducible potential. When compared with the potentials calcd. by the Nernst formula, the values indicate that the valence changes by one only. The product of the oxidation, therefore, must be the ion CeO^{IV} rather than Ce^{VI}. H. F. JOHNSTONE

Experimental investigation into equilibrium relations between a plastic crystalline solid and its solution. B. LOCKSPEISER. *Trans. Faraday Soc.* **26**, 605–23(1930).—The soly. of I in contact with its satd. soln. was detd. from room temp. to 92°. Curves were detd. by raising and lowering the temp. continuously. The results point to an actual thermodynamic irreversibility. The conditions varied with the history of the system. The shape of the curve of the approach from a displaced position toward equil. at a certain temp. is such that equil. conditions cannot be those of thermodynamic reversibility. The calcn. of the heat of soln., thermodynamic reversibility being assumed, leads to a temp. coeff. so large as to be inadmissible. ARTHUR FLEISCHER

The solution velocity of oxygen in water. III. SUSUMU MIYAMOTO AND TETSUO KAYA. *Bull. Chem. Soc. Japan* **5**, 321–5(1930); cf. *C. A.* **24**, 5575.—The diam. of the tube through which O_2 was bubbled into Na_2SO_3 soln. was varied from 0.23 to 0.49 cm., and it was found that the soln. velocity varied inversely as the product of the diam. and the velocity of rise of the bubbles (which was approx. const.). T. H. CHILTON

Chemical equilibrium between methanol, carbon monoxide and hydrogen. ÉTIENNE AUDIBERT AND ANDRÉ RAINEAU. *Ann. combustibles liquides* **5**, 454–61(1930); cf. *C. A.* **23**, 1385.—With enough time of contact the following reactions take place: $CO + 2H_2 = CH_3OH$; $2CO + 2H_2 = CO_2 + CH_4$ and $CO + 3H_2 = CH_4 + H_2O$. The reaction const. for the first reaction under the above conditions can be detd. and from the expts. the following relation is found: $\log K = -35.38 + \frac{6806}{T} + 7.22 \log T$.
E. SCHOTTE

The thermal hydrogen-oxygen combination. Formation of hydrogen peroxide and the influence of surface nature. ROBERT N. PEASE. *J. Am. Chem. Soc.* **52**, 5106–10 (1930).—The H_2-O_2 reaction studied by the flow method at 550° and 1 atm. in Pyrex vessels shows H_2O_2 formed in readily detectable amt. along with H_2O. The former may be the primary reaction product. At low pressures, the mixt. becomes explosive and unstable but does not yield H_2O_2. The reaction may be partially suppressed by broken Pyrex in the vessel or a coating of KCl on the walls. G. M. MURPHY

The melting curve of sodium chloride dihydrate. An experimental study of an incongruent melting at pressures up to twelve thousand atmospheres. L. H. ADAMS AND R. E. GIBSON. *J. Am. Chem. Soc.* **52**, 4252–64(1930).—The temp. of incongruent melting of $NaCl.2H_2O$ was detd. for pressures up to 12,000 bars. Starting at 0.1° for atm. pressure, the curve rises to 25.8° at 9500 bars and then drops. The vol. change

was measured for various pressures. The heat of fusion was calcd. as 32 cal./g. of $NaCl.2H_2O$. C. L. READ

Catalytic activity of cadmium. R. J. HARTMAN AND O. W. BROWN. *J. Phys. Chem.* 34, 2651-65(1930).—A study is made of the conditions under which Cd most effectively promotes reduction of nitrobenzene to aniline by H. An Fe tube, jacketed with molten Pb-Sn alloy, was used as a reaction chamber. Roasted at 250° and then reduced by H at 300°, $Cd(OH)_2$ is slightly more efficient than CdC_2O_4 similarly treated. The optimum reaction temp. is 319°; the rate of flow of H is 6.2 l./hr.; that of $C_6H_5NO_2$ is about 0.38 g./hr./g. of catalyst. Shredded asbestos is slightly better than pumice as a support because it carries more Cd per unit wt. B. A. SOULE

The heats of dilution of potassium chloride in sucrose and urea solutions as solvents below 0.1 *M* at 25°. E. LANGE AND A. L. ROBINSON. *J. Am. Chem. Soc.* 52, 4218-24(1930); cf. *C. A.* 24, 4984.—Data are given for the integral heats of dilu. of KCl in concns. of 10^{-1} to 10^{-4} at 25° in 15% sucrose and 5% urea solns. The curves are of the same general nature as those for a no. of 1–1 type salts in H_2O but they deviate from that of KCl in pure H_2O. These differences are ascribed to differences in dielec. properties of the solvents. C. L. READ

The heat of formation of fluorine oxide. H. v. WARTENBERG AND GERTRUD KLINKOTT. *Z. anorg. allgem. Chem.* 193, 409-19(1930); cf. *C. A.* 24, 3722.—The heat of formation of F_2O was estd. from 3 different reactions to be −11,000 cal. (± 2000) Some reactions of F_2O are described. It absorbs ultra-violet light but is not decompd by it. T. H. CHILTON

Precision of color temperature measurements under various observing conditions; a new color comparator for incandescent lamps. DEANE B. JUDD. *Bur. Standards J. Research* 5, 1161-77(1930); cf. Priest, *C. A.* 18, 350. C. J. HUMPHREYS

Laboratory filtration. PAUL H. PRAUSNITZ. *Kolloid-Z.* 50, 77-85, 167-77 (1930).—A review. A. FLEISCHER

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de Gruyter & Co. Each part, M. 180. For IV and V see *C. A.* **24**, 2953. Reviewed in *Mech. Eng.* **52**, 1116(1930).

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3—SUBATOMIC PHENOMENA AND RADIOCHEMISTRY

W. ALBERT NOYES, JR.

Chandrasekhara Venkata Raman. L. LORENZ. *Chem.-Ztg.* **54**, 946–7(1930).—A biographical note with a brief discussion of the Raman effect. E. H.

Causality in the behavior of electrons. J. STARK. *Ann. Physik* [5], **6**, 681–99 (1930); cf. *C. A.* **24**, 1571, 5600.—Stark replies to Sommerfeld's criticisms and discusses dynamic causality for atom electrons in the stationary state, causality in elementary light emission, phases of atom electrons in the splitting off of a light whirl, and the problems of the structure of electrons. H. W. WALKER

Combustion radiation and the Planck quantum theory. WALTER J. WOHLENBERG. *Mech. Eng.* **52**, 852–4, 913–8, 981–3, 1075–80(1930).—From the heats of combustion of C, CO and H it is calcd. that max. frequencies of emission during combustion are,

resp., 1.211×10^{15}, 7.26×10^{14}, and 7.28×10^{14}, all near the high-frequency border of the infra-red spectrum. Using statistical methods, the second law of thermodynamics and the quantum theory, W. shows that the radiations which may occur outside of the infra-red are negligibly small and can have no special characteristics except for a fraction too small to be measured. The Planck formula is applied to combustion in boilers.
L. P. HALL

Heat of formation and electronic properties of the atom. R. D. KLEEMAN. *Z. anorg. allgem. Chem.* 193, 106–12(1930); cf. *C. A.* 23, 2880; 24, 1571, 5599.
L. P. HALL

A chart of consecutive sets of electronic orbits within atoms of chemical elements. VLADIMIR KARAPETOFF. *J. Franklin Inst.* 210, 609–24(1930).—The results of previous phys. studies on the probable no. of electronic orbits and their characteristics are represented in the form of graphical charts for the 92 known chem. elements. An empirical rule is derived for electronic orbits whereby elements form periodic groups with recurrent chem. properties.
M. MCMAHON

The Laue photographs of iridescent crystals of potassium chlorate. S. C. SIRKAR. *Indian J. Physics* 5, 337–43(1931).—Laue photographs of colored, thick twinned and heated crystals of $KClO_3$ are identical, showing that on heating a single crystal twinned strata appear and that the strata are also present in the colored crystals. This is x-ray analysis support for Lord Rayleigh's theory of the iridescence of these crystals
H. W. WALKER

Crystal lattice distortion and reactions in the solid state. J ARVID HEDVALL. *Z. Elektrochem.* 36, 853–61(1930): cf. *C. A* 24, 2673.
JOHN R. HILL

The quantitative determination of radium by the emanation method. RALPH G FULTON. *J. Assoc. Official Agr. Chem.* 13, 497–503(1930).—The method proposed by Sale (*C. A.* 19, 3145; 21, 3422) for examg. radioactive material was applied to a water sample, a sol. salt sample and a refractory substance, and was found to be reliable. Several modifications in technic resulting in simplicity and convenience, without loss of accuracy, are suggested. The method was checked by the Schlundt and Moore method (*J. Phys. Chem.* 9, 320(1905)) and by Barker's bisulfate fusion method (*C. A.* 12, 1942), both of which are in general use at the Univ. of Missouri in making Ra assays. The procedure was extended to include other refractory substances and was found to give accurate results.
A. PAPINEAU-COUTURE

The effect of heating upon radioactive deposits. W. SEITH AND A. H. W. ATEN, JR. *Z. physik. Chem.*, Abt. B, 10, 296–8(1930).—The effect of heating radioactive films of Th deposited by distn upon surfaces of Pt foil has been investigated. At temps. as high as 550° the uniform distribution of material is modified by the appearance of small aggregates although a uniform background remains. Upon heating to 700° the background disappears and all the matter is brought into these sep. aggregations, some of which appear on parts of the surface not originally covered. A deposit formed upon quartz glass is more permanent. The explanation presumably lies in the formation of a silicate with the radioactive material. By aid of these phenomena evidence has been produced to show that a kinetic interchange occurs between the Pb ions of a Pb oxide surface and those of a Pb chloride film deposited upon it. C. J. H.

Energies of electrons in gases. J. S. TOWNSEND. *Phil. Mag.* [7], 9, 1145–73 (1930).—Equations and calcns. are made for the energy distribution based on the measurements for He and Ne. Cf. Townsend and Bailey (*C. A.* 18, 16) and Bailey (*C. A.* 18, 1083).
ARTHUR FLEISCHER

The behavior of methane molecules and argon atoms in collisions with very slow electrons. HENRY L. BROSE AND J. E. KEYSTON. *Nature* 126, 806–7(1930).—Measurements using Ramsauer's method lead to Q-$\sqrt{V}$ curves (Q = cross section, V = voltage) for CH_4 and A which are very much alike, leading to the hypothesis that a mol. of CH_4 in collisions with slow electrons behaves like an A atom. Z/p *vs.* k curves obtained by Townsend's drift velocity method do not agree (Z is the elec. force, p the gas pressure, and k the electronic temp. factor); this shows the hypothesis is untenable.
ARTHUR FLEISCHER

The capture of electrons by ions. G. WATAGHIN. *Atti accad. Lincei* 11, 993–7 (1930).—Davis (*C. A.* 24, 1029) and Barnes (*C. A.* 24, 3164) have shown that the probability of capture of an electron by an ion is a max. when the kinetic energy of the electron with respect to the He nucleus = 0. W. derives an equation *for the frequency of the light emitted in the process of combination* using the method of Schrödinger together with the equations of Dirac (*C. A.* 23, 3400; 24, 2040, 5602), and the perturbation theory. There is an emission of a quantum of light for every electron captured, and

the frequency is double the resonance frequency, $\nu' = 2E_n/h$, where E_n = the energy of the nth term of He^+. A. W. CONTIERI

Search for radiation accompanying the scattering of comparatively slow electrons at the surface of incandescent solids. ERIK RUDBERG. *Proc. Roy. Soc.* (London) **A129**, 652–6(1930); cf. *C. A.* **24**, 3431.—The energy distribution curves for electrons scattered from incandescent solids show characteristic maxima, different for each substance. A search was made for radiation accompanying the scattering. Anodes of CaO, SrO, BaO, Cu and Ag were bombarded with electrons of 600 v. and a current of 5 ma. The solids being kept incandescent, exposures up to 24 hrs. were made in the visible and ultra-violet region above 2300 A. U. Hg-arc lines and the ultra-violet OH bands were obtained but there was no evidence of any other radiation, indicating that the inelastic collisions with the target are not accompanied by radiation. G. M. MURPHY

The emission law for nickel. WASHINGTON DEL REGNO. *Atti accad. Lincei* **11**, 989–93(1930).—Using a technic similar to that used in the study on the emission of Bi (*C. A.* **24**, 3708), R. has measured the emission of Ni, as plates, as well as after wire-drawing, and other mech. working, for temps. between 344° and 643°. Thus a value of n in the emission law $E = KT^n$ (Stefan-Boltzmann) of 4.588 ± 0.031 was obtained, which agrees very well with values detd. by Suydam (4.648), Schmidt and Futherman (4.814), and Barnes (4.77). A. W. CONTIERI

Radiometer pressure and accommodation coefficient. MARTIN KNUDSEN. *Ann. Physik* [5], **6**, 129–85(1930).—Radiometer forces have been studied under such conditions that all quantities, on which the radiometer force might depend, especially the temp., were measured. The significance of the accommodation coeff. for the radiometer pressure has been shown. It follows from measurements at low pressure that the accommodation coeff. for the internal energy of a diat. gas can be equated, in the case examd., to the accommodation coeff. for the translatory energy. F. U.

Effect of temperature on the ionization current of ceresin. D. N. NASLEDOV AND P. V. SHARAVSKII. *Ann. Physik* [5], **6**, 574–80(1930).—The thermostat used has been described. The magnitude of the ionization current I_t as a function of the temp. may be expressed by the equation $I_t = I_0e^{at}$. (a = const., I_0 = current at 0°, t = cent. temp.) The amts. of electricity given off by the dielec. (ceresin) during discharge also increased with temp., indicating an increase in the no. of ions in the dielectric due to temp. FRANK URBAN

Temperature classification of the spectra of europium, gadolinium, terbium, dysprosium and holmium, λ3850 to λ4700. ARTHUR S. KING. *Astrophys. J.* **72**, 221–55(1930).—The furnace, arc, and spark spectra of Eu, Gd, Tb, Dy and Ho have been examd. in the range 3850 to 4700 A. U. to obtain data to aid in the classification of these spectra. Many new lines not hitherto recorded, which appear in the furnace spectra, have been measured. The lines of the neutral atoms of Gd, Tb and Dy are relatively strong in the furnace, and both Eu and Dy have easily reversed lines of high intensity which show at low furnace temps. In the spectra of Eu, Tb and Ho, all of odd at. no., many lines with hyperfine structure occur, whereas none appears in the spectra of Gd and Dy, of even at. no. C. C. KIESS

Multiplet intensities in the solar spectrum. R. VAN DER R. WOOLLEY. *Astrophys. J.* **72**, 256–66(1930).—The contours of solar absorption lines, which appear to be unaffected by blending, in the interval from 4500 to 4600 A. U., have been measured with a microphotometer for the purpose of comparing their intensities with those deduced from quantum theory. Among these lines is the Ti I multiplet $a^4F-y^4F^\circ$ of which the observed intensities in emission are in agreement with the theoretical values. The observed solar intensities, however, diverge from the theoretical and observed lab. values, the weaker lines being relatively stronger in the solar spectrum. C. C. K.

Intensities in stellar spectra of a triplet of Si III. OTTO STRUVE AND C. T. ELVEY. *Astrophys. J.* **72**, 267–76(1930).—The intensities of the Si III triplet at 4553, 4568 and 4575 A. U. were measured in absorption in stellar spectra and in emission in the spectrum of a condensed spark discharge between Si electrodes. The lines represent the term combination $^1S-{}^1P$ for which the theoretical intensity ratios are 5:3:1. The intensity ratios observed for the lines in emission are 4.0:2.4:1, while in absorption the ratios 2.1:1.4:1.0 were found, which are nearly equal to $\sqrt{5}:\sqrt{3}:\sqrt{1}$. This square-root relationship is discussed theoretically and is shown to indicate that the absorption coeff. is due to radiation damping, and lends support to the hypothesis that the dish-shaped contours observed for the absorption lines in early type stars are due to rotation and not to an unusual form of the absorption coeff. C. C. KIESS

The modifications effected in the fine structure of a spectral line by molecular diffu-

sion. A study of the effect as a function of the angle of diffusion. MICHEL VACHER. *Compt. rend.* **191**, 1121–3(1930).—The broadening of a spectral line by diffusion, first detected by Cabannes, was examd. with the Fabry-Perot interferometer in the 4358 A. U. line of Hg diffused by benzene. The observations were made at angles of diffusion of 30°, 90° and 150°. It was found: (1) that the short-wave-length edge of the diffused ray was not sensibly altered in position; (2) that the broadening increased with the angle of diffusion; (3) that the center of gravity of the diffused ray was shifted toward the red by amts. of the order of 0.01 A. U. increasing with the angle of diffusion. It seems that the diffused ray consists of 2 components, of which one is unaffected by the diffusion process, but the other is displaced toward the red but is too wide to be sepd. from its companion. The effect is analogous to a Compton shift or a Doppler-Fizeau effect and is regarded as a new phenomenon. C. C. KIESS

The fine structure of a spectral ray after molecular diffusion. JEAN CABANNES. *Compt. rend.* **191**, 1123–5(1930).—The theory of the mol. diffusion of light requires the exciting ray of wave length λ to be replaced in the diffused ray by 2 lines of sensibly equal intensities and of wave lengths $\lambda \pm d\lambda$, where $d\lambda = (2un/c) \sin(\theta/2)$, u and c/n being the velocities of sound and light, resp., in the diffusing medium, and θ being the angle of diffusion. Although the results found by Vacher (see preceding abstr.) for $d\lambda$ do not differ much from those given by the above formula, yet his expts. show dissymetries not accounted for by the theory and of which the cause is not clear. C. C. KIESS

The structure of the spectrum of singly ionized zirconium. C. C. KIESS AND HARRIET K. KIESS *Bur. Standards J. Research* **5**, 1205–41(1930).—Seventy-five % of the lines observed in the spectrum Zr II have been classified as combinations between doublet and quartet terms which, without exception, are those required theoretically. All the terms except one which can result from the interaction of 3 electrons occupying $4d$, $5s$ and $5p$ orbits have been found. Only a few of the terms arising when one of the electrons migrates to a $5d$ or $6s$ orbit have been found. Some of these form Rydberg series with the low terms. From 10 series-forming pairs of terms with either ^1F ^1G or ^1D of Zr III as limit (*C. A.* **24**, 5620) a value of 113,175 cm.$^{-1}$ has been found for $a^4F_{1\frac{1}{2}}$, the deepest term of Zr II. This yields an ionization potential of 13.97 v. for the ion Zr^+. The terms permit the calcn. of many faint lines which have been identified with unknown lines of the solar spectrum but do not appear in lab. sources. C. C. K

The modification of intensities in the mercury arc spectrum. ERNST LÜBCKE *Wiss. Veröffentlich. Siemens-Konzern* **9**, 246–51(1930); cf. *C. A.* **24**, 2044.—A change of color has been observed in the light emitted by a Hg arc lamp due to cooling of the cathode and of the space of the immediate vicinity. An examn. of the spectrograms made with and without cooling indicates that this color change is due to a strengthening of the lowest singlet terms and a weakening of the lowest triplet terms. Measurements of the potential distribution and of the space temp. and electron temp. indicate that the modification of the spectrum is due to the elevation of the temp. of free electrons. The investigations are being continued in order to det. whether these spectrophotometric research methods are suited to quant. measurements in gas discharge. These include velocity of electrons, their distributions and free paths, also some properties of atoms, which cannot be studied by purely elec. methods, because of the disturbing effect of the elec. discharge. C. J. HUMPHREYS

Interference measurements in the first spectra of krypton and xenon. C. J. HUMPHREYS. *Bur. Standards J. Research* **5**, 1041–55(1930); cf. *C. A.* **24**, 1286, 1287.—The wave lengths of the stronger arc lines of Kr and Xe have been redetd. by the use of Fabry-Perot étalon interferometers. The secondary standards of Ne photographed simultaneously with the Kr or Xe spectrum furnished the comparison. Interferometer measurements of a sufficient no. of Kr lines have been made to permit fixing the relative values of all the $1s$, $2p$ and $3p$ terms to a high degree of precision. The accuracy of the term values is such that the av. deviation of calcd. term combinations from the observed wave nos. is 1 part in 20,000,000. The corresponding set of terms in the Xe spectrum, except $2p_{10}$, was detd. also with increased precision from interference measurements. In addn. to these, 4 of the $4p$ terms have been recalcd. Nearly $^3/_4$ of the combinations permitted by the selection rule have been observed. The exact location of the combinations in the infra-red region not photographically accessible can now be predicted with certainty. With the resolving power employed none of the Kr lines showed hyperfine structure. It is apparent from the extremely small variations of the "constant differences" that the intensities of any unobserved satellites are too low to affect the wave lengths. Five of the Xe lines showed satellites. Further work in the examn. of the lines of both spectra for hyperfine structure is in progress

The close agreement of these results with those of other observers as well as the small differences between sep. observations indicates that the wave lengths of the radiation emitted by Kr or Xe are reproducible within the limits set by the probable error of interferometer comparisons. For the intense green and yellow lines of Kr, for which Perard at the International Bureau obtained wave lengths 5570.2892 and 5870.9154 A. U., H. obtains 5570.2890 and 5870.9153 A. U. C. J. HUMPHREYS

The effect of pressure on absorption of spectral lines. SNEHAMOY DATTA AND SATYENDRA NATH ROY. *Indian J. Physics* **5**, 365–70(1930).—Absorption spectra of K vapor at pressures from 1 cm. to 60 cm. show increasing continuous absorption with increasing pressure. A mixt. of N_2 and K shows the same effect. G. M. MURPHY

The Zeeman effect and the absorption coefficients of the hyperfine structure of the mercury resonance line. S. MROZOWSKI. *Nature* **126**, 684(1930).—The Hg resonance line 2537 A. U., was measured in absorption in magnetic fields from 0 to 8 kilogausses. The results can be reconciled with McNair's results (cf. *C. A.* **22**, 2714). A. F.

Photoionization of cesium vapor by absorption between the series lines. C. BOECKNER AND F. L. MOHLER. *Bur. Standards J. Research* **5**, 831–42(1930).—Relative ionization as a function of wave length in Cs, and as a function of pressure and temp. and the effect on the ionization of Cs by foreign gases were detected and measured by means of the neutralizing effect of pos. ions on a thermionic current limited by electron space charge. The theory of the cause of ionization is discussed with the possible conclusion that absorption leads to a highly excited neutral mol. which spontaneously passes to a state of the mol. ion. MALCOLM DOLE

Determination of the abundance ratios of isotopes from band spectra. G. STENVINKEL. *Nature* **126**, 649(1930).—A temp. rise should produce a change in the abundance ratio due to the change in the vibrational states of the mol. Correct values of the abundance ratio are obtained by intensity measurements on absorption bands of mols. in the normal state. ARTHUR FLEISCHER

Dissociation energies calculated from predissociation spectra and the dissociation energy of O_2. GERHARD HERZBERG. *Z. physik. Chem.*, Abt. B, **10**, 189–92(1930).—The discrepancy between the dissocn. energy of O_2 calcd. from predissocn. spectra of NO_2 and SO_2 and calcd. from the analysis of the O-atom spectra is explained on the basis that the long-wave-length limit of the diffuseness in the band spectra of NO_2 and SO_2 corresponds to the dissocn. of mols. with considerable kinetic energy and not to the beginning of the superimposed continuous spectrum. The value of 117,300 cals (5.09 v.) is considered correct. The energy for the sepn. of the first O atom from NO_2 is 71,500 cals. (3.1 v.) The long-wave-length limit of the predissocn. spectra gives only upper limits for the dissocn. energy. WILLIAM E. VAUGHAN

Investigations in the infra-red region of the spectrum. I. Introductory and experimental. C. R. BAILEY, A. B. D. CASSIE AND W. R. ANGUS. *Proc. Roy. Soc.* (London) **A130**, 133–41(1930).—A description is given of the app. and the exptl. procedure adopted for obtaining precision measurements of infra-red absorption bands with prisms of quartz, fluorite and sylvine. **II. The absorption spectrum of sulfur dioxide.** *Ibid* 142–56.—The method described above has been applied to a reinvestigation of the absorption spectrum of SO_2 in the region from 1 to 22μ. Bands were measured at 16.494, 8.680, 7.347, 5.345, 4.338 and 4.003μ, all of which, except the first, had been reported previously by Coblentz. The partial resolution of some of the bands has allowed the recognition of *P* and *R* branches from which the following properties of the SO_2 mol. have been derived.: (1) the S and 2O atoms lie at the vertices of an isosceles triangle of which the sides S—O and O—O measure 4.8 and 2.0×10^{-8} cm., resp., and the angle OSO equals 24°; (2) the moments of inertia in g. sq. cm. $\times 10^{-39}$ are 55, 50 and 4.7; (3) the vibration frequencies in cm^{-1} are 606, 1152 and 1361, of which the last 2 agree with Raman shifts. C. C. KIESS

Infra-red sensitivity of cesium oxide photoelectric cells. JAMES W. BALLARD. *J. Optical Soc. Am.* **20**, 618–23(1930).—The relative spectral sensitivities of Cs oxide photoelec cells to visible and infra-red regions were detd. The results for the region from 5000 to 8000 A. U. check previous workers. The sensitivity drops from the max. at approx. 7750 A. U. to zero at 12,000 A. U. Curves are given. W. E. V.

The Raman effect in liquids with rotatory power. A. KASTLER. *Compt. rend.* **191**, 565–6(1930).—Investigation of the mol. asymmetry in the Raman spectra of optically active materials, in natural and circular light, indicates that the mol. asymmetry which is found in the transmission and absorption of light does not appear in Raman spectra. M. McMAHON

The Raman effect. Its significance for physics and chemistry. S. BHAGAVANTAM. *Indian J. Physics* **5**, 237–307(1930).—A review of the Raman effect including its re-

lation to spectroscopy, mol. and crystal structure, valence and phys. and org. chemistry. A complete *bibliography* to June, 1930, is given under 26 sections; an author and substance index is also included and a list of earlier papers on light scattering. G. M. M.

The behavior of silicon dioxide under the influence of slow cathode rays. H. PETERS AND TH. SCHULTES. *Z. Elektrochem.* 36, 837–9(1930).—Red light produced on glass walls by high-frequency electrodeless discharge in a high vacuum is identical with the red fluorescence of glass caused by slow cathode rays. The spectrum consists of a continuous band in the red from 723 to 589 mμ with 2 maxima at 642 and 628 mμ. There is also a bright band in the green and violet with maxima at 560 and 479 mμ, resp. The origin of the phenomenon is not restricted to a gaseous or water layer but indicates a rearrangement of the SiO_3 group. J. R. H.

Remarks on the photochemistry of associated states. FRITZ WEIGERT. *Z. physik. Chem.*, Abt. B, 10, 241–63(1930).—A no. of phenomena may be physically verified which are characteristic of assocd. mol. states. The primary effects consist of frequent optically demonstrable mech. disruptions of complexes and micellae which are held together by van der Waals' forces. Induced chem. effects may also be observed. The appearance of primary and induced photodichroism is an indication that the form of the detached spheres within the micellae depends upon the wave form of the exciting light, a phenomenon for which no successful phys. explanation has been found. The appearance of this photodichroism, which is especially exact and easy to measure, is the very thing which affords a special insight into the peculiar character of the disruption process, further study of which is expected to yield valuable conclusions as to the structure of assocd. systems and micellae, as to the nature of the optical deformation of adjoining mol. groups, and probably also concerning some biol. problems. In connection with these characteristic "photomicellar" processes, certain "photomolecular" phenomena within individual mols. of the assocd. system are possible under suitable conditions which do not differ from those generally known. C. J. H.

The photochemical combination of chlorine and hydrogen. TEIJI ICHIKAWA. *Z. physik. Chem.*, Abt. B, 10, 299–336(1930).—Exptl. details are given of a method by which the velocity of reaction in the photochem. combination of Cl and H may be studied by aid of a photographic recording app. The Draper expansion has been investigated in a more precise way, and it is shown to be a small explosion. The primary reaction is explained by analysis of the reaction-velocity curves. Certain evidence of a chain reaction has been found. The length of the chain and its duration have been calcd. Further discussion is given of some previously proposed mechanisms regarding the nature of the primary reaction, and a new mechanism is suggested in which the building of the complex mol. $H_2O.Cl_2$ plays a prominent part in the primary reaction. C. J. HUMPHREYS

The mechanism of the synthesis of the nitrogen oxides. LOUIS A. M. HENRY. *J. Phys. Chem.* 34, 2782–91(1930).—The reaction between N and O was studied at low temp. and pressure under the action of the Geissler, electrodeless and dark electronic discharge. The best yields of NO_2 were obtained at liquid-air temp. with a luminous discharge, and a ratio $N_2:2O_2$. The synthetic reaction is probably between at. N and mol. O_2. B. A. SOULE

Inhibition and mechanism of photochemical reaction in Eder's solution. E. SHPOLSKII. *Nature* 126, 647–8(1930).—Sensitizers for the ordinary photochem. reaction are inhibitors for Eder's reaction in the presence of x-rays. $KMnO_4$ inhibits the reaction till it has been used up, after which HgCl ppts. $FeCl_3$ in concns. above 0.01 g./cc., UO_2 acetate and $UO_2(NO_3)_2$ inhibit the reaction by an increase in the H ion concn. Uranin, eosin, erythrosin and quinine bisulfate are very strong inhibitors, the inhibitory property increases at the same rate as the sensitizing effect with ordinary light. Eder's reaction is probably a chain reaction. ARTHUR FLEISCHER

Gas luminosity produced by a heterogeneous reaction. W. FRANKENBURGER AND W. ZIMMERMANN. *Z. physik. Chem.*, Abt. B, 10, 238–40(1930).—LiN_3 was produced by passing O-free N over Li heated to 500–600°. Passage of N containing very small quantities of O over the nitride produced a glow in the gas in immediate contact with the solid. The glow was red, in many cases blue, and also showed the yellow Na lines when examd. spectroscopically. The blue-green belongs to a band system that extends from the green into the violet. Active N produced in a special app. gives the red Li lines but not the green color. The phenomenon is explained on the basis of the formation of intermediate "active products" which lose their energy by collisions of the second kind and return to a normal state, the bodies with which they collide (Li and Na) giving rise to emission spectra. WILLIAM E. VAUGHAN

The displacement by ultra-violet light of the explosion limit in a chain reaction.

C. N. HINSHELWOOD AND K. CLUSIUS. *Proc. Roy. Soc.* (London) **A129**, 589–98(1930).—Mixt. of PH_3 and O_2 at ordinary temp. react explosively between 2 sharply defined pressure limits. The lower limit is diminished by ultra-violet light of 2500–2800 A. U. The effect is due to the formation of a small quantity of an active substance from the PH_3. The conditions of formation and decay of the active substance are investigated; it does not decay immediately when the illumination ceases. The max. concn. in the photostationary state is deduced, and the efficiency of collisions with the walls of the vessel in destroying it is calcd. This is an example of a chain reaction in which the existence of material rather than energy chains can be experimentally detected.
G. M. MURPHY

Effect of light on the ferrocyanide-ferricyanide iodine-iodide equilibrium. ROSCOE G. DICKINSON AND S. FREDERICK RAVITZ. *J. Am. Chem. Soc.* **52**, 4770–8(1930).—When a ferrocyanide-ferricyanide iodine-iodide soln. is illuminated with light absorbable by I_3^- but not by the complex cyanides, reduction of ferricyanide and oxidation of iodide occur. The quantum yield is substantially the same as that in the oxidation of Fe^{++} in iodine-iodide solns. D. and R. discuss some possible mechanisms of the reaction.
LOUISE KELLEY

Dependence of velocity of photochemical reaction on primary intensity of illumination. E. GAVIOLA. *Anales asocn. quím. Argentina* **18**, 133–6(1930); cf. *C. A.* **24**, 5225. Klumb and Pringsheim, *C. A.* **23**, 1570.
E. M. SYMMES

A photochemical reaction between sulfur and yellow arsenic. CH. HAENNY. *Helv. Chim. Acta* **13**, 725–30(1930).—Yellow As is prepd. by rapidly cooling vapors of As in the dark. A study is made of the photochem. reaction between the yellow As and S dissolved in CS_2 which results in the formation of insol. sulfides whose properties are neither those of a mixt. of these elements nor those of known As sulfides. The compn. of the product obtained varies in relation to the parts of S and As dissolved and indicates the existence of new As sulfides similar to sulfides of P.
M. Mc. M.

Oxido-reductions with chlorophyll and other sensitizers. FERDIN AND ALLISSON. *Helv. Chim. Acta* **13**, 788–805(1930).—The replaceability of chlorophyll and other photodynamic pigments in photochem. oxidation-reduction reactions is illustrated with new examples. Pt hydride can react as a reducing substance in sensitized oxidation-reduction reactions. O-H mixts. react with or without platinum black in the presence of numerous sensitizers, especially with chlorophyll.
M. MCMAHON

Transmitted structural blue in microsopic objects. CLYDE W. MASON. *J. Phys. Chem.* **35**, 73–81(1931).—On the basis of exptl. work with various-size particles and structures M.'s conclusions are that the uniform size particles of structures finer than about 0.4μ scatter light inversely as λ^4 and are not resolvable with axial illumination. They exhibit Tyndall blue and transmit yellow or orange, even with relatively diffuse illuminations. Uniform size particles or structures between about 0.4μ and about 0.7μ scatter red light and diffract blue in maxima at such angles as to be resolvable with blue light and axial illumination. If they are of bold outlines or surrounded by a medium of widely different n, they exhibit transmitted blue and scatter yellow or orange, even with a slightly diffuse illumination. Uniform sized particles or structures coarser than about 0.7μ diffract all wave lengths, the red more than the blue. If of good contrast, they exhibit transmitted blue provided the numerical aperture of the objective is such as to include only the blue end of the diffracted spectra obtained with a narrow axial illuminating cone. Transmitted blue, which is lost in diffuse light, is apparent to the naked eye with specimens coarser than 0.4μ. It is due to the greater deviation of red than blue, either by scattering or by diffraction. Transmitted blue, visible to the naked eye, exhibited by suspensions of fine particles, is probably explainable by the above reasoning.
L. T. FAIRHALL

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4—ELECTROCHEMISTRY

COLIN G. FINK

High-speed steel treated in a special electric furnace. E. N. BROOKINGS. *Iron Age* **126**, 1295–8, 1360(1930).—Details of construction and operation, with reference to timing and temp. control, are given for the all-elec. equipment used in heat-treating high-speed steel parts. C. L. READ

Preparation of metal powders by electrolysis of fused salts. II. Thorium. F. H. DRIGGS AND W. C. LILLIENDAHL. *Ind. Eng. Chem.* **22**, 1302–3(1930); cf. *C. A.* **24**, 2953.—Metallic Th was prepd. by the electrolysis of $KThF_5$ in a bath of equal parts of fused NaCl and KCl at a temp. of 750–75°. A Mo cathode was used. The deposit on the cathode consisted of Th metal interspersed with solidified salts, which were removed by dissolving in H_2O. The purified powder has been used for making x-ray targets, sheet and wire by the methods described earlier (*C. A.* **21**, 841). Electrolytic Th is very soft; well-annealed samples have a hardness as low as D-10 on the Rockwell scale. Bars may be cold-worked without intermediate annealing. The metal prepd. by electrolysis contained C 0.019 ± 0.005, Si 0.045 ± 0.01 and Fe 0.005%. The quantities of other impurities were negligible. It compares favorably with the best samples produced by the Ca-$CaCl_2$ reduction of ThO_2. LOUISE KELLY

Manganese in electrolytic zinc practice. OLIVER C. RALSTON. *Eng. Mining J.* **130**, 606–8(1930); cf. *C. A.* **25**, 253.—The litigation over the Canadian patent of A. G. French dealing with electrolytic recovery of Zn and Mn from ores contg. both has been critically reviewed. Mn in the soln. does not make the cathode deposit more regular. Less Pb is found in the cathodes in the presence of Mn, but the evidence needs confirmation. The claim that Mn pptg at the anode will depolarize it has been found groundless. A coating of MnO_2 over a Pb anode has little protective effect against corrosion. The usual current efficiency in MnO_2 deposition, under normal Zn plant operating conditions, is little better than 1%. The true benefit derived from the proper use of Mn is in leaching and purification prior to electrolysis rather than in the electrolytic part of the cycle. A marked benefit of the litigation lies in the testimony of a large no. of expert Zn metallurgists, indicating what portions of modern electrolytic Zn practice are old and what are novel. W. H. BOYNTON

A study of the cadmium-lead chloride voltaic cell. RUDOLF J. PRIEPKE AND WARREN C. VOSBURGH. *J. Am. Chem. Soc.* **52**, 4831–7(1930).—The two different values found for the e. m. f. of the cell, Cd (Hg) | $CdCl_2$ (satd.) | $CdCl_2$ (satd.), PbCl (satd.) | Pb (Hg), *i. e.*, 0.1407 v. and 0.1372 v., resulted from the use of $CdCl_2.5H_2O$ and $CdCl_2.H_2O$, resp. JOHN R. HILL

The electrochemical production of sodium hyposulfite. MARK RABINOVICH AND A. S. FOKIN. *Z. Elektrochem.* **36**, 839–45(1930).—$Na_2S_2O_4$ is prepd. by reduction of SO_2 with Na-Hg. The hyposulfite can be concd. to the satn. point so that during the electrolysis crystals of $Na_2S_2O_4.2H_2O$ are collected. The current output is about 70 to 80%. The loss is mainly a result of the decompn., $2Na_2S_2O_4 = Na_2S_2O_3 + Na_2S_2O_5$. This loss can be reduced considerably by the presence of Na_2SiO_3. JOHN R. HILL

The electrochemical production of formates from carbonic acid. MARK RABINOVICH AND ARKADIJ MASHOVETZ. *Z. Elektrochem.* **36**, 846–50(1930).—H_2CO_3 is reduced to formates by the use of a combined Pb-Na amalgam. This amalgam is obtained in the course of the electrolysis from NaOH or Na salts with a Pb amalgam electrode. JOHN R. HILL

The production of electrolytic hydrogen and oxygen. A. E. R. WESTMAN. *Can. Chem. Met.* **14**, 338–45, 350(1930).—Electrolytic H_2 is being used in *fertilizer manuf.*;

no urgent need for large quantities of O_2 has developed. Cell design, the prepn. of cost data, the cost of power and quantity production costs are discussed and lead to the following conclusions regarding quantity production, continuous power being used: (1) Quantity production permits a decrease in costs other than power costs. (2) With available equipment most of the economies of quantity production were obtained in a plant with an output of 3,000,000 cu. ft. of total gas (2 vols. H, 1 vol. O)per 24 hrs. (3) For a capacity of 3,000,000 cu. ft. per 24 hrs. with cells operating at 2.0 v. and 100% load factor, the cost exclusive of, power was 15.3¢ per 1000 ft. of total gas; the power cost equaled the other cost when the a. c. power rate was 0.16¢ per kw.-hr. and was twice the other costs when the a. c. power rate was 0.32¢ per kw.-hr. (4) The fixed charges differed little and represented about half the cost, exclusive of power, of a plant producing 3,000,000 cu. ft. per 24 hrs. (5) Further economies could be effected with larger cells and larger rectifiers and by developing cheaper methods of fabrication. Conclusions are given also for off-peak production. W. H. B.

Gaseous combustion in electric discharges. VI. Effect of diluents upon the cathodic combustion of carbonic oxide "detonating gas." G. I. FINCH AND W. L. PATRICK. *Proc. Roy. Soc.* (London) A129, 656–71(1930); cf. *C. A.* 25, 458.—When an elec. discharge passes through dry or moist CO-O_2 detonating gas mixts. dild. with N_2, He, A, CO or O_2, the CO burns at a rate which is directly proportional to the current. Diln of dry detonating gas with CO or O_2 within certain limits has a slight effect on the rate of combustion at a non-sputtering cathode. At sputtering cathodes and with dry gas, the rate of combustion is inversely proportional to the amount of N_2, He or A and increases with O_2 or pressure increase. The rate at non-sputtering cathodes and with moist gas increases with CO and decreases with increasing pressure. At sputtering cathodes with moist gas, the rate is independent of pressure; CO and O_2 increase the rate. H_2O_2 and H_2 are formed with moist gas. Autoxidation takes place within the cathode zone. The fundamental mechanism of the direct combustion of CO by O_2 consists in the union of CO mols. with O atoms in pure or indirect triple collisions. Metal atoms combine with O_2 mols. to form loose complexes which readily oxidize CO. **VII. The effect of dilution with hydrogen on the cathodic combustion of carbonic oxide-oxygen mixtures.** *Ibid* 672–85.—A mixt. of CO, O_2 and H_2 burns cathodically at a rate that is proportional to the current. Electrolytic gas burns more rapidly at a non-sputtering cathode than dry gas. The combustion products at a non-sputtering cathode contain more H_2O_2 than at a sputtering cathode. H_2 is a more powerful promoter of the combustion than steam. At a Au cathode, the rate of combustion is nearly independent of the pressure for certain mixts. The preferential combustion of CO is greater with decreasing pressure. H_2 burns, first, to active steam and H_2O_2, both of which oxidize CO more readily than does O_2; H_2O is reduced to active hydrogen, H_2O_2 to inactive steam. Sputtered metal atoms decompose H_2O_2 to inactive steam. Increasing pressure or O_2 concn. favors the combustion of H_2 to H_2O_2; decreasing pressure or O_2 concn. or increasing H_2 concn. favors the combustion of H_2 to active steam. G. M. MURPHY

Decomposition of methane with carbon dioxide and water vapor in the electric discharge. K. PETERS AND A. PRANSCHKE. *Brennstoff-Chem.* 11, 473–6(1930); cf. *C. A.* 23, 4326; 25, 399.—At 5000–6000 v. in the discharge tube previously described and with rates of gas flow to 800 l./hr., CH_4—H_2O and CH_4—CO_2 mixts. have been almost completely decompd. to CO and O_2. Sepn. of C did not occur, but at intermediate voltages a large part of the CH_4 formed C_2H_2. Tabulated data show that by varying the proportions of the mixt. used, variations over a wide limit are possible in the resulting gas. Curves show the relationships between c. d., CH_4 content and the production of CO and C_2H_2. F. W. JUNG

Achievements in electrical engineering during 1930. C. K. LEE AND H. N. BLACKMON *Elec. J.* 28, 2–41(1931).—This review includes chapters on water power, hydrogen for cooling, lightning arresters, de-ion circuit breakers, mechanically made wrought Fe, photoelectric cells, ultra-violet lamps and nitriding furnace. C. G. F.

Rapid determination of Ni in electroplating baths (WOGRINZ) 7. The electrochemical behavior of metals (CHITTUM) 9. Precision of color temperature measurements under various observing conditions, a new color comparator for incandescent lamps (JUDD) 2. Fuel-heated muffle furnace, with supplementary electric heating (Ger. pat. 509,288) 1. Electrophoretic deposition of rubber from aqueous solutions (Ger. pat. 509,980) 30. Light source for making photographic records of light wave variations corresponding to electrical variations (U. S. pat. 1,788,355) 1.

BILLITER, JEAN: **Die neueren Fortschritte der technischen Elektrolyse.** Supplementary vol. to "Technische Elektrochemie;" cf. *C. A.* **23**, 2890. Halle (Saale): Verlag von Wilhelm Knapp. 328 pp. Paper.

FIELD, SAMUEL, AND WEILL, A. DUDLEY: **Electro-Plating: A Survey of Modern Practice.** London: Sir Isaac Pitman & Sons, Ltd. 205 pp. 5 s., net. Reviewed in *Metal Ind.* (London) 37, 566(1930).

KREMANN, R., AND MÜLLER, R.: **Elektromotorische Kräfte, Elektrolyse und Polarisation.** Vol. VIII of "Handbuch der allgemeinen Chemie." Leipzig: Akad. Verlags.

ZELENY, ANTHONY: **Elements of Electricity.** London: McGraw-Hill Pub. Co., Ltd. 438 pp. 15 s., net. Reviewed in *World Power* **14**, 508(1930).

Dry-cell electric batteries. WM. F. HENDRY (to National Carbon Co.). U. S. 1,786,945, Dec. 30. Various details of manuf. are described.

Storage battery. CARL J. DUNZWEILER (to Willard Storage Battery Co.). U. S. 1,786,742, Dec. 30. Structural features.

Storage battery. GEO. E. PETROSKY. U. S. 1,786,961, Dec. 30. Cap and vent construction.

Storage batteries. GABRIEL A. CAPMAN. Fr. 686,877, Mar. 11, 1929. Channels are provided in the armatures to allow the electrolyte to wet the active material on the surface of the armature. If the channels are not capillary, they are filled with glass wool, etc.

Storage batteries. I. G. FARBENIND. A.-G. Fr. 688,075, Jan. 13, 1930. Storage batteries, particularly those having an alk. electrolyte have the spaces between the electrodes or between the electrodes and the walls filled with a permeable cloth, preferably of asbestos.

Storage battery. WILLARD L. REINHARDT (to Willard Storage Battery Co.). Can. 304,849, Oct. 14, 1930. The life of neg. pole plates of storage batteries of the lead-acid type is increased by incorporating in the plates a small amt. of a substance which is composed chiefly of humic acid, but which may contain addnl. substances, namely ulmic acid, opocunic acid and crenic acid.

Storage battery. M. WUILLOT. Belg. 365,630, March 31, 1930. The plates of the battery are not immersed in the electrolyte, the latter being in the bottom of the container and being brought into contact with the plates by means of separators made of absorbent material, the lower part of which dips into the electrolyte. The separators are placed on both sides of the plates.

Galvanic batteries. FRITZ RITTINGHAUS. Ger. 508,954, April 11, 1926. A covering layer of paraffin, petrolatum and petroleum oils is provided.

Carbon cap for galvanic elements. GEBR. KLEINMANN. Ger. 508,972, Dec. 1, 1929.

Selenium cells. SOC. CARL ZEISS Fr. 687,651, Jan. 3, 1930. The Se is deposited on 2 Pt electrodes fixed on a hard support such as glass or quartz, and between the 2 electrodes a furrow is made by corrosion of the glass and filled with Se.

Accumulators. WILHELM PETRI. Ger. 508,779, April 15, 1928. Details of finely reticulated plates.

Porous separator for accumulators. HARRY WEHRLIN. Ger. 508,970, June 1, 1929.

Regenerating sulfated lead accumulator plates. JEFIM FRIGELSON. Ger. 508,789, Jan. 14, 1928. The plates are subjected to periodic chargings and dischargings of short duration till the sp. gr. of the electrolyte reaches a desired value.

Electric resistances. H. ANDRE. Brit. 334,093, Oct. 5, 1928. In an electrochem. rectifier with solid contacting electrodes, one of the electrodes is porous and is impregnated with a chem. regenerating agent which maintains or restores the original chem. compn. of the electrodes. The anode may be Ag_2S, the cathode an oxidizable metal and the regenerating substance H_2SO_4. Numerous details of manuf. are described.

Dry rectifiers. ERNST PRESSER. Ger. 509,826, Mar. 28, 1928. The electrodes of dry rectification valves are coated with $Cu_2FeC_6N_6$.

Metal electrical contacts on materials such as copper oxide layers or dry rectifiers. SIEMENS-SCHUCKERTWERKE A.-G. Brit. 334,140, Dec. 5, 1928. Layers such as those of Zn applied to materials such as active layers of Cu oxide are prevented from loosening by applying materials such as japan varnish mixed with Pb_3O_4 or PbO_2 or oxide of Fe or of Mn, and the adhesion of the metal layer may be further improved by preliminarily applying to the underlying material a thin layer of finely divided graphite before applying the Zn or other metal.

Electric resistance unit suitable for high-temperature devices. CARROLL H. BOYLES. U. S. 1,788,146, Jan. 6. A mixt. formed of C 46–80, B carbide 52–12 and Na silicate 2–8% is molded under high pressure and then heated to about 650–760° for 24–48 hrs. Around this product there is molded a casing formed from corundum 85–98 and Na silicate 15–2%, which is subjected to high pressure and heated to about 980–1090° for 18–36 hrs.

Face plates for electrical contacts. CLEMENS A. LAISE (to Eisler Elec. Corp.). U. S. 1,788,243, Jan. 6. Face plates such as those of ignition contacts, x-ray targets or spark-plug points are formed of a hard, compact alloy of W together with V, Si and Th in small proportions.

Apparatus for electrodeposition of metals. COMPAGNIE FRANÇAISE POUR L'EXPLOITATION DES PROCÉDÉS THOMSON-HOUSTON. Fr. 688,070, Jan. 13, 1930.

Electrodeposition of chromium. RAWAS-MAATSCHAPPIJ (Rudolf Appel, inventor). Ger. 509,023, May 9, 1926. A bath is used comprising CrO_3 about 50 and an alkali disulfate 0.5–1 g. per l. The CrO_3 is free from H_2SO_4 but contains a small quantity of dichromate. Suitable conditions are a temp. of 35–40°, a voltage between 3 and 4, and a c. d. of 6 amps. per sq. dm.

Electroplating. HERMANN PFANHAUSER. Ger. 508,157, Jan 3, 1928. See Austrian 114,527 (*C. A.* **24**, 791).

Electroplating apparatus with a rotatable electrode-cleaning brush. KAZIMIERZ BARANOWSKI (to Wladimir J. Einstein). U. S. 1,786,592, Dec. 30. Structural features.

Movable electroplating pad. PETER J. F. BATENBURG and CYRIL J. ATKINSON (Atkinson to Batenburg). U. S. 1,787,431, Jan. 6. Structural details.

Plating metals. FIRMA OTTO KALTENBACH. Ger. 507,623, June 6, 1928. A method is described of locally thickening electrochemical deposits of metals at places where the wear is greatest, by directing the streamlines of the current by wires, etc.

Chromium plating. JOHN A. HANLEY and WALTER L. PINNER (to General Spring Bumper Corp.). U. S. 1,787,477, Jan. 6. An article such as one with a Ni surface, which is to be Cr plated, is cleaned as anode in an alk. bath, dipped in an acid bath, rinsed, and placed immediately in a Cr plating soln., and the current is turned on when the article has been in the soln. about 5 sec.

Electrolyzer operating under pressure. J. E. NOEGGERATH. Ger. 508,480, Dec. 22, 1926. Details of the pressure-equalizing means are described.

Apparatus for the electrolysis of water. GEORGES LAMBERCIER. Fr. 687,297, Dec 27, 1929.

Metals and alloys. WALTER B. HAMILTON and THOMAS A. EVANS. Fr. 688,442, Jan. 18, 1930. Metals and alloys are made by reducing appropriate mixts. in a high-frequency elec. furnace, in which one or more priming conductors carried by induction to a sufficient temp. is introduced into the reaction mass so that the reduction is started and continues in an appropriate manner.

Aluminum. COMPAGNIE DE PRODUITS CHIM. ET ÉLECTROMÉTALLURGIQUES ALAIS, FROGES ET CAMARGUE. Fr. 686,914, Mar. 15, 1929. In the prepn. of baths used in the manuf. of Al by electrolysis, cryolite is replaced wholly or partly by a mixt. of AlF_3, dry or damp, and Na_2CO_3 or K_2CO_3, or NaOH or KOH.

Aluminum. OSCAR M. HENRIQUES and THOMAS ARNE THOMSEN. Fr. 688,567, Jan. 29, 1930. Al is made by electrolysis of a salt of Al in an anhyd. electrolyte. The active surface of the cathode is partially or wholly covered by an amorphous, cryst., granular or powd. substance betweeen or on the particles of which the pptn. or sepn. of the Al takes place. An example is given of electrolysis of a molten mixt. of NaCl and $AlCl_3$, the $AlCl_3$ being in excess so that it covers the electrode in a solid form.

Pure alumina by electrothermal reduction of impurities in crude materials such as bauxite. HANS SIEGENS. U. S. 1,787,124, Dec. 30. At the beginning of the process a furnace is charged with a raw material contg. less C admixed with it than necessary for reduction of impurities present, followed by charging with mixts. of raw material contg. increasing amts. of C until the theoretical proportion of C for the reaction mixt. is reached, and the charging process is finished with mixts. contg. C in excess sufficient to supply an excess of C in the reaction mixt. Liquid pure alumina is tapped at a time when such an amt. of free C is still present in the melt that a sample drawn is still light gray but not white and CO is developed by the melt, so that during the last period of the heating a non-oxidizing atm. is present directly over the surface of the melt.

Magnesium. I. G. FARBENIND. A.-G. Fr. 687,744, Jan. 6, 1930. In the manuf. of Mg by electrolysis of $MgCl_2$ in an electrolyte composed of a fusion bath heavier than Mg, a partition of non-conducting material is dipped into the electrolyte, and the electrodes are placed so as to reach nearly to the bottom of the bath, so that the distance

between the lower end of the partition and the bottom of the bath is at least twice the distance of that between the electrodes and the bottom.

Iron foil. JOHN R. CAIN (to Richardson Co.). U. S. 1,787,139, Dec. 30. After electrodeposition of Fe on a base of bright clean Cu, the Cu is removed electrolytically in a cyanide soln., thus producing an Fe foil with a polished appearance.

Thorium. EDMUND S. DAVENPORT (to Westinghouse Lamp Co.). U. S. 1,787,672, Jan. 6. Th is rendered resistant to atm. corrosion by anodic treatment in an electrolytic bath comprising glacial HOAc contg. an ionizable constituent such as HNO_3 capable of yielding O at the anode.

Acetylene. I. G. FARBENIND. A.-G. Fr. 687,973, Jan. 10, 1930. See Brit. 332,917 (*C. A.* 25, 462).

Acetylene and hydrogen from methane by electric-arc treatment. I. G. FARBENIND. A.-G. Fr. 687,884, Jan. 9, 1930. See Brit. 332,057 (*C. A.* 25, 39).

Apparatus for making hydrogen peroxide by electrolysis under pressure. I. G. FARBENIND. A.-G. (Georg Pfleiderer and Johannes Eckell, inventors). Ger. 508,091, June 25, 1929.

High-temperature electric furnace for three-phase current. ELEKTRO-SCHALTWERK A.-G. Ger. 509,182, May 12, 1928.

High-frequency electric furnace with concentric coils above the crucible. SIEMENS-SCHUCKERTWERKE A.-G. (Gustav Karkutsch, inventor). Ger. 509,537, Sept. 16, 1926.

Induction furnace. ALLGEMEINE ELEKTRICITÄTS GES. Ger. 509,726, Jan. 1, 1927. Details of construction are given.

Electric induction furnaces. ASSOCIATED ELECTRICAL INDUSTRIES, LTD. Fr. 687,379, Dec. 28, 1929. A metal ring is placed in the upper part or at the mouth of the crucible and its section is such that it is not fused by the eddy currents while the inductor is charged.

Electric induction furnace. SOC. GÉNÉRALE D'APPLICATIONS ÉLECTROTHERMIQUES. Fr. 686,870, Mar. 9, 1929.

Electric induction furnaces. SOC. GÉNÉRALE D'APPLICATIONS ÉLECTROTHERMIQUES Fr. 687,924, Mar. 27, 1929. A method of cooling is given.

High-frequency induction furnace. SIEMENS & HALSKE A.-G. (Wilhelm Esmarch, inventor). Ger. 507,556, June 11, 1927.

Electric induction furnaces for treating metals. CHARLES MOHR. Fr. 687,529, Mar. 23, 1929.

Electric muffle furnaces. DELIOT ET CHEMINAT. Fr. 687,332, Dec. 27, 1929.

Muffles and heating elements for electric resistance furnaces. ÉTABLISSEMENTS BEKSO. Belg. 368,592, April 30, 1930. Constructional features.

Electrically heated furnace for treating zinc ores. ST. JOSEPH LEAD CO. Fr. 687,350, Dec. 28, 1929.

Electromagnetically operated hydraulic regulator for electric arc furnaces. LEONE TAGLIAFERRI. Swiss 138,139, Mar. 20, 1929.

Electric device for controlling the temperature of furnaces. SIEMENS-SCHUCKERTWERKE A.-G. (Rudolf Crundmann, inventor). Ger. 507,828, Nov. 15, 1927.

Electric annealing and hardening oven. HERAEUS-VACUUMSCHMELZE A.-G. and WILHELM ROHN. Ger. 508,009, Mar. 9, 1926.

Electrically heated hardening, etc., ovens. SIEMENS-SCHUCKERTWERKE A.-G. (Johann Schnepf, inventor). Ger. 509,286, Aug. 6, 1927. Heating elements are arranged at the bottom of the oven so as to effect a circulation of air and equalization of the oven temp.

Alternating-current melting furnace, with electrodes and single-phase transformers. AKT.-GES FÜR STICKSTOFFDÜNGER (Werner Krauss, inventor). Ger. 509,421, Dec. 9, 1927.

Furnace electrodes. I. G. FARBENIND. A.-G. (Robert Suchy, Karl Staib and Wilhelm Moschel, inventors). Ger. 508,190, Dec. 24, 1927. Combustion of C-furnace electrodes, particularly electrolytic electrodes, is prevented by impregnating or coating the baked electrodes with H_3PO_4.

Electric purification of gases. SIEMENS-SCHUCKERTWERKE A.-G. Fr. 686,759, Dec. 17, 1929. In the elec. purification of gases, particularly *blast-furnace gases*, the gases are heated before entering the elec. field and are afterward moistened by injecting a liquid such as water, so that the particles in suspension in the gas possess sufficient conductibility for sepn. Cf. *C. A.* 24, 4994.

Treating gases containing hydrocarbons. I. G. FARBENIND. A.-G. (Gustav Wiet-

zel and Alfred Starke, inventors). Ger. 507,920, Feb. 9, 1926. App. for subjecting the gas to an elec. arc is described.

Apparatus for electrical precipitation of suspended particles from gases. CRANDALL Z. ROSECRANS (to Leeds & Northrup Co.). U. S. 1,787,955, Jan. 6. Structural features.

Electric gas purifiers. SIEMENS-SCHUCKERTWERKE A.-G. (Carl Hahn, inventor). Ger. 507,914, Aug. 7, 1925. The electrodes are formed of coiled wire with barbs projecting at all angles.

Electric gas purifier. SIEMENS-SCHUCKERTWERKE A.-G. (Fritz Müller, inventor). Ger. 507,915, April 1, 1926. Details of cleaning the insulators by air.

Electric gas purifiers. SIEMENS-SCHUCKERTWERKE A.-G. (Hans Höfler, inventor). Ger. 507,916, July 3, 1926. Details of a protective cover for the lead-off column.

Electric gas-purifier with upright tubular dust-precipitating electrodes. METALLGESELLSCHAFT A.-G. Ger. 507,521, May 29, 1929.

Electric gas-purifying plant. SIEMENS-SCHUCKERTWERKE A.-G. Ger. 508,572, June 11, 1927. Addn. to 505,673 (*C. A.* **25**, 464). App. for the sepn. of combustible particles as described in 505,673, has the explosion flap balanced by a spring.

Gas-distributing device for electric gas cleaner. SIEMENS-SCHUCKERTWERKE A.-G. Ger. 509,404, June 17, 1925.

Arc-quenching material. GODFREY STEERUP (to Electrical Engineers Equipment Co.). U. S. 1,786,581, Dec. 30. A conductor-bedding material suitable for use in fuses or other elec. app. is composed of an arc-quenching volatile liquid such as CCl_4 and a metallic soap of naturally solid consistency such as Al stearate and palmitate (the liquid used being volatile at temps. occurring adjacent to fuse elements as the latter heat up under load).

Electric signals. MAX VOLMER. Fr. 688,017, Jan. 11, 1930. Electroösmosis of an appropriate liquid is used for the indication of elec. signals.

Leading-in wire. JOHN H. RAMAGE (to Canadian Westinghouse Co., Ltd.). Can. 305,419, Nov. 4, 1930. A leading-in wire for incandescent elec. lamps is electroplated with Cr and the plating sintered to the wire by heat-treating the wire under a layer of Cr powder in the presence of flowing dried H or other inert gas.

Vacuum-tube lamp. PATENT-TREUHAND-GES. FÜR ELEK. GLÜHLAMPEN M. B. H. (Kurt Wiegand, inventor). Ger. 509,372, Nov. 4, 1926. A vacuum-tube lamp for irradiation purposes has a casing transparent to ultra-violet rays and an atm. comprising N and Hg, with or without H.

5—PHOTOGRAPHY

C. E. K. MEES

Note on Silberstein's "quantum theory of photographic exposure." F. C. TOY. *Phot. J.* **70**, 393(1930); cf. *C. A.* **24**, 4214.—Measurements of photographic effects cannot give information as to the structure of the incident radiation. It is pointed out that the results described do not necessarily support the view that x-rays are discrete in structure and that one x-ray "dart" striking a grain is sufficient to make it developable. The results are to be expected from the existing knowledge of photographic sensitivity. **Reply.** A. P. H. TRIVELLI. *Ibid* 438(1930). A. B.

Photography on copper. T. J. BAKER. *Nature* **126**, 279(Aug. 23, 1930).—A sheet of brass or Cu has deposited on it a thin electrolytic coat of Cu. The sheet is then immersed in a boiling soln. of $CuCl_2$ or $CuSO_4$ and NaCl. If the deposit is not uniform the surface is scratch-brushed and again immersed. The coat is salmon pink in color and perfectly adherent. B. failed to "fix" prints obtained on this film.

Study of various influences on the sensitivity of photographic plates. O. MASAKI. *Sci. ind. phot.* [2], **1**, 231(1930).—The effect of heat and of fogging exposures by means of visible light and x-rays has been investigated. Plates exposed at 80° show increased sensitivity as compared with those at 15°, the effect being more noticeable for long wave lengths (7000 A. U.). The inertia of panchromatic and slow plates is diminished by heat while it is increased for orthochromatic and ordinary plates. The increased sensitivity does not immediately disappear on cooling. It is difficult to distinguish between the effect of heat and of drying. The inertia of the plates decreases quite rapidly between 30° and 70°, the color sensitivity of panchromatic plates also increasing. The density obtained on exposure with an addnl. fogging exposure is greater than the sum of the densities of the sep. exposures. This effect is greatest for

panchromatic plates and is a max. when the exposure immediately follows the preliminary one. For one plate a preliminary exposure giving a density of 0.4 produces the max. sensitivity. X-rays have a desensitizing effect which is greater when exposure to them displaces toward the longer wave length the spectral absorption of AgCl, AgBr and AgI. The photoconductivity decreases with increasing temp., but its max. is displaced at the same time toward the longer wave lengths. L. A. STAIB, JR.

Influence of temperature on the characteristic curve (gradation) of the photographic plate. N. BARABASCHEFF AND B. SEMEJKIN. *Astron. Nachrichten* **236**, 354 (1929); *Z. wiss. Phot.* **28**, 221(1930).—The influence of the variation of the temp. of exposure on the image developable under standard conditions was tested by exposing first one portion of a plate at an ordinary room temp., and then the other portion at a relatively low temp., before developing. "The higher temp. ranged from 15.6° to 18.8° and the lower—that of the observatory meridian room—from —7.7° to —4.0°. The exposures, of 5 or 10 min. duration, corresponding approx. to the lower half of the characteristic curve, were made by means of a metal filament lamp and a tube photometer; 45 min. was allowed in the meridian room for the plate to cool, and 40 min for it to warm up again before the development (which was in 1:19 rodinal for 7 min) in the other room. Various possible errors in exposing were carefully checked, and found smaller than the errors of observation. The plates used were Agfa "Extra-Rapid" (which were somewhat stale) and the Russian "Kino-Trest." The curves obtained for the exposures at the higher temps. were found invariably to be the higher The authors conclude that the density differences are considerable enough to render it necessary when working under conditions as extreme as these, to calibrate the plate for the actual temp. of exposure. E. R. B.

Desensitization of panchromatic emulsions. LÜPPO-CRAMER. *Kinotechnik* 11, 566(1929).—The effect of certain dye desensitizers on dye-sensitized photographic emulsions is to remove all or part of the color sensitivity, leaving a blue and green sensitivity comparable to that of the mother emulsion. This effect and the removal of a certain amt. of fog has resulted in some cases in an enhanced green sensitivity. The color sensitivity caused by ripening in emulsions having no sensitizing dye is resistant to pinakryptol green, but not to chromic acid. The action of the desensitizing dye on dye-sensitized emulsions appears to be a process of adsorption displacement rather than destruction of the dye sensitizer. C. E. IVES

Photographic sensitizers for the infra red. C. E. K. MEES. *Nature* **126**, 471 (1930).—A recent statement that the recent developments in infra-red spectrography arose from the needs of the motion picture industry is corrected. Neocyanine, the sensitizing dye used in the prepn. of infra-red sensitive photographic materials, was accidentally discovered by H. T. Clarke during the prepn. of cryptocyanine, which had been discovered at the Bur. of Chemistry in Washington.

Adsorption as the primary process of photographic development. P. WULFF AND K. SEIDL. *Z. wiss. Phot.* **28**, 239(1930).—Isomers of org. developers, such as resorcinol, phloroglucinol and *m*-aminophenol which are not developers, form insol. unstable salts with Ag ions in alk. soln. These isomers prevent the developing action of hydroquinone, pyrogallol and *p*-aminophenol. Resorcinol is adsorbed in alk. soln. as the anion to AgBr. The adsorption is diminished by Br^-, Cl^-, SO_3^{--} and is increased by Ag^+ and Tl^+. With the exception of SO_3^{--} the action of these ions is similar to their action in the hydroquinone developer. The adsorption density of resorcinol is approx detd. for different concns. Sheppard's theory, according to which photographic development is detd. by the decompn. of the adsorption complex, is supported by these expts. A. P. H. TRIVELLI

Penetration of the developer into the emulsion film. R. E. LIESEGANG. *Atelier Phot.* **37**, 53(1930).—The penetration of a dissolved substance into the emulsion film may be illustrated by the expt. of partially bleaching a developed Ag image on a paper support with a soln. of I. The result is a negative because of the dark-blue compd. formed by the unconsumed I which reaches the starch in the support. In the Eberhard effect—the mutual contrast-increasing action at the boundary of neighboring dissimilar exposures—there occurs a flank attack, as it were, on the nearest more fully exposed material by the developer that has penetrated into the emulsion film of the less-exposed area. E. R. BULLOCK

Action of long-wave radiation of a spark upon the photographic layer. M. LEVITSKII. *Physik. Z.* **31**, 769–71(1930).—Radiation of extremely long wave lengths was focused on a photographic plate after being filtered through black paper. The emulsion was first given a weak exposure to sunlight and then after exposure to the long-wave radiation, solarization was observed. The effect was easily observed for old photographic

materials, but new materials generally failed to show the phenomenon. The wave lengths which produced the effect were found to be 75–80, and 135–140μ—the wave lengths which correspond to ionic vibration in AgCl and AgBr, resp. M. E. RUSSELL

Solarization phenomena. III. Silver quantity, covering power, grain number and mass in the region of solarization. H. ARENS AND K. KIPPHAN. *Z. wiss. Phot.* **28**, 229 (1930); cf. *C. A.* **25**, 42.—Plates with peptized AgBr were investigated in the region of solarization with chem. and phys. development. With chem. development grain no. and size decrease with the density. In the region of solarization grains become less developable. Phys. development gives the same results as chem. development with the exception of the grain size, which increases with chem. development. Solarization with phys. development, therefore, depends mainly on a diminishing of grain no. The covering power increases with chem., and decreases with phys., development in the region of solarization. At max. density the grain no. is the same with phys. development as the total no. of Ag halide grains; with chem. development it is less. The max. size of developable specks was found to be 1.7×10^{-6} cm. A. P. H. TRIVELLI

Silver bromide collodion. III. LÜPPO-CRAMER. *Phot. Korr.* **66**, 141 (1930).—Continuing the expts. previously reported, the author finds that the great diminution in the fog produced by the prolonged action of water solns. of certain colloids on bromide collodion emulsion plates, as compared with distd. water, is assocd. with a considerable (though not immediate) reduction in sensitivity brought about by such solns. Among colloid solns. newly tried were: tea, coffee, beer, mustard seed ext., pure albumin (1%) and peptone (0.5%). Peptone treatment, when followed by drying, produces a not inconsiderable increase in sensitivity, without fog. Tea, etc., and certain basic dyes exert a weakening action on a latent light image already impressed, but none as far as could be detd. on the latent fog produced by long bathing in distd. water. On AgBr gelatin plates, even with 20-hr. treatment, all the agents named are without influence. E. R. BULLOCK

The Herschel effect. J. NARBUTT. *Z. wiss. Phot.* **28**, 191 (1930).—Na^+, NH_4^+, Mg^{++}, Zn^{++}, Cd^{++}, Al^{+++}, Pb^{++}, UO_2^{++}, Mn^{++}, Co^{++}, Ni^{++}, CH_3COO^-, NO_3^-, NO_2^-, F^- and SO_4^{--} cause no, or very little, decrease in the sensitivity of Satrox paper. K^+ causes a pronounced decrease in sensitivity. Cr^{+++} and Fe^{++} decrease the sensitivity still more and Fe^{+++} and Cu^{++} decrease it most of all. Of the halogen ions I^- diminishes the speed most of all, and Cl^- moderately. There is no speed difference with F^-. The Herschel effect increases very strongly with Cu^{++}, Fe^{+++} and VO^{++}. I^- increases the Herschel effect most and F^- seems even to decrease it. The Herschel effect is much stronger on wet paper than on dry, especially in the presence of Fe^{++} and VO^{++} salt soln. Red sensitizers removed the Herschel effect. Oxidizing solns. and desensitizers are sensitizers for the Herschel effect even on panchromatic plates. In red light, oxidizing solns. and desensitizers remove the latent image previously obtained in red light. The same could be done with green light, even if the previous exposure was made in white or red light. In general, any radiation was able to destroy the latent image of a previous radiation, if an oxidation soln. or a desensitizer was applied between the exposures. A. P. H. TRIVELLI

The jelly strength of photographic gelatin. J. P. LAWRIE. *J. Soc. Chem. Ind.* **49**, 403–4T (1930).—L. attempts to ascertain the cause of irregularity in jelly strength detns., using the Tracey tester, which measures the load required to break the surface of the gel. With const. soaking conditions, the jelly strength varied greatly with the temp. at which the gelatin was dissolved. Reproducible results could not be obtained even with careful control of time and temp. Different operators also obtained varying results. It is concluded that a properly equipped thermostat room is essential for producing comparable results. S. S. SWEET

The actinicity and color temperature of magnesium ribbon and flashlight. H. ARENS AND J. EGGERT. *Z. wiss. Phot.* **28**, 169 (1930).—The assumption of Eder (cf. *C. A.* **25**, 44) that his values of the actinicity of Mg ribbon light for pure AgBr without glass filtering has been set 10 times too low is explained by the fact that Beck and Eggert work under different exptl. conditions. The actinicity of flashlight is, in most cases, higher than that of ribbon light. The color temp. of flash light is, in agreement with Eder's results, about 3350°K. A. P. H. TRIVELLI

Light source for making photographic records of light-wave variations corresponding to electrical variations (U. S. pat. 1,788,355) **1**.

GABRIEL, LEONARD C.: **Bromoil and Transfer.** London: Sir Isaac Pitman and Sons, Ltd. 7s. 6d., net. Reviewed in *Pharm. J.* **125**, 516 (1930).

Photography. I. G. FARBENIND. A.-G. (Konrad Hebbel and Alfred Miller, inventors). Ger. 509,762, Apr. 11, 1929. Reflex prints are obtained by treating exposed Ag halide gelatin plates, before fixing, with H_2O_2 or other peroxides. The Ag-contg. parts of the plate are thus cleared, leaving the parts still contg. Ag halide sensitive to light. Cf. *C. A.* **25**, 465.

Color photography. W. VAN D. KELLY. Brit. 333,931, May 23, 1929. A film for color photography has a transparent base with 2 emulsion coatings on one side sepd by a stratum of gelatin contg. a color-filtering dye consisting of a combination of benzidine or its homologs with the sulfonic acids of naphthol or naphthylamine such as Congo red or benzopurpurine. The layers may be differently color-sensitive, different color images being produced in the layers followed by bleaching of the dye with Na hyposulfite. Brit. 333,933 describes coloring of the surface of an emulsion with dyes such as Congo red or benzopurpurine for use in color photography, as when exposing 2 plates or films with their sensitive surfaces in contact. Brit. 333,932 relates to details of construction of a camera suitable for use with superposed films.

Color photography. F. LIERG. Brit. 334,004, July 2, 1929. Two or more Ag halide emulsions of different color sensitivities are superposed, with or without an intermediate layer of gelatin, and one or more of the layers contain substances which enable the Ag images to be converted into colored images independently; *e. g.*, Cu carbonate may be added to one layer and $Fe(OH)_3$ or Mn carbonate to the other, and after developing and fixing the Ag images are treated with $K_4FeC_6N_6$, then dipped in HCl (Cu ferrocyanide being formed in one layer and Prussian blue or Mn ferrocyanide in the other). The Cu ferrocyanide is treated with a thiocyanate soln. to form a red image and when Mn ferrocyanide has been formed a malachite green image is produced by treatment with alkali and a soln. of leucomalachite green. Various other details and modifications of procedure are also described. Cf. *C. A.* **25**, 465.

Color photography. SPICERS, LTD., J. N. GOLDSMITH, T. T. BAKER and C. BONAMICO. Brit. 333,865, June 1, 1929. In applying a multicolor screen to a film of celluloid, cellulose acetate compn. or other cellulose ester material, the surface of the film is treated with a liquid alk. reagent (such as a 0.5–5% soln. of KOH in "methylated spirit") which renders it capable of absorbing dyes or colors.

Selective filter for color photography with a film with lenticular elements. SOCIÉTÉ FRANÇAISE CINÉCHROMATIQUE (Procédés R. Berthon). Ger. 507,595, June 11, 1929. The filter consists of four strips of gelatin, celluloid, etc., of which the outer strips are of the same color and the inner strips of different colors from each other and from the outer strips.

Combined black and white and colored image photography. WM. V. D. KELLEY (to Kelley Color Films, Inc.). U. S. 1,787,201, Dec. 30. A transparent carrier is coated on one side only with gelatin having a reduced Ag image of the "minus reds" in the original subject and a toned color representation of the red in the original subject.

Photographic emulsions. RUDOLF J. KONECNY. Fr. 687,074, Dec. 21, 1929. A gelatinous ultramicroscopic photographic emulsion is made by causing colloidal Ag to react with HBr or HI in a detd. concn. by means of a chem. catalyst. Thus, gelatin is dissolved in heated redistd. water and c. p. colloidal Ag is added and the mixt. constantly stirred, and KBr or KI is added. The soln. is transferred to a dark room and HBr or HI is added and the mixt. passed through an ultra-filter. After filtration a reserve of gelatin is added and the emulsion is dried on plates, etc. A table showing the proportionate amts. of the different ingredients is given.

Photographic reducers. I. G. FARBENIND. A.-G. Brit. 334,144, Nov. 29, 1928. See Ger. 486,324 (*C. A.* **24**, 1809).

Photographic designs on metal articles. F. W. MILLER. Brit. 333,930, May 23, 1929. The whole of the surface of the article is coated with a non-sensitized resist such as shellac varnish and to this there is applied an exposed but undeveloped photographic transfer such as a carbon print, unexposed parts of the transfer are washed out and the uncovered parts of the resist are removed. The exposed metal may then either be etched (as with $FeCl_3$ soln., to produce a design in intaglio) or has metal deposited on it to form a relief design, or may be first etched and then treated for metal deposition to form an inlaid design.

Engraving photographic pictures on printing cylinders. PIERRE BONNAUD and LOUIS M. A. JOURDAN (to Nashua Mfg. Co.). U. S. 1,788,229, Jan. 6. A screen negative taken on paper having a coating of gelatino-bromide Ag is rendered insol. in the portions acted on by light, and the screen negative is wrapped about the surface of a cylinder to be engraved with the sensitive coating of the negative in contact with the cylinder and the insol. portions of the screen negative are caused to adhere firmly

to the cylinder, and superposed on the screen negative there is wrapped on the cylinder a negative of the photographic picture to be engraved, and the surface of the cylinder is etched with acid.

Etched rollers for photographic contact copies. ALEXANDER TAUSZ and FRANZ STĚHLIK. Ger. 507,732, Dec. 15, 1928. Details are given.

Photomechanically produced plates for two or more color-printings. ULLSTEIN DRUCKEREI G. M. B. H. and JULIUS BEKK. Ger. 507,731. May 17, 1929. Details are given.

Machine for automatically developing, washing, fixing and drying photographic prints. MAURICE CUENDET. Swiss 137,768, April 11, 1929. Details of construction.

Apparatus for making photographic duplicates of printing, drawings, etc., by the aid of a photoluminescent light carrier. MANO ZIFFER VON TESCHENBRUCK. Swiss 137,769, May 18, 1929. Details are given.

Light-sensitive layers. I. G. FARBENIND. A.-G. Fr. 688,591, Jan. 21, 1930. Light-sensitive layers for use in photography are formed of small particles of the same or different materials and of equal or different sensitiveness to light. These layers are made by adding to colloids or their solns. substances sensitive to light and substances which are insol. in water and insensitive to light. They are reduced by a dry or wet method to fine particles and spread on a suitable support. Several examples are given.

Ultra-violet rays. SOC. DES ÉTABLISSEMENTS GAUMONT (SOC. ANON.). Fr. 686,905, Mar. 14, 1929. Nitrophenols, such as *p*-nitrophenol, are used in films, photographic screens, etc., for absorbing ultra-violet rays. The addn. of acids such as H_2SO_4 renders them perfectly transparent in the visible spectrum.

Transparent paper suitable for use as a photographic film. VIKTOR BAUSCH, JR. U. S. 1,787,564, Jan. 6. Paper is impregnated under pressure with a phenol aldehyde condensation product contg. a hardening agent and an excess of the product is applied to both faces of the paper so as to form a smooth coating on them, followed by heating to form a hard surface on the coating. An arrangement of app. is described.

Apparatus and procedure for tinting selected areas of motion picture films (leaving untinted sound record areas). JOHN G. JONES (to Eastman Kodak Co.). U. S. 1,787,824, Jan. 6. U. S. 1,787,825 (LLOYD A. JONES, to Eastman Kodak Co.) also relates to similar subject matter.

Combined sound record and color motion picture record films. FRED M. BISHOP (to Eastman Kodak Co.). U. S. 1,788,010, Jan. 6. Structural features.

6—INORGANIC CHEMISTRY

A. R. MIDDLETON

Chemistry of germanium. V. Complex compounds of germanium. ROBERT SCHWARZ AND HERMANN GIESE. *Ber.* **63B**, 2428–32(1930); cf. *C. A.* **24**, 3189.—$H_4[Ge(Mo_2O_7)_6].28H_2O$ and $H_8[Ge(W_2O_7)_6].28H_2O$ have been prepd. The former is green yellow. The W acid gives 2 stereoisomeric K salts but only one free acid appears to exist. The Mo acid gives the same color reaction with alk. $SnCl_2$ as does the silicomolybdic acid (*C. A.* **23**, 2906). W and Ge can be sepd. by distg. the complex acid from 70% H_2SO_4 in a HCl stream. The Mo and Ge are sepd. by heating to 500° and vaporizing the Mo as MoO_3 in an O_2 stream at 1000°; GeO_2 remains. Even at —72° no complex of $GeCl_4$ and HCl exists. V. F. HARRINGTON

Heteropolyacids of germanium. I. ALFRED BRUKL. *Monatsh.* **56**, 179–83 (1930).—A complex acid with the formula $GeO_2.12WO_3.32H_2O$ has been prepd. This is easily sol. in H_2O, crystg. in well-formed octahedral, faintly yellow crystals. These are stable up to red heat, the H_2O going off first. Alkalies decomp. the acid into its constituent parts. The NH_4, Rb and Cs salts are difficultly sol., but a very sol. tetrabasic Na salt having the formula $Na_4H_4[Ge(W_2O_7)_6].19H_2O$, a Ba salt $Ba_2H_4[Ge(W_2O_7)_6].14H_2O$ and a Ag salt, $Ag_4H_4[Ge(W_2O_7)_6].7H_2O$ are formed. G. E. E.

A study of peraluminates of alkali and alkaline earth metals. J. PRÁŠEK. *Collection Czechoslov. Chem. Comm.* **2**, 653–64(1930).—By the addn. of H_2O_2 to a soln. of the aluminate, the following compds. were obtained: $K_2O.O.Al_2O_3.8H_2O$, $K_2O.2.OAl_2O_3.8H_2O$, and the corresponding Na compds. By mixing a soln. of alk. earth chloride contg. H_2O_2 with alkali aluminate, there were pptd. $Li_2O.2O.2Al_2O_3.28H_2O$, and $Li_2O.20.4Al_2O_3.25H_2O$; $MgO.2O.Al_2O_3.10H_2O$, and the corresponding compds. of Ca, Sr and Ba. By shaking the last named with excess of hydroxide, $4CaO.2O.Al_2O_3.15H_2O$, $3SrO.2O.Al_2O_3.20H_2O$, $3BaO.2O.Al_2O_3.20H_2O$ were obtained. These peraluminates are

stable at ordinary temp., but lose O_2 at 110°; with dil. acids, H_2O_2 is liberated. The alkali compds., which are sol., ionize thus: $2K^+ + [Al(OH)_3O_2H]^- + [Al(OH)_4]^-$.
T. H. CHILTON

The chloro-, bromo- and iodo-aluminates of lime. (MLLE.) FORET. *Compt. rend.* 191, 711–3(1930).—The bromo- and the iodo-aluminates of lime are double salts analogous to the chloro-aluminate of lime. To obtain the double salt free from tricalcium aluminate, a concn. of a Ca salt or compd. represented as $(A)_2Ca$ in about 3 times the theoretical amt. is required. Drying with $CaCl_2$ is preferred. Tables are given showing figures in mols. per l. for CaO, $CaBr_2$, Al_2O_3, of various double salts. A. W. E.

The constitution of the borates. FRIEDRICH L. HAHN. *Z. anorg. allgem. Chem.* 193, 316–20(1930).—The following considerations based on the properties of the boric acids and the polyborates and on the accepted constitution of other polyacids lead to the structure of the borates: (1) B is tervalent. (2) B can act as the central atom of a binary or ternary complex, *i. e.*, such groups as —F,—OH,—OR,—O—R—O— and —O—O— may be attached to the central B atom; the charge of the complex, and thus the basicity of the corresponding acid, equals the sum of the charges on the groups less 3. (3) In the polyborates the groups attached to the central B are anions of lower boric acids. (4) O atoms attached to the central atom occupy only 1 coördination position. The monoborates, therefore, have the structures: $B(OH)_4^-$, $OB(OH)_2^-$, O_3BOH^{---} or BO_3^{---}; the tetraborates, $OB[B(OH)_4]_3^{--}$ or $OB[OB(OH)_2]_3^{--}$; the pentaborates, $B[B(OH)_4]_4^-$, $B[OB(OH)_2]_4^-$, etc.; and the perborates, $(OH)_2B(—O—OH)^-$, $OB(OH)(—O—OH)^-$ or $(OH)_2B$  .
H. F. JOHNSTONE

Alkaline pentaborates. A. P. ROLLET AND L. ANDRES. *Compt. rend.* 191, 567–9 (1930).—K, Rb and Cs borates have identical formulas $5B_2O_3.M_2O.8H_2O$ and all crystallize in the orthorhombic system. Their soly. in H_2O decreases from K to Cs.
M. MCMAHON

The structure of aluminum chloride. V. E. LASHKAREV. *Z. anorg. allgem. Chem.* 193, 270–6(1930).—The unit crystal of $AlCl_3$ as detd. by the Debye method consists of a hexagonal structure with the parameters $a = 3.475 \pm .0.007$ A. U. and $c/a = 2.45_9 \pm 0.01$. The approx. coördinates of the Cl and Al ions are, resp., (000); ($^1/_3$ $^1/_3$ $^1/_3$); ($^2/_3$ $^1/_3$ $^1/_3$); and (0 0 $^1/_2$). The structure belongs to class D_{3d}.
H. F. JOHNSTONE

The structure of the chlorites. LINUS PAULING. *Proc. Nat. Acad. Sci.* 16, 578–82(1930).—Data obtained from oscillation and Laue photographs of specimens of penninite and clinochlore, of compn. approximating the formula $Al_2Mg_5Si_3O_{10}(OH)_8$, lead to a monoclinic unit of structure with $a = 5.2-5.3$ A. U., $b = 9.2-9.3$ A. U., $c = 14.3-14.4$ A. U., $\beta = 96°50'$, contg. 2 mols. as written above. The lattice is apparently end-centered on (001), the space group being C_{2h}^3. The chlorites are composed of alternating mica and brucite layers, each of which is sym. Their general chem. formula is $X_mY_4O_{10}(OH)_8$, where $4 \leq m \leq 6$; the constituent X of coördination no. 6 varies between Mg_5Al and Mg_4Al_2 with Fe^{++} and Mn^{++} sometimes partially replacing Mg^{++} and Fe^{+3} replacing Al^{+3}; the constituent Y_4 of coördination no. 4 varies within the range between Si_3Al and Si_2Al_2.
H. F. JOHNSTONE

Oxidation of chlorites to chlorates by means of permanganate. G. R. LEVI AND D. GHIRON. *Atti accad Lincei* 11, 1005–8(1930).—Chlorites are oxidized by permanganates in neutral soln. but the reaction is stopped by the alkali formed: $3\ ClO_2^- + 2\ MnO_4^- + H_2O \longrightarrow 3\ ClO_3^- + 2\ MnO_2 + 2\ OH^-$. However, if $Ca(ClO_2)_2$ is used and a salt of Ca, Mg or Zn added to neutralize the OH ions as formed, then the reaction is quant. This reaction was studied as a possible means for detg. chlorites, chlorate, hypochlorite and chlorides in the presence of each other.
A. W. CONTIERI

Bismuth salts and sodium phosphate. ORESTE CALCAGNO. *Anales oficina quím. provincia* (Buenos Aires) 2, 1–22(1928).—Numerous equations are given for the reaction of Na phosphate with $Bi(NO_3)_3$: (*a*) dissolved in a little HNO_3, (*b*) in excess HNO_3, (*c*) in AcOH, (*d*) in a little HNO_3 with a little AcOH added, (*e*) in little or excess HNO_3 with the addn. of excess AcOH, and also for reactions of alk. solns. of Bi salts with Na phosphate and for Bi salts in neutral soln. with Na phosphate.
S. L. B. ETHERTON

Carbon suboxide. L. H. REYERSON AND KENNETH KOBE. *Chem. Reviews* 7, 479–92(1930).—A review of prepn. methods, properties and suggested structures of C_3O_2. C subsulfide, C_6S_2, is briefly reviewed. A full bibliography is included.
J. H. REEDY

——— compounds of the eighth group of the periodic system. II. Compounds of D. K. GORALEVICH. *J. Russ. Phys.-Chem. Soc.* 62, 897–913(1930);

cf. *C. A.* **22**, 1294.—Fusion of NiO with KNO_3 or $KClO_3$ in the presence of an excess of caustic alkali yields an unstable, water-sol. bright-green potassium nickelate, K_2NiO_4, which readily liberates O. It was analyzed by conversion into the Ba, Sr and Ca salts. The reactions of formation are: (1) $NiO + 2KNO_3 + 2KOH = K_2NiO_4 + 2KNO_2 + H_2O$; (2) $NiO + 2KClO_3 + 2KOH = K_2NiO_4 + KCl + KClO_4 + H_2O$. Fusion of NiO with $NaNO_3$ or $NaClO_3$ and NaOH yields bright-green, highly hygroscopic, readily sol. Na_2NiO_4, which, like K_2NiO_4, decomposes readily, liberating O_2. By the action of alkaline earth salts upon freshly prepd. aq. solns. of the alkali salts there are obtained insol. alk. earth nickelates, similar to the alk. earth ferrates, but more stable. In aq. soln., alkali ferrates decompose within 20–30 min.; the alkali nickelates, however, require several hrs. for complete decompn. The green soln. of the melt contg. K_2NiO_4 decomposed completely with liberation of gray NiO, only after 24 hrs. It follows, that with increase in at. wt. the stability of the higher oxides of the elements of the 8th group increases. D. K.

Reduction of the oxygen compounds of phosphorus by hydrogen. P. Villard. *Compt. rend.* **191**, 1035–8(1930).—P_2O_5, metaphosphoric acid, several alk. and alk. earth phosphates have been reduced in H. The reaction begins 800–900° and sufficient of the somber red variety appears so that it can be collected. All 3 forms appear between 900° and 950°; the 2 forms of red P are quite distinct and sep. Mary E. Lear

Influence of nitrogen peroxide on the glow of phosphorus. F. Schacherl. *Collection Czechoslov. Chem. Comm.* **2**, 665–80(1930); cf. *C. A.* **24**, 4476.—The pressure at which P would begin to glow in the presence of NO_2 in both O_2 and air was detd. This pressure p_x in mm. Hg. was found to be expressed by an equation $p_x = K/(a + x)$, where K and a are consts. (0.8 and 0.00135, resp., for O_2 at 20°), and x is the ratio $[NO_2]/[O_2]$. The effect is less in air than in O_2. The effect can be explained by reaction of NO_2 with O atoms, thus breaking reaction chains. T. H. Chilton

Preparation of pure rhenium compounds. F. Krauss and H. Steinfeld. *Z. anorg. allgem. Chem.* **193**, 385–90(1930).—Solns. of K perrhenates are not reduced by SO_2 or by a current of H_2 accompanied by ultra-violet radiation, but are reduced by Zn + HCl, Na amalgam and hydrazine hydrate. Treatment with Zn and HCl in cold soln. gave a step-by-step reduction, the soln. becoming first yellow, then yellowish green, bluish violet, brownish black and finally almost colorless. By stopping the reduction at the desired point, pure Re compds. in various states of oxidation can be obtained. H. Stoertz

Action of sodium thiosulfate on potassium iodate in weakly acid medium. E. Carrière and Juillard. *Compt. rend.* **191**, 1133–5(1930).—When a soln. of $Na_2S_2O_3$ is added to a soln. of KIO_3 which has been acidified with HCl so as to give an acidity of 0.1 mols. HCl per l., I_2 is formed. On further addn. of $Na_2S_2O_3$, the I_2 disappears. The changes which occur may be shown by the following reactions, the accuracy of which has been tested by a quant. study: $HIO_3 + 6Na_2S_2O_3 + 2H_2O \longrightarrow 5NaOH + NaI + 3Na_2S_4O_6$, and $4HIO_3 + 3Na_2S_2O_3 + 3H_2O \longrightarrow 4HI + 6NaHSO_4$. The factors influencing the reaction are T (temp.), C_{HCl} (concn. of HCl), C_{KIO_3} (concn. of KIO_3) and t (time of addn. of $Na_2S_2O_3$). T being const. and C_{HCl} and C_{KIO_3} being the same, the quantity of $Na_2S_2O_3$ necessary for the reaction decreases with increase in t. Slow addn. of $Na_2S_2O_3$ thus favors formation of $NaHSO_4$. T, C_{KIO_3} and t being const., the formation of sulfate is favored by an increase in C_{HCl}. C_{KIO_3} and C_{HCl} being the same and t being const., formation of sulfate is favored by an increase in T. T, t, C_{HCl} and C_{KIO_3} being const., the formation of $Na_2S_4O_6$ is favored by diln. Louise Kelley

Oxidation of ferrous iron by iodine in the presence of phosphate and the nonexistence of a ferriphosphate complex. Walter D. Bonner and Hendrick Romeyn, Jr. *Ind. Eng. Chem., Anal. Ed.* **3**, 85–7(1931).—Although, in the absence of H_3PO_4, Fe^{+++} is reduced to Fe^{++} by I^-, in the presence of H_3PO_4 and a moderate concn. of H^+ the reverse reaction can be made to take place completely. The reason for the completion of the reduction of Fe^{+++} to Fe^{++} is probably the decrease in the ratio Fe^{+++}/Fe^{++} caused by the presence of H_3PO_4. Probably no complex ion is formed but rather compounds such as $FePO_4$ and $Fe(H_2PO_4)_3$ which are but slightly ionized. W. T. H.

Iodine heptafluoride. Otto Ruff and Rudolf Keim. *Z. anorg. allgem. Chem.* **193**, 176–86(1930).—Heating IF_5 (made by treating I with F) with F up to 270° forms IF_7 with a 35% yield. Since the reaction is reversible, it is necessary to condense the IF_5 suitably to increase the yield. The IF_7 being more volatile passes off and is collected in a tube chilled with liquid air. It is then purified by distn. at a low temp. Pure IF_7 is a colorless gas at room temp., forming a cloud with moist air. On cooling,

it yields a mobile colorless liquid, a white powder or colorless crystals, m. 5° to 6°. The vapor presure, measured from 210° to 273° abs., is given by the expression $\log p = 8.6604 - 1602.6/T$. Liquid IF_7 has a d. of 2.8 at 6° and 2.7 at 10° and a mol. wt. of 260. Chem. properties include a lively reaction with H on heating, formation of BF_3 and IF_5 with B, etc.; it reacts rather easily with a large no. of substances and is much like ClF_3 (cf. *C. A.* **24**, 3722). L. P. HALL

Methods for determining the solubilities of some fluosilicates. KATHERINE K. WORTHINGTON AND MALCOLM M. HARING. *Ind. Eng. Chem., Anal. Ed.* **3**, 7–9(1931).—Methods for prepg. pure fluosilicates of Na, Mg, Zn, Pb and Cu are described and the methods of analyzing them are discussed briefly. W. T. H.

Action of fluorine on charcoal. Melting and boiling points of carbon tetrafluoride. P. LEBEAU AND A. DAMIENS. *Compt. rend.* **191**, 939–40(1930).—The mixt. of compds. resulting from the action of F on charcoal was purified by fractionation and C_2F_6 and C_3F_8 were isolated. A l. of very pure CF_4 was liquefied and the m. p. found to be —191°, and the b. p. —126° at 760 mm. Cf. *C. A.* **21**, 1603; **24**, 5741. J. H. M.

The decomposition of potassium ferrocyanide and of potassium ferricyanide by the autoclave treatment. T. KATSURA AND T. WATANABE. *Sci. Papers Inst. Phys Chem. Research* (Tokyo) **14**, 189–92(1930); cf. *C. A.* **24**, 5658.—In the previous paper a note was given as to decompn. products resulting from $K_4Fe(CN)_6$ and $K_3Fe(CN)_6$ when treated in an autoclave under pressure of 10 atm. (180°). This present study takes into account the changes of ferrocyanide on subjection to light, and of ferricyanide in presence of alkali. Variation in concn. seems to have no effect on the mode of decompn. $K_4Fe(CN)_6$ is hydrolyzed more rapidly by autoclave treatment than by action of light. Decompn. of $K_3Fe(CN)_6$ by autoclave treatment proceeds in the same way as that caused by alkali. The $Fe(OH)_3$ produced by the decompn. was dehydrated and tended to become Fe_2O_3. ALICE W. EPPERSON

The sulfides of gallium. ALFRED BRUKL AND GOTTFRIED ORTNER. *Monatsh* 56, 358–64(1930); cf. *C. A.* **24**, 4476.—Yellow, fairly hard crystals of Ga_2S_3, d_4^{20} 3.48 ± 0.02, m. 1255 ± 10° (precautions against decompn.), were prepd. by passing N loaded with S vapor over Ga heated to 1200°. Ga_2S_3 dissolves in acids and alkalies, and is attacked by moisture. Attempts to prep. Ga_2S_3 by reducing Ga_2O_3 with H_2S or S vapor failed to yield a homogeneous product. Ga_2S_3 is reduced by H, slightly at 400°, completely at 800°, yielding a luminous yellow sublimate of GaS, d. 3.75 ± 0.03, m. 965 ± 10°, stable toward water; warm 15% acetic acid causes evolution of H_2S. GaS is decompd. by heating in a high vacuum to form Ga_2S_3 and volatile Ga_2S. The latter was prepd. by heating the higher sulfides mixed with the calcd. amount of Ga metal, Ga_2S subliming in a high vacuum at 700–720°. The amorphous, grayish black product, d. 4.22 ± 0.03, is slowly attacked by air and moisture. Heating above 800° causes decompn. into Ga metal and higher sulfides. The existence of 3 different sulfides was confirmed by characteristic x-ray diagrams. L. ONSAGER

The displacement of metallic arsenic from an alkaline solution of arsenic acid by hydrogen pressure at high temperature. II. V. N. IPAT'EV, G. A. RAZUVAEV AND V. S. MALINOVSKII. *Ber.* **63B**, 2812–7(1930); cf. *C. A.* **24**, 2074—At 45 atm. pressure and 200°, in a 50 cc. mixt. of 0.025 mol. As and 0.065 mol. NaOH in a soln. of arsenic acid, only Na_2HAsO_3 will form in 24 hrs. At 250°, pptn. of metallic As begins and reaches a max. of 96% at 350°. From 200° to 350°, the reaction is almost complete; in 18 hrs. AsH_3 is not formed. The greater the concn. of NaOH between 0 and 0.3 mol. to 50 cc., the less the quantity of As but on increasing NaOH to 0.4 mol., the ppt. of As increases from 71 to 98%. One hundred % As has not been displaced or oxidized. MARY E. LEAR

Studies on phosphoric acid. III. The use of phosphoric acid in the preparation of ethylene. ARTHUR G. WEBER AND JAMES H. WALTON. *J. Phys. Chem.* **34**, 2693–700(1930); cf. *C. A.* **24**, 2076.—The prepn. of $CH_2:CH_2$ by the interaction of EtOH and H_3PO_4 between 210° and 260° was studied and the yields and purity of the gas were detd. Sirupy H_3PO_4 previously heated to 250° for 4.5 hrs. gave the highest yields (81–2%), and were at a max. when the reaction temp. was 250°. The addn. of HPO_3 decreased the yields approx. 15%, while the addn. of P_2O_5 or $H_4P_2O_7$ gave the usual yields. The addn. of 1.5–2% of CuO, $CuSO_4$, $Al_2(SO_4)_3$, Ag_2SO_4, Ag_2O, Fe_2O_3 and animal charcoal increased the yields as much as 10%, while $FeCl_3$, MoO_3, WO_3, NiO and silica gel increased the yields by smaller quantities. Na_3PO_4 tends to decrease the normal yield. In most cases the purity of the gas was over 99%. H. W. L.

Preparation of tetra- and trithionate from thiosulfate and sulfurous acid. A. KURTENACKER AND K. MATEJKA. *Z. anorg. allgem. Chem.* **193**, 367–84(1930).—To 400 cc. of satd. H_2SO_3 add 1 cc. of a satd. soln. of H_3AsO_3 and 200 g. of finely powdered

$Na_2S_2O_3$, and pass in a stream of SO_2 with simultaneous cooling and agitation. After 1 hr. the greater part of the $Na_2S_2O_3$ has gone into soln. and sepn. of tetrathionate commences; continue the passage of SO_2 for a half-hr. longer; then allow the flask to stand with occasional shaking and treatment with SO_2. The yellow color of the soln. gradually becomes lighter. After the last passage of SO_2, shake the flask well and quickly filter. Wash the residue with a little strong alc. and ether. Conduct SO_2 into the filtrate for a few min. and treat the yellow soln. with a soln. of 100 g. of $KC_2H_3O_2$ in 120 cc. of H_2O. Filter the ppt. of $K_2S_3O_6$ and wash with alc.-ether. By conducting SO_2 into the new filtrate for 5–10 min., more trithionate is obtained. Both the tetrathionate and trithionate are 95–98% pure, the first being faintly yellow on account of the presence of S. The trithionate is colorless. They can be purified by dissolving in a small quantity of luke-warm water, followed by pptn. with an equal vol. of alc. The yield was 62 g. of $Na_2S_4O_6$ and 96 g. of $K_2S_3O_6$. H. STOERTZ

Preparation of telluric acid. JULIUS MEYER AND WALTER FRANKE. *Z. anorg. allgem. Chem.* **193**, 191–2(1930); cf. *C. A.* **15**, 2397.—An easy and convenient method for making $Te(OH)_6$ consists in adding 12.75 g. finely powd. Te moistened with 5 cc. concd. HCl soln. to a previously prepd. soln. made from 24 g. $Ba(ClO_3)_2$ in 100 cc. H_2O and 7.2 cc. concd. H_2SO_4 in 40 cc. H_2O, decanted and filtered free from $BaSO_4$. The reaction raises the mixt. to the b. p., the Te dissolves and boiling is continued. On evapn. fine white crystals are obtained which are washed with alc. and ether and dried in a desiccator. The yield is 90–95%. L. P. HALL

Silicic acid hydrates. W. D. TREADWELL AND W. WIELAND. *Helv. Chim. Acta* **13**, 842–64(1930).—Recent literature on the prepn. and reactions of silicic acid hydrates is reviewed. A *M*/2 soln. of Na silicate was used as starting material from which various gels were prepd. From these gels solns. were prepd. with 1 mol. silicic acid hydrate in 2 mols NaOH, corresponding to Na metasilicate. The course of slow electrometric titrations with HCl is tabulated; data on titration of alc. solns. of the silicate are also given. Observations were made of the electrolysis of Na metasilicate solns. The course of the gelatinizing phenomena was investigated as to viscosity, temp. course, refraction, cond., Tyndall phenomenon, diln. of sols with H_2O, addn. of HCl to Na metasilicate, etc. M. MCMAHON

Valence chemistry of the metal alkyls of the third group: Secondary valence of aluminum aryls. ERICH KRAUSE AND PAUL DITTMAR. *Ber.* **63B**, 2401–7(1930).—$(MeC_6H_4)_3Al.Et_2O$ has been prepd. from the corresponding Hg compd. and Al in an app. previously described (*C. A.* **20**, 2668). It is stable and mono-mol. The Et_2O-free compd. prepd. in C_6H_6 is associated. $(MeC_6H_4)_3Al.NH_3$ and $(C_6H_5)_3Al.NH_3$, m. 112° with evolution of gas, are both prepd. by action of NH_3 on the Et_2O compds. All are decompd. by O_2 and water. V. F. HARRINGTON

Complex formation of mono- and di-carboxylic acids with ferric chloride. II. W. D. TREADWELL AND W. FISCH. *Helv. Chim. Acta* **13**, 1219–27(1930).—$FeCl_3$ titrated with formate and formate contg. formic acid gave the complex $[Fe_3(HCO_2)_6(OH)_2]^+$, $[Fe_3(OAc)_6(OH)_2]^+$ is formed with NaOAc and not with HOAc. $[Fe_3(C_2H_5CO_2)_6(OH)_2]^+$, $[Fe_3(C_3H_7CO_2)_6(OH)_2]^+$ and $[Fe_3(ClCH_2CO_2)_6(OH)_2]^+$ are formed from the Na salts of the corresponding acids. Titration with CH_2OHCO_2Na gave $H_3[Fe(OCH_2CO_2)_3]$; with $CH_2(CO_2CH_3)_2$ and NaOH, $[Fe(CH_2(CO_2)_2)_2]$; with $C_2O_4Na_2$, $[Fe(C_2O_4)_2]^-$ and $[Fe(C_2O_4)_3]^{---}$; with $CH_2(CO_2Na)_2$, $[Fe(CH_2(CO_2)_2)_2]^-$ and $[Fe(CH_2(CO_2)_2)_3]^{---}$; and with $C_2H_4(CO_2Na)_2$ and $C_2H_4(CO_2H)CO_2Na$, $[Fe(C_2H_4(CO_2)_2)_3]^-$. RACHEL BROWN

Complex formation of ferric ion with acetate ion in aqueous solution. W. D. TREADWELL AND W. FISCH. *Helv. Chim. Acta* **13**, 1209–18(1930).—$FeCl_3$ was titrated with NaOAc, Pt and HgCl electrodes being used. Eight mols. NaOAc required 3 mols. $FeCl_3$: $3\ Fe^{+++} + 2\ H_2O + 8\ HOAc \rightleftharpoons [Fe_3(OAc)_6(OH)_2]^+ + 2\ HOAc$. The presence of $FeCl_2$ or of HOAc did not alter the complex formation. The complex was also formed from $Fe(NO_3)_3$. HCl affected the titration until an equiv. amt. of NaOAc had been added after which the titration was normal. At the end of the titration the soln. contained 2 mols. free HOAc which easily explains the existence of $[Fe_3(AcO)_6(OH)_2]^+$. RACHEL BROWN

Phospho- and silico-tungstates of some quaternary bases. Analytical applications. L. LEMATTE, G. BOINOT, E. KAHANE AND MME. E. KAHANE. *Compt. rend.* **191**, 1130–2(1930).—The phospho- and silico-tungstates of choline (I), acetylcholine (II), α-methylcholine, α-methylacetylcholine, bromocholine, the Et ester of betaine and trimethylallylammonium hydroxide are const. in compn., whatever the conditions of pptn. This was tested thoroughly with I, which was used in neutral, weakly or strongly acid, dil. or concd., hot or cold solns., in an excess of one or the other of the reagents, and in

the presence of various inert substances. The pptd. salts of I correspond to the formulas $[N(CH_3)_3C_2H_4OH]_3PO_4.12WO_3$ and $[N(CH_3)_3C_2H_4OH]_4SiO_4.12WO_3$. Drummond's formula for the phospho-tungstate of I, namely, $[HON(CH_3)_3C_2H_4OH]_3H_3PO_4.12WO_3$, is not correct, since it would be more logical to write $[N(CH_3)_3C_2H_4OH]_3PO_4.12WO_3.3H_2O$. However, these salts are not hydrated. Dull red heat converts them into $HPO_3.12WO_3$ and $SiO_2.WO_3$. The pptn. of the phospho- and silico-tungstates of quaternary bases has been made use of for various exact analyses. The slight soly. of most of these salts, especially those of I and II, allows a gravimetric detn. with an accuracy of 2–3%, by weighing the dry salt or the residue from incineration. Other applications: an unknown base may be identified by detn. of its mol. wt.; if the base is known, its purity may be detd.; in a mixt. of bases of different mol. wts., the ratio in which they are present may be calcd.; with an unstable base, giving by decompn. a base of different mol. wt., the extent of its decompn. may be detd. *E. g.*, the authors made a study of the progress of the hydrolysis of the chloride of II to I in solvents contg. OH groups (EtOH, glycol, glycerol and their derivs.). LOUISE KELLEY

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7—ANALYTICAL CHEMISTRY

W. T HALL

"Star trail" method for the spectrographic quantitative determination of the elements. A. C. SHEAD AND G. FREDERICK SMITH. *J. Am. Chem. Soc.* **52**, 5295(1930).—Preliminary statement of method. C. J. WEST

Perchloric acid as a new standard in acidimetry. G. FREDERICK SMITH AND W. W. KOCH. *Ind. Eng. Chem., Anal. Ed.* **3**, 52–5(1931).—A procedure is described whereby pure, 72% $HClO_4$ can be produced by a vacuum distn. This can be used in place of const.-boiling HCl as a standard in acidimetry. It is a more convenient standard. W. T. H.

Analysis of the aluminum group. SUNAO ATO. *Sci. Papers Inst. Phys. Chem. Research* **14**, 287–311(1930).—The procedure recommended by A. A. Noyes was tested and found faulty. To overcome the difficulties encountered the following procedure is recommended: (1) Dil. the soln. contg. cations of the Al-Fe groups to 50 cc., add pure 6 *N* NaOH soln. till neutral and 5 cc. in excess. Introduce 1–5 g. of Na_2O_2 in small portions with stirring, add 5 cc. of 3 *N* Na_2CO_3 and boil about 5 min. Dil. to 100 cc. and filter promptly. Exam. the ppt. for Fe, Mn, Ni and Co in the usual way. (2) Cool the filtrate under running water and make it about *N* in AcOH by adding 5–7 cc. of glacial AcOH. Boil 3–5 min. and filter. The ppt. contains Ti and the filtrate contains Al, Be, Zn, Cr, U and V. (3) Confirm the presence of Ti by dissolving the ppt. in HCl, evapg. to about 1 cc., dilg. to 5 cc. and adding H_2O_2. (4) Heat the filtrate from (2) to boiling, add 10–20 cc. of 3 *N* $Pb(OAc)_2$ soln., boil 1–2 min. and allow to stand for a short time. The ppt. contains V and Cr and the filtrate contains Al, Be, Zn and U. (5) To sep. Cr and V, treat the ppt. of Pb salt with 5–10 cc. of concd. HNO_3, heating on the steam bath. Dil. the soln. with 10 cc. of water and filter. Sat. the filtrate with SO_2, evap. to small vol. and heat until H_2SO_4 fumes appear. Add 7 *N* concd. H_2SO_4 if necessary, to make the vol. 3 cc., add water until the acidity is and filter off $PbSO_4$ after a short time. Make the filtrate slightly alk. with NaOH,

dil. to 100 cc. and filter off the $Cr(OH)_3$ ppt. after boiling for 5 min. (6) Dissolve the $Cr(OH)_3$ ppt. in HCl, convert the Cr^{+++} to CrO_4^{--} by the usual treatment with NaOH and Na_2O_2 and test for CrO_4^{--} with $Pb(OAc)_2$ in dil. AcOH soln. (7) Test for V by the H_2S test in ammoniacal soln. (8) To sep. Zn from Al, Be and U in the filtrate from (4), add an excess of NH_4OH to ppt. Al, Be and U, boil and filter. (9) Make the filtrate acid with AcOH and ppt. the Zn with H_2S, testing the ZnS ppt. by the Rinmann-green reaction. (10) Dissolve the ppt. produced in (8) in 4 cc. of 6 *N* HNO_3 and 80 cc. of water. Sat. with H_2S and filter off any PbS. Evap. the filtrate to dryness, add 15 cc. of 7.5 *N* HNO_3 and 30 cc. of ether. Sep. the layers which form after shaking, evap. the aq. layer to dryness and repeat the extn. with HNO_3 and ether to remove all U. (11) Evap. the ethereal soln. to dryness, to the residue add 3 cc. of 6 *N* HNO_3 and 30 cc. of ether and shake in a separatory funnel. Evap. this ether soln. almost to dryness, transfer the residue to a small test tube contg. 1 cc. of satd. NaCl soln., add 1–2 drops of 6 *N* HCl and some $K_4Fe(CN)_6$; a dark red ppt. is formed if U is present. (12) Evap. the HNO_3 soln. from (10) to dryness and remove the Al as $AlCl_3.6H_2O$ by adding 20 cc. of concd. HCl, 30 cc. of ether and HCl gas in excess. (13) To remove the last traces of Al, evap. the filtrate from (12) to dryness, dissolve the residue in 20 cc. of water and add 2 cc. of 6 *N* NaOH. Introduce Cl_2 until any color due to Cr disappears, make acid with HCl and boil off excess Cl_2. Dil. the soln. to 50 cc. and neutralize with $NaHCO_3$, adding 5 g. in excess and heating 20 min. in boiling water, using a stoppered pressure flask. (14) Confirm the presence of Al in the ppts. produced under (12) or (13) by the Thenard-blue test or by the test with aurintricarboxylic acid. (15) Make the filtrate from (13) slightly acid with HCl and boil off CO_2. Add NH_4OH in very slight excess, boil for a short time and filter. Dissolve a part of the ppt. in HCl, evap. to dryness and add 2 cc. of water and 1–3 drops of 1% alizarin red S, whereby a bluish purple color will be produced if Be is present. W. T. H.

Determination of aluminum in ferrochromium and in chromium metal. THOS. R. CUNNINGHAM. *Ind. Eng. Chem., Anal. Ed.* **3**, 103–4(1931).—The method depends upon the pptn. of Fe with cupferron, oxidation of Cr with $HClO_4$ and pptn. of Al with NH_4OH. The original $Al(OH)_3$ ppt. is dissolved in HCl, the diluted soln. satd. with H_2S and, after filtering, the treatment with $HClO_4$, etc., is repeated. The weighed ppt. is then examd. for Cr (colorimetrically) and for P. The original paper must be consulted for further details. W. T. H.

Gravimetric and direct volumetric determination of cadmium. R. C. WILEY. *Ind. Eng. Chem., Anal. Ed.* **3**, 14–5(1931).—A soln. of NH_4 molybdate (30 g. MoO_3 per l) which is neutral to phenolphthalein will ppt. Cd molybdate (contg. 41.22% Mo after drying at 120°) when added to a Cd^{++} soln. which is barely acid with AcOH. The Cd can thus be detd. gravimetrically or by measuring the vol. of the precipitant, with a satd. soln. of pyrogallol in $CHCl_3$ as indicator. In the latter case a soln. of 7.4 mg MoO_3 per l. is recommended. W. T. H.

Elimination of sulfur in carbon determinations by direct combustion. WM. H. BLATCHLEY. *Ind. Eng. Chem., Anal. Ed.* **3**, 13(1931).—If the combustion tube is loosely packed in its outlet end with ignited asbestos extending into the hot part of the tube and if Pb_3O_4 is used as a flux with pig Fe and other high-S alloys, the asbestos soon becomes impregnated with enough volatilized Pb_3O_4 to remove all SO_2 formed by the combustion. W. T. H.

Determination of chromium in special steels. EMIL SCHIFFER AND PAUL KLINGER. *Arch. Eisenhüttenw.* **4**, 7–15(1930).—Numerous methods proposed for the detn. of Cr in steel are discussed and 16 of them were tested in 6 different labs. The conclusion drawn from this coöperative work, of which the results are given in full, is that the $(NH_4)_2S_2O_8$–$AgNO_3$ method is to be recommended for Cr steels low in C. Steels high in Cr and in C are so brittle that they can be powdered easily and for their assay it is well to start by fusing the powder with Na_2O_2, after which an iodometric detn. of the Cr is most satisfactory. The effects of Ni, Co, V, Mo and W on the analysis are discussed W. T. H.

Determination of chromium and vanadium in ores and alloys after oxidation with perchloric acid. HOBART H. WILLARD AND R. C. GIBSON. *Ind. Eng. Chem., Anal. Ed.* **3**, 88–93(1931).—Boiling 70% $HClO_4$ is a good oxidizing agent and serves to oxidize Cr to $Cr_2O_7^{--}$ and V to H_3VO_4. The oxidized Cr and V can be detd. by any of the usual titration methods after dilg. the soln. Directions are given for applying this process to the analysis of Cr_2O_3, steel and Fe-Cr. If H_3PO_4 is added, Mn is oxidized more or less completely to Mn^{+++} but the oxidation of Cr^{+++} is then hindered. Small quantities of W do not interfere, but large quantities should be removed prior to the oxidation with $HClO_4$, although after the oxidation has been affected, addn. of Na tung-

state to the soln. causes no trouble. If both phosphotungstic and V are present, the results are low. CrO_4^{--} can be pptd. as $PbCrO_4$ from a soln. which is molar in $HClO_4$ and 0.04 molar in $Pb(ClO_4)_2$ and this sepd. from V, Mn and Fe. W. T. H.

Detection of cobalt as cesium cobaltinitrite. HERMAN YAGODA AND H. M. PARTRIDGE. *J. Am. Chem. Soc.* 52, 4857–8(1930).—The use of 2 cc. of 6 *M* $NaNO_2$ and 0.5 cc. of 0.5 *M* $CeNO_3$ is advantageous in the final test for Co as the ppt. forms more quickly and is less sol. than the corresponding K salt. The formula of the ppt. is $Cs_2NaCo(NO_2)_6$. W. T. H.

Iodide method for copper. BARTHOLOW PARK. *Ind. Eng. Chem., Anal. Ed.*, 3, 77–82(1931).—Arsenic acid is reduced by KI in the iodometric detn. of Cu under ordinary conditions. By means of K acid phthalate, however, it is easy to adjust the p_H so that all of the Cu will be reduced and none of the Cu. By adding NH_4HF_2, the interference of Fe is prevented. Taking these things into consideration, a very short and accurate method for detg. Cu is the following: Treat a suitable sample of the ore with HNO_3 until all Cu is dissolved, evap. to about 5 cc., add 30 cc. of water and boil until the nitrates are dissolved. Filter and wash the residue with hot, dil. HNO_3. Evap. to about 30 cc., cool, add NH_4OH until a faint odor persists, also 2 g. of NH_4HF_2, 1 g. of $KHC_8H_4O_2$ and 3 g. of KI. Titrate at once with $Na_2S_2O_3$. W. T. H.

Electrolytic determination of lead as lead dioxide. W. T. SCHRENK AND PHILIP H. DELANO. *Ind. Eng. Chem., Anal. Ed.* 3, 27–9(1931).—For detg. 5–150 mg. Pb it is recommended to use a sand-blasted anode, a current of 3 amp. for 1.5–2 hrs. and a soln. contg. 20–30% free HNO_3 and about 0.25 cc. of H_2SO_4. Ag, Bi, Mn, Sn, As, Sb, chromate and phosphate should be absent. The soln. should be at 90° at the start. W. T. H.

Determination of magnesium with 8-hydroxyquinoline—gravimetrically, volumetrically and colorimetrically. W. A. HOUGH AND J. B. FICKLEN. *J. Am. Chem. Soc.* 52, 4752–5(1930).—The oxine ppt., produced in NH_3 soln., can be weighed as MgO after strong ignition. It can be dissolved in hot, dil. H_2SO_4 and titrated with $KMnO_4$; if a persistent MnO_4^- color for 2 min. is taken as the end point, approx. correct results can be obtained on the assumption that 1 g. Mg = 41.7 g. of $KMnO_4$. Very small quantities of Mg can be detd. by using a carefully measured vol. of the reagent and detg. the excess by the color of the filtrate. W. T. H.

Modified Ford-Williams method. L. H. JAMES. *Ind. Eng. Chem., Anal. Ed.* 3, 31–2(1931).—To det. Mn in Cr-Ni alloys which are practically insol. in HNO_3 the following modification of the F.-W. method is recommended: Dissolve 2 g. of alloy in 15 cc. of concd. HCl, 5 cc. of concd. HNO_3 and 20 cc. of water. When dissolved, add 20 cc. of 60% $HClO_4$. Evap. till $HClO_4$ fumes are obtained and insol. salts begin to sep. Cool, add 30 cc. of concd. HNO_3 and heat just to boiling. Add a few crystals of $NaClO_3$ and then ppt. with 4 portions of 2 g. $NaClO_3$, adding each portion after effervescence has nearly ceased. This takes about 20 min. Remove from the hot plate before the effervescence from the last addn. has entirely ceased. Filter and exam. the ppt. in the usual manner. W. T. H.

Determination of mercury by the cyanide-silver method of Denigès. J. EURY. *Bull. sci. pharmacol.* 37, 599–603(1930).—The following modification of the method is suggested: Mix 20 cc. 0.05 *N* KCN soln., 10 cc. NH_3 soln., 1 cc. 10% KI and 70 cc. H_2O. Add the Hg salt to be tested. The ppt. formed must disappear after stirring or more KCN has to be added. Titrate with 0.05 *N* $AgNO_3$ soln. to a permanent turbidity. A second test is made by using only $20-n$ cc. KCN soln. when n cc. were titrated. For values of n between 0.1 and 0.6, 0.1 cc. KCN more is used and for n = 0.1 the original value + 0.1 cc. A. E. MEYER

Rapid colorimetric method for the determination of molybdenum in plain carbon and alloy steels. THOS. R. CUNNINGHAM AND H. L. HAMNER. *Ind. Eng. Chem., Anal. Ed.* 3, 106–7(1931).—Treat 0.5–1.0 g. of steel contg. not more than 1% Mo with 25 cc. of 7 *N* H_2SO_4 at about 60°. When the action is over, add 3 cc. of perhydrol and boil a few min. Filter, evap. to small vol., add 1 g. of citric or tartaric acid (to keep W in soln.), neutralize with NaOH and add 10 cc. of 18 *N* H_2SO_4. Transfer the cold soln. to a separatory funnel, dil. to 100 cc. and add 10 cc. of 5% KCNS soln. Shake vigorously, add 5–10 cc. of $SnCl_2$ soln., cool, discard the aq. soln. and det. the Mo colorimetrically, using as comparison a standard Mo soln. which has been mixed with Fe alum soln. and treated in the same way. W. T. H.

Rapid determination of nickel in electroplating baths. A. WOGRINZ. *Chem.-Ztg.* 54, 967(1930).—Transfer 25 cc. of the soln. by means of a pipet to a 250-cc. measuring flask, add about 25 cc. of water, a liberal quantity of NH_4Cl and enough NH_4OH to give a clear, dark blue soln. Then add a little "liquid petrolatum" and 25 cc. of a stand-

ard soln. of Na_2S (about 10% $Na_2S.9H_2O$). Carefully make up to the mark, stopper the flask, shake carefully and filter off about 100 cc. Transfer 25 cc. of the filtrate to a flask contg. 25 cc. of 0.1 *N* I_2 soln. and 5 cc. of HCl. Det. the excess I by titration with $Na_2S_2O_3$. W. T. H.

Determination of potassium by the sodium cobaltinitrite method. PIERRE J. VAN RYSSELBERGE. *Ind. Eng. Chem., Anal. Ed.* 3, 3–4(1931).—The time allowed for the settling of the ppt. has a marked effect on its degree of hydration. Satisfactory results can be obtained with the reagent of Adie and Wood if the ppt. is allowed to stand 24 hrs. before filtering, if the conditions of filtering, washing and drying the ppts. are always the same and if the results are computed with reference to the wt. of ppt. produced at the same time in a parallel test with a sample of known K content. W. T. H.

Rapid method for determining selenium. E. BENESCH AND E. ERDHEIM. *Chem.-Ztg.* 54, 954(1930).—To 400 cc. of soln. contg. 0.1–0.15 g. of Se, add 30 g. of $NH_2NH_2.2HCl$ and 5 cc. of concd. HCl. Boil until the red Se deposit becomes black, filter, wash free from chloride with hot water, dry at 110° and weigh. In the case of solid materials, heat a mixt. of the sample with 3 g. pure, powdered Fe_2O_3, 3 g. $KClO_3$ and 4 g. $NaHCO_3$ in a Ni crucible until the mass begins to sinter. Ext. with water and proceed as above. W. T. H.

Determination of sulfur by means of the turbidimeter. S. W. PARR AND W. D. STALEY. *Ind. Eng. Chem., Anal. Ed.* 3, 66–7(1931).—A turbidimeter is pictured and described which is suitable for the *control of sulfate in boiler waters*. Results obtained by different operators are given. W. T. H.

Rapid determination of zinc in brass. E. R. THEWS AND HARBISON. *Chem.-Ztg.* 54, 947–8(1930).—An approx. Zn estn. in brass can be made by comparing the color of shavings with that of brass of known Zn content. Directions are given for prepg. such standards and for making the comparison. More accurate results can be obtained by merely making an iodometric Cu detn. and estg. the Zn by difference. W. T. H.

Determination of zirconium in plain carbon and alloy steels. THOS. R. CUNNINGHAM AND R. J. PRICE. *Ind. Eng. Chem., Anal. Ed.* 3, 105–6(1931).—The detn. of Zr in Fe alloys contg. possibly Ti, Al, W, Mo, Cr, V, U, Co, Ni, Cu, Sn, As, Mn, Ta, Cb and Si is a somewhat difficult problem which appears to have been solved quite satisfactorily by the directions given in this paper. With an ordinary steel, the addn. of perhydrol to the HCl soln. serves to convert Ti to the sexivalent state and a fairly pure ppt. of $Zr(HPO_4)_2$ can be obtained by treatment with a considerable excess of $(NH_4)_2HPO_4$ in the diluted, acid soln. from which ZrP_2O_7 is formed by ignition. By treating the ignited ppt. with HF and H_2SO_4, SiO_2 is removed and by evapn. with H_2SO_4 the Zr is again brought into soln. from which it can be pptd. again as $Zr(HPO_4)_2$. Final allowance is made for a trace of Ti carried down in the last ppt. Sometimes, when W, Sn, Ta or Cb is present, it is necessary to fuse with Na_2CO_3 or even with NaOH. In this case an insol. Na zirconate is left behind after leaching the fused mass with water. This can be converted into sol. $Zr(SO_4)_2$ by fusion with $K_2S_2O_7$. In the absence of W, Sn, Ta or Cb, the detn. of Zr in steel can be finished within 2 hrs. W. T. H.

Detection by spectral analysis of foreign elements in a metal. LUCIEN AMY. *Compt. rend.* 191, 1049–50(1930).—Instead of merely photographing the spectrum of the pure metal and comparing it with the spectrum of another sample of metal which may be impure, it is better to make quite a no. of comparisons, each time photographing the spectrum during the first second and using fresh surfaces. Otherwise the spectrum may change and certain lines of more or less volatile metals be lost because of a change in surface of the metal as a result of the passage of the spark. By the new procedure it is possible to detect small quantities of Ca, Mg, etc., in metals which might otherwise be overlooked. This is shown by expts. with several metals. W. T. H.

Determination of gases in metals, specially of oxygen in iron and steel, by the hot extraction method. III. Oxygen in cast iron. H. DIERGARTEN AND E. PIWOWARSKY. *Arch. Eisenhüttenw.* 3, 627–35(1930); cf. *C. A.* 24, 4233.—The influence of the O content on the mech. properties of cast Fe was investigated. The cast Fe was found to contain 0.002–0.014% O, this being independent of the treatment of the melt. With increasing addn. of O to the melt the Si content decreased sharply, and the C and Mn contents slightly. These tests show the mech. properties of cast Fe are not influenced by its O content, or as to such a slight extent that they are covered by other influences (chem. compn. or the graphite formation). J. BALOZIAN

New method for detecting bromine and iodine. F. HARMS. *Z. physik. chem. Unterricht* 42, 266–7(1929).—NaClO is substituted for Cl_2 in the usual procedure. After the I_2 has been found by adding NaClO and shaking with CS_2 or $CHCl_3$, an excess

of NaClO is added to form HIO_3 from I_2 and then H_2SO_4. On slaking again $CHCl_3$ is colored brown if Br_2 is present. M. BEBER

Rapid colorimetric estimation of iodine in mineral waters and brines. L. C. CASE. *Chemist Analyst* **20**, No. 1, 9(1931).—To a sample contg. 0.10–0.65 mg. I_2 add 20 cc. of CS_2 or $CHCl_3$. Add 6 drops of H_2SO_4 which is satd. with N_2O_3 and compare the color that develops in the CS_2 or $CHCl_3$ on shaking with a set of standards. W. T. H.

Analysis of dilute iodine solutions. HERMAN A. LIEBHAFSKY. *J. Am. Chem. Soc.* **53**, 165–6(1930).—To a soln. contg. 0.4–2.0 $\times 10^{-6}$ equiv. of I_2 (less than 3 mg.) add CCl_4 and shake vigorously, using about 25 cc. to ext. all of the I_2. Transfer the CCl_4 soln. to a 500-cc. flask contg. 50 cc. of 1% KI and enough HCl to make the soln. about 0.001 *N* in H^+. Titrate with freshly prepd. 0.004 *N* $Na_2S_2O_3$ until the CCl_4 is practically colorless on shaking, add starch and enough more thiosulfate to make the aq. soln. colorless. W. T. H.

Colorimetric determination of silica. EARL J. KING. *Ind. Eng. Chem., Anal. Ed.* **3**, 117–8(1931). LEWIS A. THAYER. *Ibid* 118.—With reference to the paper of T. (*C. A.* **24**, 4239) K. points out that the procedure published by him (*C. A.* **23**, 403) serves to det. SiO_2 satisfactorily in the presence of Fe, to which T. replies that this is undoubtedly true when more PO_4^{---} than Fe is present but he questions whether this is true when a large excess of Fe is present. W. T. H.

Quantitative precipitation of sulfides in buffered solutions. I. Cobalt sulfide. MALCOLM M. HARING AND MARTIN LEATHERMAN. *J. Am. Chem. Soc.* **52**, 5135–41 (1930).—For the complete pptn. of 0.2 g. of Co as sulfide, add 25 cc. of 0.4 *N* NH_4OAc to the neutral $CoCl_2$, together with 4.5 cc. of 6.8 *N* AcOH and 70 cc. of water. Heat to boiling and sat. with H_2S in a 300-cc. Erlenmeyer flask until the soln. has reached room temp. (45 min.). Do not agitate during the first 5 min. but give the contents of the flask an occasional swirling motion thereafter. Wash the ppt. with the buffer soln., ignite in the air till the paper is burned and finally in H_2 for 15 min. at 1000°. Weigh as Co. **II. Nickel sulfide.** MALCOLM M. HARING AND BENTON B. WESTFALL. *Ibid* 5141–5.—The conditions for the complete pptn. of Ni as sulfide are very similar to those recommended for Co but the *p*H value must be slightly higher (4.4 instead of 3.93). Dissolve the neutral salt (about 0.2 g. of Ni) in 10–15 cc. of water, add 34 cc. of 0.4 *N* NH_4OAc, 2.8 cc. of 6.8 *N* AcOH and water to make about 90 cc. Heat to about 90° and sat. with H_2S. After about 5 min. shake the contents of the flask and heat in a water bath at 60°. Continue passing the H_2S into the soln. for nearly an hr. Filter with suction, keeping the crucible full and wash with the buffer soln. Place the crucible and ppt. in a cold furnace and gradually raise the temp. to 1000° and weigh as NiO. W. T. H.

Investigation of the ammonium acetate separation of sulfates of lead, barium and calcium. WILFRED W. SCOTT AND SAMUEL M. ALLDREDGE. *Ind. Eng. Chem., Anal. Ed.* **3**, 32–3(1931).—The expts. described indicate that the $PbSO_4$ can be extd. from a ppt. of $BaSO_4$ and $PbSO_4$ by treatment with hot, concd. NH_4OAc in spite of the statement of Majdel (*C. A.* **24**, 3194) to the contrary. When, however, the quantity of Ba present is large there is increased difficulty in dissolving out all of the $PbSO_4$. The soly. of $CaSO_4$ is too great to permit a quant. sepn. of $CaSO_4$ from $BaSO_4$. When considerable $BaSO_4$ is present, less $CaSO_4$ dissolves. W. T. H.

The analysis of chemically disintegrated phosphates. V. VINCENT. *Ann. fals.* **23**, 475–81(1930).—In the French official method for the detn. of citrate-sol. P_2O_5 (a soln. contg. 400 g. citric acid per l. being used), the direct pptn. of P_2O_5 with Joulie's MgO soln. in the citrate soln. of superphosphates gives accurate results in the absence of MgO in the sample analyzed; if MgO is present, the sample must first be washed with H_2O. With phosphates which have been treated by fusion with alkali silicates the results are low because of the incomplete pptn. of P_2O_5. With such products, the following method gives accurate results: dil. 10 cc. of the citrate soln. to 25 cc., add 50 cc. NH_4NO_3 soln. (160 g. NH_4NO_3 and 150 cc. concd. HNO_3 per l.), heat to boiling on a perforated metal plate to avoid overheating the sides of the beaker, remove from the flame, add 20 cc. NH_4 molybdate (dissolve 75 g. molybdic acid in hot H_2O contg. 57 cc. NH_4OH and dil. to 1 l.) with stirring, boil 2–3 min., let cool for 20 min., filter, wash free from acid (5–6 washings), place the filter and 50 cc. H_2O in a 250-cc. Erlenmeyer flask and disintegrate the filtrate, add 25 cc. NaOH (12.968 g. per l., 1 cc. = 1 mg. P_2O_5), shake till the yellow ppt. is dissolved, titrate the excess NaOH with H_2SO_4 (15.876 g. per l., 1 cc. = 1 mg. P_2O_5) with phenolphthalein as indicator. With phosphates which have been fused with alkali silicates, soln. of the citrate-sol. P_2O_5 by the Belgian method (use of a citrate soln. contg. 200 g. citric acid per l., and less alk. than the soln. of the French official method) and pptn. of the P_2O_5 by Joulie's MgO soln.

gives high results because of entrainment chiefly of SiO_2 but partly also of basic silicates; but the above-described method gives accurate results. With such products, and by use of the volumetric method above described for detn. of the dissolved P_2O_5, the French official method gives lower results than the Belgian official method, partly because of the differences in technic but chiefly because of differences in the compn. and proportion of reagents used. The French and Belgian methods can be conciliated by admitting that chemically disintegrated phosphates can be considered as almost identical with pptd. phosphates, and applying to the former the technic used for the latter, pptg. with NH_4 molybdate as above, and titrating the ppt.; *e. g.*, shaking 1 g. mechanically for 1 hr. with 100 cc. of Petermann's (Belgian) citrate soln., and dilg. to 250 cc. gave 21.31% P_2O_5; digesting 0.750 g. for 24 hrs. with 60 cc. of French citrate soln. with occasional shaking, and dilg. to 150 cc., gave 21.93% P_2O_5; a modification of the French method in which digestion for 1 hr. at 50° was used instead of digestion for 24 hrs. at room temp. gave 21.96% P_2O_5. Total P_2O_5 can be detd. as accurately and as rapidly by a slight modification of the reagents. The SiO_2 dissolved by the acid attack must be made insoluble by evapg. to dryness, dehydrating under well-regulated conditions (not specified), and taking up the residue in 50% HNO_3. The soln. is then dild. so that 25 cc. contains not over 25 mg. P_2O_5. The pptg. reagent is prepd. by mixing 1400 cc. of the NH_4NO_3-HNO_3 soln., 800 cc. of Petermann's NH_4 citrate soln and 1800 cc. H_2O. To 25 cc. of the soln. to be analyzed add 50 cc. of the above reagent, heat to boiling, add 20 cc. of NH_4 molybdate soln. and proceed as described above. This method gives results agreeing perfectly with those obtained by the Mg NH_4 phosphate method. A. PAPINEAU-COUTURE

Rapid determination of moisture. T. H. FAIRBROTHER AND R. J. WOOD. *Ind. Chemist* 6, 442–4(1930).—As a result of some expts. which are described, the conclusion is drawn that the diclectric const. method either of Burton and Pitt or of Berliner and Ruter can be used for the detn. of the natural H_2O content of *wheat* and *flour*. The detn. takes about 1 min. If water has been added to wheat, 2–4 days must be allowed for tempering the wheat and for the complete distribution of the moisture in the berry. Better results are obtained, in this case, with the app. described if the sample is ground. W. T. H.

Proposed modification of "oxygen consumed" method for determination of sea-water pollution. H. K. BENSON AND J. C. HICKS, JR. *Ind. Eng. Chem., Anal. Ed.*, 3, 30-1(1931).—Non-concordant results between the detn. of org. content by the biologic and $KMnO_4$ methods of detg. "oxygen consumed," led to a modification of the technic for carrying out the latter detn. The modification lies in the detn. of the unconsumed $KMnO_4$. Carry out the digestion exactly as in the standard method, then add 25 cc. of $MnSO_4$-H_2SO_4-H_3PO_4 soln. and 10 ml. of standard $FeSO_4$ soln. Bring to room temp. and titrate the excess Fe with standard $KMnO_4$ soln. The results thus obtained show much better correlation with the results of biological study. W. T. H.

Hydrogen-ion determinations with low-resistance glass electrodes. G. ROSS ROBERTSON. *Ind. Eng. Chem., Anal. Ed.* 3, 5–7(1931).—The detn. of p_H values becomes difficult or impossible when the soln. to be tested contains certain active oxidizers or reducers and in such cases the use of a glass electrode is to be recommended. The method of prepg. such an electrode and manner of using are described in detail. The use requires little more skill than is needed with an industrial quinhydrone app. W. T. H.

Determination of p_H at temperatures above 100°. SVERRE STENE. *Rec. trav. chim.* 49, 1133–45(1930).—It is shown that it is possible to det. the hydrion concn. of aq. solns. at temps. above 100° by the potentiometric method. Two forms of app. are described. One provides for the use of a standard Ag/AgCl cell kept at the same temp. as that of the soln. and the other for the use of a standard calomel cell at room temp. By use of the former type of app. a series of p_H detns. was made with various buffer solns. W. T. H.

Titration of phosphoric acid. P. VILLARD. *Compt. rend.* 191, 1101–4(1930).—In titrating H_3PO_4 with NaOH the end point is obtained when 1 H is neutralized with methyl orange as the indicator and when approx. 2 H are neutralized with phenolphthalein as indicator. With $Ba(OH)_2$ the results are different because both $BaHPO_4$ and $Ba_3(PO_4)_2$ are insol. If the titration takes place quickly in the cold, the end point is obtained somewhat after the second H of H_3PO_4 has been neutralized and the color fades slowly but if, when the second H is nearly neutralized, the soln. is heated to promote the formation of crystals of $Ba_3(PO_4)_2$, then by continuing the titration the end point corresponds to a nearly complete neutralization of the 3 H of H_3PO_4. W. T. H.

Direct and reverse titration of sulfuric acid with barium hydroxide. I. M. KOLT-

HOFF AND E. B. SANDELL. *Ind. Eng. Chem., Anal. Ed.* 3, 115–7(1931).—For the standardization of $Ba(OH)_2$ solns., K acid phthalate is distinctly better than pure $H_2C_2O_4 \cdot 2H_2O$ because of the adsorption error by the BaC_2O_4 ppt. Adsorption errors also interfere with the titration of H_2SO_4 with standard $Ba(OH)_2$, the results sometimes deviating as much as 0.85% from the true value. To overcome the error, it is best to titrate at room temp. to a phenolphthalein end point, then heat to boiling and add more base until the color persists for 15–30 sec. Then cool to room temp. and finish the titration at room temp. The error, then, is usually less than 0.2%. Similarly, the titration of $Ba(OH)_2$ with standard H_2SO_4 usually leads to imperfect results because of adsorption error. The best results are obtained by adding the $Ba(OH)_2$ to an excess of K_2SO_4 at room temp., titrating at room temp. to a preliminary end point, boiling 5 min. with a slight excess of H_2SO_4 present and finally titrating this excess at room temp. The error of the titration is then usually less than 0.2%. W. T. H.

The determination of silica in ferro-silicon. A. STADELER. *Arch. Eisenhüttenw.* 4, 1–6(1930).—A modified Cl_2-vaporization method is developed for detg. SiO_2 in ferro-Si (11, 45, 90% Si). Powd. ferro-Si (10 g.) contained in a boat is placed in a quartz reaction tube heated to 550° in 3 hrs., held at this temp. while a stream of Cl_2 (550°), which has previously been held (1/2-hr.) over charcoal at 800°, is passed at the rate of 10 l./hr. over the ferro-Si for not longer than 3 hrs. and cooled to 50° in a Cl_2 stream in 1–1 1/2 hrs. To det. SiO_2 in Si-low ferro-Si this chlorinated residue is kept overnight in a desiccator contg. $CaCl_2$, transferred to a Pt crucible, ignited at 800–900° in a muffle for 1 hr. and the SiO_2 detd. by known methods (*C. A.* 23, 4908). In Si-high ferro-Si the above chlorinated residue shows the presence of SiC. To det. the SiO_2 in these the ferro Si is chlorinated as above, the residue treated with concd. HCl to remove any traces of $SiCl_4$, filtered and the SiO_2 detd. in the residue by evapg. with H_2SO_4 and HF. Stronger heating must be avoided as much as possible in pulverizing the ferro-Si for analysis. The importance of adhering to the temps. and velocity of Cl_2 flow during chlorination is shown. J. BALOZIAN

Determination of picric acid in solution. MAURICE FRANÇOIS AND (MISS) LAURE SÉGUIN. *Ann. fals.* 23, 481–5(1930).—On treating picric acid in NH_3 soln., with ammoniacal $CuSO_4$ soln., there is formed a cryst. ppt. of $[C_6H_2(NO_2)_3OH]_2CuO.2NH$. The following technic is recommended. *In the absence of PhOH.*– Place in an Erlenmeyer flask a vol. of soln. contg. 0.05–0.1 g. picric acid, dil. to 50 cc., add an excess of Cu reagent (40 g. $CuSO_4.5H_2O$ and 200 cc. concd. NH_4OH per l.), 30 cc. being required to ppt. 0.1 g. picric acid, let stand 1 hr., filter through 2 balanced 9-cm. filters, transferring the last portions of ppt. by means of a policeman, wash with 10 cc. of NH_4OH by allowing it to flow, drop by drop, along the edge of the filter, let dry to const. wt. at atm. temp.; wt. of ppt. multiplied by 0.7563 = wt. of picric acid. If desired, the detn. can be checked as follows: heat the filter 1 hr. with 50 cc. H_2O on a boiling water bath, filter, evap. the filtrate to dryness and weigh; wt. of NH_4 picrate multiplied by 0.9308 = wt. of picric acid. If necessary, qual. tests for the identification of picric acid can be made on the residue. *In the presence of PhOH.*—The above technic can be followed if care is taken not to let the ppt. stand more than 1 hr. before filtering, which will give a slightly grayish ppt., probably due to the colored impurities present in the PhOH. The PhOH may be removed by adding 1 g. Na_2CO_3, extg. with 4 × 20 cc. $CHCl_3$; the soln. is heated to drive off dissolved $CHCl_3$, filtered and treated as above. *In presence of complex org. matter.*—Bring the soln. to a vol. of about 100 cc., add 5–6 g. of wool yarn, let stand 24 hrs., renew the wool, repeat the treatment till the soln. is decolorized (generally a total of about 20 g. of wool is required), rinse the wool in a large quantity of fresh water, press into a small cylinder, wash with ammoniacal alc. (22° Bé. NH_4OH 5 cc., 95% alc. 50 cc., H_2O 45 cc.) until the wool is decolorized, evap. the alc. and proceed as described above. Recoveries of 99.8 to 100.38% are reported. Also in *J. pharm. chem.* 12, 433–8(1930). A. PAPINEAU-COUTURE

Spectographic determination of aluminum in biological ashes. DEE TOURIELOTTE AND O. S. RASK. *Ind. Eng. Chem., Anal. Ed.* 3, 97–102(1931).—The spectrographic method of analysis is capable of detecting the presence of 5 parts per million of Al in all cases tested. It will det. within 0.25% concns. of Al ranging from 0.5 to 1000 parts per million in inorg. materials including biol. ashes. The arc and the condensed-spark methods of excitation appear to be equally satisfactory in samples of salts and salt mixts. and the same is true of tests with certain biol. ashes. In some cases, particularly in cases where the ash contains some unburned C, the arc method appears to be somewhat more sensitive. The principles underlying these spectrographic methods are explained and the technic is carefully described. Modifications in the procedure were developed. W. T. H.

Poisoning by seeds of Datura stramonium (thorn apple). A. SARTORI. *Chem.-Ztg.* **54**, 890(1930).—Poisoning being suspected, a body was analyzed for poison. Microscopic examn. of many seeds in the stomach and intestines indicated that these were identical with those of *Datura stramonium*. The presence of the alkaloid, atropine, was proved beyond a doubt both chemically and biologically. G. H. W. LUCAS

Proposed solubility scale for work in organic qualitative analysis. CHAO-LUN TSENG. *Natl. Central Univ. Sci. Repts. Ser. A, Phys. Sci.* **1**, 5–7(1930).—Instead of the present, indefinite references in tabulations, a *numerical soly. scale* of fixed meaning is proposed, such as: (1) sol. in less than 5 parts of the solvent; (2) sol. in 5–10 parts; (3) in 10–50 parts; (4) in 50–500 parts; (5) insol. in 500 parts. Tests are made with 0.05 g. samples, solvent being added from a graduated pipet in successive portions. K. H. ENGEL

Problems in the estimation of unsaturated hydrocarbons in gases. III. Some factors in bromination with potassium bromide-bromate mixture. H. S. DAVIS, G. S. CRANDALL AND W. E. HIGBEE, JR. *Ind. Eng. Chem., Anal. Ed.* **3**, 108–10(1931); cf. C. *A.* **24**, 1822.—The paper deals with the factors affecting the completeness of the titration of unsatd. hydrocarbons by Br, the KBr-$KBrO_3$ method of Francis being used. $AlCl_3$ and certain other metallic salts interfere and O_2 also causes trouble. The following procedure was developed for the detn. of C_2H_4, C_2H_2 and some of their homologs. Measure out into a bottle the necessary vol. of KBr-$KBrO_3$ soln., using about 2 cc. in excess of the theoretical quantity. Evacuate with a water pump until the liquid boils, using warm water to heat the soln. if necessary. Measure the gas sample into a buret, wash it twice with K pyrogallate in a Hempel pipet and then measure again in the buret. Fill the connecting tube of the evacuated bottle with water, connect with the buret and draw the gas sample into the bottle. Fill the connecting tube with water again, attach to a Mohr buret contg. 10% H_2SO_4 and add the acid in 1-cc. portions every 30 sec., shaking the contents of the bottle after each addn. Use acid equiv. to the vol. of the KBr-$KBrO_3$ soln. Finally shake the bottle in a machine for 60–90 min. Then add 3–5 cc. of satd. KI soln. and 20 cc. of water before breaking the vacuum. Finally open the bottle, dil. to 100–150 cc. and titrate with standard $Na_2S_2O_3$ soln. W. T. H.

Potassium persulfate as an oxidizing agent and the determination of carbon in organic compounds. P. RISCHBIETH. *Z. physik. chem. Unterricht* **43**, 132–4(1930).—Water-sol. org. compds. are oxidized in neutral soln. by $K_2S_2O_8$. The CO_2 evolved is dried and absorbed as in the usual combustion method and weighed. M. B.

Some errors in analytical bromination. Thermal cleavage of hydrogen bromide from brominated substances. A new procedure for determination of organic unsaturation. H. M. BUCKWALTER AND E. C. WAGNER. *J. Am. Chem. Soc.* **52**, 5241–54 (1930).—The errors in the bromination of org. compds. to det. unsatn. are discussed. Since some of these are due to contact of the halogenated sample with H_2O, KI and KIO_3, the *aeration method* was developed (app. described), in which the bromination is carried out in CCl_4 and the excess Br and HBr are removed by a N stream and caught in KI soln. About 40 compds., both satd. and unsatd., were studied at 75°, 20–5° and 0°. The results show that in all but a few cases the aeration method, under suitable temp. conditions, yields better results than did McIlhiney's method; by proper temp. control of the brominations neg. results were completely eliminated. With unsatd. hydrocarbons, a distinct temp. effect is shown by cyclohexene, phenanthrene, indene and expecially by retene. The resistance of crotonic acid to halogenation is shown by the ineffectiveness of bromination at room temp. The results with abietic acid indicate roughly 1 double bond, although 0° may be too high for normal bromination. The aeration procedure brings into prominence the spontaneous cleavage of HBr from certain compds. when exhaustively brominated at a too high temp. This was verified by exptl. elimination of HBr from several substances brominated at low temp. and then warmed to 75°. The practical application of these results requires the use of bromination temps. low enough to prevent excessive consumption of Br by reactions other than addn. and thereby to prevent or minimize spontaneous cleavage of HBr in excess of that actually due to substitution. Some substances brominate normally at 75°, others at room temp., while others yield entirely meaningless results unless brominated near 0°, which for some substances is perhaps still too high a temp. The new procedure permits the necessary temp. regulation and appears to be unique in that it permits bromination at elevated temp. and avoids complications due to contact of H_2O, KI and KIO_3 with the brominated sample. C. J. WEST

Application of a bromine method in the determination of phenol and cresols. R. D. SCOTT. *Ind. Eng. Chem., Anal. Ed.* **3**, 67–70(1931).—As a result of some exptl.

data described in this paper, the following method of analysis was devised and found reasonably accurate. After carrying the sample through a suitable preliminary purification, take an aliquot contg. about 0.02 g. of phenol or cresol in a 500-cc. glass-stoppered flask. Add water to make exactly 200 cc. and exactly 25 cc. of 25% KBr soln. Add 10 cc. of 6 *N* HCl and heat on a water bath kept at exactly 25° until the contents of the flask are at this temp., then add exactly 25 cc. of 0.3% $KBrO_3$ soln. Mix well and let stand at 25° for an hr., shaking occasionally. Then add 25 cc. of 20% KI soln., mix, allow to stand 30 min. at 25° with occasional shaking and titrate the liberated I_2 with standard $Na_2S_2O_3$. Run a blank detn. in the same manner. The difference between the 2 titrations multiplied by 0.00157 gives the wt. of phenol and cresol in terms of phenol. W. T. H.

Method for the accurate evaluation of acetic acid anhydride. ANDOR ROTH *Chem.-Ztg.* **54**, 954–5(1930).—The method, which is held to be more accurate than any other yet devised, depends upon boiling the anhydride with a definite vol. of water under a reflux condenser until the anhydride is fully hydrolyzed to AcOH and then detg. the solidification point of the soln. Full directions for carrying out the analysis are given as well as a table showing the water contents corresponding to different f. ps. W. T. H.

Quantitative determination of pyrethrin. I. RALPH C. VOLLMAR. *Ind. Eng. Chem., Anal. Ed.* **3**, 110-2(1931).—Two methods for detg. pyrethrin I and pyrethrin II (the toxic principles of pyrethrum flowers) were studied. One method is based on the ability of the pyrethrins to reduce alk. Cu soln., the amt. reduced being measured by comparison with a standard dextrose soln. (Method of Gnadinger and Corl). The other method (Staudinger and Harder method, modified by Tattersfield, Hobson and Gimingham) depends upon extn. with petr. ether, hydrolysis of the ext. with NaOH in alc., steam distn. and titration of the distillate with 0.02 NaOH, with phenolphthalein as indicator. These 2 methods were described for samples of flowers, stems, stalks etc. The present paper deals with the analysis of several samples of Dalmatian and California flowers by both methods and with the application of the second method to the analysis of kerosene exts. such as are often used in com. insect sprays. The method is applicable only to exts. which are known to contain no foreign material likely to interfere, such as an ester used as an odorant. A table is given showing the pyrethrin content of spent flowers and of the exts. from these flowers. W. T. H.

Complex formation of mono- and di-carboxylic acids with ferric chloride (TREADWELL, FISCH) **6**. Complex formation of ferric ion with acetate ion in aqueous solution (TREADWELL, FISCH) **6**. Phospho- and silico-tungstates of some quaternary bases. Analytical applications (LEMATTE, *et al.*) **6**. Methods for determining the solubilities of some fluosilicates (WORTHINGTON, HARING) **6**.

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8—MINERALOGICAL AND GEOLOGICAL CHEMISTRY

EDGAR T. WHERRY AND J. F. SCHAIRER

The position of "rhombic sections" in anorthite and use of the irregular surface relationships of twin crystals as a geologic thermometer. O. MUGGE. *Nachr. Ges. Wiss. Göttingen Math.-physik. Kl.* **1930**, 219–26.—M. considers that variances in crystal angles of anorthite are due to the temp. of their formation. Such angles can there-

fore serve as a measure of the temp. of the rock magma from which they formed. The formula $\Sigma_t = (010)$, $K_s = (010)$ is discussed and tables are given of detns. of Σ in natural lamellas and on the density of anorthite from Vesuvius. ALICE W. EPPERSON

Potash salts in the maritime provinces of Canada. L. H. COLE. Can. Dept. Mines, *Mines Branch. Rept.* **710**, 19–27(1930).—The localities in eastern Canada in which the presence of K salts has been shown in varying quantities are described. Potash imports are analyzed. ALDEN H. EMERY

Geology and mineral resources of parts of Carbon, Big Horn, Yellowstone and Stillwater counties, Montana. R. S. KNAPPEN AND G. F. MOULTON. U. S. Geol. Survey, *Bull.* **822A**, 70 pp.(1930). E. H.

Helium ratios of the basic rocks of the Gwalior series. V. S. DUBEY. *Nature* **126**, 807(1930); cf. *C. A.* **23**, 4171.—The following ages were calcd. for the Morar group of the Gwalior series in the Purana group of India: Belaki-Bauri (fine-grained basalt) 466×10^6 yrs.; Santowa Temak (coarse-grained dolerite) 369×10^6 yrs.; Paniar (coarse-grained dolerite) 190×10^6 yrs. The method is suitable for fine-grained basaltic rocks, especially for distinguishing rocks of different igneous cycles. A. F.

The origin of meteorites. F. PANETH. *Z. Elektrochem.* **36**, 727–32(1930).—With newly improved technic 1×10^{-8} cc. He and 2×10^{-14} g. Ra can be detected (*C. A.* 22, 3110). In case of Fe meteorites (*C. A.* **23**, 3877), samples must be brought into soln., as heating expels less than 5% of the He even at 1000°. Metallic Fe, like Pd (*C. A.* **23**, 1026), is impermeable to He at red heat, as expts. with powd. meteorite samples show the He loss to be only superficial. Age calcns. based on the He:Ra ratio are considered significant to 10%. Specimens from a large no. of unaltered Fe meteorites show ages between 0.1×10^9 and 2.9×10^9 yrs., four being over 2.5×10^9 yrs. old. As these values are all less than the age now assigned to the solar system, 3×10^9 yrs., it is concluded that the meteorites were created with our solar system. Opposed astronomical arguments are also discussed. W. G. LEIGHTON

Geology and characteristics of Tennessee ground waters (POND) **14.** Practical geology for brickmakers (STANWORTH) **19.**

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9—METALLURGY AND METALLOGRAPHY

D. J. DEMOREST, H. W. GILLETT AND RICHARD RIMBACH

Metals. RAPHAEL ED. LIESEGANG. *Kolloid-Z.* **49**, 332–43(1929).—A review. A. FLEISCHER

Non-ferrous metals in chemical engineering. RICHARD SELIGMAN. *Metal Ind.* (London) 37, 509–12, 531–2, 541(1930). E. H.

Copper in 1928. C. E. JULIEN AND H. M. MEYER. Bur. Mines, *Mineral Resources of the U. S. 1928*, Pt. I, 705–59 (preprint No. 24, published October 6, 1930). E. H.

Gold and silver in 1929. J. P. DUNLOP. Bur. Mines, *Mineral Resources of the U. S. 1928*, Pt. I, 873–910 (preprint No. 27, published November 6, 1930). E. H.

The research laboratories of the Metallgesellschaft. H. VON HALBAN. *Metalliges. Periodic Rev.* 1930, No. 4, 3–16(1930). E. H.

Progress in the metallurgy [illegible]it iron. J. S. TRINHAM. *Proc. Staffordshire Iron and Steel Inst.* 1929–30). E. H.

Romance of lead in [illegible] W. CUNO. *Ind. Eng. Chem.* **23**, 108–10 (1931).—A historical sketch of th[illegible] vities in that region. LEOPOLD PESSEL.

The Inco enterprises. How [illegible] started fifty years ago. E. A. COLLINS.

Eng. Mining J. **130**, 426–8(1930).—Historical. Charts show the commercial outlets of pure Ni and its uses in ferrous alloys. **Developing new outlets for Inco products.** A. J. WADHAMS. *Ibid* 429–30.—Ni is marketed principally in four forms: electrolytic, pellets, shot and ingots. Substantial quantities of metals of the Pt group are being produced. Their uses are outlined and a chart indicates the important uses of Ni in various alloys. **The Sudbury ore.** J. C. NICHOLLS. *Ibid* 433–4.—About 90% of the world's Ni is obtained from this district. Characteristics of the ore are noted. **Brief bibliography on nickel.** *Ibid* 434.—Seventeen references are listed. **Mines and mining operations.** OLIVER HALL. *Ibid* 435–7.—Frood, Creighton, Levack and Garson are the mines in operation; of these the Frood is the largest orebody. **Mining at Creighton.** RALPH D. PARKER. *Ibid* 437–43.— Description with many sectional illustrations and a flowsheet of the rock-house. **Mining the Frood orebody at depth.** HERMAN J. MUTZ. *Ibid* 445–53.—An illustrated description, including a flowsheet of the rock-house. **Levack mine practice.** A. L. SHARPE. *Ibid* 452–3.—This mine is one of the principal producing properties of the Mond Nickel Co. shipping to the Conniston smelter. **Features of design of mill and smelter.** L. M. SHERIDAN. *Ibid* 460–4.—During the past 3 yrs. the construction work of the International Nickel Co. of Canada, Ltd., has included: addns to the Port Colborne refinery, the underground development and surface plant of Frood mine, the construction of a new smelting plant at Copper Cliff, addns. and improvements to the Conniston smelter and a new surface plant at Levack. This article deals with some of the engineering problems involved in the design of the smelter and concentrator at Copper Cliff. Several illustrations are included. **Selective flotation mill at Copper Cliff.** WM. T. MCDONALD. *Ibid* 465–73.—An illustrated description of the mill. A flowsheet with complete equipment with the 8000-ton concentrator is shown. **The new 5000-ton smelter.** DONALD MACASKILL AND R. M. COLEMAN. *Ibid* 473–7. The installation consists of 30 ten-hearth Herreschoff roasting furnaces, five reverberatory furnaces and eight Peirce-Smith type converters. The flowsheet is complete for mines to refinery. **Smelting at Conniston in blast furnaces.** W. A. MCDONNELL AND J. F. ROBERTSON. *Ibid* 478–9.—Features of this plant are the sintering plant and the blast-furnace without reverberatories. **Acid and niter-cake plants of C. I. L.** J. M. MALCOLM. *Ibid* 479.—This is the initial plant designed and constructed for the special production of niter cake as a direct product. Its installation was due to: (1) the desire to conserve the useful components of the Ni-smelter fumes and (2) the company's need for an adequate and constantly available supply of niter cake. **Refining nickel-copper mat at Port Colborne.** R. L. PEEK. *Ibid* 482–8.—The course of the metal is traced through the refining process; thus are described concurrently both plant and operations therein. **The British Empire's largest copper refinery.** C. H. ALDRICH AND J. K. BRYAN. *Ibid* 489–92.—A description of the new plant of the Ontario Refining Co., Ltd., at Copper Cliff. The general arrangement of the plant is shown in a chart. **The Huntington rolling mill.** H. S. ARNOLD AND A. S. SHOFFSTALL. *Ibid* 493–4.—A brief description with a good flowsheet of the plant. **English operations of the Mond Company.** THE MOND STAFF. *Ibid* 495–6.—A brief description of the Clydach (Wales) nickel refinery about nine miles from Swansea. W. H. BOYNTON

Smelting of wyomingite and phosphate rock in the blast furnace. T. P. HIGNETT AND P. H. ROYSTER. *Ind. Eng. Chem.* **23**, 84–7(1931).—Wyoming leucite and phosphate rock were smelted simultaneously in a small exptl. blast furnace. Phosphate volatilized to the extent of 30 to 94% and potash to the extent of 43 to 95%. It is estd. that P_2O_5 can be produced at a cost $40.00 per ton and K_2O at $18.00 per ton S. L. MADORSKY

Recent developments in industrial furnace design. G. R. MCDERMOTT. *Iron Steel Eng.* **7**, 498–503(1930); cf. *C. A.* **24**, 3468.—Discussion. W. H. BOYNTON

Open-hearth control. H. V. FLAGG. *Iron Steel Eng.* **7**, 480–1(1930).—Four essential factors influencing fuel economy in the open-hearth operation are: (1) the fuel to be used, (2) furnace design, (3) the training of the operators and (4) the equipment. **Discussion of open-hearth furnace control.** M. GREENBERG. *Ibid.* 487–9.—**The automatic reversing control of open-hearth furnaces by the temperature-difference method.** M. J. BRADLEY AND J. W. KINNEAR, JR. *Ibid* 481–4.—Extensive studies were made on a 100-ton basic open-hearth furnace to develop the best method of operating the regenerative system definitely to control the combustion rate and flame temps. in the furnace. The study demonstrated that reversing operations can be more efficiently handled automatically than manually. An outline shows the locations for thermocouples used in temp. study. **Automatic combustion control for open-hearth furnaces.** R. W. SIMPSON. *Ibid* 485–7.—The control of combustion in the open hearth is becoming increasingly a more complex problem, as a result of the use of two or more fuels at

the same time. Best results are obtained by using different proportions of the fuels at different stages of the heat. Results are better with automatic combustion control, than with hand control. Automatic combustion control will eliminate one of the variables from furnace operation, which means fuel economy in amounts that will pay for the installation in a year or less. W. H. BOYNTON

A recording dust concentration meter for blast-furnace gases. A. W. SIMON. *Blast Furnace Steel Plant* **18**, 1686–9, 1700(1930). E. H.

The orientation of rolled aluminum. J. THEWLIS. *Phil. Mag.* [7], **10**, 953–61 (1930).—Two series of photograms on flat-rolled Al with the x-ray beams at various angles to the normal direction showed that the rolling directions and the normal directions are not far from (353) and ($\bar{3}15$), resp., confirming Göler and Sachs (cf. *C. A.* **21**, 2640). Square-rolled Al, with no sign of selective orientation before rolling, showed that the direction coincides with the (111) direction. ARTHUR FLEISCHER

Carbon loss and diffusion in the malleableizing process. ENRIQUE TOUCEDA. *Metals and Alloys* **1**, 815(1930).—The C contents of the 8 samples varied from 1.99 to 2.66% before malleableizing. An av. loss of 0.35% C during malleableization was found; the range was 0.20 to 0.45%. In 6 of the samples the elimination was greatest between the surface and a depth of $^1/_{16}$ in. In the remaining 2 blocks the abrupt change took place at a depth of $^3/_{64}$ in. From the results it appears that a diffusion of the C toward the surface practically ceases at a depth of about $^7/_{16}$ in. A. J. MONACK

Extrusion of bismuth wire. J. G. THOMPSON. *Metals and Alloys* **1**, 826–7(1930).—Bi wire was produced in single pieces up to 20 ft. in length by means of an extrusion press which is described in detail. Three dies with orifices, resp., 0.012, 0.025 and 0.031 in. in diam., were used and successful operation was obtained at room temp. and at higher temps., up to 100°. The properties of the wire varied with the diam. and with the conditions of extrusion. A. J. MONACK

Behavior of thorium oxide in annealed tungsten wires. W. G. BURGERS AND J. A. M. VAN LIEMPT. *Z. anorg. allgem. Chem.* **193**, 144–60(1930).—X-ray investigation shows that in unannealed drawn W wire contg. ThO_2 and of polycryst. structure the oxide of Th is present as such. In single-crystal wire the ThO_2 crystallite shows no preferential orientation. By annealing the polycryst at high temps. (above 2500° abs.), part of the ThO_2 is reduced to metallic Th. At these temps. there is also the possibility of incomplete reduction of ThO_2, with the formation of oxides intermediate between the metal and ThO_2. The existence of a face-centered lattice with a parameter between those of ThO_2 and Th was observed, and it was also found that a lattice with varying values of parameter could be obtained by annealing superficially oxidized Th wire *in vacuo* for different time intervals. Accurate detns. of the lattice consts. of ThO_2 and Th were made, the following values being obtained for a: ThO_2, highly ignited and prepd. from the nitrate —5.585 ± 0.001 A. U.; Th prepd. by reduction of chloride with Na—5.074 ± 0.002 A. U.; Th metal prepd. by thermal decompn. of the iodide—5.081 ± 0.002 A. U. H. STOERTZ

Hardness of metallic alloys at various temperatures. V. P. SHISHOKIN AND V. AGEEVA. *Z. anorg. allgem. Chem.* **193**, 237–44(1930).—Hardness detns. were made on binary alloys in which the components do not form chem. compds.: Bi–Sn, Bi–Cd, Pb–Cd, Sn–Cd, Pb–Sn, Sn–Zn, Zn–Cd. In all cases except Pb–Sn, hardness-compn. curves show a similar course for all systems at all temps. Deviations in Pb–Sn alloys are perhaps explained by insufficient heat treatment. Breaks in the curves at 2.7% Bi in the system Cd–Bi, at 8.7 and 38% Cd in Cd–Pb, and at 1.7, 2.9 and 90.9% Pb in Pb–Sn are probably due to the passing of the 2 components into solid soln. In the systems Cd–Zn, Sn–Zn and Cd–Sn, these breaks are due to eutectoid transformations. The temp. coeff. of hardness of the alloys investigated is greater than the temp. coeff. of the pure metals, and is given by the expression: $\alpha = (\log H_2 - \log H_1)/(t_2 - t_1)$. The greatest increase in α is in the alloy Bi–Sn (0.0028–0.0117), the smallest in the alloys Pb–Cd (0.0039–0.0057) and Zn–Sn (0.0038–0.0056). Solid solns. of low concns. are found on both sides in the system Bi–Sn but only on the Pb side in the system Pb–Cd; no solid solns. are found in Zn–Sn. In all the systems except Sn–Cd the highest temp. coeff. of hardness is found in the region of the eutectic. The displacement of the max. in the Sn–Cd system is perhaps explained by the presence of a eutectoid point. The magnitude of the temp. coeff. of hardness is apparently not influenced by annealing conditions. H. STOERTZ

Heat treatment of aluminum and its light alloys. J. SUHR. *Rev. métal.* **27**, 563–9 (1930).—Numerous data are presented showing the advantage of heat-treating various Al alloys. The method used consisted in bringing the material to 525°, and keeping the temp. const. for 2 hrs. followed by a water-quench, after which treatment the samples

were kept for 15 hrs. at 150°. Hardness and tensile strength increased slightly but the resistance to repeated shocks increased to a remarkable extent, particularly for the specimens cast and treated in metal molds. Of the alloys tested there was only one, *viz.*, alpax, that could not be improved by heat treatment. Excellent results were obtained with the patented alloy with the av. compn.: Cu 1.5, Mn 0.8, Mg_2Si 1.58, Si 0.25, Ti 0.35%. In this case the heating period at 525° was 5 hrs., followed by a water quench and aging for 9 hrs. at 150° or 5 days at room temp. H. S. v. K.

Heat treatment of duralumin. MATTER. *Rev. métal.* **27**, 560–2(1930).—Specimens of duralumin varying in thickness from 1 to 20 mm. were heated in a salt bath to 500°, air-cooled and aged for 4 days. They were then broken in tension and the tensile strength was plotted as a function of the rate of cooling (at 400°) and also as a function of the thickness. For thicknesses of 1 and 2 mm. the tensile strength is practically the same as that of water-quenched specimens. For greater thicknesses the tensile strength decreases gradually to about ¾ of that for the thinnest samples. H. S. v. K.

Properties of lead-bismuth, lead-tin, type metal and fusible alloys. J. G. THOMPSON. *Bur. Standards J. Research* **5**, 1085–1107(1930).—Data are presented both in tabular form and in graphs, for tensile strength, hardness, elongation, resistance to compression and solidification characteristics of 4 classes of alloys: (1) binary alloys of Pb and Bi, (2) binary alloys of Pb and Sn, (3) type metals with and without addns. of small quantities of Bi and (4) fusible alloys of Bi, Pb, Sn and Cd. DOWNS SCHAAF

Grain growth in the chrome-irons. ARTHUR PHILLIPS AND RALPH W. BAKER. *Iron Age* **126**, 1588–9, 1665(1930).—A 5-lb. ingot was prepd. by melting Armco iron and low-C ferrochromium. The ingot contained Cr 28.72, C 0.26, Si 0.34 and Mn 0.39%. Specimens were cut from the center of the ingot, annealed at 1650°F. and then given a 20% reduction of thickness by cold working. One specimen was used for each temp. chosen for the annealing schedule. After annealing for 4 hrs. the sample was furnace-cooled and a grain count made. The same sample was annealed similarly for 4 more 4-hr. periods making the cumulative annealing period 20 hrs. This expt. leads to the conclusion that steel of this compn. is subject to relatively rapid grain growth at the lower temps. (1290 to 1830°F.) and to extremely rapid growth at higher temps. (1830 to 2550°F.). The grains approach max. size after comparatively short periods at elevated temps. Additional expts. were made on chrome-iron of similar analysis to det. if austenite occurs in quenched samples. Specimens were heated for 2 hrs. at temps. 2100 to 2640°F. and quenched in water. Austenite was found in all specimens. These results confirm belief that C is sol. to an appreciable extent in delta iron, the limit being approx. 0.10% C. A. W. HOLMES

Twenty alloys for gray iron. E. K. SMITH AND H. C. AUFDERHAAR. *Iron Age* 126, 1583–7, 1688–93(1930).—Al in gray iron has a softening effect up to 0.10% Al. Up to 0.5% Al continues to sep. out graphitic C. From 0.5% Al, graphitic C decreases, being only 0.20% of graphite with 11.8% C. White iron will usually turn to gray with 0.50 to 0.75% Al. Arsenic up to 0.1% has no deleterious effect in normal iron. B (0.4%) increases hardness and makes iron difficult to machine, while 0.8% B makes it decidedly brittle. Ca up to 0.2% has no effect on strength, fluidity or shrinkage. Cr increases chill, carbide, hardness and shrinkage. When Cr reaches 0.4 to 0.5% difficulty in machining is encountered due to carbides, but these may be broken up by addns. of Si or Ni. Co up to 2% gives no useful results. Cu up to 2% gives a slight increase in tensile strength, transverse strength and Brinell hardness. Max. soly. of Cu is placed by various investigators at from 3 to 4.9%. Cu appears to confer appreciable corrosion resistance to cast iron, reaching a max. at 1% Cu. Mo acts as strengthener and hardener of gray iron. Ni in cast iron permits production of plain castings either harder, stronger and of better structure with equal machinability or more readily machinable for the same hardness, strength and structure. Ni and Cr together produce increased tensile strength and are used for pieces that are subjected to unusual wear, high temp., repeated heatings, corroding influences, etc. Si is present in all cast irons, usually 1.5 to 2.5%. Five % Si makes iron very brittle; with 9 to 10% Si it corrodes more readily; with 11 to 14% Si it becomes corrosion-resistant; and with 14.5 to 17% it has max. resistance but is hard, brittle and unmachinable. One % V increases tensile strength 60% and Brinell hardness from 170 to 250. A. W. HOLMES

Hardening of gray iron castings. LEON GUILLET, JEAN GALIBOURG AND MARCEL BALLAY. *Compt. rend.* **191**, 538–41(1930).—Gray castings with Ni content of 0–5% were quenched at 700–950° in oil, in still air and in circulating air. The oil quench gave the highest Brinell no., the optimum temp. decreasing with increasing Ni content. The casting of 5% Ni, oil-quenched at 700°, was annealed at temps. ranging from 20°

to 825° and air-cooled. The Brinell no. decreased with rising temp. up to 750°, rising again at 825°. Heating to 900° and cooling in the furnace raised the critical points 45–100°. Annealing quenched castings at 300–350° has little effect on the hardness but increases shearing strength about 20% and compression strength about 25% without reducing resistance to bending. ANN NICHOLSON HIRD

Nitrogen in technical iron. I. The influence of nitrogen on the properties of technical iron, especially on its relation to magnetic aging. WERNER KÖSTER. *Arch. Eisenhüttenw.* **3**, 637–48(1930).—N is sol. in α-Fe (detd. as: 0.001% at 20°, 0.005% at 200°, 0.01% at 300°, 0.02% at 400°) being present in supersatd. solid soln. from which it does not sep. even on slow cooling; the sepn. is complete only after 14 days' annealing at 100°. The magnetic aging of tech. Fe is linearly proportional to its N content; by the sepn. of 0.01% N the coercive force increases 3.2 gausses. The sepn. of N from steels results in an increase in the constriction no. and chem. corrosion and a decrease in the sp. resistance, tensile strength and hardness, while the elastic limit and elongation are unchanged. The magnetic aging tendency of a steel increases with the possibility of its taking up N during production; thus Thomas steels and elec. steels age more strongly than the Siemens-Martin and weld steels. Microscopic studies show N to sep. out as small points at 100° and as small needles at higher temps.; the amt. which seps. increases with increase in temp. **II. The character of stress figures.** *Ibid* 649–58.—The relation between the N content of tech. Fe and the stress figures (I) (Kraftwirkungsfiguren) made visible by the Fry etch (*Kruppsche Monatsh.* **2**, 127–36(1921); cf. *C. A.* **16**, 226) is studied. It is shown that the N sepn. from steel is accelerated by cold forming and that the formation of I results from the difference in the sepn. velocity between the formed and unformed portions. The blackening in the etch is due to the sepn. of finely divided N. In the transition zone between the formed and unformed fields, micrographs show, after annealing the sample, the presence of grains having dark systems of lines, developed by the N sepn. I are visible only in magnetically aged steels and appear to be independent of mech. aging. Numerous photomicrographs showing the N sepn. and the I are given. J. BALOZIAN

Structures of mixed crystals of iron with beryllium and aluminum. F. WEVER AND A. MÜLLER. *Z. anorg. allgem. Chem.* **193**, 337–45(1930).—Thermal and microscopic study of Fe–Be and Fe–Al alloys led to a new detn. of the Fe side of the equil. diagram. Both systems have completely closed γ-fields. Mixed crystals of α-Fe with Be and Al are formed by at. substitution; the same structure is assumed for the mixed crystals of γ-Fe with both elements. The unusual behavior of C in alloy formation with Fe has no parallel in the elements Be and Al. H. STOERTZ

Occlusion of hydrogen and nitrogen by pure iron and some other metals. ERICH MARTIN. *Metals & Alloys* **1**, 831–5(1930).—The work of M. (cf. *C. A.* **24**, 2973) is correlated with the results obtained by other investigators. A *bibliography* is given. A. J. MONACK

The electrochemical behavior of metals. I. The passivity and corrosion of iron. JOSEPH F. CHITTUM. *J. Phys. Chem.* **34**, 2267–85(1930).—The acid, H_2O_2, colloidal, chem and electrochem. theories of corrosion are reviewed and discrimination is made between general surface, pitting and "water-line" types of corrosion. In passivity produced by anodic polarization at high c. ds. the time factor is important. C.'s theory explains production of H_2 in corrosion processes as well as the consumption of O_2 when Fe corrodes in a closed vessel. Other characteristics of passive iron, notably the absence of an oxide layer as shown by optical and x-ray evidence, substantiate the present view obtained by a study of electrode reactions in various acid media. In the present study sticks of Fe subjected to variable heat treatments and mech. roughening were used in the potential measurements. The effects of NO_3^-, Cl^-, SO_4^{--}, AcO^-, PO_4^{---} and S^{--} on the Fe neg. voltage were studied and conditions defined for the acquisition, by the Fe electrode, of the highest anode and cathode p. ds. H. R. MOORE

A study of the so-called "overreduced" condition in molten steel. J. V. MCCRAE, R. L. DOWDELL AND LOUIS JORDAN. *Bur. Standards J. Research* **5**, 1123–49(1930).—A study of 4 heats of acid elec. steel, 2 of which were "overreduced" and 2 were normal, failed to reveal any significant differences in temp., rate of cooling, tensile properties or microstructure. DOWNS SCHAAF

A magnetic method for determining carbon in steel and its application in deoxidation processes. C. J. GUNNAR MALMBERG. *Jernkontorets Ann.* **114**, 508–45(1930).—The method depends on submitting a test piece to a variable magnetic field, and measuring the induction. Thus a sample submitted to field strength H_1 and then to a lower field strength H_2 will after several repetitions show an induction B_1 and B_2 which differ by an amt. characteristic of the C content. A ballistic galvanometer is used for measur-

ing the induction, and the whole circuit is built into a compact app. known as a carbometer, on which the readings indicate the difference B_1–B_2. The test pieces, fitting into the magnetic circuit, are ingots of 12.90 ± 0.03 mm. radius poured from the steel bath. Since the diam. of the ingot is likely to vary with the compn. it is recommended that a series of ingots of known compn. be poured and used as standards. The texture of the ingots on breakage has no effect on the readings, and the C is uniformly distributed through the sample. The value of the carbometer reading is independent of the troostite, but ferrite and cementite, which form under 0.20% and above 1.20% C, resp., raise the carbometer value. The presence of Al has no influence on the reading for 0.60% C but lower it for lower C contents and raise it for higher C. Silica and Cr increase the readings; W and Mo lower them; while Mn and Ni behave somewhat as Al. O, H and N produce marked irregularities. H. C. Duus

The influence of nickel and manganese on the properties of high-speed steel. A contribution to the explanation of the tempering processes in high-speed steel as well as its peculiarity as heat-resisting steel. Viktor Ehmcke. *Arch. Eisenhüttenw.* **4**, 23–35 (1930).—The influence of Ni (2–12%) on the hardness and elongation of high-speed steel (I) quenched from temps. up to 1000°, and of Ni (11–15%) and Mn (7.8%) on the hardness and breaking strengths up to 800° is investigated. With increase in the Ni content of I the quench-hardness decreases, while the stability of the quench-austenite increases. On tempering from temps. up to 600° the quench-austenite of I contg. 5–12% Ni is stable. A crit. temp. field exists at 700–900° in which a breaking-up of the solid soln. occurs. Thus, on cooling from this field martensite is formed, resulting in an increase in the hardness I. However, the quench-austenite of tempered I alloyed with 3% Ni is unstable. At 600–700° the hardness and strength of I alloyed with Ni is less than for hardened I of normal compn., the difference increasing with the Ni added. At higher temps., however, I contg. Ni is distinctly superior to the ordinary I, the tensile properties increasing with the Ni added. The austenitic I alloyed with Mn has hot tensile properties similar to those alloyed with Ni. Photomicrographs (12) of specimens of I alloyed with various amts. of Ni and quenched in oil and H_2O are shown. J. Balozian

The ternary system: iron–nickel–sulfur. Rudolf Vogel and Willi Tonn. *Arch. Eisenhüttenw.* **3**, 769–80(1930).—The equilibria in the field Fe–FeS–Ni_3S_2–Ni of the system Fe–Ni–S are investigated, thermal, microscopic and magnetic methods being used. In this field 4 primary satn. surfaces are detd. on cooling the melt, the primary sepn. therefrom being: δ-Fe-Ni *mixed crystals* (**M**), γ-Fe-Ni **M**. FeS, and the S-rich **M**. The 3 curves formed by the intersection of 3 of these surfaces, in turn, intersect, the 4-phase reaction taking place here at 825° being: *FeS + melt (38% Fe, 27% S) = Fe(64%)-Ni* **M** *+ ternary* **M** *(39% Fe, 29% S)*. At 585° the sec. transition plane is caused by the decompn of the ternary **M**, the phases being: Fe (57%)-Ni **M**, FeS, $(FeS)_2Ni_3S_2$ and the ternary **M**, (26% Fe, 28% S). By cooling to 480° the ternary **M** contg. 13% Fe, 27% S, the ternary eutectic is formed having the phases: Fe (34%)-Ni **M**, Ni_3S_2 and $(FeS)_2Ni_3S_2$. Below 480° FeS, $(FeS)_2Ni_3S_2$, Ni_3S_2 and Fe-Ni **M** alone appear. The ternary condition diagram developed from cooling curves and microscopic investigations shows all the equilibria down to 480°. Magnetometric detns. of the magnetic transition temps. confirm the equil. relations detd. by thermal and microscopic methods. The condition diagram offers an explanation for the constitution of mat, but cannot explain the droplet form of troilite in meteors. Micrograms (9) of various Fe-Ni-S alloys are shown. J. Balozian

Influence of cadmium in a galvanizing bath. Heinz Bablik. *Metal Ind.* (London) **37**, 411–3(1930).—Cd exceeding 0.05% in a pure Zn bath increases the gain of wt., and decreases the bending qualities of the coating. O. M. Smith

Bend tests on hot-dipped zinc coatings measured with micrometer calipers. Wallace G. Imhoff. *Am. Metal Market* **37**, No. 247, 5, 9, 10(Dec. 24, 1930); cf. *C. A.* **25**, 272.—The complete results of all tests on galvanized iron pails are tabulated and lead to the conclusion that the lighter the Zn coating and the lower the temp. of the bath, the better the adherence to the base metal, the less peeling and flaking, and the more ductile the coating. For obtaining the best coating, a good grade of Zn must be used, and the proportion of alloys added to the bath is kept at a min. The time "through the flux" and the "submersion time" give a combined time of 24 secs. in the metal. Best results (pails from plant Z) were due to: (1) an open steel base, (2) proper pickling conditions, (3) good condition of the Zn in the pot, (4) proper fluxing conditions, (5) the right use of metal addns. to the bath, (6) the right bath temp., (7) the proper submersion time, (8) the proper withdrawal time, (9) the right production for the conditions set, and (10) the lightest wt. of metal deposited. A similar no. of reasons

for the poor deposits (pails from plant S) are given. Thirteen general conclusions are listed and a comparison of the deposits on pails from 4 sources is tabulated. W. H. B.

Corrosion phenomena. XVII. M. Straumanis' explanation of difference effect. A. Thiel. *Z. physik. Chem.*, Abt. A, **151**, 103–4(1930); cf. *C. A.* **24**, 5706; Straumanis, *C. A.* **24**, 4688.—Straumanis's theory of difference effect fails because it is based upon a phenomenon which cannot be explained with the help of existing theoretical considerations. T. believes that the earlier investigations of Centnerszwer and Straumanis have, therefore, no value in throwing light upon the difference. H. Stoertz

The corrosion of metals. H. Sutton. *Aircraft Eng.* **2**, 209–10(1930).—Intercryst. corrosion of duralumin is reduced to a min. when the alloy is heat-treated at a high temp., quenched in cold water and allowed to age at normal temp. Although rapid aging at elevated temps. is sometimes used for producing high-strength Al alloys, such practice has a harmful effect on corrosion resistance. Cold working increases slightly the corrosion tendency. The anodic oxidation process, in which an adherent film of oxide is produced by electrolytic oxidation of Al alloys in chromic acid soln., is valuable for protection of aircraft parts and also to show imperfections in the metal. Mg alloys, Cr Ni steels, and ordinary steels protected by oils, enamels, ZnO and Al paints are also used in the aircraft industry. H. F. Johnstone

Corrosion of light and extra light metals and alloys. I. R. Cazaud. *Rev. metal.* **27**, 285–9(1930).—A survey of the work done by different investigators. J. D. Gat

A simple method for the determination of atmospheric corrosion of protected metal tubes. W. Beck. *Korrosion Metallschutz* **6**, 201–4(1930).—The rate of decrease in the O_2 content of a closed cylinder was used as a measurement of the rate of corrosion of bare and of protected tubes in moist atms. H. F. Johnstone

The effect of cold working on the rates of corrosion of non-ferrous metals. Bernward Garre. *Korrosion Metallschutz* **6**, 200–1(1930).—The rate of attack of 10% HCl on pure Sn (99.99%) decreases with the extent of cold working. For Sn contg. small quantities of impurities (99.90%) cold working has the opposite effect. The rates of corrosion of Pb and Cu are also decreased by cold working. H. F. J.

Accurate corrosion test for chrome-iron alloys. Wm. R. Huey. *Iron Age* **126**, 1696–8(1930).—Pieces to be tested are fully immersed for five 48-hr. periods in HNO_3 (65% by wt.) contained in all-glass app. and maintained constantly at the b. p. A. W. Holmes

Effect of physical state of small quantities of copper upon rate of corrosion of lead by sulfuric acid. E. G. Mahin and E. J. Wilhelm. *Ind. Eng. Chem.* **22**, 1397–1404 (1930).—From the results of a metallographic study of the effect of small quantities of impurities upon the susceptibility of Pb to corrosion, it is shown that rapidly cooled Pb is improved in this respect by Cu in proportions up to 1%. If Pb is used under conditions where temps. of 100° are exceeded no more than 0.20% of Cu should be present as the destruction of the sheet is accelerated, since Cu falls out of solid soln. at this temp. Downs Schaaf

Welding in the chemical industry. F. Leverick. *Ind. Chemist* **6**, 448–51(1930); cf. *C. A.* **24**, 5277. E. H.

Practical salt water spray tank [for corrosion tests of metals] (Pessel) **1.** Cooler for ores, etc., comprising a number of coaxial drums (Ger. pat. 508,461) **20.** Electric purification of gases [blast furnace] (Fr. pat. 686,759) **4.** Froth flotation of pulps such as those of coals or sandy pyrites (U. S. pat. 1,787,938) **21.** Apparatus for feeding reagents in ore flotation or other operations (U. S. pat. 1,787,289) **1.**

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Testing ores. J. POHLIG A.-G. Ger. 509,850, Aug. 29, 1929. App. for removing a portion of each charge of ore excavated by a mech. scoop, for testing, is described.

Ore grading. RUDOLF WUNSCH and ERZ- UND KOHLE-FLOTATION G. M. B. H. Ger. 507,507, Mar. 23, 1927. Material fed into a hopper is carried upward by an inclined conveyor over an inclined sieve plate through which water under pressure is sprayed to carry away the lighter particles.

Treatment of complex ores by flotation and cyaniding. SHERWIN P. LOWE (to Roscoe H. Channing, Jr., Agent). Can. 305,961, Nov. 18, 1930. Complex ores are selectively floated in the absence of cyanide to give concentrates in which are contained most of the base metals that are cyanicides; the flotation tailings are treated with cyanide to recover the Au and Ag and the cyanide soln. is regenerated.

Flotation. G. O. ERCHIKOVSKII. Russ. 36,191, Nov. 30, 1928. Oxidized ores are first treated with colloidal Se or Te or their derivs. which produce a skin on the edges of oxidized metal crystals and this operation is followed by a treatment with dextrose or SO_2 as reducing agents.

Mineral froth flotation. WILHELM SCHÄFER. U. S. 1,788,331, Jan. 6. Finely divided sulfide ores such as those of Pb and Ag or Pb-Zn slimes are treated with a flotation soln. contg. Fe dithionate or Zn trithionate or other suitable stable metal salts of polythionic acids of the formula $H_2S_xO_6$. U. S. 1,788,332 describes a process of treating finely divided ZnS ore in the presence of other metalliferous ores, to effect sepn., by use of a flotation soln. contg. a metal salt (such as the Zn-Na or Na salt) of "hyposulfurous acid" ($H_2S_2O_4$), the ZnS to be sepd. being prevented from adhering to the froth.

Flotation and concentration of ores. SHERWIN P. LOWE (to Roscoe H. Channing, Jr., Agent). Can. 305,960, Nov. 18, 1930. Ores contg. Cu, Zn and Fe sulfides are sepd. by flotation into a Cu concentrate a Zn concentrate and a tailing carrying much Fe sulfide. The pulp during the Cu flotation is maintained at an alky. of from 0.01 to 0.15 lbs. CaO per ton of water, and during the Zn flotation at an alky. of from 0.4 to 0.7 CaO per ton of water, and during the retreatment of the Zn concentrates the pulp is maintained at an alky. of from 0.8 to 1.10 lbs. CaO per ton of water.

Flotation compound. WILLIAM A. DOUGLASS (to E. I. Du Pont de Nemours and Co.). Can. 305,435, Nov. 4, 1930. Flotation agents of the general formula ROC(:S)-SC(:O)OR′, in which R and R′ are alkyl, are specified.

Separating granular ores, etc., by an ascending water current. BAYERISCHE BERG-, HÜTTEN- UND SALZWERKE A.-G. Ger. 506,948, Dec. 16, 1925.

Pneumatic ore separator. OLIVER C. PATTON and JOHN G. RAWLINS. U. S. 1,787,75 , Jan. 6.

Washers for ores, etc. ANTOINE FRANCE. Ger. 509,245, Sept. 7, 1927. Automatic control means is described for app. of the kind in which the material is carried by a stream of water through a trough having an opening in the bottom for the discharge of the heavier particles.

Metals from their ores. CARL GOETZ. Fr. 686,782, Dec. 17, 1929. Metals are obtained from S-contg. ores by mixing the ores with finely ground coal or lignite or other substances which yield hydrocarbons on heating such as mineral oils, and finely ground $FeSO_4$ and, if necessary a little lime. The mixt. may be made into briquets and is heated to about 700°, when H_2S is evolved and the metal formed. The $FeSO_4$ acts as a catalyst. The hydrocarbons may also be introduced into the furnace in the gaseous form.

Reducing ores such as those of iron. JOHN W. HORNSBY (to Granular Iron Co.).

U. S. 1,786,999, Dec. 30. The ore is fed to a preheating cylinder while a slightly oxidizing atm. is maintained in its feed end and a non-oxidizing or reducing atm. at the discharge end, with introduction of a reducing agent such as granulated coal and of a stream of fuel such as pulverized coal and air, and the air is isolated from the charge being reduced by the fuel. App. is described.

Reducing carbon dioxide. Bo M. S. KALLING and CARL VON DELWIG. Ger. 508,010, Dec. 8, 1929. Gases contg. CO_2 are brought into contact with electrically heated C in a rotary oven fitted with electrodes. The whole or a part of the C may be finely subdivided. The method is applicable in regenerating gases for use in the *reduction of Fe ores.* App. is shown.

Iron ore treatment. EISEN- UND STAHLWERK HOESCH A.-G. Ger. 508,966, June 1, 1924. Fe ore is treated simultaneously with C and an O or O-enriched air blast in a converter.

Iron-ore agglomerates for blast furnaces. SOC. ANON. BELGE D'AGGLOMÉRATION DE MINERAIS. Belg. 367,556, March 31, 1930. Before calcining the powdered material contg. Fe, one or more substances contg. the P and Ca required for the production of open-hearth iron are added.

Treating titanium ores. I. G. FARBENIND. A.-G. (Heinrich Plaut, inventor). Ger. 508,110, May 7, 1927. The mixt. obtained by opening up Ti ores in the usual way with H_2SO_4 is treated with the sulfate or other salt of an alkali metal or NH_4 in order to convert the Ti into a titanium-alkali or -ammonium sulfate. The double sulfate is more stable to heat than $Ti(SO_4)_2$, and the mixt. may accordingly be warmed until all the Ti has dissolved and then filtered and cooled to cryst. the double sulfate. Addnl. details and an example are given. Cf. *C. A.* 25, 480.

Zirconium ores. KALI-CHEMIE A.-G. (Friedrich Rüsberg and Paul Schmid, inventors). Ger. 509,514, Dec. 14, 1926. Zr ores are disintegrated by heating to glowing with lime and earth-alkali oxide, carbonate or hydroxide to form a good flux. The process is preferably carried out in a rotary reverberatory furnace in the presence of steam. In the example, ore contg. 75% ZrO_2 and 15% SiO_2 is heated with fluorspar and $CaCO_3$ to 1200° in a tube furnace.

Metallurgy of sulfide ores. AARON B. BAGSAR. Can. 306,638, Dec. 16, 1930. Sulfide ores are chlorinated at a high temp. to volatilize the resulting chlorides and the volatilized chlorides are reduced with H.

Conversion of mineral carbon occurring in precious-metal ores from an active to a passive state. RALPH H. MCKEE. Can. 306,685, Dec. 16, 1930. Graphitic Au-bearing ore is ground in an aq. soln. of SO_2 to cyaniding fineness and exposed to the action of the SO_2 for 1/4 hr. to convert the graphite from an active to a passive state. The soln. is removed and the ore washed with water or an alk. soln. such as lime water, NaOH or Na_2CO_3 or corresponding K compds. before the ore is cyanided.

Semicircular trough and associated apparatus for amalgamating gold sands and ores. CHARLES S. WHITE (15% each to James E. Ogden and WM. J. Scheuss). U. S. 1,787,923, Jan. 6. Structural features.

Apparatus for dead-roasting finely granular or pulverulent ores, etc. BALZ-ERZRÖSTUNG G. M. B. H. Ger. 509,306, Dec. 4, 1926.

Water-removing centrifuge with a conical sieve drum for dressing ores, fuel, etc. HEINRICH KOPPERS A.-G. Ger. 507,892, Sept. 6, 1929.

Lignite coke. BUDERUS'SCHE EISENWERKE. Ger. 506,821, May 11, 1927. Lignite coke is rendered suitable as the reducing agent for blast furnaces by briquetting it with finely divided ores.

Slag. ADDISON H. BEALE, HERMAN A. BRASSERT and FRED WILLE (to A. M. Byers Co.). Can. 305,138, Oct. 28, 1930. A molten slag for manuf. of wrought Fe is prepd. by melting materials contg. Fe oxides and silicates in a hearth furnace in a non-reducing atm.

Apparatus for centrifugal casting of metal articles such as iron pipe. JOHN A. BYERS and MICHAEL C. SMOTZER (to Centrifugal Pipe Corp.). U. S. 1,787,567, Jan 6. Structural features.

Facing composition for foundry sand molds. BENJAMIN F. WALLACE. U. S. 1,787,964, Jan. 6. A facing compn. comprises a dry mixt. contg. a major proportion of a carbonaceous dust such as gas retort coke, the particles being coated with a deflocculating agent such as dextrin, gum arabic or gelatin and being intimately mixed with a highly colloidal clay such as bentonite.

Molds for metallic castings. I. G. FARBENIND. A.-G. Fr. 687,960, Nov. 2, 1929. The molds are made wholly or partially of porous metal by compression and heating

of metallic powder. The powder may be obtained by thermal decompn. of the carbonyl compd. of the metal.

Metal molding trough. Société électrométallurgique de Montricher. Ger. 506,523, Dec. 29, 1926.

Aluminum. Oscar M. Henriques and Thomas A. Thomsen. Fr. 688,563, Jan. 20, 1930. Al and Si are sepd. from Al silicates, with a view to getting metallic Al or Al compds., by treating the silicates with a gaseous chlorinating agent contg. H in the free or combined state at a temp. such that the silicate is partially or completely transformed to $AlCl_3$, which is volatilized, and SiO_2.

Alumina. Colloïd-Chemische Forschungs A.-G. (Eugen Herzfeld and Hans Walker, applicants in Switzerland). Fr. 687,725, Jan. 6, 1930. Bauxite or other ores contg. Al are heated with concd. H_2SO_4. The sulfate is dissolved in water and $Al_2(SO_4)_3$ is pptd. free from Fe by adding alc. The $Al_2(SO_4)_3$ is transformed to Al_2O_3 by roasting.

Refining lead. Henry Harris. Ger. 507,769, June 24, 1925. See *C. A.* **21**, 219 (Brit. 244,424).

Refining copper. Victor E. Legg (to The Western Electric Co., Inc.). Can. 306,406, Dec. 2, 1930. Non-embrittling Cu of a high degree of ductility is obtained by heating the Cu in a solid state for 1 hr. in the presence of charcoal to 1000°, cooling, cold-working, and again heating in the presence of fresh charcoal for an hr. at 1000°.

Copper and zinc. Metallgesellschaft A.-G. and Hochofenwerk Lübeck A.-G. (Otto Gerlich, inventor). Ger. 508,508, Apr. 26, 1927. Cu and Zn are obtained from the washings of chlorinated roasted ores by employing $Zn(OH)_2$ as the pptg. agent for the Cu. The Cu ppt. is redissolved by adding $FeCl_2$ soln., which causes the Fe to be pptd. as hydroxide. The Cu is pptd. from the filtered liquid by Fe, and the lye used as $FeCl_2$ lye for dissolving further Cu ppt. The Zn is pptd. from the decoppered lye by $Ca(OH)_2$ as $Zn(OH)_2$ and part may be used for pptg. the Cu as above.

Removal of magnesium and calcium from zinc-bearing material. Walter O. Borcherdt (to The New Jersey Zinc Co.). Can. 307,194, Dec. 30, 1930. Unroasted blende concentrate contg. substantial amts. of Mg and Ca as impurities is treated with H_2SO_4 in aq. soln. to cause complete conversion of the Mg and Ca into sulfates but insufficient to cause the conversion of appreciable amts. of the ZnS into $ZnSO_4$. The $MgSO_4$ and $CaSO_4$, which are present as minute suspended particles, are removed by washing.

Extracting zinc, etc. Duisberger Kupferhütte (Karl Mattenklodt and Hans Schramm, inventors). Ger. 508,071, Sept. 19, 1925. This relates to the treatment of impure Zn lyes obtained, *e. g.*, from cupriferous pyrites roasted under chloridizing conditions. The lyes are divided into 2 parts, one of which is treated in known manner to ppt. Ag, Cu, Fe, As, etc., as hydroxides or carbonates, and then further worked up, *e. g.*, to lithopone. The pptd. impurities from the first part are added to the second part, and the latter is then worked up to recover Ag, Cu, etc., in known manner.

Tin. Edgar A. Ashcroft. Ger. 508,342, May 17, 1928. See Brit. 295,805 (*C. A.* **23**, 2148).

Separating nickel and cobalt. Walter Savelsberg. Fr. 688,491, Jan. 20, 1930. See Ger. 504,437 (*C. A.* **24**, 5281).

Fused uranium. John W. Marden and Harvey C. Rentschler (to Canadian Westinghouse Co., Ltd.). Can. 305,418, Nov. 4, 1930. Anhydrous K U fluoride is reduced by Mg *in vacuo* at a temp. sufficient to remove the products of the reaction and fuse the U. The metallic U may be formed into suitable shapes for x-ray targets, wire, filaments and electrodes.

Blast furnaces. H. A. Brassert & Co. Fr. 688,204, Jan. 14, 1930.

Blast furnace with utilization of gaseous products of combustion. M. I. Fyuner Russ. 20,762, Nov. 9, 1927. Constructional details.

Open-hearth furnace. M. F. Morozov and D. I. Zelenskii. Russ. 59,796, Dec. 7, 1929. Structural details.

Open-hearth furnaces. Otto Reiner. Fr. 686,983, Dec. 20, 1929. Means for deflecting the hot and outlet gases is described.

Siemens-Martin furnaces. Ferdinando Fiorelli. Fr. 687,792, Jan. 7, 1930.

Rotating furnace for fusing metals. Carl Brackelsberg. Fr. 687,643, Jan. 3, 1930.

Rotating furnace for fusing metals. Compagnie du chemin de fer de Paris à Orléans and Louis J. Audo. Fr. 688,146, Jan. 13, 1930.

Reverberatory furnace for heating and reducing fused ores. Hans Christian. Ger. 507,963, Feb. 12, 1925. Details of arrangement.

Kiln suitable for roasting zinc blende, etc. GEORG BALZ (to Balz-Erzrostung G. m. b. H.). U. S. 1,787,504, Jan. 6.

Furnace for heating metal articles. WELLMAN SMITH OWEN ENGINEERING CORP., LTD., and E. W. PLUMLEY. Brit. 334,006, July 2, 1929.

Furnace suitable for annealing metal sheets. WM. F. DETWILER. U. S. 1,787,307, Dec. 30.

Muffle for annealing metal. Soc. ROBERT ZAPP. Fr. 687,670, Jan. 4, 1930.

Apparatus for annealing metal objects with recovery of heat. AKT. GES. BROWN BOVERI & CIE. Fr. 687,720, Jan. 6, 1930.

Furnace, quenching vat and associated apparatus for case-hardening metal articles. HEYMAN ROSENBERG. U. S. 1,786,508, Dec. 30. Structural features.

Case-hardening metals. PORTER W. SHIMER and EDWARD B. SHIMER. Can. 305,281, Nov. 4, 1930. A molten bath for case-hardening metals consists essentially of a mixt. of $CaCl_2$, NaCl and a minor proportion of $Ca(CN)_2$.

Apparatus (with troughs and stirrers) for heat treatment of metalliferous materials with a counter current of hot gases. RICHARD A. STOKES and EDWIN G. L. ROBERTS (to E. M. S. Industrial Processes, Ltd.). U. S. 1,788,351, Jan. 6. Various details of construction and procedure are described.

Heat treatment of rails. Soc. ANON. D'OUGRÉE-MARIHAYE. Belg. 368,181, March 31, 1930. The pearlite-ferrite structure is changed to a sorbitic structure, having a higher resistance to wear, by spraying water at a predetd. temp. on the working part of the rail as it leaves the rolling mill, the surface that is sprayed being limited by means of plates of a poorly conducting material which is resistant to high temps. and to water.

Hard metal compositions. EMERY G. GIBSON (to The Canadian General Electric Co., Ltd.). Can. 305,847, Nov. 18, 1930. Hard, strong metal compns. (suitable for cutting tools, wire drawing dies, etc.), consisting mainly of W, but contg. appreciable amts of C and Co, are made by mixing the W, C and Co in powd. form and uncombined with one another and consolidating the mixt. into a hard strong body by the application of heat and pressure.

Smelting vessel for making alloys or purifying metals by crystallizing. METALLHÜTTENWERKE SCHAEFER & SCHAEL A.-G. and OTTO NAESER. Ger. 509,307, Aug. 7, 1927. The vessel has a cylindrical lower part and an inverted frusto-conical upper part.

Working metals and alloys. SIEMENS & HALSKE A.-G. (Bruno Fetkenheuer, inventor). Ger. 508,436, Jan. 14, 1928. Metals and alloys that become more brittle with increase in temp. are strongly cooled before rolling, hammering, pressing, drawing or other mech. treatment, so that the temp. immediately after the treatment does not exceed about 10°. The metal may also be heated nearly to the m. p. between two mech. treatments. The treatment of Al-Ni alloys is referred to.

Refining alloys. ERWIN HOFMANN. Fr. 686,810, Dec. 18, 1929. An agent for refining metal alloys used for making printing characters is composed of a reducing mixt., *e. g.*, a mixt. of wood charcoal and borax and an alk. earth sulfide, including MgS. The constituent may be distributed in a molten mass of colophony, and $NaHCO_3$ may be added to make the mass spongy, after which it is ground.

Alloys. WILLOUGHBY S. SMITH, HENRY J. GARNETT and JOHN A. HOLDEN. Ger. 508,199, Jan. 5, 1927. See Brit. 278,454 (*C. A.* 22, 2546).

Alloy. HANS KANZ. Fr. 687,778, Jan. 7, 1930. An alloy suitable for acoustic instruments contains, *e. g.*, Cu 59.3, Sn 6, Zn 34, Ni 0.5 and Si 0.2 parts.

Alloys. THE INTERNATIONAL NICKEL CO., INC. Fr. 688,358, Jan. 16, 1930. Alloys of Fe, Ni and Cr which are resistant to corrosion and which may be worked in the cold contain Cr 4–30 and Fe over 62%, the limits of Cr and Ni being governed by the following: when the content of Cr rises to 10%, the percentage of Ni passes the no. obtained by subtracting the percentage of Cr from 19 and multiplying the result by 1.9; when the content of Cr is between 10 and 12%, the percentage of Ni is higher than the no. obtained by subtracting the content of Cr from 27, and, lastly, when the content of Cr is between 15 and 30%, the content of Ni is above the no. obtained by subtracting the content of Cr from 39 and multiplying the result by 0.5. Fr. 688,359 describes similar alloys in which the Cr content is 8–25 and the Ni 12–19%. The C content is below 0.3, and the max. amt. of other elements such as Si or Si and Mn is 5%.

Alloys. F. POMIANKOWSKI. Belg. 368,006, March 31, 1930. *Ni bronze* is obtained by melting 70–5% Cu in a crucible with 13–6% Ni and 0.04–0.08% Fe, then adding 6–9% Zn and 0.2–0.5% Al, removing from the fire, and adding 0.3–0.7% Pb and 0.02–0.06% P as Zn phosphide. It is suitable for taps, valves, equipment for the

chem. industries and parts for marine machinery, etc. Belg. 368,007 covers the prepn. of a *Zn-Al alloy* by melting 0.5–3.5% Cu and 0.1–1.5% Fe in a crucible, adding 2.7–3.8% Al followed by 88–95% Zn, and, after removing from the fire, adding 0.5–2.2% Sn and 0.5–2.8% Pb. Belg. 368,008 covers a *Pb-Al alloy* prepd. by melting in a crucible 0.04–0.08% Sb, adding 0.8–0.15% Al and then 0.5–0.12% Sn, removing from the fire and adding 95–9% Pb. It is suitable for the manuf. of pipes and roofs. Belg. 368,009 provides for the manuf. of *ferro-bronze* by melting 55–68% Cu with 0.5–3% Fe, adding 32–40% Zn, removing from the fire and adding 0.5–2% Sn. It is suitable for valves and machine parts as a substitute for bronze.

Alloy for bearings, packings, etc. KARL L. ACKERMANN. Ger. 508,154, Mar. 24, 1926. Pb 10–30, Sn 2–7, Ni and Co (together) 1–3, P up to 1, As up to 1%, the remainder being Cu. Part of the P may be replaced by Mn.

Inoxidizable alloy. WALTER HADDON and JACOB WINFIELD. Fr. 688,299, Jan. 15, 1930. An inoxidizable alloy contains, *e. g.*, Cu 89–90, Al 9–10, Ni about 1, and Mn 0.25–0.4%. Ni may be replaced partly or wholly by Fe.

Magnetic alloy. GUSTAF W. ELMAN (to The Western Electric Co., Inc.). Can. 306,812, Dec. 16, 1930. A magnetic alloy which comprises Ni 9–81, Co 4–80 and Fe 5–45% is characterized by a permeability that varies less than 5% over a range of flux densities from zero to 500 c. g. s. units.

Choke-coil frame of special alloy. ABRAHAM B. DIBNER. U. S. 1,786,604, Dec. 30. A choke coil suitable for use with high-tension transmission lines has a frame of low-cond. bronze which may contain Cu 90, P 0.1, Ni 8 and Si 1.9%.

Thermal treatment of aluminum or its alloys. ERFTWERK A.-G. Ger. 508,155, Apr. 8, 1924. Sheets of Al or alloys contg. above 80% of Al are heated to a temp. between 500° and 800° after rolling, etc. The time of heating varies with the thickness of the sheet, a sheet of 1 mm thickness being heated for 1 min. The treatment results in a finely granular recrystn. structure. Cf. *C. A.* **24**, 820.

Aluminum alloy. KARL SCHMIDT G. M. B. H. Fr. 688,076, Jan. 13, 1930. An alloy suitable for pistons contains Al about 70, Si 15–25 and 0.5–3% of each of the following metals: Mn, Cr, Co and Ni, and finally, 0.5–1% of Ti or Mo or 0.5–3% of Sb.

Aluminum-copper-nickel alloys. THE INTERNATIONAL NICKEL CO., INC. Ger. 508,198, June 4, 1926. See Brit. 253,879 (*C. A.* **21**, 2456).

Improving copper-aluminum alloys. BERG-HECKMANN-SELVE A.-G. ZWEIGNIEDERLASSUNG CARL BERG. Ger. 508,603, Oct. 21, 1928. The Cu-Al alloys are given an Fe, Co and (or) Ni content greater than the Al present, and heated to glowing, chilled and mechanically deformed by rolling, etc. Alloys mentioned in examples contain 89% Cu, 8% Ni and 3% Al or 92.5% Cu, 5% Ni and 2.5% Al.

Separating antimony from lead alloys. ALBERT HANAK. U. S. 1,786,908, Dec. 30. The alloy is treated with an alkali metal such as Na to form a less fusible alloy of Sb and alkali metal which is dissolved in caustic alkali in the molten state, the caustic melt is sepd. and treated with water to sep. metallic Sb.

Lead alloys. REGINALD S. DEAN (to the Western Electric Co., Inc.). Can. 306,610, Dec. 9, 1930. Pb alloys are produced by alloying 1% of Ca therewith and aging the alloy to cause dispersion of minute particles contg. the Ca uniformly throughout the Pb.

Refining lead-bismuth alloys. JOHN J. FINGLAND, ALEXANDER D. TURBULI and PETER F. MCINTYRE (to The Consolidated Mining and Smelting Co. of Canada). Can. 306,082, Nov. 25, 1930. Pb-Bi alloys contg. 20–40% Bi are refined by heating the crude charge to 1000°F., adding 1.5–3% Zn, agitating and allowing the molten charge to cool slowly by successive stages, removing the solidifying metals and crusts at each stage and transferring the crusts to hotter stages and finally to a stage heated to 1100° F., where after remelting they are removed and separately treated to recover the values. The liquid metal is transferred from the hottest stage to the initial stage for retreatment with a succeeding charge. The residual liquid metal of each stage is successively transferred to stages of lower temp. and the procedure continued until a low-freezing residual Pb-Bi alloy is obtained, substantially free from other metals.

Alloys of magnesium and aluminum. COMPAGNIE DE PRODUITS CHIM. ET ELECTROMÉTALLURGIQUES ALAIS, FROGES ET CAMARGUE. Fr. 686,855, Mar. 8, 1929. Alloys of Mg and Al, with or without other metals such as Zn or Cu, are improved by introducing into the alloys metals having a high affinity for N such as Ti, Zr and B, preferably in the proportion of 0.05–1%. These metals may be introduced in the form of a double fluoride of an alkali metal and the metal to be introduced.

Magnesium and its alloys. I. G. FARBENIND. A.-G. Fr. 687,274, Dec. 26, 1929. Particles of Fe or like impurities in suspension in Mg or its alloys are removed by treat-

ing the metal in fusion with purifying substances such as Si and Mn which sep. from the fusion bath by a primary crystn., after soln. by increasing the temp.

Protecting jets of magnesium or its alloys from oxidation while pouring in molten condition. ADOLF BECK, WALTER SCHMIDT and GUSTAV SCHREIBER (to I. G. Farbenind. A.-G.). U. S. 1,788,185, Jan. 6. Mech. details of pouring to minimize contact with the air.

Heat treatment of magnetic iron and nickel alloys. GUSTAF W. ELMEN (to Western Elec. Co.). U. S. 1,788,017, Jan. 6. For increasing the permeability, at magnetizing forces of less than 0.2 gauss, of a magnetic alloy formed mainly of Ni and Fe, the material is heated to at least 1100° but below the m. p. of the alloy and cooled at such a rate as to effect annealing.

Steel alloy resistant to hot gases and vapors. BENNO STRAUSS (to Fried. Krupp A.-G.). U. S. 1,787,403, Dec. 30. Vessels adapted to be used in the conversion of oil residues to gasoline are formed of an alloy which has been heated above the crit. point Ac3, quickly cooled, and reheated to about 600–650°, the alloy being a steel alloy contg. C 0.1–0.2, Cr 5–12 and V 0.2–0.5%.

"Stable-surface" alloy steel. RALPH P. DE VRIES (to Ludlum Steel Co.). U. S. 1,788,281, Jan. 6. An alloy steel which is resistant to scaling at high temps. contains Cr about 1%, Si about 2%, Cu about 1% and C less than 1%, the balance being mainly Fe. Cf. *C. A.* **24**, 4502.

The dephosphorization of cast iron in the converter. P. RIES and F. BICHEROUX. Belg 369,673, May 31, 1930. Before powdered CaO is added to the converter, a basic slag is formed in the converter, either by adding a limited amount of CaO in lumps before the introduction of the charge of Fe, or by retaining in the converter or putting back into it part of the slag from a preceding operation. Cf. *C. A.* **24**, 2104.

Cast iron. THE INTERNATIONAL NICKEL CO., INC. Fr. 687,677, Jan. 4, 1930. Gray cast Fe having a high resistance to traction is made by melting a charge composed, *e. g.*, of 60% of steel, 12% coke and the rest scrap Fe. The mass is cast in a casting ladle and graphite is sepd. by adding 2.5–7% of a mixt. of Si and Ni, the Ni being 1–5%. Cf. *C. A.* **24**, 3480.

Iron powder. HARTSTOFF-METALL-A. G. (HAMETAG). Fr. 686,689, Dec. 16, 1929. Fe powder is made by grinding the metal and heating it to redness in an atm. free from O, *e. g.*, an atm. of NH_3 and submitting it to a further mech. treatment.

Refining iron and steel. SIGURD WESTBERG. U. S. 1,786,806, Dec. 30. See Can. 301,389 (*C. A.* **24**, 3982).

Steel. WINFIELD C. HAMILTON and CLARENCE E. SIMS (to The American Steel Foundries). Can. 306,054, Nov. 25, 1930. A high-Mn pearlitic steel contains Si 0.20–1.50, C 0.20–0.60 and Cu 0.50–2.00%. Cf. *C. A.* **24**, 1612.

Steel. WINFIELD C. HAMILTON and CLARENCE E. SIMS (to The American Steel Foundries). Can. 306,055, Nov. 25, 1930. A high-Mn pearlitic steel contains Si 0.20–1.50, C 0.20–0.60 and Cr 0.50–2.00%. Cf. *C. A.* **24**, 1612.

Heat-treating steel. FRANK A. FAHRENWALD. U. S. 1,787,977, Jan. 6. Steel is heated quickly to a temp. above its crit. temp. in a "limitedly oxidizing" atm. contg. H_2O, CO, CO_2 and N but substantially devoid of free O, and is then cooled in such an atm. to a temp. which is both below the crit. temp. and below any temp. at which scale would form from reaction with free atm. O.

Operating apparatus for carburizing steel parts. RICHARD KAIER (to Singer Mfg. Co.). U. S. 1,786,951, Dec. 30. Various details of app. and mech. features of operation are described.

Apparatus for pickling steel sheets, etc. CHARLES T. HAINES. U. S. 1,787,820, Jan. 6. Structural features.

Protective treatment of aluminum or aluminum alloy. ARTHUR ARENT (to Arthur Arent Laboratories, Inc.). Can. 305,643, Nov. 11, 1930. Al surfaces are treated with a concd. NaCl soln. of $SbCl_3$.

Coating metals. OTTO HERTLING. Ger. 507,858, Sept. 29, 1928. Food containers, etc., of Fe or metal are given a galvanic coating of Sn on the inside, and a hard coating of Ni, Cr, etc., on the outside. An intermediate layer of Cu or brass may be present.

Coating with metals applied in the vapor phase. AMERICAN MACHINE & FOUNDRY CO. Ger. 508,375, April 1, 1926. See Brit. 276,390 (*C. A.* **22**, 2352).

Coating iron articles with tin or lead. MATUSCHEK METALLINDUSTRIE GUSTAV RADTKE. Ger. 508,043, Mar. 30, 1928. See Brit. 308,804 (*C. A.* **24**, 331).

Metal coatings. VEREINIGTE ALUMINIUM-WERKE A.-G. Ger. 508,554, Aug. 14, 1928. Light metals or alloys are given a corrosion-resistant coating by using metals or

alloys of m. p. below the critical or annealing temp. of the metal to be coated. Thus, a light-metal alloy may be coated galvanically with Cd, Sn or Cu.

Stainless metal coatings. N. V. MAATSCHAPPIJ TOT EXPLOITATIE VAN DER PARKER OCTROOIEN "PARKER RUST PROOF." Ger. 508,785, Apr. 14, 1927. A stainless Fe-Mn coating is given to Fe and steel objects by immersing the latter in a bath contg. MnO_2, H_3PO_4 and Mn phosphates, the proportion of phosphates being adjusted so that the $MnPO_4$ content of the final stainless coating is at least $^1/_3$ the $FePO_4$ content.

Metal-coating material. JAMES H. GRAVELL. Can. 306,870, Dec. 23, 1930. A material for coating metal consists of an admixt. of naphtha and kerosene, stearin pitch, H_3PO_4 and lampblack.

Metal-coating composition. ROBERT R. TANNER and VAN M. DARSEY (to The Parker Rust-Proof Co.). Can. 306,997, Dec. 23, 1930. Fe or Zn is treated with a hot, weak soln. of phosphates of Mn, Fe and Cu, the soln. being substantially free from acids stronger than phosphoric or salts thereof. After washing and drying, the surfaces may be coated with paint or enamel.

Apparatus for galvanizing or tinning articles such as pails or buckets, etc. JOHN CARROLL (to Reeves Mfg. Co.). U. S. 1,787,141, Dec. 30. Structural features.

Bearing metal. ROBERT J. SHOEMAKER (to The S. and T. Metal Co.). Can. 305,499, Nov. 4, 1930. A Pb alloy contains Li 0.01–0.05, Na 0.2–0.8, Ca 0.1–0.7, Al 0.02–0.1 and Pb to make up 100%. Cf. *C. A.* 24, 1612.

Magnetic material. GUSTAF W. ELMEN (to The Western Electric Co., Inc.). Can. 307,225, Dec. 30, 1930. A magnetic material comprises Ni 78.5, Fe 16–18.5 and Mo 3–4%. Cf *C. A.* 24, 4364.

Treatment of rare refractory metal powders. FRANK H. DRIGGS and WILLIAM C. LILLIENDAHL (to Canadian Westinghouse Co., Ltd.). Can. 305,425, Nov. 4, 1930. Ta oxide is mixed with powd. Ta metal in sufficient amt. to react with and reduce the C content of the metal to below 0.5%. The mixt. is compacted by heat-treating *in vacuo* to effect reaction and evacuate the C oxide product prior to sintering the powd. metal. The mixt. is then sintered *in vacuo* at a temp. below the actual fusion temp.

Joining aluminum to iron. HENRY DIETERLEN. Fr. 688,569, Jan. 20, 1930. Al is joined to Fe by first treating Fe to obtain a diffusion of Al into the Fe and then joining the Al by casting or soldering.

Apparatus and features of operation for electric arc welding. KARL STROBEL (to A. O. Smith Corp.). U. S. 1,787,600, Jan. 6.

Welding magnesium and its alloys. I. G. FARBENIND. A.-G. (Hubert Altwicker, inventor). Ger. 508,352, Apr. 27, 1929. A thin sheet or foil of a metal forming mixed crystals with Mg is laid between the parts to be joined, which are heated and then united under hydraulic pressure. Zn foil of 0.03 mm. thickness is suitable.

Welding flux for magnesium and its alloys. I. G. FARBENIND. A.-G. (Ernst de Ridder and Wilhelm Neuhaus, inventors). Ger. 509,024, June 13, 1928, and 509,025, June 8, 1929, addn. to 509,024. A salt mixt. is used comprising LiCl 0.8–14 and KF 1 part or alternatively LiBr 1–5 and KF 1 part. Small quantities of other alkali halides may be included.

Flux for welding copper to iron or steel. EMANUEL J. SCHAFFNER, NORA E. SCHAFFNER and KATIE E. FIELD. U. S. 1,787,553, Jan. 6. Cu 10, Zn 25 and Pb 1.25 parts are mixed while in a molten state, cooled and comminuted, and this product is further mixed with borax and $CuSO_4$.

Welding electrodes carrying flux, adhesive and insulating materials. MAURICE LEBRUN and JEAN BRILLIE (to La Soudure Autogene Française). U. S. 1,788,510, Jan. 6. Structural details.

Welding electrodes. R. D. THOMPSON and G. C. MILLS. Brit. 333,985, June 11, 1929. Electrodes or welding rods are coated with a compn. comprising Al or an Al alloy and AmOAc. Rods of high-speed tool alloy thus prepd. may be used for welding, tipping or depositing on C tool steel shanks, and rods of high-m. p. alloy of W, Cr or Mo may be deposited on other metals for elec. contact points. The electrode also may carry a flux such as may be formed from boric acid 15, fluorspar 15, Fe oxide 10, lime 50 and Mn oxide or carbonate 10 parts, finely ground and mixed with linseed oil and rosin.

Welding rod. FRANK A. FAHRENWALD (to The American Manganese Steel Co.). Can. 306,931, Dec. 23, 1930. A cast welding rod consists of Fe 75–95, Cr 1–15, Mo 1–8 and C 1–3%.

Welding rod. FRANK A. FAHRENWALD (to The American Manganese Steel Co.). Can. 307,129, Dec. 30, 1930. A welding rod contains Fe 80–80, Mn 10–15, Ni 1– and C 0.5–1.5%.

Soldering flux. JAMES H. GRAVELL. Can. 305,783, Nov. 18, 1930. A soldering flux comprises $ZnCl_2$, butyl alc., aniline-HCl and petrolatum.

10—ORGANIC CHEMISTRY

CHAS. A. ROUILLER AND CLARENCE J. WEST

Syntheses with β,β′-dichlorodiethyl ether. I. Derivatives of tetrahydropyran. CHARLES S. GIBSON AND JOHN D. A. JOHNSON. *J. Chem. Soc.* 1930, 2525–30.—$(ClCH_2CH_2)_2O$ (I), m. −24.5°, b_{12} 66°, b_{18} 70°, b_{744} 176°, with a large excess of NaI in Me_2CO, gives the β,β′-diiododiethyl ether (II), b_{10} 123.5–4°. I, $CH_2(CO_2Et)_2$ and Na in EtOH, boiled 5 hrs., give Et tetrahydropyran-4,4-dicarboxylate, b_{12} 134–5°; hydrolysis with EtOH-KOH gives 81% of the acid, which loses CO_2 at 175–85°, giving 94.5% of tetrahydropyran-4-carboxylic acid (III), b_{18} 146–7°; *acid chloride*, b_{16} 85–6°; *Me ester*, b_{16} 80.5–1°; *Et ester*, b_{12} 82.5°; *amide*, m. 179°; *anilide*, m. 163°. I and $NCCHNaCO_2Et$ in EtOH, heated 3 hrs. and kept 12 hrs., give 33% of *Et 4-cyanotetrahydropyran-4-carboxylate*, b_{16} 125°; *free acid*, m. 160–2°; *amide*, m. 158°; heating at 180–200° for 1 hr. gives 66% of *4-cyanotetrahydropyran*, b_{10} 82–3°; this could not be reduced to the amine by Na in AmOH. I and $AcCHNaCO_2Et$ gave only a small amt. of high-boiling material. II gives a product b_8 122.5–3.5°, which, on hydrolysis, gives III, AcOH and a trace of a ketone. No results were obtained in the Friedel-Crafts reaction with I and C_6H_6 or between I and KCN. I, As_2O_3 and NaOH gave no condensation product.

C. J. WEST

Improved procedure for the preparation of nitromethane by Kolbe's synthesis. ABLL B. WANG AND CHAO-LUN TSENG. *Natl. Central Univ. Sci. Repts., Ser. A, Phys. Sci.* 1, 27–38(1930).—Addn. of H_3BO_3 in mol. quantities to the $NaNO_2$-$ClCH_2CO_2Na$ mixt. improves the yield of $MeNO_2$ to a max. of 58%. A mixt. of 50 g. $ClCH_2CO_2H$ with 100 g. ice was exactly neutralized with satd. NaOH; 36.5 g. $NaNO_2$ in 50 cc. water and 37.4 g. H_3BO_3 were added, the mixt. being shaken. With rising temp. distn. of $MeNO_2$ began at 80° and was completed by heating the mass to 110°. The crude product, 18.5 cc., yielded 18.7 g. of pure $MeNO_2$ on distn. Addn. of H_3BO_3 served to neutralize the generated $NaHCO_3$, which causes loss of $ClCH_2CO_2H$ through formation of glycolate.

K. H. ENGEL

Interaction between alkyl Grignard reagents and arsenic trichloride. WILFRED J. C. DYKE AND WM. J. JONES. *J. Chem. Soc.* 1930, 2426–30.—The app. and procedure used in the study of $SbCl_3$ (*C. A.* **24**, 2736) were used in this study. The chief product of RMgX and $AsCl_3$ is the AsR_3; some As is always liberated as a finely divided, brown powder. AsR_3 is less readily oxidized than the corresponding SbR_3; it combines immediately with Br and with I and its avidity for RX is much greater than that of the SbR_3. With Cl, $AsMe_3$ immediately bursts into flame. MeI (31 g.) and 13 g. $AsCl_3$ give 4.2 g. $AsMe_3$, b. 51–3°. EtBr (55 g.) and 13.8 g. $AsCl_3$ give 9 g. $AsEt_3$, b_{760} 8–9°. BuBr (69 g.) gives 10 g. $AsBu_3$ and 5 g. C_8H_{18}. Me_2CHCH_2Br (69 g.) gives 9 g. *triisobutylarsine*, b_{31} 119°, d_4^{25} 0.9590, n^{25} 1.4704, 1.4627, 1.4595 for F, D and C; 3 g. hydrocarbon was also obtained. Me_2CCl gave no arsine. AmBr (61 cc.) gives 12 g. $AsAm_3$, b_{10} 179–80° and 10 g. $C_{10}H_{22}$. *Tri-dl-β-methylbutylarsine* (*tri-dl-amylarsine*), b_{10} 160°, b_{20} 149°, d_4^{25} 0.9563, n^{25} 1.4772, 1.4696, 1.4665 for F, D and C, results in 7-g. yield from 76 g. of the alkyl bromide; there also results 10 g. of hydrocarbon. *Tri-γ-methylbutylarsine* (*triisoamylarsine*), b_{18} 167–8°, d_4^{25} 0.9504, n^{25} 1.4771, 1.4694, 1.4662 for F, D and C, results in 10-g. yield from 76 g. isoAmBr. *Tri-δ-methylamylarsine* (*triisohexylarsine*), b_5 158–60°, d_4^{25} 0.9309, n^{25} 1.4741, 1.4669, 1.4639 for F, D and C, results in 10-g. yield from 83 g. of alkyl bromide; 5 g. hydrocarbon was also formed. The av. at. refractivity for As, calcd. from the 4 new derivs. is: F, 12.21; D, 11.84; C, 11.69.

C. J. WEST

Action of magnesium on iodoform in ether solution. CHAO-LUN TSENG AND EDITH JU-HWA CHU. *Natl. Central Univ. Sci. Repts., Ser. A, Phys. Sci.* 1, 15–22(1930). —CHI_3 and Mg react readily in anhyd. Et_2O, giving C_2H_2 and $MgI_2{\cdot}2H_2O{\cdot}2Et_2O$. To a mixt. of 39.3 g. CHI_3 and 7.3 g. Mg turnings 200 cc. of dry Et_2O was gradually added at 0–30°, C_2H_2 being evolved during this stage. CH_2I_2, MeI, MeOH, CH_2O or HCO_2H could not be identified after addn. of H_2O. It is concluded that intermediate mono- or di-Mg compds. of CHI_3 were not formed, but only the tri-Mg compd., which reacted immediately with a second CHI_3. $CHCl_3$ and $CHBr_3$ did not react under the same conditions.

K. H. ENGEL

Suggested modifications of Mulliken's system for the identification of compounds of Order I. CHAO-LUN TSENG. *Natl. Central Univ. Sci. Repts., Ser. A, Phys. Sci.* 1, 1–3(1930).—It is proposed to rearrange the first 4 genera in the order aldehydes, acids, phenolic compds., carbohydrates. In applying the generic test for the latter group, M.'s 3 supplementary tests for the presence of phenols and acids may then be omitted. An addnl. preliminary test for water soly. (1 part in 50) and acidity is recommended. A soln. of 0.05 g. (or the decanted soln.) is tested for acidity with Congo red paper. If the substance is insol. it is placed in contact with the wetted indicator paper. Even acids as weak as stearic produce a color change. K. H. ENGEL

The condensation of acetone by sulfuric acid. D. TISHCHENKO. *Bull. soc. chim.* [4], 47, 1137–47(1930).—Much higher yields (up to 25% theory) of mesitylene than hitherto reported were obtained by mixing 1 vol. H_2SO_4 and 0.58 vol. H_2O, cooling, adding 1 vol. Me_2CO, standing at room temp. 24 hrs., then heating 2–3 hrs. on a water bath and steam distg. The high-boiling fraction of the mesitylene contains mesityl oxide, isophorone and a hydrocarbon thought to be $3,5\text{-}Me_2C_6H_3CH{:}CMe_2$. The residue in the original flask not volatile with steam is a liquid instead of a resin as when concd. H_2SO_4 is used. It contains some $2,4,5,7\text{-}C_{16}H_4Me_4$ and a little of a hydrocarbon, $C_{16}H_{20}$, partially identified as 2,4,5,5,7-pentamethyldihydronaphthalene by its yielding mellophanic acid by oxidation by dil. HNO_3 in a sealed tube. L. F. GILSON

The cracking of acetone under pressure and in the presence of zinc chloride. V. N. IPAT'EV, A. D. PETROV AND I. IVANOV. *Ber.* 63B, 2806–12(1930).—The condensate of acetone (300–325° under pressure, $ZnCl_2$ present) contains a number of hydrocarbons, mesitylene, mesityl oxide, isophorone and xyletone. The hydrocarbons are sepd. by acid treatment after distn. over Na. Unsatd. hydrocarbons are detd. from the I no. and by action of 80–100% H_2SO_4; the aromatic compds. by nitration and action of fuming H_2SO_4. The unsatd. hydrocarbons of the benzene fraction belong to the olefins; those of the kerosene fraction to the diethylene series. Efforts to sep. the unsatd. hydrocarbons by Hg were not entirely successful. The naphthene hydrocarbons are subordinate and cannot be detd. by the aniline point. MARY E. LEAR

Ammines. IV. Cuprammine salts of monobasic acids. HERBERT J. S. KING. *J. Chem. Soc.* 1930, 2307–19; cf. *C. A.* 24, 1380.—Although a no. of ammines of Cu contg. fewer than 4 mols. of the base in the coordination complex have been described no evidence has been adduced as to whether the acid radicals are ionized. A study has been made to ascertain whether acid radicals can replace mols. of NH_3 or C_5H_5N, with formation of acido-ammines sufficiently stable for their existence to be detected in aq. soln. $Cu(OAc)_2$ in NH_3-EtOH treated with NH_3 for 1 hr., gives $[Cu(NH_3)_4](AcO)_2$, blue plates, m. 194°; exposure to the air for 2 days gives the violet diammine, m. 180° (decompn.), decompd. by even a little H_2O and giving with KSCN 60% of the grayish blue diamminocupric thiocyanate. $Cu(HCO_2)_2.4H_2O$ and liquid NH_3 give *tetrammocupric formate* (I), deep blue, m. 157° (decompn.). I and excess HCO_2Na in H_2O liberated NH_3; the resulting soln. with NH_4 picrate gives *decamminotricupric picrate*, $Cu_3(NH_3)_{10}(C_6H_2O_7N_3)_6$, green needles, which does not lose NH_3 when heated 3 hrs. at 100°. I, standing over soda-lime for 3 days, gives *diamminocupric formate*, Co blue, m. 152° (decompn.), decompd. by H_2O. $Cu(HCO_2)_2$ in NH_4OH for 2 weeks gives the tetrammine. Heating $Cu(HCO_2)_2$ and C_5H_5N to boiling gives *di-pyridinocupric formate hydrate*, $[Cu(C_5H_5N)_2](HCO_2)_2.H_2O$, bright blue; if the heating is continued more than a few min., the product is decompd.; on heating at 85° for 4 hrs., all the H_2O and slightly more than 1 mol. of C_5H_5N are removed, leaving a green powder; Bz_2ONa in H_2O gives dipyridinocupric benzoate; $o\text{-}O_2NC_6H_4CO_2NH_4$ gives the *o-nitrobenzoate hydrate*, pale blue. $Cu(NH_3)_6I_2$ (II) in NH_3, satd. with NH_3, gives *pentamminocupric iodide hemihydrate* (III), blue; *in vacuo* over H_2SO_4 for 1 week, the H_2O and 1.66 mols. of NH_3 are lost, giving the black decamminotricupric iodide. III, shaken with 2 mols. NH_4I, gives *diamminocupric iodide*, chocolate-brown; the deep blue filtrate contains $Cu(NH_3)_4.H_2O$; this iodide was also obtained when the hexammine was kept *in vacuo* over H_2SO_4 for 1 month; it is insol. in and decompd. by H_2O; over H_2SO_4, continuous slow liberation of I occurs. II and C_5H_5N, boiled gently for 10 min., give *hexapyridinocupric iodide* (IV), black plates, giving a deep blue soln. in EtOH; hot EtOH liberates I and ppts. CuO. Exposure of IV to dry air for 4 days gives *tetrapyridinocupric iodide*, moss green; after 6 weeks over H_2SO_4 0.8 mol. of C_5H_5N and 1.5 g.-atoms of I remained in assocn. with each g.-atom of Cu, the residue being a brownish yellow powder. *Cupric o-nitrobenzoate*, bright green; liquid NH_3 gives *tetramminocupric o-nitrobenzoate*, purple, a Co-blue ammine, insol. in liquid NH_3, being an intermediate product; H_2O and EtOH give bright blue solns.; in dry air for 6 days, 1 mol. of NH_3 is lost, giving a grayish blue powder, decompd. by H_2O. *Tripyridinocupric o-nitrobenzoate*, blue, insol. in and not

decompd. by H_2O or EtOH. *Tetramminocupric m-nitrobenzoate*, lilac; in air for 7 days the NH_3 content decreased to 7.3% (diammine). *Tetramminocupric picrate*, from the sulfate and Na picrate, greenish yellow; no loss in wt. occurs on heating at 100°; liquid NH_3 gives a red soln.; on evapn. the tetrammine results, being the highest ammine stable at room temp. No evidence of the existence of pentamminocupric trichloroacetate was found. The *tetrammine* is bluish violet; exposure to the air for 5 days gives the triammine. *Diquinolinocupric trichloroacetate*, bluish violet. Mol.-wt. detns. are reported for these compds. by the b.-p. and f.-p. methods. While the osmotic factors recorded for the dipyridino compds. indicate the presence of a triionic salt, they diminish somewhat more rapidly with increasing concn. than would be expected and between concns. of 0.1 and 0.25 *M* the f.-p. depressions are lower than the corresponding values for $Cu(NO_3)_2$. The differences are greater than would be expected to result from hydration of the Cu ion and suggest that to a small extent coördination of acid radicals has occurred. This is the only evidence of coördination that has been obtained. Comparatively little increase in the osmotic factor takes place on passing from dipyridino- to tripyridinocupric nitrate and the difference diminishes with increasing concn. until at a concn of 0.25 *M* the 2 salts produce the same depression. No considerable modification is produced by ionic hydration and, at least up to a concn. of 0.1 *M*, the effect of any probable degree of hydration of the Cu ion is negligibly small. C. J. West

Conjugated double bonds. XIII. Synthesis of unsaturated colored fatty acids. Richard Kuhn and Max Hoffer. *Ber.* 63B, 2164–74(1930); cf. *C. A.* 24, 4302.—From the conclusion reached from the study of the polyene dyes that an aliphatic hydrocarbon must contain 5–6 double bonds in uninterrupted conjugation in order to be colored and that a free CO_2H group conjugated with double bonds corresponds approx. to 1.5 double bonds in color value, it was to be expected that among the unknown vinylene homologs of crotonic (I) and sorbic acid (II) the extension of the absorption bands into the visible part of the spectrum would occur between *2,4,6-octatrienic* (III) and *2,4,6,8-decatetraenic acid* (IV). This has been confirmed by the synthesis of III and IV. III is still white and has a faint lemon-yellow color only in thick layers, while IV is intensely yellow. Here, too, salt formation results in a marked lightening of the color. The Na, Ca, Pb and Ag salts of III and IV are pure white. The starting point of the synthesis was AcH which, by condensation with itself or, better, with MeCH:CHCHO, gives hexadienal (V) (the aldehyde of II). Under the exptl. conditions the V reacts with still another mol. of AcH to form *octatrienal* (VI) and with $CH_2(CO_2H)_2$ in C_5H_5N to give III; VI in the same way gives IV. Zeisel and v. Bittó, in prepg. MeCH:CHCHO from AcH, obtained, in addn., CH_2:CHC(:CHMe)CHO, and an isomer b_{24-6} 75–80°, that the latter was V has been confirmed by a repetition of their work. A method by which it is possible to obtain quickly large amts. of crude V (b_{12} 65–73°) and VI (b_{12} 97–115°) consists in treating AcH or mixts. of AcH and MeCH:CHCHO with secondary amines, which act as catalysts; 1% piperidine is sufficient. The V is formed by condensation of MeCH:CHCHO with AcH and the VI from V and AcH, as shown by a special expt.; pure MeCH:CHCHO does not react in the presence of piperidine, so VI is not formed from 2 mols. of this aldehyde. Characteristic derivs. of V and VI are the azines; the 2 azines give beautiful color reactions with concd. H_2SO_4, anhyd. HCO_2H, $AsCl_3$ and $SbCl_3$. The structure of III and IV was established by catalytic hydrogenation to caprylic and capric acids, resp. They decolorize cold $KMnO_4$ immediately, are oxidized by CrO_3 to AcOH and CO_2 and decolorize Br in AcOH but consume far less Br than corresponds to the no. of double bonds in them; the bromination products are colorless and sol. in Et_2O but are not homogeneous. The acids give color reactions with the same reagents as the azines of their aldehydes; these colors, obtained after short heating, often pass through various intermediate colors. *Azine* of V, S-yellow, m. 173.2–3.5° (cor., Berl block, partial decompn.), sol. in concd. H_2SO_4 and anhyd. HCO_2H with lemon yellow, in $AsCl_3$ with chrome-yellow color, increases in wt. in the air. *Semicarbazone*, m. 206° (cor.). III, m. 189–9.5° (cor., Berl block, partial decompn.), *Me ester*, prepd. through the chloride (which is obtained with $SOCl_2$), leaflets with a bare tinge of yellow, m. 75.2–5.6° (cor.), polymerizes on long standing to a viscous yellow gum like mass. *Amide*, m. 196.7–7.7° (cor., decompn.). *Azine* of VI, orange, decomps. 220.5° (cor.), undergoes autoxidation even more easily than the azine of V, dissolves in concd. H_2SO_4 with deep bluish red, in $AsCl_3$ with blood-red, in anhyd. HCO_2H with orange color. *Hydrazone*, lemon-yellow, sinters 153–4° (cor.), resinifies 180°, sol. in concd. H_2SO_4 with lemon-yellow color. *Semicarbazone*, S-yellow, decomps. around 250°, sol. in concd. H_2SO_4 with lemon-yellow color. *Oxime*, light yellow, m. 186–7° (cor., decompn.), sol. in H_2SO_4 with yellow color. IV, needles from AcOH at a high temp. (concd. soln.), leaflets at lower temps. (dil. soln.), sol. in H_2SO_4 with brownish orange

color, m. 210–1° (cor., Berl block), up to 220° on slower heating; if the heating is started from room temp., the acid may not melt at all but begin to carbonize at 200°. *Me ester*, m. 135–6° (cor.). *Amide*, decomps. around 200°. C. A. R.

Conversion of erucic acid into brassidic acid by means of sulfur. G. RANKOFF *Ber.* **63B**, 2139–42(1930).—Saytzev and Saytzev found that erucic acid (I), heated 24 hrs. at 200° with satd. aq. SO_2, is converted into brassidic acid (II). However, they give 65–8° as the m. p. of II obtained both in this way and from I with HNO_2, while other workers give 59–61.5° for the II prepd. by the HNO_2 method. Recently (*C. A.* **24**, 1343) R. showed that oleic acid (III), heated 3 hrs. at 180° with an equal vol. of satd. aq. $NaHSO_3$, is changed into elaidic acid (IV) mixed with a S-contg. compd. of higher m. p., and that the isomerizing agent is not $NaHSO_3$ or H_2SO_3, as believed by S. and S., but the free S formed by decompn. of the $NaHSO_3$. As the result of these observations, R became convinced that the high m. p. of S. and S.'s II was due to an impurity, and this conclusion is further supported by the present investigation. I is converted into II by free S and H_2O on the one hand and by satd. $NaHSO_3$ on the other under the same conditions and in the same way as III is changed into IV; here, too, a small amt. of a S-contg. compd. of higher m. p. is formed. The II m. 61.5° (cor.), n_D^{100} 1.4347. C. A. R.

Ring contraction in the formation of internal ethers (oxides) from glycols (1,5-oxidododecane from 1,12-dodecanediol). ADOLF FRANKE AND ALFRED KROUPA. *Monatsh.* **56**, 331–46(1930).—Details are given for the prepn. of 1,12-dodecanediol (I) from 1,10-decanediol through the dibromide, dicyanide and di-Me ester of the resulting acid and from 1,10-dibromodecane by the Grignard reaction. With 50% H_2SO_4 35 g. I gives 13 g. pure *1,5-oxidododecane* (II), b. 235–7°, purified by repeated distn. at atm. pressure; it could not be freed of unsatd. impurities by shaking with $KMnO_4$. Its structure was established by oxidation to $C_7H_{15}CO_2H$ and $(CH_2CO_2H)_2$. Oxidation of I with $KMnO_4$ gave only CO_2. Heating 1,10-decanediol with 89% H_3PO_4 at 220° gives 1,5-oxidododecane, previously obtained by the action of H_2SO_4. The formation of II from I (and of other oxides from diols) is explained by the formation of a sulfate, which splits off H_2SO_4, forming an unsatd. hydrocarbon, which then adds H_2SO_4, the process being repeated until a sulfate results which is a deriv. of a 1,5-diol. C. J. WEST

Preparation of α-alkylpimelic acids from 1,5-oxidododecane and from 1,5-oxidododecane. ADOLF FRANKE AND ALFRED KROUPA. *Monatsh.* **56**, 347–57(1930).—1,5-Oxidododecane and HBr give 1,5-dibromodecane, b_9 146–7°; boiling with KCN in dil. EtOH gives about 52% of the *dinitrile*, b_9 185–9°; sapon. with KOH in dil. EtOH gives *α-amylpimelic acid* (I) and its *half amide* (II). II m. 149.5° and on hydrolysis with concd. KOH gives I, m. 68°; the I obtained in the hydrolysis of the nitrile did not crystallize but b_9 228–9°. Both the liquid and the solid acid give the same *amide*, m. 186°. 1,5-Oxidododecane yields a *dibromide*, b_9 171°, pale yellow oil; the *dinitrile*, b_9 203–4°, results in 55% yield; hydrolysis gives *α-heptylpimelic acid*, m. 75°, and the *half amide*, m. 150.3°; the acid obtained by direct hydrolysis could not be crystd. but gives an *amide*, m. 186°; alc. KOH saponifies the amide to the half amide. C. J. WEST

Unsaponifiable matter from the oils of elasmobranch fish. VII. The synthesis of α-glyceryl ethers and its bearing on the structure of batyl, selachyl and chimyl alcohols. GOMER G. DAVIES, ISIDOR M. HEILBRON AND WM. M. OWENS. *J. Chem. Soc.* 1930, 2542–6; cf. *C. A.* **23**, 3702.—Batyl (I), selachyl (II) and chimyl (III) alcs. were at first considered to be β-derivs., $ROCH(CH_2OH)_2$ but later were suggested to be α-derivs., $ROCH_2CH(OH)CH_2OH$. The lower alkyl α-monoglyceryl ethers may be readily prepd. by heating α-monochlorohydrin with RONa in ROH. The α-Et deriv., b_{21} 118–21°, gives a *diphenylurethan*, m. 103–4°. The *α-Pr deriv.* b_{18} 118–22°, d_4^{18} 1.074, n_D^{18} 1.4400; *diphenylurethan*, m. 116°. *α-Bu deriv.*, b_{22} 138–40°, d_4^{18} 1.002, n_D^{18} 1.4461; *diphenylurethan*, m. 94–5°. The *α-cetyl deriv.* (IV) could not be prepd. in this way by heating cetyl chloride (V) with Na glyceroxide. V and Na allyloxide, boiled 30 hrs., gives *cetyl allyl ether*, b_7 165–76°, m. 25°. Oxidation with H_2O_2 in AcOH gives IV, m. 64–5°; *diphenylurethan*, m. 93–4°. *Octadecyl allyl ether*, m. 27.5–8.5°; *α octadecyl glyceryl ether* (VI), m. 70–1°; *diphenylurethan*, m. 95–6°. III, which appeared at first to be identical with IV, was later shown to be a mixt. of I and an unidentified compd. I and VI give a small but definite depression of the m. p., which is emphasized in the case of the diphenylurethans. The results thus seem to indicate the β-structure III must by analogy be β-oleyl glyceryl ether. **VIII. Structure of the naphthalene hydrocarbon derived from squalene.** ISIDOR M. HEILBRON AND DONALD G. WILKINSON. *Ibid* 2546–54.—Tetrahydrosqualene and S give 1,2,5-trimethylnaphthalene (I), $C_{13}H_{14}$. Energetic oxidation with $K_3Fe(CN)_6$ gives a *naphthalenetricarboxylic acid*, m. 270–2°, whose *Me ester* m. 89°. Oxidation of I with CrO_3 in AcOH gives the following compds.: *1,2,5-*

trimethyl-β-naphthoquinone, red, decompg. 130–5°; 1,6-dimethyl-α-naphthoquinone, bright yellow, m. 94° (*phenylhydrazone*, bright red, m. 226°); *5,8-diacetoxy-1,6-dimethylnaphthalene*, m. 70–1°; *3-methylacetophenone-2-carboxylic acid*, m. 126° (*semicarbazone*, m. 177°; *Me ester*, m. 47–8.5°, and its *semicarbazone*, m. 215° (decompn.)); oxidation gives 3-methylphthalic acid; *4-methylacetophenone-2-carboxylic acid*, m. 125–6° (*Me ester*, m. 71–2°; *semicarbazone*, m. 182° (decompn.)); *3,4-dimethylacetophenone-2-carboxylic acid*, m. 105° (*Me ester*, m. 78–9°; *semicarbazone*, m. 217° (decompn.)). The structure of I was further confirmed by its synthesis by Ruzicka. C. J. West

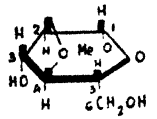
The action of alkali upon cystine and cysteine. H. T. Clarke and J. M. Inouye. *J. Biol. Chem.* 89, 399–419(1930).—The formation of $AcCO_2H$ as an intermediate product in the decompn. of cystine and cysteine by alk. plumbite has been confirmed by the isolation of its *p*-carboxyphenylhydrazone when the reaction is carried out in the presence of *p*-$H_2NNHC_6H_4CO_2H$. The characteristic orange color appearing when $AcCO_2H$ is condensed with *o*-$C_6H_4(OH)CHO$ in alk. soln. is also gradually developed when cystine or cysteine and the aldehyde are brought together in alk. soln. either alone or in the presence of plumbite. Cysteine may yield all its S as PbS when treated with plumbite but cystine normally yields but 75% with the remainder appearing largely as $Na_2S_2O_3$. NH_3 is formed in the alk. decompn. of cystine in amts. not more than the corresponding quantities of sulfide. The amt. of NH_3 is frequently less and recombination with decompn. products appears to occur, forming substances which are relatively slowly broken up by alkali. BzH, *o*-$C_6H_4(OH)CHO$ and $AcCO_2H$ accelerate the decompn. of cystine. Evidence has been obtained that when cystine reacts with NaOH alone, an unstable product is primarily formed before S ion makes its appearance. A. P. Lothrop

Metallic hydroxy acid complexes. V. Neutral α-cupritartrates. Elsie Evelyn Wark and Ian Wm. Wark. *J. Chem. Soc.* 1930, 2474–8; cf. *C. A.* 21, 3168.—This is largely polemic with Dumanskii and Chalisev (*C. A.* 23, 2088) who deny the existence of α-cupritartrates described by Packer and W. (*C. A.* 15, 3623). W. and W. are unable to notice any change in the compn. of Na α-cupritartrate when washed with 36% EtOH, as reported by D. and C. D. and C. also state that the point of soln. of Cu tartrate in NaOH does not always coincide with the ratio 5/4; repetition of their work gave the following values: for 0.1 *N* 1.17 for complete soln.; for 0.5 *N* 1.22 at room temp. and 1.15 at 35°; for 2 *N* 1.22 at room temp. At the point of complete soly. the soln. may remain acid to litmus but when the ratio Na/Cu reaches 5/4, alky. toward phenolphthalein develops. The variations observed by D. and C. are due to soly. and not to any variations in the primary chem. action. The conclusions are strengthened by the results of potentiometric titration. C. J. West

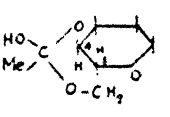
Pseudohalogens. X. Dichlorooxycyanide, *N*-mono- and *N*-dichloroallophanic ethyl ester and *N*-chloroallophanyl chloride. Lothar Birckenbach and Martin Linhard. *Ber.* 63B, 2528–44(1930); cf. *C. A.* 24, 4229.—$Cl_2NCONCO$ is prepd. in a similar manner as $(OCNBr)_3$. The dimer compds. with Cl and Br are formed already at −80°, but they are not considered pseudohalogens. With excess alc. Et allophanate and ClOEt are formed. The reaction is in 3 steps and the intermediate products, the Et esters of dichloro- and monochloroallophanic acid, have been isolated. **XI. Iodooxycyanide, diiododioxycyanide and triiodocyanuric acid.** *Ibid* 2544–58.—As solvent for the prepn. of OCNI, Et_2O is used. It is of practical importance as it combines easily with unsatd. products and may make possible the synthesis of a large no. of compds. OCNI polymerizes to the dimer compd. The end product of the polymerization is triiodocyanuric acid. The monomer form is more stable than that of the other halogens. The monomer form with alc. gives carbamic esters whereas with the dimer form the allophanic esters are formed. E. Schotte

A methyl glucoside of a new anhydrosugar; also, a contribution to acyl migration in partially acylated glucose. Burckhardt Helferich and Alexander Müller. *Ber.* 63B, 2142–9(1930).—H. and Klein recently described a tetraacetyl-β-*d*-glucose (I) obtained from 1,2,3,4-tetraacetyl-β-*d*-glucopyranose (II) by the action, *e. g.*, of dil. alkali. The process was explained as being an acyl migration and the structure of a 1,2,3,6-tetraacetyl-β-*d*-glucopyranose was suggested for I. The *p*-toluenesulfonate (III) of I with HBr-AcOH gives a well-crystd. *1-Br deriv.* (IV) which, like acetobromoglucose, yields with MeOH and Ag_2CO_3 a *p*-toluenesulfonyltriacetylmethylglucoside (V) identical with that previously obtained from 2,3,4-triacetyl-β-methyl-*d*-glucopyranoside (VI) by acyl migration and esterification of the resulting compd. with $MeC_6H_4SO_3H$. The V is rendered more readily available by this method of prepn. which strongly supports the structure which had been assigned to it. The *p*-toluenesulfonylglucose obtained by cautious sapon. of III was again prepd. and analyzed and the earlier findings

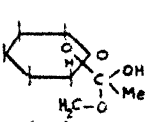
were confirmed, but cautious sapon. of V gave an unexpected result; the $MeC_6H_4SO_2$ group was split off as well as the Ac groups and there resulted a new *anhydromethylglucoside* (VIII?). Since it shows no double bond with Br, a new O ring must have been formed. It readily forms, in good yields, a cryst. diacetate and dibenzoate. H. and M. agree with Haworth, Hirst and Teece (*C. A.* 24, 4269) that the acyl migration in II can be explained as proceeding through $MeC(OH)_3$ derivs. but, contrary to the opinion of H., H. and T., such an explanation is also possible if it is assumed that it is the 4-Ac group in II which migrates; the hypothetical intermediate compd. (IX) thereby formed can be sterically constructed without strain by assuming the normal tetrahedral valence angle on the O and the C; there is fused on the glucopyranose ring already present a 2nd 6-membered ring which, in spite of the *trans*-position of the glucose-C valences involved (on C atoms 4 and 5), can be sterically developed without strain just as well as in *trans*-decalin and its derivs. That the I has a free HO group on a glucose-C atom rather than the structure IX seems to be indicated by the existence of VII, for the toluenesulfonate of a compd. IX could not, on alk. sapon., lose all 4 Ac groups and at the same time retain the $MeC_6H_4SO_2$ group. As regards the question raised by Haworth, whether it may not be the 1-Ac group in II which migrates, his exptl. observation that tetraacetyl-β-methylglucoside (X) can be isolated in the methylation of the different tetraacetylglucoses merely shows that rearrangements certainly play a role; even the formulation of the tetraacetate as XI permits of no direct methylation to X without the assumption



(VIII)



(IX)



(XI)

of further rearrangements. Evidence against the migration of the 1-Ac group, in addn. to that already given, is the above prepn. of V by a new method which shows that in the rearrangement of II and of VI the same acyl migrates and since there is no 1-acyl in VI it cannot be the 1-acyl in II which migrates. As between the 2- and 4-acyls, the following arguments can be advanced against the migration of the 2-acyl. I in C_5H_5N with Cl_3CCOCl gives a *tetraacetyltrichloroacetyl-β-d-glucose* (XII) different from Brigl's 2-Cl_3CCO compd. Furthermore, B.'s 3,5,6-triacetyl-β-methyl-*d*-glucopyranoside, whose structure has been established with certainty by Hickinbottom, is different from VII and therefore VII, formed by acyl migration, cannot have a free 2-HO group. The new VIII is formed with surprising smoothness. Its study has thus far given but few indications as to the position of the new O ring and the structure VIII is given only provisionally. Walden inversions may play a role and the substance may no longer be a glucose at all. *1,2,3,6-Tetraacetyl-4-trichloroacetyl-β-d-glucose* (XII) (yield, 35%), m. 153°, $[\alpha]_D^{20}$ —9.45° to —10.0° (ordinary $CHCl_3$), 10.23–11.30° ($PhNO_2$). *α-1-Bromo-2,3,6-triacetyl-4-toluenesulfonyl-d-glucopyranose* (IV) (80% yield), m. 171° (cor., decompn.), $[\alpha]_D^{20}$ 141° ($CHCl_3$). V, obtained in over 80% yield, m. 118° (cor.), $[\alpha]_D^{20}$ —29.8° to —32.0° (abs. C_5H_5N), —37.8° ($CHCl_3$). VIII (67% from V in $CHCl_3$ and Na in MeOH in ice-salt), m. 158°, reduces Fehling soln. only after hydrolysis with acids, $[\alpha]_D^{23}$ —118° (H_2O), shows no mutarotation (3 days), does not decolorize Br in AcOH. *Diacetate*, m. 118°, $[\alpha]_D^{20}$ —112.8° to —114.8° ($CHCl_3$), reduces Fehling soln. only after hydrolysis with acids. *Dibenzoate*, m. 133°, $[\alpha]_D^{20}$ —77.7° to —80.5° ($CHCl_3$).

C. A. R.

Structure of the acetylmethylmannosides. H. S. Isbell. *J. Am. Chem. Soc.* 52, 5298(1930).—Three new *heptaacetyl-4-glucosidomethylmannosides* are reported, m 185°, 161° and 167°, α_D^{20} 26.7° — 22.3° and —12.7° ($CHCl_3$); the 3rd compd. yields a *heptaacetyl-4-glucosidomannose*, α_D^{20} 21.7° ($CHCl_3$), which does not exhibit mutarotation. The absence of mutarotation indicates that the MeO group in the parent mannoside was not combined directly with the 1st or aldehyde C.

C. J. West

Reactivity of positivized hydrogen ions. V. Simple preparation method for tetraphenylcyclopentadienones. W. Dilthey and Ferd. Quint. *J. prakt. Chem.* 128, 139–49(1930); cf. *C. A.* 25, 294.—Bz_2 (2 g.) and 2 g. $(PhCH_2)_2CO$ in 40 cc. EtOH, treated with 0.25 cc. EtOH-KOH (1:4), give 3.1–3.2 g. 2,3,4,5-tetraphenyl-3-hydroxy-4-cyclopentenone (I), m. 210°, identical with the compd. of Löwenbein and Ulich (*C. A.* 20, 1407). Reduction of I with Zn and AcOH gives 2,3,4,5-tetraphenylcyclo-

pentenone (II), m. 162–3°. Catalytic reduction of I with Pt in AcOH gives 2 compds., 1 m. 163° but not identical with II and the second m. 220°; Pd gives a compd. m. 144°. If the above condensation reaction is heated 1–2 min., there results 3.4 g. 2,3,4,5-tetraphenylcyclopentadienone (III), red, m. 216–8°; the concd. H_2SO_4 soln. is blue-violet but becomes paler on standing, probably due to sulfonation. PbO_2 in AcOH oxidizes III to a colorless compd.; HNO_3 gives a pale yellow compd. Reduction of III with Pd-$BaSO_4$ gives II; reduction of III with Zn in AcOH gives *tetraphenylcyclopentadienol*, which apparently crystallizes with AcOH, m. 139–40°; H_2SO_4 solns. show a brick-red halochromy; the AcOH compd. is unstable in the air, giving III; Br in AcOH also gives III. The mother liquor from III contains II. III and Br in PhMe give the di-Br deriv., m. 169–70°; the Br is split off near the m. p. but more smoothly by heating in AcOH, Ac_2O, PhMe, C_5H_5N, etc. Condensation of Bz_2 and $(PhCH_2)_2CO$ with EtOH-KOH gives II. Dehydration of II by Br in AcOH gives III. C. J. West

Naphthol esters of chaulmoogric acid and chaulmoogrylnaphthylamines. Irene de Santos and Augustus P. West. *Philippine J. Sci.* **43**, 409–13(1930).—The following compds. were prepd. because of their possible therapeutic value. Chaulmoogryl chloride and α-$C_{10}H_7OH$ give about 10% of the *α-naphthyl ester* after heating 8 days at 100°, pale yellow, m. 53–4.5°; *β-naphthyl ester*, m. 49.5–51° (50% yield); time of heating, 6 days at 125°. The acid amide and α-$C_{10}H_7NH_2$, heated 5 days at 100°, give 30% of *chaulmoogryl-α-naphthylamide*, pale yellow, m. 93–5°; *β-naphthylamide*, pale yellow, m. 96–8° (40% yield). C. J. West

4-Alkyl derivatives of 1-phenylcyclohexane-3,5-dione. Ibrahim Hilmi El-Said Mattar, John J. H. Hastings and Thomas K. Walker. *J. Chem. Soc.* **1930**, 2455–8.—Styryl Et ketone and $CHNa(CO_2Et)_2$ in EtOH, boiled until neutral (4 hrs.), give 79% of *Et 1-phenyl-4-methylcyclohexane-3,5-dione-2-carboxylate*, m. 121–3°; heating with EtOH-KOH for 2 hrs. gives 40% of *1-phenyl-4-methylcyclohexane-3,5-dione*, m. 212–3°. In the same way styryl Pr ketone gives 41% of *1-phenyl-4-ethylcyclohexane-3,5-dione*, m. 200°, this absorbs O and becomes resinous in the air. The *4-Pr deriv.*, m. 185°, is formed in 35% yield from styryl Bu ketone; styryl hexyl ketone (22 g.) gives 17 g. of the *4-Am deriv.*, m. 191°. *Et 1-phenyl-4-benzylcyclohexane-3,5-dione-2-carboxylate*, m. 146° (60% yield); *1-phenyl-4-benzylcyclohexane-3,5-dione*, m. 169–70° (86% yield). $PhCH_2CO_2Et$ and styryl Et ketone give 21% of *1,2-diphenyl-4-methylcyclohexane-3,5-dione*, m. 167°. Styryl $PhCH_2CH_2$ ketone did not react. C. J. West

Aluminum chloride and the Friedel and Crafts reaction. P. H. Groggins. *Trans. Am. Inst. Chem. Eng.*, New Orleans Meeting, 1930, 44 pp.(Advance copy).—The utilization of anhyd. Al_2Cl_6 as a reagent for chem. reactions has increased tremendously during the last 10 years. Prices have declined and interest in further uses for the product have been stimulated. The F. and C. reaction employing Al_2Cl_6 is the basis of the vat dye industry. Production data on Al_2Cl_6 are given, showing that nearly 27 million lbs. was used in the petroleum industry in 1929. The prepn. of anhyd. material, the comparative properties of technical and C. P. grades, the function of anhyd. Al_2Cl_6 in org. reactions are discussed. Emphasis is placed on the material as a cracking agent in petroleum. A large share of the paper concerns itself with the mechanism of the F. and C. reaction and its numerous applications. From the engineering side, handling materials, design of app., the effect of various factors and control of the reaction are discussed. Also in *Ind. Eng. Chem.* **23**, 152–60(1931). C. L. Mantell

Identification of halides as 3,5-dinitrobenzoates. I. Chao-Lun Tseng and Edith Ju Hwa Chu. *Natl. Central Univ. Sci. Repts., Ser. A, Phys. Sci.* **1**, 9–14(1930).—In using Milliken's method, substitution of dry C_6H_6 for alc. is recommended. $ClCHPh_2$ in C_6H_6 gave the *diphenylcarbinol 3,5-dinitrobenzoate*, m. 142°. Me_3CCl reacted with $(O_2N)_2C_6H_3CO_2Ag$ but failed to yield the ester deriv. Halogenated benzenes did not react. K. H. Engel

Parachors of two isomeric chlorodinitrobenzenes. S. A. Mumford and J. W. C. Phillips. *J. Am. Chem. Soc.* **52**, 5295–7(1930).—Polemical with Sickman and Menzies (*C. A.* **24**, 4768). The parachor for $2,4$-$(O_2N)_2C_6H_3Cl$ rapidly attains and maintains a mean value of about 351.6, which is only 0.5% less than the calcd. value, 353.2. C. J. West

Parachors of isomeric chlorodinitrobenzenes. D. V. Sickman and Alan W. C. Menzies. *J. Am. Chem. Soc.* **52**, 5297(1930).—Reply to Mumford and Phillips (preceding abstr.). C. J. West

A new reaction of the aliphatic double bond. Zoltán Földi. *Ber.* **63B**, 2257–69(1930).—The addn. of halogenoamines and amides to unsatd. compds. has been studied with MeNHBr, AcNHBr, $(CONMeBr)_2$ (I), $MeNBrCO_2Et$ (II), $PhSO_2NMeBr$ (III) and $PhSO_2NNaCl$ (IV) as the one component and $PhCH{:}CHMe$ (V) as the other. Of the *N*-

Br derivs., III showed a striking reactivity with V, giving in very satisfactory yield *1-phenyl-1-bromo-2-(benzenesulfonylmethylamino)propane* (VI), $PhSO_2NMeCHMeCHPhBr$. In this addn. there can theoretically be formed 4 *dl*-isomers (2 stereoisomers of the structure VI and 2 of the structure $PhSO_2NMeCHPhCHMeBr$); there were actually formed at least 2 isomers but only the chief product, m. 105–6°, could be isolated in pure form, while the sepn. and isolation of the other product could be effected only in another way. Both products were diastereomers of the structure VI. The structure of VI was established by introducing an AcO group with NaOAc and as the resulting $PhSO_2NMeCHMeCHPhOAc$ (VII) showed no tendency to crystallize it was sapond. to the HO deriv. (VIII). The well-crystd. VIII has the same m. p. as the original I but is identical with the *N*-benzenesulfonylephedrine (IX) prepd. from *dl*-ephedrine. Furthermore, IX with PBr_5 is smoothly converted into VI. Although this establishes the structure of VI it shows nothing as to its configuration because of the possibility of a Walden inversion in the reactions VI ⟶ VIII and IX ⟶ VI and it became necessary to repeat the reactions with the optically active components. When the active ephedrines and *ψ*-ephedrines are converted into their $PhSO_2$ derivs. the rotation does not change in sign whereas when the active $PhSO_2$ derivs. are treated with PBr_5 the ephedrine derivs. suffer no optical inversion while the *l*-pseudoephedrine deriv. gives the *d*-*N*-benzenesulfonylbromoephedrine, and this with an equal part of the *l*-antipode obtained from the *l*-benzenesulfonylephedrine yields VI, which can be obtained directly with PBr_5 from the $PhSO_2$ deriv. of either *dl*-ephedrine or *dl*-*ψ*-ephedrine. The active or racemic benzenesulfonyl-*ψ*-ephedrines can therefore not be prepd. in this way, nor by changing the order of the reactions (treating the free *ψ*-ephedrine with PBr_5 and then the resulting Br compd. with $PhSO_2Cl$). The *dl*-benzenesulfonylbromo-*ψ*-ephedrine (X) was finally obtained in pure form as follows: *dl*-ephedrine-HCl was converted with PBr_5 into a mixt. of the HBr salts of the ephedrine and *ψ*-ephedrine Br derivs. which with $PhSO_2Cl$ gives an easily sepd. mixt. of VI and X. IV reacts with V like III but less homogeneously and barely 15% of *1-phenyl-1-chloro-2-(benzenesulfonylamino)propane* (XI) can be isolated. $PhCH{:}CHCH_2OH$ readily adds III but in a different way, apparently according to the scheme $2\ PhCH{:}CHCH_2OH + 2III \longrightarrow PhCHBrCHBrCH_2OH + PhCH(NMeSO_2Ph)CH(NMeSO_2Ph)OH$, the $PhCHBrCHBrCH_2OH$ being isolated (in the form of $PhCHBrCHBrCH_2Br$) in about 50% yield. The results with purely aliphatic olefins can be explained only by a similar addn.; thus $CH_2{:}CHCH_2Br$ with III gives 80% $CHBr(CH_2Br)_2$ and a product, presumably $BrCH_2CH(NMeSO_2Ph)CH_2NMeSO_2Ph$, which could not be isolated. From 2 g. each of I and V heated a few min. on the H_2O bath, dild. with alc., filtered from the $(CONHMe)_2$, concd. and boiled with 3 *N* HCl there is obtained 0.06–0.1 g. *dl*-*ψ*-ephedrine. II behaves in the same way. III is obtained in 85% yield of crude product (m. 102°, active Br 65.2%) from 30 cc. of 5 *N* NaOH dropped on a cold mixt. of 16.4 g. Br and 17 g. $PhSO_2NHMe$. IX m. 105°. *dl*-Benzenesulfonyl-*ψ*-ephedrine, from *dl*-*ψ*-ephedrine in $CHCl_3$ with $PhSO_2Cl$ and NaOH, m. 74–6°. *l*-*N*-Benzenesulfonylephedrine, m. 99°, $[\alpha]_D^{20}$ —44.59° (abs. alc.); *ψ*-isomer, m. 70°, $[\alpha]_D^{20.5}$ —27.86° (abs. alc.). *d*-*N*-Benzenesulfonylbromoephedrine, m. 88°, $[\alpha]_D^{22.5}$ 109.60° (abs. alc.); *l*-antipode, m. 88°, $[\alpha]_D^{21.5}$ —111.02° (abs. alc.). *dl*-Bromo-*ψ*-ephedrine-HBr, m. 155–7° (still contaminated with the diastereomeric ephedrine deriv.); *d*-isomer, from *l*-*ψ*-ephedrine with PBr_5 in $CHCl_3$, m. 174.5°. XI, m. 123°, insol. in concd. HCl and in NaOH, non-volatile with steam. With $CH_2{:}CHCH_2OH$, III gives $(CHBr{:}CHCH_2)_2O$ (contaminated with $CH_2BrCHBrCH_2OH$), b_{10} 118°, d^{22} 1.774.

C. A. R.

Ionization constants of some chloro- and nitroanilines by the partition method. Gwyn Williams and Frederick G. Soper. *J. Chem. Soc.* 1930, 2469–74.—The ionization consts. for *o*-, *m*- and *p*-$ClC_6H_4NH_2$ and for *o*-$O_2NC_6H_4NH_2$ have been detd., using a partition method, in which attention was directed to the effect of unhydrolyzed salt on the distribution equil. and to the choice of extg. solvent when dealing with certain very weak bases. The value of K_w employed in calcg. K_b is 1.005×10^{-14} at 25°. The following results for $K_b \times 10^{11}$ are given: *o*-Cl, *v* 39–89, 0.371; *m*-Cl, *v* 40–276, 2.88; *p*-Cl, *v* 43–170, 8.45; *o*-NO_2, *v* 32–33, 0.00353; these are at 25° ± 0.01°. The partition coeffs. at 25° ± 0.01° for C_6H_6-H_2O are (the concn. range of the aq. phase is given): *o*-Cl, 0.00115–0.00300 *M*, 119°; *m*-Cl, 0.000832–0.00327, 86.2; *p*-Cl, 0.00143–0.00348, 62.4; $PhCH_2NH_2$, 0.0162–0.0168, 4.03; heptane-H_2O: *p*-Cl, 0.0114–0.0142, 4.31; *o*-NO_2, 0.00764–0.0119, 1.790. For *p*-$ClC_6H_4NH_2$, where the unhydrolyzed salt concn. is greatest, the partition coeff. between heptane and H_2O is unchanged by salt concns. up to and including 0.1 *N*.

C. J. West

The quaternary ammonium iodides derived from iodoacetic ester. P. Freundler,

L. PIAUX AND MLLE. M. PILAUD. *Bull. soc. chim.* [4], 47, 1147–50(1930); cf. Piaux, *C. A.* 24, 4773.—In the splitting of compds. of the type $PhNMeRICH_2CO_2Et$ into betaines like $PhNMeR.CH_2.CO.O$ and EtOH by removing I with Ag_2O a large excess of the latter is required, suggesting the formation of a compd. such as AgI.AgOH. The betaine solns. are clear and colorless in the dark but in sunlight a purple to brown ppt. sometimes forms similar to that produced by very dil. $Sn(NO_3)_2$ and $AgNO_3$. Examd. spectroscopically this ppt. showed Sn present. All the reagents were free from Sn that could be detected by the ordinary qual. tests. It is assumed that Sn^{II} compds. were formed by photochem. reduction from traces of Sn^{IV} compds. present. L. E. G.

***p*-Aminophenylguanidine hydriodide.** CHARLES E. BRAUN. *J. Biol. Chem.* 89, 97–108(1930); cf. Frank, *C. A.* 21, 2320.—*p-Aminophenylguanidine-HI*, prepd. by a reaction between $MeSC(:NH)NH_2.HI$ and p-$C_6H_4(NH_2)_2$, m. 209–10°; attempts to isolate the free base have so far been unsuccessful. When injected subcutaneously it produced a hypoglucemia which reached a max. in 4–6 hrs. unaccompanied by convulsive symptoms or evidence of toxicity. A. P. LOTHROP

Action of ferric chloride upon acyl esters of phenol. HILDEGARD HUBER AND KARL BRUNNER. *Monatsh.* 56, 322–30(1930).—The action of $FeCl_3$ upon Ph esters does not give biphenyl derivs. but products of acyl wandering. Thus, AcO_2Ph and sublimed $FeCl_3$, warmed on the H_2O bath for 3 hrs., give 10% of p-HOC_6H_4OMe; if the reaction is carried out at 65° for 4–5 hrs., the yield is increased to 25%. Me_2CHCO_2Ph, b_{707} 210–12°, warmed with $FeCl_3$ 6 hrs. at 100°, gives *o-hydroxyisobutyrophenone*, b_{10} 110° (the *oxime* m. 129°; the *Br_2 deriv.* m. 97°), and 16% of the *p*-deriv., m. 56°. BzOPh gives a small amt. of the *o*- and 28% of the *p*-HOC_6H_4Bz; the latter was characterized by the *phenylhydrazone*, m. 144°, and the *semicarbazone*, m. 194°. C. J. WEST

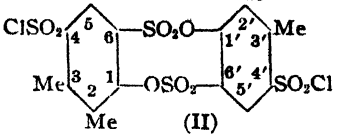
Parachor and chemical constitution. XV. Constitution of sulfonium and ammonium mercuri-iodides (iodomercuriates). HAROLD J. CAVELL AND SAMUEL SUGDEN. *J. Chem. Soc.* 1930, 2572–9; cf. *C. A.* 24, 2651.—The sulfonium mercuri-iodides (R_3SHgI_3) are of interest in connection with the electronic theory of valency since they have been formulated with 6 groups attached to a central S atom. The following substances have been studied: $(PhCH_2)_2RSHgI_3$, where R is Me (I), Et (II), *Pr* (III) and *Bu* (IV), *$PhMe_2NHgI_3$* (V), $PhMe_2EtNHgI_3$ (VI), $PhMeEt_2NHgI_3$ (VII) and $PhEt_3NHg_2I_5$ (VIII). These are all readily sol. in Me_2CO and MeCN, sparingly sol. in EtOH and insol. in C_6H_6 and ligroin, suggesting that they are polar in character; measurement of the cond. in Me_2CO solns. showed that they are all strong binary electrolytes; results are given at 26° for various dilns. The S compds. give values of the same order of magnitude as the cond. of typical binary electrolytes in Me_2CO and the change of cond. with diln. is in good agreement with Onsager's equation. While the agreement of the N compds. with the equation is not so good, the deviation is in the opposite direction to that which would be expected from incomplete dissocn. Mol.-wt. detns. by the b.-p^t method in Me_2CO again indicate dissocn. into 2 ions. The N salts may be taken to have the structure $[R_4N]^+[HgI_3]^-$. The S salts may be $[R_3SHgI_2]^+[I]^-$ or $[R_3S]^+[HgI_3]^-$. AgI is readily sol. in any of the S iodides; hence not only is the concn. of the I^- negligibly small in these solns., but this ion is removed probably to form the more stable ion $[HgI_4]^{--}$. The cell Hg—1 *M*/100 $HgCl_2$ in Me_2CO—1 *M*/100 Me_3SHgI_3 in Me_2CO—1 Hg has an e. m. f. of 0.145 v., with the electrode in contact with $HgCl_2$ positive; the $[HgI_3]^-$ ion, seems, therefore, to be very stable. Two electronic formulas are possible: $I^6{=}Hg{<}^{I^7}_{I^7}$ (IX) and $I^6 = Hg{<}_{I^6}$ (X); the S compds. give parachors in good agreement with the singlet formula IX, while the N compds. are in better agreement with X; the correct interpretation cannot be given until more information has been obtained as to the types of salt which are likely to exhibit parachor anomalies. II, d^{120} 2.333, γ 45.33, parachor (mean) 915.2 (data also for 122° and 126°). III, m. 78°, $d_4^{88.5}$ 2.296, γ 45.96, parachor (mean) 952 (data also for 91.5° and 95.5°); $d_4^t = 2.446 - 0.00174t$. IV, m. 81°, d_4^t 2.335 − 0.00147*t*; $\gamma_{88.5}$ 45.62, parachor 1000 (data also for 93.5°, 100.5°, 111°). V, m. 137–8°, $d_4^t = 2.923 - 0.00145t$, $\gamma_{147.5}$ 54.61, parachor 719.1 (data also at 154°, 157°, 161.5°). VI, m. 97.5°, $d_4^t = 2.810 - 0.00155t$, $\gamma_{100.5}$ 55.24, parachor 754 (data also at 120°, 128.5°, 134.5°). VII, m. 98.5°, $d_4^t = 2.669 - 0.00114t$, $\gamma_{107.5}$ 52.41, parachor 789.5

(data also at 119°, 126.5°, 136°). VIII, m. 113°, $d_4^t = 3.300 - 0.00164t$, γ_{124} 53.38, parachor 1060 (data also at 129.5°, 134.5°, 140.5°). C. J. WEST

Constitution of double sulfonium mercuric iodides. Optically active mercuritri- and -tetraiodides and cadmitetra- and -pentaiodides derived from *l*-phenacylmethylethylsulfonium iodide. MICHAEL P. BALFE, JOSEPH KENYON AND HENRY PHILLIPS. *J. Chem. Soc.* **1930**, 2554–72.—A study of the chem. properties of the HgI_3 and HgI_4 and analogous compds. derived from Et_3SI and $PhEt_2SI$ has led to the conclusion that the racemization of the S compds. of Pope and Neville (*J. Chem. Soc.* **81**, 1552(1902)) was due to the chem. instability of sulfonium iodides and to the sensitiveness of sulfonium mercuritriiodides toward the reagents used in their prepn. Et_3SHgI_3 (I), m. 113–4°, is formed in 85.7% yield from Et_3SI and 1 mol. HgI_2; in 84.9% yield from $(Et_3S)_2HgI_4$ (II) and HgI_2 in Me_2CO and evapg. at room temp.; in 12.4 g. yield from 5 g. Et_3SI and HgI_2 in aq. KI; and in 60 g. yield from a soln. of 45.4 g. HgI_2 in 9 cc. Et_2S and 10 cc. Me_2CO and 9 cc. EtI. $Et_3SHg_2I_5$ (III), m. 121–2°, is formed in 8.8 g. yield from 9.1 g. HgI_2 and 2.5 g. Et_3SI in Me_2CO; in 93% yield from I and HgI_2 in Me_2CO; and in 99% yield from 7 g. Et_3SI in 40 cc. warm Me_2CO satd. with HgI_2. II, m. 150–1° (decompn.), results in 90% yield from 3.2 g. $KHgI_3$, 1.8 g. Et_2S and 3.3 g. EtI in H_2O-Me_2CO; in 93% yield from 1.13 g. HgI_2 and 1.46 g. Et_3SI in 25 cc. Me_2CO; in 99% yield from 1.66 g. KI and 7 g. I in 20 cc. Me_2CO; in 92% yield from 7 g. I and 2.5 g. Et_3SI in 50 cc. Me_2CO; in 94% yield from 1.91 g. III and 1.48 g. Et_3SI in 60 cc. Me_2CO; in 25% yield from 6.9 g. III and 1.5 g. KI in dil. Me_2CO; and in 89% yield by passing H_2S into a warm soln. of I in dil. Me_2CO. Heating 18.95 g. II at 145–65° for 2 hrs. gives 1 g. II and 13 g. I; the distillate (3.2 cc.) is a mixt. of EtI and Et_2S, solidifying to Et_3SI. PhSEt (27.6 g.), 91.4 g. HgI_2 and 32 g. EtI in 60 cc. Me_2CO, gently warmed and allowed to stand 5 months, give 95% of *phenyldiethylsulfoniummercuritriiodide*, $PhEt_2SHgI_3$ (IV), pale yellow, m. 56–7°; VI and HgI_2 in Me_2CO or an excess of aq. $KHgI_3$ also give IV. Heating IV at 120–70° gives nearly quant *phenyldiethylsulfonium trimercurioctaiodide*, $(PhEt_2S)_2Hg_3I_8$ (V), pale yellow, m. 65–6°, which also results by the action of HgI_2 upon IV in Me_2CO. The action of aq. HgI_2 upon IV or V in Me_2CO gives *phenyldiethylsulfonium mercuritetraiodide*, $(PhEt_2S)_2HgI_4$ (VI), m. 114–5°; VI also results from IV or V and H_2S in dil. Me_2CO. Heating VI at 110–30° gives PhSEt and IV. Resolution of phenacylmethylethylsulfonium *d*-bromocamphorsulfonate (VII) by fractional crystn. from 90% EtOH gives a *l*-VII with $[\alpha]_{6493}$ 46.03°, $[\alpha]_{5461}$ 59°; the corresponding picrate, m. 128°, $[\alpha]_{6493}$ —11.2°, $[\alpha]_{5461}$ —13.5° (Me_2CO, *c* 1.56). The *d*-VII could not be obtained in any quantity or even optically pure. An aq. soln. of *l*-VII had $[\alpha]_{5461}$ 58.1° when freshly prepd. and 59.1° after 237 and after 1392 hrs. Six months after prepn., a specimen of the *l*-picrate ($[\alpha]_{5461}$ —16.8° (Me_2CO, *c* 1.012)) had $[\alpha]_{5461}$ —17.8° (Me_2CO, *c* 1.570); this changed to —15° after 741 hrs. and to —13.4° after 1897 hrs. VII and $KHgI_3$ in dil. EtOH give the *dl-phenacylmethylethylsulfonium mercuritetraiodide* (VIII), m. 134°. On warming the paste of VIII in a little Me_2CO, there results the *mercuritriiodide* (IX), yellow, m. 82–3°. *l*-IX results from *l*-VII and $KHgI_3$ in H_2O or by adding Me_2CO to a mixt. of *l*-VIII and HgI_2 and warming. *l*-IX, m. 81–2°, $[\alpha]_{6780}$ —6.4°, $[\alpha]_{6493}$ —9.1°, $[\alpha]_{5461}$ —10.7° (Me_2CO, *c* 1.918), unchanged after 264 hrs. After 2865 hrs. this soln. had $[\alpha]_{5461}$ —5.5°. MeI (1.37 g., 15.8 mols.), added to 19 cc. of an Me_2CO soln. of *l*-IX, having $[\alpha]_{6780}$ —7.1°, $[\alpha]_{5461}$ —7.9° (*c* 2.53), gave a soln. having $[\alpha]_{5461}$ —8.1° (unchanged after 161 hrs.), —6.1° after 1032 hrs., —5.7° after 1358 hrs. and —4.3° after 2522 hrs. Adding 5 mols. KI to *l*-IX renders the soln. inactive in 15 hrs. Adding *l*-VIII to *l*-IX causes optical inactivity in 861 hrs. Heating *l*-IX at 100° for 2 hrs. also causes optical inactivity. *l*-VIII results from *l*-VII, KI and HgI_2 in EtOH or H_2O, from *l*-IX and KI in dil. Me_2CO or by the action of H_2S on *l*-IX; *l*-VIII, m. 122–3°, $[\alpha]_{6780}$ —8.2°, $[\alpha]_{5461}$ —9.3° (Me_2CO, *c* 2.425) when freshly prepd., changing to —2.9° and —3.1° after 72 hrs. and to —1.6° and —1.7° after 192 hrs. Another sample was optically inactive after 312 hrs. In the presence of 4.5 mols. MeI a sample was optically inactive after 42 hrs.; this also results after 2 hrs. heating of the solid salt. VII and $KHgCl_3$ in H_2O give *dl-phenacylmethylethylsulfonium dimercuriheptachloride* (X), m. 153° (decompn.). *l*-VII gives *l*-X, $[\alpha]_{6780}$ —10.7°, $[\alpha]_{5461}$ —11.3° (MeOH, *c* 1.17); after 1947 hrs. both values were —7.7°. $(BzCH_2)EtMeSBr$, KI and CdI_2 in H_2O give the *cadmitetraiodide* (XI), m. 126°; this results with either 1 or 2 mols. KI. *l*-XI, m. 132–3°, results from *l*-VII and K_2CdI_4 in dil. Me_2CO; $[\alpha]_{6780}$ —9.9°, $[\alpha]_{5461}$ —10.2° (Me_2CO, *c* 1.41); after 164 hrs. the soln. was optically inactive. XI and CdI_2, warmed with sufficient Me_2CO to give a paste, give the *cadmipentaiodide* (XII), m. 134–6°; *l*-XII, $[\alpha]_{6780}$ and $[\alpha]_{5461}$ —9.0° (Me_2CO, *c* 1.115); after 48 hrs. the soln. was inactive. C. J. WEST

Action of chlorosulfonic acid on phenols. VI. Xylenol-sulfonyl chlorides and -sulfonylides. ERNST KATSCHER, H. LEHR, A. HARNISCH AND L. STEINHARDT. *Mon-*

atsh. **56**, 381–90(1930); cf. *C. A.* **22**, 3652.—2,3-$Me_2C_6H_3OH$ (I) (2 g.) and 20 g. $ClSO_3H$ after 24 hrs. give 1.6 g. of a ppt., from which was isolated 0.8 g. *2,3,2',3'-tetramethyldiphenyl-1,6,1',6'-sulfonylide-4,4'-disulfonyl chloride* (II), decomps. 295°, crystd. from $PhNO_2$; on standing in an open dish for 7 hrs., the mother liquor deposits 1.15 g., from which was isolated 0.8 g. of *2,3-dimethylphenol-4,6-disulfonyl chloride*, m. 104–5°; the *disulfonanilide* m. 232°. II gives a *4,4'-disulfonanilide* (III), m. 273°. I with 10 parts by wt. of $ClSO_3H$ at —5° to 0° for 4 hrs. gives only H_2O- or HCl-sol. products. I (2 g.) and 20 g. $ClSO_3H$ at 110° for 2 hrs. give 2.5 g. II and 2.1 g. III. 3,4-$Me_2C_6H_3OH$ and 10 parts by wt. of $ClSO_3H$ give *3,4-dimethylphenol-2,5-sulfonyl chloride*, m. 72°; *disulfonanilide*, m. 160°; the free SO_3H acid couples with *p*-$O_2NC_6H_4N_2X$, giving a bright red soln., which dyes animal fibers. 2,5-$Me_2C_6H_3OH$ and $ClSO_3H$ (10 parts) give *2,5-dimethylphenol-3,6-disulfonyl chloride*, m. 58°; *disulfonanilide*, m. 173°; the free acid gives an orange-yellow dye with *p*-$O_2NC_6H_4N_2X$. 3,5-$Me_2C_6H_3OH$ and $ClSO_3H$ give a mixt., in varying proportions, depending upon the temp. of the reaction, of the 2 *disulfonyl chlorides*, m. 89–91° and 117–9°; the 2 *disulfonanilides* m. 160–61° and 205–207°. 2,4-$Me_2C_6H_3OH$ gives *2,4-dimethylphenol-6-sulfonyl chloride* (IV), m. 93–5°, and *1,3,1',3'-tetramethyldiphenyl-4,5,4',5'-sulfonylide*, decomps. above 300°. Since the compd. IV on standing in a corked bottle changes to a H_2O-sol. oil, which gives a typical blue color with $FeCl_3$, it is possible that it may be a chlorosulfonic ester.



C. J. West

Structure of isoanethole. Geo. D. Goodall and Robert D. Haworth. *J. Chem. Soc.* **1930**, 2482–7.—Anethole and 5 *N* MeOH-HCl, refluxed for 12 hrs., give isoanethole (I), pale yellow, $b_{0.7}$ 205–10°; of the possible formulas, $MeOC_6H_4CH{:}CMeCH{-}EtC_6H_4OMe$ (I), $MeOC_6H_4CH{:}CMeCHMeCH_2C_6H_4OMe$ (II) and $MeOC_6H_4CH_2{-}CMe{:}CEtC_6H_4OMe$ (III), III was excluded because oxidation of I gave anisic acid; the decision between I and II was made by comparing the ketone $C_{12}H_{16}O_2$ with the ketones $AcCHEtC_6H_4OMe$ (IV) and $AcCHMeCH_2C_6H_4OMe$ (V), which were synthesized. Oxidation of I gives *α-p-methoxyphenylpropyl Me ketone* (IV), $b_{0.7}$ 125–8°; *semicarbazone*, m. 189°; *oxime*, m. 84–5°. *p*-$MeOC_6H_4CH_2Br$ and $AcCHNaCO_2Et$ in C_6H_6 give *Et p-methoxybenzylacetoacetate* (VI), $b_{0.25}$ 172° and a higher, boiling fraction (VII). Hydrolysis of VI gives *p-methoxybenzylacetone*, b_{25} 177°; *semicarbazone*, m. 172–3°; *oxime*, m. 77°. Hydrolysis of VII gives *di-p-methoxybenzylacetone*, m. 96–7°. VI and MeI with MeONa give *Et p-methoxybenzylmethylacetoacetate*, $b_{0.5}$ 180°, which is hydrolyzed to *α-p-methoxybenzylethyl Me ketone* (V), b_{20} 175°; *semicarbazone*, m. 135°; oxime, oil. *p*-$MeOC_6H_4CH_2CN$ (VIII) with BzH and a few drops of MeOH-KOH gives the *benzylidine deriv.*, m. 96°. VIII and AcOEt with EtONa give *acetyl-p-methoxyphenylacetonitrile*, pale yellow, m. 80°; this could not be condensed with EtI by EtONa; hydrolysis with 50% H_2SO_4 gives *p-methoxybenzyl Me ketone*, b_{20} 150°; *semicarbazone*, m. 173°; this ketone with EtI and EtONa gives V. Oxidation of V with NaOBr gives *α-3-bromo-4-methoxyphenylbutyric acid*, m. 123–5°. These results show that isoanethole has the formula I.

C. J. West

Reduction of substituted *p*-benzoquinones by sulfur dioxide alone and in the presence of alkali. John W. Dodgson. *J. Chem. Soc.* **1930**, 2498–2502; cf. *C. A.* **9**, 206.—SO_3H acids are regularly formed by the action of SO_2 on quinones. Direct reduction also takes place according to the equation: $C_6H_4O_2 + H_2SO_3 + H_2O \longrightarrow C_6X_4(OH)_2 + H_2SO_4$. While the quinone mol. contains 1 or more H atoms, the reaction may be expressed: $C_6HX_3O_2 + H_2SO_3 \longrightarrow C_6X_3(OH)_2.SO_3H$. In chloroquinones there is marked tendency to form di-SO_3H acids; *e. g.*, $C_6H_2Cl_2O_2 + 2H_2SO_3 \longrightarrow C_6HCl(OH)_2(SO_3H)_2 + HCl$. With tetrachloroquinone, which no longer contains a labile H, the sulfonation must be expressed by the equations: $C_6Cl_4O_2 + 2H_2SO_3 + H_2O \longrightarrow C_6Cl_3(OH)_2SO_3H + H_2SO_4 + HCl$; $C_6Cl_4O_2 + 3\ H_2SO_3 + H_2O \longrightarrow C_6Cl_2(OH)_2(SO_3H)_2 + H_2SO_4 + 2HCl$. The formation of SO_3H acids by neutral sulfites is largely in excess of reduction of the quinone. It must be the result of the presence of sulfonic ion. This demands previous hydrolysis of the sulfite. Additional alkali inhibits this hydrolysis and this is probably a contributing cause of the falling off of sulfonate as the proportion of alkali is increased. The action of excess of alkali apparently leads to destruction of the quinone through the formation of highly colored unstable compds. Results are given, in tabular form, for *o-* and *p*-xyloquinones, chlorobenzoquinone, 2,5- and 2,6-dichlorobenzoquinones and tetrachlorobenzoquinone. The following *Ba salts* are described: *toluquinolsulfonate*, $FeCl_3$ reaction blue; *p-xyloquinolsulfonate*, reaction, greenish blue; *chloroquinolsulfonate*, reaction, blue; *2,5-dichloro-*

quinolsulfonate, reaction, bluish violet; *2,3-dichloroquinolsulfonate*, reaction, bluish violet. C. J. WEST

1,3-Migration of amino groups. Mechanism. Application to other analogous reactions. JOSEPH ROBIN. *Compt. rend.* **191**, 1013–5(1930).—$Ph_2C(NHPh)C:CPh$ (I) to $Ph_2C:CHC(:NPh)Ph$ (II) is not a simple migration. $PhNH_2.HCl$ (III) is necessary for the reaction. If HCl from III adds at the triple bond and $PhNH_2$ and HCl split off, thus



II is formed. To test the theory, chlorides of the type $Ar_2CClC:CAr$ have been prepd. The HCl salt of diphenyl-β-naphthylethinylmethyl chloride, $C_{26}H_{17}Cl.HCl$, m. about 155°, and the HCl salt of diphenyl-*p*-bromophenylethinylmethyl chloride, $C_{21}H_{14}BrCl.HCl$, m. about 100°, were prepd. H_2O transformed these compds into $Ar_2C:CHCOAr$. The proposed interpretation can be applied to the transformation of acetylenecarbinols into their ether salts or oxides which is brought about in acid medium. RACHEL BROWN

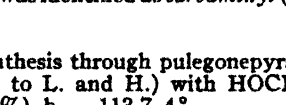
Dynamic isomerism involving mobile hydrocarbon radicals. II. Intramolecular character of the amidine rearrangement. ARTHUR WM. CHAPMAN. *J. Chem. Soc.* **1930**, 2458–62; cf. *C. A.* **24**, 94.—In part I it was shown that $PhN:CPhNPhC_7H_7$ (I) and $Ph_2NCPh:NC_7H_7$ (II), heated at a sufficiently high temp., underwent mutual interconversion by migration of a Ph group from 1 N atom to the other, similar equil. mixts. of the 2 isomers being obtained from both compds. Repeated recrystn. of II with change of solvent did not alter the rate of conversion into I nor was the velocity of change affected by the use of SiO_2 in place of a glass vessel. There was therefore no obvious indication that the progress of the reaction depended on the presence of a catalyst. *Triphenylbenzenylamidine* (III), yellow, m. 168.9°; hydrolysis gives Ph_2NH and $PhNH_2$. *Tri-p-tolylbenzenylamidine* (IV), lemon-yellow, m. 188.9°; hydrolysis gives *p*-$MeC_6H_4NH_2$ and $(p\text{-}MeC_6H_4)_2NH$. The m. p. curve of Ph_2NH and $(p\text{-}MeC_6H_4)_2NH$ is given. Heating III at 345° for 2 hrs. depresses the m. p. only 2°, while the m. p. of IV is depressed 2° after 1 hr. at 335°. To det. whether interchange of groups occurred during rearrangement, a mixt. of III and IV was made in such proportion as to yield on hydrolysis the eutectic mixt. of Ph_2NH and $(p\text{-}MeC_6H_4)_2NH$; this was analyzed before and after being heated at 330–1° for 0.5 and 1 hr. The m. p. of the mixt. of sec. amines obtained on hydrolysis differed by less than 1.5°, which is within the limit of exptl. error. *Tri-p-chlorophenylbenzenylamidine*, yellow, m. 147–8°; this was not sufficiently stable above 300° to be used. *N-p-Chlorophenylbenzimino p-chlorophenyl ether*, pale yellow, m. 68–9°. **III. Some effects of substitution on the velocity of interchange and position of equilibrium of isomeric triarylbenzenylamidines.** A. W. CHAPMAN AND CHARLES H. PERROTT. *Ibid* 2462–8.—*N,N'-Di-p-tolyl-N-phenylbenzenylamidine* (I), yellow, m. 133°; *N-di-p-tolyl-N'-phenylbenzenylamidine* (II), yellow, m. 149.5–50°; *N,N'-diphenyl-N-p-chlorophenylbenzenylamidine* (III), m. 150–2°; *N-diphenyl-N'-p-chlorophenylbenzenylamidine* (IV), yellow, m. 167.5–8.5°; *N,N'-di-p-chlorodiphenyl-N-phenylbenzenylamidine* (V), yellow, m. 132–3°; *N-di-p-chlorodiphenyl-N'-phenylbenzenylamidine* (VI), yellow, m. 101–3°. M.-p. curves are given for *p*-MeC_6H_4NHPh and $(p\text{-}MeC_6H_4)_2NH$, Ph_2NH and $(p\text{-}ClC_6H_4)NHPh$ and *p*-ClC_6H_4NHPh and $(p\text{-}ClC_6H_4)_2NH$. Details are given of the conversion of $PhN:CPhNPhC_7H_7$ (VII) and $Ph_2NCPh:NC_7H_7$ (VIII) and the above isomers at 330–1° are given. The results may be summarized as follows [$(k + k') \times 10^3$ and equil. % given]: VII–VIII, 6.2, 69% VII; I–II, 2.0, 53% I; III–IV, 4.5, 59% III; V–VI, 11.3, 71% V. The mobilities of the 3 groups concerned are in the order *p*-MeC_6H_4<Ph<*p*-ClC_6H_4. From the position of equil. of the 4 pairs of isomers investigated, it is evident that the mobile group tends, only slightly in VII–VIII, but quite definitely in the other 3 cases, to attach itself preferentially to the N atom which carries the group with the lesser attraction for electrons. The influence of substitution in the migrating group upon the position of equil. is small compared with that of substitution in the system. C. J. WEST

Menthone series. VII. Condensation of menthylamines with *d*- and *l*-oxymethylenecamphor. JOHN READ AND CATHERINE CASSELS STEELE. *J. Chem. Soc.* **1930**, 2430–4; cf. *C. A.* **23**, 2167.—The unusual difficulties experienced in attempting the resolution of menthylamines by means of the H *d*-tartrates led to the study of the possibility of utilizing optically active oxymethylenecamphor (I) as a resolving agent. *d-Neomenthylamino-d-I* (II), m. 105°, $[\alpha]_D$ 317.8° (abs. EtOH, *c* 0.6 g. in 100 cc.); no mutarotation was observed in 48 hrs. The *l-I deriv.* m. 94°, $[\alpha]_D$ —129.8° (abs. EtOH, *c* 0.6); no mutarotation. *dl*-Neomenthylamine (III) may be resolved by the use of *d*-I, the portion of the ppt. insol. in petrol. ether being II, while the mother liquor gives *l-neo-*

menthylamino-d-I, m. 92°, $[\alpha]_D$ 130° (abs. EtOH, *c* 0.6). II in EtOH, titrated with 1 mol. Br and the product shaken with H_2O and C_6H_6, gives *d-neomenthylamine-HBr*, does not m. 220°, $[\alpha]_D$ 18.6° (H_2O, *c* 0.6). The HBr salt of III is considerably less sol. than its optically active components. The unchanged base from the above resolution was optically inactive. *d-Isomenthylamino-d-I*, m. 110°, $[\alpha]_D$ 281.3° (EtOH, *c* 0.6), changing to 274.9° in 15 hrs. and to the const. value 257.5° in 48 hrs. The *l-I deriv.* m. 99–100°, $[\alpha]_D$ —212.9° (abs. EtOH, *c* 0.6), changing to —179.6° in 15 hrs. and to the const. value —160.8° in 48 hrs. The product from *dl*-isomenthylamine and *d*-I was a sirup, which could not be crystd.; it showed $[\alpha]_D$ 162.2° (EtOH, *c* 0.6), changing to 155.2° in 48 hrs. *l*-Menthylamino-*d*-I, m. 90°, $[\alpha]_D$ 96.7°, changing to 110.4° in 7 hrs. and to 125° in 16 hrs. The *l*-I deriv. is very sol. in all org. solvents and could not be recrystd.; $[\alpha]_D$ —170.2°, which remained unaltered after 24 hrs. *dl*-Menthylamine gave a product with *d*-I which could not be fractionally crystd. The recovered base was optically inactive. C. J. West

Hydration of nopinene. V. Hydration by (organic) acids in nascent state. G. Austerweil. *Bull. soc. chim.* [4], **47**, 1157–9(1930); cf. *C. A.* **21**, 3894.—*o*-$C_6H_4(CO)_2O$, 220 g., was dissolved in 600 g. xylene and kept at 135–8° while a mixt. of 100 g. nopinene and 66 g. abs. EtOH was added dropwise during 3 hrs. The mixt. was neutralized and steam-distd., leaving non-vol. bornyl Et phthalate in the flask. This, sapond. by aq. NaOH and steam-distd., yielded 48 g. (44% theory) of borneol contg. a little fenchol. With pinene instead of xylene, the yield was 64% of the theoretical. L. E. G.

Action of semicarbazide on pulegone. S. A. Busse and H. L. Gurevich. *Ber.* 63B, 2209–11(1930).—$H_2NCONHNH_2$ with unsatd. ketones under certain conditions gives, in addn. to the ordinary semicarbazones, semicarbazide semicarbazones, *i. e.*, products of the addn. of 1 mol. $H_2NCONHNH_2$ to the semicarbazone at the double bond. Attempts to obtain such products with compds. having conjugated double bonds, such as pulegone, have, however, been unsuccessful. Rupe with Lotz and with Schlochoff obtained only the ordinary semicarbazone, Masurewich only $(NHCONH_2)_2$. On the other hand, Rupe, Lotz and Schlochoff from mesityl oxide obtained the expected semicarbazide semicarbazone which with boiling H_2O yielded $(NHCONH_2)_2$ and a product identical with the pyrazoline obtained by Scholtz by distn. of mesityl oxide semicarbazone and subsequently synthesized by Locquin and Heilmann by condensing mesityl oxide with $N_2H_4.H_2O$ and introducing the $CONH_2$ group with HOCN. The question arose whether with pulegone a pyrazoline ring might not also be formed. As a matter of fact, $H_2NCONHNH_2$ and pulegone, under the conditions used by Beckmann and Fleissner with NH_2OH, gave in addn. to $(NHCONH_2)_2$ a product m. 156–7°, isomeric with the ordinary semicarbazone, m. 169°, but which did not regenerate pulegone with dil. acids and was identified as *carbaminyl* (*pulegonepyrazoline*) (I),



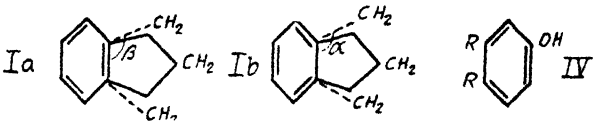
by its synthesis through pulegonepyrazoline (II) (prepd. from pulegone and $N_2H_4.H_2O$ according to L. and H.) with HOCN. I, m. 156–7°, mol. wt. in camphor 208. II (yield, 97%), b_{11-2} 113.7–4°. C. A. R.

Synthesis of alkylnaphthalenes. II. 1,3,5- and 1,3,8-trimethylnaphthalenes. Isidor M. Heilbron and Donald G. Wilkinson. *J. Chem. Soc.* 1930, 2537–42; cf. *C.* 1. 24, 2742.—2,4-$Me_2C_6H_3CHO$ (43 g.), AcOEt and Na give 40 g. *Et 2,4-dimethylcinnamate*, b_5 135–7°; reduction with Na and EtOH gives 19 g. *γ-(2,4-dimethylphenyl)-propyl alc.* (I), b_5 126° (*urethan*, m. 81°) and 13 g. 2,4-$Me_2C_6H_3CH_2CH_2CO_2H$. I (20 g.) with 30% HBr in AcOH gives 25 g. of the *bromide*, b_{18} 147°; with KCN, followed by hydrolysis, there results 18 g. *γ-(2,4-dimethylphenyl)butyric acid*, m. 78–9°; *chloride* (II), b_9 136–8°; *amide*, m. 128–9°. II (17 g.) with $AlCl_3$ gives 13 g. *5-keto-1,3-dimethyl-5,6,7,8-tetrahydronaphthalene* (III), b_{14} 160°; *semicarbazone*, m. 243–6° (decompn.). With MeMgI, 12.4 g. III gives 10 g. of an oil consisting mainly of the carbinol, converted into *1,3,5-trimethyl-7,8-dihydronaphthalene*, b_{18} 143–5°, by boiling 4 hrs. with Ac_2O (7 g. yield); dehydrogenation with Se gives *1,3,5-trimethylnaphthalene*, m. 47°; *picrate*, orange, m. 141–2°; *styphnate*, golden yellow, m. 138°. 2,4-$Me_2C_6H_3Ac$ and $BrCH_2CO_2Et$ with Zn give *Et β-hydroxy-β-(2,4-dimethylphenyl)butyrate* (IV), b_{10} 170–80°; the lower-boiling fraction, on hydrolysis, gives the free *acid*, m. 70–2°. IV and $POCl_3$, refluxed 30 min., give *Et β-(2,4-dimethylphenyl)crotonate*, b_{20} 160–70°; reduction of 58 g. of this ester with Na and EtOH gives 12 g. *γ-(2,4-dimethylphenyl)butyl alc.* (V), b_{16} 152–3°, and a large amt. of *β-(2,4-dimethylphenyl)butyric acid*, m. 69°; *Et ester*, b_{16} 168–70°; this ester may be reduced to V by Na and PrOH. The *bromide* from V, b_{17}

143°, is transformed into *γ-(2,4-dimethylphenyl)valeric acid*, b_8 175; *acid chloride*, b_{18} 157–60°; *amide*, m. 91–2°. *5-Keto-1,3,8-trimethyl-5,6,7,8-tetrahydronaphthalene*, b_{20} 174–6°; *semicarbazone*, m. 220–2°. *1,3,8-Trimethyl-5,6,7,8-tetrahydronaphthalene*, $b_{18.5}$ 133–6°; Se gives *1,3,8-trimethylnaphthalene*, m. 48 (liquefies when mixed with the 1,3,5-deriv., m. 47°); *picrate*, orange-red, m. 125°; *styphnate*, golden, m. 140.5°.

C. J. West

Stereochemical influences on aromatic substitution. Substitution derivatives of 5-hydroxyhydrindene. Wm. H. Mills and Ivor G. Nixon. *J. Chem. Soc.* **1930**, 2510–24.—From a discussion of the C valencies of the Kekulé formula for C_6H_6 it is concluded that there is reason to suppose that in the C_6H_6 nucleus constituted according to K.'s formula, the angle α, which each of the external valencies makes with the intranuclear single bond on the 1 side of it, is less than β, which it makes with the plane of the double bond on the other side. If this is correct, the stable form of a compd. in which the C_6H_6 ring is fused with a 5 atom ring must clearly be that in which the linking common to the 2 rings consists of a single bond. In hydrindene (I), *e. g.*, the form Ib should



be the more stable and I in the liquid or dissolved state should consist of an equil. mixt., in which this form predominates If this is so, then in 5-hydroxyhydrindene (II) substitution by diazo residues or by Br should take place at the 6-position, which actually occurs. The analog of II, in which the alicyclic 5-ring is replaced by a 6-ring, is *ar*-tetrahydro-β-naphthol, in which substitution takes place in the 1-position. It is suggested that the position assumed by the substituent group in the coupling and bromination of these hydrindene and tetralin derivs. is detd. by the disposition of the system of alternate single and double bonds in the benzenoid ring. 4,1,2-AcNHC$_6$H$_3$Me$_2$ (III) also gives a 5-Br deriv.; hence it may be inferred that in a 1,2,4-R$_2$C$_6$H$_3$OH, the more stable arrangement of the intranuclear bonds is that represented by IV. Details of the prepn. of II are given; with *p*-MeC$_6$H$_4$N$_2$X, 6.7 g. II gives 8.3 g. of the *6-p-toluenecazo deriv.* (V), m. 132.5° and 0.9 g. of a red compd., m. 99–101°, probably a mixt. of the 6- and 4-derivs. in the proportion approx. to the eutectic. *p*-ClC$_6$H$_4$N$_2$X gives about 90% of the *6-p-chlorobenzeneazo deriv.*, m. 155–6°, and some 4-deriv., not obtained pure. Reduction of V with SnCl$_2$, HCl and EtOH gives the 6-NH$_2$ deriv., m. 185–6°. Reduction of 5,6-dimethoxy-1-hydrindone gives *5,6-dimethoxyhydrindene*, m. 55°; heating with HI in CO$_2$ atm. gives the *5,6-di-HO deriv.*, m. 116°; this also results from the 6-NH$_2$ deriv. of II through the diazo reaction, some crystallographic data are given. II and Br in AcOH give the *6-Br deriv.*, m. 37.7°; this is also obtained from the 6-NH$_2$ deriv. through the Sandmeyer reaction. III yields a 5-Br deriv., m. 164°; hydrolysis gives *5-bromo-4-amino-o-xylene*, m. 84.5°. *4,5-Dibromo-o-xylene* m. 88°. C. J. West

2,3-Naphthalenedicarboxylic acid. Hans Waldmann. *J. prakt. Chem.* **128**, 150–2(1930).—2,3-H$_2$NC$_{10}$H$_6$CO$_2$H, through the Sandmeyer reaction, gives *2,3-cyanonaphthalenecarboxylic acid*, yellow, m. 273–4°; hydrolysis with concd. alkali or better with H$_2$SO$_4$ in dil. AcOH gives 2,3-C$_{10}$H$_6$(CO$_2$H)$_2$, m. 240°, raised by sublimation to 246°. This synthesis is simpler than that of Freund and Fleischer (*C. A.* **7**, 3737).

C. J. West

α,α-Dimethyl-β-phenylindene. J. C. Earl and C. A. Smythe. *J. Proc. Roy. Soc. N. S. Wales* **64**, 90–5(1930).— Through a misprint the title in the original reads α,α-dimenthyl-β-phenylindene. E. and S. describe the action of AlBr$_3$ upon BrCMe$_2$CHMeBr in benzene, which results in the formation of α,α-dimethyl-β-phenylindene, C$_{17}$H$_{16}$: Me$_2$CBrCHMeBr ⟶ Me$_2$CPhCHMePh(− H$_2$) ⟶ Me$_2$C.C$_6$H$_4$.CH$_2$.CHPh (−H$_2$) ⟶ Me$_2$C.C$_6$H$_4$.CH:CPh. On exhaustive oxidation phthalic acid is obtained as shown by its m. p., conversion into the anhydride and by the fluorescein reaction, while less drastic oxidation by CrO$_3$ in glacial AcOH leads to the formation of a very stable acid of the compn. C$_{17}$H$_{16}$O$_3$ and of the structural formula: *o*-HO$_2$CC$_6$H$_4$CMe$_2$COPh On treating this acid with Ac$_2$O, no dehydration is obtained but an acetylation occurs giving the Ac deriv. O.CO.C$_6$H$_4$.CMe$_2$.C(OAc)Ph. By heating the acid C$_{17}$H$_{16}$O$_3$ with baryta, cumene is produced which can be identified by its conversion into the *p*-sulphon-

amide (m. 106–7°) and by its oxidation with alk. $KMnO_4$ to phthalic acid. Aq. HNO_3 readily nitrates the hydrocarbon $C_{17}H_{16}$ to a nitro compd. (II): $C_6H_4.CMe_2.CPh{:}CNO_2$.

F. R. GREENBAUM

Berginization of anthracene. N. A. ORLOV AND N. D. LIKHACHEV. *Ber.* **63B**, 2179–85(1930); cf. *C. A.* **23**, 3926.—The study of the behavior of condensed ring systems toward H under pressure at high temps. has been extended to anthracene (I) which, from the results of its destructive distn. with $AlCl_3$ and the behavior of phenanthrene, would be expected to first form tetracene which at the high temp. would undergo rupture of the tetramethylene ring with formation of $C_{10}H_8$ and its homologs; these would again be hydrogenated to tetrahydrides and decompd., leading finally to the C_6H_6 hydrocarbons. These expectations were confirmed experimentally. In the mixt. of liquid hydrocarbons obtained by the berginization of I with Na as catalyst were identified with certainty C_6H_6 hydrocarbons (with insignificant amts. of satd. hydrocarbons, presumably naphthenes), tetralin, $C_{10}H_8$, β-$C_{10}H_7Me$, β-$C_{10}H_7Et$ and the tetrahydrides of the last 2 compds. The non-picrate forming part of the hydrocarbons (corresponding to the homologous tetralins) was investigated by the method of dehydrogenation with Se or S. The use of Se resulted in only moderate dehydrogenation, but with S the dehydrogenation apparently proceeded quite regularly, although only small amts. of the resulting alkylnaphthalenes could be isolated, the greater part of the hydrocarbons changing into an asphalt-like substance. No paraffins or olefins were present in the mixts. subjected to dehydrogenation and the anomalous results are ascribed to the presence of 5-membered ring hydrocarbons which might be formed by isomerization of the tetralins to hydrindenes. To test the possibility of the reaction tetralin ⟶ methylhydrindene, pure tetralin was heated under pressure; by careful fractionation of the product were obtained several tetralin-free fractions which were sepd. into C_6H_6 homologs and methylhydrindene. C. A. R.

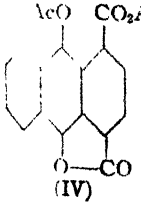
Anthraquinhydrone and anthraquinhydronecarboxylic acids. ROLAND SCHOLL AND OSKAR BÖTTGER. *Ber.* **63B**, 2120-6(1930).—1. *Anthraquinhydrone.*—Claus reported that when abs. alc. is poured upon anthraquinone (I) and Na-Hg there develops at the surface of contact of the amalgam with the alc. a dark green zone which on gentle shaking colors the whole soln. a beautiful green but disappears on shaking with air, with sepn. of I; if, however, the alc. contains even but a trace of H_2O there is formed, instead of the green soln., the air sensitive red soln. of the Na deriv. of anthrahydroquinone (II). The reaction, which was recommended by C. for the detection of traces either of I or of H_2O in alc., is still found in text- and handbooks. As a matter of fact, however, the colors formed are in no way dependent on the H_2O content of the alc., as believed by C.; the green color is an intermediate phase in the reduction to the red Na salt of II. When amorphous I is brought into contact, in the air, with Na-Hg and alc., whether or not the alc. contains a moderate amt. of H_2O, there is always produced in the immediate vicinity of the amalgam a red liquid in the form of red-brown streamers dispersing in the soln. with a green color which is destroyed, from the surface down, by atm. oxidation. In H, however, the green soln. changes, after some min. on standing quietly, very rapidly on shaking, through olive shades to the red of the II vat, and air or other oxidizing agents (AmONO) produce the same color changes, in the reverse order, in the red alc. alk. II soln. after filtration in H from the excess of Na-Hg. The red filtered soln. can also be converted back into the green soln. (quinhydrone formation) in H by adding amorphous I suspended in alc. Addn. to the green filtered alc. soln. of a moderate vol. of air free H_2O (up to 1 vol., at the proper concn.) produces no or hardly any change, but if the amt. of H_2O is increased to about 2 vols. the soln. becomes brown-red and deposits a colorless ppt. (dissocn. of the green quinhydrone salt into I and the red Na salt of II). The brown-red aq. alc. soln. is completely decolorized by the air, with pptn. of I without passing through the green stage because the quinhydrone is not capable of existence in the presence of a sufficient amt. of H_2O. The quinhydrone formation does not depend on the presence of alc.; when amorphous I is rubbed with Na-Hg and a drop of H_2O, or with $Na_2S_2O_4$ and very concd. KOH, there is formed a green mass (quinhydrone) which only on treatment with H_2O dissolves with red color (Na salt of II) and sepn. of I. When the red vat obtained from I with $Na_2S_2O_4$ and dil. NaOH in excess is concd. by boiling and the flame is removed, the green quinhydrone begins to sep. from the upper rim of the soln., as the steam condenses and the air enters, because the $Na_2S_2O_4$ is insol. a very difficultly sol. in concd. NaOH and its protective action on the Na salt of II against the atm. O is greatly weakened. The green quinhydrone salt, which is at once dissocd. by H_2O and is extraordinarily sensitive to air, was prepd., not without difficulty, by bringing together I and 2.5% Na-Hg in a little 99% alc. at room temp., filtering,

oxidizing the red vat filtrate with a little AmONO, filtering the resulting difficultly sol. quinhydrone salt, washing with petroleum ether and drying with hot H. All operations were carried out in an app. (sketch given) filled with H. The compn. of the salt was established as follows: (1) Dissocn. with H_2O or dil. alk. into the insol. I and the sol. salt of II and detn. of the I; (2) dissocn. in an open dish, passing in air or adding a little hypochlorite, and detn. of the total I formed; (3) titration of the II remaining in soln. in (1) to decolorization with $K_3Fe(CN)_6$; (4) detn. of the Na. These detns., made on samples prepd. by different methods, showed that alc. and NaOEt also play a part in the formation of the salt, whose compn. corresponds to the formula ($2C_{14}H_8O_2 + C_{14}H_8O_2Na_2 + EtOH + EtONa$). *2. Anthraquinhydronecarboxylic acids.*—It was reported some time ago (*C. A.* **23**, 3700) that the violet color of the vat acids pptd. from cold alk. hyposulfite vats of anthraquinonecarboxylic acids is not produced by radical or quinhydrone admixts. but is a property of the pure anthrahydroquinonecarboxylic acids. Nevertheless, there are indications that the reduction of the quinone acids by alk. $Na_2S_2O_4$ or Na-Hg in alc. (in the absence of air) to the hydroquinone acids and the reconversion of the latter into the quinone acids by atm. O pass through an intermediate phase, manifested by the appearance of a peculiar olive-green color. These olive-green solns. can also be obtained by bringing together the almost colorless alk. soln. of the quinone acid and the red alk. soln. of the hydroquinone acid. The color is observed only in caustic alkali solns.; the Na_2CO_3 and NH_4OH solns. are red. From all these solns. HCl ppts. the free quinhydrone acid, on strong diln., in cryst., deeply colored form, quite stable toward the air These ppts. again form with NaOH olive-green and with Na_2CO_3 or NH_4OH red solns. sensitive to the air. In the olive-green solns. the *ms*-HO groups are probably neutralized in addn. to the CO_2H groups. Unlike the noncarboxylated Na quinhydrone, the quinhydronecarboxylates, as well as the free acids, are capable of existence in much water, the 2 components in each being equally easily or difficultly sol. in H_2O, as the case may be. Neither the salts nor the free acids were isolated in pure form. C. A. R.

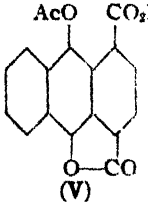
Anthraquinone azine and anthraquinone azhydrin. Roland Scholl and Herbert Lamprecht. *Ber.* **63B**, 2126-8(1930).—It has been reported (*Ber.* **40**, 321(1907)) that indanthrene (I) in concd. H_2SO_4 gives with CrO_3 2 products: a greenish yellow anthraquinone azine (II) and a green substance (III) assumed to be an intermediate product in the oxidation of I to II and designated as anthraquinone azhydrin. The similarity of II and III and the way in which it was thought that the azhydrin structure of II was proved made it doubtful whether III was really a homogeneous substance and not a mixt. of II with varying amts. of unchanged I. A no. of expts. have accordingly been made to settle this point. When pure II, pptd. in amorphous form from concd. H_2SO_4 with H_2O, is boiled with freshly distd. BzCl, the originally green liquid passes in about 45 min. through blue-green and dirty violet to a red-brown which undergoes no further change. After 1 hr., however, the product consists of chiefly the original I (which has become cryst.) and red needles of dibenzoylindanthrene; after 4 hrs. boiling the latter is the chief product. Contrary to earlier statements, III is sol. in pure, HCl-free BzCl with red color, changed to blue by small amts. of strong mineral acids and, therefore, on standing in moist air. At the time S. and Berblinger assigned to III the azhydrin structure they were not aware that II is quantitatively converted by hot concd. HCl into chloroindanthrene only under definite conditions (long heating of the amorphous II in sealed tubes at 150°). They boiled their green III 1 hr. with concd. HCl and found in the blue product a Cl content (4.4%) which by chance corresponded approx. to that (3.86%) of a mol. mixt. of I and chloroindanthrene. Moreover, the nature of the product obtained by turbining I in concd. H_2SO_4 with $K_2Cr_2O_7$ varies with the length of the turbining. The product prepd. under the conditions given by S. and B. (0.5 hr. turbining) and then heated 3 hrs. at 150° with concd. HCl gave a mixt. of I and chloroindanthrene with 4.87% Cl; with 1.5 hrs. turbining, the Cl content of the final product was 5.73%. There is, therefore, at present no definite proof of the existence of an anthraquinone azhydrin. C. A. R.

Carboxylated blue anthrahydroquinone-α-carboxylic acid lactones. I. Roland Scholl and Oskar Böttger. *Ber.* **63B**, 2128-38(1930); cf. *C. A.* **23**, 4944.—This is a contribution to the chemistry of the free radicals of the anthracene series (the so-called aroyloxanthronyls, arylpyrrolinoanthranolazyls), insofar as it deals with anthracene derivs. which, from their blue color, sensitivity to air and other properties, at first glance convey the impression of being free radicals but on closer investigation prove to be as far removed from these radicals as are the violet anthrahydroquinone-α-carboxylic acids or the blue true salts of the red anthrahydroquinone-α-carboxylic acid lactones already described. When the cold alk. hyposulfite vat of 1,4-$C_6H_4(CO)_2C_6H_2(CO_2H)_2$

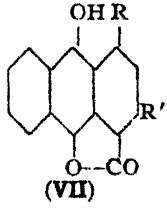
is acidified with HCl, the hydroquinone acid (I) seps. as a red to brown-red ppt. which, when boiled for a few min. in the strongly acid soln., becomes dark violet or blue and now shows great similarity to the violet anthrahydroquinone-1,5-dicarboxylic acid (II) but is fundamentally different from the latter. When purified through its *pyridinium salt*, which is stable *in vacuo* at 100° and crystallizes from Me_2CO in the form of a loose 1:1 mol. compd., it contains 1 mol. H_2O less than I, *i. e.*, it has the compn. of an *anthrahydroquinone-1,4-dicarboxylic acid monolactone* (III). It dissolves easily in dil. Na_2CO_3 and NH_4OH or very dil. NaOH with blue color, but with the NaOH it rapidly (immediately on heating) regenerates the red air-sensitive soln. of I. Ac_2O dissolves it on moderate heating with violet, on short boiling with red color and formation of a red di-Ac deriv., one of whose Ac groups is held loosely and is readily removed by boiling AcOH with formation of a red mono-Ac deriv. Both Ac derivs. are converted by cold concd. HCl into the blue III, by hot NaOH into I, and they therefore have the structures IV and V, resp. The lactonization of I also occurs in boiling AcOH and hot Ac_2O, and III can be obtained by boiling $1,4\text{-}C_6H_4(CO)_2C_6H_2(CO_2H)_2$ a short time with Na_2SO_4 and AcOH. No dilactone could be obtained from I as from II, however. Since these reactions are not quant. and elementary analysis does not show with certainty differences of one H atom in substances of such high mol. wt., titration was made use of to det. whether the dark blue III is really a lactonecarboxylic acid rather than, possibly, a free org. radical. III is readily oxidized; titrated in AcOH-Me_2CO with $KMnO_4$ to a yellow end point, it consumes 1 equiv. of O. The prepn. of the titration product by the method used with anthrahydroquinone-1-carboxylic acid lactone (VI) (with $PhNO_2$ at 70°) proved difficult, however; the mixt. had to be heated to its b. p. and under these conditions the chief product was $1,4\text{-}C_6H_4(CO)_2C_6H_2(CO_2H)_2$, the lactone ring being opened by the H_2O formed in the oxidation. If the III is sapond. to I (red soln.) with NaOH under H and titrated with NaOCl to a yellow end point, 2 equivs. of O are used up. Hence III is beyond doubt not a free org. radical; a $4\text{-}CO_2H$ group favors the lactonization of $1\text{-}C_6H_4(CO)_2C_6H_3CO_2H$ like a 2-Me group, while a $5\text{-}CO_2H$ group has no such influence. On the other hand, I, unlike II, does not give a dilactone with dehydrating agents. The most remarkable property of III is its dark blue color and the violet-blue color of its solns. in org. solvents. The other known anthrahydroquinonecarboxylic acid mono- and dilactones and -monolactonecarboxylic acids are red, both in the free state and in org. solvents, including anhyd. C_5H_5N, but with aq. C_5H_5N and with Na_2CO_3, NH_4OH and NaOH they form blue solns. of true salts. This change from red to blue was explained as a case of halochromism—the change of a vividly colored (red) phenol into its true heteropolar salt—but it was also suggested that the free red lactones and their red C_5H_5N derivs. might have the true anthrahydroquinone structure VII and the blue heteropolar salts be derivs. of a hypothetical *o*-quinoid hydroxyfuran (VIII). The discovery of III, which is blue in the free state and in indifferent org. solvents, makes it possible to decide between the 2 views. Kehrmann has shown that the tendency of quinones to pass into hydroquinones is the greater the more negatively they are substituted; introduction of CO_2H in position 4 of $1\text{-}C_6H_4(CO)_2C_6H_3CO_2H$ should, therefore, make the hydroquinone form the more stable and exclude structure VIII for III. Nor would there be any apparent reason why the blue salts of the non-carboxylated red



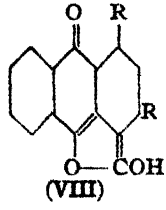
(IV)



(V)



(VII)



(VIII)

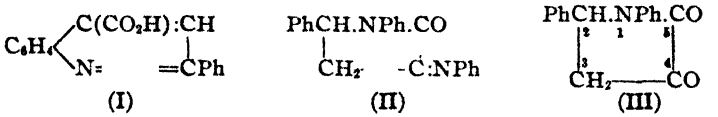
lactones should correspond to structure VIII. There is no real basis for the assumption that the red non-carboxylated lactones have the quinoid structure VIII and their blue salts and the blue III, on the other hand, the hydroquinoid structure VII, and decisive proof of the similarity in structure of the 2 groups of substances is found in the absorption spectra of VI and III in AcOEt. The 2 curves are entirely analogous: VI, max. 2580, 2720, 3510; min. 2490, 2645, 2890, >4000. III, max. 2510, 2630, 3350; min. 2380, 2550, 2750, 3900. The red VI and the blue III, therefore, undoubtedly have the same structure and the introduction of a $4\text{-}CO_2H$ group into VI has a strong bathochromic effect. Although the absorption curve for the blue Na_2CO_3 soln. of VI could not be detd. because of the instability of the soln., there can hardly be any doubt that the change

from the red VI to its blue salt is due to the bathochromic effect of salt formation. *1-Cyanoanthraquinone-4-carboxylic acid* (13 g. from 15.1 g. of the 1-NH_2 deriv. through the diazo compd.), yellowish prisms forming, through an intermediate olive-green quinhydrone, a dark red alk. $Na_2S_2O_4$ vat at room temp. and on heating (also with Zn dust and NH_4OH at room temp.) a free org. radical (azyl). The CN compd. (12.5 g.) with H_2SO_4-H_2O at 150-60° gives 9.5 g. of the light yellow 1,4-$C_6H_4(CO)_2C_6H_2(CO_2H)_2$. This acid was also prepd. (WITH ALFRED KELLER AND H. KURT MEYER) by condensing *o*-(2,5-$Me_2C_6H_3CO)C_6H_4CO_2H$ (obtained in 91% yield from *o*-$C_6H_4(CO)_2O$, *p*-xylene and $AlCl_3$ in $(CHCl_2)_2$) to 1,4-$C_6H_4(CO)_2C_6H_2Me_2$ and oxidizing the latter with MnO_2-H_2SO_4 at 110° or HNO_3 (d. 1.1) at 180-90° (yield, 90 and 95%, resp.). *Acetic (acetylanthrahydroquinone-1,4-dicarboxylic monolactone) anhydride* (IV), cinnabar-red, begins to m. 193°. *ms-Acetylanthrahydroquinone-1,4-dicarboxylic acid monolactone* (V), red, m. 239–40°. C. A. R.

Pyrrolenitriles and some of their transformations. H. FISCHER AND PAUL ROTHEMUND. *Ber.* **63B**, 2249–57(1930).—2,4-Dimethyl-3-cyano-5-carbethoxypyrrole, MeC:C(CN).CMe:CR.NH (I, R = CO_2Et) is sapond. to the *5-CO_2H acid* (II) (I, R = CO_2H) without the CN group being hydrolyzed, and distn. *in vacuo* gives *2,4-dimethyl-3-cyanopyrrole* (III). The CN group is materially stabilized by its position on the nucleus, whereas when it is on a side chain, as in 2,4-dimethyl-3-ω-cyano-ω'-carbethoxyvinyl-5-carbethoxypyrrole, it can be hydrolyzed with extraordinary ease, the β-position being attacked first and then the α-position. III can be obtained still more easily by the Knorr pyrrole synthesis from $AcCH_2CO_2Et$ and $AcCH_2CONH_2$, and $AcCH_2NH_2.HCl$ instead of $AcCH_2CO_2Et$-$NaNO_2$ gives an even better yield. With HCHO and a little HCl III readily yields *3,3',5,5'-tetramethyl-4,4'-dicyanopyrromethane* (IV) which, surprisingly enough, cannot be converted with either $FeCl_3$ or Br into the corresponding *methene* (V) although the V.*HBr* is obtained in good yield, with elimination of CO_2, from II with HCO_2H and 48% HBr on the H_2O bath. NH_4OH readily gives the free V in red needles which form metal complexes. III and HCN readily give an aldehyde (VI) (I, R = CHO), whose oxime yields with Ac_2O *2,4-dimethyl-3,5-dicyanopyrrole* (VII). With boiling HCl VI yields V.*HCl*. The CHO group in VI is reduced to Me by the Wolff-Kishner method, giving 2,4,5-trimethyl-3-cyanopyrrole, together with some 2,4,5-trimethylpyrrole. From VI and 2,3,4-trimethylpyrrole, cryptopyrrole and cryptopyrrolecarboxylic acid were obtained *3,3',4,5,5'-pentamethyl-* (VII), *3,3',5,5'-tetramethyl-4-ethyl-* (VIII) and *3,3',5,5'-tetramethyl-4-propionic acid-4'-cyanopyrromethene-HBr* (IX), resp.; VIII was also obtained from cryptopyrrolealdehyde with III. These cyanomethenes were synthesized with the object of prepg. porphyrins with CN groups on the nucleus but numerous attempts to do this failed. Porphyrin formation took place but only etioporphyrin II could be isolated. This negative result is perhaps due to the unreactiveness of the α-Me groups. Bromination of the 3 methenes could not be effected either and I (R = CO_2Et) is likewise unreactive toward Br, although with Br and $NaBrO_3$ 3 Br atoms can be introduced into the α-Me group, with simultaneous oxidation of the β-Me group, the product being *2-tribromomethyl-3-cyano-4-hydroxymethyl-5-carbethoxypyrrole* (X). III can also be brominated on the nucleus in the β position. With SO_2Cl_2 I gave a yellow oil yielding with H_2O *2-hydroxymethyl-3-cyano-4-methyl-5-carbethoxypyrrole* (XI). With higher concns., 6 atoms Cl are introduced the product is probably *2,4-bistrichloromethyl-3-cyano-5-carbethoxypyrrole* (XII). II (about 40 g. from 60 g. I with boiling aq. NaOH), m. 250°; 8 g. *in vacuo* at 150° gives 4 g. III, m. 107°. *2,4-Dimethyl-3-carboxamide-5-carbethoxypyrrole* (1.8 g. from 12 g. $AcCH_2CO_2Et$, $NaNO_2$, $AcCH_2CONH_2$ and Zn dust), m. 173°; 0.5 g. gives with boiling NaOAc Ac_2O 0.3 g. I, which is obtained in 1 g. yield from 1.5 g. $AcCH_2NH_2.HCl$ and $AcCH_2CONH_2$ in NaOH. V.HBr (13-5 g. from 20 g. II), golden yellow, m. 242° (decompn.); V.HCl (1 g. from 2 g. II), m. 225° (decompn.). Free V, ruby-red, m. 280° (decompn.). *Cu complex*, $C_{30}H_{26}N_8Cu$, crystals with metallic green surface luster, sol. in most solvents with red color; *Co complex*, green; *Zn complex*, $2C_{30}H_{26}N_8Zn.Zn(OAc)_2$, pink, contains 2 active H atoms (Chugaev-Zerevitinov). XI, reddens and sinters 145°, m. around 195-6°. XII (2.8 g. from 5 g. I, 20 g. SO_2Cl_2 and 20 cc. Et_2O), m. around 98°. X (about 20%), m. 183°, easily sol. in dil. alkalies, the yellow soln. becoming dark brown and finally black (in 20% NaOH it at once darkens and decomps.), regenerates I on long boiling with Zn dust in AcOH. *2,4-Dimethyl-3-cyano-5-formylpyrrole* (VI) (9–10 g. from 15 g. III in $CHCl_3$-Et_2O with anhyd. HCN), m. 223°; *oxime*, m. 206°; *semicarbazone*, turns yellow 250° and gradually darkens and sinters; *phenylhydrazone*, m. 175°. VII, m. 209°. *2,4-Dimethyl-3-cyano-5-bromopyrrole* (0.5 g. from 0.4 g. III with Br AcOH), darkens 130° and sinters without melting. VII (1.3 g. from 0.75 g. VI), yellow,

decomps. 230°. VIII (80%), orange-red, darkens 190°, m. 241°. IX, golden yellow, m. 240° (decompn.). C. A. R.

Action of aniline and its derivatives on benzaldehyde and pyruvic acid. HANS TH. BUCHERER AND RASCHDEN RUSSISCHWILI. *J. prakt. Chem.* **128**, 89–138(1930).—The course of the reaction between $PhNH_2$, BzH and $AcCO_2H$ is dependent upon external conditions (medium, temp., etc.), upon the nature of the combination of the components (PhCH:NPh and $AcCO_2H$, $PhNH_2$ and PhCH:$CHCOCO_2H$) and upon the substituents in the C_6H_6 nucleus of the $PhNH_2$ (NO_2, NH_2, NHAc, $NHSO_2C_6H_4Me$). In the action of $PhNH_2$ upon BzH and $AcCO_2H$ the reaction may take 3 directions instead of 2 as has been previously supposed; the formation of the by-product III has been demonstrated in the Döbner atophan synthesis as well as in the anil-anilide formation. By variation in the temp. and by the use of different solvents, the course of the reaction can be changed to secure various end products. In EtOH and at higher temps. the main product is I, with some II and III. In Et_2O and at lower temps., the products are II and III, while in AcOH or in the presence of AcOH and with low temps., the main product is III. PhCH:NPh acts upon $AcCO_2H$ as a mixt. of its components and the reaction proceeds, under the different conditions, in exactly the same way as that of $PhNH_2$, BzH and $AcCO_2H$, with the 1 difference that here the formation of the quinoline deriv. is suppressed and the formation of III is favored. The following conditions give a 80–85% yield of III: PhCH:NPh (0.05 mol.) in about 100 cc. AcOH at 8° is added to 0.05 mol. $AcCO_2H$ in 10–12 cc. abs. Et_2O and stirred for about 15 min. and then dild. with 1.5 parts H_2O. If one first condenses the BzH and $AcCO_2H$, forming the solid PhCH:$CHCOCO_2H$ and then treats this with $PhNH_2$, there results the $PhNH_2$ salt of the acid, which rearranges quant. into III, in either Et_2O or EtOH. This reaction supports the idea that the solid PhCH:$CHCOCO_2H$ is the *trans*-form. It was not possible to condense the $O_2NC_6H_4NH_2$ or $O_2NC_6H_3(NH_2)Me$ with BzH and $AcCO_2H$ to cinchonic acids, *o*-$H_2NC_6H_4NO_2$ with BzH and $AcCO_2H$ gives 34% of *1-o-nitrophenyl-2-phenyl-4,5-diketopyrrolidine*, orange-yellow, m. 154°; 4,2-$H_2N(O_2N)C_6H_3Me$ gives 71% of *1-nitrotolyl-2-phenyl-4,5-diketopyrrolidine*, yellow, m. 213–4°. III cannot be rearranged to atophan; with 80% H_2SO_4 there results *γ-anilino-γ-phenyl-α-ketobutyric acid*, decomps. 75–85°; the NH_4 salt decomps. 175°; the Ag salt decomps. 190°; the Ca and Mg salts are very stable; it was not possible to transform the acid back to III. III and EtOH KOH give a soln. from which H_2O ppts. a resin-like mass. The 4-CO group of III shows a peculiar behavior in that it is not possible to condense it with $PhNH_2$ or $PhNHNH_2$; with 1 equiv. of $PhNHNH_2$, the PhNH residue is replaced by the PhNHNH residue, giving *1-anilino-2-phenyl-4,5-diketopyrrolidine* (IV), m. 153.5°, sol. in 1% NaOH and in dil NH_4OH; the yellow Mg salt decomps. 265°; the compd. reduces $AgNO_3$ soln. and couples with *p*-$O_2NC_6H_4N_2Cl$, giving the red-brown *dye*, $C_{22}H_{17}O_4N_5$, decomps. 115°. With a 10% excess of $PhNHNH_2$, III gives IV and a small amt. of a second compd., $C_{16}H_{14}ON_2$ (?), bright yellow, m. 124–5°, which is insol. in alkali; the same compd. is obtained from Döbner's anil-anilide and $PhNHNH_2$: $FeCl_3$ gives an intense blue-violet color. 4-$MeC_6H_4SO_2Cl$ and 2,4-$H_2N(O_2N)C_6H_3Me$ with about 10% excess $CaCO_3$, heated 2 hrs. at 160–70°, give 40–45% of *4-nitro-2-toluenesulfonylaminotoluene*, m. 157°. Reduction with Fe and dil. AcOH in EtOH gives quant. *toluenesulfonyl-N³-m-toluylenediamine* (V), m. 176°. The *Ac deriv.*, m. 182–3°, results in 75% yield by the condensation of *p*-$MeC_6H_4SO_2Cl$ and 2,4-$H_2N(AcNH)C_6H_3Me$ with Na_2CO_3 in aq. suspension. *p*-$MeC_6H_4SO_2Cl$ and 4,2-$H_2N(O_2N)C_6H_3Me$ with Na_2CO_3 heated 2 hrs. at 160°, give 83% of *toluenesulfonyl-N⁴-amino-2-nitrotoluene*, yellow, m. 162–3°; reduction gives *toluenesulfonyl-N⁴-m-toluylenediamine* (VI), m. 164–5°. 2,4-$(H_2N)_2C_6H_3Me$ (2.65 g.) in 50 cc. abs. EtOH, added to a boiling soln. of 2.65 g. BzH and 2.2 g. $AcCO_2H$ in 25 cc. abs. EtOH, gives 85% of *6-methyl-7-aminoatophan*, brown powder, decomps. 250–70°; the AcOH salt, orange-yellow, decomps. above 300°; *HCl salt*, red rods; *Ac deriv.*, yellow, decomps. 300–2°; this also results by using 4,2-$H_2N(AcHN)C_6H_3Me$ in the above condensation. While ditoluenesulfonyl-*m*-toluylenediamine does not react with BzH and $AcCO_2H$, the 2 mono-$MeC_6H_4SO_2$ derivs. give the corresponding atophan derivs. V, BzH and $AcCO_2H$ in AcOH, boiled 3 hrs., give 51% of *6-methyl-7-toluenesulfonylaminoatophan*, light yellow, m. 273–4° (decompn.); *Me ester*, m. 224°; *Et ester*, m. 186–7°. VI gives a small yield of the *8-methyl-5-toluenesulfonyl deriv.*, which was not



(I) (II) (III)

obtained cryst. Isatin and resacetophenone, heated 8 hrs. with 33% NaOH, give quant. *2',4'-dihydroxy-2-phenylquinoline-4-carboxylic acid*, yellow, decomps. 305°; *Me ester*, m. 211–2°; *Et ester*, m. 195–6°. C. J. West

Synthetic experiments in the indole group. VII. Nitration and bromination of β-indolecarboxylic ester and a new synthesis of the dye of the purple of antiquity. Riko Majima and Munio Kotake. *Ber.* **63B**, 2237–45(1930); cf. *C. A.* **20**, 758.—A repetition of the work of Oddo and Sessa (*C. A.* **5**, 2638) not only confirmed the earlier observation that, contrary to the statements of O. and S., Et β-indolecarboxylate (I) is formed by the action of $ClCO_2Et$ on indolylmagnesium iodide but also showed that *di-Et N,β-indoledicarboxylate* (II) is formed at the same time; to obtain II in good yield it is well to use 2 mols. $ClCO_2Et$ per mol. of indole. Addn. of concd. HNO_3 to I in cold AcOH gives chiefly *Et 6-nitroindole-3-carboxylate* (III), sapond. by KOH to the free *acid* (IV) which with hot quinoline gives *6-nitroindole* (V). The position of the NO_2 group was established by oxidation of the salt of IV with aq. $KMnO_4$ to 2,4-$H_2N(O_2N)C_6H_3$-CO_2H. With HCl and $SnCl_2$ in AcOH III readily yields the *3-amino ester* (VI). V similarly gives the amorphous and very unstable *6-aminoindole* (VII). I is readily brominated in AcOH, giving chiefly either *Et 6-bromoindole-3-carboxylate* (VIII) or the *5,6-di-Br ester* (IX), depending on the conditions. The free *di-Br acid* (X) can be further converted into *5,6-dibromoindole* (XI). X with CrO_3 in AcOH gives a red *5,6-dibromoisatin* (XII), m. above 290°, which on distn. with KOH yields a $Br_2C_6H_3NH_2$, m. 79–80° (of the known $Br_2C_6H_3NH_2$, the 3,4-compd., m. 80.4°, comes closest in its properties to the one obtained from XII). XII on further oxidation with CrO_3 in AcOH gives a *dibromoisatoic acid* (XIII) which with concd. HCl yields 4,5,2-$Br_2(H_2N)C_6H_2CO_2H$, m. 227–8°. In the same way VIII gave *6-bromoisatin* (XIV), different from Borsche and Jacobs' synthetic 5-Br compd With O_2 in alk. soln., VIII readily gives 6,6'-dibromoindigo (XV), thus further confirming the structure of VIII. II (1.1 g. from 3 g. indole through the Mg compd. with 2 mols. $ClCO_2Et$), less sol. in alc. than I, m. 102–3°. The yield of I has been increased to over 78% by slowly adding 11 g. $ClCO_2Et$ to the Mg deriv. from 11 g. indole in cold Et_2O. III, light yellowish needles, m. 198–9°. IV, yellow, becomes opaque at 227°, decomps. around 275–8°; its alkali salts dissolve in H_2O with orange-red color. V, yellow, m. 139–40.5°. VI, m. 149–50°; *HCl salt, chloroplatinate*. β-Indolealdehyde in AcOH with HNO_3 (d. 1.4) gives an addn. *product*, $C_9H_7ON.HNO_3$, decomps 94°; with excess of HNO_3 on the H_2O bath is obtained a *nitro-β-indolealdehyde*, light yellow, m. around 290° (decompn.), turns brownish in the air. VIII, m. 134–7°; free *acid*, m. 212°. IX (85% from 2 g. I and 4 g. Br), m. 223–5°. X, m. 255–7°; if, in the sapon. of IX, the boiling with excess of alc. KOH is continued 10 hrs. the product is XI, m. 154°. XII, m. 290°, shows the indophenin reaction, gives with dil. NaOH a dark violet ppt. which redissolves with yellow color on heating and acids reppt. the original XII. XIV, orange-red, m. 256–8°. *5,5',6,6'-Tetrabromoindigo*, is obtained from IX with O_2; it dyes silk in somewhat less reddish shades than XV, the chief constituent of the purple of the ancients. **VIII. Synthesis of harman and harmine.** Shiro Akabori and Kojiro Saito. *Ibid* 2245–8.—The paper of Späth and Lederer (*C. A.* 24, 2464) appeared during the course of the present work, the starting point of which was also β-(β-indolyl)ethylamine (I) and *β-(6-methoxy-β-indolyl)ethylamine* (II). Tetrahydroharman, m. 175–7°, was obtained in 86% yield from I in dil. H_2SO_4 with AcH at 110°, and when boiled in H_2O with maleic acid and Pd black gave its own wt. of harman, m. 235–6°. *(β-6-Methoxyindolyl)acetonitrile* (52% from MeMgI, 6-methoxyindole and $ClCH_2CN$), m. 113–4°, gives in boiling alc. with Na 50% of II, m. 142.5–3.5° (S. and L. give 112–30°), distils without decompn. *in vacuo*. II with AcH in H_2SO_4 at 110° gives 85% *tetrahydroharmine*, m. 196–6.5°, dehydrogenated by maleic acid and Pd black to harmine, m. 259–9.5° (70% yield). C. A. R.

Researches directed toward the preparation of hydroxyindoles and some iodoindoles. Q. Mingoia. *Gazz. chim. ital.* **60**, 509–15(1930).—A survey of the literature shows that the various hydroxyindoles which have been prepd. have been synthesized by more or less indirect methods, and so expts. were directed toward developing a method of prepn. of hydroxyindoles by first prepg. the corresponding iodoindoles from the Hg derivs. and treating the iodoindoles with moist Ag_2O or with alkali hydroxides. In the present paper there are also described some previously unknown aceto- and chloromercuric derivs. of indole (I). It was not possible to obtain the OH derivs. from the iodoindoles, for the latter are highly resistant to hydrolyzing agents. I (5 g.) and aq. $Hg(OAc)_2$ (27.22 g. in 100 cc.), agitated for 2 hrs., filtered, washed with water, the residue dried, extd. with Et_2O, and recrystd. from glacial AcOH, yield *dimercuriindole diacetate*, $C_6H_4.C(HgOAc):C(HgOAc).NH$ (II), turns brown when heated and burns without

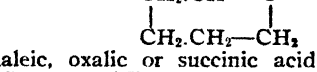
fusion. II (10 g.) and satd. aq. NaCl (300 cc.), heated for 3 hrs., cooled, filtered, washed (until the filtrate gives no ppt. with $AgNO_3$), and the residue recrystd. from hot AcOEt, yield *dimercuriindole dichloride*, $C_6H_4.C(HgCl):C(HgCl).NH$ (III), burns without fusion, gives an intense red with concd. H_2SO_4. III (5 g.), I (5 g.), KI (10 g.) and water (100 cc.), agitated for 1 hr., filtered, the residue washed free of I, dried and recrystd. from petr. ether (contg. a little Et_2O), yield *α,β-diiodoindole* $C_6H_4.CI:CI.NH$ (IV), lustrous brown, m. around 220° (decompn.). IV in dil. EtOH (and in a 2nd expt. in abs. EtOH) and Ag_2O, heated for several hrs. at 100°, gave completely negative results, and all the ingredients were recovered unaltered. Neither was there any reaction when the Ag_2O was replaced by KOH in water, in dil. EtOH and in abs. EtOH, and 10.2 to 50% concn. Skatole (5 g.) and aq. $Hg(OAc)_2$ (12.15 g. in 50 cc.), agitated for 2 hrs., filtered, the residue washed with water, dried and washed with EtOH, yield *mercurisaktole acetate*, $C_6H_4.CMe:C(HgOAc).NH$ (V), burns without fusion, has no odor; its soln. in concd. H_2SO_4 has a lemon-yellow color which changes rapidly to a violet-red; it is sol. in hot AcOH. V (5 g.) and satd. aq. NaCl (100 cc.), heated for 3 hrs., cooled, filtered, the residue washed and dried, yield *mercuriskatole chloride* (VI), decomps. when heated, burns without fusion. VI (4 g.), I (8 g.) and KI (16 g.) in water, agitated for 1 hr., filtered, the residue washed free of I, dried and recrystd. from benzine (contg. a little AcOEt), yield *α-iodo-β-methylindole*, $C_6H_4.CMe:CI.NH$ (VII), gray, m. 197–8°; in dil. EtOH with NH_3-$AgNO_3$ it forms a *Ag deriv.*, brown, sol. in excess NH_4OH. VII does not react with moist Ag_2O or with alk. hydroxides under the conditions described for IV.

Following the procedure for prepg. V, $C_6H_4.CH:CMe.NH$ (5 g.) and aq. $Hg(OAc)_2$ (12.15 g. in 50 cc.) yield, after recrystn. from AcOH, *mercurimethylketole acetate*, $C_6H_4.C(HgOAc):CMe.NH$ (VIII) pearly luster, hard but friable, does not fuse. VIII (5 g.) and satd. aq. NaCl (100 cc.), refluxed for 1 hr., cooled, filtered, the residue washed free of NaCl, and dried *in vacuo*, yields *mercurimethylketole chloride*, $C_6H_4.C(HgCl):CMe.NH$ (IX), does not fuse, gives the reaction of the Cl ion. Following the procedure used in the prepn. of VII, IX (5 g.), I (10 g.) and KI (20 g.) in water yield, after recrystn. of the product from EtOAc, $C_6H_4.CI:CMe.NH$, m. 82°, has all the properties described in the literature, does not react with moist Ag_2O or with alk. hydroxides.

C. C. DAVIS

Color of complex diazoles. III. Reduced pyrroleimidazole compounds. MANGESH V. BETRABET AND GOPAL C. CHAKRAVARTI. *J. Indian Chem. Soc.* 7, 191–7(1930). In the abstract in *C. A.* 24, 4516, the compds. prepd. were not described. This is a supplementary abstract. B. and C. describe the prepn. of reduced pyrroleimidazole derivs. similar to those studied in Part II (*C. A.* 19, 2493). The simplest was prepd. by condensing succinic anhydride with *o*-$C_6H_4(NH_2)_2$ by the method of Anderlini (*Gazz. chim. ital.*, 24, 140(1894)) to form *o*-$NH_2C_6H_4NHCOCH_2CH_2CO_2H$, m. 148–50°, which was converted by boiling with abs. alc. into *benzimidazole-2-propionic acid*, m. 225–6°, and not into an 8-membered ring compd. This acid was then converted into *α,β-dihydroacrylene-1,3-benzimidazole*, m. 172–5°. Hexahydrophthalic acid, prepd. by the reduction of phthalic acid in the presence of Pt oxide, condensed with *o*-$C_6H_4(NH_2)_2$ to give a mixt. of *benzimidazole-2-hexahydro-o-benzoic acid*, m. 245–7°, and *o-aminohexahydrophthalanil*, m. 195–6° (*Ac deriv.*, m. 261–3°). When boiled with Ac_2O, the former gave *1,2-hexahydrobenzoylene-1,3-benzimidazole*, m. 175–6°, which was converted into *Et benzimidazole-2-hexahydro-o-benzoate*, m. 163–4°, on boiling with NaOEt. *o*-Tolylenediamine was condensed with hexahydrophthalic anhydride to give a little *o-aminotolylhexahydrophthalic acid*, m. 264–6°, and *o-aminotolylamidohexahydrophthalimide*, m. 274–6°. (*Ac compd.*, m. 289–91°.) The latter, when heated at 280° until vapors ceased to evolve, gave *1,2-hexahydrobenzoylene-1,3-ethylbenzimidazole*, m. 186–7°. Similarly, 1,2-$C_{10}H_6(NH_2)_2$ and hexahydrophthalic anhydride condensed to give *naphthimidazole-2-hexahydro-o-benzoic acid*, m. 263–5°, and *aminonaphthylhexahydrophthalimide*, m. 241–3° (*Ac deriv.*, m. 217–8°). By ring closure of the former, *1,2-hexahydrobenzoylene-1,3-naphthimidazole* was obtained, m. 223–4°. **IV. Constitution of Thiele's supposed *o*-benzylene-1,3-benzimidazole.** *Ibid* 495–502.—B. and C. synthesized *o*-benzylenebenzimidazole, showing thereby that the constitution assigned by Thiele and Falk (cf.

Ann. **347**, 112(1906) to *o*-benzylene-1,3-benzimidazole is erroneous and should be represented by $C_6H_4.CH{:}N.C_6H_4.N{:}CH$ (I) instead of $C_6H_4.CH_2.N.C_6H_4.N{:}C$ (II). It was expected that phthalide and o-$C_6H_4(NH_2)_2$ would condense as follows: $C_6H_4.CH_2.O.CO$ + $C_6H_4(NH_2)_2$ ⟶ $CH_2(OH)C_6H_4C{:}N.C_6H_4.NH$ (IV) ⟶ II. When this condensation is effected by fusion, benzimidazole-2-benzyl-*o*-phenylenediamine, $NH_2C_6H_4NHCH_2C_6H_4C{:}N.C_6H_4.NH$ (V), m. above 300°, is obtained instead of II. On boiling together the phthalide and diamine in abs. alc., *o*-aminophenylaminomethyl-*o'*-aminobenzanilide, m. 162°, was obtained and converted into V on fusion. On refluxing *o*-$HOCH_2C_6H_4CO_2H$ with the diamine in the presence of 4 *N* HCl, V and IV were obtained, but the yield of the latter was very poor. On condensing the $HOCH_2C_6H_4CO_2H$ with the diamine in cold abs. alc., there was obtained *o'*-aminophenylammonium *o*-hydroxymethylbenzoate, m. 103–4°, which lost a mol. of water to form *o*-hydroxymethyl-*o'*-aminobenzanilide, $CH_2(OH)C_6H_4CONHC_6H_4NH_2$ (VIII), m. 152°, when boiled with abs. alc. VIII was also obtained in good yield by condensing the phthalide and diamine in cold abs. alc. Dehydration of VIII with Ac_2O or by fusion gave II, m. 185°. Thiele and Falk's compd. m. 210° (213.5° as found by B. and C.) must be represented by I. Both I and II gave *o*-benzoylenebenzimidazole (III) on oxidation with $KMnO_4$ and H_2SO_4. B. and C. also condensed phthalide with $(CH_2NH_2)_2$ in cold abs. alc. obtaining *o*-hydroxymethylaminoethylbenzamide, m. 179–80°. On boiling with abs. alc. for 3 hrs., dihydroimidazole-2-hydroxymethylbenzene, m. 210–1°, was obtained. This was converted into *o*-benzylenedihydroimidazole, m. 152–3°, by heating with excess Ac_2O and this in turn was oxidized by means of $KMnO_4$ and H_2SO_4 to *o*-benzoylenedihydroimidazole, m. 229–30°. A. WIEBEN

Anhydro-1-(1'-hydrazino-1'-cyclohexyl)-2-cyclohexanone. R. STOLLÉ AND FR. HANUSCH. *Ber.* **63B**, 2211–5(1930).—Kishner and Bielov assign to the compd. obtained by reduction of cyclohexanone azine with Na in alc. the structure of an asym. dicyclohexylhydrazine, $(C_6H_{11})_2NNH_2$. Expts. made in connection with 2-homopiperidone azine (*C. A.* **24**, 4034), however, indicated the possibility that the cyclohexanone azine in the Kishner reduction might rearrange under the influence of the heat or the NaOEt into a pyrazoline,  (I). Such a rearrangement was actually effected with maleic, oxalic or succinic acid. Investigation of the *semicarbazide*, $C_6H_{11}NHNC_6H_{11}CONHPh$ (II), and *thiosemicarbazide* (III) of the sym. $(NHC_6H_{11})_2$ (IV), prepd. according to Lochte, showed that IV is present in the K. reduction product. The *phenylurea* (V) and *phenylthiourea deriv.* (VI) (I, R = CONHPh and CSNHPh, resp.) of *anhydro-1-(1'-hydrazino-1'-cyclohexyl)-2-cyclohexanone* (VII) (I, R = H) are entirely different from II and III. VII, from I and about an equimol. amt. of anhyd. $(CO_2H)_2$ at 70°, b_{17} 165°, m. about 64°, liquefies in the air, turning brown and evolving gas, gives no ppt. with alc. NH_3-$AgNO_3$ even on heating, while reduction at once occurs on addn. of alkali; alc. $HgCl_2$ gives a curdy ppt. With excess of MeI in sealed tubes VII gives in poor yield a *methiodide*, m. 186°, which in H_2O or alc. gives AgI with $AgNO_3$. V, obtained in poor yield from VII and PhNCO, m. 124°, insol. in acids and alkalies, gives no ppt. with alc. NH_3-$AgNO_3$, and on heating reduction occurs only when alkali is added. VI (yield, about 50%), m. 168°, gives with alc. $AgNO_3$ a turbidity rapidly becoming yellow and on heating an immediate black ppt.; alc. $HgCl_2$ gives a white ppt. which does not change on heating. *Urea deriv.* (I, R = $CONH_2$) of VII, from VII and KOCN in AcOH, m. 161°, does not reduce aq. NH_3-$AgNO_3$ even on heating after adding alkali. II, m. 124°, insol. in acids and alkalies, gives no ppt. with alc. NH_3-$AgNO_3$ and on heating reduction takes place only after adding alkali. III, m. 129°, gives with alc. NH_3-$AgNO_3$ a ppt. which blackens on heating, and with alc. $HgCl_2$ a white ppt. C. A. R.

Trypanocidal activity and chemical constitution. II. New sulfur derivatives of aromatic organic arsenicals (continued). Derivatives of 2-thiolbenzimidazole-5-arsonic acid. JOHN G. EVERETT. *J. Chem. Soc.* **1930**, 2402–8; cf. *C. A.* **23**, 3448.—The outstanding trypanocidal value of 2-thiolbenzimidazole-5-arsonic acid (I) and its

arseno compd. made it seem possible that the free SH group had some significance in the cure of trypanosomiasis. Various derivs. of this acid have now been prepd., in which the H of the SH group has been replaced by other groups. Oxidation of 5.48 g. I in 300 cc. H_2O with 20 cc. *N* I soln. gives 45% of *benzimidazole-5-arsonic acid 2-disulfide* (II), as the *HI salt*, deep orange; the orange mother liquor, on standing, deposits 2 g. I. II is obtained as an orange, amorphous powder by acidifying an aq. soln. of the Na salt, obtained from the HI salt. Reduction of II gives 5,5′-arseno(2-thiolbenzimidazole); hydrolysis of II with dil. acid or alkali gives I. I, boiled with $HSCH_2CONH_2$ gives the *thiolacetamide deriv.*, m. 245° (decompn.). I (27.4 g.) and 9.4 g. $ClCH_2CO_2H$ in 200 cc. H_2O, mixed after being separately neutralized with NaOH, give 25 g. *2-carboxymethylthiolbenzimidazole-5-arsonic acid* (III); Ca salt, microcryst. rosets; Ba salt, amorphous. With $ClCH_2CONH_2$ there results 90% of the *2-carbamyl deriv.* (IV), needles, whose Mg salt is amorphous and Ba salt crystallizes in needles. I (5.6 g.) in 25 cc. H_2O and 12 cc. 50% KOH, heated to boiling and treated with 6.4 g. $KMnO_4$, gives 4 g. of *2-sulfobenzimidazole-5-arsonic acid* (V), needles, very resistant to hydrolysis; Ba salt, fine needles. Reduction of III with $Na_2S_2O_4$ gives 70% of *5,5′-arseno(2-carboxymethylthiolbenzimidazole)*, bright yellow, amorphous powder, which forms an insol. HCl salt; the corresponding *2-carbamyl deriv.*, bright yellow, amorphous, results in 72% yield from IV. V gives 60% of *5,5′-arseno(benzimidazole-2-sulfonic acid)*, yellow, amorphous. 2-Thiolbenzimidazole (VI) and *N* I give *benzimidazole 2-disulfide* (VII), orange, m. 198°; *HCl salt*, yellow, decomps. 210°; the HI salt could not be obtained, reduction taking place. VII is hydrolyzed by HCl or NaOH to VI. *Benzimidazole-2-sulfonic acid*, m. 365°, results in 90% yield; it crystallizes with 0.5 mol. H_2O; hydrolysis with HCl at 170° gives benzimidazole; NaOH does not cause hydrolysis. A comparison of the arsonic acids with I shows that only II approaches it in therapeutic activity; it is probably present in the blood stream and tissues as the free thiol type RSH. In other cases replacement of the H of the SH group causes adverse modification of therapeutic activity in both arsonic acid and arseno compd. Details are given of the therapeutic results. C. J. West

The production and analyses of some 1,2,4-triazoles. I. K. Matzurevich. *Bull. soc. chim.* [4], **47**, 1160–83(1930); cf. *C. A.* **21**, 2901, 3894.—The reaction between hydrazodithiocarboxamide and its mono-Ph deriv. (I) and the various common aromatic amines was studied. In all cases only a 1,2,4-triazole (urazole) was formed; thus 1,3,4-xylidine and I form 3-xylyliminothiourazole, $NH.CS.NH.NH.C{:}NC_6H_3Me_2$, tautomeric with $NH.C(SH){:}N.NH.C{:}NC_6H_3Me_2$. All formed mono-Ag salts because of the acidic H of the SH group and all formed mono-Ac and mono-Bz derivs. through the basic imino H. All the compds. in alk. soln. with a satd. soln. of $K_3Fe(CN)_6$ give a red-yellow changing to red on standing (Arndt azo-reaction). It is evident that the hydrazo group which does not exist at first is formed by the action of the alkali on the tautomer. The hydrazo group is then oxidized by the $K_3Fe(CN)_6$ to the azo compd. which gives the red color reaction. L. E. Gilson

The possible yellow content of red acid solutions of methyl yellow. A. Thiel. *Ber.* 63B, 2453–5(1930).—T. disagrees with Hantzsch and Burawoy (*C. A.* **24**, 5733) in their interpretation of his data (*C. A.* **18**, 3569) to mean that acid solns. of methyl yellow contain 30–40% of the salt form. Further spectrographic and photoelec. data are presented to prove the point. V. F. Harrington

General method for the preparation of thiocyanine dyes. Some simple thiocarbocyanines. Nellie Ivy Fisher and Frances Mary Hamer. *J. Chem. Soc.* **1930**, 2–10.—A new method for the prepn. of thiocyanine dyes consists in the action of $AmNO_2$ in the presence of Ac_2O on a benzothiazolinium salt contg. a reactive Me group. The reaction is tentatively formulated by the change of the Me group to a CH_2NO group, which then loses H_2O, giving a CCN group, which in turn reacts with a mol. of the original salt to give the thiocyanine dye, with the evolution of HCN. Neg. results were obtained with 2-methyl-β-naphthathiazole EtCl or MeCl salts and with 2,4-dimethylthiazole. The yields given below are for the recrystd. dye. 1-Methylbenzothiazole-EtCl (2 mols., 5 g.) in 75 cc. Ac_2O, treated with 2.4 cc. (1.5 mols.) $AmNO_2$ and heated under the reflux for 15 min., gives 29% of *2,2′-diethylthiocyanine chloride*, m. 255° (decompn.); NaBr in dil. EtOH gives 56% of the *bromide*, m. 298° (decompn.); KI in dil. EtOH gives the iodide, identical with a specimen prepd. by Mills' method. 1-Methylbenzothiazole-MeCl gives 33% of 2,2′-dimethylthiocyanine chloride, m. 261° (decompn.); the *bromide* m. 287° (decompn.) (72% yield); the iodide m. 290–2° (decompn.) (Mills gives 279–80°). 1-Methyl-α-naphthathiazole-EtCl gives 20% of

2,2'-diethyl-5,6,5',6'-dibenzothiocyanine chloride, m. 264° (decompn.); an EtOH soln. shows an absorption band with its max. at 4450 A. U.; with chloride plates the well-marked band of extra-sensitivity extends to 5300 A. U. and has a max. at 4800 A. U.; *bromide*, m. 286° (decompn.) (51% yield); *iodide*, m. 297° (decompn.) (70% yield). *2,2'-Dimethyl-5,6,5',6'-dibenzothiocyanine chloride*, m. 275° (decompn.) (18% yield); *bromide*, m. 309° (decompn.) (yield, 43%); the absorption max. of its EtOH soln. lies at 4500 A. U.; the band of extra-sensitivity reaches its max. at 4750 A. U. and extends to 5200 A. U. for moderate exposures; *iodide*, m. 314° (decompn.) (44% yield). 2,4-Dimethylthiazole methiodide, m. 260° (decompn.), results in 81% yield by heating the thiazole and MeI 2 days at 100°; the *ethiodide* results in 90% yield and is much more sol. in EtOH than is the MeI deriv. The MeI deriv., $HC(OEt)_3$ and C_5H_5N, boiled 4 hrs., give 14% of the *thiocarbocyanine*, $C_{13}H_{17}N_2IS_2$, m. 255° (decompn.); the EtOH soln. shows a rather broad absorption band with its max. at 5500 A. U. and an indication of another band at 5100 A. U.; a gelatino-bromide plate, bathed in it, shows practically uniform sensitivity, extending to 6800 A. U. for moderate exposure; the max. is at 5900 A. U. The EtI deriv. gives 27% of a *thiocarbocyanine*, $C_{15}H_{21}N_2IS_2$, m. 271° to 294°, depending on the rate of heating; the band of extra-sensitivity is not quite as uniform as for the preceding deriv., showing 1 max. at 5900 A. U. and a weaker 1 at 5350 A. U.; it extends to 6500 A. U. C. J. West

Certain quinoline and benzacridine derivatives yielding colored adsorption compounds with iodine. William O. Kermack, Robert H. Slater and Walter T. Spragg. *Proc. Roy. Soc. Edinburgh* **50**, Pt. 3, 243–61(1930).—Certain derivs. of benzacridine and 4-aminoquinoline give a blue or red color with I in aq. KI. The sensitivity of some of these compds. to I is equal to or greater than that of starch. To 10 cc. of a 0.05% soln. of *3,4,5,6-dibenzacridine* (I) in abs. alc. was added 90 cc. of distd. H_2O with vigorous stirring, forming a sol with particles possessing a positive charge. A series of dilns. was made from this sol and another series from a 0.05 *N* soln. of I in aq. KI. The effect of variation of concn. of the compd., I, and H ion was investigated, a whole range of colors being obtained according to the conditions of the reaction. In the case of anilino-quinoline compds. the color developed in solns. contg. I at 0.0001 *N* concns., while the benzacridines showed color at 0.00001 *N* or less. The action of the presence of KCl, K_2SO_4, KH_2PO_4, $CaCl_2$, $LaCl_3$ was tested but at low concns they are without much effect. The closely related compds., *1,2,7,8-dibenzacridine*, *1,2,5,6-dibenzacridine*, *9-phenyl-3,4,5,6-dibenzacridine* and *9-(3',4'-methylenedioxyphenyl)-3,4,5,6-dibenzacridine* (II), were prepd. and their solns. in abs. alc. were tested with I in KI solns. ranging from 0.01 *N* to 0.0001 *N*, but in no instance was any coloration observed. *9,10-Dihydro-9-(3',4'-methylenedioxyphenyl)-3,4,5,6-dibenzacridine* was prepd. by heating 7.5 g. CH_2O_2, C_6H_5CHO and 7.2 g. β-$C_{10}H_7NH_2$ to 100–10° until no further steam was evolved, adding 7.2 g. β-$C_{10}H_7OH$, heating to 200–30° and pouring the hot melt into alc. Crystd. from PhMe it m. 305°. On heating with an equimol. amt. of Br in AcOH, the HBr compd. of II was formed, decompd. by warming with dil. alkali, recrystd. from $PhNH_2$, m. 282°. *9-Methyl-3,4-benzacridine* (III) gave rise to a red color with I in dil. neutral soln., the color being detected at an I concn. of 0.000002 *N*, but small amts. of acid decreased the sensitivity. I might react with I and II through the residual valency of the feebly basic N atom, but since their methosulfates also develop colors it is suggested that the latter form micellar colloidal solns., and that the chromogenic property depends on the structure of the mol. as a whole. Certain derivs. of 2-methyl-4-anilino-6-methoxyquinoline, RPh, where R is $C_{11}H_{11}ON_2$ (cf. *C. A.* **24**, 4039), were tested by adding 90 cc. of H_2O rapidly to 10 cc. of their 0.05% solns. in abs. alc., and mixing with equal vols. of solns of I in KI. $RC_6H_4NH_2(3)$ and $RC_6H_4NH_2(4)$ gave brown colors with min. concns. of I of 0.00025 *N* and 0.0005 *N*, resp.; $RC_6H_4NHAc(4)$ a blue color at 0.000125 *N* and RC_6H_4-$C_6H_4NHAc(4')$ blue to red at 0.000004 *N*. Four quinoline compds. contg. As were investigated by dissolving 0.05 g. of each in H_2O with addn. of a min. amt. of Na_2CO_3, neutralizing with 0.1 *N* H_2SO_4 and dilg. to 100 cc. The milky suspensions were mixed with equal vols. of solns. of I in KI. $RC_6H_4AsO(OH)_2(2)$ gave a blue color with a min. concn. of I of 0.0005 *N* in presence of at least 0.625 *N* HCl; $RC_6H_4AsO(OH)_2(3)$, no color; $RC_6H_4AsO(OH)_2(4)$, purple at 0.000125 *N*; $RC_6H_4C_6H_4AsO(OH)_2(4')$, purple to 0.000125 *N*, red to 0.000008 *N*, brown to 0.000004 *N*. The compds. investigated differ from most of those previously known to give color with I, in that they are basic and form colloidal solns. in which the particles are positively charged. C. R. Addinall

Stereoisomerism in substituted 1,2,3,4-tetrahydroquinolines. II. Sydney G. P. Plant and Reginald J. Rosser. *J. Chem. Soc.* **1930**, 2444–55; cf. *C. A.* **24**, 117.—3,4-Dimethylquinoline (I) is best prepd. by treating 2-keto-3,4-dimethyl-1,2-dihydroquinoline (II) with $POCl_3$ and reducing the 2-chloro-3,4-dimethylquinoline (III) with HI

and red P; I m. 73–4°; the picrate m. 215–7°; the HCl salt m. 290° (decompn.). Reduction of I with Sn and HCl, Na and EtOH, Zn and EtOH-HCl or electrolytically gives only 1 form of *3,4-dimethyl-1,2,3,4-tetrahydroquinoline* (IV), whose *1-phenylcarbamyl deriv.* m. 107–8°; the *picrate*, orange, m. 143–5°; the *HCl salt* m. 156–8°; the free base is an oil. The reduction of I is a slow process and some unchanged I is always found. Reduction of II with Na-Hg in EtOH gives a mixt. of the *A* and *B* forms (in the ratio of about 6:1) of *2-keto-3,4-dimethyl-1,2,3,4-tetrahydroquinoline* (V), m. 127–8° and 117°, resp. The *A* form, with $POCl_3$, gives III. Reduction of the mixt. of the 2 forms with Na and EtOH gives I and IV. Further action of Na and EtOH on IV gave no trace of I. It would thus appear that the I is an intermediate product of the reduction of V, the keto group probably being reduced to an alc. group, which is then further reduced to I and then to IV; this accounts for the formation of only 1 form of IV in the reduction of the 2 forms of V. Reduction of 2,4-dimethylquinoline (VI) with Na and EtOH gives 2 forms of *2,4-dimethyl-1,2,3,4-tetrahydroquinoline A* (VI) and *B* (VII). VI was isolated from the reduction product as the *HCl salt*, m. 228°; *1-Ac deriv.*, m. 50–1°; *picrate*, yellow, m. 139–41°; *1-phenylcarbamyl deriv.*, m. 121–2°; *1-Bz deriv.*, m. 115°. VII was isolated from the mother liquor of VI as the *1-Ac deriv.*, m. 97–8°; *HCl salt*, m. 178–9°; *picrate*, yellow, m. 188–90°; *1-phenylcarbamyl deriv.*, m. 112–3°. The ratio of VI to VII is approx 2:3. With Sn and HCl the amt. of VII is less than 10% of the total yield; on electrolytic reduction the yield of reduction product is poor, but both VI and VII were present. With Zn and EtOH-HCl the ratio of VI to VII was approx. 5:1.

C. J. West

γ-Triazines. Synthesis of ethyl- and propyl-aminothioltriazine with some new data on methylaminothioltriazine. A. Ostrogovich and V. Galea. *Atti accad. Lincei* **11**, 1012–9(1930).—In a previous paper (*C. A.* **6**, 1137) O. described the prepn. of methylaminothioltriazine, HSC:N.CMe:N.C(NH_2).N, by the condensation of cyanoguanidine with thiolacetic acid. In a similar manner the *Et* and *Pr compds.* have been prepd. using 2 moles of cyanoguanidine and the K salt of the corresponding thiol acid, and then acidifying with H_2SO_4 (1:1). The *Et deriv.* (I) is obtained as needles, m. 257–8° (decompn.), very sol. in water, EtOH and MeOH, insol. in Et_2O and $CHCl_3$. It forms a picrate, m. 188–9° (decompn.). The Ag salt, formed by adding the calcd. amt. of $AgNO_3$, is not sensitive to light. The *Pr deriv.* (II) is obtained as needles, m. 262–3° (decompn.). Its soly. is a little less than that of I, which is much more sol. than the *Me deriv.* The picrate, m. 153° (decompn.), and the Ag salt is again insensitive to light. A *picrate* of the Me deriv. was also prepd. as yellow needles, m. 196–7° (decompn.).

A. W. Contieri

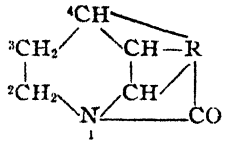
Alkaloid from Anona Reticulata Linnaeus. Alfredo C. Santos. *Philippine J. Sci.* **43**, 561–4(1930).—*Anona reticulata Linnaeus*, commonly called "anonas" is extensively cultivated in the Philippines; the leaves and fruit are officially in the first to the fourth editions of the Mexican Pharm.; the green fruit contains a large quantity of tannin and is used to check diarrhea and dysentery; the juice of the trunk is irritant. Air-dried bark (1.8 kg.) was refluxed for 3 hrs. with 3 vols. of 95% alc., filtered, the alc. evapd. from the filtrate, the sirupy residue acidified with dil. AcOH, the aq. soln. sepd. from the insol. resins, made alk. with NH_4OH, extd. with Et_2O, the Et_2O shaken with 5% NaOH to remove phenols and then treated with HCl; the HCl salt of the alkaloid which crystd. from the Et_2O was filtered, recrystd., dissolved in H_2O, extd. with Et_2O, the ext. shaken with NH_4OH and on evapg. the Et_2O gave 0.25 g. of long needles, m. 122–3°, $[\alpha]_D^{16.6°}$ −83.01° (in $CHCl_3$). The resinous material sepd. as above was dissolved in dil. NaOH, extd. with Et_2O, the Et_2O treated with dil. HCl and the HCl salt which sepd. was purified as above, yielding 0.33 g. of alkaloid. It is proposed to name this alkaloid "*anonaine*"; the chlorpolatinate is a yellow amorphous product; the alkaloid does not contain a MeO group but does have a dioxymethylene group.

N. A. Lange

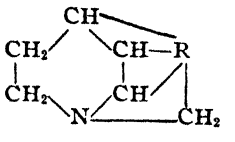
Strychnos alkaloids. LVI. Transformations of 2,3-dioxonucidine, of 2,3-dioxonucinic acid hydrate and of carboxyaponucine. Hermann Leuchs and Werner Weglner. *Ber.* **63B**, 2215–26(1930); cf. *C. A.* **24**, 4044.—It seems well to introduce special names for the degradation alkaloids and acids common to strychnine and brucine. The parent substances are 2 compds. related to each other as strychnine to strychnidine and therefore called *nucine* (I) and *nucidine* (II) (from *Strychnos nux vomica*). I, $C_{17}H_{22}O_2N_2$, is obtained with Zn-Hg from $C_{17}H_{20}O_3N_2Br_2$ (which is to be regarded as *2-hydroxy-3,4-dibromonucine*), and its 1st reduction product, *2-hydroxynucine*, $C_{17}H_{22}O_3N_2$. The product $C_{17}H_{22}O_4N_2$ obtained by oxidation of 2-hydroxynucine is *2-oxonucine hydrate*, and the Wieland acid $C_{17}H_{22}O_6N_2$ is *2,3- dioxonucine dihydrate* (III). Hanssen's acid $C_{18}H_{20}O_6N_2$ is then *3-carboxymethylene-2-oxonucine hydrate* (IV) and its reduction product

is *2-oxonucinyl-3-acetic acid* (V). Further examples are *2,3,4-trihydroxynucine* and its *diacetate anhydride*, probably *2,3-diacetoxy-Δ^3-nucenine* (VI). The other parent substance, $C_{17}H_{24}ON_2$ (II), has not yet been prepd. but *2,3-dioxonucidine*, $C_{17}H_{20}O_3N_2$, is obtained by oxidation of strychnidine, $C_{21}H_{24}ON_2$, with CrO_3. There has now been obtained about 1% of a 2nd product, a well-crystd., difficultly sol. *amino acid*, $C_{21}H_{22}O_4N_2$ (VII), whose compn. has not yet been established with certainty and whose structure is not known. Among derivs. of 2,3-dioxonucidine already described are the methiodide hydrate, the methoperchlorate, the semicarbazone and the Br oxidation product $C_{17}H_{20}O_5N_2$. Its reduction has now been effected. By Clemmensen's method it gives, not 2-oxonucidine but, in very good yield, *2-oxo-3-hydroxynucidine* (VIII), also obtained with Na-Hg. The product seems to be homogeneous, although, as the result of the appearance of a new asym. C atom, 2 stereoisomers are possible. The presence of the new HO group is shown by the formation of an *acetoxy acetate* (IX), $C_{19}H_{24}O_4N_2.AcOH.H_2O$; the well-crystd. *hydroperchlorate* and the free *base* (X) were also prepd. Dioxonucidine, similarly treated, gave only the *AcOH salt*. The *methiodide* of VIII has a normal compn.; with Ag_2CO_3 it yields a strongly basic cryst. substance which is so hygroscopic that it cannot be analyzed. The oxidation of VIII with Br is much easier than that of the dioxonucidine, the product, $C_{17}H_{22}O_5N_2$ (XI) being isolated as the *HBr salt* and the *hydroperchlorate*. The presence of the new C:O group can be shown by the formation of a *semicarbazone perchlorate* and an *oxime-HBr*. It is probably in an aldehyde group, for the HBr very rapidly reduces yellow HgO; 2 mols. HgBr are formed but the *product*, $C_{17}H_{22}O_6N_2$ (XII), was isolated in only moderate yield as the well-crystd. *perchlorate* which in H_2O gave, by dissocn., 60% of the free XII in tables with $3H_2O$. A further transformation of the dioxonucidine is the degradation to an *amino acid*, $C_{16}H_{22}O_3N_2$ (XIII), according to the scheme $=CH.CO.CO.N.CH_2- \longrightarrow :CH.CO_2H(CO_2)NH.CH_2-$ with H_2O_2 in $Ba(OH)_2$; there was obtained 75% of a *salt* XIII.$2HClO_4.2H_2O$, $[\alpha]_D^{20}$ --59.7°; as by-product was isolated up to 5% of difficultly sol. lancets, $[\alpha]$ 36.4°, whose compn., $C_{17}H_{20}O_4N_2.HClO_4.H_2O$, corresponds to an *amine oxide* of dioxonucidine XIII is called *carboxyaponucidine* and is assumed to be derived from *aponucidine* (XIV), $C_{15}H_{22}ON_2$, in which all 6 C atoms of the strychnidine C_6H_6 nucleus have been removed. Likewise, Hanssen's acid $C_{16}H_{20}O_4N_2$ is *carboxyaponucine* and its oxidation products are *carboxyaponucinic acid* and *aldehyde*. XIII is oxidized by Br to the *aldehyde*, $C_{16}H_{22}O_6N_2$ (XV), which, when, boiled with HgO, gives in good yield *carboxyaponucidinic acid* (XVI). It is a striking fact that in this whole series of compds. the original CO_2H group apparently does not react with the basic NH group, which would lead to the formation of a 5-membered ring. It is also worthy of note that the two Br oxidations yield only 1 detectable C:O group and this again disappears on boiling with HgO. This is contrary to the views of the English chemists who represent the reaction by the scheme $CH{\cdot}C{\cdot}C_2 \longrightarrow CHO—CO{:}C_2 \longrightarrow CO_2H{:}OC{:}C_2$. They also assume that strychnine contains an ether group $C.O.CH_2.CH{:}C{:}C_2$ which on oxidation naturally changes to $C.O.CH_2{-}CO_2H$, but XVI and oxohydroxynucidinic acid are not broken down by boiling 2 hrs. with much 8.8 *N* HBr; neither $BrCH_2CO_2H$ nor $HOCH_2CO_2H$ can be detected and more than 80% of the acids are recovered unchanged. The hydrates of dioxo- and oxohydroxynucinic acids are likewise not hydrolyzed; the latter yields 35% of a compd. $C_{17}H_{20}O_7N_2$ (XVII); evidently the 3-HO group has been split off along with the 4 H atom and XVII is *2-oxo-Δ^3-nuceninic acid hydrate*. 2-Oxo-3-hydroxynucine hydrate, VIII and 2-oxo-3-hydroxynucidinic acid are likewise not hydrolyzed. Carboxyaponucine, distd. *in vacuo* with Zn dust, gives at 330–50° a $CHCl_3$-sol. basic resin from which can be obtained around 6% of a *perchlorate*, $[\alpha]$ 209°, whose compn. indicates that it contains 2 mols. $HClO_4$ and that CO_2 and 1 mol. H_2O or 1 atom O have been split off in its formation. The salt is not obtained without Zn and therefore is probably a reduction product, $C_{15}H_{20}ON_2.2HClO_4$. Strychnidine and tetrahydrostrychnine were obtained in 70 and 20% yield, resp., by reducing strychnine electrolytically in H_2SO_4, pptg. the strychnidine with NH_4OH and extg. the filtrate with $CHCl_3$. VII, brownish needles and leaflets with $3H_2O$, does not m. 320°, easily sol. in NH_4OH, HCl and AcOH; *sulfate, AcOH salt* of *2,3-dioxonucidine*, obtained with Ac_2O at 100°, neutral to faintly acid, sinters 230°, m. 269–74° (decompn.) like the free base. VIII, sinters 240°, m. 252–4°, $[\alpha]_D^{20}$ easily sol. in H_2O with alk. reaction; *perchlorate*, prisms and lancets with $1H_2O$, 33°/d. IX, reacts faintly acid, sinters 117°, m. 121–2°, evolves vapors at 140°, loses its H_2O at 40° and 15 mm. over P_2O_5, leaving a neutral residue which m. 100° with loss of AcOH and formation of a strongly basic residue; *perchlorate*, needles with $1H_2O$; free *base*, obtained with $NaHCO_3$-$CHCl_3$, m. 143–4°, foams, resolidifies and again m. around

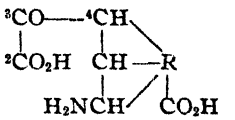
180°. *Methiodide* of **VIII**, does not m. 290°, dissolves in 55 parts H_2O. *3-Oxo-2-hydroxynucidinic aldehyde* (**XI**): *perchlorate*, m. 158–60°; *HBr salt*, prisms with $1H_2O$, $[\alpha]_D^{20}$ 106.0°/d. *3-Oxo-2-hydroxynucidinic acid* (**XII**), turns brown around 300°, reacts practically neutral. **XV.***2HBr.2H₂O*, $[\alpha]_D^{20}$ 11.1°/d.; **XV.***3HClO₄.4H₂O*; *semicarbazone-2HBr*, leaflets losing 10.1% in wt. at 100° and 15 mm., $[\alpha]_D^{20}$ −16°/d.; *oxime-2HBr*, $[\alpha]_D^{20}$ −8.5°/d. **XVI.***HBr*, tables with $2H_2O$, $[\alpha]_D^{20}$ −3.6°/d., sol. in less than 4 parts H_2O at 100°, does not dissoc., does not ppt. the free **XVI** with 1 mol. alkali; **XVI.***2HCl.HOH*, m. 266° (foaming). **XVII**, prisms with $2H_2O$, sinters 255°, m. around 270°, rapidly reacts with $KMnO_4$ in $NaHCO_3$ at 0°.



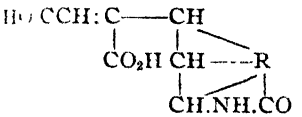
(I)



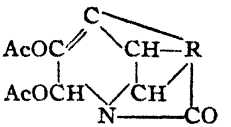
(II)



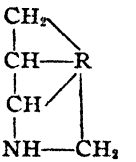
(III)



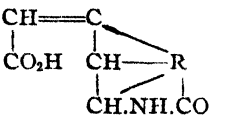
(IV)



(VI)



(XIV)



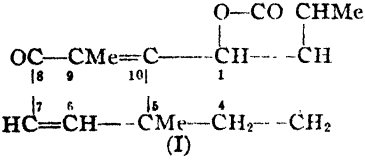
(XVII)

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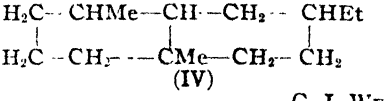
Natural glucosides. II. Constitution of esculin. FRANK S. H. HEAD AND ALEXANDER ROBERTSON. *J. Chem. Soc.* **1930**, 2434–44; cf. *C. A.* **24**, 1865.—Glaser and Kraus (*C. A.* **18**, 76) have suggested that esculin (I) was 7-glucosidoxy-6-hydroxycoumarin; the following work proves that this suggestion is incorrect. I, MeI, K_2CO_3 and Me_2CO, warmed under the reflux for 85 hrs., give *7-O-methylesculin*, crystg. with 2 mols. H_2O, m. 230° (decompn.); aq. and EtOH solns. are non-fluorescent; hydrolysis with 5% H_2SO_4 gives 7-*O*-methylesculetin (II), m. 185°, and glucose. II, EtI, K_2CO_3 and Me_2CO give nearly quant. *7-methoxy-6-ethoxycoumarin* (III), m. 120°; the EtOH soln. has a blue fluorescence. *3-Methoxy-4-ethoxyphenol*, m. 58°, was obtained from the anilide sulfate; $FeCl_3$ gives a brownish violet color; concd. H_2SO_4 gives a brownish purple soln., changing to an intense magenta and then a bright blue on addn. of H_2O; with HCN, HCl and $Zn(CN)_2$ there results *2-hydroxy-4-methoxy-5-ethoxybenzaldehyde*, m. 112.3°; the $FeCl_3$ reaction is dark green; the *2,4-di-MeO deriv.* (IV) m. 110° and does not give a $FeCl_3$ reaction. Oxidation with $KMnO_4$ in Me_2CO gives *2,4-dimethoxy-5-ethoxybenzoic acid*, m. 137°. III and 20% aq. NaOH, heated until soln. results and then treated with Me_2SO_4, gives the *Me ester*, pale yellow, m. 80°, of *2,4-dimethoxy-5-ethoxycinnamic acid* (V), colorless needles from C_6H_6, transformed at 117–8° into a bright yellow solid, m. 128°, which then crystallizes from C_6H_6 in bright yellow needles; on standing in contact with the solvent the colorless form is obtained. Oxidation with $KMnO_4$ gives **IV**. IV, $CH_2(CO_2H)_2$, C_5H_5N and piperidine, heated on the H_2O bath for 4 hrs. and then boiled for 5 min., give V as pale yellow needles, crystg. from C_6H_6 with solvent of crystn., m. 132–3°; oxidation also gives IV. Exptl. conditions necessary for the mutual reconversion of the 2 forms could not be detd. *3,4-Dimethoxyphenol*, pale yellow oil, b. 168–70°, gives a *hydrate* from H_2O, m. 46°; the $FeCl_3$ reaction in EtOH is pale green, in H_2O, bluish green, instantly changing to reddish brown; with HCl, HCN and $Zn(CN)_2$ give *2-hydroxy-4,5-dimethoxybenzaldehyde*, m. 105°; the $FeCl_3$ reaction is dark green, changing to brownish purple on diln. with H_2O. MeI and K_2CO_3 give asarylaldehyde (VI), m. 114°. 2,5-$(HO)_2C_6H_2OMe$ gives *2,5-dihydroxy-4-methoxybenzaldehyde* (VII), m. 209° (slight decompn.); $FeCl_3$ gives a bluish green color, fading on addn. of H_2O. Methylation gives **VI**. VII, Ac_2O and AcONa, heated for 3 hrs. on a steam bath, 2 hrs. at 120° and 8 hrs. at 180°, and the soln. in NaOH acidified after 2 hrs., give II. 4,3-MeO(EtO)$C_6H_3NH_2$, through the diazo reaction, gives *4-methoxy-3-ethoxyphenol*, b. 175°, crystn. from H_2O gives a *hydrate*, m. 92–3°; $FeCl_3$ gives an unstable greenish blue color; the HCN reaction gives *2-hydroxy-5-methoxy-4-ethoxybenzaldehyde*, m. 91°; $FeCl_3$ gives a bluish green color; *phenylhydrazone*, pale yellow, m. 157–8°. *2,5-Di-*

methoxy-4-ethoxybenzaldehyde, m. 110°; oxidation gives *2,5-dimethoxy-6-ethoxybenzoic acid*, m. 130°. *2,5-Dimethoxy-4-ethoxycinnamic acid*, pale yellow, m. 178–9°.
C. J. WEST

Constitution of santonin. III. Proof of the position of the methyl groups. GEO. R. CLEMO AND ROBERT D. HAWORTH. *J. Chem. Soc.* **1930**, 2579–82; cf. *C. A.* **24**, 4046.—In the structure proposed for santonin (I), there still remains the proof of the 5-position of the 2nd Me group. In order to prevent the production of phenolic derivs. from I due to the migration of a Me group from position 5 to 6, I was reduced to the tetrahydro deriv. (II), m. 156–7°; reduction of II with Zn-Hg and concd. HCl gives *deoxytetrahydrosantonin* (III), m. 141–2°; with HI and red P, distn. with soda-lime, followed by reduction of the I-contg. residue with Na and EtOH, gives *1,4(a)-dimethyl-7-ethyldecalin* (IV), b_{20} 120–5°; attempts to dehydrogenate this with Se or S gave unsatisfactory results and a pure cryst. picrate could not be obtained. III and Se give 1-methyl-7-ethylnaphthalene, b_1 95–9° (picrate, m. 96–7°). The loss of the Me group during the Se treatment establishes the 5-position of the 2nd Me group in I.



(I)



(IV)

C. J. WEST

Digitalis glucosides. II. Digoxigenin, the aglucone of digoxin. SYDNEY SMITH. *J. Chem. Soc.* **1930**, 2478–82; cf. *C. A.* **24**, 2753.—Digoxigenin (I) reduces alk. AgNO, and gives a red color with Na nitroprusside; H_2SO_4-$Fe_2(SO_4)_3$ gives a yellow soln. becoming red on standing. Titration indicates 1 lactone group; the *di-Ac deriv.* m. 221° (all m. p. cor.), $[\alpha]^{20}_{5461}$ 61.3° (MeOH, *c* 1.56). Refluxing I in 50% EtOH contg. H_2SO_4 gives *anhydrodigoxigenin*, m. 182°, $[\alpha]^{20}_{5461}$ 16.3° (MeOH, *c* 1.6); from dil. EtOH it crystallizes with 1 mol. H_2O; *di-Ac deriv.*, m. 199°, $[\alpha]^{20}_{5461}$ 38.6° (MeOH, *c* 0.5). Catalytic reduction (Pd black) of I gives the *dihydro deriv.*, m. 215°, $[\alpha]^{20}_{5461}$ 20.5° (MeOH, *c* 0.5); it does not give the Legal test; *di-Ac deriv.*, m. 222°, $[\alpha]^{20}_{5461}$ 29.8° (MeOH, *c* 0.9). I in MeOH-KOH gives *isodigoxigenin* (II), m. 260° (decompn.), $[\alpha]^{20}_{5461}$ 13.6° (MeOH, *c* 1); II retains the bitter taste of I but does not give the Legal test; II crystallizes from C_5H_5N with 1 mol. C_5H_5N, m. 280°; *di-Ac deriv.*, m. 280°. Heating II with MeOH-KOH for 15 min. gives *isodigoxigeninic acid*, m. 228°; the acid is very readily relactonized. I is therefore a tri-HO Δ^{β}-unsatd. lactone.
C. J. WEST

Arsenic derivatives of cysteine (JOHNSON, VOEGTLIN) **11H.** Some errors in analytical bromination (BUCKWALTER, WAGNER) **7.** The dielectric constant of liquids. III. Aqueous solutions of some organic compounds (DEVOTO) **2.** Valence chemistry of the metal alkyls of the third group (KRAUSE, DITMAR) **6.** Polar characteristics of the COOH group in several fatty acids and in benzoic acid (BRIEGLEB) **2.** Reactions relating to carbohydrates and polysaccharides (HARRISON, *et al.*) **11C.** Purification of gases (Fr. pat. 688,186) **13.**

Beilsteins Handbuch der organischen Chemie. 4th ed. Issued by Deutschen Chemischen Gesellschaft. **Bd. XI.** 443 pp. **Bd. XII.** 1436 pp. **Bd. XIII.** 903 pp. Edited by BERNHARD PRAGER PAUL JACOBSON, PAUL SCHMIDT and DORA STERN. Cf. *C. A.* **22**, 965. **Bd. V. Als Ergängzung d. 5 Bds. d. Hauptwerkes.** 416 pp. Edited by FRIEDRICH RICHTER. Berlin: Julius Springer. $45.60 for Bd. XIII. Cf. *C. A.* **24**, 3021.

LEWIS, HARRY F.: **Fundamentals of Organic Chemistry.** New York: McGraw-Hill Pub. Co., Ltd. 390 pp. $2.75.

TAYLOR, T. CLINTON: **Reactions and Symbols of Carbon Compounds.** A Textbook of Organic Chemistry. New York: Century Co. 704 pp. $4. Reviewed in *Chem. Markets* **27**, 581(1930).

Heat treatment of hydrocarbons. SOC. D'ÉTUDES SCIENTIFIQUES ET D'ENTREPRISES INDUSTRIELLES. Fr. 687,904, Jan. 9, 1930. **A gaseous mixt. contg.** C_2H_2, CO **and H is made by passing, at a high speed, satd. hydrocarbons or gaseous mixts. rich**

in satd. hydrocarbons mixed with steam and O through a chamber heated exteriorly to at least 1300°. Olefins may also be added to the mixt. Examples are given.

Dehydrogenating organic compounds. I. G. FARBENIND. A.-G. Fr. 688,369, Jan. 17, 1930. Co or Fe or metals of the 5th to the 7th group or their oxides, after a treatment at about 200° with gases formed of or contg. compds. of solid metalloids of groups 5 to 7, are used as *catalysts* in the dehydrogenation of org. compds. Thus, a mixt. of NH_4 tungstate, $Co(NO_3)_2$ and antimonic acid are applied to active C and the mass treated at 350° for 4 hrs. with H_2S. This catalyst is used for the *dehydrogenation of petroleum fractions* rich in naphthenes. Other examples are given.

Catalysts for dehydrogenation of organic compounds. I. G. FARBENIND. A.-G. Brit. 333,975, June 5, 1929. Catalysts comprise metals such as Co, Fe, metals of groups 5 to 7 of the periodic system such as V, Mo, W, Cb, Ta, Cr and Mn, and compds. of these metals such as their oxides, in admixt. with each other or with other materials such as Pb, Sn, Zn, Cd or their compds. or solid oxides of non-metals such as those of P, As or Sb or corresponding acids or salts, which are used after a pretreatment at above 200° with gases or vapors such as H_2S, H selenide, H phosphide, CS_2 or HI. Several examples with details are given, and the catalysts may be used in the treatment of materials such as mineral oils, naphthenes and products of the destructive hydrogenation of coal, tar, etc.

Halogenation of organic compounds. I. G. FARBENIND. A.-G. Fr. 688,046, Jan. 11, 1930. Aliphatic and isocyclic compds. are treated in the presence of strong mineral acids contg. O. and catalysts, with less than one mol. of halogen for each atom of halogen to be introduced whereby loss due to the formation of the H halide is avoided. A very large no. of examples is given.

Halogenated hydrocarbons. ALEXANDER WACKER GES. FÜR ELEKTROCHEMISCHE IND G. M. B. H. Fr. 687,855, Jan. 8, 1930. Alkyl halides are prepd. by passing a mixt. of alcs. and halogen acids over or through phosphoric acids at a temp. of about 200°. Thus EtCl is formed by passing EtOH and HCl through liquid phosphoric acid. Other examples are given.

Apparatus for drying and distilling organic materials. VEREIN FÜR CHEMISCHE INDUSTRIE A.-G. Ger. 508,668, Mar. 1, 1928. Details are given of construction of an arrangement for circulating steam through the retort.

Purifying synthetic organic products of carbon monoxide. I. G. FARBENIND. A.-G (Otto Mohr, inventor). Ger. 508,953, Aug. 5, 1924. Synthetic org. products of CO and H (*e. g.*, CH_3OH, isobutyl alc., etc.) are purified by treating them with an oxidizing agent such as $KMnO_4$, H_2O_2, HClO, HBrO, etc., and free alkali. Examples are given.

Liquid **mixtures of saturated aliphatic oxygenated compounds.** MARIA CASALE-SACCHI, LUCIA CASALE and RENATO CASALE. Swiss 139,179 and 139,180, May 12, 1926. The mixt. of compds. is produced by the catalytic treatment of gaseous hydrocarbons with oxides of C under pressure (139,179). H may also be added (139,180). The app. is described.

Liquid **mixtures of saturated aliphatic oxygenated compounds.** MARIA CASALE-SACCHI, LUCIA CASALE and RENATO CASALE. Swiss 139,798 and 139,799, Sept. 22, 1925. The mixt. is prepd. by the catalytic treatment of a mixt. of gaseous hydrocarbons and oxides of C (139,798); H may also be added to the mixt. (139,799). The layout is described.

Aliphatic nitriles. IMPERIAL CHEMICAL INDUSTRIES, LTD., and T. S. WHEELER. Brit. 333,989, June 14, 1929. A metal cyanide such as NaCN, and an aliphatic halide such as ethylene chloride are heated together (suitably under a reflux condenser) in the presence of a nitrile which may be the nitrile to be produced such as ethylene cyanide.

Aromatic hydrocarbons. I. G. FARBENIND. A.-G. (Alwin Mittasch, Wilhelm Pungs and Franz Krägeloh, inventors). Ger. 509,406, Sept. 2, 1924. Aromatic hydrocarbons are prepd. from aliphatic hydrocarbons that are gaseous at atm. temp. by leading them at a temp. above 400° over catalysts comprising carbonates or other oxygenated salts of alk. earth metals, including Mg and Be. Other gases, including H, may be mixed with the hydrocarbon. Examples are given. Cf. *C. A.* **24**, 860.

Purification of crude aromatic compounds. ALPHONS O. JAEGER and LLOYD C. DANIELS (to The Selden Co.). Can. 306,381, Dec. 2, 1930. Crude anthracene is fractionally sublimed in a carrier gas stream contg. vapors of *o*-$C_6H_4Cl_2$ or other chlorinated aromatic hydrocarbon.

Purification of crude aromatic compounds. ALPHONS O. JAEGER and LLOYD C. DANIELS (to The Selden Co.). Can. 306,382, Dec. 2, 1930. Crude anthracene or other

aromatic hydrocarbon is purified by fractional sublimation in a carrier gas stream contg. vapors of furfural.

Purification of crude aromatic compounds. ALPHONS O. JAEGER and LLOYD C. DANIELS (to The Selden Co.). Can. 306,383, Dec. 2, 1930. Crude aromatic hydrocarbons are fractionally sublimed in a carrier gas stream contg. vapors of unchlorinated aromatic hydrocarbons of the benzene series or their unchlorinated derivs.

Aromatic aldehydes. I. G. FARBENIND. A.-G. Brit. 334,009, July 4, 1929. In the manuf. of aldehydes (such as benzaldehyde, *p*-tolualdehyde or *p*-chlorobenzaldehyde) aromatic compds. such as C_6H_6, toluene or PhCl are treated with CO under pressure (suitably at a temp. of about 35°) in the presence of an anhyd. $AlCl_3$ catalyst activated with a small quantity of Ti chloride or a mixt. of the latter with other metal halides such as the chlorides of Fe and other metals present in Al ores. A small quantity of acid such as HCl or H_2SO_4 also may be added to facilitate initiation of the reaction. Various examples and details of procedure are given.

Aromatic hydroxyl compounds. I. G. FARBENIND. A.-G. Fr. 686,650, Dec. 14, 1929. Aromatic hydroxyl compds. and their halogen substitution products are made by treating C_6H_6 or its halogen substitution products in the vapor state with O or gases contg. or liberating O in the presence of O-contg. compds. of metals which are found at the minima of the large periods of the curve of at. vols. Examples are given of the prepn. of PhOH and chlorophenol. Examples of catalysts are oxides of Cr, Mo, U, V, Ta, Ti and Cb.

Olefins. ALEXANDER WACKER GES. FÜR ELEKTROCHEMISCHE IND. G. M. B. H. Fr. 687,311, Dec. 27, 1929. Olefins are prepd. from alcs., such as C_2H_4 from EtOH or butylene isomers from BuOH, by means of phosphoric acid or compds. capable of being transformed into phosphoric acids placed on supports of wood charcoal or bone charcoal material of like absorption capacity at a temp. below 300°.

Olefins from alkyl esters of sulfuric acid. I. G. FARBENIND A.-G. (Rudolf Engelhardt and Wilhelm Lommel, inventors). Ger. 507,961, Mar. 19, 1924. Alkyl esters of H_2SO_4 are heated to above 170° with salts of di- or polybasic acids, or such monobasic acids as do not combine with the liberated olefin, the salts being present in such amts. that no free H_2SO_4 is formed. Thus, Et_2SO_4 is heated to 300° with Na_2SO_4 to give C_2H_4. Other examples are given.

Polymerizing diolefins. I. G. FARBENIND. A.-G. Fr. 688,592, Jan. 21, 1930. Valuable products are made by polymerizing diolefins in the presence of alkali or alk. earth metals, the mass being stirred or the vessel rotated during the reaction. Fr. 688,593 describes a similar polymerization in the presence of solvents, the polymerization product being continuously eliminated in soln. Examples are given of the use of ether and of hexamethylene in a Soxhlet app.

Polymerizing diolefins to obtain rubber-like products. I. G. FARBENIND. A. G. Brit. 333,872, March 15, 1929. Readily sol. polymerization products are obtained by effecting the polymerization of diolefins such as butadiene in the presence of Na or other alkali or alk. earth metals previously dispersed in solvents or dispersion media such as decahydronaphthalene, dry xylene, toluene, tetrahydronaphthalene, benzene, hexahydrobenzene, gasoline or liquid polymerization products of the process. Various details of procedure are given.

Esters of resin acids. CHEM. FAB. KURT ALBERT G. M. B. H. Ger. 509,368, Aug. 29, 1928. Natural or artificial resin acids are heated with monoesters or monoethers of glycol, or with alc. compds. derived from glycol by internal etherification. The esters so obtained are sol. and resistant resins stable to light. Suitable resin acids are those from Manila or Congo copal, or acid synthetic resins prepd. from PhOH, CH_2O and colophony, or from glycerol and phthalic anhydride. Examples are given.

Vinyl esters of organic acids. HARRY B. DYKSTRA and CARYL SLY (to E. I. du Pont de Nemours & Co.). U. S. 1,786,647, Dec. 30. See Brit. 319,589 (*C. A.* **24**, 2470).

Halogen hydracid esters of 5-methyl-2-hexen-4-ol. I. G. FARBENIND. A.-G. (Karl Böttcher, inventor). Ger. 508,891, Apr. 17, 1925. These are produced directly by the action of the halogen hydracid at ordinary temps. Thus, 4-chloro-5-methyl-2-hexene (b. 38–40°) is produced by shaking 5-methyl-2-hexen-4-ol with concd. HCl. A 90% yield is obtained.

Dihaloethyl esters. SOC. DES USINES CHIM. RHÔNE-POULENC. Fr. 687,621, Jan. 3, 1930. See Brit. 325,115 (*C. A.* **24**, 3800).

Esters of borneol and isoborneol. SCHERING-KAHLBAUM A.-G. (Karl Stephan and Fritz Ulffers, inventors). Ger. 508,093, Apr. 12, 1925. Camphene and a fatty acid are mixed at atm. temp., the mixt. is cooled to about 0° and a strong mineral acid, which acts as a catalyst, is then added. The mixt. is allowed to stand until the reac-

tion is completed, rise of temp. being avoided, and the catalyst is then eliminated. The fatty acid may be in excess. Examples are given. Cf. *C. A.* **24**, 2756.

Imido ethers. KNOLL & Co., KARL F. SCHMIDT and PHILIPP ZUTAVERN. Fr. 688,062, Jan. 11, 1930. The same products as are described in Fr. 673,628 (*C. A.* **24**, 2469) are prepd. from oximes or esters of oximes by submitting them to the Beckmann transposition in the presence of alcs. Thus, the *p*-toluenesulfonic acid ester of the oxime of cyclohexanone is heated in abs. alc., and the imido ether is liberated by the addn. of KOH which is the same product as that described in example I of the prior case.

Aliphatic amines. ALEXANDER WACKER GES. FÜR ELEKTROCHEMISCHE IND. G. M. B. H. Fr. 687,398, Dec. 30, 1929. Alcs. and NH_3 are passed over heated heavy metals, such as Ni, Cu or mixts. thereof which may be deposited in pumice powder or clay.

Separating amines. I. G. FARBENIND. A.-G. Fr. 687,826, Jan. 8, 1930. Secondary and tertiary amines are sepd. by adding to the mixt. at ordinary or moderately raised temp., an amt. of phthalic anhydride corresponding approx. to the content of ondary amine, and sepg. the phthalamic acid formed from the tertiary amine, which d s not react, by extn. with NaOH lye. Examples are given.

Halogenated acetylenes and diacetylenes. I. G. FARBENIND. A.-G. Brit. 333,946, May 25, 1929. Chloro- and bromo-acetylenes and their derivs. are formed by direct replacement of H combined with triply linked C atoms by Cl or Br, by subjecting an acetylene compd. to the action of an aq. soln. of a hypochlorite or hypobromite (preferably with addn. of an excess of free alkali). The prepn. of dichloroacetylene, dibromoacetylene, bromo- and chloro-propiolic acid, 1-bromoacetinyl-1-cyclohexanol and diethylbromoacetinylcarbinol is described, and reference is also made to the prepn. of tetrabromoethylene from dibromoacetylene and a soln. of Br in $CHCl_3$.

Organic acid halides. SOC. DES USINES CHIM. RHÔNE-POULENC. Fr. 687,689, Jan. 4, 1930. α-Haloethyl esters are heated in the liquid state in the presence of acid catalysts. Examples are given of the prepn. of AcCl from α-chloroethyl acetate with $ZnCl_2$, H_2SO_4 or phosphoric acid as catalyst, chloroacetyl chloride from α-chloroethyl monochloroacetate, butyryl chloride from α-chloroethyl butyrate and others.

Acid halides. SOC. DES USINES CHIM. RHÔNE-POULENC. Fr. 687,731, Jan. 6, 1930. Halides of org. acids are made by splitting α-halo- or α,β-dihalo-ethyl esters by heating, preferably in the presence of pumice, kieselguhr, active charcoal, etc. Thus, AcCl and AcH are produced by passing chloroethylacetate over pumice heated to 250–300°.

Alkyl chlorides. I. G. FARBENIND. A.-G. Ger. 509,263, May 15, 1927. Alkyl chlorides are prepd. from alcs. boiling below 114° by adding aq. HCl to the boiling alc at such a rate that the concn. of HCl in the reaction mixt. never exceeds 20%. From ¼ to ¼ of the HCl used may be added to the alc. at the beginning, and part of the acid may be supplied as gas or in alc. soln. The method enables one to dispense with water binding agents.

Methylation. I. G. FARBENIND. A.-G. (Eduard Tschunkur and Fritz Eichler, inventors). Ger. 509,149, Jan. 15, 1927. Aromatic compds. are methylated in the nucleus by treating in the presence of hydrogen halide with CH_2O, or reagents giving rise thereto, and reducing the halomethyl deriv. so obtained. The reaction may be effected while heating, and a condensing agent, *e. g.*, $ZnCl_2$ or $AlCl_3$, may be present. Thus, $C_{10}H_8$, treated in HCl suspension at 80° with paraformaldehyde, yields α-chloromethylnaphthalene, m. 31°, which can be reduced in alc. soln. with Zn and NH_4Cl to give α-methylnaphthalene, b_{12} 110°. Other examples are given. Cf. *C. A.* **23**, 5196.

Separation of phenols. KLÄR-U. ENTPHENOLUNGS G. M. B. H. Fr. 687,319, Dec. 27, 1929. Benzene dissolved in water during the sepn. of phenols by benzene is recovered by adding a solvent for benzene insol. in water such as tar oil, or by treating the water with heated air or steam, or by submitting the water to a distn., cooling the distillate under reflux and sepg. the benzene from the distd. water.

Sulfoxylates. I. G. FARBENIND. A.-G. (Eduard Münch and Otto Schlichting, inventors). Ger. 509,516, Apr. 8, 1928. Addn. to 501,085 (*C. A.* **24**, 4521). Sulfoxylates are prepd. by reducing ketone bisulfites with H in the presence of a catalyst, *e. g.*, Ni, and in the presence or absence of indifferent gases. The reaction should be effected at about 0°, and the reaction mixt. should be approx. neutral. Pressure may be applied. Examples are given.

S-Alkylisothiourea salts. SCHERING-KAHLBAUM A.-G. (Herbert Schotte, inventor). Ger. 506,962, Sept. 10, 1927. These salts are prepd. by the action of mercaptans on cyanamide, preferably CaNCN, in the presence of acid. Thus, MeSH and $(Me)_2NCN$ are allowed to react in the presence of H_2SO_4 to give dimethylisothiourea. Other examples are given.

Acyl derivatives of k-strophanthidin. SCHERING-KAHLBAUM A.-G. (Wilhelm Neumann, inventor). Ger. 508,096, Jan. 1, 1929. See Brit. 323,973 (*C. A.* **24**, 3249).

Amino derivatives of cyclohexylbenzene. I. G. FARBENIND. A.-G. (Ernst Korten, inventor). Ger. 509,045, Mar. 29, 1928. These are prepd. by treating amino derivs. of tetrahydrobiphenyl in the liquid phase with H under pressure in the presence of a catalyst. Thus, 4-aminotetrahydrobiphenyl yields *p*-cyclohexylaniline. Other examples are given describing the prepn. of 4-amino-3-methylhexahydrobiphenyl, b_{11} 175–7°, and 4-amino-3-methoxyhexahydrobiphenyl, m. 107°. The diazo compds. of the products can be coupled to yield yellowish dyes. Acylamino derivs. of tetrahydrobiphenyl may be hydrogenated, and afterward sapond. Cf. *C. A.* **24**, 4792.

Anthraquinone derivatives. SOC. POUR L'IND. CHIM. À BÂLE. Fr. 687,039, Dec. 20, 1929. Condensation products of the anthraquinone series are made by causing the leuco-α-hydroxyanthraquinones and the leuco-α-hydroxyaminoanthraquinones and their derivs. to react in aq. medium with primary aromatic bases in the presence of boric acid. The hydroxy or hydroxyamino compds. themselves may be used if the reaction is carried out in the presence of a reducing agent. The OH groups are replaced by NH-aryl groups. The products may be used as *acid dyes* for animal or artificial fiber, or the unsulfonated compds. may be used for *coloring resins, lacquers*, etc. Several examples are given.

Benzanthrone derivatives. I. G. FARBENIND. A.-G. (Hugo Wolff, inventor). Ger. 508,322, Dec. 14, 1928. Benzanthrone derivs, substituted in the *Bz*-2-position with halogen or the NO_2 or OH group are prepd. by treating ethers of *Bz*-1-hydroxybenzanthrone with halogenating, nitrating, or oxidizing agents. Examples are given describing the prepn. of (*inter alia*), *Bz-2-nitro-Bz-1-methoxybenzanthrone*, m. 237°; *Bz-2-bromo-Bz-1-methoxybenzanthrone*, m. 186–188°; *Bz-2-chloro-Bz-1-methoxybenzanthrone*, m. 183–185°; *Bz-1-Bz-2-dihydroxybenzanthrone*, m. 355°; and *Bz-1-Bz-2-dimethoxybenzanthrone*, m. 156–158°.

Guanidine derivatives. SCHERING-KAHLBAUM A.-G. (Herbert Schotte, inventor). Ger. 509,264, Sept. 13, 1927. Polyaryl guanidines are prepd. by treating aryl-substituted isothiourea ethers with NH_3 or amines in the presence of a heavy metal salt capable of reacting with mercaptans, the reaction being effected in a mixt. of an alc. and water in such proportions that the mercaptide is pptd. while the guanidine deriv. remains dissolved. Thus, *N,N'*-di-*o*-methoxyphenyl-*S*-ethylisothiourea-HBr, treated in aq. MeOH soln. with NH_3 and then with $HgCl_2$, yields *N,N'*-di-*o*-methoxyphenylguanidine, m. 116–117°. Other examples are given also.

Propenyl derivatives of aromatic hydrocarbons such as isoeugenol. JACOB EHRLICH (to Verona Chemical Co.). U. S. 1,787,036, Dec. 30. In forming propenyl derivs. such as isoeugenol, an allyl deriv. of an aromatic hydrocarbon such as eugenol is heated with an alkali such as KOH in the presence of an org. phenolic compd. such as PhOH which causes a soln. of the allyl compd. and its corresponding propenyl deriv. during the isomerization process with practically no chem. change in the phenolic compd itself.

Quinone derivatives. I. G. FARBENIND. A.-G. (Fritz Günther, inventor). Ger. 508,395, Oct. 23, 1924. Nuclearly substituted quinones are prepd. by treating quinones with aromatic diazo compds. Thus, benzoquinone, treated in alc. soln. with the diazo compd. from aniline, yields phenylquinone, N being evolved. Other examples are given also.

Basic derivatives of substituted quinolinecarboxylic acid. SOC. ANON. POUR L'IND. CHIM. À BÂLE. Swiss 137,940, July 15, 1927. Addn. to 131,926 (*C. A.* **24**, 2473) The deriv. 2-chloro-4-quinolinecarboxylic acid-diethylaminoethanol is obtained by the action of an ester of diethylaminoethanol on a salt of 2-chloro-4-quinolinecarboxylic acid. An example mentions chloroethyldiethylamine and the Na salt of the acid.

Basic derivative of a substituted quinolinecarboxylic acid. SOC. ANON. POUR L'IND. CHIM. À BÂLE. Swiss 137,964, July 15, 1927. Addn. to 135,076 (*C. A.* 24, 3023). The deriv. 2-diethylaminoethoxy-4-quinolinecarboxylic acid ethyl ester is obtained by reacting on the diethylaminoethanol ester of 2-chloro-4-quinolinecarboxylic acid with a metal compd. of EtOH. An example is given.

Higher fatty acid derivatives. I. G. FARBENIND. A.-G. Fr. 687,752, Jan. 6, 1930. New derivs. are made by the reaction of alkali solns. on the halogen acids or their derivs. such as esters or amides with the addn., or not, of catalysts and heat under pressure. If caustic alkalies are used, products are obtained which are sol. in alkalies and are intermediate products for further derivs. If weak alkalies are used the products are insol. in alkalies and have plastic properties. Examples are given of the treatment of pentachlororicinoleic acid, hexachlororicinoleic acid, hexachlorostearic acid and others.

Derivatives of 2-hydroxynaphthalene-3-carboxylic acid amide. I. G. FARBENIND. A.-G. (Max Raeck, inventor). Ger. 506,837, April 23, 1927. See U. S. 1,733,468 (*C. A.* **24**, 380).

Aldehyde-amine condensation products having antioxidant properties. I. G. FARBENIND. A.-G. Brit. 333,941, May 24, 1929. α-Naphthylamine or a substitution product is condensed with an aliphatic aldehyde such as acetaldehyde, aldol or crotonaldehyde, in the presence of an acid such as formic acid or HOAc and a water-sol. alc. such as EtOH, and the insol. product obtained is decompd. with water. Examples with details of procedure are given.

Condensation products of aromatic sulfonic acids suitable for use as wetting agents, etc. FRIEDRICH POSPIECH (to Chemische Fabrik Pott & Co.). U. S. 1,787,408, Dec. 30. Compds. suitable for use as wetting agents or the like are obtained by reaction (suitably in the presence of H_2SO_4 at temps. of 85-90° but not higher) between naphthalenesulfonic acids or those of anthracene, phenanthrene, acenaphthene or the like, and olefins having 3 or more C atoms in their chain, and there may also be employed as starting materials halonaphthalenes, nitronaphthalenes, aminonaphthalenes, naphthalenecarboxylic acids, naphthols and so-called "functional derivs." of these compds. such as their esters, ethers, amides, chlorides, etc., and cyclic hydrocarbons with olefinic characteristics such as dihydrobenzene, tetrahydrobenzene or substitution products such as styrene. Various details and examples are given.

Metallic organic compounds. I. G. FARBENIND. A.-G. (Max Hardtmann and Peter Backes, inventors). Ger. 508,667, Oct. 28, 1926. Halides of P, As, Sb, Bi, Sn, Hg, Pb and Si and alkyl, aralkyl or arylchloro compds. are treated with finely divided high-boiling hydrocarbons in the presence of the calcd. amt. of alkali metals to produce metallic org. compds. Thus, the calcd. amt. of Na fused under toluene is added to $SbCl_5$, PhCl and toluene to give diphenyl- and monophenylstibine derivs. Several other examples are given.

Alkali salts of organic compounds. I. G. FARBENIND. A.-G. (Karl Dobmaier, inventor.) Ger. 508,097, Jan. 19, 1927. Solid alkali salts of org. compds. that are unstable or sensitive to alkali are prepd. by intimately mixing the compd. with the alkali salt of an aromatic hydroxyl compd. in the presence of a small quantity of water. Thus, chlorobenzoic acid, PhONa, and a little water may be ground together and then extd. with Et_2O, leaving Na chlorobenzoate. Alkali salts of organo-metallic compds. may be prepd. similarly.

Organic cupric cyanide compounds. I. G. FARBENIND. A.-G. (Friedrich W. Stauf and Hermann Hagenest, inventors). Ger. 507,791, Nov. 1, 1928. Addn. to 505,631 (*C. A.* **25**, 563). The method of 505,631 for producing $Cu(CN)_2$, *i. e.*, by the interaction of 1 mol. of a cupric salt, 1 mol. NH_3 and 2 mol. CN as a HCN salt in aq. soln., is modified by using a basic N-compd. (*e. g.*, urea or pyridine) instead of the NH_3.

Mercury compound of *p*-nitroaniline. MORRIS S. KHARASCH (to E. I. du Pont de Nemours & Co.). U. S. 1,787,630, Jan. 6. *p*-Nitroaniline is dissolved in HOAc and water and this soln. is warmed with an admixt. of $Hg(OAc)_2$ and the resulting Hg compd. may be pptd. as chloride by adding NaCl. A similar procedure also may be followed in the mercurizing of other substituted anilines such as *m*- and *o*-nitroaniline, the corresponding chloroanilines, bromoanilines, sulfoanilines, etc. The pptd. mercurized compd., after drying in any suitable manner, may be employed, either in water suspension or dry, as a *germicide, fungicide*, etc., and by reason of its relatively low toxicity, it is suitable for use in the treatment of diseases of small grains such as smut, wheat rust, etc.

Carbamates. I. G. FARBENIND. A.-G. Fr. 686,649, Dec. 14, 1929. NH_3 and CO_2 are introduced into solns. of salts in agents in which the carbamates are insol. or almost insol. Examples are given of the prepn. of the carbamates of Ca, Na, Pb and Ba, which may be converted to cyanamides, carbonates or cyanides as desired. Cf. C. A. **24**, 5947.

Metallic carbamates. I. G. FARBENIND. A.-G. Fr. 687,091, Dec. 21, 1929. Metallic carbamates and their transformation products are made by causing $NH_2COO-NH_4$ to react with inorg. metallic compds. in solvents for NH_2COONH_4. Thus, NaCl is dissolved in aq. NH_3 and a soln. of NH_2COONH_4 in aq. NH_3 is added, NH_2COONa being pptd. Examples are also given of the prepn. of the Ca, K, Ba and Zn salts, with MeOH or EtOH as solvent. Cf. *C. A.* **25**, 303.

Volatile aliphatic acids. HOLZVERKOHLUNGS-INDUSTRIE A.-G. Ger. 509,936, Feb. 17, 1928. Concd. volatile aliphatic acids are obtained from their solns. by adding a salt mixt. with which the acid combines, and recovering the acid by heating. Thus, a 50% soln. of glacial AcOH is treated with anhyd. AcONa and AcOK. The mixt.

is heated in a distg. current. The water distils over at temps. up to 170°, with a small quantity of acid. At 300° acid of 95% purity distils over.

Acetic acid. HOLZVERKOHLUNGS-IND. A.-G. Fr. 687,789, Jan. 7, 1930. AcOH is made by the continuous oxidation of AcH by means of O or a gas contg. O, the temp. being preferably 60–75°. The O is kept considerably in excess of the amt. theoretically necessary. The crude reaction product, *i. e.*, the product freed from AcH but not rectified, is used for extg. the unaltered AcH from the gases.

Acetic acid. WILHELM STRECKER. Fr. 688,417, Jan. 17, 1930. In the manuf. of AcOH by oxidizing AcH with O, the concn. of peracid which forms is kept below about 0.2% by a continuous circulation of crude AcOH. The peracid in this form is placed into contact with AcH on a large surface to be transformed.

Concentrating dilute acetic acid. HERMANN SUIDA. Austrian 119,478, May 15, 1930. Addn. to 116,727. The method of Austrian 116,727 (*C. A.* **24**, 2758) is modified by using 20–50% of a water-insol. wood-tar oil, or wood-spirit oil, b. 60–80°, instead of 10–30% of the fraction b. 80–120°.

Concentrating dilute acetic acid. HERMANN SUIDA. Austrian 119,481, May 15, 1930. Addn. to 117,858. The method of Austrian 117,858 (*C. A.* **24**, 4306) is modified by using an ester of a cyclic carboxylic acid as the extg. agent. Suitable esters are dibutyl or dihexyl phthalate, neutral esters from phthalic acid and glycol or glycerol, and esters of naphthenic acid.

Acetic acid; acetaldehyde. I. G. FARBENIND. A.-G. (Hermann Jochheim, inventor). Ger. 509,020, Dec. 14, 1926. AcOH and AcH are prepd. by passing C_2H_2, H, and O at a raised temp. over a contact mass, *e. g.*, a compd. of Sn, Ag or Hg. Other gases may be present in the mixt., and other compds. in the contact mass. Examples are given. Cf. *C. A.* **24**, 5768.

Acetic acid and its homologs. HOLZVERKOHLUNGS-INDUSTRIE A.-G. (Adolf Gorhan, inventor). Ger. 508,256, June 17, 1927. AcOH and its vaporizable homologs are concd. by treating the vapors of the dil. acids with fused $NaHSO_4$, which may be used alone or mixed with $KHSO_4$ or with addns. that lower the m. p., such as a small quantity of H_2SO_4 or H_2O. The treatment may be effected in a countercurrent manner. Addnl. details are given, and app. is shown.

Recovering acetic acid solvents. DESTILACIJA DRVA D. D. Ger. 508,092, June 18, 1926. See Suida, Austrian 116,377 (*C. A.* **24**, 2473–4).

4-Halo-*p*-phenyl-*o*-benzoylbenzoic acid, etc. PHILIP H. GROGGINS. U. S. 1,786,526, Dec. 30. 4-Halo derivs. of *p*-phenyl-*o*-benzoylbenzoic acid are prepd. by condensing 4-halobiphenyl with phthalic anhydride. U. S. 1,786,527 relates to the production of the similar 2-halo derivs. by condensing 2-halobiphenyl with phthalic anhydride. U. S. 1,786,528 relates to the production of 4-amino-*p*-phenyl-*o*-benzoyl benzoic acid by heating 4-halo-*p*-phenyl-*o*-benzoylbenzoic acid with aq. NH_3 under pressure in the presence of a Cu catalyst. U. S. 1,786,529 relates to similar production of the corresponding 2-amino compd. from the corresponding 2-halo compd. U. S. 1,786,530 relates to production of 4-amino-β-phenylanthraquinone by heating 4 halo β-phenylanthraquinone with aq. NH_3 under pressure, and U. S. 1,786,531 relates to similar production of the corresponding 2-amino compd. from the corresponding 2-halo compd. U. S. 1,786,532 relates to prepn. of the Al base of *p*-phenoxy-*o*-benzoylbenzoic acid by condensing diphenyl oxide with phthalic anhydride in the presence of $AlCl_3$.

6-Hydroxybenzylamine-3-arsonic acid. I. G. FARBENIND. A.-G. (Werner Schmidt, inventor). Ger. 507,638, June 1, 1927. 6-Hydroxybenzylamine-3-arsonic acid and its acyl derivs. are obtained by diazotizing 3-amino-6-hydroxyacylbenzylamine bases, treating with Na_3AsO_3 in alk. soln. and then, optionally treating the 6-hydroxyacylbenzylamine-3-arsonic acid formed with sapong. agents. Thus, 1-hydroxy-2-methyl 4-nitrobenzene, m. 95°, is diazotized and treated with Na_3AsO_3 to give 6-hydroxy 5-methylbenzylphthalimide-3-arsonic acid, m. 273°. Sapon. yields 6-hydroxy-5-methyl benzylamine-3-arsonic acid, m. 290°. Other examples describe the prepn. of 6-hydroxy benzoylbenzylamine-3-arsonic acid (m. 220 221°), 6-hydroxybenzylamine-3-arsonic acid (m. over 290°), and 6-hydroxy-*N*-phthaloxylbenzylamine-3-arsonic acid (m. 276°).

***N*-Substituted benzimidazolonearsonic acid.** I. G. FARBENIND. A.-G. (Karl Streitwolf, Alfred Fehrle and Walter Herrmann, inventors). Ger. 507,525, Feb. 12, 1929. Addn. to 446,545. Amino-*o*-alkylamino- or amino-*o*-alkenylaminobenzene-arsonic acid is treated with an ester of ClCOOH and then with acid. Thus, 3-amino 4-methylaminobenzene-1-arsonic acid is dissolved in dil. NaOH cooled to 0–5° and treated with HCl when 2,3-dihydro-1-methyl-2-ketobenzimidazole-5-arsonic acid sepd. out. Cf. *C. A.* **24**, 4057.

Phenylglycidic acid. ADOLF KAUFMANN. Ger. 509,938, July 28, 1927. Phenylglycidic acid is prepd. by treating cinnamaldehyde with H_2O_2 and alkali, optionally in the presence of a solvent.

Sulfinic acids. I. G. FARBENIND. A.-G. (Heinrich Hapff, inventor). Ger. 506,964, Sept. 18, 1928. See Brit. 321,843 (*C. A.* **24**, 2759).

4-Chloro-1-aminoanthraquinone-2-sulfonic acid. I. G. FARBENIND. A.-G. (Georg Kränzlein, Fritz Roemer and Erich Kronholz, inventors). Ger. 507,798, Dec. 9, 1927. See Brit. 302,171 (*C. A.* **23**, 4350).

Acetic anhydride. E. B. BADGER & SONS CO. Brit. 333,991, June 17, 1929. Anhyd. NaOAc, S chloride or sulfuryl chloride and Cl are fed to a batch reaction chamber surrounded by a cooling jacket and the temp. is preferably maintained slightly below 10°. Various details of app. and procedure are described.

Trichloroethane. I. G. FARBENIND. A.-G. Fr. 687,307, Dec. 27, 1929. 1,1,2-Trichloroethane is prepd. by heating a mixt. contg. C_2H_2, Cl and gaseous HCl, with or without catalysts, in reaction chambers filled with fine-grained material to prevent all danger of explosions or in the presence of an amt. of C_2H_2 (or HCl or inert gases) above the limits of explosibility of the mixt. of gases. In examples the gas mixt. is passed over coke heated to 220° and active charcoal impregnated with $MgCl_2$ and heated to 80–150°. Cf. *C. A.* **23**, 2724.

Acetylene. ROBERT G. WULFF. Can. 306,263, Dec. 2, 1930. C_2H_2 is made by rapidly passing one or more non-acetylene hydrocarbons mixed with a dilg. agent, both in vapor form, over a refractory contact mass maintained at 1500° F., the period of contact being relatively short, and then cooling the reaction products.

Methanol. GIULIO NATTA. Swiss 140,093, Mar. 9, 1929. See Fr. 670,763 (*C. A.* 24, 1869).

Methanol synthesis, etc. MATHIAS PIER and GUSTAV WIETZEL (to I. G. Farbenind. A.-G.). U. S. 1,788,170, Jan. 6. For production of org. compds. such as MeOH, there is passed over a suitable catalyst such as Fe oxide, in a circulating system, a gas mixt. contg. a large proportion of inert gas, such as a "power-gas" which has been scrubbed to remove CO_2 and then contains CO about 15.3, H about 30.6, CH_4 about 2.8 and N about 51.3%, and part of the residual gas mixt. is removed and continuously replaced by fresh gas so as constantly to maintain a proportion of about 12% CO and 24% H in the circulating gas. Temps. of 200–500° and pressures above 50 atm. are suitable for the process. It is stated that as good yields may be obtained as when employing gases richer in reacting constituents.

Formaldehyde. HOLZVERKOHLUNGS-IND. A.-G. Fr. 688,436, Jan. 18, 1930. To reduce the acidity of CH_2O prepd. by the catalytic oxidation of MeOH, the gaseous reaction mixt. is caused to pass at a temp. between 100° and the decompn. temp. of CH_2O, over one or more catalysts which are good conductors of heat such as Ag or Cu or their easily reducible compds.

Acetaldehyde. I. G. FARBENIND. A.-G. Fr. 688,047, Jan. 11, 1930. AcH is made by catalytic hydration of C_2H_2 using as catalyst Al_2O_3 activated by addnl. substances having a dehydrogenating action, or compds. of W, particularly the oxides and complex acids of W, if desired with the addn. of compds. of the heavy metals except Fe_2O_3. Thus, a mixt. of C_2H_2 and steam is passed over a mixt. of Al_2O_3 and pumice contg. a small quantity of ZnO or $ZnSO_4$ heated to 400°. Cf. *C. A.* **25**, 304.

Acetone. I. G. FARBENIND A.-G. Fr. 688,074, Jan. 13, 1930. Acetone is prepd. by passing C_2H_2 and steam over catalysts and directing the by-products formed, such as AcH and AcOH, and the unchanged C_2H_2 over catalysts which favor the production of acetone from the compds. An example is given in which ZnO is used in both reactions.

Formamide. BURRITT S. LACY (to Roessler & Hasslacher Chemical Co.). U. S. 1,787,183, Jan. 6. Combination of CO and NH_3 is effected in the presence of an alc. such as MeOH and an alcoholate such as NaOMe at about 70° under 17 atm. pressure.

Methyl chloride. MAITLAND C. BOSWELL and ROLAND R. MCLAUGHLIN. Can. 306,629, Dec. 9, 1930. MeCl is prepd. by passing a mixt. of CH_4 and Cl at a high temp. over a catalyst comprising a complex of Cu and Cl contg. less Cu than does Cu_2Cl_2 and more than does $CuCl_2$.

Hexamethylenetetramine. GUTEHOFFNUNGSHUTTE OBERHAUSEN A.-G. Fr. 687,735, Jan. 6, 1930. $(CH_2)_6N_4$ is made by passing a mixt. of CH_4 and air through an elec. field of high tension and high frequency. HCHO is also formed. Examples are given.

Urea. I. G. FARBENIND. A.-G. Fr. 687,188, Dec. 24, 1929. Carbamates are heated in the presence of an excess of NH_3 under a partial pressure of NH_3 higher than

its crit. pressure. Catalysts such as finely divided charcoal, or salts or oxides of light metals such as $MgCl_2$ or $AlCl_3$ or acids may be added. A small quantity of water also is advantageous. The carbamates may be formed intermediately by starting with NH_4HCO_3 or $(NH_4)_2CO_3$ or mixts. of these salts with metal bicarbonates.

4,6-Dichloro- and 3,4,6-trichloro-2-nitro-1-methylbenzene. I. G. FARBENIND. A.-G. (Karl Moldaenke and Ernst Runne, inventors). Ger. 507,792, Nov. 8, 1925. The above compds. are produced by treating 4-chloro-2-nitro-1-methylbenzene with Cl. Examples are given. The chlorination is arrested at the dichloro or trichloro compd. as desired.

1'-Chloro-1-methylnaphthalene. I. G. FARBENIND. A.-G. (Gustav Reddelien and Hans Lange, inventors). Ger. 508,890, Jan. 13, 1929. 1'-Chloro-1-methylnaphthalene is produced by the action of monomol. CH_2O on an aq. suspension of cryst. naphthalene in the presence of concd. HCl. The HCl may be led in as gas and the mixt. may be heated. An example is given.

Benzaldehyde. P. P. SHORUIGIN. Russ. 33,783, Oct. 11, 1928. A mixt. of $PhCHCl_2$ vapor and steam with an excess of air is passed at high temp. over a catalyst contg. oxides or salts of V.

Mesityl oxide. SOC. ANON. DES DISTILLERIES DES DEUX-SÈVRES. Fr. 687,176, Dec. 23, 1929. Mesityl oxide is prepd. in a continuous manner by the decompn. of diacetone alc. heated to boiling in a considerable excess of water contg. a small quantity of a catalyst such as phosphoric acid. The oxide and water form a mixt. with a min. b. p. of 91.5°, and this is rapidly eliminated from the reaction medium. An app. is described.

Anthraquinone from anthracene and similar catalytic oxidations of organic compounds. ALFRED WOHL (to I. G. Farbenind. A.-G.). U. S. 1,787,416, Dec. 30. Anthracene vapor with an oxidizing gas such as air is passed over a catalyst such as Ag vanadate at a temp. of about 400°, and similarly, other carbonyl compds. are formed from hydrocarbons by passing their vapors with a gas contg. O over catalysts of like character, among which are generally mentioned compds. such as vanadates, chromates, uranates, stannates and arsenates of metals such as Cu, Ag, Pb, Tl, Pt, Ce, Ni and Co. Various details are given for prepg. the catalyst, etc. U. S. 1,787,417 relates to effecting similar production of anthraquinone with an oxide of V as catalyst. These two patents are based upon corresponding patent applications filed in Germany June 22, 1916.

Anthraquinone from anthracene by catalytic oxidation. ALPHONS O. JAEGER (to Selden Co.). U. S. 1,786,950, Dec. 30. Anthracene in vapor phase is caused to react with an oxidizing gas such as air in the presence of a contact mass contg. at least one non-siliceous base-exchange material such as one contg. V. Numerous details and examples are given.

***p*-Nitroaniline.** HAMILTON MERRILL (to Tower Mfg. Co.). U. S. 1,786,766, Dec. 30. *p*-Nitrochlorobenzene is heated with NH_3, treated with an alkali such as $Ca(OH)_2$ or NaOH and the charge is filtered while hot enough to keep the nitroaniline in soln. and the purified product in the filtrate is recovered.

1,5-Naphthyridine. SCHERING-KAHLBAUM A.-G. (Curt Räth, inventor). Ger. 507,637, Sept. 10, 1926. 1,5-Naphthyridine and its substitution products are prepd. by subjecting 3-aminopyridine to the usual quinoline synthesis. Thus, 3-aminopyridine is heated with glycerol, H_3AsO_4, concd. to produce 1,5-naphthyridine, b$_{12}$ 112°. Other examples describe the production of 6-hydroxy-1,5-naphthyridine, m. 258°, 2-phenyl-6-chloro-1,5-naphthyridine-4-carboxylic acid, decomposes 186° and 6-hydroxy-2-methyl-1,5-naphthyridine, m. 260°.

Porphyrin. HANS FISCHER and JOSEF KLARER. Ger. 509,939, Mar. 11, 1926. Porphyrin is prepd. by the action of concd. H_2SO_4 on halogenated dipyrrylmethene. Thus, cryptopyrrol in glacial AcOH is shaken with Br to give brominated dipyrrylmethene. This is treated with concd. H_2SO_4 to give etioporphyrin.

1-Aminocarbazole. I. G. FARBENIND. A.-G. (Friedrich Muth and Albert Schmelzer, inventors). Ger. 507,797, Mar. 14, 1927. 1-Aminocarbazole and derivs. are prepd. by first introducing the SO_3H group into the carbazole mol., then introducing the NO_2 group into the 1-position, reducing it to the NH_2 group, and finally removing the SO_3H group if desired. Examples describe the prepn. of 1-nitrocarbazole-3,6,8-sulfonic acid, 1-aminocarbazole-3,6,8-sulfonic acid, 1-aminocarbazole and 1-phenylaminocarbazole.

***Bz*-1,*Bz*-1'-Dibenzanthronyl.** SOC. ANON. POUR L'IND. CHIM. À BÂLE. Swiss 138,589. July 13, 1928. See Brit. 315,433 (*C. A.* **24**, 1652).

Menthol. RHEINISCHE KAMPFER-FABRIK G. M. B. H. Fr. 687,279, Dec. 26, 1929. Pure inactive menthol is prepd. from the hydrogenation products of thymol men

thones and inactive menthenones and from the isomerization products of inactive isomeric menthols by submitting these products to a partial esterification, purifying the esters formed by crystn. and sapong. the pure esters.

Menthol. SCHERING-KAHLBAUM A.-G. (Walter Schoeller, Hans Jordan and Reinhard Clerc, inventors). Ger. 508,095, Nov. 25, 1927. Addn. to 498,281. A mixt. of stereoisomeric menthols is prepd. by hydrogenating hydroxythymol, as described in Ger. 498,281 (*C. A.* **24**, 3802), until 8 atoms of H have been taken up.

Menthol. SCHERING-KAHLBAUM A.-G. (Walter Schoeller and Hans Jordan, inventors). Ger. 508,892, July 15, 1927. See U. S. 1,765,620 (*C. A.* **24**, 4054).

Menthol, menthone and their homologs. SCHERING-KAHLBAUM A.-G. (Walter Schoeller, Hans Jordan, and Reinhard Clerc, inventors). Ger. 508,893, Aug. 30, 1927. Addn. to 506,044 (*C. A.* **25**, 382). Menthol and its isomers and homologs, as well as the corresponding ketones, are prepd. by treating the condensation products from *m*- or *p*-cresol and ketones (cf. Brit. 273,684, *C. A.* **22**, 1982), with H in the presence of hydrogenation catalyst until 16 or 14 atoms of H have been taken up, the reaction being effected at a temp. above 200°. Under these conditions, the use of a metal henolate auxiliary catalyst, as described in Brit. 276,010 (*C. A.* **22**, 2379), can be dispensed with. Examples are given.

Thymol. WALTER SCHOELLER and HANS JORDAN (to Chemische Fabrik auf Actien vorm. E. Schering). U. S. 1,786,922, Dec. 30. In producing alkylisopropylphenols, an alkylisopropylenephenol (such as 3-methyl-6-isopropylenephenol in making thymol) is treated with H at a temp. of about 160° in the presence of a hydrogenating catalyst such as one contg. Ni until 2 H atoms have entered into the mol. combination. Cf. *C. A.* **25**, 305.

Thymol, etc. SCHERING-KAHLBAUM A.-G. Fr. 687,101, Dec. 21, 1929. Thymol, its isomers and homologs are prepd. by submitting the condensation products of ketones and cresols obtained by the processes of Fr. 636,119 and 645,271 (*C. A.* **23**, 1911) to decompn. in a current of H according to Fr. 638,483 (*C. A.* **23**, 154) and 636,228 (*C. A.* **23**, 1761) and causing the vapors of the decompn. products mixed with H to pass over a hydrogenation catalyst at 200°. Thus, the condensation product of *m*-cresol and acetone (Fr. 636,119, *C. A.* **23**, 247) is heated to about 300° with passage of a current of H and the resulting vapors are caused to circulate over Ni pptd. on pumice stone. Thymol is sepd. by fractionation from the product. Other examples are given. Cf. *C. A.* **24**, 1394.

Vanillin. J. D. RIEDEL-E. DE HAËN A.-G. Ger. 509,152, Jan. 21, 1926. Addn. to 507,404 and 507,796. In prepg. vanillin as described in Ger. 505,404 (*C. A.* **24**, 5770) and 507,796 (*C. A.* **25**, 525), the removal of the alkoxymethyl residue from acylated monoalkoxymethyl ethers of propenylpyrocatechol is effected by warming the ethers with dil. AcOH to which a little HCl has been added. An example is given.

Bivinyl. I. G. FARBENIND. A.-G. (Richard Leopold and Alfred Michael, inventors). Ger. 507,995, June 8, 1927. Bivinyl and its homologs are prepd. by leading 1,4-butylene glycol or homologs in vapor form, diluted with gas or vapor such as steam, over anhyd. alum at high temps. Examples are given.

2-Ethoxy-6,9-diaminoacridine cholate (desoxycholate, or apocholate), and 3,6-diamino-10-methylacridinium desoxycholate. CHEM. FAB. VORM. SANDOZ. Swiss 139,409 to 139,407. Addns. to 126,678 (*C. A.* **23**, 612). The above compds. are prepd. directly by the action of 2-ethoxy-6,9-diaminoacridine on cholic, desoxycholic or apocholic acids, or of 3,6-diamino-10-methylacridinium chloride on desoxycholic acid. Cf. *C. A.* **24**, 919–20.

3,6-Tetramethyldiaminophenothiazinium desoxycholate (dehydrocholate or apocholate). CHEM. FAB. VORM. SANDOZ. Swiss 139,408 to 139,410. Addns. to 128,326 (*C. A.* **23**, 2192). The above compds. are obtained directly by the action of the appropriate cholic acid on the base.

11—BIOLOGICAL CHEMISTRY

PAUL E. HOWE

A—GENERAL

FRANK P. UNDERHILL

The destruction of one enzyme without the suppression of the activity of two others in the seed of Soja hispida. R. FOSSE, A. BRUNEL, P. DE GRAEVE, P. E. THOMAS AND J. SARAZIN. *Compt. rend.* **191**, 1025–8(1930).—**The activity of uricase in the soy bean**

has been destroyed without affecting the activity of allantoinase and urease by 2 methods: (1) The ground bean was macerated with H_2O, held overnight on ice, heated 30 min. at 78°, and the mixt. centrifugalized. (2) The beans were held over $CaCl_2$ for 48 hrs., then ground and placed in sealed tubes and held at 82° for 50 hrs. RACHEL BROWN

Asymmetric hydrolysis of esters by enzymes. IV. The influence of optically active foreign substances on the configuration specificity of liver esterase of varying degrees of purity. EUGEN BAMANN AND PAUL LAEVERENZ. *Z. physiol. Chem.* **193**, 201–14(1930); cf. *C. A.* **24**, 2153; **25**, 527.—If the influence of optically active substances, such as alkaloids, on the optical selectivity of esterase toward esters of *dl*-acids is due to concomitant substances present in the enzyme prepn., there should be a marked difference in selectivity response between purified and unpurified enzyme. Comparisons were made between the crude esterase from human liver and prepns. that had been purified 10-fold by the adsorption method of Kraut and Rubenbauer (*C. A.* **22**, 1167), with *dl*-$PhCHOHCO_2Et$ as substrate. The effect of adding strychnine was in most cases a slight increase in the extent of ester hydrolysis but more especially a considerable difference in optical rotation of the acid liberated. The adsorption treatment, however, whereby much of the accompanying substances was removed, had no appreciable effect on optical selectivity. The effect of purification was rather to render the enzyme somewhat less sensitive to the activating influence of strychnine. Evidently an enzyme-strychnine complex is formed independently of the presence of concomitant substances. This process is reversible since the properties of the original enzyme may be restored by dialysis. The influence of strychnine changes as the enzyme undergoes aging or autolysis. This is due to alteration in the enzyme complex, probably by combination with sp. cleavage products of the non-sp. concomitant substances. In sufficient concn. these products may even change the optical selectivity of the enzyme.
A. W. DOX

The cephalin from human brain. HERMANN RUDY AND IRVINE H. PAGE. *Z. physiol. Chem.* **193**, 251–68(1930).—Most cephalin prepns. thus far described have contained 59–60% C instead of the theoretical value of 66–7%. By working up the lecithin fraction remaining after pptn. of the cephalin by EtOH, prepns. of cephalin with the theoretical C content have now been obtained. The neutralization no., which agrees approx. with the Van Slyke amino-N after hydrolysis, is useful for detg. the cephalin content of lipoid mixts. and estg. the progress of purification. The amino N of the unhydrolyzed prepns. in H_2O runs 10–12% too high. A Ba salt of cephalin was prepd. by adding $Ba(OH)_2$ in MeOH to a C_6H_6-EtOH soln. of the phosphatide and pptg. with EtOH-MeOH. The salt contains 2 equivs. of Ba and is decompd. by H_2O and CO_2. Repeated pptn. of the Ba salt is a means of sepg. cephalin from lecithin. The salt-forming properties of cephalin may possibly be of physiol. importance in regulating an exchange of bases.
A. W. DOX

Estimation of diastatic enzyme preparations: taka-diastase, malt diastase and pancreatic diastase. TAICHI HARADA. *Ind. Eng. Chem., Anal. Ed.* **3**, 1–3(1931).—An improved modification of Lintner's method for the assay of diastatic enzymes is presented. The p_H is carefully controlled by a phthalate buffer giving more accurate results. A new standard unit is offered and calcd. in terms of Lintner's value. Tables to aid calcn. are given.
L. E. GILSON

X-ray interpretation of the structure and elastic properties of hair keratin. W. T. ASTBURY AND H. J. WOODS. *Nature* **126**, 913–4(1930).—Expts. carried out on human hair and various types of sheep wool show that animal hairs give rise to two x-ray fiber photographs according as the hairs are unstretched or stretched, and that the change from one photograph to the other corresponds to a reversible transformation between two forms of the keratin complex. α-Keratin (unstretched) is characterized by a marked periodicity of 5.15 A. U. along the fiber axis, and two chief side spacings of 9.8 A. U. and 27 (mean value) A. U., resp., while β-keratin shows a strong periodicity of 3.4 A. U. along the fiber axis with side spacings of 9.8 A. U. and 4.65 A. U., of which the latter is at least second order. On the basis of phys. and chem. properties and x-ray data a skeleton of the keratin complex is offered which gives a quant. interpretation of the fundamentals, and may lead to a correct solution of the details. It is a peptide chain folded into a series of hexagons, with the precise nature of the side links yet undetd.
C. E. P. JEFFREYS

The oxidizing action of cryptomeria wood. MASAKAZU YAMADA. *J. Agr. Chem. Soc. Japan* **6**, 168–77(1930); *Bull. Agr. Chem. Soc. Japan* **6**, 9–11.—Cryptomeria wood, like some other woods, has the power of oxidizing ale. In cryptomeria the zone between heart and sap wood is generally most powerful. The oxidizing power is not due to the action of substances like aldehyde or ketone, because for those the sunlight

is indispensable, while with the wood oxidation takes place smoothly in the cold and dark. Moreover the action is not due to terpene, oxidase or peroxidase, for the resin of pine tree or cryptomeria, terpene oil, potato and wheat bran have almost no effect upon alc. "Dehydrase," or in a wider sense some oxidizing catalyst, may be considered as the main cause of the oxidation. Y. KIHARA

Glutathione. V. The spontaneous cleavage of glutathione in aqueous solution. HAROLD L. MASON. *J. Biol. Chem.* **90**, 25–32(1931); cf. *C. A.* **24**, 5760.—When glutathione is kept in aq. soln. at 37–62° it undergoes cleavage into pyrrolidonecarboxylic acid and cysteinylglycine. The acid is the primary product of this cleavage and its formation may well be the first step in the synthesis of proline. Cysteinylglycine rather than cysteine is probably the catalyst which is active in the autoxidation of glutathione. Glutathione is not attacked directly by erepsin but after the glutamyl radical is broken off hydrolysis of the cysteinylglycine occurs. The glutathione mol. is in this way broken up with the liberation of only 1 CO_2H group. A. P. LOTHROP

Polar conductivity of living and dead membranes. PAUL METZNER. *Ber. deut. botan. Ges.* **48**, 207–11(1930).— A great no. of plant parts show a greater cond. in one direction than in the other. This difference is greatest when d. c. is used and decreases as a. c. of increasing frequency is used until, with extremely high frequencies, there is in general no polar effect. The current intensity also influences the magnitude of the effect. In certain tissues the results are little different if the tissue is previously killed by boiling, but with parenchymatous tissue the difference almost disappears.
LAWRENCE P. MILLER

Agglutination of cell suspensions. (Blood, milk, latex, bacteria, etc.) N. BEUMER-NIEUWLAND. *Chem. Weekblad* **27**, 658–63(1930).—An address. Sixty references are cited. W. GORDON ROSE

The mechanism of enzyme reactions. I. The influence of the hydrogen-ion concentration on the action of liver esterase upon the mono-ethyl esters of a homologous series of dibasic aliphatic acids. H. G. K. WESTENBRINK AND H. M. RONIJN. *Arch. néerland. physiol.* **15**, 529–37(1930).— W. and R. detd. the amt. of acid formed by action of the enzyme on the esters for a definite time, temp. and p_H. The latter was maintained by the continuous addn. of standard alkali, the amt. needed being indicated by a Michaelis' "Glockenelectrode." This reaction velocity is deemed an index of the optimum p_H. It increases with the C content of the series:

Acid	glutaric	adipic	pimelic	suberic	azelaic	sebacic
Optimum p_H	5.6	5.8	6.0	6.3	6.9	7.3

II. **The hydrolysis of a mixture of two esters by liver esterase.** H. G. K. WESTENBRINK. *Ibid* 538–44.—W. detd. the time required for addn. of a definite amt. of 0.1 *N* NaOH to maintain the p_H const. during the hydrolysis of the mono-ethyl esters of sebacic and azelaic acids and a mixt. of the 2. The reaction velocity for each ester alone is a max. in a 2% soln. Results with the mixt. lie between those obtained with the individuals. This would be expected on the basis of the intermediate compd. or adsorption theories. M. H. SOULE

The imitation of chromosomes with sodium silicate and alcohol. A. L. HERRERA. *Protoplasma* **11**, 168–74(1930).—A summary of H's. expts. M. H. SOULE

Refutation of the Schutz law and its analogous equations in the kinetics of enzymes. KENZO NAKAJIMA. *J. Faculty Agr. Hokkaido Imp. Univ.* **28**, 329–56(1930).—By a study of published data N. concludes that the Schutz equation holds only for dil. pepsin soln. He gives the theoretical arguments against its general applicability.
J. J. WILLAMAN

The conditions of activation of washed zymin. II. A. A. STHEEMAN. *Proc. Acad. Sci. Amsterdam* **33**, 889–97(1930); cf. *C. A.* **23**, 4238, 5201.—Zymin inactivated by washing may be reactivated by the addn. of a H acceptor, such as methylene blue, a hexosediphosphate, and von Euler's "principle." These 3 are fully as potent as the boiled washings in acting as cozymase. If von Euler's principle is present in sufficient amt. it may replace the hexosediphosphate, because it contains org. phosphate. The principle loses its potency if its phosphate is removed by hydrolysis, or if its adenine group is desaminated. Probably the principle functions by virtue of these 2 groups.
J. J. WILLAMAN

The constitution of the soluble protein substances as reversible, dissociable component-systems (SØRENSEN) 2.

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B—METHODS AND APPARATUS

STANLEY R. BENEDICT

The determination of the surface area of the white rat. SAMUEL L. DIACK. *J. Nutrition* **3**, 289–96(1930); cf. *C. A.* **23**, 3939.—The rats were carefully tied to a board, chloroformed, dehaired with a BaS-NaOH mixt. and covered evenly with a soln. consisting of dried guncotton 4 g., castor oil 1.5 cc., turpentine 2.0 cc., EtOH (95%) 20 cc. and Et_2O 80 cc. The shrinkage of this covering was detd. experimentally as 3.7%. After drying, the film was cut in pieces and the area taken with a planimeter. Seventy rats were measured. The best results were obtained by using the formula $S = 7.47\ W^{2/3}$ for normal animals, and $S = 7.64\ W^{2/3}$ for starved and emaciated animals. C. R. F.

The urocarmine reaction. WM. R. FEARON AND ARTHUR G. THOMPSON. *Biochem. J.* **24**, 1371–8(1930).—The name "urocarmine" is given to a group of pigments obtained from the condensation of indoxyl with various phenols unsubstituted in the *p*-position. The urocarmine reaction accounts for many of the pigments obtained from urine which are insol. in $CHCl_3$. To carry out the reaction, treat 2 cc. urine with 2 drops of 0.1% $KClO_3$ soln. or of 3% H_2O_2, and then 10 cc. of colorless concd. HCl. Shake the mixt., let stand for a few min. and ext. first with $CHCl_3$ and then with AmOH. Most normal urines give a variable indigo-blue reaction, the pigment dissolving in the $CHCl_3$, but from time to time specimens will be found which display a reddish color not removed by $CHCl_3$, but sol. in AmOH. BENJAMIN HARROW

A study of the bile pigments in relation to the van den Bergh reaction. WILLIAM JAMES GRIFFITHS AND GEOFFREY KAYE. *Biochem. J.* **24**, 1400–7(1930).—Pure bilirubin when suspended in blood serum does not give a prompt direct van den Bergh reaction (v. d. B.). Serum contg. bilirubin does give the indirect reaction. Fresh bile contains a pigment which, when taken up in serum, yields a prompt direct reaction ("direct-reaction pigment" (d.-r. p.)) The d.-r. p. is not bilirubin. The d.-r. p. of bile is present in those icteric sera which give a direct v. d. B. BENJAMIN HARROW

Improved method for the determination of iodine in blood. HARRY A. A. AIKEN. *Biochem. J.* **24**, 1456–9(1930).—A modification of the method of Leitch and Henderson (*C. A.* **21**, 2339). BENJAMIN HARROW

Apparatus for measuring catalase activity in plant and animal tissues. H. H. BUNZELL. *Science* **72**, 505–6(1930).—The app. described is similar to an enlarged Warburg respirometer, but useful only for megascopic measurements. From the rate of evolution of O, the activity of the enzyme is established, the unit of catalase being the amt. which will liberate 10^{-6} g. O per g. of tissue in 5 min. W. D. LANGLEY

A technic to facilitate reading of Kahn results in hemolyzed, highly tinted and cloudy sera, and in sera of doubtful reaction. B. S. LEVINE. *J. Lab. Clin. Med.* **16**, 310–11 (1930); cf. *C. A.* **24**, 5777. B. S. LEVINE

Comparative determination of nitrogen of tissues and organic fluids from various experimental conditions by the methods of Kjeldahl and Dumas. A. DI FRISCO. *Arch. Intern. Physiol.* **33**, 137–41(1930).—See *C. A.* **24**, 4067. C. M. MCCAY

Lipemia. II. The determination of the phospholipemia by sulfochromic oxidation;

Bloor's method. RICARDO B. ESQUIVEL AND GUILLERMO M. GRAMAJO. *Semana méd.* (Buenos Aires) 1930, II, 1683–5; cf. *C. A.* **24**, 1133.—The method is described. The results agree with those obtained by the method of Whitehorn. A. E. MEYER

The determination of urea in the blood filtrate of Folin-Wu. NORBERTO E. INSUA. *Semana méd.* (Buenos Aires) 1930, II, 1736–40.—The urea is detd. in 5 cc. of Folin-Wu filtrate by the hypobromite method in the app. of Van Slyke at a pressure of 50 mm. Hg. A. E. MEYER

Mill for small samples (COOK, *et al.*) 1.

CLOGNE, RENÉ: **Guide pratique d'analyses pour l'urine, le sang, le suc gastrique, les matières fécales, etc.** Paris: Le François. 472 pp. F. 32.

KRAFT, ERNST: **Analytisches Diagnostikum: Die chemischen, mikroskopischen und bakteriologischen Untersuchungsmethoden von Harn, Auswurf, Magensaft, Blut, Kot, u. s. w.** Ein Handbuch zum Gebrauch für Ärzte, Apotheker. Chemiker und Studierende. 4th ed. Leipzig: Johann Ambrosius Barth. 464 pp. M. 22.

Fixing solutions for histological purposes. WALTER SCHILLER. Austrian 119,237, Apr. 15, 1930. The solns. comprise a uranyl salt and a neutral salt or salts retarding shrinking or swelling of the tissues, with or without $HgCl_2$. A suitable soln. comprises $K_2Cr_2O_7$ 2, $Mg(OAc)_2$ 1, $HgCl_2$ 0.06, and uranyl acetate 0.08 dissolved in distd. water to 100 g.

Apparatus for the electrolytic treatment of the blood. EPHRAIM NORTHCOTT AND JAMES WALLACE WARFORD. Ger. 506,665, Mar. 20, 1927.

C—BACTERIOLOGY

CHARLES B. MORREY

Prodigiosin, the red dye of Serratia marcescens (B. prodigiosus). FRITZ WREDE. *Z. Hyg. Infektionskrankh.* **111**, 531–5(1930); cf. *C. A.* **24**, 4318.—*S. marcescens* organisms from 4–5 day cultures were shaken with 10% NaOH, and then with alc. and petr. ether. The ether layer was washed with alc. and H_2O and finally filtered and evapd. to a small vol. The cryst. HCl salt was prepd. by passing in dry HCl. The cryst. perchlorate, $C_{20}H_{26}N_3O \cdot HClO_4$, sintering 226°, m. 228°, was prepd. from the HCl salt with 5% $HClO_4$. The perchlorate (1 g.) treated with 10% NaOH until a golden-brown color was converted into free prodigiosin which was extd. with $CHCl_3$. It was a brittle solid without definite m. p., sintering 70–80°, picrate m. 176°, salicylate m. 178°, and benzoate m. 170°. RACHEL BROWN

The mechanism of the bactericidal action of ultra-violet rays. OTFRID EHRISMANN. *Z. Hyg. Infektionskrankh.* **111**, 618–43(1930).—The exposure to ultra-violet light of physiol. saline suspensions of bacteria causes a clearing. This clearing is conditioned by the passing into soln. of the cell substance, recognized by the decrease in vol. of the suspended particles, and by the appearance of N-contg. compds. in the surrounding fluid. The different bacteria tested can be arranged in a series according to their sensitiveness. An accelerated chem. decompn. of the bacterial proteins into amino acids under the influence of ultra-violet rays cannot be recognized. Increase in temp., displacement of p_H to the acid point, addn. of HCHO or $HgCl_2$ inhibit the clearing. The following cations inhibit the action in the order indicated: $La^{++} > Ca^{++} > Ba^{++} > Sr^{++} > Mg^{++} > Na^+, Li^+, K^+$. RACHEL BROWN

Bacteriophage, a central biological problem. C. J. SCHUURMANN. *Kolloid-Z.* **53**, 231–9(1930).—The physicochem. and biological data on bacteriophage are reviewed. ARTHUR FLEISCHER

Oxidation-reduction studies in relation to bacterial growth. III. The positive limit of oxidation-reduction potential required for the germination of Cl. tetani spores in vitro. BERT C. J. G. KNIGHT AND PAUL FILDES. *Biochem. J.* **24**, 1496–1502(1930); cf. *C. A.* **25**, 128.—The spores were subjected to different potential levels. Germination was completely inhibited at potentials more pos. than E_h + 0.11 v. (p_H 7.0–7.65). BENJAMIN HARROW

Pyruvic acid in bacterial metabolism, with an account of the methods used for the detection and determination of pyruvic acid. ROBERT P. COOK. *Biochem. J.* **24**, 1526–37(1930).—The method of detn. depends on the bisulfite-binding capacity of pyruvic acid. The acid is produced by the aerobic oxidation of *E. coli*. It is not decarboxylated by *E. coli*, but is broken down into a mixt. of formic and acetic acids. B. H.

Comparison of the dehydrogenations produced by E. coli in the presence of oxygen and methylene blue. ROBERT PERCIVAL COOK. *Biochem. J.* **24**, 1538–50(1930).—For formate and lactate the velocities of oxidation by methylene blue and O for the lower

temps. were nearly equal. In the dehydrogenation of succinate there is considerable difference between the velocities of oxidation by O and by methylene blue. B. H.

Oxidation-reduction potentials of pneumococcus cultures. I. LESLIE F. HEWITT. *Biochem. J.* **24**, 1551–6(1930).—The oxidation-reduction potential-time curves obtained with pneumococci are generally similar to those obtained with hemolytic streptococci, but differ from those obtained with diphtheria bacilli and staphylococci.
BENJAMIN HARROW

The oxidation of oxalates by bacteria. RUDOLF SCHOLDER AND CARL F. LINSTRÖM. *Ber.* **63B**, 2730–7(1930).—Alk. oxalates (0.01 *N*) change to bicarbonates by action with the O of the air, if bacteria are present. The reaction is more rapid in air than in O. Acids prevent the action. Suspensions of some heavy metals and alk. earth oxalates show a similar change in a longer time. $MeC_2O_4 + O = MeCO_3 + CO_2$. Cu, Hg, Ag and Ni oxalates are bactericidal and form no CO_2. MARY E. LEAR

Studies of pneumococci. III. The effect of chemicals on pneumococci. 1. Experiments in vivo. Y. MAEJI. *Acta Schol. Med. Univ. Imp. Kioto* **12**, 405–13(1930).—The chemotherapeutic effects of the following drugs were tested: (I) Quinine derivs.; (1) optochine-HCl; (2) remijine-HCl; (3) quinine-HCl; (4) eucupine-di-HCl; (5) vuzine-di-HCl. (II) Acridine derivs; (1) trypaflavine. (III) Hexamethylenetetramine. Twenty-three series of expts. were carried out on mice. The animals were given intraperitoneal injections of pneumococci type I, II, and III, which were followed in 3 hrs. by subcutaneous injection of 0.1 cc. of 2% soln. of each of the drugs. Results were judged by survival of the animals. Optochine-HCl proved impotent in both protective and therapeutic respects. Remijine-HCl possessed some effect as compared with optochine-HCl. Quinine-HCl was impotent in both respects. Eucupine-HCl showed only a slight therapeutic or protective effect. Vuzine-di-HCl possessed a slight chemotherapeutic but no protective effect. Trypaflavine was devoid of any beneficial effect. Hexamethylenetetramine possessed a noteworthy beneficial effect only when injected immediately after, or prior to, the inoculation. **2. Experiments in vitro.** *Ibid* 415–23.—The same chemicals were studied as in the *in vivo* expts. A drop of a serum-bouillon culture of virulent pneumococci was introduced into 2 cc. of serum-bouillon (of p_H 7.3 to 7.4) contg. different concns. of the chemicals. The tubes contg. the culture and chemicals were shaken and incubated at 37° for 24 hrs. Observation was then made macroscopically for turbidity and after plating a fraction upon blood agar. Bacteriolytic action was shown by optochine-HCl in dilns. of 1:8000 to 1:10000, by remijine-HCl in 1:8000 to 1:10000; by quinine-HCl in 1:2000 to 1:4000; by eucupine-HCl 1:20000 to 1:40000; by vuzine-di-HCl in 1:30000 to 1:60000; by trypaflavine in 1:100000; by hexamethylenetetramine in 1:1000 to 1:2000. A more prolonged action of optochine and remijine upon the pneumococcus culture increases the resistance of the latter to the chemicals and renders it insol. in bile and less virulent to mice. As a result of the action of optochine and remijine, pneumococci of types I and II develop a staphylococcus-like growth upon blood agar, which is not observed with type III. Pneumococci grown for 30 culture generations on media contg. optochine and remijine suffer a reduction in their agglutinability by corresponding immune serums. However, the culture generation thus obtained is still able to produce agglutinating serums which possess the same specificity as serums obtained with normal cultures. The agglutinating effect of such serums upon normal cultures is more pronounced than upon those grown in the presence of the chemicals. B. S. LEVINE

The question of the aerobic digestive processes of Shiga-Kruse-Ruhr bacilli. HERMANN HORSTER. *Zentr. Bakt. Parasitenk.*, 1 Abt., **118**, 283–97(1930).—N-, C-, S- and P-contg. salts are absolutely necessary for the multiplication of the NH_3-assimilating Shiga-Kruse-Ruhr bacillus. Mg salts while not essential are conducive to growth. Salts of asparaginic and glutaminic acids are not superior to NH_4Cl as sources of N. They will not serve as a source of both C and N, but only for N in the presence of a suitable source of C. Na lactate is a better source of C than is glucose under aerobic conditions. The acid produced from the latter quickly kills the cultures. Sulfate is necessary for the Shiga-Kruse-Ruhr bacillus but not for paratyphoid B and coli. The Shiga bacillus will grow in a variety of synthetic media if the p_H is between 5.7 and 7.7. The organism can adapt itself to unfavorable conditions as to acid or alkali if not excessive. The C metabolism of the Shiga bacillus has narrower limits than has paratyphoid B or coli, in that there are fewer suitable sources of C. A medium contg. a mixt. of amino acids (Na asparaginate, Na glutaminate, glycylglycine, proline and cystine) as sources of N, and Na lactate or glucose as a source of C is especially useful for the Shiga bacillus. JOHN T. MYERS

The Gram selective action of dye-containing culture media. Changes with the

addition of serum. W. HAUPTMAN. *Zentr. Bakt. Parasitenk.*, 1 Abt., **118**, 373–88 (1930).—Crystal violet inhibits Gram pos. organisms 2500 times more actively than it does Gram neg. ones; fuchsin and Nile blue sulfate were 200–500 times as active. The addn. of ox serum decreased the activity of fuchsin, Nile blue sulfate and crystal violet about one fifth. This may be due to a decrease in diffusion of the dye caused by a decrease in the degree of dispersion. JOHN T. MYERS

Bacillus jordaniformis and its hemotoxin. ALFRED WALD. *Zentr. Bakt. Parasitenk.*, 1 Abt., **118**, 406–10(1930).—*B. jordaniformis* produced a hemolysin which is a true toxin for which an antilysin can be prepd. JOHN T. MYERS

The influence of various salts on the activity, filterability and adsorbability of bacteriophage suspensions. E. KLEINEBERGER. *Zentr. Bakt. Parasitenk.*, 1 Abt., **118**, 411–22(1930).—Bimolar solns. of a variety of salts had no effect on the activity of lysates, while *M*/16 to *M*/32 solns. markedly decreased it. Strong solns. apparently exert a protective action. The weakening effect of the dil. solns. can be counteracted by protective colloids. Salts decrease filterability as do weak acids while weak alkalies do not. Kaolin and other materials will adsorb phage in dil. salt solns. but not in distd. water. JOHN T. MYERS

Remarks on the article of Krichevskii on the mechanism of the action of bismuth compounds on spirochetes. A. P. UHLENHUTH AND W. SEIFFERT. *Zentr. Bakt. Parasitenk.*, 1 Abt., **118**, 422–5(1930).—There is evidence that Bi salts have a direct action on spirochetes rather than an indirect action through the reticulo-endothelial system. Cf. *C. A.* **24**, 5872. JOHN T. MYERS

Reactions relating to carbohydrates and polysaccharides. XXXIII. Synthesis of polysaccharides by bacteria and enzymes. F. C. HARRISON, H. L. A. TARR AND HAROLD HIBBERT. *Can. J. Research* **3**, 449–63(1930); cf. *C. A.* **25**, 498.—*B. mesentericus* and *B. subtilis* were found to produce levan only from sucrose and raffinose and not from melezitose, lactose, maltose, xylose, glucose or fructose. The chem. structure of levan was found to be a polymer of 2,6-anhydrofructo-furanose and both sucrose and raffinose contain the fructo-furanose residue in their mols. as a terminal group. An enzyme prepn. from *B. mesentericus* was found to produce a similar synthesis of levan from sugars contg. a terminal fructo-furanose group. It was not found possible, however, to obtain a product which in small quantities would bring about the synthesis of relatively large quantities of levan from sucrose solns. J. W. SHIPLEY

Vessel for breeding bacteria cultures. F. & M. LAUTENSCHLÄGER G. M. B. H. Ger. 508,597, Jan. 30, 1930.

Bacteria culture heating device. F. &. M. LAUTENSCHLÄGER G. M. B. H. Ger. 508,596, Jan. 29, 1930.

D—BOTANY

THOMAS G. PHILLIPS

The **origin of chlorophyll and its relation to the blood pigment. II.** KURT NOACK AND WILHELM KIESSLING. *Z. physiol. Chem.* **193**, 97–137(1930); cf. *C. A.* **23**, 3249.—Crude protochlorophyll was obtained by extg. the hulls of germinated pumpkin seeds with H_2O, extg the Et_2O soln. with 18% HCl, neutralizing with Na_2CO_3 and extg. this soln with Et_2O. The product is obviously a mixt. due to a partial splitting off of phytol by the HCl, but the MeO group is still present. It resembles the phytol-free substance obtained by reduction of chlorophyll a. Protochlorophyll is, however, a phytol ester, since it is converted into chlorophyll by the living cells under the influence of light. Treatment with MeOH contg. 30% HCl converts the crude product into a blued. violet trimethyl ester, m. 233°. The same ester is obtained by reduction and esterification of methylpheophorbide a, and is designated *protophytochlorin trimethyl ester*. Protochlorophyll is therefore a deriv. of a tricarboxylic acid. Sapon. of the tri ester with dil. alkali gives a mono ester sol. in Na_2HPO_4, but unstable because of a strong tendency to form an anhydride. The resistant MeO corresponds to that of chlorophyll which is not split off by chlorophyllase. The mono ester is therefore a protopheophorbide. Direct sapon. of crude pheophytin yields an anhydro product from which the protopheophorbide is obtained by treatment with very dil. alkali. Reduction of methylpheophorbide a with Fe and 80% CH_2O_2 gives *methylprotopheophorbide* by removal of 1 O. Under the same treatment the b isomer is much less stable and yields only brown substances. In the reduction of chlorophyll a, or a + b, by Fe and CH_2O_2, the phytol is completely split off even at 0–5°. An alkali-insol. substance is formed which gives the protopheophytin spectrum. Chlorophyll b does not undergo reduction in the cold but its basicity changes. The transformation of chlorophyll into

porphyrin consists essentially in the removal of 1 O; whether or not H substitution occurs is not known. Phylloerythrin, the porphyrin derived from chlorophyll and present in beef bile, is an acid anhydride which is very sensitive to alkalies but stable to acids. Alkali treatment converts it into a free acid with a spectrum quite different from that of phylloerythrin. It is probably a tricarboxylic acid in which $1CO_2H$ is present in lactone or lactam linkage. It forms a trimethyl ester, m. 230–2°, which resembles the phytochlorin trimethyl ester in several points but shows a displacement of all 4 absorption bands. Treatment of phylloerythrin with MeOH-HCl apparently esterifies 2 CO_2H, one of which is then split off with its ester group. The product is a mono ester or a mixt. of mono and di ester according to the concn. of HCl used. Dil. alkali converts the mono ester into an alkali-sol. substance without loss of MeO. At the same time the acid no. increases to 6, hence a new CO_2H has been formed in addn. to the opening of the lactone ring. Treatment of this acid with CH_2N_2 yields a trimethyl ester, m. 205°. The intramolecular anhydride grouping of phylloerythrin corresponds to the 2 esterified carboxyls of chlorophyll, and the assumed lactam or lactone group is common to both phylloerythrin and chlorophyll. The spectral displacement between phylloerythrin and the protopheophytin series is of fundamental character, yet the transition may be effected by HI reduction. The 2 spectral types probably represent 2 isomeric groups of pigments. A. W. Dox

Chemistry of the products of Cocos nucifera. I. Juan P. C. Chandrasena. *Biochem. J.* **24**, 1493–5(1930).—The percentage of water in the kernel of the coconut palm diminishes with age. The oil content at the latest stage may be less than or equal to that at the preceding stage. The quantity of "residue" (mainly cellulose) varies slightly during all the stages of development. The quantity of pentosans is usually the same and is low. Benjamin Harrow

Macdougal, D. T.: **The Green Leaf; The Major Activities of Plants in Sunlight.** New York: D. Appleton & Co. 141 pp. 6 s. net.

Rosenthaler, L.: **The Chemical Investigation of Plants.** Translated by Sudhamoy Ghosh. London: G. Bell & Sons, Ltd. 12 s. 6 d. Reviewed in *Intern. Sugar J.* **32**, 635(1930).

E—NUTRITION

PHILIP B. HAWK

The conception of nutrition values and their determination. Holger Möllgaard. *Tierernähr.* **1**, No. 1, 44–64(1929).—In all cases in which an animal's work parallels in some degree its protein synthesis, and especially when such a synthesis is a necessary hypothesis for the phenomenon of the total work, a clear definition for nutrition value for a single food is impossible. Such a definition could apply only for a mixed food which has fixed nutritive proportions between the different amino acids and the N-contg. and N-free nutrients. If slight errors are disregarded, the nutrition value can best be defined when based on fat production. Another means of defining the nutrition value of fodder would be by utilizing its power of milk formation and growth production. Russell C. Erb

Influence of various concentrates on egg production. H. L. Kempster. Missouri Agr. Expt. Sta., *Bull.* **288**, 3–20(1930); cf. *C. A.* **24**, 2777.—White Leghorn pullets and hens were used in feeding expts. over a period of about 5 yrs. Dried milk, meat scrap, tankage and fish meal rank in the order named with reference to influencing egg production. Cottonseed meal, when supplemented with bone meal or rock phosphate and salt, produced satisfactory egg yields though the eggs did not possess as good keeping qualities as did the eggs from hens fed other rations. Soybean meal when properly supplemented with minerals proved an excellent protein supplement. The extra eggs laid by the hens fed dried buttermilk did not pay for the cost of the ration as compared to the lot fed meat scrap. C. R. Fellers

Recent advances in the study of basal metabolism. Eugene F. Du Bois. *J. Nutrition* **3**, 217–28, 331–43(1930).—A very extensive and crit. editorial review with bibliography. C. R. Fellers

Iron requirement in early childhood. Mary Swartz Rose, Ella McC. Vahlteich, Elda Robb and Emily M. Bloomfield. *J. Nutrition* **3**, 229–35(1930).—A girl aged 31 months was used as a subject in an 11-day test. The diet consisted of milk, cereal, orange powder, toast and pea, potato or prune pulp, all specially prepd. so as to avoid Fe contamination. The av. daily intake of Fe was 4.64 mg.; the av. daily output was 5.74, thus giving a neg. balance of 1.10. Sherman's tables give 30% higher Fe content in the foods consumed than were found by lab. analysis. Conclu-

sion: Though the subject was fed an av. normal diet, the intake of Fe was insufficient for all the body needs. The hemoglobin balance was above the av. for supposedly normal children of this age. The intake of Cu was about 1/5 that of the Fe, an amt. considered sufficient for normal needs. C. R. FELLERS

Basal metabolism of Filipinos. MARIANO OCAMPO, NARCISO CORDERO AND ISABELO CONCEPCION. *J. Nutrition* 3, 237–44(1930); cf. *C. A.* 24, 1891.—Observations were made on 104 healthy subjects between 20 and 30 yrs. of age during the cool season. A Benedict-Roth respiration metabolimeter was used for taking all of the measurements. The tests were performed in the morning about 12 hrs. after the last meal and following 1 hr. of complete relaxation. The metabolism of 2 subjects was taken in the U. S. during the winter for the sake of comparison. The 88 men showed metabolism measurements —7.8% lower than the Aub-DuBois standards; for 16 women, the metabolism value was —9.3%. The 2 expts. conducted in the U. S. on Filipinos gave very similar values, indicating that climate exerted very little difference in metabolism expts. The bearing of the results on the question of racial and climatic factors is discussed. C. R. FELLERS

Chemical and immunological study of egg protein obtained under restricted diets. J. GERBER AND R. H. CARR. *J. Nutrition* 3, 245–56(1930).—Pigeons were kept under controlled conditions with rations limited to a single grain, supplemented with grit, oyster shell, charcoal, salt and tap water for 150 days. Representative eggs were subjected to a modified Van Slyke procedure for the detn. of N distribution and showed differences in the make-up of the proteins. Ammonia N showed the largest deviations represented by 4.75% of the total N for "rye" eggs and 8.40 for % for "barley" egg protein. The total N content of the egg substance was fairly const. showing only slight abs. differences. Monoamino N was higher in the eggs obtained from the feeding of hemp, soy beans and wheat while "kafir" eggs showed a higher diamino N content. Corn and kafir yielded eggs with the highest non-amino N in the basic fraction. Anaphylactic shock was produced in albino rats and guinea pigs through which means quant. differences were indicated in immunological relationships between the egg proteins from various sources suggesting dissimilar chem. combination. The importance of the protein present in the egg in the development of the embryo was shown by incubation expts. Initial progress, shown by a series of photomicrographs, implies a beneficence of the proteins supplied to the egg by hemp, soy beans and wheat, whereas corn and oat embryos developed much more slowly, indicating a poorer-quality protein. C. R. FELLERS

Vitamin B and G contents of certain yeast samples. E. J. QUINN, F. B. WHALEN AND J. G. HARTLEY. *J. Nutrition* 3, 257–63(1930).—With albino rats at the weaning age, quant. tests for vitamins B and G in 5 samples of American or Canadian yeast showed the concn. of vitamin B varied considerably, at least 10-fold, in the different samples, while the vitamin G content was very uniform. Of the 2 vitamins, the antineuritic vitamin was the limiting factor in the 2 samples of brewer's yeast examd. C. R. FELLERS

Study of the absorption and retention of vitamin A in young children. JENNIE I. ROTHSTREE. *J. Nutrition* 3, 265–87(1930).—Four normal and 4 diabetic children and infants, 2–8 months old, were used in this expt. Normal diets of milk, orange juice and cod liver oil were used for the infants while the children received daily 1 g. of protein per lb. of body wt., 150 g. of vegetables and 60 g. of fat (except the diabetics who received 116–150 g. of fat). The feces and urine were collected, extd. with EtOH and petr. ether, and fed to rats suffering from xerophthalmia. Preliminary trials with the *$SbCl_3$ colorimetric test for vitamin A* showed the tests to be non-specific, and the biol. method of assay was resorted to. Even when fed generous amts., vitamin A was not excreted in the urine, and if there is a limit to the capacity to store vitamin A, it is not indicated by alimentary vitaminuria. Marked fecal loss of vitamin A always occurred, the loss varying from 2 to 12% of the intake. The largest losses corresponded to the largest intakes; similarly, the greatest retention occurred with the greatest intakes. The vitamin A of cod-liver oil and egg yolk were equally well utilized by the children. Results were inconclusive with vitamin A from carrots. C. R. FELLERS

Glycogen formation in rats. II. Diets containing approximately eighty-seven per cent of the total caloric value in the form of sucrose, lard and casein, respectively. ESTHER M. GREISHEIMER AND OLGA H. JOHNSON. *J. Nutrition* 3, 297–302(1930); cf. *C. A.* 24, 5803; 25, 132.—When 87% of the cals. was fed in the form of sucrose, lard or casein, abs. liver wts. did not vary appreciably. Liver glycogen was significantly higher on the high sucrose and lower on the lard and casein diets than on the control diet. Glycogen was not readily formed on the high lard diet. A close relationship

was noted between the last 12-hr. food intake in g. and the liver glycogen content on the stock diet (McCollom's No. 1). If it is assumed that the stock diet possesses an efficiency of 1, the values for sucrose, casein and fat are, resp., 1.85, 0.61 and 0.44.
C. R. FELLERS

Meat in nutrition. I. Preliminary report on beef muscle. P. MABEL NELSON, MARGARET H. IRWIN AND LOUISE J. PEET. *J. Nutrition* 3, 303–11(1930); cf. *C. A.* 24, 5056, 5340.—Excellent growth and reproduction were secured in rats consuming a meat ration supposedly well fortified with the necessary vitamins and mineral matter and having lean muscle beef as the main protein constituent. Lactation difficulties, cannibalism and hair-ball formation were numerous, however, and the meat ration failed to meet the needs of the mother rats during the critical period of lactation. Early senility was also evident. The addn. of yeast, salt mixt. or increased protein failed to improve the results. **II. Some dietary factors influencing lactation.** LOUISE JENISON PEET, P. MABEL NELSON AND ERMA A. SMITH. *Ibid* 313–23.—If a well-balanced, modified, synthetic ration, contg. pressure-cooked lean beef round as the chief source of protein is used as a diet, reproduction and lactation responses in rats were observed through 3 generations. Dietary modifications were added to the basal diet during pregnancy and throughout lactation. All the diets, except the basal, enabled the mothers to bear litters at the normal age of 3 months. There was a tendency of the high meat diets to delay the onset of pregnancy. The diets modified by the addns. of tikitiki and wheat germ oil and the control basal diet were least efficient in maintaining the wt. of the mothers during lactation. Mothers on the increased meat diet plus 15% autoclaved yeast weaned the largest % of the young born in the 3 generations. **III. Hemoglobin formation.** *Ibid* 325–30.—Detns. were made of the hemoglobin concn. of the blood of 82 young rats from the second and third generations of rats fed a modified synthetic diet in which lean beef muscle was the chief source of protein. To this diet during the suckling period were added certain modifications recommended as valuable for promoting successful lactation. The diets which contained, during the suckling period, an increased % of autoclaved yeast, yeast, tikitiki, lemon juice or wheat germ oil, led to significantly greater hemoglobin formation in the young than diets contg. increased protein.
C. R. FELLERS

The preparation of an activated substance from crude coffee. L. v. NOEL AND F DANNMEYER. *Strahlentherapie* 38, 583-90(1930); cf. *C. A.* 24, 4808.—The present study shows that a purified substance was obtained from crude coffee which, although biologically active, is not activated ergosterol. Various brands of coffee were not active rachitically and the authors agree that the findings published in their preliminary report have not been confirmed. They still maintain, however, that freshly obtained coffee contains vitamin D. Further work in this respect is being carried on. F. R. G

Avitaminosis B in relation to tumor growth. ESMÉ GILROY. *Biochem. J.* 24, 1384–9(1930).—The general debility induced by a vitamin-B-deficient diet is accompanied by a reduction in the rate of tumor growth. Growth is unaffected if the health of the host is not impaired. It is suggested that the high arginine content of foods rich in vitamin B accounts for the fact that diets rich in vitamin B stimulate tumor growth.
BENJAMIN HARROW

Studies on the metabolism of animals on a carbohydrate-free diet. I. The distribution of glycogen and fat in the liver of animals fed on a carbohydrate-free diet. ALEXANDER HYND AND DOROTHY LILLIE ROTTER. *Biochem. J.* 24, 1390–9(1930). In rats on a carbohydrate-free diet, the blood sugar tends to be high, there is no change in the muscle glycogen but a large increase in the liver-fat content, and the liver glycogen is reduced to half that on a carbohydrate diet. With mice similar results are obtained, but with kittens only slight differences are detected. The fasting of rats for a period of 12–24 hrs. causes a very rapid disappearance of the excess of fat from the liver, a slow fall in both muscle and liver glycogen, and a fall in blood sugar to the normal fasting level of 0.11 to 0.12%.
BENJAMIN HARROW

Vitamin B_2 content of cereals and the supposed connection between human pellagra and deficiency of this vitamin. WALLACE R. AYKROYD. *Biochem. J.* 24, 1479–88 (1930).—Since neither rice nor millet shows any superiority over maize as a source of vitamin B_2 (for method of estg. this vitamin, see Chick and Roscoe, *C. A.* 22, 4588), and since pellagra is almost invariably assocd. with the consumption of maize, "it is difficult to accept vitamin-B_2 deficiency as the sole cause of human pellagra." B. H

Question of the identity of a bacterial growth-promoting factor with vitamin B. JOHN G. DAVIS AND JOHN GOLDING. *Biochem. J.* 24, 1503–6(1930).—The bacterial test organism used was a lacto-bacillus requiring not only the intermediate products of protein degradation for good growth, but some factor present in all tissues contg.

vitamin B_1. The bacterial growth-stimulating substance and vitamin B are not identical. BENJAMIN HARROW

Irradiated ergosterol and calcium-free diet; effect of calcium and phosphorus metabolism. ELSIE WATCHORN. *Biochem. J.* **24**, 1560–3(1930).—The difference between the rats which received Ca and those which did not was the absence of any effect of large doses of irradiated ergosterol upon the P metabolism of the latter. B. H.

Manganese in relation to nutrition. MARION B. RICHARDS. *Biochem. J.* **24**, 1572–89(1930).—In lupine seeds there is a marked increase in total Mn as the seeds grow to maturity. Soil conditions have little to do with the Mn content of foodstuffs. There is a steady increase of Mn in the developing egg. The element is invariably present in the reproductive organs. "Mn may have an intimate relationship to the vital processes." BENJAMIN HARROW

The precise evaluation of light therapy in experimental rickets. JOHN W. M. BUNKER AND ROBERT S. HARRIS. *Am. J. Pub. Health* **20**, 1287–92(1930).—In precise evaluation of light therapy in exptl. rickets it is necessary to exercise meticulous care in standardizing all procedures in respect to breeding and care of animals. In the matter of diet, one factor which may be variable to a bothersome degree is the amt. of antirachitic factor in freshly ground yellow corn, which variable can be reduced by definite aging of the corn meal before use. In comparison of different light zones, the characteristics and limitations of selectively absorbing filters must be understood, and compensations therefor be introduced into the set-up. Numerous repetitions of each set of expts. with controls common to all compared conditions must be carried out. In the light of results obtained, it is felt that the rather general belief that the antirachitic effect of light in rickets prevention in white rats is confined to the zone of ultraviolet in the neighborhood of 3000 A. U. and that other parts of the spectrum from the Hg arc lamp are without contributory effect, is a belief that is not adequately supported by exptl. evidence. It is still a possibility that the future will show that radiations longer or shorter in wave length than those of the alleged "vital band" of ultraviolet may assist in the biochem. processes of rickets therapy. J. A. KENNEDY

Relationship in the hen between the development of ova, blood calcium, and the antirachitic factor. W. C. RUSSELL, C. H. HOWARD AND A. F. HESS. *Science* **72**, 506–7(1930).—Pullets which were maintained deficient in regard to vitamin D and sunlight were found to have undeveloped ova (less than 1 cm. diam.) and low blood Ca (less than 13.7 mg. per 100 cc.). Ingestion of irradiated ergosterol before and during the period of molting did not forestall the waning egg production. W. D. L.

Considerations leading to the view that pellagra is an iron-deficiency disease. SIDNEY BLISS. *Science* **72**, 577–8(1930).—Much evidence is reported from the literature on pellagra that the P-P factor or vitamin G is Fe. An attempt to prove this is being made. W. D. LANGLEY

Hemoglobin maintenance and production upon synthetic diets, including modifications in the ethyl xanthate and Biazzo methods for copper analysis. I. DAVID L. DRABKIN AND C. STANLEY WAGGONER. *J. Biol. Chem.* **89**, 51–75(1930).—"Rats which have become severely anemic upon a diet of whole milk showed a prompt and striking recovery of hemoglobin when changed to synthetic rations lower in Cu (on the basis of the quantity fed per day) than the milk. One of these hemoglobin regenerative diets was a basic incomplete ration in that no vitamins had been added to it and the salt ration used contained only NaCl and an Fe salt. The latter furnished the min. level of 0.2 mg. of Fe per rat per day. The same Fe salt added in the same quantity of milk did not stop the progressive anemia. Without the addn. of the Fe, however, the synthetic ration was inadequate for hemoglobin production under the conditions of the expts. Evidence was also obtained which indicates that rats which have had Cu in their ration are more resistant to the onset of milk anemia than rats which have been on a low Cu diet. This may have some bearing on the possibility that the effects of Cu described by Hart *et al.*, are not due to systemic action of the metal. On the basis of the above expts. the specificity of Cu in hemoglobin formation becomes questionable. In the controversy as to the unique importance of Cu in hemoglobin synthesis, min. quantities of Cu are of such moment that the method of detn. becomes of utmost importance. For this reason both the Biazzo and K Et xanthate methods for the detn. of Cu have been modified as both were found to be inaccurate in certain respects. Synthetic diets of the Karr-Cowgill type were found to be adequate in respect to hemoglobin maintenance when fed to dogs over periods ranging from 6 months to 4 yrs. Bibliography of 41 references. A. P. LOTHROP

Evidence for the presence of a third factor in the vitamin B complex of yeast. GEO Z. WILLIAMS AND ROBERT C. LEWIS. *J. Biol. Chem.* **89**, 275–88(1930).—Rats

were fed a basal diet deficient in all of the factors of vitamin B contained in yeast and to this diet were added whole yeast and various fractions of yeast for different groups of rats. In this way the growth curves produced by various fractions fed separately and various combinations of the fractions fed together were compared with those produced by feeding whole yeast. The prepns. employed were: an ext. contg. the thermolabile, antineuritic factor B_1, an ext. contg. the thermostable factor B_2 and the residue left after these 2 factors had been extd. from yeast. The residue was found to contain a growth-promoting principle necessary for the maintenance of normal growth of rats and qualitatively distinct from either factors B_1 or B_2 of the vitamin B complex. It is insol. in H_2O and alc. and is *thermostable*. This principle seems to be similar to the factor of Hunt (*C. A.* **23**, 417) and differs from all of the other third factors described in the literature [Williams and Waterman (*C. A.* **22**, 3907), Reader (*C. A.* **24**, 5801), Eddy, *et al.* (*C. A.* **24**, 4536), Coward, *et al.* (*C. A.* **24**, 4021)]. A. P. LOTHROP

The toxic effect of fish liver oils and the action of vitamin B. EARL R. NORRIS AND ANNA E. CHURCH. *J. Biol. Chem.* **89**, 437–49(1930).—Some cod-liver oils contain a toxic substance which produces symptoms similar to vitamin-B deficiency in rats even when the animals are receiving as high as 10% of yeast in their diets. This effect is not due to the excess of vitamins A and D in the oil and it can be counteracted by feeding 18% of yeast. Continued small doses of isoamylamine and of choline produce like symptoms which can be prevented or cured by added yeast. Both of these substances have been identified among the several nitrogenous bases which make up an av. of 0.2% of the oil. "The quant. detn. of vitamin A in cod-liver oil is influenced by the amt. of yeast in the basal diet, even when there is sufficient yeast to satisfy the vitamin-B requirement under some conditions. Detns. of vitamin B by methods of increase in rat wt., where a cod-liver oil of unknown toxicity is incorporated in the diet, cannot be compared." A. P. LOTHROP

Influence of the chemical composition of protein upon the elimination of unaccounted for forms of nitrogen. UGO LOMBROSO AND SALVATOR DI FRISCO. *Arch. Intern. Physiol.* **33**, 109–36(1930).—The N of the urine, feces and body deposits does not account for the intake. A series of diets with adequate protein, calories, inorg. elements and vitamin supplements was fed to rats Various proteins were employed including casein, egg albumin and gluten. The urine and feces were sepd. and their N contents detd. separately by the Kjeldahl method. They were preserved in acid. The excreted and stored N failed to account for that ingested by amts. varying 0–16% in gluten-starch diets and from values of 2–23% for casein diets. The greatest discrepancy of nearly $^1/_3$ the ingested N was found for a gluten diet. C. M. MCCAY

The vitamins and the refining of olive oil. L. MARGAILLAN. *Compt. rend.* **191**, 725–7(1930).—A comparison of the growth-promoting properties of virgin and refined olive oil shows that the refining processes destroy most of the vitamins of the raw product. Vitamin A suffers the most injury from refining and more than $^4/_5$ of it is destroyed. C. M. MCCAY

Is it possible to produce experimental rickets in the guinea pig? MME. L. RANDOIN AND R. LECOQ. *Compt. rend.* **191**, 732–4(1930).—A basal diet of meat peptone 17, dry yeast 3, butter fat 5.5, corn starch 64, NaCl 1.5, filter paper 2 was fed to 4 groups of guinea pigs. Attempts were made to produce rickets in the various groups by supplementing the basal diet with Ca lactate, leaving the P low or with phosphates with little Ca. Scurvy was prevented by feeding each animal 2 cc. of lemon juice daily. The typical lesions of rickets were not produced. The animals were very sensitive to the unequal intakes of Ca and P and usually died suddenly. Vitamin D was of no value in preventing these developments that produced death. C. M. MCCAY

Effect of a diet of sweet clover on the calcium in the blood serum. C. Y. CANNON AND DELBERT GREENWOOD. *J. Dairy Sci.* **13**, 424–31(1930).—Certain physiol. differences obtained by feeding young rabbits the diets indicated are summarized as follows: (1) There was a decrease in serum Ca of young rabbits fed on an exclusive diet of sweet clover meal with distd. H_2O, while it remained fairly const. with rabbits fed alfalfa meal with distd. H_2O or a mixed diet of alfalfa meal, oats, cabbage or lettuce. When the alfalfa diet was resumed the serum Ca returned to normal. (2) Expts. indicate that the decline in serum Ca is linked with failure of blood to clot. (3) It is suggested that loss of serum Ca may raise the surface tension of the blood such that the blood platelets would fail to rupture, thus interfering with the formation of thrombin. (4) All 3 diets support regular growth. N. M. NAYLOR

Calcium and phosphorus metabolism of heavily milking cows. C. F. HUFFMAN, C. S. ROBINSON AND O. B. WINTER. *J. Dairy Sci.* **13**, 432–48(1930).—The expts. reported are part of an extensive study of the effects of different Ca and P levels and

different mineral supplements on the growth, health, reproduction and milk production of young dairy cattle. It was shown that pos. Ca and P balances of heavily milking cows could be maintained on a diet of alfalfa, silage and grain or of timothy hay, silage and grain supplemented by bone flour. There was a tendency to utilize Ca and P more efficiently during high production of milk than during low production or when dry. The total intake of Ca or P has greater significance in utilization than has the Ca/P ratio in the food. N. M. NAYLOR

Fat-soluble vitamins. XXXI. Butter fat: its antirachitic properties and its artificial activation. H. STEENBOCK, ALICE M. WIRICK AND BLANCHE M. RIISING. *J. Dairy Sci.* **13**, 497–521(1930); cf. *C. A.* **24**, 5807.—A complete series of studies with exptl. rats is described in which comparisons are made of methods of testing the antirachitic potency of butter fat and in which the effect of irradiation of butter fat is detd. The following conclusions are made: (1) It was found that a quant. prophylactic method based on the percentage of bone ash was more accurate in the detn. of antirachitic potency than the curative method. (2) June butter fat was found to be low in vitamin D but contained constituents readily activatable by ultra-violet radiations. (3) The optimum irradiation was obtained in 10 min. exposure at a depth of 0.16 cm. of fat. Exposure for 16 hrs. destroyed the activation originally induced. (4) Irradiation is stable to storage. (5) Introduction of irradiated ergosterol in butter fat is practicable. N. M. NAYLOR

Observation on the vitamin activity and the amylolytic activity of cereal grains and various products derived therefrom. M. JAVILLIER, D. DJELATIDÈS AND (MISS) AL. CRÉMIEU. *Bull. soc. hyg. aliment.* **18**, 344-6(1930).—Examn. of 5 com. products, 3 of which were claimed to be rich in vitamins while the 2 others could be reasonably expected from their compn. to contain vitamins (at least B), showed that none of them contained any vitamin A or B in appreciable quantities. Four of the products (the 5th was not tested) were found to have a high amylolytic activity. On the other hand, the germs of wheat and other cereals, with or without removal of the oil, were found to have a good vitamin activity, but a relatively small amylolytic activity. A. P.-C.

Sulfur metabolism. L. LEMATTE. *Bull mém. soc. méd. Paris* **1930**, 105; *Bull. soc. hyg. aliment.* **18**, 354(1930).—S does not seem to possess any functional specificity and is found in the following proportions in the organs of man (the 1st figure is the total wt. and the 2nd the wt. of S in g.): skeleton 16,341, 14.580; muscles 24,872, 44.769; cerebellum 1232, 1.293, brain 163, 0.110; liver 1500, 2.313; spleen 194, 0.264; thyroid 25, 0.052, kidneys 355, 0.489; lungs 1200, 1.980; heart 314, 0.299; blood 5110, 6.392, undetd. 5805, 10.449. The S:N ratio in the active living matter is about 1:18, varying from 1:20 in the heart to 1:12 in the liver. Food normally supplies 1.235 g. of S, of which 1.16 is found in the urine and 0.075 in the feces. A. PAPINEAU-COUTURE

Does exclusive consumption of milk always produce anemia in rats? (MRS.) L. RANDOIN AND R. LECOQ. *Bull. soc. thérap* [11], **35**, 46(1930); *Bull. soc. hyg. aliment.* **18**, 355 (C. -Nutritional anemia, caused by the use of milk, either alone or in conjunction with amylaceous foods, has been reproduced experimentally on a large no. of animals, more particularly the rat. Recent investigations have shown that deficiency of Cu was responsible even more than deficiency of Fe. As com. dried and condensed milks are enriched in Cu in the course of the mfg. processes to which they are subjected, it was to be expected that they would not produce anemia. This was confirmed by expts. lasting 5 months, based on the development of the rats and the detn. of hemoglobin in the blood. A. PAPINEAU-COUTURE

Biological analysis of city milk and sweetened condensed milk from the standpoint of their antiscorbutic values. (MRS.) L. RANDOIN AND R. LECOQ. *Bull. soc. thérap.* [11], **35**, 49(1930); *Bull. soc. hyg. aliment.* **18**, 356(1930).—It is generally believed that city milk and sweetened condensed milk still possess their natural antiscorbutic values. Expts. by R. and L. have shown that this is not so, and that consequently it is advisable always to add a little fresh fruit juice to the food of city children which are brought up exclusively on such milks. A. PAPINEAU-COUTURE

Biological properties of the theosterols of the cacao bean. HENRI LABBÉ, F. HEIM DE BALSAC AND R. LERAT. *Bull. soc. thérap.* [11], **35**, 71(1930); *Bull. soc. hyg. aliment.* **18**, [illegible]; cf. *C. A.* **24**, 982.—Cacao bean butter contains 0.6–0.8% unsaponifiable matter and cac[illegible] were named α- and β-theosterols, one m. 115° and the other 134°, and having different phys. and chem. properties. β-Theosterol can fix ultra-violet rays, thus acquiring antirachitic properties like ergosterol. The calcifying action of this compd. was detd. on young rats who had been rendered rachitic by the Randoin-Lecoq diet. The active dose used was 1 mg. per day, but this does not seem to be min. dose. In the animals

which have been cured with β-theosterol the P_2O_5 content of the bones increases considerably. A. PAPINEAU-COUTURE

Vitamins in relation to pharmacy. F. WOKES. *Pharm. J.* 125, 478–80(1930).—account of recent work on vitamins A and D; cf. *C. A.* 23, 4727; with 12 references. [illegible] discussed are: casein in the basal diet (*C. A.* 24, 402, 1141); curve 850(1930)), color tests for vitamin A (*C. A.* 22, 4086; 23, 2270; 24, 3536), carotene and vitamin A (*C. A.* 23, 3013; 24, 3536), and a standard for vitamin D (*C. A.* 22, 4154; 24, 5808). S. WALDBOTT

LEITCH, J. NEIL: **Dietetics in Warm Climates (Including Foodstuffs, Their Analyses and Role in Disease).** London: Harrison and Sons, Ltd. 486 pp. 25 s. net Reviewed in *Food Manuf.* 5, 361(1930); *J. State Med.* 38, 681(1930).

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F—PHYSIOLOGY

E. K MARSHALL, JR.

The arteriovenous difference in blood-sugar content. B. Y. GLASSBERG. *Arch Internal Med.* 46, 605–9(1930).—After ingestion of 100 g. of glucose the arteriovenous difference in blood sugar showed such wide variations (2–60 mg. per 100 cc.) that no normal standard could be predicted. Study of a no. of pathol. cases, including diabetes, gave results which do not seem to warrant attaching diagnostic significance to this type of detn. J. B. BROWN

The oxygen and carbon dioxide content of blood from the internal jugular and other veins. WM. G. LENNOX AND ERNA LEONHARDT. *Arch. Internal Med.* 46, 630–6 (1930).—The O_2 and CO_2 contents of the blood from an artery and various veins were measured in a large series of patients. The gaseous content from the femoral vein was found to be the same as that from a cubital vein. However, the blood from the internal jugular was more reduced and that from the external jugular less reduced than that from a cubital vein. The results showed wide variations. The av. respiratory quotient from a cubital vein was found to be 0.84 and from the internal jugular 0.9. More sugar disappeared while the blood was passing through the brain than through a muscle, suggesting that carbohydrates are unusually important in brain metabolism. J. B. BROWN

The alkaline tide as a method of studying gastric acidity. ROGER S. HUBBARD. *Arch. Internal Med.* 46, 994–1001(1930).—In 80% of the cases studied which did not show a definite alk. tide in the urine HCl was either absent from or present in very low concn. in the gastric juice. HCl can nearly always be demonstrated in the stomach when an alk. tide appears after a meal. Normal and hypersecretion cannot be distinguished by this method. The test is useless in cystitis and nephritis. J. B. B

A comparison of the urea nitrogen content of cutaneous and venous blood by microgasometric analysis. CHRISTOPHER JOHNSTON. *J. Clin. Investigation* 9, 209–13 (1930).—In tests on 6 normal and 6 nephritic subjects no difference was found in the concn. of urea N in venous and cutaneous blood. J. B. BROWN

The occurrence of the Abderhalden reaction after parenteral administration of the hypophysis preparation prehormone and of the ovarian hormone folliculin (menformone). EMIL ABDERHALDEN AND SEVERIAN BUADZE. *Fermentforschung* 12, 262–72 (1930).—Subcutaneous injection of prehormone and menformone in castrated or non-castrated dogs of either sex results in a pos. Abderhalden reaction of the urine toward ovarian, testicular and anterior hypophysis substrates. The hormone prepns. themselves contained no specific enzymes and no appreciable quantities of protein. It is suggested that a part of the hormones occurs as a structural unit of proteins and becomes available when occasion arises. Possibly the hypophysis and the sex glands contain proteins which have structural features in common. In the absence of sex glands the specific unit would then be supplied by the hypophysis. As a practical application of these observations the fact is pointed out that glandular therapy of the patient must be taken into account when interpreting a pos. diagnosis by the Abderhalden reaction. A. W. DOX

Experimental investigations on the effect of yeast on the chemical composition of muscle and liver during chronic training and during a single performance. C. Pi-Suñer Bayo and G. Liss. *Z. physiol. Chem.* **193**, 193–7(1930).—A comparison was made of the effect of adding yeast to the diet of dogs performing regular work and those doing a single performance in a treadmill. The yeast had no effect on the glycogen content of the liver of the animals in regular training as compared to the controls without yeast. The glycogen content varied between 3 and 4%. However, the liver was larger in those animals receiving yeast. Variations were noted in the muscle glycogen but no significance is attached to them. A large increase was found in the fat content of the liver and especially of the muscle. Probably the increased glycogen is transformed into fat and stored as such. The lactic acid content of both liver and muscle was somewhat greater than in the control. On the other hand the animals subjected to a single period of work showed an increase in glycogen several times greater with yeast than without. The max. of liver glycogen was reached in about 3 hrs. No definite conclusions could be drawn from the lactic acid values. A. W. Dox

Quantitative studies in ion antagonism. I. Experiments on the striated muscle of the frog. E. Gellhorn. *Biol. Bull.* **59**, 339–52(1930).—The irritability of the sartorius muscle of *Rana esculenta* has been studied in different mixts. of NaCl, KCl and $CaCl_2$. Within certain limits, 0.014 *M* NaCl has the same antagonistic value against KCl as 0.00081 *M* $CaCl_2$. It is possible, therefore, to predict the behavior of the muscle in any other soln. if the antagonism has been investigated for 1 single mixt. of these 3 salts. Frederick G. Germuth

Fatty acids in the liver of sheep. Kenneth Turner. *Biochem. J.* **24**, 1327–36 (1930). Oxidation of the Et esters prepd. from the fatty acids (see Armstrong and Hilditch *C. A.* **19**, 1851) gives a mixt. of pelargonic and caproic acids. Oxidation of the liquid fatty acids with H_2O_2 gives dihydroxystearic acid. The oleic acid present in sheep liver fat is the $\Delta^{9,10}$-modification. Linoleic and arachidonic acids are also present. Benjamin Harrow

Effect of freezing in a concentrated solution of sodium chloride on the color of red muscle. John Brooks. *Biochem. J.* **24**, 1379–83(1930).—Differences between the results of air freezing and brine freezing are due to the penetration of NaCl into the tissue. This penetration influences the oxidation of hemoglobin into methemoglobin by increasing the rate of oxidation, and by increasing the depth of the superficial layer of tissue in which oxidation is possible. Benjamin Harrow

Glycogen of mammalian muscle and its behavior after death. Ian A. Anderson and John J. R. Macleod. *Biochem. J.* **24**, 1408–20(1930).—The glycogen of intact mammalian muscle does not appreciably diminish when the muscle is kept for 1 hr. at room temp. after death. Lactic acid accumulates; and it is believed that an intermediate substance exists in mammalian muscle from which the lactic acid can be derived. Benjamin Harrow

Alleged presence of bile salts in normal blood. Ernest Walker. *Biochem. J.* **24**, 1892(1930). The pos. Pettenkofer test obtained with alc. exts. of blood is due to choleic acid. There are no bile salts in normal blood (ox and sheep). B. H.

Preparation and properties of the gonad-stimulating hormone from the urine of pregnancy. Frank Dickens. *Biochem. J.* **24**, 1507–25(1930).—The hormone is prepd. from the urine of pregnant women by satn. with NH_4 sulfate. Injection of the hormone into immature animals leads to precocious sexual maturity. Aq. solns. contg. up to 1000 mouse-units per cc. have been obtained. The hormone dialyzes slowly; it is inactivated by boiling and by acids and alkalies; and it is slowly inactivated by trypsin or pepsin. Benjamin Harrow

Production of ammonia by surviving kidney tissue. II. Studies of the possible precursors of **urinary ammonia.** Barbara Elizabeth Holmes and Antoinette Pantin. *Biochem. J.* **24**, 1564–71(1930); cf. *C. A.* **24**, 408.—The precursor of the NH_3 produced is unknown. The possibility that it may be adenylic acid or urea is discussed. Benjamin Harrow

The lactic acid metabolism in pregnancy and its relation to carbohydrate metabolism, to the **function of the liver and thyroid gland and to the circulation. I. What is** the source of the **lactic acid increase in the blood of pregnant women?** K. J. Anselming and F. Hoffmann. *Arch. Gynäkol.* **142**, 289–309(1930).—The increase of **lactic** acid noted in the blood of **pregnant women** towards the end of pregnancy might be due to a failure of the liver to **remove the lactic acid** from the blood or to an increased formation of lactic acid in the **placenta or the muscles.** Injections of lactic acid showed that the liver of pregnant **women is quite as able** to dispose of lactic acid as the liver of non-pregnant women. **It has been shown that the placenta is not the source of any consider-**

able amt. of lactic acid. Pregnant women doing light work were found to have more lactic acid in the blood than non-pregnant women doing similar work. It is probable, therefore, that the muscles are the source of the increase of lactic acid towards the end of pregnancy. Soon after delivery the lactic acid formation from the muscles returns to normal. **II. The cause of the increased formation of lactic acid in the muscles of pregnant women.** *Ibid* 310–23.—The increased production of lactic acid in the muscles of the pregnant woman as compared to the non-pregnant woman might be due to a deficient supply of O or to a change in the regulation of carbohydrate metabolism. No relation was found between the O content and the lactic acid content while the percentage use of O directly after work was greater in the pregnant than in the non-pregnant woman. Physiol. and clinical studies indicate that in pregnancy there is a hormonal change in regulation of carbohydrate metabolism which through an increased function of the thyroid gland leads to an increased production of lactic acid in the muscles both when at rest or at work. HARRIET F. HOLMES

Iodine content of lamb thyroids. B. W. SIMPSON. *New Zealand J. Agr* **41**, 302–6 (1930); cf. *C. A.* **24**, 5409; **25**, 749.—Thyroid glands from lambs grown in various New Zealand districts contained 0.1 mg. to 10 mg., or 0.0009 to 0.21% I. The I content of the thyroids of lambs born and bred on definite areas seemed to give a fair indication of the amt. of I available in those areas. K. D. JACOB

Oxidative nature of the nerve impulse. FRANCIS O. SCHMITT. *Science* **72**, 583–4 (1930); cf. *C. A.* **23**, 4254.—Nerve respiration is inhibited by 0.1 *N* NaCN, and by CO in the dark. Illumination of the nerve causes a marked diminution of the inhibition by CO. The effect is not one of temp. or photoöxidation. It seems that the action potential is produced by the oxygenation of some substance in the nerve, and that activation of the O by a respiratory enzyme similar to that discovered by Warburg is essential. W. D. LANGLEY

A comparison of the highly unsaturated acids of beef, hog and sheep brains. J. B BROWN AND W. C. AULT. *J. Biol. Chem* **89**, 167–71(1930); cf. *C. A.* **23**, 5495.—Tetracosapentenoic acid, having 5 double bonds, probably occurs in both beef and sheep brains but is not present in more than traces in hog brains. The content of highly unsatd. acids is essentially the same in all 3 types. The Me esters of the acids from beef and sheep brains are very similar and are more unsatd. and of higher mol. wt than the esters prepd. from hog brain acids. The latter esters analyze very closely to the theoretical for Me arachidonate except for the m. p. of the bromide and the possibility of the presence of an isomeric arachidonic acid is suggested to explain this anomaly. The acids were isolated by direct alk. hydrolysis of the fresh tissue and extn. of the soaps by BuOH. A. P. LOTHROP

Further studies of blood creatinine. OLIVER HENRY GAEBLER. *J. Biol. Chem.* **89**, 451–66(1930); cf. *C. A.* **22**, 1168.—Blood of normal dogs contains a substance, not creatine, which yields creatinine in isolation expts. A similar substance is also present in human blood. The amts. present in corpuscles and plasma are approx. the same. The creatinine-yielding substance is not creatinine itself and whether it is the precursor of the urinary creatinine cannot be stated although its accumulation in early retention suggests, but by no means establishes, this. Impairment of renal function, whatever the cause, results in the accumulation of one or more substances (other than creatine) yielding creatinine and the accumulation in the exptl. types of retention was found to be progressive from the beginning to the end of the expt. The findings are in agreement with the view of Behre and Benedict that creatinine is not present in blood in detectable quantities. A. P. LOTHROP

Kallikrein, a hormone of the pancreas. HEINRICH KRAUT. *Chem.-Ztg.* **54**, 849–51 (1930).—When urine is injected intravenously into an animal, the amplitude of the pulse is increased, but the mean blood pressure falls. This response is due to a substance provisionally named *kallikrein*, which is found only in the pancreas. It is present in the blood, but only in an inactive state, rendered thus by a proteolytic enzyme. This enzyme is also present in tissue fluid, but in a greater degree of purity. Inactivation is dependent on the p_H of the media. Kallikrein dilates peripheral blood vessels and is assayed biologically only. It is absorbed on argillaceous earth, and forms a cryst. product with uranyl acetate. It has a high mol. wt., and does not dialyze through parchment. After final purification, it forms a weakly yellow, odorless soln. contg. P and protein; 0.1 mg. of the dry substance constitutes a standard unit. After hydrolysis in strong acid, it reduces Fehling's soln. G. H. W. LUCAS

Investigations on the metabolism of the heart. III. The phosphoric acid metabolism of the surviving beating cold-blooded heart deprived of oxygen. KAORU MONONOBE. *Folia Pharmacol. Japon.* **11**, No. 1, Opera orig. 1–39(1930) (in German); cf.

C. A. **25**, 328.—Expts. have been continued by M. to det. the P metabolism in the isolated toad heart prefused according to the Straub method with Ringer soln. to which other reagents were added. Inorg. P phosphagen and total P were measured by the method of Lohmann. Lactacidogen estns. were made according to Embden. In summer months at high temp. perfused hearts show that inorg. P suffered no change, while the phosphagen and total P and that from a 2-hr. autolysis with 2% bicarbonate soln. at 45° showed a decrease. The most rapid change occurred in the first 1½ hrs., but continued gradually for 4 hrs. Frequent changing of the perfusion fluid made an important difference. Addn. of O to the perfusion fluid made little or no difference in the various P contents, if it was given shortly before activity ceased. The P contents of hearts perfused with Ringer soln. and O were practically the same as those in hearts of freshly killed toads. The decrease in phosphagen and P from bicarbonate autolysis was much greater in summer than in spring, in hearts perfused with Ringer soln. without O. Solns. contg. *M*/5000 KCN temporarily strengthened systole and diastole. The heart ceased in diastole. Solns. *M*/2000 quickly killed the heart in diastole. Hearts poisoned with KCN showed practically the same P contents as hearts perfused with Ringer soln. for the same period, except that the P from bicarbonate autolysis was lower. Turtle hearts perfused with 0.1% dihydroxyacetone Ringer soln. were damaged considerably in both diastole and systole. Beating ceased in diastole or half diastole. P changes were very small. Dihydroxyacetone temporarily improved a turtle heart poisoned with KCN. When N was added to the perfusion fluid in place of O, the heart was somewhat damaged, and beating ceased in diastole or half diastole. Inorg. and total P remained unchanged, but phosphagen and autolysis P were considerably greater. The action of KCN and N was due to the lack of O for large quantities of lactic acid were formed. G. H. W. LUCAS

The action of the anterior pituitary hormone on the testicle, with special reference to the interstitial cells. CAMILLO COLOMBI. *Boll. soc. ital. biol. sper.* **5**, 726–8(1930).—The anterior pituitary hormone, when injected into mice in the form found in the urine of pregnant women, is active in causing a marked increase of interstitial substance. The increase is attributed to the hypertrophy of the prostate and of the seminal vesicles. PETER MASUCCI

Experimental studies on the fixation of eosin in living tissues. VIRGILIO DALL' ACQUA. *Boll. soc. ital. biol. sper.* **5**, 724–6(1930).—By means of a local anesthetic it is possible to fix eosin in living tissue. It behaves differently from other electronegative colloids because it does not form granular ppts. either outside or inside the cells. Only the pseudoeosinophiles are stained. The eosin stain remains longer in the superficial strata of the derma and epiderma; it first disappears from the deep connective tissue strata. After 24 hrs. microscopic examn. shows that the dye has almost completely disappeared because of elimination. PETER MASUCCI

New biochemical properties of biliary pigments. III. The agglutinating power of bile on the stroma of hemolyzed erythrocytes. A. CLEMENTI AND F. CONDORELLI. *Boll. soc. ital. biol. sper.* **5**, 748–50(1930); cf. *C. A.* **24**, 5826.—The bile of certain vertebrates (frogs and hogs) in proper dilns. hemolyze instantly the erythrocytes (of animals of the same species or different species) suspended in physiol. NaCl soln. or in Ringer soln. After 2–4 hrs. the hemolyzed tubes get cloudy and finally show a flocculent ppt. The ppt. consists of the stroma of deformed erythrocytes. The bile, therefore, has an agglutinating power on the stroma. PETER MASUCCI

The relation of the mitochondria-Golgi complex to secretion. V. Further identification of neutral red stained material. WEN-CHAO MA. *Chinese J. Physiol.* **4**, 381–6 (1930); cf. *C. A.* **23**, 406.—The neutral red stained material is lipoid in nature. It is physicochemically similar to the osmophilic substance, the Golgi material. L. A. M.

The effect of thyroparathyroidectomy and parahormone administration on gastric motility in dogs. CHIAO TSAI. *Chinese J. Physiol.* **4**, 415–22(1930).—After parathyroidectomy in dogs the stomach no longer exhibits hunger contractions, despite several days deprivation of food, and gastric tone is permanently lowered. Administration of parahormone to normal dogs has no effect on gastric motility except a partial and temporary inhibition. With parathyroidectomized dogs it restores the gastric tone but not the appetite. L. A. MAYNARD

The calcium content of the skeletal muscles after thyroparathyroidectomy and parahormone injection. FONG-YEN HSU AND CHIAO TSAI. *Chinese J. Physiol.* **4**, 423–9(1930).—Thyroparathyroidectomy resulted in a drop in the Ca content of the muscles of dogs. This drop was less abrupt and less extensive than the fall of serum Ca. This suggested that the diminution in the muscle was the result of the drop in the blood. The effect of parahormone administration was variable, but in no case did

a depression of muscle Ca result. In general the muscle Ca followed the serum Ca. L. A. MAYNARD

Experimental hyperfeminization. DEMETRIUS GOSTIMIROVIC. *Biol. Zentr.* **50**, 599–608(1930).—The female sex hormone, when injected into female mice shortly after they had been mated, caused sterility, but a non-specific protein caused also a considerable reduction of fertility. Pregnancy, once developed, was not interrupted by the hormone. Treatment before mating increased the fertility. No influence on the offspring was observed. A. E. MEYER

The destruction of vegetable tissues and especially of the cellulose in nature and in the intestine of man and animal. PIERRE LAVIALLE. *Bull. sci. pharmacol.* **37**, 613–39(1930).—A review of the work of Khouvine and René Sartory. A. E. M.

The active principles of the posterior hypophysis. I. SPAGNOL AND D. BOCCIA. *Rev. sudamericana endocrinol. inmunol. quimioterap.* **13**, 699–716(1930).—After a general introduction the prepn. of *Metrergin* and *Vasopressin* is described. The method of Kamm was used. Tests on animals and clinical results are reported. A. E. M.

The heart hormones. GAETANO VIALE. *Rev. sudamericana endocrinol. inmunol. quimioterap.* **13**, 801–8(1930).(Italian).—A general review is given. A. E. M.

The catalytic action of methylene blue in living cells. OTTO WARBURG, FRITZ KUBOWITZ AND WALTER CHRISTIAN. *Biochem. Z.* **227**, 245–71(1930).—If methylene blue is added to red blood cells the following reaction takes place: Methylene blue + *n* hemoglobin + *n* H_2O ⇌ leucomethylene blue + *n* methemoglobin (1), *n* probably being 2. If the cells are free from glucose the methemoglobin accumulates in the cells, otherwise the first reaction is followed by a second: *n* methemoglobin + glucose = *n* hemoglobin + glucose oxidation products + *n* H_2O (2). It is not yet decided whether it is hexose, hexosephosphoric esters or hexose cleavage products which react with the methemoglobin. This is then followed by a third reaction: leucomethylene blue + $^1/_2$ O_2 = methylene blue + H_2O (3). Each of these 3 phases of the methylene blue catalysis can be studied separately: the first phase, by means of glucose-free red cells; the second phase, by producing methemoglobin in the cells with Am nitrite. The second phase is also a surface reaction where the methylene blue is adsorbed and produces a small concn. of methemoglobin which suffices to effect extensive oxidation. Much more methemoglobin is required to produce a corresponding oxidation rate, if the methemoglobin is produced by Am nitrite, because in this case the methemoglobin is formed in the cell fluid and must diffuse to the surface to become effective. CO inhibits the methemoglobin formation because it diminishes the concn. of free hemoglobin and thus hinders the methylene blue catalysis. Although the catalysis is independent of the methylene blue concn. when this concn. is sufficiently high, it is inhibited relatively little when the methemoglobin formation is slowed up by CO in the presence of a great excess of methylene blue. On the contrary, when the methylene blue concn. is reduced to a point where the catalysis does vary considerably with the variation in its concn. the catalysis is strongly suppressed by CO when the methemoglobin production is hindered by it. The reaction of the third phase is only a balancing reaction but there is evidence that H_2O_2 is produced. It is concluded that one must clearly differentiate in the study of living processes between the balance of reactions and the actual mechanism of these chem. reactions. As a balance of reactions, the effect of methylene blue on red blood cells seems to parallel the normal catalytic processes of the living substance, whereas as a matter of fact one deals with an instance of heavy metal catalysis instead. S. MORGULIS

The effect of blood pigments in augmenting oxidation. K. BINGOLD. *Biochem. Z.* **227**, 457–61(1930).—H_2O_2 decolorizes blood rather rapidly, the temp. at which this occurs being practically specific. Thus 3% H_2O_2 decolorizes blood from pigeons, ducks or geese at room temp., dog blood at 50°, guinea pig blood at 60°, goat blood at 68° and human blood at 73–74°. Probably an iron-contg. product of partial oxidation of the blood pigment catalyzes further oxidation. When the compd. is freed from the Fe it no longer exerts the catalytic action. S. MORGULIS

Studies on the carbon dioxide production of Finnish school girls. ARMAS RUOTSALAINEN. *Skand. Arch. Physiol.* **60**, 225–43(1930).—The total CO_2 production of girls between 9 and 18 years increases with age. The av. CO_2 production of a 9-year-old girl is 10.7 g. for 2 hrs. and of an 18-year-old girl 15.1 g. The av. CO_2 production per kg. and 2 hrs. diminishes with increasing age from 9 to 18 years from 0.36 g. at the former to 0.26 g. at the latter age. The av. CO_2 production per sq. m. of body surface likewise diminishes from 9.76 g. at 9 years to 7.71 g. at 18 years of age. S. M.

Metabolism of billiard playing. H. BORGSTRÖM, E. ELFVENGREN, C. O. LÖVEGREN AND C. SUNDSTRÖM. *Akand. Arch. Physiol.* **60**, 244–6(1930).—The metabolism of

billiard playing is about 2.9 cal. per hr. per kg. It is thus somewhat higher than in walking at a pace of 70 steps per min., but considerably lower than in walking 120 steps per min., or in playing ping-pong. S. MORGULIS

Metabolism of parallel-bar gymnastics. O. SILANDER AND H. VIRI. *Skand. Arch. Physiol.* **60**, 247–50(1930).—The metabolism of exercise on the parallel bars, which is about 8.7 cal. per hr. per kg., is of the same magnitude as that of some of the most strenuous sports, like fencing, and corresponds to the metabolism of some of the heaviest muscle work. S. MORGULIS

A contribution to the knowledge of calcium metabolism. III. The relative fecal outgo of calcium in dairy cows. A. WESTERLUND. *Skand. Arch. Physiol.* **60**, 251–63 (1930); cf. *C. A.* **25**, 316.—A statistical study of the co-variations of the factors affecting the relative Ca elimination points to the conclusion that the difficulty of keeping lactating cows in Ca equil. on the usual feeds is chiefly due to the unsuitability of such controlling factors as the scanty supply of some dietary constituents necessary to guarantee the animals max. utilization of the Ca, *i. e.*, Ca itself, as well as P, fat, Na and silage, while such constituents as Mg or Si are supplied too abundantly in proportion to the Ca consumed. Besides, the milk secretion is also of importance, the more copious its flow the smaller the relative fecal outgo of Ca. **IV. The relative fecal outgo of calcium in children.** *Ibid* 264–72.—Analysis of exptl. data leads to the conclusion that the relative fecal outgo of Ca is reduced by a restriction of the K, Mg or fat consumption, or by a more liberal supply of P than is usually given. S. M.

Elimination of alcohol in the expired air. G. LILJESTRAND AND P. LINDE. *Skand. Arch. Physiol.* **60**, 273–98(1930).—The alc. content of arterial venous and capillary blood following alc. consumption is the same. The distribution coeff. of alc. between air and blood at 37° is 0.00063–0.00073, and at equil. at 31° one cc. blood contains as much alc. as 2 l. air. Alveolar air in the first hrs. after taking alc. contains considerable amts. of alc. The air of the dead space as well as the expired air is practically satd. with alc. With the alc. consumption is rather large and the ventilation of the lungs vigorous; considerable quantities of alc. may be eliminated in this way. S. M.

The relation between sleep and the liver function. ERIK FORSGREN. *Skand. Arch. Physiol.* **60**, 299–310(1930).—The human liver has a rhythmic function with an assimilatory and secretory phase of its activity. The bile secretion in man reaches a max. in the daytime and a min. at night, so that the anabolic function of the liver is greatest at night. In the rabbit the situation is reversed because, during the day when the liver is generally in the secretory phase of its activity, the animal is in a somnolent state. It is suggested that possibly the drowsy condition of the rabbit as well as man at midday is due to the production of hypnotic substances in the liver during its secretory phase S. MORGULIS

Alveolar gas exchanges and atelectasis. The mechanism of gas absorption in bronchial obstruction. POL N. CORYLLOS AND GEORGE L. BIRNBAUM. *Arch. Surg.* **21**, 1211–81(1931).—The gases of the alveolar air tend to, but never quite reach, an equil. with the gases of the venous blood. The entrapped alveolar gases pass through the respiratory membrane into the blood in the perialveolar capillaries, until complete airlessness of the involved area is produced. The mechanism of the production of atelectasis in the compressed lung is the same as in bronchial obstruction. If, instead of air, other gases are introduced into the atelectatic lung, the absorption time is different for each gas, depending on the respective coeffs. of soly. and diffusion and the chem affinity for the blood. N in the respiratory air plays the part of a buffer, retarding the absorption of more diffusible and more sol. gases. JOHN T. MYERS

Normal synovial fluid of cattle. I. Cellular constituents and nitrogen content. WALTER BAUER, G. A. BENNETT, ALEXANDER MARBLE AND DOROTHY CLAFLIN. *J. Exptl. Med.* **52**, 835–48(1930).—The astragalotibial (hock) joints of normal young beef cattle contain large and uniform quantities of synovial fluid, the total N content of which is 169 mg. per 100 cc. The approx. total protein content was calcd. to be 680 mg. of 0.68% per 100 cc. No correlation between the total protein level and the total cell counts of isolated specimens of synovial fluid is possible from the data reported. C. J. WEST

Relative reaction within living mammalian tissues. XIII. The reaction prevailing during the autolysis in vivo of small tissue masses. H. P. GILDING. *J. Exptl. Med.* **52**, 953–61(1930); cf. *C. A.* **22**, 2609.—The findings support the view that within the body the autolysis of individual cells and of small tissue masses may take place under the circumstances of a slight alky. C. J. WEST

GIROUD, A., AND BULLIARD, H.: **La kératinisation de l'épiderme et des phanères.**

Genèse des substances soufrées de la kératine. FASC. 29 of "Archives de morphologie générale et experimentale." Paris: Gaston Doin & Cie. 83 pp. F. 50.

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PÉNAU, H., BLANCHARD, L., and SIMONNET, H.: **L'hypophyse.** Paris: Les Presses Universitaires de France. Reviewed in *Endocrinology* **14,** 364(1930).

WIDMARK, ERIK, M. P.: **Les lois cardinales de la distribution et du mètabolisme de l'alcool èthylique dans l'organisme humain.** LUND: C. W. K. Gleerup. 57 pp.

G—PATHOLOGY

H. GIDEON WELLS

Diabetes mellitus. Sugar consumption in its etiology. C. A. MILLS. *Arch. Internal Med.* **46,** 582–4(1930).—Examn. of the death rate from diabetes in relation to the sugar consumption shows that there is no uniform correlation between the two in the many countries studied. J. B. BROWN

The specific effect of bile salts on pneumococci and on pneumococcus pneumonia. EDWIN E. ZIEGLER. *Arch. Internal Med.* **46,** 644–56(1930).—Solns. as dil. as 1:25000 of bile salts produce lysis of pneumococci *in vitro*. The presence of serum inhibits the action. The lytic action is 5 times as great on pneumococci as on red blood cells. Bile salts do not interfere with antibody action of specific serums. No toxic symptoms follow injections of these salts. Intravenous injections tend to damage the veins in proportion to the concn. Bile salts seem to have a specific effect in terminating pneumococcus pneumonia. J. B. BROWN

Diabetes mellitus. The colliodal osmotic pressure of the blood. I. M. RABINOWITCH AND MARY BEARD. *Arch. Internal Med.* **46,** 752–67(1930).—No explanation was found for certain high cholesterol values occasionally occurring in diabetic blood. It is probable that in diabetes with lipemia there is constantly exerted in the capillaries a colloidal pressure higher than normal. To overcome this for renal secretion a higher hydrostatic pressure is required. This may be the cause of the marked incidence of cardiovascular disease in diabetes. J. B. BROWN

The Boltz test in urinalysis. ARTHUR T. BRICE, JR. *Arch. Internal Med.* **46,** 778–81 (1930).—The Boltz test (treatment of specimen with Ac_2O and H_2SO_4) was applied to 167 normal and 525 pathol. urines. It is of value in demonstrating the elimination of an amino acid and may be of more value than the test for albumin for discovering an early or latent condition of the kidney. The test is of particular significance in nervous and mental cases and in shock. J. B. BROWN

The diagnostic value of the sugar tolerance curve in endocrinopathies. B. Y. GLASSBERG. *Arch. Internal Med.* **46,** 984–7(1930).—The sugar tolerance test yields no information of diagnostic value in the differentiation of normal and endocrinopathic conditions. J. B. BROWN

The origin of urobilinogen. A clinical experiment. I. M. RABINOWITCH. *Arch Internal Med.* **46,** 1014–7(1930).—A case is reported of the presence of increased amts of urobilinogen in the urine, apparently caused by reduction of extravasated blood in a large ovarian cyst with torsion of the pedicle. This pigment can be formed elsewhere in the body than in the intestine. J. B. BROWN

Studies in congestive heart failure. V. The potassium content of skeletal muscle obtained by biopsy. COBB PILCHER, J. ALFRED CALHOUN, GLENN E. CULLEN AND T. R. HARRISON. *J. Clin. Investigation* **9,** 191–6(1930).—Pieces of muscle removed by biopsy from patients with cardiac edema showed an increased % of H_2O with a corresponding decrease of total solids. The K content of wet muscle was always abnormally low. With dry muscle, however, the K was usually but not always diminished. The K content of muscle was raised by administration of K_2HPO_4. J. B. B

The serum calcium in polycythemia vera. ETHEL M. BENEDICT AND KENNETH B. TURNER. *J. Clin. Investigation* **9,** 263–4(1930).—There is no significant variation in serum Ca in polycythemia vera. J. B. BROWN

Serum electrolyte studies in normal and pathological conditions: pneumonia, renal edema, cardiac edema, uremic and diabetic acidosis. DANA W. ATCHLEY AND ETHEL M. BENEDICT. *J. Clin. Investigation* **9,** 265–94(1930).—Serum electrolyte partitions were made on normal and pathol. individuals. If HCO_3^-, Cl^-, protein, phosphate, sulfate and ketones were measured, the so-called "undetermined acids" were negligible. The normal mean total base was 151.9 m. eq. (milli-equivalents per l.) and the total acid 151.7. Pneumonia gave a lower total base, chloride, phosphate and protein with a slow return to normal after the crisis. Undetd. acid was un-

changed. Renal edema showed a low protein % and usually low fixed base. Serum Cl^- was high and increased after Cl^- administration, probably because of the effect of a decreased serum protein upon the Donnan equil. between serum and fluid in the tissues. With diuresis in cardiac patients the body eliminated large amts. of H_2O and Cl^- without parallel decrease in total base. The acidosis of advanced nephritis seemed to be due to decrease in total base caused by loss of base-conserving power of the kidney and to retention of phosphate and sulfate because of renal insufficiency. No ketosis occurred. A no. of observations on diabetic acidosis showed: dehydration with high serum protein, loss of base due to urinary excretion combined with ketones, great drop in HCO_3^- depending on neutralization of ketones, and decrease in serum Cl^-.
J. B. Brown

The composition of the bile following the relief of biliary obstruction. Carl H. Greene, Waltman Walters and Clyde H. Fredrickson. *J. Clin. Investigation* **9**, 295–310(1930).—The compn. of the bile was followed in 9 cases following relief from biliary obstruction. The output of bilirubin was const., its concn., however, varying inversely with the vol. of the bile. The formation of bile acids is inhibited by biliary obstruction with a rapid return to normal if the liver has not been injured. Bile Cl^- concn. is greater than that in blood serum. In cholerrhagia the loss of salts becomes important while the loss of fluids is sufficient to decrease the vol. of urine. Bile urea varies directly with blood urea. The loss of urea through the bile is usually insignificant but in one case it was found to be appreciable. J. B. Brown

Studies on the nitrogen and sulfur metabolism in "Bright's Disease." I. The retention of nitrogen and sulfur in "nephrosis." G. P. Grabfield. *J. Clin. Investigation* **9**, 311–8(1930).—A study of N and S excretion of 5 patients with nephrosis on a diet const. as to N, S, P, calories and H_2O showed great retention of N; a still greater retention of S; high N:S in urine; low N:S ration of the retained protein. J. B. B.

Blood volume and plasma electrolyte changes in the dehydration of infants. Rustin McIntosh, Laslo Kajdi and Dorothy Meeker. *J. Clin. Investigation* **9**, 333–57 (1930).—Total blood vol. and serum electrolyte concn. detns. were made on 11 infants suffering from diarrhea dehydration, both during dehydration and recovery. In the acute condition some patients showed change in blood vol. while in others there was a reduction of 20%, involving mainly the plasma fraction. There was no direct parallelism between this change in vol. and either the degree of dehydration or the severity of the toxic symptoms. The dehydration was usually accompanied by a decrease in total fixed base, Cl^- and HCO_3^- in the serum; the degree of acidosis could not be correlated with blood changes. Without further criteria, no satisfactory discussion can be given of the factors influencing the degree of dehydration of the subcutaneous tissues and the severity of the toxic symptoms. J. B. Brown

The problem of sodium salicylate excretion in the bile. Bela Halpert, Milton T. Hanke and Geo. M. Curtis. *J. Clin. Investigation* **9**, 359–62(1930).—Na salicylate does not appear in the bile of patients with diseases of the biliary system, following the oral ingestion of a medicinal dose. J. B. Brown

Anaphylaxis and atopy. III. Anaphylaxis experiments with atopens. Lucei Adelsberger. *Z. Hyg. Infektionskrankh.* **111**, 577–99(1930).—Production of anaphylaxis by timothy pollen ext. was observed in 1 case out of 12 attempts in guinea pigs. Antianaphylaxis was observed. Cat hair, and cat and goat dandruff gave no anaphylaxis in guinea pigs although they give skin reactions in sensitized men. Rabbit dandruff possessed sensitizing, as well as shock-producing, powers. Surviving guinea pigs were desensitized. Salt-pptd. horse dandruff as well as Coca's ext. cause anaphylaxis. Horse-dandruff anaphylaxis is not the same as horse-serum anaphylaxis. Horse dandruff contains an antigenic component of horse serum, but the presence of a horse-dandruff antigen in horse serum has not been proved. Rachel Brown

Horse-dandruff allergens. Lucie Adelsberger and Werner Ulrich. *Z. Hyg. Infektionskrankh.* **111**, 600–17(1930).—The allergic substance in horse-dandruff ext. is precipitable with alc. and can be obtained in a manner similar to that for obtaining bacterial polysaccharides. No parallelism was observed between the activity of a single ext. in the skin of hypersensitive men and its anaphylactic properties in animals. Furthermore, a soln. contg. an extremely small amt. of protein was anaphylactically active in the guinea pig intestine, while other solns. of higher N content were not.
Rachel Brown

Are the young of fathers immunized with ricin hypersensitive? R. Otto. *Z. Hyg. Infektionskrankh.* **111**, 644–58(1930).—The young of mouse fathers treated with ricin until a short time before mating are generally more sensitive to ricin than the young of normal animals. The sensitivity is due to a toxic poisoning of the spermatazoa

and can be recognized even in the second generation. The specificity of the action has not been detd. Ricin standing for 1–4 months at 37° with 0.8% HCHO gives a degraded ricin-toxoid which has good immunizing properties. RACHEL BROWN

Metabolism of normal and tumor tissue. II. The respiratory quotient and the relationship of respiration to glucolysis. FRANK DICKENS AND FRANTIŠEK ŠIMER. *Biochem. J.* **24**, 1301–26(1930); cf. *C. A.* **25**, 309.—The failure of the oxidation of carbohydrate by tumor tissue occurs at a stage of the intermediary metabolism subsequent to the conversion of hexose to the 3-carbon stage, and prior to the oxidation of the latter. Tumors possess both high glucolysis and low oxidative carbohydrate metabolism—a combination not found in normal tissues. BENJAMIN HARROW

Separation of antibodies from the serum proteins. MAX FRANKEL AND LEO OLITZKI. *Nature* **126**, 723–4(1930).—Antibodies adsorbed in kaolin could be obtained in solns. of glycocoll in 2% NaCl. The eluates of antibodies obtained corresponded to the protein-free enzymes in that they were chemically free from proteins. They did not give the Millon or Esbach reactions or the Jones-Spiegler test. By elution with a soln. contg. about 2% glycocoll and 2% NaCl, only the flagellar agglutinin of typhoid antisera was recovered. On diminishing the quantity of NaCl (0.3–0.5%), the amts. of flagellar agglutinin recovered became much smaller and at the same time small quantities of somatic agglutinins appeared. Diphtheria antitoxin behaved like the flagellar agglutinins. The recovered antibody in the protein-free solns. was, both in the case of diphtheria antitoxin and flagellar typhoid agglutinin, about 20% of the concn. in the original sera. J. A. KENNEDY

Chemical alteration of purified antibody proteins. L. REINER. *Science* **72**, 483–4 (1930).—*p*-Aminobenzenearsonic acid (atoxyl) was used for diazo coupling because of its activity as a chemotherapeutic agent in certain protozoan diseases. The antibody protein was a Type I and II pneumococcus antibody. The p_H was not allowed to change during the whole process of coupling more than from 5.0 to 7.5 approx. A product resulted which was almost insol. around its isoelec. point at p_H 6, and sol. to a dark brown soln. at neutral or alk. reaction, sol. with a light yellow color on the acid side of the isoelec. point. This "antibody-dye" could easily be repptd. by dialysis and adjustment of p_H. On carrying out the process in the same way a second time, identical products were apparently obtained, the As_2O_3/N ratio being in one case 0.028, in the other 0.027. If the products were taken up in the same vol. of physiol. saline as the original, agglutination was observed up to the same diln. as with the original antibody prepn. (1/320). A very marked prezone was found, which was not present in the original prepn. Mice infected with 100,000 lethal doses of virulent pneumococci could be protected fully, *i. e.*, cured with 0.2 cc. of the prepn. contg., resp., 6.6 mg. N and 0.18 mg. As_2O_3, and 7.5 mg. N and 0.2 mg. As_2O_3 per cc., when injected intravenously, simultaneously with the infection or 4 hrs. after, or 20 hrs. after the infection. Normal horse serum-globulin coupled with atoxyl had almost no effect. Half a cc. of the original antibody soln. killed mice almost instantly when injected intravenously, whereas the same amt. of the coupled product had no effect. Introduction of the easily detectable As into the antibody-carrier protein is helpful for a quant. study of the degree of purification of antibodies, as well as a quant. study of the antibody reaction. Further expts. are in progress. J. A. KENNEDY

Immunization with aluminum hydroxide mixtures of poliomyelitis virus. C. P RHOADS. *Science* **72**, 608(1930).—The $Al(OH)_3$ employed was the type C suspension of Willstätter contg. 22.5 g. of Al per l. The virus was either Berkefeld N filtrate of fresh monkey pooled virus or suspension of glycerolated material of the same strain. Mixts. of virus and suspension were allowed to stand 30 min. at room temp. The filtrate and $Al(OH)_3$ mixed in equal vols. became inactive. Inactivation was promoted by acid (p_H 5.5) and prevented by alk. (p_H 8.8) reactions. Repeated subcutaneous injections of the inactivated virus led to active immunity. Immunity thus induced was tested (1) by repeated instillation into the nostrils of glycerolated virus, (2) by intracerebral inoculation of fresh virus 28 days later and (3) by means of the blood serum of the treated monkeys. Each of the 3 sera neutralized the virus. Conclusion: The virus, when adsorbed on $Al(OH)_3$, is incapable of producing poliomyelitis, but is still capable of inducing active immunity in *Macacus rhesus*. J. A. KENNEDY

Reversal of charge of serum and its coagulation and gelatinization with acids. SATYA PRAKASH AND N. R. DHAR. *J. Indian Chem. Soc.* **7**, 723–32(1930); cf. *C. A.* **22**, 4170.—Serum from goat blood is treated with acids at various dilns. and changes in the appearance of the serum are noted at various time intervals. Other than the amts. of reagents used, and in some cases, the resulting p_H of the serum, no data are given. W. D. LANGLEY

The preparation of the type-specific polysaccharides of pneumococcus. WALTHER F. GOEBEL. *J. Biol. Chem.* **89**, 395–9(1930); cf. *C. A.* **21**, 2288.—In the new procedures described the laborious and costly sepn. through fractional pptn. with alc. has been eliminated. The carbohydrate and proteins are pptd. with alc. and the proteins are then removed from a water soln. with CCl_3CO_2H. Approx. 35 g. can be obtained from 175 l. of broth culture of type III and 18.5 g. from 350 l. of broth culture of type I. The polysaccharide from both types reacted with antipneumococcus serum in dilns. of 1:6,000,000. A. P. LOTHROP

Uremia and chloropenia. J. M. MACERA, I. FEIGUES AND J. PEREYRA KAFER. *Semana méd.* (Buenos Aires) **1930**, II, 1718–23.—A single case is studied. The low Cl content of the blood is assocd. with a high Cl content of the tissues and the spinal fluid, with azotemia and azoturia, hypochloruria and an increased alkali reserve. The catabolism of the proteins attracts the Cl into the tissues. In the treatment, NaCl is effective, but not KCl or NH_4Cl. A. E. MEYER

The influence of different p_H values on the results of the Sachs-Georgi reaction. S. SIERAKOWSKI AND MELZAK. *Zentr. Bakt. Parasitenk.*, 1 Abt., **118**, 366–73(1930).—The reaction remains unchanged between an antigen p_H 5.5 and 7.0. Every neg. serum becomes pos. with the antigen at a p_H of 5.0, and every pos. serum becomes neg. at p_H 9.0. The best results are obtained when the antigen is dild. with a mixt. of 0.85% NaCl and 0.2 *N* NaOAc in a ratio of 25:1. Dild. thus a weak antigen gives the same results as a standard antigen. There is no parallelism between the p_H of the serum and the reading of the reaction. JOHN T. MYERS

Hormones in cancer. I. The effect of ovarian, splenic and adrenal extracts upon rat sarcoma No. 10. FRITZ BISCHOFF AND L. C. MAXWELL. *J. Pharmacol.* **40**, 97–113(1930).—None of the exts. appreciably affected the incidence of regression or rate of growth of the tumor. Follicular, corpus luteum and 4 adrenal exts. caused early liquefaction or opening of the tumor. C. RIEGEL

BESREDKA, A.: **Le choc anaphylactique et le principe de la désensibilisation.** Paris: Masson & Cie. 276 pp. F. 30.

MAXWELL, IVAN: **Clinical Bio-Chemistry.** 2nd ed., enlarged. Melbourne: W. Ramsay. 269 pp. Cloth, $3.60. Reviewed in *J. Am. Med. Assoc.* **95**, 1450(1930).

H—PHARMACOLOGY

A. N. RICHARDS

The action and excretion of nitrates. NORMAN M. KEITH, MARY WHELAN AND EDWIN G. BANNICK. *Arch. Internal Med.* **46**, 797–832(1930).—See *C. A.* **24**, 1159. J. B. BROWN

Calcium changes in the brain in ether anesthesia. EDMUND ANDREWS, WILLIAM F. PETERSEN AND REUBEN I. KLEIN. *Ann. Surgery* **92**, 993–7(1930).—Ether anesthesia in dogs is accompanied by a marked rise in the Ca in the brain and liver. These changes are probably to be interpreted as meaning a lesser activity and irritability of the brain cells due to changes in the mineral-salt content in the cells themselves. R. B.

Formaldehyde and mercurochrome in the treatment of rabbits injected with Brucella abortus. RONALD GWATKIN. *J. Am. Vet. Med. Assoc.* **30**, 743–5(1930).—Intravenous injections of 5 cc. HCHO per 3 kg. of body wt. or of 0.4 cc. of a 1% soln. of mercurochrome per kg. had no effect in controlling *B. abortus* infection as judged by the agglutinin titer in rabbits. RACHEL BROWN

The relation of toxicity to dosage of tetrachloroethylene. ELWOOD A. SHARP. *J. Trop. Med.* **33**, 336–9(1930).—C_2Cl_4 is not absorbed to any extent by the human intestinal tract, probably because of its insoly. It is probably non-toxic for man and animals. RACHEL BROWN

Anaphylaxis resulting from the use of an iodide. H. A. SPENCER. *J. Trop. Med.* **33**, 339(1930).—Report of 3 cases of urticaria following treatment with fibrolysin and iodolysin. RACHEL BROWN

Contributions to the toxicology of the higher fungi. I. Lactarius torminosus. HANS STEIDLE. *Arch. exptl. Path. Pharmakol.* **151**, 232–52(1930).—*Lactarius torminosus* is not toxic for protozoa or most poikilothermic animals, except frogs. The expressed juice injected intravenously in the latter, as well as aq. extract of the dried fungus, causes dyspnea, paralysis and even death. The ingestion of the fungus by warm-blooded animals has very little effect; but aq. exts. given parenterally, whether subcutaneously or intravenously, cause vomiting, respiratory distress, fall in temp. and death, with histological changes similar to those found in the frog. *L. torminosus* con-

tains traces of muscarine, and probably choline. Its most characteristic effects are the hyperemia and hemorrhages observed in almost all the tissues, due to a vascular and capillary poison. H. EAGLE

Action of diethylsulfonmethylethylmethane upon normal blood constituents. FREDERICK G. GERMUTH. *Am. J. Pharm.* **102**, 653–8(1930).—The action of di(ethylsulfonyl)methylethylmethane (trional) upon the normal blood constituents of the rabbit has been detd. The tabulated results seem to support the belief that continued employment of trional produces pathological symptoms that are clearly manifested by deviations from the normal in the proportions of those sp. bodies present in the blood, and generally considered in clinical examns. to furnish valuable criteria in relation to diagnosis and prognosis. A decrease in the body wt. of rabbits obtains following prolonged treatment with the sulfone. While this loss in body wt. of the exptl. animals may be ascribed to a natural disinclination for the usual quantity of food during the period of treatment, it is believed that this condition is partially caused by the systemic effects of the hypnotic. A well-defined hematoporphyrinuria is produced by the administration of trional to rabbits. An increase in the uric acid, sulfate, sugar and creatinine contents of the blood is observed when trional is administered by either subcutaneous or intravenous injection for a ten-day period. Under similar conditions a decrease in the Fe, Ca, Mg, chloride, total P, acid-sol. P, protein-combined P and total solids occurs, while the sp. gr. and *n* are lowered. A bibliography is appended. W. G. GAESSLER

The effect of carbon monoxide and of hydrogen sulfide on nerve irritability. FRANCIS O. SCHMITT AND LYLE V. BECK. *Biol. Bull.* **59**, 269–74(1930).—Both CO and H_2S, which presumably inhibit cellular oxidation by combining with the Fe-containing respiratory enzyme, render the nerve non-irritable. The effect of the former appears to be completely reversible. FREDERICK G. GERMUTH

Biochemistry of aluminum. I. Excretion and absorption of aluminum in the pig. KENNETH MACKENZIE. *Biochem. J.* **24**, 1433–41(1930).—No harmful effects on general growth and metabolism results from feeding comparatively large amts. of Al. BENJAMIN HARROW

Investigations on the increase in sensitiveness of adrenaline by thyroxine on surviving mammal hearts. WERNER LÜTOLF. *Z. Biol.* **90**, 334–46(1930).—Thyroxine in large doses (1–20,00) together with adrenaline injuries the heart. In dil. solns (1:400,000–1:800,000) it has neither a strengthening nor weakening effect on heart activity, while in 1–20,000 there is a weakening effect. The influence of adrenaline is often but not regularly enhanced by thyroxine, the frequency being increased 7% and stroke height 28%. The hearts of animals treated with thyroxine became more sensitive to adrenaline. FRANCES KRASNOW

Arsenic derivatives of cysteine. J. M. JOHNSON AND CARL VOEGTLIN. *J. Biol. Chem.* **89**, 27–31(1930); cf. *C. A.* **24**, 5874.—It has been shown that reduced glutathione and certain other sulfhydryl compds. protect rats and trypanosomes against the toxic action of As_2O_3 and its aromatic derivs. and the biol. action of As has been explained by the assumption that it combines chemically with cellular SH compds. which are essential to the life of the cell. Further evidence has been obtained by the prepn. of certain As derivs. of cysteine. *Tricysteinylarsine*, from cysteine-HCl and AsCl in alc. soln., white felted needles, decompd. 260°. *Dicysteinyl-3-amino-4-hydroxyphenylarsine*, from cysteine-HCl and 3-amino-4-hydroxyphenylarsenious oxide in alc. soln., small white needles, decompd. 225–7°. A. P. LOTHROP

Antiphlogistic action of certain drugs. The case with the extirpation of the ciliary ganglion. HIROSHI SUZUKI. *Folia Pharmacol. Japon.* **11**, No. 1, 1–10, Breviaria 1 (1930); cf. *C. A.* **25**, 351.—According to the neurological theory, anti-inflammatory action is controlled, on the one side, by a point of attack in the nerve center and, on the other side, by a point of attack lying in the periphery. On this basis central and peripheral antiphlogistic drugs are differentiated. The ciliary ganglions of rabbits eyes were extirpated and 3 days later the eye was inflamed with mustard oil. An injection of antiphlogistic drugs was made 2 min. after the mustard oil treatment. Subcutaneous injection of antipyrine, quinine, erycon and sinomenin gave an antiphlogistic action. After 3 days, however, the further course of the inflammation is more unfavorable by use of sinomenin than in the control. Extirpation of the ganglion weakens somewhat the action of antipyrine and erycon. Their action appears both central and peripheral. Quinine and sinomenin are not affected by removal of the ganglion and their action is chiefly peripheral. Salicylic acid is very weak. G. H. W. L.

The drugs used in Chinese medicine as antidiabetica. Noriyuki Sugihara. I. Experimental investigation on the influence of the drugs used in Chinese medicine on

the blood sugar of rabbits. PUINGKI MIN. *Folia Pharmacol. Japon.* **11**, No. 1, 11–21, Breviaria 1–2(1930).—Many plants were employed by the Chinese as antidiabetica. Two hundred and fifty g. of each plant was heated with 2000 cc. water on a water bath for 5 hrs. and then filtered. The filtrate was concd. to 500 cc. A rabbit was given *per os* 25 cc. per kg. body wt. According to the dose, *Lonicera japonica, Paeonia obovatae, Trichosanthes kirilowii, Coptis teeta, Licium chinense, Phyllostachys bambusoides, Liriop, graminifolia* and *Bupleurum falcatum* increase the blood sugar rapidly, reach their max. in $^1/_2$ to 1 hr. and then gradually decrease. After 5–6 hrs. the original value is reached. II. *Ibid* 21–33, Breviaria 2–3.—Twelve other Chinese drugs were investigated in a manner similar to that reported above. These all showed an increase in blood sugar and then a fall. One alone, *Rehmannia lutea*, showed no preliminary increase, but reduced the blood sugar from the beginning. G. H. W. LUCAS

The pharmacological action of tetrahydroharmin. FUMIO SETO. *Folia Pharmacol. Japon.* **11**, No. 1, 34–41, Breviaria 3(1930).—*Paganum harmala* contains three alkaloids, harmine, harmatine and tetrahydroharmine. The action of the last resembles that of the two former, but in general is weaker. It has a depressant action on heart and skeletal muscle of frogs, excised rabbit intestine and uterus (in large doses). It stimulates earthworm muscle, lowers blood pressure in rabbits, causes shallow respiration and dilates blood vessels in the rabbit ear. The main difference lies in the fact that the tetrahydroharmine causes remarkable constriction in the vessels in the frog leg, and in a proportional small dose stimulates the excised rabbit uterus. G. H. W. LUCAS

Investigations on the pain-depressant action of some agents used for rheumatism and neuralgia with a toothache comparison. TOICHIRO KONDO. *Folia Pharmacol. Japon.* **11**, No. 1, 84–93, Breviaria 6(1930).—Earlier expts. on the pain of rheumatism and neuralgia left much to be desired, but it was found that certain remedies were beneficial. Investigation was begun to ascertain the effect of these remedies on toothache, according to the method of Nagira. The tooth was cut across, the pulp electrically stimulated, and a twitch of the cheek muscle noted. Antipyrine and erycon lowered the sensitivity on stimulation, and acted also on toothache. Simomenine and salicylic acid were actionless. Quinine also had no effect in toothache. At higher and lower temps., the artificial toothache reflexes were increased, and the above-mentioned remedies acted as pain depressants. G. H. W. LUCAS

The influence of antiutrin and thyroxine on the growth of in-vitro cultures of fibroblast. SEIICHI SEMURA. *Folia Pharmacol. Japon.* **11**, No. 1, 94–105, Breviaria 6–7 (1930).—Very little information has appeared in the literature on the effect of thyroxine and pituitary hormone on the growth of cultivated tissue. Expts. have been undertaken by S. to measure the effects of these on *in vitro* cultures of fibroblast. A stock of fibroblast, 1 to 2 months old, from the ventricle of chick embryo was grown in chick plasma, together with an equal vol. of embryo fluid. In other expts. the nutrient medium was plasma and Ringer soln. The usual cover-glass, hanging-drop method was used. In tissue juice cultures, antiutrin and thyroxine caused an increase in growth. With increasing concn. of these, the growth-promoting action was increased, but very high concns. produced an inhibition. In plasma and Ringer soln. growth was very slow, and degeneration followed. When tissue juice was absent, growth was accelerated considerably, and degeneration did not set in rapidly. G. H. W. LUCAS

The existence of peripheral parasympathetic tonus in the isolated rabbit intestine. MASAMI TAKAHASHI. *Folia Pharmacol. Japon.* **11**, No. 1, 106–25, Breviaria 7–8(1930).—The effects of atropine on pieces of rabbit intestine have been studied by the Magnus method. Very small doses caused a fall in tonus, together with a decrease in frequency and diminution of the pendular movement. A moderate dose, however, after a short arrest, produced increase in tonus with an increase in frequency and strengthened pendular movements. Very small doses of atropine also hindered the stimulating action of acetylcholine, pilocarpine and physostigmine on the intestine. It had no action, however, on adrenaline and Ba. The depressant action of atropine increased when the parasympathetics of the intestine were stimulated by a decrease of Ca or increase of K in the nutrient medium, or by the agents mentioned above. Conversely, the depressant action was considerably weaker when the excitability of the parasympathetics was reduced through a low Ca content of the medium. It was almost lost when the intestine was stimulated with Ba. It was completely independent of adrenaline action. Its action apparently was on the parasympathetic endings. One must assume that isolated intestine still possesses a certain peripheral tonus from the parasympathetics. The peripheral tonus may be due in part to choline. Contrary to published data, T. has found that after repeated washing of a piece of intestine with nutrient soln.

atropine still had its depressant effect. Other factors yet unknown must influence this peripheral tonus. G. H. W. LUCAS

Neutralization of various poisons by thorium X. AVERSENQ, JALONSTRE AND MAURIN. *Compt. rend.* **191**, 734–6(1930).—The injection of 5–10 γ of Th X into a guinea pig 5 min. after the injection of a lethal dose of sparteine sulfate prevents the development of toxic symptoms. A bowl of fish was rendered resistant to a lethal dose of picrotoxin by the addn. of 100 γ of Th X to the water in which they swim. Kephir grains in a favorable medium have their growth arrested by picrotoxin but this poison has no effect in the presence of 10 γ of Th X. Th X is also able partly to neutralize the effects of tetanus toxin. C. M. MCCAY

Studies on muscular inhibition. V. Importance of urea on inhibition and on muscle excitability. GIULO BUCCIARDI. *Boll. soc. ital. biol. sper.* **5**, 641–3(1930).—The degree of inhibition of muscle tissue is greater in weak or medium concns. of urea solns. than in strong concns.; the elec. excitability, however, diminishes rapidly with increasing concns. of urea. PETER MASUCCI

The action of chromium on lipoids. I. Microhistochemical studies. C. CIACCIO. *Boll. soc. ital. biol. sper.* **5**, 697–700(1930).—C. confirms his previous results, namely, that the fat of normal adipose tissue and fat from infiltration give a negative result with his process, whereas the myelin sheath and lipoids of autolyzed organs give positive results. The tissues should remain in the fixing fluid for 24 hrs. and then be placed in the chromate bath 24–48 hrs. at 38–40°. The positive results obtained with commercial olein by Kauffmann and Lehmann are attributed to the presence of free oxidized acid. **II. Chemical studies.** *Ibid* 701–4.—After chrome treatment, olein is completely removed by solvents. The phospholipoids are rendered completely insol. and are not appreciably hydrolyzed. PETER MASUCCI

The inhibiting action of digitonin on the development of adenocarcinoma of the mouse. PIETRO RONDONI. *Boll. soc. ital. biol. sper.* **5**, 722–3(1930).—Mice were injected with digitonin 7–9 days before the grafting of the tumor. There was a marked inhibition in the development of neoplastic tissue in the treated mice compared with the controls. PETER MASUCCI

Studies on parathyroidectomy syndrome. III. Its course in animals under strontium and calcium treatment. M. COMEL. *Boll. soc. ital. biol. sper.* **5**, 729–32 (1930); cf. *C. A.* **24**, 5814.—In the parathyroidectomized animal treated with toxic doses of Sr, it is possible to impede tetany but not the picture of the parathyroidectomy syndrome, which eventually results in the death of the animal in marasma and cachexia. The antitetanic action of Sr is different from that of Ca and has its seat in the nervous system. **IV. The effect of irradiated ergosterol administered in excessive doses and its mechanism.** *Ibid* 732–4.—Irradiated ergosterol in large doses, 0.5–0.7 million rat units, administered to parathyroidectomized dogs impedes the onset of tetany and other functional symptoms characteristic of parathyroid insufficiency. However, there are no marked serological changes; it does not prevent hypocalcemia. There is some increase in blood P so that the ratio Ca/P is not lowered to the level common to tetany. Later, the hypocalcemia disappears rather quickly and the blood Ca becomes normal. Simultaneously, the blood P also decreases and the ratio Ca/P becomes normal. This behavior is attributed to the presence of accessory parathyroid tissue and to the formation of compensating factors. PETER MASUCCI

Changes in the parathyroids under experimental strontium treatment. M. COMEL. *Boll. soc. ital. biol. sper.* **5**, 735–7(1930); cf. *C. A.* **24**, 4854.—In dogs receiving toxic doses of Sr, the parathyroids show no cellular changes but only a marked hyperplasia. PETER MASUCCI

Ergosterism in pups nursed by the mother treated with excessive doses of irradiated ergosterol. M. COMEL. *Boll. soc. ital. biol. sper.* **5**, 738–40(1930).—Under intensive ergosterol treatment, enough ergosterol passes into the milk of the mother to produce toxic symptoms of ergosterism in the pups. PETER MASUCCI

Further data on the action of bulbocapnine on man. UMBERTO DE GIACOMO. *Boll. soc. ital. biol. sper.* **5**, 757–8(1930); cf. *C. A.* **24**, 5870.—Bulbocapnine administered intravenously (100-mg. doses) produced in 25% of the cases cataleptic phenomena without muscular hypertonia. The drug, however, almost invariably provoked a stupor characterized by a psychic and psycho-motor torpor, or brief confusional excitement. PETER MASUCCI

Changes in renal threshold during insulin therapy in diabetics. G. SORGE. *Boll. soc. ital. biol. sper.* **5**, 762–4(1930).—*In certain diabetics, insulin raises the renal threshold for glucose, chlorides and water.* PETER MASUCCI

The influence of bulbocapnine on blood calcium and potassium. S. GULLOTTA.

Boll. soc. ital. biol. sper. **5**, 768–70(1930).—Bulbocapnine disturbs the electrolyte equil. of the blood in a manner analogous to that found by Fischer in somnifen narcosis. A marked lowering in Ca coincides with the somnolence, while a marked lowering of K corresponds to the increase in catalepsy. PETER MASUCCI

The mechanism of action of barium chloride. ALFREDO CHISTONI. *Boll. soc. ital. biol. sper.* **5**, 786–8(1930).—If the vagal tone of the dog is increased by means of pilocarpine (0.1 mg. per kg.) it is possible to obtain an increase in intestinal peristalsis and a purgative action by $BaCl_2$ in doses of one mg. per kg. body wt. The action of $BaCl_2$ is not essentially muscular, but involves the parasympathetic nervous system. PETER MASUCCI

Attempts to prepare compounds of the rare earths for therapeutic use; a contribution to their pharmacologic properties. P. NICCOLINI. *Boll. soc. ital. biol. sper.* **5**, 795–7(1930).—The albuminate, peptonate and nucleinate of Nd were prepd. but these compds. were of no therapeutic value on account of their slight soly. A compd. of La and trypan blue was prepd. which contained 0.2% $LaCl_3$. In general the pharmacologic studies showed it to be non-toxic, but bacteriol. tests revealed the absence of bactericidal properties. The use of rare earth compds. in the treatment of tuberculosis must await the development of sol. org. salts which possess antiseptic powers. PETER MASUCCI

Adrenaline erythrocytosis and leucocytosis. MODESTO DALLA PALMA. *Minerva méd.* **1930, II**, 397–404.—One mg. adrenaline was injected intramuscularly into 20 patients, 15 of whom were affected with splenomegalia. The number of erythrocytes, leucocytes, general reaction, pulse, arterial pressure and splenic contraction were studied and correlated. Erythrocytosis was independent of leucocytosis and ran more parallel to the splenic contraction than the leucocytosis. PETER MASUCCI

The toxicity of the seeds from Artemisia maritima L. compared with that of santonin. MAURICE M. JANOT AND ROBERT MOUTON. *Bull. sci. pharmacol.* **37**, 593–9 (1930).—An infusion 1:100 of the so-called "seeds" (flower heads) of *Artemisia maritima* L. contg. 1.75% of santonin was compared with a soln. of santonin (0.0175%). A soln. of the essential oil of the drug was tested. Expts. with *Lumbricus terrestris* L. and *Carassius auratus* showed a higher toxicity of the drug ext. than of the santonin soln. The soln. of essential oil, as well as a soln. of cineole, main constituent of the oil, is very toxic. *Ascaris megalocephala* was treated with Bunge's soln., with santonin and with the drug ext. The last one caused the strongest toxic symptoms; the first, none at all. Only 1 out of 6 died in the first and in the last test; all survived in the santonine. Conclusion: The time of surviving is not a measure for the efficacy of a vermifuge, as the parasites are expelled while alive. A. E. MEYER

Therapeutic action of sugar in cardiac insufficiency. N. KISTHINIOS AND D. M. GOMEZ. *Presse méd.* **38**, 1363–4(1930).—In cases where ouabain had failed, 80 g. of coned dextrose soln. followed by an injection of 4 units of insulin gave prompt relief. The patient was kept on a Cl-free milk-vegetable diet. A combined treatment with dextrose and ouabain is suggested. A. E. MEYER

Eserine for the regulation of general anesthesia. L. GARRELON, GEO. PASCALIS AND L. THUILLANT. *Presse méd.* **38**, 1365(1930).—In patients resistant to anesthesia an injection of 0.5 mg. physostigmine salicylate caused a prompt effect. It is recommended, besides, for minor operations combined with morphine or local anesthetics. A. E. MEYER

Insulin in the treatment of cardiac diseases. M. LOEPER, A. LEMAIRE AND R. DEGOS. *Presse méd.* **38**, 1361–3(1930).—Insulin, alone or combined with dextrose, relieves cardiac insufficiency and reënforces the action of specific cardiants. Its effect is on the nutrition of the myocardium and it establishes equil. between the formation and decompn. of glycogen. The doses were 5 to 10 units each morning, and 20 min. later 50 g. dextrose. A. E. MEYER

Aniline poisoning by absorption through the skin. ATILIO C. GRAPIOLO AND JUAN TENCONI. *Rev. sudamericana endocrinol. inmunol. quimioterap.* **13**, 809–11(1930).—Report of a case of acute aniline poisoning caused by a black dye used on shoes. The main symptom was cyanosis, accompanied by certain nervous disturbances and cyanopsia. A. E. MEYER

Diabetic coma followed by hypoglucemic coma without interruption. PEDRO ESCUDERO AND GUILLERMO SCHULTZ ORTIZ. *Semana méd.* (Buenos Aires) **1930, II**, 1537–40. After application of large doses of insulin in a case of diabetic coma, the hypoglucemic coma developed before the acidosis disappeared. A. E. MEYER

The action of peptone on the gastric secretion. IRIS TESSIERI. *Semana méd.* (Buenos Aires) **1930, II**, 1579–86.—Peptone increases the duration and quantity of

gastric secretion. Liquids remain longer in the stomach if peptone is present. The acidity is increased, especially when liquid food is given. In certain cases of anachlorhydria the normal constituents of gastric acidity were produced. No effect was observed in gastric cancer and in highly developed gastric insufficiency. A. E. M.

The sugar content of cerebrospinal fluid. I. Studies on the influence of glucose and and of adrenaline hyperglucemia as well as of glucose plus adrenaline hyperglucemia on the spinal-fluid sugar. CARL J. MUNCH-PETERSEN. *Acta Med. Scand.* **74**, 31–58 (1930).—The ratio spinal-fluid sugar × 100/blood sugar after glucose hyperglucemia is usually within 55 to 65, higher values of this ratio indicating an org. disease of the central nervous system. With a hyperglucemia up to 160 mg. % the spinal-fluid sugar shows a max. increase 2.5 hrs. after an injection of adrenaline. S. MORGULIS

Experimental studies on the influence of the enteral administration of yeast biocatalyzers on the chemical processes in muscle and liver during training. J. A. COLLAZO, G. LISS AND C. PI-SUÑER BAYO. *Biochem. Z.* **227**, 326–33(1930).—The enteral administration of yeast causes a marked increase in glycogen and P and diminution in lactic acid and lactacidogen of the muscles as compared to that of control animals The glycogen content of the liver is also increased and so is also the lactic acid content S. MORGULIS

Studies on the growth effect of carotenoids. MARGARETA RYDBOM. *Biochem. Z.* **227**, 482–7(1930).—Two carotenoid esters, lutein distearate and xanthophyll distearate, even in 0.05-mg. daily doses, have no effect on growth. Carotene injected intramuscularly causes strong stimulation of growth. S. MORGULIS

Effect of cations of Ringer solution on the diameter of the blood vessels of the frog. M. KOCHMANN. *Biochem. Z.* **227**, 488–91(1930).—The mixt. of the 3 ions, K, Na and Ca, usually causes vasoconstriction in the Lawen-Trendelenburg prepn. The most favorable mixt. for producing and maintaining vasodilation is one consisting of 92% NaCl (0.5612%), 3% KCl (0.0234%) and 5% $CaCl_2$ (0.0575%), and even slight changes in proportion produce significant and at times irreversible alterations. S. M.

The pharmacological action of the exotoxin of Staphylococcus aureus. C. H. KELLAWAY, F. M. BURNET AND F. ELEANOR WILLIAMS. *J. Path. Bact.* **33**, 912(1930). The intravenous injection of crude agar staphylococcal toxin causes a transient fall in blood pressure of the cat and the rabbit with recovery above normal and then a rapid terminal fall. The initial transient fall is vasomotor in origin; the rise above normal is probably due to an increased output of adrenaline; and the final fall is due to obstruction of the pulmonary circulation. JOHN T. MYERS

The influence of liver extract effective in pernicious anemia upon the diameter of erythrocytes in experimental anemias. G. PAYLING WRIGHT AND BARBARA ARTHUR *J. Path. Bact.* **33**, 1017–34(1930).—Liver ext. mitigates the anemia produced by phenyl hydrazine as indicated by symptoms and an increased diam. of the erythrocytes, but this phenomenon is probably entirely different from the effect in pernicious anemia. JOHN T. MYERS

The influence of testicular extract on dermal permeability and the response to vaccine virus. DOUGLAS MCCLEAN. *J. Path. Bact.* **33**, 1045–70(1930). Intravenous inoculation of the ext. enhances the local lesions of intradermal injections of vaccine virus. It has no effect on the virus response to applications to the closely shaven skin. Testicular ext. has a similar enhancing effect on dermal response to diphtheria toxin. This effect is due to increased dermal permeability, with increased diffusion of the virus. The active substance in the ext. is not pptd. in the nucleoprotein fraction thrown down by weak acids, though a small quantity is adsorbed. It can be pptd. by alc. or ether, and obtained in soln. with only a trace of protein and no carbohydrate or S. While there is no direct evidence that the effect is due to a protamine or histone, somewhat similar results follow the injection of these substances. JOHN T. MYERS

The treatment of dog piroplasmosis with trypaflavine. G. DOMAGK AND W. KIKUTH. *Zentr. Bakt. Parasitenk.*, 1 Abt., **118**, 401–6(1930). JOHN T. MYERS

Idiosyncrasy to quinine, cinchonidine and ethylhydrocupreine and other levorotatory alkaloids of the cinchona series: Further chemical delimitation of the idiosyncrasy; alteration in sensitiveness. W. T. DAWSON AND FRANCIS A. GARBADE. *J. Pharmacol* 39, 417–24(1930).—Skin sensitivity of a quinine-sensitive patient to the following compds is reported: ethyl-, amyl- and isoamyl-quitenine, ethyl-, isopropyl-, propyl- and isobutyl-hydrocupreine, hydroquinine, cupreine, apoquinine, qdinoline. Negative results were obtained with quitenine, cinchotenidine, cinchotenine, quitenidine, quinicine, cinchomicine, hexyl-, isoöctyl- and dodecyl-hydrocupreine, nitro- and amino-hydroquinine, quinamine, plasmochin. Isoamylhydrocupreine gave negative results on the 1st test, positive two months later. C. RIEGEL

Some observations on the effect of pitressin upon the cardiovascular system. CHARLES M. GRUBER AND WM. B. KOUNTZ. *J. Pharmacol.* **39**, 435-47(1930); cf. *C. A.* **24**, 5874.—Pitressin, either in acid or alkaline soln., caused constriction of the coronary vessels of the excised perfused frog heart, and an increase in vol. of the dog heart when injected intravenously. Pitocin caused dilatation of coronary vessels and had no effect on cardiac vol. C. RIEGEL

The effect of adrenaline upon the rate of contraction and upon the conduction time of peristalsis and antiperistalsis in excised ureters. CHARLES M. GRUBER. *J. Pharmacol.* **39**, 449-56(1930).—There was no marked difference between the rate of conduction of peristaltic and antiperistaltic waves in the pig ureter. Adrenaline increased the rate of conduction in both types of waves. Segments taken from the ureter near the kidney were as sensitive to the action of adrenaline as segments taken at some distance from the kidney. C. RIEGEL

A study of the innervation of the pylorus of the terrapin. NOLAN L. KALTREIDER. *J. Pharmacol.* **39**, 469-82(1930).—The effect of the following on the contraction of the excised pyloric sphincter in a bath of oxygenated Ringer soln. was studied: pilocarpine, atropine, adrenaline, ephedrine. Pilocarpine caused rhythmic contractions which were inhibited by atropine (vagal action). Adrenaline and ephedrine inhibited movements initiated by pilocarpine in both the pyloric sphincter and in segments of the small intestine in the majority of cases. Conclusion: The sympathetic fibers to the pylorus are mainly inhibitory, although occassionally excitatory fibers predominate. C. RIEGEL

Synergism of local anesthetics. T. H. RIDER. *J. Pharmacol.* **40**, 7-22(1930).—A synergic effect on the onset of anesthesia in the sciatic nerve of the frog was shown by mixts. of KCl-cocaine, NH_4Cl-cocaine, $MgCl_2$-cocaine and butyn-cocaine. Synergism also was exhibited by the latter mixt. on the duration of anesthesia on the rabbit's cornea C. RIEGEL

Studies on calcium. I. Some comparative pharmacological effects following the intravenous injection of calcium lactate and calcium gluconate in unanesthetized dogs. ARNOLD L. LIEBERMAN. *J. Pharmacol.* **40**, 65-70(1930).—There was a rise in blood pressure, slowing of the pulse rate, more marked and more prolonged with the gluconate. A digitalis like action on the heart was observed. In 2 dogs intravascular clotting occurred. With excessive doses Cheyne Stokes respiration was observed. **II. Urinary output of calcium in normal individuals after peroral administration of calcium lactate and calcium gluconate.** *Ibid* 71-6.—Diuresis occurred. From 5 to 8% of the Ca was recovered in the urine. Distressing symptoms were greater with the lactate. Greater absorption, with a min. of distress, was obtained if the Ca salt was given after a meal. C. RIEGEL

Comparative actions of sympathomimetic compounds: synephrine isomers and ketone. M. L. TAINTER AND M. A. SEIDENFELD. *J. Pharmacol.* **40**, 23-42(1930).—All three synephrine isomers and synephrine ketone caused in cats a rise in blood pressure unmfluenced by removal of the adrenals, the levo form being the most effective. In ergotaminized or cocainized cats the pressor response was unchanged, indicating that the action was more peripheral than that of adrenaline—a direct stimulation of vascular muscle. Evidence of musculotropic action was obtained also with excised spiral of sheep carotid, perfused rabbit ears, segments of rabbit duodenum and on the bronchi of cats and dogs. Racemic synephrine reduced the chemosis produced in the rabbit eye by mustard oil. C. RIEGEL

Comparative actions of sympathomimetic compounds: catechol derivatives. M. L. TAINTER. *J. Pharmacol.* **40**, 43-63(1930).—A comparative study was made of the pressor and pulse rate actions of *l*-, *dl*- and *d*-adrenaline, epinine, adrenalone and catechol in urethanized and atropinized cats. All had pressor action which was prevented by the injection of ergotamine, and sensitized by cocaine injection. The results with catechol, while variable, point to the conclusion that the catechol nucleus of the compds. is necessary for action on the sympathetic system. C. RIEGEL

Toxicity of rotenone, isorotenone and dihydrorotenone to goldfish. W. A. GERSDORFF. *J. Am. Chem. Soc.* **52**, 5051-6(1930); cf. *C. A.* **24**, 4556.—The toxicity of rotenone (I) begins at a higher concn. than that of dihydrorotenone (II) (about twice, according to Powers' formula) and a lower concn. than that of isorotenone (III) (about 1/4). The toxicities of I and II increase with increase in concn. at about the same rate but this rate is lower in the case of III (about 1/8). At higher concns., I is the most toxic and III the least. According to Powers' formula, which is an expression of relative toxicity based on the first 2 variables, these substances have the following decreasing order of toxicity: II, I, III. C. J. WEST

Trypanocidal activity and chemical constitution (EVERETT) **10.** Alkaloid from *Anona reticulata Linnaeus* (SANTOS) **10.** *p*-Aminophenylguanidine hydroiodide (BRAUN) **10.**

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12—FOODS

F. C BLANCK AND H. A. LEPPER

Some notes on air filtration in a food factory. S. LANCEFIELD. *Ind. Chemist* **6**, 452(1930). E. H.

A study of Mexican wheats as raw material for the milling and baking industries. EDUARDO B. GUZMÁN. *Rev. quím.* **6**, 17–27(1930).—Descriptions and analyses of the various wheats grown in Mexico are given. L. E. GILSON

Effect of carbohydrates and other impurities on the crystallization of glutamic acid hydrochloride from decomposition products of soy-bean protein. M. MASHINO AND T. SHISHIDO. *J. Soc. Chem. Ind., Japan* **33**, Suppl. binding 421–2(1930); cf. *C. A.* **24**, 3025.—MeOH extn. removes objectionable impurities from soy-bean cake. This ext. was added in varying amts. to the HCl-hydrolyzed soy-bean product, where it diminished yields of glutamic acid-HCl severely. Starches or their degradation sugars had a similar, though less pronounced, effect. Extn. with MeOH might make the 40–45% proteins of the soy bean available for the manuf. of glutamic acid. K. H. E.

A study of the utility of protein peptization by inorganic salt solutions as a means of predicting loaf volume. W. F. GEDDES AND C. H. GOULDEN. *Cereal Chemistry* **7**, 527–56(1930).—Peptization studies have been conducted on 102 straight-grade flours, experimentally milled from com. samples of hard red spring wheat grown in Western Canada in 1928. These samples included wheats grading from No. 2 Northern to No. 6, the predominating forms of damage in the lower grades being immature and frosted kernels. Peptization detns. were conducted on the entire series with 0.5 *N* $MgSO_4$, the Gortner method being used, and on a part of the series with 0.5 *N* KBr and 0.5 *N* KI by a simplified procedure. The samples were baked by the basic, malt and bromate formulas. The mean total protein and peptized protein were quite uniform for the different grades, this uniformity indicating no essential difference between peptizability of the flour proteins from sound wheat and immature and frost-damaged wheat. Baking results with the bromate formula combined with progressively decreasing responses to the differential test indicated inferior baking quality with decreasing grade. High neg. correlations were obtained between total protein and percentage total protein peptized, which were not due to less complete extn. of the high-protein flours. The response of an experimentally milled flour to bromate depends, in part, on the quantity of protein present and in part on other facts usually included in the term "protein quality." Correlations computed between percentage of the total protein peptized and loaf vol. are not a satisfactory measure of the relative value of the peptized and non-peptized fractions for baking purposes, since their magnitude is, in part, a reflection of the relation between total protein and loaf vol. Partial correlations involving the use of total protein as an invariant with peptized and non-peptized protein as variables cannot be utilized because total protein contains both these fractions. A satisfactory comparison of the 2 protein fractions may be made by computing partial correlations, peptized protein, non-peptized protein and loaf vol. being used. The basic baking procedure revealed no significant difference in the relative values of the peptized and non-peptized protein fractions for baking purposes and also gave somewhat lower correlations between protein content of flour and loaf vol. than the malt and bromate methods. The peptization data with 0.5 *N* $MgSO_4$ showed the non-peptized protein to be somewhat superior to peptized protein in its effect on loaf vol., while the results with 0.5 *N* KI revealed the peptized protein to be superior. The data for 0.5 *N* KBr were not so significant. An analysis of the peptization data (with 0.5 *N* $MgSO_4$ and 0.5 *N* KI) obtained by Gortner on flours milled from

wheat differing widely in type and origin reveals greater differences (in favor of the non-peptized protein) than those obtained in these studies, while the data of MacLeod on Marquis wheat grown from the same seed under different environmental conditions revealed no significant difference between the baking values of the 2 fractions. The "optimum coagulation" theory affords an explanation of the peptization data thus far published. L. H. BAILEY

Relation between crude-protein content and loaf volumes obtained by two different methods of baking. R. H. HARRIS. *Cereal Chemistry* 7, 557–70(1930).—A study was made of 59 samples of Marquis wheat grown in the territory more or less adjacent to Saskatoon. The samples were milled experimentally into a 75% patent flour and the flour was baked by the basic method. They were also baked by a formula including 1% of malt and 0.001% $KBrO_3$. With an increase of vol. greater than 10% by the latter method, the samples were rebaked with 3% malt and 0.5% Arkady. Coeffs. of correlation between baking strength and protein content obtained by the latter method were significantly higher and appeared to justify the conclusion drawn by Larmour (1930) that com. use of the protein test is justified as a factor in the classification of hard red spring wheat. L. H. BAILEY

Contribution to the knowledge of colloid chemistry of gluten. III. H. L. BUNGENBERG DE JONG AND W. J. KLAAR. *Cereal Chemistry* 7, 587–91(1930); cf. *C. A.* **24**, 4095.—The relative viscosity of an acid gliadin sol passes through a max. in ±44% acetone by vol. In higher acetone concns. a strong dehydration takes place. A gradual increase of the % rise in relative viscosity in 44% acetone takes place at both sides of the point of maximal hydration of the gliadin sol. Sepn. may be observed microscopically at both sides of this point in aq. medium. L. H. BAILEY

Relation of the overgrinding of flour to dough fermentation. L. P. KARACSONYI AND C. H. BAILEY. *Cereal Chemistry* 7, 571–87(1930).—Overgrinding wheat flours resulted in substantial increases in diastatic activity as measured by the Rumsey autolytic method. The magnitude of the proportional increase was in inverse ratio to the initial diastatic activity of the untreated flour. Gas production and gas retention in freshly mixed doughs, and in doughs previously fermented for 3 hrs. were not substantially modified by overgrinding. This suggests that the Rumsey method for measuring diastatic activity may fail at times to afford an adequate basis for estg. the fermentation potentialities of a wheat flour when measured either in terms of gas production, gas retention or fermentation tolerance. L. H. BAILEY

The composition of cow milk in Finland. A. I. VIRTANEN. *Milchwirtschaft. Forsch.* 9, 355–64(1930).—Samples from different breeds and from different parts of the country are low in protein (3.12%) and high in lactose (4.94%). The fat and protein begin to drop in October and reach a min. in May. The protein drops as low as 2.8%. The sugar begins to increase in January and reaches its max. in March or April with a min. in August or September. When cows go on pasture, fat and protein increase rapidly with a max. of 3.3 to 3.5% in September or October. There exists an antagonism between protein and fat on the one side and lactose on the other. The phenomenon is probably due to feed. Ca and P remain unchanged. Analyses show 23.36 to 25.13% CaO and 29.20 to 30.85% P_2O_5 in ash. GEORGE R. GREENBANK

The relation between the calcium content of Allgau soils and the calcium content of the milk and its coagulability by rennin. K. WURSTER. *Milchwirtschaft. Forsch.* 9, 258–85(1930).—There was little variation in the coagulation by rennin. The feed and lactation conditions had little effect. The variations in Ca content are attributed to the progress in lactation The manner of combination of the Ca has more to do with the coagulation by rennin than the amt. G. R. G.

New method of direct analysis with a cubic centimeter of milk. TRIFON UGARTE. *Anales asocn. quím. Argentina* **18**, 137–63(1930).—Fat is extd. by Et_2O-alc., lactose detd. by 5% K_2CrO_4 soln., Cl by $AgNO_3$ soln., and protein and ash by drying, weighing and incinerating. Results are compared with those of standard methods. E. M. S.

The milk peroxidase. W. GRIMMER AND H. ENGLE. *Milchwirtschaft. Forsch.* **10**, 273–96(1930).—G. and E. find no possible means of sepg. the peroxidase. The peroxidase reaction is increased by digestion of the protein with pancreatin. Heat increases the reaction after flocculation of the albumin. They show that the milk peroxidase is closely related to albumin. It is probably a complex bound to the albumin, little influenced by pancreatin but sepd. from the albumin by the flocculation of the latter by heat The chem. nature of the peroxidase is not explained. G. R. G.

Indication of glucose in milk. CARRELL H. WHITNAH. *J. Am. Chem. Soc.* **53**, 300–4(1931).—A method for estg. small quantities of glucose in milk depends upon the selective fermentation of the glucose and measurement of the rotatory power of fer-

mented and unfermented milk. Changes in rotatory power corresponding to percentages from 0 to 0.35% glucose have been found in normal cow milk. The percentages of glucose, lactose, fat and solids and the d. were detd.; the presence of apparent glucose seems to be independent of any of the other characteristics of the milk which were measured. C. J. WEST

Curd casein and methods of testing. FRIEDEL. *Milchwirtschaft. Ztg.* **34**, 1680–1 (1929).—In order to produce good casein the curd must be fresh, metal-free and of low fat content. Lactose causes caramelizing on drying. Acid casein forms salts on soln. in alkali. Rennet casein is high in ash. Mixts. of acid and rennet curd make poor casein. Buttermilk and sour milk cannot be used. The H_2O content of the curd should be low; it should not exceed 6 to 8%. The fat is detd. by soln. in borax followed by the usual methods of detn. for skim milk. Acid is detd. by the addn. of an excess of 0.1 *N* alkali and back titration with 0.1 *N* acid. Fifty g. of casein should dissolve in 300 cc. of a $2^1/_2$% borax soln. when held at 65° for 10 min. GEORGE R. GREENBANK

The boundary-surface water-fat in butter. N. KING. *Milchwirtschaft. Forsch.* **9**, 501–19(1930).—K. studies the relationship between the structure of butter and the chem. changes in the fat phase. He considers the continuous phase as a liquid fat fraction, which is in direct contact with the water droplets. Chem. and bacteriol. changes occur first in the adjoining surface between the H_2O drops and the fat. The boundary surface between the H_2O droplets and fat is calcd. from the diam. of the H_2O droplets. According to Rahn and Sharp the small droplets are buttermilk and the larger ones wash water. He finds that the greater boundary surface occurs in the smaller droplets; therefore the greater spoilage comes from the buttermilk. Fe and Cu from equipment in poor condition are responsible for more defective butter than the wash water. GEORGE R. GREENBANK

Some color-producing organisms in butter-washing water. G. F. V. MORGAN *New Zealand J. Agr.* **41**, 315–8(1930).—The following color-producing organisms were isolated from butter-washing waters: (1) *Chromobacterium violaceum*, producing violet spots; (2) *Rhodococcus rosaceus*, producing a pink coloration; (3) *Bacterium fluorescens*, producing green coloration; and (4) a short Gram-pos. rod of uncertain classification, forming a bright orange pigment. K. D. JACOB

The preparation of milk for Cheddar-cheese manufacture and its relation to quality. A. B. SHELTON. *Agr. Gaz. N. S. Wales* **41**, 760–4(1930); cf. *C. A.* **24**, 3573. K. D. JACOB

Black discoloration in annatto-colored cheese. G. F. V. MORGAN. *New Zealand J. Agr.* **41**, 100–5(1930).—The discoloration was due to the action of microörganisms on Pb salts present in the annatto ext. used in coloring the cheese. K. D. JACOB

Bananas. The behavior and diseases of the banana in storage and transport. CLAUDE W. WARDLAW AND LAURENCE P. MCGUIRE. *Trop. Agr.* (Trinidad) **7**, 183–9, 214(1930).—Cavendish and Gros Michel varieties keep best at temps. of 53–55° F. The storage atm. should be changed at least once daily. A. L. MEHRING

Tomato varieties and pulping quality. F. C. ELSWORTH. *Agr. Gaz. N. S. Wales* **41**, 741–3(1930).—Data are given on the content of total and sol. solids and skins and seeds in several varieties of tomatoes used for the prepn. of tomato pulp. The Marglobe, Columbia, Norton and Bonny Best varieties give a high yield of total solids and produce a pulp with a desirable color. K. D. JACOB

Sulfur dioxide in dried fruit. F. G. ANDERSSEN. Union S. Africa Dept. Agr., *Sci Bull.* **84**, 14 pp.(1929).—Apricots and sultanas were sulfured for various periods and in various concns. of SO_2, and were partially dried in the shade for 0–4 days before placing in the sun. Partial shade-drying very definitely had the effect of reducing the amt. of SO_2 in the final product. First-grade apricots and probably also pears and peaches could easily be produced with a SO_2 content well below the max. (2000 p. p. m.) allowed by the Brit. Public Health Regulations. Various attempts to reduce the SO_2 content of sultanas below 750 p. p. m., the max. allowed under the regulations, were unsuccessful, all first-grade sultanas contg. at least 1000 p. p. m. SO_2. Fairly green sultanas absorbed less SO_2 than fully ripe ones, but the latter are recommended because of better quality. Sulfured fruit contained much more acid, more reducing sugar and less non-reducing sugar than unsulfured fruit. K. D. JACOB

Diastatic activity of some American honeys. R. E. LOTHROP AND H. S. PAINE *Ind. Eng. Chem.* **23**, 71–4(1931).—German importers of honey test it for diastatic activity. American honey is often penalized for low diastase content, probably because of overheating. In general, honeys with a dark color are high in diastase, while those with a light color are low, although there is a wide variation in honeys of the same floral type. Gothe's method of detg. diastase, which is used by German chemists, is in-

accurate, since the p_H value, which it does not take into consideration, has an effect on diastatic activity. A modification of this method has been developed in which the p_H is controlled. AMY LEVESCONTE

The effect of heat on the diastatic enzymes in honey. H. W. DE BOER. *Chem. Weekblad* **27**, 646–8(1930).—The method of Gothe (*C. A.* **9**, 1077) was used to det. the amt. of diastatic enzymes present in honey from various sources, after heating 1–24 hrs. at temps. of 60–90°. The amt. of diastatic enzyme is not reduced when a typical honey is heated for 24 hrs. at 60° but is completely destroyed by heating for 1 hr. at 90°. W. GORDON ROSE

Cattle feeds of western India. D. L. SAHASRABUDDHE. Bombay Dept. Agr., *Bull.* **161**, 23 pp.(1930).—Analyses of various oil cakes, oil seeds, grains, grain by-products, leaves, stems, roots and silages used as cattle feeds in western India are tabulated. K. D. JACOB

The alimentary value of feeding stuffs and their chemical composition. CARLO TOA. *L'alimentazione* **1**, 11–21(1930).—The chem. compn. and the alimentary value of leaves vary in a given plant with the time of harvest and the state of preservation. The leaves of trees are very similar in chem. compn. to those of leguminous plants, being richer in N compds. and fat. The digestibility of these leaves is not inferior to that of leaves of leguminous plants. Straw from cereals contains raw proteins 2.5–6, fat 1–3, cellulose 34–44 and carbohydrates (pentosans) 33–38%. Straw of beans and peas is more nutritive. The consistence and the taste of straw are improved by treating with steam at 4 atm. and NaOH, which causes a partial hydrolysis of the cellulose and pentosans, forming saccharides more easily attacked by the digestive enzymes, and increasing the nutritive value The husks are a little richer in proteins and carbohydrates and poorer in cellulose. The husks and pods of clover and alfalfa are richer in digestible proteins, the nutritive value of which is not much under that of hay. They contain proteins 4.5–10, fat 0.5–1.3 and carbohydrates 30–40%. Blood can be used for feeding animals. The contents of blood in N compds. are for cows 19.14, calves 16.57, pigs 22.23, sheep 16.81, horses 18.71%. Fresh blood is only used with pigs and poultry. Dry blood contains N compds. 80–84, fat and carbohydrates 2.5, and salts 3%. R. SANSONE

Iodine content of some New Zealand pastures. B. W. SIMPSON. *New Zealand J. Agr.* **41**, 179–82(1930); cf. *C. A.* **25**, 732.—The I content of a no. of samples of New Zealand pasture grasses ranged from 0.011 mg. to 0.191 mg. per 100 g. of dry material, depending on the locality and the time of year at which the samples were taken. In general, the I content reached a max. during June and July and was at a min. during Dec. and Jan. K. D. JACOB.

Balanced cubes. CHARLES CROWTHER. *Fertiliser, Feeding Stuffs and Farm Supplies J.* **15**, 747–8(1930).—The production of animal feeds in the form of pellets of various shapes and sizes is meeting with considerable favor in England. The advantages of this form of feed are: a balanced, non-segregating feed may be produced; accurate rationing may be effected with a min. of labor; the feed is cleaner, more easily handled and stored and keeps fresh and wholesome much longer than ordinary feeds; loss of feed is reduced to a negligible amt.; and feed receptacles are maintained in a more sanitary condition K. D. JACOB

Feeding experiments with fermented beet slices and dried slices containing lactic acid. K. POPÍŠIL AND V. SÁZAVSKÝ. *Listy Cukrovar.* **49**, 33–9(1930).—During the feeding of dried beets, the solid content of milk rose 1.63%. In changing from fermented to dried beets, the lactation and live wt. decreased 1.0%. On a diet of dried beets plus lactic acid the yield of milk was decreased 3.7–6% and the consumption of drinking water was decreased 20–30%. A decline in live wt. occurred in changing to 3.87 kg. dried beets; if 4.3 kg. dried beets was fed, the live wt. remained const.; if 0.6 kg. lactic acid was added to the 4.3 kg. dried beets, an increase in live wt. occurred. In general, the lactic acid had no effect upon lactation. Fermentation of wet beets destroys 33% of the beet and increases the transportation costs. The drying of beets decreases their food value 20%. By increasing the dry matter from 6 to 7%, it may become economically profitable to use dried beet slices in cattle feeding. F. M.

Plant and animal nutrition (ESSKUCHEN) **15.** Rapid determination of moisture of wheat and flour (FAIRBROTHER, WOOD) **7.** Packing and wrapping materials [for foodstuffs] (Fr. pat. 687,126) **18.**

MACLEOD, ANNIE L., AND NASON, EDITH H.: **Chemistry and Cookery.** New York McGraw-Hill Book Co. 545 pp. $3.50.

Food. ALFRED DREESSEN. Ger. 506,597, April 26, 1929. Fresh sea fish is preserved by laying bare the backbone and coating with H_2O_2.

Food. ÈTABLISSEMENTS GROSJEAN FRÈRES. Fr. 687,238, Dec. 26, 1929. A food product is composed of a mixt. of dry grated cheese and vegetable or animal fatty substance such as cacao butter or margarine.

Device for determining the water content of flour, etc., by measuring its electrical resistance. FRIEDRICH AMME. Ger. 508,512, Aug. 2, 1929.

Bread. VOLKMAR KLOPFER and VOLKMAR KLOPFERS NAHRUNGSMITTEL A.-G. Ger. 509,033, Aug. 26, 1928. A method of mfg. whole-wheat bread is described in which a dough prepd. at a moderate temp. from bran and water, contg. enzymes, lactic-acid producers and basic mineral substances, is dried *in vacuo* at a low temp., ground, mixed with flour and baked.

Mixing vegetable phosphatides with flour, cocoa, etc. HERMANN BOLLMANN. Ger. 508,353, July 6, 1928. Uniform distribution of the phosphatides is effected by mixing the ingredients in the usual manner, forming the mixt. into lumps in a screw-press, and separately grinding the lumps.

Leavening agent suitable for use as baking powder or in self-rising flours. AUGUSTUS H. FISKE (to Rumford Chemical Works). U. S. 1,787,193, Dec. 30. In order to improve the keeping qualities of phosphate-contg. leavening agents, the phosphatic ingredient such as mono-Ca phosphate is prepd. with an added content of an Fe compd. so that it may contain 2-3% Fe (calcd. as Fe_2O_3) by adding a suitable proportion of Fe or an Fe compd. to the H_3PO_4 from which the phosphate used is made.

Baking powder. AKT.-GES. FÜR MEDIZINISCHE PRODUKTE. Ger. 509,035, Sept. 4, 1928. Dicarboxylic acids that decomp. smoothly and completely at the baking temp. into volatile compds. are used as ingredients of baking powder Derivs. of the acids may also be used. Malonic acid is a suitable acid.

Milk foods. SALAMON SZÉKELY. Ger. 507,725, April 17, 1927. Addn. to 488,848 (*C. A.* **24**, 2212). The method of 488,848 for working up into a food natural milk enriched with colloidal casein is modified in that after pasteurization the milk is inoculated with lactic acid or yoghurt cultures and fermented

Device for the electrical pasteurization of milk, etc. ADRIAAN H. W. ATEN and WARNER LULOFS. Ger. 506,693, Mar. 23, 1928.

Tank and coil apparatus for pasteurizing, cooling and ripening liquids such as milk or cream in bulk. ARTHUR H. BOILEAU (to Cherry-Burrell Corp.). U. S. 1,786,819, Dec. 30. Structural features.

Apparatus for sterilizing milk by treatment with low-tension direct current. WILHELM WOLFRUM. Austrian 119,506, May 15, 1930.

Sterilizing apparatus for bottled liquids such as milk. HUIJGEN EN WESSEL'S INGENIEURSBUREAU. Ger. 509,868, Dec. 21, 1927.

Vacuum evaporator for milk, sugar, sap, etc. EMIL HELLER. Swiss 140,076, Feb. 7, 1929.

Centrifugal separating apparatus for liquids, especially milk. ERNST BLASCHKE Ger. 509,197, May 5, 1926.

Albumin and milk sugar from milk whey. ELIZABETH M. MEYER. U. S. 1,787,754, Jan. 6. A small proportion (suitably about 1-2%) of KNO_3 is added to the whey, followed by admixt. with $Ca(OH)_2$ and gradual addn. of water with stirring, and the resulting soln. is allowed to sep. into a heavy creamy portion and a supernatant, substantially clear portion, and albumin and milk sugar are recovered from the latter

Colloidal solution of edestin-calcium in whey. JOSEF SIREK. Swiss 139,170, May 13, 1929. $MgSO_4$ and H_3PO_4 are added to milk to remove part of the casein, the rest being removed by neutralization of the H_3PO_4 by $MgCO_3$. NaOH is then added to the casein-free liquid and the whole boiled until the lactalbumin and lactoglobulin are converted to albuminate. H_3PO_4 is added and the whole again boiled until a ppt. separates. The filtrate is neutralized with $MgCO_3$, stirred with lime water and heated to 57°. The liquid is neutralized with H_3PO_4, boiled and filtered. Sugar is added to form a sirup.

Vacuum apparatus for the vacuumizing of milk powder. IRVING S. MERRELL and HELGE SCHIBSTED (to Merrell-Soule Co.). U. S. 1,786,858, Dec. 30. Structural features.

Solid preparations of milk and cream. PHILIPP BORN (to N.-V. Nederlandsche Gruyere-Blokmelk Fabriek). U. S. 1,786,559, Dec. 30. Solid stable prepns. are obtained by heating the milk, etc., with added sugar, with stirring in a vacuum until water is removed to produce a mass capable of retaining its shape (the final product may

contain 6–15% water), forming the product into blocks and coating the blocks with cacao butter.

Cream separator. SCHWARZWALDWERKE LANZ G. M. B. H. Ger. 508,999, Aug. 29, 1929.

Butter. VICTORINE ALICE MARCHAL (NÉE MILLION). Fr. 687,115, Dec. 23, 1929. Rennet is added to milk cream to further the agglomeration of the mols. of fatty substances, whereby the time necessary for making butter is reduced and the yield is increased. $NaHCO_3$ may be added to prevent rancidity.

Preserving meats such as whale meat. D. A. HANSEN. Brit. 333,898, Jan. 28, 1929. The meat is treated with a soln. which is preferably produced from H_3BO_3 and borax under such conditions and so shortly before use that the formation of polyborates takes place while the soln. is in contact with the meat. Other preservatives such as salicylic acid also may be added. Various details of treatment are given.

Fruit juices. MARC MANGINI, FÉLIX MANGINI and JEAN MANGINI. Fr. 686,895, Mar. 13, 1929. Juices contained in fruits are obtained in a concd. form by submitting the fruits in a strong current of air to a rapid evapn. at about 30–40°, until about $^2/_3$ of the liquid is removed, pressing out the residue and adding to this juice the liquid from the maceration in water of the residues, which liquid is first concd. by simple boiling. The necessary amt. of sugar is added.

Device for atomizing such materials as fruit juice, malt extract, milk, cream, eggs, etc. FRANK H. DOUTHITT. Ger. 507,723, and 507,724, Oct. 9, 1929.

Pectin. SOC. ANON. DES ANCIENS ÉTABLISSEMENTS GAETAN BRUN. Fr. 687,681, Jan. 4, 1930. A concd. pectin is made by adding to a soln. of pectin in water a pptg. agent sol. in water such as alc., a mixt. of alc. and ether or acetone, and drying.

Decolorizing and "deflavoring" colloidal solutions such as those of pectin. WM. A. HOOPER, ROBERT DOUGLAS and LOWELL H. CUTHBERT (to General Foods Corp.). U. S. 1,787,467, Jan. 6. The soln. under treatment is percolated through a mixt. of activated C and a filter mass such as cellulose pulp (material of coarse open texture and with a content of at least 50% C on an air-dry basis being used).

Confectionery. AKT.-GES. FÜR MEDIZINISCHE PRODUKTE. Ger. 509,034, Oct. 16, 1929. Margarine for use in the manuf. of puff pastry is mixed with a small quantity of malonic acid, with or without phosphates.

Apparatus for the removal of caffeine from coffee. WILLHELM A. C. HELMKE. Fr. 687,860, Jan. 8, 1930. An app. is described for the continuous removal of caffeine from coffee by successive treatments with steam, solvents, warm water and alc.

Coffee substitute. WILHELM KOCH. Fr. 687,903, Jan. 9, 1930. A substitute for coffee is made by macerating corn and submitting it to an intense fermentation during the maceration, after which it is roasted.

Transparent paper (suitable for packing food products). OTTO KLOTZ. U. S. 1,786,011, Dec. 30. Both sides of a translucent paper are coated with a soln. of gelatin to render it transparent.

13—GENERAL INDUSTRIAL CHEMISTRY

HARLAN S. MINER

Surface energy and chemical engineering. V. The formation of precipitates. W. GIBBS. *Ind. Chemist* **6**, 273-6(1930).—The influence of the conditions upon the character of the pptd. particles in solns. and gases is discussed at length, and in particular the degree of supersatn. and development of the primary ppt. The conditions are pointed out which tend to produce small, large, cryst., amorphous, etc., particles (cf. *C. A.* **24**, 3066). E. G. R. ARDAGH

Industrial ultrafiltration and the metafilter. C. PLANS. *Quim. e ind.* **7**, 253–6 (1930). P. describes the Chamberland type of metafilter, and the ultrafilter press, each with a sketch. The only industrial ultrafilter is of the latter type, the filtering medium being collodion. The funnel type ultrafilter is used principally in the lab. for microanalysis and in bacteriology. S. L. B. ETHERTON

The transmission of heat between moving fluids. A. MONDIEZ. *Chaleur ind.* **11**, 117–25, 188–96(1930).—On the basis of the classical theory, M. develops a series of equations for (1) parallel current and (2) counter current, and compares the two circulations. Weaknesses of the classical theory are pointed out. M. then develops more exact equations. Heat transmission is examd. in countercurrent flow and in the case where one fluid circulates and the other remains const. and uniform. In some cases

countercurrent flow is most desirable and in some cases parallel flow; in some cases comparative direction is immaterial. The analytical method is applied to the tubes of a locomotive superheater. S. L. B. ETHERTON

Viewing the fundamentals of three-roll grinding. G. A. VASEL. *Chem. Met. Eng.* **37**, 759–61(1930). E. H.

Non-ferrous metals in chemical engineering (SELIGMAN) **9.** The mixing of gases for reaction (CHILTON, GENEREAUX) **2.** Artificial stone [for insulating] (Austrian pat 119,267) **20.** Drying varnish films such as those on fibrous insulating materials (U S pat. 1,786,824) **26.** Blown bituminous products suitable for roofing and insulating, etc (Brit. pat. 334,032) **22.**

Chemical Engineering Catalog, 1930. 15th annual ed. New York: The Chem. Catalog Co., Inc. 1168 pp. Reviewed in *Mining and Met.* **11**, No. 288, 20; *Pit and Quarry* **21**, No. 4, 63; *Ind. Eng. Chem.* **22**, 1414; *Cellulose* **1**, 242(1930).

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HAMSON, C. J.: **Patent Rights for Scientific Discoveries.** Indianapolis: Bobbs Merrill Co. 286 pp. $5. Reviewed in *Chem. Markets* **27**, 581(1930).

Handbook Encyclopedia of Engineering. Edited by Franklin D. Jones. London: The Machinery Pub. Co., Ltd. 1242 pp. 30 s., net. Reviewed in *World Power* **14**, 507(1930).

KUNZMANN, TH.: **Die Bedeutung der wissenschaftlichen Tätigkeit Friedrich Wöhlers für die Entwicklung der deutschen chemischen Industrie.** Berlin: Verlag Chemie, G. m. b. H. 90 pp. M 4.

KURTZ, EDWIN B.: **Life Expectancy of Physical Property Based on Mortality Laws.** New York: The Ronald Press. 205 pp. $6. Reviewed in *Ind. Eng. Chem.* **22**, 1260(1930).

MOORE, HERBERT F.: **Textbook of the Materials of Engineering.** 4th ed., revised. New York: McGraw Hill Book Co., Inc. 469 pp. $4. Reviewed in *J. Eng. Education* **21**, 260(1930); *Metals & Alloys* **1**, 917(1930).

POPE, WM. J.: **Science and Modern Industry.** The Norman Lockyer Lecture. London: British Science Guild. 20 pp. 1 s.

Produits d'entretien. Formulaire des spécialités industrielles de produits chimiques et droguerie. Paris: Ch. Beranger. 149 pp. F 18 plus postage. Reviewed in *J. Intern. Soc. Leather Trades' Chem.* **14**, 681(1930).

TIMOSHENKO, S.: **Strength of Materials. Part I. Elementary Theory and Problems.** 368 pp. $3.50. **Part II. Advanced Theory and Problems.** 356 pp. $4.50. New York: D. Van Nostrand Co., Inc. Reviewed in *Mech. Eng.* **52**, 1112 (1930).

Purifying reacting materials. SOC. CHIM. DE LA GRANDE PAROISSE, AZOTE ET PRODUITS CHIM. Fr. 687,408, Dec. 30, 1929. Substances to be used in exothermic chem. reactions, particularly in gaseous catalytic reactions, are heated by indirect contact with the reacting substances, passed to a purifying mass placed in a sep. container and then led to the reaction chamber. Fr. 687,409 describes the purification of substances to be used in chem. reactions by mixing them with the reaction products coming from the reaction chamber, passing the mixt. through the purification mass, sepg. the reaction products and passing the purified substances to the reaction chamber.

Purification of gases. I. G. FARBENIND. A.-G. Fr. 688,186, Jan. 14, 1930. Gases contg. C_2H_2, obtained by the treatment of hydrocarbons in the elec. arc, are purified by directing them over porous active material and, if necessary, freeing them by appropriate agents, such as $FeSO_4$, from compds. contg. the radical -CN, before or after the other treatment.

Purification of gases. SIEMENS-SCHUCKERTWERKE A.-G. (Richard Heinrich, inventor). Ger. 508,889, Jan. 25, 1928. Minute particles are removed from gas by leading it into an ionized gas current so that the gas is partly negatively and partly positively ionized before reaching the filter.

Drying gases. OSCAR M. HENRIQUES and THOMAS A. THOMSEN. Fr. 688,564, Jan. 20, 1930. Gases used in the manuf. of anhyd. $AlCl_3$ are dried by passing them over or through incandescent C; the speed and temp. are regulated so that the content of steam is converted to CO and H as completely as possible.

Absorbing gases or vapors. SOC. ANON. DES CHARBONS ACTIFS ET PROCÉDÉS

ÉDOUARD URBAIN. Fr. 687,501, Mar. 20, 1929. In the absorption of gases or vapors by a solid absorbent, the absorbents are used in horizontal layers of regular or irregular grain, traversed by the gas upward; the thickness of the bed is such that the static pressure exercised by the absorbent on its support is at least equal to the weight lost by the gas in its passage through the absorber when the gas traverses the absorbing layer downward under the max. flow realized during the absorption.

Catalytic decomposition of gases and vapors. I. G. FARBENIND. A.-G. (Hans Rotger and Fritz Stöwener, inventors). Ger. 509,582, July 31, 1927. The gases or vapors are led over a highly porous active contact mass with pores diminishing in size in the direction of the gas current In an example, a mixt. of air and SO_2 is passed successively over coarse and fine platinized SiO_2 gel at 475°. Other examples are given.

Separating gases. ÉDOUARD URBAIN Fr. 688,528, April 9, 1929. Gases or vapors contained in a gaseous mixt. are sepd. by washing with cold water contg. a large amt. of absorbent charcoal in suspension, the complete sepn. of the absorbed substances being afterward effected on the charcoal filtered from the water. An example is given of the sepn. of benzene from lighting gas.

Separating constituents of gas mixtures. I G FARBENIND. A.-G Brit. 333,907, April 15, 1929; Fr. 687,357, Dec 28, 1929. Sepn. is effected by diffusion of one or more constituents of the mixt into a body of vapor generated by evapg. a liquid in contact with the gas mixt The liquid is preferably preheated and the gas mixt. used at a temp. sufficient to vaporize the liquid. App. is described in which the liquid is distributed over an annulus of clay balls, Raschig rings or the like, the gas being supplied to a space around the annulus and a cooling pipe being placed within the annulus.

Fractionally separating suspended or emulsified substances. J. D. RIEDEL-E. DE HAEN A G Ger. 509,500, Feb. 15, 1924. The sepn. of suspended or emulsified substances into fractions of different particle size by centrifuging or sedimentation is assisted by adding an org. electrolyte of high mol. wt to the suspension, etc. Thus, NH_4 humate may be added to a graphite hydrosol before centrifugal fractionation. Other suitable addns are lignin sulfonates and soaps

Extracting crude materials with solvents. JOHS CROPP and G. KNOTH. Ger 509,813, Oct 6, 1929 Non volatile materials are extd by making a paste of the crude material with a solvent and submitting the mass to the action of the vapor of the extg. agent in an app. consisting of a multi stage column *Montan wax* is extd. by C_6H_6 vapor from a paste of dried distn coal, C_6H_6 and EtOH Other examples are given.

Polymerizations. I. G FARBENIND. A G Fr 687,721, Jan 6, 1930. In carrying out polymerizations in which a large amt. of heat is evolved, such as the polymerization of butadiene hydrocarbons in the presence of polymerization agents, the reaction vessel is connected to another vessel called a "moderator", which contains no polymerization agent so that the substance to be polymerized can distil over into the moderator when the reaction becomes too violent and can be returned to the reaction vessel when the violent action dies down

Dissolving salts. KALI-FORSCHUNGS-ANSTALT G M B H. (Erich Ritter, inventor). Ger 508,090, Nov. 8, 1925 In dissolving large amts. of salts, economies are effected by heating the solvent with waste steam under an abs. pressure of at least 4 atm.

Filtering liquids. REGINALD H. LEE-PENNELL and ADRIAN W WYLIE. Fr. 687,6[illegible] 4, 1930. In app. for *filtering water* or other liquids upward through a filtering [illegible]r, air under pressure is automatically stored on the evacuating side of the filtering [illegible]ring the normal working of the filter, and is used to accelerate a reverse flow of liquid through the filtering layer when washing the filter.

Pulverizing materials to colloidal or semi-colloidal fineness. ROHM & HAAS CO. Ger. 509,759, Oct 20, 1928. The pulverization takes place with addn. of vapor of low-boiling liquids, optionally mixed with air Thus, paraffin, wax and methyl violet are molten and ground in a colloid mill in the presence of a mixt of petr. ether and ether vapors

Cleaning apparatus chemically. SCHERING-KAHLBAUM A.-G. (Walter Baensch, inventor) Ger 507,636, June 28, 1928. Solvent vapor is passed into the app. where it condenses on the inner surfaces to dissolve soluble impurities It is washed out together with the insol. impurities.

Method of washing pasty, granular or liquid products in a centrifugal machine. LUDWIG ALTPETER. Ger. 509,242, May 1, 1926. Manipulative features are described.

Heating air and water by flue gases from furnace plant. GEORGE K. ENGELHART. Ger. 500,972, July 24, 1925.

Preventing loss of the product of suction-roasting furnaces. BERGWERKSGESELL-

SCHAFT GEORG VON GIESCHE'S ERBEN and WALTER LANGNER. Ger. 506,583, June 18, 1929. The material to be roasted or sintered is placed in material such as paper or fabric, which is pervious to air.

Refrigerating mixture. OSCAR HANNACH (to Wilhelm Kash). U. S. 1,786,842, Dec. 30. NH_4Cl is used with an excess of Na_2CO_3 to form a mixt. producing a decrease in temp. on being dissolved.

Waterproofing and flame-proofing coverings of electrical conductors. JOSEPH A KENNEDY (to Anaconda Wire and Cable Co.). U. S. 1,787,629, Jan. 6. A covering material is first impregnated with wax having a lower m. p. than the flame-proofing compd. subsequently to be applied; it is then coated with a flame-proofing compd. such as stearin pitch, which is liquefiable by heating but at a higher temp. than the m. p. of the wax.

Insulating material. CHARLES A. STYER (to The Canadian Westinghouse Co., Ltd.). Can. 305,860, Nov. 18, 1930. Asbestos tape is baked to remove any carbonaceous material and is then impregnated with tritolyl phosphate.

Insulating material. I. G. FARBENIND. A.-G. Fr. 687,702, Jan. 4, 1930. Elec. insulating materials are composed of mixed cellulose esters of fatty acids of low mol. wt., such as cellulose acetate-butyrate or cellulose monoacetate-dipropionate; they may be made from solns. of the esters in acetone, etc.

Heat- and sound-insulating material. H. BOHLANDER. Brit. 333,957, May 28, 1929. A felt-like material is formed of 2 different kinds of inorg. fiber, one chosen for its strength and the other for its insulating properties, such as asbestos and slag wool, which can be treated with a binder such as starch or water glass and mixed with other materials such as kieselguhr or magnesia. Various details of manuf are described. Cf. *C. A.* **24**, 2217.

Heat insulating material suitable for use in building construction, etc. GEORGE B. STRYKER, JR. (to Weatherproof Products Co.). U. S. 1,786,462, Dec. 30. An insulating mixt. is formed from finely comminuted cotton stalk fiber 67–73, finely comminuted paper waste 25 and dissolved rosin 2–8%.

Mica composition. BAKELITE CORP. Fr. 688,149, Jan. 13, 1930. A moldable compn. suitable for *elec. insulators*, etc., is composed of a phenolic resin and a filling material contg., *e. g.*, 5% of finely divided mica.

Thin insulating layers on wires. REINHOLD RÜDENBERG and WALTER SCHOTTKY (to Siemens-Schuckertwerke A.-G.). U. S. 1,786,920, Dec. 30. Thin insulating layers having a thickness of less than 0.01 mm. are produced on wires by alternate pptn of different insulating substances such as paraffin hydrocarbons from the gaseous state upon the surface of the strongly cooled wire. App. is described.

14—WATER, SEWAGE AND SANITATION

EDWARD BARTOW

The new Elbe water supply plant at Aussig. E. KROB AND TH. GRUSCHKA. *Gas u. Wasserfach* **73**, 1057–65(1930).—This is one of the first plants to use the Adler high-chlorination and dechlorination plants. Bank-filtered water from wells is obtained from two sources, one giving ordinarily pure water and the other a mixt. of ground and surface waters. Ordinarily, the latter source alone requires extensive purification. Addition of alum and (or) iron sulfate is followed by chlorination and settling, after which the water is passed through rapid and slow sand filters. After a second chlorination the water is passed through Depurit active charcoal filters to remove chlorine, etc. The active charcoal filter is regenerated with Na_2CO_3 solutions at monthly intervals and by occasional steaming. The resultant water has no taste, color or odor. A less intensive purification process is used when possible. R. W. RYAN

The water supply of Stuttgart and the use of active charcoal. E. LINK. *Gas u. Wasserfach* **73**, 985–92, 1016–22, 1033–8(1930).—The principal sources of water supply at Stuttgart are the "Landeswasserversorgung" with a source 100 km. distant, the Gallenklinge peak-load and emergency source which takes water from the park lakes, and the Neckar water works, together with a number of smaller works. The Gallenklinge and Neckar waters require special purification. High chlorination (two stages) is used to insure sterility and after clarification and filtration an Adler Mutonator or active charcoal filter is used to remove the excess of Cl and chlorinated compounds. Chlorinated Na_2CO_3 soln. is used for regenerating the charcoal and this is followed by treatment with $CaCl_2$ soln. to remove alkali and to deposit $CaCO_3$. Colorless, odorless

and tasteless water is prepd. by the present methods of treatment. Exptl. and details are given. R. W.

Biological investigation of Stuttgart park lakes as related to water supply. K ENGLER. *Gas u. Wasserfach* **73**, 1081–90(1930); cf. *C. A.* **24**, 3845.—The seasonal and other biol. changes in the water of the Stuttgart park lakes are discussed with respect to causative factors and the effect on the water supply. R. W. RYAN

Progress of Steelton (Pa.) system. GEORGE H. ROBERTS. *Water Works Eng.* **83**, 352(1930).—The development and improvement of the Steelton water system since 1899 are described. C. H. BADGER

Dissolved oxygen condition in the harbor waters of the metropolitan district. WILLIAM T. CARPENTER. *Sewage Works J.* **2**, 276–83(1930).—There has been a marked decrease in the O content of the harbor since 1909. Since 1921 the rate of fall has been less rapid than before Variation in the amount of O present at any point in the harbor may be classed as tidal, seasonal or annual. The data for 1919 show a considerable annual variation due to fluctuations in the flow of upland waters and to air temp The 1929 data show a marked variation, due possibly to the abnormal growth of green water plants stimulated by an abnormal abundance of sunshine. The Harlem and East rivers are in a condition which might, under the proper conditions, give rise to nuisance but which will be made entirely safe on construction of the Ward Island Plant. E. HURWITZ

How a small-town water works (Cocoa, Fla.) reduced its iron content. T. M. EARLY *Water Works Eng.* **83**, 287–8(1930).—The present capacity of the water works is 0.75 m. g. d. Water is taken by pumps through sand traps from 4 groups of wells, each contg 6 shallow wells 3.5 in. in diam., from as near the surface as possible, since at greater depths much H_2S and salt are obtained After aeration the incoming raw water is treated by means of dry-feed machines with 2.25 grains of alum and 3 grains of soda ash per gal. Approx. 1 grain lime per gal. is added to the mixing trough situated between the 2 coagulating basins. Aeration alone raises the p_H value of the water from 5.6 to 6.8. With alum and soda ash only, the p_H could not be brought above 7.0, while with lime the p_H is raised to 7.8 8.2. The color and quality of the water have been much improved and red water has been greatly reduced. C. H. BADGER

Demonstrating proposed treatment by means of miniature plant (Morgantown, W. Va.). LEWIS V. CARPENTER. *Water Works Eng.* **83**, 351–2(1930).—The normal consumption of water is 1.8 m. g. d. Usually, 80% of the supply for 8 months of the yr. gravitates from an earth reservoir which is supplied by a mountain stream. This water is chlorinated. The addnl. source of supply, Monongahela River water is treated with lime and alum, filtered through rapid sand filters and pumped to storage reservoirs. While the river water above the intake is polluted by sewage from approx. 125,000 people during times of low flow the bacteria count is very low, presumably because of the stabilizing effect of 50 m. g. d. of mine water contg. an av. acidity of 400 grains per gal. The river water often has an acidity of 40 p. p. m. and a p_H of 3.6. When the mountain supply is cut off after June 1, the hardness increases from about 15 p. p. m. to from 150 p. p. m. to 300 p. p. m. later. Consequently, many complaints are received from consumers. Based on a future supply of 4 m. g d., filtration of the present mountain supply and zeolite softening of the river supply were recommended. In order to acquaint the people with the various methods of water treatment a miniature plant consisting of a coagulation basin, chem. feed devices, rapid sand filter, gravity type zeolite (greensand) filter and chlorinator was built in the city building. The filters were made from domestic hot water tanks and the coagulation basin and the storage reservoir were made from barrels C. H. BADGER

Experiences with water supply from reservoirs on streams (Talsperren). LEMBERG. *Gas u. Wasserfach* **73**, 1129–36(1930).—Various experiences with water yield, etc., also graphs showing free CO_2, permanganate requirements, bacteria number, etc. are given. R. W. RYAN

Geology and characteristics of Tennessee ground waters. WALTER F. POND. *Water Works Eng.* **83**, 316, 319(1930).—In the mountains of east Tenn. springs yield soft waters, although Fe is sometimes present. In the valley of east Tenn. the occurrence of ground water is quite varied. The larger cities obtain their water supplies from surface streams and springs. These also furnish most farm supplies. The waters are of medium hardness, $Ca(HCO_3)_2$ predominating. In the Cumberland Plateau the waters are apt to contain much Fe. In central Tenn. springs are common. Well waters are uncertain both as to quality and quantity. Shallower waters contain 50–500 p. p. m. dissolved solids with from 30 to 300 p. p. m. of non-carbonate hardness, but they are usually free from excessive Fe or H_2S. The max and min. total dissolved solids for 101 well and

spring waters were 26,410 and 50 p. p. m., resp. In West Tenn., geologically quite different from the rest of the state, the waters contain more mineral content the greater the distance from the outcrop. Waters from the basal Eutaw-Tuscaloosa sands and gravels, Ripley formation and Wilcox formation are $Ca(HCO_3)_2$ waters of low to medium hardness with usually enough Fe present to require its removal. Memphis and most of the larger cities and towns derive their supplies from the Wilcox formation. At Memphis $NaHCO_3$ water is found in the Ripley formation at a depth of 1400–1600 ft. This is ascribed to base exchange. C. H BADGER

Surface water supply of the United States in 1926. III. Ohio River basin. NATHAN C. GROVER, A. W. HARRINGTON, A H. HORTON, LASLEY LEE, J. J. DIRZULAITIS, H. J. GROSBACH, W. R. KING AND E. D. BURCHARD. U. S. Geol. Survey, *Water-Supply Paper* **623**, 333 pp.(1930); cf. *C. A.* **24**, 3844. **IV. St. Lawrence River Basin.** NATHAN C GROVER, S. B. SOULÉ, H E GROSBACH, A H HORTON, LASLEY LEE, A. W. HARRINGTON AND H. B. KINNISON *Ibid* **624**, 163 pp. **V. Hudson Bay and upper Mississippi River basins.** NATHAN C GROVER, W. A. LAMB, S. B. SOULÉ, J B. SPIEGEL, H J. GROSBACH AND H. C. BECKMAN *Ibid* **625**, 170 pp **VI. Missouri River basin.** NATHAN C. GROVER, W. A. LAMB, ROBERT FOLLANSBEE, C. G. PAULSEN, J. B SPIEGEL AND H. C. BECKMAN. *Ibid* **626**, 228 pp **VII. Lower Mississippi River basin.** NATHAN C. GROVER, H. C. BECKMAN, ROBERT FOLLANSBEE, J. B. SPIEGEL AND C. E ELLSWORTH. *Ibid* **627**, 98 pp **VIII. Western Gulf of Mexico basin.** NATHAN C GROVER, C. E. ELLSWORTH AND ROBERT FOLLANSBEE. *Ibid* **628**, 207 pp. E H

Surface water supply of the United States in 1927. VI. Missouri River basin. NATHAN C. GROVER, W. A LAMB, ROBERT FOLLANSBEE, C. G. PAULSEN, J B SPIEGEL AND H. C. BECKMAN. U S Geol Survey, *Water-Supply Paper* **646**, 216 pp (1930) **VII. Lower Mississippi River basin.** NATHAN C GROVER, H C BECKMAN, ROBERT FOLLANSBEE, J B. SPIEGEL AND C E ELLSWORTH *Ibid* **647**, 95 pp. **VIII. Western Gulf of Mexico basins.** NATHAN C GROVER AND C E ELLSWORTH. *Ibid* **648**, 117 pp E H

Surface water supply of Hawaii July 1, 1926, to June 30, 1927. NATHAN C GROVER AND MAX H. CARSON U. S Geol Survey, *Water-Supply Paper* **655**, 151 pp.(1930) E H

Manganese in river water and its removal. PERKINS BOYNTON. *Am. J. Pub. Health* **20**, 1346–7(1930). J A KENNEDY

Comparative rates of stream purification under natural and controlled conditions. H. W. STREETER. *Ind. Eng. Chem.* **22**, 1343–6(1930); cf. *C. A.* **22**, 4687. – Comparison in reduction of biochem. O demand of the Ill River and of the artificial controlled stream at the Cincinnati station is made The rates of oxidation in this highly polluted river seem to be similar to those under controlled conditions of the exptl stream flow The apparent rate of reduction in biochem O demand is not necessarily a criterion of the true rate of reoxygenation. The demand value of suspended material, immediate demand value of the stream and of readsorbed material from the bottom are controlling factors A large proportion of the O demand of a stream is utilized by deposited material Removal by sedimentation of material, while decreasing the immediate demand, may in the course of time, raise the basic demand The rates of oxidation measured in the artificial stream channel were of "the same order of magnitude" as for the river with the same "density of pollution" EDWARD S. HOPKINS

Purifying water for domestic use. ROBERT SPURR WESTON. *Civil Eng.* **1**, 197–201 (1930). – A review E H

New investigations of the chemical treatment of drinking water. H KLEPTAR *Gesundheits-Ing.* **53**, 641–3(1930). – A study has been made of the concn. of chloramine needed as a sterilizing agent for cultures of *B. coli*, *Staphylococci*, *B. subtilis* and *Staphylococcus aureus*. Sterilization was completed in very short periods if AcOH was added to the extent of 0.5 cc per l The Na deriv. of *p*-toluenesulfonchloramide was used as a disinfecting agent A. I. ELDER

Rational constants for expressing the results of water analysis. A. SULFRIAN. *Seifensieder-Ztg.* **57**, 805–8(1930). cf *C. A.* **24**, 4105. – A general review suggesting the use of S.'s "Millinorm table" as a standard in water analysis, by which the various German, French and British degrees of hardness can be converted into each other and into the chem. equivs. of CaO, MgO, etc., with 0.1 *N* soln. per 100 cc. (= 1/1 *N* per l.) as a basis of calcn. P ESCHER

Volumetric sulfate determinations and limits of error in water analysis. R. SCHMIDT. *Z. anal. Chem.* **82**, 353–61(1930).—Various methods for the detn. of SO_4 in water are discussed and the practical advantages of the iodometric chromate method are pointed out. The 3 most promising adaptations of this method to water analysis

appear to be the procedure recommended by Bruhns, by Nachtigall and Raeder and by Koszegi. B. used a suspension of $BaCrO_4$ as reagent, N. and R. used a soln. of $BaCrO_4$ in 0.1 *N* HCl and K. used $BaCl_2$ as reagent, pptg. the excess Ba^{++} with a measured vol of $K_2Cr_2O_7$. In all 3 methods, the filtered soln. to be titrated finally contained 1 $Cr_2O_7^{--}$ for each 2 SO_4^{--} originally present; this $Cr_2O_7^{--}$ was detd. iodometrically. The results of 38 expts. compared with gravimetric detns. of the SO_4^{--} content of 15 samples of water showed that the method of B. gave the best values, that the method of K. is nearly as good but that the method of N. and R. suffers from an attempt to carry out the pptn. at the boiling temp., whereby some $Cr_2O_7^{--}$ is reduced by org. matter present. The following procedure was adopted as a result of these expts. To 100 cc. of water in a 200 cc. measuring flask add 20 cc. of $BaCrO_4$ soln. contg. about 90 mg. $BaCrO_4$ dissolved in 0.2 *N* HCl. This quantity of reagent suffices for a SO_4^{--} content of 280 mg. per l. (If nitrites are present, first add 0.5 cc. of 5% NaN_3 soln.) Shake well and allow to stand 30 min. Then neutralize by adding NH_4OH carefully until the soln. assumes a light, greenish yellow color; 10 drops of 25% NH_3 usually suffices. Make up to the mark, mix, allow to stand 5 min. and filter through a small dry filter. Discard the first 20–30 cc. of filtrate and take 100 cc. for further analysis. Add 1 g. of KI and 10 cc. of 25% HCl. Titrate with 0.1 *N* $Na_2S_2O_3$. Carry out a blank analysis with the reagents. The results obtained by this procedure are excellent. The greatest deviation from the gravimetric values was 6.3 mg. per l. It is pointed out that even this max. deviation lies within the permissible limits for water analysis. W. T. H.

Use of lime for removal of iron and carbon dioxide. F. M. Veatch *Water Works Eng.* **83**, 311(1930); cf. *C. A.* **24**, 5088. C. H. Badger

Principles of boiler-feed control. A. Sulfrian. *Braunkohle* **29**, 887–9(1930); cf. Regel, *C. A.* **24**, 5399.—Expression of analytical results in milli-equivs. instead of in arbitrary hardness degrees is recommended. K. H. Engel

Water and sewage. F. Sierp *Kolloid-Z.* **47**, 372–8(1929).—A review. A. Fleischer

Automatic sewage pumping plant at Georgetown. Anon. *Engineering* **130**, 754 (1930). E. H.

Colloids in relation to sewage purification. H. Wilson. *The Surveyor* **78**, 561–2 (1930).—Although colloidal material is largely removed in the upper foot of a percolating bed, there is required 5 times the depth for the removal and destruction of dissolved materials. Adsorption is the important factor in removal of colloids. A. L. E.

Effect of temperature on rate of settling of sewage solids. G. M. Ridenour. *Sewage Works J.* **2**, 245–50(1930).—The rate of settling of sewage solids is slightly increased up to 30°, after which it rapidly decreases. The effect is most pronounced in settling periods of from 0 to 30 min. At the end of 2 hrs. the percent removal of solids is practically the same for all temps. between 1° and 37°. The settling of finer particles was not influenced by temp. Less flocculation of sewage particles occurs at higher temps. than at lower temps. At higher temps. the sewage particles settle in a finely divided state. Below 30° a more pronounced flocculation of particles was noticed. E. H.

Ordinary chloroform as a sewage preservative increases oxygen consumed values. R. T. Homewood and H. W. Rue. *Sewage Works J.* **2**, 251–4(1930).—The use of ordinary chloroform as a preservative for sewage and trade wastes increases the oxygen-consumed value (permanganate reduction). The increase is proportional to the amount of chloroform used. The error can be avoided by washing out with water the impurities in ordinary U. S. P. chloroform. E. Hurwitz

The use of single- and multiple-unit tank cars of liquefied chlorine gas in disinfecting sewage. Joseph W. Ellms and G. T. Pond. *Sewage Works J.* **2**, 260–5(1930); cf. *C. A.* **24**, 5300.—Changes in the disinfecting equipment to permit the use of multiple-unit tank cars consisting of 15 one-ton containers of chlorine and single-unit cars consisting of one 15 ton container made possible a large saving in cost of disinfection at the Cleveland plants. E. Hurwitz

The river as purification works. Mahr. *The Surveyor* **78**, 618–9(1930); cf. *C. A.* **25**, 369.—A formula for permissible sewage load on a river is:

$$Q = qt\left(\frac{1/_5\, S}{a} + 60b\right), \text{ where}$$

Q = the river water vol. in (cu. m./sec.), q = the sewage vol. spread over 24 hrs. (cu. m./sec.), t = the mean river depth (m), S = the biochem. O demand of the sewage (g./cu. m.), a = the amt. of reaeration of the river (g./sq. m./day), b = the sludge con-

tent of the sewage (cc./1). Fluctuations in temp. must be kept in mind when considering river purification. A. L. ELDER

Experience with chlorination of sewage along a seacoast near bathing places O. KLINGBERG AND E. SCHROEDTER. *Gesundheits-Ing.* 53, 753–4(1930).—Cl, used to the extent of 6–7 mg. per l., proved satisfactory. A. L. ELDER

Disinfection of sewage. H. BRUNS. *Tech. Gemeindeblatt* 33, 233–6(1930). Sewage chlorinated at the rate of 20 g. per cu. m. showed bacterial reduction from several million to 10–30,000. Coli counts were lowered proportionately. A. L. E

Activated sludge. F. R. O'SHAUGHNESSY. *Sewage Works J.* 2, 255–9(1930). Several personal views and opinions are presented regarding activated sludge and the activated-sludge process. Floc is considered as a matrix upon which the organisms sustain themselves in the presence of moving water. This phenomenon is the basis upon which the whole activated-sludge process rests. E. HURWITZ

Sludge-aeration experiments. I. Rate of disappearance of oxygen in sludge. EMERY J. THERIAULT AND PAUL D. MCNAMEE. *Ind. Eng. Chem.* 22, 1330–6(1930); cf. *C. A.* 24, 450.—Expts. were conducted for about a year in the artificial stream channels, approx. 1 mile in length, of the U. S. Pub. Health lab. at Cincinnati. The purpose of this study is to show the rate of purification under controlled conditions. Storage effect, H-ion concn. changes and diln. were considered. It was concluded that actual oxidation purification by aerated sludge in the channels is effected at about the same rate as that observed in the lab. expt. for a given temp. Expts. indicated that the rapid reduction of org. material in the liquid when sewage and aerated sludge are mixed is due to adsorption by the sludge and not to oxidation. New app. was developed for detg. the O demand of sludge without diln. The diagrams presented are clear and the methods should be of value as they are simple and easy to manipulate. F. S. H

Influence of rotating sludge in digestion tanks on gas production, tank size required and floating scum. F. SIERP. *Gesundheits-Ing.* 53, 810–12(1930).—Stirring increases gas products 10–20%, and decreases the capacity for digestion and trouble due to floating scum in tanks. Gas increase does not compensate the cost of stirring. A. L. E

Gas formation from Emscher tank floating sludge. H. BACH. *Gesundheits-Ing.* 53, 790–2(1930).— The rate of gas formation from different tanks was measured by lab. expts. Gas production was practically complete in 60 days. The ratio of org. matter in raw sludge compared to digested sludge from 4 tanks was 1.25, 2.0, 1.2 and 1.54. The compn. of the gas was usually about 20% CO_2, 70% CH_4 and 10% N, and H_2. A. L. ELDER

Some observations of the effect of pollution contributed to streams. J. K. HOSKINS AND H. R. CROHURST. *Ind. Eng. Chem.* 22, 1340–2(1930).—By using the characteristics of the Ohio River between Cincinnati and Louisville as a basis, this study was undertaken to det. the polluting effect on a large stream of increasing population on its watershed. Comparison of data for the years 1914–15–16 with the past year indicates that the river at these points is in a better condition now than at the time of previous investigations. This is true, although the available dissolved O has decreased. It is believed that interpretation of biochem. O demand results may often be influenced by errors in stream flow measurement or by analytical errors of sufficient magnitude as to lead to erroneous conclusions. EDWARD S. HOPKINS

Survey of the pollution of rivers and lake in the vicinity of Rochester, N. Y. STUART E. COBURN. *Ind. Eng. Chem.* 22, 1336–40(1930).—A general description is given of a sanitary survey of the bathing beaches on Lake Ontario during the summer of 1929. Moderate pollution was present from the discharge of the Genesee River, from Irondequoit sewage-treatment plant, from erosion of banks and from the bathers themselves. It was concluded that the health hazard was negligible. A standard of quality allowing 100 organisms per cc. on presumptive test of the colon-aerogenes family per single sample, in not more than 5% of the individual samples collected, was adopted for the survey. EDWARD S. HOPKINS

The new Michigan law with regard to stream pollution and sewage disposal. WALTER A. SPERRY. *Municipal Sanitation* 1, 157–61(1930). G. L. KELSO

The question of the purification of phenol waste waters. W. A. Perlow Z. *Hyg. Infektionskrankh.* 111, 511–30(1930).— The possibility of bacterial destruction of aromatic compds. which have a strong bactericidal action is established. Activated sludge from household waste shows an outstanding specializing action for the destruction of different chem. compds. The destructive action can be increased by gentle aeration. PhOH is easily destroyed in a concn. of 1–550, but cresol and β-naphthol are less easily destroyed. The activity shows itself in the loss of the amt. of sludge and air mixt. or in the amt. of sludge alone which is necessary for the destruction of a unit of the aro-

matic compd. Treated PhOH waste water not only gives neg. PhOH tests but is also able to support fish life. Filtration through charcoal together with aeration and sludge treatment gives the best results. RACHEL BROWN

Sanitary protection at mining camps. E. B. BESSELIEVRE. *Mining & Met.* **11**, 538-40(1930).—A description is given of the model sewage-treatment plants of the Home Copper Co. at Noranda, Que., and Hudson Bay Mining Co at Flin Flon, Man. The water-purification plant is of the mech. gravity type and has a max. capacity of 1,000,000 gals. per day. The process consists of chem. coagulation, filtration and chlorination. A figure shows the activated-sludge sewage-treatment layout. W. H. B.

Can a public pool be safe? CARL A. HECHMER. *Municipal Sanitation* **1**, 138–41 (1930). -The Chevy Chase, Maryland, swimming pool owned by the National Capitol Natatorium Co. is 200 ft. long and 100 ft. wide with depth range from 1 to 10 ft. The water is circulated through a purification system consisting of an alum pot. pressure filter and chlorinator. The filter is backwashed with pool water, doubly chlorinated. The free Cl content of the water is tested every 2 hrs. by the *o*-tolidine method and is maintained in the influent at 0.4–0.5 p. p. m. and in the effluent at 0.1 p. p. m. Soda ash is added in an attempt to keep the p_H up to 7.6–8.0. Bacterial examns made semi-weekly during the season of 1929 showed 92% of the samples to pass the U. S. Treasury Department Standard for drinking water. Daily cost of water was $11.90 and the daily cost of providing safe water was $19.40. G. L. KELSO

Road tars and fish life. REPORT OF THE JOINT COMMITTEE ON DAMAGE TO FISH-ERIES. *The Surveyor* **78**, 625-6, 641-2(1930).—The purpose of the investigation was to establish whether tar as used for surfacing roads was harmful to fish life; if so, which of its constituents was responsible, the concns necessary for the toxic effects to be noted and precisely how the fish were affected. Yearling perch were selected as the exptl. fish. The first washings from tarred roads are definitely toxic to fish. Naphthalene in concns. greater than 1 part per 100,000 are toxic to shrimp. Loss of equil. was the prominent symptom observed in fish poisoned with tar wastes. Crude tar diluted 1:1000 killed 1 in the ratio of 4. Aq. exts. from road board tar were toxic in concns. of 1 vol. of tar extd. with 100 vols. of water. Aq. exts. from synthetic tar, heavy oils and coal-tar pitch were toxic. Killing strengths in parts per 100,000 for perch were: lowest with acridine, 0.07; phenol 1.0-1.5; phenol 0.9; pyridine 100, isoquinoline 10, guaiacol 7–8, quinoline 4.5-5, naphthalene 4.0. The harmful effects of these substances on milt and ova of brown trout were shown. A. L. ELDER

Determination of S by means of the turbidimeter (PARR, STALEY) **7**. Rapid colorimetric estimation of I in mineral waters and brines (CASE) **7**. Filtering liquids (Fr. pat. 687,692) **13**. Decantation apparatus; water-softening apparatus (Belg. pat. 307,201) **1**.

Purifying and softening water. ARTHUR R. MOBERG (to Fred O. Paige, Jr.). U. S. 1,787,601, Dec. 30. Water is purified and suspended impurities are removed from it by the action of a concd. soln. of $FeCl_3$ contg. peptized Al hydrates. Lime and Na_2CO_3 also may be used.

Apparatus for softening water by use of base-exchange materials. EDWARD T. TURNER. U. S. 1,787,129, Dec. 30. Structural features, particularly relating to a valve system.

Improving the base-exchanging properties of glauconite. OTTO LIEBKNECHT (to Permutit Co.). U. S. 1,787,008, Dec. 30. Glauconite is heated with a soln. of an alkali metal silicate under superatm. pressure. Cf. *C. A.* **24**, 3306.

Apparatus for softening water with zeolitic material. JOHN A. MONTGOMERY. U. S. 1,787,208, Jan. 6. The zeolite is supported on a bed of non-buoyant, granular material such as gravel which has over it a layer of similar but coarser material.

Level-controlling device for liquid containers such as brine-generating tanks of water-softening apparatus. EDWARD T. TURNER. U. S. 1,787,130, Dec. 30. Various details of a valve-control system are described.

Method of cleaning water filters. OSKAR KARY & Co. G. m. b. H. and BRUNO LIETZ. Fr. 688,086, July 10, 1929.

Distillation plant for preparing boiler-feed water. A.-G. BROWN, BOVERI ET CIE. Brit. 331,131, Dec. 5, 1928. Structural features.

Treating boiler-feed water. PETER M. CONTANT (to Neckar Water Softener Corp.). U. S. 1,788,149, Jan. 6. In treating boiler-feed water contg. $NaHCO_3$, the $NaHCO_3$ is decompd., by heating, into Na_2CO_3 and NaOH; these substances and

addnl. $NaHCO_3$ are caused to react with $FeSO_4$ to form Na_2SO_4 and $FeCO_3$. An arrangement of app. is described.

Preventing formation of "fur" in boilers. JEAN SCHNEEBELI. Swiss 139,517, Feb. 14, 1929. A mixt. of copal resin and alkali phosphate is used as the preventative.

Clarifying sewage. ANTON KRIESER. Ger. 500,347, Dec. 20, 1928. The sewage is mechanically agitated with about an equal amt. of petroleum so as to form an emulsion, which is allowed to stand until the two liquid layers have sepd. and the solids have settled

Purifying air vitiated with ammonia. GEO. ST. J. PERROTT and MAX YABLICK (to Mine Safety Appliances Co.). U. S. 1,787,875, Jan. 6. Air vitiated with NH_3 is rendered suitable for breathing by passing it through a dry solid mass of absorbent silicic acid. This pat. is based on an application filed Jan. 10, 1919, now matured into U. S. pat. No. 1,559,980 (*C. A.* 20, 84).

15—SOILS, FERTILIZERS AND AGRICULTURAL POISONS

J. J. SKINNER AND M. S. ANDERSON

When agriculture enters the chemical industry. WM. J. HALE. *Ind. Eng. Chem.* 22, 1311-5(1930). A discussion of the need of the farmer for closer coöperation between the farm and chem. industry in order to make farming economically possible.

J. R. ADAMS

Soils of the Bombay Presidency. D. L. SAHASRABUDDHE. Bombay Dept. Agr., *Bull.* 160, 84 pp.(1929). Chem. and mech. analyses of the soils are tabulated and general descriptions are given.

K. D. JACOB

The International Congress of Soil Science and the evolution of agriculture to U. S. S. R. EUGENE ROUX. *Compt. rend. acad. agr. France* 16, 816-24(1930). A survey of the soil work presented at the Congress shows that great advances are being made in Russia in spite of the fact that up to the present only about 5% of the land has been cultivated. The examn. of the soil as a 3- or 4-dimensional phenomenon has replaced the earlier morphological study of the soil. The principal soil types are: tundras, podsol, "tchernozem" (black soil), "sérozems" (gray soils) and red soils. The Russian 5-year plan depends to a large extent on the soil types and reports indicate considerable progress. The role of the scientific institutions, particularly the Inst. of Phytotechnic at Léningrad and the Sci. Inst. of Fertilizers at Moscow, is explained in its effect on agriculture.

J. R. ADAMS

Soil and eucalyptus trees in the forests of La Plata. CARLOS A. GRAU. *Anales oficina quím. provincia* (Buenos Aires) 2, 23-31(1928).—Analyses are given of soil and subsoil from a decaying plantation. Soil with a p_H of 4.6 is considered too acid and prejudicial to the trees. Means for improving the plantations are indicated, a fertilizer of guano, crude bones and gypsum is prescribed.

S. L. B. ETHERTON

Notes on soil observations in the Arazdajan steppe of Armenia, U. S. S. R. B. GALSTIAN. *Bull. univ. état R. S. S. Arménie*, No. 5, 5-39(in Armenian), 40-4(in Russian) (1930).—An account of the soil varieties of the steppe with special reference to topography, climate, air currents and water streams as factors affecting the evolution of the soil.

B. S. LEVINE

Soil investigations of the Echmiadzin Experimental-Meliorative station. KH. MIRIMANIAN. *Bull. univ. état R. S. S. Arménie*, No. 5, 45-81(in Armenian), 82-7(in Russian), 88-9(in English)(1930). The *soils* are (*a*) dark-brown, comparatively high in org. matter, (*b*) brown, with org. matter varying from 0.5 to 1%, (*c*) alk., with org. matter exceeding 1% only occasionally, or (*d*) light-brown, with org. matter below 1%. The mechanical fraction consists for the most part of silt and clay with an admixt. of a considerable amount of fine sand. The N content (Kjeldhal method) in the upper layers is 0.188%, decreasing gradually with depth. Carbonates are found only in small quantities as a result of artificial irrigation. P_2O_5 content (HCl ext.) is 0.165%, likewise decreasing with depth, in the HF ext. it reaches 0.814%. Ca and Mg exceed 1% only occasionally in the HCl ext. and 4% in the HF ext. H_2SO_4 is less than 0.09%. Fe and Al in the HCl ext. equals 11%. K varies from 0.7 to 0.94% and Na from 0.1 to 0.3% in the surface layers, in the HF ext. K equals 1.95 and Na 4.94%. Water ext. shows only a slight amt. of solids. Alky. of the water ext. varies from 0.02 to 0.03%, while Cl does not exceed 0.997% and only a trace is found of H_2SO_4.

B. S. L.

Occurrence of podsol soils in Santo Domingo. E. BALZAROTTI. *Soil Research* (*Suppl. to Proc. Intern. Soc. Soil Sci.*) 2, No. 1, 1-10(1930).—Podsol profiles were found in the lowest places of a wide savanna near S. Pedrode Macoris, Dominican Republic.

West Indies. Since neither the av. annual temp. of 27.3°, nor the av. annual pptn. of 1288 mm nor the poor grass vegetation of the savanna is favorable to such soil formations, it was concluded that they were produced under the influence of a high-water table in the dry season. Impermeability of the subsoil accounts for the high-water table.
I. A. DENISON

Agro-geological studies in the tropics. I. High altitudes of the Oriental tropics. M. W. SENATINS. *Soil Research* (*Suppl. to Proc. Intern. Soc. Soil Sci.*) **2**, No. 1, 10–54 (1930).—Field and lab. studies made on soil profiles developed above 2000 m. on the islands of Java and Luzon (Philippine Islands) indicate that podsol soils are not found in the high altitudes of the Oriental tropics, but that the mechanism of the podsolizing process is the same there as in other regions. The data obtained lend support to the modern classification of soils based on the climatic control of rock-weathering and soil formation.
I. A. DENISON

Influence of surface configuration, climate and vegetation on the distribution of soil types in Chile. A. MATTHEI. *Soil Research* (*Suppl. to Proc. Intern. Soc. Soil Sci.*) **2**, No. 1, 57–67 (1930).
I. A. DENISON

The mechanical analysis of soils without acid pretreatment. L. B. OLMSTEAD AND J. J. ALEXANDER. *Soil Research* (*Suppl. to Proc. Intern. Soc. Soil Sci.*) **2**, No. 1, 68–72 (1930). The method described for mech. analysis of soils differs from the international method in that pretreatment with HCl is omitted and $Na_2C_2O_4$ is used as the dispersing agent.
I. A. DENISON

Humic acids. W. FUCHS. *Kolloid Z.* **52**, 248–51, 350–6; **53**, 124–6 (1930).—A review.
A. FLEISCHER

Tropical-soil surveying. I. F. HARDY. *Trop. Agr.* (Trinidad) **7**, 235–6 (1930). A description is given of methods of surveying tropical soils by reconnaissance and botanical exploration. **II.** *Ibid* 274–7.—Chem. and phys. methods are discussed. Soil profiles involving 1880 soil samples of Trinidad and Tobago were examd. by such methods. Tables are presented giving typical results. These results were compared with yields of crops and for areas known to be good and bad agriculturally. The good cacao soils are more sandy, less acid, contain more org. matter and N in the upper layer, have much higher elec. cond. and show a much higher rate of soln. of nutrients by cond. methods. The same points are true of the good coconut soils except that the latter in this case is much heavier than that of the poor soils. The good sugar-cane soil were more sandy, much more alk. and gave higher cond. measurements than the poor ones which frequently also showed evidences of poor drainage near the surface. In good soils such evidence always lay 20 in. or more below the surface. **III** *Ibid* 306–8. The H_2O nutrient and air supplies, the activity of microorganisms and soil temp. are discussed.
A. L. MEHRING

Experiments on soil-breathing. WILHELM SCHMIDT AND PAUL LEHMANN. *Sitzb. Akad. Wiss. Wien*, Abt. IIa, **138**, 823–52 (1929). Of particular importance to the soil is that part of air contained in it which is replaceable when used up and which is in communication with the atm. To study the relation of air in the soil to atm. air, soil samples were enclosed in thick-walled air tight glass vessels. Pressure fluctuations were produced above the samples. These fluctuations were found to produce different results in the samples, depending on the amt. of soil air participating in these fluctuations, on fluctuation period and on water content of the samples.
S. L. MADORSKY

Electrical conductivities of soil extracts. C. H. WRIGHT. *Trop. Agr.* (Trinidad) **7**, 24–6 (1930). Methods of making cond. measurements on soils are reviewed. Soil fertility in Nigeria is closely related to the cond. of the soil soln. If K = mean sp. cond. the soil in millionths of a mho and N the no. of open bolls of cotton per acre in thousand, $N = 18.74\ K^{0.37}$ for American cotton, $8.73\ K^{0.43}$ for African. Empirical formulas for the wt. of cotton per plant in terms of K are also given. The soil can be compared in this way only when sp. cond. is detd. at the same season of the year. The correlation coefficients between sp. cond. and nitrate in the soil were 0.905, 0.916 and 0.918; between sp. cond. and H_2O-sol. Ca, 0.858, 0.790 and 0.772. These correlations show why sp. cond. is an index of fertility. The rise in sp. cond. during the dry season is due to biological activity in the soil.
A. L. MEHRING

Results of comparative investigations on the quinhydrone electrode method. J. J. HEDDINE. *Soil Research* (*Suppl. to Proc. Intern. Soc. Soil Sci.*) **2**, No. 1, 77–139 (1930). Data are presented on p_H detns. of soils by the quinhydrone electrode method, special attention being given to the influence of time after addn. of quinhydrone on the p_H value. Seven research organizations coöperated in the work, values being obtained on seven soils by each organization. p_H values obtained by the H electrode, by the Sb

electrode and colorimetrically are given for comparison. Conclusions from the data will be given in a succeeding paper. I. A. DENISON

The distribution of pasture plants in relation to soil acidity and other factors. W. R. G. ATKINS AND E. W. FENTON. *Sci. Proc. Roy. Dublin Soc.* 19, 533–47(1930).—Population counts in natural pastures and permanency trials of seeded pastures indicated that the p_H of the soil is an important factor in detg. the species of grasses and legumes that will thrive. The approx. p_H range of about 40 species is given. When allowed to roam freely sheep and cows graze closely on herbage growing in soil at p_H 6.5, and will graze on most sites of p_H greater than 5. Grazing practically ceases at p_H 5. J. J. WILLAMAN

The relation between p_H and plant pathology. G. CATALANO. *Boll. Studied Informazioni Real Giardino Coloniale Palermo* 10, 13–43(1929); *Rev. botan. appl. agr. trop.* 10, 812–5(1930).—A summary is given of the actual knowledge on the injury to vegetation caused by acidity or alky. of the soil, on the relation between parasitic maladies and p_H of the soil and on the reaction of the sap of a sick plant. J. R. A.

Electrofiltration: A new method of removing exchangeable bases from soil colloids. AMAR NATH PURI. *Soil Science* 30, 413–9(1930).—A process known as electrofiltration is described for the removal of exchangeable cations from soil colloids. One type of app. consists essentially of a cylinder mounted on a funnel with a perforated Cu disk sealed between them. On top of the disk is a filter paper. Inserted in the cylinder from the top is a Pt gauze. A glass U tube extending below the Pt is used to circulate water for cooling. The Cu disk serves as a cathode and the Pt gauze as an anode. Ten g. of soil is placed in the cylinder and water added from time to time. The movement of colloidal particles upward toward the anode serves to keep the paper from becoming clogged and filtration proceeds rapidly. A second type of app. for the same purpose, somewhat simpler in construction, consists of a funnel fitted with a filter paper, and inside of this is a perforated Cu cone which serves as a cathode. A Pt gauze suspended near the center of the funnel serves as an anode. A current of 0.2 to 0.5 amp. is sufficient to remove the exchangeable bases in 3 to 10 hrs. The bases removed correspond closely with those removed by 0 05 *N* HCl. Electrofiltration can be used as a preliminary treatment for soils for mech. analysis. M. S. ANDERSON

Occurrence of nitrites in soils. G. S. FRAPS AND A. J. STERGES. Texas Agr Expt. Sta., *Bull.* No. 412, 5–16(1930); cf. *C. A.* 24, 4883.—By the diphenylamine method, nitrites were found in large amt. in cultures of soils contg. $(NH_4)_2SO_4$, and in lesser quantities in soils which received no addns. of nitrogenous fertilizers. Soils which do not nitrify $(NH_4)_2SO_4$, or which have only low nitrifying power, may produce large amts. of nitrite. Low production of nitrates in soils may be accompanied by high nitrite production. The relative capacity of a soil to oxidize N may be considerably larger for nitric and nitrous N combined than for nitric N alone. The production of nitrites was small the first week, a little larger the second and much higher the third and fourth weeks of incubation. After 28 days, the production decreased. The most favorable amt. of water was 50% of the water-holding capacity of the soil. The addn of $CaCO_3$ or $MgCO_3$ increased the production of nitrous and nitric N from $(NH_4)_2SO_4$. Nitrites persisted in the cultures for more than 6 weeks in considerable amts. They also persisted practically unchanged for over a week in soil exts., indicating that nitrites are more stable than is ordinarily assumed. Field soils as well as lab. samples contained very small amts. of nitrites. In some soils, urea acted as a source of nitrites. Most of the common soil types produced an abundance of nitrites in soil cultures. C. R. F

The changes of cyanamide in the soil. I. A comparative study in dry-field and paddy-field conditions. HISAJI MURATA. *J. Agr. Chem. Soc. Japan* 6, 261–91(1930); *Bull. Agr. Chem. Soc. Japan* 6, 25–31.—The application of commercial cyanamide to the paddy-rice field gives good results in prevention of Weil's disease, as well as a good fertilizing effect on the rice crop. The rate of NH_3 formation from cyanamide is somewhat lower in paddy-field conditions than in dry-field conditions; in the former condition the decompn. stops at NH_3 formation, no nitrate being formed. In fine sandy loam the disappearance of cyanamide is slow, while in fine sandy loam rich in humus and in the clayey loam the disappearance of cyanamide is relatively rapid and only a small part of the cyanamide is transformed into dicyanodiamide. Y. KIHARA

Chemical denudation in Sweden. JOEL VILHELM ERIKSSON. *Medd. Statens meteorol.-hydrograf. Anstalt* 5, No. 3, 1–92 (in French 93–6) (1929). E. J. C.

Effect of small and large amounts of humus on the fixation of nitrogen by Azotobacter chroöcoccum in the presence of different glucides, of mannitol and of calcium malate as sources of energy. JULIU VOICU AND ELENA LUNGULESCU. *Bul. soc. chim. Romînia* 12, 71–81(1930).—The effect of humus on the disappearance of the source of

energy and the rate of fixation of N in cultures of *Azotobacter chroöcoccum* has been studied. A synthetic culture medium was used. As sources of energy saccharose, glucose, dextrin, starch, mannitol and Ca malate were added in 2% amts. Humus was added to the different media in 5 mg. % and 100 mg. %. The humus, prepd. by a 0.5% NaOH extn. of manure previously extd. by 1% HCl, contained 4.56% N and 3.4% ash. A small quantity of humus accelerates the disappearance of saccharose but retards the disappearance of glucose. The large amt. of humus always accelerates the disappearance of the source of energy and the fixation of N, and increases the yield. The expts. do not confirm the existence of a relation between the acceleration of the fixation of N and the increase in yield. If such a relation exists, it is limited to a certain period of vegetation and detd. by the compn. of the humus. RACHEL BROWN

Recent developments in the preparation and use of fertilizers. WILLIAM H. ROSS. *Ind. Eng. Chem.* **23**, 19–21(1931).—A review is given of certain new and improved methods for the prepn. of fertilizer materials and mixts. Granulation of fertilizer mixt. tends to reduce caking, prevents segregation, and greatly improves the drillability of the fertilizer mixt. The efficiency of fertilizers may be greatly increased by uniformity of distribution and placement in the soil with respect to the seed. The apparent toxicity of certain fertilizer ingredients is also reduced. M. S. ANDERSON

Recent developments in the phosphate industry. K. D. JACOB. *Ind. Eng. Chem.* **23**, 14–8(1931).—Recent developments in the phosphate industry are discussed. Reference is made to the utilization of low-grade rock and to the direct application of colloidal phosphate to soil. Phosphate used as a mineral supplement in feeding stock must be of low F content. The manuf. of H_3PO_4 by both furnace methods and wet processes are commercially feasible. The manuf. of superphosphate, ammoniated superphosphate and triple superphosphate is discussed. M. S. ANDERSON

Chemical and physical composition of certain finely divided natural phosphates from Florida. W. L. HILL, K. D. JACOB, L. T. ALEXANDER AND H. L. MARSHALL. *Ind. Eng. Chem.* **22**, 1392–6(1930).—Results are given of a study of the chem. and phys. compn. of samples of soft and waste-pond phosphates from Florida. Data are also included on the phys. compn. of the samples, effect of temp. on the phys. compn., sp. gr., chem. compn. of the original phosphates and the mech. fractions sepd. therefrom, and the soly. of the P_2O_5 in neutral NH_4 citrate and 2% citric acid solns. J. R. A.

The production of superphosphate from Khibinsk apatite. S. I. VOLFKOVICH AND L. E. BERLIN. *Udobrenie i Urozhai* **2**, 11–24(1930).—Expts. were conducted on: (I) the reaction between H_2SO_4 and apatite of particle size up to 0.3 mm.; (II) the reaction between particles up to 0.7 mm. and (*a*) H_2SO_4, with and without the addn. of $CaCO_3$ to the apatite, (*b*) a mixt. of HCl and H_2SO_4 with $(NH_4)_2SO_4$.; (III) the decompn. by H_2SO_4 of mixts. of phosphates from Vyatka, Egorov, with apatite. Apatite samples consisting of 35–51% of particles of a fineness of 0.15 mm. with 44–49% of a fineness from 0.15 to 0.3 mm. gave a product with poor physical properties. When the 0.3 mm. fraction was cut down to 21–58% the product improved. The lower the fraction of large particles the better the product. The preheating of H_2SO_4 and the addn. of $CaCO_3$ to the apatite had no influence on the course of the reaction. The mixts. of HCl and H_2SO_4 gave a product with good physical properties. The mixt. of H_2SO_4 and NaCl gave a fair product. Addns. of $(NH_4)_2SO_4$ showed an improvement of the physical condition of the product. Mixts. of the various phosphates with apatite also gave fairly good products. J. S. JOFFE

The change of the water-soluble phosphoric acid content of superphosphate during its storing in heap. III. The relation of the variety of raw phosphates and the manufacturing conditions of superphosphate to the decline of the water-soluble phosphoric acid content. TSUTOMU SHŌJI, EIZABURŌ SUZUKI AND EIJU NANAI. *J. Chem. Soc. Ind., Japan* **33**, Suppl. binding, 418–9(1930); cf. *C. A.* **24**, 2245, 4349.—The decline of H_2O-sol. P_2O_5 content of superphosphate is closely related to the kind of raw phosphate but not to the manufacturing conditions. J. R. ADAMS

Reactions occurring during the ammoniation of superphosphate. FRANK G. KEENEN. *Ind. Eng. Chem.* **22**, 1378–82(1930).—Superphosphate can be treated with either anhyd. liquid NH_3 or aqua NH_3 in the proportion of 1 mol. or less of NH_3/mol. of H_2O-sol. P_2O_5 with practically no reversion of the P_2O_5 to the insol. form. The addn. of more NH_3 results in a proportional loss of available P_2O_5. The treatment of superphosphate under plant conditions with more than 2 mols. NH_3/mol. H_2O-sol. P_2O_5 gives an equil. mixt. contg. $NH_4H_2PO_4$, $(NH_4)_2SO_4$, $CaSO_4 \cdot 2H_2O$ and pptd. $Ca_3(PO_4)_2$. Under lab. conditions this same equil. is reached but the reactions follow different courses. J. R. ADAMS

Composition of citrate-insoluble residues from superphosphates and ammoniated

superphosphates. K. D. JACOB, W. L. HILL, W. H. ROSS AND L. F. RADER, JR. *Ind. Eng. Chem.* **22**, 1385–92(1930).—Reducing the wt. of sample of $Ca_3(PO_4)_2$ and highly ammoniated ordinary and triple superphosphates sensibly decreases the citrate-insol P_2O_5, while with phosphate rock and non-ammoniated ordinary and triple superphosphates no appreciable decrease is noticed. $CaSO_4$ reduces the soly. of H_2O-insol. P_2O_5 in neutral NH_4 citrate soln. The citrate soly. of H_2O-insol. P_2O_5 as detd. by the official method of analysis depends on the type and quantity of P_2O_5 present. The citrate-insol residue from $Ca_3(PO_4)_2$ is primarily Ca hydroxyphosphate. The insol. residue from ammoniated and non-ammoniated superphosphates and triple superphosphates contains $FePO_4$ and $AlPO_4$ and unattacked phosphate rock, while in addn. the residue from highly ammoniated ordinary superphosphates contains $Ca_3(PO_4)_2$, Ca hydroxyphosphate and possibly some $CaHPO_4$. In general, ammoniation of triple superphosphates and superphosphates decreases the soly. of Fe, Ca and P_2O_5 in neutral NH_4 citrate soln.

J. R. ADAMS.

Free-ammonia injury with concentrated fertilizers. L. G. WILLIS AND W. H. RANKIN. *Ind. Eng. Chem.* **22**, 1405–7(1930).—Work on cotton seedlings indicates that appreciable quantities of free NH_3 in the soil in contact with the roots is injurious until converted into a non-toxic form with a sol. salt. This effect is most severe with $(NH_4)_2HPO_4$ and also occurs with readily ammonified org. ammoniates such as cotton seed meal. Some Ca salt should be used in coned. fertilizers contg. ingredients which decompose into free NH_3, or all sources of free NH_3 should be eliminated from the formula if no Ca is present in the fertilizer.

J. R. ADAMS.

Potassium fertilization of podsol earths of the Kasan Research Station. N. V. ARKHANGELZSKII. *Inst. Landw. Forwertschaft. Kasan* **1**, 33–49(1929); *Deut. Landw. Rundschau* **6**, 482(1930).—Hay and clover were used in the vegetation house. Flax and potatoes were used in the field. K fertilization is effective if enough N is added. Increasing phosphoric acid from 0.1 g. to 0.3–0.5 g. as P_2O_5 doubled the yield per vessel. Increasing the K from 0.2 to 0.6 g. per vessel diminished the yield. The action of phosphoric acid fertilization from the following sources diminishes in the following order: superphosphate, pure $Ca_3(PO_4)_2$, bone meal, phosphorite. The individual K fertilizers act differently. Acid and neutral K fertilizers are better than the basic K_2CO_3. Of the K salts, sylvanite, which approximates K_2SO_4 in action, was found to be the best.

GEORGE R. GREENBANK

The effect of various potash fertilizers on the firmness and keeping quality of fruits. J. H. WEINBERGER. *Proc. Am. Soc. Hort. Sci.* **26**, 174–9(1929); *Deut. landw. Rundschau* **6**, 521.—Recent contentions that N fertilizers cause poor keeping quality lead to the study of K fertilizers to offset this action. With the soil and climatic conditions of Maryland the use of K fertilizers alone with or without N has not affected the firmness or keeping quality as shown by orchard tests.

GEORGE R. GREENBANK

Some relations of nitrogen to the keeping quality of fruit. J. H. GOURLEY AND E. F. HOPKINS. *Proc. Am. Soc. Hort. Sci.* **26**, 167–71(1929); *Deut. landw. Rundschau* **6**, 521(1930).—Nitrates produce larger, less highly colored fruit, with a greater amt. of H_2O and N, with greater catalase activity. Detns. of p_H, total acid, sol. pectin and respiration show no marked differences. There is no difference in the keeping quality of fruit grown on soil of high or low N content.

GEORGE R. GREENBANK

The effect of nitrate fertilizer on stomatal behavior. ANNE L. PLEASANTS. *Elisha Mitchell Sci. Soc.* **46**, 95–116(1930). Bean plants (*Phaseolus vulgaris*) were grown with and without added nitrates in sand and H_2O cultures, in pot tests with sandy loam and in field tests on light clay loam. A few expts. were also made with other species of plants. Added N appears to make the stomata more responsive to light. They opened more quickly and completely in direct sunshine and closed in less time when the light was removed. The plants grown with added N lost less H_2O per sq. cm. of leaf surface and per g. of dry wt. during both clear and cloudy weather. Nineteen references are appended.

A. L. MEHRING.

Solving "mixed acid" problems by use of determinants. E. P. DEATRICK. *Ind. Eng. Chem.* **23**, 34–5(1931).—The use of determinants is especially valuable in solving simultaneous equations of the type involved in the computation of *fertilizer mixts.* when the ingredients possess varying concns.

M. S. ANDERSON

Plant and animal nutrition. ESSKUCHEN. *Das Superphosphat* **6**, 197–202(1930). A general discussion of the inorg. elements required for optimum growth and nutrition of plants and animals.

K. D. JACOB

Pasture top-dressing in Canterbury. Experimental work during the period 1924–30. A. W. HUDSON AND A. Y. MONTGOMERY. *New Zealand J. Agr.* **41**, 249–52, 326–52(1930).—In 46 of 54 expts. mixts. of superphosphate and ground limestone gav

better results on pastures than either superphosphate or ground limestone alone.
K. D. JACOB

Relation of ash constituents of pasture plants to the oxidation reduction potentials of nutrients. H. P. COOPER AND J. K. WILSON. *Soil Science* **30**, 421-30(1930); cf. C. A. **24**, 4079.—Data are reported on certain ash constituents of the grasses representing the most common plant successions accompanying the depletion of soils in New York pastures. The N and SiO_2-free ash contents of the grasses tend to decrease as soils become depleted. Elements with high standard electrode potentials such as Ca and K often predominate in the ash. K tends to increase as Ca decreases. Many organisms differentially absorb at. nutrient cations in the same qual. order as they are removed from soil colloidal complexes by electrodialysis. Plants which require fertile soils or strong nutrient ions for optimum growth are often intolerant of shade and require large quanta of radiant energy for optimum growth. Such plants also tend to synthesize org. compns., which on oxidation yield much energy and may be of high food value. There is a wide difference in the quality of radiant energy necessary for the reduction of the common nutrient anions. Phosphate is one of the most difficult to reduce.
M. S. ANDERSON

Establishment of lucerne root nodules. W. D. REID. *New Zealand J. Agr.* **41**, 316-24(1930). Mixing superphosphate or $(NH_4)_2SO_4$ with inoculated lucerne seed kills a large % of the nodule-forming organisms. Mixing of limed superphosphate (mixt. of equal wts. of superphosphate and ground limestone), ground rock phosphate or basic slag with inoculated seed gives excellent nodule formation, the limed superphosphate giving the best plant growth. Superphosphate gives satisfactory results provided it is drilled or broadcast before seeding, or is drilled out of contact with the seed at the time of seeding. A sufficient quantity of lucerne inoculum remains viable on the seed for 3 weeks to give good inoculation.
K. D. JACOB

Fertilizing turnips in Canterbury. A. W. HUDSON. *New Zealand J. Agr.* **41**, 306-7(1930). Impairment of the germination of turnip seed by contact with superphosphate can be almost entirely eliminated by mixing the superphosphate with an equal wt. of ground limestone about 1 week before it is used. The fertilizer value of superphosphate is not reduced to any appreciable extent by mixing with ground limestone.
K. D. JACOB

The canary banana. E. HOLMES. *Trop. Agr.* (Trinidad) **7**, 320-5(1930). —Nearly all soils in the Canary Islands are lacking in lime. The reaction of banana soils is usually on the acid side of neutrality. The irrigation water used contains sufficient Na_2CO_3 to prevent the soils from becoming decidedly acid. Practically all bananas in the Canaries are fertilized and the most satisfactory analysis is about 10% N, 3-6% P_2O_5 and 11-15% K_2O. From 2 to 5% each of $FeSO_4$ and $CaSO_4$ are frequently added to the mixt.
A. L. MEHRING

Field control of frenching in tobacco. J. C. F. HOPKINS. *Rhodesia Agr. J.* **27**, 581-90(1930). Frenching in tobacco is a N-deficiency disease. The disease has been successfully controlled in the field by applications of readily available nitrogenous fertilizers. The soil conditions causing frenching are discussed.
A. L. MEHRING

Manufacture and use of insecticides and fungicides. IV. Organic compounds. ARTHUR S. CARLOS. *Fertilizer, Feeding Stuffs & Farm Supplies J.* **15**, 749-50(1930), cf. C. A. **24**, 5416.
K. D. JACOB

Formula and method of preparation of insecticides in common use. G. L. FAWCETT. *Rev. ind. agr. Tucumán* **20**, 91-3(1929).—Directions are given for prepg. Bordeau mixt. Bordeau paste and lime sulfur.
S. L. B. ETHERTON

Codling moth experiments, 1928-29. N. S. NOBLE. *Agr. Gaz. N. S. Wales* **41**, 771-80(1930). Pb arsenate at a concn. of 20 oz. to 50 gal. of water combined with miscible white oil, 1 part in 60 parts of water, was efficient in controlling the codling moth on apples. Slightly better results were obtained by the addn. of casein-lime spreader to the Pb arsenate. Colloidal Pb arsenate was no more efficient than ordinary Pb arsenate at the same strength. Addn. of lime-sulfur to the Pb arsenate seemed to be advantageous, possibly acting as an ovicide or as a repellent, but a pronounced spray residue was left on the fruit. Pb arsenate dusts were much less effective than the sprays. Paris ... Bordeaux mixt showed promise as a repellant but caused russeting of the fruit. Lab. tests indicated that several miscible white oils are somewhat toxic to codling moth eggs, and may remain so for several days after the oil has been applied. Hellebore apparently had no value as a larvicide.
K. D. JACOB

Note on the use of chloropicrin for destruction of ants. CARMOUZE. *Ann. Med. Pharm. Colon.* **27**, 460-3(1929); *Bull. Hyg.* **5**, 608.—Various chemicals have been em-

Insecticides. STANDARD OIL DEVELOPMENT CO. Fr. 686,730, Dec. 16, 1929. An insecticide contains a terpene ester such as terpene acetate in a mineral oil, petroleum jelly, cream, etc.

Producing gases containing nicotine. BRABENDER ELEKTROMASCHINEN G. M. B. H. Ger. 509,084, Feb. 7, 1930. Addn. to 486,530. Gases contg. nicotine for *insecticides*, etc., are continuously produced from nicotine-contg. powder such as tobacco by feeding the powder on to an endless band which conveys it over or between heated bodies.

Insecticide and fungicide. IRA G. MCBETH and JOHN R. ALLISON (to Leffingwell Rancho Co.). U. S. 1,787,585, Jan. 6. A compn. suitable for use on foliage contains an oil and water emulsion and a stabilizing and spreading material including a water-sol protein material such as dried blood albumin in an aq. soln. contg. NH_3. U. S. 1,787,586 describes a compn. comprising a mixt. of 2 uncoalescent emulsions, one contg. a light penetrating oil and the other contg. a heavy slow-drying oil; it may also contain pyridine oleate or nicotine oleate.

Fungicide, etc. I. G. FARBENIND. A.-G. (Wilhelm Bonrath and Fritz Heckmanns, inventors). Ger. 506,394, Nov. 5, 1926. Addn. to 502,204 (*C. A.* **24**, 4907) The distn. residues of isobutyl alcohol are used, alone or with the usual addns., for the destruction of animal and vegetable pests

Fungicides and anti-vermin preparations. I. G. FARBENIND. A.-G. (Georg Wesenberg, inventor). Ger. 506,771, Mar. 21, 1928. Potato meal, etc., is protected from fungus and vermin by a prepn. contg. inorg. salts of N_3H.

Preparation for destroying grubs, blight, etc. CHRISTIAN KÖNIG. Swiss 140,348, Jan. 29, 1930. The prepn. contains tobacco ext. (14% strength), $FeSO_4$, $Ca(OH)_2$ (or CaC_2 residue) and $(NH_4)_2S$.

Parasiticides. ALEXANDER WACKER GES. FÜR ELEKTROCHEMISCHE IND. G. M. B. H. Fr. 687,059, Dec. 20, 1929. Waste inorg. substances from the oil and fat industry, such as used bleaching earth or $CaCO_3$ from the sapon. with CaO, are mixed with known substances used for combating parasites

Solution for separation of seeds. HARRY R. WARREN (to The Warren-Teed Seed Co.). Can. 306,405, Dec. 2, 1930. A soln. for the gravity sepn. of seeds consists of $NaNO_3$ 77, glucose 20, and Na_3PO_4 3 lb. dissolved in water. The soln. stimulates the germinating properties of the seeds. Cf. *C. A.* **24**, 3097.

Seed-goods protecting preparation. I. G. FARBENIND. A.-G. (Adolf Steindorff and Kaspar Pfaff, inventors). Ger. 506,731, Nov. 3, 1925. The prepn. is made by mixing filling material and powd. insecticides and fungicides with methyl cellulose. Thus, the mixt. may contain $Ca_3(AsO_4)_2$, $CuCO_3$ or $HgCl_2$ and talcum, with methyl cellulose.

Cauterization of seed goods. I. G. FARBENIND. A.-G. (Adolf Steindorff, Kaspar Pfaff and Nicolaus Malmus, inventors). Ger. 508,520, Nov. 5, 1925. Addn. to 506,731 (preceding abstr.) Seed goods are cauterized with fungicides contg. methylcellulose, slightly moistened with water, and finally dried.

Organic mercury compounds. I. G. FARBENIND. A.-G. Fr. 688,209, Jan. 14, 1930. See Brit. 329,987 (*C. A.* **24**, 5928).

Pyrethrum extract emulsion. I. G. FARBENIND. A.-G. Ger. 506,889, Oct. 27, 1928. Addn. to 431,699. The ext. is emulsified with a sulfonated mixt. of aromatic compds. such as the by-products of petroleum manuf.

Herbicide. E. RALPH DE ONG (to The Shell Development Co.). Can. 305,500, Nov. 4, 1930. A herbicide comprises an emulsion in water of the ext. (Edeleanu ext.) obtained by the extn. of kerosene distillate with liquid SO_2, combined with a small quantity of As, dissolved in one of the two phases of the emulsion.

Herbicide. E. RALPH DE ONG (to The Shell Development Co.). Can. 305,502, Nov. 4, 1930. A herbicide comprises an emulsion in water of an oxidized mixt. of org. acids derived from petroleum oils (particularly from naphthenic hydrocarbons) with petroleum oil.

16—THE FERMENTATION INDUSTRIES

C. N. PREY

Some minor industrial fermentations. O. E. MAY AND H. T. HERRICK. *Ind. Eng. Chem.* **22**, 1172–6(1930).—A review is given of the production by fermentation of *citric, gluconic,* and *gallic acids* and *glycerol.* Raw materials, methods of fermentation and yields are given. F. DE LEEUW

Constituents of fermentation products obtained by the action of ferments, as also

the distribution of the latter. H. VALENTIN. *Apoth. Ztg.* **45**, 1464-5, 1477-8(1930).—Since the close of the World War various methods have become known for the prepn. of certain popular beverages by the action of definite ferments (bacteria, yeasts, etc.) on sugar-contg. solns. (infusions of tea, etc.). The exciting ferment in most cases is believed to consist essentially of a symbiotic combination of a yeast and a bacterium, the one producing EtOH, the other an acid. The author has carried out a series of 10 fermentation expts. involving ferment cultures from various sources and has characterized certain individual ferments. Among the acids detected in these expts. may be mentioned lactic, malic, tartaric, citric, oxalic, malonic, acetic, succinic and gluconic. The geographical distribution of such ferments is discussed. W. O. E.

The influence of agitation and temperature upon the production of acidity and assimilation of nitrogen during fermentation. W. WINDISCH AND P. KOLBACH. *Wochschr. Bran.* **47**, 327-31, 337-40(1930).—It is shown that slight changes in the mode of exptl. procedure, such as shaking up the fermentation flask once a day, affect the acid formation and N assimilation considerably. Both acidity and N assimilation increase with agitation. There was no true agreement between the lab. expts. and those made in the brewery in vessels. It was found that the ext. in the vessels on large scale decreased at 6.5° at the same rate as the ext. of the same wort in the labs. at 9° when agitated vigorously once a day. The results of the expts. were not sufficient to deduce a relationship as to the effect of temp. on the production of acidity and N assimilation; the expt. proved, however, that the true acid formation and N assimilation could not be detd., because of the fact that at higher temps. products of autolysis masked these compds. There is a relationship between NH_3 assimilation and acid formation in so far as increased NH_3 assimilation led to increased production of acidity. The NH_3 content of the wort reached a min. during fermentation and then increased again. During fermentation in brewery vessels the NH_3 content did not go beyond the minimum, that is to say, no NH_3 formation was observed, the formation of which is probably due to autolysis. The gradual increase in acidity was in general followed by a slight decrease toward the end of the fermentation, more marked at higher temperatures. This decrease, however, was not observed in the fermentation vessels. S. JÓZSA

Formation of sulfurous acid by fermentation. MOSUKE MATSUYAMA AND HIRIOCHI NAKAMURA. *J. Agr. Chem. Soc., Japan* **6**, 307-12, *Bull. Agr. Chem. Soc., Japan* **6**, 19-21(1930). Sulfurous acid in the raw materials for beer brewing disappears in the course of boiling and is produced during the course of the fermentation. The production of sulfurous acid in ale fermentation depends on the kinds of yeast used and the kind and quantity of sulfate in the soln. Y. KIHARA

Methanol in beverages. I. A critical study of methods of investigation and qualitative analysis. NORBERTO A. ESPINOSA. *Anales asocn. quim. Argentina* **18**, 57-73(1930). The Denigès-Villavecchia method ("Química Analítica Aplicada," p. 362), with slight modifications, was adopted. It allows comparison of a series of tests in about 1.5 hrs. and has a limit sensitiveness of 0.0002 cc. of MeOH. The second addn. of H_2SO_4 affects the final color obtained only slightly, unless more than 1 cc. of concd. H_2SO_4 is added. It is possible to make the detn. in the above time without the second H_2SO_4 addn., but the final color is weaker. With the Chapin method the yield of HCHO is 2.5 times that obtained with the Denigès-Villavecchia method. If the Schiff reagent is used in place of the Schuff-Elvove, the limit of sensitivity is 0.00008 cc. MeOH. The most common impurities in beverages which can react like MeOH, *e. g.*, aldehydes, iso-Bu, Am, Pr alcs., AcOH and tartaric acid, do not interfere when present in normal amts. In detn. of ale essences it is quite necessary to give the distillate a preliminary purification. The Rothera qual. test can be used for detn. of acetone. E. M. SYMMES

Extract of malt. C. EDWARD SAGE. *Chemist and Druggist* **113**, 53(1930).—The Brit. Pharm. Codex states that malt ext. consists chiefly of maltose (50% or more) and dextrin, with some dextrose, "and should also contain a fair proportion of diastase." A method for detg. its activity is also given. In 3 samples of ext. of malt S. found very variable Lintner nos. (54, 170 and 6) and total sugars (as maltose, 69, 62 and 49). In 10 samples of malt ext. contg. about 15% of cod-liver oil, Lintner nos. varied from 1.5 to 19 and total sugars from 42 to 54; yet all samples were clinically satisfactory. If ext. of malt is to be official in the Brit. Pharm., the official ruling by the Ministry of Agriculture and Fisheries, 1929, must be recognized; accordingly, pharmaceutical malt exts. must have a diastatic activity (Lintner no.) of not less than 25, a sol. protein content of not less than 5%, and a sp. gr. not less than 1.4. S. WALDBOTT

Form of phosphate in barley and malt for beer brewing. MOSUKE MATSUYAMA AND HIROYOSHI JINNAI. *J. Agr. Chem. Soc., Japan* **6**, 313-6; *Bull. Agr. Chem. Soc., Japan* **6**, 21-2(1930).—P_2O_5 was detd. by Lorenz's method. In both barley and malt

nuclein P was about half the amt. of total P; inorg. P and phosphatide P were next. Org. P in malt was less than in barley, but inorg. P was present in larger amts. in malt.
Y. KIHARA

Oxido-reduction—beer yeast—the influence of desiccation. RENÉ FABRE AND HENRI SIMONNET. *Compt. rend.* **191**, 1075–7(1930).—Expts. on beer yeast confirm previous work on hepatic tissue (*C. A.* **24**, 4816–7) that sulfhydryls of the glutathionic type are liberated in proportion to the no. of dead cells. Fresh yeast gives no NH_4 nitroprussiate reaction—a specific test for sulfhydryls—unless it is first treated with trichloroacetic acid. In chloroform atm. the autolysis is rapid. The greater the degree of desiccation of the yeast, the greater is the quantity of derived sulfhydryls. Desiccated yeast solns. exert a reducing action analogous to that of cystine. Fresh yeast solns. do not.
MARY E. LEAR

The oxidizing action of cryptomeria wood (YAMADA) **11A.** Coffee substitute (fermentation process) (Fr. 687,903) **12.**

SMYTH, HENRY F., AND OBOLD, WALTER L.: **Industrial Microbiology; The Utilization of Bacteria, Yeasts and Molds in Industrial Processes.** Baltimore: The Williams & Wilkins Co. 313 pp.

Organic acids by fermentation. FRANK J. CAHN (to The Commercial Solvents Corp.). Can. 306,081, Nov. 25, 1930. Bagasse or dried, spent sugar-beet cossettes, or wet, leached-out sugar-beet cossettes are impregnated with solns. made by dilg. molasses to 10 to 15% sugar concn. The resulting material is fermented with a selected strain of fungus, such as *Aspergillus*, to produce a desired acid such as citric acid. Cf. *C. A.* **24**, 2831.

Neutralizing citric acid obtained by fermentation. M. S. FILOSOFOV. Russ. 17,805, June 30, 1927. Filter-press mud from the sugar industry is used to neutralize the liquid of fermentation.

Butyl alcohol and acetone by bacteriological fermentation. COMMERCIAL SOLVENTS CORPORATION. Ger. 507,793, Mar. 13, 1926. Nitrogenous nutrients obtained from maize are added to carbohydrates free from, or poor in, proteins and the product subjected to the action of butylalc. acetone bacteria. The steeping water of maize is suitable for addn. Cf. *C. A.* **20**, 2045, **22**, 2235, 2635, **24**, 1700.

Anhydrous alcohol. ZEITSTOFFFABRIK WALDHOF & OTTO LÜHRS. Fr. 687,924, Dec. 18, 1929. Anhyd. alc. is obtained by heating dil. alc. with quick lime under high pressure and causing the vapors to traverse first a layer of abs. alc. without appreciable condensation, to stop any lime carried over and afterward condensing.

Buoyancy volumeter for the estimation of gas evolved in fermentation processes. WILHELM KLEINSORGEN and HELMUT JUSATZ. Ger. 509,848, Nov. 20, 1928.

Raising the reaction velocity of enzymic processes. FRIED. F. NORD. Ger. 507,511, June 4, 1927. See Brit. 291,443 (*C. A.* **23**, 1148).

Influencing the velocity of enzymic reactions. FRIED. F. NORD. Ger. 508,560, Jan. 4, 1929. Addn. to 507,511 (preceding abstr.). The velocity of enzymic reactions, such as the production of malt from barley, wheat, rye, oats, maize, etc., is increased by treating with gaseous or dissolved CH_4, C_2H_4, C_3H_6, C_4H_8, C_4H_{10} or similar unsatd. hydrocarbons and with N_2O. The hydrocarbons may be used singly or mixed. Several examples are given.

Germinating drum for grain, etc. SPECK WERKE DRESDEN DER "MIAG" MÜHLENBAU U. INDUSTRIE A.-G. Ger. 507,510, April 20, 1928. The drum has a central air-circulatory passage.

Re-using the bitter principle in brewing sediment. GOTTFRIED JAKOB. Ger. 507,512, Jan. 23, 1929. The sediment is leached out with water, and the resulting bitter water employed as mashing or sparkling water at a later brewing.

Malt. WILLI WOLFRUM. Ger. 507,982, June 2, 1928. Floor malting by spraying the green malt one or more times with a soln. of nitrogenous plant food, during germination, is described.

Malt-turning device. JOHANNES KRAMER. Ger. 507,626, Aug. 15, 1928.

Wort. BERGEDORFER EISENWERKE A.-G. ASTRA WERKE. Ger. 507,513, April 2, 1925. Addn. to 485,547 (*C. A.* **24**, 1180). The husked and mashed malt of 485,547 is washed out in a centrifuge to obtain the wort from the grain.

Beer. RHEINISCHE MASCHINEN- UND APPARATEBAU-ANSTALT PETER DINCKELS & SOHN G. M. B. H. Ger. 509,597, Oct. 7, 1928. Residual beer is worked up by pas-

teurization. The beer is circulated in a container in which it is alternately heated and cooled. The app. is described.

Yeast. VEREINIGTE MAUTNER'SCHE PRESSHEFE FABRIKEN G. M. B. H. Ger. 508,061, May 24, 1925. Molasses is rendered suitable for use in the manuf. of pressed yeast by simple diln. and filtration, without sterilization by heat and without addn. of reagents. An inert powder may be deposited on the filter cloth to assist the filtration, *e. g.*, talc if the molasses is acid, or $CaCO_3$ if it is alk.

Yeast. M. FISCHL'S SOEHNE and FRANZ ROSENBERG. Fr. 686,784, Dec. 17, 1929. The aeration method is used with periodical addn. of the nutrients in such a way as to cause partial fermentations of increasing vol directly following each other, which constitute fully accomplished fermentation operations, inasmuch as at the beginning of each phase the entire nutrient soln. required for that phase is supplied to the yeast and the propagation is in every single phase carried on up to the full consumption or nearly the full consumption of the fermentable sugar introduced at the beginning of the phase. The yeast produced in the preceding phase is, without sepn., employed as starting yeast for the next phase. The above conditions are worked out mathematically as being the best conditions for working. A suitable app. for the process is described.

17—PHARMACEUTICAL CHEMISTRY

W. O. EMERY

Hydrogen peroxide and iperol. ULISSE MALUSARDI. *Ann. Schiapparelli* **4**, 271–7(1930).—A review of the properties of H_2O_2, and of iperol, $CO(NH_2)_2.H_2O_2$. The $CO:NH_2$ group acts as a stabilizer. G. A. BRAVO

Pharmacy in ancient Egypt. M. WAGENAAR. *Pharm. Weekblad* **67**, 1329–34 (1930). Historical. A. W. DOX

Chemical control of fluid extracts and tinctures. MANUEL D. GOROZPE. *Rev. quim.* **6**, 11–3(1930).—The densities, total solids, alkaloids and EtOH contents, as found by actual analysis, of a number of carefully prepd specimens of important tinctures and fluid extracts of the Mexican Pharmacopeia are given. L. E. GILSON

Composition of salts used in Madagascar. P. FERRÉ AND RAZAFINJATO. *Bull. soc. pharm. Centr.* **23**, 118–29(1930); *Bull. Hyg.* **5**, 613.—The natives used the salts of 2 plants, *Sira rondrona* and *Sira hazo*. The salts are obtained by ashing the plants and extg. with H_2O. They contain Na, K, Ca, Mg, Fe and Mn as chlorides, sulfates and silicates. Solns. of *Sira rondrona* are alkaline and contain 47.7% K as KCl. *Sira hazo* is similar, giving an ash contg. the same elements but is more alkaline. G. R. G.

The study of Leonurus sibericus L. I. Chemical study of the alkaloid "leonurine" isolated from **Leonurus sibericus L.** SEIKO KUBOTA AND SEIKICHI NAKASHIMA. *Folia Pharmacol. Japon.*, **11**, No. 2, 153–8, Breviaria 10(1930).—The alkaloid *leonurine* has been isolated from *Leonurus Sibericus* L., a Chinese drug which has been in use in China for several thousand years. The plant contains about 0.05% of the cryst. alkaloid. Amyl alc. is so far the only solvent capable of dissolving the free base. The hydrochloride salt is sol. in cold water and is 1.2% sol. in hot water. The empirical formula is $C_{13}H_{19}N_4O_4$. There appears to be a OCH_3 group in its constitution. It m. 238°. G. H. W. LUCAS

The efficacy of commercial extracts of the anterior hypophysis. A. GUITARTE. *Semana med.* (Buenos Aires) **1930**, II, 1357–8.—The products deteriorate with the age, as observed in expts. with rats. A. E. MEYER

Laurel and its products. GUIDO ROVESTI. *Rivista ital essenze e profumi* **12**, 241–51 (1930). *Laurus nobilis* essence contains eucalyptol 45%, free alcs. (terpineol, geraniol) 18, esters of acetic acid 13, free eugenol 0.53, acetyleugenol 1.1, methyleugenol 3, terpenic hydrocarbons such as β-pinene and phellandrene 13 and sesquiterpene 3–4%. The consts. are: d 0.920–0.930 $[\alpha]_D$ −13 to −21, acid no. 3, ester no. 28–50; it is sol. in 2–3 vol 80% alc. Garda laurel oil obtained by prolonged boiling is greenish yellow and has a pleasant odor; d_{15} 0.926, solidification point 24–25°, m. 32–36°, n_{20} 1.4710, acidity 11.5, saponification no. 205, acid no. of volatile oils 1.5, Hehner value 94, I no. 74.5, I no. of fatty acids 1.82. It contains **melissic acid**, melissic alc., laurane, lauric acid, trilaurin, triacetin, tricaprin, **trimyristicin, triarachidin**, tripalmitin, resins and chlorophyll; it yields a frothy **antiseptic soap.** R. SANSONE

New process of the determination of allyl mustard oil in powdered black mustard. R. MEESEMAECKER AND J. BOIVIN. *J. pharm. chim.* [8], **11**, 478–84(1930).—To 5 g. of finely powd. mustard (no. 9 sieve) add 100 cc. H_2O in a 220-cc. flask, cork and keep the

mixt. for 1 hr. at 68°. Add 100 cc. official NH_4OH and allow to stand for 15 min. Cool, bring the vol. to 200 cc. with H_2O, add 20 cc. of Courtonne reagent and filter. Take of the limpid filtrate 100 cc., add to this in a glass-stoppered flask 5 cc. of 50% H_2SO_4, then 10 cc. of 0.1 *N* I soln. After 15 min. add about 10 cc. C_6H_6 and titrate the excess of I with 0.05 *N* $Na_2S_2O_3$. One l. of 0.1 *N* I corresponds to 5.8 g. of thiosinamine or to 4.85 g. of allyl mustard oil. The results obtained with this method compare well with those of the Codex Supplement 1925, the method is more rapid and avoids distn. and slow pptn. of Ag_2S. The yield diminishes as the time of maceration is increased. The observation of Astruc and Mousseron (*C. A.* **21**, 2759) as to the proper temp. of maceration is confirmed for mustards not deprived of their fatty oil. With mustards from which the oil is extd., the viscosity of the mixt. is greatly diminished, then the optimum temp. for max. yield of essence is 40°. S. Waldbott

A new reaction of diallylmalonylurea (dial). F. Lagarce. *J. pharm. chim.* [8] **12**, 364–5(1930). Treat a few crystals of dial on a watch glass with 2–3 drops of a freshly prepd. 1% soln. of vanillin in pure H_2SO_4. Upon gently warming on a water bath, a cherry-red color is produced, not given by numal (isopropylallylmalonylurea) or the other analogous malonylurea derivs. The reaction is also obtained with aq., alc. and Et_2O solns. of dial. Add the reagent drop by drop to a small quantity of the soln. in a test tube, the heat produced usually brings out the color; if not, after 2 to 3 vols. of the reagent have been added, warm on the water bath. When dial is absent, alc. or Et_2O solns. show a green color. The reaction is not quite sp., since it is also given by allyl alc., terpenes, menthol, camphor, etc. S. Waldbott

Pharmacopeia revision; first report of the Pharmacy Subcommittee. Anon. *Pharm. J.* **125**, 405, 408–9, 427–9; *Chemist and Druggist* **113**, 523–7, 555–6, 580–92 (1930). Detailed recommendations are made for alterations in the text of the Brit. Pharm. Criticisms are invited. S. Waldbott

Evaluation of alkanet root: A colorimetric test. W. A. N. Markwell and J. J. Walker. *Pharm. J.* **125**, 429(1930). Exhaust 5 g. of alkanet in no. 20 powder in a Bolton-Revis continuous extn. app. with a mixt. of 50 cc. of 90% methylated alc. and 50 cc. of crystd. C_6H_6, transfer to a 200 cc. flask, washing with more of the mixed solvent and make up to 200 cc. Transfer 2 cc. of the soln. into a 50 cc. Nessler tube and fill up to 50 cc. with the solvent. If the sample of root is of av. quality, the depth of color should be equal to that of a standard prepd. by mixing 40 cc. of a 0.01% (wt. vol.) $KMnO_4$ soln. with 10 cc. of a 0.1% soln. of $K_2Cr_2O_7$. S. Waldbott

Phospho-tonic wine. Wm. Forster and Wm. Johnston. *Pharm. J.* **125**, 480 (1930). As an improvement on quinine wine, Brit. Pharm., the following mixt. is suggested, yielding a non-pptg. product: compound syrup of hypophosphites, Brit. Pharm. Codex (with 1.1 grains of quinine hypophosphite in each fluid drachm) 1 fluid part; orange wine, Brit. Pharm. free from gelatin and with not more than a trace of phosphates 7 fluid parts. Mix and allow to stand for several weeks, then decant or filter from any slight ppt. formed. S. Waldbott

The purity standards and tests of medicinal substances. W. H. Linnell. *Pharm. J.* **125**, 504–7, 547; *Chemist and Druggist* **113**, 640–1(1930). The various causes affecting purity tests for the 3 classes of medicinal substances are discussed: chemicals, natural products and galenical preps., *e. g.*, the loss or gain of H_2O, oxidation in air, varying soly. of salts ($BaSO_4$, $PbCl_2$ in presence of other substances. The Brit. Pharm. test for the presence of a max. of 2.12% Na_2CO_3 in $NaHCO_3$ is misleading. S. W.

More European pharmacies. Wm. Mair. *Pharm. J.* **125**, 532–4, 593–5(1930); cf. *C. A.* **24**, 5938. An account of the scientific activities of the Ger. Pharmaceutical Soc., the Apothecaries' Union and its club house (photograph), Berlin famous pharmacies and historical notes on old pharmacies in Copenhagen, Stockholm and Vienna. Illustrated. S. Waldbott

Mist. bismuthi composita acida cum pepsino, Brit. Pharm. Codex. J. F. Boyle and J. H. Franklin. *Pharm. J.* **125**, 559–60(1930). To avoid pptn. of Bi, use a max. quantity of H_2O (15 out of 16 parts) to dissolve the Bi Na tartrate (*A*) and pepsin together, then add the other ingredients. A definite standard should be fixed for the compn. of *A*, as some com. samples do not completely dissolve in the above max. quantity of H_2O. Also the carmine soln. should be replaced. F. Goldby. *Ibid.* 655. A modification of the Codex formula is suggested, *viz.*, the use of Bi tartrate in H_2O-sol. scales, tincture of cudbear to replace the soln. of carmine and slightly less than an equiv. soln. of strychnine-HCl to replace the tincture of nux vomica. The resulting mixt. is clear and permanent. S. Waldbott

The necessity of sterilizing "T. I. D." solutions. Arthur E. Bailey and F. A. Croxon. *Pharm. J.* **125**, 615(1930). *Na tetraiodophenolphthalein* used in

as an injection into the gall bladder prior to taking a skiagram is said by authorities to be naturally sterile (probably because the compd. contains over 50% of I). This, however, is not the case. To 5 cc. of a 10% soln. of "T. I. P." was added a 4 mm. Pt loopful of the culture of the organism under test. After intervals of 1,2, 3 min., etc., up to 6 hrs., a loopful of the "doped" soln. was transferred to a tube of nutrient broth and the whole incubated for 48 hrs. *Bacillus coli* and *B. typhosus* were killed within 1 hr., but *B. subtilis* persisted during the 6 hrs. of the expt. Since solns. are always prepd. fresh and often injected within a few min. after prepn., the less resistant bacilli are also liable to be present. S. WALDBOTT

Cosmetics and hair dyes. R. M. B. MACKENNA. *Brit. Med. J.* **1930, I,** 899; *Chemist and Druggist*, **113,** 190–1(1930).—The physiol. and pathol. effects of skin preps. and of hair dyes are discussed. S. WALDBOTT

West Australian sandalwood oil. ERNEST J. PARRY. *Chemist and Druggist* **112,** 65, 171; PERCY MAY. *Ibid* 114; A. R. PENFOLD. *Ibid* **113,** 344(1930); cf. *C. A.* **23,** 174, 931.—Polemical between E. J. P. and M. In 14 com. samples of oil from *Santalum spicatum* (*Eucarya spicata*) M. found very narrow limits of variation: d. 0.970–0.973; optical rotation −5° 30′ to −6° 40′; n_D^{25} 1.5035-1.5072; soly. in 70% alc., 1 in 3.5 vols. to 1 in 4.0 vols.; sesquiterpene alcs. calcd. as santalol 95.0-96.3%. The oil, offered in the French Codex, should generally become official on its own merits, as its therapeutic properties are at least equal to those of oil from *S. album* (cf. *C. A.* **23,** 4533; 5545).—These exptl. results and conclusions are confirmed by A. R. P. The com. oil on the market is not a crude oil but a highly rectified product; nor is it now a mixt. of the distillates of *Eucarya spicata* and *S. lanceolatum* (of large neg. rotation) intended to imitate the official East India oil. Stickwood yields an oil devoid of santalol; oils from roots and butts which are actually used in distg. the oil, contain moderate quantities of santalol.—H. V. MARR. *Ibid* 821-2.—Contrary to a statement by Penfold, stickwood contains santalol as shown in actual manuf. of the oil. The correct name of the species from which the oil is obtained is *Santalum spicatum* A. DC.; the special name *Eucarya* given to it by Sprague and Summerhays is based on insufficient data. In support of this statement C. A. Gardner, *Bull. W. Australian Forestry Dept.*, is quoted. S. WALDBOTT

Everyday problems in the pharmacy. J. R. WALMSLEY. *Pharm. J.* **125,** 507–8; *Chemist and Druggist* **113,** 673-5(1930). Among the topics discussed are: *Storage of drugs*: the new Brit. Pharm. will probably include directions. *Dakin soln.*, kept in amber colored bottles and at south exposure, showed a loss of only 8% of NaOCl in 6 months, but *eusol* (Brit. Pharm. Codex) should be stored only in a cool, dark place for not more than 1 month. The action of *polarized light* on the *glucosides of stored drugs* (cf. *C. A.* **18,** 87; **19,** 781; **20,** 3133; **21,** 3089) is apt to take place when the drugs are stored to sunlight reflected from wet roofs or pavements. *Australian sandalwood oil* is recommended a concoction (cf. preceding abstrs.). *Isopropyl alcohol* is detected by oxidation with $K_2Cr_2O_7$ and H_2SO_4, distg. the acetone and applying the Na nitroprusside test. Pptn. of casein from *pasteurized milk* by *rennet* is much retarded when the milk has been heated to 167° F. instead of 145°, the official min. temp. At 149°, pptn. is slightly hastened (cf. *C. A.* **23,** 5513). A phenol odor in pasteurized milk was not caused by rennet, but by *p* cresol developed in the milk (*C. A.* **24,** 1678). *Grease film* firmly adhering to glassware may be removed by wetting with a little lysol. S. WALDBOTT

Musk, civet and castor. H. STANLEY REDGROVE. *Chemist and Druggist* **112,** 288-9(1930).—A review, with structural formulas of the odoriferous constituents (cf. *C. A.* **23,** 2728, 4297). A tincture made from a strongly odoriferous fatty material recently obtained from the *musk-rat, Ondatra zibethica* (*Fiber zibethicus*), has the combined fragrance of dil. solns. of civet and musk-xylene and may replace this blend in specialties, possibly in enhancing the fragrance of rose-geranium oil. S. W.

Bergamot products. GUIDO ROVESTI. *Rivista ital. essenze e profumi; Chemist and Druggist* **112,** 200-1(1930).—The machine perfected by Ugo Giovanelli for the *mechanical extn.* of the *oil* is illustrated and its use described in detail. Other bergamot products discussed are "second" oils, "petit-grain" bergamot from the leaves and the manuf. of Ca citrate. S. WALDBOTT

The place of drugs in dental surgery. A. T. PITTS. *Chemist and Druggist* **112,** 448-9, 479-80(1930).—**An account of the various ills affecting teeth, and the use of drugs appropriate in the treatment of each case. A 5 to even 10% soln. of H_2CrO_4 is used as an antiseptic in ulcerated gums ("trench mouth") after washing with 3% H_2O_2 soln. Dentifrices should be alk. to neutralize lactic acid formed in fermentation of carbohydrates.** S. WALDBOTT

The theory and structure of emulsions. THOMAS J. SMITH. *Chemist and Druggist* **112,** 537(1930).—An address. S. WALDBOTT

Siam Government Laboratory, 4th Report. A. MARCAN. *Chemist and Druggist* **112,** 746-7(1930).—Consts detd. for oils of *Hydnocarpus anthelmintica* and *H. ilicifolia* King are tabulated. The uncorticated seeds of *Jatropha curcas* (*physic nut*) yielded by hot pressure 26.2%, by extn. with $CHCl_3$ 31.2% of oil, showing, resp., $d_{15.5}$ 0.924, 0.923; sapon. no. 192.6, 202.9; I no. (Wijs) 101.1, 98.2; n_D^{40} 1.4640, 1.4623; acid no. as oleic acid 7.5%, 12.4%. *Oil of turpentine* from *Pinus merkusii* gave $d_{15.5}$ 0.861; initial b. p. 153°; 97% distd. 170°, n_D^{20} 1.467; $[\alpha]_D$ −40.4°; acid no. 0.1; residue, pale yellow 7%. Among other topics discussed are *native Malay poisons* (cf. J. D. Gimlette, *Malay Charms and Poisons, Ibid* **111,** 310(1929); **113,** 593(1930)). S. WALDBOTT

Perfumery products in North Africa. R. M. GATTEFOSSÉ. *Chemist and Druggist* **113,** 333-4(1930).—In Tunisia, orange-flower water and neroli oil have been prepd. early by the Arabs. In Algeria, geranium was the first perfume grown; in recent yrs., oils of lemon, orange, lavender, jasmine and rose are prepd by modern methods. In Morocco, orange products are prominent; also rose, citronella, vetivert and oakmoss are grown. S. WALDBOTT

Chinese medicine. DAVID HOOPER. *Chemist and Druggist* **113,** 713(1930); cf. *C. A.* **21,** 4023.—A lecture on old Chinese drugs based on the "law" of signatures. Chinese poisons and curious animal remedies. S. WALDBOTT

Pharmacy in Siam. A. H. HALE. *Chemist and Druggist* **113,** 742-3(1930).—Strict pharmacy and medical laws are operative in Siam. A pharmaceutical society recently organized intends to investigate the little known materia medica of Siam plant life. S. WALDBOTT

The quality of aconite. H. B. HAAG AND L. W. HAWKINS. *J. Am. Pharm. Assoc.* **19,** 1284-87(1930).—Six specimens of tincture of aconite were obtained from various sources and assayed by the U. S. P. X method (m. l. d. for guinea pigs). The specimens ranged from 10 to 100% of the U. S. P. requirements. The p_H values of the prepns. lay between 3.1 and 4.57. The p_H values of the two showing 100% activity were 3.1 and 3.13. The ages of these two prepns. were not known. H. and W. believe that tincture of aconite should be sold with an expiration date on the label. L. E. WAKEMAN

Vitamins in relation to pharmacy (WOKES) **11E.** Attempts to prepare compounds of the rare earths for therapeutic use (NICCOLINI) **11H.** Dyed furs and dermatitis (BEAN) **25.** Field control of frenching in tobacco (HOPKINS) **15.** Quantitative determination of pyrethrin I (VOLLMAR) **7.** Manufacture of surgical rubber goods (DAVAKERLEY) **30.** Packing and wrapping materials (Fr. pat. 687,126) **18.** Basic products [for preparation of cosmetics] (Fr. pat. 687,224) **27.**

BENTLEY, ARTHUR O., AND HOLDEN, HENRY S.: **A Textbook of Pharmacy.** 2nd ed., revised and enlarged. London: Balliére Tindall and Cox. 15s., net. Reviewed in *Pharm. J.* **125,** 370(1930).

Handbuch der Pharmakognosie. Lfg. 1. Edited by A. Tschirch. 2nd enlarged ed. Leipzig: Bernhard Tauchnitz. 112 pp. M. 8. Reviewed in *Nature* **126,** 911 (1930).

The R. P. U. Formulary of Preparations Made with Industrial Methylated Spirits. London: Retail Pharmacists' Union. 2s. 6d. Reviewed in *Pharm. J.* **125,** 596 (1930).

SCHMUK, A. A.: **Chemistry of Tobacco and Manufactured Tobacco Products.** Krasnodar: State Institute for Tobacco Investigations. 280 pp.

Useful Drugs: A List of Drugs Selected to Supply the Demand for a Less Extensive Materia Medica with a Brief Discussion of Their Actions, Uses and Dosage. Edited by Robert A. Hatcher and Cary Eggleston. Issued by the Council on Pharmacy and Chemistry of the Am. Med. Assoc. 8th ed. Chicago: Am. Med. Assoc. 176 pp. 60 cents. Reviewed in *J. Am. Med. Assoc.* **95,** 1368(1930).

Pharmaceutical mixture of hyoscyamine and scopolamine. EMIL STARKENSTEIN (to Chemische Fabrik auf Actien vorm. E. Schering). U. S. 1,786,873, Dec. 30. A mixt. of 10 and 1 parts, resp., of these 2 substances (suitably their camphoric compds.) is used for combating sea-sickness.

Synthetic drugs. I. G. FARBENIND. A.-G. Ger. 508,334, Feb. 10, 1928. Aq. solns. of arsenobenzenes are stabilized by means of pyrazolone derivs. of non-acid

character, *e. g.*, 1-phenyl-2,3-dimethyl-5-pyrazolone or 1-phenyl-2,3-dimethyl-4-dimethylamino-5-pyrazolone. The pyrazolone deriv. may be added to the arsenobenzene soln., or it may be mixed with the arsenobenzene and the mixt. then dissolved. The method is particularly applicable to arsenobenzenes contg. a ketone or aldehyde group, or derivs. of these in which the O atom of the CO or CHO group has been replaced by a nitrogenous radical. Examples are given. Cf. *C. A.* 25, 559.

Medicinal preparations. ERNST LOEWENSTEIN. Austrian 119,233, April 15, 1930. Addn. to 115,408. The method of prepg. a diphtheria preventive described in Austrian 115,408 (*C. A.* 24, 1705) is now used to prep. preventives of other infectious diseases, *e. g.*, tuberculosis, syphilis and cholera. Examples are given.

Medicinal preparations. F. HOFFMANN-LA ROCHE & CO. A.-G. Swiss 138,442, May 7, 1928. A medicinal ext. is obtained by extg. gall with an org. solvent such as ether and purifying the product by treatment with dil. alkali. Evapn. gives the medicine in solid form.

Metallic colloids for medicinal purposes. FRITZ E. BISCHOFF (to Henry J. Ullmann). U. S. 1,787,659, Jan. 6. A metal such as Pb is disintegrated in an aq. soln. of gelatin and an aliphatic polyhydroxy compd. such as glucose, fructose, sucrose or glycerol capable of retarding oxidation of the metal and having substantially no reducing action.

Purgative. JOHANN TENGLER. Swiss 138,145, Oct. 31, 1929. A purgative contains nutritive acids (*e. g.*, lactic or fruit acids) emulsified with more than sufficient base (*e. g.*, MgO) completely to neutralize them, in unsaponifiable oil or fat.

Acetylsalicylic acid in stable anhydrous solutions. LEONIDAS WHORTON (to Whorton Pharmacal Co.). U. S. 1,787,924, Jan. 6. In forming a stable soln. of acetylsalicylic acid with glycerol and alc., the acid is supplied to a closed receptacle, dissolved in dehydrated alc., dehydrated glycerol is added and the materials are agitated, and the soln. is maintained *in vacuo* during the operation. App. and various details of procedure are described.

α-Tetrahydronaphthol esters and ethers. I. G. FARBENIND. A.-G. (Ernst Korten, inventor). Ger. 508,094, Nov. 22, 1927. See Brit. 326,762 (*C. A.* 24, 4901).

Purine bases. C. F. BOEHRINGER & SOEHNE G. M. B. H. Fr. 687,732, Jan. 6, 1930. Purine bases such as theobromine and caffeine are extd. from vegetable substances contg. them by means of liquid SO_2.

Molecular compounds of sodium iodide and urea. GEHE & CO. A.-G. and ALFRED ROSENO. Ger. 509,265, Feb. 3, 1929. These compds. are obtained by mixing solns. of NaI and urea and evapg. or adding a precipitant, *e. g.*, $CHCl_3$, or by grinding the reagents together in the presence of a small quantity of solvent. Compds. of 1, 2 and 4 mols. of urea with 1 mol. of NaI are obtainable. The products are *therapeutically useful*. Examples are given.

Stabilizing hydrogen peroxide solutions. CHEMISCHE FABRIK GRÜNAU LANDSHOFF & MEYER A.-G. Ger. 509,702, Apr. 26, 1929. The solns. are stabilized by adding phosphatide emulsion, especially those contg. lecithin. The emulsion may contain nonvolatile alcs. such as glycerol.

Esters of hydnocarpus. F. HOFFMANN-LA ROCHE & CO. A.-G. Swiss 139,326, Nov. 27, 1928. The diethylaminoethanol ester is prepd. by condensing the acid or deriv. in which the OH group is replaced by a readily exchangeable group, with diethylaminoethanol. The substance boils 200–210° and is used as an injectant for leprosy.

Stabilizing irradiated ergosterol. F. HOFFMANN-LA ROCHE & CO., A.-G. Brit. 331,042, July 1, 1929. Stabilization is effected by adding, either before or after the irradiation, a small proportion of a substance such as hydroquinone, or other phenolic compd., other than fluorescein, erythrosin or eosin.

Lupinine. GES. FÜR LUPINENE-IND. M. B. H. Ger. 509,869, May 28, 1925. Bitter principles are removed from lupinine by extg. with aq. solvents. The ext. is rich in carbohydrates, albumin, org. acids and salts. The aq. extg. agent contains some ether or $CHCl_3$ to ext. the alkaloid, which is afterward sepd.

Lens extract for treating and arresting cataracts. ELMER H. STUART (to Eli Lilly and Co.). U. S. 1,787,179, Dec. 30. Lenses of the eyes of animals such as hogs or cattle are repeatedly extd. with sep. quantities of alc. (the whole lenses are extd. first with cold alc. and then the lenses, after being ground, are extd. with alc. heated to the b. p.), the exts. are mixed together and the combined exts. are evapd., with addn. of water before completion of the evapn.; defatting is effected with a hydrocarbon solvent such as gasoline, and after further evapn. the clear liquid is sepd. by filtration and may be preserved for several months at least without appreciable loss of potency.

Vitamin solution. I. G. FARBENIND. A.-G. (Walter Kropp, Fritz Lange and

Arnold Bohne, inventors). Ger. 508,503, Oct. 23, 1928. A stable vitamin soln. is obtained by using liquid aq. sol. amides of the lower fatty acids alone or mixed, as solvents. *N*-Ethylacetamide is mentioned in examples.

Therapeutic preparations from glands. Georg Schröder. Ger. 509,186, Dec. 17, 1925. See Brit. 263,155 (*C. A.* **22**, 141).

Physiologically active preparations. Soc. anon. pour l'ind. chim. à Bâle. Swiss 138,784, Sept. 30, 1927. Addn. to 113,835. Exts. from male inner secretory organs are obtained in highly purified form by treating the ext. with alk. solns. of metal compds. and treating the product with org. solvents which do not dissolve soap. In an example, testicular ext. is treated with $Ca(OH)_2$ and petr. ether.

Physiological preparations. Soc. anon. pour l'ind. chim. à Bâle. Swiss 139,324, Sept. 30, 1927. The fresh male internal secretory organs for the preparation of the ext. are cooled to a temp. sufficiently low to cause them to congeal, pulverized in this condition and extd.

Physiological preparations. Soc. anon pour l'ind. chim. à Bâle. Swiss 139,403, Sept. 30, 1927. Addn to 106,038 Male internal secretory organs are pulverized, extd. and the ext purified by treatment with basic $(AcO)_2Pb$, preferably at low temps The products have a stimulating physiol effect

Ovovitelline product. Swigel Posternak and Theodor Posternak Swiss 139,325, Mar. 12, 1928. An Fe P org compd split off from ovovitelline is obtained by treating a mixt. of the Na salts of the P and Fe-contg. cleavage products of egg yolk (obtained by treating defatted yolk with mineral acid) with AcOH and a sol. Fe salt (*e. g.*, $FeCl_3$), and pptg. the product by addn of a mineral acid (*e. g.*, concd. HCl). Cf. *C. A.* **24**, 1706

Antiserums. Ernst G. Drelsl and Paul von Gara Ger 508,595, Sept. 21, 1929. Antiserums (agglutinating, pptg., etc., serums) are obtained from animals previously sensitized by innoculation, by injecting the correct antigen and obtaining the serum in the usual way. Examples of the innoculation of rabbits with various serums are given.

Absorbable sewing material for surgical uses. Paul Bost Ger. 508,783, July 16, 1926. Fresh muscular tissue is sterilized and spun into sewing threads.

Surgical pads carrying "tell-tale" substances for radiography. Johnson & Johnson (Gt. Britain), Ltd Brit 333,980, June 7, 1929. A strand or strip of the material is treated with substances such as Pb sulfate, Bi subcarbonate, Th oxide or $BaSO_4$, and an adhesive or enamel may be employed for preventing detachment of the coating

Extracting pyrethrum flowers. Wm J Trevillian (to W. T. Rawleigh Co U. S. 1,786,967, Dec. 30. Pyrethrum flowers are treated with a petroleum distillate solvent such as gasoline to ext the active principles and the marc formed by drawing off the solvent. The residual solvent and active principles retained by the marc are then expelled by treatment under high pressure and with a "twisting motion" such as effected by a screw conveyer and pressing device

Disinfectants. Produits Roche, soc. anon. Belg. 369,451, May 31,1930 Oxy derivs of polyphenyl polyoxides are used.

Disinfecting, cosmetic or tanning agent. Cornelius Keleti. Swiss 139,327, June 10, 1927. See Ger 504,693 (*C. A.* **25**, 382).

Removing nicotine from tobacco. Walther Bruck and Julius Pohl Ger 509,016, Nov. 26, 1927. The method of Ger 483,686 (*C. A.* **24**, 2244) is modified by using an aq soln. of tannin or other tanning agent instead of tobacco lye.

Tobacco. I. G. Farbenind A.-G (Karl Vierling, inventor). Ger. 507,604, Feb. 25, 1927. Tobacco is treated with phosphates, citrates, etc., prior to fermenting

18—ACIDS, ALKALIES, SALTS AND SUNDRIES

E. M. SYMMES

The manufacture of sulfuric acid by modern chamber and intensive systems. H. E. Woisin. *Metallges. Periodic Rev.* **1930**, No. 4, 17-26(1930). E. H.

Potash bibliography to 1928 (annotated). J. F. T. Berliner. Bur. Mines, *Bull.* **327**, 578 pp.(1930).—Abstracts of 3967 articles are given and cross-indexed. A. H. E.

Volatilization of potash from wyomingite. S. L. Madorsky. *Ind. Eng. Chem.* **23**, 78–84(1931).—K_2O can be readily removed from wyomingite by volatilization, provided $CaCO_3$ and a halogen salt promoter are present. Representative samples of wyomingite rock contg. about 12% K_2O were heated in a small elec. furnace alone, and mixed with

varying proportions of $CaCO_3$, $CaCl_2$, CaF_2 and NaCl. When the rock was heated alone, 25 to 30% of the K_2O present was volatilized at 1510° in 40 min. The volatilization was progressively increased by the addn. of $CaCO_3$ and various halides. The mixt. with $CaCO_3$ and $CaCl_2$ was the most effective. Complete volatilization was obtained with this mixt. at 1200° or even below this temp Time is not an important factor, since most of the K leaves the crucible in the first 10 min. Temp. is not important, provided it is above 1100° M. S. ANDERSON

Ammonia as a source of hydrogen and nitrogen. J. F. T. BERLINER AND G. W. BURKE. *Trans. Am. Inst. Chem. Eng.*, New Orleans Meeting 1930, 15 pp.(Adv. copy); *Chem Met. Eng.* **37**, 751-4(1930).—The rapid development of the synthetic-NH_3 industry has made anhyd. NH_3 one of the cheapest and purest of the heavy chemicals. Utilizing NH_3 as a source of H is highly practical and economical. Anhyd. NH_3 can be dissocd or "cracked" directly into its component elements by reversal of conditions required for its synthesis. By passing NH_3 vapor over a catalyst heated to about 600° at pressures from below atm. to about 15 atm. or higher, it is practically completely decomposed to N and H. Under normal conditions the reaction approaches very nearly the equil. value of a residual NH_3 content in the H-N mixt. of about 0.03 to 0.05% by vol at atm. pressures and approx. 0.60% by vol. at pressures of about 15 atm. The product of dissocn is a mixt. of 75% by vol of H and 25% by vol. of N, or 17.76% by wt of H and 82.24% by wt. of N. Applications of cracked NH_3 are discussed, as well as its economics in competition with compressed H and N in cylinders. For large demands, the method of obtaining H by cracking NH_3 is not economical. Liquid anhyd. NH_3 contg a high concn. of available H is a means of transporting liquefied or stored H. Equipment for cracking NH_3 is described. C. L. MANTELL

Sodium metasilicate as an industrial alkali. JAMES G VAIL *Trans. Am. Inst. Chem. Eng.*, New Orleans Meeting 1930, 19 pp.(Adv. copy), *Chem Met. Eng.* **37**, 736–40(1930), cf. *C. A* **24**, 5114. Most forms of Na_2SiO_3 crystallize from mother liquors which are sticky Crystals are so sol that satisfactory sepns are not readily obtained. A granular, free flowing product, $Na_2SiO_3\,5H_2O$, has lately been prepd. from a new hydrate The properties of Na_2SiO_3 and a number of tests comparing these properties with other alkalies such as NaOH, Na_3PO_4, borax and $NaHCO_3$ in various cleaning and washing applications are shown Particular emphasis is placed on Al cleaning, lathering of soap, action of alkalies on spore suspensions or vegetative bacteria, cleaning of glassware, removal of oils and other com applications C. L. MANTELL

Industrial aspects of bromine and its compounds. G. MALCOLM DYSON. *Chem. Ind.* (London) **23**, 425–6, 450–2(1930). E. H.

Helium resources within the Empire. REX FURNESS *Chem Age* (London) **23**, 345–6(1930). E. H.

Carbon black in 1929. G. R HOPKINS AND H BACKUS. Bur Mines, *Mineral Resources of the U. S. 1929*, Pt. II, 51–59 (preprint No 4, published October 20, 1930). E. H.

Fuller's earth in 1929. JEFFERSON MIDDLETON Bur. Mines, *Mineral Resources U. S. 1929*, Pt II, 61–4 (preprint No 6, published October 28, 1930). E. H.

Magnetic separation purifies feldspar. C. H. PEDDRICK, JR. *Eng. Mining J.* 130, 613–4(1930) The new process employed in the plant of the Tennessee Mineral Products Corp at Spruce Pine, N C., produces a granular product especially suited for the glass industry The crushed feldspar has the same small particle size as is standard in the manuf of glass. The induction separator extracts almost completely from the raw feldspar all contaminating materials. Charts of comparative screen tests show clearly the marked difference between the new 20-mesh granular material and ground feldspar produced in the usual manner W. H. BOYNTON

Western gypsum products – a new gypsum industry in Manitoba. J. P. DE WET. *Canadian Mining J.* **51**, 1218–21(1930). A brief description of the plant and products of the Western Gypsum Products, Ltd., at Winnipeg. W H. BOYNTON

Advances in silica-gel technic. KUNO WOLF AND MAX PRAETORIUS. *Metallbörse* 20, 2301–2, 2357–8(1930). E. H.

The manufacture of casein plastics. W H. SIMMONS. *Ind. Chemist* **6**, 206–8 229–32, 297–9(1930). E. H.

Condensation products of phthalic acid or phthalic anhydride and polyhydric alcohols. ARTHUR ULLRICH. *Metallbörse* **20**, 2413–4, 2563–4, 2613, 2660–1, 2708–9 (1930) A review of patents. E. H.

Physicochemical properties of acid clay (KOBAYASHI, YAMAMOTO) **2. Rapid colorimetric estimation of I in mineral waters (CASE) 7. Cellulosic substances [in pro-**

duction of decolorizing or absorbent C] (Swiss pat. 138,305) **23.** Reaction columns (Fr. pat. 688,139) **1.** Recovery of sulfates from viscose-silk waste water (Ger. pat. 509,602) **23.** Device for dissolving solid materials [in manufacture of $CuSO_4$] (Ger. pat. 509,814) **1.** Plate atomizer for liquids (Ger. pat. 508,794) **1.**

Hydrogen chloride. HOLZHYDROLYSE A.-G. Ger. 509,044, Dec. 18, 1928. Details are given of a method of prepg. HCl by heating aq. HCl with H_2SO_4 in a no. of stages at successively increasing temps. The H_2SO_4 is regenerated and used again. App. is shown.

Hydrochloric and hydrobromic acids. RÖHM & HAAS A.-G. (Walter Bauer, inventor). Ger. 506,634, June 3, 1928. See Brit. 312,908 (*C. A.* **24**, 923).

Nitric acid. APPAREILS ET ÉVAPORATEURS KESTNER. Fr. 687,763, Jan. 6, 1930. A condensing app. for nitrous vapors for the production of HNO_3 is described in which the interior walls are sprayed with a liquid, and cold water is caused to flow over the exterior so that excessive corrosion is prevented.

Sulfuric, hydrochloric and nitric acids. HERMANN FRISCHER. Ger. 508,063, Dec. 21, 1926. The manuf. of H_2SO_4 in small chambers from SO_2 with the aid of oxides of N is improved by intimately mixing the gases with the H_2SO_4 formed or in circulation by drawing or forcing the gases and the acid through a sieve or like mixing device. Circulation tubes opening above and below the sieve may be provided. A concn. app. may replace the Glover tower. The same method of mixing may be applied in dissolving HCl and oxides of N.

Sulfuric acid. HUGO PETERSEN. Ger. 508,064, Sept. 4, 1927. See Brit. 296,062 (*C. A.* **23**, 2537).

Sulfuric acid. THE SELDEN CO. Fr. 687,149, Dec. 23, 1929. SO_2 is oxidized to SO_3 by passing a mixt. of SO_2 and O over a contact mass contg. at least one catalytically active silicate or polysilicate which is not a base-exchange substance. Silicates of V or complex silicates contg. V or silicates of other metals of the 5th or 6th group are particularly suitable. The catalyst is preferably dild. with kieselguhr, etc. Several examples are given.

Sulfuric acid. RICHARD ZEH. Ger. 509,703, Mar. 16, 1930. A method for the continuous production of highly concd. H_2SO_4 consists in letting H_2SO_4 flow into a series of downwardly directed cells in a chamber highly heated by burning gas. The evapd. water and the products of the gas combustion are led off.

Recovery of sulfuric acid. CHEMISCHE FABRIK BORK G. M. B. H. Fr. 688,360, Jan. 17, 1930. H_2SO_4 used for washing petroleum, mineral oils or tar is recovered by bringing the acid in a tower into contact with the vapors of tar oils traveling in counter current.

Regenerating sulfuric acid, etc. ALEXANDER WACKER GES. FÜR ELEKTROCHEM. IND. G. M. B. H. (Wolfram Eschenbach, inventor). Ger. 508,321, Jan. 7, 1930. Spent H_2SO_4 is regenerated and concd. by treatment with the compds. obtainable by combining oxides of S with oxides of N. Thus, H_2SO_4, after use in purifying mineral oils, may be treated with $(SO_3)_2NO$ (cf. *C. A.* **21**, 477), whereby the water present is combined to form H_2SO_4 and the org. impurities are oxidized. Other examples are given also. The process may be accelerated by blowing in air or O, and by adding to the mixt. an oxidation catalyst, *e. g.*, a compd. of Fe, Cu, Ce or Zn. Other oxygenated acids of S may be treated in the same way.

Sulfuric acid and chromic salts. SILESIA VEREIN CHEMISCHE FABRIKEN. Ger. 507,918, Oct. 18, 1927. The yield of H_2SO_4 in the production of Cr^{+++} salts by the reduction of alkali chromates or dichromates by H_2S is improved by leading the H_2S into solns. of the chromate or dichromate and adding a considerable excess of acid above that usually required for the oxidation process.

Phosphoric acid. SAMUEL BRULL. Fr. 687,941, Mar. 29, 1929. Phosphoric acid is made by heating natural phosphates with materials rich in Fe such as Fe ores, slags etc., in a blast, cupola or elec. furnace, and submitting the product in the liquid state to an oxidizing atm. to transform the P into gaseous phosphoric acid.

Phosphoric acid. COMPAGNIE MINIÈRE DU M'ZAITA. Fr. 687,946, Mar. 29, 1929. P contained in natural or artificial materials is extd. by melting the materials with Fe ore in a reducing atm. to obtain melts rich in P which, by a second treatment, liberate phosphoric acid.

Phosphoric acid. I. G. FARBENIND. A.-G. Fr. 688,371, Jan. 12, 1930. Phosphoric acids are made by treating P or its lower oxidation products with anhyd. phosphoric acid under high pressure and at a high temp., *e. g.*, 300°.

Phosphoric acid. Soc. d'études scientifiques & d'entreprises industrielles. Fr. 687,799, Jan. 7, 1930. Phosphoric acid and a gaseous mixt. suitable for the manuf. of NH_3 are made by oxidizing P with a gaseous mixt. contg. N, CO_2 and O and removing the compds. of P. The CO resulting from the oxidation of the P is caused to react with steam and the CO_2 formed is removed. The vols. of gases used are chosen so that the H and N remaining are in correct relation for the production of NH_3.

Phosphoric acid. Soc. d'études scientifiques & d'entreprises industrielles. Fr. 687,849, Jan. 8, 1930. P or phosphoric acid and gaseous mixts. contg. H and N or these 2 gases and CO are made simultaneously by reducing crude phosphates by C in the presence of a flux in a blast furnace, treating the reaction mixt. in the blast furnace with a mixt. of N and O contg. more O than does air and reacting the waste gases freed from P or its compds. and contg. CO with steam. The CO_2 formed is sepd. Cf. *C. A.* 25, 562.

Phosphoric acid purification. Augustus H. Fiske (to Rumford Chemical Works). U. S. 1,787,192, Dec. 30. Relatively small quantities of a sol. sulfide such as Na sulfide are added to the dil. acid prior to concn.; this is followed by evapn. in a vessel having a corrodable lining such as Pb with gradually addn. of more sulfide to the acid as it is concg. in order to prevent attack of the metal lining.

Apparatus for making phosphoric acid by catalytic interaction of phosphorus and steam. Comp. nationale de matières colorantes et manufactures de produits chimiques du Nord Réunies, Établissements Kuhlmann. Ger. 508,481, Feb. 25, 1930.

Metazirconic acid. Paul Schmid. Ger. 509,151, Nov. 11, 1925. H_2ZrO_3 is prepd. by treating solid Zr salts with NH_3 under such conditions that the production of a Zr salt soln. is substantially avoided. Thus, a Zr salt may be treated with gaseous NH_3 or with a concd aq. soln. of NH_3. The product may be purified by taking advantage of its relative insoly. in acids. Examples are given.

Hydrogen cyanide and cyanides. Ges. für Kohlentechnik. m. b. H. Ger. 510,055, June 8, 1929. NH_4CNS dye obtained from the working-up of the distn. gases of bituminous fuel is oxidized by HNO_3 and neutralized by NH_4OH to produce HCN and an oxidized residue useful as a *fertilizer*. The HCN can be worked up into cyanides. The HNO_3 may be replaced by the N oxides obtained by burning NH_3 for the prepn. of HNO_3.

Caustic alkalies. Ernst Bürgin and Walter Schmid (to I. G. Farbenind. A.-G.) U. S. 1,786,516, Dec. 30. See Fr. 670,335 (*C. A.* **24**, 1941).

Caustic alkali lyes. I. G. Farbenind. A.-G. Fr. 680,652, Dec. 14, 1929. Concd. caustic alkali lyes are prepd. in a continuous manner by sepg., from the alk. earth carbonate the lye obtained after caustification, starting with alkali carbonate and alk. earth oxide, using for fresh charges the washing lyes obtained during the washing of the alk. earth carbonate, and baking the carbonate for conversion to oxide which is then reintroduced into the cycle.

Alkali lyes. I. G. Farbenind. A.-G. Fr. 688,451, Jan. 18, 1930. Alkali lyes are prepd. by treating alkali sulfates with oxide or hydroxide of Sr in excess. The SrO_4 is transformed to $SrCO_3$ by NH_3 and CO_2 and thence to the oxide and reintroduced into the cycle.

Alkali or alkaline-earth salts. H. Lawarrée. Belg. 369,885, May 31, 1930. A sol. salt is used in a cycle. The salt is such that, by double decompn. with an alkali or alk.-earth salt, it gives the desired alkali salt on the one hand and an insol. Pb salt on the other. The insol. Pb salt is converted into a basic Pb salt, which, by addn. of a suitable acid, is converted into the original Pb salt.

Alkali chromates. Zahn & Co., Bau chem. Fabriken G. m. b. H. and Ludwig Wicke. Ger. 509,133, Nov 1, 1927. Alkali chromates are prepd. by roasting a mixt. of chromite, Na_2CO_3, $Ca(NO_3)_2$ and an addn. that prevents sintering, *e. g.*, CaO. The oxide and the $Ca(NO_3)_2$ may be heated together before the other reagents are added. An example is given.

Alkali nitrates and ammonium chloride from alkali chlorides, nitric acid and ammonia. H. Lawarrée. Belg. 368,616, April 30, 1930. $Pb(NO_3)_2$ obtained by the reaction of HNO_3 with $PbCO_3$ is treated with alkali chloride. The $PbCl_2$ obtained is treated with $(NH_4)_2CO_3$ to give $PbCO_3$. The $(NH_4)_2CO_3$ is obtained by passing through NH_4OH soln. the CO_2 liberated by the action of HNO_3 on the $PbCO_3$. 368,903 provides for the treatment with NH_3 of the $PbCl_2$ obtained by the action of HNO_3 on an alkali chloride in presence of Pb oxychloride or hydroxide.

Alkali phosphates. Metallges. A.-G. Fr. 688,201, Jan. 14, 1930. See Ger. 502,039 (*C. A.* **24**, 4720).

Phosphates and cement. ÉDOUARD URBAIN. Fr. 687,538, Mar. 25, 1929. A K phosphate, phosphoric acid and fused cement are made from an intimate mixt. of natural phosphate, feldspar and sufficient cokefying coal to obtain by heating homogeneous and resistant agglomerates. The air fed to the crucible is preheated to above 550°. The gases leaving the furnace are cooled before combustion and used after combustion for heating the retorts where the mixt. is cokefied and afterward for concg. the dild phosphoric acid.

Stable alkaline ferric solution. WILBERT J. HUFF, DAVID L. JACOBSON and WM H. HILL (to Koppers Co.). U. S. 1,786,490, Dec. 30. A carbohydrate such as glucose is treated with a sol. alkali metal compd. of alk. reaction such as Na_2CO_3 and to the product thus formed is added a sol. Fe salt such as $FeSO_4$ while the soln. is being aerated. The resulting soln. may be used as a catalyst in oxidation reactions.

Alkaline earth cyanamides. SOC. D'ÉTUDES CHIM. POUR L'IND. and ÉDOUARD DE LUSERNA. Fr. 687,129, Dec. 23, 1929. Alk. earth cyanamides, particularly $Ca(NH_2COO)_2$, are made by the action of NH_3 at a raised temp. on alk. earth carbonates to which wood charcoal, anthracite or coke is added, or hydrocarbons which form C at the temp. of reaction may be used.

Recovering cyanide from solutions. RUSSELL R. BRYAN (to Merrill Co.). U. S. 1,787,033, Dec. 30. A soln. contg. cyanide together with an alkali and carbonates such as a waste mill soln. is divided into 2 portions. One portion is treated with CO_2 to neutralize the alkali and treated with SO_2 to form HCN and CO_2 and a current of air is passed through the soln. to vaporize HCN together with CO_2 and SO_2, and the air current is passed through the remaining portion of the original cyanide soln. to utilize its SO_2 and CO_2 content by neutralization of the alkali of the soln. Remaining HCN is absorbed in an alk. soln. to form a cyanide, and the remaining portion of the original soln. is further treated with SO_2. An arrangement of app. is described.

Cyanides. JOHANNES HENDRIK VAN DER MEULEN. Fr. 688,037, Jan. 11, 1930. Thiocyanates, particularly those of alkali and alk. earth metals, are treated in the presence of an oxide, hydroxide or carbonate of Zn with H, or a gas contg. or liberating H, at a high temp. under pressure.

Production of arsenates. GUSTAF N. KIRSEBOM. Can. 307,091, Dec. 30, 1930. Na_3AsO_4 is produced by causing a reducible metal compd., As_2O_3 and fused NaOH to react to form a Na_3AsO_4 melt or slag contg. excess NaOH, dissolving the slag and crystg. Na_3AsO_4 from the resulting soln.

Perborates. ROESSLER & HASSLACHER CHEMICAL CO. Ger. 507,522, Sept. 20, 1928. See Brit. 297,777 (*C. A.* **23**, 2791).

Nitrogen compounds. I. G. FARBENIND. A.-G. Fr. 687,276, Dec. 26, 1929. Halogen derivs. of high paraffin hydrocarbons are heated with NH_3 in aq. or alc. soln. or agents liberating NH_3, preferably under pressure and with or without catalysts. Thus, a chlorinated vaseline oil is heated to 140° in an autoclave with NH_3 in alc., giving a brownish oil. Other examples are given. The products are useful as *soaps*, and, on account of their activity, are important intermediate products for the production of other compds.

Alumina. APPAREILS ET ÉVAPORATEURS KESTNER. Fr. 688,278, April 8, 1929. Al_2O_3 is made by treating leucite with HNO_3 and treating the $Al(NO_3)_3$ obtained with NH_3 in the presence of the KNO_3 obtained in the initial reaction.

Alumina. JEAN C. SLAILIFES. Fr. 686,894, Mar. 13, 1929. Al_2O_3 is prepd. from bauxite or other ores of Al not contg. halogen, by eliminating SiO_2 from the ore with soda or potash lyes before bringing the Al_2O_3 into soln.

Aluminum chloride. OSCAR M. HENRIQUES and THOMAS A. THOMSEN. Fr. 688,565, Jan. 20, 1930. $AlCl_3$ or gases contg. it is purified and rendered innocuous to Fe vessels, by passing it, at 500° or higher, over metallic Fe waste. Fr. 688,566 describes the purification of $AlCl_3$ by subliming it from a bath composed of NaCl and $AlCl_3$.

Aluminum chloride. I. G. FARBENIND. A.-G. Ger. 509,150, Aug. 18, 1928. See Brit. 317,259 (*C. A.* **24**, 1944).

Ammonium sulfate. CHEMISCHE FABRIK KALK G. M. B. H. and HERMANN OFFIMF. Fr. 688,388, Jan. 17, 1930. Plaster contained in superphosphate is transformed to $(NH_4)_2SO_4$ by neutralizing the superphosphate with NH_3 and mixing the product with $(NH_4)_2CO_3$ or NH_4HCO_3 in the presence of a small quantity of water, so that water and excess $(NH_4)_2CO_3$ are expelled. In a modification NH_3, CO_2 and water are added simultaneously in the gaseous state and in the necessary proportions.

Barium cyanide. SOC. D'ÉTUDES POUR LA FABRICATION ET L'EMPLOI DES ENGRAIS CHIM. and L'UNION CHIM. FRANÇAISE. Fr. 686,686, Dec. 16, 1929. An app. is described for the prepn. of $Ba(CN)_2$ in which a mixt. of charcoal and $BaCO_3$ is caused to move

through a vessel conveniently heated where the decompn. of the carbonate takes place, after which the mixt. moves through a zone indirectly heated to 1100–1400° and in which a large no. of openings permit the continuous admission of N to form the cyanide.

Barium hydroxide. PAUL KIRCHEISEN. Ger. 509,261, April 26, 1928. In the manuf. of $Ba(OH)_2$ by hydrolysis of BaS, the latter is preliminarily mixed in the solid state with finely divided S and a little water.

Calcium cyanamide. I. G. FARBENIND. A.-G. Fr. 686,935, Dec. 19, 1929. See Brit 328,743 (*C. A.* **24**, 5442).

Calcium hypochlorite. ROBERT B. MACMULLIN and MAURICE C. TAYLOR (to the Mathieson Alkali Works). Can. 305,209, Oct. 28, 1930. A triple salt of $Ca(OCl)_2$, NaOCl and NaCl is mixed with a chlorinated lime slurry contg. $Ca(OCl)_2$ crystals in a mother liquor contg. $CaCl_2$ at a temp. below 10° to prevent transformation of the triple salt during mixing. The mixt. is warmed to cause transformation of the triple salt and reaction of the NaOCl with the $CaCl_2$ to form a mass of interlocking crystals of $Ca(ClO)_2$, which is dried.

Hypochlorite composition. ROBERT B. MACMULLIN and MAURICE C. TAYLOR (to Mathieson Alkali Works). U. S. 1,787,048, Dec. 30. By bringing together in the presence of water Na, Ca, chloride and OCl ions, at a temp. below about 16°, a triple salt may be obtained of the formula $Ca(OCl)_2.NaOCl.NaCl.12H_2O$ which may be used for *bleaching*. U. S. 1,787,080 describes the production of a triple salt of the same components by adding NaCl to a satd soln. of $Ca(OCl)_2$ at low temp.

Bleaching powder. I. G. FARBENIND. A.-G. (Adolf Remelé, inventor). Ger. 508,167, July 17, 1929. Bleaching powder prepd. by the customary processes and having more than 36% of active Cl is treated with an amt. of unslaked CaO equal to between one half and the whole amt of free water in the powder. The CaO is allowed to slake, and the mixt. is then fully dried by a current of warm air. The product can be stored without decompn.

Double salts of calcium nitrate. LONZA ELEKTRIZITATSWERKE UND CHEMISCHE FABRIKEN A.-G. Fr. 686,728, Dec. 16, 1929. See U. S. 1,776,694 (*C. A.* **24**, 5442).

Solid carbon dioxide. CARL BAUMANN. Swiss 138,986, April 2, 1929. Liquid CO_2 under high pressure is allowed to expand in a closed freezing cell.

Burning of ferric chloride. ERNEST W. WESCOTT (to Sulphur and Smelting Corporation). Can. 306,798, Dec. 16, 1930. Preheated $FeCl_3$ in dispersed or vaporized form is burned with air or O at a temp. exceeding 800°. Addnl. heat is supplied to the reaction zone to insure the formation of coarsely cryst. Fe_2O_3, which settles and is collected in the form of interlocked crystal masses. Fe_2O_3 and Cl are recovered.

Hydrogen peroxide. DEUTSCHE GOLD- UND SILBER-SCHEIDEANSTALT VORM. ROESSLER. Fr. 687,143, Dec. 23, 1929. See Brit. 330,255 (*C. A.* **24**, 5948).

Oxidation of hydrogen sulfide. RICHARD KUHN. Fr. 687,038, Dec. 20, 1929. H_2S is absorbed in a soln. of Na_2CO_3 or a soln. of a Ca salt, and treated with O or air in the presence of complex compds derived from heavy metals on the one hand and org. cyclic compds on the other. Examples are given of the use of a complex Cu salt of α-hydroxyanthraquinone or of quinizarin, a complex Mn salt of alizarin, and hemin dissolved in a soln. of Na_2HPO_4.

Lead carbonate. STANLEY C. SMITH. Ger. 509,262, April 24, 1927. See Brit. 272,053 (*C. A.* **22**, 1658).

Nitrous oxide from ammonium nitrate. WALTER FRIEDERICH. Ger. 506,542, April 28, 1928. See Brit. 310,507 (*C. A.* **24**, 696).

Nitryl chloride. I. G. FARBENIND A.-G. (Karl Dachlauer, inventor). Ger. 509,405, Aug. 30, 1929. NO_2Cl is prepd. by treating HNO_3 with $ClHSO_3$ at 5–10°. The HNO_3 should be dehydrated by addn. of oleum. An example is given.

Potassium carbonate. ALCALINA (SOC. ANON.). Fr. 688,493, Jan. 20, 1930. K_2CO_3 is made by introducing MgO into a soln. of a K salt under a pressure of CO_2 equal to or higher than the critical pressure at which CO_2 is sol. in all proportions in water. KCl is the preferred K salt so as to obtain $MgCl_2$ at the same time.

Potassium metaphosphate. PAUL DUTOIT and ÉDOUARD URBAIN. Fr. 688,246, Mar. 30, 1929. KPO_3 is prepd. from K polysilicates and Ca phosphates used in such proportions that all the potash and all the P_2O_5 are combined in the state of metaphosphate, and the amt. of charcoal and Al_2O_3 necessary for the total displacement of the potash is added. The slag has the compn. of an aluminous cement.

Potassium sulfate. ZAHN & CO. G. M. B. H. Fr. 687,864, Jan. 8, 1930. K_2SO_4 is made direct and by a dry method by submitting 2 mols. of KCl and about 1 mol. of H_2SO_4 to a reaction in a mech. circular furnace without isolating the bisulfate and without breaking up the process into successive steps.

Potassium sulfate and sodium carbonate. CHEMIEVERFAHREN-GES. M. B. H. Fr 687,905, Jan. 9, 1930. A lye (obtained by stirring the $NaHCO_3$ mother-liquor produced in the operation with $CaSO_4$, or $SrSO_4$, followed by the sepn. of the carbonate formed, and pptn. of glaserite and KCl) is treated with crude sylvinite and NH_3. The mother liquor from the glaserite and KCl is used, after partial sepn. of its NH_4Cl by cooling, for the manuf. by the Solvay process of $NaHCO_3$, the mother liquor of which is stirred, as indicated above, with $CaSO_4$ or $SrSO_4$, so that a closed-cycle operation is carried out. The mixt. of glaserite and KCl is transformed to K_2SO_4 by treatment with water.

Potassium sulfate and soda. CARL T. THORSSELL. U. S. 1,787,497, Jan. 6. In the production of K_2SO_4 and soda from crude sylvinitic salt with $CaSO_4$ or $SrSO_4$, $NaHCO_3$ mother liquor obtained from the Solvay process is mixed with $CaSO_4$ or $SrSO_4$, the carbonate formed is sepd., the remaining liquor is treated with crude sylvinitic K salt and NH_3, the glaserite and KCl formed are sepd., the mother liquor is cooled for removing NH_4Cl from it, and the remaining mother liquor is treated for the production of bicarbonate and the mother liquor is again mixed with $CaSO_4$ or $SrSO_4$.

Working up soda-potash mixtures. RICHARD FRIEDRICH and RUDOLF TAUSSIG Ger. 509,260, Nov. 16, 1926. Solns. contg. Na_2CO_3 and K_2CO_3 are treated with sufficient acid to react with part of the K_2CO_3, whereby $NaHCO_3$ is pptd., with or without $KHCO_3$. After sepg. the ppt., the decompn. of the K_2CO_3 is completed by adding a further amt. of acid. Detailed examples are given.

Sodium metaborate. ANDREW KELLY. Fr. 687,200, Dec. 24, 1929. See Brit. 326,378 (*C. A.* **24**, 4361).

Crystallizing borax from solutions containing also potassium chloride. WM. F. BURKE (to American Potash & Chemical Corp.). U. S. 1,787,356, Dec. 30. Liquor satd. with borax and KCl is brought to supersatn. with borax and the supersatd liquor is caused to flow countercurrent to a sludge of borax crystals, through a crystallizer which is relatively high as compared to its diam.

Trisodium phosphate. VICTOR CHEMICAL WORKS. Fr. 687,850, Jan. 8, 1930. Na_3PO_4 is obtained in scale form in which form it is used as a *cleansing agent* by melting it with an amt. of water corresponding to its water of crystn. and spreading it on a cooling surface, *e. g.*, by rotating a wheel dipping into the melt.

Sodium sulfite or bisulfite solution from alkaline lye. ZELLSTOFFFABRIK WALDHOF and OTTO FAUST. Ger. 507,523, Aug. 10, 1928. See Brit. 317,040 (*C. A.* **24**, 1981).

Sodium stannate. WM. T. LITTLE. U. S. 1,787,078, Dec. 30. To obtain cryst. Na stannate, a strong NaOH soln. is added to a Na stannate soln. to effect pptn. of the stannate.

Strontium oxide. I. G. FARBENIND. A.-G. Fr. 687,995, Jan. 10, 1930. SrO is made by calcining $SrCO_3$, wetted with water in a rotating furnace at about 1200°.

Titanium compounds. FOORD VON BICHOWSKY (to The Titania Corp.). Can. 306,145, Nov. 25, 1930. Ti compds., especially TiO_2, are produced by oxidizing Ti-N compds. with HNO_3 contg. a little H_3PO_4 and a catalyst (H_2SO_4 or strong HCl), washing the colloid-like material so obtained, evapg. to dryness and grinding.

Zinc sulfate separation from solutions also containing sodium sulfate. HANS WEIDMANN. U. S. 1,787,806, Jan. 6. The Na_2SO_4 is converted into $NaHSO_4$ by addn. to the soln. of H_2SO_4, and the $ZnSO_4$ is sepd. as its monohydrate by evapg. the soln. at temps. above 100°.

Zinc sulfide. EARL C. GASKILL (to The St. Joseph Lead Co.). Can. 306,140, Nov. 25, 1930. Raw ZnS ore is heated in a furnace with the exclusion of air, superheated steam is passed through the furnace to convey the ZnS vapor into a condensing chamber from which air is excluded and the finely divided cryst. ZnS produced is collected. Cf. *C. A.* **24**, 3387.

Salt. THEODOR LICHTENBERGER. Ger. 507,635, Dec. 17, 1927. Addn. to 461,009. In the evapn. of brine to form table salt, other salts such as KCl, alkali sulfates and carbonates are removed from the surface of the soln., where they sep. out.

Treating salt mixtures. I. G. FARBENIND. A.-G. Fr. 686,807, Dec. 18, 1929. Solid salt mixts., either from natural or industrial sources, particularly those contg. K salts, are extd. with liquid NH_3. Salts which lower the soly. of the salt remaining undissolved may be added to the NH_3.

Dehydrating salt. VICTOR BELLAVOINE. Fr. 687,647, Jan. 3, 1930. Table or cooking salt is dehydrated by placing it in a thin layer on a heated surface and stirring the layer constantly with a reciprocating movement. The salt may be caused to move gradually over the surface.

Apparatus for drying salt by hot gases. MICHAEL Y. LUR'E and ANATOLY P. VOROSHILOV. U. S. 1,787,009, Dec. 30. Structural features.

Lime water. N.-V. NECKAR WATERREINIGER MAATSCHAPPIJ and J. A. HERINGA. Brit. 334,011, July 5, 1929. Water is passed upwardly in a continuous stream at high velocity through a bed of gravel and superposed layer of lime sludge.

Synthetic spinel. I. G. FARBENIND. A.-G. Fr. 687,661, Jan. 3, 1930. A synthetic spinel having an aquamarine color in daylight and artificial light is made by adding 0.3% of TiO_2 to the starting mixt. of Al_2O_3 and MgO. Other substances producing this color may be added as well.

Liquefaction of materials such as in the purification of helium. WM. L. DEBAUFRE AND JOHN W. DAVIS. U. S. 1,786,898, Dec. 30. The major portion of undesired constituents is liquefied by an internal cycle of refrigeration, and the remaining undesired constituents are then liquefied by an external cycle employing liquefied N as the refrigerating medium, without materially reducing the pressure of the gas being processed; and the liquefied constituents are employed as return fluid in the internal cycle. App. is described.

Atomic hydrogen. OTTO REICHENHEIM and ERNST LAU. Ger. 509,043, Feb. 28, 1930. In the prepn. of a gas contg. H by subjecting H_2 at a very low pressure to elec. discharge, the yield of at. H is increased, and its life is prolonged, by mixing an inert gas with the H_2.

Hydrogen-carbon monoxide mixtures. I. G. FARBENIND. A.-G. Ger. 507,917, Dec. 5, 1926. A H-CO mixt. free from, or contg., N is obtained by the partial combustion of natural gaseous hydrocarbons with O or air. The app. is described in which the hydrocarbons are introduced tangentially into a reaction chamber through a number of inlets.

Separation of mixtures of hydrogen and hydrocarbon gases. WARREN K. LEWIS (to The Standard Oil Development Co.). Can. 305,734, Nov. 11, 1930. Mixts. of H and hydrocarbons are passed under high pressure through a body of activated charcoal until it is substantially satd. with hydrocarbons and a gas rich in H is withdrawn. Then a gas rich in hydrocarbon is passed into the satd. charcoal to displace unadsorbed gas held between grains of the charcoal, the pressure on the satd. body of charcoal is reduced and a gas rich in hydrocarbon is withdrawn.

Oxygen and nitrogen from liquid air. MESSER & CO. G. M. B. H. Ger. 509,793, May 15, 1926. Addn. to 505,676 (*C. A.* **25**, 549). Further details of the app. for sepg. liquid air into O and N at reduced pressure by fractionating are given.

Active carbon. VEREIN FÜR CHEMISCHE UND METALLURGISCHE PRODUKTION. Ger. 507,524, June 11, 1925. Addn. to 485,825 (*C. A.* **24**, 1188). In the prepn. of active C from sclerenchymatous tissue such as fruit husks by the method of 485,825, H_3PO_4 is used to mix with the starting materials instead of $ZnCl_2$.

Active carbon. NAAMLOOZE VENNOOTSCHAP NORIT VEREENIGING VERKOOP CENTRAAL. Ger. 506,544, July 19, 1928. An activating retort is described for producing or reviving active C by stirring while heating in a current of activating gases.

Reviving decolorizing carbon. FRIEDRICH W. MEYER. Ger. 507,994, Sept. 9, 1928. The used C is heated to temps. below the glowing temp. by superheated steam in a closed vessel.

Kaolin. ERICH MÜLLER. Fr. 687,653, Jan. 3, 1930. Kaolin of perfectly defined grain is obtained by fractionated washing of previously purified suspensions. A suspension of kaolin of sp. wt. $s = 1.06 - 1.12$ is poured into a vessel up to a height of $h = 6.2(s - 1)$ cm. The matter which still swims after a decantation of about 12 hrs. is removed from the sediment of little value, and the kaolin contained in the said matter is separated and submitted to a final treatment.

Fuller's earth. PFIRSCHINGER MINERALWERKE GEBR. WILDHAGEN & FALK. Ger. 507,760, Nov. 8, 1925. Highly absorptive granular fuller's earth is produced by grinding air dried crude material to the desired size, heating *in vacuo* under pressure with a mineral acid (*e. g.*, a mixt. of 20% HCl and 30% H_2SO_4) and finally washing with water.

Lime kiln. EMANUEL SOBEK. Ger. 507,605, May 2, 1929. Addn. to 451,403. Details of a discharging funnel.

Rotating furnaces for lime, cement, etc. SOC. D'EXPLOITATION DES PROCÉDÉS INDUSTRIELS CANDLOT. Fr. 687,838, Jan. 8, 1930. Construction of recuperative coolers.

Cement powder. I. G. FARBENIND. A.-G. (Karl Frank and Karl Dietz, inventors). Ger. 506,928, Oct. 3, 1928. Non-refractory readily sol. silicates in solid form are mixed with substances with a strong alk. reaction. Thus powd. Na_2SiO_3 is mixed with Na_2SiF_6.

Catalysts. BAMAG MEGUIN A.-G. Fr. 686,696, Dec. 16, 1929. A catalyst, *e. g.*,

for the combustion of NH_3 for the production of nitrous gases, is made in the form of a network from wires of an alloy of Pt and Rh and wires of pure Pt, or wires of pure Pt and wires of pure Rh.

Catalysts containing aluminum. ALEXANDER WACKER GES. FÜR ELEKTROCHEMISCHE IND. G. M. B. H. Fr. 688,077, Jan. 13, 1930. A catalyst suitable, *e. g.*, for transforming AcH into acetic ester, is made by treating a mixt. of Al and alc., preferably in the presence of an indifferent solvent, with an elementary halogen or halogen compds giving with Al a halogenated Al.

Iron oxide catalyst. MARJAN GODLEWICZ. Fr. 687,847, Jan. 8, 1930. An active oxide of Fe (Fe_3O_4) for use as a catalyst is prepd. by pptg. $Fe(OH)_2$ from a soln. of $Fe(NO_3)_2$ by means of NH_3, alkalies or carbonates and heating lightly.

Active iron compounds. MICHAEL TENNENBAUM and CARL VAN EWEYK. Ger. 507,887, Dec. 22, 1926. Addn. to 489,550 (*C. A.* **24**, 2252). The active Fe carbonate obtained by the method of 489,550 is dried with exclusion of air at 100–300° to form an artificial magnetite, which, on further heating in presence of air, gives a strongly magnetic active Fe oxide. Treatment of the magnetite with concd. org. acid and heating the product with a weak base, gives a highly active Fe hydroxide. If the carbonate is treated with dil. acid, a weakly magnetic, strongly active Fe oxide is produced. Examples are given.

Catalyst poisons. METALLGES. A.-G. Fr. 687,688, Jan. 4, 1930. Combustible catalyst poisons such as AsH_3 contained in gases such as those coming from a Dwight-Lloyd app. are rendered inoffensive by passing the gases into a roasting or metallurgical furnace in which the poisons are burnt, after which their sepn. is carried out in known manner.

Catalyst supports. VEREIN FÜR CHEMISCHE UND METALLURGISCHE PRODUKTION. Fr. 688,561, Jan. 20, 1930. Supports for catalysts are composed of silicic acid or strongly acid silicates and are made by heating natural or artificial substances having a high content of silicic acid with salts or oxides such as Al_2O_3 capable of forming silicates, after which the basic constituent of the reaction mixt. is eliminated by treatment with mineral acids. The heating may take place in the presence of an NH_4 salt.

Roasting pyrite ores. SAUREFABRIK SCHWEIZERHALL. Swiss 138,363, Jan. 19, 1929. A multi-stage furnace for thoroughly roasting pre-heated S ores or other sulfurous material is described.

Roasting sulfide ores. SAUREFABRIK SCHWEIZERHALL. (Otto Saladin, inventor.) Ger. 508,340, Feb. 22, 1929. In roasting sulfide ores in a multiple-hearth furnace down which the material is passed in countercurrent to a stream of air, premature cooling of the roasted material is avoided by by-passing the air stream past some of the intermediate hearths through channels in the furnace wall. App. is shown.

Rotary-tube furnace for roasting sulfide ores. ZELLSTOFFFABRIK WALDHOF and METALLGES. A.-G. Ger. 508,341, Mar. 24, 1927.

Plastic compositions. ALEXANDER M. NASTYUKOV. Ger. 509,305, April 3, 1927. The condensation product ("formolite") obtained by treating mineral oils with H_2SO_4 and CH_2O, as described in Brit. 289,920 (*C. A.* **23**, 968), is used, alone or mixed with artificial resins or other plastics, etc., for the manuf. of shaped articles.

Plastic material. V. P. KHRISTYANOVICH AND A. I. SARK. Russ. 42,398, Mar. 8, 1929. Plastic material is prepd. by mixing freshly pptd. SiO_2 with glycerol and powdered or fibrous material such as clay, talcum, sawdust, pulp or cotton wool.

Plastic masses. "HEROLD" A.-G. Ger. 507,997, Aug. 24, 1927. Starch is condensed with CH_2O in the presence of acid-reaction accelerators such as mono- or polybasic aromatic or aliphatic hydroxyacids, unsatd. acids, halogen-substituted acids and aliphatic acids, with a small quantity of inorg. acid. The salts or anhydrides may be used. Examples mention lactic acid, phthalic acid anhydride, H_2SO_4 and $NaHSO_3$.

Agents for dissolving or softening plastic masses. I. G. FARBENIND. A.-G. (Otto Jordan, inventor). Ger. 506,677, Aug. 2, 1925. Agents for dissolving or softening resins, lacs, oils, dyes, essences or other org. plastic masses consist of esters of substituted fatty acids contg. 6 or more C atoms, and having no O in the mol., except in the COOH group. Et methylpropylacetate is mentioned as the example.

Method and plant for molding plastic masses under high pressure. KARL F. HÖLLER and STEFAN SCHLESS. Austrian 119,622, May 15, 1930. Manipulative and structural features are described.

Composition for use in modeling, sculpture, pottery, etc. J. T. TASSAUD. Brit. 334,000, June 27, 1929. Plaster of Paris or a similar material 2–3 is mixed with an oleaginous material such as lard 1 part. The hardened surfaces of articles formed from

the compn. may be treated with varnish, linseed oil or other covering or protecting materials.

Composition from blood suitable for making molded articles. FELIX HOMBERG (to American Nuplax Corp.). U. S. 1,786,488, Dec. 30. Dried blood is mixed with an insol. inorg. filling material such as lithopone, adapted to render the product permeable after molding, the material is molded under the action of heat and pressure to form buttons or other articles, and the product is bleached (suitably by H_2O_2, Cl or SO_2) and treated with a coloring material such as a dye soln. Cf. *C. A.* **24**, 212.

Artificial masses. HANS FRIEDLÄNDER. Ger. 506,883, Sept. 26, 1925. Addn. to 454,831. The method of 454,831 for prepg. artificial masses by soaking a fibrous groundwork with hard wax is modified by using by-products from montan-wax manuf. instead of hard wax. Thus, montan-wax pitch or lignite tar may be used.

Condensation products. SOC. ANON. POUR L'IND. CHIM. À BÂLE. Swiss 138,489 to 138,491, Sept. 18, 1928. Addns. to 130,420. Benzoin, isopropyl alc. and naphthalene-β-sulfonic acid are condensed in equimol. proportions, optionally in the presence of concd. H_2SO_4. The product is a good dispersion agent (138,409). BuOH or EtOH may be used and the respective proportions changed to 5:5:1, (138,490 and 138,491). Cf. *C. A.* **24**, 4363.

Artificial gems (corundum). SIEMENS-SCHUCKERTWERKE A.-G. Ger. 509,132, July 15, 1924. In the method in which the powd. initial materials are conveyed into the fusion zone by a gas stream, efficient distribution of the materials is effected by directing the stream against the surface of a heap of the materials. App. is shown.

Wetting agents. THE TWITCHELL PROCESS CO. Fr. 688,511, Jan. 20, 1930. A liquid for wetting fibrous materials and finely divided substances contains 99% water and 1% of sulfonates of mineral oils of the type produced by the refining of petroleum fractions having a naphthenic base. These sulfonates are distinguished principally by the solv. in water of their Ca and Mg salts.

Detergents. THE TWITCHELL PROCESS CO. Fr. 688,513, Jan. 20, 1930. A detergent is composed of mineral oil sulfonates sol. in oil and those sol. in water, these sulfonates coming, resp., from layers of oil and mud resulting from refining. Cf. *C. A.* **25**, 170.

Non-inflammable polishing and cleaning agent for floors, linoleum, etc. AURÈLE CHAUDEMS. Swiss 140,104, Nov. 30, 1928. The prepn. contains C_2HCl_3, oil of turpentine and beeswax.

Non-inflammable cleansing agent for floors, oil paintings, etc. ALBERT HUBER. Swiss 138,818, Feb. 17, 1929. The prepn. consists of a mixt. of hydrogenated naphthalene 60, cyclohexanol 10, sulfoleate 10, water 20, turpentine 15, NH_4Cl 3 and AcOAm 2 parts, preferably in the proportions as given.

Composition for cleaning metal. JAMES H. GRAVELL. Can. 305,576, Nov. 11, 1930. A material for prepg. metal for painting consists of an admixt. of H_3PO_4, EtOH, BuOH, water and raw starch.

Removing lead fouling from rifle barrels, etc. G. HALBE. Brit. 333,963, May 31, 1929. For removing metal fouling such as Pb from iron or steel surfaces, an alc. soln. of a Hg salt such as $HgCl_2$ is used; castor oil, turpentine, etc., may be added to reduce the tendency of the surface to rust.

Composition for prevention of corrosion. JAMES H. GRAVELL. Can. 305,575, Nov. 11, 1930. A material for preventing corrosion of metal consists of an admixt. of amine phosphate, iron oxide, a liquid hydrocarbon and stearin pitch.

Soot-destroying composition. ALBERT C. BERRYMAN. Can. 305,971, Nov. 25, 1930. A soot destroying compn. consists of NaCl 285 lb., powd. Zn 14 lb., powd. hard coal 6 lb. and powd. charcoal 3.5 lb.

Solution for stripping old paint, etc., from wood, etc. ALBERT WEBER. Ger. 508,661, Sept. 9, 1927. The paint surface is coated with a soln. contg. 72% spirits, 25% C_6H_{12}, tetralin and 1% thioether, and rubbed with sand paper.

Dry bleaching composition. WM. B. STODDARD and VAMAN R. KOKATNUR (to Pilot Lab., Inc.). U. S. 1,787,402, Dec. 30. In drying a bleaching compn. which when wet is an intermediate product such as a peroxide or other "per-compd.," the wet bleaching compn. is mixed with a material such as Na_2SO_4, alum or Na_2HPO_4 contg. a proportion of water of crystn. which is less than its normal content of water of crystn. so that it takes up addnl. water from the compn. to be dried. Cf. *C. A.* **24**, 4364.

Colloidal solutions. JEAN J. PETIT. Fr. 686,880, Mar. 12, 1929. Concd. colloidal solns. (generally contg. at least one org. solvent) have their viscosities considerably lowered without modifying the chem. structure of the colloids which they contain by the addn. of emulsifying agents, which include salts of fatty or resinic acids, Turkey-red

oils, sulforicinates, ester acids of dibasic aliphatic acids with higher alcs., sapon. products of lanolin, saponin and emulsin, oxidation products of paraffins, waxes, etc., naphthenic acids or their derivs. and cyclohexanol or its homologs or derivs. The process is particularly applicable to solns. of cellulose compds. used for making *artificial silk*.

Coating materials. IMPERIAL CHEMICAL INDUSTRIES, LTD. Fr. 687,597, Jan. 2, 1930. Plastic substances, substantially free from water, used in the *manuf. of lacquers, celluloid, floor coverings* and *artificial leather* are made by incorporating water-wet cellulose esters and ethers with a plasticizing and softening medium which includes a volatile gelatinizer, during which the water seps. and is removed. The gelatinizer may be a water-miscible or partly miscible solvent such as ethylene glycol mono-ethyl ether, Et lactate and Me acetate or a water-immiscible solvent such as Bu acetate and chloroform or mixts. of the 2 kinds. A non-volatile gelatinizing agent such as dibutyl phthalate, tricresyl phosphate, camphor or camphor oils may be used for the gelatinization. Coating materials are made by dissolving the products in suitable solvents with or without the addn. of resins or further plasticizers or softeners. Pigments in the form of water-wet pastes may be added. Examples are given.

Adhesive. WALTER ALEXANDER. U. S. 1,786,417, Dec. 30. An adhesive suitable for use where flexibility is desirable comprises a starch or deriv. such as tapioca starch or flour or "commercial white corn dextrine" together with a water-sol. alk. B compd such as borax and diethylene glycol, and may contain other ingredients also such as NaOH and formaldehyde.

Adhesive suitable for gluing up ply-wood. LAWRENCE BRADSHAW (to Casein Mfg. Co. of America). U. S. 1,787,611, Jan. 6. An adhesive is prepd. comprising an alkali-sol. protein material such as casein or soy-bean meal together with an alkali in at least sufficient quantity to dissolve the protein material, starch-viscose, NaF and water, etc.

Rendering rubber tasteless and suitable for use in chewing gums. CHARLES E. DELLENBARGER (to Paul Carpenter). U. S. 1,786,831, Dec. 30. A compn. which may comprise rubber and a wax such as paraffin is gradually heated to 132–145°. Various flavoring and modifying ingredients may be added.

Packing and wrapping materials. MARINO GENTILE and SAMUEL W. WEIS. Fr. 687,126, Dec. 23, 1929. A packing or wrapping material for *foodstuffs, pharmaceutical products*, etc., is made from a base of a protein substance such as gelatin coated with a cellulose ester such as the nitrate, in which an org. substance such as castor oil is incorporated to give binding qualities to the coating.

Soluble transformation products of diolefins. I. G. FARBENIND. A.-G. Fr. 687,773, Jan. 7, 1930. Butadiene or its homologs, in the presence of solvent or dispersive agents, is treated by finely divided alkali metals or by mixts. contg. them; care is taken that the reactive components are well mixed and it is preferable to add butadiene hydrocarbons as they are consumed. The products are submitted to a hardening process at ordinary or elevated temp. and are used for the manuf. of *resistant masses, coatings, films*, etc.

Ossein. HONORÉ SCIALLANO. Fr. 688,104, Nov. 27, 1929. Ossein is prepd. from bones by dissolving the mineral part of the bones with phosphoric acid regenerated from a previous operation.

Laminated material. VICTOR H. TURKINGTON (to The Bakelite Corp.). Can. 306,935, Dec. 23, 1930. Fibrous sheet material is treated with a reactive resinoid varnish and dibutyl phthalate and subjected to heat and pressure to harden the resinoid. A laminated material for elec. insulation is obtained. Cf. *C. A.* **24**, 6042.

Working up zirconium-lime sinter products. KALI-CHEMIE A.-G. (Friedrich Rüsberg and Paul Schmid, inventors). Ger. 509,515, Nov. 12, 1927. The product is treated with aq. H_2SO_3 to remove part of the $CaCO_3$. The residue is dissolved in HCl and treated with the $Ca(HSO_3)_2$ lye obtained by the prior treatment with aq. H_2SO_3 and allowed to stand. The whole is heated to drive off SO_2, causing basic $Zr(SO_3)_2$ to be pptd. This is filtered off, washed and calcined at 700–800° to give practically pure ZrO_2.

Finely divided magnetic material suitable for cores of loading coils, etc. JOHN H. WHITE and VICTOR E. LEGG (to Bell Telephone Laboratories, Inc.). U. S. 1,787,606, Jan. 6. For increasing the yield of fine dust obtained by comminuting magnetic materials including common elements of the Cr group of the periodic table, such as an alloy contg. Ni 78.5, Fe 13.5 and Mo 4%, the materials such as Ni and Fe are melted with metallic Cu (suitably in the proportion of about 4%) so that premature breaking up into large fragments during mech. hot working is avoided, and the material is then subjected to hot working and comminution. Cf. *C. A.* **24**, 3481.

Phonograph disk records containing cellulose ester. HUBERT LAFFON. U. S.

1,787,484, Jan. 6. A disk of material such as cardboard is impregnated with cellulose ester and plasticizer, impressed as desired, and then coated with transparent "cellulosic varnish."

Printing pastes. H. BOLLMANN and B. REWALD. Brit. 333,959, May 28, 1929. A vegetable or animal phosphatide (suitably a product obtained from soy beans by a process which is described) is added to a starch, dextrin, tragacanth, gum arabic or other thickener, in the production of a printing paste, and may be preliminarily dissolved in a mineral oil such as spindle oil, or used together with fatty oils and wetting agents such as turkey red oil. Pea shell meal, fish roes, brain, egg yolk and soy-bean slime (obtained in the extn. of soy beans with benzene) also may be used as sources of the phosphatides.

Ice-rotting composition. ARTHUR C. WHITE and CHARLES E. CLASON (to Dow Chemical Co.). U. S. 1,787,887, Jan. 6. An ice-rotting substance such as $CaCl_2$ is mixed with a buoyant material such as powd. cork to form air-including agglomerated granules which will float on water. U. S. 1,787,888 describes ice-rotting compns. formed from an ice-rotting material such as $CaCl_2$ and a heat-absorbing material such as lampblack which absorbs heat from the rays of the sun.

Anti-freeze composition. WILLIAM F. HURLEY (to Guiseppe Gismondi). Can. 305,021, Oct. 21, 1930. An anti-freeze compn. comprises an aq. soln. of $CaCl_2$ and the water sol. ash resulting from peanut kernels from which the oil has been expressed.

Cork. FRITZ SCHLOTTERBECK. Ger. 507,689, Sept. 15, 1929. Cork is improved, *i. e.*, its pores enlarged, by heating with NH_3. The cork may be soaked with aq. NH_3 and heated under reduced pressure.

Fiber bands. G. ROTHMUND & Co. Ger. 508,547, April 14, 1926. The fiber is soaked in a C_6H_6 soln. of gutta percha and asphalt and dehydrated. The rolled fiber is then treated with alc., acetone, etc., to harden it.

Band-drier for use in carbonizing wool, rags, etc. HERMANN HAAS. Ger. 509,431, July 7, 1928.

Aqueous dispersions of thermoplastic material such as asphalts, waxes, gums or resins. ALBERT L. CLAPP (to Bennett, Inc.). U. S. 1,787,338, Dec. 30. After prepg. a hot batch of liquefied thermoplastic material and a hot batch of aq. Na silicate soln., the 2 materials are progressively withdrawn as continuously moving streams of comparatively small cross sectional area, from the batches, and the 2 streams are united into a single continuously moving stream and the latter is thoroughly agitated to effect dispersion of the thermoplastic material in the aq. Na silicate soln. The dispersions thus prepd. are suitable for coating, etc. U. S. 1,787,339 relates to app. for use in processes of this character.

Treating seaweed. COMPAGNIE FRANÇAISE DE L'IODE ET DE L'ALGINE. Ger. 508,573, Sept. 10, 1929. Brown algae or seaweed is extd. with water after treatment with a soln. of alkali earth salts. The residue is treated with dil. H_2SO_4, washed and further extd. with an alk. soln. or Mg lye. Cf. *C. A.* **24**, 2563.

Artificial teeth. ANTOINE F. M. VAN RENTERGHEM. Ger. 508,820, June 6, 1928. The teeth are made from a mixt. of phenol-aldehyde resin, tartaric acid and alc. The materials are purified by centrifuge and heated till milky. Pure Sn may be used for the mold.

Use of chloropicrin as a warning agent with hydrocyanic acid in fumigating. HANS LEHRECKE (to Koessler & Hasslacher Chem. Co.). U. S. 1,786,623, Dec. 30.

Insect repellent. DUDLEY H. GRANT (to The Standard Oil Development Co.). Can. 307,013, Dec. 23, 1930. An insect repellent comprises terpinyl acetate, pyrethrum ext. and kerosene. It is adapted to be used with a vehicle whereby it may be applied to human beings, domestic animals, clothing, furniture, etc. Cf. *C. A.* **24**, 2849.

Insecticide. I. G. FARBENIND. A.-G. Ger. 509,086, Oct. 16, 1926. A compn. for destroying lice on the human or animal body comprises an org. solvent soln. of Al naphthenate, with or without a wetting agent.

19 - GLASS, CLAY PRODUCTS, REFRACTORIES AND ENAMELED METALS

G. E. BARTON, C. H. KERR

Machinery and methods of manufacture of sheet glass. W. E. S. TURNER. *Engineering* 130, 755-9 (1930). E. H.

The influence of chemical compositions on the physical properties of soda-lime

glasses. J. W. GILL AND W. C. RUECKEL. *J. Am. Ceram. Soc.* **14**, 21–9(1931).—Nineteen glasses were studied. Conclusions: (1) With SiO_2 const., each 1% increase in dolomitic lime, at the expense of Na_2O, increased the softening point 11–12°, d. 0.004, and n 0.0015. (2) With Na_2O const., the softening point was const. The d. decreased 0.011 and n 0.0030 per 1% increase in SiO_2 at the expense of CaO. (3) With CaO const., the increase in softening point per 1% increase in SiO_2 varied thus: 5% CaO, 21; 8% CaO, 17°; 10% CaO, 15°; 12% CaO, 12°. The d. decreased 0.008 and n 0.0015 per 1% increase in SiO_2 at the expense of Na_2O. (4) A thermochem. relation of the softening points and chem. compns. (calcd.) parallels closely the "liquidus" surfaces of Feild and Roysters' system, CaO–Na_2O–SiO_2. C. H. KERR

Molecular kinetics in the softening range of glasses. G. TAMMANN. *Z. anorg. allgem. Chem.* **193**, 406–8(1930); cf. *C. A.* **25**, 179.—It is considered that the mols. of a glass begin to rotate freely during the softening interval, rather than that the amplitude of vibration increases. T. H. CHILTON

Some anomalous phenomena in glass near its softening point. O. K. BOTVINNIKOV. *Keram. i Steklo* **6**, 431–4(1930).—B. reviews the existing literature on anomalous phenomena in glass near its softening point and describes his investigations. The results are: (1) At certain temps. lying below the softening point of glass, an anomalous change in the coeff. of cubic expansion of glass was observed; this interval coincides with the corresponding intervals for specific heat and viscosity. (2) Three transition points were found for all glasses; this fact disagrees with the investigations of M. O. Sanford and others, who found only 2. M. V. KONDOROV

The properties of re-melted cullet. W. E. S. TURNER. *Pottery Gaz.* **55**, 1761–3(1930); cf. *C. A.* **24**, 2564.—Meltings of glass made in refractory crucibles could not be used for study because of the corrosion of the pots by the glass. Pt crucibles were then used. Evidence gained up to the present shows that if a glass of known compn. is used and the heating is of such a character that its chem. compn. does not change, repeated meltings of that glass should not affect the phys. characteristics. The important thing in glass making is to have the mass homogeneous and, if results were obtained in practice which seem to indicate that the character of the glass changed because of the addition of cullet, the explanation is probably that the homogeneity had been interfered with, rather than that a fundamental change had taken place. R. A. HEINDL

Coloring glass with coal and sulfides. A. K. BORK. *Keram. i Steklo* **6**, 435–7(1930).—The results of investigations showed that pure coal does not color glass either yellow or orange (brown), but that these colors and black generally depend on the formation of Fe sulfide. Also in *Glastech. Ber.* **8**, 275–9(1930). M. V. KONDOROV

Commercial glass transmitting ultra-violet light. PAUL DAVIDOVICH. *J. Optical Soc. Am.* **20**, 627–41(1930). The history of the manuf. of ultra-violet glass from 1854 to date is reviewed. The main features of modern com. ultra-violet transmitting glasses are described with tables showing the progressive shift of the limit of ultra-violet transmission with change of compn. Wave length and transmitting power in percents are given for the following glasses: Brevos, Ultravit, Uviol, Sanalux and Vita. The aging of ultra-violet glass is considered, also the effect of heat on its transparency. M. M.

A study on the drying of clay and clay mixtures. V. BODIN AND P. GAILLARD. *Brit. Clayworker* **39**, 130–3, 164–8(1930). R. A. HEINDL

Drier problems with calculations. JOHN L. CARRUTHERS. *J. Am. Ceram. Soc.* **14**, 8–20(1931). C. H. KERR

Practical geology for brickmakers. JAMES STANWORTH. *Brit. Clayworker* **39**, 198–200, 284–5(1930). R. A. HEINDL

The effect of hydrogen-ion concentration upon the sedimentation of clay. NORVIN BEEMAN. *J. Am. Ceram. Soc.* **14**, 72–87(1931).—The effect of H-ion concn. upon the rate of sedimentation was relatively great, which explains why changes in p_H values produce changes in plasticity and viscosity. Elutriation is an uncertain process without p_H control. C. H. KERR

History of Strasburg firebrick district. E. J. BOGNAR. *Bull. Am. Ceram. Soc.* **10**, 3–7(1931). C. H. KERR

Recent German technical research in the field of brick making. HANS HIRSCH. *Tonind.-Ztg.* **54**, 1273–5, 1303–5, 1330–2, 1356–8(1930).—The SO_3 absorbed from the combustion gases is dependent on the amt. of lime present and on the firing temp. The dissocn. of gypsum takes place at 900° in a reducing atm. and at 1400° in an oxidizing atm. ROBERT F. FERGUSON

Recent patent literature on the manufacture of silica brick. FRIEDRICH REINHART. *Tonind.-Ztg.* **54**, 1373(1930).—All domestic and foreign patents are listed. Most of them show an attempt to invent a brick which will not grow in service because of residual

expansion. These may be classified into groups: addn. of combustible or highly shrinking material to compensate for the increase; and the addn. of catalytic agents to accelerate the expansion during manuf. Some of the catalytic agents which have been mentioned are P_2O_5, Na tungsate, borates, molybdates, phosgene, KCl, feldspar and quartz glass. ROBERT F. FERGUSON

Continuous kilns for the burning of clay products. J. WILLIAMSON. *Brit. Clayworker* **39**, 274–8(1930).—The advantages of the continuous kiln are: (1) 50% saving in fuel; (2) 30 to 60% saving in labor; (3) control is easier; (4) the product is more uniform; (5) losses are greatly reduced; (6) repairs are lower; and (7) greater output is obtained for a given space. R. A. HEINDL

The recent trend of ceramic kiln practice. S. R. HIND. *Brit. Clayworker* **39**, 181–91(1930); cf. *C. A.* **24**, 4367.—The use of car tunnel kilns is increasing. R. A. HEINDL

Heating porcelain kilns with coal gas. FRANZ DIETRICH. *Gas u. Wasserfach* **73**, 1069–74, 1090–6(1930). R. W. RYAN

Investigation of feldspar and its effect in pottery bodies. R. F. GELLER AND A. S. CREAMER. *J. Am. Ceram. Soc.* **14**, 30–71(1931).—Nineteen feldspars were studied, alone and in typical vitreous and semivitreous bodies. Results are given in detail. Some points are: (1) Refractoriness increases and softening range decreases with increase in K_2O. (2) "True" sp. gr. ranged from 2.628 for highest Na_2O to 2.565 for highest K_2O feldspar. (3) The type of feldspar had little or no effect on the firing behavior of the body or on the color by reflected light. (4) Translucency of bodies increased with increase in K_2O content of the feldspar used. (5) Petrographic examn. of 3 bodies showed no great differences in mullite development or quartz soln. (6) Quenching test did not indicate the relative merits of the feldspars, as to "glaze fit." (7) Thermal expansion was highest in bodies contg. high Na_2O feldspars. C. H. KERR

Grog. C. R. F. THRELFALL. *Brit. Clayworker* **39**, 310–17(1930). R. A. HEINDL

The chemical investigations of refractory materials. III. H. J. VAN ROYEN AND HERBERT GREWE. *Arch. Eisenhüttenw.* **4**, 17–21(1930); cf. *C. A.* **23**, 4312.—A method is described for analyzing chrome brick for use in an Fe smelting lab. A sample of the brick is ground in an agate mortar until grit-free, decompd. by fusing with Na_2CO_3, dissolved in dil HCl, and the SiO_2 detd. in the residue (*Ber. Chem.-Aussch. Eisenh.*, No. 110(1927)). The alk. earths are sepd. from the $(NH_4)_2S$ group metals in the filtrate either by $(NH_4)_2S$ or NH_3. By dissolving either of these ppts. in HCl (1:2), diluting to 100 cc. with H_2O, pptg. an aliquot portion with $(NH_4)_2S$, and igniting, (Cr_2O_3 + Fe_2O_3 + Mn_3O_4) may be detd. Fe is detd. in another aliquot portion of the soln. by the $TiCl_4$ method. Cr is detd. in still another portion by the method of Philips (*Ber. Eisen* **27**, 1164–7(1907)). To det. Mn the dried sample is evapd. with HF-H_2SO_4, the residue decompd. by fusing with $NaKCO_3$, the fused mass dissolved in HCl, and Mn in the soln. detd. by the Volhard Wolff method. Al_2O_3 is detd by difference. Ca in the filtrate of the $(NH_4)_2S$ or NH_3 pptn. is detd. by the oxalate method. MgO is detd by pptg. with $(NH_4)_2HPO_4$ from the cold oxalate filtrate as $MgHPO_4$. J. BALOZIAN

Thermal conductivity of refractory materials. H. GOLLA AND H. LAUBE. *Tonind.-Ztg.* **54**, 1413–4, 1431–2, 1458–60(1930).—The app. consists of a hollow sphere of the material to be tested, which is heated from the center with an elec. resistance. The temp. of the outside surface of the sphere, suitably guarded and insulated, is then measured. The cond. in phys. units is given in the form of a table for 24 different refractory materials each at 5 different temps. ROBERT F. FERGUSON

Study of the equilibrium of refractory arches. R. HUSTIN. *Chaleur et ind.* **11** 131–2(1930). An investigation of the expansion of certain bricks under pressure. Brick A had higher dilatation than brick B under one pressure but the reverse was true under two that pressure. Hence each problem of the most suitable refractory brick requires examn. upon its own merits. S. L. B. ETHERTON

Furnace-testing refractories for slag erosion. B. W. STROMBERG. *Chem. & Met. Eng.* **37**, 665–6(1930).—In an oil- and powd. coal-fired furnace representing boiler furnace conditions, refractory brick is tested for slag erosion and penetration. High-grade fire clay brick erodes about 1 in. in 48 hrs.; SiC brick, little or not at all; and SiO_2 brick, about 5 in. E. M. SYMMES

Magnetic separation **purifies feldspar (PEDDRICK) 18.** Composition for use in modeling, sculpture, **pottery, etc. (Brit. pat. 334,000) 18.**

ANDERSON, LAURITZ: **Ziegelbrennen. Theorie und Praxis.** Hälsingborg: A. B. Bergstens. 46 pp. Reviewed in *Ceram. Abstracts* **9**, 968; *Tonind.-Ztg.* **54**, 971(1930).

MAFFEI, C. A.: **Industria del vetro.** Milan: U. Hoepli. 527 pp. L. 60. Reviewed in *Giorn. chim. ind. applicata* **12** (6), 325; *Ceram. Abstracts* **9**, 932(1930).

Glass. FRITZ ECKERT. Ger. 508,114, Mar. 5, 1927. Between the clarifying chamber and the place of withdrawal, an addnl. chamber is arranged in which the molten glass is subjected to mech. agitation at a temp. substantially above the working temp. It is then led away and cooled as rapidly as possible to the working temp.

Delivering mold charges of molten glass. ROY E. SWAIN. U. S. 1,788,037, Jan 6. Mech. features.

Glass-blowing apparatus suitable for the manufacture of bottles. JAMES W LYNCH and EDWARD G. BRIDGES (to Lynch Corp.). U. S. 1,788,312, Jan. 6. Structural features.

Apparatus for forming glassware. JAMES W. LYNCH and EDWARD G. BRIDGES (to Lynch Corp.). U. S. 1,787,635, Jan. 6. Structural features.

Apparatus for manufacture of molded glassware. SOC. ANON. D'ÉTUDES ET DE CONSTRUCTIONS D'APPARÉILS MÉCHANIQUES POUR LA VERRERIE. Brit. 334,056, Oct 12, 1928. Structural features

Apparatus (with electrically heated delivery and mold parts) for making molded glass articles. ALBERT C. WILCOX. U. S. 1,787,460, Jan 6 Structural features

Apparatus and procedure for producing glass sheets. CLARENCE P. BYRNES (to Window Glass Machine Co.) U. S. 1,786,892, Dec. 30. A mass of molten glass is subjected to skimming by drawing off its surface in sheet form; a sheet is then drawn from the skimmed glass Various details of app. and operation are described.

Apparatus for sheet-glass production. OTTO C. MILLER (to Libbey-Owens-Ford Glass Co.). U. S. 1,787,391, Dec. 30. Structural features.

Forming glass globes from portions of glass of different colors. JOHN EMERSON (to Inland Glass Works, Inc.) U. S. 1,787,619, Jan. 6. Mech. features.

Rotary furnace for the continuous melting of glass. LUDWIG BOSSE. Ger. 507,857, May 8, 1928.

Glass-fusion furnaces. HARTFORD-EMPIRE CO. Fr. 686,917, Dec. 18, 1929.

Apparatus for fusing the mouths of glass flasks. HALLESCHE PFÄNNERSCHAFT DER MANSFELD A.-G. FÜR BERGBAU UND HÜTTENBETRIEB. Ger. 507,838, Sept 12, 1929.

Tempering glass. SOC. ANON. DES MANUFACTURES DES GLACES ET PRODUITS CHIM DE SAINT-GOBAIN, CHAUNY ET CIREY. Fr. 686,890, Mar. 13, 1929. Sheets of glass are tempered by heating them, suspended vertically, to a uniform temp. corresponding with that at which softening begins to take place, and submitting them to violent jets of air striking the 2 faces normally until completely cold. Cf. *C. A.* **24**, 571.

Safety glass. JACQUES VANDIER. Fr. 688,543, April 11, 1929. In assembling sheets of glass and celluloid by a viscous substance such as Canada balsam for making safety glass, all possibility of the components sliding with respect to one another is eliminated by solidifying the viscous substance on the periphery of the plates, particularly by allowing the atm. to come in contact with the viscous substance to a certain depth.

Reënforced glass. HUMPHREY D. MURRAY and DOUGLAS A. SPENCER. Fr. 686,961, Dec. 19, 1929. The intermediate flexible layer in reënforced glass is made of regenerated cellulose or viscose impregnated with gelatin or a gum sol. in water, and a polyhydric alc. such as glycerol or glucose or a mixt. thereof.

Coloring reënforced glass. HUMPHREY D. MURRAY and DOUGLAS A. SPENCER. Fr. 687,049, Dec. 20, 1929 The intermediate layer of reënforced glass is colored by a diazotype process.

Composite glass and celluloid sheets, etc. J. C. DESTREE. Brit. 334,089, Aug 16, 1929. Structural features.

Laminated glass. N. I. VOLUINKIN. Russ. 61,279, Dec. 28, 1929. Glass plates are held together by a condensation product of phthalic anhydride and glycerol which is placed in powder form on the heated glass surface.

Method of joining metal to glass. MANHATTAN ELECTRICAL SUPPLY CO., INC. Ger. 508,152, Nov. 19, 1927. This corresponds to Brit. 293,292.

Kaolin and clay. ERICH MÜLLER. Fr. 687,701, Jan. 4, 1930. Kaolin and clay are treated by feeding the washing app. therefor in a continuous manner with fresh water and Na_2SiO_3 or K_2SiO_3 of 36–38° Bé., in const. proportion with respect to the wt. of the crude material; the crude material is added in such a way as to form waves on

the surface of the suspension, after which the suspension leaving the app. is neutralized with HCl and treated in known manner.

Drying bricks, etc., before firing. A. MONNIER. Brit. 333,921, April 20, 1929. The drying app. is first supplied with air heated by radiation from the oven, then with air used for cooling the fired products, and finally with hot gases from the oven. Various structural features of app. are described.

Ceramic material. WALTER J. SCOTT (to Western Electric Co., Inc.). Can. 305,248, Oct. 28 1930. Articles of ceramic material are made by mixing talc 75 and kaolin 25 with paraffin dissolved in CCl_4 16 parts, evapg. the CCl_4, molding the resulting mass into the desired form, and heating the molded mass at about 2200°F. to remove the paraffin and to harden the remaining substance.

Ceramic materials. VEREIN FÜR CHEMISCHE UND METALLURGISCHE PRODUKTION. Fr. 687,174, Dec. 23, 1929. In the manuf. of ceramic materials of all kinds from plastic and non-plastic materials, the non-plastic constituent is mixed with an agent capable of dispersing or peptizing the plastic constituent, before working the 2 together. Thus, chamotte and quartz are dampened and impregnated with a soln. of NH_3 or K_2CO_3 and then mixed with plastic clay, whereafter the procedure is as usual. Other examples are given.

Ceramic materials. VEREIN FÜR CHEMISCHE UND METALLURGISCHE PRODUKTION. Fr. 687,756, Jan. 6, 1930. In the prepn. of ceramic materials from a plastic material and organic binders in the form of colloidal solns., the liquefaction of the binder is obtained by the use of a soln. contg. humic substances and NH_3 or NH_4 salts, and then working in known manner.

Artificial ceramic masses. ALFRED KRIEGER. Ger. 508,659, Dec. 3, 1927. Artificial stone and like ceramic masses are formed from an inorg. binding material such as cement, mortar, etc., and phenol-aldehyde condensation products. The product is heated and pressed.

Ceramic product. JULIUS LAMPERHOFF. Ger. 508,365, Dec. 9, 1928. A method of imitating antique pottery is described, according to which a soln. comprising one part each of a fatty acid, ZnO and NH_3 in 6 parts of distd. water is applied over a hardened cold glaze prepd. from a MgO cement. When the article is warmed at 20–22° for some days, fine hair like cracks develop, into which a dark greasy pigment may be rubbed. Addnl. details are given.

Prevention of carbon deposition in regenerators. I. G. FARBENIND. A.-G. (Hans Wolf and Hermann Leuchs, inventors). Ger. 508,771, Mar. 23, 1928. See Brit. 330,[illegible] of [illegible] 24, 5959.

Ceramic kiln. PORZELLANFABRIK KAHLA, ZWEIGNIEDERLASSUNG FREIBERG. (Ludwig Wirth, inventor). Ger. 507,880, June 15, 1928. A method is described of heating the kiln directly by the flue gas and by elec. heating elements.

Rotary ceramic kiln. FRIED. KRUPP GRUSONWERK A.-G. Ger. 506,710, Jan. 19, 1929. Details are given.

Driving means for mechanical stoker for ceramic annular kilns. JOSEF HANNAK. Austrian 119,630, May 15, 1930.

Tunnel kiln for making fireproof stone, etc. HEINRICH KOPPERS A.-G. Ger. 509,787, Mar. 10, 1929. The kiln has a series of regenerators.

Device for producing tubes or rods from fused quartz. ALLGEMEINE ELEKTRIZITÄTS GESELLSCHAFT. Ger. 507,839, Jan. 16, 1926.

Machines for working molten silica. COMPAGNIE FRANÇAISE POUR L'EXPLOITATION DES PROCÉDÉS THOMSON-HOUSTON. Fr. 686,989, Dec. 20, 1929.

Materials for furnace linings. GEORGE M. CARRIE and ARTHUR C. HALFERDAHL. Can. 305,[illegible]55, Nov. 18, 1930. A homogeneous magnesia refractory for furnace lining is produced by dead burning an intimate mixt. of crushed magnesian rock, lime-bearing material and iron oxide material, to form a clinkered mass contg. 18 to 22% lime and 5 to 10% iron oxide, and crushing the product.

Refractory material suitable for bricks, furnace linings, etc. STUART M. PHELPS and MACGREGOR C. BOOZE (to American Refractories Institute). U. S. 1,788,123, Jan. 6. Alumina-contg. material which shrinks excessively in firing is mixed with 10% or somewhat less of phosphate rock; the mixt. is calcined to effect suitable pre-shrinkage before the material is put into final use. Various other materials are enumerated which may be used also for facilitating a desired pre-shrinkage on calcination.

Refractory composition suitable for lining glass furnaces. THOMAS S. CURTIS (to Vitrefax Corp.). U. S. 1,786,482, Dec. 30. A mullite aggregate is incorporated into a bonding matrix of amorphous mullite.

Plant arrangement for enameling metal articles and firing them. ALVIN G.

SHERMAN and ALBERT MEADOWS (to Detroit Vapor Stove Co.). U. S. 1,787,175, Dec. 30. Structural features.

Enameling iron. ALEXANDER KREIDL. Ger. 509,381, Oct. 28, 1925. The viscosity of the fused enamel is raised by adding carbonates or other water-insol. compds. of the alk. earths and by raising the Al content. The enamel can then be applied at a high temp., *e. g.*, 950°, while still using only about 6% of the opacifying agent (SnO_2)

Enameling furnace. BOYD M. JOHNSON (to The Carborundum Co.). Can. 306,533, Dec. 9, 1930.

Muffle furnace for enamel work. GEORG TIEGEL. Ger. 507,859, April 11, 1929. The construction of the furnace from ceramic plates and steel of high heat-resisting capacity is described.

20—CEMENT AND OTHER BUILDING MATERIALS

J. C. WITT

Magnesium oxide cement. III. Radiographic studies of basic magnesium chloride. W. FEITKNECHT. *Helv. Chim. Acta* **13**, 1380–90(1930); cf. *C. A.* **21**, 3519. Debye-Scherrer examn. of basic Mg chlorides confirms the views of the cause and mechanism of the hardening of sorel cement (*C. A.* **21**, 3519). In prepns. contg. between 2 and 7 mols. $Mg(OH)_2$, the OH is chemically combined. Similar kinds of crystals of different structures occur for varying amts. of OH. In the hardening process, a direct change of the oxide to the basic salt takes place without the formation of the hydroxide. In excess chloride, one kind of crystals may change to another, an equil. being established. On intense drying they may change to crystals contg. little water. MARY E. LOVE

Advances in the technic of magnesium oxychloride cement. RICHARD PASSE. *Kunststoffe* **20**, 243–4(1930). E. H.

Production of insulating board from cornstalks (HARTFORD) **23**. Composition and properties of certain explosives suitable for the lime, cement and plaster industries (DEFORGE) **24**. The use of rubber in cement tiling (RICE) **30**. Blown bituminous products suitable for roofing, etc. (Brit. pat. 334,032) **22**. Rotating furnaces for lime, cement, etc. (Fr. pat. 687,838) **18**. Artificial ceramic masses (Ger. pat. 508,659) **19**. Apparatus for making cement and other powdered or granular products (Fr. pat. 687,624) **1**. Phosphates and cement (Fr. pat. 687,538) **18**. Residues from the saccharification of wood [as construction material] (Fr. pat. 688,507) **23**.

Schutz der Bauwerke gegen chemische und physikalische Angriffe. Edited by OTTO GRAF AND HERMANN GOEBEL. Berlin: Wilhelm Ernst & Sohn. 224 pp. M. 22. Reviewed in *Ind. Eng. Chem.* **22**, 1262; *Chem. Met. Eng.* **37**, 698(1930).

"High-temperature" cement. ADDIE HUTCHINSON. U. S. 1,787,625, Jan. 6. A cement suitable for pointing up jambs and cracks in coke ovens is formed from silica sand 15, ground silica brick 3, portland cement 2 and soda ash 1.5 parts.

Cooler for cement, ores, etc., comprising a number of coaxial drums. SOC. D'EXPLOITATION DES PROCÉDÉS INDUSTRIELS CANDLOT. Ger. 508,461, Dec. 24, 1929.

Refining fusible cement. SOCIÉTÉ D'ÉTUDES CHIMIQUES POUR L'INDUSTRIE. Ger. 509,593, Oct. 2, 1928. Fusible aluminiferous cement obtained as a by-product from the elec.-furnace prepn. of P from phosphates and C is refined by treating with oxidizing agents such as MnO_2.

Machine for making tubes from asbestos cement. ETERNIT-WERKE LUDWIG HATSCHEK. Austrian 119,610, May 15, 1930.

Rotating furnaces for cement. JOHAN S. FASTING. Fr. 688,410, Jan. 17, 1930. Chains are suspended in the furnace which give a pos. forward movement to the material treated.

Rotary tubular furnace suitable for burning cement. ERICH SCHULZE (to Fried. Krupp Grusonwerk A.-G.). U. S. 1,787,841, Jan. 6.

Concrete. ÉTABLISSEMENTS BRISSET ET SANUA. Fr. 686,705, Dec. 16, 1929. Concrete made from cement is preserved against the action of chem. agents by applying one or more layers of synthetic resin (*e. g.*, that obtained by condensing CH_2O and phenols) and polymerizing by heating to 120–170°.

Molding concrete. CORWILL JACKSON. U. S. 1,787,449, Jan. 6. A mixt. of cement and aggregate is placed in a form with such a proportion of water as to produce

a non-flowing mixt., and the mixt. is then rendered fluid within the form by vibrating a wall of the form at high frequency.

Light concrete. H. IMBERECHTS. Belg. 369,056, April 30, 1930. In order to obtain a light, porous concrete, a substance which has no effect on the setting of the cement, but which can be dissolved after setting, is added to the concrete. The removal of the particles of sol. substances produces fine pores in the concrete.

Bituminous coatings on reënforcing for concrete. N.-V. DE BATAAFSCHE PETROLEUM MAATSCHAPPIJ. Brit. 333,940, May 24, 1929. The reënforcements are coated with an aq. dispersion of asphalt or the like (which may contain pigments), and then dried. Dispersions may be used such as are described in Brit. 245,418 (*C. A.* **21**, 319) and Brit. 291,393 (*C. A.* **23**, 1262).

Waterproofing cement mortars and concretes. A. STEWART. Brit. 334,053, Aug. 20, 1929. A waterproofing material is prepd. from soft soap 4 lb., "ammonia" 3 gills, alum 4 oz., washing soda 1 lb., lard 8 oz., boiled linseed oil 2 gills and water 5 gills, boiled together.

Artificial aggregate for mortars and concretes. JOHN E. GREENAWALT. U. S. 1,786,713, Dec. 30. A mixt. of finely crushed clay and cinders contg. combustible matter has a combustion-supporting gas such as air passed through it (in an app. which is described) and the charge is sintered by the heat of combustion effected by ignition at its surface. U. S. 1,786,714 describes a method in which an agglutinated mixt. of argillaceous material and water is formed into a plurality of small bodies such as balls which are arranged in a charge on a permeable hearth, fuel being then ignited at the surface of the charge, while a supporter of combustion such as air is passed through the charge away from the ignited surface, to produce a hard, porous, burnt product Apparatus described.

Artificial stone. AUGUST FRICKE. Ger. 508,364, Oct. 6, 1928. This relates to the manuf. of colored asbestos-cement slabs, etc A paste of cement and asbestos powder is applied on an incompletely hardened slab, and the surface of the paste is perforated by mech. means. A colored lacquer is then sprayed on.

Artificial stone. DEUTSCHE HERAKLITH A.-G. Ger. 508,316, Aug. 21, 1928. Addn to 434,348. According to Ger. 434,348, the manuf. of shaped articles from fibrous materials united by a sorel cement is effected by causing the mixt. to bind and harden in closed molds surrounded by a medium, *e. g.*, air, heated to 180–220°. This method is now modified by heating the medium to a temp. above 220° and by using open or perforated molds if desired.

Artificial stone. JOSEF KLEIN. Ger. 509,574, July 7, 1928. Insol. binding material, such as bituminous, oleaginous or resinous materials, are emulsified with a water-sol soap and mixed with mineral filling material. Water is extd. and the residue treated with mineral salts and molded. Cf. *C. A.* **24**, 2573.

Artificial stone. J. MUSTER. Swiss 137,978, Mar. 1, 1929. Ground slag, sawdust, cement and water are mixed to a paste and molded while moist, and the formed stones are laid in a subterranean place for a period, *e. g.*, 2 months.

Artificial stone. THEO URANSCHEK. Austrian 119,267, Feb. 15. 1929. Porous plates, etc., *for building* and *insulating* are prepd. by mixing 1 part of wood wool, straw or other org. fibrous material with 6 parts of an emulsion comprising water-glass soln. of 32–38° Bé and an equal amt. of finely divided asbestos or the like. The mass is then compressed in perforated molds for 0.5–2 hrs. at 200°, and the products are finally dried at 120°.

Paving blocks. CORWA, SCHLACKENVERWERTUNGSGESELLSCHAFT. Fr. 687,287, Dec. 27, 1929. Paving blocks are made from blast-furnace slags, the compn. of which is limited to SiO_2 29–34, and CaO 39–44, by casting the slag at a temp. between 1100° and 1200°. The slag may be submitted to a process of distn. before casting, and the cooling is allowed to take at least 5 days.

Paving material. EDWIN C. WALLACE. U. S. 1,788,258, Jan. 6. A rock contg. hard asphalt is crushed until all the rock will pass a screen of 0.75 in. mesh, fine material is screened out, the coarser material is mixed with 1 to 4% of fluxing oil, and the fine material is then added in about the same proportion as it was present in the original rock before sepn. Cf. *C. A.* **24**, 2267.

Bituminous compositions for paving, etc. N.-V. KONINKLIJKE STEARINE KAARSENFABRIEK GOUDA. Brit. 333,937, Feb. 5, 1929. A bituminous emulsion is mixed with a stony material such as basalt lava, blast-furnace slag or limestone of such porosity that strong adhesion is obtained between the bitumen and the aggregate; the latter may be pretreated with fatty or mineral oils, petroleum residues, resin oils, etc. Cf. *C. A.* **25**, 575.

Light, waterproof agglomerate. F. SPRINGAEL. Belg. 369,552, May 31, 1930. The agglomerate consists of volcanic rocks, or other similar, light, strong material, mixed with a cement and a binder, to which is added Na silicate or other waterproofing material. Cf. *C. A* **24**, 4607.

Constructional materials. BENCJAN JOSEF KOPELOWICZ, LUBA KOPELOWICZ NÉE BAUER, FLORA FEILES NÉE GOLDMAN and SAMUEL HERSCHTHAL. Fr. 688,101, Nov. 16, 1929. A constructional material is made by mixing sawdust with sand and cement and binding them with an aq. soln. of lime, plaster, etc. The sawdust is preferably first freed from resin. Cf. *C. A.* **24**, 2856.

Porous bricks, etc. ALEX DERICHSWEILER. Ger. 468,664, June 20, 1926. In the manuf. of porous bricks, etc., from a mixt. of a cement mass and a powd. metal giving rise to a gas, the metal is incorporated in the form of an emulsion prepd. by treating a mixt. of the powd. metal and oil with hot water. Finer distribution of the gas bubbles within the bricks, etc., is thus obtained. The outer pores may be protected by a thin cement coating. Cf. *C. A* **24**, 608.

Porous bricks, etc. TORKERT G. M. B. H. Ger. 509,239, Nov. 11, 1927. Addn to 468,664. The method of Ger. 468,664 (preceding abstr.) is modified by incorporating the metal-oil emulsion into the cement mass in sep. portions. Thus, $^1/_3$ or $^1/_4$ of the emulsion may be added while the mass is at a temp. of 70°, the remainder being added when the temp. has fallen to 50–60°. A thickening agent, *e. g.*, water glass, and porous fillers may also be incorporated.

Preventing weathering of sandstone. ADOLF SCHRANER-WEISS. Swiss 138,271, Feb. 2, 1929. The stone is impregnated with a soln of S in CS_2 contg. also linseed oil and Na_2SiO_3.

Insulating building material. O. WUSTEFELD-DULLIRT. Belg. 367,527, March 31, 1930. A mixt. of plaster, wood (in the form of dust, sawdust, shavings or "wool"), and water is used. Marble cement, alabaster cement or CaO can be used instead of plaster. Alum or borax may be added

Rendering building materials water-, acid- and alkali-proof. MARTIN VELLER & CIE. Swiss 140,476, May 15, 1929. The materials are treated with a soln. of paraffin wax in CS_2 in the cold.

Sheets or slabs for building construction. A. H. J. WRIGHT. Brit. 333,978, June 6, 1929. A sheet-metal core is treated with a protective coating of casein adhesive, paint or spelter, and after the coating has dried or set, there is applied a sheet of felted material which has been coated with a casein adhesive, and the materials are pressed together while the adhesive is maturing. Various details of manuf. are described

Stucco mixture. GUSTAVE A. NEW (to American Gypsum Co.). U. S. 1,787,162, Dec. 30. A compn. for producing a product of cellular texture suitable for use in building construction comprises a mixt. of calcined gypsum in plastic form and a foam formed from an agitated soln. of blood albumin and lime. U. S. 1,787,163 relates to structural features of gypsum wall-board manuf. Cf. *C. A.* **24**, 1720

Composition for coating walls, etc. ALFRED B. CALLAGHAN (to Caltex Co.). U. S. 1,787,425, Jan. 6. A mixt. is formed of mica 49, clay 30, casein 18, a coloring agent, alum 2 and cream of tartar 1 part, mixed with hot water.

Gypsum composition. CHRISTIAN GAMARRA (to Bemis Industries, Inc.). Can. 305,651, Nov. 11, 1930. Water-resistant, aerated gypsum products are made by mixing $CaCl_2$ and tartaric acid with calcined gypsum contg. carbonate, adding water and permitting the mixt. to set.

Imitation marble finish on hard surfaces. LLOYD V. CASTO (to Oxford Varnish Corp.). U. S. reissue 17,912, Dec. 30. Reissue of original pat. No. 1,682,067 (*C. A.* **22**, 3971).

Laminated roofing comprising layers of asphalt and saturated roofing felt. FREDERICK C. OVERBURY (to Patent and Licensing Corp.). U. S. 1,788,121, Jan. 6. Structural details.

Impregnating timber. G. S. PETROV. Russ. 47,759, May 22, 1929. Timber is impregnated with solns. of condensable, high-molecular sulfonic acids or sulfonated fatty acids obtained by condensing acrolein or furaldehyde with phenols or hydroxy acids. The hydroxy acids are obtained by oxidizing hydrocarbons, glycerides or fatty acids.

Preserving wood. RÜTGERSWERKE-A.-G. Ger. 509,303, Dec. 16, 1928. Wood that is difficult to impregnate is incised in a no. of places, transversely to the grain, before it is dipped into a preservative liquid or treated with the liquid under pressure or suction.

21—FUELS, GAS, TAR AND COKE

A. C. FIELDNER

Examination of solid fuels. A. P. SHAKHNO. *J. Chem. Ind.* (Moscow) **6**, 1665–8 (1929).—A review of the known systems for methodical examn. of the qualities of solid fuels. A table is given comparing in symbolic form the ordinary system of fuel analysis with the systems of Aufchenzer, Parr, Ramsin, Schwakchefer, Cheslem and Russell, and Bunte. The analytical systems should be supplemented by a detn. of the variability and of the susceptibility to spontaneous combustion of coals. D. K.

Grate firing or dust firing for low-grade fuels? ALFRED HERRMANN. *Montan. Rundschau* **22**, 409–16(1930).—Practical tests show that the use of grates for firing low grade fuels is more economical than the use of the powd. fuel. E. SCHOTTE

The coal fields of the United States. General introduction. MARIUS R. CAMPBELL. *U. S. Geol. Survey Paper* **100**, 1–33(1929). **Ohio.** J. A. BOWNOCKER. *Ibid* 35–96. E. H.

Contribution to the study of the constitution of coal. P. LEBEAU AND H. LEROUX. *Ann. combustibles liquides* **5**, 443–54(1930).—The procedure of extn. and fractionation worked out by Cochram and Wheeler (cf. *C. A.* **21**, 2780) is followed by the authors. The isolated products are subjected to carbonization and thermal fractionation is applied (cf. *C. A.* **19**, 3010). Detailed results with a Durham coal are given. With pyridine and $CHCl_3$ a γ-fraction to the amt. of 4.9% is obtained. With $CHCl_3$ alone only 1.1% yield is obtained. The γ_1, γ_2, γ_3 and γ_4 fractions differ for the 2 products. If the coal is heated with pyridine and the pyridine then distd. off in vacuum and then extd. with $CHCl_3$, a γ-fraction quite similar to the one obtained by the method of C. and W. is procured. E. SCHOTTE

Recently developed methods of research in the constitution of coal and their application to Illinois coals. REINHARDT THIESSEN. Ill. State Geol. Survey, Coöperative Mining Series, *Bull.* **33**, 58–89(1930). E. H.

The chemistry of Illinois coal. A review and a forecast. S. W. PARR. Ill. State Geol. Survey, Coöperative Mining Series, *Bull.* **33**, 53–7(1930); cf. *C. A.* **24**, 3098. E. H.

Patent literature on the hydrogenation of coal. J. ALPETER. *Metallbörse* **20**, 2167–8, 2515–6(1930). E. H.

Production of oil by carbonization of brown coal under pressure. R. VON WALTHER, W. BILLENBERG AND W. JENTZSCH. *Z. angew. Chem.* **43**, 1009(1930).—A bituminous coal heated to the temp. of tar formation was further heated under pressure. Instead of 11.2% tar, as under ordinary conditions, 23.3% of oil was formed, 96% of which distd. over below 300°. From the regular tar only 34% distd. off at 300°. The coke obtained also differed and the gas formed consisted of about 58% CH_4 and homologs. E. SCHOTTE

Investigations on lignites. III. Analysis of lignite from Kankyohokudo, Korea. YOSHIO ODA. *J. Soc. Chem. Ind., Japan* **33**, Suppl. binding 398–9(1930); cf. *C. A.* **24**, 5673. The analysis gave H_2O 21.4, ash 8.61, bitumen 8.02, humic acid 4.06, methoxyl content of humic acid 0.96 and cellulose (with fuming HCl) 4.28, (by Schmidt's method) to 72%. In detg. lignin with AcBr, the weight of the residue was found greater than that of the sample by 4.34%. Probably an intermediate in the formation of humic acids from lignin is not solubilized by AcBr, but suffers acetylation and bromination. **IV. Low-temperature distillation of lignite, humic acid, lignin and cellulose.** *Ibid* Suppl. binding 411–4 (in German).—Lignite of medium age (I), humic acid from lignite (II), invert sugar (III), lignin (according to Willstätter) (IV), and paper from rag stock (V) were dry-distd., the temp. being raised 8–10°/min. up to 300° and 3–6°/min. up to 500°. Results from I, II, III, IV and V are: coke 57.4, 57.0 55.8, 39.8, 22.4%; tar and H_2O: I, 22.8, 20.0, 40.4, 61.7; gas 18.5, 20.1, 24.2, 19.7, 15.9; gas analysis: CO_2 51.6, I, 34.2, 14.2, 42.7; C_mH_n 1.6, 1.1, 1.6, 2.2, 2.2; O_2 1.5, 2.6, 2.4, 11.6, 2.7; CO 11.5, 6, 33.6, 21.0, 20.9; H_2 6.9, 2.2, —, 6.3, 1.3; CH_4 10.7, 7.1, 11.4, 20.1, 4.2; C_2H_6 18.1 2.1, —, 2.1; N_2 14.5, 11.6, 14.7, 24.6, 14.9. III and IV showed strong gas formation at low temps. The large tar and H_2O yields of V were not due to incomplete drying of the substance. H_2O from natural humic acid was neutral; it contained AcOH in all other cases. Cellulose, in addn., gave HCO_2H. Only IV, I and III gave MeOH. All distillates gave traces of phenols. Schiff's reaction was pronounced with IV and V, weak with III, and absent with I and II. Residues of IV (atm. distn.) were in some cases completely sol., in other cases partially sol., in NaOH. Addn. of acid to these

solns. pptd. substances similar to natural humic acid. Distn. of V, under vacuum, gave a caramel-like residue, almost insol. in NaOH. K. H. ENGEL

The constituents of lignites and their behavior on low-temperature distillation. I. UBALDINI. *Ann. chim. applicata* **20**, 461–82(1930).—Several lignites were extd. with C_6H_6 as well as with C_6H_6-EtOH mixts., and extd. material, residue, etc., detd. Three types of lignites were studied: one high in bitumens, one low in bitumens and the other high in tar. In all cases C_6H_6-EtOH extd. a much larger proportion of bitumens, increasing from 34.5 to 45.6% in the first, from 11.51 to 16.5% in the second and from 1.12 to 6.98% in the tar type. Similarly, the mixt. extd. about 20% more of the humic acids in each case. A. W. CONTIERI

The Muldenstein lignite distillation plant. ROSENTHAL. *Z. Ver. deut. Ing.* **74**, 1377–80; *Braunkohle* **29**, 900–7(1930).—The exptl. plant of the German State Railway for making locomotive fuel from lignite is described. The retort is a sort of tunnel kiln which may be divided into 5 sections: entrance lock, distn. zone, neutral zone, coke-cooling zone and exit lock. Special cars are used. They have a refractory base on which rests an iron frame carrying sheet metal pockets 30 to 60 mm. thick, sepd. by open passages. They are dumped by lifting the frame. The coke falls on the refractory base and is swept off. The raw coal contains 50% H_2O. It is broken up in a hammer mill and dried to 12% H_2O in a drum drier fired with powd. coal. The cars are filled with dried coal in the entrance lock, are passed through the kiln and are dumped in the exit lock. The coal is distd. by hot gas flowing countercurrent to it. The gas makes the following cycle: It leaves the detarring plant at 60°, is heated to 300° in the coke-cooling zone, to 550° in a recuperator, is cooled to 120° in the distn. zone and passes back to the detarring plant. The excess gas from the distn. of the coal plus producer gas is used to heat the recuperator. Various lignites and bituminous coals all gave good results. Even coal less than 1 mm. in size gave dust-free tar. Finished coke has about 18% volatile matter. The tar has about 0.03% dust content and less than 0.5% H_2O. About 240 kg. cal. per kg. of dried coal is required by the process. The exptl. plant has a capacity of 46 metric tons per day. It can easily be changed to a production plant. Further savings with larger plants now planned are discussed as is the working up of the various products. A. C. HIGGINS

Situation of the technic of semi-carbonization. G. BERTHELOT. *Ann. combustibles liquides* **5**, 535–45(1930).—A review of the technic of semi carbonization in Europe. E. SCHOTT

The partial combustion of methane at various pressures with particular consideration of accompanying acetylene formation. FRANZ FISCHER AND HELMUT PICHLER *Brennstoff-Chem.* **11**, 501–7(1930); cf. *C. A.* **22**, 2652; **23**, 2694.—By use of CH_4-air, CH_4-O and coal gas-O mixts. in various proportions with various flow-rates, temps. and pressures, the decompn. of CH_4 has been detd. and is shown in tabulated analyses and graphs. A heated porcelain tube passing the gas-air mixts. is employed for the low pressures and a bomb for the high pressures. The arrangement and construction are given in diagrams. The importance of time and temp. is demonstrated. A primary formation of —CH and —OH radicals is followed by a secondary decompn. into CO and H, making the prompt removal of the C_2H_2 necessary for recovery. These reactions may be accelerated by large catalytic surfaces. Yields of C_2H_2 as high as 50% of the CH_4 used have been obtained over a temp. range of 600–1500°. The rest of the CH_4 in burning to CO and H_2O furnishes the necessary heat of formation for the C_2H_2. The use of diminished pressure does not materially increase C_2H_2 formation but does retard the secondary decompn. Explosion pressures do not produce greater yields. Oxidation and decompn. reactions of CH_4 are briefly discussed. F. W. JUNG

The development of the benzine synthesis from carbon monoxide and hydrogen at atmospheric pressure. FRANZ FISCHER. *Brennstoff-Chem.* **11**, 489–500(1930). cf. Tropsch and Koch, *C. A.* **24**, 4919.—Motor benzine, colorless, S-free and requiring no further refining, has been prepd. on a semi-com. scale from industrial gas mixts., contg. CO and H, in a train of app. consisting of purifiers, heaters, contact units, etc. Gas liquefaction has been increased from 20 to 50% with a Co-Cu-Th catalyst and the possible use of a cheaper Ni catalyst is indicated. From 1 cu. m. of a mixt. CO-H-C_2H_2, prepd. by incomplete combustion of CH_4 and O, as much as 100 cc. benzine and 50 cc. oil have been obtained. The app. is shown schematically and detailed drawings are given of a no. of the various designs of contact units employed in the tests. Questions involved in com. utilization of the process with reference to necessary costs and feasible mixts. of coal, water, fuel, producer and blast-furnace gases for use in the synthesis are discussed. A b.-p.-compn. curve for the benzine is given together with a bibliography for 1926 to date. F. W. JUNG

Methodical heating. A. BOUCHET. *Chaleur et ind.* **10**, 269–76(1929).—B. derives equations for heat flow in tunnel ovens and applies them, theoretically, to brick ovens. He then deals with the Hoffmann furnace under different conditions, such as, perfect recuperation, fume exit temp. at 200° and at 100°, varying initial temps., radiation, heat penetration, etc. The heat exchange downstream in the furnace is considered when the air for combustion is reheated by the finished products. There is a relation between fuel consumption, excess air, exit fume temp. and the air-reheating temp.
S. L. B. ETHERTON

The heating of industrial furnaces with coke-oven gas and the development of distant gas distribution. A. LEMONNIER. *Chaleur et ind.* **10**, 381–4(1929).—A general discussion. L. advocates the increased production of coke-oven gas and distant gas distribution.
S. L. B. ETHERTON

The state of the gas industry in Germany. F. MULHERT. *Chaleur et ind.* **10**, 283–6(1929).—A general account of various developments. The Elvers system, with residual coke to make poor gas for power plant consumption, has given satisfactory results in Frankfort. The Dellwik-Fleischer system for "Omgas" is briefly considered, as is distant gas distribution, gasification with added O_2 and hydrogenation, including the process that makes H_2 thus: $2P + 8H_2O = 2H_3PO_4 + 5H_2$. Lignite exploitation appears to be successful with the rotating furnaces, such as those of the Kohlveredelungsgesellschaft of the A. E. G. The new wood carbonization process of Schwabbe uses a solution of $MgCl_2$ at 5–6 kg. at 180°. Carbonization is rapid, MeOH and AcOH are recovered, and the wood has a calorific value of 600 cal., which therefore lends itself to gasification in the gas producer.
S. L. B. ETHERTON

Motor vehicle operation and producer gas. KARL DEHN. *Brennstoff-Chem.* **12**, 473–7(1931).—Automotive development is described briefly with particular reference to gas generative equipment, the operative principles of which are reviewed. As one example, the app. of Imbert (cf. *C. A.* **22**, 2830; HELLER. *Z. Ver. deut. Ing.* **72**, 106(1928)), in which one charge, with wood shavings for the generation of producer gas, will last 40 km., is described in detail. Gas of 130–155 B. t. u. per cu. ft. is carbureted 1:1 with air for combustion in the motor, with resulting 30% less power than that developed by benzine. The raising of the compression ratio from 4.5 to 7.0, however, compensates for this power loss by an increase in the thermal efficiency of from 0.36 to 0.44. Other producers are described and the possible use of briquetted brown coal as generator fuel is discussed.
F. W. JUNG

Some problems and suggestions relating to coal tar. W. J. CHADDER AND H. M. SPIERS. *Chemistry and Industry* **49**, 863–70; *Gas World* **93**, 347–52(1930).—The compns. and yields of tars are changing with progressive adoption of continuous and low-temp. retorting methods. Two widely differing tars (from a list of 19 analyses) compared as follows: sp. gr. 1.24, 1.03; tar acids 2.5, 16%; medium pitch 67, 35%; $C_{10}H_8$ 7%, nil; free C 28, 1%. Variations in nature and in yield of tar from any one particular coal may be produced by variations in the size of coal. In vertical retorts, yields were roughly 50% higher with large-sized coal than with small-sized coal. In horizontal retorts, such increase at the max., was 32% with feebly caking and 11% with strongly caking coal. Excessive cracking of tars produces too high sp. gr., excessive $C_{10}H_8$ and free C content. In hot spraying in the foul main, excessive recirculation leads to overconcn. of salts and consequently to troublesome emulsions. Sepn. of the hot tar and liquor is more rapid and complete. Electrostatic sepn. of gas and tar obviates cooling of the gas and is therefore especially applicable in the direct NH_3 recovery process. The sale of refined or road tar for local use necessitates uniformity of product, obtainable through blending of tars. Horizontal retort tars readily furnish correct road tars. Vertical retort tar, which is brought to higher consistency by more complete removal of distillate, contains no easily evapg. oils and is therefore slow-drying. A formula is developed for the blending of straight-run, light and heavy residue tar to match a desired consistency. Such blends may be brought to conform to the highest standard specifications, which could not be achieved by a straight-run distn. The effectiveness of various oils in lowering the consistency has been compared and expressed in consts. Such consts. may be calcd. from an appended nomogram, if the consistency of a known mixt. of tar and oil is first detd.
K. H. ENGEL

The trend of modern coking practice. G. E. FOXWELL. *Gas Eng.* **47**, 679–82(1930).
E. H.

Heating **porcelain kilns with coal gas** (DIETRICH) **19. Residues from the saccharification of wood (Fr. pat. 688,507) 23. Separating gases (Fr. pat. 688,528) 13. Water removing centrifuge with a conical sieve drum for dressing fuel, etc. (Ger. pat.**

507,892) **9.** Apparatus for separating coal and slate or other solids of different specific gravities by air currents, vibration and gravity (U. S. pat. 1,786,738-9-40) **1.** Catalysts for dehydrogenation of organic compounds (Brit. pat. 333,975) **10.** Hydrogenating petroleum, tars, etc. (Fr. pat. 687,415) **22.** Tank and internal baffle apparatus for separating oil and gas at wells (U. S. pat. 1,786,790) **22.** Extracting crude materials with solvents (Ger. pat. 509,813) **13.** Decomposition of salts of mineral-oil acids and of fatty and tar acids (Russ. pat. 54,955) **22.**

BOOTSGEZEL, J. J.: **Steenkool.** Deventer (Holland): A. E. Kluwer. Reviewed in *Engineering* **130**, 673(1930).

HOLTZ, JOHN C.: **The Origin and Decomposition of Organic Sulfur Compounds under Gas-Making Conditions with Particular Reference to the Role of the Carbon-Sulfur Complex.** Baltimore: The Johns Hopkins Univ. 83 pp. $1. Reviewed in *Ind. Eng. Chem.* **22**, 1261; *Gas Age-Record* **66**, 320; *Ceram. Abstracts* **9**, 969(1930).

Results in Glover-West Vertical Retorts. Manchester: West's Gas Improvement Co., Ltd. 230 pp. Reviewed in *Chemistry and Industry* **49**, 808(1930).

STADNIKOV, G.: **Neuere Torfchemie.** Leipzig: Theodor Steinkopff. 166 pp. M. 12. Reviewed in *Chem. News* **141**, 287(1930).

Light fuels. JEAN H. BREGEAT. Fr. 687,950, Mar. 29, 1929. Asphaltic or paraffinic residues distg. above 350° and coming from various sources are converted to light fuels such as gasoline, kerosene and gas oil by a pyrogenic distn. at above 345° in the presence of less than 3% of a chloride of a bivalent metal which dissociates or volatilizes at a temp. of 350° or above. An example is given of the use of Fe_2Cl_6.

Motor fuel. DANIEL STRYKER (to The Texas Co.). Can. 306,144, Nov. 25, 1930. A motor fuel comprises a liquid hydrocarbon fuel and less than 1% of oxidized heavier liquid or semi-liquid hydrocarbon of the paraffin series which is completely sol. therein. Small quantities of higher fatty acids as stearic, palmitic and oleic acids having high lubricating values may be compounded with the mineral oils.

Motor fuel. SOC. DES BREVETS CATALFX. Fr. 687,483, Mar. 18, 1929. A heavy motor fuel with a combustion point between 60° and 130°, the dry point of its distn. in an Engler flask between 340° and 385° and a residue below 1%, is made by distg. preferably in a vacuum, naphthas, tars, etc., or by rectification under reduced pressure of distillates such as gas oils, anthracene oils, etc., so as to divide them into a distillate and a residue. The distillate is fractionated to obtain a fraction having the desired characteristics. The vapors of the distillate may be mixed with air and passed over a contact material to produce CO, the latter reacting with the contact mass to produce organo-metallic compds.

Solid fuel. THERMOLIZED COAL CORP. Fr. 686,020, Dec. 18, 1929. A solid carbonaceous material such as coal is heated to a temp. below that at which combustion would take place when the material is burnt, whereby moisture and explosive gases are removed and the material swells. The product is ground and used as powd. fuel. An app. is described.

Froth flotation of pulps such as those of coals or sandy pyrites. JULIUS FISTEL, ROBERT GRIESSBACH and CLAUS HEYCK (to I. G. Farbenind. A.-G.). U. S. 1,787,968, Jan. 6. As a flotation reagent there is used an oxidation product such as may be obtained by oxidizing paraffin or montan wax and neutralizing with NH_3.

Fuel briquets. WILLY EICKEL. Ger. 508,548, Oct. 22, 1927. Smokeless and odorless burning briquets are made from powd. coal and binding materials such as sulfite-cellulose, molasses, etc., sol. in water, the finished briquet being covered with an aq.-insol. layer such as pitch, resin, etc.

Briquetting powdered fuel. OTTO REYNARD and FRANK F. TAPPING. Ger. 508,570, Apr. 3, 1928. Solid bituminous binding material in the form of an aq. emulsion is dispersed in oil is used. Examples mention petroleum asphalt, Mexican burning oil and KOH soln.

Regulating device for a liquid carbureting plant. MASCHINEN- UND APPARATEBAUGES. MARTINI & HÜNEKE M. B. H. Ger. 509,834, Oct. 27, 1929. The device is for the regulation of the supply of atomized tetrahydronaphthalene, etc., to gases.

Temperature-control device suitable for use with carburetors. MAURICE GOUDARD (to "Soc. Anon. Solex"). U. S. 1,787,310, Dec. 30. **Structural features.**

Apparatus for carbonizing fuel. JACQUES WEISS. Fr. 687,184, Dec. 24, 1929.

Distilling carbonaceous materials. IMPERIAL CHEMICAL INDUSTRIES, LTD. Fr. 687,954, Nov. 29, 1928. Solid carbonaceous materials are distd. by passing them in

small pieces through a continuous mass of oil while submitting them to progressively increasing temps. The scale of temp. extends from that temp. at which volatile matters are liberated to the highest temp. compatible with the boiling temp. of the oil used.

Furnace for distilling and drying bituminous fuel. SCHWÄRZEL & FRANK. Ger. 508,666, Oct. 27, 1928. Details of construction and arrangement.

Vertical retort for distilling bituminous fuels. JULIUS PINTSCH A.-G. Ger. 506,572, Jan. 12, 1928. Details of arrangement.

Furnace for low-temperature distillation. C. HONNAY. Belg. 366,755, March 31, 1930. The coal is spread in a thin layer on the hearths of a series of superposed distn. chambers. The coal travels continuously from top to bottom through all the chambers, being conveyed through each chamber by an endless chain carrying scrapers. Heating is effected by means of gas circulating through flues under the hearths. The coal is discharged in the form of semi-coke which can be briquetted without addn. of a binder.

Destructive distillation. TROCKNUNGS-, VERSCHWELUNGS-, UND VERGASUNGS-G. M. B. H. Ger. 508,569, Dec. 10, 1927. Addn. to 490,167 (*C. A.* **24**, 2274). For the treatment of fuel dust, the method of Ger. 490,167 is carried out with layers less than 2 mm. thick and with a temp. only slightly above the dew point of the tar, *e. g.*, 380°.

Apparatus for the destructive distillation of solid particles suspended in a gas stream. TROCKNUNGS-, VERSCHWELUNGS- UND VERGASUNGS-G. M. B. H. Ger. 508,591, Feb. 9, 1927.

Air hearth for the dry preparation of coal, etc. KENELM C. APPLEYARD, COLIN W. H. HOLMES, IVOR L. BRAMWELL and THE BIRTLEY IRON CO., LTD. Ger. 507,770, Dec. 19, 1928.

Distributor for mixture of coal dust and air. ALLGEMEINE ELEKTRIZITÄTS-GES. (Hermann Kremholler, inventor). Ger. 508,819, April 16, 1929. Addn. to 498,123 (*C. A.* **24**, 3678).

Sand separator for coal dust. ZEITZER EISENGIESSEREI UND MASCHINENBAU A.-G. Ger. 507,771, July 5, 1928.

Apparatus for separating materials such as coal and rock by air currents, etc. KENNETH DAVIS (to Peale-Davis Co.). U. S. 1,787,340, Dec. 30. Structural features.

Carbonization of coal. COMPAGNIE HOUILLÈRE DE BESSÈGES. Fr. 688,199, Jan. 11, 1930. Poor or anthracitic coals are agglomerated with an agglutinant such as pitch in amt. not more than 7%, and heated externally from 500° progressively to 900–950°, whereby a very hard artificial anthracite of high d. is obtained.

Distillation of coal, etc. THEODOR LICHTENBERGER, LUDWIG KAISER and FRANZ MEYER. Fr. 688,529, Apr. 10, 1929. Fuel such as coal, lignite, tar, schists, etc., is distd. and gasified in a bath of fused salts, or water gas is produced by introducing steam into fuel in fused salts. The distn. and gasification in fused salts may take place in sep. chambers of the same furnace, the baths of fused salts communicating with one another.

Low-temperature distillation of coal for the production of tar. M. BERBIERS. Belg. 366,519, May 31, 1930. A mixt. of pulverized coal and gas is heated to 500°; the semi-coke is sepd. from the mixt.; the gas liberated by distn. is withdrawn and is mixed with pulverized coal. A. PAPINEAU-COUTURE

Furnace for distilling coal to produce coal gas and water gas simultaneously. EUGENE JEFFERY. Fr. 686,743, Dec. 17, 1929.

Rotary annular plate furnace for coal distillation. TROCKNUNGS-, VERSCHWELUNGS- UND VERGASUNGS-G. M. B. H. Ger. 508,568, Jan. 16, 1927. Details of a safety device to prevent explosion.

Rotary drum coal-distilling retort. KOHLENVEREDLUNG A.-G. Ger. 508,952, Oct. 5, 1927. Details of construction.

Rotary tube furnace for distillation of coal. CONTINENTALE "L & N" KOHLENDESTILLATIONS A. G. Ger. 508,567, Mar. 3, 1928. Details of construction.

Retort for the destructive distillation of coal. EMIL KESSELRING. Swiss 138,544, May 1, 1929. The retort has an endless shaft running round the furnace and round which granulated coal is conveyed.

Vertical oven for distilling coal, etc. KOHLENVEREDLUNG A.-G. Ger. 508,389, April 12, 1927. Addn. to 505,369 (*C. A.* **24**, 5984).

Vertical chamber furnaces for the distillation of coal. FOURS PICARD. Fr. 688,012, Jan. 10, 1930. The lower door forms a water bath for the production of steam.

Heating ring for coal-distillation oven. KOHLENVEREDLUNG A.-G. Ger. 506,142, Jan. 20, 1927. Addn. to 505,369 (*C. A.* **24**, 5984).

Device for delivering powdered material from a coal distillation or drying furnace. TROCKNUNGS-, VERSCHWELUNGS- UND VERGASUNGS- G. M. B. H. Ger. 508,888, Dec. 16, 1927.

Hydrogenating coal, etc. N.-V. DE BATAAFSCHE PETROLEUM MAATSCHAPPIJ. Fr. 687,421, Dec. 30, 1929. Liquid products are prepd. by heating coal, etc., with H under pressure and in the presence or absence of catalysts, in 2 or more steps and in such a manner that in the first step there is formed besides liquids a gaseous mixt. contg., practically in the state of completely oxidized compds., the total amt. of O present in the starting material, while in the step or steps following, the gaseous products are practically free from O. The coal, etc., is first rapidly heated to a max. temp in the presence of H, then the heating is immediately stopped, the gaseous products are removed while the mass is still hot and cooled to obtain liquid hydrocarbons. The residue is again heated in the presence of H. The uncondensed gases obtained in the second or subsequent step may be used for heating the coal. Mo or Mo and I may be used as catalysts. Cf. *C. A.* **24**, 2275.

Hydrogenating coal, tar, etc. IMPERIAL CHEMICAL INDUSTRIES, LTD. Fr. 687,955, Nov. 29, 1928. Coal, tar, mineral oils, etc., are hydrogenated under pressures of 300-500 atm. or more, preferably 800–1000 atms. or more, and at a temp. of 420–500°, and with or without a catalyst Cf. *C. A.* **24**, 2865.

Combustion. HANS VOLCKMANN and KARL LUDWIG. Ger. 509,183, Mar. 2, 1930. Addn. to 506,627 (*C. A.* **25**, 443). Details are given of the supply of hot and cold air to a muffle furnace.

Apparatus for desuperheating steam. SVEND M. JORGENSEN (to Superheater Co.). U. S. 1,788,160, Jan. 6. Structural features.

Steam desuperheater. HENRY J. MASTENBROOK (to Swartwout Co.). U. S. 1,787,790, Jan. 6. Structural features.

Improving bituminous material. LASZLÓ BOLGÁR. Ger. 508,960, Oct. 3, 1926. Mineral coal and lignite tar residues or mixts. are improved by melting with H_2SO_4 of not greater than 5% strength. Asphalt and petroleum residues are treated with 10% H_2SO_4 or HNO_3.

Treating lignite, etc. VERLASSENSCHAFT NACH HANS FLEISSNER. Austrian 119,315, Mar. 15, 1928. Lignite and like fuels are improved as regards calorific value by heating in a closed container to a temp higher than that necessary for simple drying but lower than the carbonization temp., the heating being effected by means of or in the presence of steam. Thus, lignite may be heated at 160° for several hrs.

Steam-heated tubular drier for lignite. MAX GENSECKE. Ger. 508,466, May 29, 1929.

Dewatering peat. I. G. FARBENIND. A.-G. (Walter Strathmeyer, inventor). Ger. 508,392, Sept. 28, 1928. Dewatering is facilitated by first heating the peat under pressure to a temp. above 100° with the addn. of an electrolyte, which is removed before the dewatering. Suitably, the peat is treated with SO_2 and heated as stated above the SO_2 being recovered when the pressure is released. App. is shown.

Wax from brown coal. WILHELM EITLER and OTTO BURKHARDT. Ger. 509,636, July 14, 1927. A montan wax-like product is obtained by extg. chlorinated brown coal with hydrocarbons and filtering and evapg. the ext. Examples describe the prepn of waxes, m. 97° and 121°.

Montan wax, etc. A. RIEBECK'SCHE MONTANWERKE A.-G. Ger. 509,373, April 28, 1927. Deresinified montan wax is heated with EtOH or like solvent and filtered hot. The filtrate yields a clearer wax, which is then bleached with oxidizing agents, *e. g.*, $Na_2Cr_2O_7$ and H_2SO_4, in the usual way. An economy of oxidizing agent is thus effected. Waxes extd. directly from bituminous coal may be treated in the same way.

Purifying montan wax. A. RIEBECK'SCHE MONTANWERKE A.-G. Ger. 509,427, Apr. 9, 1927. Montan wax that has been bleached with oxidizing agents is further purified by fusing or grinding with a reagent that dissolves the impurities but not the wax, *e. g.*, dil. EtOH, C_6H_6 or C_2HCl_3, or an ester, ether or ketone. Cf. *C. A.* 24, 2582.

Purifying montan wax distillates. A. RIEBECK'SCHE MONTANWERKE A. G. Ger. 509,428, Nov. 13, 1928. The crude or partly purified distillates are treated with solvents for the impurities, *e. g.*, benzine, CCl_4, cold EtOH or liquid SO_2. The use of acetone is disclaimed.

Montan wax products. I. G. FARBENIND A.-G. Ger. 508,876, Sept. 15, 1922. Saponifiable products are produced by simultaneously chlorinating and oxidizing crude montan wax. The wax may be previously deprived of resin. Thus, $KClO_3$ is added to crude molten montan wax and a mixt. of air and HCl led in. The excess of HCl

is removed by washing, leaving a 90% yield of a product, m. 78.5° and with a sapon. no. of 118. Other examples are given.

Recovery of phenols. I. G. FARBENIND. A.-G. Fr. 687,275, Dec. 26, 1929. Phenols contd. in wash waters from gas purification are recovered by extn. with liquid trialkyl- or triaryl-phosphates, *e. g.*, tricresyl- or tri-butyl-phosphate.

Extracting phenols from ammonia liquor. GEWERKSCHAFT MATHIAS STINNES. Ger. 509,154, May 5, 1929. The circulating org. solvent used for extg. phenols from NH_3 liquor is freed from H_2S by allowing it to stand, *e. g.*, for 1–3 days, before re-extg. the phenols therefrom.

Carbazole. I. G. FARBENIND. A.-G. Fr. 687,957, Sept. 27, 1929. Carbazole is extd. from tar fractions by treating them at above 300° and under pressure with H or gases liberating H, preferably in the presence of catalysts. The unchanged carbazole is sepd. from the product by filtration or distn.

Gas. KURT BEUTHNER. Fr. 687,395, Dec 30, 1929. To remove the distn. gases from the lower part of vertical degasification chambers and to introduce steam, one-half of the hood on which the fuel rests has an open side toward the middle so that the fuel does not fill the space under the hood.

Gas. FIRMA AUG. KLÖNNE. Fr. 687,244, Dec. 26, 1929. The transverse section of the degasification chamber is enlarged at the bottom so that the distn. material does not fill this part of the chamber thus distn. products can be removed and steam introduced.

Gas. I. G. FARBENIND. A.-G. Fr. 687,883, Jan. 9, 1930. A gas having high calorific power is made from bituminous coals by heating them, in a granular or finely divided state, in chambers capable of being heated periodically to 900° and more, and provided with a perforated filling of refractory clay bricks, etc., which form a heat reservoir.

Gases rich in carbon monoxide. "S. I. R. I" SOCIETÀ ITALIANA RICHERCHE INDUSTRIALI. Swiss 140,043, Jan. 30, 1929. A gas with a high CO content is produced by the gasification of finely divided combustible solids in insufficient O to form CO.

Removing oxygen from natural gas. FRANK PORTER (to Kay County Gas Co.). U. S. 1,787,795, Jan. 6. Natural gas (suitably by heating in refractory material) is caused to react with air at a high temp. (which may be about 800–2000°) to produce substances such as CO and H, which are more reactive toward O than satd. hydrocarbons, the more reactive resultant gases thus formed are commingled with a body of the natural gas to be treated and reaction with the O in the gas is effected (suitably at 600–800° in the presence of Cu). App. is described.

Fuel gas. THE WESTERN GAS CONSTRUCTION CO. Ger. 508,589, Oct. 10, 1925. Plant for producing carbureted fuel gas by passing air and steam successively through a gas producer, carbureter and superheater is described.

Oil gas. PAUL HAHN. U. S. 1,788,055, Jan. 6. Oil vapors are passed to a gasifying chamber having staggered and spaced catalytic metal baffle plates, which may be formed of Fe or Ni, arranged to form narrow spaces or nozzles; steam is admitted to the lower portion of the gasifying chamber to mix with the oil vapors, and the mixt. passes upwardly through the spaces between the baffles to form oil gas. Various details of app. are described.

Suction gas. MOTORENFABRIK DEUTZ A.-G. (Kurt Schmidt, inventor). Ger. 509,069, Mar. 24, 1929. Means is described for preventing access of air to the producer shaft through the charging orifice.

Water gas. ALBERT BRISIG. Ger. 509,291, June 16, 1927. A method and app. are described for automatically regulating the gasifying period in accordance with the temp. of a heat recuperator heated by the hot blow gases.

Water gas from coal. HUMPHREYS & GLASGOW, LTD. Ger. 506,865, Nov. 7, 1925. Details of the producer. Cf. *C. A.* **21**, 488.

Carbureted water gas. HUMPHREYS & GLASGOW, LTD. Fr. 686,901, April 24, 1929. The gas as it leaves the generator is divided into 2 currents, one of which passes directly to the reservoir while the other is passed through a carbureter and becomes enriched in oil. Cf. *C. A.* **24**, 5986.

Carbureted water gas. LEON J. WILLIEN and LOUIS STEIN (to United Gas Improvement Co.). Can. 305,227, October 25, 1930. An app. and process for producing carbureted water gas is specified in which oil is introduced into the steam during the run back of the steam and the resultant mixt. is passed from the upper portion of the generator down through the fuel bed.

Water-gas plant. BAMAG-MEGUIN A.-G. Ger. 508,588, Nov. 24, 1926. Addn. to 486,557 (*C. A.* **24**, 1494). High-pressure plant with an automatic throttle is described.

Apparatus for **proportionate mixing of producer gas and "town's gas supply" for**

industrial purposes, etc. PREMIX GAS PLANTS, LTD., and A. DOCKING. Brit. 333,924, April 23, 1929. Structural features.

Gas purification. GILBERT E. SEIL (to Koppers Co.). U. S. 1,786,509, Dec. 30. For removing H_2S from gas, the gas is washed with an alk. wash liquor contg. Fe sulfide and an oxidized starch (which may be prepd. by treating starch with HNO_3) to maintain the Fe sulfide in "stable soln." Cf. *C. A.* **24**, 1205, 2582.

Purifying gases. PREMIX GAS PLANTS, LTD. Fr. 687,220, Dec. 24, 1929. S is removed from gases from gas producers after leaving the scrubbers by heating the gas to about 21° and bringing it in contact with Fe_2O_3. An app. is described.

Desulfurizing gas. I. G. FARBENIND. A.-G. Fr. 686,986, Dec. 20, 1929. The H_2S in part of the gas is catalytically oxidized to SO_2, the SO_2 is eliminated if necessary, after addn. of NH_3, by washing and using the lye of sulfite, bisulfite or polythionates of NH_4, separately, to absorb by washing the H_2S from another part of the gas with formation of hyposulfite. The amts. of H_2S and SO_2 are regulated so that heating of the resulting lyes gives only sulfate and S. Cf. *C. A.* **24**, 1205.

Safety pipe closure to prevent backfire from burners to gas mains. F. MANGIAMELI. Brit. 334,129, Nov. 11, 1929. Structural details of a gas cut-off device.

Gas producer. J. M. RUSBY (to Humphreys & Glasgow, Ltd.). Brit. 334,133, Jan. 21, 1929. Plates are positioned in the upper part of the fuel bed so as to form fissures through which the gases pass. Various details of construction and operation are described. Cf. *C. A.* **25**, 582.

Gas producer. EUGÈNE A. COTTENCFAU and ALBERT V. F. PARIS. Fr. 686,733, Dec. 16, 1929.

Gas producers, furnaces, etc. SIEMENS-SCHUCKERTWERKE A.-G. Ger. 508,817, May 30, 1926. Details of agitating the fuel.

Rotary fire chamber for gas producers. FRITZ BRAND. Ger. 508,816, June 6, 1926.

Gas-production plant for obtaining carbureted water gas from coal. SIDNEY J. B. TULLY and OLIVER E. YEO. Ger. 508,815, Dec. 6, 1927. See Brit. 271,765, *C. A.* **22**, 1673.

Fuel charger for gas generators. FRED B HAYES (to Gas Machinery Co.). U. S. 1,787,248, Dec. 30. Structural features.

Decomposition of hydrocarbons. SOC. DES BREVETS CATALEX. Fr. 687,162, Mar. 15, 1929. An app. is described for the combined pyrogenic and catalytic decompn. of hydrocarbons either for *feeding explosion motors* or for *combustion;* in this app. an emulsion of air and hydrocarbon is formed by a large no. of jets, each jet being formed by the meeting of a vein of atomized hydrocarbon and air. The jets send the emulsion to the catalytic tubes which are placed in an envelope traversed by the burnt gases in a motor or in other cases by other heating fluids.

Product for improving the combustion of liquids in internal-combustion engines. E. DILIS. Belg. 368,043, March 31, 1930. The product consists of an org. solvent in which are dissolved camphor and smaller proportions of menthol and oil of eucalyptus.

Apparatus for purifying oil of internal-combustion engines by distilling light contaminants. CHARLES R. SHORT and CHARLES L. LEE (to General Motors Research Corp.). U. S. 1,787,409, Dec. 30. Structural features.

Removing carbon deposits from cylinders such as those of internal-combustion engines. THOMAS MIDGLEY, JR., and CARROLL A. HOCHWALT (to General Motors Research Corp.). U. S. 1,786,860, Dec. 30. While the metal is heated to above 65° there is applied to the C deposit a mixt. contg. a high b.-p. org. compd. which removes varnish and a lower b.-p. varnish remover to soften and facilitate removal of the deposit. For this purpose there is described the use of a mixt. comprising aniline 25, alc. 25, benzene 25 and naphthalene 25%; the use of other similar substances is also mentioned.

Removing carbon deposits from internal-combustion engines. WHEELER G. LOVELL and THOMAS A. BOYD (to General Motors Research Corp.). U. S. 1,787,789, Jan. 6. While they are heated, the C-coated parts are treated with an aliphatic amine boiling above 64°, such as hydroxyethylamine, to facilitate removal of the deposit. Alc., C_6H_6, aniline or furfural, etc., also may be used.

Storing acetylene. ANDRÉ SOLIGNAC. Fr. 686,825, Dec. 18, 1929. Pumice stone ground to different sizes of grain so that the mixt. of grains has no capillary interstices is used as a filler for vessels contg. dissolved C_2H_2. Cf. *C. A.* **24**, 3888.

Treating tars. COMPAGNIE DES MINES DE VICOIGNE, NOEUX ET DROCOURT. Fr. 688,542, Apr. 11, 1929. The unstable hydrocarbons in tar oils are polymerized or satd. in the presence of metal halides, *e. g.*, the chlorides of Ti and Fe, whereby the losses in the subsequent refining are greatly reduced.

Treating tar. VEREIN FÜR CHEMISCHE UND METALLURGISCHE PRODUKTION. Fr. 688,307, Jan. 15, 1930. See Ger. 493,675 (*C. A.* **24**, 2867).

Distillation of tar. STUART P. MILLER (to The Barrett Co.). Can. 304,941, Oct. 21, 1930. The heated gases from several coke ovens are collected in a heavily insulated header or collecting pipe in which the gases blend to form a fairly uniform mixt. The resulting mixt. is passed into a still while in a highly superheated state, and coke-oven tar is introduced into the still and sprayed into the gases at such a rate that the gases are quickly cooled and the tar is rapidly distd. The tar supply and the gas vol. are so regulated as to effect distn. of the tar to produce around 70% or more of distillate oils and a pitch residue m. about 380° F. or higher. The pitch is withdrawn continuously from the still, and the gases and vapors are removed and cooled to recover the distillate.

Distillation of tar. STUART P. MILLER (to The Barrett Co). Can. 304,943, Oct. 21, 1930. An app. and a method of distg. tar and producing high-melting and low-melting pitch are specified. The tar is distd. by direct and intimate contact with hot coal-carbonization gases at a temp. to effect distn. of the tar and the production of high-melting pitch and hot enriched gases; the gases are withdrawn and cooled in an indirect condenser in indirect contact with tar to be preheated and distd.; the tar is pumped under pressure through a pipe coil located in the condenser in indirect heat-interchanging relation with the hot enriched gases, the supply of tar being so regulated that it is heated to a temp. to effect partial distn. of the tar; the preheated tar is discharged into a vapor box maintained under a vacuum; the vapors are drawn off and condensed; the low-melting pitch is drawn off from the vapor box.

Distillation of tar. STUART P. MILLER (to The Barrett Co). Can. 304,945, Oct. 21, 1930. Coke-oven tar is preheated continuously in a pipe-coil still by waste-heat gases; it is then introduced into a still into direct contact with a current of hot coke-oven gases with thorough spraying of the tar into the gases, scrubbing of the gases and further distn. of the preheated tar. The resulting gases and vapors are drawn off and cooled to condense the oils. Cf. *C. A.* **24**, 229.

Distillation of tar. STUART P. MILLER (to The Barrett Co.). Can 304,946, Oct. 21, 1930. The tar is preheated in a pipe coil by waste-heat gases, and is discharged into a vapor box under reduced pressure; the vapors are sepd. from undistd. residue within the vapor box and separately collected and cooled to recover low-boiling constituents; the residue from the vapor box is introduced into direct contact with hot coal carbonization gases to effect distn.

Apparatus for the distillation of tar, etc. THE BARRETT CO. Fr. 686,723-4-5-6. Dec. 16, 1929.

Apparatus for distilling tar. THE BARRETT CO. Fr. 687,890, Jan. 9, 1930.

Apparatus for distilling tar. THE BARRETT CO. Fr. 688,298, Jan. 15, 1930. Tar is distd. by bringing it into intimate contact with gases at a high temp. so that a pitch residue of high fusion point and an enriched gas are obtained. The enriched hot gases are passed through a condenser in indirect contact with tar which is thereby preheated and from which a part of the light oil is distd.

Semi-coke. COMPAGNIE DES MINES DE BRUAY. Fr. 686,908, Mar. 14, 1929. Fuel is treated in a vessel, the walls of which are permeable to heat and which is heated by a radiant source of const. temp., whereby an improved semi-coke is obtained called "Carbolux."

Coking. JOHANN LÜTZ. Ger. 509,258, Dec. 23, 1927. In the manuf. of metallurgical coke in a continuously operating vertical oven, the column of coal is spaced apart from the wall of the shaft and is heated by radiation. App. is shown.

Coking coal dust. INTERNATIONAL COMBUSTION ENGINEERING CORPORATION. Ger. 508,648, May 22, 1926. Details of the app.

Coking coal, shale, wood, peat, etc. CHARLES B. WINZER. Ger. 508,778, Nov. 15, 1925. Details of the retort plant.

Coke oven. C. OTTO & CO. G. M. B. H. Ger. 509,699, Mar. 13, 1930. Addn. to 492,506 (*C. A.* **24**, 2586). Details of construction.

Coke oven. KARL SASSENHOFF. Ger. 509,513, May 11, 1929. Addn. to 491,312. An oven is described for coking fuels by the method of Ger. 491,312 (*C. A.* **24**, 2278).

Coke oven. N. V. SILICA EN OVENBOUW MIJ. Fr. 687,320, Dec. 27, 1929.

Vertical coke oven. CARL OTTO. U. S. 1,787,490, Jan. 6.

Under-burner coke oven. HINSELMANN KOKSOFENBAU GES. M. B. H. Ger. 509,499, Sept. 7, 1924.

Regenerative coke oven. C. OTTO & CO. G. M. B. H. Ger. 508,887, June 5, 1927.

Twin regenerative coke oven. C. OTTO & Co. G. M. B. H. Ger. 509,259, Dec. 17, 1929. Addn. to 503,895 (*C. A.* **24**, 5987). Details of construction.

Regenerative coking retort. C. OTTO & Co. G. M. B H. Ger. 507,515, July 21, 1927. Addn. to 503,895 (*C. A.* **24**, 5987). Further details of the hot gas and heating channels.

Coke retort. JOSEPH BECKER. Ger. 508,792, April 6, 1923. Addn. to 454,259. Details of construction.

Continuously acting upright coking retort. JOHANN LÜTZ. Ger. 507,788, July 2, 1926. Details of the continuous supply of coal and removal of distn. products.

Coking-retort oven. JOSEPH VANACKEREN (to Koppers Co.). U. S. 1,787,963, Jan. 6.

Charging and offtake apparatus for coke ovens or similar apparatus. WOODALL-DUCKHAM (1920), LTD., and A. M. DUCKHAM. Brit. 334,050, Aug. 16, 1929. Structural features.

Furnace for the low-temperature coking of fuel. COMPAGNIE DES MINES DE BRUAY. Ger. 508,566, July 13, 1926. Details of construction.

22—PETROLEUM, LUBRICANTS, ASPHALT AND WOOD PRODUCTS

W. F. FARAGHER

Petroleum in 1929. R. B. HARKNESS. *Ann. Rept. Ont. Dept. Mines* **39**, Pt. 7, 37–41(1930).—Detailed figures of crude-oil production, refinery production and importations for 1929 are given. ALDEN H. EMERY

Chemical and technical progress in the petroleum industry during 1929. RICHARD KISSLING. *Teer & Bitumen* **28**, 469–73(1930).—Outstanding developments as shown in the patent literature are reviewed. An extended list of references pertaining to petroleum research and examn. is appended. K. H. ENGEL

Magnetic double refraction in specimens of petroleum of different origins. A. COTTON AND M. SCHERER. *Ann. combustibles liquides* **5**, 551–2(1930).—See *C. A.* **24**, 3634. E. SCHOTTE

Vapor pressure-temperature relationships of petroleum hydrocarbon fractions. S. D. TURNER AND J. E. POLLOCK. *Trans. Am. Inst. Chem. Eng.*, New Orleans Meeting **1930**, 15 pp.(Adv. copy).—In refinery practice it is frequently necessary to extrapolate a vapor pressure from the temp. at which it was detd. to a working temp., or from one working temp. to another. It has been customary to perform such an operation on a vapor-pressure chart of the normal paraffin hydrocarbons. Unsatisfactory results in design work based on the application of this method, together with fragmentary data from various sources, led to the belief that such an extrapolation was at times not even approx. correct. While the investigation has not covered nearly the whole range of petroleum fractions, or of temps. and pressures of interest to the engineer, it is felt that 2 phases of the work will be of interest; in the first case a very useful correlation is reached, and in the second a new lab. method of investigation is developed. The paper treats of the theoretical considerations involved, the correlation of gasoline data, the vapor pressures detd. by their exptl. method, which is outlined, and the method and results are considered in a critical manner. C. L. MANTELL

Redistillation of light petroleum oils in pipe stills. I. KLIGERMAN AND N. BOGOSLOVSKII. *Azerbaĭdzhanskoe Neftyanoe Khozyaĭstvo* **1929**, No. 12, 64–73.—A mathematical discussion with reference to the pipe-still installation on the Pyatakov plant. V. KALICHEVSKY

Determination of coke residue in petroleum products—Conradson test. B. ROSENBAUM. *Chem.-Ztg.* **54**, 857–8(1930).—The results obtained by applying the Conradson test, as specified in the A. S. T. M. specification No. D-189-27, to 17 com. motor oils are tabulated. D. F. BROWN

National survey of fuel-oil distribution, 1929. E. B. SWANSON. *Am. Petroleum Inst.* 1930, 30 pp.—Deliveries of gas oil and fuel oil during 1929 were 408,735,493 bbls., an increase of 2.8% over 1928. Gains were chiefly due to increased railroad fuel-oil consumption, larger deliveries of bunker oil to steamships, and the greater use of oil as fuel in petroleum refining and in the generation of elec. power. The mfg. demand was slightly larger than in 1928. Com. and domestic heating greatly expanded. Increases occurred in the use in manufactured-gas plants, naval vessels and yards and in exports (due to increased refining in the Caribbean area). The uses, in order of im-

portance, are: steamships; railroads; fuel in oil refineries; mfg.; exports; gas and elec. power; smelters, mines, Fe and steel products; heating; U. S. Navy and miscellaneous. The consuming regions, in order of importance, are: Pacific Coast States, South Central States, Middle Atlantic States, North Central States, New England States, South Atlantic States and Rocky Mt. States. The amt. exported falls between that consumed in the Middle Atlantic States and that consumed in the North Central States. Details of consumption by states are given for each use. ALDEN H. EMERY

Methods of refining Montana crude oil. F. R. STALEY. *Petroleum Eng.* **2**, No. 3, 36, 38(1930).—*Cat-creek crude oil* presents no difficulties in refining and yields 70% of straight-run gasoline. C. WIRTH

Determination of sulfur in heavy oils by the A. S. T. M. lamp method. F. PACHECO. *Chemist Analyst* **20**, No. 1, 10-1(1931).—The method is described, the computation explained and some hints are given concerning the manipulation. W. T. H.

Divergence of viscosities and flash points in oil mixtures. ERICH KADMER. *Chem.-Ztg.* **54**, 871(1930).—In compounding mineral oils of different viscosities and flash points it has been found that the viscosity or flash point of the mixt. is always lower than an additive result. Formulas are given for calcg. these properties of oil mixtures as follows: (1) viscosity $= \frac{a.A + b.B - v(A - B)}{100}$; (2) flash point $= \frac{a.A + b.B - f(A - B)}{100}$, where a and b are the percentages of the components, A and B the viscosities or flash points of the pure components, and v and f are consts., the values of which are given in a table. D. F. BROWN

Esterification number and oxidizability of hydrocarbons and oils. ROBERT Z. BRONSTENBINDER. *Chem.-Ztg.* **54**, 782-3(1930).—B criticizes the present sludging test for transformer oils and proposes in its place the detn. of acid and sapon. no. before and after heating 100 g. of the oil in a 300 cc. Erlenmeyer flask with 1 g. of C. P. CuO at 120° for 7, 70 and 360 hrs. P. ESCHER

The separation of oil-sand mixtures by physical methods. WERNER GRÜNDER. *Petroleum österr. Chem. Tech.-Ztg.* **48**, 119-24(1930); cf. *C. A.* **24**, 5988.—Expts. with Wietze oil sands show that 95% of the oil can be extd. with a suitable electrolyte, such as NaOH soln. About 97% of the oil can be obtained by amalgamation with pulverized coke after NaOH soln. has sepd. the oil from the sand particles. A flow chart is shown. The amalgam may be treated by one of the following methods: (1) It may be fractionally distd. and the residuum either briquetted or used as a binder for briquets. (2) The oil may be pressed out, leaving a high-grade fuel. (3) The amalgam may be used as the starting material for coal hydrogenation. By subsequently treating the oily clay suspension remaining with coal dust, about 50% of this oil can also be removed. EMMA E. CRANDAL

Core drilling bituminous sands of northern Alberta. S. C. ELLS. Can. Dept. Mines, *Mines Branch Rept.* **710**, 28-46(1930).—Descriptions and logs of wells (with analyses for water, bitumen and S) drilled in the bituminous sands of northern Alberta are given. ALDEN H. EMERY

Modern tube stills for oil refineries. MARTIN J. GAVIN. *Oil Bull.* **16**, 1273-5 (1930). E. H.

Aspects of hydrogenation in refining. R. T. HASLAM AND R. P. RUSSELL. *Oil and Gas J.* **29**, No. 28, 32, 33, 63(1930). J. R. STRONG

Treating light oils. G. STAUB. *Petroleum Eng.* **2**, No. 3, 161-4, 166(1930).—A review. C. WIRTH

Electric corona discharge employed. HERBERT R. ROWLAND. *Oil and Gas J.* **29**, No. 28, 28, 92, 95, 97(1930).—The corona discharge serves as an accelerator in vapor-phase cracking. The exptl plant in which this method was perfected has a small wire suspended in the reaction chamber as one electrode. When the plant is operated without the corona, recovery is lower and the antiknock values of the gasoline are less. J. R. STRONG

New method of cracking of heavy oils. C. CHILOWSKY. *Ann. combustibles liquides* **5**, 547-9(1930); cf. *C. A.* **24**, 496, 2577, 4617. E. SCHOTTE

Cracking process claims 80 per cent benzene equivalent for product. ARCH L. FOSTER. *Natl. Petroleum News* **22**, No. 53, 50, 52, 54, 56(1930).—The *Pratt cracking process* will produce a finished distillate with a knock rating of 80% benzene equiv. by cracking a gas oil in a tube still and further cracking a heavy residue in intimate contact with the heated vapors of the gas oil. There is no appreciable C formation in the plant. R. W. KELLY

Composition of gasoline and kerosene from Vickers cracking plant. I. BESPOLOV,

A. MAKHNOVA AND A. DUDENKO. *Azerbaĭdzhanskoe Neftyanoe Khozyaĭstvo* **1930**, No. 9, 104–7; cf. *C. A.* **22**, 1730, 3105; **24**, 952.—Temp. and pressure have more influence on the compn. of cracked gasoline than the recycling ratio. Increase in recycling ratio increases the aromatic content of the kerosene distillate but leaves the chem. compn. of the gasoline practically unaltered. V. KALICHEVSKY

The trend in design and equipment of the modern gasoline plant. FRANK P. PETERSON. *Natl. Petroleum News* **22**, No. 51, 67, 70–2(1930).—Compressors are equipped with interchangeable cylinder sizes to meet the large range of requirements. Heat exchangers and cooling equipment tend to the closed tubular type. Pumps are mostly centrifugal because of lessened packing difficulties. Bubble-cap trays are used in absorber, still and fractionating columns. The control of operation has been made largely automatic. According to the present trend, the volatile hydrocarbons intermediate between gasoline and CH_4 will be fully utilized commercially in the future. R. W. KELLY

Twenty-second semiannual motor-gasoline survey. E. C. LANE, E. L. GARTON AND A. J. KRAEMER. Bur. Mines, *Rept. of Investigations* **3063**, 19 pp.(1930).—Vapor pressures, sp. gr. and distn. data for 298 motor fuels purchased in 20 cities in Aug., 1930, are given in 13 pp. of tables. Only 15 samples (5%) had vapor pressures of 9 lb. per sq. in. or higher (Reid test), 251 samples (84%) were 6 9 lb., 33 (11%) were <6 lb. Vapor pressure of competitive-price gasoline was 4.4 9 9, av. 7.2 lb., and of premium-price gasoline was 4.1–10.0, av. 7.0 lb. The temp. at which 10% of the competitive-priced gasoline evapd. was 115–166°F., av. 142°, while for premium fuel it was 118–163°, av. 141°F. Av. b. p. for competitive gasoline was 221–278° F., av. 261° F. and for premium was 215–270°F., av. 248°F. The sp. gr. for the competitive product was 0.717–0.765, av. 0.746, and for premium was 0.722–0.790, av. 0.746. A. H. E

Oxidation of fuels in motors. ERNEST BERL, K. HEISE AND K. WINNACKER. *Chaleur et ind.* **10**, 179–87, 241–6(1929).—It is usually considered that olefins are more easily oxidized than paraffins, but in the cylinder of the motor paraffins are more easily oxidized than olefins or hydroaromatic or aromatic hydrocarbons. Substances resistant to detonation have a higher temp. of spontaneous inflammation. A table collates the spontaneous-inflammation temps. of pentane, hexane, cyclohexane, cyclohexene, benzene, toluene, xylene, aniline and alc. Four sketches show the limits for spontaneous inflammation of ether, pentane, hexane, and cyclohexane. Addnl. tables and data are given for the substances mentioned. Substances which knock easily are easy to oxidize. Resistance to compression of hydrocarbons with 6 C atoms increases in the order, hexane, cyclohexane, benzene. The temp. of spontaneous inflammation varies with pressure, provided the amount of admixed air remains const. The addn. of antiknocks raises the temp. of spontaneous inflammation very much but not constantly. The addn. of relatively little antiknock raises the temp. of spontaneous inflammation, but more antiknock does not raise this temp. In the case of hexane, antiknocks act as negative catalysts, fixing some O_2. The action of antiknocks contg. heavy metal depends on the liberation of the metal in a finely divided state. Hydrocarbons rich in H_2 decompose into H_2 and non-satd. hydrocarbons. Both then absorb O_2 to form H_2O_2, water and org. peroxides. The latter decompose very quickly into the final products The finely divided metal from antiknocks prevents the formation of peroxides. S. L. B. ETHERTON

The antiknock agents. I. II. III. L. A. HORNIG. *Allgem. österr. Chem. Tech. Ztg.* **48**, 125–6, 129–32, 135–7(1930).—A general discussion, without special application of the thermodynamics considered to the detonation of motor fuels. E. E. C.

Asphaltic bitumen, its properties and applications. J. S. JACKSON. *J. Oil and Colour Chem. Assoc.* **13**, 304–15(1930).—The production, testing and uses of asphaltic bitumens are briefly reviewed. On account of hysteresis effects, great care is required in testing. Emulsification is probably accomplished best with a colloid mill. G. G. SWARD

Asphalt from acid sludge. B. VOINOV AND I. GINSBURG. *Azerbaĭdzhanskoe Neftyanoe Khozyaĭstvo* **1929**, No. 12, 51–64.—Description of expts. made on a com. scale by Azneft. V. KALICHEVSKY

New process for the preparation of special lubricants. ERNST W. STEINITZ. *Chem.-Ztg.* **54**, 837–9(1930).—Recent developments in this field include the improvement of motor oils by the addn. of fatty acids, the perfection of the Voltol process, which is applicable to either mineral oil or a mixt. thereof with vegetable or animal oils, the Continentale A.-G. für Chemie process of increasing the viscosity of fatty oils by heating under vacuum to 150–250° without blowing, the Vogel-Ossag process of blowing fatty and mineral-oil mixts. in stages, and the Daimler process of adding "bridge hydrocar-

bons" composed of compds. belonging to the system X–CH_2–Y, where Y represents an aromatic radical and X an aromatic or aliphatic radical. D. F. BROWN

Potentiometric determination of acidity in insulating oils. R. N. EVANS AND J. E. DAVENPORT. *Ind. Eng. Chem., Anal. Ed.* **3**, 82–5(1931).—The detn. of acidity in oils by the alkali blue procedure gives better results than the A. S. T. M. procedure. In the latter method, MeOH should be substituted for EtOH. Electrometric detns. with typical org. acids show that the potentiometric method is reliable although somewhat tedious. The Ag–AgCl electrode can be used satisfactorily in routine work. W. T. H.

The essential properties of a bearing oil. C. A. GRIFFITHS. *Power* **72**, 791–2 (1930).—Charts show the relation of coeff. of friction to viscosity at const. temp. and to bearing pressure at various temps. D. B. DILL

Some engineering features of the naval-stores industry. V R. CROSWELL AND R. ROCKWELL. *Trans. Am. Inst. Chem. Eng.*, New Orleans Meeting 1930, 24 pp.(Adv. copy).—The paper deals exclusively with the steam-distn. solvent-extn. process. The engineering problems in connection with wood harvesting, chip prepn., eduction of products, distn. and fractionation, handling of solvent naphtha, corrosion and erosion, and steam generation from spent chips are considered. Machinery details and flow-sheets of operations are given. C. L. MANTELL

Physicochemical properties of acid clay. V Decolorization of petroleums by adsorption (KOBAYASHI, YAMAMOTO) **2**. Potentiometric determination of saponification number of mixtures of asphalt and drying oils (DEMAREST, RIEMAN) **26**. Catalysts for dehydrogenation of organic compounds (Brit. pat. 333,975) **10**. Apparatus for determining specific gravity of oils, etc. (U. S. pat. 1,787,132) **1**. Apparatus with superposed evaporating trays suitable for distillation of oils and liquid solvents (U. S. pat. 1,787,399) **1**. Distillation of coals, etc. (Fr. pat. 688,529) **21**. Bituminous coatings on reenforcing for concrete (Brit. pat. 333,940) **20**. Bituminous compositions for paving, etc. (Brit. pat. 333,937) **20**. Dehydrogenating organic compounds (Fr. pat. 688,369) **10**. Apparatus for distillation of hydrocarbons (Can. pat. 304,942) **1**. Hydrogenating coal, tar, etc. (Fr. pat. 687,955) **21**. Rubber-like products from mineral oils (Brit. pat. 333,901) **30**.

MARCUSSON, J., BURCHARTZ, H., AND WILKE, P.: **Die natürlichen und künstlichen** Asphalte. 2nd ed., revised. Leipzig: Wilhelm Engelmann. 254 pp. Paper, M. 17; bound, M. 19.

WESTCOTT, JAMES H.: **Oil—Its Conservation and Waste.** 4th ed., enlarged. New York: Beacon Pub. Co. 273 pp. $3. Reviewed in *Chem. Markets* **27**, 581 (1930).

Refining viscous petroleum oils. EDWARD W. ISOM and ERNEST B. PHILLIPS (to Sinclair Refining Co.). U. S. 1,786,493, Dec. 30. A solid absorbent refining agent such as "terrana earth" is suspended in the raw stock, and the mixt. is passed through a heating zone such as a heating coil, as a rapidly flowing stream, and heated to not substantially above 400° and kept below a temp. at which any substantial cracking would take place in the time the mixt. is in the heating zone; the mixt. thence passes to a vaporizing and digesting zone such as an insulated drum when vapors are taken off, and in this zone a body of liquid is maintained at a temp. of about 325°, and the absorbent refining agent is kept in suspension. Refined viscous oil is discharged from the vaporizing and digesting zone as a residue still carrying the absorbent agent in suspension, and the vol. of liquid in this zone is so regulated that the residue product remains in it a period of time not less than 5 times as long as the mixt. is in the heating zone. Various details of app. are described.

Hydrogenating petroleum, tars, etc. STANDARD OIL DEVELOPMENT CO. Fr. 687,415, Dec. 30, 1929. Liquid hydrocarbons of low b. p. are prepd. by submitting petroleum, tars, coal, etc., in a finely divided state to the action of a gas rich in free H under pressure and at a high temp., drawing off a part of the hydrocarbons thus produced in the liquid state, lowering the pressure of the liquid so that an important part of the liquid vaporizes and condensing the vapor. An app. is described.

Hydrogenating oils, etc. I. G. FARBENIND. A.-G. Fr. 687,294, Dec. 27, 1929. In the hydrogenation of oils, gasolines, etc., contg. substances of high mol. wt. such as asphalt, pitch, etc., the latter are removed before hydrogenation by an adsorbent substance such as SiO_2 contg. Mo and Zn. The adsorbent contg. these substances is sepd.

and hydrogenated separately to produce middle oils, gasoline, etc. The adsorbent may be re-used after heating.

Petroleum naphtha purification and stabilization. JOHN M. GOODWIN (to Texas Co.). U. S. 1,786,650, Dec. 30. The material is treated with a gas contg. H_2S so that a small proportion of H_2S is absorbed, and then treated with concd. H_2SO_4.

Treatment of hydrocarbon residues. RALPH T. GOODWIN (to The Standard Oil Development Co.). Can. 305,511, Nov. 4, 1930. Tar resulting from cracking a hydrocarbon oil in the presence of lime is stabilized by treating the tar with about 0.5–1.5% by vol. of H_2SO_4 of 30° to 60° Bé., heating to about 200° to 275°F., whereby relatively rapid pptn. of sediment is obtained, and sepg. the sediment.

Cracking hydrocarbons. FRANÇOIS P. E. S. DUPLAN. Fr. 688,446, Jan. 18, 1930. Heavy hydrocarbons are transformed into more volatile hydrocarbons by heating them under a pressure which exceeds their vapor pressure for 1 hr. to 1½ hr. at a const. temp. not above 360° and at a speed of between 6 and 72 cm. in a tube of 10 mm. diam. A suitable app. is described.

Apparatus for cracking hydrocarbon vapors. WILLIS F. SIMS and VENUS U. CLOER (to Panhandle Refining Co.). Can. 306,373, Dec. 2, 1930.

Cracking hydrocarbon oils. EUGENE C. HERTHEL and HARRY L. PELZER (to Sinclair Refining Co.). U. S. 1,787,981, Jan. 6. Oil from a body of oil in a vaporizing zone is circulated through heating tubes and back to the body of oil and is heated to a cracking temp. in the tubes; a bed of finely divided solid absorbent material, such as fuller's earth, is maintained within the body of oil so that the circulating oil passes through it, and vapors from the vaporizing zone are taken off under superatm. pressure and refluxed, and the reflux condensate is passed through sep. heating tubes into the vaporizing zone. Heating gases from a fire-box in which fuel is burned are first passed over the last-mentioned heating tubes to heat the reflux condensate and then passed over the first-mentioned heating tubes. Various details of app. are described. Cf. *C. A.* **24**, 495, 25, 199.

Cracking hydrocarbon oils. RALPH C. HOLMES and FREDERICK T. MANLEY (to Texas Co.). U. S. 1,786,947, Dec. 30. The oil is charged into a plurality of series-connected vertical converters, through which it passes in succession, and the converters are heated between their ends to a cracking temp. the most heat being supplied to the first converter of the series. The liquid level in the converters is maintained above the heated intermediate portions, heavier constituents are sepd. from evolved vapors by condensation and the condensate is returned to the first and most strongly heated converter. Various details of app. and procedure are described.

Cracking hydrocarbon oils. CHARLES P. TOLMAN. Ger. 508,587, Sept. 20, 1927. See Fr. 647,721 (*C. A.* 23, 2565).

Refining cracked products of hydrocarbon oils. CARBON P. DUBBS (to Universal Oil Products Co.). U. S. 1,787,570, Jan. 6. Ca hydroxyhydrosulfide is used for removing compds. such as CS_2 and may be formed from $Ca(OH)_2$, water and H_2S in the oil.

Pressure still for cracking hydrocarbon oils. DAVID A. YOUNG (to Sinclair Refining Co.). U. S. 1,788,006, Jan. 6. Structural features of a discharge line for unvaporized oil, extending a substantial distance into the still drum and provided with special valve-operating devices.

Tube still for oil distillation and cracking. HENRY THOMAS (to Sun Oil Co.). U. S. 1,788,213, Jan. 6. Various structural details are described.

Vacuum distillation of hydrocarbon oils. HARRY C. WIESS (to Standard Oil Development Co.). U. S. 1,786,639, Dec. 30. Oil such as a heavy lubricating distillate is heated to a distn. temp., and a light hydrocarbon material such as naphtha is injected into the heated oil (the injected material being liquid under ordinary conditions and having a vapor pressure less than that of water at the corresponding temp. of condensation), and the abs. pressure upon the oil undergoing distn. is reduced to 50 mm. Hg or lower. App. is described.

Hydrogenation of carbonaceous materials. JAMES M. JENNINGS (to The Standard Oil Development Co.). Can. 305,514, Nov. 4, 1930. Heavy, asphalt-contg. hydrocarbon oil is heated in the presence of a solid catalyst (as Cr and Mo oxides), resistant to S poisoning, to 800° to 970°F. under pressure of H in excess of 25 atm., which is sufficient to hold heavy constituents in the liquid phase. A stream of such heavy constituents is continuously removed, heated in admixture with H, and returned to the body of oil. The ratio of asphaltic materials to catalyst is kept below about 0.5.

Distilling crude mineral oil or tar, etc., with steam. WITWE A. MELHARDT, MARGARETHE V. LEONTOWITSCH GEB. MELHARDT, HELENE MELHARDT and GERTRUD MELHARDT. Ger. 509,584, Aug. 12, 1925. The oil, etc., is fed into a distn. chamber

filled with dividing material (*e. g.*, broken glass) and steam fed from below. The app. is described.

Bleaching mineral oils. WILHELM POSTH and FRANZ BESEMANN (to I. G. Farbenind. A.-G.). U. S. 1,788,204, Jan. 6. "Pre-refined" mineral oils are treated with an alk. hypochlorite soln. in the presence of a heavy-metal salt such as Ni, Co or Cu sulfate, capable of accelerating the decompn. of hypochlorites into chlorides and O, the mixt. is heated to about 60° and the oils are sepd. from the spent bleaching soln. and washed.

Apparatus for raising mineral oils. SIMPLEX REFINING CO. Ger. 508,695 April 25, 1927.

Decomposition of salts of mineral-oil acids and of fatty and tar acids. G. S. ISAKOV, A. I. DANILOVICH and A. YU. RABINOVICH. Russ. 54,955, Sept. 19, 1929. These salts are decomposed by volatile acids obtained in the oxidation of mineral oils by air.

Developing oil fields with a plurality of wells. HENRY L. DOHERTY. U. S. 1,787,972, Jan. 6. A plurality of wells are projected into an oil sand, and flow of oil and gas is initiated simultaneously from all the wells after preventing flow from any individual well until all the wells are ready for producing. U. S. 1,787,973 relates to a method of operating a group of oil wells which flow oil because of natural rock pressure, by alternately opening and shutting in certain of the wells to alternate the direction of flow of gas and oil between the wells. The wells are shut in when the ratio of the gas to the oil exceeds a predetd. ratio and opened again after the vol. of the gas in the shut-in wells has dropped to a point permitting production at substantially the ideal gas-oil ratio.

Tank and internal baffle apparatus for separating oil and gas at wells. CLARENCE L. SCHLICHTER. U. S. 1,786,790, Dec. 30. Structural features.

Residues from oil refineries. AKT.-GES. FÜR CHEMIEWERTE. Ger. 505,930, Dec. 15, 1927. The residues from oil refineries, especially acid-treated residues contg. kieselguhr, are rendered useful as asphaltic products by treatment with sulfonated tall oil.

Distilling bituminous products, etc. JEAN H. BRÉGEAT. Fr. 687,172, Mar 16, 1930. Asphaltic paraffinic and bituminous substances, resinous exts. from petroleum and low temp. tars, vitriolic muds and natural asphalt waxes are distd. in a retort provided with stirring means at a temp. above 380° and below 460°, while the level in the retort is kept const. and while the products distg. above 300° are constantly returned to the retort so that the amt. of distillate collected in an hr. is between 5 and 14% of the wt. of material in the retort.

Blown bituminous products suitable for roofing and insulating, etc. N.-V. DE BATAAFSCHE PETROLEUM MAATSCHAPPIJ. Brit. 334,032, Oct. 23, 1928. Materials such as asphalt, petroleum residues, tar and pitch are treated in a continuous process with gases such as air or O, ozone, NO_2, SO_2, Cl or mixts. of air or O with the other gases. Various details of app. are described.

Dispersion of bituminous materials. N.-V. DE BATAAFSCHE PETROLEUM MAATSCHAPPIJ. Brit. 334,100, Oct. 9, 1929. Dispersions such as those of asphalt, tar and pitch, prepd. with other materials such as clay, bentonite, colloidal metal oxides or silicates are subjected to mech. treatment such as "intensive beating" to reduce their viscosity, and after this addnl. material can be dispersed without reversal of phase. Numerous details of treatment, adjustment of p_H, etc., are described, as is also the app.

Bituminous dispersions. RICHARD W. LEWIS. U. S. 1,787,418, Dec. 30. Dispersions of asphalt or the like, suitable for use as binders or waterproofing coatings, etc., are prepd. by disintegrating the bituminous material with water and an $Al(OH)_3$ paste and a bentonite (suitably about 10% of each). Instead of asbestine, there may also be used other materials such as finely ground silica, oxides of Fe, chrome yellow, chrome green or Prussian blue.

Low-boiling oils. EDWARD B. PECK (to The Standard Oil Development Co.). Can. 311,773, Nov. 4, 1930. Low-boiling oils suitable for motor fuels are produced by cracking a heavier oil, segregating from the cracked products an oil boiling below about 700°F. and passing it with H through a reaction zone at about 900°F. and under a pressure in excess of 20 atm.

Pressure-control apparatus suitable for oil tanks. JULIAN A. CAMPBELL. U. S. 1,787,865, Jan. 6. Structural features.

Apparatus for supplying fire-extinguishing foam to oil tanks. STUART MOSER (to Standard Oil Co. of Calif.). U. S. 1,787,792, Jan. 6.

Refining benzene, etc. MARCEL MALLET. Fr. 687,842, Jan. 8, 1930. In the refining of benzenes, **gasolines, etc., without altering the antiknock properties of their** unsatd. constituents, **a partial hydrogenation in the vapor phase is carried out in the**

presence of a mixed catalyst composed of an intimate and uniform mixt. of a reduced metal of the Ni group and activated C. The latter plays the part of an accelerator and protector toward the metal on account of its power of absorbing compds. which cause the poisoning of metallic catalysts. The catalyst is regenerated with sepn. of the constituents by treating it with an acid, pptg. the metallic hydrate, concg. and granulating the product.

Refining and deodorizing cracking gasolines. P. M. E. SCHMITZ. Belg. 369,809, May 31, 1930. The gasoline vapor is passed through a tower filled with previously dehydrated and ignited metallic oxides, particularly Fe oxide, which are kept at a temp of over 300° at the bottom of the tower and equal to or slightly lower than the final b. p. of the gasoline at the top of the tower.

Preventing compression knocking of motor fuels. THOMAS MIDGLEY, JR. (to General Motors Corp.). U. S. 1,787,419, Dec. 30. This pat. (granted on an application divided from the application on which U. S. pat. No. 1,573,846 (*C. A.* **20**, 1514) was granted) claims generally the method of burning a "low compression motor fuel" with air in the presence of vapors of a metal compd. such as Et_4Pb or various other phenyl or alkyl compds. of metals such as Pb, Se, Te, Sn, As and Sb.

Antiknock motor fuel. IMPERIAL CHEMICAL INDUSTRIES, LTD. Ger. 505,928, June 7, 1929. An antiknock motor fuel consisting essentially of benzine hydrocarbons is produced by adding metal- or metalloid-free substances which produce free org radicals at high temps. by dissocn Examples are tetraarylhydrazine, diarylnitrosamine and triphenylmethyl derivs. Other antiknock agents may be added, *e. g.*, $Pb(Et)_4$, $Fe(CO)_x$, $PhNH_2$ and metal compds. of β-diketones.

Apparatus for separation of naphtha from natural gas. RUSSEL R. SMITH. Can 305,024, Oct. 21, 1930.

Removal of naphthalene from solvent naphtha. FRANK F MARQUARD. Can 306,628, Dec. 9, 1930. Crude heavy solvent naphtha contg. resins and naphthalene impurity is mixed with wash oil in equal proportions. The mixt. is distd. and the solvent distd. off from the wash oil, which retains the naphthalene. The resins pass over with the distillate, which is substantially free from naphthalene. These resins may be polymerized and removed, leaving a solvent suitable for *paints*.

Lubricating oils. JOHN C. BLACK and WIRT D. RIAL (to Richfield Oil Co. of Calif.). U. S. 1,787,505, Jan. 6. In order to improve the color and demulsifying qualities of lubricating oils such as those from Calif. petroleum, they are heated at a temp of about 140° with a KOH soln. (suitably of about 10° Bé. strength) under pressure, prior to acid treatment.

Lubricating oils. WILHELM PUNGS and ERICH FRESE (to Standard-I G. Co.). U. S. 1,787,951, Jan. 6. An oil such as a mineral or castor oil is improved as to viscosity and lubricating properties by addn. of montan wax bleached by oxidation with chromic acid.

Apparatus for condensing vapors of lubricating oils. SIMPLEX REFINING CO. Ger. 509,426, Aug. 8, 1925. See Brit. 251,928 (*C. A.* **21**, 1546).

Identifying liquids such as lubricating oils. FRANK C. REILLY. U. S. 1,787,995, Jan. 6. Markers (which may be of configuration to serve as trade marks to indicate the name or grade of the oil) are placed in the oil. These may be formed of material of about the same sp. gr. as the oil so that they will remain in suspension and may be of a character such that when the oil is heated they dissolve in it and contribute to its lubricating qualities. Similar indicating devices of "sugary material" may be placed in *table syrups*.

Regenerating used lubricating oils. HERMANN BENSMANN. U. S. 1,787,353, Dec. 30. Used oil such as that from an internal-combustion engine is first heated to about 30°, then gradually further heated to about 60–70° together with polymerizing agents such as $SnCl_4$, $AlCl_3$, H_2SO_4 or H_3PO_4 while stirring, to form asphalt-like substances from the decompn. products of the oil, the sludge is drawn off, and the oil is passed through a settling vessel and treated by means of a filter having a long filtering path with an AlMg *hydrosilicate to remove org. acids and tarry constituents*. An arrangement of app. is described.

Refining used oil. WM. D. HARRIS and ROBERT V. AYCOCK. Fr. 686,900, April 5, 1929. See Can. 298,538 (*C. A.* **24**, 2877).

Cleaning the insulating oil of oil switches. SIEMENS-SCHUCKERTWERKE A.-G. (Adolf Stauch, inventors). Ger. 507,965, July 17, 1924. The oil is continuously cleaned by a layer of colloidal H_2SiO_3 in the bottom of the vessel.

High-melting waxes. FREDERICK W. SULLIVAN, JR. (to Standard Oil Co.). Can.

305,223, Oct. 28, 1930. High-melting paraffin wax is produced from low-melting wax contg. a small proportion of oil of high b. p. by distg. with steam at 520–550°F.

Plug lock for oil-refining apparatus. CLARENCE B. HARBISON (to Ohio Steel Foundry Co.). U. S. 1,787,040, Dec. 30.

Furnace for carbonizing wood, etc. CHAUDRONNERIE ET ATELIERS DE CONSTRUCTION D'ERMONT. Fr. 688,258, April 3, 1929.

Distillation of wood, etc. PHILIP POORE. Fr. 687,454, Dec. 31, 1929. See Brit. 327,415 (*C. A.* **24**, 5150).

23—CELLULOSE AND PAPER

CARLETON E. CURRAN

Corrosion problems in the viscose-silk industry. H. R. S. CLOTWORTHY. *Ind. Chemist* **6**, 445–7(1930). E. H.

Newly discovered microscopic structural units of wood fibers. GEO. J. RITTER AND R. M. SEBORG. *Ind. Eng. Chem.* **22**, 1329(1930).—Fusiform bodies, which were previously the smallest known structural units of the wood fibers, have been broken down into smaller units approx. 0.45 micron in diam. and spherical in shape when detached. They are uniformly luminous in all positions between crossed Nicol prisms. The original form is probably angular rather than spherical. L. K. ARNOLD

Production of insulating board from cornstalks. C. E. HARTFORD. *Ind. Eng. Chem.* **22**, 1280–4(1930).—Cornstalks are bought for $10 a ton f. o. b. the factory at Dubuque, Iowa. They are shredded in a swing hammer mill, digested in water under a max. steam pressure of 100 lb. for 2 hrs., washed in 2 trommel washers with 40-mesh screens, and passed through an ensilage cutter. The resulting pulp is sized with 2% rosin and 1% alum, refined in a Claflin and a Jordan refiner, formed into a board on a specially designed machine, pressed in a caterpillar press, cut by an automatic cutter into 16-, 18-, or 20-ft. lengths, and dried in an 8-deck continuous drier. The finished Masonite wood has a heat cond. of 0.320 to 0.345 B. t. u. per in. per sq. ft. per hr. per °F., tensile strength of 205 lb. per sq. in., plaster bond strength of 10.64 lb. per sq. in. and a transverse breaking test of 110 lb. on a 4-in.-wide sample on a 3-in. span. A discussion of the cornstalk supply shows that the factory is poorly located from the material standpoint. L. K. ARNOLD

Hindering fermentation in sizing baths (RINOLDI) **25**. Coating materials [in manufacture of celluloid] (Fr. pat. 687,597) **18**. Colloidal solutions (Fr. pat. 686,880) **18**.

Cellulose. GUSTAF HAGLUND. Ger. 507,969, April 24, 1928. See Swed. 66,729 (*C. A.* **24**, 1507).

Cellulose. VEREIN FÜR CHEMISCHE INDUSTRIE A.-G. (Roland Runkel, inventor). Ger. 507,870, May 21, 1926. Cellulose is obtained from pentosan rich, lignified or incrusted vegetable matter such as beechwood, bamboo rods, etc., by softening the ground-up raw material with an acid or alk. agent (*e. g.*, KOH), sepg. the fibers and treating with Cl and alkali and removing the liquid. The cellulose so produced is useful for *making paper*. Examples are given.

Cellulose. JOAQUIN JULIO DE LA ROZA, SR. Fr. 688,311, Jan. 15, 1930. See Brit. 322,763 (*C. A.* **24**, 2880).

Cellulose fibers. GUSTAV SCHLICK. Ger. 509,541, April 19, 1928. Cellulose fibers are prepd. from artificial silk, films, or guncotton by forcing the cellulose paste, with or without addn. of diluent, bleaching agent, etc., through nozzles so that the fibers remain for some time in a hanging condition in which they dry and form a loose fiber mass at the bottom of the chamber. The fibers may encounter hot air, gas or vapor.

Cellulose and textile fibers from vegetable material such as straw, stalks or wood. CARL A. BRAUN. U. S. 1,786,890, Dec. 30. The material is treated at boiling temp. and corresponding pressure with a sulfite soln. initially contg. caustic alkali and alk. salts of weak acids such as resinates, fatty acid salts, silicates, borates, aluminates or zincates with a small proportion of Na_2CO_3.

Oscillatory device for treating raw fibers. IGO ETRICH. Ger. 508,551, Nov. 9, 1926.

Bleaching cellulose. LADISLAV RYŠ. U. S. 1,787,395, Dec. 30. Pulp or other form of cellulose to be bleached is digested with dil. aq. solns. of alk. compds. such as

NaOH and then subjected to a preliminary bleaching with an aq. soln. of Cl in quantity less than would be required for complete bleaching; the pre-bleached material is then washed and subjected to a further bleaching with hypochlorites (suitably in the presence of catalyst such as salts of Cu, Ni or Co).

Apparatus for determining the hygroscopicity of cellulose. AXEL C. ANDERSEN. Ger. 509,982, May 19, 1927.

Cellulosic substances. PAUL DUTOIT. Swiss 138,305, Oct. 6, 1928. Cellulosic substances are treated with water and H_3PO_4 at 110–120° under pressure to produce fermentable carbohydrates and a combustible product from which *decolorizing or absorbent C* may be produced.

Cellulose solutions. KURT HESS and CARL TROGUS. Ger. 508,014, Mar. 17, 1928. Addn. to 505,221 (*C. A.* **24**, 6013). Free alkali is removed from soda-copper cellulose, prepd. as in Ger. 505,221, by wetting the pressed compd. with water and pressing again, and (or) by adding acids or suitable salts when dissolving the compd.

Solution of cellulose in phosphoric acid. GEO. W. MILES and CAMILLE DREYFUS (to Celanese Corp. of America). U. S. 1,787,542, Jan. 6. A cellulosic material such as linters is mixed with H_3PO_4 of 75% or greater strength and the mixt. is allowed to stand for several hrs. until the cellulose is dissolved, at a temp. below 21°. The resulting soln may be used in *artificial silk manuf* or for other similar purposes.

Cellulose derivatives. CHARLES GRAENACHER. Fr. 687,298, Dec. 27, 1929. New derivs. of cellulose are prepd. by treating cellulose, viscose, etc., with aromatic compds. contg. a NO_2 group capable of being reduced to an NH_2 group and a substituent capable of double decompn., in the presence of an acid-binding agent having no caustic action, and reducing the products. The products may be colored by diazotizing and coupling them with appropriate components. Thus, cotton is treated with 10% NaOH and then in a bath of molten 1-chloro-2,4 dinitrobenzene in the presence of Li_2CO_3. The product is washed and reduced. With diazo-*p*-nitrobenzene the fiber is colored brown. Other examples are given.

Cellulose derivatives. SOC. POUR L'IND. CHIM. À BÂLE. Fr. 687,301, Dec. 27, 1929. New cellulose derivs. are prepd. by treating active cellulose, such as cellulose treated with caustic alkalies, with heterocyclic compds. contg. one or more NC-halogen groups, and, if desired, causing the products to react with compds. contg. atoms capable of reacting with the products. Thus, active cellulose is treated at 25–40° in a soln. of cyanuric chloride in xylene in the presence of chalk powder. The product may be dyed with basic dyes but not with acid or direct dyes. Examples are also given of the use of cyanuric bromide, the hydrazide of dichloromaleic acid, dichloroquinazoline and piperazine and of the dyeing of these products. Cf. *C. A.* **25**, 591.

Cellulose acetate. SOC. KODAK PATHÉ (SOC. ANON. FRANÇAISE). Fr. 687,084, Dec. 21, 1929. Cellulosic material is treated with a soln. of a lower aliphatic acid satd. with N_2O_4, until the soly. of the product in potash reaches at least 15%, and acetylating in a bath contg. Ac_2O and H_2SO_4 or H_3PO_4. Cf. *C. A.* **24**, 6014.

Cellulose butyrates. SOC. DES BREVETS ÉTRANGERS LEBLANC ET CIE. Fr. 686,906, Mar. 14, 1929. Cellulose butyrates, particularly triisobutyrates and tributyrates, are prepd. by submitting the cellulose material to the regulated action of a Cl deriv. of AcOH, in the presence of a suitable solvent such as butyric acid or acetone at a low temp., and esterifying at 15–25° in the presence of a dehydrating agent such as 66° Bé. H_2SO_4 and an appropriate solvent.

Benzylcellulose, etc. IMPERIAL CHEMICAL INDUSTRIES, LTD., and D. TRAILL. Brit. 333,902, Feb. 20, 1929. In order to improve their solubilities in cheap solvents such as benzene, toluene or xylene mixed with "industrial spirits," benzylcellulose or other aralkyl ethers of cellulose, not readily sol. in such solvents, are treated with benzyl chloride or other aralkyl halide and water and steam at increased pressure (suitably 50 lb. per sq. in. for an hr.). Products thus treated give solns. of reduced viscosity suitable for use in *lacquers* or for various other purposes. Details of procedure are given. Cf. *C. A.* **24**, 5157.

Solvent for derivatives of cellulose. WILLIAM H. MOSS (to Camille Dreyfus). Can. 306,829, Dec. 16, 1930. A solvent for derivs. of cellulose comprises methylene chloride and an aliphatic alc. having more than two C atoms. Cf. *C. A.* **24**, 1740.

Nitrocellulose. WESTFÄLISCH-ANHALTISCHE SPRENGSTOFF-A.-G. CHEM. FAB. Ger. 509,348, May 28, 1929. Plates or boards of compressed cellulose are hung in a nitrating vessel, which is closed and evacuated before admission of the acid.

Acetylating nitrocellulose. HENRY A. GARDNER and CALVIN A. KNAUSS (to Henry A. Gardner Laboratory, Inc.). U. S. 1,786,989, Dec. 30. Ethylene dichloride

is added to a soln. of acetylated nitrocellulose in a solvent comprising HOAc, and the resulting pptd. acetylated nitrocellulose is sepd.

Cellulose esters. I. G. FARBENIND. A.-G. Fr. 687,627, Jan. 3, 1930. Mixed cellulose esters of org. acids are made by treating cellulose in a diluent with a free acid or its anhydride and the halide of another acid, in the presence of tert. bases, the amt. of which is less than the total amt. corresponding to the acid and acid derivs. present. Examples are given.

Cellulose esters. SOC. DES BREVETS ÉTRANGERS LEFRANC ET CIE. Fr. 687,169, Mar. 16, 1929. Mixed esters of cellulose are made by treating cellulosic materials with a Cl deriv. of AcOH at a low temp. in the presence of a solvent such as AcOH or butyric acid, and then esterifying with a mixt. of butyric anhydride and Ac_2O in the presence of H_2SO_4.

Cellulose esters. SOC. KODAK PATHÉ (SOC. ANON. FRANÇAISE). Fr. 687,996, Jan. 10, 1930. Mixed esters of cellulose which are insol. in acetone and in C_6H_6 are prepd. by treating cellulose material with an acyl halide selected from the group which consists of the halides of the aralkyl monocarboxylic acids, the aromatic monocarboxylic acids, and the aliphatic monocarboxylic acids including the cycloparaffinic, and subsequently treating the product with an acylating agent which contains a smaller no. of C atoms than the acyl halide. The second treatment may be carried out in the presence of tetrachloroethane or $CHCl_3$, and the first in the presence of pyridine or C_6H_6. Examples are given of the prepn. of acetostearates. The products may be used for making *plastic compns.* in *varnishes*, etc., in *artificial leather*, as a coating for fabrics and in *artificial silk*.

Cellulose esters. SOC. KODAK-PATHÉ (SOC. ANON. FRANÇAISE). Fr. 688,601, Jan. 21, 1930. Cellulose esters are made by treating cellulosic material with a soln. of HNO_3 (sp. g. 68%), washing and dehydrating, and heating the cellulose thus hydrolyzed with a fatty acid contg. more than one and less than 8 C atoms in the presence of a catalyst at a temp. of 100–170° until $2^1/_2$–3 mol. proportions of the said fatty acid are combined with a quantity of cellulose corresponding to 24 atoms of C.

Cellulose ether solutions. ARTHUR EICHENGRÜN. Ger. 508,153, Aug. 11, 1922. Solns. of aliphatic or aromatic ethers of cellulose are prepd. with a solvent comprising CH_2Cl_2 alone or mixed with EtOH, $C_2H_4Cl_2$, or other cellulose-ether solvents or non-solvents.

Residues from the saccharification of wood. HOLZHYDROLYSE A.-G. Fr. 688,507, Jan. 20, 1930. Deacidified residues from the saccharification of wood or other vegetable materials by acid are agglomerated by compression and used directly as *fuel* or as a *construction material*, or are carbonized after mixing with fine coals, or are mixed with other construction materials.

Apparatus for suppressing malodorous gases produced in the manufacture of cellulose by the sulfate or soda process. BROR NATANAEL SEGERFELT. Fr. 687,335, Dec. 2, 1929. The gases are cooled to their dew point or satd. with water and treated with substances which oxidize, absorb or combine with the gases. The gases may be given a preliminary treatment by passing them through alk. solns. and combustible gases may be removed by burning.

Desulfurizing articles of regenerated cellulose. WILHELM ELLER and TOTILA MADELUNG (to I. G. Farbenind. A.-G.). U. S. 1,786,941, Dec. 30. Products of regenerated cellulose obtained by coagulation from a viscose soln. are treated with a soln. of the strongly colored by-products contained in crude cellulose xanthate (which soln. may be prepd. by extn. with MeOH).

Fabric comprising regenerated cellulose. MILTON J. SHOEMAKER (to C. F. Burgess Laboratories, Inc.). U. S. 1,786,781, Dec. 30. See Brit. 317,330 (*C. A.* **24**, 2296).

Viscose for artificial-silk manufacture. FRANZ STEIMMIG and ERSTE BÖHMISCHE KUNSTSEIDEFABRIK A.-G. Fr. 687,353, Dec. 28, 1929. See Brit. 332,628 (*C. A.* **25**, 414).

Regenerating viscose spinning baths. HENRY MOLINARI. Ger. 509,430, Aug. 26, 1928. In regenerating spinning baths comprising H_2SO_4 and Na_2SO_4, the spent bath liquor is removed into an unpacked tower down which it falls freely in counter current to hot combustion gases. The sulfate sepg. from the concd. liquor is removed. App. is described.

Desulfurizing viscose products. HERMINGHAUS & CO. G. M. B. H. Ger. 508,013, Mar. 25, 1929. An org. solvent for S, or a soln. of an inorg. or org. desulfurizing agent in an org. solvent or solvents, is used. The soln. may contain a small quantity of water. Suitable reagents are PhOH 1 dissolved in EtOH 4 parts, pyridine, or a soln. of glycerol MeOH or EtOH 5 parts.

Filaments, films, etc., from viscose. CHEM. FAB. POTT & Co., and FRIEDRICH POSPIECH. Ger. 509,375, June 18, 1925. Alkylnaphthalenesulfonic acids or their salts are added to the viscose soln. and (or) to the pptg. bath in an amt. up to 3%.

Artificial silk from viscose. TOSHIYA IWASAKI. Ger. 509,295, Sept. 3, 1926. See Brit. 288,655 (*C. A.* **23**, 705).

Artificial silk from viscose. J. G. FARBENIND. A.-G. Brit. 334,030, Oct. 2, 1928. Viscose made from unripened alkali cellulose and contg. an excess of alkali (such as a viscose contg. 5% of cellulose and 6.5% of alkali) is spun (suitably at a temp. of 50°) into a bath contg. H_2SO_4 of not over 47% strength, which may also contain salts such as Na_2SO_4 or org. substances. It is preferable to prep. the viscose in an inert atm. such as N, and addns. such as reducing agents, mordanting agents, mucilage, oxalates, lactates, silicates, sulfonic acids or substances for producing mat or aerated effects may be made.

Artificial silk from viscose solutions. C. F. M. VERSTIJNEN. Brit. 333,977, June 6, 1929. Products of reduced luster are obtained from viscose solns. by adding chemically inert substances emulsifiable with the soln., as by homogenizing with 0.5–0.8% of a mixt. of benzene or toluene and CCl_4 having about the same sp. gr. as the soln.

Magnesium sulfate from waste water of artificial-silk factories, etc. EMILIO RODOLFO. Ger. 509,602, Dec. 8, 1928. See Brit. 331,648 (*C. A.* **25**, 175).

Rayon. GEORGE A. RICHTER (to Brown Co.). Can. 305,135, Oct. 28, 1930. Rayon filaments are spun in an acid setting bath of comparatively high H_2SO_4 content and at above room temp. and the acid is removed from the filaments as they progressively issue from the bath.

Rayon. GEORGE A RICHTER (to Brown Co.). Can. 306,064, Nov. 25, 1930. Rayon filaments are spun into a setting bath contg. H_2SO_4, the acid-soaked filaments are lead through an alc. bath (glycerol) to dil. the acid, and the filaments are then wound.

Rayon filaments. ARTHUR E. GUENTHER and HARRY S. TOOLE (to DuPont Rayon Co.) U. S. 1,787,575, Jan. 6. Mech. features.

Artificial silk. FRANZ J. GAHLERT. Ger. 509,634, Dec. 11, 1926 and 509,635, May 31, 1927. Addns. to 472,113 (*C. A.* **23**, 3111). In after-treating artificial silk threads as described in Ger. 472,113, caustic soda soln. is used as the softening agent (509,634). A size, *e. g.*, starch or gelatin, may be added to the softening bath (509,635).

Artificial silk. MAURICE LEON and HARBEN'S (VISCOSE SILK MANUFACTURERS), LTD. Ger. 509,429, Dec. 30, 1928. See Brit. 325,617 (*C. A.* **24**, 4157).

Artificial silk. SOC. POUR LA FABRICATION DE LA SOIE "RHODIASETA." Ger. 508,070, Dec. 20, 1927. Spinning solns. yielding dull, weighted filaments are prepd. by pptg. a cellulose ester or ether from a soln. in which $BaSO_4$ or other white salt insol. in water has been formed by chem. reaction, then washing and drying the pptd. product, and prepg. the spinning soln. therefrom in the usual manner. The formation of the salt and the pptn. of the ester or ether may proceed at the same time, *e. g.*, by adding a soln. of $BaCl_2$ in dil. AcOH to an acetylation mixt. to which H_2SO_4 has been added, if necessary.

Artificial silk. STECKBORN KUNSTSEIDE A.-G. Swiss 134,056, Feb. 23, 1929. Matt effects are produced by mixing a finely divided non-reactive ether, of about the same sp. gr. as the viscose, with the silk. Benzyl ethers are mentioned in the example.

Artificial silk, etc. PIERRE L. E. V. BOURGEOIS Fr. 688,420, Jan. 18, 1930. Dextrin is added to viscose to be used for the manuf. of artificial silk, to obtain a larger wt. of fixed cellulose.

Artificial silk. I. G. FARBENIND. A.-G. Fr. 686,922, Dec. 18, 1929. Artificial silk, stable to boiling and resistant to the action of soap and alkalies, is made from cellulose esters contg. besides AcOH about 0.2 mols. or more of a higher fatty acid, such as butyric or propionic acid, to 1 mol. of cellulose ester.

Artificial silk. I. G. FARBENIND. A.-G. Fr. 687,093, Dec. 21, 1929. The elementary strands prepd. by spinning from transformation products of the polymerization products of butadiene hydrocarbons (cf. Fr. 674,679, *C. A.* **24**, 2846) or rubber or mixts. thereof with or without other substances are used for the manuf. of artificial silk.

Artificial silk. KABELFABRIK A.-G. and SOIERIES DE STRASBOURG (SOC. ANON.). Fr. 688,211, Jan. 14, 1930. Pneumatic means is described for removing the cake of silk from the spinning pot.

Artificial silk. OSCAR KOHORN & Co. and ALFRED PERL. Fr. 686,783, Dec. 17, 1929. In artificial silk manuf. from ammoniacal-CuO soln., the action of the hardening liquid on the thread is limited to the time necessary for the thread to pass through the

bath, by washing off or otherwise removing the liquid from the thread immediately after it leaves the bath.

Artificial silk. OTTO SCHWARZKOPF and ALEXANDER ALBRECHT. Fr. 687,098, Dec. 21, 1929. The cake of silk obtained in pot-spinning is pressed tightly between plates, the lower one of which has inlet and outlet openings for liquids, the sides of the cake thus forming a container for the treating liquids.

Artificial silk. SAMUEL WILD. Fr. 687,805, Jan. 7, 1930. Means for cooling the spinning nozzles is described.

Films. ZELLSTOFFFABRIK WALDHOF and ARNOLD BERNSTEIN. Fr. 687,324, Dec. 27, 1929. Films or sheets are made from viscous solns. (cellulose, cellulose compds., gelatin, etc.) by passing the soln. down between 2 cylinders rotating in opposite directions, and sufficiently apart to allow a film of the desired thickness to pass. The film is solidified by coagulation on one of the cylinders which dips into a pptn. bath.

Films from plastic materials. SOC. DES USINES CHIM. RHÔNE-POULENC. Fr. 688,200, Jan. 14, 1930. Films or sheets are drawn from plastic material having a basis of cellulose esters or ethers, at a temp. near that at which the plastic material used softens and tends to become liquid. The film is carried away by rollers turning at different speeds.

Artificial filaments, films, ribbons, etc., from cellulose esters and ethers. H. DREYFUS. Brit. 333,926, May 17, 1929. The solvent medium described in Brit. 312,-203 (*C. A.* **24**, 963) is modified so that the relative proportions of the non-solvent liquid or liquids and of the volatile substances or substances are such that together they do not form a solvent for the cellulose deriv., and one or more solvents of high b. p. are used in sufficient quantity to give solvent properties. Various examples are given.

Artificial threads, films, etc. HENRY DREYFUS. Fr. 687,471, Dec. 31, 1929. Threads films, etc., are made from solns. of cellulose esters by spinning or molding followed by a superficial or partial sapon. by NaOH, etc.

Producing artificial-silk filaments. GIOVANNI LUCHSINGER. Swiss 138,678, Mar. 13, 1929. Details of the app.

Artificial fibers by the wet-spinning and stretching method. NOVASETA A.-G. ARBON. Swiss 140,048, July 11, 1929. Details are given.

Artificial-silk thread by the spinning-head method. I. G. FARBENIND. A.-G. (Paul Esselmann and Walther Schieber, inventors). Ger. 509,836, June 4, 1929. Details of tensioning and spinning the filaments are given.

Apparatus for making artificial silk. FR. KÜTTNER A.-G. Ger. 508,592, Nov. 19, 1929. Addn. to 482,068 (*C. A.* **24**, 501).

Spinning apparatus for artificial silk. STECKBORN KUNSTSEIDE A.-G. Swiss 137,993, April 5, 1929.

Spinning device for artificial silk. HARBENS, LTD., and LESLIE C. GOODWIN. Ger. 509,966, Sept. 1, 1929. A device is described for deaerating the spinning-head chamber.

Spinning device for artificial silk. MORRIS SCHOENFELD. Swiss 135,715, Jan. 14, 1929.

Spinning machine for artificial silk. CARL HAMEL A.-G. Ger. 506,976, April 14, 1929.

Spinning machine for artificial silk. I. G. FARBENIND. A.-G. (Rudolf Grützner, inventor). Ger. 508,267, April 2, 1927. See Brit. 288,153 (*C. A.* **23**, 514).

Funnel spinning device for artificial silk. FRITZ TSCHIRCH. Ger. 509,636, June 7, 1928. Details of arrangement.

Centrifugal spinning machine for artificial silk. SOCIÉTÉ DE LA VISCOSE SUISSE. Swiss 138,557, May 7, 1929.

Electrically driven spinning device for artificial silk. MASCHINENFABRIK OERLIKON. Swiss 137,712, Mar. 15, 1929.

Spinning tubes for artificial silk. W. C. HERAEUS G. M. B. H. Fr. 688,002, Jan. 10, 1930. Spinning tubes for artificial silk are made from alloys of noble metals such as Au or Pt with Si, Al or an alk. earth metal including Mg. Up to 10% of Ni, Fe, Cr, Ta or Tu may also be added.

Spinning pot for artificial silk. SIEMENS-SCHUCKERTWERKE A.-G. (Wilhelm Stiel, inventor). Ger. 508,194, Oct. 21, 1928. A spinning pot is provided with a flexible insertion, *e. g.*, of paper, of such dimensions that it can be packed around the spun cake.

Removable insertion for artificial silk spinning pot. I. G. FARBENIND. A.-G. (Richard Hofstadt, Totila Madlung and Hubert Rein, inventors). Ger. 508,268, Dec. 12, 1928.

Dry-spinning apparatus for artificial silk. ACETA G. M. B. H. Ger. 508,113, June 25, 1927. A construction of spinning cell is described.

Dry-spinning artificial silk. ERNST BERL. Ger. 506,975, Mar. 25, 1928. Filaments pass down a cylinder contg. drying gases.

Dry-spinning artificial fibers. LONZA ELEKTRIZITÄTSWERKE UND CHEMISCHE FABRIKEN A.-G. and NOBILE CARLO THOMMASI. Swiss 139,145, May 12, 1928.

Apparatus for dry spinning of artificial silk from cellulose acetate. O. VON KOHORN (trading as O. Kohorn & Co.) and H. SCHUPP. Brit. 334,109, Nov. 15, 1928. Pins or pencils carrying soap or oil are used for cleaning spinning nozzles. Various details of app. are described.

Spindle for artificial fibers, especially artificial silk. PAUL LIEBSCHER and KARL KOSKE. Ger. 507,938, Feb. 7, 1929.

Funnel for making artificial silk by the stretch-spinning method. FR. KÜTTNER A.-G. Ger. 509,294, May 27, 1928.

Device for the simultaneous heating of a battery of spinning shafts for artificial fibers. ACETA G. M. B. H. Ger. 508,591, June 10, 1928.

Apparatus for regulating the supplementary treatment of artificial silk in a hardening or precipitation bath. OSCAR KOHORN & Co. and ALFRED PERL. Fr. 687,632, Jan. 3, 1930.

Apparatus for washing and after-treating cakes of artificial silk. HANS EGGERT. Ger. 508,012, Dec. 23, 1926.

Pulp manufacture. LINN BRADLEY and EDWARD P. MCKEEFE (to Bradley-McKeefe Corp.). Can. 306,941, Dec. 23, 1930. Raw cellulosic material is digested in an alk. liquor contg Na_2SO_3, the spent liquor is concd., the combustible content burned and the inorg. content heated to produce Na_2S and Na_2CO_3. These are dissolved in water and the soln. is treated with CO_2 to produce pure H_2S and convert all the Na_2S to Na_2CO_3. The H_2S is recovered as Na salt and the Na_2CO_3 soln. is treated with SO_2 to produce substantially pure CO_2 and Na_2SO_3 soln. The CO_2 obtained is used for the carbonation of another batch. Cf. *C. A.* **24**, 4158.

Machine for cleaning old paper, rags, etc. AUGUST AELDERT. Ger. 508,356, Aug. 19, 1927.

Digesting raw cellulosic material such as wood. GEO. A. RICHTER (to Brown Co.). U. S. 1,787,953, Jan. 6. Material such as wood is cooked in a H_2SO_3 liquor, residual H_2SO_3 groups in the liquor are oxidized (suitably by NaOCl or Na_2O_2) and the liquor is rendered alk. (suitably by the addn. of NaOH) and the cellulosic material is further cooked in the alk. liquor. U. S. 1,787,954 relates to a process in which the cellulosic material is cooked in H_2SO_3 liquor, the liquor is neutralized while the S content is maintained in combined state, and alk. substances including Na sulfide are added to render the liquor alk., followed by further cooking of the cellulosic material in the alk. liquor. Cf. *C. A.* **25**, 593.

Separating long fibers from materials such as wood-pulp suspensions. ROBERT A. WEBBER (to Brown Co.). U. S. 1,786,973, Dec. 30. Mech. features.

Pump for conveying thick wood pulps or similar materials. A. FROISLAND and K. MORCH. Brit. 334,135, May 1, 1929. Structural features.

Chemical pulp for paper making. FRANK A. JOHNSON (one-fourth each to John H. O'Connell, John D. Haskell and Dilts Machine Works, Inc.). U. S. 1,786,538, Dec. 30. Chem. pulp is subjected to a grinding (as distinguished from beating) operation and the character of the grinding stones is varied in accord with the character of paper to be produced and freeness tests are applied at the point of grinding and the pressure of the pulp against the grinders is varied and water is introduced in accord with the requirements of the particular pulp under treatment and the product desired.

Bleaching pulp. ERIC WAHLFOROSS (to Industrial Processes, Ltd.). Can. 305,908, Nov. 18, 1930. Pulp is impregnated with an aq. soln. of H_3PO_2 to react upon the Fe in the pulp to form $FePO_2$, which is stable to the action of light and atm. conditions.

Bleaching paper pulp. ROBERT B. WOLF and RAYMOND S. HATCH (to The International Bleaching Corp.). Can 307,171, Dec. 30, 1930. Pulp is initially treated at low concn. and ordinary temp. with 20–40% of the $Ca(ClO)_2$ required to complete the bleaching. The released impurities are washed from the pulp and it is then further bleached at high concn. and at a temp not exceeding 80°F.

Dewatering paper pulp, etc., by pressing. RICHARD KASTNER and HERBERT SCHMOLKA. Ger. 509,455, June 21, 1927. This corresponds to Austrian 115,901 (*C. A.* **24**, 2295) but gives addnl. details.

Paper. JOHN TRAQUAIR (to Mead Pulp & Paper Co.). U. S. 1,786,681, Dec. 30. A formed sheet of wet paper has incorporated with it a paper surface layer of desired

character before it is passed to the driers, by flowing on to it a liquid stock suspension contg. fibrous material. An arrangement of app. is described.

Paper. ROBERT B. WOLF. Ger. 507,585, Dec. 31, 1925. An app. is described for treating wood pulp, etc., mixed with a bleaching agent and with air at reduced pressure for paper-manuf.

Paper. BRITISH AMERICAN TOBACCO CO., LTD. Fr. 688,350, Jan. 16, 1930. The tendency of cigaret paper to change color and become stained with tobacco is prevented by incorporating in the paper during or after its manuf. a fatty material such as stearin.

Roll suitable for paper-making apparatus. FREDERICK R. WOODWARD (to Stowe & Woodward Co.). U. S. 1,787,890, Jan. 6. Pieces of rock forming a portion of the active surface of the roll are held in position by a binder of other material such as rubber.

Hydraulic calendering rollers for paper manufacture. JOSEPH ECK & SÖHNE. Ger. 507,766, Feb. 5, 1929.

Paper machine. WM. H. MILLSPAUGH. Ger. 507,588, Sept. 25, 1929. Details are given.

Long sieve paper machine. F. H. BANNING & SEYBOLD MASCHINENBAU-G. M. B. H. & Co. Ger. 507,728, Sept. 22, 1926. Addn. to 428,843.

"Setting system" for paper machines for reclaiming fiber or white water. CHARLES DUPUIS. U. S. 1,787,341, Dec. 30. Structural features.

Raising the moisture capacity and soaking velocity of animal and vegetable raw materials for paper manufacture. CHEMISCHE FABRIK POTT & Co. and FERDINAND SCHOELLER. Ger. 507,729, May 2, 1925. The materials are treated with sulfonic acids of alkylated aromatic compds., especially of the naphthalene and tetrahydronaphthalene series, alone, mixed or with hydrocarbons, alcs. or ketones.

Resin soaps and emulsions for dressing and finishing paper, etc. CHEMISCHE FABRIK POTT & Co. and FERD. SCHOELLER. Ger. 507,506, May 26, 1925. Natural resin or resinous substances are rendered sol. in water for their removal from, *e. g.*, sawdust or old paper, or for their spreading as glaze, etc., on paper, etc., by treatment with sulfonic acids of polynuclear aromatic hydrocarbons. Isobutyl-β-naphthalenesulfonic acid is mentioned in examples.

Method and apparatus for locally applying colors to wet sheet material (paper). GEBR. PALM, PAPIERFABRIK. Ger. 509,382, Oct. 10, 1924.

Method of making cardboard, etc., from fibrous materials impregnated with asphalt. ALEX. WENDLER. Ger. 509,042, June 13, 1926. Mech. and manipulative features are

24—EXPLOSIVES AND EXPLOSIVES

CHARLES E. MUNROE

Numerical data on the combustion and detonation of gaseous mixtures, powders and explosives. P. LAFFITTE AND H. MURAOUR. *Annual Tables* **7**, 1672–716(1925–26). McGraw-Hill Book Co., N. Y. (1930).—This separate from the Annual Tables of Constants and Numerical Data, Chemical, Physical, Biological and Technological will be of value to all concerned with explosives and explosions. CHARLES E. MUNROE

Instability of colloidal powders. HENRI MURAOUR. *Bull. soc. chim.* **47**, 1230–6(1930).—There are 2 general causes for the decompn. of colloidal powders, thermolysis and hydrolysis; the latter leads to autocatalysis through the formation of HNO_3 from the decompn. products; this HNO_3 induces further decompn. These factors usually are together and produce a composite effect. M. has dealt with each factor independently and traces its effects in the graphs presented. C. E. M.

The sensitiveness of colloidal powders. M. TARLÉ. *Z. ges. Schiess-Sprengstoffw.* **25**, 398–9(1930).—T. investigated the influence of drying on the sensitiveness to impact and the ignition temp. of smokeless powders. Two varieties of powders were tested: strip powder 0.7 mm. thick, with 12.7% N, and flake powder 0.32 mm. thick, with 13.2% N. Samples were dried on watch glasses in an oven at temps. of 30° to 100° for periods up to 72 hrs., cooled in desiccators, weighed and tested. For the impact test, 0.05-g samples, not ground, but of the original thickness, were used, the temp. of test being 18°. Sensitiveness increased with increase in both time and temp. of drying, in about the same ratio as loss of weight, the greatest change occurring in the first 20 hrs. It therefore follows that sensitiveness to impact varies with content of moisture and volatile solvent. Ignition temp. was practically not affected by drying as above described.

C. G. STORM

Determination of potassium perchlorate in explosives containing ammonium nitrate. C. BUNGE. *Chem.-Ztg.* **54**, 915(1930).—Prep. an aq. soln. of 10–15 g. of the explosive, mix it with 20–25 g. of pure quartz powder (which can be platinized), evap. to dryness and ignite. Ext. the residue with water and proceed with the detn. of K by the $HClO_4$ method in the usual manner, taking into consideration any K present as KCl or KNO_3. Sometimes, when too much nitroglycerin is not present, the original powder can be mixed with quartz and ignited directly. W. T. H.

Mercury fulminate. F. H. VAN LEENT. *Chem. Weekblad* **27**, 670–1(1930).—$Hg(ONC)_2$ is considered to be an isocarbonitrile of Hg peroxide. This explains the formation of NaOH in the reaction with $Na_2S_2O_3$, the latter being oxidized by the loosely combined O. An amt. of NaOH can be obtained corresponding to 2O atoms. The remaining part of the fulminate, the isocarbonitrile, functions as a weak acid combining partly with the NaOH formed. The isocarbonitrile can also easily combine with atoms or atom groups and can be titrated with I. E. SCHOTTE

Penthrinit, the new "universal explosive" of Stettbacher. NAOUM. *Z. ges Schiess-Sprengstoffw.* **25**, 442–6(1930).—The conclusions of S. (*C. A.* **24**, 6017) are based on inadequate small-scale tests. Blasting gelatins do not deteriorate to the extent pictured by S. Pb-block compression tests and Trauzl tests with 100-g. samples in cartridges 40 mm. in diam. showed that whereas a 30/70 nitroglycerin-nitropentaerythritol (Penthrinit) mixt. suffered no change in strength after 3.5 month's storage at 30°, com. blasting gelatins contg. 93% nitroglycerin or nitroglycol (or mixt. of same) and 7% nitrocellulose, suffered such slight loss during similar storage that they still gave test results showing strength equivalent to the Penthrinit mixt., and underwent no appreciable loss of sensitiveness Such high-powered explosives have almost negligible practical application. Loss of sensitiveness in gelatin dynamites is of minor importance, since it is customary to use them without extended storage. Pb-block compression tests with 100-g. charges showed that mixts. of 75% tetryl and 25% nitroglycerin, or 70% TNT and 30% nitroglycerin gave practically the same results as 70/30 Penthrinit Sensitiveness tests with the 2-kg. falling wt. gave the following heights of fall: for 65% dynamite 10 cm., Penthrinits with 20–40% nitroglycerin 15–20 cm., picric acid and tetryl 40 cm. Charges of Penthrinit in metal foil invariably detonate on penetration by a rifle bullet (25 m. range), while tetryl or picric acid is frequently not even ignited by similar tests. These tests for sensitiveness do not lead to the conclusion that Penthrinits are suitable for military use. C G. STORM

Composition and properties of certain explosives suitable for the lime, cement and plaster industries. J. DEFORGE. *Rev. materiaux construction trav. publics* 1929, 350–5, 389–94, 440–6.—A general discussion. F. O. ANDEREGG

The influence of radiation in the burning of colloidal powders in a closed vessel. H. MURAOUR *Compt. rend.* **191**, 713–5(1930).—M. has previously shown that at high density of air the curve of pressure-time ($\int pdt$) is practically const., and that in low densities the load of the air decreases considerably. In the hypothesis formulated, that is, of mol. shocks necessary to decomp. the powder, this decrease can only be explained by a variation of temp. of the gaseous layer which heats the powder, or by an addnl. load of energy. By a simple hypothesis this load of energy is considered due to heat radiation of the gas. Studies indicate, and figures are given to show, that the hypothesis of radiation is insufficient to explain the reduction of air observed in the range of low pressure of colloidal powders. ALICE W. EPPERSON

The ignition of detonating gas by electric sparks. A. KOVALSKII. *Z. physik. Chem.*, Abt. B, **11**, 56–8(1930).—The conditions for ignition of the mixt. $2H_2 + O_2$ by elec. sparks were studied. A spark of given strength would cause ignition only when the pressure exceeded a critical value, which could be lowered by strengthening the spark, down to an asymptotic minimum. At 20° this min. critical pressure was 17 mm Hg; at higher temps. it was lower. Quite generally, the critical pressure for ignition by a given spark would decrease with increasing temp. The different pressure-temp. curves meet at 450° and 5 mm., which were min. temp. and optimum pressure for autoignition in the vessel used. L. ONSAGER

The displacement by ultra-violet light of the explosion limit in a chain reaction (HINSHELWOOD, CLUSIUS) **3.** Removing Pb fouling from rifle barrels, etc. (Brit. pat. 333,963) **18.**

PASCAL, PAUL: **Explosifs, poudres, gaz de combat. 2nd ed., enlarged.** Paris: Hermann et Cie. 320 pp. F. 60.

Explosives. WALTER FRIEDRICH and KARL FLICK. Ger. 509,118, Oct. 11, 1929. Nitrates of cyclic keto alcs., *e. g.*, tetramethylolcyclohexanone, tetramethylolcyclopentanone or octamethylolcyclohexanedione, or nitrates of the cyclic alcs. obtained by reducing the keto alcs., are used as explosives, alone or mixed with one another or with other explosives. The products are stable when stored at 50°, have a high detonation velocity, and can be poured at a temp. below 100°. The keto alcs. are prepd. by condensing cyclic ketones with CH_2O in the presence of alkalies or alk. earths.

Combustible compositions. ASOCIACIÓN DE PRODUCTORES DE YODO DE CHILE Ger. 509,898, Aug. 19, 1928.

Explosive shell (carrying a drill-hole reamer and external holding threads) for use in mining. STERLING S. LANIER, JR. U. S. 1,787,910, Jan. 6. Structural features.

Pseudo solutions of an explosive or readily inflammable substance. KLEMENS BERGE (Josef Reitstötter, inventor). Ger. 509,792, May 7, 1925. The explosive or inflammable substance to be dispersed is milled with the liquid in a ball mill till the particles are of colloidal size.

Detonators. WILHELM ESCHBACH and GERHARD VON LÖBBECKE Ger. 508,244, Mar. 20, 1929. Reaction of the Cu or brass parts with PbN_6 is avoided by coating them with Cd

Fuses. JOHANNES FRITZSCHE. Ger. 509,350, July 30, 1926. A drying treatment is interposed between the spinning process and the customary impregnation or coating with tar, pitch or gutta-percha.

25—DYES AND TEXTILE CHEMISTRY

L. A. OLNEY

Artificial silk dyeing. W. WELTZIEN. *Kolloid-Z.* 52, 110–6(1930).—A review. A. FLEISCHER

The dyeing of viscose silk. EMILE DUHEM. *Bull. soc. ind. Rouen* 58, 291–304 (1930).—The principal varieties of artificial silk are mentioned, with reactions for distinguishing them from each other and from natural silk, including combustion and treatment with H_2SO_4, $NHPh_2$, alk. Cu soln. and alk. Ni soln. Comparisons are given of the tensile strengths of natural and artificial silks in the wet and dry states. Tests are given to det. what dyes are suitable for use with viscose. The best dyes for this purpose are those which show the slowest capillary rise in viscose threads, those which give the most ready transfer of color from a dyed skein of viscose to a raw skein in boiling soap soln., and those which, when applied to viscose at various temps., reach their strongest shade at the lower temps. A long list of dyes is given, classified in 2 groups according to their suitability for viscose. Detailed directions are given for dyeing viscose and mixed fibers contg. viscose. I. H. ODELL

Careful choice of equipment essential in dyeing of acetate fabrics. W. GORDON YOUNG. *Textile World* 78, 3031(1930). R. K. WORNER

The liability of dyed wool to mildew with special reference to the resistance resulting from chroming. R. BURGESS. *J. Textile Inst.* 21, T441–52(1930).—Wool dyed by various methods in the lab. was exposed to conditions favorable for the growth of microorganisms. The results of these tests are tabulated and show that the use of chrome in the dye bath imparts to wool a considerable resistance to the development of the mold fungi chiefly responsible for mildew. Results of tests on the effect of various amts. of chrome indicated that ½% chrome, either as CrO_3 or Cr_2O_3, imparts a definite resistance to mold growth, while 1% checks it. The results indicate that the resistance imparted by chrome is due to the impoverishment of the wool as a source of the nutriment required by these organisms. Thorough washing off after dyeing or scouring is beneficial and reduces the liability to mildew. R. K. WORNER

Dyed furs and dermatitis. PERCY BEAN. *Pharm. J.* 125, 640–2(1930); cf. Hazen, *C. A.* 22, 4646.—Fur dyes, methods of dyeing and identification tests for dyes are described. Susceptibility to poisoning varies with different persons. Certain mordants, *e. g.*, Cr compds., are also dangerous. The same class of dyes is used as *hair dyes*. S. WALDBOTT

Belt drier in the dyestuff industry. K. ZEIDENBERG. *J. Chem. Ind.* (Moscow) 6, 1660–5(1929).—For drying *β-naphthol* and *β-naphthylamine* Z. designed a drier of the endless belt type, subjected to the action of a countercurrent of hot air. Preliminary expts. with a small model showed that: (1) The hot air should not be above 90–92°. (2) The air traveling above the belt should be stirred by propellers. (3) At the beginning of the drying the air should be as hot as possible. (4) The velocity of the air

should not be greater than 2.5–3 m./sec. (5) β-Naphthol dried down to 0.7% H_2O absorbed moisture from the atm. to a total of 2% H_2O. (6) The operation is very smooth when there is both a pressure fan at the head and an exhaust fan at the end of the air channel. In a plant constructed on the basis of the information thus obtained, β-naphthol with initial moisture of 40–45%, was dried in 2 hrs. to a moisture content of 0.20–0.64%. β-Naphthylamine dried under similar conditions contained 0.08% H_2O. The drier produces 1870 kg. of dry product in 24 hrs., the initial material having an av. of 35% H_2O, and the final product 0.1 to 0.5%. 75.4 kg. of the dry substance required 77,200 cal./hr., *i. e.*, about 144 kg. steam; the coeff. of useful action was 0.55 for the exptl. model, 0.37 for the actual drying plant. D. K

The use of unoxidizable steel in the dye house. RENATO RIMINI. *Boll. lanier.* **44,** 847–8(1930).—While unoxidizable steel withstands some dyeing solns. well, it has little resistance against H_2SO_4 in concns. above 5%. Steel vats do not absorb dye baths as do wooden vats; hence they give purer shades and are more easily cleaned. Unoxidizable steel is also used to cover dye-house trucks and for the raising chains on the covers of dyeing machines. R. SANSONI

The "handle" of cloth as a measurable quantity. F. T. PIERCE. *J. Textile Inst.* **21,** T377–416(1930).—The "feel" or "handle" of a material is generally measured by such sensations as stiffness or limpness, hardness or softness and roughness or smoothness. Phys. tests are needed which will analyze and reflect the sensations felt and assign numerical values to the measurements. Tests for evaluating stiffness and hardness are described. An instrument, called a "flexometer," is described on which the angle through which a specimen of cloth droops when a definite length is held out over an edge can be measured. By means of a math. formula, this angle is converted into a term called the *bending length* of the material, which is a measure of its draping quality. The stiffer the material, the longer is the bending length. From the "bending length" and the weight of the material, is obtained a quantity called the *flexural rigidity*, which measures the resistance to bending or the stiffness that would be appreciated by the fingers. The measurement of thickness is discussed in detail, since the sensation of this property depends on how much the material is squeezed, and therefore combines both thickness and hardness. In order to compare the stiffness of fabrics of different thicknesses, the "flexural rigidity" may be converted into a quantity called the *bending modulus*, which takes account of thickness. This quantity is in a sense a measure of the intrinsic stiffness of the material. Modifications of the standard procedure for testing bending length of very stiff or very limp materials are described. RUBY K. WORNER

The bleaching of textile fibers. F. HERNANDEZ. *Quim. e ind.* **7,** 201–9(1930). The effects of the quality of water, action of alkalies, of oxidants and of acids on the bleaching of cotton of various kinds, wool, linen, silk and cellulose, are discussed, as are also the action of lime, NaOH and hypochlorites with some practical data. Formulas are given for the liquors used, together with some practical precautions. S. L. B. ETHERTON

The bleaching of plain and color-stripe cotton goods. A. J. HALL. *Chem. Age* (London), *Dyestuffs Monthly Suppl.* **23,** No. 593, 33–4(1930). E. H

Some causes of spots in bleached cotton goods. J. MERRITT MATTHEWS *Cotton* **95,** 123–6(1930).—A case is cited where the occurrence of brown spots on underwear was eliminated by filtering the H_2O. This H_2O supply contained colonies of algin-aceous material non-uniformly distributed. Heating in the kier apparently rendered the substance lifeless and caused the formation of variously sized masses of a slightly agglutinant material which was forced into the cloth by the pressure of the kier liquor. The deposit was not removed by washing or subsequent processing and apparently gave to the cloth the property of absorbing a relatively large amt. of lime, as evidenced by the ash. The brown stains did not appear until the cloth had been stored. They were not accompanied by a weakening of the fiber. It is suggested that the glutinous material undergoes oxidation and drying, resulting in the brown stain. R. K. W

A modified method for determining the tendering of cotton. RUTH EVERETT *J. Home Econ.* **23,** 62–6(1931).—The deterioration of cotton by heat is detd. by its power to reduce Fehling soln. A method developed by Hägglund for detg. Cu_2O has been modified to give accurate results. The cotton is ground in a special non-heating mill, a glass-sintered filter crucible is used for the Cu_2O, molybdophosphoric soln. is substituted for ferric salt to give a more definite end point and a microburet is used when the vol. of $KMnO_4$ soln. required is small. AMY LEVESCONTE

The weight per inch of fibers of different lengths and the numbers of fibers of different lengths per seed, for each of the standard Indian cottons. R. L. N. IYENGAR AND A. J. TURNER. *J. Textile Inst.* **21,** T417–40(1930). R. K. WORNER

Intensive research promises better rayon. A. J. HALL. *Textile World* **78**, 3034–5 (1930).—A brief review of some recent investigations on the effect of raw material on rayon and the importance of time and concn. in the steeping of cellulose in the manuf. of viscose. It is predicted that rayon research will in the near future be directed largely along the lines dealing with micelle size and micelle alignment, since its properties depend largely on these factors. R. K. WORNER

Pure linen damask and the laundry. J. A. MATTHEW. *J. Textile Inst.* **21**, T453–62 (1930).—A discussion is given of the construction of linen damask and the types of damage which may occur to it in the laundry. Some practical suggestions on the finishing of it are given. R. K. WORNER

Proper application of thin-boiling starch in slashing. R. CAMERON WHITNEY. *Textile World* **78**, 3036–7(1930).—Practical. R. K. WORNER

Hindering fermentation in sizing baths. L. RINOLDI. *Boll. laniera* **44**, 390–1 (1930).—In sizing baths of animal glue fermentation is hindered by warming each day to 80° not to boiling, as this reduces the gluing power. Farina and starch baths are best boiled a few min. Where warming is not convenient, there may be used $HgCl_2$, $AgNO_3$, $CuSO_4$, $ZnSO_4$, $ZnCl_2$, Na or K arsenite, phenol, formic or salicylic acid, formol or creosote. One g. $HgCl_2$ or $AgNO_3$ protects against fermentation 1,600,000 g. of sizing bath, while 1 g. Na_2AsO_3 protects only 300 g. Two g. $ZnSO_4$ or $CuSO_4$ per l. of bath is more used. Formol and formic acid are the most useful org. products. Salicylic acid is too weak and too expensive; phenol and the cresols leave an objectionable odor. Formic acid and formol give insol. ppts. with animal glue. R. S.

...eral method for the preparation of thiocyanine dyes (FISHER, HAMER) **10**. ...hemical studies on dyestuff sols (TANAKA) **2**. Synthetic experiments in the indole group. **VII.** Nitration and bromination of β-indolecarboxylic ester and a new synthesis of the dye of the purple antiquity (MAJIMA, KOTAKE) **10**. Cellulose and textile fibers from vegetable material such as straw, stalks or wood (U. S. pat. 1,786,890) **23**. Electrical heater for dye liquors, etc (Brit. pat. 333,869) **1**. Anthraquinone derivatives acid dyes (Fr. pat. 687,039) **10**. Recovering dye from hides and residues (Swiss pat. 150,803) **29**. Cellulose derivatives (Fr. pat. 687,301) **23**. Cellulose esters (Fr. pat. 687,966) **23**.

JUSTIN MUELLER, E.: **Les phénomènes de teinture.** Paris: L'Édition Textile 371 pp. F. 110. Reviewed in *J. Textile Inst.* **21**, 184; *J. Soc. Dyers Colourists* **46**, 377 (1930).

KIELMEYER, A.: **Färberlehrling im Chemie-Examen.** 4th ed., enlarged and revised by W. Zänker. Wittenberg: A. Ziemsen Verlag. 282 pp. Cloth, M. 16. Reviewed in *J. Soc. Dyers Colourists* **46**, 378(1930).

New Technical Notes for Cleaners and Dyers. Revised and arranged by MOSES H. GOLDMAN. New York: The National Cleaner and Dyer. 352 pp. $4. Reviewed in *Am. Dyestuff Reptr.* **19**, 820(1930).

Dyes. MARCEL BADER, CHARLES SUNDER and DURAND & HUGUENIN SOC. ANON. Swiss 128,243, Aug. 24, 1928. Addn. to 102,540. A stable deriv. of 6-ethoxy-4'-methyl-5-chlorothioindigo in solid form for dyeing and printing is obtained by treating the leuco compd. with SO_3.

Dyes. I. G. FARBENIND. A.-G. Brit. 333,882, March 13, 1929. Mononitro derivs. are obtained by nitrating dibenzopyrenequinones under "milder conditions" than those used as described in Brit. 307,926 (*C. A.* **24**, 243), as by use of a lower temp., shorter time or smaller proportion of nitrating agent for the nitration, and the mononitro deriv. may be reduced to the monoamino compd. Examples are given.

Dyes. I. G. FARBENIND. A.-G. Brit. 334,111, Oct. 22, 1928. Naphthoylene-diarylimidazoles, which may be obtained as described in Brit. 237,294 (*C. A.* **20**, 1527), Brit. 265,...2 (*C. A.* **22**, 322) and Brit. 265,964 (*C. A.* **22**, 503), are converted into other dyes by nitration, which may be followed by reduction. Several examples are given.

Dyes. IMPERIAL CHEMICAL INDUSTRIES, LTD. Fr. 687,316, Dec. 27, 1929. See Brit. 325,5... (*C. A.* **24**, 4164).

Dyes. SOC. ANON. POUR L'IND. CHIM. À BÂLE. Ger. 500,289, April 22, 1928. Blue to gray dyes for wool, silk, cotton and viscose are prepd. by the action of chroming agents on the *o*-hydroxyazo dyes obtained by coupling the diazo compds. from 5-nitro-*o*-aminophenol and its substitution products with *N*-substitution products of 2-amino-5-hydroxynaphthalene-7-sulfonic acid. Numerous examples are given.

Dyes. Soc. anon. pour l'ind. chim. à Bâle. Ger. 509,290, Dec. 9, 1928. Orange dyes for animal fibers are prepd. by the action of chroming agents on the dyes obtained by coupling the diazo compd. from 2-aminophenol-4,6-disulfonic acid with unsulfonated 1-aryl-5-pyrazolines. An example is given.

Dyes. Soc. anon. pour l'ind. chim. à Bâle. Swiss 138,210 to 138,226, July 13, 1928. Addns. to 136,649 (*C. A.* **24**, 4400). Chromed dyes are obtained by treating the dye from nitrated 1-diazo-2-hydroxynaphthalene-4-sulfonic acid and 2-amino-5-hydroxynaphthalene-7-sulfonic acid with a chroming agent and subsequently oxidizing the product. The dye colors wool and silk in fast green shades in an alk. bath (138,210). The other patents describe the application of the method to anologous sulfonic acids and to treating the products with Cu- or Ni-yielding agents instead of chroming.

Dyes. Soc. anon. pour l'ind. chim. à Bâle. Swiss 138,242, May 12, 1928. Addns. to 136,651 (*C. A.* **24**, 4404). Benzanthrone is oxidized by $Mn_2(SO_4)_3$ in H_2SO_4 to give dihydroxydibenzanthronyl, which is treated with a condensing agent and the product ethylated. The dye colors cotton in Cl-fast grey-blue shades in a blue vat.

Dyes. Soc. anon. pour l'ind. chim. à Bâle. Swiss 138,500, Dec. 31, 1927. Addn. to 133,479 (*C. A.* **24**, 505). Pyranthrone is sulfonated with oleum, the product fused with caustic alkali and then ethylated. The monoethoxypyranthrone dye produced colors cotton red from a red vat.

Dyes. Soc. anon. pour l'ind. chim à Bâle. Swiss 138,602, Sept. 17, 1927. A new dye is produced by chroming together the dye from nitrated 1-diazo-2-hydroxynaphthalene-4-sulfonic acid and β-naphthol and the azo dye produced from the above by reducing the NO_2 group. The product colors wool and silk in fast blue-black shades.

Azo dyes. I. G. Farbenind. A.-G. (Richard Stüsser, inventor). Ger. 508,584, July 12, 1925. Cu-contg. azo dyes are prepd. by treating the dye obtained by coupling amines contg. *o*-carboxyl groups with the urea compd. of 2,5-aminonaphthol-7-sulfonic acid or derivs., with Cu-yielding compds. Thus, the Na salt of the dye from 2 mols. *o*-aminobenzoic acid and 1 mol. 5,5′-dihydroxy-2,2′-dinaphthyl-*p*-phenylenediamine-7,7′-disulfonic acid is treated with $CuSO_4$ to give a product which dyes cotton in light fast violet shades. Other examples are given. Cf. *C. A.* **25**, 600.

Azo dyes. I. G. Farbenind. A.-G. (Richard Dereser and Karl Moldaenke, inventors). Ger. 508,586, Dec. 18, 1927. Addn. to 488,535 (*C. A.* **24**, 2303). The method of 488,535 for producing fast, H_2O-insol. dyes is modified by using arylamide derivs. of 2,3-hydroxynaphthoic acid instead of arylides thereof, to couple with the diazo compds. of dihalo-2-aminotoluene which have a halogen atom in the 4-position and which contain at least one atom of Br, I or F. In an example, 4-chloro-5-bromo-2-aminotoluene is diazotized and added to a suspension of 2,3-hydroxynaphthoic acid-4-anisidide in dil. NaOH. Other examples are given. Cf. *C. A.* **25**, 600.

Azo dyes. I. G. Farbenind. A.-G. (Hermann Wagner and Bartholomäus Vossen, inventors). Ger. 508,811, June 20, 1928. Acid yellow monoazo dyes are prepd. by the action of 1 mol. resorcinol or its substitution products or homologs with diazotized 2-chloro-4-amino-1-methylbenzene-6-sulfonic acid. Examples are given. Cf. *C. A.* **25**, 599.

Azo dyes. Soc. anon pour l'ind. chim. à Bâle. Ger. 508,333, Sept. 8, 1928. Complex metalliferous azo dyes are prepd. by the action of suitable metal compds. on a mixt. of different mono- or poly-azo dyes contg. metal-binding groups. The reactions may be effected under various conditions. Like products may be prepd. by treating the metal compd. of an azo dye with another azo dye contg. a metal-binding group. This latter method may be applied on the fiber. Examples are given.

Azo dyes. Soc. anon. pour l'ind. chim. à Bâle. Swiss 138,024, May 10, 1928. An azo dye contg. metals is produced by treating with Cu salts the chromed dye obtained by heating nitrated 1-diazo-2-hydroxynaphthalene-4-sulfonic acid with β-naphthol in the presence of AcONa. The dyes color wool and silk in black shades.

Azo dyes. Soc. anon. pour l'ind. chim. à Bâle. Swiss 138,203 to 128,209, Oct. 22, 1927. Addns. to 135,220 (*C. A.* **24**, 2610). Equimol. proportions of cyanuric chloride, 1,4-phenylenediamine-3-sulfonic acid, dehydrothiotoluidinesulfonic acid, HNO_2 and $(Ac)_2O$ are allowed to interact so that the first two constituents are diazotized by the HNO_2 and coupled successively with the second two constituents (138,203). The other patents describe the process carried out with other analogous compds. acting with the cyanuric chloride.

Azo dyes. Soc. anon. pour l'ind. chim. à Bâle. Swiss 138,227 to 138,234, Sept. 8, 1928. Addns. to 136,650 (*C. A.* **24**, 4401). 1 Mol. 5,5′-dihydroxy-7,7′-disulfo-1,2,2′,1′-dinaphthazine is allowed to react with 2 mols. of diazotized *p*-nitroaniline. The dye colors wool and silk in olive-green shades in acid baths (138,227). The other

patents describe the dyes produced by replacing the diazotized *p*-nitroaniline with other suitable compds.

Azo dyes of the anthraquinone series. BERTRAM MAYER and JACOB WÜRGLER (to Soc. anon. pour l'ind. chim. à Bâle). U. S. 1,788,314, Jan. 6. Dyes of widely varying color and which are suitable for dyeing cellulose esters and ethers are obtained by diazotizing compds. such as 1,4-, 1,5- or 1,8-aminonitroanthraquinone, 1-amino-2-methyl-4-nitroanthraquinone, 1-amino-4-methylaminoanthraquinone or 1-amino-4-cyclohexylaminoanthraquinone and coupling with components such as resorcinol, *m*-tolylenediamine, 1-naphthylamine, 2-naphthol, diethylaniline and phenylmethylpyrazolone. Several examples are given.

Vat dyes. FELICE BENSA. Ger. 507,829, Aug. 18, 1925. Vat dyes are produced by treating diaryl haloperylene diketones with alkali or alk. earth, in the presence or absence of an org. solvent. Thus, dibenzoyldibromoperylene is lightly boiled with $PhNH_2$ and powd. KOH to give a dye which colors cotton blue, turning to a fast violet in air, in an alk. blue vat. Numerous other examples are given. Cf. *C. A.* **24**, 600.

Vat dyes. FELICE BENSA. Ger. 508,404, Dec. 17, 1927. See U. S. 1,783,137 (*C. A.* **25**, 419).

Vat dyes. LEOPOLD CASSELLA & CO. G. M. B. H. (Richard Herz and Werner Zerweck, inventors). Ger. 507,558, Dec. 11, 1928. Addn. to 458,598. In the prepn. of fast orange vat dyes by halogenating anthanthrone, the anthanthrone is suspended in water and the halogenation is carried out in the presence or absence of a catalyzer, and the halogen acid formed is neutralized. Thus, an aq. paste of anthanthrone is treated with Br at 60–65°. The excess of Br is removed by bisulfite and the ppt. filtered, washed and dried. The HBr may be neutralized by alkali prior to filtration. Cf. *C. A.* **24**, 4167.

Vat dyes. COMPAGNIE NATIONALE DE MATIÈRES COLORANTES ET MANUFACTURES DE PRODUITS CHIMIQUES DU NORD RÉUNIES ÉTABLISSEMENTS KUHLMANN. Fr. 688,256, Apr. 3, 1929. A vat dye having a Bordeaux color is obtained by condensing 2,7-dichloroanthraquinone with a product obtained according to Ger. 267,414 from α-naphthoquinone and 1,5-diaminoanthraquinone.

Vat dyes. I. G. FARBENIND. A.-G. (Paul Nawiasky, inventor). Ger. 507,559, Oct. 9, 1926. The NO_2 group of nitrobenzanthrone is replaced by a hydroxyalkyl group and the product treated with alkali. Thus, nitrobenzanthrone is reduced to aminobenzanthrone and treated with H_2SO_4 and HNO_2, cooled and heated with NaOH to form a hydroxy deriv. The product m. 287–288° and is methylated with Me toluenesulfonate and $C_6H_3Cl_3$ to give methoxybenzanthrone, m. 167–168°. The product is a fast green dye.

Vat dyes. I. G. FARBENIND. A.-G. (Karl Wilke, inventor). Ger. 507,560, July 21, 1927. Vat dyes of the benzanthronepyrazoleanthrone series are obtained by oxidizing compds. of the type *Bz*-1-*Py*-1(or 2-2')benzanthronepyrazoleanthrone and alkylating the product. Thus, pure benzanthronepyrazoleanthrone and H_3BO_3 are dissolved in H_2SO_4 and treated with MnO_2 to give a dye which colors cotton in green-blue shades in an alkaline vat. Several other examples are given. Cf. *C. A.* **24**, 2611.

Vat dyes. I. G. FARBENIND. A.-G. (Walter Bruck, inventor). Ger. 507,561, Oct. 28, 1928. Vat dyes of the anthraquinoneacridone series are prepd. by chlorinating the bromo deriv., brominating the chloro deriv. or acting on anthraquinoneacridone with chlorinating and brominating agents simultaneously. Several examples are given.

Vat dyes. I. G. FARBENIND. A.-G. (Heinrich Nerescheimer and Willy Eichholz, inventors). Ger. 507,832, Nov. 18, 1928. An orange colored vat dye is produced by condensing 1,4,5,8-naphthalenetetracarboxylic acid anhydride with *o*-phenylenediamine and treating the red dye so produced with an acid oxidizing agent such as $K_2Cr_2O_7$. Examples are given.

Vat dyes. I. G. FARBENIND. A.-G. (Karl Thiess and Friedrich Maennchen, inventors). Ger. 507,833, Feb. 1, 1929. Vat dyes contg. S are obtained by oxidizing 2,5-diarylamino-3-mercapto-1,4-benzoquinone. Thus, 2,5-dianilino-3-mercapto-1,4-benzoquinone and $PhNO_2$ are boiled together for 1 hr. giving a dye which colors wool brown. Several other examples are given.

Vat dyes. I. G. FARBENIND. A.-G. (Paul Nawiasky and Emil Krauch, inventors). Ger. 507,935, Apr. 4, 1929. New vat dyes are produced by leading halogen into 2'-anthraquinonyl-*N*-pyrazoleanthrone, or by condensing the latter with such compds. as have at least 1 halogen atom in the mol. Several examples are given. In one, I is added to a soln. of the above compd. in oleum to give a dye which colors cotton greenish yellow from a brown vat. In another, the compd. is condensed with $ClSO_3H$ and treated with I to give a fast yellow dye for cotton.

Vat dyes. I. G. FARBENIND. A.-G. (Walter Albrecht and Fritz Helwert, inventor). Ger. 508,108, Sept. 19, 1928. Vat dyes are prepd. by treating an aq. sludge of pyranthrone with Br or a brominating agent. The reaction mixt. may be kept neutral by gradual addn. of NaOH, etc. Examples are given.

Vat dyes. I. G. FARBENIND. A.-G. (Ernst Honold, inventor). Ger. 508,980, Apr. 12, 1928. Addn. to 435,477. Dihalodibenzanthronyl compds. obtained by the method of 435,477 are treated with acid amides to form the diamino derivs. which are then sapond. Thus, 2,2′-dibenzanthronyl is treated with excess of Br at room temp. to give dibromo-2,2′-dibenzanthronyl, which in turn is converted to the diamino deriv. This is sapond. to give the dye dibenzenesulfamino-2,2′-dibenzanthronyl. Other examples are given.

Vat dyes. I. G. FARBENIND. A.-G. (Heinrich Neresheimer, inventor). Ger. 509,422, Feb. 14, 1929. Addn. to 504,016 (*C. A.* **24**, 5507) and 507,344 (*C. A.* 25, 601. Green vat dyes are prepd. by treating halo derivs. of 2-benzanthronyl 1-aminoanthraquinone or its substitution products with acid condensing agents or mild dehydrogenating agents. Examples are given.

Vat dyes. I. G. FARBENIND. A.-G. (Fritz Baumann, inventor). Ger. 509,423, Apr. 10, 1929. For the prepn. of new vat dyes, α-aminoanthrimidecarbazole or its substitution products is reacted upon by anthraquinone-*o*-halocarboxylic acids or their derivs. or substitution products, and the reaction products are converted into the corresponding acridones in known manner. Thus, 4-amino-1,1′-anthrimidecarbazole may be heated at 215° in C_6H_5 with Me 2-bromoanthraquinone-1-carboxylate in the presence of AcOK, MgO and $(AcO)_2Cu$, the isolated reaction product being subjected to acridone ring closure by heating to 100° in H_2SO_4 soln. Detailed examples are given.

Vat dyes. I. G. FARBENIND. A.-G. (Walter Mieg and Robert Berliner, inventors). Ger. 509,424, Apr. 23, 1929. Brown to black vat dyes are prepd. by heating aminoanthraquinonylaminocarbazoles contg. at least one acridone ring with anthraquinone derivs. contg. one or more exchangeable halogen atoms. The reaction is effected in a high-boiling solvent in the presence or absence of acid-binding agents and catalysts. Thus, the product obtained by condensing trichloroanthraquinone acridone with 1-benzoylamino-4-aminoanthraquinone, carbazolizing and sapong., may be boiled in $C_{10}H_8$ with 1-chloroanthraquinone in the presence of Na_2CO_3 and powd. Cu. Other examples are given also.

Vat dyes. SOC. ANON. POUR L'IND. CHIM. À BÂLE. Fr. 688,029, Jan. 11, 1930. Vat dyes of the dibenzanthrone series are prepd. by treating aminodibenzanthrones with halogenated quinones. Thus, aminodibenzanthrone (prepd. by reduction of nitrodibenzanthrone, the prepn. of which is described in Ger. 402,641) is suspended in $PhNO_2$ and heated with tetrachloroquinone to 190°. The dye obtained contains Cl and dyes cotton in greenish blue shades.

Vat dyes. SOC. ANON. POUR L'IND. CHIM. À BÂLE. Swiss 137,954, Jan. 17, 1928. Addn. to 125,480. 2,2′-Dibenzanthronylsulfonic acid, obtained by treating 2,2′-dibenzanthronyl with 12% oleum, is fused with caustic alkali and the product methylated. The resulting dye colors cotton in fast greenish grey shades in a violet vat.

Vat dyes. SOC. ANON. POUR L'IND. CHIM. À BÂLE. Swiss 138,316, Sept. 21, 1928. *Bz*-1-*Bz*-1′-Dibenzanthronyl is nitrated to the "mono" stage and the product fused with caustic alkali. The dye gives a wash-fast blue-grey shade to silk.

Vat dyes of the anthraquinone series. SOC. ANON. POUR L'IND. CHIM. À BÂLE. Ger. 507,830, Dec. 30, 1928. Aminopyranthrone is condensed with heterocyclic compds. with one or more —C(halogen):N— groups and the product treated with compds. contg. reactive H atoms. The final product may be acylated or alkylated. Thus, monoaminopyranthrone is condensed with cyanuric chloride in the presence of $PhNO_2$ giving a dye which colors cotton brown in an alk. vat. The product is treated with aminoanthraquinone giving a further product which colors cotton in fast violet brown shades. Equimol. proportions of the reacting substances give a dye which colors cotton in Bordeaux red shades. Other examples are given.

Indigo. JUSTIN F. WAIT (to National Aniline & Chemical Co.). U. S. 1,787,069, Dec. 30. The K salt of phenylglycine is fused with a mixt. contg. KOH, NaOH and sodium amide, the fusion mass is dissolved in sufficient water to form a dil. NaOH soln., indigo is pptd., caustic alkali liquor is sepd. from the indigo, the liquor is concd. to a water content of less than 10%, material remaining solid above 230° is removed from the liquor, and the resulting concd. caustic alkali is used for further fusion with sodium amide and with the K salt of phenylglycine.

Dyes of the anthracene series. IVAN GUBELMANN, ROBERT J. GOODRICH and WM. DETTWYLER (to Newport Co.). U. S. 1,787,069, Dec. 30. Several examples are

given of the production of dyes by condensing an anthraquinone halogen-substituted benzacridone which contains a halogen atom in *m*-position to the imino group in the benzene ring, with an aminoanthraquinone compd., and heating the resulting product with a metal chloride such as $AlCl_3$; *e. g.*, from a dichloroacridone, made from 1-chloroanthraquinone-2-carboxylic acid and a 3,4-dichloroaniline compd., by condensing the dichloroacridone further with an α-aminoanthraquinone compd., and heating the resulting product with a metal chloride, which dyes are, in general, dark brown powders contg. combined Cl, insol. in water, alc., alkalies and dil. mineral acids, somewhat sol. in aniline, but readily sol. in concd. H_2SO_4 forming a brown soln. and giving with alk. hydrosulfite a violet vat from which cotton is dyed violet changing to brown on treatment with suitable oxidizing agents.

Indigoid dyes. Soc. anon. pour l'ind. chim. à Bâle. Swiss 138,773, Nov. 17, 1927. Addn. to 100,705. Indigoid dyes are produced by condensing an α-ketomonoanil of thionaphthenequinone with 1-methyl-2,3-naphthohydroxythiophene. In the example, thionaphthenequinone *p*-dimethylaminoanil is used.

Indigoid dye. Soc. anon. pour l'ind. chim. à Bâle. Swiss 138,774, Nov. 17, 1927. Addn. to 109,483. An indigoid dye is produced by oxidizing 1-methyl-2,3-naphthohydroxythiophene.

Pyridine dyes. Ernst Koenigs. Ger. 507,562, April 10, 1927. Basic pyridine dyes are obtained by treating tert. aromatic bases with pyridine in the presence of powd. Cu and acid chlorides at high temps.

Triarylmethane dyes. Imperial Chemical Industries, Ltd. Ger. 508,499, April 6, 1926. See Brit. 308,906 (*C. A.* **24**, 503).

Triarylmethane dyes. British Dyestuffs Corp., Ltd. Ger. 508,694, Oct. 25, 1928. Addn. to 461,148. See Fr. 662,909 (*C. A.* **24**, 507).

Polymethine dyes. Richard Kuhn and Alfred Winterstein. Swiss 137,958 to 137,960, Feb. 8, 1928. Addns. to 136,391 (*C. A.* **24**, 4404). Dyes of this series are obtained by condensing 1,3,3-trimethyl-2-methyleneindoline (137,958), or *N*-methyl-α-methylhydroquinoline (137,959), or 1,3,3-trimethyl-5,7-dibromo-2-methyleneindoline (137,960), with HCOOH. Examples are given. The dyes color cotton in violet shades.

Polymethine dyes. Richard Kuhn and Alfred Winterstein. Swiss 139,722 to 139,725, Feb. 8, 1928. Addns. to 136,391 (*C. A.* **24**, 4404). Polymethine dyes are obtained by condensing the trichloroacetate or the monochloroacetate or the perchlorate or the formate, of 1,3,3 trimethyl-2-methyleneindoline, with HCOOH. The dyes colored color cotton in violet-red shades.

Polymethine dyes. Soc. anon. pour l'ind. chim. à Bâle. Swiss 138,025, May 2, 1927. Polymethine dyes of the indolenine series are obtained by the oxidation of condensation products from 2 mol. of a methylene base (obtained by treating a cyclo-ammonium salt contg. a reactive Me group with alkali) and 1 mol. CH_2O, in non-alk. media. Thus, 1,3,3-trimethyl-2-methyleneindoline is condensed with CH_2O, in 50% alc. and oxidized by Ag_2O and glacial AcOH.

Benzanthrone derivatives. I. G. Farbenind. A.-G. (Georg Kränzlein and Martin Orth, inventors). Ger. 508,109, Feb. 8, 1929. Addn. to 453,280. Hydroxybenzanthrone carboxylic acids are prepd. by treating 2-aroylhydroxynaphthalene-3-carboxylic acids with condensing agents. Thus, the benzoic ester of 2,3-hydroxynaphthoic acid, treated at 140–150° for 6 hrs. with NaCl.$AlCl_3$, yields *4-hydroxybenzanthrone-3-carboxylic acid*, m. 285°, which is a *chromable dye for wool*. The prepn. is described of *4-hydroxy-6-chlorobenzanthrone-3-carboxylic acid*, m. 250–252°.

Dye preparation. Soc. anon. pour l'ind. chim. à Bâle. Swiss 138,844, Sept. 16, 1927. The prepn contains a vat dye mixed with urea. A reducing agent may also be added. Examples are given.

Dyes and intermediates of the anthraquinone series. Imperial Chemical Industries, Ltd. and W. W. Tatum. Brit. 333,992, June 18, 1929. Diaminoanthraquinonesulfonic acids, or halogen compds. or dyes derived from them are obtained by converting 1,4- or 1,5-diaminoantnraquinone (or the crude mixt. obtained by nitration and reduction from anthraquinone) into the sulfate salt, baking at a high temp., halogenating (as with Br) and condensing with an arylamine (*p*-toluidine gives a blue acid wool dye).

Dye intermediates. Soc. anon. pour l'ind. chim. à Bâle. Swiss 137,932, to 137,938, Oct. 22, 1927. Addns. to 103,430. New dye intermediates are obtained by the interaction of 1 mol. cyanuric chloride, 1 mol. 1,8-aminonaphthol-4,6-disulfonic acid and 1 mol dehydrothiotoluidinesulfonic acid (137,932). $PhNH_2$ may be used instead of or with the latter constituent (137,933 and 137,934). Different sulfonic

acids of the second constituent are used in the various other patents. Examples are given.

Dye intermediates. Soc. anon. pour l'ind. chim. à Bâle. Swiss 138,190, Sept. 8, 1928. Addn. to 136,040 (*C. A.* **24**, 2614). An azine forming a useful dye intermediate is obtained by esterifying 2-amino-8-hydroxynaphthalene-6-sulfonic acid, oxidizing and sapong.

Intermediates for the coal-tar dye industry. Heinrich von Diesbach. Swiss 139,642 to 139,645, Dec. 12, 1927. Addns. to 136,046 (*C. A.* **24**, 2614). The intermediates are produced by condensing salicylic acid, or resorcinol, or 2-hydroxy-3-naphthoic acid, or 1-hydroxy-2-naphthoic acid, with dimethylolurea. Examples are given.

Formaldehyde condensation products. Soc. anon. pour l'ind. chim. à Bâle. Swiss 137,942 to 137,945, May 19, 1928. Addns. to 136,380 (*C. A.* **24**, 4405). CH_2O is allowed to act on 1,3,3,5-tetramethyl-2-methyleneindoline in the proportions 1:2 (137,942), or on 1,3,3-trimethyl-5-chloro-2-methyleneindoline (137,943), or on 1,3,3-trimethyl-2-methylene-β-naphthindole (137,944), or on 1,3,3-trimethyl-2-methylene-α-naphthindoline (137,945). The products are useful as *dye intermediates*.

Dyeing with chromed dyes. Soc. pour l'ind. chim. à Bâle. Fr. 687,300, Dec. 27, 1928. The fastness of shades obtained with chromed dyes is improved by adding to the dye bath tannin and an aromatic hydroxycarboxylic acid such as salicylic acid or by treating with these ingredients after dyeing.

Dyeing with vat dyes. I. G. Farbenind A.-G. Fr 687,734, Jan. 6, 1930. Vat dyestuffs are fixed on the fiber by means of tervalent Ti compds. Examples are given of the addn. to an indigo bath of the hydrate of Ti_2O_3 prepd. in the presence of a thickening agent such as glue, gum or starch paste and a complex salt of $TiCl_3$ and $HCOONa$. Cf. *C. A.* **24**, 6032.

Aniline-black dyeing. The Calico Printers' Association, Ltd., Louis Amédée Lantz and Ronald Watson. Ger. 508,254, July 21, 1927. See Brit. 279,164 (*C. A.* **22**, 2846).

Dyeing textiles. Durand et Huguenin S. A. Fr. 686,820, Dec. 18, 1929. In the production of fast dyeings and printings by means of esters of a leuconic vat dye, an appropriate oxidizing agent and a substance capable of liberating acid on heating, by steaming on the fiber, is carried out in the presence of an aminosulfonic or aminocarboxylic acid of the aromatic series which acts as a buffer to preserve the dyeing from a superoxidation. Examples are given of the use of the sulfanilate and the diethylaniline-*m*-sulfonate of Na.

Dyeing acetate silk. I. G. Farbenind. A.-G. (Alfred Fischesser, inventor). Ger. 508,562, Jan. 17, 1928. Acetate silk is dyed black with white or colored effects by impregnating the fiber with aminodiphenylamine or similar bases either before or during the treatment with the resist. The diphenyl black may be developed by steaming. Thus, undyed silk is treated with a white resist contg. thickening water, Na sulfoxalate-formaldehyde and AcONa. After printing and drying it is treated with aminodiphenylamine. Another example is given. Cf. *C. A.* **24**, 4171.

Dyeing regenerated cellulose. British Dyestuffs Corp., Ltd., and James Baddiley. Ger. 508,253, May 3, 1927. See Brit. 287,214 (*C. A.* **23**, 528).

Dyeing cotton. I. G. Farbenind. A.-G. (Wilhelm Neelmeier, inventor). Ger. 508,387, May 5, 1926. Cotton is impregnated at ordinary or moderately raised temp. with solns. of the urea derivs. obtained by the action of $COCl_2$ on carboxylated *p*-amino azo or *p*-aminodisazo dyes contg. no OH groups. The impregnated cotton, after drying if desired, is then treated with solns. of Cr salts. Yellow to orange dyeings fast to boiling water are thus produced. Examples are given.

Half-tone effects on textile fibers, etc. I. G. Farbenind. A.-G. (Erich Kern, inventor). Ger. 508,561, Jan. 5, 1928. The fiber is treated with an emulsion of water repelling substance prior to dyeing or printing. Thus, silk fiber is treated with an emulsion of gum arabic with Pr naphthelenesulfonate as the emulsifying agent, prior to dyeing.

Producing variegated colors on fabrics. Durand & Huguenin A.-G. Ger. 508,563, Dec. 14, 1927. Fast variegated colors are produced on fabrics by using enol esters of vat dyes and oxidizing. Several compositions of printing pastes are enumerated in examples.

Coloring threads, etc. Henry Dreyfus. Fr. 687,265, Dec. 26, 1929. A coloring material or a discharge material is applied in an intermittent manner to threads in movement. If the thread contains a cellulose ester it may be sapond., weighted, mordanted, reserved or discharged and then the colors applied.

Cloth printing. Wilhelm Petri. Ger. 508,564, Jan. 30, 1930. A soln. of Johan-

ms bread kernel or similar seed kernels for use in cloth printing, is prepd. by grinding the kernels and forming them into a paste with alc., glycerol or pyridine, before stirring with water. An example is given.

Tinting yarns. HERBERT PLATT, WILLIAM WHITEHEAD and FREDERICK J. WILLIAMS (to Camille Dreyfus). Can. 305,265, Oct. 28, 1930. A tinting fluid for yarns contains a dyestuff, olive oil and a sulfonated olive oil.

Producing patterns on textiles, leather, wood, etc. I. G. FARBENIND. A.-G. (Alfred Eckardt and Kuno Franz, inventors). Ger. 507,743, Oct. 23, 1927. Addn. to 430,946. A mixt. of dye and diluent or dispersion agent is used to produce the pattern or design directly, after soaking the textiles, etc., in cold water if necessary, and the color carrier is removed mechanically.

Apparatus for dyeing tubular textile materials. HANS LOESER. Ger. 506,537, Feb. 12, 1929. Details of the vat.

Apparatus for dyeing, bleaching, mercerizing or other treatments. J. A. BOLTON and S. S. HAMMERSLEY. Brit. 333,888, April 20, 1929. Concn. of the liquor used is kept const. by the action of a hydrometer floating in the liquor, which controls the supply of fresh liquor when needed, through the action of an elec. circuit and valve. Various details of construction are described.

Method and plant for locally dyeing fabrics in a number of colors. MARIUS RATIONIER. Ger. 509,396, Aug. 11, 1927.

Fabric dyeing machine. MASCHINENFABRIK RAPPERSWIL, A.-G. Ger. 509,923, Mar. 1, 1929.

Yarn-dyeing machine. MASCHINENFABRIKEN. TILLM. GERBER SÖHNE & GEBR. WANSLEBEN. Ger. 507,783, June 4, 1929. Details of arrangement.

Apparatus for the irregular dyeing of hanks of yarn, etc. WILLY SCHILDBERG. Ger. 507,990, Oct. 25, 1925. Structural details.

Apparatus for dressing or dyeing hanks of yarn. JOSEF TIMMER. Ger. 507,991, May 7, 1929. Structural details.

Apparatus for treating fabrics with steam after vat dyeing or discharge printing, etc. F. S. CHAPIN and A. H. JACOBY. Brit. 334,069, Aug. 29, 1929. Structural features and details of operation of an "ager" are described.

Preparing and using photographic designs which are projected for purposes such as showing effects of various textile patterns. FRANK TWYMAN and CHARLES F. SMITH (to Adam Hilger, Ltd.). U. S. 1,788,135, Jan. 6. Various details of procedure are described.

Improving textiles, etc. I. G. FARBENIND. A.-G. (Wilhelm Lommel and Heidrich Moenzel, inventors). Ger. 506,987, May 22, 1928. The textiles, etc., are treated with salts of quaternary phosphonium bases. Thus, wool is treated with benzyltriphenylphosphonium chloride. A list of many suitable bases is given.

Softening agents for textile fibers. SOC. ANON. POUR L'IND. CHIM. À SAINT-DENIS. Fr. 688,585, Jan. 21, 1930. Sulfonated products useful as softening agents for textiles are prepd. by treating a fatty acid or fatty acid ester, *e. g.*, stearic acid in the presence of a solvent, with $ClHSO_3$, or with H_2SO_4 while bubbling HCl through the mixt.

Lubricating or softening textile materials. BRITISH CELANESE, LTD. Brit. 333,949, March 17, 1928. Natural or artificial silk, wool, flax, cotton, etc., are treated with di- or poly-hydric alc. compds. such as ethylene glycol, diethylene glycol, propylene glycol, glycerol or ethers such as monoethyl ether of ethylene or diethylene glycol, diethyl ether of diethylene glycol or mixts. of such substances.

Delustering, swelling and softening fabrics of artificial material. ADOLPH W. BUHLMANN. U. S. 1,786,421, Dec. 30. The material is permeated with steam at a pressure of about 15 lb. and temp. of about 100°, then cooled and freed from steam by forcing air through the fabric. App. is described.

Eliminating oil from textiles. THE TWITCHELL PROCESS CO. Fr. 688,514, Jan. 20, 1930. Mineral oils are removed from textile materials by washing them in a bath contg. "mahogany" sulfonates, mixed, if desired, with mud sulfonates.

Textile oils. THE TWITCHELL PROCESS CO. Fr. 688,515, Jan. 20, 1930. A textile oil is composed of (*a*) a mineral oil from which certain components have been eliminated by extn. after a sulfonation with oleum, and (*b*) "mahogany" sulfonates which are produced by this treatment with oleum and which have been sepd. in a relatively complete manner from the mother oil.

Treating animal fibers. DEUTSCHE GOLD-UND SILBER-SCHEIDEANSTALT VORM. ROESSLER. Fr. 688,418, Jan. 17, 1930. Animal fibers such as wool are preserved by impregnating them with a soln. of H_2O_2 and drying.

Method and plant for drying textiles, etc., in a series of chambers. HEINRICH BRUGGEMANN. Ger. 509,362, Sept. 28, 1926.

Continuous method and plant for making bands from fibers and hydraulic binders. OSKAR TENNER. Austrian 119,625, May 15, 1930.

Apparatus for treating textile fibers with liquids or gases. SOCIÉTÉ FRANÇAISE DES TEXTILES NÉO-SOIE & NÉO-LAINE. Ger. 509,729, Aug. 7, 1929. App. for treating artificial silk, etc., centrifugally is described.

Apparatus for the wet treatment of textile fibers, especially artificial silk. OSCAR KOHORN & Co. and ALFRED PERL. Ger. 506,977, Aug. 15, 1928. Addn. to 481,247. Details are given.

Wet treatment of spun fibers. AKTIEBOLAGET SVENSKA KONSTSILKE (Oskar Wahlberg, inventor). Ger. 509,728, Aug. 24, 1929. The fibers are wound on a perforated bobbin and treated centrifugally.

Spraying device for the wet treatment of textiles. STICKBORN KUNSTSEIDE A. G. Swiss 138,577, April 26, 1929.

Apparatus for the wet treatment of individual textile pieces. EMILE EYMERIC Ger. 509,921, Mar. 7, 1930.

Apparatus for the wet treatment of fabrics in open width. FRANTIŠEK RUDOLF Ger. 508,478, Jan. 3, 1928.

Machine for the wet treatment of fabrics in open width (foulard type). PAUL BUSCHMANN. Ger. 509,252, Oct. 8, 1929.

Apparatus for the wet treatment of yarn, especially silk. MASCHINENFABRIKEN TILLM. GERBER SÖHNE & GEBR. WANSLEBEN. Ger. 506,978, Apr. 7, 1929. Details of app. for desulfurizing, bleaching, acidifying and scouring.

Wet treatment of cloth rolls. COHOE PROCESSES, INC. Ger. 509,922, Nov. 20, 1926. Details are given.

Alkaline liquids for mercerizing, etc. I. G. FARBENIND. A.-G. Fr. 687,616, Jan. 3, 1930. A high wetting and dispersing power is obtained by addn. of phenols and sulfonic acids or their salts. Org. solvents may be added if desired.

Recovery of mercerizing lye. JOSEF OLIG, JR. & Co. G. M. B. H. Ger. 507,784, and 507,785, Feb. 18, 1927. An app. is described for squeezing and washing the mercerizing lye from treated hanks of yarn, for concn. and use with further hanks.

Bucking process for vegetable fibrous materials. GUSTAV ULLMANN. U. S. 1,787,880, Jan. 6. Fibrous material such as cotton is boiled in a liquor contg. caustic alkalies, metallic hydroxides such as $Ca(OH)_2$, $Ba(OH)_2$, $Al(OH)_3$ or $Fe(OH)_3$ and substances such as sulfonated castor oil adapted to cause the compds. produced from the natural fats and waxes of the fibrous material during boiling to assume a form which can readily be washed from the material.

Bleaching vegetable fibers. DEUTSCHE GOLD- UND SILBER-SCHEIDEANSTALT VORM. ROESSLER. Ger. 507,759, Sept. 23, 1924. Vegetable fiber, especially cotton, is bleached with alk. H_2O_2 at temps. below 50° and in a bath of such weakness that it contains 100 parts of cotton, etc., to 1 part H_2O_2. The bath may contain water glass and the cotton, etc., may be pretreated with weak Cl soln.

Bleaching linen. DEUTSCHE GOLD- UND SILBER-SCHEIDEANSTALT VORM. ROESSLER (Hermann Baier, inventor). Ger. 508,386, June 16, 1926. The linen is given an alk. boil and then treated with a series of bleaching baths comprising both oxidizing and reducing baths.

Bleaching feathers, pelts, bristles, etc. ÖSTERREICHISCHE CHEM. WERKE G. M. B. H. Austrian 119,265, Dec. 15, 1929. The materials are treated with gaseous H_2O_2. Suitably, they are warmed in a closed container contg. H_2O_2 soln. not in contact with the materials. In treating pelts, etc., the hide may be protected by pretreatment with fat. Cf. *C. A.* **24**, 3672.

Hypochlorite bleaching compositions. LLOYD T. HOWELLS (to The Electric Smelting and Aluminum Co., Inc.). Can. 305,878, Nov. 18, 1930. A sol. fluosilicate is added to hypochlorite compds. to activate them and produce a bleach for textiles. Where a hard bleach, such as $Ca(ClO)_2$, is used, a sol. fluoride, as KF, is mixed with the fluosilicate to ppt. the Ca producing a soft hypochlorite soln. which is not antagonistic in washing processes. Cf. *C. A.* **25**, 218.

Sizing textile fibers. I. G. FARBENIND. A.-G. Fr. 687,155, Dec. 23, 1929. Textile fibers are sized by treatment with polyvinyl alc. (Hermann and Haehnel, *C. A.* **22**, 214) either alone or with a sulfonated oil and the usual addns. for sizing such as oil, fat, wax, etc.

Sizing textile fibers. E. A. LAMONT. Belg. 367,413, March 31, 1930. The fibers are immersed in a colloidal soln. prepd. by digesting rubber waste in an org. sol-

vent. **Desizing is effected by using an emulsion of an org. rubber solvent in a hot soln. of neutral soap.**

Warp-sizing apparatus. CHARLES B. JOHNSON. U. S. 1,788,196, Jan. 6. Structural features.

Apparatus for sizing threads of artificial silk. VITTORIO VENEGONI. Fr. 687,686, Jan. 4, 1930.

Apparatus for the continuous washing and after-treatment of freshly prepared artificial fiber yarns. I. G. FARBENIND. A.-G. (Otto Weitermann and Hans C. Stuhlmann, inventors). Ger. 508,983, May 12, 1928. Details of construction and arrangement.

Artificial textile fibers. SOIE CHARENTAISE. Fr. 687,485, Mar. 18, 1929. After coagulation the threads from the spinning nozzles are united into a single bundle of parallel strands; this bundle is then submitted in the form of a ribbon to the various finishing operations such as washing, desulfurizing, bleaching, soaping and drying. An app. is described.

Artificial silk. SACHSISCHE MASCHINENFABRIK VORM. RICH. HARTMANN A.-G. Fr. 688,439, Jan. 18, 1930. App. for the washing and final treatments of the silk.

Artificial silk. THE TWITCHELL PROCESS CO. Fr. 688,512, Jan. 20, 1930. Artificial silk fibers of various origins are protected, from the time of their manuf. to the finishing of the cloth, by a layer composed of a chemically inert mineral oil such as paraffin oil and "true mahogany," the sulfonates obtained by treating lubrication oils with oleum.

Treating artificial silk. I. G. FARBENIND. A.-G (Kurt Littmann, inventor). Ger. 508,270, July 11, 1926. Artificial silk is given the appearance of natural silk by treatment in turn, in either order, with a soln. of a tanning agent and a soln. of a metal salt capable of forming with the tanning agent a colorless insol. or difficultly sol. ppt. Specific treatments with tannin soln. and $(AcO)_4Al$ or $SnCl_2$ are described.

Artificial horsehair. WALTER SCHNEIDER. Ger. 509,399, April 5, 1927. Cotton yarn is treated in turn, in either order, with a soln of glutin and a soln. of an Al salt. It is then dry-brushed by mech. means while still damp.

Degumming silk. I. G. FARBENIND. A.-G. (Paul Rabe and Gutav Manthe, inventors). Ger. 508,269, July 15, 1929. Crude silk is degummed by treatment with an acid, e. g., dil. HCl or AcOH, in the presence of sulfonated oils, fats or fatty acids that are not attacked by the acid. Mixed fabrics contg crude silk and acetate silk may be so treated. The treatment may be followed by soaping. Examples are given.

Scouring wool and silk. THE TWITCHELL PROCESS CO. Fr. 688,516, Jan. 20, 1930. Wool or silk is degummed by treating it with an alk. soln. of mineral oil sulfonates, preferably "mahogany" sulfonates. Fr. 688,517 describes a process for scouring wool by the action of an aq. soln. of mineral oil sulfonates and if necessary an alkali of moderate strength.

Felting woolen fabrics. SOC. ANON. DES ÉTABLISSEMENTS RICALENS. Ger. 508,647, May 15, 1929. The fabric is impregnated several times with a suspension of wool fat in soap soln., and after each impregnation a pressure difference is established between the two sides of the fabric so as to force the liquid therethrough in alternate directions. App. is shown.

Apparatus for cleaning and degreasing wool. HAROLD G. HOWELL and THOMAS R. HOWELL. Fr. 688,360, Jan. 16, 1930.

Separating fat from the waste waters of wool washing. KARL IMHOFF, GEORG MARTIN and FRIEDRICH SIERP. Ger. 508,192, Apr. 7, 1926. Colloid-collecting surfaces of the kind described in Brit. 255,833 (*C. A.* **21**, 2949), are used to sep. fat from the waste waters of wool washing, etc.

Wool fat. CARL VON OVERSTRAETEN. Ger. 508,500, Oct. 7, 1926. The ppt. obtained in known manner from wool-washing waste waters is heated with about 1% of sodium carbonate without addn. of water, and allowed to stand at a temp. below 105°. The upper layer, consisting of neutral wool fat, is then decanted and centrifuged.

Mothproofing wool, furs, etc. I. G. FARBENIND. A.-G. (Hermann Stötter, Berthold Wenk and Max Weiler, inventors). Ger. 506,770, Oct. 21, 1927. Wool, furs, etc., are treated with a cold aq. soln. of aromatic, non-halogenated hydroxycarboxylic acids, e. g., hydroxybenzoic acid, or their substitution products.

Waterproofing woolen cloth. V. F. GABBERKORN. Russ. 21,240, Nov. 26, 1927. Woolen cloth is treated for 15–20 min. with a soln. of $Al_2(SO_4)_3$ or alum on a water bath at a temp. not above 70°.

Waterproofing canvas, flax and other heavy sheeting. J. W. MACKENZIE. Brit. 334,020, July 16, 1929. The material is treated with an aq. compn. contg. flour, oil

or fat, rosin and alum, and then allowed to dry. Various details of procedure and compns. are given. NH_3 and a sizing agent such as gum arabic also may be added.

Fireproof fabric. HERBERT PLATT and CAMILLE DREYFUS (to Camille Dreyfus). Can. 307,239, Dec. 30, 1930. A fabric contg. yarn of cellulose acetate is immersed in an aq. soln. contg. approx. 100 g. of H_3PO_4 per l. at 40° for 15 min.

26—PAINTS, VARNISHES AND RESINS

A. H. SABIN

Comparative tests of paints carried out at Chatham dockyard. LEOPOLD H. SAVILE. *Dept. Sci. Ind. Research, Deterioration of Structures in Sea Water, 11th. Rept. Comm. of the Inst. Civil Eng.* 1930, 10–2.—Tests were made to compare some graphite paints with "dockyard" mixed red oxide and "Navy gray" paints. The corrugated iron walls (north and south) of a building were painted and exposed for about 13 years. On the south wall, the paints of graphite, Fe oxide and white lead were in good condition, while one of the gray paints was rated poor and one fair. The former gray was rated good on the north wall; otherwise the results on the 2 walls agreed. Of 2Fe oxide paints, the one giving better results contained a higher % of Fe oxide and no rosin.

I. H. ODELL

Protective coatings for iron and steel. II. Paints and enamels. HENRY N. BASSETT. *Ind. Chemist* 6, 293–6(1930); cf. *C. A.* 24, 4498.—Detailed descriptions are given of the methods in use for the removal of rust and scale, and for enameling, including a typical analysis of a ground coat and a final coat. A discussion of the properties required in the vehicle and of the functions of the pigment in rust-preventing paints, together with useful information on their application, is followed by information gathered from experience in protecting iron and steel from sea water. Varnishes, japans, cellulose lacquers, asphalt, pitch, anti-fouling compns. and methods for providing a cheap temporary protection are discussed.

E. G. R. ARDAGH

Plant and laboratory practice in the manufacture of pigments. L. V. ITZKOVICH AND A. I. GELIKH. *J. Chem. Ind.* (Moscow) 6, 1678–85(1929).—*Lead chrome.*—The chromes of commerce are generally a mixt. of various chromates ranging in compn. between $PbSO_4.2PbCrO_4$ and $2PbSO_4.PbCrO_4$. The following methods of prepg. the pigment were studied: (1) A soln. of $Pb(NO_3)_2$ or suspension of basic lead nitrate was mixed directly with a soln. of $Na_2Cr_2O_7$ and H_2SO_4. (2) A soln. of basic Pb acetate was pptd. with a soln. of dichromate and H_2SO_4. (3) $Pb(NO_3)_2$ was converted by soda into carbonate, and the chrome was then pptd. in the presence of HCl. (4) Basic Pb acetate was pptd. by soda, and the chrome was pptd. in the presence of HCl. (5) Basic Pb acetate was pptd. with CO_2, and the chrome was prepd. in the presence of HCl. (6) Litharge was ground in a mortar with NaCl until the oxychloride was obtained; the latter was then powdered, and the chrome was pptd. in the presence of HCl. (7) Finely powd. litharge was worked up in a beaker with AcOH (10 parts of 80% AcOH to 100 parts of litharge) with gradual addn. of H_2O. From the white "colloidal" litharge obtained paste with water was formed, and the chrome was pptd. in the presence of HCl. The methods starting with insol. salts are to be preferred. The p_H value during, and at the end of the reaction, and the dispersion of the initial insol. salts also have an influence, which is to be investigated further. *Artificial vermilion.*—Known methods of the manuf. of this pigment are reviewed. The plant at Odessa adopted a mixt. of powdered chalk and lithopone as substratum. Trial use of this vermilion for painting agricultural machinery gave satisfactory results. *Ultramarine.*—Calcination of kaolin for use in the manuf. of ultramarine increases its reactivity. For best results calcination should be carried out at about 650–700° for no longer than 1 hr. Of considerably greater importance is the dispersion of the kaolin. In addn. to these, the purity of shade of the ultramarine depends on the observance of a regular series of conditions during the ignition of the ultramarine. The porosity of the crucible material has a cardinal influence.

D. K.

The white pigments and their technical value. C. P. VAN HOEK. *Verfkroniek* 3, No. 9, 21–4(1930).—A review.

F. DE LEEUW

The use of zinc oxide as a pigment. I. II. PAUL KAMP. *Verfkroniek* 3, No. 8, 20–3, No. 9, 15–9(1930); cf. *C. A.* 24, 4408.—A review.

F. DE LEEUW

Emerald (chrome) green. V. N. SCHULTZ, YU. P. NIKOLSKAYA AND L. F. PENKOVA. *J. Chem. Ind.* (Moscow) 6, 1412–8(1929).—**Emerald green** $(Cr_2O_3)x.(H_2O)y$, **is in general manufd. by fusing** $K_2Cr_2O_7$ **and** H_3BO_3 **at a high temp.** The product

therefore invariably contains boric oxides. The authors studied this process to det. the best and most practical conditions of manuf., as well as the effect of these conditions upon the shade of the product. If the residual B_2O_3 is removed from the green by suitable reagents, the pigment acquires a fresh and bright appearance. The H_2O content of the pigment can be reduced to about 5% without injury to the pigment. From this they conclude that its formula is $3Cr_2O_3.2H_2O$ and that it is formed according to the following equation: $3K_2Cr_2O_7 + 12H_3BO_3 = 3Cr_2O_3.2H_2O + 3K_2B_4O_7 + 4.5\ O_2 + 16H_2O$. For satisfactory results a quantity of H_3BO_3 2 or 3 times the theoretical should be employed. As substitute for H_3BO_3, H_3AsO_3 does not give a sufficiently bright green; H_3PO_4 gives a pigment which is readily sol. in water. D. K.

Color pastes. W. Drostb. *Z. angew. Chem.* **43**, 1002–6(1930).—The significance of color pastes to the painting industry is discussed. The most important properties of linseed oil pastes are viscosity, elasticity and "stringyness." Viscosity is detd. by the work of deformation per unit vol. as obtained by measuring the distance a cone of certain shape falling from a fixed height enters the paste under investigation. The accuracy of the method was shown to be 10%. Elasticity is comparative and is measured by observing the difference in the rate at which the cone used in detg. viscosity enters different pastes. Stringyness depends upon the adhesive properties of the paste and is measured by the length to which a thread of paste is spun out when the cone is withdrawn from the paste. Satisfactory pastes must be smooth and flexible, with a viscosity of 80–180 g. cm. per cc. and a stringyness of 5–20 cm. The av. rate at which the cone sinks into most pastes lies between 0.3 and 2 sec. per cm. though some pastes show a rate of above 5 sec. per cm. High elasticity appears to be an undesirable characteristic. Estn. of the "oil number" resulting from the oil consumption in the conversion of a pigment to a paste shows no correspondence with viscosity, and no conclusion regarding behavior at a higher oil content can be drawn. *Ibid* 1022–5. The workability and character of the paste are detd. essentially by the properties of the combined pigment and linseed oil, though the pigment seems to play the major role. Poor pastes can often be improved by the addn. of some material such as fatty acid, heavy oil or Al stearate. These seem to serve essentially as wetting agents, but the action of each is rather specific, serving to correct some one deficiency of the paste. A new wetting agent has been developed which is general in its action, is required in only small quantities and is much more efficient in the correction of paste deficiencies. The interfacial surface tension between corn, linseed oil and H_2O differs greatly but does not parallel the results of grinding, and the effects produced by the addn. of the wetting agents mentioned cannot be ascribed simply to a change in interfacial surface tension. Rather, these substances appear to serve as protective colloids against the pigment aggregation which is often promoted by the properties of the pigment or the vehicle or both. The especially great influence of the new wetting agent is probably due simultaneously to its action as a protective colloid and its extraordinary ability to decrease interfacial surface tension. C. H. Peet

The story of inks. C. C. Pines. *Am. J. Pharm.* **102**, 677–88(1930).—A popular science talk including a review of the compn. and manuf. of inks. A short bibliography is appended. W. G. Gaessler

Potentiometric determination of saponification number of mixtures of asphalt and drying oils. James V. Demarest and Wm. Rieman, 3rd. *Ind. Eng. Chem., Anal. Ed.* **3**, 403(1931).—The sapon. no. of linseed oil, gilsonite or their mixts. can be very accurately det. by dissolving in anisole, refluxing with alc. KOH, and titrating with standard aq. HCl, a normal calomel electrode and a H electrode of the usual type being used. With mixts. contg. soy-bean oil or Bermudez asphalt the results are less accurate. Blank det. and standardization of the KOH are unnecessary. L. E. Gilson

Kinetics of the baking process of oil varnishes. R. H. Kienle. *Ind. Eng. Chem.* **22**, 1370–3(1930); cf. *C. A.* **24**, 737.—The baking process of a typical oil varnish was studied kinetically; a spectrophotometer was used to measure the degree of bake by the percentage of light of 6600 A. U. reflected by the film. Measurements were made at 275°, 295°, 315° and 335° in air, O and N atms. In each case isotherms of the baking process were obtained by plotting the percentage of reflected light as a function of the time. For each gaseous atm. the percentage of reflected light for the initial and the deteriorated states was also detd. By using these values and analyzing the data of the various isotherms it was found that the baking process follows the expression for a unimol. reaction and satisfactory reaction velocity consts. could be calcd. When the logarithm of the reaction velocity const. was plotted against the reciprocal of the abs. temp. a series of straight lines was obtained. The temp. coeffs. of the baking

process for the different atms. investigated were obtained directly from these curves. Expressed in terms of a 10° temp. difference the coeffs. (k 305°/k 295°) were 1.40, 1.35 and 1.29 for O, air and N, resp. From the reaction velocity consts. and the temp. coeffs. the heats of activation were calcd. by the use of the Arrhenius equation as 22,000, 19,500 and 16,000 cal./g. mol. for O, air and N, resp. Tables and diagrams are given. Several practical applications of the data obtained are discussed. Cf. Genthe, *Z. angew. Chem.* **19**, 2087(1906); *C. A.* **2**, 1690, 2896; **4**, 2882; **15**, 1135, 3559; **16**, 348, 1511; **17**, 3922; **21**, 1192; **24**, 3661. D. Thuesen

Oils, resins, lacquers. Hans Wolff. *Kolloid-Z.* **49**, 210–7(1929).—A review. A. Fleischer

X-ray study of natural and fossil resins. C. Mahadevan. *Indian J. Physics* **5**, 345–57(1930).—X-ray diffraction patterns of natural and fossil resins are essentially alike. A strong halo appears with the intensity max. varying from 14½° to 16°. There is considerable scattering between the direct spot and the inner margin of the halo. The softer resins give larger spacings and as the hardness increases the inter mol. distances become smaller. The resinic acids and resenes obtained from typical resins also give the intense halo within approx. the same range as that for the untreated resins. The common halo is believed to be due to a similar structure of the components in spite of chem. variations. H. W. Walker

The optical rotation of resins. I. Amber. C. Plonait. *Chem. Umschau Fette, Oele, Wachse Harze* **37**, 321–3(1930).—The ext of amber has a strongly positive sp. rotation regardless of the type of solvent used; in a 1-dm. tube the sp. rotation is + 20.5 to + 29.1° in dioxane at 20°. **II. Copal.** C. Plonait and S. Lorbmann. *Ibid* 323–6.—One hundred different copal samples were examd., dissolved in Wolff's solvent (1 benzene, 1 butanol and 2EtOH). Contrary to general belief the different types varied within characteristic limits. Zanzibar copal —25 to —35°, Sierra Leona —28 to —37, Congo —24 to —35, Angola —2 to +12, Venezuela —3 to —21, Brazil —11 to —23, Manilla hard —30 to —48, soft +33 to +55, Borneo +28, Pontianak +33 to 34, Philippine +23 to +31, Netherland India +32 to +37, Batjan +36 to +39, Australian kauri copal —1 to +23°. The sp. rotation is a useful const. in differentiating between different types of copal resins. P. Escher

Modern methods of rosin size manufacture. C. N. Ridley. *Ind. Chemist* **6**, 369–71(1930). F. H.

Cellulose esters [in making varnishes] (Fr. pat. 687,996) **23.** Anthraquinone derivatives [for coloring resins, lacquers, etc.] (Fr. pat. 687,039) **10.** Coating materials [lacquers] (Fr. pat. 687,597) **18.** Benzyl cellulose, etc. [use in lacquers] (Brit. pat. 333,902) **23.** Resin soaps and emulsions for dressing and finishing paper, etc. (Ger. pat. 507,506) **23.** Soluble transformation products of diolefins (Fr. pat. 687,773) **18.** Removal of naphthalene from solvent naphtha (Can. pat. 306,628) **22.**

Gardner, H. A.: **Physical and Chemical Examination of Paints, Varnishes, Lacquers and Colors.** 5th ed., revised and enlarged. **Distributed by** Inst. of Paint and Varnish Research, Washington. 950 pp. **$10. Reviewed in** *Ind. Eng. Chem.* **22**, 1261(1930).

Harrison, A. W. C.: **Pigment Manufacture (The Manufacture of Lakes and Precipitated Pigments.)** London: Leonard Hill, Ltd. 270 pp. 15s. Reviewed in *J. Oil Colour Chem. Assocn.* **13**, 316(1930).

Miskella, Wm. J.: **Practical Japanning and Enameling.** Chicago: Finishing Research Labs., Inc. 250 pp. $3.65. Reviewed in *Foundry* **58**, No. 22, 72(1930).

Paints. Cropp & von Plettenberg. Ger. 508,405, May 15, 1927. Paints for ships' bottoms include 1–10% of Hg powder for the purpose of preventing attachment of barnacles, etc., to the ship. The Hg powder is prepd. by gradually adding an aq. soln. of $HgNO_3$ to a feebly acidified soln. of $FeSO_4$, and decanting and washing the ppt.

Paints. Nicholas J. Schields. Fr. 687,612, Jan. 3, 1930. A paint is composed of a vehicle and oxide of Hg exceeding 25% of the total wt. of the paint, and preferably about 50%. The paint also contains oxide of Fe and minium or other Pb compd.

Paints. De Keyn Frères (Soc. anon.). Fr. 687,252, Dec. 26, 1929. A compn. for use in the paint industry is formed of oxides of Ti and Al (the latter hydrated or not). They may be used as powder or ground with oils or varnishes.

Paints. I. G. Farbenind. A.-G. Fr. 687,086, Dec. 21, 1929. Finely divided

doring materials are mixed in an aq. emulsion of a synthetic resin contg. radicals of a olyhydric alc., a polybasic acid and an unsatd. fatty acid of the drying type. A resin ade from glycerol, linoleic or oleomargaric or ricinoleic acid and phthalic anhydride ay be used.

Coating or painting bituminous materials such as molded battery boxes or flush nks. OLIVER O. RIESER (to Richardson Co.). U. S. 1,788,250, Jan. 6. The surface objected to a preliminary treatment with agents such as $CaOCl_2$, $K_2Cr_2O_7$, nascent O or HNO_3 to render it impervious to the solvent (such as oil of ordinary paint) with ich the coating is applied.

Pigments. RUDOLF BLOCH and CARLO ROSETTI. Ger. 507,834, Jan. 1, 1929. A t fast, luminous, heat-resisting green pigment is prepd. by heating the basic Cu phate $4CuO.P_2O_5.H_2O$ to 640–650° until it reaches the luminous stage.

Pigments. GUANO-WERKE A.-G. VORM. OHLENDORFF'SCHE UND MERCK'SCHE (Walter Hene, inventor). Ger. 507,936, Apr. 4, 1929. $Cr(OH)_3$ contg. weak lkali is heated to glowing in air and the alkali chromate so formed leached out. The oxide is heated to glowing in a reducing atm. to give 97–98% Cr_2O_3 as a finely powd. green pigment.

Green chromium pigment. I. G. FARBENIND. A.-G. (Rudolf Caspari, inventor). Ger. 507,937 May 8, 1926. Chromate soln is heated to 110° with an org. reducing agent optionally under pressure, till an oxide-hydroxide is produced. This is filtered off, washed and heated to glowing to form Cr_2O_3 as a fine blue-green powder. Examples are given.

Titanium pigments. REGINALD H. MONK and LUDVIG FIRING (to Titanium, Ltd.). Can. 307,012, Oct. 21, 1930. Titanates of the alk. earth metals are produced by mixing with pptd. $Ti(OH)_4$ a halide of an alk. earth metal to disperse the $Ti(OH)_4$, mixing with the dispersed hydroxide an alk. earth metal compd. which contains an ion of charge opposite to that of the dispersed hydroxide and calcining the coagulated mass at substantially 840° in the presence of an alk. earth metal compd. Cf. *C. A.* **24**, 6040.

Zinc white. "SMELTING" KOHÁSZATI ÉS FÉMMŰVEK RÉSZV.-TÁRS. Swiss 140,405, May 1, 1929. App. is described for heating a mixt. of metallic material and fuel with air, molten Zn is produced and collected, and for passing a current of O over the Zn vapor to form ZnO. Cf. *C. A.* **24**, 2844.

Iron-free solutions of aluminum salts. LEOPOLDINE DÖRNER NÉE ZOLLMANN VON ZIPSER DORF. Ger. 506,626, Mar. 10, 1925. Al-contg. minerals such as anorthite, labradorite, kaolin, etc., are heated with neutral ferric salt solns. The ppt. is filtered off and an Fe free Al salt soln. Alkali chloride may be added to facilitate the separation. The Fe contg. ppt. is dried and used in *pigments*.

Mill (with roller and contact block) for grinding inks, paints, enamels, etc. ERNEST G. [illegible]. U. S. 1,787,180, Dec. 30. Structural features.

Ink suitable for writing. CHALFANT F. BIVINS. U. S. 1,787,233, Dec. 30. A dry powder suitable for use after mixing with water comprises an admixt. of a suitable color matter together with citric or benzoic acid or both, or salicylic, tartaric or succinic acid, for avoiding undue pptn. of sediment.

Intaglio ink. GEORGE D. KNIGHT (to Emory Winship). Can. 304,857, Oct. 14, 1930. A quick drying ink for use in intaglio printing consists of approx. 22% gilsonite, 51% aromatic hydrocarbon solvent of gilsonite, 22% of water and 5% of glue united to constitute a homogeneous mixt.

Intaglio printing colors. HANNS FLEISCHMANN and OTTO JORDAN (to I. G. Farbenind. A.-G.). U. S. 1,787,239, Dec. 30. Intaglio printing colors are prepd. which comprise a finely dispersed coloring material and a soln., in a volatile org. solvent, of a resinous product formed by the condensation of a urea with an aldehyde, of org. vinyl esters or of dibasic org. acids with polyhydric alcs.

Varnishes. BAKELITE G. M. B. H. (Ernst Elbel and Fritz Seebach, inventors). Ger. 507,998, June 23, 1927. Varnishes comprising a reactive or hardened phenol-aldehyde condensation product and a drying oil are prepd. by grinding the ingredients together in a ball mill or the like.

Varnishes. BAKELITE CORP. Fr. 688,303, Jan. 15, 1930. An oleoresinous varnish resistant to water is made by incorporating chlorinated naphthalene in a mixt. of a resinous substance and a fatty oil and afterward adding suitable varnish solvents. A mixt. of rosin and tetra-chloronaphthalene is mentioned as suitable. In an example, tung oil 70, Cellosol 120, CH_3O 120, colophony 50, $(CH_3)_6N_4$ 1 and chlorinated naphthalene 90 and xylol 250 parts are melted together and dehydrated. Solvents such as a mixt. of toluene are added. Other examples are given.

Varnishes, etc. I. G. FARBENIND. A.-G. Fr. 687,119, Dec. 23, 1929. Varnishes,

mastics and like coverings are made from cellulose ethers, resinous condensation products sol. or swelling strongly in benzene hydrocarbons, prepd. from polybasic acids and derivs. of polyhydric alcs. which contain at least one free OH group, and solvents with or without other substances. Thus ethylcellulose and a condensation product of phthalic acid and the glyceride of linoleic acid contg. unesterified groups are dissolved in a mixt. of C_6H_6, toluene and alc. The product is a valuable coating for wood. Other examples are given. Cf. *C. A.* **24**, 6040.

Drying varnish films such as those on fibrous insulating material. PAUL B. COCHRAN (to Westinghouse Elec. & Mfg. Co.). U. S. 1,786,824, Dec. 30. Fibrous material such as silk or cotton insulation is preheated in ozonized air to strengthen the material and sat. it with ozone, there is then applied to it an insulating varnish contg. asphalt, a vegetable drying oil and a volatile thinner, and heating is continued at an elevated temp. to expedite oxidation of the oil and drying of the varnish assisted by the ozonized air and ozonized fibers.

Driers for varnishes, etc. GEBRÜDER BORCHERS A.-G. Fr. 688,306, Jan. 15, 1930. Driers having a high metal content are prepd. by replacing the H of the OH or COOH groups of mono- or poly-hydroxy fatty acids contg. one or more COOH groups or of the glycerol esters of these acids by metals such as Al, Pb, Zn, Co, Cu, Mn and Bi. Examples are given.

Drying-oil composition. JAMES E. BOOGE (to Canadian Industries, Ltd.). Can. 305,163, Oct. 28, 1930. To make a permanent mixt. of nitrocellulose and a drying oil (linseed, China wood or perilla) the hot oil is blown with air, which results in a drop in the I no. of the oil, accompanied by an increase in the viscosity that renders the oil completely miscible with pyroxylin jelly, and then the blown oil is mixed with nitrocellulose. This compn. is used in the manuf. of *artificial leather, films*, etc.

Lacquer. ROBERT T. HUCKS (to Canadian Industries, Ltd.). Can. 305,160, Oct. 28, 1930. Colloided pyroxylin contg. dibutyl phthalate is mixed with a pulp pigment contg. a substantial quantity of water, the mixt. is stirred until the water seps. and the sepd. water is removed. Prior to, or during mixing it is preferable to add a small amt. of an active pyroxylin solvent which is also a water repellent and hastens the sepn. of the H_2O.

Lacs. ALLGEMEINE ELEKTRIZITÄTS-GES. Ger. 509,538, May 26, 1927. Addn. to 410,600. In making the lac described in 410,600, from resin, asphalt, wood oil, linseed oil, etc., 1–10 parts of NH_3 are used as the emulsifying agent in the cold.

Lacs. LOTHAR BARENSFELD. Ger. 508,556, May 9, 1928. A wrinkled effect is produced by spraying a solvent liquid over a smooth-dried wood-oil lac. Thus, a smooth-dried coating of a lac contg. collodion, wood oil, Cu resinate, AcOBu and toluene is sprayed with a mixt. of AcOBu, AcOEt and toluene.

Colored nitrocellulose lacs. I. G. FARBENIND. A.-G. (Erich Richter, inventor). Ger. 509,539, Feb. 2, 1926. See Brit. 291,539 (*C. A.* **23**, 1293).

Coating lac of hardened phenolic resin. BAKELITE CORPORATION. Ger. 508,814, June 5, 1926. See *C. A.* **22**, 2476 (Brit. 276,417).

Coating materials. I. G. FARBENIND. A.-G. Fr. 688,315, Jan. 16, 1930. A compn. for the production of coatings on porous materials consists of emulsions of solns. of cellulose derivs. in aq. solns. of org. colloids sol. in water, capable of forming films, in the presence of supplying agents. Thus, a nitrocellulose varnish is emulsified in a soln. of methylcellulose in water and dibutyl phthalate is added. Other examples are given.

Coating composition. CHESTER G. GAUERKE (to Canadian Industries, Ltd.). Can. 305,654, Nov. 11, 1930. A coating compn. contains run β-eleostearin, a modified glyptal resin, high-boiling gasoline and cobalt drier.

Coating composition. VICTOR H. TURKINGTON and WILLIAM H. BUTLER (to Bakelite Corp.). Can. 306,936, Dec. 23, 1930. A coating compn. includes a resinous reaction product of a phenol having a mol. wt. of about 122 or higher with a methylene-contg. agent and a fatty acid.

Coatings for flame-retarding coverings. HARRY N. BOCKUS (to The Solar Compounds Corp.). Can. 305,733, Nov. 11, 1930. A coating comprises 6 lb. of an alc.-sol. gum dissolved in 1 gal. of thinner, a plasticizer 3% by wt. of said soln., and a colored pigment. Cf. *C. A.* **24**, 4127.

Linoxyn. RUDOLF KÜRTH. Ger. 508,812, June 22, 1928. Lynoxyn cloth is prepd. by soaking coarsely woven fabric with linseed oil and oxidizing. Fabric made wholly or partly of artificial silk may be used.

Linoxyn. RUDOLF KÜRTH. Ger. 508,813, July 14, 1928. Bands of cellulose, paper, cellulose yarn or paper yarn are punched, soaked and oxidized. The surface

may have a wave-like form and the oxidizing air may be artificially supplied to the oxidizing chamber.

Linoleum. EDMUND CLAXTON (to Armstrong Cork Co.). Can. 305,126, Oct. 28, 1930. A mixt. of linseed oil and an anticoagulant resin is oxidized to a linoleum cement. A linoleum mix contg. this cement and a coagulant is then prepd.

Resins. ALEX STIEL. Fr. 688,329, Jan. 16, 1930. Insol. or difficultly sol. natural resins are transformed into easily sol. resins by treating them in a finely divided state with O or oxygenated gases. The treatment may be carried out in moist air and with the aid of chem. active light.

Rosin. ROBERT C. PALMER (to Newport Co.). U. S. 1,787,281, Dec. 30. Rosin in solid form substantially free from cryst. abietic acid is prepd. by adding to rosin while in the liquid phase an amt. of caustic alkali sufficient to neutralize 2.5-6% of the abietic acid content of the rosin under treatment (thus forming a relatively small quantity of alkali metal abietate) and allowing the treated rosin to solidify.

Mastic. CARNITT ROSTSCHUTZ- UND FARBSTOFF GES. M. B. H. Fr. 688,482, Jan. 20, 1930. A mastic which may be applied as a coating or by pulverization is composed of ground slags such as Fe slag and a support or binding material.

Resinous compositions. BAKELITE CORP. Fr. 686,772, Dec. 17, 1929. A fibrous resinous compn. useful as *an insulator* is composed of ligneous fibers rich in α-cellulose and a potentially reactive resinoid, such as a PhOH-CH_2O condensation product in the potentially reactive state. Cf. *C. A.* **24**, 1996.

Condensation products from aldols and urea. I. G. FARBENIND. A.-G. Ger. 500,753, Sept. 16, 1926. Water-sol. resins having emulsifying and wetting properties are prepd. by heating aldols with urea, *e. g.*, at 110–120°. An example is given.

Condensation products of urea and alcohols or ketones. I. G. FARBENIND. A.-G. (Max Paquin, inventor). Ger. 506,963, Oct. 5, 1926. Oily or resinous products are obtained by heating urea or derivs. with excess of alcs. or ketones, optionally under pressure and with catalyzers. In an example, urea is heated with AcH and glycerol to 150° for 1 hr., to produce a viscous oil. Many other examples are given.

Condensation products of urea and alcohols or ketones. I. G. FARBENIND. A.-G. (Max Paquin inventor). Ger. 508,795, Nov. 7, 1926 and 508,796, Mar. 15, 1927. Addn. to 506,963 (preceding abstr.). In producing synthetic resins and oils by the method of 506,963, the starting materials are allowed to react in the presence of strong mineral acids (508,795), or in the presence of amino compds. other than urea (*e. g.*, toluene sulfamide) (508,796). In the former case, the reaction takes place without external addn. of heat. Examples are given.

Laminated products bonded with synthetic resins. JOHN M. TAYLOR, CLIFTON N. JACOBS and ROBERT R. TITUS (to Continental-Diamond Fibre Co.). U. S. 1,787,404, Dec. 30. A plurality of strips of material such as paper or cloth are treated with a synthetic resin in its sol. stage, the strips are dried, superposed one upon another and each strip, prior to its application to the previously assembled strips, is heated to melt the resin and is then immediately rolled in contact with the previously assembled strips.

Synthetic resins. CARLETON ELLIS. U. S. 1,787,618, Jan. 6. A material contg. a S chloride resin derived from 10 parts of a phenolic compd. with at least 15 parts of S chloride is incorporated with a small proportion of a formaldehyde material, and the mixt. is heated substantially to raise the softening point of the material without rendering the resin infusible.

Synthetic resin. CONSORTIUM FÜR ELEKTROCHEMISCHE INDUSTRIE G. M. B. H. (Wolfgang Haehnel and Willy O. Herrmann, inventors). Ger. 507,962, Apr. 30, 1927. Polyvinyl alc. is condensed with CH_2O or paraformaldehyde in such amts. that the resinous product contains both components. Examples are given.

Synthetic resins. I. G. FARBENIND. A.-G. (Otto Schmidt and Karl Seydel, inventors). Ger. 508,994, Mar. 24, 1926. Addn. to 420,414. Resins manufactured by condensing cyclic ketones are worked with natural or artificial rubber-like products in the presence or absence of other materials such as cellulose. Examples are given.

Synthetic resins. I. G. FARBENIND. A.-G. Fr. 688,185, Jan. 14, 1930. Condensation products prepd. by condensing urea or its derivs. with CH_2O, its polymers or derivs. in org. solvents, are sepd. from the solvents by a steam distn., if necessary under vacuum and with superheated steam. Examples are given.

Synthetic resin compositions. IMPERIAL CHEMICAL INDUSTRIES, LTD. Fr. 687,801, Jan. 9, 1930. Resins are made by condensing a polyhydric alc. with a polybasic acid in the presence of one or more mono-carboxylic acids, a drying oil being incorporated at any stage. Thus, glycerol, phthalic anhydride and oleic acid are heated to 200–250° and linseed oil is added to form a clear brown resin. The oleic acid may

be replaced by linseed oil acids and the linseed oil by China wood oil. Cf. *C. A.* 24, 740, 4648.

Synthetic resins. LÉON ARNAUD. Fr. 688,269, April 5, 1929. Synthetic resins are prepd. by condensing CH_2O and urea in the presence of glucides (levulose, glucose, saccharose, dextrin, etc.), with oxides, hydroxides or basic salts of heavy metals as catalysts; the mass is brought to a degree of neutralization between acidity to tournesol and neutrality to methyl orange. This state of neutralization is obtained by the addn. of NH_4 salts or salts of aliphatic or aromatic amines.

Heavy metal salts of monoalkyl phthalates. COMMERCIAL SOLVENTS CORPORATION. Ger. 509,937, Apr. 1, 1926. These are prepd. from solns. of alkali metal monoalkyl phthalates and solns. of salts of Zn, Fe, Pb, Cu, Ni, Cr, Co, Cd and Mn. The example describes the prepn. of Zn butylphthalate from Na butylphthalate and ZnCl. The products are *synthetic resins*.

27—FATS, FATTY OILS, WAXES AND SOAPS

E. SCHERUBEL.

The pyrolysis of vegetable oils of high acetyl number. RAYMOND DELABY AND RAYMOND CHARONNAT. *Compt. rend.* 191, 1011-2(1930).—In order to det. whether the com. grape-seed oil contains ricinoleic acid its thermal decompn. under reduced pressure was studied. Under conditions in which the Na soap of ricin yielded sebacic acid, methylhexylcarbinol, and the corresponding ketone, the grape-seed oil gave only a no significant alc. fraction and an oily acid phthalate. Grape seed oil, therefore, does not contain ricinoleic acid or other ethylene acid alc. capable of breaking down into a satd. aldehyde and unsatd. acid. RACHEL BROWN

Investigations on castor oil. EMILE ANDRÉ AND CL. BESSÉ. *Ann. combustibles liquides* 5, 463-80(1930); cf. *C. A.* 24, 2908.—A complete chem. and phys. examn. is made of various grades of castor oil. The various tests for adulteration are discussed. The H_2SO_4 test is not reliable. The petr. ether test was examd. for mixts. with 1 to 20% of other oils; only in the latter case are reliable results obtained. E. SCHERUBEL

The oil-palm industry. S. M. GILBERT. *Trop. Agr.* (Trinidad) 7, 204-9(1930). The oil content of the fruit of the oil palm is about 20% by wt. One variety from S. Nigeria contains 55% oil. The av. tree produces 20 lb. of fruit annually which by native methods of extn. yields only about 2 lb. of oil. Methods of production of fruit and extn. of oil are discussed in detail. In Nigeria oil is produced by 2 different primitive hand methods known as the hard-oil and soft-oil processes. Soft oil consists chiefly of triglycerides palmitates. The hard oil is less desirable because it contains free fatty acids but since no premium is paid for soft oil in the export market only hard oil is exported. The chief method of extn. in the Belgian Congo is the centrifugal process and in Sumatra it is the hydraulic-press method. A. L. MEHRING

Determination of trimethylene glycol in glycerol. K. CAZAFURA. *Seifensieder-Ztg.* 57, 789-91(1930).—This is a crit. discussion of the detn. of trimethylene glycol in glycerol by Rojahn's method and Fachini-Somazzi's method (*C. A.* 18, 2858), and a suggestion of some changes and adoption of Bosart-Snoddy's sp. gr. table for glycerol (*C. A.* 21, 1907). The F.-S. method for trimethylene glycol depends upon the detn. of total O_2 consumption of glycerol + trimethylene glycol with $K_2Cr_2O_7$ and upon the gravimetric detn. of CO_2 evolved, from which data the % of each can be calcd. A slight error in titration or CO_2 wt. causes a large error in the final results. P. J. CARR

Detection of carnauba wax in beeswax. LLOYD R. WATSON. *Chemist Analyst* 20, No. 1, 4-9(1931). See *C. A.* 24, 2908. W. H. H.

Potentiometric determination of saponification number of mixtures of asphalt and drying oils (DEMAREST, RIEMAN) 26. Some errors in analytical bromination (BLICKWALTER, WAGNER) 7. Siam Government Laboratory, 4th report [oils] (MARCH) 17. Separating fat from the waste waters of wool washing (Ger. pat. 508,192) 25. Hydrogenating oils, etc. (Fr. pat. 687,204) 22. N compounds [soaps] (Fr. pat. 687,2[illegible]) 18. Apparatus with superposed evaporating trays suitable for distillation of oils and liquid solvents (U. S. pat. 1,787,309) 1. Apparatus for determining specific gravity of oils, etc. (U. S. pat. 1,787,132) 1. Decomposition of salts of mineral-oil acids and of fatty and tar acids (Russ. pat. 54,955) 22.

McGOWAN, ELLEN BEERS: ***A Comparative Study of Detergents, with Special Reference to the Teaching of the Subject.*** *New York: Columbia Univ.* 125 pp.

Fatty acids. HANS P. KAUFMANN. Fr. 687,233, Dec. 26, 1929. Satd. fatty acid are prepd. from fats, or fats are enriched in fatty acids by uniting in a single operation catalytic hydrogenation and hydrolytic decompn. Several examples are given.

Fatty acids from oxidation of paraffin, etc. I. G. FARBENIND. A.-G. Brit. 333,904, March 14, 1929. For effecting isolation of fatty acids from crude oxidation products such as those of paraffin, montan wax or beeswax, the products are treated, at room temp. or slightly higher temp., with an alkali (such as anhyd. Na_2CO_3) in quantity sufficient to neutralize exactly the free acids in the material; the neutralized mass is preferably dried, and, after removing unsaponifiable materials and esters by extn. with a solvent such as benzine, the resulting pure salts are decompd. with an inorg. acid. Details of treatment are described.

Fatty acid derivatives containing nitrogen. I. G. FARBENIND. A.-G. Fr. 687,865, Jan. 8, 1930. Derivs. of higher fatty acids are made at high temps. with or without catalysts and, if necessary, under pressure by the reaction of solns. of NH_3 in org. solvents such as alcs. on halogen derivs. of satd. or unsatd. higher fatty or hydroxy fatty acids. The products have the property of *soaps*. Examples are given of the treatment of hexachlororicinoleic acid, hexachlorostearic acid, chlorolinoleic acid and the ethyl ester of tetrachlorooleic acid.

Splitting fatty acid esters. H. T. BÖHME A.-G. Brit. 334,022, Oct. 17, 1929. Esters such as fats or oils are hydrolyzed by heating with water in the presence of a product obtained by the sulfonation of a mixt. of an alc. such as "olein alc." and an aromatic hydrocarbon such as naphthalene.

Purifying oils and fats. I. G FARBENIND. A.-G. Fr. 688,370, Jan. 17, 1930. Impurities such as soaps, resinous, mucilaginous or albuminous substances are sepd. from oils or fats by adding org. substances practically insol. in oils or fats (which adhere to the impurities and which are capable of dissolving them) in such small quantities that the impurities are sepd. without being dissolved, or by emulsifying the oils or fats with such small quantities of liquids which do not mix with them, that the added liquids form the internal phase in the resulting emulsion. Thus, 100 parts of cottonseed oil is treated in a turbo-mixer with 2 parts of distd. water and the resulting emulsion is centrifuged. Soy-bean oil (100 parts) is treated with formamide (2 parts) and the resulting emulsion is filtered. Other examples are given.

Apparatus for extracting oils and fats. PAUL PÁRODI. Fr. 687,710, Jan. 6, 1930.

Apparatus for extracting oils, fats, etc. VOLKMAR HÄNIG & Co. Ger. 508,313, Aug. 22, 1926. A construction of grating or sieve is described.

Glycerophosphates. J. D. RIEDEL-E. DE HAËN A.-G. Ger. 507,794, July 15, 1927. Addn. to 421,216. Soy-bean ext. or lecithin-free soy mucus is sapond. with aq.-alc. alkali and the resulting glycerophosphates sepd. from the soap, bases and glycerol, by alc. The impurities insol. in alc. are removed by water. Examples are given.

Cholesterol. GÜNTHER ADAM. Ger. 508,407, Jan. 10, 1930. Cholesterol is sepd. from the saponn. products of wool fat by treating these with a soap prepd. from coconut oil and/or palm-nut oil, dilg. the mixt., and allowing it to stand in the warm after satg. it with salt. Addnl. details are given.

Basic products. I. G. FARBENIND. A.-G. Fr. 687,224, Dec. 24, 1929. Fatty acids, or their esters, chlorides or amides are condensed with amino alcs. contg. at least 2 amino groups one of which is a tertiary group. Thus, oleic acid or its ethyl ester is heated to 220° with diethylamino-β-hydroxypropylamine, giving a viscous oil. Other examples are given. The products are auxiliary agents in the manuf. of *rubber*, and thickening agents for the prepn. of *cosmetics*, etc. Cf. *C. A.* **24**, 2244.

Rendering waxes, soaps, etc., electrically conductive. THE GRAMOPHONE CO., LTD. Ger. 508,206, Mar. 1, 1928. See Brit. 290,406 (*C. A.* **23**, 778).

Detergent. HOMER LANDON (to Joseph Lewis). Can. 305,022, Oct. 21, 1930. To a soap (preferably made by using both soda and potash lye) are added Na_3PO_4 and an abrasive such as fine granular silica sand.

28—SUGAR, STARCH AND GUMS

J. K. DALE

Identifying liquids **such as lubricating oils (U. S. pat. 1,787,995) 22. Organic** acids by fermentation **(Can. pat. 306,081) 16.**

WOMACKA, OSKAR: **Betriebskontrolle der Zuckerfabrikation. II Teil: Chemische**

technische Rechnungen. 3rd ed., enlarged and improved. **Magdeburg: Schallehn & Wollbrück.** Reviewed in *Intern. Sugar J.* **32,** 635(1930).

Sugar. BERTHOLD BLOCK. Ger. 509,580, Sept. 5, 1928. Sugar sap is satd. by leading the sap residues back through the sap till satn. is reached. The app. is described.

Sugar. SOC. ANON. DES ÉTABLISSEMENTS A. OLIER. Ger. 507,884, Mar. 2, 1928 An automatic continuously acting device is described for treating solid sugar-contg. materials with extg. liquid.

Sugar extraction. KARL PHILIPP. Fr. 688,013, Jan. 10, 1930. See Ger. 502,881 (*C. A.* **24,** 5533).

Apparatus for treating sugar juices with lime. WALTHER SCHRADER. Ger 508,231, Mar. 2, 1928.

Purifying saccharine liquids such as sugar juices, sirups or molasses. LEONARD WICKENDEN and JOHN J. NAUGLE (Wickenden to Naugle). U. S. 1,787,502, Jan. 6. Material contg. 2 or more types of impurities is treated with subdivided carbonaceous adsorbent of varied degrees of fineness, one portion of which adsorbs one type of the impurities and another portion of which adsorbs another type of the impurities. An arrangement of app and numerous details of procedure are described.

Recovery of sugar from sugar-house and refinery scums. D. TEATINI. Belg. 367,849, March 31, 1930. The scums are worked up with a liquid so as to obtain a "milk" of predetd. d., which is then treated with CO_2 or SO_2 so as to reduce the alky. to the point required for max. liberation of sugar. The mixt. is then filtered and the filter cake washed to an extent depending on the degree of recovery desired.

Purifying sugar-house and refinery juices. D. TEATINI. Belg. 367,847, March 31, 1930. The raw juices are treated with an amt of SO_2, preferably in liquid form, which is detd. in each case. This treatment is preceded by an alkalinization depending on the nature of the raw juice to be treated, and followed by addn. of a small quantity of CaO, or its equiv., which is subsequently pptd. with CO_2 or the like. Belg. 367,848 provides for the elimination of the usual carbonation treatment. The previously alkalinized raw juice is treated at suitable temp. with a predetd. quantity of SO_2, as liquid or gas, so as to cause flocculation in the liquid, which is subsequently clarified.

Multiple-effect crystallization of sugar. JOSHUA R. RAY and THOMAS RAY. U. S. 1,785,530, Dec. 16. An evapg. pan is partially filled with liquor, and after partial evapn., more of the liquor is slowly fed to the evapg. pan; a cut strike is then made into a plurality of assocd. evapg. pans of the multiple effect, and the second-mentioned pans are fed with fresh liquor. Various details of app. are described.

Rotary-drum crystallization apparatus for sugar, etc. N. V. CONSTRUCTIE ATELIER DER VORSTENLANDEN. Ger. 507,115, May 15, 1929.

Rotary sugar press. MASCHINENFABRIK GREVENBROICH A.-G. Ger. 509,581, Dec. 9, 1928.

Machine for dressing the bases of sugar loaves. INGENIEUR- UND INDUSTRIEBÜRO G. M. B. H. Ger. 509,909, Mar. 30, 1928.

Levulose from inulin. SCHERING-KAHLBAUM A.-G. (Friedrich Medicius, inventor). Ger. 507,612, June 16, 1926. Com. inulin is treated with warm water and the water then removed by a centrifuge. The residue is treated with volatile org. acids to form fruit sugar. The example mentions HCOOH.

Treating massecuite. JULIEN BERGE (to RAFFINERIE TIRLEMONTOISE SOC. ANON.). U. S. 1,784,982, Dec. 16. For increasing the yield of sugar crystals from any kind of massecuite, it is cooled to pasty condition, followed by sepn. of the mass into sugar crystals and sirup by centrifuging, employing a centrifugal force considerably more than 800 times the wt. of the mass to be sepd.

Evaporators for the manufacture of gums, gelatins, etc. EMILE A. REBIÈRE. Fr. 687,780, Jan. 7, 1930.

Starch. CHEM. FAB. MAHLER & SUPF A.-G. Ger. 508,160, Nov. 16, 1921. A product that swells in cold water is prepd. by grinding starch or amylaceous materials with dry caustic alkali.

Starch. W. H. UHLAND G. M. B. H. Ger. 508,149, April 4, 1926. A method and app. are described for washing concentrates obtained from crude starch milk.

Cold-water starch. HENKEL & CIE. (Max Jacobi, inventor). Ger. 508,786, May 16, 1925. The moistened starch is intimately ground with caustic alkali below the paste-forming temp., dried and re-ground.

29—LEATHER AND GLUE

ALLEN ROGERS

Adsorption of sulfuric acid by leather. JOHN BEEK, JR. *Ind. Eng. Chem.* **22**, 1373–8; *Bur. Standards J. Research* **5**, 1109–21(1930).—Samples of vegetable-tanned steer hide were placed in 300-cc. portions of soln. contg. 0–12% H_2SO_4. Expt. showed that equil. was reached in 2 hrs. The leather was drained and solns. poured off were weighed and analyzed. The H_2SO_4 content of leather + residual soln. was detd. The H_2SO_4 content of residual soln. was calcd. and deducted, and the remainder taken as adsorbed H_2SO_4. Corrections were made for the S content of leather and for the sol. matter leached from the leather. With increasing H_2SO_4 concn., H_2SO_4 adsorbed (millimoles per g. of insol. leather) increased from 0.07 when H_2SO_4 = 0.0022 *M* to about 0.2 when H_2SO_4 = 0.04 *M*, and is thereafter const. until H_2SO_4 = 0.48 *M*. Further increase in concn. results in decreased adsorption. Application of the Gibbs equation for adsorption due to change in surface tension showed that adsorption due to this cause would be neg. over the whole molality range. It is suggested that adsorption up to H_2SO_4 = 0.4 *M* is due chiefly to chem. combination, and that the decreasing adsorption at higher molalities is due to surface-tension effects. Expressions are derived for acid chemically combined, based on the mass law, and acid adsorbed due to surface tension effects, based on the Gibbs equation, that fit the author's exptl. data fairly well. This equation also fits data of Kubelka and Wagner for HCl adsorbed by hide powder. The equiv. wt. as a base of the steer hide leather used was 4.3 × 10^3. The sp. surface of the leather was of the order of magnitude of 10^7 sq. cm. per g. R. G. HENRICH

Solutions of gallic acid and tannin (STEENHUISEN) **2.** Coating materials [artificial leather] (Fr. pat. 687,597) **18.** Cellulose esters [artificial leather] (Fr. pat. 687,996) **23.** Bleaching feathers, pelts, bristles, etc. (Austrian pat. 119,265) **25.** Producing patterns on leather, etc. (Ger. pat. 507,743) **25.** Disinfecting, cosmetic or tanning agent (Swiss pat. 139,327) **17.** Evaporators for the manufacture of gums, gelatins, etc. (Fr. 687,780) **28.** Vulcanizing rubber to leather (U. S. pat. 1,787,145) **30.**

MACKSCH, K.: **Das Färben von Leder und Lederwaren.** 3rd ed., enlarged. Berlin: Verlag der deutschen Sattler und Tapezierer Zeitung. Berg und Schoch. 154 pp. Reviewed in *J. Intern. Soc. Leather Trades' Chem.* **14**, 593(1930).

ROUSSET, H. J.: **Travail du cuir.** Paris: Ch. Beranger. 169 pp. F. 30, plus postage. Reviewed in *J. Intern. Soc. Leather Trades' Chem.* **14**, 680(1930).

Treating **skins.** SOC. FINANCIÈRE DE CRÉDIT MOBILIER ET IMMOBILIER. Fr. 687,977, Mar. 28, 1929. Skins from which wool or hair is to be removed are treated with a mixt. of epidermose (waste from skins), caustic soda and water, to which BaS, Na_2CO_3, colophony and resorcinol or phenol may also be added.

Treatment **of fibrous animal skins.** M. BOUSSART. Belg. 368,922, April 30, 1930. The hides are treated with a hot, weak H_2SO_4 soln. Any acid remaining on the recovered hair is subsequently neutralized by a suitable liquor.

Treating **pelts and skins, etc.** FIRMA RICHARD F. SCHMIDT. Ger. 507,835, May 4, 1928. Pelts and skins, etc., with a thin or delicate inner face, are coated at this face with leather with the same degree of elasticity.

Recovering **dye from hides and residues.** MAX VOGEL. Swiss 139,893, June 18, 1929. The hides, etc., are placed in the inner chamber of a double-walled vessel and heated by electricity. Turpentine is added and the recovered dye passes through a pipe to a receptacle.

The recovery **of hair and wool from hides.** H. A. BARE, (MISS) M. J. KERREMANS and H. M. J. A. DE COSTER. Belg. 368,267, April 30, 1930. Hides are immersed in a soln. contg. 0.5 g. melorian B9, 0.5 g. cykloran M, 0.05 g. $AgNO_3$ and 6% H_2SO_4 per l. of water. The bath is heated to about 70°.

Drying **hide-steeping drums.** PAUL HERTZSCH. Ger. 509,902, Aug. 15, 1928.

Tanning **agent.** J. R. GEIGY A.-G. Swiss 138,884, July 30, 1928. The agent is prepd. by condensing ω-chloromethylenesalicylic acid with Na phenol-*p*-sulfonate in dil. acid.

Tanning **agents.** I. G. FARBENIND. A.-G. Fr. 687,411, Dec. 30, 1929. Tanning prepns. are made by forming solns. of TiO_2 and H_2SO_4 with a basicity of about 0.3 to 0.5 mols. of H_2SO_4 for 1 mol. of TiO_2 (equals about 70–55% of basicity), concg. these solns. or bringing them to a solid form.

Tanning and other treatments for lustering, etc., of lambskins and sheepskins. MYRON LASKIN. U. S. 1,788,026, Jan. 6. After tanning, the wool sides are combed and clipped, the skins are dyed and they are then directly immersed in an aq. emulsion contg. about 1% of oil such as sulfonated neat's foot oil. Other details of treatment also are described.

Treating tanning solutions. ANDREAS G. WACKENREUTER. U. S. 1,786,880, Dec. 30. A tanning soln. such as quebracho ext. or the like is subjected to the selective action of hides to effect tanning and after the hides are sepd. from the soln., solids are removed from the latter and the soln. is coned. to recondition it. App. is described.

Solvent for use in the tanning industry. R. BOTSON AND J. KAMP. Belg. 369,808, May 31, 1930. Rubber is distd. in a retort; the liquid remaining in the retort is decanted, purified with an alkali, then with H_2O and finally with an acid; after neutralizing it is fractionally distd. to obtain fractions, b. 70–200° and 201–360°, which are used in the tanning industry.

Neutralizing iron-tanned leather. OTTO RÖHM. Ger. 508,502, June 11, 1927. The leather is neutralized by phosphates, optionally mixed with bicarbonate, calcined soda, NH_3, etc.

Coloring leather. CHEMISCHE FABRIK VORM. SANDOZ. Ger. 509,925, Jan. 6, 1928. Colors fast to washing and to soap are imparted to leather, especially Samian leather, by pretreating the leather with oxidizing agent and coloring with S dyes or vat dyes. In an example, Samian leather is treated with perborate and dyed green with the S dye obtained by treating 4-alkylaminonaphthyl-4'-hydroxyphenylamine with bisulfate and sulfuric acids. Cf. *C. A.* **24**, 1247.

Colored fibrous stock suitable for making a leather substitute for upholstery, etc. ROBERT C. HARTONG (to Seiberling Rubber Co.). U. S. 1,787,680, Jan. 6. A base stock such as rubber compn. and a filler such as fibers are separately colored, and then mixed with each other.

Artificial leather. RENÉ CLAVEL. Ger. 509,400, Jan. 21, 1926. See Brit. 252,661 (*C. A.* **21**, 2397).

Synthetic horn. FRANZ PABST. Ger. 509,551, Feb. 29, 1928. Transparent horn is prepd. by treating albuminous material with alkylated carbazole. Thus, casein is plasticized with water and alc. and treated with ethylcarbazole.

30—RUBBER AND ALLIED SUBSTANCES

C. C. DAVIS

Colloid chemistry and the rubber industry. A. VAN ROSSEM. *Kolloid Z.* 48, 283–93(1929).—A review. A. FLEISCHER

The constitution of rubber according to its swelling in liquids. H. KROEPELIN. *Rev. gén. caoutchouc* **7**, No. 63, 5(1930).—Comments on a paper by Bary (cf. *C. A.* **24**, 4954). P. STAMBERGER. *Ibid* 5. E. VALKO. *Ibid* 5. **Reply.** PAUL BARY. No. 64, 3–4. C. C. DAVIS

Automatic control of surface temperatures for laboratory mixing mills. R. L. MOORE AND P. M. TORRANCE. *India Rubber World* **82**, No. 5, 59–60(1930). An illustrated description. C. C. DAVIS

Water dispersions of rubber. JOSEPH ROSSMAN. *India Rubber World* **82**, No. 5, 56–8(1930).—A survey is made of U. S. patents on water dispersions and their industrial applications. C. C. DAVIS

The plasticization of rubber. F. JACOBS. *Rev. gén. caoutchouc* **7**, No. 64, 4 to 65, 15–22(1930).—A review and discussion of the general phenomena of the plastication of rubber, and the properties of the important com. softeners. C. C. DAVIS

The oxidation of rubber at atmospheric temperatures. W. C. DAVEY. *Ind. Eng. Chem. Inst. Rubber Industry* **6**, 202–13(1930).—In continuation of earlier expts. which dealt with chem. changes which take place when rubber is oxidized at 70° and 100° (cf. *C. A.* **24**, 4660), the present paper deals with changes which occur in rubber stored at room temp., and the relation of these changes to those at the higher temps. The procedure was to keep a few g. of each sample (macerated and finely divided) in a beaker in darkness, agitate frequently and measure periodically the gain in wt. and the proportion and character of the acetone ext. With rubber-S (100:8) vulcanizates with different states of cure, the degree of cure played a greater part than in the previous expts. at 70° and 100° (the higher the vulcanization coeff. the greater the rate of oxidation), and when these vulcanizates were first extd. successively with acetone and $CHCl_3$, the rate

oxidation was still faster (varying as before with the vulcanization coeff.). In general, aging at room temp. gave very high acetone exts. which reached maxima before the sol. products began to change to insol. products. The final increase in wt. after long aging was higher at room temp. than at 70°, and the acetone ext. and the acetone ext./wt. increase ratios were much higher. The rubber-S vulcanizates were then boiled in 4% NaOH, washed, dried and aged at room temp. (40–97°F.) (1) in dry air, and (2) in air with 65% relative humidity. Oxidation was more rapid than with the untreated vulcanizates; nevertheless it was slow, and it was slower in moist air than in dry air (cf. Stevens, *C. A.* **14**, 3823). The longer the cure, the greater was the difference between the moist and dry air (cf. McKee and Depew, *C. A.* **22**, 2490). The increase in acetone ext. formed in moist air was less than that in dry air. If it is assumed that water is formed during the oxidation, these results can be explained by an equil. (cf. *C. A.* **23**, 4100). Rubber-S vulcanizates which had been extd. with acetone and others which had been extd. with acetone and then with $CHCl_3$ were aged similarly in moist and dry air. In all cases, *i. e.*, regardless of cure and of humidity, acetone extn. increased greatly the rate of oxidation (as judged by acetone exts. and increase in wt.) and acetone and $CHCl_3$ extns. increased it still more. In moist air the increase in wt. was proportional to the vulcanization coeffs., and the acetone ext./wt. increase ratios indicated that the tendency for the acetone-sol. substances to become insol. was greater in moist than in dry air. Though the vulcanizates extd. with acetone and $CHCl_3$ oxidized faster than those extd. only with acetone, the nature of the oxidation was the same. In dry air the wt. increases did not run parallel with the vulcanization coeffs., but they did so in moist air. When rubber-S vulcanizates were exposed in quartz tubes to summer sunlight (up to 45°), the wt. increased rapidly, while the acetone exts. increased to a max. (cf. Yamazaki, *C. A.* **22**, 2084) and then diminished in a way similar to the effect with rubber-S vulcanizates oxidized at 70°. The samples at lower cures showed a higher max. acetone ext. than the more highly cured samples. The relatively low acetone exts. and the acetone ext./wt. increase ratios indicated a marked tendency toward conversion of acetone-sol. substances to acetone insol. substances in a way similar to oxidation at 70°. The lower the cure, the higher the ratios. With vulcanizates cured with accelerator, oxidation was extremely slow in the dark, and the results are not yet ready for publication. Vulcanizates of rubber 100, S 5, diphenylguanidine 0.75, ZnO 5 with different cures were extd. with acetone and oxidized in darkness. Even after extn. oxidation was very slow compared with that of rubber-S vulcanizates under similar conditions (the wt. increase in the latter case was greater in 1 month than in the accelerated vulcanizates after 13 mos.). When exposed to summer sunlight behind glass, the accelerated vulcanizates oxidized in a way more nearly similar to rubber-S vulcanizates than in darkness. Therefore heat but in conjunction with the attendant heat gives an effect similar to that at 70°. A comparison of the oxidation effects at 70° with those from exposure to sunlight showed that at the same time the increases in wt. were higher in sunlight than at 70°. Probably the wt. increases of vulcanizates exposed to sunlight are higher than after oxidation at 70° in darkness, because the losses of volatile products were not so great. The acetone exts. after exposure to sunlight were higher than at 70° but lower than at room temp., and the acetone ext./wt. increase ratios were higher after exposure to sunlight than at 70° but lower than at room temp. in darkness. The acetone exts. and the acetone ext./wt. increase ratios of the accelerated vulcanizates reached very high values, with no max. The acetone ext. of the rubber-S vulcanizate reached a max. which was higher than that at 70°. Though exposure directly to sunlight behind glass results in greater oxidation than at 70° (judged by increases in wt.), the extent to which the acetone ext. characteristic material is not so complete as it is at 70°. C. C. DAVIS

Rubber pigments. F. HARRIS COTTON. *India Rubber J.* **80**, 727–9(1930).—This is a discussion of the requirements of a rubber pigment, the use of Sb sulfides and Sb oxides, and red Fe oxide. C. C. DAVIS

Fillers and their functions. II. F. HARRIS COTTON. *India Rubber J.* **80**, 216–7, 348 (cf. *India Rubber J.* **80**, 138(1930).—The discussion includes resistance to abrasion, black, ZnO, china clay, Mg carbonate, the nature of vulcanization, reclaiming, different types of reclaimed rubber and the advantages of reclaimed rubber. C. C. DAVIS

The application of modern statistical machinery to rubber compounding. J. D. MORREY. *India Rubber World* **82**, No. 5, 61–2(1930). C. C. DAVIS

Liquid rubber and textiles. WEBSTER NORRIS. *India Rubber World* **83**, No. 4, 53–4 (1931). A description of technical features. C. C. DAVIS

Some notes on curing conditions. E. F. POWELL. *Trans. Inst. Rubber Industry* **6**, 184–201(1930). The paper, which is essentially engineering, describes new expts. on

certain phys. aspects of large-scale vulcanization, some of which are related to earlier expts. by Perks (cf. *C. A.* **23**, 308), and all of which deal with the problem of obtaining repeated uniform cures in production. The work includes studies of variations in the internal temp. of open steam vulcanizers of different types, internal heating of airbags by air and steam, cure penetration and the effect of tire-tread pattern on this penetration A general discussion follows the paper. C. C. DAVIS

Control of uniformity of press cures. H. G. BIMMERMAN. *Rubber Age* (N. Y.) **28**, 307–8(1930).—Mech. problems are discussed. C. C. DAVIS

Some new developments in the physical testing of rubber. A. A. SOMERVILLE. *Trans. Inst. Rubber Industry* **6**, 130–69(1930).—A review and discussion of certain recent developments in testing which approach service conditions more closely than the older conventional methods. The subjects include standardization and interpretation of tests, stress-strain curves at low elongations (cf. S., Ball and Edland, *C. A.* **24**, 4957), fatigue tests, flex-cracking, compression and cutting tests, and aging at various elongations (cf. S., Ball and Cope, *C. A.* **24**, 987). New data are offered in some cases to show the scope and utility of these developments. Fatigue tests with the de Mattia machine of 6 different vulcanizates cured to different degrees and tested at various elongations up to 300% and at different temps. (100° to —10°) showed that: (1) with increase in the % elongation during the fatigue test the endurance of a vulcanizate diminishes greatly, (2) the frequency of the elongations has (at 300% elongation) no effect on the life, (3) the life is slightly shorter at 100° than at 20° (because as the temp. diminishes the permanent set becomes greater so that less work is done), though a tire-tread vulcanizate was an exception in that its endurance was greater at 100° than at 20° (because of an enormous permanent set at 100°); (4) at 20° the life when fatigued does not depend upon the state of cure, but at —10° and 100° undercured samples showed the greatest endurance and overcured samples the shortest life. The tensile strengths and moduli were lower after the vulcanizates had been fatigued. Addn. of an antioxidant improved the endurance of a tire-tread vulcanizate, particularly after the latter had been aged in O. The de Mattia machine was used for measuring the relative resistances of vulcanizates to cracking when flexed repeatedly by flexing specimens which had been cured with a transverse groove of semicircular cross-section to simulate a non skid design. The presence of an antioxidant decreased greatly the tendency to crack under these conditions. Here cracking occurred sooner at 20° than at 0° or at 50° or 100° With a *compression-cutting machine* like that described by Hippensteel (cf. *C. A.* **22**, 2855, 4272) vulcanizates were tested in various ways to ascertain the importance of aging with and without an antioxidant present; of the thickness of specimen; of whether the specimen was wet or dry; of the state of cure; of the proportion of whiting, C black, ZnO, barytes and "mineral rubber"; of the relation between compression and stress-strain curve, of the effect of aging in O on the compression; and of the effect of temp. on the compression (cf. Ingmanson and Gray, *C. A.* **24**, 4657). The resistance to cutting was diminished by aging in O, and an antioxidant minimized this effect of aging. The highest resistance to cutting and the stiffest compression curve were obtained at 45% humidity, and the lowest resistance to cutting and softest compression curve with the specimens immersed in water. C black imparted the greatest resistance to cutting, followed by ZnO, whiting and barytes. At low concns. C black lowered the resistance to cutting, but unlike the other fillers with greater proportions the resistance became greater than the corresponding vulcanizate with no filler. A small proportion of mineral rubber increased the resistance slightly, while a high proportion reduced it but little. The resistance to cutting was greater at 0° and lower at 100° than at 20°. A general discussion follows the paper C. C. DAVIS

A simple abrasion test machine for rubber. P. A. SIGLER AND W. L. HOLT. *India Rubber World* **82**, No. 5, 63–6(1930).—The new machine which is described and illustrated is the garnet paper machine described in a former publication (*C. A.* **20**, 310) redesigned for greater rigidity and compactness and to hold 3 samples. Quant. results on typical vulcanizates under different conditions are given. C. C. DAVIS

A method for the determination of the adsorption capacity of commercial blacks by means of methylene blue. RUDOLF DITMAR AND KARL H. PREUSSE. *Gummi-Ztg* **45**, 243–4(1930).—A qual. method and a quant. method are described. *Qual.*—Thoroughly agitate the sample (0.5 g.) with aq. 0.001% methylene blue (30 cc.) and filter. If the filtrate is colorless, the black is an active one. *Quant.*—Add in extremely small portions the black to aq. 0.01% methylene blue (50 cc.) at 15°, agitating vigorously, until the supernatant liquid remains colorless, then titrate back with the 0.001% methylene blue until a faint green-blue color remains. Calc. the methylene blue adsorbed by 100 g. of black. On this basis tests gave the following results: Durex O lampblack

, Arrow gas black 0.102, Durex M lampblack 1.01, Cabot gas black 0.153, Durex tra 0.806, Kosmos gas black 2.55, Micronex gas black 1.29. No relation was found veen the absorption capacities and the rates of settling of the blacks from the methyl- blue soln. A *method for detg. the relative wetting of blacks by rubber* was then de- ped. Place thin sheets of crepe (milled for 20 min. and cut about 3 × 3 cm.) on ron screen of coarse mesh, powder the surfaces with the blacks and keep the sheets n oven at 70° for 45 min. If the black is easily wetted by the rubber, a lustrous ish-like coating appears on the surface. With blacks not easily wetted, the powd. ace remains dull. Only the Kosmos and Cabot blacks gave a lustrous surface. canization tests in a rubber mixt. accelerated by tetramethylthiurammonosulfide w d that blacks with a high power of absorption retarded the rate of vulcanization. t. whether this retardation was a result of absorption of S or of accelerator, the vious mixt. accelerated with tetramethylthiurammonosulfide was cured with more an before, under which conditions the mixt. was overcured instead of undercured. s indicates that S rather than accelerator is adsorbed by the gas black, which is at iance with results of Carson and Sebrell (cf. *C. A.* **23**, 5351). If this is so, a black h high absorptive power offers no disadvantage, for the proportion of S need only increased. The overflow during vulcanization with blacks having high absorptive wers is smaller than with blacks of low absorptive power, and the d. of the former cts is the greater. C. C. DAVIS

The **development of rubber reclaiming since the War and its importance in rubber** nufacture. PAUL ALEXANDER. *Gummi-Ztg.* **45**, 416–8(1930).—A further review d discussion (cf. *C. A.* **24**, 6061). C. C. DAVIS

Toxic **substances in the rubber industry. XVII. Thiocarbanilide.** P. A. DAVIS. *bber Age* (N. Y.) **28**, 305–6(1930); cf. *Rubber Age* **28**, 143(1930); cf. *C. A.* **25**, 436.— ough thiocarbanilide is not poisonous itself, its decompn. products are toxic, and oper ventilation is necessary. C. C. DAVIS

The **use of rubber in cement tiling.** GEO. RICE. *Rubber Age* (N. Y.) **28**, 255–6 930).—A general description. C. C. DAVIS

Rubber **in the grinding-wheel industry.** JOSEPH N. KUZMICK. *India Rubber rld* 82, No. 5, 53–5(1930).—An illustrated description. C. C. DAVIS

Rubber-**bonded grinding wheels. What the user of organic-bonded wheels should** now. J. N. KUZMICK AND LANGE. *India Rubber World* **83**, No. 4, 56–7, 60(1931).— lustrated. C. C. DAVIS

Rubber **power-transmission belting. I. The materials and the construction of** ubber belting. W. L. STURTEVANT. *India Rubber World* **83**, No. 1, 59–60(1930). **II.** esting methods **for determining the strength of ply-adhesion in belting.** *Ibid* No. 2, 3 5 **III. Flexing machine and dynamometers for testing belting quality. Com-** arison of adhesion, flexing and dynamometer tests. *Ibid* No 3, 67–9. **IV. Physical** roperties of ducks **and belting. Seam and stiffness tests. Static coefficient of fric-** ion. Dressing **and fasteners.** *Ibid* No. 4, 58–60(1931).—All 4 installments are illustrated and contain quant. data. C. C. DAVIS

Manufacture **of surgical rubber goods.** THOMAS W. FAZAKERLEY. *India Rubber J* 80, 831–2(1930).—A general discussion of mfg. problems. C. C. DAVIS

Hot vulcanization. **The development of the technical process. III.** PAUL BREDEMANN. *Gummi-Ztg.* **45**, 458–62(1930). C. C. DAVIS

Vulcanization **with hot air. Development of the technical process.** PAUL BREDE- MANN. *Gummi-Ztg.* **45**, 375–6, 413–6(1930).—A review and discussion of modern equipment C. C. DAVIS

Suncracking **of vulcanized rubber.** B. B. EVANS. *India Rubber World* **83**, No. 1, 55–7(1930). See *C. A.* **24**, 4664. C. C. DAVIS

Curing-bags **for vulcanizing cord tires.** A. FRÖLICH. *India Rubber J.* **80**, 351–5 (1930).—English version of *Gummi-Ztg.* **44**, 2080, 2132(1930). C. C. DAVIS

Agglutination **of cell suspensions** [latex] (BRUMÉE-NIEUWLAND) **11A.** Basic products (Fr. pat. 687,224) **27.** Colored fibrous stock suitable for making a leather substitute for upholstery, etc. (U. S. pat. 1,787,680) **29.** Polymerizing diolefins to obtain rubber-like products (Brit. pat. 333,872) **10.**

Concentrating **latex.** K. D. P., LTD. Fr. 686,821, Dec. 18, 1929. Latex is concd. by adding mucilages or substances fixing water, *e. g.* carrageen moss or lichen, and heating to a temp. above 60°.

Rubber. MERVYN S. STUTCHBURY. Ger. 509,553, Oct. 30, 1925. Addn. to

419,658. Rubber mixts. are prepd. from concd. latex and filling material by using about 75% latex paste with the desired filling material, vulcanizing agent and coloring matter and a protective colloid. The water content is kept const. during mixing. The whole is then dried and rolled. In an example, 100 parts of 75% rubber latex is made into a paste with soap, 80 parts water, 10 parts ZnO, 10 parts talcum, 30 parts chalk, 5 parts castor oil, 4 parts S and 1 part diphenylguanidine.

Rubber. THE NAUGATUCK CHEMICAL CO. Fr. 688,452, Jan. 18, 1930. The deterioration of rubber is retarded by treating it with a substance obtained by mixing an org. base and a naphthol, almost the whole of the naphthol remaining sol. in a 10% soda soln. Thus, β-naphthol 2 and *p,p'*-diaminodiphenylmethane 1 part are melted together and the product is incorporated in a mass to be used for pneumatic tires. Polyethylenepolyamine, prepd. by heating $C_2H_4Cl_2$ with NH_3 and AcONa in aq. soln., is melted with β-naphthol and a little stearic acid, and the product is incorporated with rubber.

Treating rubber. THE NAUGATUCK CHEMICAL CO. Fr. 688,494, Jan. 20, 1930. Deterioration of rubber is prevented by treating it with a diaminodiphenylmethane or a condensation product of this with CH_2O. An example is given of the use of 4,4'-diaminodiphenylmethane (by treating $PhNH_2$ with CH_2O, and treating the methylenedianiline with $PhNH_2.HCl$).

Electrophoretic deposition of rubber from aqueous solutions. THE ANODE RUBBER CO., LTD. Ger. 509,980, Apr. 29, 1926. The deposition takes place on a conductor permitting the passage of gas and forming part of a suction chamber in which a reduced pressure is maintained.

Preserving rubber. THE B. F. GOODRICH CO. Fr. 688,009, Jan. 10, 1930. Rubber is preserved by treating it with a tetra-substituted hydrazine such as tetraphenylhydrazine or a tetraphenylhydrazine substituted with alkyl, hydroxyalkyl or similar groups. The substituted hydrazine may be incorporated in the rubber compn. before vulcanization. Examples are given of the use of tetraphenyl-, tetrabenzyl-, tetra-*p*-toluyl- and *N,N'*-di-*p*-anisyl-*N,N'*-diphenylhydrazine. These derivs. are prepd. by a regulated oxidation of secondary aromatic amines. Cf. *C. A.* **25**, 617.

Preservation of rubber. SHERMAN I. STRICKHOUSER (to Dominion Rubber Co., Ltd.). Can. 305,668, Nov. 11, 1930. Rubber stock is treated with S, ZnO and an accelerator together with benzil, and then vulcanized. This retards cracking.

Retarding deterioration of rubber. WM. S. CALCOTT and WM. A. DOROTHY (to E. I. du Pont de Nemours & Co.). U. S. 1,787,064, Dec. 30. A small proportion (suitably 1–5%) of 4,4'-diaminobenzhydrol, 4,4'-methylamino-3,3'-dimethylbenzhydrol or other diamino and substituted diaminodiarylhydrols is added to a rubber mix before vulcanization. Numerous compds. suitable for this purpose are mentioned. U. S. 1,787,065 describes the use of *p,p'*-tetramethyldiaminodiphenyl ketone, 4,4'-diaminodiphenyl ketone and other diamino and substituted diaminodiaryl ketones for the same purpose and gives numerous examples.

Inhibitor of oxidation in rubber. ALBERT M. CLIFFORD (to The Goodyear Tire and Rubber Co.). Can. 306,332, Dec. 2, 1930. Rubber is preserved by vulcanizing it in the presence of a tertiary naphthylamine. Cf. *C. A.* **24**, 3925.

Extraction of rubber. V. F. KARIS. Russ. 21,612, Dec. 5, 1927, and 22,[illegible] Jan. 16, 1928. The rubber-contg. material is treated with solvents such as light petroleum fractions to remove admixts. and to ext. the rubber. It is claimed that rubber can be recovered by the above method from larvae of caterpillars breeding on the [illegible] plant.

Apparatus for mixing or masticating rubber or similar materials. DAVID BOWEN and CARL F. SCHNUCK (to Farrell-Birmingham Co.). U. S. 1,787,507, Jan. 6. Structural features.

Incorporating powders in the rubber mixture. L. M. GORBUNOV, S. I. ROSENBERG and S. K. SERDOBOLSKII. Russ. 34,205, Oct. 20, 1928. Powdery materials is first mixed with tars, vegetable or mineral oils, bitumens, pitch, residues, wax, ozocerite, paraffin or ceresin. A liquid or a paste or briquets are prepd. from the above mass which is then incorporated into the rubber mixt. and passed through rollers.

Rubber articles. THE ANODE RUBBER CO. (England), LTD. Fr. 687,691, Jan. 4, 1930. Articles of moderate thickness such as gloves or tobacco pouches are made by dipping a former, porous or not, into an aq. dispersion of rubber, etc., and permitting the deposit on the former to the action of a vaporous, gaseous or liquid coagulating or solidifying agent.

Sponge rubber articles which may be of large size. DUNLOP RUBBER CO., LTD., G. W. TROBRIDGE, E. A. MURPHY, D. F. TWISS and W. G. GORHAM. Brit. 333,952,

May 28, 1929. Various details of app. and procedure are described for producing sponge articles "of practically unlimited size" from frothed dispersions of rubber introduced into molds provided with elec. or other suitable heating devices. Dispersions may be used such as those described in Brit. 332,525–6 (*C. A.* **25**, 437).

Repairing shoe soles with rubber mixtures. CLARK H. GEIPERT. U. S. 1,786,-900, Dec. 30. There is applied to the sole a semi-liquid mixt. contg. rubber dissolved in a solvent such as benzine and also contg. "builders' cement," and water is subsequently applied to cause the cement to set and harden upon evapn. of the solvent and the water.

Rubber-impregnated fibrous materials such as felted wood pulp material. GEORGE A. RICHTER and ROGER B. HILL (to Brown Co.). U. S. 1,787,952, Jan. 6. Material is impregnated with an aq. rubber dispersion, and then treated with a rubber solvent to effect a swelling of the rubber, and the solvent is removed.

Cellular rubber products. HARRY L. FISHER (to B. F. Goodrich Co.). U. S. 1,788,563, Dec. 30. Cellular products are obtained by heating rubber contg. S with a substance of the general formula R-SO_2-X, such as a mixt. of *p*-toluenesulfonic acid and H_2SO_4.

Plastic material from rubber and celluloid. D. S. VELIKOVSKII. Russ. 27,774 and Supp. May 16, 1928. A soln. of rubber and Al soaps (fatty or naphthenic or a mixt. of them) in gasoline dild. with petroleum ether is mixed slowly, with const. agitation, with a soln. of celluloid in acetone or amyl acetate which is added to the rubber-soap soln. The acetone and amyl acetate soln should be first dild. with petroleum ether. The dispersion is evapd. and the material is dried.

Dispersing plastic materials. K. D. P., LTD. Fr. 686,711, Dec. 16, 1929. Plastic materials such as crude, vulcanized or regenerated rubber or factis are dispersed by kneading them in the presence of hydrotropes, with the exception of soaps. Examples are given of the treating of such substances in mixers with Na toluenesulfonate, Na xylenesulfonate, casein and salts of gallic acid. The dispersion is facilitated by the addn. of finely divided solids such as $BaSO_4$, lithopone, quartz powder and lampblack. Cf. *C. A.* **24**, 6063.

Dispersions of plastic materials. K. D. P., LTD. Fr. 686,764, Dec. 17, 1929. Aqueous dispersions of plastic materials such as rubber, gutta-percha, balata or factis are converted to the thixotrope state by bringing the colloids added, such as bentonite or clay or those occurring naturally in the dispersion, to the thixotrope state by the addn. of $NaOH$ or H_2SO_4. Under the term "thixotropy" is included the phenomenon where solns. of colloids with their dispersing agents a plastic gel (sometimes even elastic) which can be transformed by agitation, shocks or pressure to the state of a sol, and the dispersions thus formed when left to rest are transformed afresh to the state of a plastic gel. Dispersions artificially prepd. include the sol of dialyzed Fe_2O_3 which can be converted into the plastic gel by an electrolyte soln.

Synthetic rubber. I. G. FARBENIND. A. G. Fr. 687,808, Jan. 7, 1930. Hydrocarbons of the butadiene series are polymerized by treating them with a homogeneous mixt. of colloidal Na and solid powd. diluents such as NaCl.

Synthetic rubber. I. G. FARBENIND. A.-G. Brit. 333,804, May 16, 1929. Polymerization of diolefins such as butadiene is effected in the presence of hydrazine or its derivs. such as hydrazoisobutyric acid, hydrazine dicarboxylic acid ethyl ester or Na phthalic acid hydrazide and of oxidizing agents such as H_2O_2 or its compds. with org. substances such as betaine, urea or NaOAc or inorg. compds. such as perborates, percarbonates or the prepn. of KF with H_2O_2, and air or O_2, ozonides or enzymes also may be used, together with various specified emulsifying agents of different characters. Several examples are given.

Synthetic rubber. I. G. FARBENIND. A.-G. Fr. 686,934, Dec. 19, 1929. Sol. polymerization products are prepd. from butadiene hydrocarbons in aq. suspension or as an aq. emulsion in the presence of oxidizing agents, by operating in the presence of substances which prevent the formation of difficultly sol. products, such as phenols, thymol, hydroquinone, resorcinol, pyrocatechol, pyrogallol, AcOH or aldol resins, or acetone and its condensation products. Certain inorg. substances such as I, colloidal S or arsenious acid may also be used.

Synthetic rubber. I. G. FARBENIND. A.-G. Fr. 686,960, Dec. 19, 1929. Products resembling rubber are prepd. by polymerizing 1,3-butadiene diluted with over 25% of an aliphatic ether of low b. p. such as Et_2O or Me_2O.

Rubber like product from mineral oils. E. W. HULTMAN. Brit. 333,901, Feb. 18, 1929. See U. S. 1,704,104 (*C. A.* **23**, 2071).

Vulcanization of rubber. SIDNEY M. CADWELL (to the Dominion Rubber Co.,

Ltd.). Can. 305,664, Nov. 11, 1930. A rubber mixt. contains S and a Cl-contg. deriv., a product of condensation of aldehydes having 2–7 C atoms in the open chain with primary aromatic amine.

Vulcanization of rubber. SIDNEY M. CADWELL (to The Dominion Rubber Co., Ltd.). Can. 305,666, Nov. 11, 1930. The rubber mixt. contains ZnO, a vulcanizing agent and a phenylmethylenebis compd. of a dialkyldithiocarbamate capable of hydrolyzing in aq. alc. in the presence of NaOH at least as rapidly as does diphenylmethyl dimethyldithiocarbamate under the same conditions; further a basic material is introduced during the vulcanization.

Vulcanizing rubber to leather. LEON B. CONANT (to Standard Patent Process Corp.). U. S. 1,787,145, Dec. 30. Leather coated with rubber cement and heated to adaptation for hot vulcanization is united with and vulcanized to a rubber compn. Cf. *C. A.* **24**, 4666.

Vulcanized oil products. D. GESTETNER, LTD. Ger. 508,418, Nov. 27, 1925. See Miller (*C. A.* **21**, 2576).

Apparatus for devulcanizing rubber by digestion with alkali or acid, etc. BYRON R. BARDER (to Biggs Boiler Works Co.). U. S. 1,787,891, Jan. 6. Structural features

CHEMICAL ABSTRACTS

Vol. 25. MARCH 10, 1931 No. 5

1—APPARATUS AND PLANT EQUIPMENT

W. L. BADGER

Test tube. A. KUHN. *Chem.-Ztg.* 54, 908(1930). J. H. MOORE

A new buret for the determination of unsaturated and aromatic hydrocarbon oils. J. HORMÁNEK. *Chem.-Ztg.* 54, 908(1930).—The detn. is made by shaking with H_2SO_4, as with the Bunte gas buret. J. H. MOORE

An automatic zero device for gas burets. H. DREHSCHMIDT. *Gas u. Wasserfach* 241–2(1930).—A capillary tube is fused into the lower part of the buret, terminating with a bend, at the zero point of the buret. An excess of gas is taken into the buret and the excess forced out into bulbs at one side by manipulation of the leveling bulb. It is claimed that the app facilitates rapid and accurate adjustment of the vol. to zero. R. W. RYAN

Evaporation of large quantities of liquids in the laboratory. C. BLACHER. *Chem. Ztg.* 1930, 534.—The supply flask, inverted over the evapg. dish, has a 2-hole stopper with narrow glass tubes, both extending below the rim of the dish but 1 deeper than the other. Cf. Fuchs (*C. A.* 25, 1). J. H. MOORE

A new revolvable high-vacuum manometer. MAX BRUNNER. *Helv. Chim. Acta* 13, 7(1930).—The app. is a McLeod manometer designed for pressures down to 0.001 mm., and is especially suitable for org. labs. J. H. MOORE

A new photoelectric photometer. HORST TEICHMANN. *Naturwissenschaften* 18, 1130(1930).—The photoelec. effect of a Cu-Cu_2O cell is utilized. A Cu plate coated with Cu_2O on both sides is provided with 2 transparent electrodes (Cu wire netting), held together by 2 quartz or glass plates. A mirror galvanometer (null instrument) connected with the 2 Cu_2O layers makes the combination to a photometer unit for comparison of 2 light sources one on each side of the cell. B. J. C. VAN DER HOEVEN

New pycnometer. FRITZ G. HOFFMANN. *Chem.-Ztg.* 54, 936–7(1930).—This is formed by a wide-mouth tube of about 50 cc. capacity hung in a beaker of water at the desired temp., filled with water to a fixed point and weighed, then weighed with the stopper with the solid and water filled to the same point. J. H. MOORE

Contribution to the technic of laboratory vacuum evaporation and distillation. II. The discharge of the residue and improvement of the apparatus by means of a cooler. HANS N. NAUMANN. *Chem. Fabrik* 1931, 4–7.—The dimensions, capacities, flow velocities and vol. are given for several app.; also, a detachable bottom tube for the removal of residues, a metal cooler and a device to prevent foaming and splashing from Kjeldahl flasks are described, with a short bibliography. Cf. *C. A.* 23, 1186, 5079; 24, 1553, 1768; 25, 440. J. H. MOORE

Apparatus for six simultaneous distillations in one flask. NORMAN L. KNIGHT. *Ind. Chem., News Ed.*, 8, No. 22, 3(1930); illus. E. J. C.

Apparatus for the automatic and safe distillation of ether, alcohol, chloroform, etc., under reduced pressure. CHARLES LAPP. *J. pharm. chim.* [8], 12, 498–502(1930).—A constant level is regulated by a 3-way stopcock. The liquid to be distd. is automatically fed into the top bulb of a glass fractionating column (*A*) connected below with a horizontal (Allihn) condenser. The outside water of this is warmed to about 40° by means of an elec. 30-candle lamp through the medium of a Pb serpentine tube surrounding it and attached to the condenser. The residual fluid runs off into a flask at the end of the system. The vapor in *A*, meeting the cold fluid fed in drop by drop, at a temp. of about 20°, and is condensed in a Vigreux cooler at about 10°. The distillate collects in a cooled storage flask at the other end of the system, where a partial vacuum is applied, recorded by a gage. The entrance of air automatically stops the flow of Et_2O–H_2O or $CHCl_3$–H_2O are readily sepd. in 1 operation. Very little supervision is required. S. WALDBOTT

An electrically heated melting-point apparatus. CHARLES E. SANDO. *Ind. Eng. Chem., Anal. Ed.* 3, 65(1931).—The Thiele-Dennis tube (*C. A.* 14, 1237) is modified

to a combination Roth-Thiele-Dennis tube with which it is possible to reach 300° in about 25 min. J. H. MOORE

A small apparatus to produce very low temperature. MARTIN RUHEMANN. *Z. Physik* **65**, 67–74(1930).—The Joule-Thomson effect in combination with the Linde principle is applied to the liquefaction of He or H_2 on small scale. The whole app. is placed in a vacuum beaker and can be constructed in any work shop. To obtain liquid H_2, liquid air and H_2 of 120 atm. are necessary. To liquefy He, liquid H_2 is required and He of 35 atm. By regulation of the gas flow the app. may be used as a *cryostat*. EGON BRETSCHER

Practical improvements in the field of gas analytical investigations. E. VOSSIECK AND A. SCHMITZ. *Chem. Fabrik* **1930**, 529–31.—Portable and stationary *app.* designed by the authors are described in detail for analyses including combustion over CuO. The combustion section is independent of the 1st absorption section, so that 2 analyses may be running at the same time. J. H. MOORE

An improved absorption tube for combustion analyses. W. D. TURNER. *Ind. Eng. Chem., Anal. Ed.* **3**, 63(1931).—The app. is especially designed for solid absorbents, the novel feature is a ground-joint cap with inlet and exit tubes instead of a stopper. J. H. MOORE

Holder for mercuric chloride in the Gutzeit test. G. H. DAVIS. *Analyst* **56**, 30 (1931).—A Sn screw cap is cut from a mailing tube and forced over a tightly fitting rubber stopper, which has a hole in the middle coinciding with a hole in the Sn cap. The $HgCl_2$ paper is placed on the stopper covering the 8 mm. hole, the cap is screwed on and the stopper pushed on the end of the Gutzeit tube so that the vapors contg AsH_3 must pass through the paper. W. T. H.

Apparatus for the detection of traces of fluoride by the etching method. R. E ESSERY. *Analyst* **56**, 38–9(1931).—The app. consists of a Pb casting, 2 in. across the bottom, 1.5 in. across the mouth and 2 in. high. The mouth is ground flat and polished, the vessel holds 3–4 cc. of liquid. The manner of carrying out the test is described. W. T. H.

Apparatus for continuous leaching with suction. J. F. FUDGE. *Ind. Eng. Chem., Anal. Ed.* **3**, 114(1931).—The app was designed for *leaching soils* in a Gooch crucible and consists of an inverted Erlenmeyer flask with a 2-hole stopper with glass tips, 1 about 0.25 in. longer, extending into the crucible. J. H. MOORE

A new device for determining the potential of cells with very high internal resistances. GEROLD SCHWARZENBACH. *Helv. Chim. Acta* **13**, 865–9(1930).—A modification of Stadie's app. (*C. A.* **23**, 4598) is described in detail and results are given. J. H. MOORE

Improvement of thin film cesium photoelectric tube. S. ASAO AND M. SUZUKI. *Proc. Phys.-Math. Soc. Japan* [3], **12**, 247–50(1930).—An improved photoelec. cell of the Cs vacuum type is described. CsO is deposited on a Ag cathode in the cell A film of metallic Cs is formed on the CsO. A thin layer of either Ag or Au on the Cs is then deposited and the cell is baked at a temp. of 250°. This type cell is more sensitive than the older type cell, which did not have the final Ag or Au coating. The new cell is very sensitive in the red, and the long wave-length limit, λ_0, moves out toward the infra-red. A current of 40μ amp. (sometimes as high as 48μ amp.) per lumen can be obtained from a gas-filled lamp at 2700°. An increased sensitivity is gained by the use of K or Rb instead of Cs; this is to be reported later. Sensitivity curves are given. WILLIAM E. VAUGHAN

Laboratory extraction apparatus. A. M. GALKIN. Russ. 36,138, Nov. 29, 1928.

Laboratory extraction apparatus. N. D. PRYANISHNIKOV. Russ. 55,269, Sept. 25, 1929. In an extractor connected with a reflux condenser by a side arm the latter is provided (on the end connected with the lower end of the condenser) with a buret for measuring the water condensed from the evapd. solvent.

Apparatus for automatically controlling the humidification of air. SAMUEL M. ANDERSON (to B. F. Sturtevant Co.). U. S. 1,789,268, Jan. 13. Light variations produced by condensation of moisture from the air affect a photoelectric cell and through it an elec. control system for regulating a humidifier.

Apparatus (utilizing combustion gases) for heating and humidifying air. EVERETT S. BUCK (to General Iron Works Co.). U. S. 1,788,447, Jan 13. Structural features.

Apparatus for conditioning air by water sprays. GUY F. KELLEY. U. S. 1,789,141, Jan. 13. Structural features.

Bubble tower. YA. E. BEZGINSKII. Russ. 63,405, Jan. 31, 1930. In a gas-drying bubble tower, the lower and middle sections are heated by coils placed in the walls.

The gas enters the lower section, passes a number of trays contacting with H_2SO_4 flowing downward, and leaves the upper part of the tower after passing through a layer of coke. The acid layer on the trays can be regulated by siphons connecting the upper and lower trays.

Recording calorimeter (Junkers type). ADOLF OXEN. Ger, 510,372, Dec. 13, 1929.

Calorimeter for flowing gases or liquids. WM. RIENKS. Ger. 510,143, May 13, 1928.

Thermoelement for measuring radiation. RUDOLF HASE. Ger. 510,759, Dec. 21, 1927.

Radiant reading pyrometer. JULIUS SCHÜNEMANN (to Hartmann & Braun A.-G.). U. S. 1,788,849, Jan. 13. Structural features.

Filter. A. G. DAUMAN. Russ. 18,114, July 12, 1927. A lab. filtering device provided with a centrifuge is specified.

Air filters. IVOR L. BRAMWELL, COLIN W. H. HOLMES and THE BIRTLEY IRON CO., Fr. 688,691, Jan. 22, 1930.

Filter for purifying compressed air. FERDINAND R. DE PAUW. Fr. 689,499, Feb. 6, 1930.

Apparatus for separating gases. ADOLF BURSCHEL. Fr. 690,372, Feb. 21, 1930. See Ger. 488,245 (*C. A.* **24**, 2335).

Apparatus for separating solids from gases. EUGÈNE C. SAINT-JACQUES and SOC. NOUVELLE DE METALLISATION. Fr. 690,558 and 690,560, Apr. 29, 1929. An app. is described for sepg. solids from gases particularly suitable for the *lime and cement industries* and for *furnaces producing* SO_2.

Apparatus for separating finely divided solids from a stream of air or other gases. WM. A. SMITH (to Pneumatic Conveyance & Extraction (1929), Ltd). U. S. 1,788,851, Jan. 13. Structural features.

Gas filter (wetted plate type). K. & TH. MÖLLER G. M. B. H. (Willy Sell, inventor). Ger. 510,089, June 6, 1928.

Device for separating atomized liquids or vapors from gases. SOC. INDUSTRIALE MECCHINE PNEUMOFORE REHSTEINER & C. Ger 510,603, Oct. 5, 1927. The mixt. is led into a chamber through narrow openings where the liquid or vapor loses velocity, and collects or condenses.

Filter for liquids. SVENSKA ACKUMULATOR AKTIEBOLAGET JUNGNER. Ger. 512,388, Nov. 3, 1926. This corresponds to Brit. 272,841.

Filter candles. LÉON ROGER. Fr. 688,781, Jan. 24, 1930. The porous material of the candle is reënforced at the point of support.

Edge filter for filtering liquids. J. A. PICKARD and F. ROGERS Brit. 334,569, May 7, 1929.

Apparatus for filtering sugar solutions, oils or other liquids under pressure. A. R. JAHN. Brit. 334,663, July 17, 1929. The liquid passes successively, in a serpentine path, through compartments of a closed casing which are filled with filtering material, such as charcoal, sawdust, sand, kieselguhr or the like. The app. also may be used for *treating ores with cyanide solns.*, for *filtering cyanide solns. of metals through material such as Zn turnings to effect pptn. of the metals* or for *hydrogenating oils* by passing in contact with Ni shavings or Ni-plated kieselguhr.

Filter for separating solids from liquids. BRITISH GLUES & CHEMICALS, LTD., AKT. GES. FÜR CHEMISCHE PRODUKTE VORM. H. SCHEIDEMANDEL and W. WACHTEL. Brit. 334,585, June 6, 1929.

Apparatus for separating oil and water, etc. WHITE OIL SEPARATORS, LTD. Ger. 510,087, June 3, 1928. See Brit. 285,707 (*C. A.* **23**, 275).

Filter head for oil filters. CHARLES L. MCCUEN (to General Motors Corp.). U. S. 1,788,884, Jan. 13.

Filter bed. FRANK DELERY. U. S. 1,788,383, Jan. 13. Structural features.

Filter cloths. AUGUSTE LEMAIRE. Fr. 689,028, Jan. 28, 1930. Methods of making filter cloths with reënforced edges.

Filter cloth suitable for use in filter presses. CORNELIS H. CAALS. U. S. 1,788,657, Jan. 13. Structural features.

A continuous filter press. V. I. FILIN. Russ. 46,645, May 8, 1929. Constructional details.

Method and apparatus for washing filters having loose filtering material. ROBERT BREDE. Ger. 512,390, Sept. 19, 1925.

Heating means for rotating-plane suction filters. MASCHINENFABRIK BUCKAU R. WOLF A.-G. Ger. 512,389, Jan. 25, 1927.

Laboratory apparatus for analyzing gases by combustion. SELMAN S. LEWINSOHN. Ger. 512,358, Aug. 11, 1926.

Device for determining the density of gases. JACOB M. SPITZGLASS. Ger. 510,622, Jan. 15, 1928. Details are given.

Apparatus for determination of density of gases. SH. SH. PODOLSKII. Russ. 42,970, Mar. 19, 1929. The density of gases is detd. by the decrease in wt. of a solid body placed in the gaseous medium, as shown by the amount of slackening of a spring placed in a permanent magnetic field, through which spring an elec. current is passed and which is tightened by the above weight. This operation is carried out in the gaseous medium and *in vacuo*.

Device for determining the moisture content of gases. I. G. FARBENIND. A.-G. (Paul Gmelin, Albert Ernst and Fritz Ranke, inventors.) Ger. 510,953, Nov. 25, 1927. A dew-point device is used and visual observations are replaced by a radiation-sensitive device such as an elec. resistance thermometer.

Arrangement for estimating the calorific power of gases. SIEMENS & HALSKE A.-G. (Heinz Grüss, inventor.) Ger. 510,952, Mar. 18, 1928. The app., including an elec. resistance thermometer, is described.

Centrifugal purifier for air or other gases. MAX AURIG. Fr. 690,443, Feb. 22, 1930.

Apparatus for purifying vapors, gases and liquids. P. S. GRACHEV and A. N. ANTIPOV. Russ 12,770, Dec. 4, 1926. Constructional details.

Gas purifier. V. D. POGORELUII. Russ. 39,069, Jan. 16, 1929. Structural details

Apparatus for purifying gases by a countercurrent of liquid. CARRIER ENGINEERING CO., LTD. Fr. 689,620, Feb. 8, 1930.

Apparatus for treating gases with atomized liquids. STELLAWERK A.-G. VORM. WILISCH & CO. (Karl Kuhn, inventor). Ger. 512,128, Oct. 20, 1925.

Container for liquid air, oxygen, etc. I. G. FARBENIND. A.-G. Ger. 510,577, July 20, 1927. The container comprises a vacuum jacketed vessel filled with a porous adsorbent made from a refined SiO_2 sol which, prior to drying, had a p_H value of less than 7 and preferably between 2-5.

Gas-detecting apparatus. M. H. ESPES. Brit. 334,640, June 19, 1929. Various details are described of an app. of the type employing differential expansion of 2 members, one of which carries spongy Pt pellets.

Apparatus for measuring the viscosity of liquids. DIMITRY TROSCHENSKY. Fr. 690,051, Feb. 15, 1930.

Apparatus for separating liquid particles containing albumin or foam from generated vapors. PAUL KNICHALIK Ger. 510,710, Oct. 22, 1927. The app. includes a drum with a perforated spiral canal.

Apparatus for mixing liquids. I. A. GUSEV. Russ. 67,100, Mar. 26, 1930. A propeller is placed in a pipe through which the liquids are passed.

Device for mixing a liquid in flow with a small proportion of another liquid. OSKAR RITSCHEL. Ger. 512,174, Nov. 5, 1927

Apparatus for mixing a liquid in flow (water) with a small proportion of another **liquid (reagent solution).** OSKAR RITSCHEL. Ger 510,055, Dec. 20, 1927.

Apparatus for producing water containing carbon dioxide. S. A. B. SOC ANON. BREVETTI. Ger. 510,052, Nov 25, 1927.

Apparatus for rapid boiling and evaporation of liquids. WEHRLE-WERK A. G. Fr. 690,506, Feb. 24, 1930.

Plant for cooling liquids with liquids, operating under reduced pressure. WINTERSHALL A.-G (A. Siebers, inventor). Ger 510,417, Jan. 17, 1929.

Apparatus for circulating solutions such as salt solutions and for expelling the solute **to effect concentration.** EDMUND ALTENKIRCH (to Siemens-Schuckertwerke G. m. b. H.). U. S. 1,788,818, Jan. 13. Structural features.

X-ray apparatus (time exposure control device for x-ray photography). S. COX. Brit. 334,639, June 17, 1929. Structural features.

Light-sensitive cells. S. REUBEN (to Arcturus Radio Tube Co.). Brit. 334,409, March 16, 1929. An electrode of Cu_2O is employed in contact with an electrolyte capable of releasing nascent O independently of electrolysis, such as H_2O_2; a cooperating electrode is made of electropos. material, such as Mg, Zn, Cd or Al, or of electroneg. material, such as Se or C. Various structural details are described.

Activating the cathodic surface of a photoelectric element. GOSUDARSTVENNOYE VSESOYUZNOYE ELEKTROTEKHNICHESKOYE OB'EDINENIE. Russ. 61,248, Dec 28, 1929. A gas contg. a high percentage of activated hydrogen is admitted into a previously evacuated container of the photoelec. element.

Thermionic cathodes. G. P. HALLIWELL (to Westinghouse Elec. & Mfg. Co.). Brit. 334,460, Dec. 14, 1928. A cathode is formed of a homogeneous body contg. at least one metal of the Ni group, a deoxidizing agent such as Ti, Th, V, Ta, Si, Mn, Al, Ce, Zr or other rare earth metal, together with one or more alk. earth metal oxides disseminated throughout the material. Various details and examples are given.

Cathodes for electron tubes. SOC. DES ÉTABLISSEMENTS INDUSTRIELS E. C. GRAMMONT & ALEXANDER GRAMMONT. Ger. 512,263, Feb. 21, 1928. See Fr. 661,813 (*C. A.* 24, 270).

Oxide cathodes for electron tubes. FRITZ TÖDT. Ger 512,343, Mar. 21, 1929. The metallic carrier for the oxide is placed in an aq. soln. of unstated compn. together with a baser metal; the metals are conductively connected to form a galvanic chain. After about a day, a sufficient incrustation of alk. earth carbonate accumulates on the carrier.

Electron discharge devices. INTERNATIONAL GENERAL ELECTRIC CO. Ger. 512,362, Dec. 12, 1928. See Brit. 302 315 (*C. A.* 23, 4282).

Electric discharge device. N.-V. PHILIPS' GLOEILAMPENFABRIEKEN. Brit. 334,-329, May 3, 1929. A gas-filled arc discharge tube with 2 or more anodes has a hollow cathode, suitably heated and provided on its inner surface with an electron-emitting substance such as BaO, $Sr(NO_3)_2$ or Zr carbide. Various structural details are described. Cf. *C. A.* 24, 5543.

Film evaporating- and drying-apparatus of the roller type. A. ST. J. GATES. Brit. 334,765, Aug. 6, 1929. Structural features.

Multi-stage evaporating apparatus. J. A. REAVELL. Brit. 334,623, June 11, 1929. Filters are inserted between the stages of an evapg. system comprising 2 or more evaporators working under substantially the same pressure. A 4-stage triple effect app. (various details of which are described) is used for evapg. a liquor consisting mainly of a soln. of Ca acetate, with some NH_3 and org. impurities, such as is obtained in *cellulosic fermentation*.

Ripple device for drying, etc., drums. FELLNER & ZIEGLER A.-G. Ger. 510,396, Nov. 28, 1929.

Drying plant with a number of superposed conveying bands. FRITZ HAAS. Ger. 512,624, Mar. 3, 1928.

Plant for drying pulverulent materials. TECHNO-CHEMICAL LABORATORIES, LTD. Ger. 513,527, Dec. 6, 1927. See Brit. 294,289 (*C. A.* 23, 2021).

Apparatus for drying casein. PASQUIER MEESE ET CIE. Fr. 36,720, Jan. 28, 1930. Addn. to 664,296 (*C. A.* 24, 758).

Shaft furnaces. MASCHINENBAU-ANSTALT HUMBOLDT. Fr. 690,382, Feb. 21, 1930. Means is described for blowing combustion air into the furnaces.

Closure for chamber furnace. ARNOLD BECKERS Ger. 510,560, Oct. 24, 1926.

Electrical closing apparatus for vertical chamber furnaces. BAMAG-MEGUIN A.-G. Ger. 513,717, June 21, 1929.

Arrangement for equalizing pressure in channels of multi-chamber furnaces. A. V. GRUM GRJIMAILO. Russ. 16,552 Mar. 21, 1927. Structural details.

Horizontal chamber oven. ERNST CHUR. Ger. 512,400, Oct. 28, 1926.

Oven for annealing tubes. MAX SCHLIPKÖTER. Ger. 510,209, Jan. 8, 1928. Details of conveying means are described.

Burners for heavy fuels. ALFRED LANSER. Fr. 690,383, Feb. 21, 1930.

Burners for liquid fuel with direct feed. ADRIEN A. BIANCHI. Fr. 689,829, Feb. 13, 1930.

Bunsen burners. HERMANN GUHL. Fr. 688,694, Jan. 22, 1930. The speed and amt of flow leaving the tap are increased by creating a reduced pressure in the section of the mixing tube of the tap by narrowing the initial section of the mixing tube.

Burners using explosive mixtures of high speed of combustion. SOCIÉTÉ L'AIR LIQUIDE (SOCIÉTÉ ANON. POUR L'ÉTUDE ET L'EXPLOITATION DES PROCÉDÉS GEORGES CLAUDE). Fr. 688,744, Jan. 23, 1930. Means is described for obtaining low burning.

Gas burner. BURTON FOUNDRY CO., LTD., and D. F. CAMPBELL. Brit. 334,307, June 17, 1929.

Gas burner suitable for furnaces. WM. M. HEPBURN (to Surface Combustion Co.). U. S. 1,788,716, Jan. 13.

Gas burner of the "ribbon burner" type. WM. B. ENSIGN and LLOYD H. V. REYNOLDS (to Reynolds, Inc.). U. S. 1,789,226, Jan. 13. Structural features.

Pressure and air proportion-control apparatus for gas burners. GARNETT W. MCKEE. U. S. 1,788,925, Jan. 13.

Burners for gas-producing furnaces. N. V. SILICA EN OVENBOUW MAATSCHAPPIJ. Fr. 36,901, Aug 4, 1928. Addn. to 665,658 (*C. A.* **24**, 950).

Combined temperature and time control for gas-fired heating apparatus. JOSEF MOSING. Austrian 119,284, April 15, 1930.

Traveling grate. UNDERFEED STOKER CO., LTD., and JOHN W. WRAY. Ger. 512,158, July 14, 1928. This corresponds to Brit. 306,983.

Heat-exchange apparatus suitable for use as a condenser. RAYMOND N. EHRHART (to Elliott Co.). U. S. 1,788,386, Jan. 13. Structural features.

Helical tubular heat-exchange apparatus suitable for use as a condenser. ELECTROLUX, LTD. Brit. 334,333, July 19, 1929. Structural features.

Electric water heater. OTTO GRAETZER. U. S. 1,788,669, Jan. 13. Structural features.

Gas valve suitable for use with water heaters. CLARENCE H. MORROW (to Hotstream Heater Co.). U. S. 1,788,537, Jan. 13.

Rotary kiln and associated cooling drum suitable for calcining and clinkering. FRITZ LUTHER (to the firm of G. Polysius). U. S. 1,788,839, Jan. 13. Structural features.

Device for distributing dry materials fed to furnaces. ZAHN & CO., BAU CHEM FAB. G. M. B. H. Ger. 510,091, Feb. 12, 1928. The device is especially intended for use in the manuf. of Na_2SO_4 from NaCl and H_2SO_4.

Device for conveying goods through annealing, etc., ovens. BENNO SCHILDE MASCHINENBAU-A.-G. (Frederic R. Colby and Arnold L. Larsen, inventors.) Ger. 512,491, May 11, 1928.

Device for taking samples of bulk materials such as cottonseed. GUY S. MILLER. U. S. 1,789,246, Jan. 13. Structural features.

Apparatus for testing vessels (such as pots used in zinc cells) for leakage. H. A. BUMKE GES and AUTOM SPEZIAL-MASCHINEN GES. Brit. 334,680, April 10, 1929. Structural features.

Apparatus for compressing chlorine gas. KREBS & CO., G. M. B. H. Fr. 688,669, Jan. 22, 1930.

Apparatus for decomposing salts. HOWARD B. BISHOP. Fr. 688,820, Jan. 24, 1930. An app. is described for treating salts with acids, such as $NaNO_3$ with H_2SO_4, in which the salt is heated by itself below the point of fusion of the solid elements and above the b. p. of the acid to be produced, before bringing it into contact with the decomposing acid. The reaction vessel has agitating means and jets for introducing the acid.

Apparatus (with a slotted suction tube) for extracting fluids from cloth or other materials. ALBERT BIRCH. U. S. 1,789,132, Jan. 13.

Apparatus for kneading and agitating plastic masses. S. F. PAPICH. Russ. 45,508, April 19, 1929.

Agitators for sedimentation apparatus. THE DORR CO. Fr. 689,518, Feb. 6, 1930.

Apparatus for producing high vacuums. SOC. KODAK-PATHÉ (SOC. ANON. FRANÇAISE). Fr. 690,169, Feb. 18, 1930.

Vacuum flask. L. T. SAWNEY. Brit. 334,262, June 1, 1929. Mech. details.

Hollow vessels of fused silica. G. A. MILLAR (to British Thomson-Houston Co., Ltd.). Brit. 334,470, Dec. 20, 1928. App. and various details of operations are described.

Device for fusing metals, salts, etc., in crucibles. TRAUGOTT METZGER. Ger. 512,338, Dec. 9, 1928. This describes a device intended to be inserted into material solidifying in a crucible, and designed so as to avoid development of strains when the material is re-fused.

Siphon device suitable for use with "desert water bags," etc. LOUIS B. DI SPAIN. U. S. 1,788,709, Jan. 13. Structural features.

Thermostatic electric switch. FRANK E. STOVER. U. S. 1,788,640, Jan. 13. Structural features.

Thermostatic electric switch. ROY D. MAILEY (to General Electric Vapor Lamp Co.). U. S. 1,788,922, Jan. 13. Structural features.

Thermostatic electric switch. WILBUR E. LAGANKE. U. S. 1,789,183, Jan. 13. Structural features.

Thermostatic and electric control system suitable for fuel-supply-valve control. CHRISTIAN WILHJELM. U. S. 1,788,787, Jan. 13. Structural features.

2—GENERAL AND PHYSICAL CHEMISTRY

FREDERICK L. BROWNE

Ellwood Hendrick. ARTHUR D. LITTLE. *Ind. Eng. Chem., News Ed.* **8**, No. 21, 3(1930).—An obituary, with portrait. E. J. C.

Walter Louis Jennings. LEON V. QUIGLEY. *Ind. Eng. Chem.* **23**, 244–5(1931).—Biography with portrait. E. C. K.

Konrad Kubierschky on his seventieth birthday. *Z. angew. Chem.* **43**, 1105 (1930).—Biography with portrait. E. H.

Joseph Achille Le Bel. W. J. POPE. *J. Chem. Soc.* 1930, 2789–91.—Obituary with portrait. E. C. K.

Guyton de Morveau, the unrecognized discoverer of the fundamental facts of J. B. Richter's neutrality law. MAX SPETER. *Chem.-Ztg.* **54**, 1005–7(1930). E. H.

Fritz Pregl. R. STREBINGER. *Chem.-Ztg.* **55**, 29–30(1931).—Obituary with portrait. Also in *Oesterr. Chem.-Ztg.* **34**, 10–11(1931). E. H.

To the memory of Fritz Pregl. S. EDLBACHER. *Z. angew. Chem.* **44**, 29–30 (1931).—Obituary with portrait. E. H.

Perkin Medal award (to Arthur D. Little). *Ind. Eng. Chem.* **23**, 235(1931). **Accomplishments of the medalist.** FREDERICK G. KEYES. *Ibid* 236–7.—Portrait included. **Medal address: The evaluation of chemical projects.** ARTHUR D. LITTLE. *Ibid* 237–43. E. C. K.

The growth of chemical literature. FRED B. KILMER. *Ind. Eng. Chem., News Ed.* **9**, 25(1931). E. J. C.

Demonstration experiments and their place in teaching of chemistry. ARTHUR B. GOULD. *J. Chem. Education* **8**, 297–302(1931). E. H.

Lecture demonstrations in general chemistry. JAMES H. WALTON. *J. Chem. Education* **8**, 303–6(1931). E. H.

A simple device for illustrating on a plane surface the projection formulas of organic compounds. M. ALOYSE ELLINGSON. *J. Chem. Education* **8**, 316–9(1931). E. H.

The study of isomerism in courses in general chemistry. JOHN C. BAILAR, JR. *J. Chem. Education* **8**, 310–5(1931). E. H.

The quantitative trend in general chemistry laboratory courses. R. D. BILLINGER. *J. Chem. Education* **8**, 307–9(1931). E. H.

A method of dispensing qualitative unknowns. WM. O. SWAN. *J. Chem. Education* **8**, 250–2(1931). E. H.

The problem of the one-year course in chemistry for the general student. GERALD L. WILSON. *J. Chem. Education* **8**, 270–84(1931). E. H.

The freshman course in chemistry for students who have had secondary-school chemistry. STUART R. BRINKLEY. *J. Chem. Education* **8**, 285–9(1931). E. H.

Liebig's student days. ERNEST R. SCHIERZ. *J. Chem. Education* **8**, 223–31(1931). E. H.

The Liebig laboratory and Liebig museum in Giessen. ROBERT SOMMER. *J. Chem. Education* **8**, 211–22(1931). E. H.

The present scientific picture of the world. RICHARD V. MISES. *Naturwissenschaften* **18**, 885–93(1930). B. J. C. VAN DER HOEVEN

The blue color of sea water. RICHARD WILLSTÄTTER. *Naturwissenschaften* **18**, 868–70.—It is suggested that the blue color of sea water is caused by small quantities of dissolved complex Cu compds. (ammino salts). B. J. C. VAN DER HOEVEN

An ammonia world. W. CONARD FERNELIUS. *J. Chem. Education* **8**, 55–62 (1931).—An imaginative article picturing a "planet" in which the H_2O of the earth is replaced by liquid NH_3. Because of the similarities in certain properties between NH_3 and H_2O, an "ammonia world" would have many characteristics in common with a "water world." W. C. FERNELIUS

Platinum resistance thermometry. I. Calibration of bridge and annealing of platinum bulb. MOTOTARŌ MATSUI AND SHUJI KAMBARA. *J. Soc. Chem. Ind.* (Japan) **33**, Suppl. binding 401–3(1930).—To obtain an accuracy of 0.01° in resistance thermometry it is necessary to calibrate and det. the temp. corrections of the bridge used, and to anneal the Pt bulb sufficiently. The bridge was calibrated by the method of Mueller (*C. A.* **11**, 1). **Two thermostats were used to obtain temp. corrections. An** oil bath contained **a standard resistance. The bridge was contained in an air bath** and the temp. **varied between 14° and 32°. The bulb was annealed at 400–600° and** R_0 measured **to det. when a steady state had been reached. Fourteen annealings were**

required to obtain a const. R_0. **II. Determination of constants of platinum bulb and accuracy of resistance thermometry.** *Ibid* 403–7.—The consts. R_0, R_{100} and δ were obtained by means of the annealed bulb and calibrated bridge. By differentiating R_t, R_0 and R_{100} with respect to temp., each max. allowable error was obtained. If an accuracy of 0.1° is satisfactory it is unnecessary to calibrate the bridge. The deviation of R_0 and R_{100} from the mean value was less than ±0.000010. From observations of the S b. p. the deviation of δ was less than ±0.000050. With these limiting conditions the accuracy of resistance thermometry is 0.01° below 500° and 0.1° above that temp. ALLEN S. SMITH

Optical pyrometry. A. C. EGERTON AND M. MILFORD. *Proc. Roy. Soc.* (London) A130, 111–9(1930).—The advantages of a magnifying pyrometer are pointed out. A monochromatic filter using a "didymium glass" is described which transmits light between 5740 and 5600 A. U. The calibration of a pyrometer by use of a wedge as a blackbody source or a Pt tube provided with a small hole is discussed. The temps. are detd by melting small pieces of metal on the outside of the tube or wedge, or preferably by hanging a wire down the middle of the tube. Two monochromatic filters made it possible to det. the color temp. H. W. LEAHY

Correction for adsorption in physicochemical measurements of molecular and atomic weights. ENRIQUE MOLES. *Anales asocn. quím Argentina* **18**, 114–23(1930).—The adsorption per unit of calcd. surface is found experimentally to be greater on a sphere than on cylindrical tubes. The actual surface of the sphere is believed to be greater than the calcd. surface. Data for relatively small surfaces adsorbing NH_3 and SO_2 agree well with those of Bangham and Burt (*C. A.* **19**, 1215, 2290), who used glass wool having considerable surface, showing that the 2 phenomena are the same. In practice, adsorption correction cannot be eliminated by using vessels of different vols. E. M. SYMMES

A simple principle of the elements. HERBERT HERIBERT. *Z. Elektrochem* 36, 687–8(1930).—A scheme is presented in which the elements of a principal group or subgroup of the periodic system are indicated by mechanical operation of a slider. The app. consists of two identical horizontal strips, one above the other, sepd. by a slider after the manner of a slide rule. Each strip bears the symbols and at. no. of the elements arranged in the order of the at. no. The slider carries definitely spaced arrows some of which point to the upper strip and others to the lower strip. When the arrow at the left end of the slider is set on one of the first 8 elements (He to F) the other arrows point upward to the symbols of the other elements in the principal group, and downward to the symbols in the corresponding subgroup. Similarly, if an arrow is set on the symbol of an element, the elements that belong to the corresponding principal group and subgroup will be indicated by the other arrows on the slider. The spacing of the arrows on the slider is detd. by the fact that the at. no. of the elements in the same groups of the periodic system are sepd. by one of 3 intervals, namely, 2×2^2, 2×3^2 or 2×4^2. R. H. LOMBARD

The frequency of elements and the presence of a nucleus periodicity. R. A. SONDER. *Naturwissenschaften* **18**, 939–40(1930).—The results on periodicity of nucleus structure given by I. and W. Noddack (*C. A.* **25**, 5546) agree with recent data of S (*C. A.* **25**, 7). Previously the same relations had been suggested before there was sufficient evidence (*C. A.* **18**, 497). B. J. C. VAN DER HOEVEN

The basis of chemical atomic weights. A proposal. ARISTID V. GROSSE. *Z. physik. Chem.*, Abt. B, **10**, 395–6(1930).—It is proposed that the basis of at. wts be made He with a value of 4.0000, since it exists with only one kind of atom. This change gives slightly less than integral values for many isotopes and lowers the present values for at. wts. (O = 16) only a little. L. P. HALL

The synthesis of silver sulfide. Atomic weight of sulfur. O. HÖNIGSCHMID. *Z. Elektrochem.* **36**, 639–90(1930).—Samples of purest at. wt. Ag weighing about 10 g. were converted to Ag_2S by heating them at 250° in S vapor carried by a current of N_2. Excess S was removed from the Ag_2S by heating it in O_2-free N_2 for 30 min. at 280°. Ten syntheses of Ag_2S gave, $Ag_2S:2Ag = 1.148630$, and the at. wt. of S = 32.0685 ± 0.0006. Ag_2S is stable between 200° and 300°, and excess S in a synthetic prepn can be removed by heating in this temp. range. Likewise, a sample of Ag_2S that has been made deficient in S through thermal dissocn. or by reduction by H_2, will regain its original wt. within a few hundredths mg. when heated in S vapor between 200° and 300°. Attempts to analyze Ag_2S by reduction with purest electrolytic H_2 at 720° for 160 hrs. did not give satisfactorily quant. results. The wt. of Ag obtained after reduction was 0.1 to 0.2 mg. greater than that from which the sample of Ag_2S had been synthesized. The reduction becomes slower as the end is approached, and if reduction is prolonged

unduly, loss of Ag by volatilization may become significant, especially above 800°.
R. H. LOMBARD

The concurrence of principle and secondary valence. EDUARD HERTEL AND GEORG H. ROMER. *Ber.* **63B**, 2446–52(1930).—Mols. *M*, that form addn. products are considered to have a reacting group, *R*, and a center of addn., *A*. Two such compds. can react to give the following products: I, $R_1—M_1—A_1:::A_2—M_2—R_2$; II, $A_1—M_1—R_1—R_2—M_2—A_2$, III, $A_1—M_1—R_1—M_2—A_1 + R_1$; or IV, $A_1—M_1—M_2—A_2 + R_1—R_2$. The reaction may be altered by changing the groups attached to the two basic mols. $MeOC_6H_2(NO_2)_3$ (V) and $Me_2NC_6H_5$ or dimethyl-β-naphthylamine form addn. products, which on warming rearrange to give picrates of quaternary ammonium bases the Me group wandering. $(NO_2)_3C_6H_2OCHMeCOOEt$ (VI) gives only an addn. compd. V with NH_3 or NH_2Ph gives only MeOH and the amine; no addn. compd. can be isolated. A study of the phase diagram of V and α- (VII), β-naphthylamine (VIII) or 4-bromo-α-naphthylamine (IX) shows that each forms an addn. compd. The compd. with VIII at 150° above its m. p. gives $(NO_2)_3C_6H_2NHC_{10}H_7$. VI with VII and VIII gives no addn. compd. VI and IX give an addn. compd. V and VI form compds. with Ph_2NH. These facts indicate that secondary valence is manifest only by compds. having a reactive group.
V. F. HARRINGTON

Values and inter-relationships of *c*, *e*, *h*, M_p, m_e, *G* and *R*. W. N. BOND. *Phil. Mag.* 10, 994–1003(1930).—Theoretical. The evidence in support of Eddington's $hc/2\pi e^2 = 137$ and Furth's $hc/\pi(M_p + m_e)^2G = (16)^{32}$ is believed to be sufficient. On the basis of these the following are calcd.: $e = (4.779_7 \pm 0.0017) \times 10^{-10}$ e. s. u., $h = (6.550_8 \pm 0.0046) \times 10^{-27}$ erg. sec., $e/m = (1.7688_2 \pm 0.0006_5) \times 10^7$ e. m. u./g., $M_p/m_e = 1846.43 \pm 0.65$ and $G = (6.635 \pm 0.001) \times 10^{-8}$ dyne.cm.²/g.² (c = velocity of light; e = electronic charge; h = Planck's const.; M_p and m_e are masses of proton and electron; G is the gravitational const.)
WILLIAM E. VAUGHAN

Extended energy functions of the hydrogen molecule. P. M. DAVIDSON AND W. C. PRICE. *Proc. Roy. Soc.* (London) **A130**, 105–11(1930).—A math. discussion of the potential energy of H_2.
H. W. LEAHY

Magnetism in discontinuous media. L. W. MCKEEHAN. *Rev. Modern Physics* **2**, 77–97(1930).—This a comprehensive survey of the various theories of magnetism based upon some type of "elementary magnet." The behavior of fluids, mesophases, and ferromagnetic and paramagnetic crystals is discussed. A no. of the theories of ferromagnetic crystals are outlined and criticized, including those of Ewing, Honda and Kaya, Weiss, Piddie, Gans, Mahajani, Akulov, Becker, Heisenberg and Weiss. Bibliography
W. W. STIFLER

Dependence of the susceptibility of diamagnetic metals on the field. W. J. DE HAAS AND P. M. VAN ALPHEN. *Proc. Acad. Sci. Amsterdam* **33**, 680–2(1930).—A preliminary report, covering measurements on a small rod of very pure Bi at 290°, 20.3° and 14.2° K. At room temp. the susceptibility is independent of the field but at the 2 low temps. the susceptibility begins to decrease at higher fields, just as the change in resistance has been found to do.
W. W. STIFLER

Determination of the susceptibility of potassium chromium alum at low temperatures. W. J. DE HAAS AND C. J. GORTER. *Proc. Acad. Sci. Amsterdam* **33**, 676–9(1930). The susceptibility of K Cr alum was measured at 8 temps. between 14.33° and 2.06° K. When these results are corrected for the diamagnetism of the K and sulfate ions and for the H_2O of crystn., they follow the Curie-Weiss law with $\theta = 0.16°$, $C = 36.9 \times 10^{-4}$, and $p = 19.02$ Weiss magnetons. This behavior does not accord with the theories developed by Sommerfeld and Laporte to explain the magneton nos. in the iron group.
W. W. STIFLER

Thermal variation of the magnetic birefringence of *p*-azoxyanisole above the temperature of disappearance of the mesomorphous state. JACQUELINE ZADOC-KAHN. *Compt. rend.* 191, 1002–4(1930); cf. *C. A.* **24**, 2924.—The *Cotton-Mouton effect* was detd. for anisotropic *p*-azoxyanisole between 134.5° and 172.6° in a field of 33,900 gauss. The temp. measurements were accurate to 0.5° and the angles of rotation of the analyzer to 1/1000. Thermal conditions were better than during previous measurements.
FRANK URBAN

The dipole moment of naphthalene and its monohalogenated substitution products. ADOLF PAUL. *Z. physik. Chem.*, Abt. B, **10**, 264–72(1930).—The influence of substitution in the 1- and 2-positions on the magnitude of the dipole moment was studied for $C_{10}H_8$ and its 8 monosubstituted halogen derivs. in C_6H_6 soln. at 20°, methods previously described (*C. A.* **23**, 4857; **24**, 4195) being used. The d., dielec. consts., polarization, and the total polarization were measured for each product over a range of concns. The indices of refraction for H_β, *D* and H_α lines were detd. for

1-fluoronaphthalene as 1.61474, 1.59388, 1.58611 at 19.6° and for 1-iodonaphthalene as 1.72995, 1.70256 and 1.60244 at 19.5°. The 2-halogen derivs. had 0.13 to 0.15, 10^{-18} greater moment than the 1-derivs. Naphthalene had zero moment. All halogens in the 1-position of $C_{10}H_8$ had the same moment as in C_6H_6. L. P. H.

A mechanistic view of the Broglie waves and an extended equation of state for gases. ARTHUR KORN. *Physik. Z.* **31**, 955–7(1930).—The customary equations for compressible liquids may be solved in the form of the *Schroedinger wave equation*. The phenomena of wave mechanics are interpreted as true mech. vibrations of which the de Broglie waves are a special case. No relativity considerations are needed for their explanation. It is shown that c in the *kinetic theory* equation $p = c\mu$ is no longer proportional to the temp., but assumes the form $c = \text{const.} \sqrt{T}\nu$, for large values of the frequency ν. The latter expression also covers *photoelec. phenomena*. F. U.

Kinetic theory of the liquid state. R. O. HERZOG. *Z. physik. Chem.*, Abt. B, 10, 347–46(1930).—Tests of Jager's equation (*Drud. Ann.* **11**, 1077 (1903)) connecting viscosity, internal pressure, radius and velocity of a mol. give good agreement for liquid H and for Hg at higher temps. Jäger's equation is combined with that of Riecke (*Z. physik. Chem.* **6**, 564 (1890)) to relate the previous quantities with mean free path and diffusion. L. P. HALL

The kinetics of the polymerization of vinyl acetate. HOWARD W. STARKWEATHER AND GUY B. TAYLOR. *J. Am. Chem. Soc.* **52**, 4708–14(1930).—The polymerization of pure $CH_2{:}CHOAc$ is shown to follow the unimol. rate law. In PhMe soln. the rate of reaction is retarded. The kinetics of the polymerization are explained on the basis of a chain reaction. $(PhCO)_2O_2$ acts as a trigger catalyst by initiating reaction chains, while S inhibits the reaction. H. W. LEAHY

The changes in volume and temperature that accompany the mixing of organic liquids. I. E. ROGER WASHBURN AND ALBERT LIGHTBODY. *J. Phys. Chem.* **34**, 2701–10(1930).—In an effort to find a relationship between the temp. and vol. changes on mixing org. liquids, the temp. and vol. changes that occur on mixing MeOH, EtOH and iso-PrOH with C_6H_6 or PhMe were measured. The effect of H_2O on the curves for the EtOH-C_6H_6 mixts. was also detd. It was found that between 0 and 1.0 mole fraction of 99.7% EtOH no contraction occurs, while with 99.87% EtOH there is contraction between 0.6 and 1.0 mole fraction. No simple relationship was found between the temp. and vol. changes. H. W. LEAHY

Molecular volume relations of liquid mixtures. W. HERZ. *Z. Elektrochem.* **36**, 850–2(1930).—The mol. vol. of liquid mixts. and solns. is calcd. from the d. and the true vol. of the mols. from the index of refraction. These values are compared with the corresponding values of the components. Data are given for various mixts. of EtOH and $PhNH_2$, Me_2CO and PhH, H_2O and H_2SO_4, PrOH and $C_2H_4Br_2$, H_2O and EtOH, H_2O and Me_2CO, H_2O and KCl, and H_2O and NaCl. JOHN R. HILL

The influence of the period of heating upon the boiling point of certain liquids used in ebullioscopy, with a note on testing the purity of volatile liquids by isothermal distillation. SYDNEY L. WRIGHT, JR., AND ALAN W. C. MENZIES. *J. Am. Chem. Soc.* **52**, 4699–708(1930).—To det. whether the b. p. of a liquid is altered by prolonged heating at the b. p., an app. was constructed that allows a direct differential vapor pressure measurement to be made on 2 samples of a liquid, one having been kept at the b. p. for several hrs., the other elevated to the b. p. from room temp. immediately before measuring. From data obtained on AcOH, Br, C_6H_6 and CCl_4, it is concluded that the vapor pressure of a sample of liquid rapidly elevated to its b. p. is identical with that which it exerts after remaining at the b. p. for several hrs. Delay in attaining internal equil. is not thought to be a factor influencing the measurement of b. p. and vapor pressure when these liquids are used for ebullioscopy. H. W. LEAHY

The motion of xylene drops on the surface of aqueous propyl alcohol solutions. G. G. KANDILAROW. *Kolloid-Z.* **53**, 304–6(1930).—Place a few drops of xylene on water and add, drop by drop, from a capillary pipet, Pr alc. The xylene drops show the same type of movement observed when camphor is placed on an aq. surface. Observation through a microscope shows a very lively action with the xylene drops pushing waves in various directions. Two cases are distinguished: (1) in dil. alc. solns. xylene dissolves in the aq. layer, (2) in concd. alc. solns. Pr alc. dissolves in the xylene drops. ARTHUR FLEISCHER

Remarks on the drop method of measuring surface and interfacial tensions. I. TRAUBE. *Kolloid-Z.* **53**, 300–3(1930).—Polemical with Junker (cf. *C. A.* **24**, 5990) and with Palitzsch (cf. *C. A.* **24**, 1011). ARTHUR FLEISCHER

Crystal growth. W. KOSSEL. *Naturwissenschaften* **18**, 901–10(1930).—A lecture.

The **rate of growth at different crystallographic points is derived from energy considerations** (cf. *C. A.* **22,** 2690; Sommerfeld, Festschrift Leipzig 1928).
B. J. C. VAN DER HOEVEN

The electric resistance of titanium, zirconium and their mixed crystals. J. H. DE BOER AND P. CLAUSING. *Physica* **10,** 267–9(1930).—Previous measurements of the resistance of Ti rods (*C. A.* **23,** 1320) were improved. The rods now used have less sp. resistance and greater purity. Matthiesen's law holds for them as well as for mixed-crystal Ti-Zr rods, *i. e.*, for small admixtures of one metal with the other the product of α and ρ_0 is const. (α is the temp. coeff. of sp. resistance ρ_0). For 5 metals of at. compn Ti-Zr 0-100, 13.4-86.6, 21.1 78.9, 87.7-12.3 and 100 0 the values for $10^4.\rho_0$ are 9.410, 0.585, 0.75, 0.73, 0.475 and for $10^2.\alpha$ 0.438, 0.292, 0.234, 0.280, 0.425, resp. (the old Ti values were 0.82 and 0.469). The ρ_0 values were detd. at 0°, the α values between 0° and 100°. The Ti was prepd. by the method of de Boer and Fast (*C. A.* 20, 427; **24,** 2683), the 100% and 87.7% Ti rods were both monocryst. (10 cm. long or more).
B. J. C. VAN DER HOEVEN

Anisotropy of the electrical resistance of mercury crystals. OTTO SCHELL. *Ann. Physik* [5], **6,** 932–56(1930).—Hg crystals were prepd. in an app. that permitted measurement of the elec. resistance of the material at various angles to the principal axis of the crystals. The temp. range was from −40 to −80°. The sp. resistances parallel to, and perpendicular to, the axis at various temp. are tabulated. The changes in the resistance at the m. p. for each case are given: R (liquid)/R (solid; parallel), 4.94; R (liquid)/R (solid; perpendicular), 3.74. These values are compared with other work, both on Hg and on other metals.
WILLIAM E. VAUGHAN

The compound SnSb. W. MORRIS JONES AND E. G. BOWEN. *Nature* **126,** 846–7(1930). Photograms of SnSb show a NaCl type lattice with 4 mols. per unit cell and a_0 6.092 A. U. The at. nos. of the elements are so close that no reflections from the (11) planes appear, as with KCl. The structure persists from 46 to 60% Sn with slight change of the lattice const.
ARTHUR FLEISCHER

Structure of hydrogen sulfide, hydrogen selenide and nitrogen peroxide at liquid-air temperature. L. VEGARD. *Nature* **126,** 916(1930). Solid H_2S and H_2Se are isomorphous, with cubic elementary cell contg. 4 mols. The S and Se are arranged in face centered lattice. If the H atoms are given positions the most probable arrangement of the atoms in a mol. is in a straight line. The most probable space group would be T_h^6 if the mol. is asymmetric, and T_d^6, if it is symmetric. For H_2S, a = 5.76 A. U. ρ = 1.11. For H_2Se, a = 6.10 A. U., ρ = 2.34. Solid NO_2 has cubical structure, but more complicated than the other two. a = 7.77 A. U. and ρ = 1.93, which gives 6 mols. per cell. T_h^6 is considered to be the only possible space group fulfilling the conditions. Also in *Naturwissenschaften* **18,** 1098(1930).
C. E. P. JEFFREYS

Structure of an organic molecular compound. EDUARD HERTEL AND HANS KLEU. *Z. physik. Chem.*, Abt. B, **11,** 59–75(1930). The crystal structure of the mol. compd. acenaphthene + *1,6 dinitro 1,3-xylene* (1:1) was detd. by x-rays. It is a simple monoclinic translation lattice (space group C_{2h}^5), in which the component mols. alternate along the directions of the crystallographic axes. Simple additive relations connect the lattice dimensions of the compd. with those of the components; the vols. are not additive (4.5% expansion). The crystal structure of acenaphthene (cf. Bragg, *C. A.* 16, 2044) is discussed.
L. ONSAGER

Determination of the melting point of chromium with a thermocouple. LUDWIG MATTHES. *Ann. Physik* [5], **7,** 48–53(1930). A thermocouple, consisting of Ir with 10% Rh against Ir with 10% Ru, standardized by a Pt-Pt Rh couple up to 1600°, and by the m. p. of Pt, was used to obtain the cooling curve of Cr from about 2000° to 1400°. By this method the m. p. of pure electrolytic Cr is 1805°.
L. P. H.

Lead in chemistry and pharmacy. I. History and occurrence. G. MALCOLM DYSON. *Pharm. J.* **125,** 286–7(1930). **II. Extraction and properties.** *Ibid* 302–3. Descriptive and historical. **III. The salts of lead.** *Ibid* 386–7.—Prepn. of the oxides of Pb and of white lead in the historic light. **IV. Medicinal and allied aspects of lead.** *Ibid* 406–7(1930).—Occurrence of Pb in drinking water and in foodstuffs, occupational diseases affecting workers in Pb, and uses of Pb compds. in medicine, including "colloidal Pb," a supposed remedy in cancer (cf. *C. A.* **22,** 2984, 3703, 4642).
S. WALDBOTT

Univalent platinum. W. MANCHOT AND G. LEHMANN. *Ber.* **63B,** 2775–82(1930).—By the reduction of $K_2Pt(CN)_4 \cdot 3H_2O$ in 1% soln. by 3% NaHg, a Pt soln. was obtained that showed marked **reducing properties. It reduced** I soln. and $K_3Fe(CN)_6$. The potential against **platinized Pt was in one case** −0.726 and in another −0.783 for 0.32

M soln. The absence of other reducing agents was ensured. This form of Pt may be involved in the catalytic reactions of the metal. GREGG M. EVANS

Univalent palladium. W. MANCHOT AND H. SCHMID. *Ber.* **63B**, 2782–6(1930).—Univalent Pd, prepd. as was the corresponding Pt compd. (cf. preceding abstr.), was found to be a more energetic reducing agent than Pt. The Pd reduces alk. Pb soln., which is not acted upon by the Pt soln. The valence was established both by measurement of evolved H_2 and by titrations. The possibility of similar compds. for other members of the Fe-Pt group is discussed. GREGG M. EVANS

Density and refraction of crystallized ammonium halides. PETER WULFF AND HUGH K. CAMERON. *Z. physik. Chem.*, Abt. B, **10**, 347–67(1930).—Ds. were detd. by a suspension method for NH_4F, 1.0092, NH_4Cl, 1.5274, NH_4Br, 2.429, NH_4I, 2.5142. For the same salts values for n_D^{25} were measured as 1.3147–60, 1.63851, 1.71239 and 1.70070, resp. The NH_4 ion and the alkali ions were compared. L. P. HALL

The significance of Boedeker's adsorption equation. LOTHAR WÖHLER AND WILH. WENZEL. *Kolloid-Z.* **53**, 273–88(1930).—The adsorption equation usually attributed to Freundlich is credited to Boedeker. The adsorption of acetic, propionic, butyric and valeric acids from aq. soln. by Merck *Carbo animalis pro anal.* was studied at 20°, 40°, 60° and 80° over a range of concns. Rise in the no. of C atoms increases the adsorption. Rise in temp. decreases the adsorption; k decreases while n increases. The coeff. n approaches 1 with increasing temp. and increasing dilu. The adsorption of paraffin from hydrocarbon solvents was studied from —14° to 14°. The const. k decreases and n increases with rise in the b. p. of the solvent. The adsorption of Cl from NaCl, IO_3 from KIO_3, and SCN from NH_4SCN at high dilns. at 18° gave values of $n = 1$. ARTHUR FLEISCHER

The size of bubbles and drops in liquids. SIEGFRIED HALBERSTADT AND PAUL H PRAUSNITZ. *Z. angew. Chem.* **43**, 970–7(1930).—Bubbles formed by forcing N_2 through filtering plates, glass capillaries and perforated Pt plates were photographed as they rose through H_2O or Et_2O. Their size varied approx. as the reciprocal of the pressure With different liquids, the size of the bubble is detd. mainly by surface tension, though viscosity may have a certain influence. Liquid drops were formed by forcing one liquid into another through perforations in metal sheets. In the system EtOAc-H_2O the drops are larger than in Et_2O–H_2O. Their size decreases when the pores are made smaller or the surface tension of the outer liquid is increased. J. H. REEDY

Methods of breaking emulsions formed during the process of ether extractions. LESLIE HART. *Chemist Analyst* **20**, No. 1, 14(1931).—Addn. of 2–3 cc. of 25% NaOH, 2–5 cc. of alc., or 1–2 g. of NaCl, or placing the unstoppered funnel in the rings of the steam bath may break the emulsion. W. T. H

Methods of preventing foaming. LESLIE HART. *Chemist Analyst* **20**, No. 1, 9 (1931).—Foaming during steam distn. or during the detn. of water by the Bidwell-Sterling method of xylene distn. is prevented in different cases by adding one of the following: 3–5 g. $NaHSO_4$, 2–5 g. lump rosin, 5 cc. oleic acid, a small piece of paraffin, a little mineral oil, a sol. Ba or Ca salt, or a few drops of amyl alc. W. T. H.

The influence of insoluble powders on the emulsion type. J. F. CARRIÈRE. *Chem. Weekblad* **27**, 638–9(1930).—In an emulsion of 2 liquids with an insol. powder the liquid that wets the emulsifier forms the homogeneous phase. The wetting liquid enters the capillary spaces between the particles and forms a concave surface at each point against the other liquid. There is equil. when the interface is as small as possible, or when the interfaces between the particles have the smallest radius. This is attained when the particles take a slanting position with regard to each other. The result is that the total interface becomes concave toward the liquid that does not wet the particles. The same theory indicates that the other type of emulsion, if formed, is unstable E. SCHOTTE

Colloids. MERVYN V. SARGENT. *Chemist and Druggist* **112**, 613(1930).—A lecture. S. WALDBOTT

The evolution of colloidal molecules. PAUL BARY. *Rev. gén. colloïdes* **8**, 289–300 (1930).—Colloidal materials are chem. compds. possessing mol. chains on the unsatd. extremities of which radicals are adsorbed from the dispersion medium. They can exist in 2 states that are distinguished by their evolution processes and by their degree of solvation. Peptizable colloids for a given temp., pressure and chem. environment at the time of peptization are compds. that tend toward a very weakly polymerized state limited only by the concn. (pos. evolution). If the conditions of temp. and pressure are varied in the dispersion medium the speed of the evolution process is increased or decreased as the case may be. The direction of the process may be changed and the coagulation process favored or congealing to a mass may result (neg. evolution).

Colloids that at ordinary temp. and pressure are in a state of pos. evolution show swelling but can be peptized in several other liquids either spontaneously or by a slight modification of the temp. or the chem. nature of the dispersion medium. Non-swelling colloids that are dispersed by mech. or elec. means are non-evolutive and give rise only to lyophobic colloids. If the non-swelling colloid is formed by chem. action and is subsequently purified by dialysis, etc., it does so in a non-evolutive manner until it finally becomes an inert colloid. Jellies are produced by the mass congealing of evolutive systems; they are transformed into gels on leaving the evolution zone. F. W. LAIRD

Preparation of colloidal gold by the Zsigmondy method. I. Factors that affect the quality of distilled water. Action of traces of hydrogen sulfide. R. WERNICKE AND R. BIRABÉN LOSSON. *Anales asocn. quím. Argentina* 18, 74–97(1930).—Study of conditions under which good, ruby-red aurosols were obtained with formol in alk. media show that distd. H_2O redistd. into Jena flasks, the condenser being a Ag or Jena-glass tube, is unsuitable; the same H_2O kept 24 hrs. in contact with a piece of vulcanized rubber is satisfactory. If a small piece of vulcanized rubber is placed in boiling, twice-distd. H_2O for 3–5 hrs. the H_2O is satisfactory. By repeated treatments the rubber loses its property of activating the H_2O, but recovers it after 24 hrs. H_2O treated by the second or third method does not become opalescent in the second method even after weeks of contact H_2O can be dild. to 5–6 times its vol. without losing its property of giving good aurosols. H_2O kept in contact with unvulcanized rubber becomes opalescent and gives good aurosols; it does not lose this property on boiling; H_2O treated by the second or third method loses this property on boiling 10 hrs. Twice-distd. H_2O, in contact with air, increases in aurosol-forming properties, but prolonged action gives neg. results. The effect of contact with air cannot be attributed to H_2S content. Very good aurosols are obtained by addn. to twice-distd. H_2O, of Na_2S in concn. of 1.6×10^{-6} to 3.7×10^{-8}, the min. concn. being 3×10^{-9}; 4.9×10^{-6} prevented aurosol formation. Addn. of Na_2S or contact with rubber does not cause ordinary distd. H_2O to form aurosols; addn. of Na_2S allows prepn. of very concd. aurosols and large vols. in a single operation. By boiling 30 hrs. in vessels of Pt, quartz or Jena glass, twice-distd. H_2O does not alter its properties but continues unsuitable for making good aurosols unless Na_2S is added. The good results obtained by Zsigmondy can be explained by the presence of H_2S in the air and by the contact of the H_2O with the rubber tubes. E. M. SYMMES

Precipitation and adsorption of small quantities of substances on crystalline precipitates. OTTO HAHN. *Z. angew. Chem.* 43, 871–5(1930); cf. *C. A.* 21, 530, 1408.—Deposition of small quantities of substances with cryst. ppts. is classified into true "pptn." and "adsorption." True "pptn." is independent of the conditions, and is restricted to isomorphous and isodimorphous mixed-crystal formation. Photographs are presented showing isomorphous $BaBr_2$ + Ra(Th X) crystals, and isodimorphous BaCl + Pb(Th B) crystals. "Adsorption" depends on the conditions of pptn. The adsorption of Pb(Th B) by $BaBr_2$, which clearly differs from the above cases of true pptn. is shown in a photograph. The earlier pptn. and adsorption rule of Fajans and Paneth does not describe the process completely. The more recent adsorption law of H. by considering the charge on the ppt., comes nearer the true relation. Data are given for the adsorption of Th B by gypsum, AgBr and HgBr, and Th C″ by AgBr. However, the adsorption law cannot explain the entire process. Adsorption is very often the sum of at least 2 processes, a primary or momentary adsorption, and a secondary or integral adsorption. Primary adsorption is a function of the surface charge of the adsorbent and the valence of the adsorbed ions. Secondary adsorption results from a kind of building up of mols. on the diminished surface and takes place slowly. If the adsorption compd. is easily sol., secondary adsorption is negligible. R. I. R.

Dispersoid synthesis from gold by means of alkaline formaldehyde solutions. II. P. P. VON WEIMARN. *Kolloid-Z.* 53, 352–70(1930); cf. *C. A.* 23, 2868, 5383.—To prep. a stable red Au sol, it is advisable to use freshly redistd. CH_2O. The other reagents must be of reasonable purity. If redistd. CH_2O is used the water may be ordinary distd. or triple-distd. in Au or Pt condensers, and the same red sol obtained. The unreduced Au is present as AuOH and decreases in amt. with decreasing particle size. The stabilizer of the sol prepd. in this manner is a condensation product of the CH_2O. The article is mainly polemical with Zsigmondy and his school (cf. Das kolloide Gold, Calvary, 1, 1172). ARTHUR FLEISCHER

The coagulation of hydrophobe sols by electrolyte mixtures. H. FREUNDLICH AND TAMAMUSHIGUYNA. *Kolloid-Z.* 53, 288–94(1930).—Pos. Graham Fe_2O_3 sol, hydrophobic CuO sol and TiO_2 sol show no ionic antagonism when pptd. by mixts. of K or Li salts. The same results are obtained by adding a bivalent salt before the univalent. This

checks the work of previous investigators. **The first case of ionic antagonism** in a pos. sol was found with an As_2S_3 sol which was made pos. by the addn. of malachite green. For pure salts the coagulation values decrease in the following order, Li, Na, K. A marked ionic antagonism was found especially for the mixts. NaCl + Na_2SO_4, KCl + K_2SO_4, and $MgCl_2$ + $MgSO_4$, if the chloride is added to the sol first. The antagonistic action is greatest for the K salts, decreasing with Na, and least for Li salts. It is greater for Mg salts than for Be salts. If the sulfate is added to the sol before the chloride, the antagonism disappears. For neg. As_2S_3 sols, the coagulation values decrease in the order Li, Na, K, Mg, Ca, Ba and Al. If Li, Na or K chlorides are added first to the neg. sol, the antagonism increases with the series Ca, Ba and Al. If the higher-valence salt is used first, a slight antagonism is shown with the lower valence salt; it disappears with time. ARTHUR FLEISCHER

The clinging of quartz powder in electrolyte mixtures. A. VON BUZÁGH, H. FREUNDLICH AND J. TAMCHYNA. *Kolloid-Z.* **53**, 294–300(1930); cf. *C. A.* **24**, 3413, 3938, 4684 and preceding abstr.—Measurements were made on SiO_2 particles 17.1μ in size in concns. of 12 mg. per 10 cc. in the presence of Al, Ba, Mg, K, Na and Li salts and their mixts. The results are expressed as curves in which the sine of the break angle is plotted against electrolyte concn. The order of the electrolyte addn. made no difference in the results. Cation antagonism is strongest with the Li ion, then Na, and weak with K. The nature of the cation, the oppositely charged ion in this case, is of greater influence than the anion, the ion of like charge. ARTHUR FLEISCHER

The influence of electrolytes on colloidal sulfur. A. BONVARLET. *Rev. gén colloïdes* **8**, 300–9(1930).—The influence of varying amts. of NaCl on colloidal S was detd. A certain amt. of NaCl is necessary for stability but a concn. of 0.54% must not be exceeded. Ba, Cu, Ca, K and Mg, salts cause irreversible pptn., while Na, NH_4 and Li salts cause reversible pptn Observation in the ultramicroscope revealed no coagulation during reversible pptn even though the particles were deprived of their charge (as evidenced by electrophoresis). During irreversible pptn. agglomeration took place and compact masses were formed For a sol of 13.4% S content the stability appears to be optimum at 0.93% NaCl concn when the ratio NaCl/S is 0.07. These sols are unstable toward heat, cold and light but are easily repeptized by shaking. However, air slowly oxidizes them F. W. LAIRD

Effect of hydrogen-ion concentration on the flocculation values of ferric oxide sols. I. FRED. HAZEL AND C. H. SORUM *J. Am. Chem. Soc.* **53**, 49–54(1931).—The stability of colloidal Fe_2O_3 increases with increasing acidity for KCl, KBr, NH_4Cl, $BaCl_2$, K_2CrO_4, KH_2PO_4, $K_3Fe(CN)_6$ and $K_4Fe(CN)_6$. $FeCl_3$ and Al_2Cl_6 hydrolyze to such an extent that the initial p_H of the sol is altered to a const. value. F. G. G

The Hofmeister series and the hydrogen-ion concentration. E. H. BÜCHNER. *Rec. trav. chim.* **49**, 1150–60(1930); cf. *C. A.* **21**, 3515.—The salting out effect of certain anions on a 1% gelatin sol places them in 2 groups according to p_H. The first group salts out only at $p_H < 5$. This contains Cl^-, NO_3^- and Br^- in the order of decreasing power. The second group salts out only at $p_H > 3$. The order of these anions—tartrate, phosphate and citrate—varies according to the p_H of the sol The salts of the second group are more effective than those of the first, 0.5 to 1.0 mol being sufficient to produce opalescence Sulfate ion salts out in both acid and alk soln It is more effective than the ions of the first group in acid soln. and less effective than those of the second group in alk soln Salicylate ion and I^- fail completely to produce opalescence. With hemoglobin in basic soln. the pptg. power increases in the order thiocyanate, tartrate, acetate; Cl^- no effect. In acid soln. the pptg power increases in the order chloride, nitrate, sulfate, acetate-tartrate-thiocyanate. CORNELIA T. SNELL

Steady states at non-living membranes. JAN STRAUB. *Chem. Weekblad* **27**, 672–4(1930).—S.'s hypothesis of maintenance of const. concn. differences at membranes in live organisms by elec. energy from metabolic processes (*C. A.* **23**, 3482) finds support in the fact that equil. is established at non-living membranes by elec energy. (1) A cellophane cup was filled with 0.1 *N* H_2SO_4 and immersed in a beaker contg. the same soln. The soln. was electrolyzed; equil. was established in hrs. (2) The same expt. was repeated with 0.1 *N* NaH_4PO_4. Equil. was established in hrs. (3) A porous pot contg. solid oxalic acid, satd. oxalic acid soln. and 10% LiCl soln. was immersed in a beaker contg. 10% LiCl soln. and marble chips. Equil. was established in 14 days. The word "harmony" is proposed to express a state of dynamic equil., "being a state in which const. differences of mech. pressure, of osmotic pressure, and of elec. potential, of many concns. are in harmony with const. velocities of chem reaction, of diffusion and of current density." W. GORDON ROSE

The constitution of soluble proteins as reversible, dissociable component systems. S. P. L. SØRENSEN. *Kolloid-Z.* **53**, 306–18(1930); cf. *C. A.* **25**, 245.—Systems that are mixts. of proteins, such as plasma or serum, when subjected to sepn. processes vary in behavior according to the procedure chosen. The relation of lipoids to euglobulin in serum and the relation of the lipoid prepd. by pptn. of the serum in the cold by alc. or alc.-ether are reviewed. It is difficult to det the relations between proteins in soln. by analyzing the products obtained by adding a precipitant because the reagent may cause dissocn. or assocn. of proteins or may lead to the formation of compds. with the proteins. The compn. of such a ppt. gives at best a very incomplete explanation of the original combination relations in the soln. There seems to be no doubt that the lipoids in clear serums are combined in some way with the serum proteins. It is not known with certainty if the lipoids are pptd. with the same proteins with which they are combined in the serum. The exact manner of combination is unknown. The old classification principles for proteins should be retained with specification, however, of the method of sepn. and purification. ARTHUR FLEISCHER

The solubility of hydrofluoric acid in benzene and in octane. J. H. SIMONS. *J. Am. Chem. Soc.* **53**, 83–7(1931).—The solubilities of HF in C_6H_6 and in octane were detd. The vapor pressure of HF from benzene soln. shows unusual deviations from Raoult's law. A possible explanation is given. HENRY J. WING

Study of solutions of tartrates in fused calcium chloride hexahydrate. E. DARMOIS AND J. CESSAC. *Compt. rend.* **191**, 1053–5(1930).—By use of the av. cryoscopic const. k_1 detd. by dissolving urea, KCl, NH_4Cl and $CuCl_2$ in fused $CaCl_2.6H_2O$, solns. of Ca, Me and Et tartrates in fused $CaCl_2.6H_2O$ are shown to have a normal mol. wt. However, $[\alpha]$ differs entirely from $[\alpha]$ in aq. solns. and is in accord with the hypothesis of the existence of several isomers that reach equil. very rapidly. A. P. SACHS

Study of nitric acid. VI. Total vapor pressure of solutions of nitrogen dioxide in highly concentrated to absolute nitric acid and their corresponding densities. ALFONS KLEMENC AND JOHANN RUPP. *Z. anorg. allgem. Chem.* **194**, 51–72(1930); cf. *C. A.* **24**, 2765. The d. of the system: HNO_3–NO_2 was detd. at 0°, 12.5° and 25°. At 0°, as NO_2 ranges from 0 to 41%, d. increases from 1.5472 to 1.6727, and then falls gradually to 1.657 at 55% NO_2. At 12.5 and 25° the max. ds. are 1.6508 and 1.6273, resp. At 55% NO_2, 2 liquid phases are in equil., HNO_3 satd. with NO_2 and NO_2 satd. with HNO_3. In the system: HNO_3–H_2O–NO_2, with 19 *N* HNO_3, d. at 0 ranges from 1.4918 at 0% NO_2 to a max. of 1.5256 at 14% NO_2. With 16 *N* HNO_3, d. at 0° ranges from 1.4491 at 0% NO_2 to a max. of 1.4729 at 16% NO_2. These results indicate a compd. of NO_2 with HNO_3. Vapor-pressure curves were detd. for the same systems at the same temps. Henry's law does not apply for the partial tension p_{NO_2}. The soly. of NO_2 is very great in abs. HNO_3, about equal to that of NH_3 in H_2O. The equil. $HNO_3.NO_2 + H_2O \rightleftarrows HNO_3.H_2O + NO_2$ is assumed and must quickly follow temp. changes. The dissocn. of N_2O_4 occurs rather slowly in the system contg. H_2O, but much more rapidly in abs. HNO_3. The partial specific and molar vols. in the system $HNO_3.NO_2$ were detd. H. STOERTZ

Thermodynamic data on metallic sulfates. II. FUSAO ISHIKAWA AND HOSAKU MURAKA. *Bull. Inst. Phys. Chem. Research* (Tokyo) **9**, 781–94 (Abstracts 81 (in English)) published with *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) **14**, No. 271–[illegible]1930); cf. *C. A.* **24**, 4689.—The vapor pressures in mm. of Hg of the following systems were measured by a tensimetric method:

Temp.	$CuSO_4.5H_2O$ and satd. soln.	$ZnSO_4.7H_2O$ and satd. soln.	$CdSO_4.8/3H_2O$ and satd. soln.
20	16.99	15.93	15.65
25	22.99	21.17	21.17
30	30.80	27.73	28.44
35	40.63	35.90	37.84
40	53.37	45.68	49.68

The following values are given for 25°: $ZnSO_4.7H_2O + ZnSO_4.6H_2O - 15.38$; $ZnSO_4.6H_2O + ZnSO_4.H_2O$ 13.73; $ZnSO_4.H_2O + ZnSO_4$ 0.006; $CdSO_4.8/3\ H_2O + CdSO_4.H_2O$ 17.00; $CdSO_4.H_2O + CdSO_4$ 0.02. By combining these results with available data the following were calcd.: $Cu + S + 2O_2 = CuSO_4$, $\Delta F_{298} = -156{,}898$ cal., $\Delta H_{298} = -182{,}172$ cal., $S_{CuSO_4} = 29.1$ cal./deg. (25°); $Zn + S + 2O_2 = ZnSO_4$, $\Delta F_{298} = -207{,}038$ cal., $\Delta H_{298} = -231{,}322$ cal., $S_{ZnSO_4} = 34$ cal./deg. (25°); $Cd + S + 2O_2 = CdSO_4$, $\Delta F_{298} = -194{,}712$ cal., $\Delta H_{298} = -219{,}604$ cal., $S_{CdSO_4} = 34$ cal./deg. (25°). J. B. AUSTIN

New investigations concerning alkali alkyls. FR. HEIN AND H. SCHRAMM. *Z.*

physik. Chem., Abt. A, **151**, 234–56(1930).—Earlier investigations concerning the nature of alkali alkyls, as NaEt, KEt, etc. (cf. *C. A.* **19**, 1080), have established the conception of these substances as salts. In continuing, a cryoscopic investigation was made of the soln. state, or, as far as permitted, the soly. of $ZnEt_2$ solvates of the alkali metal alkyls in benzene. LiEt in C_6H_6 is assocd. 6 to 7 fold, which may be traced to its polar character. The $ZnEt_2$ solvate of LiEt aggregates to higher complexity. The investigation of $ZnEt_2$ solvate of NaEt, KEt and RbE indicated that these are likewise assocd. in C_6H_6. The solns. of the pure monosolvates may be represented by $[MeC_6H_5{\cdot}Zn(C_2H_5)_2]_2$. It is detd. by the method of Barger-Rast (cf. *C. A.* **16**, 519) that NaEt is monomolecular in its dil. non-conducting $ZnEt_2$ soln. The cond. of NaEt-$ZnEt_2$ solns. in C_6H_6, as well as the viscosity, decreases with diln. The electrochem. nature of RbEt is confirmed by detn. of the cond of its $ZnEt_2$ soln. It possesses the most decided salt character of all the alkali metal alkyls investigated. ALLEN S. SMITH

The cryoscopy of paraldehyde in solutions of sodium chloride and barium chloride. F. BOURION AND E. ROUYER. *Compt. rend.* **191**, 1062–4(1930).—The parameter K, for 0.5 and 1.225 *M* NaCl = 23.30 and 31.64, resp.; ΔC = 1.721° and 4.310°, resp. The paraldehyde $(C_2H_4O)_3$ is more or less polymerized. The greater the concn., the less is the mol. wt. An equil exists exclusively between the simple and triple mols. K, for 0.25 and 0.6125 *M* $BaCl_2$ solns. = 22.44 and 28.60, resp.; ΔC = 1.195° and 3.056°, resp. There is no depolymerization and $BaCl_2$ stabilizes the paraldehyde. M. E. L.

Equilibria in osmotic systems in which forces act. I. F. A. H. SCHREINEMAKERS. *Proc. Acad. Sci. Amsterdam* **33**, 820–6(1930).—The first section of a thermodynamic discussion of osmotic equilibria in systems in which there exist in the membrane forces capable of driving one or more substances in one direction or another J. B. AUSTIN

Associations in solution. JAKOB MEISENHEIMER AND OSKAR DORNER. *Ann.* 482, 130–60(1930).—The assocn. of a large no. of simple org. substances, representing many different types of compds dissolved in $PhNO_2$, dioxan and C_6H_6, was detd. by the cryoscopic method. The factor of assocn. increases linearly with the concn. of the soln. and this is regarded as the general course of assocn. The same result is also reached theoretically from kinetic considerations. In certain instances, however such as in a soln. of BzOH in $PhNO_2$, the assocn. factor at first increases rapidly with the concn. and later more slowly. This behavior is due to a special type of assocn leading to the formation of new double or triple mols. in accordance with the law of mass action. The curve obtained is never simple, because the general assocn. process is always superimposed on the special assocn. The assocn. of mixed mols. was also studied. The assocn. of HCl with H_2O, a series of alcs., Et_2O and Me_2CO was followed by prepg. solns. of the components in $PhNO_2$ or in dioxan and detg. the alteration in the f. p. on mixing. HCl assoc. strongly with H_2O and a series of alcs. examd. assoc. to a smaller extent. Those substances that show the greatest sp. assocn. of their own mols. also assoc. most strongly with HCl and the order of the tendency to assoc. with HCl is the same for the series of alcs., in both solvents. Me_2CO assocs. strongly and Ph_2CO weakly with HCl and in general assocn. is less with aromatic compds. In a few cases no change of f. p. occurs on mixing the solns. and in other instances a very slight further lowering takes place. The nature of the force involved in mol. assocn. is discussed and it is pointed out that the assocn of HCl with H_2O does not depend on the no. of single H_2O mols. but on the no. of assocd. H_2O complexes. The degree of sp. assocn. of the solute depends not on the dielec. const of the solvent but on the extent of solvation of the solute in the particular solvent. C. J. WEST

Recalculations of the first dissociation constant of phosphoric acid in aqueous solution at 18°, and incidental determination of the activity coefficients of the undissociated acid molecules. JOSEPH W. H. LUGG. *J. Am. Chem. Soc.* **53**, 1–8(1931).—pK_1 at infinite diln. has been assigned the value 2.09. An approx. equation for the activity coeff. of the undissocd. fraction in pure dil. aq. solns. of H_3PO_4 at 18° is $p\gamma_{H_3PO_4} = -1.8\mu$ where μ is calcd. from the equiv. ion concn. FREDERICK G. GERMUTH

Electrical conductivity of solutions of potassium perrhenate. N. A. PUSHIN AND P. S. TUTUNDŽIĆ. *Z. anorg. allgem. Chem.* **193**, 420–4(1930).—Cond. measurements were made at 18, 25, 30 and 40° on solns. ranging in concn. from 0.04 to 0.0005 *M*. The results include specific and mol. cond., ion mobility (ReO'_4) and degree of dissocn. Mol. cond. at infinite diln., obtained by graphic extrapolation, was found to be 111.5 at 18°, 125.7 at 25°, 141.8 at 30° and 169 at 40°. Specific cond. × 10^6 ranges at 18° from 1923 at a concn. of 0.02 *M* to 55 at a concn. of 0.0005 *M*; at 25° from 2248 at 0.02 *M* to 124 at 0.001 *M*; at 30° from 2510 at 0.02 *M* to 140 at 0.001 *M*; and at 40° from 2976 at 0.02 *M* to 167 at 0.001 *M*. At 0.02 *M* $KReO_4$ is 86% dissocd. at 18°,

89% at 25° and 30°, and 88% at 40°, while at 0.001 *M* it is 96.8% dissocd. at 18°, 98.6% at 25° and 99% at 30° and 40°. H. STOERTZ

Mobility of iron-containing ions. III. The complex ions of the salts $Na_3[Fe(CN)_5OH_2]$ and $Na_2[Fe(CN)_5OH_2]$. FRANK HÖLZL. *Monatsh.* 56, 253–60(1930); cf. *C. A.* 25, 245.—The acid character of the salts is established by both cond. and titration methods. These ions carry an "uncoördinated" mol. of H_2O which, with the acid H, forms hydroxonium salts $Na_3H_2O{\cdot}H[Fe(CN)_5OH]$ and $Na_2H_2O{\cdot}H[Fe(CN)_5OH]$. These with NaOH form salts contg. 4 and 3 Na atoms, resp. GREGG M. EVANS

The thermodynamic properties of molten solutions of lead chloride in lead bromide. E. J. SALSTROM AND J. H. HILDEBRAND. *J. Am. Chem. Soc.* 52, 4641–50(1930).—A reversible and reproducible Br electrode was devised. The ds. at 500° of $PbBr_2$ and $PbCl_2$ and of their solns. were detd. The molal vols. are additive. The free energy changes of molten $PbBr_2$ on diln. with $PbCl_2$ were also detd. The free energy of formation in cals. of pure molten $PbBr_2$ is $-69270 + 28t$ between 450° and 580°. J. B. AUSTIN

The thermodynamic properties of solutions of molten lead chloride and zinc chloride. A. WACHTER AND J. H. HILDEBRAND. *J. Am. Chem. Soc.* 52, 4655–61(1930).; cf. preceding abstr.—The e. m. f. of reversible cells with metal and Cl_2 electrodes and fused salt electrolytes was measured in the range 500° to 600°. At 500° the free energies and heats of formation, resp., are: molten $PbCl_2$, —58,750 cals., —81,100 cals.; molten $ZnCl_2$, —72,550 cals., —97,300 cals. The free energy change upon diln. of $PbCl_2$ with $ZnCl_2$ was also calcd. Neither the assumption of no ionization nor that of complete ionization of both salts accounts for the observed values. The d. of molten $PbCl_2$ in this range is $4.947–0.00164\ (t-500)$; that of molten $PbCl_2$, $2.424–0.00046\ (t-500)$. A 50 mol. percent soln. has a d. slightly less than the additive value. J. B. AUSTIN

The activity coefficient of copper iodate in aqueous salt solutions. BEN H. PATERSON AND EARL L. MEYERS. *J. Am. Chem. Soc.* 52, 4853–7(1930).—Activity coeff. of $Cu(IO_3)_2$, measured by the soly. method in aq. solns. of the chlorides and sulfates of K and Mg, show deviations from the Debye-Hückel limiting law similar to those found for other valence types by La Mer and Goldman (*C. A.* 23, 5085). The soly. of $Cu(IO_3)_2$ in water is 0.003693 mols. per l. at 25°. OSCAR T. QUIMBY

A potentiometric study of acid-base titration systems in the very strongly acid solvent formic acid. LOUIS P. HAMMETT AND NICHOLAS DIETZ, JR. *J. Am. Chem. Soc.* 52, 4795–4807(1930).—Titrations in HCOOH with $C_6H_5SO_3H$ were made with $NaHCO_2$, $(C_6H_5)_2COH$, and urea, which acted as strong bases. Gold electrodes were used and the comparison electrode was *p*-benzoquinhydrone in HCOOH satd. with $NaO_2SC_6H_4$ plus 0.098 *M* $NaHCO_2$. L. P. HALL

The strength of organic bases in glacial acetic acid solution. NORRIS F. HALL. *J. Am. Chem. Soc.* 52, 5115–28(1930); cf. *C. A.* 24, 2017.—A large no. of org. bases were titrated with $HClO_4$ in glacial AcOH soln. It is shown that the relative strengths of the bases in AcOH and H_2O are nearly proportional and that it is possible to det. in AcOH the "H_2O strength" of certain bases which cannot be studied in H_2O. A large part of the published data on the strength of bases in H_2O has been surveyed, and the values cor. to 25° where necessary in accordance with the new detns. of the temp. coeff. of pK_B for bases of different strengths. H. W. LEAHY

Chemical reaction between metallic magnesium and aqueous chloride solutions. ICHIRO IITAKA. *Proc. Imp Acad.* (Japan) 6, 363–6(1930).—Mg reacts with aq. solns. of NaCl, KCl, $BaCl_2$, $SrCl_2$, $CaCl_2$, $MgCl_2$, $AlCl_3$, $MnCl_2$, $ZnCl_2$, etc., but not with solns. of nitrates, sulfates, phosphates and acetates. Solns. freed from O_2, N_2 and CO_2 also react showing that these gases have no part in the reaction. The reaction velocity of Li with HNO_3, NaOH, HCl, H_2SO_4, AcOH and H_3BO_3 is given in the form of curves. Possible equations are given. Full details will be given in the *J. Iron Steel Inst. Japan.* C. J. WEST

Slow and induced oxidation of potassium oxalate, sodium nitrite and sodium sulfite. SACHINDRA NATH CHAKRAVARTI AND N. R. DHAR. *J. Phys. Chem.* 34, 2749–60(1930).—In previous work (*C. A.* 20, 2935) it was shown that $K_2C_2O_4$ and $NaNO_2$ are not oxidized appreciably by passing air for 5.5 hrs. at 30° through their solns. in the presence of $Fe(OH)_3$, $Ce_2O_3{\cdot}6H_2O$, and Na_2SO_3. The expts. are repeated with *freshly pptd.* $Fe(OH)_3$ and $Ce_2O_3{\cdot}6H_2O$ and aq. solns. of Na_2SO_3. The concns. of the acceptor and inductor as well as the time of passing air are varied. In addn. the oxidation of Na_3PO_3 in the presence of Na_2SO_3 is studied. In the presence of $Ce_2O_3{\cdot}6H_2O$ neither $K_2C_2O_4$ nor $NaNO_2$ can be oxidized, but both are oxidized easily by passing air at 30° in the presence of $Fe(OH)_3$ and Na_2SO_3. The oxidation of $NaNO_2$ is much greater when the $Fe(OH)_3$ is prepd. in the soln. contg. the $NaNO_2$ than when prepd. separately.

This is explained on the assumption that an easily oxidizable complex is formed between $FeSO_4$ and $NaNO_2$. In all cases oxidation increased with increasing concns. of inductor and acceptor, and also with time. A peroxide type of compd. is formed in every case (except with Na_3PO_3) which liberates I from an acid soln. of KI, and which depends upon the concn. of the acceptor only. Colloidal complexes prevent investigation of the oxidation of Na_3PO_3 in the presence of $Fe(OH)_3$ and $Ce_2O_3 \cdot 6H_2O$.
H. W. Leahy

The sorption of hydrogen sulfide by potassium benzenesulfonate. II. Willy Lange and Gerhard Lewin. *Ber.* **63B**, 2954–9(1930); cf. *C. A.* **25**, 21.—The integral heat of reaction, when 1 mol. of $(KO_3SPh)_4 \cdot H_2S$ (I) is formed from H_2S and aged KO_3SPh (II), is 10,000 ± 200 cal. The differential heat of this reaction is less for fused than for aged II. The sorption of H_2S obeys the equation: $c = (ap/kRT)/(1 + p/kRT)$, in which c is the no. mols. H_2S taken up per mol. II under pressure p and temp. T, k is the equil. const. and a is the limiting value of c, namely, 0.25. The exptl. isotherm at 0° gives $a/kRT = 0.00437$ if p is in mm. Hg. The sorption isobar also follows the above equation if the influence of T on k is detd. by the reaction isochore. O. T. Q.

The combustion of carbon disulfide with oxygen. H. W. Thompson. *Z. physik Chem.*, Abt. B, **10**, 273–95(1930).—The reaction between CS_2 and O with vol. relations of 1:3 was followed manometrically over a range of temps. and pressures. Below 140° the thermal reaction was very slow, but above this temp. there were definite pressure limits which became wider with increasing temp. The similarity of this reaction to that of H and O is stressed, as is also the importance of the effects of walls
L. P. Hall

Oxidation of carbon monoxide by dissociated water vapor. G. I. Lavin and W. E. Jackson. *J. Am. Chem. Soc.* **53**, 383–4(1931).—Harteck and Kopsch (*C. A.* **24**, 5612) showed that atomic O, from a discharge tube, has very little effect on CO. It is now shown that dissocd. H_2O vapor causes oxidation of CO to CO_2; the oxidation in H and K.'s expts. is due to the presence of a small quantity of H_2O. C. J. West

The indanthrene fusion. III. Indanthrene fusion in presence of phenol. T. Maki. *J. Soc. Chem. Ind., Japan* **33**, Suppl. binding 456–60(1930) (in German); cf. *C. A.* **24**, 2366; Japan. Patent 84,373.—Addn. of phenols or naphthols to the fusion mass selectively accelerates indanthrene over alizarin formation. Fusing a mixt. of 4.2 g. PhOH 40 g. KOH (79%), and 10 g. 2-aminoanthraquinone at 180°, for 60 min., gave 51.5%, the max. obtainable yield of indanthrene. A straight fusion, under optimum conditions, yielded no more than 18%. **IV. Influence of temperature in fusions with phenol present.** *Ibid* 461–3(1930).—No temp. variation raised the yield above the max. 51.5%. Fusion at 180° was completed in 60 min., at 210° in 15 min. Higher temps. than 210° increased the decompn. velocity unduly. K. H. Engel

The reactivity of the halogen derivatives of cyclohexane. B. V. Tronov and L. V. Ladigina. *Ber.* **63B**, 3060–7(1930).—A detn. was made of the relative reaction velocity of cyclohexyl chloride, bromide and iodide with CH_3ONa, pyridine and piperidine. The compds. in equimolar amts. interact at 17–19° for equal time intervals. The liberated halide is detd. gravimetrically as the Ag salt. The compds. studied rank next to the tertiary halohydrocarbons in reaction velocity. The mechanism of reaction is considered on the basis of the electron and polarity theories. B. A. S.

The solution of metals in acids. Gerhard Walpert. *Z. physik. Chem.*, Abt. A, **151**, 219–33(1930).—The soln. of metals in acids after the addn. of salts, acids and high-mol. substances is investigated. HCl reduces the potential and the soln. velocity of iron in 8 *N* H_2SO_4. The influence of the addn. does not follow immediately and no change is observed in the gas evolution in the first few minutes. A const. gas evolution and potential are obtained after 30 to 40 min. H_2SO_4 added to 8 *N* HCl reduces the soln. velocity of iron but not in the same measure as in the reverse order. The sequence of the reduction of soln. velocity of iron in concd. H_2SO_4 through salts is I > Br > Cl. In dil. solns. the influence of salts is small. The aliphatic acids reduce the reaction velocity in the order: formic, acetic, propionic, butyric. High-mol. substances, such as gelatin and methyl violet, reduce the reaction velocity to a large extent. The results are analogous for Cr, Zn and Cd, only salts increasing the soln. velocity. The observations may be traced to the adsorption of foreign substances. It follows that the primary process in the soln. of metals is likewise an adsorption of ions.
Allen S. Smith

An attempt to measure the velocity of dissociation of nitrogen tetroxide by the method of sound waves. Geo. B. Kistiakowsky and Wm. T. Richards. *J. Am. Chem. Soc.* **52**, 4661–71(1930).—The velocity of sound at 25° in N_2O_4 was investigated at frequencies from 10 to 80 kilocycles and pressures from 760 to 140 mm. by the use

of the magnetostriction oscillator developed by Pierce. It is independent of the frequency. Calcns. indicate that the theoretical velocity of decompn. and the no. of triple collisions have values close to those calcd. from the min. velocity const. defined exptly. Preliminary detns. of the absorption of sound in N_2O_4 are given. A. S. S.

The effect of neutral salts on reaction velocities in alcoholic solutions. ANTON KAILAN AND ADOLF IRRESBERGER. *Monatsh.* **56**, 428–46(1930).—The esterification of benzoic acid in alc. soln. with HCl as a catalyst is retarded by the addn. of 0.1–1 mol /l. of LiCl, $CaCl_2$ or $HgCl_2$, provided that the water content of the alc. is very small (0.05 *M.*). However, in alc. contg. approx. 1 mol./l. of water the same reaction is accelerated by addn. of the salts named, except $HgCl_2$ added in concn. $^1/_2$ mol. or less. The retardation is attributed to viscosity, the acceleration to hydration.

L. ONSAGER

Determination of the melting point of platinum alloys. LUDWIG MÜLLER. *Ann. Physik* [5], **7**, 9–47(1930).— For the measurement of temps. above 1500° a photoelec. cell was used with a wave filter. Standardizations were made with pure metals similar in kind and m. p. to the alloy under investigation. The liquidus curves (freezing point) were detd. for the systems Pt–Rh, Pt–Ir, Pt–W (up to 51.4 at. % W), Pt–Cr (up to 61.7% at. % Cr). For detn. of elec. cond. and temp. coeffs. wires were made of Pt with 3 and 5% Cr and 5 and 10% W, which were homogenized at 800°. Photomicrographs of Pt alloys with 50% Rh, Ir and W, 10% W and Cr, also 30% Cr were made. These studies indicated the formation of mixed crystals for Pt alloys contg. from 0 to 100% Rh or Ir, from 0 to at least 50% W, and from 0 to 10 or perhaps 30% Cr.

L. P. HALL

Special properties of eutectic and eutectoid mixtures in the binary metal systems. ...DAU *Z. anorg. allgem. Chem.* **194**, 1–37(1930).—Annealed eutectic mixts. of ...Pb, Sb, Sn–Zn, Au–Zn and Au–Cd and annealed C contg. eutectoid steels possess greater hardness and elec. resistance and lower temp. coeff. and cond. than the neighboring mixts. For this reason the phys. and mech. properties of eutectics and eutectoids cannot be brought into a scheme of straight-line diagrams, as can be done for the properties of alloys that consist of mech. mixts. of phases. On the property diagrams, eutectics and eutectoids take positions of relative maxima (hardness, elec resistance) or relative minima (cond., temp. coeff.) or, in general, the intersecting point of 2 lines that represent the properties of alloys on each side of the eutectic or eutectoid. This condition applies to all isotherms up to the m. p. of the eutectic or to the transition into solid soln. by the eutectoid and reappears on cooling. For coalescence to occur on heating, the eutectic mixt., an excess of one phase of which the eutectic is comprised is necessary.

H. STOERTZ

Does a middle horizontal part between two eutectic points exist on the fusion diagrams of binary systems? N. A. PUSHIN AND I. I. RIKOVSKII. *Z. physik. Chem.*, Abt. A, **151**, 257–68(1930).—R. Kremann *et al.* (cf. *C. A.* **12**, 1524) have worked out many fusion diagrams of binary systems that indicate chem. compds. between the components. The authors det. whether such diagrams exist. The investigation of the systems *m*-dinitrobenzene–*o*-phenylenediamine, *m*-dinitrobenzene–*m*-phenylenediamine, benzamide–*m*-nitrophenol, benzamide–*p*-nitrosodimethylaniline, benzophenone–picric acid by means of thermal analysis indicates that the middle horizontal branches which are given on the diagrams of Kremann, do not exist. In the five systems the diagram of state is expressed by two branches that meet at a single eutectic point. The system naphthalene–*m*-dinitrobenzene contains no horizontal branch but is characterized by a eutectic and a transformation point. The components form an equimol compd. It is concluded that middle horizontal branches between two eutectic points seldom exist on a fusion diagram since in none of the cases investigated was it confirmed

ALLEN S. SMITH

Electrochemical investigations of aluminum and alloys of aluminum with mercury. H. GERDING. *J. physik. Chem.*, Abt. A, **115**, 190–218(1930).—The complete binary system Al–Hg is detd. by means of potential measurements of Al and Al–Hg alloys in acetylacetone solns. The system contains no compds. A region of two phases, a liquid and a solid, extends from 0.8 to 99.97 atomic % Hg. The potentials of Al amalgams are more neg. than the potential of Al in solns. of Al amalgam and acetylacetone. The potential increases up to 0.35% Hg and is const. in the region of the two phases. The potential difference between an amalgam with two phases and the extrapolated potential of the "theoretical Al" amts. to 130 mv. Amalgams with 0.2% or more Hg evolve H in the soln. used and form Al acetylacetonate. No H is evolved in pure acetylacetone soln. at first and the potential is slightly neg. The difference between the pure liquid and a satd. soln. of Al acetylacetonate in acetylacetone is probably the

result of a difference of the charge on the Al ion. The oxide-film theory cannot explain the electrochem. behavior of Al and the Al–Hg alloys in the soln. The normal potential of the "theoretical Al" is 1.47 v. in $AlCl_3$ and 1.43 v. in $Al_2(SO_4)_3$ soln. in water.
ALLEN S. SMITH

Rates and temperature coefficients of the catalytic decomposition of ammonia over molybdenum, tungsten and promoted iron. C. H. KUNSMAN, E. S. LAMAR AND W EDWARDS DEMING. *Phil. Mag.* 10, 1015–37(1930).—A formula for the "true heat of activation," Q, is developed in terms of the temp. coeff., E, and the heats of desorption of the reactant and products. $E = Q - \lambda_0 + \sum_0^n \lambda_i \sigma_i$, in which $\lambda_0, \lambda_1 \ldots \lambda_n$ are the heats of desorption for the reactant and n products and $\sigma_0, \sigma_1, \ldots \sigma_n$ are the fractions of the surface covered by the reactant and the n products. NH_3 was decomposed on Mo and on W in the form of filaments and also promoted Fe catalysts. The change in pressure with time was detd. The temp. of the catalysts was detd and kept const. during an expt. by means of a Wheatstone bridge arrangement. Temp. measurements were made with pyrometer, thermocouple and by means of the temp coeff. of the resistance of W and Mo. It is concluded that the absorption of N from the gas phase is negligible and that the surface is covered with H and NH_2 during a run. The heat of activation and the heat of desorption of NH_2 less that of H are computed and tabulated. The heats of activation vary from 24,500 for used Mo at high temp. to 45,600 for one of the Fe catalysts.
WILLIAM E VAUGHAN

Dependence of detonating gas catalysis upon the quantity of catalyst. C. KRAUSE *Z. anorg. allgem. Chem.* 194, 73–88(1930).—In a heterogeneous catalytic gas reaction, such as takes place in detonating gas ($2H_2 + O_2$), the equil. depends, among other factors, upon the quantity of catalyst. The silent union of H_2 and O_2 was studied in the presence of catalysts that adsorb O_2 markedly, such as Ag, or catalysts that act chiefly chemically, in which the adsorption is retarded by the formation of intermediate compds. Catalysis with Sb, Ni, Cu and Ni and Cu oxides involves alternate oxidation and reduction. With Ag having a particle size from 0.05 to 1.0 mm., the reaction takes place at a lower temp. the greater the amount of catalyst present. With 2 g. of Ag, the reaction was 38.7% completed at 302°, with 4 g. of Ag, 38% completed at 265° and 84% at 315°; with 16 g. of Ag, 31.2% at 206°, and with 62 g. of Ag, 100% completed at 190°. The heat of activation of the Ag was found to be 12.12–12.98 kg.-cal. For the reaction with Sb as catalyst, "Kahlbaum" metal was finely powdered, its particle size being 0.02–0.2 mm. In this case variation in quantity of catalyst was without effect, indicating no adsorption of either H or O. The heat of activation was found to be 13.5 kg.-cal. With Ni, the temp. at which 100% reaction was brought about with 2 g. was 286°, with 4 g. 257°, with 8 g. 247° and with 16 g. 191°. The heat of activation was found to be 18.3 kg.-cal. NiO gave 100% reaction with 4 g. at 230°, with 8 g. at 215°, with 16 g. at 223° and with 64 g. at 247°. With Cu, 100% reduction occurred with 8 g. at 313°, with 16 g. at 350° and with 64 g. at 310°. The heat of activation with 16 g. was 17.6 kg.-cal. With CuO, 100% reaction was obtained with 4 g. at 204°, with 8 g. at 258°, with 16 g. at 265° and with 32 g. at 272°.
H. STOLTZE

The catalysis of autoxidation: antioxygenic and pro-oxygenic action of iron and its compounds. CHARLES DUFRAISSE AND RAYMOND HORCLOIS. *Compt. rend.* 191, 1126–8 (1930); cf. *C. A.* 18, 2138, 2635, 3134; 20, 2443, 3625.—The wide distribution of Fe in nature and its presence in respiratory pigments of higher animals make study of the catalytic activity of Fe important. Some authorities consider Fe exclusively a positive catalyst for autoxidation (cf., however, Berl and Winnacker, *C. A.* 24, 4374). Expts. were made on the following autoxidizable substances: acrolein, PhCHO, furfural, styrolene, turpentine and Na_2SO_3 in slightly acid or slightly alk. aq. soln. The following Fe compds. were used as catalysts: in the ratio 1:100—metallic Fe, anhyd. FeO, $Fe(OH)_2$, anhyd. $FeCl_2$, anhyd. $FeCl_3$, FeI_2, anhyd. $FeSO_4$, ferric alum, FeC_2O_4, $K_4Fe(CN)_6$, $K_3Fe(CN)_6$, Prussian blue, French blue; in the ratio 1:50—ferric acetylacetonate; in the ratio 1:10 (corresponding to a concn. of Fe of the order of 3.5 in 10,000)—oxyhemoglobin, methemoglobin, carboxyhemoglobin; in the ratio 1:25 (corresponding to a concn. of Fe of the order of 3.5 in 1000)—hematin, α-chlorohemin, β-chlorohemin, β-bromohemin, di-Me ester of α-chlorohemin. In common with other elements, the catalytic activity of Fe varies in intensity and in sign, according to its chem. form and the nature of the autoxidizable materials with which it is in contact. The non-ferruginous part of the catalyst often exerts a detg. influence. Thus $FeCl_2$ accelerates, while FeI_2 retards, the autoxidation of PhCHO and of acrolein. Ferric alum is strongly

-oxygenic, while ferric acetylacetonate is clearly antioxygenic toward Na_2SO_3. With re complex catalysts, especially with the large mols. like that of oxyhemoglobin, non-ferruginous portion influences the catalyst even so far as to cause a reversal the direction of the action. The following Fe compds. have an antioxygenic action:) for furfural; $Fe(OH)_3$ for Na_2SO_3 in slightly alk. soln.; $FeCl_3$ for PhCHO and for rfural; ferric acetylacetonate for Na_2SO_3 in weakly acid or weakly alk. soln. and for rfural; oxyhemoglobin, carboxyhemoglobin and methemoglobin for furfural and to maller extent for acrolein and Na_2SO_3; α-chlorohemin for furfural; β-chlorohemin, matin, di-Me ester of α-chlorohemin, and β-bromohemin for furfural, acrolein and to maller extent for Na_2SO_3 and PhCHO. These expts. show that Fe has an anti- nic as well as a pro-oxygenic action, and that the "relationship of inverse catalyses" plies to ferruginous catalysts as well as to others. LOUISE KELLEY

The **reaction between methanol and steam as an example of heterogeneous catalys.** J. A. CHRISTIANSEN AND JOHN R. HUFFMAN. *Z. physik. Chem.*, Abt. A, **151**, 2(1930).—A kinetic investigation is reported of the reaction $CH_3OH + H_2O = 3\ H_2$ catalyzed by Cu at temps. of 190° to 250°. In all the expts. about 0.1 tom of Cu with varying addns. of $Mg(OH)_2$ was used. The conclusions were from expts. made with a ratio of 0.7 atom Mg/1 atom Cu. The catalyzer de- activity with time but can be reactivated to a known max. value by treatment The activity decreases with increased ratio of Mg to Cu. The reaction ve- can be expressed by $(\sqrt{[M]}/2v) = I\ (1 + \varphi.[H_2] + \varphi[H_2]\ [CO_2]/[M])$, where indication of the activity of the catalyst, φ is a function of the partial pressure and H_2O, and $[M]$, $[H_2]$ and $[CO_2]$ are partial pressures. The initial velocity proportional to $\sqrt{[M]}$, whereas H_2 apparently arrests the reaction. The of CO_2 and H_2O on the velocity is small. The temp. effect is large and its to the const. $1/I$ may be expressed by $-\log_{10} I = -(6470/T) + 12.19$.

ALLEN S. SMITH

The **catalytic preparation of 2,4-diaminophenol.** W. E. BRADT. *J. Phys. Chem.* 34, 1(1930).—An abs.-alc. soln. of 2,4-$(O_2N)_2C_6H_3OH$ (I) was reduced to 2,4- H_3OH (II) in the presence of a Ni catalyst under 500 lbs. of H pressure. The of II was obtained at 96°. Increasing the time of reduction beyond 2 hrs. a slight increase in the yield of II. Variation of the concn. of I (when the Ni to I was 1:5) caused a max. yield of 91.5% at a concn. of 5 g. in 20 cc. of sol- When the ratio of Ni to I was 2:5, variation of the concn. of I gave a max. 97%, from 2.5 g. of I in 20 cc. of solvent. The latter ratio of g. of catalyst to g. of I caused an increase in the yield of II at all concns. investigated. Abs. EtOH at room temp. over $CuSO_4$ gave higher yields than any other solvent The Ni catalyst was reduced from $NiCO_3$ at 288°. H. W. LEAHY

Adsorption and promoter action in catalysis. A. C. ROBERTSON. *J. Am. Chem.* 53, 3(1931).—R. does not agree with Taylor that the result of Elissafoff's 1, 9, 3015) is an example of adsorption in catalysis. The glass wool prob- Cu from soln. as E. says but not as $CuSO_4$; the Cu probably forms a upon the surface of the glass wool and then solid CuO_2. C. J. WEST

Reactions at the surface of hot metallic filaments. B. S. SRIKANTAN. *Rec. trav.* 49, 946–9(1930); cf. *C. A.* **24**, 2036, 5584.—A general discussion. A study of the reaction of CO_2 and H_2 at various surfaces indicates that a good catalyst sup- the necessary energy of activation at a lower temp. than a poor catalyst, and at the same temp. enables the reactants to reach an active state with a smaller quantity of energy. CORNELIA T. SNELL

I. The **specific heats of thallium, calcium and magnesium measured to 10° absolute.** II **The entropy and chemical constants of magnesium from spectroscopic data.** F. G. KEYES AND J. V. VAUGHEN. *J. Am. Chem. Soc.* **52**, 4686–99(1930).—By use of a vacuum calorimeter and Pb resistance thermometer (*C. A.* **23**, 3609) the sp. heats of Tl, Ca, and Ca were detd. between 10° and 200° abs. and their Debye functions studied. The entropies were calcd. as 15.51, 9.72 and 7.76, resp. The vapor pressure constant of Mg was calcd. as 0.443 ± 0.1 and the entropy of Mg vapor as 35.29 at 25°. L. P. HALL

The calculation **of free energy from spectroscopic data.** W. F. GIAUQUE. *J. Am. Chem. Soc.* 52, 4808–15(1930).—Preparatory to the presentation of thermodynamic properties from spectroscopic data, methods and equations for the exact calcn. of free energy, entropy, etc., for **gases** are discussed. L. P. HALL

The entropy **of hydrogen and the third law of thermodynamics. The free energy** and dissociation **of hydrogen.** W. F. GIAUQUE. *J. Am. Chem. Soc.* **52**, 4816–3

(1930).—The relative amts. of ortho- and para-H are calcd. from 0° to 298° abs. for equil. conditions. Energy contents and heat capacities for the 2 rotational states and mixts. are obtained from certain equations (cf. preceding abstract). Values for the free energy of the reaction $H_2 = 2$ H, equil. consts. and percentage dissocn. up to 5000°K. are calcd. from band-spectrum data and agree well with those experimentally detd. by others. L. P. HALL

Calculation of heat of activation. H. EYRING AND M. POLANYI. *Naturwissenschaften* **18**, 914–5(1930); cf. *C. A.* **24**, 2941.—Application of the theory of London (Sommerfeld Festschrift Leipzig 1928, 104) on the reaction H + H_2 (para) = H_2 (ortho) + H (all atoms being assumed to be on one line) does not give a satisfactory result. The activation heat is actually between 4 and 8 kg.-cal. (Farkas, *C. A.* **25**, 32) more than the value calcd. from London's equation. By taking into account Coulomb members of the energy equation and the influence of the 2 outer atoms on each other (both factors were left out by L.) it is found that for a symmetrical condition of 3 H atoms in line the energy is a max. By taking the energy of the lowest max. as activation energy and considering the corresponding distances as those of an intermediary condition in the reaction above mentioned, it is found that the H atoms are thereby 0.95 A. U. apart (normal H_2 mol. 0.76 A. U.); the heat of activation is less than 10 kg.-cal The influence of the two outside H atoms on each other makes the original H_2 mol wider. B. J. C. VAN DER HOEVEN

The heat of formation of water. FREDERICK D. ROSSINI. *Proc. Nat. Acad. Sci.* **16**, 694–9(1930).—H_2 and O_2 were burned in a small chamber in a calorimeter and the wt. of H_2O formed was detd. The temp. rise was measured by a Pt resistance thermometer. The temp. rise was then reproduced with a measured elec. input. The av temps. were 25° and 30° in two sets of expts. The heat of formation of 18.0156 g of liquid H_2O at 25° and const. pressure of 1 atm. was 285,775 ± 40 international joules, or 68,313 cal. (15°). Also in *Bur. Standards J. Research* **6**, 1–35(1931). L. P. HALL

Thermal decomposition of nitrous oxide between one and ten atmospheres. N NAGASAKO AND M. VOLMER. *Z. physik Chem.*, Abt. B, **10**, 414–8(1930).—The uni mol. character of the reaction is confirmed. Temp. range is 848–938°. The heat of activation is 53 kg.-cal./mol. WILLIAM E. VAUGHAN

The decomposition of citric acid by sulfuric acid. EDWIN O. WIIG. *J. Am. Chem. Soc.* **52**, 4729–37(1930).—The decompn. of citric acid was found to follow the unimol. rate law. Small quantities of both SO_3 and H_2O have a pronounced inhibitory action on the velocity of decompn. As the concn. of H_2SO_4 increased, the rate increased to a max. which varied with the temp. For a 10° rise in temp. the temp coeff. was approx. 4 and increased regularly as the H_2O content of the H_2SO_4 increased The decompn. is assumed to proceed through the formation of an unstable citric acid – H_2SO_4 mol. complex. The inhibition by H_2O and SO_3 is explained on the basis of Taylor's theory of neg. catalysis. H. W. LEAHY

The effect of sulfur trioxide on the decomposition of oxalic acid by sulfuric acid. EDWIN O. WIIG. *J. Am. Chem. Soc.* **52**, 4737–41(1930); cf. preceding abstr.—The rate of decompn. of oxalic acid by H_2SO_4 mixts. contg. 0–30% free SO_3 showed a max at 14% SO_3 (2.0 molar). The data have been interpreted to indicate that SO_3 is not a pos. catalyst but merely decreases the concn. of H_2O, which is a very powerful inhibitor, the SO_3 being relatively weak. H. W. LEAHY

Inhibition in the decomposition of organic acids by sulfuric acid. EDWIN O. WIIG. *J. Am. Chem. Soc.* **52**, 4742–51(1930); cf. preceding abstrs.—The mechanisms of the above decompns. are discussed. Taylor's theory of neg. catalysis offers the only satisfactory explanation for the effect of inhibitions on the decompn. of org. acids by H_2SO_4 No definite conclusions with respect to the applicability of the chain reaction theory can be made until more data are available. H. W. LEAHY

The decomposition of ethylamine. A unimolecular reaction. H. AUSTIN TAYLOR. *J. Phys. Chem.* **34**, 2761–70(1930).—The decompn. of $EtNH_2$ was shown to be a homogeneous unimol. reaction over the temp. range 500–40° and at pressures of 50–400 mm The energy of activation was detd. to be 43,400 cals. and the value of E/RT of 28.9 was found to be comparable with that of other unimol. reactions. H. W. LEAHY

Thermal and chemical potential. PAUL DROSNE. *Chaleur et ind.* **11**, 465–8 (1930).—A discussion of terminology. S. L. B. ETHERTON

The use of optical data for calculation of activation heat. H. EYRING. *Naturwissenschaften* **18**, 915(1930).—In the calcn. of the H + H_2 (para) = H_2 (ortho) + H reaction it appeared that the Coulomb members of the London energy equation amount approx. to 10% of the whole if the system is in the reaction range. If this is a general rule it will make possible the calcn. of a large no. of chem. reactions when the total

energy of diatomic mols. as a function of the nucleus distance is known from optical consts. (cf. Morse, *C. A.* **23**, 5406). B. J. C. VAN DER HOEVEN

Physicochemical studies of complex acids. IV. The vanadates of Ag (BRITTON, ROBINSON) **6**. Changes in the absorption spectrum of a dye solution due to the introduction of a colloid (BOUTARIC, DOLADILHE) **3**. The photoelectric properties of NH_3 catalysts (BREWER) **3**.

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3—SUBATOMIC PHENOMENA AND RADIOCHEMISTRY

W. ALBERT NOYES, JR.

The corpuscular theory of radiation and the wave theory of matter. J. B. DERIEUX. *J. Elisha Mitchell Sci. Soc.* **46**, 27–40(1930).—A popular discussion. Radiation and matter show both corpuscular and wave-like characteristics. A. L. MEHRING

A conclusion of the Dirac theory of the proton and electrons. V. A. AMBARTZUMIAN AND D. D. IVANENKO. *Compt. rend. acad. sci. U. R. S. S.* **1930A**, 153–5.—Theoretical. WILLIAM E. VAUGHAN

Perturbation problems in quantum mechanics. J. E. LENNARD-JONES. *Proc. Roy. Soc.* (London) **A129**, 598–615(1930).—The Schrödinger perturbation theory is so modified as to extend its scope and increase accuracy and convenience in calcns. Examples are given of its application to van der Waals' attraction of 2H atoms, and the dielectric properties of a polar gas in strong fields. L. ONSAGER

Theory of elastic scattering of electrons in molecular hydrogen. H. S. W. MASSEY *Proc. Roy. Soc.* (London) **A129**, 616–27(1930).—The scattering cross-sections presented by H_2 mols. to electrons are calcd. from Born's theory of collisions. The re-

sults show that diffraction effects are to be expected; their intensities are calcd.
L. ONSAGER

Radioactivity and atom theory. G. J. SIZOO. *Physica* 10, 241–58(1930).—A lecture. B. J. C. VAN DER HOEVEN

Present status of theory and experiment as to atomic disintegration and atomic synthesis. ROBERT A. MILLIKAN. *Science* 73, 1–5(1931). E. H.

The interaction of inert gases. MAX DELBRÜCK. *Proc. Roy. Soc.* (London) A129, 686–98(1930).—This is a math. discussion of exchange integrals of closed shells.
L. ONSAGER

Thermionic emission. SAUL DUSHMAN. *Rev. Modern Physics* 2, 381–476(1930).
L. ONSAGER

Direct determination of the electron volume. V. POSEJPAL. *Compt. rend.* 191, 1000–2(1930).—P. derives the equation $\sigma/\rho = (\pi/m_H)r^2$, in which σ/ρ is the sp. diffusion coeff. of very hard γ-rays in H, $m_H = 1.662 \times 10^{-24}$ g., and r the radius of the ether corpuscle. For r is obtained the same value which the electromagnetic theory gives for the radius of the electron, thus lending support to the author's theory of a *corpuscular ether* composed of neutrons. FRANK URBAN

Optics of x-ray reflection from crystal faces. IV. Complete spectral diagrams (zone diagrams). H. SEEMANN. *Ann. Physik* [5], 6, 793–824(1930).—A detailed consideration of x-ray optics. C. E. P. JEFFREYS

A relationship between electron interference and soft x-rays. E. RUPP. *Naturwissenschaften* 18, 880(1930).—Vacuum tubes were constructed which made possible measurement of electron diffraction and of the crit. potential of soft x-rays (method of Richardson and Chalklin, *C. A.* 22, 2712), the former with or without variable angle of incidence. When the diffraction curve was measured for (111) face of Ni, angle of incidence $\theta = 10°$, maxima at 66 and at 132 v. were found. On the same surface a measurement of the photoelectrons caused by soft x-rays (electrode circuit of Richardson and Andrews, *C. A.* 24, 5215) gave a relation between i_p/i_t (i_p is photoelectron current, i_t current to Ni crystal) and potential with crit. potentials at 66.5 and 132 v. obviously the same as before. This coincidence is not accidental. The same result is obtained for const. velocity of the rays and variation of θ. A similar coincidence was furthermore found on W and on Cu. Apparently certain crit. potentials for soft x-rays exist which are related to the properties of the crystal lattice. B. J. C. v. D. H.

Interference of x-rays on thin films. HEINZ KIESSIG. *Naturwissenschaften* 18, 847–8(1930).—Reflection curves of thin Ni mirrors for x-rays were studied (Cu K_α line of $\lambda = 1.54$ A. U.). The mirrors were made by pptn. of Ni vapor on glass, rotational diagrams and a curve are reproduced. The curve shows that at angles up to 10′ the reflection is as high as 97%; it drops steeply at about 20′, and has low maxima again at about 28′ and 38′ for the thin Ni film used (thickness about 220 A. U.). These maxima are explained by reflection on the Ni-glass interface and interference of the 2 reflected rays. From the maxima and minima the thickness of the film was calcd.; also the intensities followed satisfactorily from calcns. B. J. C. VAN DER HOEVEN

The cathode-ray tube in x-ray spectroscopy and quantitative analysis. GORTON R. FONDA AND GEORGE B. COLLINS. *J. Am. Chem. Soc.* 53, 113–25(1931).—A method is described by which the x-ray spectrum of a sample is excited by directing upon it a stream of electrons transmitted by the Al window of a cathode ray tube. The usual photographic method of recording is replaced by a system consisting of an ionization chamber together with amplifying app. in which the new 4-element vacuum tube, FP 54, is employed. The law governing intensity variation, $I = C(V - V_0)^2$ is discussed for the case of the K_α radiation of Fe and Mo. The exponent is found to be correct up to a voltage four-fold that of V_0, the exciting voltage for Mo, and eleven-fold for Fe. Quant. results are presented of the analysis of certain metallic alloys. C. J. H.

Half-life of uranium II. The weight relations of the isotopes uranium I and uranium II in the element uranium. E. WALLING. *Z. physik. Chem.*, Abt. B, 10, 467–75(1930).—The half-life of U-II was detd. by α-ray activity as 340,000 years ± 15% (av. of 3 detns.) For each atom of U-II there exist 13,200 atoms of U-I
W. F. V.

The atomic weight of uranium lead from Swedish kolm. G. P. BAXTER AND A. D. BLISS. *J. Am. Chem. Soc.* 52, 4848–51(1930).—Pb was extd. from the ash of kolm and pure $PbCl_2$ prepd. Nephelometric end points showed this Pb to have an at. wt. of 206.013, agreeing with the fact that no Th was found in the mineral. Ordinary Pb from Coeur d'Alêne Pb-Ag ores yielded an at. wt. of 207.218. L. P. HALL

Obtaining U_3O_8 as a standard of radioactivity. D. K. GORALEVICH. *J. Russ. Phys.-Chem. Soc.* 62, 843–64(1930).—U ore is of a very complex chem. compn., contg.

practically every known element. As U_3O_8 constitutes the adopted standard of radioactivity, its prepn. in the pure state becomes a problem of great importance. This article reports in detail a system worked out by G. for obtaining pure U_3O_8 by starting with uranyl nitrate. Particular emphasis is placed on the elimination of the alkalies, alk. earths, radioactive elements, Mg and, particularly, Th. G. also discusses the products obtained by igniting various salts of uranyl. Thus U_3O_8 obtained from the nitrate is olive-green; from NH_4 salts, black or dark gray; from the chloride, black; from the sulfate, yellowish green; from equimol. mixts. of the chloride and nitrate, coffee-brown. The color of U_3O_8 evidently depends on the size of the particles. The layer of uranyl salt being ignited should not be thicker than 4–5 mm., as otherwise UO_3 is formed along with U_3O_8. D. K.

The atomic weight of uraninite lead from Wilberforce, Ontario, Canada. G. P. BAXTER AND ALLEN D. BLISS. *J. Am. Chem. Soc.* **52**, 4851–3(1930).—To check the age detn. of a specimen of uraninite from Wilberforce (cf. *Trans. Can. Inst. Min. & Met.* 1930, 2; *Am. Mineralogist*, Oct., 1930) the at. wt. of its Pb was detd. as 206.195. Analyses by Wells for Th, U and Pb indicated a value for the Th/U const. of 0.27, instead of 0.36, the usual lead-producing power of Th as compared with U. L. P. HALL

The scattering of hard γ-rays. G. BECK. *Naturwissenschaften* **18**, 896(1930).—Meitner and Hupfeld (*C. A.* **24**, 4698) have shown that γ-rays of 4.7 X. U. are scattered by nuclei. B. demonstrates the theoretical possibility of it for hard γ-radiation and heavy nuclei on the basis of the Klein-Nishina equation. It is suggested that this scattering by nuclei will play a role in cosmic radiation. B. J. C. VAN DER HOEVEN

The constitution of tungsten. F. W. ASTON. *Nature* **126**, 913(1930).—The mass spectrum of W was obtained by using volatile $W(CO)_6$. It proves the presence of the 4 isotopes whose wts. and percentages are: 182, 22.6; 183, 17.2; 184, 30.1; 186, 30.0%. The packing fraction curve indicates a zero value. The resulting chem. at. wt. is 184.96. C. E. P. JEFFREYS

Diffraction phenomena of molecular rays. O. STERN. *Physik. Z.* **31**, 953–5 (1930).—A review. FRANK URBAN

Increased output of electron tubes. NIKOLAUS VERMES *Ann. Physik.* [5], **7**, 257–66(1930); cf. *Ann. Physik.* **4**, 943(1930). J. B. AUSTIN

Secondary electronic emissions from metal foils and animal tissues. W. V. MAYNEORD. *Proc. Roy. Soc.* (London) **A130**, 63–80(1930).—Expts. on small ionization chambers, made artificially sensitive to different x- and γ-radiations by the insertion of foils of different elements, show a max. sensitivity in the region of medium wave lengths when compared to an air chamber. The relative intensity of primary and secondary scattered beams of γ-rays showed differences depending upon the materials of which the chamber was constructed. With ionization chambers contg. animal tissues it is shown that besides a region of max. sensitivity the various tissues diverge by varying amounts from "air equivalence." The significance of these observations is briefly discussed. H. W. LEAHY

The photoelectric effect of aluminum and aluminum-mercury alloys. H. GERDING. *Z. physik. Chem.*, Abt. B, **11**, 1–37(1930).—Photoelec. measurements for Al and Al amalgams show that the photoelec. sensitivity increases greatly by shaving the surfaces in vacuum, the limiting wave length advancing toward the red. The sensitivity decreases with time even in high vacuum, more rapidly in the presence of air, the limiting wave length receding toward the violet; this "exhaustion" is explained by adsorption of air (O_2). Max. sensitivity values, reached by continued shaving of the surfaces, were greater for amalgams contg. 0.38 or 0.26% Hg than for an amalgam contg. 0.06% Hg or for pure Al. L. ONSAGER

The photoelectric effect in metals. HERBERT FRÖHLICH. *Ann. Physik* [5], **7**, 103–28(1930).—On the basis of Sommerfeld's electron theory a theory of the photoelec. effect in thin layers of metal is developed. With the alkali metals this theory yields intensity values and maxima for current and light frequency which agree in general with experimentally obtained values. The difference in behavior of a surface toward fast and slow electrons accounts for the direction of polarization. For fast electrons the atomic structure of the surface is important; for slow electrons the surface may be regarded as smooth. The distribution of energy of the photoelectrons shows a strong maximum near the max. velocity. L. P. HALL

Energy losses of electrons on nitrogen. ERIK RUDBERG. *Proc. Roy. Soc.* (London) A129, 628–51(1930).—The velocity distribution of an initially homogeneous beam of electrons was detd. after passing through a chamber contg. N_2 at a pressure of the order 0.01 mm. The method of velocity analysis was based on a special type of electrostatic deflection, combining considerable resolution with a focusing property for slightly

divergent beams. The distribution curves show 7 maxima in the region corresponding to individual energy losses of 0–30 v. The smallest loss was attributed to collisions with the electrodes. The strongest max., rather sharp, occurred at 12.78 v.; this and one further prominent max. were interpreted as due to excitation of the first singlet level of mol. N_2, known from far ultra-violet spectra. Two further definite maxima are probably related to similar levels; the corresponding spectra have not been classified at present A search for a characteristic energy loss connected with ionization of K electrons from N gave neg. results, although the test was very sensitive. L. O.

The formation of neutral particles of high velocity by charge exchange. H. KALLMANN AND B. ROSEN. *Naturwissenschaften* **18**, 867–8(1930).—It was shown previously (*C. A.* **24**, 4221) that moderate-speed ions acting on a neutral gas charge can give rise to slow ions with high-speed neutral particles. Such exchange occurs frequently. The neutral rays thus produced can be recorded in the following way. When neutral particles at speeds above 100 v. hit a metal plate slow electrons are emitted (Oliphant, *C. A.* **23**, 4135). A wire ring of variable potential was used to measure the electron current thus brought about. When the ring is pos. both ions and neutral particles in the ray are measured, but when the ring is neg. only the ions are measured. The neutral ray produced by a 400-v. argon ion ray had approx. the same intensity as the original ray. B. J. C. VAN DER HORVEN

Discharge of hydrogen canal rays by passage through gases and solid bodies. H. BARTELS. *Ann. Physik* [5], **6**, 957–84(1930).—The discharge of H canal rays by passage through gases at low pressure, and through solid bodies, was investigated by use of a high-vacuum ionization chamber. The app. and prepn. of the materials are described. O was very effective in discharging the rays; curves are given; the effect of the O is const. for canal rays from 30 kv. after the pressure of the O has reached 2×10^{-3} mm. of Hg; further rise in pressure has no effect. N was even more effective than O. H was least effective of the pure gases. The ability of air to discharge the rays was calculable from the data on O and N and was in agreement with expt Curves for all of the cases are given. The course of the curve in which an equil. state exhibits a relationship to the velocity of the rays, was more or less analogous for both the solids and the gases. The discharge coeff. n_-/n_0 for solid bodies was const. for thicknesses greater than 13.3 mμ. WILLIAM E. VAUGHAN

Ionization of noble gases by slow alkali ions. OTTO BEECK. *Ann. Physik* [5], **6**, 1001–24(1930); cf. *C. A.* **24**, 5217.—The ionization of A, Ne and He by Li^+, Na^+ K^+, Rb^+ and Cs^+ was systematically investigated. The app. and method are described in detail. The ionization was general between 100 and 300 v. ion velocity and the curves show a more or less gradual rise up to 500 v. In He the ionization was very slight, not measurable in part. There are some sharp breaks in the curves. Correlation of these points with other data is attempted. B. states that a noble gas atom is most easily ionized by an alkali ion which has the same no. of electrons in the shell as has the gas atom; *e. g.*, Ne by means of Na^+ and A by means of K^+. The data indicate this correlation. Helium is most easily ionized by $Li.^+$ WILLIAM E. VAUGHAN

Measurement of the light yield in the mercury spectrum on excitation by electronic collisions. W. HANLE AND W. SCHAFFERNICHT. *Ann. Physik* [5], **6**, 905–31(1930). cf. *C. A* **24**, 1283.—The radiation produced in a vacuum tube filled with Hg vapor at 10^{-3} mm. by electronic impact with Hg is passed through a filter and detd with a vacuum photoelec. cell (either K or K-Cs type). An electrometer is used for measurement. The cell is calibrated by means of a Hg arc whose emission is detd. by a thermopile, in turn calibrated with a standard lamp. The light yield, *i. e.*, the ratio of quanta emitted to the no. of collisions between electrons and Hg atoms, is detd. for various accelerating potentials in the electron tube. With electrons of 60 v. for each 1000 collisions there are found 2.7 quanta for line 4348, 5.4 q. for 4358, 4.4 q for 5461, 0.85 q. for 5675, 3 4 q. for 5769, 6.9 for 5789 and 5790 together. The method is described in detail. WILLIAM E. VAUGHAN

Magnetic analysis of negative ions in mercury vapor. WALTER M. NIELSEN. *Proc. Nat. Acad. Sci.* **16**, 721–7(1930).—A beam of electrons from a W filament was projected parallel to a magnetic field of approx. 100 gausses, produced by a pair of Helmholtz coils The ions produced were deflected by suitable elec. fields and the ratios of m/e were detd. in terms of the deflection produced by an electromagnet giving fields up to 2000 gausses. The results are displayed as curves giving the ratio of the ion current to the total electron current as a function of m/e. The curve for pos. ions shows peaks corresponding to Hg^+ and Hg^{++} as well as giving evidence of other pos. ions for which m/e has smaller values. The curve for the neg. ions shows a peak at m/e = 200, which is ascribed to Hg^-, as well as several definite peaks lying in the region below m/e 40.

which are ascribed to C, CO and possibly to H_2O. One or two peaks have not been accounted for satisfactorily. W. W. STIFLER

The measurement of the life period of excited helium atoms and a direct method for the determination of the diffusion coefficient of excited atoms. EDGAR EBBINGHAUS. *Ann. Physik* [5], **7**, 257-66(1930).—The life period and diffusion coeff. of metastable He atoms in the 2^3S_1 state have been measured by a method based on the absorption of light. For 1 mm. pressure and room temp. the diffusion coeff. is 400 sq. cm./sec. The diam. of the normal He atom is 2.5×10^{-8} cm. while that of the excited atom is 4.5×10^{-8} cm. This is in accord with theory. J. B. AUSTIN

Paramagnetism independent of the temperature and the existence of electronic isomers in polyatomic ions. SIMON FREED AND CHARLES KASPER. *J. Am. Chem. Soc.* 52, 4671-9(1930).—The variation of susceptibility between room temp. and that of liquid air has been studied for the ions UO_2^{++}, WO_4^{--}, $Cr_2O_7^{--}$. The susceptibility of UO_2^{++} decreases slightly but uniformly with temp. The others showed no variation within exptl. error. A discussion based on Van Vleck's deductions from quantum mechanics is given. J. B. AUSTIN

Kinetics of the thermal transformation of para-hydrogen. A. FARKAS. *Z. physik. Chem.*, Abt. B, **10**, 419-33(1930); cf. *C. A.* **25**, 32.—An amplification of the previous paper. WILLIAM E. VAUGHAN

The crystal structure of para-hydrogen at liquid-helium temperature. W. H. KEESOM, J. DE SMEDT AND H. H. MOOY. *Proc. Acad. Sci. Amsterdam* **33**, 814-9(1930).—Three films made by the Debye-Scherrer method show faint granular lines. The spacings cannot be explained by a cubic lattice but do agree with those calcd. on the basis of a hexagonal closely packed structure $a = 3.75$ A. U., $c/a = 1.633$. This leads to a calcd. density of 0.088. J. B. AUSTIN

Direction of magnetization of single ferromagnetic crystals. F. C. POWELL. *Proc. Roy. Soc.* (London) **A130**, 167-81(1930).—When a magnetic field is applied to a crystal the direction of magnetization does not, in general, coincide with that of the field. Gans recently attempted to account for this on the assumption that the elementary magnets are electron orbits, and had at least partial success with Fe and pyrrhotite. There are 2 objections to this theory, *viz.* (1) that it does not hold quantitatively for non-magnetic crystals, such as Co, and (2) that the elementary magnets should be ascribed to electron spins rather than to electron orbits. P. then proposes a theory based on the magnetic interaction between each electron and the atom to which it belongs. This interaction is represented by a field G, fixed in the crystal, called the "crystalline field." It may be in a no. of possible directions which bear simple relations to the crystal structure. The math. part of the theory as worked out is based on certain equations developed by Dirac and Heisenberg. When applied to Kaya's data for Fe and Ni, the results to be good agreement between calcd. and exptl. results. For Ni, G = 5×10^5 gausses and for Fe it is of the order of 10^6 gausses. It is then shown that the theory may be applied to a non-cubic crystal with satisfactory results and for Co it is shown that G is not less than 4.5×10^6 gausses. W. W. STIFLER

Paramagnetic rotation in the uniaxial crystals of the rare earths. H. A. KRAMERS. *Compt. rend.* **191**, 784-6(1930); cf. *C. A.* **24**, 2046.—The magneto-optic effects in uniaxial crystals of the rare earths indicate that the metallic ions are in an intense elec. field, symm. with respect to the optical axis, which is attributed to the neighboring ions. The particular forms which the equation for this field assumes for xenotine and tysonite are discussed. W. W. STIFLER

The paramagnetic rotatory power of crystals of xenotine at very low temperatures and the paramagnetic saturation. JEAN BECQUEREL AND W. J. DE HAAS. *Compt. rend.* 191, 482-4(1930); cf. *C. A.* **24**, 2046.—Expts were made on crystals placed with the optical axis parallel to the light and to the magnetic field for wave lengths 5616 and [illegible] A. U. At the temp. of liquid He, and a field of approx. 20,000 gausses, practically complete paramagnetic satn. was obtained. When the rotation is plotted as a function of H/T, the curves for $T = 4.22$°K. and $T = 1.38$°K. have the same asymptote, although they do not seem to follow exactly the same law. They indicate a magnetic moment between 6.5 and 7 Bohr magnetons. The curve for $T = 14.34$°K. follows the hyperbolic tangent law and indicates a magnetic moment in the vicinity of 7 magnetons. W. W. STIFLER

The nuclear moment of sodium. S. FRISCH AND A. FERCHMIN. *Naturwissenschaften* 18, 866(1930).—From the study of the hyperfine structure of Na II with a quartz Lummer plate in the near ultra-violet (cf. *C. A.* **22**, 3584) the majority of these lines were found to be narrow doublets. For the lines at 3711, 3631 and 3533 A. U. the photometer curves are given. The 3711 A. U. line is single ($3P_2 - 3S_1$); the other 2

have $\Delta\lambda$ 0.025 and 0.020 A. U. resp. ($3P_1 - 3S_1$ and $3P_2 - 3S_1$). **Conclusion:** The nuclear moment of Na is $i = 1/2$. With Fermi's calcns. (*C. A.* **24**, 1791) a value of μ_o $\mu/890$ is found (μ is the Bohr magneton, μ_o the magnetic moment of the nucleus).
B. J. C. VAN DER HOEVEN

Arc spectrographic estimation of chromium in ruby. JACOB PAPISH AND WM. J. O'LEARY. *Ind. Eng. Chem., Anal. Ed.* **3**, 11-3(1931).—The effect of concn. of Cr in detg. the persistence of its spectral lines in the region between 5785.8 and 3120.4 A. U. has been studied both with Cr introduced into the arc as chromic acid and in the form of synthetic rubies consisting of a mixt. of fused chromic oxide and alumina. The sensitive lines are found to persist with smaller concns. in the oxide mixts., a concn. of 0.001% being sufficient to excite the lines at 4289.7, 4274.8 and 4254.3 A. U. The results made possible an estn. of the Cr content of 8 samples of natural ruby, of which 2 were available in sufficient amts. to check the result by direct analysis. C. J. H.

The red coronal line in oxygen. JOHN J. HOPFIELD. *Nature* **126**, 846(1930).—A strong line λ6374.29 A. U. on spectrum plates of O_2 seems to be identical with the red coronal line λ6374.2 A. U.
ARTHUR FLEISCHER

. *J. Soc. Chem. Ind*

spectra of cyanogen

cyanogen-O flame. The absorption spectrum obtained was: 3.71, 3.85, 4.55, 15.5 and 16.1μ. The explosion spectrum band of 2.8μ probably confirms the assumption that the spectrum will be like that from CO-O mixt., *i. e.*, 2.8 and 4.4μ
ALLEN S. SMITH

Spectrum of hydrogen bromide. W. WEIZEL, H. W. WOLFF AND H. E. BINKELI *Z. physik. Chem.*, Abt. B, **10**, 459-66(1930).—A discharge in HBr gives a continuous spectrum that increases in intensity from the green toward shorter wave lengths. In the near ultra-violet several maxima exist. The continuous spectrum is interpreted as the dissocn. spectrum of HBr or HBr^+.
WILLIAM E. VAUGHAN

Determination of the abundance ratios of isotopes from band spectra. A. ELLIOTT *Nature* **126**, 845-6(1930); cf. *C. A.* **24**, 5227.—An account of the detn. of the correction necessary to obtain abundance ratios from intensity data is presented with more complete data.
ARTHUR FLEISCHER

The relation between molecular structures and absorption spectra. E. K. PLYLER *J. Elisha Mitchell Sci. Soc.* **46**, 22(1930).—The results of infra-red absorption measurements indicate that all materials contg. C and H have absorption bands in the region of 3 and 6μ.
A. L. MEHRING

The constitution of prussic acid. A. DADIEU. *Naturwissenschaften* **18**, 895(1930).—The Raman spectrum of pure dehydrated HCN was again detd.; besides the known frequency of 2094 cm.$^{-1}$ (intensity 12) 2 weak bands at 2062 (1/2) and 3220 (2) cm.$^{-1}$ were found. The 2062 line is not due to dissocn. It is assumed that 3220 is a vibration of H with respect to CN with increased C-H frequency due to triple bond. The other 2 lines are due to the 2 isomeric forms of HCN: 2094 to normal HCN, 2062 to the isonitrile form. For the latter a triple bond is thereby indicated: $H—\overset{+}{N}\equiv\overset{-}{C}$ in agreement with results of Lindemann (*C. A.* **24**, 5018).
B. J. C. VAN DER HOEVEN

New bands in the secondary spectrum of hydrogen. III. D. B. DEODHAR *Phil. Mag.* **10**, 1082-95(1930); cf. *C. A.* **24**, 2952.—The data of Part II are discussed and interpreted. Data and calcns. are given in tabular form.
W. E. V

The emission spectra of some simple benzene derivatives. JAMES B. AUSTIN AND IAN A. BLACK. *J. Am. Chem. Soc* **52**, 4755-62(1930).—The emission spectra of *toluene ethylbenzene* and *o-, m and p-xylene* have been photographed with the Tesla discharge for excitation. They contain a no. of bands in the region 2600 to 2900 A. U. which are generally accompanied by a continuous background.
J. B. AUSTIN

Ultra-red spectrum filters. H. G. HIRSEKORN. *Ann. Physik* [5], **6**, 985-1000 (1930).—The transmissivity of thin layers of NaCl, KCl, NH_4Cl and TlCl (prepd. by evapn. was investigated spectrometrically in the region from 40 to 140μ. All of the substances show that they act as selective filters in this region. The width of the absorption region decreases in the order of the following: NaCl, NH_4Cl, KCl and TlCl. All of the substances show a gradually subsiding transmission increase on the long wave-length side. With NaCl, NH_4Cl and TlCl there appear 2 and with KCl possibly 3 symmetrically arranged transmission minima. The problem is complicated by interrelationships of absorption, reflection and transmission and scattering properties of the thin layers.
WILLIAM E. VAUGHAN

Chemical constitution and Raman effect, ethylene hydrocarbons. R. LESPIEAU AND M. BOURGUEL. *Bull soc. chim.* [4], **47**, 1365-76(1930).—See *C. A.* **24**, 4460. G. G.

Chemical constitution and Raman effect; the acetylene linkage. M. Bourguel and P. Daure. *Bull. soc. chim.* [4], **47**, 1349–65(1930).—See *C. A.* **24**, 4222. E. C. K.

The Raman effect at the critical point. G. Placzek. *Proc. Acad. Sci. Amsterdam* 33, 832–40(1930).—Intensity measurements have been made on the Raman spectrum at the crit. mixing temp. of a mixt. of CH_3OH and C_6H_{14}. They show that the intensity of the Raman lines of each component remains unchanged as the crit. temp. is approached while that of the continuous spectrum increases. This continuous effect is attributed to vibrations of mol. complexes. The bearing of these observations on the theory of liquids is discussed. J. B. Austin

Raman spectra of pinene. G. B. Bonino and P. Cella. *Nature* **126**, 915(1930).—In liquid *d*- and *l*-pinene, a series of very weak lines was found, whose distance from the Raman frequency, 1454 cm.$^{-1}$, excited by the Hg line $\lambda = 404.6$ A. U. could be represented by $\Delta\nu = 6.15\ (4\ m + 4)$, $m = 2, 4, 6$, etc., which corresponds to the series of Raman frequencies of rotation relative to the rotator with fixed axis. By supposing the rotator composed by 2 atoms of H of 1 CH_2 group rotating around the C atom (the Raman frequency, $\nu = 1454$, being attributed to the transverse oscillation of 2H atoms in the CH_2), the value $1.16\ 10^{-8}$ cm. was calcd. for the distance between the atoms of H and C in the CH_2 group. C. E. P. Jeffreys

Studies in Raman effect. VIII. Calculation of simple molecular models. Michael Radaković. *Monatsh.* **56**, 447–60(1930).—Mathematical. **IX. Raman spectra of organic substances.** A. Dadieu and K. W. F. Kohlrausch. *Ibid* 461–76.—Raman spectra of *propionitrile, benzonitrile, methylene bromide, methylene iodide* and *dimethylaniline* are given and discussed in relation to Raman spectra of other compds. (cf. *C. A.* 24, 5026). L. Onsager

Raman lines of simple polyatomic molecules. G. B. B. M. Sutherland. *Nature* 126, 906–7(1930).—The Raman spectrum of N_2H_4 showed 3 lines of roughly the same intensity at 3196, 3270 and 3344 cm.$^{-1}$, along with a very doubtful line at 1720 cm.$^{-1}$. These lines correspond to N-H vibrations, and the sym. N-N vibration was extremely weak if present at all. $N_2H_4.H_2O$ gave the same 3 lines with less intensity. C. E. P. J.

The Geiger-Müller tube as a quantitative ion counter. J. A. Van den Akker. *Rev. Sci. Instruments* **1**, 672–83(1930).—The new Geiger-Müller ion-counter tube is accurate only when the rate of counting is as low as 300/min. Various spurious discharges occur which seem to be due to temporary disruptions of ion layers in the tube, causing abnormally high values of the field gradient. Gregg M. Evans

The liberation of electrons from a metal surface by positive ions. II. F. M. Penning. *Proc. Acad. Sci. Amsterdam* **33**, 841–57(1930); cf. *C. A.* **22**, 1097.—In continuation of previous assumptions it is shown that neutral particles do not liberate any appreciable no. of electrons. The condition of the metal surface has also been investigated. The no. of electrons liberated from W per pos. ion depends on the extent of outgassing of the W surface. The no. of electrons per ion of 500 v. energy on properly degassed W is 0.20 ± 0.02. A no. of complicated tubes are described. J. B. A.

The emission of electrons under the influence of chemical action at lower gas pressures. O. W. Richardson and L. G. Grimmett. *Proc. Roy. Soc.* (London) **A130**, 217–38(1930); cf. *C. A.* **16**, 1703; **18**, 1945–6, 2466.—A method is described by which the partial pressures of $COCl_2$ can be controlled and their changes measured down to 10^{-5} mm. Hg. The electron emission from NaK in this gas was directly measured to pressures of 10^{-3}, pressures of 5×10^{-7} being extrapolated. In contrast to the results obtained above 10^{-4}, the emission is now found to be a function of the pressure as R. originally supposed. Evidence is presented to show that the experimentally detd. velocity distribution function among the electrons approaches a limit as the pressure is reduced. H. W. Leahy

The photoelectric properties of ammonia catalysts. A. Keith Brewer. *J. Am. Chem. Soc.* **53**, 74–83(1931).—Unpromoted Fe catalysts as well as those promoted with Al_2O_3 have the photoelec. characteristics of pure Fe; those promoted with K_2O or with $K_2Al_2O_4$ have long-wave-length limits that lie between those of metallic K and those of pure Fe, the limit for the K_2O-promoted catalyst being much farther toward the red than that for the $K_2Al_2O_4$-promoted catalyst. It is suggested that the known poisoning effect of K_2O present as a single promoter in NH_3 catalysts may be due to the metallic K formed by dissocn. of the K_2O. P. H. Emmett

Energy losses of electrons in carbon monoxide and carbon dioxide. Erik Rudberg. *Proc. Roy. Soc.* (London) **A130**, 182–96(1930); cf. *C. A.* **24**, 3431, 4696, 4986.—Previous measurements of the energy losses suffered by electrons in N at low pressures by R. have been extended to CO and CO_2. The energy distribution of the electrons

after passing through the gas shows several well-marked maxima which were measured for different voltages and pressures. The maxima are characteristic for the mols. used. With CO the various maxima are correlated with the transitions from the normal state to the excited states known from analysis of the band spectra belonging to the mol. or to singly ionized CO. In these cases where a max. has been attributed to a single electron level, a study of the potential curves for the mol. shows the position of the max. to be in accordance with the Franck-Condon theory. H. W. L.

Fracture of discharge tubes. R. H. SLOANE. *Phil. Mag.* **10**, 1099–102(1930).—Some rather detailed observations are made on the breakdown of discharge tubes.
WILLIAM E. VAUGHAN

Photometric measurements of the concentration and dispersion in colloidal solutions. I. Measurements on decrease in light intensity. TORSTEN TEORELL. *Kolloid-Z.* **53**, 322–38(1930).—The decrease in light intensity of light obtained with monochromatic filters on passing through colloidal solns. of mastic, Fe hydroxide and gelatin was measured with a Pulfrich photometer. The factors studied are the layer thickness, concn., wave length of the light employed, particle size, particle form, index of refraction and hydration. The Lambert-Beer law was obeyed over a wide range for layer thickness. The hydrophobe sols obey Beer's law for concn. up to high values. For colorless or white sols filters for 470 or 570 mμ are suitable for dil solns., and 610 or 720 for more concd. solns. The weakening of light increases rapidly with increase in particle size, reaching a max. and then decreasing. The max. is displaced to larger particles with increasing wave length, but the value of the max. decreases. Solvated colloids do not follow the Lambert-Beer law and empirical relations must be used.
A. FLEISCHER

Spectrophotometric investigations on the action of light on nuclear silver sols. A. GALECKI AND R. SPYCHALSKI. *Kolloid-Z.* **53**, 338–52(1930); cf. *C. A.* **22**, 4027, 25, 459.—From measurements of the ultra-violet light sensitivity, viscosity change at 25° by radiation, and change in cond., the following mechanism is proposed for the action of light on Ag sols. The ultra-violet light causes the formation of H_2O_2, which dissolves the colloidal Ag and decolorizes the soln. by forming Ag ion, which may subsequently be reduced by the action of the ultra-violet light. Spectrophotometric measurements at 510 mμ were carried out to det. the reaction mechanism. Under the influence of light, it is a reaction of the first order. At 29° the velocity const. varies from 0.0875 to 0.2104 and at 10° from 0.0528 to 0.1345, the individual value depending on the particular soln. The mean value for the temp. coeff. is 1.3. A. F.

The behavior of cathode rays on cellulose preparations. C. TROGUS, H. HAUBER SCHADT AND K. HESS. *Naturwissenschaften* **18**, 846–7(1930).—Thomson has reported Debye-Scherrer interference obtained on irradiation of cellulose with cathode rays (*C. A.* **22**, 1723) (also Kirchner, *C. A.* **24**, 5604). The authors found that ash-free cigaret paper does not give a diffraction effect when perpendicularly incident rays from an incandescent cathode are used. If the same paper is provided with a pinhole and irradiated near it, it gives a no. of interference spots attributed to diffraction at the edges of the hole. Reproductions are given of these photograms obtained with 5 and 10 kv. potential, 2 to 10 sec. exposure. The character of the diagram is like that of mica monocrystals (cf. Kikuchi, *C. A.* **22**, 4052). The sharpness of the spots decreases with increasing potential. Diffraction effects were observed by tangential irradiation of fibers of acetylcellulose II or of natural silk.
B. J. C. VAN DER HOEVEN

Catalytic influence of light on efflorescence of a salt. ERNST BEUTEL AND ARTUR KUTZELNIGG. *Monatsh* **56**, 184–90(1930).—Light causes a decided increase in the velocity of efflorescence in most hydrates. Depending upon the case with which the resp. salts give up their water, radiated ones give off 1.5–5.0 times the amt. of those held in the dark for the same time at the same temp. Detailed results of 15 salts are given.
GREGG M. EVANS

A study of some of the chemical characteristics and the absorption spectrum of cystine. MARY L. FOSTER, GLADYS A. ANSLOW AND DOROTEA BARNÉS. *J. Biol. Chem.* **89**, 665–73(1930).—The ultra-violet absorption curves of *l*-cystine in HCl and water show only continuous absorption and are similar to those of alanine. Since tyrosine, uric acid, etc., exhibit selective absorption it is concluded that cystine cannot possess the ring structure suggested by Ward (*C. A.* **18**, 1117). From the absorption coeff. the % dissocn. produced by light is calcd. to be 2×10^{-8} at 4000 A. U., the energy of dissocn. being 70,800 cal. per g.-mol. The p_H of optimum pptn. of cystine varies with the concn. of the soln.
K. V. THIMANN

Comparison of molecular ionizing potentials in an alternating electric wind. W. M. THORNTON. *Phil. Mag.* **10**, 1052–63(1930).—Ionizing potentials were detd. in an app.

in which the gas under investigation was enclosed in a glass chamber with the hot wire. A p. d. was applied to the hot wire and another electrode outside the glass chamber. Voltages as high as 60 kv. were used. The galvanometer deflections of a bridge of which the hot wire is one arm are detd. for varying voltages and several of these plots are given. From the curves and the measured slopes, the mol. ionizing potentials of the various materials studied can be calcd. The gases investigated are A, Ne, He, H_2, O_2, N_2, air, CH_4, C_2H_6, C_3H_8, C_4H_{10}, C_5H_{12}, C_2H_2, C_2H_4, $CHCl_3$, Et_2O, CO_2, CO, NO, NH_3, CS_2 and H_2O. The data are summarized. WILLIAM E. VAUGHAN

Polarization phenomena in the stepwise activation of the fluorescence of mercury. L. F. RICHTER. *Ann. Physik* [5], **7**, 293–328(1930).—A color effect produced by polarized radiation in a mixt. of N and Hg vapor has been investigated spectroscopically. The polarization and Zeeman patterns of the lines have also been observed. The color is laid to stepwise activation. Quant. measurements of the degree of polarization of the excited lines show only a qual. agreement with theory. The deviations from theoretical values are of the same order of magnitude as those in Hg resonance radiation and are explained in the same way. Ultra-violet lines show the same behavior as visible ones. Measurements of the angle of rotation and of depolarization give approx. the same results for the half life period of the excited atoms. The variation of life period with pressure of the added N shows that it is impossible to extrapolate to the life period *in vacuo*. J. B. AUSTIN

A new method of producing and controlling the emission of positive ions. F. G. CORRELL, C. H. KUNSMAN AND R. A. NELSON. *Rev. Sci. Instruments* **1**, 654–61(1930).—By shrinking a Na-free capillary glass tube upon a Pt strip and then electrolyzing K from fused KNO_3 into the space between the strip and the glass, a reservoir of K is produced. A Pt layer is then sputtered upon the outer surface of this anode. Electrically heating the filament strip, electrolyzing K from the reservoir to the outer coating, and applying a plate potential between anode and a cylindrical cathode provides a source of pos. ions which is const. for long periods of time. Since the cathode surface is at low temp., surface action is reduced to a min. The ion current is subject to easy control by means of the electrolyzing potential. GREGG M. EVANS

Spectroscopic study of the decomposition and synthesis of organic compounds by electrical discharges. I. The electrodeless discharge. WM. D. HARKINS AND DAVID T. WILLIS. *J. Am. Chem. Soc.* **52**, 5165–75(1930); cf. *C. A.* **24**, 3440.—The electrodeless discharge in the vapors of benzene, phenol, aniline acetylene, naphthalene and pyridine has been exaind. spectroscopically for the purpose of detg. the decompn. products of the discharge. The following were found in all cases: CH, C_2, C, H and C^+. Phenol showed in addn. OH, H_2O and CO, and the aniline discharge indicated CN, NH^+, and N_2^+. All these intermediate decompn. products are extremely active and coalesce very rapidly to form brown or black solids which are insol. in water and org. liquids and probably have high mol wts. Heptane, unlike the unsatd. hydrocarbons, gives very little solid in the type of app. employed. C. J. HUMPHREYS

Thermal and photochemical decomposition of ozone. HANS J. SCHUMACHER AND GERHARD SPRENGER. *Z. physik. Chem.*, Abt. B, **11**, 38–44(1930).—The authors maintain their standpoint (*C. A.* **24**, 2946, 4224) on the mechanism of ozone decompn. against that of Riesenfeld and Wassmuth (*C. A.* **24**, 5592). L. ONSAGER

The photochemical reaction between ethylene iodide and iodine in carbon tetrachloride solution. HANS J. SCHUMACHER AND EDWIN O. WIIG. *Z. physik. Chem.*, Abt. B, **11**, 45–55(1930).—The photochem. reaction between $C_2H_4I_2$ and I_2 in CCl_4 solution can be described by the equation: $d[C_2H_4I_2]/dt = k\sqrt{J_{abs}}[C_2H_4I_2]$, where J_{abs} = light absorbed. The temp. coeff. at 100° is 1.57 per 10°. The mechanism is a chain of simple type, involving I atoms; the only difference from the dark reaction (cf. *C. A.* **24**, 5255) is the displacement of the I_2 dissocn. equil. by light. L. ONSAGER

Decomposition of thiocyanates in ultra-violet light. K. JABLCZYŃSKI AND H. JABLCZYŃSKA. *Rozniki Chem.* **10**, 579–99 (599–600 German)(1930).—The decompn. of NH, K and Na thiocyanates under the influence of ultra-violet light of a quartz lamp of Heraeus type was investigated spectrophotometrically. The decompn. was accompanied by a sepn of S. As this reaction takes place endothermally the opposite reaction, that is the formation of the thiocyanate from S, must proceed spontaneously in distant places of the soln. Both simultaneous processes must lead to an equil. which was observed experimentally. It was found that the decompn. reactions of thiocyanates are autocatalytic and correspond very well with the equation $K = [1/(1+d)t] \log[(x+d)/d(1-x)]$, where t is time, x degree of partial turbidity and d is a const. When to a fresh soln. of the thiocyanate a little of the turbid soln. of the preceding expt. is

added the reaction velocity is greatly accelerated. With the dilution of the thiocyanate the equil. point is displaced and a max. of the reaction velocity appears on the concn. line. The temp. has a big influence on the velocity. It is true the main reaction (decompn.) being photochemical should be independent of the temp. yet the opposite reaction depends upon the temp. to a large extent. The addn. of an acid increases the velocity supposedly because the thiocyanic acid set free is more easily decompd. than its salts. Addn. of KCl, Zn and Ni sulfate to KCNS soln. accelerates the decompn. which is dependent on the cation. The decompn. of NH_4, K and Na thiocyanates takes place only under the influence of rays of length of 3000 and 1850 A. U. J. K.

The lattice energies of the silver halides and their photochemical decomposition. II. S. E. SHEPPARD AND W. VANSELOW. *J. Phys. Chem.* **34**, 2719–48(1930); cf. *C. A* **23**, 1819.—The importance of lattice energy for light absorption and photodecompn. of crystals is affirmed. Sommerfeld's "electron gas" theory and Pauling's "electron affinity of the crystal" conception are analyzed and certain objections to the latter are raised. Pauling's theory is replaced by the virtual field (lattice potential) of the metal released by photoionization, since better agreement is obtained between the observed and calcd. wave-length limits of absorption. It is suggested that the deformation of anions by cations with large external electron sheaths tends to shorten the wave-length limit of absorption rather than to extend it. Adsorption effects supporting the opposite view are ascribed to lattice loosening. H. W. LEAHY

Luminescence from solidified gases at the temperature of liquid helium. L. VEGARD AND W. H. KEESOM. *Comm. Phys. Lab. Univ. Leiden* No. **205b**, 49–114(1930); cf *C. A.* **24**, 2670.—Expts. were made with cathode rays. No polarization effects were found. Again N_2 and N_4 appear in the afterglow, with N_3 very faint and of short duration, indicating that N_2 and N_4 are characteristic of the solid state. Their wave lengths agree satisfactorily with the red and green aurora lines. Mixed with Ne these lines are displaced toward the red. Three diffuse lines identified as new components of the η-series (ϵ-system) were found. Ne with 1.6% N shows in the green and red only the 4 auroral lines. These shift and approach the auroral frequencies with diminishing concn. of N. The N_2 band may consist, according to conditions, of a narrow band with an av. wave length of 5206 or 5238 A. U. explaining former results (cf. *C. A.* 21, 3311). The results of both this and the previous article are tabulated and summarized both with respect to conditions under which the lines occur and with respect to the various series. Extended theoretical discussion is deferred to a future paper GREGG M. EVANS

Luminescence from solidified gases at the temperature of liquid hydrogen. II. Luminescence produced by canal rays. L. VEGARD. *Comm. Phys. Lab. Univ. Leiden* **205a**, 3–45(1930); cf. *C. A.* **24**, 1288.—A continuation of earlier investigations in which cathode rays were used. Measurements of lines are given tabularly and spectrographs reproduced that were taken (*a*) with a glass spectrograph of the solid systems N, A and A + 1.2% N, and (*b*) with a large quartz spectrograph of the solid systems A, A + 1% N, A + 2.2% N and A + 30% N. These show in each case both the spectrum of the direct light and the afterglow. In this work certain lines of gaseous N_2 such as the N_1 line appear in the direct spectrum. The *A* band which remains in the afterglow seems to be characteristic of solid N. A new series in N, the *E*-series was noted. This is possibly connected with the third pos. group of N. In A, and A-N mixts. a χ-series, some lines of which had already been observed, was classified and 2 new lines were noted. The α- and η-series seem to dominate in the afterglow. A κ-series similar to the ϵ-series may have the latter's lower level but a different upper level. The *G*-*G'* system is now seen to correspond to the third pos. group of N bands, and probably arises from gaseous N_2 mols. temporarily liberated from the solid system by the intense energy of stoppage of the canal rays. The α-series is believed to be characteristic of the mol. elements of the crystal lattice of N, and is referred to an oscillatory system corresponding to the bottom level of the *G*-series. GREGG M. EVANS

Changes in the absorption spectrum of a dye solution due to the introduction of a colloid. A. BOUTARIC AND M. DOLADILHE. *Compt. rend.* **191**, 1008–11(1930).—Introduction into a colloidal dye soln. of a lyophobic sol of opposite charge decreases the opacity of the former. The ordinates of the absorption curve all decrease by the same fraction. This also occurs when lyophilic colloids are added. In this case, the magnitude of the shift is a function of the p_H changes. If the introduced lyophobic sol has the same charge, no change is observed. Whenever these effects are not observed, this is a true dye soln. FRANK URBAN

Electronic arrangement in the principal organic bindings. MANFRED DUNKEL. *Z. physik. Chem.*, Abt. B, **10**, 434–58(1930).—Theoretical. Recent work on the struc-

ture of simple substances is utilized in an attempt to make statements relative to the structure of more complex org. substances. The polarizability of atoms and their spatial arrangement in mols. is related to electronic structure. The electrons shared in certain bonds are classified and various groups of materials are subdivided according to this idea. WILLIAM E. VAUGHAN

The photoactivity of rosin (NORKIN, SHADIN) **26.** A mechanistic view of the de Broglie waves and an extended equation of state for gases (KORN) **2.** The calculation of free energy from spectroscopic data (GIAUQUE) **2.** Values and interrelationships of c, e, h, M_p, m_o G and R (BOND) **2.** Ra in rocks (PIGGOT) **8.**

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Apparatus for spectrum analysis. A. HILGER, LTD., and F. TWYMAN. Brit. 311,618, June 11, 1929.

Radioactive preparations. DEUTSCHE GASGLÜHLICHT-AUER-GES M. B. H. Fr. 691,215, Mar. 5, 1930 Radioactive prepns. pptd. on supporting materials are lixiviated with solns. which lower the soly. of the pptd. salt or liquids in which the salt is more difficultly sol. than in water, *e. g.*, solns. of $(NH_4)_2CO_3$. Fr. 691,217 describes the manuf. of concd emanation prepns. by using strongly active charcoals or SiO_2-gel to absorb the emanation.

Phosphorescent letters, signs, etc. DEUTSCHE GASGLÜHLICHT-AUER-G. M. B. H. Fr. 510,565, Sept. 14, 1928. The color or pigment is mixed to a paste with a small quantity of highly viscous binding material and applied to indifferent material. Thus, radioactive ZnS is mixed to a paste with highly viscous nitrocellulose soln. and applied to celluloid.

Luminescent surfaces. LUMINOSE S. A. Fr. 689,925, April 25, 1929. Plates, films or other surfaces are covered with a luminescent layer on which is applied a layer sensitive to light contg. an agglomerant not attacked by the ordinary reagents used for photographic treatments. An image is obtained on the sensitive layer and developed, and the proof has the peculiarity of being visible at night while having the appearance of an ordinary photograph during the day. Fr. 689,939, Apr. 26, 1929, describes the prepn. of luminescent surfaces on paper, etc., resistant to atm. agents and capable of receiving typographic, lithographic or heliographic printings, by depositing on the paper a layer of luminescent salts agglomerated by a mixt. of soap, gelatin and alum. The surface is allowed to dry and is calandered.

4—ELECTROCHEMISTRY

COLIN G. FINK

Economy of electrothermal zinc recovery. RICHARD ROSENDAHL. *Metall u. Erz* 27, 616-7(1930).—Comment is made on a paper under the same title by Walter (*C. A.* 24, 5626). H. STOERTZ

The electrical conductivity and tensile properties of light magnesium-aluminum alloys as affected by atmospheric exposure. ERNEST WILSON. *J. Inst. Elec. Eng.* **69,** 89-94(1930).—The 0.5% Mg alloy of Al (Aldrey) is being used in Continental Europe for overhead elec. conductors without steel cores. The results of exposure tests of this type of metal to London atms. are indicated. The conductors were in the form of wires, and variations in elec. and mech. properties have been studied with special reference to type of corrosion and mech. stress during exposure. Increased stress has been beneficial as far as variations in tensile properties are concerned but has little effect upon elec. cond. Expts. are described that attempt to explain the reason for the beneficial results obtained. Phys. tests and chem. analyses of the Mg alloys used are tabulated, and variation of elec. cond. as a function of the time of exposure is shown by a curve.

Reference is made to published work on the atm. exposure of light Ni alloys, duralumin and high-purity Al, and comparisons are made with the present expts. An attempt is being made to det. the effect the nature of the corroded surface of Aldrey will have upon *corona* production, in comparison with the corroded surfaces of other light Al alloys. W. H. BOYNTON

Debismuthizing lead with calcium. RALPH F. COHN. *Trans. Electrochem. Soc.* 59 (preprint) 6 pp.(1931).—Desilverized Pb contg. one-tenth to one-third of a % of Bi is not suitable for white-lead manuf. The Betts' electrolytic Pb process for the elimination of the Bi is applicable, but the new process herewith presented is more economical. Metallic Ca is introduced into molten Pb. A Ca-Bi dross is formed. The Bi in the Pb is reduced to less than 0.05%, and the last traces of As, Sb, Ag and Cu are scavenged. The slight excess of Ca remaining in the Pb is removed with Cl. The dross is submitted to the Betts' process. The theory and economics of the new process are discussed at length. C. G. F.

Effect of various metallic sulfates upon the throwing power of a chromium plating bath. LAWRENCE E. STOUT AND JONAS CAROL. *Ind. Eng. Chem.* **22**, 1324–5(1930).—The addn. of Ni, Co, Zn or Cd sulfates to a chromic acid plating bath in the ratios of CrO_3-SO_4 of 200:1 or 150:1 increases the throwing power of the bath. When used in these proportions, $CdSO_4$ gives the greatest throwing power, Ni and Co sulfates give deposits much more resistant to the solvent action of HCl, and these metals do not deposit at the cathode with the Cr. C. L. READ

The time factor in anodic passivation of metals (gold, iron). WM. J. SHUTT AND VINCENT J. STIRRUP. *Trans. Faraday Soc.* **26**, 635–42(1930); *J. Electroplaters & Depositors Tech. Soc.* **6**, 41–8(1931).—Passivation of Au in 2 *N* HCl was studied with a rotating commutator recording time, current and potential on an oscillograph. The time (t) required for the Au to become passive depended on the current density (c) and the temp. At 9.5°, $(c - 0.58)\ t = 0.11$. The time of recovery depended only on the temp. Essentially the same results were found with Swedish Fe in H_2SO_4. Interpreted in the light of recent theory (*C. A.* **19**, 1538), these exptl facts indicate that the OH-ion concn. increases until O should be liberated, but because of the high overvoltage of O, the potential rises still higher until Cl is evolved with HCl or O with H_2SO_4. L. P. HALL

Electrode potentials in air-free electrolyte. A. L. MCAULAY, G. L. WHITE AND E. C. R. SPOONER. *Nature* **126**, 914–5(1930).—Expts on Fe, Cd and Zn and some rough measurements on other metal electrodes show that when there is no sensible concn. of the ions of a metal electrode in a soln., and when the electrode is not covered by an oxide film, its potential is detd by p_H if its H_2 overvoltage is pos. to the deposition potential which it would have in a soln. of the order of 0.001 *N* of its own ions. When this is not the case, the potential is controlled by anion concn. probably acting through a film of electrolyte in contact with the metal with a concn. of electrode-metal ions of the order of 0.0001 *N*. Reproducible potentials for high-overvoltage metals were found. The reason for this is under investigation. C. E. P. JEFFREYS

Experimental investigations on the lead accumulator. E. DENINA. *Atti soc. ital. progresso sci.* **18**, 135–40(1929); cf. *C. A.* **22**, 2516.—From the expts. and the thermodynamical calcns it is shown that the pos. plates of the normal Pb accumulator are formed by the couple $PbO_2|PbSO_4$ with exclusion of peroxides and other compds. G. A. BRAVO

Electrolytic fixation of compressed nitrogen at ordinary temperatures. FR. FICHTER, PIERRE GIRARD AND HANS ERLENMEYER. *Helv. Chim. Acta* **13**, 1298–306 (1930); cf. *C. A.* **16**, 2440.—E. found that Li catalyzed the cathodic reduction of N. Accordingly, LiCl soln. in abs. EtOH was electrolyzed between a water-cooled Pt cathode and graphite anode, the cell being placed into a hermetically sealed chamber filled with N at pressures up to 1000 atm. At 1 atm. N no appreciable amt. of NH_3 was formed, although Li metal was deposited. A soln. of $LiC_2H_5O_2$ in EtOH produced no Li upon electrolysis. As the N pressure was increased, the amt. of NH_3 formed increased. At 1000 atm. 22.3 mg. NH_3 per amp. hr. was produced. The catalytic effect of Li is due to the intermediate formation of Li_3N, which then reacts with the EtOH: $Li_3N + 3C_2H_5OH = 3LiOC_2H_5 + NH_3$. Li metal is sol. in abs. EtOH. Expts. with LiBr in EtOH were not as good as those with LiCl. Upon electrolyzing LiCl in butyl alc. (b. 116°) the output of NH_3 at 1000 atm. N ranged from 20.6 to 23.5 mg./amp. hr. MARY E. LEAR

Glow discharge at the active electrode of an electrolytic rectifier. JOHN S. FORREST. *Phil. Mag.* **10**, 1003–14(1930).—Three types of cells were used: Al in NH_4 phosphate; Ta in dil. H_2SO_4 with $FeSO_4$ added; W in dil. H_2SO_4. Pb was used as the inactive

lectrode in all cases. A dull glow is observed at the active electrode surface with the assage of current at some definite potential; this was 60 v. for the Al cell. As the oltage increases the glow increases and sparking occurs (at 150 v. for the Al cell). The sparks are replaced by an arc of a reddish color and breakdown takes place; this ecurs at 200 v. for the Al cell, 115 for the W cell and at approx. 90 for the Ta cell. ther observations of a qual. nature are given. Measurement shows that the layer gas on the active Al electrode is approx. 10^{-6} cm. thick. The spectrum of the glow hows it to be brightest at about 5550 A. U. This is attributed to O under weak ex- itation. Magnetic fields of 4000 gausses had no effect upon the current through the ells and the appearance of the glow. The pressure of the gas at the surface is thought to be many atms. The intensity of the glow is primarily a function of the current; the curve is slightly concave upward. This is attributed to the increase in the thick- ness of the gas layer with increase in the current and voltage. Possibly a satn. value may be attained, although this was not realized. The cathode glow becomes visible at approx. the same voltage as the anode glow. The cathode glow must be viewed by means of a stroboscope. The general characteristics of the cathode glow are similar to those of the anode. Twenty-five cycle current was used in all of the expts. A dis- cussion is given. WILLIAM E. VAUGHAN

Photometry and illumination research at the National Physical Laboratory. JOHN W. WALSH. *World Power* 85, 32–41(1931).—A short report of progress emphasizing the increasing importance of the gaseous-discharge tube and the photoelec. cell. C. G. F.

Power problems in high-frequency melting. E. F. NORTHRUP. *Iron Age* 127, 367–8(1931). E. H.

...per in the electrical industry (ANDERSON) **23.** Electro-fused cement (KAUCHT- ...LE) **20.** Electrochemical investigations of Al and alloys of Al with Hg (GERD- ... of oscillating discharges in the formation of some gaseous hydrides (FORESTI, ... 6. Electrophoretic deposition of rubber (Ger. pat. 512,170) **30.** Moisten- ... (Ger. pat. 510,330) **13.** Rubber deposition by electrophoresis, etc. (Brit. pat. ... **30.** Coating non-metallic surfaces with Ni and other metals (Brit. pat. ... 9. Purification of gas (Fr. pat. 689,440) **21.** Refining sugar juice (Ger. pat. ... 28.

Dry-cell electric battery. SIEMENS BROS. & CO., LTD., and C. F. EDWIN. Brit. ... Oct. 12, 1929. Electrodes of Pb and C are used with an electrolyte of Pb ... soln. made into a paste with flour and gum. The C may be in rod form sur- ... with a MnO_2 depolarizer, and the Pb electrode may constitute the container.

Dry-cell electric battery. GEORGE W. HEISE (to National Carbon Co.). U. S. ... Jan. 13. A dry-cell cathode is provided with a self-sustaining envelope ... paper impregnated with $ZnCl_2$ and cemented to the cathode with the reaction ... of the $ZnCl_2$ on the envelope. Cf. *C. A.* **25,** 255.

Electric dry cells. SIEMENS & HALSKE A.-G. (Reinhold Reichmann, inventor). ... June 23, 1927. A $Mn(NO_3)_2$ depolarizer for galvanic cells is manufd. ... 50–200 cc. of satd. $Mn(NO_3)_2$ soln. to each kg. of a pyrolusite-graphite mixt. ... and HCl may also be added.

Cap for carbon electrodes of electric batteries. E. KLEINMANN and A. MENDEL ... Geb Kleinmann). Brit. 334,463, Dec. 10, 1929. Structural features.

Storage battery. G. F. JUDD and J. CARLIER. Brit. 334,711, Sept. 9, 1929. Active plate material is prepd. by mixing Pb oxide with a soln. of S in NaOH which ... ated and allowed to cool. Plates are pasted with this mixt., baked and ... with Pb. Before pasting, the plates may be immersed in NaOH soln.

Storage batteries. E. FRIEDELSON. Brit. 334,393, Sept. 18, 1929. Battery elec- trodes are regenerated by subjecting them to successive charges and discharges of short duration; a small current is used and the electrolyte is replaced by water. The discharge current is about 0.2 and the charging current is about 0.4 of the normal dis- charge current. Cf. *C. A.* **24,** 4992.

Storage batteries. MORITZ KUGEL. Fr. 36,775, April 26, 1929. Addn. to 642,145 (*C. A.* **23,** 1065). The necessary amt. of phosphoric acid in batteries of the kind described in Fr. 642,145 is kept up by adding the acid in a solid form in the form of regular pieces of known wt. The pieces may be composed of phosphates of metals not harmful to the battery. Cf. *C. A.* **25,** 255.

Storage batteries. EDMOND PARVILLE and PIERRE RIVEAU. Fr. 689,919, April

24, 1929, and 689,927, April 25, 1929. **Method of embedding the active material in the plates.**

Storage-battery electrodes, etc. I. G. FARBENIND. A.-G. Brit. 334,628, June 12, 1929. Battery manuf. as described in Brit. 211,401 (*C. A.* **24**, 790) is modified by making the hard lead parts of the battery by stamping or swaging a hard lead band made by extrusion. Various details of manuf. are described. Cf. *C. A.* **25**, 461.

Active material for storage batteries. WM. GARDINER and HENRY D. STALEY (to Vulcanite, Inc.). U. S. 1,788,571, Jan. 13. A mixt. (for pos. electrodes) formed from Ta oxide 4, Pb oxides 200 parts and an acid soln. such as H_2SO_4 is used in paste form Mo oxide, C, $Al_2(SO_4)_3$ and pumice stone may be added.

Porous metal articles such as storage-battery electrodes. I. G. FARBENIND A.-G. Fr. 690,485, Feb. 24, 1930. See Brit. 332,052 (*C. A.* **25**, 39).

Accumulators. CHARLES J. V. FÉRY. Fr. 690,580, May 1, 1929. The neg. electrode is placed horizontally at the bottom of the container, a layer of porous material covers it and the pos. electrode is mounted vertically above that.

Accumulators. JEAN M. LARGE. Fr. 689,751, Feb. 12, 1930. The electrodes of accumulators are made of little cases of insulating material perforated to a certain height, in which the Pb conductors and active material are placed.

Accumulators. KARL NAUMANN. Fr. 690,409, Feb. 21, 1930. Benzoic acid, citric acid or phosphoric acid or one of their salts is added to the active mass of the plates of elec. Pb accumulators, whereby the life of the plates is lengthened.

Accumulators. YVES LE MONIES DE SAGAZAN and PHOSPHATES ET SUPERPHOSPHATES DE TEBBAKA. Fr. 691,181, May 15, 1929. An electrolyte for Pb accumulators is composed of an aq. soln. of $(NH_4)_2SO_4$.

Accumulators. PHOSPHATES ET SUPERPHOSPHATES DE TEBBAKA. Fr. 36,869, Feb. 19, 1929. Addn. to 667,341 (*C. A.* **24**, 1042). The electrolyte is composed of an aq. soln. of H_2SO_4 contg. 65–120 g. of H_2SO_4 per l., the cupric soln. being formed after one normal charge and discharge of the battery. Cf. *C. A.* **24**, 3955.

Accumulator electrodes. I. G. FARBENIND. A.-G. Fr. 690,452, Feb. 22, 1930. Accumulator electrodes are made by submitting metal powders (preferably made from the corresponding carboxyl), mixed with an addnl. substance such as NH_4HCO_3, NaCl or C, to compression or to a heat treatment or both and then eliminating the addnl substance either wholly or in part.

Accumulator electrodes. I. G. FARBENIND. A.-G. Fr. 36,653, Mar. 16, 1929. Addn. to 644,966 (*C. A.* **23**, 1828). Electrodes for Edison accumulators having an alkali electrolyte are made of metals made by decompn. of their carbonyl compds. and used in the form of porous agglomerates.

Galvanic cells. ARTHUR GASSAN. Ger. 510,829, Oct. 30, 1928. Addn. to 495,983 (*C. A.* **24**, 3479). Further details of die-casting the Zn containers are given.

Selenium cell. "SELENOPHON" LICHT- UND TONBILDGES. M. B. H. Fr. 689,585, Feb. 7, 1930. Arrangement and connections of plates of 2 types of metals, one capable of being wetted by molten Se and the other not.

Electrodeposition of tin. SIEMENS & HALSKE A.-G. Brit. 334,738, March 28, 1929. Alk. Sn solns. contg. no plumbite or bismuthite or other not-readily-oxidizable compd. of these metals are treated with an oxidizing agent (such as O_2, H_2O_2, alkali metal or alk. earth metal peroxides or $KMnO_4$) for quant. conversion of all the Sn into stannate and the solns. are then electrolyzed without addn. of a colloid.

Electrodeposition of a coarse chromium layer on metallic surfaces. N. D. BIRYUKOV. Russ. 38,892, Jan. 16, 1929. A coarse layer of Cr is deposited on metal disks, etc., used for grinding purposes, from an electrolyte consisting of chromic acid and chromium sulfate, which compounds are introduced into a soln. of manganese chromate in strong chromic acid and of complex compds. obtained by the action of org. reducing compds on chromic acid.

Chromium electroplating. N. D. BIRYUKOV. Russ. 38,889, Jan. 16, 1929. To an electrolyte contg. chromic acid, Cr sulfate and other metals is added hydrated Pb oxide and a mixt. of Fe and Co chromates in chromic acid in a proportion of metallic cobalt, iron and lead equal to 5:1:0.6.

Chromium electroplating. N. D. BIRYUKOV. Russ. 38,898, Jan. 16, 1929. In the prepn. of a stereotype plate an electrolyte is used which contains, besides a soln. of chromic acid, Cr sulfate and Zn and Cd chromates, also a hydrate, carbonate or oxide of Ca. The proportion of metals is Ca:Zn:Mg = about 1:1:0.03.

Removing chromium plating. TRENSTEDT MANUFACTURING CO. Fr. 689,415, Feb 4, 1930. Cr plating is removed from objects coated therewith by making the object

the anode in an electrolytic bath composed of an aq. soln. of an org. acid such as oxalic, tartaric or citric acid.

Electrolyte for nickel-plating aluminum and other metals. M. O. GERSHMAN. Russ. 61,475, Dec. 31, 1929. The electrolyte is a soln. of Ni NH_4 sulfate, NH_4 lactate and $(NH_4)_2SO_4$ acidified with citric acid.

Applying abrasives to sheet materials by electrostatic precipitation on the sheets. JAMES S. SMYSER. U. S. 1,788,600, Jan. 13. Various details of app. and operation are described.

Coating electrolytic or battery electrodes. SOC. ANON. LE CARBONE. Ger. 512,341, April 26, 1923. See Brit. 206,471 (*C. A.* **18**, 1089).

Electrolysis. NADAL R. ROMULO. Fr. 691,378, Feb. 10, 1930. To obtain by electrolysis metallic compds. having low coeffs of soly. in the electrolyte, a series of vats is used in which are placed electrodes in the form of plates, the anodes being formed of the metal of which compds. are desired, and the cathodes of the same metal or of another convenient conducting substance. No membranes or diaphragms are placed between the electrodes.

Electrolytic vats. ANACONDA COPPER MINING CO. Fr. 690,437, Feb. 22, 1930. Contamination of the atm. by gas bubbles escaping from an electrolytic vat is prevented by maintaining on the electrolyte a layer of a finely divided solid substance such as ground cork, which may itself be covered with S.

Electrolyzing vessel. I. G. SHCHERBAKOV. Russ. 55,448, Sept. 28, 1929. Constructional details.

Electrolytic cell for decomposing water. ARNO E. ZDANSKI (to Bamag-Meguin A.-G.). U. S. 1,788,904, Jan. 13. Structural features.

Electrolytic cell for etching zinc or other plates. GEORGE F. JOHNSTONE. U. S. 1,788,462, Jan. 13. Structural features.

Electrolytic cell for metal deposition. IMPERIAL CHEMICAL INDUSTRIES, LTD. Ger. 512,277, Jan. 20, 1929. See Brit. 312,395 (*C. A.* **24**, 792).

Electrolytic deposition of metals. IMPERIAL CHEMICAL INDUSTRIES, LTD. Ger. 510,618, Jan. 19, 1929. Details are described of a circular cell comprising anode and cathode chambers sepd. by a filter diaphragm.

Electrolytic production of salts and alkalies such as ferrous chloride and sodium hydroxide. PETER FIREMAN (to Magnetic Pigment Co.). U. S. 1,788,512, Jan. 13. A soln. of an alkali metal salt such as NaCl is electrolyzed in the presence of a cathode and of an anode such as Fe; the bodies of the salt soln. in contact with the anode and cathode are sepd. by an independent body such as an electrolyte in an intermediate compartment which is constantly renewed without contacting the anode or cathode; the salt soln. is separately supplied to the soln. bodies in contact with the anode and cathode. App. is described.

Electrolytic refining plant for silver and other precious metals. SIEMENS & HALSKE A.-G. (Victor Engelhardt, Georg Eger and Herbert Hein, inventors). Ger. 512,172, May 7, 1928. Details of the arrangement of the anodes are described.

Drying electrolytic iron, etc. INTERNATIONAL STANDARD ELECTRIC CORP. Ger. 512,115, Aug. 9, 1927. Pulverulent, electrolytically prepd. magnetic metals, especially Fe to be used in making cores for Pupin coils, are washed with water, treated with a volatile liquid, *e. g.*, EtOH, to displace the water, and then dried.

Aluminum. COMPAGNIE DE PRODUITS CHIM. ET ÉLECTROMÉTALLURGIQUES ALAIS, FROGES ET CAMARGUE. Fr. 691,336, May 21, 1929. In the prepn. of baths used in the fabrication of Al by electrolysis, the cryolite is partly or wholly replaced by a mixt. of Al fluoride dry or damp, and NaCl or KCl. Cf. *C. A.* **25**, 647.

Nitric acid. GUTEHOFFNUNGSHUTTE OBERHAUSEN A.-G. Fr. 688,602, Jan. 21, 1930. Compds of N and O for the manuf. of HNO_3 are made by passing mixts. of N and O through a high-frequency elec. field which is created in a controlled circuit of high-frequency elec. oscillations of very high tension. Substances having a catalytic action are used, preferably as intermediate electrodes, in the high-frequency elec. field.

Phosphoric acid (electrolytic purification). I. G. FARBENIND. A.-G. Brit. 334,790, Feb. 20, 1929. The process described in Brit. 319,656 (*C. A.* **24**, 2679) is modified, when the crude acid contains an insufficiency of heavy-metal salt, by adding to the acid, before refining, a small quantity of a Cu salt (preferably Cu phosphate) in order to promote deposition of the As present (presumably as Cu arsenide). The Cu should not exceed 10% of the quantity of the As present and is preferably only 25–40% the quantity of the As. The temp. is maintained at about 50° by the working current or by external heating.

Ozone. VITTORIO GAMBAROTTA. Fr. 689,677, Feb. 10, 1930. An app. is de-

scribed for producing ozone by the action of elec. waves, in which one of the armatures is placed outside and the other inside a closed vessel.

Purifying hydrocarbons. ABRAHAM ESAU. Fr. 690,342, Feb. 20, 1930. Air, water, etc., are eliminated from solid or liquid hydrocarbons by submitting them to the action of an elec. field of high frequency or of a condenser or of a solenoid field.

Purifying liquids by electrodialysis. FILTRES PHILIPPE. Fr. 689,674, Feb. 10, 1930. Liquids are purified by electrodialysis in a vat having 3 compartments; the central compartment is traversed by the liquid to be purified and the side compartments (anodic and cathodic) are traversed by a washing liquid, the said compartments being sepd. by porous membranes. The flow of liquids in the compartments is detd to give optimum yield for a const tension of elec. current.

Chemical reactions using high-frequency currents. I. G. FARBENIND. A.-G. Fr. 691,099, Mar. 5, 1930. In carrying out reactions (such as the production of O_3, oxides of N or NH_3, the formation of acids by oxidation, etc.) by means of high-frequency currents, the elec. consts. of the generator of oscillations of high frequency and of its coupling elements are so chosen that strongly deformed oscillations are necessarily produced, comprising in each period a long pause of current. The reaction chamber is either a space, acting as condenser, placed between the generator and the vibratory circuit or in the circuit itself, or a space situated in the condenser of a coupled circuit, preferably harmonized.

Recording electric currents by color reactions. ROBERT POLLAK-RUDIN. Ger. 512,411, Dec. 4, 1928. See Brit. 301,749 (*C. A.* 23, 4309).

Liquid electric resistance. A. A. SHAPOSHNIKOV and V. A. SUKODSKII. Russ. 41,858, Mar. 1, 1929. A liquid elec. resistance having two electrodes of the same material is prepd. by dissolving Br or I in the electrolyte.

Loading wire or tape for electric conductors. STANDARD TELEPHONES & CABLES, LTD., G. LAWTON and W. H. DEARDEN. Brit. 334,547, May 31, 1929. A magnetic material is used, on the surface of which is an exceedingly thin layer of a material of higher resistivity, such as C, a nitride or Cr, *e. g.*, a layer produced by treatment with NH_3 or hydrocarbons or by a cementation process with ferro-chrome, the layer being diffused into an underlying layer, the permeability of which is at least as great as that of soft iron at low-flux ds. Also, an Fe-Ni alloy may be coated successively electrolytically with Ni and with Cr and then heated to 1000–1200°.

Electric furnaces. EMIL F. RUSS. Fr. 690,195, Feb. 19, 1930. An arrangement of suspended heating resistances is given.

Electric furnaces. ELECTRIC FURNACE CO., LTD. Fr. 689,999, Feb. 14, 1930. Construction of inductors is given.

Electric furnaces for treating metals. VICTOR SORREL and LOUIS A. LAFONT. Fr. 36,999, June 3, 1929. Addn. to 641,635 (*C. A.* 23, 1066).

Electric furnace functioning continuously for reheating or for chemical reactions. LOUIS VENNIN. Fr. 689,955, April 29, 1929.

Electric induction furnaces. GUILLIAM H. CLAMER. Fr. 690,231, Feb. 19, 1930.

Electric induction furnace for smelting ores. HERMANN ZEPERNICK. Ger. 510,599, Nov. 20, 1927. Details of construction.

Induction furnace for fusing metals. HIRSCH, KUPFER- UND MESSINGWERKE A. G. Fr. 689,754, Feb. 12, 1930.

Electric resistance oven for heating articles to be tempered, etc. L. W. WILD and WILD-BARFIELD ELECTRIC FURNACES, LTD. Brit. 334,621, June 11, 1929. A centrifugal fan effects circulation of air within the oven, various structural details being described.

Electric shaft furnace for treating waste metals and oxygen or sulfur ores. JOHANN HALÁSZ. Fr. 689,874, Feb. 14, 1930.

Melting metals in the electric furnace. K. G. WENNERSTRÖM. Brit. 334,201, May 28, 1929. In melting metals such as waste Cu, brass or Al, or heating molten [illegible] means of a slag layer by passing current through it, the entire charge is situated above the slag layer during the entire treatment. Various details of process described; a slag may be used which is lighter than the charge but has a [illegible] p. so that the surface of the slag may be kept in solid condition.

[illegible]s-distributing device for electric gas cleaner. SIEMENS-SCHUCKERTWERKE A.-G. (Richard Heinrich, inventor). Ger. 512,129, Oct. 31, 1925.

Hanging electrode for electric gas cleaners. METALLGES. A.-G. (Kurt von Eberhard, inventor). Ger. 510,199, May 24, 1929.

Furnace electrodes. SIEMENS & HALSKE A.-G. (Otto Rönitz, inventor). Ger. 512,055, June 1, 1929. A protective device is described for furnace electrodes nor-

mally kept in place by a source of power. The device acts so as to prevent the electrodes from falling into the furnace if the source of power fails.

Furnace electrodes. SIEMENS-PLANIAWERKE A.-G. FÜR KOHLEFABRIKATE. Ger. 512,499, Jan. 22, 1927. Details are given of a method of renewing self-baking electrodes while they are in use.

Carbon electrode. MERRILL J. DORCAS (to Canadian National Carbon Co., Ltd.). Can. 307,403, Jan. 6, 1931. A C electrode has a core formed by baking a mixt. of CaF_2 40, SrF_2 10, Na or K silicate 5, C flour 45 parts and tar sufficient to bind.

Electrodes for arc lamps. K. N. PUZANKOV. Russ. 60,096, Dec. 11, 1929. The elec. resistance of electrodes is increased by pressing them from a mixt. contg. 60–65% moist retort carbon and 40–35% NaCl.

Arc-lamp electrodes. PAUL GRAVIER and COMPAGNIE LORRAINE DE CHARBONS D'ELECTRICITÉ. Ger. 510,227, Sept. 15, 1929. Occluded air and other gases are removed from the electrode mass, before it is compressed, by rinsing when cold or warm with a liquid or a vapor, *e. g.*, steam. A vacuum may then be applied. App. is shown.

Quartz lamp for analysis. QUARZLAMPEN-GES. M. B. H. Fr. 689,989, Feb. 14, 1930.

5—PHOTOGRAPHY

E. P. WIGHTMAN

Reflection and transmission of light by photographic plates. D. BRENT MCRAE and R. C. TOLMAN. *J. Optical Soc. Am.* **20**, 565–72(1930).—The reflecting power and transmission for red, green, blue and "actinic" light were detd. for unexposed Eastman 40 plates. The method used was a photographic one, approx. monochromatic light being obtained by the use of Wratten filters. It was found that the reflection and transmission varied with wave length in the same general manner as did the photographic sensitivity of the emulsion. G. SILBERSTEIN

Mechanism of the formation of the latent photographic image. A. P. H. TRIVELLI. *Nature* **126**, 760(1930). —It is pointed out that the larger a Ag speck (so long as it is below a size at which development is spontaneous) the less is the amt. of Ag required to be added to it to produce developability. Viewed in this way the objections of Toy and Harrison (cf. *C. A.* **24**, 5650) may be overridden. E. W. H. S.

The **latent photographic image.** R. HILSCH AND R. W. POHL. *Nachr. Ges. Wiss. Göttingen, Math.-physik. Klasse* No. **2**, 176–8; *Z. Physik* **64**, 606-22(1930).—The no. of nuclei of the latent photographic image is related as $1:10^7$ to the no. of original AgBr mols. Because of this low concn. they are optically invisible in the AgBr layers of the dry plate. They become visible, however, in a quite transparent AgBr crystal of a few mm. thickness. The absorption spectrum of the latent image forms a band with a max. at 690 mμ. A. P. H. TRIVELLI

Photochemistry of mercuric iodide. LÜPPO-CRAMER. *Phot. Korr.* **65**, 97–100 (1929). Except for Lüppo-Cramer, only F. Kropf (*C. A.* **4**, 2911; **8**, 1710) appears to have published any work on the photochemistry of HgI_2 in gelatin. The present paper, in part, describes a repetition (and confirmation) of some of the author's earlier expts. Red HgI_2 (with gum arabic) in a gelatin film is light- and color-sensitive, the latent image being developable in alk. amidol or metol-hydroquinone. After a preliminary uniform exposure to white light, a wedge exposure to the same light source gives early and extensive "bleaching-out" (reversal) followed by re-reversal of the highest wedge exposures; the onset of these effects can be further hastened by phenosafranine. The Schwarzschild phenomenon (intensity more effective than time) is strongly marked, and the latent image itself fades rapidly, almost disappearing in about 5 hrs. E. R. BULLOCK

Luminescent surfaces (Fr. pat. 689,925) **3.**

Verarbeitung **der photographischen Platten, Filme und Papiere. Ausführliches** Handb. d. **Phot. Bd. III, Tl. 2.** 6th ed., edited by JOSEF M. EDER AND H. LÜPPO-CRAMER. Halle (Saale): W. Knapp. 388 pp. M. 30; bound, M. 32.

Photography. JOS-PE FARBENPHOTO-GES. M. B. H. Ger. 512,476, Feb. 21, 1929. See Brit. 319,077 (*C. A.* **24**, 2390).

Color **photography.** GIOVANNI ALIFREDI. Fr. 688,615, Jan. 21, 1930. Natural

colors are produced directly by the use of a single negative obtained without a screen. The negative is obtained by using a panchromatic plate and an appropriate color filter consisting of a perfect crystal. This negative is printed on an appropriate support, *e. g.*, a blue lithographic stone previously prepd. by a sensitizing soln. and developed, after which the various colors are selected by appropriate solvents and appear clearly on the matrix.

Color photography. ARTHUR TRAUBE. Fr. 689,977, Feb. 14, 1930. In the production of color photographs the reliefs in tanned gelatin are colored and absorbed by coloring solns. of a specific degree of dispersion, the prepn. of these solns. being effected by decompn. of polydispersed solns., particularly azo solns. The colored reliefs are submitted to a complementary treatment with distd. water, and, if necessary, with swelling agents such as glycolic acid. The reliefs may be regenerated by oxidizing agents destroying the colors.

Color photography. WILFRED T. L. BECKER and LESLIE W. OLIVER. Ger 510,010, April 19, 1929. See Brit. 317,909 (*C. A.* **24**, 2071).

Color photography. I. G. FARBENIND. A.-G. (Bruno Wendt, inventor). Ger. 499,481, June 5, 1929. Photographic pictures in two or more colors are produced with the use of esters and ester salts of leuco compds. of dyes as light-sensitive substances. A compd. having an oxidizing action in light, *e. g.*, an org. nitro compd., may be used as an accelerator. The carrier for the light-sensitive substance may be a colloid that hardens when exposed to light, *e. g.*, gelatin.

Screens for color photography. J. N. GOLDSMITH and SPICERS, LTD. Brit. 334,243, May 30, 1929. In forming multicolor screens upon a support of celluloid, cellulose acetate or similar compns., a greasy resist contg. a dye is applied, as by printing, to the surface of a film in a series of lines or in a geometrical pattern; the dye migrates from the resist into the surface of the film so that after removal of the resist, as by a solvent, a colored series of lines or a pattern remains on the film. Various details of compns., etc., are given.

Multicolor screen for color photography. J. N. GOLDSMITH, T. T. BAKER, C. BONAMICO and SPICERS, LTD. Brit. 334,265, June 1, 1929. The surface of a film of cellulose or celluloid or other suitable cellulose deriv. is made receptive to dyes by applying to it a layer of cellulose acetate without dye-inhibiting addns.

Photographic emulsions. KODAK PATHÉ (SOC. ANON. FRANÇAISE). Fr. 689,246, Feb. 1, 1930. New compds. suitable for photographic emulsions as sensitizers are prepd. by condensing the quaternary salts of 1-methylnaphthothiazole with ethyl orthoformate in dry pyridine. A discussion as to the mol. structure of the compds. and their intermediate products is given. In an example, the bromide of 2,2′-diethyl-5,6,5′,6′-dibenzothiocarbocyanine is prepd. by converting β-naphthylamine to 1-methyl-α-naphthothiazole, 2 mols. of which or of its halogen derivs. are condensed with 2 mols. of ethyl-*p*-toluenesulfonate by heating them together to 100° for 6 hrs. The crude product is dissolved in boiling pyridine; ethyl orthoformate is added and the mixt. heated under reflux. The dye is pptd. as bromide by adding excess of NH_4Br in aq. soln. and is recrystd. from MeOH. Another example is given.

Photographic emulsions. KODAK-PATHÉ (SOC. ANON. FRANÇAISE). Fr. 690,646, Feb. 25, 1930. A photographic emulsion is composed of a colloid, particles of photographic Ag salts and a stabilizing compd. of the type R-X-NH-Y-R, in which R is an org. radical free from N, and X and Y chosen from among the electroneg. radicals may be carbonyl, sulfuryl and imide N groups. Examples are diacetamide, phthalimide, pyrrol, succinimide, saccharine, pyrazolonic rings, pyrazolic rings, etc. Fr. 690,647 describes a similar emulsion in which the stabilizing compd. is chosen from among the group of substituted carbamides, cyclic carbamides, acid amides, substituted acid amides and amidohydrazides.

Photographic layers. KALLE & Co. A.-G. (Hermann Neuroth, inventor). Ger. 510,165, Oct. 22, 1929. Light-sensitive layers are prepd. by bringing aryl azides onto a support together with phenols, aromatic amines or aminophenols. Development of the exposed layer is effected by washing out the unreacted azide or by rendering it inactive, *e. g.*, by reduction. Examples are given. Cf. *C. A.* **24**, 3187.

Photographic diazo copies. KALLE ET CIE. A.-G. Fr. 687,956, Feb. 15, 1929. Photographic diazo copies are stabilized by adding S compds. to the light-sensitive layer, particularly derivs. of thiocarbonic acid. Examples are given of the use of thiourea.

Fixing bleaching layers containing basic dyes. I. G. FARBENIND. A.-G. Fr. 690,386, Feb. 21, 1930. Layers contg. basic dyes are fixed so that they may be rendered colorless in a subsequent operation, by treating them, after exposure to light

under a negative, with a soln. of HBF_4 or one of its salts in a solvent which dissolved the sensitizer contd. in the layer. During this operation the dyes are transformed into their insol. fluoborates while the sensitizer is dissolved. Thus, a layer of gelatin which contains anilidoflavinduline chloride sensitized by thiosinamine is exposed to light under a negative and washed with a 12% aq. soln. of $NaBF_4$ and then with weaker solns. of $NaBF_4$.

Bleach-out color films. I. G. FARBENIND. A.-G. Fr. 689,122, Jan. 30, 1930. Bleach-out color films contain basic oxonium dyes free from N with the exception of anthocyanosides Examples are the chloride of 3,6-dihydroxy-9-phenylxanthoxonium and the ethers and the chloride of 3, 6-dimethoxy-9-*o*-carbomethoxyphenylxanthoxonium.

Photographic film rolls. I. G. FARBENIND. A.-G. Brit. 334,206, May 27, 1929. Protective paper backing-strips or leader-strips are rendered unnecessary by printing non-actinic-ray-excluding coloring material over the rear of the film at its ends and over its entire width, for which purpose compns. may be used insol. in usual photographic developing baths, *e. g.*, compns. such as are described in Brit. 287,124 (*C. A.* 23, 349), Brit. 295,383 (*C. A.* **23**, 2113) and Brit. 295,578 (*C. A.* **23**, 2113).

Producing designs on surfaces composed of cellulose derivatives. I. G. FARBENIND A.-G. Fr. 689,007, Jan. 28, 1930. Designs, etc., are produced on surfaces composed entirely or partly of cellulose derivs. by incorporating in the surface products which are capable of changing, under the influence of light, the phys. or chem. properties of the cellulose derivs., exposing the layers to light under a negative and rendering the image visible by an appropriate treatment. Thus, acetylcellulose is dissolved in acetone and a soln. of $Na_2Cr_2O_7$ in MeOH is added. The mixt. is applied in a thin layer on a sheet of glass, dried and exposed to light under a negative. The development is effected by acetone in which the unexposed parts remain sol., and the image remaining is colored by appropriate dye solns. Other examples are given.

Apparatus for developing photographic prints such as diazotypes with ammonia, etc. F. C. FUKE and OZALID CO., LTD. Brit. 334,555, April 5, 1929. This pat. covers subject-matter similar to that of Brit. 331,823 (*C. A.* **25**, 45).

Photographic papers. I. A. KHOKHRENKOV. Russ. 43,109, Mar. 20, 1929. A soln. of diazo compds. and Cu salts in HPO_3 is used to treat photographic paper.

Sensitized paper. LÉONID STAROSTIN. Fr. 689,318, Jan. 28, 1929. Diazo compds. prepd. with org. acids such as oxalic acid instead of mineral acids are used for making sensitized paper. Oxidizing substances or substances having an oxidizing effect by the action of light may be used jointly with the diazocompds.

6—INORGANIC CHEMISTRY

A. R. MIDDLETON

Germanium. VIII. The sulfides of germanium. WM. PUGH. *J. Chem. Soc.* 1930, 2369–73; cf. *C. A.* **24**, 2391.—A method of prepg. GeS direct from GeO_2 is developed. Thus, GeS is obtained from GeO_2 and H_2-H_2S mixts. (1–3 vols. H_2/vol. H_2S) at 700°, traces of GeS_2 in the product being removed by pulverizing, digesting overnight with cold dil. NH_3, and drying. Cryst. GeS_2 is slowly produced by the action of S vapor on GeO_2 at 850°, and is formed quite rapidly by heating (700–800°) GeO_2 in a current of H_2S and S vapor. Some of the properties of GeS and GeS_2 are described.

J. BALOZIAN

Isomorphism among oxides of quadrivalent metals. The systems: CeO_2–ThO_2, CeO_2–ZrO_2 and CeO_2–HfO_2. L. PASSERINI. *Gazz. chim. ital.* **60**, 762–76(1930).—The expts. continue similar investigations of isomorphism in oxides of metals of lower valency, the results of which have been recently published for binary systems of tervalent metal oxides (*C. A.* **25**, 633). Besides the chief object of the work, which is devoted to the problem of isomorphism, attention was also devoted to the cubic form of HfO_2 and ZrO_2. The existence of a monometric modification of these oxides is established for ZrO_2 but not for HfO_2 except by analogy in the similar chem. behavior of Hf and Zr. However, solid cubic solns. between ZrO_2 and HfO_2 were obtained, in which each oxide was dissolved in a greater proportion of the other oxide; therefore it was possible to det. the dimensions of the cell of the cubic modification of HfO_2 and thus to est. the diam. of the Hf^{++++} ion. The oxides were prepd. by calcination, at approx. 800°, of solid solns. of the hydroxides, which had been pptd. by KOH from calcd. quantities of the nitrates or sulfates. The systems CeO_2–ThO_2, CeO_2–ZrO_2 and CeO_2–HfO_2 were then examd. by x-rays (with the powder method). They consist of solid solns. which,

like CeO_2 and ThO_2, crystallize in the cubic system with a lattice structure of the fluorite type. In the CeO_2–ThO_2 system, the components are sol. in all proportions, and the lattice consts. and the d. are proportional to the compn. of the solid solns. In the CeO_2–ZrO_2 and the CeO_2–HfO_2 systems the soly. is only partial. The max. proportions dissolved are approx. 27% CeO_2 in ZrO_2 and 23% ZrO_2 in CeO_2, and 25% CeO_2 in HfO_2 and 32% HfO_2 in CeO_2. These limits are slightly greater than the limits for the bivalent and tervalent metal oxides, where the difference in dimensions of the metal ions is equal to that between the Ce^{++++} and Zr^{++++} ions. From the solid solns. obtained it was possible to calc. by extrapolation the lattice dimensions of the cubic form of ZrO_2 and of the probable cubic form of HfO_2. These were for ZrO_2: $a = 5.065 \pm 0.01$ A. U., $v = 129.94 \times 10^{-24}$ cc., d. 6.27; for HfO_2: $a = 5.115 \pm 0.01$ A. U., $v = 133.82 \times 10^{-24}$ cc., d. 10.43. The 2 oxides have a lattice of the fluorite type, with a calcd. diam. of the Hf^{++++} ion of 1.79 A. U. The solubilities in the solid state of the quadrivalent metal oxides are qualitatively similar to those of the bivalent and tervalent metal oxides, insofar as the soly. is an inverse function of the ratio between the dimensions of the metal ions in any system. Quantitatively, however, the soly. differs in that the limits of soly. between the quadrivalent metal oxides are slightly higher than those of the oxides of the metals of lower valency. Consequently, the ratios between the diams. of the metal ions which delimit the solubilities (total and partial solubilities and insolv.) are 1–2% different from those of the bivalent and tervalent metal oxides. C. C. Davis

Use of oscillating discharges in the formation of some gaseous hydrides. B. Foresti with Mario Mascaretti *Gazz. chim. ital.* **60**, 745-54(1930).—The expts. are closely related to the ground-breaking expts. of Paneth and his collaborators (cf. P., *C. A.* **13**, 1043, 1430; **15**, 350; **17**, 2238; P. and Winternitz, *C. A.* **13**, 1431; P. and Fürth, *C. A.* **14**, 1494; P. and Nörring, *C. A.* **15**, 213; P. and Matthies, *C. A.* **16**, 2088; P., M. and Schmidt-Hebbel, *C. A.* **16**, 2088; P. and Rabinowitsch, *C. A.* **19**, 1228; P., Haken and R., *C. A.* **19**, 1228), and deal with the formation of SnH_2, BiH_3 and PbH_2 by the use of oscillating discharges between Sn, Bi and Pb electrodes in a current of H at atm. pressure and in the complete absence of org. substances. The previous investigators had been unable to obtain any hydride unless certain org. substances were present, and their results indicated that the presence of the latter was essential to the formation of hydrides (cf. P. and Hofeditz, *C. A.* **23**, 5159; Schultze and Müller, *C. A.* **24**, 2036). Under the conditions and with the technic employed by F., however, hydrides were formed in the absence of any org. substance. The *app.*, which is described and illustrated, involved: (1) heating by a "localized" discharge (2) rapid elimination of the products and cooling the latter rapidly to room temp.; and (3) abs. absence of org. substances. Under these conditions all 3 hydrides were obtained. The best results were obtained with Sn, where the yield increased with diminution of the distance of the discharge. If the latter becomes aperiodic, the quantity of hydride becomes almost or wholly negligible. To obtain the highest yields, it is necessary, with increase in the self-induction of the circuit, to increase the capacity, and *vice versa*. This indicates that there is no relation between the yield and the period of the oscillating discharge. C. C. Davis

Boron hydrides. XIV. B_4H_{10}. Alfred Stock, Egon Wiberg and Hans Martini. *Ber.* **63B**, 2927–37(1930); cf. *C. A.* **24**, 2684.—B_4H_{10} is the principal product of the dissocn. of borides with acids. At room temp. B_2H_6 occurs also. H_3PO_3 was found preferable to the HCl formerly used (cf. *C. A.* **24**, 2684). With HCl the hydride itself gives B_4H_9Cl, and with NaHg, $2Na.B_4H_{10}$, which with H_2O gives H_2 and the hypoborate. With NH_3 (−70°) a solid white salt-like substance, $B_4H_{10}.4NH_3$, is formed, which decomposes with loss of H and NH_3 at room temp., but at 180° loses H to form $B_4N_4H_6$, for which a 6-at. ring structure is suggested. $B_4H_{10}.4NH_3$ can be chlorinated with HCl in steps at room temp. On electrolysis in liquid NH_3, NH_4 (with subsequent decompn.) is given off at the cathode and B_4H_6 at the anode. Several intermediate reactions such as the formation of $[B_4H_4(NH_2)_2]H_4$, $[B_4H_2(NH_2)_4]H_4$, $[B_4(NH_2)_6]H_4$ and their salts are indicated, leading to the conclusion that 4 of the H atoms in B_4H_{10} are different from the other 6 Gregg M. Evans

Investigations of the structure of compounds of the $MeMe_2^{\prime\prime\prime}O_4$ type. I. Cadmium and calcium indiates. L. Passerini. *Gazz. chim. ital.* **60**, 754–61(1930).—The present work is a continuation of studies of the factors on which the lattice structure and the cryst. system of $MeMe_2^{\prime\prime\prime}O_4$ compds. depend, studies which were begun with compds. of this type which crystallize in the cubic system with the lattice structure of spinels (cf. *C. A.* **23**, 4167; **24**, 4439; Natta and P., **23**, 4649; **24**, 1311). A consideration of these results and those of other investigators shows that compds. of the $MeMe_2^{\prime\prime\prime}O_4$ type can crystallize with a spinel lattice structure only for certain relations between

the at. dimensions, whereas the chem. properties have little or no influence. In the present expts., 2 hitherto unknown compds. were prepd. by calcination at 900° of mixts. of the theoretical proportions of the resp. nitrates, *viz.*, *Cd indiate*, $CdIn_2O_4$, and *Ca indiate*, $CaIn_2O_4$. Both are white powders; they were examd. by x-rays (with the powder method). They crystallize in the tetragonal system with a lattice structure of the hausmannite type (spatial group $D_4^{19}{}_h$), as judged by calcns. of the theoretical intensities of the observed lines. The elementary cells contain 8 mols. For $CdIn_2O_4$, $c/a = 1.14$, $a = 8.650 \pm 0.005$ A. U., $c = 9.875 \pm 0.007$ A. U., $v = 739.0 \times 10^{-24}$ cc., calcd. d. 7.30. For $CaIn_2O_4$, $c/a = 1.12$, $a = 8.770 \pm 0.005$ A. U., $c = 9.822 \pm 0.007$ A. U., $v = 755.5 \times 10^{-24}$ cc., d. 5.87. C. C. DAVIS

A note on the preparation of iodine trichloride. E. C. TRUESDALE AND F. C. BEYER. *J. Am. Chem. Soc.* **53**, 164–5(1931).—A convenient app. and method for the prepn. of pure ICl_3 are described. P. H. EMMETT

Rubidium and cesium nitrides. K. CLUSIUS. *Z. anorg. allgem. Chem.* **194**, 47–50 (1930).—In the decompn. of Rb and Cs azides, the residues contain the nitrides of these metals, Rb_3N and Cs_3N. They are gray, green powders, extremely sensitive to moisture, giving the following reaction: $Me_3N + 3H_2O \longrightarrow 3MeOH + NH_3$. H. S.

The other oxides of carbon. KENNETH A. KOBE. *J. Chem. Education* **8**, 232–9 (1931).—A review. E. H.

Recovery of rubidium and cesium compounds from carnallite. III. GERHART NDER AND FRANZ BUSCH. *Z. anorg. allgem. Chem.* **194**, 38–46(1930); cf. *C. A.* **24**, 84.—An artificial carnallite contg. between 0.7 and 1.0% RbCl and 0.007 and 0.01% CsCl was the raw material for these expts. 2.3 kg. was dissolved in a mixt. of 2.9 l. O and 0.9 l. concd. HCl, the soln. was warmed to 65°, and 140 cc. of silico-molybdic id was added. After distn. in a current of HCl gas and sepn of silicic acid, 3.25 of mixed chlorides was obtained. From the HCl soln. of this salt mixt., CsCl was pd directly by $SbCl_3$ in the form of a Cs-Sb chloride, and the CsCl was sepd. from the $SbCl_3$ by a HCl distn. The chloride residue so obtained contained 0.234 g. CsCl, rresponding to about 0.01% CsCl in the carnallite. In working up larger quantities this material, a further working of the silico-molybdate ppt seems desirable. This dissolved in a caustic alkali to form a soln. of simple alkali molybdates and alkali licates. If $Ca(OH)_2$ or a soln. of $Ba(OH)_2$ is used, a soln. of alkali hydroxide and a t. of poorly sol. Ca silicate and Ca molybdate or the corresponding Ba compds. are rmed. If the filtrate is satd. with CO_2 the hydroxide is converted into a carbonate; a digestion of this the carbonates of the alk. earths sep. out and the filtrate remaining contains only the carbonates of the alkalies. This method, applied to 2.3 g. of carnallite, yielded 0.23 g. CsCl and 24.3 g. RbCl, in complete agreement with he HCl distn. method. A method for recovering molybdic acid from the silico-molybate ppt. is described. H. STOERTZ

The **behavior of molybdenum pentachloride in organic solvents.** WM. WARDLAW ND HARRY W. WEBB. *J. Chem. Soc.* **1930**, 2100–6.—This study of the action of $MoCl_5$ n EtOH, Et_2O and pyridine (I) shows that it is a most reactive compd., the green solns. oing due in all cases to a reaction between $MoCl_5$ and the solvent. Analogous to the eaction between EtOH and PCl_5, dry EtOH and $MoCl_5$ react vigorously, $[NMe_2H]_3$-$MoOCl_5$] being isolated with 2-methylamine hydrochloride from the reaction soln. hild with EtOH. The coördination compd. $MoCl_5.2(C_2H_5)_2O$ (black crystals) is prepd. by mixing dry Et_2O (100 cc.) and powd. $MoCl_5$ out of contact with the air, decanting and evapg. in a vacuum. In the presence of H_2O the green $MoOCl_3$ is formed. *$MoCl_4$.-$3C_5H_5N$* (brown amorphous powder) is prepd. by reacting in a sealed vessel for 10 days $MoCl_5$ (12 g.) and dry I (250 cc.), filtering, and washing with CH_2Cl until the wash is free of I. *$MoCl_4.4C_5H_5N$* (colorless cryst. substance) deposits on allowing the preceding filtrate to stand. *$MoCl_4.5C_5H_5N$* (red orthorhombic crystals) deposits from the filtrate on prolonged standing. To explain the action of $MoCl_5$ on I it is suggested that the reaction is preceded by the formation of $C_5H_5N\langle^{Cl}_{MoO_4}$ which breaks up to form MoO_4 and C_5H_5NCl. J. BALOZIAN

Partial substitution of the oxalic acid residue in oxalate anions of bivalent metals. II. R. SCHOLDER AND CARL F. LINSTRÖM. *Ber.* **63B**, 2828–31(1930); cf. *C. A.* **21**, 3322.—The following compds. have been prepd.: $MnC_2O_4.2KNO_2.H_2O$; $2ZnC_2O_4$-$K_2C_2O_4.KNO_2.6H_2O$; $2MnC_2O_4.K_2C_2O_4.2KCNS$; $2ZnC_2O_4.K_2C_2O_4.KCNS.6H_2O$; CoC_2O_4-$K_2S_2O_8$; $MnC_2O_4.K_2S_2O_8.H_2O$; and anhyd. $ZnC_2O_4.K_2C_2O_4$. In general, this was done by the action of very concd., hot solns. of the nitrite, etc., upon the metallic oxalate.

The coördination structure of these is discussed with relation to similar ones prepd earlier. GREGG M. EVANS

Oxidation with fluorine. XVII. Preparation of pertitanic, pervanadic and permolybdic acids; reduction of peracids by ozone. FR. FICHTER AND ARON GOLDACH. *Helv. Chim. Acta* **13**, 1200–7(1930); cf. *C. A.* **24**, 4997.—Molybdic acid in HF is oxidized by F to permolybdic acid, the yield varying from 4.89 to 29.05% calcd. to the F used. Temps. from 0 to 50° were employed and periods during which F was passed into the soln. were varied from 5 to 30 min. The higher temps. and shorter duration gave the best yields. A similar soln. of TiO_2 gave 0.4–4.58% pertitanic acid, and a soln. of vanadic acid dissolved in H_2SO_4 was oxidized to the extent of approx. 1%. Ozonized O reduces H_2SO_4 solns. of the 3 per acids, this accounting for the diminution of yield with increase in duration of the oxidation expts. since ozone is formed gradually in these expts. This explanation, however, is not applicable to the F oxidation of Na metaborate in Na_2CO_3 since, although ozone reduces the perborate, the formation of ozone has never been observed under these conditions. A. WIEBEN

The true nature of per-acids and the alleged "acid nucleus theory." SHIN'ICHIRO HAKOMORI. *Bull. Chem. Soc. Japan* **5**, 333–44(1930).—A polar mol. such as H_2O or H_2O_2 may induce polarity in a particle and be held to that particle by the resulting "induction valence." Thus, an oxy-acid may be considered a combination of H_2O with an "acid nucleus," which is an element combined with O to form a stable octet For H_2SO_4 the acid nucleus is (SO_3), forming $(SO_3) \sim HOH$. *Orthophosphoric acid* may be written $(P_2O_5) \sim 3HOH$, which is unstable and breaks down to give $2H(PO_3) \sim HOH$, which in turn loses H_2O to become HPO_3 The per-acids are similar combinations of H_2O_2 with acid nuclei such as UO_3, TiO_2, MoO_3, V_2O_5 and CrO_3, which are listed in order of increasing color and constraint of electrons and decreasing stability of the per-acid formed. JANET E. AUSTIN

Purification of perchloric acid by vacuum distillation. G. FREDERICK SMITH AND O. E. GOEHLER. *Ind. Eng. Chem., Anal. Ed.* **3**, 48–52(1931).—Designs of stills for the purification of $HClO_4$ by vacuum distn. are described, including a cold-target type, the use of special designs to prevent superheating is discussed. A cold target design giving the best results is described in detail. This form of still provided the greatest degree of superheating and the best time rate of distn. The variation in the acid concn. of both distillate and residue with change in pressure over the range 1 to 7 mm. is given. The sepn. of $HClO_4$ from various amts. of H_2SO_4 and H_3PO_4 by vacuum distn. is examd. quantitatively, and the conditions under which complete sepns. are effected are described. The time rate of distn. of various designs of stills is detd. and the rate of distn. shown to be directly proportional to the degree of superheating employed. Graphs and tables accompany the paper. J. W. SHIPLEY

Dissociation of concentrated perchloric acid during vacuum distillation at moderately low pressures. New method for the preparation of anhydrous perchloric acid. O. E. GOEHLER AND G. FREDERICK SMITH. *Ind Eng. Chem., Anal Ed.* **3**, 55–8(1931). A study of the vacuum distn. of 73.3–73.6% $HClO_4$ was made over the pressure range 7–18 mm. Yields of 7–10% anhydrous $HClO_4$ were obtained without the use of any desiccating agent and under abnormally high superheating conditions. The mechanism of the distn. is explained on the basis of assuming a surface film of oxonium perchlorate, OH_3ClO_4. J. W. SHIPLEY

Oxonium structure of hydrated perchloric acid. G. FREDERICK SMITH AND O. E. GOEHLER. *Ind. Eng. Chem., Anal Ed* **3**, 58–61(1931).—**The transition** of cryst. $HClO_4$ was studied in a f.-p. app., approx. 73% $HClO_4$ being used. **Transition** with absorption of heat indicating the reaction $HClO_4.2H_2O \longrightarrow OH_3ClO_4.H_2O$ was pointed out The m. p. of oxonium perchlorate was detd. as 49.905° ± 0.005°. No evidence of the existence of $HClO_4.H_2O$ was obtained and the reaction $OH_3ClO_4 \longrightarrow HClO_4.H_2O$ probably does not occur. The construction of a density-acid concn. table over the range 70–80% is suggested in place of detg. the acid strength by chem. means. The data secured indicate an oxonium structure for all of the hydrates of $HClO_4$. J. W. S.

Oxonium perchlorate as reference standard for the construction of specific gravity-percentage composition table for strong perchloric acid solution. G. FREDERICK SMITH AND O. E. GOEHLER. *Ind. Eng. Chem., Anal. Ed.* **3**, 61–3(perchlorate, OH_3ClO_4, was prepd. and the d. of solns. covering the range 65–[illegible] detd. by the displacement method. A table of ds. covering this range of concns. is given. Const.-boiling $HClO_4$, 72.4% at 760 mm. and 203°, has the approx. d. 1.6964. The d_4^{25} $HClO_4.2H_2O$ is 1.71282. J. W. SHIPLEY

Possibility of a partial substitution of the lead halides by lead chromate in the chlorophosphates, chlorovanadates and chloroarsenates of the same metals (pyro-

morphite, vanadinite and mimetite). GUIDO CAROBBI. *Atti III congresso naz. chim. pura applicata* 1930, 341–2.—By melting together $Pb_3(PO_4)_2$, $PbCl_2$ and $PbCrO_4$ with excess NaCl, yellow hexagonal crystals of pyromorphite were obtained. Analysis gave the formula as $3Pb_3(PO_4)_2.(PbCl_2.PbCrO_4)$ with not more than 6% $PbCrO_4$. Similar procedure gave compds. $3Pb_3(VO_4)_2.(PbCl_2.PbCrO_4)$ and $3Pb_3(AsO_4)_2.(PbCl_2.PbCrO_4)$ with not more than 6% and 4% $PbCrO_4$, resp. G. M. MURPHY

Physicochemical studies of complex acids. III. Molybdic acid. HUBERT T. S. BRITTON AND WM. L. GERMAN. *J. Chem. Soc.* 1930, 2154–66; cf. *C. A.* **24**, 4477.—The reaction in aq. soln. between Na_2MoO_4 and strong and weak acids (HCl, AcOH, phenylacetic acid) is followed potentiometrically and conductometrically. To explain the results it is assumed that the Na polymolybdate first formed in HCl soln. decomposes with further addn. of HCl, giving a highly ionized polymolybdic acid, the ionization of which decreases with increase in the HCl added until finally un-ionized MoO_3 remains in soln. Weak acids decompose Na_2MoO_4 to a smaller extent than HCl, the final complex being $Na_2O.3MoO_3$, which resists further attack by the weak acid. $ClCH_2CO_2H$ gives a final Na polymolybdate intermediate between $Na_2O.3MoO_3$ and $Na_2O.5MoO_3$. IV. **The vanadates of silver.** HUBERT T. S. BRITTON AND ROBERT A. ROBINSON. *Ibid.* 2328–43.—A study of the compds. of Ag and 5-valent V, potentiometric titrations of $AgNO_3$ soln. with 3:1, 2.5:1, 1.6:1 and 1:1 $Na_2O{\cdot}V_2O_5$ (I) (and the reverse titrations) with the cell $Ag \mid 0.1\ N\ AgNO_3 \mid$ satd. $KNO_3 \mid 0.01\ N\ AgNO_3 + Na_3VO_4 \mid Ag$, and conductometric titrations of 3:1, 2:1 and 1:1 I with $AgNO_3$ solns. being described. No compds. of Ag_2O and V_2O_5 other than the 3:1, 2:1 and 1:1 could be found. If an excess of $AgNO_3$ soln. is added to a $x Na_2O.V_2O_5$ soln, then a mixed ppt. of compn. $xAg_2O.V_2O_5$ is obtained. If the I soln. in excess is added to $AgNO_3$ soln., the 3:1 $Ag_2O.V_2O_5$ is pptd. if the solute lies between 3:1 and 2:1 I, while the 2:1 $Ag_2O.V_2O_5$ is pptd. if the solute lies between 2:1 and 1:1 I. If it is assumed that the VO_4^{---} ion hydrolyzes into HVO_4^{--} and OH^- (this being confirmed by both series of titrations), const. values of the soly. product (K) of Ag_3VO_4 are detd. as: $K = [Ag^+]^3[OH^-][HVO_4^{--}] = 1.5 \times 10^{-21}$. In the 2 $Ag_2O.V_2O_5$ soln., the HVO_4^{--} ion exists rather than the $V_2O_7^{----}$ ion, giving const. values of $K = [Ag^+]^3[HVO_4^{--}] = 1.5 \times 10^{-14}$. The soly. product of $Ag_2O.V_2O_5$ is detd. as $K = [Ag^+][VO_3^-] = 4.8 \times 10^{-7}$. J. BALOZIAN

Handbuch **der anorganischen Chemie. Bd. IV, Abt. 3, Tl. 2, B. Lfg. 1. Die Elemente d. achten Gruppe d. period. Systems. Tl. 2. Eisen und s. Verbindungen.** Edited by RICHARD ABEGG, FRIEDRICH AUERBACH AND IVAN KOPPEL. Leipzig: S. Hirzel. 463 pp. M. 45.

7—ANALYTICAL CHEMISTRY

W. T. HALL

New ways **in analytical chemistry. Rapid determination of different elements according to classic methods. II.** J. DICK. *Z. anal. Chem.* **82**, 401–15(1930); cf. *C. A.* **23**, 1634.—The procedures recommended for detg. Zn as $ZnNH_4PO_4.H_2O$, Mn as $MnNH_4PO_4.H_2O$, Co as $CoNH_4PO_4.H_2O$ and Cd as $CdNH_4PO_4.H_2O$ correspond closely to those previously described except with respect to the drying and weighing of the ppts. $(NH_4)_2HPO_4$ is recommended as precipitant, 10–20 times as much as the wt. of metal cation to be detd. being used. The reagent is added to the boiling soln., which is then heated 10–20 min. on the hot-water bath. The presence of NH_4 salts is necessary in the Zn detn., does no harm in the Mn detn. but should be limited in the Co and Cd detns. The first 2 ppts. can be filtered off within half an hr. but the 2 latter should stand at least an hr. The Zn and Mn ppts. should be washed first with hot 0.1% (NH4)2HPO4 soln., the Co ppt. with hot 0.5% $(NH_4)_2HPO_4$ and the Cd ppt. with cold 0.1% $(NH_4)_2HPO_4$ soln. Then, to remove sol. PO_4^{---} the Zn ppt. is washed with water and the Mn, Co and Cd ppts. are washed with 65% alc. All ppts. are then washed with 95% alc. to remove water and lastly with ether. Finally air is drawn through the porcelain filtering crucible or it is dried in a vacuum; this final treatment constitutes the principal change in the procedure and the only shortening of the time needed. Ppts. with detg. Se as metal after pptn. with SO_2, of Te as metal after pptn. with an alk. soln. of *d*-glucose and of Cu as CuSCN show that in these cases also the drying in the hot closet can be omitted and considerable time saved. W. T. H.

Effect of ammonium chloride upon the results in the determination of magnesium by the method of B. Schmitz. J. MAJDEL. *Z. anal. Chem.* **82**, 425–9(1930).—The expts. described show very clearly that in the detn. of Mg as $Mg_2P_2O_7$ correct results

can be obtained when 20 times as much NH_4Cl as Mg is present, but the results are likely to be low with very little excess NH_4 salt present or with too much NH_4Cl. W. T. H.

New method for determining traces of chromium in steel. W. J. AGNEW. *Analyst* 56, 24–8(1931).—Dissolve 1 g. of sample in 15 cc. of 9 *N* H_2SO_4 and 20 cc. of water, finally oxidizing the Fe^{++} with 5 cc. of concd. HNO_3. Boil free from HNO_3 and make up to 200 cc. Take 40 cc. of the soln., add 3 drops of satd. $KMnO_4$ soln., boil 5 min., destroy excess $KMnO_4$ with concd. HCl added dropwise until the soln. becomes clear (about 50 drops). Cool, ppt. the Fe as hydrated oxide by a slight excess of satd. Na_2CO_3 soln., dil. to 100 cc. and filter. Take 50 cc. of the filtrate, add 20 cc. of 9 *N* H_2SO_4 and 5 cc. of 0.1% diphenylcarbazide soln. Compare the resulting color with that obtained with standards contg. known quantities of Cr. The results obtained with 0.0017–0.051% of Cr added to electrolytic Fe show an abs. check to 2 significant figures in 36 out of 38 analyses in the presence of Cu, Ni, Mo, V, W and Co. W. T. H.

Determination of potassium as potassium perrhenate. HANS TOLLERT. *Naturwissenschaften* 18, 849(1930).—The detn. of K as $KReO_4$ is advocated. The method is analogous to the $KClO_4$ method, with the following advantages: Less reagent need be employed, the perrhenic acid is non-volatile, the mol. wt. of the perrhenate (289.4) is favorable and Re can be re covered by reduction in H_2. B. J. C. VAN DER HOEVEN

Detection and determination of nickel with dimethylglyoxime in the presence of considerable cobalt. F. FEIGL AND H. J. KAPULITAS. *Z. anal. Chem.* 82, 417–25 (1930). The detection [illegible] of Ni as well as the detn. of the quantity

therefore, dissolve 0.0–1.0 g. [illegible] in 2–3 cc. of water, and treat with concd. KCN soln. till the cyanide ppt. redissolves. Add H_2O_2 to the hot soln. until a honey yellow color shows that $Co(CN)_6^{---}$ has been formed, evap. to a small vol. and add an excess of (*A*). To the luke-warm soln. (50–60°) add formaldehyde dropwise until an excess is shown by the smell. Shake with 1–2 cc. of ether to get the characteristic film between the 2 layers. The ppt can be weighed. From the aq. soln. pure *Co salt free from Ni can be prepd.* W. T. H.

Some tests for zirconium. F. PAVELKA. *Mikrochemie* [n. s.] 2, 345–51(1930). Zr gives many characteristic color reactions with org. substances. In this paper tests with carminic acid (*A*), gallocyanin (*B*), (*B*) together with arsenate (*C*) and (*B*) together with *m*-nitrobenzenearsonic acid (*D*) are described. The reagent (*A*) is yellow in acid soln. but gives with Zr a coloration resembling MnO_4^- in color. To the acid soln (0.4 *N* in HCl) add some (*A*) (dissolved in sufficient 30% alc. to give a wine red color) and heat on the water bath. To detect traces of Zr use only enough of (*A*) to give a slight yellow tint to the acid soln. The reagent (*B*) is pink in dil. acid solns. but turns blue if Zr is present. Add to 1 cc. of the sample, 0.2–0.3 cc. of 2 *N* HCl and enough of the aq. soln. of (*B*) barely to give a pink coloration in a blank test with dil. HCl. If Al, Th, Be or Ce is present, the tested soln. should contain 10% of concd. HCl. Ti interferes. To sep. Zr from Th, Moser and Lessnig (*C. A.* 19, 2180) have recommended pptg. the Zr as arsenate. When such a ppt. is formed in the presence of (*A*) or (*B*), highly colored ppts. are formed and it is easy to detect smaller quantities of Zr than are pptd by arsenate alone. To the soln. to be tested, add a little solid (*B*) and 0.2–0.3 cc. of 2.4 *N* HCl. Heat nearly to boiling, add 1 cc. of 4% Na_2HAsO_4 soln. and heat a little while on the water bath. Dil. with half as much alc. to dissolve the excess reagent and boil a min. Filter to see if any blue ppt. has been formed in the violet soln., using an Emich filtering rod, wash any ppt. with 1 cc. of hot alc. and dry if necessary. The presence of Al and Be does no harm but, when Ce is present, more acid is required. With *m*-nitrobenzenearsonic acid alone, a few drops of its dil., aq. soln. is added to the test soln. to which 0.2–0.3 cc. of concd. HCl has been added. A strong turbidity at once appears and the ppt. coagulates on heating the liquid. Al, Ce, Be and Th do not interfere but Ti must be absent. The pptn. with reagent (*D*) is effected similarly except that a tiny crystal of (*B*) is added before heating. Finally the ppt. should be filtered off as with (*C*). This test succeeds in the presence of Al, Ce and Be but more acid is required in the presence of Th. and Ti must be absent. The test with (*A*) can be carried out effectively as a spot test on good filter paper. W. T. H.

Determination of phosphorus in steel, alloy steels and cast iron. A. T. ETHERIDGE. *Analyst* 56, 14–21(1931).—The method recommended by E. is essentially that of J. O. Handy and depends on the formation of NH_4 phosphomolybdate and alkalimetric

titration of the ppt. after suitable washing. The details differ slightly from the directions commonly followed in the steel labs. of the U. S. The notes on the effect of Ti, Si, Cr, V and W are helpful. No analytical results are given. W. T. H.

Microchemical detection of certain heavy metals by drop tests with dithizone (diphenylthiocarbazone). HELLMUT FISCHER. *Mikrochemie* **2**, 319–29(1930); cf. C. A. **24**, 567.—Dithizone, in even as low concn. as 1–2 mg. per 100 cc., gives a bright-green color in CCl_4 soln. If such a soln. is shaken with an aq., approx. neutral soln. contg. salts of heavy metals, a characteristic color change is noticeable. The reaction can be carried out in spot tests on paper, on a tile or in a small test tube. The tests for Cu, Pb, Ag, Zn and Co are described. A yellow-brown color is obtained with Cu and thereby a very small quantity is detected in the presence of Pb, Zn, Cd and Ni. The Cu test is best made in neutral or very slightly ammoniacal soln. A brick-red color is obtained with Pb; in alk. solns. contg. KCN very small quantities of Pb can be detected in the presence of Ag, Cu, Ni, Zn, Cd and Sb. A fine, violet ppt. is obtained with Ag and in slightly alk. soln. traces of Ag can be detected in the presence of Pb, Zn and Sb. A purple-red color is obtained with Zn, a stronger soln. of reagent being desirable; the test can be obtained in AcOH soln. buffered with NH_4OAc in the presence of Ni, Cd and Al but Ag, Hg, Cu and any considerable quantity of Co interfere. A reddish violet color is obtained with Co in 2% NH_3 soln. and the test succeeds in the presence of Ni. To detect Co in the presence of Zn, a 2% NaOH soln. is advisable the color produced is at first bluish violet fading to a nearly colorless gray. Of these tests, those for Cu and Pb are to be recommended especially. W. T. H.

The analysis of various alloys. ETTORE DI NOLA. *Ann. chim. applicata* **20**, 601(1930).—Alloys of Cu-Zn and Cu-Zn-Ni may be analyzed rapidly and volumetrically by detg. the Cu by the Volhard method, the Ni by the use of dimethylglyoxime, the Zn by difference. A. W. CONTIERI

Analysis of ferro-silicon. G. H. GOODWIN. *Analyst* **56**, 21–4(1931).—To det. Si, fuse 1 g. of fine powder with 10 g. Na_2CO_3 and 5 g. Na_2O_2 in a Ni crucible. Ext. the fused mass with hot water and, when completely disintegrated, transfer to an evapg. dish, add an excess of HCl and evap. to dryness. Bake 2 hrs. at about 110°, take up in 20 cc. of 6 *N* HCl and heat 5 min. on the water bath. Add 150 cc. of hot water and filter immediately, washing the ppt. with 5% HCl. Then ppt. $Fe(OH)_3$ by adding a slight excess of NH_4OH, filter, dissolve the ppt. and evap. with HCl, repeating the treatment as before but using only 10 cc. HCl to take up the residue and washing the SiO_2 recovered with cold 1% HCl. Add this ppt. to that originally obtained and continue in the usual manner. W. T. H.

Detection of chlorates in the presence of perchlorates and nitrates. THEODORA P. RAIKOW AND KOWACHEWA. *Z. anal. Chem.* **82**, 415–7(1930).—If about 1 g. of the fine powder is treated with 5 cc. of freshly prepd. H_2S water, a turbidity due to S appears within 1 sec. and in 1–3 min. makes the soln white and opaque. Perchlorates do not show this reaction and it takes at least 10 min. for the same quantity of nitrate to show any effect. As little as 0.01 mg. of $KClO_3$ in 0.1 cc. of soln. gives the turbidity test with 5 cc. of the aq. H_2S. W. T. H.

Local detection of phosphides in metal sections. M. NIESSNER. *Mikrochemie* **2**, 94–6(1930).—Polish the section with the finest emery paper, be sure that all grease is removed and immerse for 30 sec. in a cold, satd. Ag_2SO_4 soln. contg. 0.1% free H_2SO_4 by vol. Wash off the deposited Ag by a strong stream of water and wipe repeatedly with cotton. Then treat with a 0.03% soln. of *p*-dimethylaminobenzylidenerhodanine in acetone. Adding to the reagent, just before using it, half as much of 6 *N* H_2SO_4. After 2 min. remove the specimen and wash off excess reagent by dipping in acetone and finally in ether. Dry in the air and examine under the microscope. The test is shown to give characteristic results in detecting P inclusions in Cu alloys. The assumption that S prints show evidence of P inclusions as well as of S is shown to be erroneous. W. T. H.

Note on the Denigès-Personne method (of potassium iodide analysis). JACINTO PLACERES. *Anales oficina quím. provincia* **3**, 104–7(1929).—In the assay of KI by titration with 0.2 *N* $HgCl_2$ the sample should be dissolved in less than 10 cc. of H_2O or the result may be too low. Titration in hot soln. is best. Enough $NaHCO_3$ should be added to neutralize any acid present in the $HgCl_2$ soln. L. E. GILSON

Determination of small amounts of hydrogen sulfide. W. V. HARSHMAN, D. A. MCPHERSON AND F. H. EDMISTER. *J. Elisha Mitchell Sci. Soc.* **46**, 54–61(1930).—Expts. were made to test the accuracy of various methods and suggestions are given for obtaining greater accuracy. No method was found sufficiently accurate for detg. H_2S produced by microörganisms. A. L. MEHRING

The reaction between nitrite and aminosulfonic acid. FRIEDRICH L. HAHN AND PAUL BAUMGARTEN. *Ber.* **63B**, 3028–9(1930); cf. *C. A.* **24**, 3727.—If the nitrite in a 4% soln. is destroyed by aminosulfonic acid, 0.004 mg./cc. of nitrate is found in the nitrite-free soln. After pptn. with 2,4-diamino-6-hydroxypyrimidine the filtrate shows 0.002 mg./cc. of nitrate. The diphenylamine test in the presence of chloride is sensitive to 0.0001 mg./cc. It is therefore pos. in either case but the $FeSO_4$ test is pos. only after concn. to 4% and 2%, resp., of the original vol. B. A. SOULE

Hydroxyquinoline and its usefulness in the determination of certain cations. E. CATTELAIN. *J. pharm. chim.* [8], **11**, 484–96(1930); cf. *C. A.* **20**, 1365.—The chem. nature and synthesis of the reagent (*A*) (Skraup, 1882) and the chem. compn. and properties of its compds. with metals are reviewed (cf. Fox, *C. A.* **4**, 2937; Mörner, *C. A.* **16**, 3527). The pptg. behavior of *A* (*e. g.*, in 2% alc. soln.) toward salts of 23 metals in either AcOH-AcONa, tartro-ammoniacal or tartro-alk. medium is tabulated, also the sensitiveness of pptn. for Cu, Mg, Zn, Cd, Al, Bi, U, Mn, Fe^{+++}, Co and Ni. The use of *A* in qual., gravimetric and volumetric analysis and sepn. of the metals is then briefly reviewed, based on the work of Berg (*C. A.* **21**, 799 (Br method), 1237 (outline), 1778, 2449, 2630, 3849–50 (Cu, Mg, Zn, Cd, Al); **22**, 1929 (Bi); **23**, 1588 (Fe, Mn, Ni, Co); **24**, 4479 (Ti)), Hahn, *et al.* (*C. A.* **21**, 244, 2632 (Mg, Zn, Al, Cu)), Niessner (*C. A* **23**, 1589 (Be)), Marsson and Haase (*C. A.* **23**, 1077 (Pb)), etc. A list of 23 references is added. S. WALDBOTT

Simple method for detecting traces of hydrochloric acid in the presence of hydrobromic acid. G. G. LONGINESCU AND TH. I. PIRTEA. *Bull. sect. sci. acad. roumaine* 13, 195–6(1930).—First ppt. all the halogen by adding an excess of $AgNO_3$. Filter off the ppt. and wash it with water till all excess Ag is removed. Then pour a little 6 *N* NH_4OH through the filter several times; this should dissolve the AgCl much more readily the AgBr. To the ammoniacal soln. add 1 cc. of 0.1% KBr soln., make acid with HNO_3 and filter. To the filtrate add a little $AgNO_3$; if a white ppt. of AgCl is obtained it is certain that the original ppt. contained at least 1 mg. of AgCl W. T. H.

New rapid method for the determination of the nitric acid radical in medicinal subnitrates. LEONOR S. VILLEGAS DE BOLLINI. *Anales oficina quím. provincia* **3**, 96–103 (1929).—Dissolve 0.1 g. of Bi subnitrate in 5 cc. H_2O and 2 cc. concd. H_2SO_4 and dil. to 100 cc. Mix 10 cc. of this soln. with 20 cc. concd. H_2SO_4 and titrate with a 1/40 soln. of indigotin sulfate. The end-point color change varies from dark bottle green to violet with different samples of indigotin sulfate and is detd. when the soln. is standardized against pure KNO_3. L. E. GILSON

Spot tests for acetic acid and for propionic acid. D. KRÜGER AND E. TSCHIRCH. *Mikrochemie* **2**, 337–8(1930); cf. *C. A.* **24**, 2083, 5002.—The characteristic blue colorations with basic La salt and I_2 can be used for spot tests. As reagents use (*A*) 5% $La(NO_3)_3.6H_2O$ soln., (*B*) 0.01 *N* I in alc., (*C*) *N* NH_4OH. Place a drop of the neutral soln. to be tested on the porcelain spot plate, add a drop of (*A*), a drop of (*B*), mix and add a drop of (*C*). Around the drop of (*C*) a blue or bluish brown ring is formed if acetic or propionic acid is present. W. T. H.

Quantitative analytical study of the simultaneous production of thiol acids (R-S-H) and sulfonic acids ($R-SO_3H$) from dithio acids (R-S-S-R) by silver sulfate. PAUL W. PREISLER AND DORIS B. PREISLER. *J. Biol. Chem.* **89**, 631–45(1930); cf. Vickery and Leavenworth, *C. A.* **24**, 2723.—Ag_2SO_4 reacts with $COOH.CH_2SSCH_2.COOH$, dithiodilactic acid, cystine and $COOH.(CH_2)_2SS(CH_2)COOH$ to produce iodine-reducing substances and some free sulfide. Three mols. $NaOOC.(CH_2)_2SS(CH_2)_2.COONa$ react with 5 mols. $Ag_2SO_4 + 3H_2O$ to give $5AgOOC(CH_2)_2SAg$ (I) + $5NaHSO_4$ + $NaOOC(CH_2)_2SO_3H$, (II), thus being more readily reduced by Ag_2SO_4 than by $CrCl_2$, (Preisler, *C. A.* **24**, 5023). (I) was identical with the Ag salt prepd. from thiohydracrylic acid and was unstable at 80°. (II) was crystd. as the Ba salt + $5H_2O$. K. V. THIMANN

Toxicological detection of barbituric acid derivatives. H. KAISER. *Pharm. Monatshefte* **11**, 271(1930); cf. *C. A.* **24**, 4732.—An address. W. O. E.

Defecation of extraction liquids obtained in toxicology. P. CHERAMY AND F. LAGARCE. *J. pharm. chim* [8], **12**, 366(1930).—Emulsifying matter (lipoids, fatty acids, biliary salts) in exts. obtained by the Stas-Otto-Ogier method may be largely eliminated by adding a slight excess of a 10% soln. of $BaCl_2$ to the aq. soln. of the alc.-tartaric residue, excess $BaCl_2$ being removed by means of dil. H_2SO_4. This method is specially useful in the toxicol. extn. of barbituric derivs. (cf. Lang, *C. A.* 24, 5110). S. WALDBOTT

Combustion arrangement for the acid method of determining iodine in organic products. G. PFEIFFER. *Biochem. Z.* **228**, 146–53(1930).—In the oxidation of org.

matter by means of H_2SO_4 and H_2O_2 a difficulty is encountered in the fact that volatile fatty acids escape in the distn. and are absorbed in the alkali. This is now prevented by inserting a short quartz tube contg. Pt gauze coil between the flask in which the org. matter undergoes oxidation and the absorption bottles. The tube is kept at red heat by means of an elec. heater. The I_2-contg. combustion gases are absorbed in K_2CO_3 soln. For 10 g. of dry substance the first bottle is filled with 5 cc. satd. K_2CO_3 and 5 cc. H_2O; the second bottle, with 1–2 cc. K_2CO_3. However, where as much as 1–2 γ I_2 is expected per cc. of absorption fluid, KOH may be used instead of K_2CO_3. The alkali, together with the wash water, is used for the I_2 analyses. A suitable aliquot, perhaps 10 cc., is transferred to a small Erlenmeyer flask, mixed with freshly prepd. Cl water and acidified with HCl dild. 1:1. The Cl_2 water should be added until the acidified mixt. smells strongly of Cl_2. This is now kept boiling vigorously 3–4 min. and cooled; the liberated I_2 is titrated with 0.002–0.001 *N* $Na_2S_2O_3$ after adding a few drops of 0.2% starch soln. and a few crystals of KI. If, however, a preliminary qual. test fails to show demonstrable amts. of I_2 in the collected fluid, this is to be evapd. and finally brought to dryness in a 250-cc. porcelain dish. The residue which must be pure white is rubbed with a pestle and worked into a thin mass with a few drops of H_2O. This is extd. with alc., the ext. evapd. to dryness in a porcelain dish. Only when this is still colored by admixture of org. matter is the residue transferred to a Pt dish and carefully ignited over a free flame. The residue is now available either for a titrimetric or colorimetric I_2 detn. S. MORGULIS

Micro iodine determination in organic substances. L. SCHEFFER. *Biochem. Z.* 228, 4–20 36(1930).—The ashing of the org. substance is carried out on the sand bath, 1–2 or 5 g. dry substance being completely ashed in 3–6 hrs. with an excess of KOH. The ash is treated with 2 cc. satd. I_2-free $(NH_4)_2CO_3$ soln. to convert all the KOH into K_2CO_3, the NH_4OH is driven off on the water bath and the crucible again heated on the sand bath for 5–10 min. To the ash moistened with a few drops of H_2O is added 2.5 cc. alc., this washing with alc. being repeated. The alc. ext. contains all the I_2. It should be evapd. cautiously without boiling, any residue of org. matter being ashed once more with a few drops of KOH for 10–30 min. It is important that the ash should be first taken up in a little water before the alc. extn. is attempted. The I_2 is estd. from the residue by means of CCl_4 after the elementary I_2 is set free by oxidation with HNO (Rosenthaler's method). For this purpose the ash is dissolved in warm H_2O and the soln. is filtered into a 30-cc. separatory funnel. This is acidified with 5% HNO_3 and after adding 2 drops of 5% $NaNO_2$ is extd. 4 times with 1-cc. quantities of CCl_4. Only HNO and not H_2SO_4 should be used for acidifying. The combined CCl_4 exts. are poured into 0.4 cc. 4 *N* H_3PO_4 contg. 0.4 cc. satd. $CaCl_2$ soln. and mixed well until the violet color of the CCl_4 disappears. This amt. of reagent is enough for 50 g. of I_2; other wise larger quantities must be used. On adding 4–5 cc. H_2O, the mixt. is boiled down to about 2–3 cc. The water-clear soln. after cooling is now titrated from a microburet with 0.002–0.005 *N* $Na_2S_2O_3$. One or two crystals of solid KI are added before the titration. S. MORGULIS

Iron activity. V. The benzidine reaction. A. SIMON AND TH. RIETZ. *Z. anorg. allg. Chem.* 194, 89–112(1930); cf. *C. A.* 23, 4113.—The activity of Fe compds. is characterized by at least 3 reactions: the ordinary benzidine reaction as used in the common test for blood; an influence on bacterial growth; absorption of O. The purpose of the present work was the application of the benzidine reaction in studying differences in activity between Fe^{II} ions and complex Fe^{II} salts, and its use as a quant. measure of this activity. The Fe compds. studied were $Fe(HCO_3)_2$, $FeCl_2$, $Na_3[Fe(CN)_5H_2O]$, $Na_2[Fe(CN)_4.H_2O]$, hemoglobin and Na Fe tartrate. Preliminary quant. tests indicated that the benzidine test gave neg. results in either strongly acid or strongly alk. solns., the max. p_H being 3.95. Fe^{II} ions give a less permanent blue color in this reaction than the complex Fe^{II} salts, hemoglobin or blood, because of the destruction of this blue color by oxidation, which takes place more rapidly in the presence of simple Fe^{II} ions than in soln. of complex Fe^{II} salts. The intensity of color in the benzidine is thus little suited as a measure of the catalytic activity of these Fe compds. A study was made with the object of using the amt. of benzidine consumed as an indication of the activity of the Fe. It was first necessary to develop a method for accurate detn. of benzidine in both alc. and H_2O solns. This was as follows in alc. soln.: After the Fe salt has completed its action, 3 times the vol. of H_2SO_4 is added and the pptd. benzidine sulfate filtered out. It is washed twice with 0.3% Na_2SO_4 soln. and finally with H_2O. The filter and ppt. are then suspended in 100 cc. of H_2O, vigorously shaken and titrated boiling hot with KOH and phenolphthalein. In H_2O solns. the method is essentially the same except that in addn. to the H_2SO_4 at least 35 cc. of alc. must be

added for every 100 cc. of soln. These methods gave good results on known solns.; this should then afford a means of quantitatively estg. the catalytic action of Fe compds. H. STOERTZ

Method of analyzing mixtures of hydrogen, methane and ethane. MLLE. E. M. J. MULDERS AND F. E. C. SCHEFFER. *Rec. trav. chim.* **49**, 1057–65(1930).—M. and S. have devised a *rather simple method of analyzing mixts. of* H_2, CH_4 *and* C_2H_6. The basis of the method is as follows: At the temp. of liquid air, H_2 is above its crit. temp., whereas CH_4 and C_2H_6 are solids with low vapor tensions. At −190° CH_4 has a vapor tension of 2.5 cm. of Hg; that of C_2H_6 is negligible. A mixt. of these 3 gases when condensed at −190° may contain solid CH_4, solid C_2H_6, liquid (H_2 + CH_4 + C_2H_6) and gas (H_2 + CH_4). When the pressure is diminished by means of a pump, the gas (H_2 + CH_4) is removed, the liquid is changed into solid C_2H_6 and gas (H_2 + CH_4), the solid CH_4 evaps., while the solid C_2H_6 remains in the cooled tube. The mixt. of the 3 gases is thus sepd. into 2 fractions, each of which contains only 1 or 2 gases. The analysis is carried out as follows: The mixt. of the 3 gases is passed through a tube cooled with liquid air. Some of the material condenses; a vacuum is then created by means of a Hg pump and the vol. of the gas obtained is measured. This fraction (I) contains all the H_2 in the sample and all, or nearly all, of the CH_4. The solid in the tube is then vaporized by removing the liquid air bath, and the vol. of the gas is measured. This fraction (II) consists of all the C_2H_6 and either no CH_4 or only a slight quantity of it. The gas in I is then oxidized by passing it several times through a tube contg. CuO heated to redness. A small quantity of O_2 is set free from the CuO, but is made to recombine with the Cu by passing the gases back and forth through the CuO tube at a lower temp. The CO_2 formed is measured in a buret; the H_2O is absorbed by P_2O_5. Fraction II is then oxidized and the products are measured as before. From the vols. measured, the compn. of the original mixt. may be calcd. The results obtained showed that the sepn. of H_2 and C_2H_6 is quant., but that the sepn. of CH_4 and C_2H_6 is not quant., since solid C_2H_6 retains some CH_4 either by absorption or by occlusion. A better sepn. of these 2 gases is obtained by repeated vaporization and condensation. The presence of H_2 diminishes the absorption of CH_4 by C_2H_6. M. and S. state that the method gives exact results, even when the work is done rapidly. L. K

Microanalytical determination of methoxyl groups. GERTRUDE M. WARE. *Mikrochemie* **2**, 352–5(1930).—In detg. methoxyl groups by the micro-Zeisel method, the results are invariably low, chiefly because of (1) loss of AgI as a result of incomplete reaction of the alkyl iodide with the alc. $AgNO_3$ soln. and (2) incomplete reaction between HI and the dissolved substance. To overcome these difficulties the substance can be introduced in pellet form and HI of d 1.96, instead of d. 1.50, used. Pass CO_2 into $AgNO_3$ soln. to remove traces of sulfide, then through a precision stopcock into concd. H_2SO_4 and finally through a wash bottle which is ¾ filled with a suspension of red P in 10% $CdSO_4$ soln. W. T. H.

New method for the volumetric determination of methoxy- and ethoxy-groups. II. Microanalysis. F. VIEBÖCK AND C. BRECHER. *Ber.* **63B**, 3207–10(1930); cf. *C. A.* **25**, 474.—A 3–5 mg. sample is treated with HI and P in a modified Pregl app. The absorption flask is charged with AcOH-acetate mixt. contg. 2–3 drops of Br_2. After heating and passing CO_2 through the system 20–30 min., the soln. in the receiver is poured into an acetate soln. Excess Br_2 is destroyed with HCOOH. The addn. of KI and then H_2SO_4 gives I_2, which is titrated with $N/30$ $Na_2S_2O_3$. Data show the accuracy of the method. B. A. SOULE

Detection of glucose and lactose. LIVIO PAVOLINI. *Chim. ind. agri. biol.* **6**, 411 (1930).—Glucose and lactose reduce the Schweitzer soln.; when glucose is present, the CH_2O ppts. as a red-brown flaky deposit (hydrogel), while when lactose is present, the soln. becomes turbid, but the Cu_2O remains in colloidal soln. (hydrosol). G. A. BRAVO

New test for methylglyoxal in the biochemical splitting of sugars. CARL NEUBERG AND MAX SCHEUER. *Ber.* **63B**, 3068–72(1930).—One mol. hexose, as H_2PO_4 ester, yields 2 mols. methylglyoxal in the presence of *B. lactis aerogenes*. 1,2-Naphthylenediamine reacts with this methylglyoxal to form 3-methyl-α,β-naphthoquinoxaline, which may be extd. with ether and crystd. If HCl is present with ether, colorless prisms of $C_{13}H_8(NH_2)_2.2HCl$ are formed, m. 267°. The free diamine crystals easily darken in moist conditions. On sublimation *in vacuo*, white glistening laminae result, m. 95°. MARY E. LEAR

Detection and determination of pyridine. S. B. TALLANTYRE. *J. Soc. Chem. Ind.* **49**, 466–8T(1930).—A discussion involving the methods of sepg. the pyridine bases, with special reference to pyridine. Detection with aq. CNBr-PhNH$_2$ [illegible]

bright yellow color with 1 part C_5H_5N in 350,000. Other methods are mentioned and references given. Detns. by pptn. with phosphotungstic acid and with silicotungstic acid are described. G. R. YOHE

Determination of nicotine in commercial solutions and insecticides. A. SABATIÉ. *Ann. fals.* **23**, 544–7(1930).—It is recommended that the nicotine be detd. by 3 methods: (1) steam distn. over calcined MgO or NaOH, 250 cc. of distillate being collected without concn. of the soln., and a further 250 cc. while concg. the soln., and then polarizing the 2 distillates separately; (2) titration with 0.1 *N* acid in the presence of methyl red indicator; (3) pptn. with Bertrand's reagent (K silicotungstate) in HCl soln., the ppt. being weighed after drying at 120° and also after igniting, with the factors 0.1011 and 0.1139, resp. When the soln. is adulterated with C_5H_5N the Bertrand method and the titration with acid give too high results; when it is adulterated with NH_4OH titration with acid gives too low results. A. PAPINEAU-COUTURE

Colorimetric method for determining turpentine oil in the atmosphere. I. M. KORENMAN. *Z. anal. Chem.* **82**, 429–38(1930).—The colorimetric detn. of turpentine-oil vapors in the air by absorbing in EtOH and further treatment with vanillin-HCl is shown to be inaccurate. Attempts to improve the accuracy did not prove successful. Considerable information concerning the colors obtained with various concns. of turpentine under different conditions is given in a 2-page table. W. T. H.

The cathode-ray tube in x-ray spectroscopy and quantitative analysis (FONDA COLLINS) **3.** Determination of carbonates in soil (SCHOLLENBERGER) **15.** Preparation of nitromethane (PRITZL, ADKINS) **10.**

Analysis Methods. Matawan, N. J.: Hanson-Van Winkle-Munning Co. Free. Reviewed in *Abrasive Ind.* **11**, No. 10, 44; *Ceram. Abstracts* **9**, 1105(1930).

FABER, O. M.: **Physikalische Staubbestimmungen.** Halle (Saale): W. Knapp. 60 pp. M. 3.50.

KOLTHOFF, I. M.: **Die Massanalyse. Tl. 1. Die theoretischen Grundlagen der Massanalyse.** 2nd. ed. Berlin: Julius Springer. 277 pp. M. 15.

Quantitative Analyse. Tl. 2. Gewichts-Analyse. 4th ed., edited by ERNST OBER. Leipzig: John. Ambr. Barth. 85 pp. M. 3.

Colorimetric analysis. PETER WULFF. Ger. 510,760, Dec. 17, 1927. Addn. to 405,091. In or on the "indicator foil" (cf. *C. A.* **21**, 3855), specified in Ger. 405,091, are provided substances (*e. g.*, esters whose acid radicals are to be freed within the foil in a subsequent operation) which "topochemically" hold the materials that are to react in the foil with the formation of a ppt., and thus localize the reaction in or on the foil. The colorimetric detn. of a sol. Fe salt by the formation of an alkali salt of $H_4FeC_6N_6$, using a cellulose xanthate foil, is described.

8 MINERALOGICAL AND GEOLOGICAL CHEMISTRY

EDGAR T. WHERRY AND J. F. SCHAIRER

The vanadium content of acid earths and minerals. SATOYASU IIMORI. *Bull. Inst. Phys. Chem. Research* (Tokyo) **9**, 852–4 (Abstracts 82–3 (in English) published with *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) **14**, No. 271–3)(1930).—V has been detd. in a no. of Japanese acid earths and minerals such as mica, clay, pumice, sandstone and rhyolite. The V content of the acid earths is between 0.0041 and 0.018% V_2O_5. Evidence is given to show that the oxidase-like action of the acid earths in the indophenol reaction is not due to structural characteristics but to the presence of small amts. of Mn or Ce; V and Fe do not give this reaction. J. B. AUSTIN

New observations on quartz. R. WEIL. *Compt. rend.* **191**, 935–7(1930); cf. *C. A.* 24, 5002. **25**, 243.—Further observations on etching with HF indicate that type "*S*" differs from type "*L*" in showing "hairs" on the etched surface instead of canals. Solution with HF placed in holes in the quartz showed formation of negative crystals in the case of *L* and complete disintegration with *S*. R. S. DEAN

The hydrated calcium silicates. I. The system CaO–SiO_2–H_2O. VALDIMAR A. VIGFUSSON. *Am. J. Sci.* [5], **21**, 67–73(1931).—The system CaO–SiO_2–H_2O includes a no. of rare natural minerals such as hillebrandite, foshagite, afwillite, xonotlite, riversideite, crestmoreite, gyrolite, reyerite, centrallasite and okenite. The hydrated minerals are compared as to compn. and with the corresponding anhyd.

compds. All the hydrated Ca silicates except foshagite and centrallasite have compns. involving simple ratios of $CaO:SiO_2$. The compds. having a 1:1 ratio are most numerous and may be considered the most stable. The sp. gr. decreases with increasing H_2O and decreasing proportion of CaO. **II. Hillebrandite and foshagite.** *Ibid* 73-8.—X-ray data show that hillebrandite and foshagite have the same crystal structure. Differences in the chem. compn. of the 2 minerals are most likely due to partial hydrolysis and carbonation of foshagite. The sp. gr. of foshagite is 2.67, slightly less than hillebrandite. The optical properties of the 2 minerals are similar. Differences in *n*s are probably due to the presence of a thin film of amorphous SiO_2 on the fibers of foshagite

ALDEN H. EMERY

The computation of the probable value of ore reserves from assay results. S. J. TRUSCOTT. *Bull. Inst. Mining Met* No. 315, 25-6(1930); cf. *C. A.* **24**, 4737; 25, 265.—Discussion. ALDEN H. EMERY

Mineral industry of Alaska in 1929. PHILIP S. SMITH. *U. S. Geol. Survey Bull.* **824A**, 1–109(1930). E. H

The gold resources of Alaska. PHILIP S. SMITH. *Econ. Geol.* **25**, 176–96(1930) - A history of production with map of districts and tables showing lithology and methods of mining in various districts It is unjustifiable to give a precise est of the lode Au, but the probable reserves are very large. ALICE W. EPPERSON

A metallographic study of some metallic minerals of Jugoslavia. ST. PAVLOVITCH *Compt. rend.* **191**, 720–2(1930).—The principal minerals of Jugoslavia are the Cu ores and the Pb-Ag-Cu ores. The characteristic of the latter class, as evidenced by metallographic examn., is the const. presence of tetrahedrite, the cause of the ores' richness in Ag. This characteristic has been found by others in analogous ores elsewhere. A brief report is made of the examn. of ores of both classes. ALICE W. EPPERSON

Sequence of ore deposition in north Idaho. ALFRED L. ANDERSON. *Econ. Geol.* **25**, 160–75(1930); cf. *C. A.* **24**, 2085, 4737.—Copper veins are invariably accompanied by a dolomite gang, and were earlier depositions than the Pb-Ag veins which are accompanied by siderite. These 2 classes of veins probably owe their distribution to differences in thermal conditions along fissures during deposition, Cu being deposited earlier and at higher temp. than Pb and Ag, and deposited during the interval in which the more insol. dolomite and ankerite were pptd. The Pb, Zn and Ag remained in soln longer and were concd. along with the Fe to be later pptd. as sulfides in assocn with a siderite gang. Formation of the Cu veins is a complex process, while that of the younger Pb-Ag veins is simpler, involving only 2 stages. ALICE W. EPPERSON

Origin of the Boleo copper deposit, Lower California, Mexico. M. E. TOURWAIDE. *Econ. Geol.* **25**, 113–44(1930).—T. discusses general, structural and historical geology of the deposit, its origin and the ore beds. The deposit consists of 4 mineralized clay beds, interstratified in volcanic tuffs and conglomerates. Cu was carried into the clay beds by diffusion, and there pptd. as chalcocite by H_2S or a similar product of org. decompn. Plasticity of the clay allowed crystal formation. Native Cu was also pptd. in some parts of the district. The deposit can be defined as a stratified deposit of primary chalcocite and native Cu, formed by concn. of Cu contained in the surrounding rocks by means of circulating waters. Tables are given showing compn. of the ore.

ALICE W. EPPERSON

Copper deposits on the Arctic Coast of Canada. GORDON C. DUNCAN. *Can. Mining J.* **52**, 34–5(1931).—Coppermine River area on the north coast of Canada was explored during the summer of 1930. No important tonnage of native Cu was located, but rich sulfides of Cu, chalcopyrite and bornite were found in very encouraging surface showings. W. H. BOYNTON

The copper shale of Mansfield. J. W. GREGORY. *Bull. Inst. Mining Met.* No **315**, 28 pp.(1930).—The ore is a thin bed (av. 9 in.) of bituminous marly shale contg. 2.7–3.2% Cu. The distribution of values is very irregular. The origin of the ore is discussed. G. believes it is syngenetic. Cu was originally pptd. from soln. as carbonate The source of the Cu was probably the lodes in the Hartz Mts. The $CuCO_3$ was later altered to bornite. ALDEN H. EMERY

Iron in Bermuda. W. L. R. EMMET. *J. Maryland Acad. Sci.* **1**, 235–8(1930). — The island is built of coral rock which is white and nearly free from siliceous matter and Fe. The fertile soil found in the valleys and in pockets has a deep red color. Analyses of the rock and soil, resp., are: H_2O 0.316, 6.930; org. matter 3.806, 14.910; sand 0.050, 20.100; $Al_2O_3 + Fe_2O_3$ 0.520, 51.550; CaO 52.470, 3.334; MgO 1.686, 0.091; K_2O 0.064, 0.155; Na_2O 0.243, 0.055; CO_2 42.866, 0.767; SO_2 0.206, 0.060; Cl 0.020, 0.042; P_2O_5 0.077, 0.620%. According to E.'s theory this red Fe-bearing material is of meteoric origin. W. L. HILL

Origin of chromite. F. E. KEEP. *Econ. Geol.* **25**, 219–21(1930).—A discussion of the papers of Sampson and of Ross (*C. A.* **24**, 40). ALICE W. EPPERSON

Molybdenite deposit at Shakan, Alaska. A. F. BUDDINGTON. *Econ. Geol.* **25**, 197–200(1930).—The ore carries from 1.0 to 2.28% MoS_2. The deposit affords evidence as to the position of molybdenite in the succession of sulfide deposition: it was deposited in 3 successive mineralizations at different temps. ALICE W. EPPERSON

The absence of gypsum in calamine deposits of Sardinia. CARLO CHINAGLIA. *Resoconti assoc. miner. sarda* **35**, No. 6, 28–9(1930).—The absence of $CaSO_4.2H_2O$ in the deposits of Zn minerals shows that the calamine is not formed by oxidation of the blende, as in the blende-smithsonite deposit of Dezzo (Lombardy). G. A. BRAVO

Tin-bearing pegmatites in eastern Manitoba. DUNCAN R. DERRY. *Econ. Geol.* 25, 145–59(1930).—Tin occurs as cassiterite in eroded pegmatite dikes. The most favorable places for segregations of possible economic value are in the roofs of pegmatite bodies not yet exposed by erosion, but which may be picked up by drilling or underground exploration. Geologic history and commercial possibilities are discussed. ALICE W. EPPERSON

Supergene cassiterite in Bolivian tin veins. JOSEPH T. SINGEWALD, JR. *Econ. Geol.* 25, 211–8(1930).—S. takes issue with the theory advanced by Koeberlin (*C. A.* 25, 266) that ore shoots in many Bolivian Sn mines are due to "soln. of cassiterite in the upper parts of the veins; downward percolation; re-deposition as tin oxide at lower levels." Contrary evidence is presented. ALICE W. EPPERSON

Mercury in New Zealand. T. A. BLACK. *Chemist and Druggist* **112**, 50, 648, 708; 113, 405–6(1930); cf. *C. A.* **17**, 1203. S. WALDBOTT

Gallium, germanium, indium and scandium. ALICE V. PETAR. Bur. Mines, *Information Circ.* **6401**, 17 pp.(1930).—P. gives a description of these 4 metals under the following headings: properties, history, occurrence, uses, production, list of dealers, markets and prices, metallurgy. A 5-page bibliography is included. A. H. E.

Occurrence, stratification, origin and formation of German rock salt (Zechstein) deposits. E. KÜHNEWEG. *Naturwissenschaften* **18**, 925–31(1930).—A review with several diagrams of the salt deposits of Germany with geological and chem. details. B. J. C. VAN DER HOEVEN

Greensand bibliography to 1930 (annotated) with a chapter on zeolite water softeners. R. NORRIS SHREVE. Bur. Mines, *Bull.* **328**, 78 pp.(1930).—The literature on the manufacture of K_2O and other chemicals from greensand, on the use of greensand and zeolites as H_2O softeners is classified and abstracted. ALDEN H. EMERY

The witherite deposit of the Settlingstones Mine, Northumberland. G. TRESTRAIL. *Bull. Inst. Mining Met.* No. **315**, 10 pp.(1930).—The deposit consists chiefly of a grayish crystalline mass of witherite with some transparent nearly pure $BaCO_3$. Accessory minerals are not uncommon. Calcite frequently occurs, galena infrequently, strontianite sporadically. Niccolite, together with crystals of ullmannite, were once found assocd. with $Sb_2Pb_2O_7$ in a pocket of galena. ALDEN H. EMERY

The diamond deposits on the upper Araguaya River, Brazil. FREDERICO W. FREISE. *Econ. Geol.* **25**, 201–7(1930).—The geography and geology of the district are described. The diamonds occur as hexoctahedra and tetrahexahedra. Discussion of possible origin, working and future prospects is given. Characteristic minerals occurring as satellites and their frequency of occurrence are listed. ALICE W. EPPERSON

The origin of coal. E. BERL, A. SCHMIDT AND H. KOCH. *Z. angew. Chem.* **43**, 1018–23(1930).—In earlier work (*C. A.* **22**, 3292) B. and S. discussed the behavior of cellulose on treating with water under pressure; in a similar way in the present study both lignin and pine wood were treated with water at 350°. By suitable pressure at a temp. of 200–250°, a hard product similar to lump coal is obtained. Charred lignin is a brittle coal. Difference in properties is thought to be due to the quantities of soluble extractable material. Cellulose coal gives tar rich in phenolic compds., and on dist. yields more tar that the lignin coal. These N- and S-free tars have the same constituents as natural coal tars. Cellulose coal is not identical with lignin coal. It is possible to prepare a coal from cellulose identical in properties with natural coal. By higher alk. concn. of the charring medium, a viscous asphalt-like product is obtained, indicating that the p_H of the medium of coal formation was greater than 7, and that the cause of clinkering of coal is the alkalinity of the medium in which the cellulose was charred. It is established that charring with water converts cellulose to cellulodextrin, hydrocellulose, glucose and the like. Similarly, by charring bituminen-forming constituents of brown coal, products resembling montan wax are obtained. Probably hard coal has its origin chiefly in lignin-poor plants. It is not thought that clinkering coals originate from albuminous material, since charring of albumin gives

an oil instead of a coal. Brown coal has been chiefly formed from wood containing lignin as well as cellulose. ALICE W. EPPERSON

Geology of the oil fields of Baku. R. SCHREITER. *Allgem. österr. Chem. Tech.-Ztg.* **48**, 111–5(1930).—The 3 oil fields at Baku, the most important in Russia, are compressed into a limited space in the peninsula of Apscheron. The dozens of sand deposits filled with oil are nowhere extensive. The dome-shaped anticline stretches from northwest to southwest, its sides sloping at 18–20°. The productive surface of the dome is about 4 sq. km. in area. The Balakhany-Sabunchy-Romany field, surrounded by Pliocene limestone rocks like Bibi-Eibat, has a productive surface of about 15 sq. km. Petroleum fills the loose sands and shale to a depth of 2500 ft. The frequent folds and wrinkles make boring difficult. This field especially is characterized by lenses of oil sands. The anticline of the third field, Surakhany, runs from north to south. Near the summit of the anticline, all the sands contain gas. Even at depths of 20 to 30 ft., gas is obtained in abundance and is used for lime-burning. In the region where the Aktschagyl layer (Upper Miocene) arches up, many sands from below 650 ft. contain considerable amts. of white oil, sp. gr. 0.785. The dark-colored oils (sp. gr. 0.820) are found more in the fresh-water formation. The stratigraphy is detailed in 4 tables. EMMA E. CRANDAL

The nature of the siliceous rocks of the spur of the mountain of Valenius. M. G. FILIPESCO. *Bull. sect. sci. acad. roumaine* **13**, No. 6, 158–62(1930).—The Carpathian Oligocene strata are composed of siliceous rocks of diatomaceous origin, deposited in the sea, as indicated by the presence of diatoms in glauconite. In the strata of sandstone of Kliwa, the constituents of the sandstone have been carried by the sea, the wind and waves. The silica of diatomaceous earth was the source of silica for silication. It is generally admitted that diatoms contain drops of oil which may be transformed to hydrocarbons, and diatoms multiply so rapidly to form so many individuals that it is possible that they could furnish the org. material from which, by a physico-chem. process, hydrocarbons are produced. The opinion of other authors is confirmed that the menilitic strata are those of the primary formation of petroleum. At Monterey (California) it has been concluded that the parent rock of the oil formation is represented by a diatomaceous earth, and that the substance of these organisms has given rise by natural distn. to the hydrocarbons. ALICE W. EPPERSON

Contribution to the petrography of Kamchatka. F. YU. LEVINSON-LESSING. *Compt. rend. acad. sci. U. R. S. S.* **1930A**, 1–6(in English).—New analyses of lavas from the old collections of Ditmar and Postels are given. Comparative study of these analyses shows a great variety of lavas of Kamchatka, as regards chem. compn. A brief microscopic description of some of the specimens is given, showing that most of the lavas are characterized by the presence of basic plagioclase phenocrysts, basaltic hornblende as colored constituent and vitrophyric texture. Lavas containing pyroxene (light green augite) are rare; rhombic pyroxene has not been found. The basaltic rocks of Kamchatka are in the main like the basalts of Etna, in regard to their acidity coefficient and alkalinity, in which respect they differ from av. Hawaii lavas. In Fe content and alkalinity, lavas of Kamchatka are more like the lavas of Etna, both belonging to the alk type of basalts. ALICE W. EPPERSON

Retrogressive metamorphism and phyllonitization. ELEANORA B. KNOPF. *Am. J. Sci.* [5], **21**, 1–27(1931).—To demonstrate reversal in metamorphism, the rock must be caught in the act of changing from one set of characteristic minerals to another and it must be possible to prove that the change is retrogressive, as in the case of garnet or biotite that has altered to chlorite. A *phyllonite* is a rock of phyllitic appearance, formed by the mylonitic degradation of an originally coarser-grained rock. A. H. E.

Secondary salt-dome materials of the coastal plain of Texas and Louisiana. MARCUS A. HANNA. *Bull. Am. Assoc. Petroleum Geol.* **14**, 1469–75(1930).—Anhydrite, residual after the leaching of impure salt, is hydrated to gypsum and converted to calcite and S with minor amts. of galena, sphalerite, hauerite and barite. "Burned" cores of granular gypsum and coarse selenite have changed to satin-spar. One replacement of selenite by S is discussed. ALDEN H. EMERY

The origin of desert varnish. J. D. LAUDERMILK. *Am. J. Sci.* [5], 21, 51–66 (1931).—Lichens growing on rocks having a Mn and Fe content secrete acids which corrode the outer layers of the rock surface. The resulting soln., bearing dissolved mineral matter, is absorbed and elaborated by the lichen. Part of the dissolved Fe and Mn salts are pptd. on the surrounding rocks as hydroxides. As the growth of the lichen progresses, a point is reached when the plant is checked by the accumulation of Fe and Mn oxides, and eventually dies. Through the decompn. of the org. matter, acids are generated which dissolve or peptize the oxides. During the rainy season,

capillary action distributes them on the surrounding surface and also carries them to other rocks which may have no Mn. During the dry season the intense heat completes the transformation of the hydroxides or other compds. to anhyd. desert varnish.
ALDEN H. EMERY

Radium in rocks. II. Granites of eastern North America from Georgia to Greenland. CHARLES S. PIGGOT. *Am. J. Sci.* [5], **21**, 28–36(1931); cf. *C. A.* **23**, 1565.—Redetd. figures for Ra content of the rocks listed in the previous paper are given, together with figures for 11 other rocks. The av. Ra content is approx. 0.9×10^{-12} g. per g. of rock. Greater amts. were found in granites from Stone Mt., Ga., and North Jay, Maine.
ALDEN H. EMERY

The Jharia coal field (FOX) 21.

Arbeiten aus d. Institut f. Paläobotanik und Petrographie d. Brennsteine. Bd. II, H. 1. ROBERT POTONIÉ: **Allgemeine Ergebnisser der Kohlenpetrographie.** C. Y. HSIEH: **Arzstrukturen in der Kohle.** Berlin: Vertrieb d. Preuss. Geolog. Landesanstalt. 102 pp. M. 7.50.

BRUNE, ALFRED: **Beitrag zur Geologie des produktiven Karbons der Bochumer Mulde zwischen Dortmund und Kamen.** Berlin: Vertrieb d. Preuss. Geolog. Landesanstalt. 128 pp. M. 22.50.

KRAUSEL, RICHARD: **Die paläobotanischen Untersuchungsmethoden.** Jena: Gustav Fisher. Reviewed in *Science* **72**, 344(1930).

NIGGLI, PAUL, QUERVAIN, F. DE, AND WINTERHALTER, R. U.: **Chemismus schweizerischer Gesteine mit ausführlicher Analysentabelle.** Bern: Geograph. Kartenverlag Kummerly & Frey. 389 pp. F. 50.

9—METALLURGY AND METALLOGRAPHY

D. J. DEMOREST, H. W. GILLETT AND RICHARD RIMBACH

Rare metals cobalt, molybdenum, tantalum, titanium, tungsten, radium, uranium and vanadium in 1929. PAUL M. TYLER AND ALICE V. PETAR. Bur. Mines, *Mineral Resources of the U. S. 1929*, Pt. I, 79–116 (preprint No. 6, published December, 1930).
E. H.

Silver, copper, lead and zinc in the Central States in 1929. J. P. DUNLOP AND H. M. MEYER. Bur. Mines, *Mineral Resources of the U. S. 1929*, Pt. I, 143–77 (preprint No. 8, published January 10, 1931).
E. H.

Mercury in 1929. PAUL M. TYLER. Bur. Mines, *Mineral Resources of the U. S. 1929* Pt. I, 117–42 (preprint No. 7, published December 18, 1930).
E. H.

Developments in ferrous and non-ferrous metallurgy during 1930. HERBERT M. BOYLSTON. *Fuels and Furnaces* **9**, 19–31(1931).
E. H.

Flotation reagents. B. W. HOLMAN. *Bull. Inst. Mining Met.* No. **315**, 2–4, 9–22 (1930); cf. *C. A.* **25**, 268.—Discussion.
ALDEN H. EMERY

The concentration of ores by flotation. H. L. SULMAN. *Bull. Inst. Mining Met.* No. 315, 5–6, 9–22(1930); cf. *C. A.* **24**, 2699, 5006, 5263.—Discussion. A. H. E.

Water concentration tests. BERNARD W. HOLMAN. *Bull. Inst. Mining Met.* No. 312, 47 pp.; No. 315, 23–4(1930).—See *C. A.* **24**, 2699.
ALDEN H. EMERY

Milling methods and costs at the Copper Queen concentrator of the Phelps Dodge Corporation, Bisbee, Ariz. E. WHITTENAU AND W. B. CRAMER. Bur. Mines, *Information Circ.* 6404, 29 pp.(1931).—The Copper Queen Concentrator treats 4000 tons of ore daily by flotation. During 1929, heads averaged 2.15% Cu; recovery was 91.32%, the concentrates contg. 12.92% Cu. The ore is a porphyry carrying Cu mainly as chalcocite, which is very finely assocd. with pyrite, in a siliceous gang. Au assays 0.006 and Ag 0.12 oz. per ton. The approx. mineralogical compn. of mill heads in 1929 was: chalcocite 2.32, chalcopyrite 0.07, covellite 0.13, bornite 0.03, native Cu trace, tenorite 0.02, cuprite 0.02, unspecified oxides 0.13, pyrite 19.11 and gang 78.17%. Costs of treating 1,445,425 tons of ore to produce 219,991 tons of concentrates in 1929 were (in cents per ton of ore): crushing and conveying 5.9, primary grinding 11.1, secondary grinding 8.3, flotation 7.5, concentrate handling 1.9, tailings disposal 2.2, assaying and sampling 1.4, mill H_2O 5.9, mill dept. 5.1, total 49.3.
A. H. E.

A plant for treating sulfide ores of lead. R. AVERAN. *Science ind.* **14**, 201, 779–82 (1930).—A description of the equipment and operation of a plant at Trémuson, France, for recovering Pb and Ag from local galena ores. Two [illegible]ry roastings reduce the

S content to 1.5–2%. The crude lead is melted; the Cu is removed at 400°; the As and Sb are removed by forced air at 900°. The Pb is remelted under an oxidizing atm. to form litharge, from which crude Ag is recovered. ANN NICHOLSON HIRD

Volatilization processes for low-grade zinc material. KURT R. GOEHRE. *Eng. Mining J.* 131, 19–20(1931).—The 4 prevailing volatilization processes are briefly discussed. The Waelz process is quite widely used, while the other com. process, the Laist process, is confined to slag and ores of low m. p. At present the main bulk of the production of the Waelz, Laist and Coley processes must be converted into metallic Zn. The oxide produced by the volatilization process cannot be treated in the old Belgian muffle furnace without sintering, because of excessive dust loss. At the New Jersey Zinc Co. the oxide is treated in a vertical muffle. The oxide is mixed with coal dust having a certain % of volatile matter and coked in a sep. furnace. With this procedure, no dusting results, and reduction takes place without disintegration, at a lower temp., and with a higher yield than was formerly possible. W. H. B

Oxygen as an aid in the solution of silver by cyanide from various silver minerals. E. S. LEAVER, J. A. WOOLF AND N. K. KARCHMER. Bur. Mines, *Rept. of Investigations* 3064, 15 pp.(1931).—Cerargyrite is completely sol. in cold cyanide soln. in 8 hrs. Practically all the Ag in stetefeldtite is dissolved by cold cyanide in 24 hrs. Argentite, polybasite, stephanite and pyrargyrite are slowly sol. under the usual conditions of cyanidation. Their rate of soln. is materially increased by supplying addnl. O. Proustite, similar in compn., did not show any material increase in extn. by use of O. By a preliminary low-temp. roast, an extreme case of oxidation, the resulting calcines yield an extn. of 90% of the Ag by cyanidation. Tetrahedrite is the most refractory mineral tested. Direct cyanidation, even with excess O, gave < 25% extn. Preliminary roasting increased this figure. In general, O is an aid in the treatment of Ag minerals by cyanidation. Warm soln. also increases the soln. rate. Low-temp. roasting is usually effective if the preceding fail. Usually 72 hrs. or more are required for max. soln. of Ag by cyanidation. ALDEN H. EMERY

Manufacture of portland cement and cupriferous iron from slag. J. A. BRADBURY *Chem. Eng. Mining Rev.* 22, 443–9; 23, 27–9(1930).—Research was conducted on the elec.-arc furnace smelting of Mt. Lyell blast-furnace slag with limestones and coke in proportions to produce: (*a*) slag, which on grinding would have the compn., properties and tensile strength of portland cement, and (*b*) cupriferous iron, which might be subsequently converted to mild steel, or used as an addn. to produce steel of high resistance to corrosion. Preliminary expts. indicated disadvantages of the process but established that (1) it is necessary to design a furnace to minimize chilling of the slag pool, and to eliminate air vents which would waste coke and electrodes; (2) careful choice of basic refractories is necessary to minimize slag contamination, and to afford max. of heat resistivity in a small intermittent arc furnace; (3) considerable difficulty in proportioning the constituent of the charge is expected because of the use of four main stocks, blast furnace slag, limestone, coke and small proportions of clay; (4) it is doubtful whether the high temp. of the elec. arc would permit the functioning of normal C reduction; (5) literature on cement manuf. discourages fusion of the clinker as being productive of inferior cement. Points studied include: hearth refractories, charge proportioning, FeO reduction, reduction of MgO, slag behavior, properties of cement produced, cement grinding, iron produced and the effects of small percentages of Cu in steel. The cupriferous iron obtained in the specially designed furnace analyzed: Fe 88.8, Cu 0.95, Mg 1.1%, Ca nil, As, Sb, Co, Ni, Zn, Pb nil to faint trace, Si 5.6, C 3.05, P 0.5, S 0.04%. Elec.-furnace iron evidently differs from normal cast iron in the higher percentages of easily removable impurities, such as Si and C, in the unusual presence of Mg, and in the presence of a small proportion of Cu which would not readily yield to refining methods. Opinions of numerous investigators on the effects of Cu on corrosion-resistance of iron are briefly reviewed. W. H. BOYNTON

Carbon is controlled in synthetic gray iron. EDWIN BREMER. *Foundry* 58, No. 22, 51–2(1930).—Synthetic gray iron is produced from 3 to 4% Si steel by adding to the charge in a Detroit Electric furnace sufficient petroleum coke to give the required C content. In tests carried out with high-Si steel as the base metal, a charge of 1 ton melted in 1 hr. and 40 min. The following figures are, resp., the percent coke added and the percent C content of the iron: 3.95, 3.05; 4.70, 3.30; 4.70, 3.35; 4.85, 3.35; 5.20, 3.40; 5.25, 3.46; 5.25, 3.43; 5.70, 3.60. The resulting iron may be varied between 2 and 3.50% Si and 2.5 and 3.5% C. G. T. MOTOK

Calculation of the temperature of combustion of a few metals. ILJA WEISTERMANN. *Metall u. Erz* 27, 613–5(1930).—The temps. of combustion for various metals are detd. by plotting the heat content of the metal in question as a function of temp.

A line is drawn from the ordinate corresponding to the heat of combustion of the metal, and the abscissa corresponding to the point where this intersects the heat-content curve represents the combustion temp. of the metal. The following results were obtained: for Pb —1470°, Sn —1950°, Zn —1800°, Cd —1385°, Bi —1890°. By extrapolation above the m. p., comparative temps. are detd. which would result if no vaporization or dissocn. occurred. These are designated T_s and are for Pb heated in O at 0 —4150°, for Zn in O at 0 —6400°, for Cd in O at 0 —5000°, and for Bi, Sb and Cu under the same conditions, 3800°, 5300° and 2200°, resp. H. STOERTZ

The new foundry of the Skoda works at Pilsen. JOH. MEHRTENS. *Z. Metallkunde* **22**, 304–7(1930). ROBERT F. MEHL

Metal stocks and intermediate products in lead foundry operation and the possibility of their limitation. BERGRAT GEORGE. *Metall u. Erz* **27**, 605–12(1930).—A discussion of the source and significance of metal stocks, with consideration of conditions which will bring about a decrease in the decline of intermediate products. H. S.

Cupola practice in the malleable iron foundry. J. H. D. BRADSHAW. *Foundry Trade J.* **43**, 361–2(1930).—Although more reliable malleable Fe castings may be obtained from crucible or pot melting, the cupola is gradually displacing crucible melting because of its cheapness. Its principal disadvantage is that the compn. of the product cannot always be guaranteed, but with careful control it will yield castings equal to, and sometimes superior to, crucible-melted ones, and at a lower cost. Regularity depends upon the correct vol. of air, an adequate blast pressure, and the correct charge calcn. The disposition of C, Si, Mn, S and P during melting is discussed, as are also the cost of coke used, the casting temp., and the slag formed. CURTIS L. WILSON

The constant-air-weight method of cupola blowing. H. V. CRAWFORD. *Gen. Elec. Rev.* **33**, 626–33(1930).—In the past, air for cupola blowing has been supplied at a certain pressure and a const. vol. The more logical method of supplying air by the const.-weight cupola blower with automatic control is described. The weight of air required will depend upon the C in the coke, moisture in the coke, density and size of coke, the loss by leakage, the humidity, the ratio of Fe to coke charges and atm. temp. and pressure. Various other factors governing operating conditions are discussed along with the effects of excess or insufficient O_2. A. D. SPILLMAN

Blast-furnace progress in 1930. RALPH H. SWEETSER. *Blast Furnace Steel Plant* **19**, [illegible] (1931). E. H.

Economies in blast-furnace operation. J. P. DOVEL. *Blast Furnace Steel Plant* **19**, [illegible] (1931). E. H.

Economical aspects of the 1000-ton blast furnace. H. A. BRASSERT. *Blast Furnace Steel Plant* **19**, 89–91, 98(1931). E. H.

Thin-walled blast-furnaces of the Prague Ironworks Company. J. ŠÁREK. *Engineering* **130**, 817–20(1930).—See *C. A.* **24**, 5689. G. G.

Blast furnace theory and practice. RALPH H. SWEETSER. *Blast Furnace & Steel Plant* **18**, 1824–6, 1828(1930); cf. *C. A.* **24**, 574.—A survey of the progress and operation during recent years. A part of the progress has been due to improvements in app. tending to more uniform operation, and to a few changes in the dimensions of the interior of the blast furnace. "The greatest advances have been due to causes other than mech. and have been brought about more by changes in our attitude of mind than by changes in design and equipment." The capacity of a blast furnace must be expressed in terms of lbs. of coke which can be burned per day. To cover variations in operation, it is necessary to adopt a base coke, a base theoretical-yield ore mixt. and a base hot blast temp., and then make allowances for variations as encountered. Blast-furnace gas is now used for underfiring by-product coke ovens in the U. S., though used in Germany for several yrs. The 3-shift day has resulted in a greater output per man, a much higher rate of wages per hr., reduction in labor turnover, practically the same labor cost per ton of pig iron and practically the same monthly earnings at 8 hrs. per day as were formerly obtained at 12 hrs. per day. W. H. BOYNTON

Hot-blast furnace problems. WM. MCCONNACHIE. *Blast Furnace & Steel Plant* **18**, 1827–8(1930); cf. *C. A.* **24**, 5972.—In an attempt to show what removes O_2 from the ore, a close study was made of conditions obtaining in blast furnaces, the fuel used being the bituminous coal in general use in Scotland. It appears that there is no intrinsic difference in the conditions of a coal furnace about and below tuyère level from those of a coke furnace, so that the reasons for the remarkable differences in fuel requirement must be looked for higher in the furnace. Probably the heavier tarry matters expelled from the coal are intercepted and condensed on the cold material of the charges and so are taken down to lower and hotter levels, are again distd. off and again intercepted. From the wt. of O_2 contributed to the gases by the Fe_2O_3, SiO_2, CaO, etc., which is re-

duced, it is possible to calc. the O_2, etc., brought in by the blast and thereby get at the total amount of oxidized C present in the gases. The part played by tars in carburizing the Fe and in removing O_2 from Fe_2O_3 and Fe_3O_4 in the partially reduced ores is indicated. W. H. BOYNTON

Fuel impregnation by the slag in the hearth and bosh of the blast furnace. C. D. ABELL. *Foundry Trade J.* **43**, 410(1930).—Analyses of 3 main types of impregnations found in the coke of the cold-blast furnace are given. The "amber slag" is considered to be a definite phys. and chem. entity. The "mineralized fuel," found in the central zone of the furnace hearth, is a silicified C and contains much free Fe and graphite, as well as metallic carbides. The "white slag" is obtained by the burning away of the mineralized fuel. CURTIS L. WILSON

Furnaces for burning blast-furnace gas. OTTO DE LORENZ. *Blast Furnace Steel Plant* **19**, 135–9, 142(1931). E. H

Steel metallurgy in 1930. G. R. FITTERER. *Blast Furnace Steel Plant* **19**, 99–100 (1931). E. H

Progress in the iron and steel industry in 1930. J. D. KELLER. *Mech. Eng.* 53, 48–50(1931). E. H

Plant of the Wisconsin Steel Company. CHARLES LONGENECKER. *Blast Furn. & Steel Plant* **19**, 127–34(1931). E. H

German and American steel-plant practice. F. L. ESTEP. *Iron and Steel (A. I. M. E. Trans.)* **52**, 73–8(1930). E. H

Stainless steel. HARRY BREARLEY. *Proc. Soc. Chem. Ind., Victoria* **30**, 368–84 (1930).—The properties of stainless steel are briefly discussed. Expts. are described and observations detailed on the general problem of corrosion, particularly the part which stainless steel has had to do with the simplification of that study. D. S

Crystal structure of the β-phase of aluminum bronze. ICHIJI OBINATA. *Nature* **126**, 809(1930); cf. *C. A.* **24**, 1068.- A fine rod of 12.5% alloy measured at 650° showed that the β-phase has a body-centered cubic super-lattice with the parameter equal to 5.887 A. U. A sample heated to 850° and quenched in H_2O showed a hexagonal lattice for the β′-phase with parameters $a = 11.13$, $c = 6.342$ and $c/a = 0.5698$; the parameter for the β-phase equals 5.835 A. U. ARTHUR FLEISCHER

Electrochemical investigations of Al and alloys of Al with Hg (GERDING) 2. The electrical conductivity and tensile properties of light Mg-Al alloys as affected by atmospheric exposure (WILSON) 4. Corrosion of cross stream plate air heaters and its prevention (BURWICK) 21. Debismuthizing Pb with Ca (COHN) 4. Special properties of eutectic and eutectoid mixtures in the binary metal system (SALDAU) 2. Removal of dissolved gases from boiler water for prevention of corrosion (HARMON) 14. Apparatus for filtering sugar solutions, oils or other liquids under pressure (Brit. pat. 334,663) 1. Washing and classifying device for coal and ores (Ger. pat. 512,317) 21. Apparatus for carbonizing coal, schists, etc., at low temperature and for the treatment of ores (Fr. pat. 690,502) 21. Nozzle for injecting hydrocarbons into fused metals or salts (Ger. pat. 512,427) 22. Synthetic fuels (Fr. pat. 37,076) 21.

BAUER, ERNST: **Herstellung der Abgüsse in der Graugiesserei.** Halle (Saale): W. Knapp. 72 pp. M. 4.80; bound, M. 6.20.

BENEDICKS, CARL, AND LÖFQUIST, HELGE: **Non-Metallic Inclusions in Iron and Steel.** London: Chapman & Hall. 311 pp. 30s. net.

BRONIEWSKI, W.: **Travaux pratiques de métallographie.** Paris: Dunod. 110 pp. F. 15.

GOWLAND, WM.: **The Metallurgy of the Nonferrous Metals.** London: Griffin. 633 pp. 30s. net.

SARAZIN, R.: **La soudure électrique a l'arc.** Paris: L'Usine. 350 pp.

SAUERWALD, FRANZ: **Physikalische Chemie der metallurgischen Reaktionen. Leitfaden der theoretischen Hüttenkunde.** Berlin: J. Springer. 142 pp. M. 13.50; linen, M. 15.

Electromagnetic apparatus for locating ore deposits, etc. AKTIEBOLAGET ELEKTRISK MALMLETNING. Ger. 512,054, Feb. 9, 1926. This corresponds to Brit. 251,429.

Apparatus for grinding ores. HARDINGE CO., INC. Fr. 689,042, Jan. 28, 1930.

Enriching ores. AUGUSTE DE CASEMBROOT. Fr. 691,184, May 15, 1929. Zn and other ores contg. limestone are enriched by calcining to about 700° and putting them immediately into water, where they are freed from CaO.

Enriching ores. EUGÈNE C. SAINT-JACQUES and SOC. NOUVELLE DE METALLISATION. Fr. 691,176, May 15, 1929. Ores are enriched by calibrating them to present to the grinders pieces of the same size. The subsequent grinding will break the softer pieces, which are sepd. by screening.

Centrifugal apparatus for enriching ores, etc. HANS KAMMERL. Fr. 690,321, Feb. 20, 1930.

Slaking apparatus for the dry treatment of ores. MASCHINENBAU-ANSTALT HUMBOLDT. Fr. 688,768, Jan. 23, 1930.

Treating ores or metals. SINDICATO MAQUEPA. Fr. 690,608, May 3, 1929. Ores or metals are mixed with a soln. of a halogen salt, *e. g.*, NaCl, and a nitrate, *e. g.*, $NaNO_3$; the mixt. is treated with decomposing acid such as H_2SO_4, whereby a nascent nitrosyl gas such as ClON is produced, which acts on the metals or ores to form salts. The mass may be stirred and heated by warm compressed air, and if it is desired to increase the intensity of the reaction an oxidizing substance such as MnO_2 may be added to the soln.

Reduction of ores. ALFRED MUSSO. Fr. 690,255, Dec. 23, 1929. Ores, particularly fine ores, are reduced at a relatively low temp. in a retort by the fixed C of a carbonaceous material and the forced and simultaneous evacuation of the gas products. The temp. used is below the m. p. of the metal or the gang and increases from the point of entry to the point of exit of the retort. The gases obtained have a high combustion value.

Reducing ores. HERBERT WITTEK. U. S. 1,787,348, Dec. 30. Ore such as roasted Zn blende ore or cinnabar is mixed with carbide such as CaC_2; the carbide in the mixt. is then "azotized" (suitably by N at 1000–1100°) to reduce metal values and to produce "nitro-lime."

Reducing ores such as those of iron. E. A. A. GRÖNWALL and H. J. H. NATHORST. Brit. 334,700, April 26, 1929. In effecting reduction in a shaft furnace with carbonaceous reducing agents, the combustible gases escaping at the upper portion of the furnace are partly burnt with O and blown back into the charge, and a continual circulation is maintained. In a modified procedure, the escaping gases are treated for removal of CO_2, then partly burnt with O, passed through C to increase their CO content and again partly burnt with O before being blown back into the charge. The O used may be obtained by the Linde process or by electrolysis of water (in which latter case the H formed is blown into the furnace). Various details of app. and procedure are described.

Reduction of metallic halides. I. G. FARBENIND. A.-G. Fr. 690,141, Feb. 18, 1930. Metal halides are reduced by H in vessels composed wholly or in part of metals, preferably of the same metal as it is desired to obtain; if another metal is used the product is only partly removed from the walls of the vessel.

Briquetting chromium-iron ore concentrates. M. N. TKACHENKO. Russ. 68,090, April 30, 1930. The wet ore is mixed with up to 5% of $Mg(OH)_2$ and then pressed into briquets.

Treating copper ores. M. MIYAKE. Brit. 334,761, Oct. 18, 1929. With the purpose of reducing the quantity of SO_2 evolved in roasting copper glance, the material is mixed with bone ash and "red earth."

Treating iron pyrites. STANLEY I. LEVY and GEORGE W. GRAY. Ger. 510,139, March 28, 1928. See Brit. 307,188 (*C. A.* **23**, 5150).

Treating titanium ores. TITAN CO. A.-S. (P. Farup, inventor). Ger. 510,200, May 4, 1928. See Brit. 275,580 (*C. A.* **22**, 2247).

Vanadium ores. SOC. DE PRODUITS CHIM. DES TERRES RARES (SOC. ANON.). Fr. 36,572 (Addn. to 669,115, March 13, 1929. Addn. to 669,115 (*C. A.* **24**, 1611). In treating V ores by the process of Fr. 669,115, Fe in the form of $FeSO_4$ is added to the solns. from which it is desired to recover vanadic acid, if the ores are free from, or insufficient in, Fe to obtain this result. This addn. may be made before or after the first hydrolysis of vanadic acid.

Sintering pulverulent ores, etc. VEREINIGTE STAHLWERKE A.-G. (Albert Daub, inventor). Ger. 512,171, Nov. 10, 1929. The ore, etc., is packed in a shaft having a stationary lower part and an upper part adapted to be lifted off. Hot gases are passed downwardly through the ore, and the operation is continued until the sintering zone has reached the junction of the two parts of the shaft.

Roasting ores. METALLGES. A.-G. Fr. 688,928, Jan. 27, 1930. See Ger. 502,586 (*C. A.* **25**, 479).

Apparatus for roasting and agglomerating ores. ADRIEN DAWANS. Fr. 689,324, Feb. 3, 1930.

Metallurgical furnaces. ALFRED STANSFIELD. Fr. 689,345, Feb. 3, 1930.

Prolonging the life of blast-furnace shafts by air cooling. SOC. ANON. JOHN COCKERILL. Fr. 691,221, Mar. 5, 1930. See Belg. 366,775 (*C. A.* **24**, 4754).

Blast-furnace processes. ERNST BAUMGARTNER. Fr. 689,678, Feb. 10, 1930. Basic fluxes (limestone or dolomite) for use in blast-furnace processes are calcined for the removal of CO_2 only to such a degree that the calcined product retains its size and the necessary resistance to maintain the charge and to allow the furnace to function properly.

Charging device for blast furnaces. AWANS-FRANÇOIS SOC. ANON. Ger. 510,820, May 25, 1929.

Device for supplying air to the tuyères of blast furnaces. FRIED. KRUPP A.-G. FRIEDRICH-ALFRED-HÜTTE. (Hugo Bansen, inventor). Ger. 512,238, May 26, 1928.

Rotary smelting furnace. ERNST WEISS. Ger. 510,492, Sept. 17, 1929.

Rotatable and tiltable smelting oven. GEWERKSCHAFT EISENHÜTTE WESTFALIA. Ger. 512,119, April 18, 1928.

Furnace for heating metals. A. A. MOZALEVSKII. Russ. 60,729, Dec. 20, 1929. Construction details.

Continuous furnace for heating metals. SOC. UGINE-INFRA. Fr. 691,120, May 8, 1929.

Furnace and conveyer for heat treatment of metal sheets. WM. A. BLOCKINGER (one-half to Homer Wolf). U. S. 1,788,977, Jan. 13.

Brass-melting furnace. ADOLPH W. MACHLET. U. S. 1,789,149, Jan. 13. Structural features.

Copper-melting furnace. HIRAM S. LUKENS and RUSSELL P. HEUER (to The American Metal Co., Ltd.). Can. 307,861, Jan. 20, 1931.

Furnace suitable for brazing, annealing, etc. CARL L. IPSEN and JAMES L. MCFARLAND (to General Elec. Co.). U. S. 1,789,177, Jan. 13.

Furnace and conveyer for annealing metal sheets. EVELYN E. GRIFFITHS. U. S. 1,788,866, Jan. 13.

Annealing furnace for brass. K. S. RUMYANTZEV. Russ. 50,832, July 9, 1929. Structural features.

Drying or annealing oven for wires or bands. ALLGEMEINE ELEKTRICITÄTS-GES. Ger. 512,465, Dec. 28, 1927.

Furnace for the removal of tin from tinned-iron waste. I. P. VOLODIKHIN. Russ. 14,615, April 2, 1927. Constructional details.

A rotating kiln for heating metal ingots. K. K. LOSEV. Russ. 47,691, May 21, 1929; addn. to Russ. 17,294. Constructional details.

Metal-molding machine. AUTOMATIC MOULDING MACHINE, LTD. Ger. 510,742, Jan. 29, 1928.

Metal-molding machine. MITTELDEUTSCHE STAHLWERKE A.-G. Ger. 510,692, July 1, 1928.

Core for molding hollow metal bodies. VEREINIGTE STAHLWERKE A.-G. Ger. 510,942, Aug. 17, 1929.

Twin-mold compression molding machine for metals. GUSTAV ZIMMERMANN. Ger. 510,941, Mar. 15, 1929.

Ingot mold. FRANK STUHL. Ger. 510,358, Mar. 29, 1929.

Steel molds for centrifugal casting. INTERNATIONAL DE LAVAUD MANUFACTURING CORP., LTD. Ger. 510,359, May 10, 1928. See Brit. 291,759 (*C. A.* **23**, 1100).

Mold for making castings from copper alloys in vacuo. PAUL ZIEGS. Ger. 512,060, Mar. 5, 1929.

Casting channel for Martin furnaces. HERMANN MOLL and RASSELSTEINER EISENWERKS-GES. A.-G. Fr. 689,335, Feb. 3, 1930.

Rotary casting drum for metal founding. JOHANNES WILBERG. Ger. 510,501, April 14, 1929.

Apparatus for casting metals into indefinite lengths. SIEGFRIED JUNGHANS. Ger. 510,361, June 11, 1927.

Die-casting machines. PRÄZISIONSGUSS-FABRIK NÜRNBERG GEBR. ECKERT. Ger. 510,366, Jan. 23, 1929. Details of the arrangement of the melting pot are described.

Centrifugal casting apparatus. SOCIETÀ ALTI FORNI, FONDERIE, ACCIAIERIE E FERRIERE FRANCHI-GEGORINI. Ger. 512,062, June 7, 1928.

Method of casting hollow metal bodies. MARTIN ROECKNER and CARL DAEVES. Ger. 510,497, June 7, 1929.

Casting hollow articles of aluminum alloy. METAL CASTINGS, LTD., and A. H. NICHOLSON. Brit. 334,714, Sept. 12, 1929. Cores for use in the casting are made of a

Zn alloy or other suitable metal, which will not melt during casting but can be removed after casting by a heat treatment.

Casting aluminum and its alloys. VEREINIGTE ALUMINIUM-WERKE A.-G. Brit. 334,435, Oct. 29, 1928. Mech. features.

Casting of aluminum alloy. EUGEN STRASSER (to Max Dietiker). U. S. 1,788,751, Jan. 13. A preliminary alloy contg. Cu 90 and Ni 5 parts is covered with a fused layer of KF adapted to scorify the metal oxides present; about 5% of Mg is added while stirring and the preliminary alloy is cast. About 2% of this preliminary alloy is added to Al or Al-Zn alloy contg. up to 18% Zn and the metal is cast in a mold of material having a chilling effect on the alloy (the mold contg. granulated metal and having a water content of about 6%). Subsequent heat treatment for aging is not required, because of the aging effect which takes place during the process.

Casting steel. VEREINIGTE STAHLWERKE A.-G. Ger. 512,061, Feb. 14, 1930. This relates to the manuf. of compound steel castings in a mold having a removable partition, which is removed when one of the steels has been cast. The improvement consists in treating the first steel, directly after removing the partition, with a current of air or steam, so as to form a superficial layer of Fe_3O_4. The second steel is then poured in.

Refining metals. WALTER C. SMITH (to Allied Process Corp.). Can. 307,857, Jan. 20, 1931. Molten metal is deoxidized with an agent of the group including P and Si, and thereafter the molten metal is treated with Li. Cu, Cu alloys such as brasses and bronzes, and other metals and alloys such as Zn and its alloys, Ni, Cu-Ni alloys, Fe, steel and ferrous alloys, as rustless Fe, may be treated in this way to produce sound ingots and castings.

Refining metals, ores, etc. M. I. GUTMAN and G. YA. Russ. 53,703, Nov. 21, 1929. Cl is admitted into the blast furnace and acts on the molten metal.

Refining copper. ELECTRICAL RESEARCH PRODUCTS, INC. Fr. 690,219 Feb. 19, 1930. Metallic Cu of high cond., which may be heated in a reducing atm. without breaking, is prepd. by maintaining pure molten Cu in a vessel having a covering of a refractory material such as Al_2O_3, which prevents traces of impurities such as Fe from entering the Cu, and adding a deoxidizing agent to the Cu. Ca_2B_2 may be added to the bath immediately before casting.

Refining nickel and copper. HENRI J. M. E. CLERC. Fr. 36,617, Mar. 30, 1929. Addn. to 633,109 (*C. A.* **24**, 1610). Ni, Cu or alloys of Ni and Cu are refined by chlorination with alkali alk. earth, or earth chlorides which act on the oxides by double decomp., and form with the impurities volatile chlorides. The chlorides are injected in the fused state by a gaseous current which may be Cl or air or both. Cf. *C. A.* **24**, 815.

Refining zinc residues. RAYMOND THOMAS and FRANZ SCHREIBER. Fr. 688,649, Dec. 19, 1929. In melting Zn, the formation of ZnO is prevented by introducing into the furnace at the commencement of the operation substances which vaporize, expel the air and form a reducing atm. Hydrocarbous or glycerol in emulsion with water with or without addn. of emulsifiers, HCl, $ZnCl_2$ and NH_4 salts may be used. The superheated steam formed causes the rupture and retraction of the layer of oxide on the surface of the Zn.

Zinc. THE NEW JERSEY ZINC CO. Fr. 690,027, Feb. 15, 1930. Zn vapor obtained in the reduction of Zn materials is purified by passing it through a medium for eliminating Pb kept at a suitable temp. The medium may be one of the ingredients of the reduction charge of Zn, or the reduction charge itself composed of the Zn material and a carbonaceous reducing agent.

Aluminum. JEAN HANCO. Fr. 689,593, Feb. 7, 1930. Pure Al is made by adding to the molten Al about 3% of a mixt. of equal parts of fused dry $CaCl_2$ and borax, both finely ground, which mixt. in the molten Al at 900° is liquefied and absorbs impurities. The mech. resistance of the Al may be increased without impairing its cond. by adding Ce or metals derived from Ce ores.

Finely divided metals. I. G. FARBENIND. A.-G. Fr. 691,243, Mar. 6, 1930. Finely divided metals are made by decompn. of their carbonyl compds. in a heated vacuum, a whirling motion being imparted to the carbonyl compds. Cf. *C. A.* **24**, 3748.

Pickling metals. P. J. COLE and C. BANTA (to Barrett Co.). Brit. 334,418, Oct. 31, 1928. Pickling baths such as H_2SO_4 or HCl are used with inhibitors such as benzo-, toluo- or naphthonitrile or α- or β-naphthonitrile in small proportion. Cf. *C. A.* **24**, 3482.

Nitriding. CENTRAL ALLOY STEEL CORP. Fr. 688,616, Jan. 21, 1930. The walls of nitriding vessels are covered with a substance inert to the NH_3 gas used, *e. g.*, enamel.

Cold brass rolling. JOHN C. SHARP (to Standard Oil Co. of Ind.). U. S. 1,789,054, Jan. 13. Before entering the cold rolls, soft metal such as brass is treated with a lubricating oil contg. an alkali metal compd. of petroleum sulfonic acids.

Temperature indicator for carburizing boxes. HENRY H. HARRIS (to General Alloys Co.). U. S. 1,788,794, Jan. 13. A metallic "tell-tale," such as a plug of brass, Ag or Ni alloy which is fusible at a predetd. temp., is embedded in the wall of a device such as a carburizing box to indicate any possible subjection of the box and contents to temps. above those intended.

Reheating metals. FAGERSTA BRUKS AKTIEBOLAG. Fr. 690,203, Feb. 19, 1930. Surface decarbonation in reheating metals, particularly steel, is avoided by heating them in a chamber into which is introduced a gas obtained by passing blast-furnace gases or gases of like compn. through a layer of incandescent C heated by elec. means.

Hardening metals and alloys. GUSTAV SCHOENBERG. Swiss 140,790, May 2, 1929. Metals and alloys which do not readily undergo cementation are improved by immersion in a molten bath contg. at least 10% of a substance capable of oxidation, such as salts of HCN, or powd. C. The bath may be a fused mixt. of salts, and KOH may be present. The method is particularly suitable for hardening Au, Ag, Ni, Cu and their alloys.

Hardening metals such as iron, steel, copper and their alloys. DAVID LAMON. U. S. 1,788,876, Jan. 13. The metal is heated to convert it into a "semi-molten" state, the surface of the heated metal is sprinkled or covered with a mixt. which may be formed of KCN 2, H_3BO_3 1 and molybdic acid 1 part. Molybdic acid anhydride also may be used.

Hardening of iron and steel. KHIMICHESKII INSTITUT IM. L. YA. KARPOVA. NTU. VSNKh. SSSR. (Chemical Institute Karpov Memorial). Russ. 49,418, June 17, 1929. The object to be hardened is introduced into a bath prepd. by fusing KF or NaF or their mixts.; then there is added a mixt. of clay and $K_3Fe(CN)_6$ compressed into small agglomerates.

Fused bath for case-hardening metals. PORTER W. SHIMER and EDWARD B. SHIMER (to American Cyanamid Co.). U. S. 1,789,257, Jan. 13. The case-hardening properties of a fused bath such as $CaCl_2$, NaCl and a cyanamide are maintained by regular frequent addns. of a cyanide-forming material such as Ca cyanamide. U. S. 1,789,258 relates to a molten case-hardening bath which may be formed of a Ca halide such as $CaCl_2$, an alkali metal halide such as NaCl and a minor proportion of alk. earth metal cyanide such as $Ca(CN)_2$. U. S. 1,789,259 specifies making frequent regular addns. of an alk. earth metal cyanide such as $Ca(CN)_2$ to maintain the case-hardening properties of a bath which may contain fused chlorides and a cyanamide.

Apparatus for the thermal treatment of steel rails. CHARLES W. ST. J. ROWLANDSON and CHARLES J. GRIST. Ger. 512,036, April 4, 1928. This corresponds to Brit. 288,369.

Apparatus for annealing wire, metal sheets, etc. AKT.-GES. BROWN, BOVERI & CIE. Swiss 140,789, May 1, 1929.

Pot-annealing oven for wires, bands, etc. ERNST BECKERT NADELFABRIK COM.-GES. Ger. 510,208, Jan. 26, 1927.

Annealing gray iron. ROYSEL J. COWAN (to Surface Combustion Co.). U. S. 1,789,136, Jan. 13. The iron is heated to a temp. above its crit. point, held at this temp. for a time sufficient to initiate graphitization, and, before the graphitization has stopped, is cooled by quenching in the open air.

Annealing steel. HEINRICH HANEMANN. Fr. 36,667, April 8, 1929. Addn. to 667,217. Steel objects are annealed by heating them with a direct elec. current in a vacuum.

Cementation of steel articles. A. N. NAZAROV. Russ. 44,445, April 6, 1929. Articles placed in an iron container and heated to the required temp. are treated alternately with CO and H_2.

Cast iron. YVES LE M. DE SAGAZAN and PHOSPHATES ET SUPERPHOSPHATES DE TEBBAKA. Fr. 689,895, April 19, 1929. P is introduced into cast iron in the form of Fe phosphide either in the blast furnace or in the Bessemer converter.

Cast iron. VEREINIGTE STAHLWERKE A.-G. and KARL EMMEL. Ger. 519,391, Dec. 10, 1924. See Brit. 244,405 (*C. A.* **21**, 220).

Alloy. HENRY A. BEHRENS. Can. 307,257, Jan. 6, 1931. A cryst. alloy readily cast to form electrodes comprises Sn, Cu, Pb, Bi and Sb.

Alloy. FRANK A. FAHRENWALD. Can. 307,527, Jan. 6, 1931. An austenitic Fe alloy contg. Cr 5–25, Mn 1.5–5, Ni 1.5–10, C 0.3–3 and Si 0.0–3% is used in tool making.

Alloys. HANS KANZ. Fr. 689,079, Jan. 29, 1930. An alloy suitable for parts submitted to friction contains, *e. g.*, Cu 58, Sn 4, Zn 34, Pb 2.5 and Ni 1.5%. Cf. *C. A.* **25**, 677.

Alloys. THE INTERNATIONAL NICKEL CO., INC. Fr. 688,967, Jan. 27, 1930.

Alloys suitable for use by dentists, etc., for conducting heat and electricity and which are resistant to corrosion contain Pd 25–98, Cu 1–60 and Ag the rest (not less than 1%). Heat treatments for improving the qualities of the alloys are described. Cf. *C. A.* 25, 677.

Aluminum alloys. H. C. HALL and T. F. BRADBURY. Brit. 334,430, Oct. 24, 1929. Al alloys are described contg. Mg 0.1–4.0, Ni 0.5–2.5, Fe 0.3–1.5, Si 0.5–5.0, Ti up to 0.5, Mn up to 0.2, Cr 0.01–0.2 and Cu up to 0.5%. Na may be used as a refining agent in prepg. the alloys.

Aluminum alloys. K. SCHMIDT GES. Brit. 334,777, Aug. 15, 1929. Alloys suitable for manuf. of pistons for internal-combustion engines contain Al over 70%, together with Si 15–25, Cr 0.2–3.0 and Mn, Co and Ni 0.5–3.0% each, with or without Ti or Mo 0.5–1.0%. Sb 0.5–3.0% and some Fe also may be present. Cf. *C. A.* 25, 678.

Aluminum alloys. AKT.-GES. DER EISEN- UND STAHLWERKE VORMALS GEORG FISCHER & MESSINGWERK SCHWARZWALD A.-G. Fr. 689,206, Jan. 31, 1930. Al alloys, for the foundry, contg intermetallic combinations of alkali and alk. earth metals and one metal at least of each of groups 1, 6, 7 and 8 are prepd. by adding intermediate alloys in the usual manner to the fused Al bath, after which an alkali and an alk earth metal as metal or intermediate alloy is added to the bath, on which an autorefining takes place by aging, *i. e.*, by leaving the alloy to stand.

Aluminum alloys suitable for pistons. R. S. ARCHER and L. W. KEMPF (to Aluminium, Ltd.). Brit. 334,656, Dec. 22, 1928. Al is alloyed with Si 7–15, Mg 0.2–1.5, Ni 0.5–7.0 and Cu 0.7–3.0%, and in some cases Mn, Cr and Ti may also be added. Fe may be present as an impurity. Some mention is also made of alloys contg. a greater proportion of Si. Cf. *C. A.* 24, 4254.

Hard aluminum alloy. E. I. PETROV. Russ. 56,640, Oct. 18, 1929. An alloy contg. 90% Al and 5% Cu is prepd. by adding Cu to Al. A mixt. amounting to 5% of K_2MnO_4, Na_2CO_3, NaCl and aniline is then added to the molten alloy.

Copper alloys. WILHELM KROLL and M. LISSAUER ET CIE. Fr. 690,503, Feb. 24, 1930. Cu contg Ti or alloys of Cu contg. Ti are improved by quickly cooling the metal from a temp. of 650–1000° or allowing it to cool in the air and then aging it at 200–400°.

Iron and titanium alloy. WILHELM KROLL. Fr. 689,556, Feb. 7, 1930. Alloys of Fe and Ti are improved by submitting them to a chilling or cooling in air from a temp. of 700–1550° and aging them artificially to increase their hardness by reheating to 200–500°.

Alloys of magnesium. I. G. FARBENIND. A.-G. Fr. 36,601, Mar. 15, 1929. Addn. to 668,868 (*C. A.* 24, 1613). Alloys of Mg which are wetted momentarily by water, e. g., tools, are protected against corrosion by adding to the water a small quantity (about 1%) of dichromate.

Light magnesium alloy containing also aluminum, copper and manganese. EDWARD BURDICK (to Dow Chemical Co.). U. S. 1,788,616, Jan. 13. An alloy contains Mg 93, Al 6, Cu 0.7 and Mn about 0.25%.

Zinc-base alloys. WILLIS M. PEIRCE and EDMUND A. ANDERSON (to The New Jersey Zinc Co.). Can. 307,926-29-30-31-32, Jan. 20, 1931. Zn alloys that can be mechanically worked to produce wrought products possessing superior resistance to cold flow contain (a) 0.05–2% Cu and 0.005–0.5% Mg; (b) about 1% Cu and about 0.3 to 0.5% Mn; (c) about 1% Cu and about 0.05% Li; (d) about 1% Cu and about 0.1 to 0.5% Ni; (e) about 0.5% Cd and about 0.05% Li.

Determination of the resistance to rusting of iron alloys. VEREINIGTE STAHLWERKE A.-G. Fr. 689,093, Jan. 29, 1930. The resistance to rusting of Fe alloys is rapidly by detg. the resistance of the metal to vibrations first in the ordinary manner and afterward while submitting it to the action of water or moist air.

Acetylides. DEUTSCHE GOLD- UND SILBER-SCHEIDEANSTALT VORM. ROESSLER. Fr. 689,160, Feb. 5, 1930. Acetylides of alkali metals or their alloys are made by treating molten metals with C_2H_2 on constantly renewed fresh surfaces of the metal, *e. g.*, in a rotating drum or tube.

Coating ferrous metals with zinc and aluminum alloy. EARL R. WEHR and CARL C. MARCH (to American Rolling Mill Co.). U. S. 1,788,755, Jan. 13. In making products with a permanent rough-textured surface, ferrous metal bodies such as sheets, plates or strips are treated with an alloy which may contain Zn 97% or less and Al 3% (or more) in molten condition; the body and coating are subsequently heated to approx. the m. p. of the coating or above so as to effect a suitable crystn.

Apparatus suitable for use in coating metal sheets with zinc or its alloys. BENJAMIN P. FINKBONE (to American Rolling Mill Co.). U. S. 1,789,172, Jan. 13. A pot

suitable for holding molten Zn, etc., is provided at its exit end with an internal shell of an alloy of Ni, Cr and Fe contg. at least 10% of Cr to avoid solvent action with the coating material; a partition is placed between the exit portion and the remaining portion of the pot.

Coating non-metallic surfaces with nickel and other metals. J. G. A. RHODIN and BRITISH METALLISING CO., LTD. Brit. 334,510, May 29, 1929. Articles such as SiC elec. resistance rods for heating or abrasive wheels are coated with Ni by heating to above 350° and immersing in a soln. of Ni tetracarbonyl in C_2HCl_3, $C_2H_2Cl_4$, $CHCl_3$, Cl-substituted polybasic alcs., glycolchlorohydrin, epichlorohydrin or other suitable non-inflammable solvent. The coating may be rendered more firmly adherent by heating the coated article to redness after its removal from the soln. Over the coating thus produced, there may be applied an electroplated coating of addnl. Ni or coatings of other metals such as Cr, Ag, Cu, Au or Al, applied by various methods (details of some of which are given).

Metallizing non-metallic cores of bobbins for use on looms, etc. BRITISH CELANESE, LTD., W. A. DICKIE and F. C. HALE. Brit. 334,174, May 21, 1929. Cores such as those of wood, fiber, cardboard and paper are coated by the application of fused metal under high velocity, such as may be produced by fusing a metal wire or ribbon in an O-H or O-coal gas flame; the fused metal is projected onto the core by a strong air current.

Coloring metals. ALADAR PACZ. Ger. 510,380, Oct. 30, 1927. Metals are colored by cathodic treatment in a neutral or acid bath of NH_4 molybdate to which other NH_4 salts (other than sulfomolybdates) have been added, a sol. anode being employed, *e. g.*, Zn. When the cathode is more electropos. than the anode, no external source of current need be used, the anode and the cathode being directly connected. A suitable bath contains NH_4 molybdate 0.125 and NH_4NO_3 0.5%.

Blow-pipe apparatus for cutting metals by fusion. M. CLAUDE. Brit. 334,162, March 5, 1929. Structural features.

Magnetic testing apparatus for determining the physical properties of materials such as steel cutting tools. JAMES A. SAMS and VIRGIL F. SHAW (to General Elec Co.). U. S. 1,789,196, Jan. 13. Structural and elec. features.

Renovating files and like cutting tools with multiple edges. M. M. TURNER Brit. 334,517, April 3, 1929. The tools are immersed in successive acid baths, the cutting edges being protected (as by a Barbadoes tar soln. or the like) during some of the immersions and exposed to the acid during at least one of the later immersions. Use of HNO_3 and H_2SO_4 after a preliminary boiling in KOH soln. and then in $Ca(OH)_2$ soln. is described.

Aluminothermic welding. ELEKTRO-THERMIT G. M. B. H. Fr. 689,248, Feb. 1, 1930. The Fe scrap which is added to the aluminothermic mixt. is previously mixed with ferromanganese or ferrosilicon.

Welding copper. FRIED. KRUPP A.-G. Fr. 689,636, Feb. 8, 1930. Welding for Cu is carried out with electrodes made of carbides of W or like metals of high fusion pt., *e. g.*, "Widia", with a small quantity of metals of lower m. p.

Solder. ALLGEMEINE ELEKTRIZITÄTS-GES. Fr. 689,008, Jan. 28, 1930. A solder for Fe or steel is composed of an alloy of Cu and Ni, to which a more easily fusible metal such as Zn, Sn, Pb, Al or Cd may be added.

Soldering. I. G. FARBENIND. A.-G. Fr. 691,242, Mar. 6, 1930. Metals for soldering are made by decompn. of their carbonyl compds.

Soldering metals. LA SOUDURE AUTOGÈNE FRANÇAISE. Fr. 688,915, April 17, 1929. In soldering easily oxidizable metals by blowpipe, the flame is surrounded by a gaseous sheath of hydrogen.

10—ORGANIC CHEMISTRY

CHAS. A. ROUILLER AND CLARENCE J. WEST

Oxidation of "triisobutylene" by ozone. ROBERT J. MCCUBBIN. *J. Am. Chem. Soc.* 53, 356–9(1931); cf. M. and Adkins, *C. A.* 24, 3483.—"Triisobutylene," b$_{14}$ 175.5–9°, with O_3 in AcOH contg. 1.5–2% Ac_2O, gives as oxidation products an av. yield of 0.38 mol. Me_3CCHO, 0.40 mol. Me_3CCH_2Ac, 0.18 mol. $(Me_3CCH_2)_2CO$ and 0.16 mol. $(Me_3C)_2CMeAc$. These results indicate that triisobutylene exists in at least 3 isomeric forms, present in an approx. ratio of 2 mols. of $Me_3CCH_2CMe{:}CHCMe_3$ and 1 mol. each of $Me_3CC(CMe_3){:}CMe_2$ (I) and $Me_3CCH_2C(:CH_2)CH_2CMe_3$. It also seems apparent that during hydrolysis of the ozonide the hydrocarbon of formula I

undergoes a pinacolone rearrangement instead of breaking down into 2 simple ketones. C. J. WEST

Synthesis and pyrolysis of methylallene and ethylacetylene. CHARLES D. HURD AND RICHARD N. MEINERT. *J. Am. Chem. Soc.* **53**, 289–300(1931).—MeCHBrCHBr-CH_2Br b_{14} 100–1°, n^{20} 1.5680; NaOH gives 86% of *MeCHBrCBr:CH*$_2$, b_{20} 75°, $n^{2}_{D}{}^{8}$ 1.5556, n^{20}_{D} 1.5464, $n^{26}_{D}{}^{5}$ 1.5430, dn/dT = —0.00053; Br in CCl_4 gives $MeCHBrCBr_2$-CH_2Br, m. —2°, b_7 97.5°, d^{20}_4 2.510, $n^{3.6}$ 1.6152, n^{20} 1.6070; Zn dust in EtOH gives 72% of $MeCH:C:CH_2$, b. 10.3°, d^{0}_4 0.676, $n^{1}_{D}{}^{3}$ 1.4205. This polymerizes when pyrolyzed, the *compd.* C_8H_{12}, b. 110–5°, n^{27} 1.4758, being isolated; in addn. to the polymers CH_4, C_2H_6, C_2H_4, H, C_3H_8 and allene are formed in small amts. EtC : CH has been prepd. from CH : CNa and Et_2SO_4 in 60% yields. In its pyrolysis from 33 to 50% of the material is converted into liquids which resemble the liquids formed from $MeCH:C:CH_2$, $CH_2:C:CH_2$ and MeC : CH. In addn. to the liquids there were produced paraffin hydrocarbons, H, C_2H_4 and C_3H_6 in the ratio approx. of 9.3:2.2, as well as small quantities of C_4H_6, MeC : CH and $CH_2:C:CH_2$. C. J. WEST

Thermal chlorination of methane by a flow method. ROBERT N. PEASE AND GEO. F. WALZ. *J. Am. Chem. Soc.* **53**, 382(1931).—The thermal (non-catalytic) chlorination of CH_4 by the flow method takes place readily in Pyrex glass above 200° at 1 atm. total pressure; the reaction is homogeneous and is bimol. At 225–300° the reaction is inhibited by O; at 375° 5% O has no measurable effect; this effect of O points to a chain mechanism. C. J. WEST

Photochemical reactions of gaseous methyl iodide. JOHN R. BATES AND ROBERT SPENCE. *J. Am. Chem. Soc.* **53**, 381(1931).—Studies of the photochem. decompn. and oxidation of gaseous MeI supports the idea that Me and I are the initial products (cf. *C. A.* **25**, 249); the reaction products are HCHO, $(CH_2O)_x$ and $CH_2(OMe)_2$, as well as free I. C. J. WEST

Alkyl peroxides. V. Barium methyl peroxide. ALFRED RIECHE AND FRITZ HITZ. *Ber.* **63B**, 2504–5(1930); cf. *C. A.* **24**, 1078.—$Ba(OH)_2$ is added to 30–50% aq. MeO_2H soln. in excess and the Ba salt pptd. by alc. The salt is too explosive to be entirely freed from alc. RCOCl give RCO_2OMe which are easily decompd. into MeO_2H and acid *p*-$C_6H_4(CO_2OMe)_2$, m. 125°, is stable. **VI. Monohydroxydialkyl peroxides.** ALFRED RIECHE. *Ibid* 2642–52(1930).—These are prepd. by allowing 5% Et_2O solns. of aldehyde and HO_2R to stand a day. The Et_2O is evapd. and the residue distd. *in vacuo*. Traces of H_2O cause explosions. $CH_2(OH)O_2Me$, b_{17} 45°, d^{15}_4 1.112, n^{15}_{D} 1.4083, reacts with alkali: $2\ MeO_2CH_2OH = 2.5\ HCO_2H + 1.5\ MeOH + 2\ H$. CH_2-$(OH)O_2Et$, b_{12} 46–8°, d^{16}_4 1.045, n^{16}_{D} 1.4043, is decompd. by alkali but according to no simple equation. With $Fe(SO_4)_2$ EtOH and HCO_2H result. $MeCH(OH)O_2Me$, b_{22} 29–31°, d^{15}_4 1.029, n^{15}_{D} 1.3930, decomps. with alkali in no simple way. $Fe(SO_4)_2$ also gives no simple reaction. $EtCH(OH)O_2Et$, b_{10} 50–52°, $d^{21.4}_4$ 0.974, $n^{21.4}_{D}$ 1.4021. Higher aldehydes yielded only mixts. V. F. HARRINGTON

Oxidation of sulfides with benzoyl peroxide. IV. L. N. LEVIN AND I. CHULKOV. *J. prakt. Chem.* **128**, 171–9(1930); cf. *C. A.* **24**, 4257.—$CH_2:CClSCH_2CH_2Cl$, b_4 92°, d^{20}_4 1.3123, n^{20} 1.5502, with Bz_2O_2 (1.85 g. active O for 18.2 g. sulfide) at —10° gives about 18 g. of *α-chlorovinyl β-chloroethyl sulfoxide*, b_4 104°, does not solidify at —20°, d^{20}_4 1.4048, n^{20} 1.5011; further oxidation gives the *sulfone* (also obtained from the sulfide and a larger amt. of Bz_2O_2), $b_{2-3.5}$ 108–9° (slight decompn.), d^{20}_4 1.4366, n^{20} 1.5238. Similarly, $ClCH:CHSCH_2CH_2Cl$, b_4 99°, d^{20}_4 1.3103, n^{20} 1.5490, with Bz_2O_2 gives a small amt. of $OS(CH_2CH_2Cl)_2$ and *β-chlorovinyl β-chloroethyl sulfoxide*, d^{20}_4 1.3924, n^{20} 1.5416, decomps. at 80° and 4 mm.; the sulfone, b_2 125–7°, d^{20}_4 1.4384, n^{20} 1.5306; a by-product is a compd. m. 109–11°, which was not identified. The results of 21 oxidations of the sulfides, sulfoxides and sulfones are given in a table. C. J. WEST

Reaction between certain organic sulfur compounds and sodium in liquid ammonia. F. F. WILLIAMS AND E. GEBAUER-FUELNEGG. *J. Am. Chem. Soc.* **53**, 352–6(1931).—Aliphatic sulfides react with Na in liquid NH_3 chiefly according to the equation: $R_2S + 2\ Na + NH_3 = RSNa + NaNH_2 + RH$. Under the same conditions, aliphatic disulfides are reduced quant. to the corresponding mercaptides: $R_2S_2 + 2\ Na = 2\ RSNa$. Aliphatic mercaptans react as follows: $RSH + NH_3 = RSNH_4$; $RSNH_4 + Na = RSNa + NH_3 + 0.5H_2$. No Na_2S is produced in any of these reactions; the reaction stops with the formation of mercaptide. C. J. WEST

Pentachloromethyl ether. IGNACY RABCEWICZ-ZUBKOWSKI AND STEFAN CHVA-

LIŃSKI. *Roczniki Chem.* **10**, 686–9(689 English)(1930).—By chlorination of $(CH_2Cl)_2O$, under the influence of ultra-violet light, *pentachloromethyl ether*, CCl_3OCHCl_2, is formed, b_{760} 158.5–9.5°, b_{30} 69–70°; a colorless liquid of a specific odor, insol. in H_2O, sol. in org. solvents, $d^{17.3}$ 1.6496, n_α 1.4772, n_β 1.4825, n_β 1.4879. When heated with water it decomps. slowly, giving CO, CO_2, HCl, CCl_4 and other products. With aq. $PhNH_2$ $CO(NHPh)_2$ is formed. J. KUČERA

Preparation of nitromethane. PETER P. PRITZL AND HOMER ADKINS. *J. Am. Chem. Soc.* **53**, 234–7(1931).—In the reaction of $ClCH_2CO_2Na$ and $NaNO_2$, mol. quantities being used, approx. 50% of the $NaNO_2$ is converted into $MeNO_2$, while about 24% gives $MeNO_2$ which undergoes further condensation to what is presumably the Na salt of methazonic acid. About 26% of the $NaNO_2$ does not react, chiefly because 15% or more of the $ClCH_2CO_2Na$ undergoes hydrolysis to Na glycolate. The formation of $MeNO_2$ may be increased to approx. 75% of the theory if a sufficient excess of $ClCH_2CO_2Na$ is used to insure the complete reaction of the $NaNO_2$. The actual yields of $MeNO_2$ obtained were about 9% lower than those given above, because of mech. losses on the scale of operation used in obtaining them. The wt. of $MeNO_2$ actually obtained may be increased by about 10% by modifying the standard method so that the $ClCH_2CO_2Na$ is introduced into the $NaNO_2$ soln. after the latter has been heated to the temp. of the reaction. A method is described for the *detn. of* $NaNO_2$ in the presence of NO_2 and methazonic acid and its condensation products C. J. WEST

Silica gel as a catalyst in the preparation of nitriles. JAMES A. MITCHELL AND E. EMMET REID. *J. Am. Chem. Soc.* **53**, 321–30(1931).—Silica gel is a more efficient catalyst than either thoria or alumina in the prepn. of nitriles from acids and NH. The optimum operating temp. for the reaction is 500°; at higher temps. the catalyst becomes foul; at these higher temps. $(NH_4)_2CO_3$ is formed. With AcOH, when the time of contact is 25 sec. at 500°, the % conversion is 95%; the yield is only 60% when the rate of flow is twice as fast. Highly purified gel and com. gel are of the same order of activity. The life of the catalyst is long with the acids and short with the esters studied. From the acids the following yields were obtained: MeCN 95%; EtCN 85%; PrCN 90%; BuCN 80%; iso-BuCN 94%; $C_6H_{11}CN$ 90%; $C_8H_{13}CN$ 93%; $C_{11}H_{21}CN$ 55%; $PhCH_2CN$ 87%; $PhCH_2CH_2CN$ 81%; no cyanide was obtained from palmitic acid. From the esters the following yields were obtained: MeCN 87%; PrCN 75%; PhCN 77%. The catalyst is only active in dehydrating amides and is not effective in the establishment of the NH_3-acid amide-H_2O equil. C. J. WEST

Organic tin compounds. J. G. F. DRUCE. *Chemist and Druggist* **112**, 643(1930); cf. *C. A.* **23**, 1870, 4670.—A review is given of the inter-relation of stannane, stannonic acid and the various halogen derivs. of stannane (stanniform, etc.), analogous to $CHCl_3$, etc The prepn. of the chief compds. is briefly described. S. WALDBOTT

Decomposition of ketones in the presence of silica gel. JAMES A. MITCHELL AND E. EMMET REID. *J. Am. Chem. Soc.* **53**, 330–7(1931).—The principal condensation product of Me_2CO in the presence of silica gel at 400–550° is 1,3,5-$C_6H_3Me_3$ (I); at 500° a 17% yield of I is obtained. This is the only catalyst that has effected this reaction at atm. pressure. The primary products in the homogeneous unimol. decompn. of Me_2CO are ketene and CH_4; the ketene then decomps. bimolecularly to C_2H_4 and CO. In the presence of silica gel at 460° the highest % of ketene produced was 4.4%, 65% of the Me_2CO being decompd. The gas evolved at this temp. contained 9% CO, 17% CH_4, 28% CO_2, 40% unsatd. hydrocarbons and 3% H. These facts show that the homogeneous decompn. of Me_2CO in the presence of silica gel is taking place to only a minor extent at the temp. employed. The presence of a small quantity of MeC:CH in the gaseous products would indicate that the mechanism of the formation of I is dehydration of the Me_2CO to MeC:CH and polymerization of the latter. Condensation products other than I are mesityl oxide, phorone, isophorone and xylitone. The gaseous fractions at 400°, 450°, 470° and 500° were also analyzed. An analogous reaction does not take place with MeEtCO to an appreciable extent, ketonic condensation products only are produced, homomesityl oxide, homophorone and homoisophorone being identified. A typical analysis of the gaseous products gave 15.5% CO_2, 12% CO, 15% unsatd. hydrocarbons, 2.2% H_2 and 30% CH_4. PhAc gives 1,3,5-$C_6H_3Ph_3$. C. J. WEST

Certain wax in rice polishings. UMR TANGE. *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) **14**, 275–7(1930).—From rice polishings, melissyl cerotate was prepd. and identified. Extn. of rice polishings with 90% EtOH and subsequent cooling gave a ppt. of melissyl cerotate which was analyzed for C and H. Sapon. gave cerotic acid, isolated as the Ca salt, insol. in benzene, and melissyl alc., sol. in benzene. The Ca cerotate was hydrolyzed to cerotic acid which was recognized as such by analysis, by the acid value, m. p. and other properties. The melissyl alc. was identified by analysis

for C and H, and by formation of melissyl acetate with a further recognition of its m. p. and analysis. N. M. NAYLOR

Carbonyls and nitrosyls. IV. HANS REIHLEN, A. GRUHL, G. v. HESSLING AND O. PFRENGLE. *Ann.* **482**, 161–82(1930); cf. *C. A.* **23**, 4674.—The compd. to which Manchot and Gall (*C. A.* **23**, 3870) attributed the formula $FeNO.2MeOH$ is more accurately represented as $Fe_2(NO)_2(OMe)_2OH$. It is decompd. almost exclusively to ferrous salt by dil. H_2SO_4 in the cold if the HNO_2 simultaneously formed is immediately removed. $Ni(CO)_4$, MeOH and NO with a trace of H_2SO_4, with exclusion of moisture and atm. O, give the *compd.* $NiNO.OMe.OH$ + MeOH, green, which readily loses a mol. of MeOH. It does not undergo autoxidation as readily as the Fe compd. but is stable to hydrolysis. $Fe(CO)_5$ and boiling MeOH in ultra-violet light give Fe-, MeOH and the *compd.* $FeCO.OMe.OH$, which tends to lose CO but not MeOH in high vacuum. Long heating of $Fe(CO)_5$ with butadiene gives the *compd.* $Fe(CO)_3.C_4H_6$, b. 20.5 30° in a high vacuum. Less well-defined compds., approx. to $Fe(CO)_3.C_5H_8$, $Fe(CO)_3.(C_5H_8)_2$ and $Fe(CO)_3.(C_6H_{10})_2$, are obtained with isoprene and β,γ-dimethylbutadiene. C. J. WEST

Decomposition of acetic acid in the presence of silica gel. JAMES A. MITCHELL AND F. FAIRBET REID. *J. Am. Chem. Soc.* **53**, 338–43(1931).—In passing AcOH over silica gel the max. yield (29%) of Me_2CO is obtained at 430–60°; above 400° appreciable decompn. of the Me_2CO formed becomes noticeable. With aq. AcOH a greater proportion of the decompd. acid is obtained as Me_2CO; this would indicate that the proportion of H_2O vapor present influences the rate of decompn. of the Me_2CO in accord with the results of Kultashev and Kudryasheva (*C. A.* **19**, 2443). Purified and com. gel were equally effective catalysts. Some of the CO_2 formed results from the reaction $AcOH \rightarrow CH_4 + CO_2$. From 40 to 60% of the Me_2CO originally formed in the reaction is decompd., depending upon the temp. of the reaction. C. J. WEST

The preparation of the ethyl ester of 10-octadecenic acid by partial reduction of the corresponding ester of 9,11-octadecadienic acid and the acid itself as a member of the series of the elaidic acids. J. BÖESEKEN AND R. HOEVERS. *Rec. trav. chim.* 49, 1065–76(1930).—Boeseken *et al.* (*C. A.* **22**, 219; **24**, 2985) have shown that the reaction of Et α-eleostearate proceeds according to Thiele's principle, first with the formation of the Et 10,12 octadecadienate and subsequently with the formation of the Et 10-octadecenate. The present paper deals with the partial hydrogenation of the Et 9,11-octadecadienate, which again proceeds according to Thiele's theory with the formation of the Et 10 octadecenate. Ricinolic acid, prepd. by sapon. of castor oil with alc. KOH, was converted into ricinelaidic acid, m. 52°, by means of 50% HNO_2, contg. HNO_3. The acid was dehydrated by distn. under reduced pressure in the presence of Ni as a catalyst; the yield of 9,11-linolic acid, m. 53°, was, however, only 15%. The Et ester, prepd. in the usual way, b. 156° in the cathodic vacuum, $n_D^{18°}$ 1.4720. The hydrogenation was carried out with Ni as a catalyst at 180°, the process being stopped after addn. of 1 mol. H, and gave the Et 10-octadecenate, d^{18} 0.8757, n_D^{18} 1.4550. On saponn. the octadecenic acid, m. 42° from petr. ether, was obtained, the constitution being established by ozonization in $CHCl_3$, which, after oxidation of the fission products of the ozonide, gave caprylic acid, b. 236°, and sebacic acid, m. 133°. The curve representing the connection between the m. p. and the place of the double bond shows the acid to belong to the elaidic series, especially on comparing the 2-, 6-, 9- and 11-octadecenic acids, which have been recognized as elaidic acids with certainty. C. F. VAN DUIN

Action of maleic anhydride on 9,11-octadecadienic acid and its ethyl ester. The products of the dehydration of ricinoleic acid. J. BÖESEKEN AND R. HOEVERS. *Rec. trav. chim.* 49, 1165–8(1930).—The reaction of Diels (*C. A.* **24**, 356) between compds. with a conjugated system and maleic anhydride also takes place with 9,11-linolic acid and its Et ester, although the formation of 4 isomers is possible (*cis-1-cis-2-cis-3; cis-1-cis-2-trans-3; cis-1-trans-2-cis-3; trans-1-cis-2-trans-3*) the formation of one of these seems to be favored to a degree that a simple compd. and not a mixt. is obtained. The reaction between the 9,11-linolate and maleic anhydride gives a deriv. of the anhydride of tetrahydrophthalic acid, m. 60°, which is hydrogenated *in AcOH with Pt* to the satd. analog m. 27°; the hydrogenation with Ni takes also another course, for after having taken up 1 mol. H, unsatd. compds. are still present (I no.), while the mol. wt., detd. by titration with alkali, is 424 (calcd. 408). On heating maleic anhydride with 9,11-linolic acid, a reaction product m. 88° is formed; both the products m. 60° and 88°, mentioned above, on hydrolysis give a tri-CO_2H acid, which could not be obtained in the cryst. state, only a vitreous mass being obtained. On boiling the latter with Ac_2O the anhydrides m. 60°

and 88° are formed again. This method has now been used to elucidate the dehydration of ricinoleic acid, which only gives a small quantity of 9,11-linolic acid (cf. preceding abstr.). The reaction product of the dehydration was esterified and brought into reaction with maleic anhydride, the excess of the latter being estd. by titration with alkali of the aq. ext. of the reaction product. In this way it was found that 75% of compds. with a conjugated system were formed; by distn. of the reaction product in a cathodic vacuum a mixt. of esters of linolic acids with 2 sepd. double bonds (9,10 and 12,13) were obtained (15%). The residue of this distn. only gives a small quantity of the compd. m. 60° described above, from which it follows that several linolic acids (9,11) are formed in the dehydration. A small quantity of an aldehydic substance could be isolated from the reaction product before its esterification on cooling at —10° during 24 hrs.; it was not investigated further. C. F. VAN DUIN

Polymerization of methyl esters of high, unsaturated fatty acids. V. Esters containing a four-carbon ring. K. KINO. *J. Soc. Chem. Ind., Japan* **33**, Suppl. binding, 444–5(1930)(in German); cf. *C. A.* **25**, 71.—The Me ester, $C_{21}H_{33}CO_2Me$ (5 double bonds), was heated under H_2 at 290–300° for 20 min. The ester of the new, intramolecularly combined mono-CO_2H acid was sepd. from higher-boiling polymers by distn. *in vacuo*. The sapon. no., I no. and mol. wt. of the acid corresponded to a monomeric compd., $d_4^{20.6}$ 0.9192, $n_D^{30.6}$ 1.4820, M. R. 105.75, calcd. for $C_{22}H_{34}O_2Me$ (3 double bonds) 101.27. The acid was hydrogenated, and the solid fatty acid, isolated as the Pb salt from alc., m. 79–9.3°. Though its m. p. was 1° higher, it was probably identical with a previously found compd., which was assumed to contain the 4-C ring. K. H. ENGEL

Products of the action of chlorosulfonic acid on butyryl chloride at room temperature. M. KRAJČINOVIČ. *Ber.* **63B**, 2276–8(1930); cf. *C. A.* **23**, 3662.—The study of the products of the action of $ClSO_3H$ on AcCl and EtCOCl has been extended to the products formed from PrCOCl at room temp. The reaction is gradual, quite slow and accompanied by a continuous evolution of HCl and CO. From the reaction mixt., after decompn. with H_2O, no $EtCH(SO_3H)CO_2H$ could be isolated, as in the case of AcCl and EtCOCl. Extn. with Et_2O yielded Pr_2CO, b. 144°. The results with the 3 chlorides indicate that the greater the no. of C atoms they contain, the fewer no. of mols. condense with each other. Thus, 4 mols. of AcCl condense to form 2-methyl-1,4-pyrone-6-acetyl chloride, 3 mols. of EtCOCl to form α-ethyl-β,β'-dimethylpyronone and only 2 of PrCOCl to form Pr_2CO. Furthermore, the condensation products of AcCl are obtained only at higher temps., whereas those of the EtCOCl and PrCOCl are decompd at the higher temps. and can be isolated only at room temp. C. A. R.

A method of preparation of thio acids, especially chlorothioacetic acid. F. ARNDT AND NADJI BEKIR. *Ber.* **63B**, 2390–3(1930).—*Chlorothioacetic acid*, $ClCH_2COSH$ (I), light yellow, b_{14} 46°, is obtained in 24-g. yield from 50 g. $ClCH_2COCl$ and 1 g. anhyd. $AlCl_3$ treated 8–9 hrs. in ice with dry H_2S. MeCOSH, b. 93°, is similarly obtained in 40% yield from AcCl at an initial temp. of —15°. I is little sol. in H_2O and does not fume when freshly distd. but after some time it begins to decomp. Although all its properties pointed to the structure $ClCH_2COSH$, there is in the literature a hitherto uncontradicted statement that when $ClCH_2COCl$ reacts with mercaptans it is the Cl in the CH_2Cl, not the COCl group, which reacts. Stollé believed that the compd. m. 38° obtained from $ClCH_2COCl$ and *p*-MeC_6H_4SH is $MeC_6H_4SCH_2COCl$ (II) but it is really $ClCH_2COSC_6H_4Me$ (III), as had been assumed 5 yrs. before by v. Auwers and Arndt, for the true II, obtained from *p*-$MeC_6H_4SCH_2CO_2H$ with PCl_5, is a liquid with the typical penetrating odor of acid chlorides and is rapidly hydrolyzed by H_2O to $MeC_6H_4SCH_2CO_2H$, while III is quite stable toward H_2O and is only slowly dissolved by even hot alkali, acids pptg. $MeC_6H_4CH_2CO_2H$, resulting from the combination, in the alk. soln., of the products of hydrolysis (MeC_6H_4SH and $ClCH_2CO_2H$). The product of the reaction between $ClCH_2COCl$ and MeSH is therefore $ClCH_2COSMe$ (IV), and is also obtained from I with CH_2N_2, thus establishing the structure of I. In attempts to prep. thioglycolide from I, it was found that I at first dissolves clear in a little Na_2CO_3 but there soon seps. an oil of penetrating nauseating odor. In 1 expt. on a small scale there was isolated, by extn. with Et_2O, a substance, m. 86°, of the same odor, but this could not be reproduced on a larger scale, the product being for the most part neither distillable nor crystallizable. Apparently, the auto-alkylation of I results only to a minimal extent in the formation of cyclic products of low mol. wt. The $HSCH_2COCl$ isomeric with I is not formed from $HSCH_2CO_2H$ and $SOCl_2$ (Holmberg) and PCl_5 gives a relatively low-boiling (b_{12} 93°) *liquid* (V) having apparently the structure $S(CH_2COCl)_2$.

Cf. IV b. 160°, b_{12} 58°. ***Bis(chloroacetyl) sulfide* (65% from I and 1 mol. $ClCH_2COCl$**

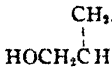
refluxed 1–1.5 hrs. in CCl_4), m. 47°, b_{11} 130°, becomes violet, then dark brown and resinous in a few days, even in sealed tubes, and shows not a trace of the toxic properties of $(ClCH_2CH_2)_2S$. *p-Tolylthioglycolyl chloride* (II), b_{18} 149° (slight decompn.). V fumes in the air and with H_2O evolves HCl with a hissing sound; in sealed tubes it decomps. in a few days to a gelatinous mass and at 120° or in contact with concd. HNO_3 it explodes with formation of a voluminous carbonaceous mass. C. A. R.

Methanetrisulfonic acid. H. J. Backer (with K. H. Klaassens). *Rec. trav. chim.* **49**, 1107–17(1931).—$CH(SO_3H)_3$ has already been prepd.: (1) by Theilkuhl (*Ann.* **147**, 134(1868)) on heating Ca Me sulfate with $H_2S_2O_7$; (2) by Bagnall (*J. Chem. Soc.* **75**, 278(1899)) on sulfonating Ac derivs. of aromatic amines; (3) by oxidation of $HSC(SO_3H)_3$ (Albrecht, *Ann.* **161**, 139(1872); cf. Backer, *C. A.* **24**, 76); (4) by the action of K_2SO_3 on $O_2NCH(SO_3H)_2$ (Rathke, *Ann.* **167**, 219(1873)), which is formed by the action of K_2SO_3 on O_2NCCl_3; it is, however, to be recommended to isolate the $O_2NCH(SO_3H)_2$, which is formed as an intermediate product; (5) on heating $N_2C(SO_3H)_2$ with acids, water or $KHSO_3$ (von Pechmann, *Ber.* **28**, 2382(1895); Fantl and Fisch, *C. A.* **24**, 1841); (6) by sulfonation of $CH_2(SO_3H)_2$. All these methods, except 1, are discussed in the present paper. *Method 6:* On heating $CH_2(SO_3H)_2$ with SO_3 (2.5 mols.) during 5 hrs. at 170°, $CH(SO_3H)_3$ may be obtained as the K salt with 10% yield. *Method 2:* sulfonation of PhNHAc 0.5 mol. AcNHPh is introduced slowly into 600 g. fuming H_2SO_4 contg. 35% SO_3, the mixt. being heated 3 hrs. at 130° with mech. stirring; yield of the tri-K salt 57%; on carrying out the same reaction with succinanilide, a small yield of the same compd. was obtained. *Method 3:* 0.1 mol. $HSC(SO_3K)_3$, in 1 l. water is oxidized at room temp. by a current of Cl with the gradual addn. of 80 g. $KHCO_3$; yield 90%. *Method 4:* $O_2NCH(SO_3H)_2$ was prepd. according to Rathke (*loc. cit.*) by adding 82 g O_2NCCl_3 gradually to 450 g. K_2SO_3 in 900 cc. water, heated to 75°, and keeping the temp. at 80°; yield 40% of the anhyd. di-K salt, which dissolves in water at 25° to the extent of 1.16%. The normal strychnine salt of $O_2NCH(SO_3H)_2$ crystallizes with 3.5 H_2O, the free acid itself with 2 H_2O while the normal Na and Tl salts crystallize without H_2O; both the latter salts are easily sol. in water. On heating the K salt with K_2SO_3 in a sealed tube at 140°, $CH(SO_3K)_3$ is obtained in 67% yield. *Method 5:* $N_2C(SO_3K)_2$, prepd. according to von Pechmann (*loc. cit.*), may be converted into $CH(SO_3H)_3$ by the action of $KHSO_3$ at 60° and finally on the water bath (yield 62%), decomp. the compd. with water or introducing it into dil. HCl, the latter reaction giving a 40% yield. On introducing the diazo compd. into concd. HCl at 0°, $ClCH(SO_3H)_3$ is obtained. The following salts of $CH(SO_3H)_3$ and the acid itself were prepd. in the usual way: The *tri-acid* with 3.5 H_2O, m. 156°; the *tri-K salt*, rhombic prisms with 1 H_2O; 100 g. of water dissolve at 25°, 1.202 g. of the anhyd. salt and 1.261 g. of the crystd. salt. Crystallographic properties (P. Terpstra): rhombic system, bisphenoidic class D_2; $a:b:c$ = 0.9977 : 1 : 1.3604. Forms: a = (100); b = (010); c = (001); p = (101); m = (110); o = (111); ω = (1$\bar{1}$1); q = (011); s = (121); angles: $a:m$ = 44° 56′; $c:p$ = 52° 38′; $o:s$ = 19° 28′, $b:\omega$ = 51° 34′; $c:q$ = 52° 36′; $o:s$ = 19° 22′. The crystals obtained by evapn. at ordinary temp. have a larger dimension in the direction of the b-axis. The crystals show a marked piezoelectricity; the plane of the optical axes is (001); the a-axis is the sharp bissectrix; $\rho < v$. For Na light $2E$ 83° 1′; α = 1.513; β = 1.5253; γ = 1.5270; $2V$ = 51° 45′. The *tri-Tl salt* also contains 1 H_2O; crystallographic properties (P. Terpstra): rhombic system, bisphenoidic class; $a:b:c$ = 0.9971 : 1 : 1.3009, forms: m = (110); p = (101); q = (011); ω = (1$\bar{1}$1); o = (111); the crystals possess either the form o or the form ω, which have never been found to occur in the same crystal. Angles: $m:m$ = 90° 10′; $p:p$ = 105°4′; $q:q$ = 104°54′; $\omega:\omega$ = 123°0′; $p\omega$ = 38° 20′; $\omega:q$ = 38°29′. The plane of the optical axes is (001); the sharp bissectrix (010). By means of a prism formed by (1$\bar{1}$1) and (1$\bar{1}$1) the refractive index β has been found to be 1.739, 1.743, 1.768 for λ = 578, 546, 436, resp. The crystals are piezoelectrical. The *tri-Ag salt* contains 1 H_2O; the *Ba salt*, 9 H_2O; the latter is difficultly sol. in water, only to the extent of 0.1%. On mixing without precautions the solns. of the K salt and $BaCl_2$, a *double salt of Ba and K* is obtained, $CHO_9S_3KBa.3H_2O$, which, after several recrystns. from a large amount of water, gives the pure Ba salt. The *Ca salt* contains 12 H_2O and the *La salt* 6 H_2O (cf. Backer and Klaassens, *C. A.* **24**, 4729). C. F. van Duin

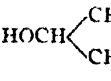
The preparation, properties and uses of glycerol derivatives. I. Glycerol ethers. A. Fairbourne, G. P. Gibson and D. W. Stephens. *Chemistry and Industry* **49**, 1021-3(1930).—F., G. and S. describe the prepn. of derivs. of glycerol: *monochlorohydrin*, $CH_2ClCH(OH)CH_2OH$ (I), in 86% yield from glycerol + 2% HOAc + HCl gas at 100°, b_{15} 98–100°, b_{40} 141, d_4^{25} 1.313; $CH_2ClCH(OH)CH_2Cl$ (II), made as I at 130°

(yield, 82%), b_{40} 92°, b_{760} 176°, d_4^{25} 1.359; $O.CH_2.CHCH_2Cl$ from II by the action of NaOH (yield 90%), b_{760} 116–7°, d_4^{20} 1.18. $C_3H_5(OH)_2ONa$ (III) was prepd. by heating equimol. quantities of glycerol and NaOH. Monoethers are prepd. in good yields by ROH and NaOH on I. α- and β-Monoethers as well as the di- and triethers can be prepd. from III and Me_2SO_4. In the following is listed the b. p. at diminished pressure, followed by b_{760}, d_4^{25}, n_D^{25}, and soly. in water: α-Me, b_{40} 135.5–6°, 220°, 1.111, 1.442, miscible; β-Me, b_{10} 147–8°, 230°, 1.124, 1.446, miscible; Et, b_{10} 112–3°, 222°, 1.063, 1.441 (20°), miscible; iso-Am, b_{10} 136–8°, 254°, 0.976, 1.440, 1%; $PhCH_2$, b_2 164–6°, —, 1.130, 1.530, 1%. Tolyl (mixt. *o*, *m*, *p*), b_1 155–160°, —, 1.127, 1.534, 1%. The same information is given for the following glycerol diethers: α,β-di-Me, b_{40} 99–100°, 180°, 1.016, 1 421, miscible; α,γ-di-Me, b_{40} 88–9°, 169°, 1.004, 1.417, miscible; di-Et, b_{60} 108–110°, 191°, 0.952, 1.419 (23°), miscible; diiso-Pr, b_{60} 123–4°, 199°, 0.914, 1.418, 20%; di-Pr, b_{60} 135–7°, 218°, 0.926, 1.424, 8%; diiso-Am, b_4 120–1°, 265°, 0.901, 1.431, 1%; dibenzyl, b_2 198–204°, —, 1.101, 1.547, insol; ditolyl (mixed), b_{20} (steam) 200–210°, —, 1.101, 1.552 (23°), insol.; di-*o*-tolyl, b_2 195–7°, —, 1.111, 1.556, insol.; di-*m*-tolyl, b_2 205–7°, —, 1.105, 1.558 (24°), insol.; di-*p*-tolyl, solid m. 88°, insol. in H_2O. Glycerol triethers: tri-Me, —, 148°, 0.937, 1.401, miscible; tri-Et, b_{60} 103–5°, 181°, 0.886, 1.407, 10%. Glycerol ether acetates: α-Me diacetate, b_{40} 139–40°, 228°, 1.097, 1.422, miscible; β-Me diacetate, b_{40} 144–5°, 232°, 1.100, 1.424, miscible; Et diacetate, b_{10} 117–9°, 234°, 1.062, 1.421, 10%; α,β-di-Me acetate, b_{10} 108–9°, 195°, 1.027, 1.414, miscible; α,γ-di-Me acetate, b_{40} 105–6°, 191°, 1.025, 1.413, miscible; di-Et acetate, b_{60} 127–9°, 208°, 0 979, 1.414, 13%. These compds. may be used as solvents for oils, nitrocellulose, gums, resins. A brief discussion of their use as lacquer solvents is given. G. R. YOHE

A new acetoneglycerol (α,α′-isopropylideneglycerol). NEAL M. CARTER. *Ber.* **63B**, 2399–400(1930).—The structure I has been established for ordinary acetoneglycerol by Irvine, Macdonald and Soutar. Recently, Bergmann and C. described a method of prepg. β-glycerides by which they obtained $BzOCH(CH_2OH)_2$, m. 72°, to establish the structure of which they condensed it with Me_2CO to β-benzoyl α,α′-isopropylideneglycerol (II). This proved to be different from the known α-benzoyl acetoneglycerol. By sapong. II with alkali, C. has now obtained *α,α′-isopropylideneglycerol* (III), b_{12} 90–1°, d_4^{20} 1.0911, n_D^{20} 1.4427 (the corresponding values for I, detd with the same instruments, are 87–8°, 1.0691, 1.4352). Rebenzoylation gave 70% II (probably the true yield was much higher, since the great soly. of II in all org. solvents makes its quant isolation difficult).



(I)



(III)

C. A. R.

Oxidation-reduction potentials of certain sulfhydryl compounds. EARL K. FISCHER. *J. Biol. Chem.* **89**, 753–63(1930).—The oxidation-reduction potentials of $HSCH_2CO_2H$, $HSCH_2CH_2OH$ and $HSCH_2CH(OH)CO_2H$ can be derived from the concn. of hydrion and of reduced substance (−SH compd.) according to the equation of Dixon and Quastel (*C. A.* **18**, 380), by selecting an arbitrary value for E_1. By electrometric titration with I_2 and $K_3Fe(CN)_6$, however, it is shown that the potentials depend also on the presence of an oxidized form, presumably an intermediate compd., when the p_H is kept const. For the above compds. and cysteine, the value of E_0 between p_H 3 and 7 = 0.44 v. approx. K. V. THIMANN

Mechanism of the formation of hydrazones from diazonium compounds and alkyl derivatives of acetylacetic, malonic and cyanoacetic esters. G. FAVREL *Bull. soc. chim.* [4], **47**, 1290–1300(1930).—According to Japp and Klingemann (*Ber.* 20, 2942(1887)) diazonium compds. react with alkylacetylacetic esters in alk. soln. to form hydrazones. J. and K. represent the reaction in 1 step. F. believes that it should be represented as taking place in 3 steps: (1) formation of H_2O and a mixed azo compd.; (2) action of the mixed azo compd. with NaOH to give AcONa and a new mixed azo compd.; (3) the mol. rearrangement of this new azo compd. to give a hydrazone isomeric with it. F. has attempted to isolate the mixed azo compd. formed in the first step. *m*-$C_6H_4(NH_2)NO_2$ (0.1 mol.) was diazotized in HCl, and excess AcONa soln. added to give an AcOH soln. of the diazonium hydroxide (I). Powd. $CaCO_3$ was then added to this soln. at 0°, until it contained 0.05 mol. AcOH per 0.1 mol. of I. An equimol. quantity of $CHEtAcCO_2Et$ in 30 cc. Et_2O was added, and the whole kept at 0° for 30

min. The sirup from the Et_2O ext. gave after 3 months crystals of Et *m*-nitrophenylazoethylacetylacetate, *m*-$O_2NC_6H_4N$:NCEtAcCO$_2$Et, m. 132–3°, pale yellow, decompd. by dil. alkali and by H_2O. From I and CHMeAcCO$_2$Et was obtained *m*-$O_2NC_6H_4N$:NCMeAcCO$_2$Et, m. 122–3°, decompd. by dil. alkali. Diazonium compds. of toluidines, chloroanilines, bromoanilines, etc., gave with alkylacetylacetic esters liquids which could not be purified, and which were probably mixed azo compds., since they were hydrolyzed by H_2O or dil. alkali to hydrazones. Using the method of condensation described above, the tetrazonium hydroxide (II) formed from benzidine gave, when condensed with CHEt(CO$_2$Et)$_2$ (III), [C_6H_4NEtN:C(CO$_2$Et)$_2$]$_2$, m. 112–4°; with CHMe(CO$_2$Me)$_2$ II gave [C_6H_4NMeN:C(CO$_2$Me)$_2$]$_2$, m. 103–4°. The tetrazonium hydroxide prepd. from tolidine gave, when condensed with III, [C_6H_3MeNEtN:C(CO$_2$Et)$_2$]$_2$, m. 118–20° (decompn.). The tetrazonium hydroxide of bianisidine when condensed with III gave [C_6H_3(OMe)NEtN:C(CO$_2$Et)$_2$]$_2$, m. 115–6°. Thus, tetrazonium hydroxides reacting with alkylmalonic esters give *N*-alkyldihydrazones which are isomeric with the mixed azo compds. which one might expect to be formed. The diazonium compd. of *p*-$BrC_6H_4NH_2$ gave with CHEt(CN)CO$_2$Et (IV), *p*-BrC_6H_4NEtN:C(CN)CO$_2$Et, m. 56–7°, and *p*-BrC_6H_4NN:CEt(CN)CO$_2$Et (formula given by F., but should probably be *p*-BrC_6H_4N:NCEt(CN)CO$_2$Et), m. 111–2°. I with CHMe(CN)CO$_2$Et gave *m*-$O_2NC_6H_3$NMeN:C(CN)CO$_2$Et (F. gave *m*-$O_2NC_6H_4$NMeN:C(CN)CO$_2$Et), m. 118°, and an isomer in the form of a mixed azo compd., *m*-$O_2NC_6H_4N$:NCMe(CN)CO$_2$Et, m. 197–8°. PhN$_2$OH (V) and IV gave a *N*-ethylhydrazone (prepd. by Kruckeberg, *J. prakt. Chem.* **47**, 591(1893)), m. 72°, and the isomeric mixed azo compd., m. 126°. V with CHAc(CN)CO$_2$Et gave PhN:NCAc(CN)CO$_2$Et, m. 129–30°.

LOUISE KELLEY

Some **hydroxy acids of the sugar group. II.** K. REHORST. *Ber.* **63B**, 2279–92 (1930), cf. *C. A.* **22**, 1331.—It was shown in the 1st paper that by avoiding the presence of H_2O the polyhydroxymonocarboxylic acids of the sugar group can be obtained in cryst. form instead of their lactones; immediately after liberation from their salts, EtOH and a higher-boiling alc. (Bu, iso-Bu or Am) are added and on evapn. the H_2O is removed along with the EtOH and the free acid crystallizes from the remaining higher boiling alc. As a rule these acids in H_2O apparently change into their lactones even at room temp. but it has been found that with *d*-gluconic acid (I) this lactonization depends on the temp.; if the soln. is evapd. directly on a boiling H_2O bath the free acid separates exclusively. This greatly simplifies its prepn. *l*-Arabonic acid (II) has been obtained in cryst. form by the method described above (yield, 67% after recrystn. from EtOH or MeOH). It is not esterified by refluxing 1 hr. in 30 parts MeOH while the lactone is esterified by MeOH. The cryst. II, in which the free CO_2H group can be titrated directly with alkali, m. around 118–9° and shows $[\alpha]_D$ —10.02° 3 min. after soln., increasing to —7.11° in about 2.5 hrs. and then decreasing again to —11.6° in 21 days. Along with the change in rotation there is a decrease of the directly titratable acidity while an excess of alkali is used up in the cold, pointing to the presence of lactone. The course of the titration curve indicates that at least 2 substances are formed from the cryst. II in H_2O. Levene and his co-workers had concluded, from the similar behavior of other polyhydroxymonocarboxylic acids, that these acids regularly change in H_2O in part into 2 different lactones (γ and δ). In some cases there has been isolated, in addn. to the previously known γ-lactone, a 2nd lactone and although it has not been proved that these isomers are δ-lactones, a consideration of the Loschmidt and Kekulé models of org. compds. shows that alc. groups on the δ-C atom lie in a peculiarly favorable position for lactone formation. Furthermore, the directions of the rotation of the new lactones hitherto isolated obey the 1st Hudson acid rule only if they are considered as being δ lactones. According to the views of Levene and Simms the change in rotation of the free acids is due to their partial conversion into the 2 lactones; the formation of the γ-lactone is slow and proceeds for several hundred hrs. while the δ-lactone formation, which is at first 8 times faster, stops in a few hrs. As a result, when the relatively weakly rotating acid is dissolved, the δ-lactone is at first formed almost exclusively and when its formation ends after a few hrs. there is as yet hardly any γ-lactone in the soln. The observations made on the cryst. II permit of still further extending the views of L. and his collaborators. If the 2 lactones rotate in the same direction, which according to the Hudson acid rule will be the case when the HO groups on the γ- and δ-C atoms are in the *cis*-position to each other, then a reversal in the direction of the change in rotation is hardly to be expected (*e. g.*, with cryst. I and *l*-mannonic acid liberated from its salts). If, however, the HO groups are in the *trans*-position to each other, the lactones will, by the H rule, rotate in different directions, and the rotation of the acid, when dissolved, will at first change in the direction of that of the δ-lactone and later of that of the

γ-lactone. Such reversals in the change in rotation have been observed with *d*-galactonic, *d*-gulonic and *d*-glucoheptonic acid. If these views are correct, of the 16 possible hexonic acids, these reversals would be expected only with the idonic and talonic, in addn. to the galactonic and gulonic acids. Nothing is known as to the course of the rotation of *d*-idonic acid and no reversal has been noted with cryst. *d*-talonic acid; possibly the rotation of the δ-lactone is of the same order of magnitude as that of the acid, or the cryst. acid was contaminated with a small amt. of lactone not detectable by analysis. If this reasoning can be applied to the pentonic as well as to the hexonic acids, the reversal in the change in rotation observed with II would indicate that the γ- and δ-HO groups are in the *trans*-position to each other. Probably all 8 pentonic acids will show such reversals. There are no data in the literature on this point; R. has found for cryst. *d*-xylonic acid $[\alpha]_D$ —1.9° ⟶ —3.6° ⟶ 20.2°. By analogy, the γ lactones of the *d*-series of the tetronic acids are probably *d*-rotatory. All attempts to prep. cryst. *l*-rhamnonic acid (III) by the method given above failed; always the δ-lactone crystd. in pure form and generally in good yield. Only by very rapid work was it possible to obtain needles which from their compn. apparently consisted of about equal parts of acid and lactone which could not be sepd. Their rotation, however, agreed with that given by Schnelle and Tollens ($[\alpha]_D$ —7.7°) for the acid liberated from its Sr salt. A repetition of their work showed that the acid has $[\alpha]_D$ 5.8°, but when prepd. from the crystd. lactones (either γ or δ) it shows $[\alpha]_D$ 11.0°. As the 2 lactones are *l*-rotatory, in agreement with the H. rule, the rotation falls rapidly to 0°, then becomes *l*-rotatory and finally attains a const. value, $[\alpha]_D$ —34.7°. As expected, there is no reversal in the direction of the change in rotation. C. A. R.

The effect of weak alkalies on the trioses and on methylglyoxal. H. A. Spoehr and Harold H. Strain. *J. Biol. Chem.* **89**, 503–25(1930); cf. following abstr. —The general chem. reactions of $CH_2(OH)CH(OH)CHO$ (I), $CH_2(OH)COCH_2OH$ (II), and MeCOCHO (III), have been studied in view of possible relationship to the oxidation of carbohydrates. I, m. 141–2° after prolonged drying, was prepd. by Evans and Hass' method (*C. A.* **20**, 3692) and could be quantitatively oxidized by Cajori's I_2 method (*C. A.* **17**, 783) to $CH_2(OH)CH(OH)CO_2H$. Phosphotungstomolybdic acid is reduced by I and II and also by fructose and xylose. I and II are oxidized by Benedict's soln., requiring 1.68 and 1.63 atoms O, resp., and are completely reduced by Adams' catalyst in the presence of Na_2HPO_4 or NaH_2PO_4. II reacts with I_2 to form smaller mols. of high reducing power and cannot, therefore, be detd. by Cajori's method. For III, acetol (cf. Nef, *Ann.* **335**, 247, 1904) was treated with $Cu(OAc)_2$ for 3–4 weeks, filtered from Cu_2O, distd. *in vacuo* at 35°, extd. with Et_2O, dried, the Et_2O distd. off, and the residual gum desiccated over KOH and fractionated *in vacuo*. Detns. of III by different methods differ by 3–4%; Fischler and Boettner's method (*C. A.* **22**, 2901) gives erroneous results unless a large excess of NaOH and I_2 is present. In Na_2HPO_4 soln., I and II undergo slow condensation, and the reducing power of II toward Benedict's soln. or I_2 decreases. The reducing power of III under the same conditions increases 15%, but the amt. of III in soln., detd. by the *m*-nitrobenzohydrazide, falls to 0 in 8 days at 25°, with corresponding formation of CHI_3-reacting groups. K. V. Thimann

The effect of amines on the conversion of trioses into methylglyoxal. Harold H. Strain and H. A. Spoehr. *J. Biol. Chem.* **89**, 527–34(1930); cf. preceding abstr.—MeCOCHO (I) reacts with *m*-nitrobenzohydrazide (II) in dil. HOAc to produce *methylglyoxal m-nitrobenzoylosazone*, $C_{17}H_{14}O_6N_6$ (III), only slightly sol. in org. solvents, decomps. 280°. By means of this reagent I can be quantitatively detd. If $CH_2(OH)CH(OH)CHO$, which forms no such ppt., be treated with an amine, and then with II, an immediate ppt. of III is produced. The reaction is catalyzed by many aromatic amines, but not by amino acids. In the absence of II, I accumulates in the soln. up to 50% of the theoretical yield. $CO(CH_2OH)_2$ reacts slowly with II to give a ppt. of III after several days. $PhNH_2$ also catalyzes this reaction. The *4,4-diphenylsemicarbazone* of I, $C_{28}H_{26}O_2N_6$, m. 161–2°, was also prepd. but was not suitable for use in its detn. K. V. Thimann

Transformation of pyruvic acid as a function of time and temperature. M. Garino, G. Balletto, F. De Thierry and C. Becchi. *Gazz. chim. ital.* **60**, 592–605(1930); cf. *C. A.* **25**, 494.—Systematic expts. were carried out to obtain quant. data on the stability of $AcCO_2H$ at different temps. (0–40°) in N and in air, a subject which is of importance because of the fact that in syntheses with $AcCO_2H$ unexplained variations in yields have been obtained (resulting from the age and condition of the $AcCO_2H$). The results show that $AcCO_2H$ remains unaltered over a period of several months only if it is kept in the solid state not above 0°. At temps. near the m. p. it gives evidence of decompn. in a very short time. In the liquid state its rate of decompn. is proportional to

the temp. After 24 hrs. at 25°, the m. p. diminishes greatly and after 20–5 days the substance can no longer be crystd. After 2 days at 40°, the m. p. is a min. and after 5 more days $AcCO_2H$ is no longer present. During the initial stage of decompn., the acidity does not change, while the elec. cond. varies but slightly, and the m. p. diminishes considerably. In the later stage of decompn., the acidity diminishes greatly (a decrease of 11% of the original acidity), the substance is no longer crystallizable and an unidentified fluorescent *compd.* is formed. The m. p. of $AcCO_2H$ purified by redistn. was 13.62° (cf. *Bull. soc. chim.* [3], **13**, 336(1895)), and the dissocn. const. K was 0.00593. It is probable that in the liquid state $AcCO_2H$ is in equil. with its enolic form: $AcCO_2H \rightleftharpoons CH_2:C(OH)CO_2H$ (cf. Henri and Fromageot, *C. A.* **20**, 900) and that condensation products are formed: $2AcCO_2H \longrightarrow HO_2CCOCH_2CMe(OH)CO_2H$ and the presence of a new compd. lowers the m. p. of the mixt. Though the acidity (tested by NaOH) does not change, the elec. cond. diminishes because of the increase in mol. wt. The formation of $\overset{\displaystyle CH:C(OH).CO.O.}{\displaystyle\vert\!\!\vert\!\!\vert\!\!\vert}\!\!CMeCO_2H$ (cf. *Ann.* **317**, 6(1901)) would also account for the measurements in the present paper. Decompn. is more rapid in air than in N.

C. C. DAVIS

α,α'-Dimethylsuberic and α,α'-dibromo-α,α'-dimethylsuberic acids. CATHERINE C. STEELE. *J. Am. Chem. Soc.* **53**, 283–9(1931).—Details are given for the prepn. of $Br(CH_2)_4Br$ from the glycol, HBr and H_2SO_4 and for $MeCH(CO_2Et)_2$ from $MeCH(CN)CO_2Et$; condensation of these 2 compds. with Na gives 40% of *tetra-Et dimethylhexa-tetracarboxylate*, b_8 210–7°; hydrolysis and removal of CO_2 give 2 isomeric forms of α,α'-dimethylsuberic acid, *A* (I), m. 132–3°, and *B* (II), m. 91–2°; di-Et ether, b_{25} 178–80°. I gives a *di-Br deriv.*, m. 200–1°; *di-Me ester*, b_{20} 216–9°, turns brown on exposure to the air. II gives the same di-Br deriv. Attempts to form a cyclohexane ring by removal of Br with Cu-bronze and mol. Ag were unsuccessful. No attempt was made to det. which was the *dl*- and which the *meso*-form of the acid. C. J. WEST

Preparation of ethyl aminomalonate. V. CERCHEZ. *Bull. soc. chim.* [4], **47**, 1282–7(1930).—The procedure of Piloty and Nerensheimer for the prepn. of $NH_2CH(CO_2Et)_2$ (I) by the reduction of $HON:C(CO_2Et)_2$ in ether with Al-Hg has been modified in several respects. Into a 3-necked flask provided with reflux condenser, dropping funnel and mech. stirrer, contg. 25 g. $HON:C(CO_2Et)_2$ and 200 cc. of *ordinary* ether, was introduced 6 g. of Al plates, 0.3 × 8 × 25 mm., amalgamated by the aid of $HgCl_2$. On initiation of the reaction, 36 g. H_2O was added, drop by drop, over a period of 5 hrs. the ether being kept boiling gently, so that the Al was totally pptd. as a grey powder. The ether soln., freed from Al, was evapd., and the residue, when distd. *in vacuo*, gave 65% of I, stable after redistn., d_4^{18} 1.100, n_D^{18} 1.4353, M_D 41.55, calcd. 41.31; *oxalate*, $CH(CO_2Et)_2.(CO_2H)_2$, m. 138°. C. R. ADDINALL

Some direct derivatives of ethyl aminomalonate. V. CERCHEZ. *Bull. soc. chim.* [4], **47**, 1287–9(1930); cf. preceding abstr.—$H_2NCH(CO_2Et)_2$ (I) gives, by virtue of its NH_2 group, a no. of derivs. Its *urea* (II), prepd. from I and pulverized KOCN in 50–70% yield depending on the purity of the KOCN used, m. 169° (173° given by Johnson and Nicolet, *C. A.* **8**, 1278). II (4 g.) when heated in 400 g. 25% HCl (*d* 1.035 approx.) for several hrs. gave pure hydantoin, m. 119° (90% yield). II is preferable to the urea of $H_2NCH(CO_2Et)_2$ for this prepn., since it is more stable and more easily obtainable. *Phenylurea* of I, prepd. from I and PhNCO, m. 117° (cf. 112–4° given by Gatewood, *C. A.* **19**, 2810). *Carbethoxy deriv.*, from I and a slight excess of $ClCO_2Et$ in the presence of NaHCO, m. 61.2° (63° given by Johnson and Nicolet, *C. A.* **8**, 3787). *Diamide*, prepd. in 60% yield from I and aq. NH_3 satd. at 0°, m. 197° (192° given by Piloty and Nerensheimer *Ber.* **39**, 514(1906)). LOUISE KELLEY

The preparation of ethyl isonitrosomalonate. V. CERCHEZ. *Bull. soc. chim.* [4], **47**, 1279–81(1930).—$HON:C(CO_2Et)_2$ (I) can be prepd., in good yields, directly from $CH_2(CO_2Et)_2$ by the action of HNO_2, the acid being formed in the reaction mixt. by stirring $NaNO_2$ into $CH_2(CO_2Et)_2$ in AcOH, and by operating at room temp. in the proportions of 3 mols. HNO_2 to 1 mol. $CH_2(CO_2Et)_2$. To 160 g. $CH_2(CO_2Et)_2$ in 180 g. of glacial AcOH 190 g. of $NaNO_2$ in the least possible amt. of H_2O was added during the course of one day. After sepn. from the aq. layer, the org. layer was dild. with 2 vols. of Et_2O, neutralized with extremely dil. Na_2CO_3, washed 3 times with a little H_2O, and, after removal of the Et_2O, was distd., giving 80–90% I, b_{12} 172°, n_D^{18} 1.4544, d_4^{18} 1.182, M_D 43.34, calcd. 43.18. C. R. ADDINALL

Supernumerary isomers. IV. Alleged isomerism of cyclic oxalic acid esters. ERNST BERGMANN AND HANS A. WOLFF. *J. prakt. Chem.* **128**, 229–33(1930); cf. *C. A.* **24**, 4025.—The existence of more than 1 ethylene ester of $(CO_2H)_2$ (cf. Chichibabin,

C. A. **23**, 1114) cannot be confirmed, all samples prepd. m. 143°. MeO_2CCOCl and $(CH_2OH)_2$ in C_6H_6, boiled about 3 hrs., give *Me β-hydroxyethyl oxalate* (I), m. 166° (decompn.); distn. *in vacuo* gives the ethylene ester, m. 143°. The product of Tilicheiev (*C. A.* **18**, 970), m. 162°, which he believed to be an isomeric ethylene ester, is believed to be I. C. J. WEST

Synthesis of cyanic acid and urea by ammoniacal oxidation of carbon. GEORGES LAUDE. *Compt. rend.* **191**, 1135–7(1930); cf. *C. A.* **24**, 2990.—HOCN was formed by the ammoniacal oxidation of C prepd. from either camphor or C_2H_2. Each oxidation was carried out as follows: 0.1 g. C, 1 g. Cu powder, 30 cc. concd. NH_3 soln., 20 g. $KMnO_4$ (added in 4 portions), temp. 40–45°, time of oxidation 30 hrs. The HOCN formed was converted into urea, which was detd. by means of xanthydrol. The yields of HOCN were 11.39 g. per 100 g. of camphor C, and 6.3 g. per 100 g. of acetylene C. The latter C is probably a mixt. of amorphous C and graphite, which would explain why it is less easily oxidized than is the camphor C. LOUISE KELLEY

Methyl *N*-formylcarbamate. I. J. RINKES. *Rec. trav. chim.* **49**, 1126(1930). On boiling 5 g. NH_2CO_2Me during 2 hrs. with 25 g. 100% HCO_2H, Me OHCNHCO$_2$Me m. 90–1° after crystn. from benzene, was obtained, which was identical with the compd obtained by ozonization of $PhCH{:}CHNHCO_2Me$. The yield was 1.5 g., but can undoubtedly be increased by altering the amount of HCO_2H and the time of heating. C. F. VAN DUIN

Sugars with branched carbon chains. II. Constitution and configuration of apiose. OTTO TH. SCHMIDT. *Ann.* **483**, 115–23(1930); cf. *C. A.* **24**, 2112.—Previous work, especially by Vongerichten, had shown that apiose is oxidized by Br to apionic acid, which in turn is reduced to a $C_4H_7CO_3H$, provisionally identified as $Me_2CHCH_2CO_3H$. The present work confirms this and thus establishes the constitution of apiose as $(HOCH_2)_2C(OH)CH(OH)CHO$. Consideration of the optical properties of the sugar and its derivs. shows that it must possess the same configuration as *d*(−) lactic acid. Apiose was obtained as a clear, light yellow sirup with α_D^{15} 5.6° (2.4812 g. in 25 cc. H_2O), purified through the benzylphenylhydrazone, m. 137° S°, α_{579}^{25} −78.5° (C_5H_5N *c* 4.5875), α_{546}^{20} −94° (C_5H_5N, *c* 5.020). Oxidation with I-BaI_2 in 0.4 *N* Ba(OH)$_2$ and boiling with $CaCO_3$ give *Ca apionate*, crystg. with 2 mols. H_2O. Reduction with HI and P gives $Me_2CHCH_2CO_2H$, identified as the *p-bromophenacyl ester*, m. 68°; the normal acid ester m. 74°. C. J. WEST

Isomerization of the hydroxy aldehydes. III. Transformation of glucose into ketose (fructose). S. DANILOV, E. VENUS-DANILOVA AND P. SHANTAROVICH. *J. Russ. Phys.-Chem. Soc.* **62**, 494(1930); *Ber.* **63B**, 2269–74(1930); cf. *C. A.* **24**, 1096.—Glucose heated in org. bases, especially pyridine and quinoline, gives neutral products consisting of only glucose and fructose without any admixed mannose. In aq. pyridine and aq. alc. quinoline the rearrangement does not proceed so smoothly; 1–2% of org. acids is formed and mannose could be detected. C. A. R.

Halogenoses of the β-series and their use for syntheses. V. β-Acetochlorogalactose and β-acetochloroxylose. HANS HEINRICH SCHLUBACH AND ROLF GILBERT. *Ber.* **63B**, 2292–7(1930); cf. *C. A.* **23**, 4932.—Bertho (*C. A.* **24**, 3761) recently described a β-azidoacetoglucose whose rotation agrees well with the value calcd. by the Hudson method, whereas the β-acetochloroglucose (I) discovered by Schlubach has a rotation 33° higher than that calcd. by the H. rule. S. had concluded that the H. rule does not hold for I, while B. suggests that the I might not have been pure. Also, Micheel and Micheel (*C. A.* **24**, 2727) were unable to prep. β-acetochloromannose by the S. method (treatment of the corresponding Br deriv. of the α-series with AgCl); they obtained the isomeric α-acetochloromannose. To test the extent of the applicability of the method of prepn. and to obtain new data on the validity of the optical superposition rule, S. and G. have subjected the I to a thorough optical investigation and prepd. the hitherto unknown *β-acetochlorogalactose* (II) and *β-acetochloroxylose* (III) by the above method. The prepn. of I has been so improved that an av. yield of 47% is obtained. Some 300 g. was prepd. in this way and a large amt. was carefully purified. After the rotation no longer changed on recrystn. it was crystd. twice more from Et_2O and C_6H_6; it then showed $[\alpha]_D^{23}$ −18.6° (CCl_4, *c* 1.0), *i. e.*, only 1.2° lower than previously reported. II, after repeated careful purification, m. 93–4°, $[\alpha]_D^{20}$ 5.8° (CCl_4, *c* 1.036). The rotation calcd. by the H. rule is −39°, *i. e.*, the discrepancy between the observed and calcd. values for I is also found in II. Just as I yields a cryst. tetraacetyl-α-glucose (IV), the prepn. of which has been materially improved by adding $AgNO_3$ to speed up the reaction still more, so II gives the hitherto unknown *tetraacetyl-α-galactose* (V), m. 133°,

$[\alpha]_D^{21}$ 144.4° ($CHCl_3$, *c* 0.982), falling immediately on addn. of a drop of NH_4OH to the const. value 90.7 ± 1.0° (*c* 0.992). V is certainly different from the Skraup and Kremann compd. assumed by Hudson and Johnson to be the α-deriv. The half-value times for the change in rotation in abs. MeOH and in Et_2O are about the same for II as for I, showing that epimerism of the 4th C atom has practically no influence on the rearrangement velocity. While I and II thus show a close analogy to each other, III gave an entirely different picture. Considerable difficulty was encountered in its prepn. Because of its unusually strong tendency to rearrange, the rearranging influence of the AgCl is strongly marked and the reaction must be carried out with the purest α-acetobromoxylose, highly active AgCl and in the shortest possible time; these unfavorable factors are partially neutralized, however, by the crystg. power of the III. The pure III m. 112-3°, $[\alpha]_D^{24}$ −131.0° (CCl_4, *c* 1.038); the value calcd. by the H. rule is −99°. As Hudson has frequently explained lack of agreement with his system by assuming that the 2 members of a given pair of compds. do not have the same ring system, S. and G. have attempted to prove that III has the same ring system as the known α-compd., and since H. does not consider the methylation method reliable for this purpose, S. and G. used 2 different methods. With AgCl they effected a smooth transformation of III into the α-compd., and from the 2 isomers they obtained under identical conditions (treatment with aq. Me_2CO and Ag_2CO_3) the same triacetyl-α-xylose described by H. As it seems highly improbable that a change in the ring would occur under these very mild conditions, S. and G. believe it is established that III and the α-compd. have the same ring structure. From these results they conclude that the far-reaching deductions as to ring structure made by H. are not justifiable on the basis of the superposition rule alone. VI. **Crystalline halogenoacetyl derivatives of *h*-galactose.** Hans Heinrich Schlubach and Vilma Prochownick. *Ibid* 2298-301.—S. and P. have been unable to hit upon the conditions necessary to obtain cryst. β-acetochloro-*h*-galactose directly (I) by Hudson and Johnson's method, but after obtaining seed material by the Fischer and Armstrong method (treatment with anhyd. liquid HCl) they were able to prep. I, although in poor yield, by the method of H. and J. From its rotation and behavior in solvents, it undoubtedly belongs to the β-series. It is entirely different from the isomeric α-galactose (II) (see preceding abstr.). The half-value time for its change in rotation in the $CHCl_3$ of the German Pharmacopea VI (about 1% EtOH) is about 12 hrs., in abs. MeOH less than 2 min.; the corresponding values for β-acetochloro-*n*-glucose are 23 hrs. and 5½ min., and as the change in rotation of II is of the same order of magnitude, I in this respect also shows the increased lability characteristic of *h*- as compared with *n*-derivs. Hudson and J. tried in vain to prep. a Br deriv. of pentaacetyl-*h*-galactose, but S. and P. by the action of liquid HBr at room temp. for 2 hrs. obtained a *di-Br deriv.* (III), m. 83-4.5°, $[\alpha]_D^{20}$ −116.2° (CCl_4, *c* 1.22). The Br atoms are removed as easily as they are introduced; by the anal. method of Hudson and Johnson (treatment with 50% $AgNO_3$ in the cold) up to 97% of the Br can be detected. From all previous experience it may be concluded that 1 of the Br atoms is on the 1-C atom and therefore very labile, but that there should be a 2nd labile Br atom and correspondingly a 2nd strongly reactive HO group in a hexose is without previous analogy. It will therefore be of special interest to det. the position of this 2nd Br atom. C. A. R.

Stereoisomeric polyhydroxycycloalkanes. II. Stereoisomeric pyrogallitols. Hans Lindemann and Adriaan de Lange. *Ann.* **483**, 31-43(1930); cf. *C. A.* **24**, 1629.—Catalytic reduction of 1,2,3-$C_6H_3(OH)_3$ gives a small amt. of cyclohexane and cyclohexanol, a mixt. of *cis*- and *trans*-cyclohexane-1,2-diols (*diphenylurethans*, m. 185° and 212°, resp.), and a mixt. of α (I), β (II) and γ (III)-cyclohexane-1,2,3-triols. I, m. 108°; tribenzoate, m. 142°; *tri*-(*l-menthylurethan*), m. 120°, then solidifies and m. 213°, $[\alpha]_D^{23}$ −59.6° in C_5H_5N. II, m. 124-5°; tribenzoate, m. 184°. III, m. 148°; *tribenzoate*, m. 142°; *tri*-(*l-menthylurethan*), m. 130° and then 208°, $[\alpha]_D^{25}$ −56.2° in C_6H_6. III is identical with that (m. 145°) described by Senderens and Aboulenc (*C. A.* **16**, 2133) but their so-called triol, m. 95°, is a cyclohexane-1,2-diol. The triol, m. 67°, of Sabatier and Mailhe (*Compt. rend.* **146**, 1196(1908)) could not be prepd. Hydrolysis of the above benzoates gives the appropriate triol, which can be rebenzoylated to the corresponding ester; no inversion occurs during hydrolysis. The above triols are the 3 theoretically possible cyclohexane-1,2,3-triols. C. J. West

Preparation of unsaturated ethers from acetals. Akop Johannissian and Elizabeth Akunian. *Bull. univ. état R. S. S.-Arménie*, No. 5, 245-9(in German 249-51)(1930).—(1) *Cyclohexanone di-Et acetal* (I) (12 g.) and 0.04 g. *p-MeC*$_6$*H*$_4$*SO*$_3$*H* (II), in an oil bath and distd., yielded 7.6 g., or 87.3%, of *1-ethoxycyclohexene*, b_{16} 47-8°.

(2) I (20 g.), 4 mols. BuOH and 0.05 g. II yielded 88.8% of *1-butoxycyclohexene*, b_{10} 80–1°. (3) *1-Hexoxycyclohexene* (90% from I, hexanol and II), b_7 108–9°. (4) I, heated in an air bath at 775 mm., distd. at 48–50° and 10 mm., yielded 85.7% of 1-ethoxycyclohexene, b_{10} 48–50°. (5) I, heated at 685 mm., gave 90.9% of 1-hexoxycyclohexene, b_{7-9} 108–10°. (6) *Cyclohexanedione di-Et acetal* (10 g.) heated alone at 677 mm., yielded an oily substance, b_{78} 147.2–7.5°, which largely crystd. upon cooling. The crystals proved to be *1,4-diethoxycyclohexa-1,4-diene*. B. S. Levine

***p*-Toluenesulfonic acid as a catalyzer in the preparation of acetal derivatives.** Akop Johannissian and Elizabeth Akunian. *Bull. univ. état R. S. S. Arménie*, No. 5, 235–41 (in German 242–4) (1930).—J. and A. undertook to prove that *o*-$MeC_6H_4SO_3H$ (I) as a catalyzer in the prepn. of acetals is superior to HCl, H_2SO_4, NH_4Cl, $FeCl_3$, etc. (1) Cyclohexanone (40 g.), 1.25 mols. $HC(OEt)_3$ (II), 4 mols. abs. alc. and 4 cc. 0.01% soln. of the catalytic agent (I) in abs. alc., boiled 10 min., cooled with running water, neutralized with KOEt, freed from the HCO_2Et and alc. by distn. and fractionated under 13 mm., gave 96% *cyclohexanone di-Et acetal* (III), b_{13} 75–6°. (2) *p*-$MeOC_6H_4CHO$, I and II, refluxed 3 min., gave 88.1% of *anisaldehyde di-Et acetal*, b_{14} 130–2°. (3) Cyclohexanedione, I and II, refluxed 10 min., gave 96.8% *1,4-cyclohexanedione bis(di. acetal)*. (4) III (20 g.), 4 mols. BuOH and 0.04 g. solid I, heated in an oil bath, gave 87.6% *cyclohexanone di-Bu acetal*, b_{10} 118–20°. (5) III (10 g.), 4 mols. *hexanol* 0.04 g. cryst. II, heated in an oil bath, gave 91% of *cyclohexanone dihexyl acetal*, b. 162° (6) *p*-$MeOC_6H_4CH(OEt)_2$ (21 g.), 4 mols. BuOH and 0.05 g. cryst. I gave 82% of *anisaldehyde di-Bu acetal*, b. 168–70°. B. S. Levine

Carbon rings. XV. Preparation and some physical constants of various carbon rings containing up to 32 carbon atoms. L. Ruzicka, M. Stoll, H. W. Huyser and H. A. Boekenoogen. *Helv. Chim. Acta* **13**, 1152-85 (1930); cf. *C. A.* **23**, 1411. The hitherto unprepd. ring compds. contg. 24, 26, 28 and 32 C atoms were prepd. by reduction of the corresponding diketones. Further details are given for the prepn. of various cyclic ketones by the action of heat on yttrium polymethylenedicarboxylates, the salts decompg. to give the mono- and also the diketones. Phys. consts., such as p., m. p., d., mol. refraction and mol. vol., are given for these new compds. and also for a large no. of previously prepd. cyclic hydrocarbons (C_5-C_{32}, C_{19} and C_{30}) and their derivs. In general, the m. ps. of the hydrocarbons and ketones oscillate up to about C_{14}, reach a max. at C_{18-19}, then decrease to about C_{28} and finally rise again. Series relationships are discussed from the standpoint of d., mol. refraction and mol. vol. The following new compds. are described: *Cyclotetracosane*, m. 46–7°, $b_{0.6}$ 222–8°; *cyclotetracosanone*, m. 35–6°, $b_{0.4}$ 233–8°; *cyclotetracosane-1,13-dione*, m. 64–5°, $b_{0.25}$ 216°; *cyclohexacosanone*, m. 41–2°, $b_{0.5}$ 218–9°, d_4^{20} 0.846; *cyclohexacosanone*, m. 41–2°, $b_{0.1}$ 208–12°; *hexacosane-1,14-dione*, m. 68–9°, $b_{0.1}$ 235°, d_4^{20} 0.912; *cycloöctacosane*, m. 47–8°, 213–4°, d_4^{20} 0.846; *cyclooctacosanone*, m. 44–5°, $b_{0.25}$ 210°; *cycloöctacosane-1,15-dione*, m. 72–3°, $b_{0.2}$ 238–41°, d_4^{20} 0.919; and *cyclodotriacontane-1,17-dione*, m. 77–8°, 258–62°. A. Wibaut

nucleus.

Two cases of substitution phenomena are to be differentiated, viz., [illegible] tion, in which a H atom of the nucleus is replaced directly by a new substituent *indirect* substitution, which occurs in the presence of the groupings OH, NH_2, NHX and Me. Indirect substitution takes place much more readily, always takes place in the *o*- and *p*-positions and may be accompanied by a displacement of a group, already present, by the entering substituent. In these displacement phenomena there exists a definite order, namely CO_2H, CHO, SO_3H, I (COMe, COPh, OMe, AsO_2H_2, PO_3H_2), Br, Cl, NO_2, in which an atom or group is able to displace the ones preceding. Blanksma and his co-workers have often made use of these displacement phenomena. The several cases are, however, scattered throughout the literature; they have now been collected and arranged systematically in order to demonstrate that this method affords a general way for detg. the constitution of aromatic compds. C. F. van Duin

Conjugated systems. VI. Preparation of the geometric isomers of methylstyrylcarbinol and of phenylbutadiene. Irving E. Muskat and Margaret Herrman. *J. Am. Chem. Soc.* **53**, 252–60 (1931); cf. *C. A.* **24**, 5716.—The reaction product of PhCH:CHCHO and MeMgBr, prepd. according to M. and Ludeman (*C. A.* 24, 347) and decompd. with 10% acid, the decompn. mixt. extd. with Et_2O and carefully freed from acid, gives *trans-methylstyrylcarbinol* (I), $b_{0.5}$ 116.5°, b_5 117.5°, $b_{7.5}$ 123°, n_D^{21} 1.5550; its structure was proved by ozonization. I is stable for many months and is dehydrated

only by very strong dehydrating agents. H_2O may be used in the above decompn., but the yield is much less; 30% H_2SO_4 may also be used. If the acid is not carefully removed there results a mixt. of I and the ordinary *cis*-form (II). Decompn. with 50% H_2SO_4 gives some *trans*-phenylbutadiene (III), b_{11} 76°, which also results from the chloride of I and C_5H_5N. II readily loses H_2O to give the *cis*-phenylbutadiene (IV). The structures of III and IV have been confirmed by the relative rates of catalytic hydrogenation, IV being reduced more rapidly. IV, on standing overnight with a trace of acid, gives III on distg.; acid rearranges I into II. IV is also oxidized more rapidly than III. The structure of I was likewise confirmed by catalytic reduction, II being reduced more rapidly. **VII. Chemical reactions of the geometric isomers of methylstyrylcarbinol.** *Ibid* 260–71.—I and PhCNO give *phenylurethan*, m. 94°; no such deriv. of II could be prepd. I yields an *acetate*, b_{15} 141–4°, by boiling with Ac_2O for 6 hrs.; II, under the same conditions, gave a dimer of IV. I gives a *chloride*, b_6 104°; that from II b_6 108°. The *trans*-chloride with 10% AcONa gives a mixt. of the acetate and the condensation product V; with Ag_2O in H_2O there results III and its polymer; C_5H_5N gives III. The *cis*-chloride with C_5H_5N gives about 40% of IV, the remainder being the dimer, b_{10} 205°. The *trans*-chloride and 5% NaOH, shaken for 24 hrs., give III; the *cis*-chloride gives a very small yield of IV, the greater portion being the dimer. Heating I at 180° gives a *condensation product*, $C_{20}H_{22}O$ (V), b_6 200°; *tetrabromide*, m. 179°. O_3 gives 76% BzH. Attempts to prep. a Br addn. compd. from I or II failed, decomposition occurring with the elimination of H_2O and the formation of phenylbutadiene tetrabromide. Catalytic reduction of I and II gave $PhCH_2CH_2CH(OH)Me$, b_6 105°; the relative rates are given as curves, II being reduced more rapidly. The same is true for the oxidation with BzO_2H; the rate of oxidation is best expressed by an equation for order reaction. The *oxides* of I and II b_4 118° and $b_{3.5}$ 117°, resp.; the oxide from I, heated with 2 *N* H_2SO_4, gives a condensation product, b_4 200°; dry HCl in Et_2O does not open the oxide ring nor does NH_3 in EtOH; it may be that the oxide had rearranged to a ketone. C. J. West

Methods of reaction of phosphorus pentachloride. C. Harnist. *Ber.* **63B**, 2367(1930); cf. Bergmann and Bondi, *C. A.* **24**, 4024.—The addn. of PCl_5 to $Ph_2C{:}CH_2$, styrene and indene was discovered in Thiele's lab. in 1910 (Harnist, *Diss. Strassburg* **1910**; Bulle, *ibid* **1911/12**). C. A. R.

The oxidation of organic iodine compounds by means of organic peracids (preliminary paper). J. Böeseken and G. C. C. C. Schneider. *Proc. Acad. Sci. Amsterdam* **33**, 827–9(1930).—PhI, *o*-$C_6H_4I_2$, the I derivs. of PhMe, BzOH, $PhSO_3H$ and PhNO and $(CHI)_2$ when treated with AcO_2H yield the corresponding iodoso compds., usually as acetates. With BzO_2H the iodo (iodoxy) compds. were obtained except with ICH_2CO_2H and *p*-$IC_6H_4SO_2H$ which give iodoso compds. believed to be internal salts without ring structure. The iodosoacetates treated with BzO_2H give the iodoxy compd. *Iodosobenzenesulphonic acid*, m. 156.4° (decompn.), is formed by treating 5 g. *p*-$IC_6H_4SO_2H$ with 10 cc. 13% AcO_2H or with 90 g. of a 6.7% BzO_2H in $CHCl_3$. Other new compds. prepd. are *o-diiodoxybenzene* and *diiodoxyethylene*. J. E. A.

Decomposition of phenyl dichloroiodide. III. Criticism of results obtained by Guglialmelli Ruiz, Chanussot and Hermitte. Enrique V. Zappi and Venancio Deulofeu. *Anales asocn. quím. Argentina* **18**, 124–32(1930); cf. *C. A.* **24**, 3226.
E. M. Symmes

The action of sodium methylate on some derivatives of *o*-dichlorobenzene. G. M. Kraay. *Rec. trav. chim.* **49**, 1082–92(1930).—The compds. investigated were prepd. as follows: *1,2,4-dichloronitrobenzene* (I) according to Reiding (*Rec. trav. chim.* **23**, 364(1904)), m. 43°; *3,4-dichloroaniline* (II) by reduction of I with Fe and acidulated water; *1,2,4-dichlorofluorobenzene* (III) from II in the way already described (Kraay, *C. A.* **23**, 4690), a pure prepn., however, not being obtained; *1,2,4-trichlorobenzene* (IV) from II by the Sandmeyer reaction, m. 17°; *1,2,4-dichlorobromobenzene* (V) from II by the Sandmeyer reaction in 80% yield, m. 24.4–4.8°; *1,2,4-dichloroiodobenzene* (VI) from II by the action of KI on the diazo compd. m. 30.5°; *3,4-dichlorobenzenesulfonic acid* (VII), according to van der Linden (*Rec. trav. chim.* **30**, 332(1911); cf. *C. A.* **6**, 1293); the Na salt crystallizes without H_2O; *3,4-dichlorobenzonitrile* (VIII) from II by the Sandmeyer reaction, m. 71.8–2.1°; this nitrile may be saponif. easily with 20% alc. KOH, *3,4-dichlorophenol* (IX) according to Holleman's method (*C. A.* **12**, 1542); *3,4-dichloronitrobenzene* (X) according to Holleman's method (*Rec. trav. chim.* **31**, 228(1912); cf. *C. A.* **7**, 1963), $b_{745.5}$ 206.3–8.8°; *1,2,4-dichloronitrosobenzene* (XI) by oxidation of the corresponding $Cl_2C_6H_3NHOH$ (Lapworth and Pearson, *C. A.* **15**, 2838; Haworth and Lapworth, *C. A.* **15**, 2838, m. 75°) with the calcd. amount of CrO_3, m. 88°. The 3,4-$Cl_2C_6H_3NHOH$ is oxidized in alc. by the air to *3,4,3',4'-tetrachloroazoxybenzene*,

m. 139–9.5°; *3,4-dichlorobenzophenone* (XII) according to the method of Böeseken (*C. A.* **2**, 1132), m. 102–3°; *3,4-dichlorobenzaldehyde* (XIII) by first chlorinating X at its b. p. to $Cl_2C_6H_3CHCl_2$ and then sapong. the latter compd. with boiling water in the presence of $CaCO_3$ or with fuming H_2SO_4 (Erdmann and Schwechten, *Ber.* **18**, 470(1885), Ger. pat. 32,238); the aldehyde, purified by means of the bisulfite compd., m. 42–2.6°. With the Cannizarro reaction XIII gives *3,4-dichlorobenzoic acid*, (XIV) m. 208–9°, and *3,4-dichlorobenzyl alc.*, m. 38°. XIV, however, is obtained in a purer state and with the m. p. mentioned above, by sapon. of VIII. With NaOMe these compds. show the following reactions: I is converted into 2,4-$Cl_2C_6H_3OMe$ (de Mooy, *Rec. trav. chim.* **31**, 230(1912)); II is resinified completely; III gives 3,4-$Cl_2C_6H_3OMe$ and by prolonged heating 3,4-$Cl_2C_6H_3OH$, m. 65–6°; IV gives 2,5-$Cl_2C_6H_3OH$ (Holleman, *C. A.* **10**, 1508), m. 57°; V yields *2-chloro-5-bromophenol*, m. 57°, which was synthesized from 2,5-$ClBrC_6H_3NO_2$ by reduction and diazotization in the usual way; VI was converted into a mixt. of 3,4-$Cl_2C_6H_3OH$ and *2-chloro-5-iodophenol*, m. 56°; the latter compd. was again synthesized in the following way: 4,3-$Cl(O_2N)C_6H_3NH_2$ was converted into *1-chloro-4-iodo-2-nitrobenzene*, m. 74.5°, by the Sandmeyer reaction, the nitro compd. being again reduced by $TiCl_3$ to the amino compd., *2-chloro-5-iodoaniline*, m. 61.6°, which was converted into *2-chloro-5-iodophenol*, m. 56°, in the usual way. VII gives $Cl(HO)C_6H_3SO_3H$, which on nitration is converted into 2,4,6-$Cl(O_2N)_2C_6H_2OH$, m. 110–1°, and thus must be 3,4-$Cl(HO)C_6H_3SO_3H$; VIII is sapond., IX remains unchanged, while X gives a liquid phenolic substance, which was not identified, and *2-chloro-5-methylphenol*, m. 46°, which was prepd. also from 2,5-$ClMeC_6H_3NH_2$ in the usual way. XI is converted into the $(3,4\text{-}Cl_2C_6H_3)_2N_2O$, m. 139°, mentioned above, while XII, XIII and XIV gave a reaction with the elimination of Cl, it being, however, impossible to isolate the compds. formed. In order to get some idea of the relative velocities of the reactions of these compds. with NaOMe, 5 millimols. were heated with 2 equivs. of 0.5 *N* NaOMe during 3 hrs. at the b. p. of aniline, 183°, then the MeOH was evapd. on the water bath and the halogen detd. after acidulation with HNO, the following results being obtained: III, 83% F, 4% Cl; IV, 72% Cl; V, 83% Cl and a small amount of Br; VI, 94% Cl + I; VII, 79% Cl; X, 3% Cl; XIV, 20% Cl, and IX, 0%. C. F. VAN DUIN

Action of iodine and of halogen derivatives on *aci*-nitro-alkali compounds. COSTIN D. NENITZESCU AND DIMITRIE A. ISĂCESCU. *Ber.* **63B**, 2484–96(1930).—$(C_6H_4)_2C$ N(:O)OK (I) and PhCH:N(:O)ONa (II) lose their alkali to I and form the compds. $(C_6H_4)_2C(NO_2)C(NO_2)(C_6H_4)_2$ (III) and $PhCH(NO_2)CH(NO_2)Ph$ (IV) (*C. A.* **24**, 1094). It has now been found that under somewhat different conditions I, II and other *aci* nitro-alkali compds. RR'C:N(:O)ONa give with I the iodonitro compds. RR'C(NO₂)I which would normally be expected. These are generally stable enough at room temp to permit of their analysis; on standing or heating they lose I. They were of special interest as possibly being intermediate products in the formation of the compds. of type III and IV. In fact, $(C_6H_4)_2C(NO_2)I$ (V) with I and $PhCH(NO_2)I$ (VI) with II gave III and IV, resp., but this reaction could not be brought about with any of the other *aci*-nitro-alkali and iodonitro compds. V, heated in solvents, gives III and I almost quantitatively with a rapidity depending on the b. p. of the solvent (in a few min in AcOH, in about 2 hrs. in MeOH). The reaction can hardly be interpreted as being other than a dissocn. into radicals which then polymerize, the great tendency of fluorene radicals to polymerize making the dissocn. non-reversible. I, boiled with alc. MeI $PhCH_2Cl$, EtBr or $ClCH_2CO_2Et$, gives the K halide and more than 80% $(C_6H_4)_2C$ NOH (VII), the org. halide being converted into the aldehyde; probably an unstable nitronic ester is an intermediate product: $I + XCH_2R \longrightarrow [(C_6H_4)_2C:N(:O)OCH_2R] \longrightarrow$ VII + OHCR. Secondary halides react in the same way, giving VII and ketones Me_2CHBr and Me_2CHI smoothly yielded Me_2CO, the iodide also giving a little III. Bromocyclohexane did not react even after 8 hrs. boiling, while $BrCH(CO_2Et)_2$ gave VII and a little III. The tertiary Me_3CBr reacted readily in boiling alc., giving $Me_2C:CH_2$, III and VII, whereas, by analogy with the thermal decompn. of other esters, it was expected that there would be formed $(C_6H_4)_2C:N(:O)OH$ (VIII), which under the exptl. conditions would rearrange into the true $(C_6H_4)_2CHNO_3$ (IX). As no indications of the presence of other than the above compds. was obtained, a direct comparison was made of the III obtained electrolytically with the compd. described in the literature as the true IX and it was found that the 2 are identical. As the structure of III has been established with certainty, the supposed IX must also have this structure, a view in harmony with its phys. properties. The peculiar conversion of VIII into III is represented by the scheme 3 VIII $\longrightarrow$ [3 IX] $\longrightarrow$ 2 III + VII + H_2O, which is in excellent agreement with the results of a semi-quant. expt. which was carried out. Attempts to prep

IX by rearrangement of VIII under mild conditions or from V with HI were unsuccessful, the latter reaction giving pure VIII. The formation of $Me_2C:CH_2$ from I and Me_3CBr probably takes place through the nitronic ester: $(C_6H_4)_2C:N(:O)OCMe_3 \longrightarrow$ VIII + $CH_2:CMe_2$; if the reaction is carried out at room temp. instead of in boiling alc., VIII is obtained in good yield. $PhCH_2CMe_2Br$ and Ph_3CCl with I both gave III and VII. Picryl chloride and $EtCHBrCO_2Et$ did not react even after long boiling. II and its *p*-Br deriv. react much less readily than the fluorene compds. with MeI. The only definite products which could be identified were PhCH:CHPh and $(p\text{-}BrC_6H_4CH:)_2$. With Me_3CBr, II gives $PhNHNO_2$. *9-Iodo-9-nitrofluorene* (V), yellow, m. 86°, decomps. violently a few degrees higher. *Aryliodonitromethanes: Ph* (VI), yellow oil; *p-tolyl*, yellow oil; *p-chlorophenyl*, lemon-yellow, m. 30°, decomps. 173°; *p-bromophenyl*, yellow, m. 35°, becomes colored 135°, decomps. 165°; *p-nitrophenyl*, m. 90°, decomps. 150°, quickly becomes colored on standing; *α-naphthyl*, m. 74°, decomps. 110–35°; *β-naphthyl*, m. 60°, decomps. 105°; *diphenyl*, yellow, m. 62°, decomps. 64°, decomps. suddenly within 0.5 hr. after it has been prepd. *Iodonitromethane*, from $MeNO_2$ in 2 *N* NaOH with I-KI at 0°, yellow, strongly lacrimatory oil which cannot be distd. and slowly deposits I. C. A. R.

Firmness of attachment of organic residues. VII. JULIUS V. BRAUN AND AUGUST FRIEDSAM. *Ber.* **63B**, 2407–13(1930); cf. *C. A.* **22**, 381.—It was shown in Paper V that introduction of a halogen atom into a $PhCH_2$ residue increases the firmness of attachment of the latter to N in the order I > Br > Cl as regards the nature of the halogen and *o* > *m* > *p* as regards its position. $FC_6H_4CH_2$ might therefore have been expected to be attached less firmly than $ClC_6H_4CH_2$ but more firmly than $PhCH_2$. The chemistry of it shows so many peculiarities, however, that it was possible that it would prove an exception to the rule, and such is the case; the introduction of an *o*-, *m*- or *p*-F atom into $PhCH_2$ has practically no effect on the firmness of attachment of the $PhCH_2$ residue, as shown by the action of BrCN on the following compds.: $PhCH_2NMeCH_2C_6H_4F(p)$ (I), $p\text{-}MeC_6H_4CH_2NMeCH_2C_6H_4F(p)$ (II), $p\text{-}MeC_6H_4CH_2NEtCH_2C_6H_4F(p)$ (III), $p\text{-}ClC_6H_4CH_2NMeCH_2C_6H_4F(p)$ (IV), $PhCH_2NMeCH_2C_6H_4F(o)$ (V), $p\text{-}FC_6H_4CH_2NMeCH_2C_6H_4F(o)$ (VI) and $PhCH_2SCH_2C_6H_4F(m)$ (VII). These were obtained by treating the $FC_6H_4CH_2Br$ (prepd. from the $MeC_6H_4NH_2$ through the MeC_6H_4F by bromination of the side chain) with 3–4 mols. of a secondary amine 1 day at room temp. and 1 hr. at 60°. The yields were about 40%. The reaction with BrCN was carried out by slowly adding 1 mol. BrCN to the cold amine, heating the clear mixt. 0.5 hr. on the H_2O bath, adding Et_2O (which ppts. the addn. product with the original base of the bromide split off by the BrCN), shaking the Et_2O out with dil. HCl, treating the distillate (bromide and cyanoamide) 12 hrs. with an excess of Me_3N and adding Et_2O. The bromide is thereby pptd. as the quaternary salt, $RNMe_3Br$, and the cyanoamide is isolated by shaking the alc.-Et_2O filtrate with H_2O and distg. II, III and IV gave homogeneous products, I, V, VI and VII gave mixts. of 2 bromides and 2 cyanoamides. III was used as a check on II to show, as had been found before, that a 3rd substituent on a N contg. 2 aromatic groups has no influence on the course of the reaction if it is itself a firmly attached residue. *Benzyl-p-fluorobenzylmethylamine* (I), from $p\text{-}FC_6H_4CH_2Br$ and $PhCH_2NHMe$, b_{18} 168–70° (*HCl salt*, slightly hygroscopic, m. 153–6°; *picrate*, m. 105°; *methiodide*, m. 221°), yields with BrCN almost equimol. mixts. of $PhCH_2Br$ + $FC_6H_4CH_2Br$, isolated as $RNMe_3Br$ (the pure salt *p* $FC_6H_4CH_2NMe_3Br$, prepd. for comparison, m. 228–9°), and $PhCH_2NMeCN$ + FC_6H_4NMeCN. *p-Methylbenzyl-p-fluorobenzylmethylamine* (II), b_{10} 166–8° (*HCl salt*, very hygroscopic, m. 183°; *picrate*, m. 110–2°; *methiodide*, m. 216–7°), yields with BrCN almost pure $MeC_6H_4CH_2Br$ and the *cyanoamide*, $FC_6H_4CH_2NMeCN$, b_{10} 148–54°. The reaction was even more sharp cut with *p-methylbenzyl-p-fluorobenzylethylamine* (III), prepd. from *p methylbenzylethylamine*, b_{10} 98–9° (*HCl salt*, hygroscopic, m. 189°; *picrate*, m. 89°); the III, b_{10} 175° (HCl salt and picrate, oily; *methiodide*, m. 122–5°), gives with BrCN $MeC_6H_4CH_2Br$ and the *cyanoamide*, $p\text{-}FC_6H_4CH_2NEtCN$, b_{10} 155°. *Benzyl-p methylbenzylethylamine*, b_{11} 82°, gives pure $MeC_6H_4CH_2Br$ and the *cyanoamide*, $PhCH_2NEtCN$, b_{12} 160°. *p-Chlorobenzyl-p-fluorobenzylmethylamine* (IV), b_{10} 182–4° (*HCl salt*, m. 160–1°; *picrate*, m. 129°; *methiodide*, m. 210–2°), gives $FC_6H_4CH_2Br$ and the *cyanoamide*, $p\text{-}ClC_6H_4CH_2NMeCN$, b_{10} 166°. *Benzyl-o-fluorobenzylmethylamine* (V), b_{11} 158–60° (*HCl salt*, m. 189°; *picrate*, m. 99°; *methiodide*, m. 213°), gives with BrCN a mixt. of bromides and cyanides which, however, are not equimol., the $PhCH_2Br$ and the $p\text{-}FC_6H_4CH_2NMeCN$ predominating; the pure $o\text{-}FC_6H_4CH_2NMe_2Br$ m. 225°. *p-Fluorobenzyl-o-fluorobenzylmethylamine* (VI) (from *p-fluorobenzylmethylamine*, b_{14} 80–2°; *HCl salt*, m. 199°; *picrate*, m. 131°), b_{12} 164–6° (*HCl salt*, very hygroscopic, m. 130°; *picrate*, m. 142°; *methiodide*, m. 230°), gives a mixt. of *o*- and *p*-$FC_6H_4CH_2Br$ and of *o*- and *p*-$FC_6H_4CH_2NMeCN$, the latter of which is hydrolyzed by concd. HCl at 130°

to *o*- and *p*-$FC_6H_4CH_2NHMe$; the *o-fluorobenzylmethylamine* b_{12} 73° (*HCl salt*, m. 160°, *picrate*, m. 139–40°. *Benzyl m-fluorobenzyl sulfide* (VII), from $PhCH_2SH$, Na and *m*-$FC_6H_4CH_2Br$ in alc., faintly yellow, $b_{0.3}$ 140–2°, gives with BrCN a mixt. of $PhCH_2Br$ and $FC_6H_4CH_2Br$ and of PhCHSCN and $FC_6H_4CH_2SCN$. Pure $FC_6H_4CH_2NMe_2Br$ m. 231°.

C. A. R.

Picramic acid. E. Clayton. *J. Soc. Dyers Colourists* **46**, 365–7(1930).—A 90% yield is obtained by the following method: 10 g. com. picric acid in 250 cc. hot H_2O is neutralized with 40 cc. 5% NaOH and cooled to 50°. Fifty cc. of $Na_2S_2O_4$ is added with stirring. Fine crystals settle out and are filtered after the soln. is cool.

Milton Harris

The behavior of phenylenediamines with aromatic nitro derivatives. G. B. Crippa with G. Bellani and A. Marubini. *Gazz. chim. ital.* **60**, 644–7(1930).—$PhNO_2$ (I) reacts with phenylenediamines in 2 different ways, *viz.*, to form condensation products and as an oxidizing agent. In earlier expts. of C. (cf. *C. A.* **21**, 1809) it was shown that in the reaction of I and *p*-$C_6H_4(NH_2)_2$ (II) a large quantity of an unidentified black substance (III) is formed. It was regarded as an oxidation product of the polynuclear oxidation of II, and therefore analogous to aniline black (IV), but since it was too complex to identify, it was decided to establish its identity through some intermediate phase in the same way that numerous investigators have studied the intermediate products leading to IV. Judged by other cases of oxidation of II, the intermediate oxidation products should be 2,5,2′,5′-tetraaminodiphenyl-*p*-azophenylene (V). Therefore I and II were condensed as before, but the boiling was interrupted at a much earlier point than before, the reaction mixt. was steam-distd. and the distillate was let stand several months in a closed vessel. V sepd. and m. 249° (much higher than previously recorded, *e. g.*, Bandroski, 230–1°, Erdmann, 242–3°). However, tetraacetyldiaminodiphenyl-*p*-azophenylene m. 293–4°, which agrees with the earlier literature. It was possible, however, that oxidation had led to V only during the long standing and that it was not a normal intermediate product of the reaction of I and II at the higher temp. and shorter time. Further expts. showed that the long standing was not a factor, for II (5 g.), I (40 g.) and anhyd. Na_2CO_3 (2 g.) boiled 2 hrs., filtered, extd. with EtOH, and the EtOH partially eliminated, pptd. V. V (2 g.) and I (50 cc.), boiled, steam-distd., and the residue extd. with Et_2O, left a residue of III, which shows that the oxidation of II by I leads first to V and thence to III. *o*-$C_6H_4(NH_2)_2$ (VI) condenses with I to form phenylbenzotriazole and *o*-aminoazobenzene (cf. C. and Castelli, *C. A.* **22**, 418). This reaction was studied further to ascertain whether the 3 isomeric nitrotoluenes are reactive enough to react like I in such a condensation. It was found that only *m*-$MeC_6H_4NO_2$ (VII) condenses with VI. VI (10 g.), anhyd. Na_2CO_3 (2 g.) and VII (80 g.), boiled 20 hrs., steam-distd. and the distillate fractionally crystd., yields 2 products (1) 2-*N*-(*m-tolyl*)-*1,2,3-benzotriazole*, $C_6H_4<\begin{matrix}N\\|\\N\end{matrix}>NC_6H_4Me$-*m* (VIII), according to the reaction.

VI + VII ⟶ VIII + $2H_2O$, and the secondary product *m-tolylazo-o-aminobenzene*, *o*-$H_2NC_6H_4N{:}NC_6H_4Me$ (IX), formed thus: VI + VII − O ⟶ IX. Recrystd. from ligroin, VIII m. 99°. To establish its constitution and that of IX they were prepd. by another method. *m*-MeC_6H_4NO was condensed with benzoyl-*o*-phenylenediamine (cf. Witt, *C. A.* **7**, 83), and *m*-tolylazo-*o*-(benzoylamino)benzene which is obtained forms IX on sapon. IX recrystd. from ligroin is pomegranate-red and m. 81°. According to IX the general method of Zincke (*Ber.* **18**, 3136) it forms VIII. The behavior of *m*-$C_6H_4(NH_2)_2$ with I was also studied. Unlike its isomers II and VI, no condensation took place, and after the same treatment as in the other cases azobenzene was the only product which was formed by the reduction of I.

C. C. Davis

Catalytic effect of magnesium alcoholates on the reaction of Grignard reagents with carbon dioxide. Corliss R. Kinney and M. L. Mayhue. *J. Am. Chem. Soc.* **53**, 190–9(1931).—Curves are given showing the depression in yield of the reaction of several Grignard reagents with CO_2 caused by the addn. of relatively small quantities of the alcs. corresponding to the reagents. Reactions are given which indicate an equil. relationship between Ph_3CMgCl and Ph_3C. Cleavage of Ph_4C with MgI was not successful. The yield of Ph_3CCO_2H from Ph_3CMgCl and CO_2 is decreased from 75% to 63.5% by the addn. of 0.8 mol. % Ph_3COH before the prepn. of the Grignard reagent; to 55% by 3.1 mols. %; to 33.2 by 6 mols. %; to 16.6 by 12.3 mols. % and to 0 by 15.3 mols. %. The yield of $PhCH_2CO_2H$ from $PhCH_2MgCl$ is decreased from 84.5% to 74.3, 65.8 and 46.3%, resp., by the addn. of 2, 10 and 20 mols. % of $PhCH_2OH$. The

yield of BzOH from PhMgBr is decreased from 72.1 to 58.6, 45.1, 35.9 and 29.1%, resp., by the addn. of 0.5, 2, 6 and 7 mols. % of PhOH. The yield of $BuCO_2H$ was decreased from 78.4 to 63.5, 50 and 26.2%, resp., by the addn. of 2.43, 9.46 and 24.3 mols. % of BuOH. C. J. WEST

Phenylmagnesium fluoride. HENRY GILMAN AND LLOYD L. HECK. *J. Am. Chem. Soc.* **53**, 377–8(1931).—PhMgF was formed from PhF and Mg–Cu alloy in Et_2O after standing 18 months at room temp. No reaction had occurred in the first 6 months. C. J. WEST

Preparation of aromatic mercuric chlorides from aromatic diazonium chlorides. ROBERT E. MCCLURE AND ALEXANDER LOWY. *J. Am. Chem. Soc.* **53**, 319–21(1931).—Aromatic mercuric chlorides are obtained by stirring a mixt. of RN_2Cl and Hg at about 5°. In this way the following compds. were prepd.: PhHgCl, 45%; *p*-MeC_6H_4HgCl, 52%; *o*-MeC_6H_4HgCl, 72%; 2,5-$Me_2C_6H_3HgCl$, 64%; α-$C_{10}H_7HgCl$, 20%. PhN_2Cl and Black pptd. Hg give 20% PhHgCl. C. J. WEST

Nitrogenous arsenical derivatives. S. BERLINGOZZI AND M. LIGUORI. *Ann. chim. applicata* **20**, 494–500(1930).—A no. of complex derivs. of $ClN{:}NC_6H_4AsO_3H_2$ have been prepd. so as to make a systematic study of the relation between chem. constitution and physiol. action. *1,3-Dihydroxybenzene-6-azo-p-benzenearsonic acid* was prepd. by diazotizing *p*-$H_2NC_6H_4AsO_3H_2$ (I) and adding resorcinol soln. It is slightly sol. in the common solvents, so is purified by means of its Na salt; it m. above 250°. *1,3-Dihydroxybenzene-4,6-bisazo-p-benzenearsonic acid* (II), $(HO)_2C_6H_2(N{:}NC_6H_4AsO_3H_2)_2$, is prepd. by diazotizing I and coupling it with another mole of I. It is a red-brown cryst. solid, does not decomp. below 250°. *1,3-Dihydroxybenzene-6-α-naphthaleneazo-4-azo-p-benzenearsonic acid* (III), prepd. by combining diazotized α-$C_{10}H_7NH_2$ with II; is a dark red solid, decomps. above 250°. *1,3-Dihydroxybenzene-2,4,6-triazo-p-benzenearsonic acid*, is prepd. by combining $ClN{:}NC_6H_4AsO_3H_2$ with II, or, preferably, with resorcinol. When dry it is a black powder. *1-Amino-3-hydroxybenzene-6-α-phenylazo-8-azo-4-azo-p-benzenearsonic acid* is prepd. by combining diazotized α-phenylaminoquinoline with 4-[4,2-$H_2N(HO)C_6H_3N{:}N$]$C_6H_4AsO_3H_2$ in alk. soln. The product is an orange-red powder, darkens above 180°, decomps. above 250°. Similarly, $C_6H_3N(NCl)_2$, made by diazotizing benzidine, may be combined with 4-[4,3-H_2N-$HO(C_6H_3N{:}N$]$C_6H_4AsO_3H_2$ and also with the 4,3-$(HO)_2$ compd. The first product is a dark red, the latter a chocolate-brown powder, stable below 250°. A. W. C.

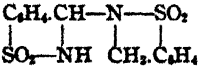
Reaction between dichloroarsines and secondary aromatic amines. C. S. GIBSON. *J. Soc. Chem. Soc.* **53**, 376–7(1931).—G. calls attention to work apparently overlooked by Lewis and Stiegler (*C. A.* **24**, 5719). C. J. WEST

Reaction of mercury organic compounds with tin salts as a method of preparing an organic compounds. A. N. NESMEYANOV AND K. A. KOCHESHKOV. *Ber.* **63B**, 2204–14(1930).—The reaction of R_2Hg and RHgX with Sn salts has been studied and found to vary greatly with the solvent, the org. compd., and the inorg. compd. and their solv. In anhyd. Me_2CO, Ph_2Hg, $(PhCH_2)_2Hg$, $(MeC_6H_4)_2Hg$, $(\alpha\text{-}C_{10}H_7)_2Hg$ (I) and $(C_6H_{11})_2Hg$ react with $SnCl_2$ or $SnBr_2$ thus: $R_2Hg + SnX_2 = R_2SnX_2 + Hg$. In alc. the reaction is all or partly $R_2Hg + SnX_2 + EtOH = 2RH + Hg + (EtO)_2SnX_2$. I reacts thus even in Me_2CO. All aromatic compds. react rapidly. Et_2Hg reacts only after hrs. of boiling, the reaction $Et_2SnX_2 + Et_2Hg = Et_2SnX + EtHgX$ also taking place. Freshly prepd. $(PhCH_2)_2Hg$ reacts like Ph_2Hg but after 2 months like Et_2Hg. All aromatic RHgCl react in Me_2CO thus: $2RHgCl + SnCl_2 = R_2SnCl_2 + 2Hg + SnCl_4$. All the RHgX compds. whose corresponding R_2Hg react with alc. above react in alc. this reaction; $RHgCl + SnCl_2 + EtOH = RH + Hg + EtOSnCl_3$. The RHgBr compds. react according to both $2RHgBr + SnBr_2 = R_2SnBr_2 + 2HgBr$ and $RHgBr + SnBr_2 = RSnBr_3 + Hg$. W. F. HARRINGTON

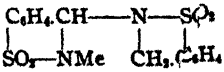
Aromatic boron compounds and the aryl mercury salts obtained from them. W. KÖNIG AND W. SCHARRNBECK. *J. prakt. Chem.* **128**, 153–70(1930).—The B compds. were prepd. because of their possible chemotherapeutic interest. *p-Bromophenylboric acid*, m. 260°, was obtained from *p*-BrC_6H_4MgBr and iso-Bu borate in Et_2O; the *oxide*, BrC_6H_4BO, results by heating the acid at 105° or by standing over H_2SO_4 for several days, it m. 280°. *o*-ClC_6H_4MgBr gives *o-chlorophenylboric acid*, m. 149°. *p*-$MeOC_6H_4MgBr$ gives *p*-methoxyphenylboric acid, m. 207°; the *o*-isomer m. 105°; the *m*-isomer m. 147°. *p*-Tolylboric acid m. 245°; it readily yields the *oxide*, m. 259°; the *o*-isomer m. 168° and 168°; the *m*-acid m. 157°. α-Naphthylboric acid m. 202°; the *oxide* m. 207°; the β-acid m. 248° and 266°; the higher-melting form is changed to the lower melting by crystg. from hot H_2O. The tolylboric acids are oxidized by $KMnO_4$ to the carboxyphenylboric acids; the *p*-isomer m. 225°; the *o-isomer* m. 152°; the *m*-isomer m. 240° (*Pb salt*; *Ba salt*, crystg. with 1 H_2O; *Ag salt*). *Di-p-anisylboric acid*, m. 107°;

di(p-bromophenyl)boric acid, m. 113°; *di-β-naphthylboric acid*, b_{14} 135–8°, m. 172°. The following *Hg salts* were prepd. by treating the boric acid in H_2O with the Hg salt: *p*-BrC_6H_4HgCl, m. 235°; *p*-BrC_6H_4HgOAc, m. 188°; *o*-ClC_6H_4HgCl, m. 133°; *p*-$MeOC_6H_4HgO$; *p*-$MeOC_6H_4HgOAc$, m. 176.5°; *o*-isomer, m. 124°; *o*-$MeOC_6H_4HgCl$, m. 178°; *m*-isomer, m. 158°; *m*-$MeOC_6H_4HgCl.HgOAc$, m. 120°; *p*-MeC_6H_4HgCl, m. 232°; *p*-MeC_6H_4HgOAc, m. 147°; *o*-MeC_6H_4HgOAc, m. 101°; *o*-MeC_6H_4HgCl, m. 142°; *m*-isomer, m. 159°; *m*-MeC_6H_4HgOAc, m. 84°; α-$C_{10}H_7HgOAc$, m. 154°; β-isomer, m. 147°; β-$C_{10}H_7HgCl$, m. 271°; *p*-$HO_2CC_6H_4HgCl$, m. 272°; *o*-isomer, m. 131°; *m*-isomer, m. 258°; *m*-$HO_2CC_6H_4HgOAc$, m. above 310°. C. J. West

The oxidizing power of the chloramines. J. Koetschet, P. Koetschet and Pierre Viaud. *Helv. Chim. Acta* **13**, 587–619(1930).—Chloramine B ($PhSO_2NNaCl$) (I) when treated with acid gives *benzenedichlorosulfonamide* (II). In practice II is not isolated but is the active oxidizing agent. 4,3-$Me(O_2N)C_6H_3SO_2NH_2$ (XI) (45 g.) and 28 g. I were refluxed in 900 cc. H_2O contg. 6 cc. HOAc for 32 hrs. yielding 33 g. *o-nitro-p-sulfonamidobenzaldehyde* (III), m. 141–3°; *anil* (IV), m. 171–1.5°. III, recovered from IV, m. 149–51° (from H_2O); *phenylhydrazone* (V), m. 239° (from alc.); *p-nitrophenylhydrazone* (VI), m. 290° (from $PhNO_2$). The *phenylhydrazone* (VII) and *p-nitrophenylhydrazone* (VIII) of *p-sulfonamidobenzaldehyde* are yellow. The addn. of a NO_2 group in the hydrazone-benzene ring as in VIII does not alter the color, but added in the aldehyde-carrying ring, as in V and VI, it confers a red color. On the other hand, while the *Na salts* of V and VII are almost colorless, those of VI and VIII, with the NO_2 group in the hydrazine ring, are blue-violet. I (35 g.), 5 g. *2,5-*$Me(O_2N)C_6H_3SO_2NH_2$ (XII) and 0.7 cc. HOAc, heated for 14 hrs. in 100 cc. H_2O, gave no isolable aldehyde, but the *phenylhydrazone* of *p-nitro-o-sulfonamido-ps-benzaldehyde* (IX), $NH.SO_2.C_6H_3(NO_2).CHNHNHPh$, was prepd. from the reaction mixt., m. 228° (from alc.). Similarly, PhMe gave 26.5% BzOH, isolated as the phenylhydrazone, m. 148–52°. *o*-$O_2NC_6H_4Me$ gave 4.8% of *o*-$O_2NC_6H_4CHO$ (*phenylhydrazone*, m. 152–3°). *m*-Xylene gave 13% of *m*-MeC_6H_4CHO (*phenylhydrazone*, m. 75–81°). *p*-Xylene gave 26.5% of *p*-MeC_6H_4CHO (*phenylhydrazone*, m. 106–10°) (from 50% alc.). Five g. *p*-$MeC_6H_4SO_2NH_2$ and 2 g. halazone (X) (with NaOH to give the H_2O sol. Na salt), heated for 14 hrs. in H_2O, gave yields, varying with the dilu. and duration of reaction, of the *phenylhydrazone* of *p-sulfonamidobenzaldehyde* (max. yield 1 g.). Similarly *o*-$MeC_6H_4SO_2NH_2$ gave 21.5% of aldehyde. X and XI gave 16% III. X and XII gave 25% of IX. X with *2,4-*$(H_2NSO_2)_2C_6H_3Me$ gave 20% of the *phenylhydrazone* of *2,4-disulfonamidobenzaldehyde*, $HN.SO_2.C_6H_3(SO_2NH_2).CHNHNHPh$, m. 241–2° (from alc.). The following compds. were derived from the hydrolysis products of *chloramine T:* *p-*$Me_2NSO_2C_6H_4CHO$ gave a *p-tolylhydrazone*, m. 160° (from 50% alc.), and an *asym. phenylmethylhydrazone*, m. 134–5° (from alc.). XII with KOH gave the corresponding *alc.*, m. 83–4° (from PhH-ligroin), and the *acid*, m. 247–8° (from H_2O). The following products were derived from the hydrolysis products of *chloramine TO* (XV): *o-sulfamidoanhydrobenzyl alc.* (XIII); *N-Ac deriv.*, $AcN.SO_2.C_6H_4.CH_2$, m. 108–9° (from PhH-ligroin), Bz deriv. m. 117–7.5° (from 40% alc.); *benzenesulfonyl deriv.* m. 174–5° (from alc.); *β-naphthalenesulfonyl deriv.* m. 214° (from alc.). XIII (1.5 g.) gave 1.25 g. *methylated deriv.*, m. 126–7° (from alc.), which was oxidized with alk. $KMnO_4$, yielding *o-methylsulfamidobenzaldehyde; phenylhydrazone*, m. 147–9°. *o-Sulfonamido-ps-benzaldehyde* (XIV); *methylphenylhydrazone*, m. 165° (from 60% alc.); *p-tolylhydrazone*, m. 207–9° (from 50% alc.). XIV dehydrated with H_2SO_4 gave *1-S-dioxy-α,β-benzylisothiazole*, $C_6H_4.CH:N.SO_2$, m. 257–8° (from $PhNO_2$ (alc.)). XIV was condensed with $PhNH_2$, yielding *1-S-dioxy-2,3-dehydro-3-p-aminophenyl-α,β-benzylisothiazole*, m. 236–7° (from alc.), and, condensed with $PhNMe_2$ (XVII), gave the corresponding *dimethylamino deriv.*, m. 152–4° (from PhH-ligroin). From the hydrolysis of XV a compd. (XVI), m. 141°, was also obtained; *Ac deriv.* m. 250–4°. XVI was not attacked by 40% NaOH at 25–30°, but when heated on the steam bath yielded the resp. *alc.* (XIII) and *aldehyde* (XIV). XVI with 3% or 25% Na_2SO_3 gave the same products. XVI was synthesized from XIII and XIV. Also derived from XV was another unnamed compd. (XVII) m. 263°, which was split by the action of $PhNHNH_2$ into *methyl-o-sulfonamidobenzaldehyde phenylhydrazone*, m. 153° (from dil. alc.) and XIII. —U on hydrolysis also gav



(XVI)

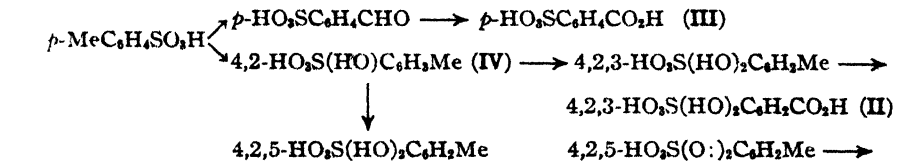


(XVII)

saccharin, which with XVII yielded *methylsaccharin*, m. 132–3°, showing XVII to be a good methylating agent for saccharin. T. H. RIDER

Aromatic fluorosulfonates. WILLY LANGE AND EMIL MÜLLER. *Ber.* **63B**, 2653–7 (1930).—Ph-, b_{754} 179–6° (yield 40%), *o*-tolyl-, b_{754} 191.6–192.6° (yield 43%), diphenylene-1,4-di-, m. 94.8° (yield 5%), *p*-chlorophenyl-, b_{753} 208–211° (yield 37%), *o*-, b_{26} 152° (yield 8%), *m*-, b_{22} 154° (yield 12%) and *p*-nitrophenyl-fluorosulfonates, b_{19} 156° (yield 12%), were prepd. by heating the corresponding diazonium fluorosulfonic acids (*C. A.* **21**, 3500). All are stable to boiling H_2O and acids but are very slowly hydrolyzed by alkali. V. F. HARRINGTON

The electrochemical oxidation of 1-methyl-4-benzenesulfonic acid. MORIAKI YOKOYAMA. *Helv. Chim. Acta* **13**, 1257–64(1930).—The electrochem. oxidation of *p*-$MeC_6H_4SO_3H$ acid takes the following course:



was obtained from the recrystn. of the ether-sol. product. II was identified as the Ba salt from the portion not pptd. with $Pb(OAc)_2$. III was identified by color reactions and by analysis of the Ba salt from the fraction pptd. with $Pb(OAc)_2$. The electrochem. oxidation of IV gave I, m. 199°, and II, identified by analysis of its Ba salt and by its color reactions. RACHEL BROWN

Firmness of attachment of alkyl groups in the benzene nucleus. K. v. AUWERS AND J. JANSSEN. *Ann.* **483**, 44–65(1930); cf. *C. A.* **22**, 3646.—The Fries transformation of various 2,6-dimethyl- and 2-methyl-6-ethyl-4-alkylphenyl acetates has been effected by the methods previously used. *vic-m-Xylenyl propionate*, pale rose, b. 234–6°; $AlCl_3$ gives *2,6-dimethyl-4-propiophenol*, m. 106–6.5°; reduction by Clemmensen's method gives *2,6-dimethyl-4-propylphenol*, m. 33–4°, whose *acetate* b. 252–60°. *vic-m-Xylenyl butyrate*, pale yellow, b. 248–50°; *2,6-dimethyl-4-butyrophenol*, m. 124–5°; *2,6-dimethyl-4-butylphenol*, b_{20} 138–46°, m. 32.5–3.5°; *acetate*, b. 268–76°. *vic-m-Xylenyl heptoate*, b_{12} 162–4°, *2,6-dimethyl-4-heptoylphenol*, pale yellow, m. 92–3°; *2,6-dimethyl-4-heptylphenol*, b_{12} 170–85°, m. 48.5–9°; *acetate*, m. 37.5–8°. *vic-m-Xylenyl dodecoate*, b_{12} 216–8°, m. 28.9°. *2,6-dimethyl-4-laurylphenol*, m. 52–3°; *2,6-dimethyl-4-dodecylphenol*, m. 65–6°; *acetate*, m. 57–8°. *vic-m-Xylenyl benzoate*, b. 310–20°, m. 40.5–1°; *2,6-dimethyl-4-benzoylphenol*, m. 142–2.5°; *2,6-dimethyl-4-benzylphenol*, b_{20} 195–200°, m. 66.5–7.5°; acetate, b. 324–6°. The Fries transformation of the above acetates affords, in all cases, unchanged acetate, the corresponding phenol and 3,5,4-$Me_2(HO)C_6H_2Ac$; small amts. of unidentified *o*-hydroxyketones are formed with the Pr, Bu and heptyl derivs. *2-Methyl-6-ethylphenyl propionate*, b. 244–6°; *butyrate*, b. 258–61°; *heptoate*, b_{12} 172–4°; *dodecoate*, b_{12} 218–20°. *2-Methyl-6-ethyl-4-propiophenol*, m. 101–2°; *4-butyro deriv.*, m. 86–7°; *4-heptoyl deriv.*, m. 56–7.5°; *4-lauryl deriv.*, m. 44.5–5.5°. *2-Methyl-4-propyl-6-ethylphenol*, b_{15} 130–3° (*phenylurethan*, m. 140.5–1.5°; acetate, pale yellow, b. 264–6°), the Fries transformation gives a little *o*-hydroxyketone and regenerated phenol. *2-Methyl-4-propylphenol*, b_{10} 117° (*phenylurethan*, m. 136°) yields an *acetate*, b_{11} 125°, giving *2-methyl-4-propyl-6-acetophenol*, pale yellow, b_{12} 136° (*p-nitrophenylhydrazone*, ocher-yellow, m. 216–7°). *2-Methyl-4-butyl-6-ethylphenol*, pale yellow, b_{18} 146–50° (*phenylurethan*, m. 117–9°); *acetate*, b. 270–80°; the Fries transformation gives the phenol and *2-methyl-4-butyl-6-acetophenol*, b_{12} 152–4° (*p-nitrophenylhydrazone*, red, m. 168–70°), synthesized from *2-methyl-4-butylphenyl acetate*, b. 268–70°. *o*-Tolyl butyrate, b. 237–40°. *2-Methyl-4-heptyl-6-ethylphenol*, m. 26–8°; *acetate*, b_{18} 184–94°, the Fries transformation gives the phenol and a little unidentified ketone. *2-Methyl-4-dodecyl-6-ethylphenol*, m. 51–2°; *acetate*, m. 41–3°; the Fries conversion gives small quantities of the phenol and 2,6,4-MeEt(OH)C_6H_2Ac. In these transformations the Et group is generally eliminated exclusively. *m-4-Xylenyl heptoate*, b_{16} 180–2°; *2,4-dimethyl-6-heptoylphenol*, pale yellow, b_{16} 186–90°; reduction gives *2,4-dimethyl-6-heptylphenol*, b_{16} 172–8°, m. 39–40°; *acetate*, b_{12} 180–8°; the Fries transformation gives mainly 3,5,2-$Me_2(HO)C_6H_2Ac$; the heptyl group is replaced by Ac. *2-Methyl-4-ethylphenyl propionate*, b_{16} 136–8°; *2-methyl-4-ethyl-6-propionylphenol*, yellow oil, b_{16} 134–8° (*phenylurethan*, m. 131–1.5°); *acetate*, b_{16} 142–6°; the Fries transformation

ives approx. equal amts. of *2-hydroxy-3-methyl-5-propylacetophenone*, m. 101° (also btained from *2-methyl-6-propylphenyl acetate*, b_{11} 117°) and an unidentified *o*-hydroxy-etone. *2-Methyl-4-ethyl-6-allylphenol*, b_{15} 120–5° ($FeCl_3$ reaction green); *acetate*, ale rose, b. 250–60°. *2-Methyl-4-ethyl-6-benzylphenol*, b_{12} 188–94° (*phenylurethan*, m. 42–3°); *acetate*, b_{12} 194–8°. Both acetates are converted into 3,5,2-MeEt(HO)C_6H_2-ic. The results show that the ease of elimination of the Et, Pr and Me groups is in the rder named. *o-Hydroxypropiophenone oxime*, m. 93.5–4°. *2-Hydroxy-5-propylaceto-henone*, yellow, b_{10} 145–7° ($FeCl_3$ reaction deep violet). Reduction gives *2-ethyl-4-ropylphenol*, yellow, b_3 245–6°; *acetate*, b. 244–6°; *2-hydroxy-3-ethyl-5-propylaceto-henone*, b_{18} 140–1°; $FeCl_3$ reaction green; *p-nitrophenylhydrazone*, m. 152.5–3.5°.

C. J. West

Identification of phenols. C. Frederick Koelsch. *J. Am. Chem. Soc.* **53**, 304–(1931).—Aryloxyacetic acids, easily prepd. from $ClCH_2CO_2H$ and phenols in aq. NaOH, re recommended as derivs. for the identification of the latter compds. The results vith 20 phenols are given, the following new derivs. being prepd.: *o-chlorophenol*, m. 43–5°; *m-deriv.*, m. 108–10°; *m-bromophenol*, m. 107–8.5°; *o-iodophenol*, m. 134–5°; *n-deriv.*, m. 114–5.5°; *p-methoxyphenol*, m. 110–2°. No derivs. were obtained with *o-* nd *p*-$O_2NC_6H_4OH$ and the yield was unsatisfactory with the *m*-isomer. C. J. W.

Derivatives of the *m*-xylenols. I. Intermediate products from *m*-5-xylenol 5-hydroxy-1,3-dimethylbenzene). F. M. Rowe, S. H. Bannister, R. R. Seth and R. C. Storey. *J. Soc. Chem. Ind.* **49**, 469–73T(1930).—3,5-$Me_2C_6H_3OH$ (I) was ni-rated with $NaNO_3$-H_2SO_4-H_2O mixt. at 28°, and gave 14.6% 4-nitro-*m*-5-xylenol (II), ellow needles from MeOH, m. 66°, and 2.4% 2-nitro-*m*-5-xylenol (III), pale yellow eedles from dil. HCl, m. 107–8°. I in HOAc, treated with 83% HNO_3 at 5°, then varmed to 60°, gave a resinous product from which 29.2% of II was isolated by steam listn., and 18.3% of III by crystn. from dil. HCl. Sulfonation of I with $ClSO_3H$ yielded a S-contg. by-product, insol. in H_2O, m. 111–2°, not a SO_3H acid. 2,4,6-$Me_2(HO)C_6H_2$-SO_3H (IV) is best prepd. by the action of cold $H_2SO_4.H_2O$ on I, and IV isolated as the Na alt from the Ca salt with Na_2CO_3. Sulfonation occurs ortho to the OH. The sulfona-ion mixt., contg. IV, was nitrated directly, the SO_3H group hydrolyzed, giving a total of 38.3% of II and 29.2% of III, based on I. III was nitrated in HOAc with concd. HNO_3, giving 84.6% of 2,4-dinitro-*m*-5-xylenol (V), pale yellow needles from H_2O, m. 115–6°. Nitration of II in H_2SO_4 gave 39.3% of V and a small amt. of 2,4,6-trinitro-*m*-5-xylenol (VI), m. 107–8°. Nitration of IV gave V, VI and dinitro-*m*-5-xylenolsulfonic acid, which yielded V on hydrolysis. 4,6-Dinitro-*m*-5-xylenol, pale yellow leaflets from H_2O, m. 126–7°, was formed as a by-product in an attempted mono-nitration of a sulfo-nation mixt. Treatment of I with *p*-$MeC_6H_4SO_2Cl$ in C_5H_5N gave *p*-toluenesulfonyl-*m*-5-xylenol (VII), m. 83°. VII was nitrated under various conditions, and the nitration product hydrolyzed, yielding I and III or V. Hydrolysis of the trinitro deriv. (VIII) of VII, m. 148–9°, gave V, indicating that VIII has the structure 3,5,2,4 $Me_2(O_2N)_2C_6HO_2$-$SC_6H_2(NO_2)Me(3,4)$. 2-Amino-*m*-5-xylenol (IX), m. 182°, was prepd. by coupling PhN_2Cl with I and reducing with $Na_2S_2O_4$; also from 3,5,4-$Me_2(ON)C_6H_2OH$ (m. 182°) by alk. reduction with $Na_2S_2O_4$; di-Ac deriv., m. 182°. 4-Amino-*m*-5-xylenol, m. 163°, was obtained in 71.6% yield from II by reduction with $Na_2S_2O_4$. Di-Ac deriv. m. 87–8°. Attempts to prep. 2,4-dinitro-4′-hydroxy-2′-6′-dimethyldiphenylamine (X) from IX and 2,4-$(O_2N)C_6H_3Cl$ yielded only the 2″,4″-dinitrophenyl ether of X, m. 283–4°. *m*-5-Xylenol Me ether (XI), b. 194°, was obtained in 86.7% yield by the action of Me_2SO_4 on I. The nitro derivs. of XI were best prepd. by methylating the corresponding nitro-xylenols with Me_2SO_4 or MeI. The following Me ethers were prepd.: of II (XII), m. 5–6°; of III, m. 53°; of V (XIII), m. 172°. Nitration of XI gave 24% of the Me ether of V and some Me ether of VI, m. 124–5°. XII with $SnCl_2$ gave 80% of 4-amino-*m*-5-xylenol Me ether (XIV), m 36–7°; di-Ac deriv. m. 80–1°. Treatment of XII with $Na_2S_2O_4$ gave the Na 4-amino-*m*-5-xylenol methyl ether-sulfonate (97.3%), readily hydrolyzed to XIV. XIII was reduced with Na_2S, giving 76.1% of 2-nitro-4-amino-*m*-5-xylenol Me ether, yellow tables, m. 91°.

G. R. Yohe

Autoxidation reactions. II. Mechanism of the autoxidation of certain esters. Nicholas A. Milas. *J. Am. Chem. Soc.* **53**, 221–33(1931); cf. *C. A.* **24**, 1629.—Evidence is presented to show that the dehydrogenation theory of Wieland, as applied by W. and Wingler (*C. A.* **17**, 2558) to the autoxidation of ethers, is untenable. The oxonium peroxide theory, based on previous views of M., is proposed to explain this behavior. The rate of O absorption by $(PhCH_2)_2O$ is reported at 40° and the effect on this rate of Au, Ag, Cu, Fe and Hg, of H_2O, I, picric acid and benzoquinone has been studied; the metals show a definite acceleration effect; H_2O acts as a neg. catalyst during the initial stages of the reaction, then as a pos. catalyst; I, picric acid and benzo-

quinone show a strong inhibitory action on the oxidation. Ultra-violet radiation shows a markedly accelerating action on the oxidation of various ethers; the rate of peroxide formation under these conditions depends largely on the type of groups attached to the O atom of the ether. *tert-Bu benzyl ether*, b. 205.6–8° (cor.), d_4^{25} 0.9439; concd. HCl gives $PhCH_2Cl$ and *tert*-BuCl; it oxidizes in the dark, giving *tert*-BuOH and hydroxybenzyl peroxide. Peroxides have been isolated from *tert*-BuOEt, *tert*-BuOPr, Bu_2O and BuOEt; these are colorless oils which explode violently on heating and possess an odor resembling that of peracids. They liberate I from KI and give a strong red color with *p*-$H_2NC_6H_4NMe_2$.HCl. These are different in properties from monohydroxy- and dihydroxyalkyl peroxides. C. J. West

Action of compounds of the diazomethane series upon thiono esters. Synthesis of ketene mercaptoles, acetal chlorides and thioacetal chlorides. Diphenyldiazomethane as a "free radical." Alexander Schönberg and L. v. Vargha. *Ann.* **483**, 176–89 (1930).—Ph_2CN_2 and $S:C(SPh)_2$ in Et_2O at room temp. for 2 days give *1,1'-diphenyl-2,2'-diphenylmercaptoethylene sulfide*, $Ph_2C.S.C(SPh)_2$, m. 135° and turns green at 200°; when covered with concd. H_2SO_4 it also turns a deep green. Heated in C_6H_6 with Cu-bronze, there results nearly quant. *1,1'-diphenyl-2,2'-(diphenylmercapto)ethylene*, $Ph_2C:C(SPh)_2$, pale yellow, m. 112°; the compd. is very stable to acid and alkali and is unchanged in the KOH melt at 200° for 30 min.; with concd. H_2SO_4 in AcOH, heated 5 hrs on the H_2O bath, there results Ph_2CHCO_2H. *1,1'-Di-p-tolyl-2,2'-(di-p-tolylmercapto)ethylene sulfide*, from $(p\text{-}MeC_6H_4)_2CN_2$ and $S:C(SC_6H_4Me\text{-}p)_2$, m. 134–5°; concd. H_2SO_4 gives a deep violet halochromy; Cu-bronze in C_6H_6 or heating at 200° for 1 hr. gives *1,1'-di-p-tolyl-2,2'-di-p-tolylmercaptoethylene*, m. 122–3°. Ph_2CN_2 and $S:C(SPh)Cl$ in Et_2O give *diphenylenephenylmercaptochloroethylene sulfide*, yellow, m. 110°; with Cu-bronze in C_6H_6 there results *diphenylenephenylmercaptochloroethylene*, yellow, m. 133°; hydrolysis with H_2SO_4-AcOH gives fluorenecarboxylic acid. Ph_2CN_2 and $SC(OPh)Cl$ in C_6H_6 4 days at room temp. give *diphenylenephenoxychloroethylene*, yellow, m. 114–5°. *2,4,6-Trichlorophenylthionocarbonyl chloride*, b_{12} 146–7°, with Ph_2CN_2 gives *1,1'-diphenyl-2-hydroxy-(2,4,6-trichlorophenyl)-2'-chloroethylene*, m. 91°. The formula

$$Ph_2{:}\,C\text{-}(N_2)\text{-}$$

is proposed for Ph_2CN_2 and its relation to Ph_2C is discussed. C. J. W.

Migration of acyl from sulfur to nitrogen. H. P. Lankelma and Albert E. Knauf. *J. Am. Chem. Soc.* **53**, 309–12(1931).—*N*-Acyl derivs. of 4,2-Cl(H_2N)C_6H_3SH (I) lose H_2O very readily to form the corresponding benzothiazoles. No rearrangement of Ac and Bz between S and N occurs upon acylation of these *N*-acyl derivs., which is unlike the typical behavior of an *o*-$H_2NC_6H_4OH$. I, light yellow, m. 198-201° (decompn.) (Hodgson and Wilson, *C. A.* **19**, 1412, give 120°); HCl salt (II), straw-colored, has a pronounced vesicant action upon the skin; I is very rapidly oxidized by the air to the disulfide. II, $PhNMe_2$ and BzCl, boiled 30 min., give *2-phenyl-5-chlorobenzothiazole* (III), m. 139°; Ac_2O gives the *2-Me deriv.* (IV), m. 68–9°. Heating 1 g. II, 1.8 g. BzCl and 5 cc. $PhNMe_2$ for 10 min. gives 1.35 g. *2-benzoylamino-4-chlorophenyl thiobenzoate*, m. 158–9°; sapon. by KOH-EtOH at room temp. gives *2-benzoylamino-4-chlorothiophenol* (V), m. 105–6°; recrystn. from EtOH or Et_2O gives III. *2-Acetylamino-4-chlorophenylthioacetate*, m. 150–1°; the free *thiophenol* m. 92–4° and on crystn. from EtOH gives IV. *2-Acetylamino-4-chlorophenylthiobenzoate* (VI), m. 141–2°; sapon. gives III; *2-benzoylamino-4-chlorophenyl thioacetate*, m. 129–30°; sapon gives V. Thus in the sapon. of VI a migration of Bz from S to N occurs. C. J. West

Mercury derivatives of acetylaminocresols. A. Proskouriakoff and R. J. Titherington. *J. Am. Chem. Soc.* **52**, 3978–84(1930).—Correction. "$NaHSO_3$" in the abstract in *C. A.* **24**, 5737, should read "$Na_2S_2O_4$." E. J. C.

Addition of phenols to the ethylenic linkage. Reaction mechanism and synthesis of certain phenolic ethers. Joseph B. Niederl and Samuel Natelson. *J. Am. Chem. Soc.* **53**, 272–7(1931); cf. *C. A.* **23**, 4471.—*m*-MeC_6H_4OH and EtCH:CHMe with H_2SO_4, added dropwise, at 0°, give *2-m-cresoxypentane(sec-amyl m-cresyl ether)* (I), b. 238°, n_D^{21} 1.500, d^{20} 0.920; HNO_3 and H_2SO_4 give trinitro-*m*-cresol. I was also prepd. from *m*-MeC_6H_4ONa and AmBr. It is assumed that H_2SO_4 first adds to the double bond and then H_2SO_4 is split off, giving the ether. The *p-isomer* b. 225°, d^{20} 0.920, n_D^{21} 1.505; the *o-isomer* b. 231–4°, d^{20} 0.915, n_D^{21} 1.493. *2,2,4-Trimethyl-4-phenoxypentane*, b_{40} 190°, b_{760} 258°, m. 12°, d^{20} 0.950, n_D^{21} 1.510; nitration gives picric acid. The *4-p-cresoxy deriv.* b. 272°, d^{20} 0.889, n_D^{21} 1.470; the *m-isomer* b. 273°, d^{20} 0.895, n_D^{21} 1.476; the *o-isomer* b. 271°, m. 6°, d^{20} 0.881, n_D^{21} 1.472; with HCl and $ZnCl_2$ the last compd. gives *diisobutyl-o-cresol* ($Me_2CH_2CMe_2C_6H_2(OH)Me$), m. 49–50°. C. J. West

Action of diazonium salts on unsaturated compounds. IV. ADOLFO QUILICO AND M. FRERI. *Gazz. chim. ital.* **60**, 606–19(1930); cf. *C. A.* **24**, 559.—In non-aq. soln. diazonium salts and unsatd. compds. do not undergo a coupling reaction, but a rupture of the unsatd. lateral chains, *i. e.*, a sort of oxidation (cf. *C. A.* **24**, 559), a reaction which was also found to be true of pyrroles (cf. *C. A.* **24**, 3508, 3797). In these reactions the well-known reaction between diazonium salts and satd. alcs. also takes place, which according to Angeli is of the type: $PhN(:NH):O + EtOH \longrightarrow PhN:NH + AcH \longrightarrow C_6H_6 + N_2 + AcH + H_2O$. With satd. alcs. this reaction proceeds only when hot, whereas with compds. of the $HOC_6H_4CH:CHMe$ type oxidation proceeds easily at 0° with formation of unidentified unstable products which are probably of the $HOC_6H_4CH:NNHAr$ type. In the Griess reaction, *N*-condensation products are not in general formed, probably because of the ready decompn. of the initial products, thus $ArN:NH \longrightarrow ArH + N_2$. On the other hand, in the expts. of Q. and F., the initial products can condense with the oxidation products of the unsatd. compd. to form *N*-derivs. To explain the mechanism of the reaction and to extend the investigation to new classes of unsatd. compds., a study was begun of the secondary products, with the further object of ascertaining in what form the =CHMe group of the lateral chain of the phenols is eliminated. It was shown in the earlier expts. that in the reaction of anethole, isosafrole (I), etc., with diazo-*p*-nitroaniline (II) a red compd. (III), m. 228°, is formed as a secondary product. It is prepd. most economically in the following way: *p*-Nitrobenzenediazonium sulfate (IV) (from 13.8 g. of $p\text{-}O_2NC_6H_4NH_2$ (V) diazotized with $AmNO_2$ in glacial AcOH and purified with Et_2O in the ordinary way) suspended in 95% EtOH (150 cc.), cooled to 0°, isosafrole (15 g. in a little EtOH) added, let stand 24 hrs., filtered, the residue extd. repeatedly with EtOH, the new residue (crude III) dissolved in C_5H_5N and fractionally pptd. with a little water, yields III, which has the *compn.* $C_{14}H_{12}N_6O_4$, sol. in concd. H_2SO_4 with intense violet color, with concd. KOH forms an almost black *salt*, whose hot aq. soln. is dark blue. II is easily reduced by $SnCl_2$ in HCl, and on evapn. of the soln. (freed of Sn) $p\text{-}C_6H_4(NH_3Cl)_2$ crystallizes. III is always obtained, whatever the particular phenol used. The reaction of IV and alk. $p\text{-}O_2NC_6H_4NHN:CHMe$ (VI) does not give good results because the alkali brings about a partial decompn. of VI and an impure product is obtained. The reaction proceeds much better in acidified dil. alc. V (2.8 g.), diazotized in the regular way, cooled, VI (3.4 g.) in EtOH (100 cc.) added, let stand until pptn. is complete, filtered and the residue washed with hot EtOH, yields 3 g. of *p-nitromethylformazyl*, $p\text{-}O_2NC_6H_4N:NCMe:NNHC_6H_4NO_2\text{-}p$ (VII), red, m. 228° (decompn.); its solns. in hot alkalies have an intense blue color. A mixt. of III and VII m. 228°, proving that III has the formula of VII. V (5.6 g.) in glacial AcOH, diazotized with concd. H_2SO_4 (3.8 cc.) and $AmNO_2$ (7 cc.) (if crystn. is difficult EtOH is added to the decanted oil), filtered, washed with cold EtOH, the IV dissolved in boiling 95% EtOH (200 cc.), evapd. to a small vol. on a water bath, filtered and the residue washed with hot EtOH, yields $[p\text{-}O_2NC_6H_4NHN:CH\text{-}]_2$ (VIII), m. around 310° (cf. 308-11° of Wohl and Neuberg, *Ber.* **33**, 3107 (1900)). The formation of VIII in this way gives further proof of the compn. of III, and is a notable example of the oxidizing power of diazo compds. which effect not only the well-known oxidation: $EtOH \longrightarrow AcH$, but also $EtOH \longrightarrow CHO.CHO$. Since a small quantity of III is formed from II and alc. $p\text{-}H_2NNHC_6H_4NO_2$, thus $EtOH \longrightarrow AcH \longrightarrow MeCH:NNHC_6H_4NO_2 \longrightarrow$ VII, it is probable that in the cleavage of propenylic derivs like anethole by diazonium salts the 2 parts of the mol. reunited from the double bond behave equally, with formation of the phenylhydrazones of the corresponding aldehydes, the formation of the formazylic deriv resulting from subsequent action of the diazo compd. on the acetaldehyde phenyl hydrazone. In this connection expts. are in progress in which the ratio between the diazonium salt and the unsatd. compd. are varied. *p*-Propenyldimethylaniline (IX) was prepd. by the method of Sachs (*Ber.* **38**, 514(1905)), and for the following synthesis was sufficiently pure after simple pressing on a porous plate. IV (from 2.8 g. of V diazotized in glacial AcOH with $AmNO_2$), suspended in EtOH (50 cc.) and added slowly to ice-cold alc. IX (3.2 g. in 100 cc.), let stand 1 day, evapd. on a water bath to incipient crystn., cooled, filtered and the residue recrystd. from hot EtOH, yields *dimethylaminobenzaldehyde p-nitrophenylhydrazone sulfate* $(Me_2NC_6H_4CH:NNHC_6H_4NO_2)_2.H_2SO_4$ (X), lustrous orange, m. 128–32°, slowly turns dark on exposure to air and light; boiled with aq. Na_2CO_3 it is transformed with recrystn. from EtOH, into free $Me_2NC_6H_4CH:NNH\text{-}C_6H_4NO_2$, which is known in 2 stereoisomeric forms (cf. Vecchiotti, *Gazz. chim. ital.* **43**, ii, 641(1913)). The order of adding IV and IX was then reversed. Alc. IX (4.8 g. in 50 cc.), added slowly to ice-cold IV (from 4.2 g. of V) suspended in 100 cc. of EtOH, let stand 1 day, filtered and the residue washed with EtOH and dried at 80°, yields 10 g. of a *sulfate*, $C_{17}H_{17}N_5O_2.H_2SO_4$ (XI), violet-red with dark blue reflection, does not have a

definite m. p., gives intense red solns. in hot glacial AcOH (repptd. on cooling); boiled with aq. Na_2CO_3 and the product recrystd. from xylene or AmOAc it forms the *compd.* $C_{17}H_{17}N_5O_2$ which is probably the *oxotriazole*, $Me_2NC_6H_4\overline{C:N.N(C_6H_4NO_2).N:CMe}$ (XII), violet-red with silvery reflection, m. 232–3°, gives intense red solns. in hot mineral acids, is not altered by boiling several hrs. with Ac_2O (which excludes a secondary N atom), oxidized very slowly by hot alk. $KMnO_4$ but more readily by hot acidic $KMnO_4$, is rapidly decolorized by $SnCl_2$ in aq. HCl (only p-$H_2NC_6H_4NH_2$ was identified in the products), and heated in a sealed tube at 130–50° with fuming HCl it is decompd. with formation of a yellow *substance* now under investigation. The formation of XII can probably be accounted for thus: IX ⟶ $Me_2NC_6H_4C(:NNHC_6H_4NO_2)C(:NNHC_6H_4NO_2)Me$ ⟶ $Me_2NC_6H_4\overline{C:N.N(C_6H_4NO_2).N(C_6H_4NO_2).N:CMe}$ ⟶ XII, is a synthesis like the formation of oxotriazoles from oxazones (cf. v. Pechmann, *Ber.* **21**, (1888)). Crystd. AcONa (4–5 g.), added to aq. IX (1.61 in 50 cc. contg. AcOH), made ice-cold, aq. p-$O_2NC_6H_4N_2Cl$ (from 1.38 g. of V and filtered) added dropwise, let stand several hrs., filtered and the residue washed with water, yields 100% of the *compd.* $C_{16}H_{16}N_4O_2$, probably p-$O_2NC_6H_4N:NC_6H_3(NMe_2)CH:CHMe$ formed by a normal coupling reaction, amorphous, brown-red, softens around 65° and decomps. completely at 85°. C. C. Davis

Preparation of methyl ethers of the quinone oximes. Stig Veibel and Margrethe Hejde Simesen. *Ber.* **63B**, 2476–84(1930).—Of the 2 methods of prepg. quinone oxime Me ethers (quinone + NH_2OMe, and salts of quinone oximes (nitrosophenols) + MeI or CH_2N_2), the first gives the better yields but yields homogeneous products only with sym. quinones, and even then there are often formed difficultly separable mixts. of quinone, quinone monoxime ether and quinone dioxime ether. V. and S. therefore undertook to det. whether the yields by the 2nd method might not be increased by the use of a suitable methylating agent and found with a series of nitrosophenols that under certain conditions quite good yields of oxime ether can be obtained with Me_2SO_4 or p-$MeC_6H_4SO_2Me$ (I). That the products are really oxime ethers and not nitrosoanisoles was shown by their reduction with boiling 15% $TiCl_3$ to the aminophenols. Titration with $TiCl_3$ cannot be used, however, to det. the purity of the products, although alkyl substituents seem to facilitate the reduction so that dialkylquinone oxime ethers use up almost the calcd. quantity of $TiCl_3$. Quinone chloroimide with NaOMe gives indophenol-like products and not the oxime ether, but $Mg(OMe)_2$ does give a very small amt. of quinone ether. p-$O:C_6H_4:O$ with 1 mol. $MeONH_2.HCl$ in alc. at room temp. gave 59% of $O:C_6H_4:NOMe$; p-ONC_6H_4OH gave 28% with Me_2SO_4 in NaOH and 27% with I. 1,2,4-$O:C_6H_3Me:NOMe$ was obtained in 20% yield from 2,4-$Me(ON)C_6H_3OH$ with Me_2SO_4 and in 26% yield with I. 3,4-$Me(ON)C_6H_3OH$ gave 39% oxime ether, m. 73°, with Me_2SO_4 and 42% with I. *p-Xyloquinone oxime Me ether*, 4,2,5,1-$O:C_6H_2Me_2:NOMe$, yellow, m. 70.5–1°, was obtained in 70% yield from $Me_2(HO)C_6H_2NO$ and Me_2SO_4; xyloquinone and NH_2OMe yielded difficultly separable mixts. 1,2,5,4-$O:C_6H_2Me(CHMe_2):NOMe$ was obtained in 74% yield from nitrosocarvacrol with Me_2SO_4, and the isomeric *thymoquinone 1-oxime ether*, yellow, m. 35°, b_{18} 144–5°, in 80% yield from nitrosothymol; thymoquinone with NH_2OMe gives a difficultly separable mixt. of the 2 isomers. When thymol is nitrosated and, without isolating the NO compd., is then treated with HNO_3, it gives 4-nitrothymol whose *Me ether*, prepd. with Me_2SO_4, very faintly yellowish, m. 31.5°, b_{16} 173°; yield 53%. C. A. R.

Acetylation of *o*-hydroxy aldehydes. T. Malkin and M. Nierenstein. *J. Am. Chem. Soc.* **53**, 239–42(1931).—*o*-HO aldehydes may be acetylated with Ac_2O and anhyd. K_2CO_3 in the presence of Et_2O, which method avoids benzylidene diacetate formation. Thus, *o*-HOC_6H_4CHO, Ac_2O, K_2CO_3 and Et_2O give the Ac deriv., m. 38°, while without the Et_2O there results 2-acetoxybenzylidene diacetate, m. 107°. *Diacetyl-β-resorcylic aldehyde*, m. 69°. *Triacetylphloroglucinol aldehyde*, m. 101°; 2,4,6-triacetoxybenzylidene diacetate m. 157°. The use of Et_2O permits the control of all rise of temp. C. J. West

Some derivatives of veratrole and of methylvanillin. II. 2,3,6,7-Tetramethoxyanthraquinone. B. L. Vanzetti and A. Oliverio. *Gazz. chim. ital.* **60**, 620–32 (1930).—In a previous paper (cf. V., *C. A.* **21**, 1974) a curious transposition of veratril and of veratrilic acid to a condensation product of the quinone type is described. Because of the difficulty of obtaining this compd. and of its inactivity toward mild reagents, expts. were directed toward some other way of synthesizing it and thus identifying its constitution. Because of their extensive literature and their technical importance, anthraquinones were chosen as the field of investigation, and the most promising starting

point was in the direct condensation of a sym. dimethoxylated phthalic acid, *viz.*, *m*-hemipinic acid (I) with veratrole (II). I was prepd. by application of the condensation reaction of Perkin and Robinson, *viz.*, 3,4-$(MeO)_2C_6H_3CHO$ and Na in AcOEt formed 3,4-$(MeO)_2C_6H_3CH:CHCO_2H$, which reduced with Na-Hg formed 3,4-$(MeO)_2C_6H_3$-$CH_2CH_2CO_2H$. The latter with P_2O_5 condensed to 3,4-$(MeO)_2C_6H_2.CH_2.CH_2.CO$ and this was oxidized by HNO_3 (1:3) to I. Contrary to von Konek and Szamák (*C. A.* **16**, 2139) the condensation reaction of Perkin and Robinson gives good results. Thus obtained and crystd. from boiling water, I m. 174–5°, and when heated at 190–5° it partially sublimes and is transformed to *m*-hemipinic anhydride (III). For the condensation of III with II, the reaction of Bentley and Weizmann (cf. Beilstein **10**, 522; *Monatsh.* **6**, 380(1884)) and of Bistrzycki and Krauer (*C. A.* **18**, 241) was followed. B. and W. used CS_2 and B. and K used C_6H_6. In the present expts. C_6H_6 did not give good results because (1) it took part in the reaction with formation of *4,5-dimethoxy-2-benzoylbenzoic acid*, which has not been described before and which will be dealt with in a later paper and (2) in the presence of C_6H_6 the condensation product is partially demethylated. The reaction proceeded better in CS_2, and because the yield was low the product was not demethylated and was readily purified. III (10 g.), CS_2 (150 cc.), II (20 g.) and $AlCl_3$ (25 g.), heated 24 hrs. on a water bath, the CS_2 removed by distn., made ice-cold, dil. HCl added, excess II removed by steam distn., the residue filtered, 10% Na_2CO_3 added to the filtrate, acidified, the brown-yellow resinous mass crystd. from dil. EtOH, from C_6H_6 or from AcOH, yields 30% of *4,5,3',4'-tetramethoxy-2-benzoylbenzoic acid*, $(MeO)_2C_6H_3COC_6H_2(OMe)_2CO_2H$ (IV), m. 217–8° to a brown liquid Its soln. in concd. H_2SO_4 is carmine-red, and when warmed SO_2 is evolved and on diln. a greenish yellow flocculent *anthraquinone deriv.* is ppt'd. *NH₄ salt Ag salt*, by doubl decompn. with the NH_4 salt, turns yellow in light. IV (1 g.) in 10% aq. NaOH (25 cc.) and Zn dust (3 g.), boiled 1 hr., filtered, acidified with HCl, the ppt. digested with 10% Na_2CO_3 and the residue recrystd. from C_6H_6, dil. EtOH or dil AcOH, yields *5,6-dimethoxy-3',4'-dimethoxy-3-phenylphthalide* (V), $O.CO.C_6H_2(OMe)_2.CHC_6H_3(OMe)_2$, softens 235°, m. 238°, insol. in alk. carbonates and in NH_4OH, sol. in hot 10% aq. NaOH and KOH. A very small yield of V is also obtained when the reduction is carried out in acid medium. Zn dust (10 g.) and concd. HCl (10 cc.), added during 14 hrs. to IV (2.5 g.) in AcOH (50 cc) (keeping the soln. boiling), filtered hot, dild. with boiling water, cooled, the ppt. dissolved in dil. NH_4OH, filtered, acidified and the ppt. recrystd. from dil. EtOH, yields 2.1 g. of *4,5,3',4'-tetramethoxy-2-benzylbenzoic acid* (VI), m. 165–6°. VI (1 g.) in concd. H_2SO_4 (10 cc), kept ice-cold for 15 min., poured on ice, the ppt. digested with 10% Na_2CO_3, filtered, washed and dried, yields 100% of *2,3,6,7-tetramethoxy-9-anthrone*, $(MeO)_2C_6H_2<^{CH_2}_{CO}>C_6H_2(OMe)_2$ (VII), m. 282–4° (decompn.); in boiling KOH it has the *tautomeric anthranol form*, $(MeO)_2C_6H_2<^{CH}_{C(OH)}>C_6H_2(OMe)_2$ (VIII), and by the action of atm. O this soln. deposits VIII. VII was oxidized by 2 methods, (1) CrO_3 and (2) H_2O_2. CrO_3 in AcOH, added to VII (calcd. quantity) in boiling AcOH (1 g. of VII in 50 cc.) and filtered hot, yields *2,3,6,7-tetramethoxyanthraquinone* (IX), m. 345–6°, sublimes without decompn., gives an intense green soln. in concd. H_2SO_4 and on diln. it is repptd. unaltered, insol. in 10% KOH. VII (0.5 g.), AcOH (25 cc.) and 30% H_2O_2 (5 cc.), boiled 1 hr. and filtered hot, yields 100% of IX, m. 345°, slightly darker than when prepd. by oxidation with CrO_3. Thirty-five % HCHO (14 g.), added slowly to II (10 g.) in 70% H_2SO_4 (34 g.), let stand 2 hrs., and the ppt. recrystd. from C_6H_6, yields 2 3,6,7-tetramethoxydihydroanthracene (X) (cf. Robinson, *C. A.* 9, 1602). It is difficult to oxidize, for alk. $KMnO_4$ does not attack it, and CrO_3 in AcOH forms a mixt. of products which are difficult to sep. $Na_2Cr_2O_7$ (20 g.) in a little water and AcOH (100 cc.), added slowly to X (2 g.) in AcOH (20 cc.), refluxed 6 hrs., dild. with boiling water, filtered, the residue, washed with Na_2CO_3 and NaOH, digested in boiling AcOH, and filtered, yields a residue of IX, while the filtrate, let stand, ppts. an unidentified compd with a pearly aspect. IX (0.5 g.) and HBr (40 cc. of d. 1.49), heated 6 hrs. in a sealed tube at 170–5°, yield almost 100% of *2,3,6,7-tetrahydroxyanthraquinone* (XI), orange-yellow, turns brown above 360° and decomps. without fusion (partially sublimes), sol. in aq. alkalies with a green-yellow color (repptd. by acids); with Al salts it gives greenish lakes. On prolonged boiling in Ac_2O, XI forms, after recrystn. from AcOH, *2,3,6,7-tetraacetoxyanthraquinone*, lustrous straw-yellow, m. 300° (decompn.), insol. in dil. alkalies and in dil. NH_4OH.

C. C. Davis

Nucleus synthesis of ketimides and ketones by condensation of nitriles with aromatic and heterocyclic compounds. J. Houben. II. Syntheses with toluene, mesitylene, tetralin, phenol, 1,4,5-xylenol, 3,5-dimethylanisole, thymol and carvacrol. J. Houben and Walter Fischer. *Ber.* **63B**, 2455–63(1930); cf. *C. A.* **24**, 1106.—The Houben-Hoesch ketone synthesis has been extended to a whole series of further compds. By this method it is possible to prep. ketimide HCl salts, ketimides, ketones, acids, esters, amides and nitriles in a simple way and generally with very good yields. The working up of the reaction mixt. has also been improved. Instead of the "acid" method, the "alk." method or decompn. of the reaction mixt. with so much crushed ice that the temp. is greatly lowered as with a freezing mixt. are now often used, sensitive compds., especially the ketimides, being thereby protected from destruction. *p-Trichloroacetimidotoluene-HCl* (*trichloromethyl p-tolyl ketimide-HCl*) (80% from PhMe, CCl_3CN and $AlCl_3$ satd. with HCl), very hygroscopic and can be kept only in sealed vessels; when it is rapidly shaken under Et_2O with aq. $KHCO_3$ and the Et_2O layer is at once dried with Na_2SO_4 vacuum distn., it gives a liquid of const. b. p. (138–9° under 11 mm.) but contg. only about 33% of the ketimide with 66% ketone. A product 86% pure, b_{28} 158°, is obtained by extg. the $AlCl_3$-PhMe-CCl_3CN reaction product (decompd. with 5% NaOH) with ice-cold Et_2O. On the other hand, 2,4,6-$Me_3C_6H_2C(:NH)Me$ and its HCl salt had been readily obtained in good yield and it was apparently unchanged by long boiling with 39% HCl. Further study has shown that this was a mistake. The ketimide is not only very difficultly sapond. but the resulting *trichloroacetomesitylene* (I) is unexpectedly resistant to alkalies, and as the ketimide had always been tested for sapon. by heating a sample of the soln. with alkali and detg. the content of CO_2H acid it had been concluded, from the absence of acid, that the ketimide had not been sapond. It has now been possible, by boiling the ketimide 6 hrs. with 25% HCl, to obtain the *N*-free I, b_{10} 148–9°, converted by boiling 40% NaOH into $Me_3C_6H_2CO_2H$. Tetralin with CCl_3CN, PhCl and $AlCl_3$ gives 42% of a mixt. (yellow, extremely hygroscopic powder) of much *β*- with a little *α-tetralyl trichloromethyl ketimide*, converted by solid KOH and CaO into *β*-tetralincarboxylic acid and *α*-tetralin nitrile. Together with the ketimides is obtained 14% of a ketone, b_2 170–80° (slight decompn.), having the compn. of a *trichloroacetotetralin;* it was apparently the not quite pure *β*-compd. For the direct conversion of PhOH into *p*-$CCl_3COC_6H_4OH$, the method recently described, with "acid" working-up of the product, is the best, giving a 95% yield. The *ketimide-HCl*, light yellow hygroscopic powder, can be isolated in 18% yield by the alkali method. From 2,5-$Me_2C_6H_3OH$ are obtained *4-hydroxy-2,5-dimethylphenyl trichloromethyl ketimide-HCl*, bright yellow, m. 185° (decompn.) (free *ketimide*, m. 170 1° (decompn.)), and the *ketone*, m. 85–6°, quantitatively converted by aq. alkali into *2,5-dimethyl-4-hydroxybenzoic acid*, m. 182–4°. 3,5-$Me_2C_6H_3OMe$ gives 74% of a mixt. of *2,4,6-* and *2,6,4-dimethylmethoxyphenyl trichlorophenyl ketimide-HCl*, m. 130–5°, hydrolyzed by boiling 6 hrs. with 20% HCl to the *ketones*, b_{11} 168–70°, from which, by boiling 6–8 hrs. with 30% NaOH, was obtained v. Auwers and Sauerwein's $Me_3(MeO)C_6H_2CO_2H$, m. 163–7° (*C. A.* **17**, 732). From thymol are obtained 50% *4-hydroxy-5-isopropyl-2-methylphenyl trichloromethyl ketimide-HCl*, yellow, m. 170–5° (decompn.), and 23% of the *ketone*, m. 99–100°; free *ketimide*, m. 115–7°. Pure carvacrol, from carvone with boiling HCO_2H, b_{16} 120°, gives 66% of *4-hydroxy-2-isopropyl-5-methyl trichloromethyl ketimide-HCl*, decomps. around 180–90°; the free *ketimide* and the *ketone* are oils which do not distil without decompn. even in a high vacuum. The ketone gives an *acid* m. 161–4°, which is different from Kekulé's *o*-carvacrotinic acid, m. 136°, and must, therefore, be the *p*-acid, 5,2,4-$Me(Me_2CH)(HO)C_6H_2CO_2H$; it gives no $FeCl_3$ reaction.

C. A. R.

A new method for the preparation of cyclic nitriles by catalytic degradation. I. J. Houben and Walter Fischer. *Ber.* **63B**, 2464–72(1930).—The trichloromethyl ketimides of the type described in the preceding abstr. are smoothly converted not only by alc. and aq. alkali but also catalytically in Et_2O by small amts. of powd. KOH into cyclic nitriles and $CHCl_3$ without the alkali being in any way attacked. With the ketimides of the free phenols, where the HO group must be satd. with alkali before cleavage can take place, it is difficult to det. the amt. of alkali required for the cleavage, but it is believed that here, too, the process is catalytic. A procedure has been developed which permits of converting the ketimide directly, without purification, into the nitrile and also of sepg. the ketimide from the accompanying ketone. The method almost always gives good yields and has thus far failed in no case. Thus, from *p*-$MeC_6H_4C(:NH)CCl_3$ (85% pure), allowed to stand 2–4 hrs. under petroleum ether with powd. CaO and KOH (powd. under petroleum ether and dried over P_2O_5 at 100°), was obtained 75% *p*-MeC_6H_4CN which, while it did not solidify until cooled to 0°, yielded only *p*-

$MeC_6H_4CO_2H$ with acids and then alkali, and *p*-$MeC_6H_4CONH_2$ with MeOH-HCl. It is not clear what caused the depression of the m. p. of the MeC_6H_4CN. The crude mixt. of 2,4-$Me_2C_6H_3C(:NH)CCl_3$ (91%) and ketone obtained from *m*-xylene and CCl_3CN gives with powd. KOH-CaO 82% 2,4-$Me_2C_6H_3CN$, m. 24–5°. From 2,5-$Me_2C_6H_4C(:NH)CCl_3$ (85%) was obtained 98% 2,5-$Me_2C_6H_3CN$, begins to m. —3°, m. completely 6°. 2,4,6-$Me_3C_6H_2CN$, b. 225–30°, was obtained in 62% yield, based on the $C_6H_3Me_3$ used, without isolating the ketimide. The mixt. of little *α*- with much *β*-tetralyl CCl_3 ketimide HCl salts (see preceding abstr.) yields 14% *α*-cyanotetralin, m. 48–50°, the H_2O set free from the salts by the KOH converting the *β*-ketimide almost completely into the ketone and NH_3, which is recovered in about 68% yield as $C_{10}H_{11}CO_2K$. *p*-$HOC_6H_4C(:NH.HCl)Me$, allowed to stand 2 min. in 10% NaOH at 50°, gave *p*-$HOC_6H_4CO_2H$ and 25% *p*-HOC_6H_4CN. 2,5,4-$Me_2(HO)C_6H_2C(:NH)CCl_3$ was quant. converted in the same way into $Me_2(HO)C_6H_2CN$, m. 163–5°. *2,6,Dimethyl-4-methoxybenzonitrile*, m. 85–7°, was obtained in 52% yield, together with a substance, m. 49–55°, of the same N content, directly from 3,5-$Me_2C_6H_3OMe$ without isolating the ketimide. *p-Thymotinic nitrile*, m. 115–6°, was obtained in 81% yield from the ketimide-HCl, and in 61% yield directly from thymol. *p-Carvacrotinic nitrile*, m. 75–7°, was likewise obtained in 62% yield from the ketimide-HCl. C. A. R.

Derivatives of dulcin. E. Wertheim. *J. Am. Chem. Soc.* **53**, 200–3(1931).—Dulcin (I) and $ClCO_2Et$, heated in the free flame until homogeneous and then at 100° for 2 hrs., give *Et p-phenetylallophanate*, m. 139–40°, tasteless; with concd. NH_4OH at 100° for 4 hrs. there results *p-phenetylbiuret*, m. 185–6°, tasteless. Heating I and $ClCO_2Et$ at 175° for 2 hrs. gives $(p\text{-}EtOC_6H_4NH)_2CO$, m. 225–6°, and *bis(p-phenetyl)biuret*, m. 208–9°, the 2 compds. being sepd. by AcOH. *p*-$EtSC_6H_4NH_2$ and KCNO in HCl give *p-thiophenetylurea*, m. 149–50°; concd H_2SO_4 gives a colorless soln., becoming pale green on heating and colorless on cooling; the compd. has a very slight bitter taste. *p-Thioanisylurea*, m. 164–5°, tasteless. *p-Thiophenetylthiourea*, m. 136–7°, lasting bitter taste. *p-Thioanisylthiourea*, pale yellow, m. 198–9°, persistent bitter taste. C. J. West

Benzalpyruvic acid. L. Musajo. *Gazz. chim. ital.* **60**, 669–72(1930).—$PhCHBrCHBrCOCO_2H$ (I) has been previously described by several experimenters (cf. Erlenmeyer, *Ber.* **36**, 2528; Ciusa, *C. A.* **14**, 172; Reimer, *C. A.* **20**, 3164), but its m. p. has varied greatly. Reimer found 125–42° and explained it by liberation of HBr and formation of an unsatd. mono-Br deriv. Prepd. by M. by the old method, and crystd. by spontaneous evapn. of a concd. C_6H_6 soln., it m. 124°. When this is then kept in the fused state *in vacuo*, the m. p. rises to 142–3°. This may be due to loss *in vacuo* of solvent of crystn. In crystg. from C_6H_6, fractions were frequently obtained which m. 147–50°, and these had the same compn. When boiled in water, these fractions give the same mono-Br deriv. (II), m. 131° (cf. Reimer, *loc. cit.*). An isomerism may explain this range of m. ps., in which case it was of interest to prep. I from $PhCH_2CH_2COCO_2H$ (III) in its oil modification (cf. Claisen and Antweiler, *Ber.* **13**, 2123; C. and Claparède, *Ber.* **14**, 2472). Oily III absorbs Br, with formation of an oil which, boiled with water as before, yields II. From the decanted aq. liquor BzOH can be isolated, and when the brown resin remaining after the boiling water treatment is dried and purified with C_6H_6, a cryst. substance (IV), insol. in C_6H_6, is obtained. The yield of IV is 8.5 g. per 330 g. of III. Crystd. from AcOH, it m. 279°. It does not contain Br, gives yellow solns. in alk. hydroxide and carbonates and NH_4OH, from which it is repptd. on acidification. Heated with alkalies, it gives intense yellow solns., with formation of BzH. Treated in AcOH with Br, IV forms a bright red *substance* (V), m. 210°, whereas with alc. Br it forms a yellow substance (VI), m. 210°, with properties similar to those of V. V and VI do not contain Br, and their solns. in cold alkalies are yellow and evolve BzH. Further data on IV are to be published later. C. C. Davis

The action of potassium hydroxide on the esters of the tetracarboxylic acids of the dimalonic acid series (preparation of ethylphenylpropionic acid). Hsuing T. Lo. *Bull. Chem. Soc., Japan* **5**, 326–33(1930).—An attempt was made to prep. *o*-$C_6H_4(CH_2CH_2CO_2H)_2$ (I) by heating *o*-$C_6H_4[CH_2CH(CO_2Et)_2]_2$ (II) 3 hrs. with alc. KOH (25%), acidifying with dil. H_2SO_4, extg. with ether and heating to 150° (Perkins method). The product contained only a small quantity of I and nearly 90% of a new compd., *o-ethylphenylpropionic acid* (III), m. 103°. Lower concns. of KOH gave less of III and more of I. The *p*-isomer of II gives *p-ethylphenylpropionic acid*, m. 114–5°. The *m*-compd. gave only $C_6H_4(CH_2CH_2CO_2H)_2$. Heating I alone or with concd. KOH does not form III, therefore III is probably formed by the direct loss of 3 mols. CO_2. The Ag salts of I and III, prepd. from soln. of the NH_3 salt by pptn. with $AgNO_3$, are amorphous

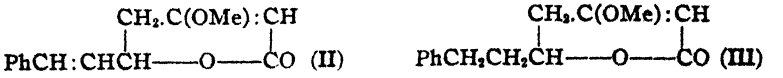
powders which on heating with EtI and ether yield *Et o-ethylphenylpropionate*, b_{10} 131°, and *Et p-ethylphenylpropionate*, b_{15} 141°. JANET E. AUSTIN

Minjak Pelandjau, the exudate from the wood of Pentaspadon motleyi Hook f. P. VAN ROMBURGH, A. G. VAN VEEN, AND A. J. HAAGEN SMIT. *Proc. Acad. Sci. Amsterdam* **33**, 589–94(1930); cf. *C. A.* **24**, 124.—Jones and Smith (*C. A.* **24**, 3532) give to pelandjauic acid provisionally the structure 2,6-$[Me(CH_2)_4CH:CHCH:CH(CH_2)_7]$-$(HO)C_6H_3CO_2H$. R., V. and S. prepd. *tetrahydropelandjauic acid*, $C_{23}H_{42}O_3$. Decarboxylation of the acid yielded a phenol which gave no reaction with $FeCl_3$ and was insol. in NaOH. It contained 1 OH group as detd. by the method of Zerevitinov. Upon hydrogenation with Pt black 5 mols. of H was taken up. HO detns. in the decahydro product added evidence that the phenol mol. was $C_{24}H_{37}OH$. In 1 expt. a substance was obtained which did not contain O. The phys. properties and the process in tetrahydration of this hydrocarbon indicated it to be $C_6H_{11}C_{18}H_{37}$. *Methyl tetrahydro-* and *decahydropelandjauate Me ether* were prepd. and analyzed; the *tetrahydro ether ester* was oxidized with CrO_3 and its phys. properties were detd.; methylation of the phenol $C_{24}H_{37}OH$, hydrogenation of the Me ether of the phenol, oxidation of the Me ether, dehydration of the decahydrophenol and ozonization of the hydrocarbon $C_{24}H_{46}$ lead to the conclusion that the formula of pelandjauic acid is $C_6H_2(CO_2H)(OH)R_6R_1$, the side chain R_6 containing 2 double linkages and R_1 being a Me group. R., V. and S. give the full structure of the acid as 4,2,3-$Me(HO)[Me(CH_2)_4CH:CHCH_2CH:CH(CH_2)_7]C_6H_2CO_2H$ which is different from the formula proposed by Jones and Smith. *Ibid* 690–3.—R., V. and S offer further evidence supporting their previous suggestion that the hydrocarbon isolated by them, when catalytic hydrogenation of the phenol (obtained by decarboxylation of pelandjauic acid) was carried to completion, may contain a Me group in the benzene nucleus. Two expts. were added: 1. Distn. of decarboxylated tetrahydropelandjauic acid over Zn. Three fractions were thus obtained from 1 g. of the original material, (*a*) 0.2 g., b_{15} ≈ 70°, (*b*) 0.25 g., b_{15} ≈ 170°, (*c*) 0.2 g., $b_{0.7}$ ≈ 200°. The fractions were studied with picric acid, picrates and otherwise, and the authors were led to a confirmation of their original suggestion. 2 Distn. of the original phenol over Zn dust. Naphthalenes were distd. at 760 mm. and yielded the following fractions: (*a*) 0.5 g., b. 170–235°, (*b*) 0.5 g., b. 235–40°, (*c*) 0.3 g., b. 240–300°. Studies of the properties of these fractions further strengthened the original assumption. From addnl. studies the authors conclude that the cryst. acid obtained from *minjak pelandjau* must possess the structure 2,3-$HO(C_{17}H_{31})C_6H_3CO_2H$ while to the liquid acid they assign the formula 4,2,3-$Me(HO)(C_{17}H_{31})C_6H_2CO_2H$. B. S. LEVINE

Tannins and similar compounds. XXV. Catechols of the cola nut. KARL FREUDENBERG AND LEONIE OEHLER. *Ann.* **483**, 140–3(1930); cf. *C. A.* **21**, 2263.—The cola nut contains *d*-catechol and *l*-epicatechol; the names colatin, colatein and cola-catechol can, therefore, be stricken from the literature. This is the first time that these 2 catechols have been found together. C. J. WEST

Constituents of kawa root. X. Kawain and dihydrokawain. W. BORSCHE AND W. PEITZSCH. *Ber.* **63B**, 2414–7(1930); cf. *C. A.* **24**, 1099–1100.—It was shown in Paper VIII that kawaic acid (I) is the CH_2O_2-free mother substance of methysticinic acid, $CH_2O_2C_6H_3CH:CHCH:CHC(OMe):CHCO_2H$, and it was concluded that kawa root also probably contains, in addn. to methysticin, $C_{13}H_{14}O_5$, the doubly unsatd. lactone kawain (II). Considerable difficulties were at first met in attempts to isolate it, but this was finally effected. Pure II is a beautifully crystd. substance, optically active like methysticin and extraordinarily similar to it in its chem. behavior. Hot NaOH smoothly converts it into I and catalytic hydrogenation gives a mixt. of much *dihydrokawain* (III) and a little *tetrahydrokawaic acid*, $PhCH_2CH_2CH_2CH_2C(OMe):CHCO_2H$ (IV). III was also found (WITH J. NIEMANN) in kawa resin. Alkali isomerizes it to *dihydrokawaic acid*, $PhCH_2CH_2CH:CHC(OMe):CHCO_2H$ (V). Com. kawa resin in 250-g. portions is dissolved in 2 l. Et_2O, filtered, the Et_2O shaken out 3 times with 3% NaOH, washed to neutrality with cold satd. NaCl, turbined several hrs. with Na_2SO_4 and evapd., giving about 225 g. of residue. This is then extd. 10 hrs daily for 6–7 days with petroleum-hexane in a continuous extractor, the extractive which seps. in the boiling flask being separately rinsed out every morning with Et_2O. When the combined Et_2O solns. are evapd. the residue begins to crystallize, especially if seeded with II and stirred. After several weeks the crystals are washed with Et_2O until the residue is colorless. Most of the II is present in the exts. of the 2nd–4th days and is obtained almost pure after 1 crystn. from MeOH-Et_2O. The total yield of II is about 25% of the purified resin. It is purified by distg. (195–7° under 0.1 mm.) and crystg. from MeOH-Et_2O. It begins to sinter 102°, m. 105–6°, is sol. in concd. H_2SO_4 with red color, $[\alpha]_D^{20}$ 105° (1% soln. in abs. alc.). III (3 g. from 4.6 g. II), m. 56–8°, sol. in H_2SO_4 without

color, $[\alpha]_D^{20}$ 30° (1% soln. in abs. alc.). V, m. 139–40° (gas evolution). As III is more sol. than II, it is found in the Et_2O filtrates from the crude II obtained in the 2nd–4th day exts. of the resin. It seps. in yellowish cryst. aggregates, m. 50–4°, of a III-II



mixt. or "pseudokawain." **XI. Synthesis of methysticinic acid and kawaic acid.** W. Borsche and B. R. Blount. *Ibid* 2418–20.—B. and Peitzsch recently demethylated the Me esters of methysticinic (I) and kawaic acid (II) by cautious heating with HCl in MeOH to allomethysticin (III), $CH_2O_2C_6H_3CH:CHCH:CHCOCH_2CO_2Me$, and allokawain (IV) and concluded that I and II are the β-methoxycrotonic acids, $=CH-C(OMe):CHCO_2H$, isomeric with III and IV. On this conclusion are based the structures which have been assigned to methysticin, kawain and their dihydro derivs. It was desirable, therefore, to confirm it in another way, by regeneration from III and IV of the esters of I and II. B. and P. had already attempted to do this by the von Pechmann method but without satisfactory results because the CH_2N_2 used reacted too readily with the ethylene unions in III and IV to form stable addn. products contg. N The desired reaction has now been effected with surprising smoothness by the use of $Si(OMe)_4$ which Helferich and Haussen found an excellent means for prepg. di-Me acetals of unsatd. aldehydes. Under the conditions employed by B. and B., III and IV with $Si(OMe)_4$ gave the Me esters of I and II directly. C. A. R.

Deguelin. I. Preparation, purification and properties of deguelin, a constituent of certain tropical fish-poisoning plants. E. P. Clark. *J. Am. Chem. Soc.* **53**, 313–7 (1931); cf. *C. A.* **24**, 2752, 3534, 5927.—Complete details are given for the purification of *deguelin* (I), $C_{23}H_{22}O_6$, m. 171°, n_α 1.570, n_β 1.590, $n_\gamma > 1.739$; the extinction is inclined and the elongation is neg. This was prepd. from derris root and cubé root. It also occurs in the leaves of *Cracca (tephrosia) vogelii* and the roots of *Cracca (tephrosia) toxicaria*. Apparently I exists in nature in some form of combination, since it can be obtained only when the non-cryst. material is treated with an alkali. I showed no optical activity but it may have existed in the plant in an optically active state. I is oxidized with alk. $K_3Fe(CN)_6$ to *dehydrodeguelin* (II), $C_{23}H_{20}O_6$, m. 233°, n_α 1.635, n_β 1.687, $n_\gamma > 1.74$. II may also be obtained from crude I from derris root. Further oxidation of II in AcOH with CrO_3 gives *dehydrodeguelone*, $C_{23}H_{18}O_7$, bright yellow, m. 232 (cor.), n_α 1.505. II, EtOH-KOH and Zn dust, boiled 30 min., give 55% of *deguelic acid* (III), $C_{23}H_{24}O_8$, m. 189° (cor.), n_α 1.520, n_β 1.665, $n_\gamma > 1.74$; $FeCl_3$ gives a claret color. attempts to prep. an Ac deriv. by refluxing with Ac_2O and AcONa give II. These results indicate that I is a dimethoxylactone. C. J. West

Action of hydrogen sulfide on acid chlorides. II. Hydrogen sulfide and phthalyl chloride. Ludwik Szperl. *Roczniki Chem.* **10**, 652–6(656 French)(1930). cf. *C. A.* **25**, 503.—By action of H_2S on o-$C_6H_4(COCl)_2$ at 195–200° after elimination of HCl and o-$C_6H_4(CO_2)_2$ 2 compds were obtained: *o*-phthalyl sulfide (m. 113–4°) and *di-o-phthalyl disulfide*, $(C_6H_4)_2(COS)_4$, light-yellow needles, m. 330–1.5°. **III. Hydrogen sulfide and naphthalyl chloride.** Ludwik Szperl and Henryk Morawski *Ibid* 657–66(666 French).—By action of H_2S on $C_{10}H_6(COCl)_2$ at 100° without using a solvent a tarry mass is obtained. The same compd when heated in xylene or benzene to 80–6° gives *naphthalic acid thioanhydride*, $C_{12}H_6O_2S$, orange crystals, decompg. 200°. When heated energetically, they m. 205–6°. The compd. undergoes a hydrolysis under the action of the alkali and NH_4OH. J. Kučera

Sulfur compounds of terpenes. I. Action of sulfur on *d*-limonene and α-pinene. Akira Nakatsuchi. *J. Soc. Chem. Ind., Japan* **33**, Suppl. binding 408–9(1930). *d*-Limonene (I) reacted readily with S, yielding $C_{10}H_{16}S$, or, if the double bond of the side chain was the point of attack, probably $S.CH_2.CMeCH.CH_2.CH_2.CMe:CH.CH_2$,

b. 104.5–5.5°, m. —26.79°, $[\alpha]_D^{25.1}$ —12.31°, $n_D^{27.6}$ 1.51534, $d_4^{27.6}$ 0.9948, M. R. 51.01. A mixt. of 180 g. of I and 46.8 g. S was heated at 160° for 28 hrs. and the reaction product fractionated under reduced pressure. The lower fractions, 28 g., consisted of *p*-cymene; higher ones were further fractionated and recrystd. from EtOH-Et_2O, crystals being obtained after 10 hrs. at —60°. $AuCl_3$ gave a cryst. addn. compd. α-Pinene (II) and S, under similar conditions, yielded a viscous mass consisting mostly of unchanged II, besides a polymerized product and a very small quantity of $C_{10}H_{16}S$. Whether this was identical with the reaction product from I was not detd. K. H. Engel

Autoxidation of piperitone in alkaline solution. W. Treibs. *Ber.* **63B**, 2423–8

(1930).—Various quinones in aq. or alc. alk. soln. absorb O and Harries observed that carvone (I), which, if considered as an unsatd. ketone, is closely related in chem. structure to these quinones, absorbs O when shaken in aq. MeOH with $Ba(OH)_2$, giving BaO_2 and a small amt. of a diketone. He assumed that a mol-oxide, formed by addn. of O, is the intermediate product. Pursuing this observation, T. has studied the power of a series of unsatd. ketones to absorb O in alk. alc. soln., as compared with quinones and phenols Unlike H., he used little or no H_2O. The O absorption was most rapid with the unsatd. cyclic ketones I, piperitone (II) and carvenone (III) and was accompanied by strong evolution of heat. Pulegone (IV), with a semicyclic double bond, slowly absorbed O, as did cyclohexenone and the bicyclic verbenone. Dihydrocarvone did not absorb O at all, benzalacetone absorbed it quite strongly, methylheptenone and mesityl oxide exceedingly weakly. The influence of various factors was first studied with the rapidly reacting I and II (0.1 *M* solns. in 40–60 cc. solvent). KOH at first accelerates the absorption somewhat more than NaOH but later slows up as compared with NaOH, so that the total absorption is about equally rapid with the 2 alkalies. The total amt. of absorbed O increases with the alkali concn. and with 1 mol. alkali to 1 mol. ketone the ketone reacts completely, taking up 1 mol. O_2. More alkali does not increase the amt. of O_2 taken up and does not appreciably accelerate the reaction. In more dil. soln. (0.1 mol. ketone in 500 cc.), 2 mols. O_2 is taken up and the reaction products contain lower fatty acids (probably resulting from autoxidation of the alc.). In Me_2CO absorption occurred only after addn. of alc., 1 mol. of the alc. sufficing to carry the reaction as far as in alc. alone. Different aliphatic alcs. (Me, Et, Pr, Bu, Am) had but little influence on the velocity of absorption, although a distinct acceleration was noted with increase in the length of the alc. chain. The action of $PhCH_2OH$ was weaker. The total absorption was practically independent of the nature of the alc. Under the same conditions (0.1 mol. in 40–60 cc. alc. with more than 0.1 mol. alkali), *p*-benzoquinone, phenanthrenequinone, β-naphthoquinone and orcinol, like I, II and III, absorbed 1 mol. O_2; *o*- and *p*-$C_6H_4(OH)_2$ used up 2 mols. O_2, $PhCH:CHCOMe$ and *m*-$C_6H_4(OH)_2$ only about 0.5 mol. In many cases, as with the very slowly reacting IV, a little $AuCl_3$ strongly accelerated the reaction until its velocity reached that with I. On *m*-$C_6H_4(OH)_2$, however, $AuCl_3$ exerted a strongly retarding influence. Pt and Pd salts were without effect. In every case, the absorption was accompanied by discoloration and formation, chiefly, of brown resins. In the acidified and filtered reaction mixt. and in the acid and neutral steam distillates, small amts. of superoxides could be detected by the liberation of I from KI. Steam distn. of the reaction product of II yielded thymol. More than 0.5 of the reaction product consisted of a resin, 30–5% of a mixt. of acids, the steam distillate of which dissolved to only a slight extent in alkali. The insol. portion (V) slowly dissolved in boiling alkali to form the salt of a cryst. odorless acid and is therefore undoubtedly a *lactone*. Analyses and equiv. wt. detns. by sapon. gave the formula $C_{10}H_{18}O_3$. V is stable toward Br and $KMnO_4$ and shows none of the reactions of keto acid lactones. The corresponding *HO acid* (VI) regenerates V above its m. p., on treatment with steam or on heating with dil. H_2SO_4. Autoxidation of II in alk. soln. therefore gives a γ- or δ-HO acid with a new (probably 5-membered) ring system With Na and alc. according to Semmler it gives a *glycol*, $C_{10}H_{20}O_2$, b_{13} 150–2°. $KMnO_4$ yields no keto acid but only unchanged VI or decompn. products. Attempts to esterify V with boiling alc. H_2SO_4 gave the esters of an unsatd. *acid* (VII) formed from VI by loss of H_2O. These esters are sapond. by short boiling with KOH in $PhCH_2OH$. The VII is identical with an acid accompanying V in the steam distillate of the autoxidation product of II. The residue of the steam distn. was a brown brittle tar whose soly. in alkali increased with the amt. of alkali used in the autoxidation; with the ratio ketone:alkali>1, it was almost completely alkali-sol. The sol. and insol. portions had the same compn. In the autoxidation of II, there is formed, along with the thymol, a phenol giving a green $FeCl_3$ reaction (probably thymohydroquinone). VII, $C_{10}H_{18}O_2$, b_{13} 140–5°, m. 57–9°, absorbs 2 atoms Br in $CHCl_3$. V, b. 246–8°, b_{13} 118–20°, d_{15}^{20} 1.010. VI, m. 113–4°; *K* and *Na salts*. *Me ester* of VII, b_{18} 94–5°, d_{15}^{20} 0.9450; *Et ester*, b_{14} 102–5°, d_{15}^{20} 0.9467.

C. A. R.

New condensation products of pernitrosocamphor with amines. PIETRO SACCARDI. *Ann. chim. applicata* **20**, 489-94(1930).—Using the discovery of Angeli and Rimini (*Gazz. chim. ital.* **25**, 406; **26**, 29–31) that pernitrosocamphor reacts readily with amines with elimination of water and N_2O_4, S. has prepd. several new products. *2-Camphoranaesthetine*, *p*-$R:NC_6H_4CO_2Et$ ($R = CH_2.C_8H_{14}.C:$) is formed by heating the components about 15 hrs. at 75–80° on a water bath. Recrystd. from EtOH, and de-

colorized with bone black, it m. 85°. It is very sol. in org. solvents, as well as in water. *2-Camphoranisidine*, *p*-R:NC_6H_4OMe, prepd. similarly, is a liquid, b. 246–9°, n^{18} 1.401. *2-Camphor-p-aminobenzoic acid*, *p*-R:$NC_6H_4CO_2H$, m. 238–9°, is slightly sol. in water, but more sol. in NaOH and $NaHCO_3$, and is more stable in alk. than in acid solns. *Pb-2-camphor-o-aminobenzoate*, prepd. by condensing pernitrosocamphor with anthranilic acid, and pptg. with $Pb(OAc)_2$, is a white powder. It was not possible to form a compd. with urethan or novocaine. A. W. CONTIERI

Catalytic oxidation of camphor. KUNIJIRO TAKEUCHI. *Bull. Inst. Phys. Chem. Research* (Tokyo) 9, 871–7(Abstracts 83(in English) published with *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) 14, No. 271–3)(1930).—Camphor was air-oxidized in the vapor phase with the oxides of 5th and 6th group metals as catalysts. Maleic acid was one of the products, its max. % being about 10. J. B. AUSTIN

Camphoreins. II. The two camphoreins of phloroglucinol. VENANCIO DEULOFEU. *Anales asocn. quím. Argentina* 18, 164–71(1930); cf. *C. A.* 24, 3235.—α- and β-Phloroglucinol camphoreins can be converted one into the other. Both camphoreins and their salts have a quinone structure, shown by color. Acylic derivs. of both are colorless or slightly colored and have a lactone structure. E. M. SYMMES

X-ray investigations of optically active compounds. II. Biphenyl and some of its active and inactive derivatives. GEORGE L. CLARK AND LUCY W. PICKETT. *J. Am. Chem. Soc.* 53, 167–77(1931); cf. *C. A.* 23, 4942; 24, 2351.—Unique solns. of the crystal structure for Ph_2 and 5 of its derivs. have been detd by rotating and oscillating crystal methods. The results are summarized in the following table:

	System	Unit cell dimensions *a*	*b*	*c*		*n*	Space group	Symmetry of molecule
Biphenyl	Mono.	8.11	5.67	9.57	94°30′	2	C_{2h}^5	Center of symmetry
Bimesityl	Mono.	8.21	8.58	22.25	96°30′	4	C_{2h}^5	None
3,3′-Diaminobimesityl	Mono.	8.26	8.58	22.62	90° ± 30′	4	C_{2h}^5	None
Hexachloro biphenyl	Orth.	15.80	8.54	21.48	90°	8	Q_h^{16}	None
o-Tolidine	Orth.	6.50	7.48	23.62		4	Q^4	None
Diphenic acid	Orth.	13.80	11.90	14.12		8	Q_h^{13}	None

The $2C_6H_5$ rings in the Ph_2 mol. are in prolongation of each other rather than doubled over on each other. The rings probably are not flat. It is probable that the C atoms are in staggered or puckered rings, a conclusion reached by Hengstenberg and Mark. The fact that the mols. of bimesityl and $(Cl_3C_6H_2)_2$ possess no symmetry leads to the conclusion that the 2 rings are either bent or turned at an angle to each other in these compds. The mols. in all cases lie with their length parallel or at a slight tilt to the *c* axis. The rings of C atoms are in each case probably staggered and have a thickness which is constantly 4.3 for the derivs. and 4.1 for Ph_2 itself. The width across the ring is 5.6 for Ph_2, 7.9 for $(Cl_3C_6H_2)_2$ and 8.1 for bimesityl and its di-NH_2 deriv. The resp. lengths for these compds are 9.5, 10.75, 11.1 and 11.3. The facts that the mols. are asym. and that they occupy the spaces given above lead to the conclusion that the 2 rings are in planes turned from each other at an angle of not greater than 45° in the 2,2′,6,6′-deriv. of Ph_2, while the rings in Ph_2 itself are coplanar. C. J. WEST

Stereochemistry of diphenylbenzenes. Meso and racemic 2,5-di(3-bromo-2,4,6-trimethylphenyl)-3,6-dibromohydroquinones and the corresponding quinones. XII. P. R. SHILDNECK AND ROGER ADAMS. *J. Am. Chem. Soc.* 53, 343–52(1931); cf. Steele and A., *C. A.* 25, 105.—O:C_6H_4:O and 1,3,5-$C_6H_3Me_3$ with $AlCl_3$, below 5°, give *2,5-dimesitylhydroquinone*, m. 225–6° (all m. p. cor.). With Br in $CHCl_3$ this yields 2 stereoisomeric *2,5-di(3-bromo-2,4,6-trimethylphenyl)-3,6-dibromohydroquinones* (I and II), m. 334–5° and 294–5°, sepd. by their differing soly. in Me_2CO, the ratio at room temp. being about 50:1. The *acetate* from I m. 285–6°; from II, 237–8°; the latter is 8–10 times more sol. in boiling C_5H_5N than is the former. Oxidation of I and II with O:C_6H_4:O gives 2 forms of *2,5-di(3-bromo-2,4,6-trimethylphenyl)-3,6-dibromoquinones* (III and IV), orange, m. 295–6° (decompn.) and 284–5° (decompn.); reduction gives I and II. Oxidation of III and IV gives with alk. H_2O_2 a *monobromomesitylcarboxylic acid*, m. 168°, also obtained by brominating the parent acid. Further bromination of I and II gives the same *2,5-di(3,5-dibromo-2,4,6-trimethylphenyl)-3,6-dibromohydroquinone*, m. 395–8° (block); *diacetate*, m. 297°; oxidation gives the corresponding *quinone*, orange, m. 390–3° (block). Oxidation of the quinone gives *dibromomesitylcarboxylic acid*, m. 210–1°. C. J. W.

Stereochemistry of *N*-phenylpyrroles. Preparation and resolution of *N*-2-carboxyphenyl-2,5-dimethyl-3-carboxypyrrole. XIII. L. H. Bock and Roger Adams. *J. Am. Chem. Soc.* **53**, 374–6(1931); cf. Shildneck and A., preceding abstr.—Condensation of 3-carbethoxy-2,5-hexanedione and anthranilic acid in abs. EtOH and sapon. give *N-2-carboxyphenyl-2,5-dimethyl-3-carboxypyrrole* (I), m. 224.5–5.5°. Resolution was effected by means of the brucine salt. *l*-I, m. 202–3°, $[\alpha]_D^{20}$ —27.2° (0.1349 g. in 15 cc. abs. EtOH); *monobrucine salt*, m. 231–2° (decompn.), $[\alpha]_D^{20}$ —44.9° (0.1137 g. in 15 cc. $CHCl_3$). *d*-I, m. 202–4°, $[\alpha]_D^{20}$ 27° (0.1753 g. in 15 cc. abs. EtOH); *brucine salt*, m. 175–80° (decompn.), $[\alpha]_D^{20}$ 13.5° (0.1551 g. in 15 cc. $CHCl_3$). The active forms do not racemize upon boiling for 8 hrs. in EtOH; they are, however, completely racemized upon boiling 24 hrs. in 0.1 *N* NaOH. C. J. West

Action of organic magnesium compounds on α-oxido ketones and esters. E. P. Kohler, N. K. Richtmyer and W. F. Hester. *J. Am. Chem. Soc.* **53**, 205–21(1931).—When org. Mg compds. react with α-oxido ketones, they combine with the CO group only. By operating at a low temp. and decompg. the product immediately, it is possible to secure the corresponding oxidocarbinol; otherwise the unstable Mg derivs. decomp. spontaneously into Mg derivs. of aldehydes and ketones, which may subsequently be transformed into tert. alcs. Org. Mg derivs. first transform α-oxido esters into α-oxido ketones; the final products are therefore the same as those obtained with these ketones. Benzalacetophenone oxide and EtMgBr at room temp. give 66% of Et_2PhCOH, b_{20} 110–2°; PhMgBr gives 70% of Ph_3COH. If the reaction is carried out at —10°, there results *α-phenyl-β-(diphenylhydroxymethyl)ethylene oxide*, O.CHPh.CHCPh$_2$OH (I), m. 129–30°; excess PhMgBr does not react with I at —10° but at room temp. Ph_3COH was isolated; I is unchanged by heating 1 hr. at 150°, does not react with warm Ac_2O and is unchanged by concd. NH_4OH, with or without MeOH. I in abs. MeOH contg. concd. HCl, boiled 1 hr., gives *α,α,γ-triphenyl-α,β-dihydroxy-γ-methoxypropane* (II), m. 154–5°; by-products are BzH and Ph_2CHCHO; oxidation of II gives BzOMe and BzPh. Benzalacetophenone dibromide and MeONa at 0° give the *di-Me acetal* of *α-hydroxy-β-methoxy-β-phenylpropiophenone*, m. 122°; hydrolysis, followed by reaction with PhMgBr, gives quant. II. Isomerization of I with KOH gives *α,α-diphenyl-β-(hydroxybenzyl)ethylene oxide*, PhCH(OH)CH.CPh$_2$.O, m. 103° and unchanged at 150°, oxidation with CrO_3 in AcOH gives diphenylethylene oxide; PhMgBr gives an oil, contg. Ph_2, Ph_3CHCHO and benzohydrol; MeMgI gives BzH, Ph_2CHCHO and a *compd.*, m. 128°, possibly PhCH(OH)COCHPh$_2$. Autoxidation gives BzH and a *peroxide*, $C_{21}H_{18}O_4$, m. about 160° (decompn.); thermal decompn. of this peroxide gives BzH, BzPh and HCO_2H; MeMgI gives diphenylmethylglycol, m. 94–5°. $BzCBr_2Bz$ and PhMgBr give *α-bromo-β,β diphenyl-β-hydroxypropiophenone*, $Ph_2C(OH)CHBrBz$, m. 180° (decompn.); MeONa gives nearly quant. *benzoyldiphenylethylene oxide* (III), m. 124–5°; with PhMgBr III gives Ph_3COH and Ph_2CHCHO; EtMgI also gives Ph_2CHCHO. Diphenylglycidic ester (IV), which was not obtained pure, and PhMgBr give Ph_3COH. Et diphenylglyoxylate m. 37°; *phenylhydrazone*, yellow, m. 99–100°; oxidation with H_2O_2 gives Ph_2CHCO_2H; sapon. gives $Ph_2CHCOCO_2Et$, whose phenylhydrazone m. 210° (slowly heated) or 245° (on block); the *Me ester* b_8 175°, m. 75°. The ester and PhMgBr at 0° give *Et α,β,β-triphenyl-α-hydroxypropionate*, m. 118–20°; if the reaction is carried out at room temp. for several days or is boiled 3–4 hrs., the products are *α,β,β-triphenyl-α-hydroxypropiophenone*, m. 123°, and *α,α,β,γ,γ-pentaphenyl-α,β-dihydroxypropane*, m. 190° (decompn.), sepd. by the greater soly. of the former in petr. ether. The crude IV, on distn. with steam, gives the *compd.* $Ph_2C(OH)CH(OH)CO_2Et$, m. 130°; the corresponding *Me ester* m. 130–1°. C. J. West

Derivatives of fluoran. I. The isomeric dihydroxyfluorans. Mieczyslaw Dominikiewicz. *Roczniki Chem.* **10**, 667–85(685 German)(1930).—The synthesis is described of 1,6-, 2,6- and 4,6-dihydroxyfluorans which were obtained in 1919 by D. and recently synthesized by Ghattak and Dutt (*C. A.* **24**, 101) in another way. In addn. there was isolated from the fluorescein fusion about 15% of 1,8-dihydroxyfluoran which represents an *o*-quinoid isomeric fluorescein. The 2,4,5,7-Me_4 deriv. of this dihydroxyfluoran had already been obtained from *m*-xylorcinol and $C_6H_4(CO)_2O$ (*Sprawozd. Tow. Nauk. Warszawa* **1918** [3], 280). Fluorescein, hydroquinonephthalein and the 4 above-mentioned dihydroxyfluorans were subjected to nitration and thereby were obtained dinitro derivs. which on reduction gave the corresponding diamino derivs. The dinitro derivs. behave as acid dyes of orange color whereas the diamino compds. are not basic dyes. The only exception is 3,6-diaminohydroquinonephthalein which must

be regarded as 2,7-dihydroxyrhodamine. The constitution which is given to this compd. is not doubtful and is at the same time determinative, for the constitution of other dihydroxyfluorans. Samples of colorations of Na salts of the resp. dyes are given.
J. KUČERA

Occurrence of free disubstituted methyl radicals in chemical reactions. ERNST BERGMANN AND SHIN-ICHIRO FUJISE. *Ann.* **483**, 65–80(1930).—Prolonged exposure of a mixt. of Ph_2CO and $(p\text{-}MeC_6H_4)_2CH_2$ to sunlight in quartz vessels results in the formation of benzopinacol (I), also formed from $(p\text{-}Me_2NC_6H_4)_2CH_2$ (II) and Ph_2CO in dioxane. II and $PhCOC_6H_4Ph$ in C_6H_6 in a N atm., exposed to sunlight for 2 months, give a *4,4'-diphenylbenzopinacol*, m. 212°. $(p\text{-}MeOC_6H_4)_2CH_2$ and Ph_2CO in C_6H_6, after exposure to light for 9 weeks, give a mixt. of I, *tetra-p-anisylethane*, m. 189–90°, and *α,α-diphenyl-β,β-di-p-anisylethyl alc.*, m. 182–3°, dehydrated by boiling AcCl to *α,α-diphenyl-β,β-di-p-anisylethylene*, m. 154–5°. The production of these compds. is readily explained by the intermediate formation of the radicals $CH(C_6H_4OMe)_2$ and CPh_2OH, which either add or dimerize. Ph_2CO and Ph_2CHOMe give, after 3 months in the light, a mixt. of I and its *di-Me ether*, m. 157–9°. The *mono-Me ether*, m. 127–8°, is not formed, but is synthesized from PhMgBr and *Me α-methoxydiphenylacetate*, b_{27} 199–200°. *Di-p-anisylmethyl Me ether*, b_{15} 218–9°, m. 35–7°, undergoes very slow scission when treated with Na. $[(PhCH_2)_2CHS]_2$, heated with Cu-bronze, gives a mixt. of $(PhCH_2)_2CH_2$ and $PhCH{:}CHCH_2Ph$; the intermediate free radical, $(PhCH_2)_2CH$, undergoes disproportionation into $(PhCH_2)_2CH_2$ and $(PhCH_2)_2C$: the last named radical is rendered stable by the migration of a H atom, whereby the propene results Distn. of the reaction product $(PhMeCHS)_2$, from PhAc and $(NH_4)_2S$, furnishes PhEt and $PhCH{:}CH_2$; a small amt. of *di-α-phenylethyl sulfone* (?), m. 167–9°, is also formed. These results are explained by disproportionation of free $PhCH_2CH_2$ radicals. When 9,9'-difluorenyl disulfide is heated with Cu-bronze over a free flame in an atm. of N, fluorene, diphenylenephenanthrene and a small amt. of *α,β*-di(diphenylene)ethane are produced. The 9-methylenefluorene described by Manchot and Krische (*Ann.* **337**, 170(1904)) is impure fluorene.
C. J. WEST

Triphenylmethyl chloride and silver fulminate. HEINRICH WIELAND AND BRUNO ROSENFELD. *Ann.* **484**, 236–45(1930).—Ph_3Cl and $C{:}NOAg$ in abs. C_6H_6 give *triphenylmethyl nitrile oxide* (I), $Ph_3CC{:}N{:}O$, m. 153–4°; concd. H_2SO_4 gives a red color, changing to deep yellow and on warming to green. During the reaction a double salt of AgCl and Ph_3CCl, deep yellow, was observed. Heating I with EtOH-HCl gives quant. *triphenylacethydroxamyl chloride*, $Ph_3CC(:NOH)Cl$, m. 178–80° (decompn.); heating at 190° for 5 min. again gives I; MeOH-KOH gives the *Me ester*, m. 204°; the free acid m. 165–7°. Reduction of I with Zn and EtOH-HCl gives *triphenylmethyl cyanide*, m. 129°. I and PhMgBr give *benzopinacolin oxime* (II), m. 210°, whose Bz deriv. m. 175°. The Beckmann rearrangement with concd. H_2SO_4 gives Ph_3COH and $BzNH_2$. II and $NaNO_2$ in AcOH give the *nitrimine*, m. 160° (decompn.); heating at 160–80° gives NO, PhCN and Ph_3COH; reduction with Na-Hg gives *benzopinacolin hydrazone* (III), m. 189°; *Me_2CO condensation product*, m. 144–5°. III and HgO in $C_6H_4Me_2$ give $Ph_2C{:}CPh_2$. *Benzopinacolin imine*, m. 165°, results from the nitrimine, $SnCl_2$ and HCl in 35% EtOH-HCl. Ph_3CCl (11.5 g.) and 6 g. $C{:}NOAg$ in 40 cc. C_6H_6 give 1.6 g. I, insol. in Et_2O, and 1.5 g. of the *triphenylmethyl ether* of triphenylacethydroxamyl chloride, $C_{39}H_{30}ONCl$, m. 174–5°; reduction gives Ph_3CCN and Ph_3CH.
C. J. WEST

The reaction between phenylmagnesium bromide and carbon dioxide at elevated temperatures. HENRY GILMAN AND NINA B. ST. JOHN. *Rec. trav. chim.* **49**, 1172–7 (1930).—Gilman, Fothergill and Parker (*C. A.* **23**, 4464) have given directions for the prepn. of tertiary alcs. from acid halides; the present paper deals with the prepn. of these compds. from CO_2 and RMgX compds. In the latter reaction small quantities of $(Ph_3C)_2O_2$ are always formed on carrying out the reaction with PhMgBr (cf. Meyer and Tögel, *Ann.* **347**, 55(1906); Schroeter, *Ber.* **36**, 3005(1903)) and the supposition is put forward that this compd. is formed by the oxidizing action of ether peroxide which almost invariably is present in small quantities in Et_2O. In support of this supposition are the facts that old ether gives a higher yield of the peroxide than fresh ether and that no peroxide was obtained when the PhMgBr was prepd. in PhOEt or was suspended in PhBr. The $(Ph_3C)_2O_2$ may, however, also be formed by atm. oxidation of a Ph_3C halide, the formation of which is possible according to the reaction: $Ph_3COH + MgBr_2 \longrightarrow Ph_3CBr + MgBrOH$, the Ph_3COH being formed by hydrolysis of $Ph_3COMgBr$, only traces of water being necessary in view of the high mol. wt. of the Ph_3C compds. The 2nd explanation is, however, not very probable in view of the fact that the yield of the peroxide increased on using a soln. of PhMgBr which was prepd. with such an excess

of Mg that the yield of PhMgBr was almost theoretical and which, therefore, contained hardly any $MgBr_2$. On carrying out the reaction between CO_2 and PhMgBr in PhBr a small quantity of *p*-$PhC_6H_4CO_2H$ was isolated, the formation of which indicates the intermediate formation of Ph and phenylene radicals. On heating $Ph_3COMgBr$ in an ether-benzene mixt. during 20 hrs. a 73% yield of Ph_3CH was obtained; the $Ph_3COMgBr$ was prepd. from the carbinol and EtMgBr and, if an excess of the latter reagent was used, $CHPh_3$ was not formed at all. From Ph_2CO and PhMgBr 92% of Ph_3CH was obtained and Ph_2CO may be obtained from PhMgBr and BzCl in 50% yield by the rapid addn. of the Grignard reagent to the BzCl. On prepg. Ph_3COH from PhMgBr and CO_2 the following results were obtained in which the time necessary for the completion of the reaction is given also: in ether, 6 hrs. and 36.9%; in benzene, 16 hrs. and 44.5%; in benzene, 10 hrs. and 46%; in toluene, 4 hrs. and 42%; in *p*-cymene, 9 hrs. and 46.8%. C. F. VAN DUIN

Hemi-ethers of benzopinacol. LUDWIG SCHUSTER. *Ber.* **63B**, 2397–9(1930); cf. Löwenbein and S., *C. A.* **24**, 5296.—The monoalkyl and -aryl ethers of $Ph_2C(OH)COPh$ with PhMgBr give in good yield the cryst. hemi-ethers, $Ph_2C(OR)C(OH)Ph_2$, of benzopinacol which with hot HBr-AcOH rearrange almost instantaneously and quantitatively into the alc. ROH and β-benzopinacolin. *Phenylbenzoin mono-Ph ether* (10 g. from 17.5 g. Ph_2CMeBr and 1 equiv. PhOH gently warmed on the H_2O bath), m. 134.5°. *Benzopinacol mono-Me ether* (88% from $Ph_2C(OMe)COPh$ and PhMgBr), m. 182.5°. *Mono-Et ether* (75% from $Ph_2C(OEt)COPh$). *Mono-Ph ether* (66%), m. 219°. C. A. R.

Valence tautomerism of unsaturated systems. G. WITTIG AND W. WIEMER. *Ann.* **483**, 144–56(1930).—1,5-$C_{10}H_8Bz_2$, m. 185–6°; *1,6-isomer*, m. 175–6°; *2,6-isomer*, m. 184–6°; *2,7-isomer*, m. 171–2°. With PhMgBr the 1,5-isomer gives *1,5-bis(diphenylhydroxymethyl)naphthalene*, m. 280° (decompn.); concd. H_2SO_4 gives a red soln.; HCl gas in dioxane gives the *dichloride*, m. 250–1°; a dry $C_6H_4Me_2$ suspension, shaken with Naturkupfer C in a N atm. for several days, gives a red filtrate with a sharp absorption band at about 470 mμ. The soln. contained a considerable amt. of the HO deriv., so that the radical could not be obtained pure; shaking with O decolorizes the soln. after several hrs. *2,6-Bis(diphenylhydroxymethyl)naphthalene*, m. 279–81° (decompn.); concd. H_2SO_4 gives a deep red color; *dichloride*, m. 250–3°; Cu gives *2,6-bis(diphenylmethylene)naphthalene*, black glistening crystals; the $C_6H_4Me_2$ soln. is red with an absorption band at 500 mμ; $PhICl_2$ gives the dichloride. (*p*-$BzC_6H_4CH_2)_2$, m. 174–6°, with Br in $PhNO_2$, heated 15 min. to boiling, splits off HBr and gives *p,p'-dibenzoylstilbene*, m. 234–5°; with PhMgBr there results *p,p'-bis(diphenylhydroxymethyl)stilbene*, m. 208–12°; *dichloride*, m. 213–6°; concd. H_2SO_4 gives a blue color and NaOH gives the original glycol. With Cu there results *p,p'-bis(diphenylmethylene)stilbene*, greenish crystals, giving a blue-violet color; the deep blue C_6H_6 or $C_6H_4Me_2$ soln. shows an absorption band at 630 mμ. $PhICl_2$ gives the dichloride. O_2 decolorizes the soln. of the radical momentarily, giving a yellow oxidation product, m. 150–5°. The solid unsatd. radical decomps. in about 20 min. on standing in the air. C. J. WEST

Method of preparing β-naphthalenic derivatives. A. BARBOT. *Bull. soc. chim.* [4], **47**, 1314–23(1930).—The Friedel-Crafts reaction with tetralin results exclusively in substitution in the β-position, and also, by the use of $AlBr_3$, in place of $AlCl_3$ the yields can be so increased as to make the reaction serviceable. *β-Methyltetrahydronaphthalene* (I) (cf. *C. A.* **18**, 2515). MeBr was passed through a hollow agitator into 12 g. $AlBr_3$ in 400 g. of dry $C_{10}H_{12}$ at 140–50° for 2 days, until 75.5 g. was absorbed. The product was cooled, decompd. with H_2O, washed, dried and fractionated. Sixteen g. of I (14% yield), b_{12} 99–101°, was obtained in addn. to 170 g. $C_{10}H_{12}$ and 35 g. of a mixt. of octahydrophenanthrene and octahydroanthracene. The addn. of 327 g. of EtBr to 40 g. of $AlBr_3$ in 792 g. of $C_{10}H_{12}$ at 110–20° gave 28% of *β-Et homolog* (II) of I, b_{10} 121–2°, and 80 g. of a substance (IX), b_9 219°. The yield with $AlCl_3$ was 3.5%. *iso-Pr compd.* (III), b_{13} 124–6° (37% yield), was prepd. in a similar fashion and was accompanied by IX. *β-tert-Bu compd.* (IV), b_{11} 129°, gave a 70% yield with $AlBr_3$ against 24.5% with $AlCl_3$. By the action of AcCl on $C_{10}H_{12}$ with $AlCl_3$ as catalyst *Me β-tetrahydronaphthyl ketone* (V), b_{16} 161° (*semicarbazone*, m. 257–8°), was formed with 90% yields B. prepd. in the same way the following *β-tetrahydronaphthyl ketones: Et* (VI), b_{12} 163–4°, d_{23}^{23} 1.033, n_D^{23} 1.550, M_D 58, calcd. 56.7 (*semicarbasone*, m. 224–5°), yield 46%; *Pr* (VII), b_{18} 176–9°, d_{23}^{23} 1.030, n_D^{23} 1.5460, M_D 62.1, calcd. 61.3 (*semicarbazone*, m. 172–3°), yield 58%; *iso-Pr* (VIII), b_{11} 164–7°, d_{23}^{23} 1.025, n_D^{23} 1.5444, M_D 62.2, calcd. 61.3, yield 54%. When acted upon by CH_2O and HCl in the presence of $ZnCl_2$, or by CH_3OCH_2Cl in the presence of $SnCl_4$, $C_{10}H_{12}$ gives a mixt. of α- and β-$C_{10}H_{11}CH_2Cl$. By heating with S, the tetra-

hydronaphthalenic derivs. can be dehydrogenated simply and with satisfying yields. For quantities of about 100 g., the substance (1 mol.) is introduced together with 2 atoms of S into the inner chamber of a thermostatic jacket which is heated by crude $NO_2C_7H_7$ at 215–20°. H_2S begins to come off at 190° and the evolution is rapid at 200°. After heating for 2 hrs. the crude product is distd. and the distillate is purified by boiling with NaOH. The following *β-alkyl(acyl)naphthalenes* were prepd. in this manner: *Me*, from I in 75% yield, b_{16} 110–2° (*picrate*, m. 115°); *Et*, b_{10} 117–8° (*picrate*, m. 72–3°), from II in 69% yield; *iso-Pr*, 72.5% from III, b_{14} 129–30° (*picrate*, m. 89–90°); *tert-Bu*, 70% from IV (*picrate*, m. 102–3°); *Ac*, in 71% yield from V, b_{17} 171–3°, m. 52° (*oxime*, m. 142°; *semicarbazone*, m. 234–5°); *EtCO*, 72% from VI, b_{18} 181–3°, m. 58–9° (*oxime*, m. 131–2°; *semicarbazone*, m. 190–1°); *PrCO*, 72% from VII, b_{16} 184–5°, m. 52° (*oxime*, 86–9°); *iso-PrCO*, from VIII in 71.4% yield, b_{18} 180–1° (*oxime*, m. 121–2°). By the dehydrogenation of β-tetrahydronaphthyl Ph ketone 73% of *β-naphthyl Ph ketone*, m. 81°, was obtained, identical with the product of the CrO_3 oxidation of β-$C_{10}H_7CH_2Ph$. By the action of HCl and $AlCl_3$, $C_{10}H_{12}$ may form $PhCH_2CH_2CH_2CH_2Cl$, condensing with $C_{10}H_{12}$ to give the dimer $PhCH_2CH_2CH_2CH_2C_{10}H_{11}$ (IX), which in the presence of $AlCl_3$, on splitting out C_6H_6 and joining the end of the chain to the tetralin nucleus in the 5- or 7-position, would form octahydrophenanthrene or octahydroanthracene, resp. *α,δ-Diphenylbutane* (X) (cf. *C. A.* **15**, 525). Sixty-six g. of $C_{10}H_{12}$ was heated to boiling with 234 g. of dry C_6H_6 and 10 g. $AlBr_3$ or $AlCl_3$ for 8 hrs. On cooling, washing with H_2O, distn. and recovery of 224 g. C_6H_6 and 52 g. of $C_{10}H_{12}$ there was obtained 14 g. of X, m. 82°. C. R. ADDINALL

Interaction of tertiary butyl chloride and naphthalene. WM. GUMP. *J. Am. Chem. Soc.* **53**, 380–1(1931).—The so-called α,β- and α,α-$(C_{10}H_7)_2$ of Wegscheider (*Monatsh.* **5**, 238(1884)) are actually 2 isomeric *di-tert-butylnaphthalenes*, b. 319°, m. 82–3°, and b. 320°, m. 145–6°, sepd. by crystn. from MeOH or EtOH. The position of the Bu groups could not be established by oxidation with dil. HNO_3. C. J. WEST

Reduction of naphthalene by alkali metals in liquid ammonia. CHARLES B. WOOSTER AND FRANK B. SMITH. *J. Am. Chem. Soc.* **53**, 179–87(1931).—The reduction of $C_{10}H_8$ with Na in liquid NH_3 takes place through the intermediate formation of a 1,2,3,4-tetra-Na addn. product, which is approx. 75% ammonolyzed even in soln. at −33.5°. The reaction with K apparently follows essentially the same course as that with Na. These facts confirm the mechanism derived by extending to this reaction the theory proposed by Willstätter, Seitz and Bumm to explain reductions of org. compds. with Na-Hg and H_2O. Certain facts have been pointed out which suggest a similar mechanism for the reduction of other aromatic compds. by Na in liquid NH_3 and for the reduction of $C_{10}H_8$ by Na in EtOH. C. J. WEST

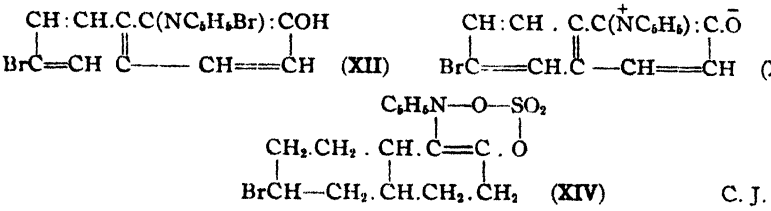
The velocity of intramolecular transformation of β-naphthylacetylchloroamine. A. P. J. HOOGEVEEN. *Rec. trav. chim.* **49**, 1093–106(1930); cf. *C. A.* **24**, 4289.—Contrary to the results obtained by Blanksma (*Verslag. Akad. Wetenschappen Amsterdam* 159, June 28, 1902 and 378, Oct. 25, 1902; *Rec. trav. chim.* **21**, 290(1903)) and Fontein (*C. A.* **22**, 2553) in the detn. of the velocity of transformation of PhNClAc and other arylacylhalogenoamines, the curves showing the relationship between the compn. of the solvent and the velocity of transformation of α-$C_{10}H_7NClAc$ show a min. at about 50% EtOH or AcOH. This min. was obtained with different concns. of HCl, while it was impossible to detect any connection between the amt. of HCl and the reaction velocity; on the other hand, Blanksma had found with the arylacylhalogenoamines that the reaction velocity was proportional to the square of the quantity of HCl present. Therefore these investigations in the $C_{10}H_8$ series were continued with the β-compd. which was prepd. from the dil. AcOH soln. of β-$C_{10}H_7NHAc$ and bleaching powder soln. and recrystn. of the crude product from petr. ether, b. 40–50°, m. 80°; purity, as detd. by titration with KI, 94%. The intramol. transformation of this compd. gives 1,2-$ClC_{10}H_6NHAc$, m. 149–150°, which on sapon. gave 1,2-$ClC_{10}H_6NH_2$, m. 60° (*Ber.* **20**, 1990(1887)). This is in agreement with the fact that in similar cases with β-$C_{10}H_7$ derivs., products are obtained with substituents in position 1 (cf. Fischer and Hepp, *Ber.* **20**, 2471(1887) for β-$C_{10}H_7NEtNO_2$, Gilbert and others, *J. Chem. Soc.* **115**, 1141(1919) for the corresponding Me compd. and Bamberger, *Ber.* **30**, 1262(1897) for β-$C_{10}H_7NHNO_2$). According to Franzen and Stäuble (*C. A.* **16**, 1945) the positions 1, 3 and 6 may be occupied in such transformations, the position 1 being favored. The 94% prepn. of the chloroamine was used for all the measurements, which were carried out at 25°, the following results being obtained: *In 0.1 N HCl: K* in water 0.0054; 5% EtOH 0.0046; 10% EtOH 0.0040; 20% EtOH 0.0039; 30% EtOH 0.0045; 40% EtOH 0.0070; 50% EtOH 0.0124; 60% EtOH 0.0233; 70% EtOH 0.0500. *In 0.2 N HCl: K* in water 0.0119; 10% EtOH 0.0094; 20% EtOH 0.0102; 30% EtOH 0.0147;

40% EtOH 0.0245; 50% EtOH 0.0423; 60% EtOH 0.0808; 70% EtOH 0.1670. From 30% EtOH upward the ratio of the reaction velocities on doubling the concn of the HCl is about 3.4 and in smaller concns. 2.1–2.6. The same ratio, 3.5, was found in 50% EtOH for 0.1 and 0.05 N HCl, the reaction velocity in the latter case being 0.0035. *In 0.1 N HCl: K* in 10% AcOH, 0.0039; 20% AcOH 0.0038; 30% AcOH 0.0056; 40% AcOH 0.0092; 50% AcOH 0.0185; 60% AcOH 0.0489; 70% AcOH 0.1832. All these reaction consts. were calcd. by means of the formula for a monomol. reaction. From these results the following conclusions were drawn: (1) The reaction velocity in mixts. of EtOH and water is about 1.5 times as great as that of PhNClAc and α-$C_{10}H_7$NClAc in mixts. with equal % of EtOH; (2) the reaction velocity is high in mixts. of water and EtOH or AcOH with high concns. of the org. compd. and it decreases on addn. of water; (3) the reaction velocity is lowest in mixts. contg. from 10 to 20% EtOH or AcOH; (4) in H_2O the reaction velocity again increases slightly; (5) the various peculiar phenomena, which were observed with α-$C_{10}H_7$NClAc (cf. above), are also observed, although to a much smaller extent, with β-$C_{10}H_7$NClAc in mixts. contg. 10% and 20% AcOH or EtOH. The curves representing the connection between the compn. of the solvent and the reaction velocity are almost identical with those obtained with phenylacylhalogenoamines (cf. Blanksma, *Rec. trav. chim.* **21**, 336(1902); **22**, 290 (1903); Fontein, *C. A.* **22**, 2553). C. F. VAN DUIN

Aromatic and hydroaromatic halogen compounds from β-naphthol. Consideration of the course of substitution reactions. K. FRIES AND K. SCHIMMELSCHMIDT. *Ann.* **484**, 245–300(1930); cf. *C. A.* **19**, 59.—2,3-$HOC_{10}H_6CO_2H$ and Br in AcOH, heated 1 hr. on the water bath, give 80% of the *1,5,6-tri-Br deriv.*, light yellow, m. 320°, very resistant to further bromination; oxidation with HNO_3 gives *3,4-dibromophthalic acid*, m. 196°; *anhydride*, m. 148.5°. If the above bromination is carried out in the presence of AcONa, 94 g. acid gives 180 g. of *1,1,3,3-tetrabromo-2-keto-4-acetoxynaphthalene 1,2,3,4-tetrahydride* (I), m. 140°, decomps. 155°, liberates I from KI, gives with Zn 1,3,2-$Br_2C_{10}H_5OH$ and with $SnCl_2$ in concd. HCl *1,3-dibromo-2-hydroxy-4-acetoxynaphthalene*, m. 148°; Ac deriv., m. 122°; the di-HO compd. could not be prepd. by acid or alk. hydrolysis; with $SnCl_2$ and 2 *N* NaOH there results 40% of *1,1'-dibromo-2,4,2',4'-tetrahydroxy-3,3'-dinaphthyl*, m. 242° (decompn.); *tetra-Ac deriv.*, m. 222–3°. I with HBr-AcOH gives 1,3 6,2,4-$Br_2C_{10}H_3(OH)_3$, m. 186°. I and Zn in AcOH give *1,3,2-dibromonaphthol* (II), m. 75°; *Ac compd.*, m. 102°. With fuming HNO_3 in AcOH II gives *1,3-dibromo-1-nitro-2-ketonaphthalene 1,2-dihydride*, yellow, m. 98° (decompn.); in boiling C_6H_6 there results 3-bromo-1,2-naphthoquinone, m. 179°; $PhNH_2$ in EtOH gives 50% *3-bromo-2-hydroxy-1,4-naphthoquinonanil*, dark brown, m. 233°, also obtained from the 3,4-Br_2 deriv. and $PhNH_2$ in 80% yield; excess $PhNH_2$ gives the 2-anilino deriv Reduction of the quinone with H_2SO_3 in AcOH gives *1,2-dihydroxy-3-bromonaphthalene*, m. 117°; *di-Ac deriv.*, m. 160°. II, Br, AcONa and AcOH give *1,1,3-tribromo-2-ketonaphthalene 1,2-dihydride*, yellow, m. 102–5°; in HBr-AcOH there are formed II and 1,3,6,2-$Br_3C_{10}H_4OH$. II, Sn, concd. HCl and EtOH, boiled 8 hrs., give *3-bromo-2-naphthol*, m. 83°; *Ac deriv.*, m. 94°; *Me ether*, m. 77–8°; the Grignard reagent from the ether and CO_2 give *2-methoxynaphthalene-3-carboxylic acid*, m. 131°, thus establishing the 3-position of the Br. 4,2-$BrC_{10}H_6NH_2$ (*Ac deriv.*, m. 189.5°) in H_2SO_4 gives with HNO_2 *4-bromo-2-naphthol*, m. 122°. *4-Bromo-2-amino-1-naphthol*, m. 128°; *di-Ac deriv.*, m. 231°; with HNO_3-AcOH there results 90% of *4-bromo-1,2-naphthoquinone*, red, m. 154°, which gradually splits off HBr, giving a yellow-green compd.; heating on the water bath gives a black resin; heating with 20 parts EtOH and 1 part concd. HCl gives 80% of *2-hydroxy-1,2-naphthoquinone*, m. 189°; $PhNH_2$ in EtOH gives the anil, m. 265° when pptd. from dil. NaOH or 244° when crystd. from EtOH or C_6H_6; *o*-$C_6H_4(NH_2)_2$ gives the *quinoxaline*, yellow, m. 186°. 1,6,2-$Br_2C_{10}H_5OH$ and HNO_3 in AcOH give *1,6-dibromo-1-nitro-2-ketonaphthalene 1,2-dihydride*, yellow, m. 100° (decompn.); heating in C_6H_6 gives *6-bromo-1,2-naphthoquinone* (III), m. 168° (decompn.). 2-$C_{10}H_7OH$, Br, AcOH and AcONa give 72% of *1,1,3,6-tetrabromo-2-ketonaphthalene 1,2-dihydride*, golden yellow, m. 168° (decompn.); reduction with $SnCl_2$-AcOH gives 95% of 1,3,6,2-$Br_3C_{10}H_4OH$ (IV), m. 132°, also obtained by bromination of II; *Ac deriv.*, m. 152°; reduction with Sn and HCl in EtOH gives 3,6,2-$Br_2C_{10}H_5OH$, m. 127° (*Ac deriv.*, m. 127°). IV and HNO_3 in AcOH give *1,3,6-tribromo-1-nitro-2-ketonaphthalene 1,2-dihydride*, canary-yellow, transformed at 80° or better by heating in C_6H_6 into *3,6-dibromo-1,2-naphthoquinone*, red, m. 176°, which also results from the 3,4,6-Br_3 deriv. by reduction and oxidation of the hydroquinone. 1,4,6,2-$Br_4C_{10}H_4OH$ (Franzen and Stauble, *C. A.* **16**, 1945, termed this the 1,3,6-compd.) and HNO_3 in $CHCl_3$ give 60% of *1,4,6-tribromo-1-nitro-2-ketonaphthalene 1,2-dihydride*, yellow, m. 145°; with NaOH in EtOH there results the red Na salt of 4,6,1,2-$Br_2(O_2N)C_{10}H_4OH$; boiling in 5 parts

C_6H_6 gives *4,6-dibromo-1,2-naphthoquinone* (V), orange-red, m. 153°, also obtained from the naphthol and HNO_3 in boiling AcOH; it is unstable and on drying on the water bath, in the light and on continued boiling of a C_6H_6 soln. gives a compd. m. about 100° higher. $PhNH_2$ in EtOH gives quant. *6-bromo-2-hydroxy-1,4-naphthoquinone anil*, red, m. 276°; excess $PhNH_2$ gives the *2-anilido deriv.*, m. 211°. V and concd. HCl in EtOH give *6-bromo-2-hydroxy-1,4-naphthoquinone*, yellow, m. 203°; the alkali salts are deep red; the same compd. is formed from III by the same reaction. Heating V in AcOH 1 hr. gives *3,6-dibromo-2-hydroxy-1,4-naphthoquinone* (VI), the halogen migrating from the 4- to the 3-position. 1,3,4,6,2-$Br_4C_{10}H_3OH$ with HNO_3 in AcOH gives, on heating 20 sec. to boiling after soln. results, 3,4,6-tribromo-1,2-naphthoquinone (VII), red, m. 191°; the *quinoxaline*, yellow, m. 250°; careful reduction with $SnCl_2$-AcOH gives *3,4,6-tribromo-1,2-dihydroxynaphthalene*, m. 160°; longer action of the reducing agent gives 3,6,1,2-$Br_2C_{10}H_4(OH)_2$; oxidation gives the quinone and a compd., probably *3,6,3',6'-tetrabromo-1,2,1',2'-tetrahydroxy-4,4'-dinaphthyl*, m. 293°. Heating VII in AcOH 2 hrs. or better with concd. H_2SO_4 gives VI, golden yellow, m. 219°; the alkali salts are red. VII and 2 mols. $PhNH_2$ in EtOH give *3,6-dibromo-2-hydroxy-1,4-naphthoquinone anil*, dark red, m. 185°; excess $PhNH_2$ gives the *6-bromo-2-anilino deriv.*, brownish red, m. 211° (decompn.); the HCl soln. is violet; the same compd is obtained from 6-bromo-1,4-naphthoquinone and *6-bromo-2-hydroxy-1,4-naphthoquinone anil*, m. 276°. VII and fuming HNO_3 give *3,3,6-tribromo-1,2,4-triketonaphthalene 1,2,3,4-tetrahydride*, m. 157°, crystg. with 1 mol. H_2O; reduction gives 3,6,1,2,4-$Br_2C_{10}H_3(OH)_3$. *1,3,5,6-Tetrabromo-2-naphthol* (VIII), m. 186°, results in a small yield in the prepn. of the 1,3,4,6-Br_4 deriv. (F. and S.); in 75 g. yield from 100 g. β-$C_{10}H_7OH$ and 1-vol. of Br on the water bath; in 40% yield by reduction with Zn and AcOH of *1,1,3,3,5,6-hexabromo-2-keto-4-acetoxynaphthalene 1,2,3,4-tetrahydride*, yellow, m 174.5° (decompn.), obtained by bromination of 1,5,6,2,2-$Br_3(HO)C_{10}H_3CO_2H$ in AcOH and AcONa. VIII with HNO_3 in AcOH gives *1,3,5,6-tetrabromo-1-nitro-2-ketonaphthalene 1,2-dihydride*, pale yellow, changing at 85° or on heating the C_6H_6 soln. to *3,5,6-tribromo-1,2-naphthoquinone* (IX), fiery red, m. 184° (70–80% yield); the *quinoxaline*, yellow, m. 271°; with 3 mols. $PhNH_2$ in EtOH there results *5,6-dibromo-2-anilino-1,4-naphthoquinone anil*, violet or bronze needles, decompg. 221°. Heating IX in AcOH or EtOH-HCl gives *3,5,6-tribromo-2-hydroxy-1,4-naphthoquinone*, yellow, m. 232°. In the prepn. of IX from VIII and HNO_3 in AcOH there results a *compd.*, $C_{10}H_6O_5NBr_4$, m. 121° (decompn.), cystals with 1 mol. AcOH, m. 115° (decompn.); heating in C_6H_6, benzine or EtOH gives IX; reduction with $SnCl_2$-AcOH gives 90% of *3,5,6-tribromo-1,2-dihydroxynaphthalene*, m. 181°; di-Ac deriv., m. 171° (?, original gives 17.1°). β-$C_{10}H_7OH$ (144 g.) and 400 g. AcONa in 1 l. AcOH, treated drop-wise with 50 cc. Br and then with 1 portion of 60 cc. Br, give 65–75% of 1,1-dibromo-2-ketonaphthalene, 1-2 dihydride (X); Br in AcOH gives the 1,1,3,6-Br_4 deriv.; Br in $CHCl_3$ at —15° gives *1,1,3,4,6,7-hexabromo-2-ketonaphthalene 1,2,3,4,6,7-hexahydride* (XI), m, 173°, stable toward cold NaOH or H_2SO_4 but decompd. on warming; $SnCl_2$ or Hi gives 1,3,2-$Br_2C_{10}H_5OH$. XI and Ac_2O with a little concd. H_2SO_4 gives *1,1,3,4,6,7,-hexabromo-2-acetoxy 1,4,6,7-tetrahydride*, m. 178° (decompn.); reduction with Zn and AcOH gives 1,3,2-$Br_2C_{10}H_5OAc$, m. 102°; C_5H_5N splits off HBr, giving the *Ac deriv.*, m. 221°, of *1,3,6,7-tetrabromo-2-naphthol*, m. 174°; oxidation with HNO_3 gives 4,5-dibromophthalic acid. 2-$HOC_{10}H_6Me$, brominated in AcOH and AcONa and the ketobromide reduced with Zn in AcOH gives *3-bromo-2-hydroxymethylnaphthalene*, m. 76°; *Ac. deriv.*, m. 77°. Further bromination gives the *3,6 di-Br deriv.*, m. 110°; *Ac deriv.* m. 136°; and then the *3,4,6-tri-Br deriv.*, m. 158°; *Ac deriv.*, m. 202°. The 3,6- or 4,6-Br_2 deriv. gives *1,4,6-tribromo-1-methyl-2-ketonaphthalene 1,2-dihydride*, yellow, m. 124° (decompn.); with 15 parts $PhNH_2$, warmed 10 min and then treated with 20 parts AcOH, there results the *6-bromo-1,4-dianilino deriv.*, yellow, m. 250° (decompn) 1,2-$BrC_{10}H_6OH$ in HBr or HCl with KI or $SnCl_2$ gives β-$C_{10}H_7OH$; free III alone does not produce the same result. Similarly, 1,6,2-$Br_2C_{10}H_5OH$ was transformed into 6,2-$BrC_{10}H_6OH$ and then into β-$C_{10}H_7OH$; 1,2-$ClC_{10}H_6OH$ into β-$C_{10}H_7OH$ and 1,4,2-$Cl_2C_{10}H_5OH$ into 4,2-$ClC_{10}H_6OH$; the reaction seems to be general for halogen derivs. of β-$C_{10}H_7OH$, substituted in the 1-position; it does not apply to halogen derivs. of phenol. 1,1-Dichloro-2-ketonaphthalene 1,2-dihydride (Zincke, *Ber.* 21, 3540) is yellow and m. 54°; the green H_2SO_4 soln. evolves HCl; HCl-AcOH gives 1,4,2-$Cl_2C_{10}H_5OH$; HBr-AcOH gives 1,6,2-$ClBrC_{10}H_5OH$. *1-Chloro-1-bromo-2-ketonaphthalene 1,2-dihydride*, pale yellow, m. 90°, is formed from 1,2-$ClC_{10}H_6OH$ or 1,2-$BrC_{10}H_6OH$; reduction gives 1,2-$ClC_{10}H_6OH$; HCl-AcOH or HBr-AcOH gives 1,6,2-$ClBrC_{10}H_5OH$, m. 105°. 2,3-$HOC_{10}H_6CO_2H$ and Cl in AcOH give 1,1,3,3,4-pentachloro-2-ketonaphthalene 1,2,3,4-tetrahydride, m. 116°; reduction with Zn dust in AcOH gives 1,3,2-$Cl_2C_{10}H_5OH$, a simple method of prepn. 1,1,6-Tribromo-2-ketonaphthalene 1,2-dihydride and HBr-

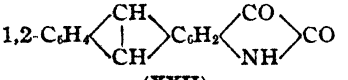
AcOH give 1,6,2-$Br_2C_{10}H_6OH$, m. 106°. **X** and C_5H_5N, at a temp. not over 40°, give the *compd.* $C_{15}H_{11}ONBr_2$ (**XII**), yellow, m. 320° (decompn.); with aq. AcONa there is formed the *compd.* $C_{15}H_{10}ONBr$ (**XIII**), golden yellow with 2 mols. H_2O, or deep red when anhyd., m. 250° (decompn); HBr gives **XII**; Ac_2O-H_2SO_4 gives the *compd.* $C_{15}H_{20}O_4NBrS$ (**XIV**), darkens 325°, m. 330°, hygroscopic, very stable toward NH_3 and dil. alkali at room temp.; heating with AcOH or aq. AcONa gives **XIII**. Dehydro-1-methyl-2-naphthol, m. 144°, is formed from 1-methyl-1-bromo-3-ketonaphthalene 1,2-dihydride and 1,2-$MeC_{10}H_6ONa$ in C_6H_6.



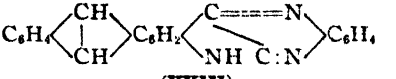
C. J. West

Derivatives of the anthracenes. IV. Indole derivatives of the anthracenes. Paul Ruggli and Ernst Henzi. *Helv. Chim. Acta* **13**, 409–37(1930); cf. *C. A.* **23**, 2711.—Nitration of 2-methylanthraquinone with KNO_3 in H_2SO_4 gave *1-nitro-2-methylanthraquinone* (**I**) which was reduced with Na_2S to give the *amino deriv.* (**II**) **II** (20 g.) was heated for 4 hrs. in 100 cc. $PhNO_2$ with 5 cc. $PhNH_2$ in the presence of 5 g. anhyd. KOAc. Cooling pptd. 17 g. of red-violet *1-amino-2-phenylazomethinanthraquinone* (**III**), m. 212–3°. **III** with concd. H_2SO_4 gave the dark brown *1-aminoanthraquinone-2-aldehyde* (**IV**). **IV** (2.51 g.) in 25 g. $H_2SO_4.H_2O$ with 5 g. Ac_2O dropped into H_2O pptd. 1.9–2 g. yellow-green *1-acetamidoanthraquinone-2-aldehyde* (**V**), sinters 220–30°, m. 237–40° (from xylene and $PhNO_2$). **V** with MeOH-KOH or upon long warming with concd. H_2SO_4 gave **IV**. **IV** (2.51 g.) in 10 cc. hot $PhNO_2$ with 3 g. BzCl gave the carmine-red *anhydro-bis(1-aminoanthraquinone-2-aldehyde)* (**VI**), m. 380–90° (from $PhNO_2$)(decompn.). Heating **III** or **IV** with $ClCH_2CO_2H$ and NaOAc failed to give a *glycine deriv.*, but **IV** so treated gave a dark red *condensation product*, $1,2\text{-}C_6H_4(CO)_2C_6H_2[N{:}CHC_6H_3(CO)_2C_6H_4]CH$ NPh, m. 334° (from C_4H_4N), cherry-red in concd. H_2SO_4, orange on warming and yellow at 100°. The hot soln. thrown into cold water ppts. **IV**. 1-aminoanthraquinone (22.3 g.) was warmed with 21 g. *p*-$MeC_6H_4SO_2Cl$ in 100 cc. C_4H_4N. Cooling pptd. 34 g. *p-tolylsulfon-1-aminoanthraquinone* (**VII**). **VII** (3.8 g.), 0.56 g. KOH and 6 g. $(CH_2Br)_2$ in 25 cc. hot AmOH gave 1.1 g. *bromoethyl-p-tolylsulfon-1-aminoanthraquinone* (**VIII**), m. 165° (from HOAc). **VIII** was dissolved in concd. H_2SO_4 and heated to 50–60°, the red color changing to yellow, the soln. then cooled and thrown into cold water, quantitatively pptg. *1-(β-bromoethylamino)anthraquinone* (**IX**), m. 266° (from HOAc). **IV** (2.51 g.) and 1.2 g. semicarbazide-HCl in 250 cc. hot HOAc and 1.2 g. NaOAc gave 2.7–8 g. of the *semicarbazone* (**XI**), m. 350–60° (from alc.) (decompn.). **IV** (2.51 g.) 1.5 g. *$NH_2OH.HCl$* and 1.8 g. NaOAc in HOAc gave 2.0 g. of oxime, m. 282° (from HOAc) (decompn.). **IV** (2.51 g.), 0.65 g. $N_2H_4.H_2SO_4$ and 1 g. NaOAc in HOAc gave *azine* of *1-aminoanthraquinone-2-aldehyde* (**XII**), m. 375°. **V** (2.9 g.) with 1.2 g. $PhNHNH_2$ in HOAc gave the red *phenylhydrazone*, m. 254° (from HOAc). **V** (2.91 g.) with 2 g. *o,p*-dinitrotoluene in 10 cc. $PhNO_2$ heated to 110–20° with 6 drops piperidine gave 2.9–3 g. of *1-acetamido-2 (o,p-dinitrophenylvinyl)anthraquinone* (**XIII**), $C_6H_4(CO)_2C_6H_2(NHAc)\text{-}CH{:}CHC_6H_3(NO_2)_2$, m. 268° (from $PhNO_2$). The Ac group is split from **XIII** by hot concd. H_2SO_4, MeOH-KOH or aq. alkali. **XIII** (2 g.) in 20 g. cold concd. H_2SO_4 heated to 80–90° and thrown into 200 cc. ice water gave the homologous free amine, m. 286–90° (from $PhNO_2$) (decompn.). **V** (2.9 g.), heated for 3 hrs. with 1.8 g. $PhCH_2CO_2Na$ in Ac_2O, gave 2.2 g. of *3-phenyl-7,8-phthaloylcarbostyril* (**XIV**), $C_6H_4(CO)_2C_6H_2.NH.CO.CPh{:}CH$, m. 278° (from C_5H_5N). **XIV** with MeOH-KOH in C_5H_5N gave a purple *K salt*, easily hydrolyzed by H_2O. **II** (11.8 g.) and 3.3 g. $(COCl)_2$ in PhH gave 12.1 g. of the *bisoxalyl deriv.* (**XV**), m. 330–5° (from $PhNO_2$) (decompn.). An unsuccessful attempt was made to prep. a *diindyl deriv.* by reacting **XV** with AmONa. 2-aminoanthraquinone (**XVI**) (2.23 g.) and 1.6 g. $CH_2(CO_2Et)_2$ in hot $PhNO_2$ gave 2.4 g. *malonylbis(2-aminoanthraquinone)* (**XVII**), m. 310°. **XVI** (50 g.) was reduced by heating 8 hrs. with 80 g. Zn dust in 2 l. 5% NaOH, yielding 35 g. *β-anthramine* (**XVIII**), m. 238° (from PhMe). **XVIII** (19.3 g.) with 15 g. $CHBr(CO_2Et)_2$ in alc. gave 14–15 g. *di-Et β-anthraminomalonate*, m. 131° (from alc.) (closes alc. at 200°), 15 g. of which was heated to melting at 131°, giving a distillate of 2.4–6 g.

alc. and leaving a residue of 12 g. *Et anthracene-1,2-indoxylate* (**XIX**), $R.CO.CH(CO_2Et).NH$ ($R{=}C_6H_4{<}^{CH}_{CH}{>}C_6H_2$), m. 203° (from acetone), sol. in hot alkali. The former reaction also gave 0.8 g. of *dianthracene-1,2-indoxylic anhydride*, $\begin{matrix} CO.CH.CO.N{-}R \\ | \quad | \quad\quad | \quad | \\ R{-}N{-}CO{-}CH.CO \end{matrix}$, almost insol. in all org. solvents, but difficultly sol. in cold concd. H_2SO_4. One g. **XIX** in 20 cc. hot AmOH with KOH gave an enolic *K salt* (**XX**), m. > 360°, which gave **XIX** with acids. **XIX** (3 g.) heated with 20 cc. Ac_2O gave 2.9–3.0 g. of the *N-Ac deriv.* (**XXI**), m. 265–70° (from HOAc) (decompn.), which with alc. KOH gave **XX**. **XXI** when sapond. with 5% KOH in MeOH gave *anthracene-isatin* (**XXII**), m. 286° (from HOAc). **XIX** (3.5 g.) with 14 g. NaOH in 5 cc. H_2O at 170–80° gave 0.9 g. *indigo dye*, m. 425–30° (from $PhNO_2$) (decompn.), insol. in all low-boiling org. solvents. Heating a suspension in H_2SO_4 to 145–50° gave a color change from green to red. Cooled and thrown into H_2O the *sulfonate* pptd. One g. **XXI** in 20 cc. cold H_2SO_4 was heated to 100° by the addn. of H_2O, then thrown into ice and made alk. with dil. NaOH. The resulting soln. was oxidized with a stream of air giving a violet ppt., insol. in acid, alkali and salt solns., but giving a colloidal soln. in H_2O. The oxidation of an alk. soln. of **XIX** with air gave **XXII** which with $PhNHNH_2$ gave a red *phenylhydrazone*, m. 275–7° (from $PhNO_2$) (decompn.), and with *o*-$C_6H_4(NH_2)_2$ an *indophenazine* (**XXIII**), m. 395–400° (from $PhNO_2$).



(**XXII**)



(**XXIII**)

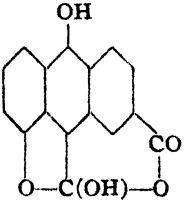
To 3.47 g. **XXI** in 40 cc. boiling HOAc was added 3 g. Cr_2O_3 giving 1.3 g. of the *anthraquinone deriv.*, m. 275–90° (from HOAc) (decompn.) T. H. RIDER

New compound of benzaldehyde and anthrahydroquinone. HAROLD A. BEATTY. *J. Am. Chem. Soc.* **53**, 378–80(1931).—Com. BzH (250 cc.), 10 g. anthraquinone (I), 10 g. BzOH, 1 cc. HCl and 20 cc. EtOH, in a sealed tube, exposed to light until the I has dissolved, the soln. steam-distd., the tar freed from resinous matter by EtOH and Et_2O and the residue dissolved in hot EtOH and treated with 2 vols. $Na_2S_2O_4$, give 10% of a *compd.*, $C_{28}H_{20}O_3$, m. 211–2° (cor., decompn. and sublimation of I), slowly hydrolyzed by EtOH-alkali and more rapidly by EtOH-HCl to BzH and anthrahydroquinone; 0.6 g. dissolve in 100 cc. boiling 95% EtOH; concd. H_2SO_4 gives a red soln., turning brown. It may result by the condensation of 2 mols. BzH with 1 of oxanthrone. C. J. WEST

Preparation of 1-amino-5-chloroanthraquinone and of 1-amino-5-tolylaminoanthraquinone. T. MAKI AND Y. NAGAI. *J. Soc. Chem. Ind., Japan* **33**, Suppl. binding 464–6(1930)(in German).—1-$C_6H_4(CO)_2C_6H_3SO_3K$ (40.0 g.) in 160 cc. concd. H_2SO_4 was nitrated with 9.0 cc. HNO_3 (d. 1.40) at 50°, followed by heating for 1 hr. at 95°. *5-Nitroanthraquinone-1-sulfonic acid* (I) sepd. on cooling (yield 60%), whereas the 8-isomer remained dissolved (yield, on dilg. with ice, 30%). To 22.8 g. of I (K salt) in 600 cc. boiling H_2O and 85 cc. concd. HCl, 20.0 g. $KClO_3$ in 100 cc. H_2O was slowly added, boiling being continued for 1 hr. A yield of 16.0 g. of *1-chloro-5-nitroanthraquinone* (II), m. 314.8°, was obtained. A paste of 15.0 g. of II, 30 g. cryst. Na_2S, and a little H_2O was mixed with 500 cc. H_2O and heated until reduction to the scarlet-red *1-amino-5-chloroanthraquinone* (III), m. 218.9°, was complete; yield 13.0 g. A colloidal suspension of the product dyed acetylcellulose a bright orange-yellow, with good affinity. Refluxing 10.0 g. of III and 150 g dry *p*-toluidine with 5.0 g. dry AcONa for 2 hrs. at 200°, gave *1-amino-5-tolylaminoanthraquinone*. The reaction mixt. was dild. with alc., 11.0 g. of violet-black crystals, m. 160.2°, was isolated. The product dyed acetylcellulose a violet-red. It was sulfonated on heating with concd. H_2SO_4 at 95°, yielding a magenta-red acid dye of good fastness. K. H. ENGEL

Blue carboxylated anthrahydroquinone-α-carboxylic acid lactones (II) and the formation therefrom of bicyclic condensed lactol-*ps*-carboxylic acids. ROLAND SCHOLL AND OSKAR BÖTTGER. *Ber.* **63B**, 2432–40(1930); cf. *C. A.* **25**, 695–6.—It had been observed that 1,2-$C_6H_4(CO)_2C_6H_2(CO_2H)_2$ (I), its anhydride (II) and imide are converted by Cu powder and concd. H_2SO_4 into blue substances which were assumed to be "oxanthronyls," although they differ from the relatively stable aroyloxanthronyls in their great sensitivity toward air and Ac_2O. Meanwhile it was shown, in Paper I, that the red anthrahydroquinone-1,4-dicarboxylic acids on short heating with aq. HCl or

AcOH yield monolactones sensitive to air and AcOH and which are *blue* both in solid form and in org. solvents. This suggested that the blue compds. obtained from I and its derivs. might also be lactone carboxylic acids and not oxanthronyls. This has been confirmed experimentally, but because of the proximity of the CO_2H groups to each other the picture is not so simple as with the 1,4-di-CO_2H derivs. On boiling I for a short time with $Na_2S_2O_4$ and AcOH or the orange hydroquinone acid (III), obtained by pptg. the cold $Na_2S_2O_4$ vat with HCl, in the aq. HCl suspension, there is obtained a product (IV), at once cryst. in the 1st case, at first amorphous in the 2nd case, which seps. from AcOH, AcOEt or dioxane in beautiful dark blue crystals forming in indifferent org. solvents blue-violet to blue solns. sensitive to the air. They have the compn. $C_{16}H_8O_5$, like the monolactone of the 1,4-acid, and the radical formulas $C_{16}H_7O_5$ or $C_{16}H_9O_5$ are excluded by the fact that IV consumes 2 equivs. O when titrated with $KMnO_4$ in Me_2CO-AcOH or NaOCl-NaOH. Its properties, however, indicate that it is not a monolactone of III. It is so closely related, genetically, to II that it is rather a lactol, or *ps-anthrahydroquinone-1,2-dicarboxylic acid lactone*,



These genetic relationships are as follows: (1) IV is also formed from II and $Na_2S_2O_4$ on short boiling in AcOH or gentle warming with Na_2CO_3, under which conditions the anhydride ring of II is not opened. (2) In cold AcOH suspension $FeCl_3$ quickly converts it into II, and in the blue solns. in indifferent org. solvents, even air oxidizes it to II; with $KMnO_4$ in Me_2CO-AcOH it therefore consumes 2, not 1, equivs. of O. In its formation from I or III, the lactone ring is undoubtedly formed first and then the anhydride ring, whereas in its formation from II the lactone ring is formed last. The phys. and chem. properties of IV agree with this structure. Its absorption in AcOEt in the ultra-violet corresponds to that of the monolactone of the 1,4-acid and the lactone of the 1-acid (max. at 2435 and 3200 and min. at 2245, 2700 and 3640). As expected, the lactol ring is opened with extraordinary ease. The soln. in anhyd. C_5H_5N remains blue only a short time and in greatly dild. aq. C_5H_5N or ordinary alc. (contg. H_2O) it dissolves on heating almost at once with red color. I and II with $Na_2S_2O_3$ and cold NaOH (only 1–2% in the case of II, to prevent opening of the anhydride ring) form different red vats (*A* and *B*). *A* is decolorized by air through olive intermediate stages, the freshly prepd. *B* through pure red, relatively air-stable intermediate stages. With $Na_2S_2O_3$ and NH_3, I gives a normal vat (C) practically identical with *A*, and II at room temp. a brown-red vat (*D*) with which HCl forms a ppt. which is blue-violet or almost instantly changes from brown to blue-violet. IV with cold dil. NaOH forms a red soln. identical with vat *B*, with hot dil. NaOH vat *A*, with cold Na_2CO_3 a blue, relatively air-stable soln., with boiling Na_2CO_3 discolored solns. turning blue when shaken with air and again discolored on standing and finally colorless when the process is repeated many times; the discolored solns. probably contain mixts. of the blue salt of IV and the red salt of vat *B*. Aq. NH_3 at room temp. gives a soln. similar to that in hot Na_2CO_3; after decolorization it probably contains $1,2\text{-}C_6H_4(CO)_2C_6H_2(CONH_2)CO_2H$, for it gives vat *D* with $Na_2S_2O_4$ and NH_3. I boiled a few min. with $Na_2S_2O_4$ in AcOH-Ac_2O gives, through the blue IV, a *mono-Ac deriv.* of IV, m. 255–6°, brown-red with violet tinge, sol. in org. solvents with violet-red color and easily sol. in cold dil. NaOH and NH_4OH, converted into III by hot NaOH. Short boiling of IV with Ac_2O-NaOAc gives an orange *di-Ac deriv.*, m. 284–5°, can be crystd. from boiling AcOH without decompn., is only slowly sol. in cold dil. NaOH and NH_4OH and converted into III on heating. IV is dark blue to almost black in incident, violet (in thin layers) in transmitted light, m. above 290° (decompn.). C. A. R.

Behavior of anthraquinonecarboxylic acids toward sodium hyposulfite, and anthranol-α-carboxylic acid lactones. ROLAND SCHOLL AND OSKAR BÖTTGER (WITH JOHANNES HORN). *Ber.* **63B**, 2440–6(1930).—It has been shown in earlier papers that anthrahydroquinone-1-carboxylic and -1,2-, -1,4- and -1,5-dicarboxylic acids, as obtained by pptn. from their alk. $Na_2S_2O_4$ vats prepd. in the cold, are easily lactonized by Ac_2O and in part even by hot HCl. On the other hand, if the vats are heated to a

more or less high temp., treatment of the pptd. vat acids with Ac_2O gives different results. 1,5-$HO_2CC_6H_3(CO)_2C_6H_3CO_2H$ (I) with alk. $Na_2S_2O_4$ at room temp. gives a red air-sensitive vat from which HCl ppts. the violet hydroquinone acid (II), but if the red alk. vat is heated to boiling even for only 1 min., HCl, after cooling, gives a brick-red-brown ppt. (III) of entirely different properties. As it is insol. in indifferent solvents it cannot be purified by crystn. It dissolves in boiling Ac_2O and on cooling there seps. a yellow-brown cryst. compd. $C_{16}H_{10}O_5$ (IV), showing the properties of both a mixed anhydride with AcOH and of a lactone. It is only slowly sol. in cold dil. NaOH, loses AcOH with boiling 50% AcOH to form a yellow-brown lactonic acid $C_{16}H_8O_4$ (V) which is easily sol. in cold NaOH and, on heating a short time with NaOH, takes up water to form an orange-red di-CO_2H acid $C_{16}H_{10}O_6$ (VI), also obtained directly from IV with hot NaOH. VI can be only *anthranol-1,5-dicarboxylic acid*, for in alk. soln. it changes in the air into I. The mechanism of the reaction is now clear. I in the hot alkali is reduced by $Na_2S_2O_4$ past the II stage to VI which by Ac_2O is at the same time lactonized and converted into the mixed *anhydride* (IV) of AcOH and *anthranol-1,5-dicarboxylic acid lactone* (V). The reaction also takes place with 1-$C_6H_4(CO)_2C_6H_2CO_2H$ and the 1,2- and 1,4-di-CO_2H acids but not with the same ease. The 1-CO_2H and 1,2-di-CO_2H acids require long heating with the alk. $Na_2S_2O_4$ The product from the 1-acid was so unhomogeneous that it was not further investigated. The 1,4-acid after 5 min. boiling gave the *anthranol-1,4-dicarboxylic acid* (VII) in bright flesh-colored needles and readily yielded the red *lactonecarboxylic acid* (VIII). The 1,2-acid is reduced to the anthranol stage only after long boiling. The resulting yellow acid is without doubt a mixt. of 9- and *10-anthranol-1,2-dicarboxylic acids* (IX and X), for with Ac_2O it gives a dark red compd. $C_{16}H_8O_4$ (XI) and a yellow acetate $C_{18}H_{10}O_5$ (XII); XI cannot be converted into XII by further treatment with Ac_2O. The 2 compds. can be sepd. from each other only with difficulty and with considerable loss and they were therefore not thoroughly studied. XI is believed to be the *ps-form* of the lactone of VI (see preceding abstr.); it is only slowly sol. in NH_4OH, forms in NaOH a relatively air-stable red soln. and HCl gives a yellow ppt., presumably the free IX which with boiling AcOH or $C_6H_3Cl_3$ regenerates XI. XII is supposed to be the *acetate* of *10-anthranol-1,2-dicarboxylic anhydride;* it dissolves in hot NaOH with much more yellowish red color than XI, forming a relatively air-stable soln. and giving with HCl a yellow ppt., probably of the free X. IV (60% yield), decomps. above 285°. V, darkens above 310° and decomps. without melting. VI, m. above 310°. VIII (yield, 75%), does not m. 325°. VII, becomes dark red at 250° XI, m. 278°. XII, m. 266–7°, sol. in AcOEt with yellow color and green fluorescence in AcOH and Ac_2O without fluorescence, in concd. H_2SO_4 with yellow color. C. A. R.

Action of nitrous acid on primary tetrahydro-α-furfurylamine. N. V. Williams *Compt. rend. acad. sci. U. S. S. R.* **1930A**, No. 16, 424–8.—The reaction has been found to be quite complicated, resulting in the formation of products of various nature, and seems to be similar to the decompn. of nitrous salts of amines of the polymethylene series contg. a side chain CH_2NH_2. The predominance of primary alc. in the products of reaction is concluded to be related to the stability of the pentacycle. Substitution of O for CH_2 does not remove the ability of the heterocycle to isomerize. It is pointed out that a further detailed study of the reaction is necessary. Robert Schless

Furan derivatives. I. J. Rinkes. *Rec. trav. chim.* **49**, 1118–25(1930).—2-Methylfuran was prepd. according to the method of Wolff-Kischner (*Ann.* **394**, 86(1912), cf. Reichstein, *C. A.* **24**, 3781) and nitrated according to Marquis (*Ann. chim. phys.* [8], **4**, 196(1905)) with Ac_2O-HNO_3 at —5°. The reaction product is poured out on ice dild. with water and the intermediate product, $O_2NC(OAc):CHCH:C(OH)Me$, is extd. with ether. After evapn. of the ether, the furan ring is closed again by the addn of an equal vol. of pyridine, which is added gradually. On distg. the reaction product with steam, first oil drops are obtained which solidify on cooling and which may be recrystd. from petroleum ether; solidification point 43.5°; b_{12} 104°. This compd. has a smell like *p*-nitrotoluene and is the furan analog of this substance, the *2-methyl-5-nitrofuran*. During the last part of the distn. with steam an oily compd. is obtained, which only solidifies after about a day and which, by recrystn. from EtOH, is obtained in the form of octahedric crystals, m. 77–8°. This compd. is the *1-methyl-2,4-dinitro-1,3-butadiene-1,4-diol monoacetate*, $O_2NC(OAc):CHC(NO_2):C(OH)Me$, which, with pyridine, does not undergo a ring closure, probably because of a hindering influence of the 2nd nitro group. *2-Methyl-5-formylfuran* was prepd. according to Middendorp (*C. A.* **13**, 2344; cf. Fenton, *J. Chem. Soc.* **79**, 807(1901)) and was oxidized to *2-methylfuran-5-carboxylic acid*, m. 108–9°, by means of Ag_2O; the *Me ester*, b_{15} 98°, was obtained by esterification of the acid at room temp. during 2–3 days with MeOH satd. with HCl. On nitration with Ac_2O and HNO_3, *Me 2-methyl-3-nitrofuran-5-*

carboxylate, m. 81°, is obtained at once without treatment of the reaction product with pyridine; it may be isolated by distn. with steam. The nitration of the CO_2H acid itself chiefly leads to the formation of the same nitro deriv. which is formed by the nitration of 2-methylfuran. Thus the nitro group replaces the CO_2H group, a process which takes place with remarkable ease; it takes place much more easily in the furan ring than in the benzene ring, the nitration of *p*-toluic acid only giving 2-nitro-*p*-toluic acid. The same replacement of the CO_2H group takes place in the nitration of nitropyromucic acid to dinitrofuran (Marquis, *loc. cit.* 254). The formation of 2-methyl-5-nitrofuran in the nitration of 2-methylfuran-5-carboxylic acid also proves the position of the nitro group in the nitration product of 2-methylfuran. The 2nd product formed in the nitration of the 5-CO_2H acid, which is not volatile with steam, was obtained in needles, m. 159–60°, and consists of *2-methyl-3-nitrofuran-5-carboxylic acid*. 3-Methylfuran-2-carboxylic acid was prepd. from Elsholtzia ketone according to Asahina (*C. A.* **19**, 1139); on nitration this compd affords *2-nitro-3-methylfuran*, m. 32.6° and volatile with steam, the CO_2H group being again replaced by the nitro group, together with a non-volatile compd. m. 195°, which still contains the CO_2H group, but has not yet been investigated further. Most probably this compd. consists of a nitromethylfurancarboxylic acid. II. *Ibid* 1169–71.—According to Marquis (*Ann. chim. phys.* [8], **4**, 227(1905)) the nitration of furan gives 3-nitrofuran and a dinitro compd., m. 101.5°, with one of the NO_2 groups in the 3-position. This dinitrofuran was, however, identical with the 2,5-dinitrofuran prepd. by Hill and White (*Am. Chem. J.* **27**, 193(1902)) by nitration of 5-nitropyromucic acid, the latter being obtained by nitration of 5-sulfopyromucic acid or dehydromucic acid (Klinkhardt, *J. prakt. Chem.* **25**, 51(1882)). It thus follows that the mononitro compd. obtained by M. is the 2-nitrofuran. All substitutions in the furan ring take place at the *o*-position with respect to the indifferent O atom; if this position is occupied by a group which is readily displaced, a displacement takes place while in the case of a group which cannot be displaced (*e. g.*, the Me group), the substitution takes place at the 5-C atom. According to Reichstein (*C. A.* **24**, 3781) the aldehyde group is also introduced into furan in the 2-position with the formation of furfural while the same reaction with 2-methylfuran gives 2-methyl-5-formylfuran. It is now shown that the nitration of pyromucic acid with Ac_2O and HNO_3 (d. 1.51) at −10° gives a mixt. of about equal amounts of 2-nitrofuran, m. 27.9°, which was identical with the direct nitration product of furan itself, and of 5-nitropyromucic acid, m. 183°. The yield was, however, small, only 2.5 and 3.8 g. of these compds. being obtained from 50 g. pyromucic acid. The products of the reaction could be sepd. by distn. with steam, the 2-nitrofuran being volatile and the nitropyromucic acid remaining behind.

C. F. VAN DUIN

Synthesis of some new compounds in the pyrrole and pyrrolidine series. LYMAN C. CRAIG AND R. M. HIXON. *J. Am. Chem. Soc.* **53**, 187–90(1931); cf. *C. A.* **24**, 1374.—*N*-Butylpyrrole (I) was prepd according to Reichstein (*C. A.* **21**, 2451), except that mucic acid was used; 60 g. $BuNH_2$ give 13.5 g. I, b. 165–80°, and *N*-butylpyrrole-α-butylcarboxamide, m. 57° (R. terms this the α-isobutylamide); hydrolysis of 10 g. with 8 g. KOH in 4 cc. 95% EtOH by heating 10 hrs. at 200° gives the free *acid*, whose *amide* m. 108°. *N*-Substituted pyrroles can be catalytically reduced easily to the corresponding pyrrolidine compds. in EtOH-HCl soln. This method of prepn. is to be preferred over that of condensation of RX with pyrrolidine as the yields are often low by the latter method due to formation of the quaternary derivs. Reduction of I gives 88% of *N*-butylpyrrolidine; the picrate m. 124°; *chloroaurate*, yellow, m. 78°. Cl-$(CH_2)_4$Cl (5 g.) and 12.6 g *p*-toluidine give 4.5 g. *N-p-tolylpyrrolidine*, b_8 120°, m. 42.5°; *chloroplatinate*, decomps. 175°. *N*-Benzylpyrrolidine results in only 40% yield from $PhCH_2Cl$ and pyrrolidine (Schlinck, *Ber.* **32**, 952(1899), reports a quant. yield).

C. J. WEST

The catalytic dehydrogenation of pyrrolidine. J. P. WIBAUT, MISS C. C. MOLSTER, H. KAUFFMANN AND MISS A. M. LENSSEN. *Rec. trav. chim.* **49**, 1127–30(1930).—Wibaut and Overhoff (*C. A.* **23**, 148) have shown that nicotine may be dehydrogenated to 3,2′-nicotyrine by means of Pt-asbestos at 320°. Also with simpler pyrrolidine compds. this reaction takes place; Zelinskii and Yur'ev (*C. A.* **24**, 1110) have shown that *N*-methylpyrrolidine is dehydrogenated to *N*-methylpyrrole by means of Pd-asbestos at 250°. According to Z. and I. pyrrolidine behaves differently, but it is now shown that pyrrolidine may be dehydrogenated just as well by means of a suitable catalyst. The reaction product obtained by slow dehydrogenation of pyrrolidine with Pt-asbestos at 360° was fractionated and the presence of pyrrole in the higher-boiling fraction could be demonstrated by the formation of an azo dyestuff with PhN_2Cl according to Fischer and Hepp (*Ber.* **19**, 2251(1886)) which is characterized by a color change

in alk. soln. With Pd-asbestos at 335–60° a reaction product was obtained which showed the presence of pyrrole by the formation of a blue dyestuff with isatin according to Meyer (*Ber.* **16**, 2974(1883); **17**, 1034(1884); cf. Ciamician and Silber, *Ber.* **17**, 142(1884)). The presence of unchanged pyrrolidine in the reaction product could be shown by the formation of pyrrolidine picrate, m. 112°. It thus follows that the catalytic hydrogenation of pyrrole is a reversible reaction. C. F. VAN DUIN

The use of *sym*-dichloroacetone for the preparation of thiazoles. III. C. M. SUTER AND T. B. JOHNSON. *Rec. trav. chim.* **49**, 1066–8(1930).—$CO(CH_2Cl)_2$ was found to react easily with thioamides; the reaction can be formulated easily by taking the dichloroacetone in the enolic and the thioamides in the imide form; particulars of the reaction are not given, only the solvent used being mentioned. The following compds. are described: *4-chloromethyl-2-phenylthiazole* (I), m. 51°; *4-chloromethyl-2-p-methoxyphenylthiazole* (II), m. 55–6°; *4-chloromethyl-2-piperonylthiazole* (III), m. 106–7°; *2-phenylthiazole-4-acetonitrile* (IV), b_4 180–5°; *2-phenylthiazole-4-acetic acid* (V), m. 90°; *HCl salt*, m. 206–7°; *4-phthalimidomethyl-2-phenylthiazole* (VI), m. 151–2°; *2-phenylthiazole-4-methylamine* (VII); mono-HCl salt, 188–9°; di-HCl salt, m. 217–8°; *2-p-methoxyphenylthiazole-4-acetonitrile* (VIII), m. 75°; *4-phthalimidomethyl-2-p-methoxyphenylthiazole* (IX), m. 186–7°; *2-p-methoxyphenylthiazole-4-methylamine* (X); di-HCl salt, m. 224–5°; *di(2-phenylthiazole-4-methyl)amine* (XI); di-HCl salt, m. 190°; *2-p-hydroxyphenylthiazole-4-methylamine* (XII), m. 205–6°. The compds. VII and XI are formed by the action of NH_3 on I in alc., the primary and the secondary amine being formed simultaneously, the first being the chief product of the reaction. This compd. is, however, obtained easily in a pure state by the action of the halide I with K phthalimide and decompn. of the reaction product with acids. The reactivity of the halogen atom in compds. of the type I is about that of the Cl atom in $PhCH_2Cl$. The compds. VII, XI and XII show a marked physiol. activity, the nature of which, however, is not indicated C. F. VAN DUIN

1-Thio-γ-pyrone and derivatives. F. ARNDT AND NADJI BEKIR (WITH W. PARTALE) *Ber.* **63B**, 2393–7(1930).—*1-Thio-γ-pyrone* (I) (0.4–0.7 g. from 2 g. penthianone (II) in 8 cc. cold C_6H_6, treated with 11 g. PCl_5, then after 15 min. refluxed until no more HCl is evolved (30–40 min.), rapidly filtered, at once added to 50 g. ice, treated with excess of pptd. $CaCO_3$, filtered, satd. with NaCl and extd. repeatedly with $CHCl_3$, m. 110°, sol. without color in concd. H_2SO_4. Unlike II, it is easily sol. in H_2O, again pointing to the betaine-like nature of the pyrone system (with no acidic substituents). The *HCl salt*, m. around 135°, is stable; *$HgCl_2$ addn. compd.*, m. 189°; *ferrocyanide*, difficultly sol. light green crystals. II is readily oxidized in AcOH by H_2O_2 to the *sulfone* (2 g. from 5 g. II), m. 171–2°, almost insol. in concd. H_2SO_4; *3,5-dibromo deriv.* (III), obtained with Br in AcOH, m. 220° (decompn.). I, on the other hand, offers great resistance to oxidation; long continued treatment with H_2O_2 results in the splitting off of H_2SO_4. The *sulfone*, light yellow, m. 174°, is obtained, however, by boiling III a short time with C_5H_5N; it is sol. in concd. H_2SO_4 with light yellow color and is immediately decompd. with a violet color by dil. alkali. Although the structure of Apitzsch's di-Et2,6-dithiol-1-thiopyrone-2,5-dicarboxylates, obtained from substituted acetones and CS_2, was established by their compn. and the identification of the side chains, it seemed desirable to show directly the presence in them of the thiopyrone system by means of the characteristic properties of the latter. 2,6-Dimethylmercapto-1-thiopyrone-3,5-dicarboxylic acid, from the di-Et ester through the mono-Et ester (m. 176°) by refluxing in concd. HCl, m. 243–5° (decompn.) (A. gives 230°); heated at 245° until the evolution of gas ceased, it yielded *2,6-dimethylmercapto-1-thiopyrone* (IV), m. 130–1°, which already shows great similarity to the most characteristic of the γ-pyrones, *viz.*, 2,6-dimethylpyrone. It is much less sol. in H_2O, to be sure, but nevertheless it dissolves easily in even 2 *N* acid, *i. e.*, is pronouncedly basic. By oxidation only four O atoms can be introduced; the *product* m. 270°. As the S atoms in the side chains are undoubtedly oxidized to SO_2, it follows that the ring S is not oxidized. *2,6-Dimethylmercaptodithiopyrone*, from IV boiled in C_6H_6 with P_2S_5, yellow-brown, m. 121°, sol. in concd. acids with yellow color. C. MARTIUS from $MeCHClCH_2CO_2H$ readily obtained *Me 2,6-dimethylpenthianone-3-carboxylate*, m. 86°, and converted it with H_2O at 175° into *2,6-dimethylpenthianone*, m. 38.5°, while at 210–20° he obtained a liquid *stereoisomer;* both, on dehydrogenation with Cl or SO_2Cl_2, gave *3-chloro-2,6-dimethyl-1-thiopyrone*, m. 96°, whereas PCl_5 gave only dark blue lakes. C. A. R.

The application of titanium trichloride to the reduction of the carbon-carbon double bond, flavones and flavanones. P. KARRER, Y. YEN AND I. REICHSTEIN. *Helv. Chim. Acta* **13**, 1308–19(1930); cf. *C. A.* **23**, 3227, 4480.—To ascertain the serviceability of $TiCl_3$ in reduction, expts. were carried out on simple unsatd. substances.

$PhCH:CHPh$, $Ph_2C:CH_2$ and $PhC:CPh$ resisted reduction whereas $PhCH:CHCO_2H$, $PhCH:CHCONH_2$ and $PhCH:CHAc$ were transformed to $PhCH_2CH_2CO_2H$, $PhCH_2CH_2CONH_2$ and $PhCH_2CH_2Ac$, resp. $PhCH:CHCH:CHCO_2H$ gave principally $PhCH_2CH:CHCH_2CO_2H$ and a smaller yield of $PhCH:CHCH_2CH_2CO_2H$. $TiCl_3$ would reduce neither $PhCH:CHCO_2Et$ nor $PrCH:CHCO_2H$. It appears that only such ethylenic double linkages which are next to CO groups are reduced by $TiCl_3$ in ammoniacal soln. The behavior of $TiCl_3$ in the reduction of the flavones is in sharp contrast with the above findings. Flavone (I) gave, in addn. to an unknown non-crystallizable compd., a small yield of a pinacol $[C_6H_4.O.CPh:CH.C(OH)]_2$ and 4'-methoxyflavone gave a similar pinacol in smaller yields. The reduction of various flavanones with $TiCl_3$ gave surprisingly good results. Flavanone (II) gave both forms of 4-hydroxyflavan: β-form m. 148–9°, α-form m. 120–0.5°, and traces of a pinacol (cf. *C. A.* **17**, 108), whereas only the α-form is given on reduction with Al-Hg. 6-Chloroflavanone and 4'methoxyflavanone (III) gave the corresponding 4-hydroxyflavans in 1 form only. It was found that the prepns. of I, II and III were best effected by the method of Lowenbein (cf. *C. A.* **19**, 286). The reduction of quercetinol penta-Me ether with $TiCl_3$ gave pentamethylcyanidin (cf. *C. A.* **19**, 1141; **23**, 148). C. R. ADDINALL

Derivatives of pyridine. A. BINZ AND C. RÄTH. VIII. **Isomerism of derivatives of 2-hydroxypyridine.** C. RÄTH. *Ann.* **484**, 52–64(1930); cf. *C. A.* **24**, 4038.—The *Ag salt*, yellow, of 2-hydroxy-5-nitropyridine (I), with MeI in boiling MeOH for 8 hrs., gives 15.6% of *2-methoxy-5-nitropyridine* (II), m. 108–9°, and 60% of *N-methyl-5-nitro-2-pyridone* (III), m. 175°. 2-Iodo-5-nitropyridine and MeONa in abs. MeOH give 33.8% of II but no III. After heating II with PCl_5 at 140–50° for 4 hrs., 30% II was recovered but the residue was a resinous mass; attempts to rearrange II into III by heating at 150–200°, with or without H_2O, failed. The K salt (IV) of I, crystg. with 2 H_2O, and MeI in 96% EtOH, heated 1.5 hrs., give 0.8% II and 83% III; III was also obtained in 81.8% yield with Me_2SO_4. Heating 7.7 g. III with 12 g. BrCN at 180° in a bomb tube gives the *3-Br deriv.*, m. 124–5°. Reduction of II with $SnCl_2$ and HCl in dry Et_2O gives *2-methoxy-5-aminopyridine*, yellow, m. 135–6°; the colorless di-HCl salt gradually turns brown to black. Reduction of III with Sn and 33% HCl gives a small yield of *N-methyl-5-amino-2-pyridone*, m. 125–6° (decompn.). The Ag salt of I and EtI give 34.3% of *2-ethoxy-5-nitropyridine*, m. 91–2°, and 40% of *N-ethyl-5-nitro-2-pyridone*, m. 142–3°, also obtained in 76.3% yield from IV and EtI in EtOH. The Ag salt of I and $PhCH_2I$ give 21.7% of *2-benzyloxy-5-nitropyridine*, m. 107–8°, while IV and $PhCH_2Cl$ give 87.5% of *N-benzyl-5-nitro-2-pyridone*, dark yellow, m. 105–6°. IV and PrI give 67.8% of the *N-Pr deriv.*, m. 76–7°; iso-PrI gives 52% of the *N-iso-Pr deriv.*, yellow, m. 86–90°; BuI gives 66.8% of the *N-Bu deriv.*, m. 46–7°. The *Ag salt* of 2-hydroxy-5-iodopyridine (V), pale yellow, and MeI in MeOH give 13.9% of *2-methoxy-5-iodopyridine*, pale yellow oil, b_{15} 109–10° (*HCl salt*, m. 145–50° (decompn.)); the base is very unstable; the K salt of V and MeI in KOH give 80% of *N-methyl-5-iodo-2-pyridone*, yellow, m. 73–4° (*HCl salt*, m. 130° (decompn.)); *N-Et deriv.*, m. 75–6° (64% yield) (*HCl salt*); *N-Pr deriv.*, b_{16} 185–8° (74.2% yield) (*HCl salt*, m. 112° (decompn.)); *N-iso-Pr deriv.*, pale yellow, m. 110–1° (60% yield); *N-Bu deriv.*, b_{12} 185° (32.7% yield) (*HCl salt*, m. 125° (decompn.)); *N-octyl deriv.*, b_{14} 221–2° (49.1 yield) (*HCl salt*, m. 85° (decompn.)); *N-benzyl deriv.*, m. 100–1° (42.5% yield). C. J. WEST

Catalytic reduction of α-picoline to pipecoline. P. BORISOV. *Ber.* **63B**, 2278 (1930); cf. Zelinskii and B., *C. A.* **18**, 2167.—α-Picoline, b_{761} 128.5–9.5°, n_{18} 1.5034 (35 g.) was passed at the rate of 10 drops per min. over 29% Pd-asbestos in a 70-cm. quartz tube at 160°. After 2 treatments the n had fallen to 1.4520, and after fractionation, another hydrogenation and a 2nd distn. there was obtained 28 g. pipecoline, b_{747} 117–8°, n_{18} 1.4492, $d_4^{18.5}$ 0.844, mol. refraction 31.47. C. A. R.

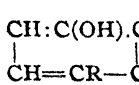
Quinoline derivatives. XIII. Degradation of 6-methoxyquinoline-4-carboxylic acid. HANNS JOHN AND EMIL ANDRASCHKO. *J. prakt. Chem.* **128**, 180–9(1930); cf. *C. A.* **24**, 4039.—6-Methoxyquinoline-4-carboxylic acid gives a *Me ester*, m. 84°, and an Et ester, m. 69°. The Et ester and $N_2H_4.H_2O$, heated 40 hrs., give the *hydrazide*, m. 151°; picrate, m. 205°; *isopropylidene deriv.*, $MeOC_9H_6NCONHN:CMe_2$, m. 134°; *methylbenzylidene deriv.*, m. 201°; *p-dimethylaminobenzylidene deriv.*, m. 132°. The azide, yellow, decomps. 106°, gives with EtOH the *6-methoxy-4-quinolylurethan* (I), m. 170°, and on warming in C_6H_6 the *isocyanate*, $MeOC_9H_6NNCO$, m. 171° (decompn.), which is not changed by warming with 30% EtOH-KOH for 10 hrs. on the H_2O bath. The azide, boiled in H_2O until soln. results, gives *N,N'-bis(6-methoxy-4-quinolyl)urea*, m. 205°, soly. in H_2O at room temp., 2.6%; various salts are qualitatively described. I and concd. HCl, gently boiled 4 hrs., give 6-methoxy-4-aminoquinoline, m. 120°. the HCl

salt m. 249°; the picrate m. 192° (decompn.); other salts are qualitatively described; *di-Ac deriv.*, m. 242°. **XIV. Derivatives of quininic acid and xanthoquinic acid.** *Ibid* 190–200.—6-Methoxyquinoline-4-carboxyl chloride-HCl, decompg. 186°, and $ClCH_2CH_2OH$, heated 8 hrs. at 110–2°, give *β-chloroethyl 6-methoxyquinoline-4-carboxylate*, m. 71°; $H_2NCH_2CH_2OH$ gives *6-methoxy-4-quinolylaminoethanol*, m. 143°; $C_6H_4(NH_2)_2$ gives *N,N'-bis(6-methoxy-4-quinolyl)ethylenediamine*, m. 269°. 6-Methoxyquinoline-4-carboxylic acid and HI (d. 2.0), heated 5 hrs. to gentle boiling, give 6-hydroxyquinoline-4-carboxylic acid (I), m. 320° (decompn.); a large no. of metallic salts are qualitatively described; the *acid chloride* m. 158° (decompn.); the *amide* m. 264°; the *diethylamide* m. 119°; the *β-chloroethyl ester* m. 150°. *6-Ethoxyquinoline-4-carboxylic acid*, m. 278°, results from the Et ester of I and EtI with EtOH-KOH; various metallic salts were prepd.; *Me ester*, yellow, m. 58°. **XV. 6-Hydroxy-4-aminoquinoline.** *Ibid* 201–10.—6-Hydroxyquinoline-4-carboxylic acid yields a *Me ester*, m. 212°; an *Et ester*, yellow, m. 185.5°; a *Pr ester*, pale yellow, m. 130°, and an *iso-Pr ester*, pale yellow, m. 157°. The hydrazide m. 244°; *isopropylidene deriv.* does not m. 300°; *methylbenzylidene deriv.* m. 276°. The azide, decomps. 115°, gives with EtOH *6-hydroxy-4-quinolylurethan* (I), m. 236° (decompn.); with C_6H_6 the *isocyanate* (II), light brown, m. 178°; and with H_2O *N,N'-bis(6-hydroxy-4-quinolyl)urea*, pale yellow, m. 253°. I with concd. HCl or II with 30% EtOH-KOH gives *6-hydroxy-4-aminoquinoline*, m. 264°; soly. in H_2O at room temp. 2%; concd. H_2SO_4 gives a pale yellow soln. with a yellow-blue fluorescence; $NaNO_3$ gives a carmine-red soln., HNO_3 a brick-red soln. **XVI. 6-Substituted 4-halogenoquinolines.** *Ibid* 211–7.—Through the diazo reaction 6-hydroxy-4-aminoquinoline gives the *4-Cl deriv.*, m. 210°; the *4-Br deriv.*, pale yellow, m. 253°; and the *4-I deriv.*, pale yellow, m. 283°. Similarly, 6-methoxy-4-aminoquinoline yields the *4-Br deriv.*, m. 106°, and the *4-I deriv.*, m. 85°. The behavior of these compds. with various reagents is qualitatively described. **XVII. 6-Methoxy-4-hydrazinoquinoline, 6-methoxy-4-mercaptoquinoline, 6-methoxyquinoline-4-sulfonic acid.** *Ibid* 218–22.—6-Methoxy-4-chloroquinoline (I) and 100% $N_2H_4.H_2O$, heated 8 hrs. on the H_2O bath, give the *4-hydrazino deriv.*, m. 154°; this gives a *condensation product* with *p*-MeC_6H_4COMe, $MeOC_9H_5NNHN:CMeC_6H_4Me$, m. 105°. I and KSH in abs. EtOH, heated in a sealed tube 15 hrs. at 100°, give the *4-mercapto deriv.*, red, m. 139° I and $NaHSO_3$ in H_2O, heated 20–5 hrs., give *6-methoxyquinoline-4-sulfonic acid*, pale yellow, m. 292° (decompn.); various salts are qualitatively described. **XVIII. Chitenine.** *Ibid* 223–8.—Oxidation of quinine with $KMnO_4$ gives chitenine (I) (Skraup, *Ber.* **12**, 1104(1879)); $SOCl_2$ gives the *chloride*, $C_{19}H_{21}O_2N_2Cl$, m. 206°; MeOH gives the *Me ester*, m. 217°, also obtained from I, MeOH and H_2SO_4; *Et ester*, m. 198°; *hydrazide*, m. 236° (*benzylidene deriv.*, m. 179°; *methylbenzylidene deriv.*, m. 223°). *N,N'-Bischitenylurea*, m. 154°; *picrate*, m. 185°. C. J. WEST

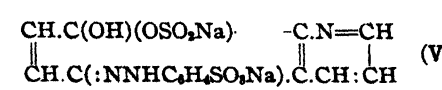
Synthesis of quinoline derivatives. VI. Preparation of certain acylamino derivatives of 8-hydroxyquinoline. KONOMU MATSUMURA AND CHUSABURO SONE. *J. Am Chem. Soc.* 53, 177–9(1931).—The following derivs. of 8-hydroxyquinoline are reported: *5-acetamido* (I), m. 218–9° (*acid sulfate*, yellow, m. 263° (decompn.); the *7-I deriv.* of I, m. 212° (*HCl salt*, yellow, m. 196° (decompn.)); *7-acetamido-5-methyl* (II), pale yellow, m. 203–4° (*sulfate*, yellow, m. 180°); the 8-Ac deriv. of II, m. 222° (*acid sulfate*, yellow, m. 183°); *7-amino-5-methyl*, yellow, m. 141–2° (*picrate*, red, decomps. 215–20°); *5-benzoylamino*, m. 237–8° (*acid sulfate*, yellow, m. 225–7° (decompn.)); *7-benzoylamino-5-methyl-8-benzoyl deriv.*, m. 181°. *5-Acetamido-6-hydroxyquinoline*, m. 278° (decompn.) (*acid sulfate*). *5-Methyl-8-methoxyquinoline*, viscous yellow oil, b_{775} 298–302° *picrate*, yellow, m. 180–1°; *chloroplatinate*, yellow, m. 224° (decompn.). C. J. WEST

Action of sulfurous acid and its salts on quinoline derivatives (preliminary communication). N. N. VOROSHZOV AND I. M. KOGAN. *Ber.* **63B**, 2354–62(1930).—The colorless *o*-hydroxyquinoline (I, R = H) with $NaHSO_3$ gives yellow crystals (II) decompg. in their dark yellow aq. soln. on heating with evolution of SO_2 and regeneration of I. They show the same instability toward weak alkalies or mineral acids and have the compn. $C_9H_7O_2NS$, of a 1:1 *addn. product* of I and SO_2. The color change in the formation of II indicates that the quinoline nucleus plays the chief role in the reaction, and as a matter of fact an analogous *compd.* $C_9H_7O_3NS$ (III) is obtained from quinoline warmed with aq. SO_2 or $NaHSO_3$. Likewise benzeneazo-*o*-hydroxyquinoline (IV) (I, R = PhN:N) yields orange crystals (V) which have not as yet been obtained in analytically pure form, but the color change yellow IV ⟶ orange V and the properties of V indicate that V is analogous to II and III. The yellow *p*-SO_3H deriv. (VI) (I, R = $HO_3SC_6H_4N:N$) of IV, however, reacts quite differently with $NaHSO_3$. Like the corresponding α-naphthol compd., it forms a $NaHSO_3$ instead of a SO_2 *addn. product*, presumably VII, which is dark red; it decomps. into its components in H_2O and in the

presence of $NaHCO_3$, while acids, even in minimal amts., hinder the decompn. **III**, m. 80–1°. **II** m. 127–9°. **IV**, from I in cold NaOH-Na_2CO_3 soln. added to diazotized $PhNH_2$ in HCl, m. 187° (Fox, *C. A.* **4**, 3075, gives 171°). The decompn. of **VII** in H_2O increases with increasing diln. (the % of total SO_2 which is titratable with 0.01 *N* I after 6 hrs. at 25° increases from 1.88 in a 0.02 *N* soln. of **VII** to 14.0 in the same soln. dild. 100-fold) and with increasing concn. of $NaHCO_3$ (from 6.4% in a 0.0016 *N* soln. of **VII** after 6 hrs. at 25° with 0.01 mol. $NaHCO_3$ to 69.7% with 2.50 mols.). With 0.01 to 5.00 mols. HCl in a 0.004 *N* soln. of **VII** kept 6 hrs. at 25°, the decompn. ranged from 3.6 to 2.6%.



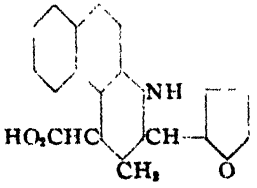
(I)



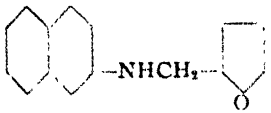
(VII)

C. A. R.

The Doebner reaction. X. L. Musajo. *Gazz. chim. ital.* **60**, 673–7(1930); *C. A.* **24**, 1863.—In the present paper the reaction of furfural (I), β-$C_{10}H_7NH_2$ (II) and $AcCO_2H$ (III) was studied. Alc. I (19.2 g. in 150 cc.), added to hot alc. II (28.6 g. in 550 cc.), brought to boiling, alc. III (17.6 g. in 80 cc.) added, boiled 3 hrs., let stand 48 hrs., and filtered and washed with EtOH, leaves a residue which, purified by soln. in alc. KOH and repptn. with AcOH, gives 53% of α-furyl-β-naphthocinchoninic acid (IV), m. 278° (cf. Doebner, *Ber.* **27**, 2028). With 2 mols. of I and 2 mols. of II per mol. of III, the yield of IV is 80–1%. *Cu salt*, $(C_{18}H_{10}O_3N)_2Cu.1.5H_2O$, prepd. by double decompn. of the Na salt and $Cu(OAc)_2$. The filtrate from the prepn. of IV was then analyzed for secondary products. This alc. filtrate and alc. wash liquors (a total of approx. 900 cc.) concd. to 0.25 of their vol., dild. with water to a little more than the original vol., 10% aq. Na_2CO_3 (200 cc.) added, heated a short time on a water bath, cooled and extd. with Et_2O, yields 2 liquids, an aq. alk. soln. (*A*) and an Et_2O soln. (*B*). Soln. *A*, freed of Et_2O by an air current, acidified with AcOH, filtered and the residue recrystd. repeatedly from EtOH, yields 35–40% of *py-tetrahydro-α-furyl-β-naphthocinchoninic acid* (V), m. 200°. It is the 4th tetrahydrogenated cinchoninic acid synthesized by Ciusa and his collaborators in work on the Doebner reaction. An aq. suspension of V, dissolved by addn. of KOH, cold aq. $KMnO_4$ (1 g.) added slowly, heated gently, filtered, washed, the filtrate acidified with AcOH, the ppt. washed with EtOH and purified by soln. in alc. KOH and repptn. with AcOH, yields **IV**. Though phenylnaphthocinchoninic acid and Hg-Na yield the same tetrahydrogenated acid as is obtained from the reaction of BzH, II and III (cf. Ciusa and Barattini, *C. A.* **20**, 2331), the reaction proceeds otherwise in the reaction of Na-Hg and **IV**. The product is an unidentified *acid*, m. 240°, which will be described more fully in a later paper. Soln. *B*, filtered, evapd., the residual oil dissolved in a little EtOH, filtered, the filtrate extd. repeatedly with benzine, the ext. concd. by warming and the last part of the benzine removed by spontaneous evapn., the residual oil dissolved in Et_2O, dried with Na_2SO_4, evapd., kept *in vacuo* (no tendency to crystallize), and distd. *in vacuo*, yields *α-furylmethyl-β-naphthylamine* (VI), oil, b_{16} 225–30°, does not readily form salts. Alc. VI, acidified with dil. H_2SO_4, aq. $NaNO_2$ added cautiously, filtered, the residue washed with water (until I is no longer liberated from KI), and recrystd. from benzine, yields the *nitroso deriv.*, $C_{18}H_{12}O_2N_2$, of VI, m. 98°, gives the Liebermann reaction. With BzCl, VI forms an unidentified *substance*, m. 168°. With certain diazo compds., alc. VI gives violet dyes which are to be studied further.



(V)



(VI)

C. C. Davis

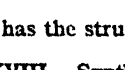
Dioximes. LXVII. M. Milone. *Gazz. chim. ital.* **60**, 632–43(1930); cf. Ponzio and Durio, *C. A.* **25**, 80.—Though crystallographic methods do not yet make it possible to correlate mol. structure, chem. properties and cryst. form, the crystallographic consts. of some glyoxime peroxides described in earlier publications, which are known in the form of 2 easily isolated isomers, were detd. in order to compare them with the crystallographic consts. of furazans (which differ from the peroxides only by 1 O atom and yet

whose constitution is still in doubt). It was impossible to measure the angles of phenylfurazan because of the high vapor pressure and the low m. p. However, its optical properties indicated that it belonged to the triclinic system. The following results were obtained: Methylphenylfuroxan (cf. *C. A.* **23**, 375), rhombic system, bipyramidal class, $a:b:c$ = 0.59179:1:0.79354. 4-Methyl-5-phenyl-1,2,3,6-dioxdiazine, Me-C:N.O.O.N:CPh (cf. *C. A.* **23**, 375), monoclinic, prismatic class, $a:b:c$ = 1.36827:1:-0.506001. Methyl-*p*-methoxyphenylfurazan, MeC:N.O.N:CC$_6$H$_4$OMe-*p* (cf. *C. A.* **23**, 3665), monoclinic system, prismatic class, $a:b:c$ = 1.6524:1:1.15384. Methyl-*p*-methoxyphenylfuroxan, MeC:N(:O).O.N:CC$_6$H$_4$OMe (cf. *C. A.* **23**, 375), monoclinic system, prismatic class, $a:b:c$ = 1.76427:1:1.52736. 4-Methyl-5-*p*-methoxyphenyl-1,2,3,6-dioxdiazine, MeC:N.O.O.N:CC$_6$H$_4$OMe-*p* (cf. *C. A.* **23**, 375; **24**, 845), triclinic system, pinacoidal class, $a:b:c$ = 1.299:1:0.9539. Diphenylfurazan, PhC:N.O.N:CPh (cf. *Ber.* **22**, 715(1889), rhombic system, rhombic bipyramidal class, $a:b:c$ = 0.81644:1:-0.27766. Diphenylperoxide (4,5-diphenyl-1,2,3,6-dioxydiazine), PhC:N.O.O.N:CPh (cf. *Gazz. chim. ital.* **36**, ii, 103(1906)), monoclinic system, prismatic class, $a:b:c$ = 2.-4803:1:1.0698. α-Phenylperoxide (phenylhydroxyiminoacetic acid nitrile oxide), PhC(:NOH)CNO (cf. *C. A.* **17**, 2268, 3875, 3876), triclinic system, pinacoidal class, $a:b:c$ = 1.7463:1:0.66613. β-Phenylperoxide (5-phenyl-1,2,3,6-dioxdiazine)(cf. *C. A.* **20**, 1085) triclinic system, pinacoidal class, $a:b:c$ = 1.5918:1:1.0314. The results confirm anew the structural formulas previously assigned to the various pairs of isomeric peroxides (cf. *C. A.* **17**, 3875, 3876; **18**, 1491; **20**, 1085; **21**, 1976). The 2 peroxides obtained by dehydrogenation of the asym. glyoximes ArC(:NOH)C(:NOH)Me crystallize in different systems. In the series in which it was possible to measure all the members (the 2 peroxides and the corresponding furazan) only 1 of the 2 peroxides is isomorphous with the furazan (monoclinic), *viz.*, the one to which has been assigned the furoxan (furazan oxide) structure. The similarity in the cryst. forms would accordingly depend upon the presence in each compd. of the penta-atomic ring C_2N_2O characteristic of furazans. On the contrary, the other peroxide crystallizes in the triclinic system, though having a habitus similar to that of the corresponding furoxan and furazan, probably because of the presence of the same lateral chains in the 2 compds. The furazans and furoxans crystallize in systems of higher symmetry than do the corresponding dioxdiazines. Since diphenylfurazan is rhombic and diphenyl peroxide is monoclinic, the latter should have a dioxdiazine structure, and this conforms to all its methods of formation. In the monosubstituted deriv. series, the 2 peroxides crystallize in the triclinic system and have similar angles between axes. However, the orientation of the faces is different so that the parametric ratios differ. Evidently in this series the great asymmetry and the disproportion between the lateral chains is such that the compn. and the orientation of the mol. nucleus has little influence on the formation of the cryst. lattice. The crystallographic data follow:

	Furazans RC:N.O.N:CR′		Furoxans RC:N(:O).O.N:CR′	Dioxdiazines RC:N.O.O.N:CR′
R = Me; R′ = Ph	...		rhombic	monoclinic
R = Me; R′ = C$_6$H$_4$OMe	monoclinic	(isomorphous)	monoclinic	triclinic
R = Ph; R′ = Ph	rhombic		...	monoclinic
R = H; R′ = Ph	...		...	triclinic

The data confirm and complete the f.-p. detns., which established the formation of solid solns. between furazans and furoxans and not between dioxdiazines and furazans, and thus showed that only furazans and furoxans show similar structures. C. C. Davis

Relation of quinoxaline to the ammonia system. F. W. BERGSTROM AND R. A. OGG, JR. *J. Am. Chem. Soc.* **53**, 245–51(1931); cf. B. and McAllister, *C. A.* **24**, 4038.—The behavior of quinoxaline (I) as an ammonoglyoxal has been demonstrated by several new reactions. I adds 2 equivs. of $NaHSO_3$, giving the *compd.* $C_8H_6N_2.2NaHSO_3$, needles, decomps. on heating and gives with bases I and a neutral sulfite; acids cause evolution of SO_2. I reacts slowly with H_2SO_3, giving some H_2SO_4 and an amorphous blue solid which was not further investigated. I and PhMgBr give 70% of *dl*-1,2,3,4-tetrahydro-2,3-diphenylquinoxaline, m. 106°; MeMgI gives 50% of the corresponding 2,3-di-Me deriv. This method is suggested for the synthesis of other homologs. I (10 g.), 7 g. anhyd. HCN and 20 cc. abs. EtOH, heated 2 hrs. at 100°, give 30% of *1,2,3,4-tetrahydrodicyanoquinoxaline*, m. 168.5°, decomps. above 200°; *di-Ac deriv.*, m. 93.5°; attempts to sapon. the cyanide were unsuccessful. I is oxidized by $(NH_4)_2S_2O_8$ to 2,3-dihydroxyquinoxaline. Attempts to nitridize I in liquid NH_3 with I or NH_4N_3 were unsuccessful. I reacts with KNH_2, probably in the sense of the Cannizzaro reaction; less than 1 equiv. of KNH_2 gives a viscous, resinous substance; 2 or more equivs. gives fluorubin and a dark tarry substance. Pyrazine did not show any of the above reactions, although it may be considered as an ammonoglyoxal. C. J. WEST

Formation of a heterocyclic ring closed through mercury atoms. L. VECCHIOTTI. *Ber.* **63B**, 2275–6(1930); cf. *C. A.* **25**, 518.—*o*-$C_6H_4Br_2$ and 2% Na-Hg kept 5 hrs. at 120° in petroleum ether and a little AcOEt and filtered (nothing goes into soln.) yielded a magma consisting of metallic Hg, NaBr and a gray substance (I) which, when mechanically sepd. from the Hg, washed free of NaBr with hot H_2O and crystd. from cymene, gave microprisms which did not m. 300° and darkened slightly on warming. Their compn. corresponded to C_6H_4Hg and with boiling AcOH they gave C_6H_6 and *bis(acetoxymercuri)benzene*, does not m. 300°, converted by I-KI into *o*-$C_6H_4I_2$, m. 270°. V. concludes that I has the structure  C. A. R.

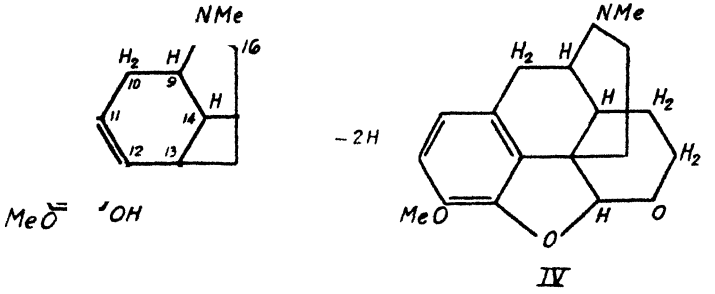
γ-Triazines. XVIII. Synthesis of *m*-tolyl-, *p*-tolyl- and benzyldiaminotriazine. A. OSTROGOVICH AND GH. GHEORGHIU. *Gazz. chim. ital.* **60**, 648–64(1930); cf. *C. A.* **24**, 5752.—In a preliminary paper (cf. O., *C. A.* **5**, 2099) a new synthesis of methyldiamino- and phenyldiamino-γ-triazine was described, which involved condensing $H_2NC(:NH)NHCN$ (I) with MeCN and PhCN, resp. The synthesis was not extended to other compds. sufficiently at the time for publication. In the present paper it includes the 4 isomers, *o*-MeC_6H_4CN (II), *m*-MeC_6H_4CN (III), *p*-MeC_6H_4CN (IV) and $PhCH_2CN$ (V). III, IV and V condense readily with I, as do MeCN and PhCN, whereas II formed no trace of the corresponding aryldiaminotriazine under various exptl. conditions tried. In this latter case, II always remained unaltered, and I was transformed into a mixt. of ammeline (diaminohydroxytriazine) (VI) and melamine (triaminotriazine) (VII), the proportions of VI and VII depending upon the conditions. The *picrate* of VI, $C_3H_4N_5O.C_6H_3N_3O_7.H_2O$ (VIII), was prepd. by dissolving VI in hot concd. aq. picric acid (IX) and cooling. To facilitate the soln. of VI in IX, a little $(CO_2H)_2$ may be added, with much better effect than HCl. VIII is golden yellow and m. 266°. It loses its H_2O of crystn. only when it is heated *in vacuo* over P_2O_5 at 140°. These results show that a Me group in the *o*-position to the CN group impedes the condensation with I and consequently the formation of the γ-triazine nucleus. I (2 g.), III (4 cc.) and EtOH (5 cc.), heated 4 hrs. at 220–5° in a sealed tube, dild. with C_6H_6, filtered, the residue dried, finely ground with 3 *N* NaOH, filtered, the residue washed with cold water and then with dil. EtOH, dissolved in hot dil. HCl, cooled, filtered, poured into a slight excess of 3 *N* NaOH, filtered, the residue washed with water and recrystd. from dil. EtOH (1:1) and then from EtOH, yield 18–20% of *m-tolyldiamino-γ-triazine*, *m*-MeC_6H_4-

$C:N.C(NH_2):N.C(NH_2):N$ (X), m. 239–40°. X, dissolved in boiling dil. HCl and cooled, yields the *HCl salt*, m. 265°. A slight excess of hot *N* H_2SO_4 added to X in a min. of dil. EtOH (1:1) and cooled yields the *H_2SO_4 salt* $(C_{10}H_{11}N_5)_2.H_2SO_4.2H_2O$, softens around 254°, m. 260°, loses its 2 H_2O when heated *in vacuo* at 100°. On cooling X and hot aq. IX or adding cold aq. IX to a cold, dil. soln. of a sol. salt of X ppts. the *picrate* of X, pale yellow, m. 267–8° (to a dark red liquid which evolves a gas). X in a min. of boiling glacial AcOH, cooled, ppts. the *diacetate* $C_{10}H_{11}N_5(AcOH)_2$ (XI), softens 130–40°, solidifies above this range and m. 230–2°. Hot aq. XI, let cool, yields *compds.* contg. less AcOH than IX and the compns. of which depend upon the concn. of the soln. of XI. A definite monoacetate could not be obtained. *In vacuo* over soda-lime, XI loses the greater part of its AcOH, *e. g.*, 2.05, 9.88 and 27.29% after 24 hrs., 60 hrs. and 10 days, resp. *In vacuo* at 100° over soda-lime, XI loses 36.87% in wt. after 2 days (37.37%

corresponds to 2AcOH). **X** (0.5 g.) and Ac_2O (15 cc.), warmed carefully until soln. is complete, filtered hot, cooled and the ppt. recrystd. twice from boiling AcOEt, yields *monoacetyl-m-tolyldiamino-γ-triazine*, $C_{10}H_{10}N_6C_2H_3O$ (**XII**), m. 248°. More is obtained (less pure) by evapn. *in vacuo* over soda-lime, or by distn. *in vacuo*, of the filtered liquid. **X**, warmed with Ac_2O (same proportions as in the prepn. of **XII**) and the soln. boiled 15–20 min. after **X** is dissolved, filtered hot, and the filtrate cooled and the ppt. recrystd. from boiling EtOAc, yields *diacetyl-m-tolyldiamino-γ-triazine*, $C_{10}H_9N_6(C_2H_3O)_2$, m. 232–3°. More is obtained by distn. of the filtrate *in vacuo*. I (2 g.), IV (4 cc.) and EtOH (5 cc.), under the same conditions as in the prepn. of **X**, except for the use of Et_2O instead of C_6H_6 in dissolving the reaction mixt., yield after purification from 50% EtOH 25% of *p-tolyldiamino-γ-triazine* (**XIII**), m. 240° (same as that of **X**, but a mixt. of **X** and **XIII** melts lower). The following salts of **XIII** were prepd. in the same way as those of **X**: *HCl salt*, m. 285°. *Sulfate*, $(C_{10}H_{11}N_6)_2.H_2SO_4.3H_2O$, m. 298°. *Picrate*, yellow, m. 269° (to a dark red liquid which decomps.). *Diacetate*, softens around 140°, then solidifies and m. 230–2°, *in vacuo* over soda-lime it loses its AcOH rapidly, *e. g.*, 16.35, 20.33 and 32.21% in 24 hrs., 60 hrs. and 10 days (cf. the rate loss of **XI**). *In vacuo* at 100° over soda-lime the loss is 37.10%. No monoacetate could be obtained. *Monoacetyl-p-tolyldiamino-γ-triazine*, prepd. like **XII**, m. 273–4°. *Diacetyl-p-tolyldiamino-γ-triazine*, prepd. as before, m. 264°. *Benzyldiamino-γ-triazine* (**XIV**) has been prepd. by Elzanowski (cf. *Diss. Fribourg* (Switzerland) 1898) but has not been described elsewhere since. The yield was low and the following method is much better (50% yield). I (2 g.), V (4 cc.) and EtOH (5 cc.), heated 8 hrs. in a sealed tube at 180–90°, Et_2O added, the solid product finely ground with 3 *N* NaOH or KOH (to eliminate most of the hydroxylated cyanuric bases, especially **VI**, which are always formed), filtered, the residue washed with water, dissolved in dil. HCl, filtered if necessary, the filtrate poured cautiously into 3 *N* NaOH, filtered, the residue washed with water and recrystd. from boiling EtOH, yields **XIV**, m. 238–9° (decompn.) (cf. 233° of Elzanowski). The cryst. form described by E. could not be obtained. The soly. of **XIV** in boiling EtOH or MeOH is approx. 2.2 g. in 100 cc. and in EtOH at 22° is 0.9 g. in 100 cc. Its solv. in boiling water is 0.26 g. in 100 cc. **XIV** forms *salts* when dissolved in acids. It is insol. in cold alkalies, but on prolonged boiling in concd. KOH it dissolves with evolution of 1 mol. of NH_3, and formation of *benzyliminoöxotriazine* (**XV**), called phenylacetoguanide by Elzanowski. **XV** will be described more fully in a later paper. The highest yield of **XIV** was 50%, though in earlier expts. yields up to 80–5% had been obtained. Moreover, in using the same method of synthesis to prep. some alkyldiaminotriazines (to be described in a later paper) a max. yield of only 25% of methyldiaminotriazine was obtained from I and MeCN, though in this particular case it had been prepd. before (cf. O., *C. A* 5, 2099) with yields of 55–6%. All this suggested that in the earlier work there was some impurity in the V and MeCN which catalyzed (accelerated) the condensations in the earlier expts. *HCl salt* (**XVI**) of **XIV**, m. 215°, is so sol. in water that its soln. must be evapd. nearly to dryness to cause crystn., but if fuming HCl is added slowly to its concd. aq. soln. it crystallizes. When **XVI** deposited in the presence of a great excess of HCl is recrystd. from water, slight hydrolysis occurs. When, however, **XVI** is dissolved in EtOH and is repptd. with Et_2O, pure **XVI** is obtained. The fact that pure **XVI** is obtained in the presence of a strong excess of HCl shows that in water a di-HCl salt does not exist, and therefore that under ordinary conditions the base is univalent. Attempts to prep. a di-HCl salt from dry HCl gas under various conditions resulted in failure. A mixt. of anhyd. Et_2O (2 vols.), abs. EtOH (1 vol.) and a little glacial AcOH added to cold **XIV** in a little concd. H_2SO_4, let stand with frequent agitation, ppts. a *sulfate* $C_{10}H_{11}N_6.H_2SO_4$, m. 193–203°; recrystd. from hot water it hydrolyzes to the *monosulfate* $(C_{10}H_{11}N_6)_2.H_2SO_4.2H_2O$ (**XVII**), heated *in vacuo* it loses its H_2O of crystn. at 100° and m. 178–83°. Attempts to prep it from **XIV** in 60–70% EtOH and *N* H_2SO_4 (calcd. quantity) gave a partially hydrolyzed *product* which contained less acid than corresponds to **XVII**. On the other hand, addn. of excess of *N* H_2SO_4 to **XIV** in dil. EtOH gives a salt which contains a little more acid than that which corresponds to **XVII**. When this is recrystd. from hot water, further loss of H_2SO_4 through hydrolysis occurs. In general, only with a certain quantity of H_2SO_4 in excess and at certain concns. is it possible to obtain **XVII**. *Picrate* of **XIV**, prepd. like those of **X** and **XIII**, except that it is necessary to add EtOH to facilitate the soln. of **XIV**, is pale yellow, m. 235° (blackening). *Diacetate* of **XIV**, prepd. like those of **X** and **XIII**, softens 130–40°, then solidifies and m. 230°; kept *in vacuo* at room temp. it loses 1 AcOH (28.47% loss in wt. after 24 hrs.), but the remaining AcOH is lost less readily than with the diacetates of **X** and **XIII** (29.48% loss in wt. after 84 hrs. and 29.86% after 10 days). After 2 days *in vacuo* at 100° over soda-lime it loses all AcOH. It hydrolyzes completely in water, and a mono-

acetate could not be obtained. The behavior of the various salts of XIV show that XIV is a little less basic than X and XIII. XIV (1 g.) and Ac_2O (15 cc. of freshly distd.), refluxed until the liquid becomes a cryst. mass, cooled immediately, filtered, the solid washed with AcOEt, and recrystd. from EtOH, yields *monoacetylbenzyldiamino-γ-triazine* (XVIII), m. 239–40°. If instead of stopping the heating as soon as the reaction liquid crystallizes, it is maintained at a gentle boil, the cryst. mass redissolves, and if the boiling is continued for 0.5 hr., the product is distd. *in vacuo* (to remove Ac_2O) and the residue is recrystd. from hot EtOAc, there is obtained *diacetylbenzyldiamino-γ-triazine* (XIX), m. 145°. The difference in the m. ps. of XVIII and XIX is noteworthy when compared with the relatively small differences among the corresponding derivs. of X and XIII. C. C. DAVIS

Partial syntheses in the morphine series. I. CLEMENS SCHÖPF AND THEO PFEIFER. *Ann.* **483**, 157–69(1930).—Dihydrothebainone (I) (35 g.) in 300 cc. AcOH treated with 16 g. Br in 150 cc. AcOH at 15° and the residue in 200 cc. H_2O treated with 35 g. KI, gives 43.5 g. of the *HI salt*, m. 215° (decompn.), of *1-bromodihydrothebainone* (II), m. 167°, crystals with 0.5 mol. AcOEt; *HBr salt*, m. 210–5° (decompn.); *oxime*, m. 178–80°. II also results by the reduction of *1-bromodihydrocodeinone* (III), m. 205–7°, with Zn and NH_4Cl in EtOH. III is formed in 75–80% yield by treating I with 2 mols. Br and treating the residue with 7 *N* KOH; from II.HBr in MeOH with Br and



IV

then treating the residue with KOH (80% yield); and by bromination of dihydrocodeinone (IV) in AcOH. Reduction of III in AcOH-AcONa with Pd and H gives quant. IV. While the formation of the phenol group from the O bridge has been accomplished before, this is the first time the reverse reaction has been carried out. In the same way there was prepd. *1-bromodihydrohydroxythebainone*, m. 190–1°; with Br and alkali this gives 75–80% of 1-bromodihydrohydrocodeinone, m. 181–4°; catalytic reduction gives dihydrohydroxycodeinone. 1-Bromosinomenine, m. 188–9° (Goto and Nambo, *C. A.* **24**, 4042), with Br and alkali, give 75% of 1-bromosinomeneine, m. 213° (this is the isobromosinomenine of G. and N.). C. J. WEST

Preparation and properties of dihydrometacodeinone. CLEMENS SCHÖPF AND HERTHA PERREY. *Ann.* **483**, 169–75(1930).—Dihydrometathebainone (thebainol) (I), brominated in MeOH at room temp. and then heated with excess alkali, gives *1-bromodihydrometacodeinone*, m. 241–6°. Catalytic reduction gives quant. *dihydrometacodeinone* (II), m. 196–201°; concd. H_2SO_4 gives a deep red soln.; *oxime*, m. 176–80°; if the oxime formation is carried out at 50°, there results also *metathebainone oxime*, m. 200–3°. II is reduced by Na-Hg to I. II, heated with concd. HCl at 100° for 1 hr. or with 2 *N* NaOH 3 hrs. under the reflux, gives metathebainone. C. J. WEST

Alkaloids of Berberis thunbergii, D. C. var. Maximowiczii, Franch. I. HEISABURO KONDO AND MASAO TOMITA. *Arch. Pharm.* **268**, 549–59(1030).—See *C. A.* **24**, 3512. W. O. E.

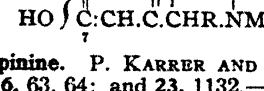
Optical rotation of certain cinchona alkaloids. R. DIETZEL AND K. SÖLLNER. *Arch. Pharm.* **268**, 629–36(1930).—The conclusions drawn from the findings obtained in the examn. of quinine, quinidine and cinchonine indicate that a rising content of acid (increase of p_H) is followed by an increase in the optical rotation, which reaches its max. value at a definite p_H. This value remains nearly const. with further addn. of H ion, but finally suffers a gradual fall. The max. optical rotation is reached before 1 acid equiv. is added to the monochloride soln., *i. e.*, before transition of the mono- to the dichloride. The quinoline *N* atom is ionized by the addn. of 1 acid equiv. to the alkaloidal monochloride soln., and parallel with this new ionization an increase in the optical rotation takes place. In certain analogy with these findings observations were made

on the tartrates, from which it appears that tartaric acid possesses in the form of its salts a higher [α] than in its free state; addn. of a strong acid to a tartrate soln. as well as to a soln. of tartaric acid causes diminution in the optical rotation. W. O. E.

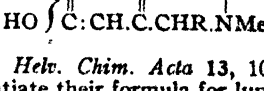
Preparation of certain brominated cinchophens. H. G. LINDWALL, J. BANDES AND I. WEINBERG. *J. Am. Chem. Soc.* **53**, 317–8(1931).—5,7-Dibromoisatin (I) is obtained in 80% yield by slowly adding 7.5 g. Br to 3 g. isatin (II) in 40 cc. hot 95% EtOH. II (15 g.), 22.5 g. *p*-BrC_6H_4Ac, 122 cc. EtOH and 60 cc. 33% KOH, refluxed 8 hrs. with stirring, give about 65% of *4'-2-bromo-phenylcinchoninic acid*, pale yellow, m. 239–40°. I and PhAc give the *6,8-di-Br deriv.*, pale yellow, m. 270–1°. I and *p*-$MeOC_6H_4Ac$ give *6,8-dibromo-2-phenyl-4'-methoxycinchoninic acid*, pale yellow, m. 263–4°. II and *p*-$MeOC_6H_4Ac$ give about 65% of 2-phenyl-4'-methoxycinchoninic acid, m. 216°. These Br derivs. will be studied physiologically. C. J. WEST

Neonicotine and isomeric pyridylpiperidines. C. R. SMITH. *J. Am. Chem. Soc.* **53**, 277–83(1931); cf. *C. A.* **18**, 2006.—Details are given for the isolation of *neonicotine* (*β-pyridyl-α-piperidine*) (I) from the reaction product of C_5H_5N, Na and O; I b_{775} 280–1° and yields a *picrate*, m. 213° (cor.); this is probably not identical with nicotimine, isolated by Pictet and Rotschky (*Ber.* **34**, 696(1901)) from the nicotine alkaloids. Reduction of I gives α,β-dipiperidyl, b. 269–70°. Reduction of α,β-dipyridyl gives isoneonicotine (α-pyridyl-β-piperidine), b_{760} 282°, whose picrate m. 217–8° (cor.). *α,α-Pyridylpiperidyl*, b_{755} 265–6°, whose *picrate* m. 187°; the NO deriv. is an oil. Isonicotine (γ,γ-pyridylpiperidine) b_{760} 292°; the picrate m. 215–8° (decompn.); the NO deriv. m. 112°. Nicotidine (β,β-pyridylpiperidine) b. 284–5°; picrate m. about 206°. *β-Pyridyl-γ-piperidine* yields a *picrate*, m. 240°. The ease of reduction by Sn and HCl of the dipyridyls is in the order γ,γ-, β,γ-, α,α- and β,β-, the first being the most easily reduced. C. J. WEST

Constitution of dauricine. HEISABURO KONDO AND ZOICHI NARITA. *Ber.* **63B**, 2420–3(1930); cf. *C. A.* **24**, 122.—It had been found that *m*-hemipinic anhydride and 4,3-MeO(*p*-$HO_2CC_6H_4O$)$C_6H_3CO_2H$ are formed in the oxidative degradation of dauricine, to which was assigned the structure I (R = *p*-$MeOC_6H_4CH_2$). To det. the position of the phenolic HO group, *ethyldauricine ethobromide* (II), from I and EtBr, was subjected to the Hofmann degradation, giving through the methiodide of *α-ethyldauricine-ethylmethine* (III), $EtNMe_2$ and *des-N-ethyldauricine* (IV), oxidized to *4-ethoxy-3,4'-diphenyl ether-1,1'-dicarboxylic acid* (V) by $KMnO_4$ in Me_2CO. The HO group in I must therefore be on C atom 6 or 7, and most probably on 7, since on oxidation C atom 1 is usually easily oxidized off as CO_2. Faltis has recently (*C. A.* **24**, 3513) expressed the opinion that I has perhaps double the above formula, *viz.*, $C_{38}H_{44}O_6N_2$, with an O bridge, but renewed mol.-wt. detns. (Rast) lead K. and N. to retain the formulas $C_{19}H_{23}O_3N$ and $C_{20}H_{27}O_3N$ for I and methyldauricinemethylmethine. II, yellow, decomps. 136–9°; *chloroplatinate*, decomps. 215–8°. III, yellow, optically inactive (0.1965 g. in 10 cc Me_2CO); *methiodide*, yellow, decomps. 162–5°. V, m. 276–9°, was identified by its synthesis from the *4-HO acid*, m. 282° (prepd. from the 4-MeO acid heated with concd. HI in PhOH), refluxed with an excess of EtBr in MeOH.



(I)



(II)

C. A. R.

Lupinine. P. KARRER AND A. VOGT. *Helv. Chim. Acta* **13**, 1073–7(1930); cf. *C. A.* **16**, 63, 64; and **23**, 1132.—To substantiate their formula for lupinine, K. and V. prepd. optically active anhydrolupinine and lupinane, which is new evidence of the existence of 2 asym. centers in the lupine mol. Treatment of lupinine with $SOCl_2$ gave *chlorolupinane*, b. 124–5°, $[\alpha]_D^{20}$ −32.9° in alc.; this reacted with 33% NMe_3 in alc. at 130–5° to give *lupinanyltrimethylammonium chloride*, $[\alpha]_D^{20}$ −17.9° in alc. The hydroxide prepd. from this with Ag_2O decompd. when heated, giving NMe_3 and anhydrolupinine, b_{15} 86–8°, $d_4^{23.5}$ 0.929, $[\alpha]_D^{23.5}$ −49.8°. Catalytic reduction of this in HCl (Pt oxide) gave lupinane, b. 80–1°, d_4^{23} 0.93, $[\alpha]_D^{23}$ −0.65°; picrate, m. 185°. Another lupinane, b_{15} 84–6°, [α] −9.4° in MeOH (picrate, m. 185°), was obtained by reduction of chlorolupinane with Na and alc. A. WIEBEN

Sparteine. P. KARRER, B. SHIBATA, A. WETTSTEIN AND L. JACUBOWICZ. *Helv. Chim. Acta* **13**, 1292–308(1930); cf. *C. A.* **23**, 1132.—Sparteine, second in importance of the lupine alkaloids, has probably a similar structure to lupinine, and hence 4 possible formulas are advanced, each contg. 2 N atoms in completely satd. ring systems. By repeated application of the Hofmann degradation, each step followed by catalytic

reduction of the unsatd. intermediates, it was hoped to gain an insight into the constitution of sparteine by effecting the removal of the N atoms and by comparing the resulting hydrocarbon with I, II and III, pentadecanes of known structure, since these could result by such a degradation from the above ring systems. *6-Methyl-7-ethyldodecane* (I).—MeAmCHCO$_2$H, b_{18} 121–2°, prepd. from $C_5H_{11}CH(CO_2Et)_2$, was converted by $SOCl_2$ into the acid chloride, b_{737} 179.5–182°, which on treatment with $ZnEt_2$ gave MeAmCHCOEt, b_{738} 191–3°. The tertiary alc. resulting from the action of AmMgBr was dehydrated by $(CO_2H)_2$ to the olefin $C_{15}H_{30}$, b. 236–7°, and reduced by H_2 and Pt in AcOH to I, b_{739} 240–2°, $d_4^{21.9}$ 0.7769, n_D 1.43462, M_D 71.24. *6-Propyldodecane* (II).—The carbinol made by the action of PrMgCl on AmCHO was oxidized with CrO_3 in H_2SO_4 and AcOH to $C_6H_{13}COPr$, b_{731} 202–6°, and converted by AmMgBr into a carbinol which on dehydration with Ac_2O gave the olefin $C_{15}H_{30}$, reduced by H_2 and Pt to II, b_{739} 241–3 $d_4^{18.6}$ 0.7729, n_D 1.43321, M_D 71.41, M_D (calcd. $C_{15}H_{32}$) 71.47. *4-Methyl-6-propylundecane* (III).—PrCHMeCH$(CO_2Et)_2$, b_{11} 120–1°, from the condensation of PrCHMeBr with $NaCH(CO_2Et)_2$, which by processes similar to those used in the prepn. of I was converted into $PrCHMeCH_2COCl$, b_{733} 159–161°. By condensation with PrZnI in the presence of a Zn-Cu couple, the ketone $PrCHMeCH_2COPr$, b_{715} 192–3°, was prepd. which on treatment with AmMgBr gave the tertiary alc. whose olefin $C_{15}H_{30}$, b_{739} 231–3°, was reduced to III, b_{739} 235–6°, $d_4^{18.6}$ 0.7733, n_D 1.43311, M_D 71.36. *Hydrocarbon* (IV) from sparteine By a 6-fold application of the Hofmann degradation, each step being followed by catalytic reduction, a pentadecane of unknown nature, $C_{15}H_{32}$, was formed, b_{739} 242°, $d_4^{18.7}$ 0.7740, n_D 1.43351, M_D 71.35. Comparison of the phys. consts. of the 4 hydrocarbons show that the proposed ring formulas for sparteine cannot be greatly in error, since if the true structure varied greatly from the one proposed, the hydrocarbon IV, isolated in the above manner, would, of necessity, vary more in phys. properties from those of the synthetic hydrocarbons I, II and III. C. R. ADDINALL

An artificial conifer resin acid of the isosylvic acid group. OSSIAN ASCHEN AND O. M. GADD. *Ann.* **483**, 124–32(1930).—Pinabietic acid and HBr in AcOH-Et$_2$O, allowed to stand 4 days, give a mixt. of about 11.6% of the *dihydrobromide* (I), m. 192–4°, and about 15% of the *monohydrobromide* (II), m. 186°; in $CHCl_3$ II adds 1 mol. Br. Boiling I or II with 2 mols. KOH in 90% EtOH for 2 hrs. gives *pinisosylvic acid*, m. 82°; with Ac_2O and H_2SO_4 there results a pale-red color, changing to light brown and finally a violet color. The Na and Ag salts were prepd. Br gives a *tetrabromide*, $C_{20}H_{30}Br_4O_2$, m. 87°. HBr gives I. I, treated with Zn in AcOH on the water bath, gives *dihydroisosylvic acid*, m. 92°; it adds 1 mol. Br but a cryst. dibromide could not be obtained; HBr gives the cryst. *compd.* $C_{20}H_{32}BrO_2$, m. 163–5°. The nitrochloride could not be obtained. C. J. WEST

Higher terpene compounds. XLI. Constitution of santonin. L. RUZICKA AND E. ELSENBERGER. *Helv. Chim. Acta* **13**, 1117–24(1930); cf. *C. A.* **24**, 607.—Catalytic reduction of santonin gives a *hexahydro deriv.*, m. 210–1°, dehydrated by Se to 1-methyl-7-ethylnaphthalene, whose *styphnate* m. 126°. (WITH H. RAMONDT AND A. WICK.) Details are given of the steps for the synthesis of *1,4-dimethyl-6-ethylnaphthalene*, $b_{0.5}$ 115°, *picrate*, m. 85°; *styphnate*, yellow, sinters 74°, colorless at 120°, m. 175°. The behavior on hydration lends support to the formula for santonin of Clemo, Haworth and Walton, *C. A.* **24**, 4046. C. J. WEST

Chlorophyll. XIV. Transformation of pheophorbides into phylloerythrin. H. FISCHER AND OSKAR SÖS. *Ann.* **482**, 225–32(1930); cf. *C. A.* **25**, 520.—Pheoporphyrin a_5 and a_4, with AcOH-HBr at 50–5°, give phylloerythrin, identical with that isolated from bile. Its Me ester m. 266°. The yields are 35–40%. C. J. WEST

Preliminary work to the ring syntheses of porphyrins, etc. III. Several pyrrole compounds with amino groups and unsaturated side chains. H. FISCHER AND KARL ZEILE. *Ann.* **483**, 251–71(1930); cf. *C. A.* **24**, 5302.—2,4-Dimethyl-3-amino-5-carbethoxypyrrole (I) yields an *Ac deriv.*, m. 201° (60% yield). With iso-AmNO$_2$, I gives 90% of the *diazonium chloride*, decomps. at 173°; it is not completely decompd. by boiling with H_2O for 1 hr.; continued boiling, especially with Cu powder, gives 2,4-dimethyl-5-carbethoxypyrrole, m. 125°. Hydrolysis of I with 10% NaOH gives *2,4-dimethyl-3-amino-5-carboxypyrrole* (II), which begins to split off CO_2 at 75°; *Ac deriv.*, m. 203° (decompn.). *2,4-Dimethyl-3-aminopyrrole*, m. 127°, results in about 50% yield by warming the moist II at 75°; *Ac deriv.*, m. 205°. The bromination product of the Ac deriv. of I, heated with H_2O, gives nearly quant. *bis(3-acetylamino-4-methyl-5-carbethoxy-2-dipyrryl)methane*, m. 251°, crystg. in different forms from EtOH, Ac_2O and dil. AcOH. With HCO_2H and Fe powder, this yields an amorphous *1,4,5,8-tetramethyl-2,3,6,7-tetraacetylaminoporphin*. II, HCO_2H and HBr, heated 2–3 min., give (*2,4-di-*

methyl-3-aminopyrryl)-2',4'-dimethyl-3'-aminopyrrolenyl)methene tri-HBr salt, decomps over 280°; from H_2O it seps. as violet crystals, from HBr in yellow-red prisms; AcONa gives the *mono-HBr salt*, dark violet needles, m. 234°. 2,4-Dimethyl-3-(β-carboxyvinyl)-5-carbethoxypyrrole (III) and NaOH with a little H_2O, heated over a free flame for 2 hrs. and then dry-distd., give dimethylpyrrole and (2,4-dimethylpyrryl)(2',4'-dimethylpyrrolenyl)methene. $MeNO_2$ adds to 2,4-dimethyl-3-(β-nitrovinyl)-5-carbethoxypyrrole, giving the *compd.* $C_{12}H_{17}O_6N_3$, m. 180°. 2,4-Dimethyl-3-(β-dicyanovinyl)-5-carbethoxypyrrole (IV) and Br give a perbromide, golden yellow, decompd. by H_2O to a *2-bromomethyl deriv.*, m. 258°. IV, MeOH and Br give the *2-carbomethoxy deriv.*, m. 187°; sapon. with 0.1 *N* NaOH by heating 12 hrs. at 85° gives 2 5-dicarboxy-3-formyl-4-methylpyrrole, does not m. 360°; the *di-Me ester* m. 180° (*oxime*, m. 221°; *semicarbazone*, m. 247°). IV and SO_2Cl_2 in Et_2O, followed by hydrolysis with H_2O, give the *2-carboxy deriv.*, does not m. 360°; similarly III gives the *2-carboxy deriv.*, m. 241°; the free *acid* has no m. p. The *Me ester* of III m. 150°. 2,4-Dimethyl-3-formyl-5-carbethoxypyrrole and SO_2Cl_2 give the *2-carboxy-3-chloro deriv.*, m. 260°. 2,4-Dimethyl-3,5-diformylpyrrole (V) and 2,4-dimethyl-3-acetylpyrrole with HBr-EtOH give *(2,4-dimethyl-3-formylpyrryl)(2',4'-dimethyl-3'-acetylpyrrolenyl)methene*, m. 210°. V and cryptopyrrole give with HBr *5,5',3,3'-tetramethyl-4-ethyl-4'-formylpyrromethene-HBr*, thick prisms. 2,4-Dimethyl-5-carbethoxy-3-thioformylpyrrole, for which a method of prepn. is given, gives with SO_2Cl_2 and H_2O *4-methyl-3-formyl-2-carbethoxy-5-carboxylic acid-pyrrole*, m. 169°; *phenylhydrazone*, yellow, m. 235°. C. J. West

Hydrogen transition in cholesterol. Rudolf Schönheimer. *Naturwissenschaften* **18**, 881(1930).—Cholesterol, free from ergosterol, heated to a high temp. forms a substance which acquires antirachitic qualities on irradiation with ultra-violet light (Koch, *et al.*, *C. A.* **24**, 1140), *i. e.*, an ergosterol-like compd. with probably also 3 double bonds. Cholesterol prepns. free from ergosterol and also from dihydrocholesterol (*C. A.* **24**, 2152; **25**, 323–4) again show after heating to 190–220° under 0.01 mm. (N_2) the presence of 1–2% of a satd. sterol (digitonin reaction, neg. Salkowski reaction, m. 119°, *d*-rotatory), probably a dihydrosterol. Small quantities of the cholesteryl ether of Mauthner are also present. It is believed that a dehydration and a hydration of cholesterol take place simultaneously in this reaction. A so far unknown catalyzer seems to play a role in the process. In the organism the same set of reactions may cause the formation of the 2 compds. from cholesterol. B. J. C. van der Hoeven

The cryoscopy of paraldehyde in solutions of NaCl and $BaCl_2$ (Bourion, Rouyer) 2. The photochemical reaction between ethylene iodide and I in CCl_4 solution (Schumacher, Wiig) 3. Structure of an organic molecular compound (Hertel, Klebu) 2. Insect poisons. XI. The constitution and synthesis of the pyrethrins (Staudinger, *et al.*) 15. Hydrocarbons (Fr. pat. 37,096) 22. Synthetic products (alcohols, aldehydes, acids, NH_3) from industrial gases (Fr. pat. 690,091) 21. *o*-Aminoaryl mercaptans (U. S. pat. 1,784,441) 25.

Schmidt, Julius: **Jahrbuch der organischen Chemie. Jg. XV. Die Forschungsergebnisse und Fortschritte im J. 1928.** Vienna: F. Deuticke. 245 pp. M. 24; linen, M. 27.

Hydrocarbons. I. G. Farbenind. A.-G. Fr. 688,713, Jan. 23, 1930. In the thermal treatment of olefins contg. S compds. as impurities, the reaction vessel and the catalyst are made of materials not attacked by H_2S. Thus, the reaction vessel may be made of plated V2A steel and the catalyst may be Si.

Verifying the purity of hydrocarbons. Abraham Esau. Fr. 691,306, Mar. 6, 1930. The purity of hydrocarbons is verified by submitting them to the action of short waves and measuring the variations of temp.

Higher hydrocarbons. Ruhrchemie A.-G. Fr. 690,028, Feb. 15, 1930. Higher hydrocarbons are obtained by submitting gases contg. CH_4, C_2H_4 and C_2H_2 or their homologs to the action of temps. above 900° for a short time and to the action of an electromagnetic field (luminescent discharges or high frequency oscillations). The treatments may be simultaneous or the heat treatment may follow the other.

Unsaturated hydrocarbons. R. G. Wulff. Brit. 334,178, Feb. 25, 1929. For the production of unsatd. hydrocarbons such as C_2H_2, C_3H_4 or allylene, initial materials such as C_2H_6, casing head gas, gas oil, petroleum fractions, carbureted natural gas, C_3H_8 and higher olefins, naphthenes and aromatic hydrocarbons such as benzene or toluene are heated under a partial pressure of less than 1 atm., to a temp. above 815° for a short

time (suitably 5 sec. or less) in a non-ferrous refractory vessel (such as a Carborundum tube contg. pieces of Carborundum, quartz, sillimanite or other suitable refractory material) in the substantial absence of gases contg. free O, and the reaction products are rapidly cooled. Diluents may be used such as Hg vapor, steam, N, CO or H, in which case the reaction may be effected at atm. pressure. App. and various details of procedure are described.

Cyclic hydrocarbons from acetylene. I. G. FARBENIND. A.-G. Brit. 334,203, Feb. 23, 1929. In the production of cyclic hydrocarbons such as products contg. hydrogenated benzene derivs., C_2H_2 or its mixts. with homologs is passed over heated condensation catalysts (such as compds. of Al or of metals, except As, having a sp. gr. above 4.4 and belonging to the second to seventh groups) and the products thus formed are then passed together with H over metallic hydrogenating catalysts. Industrial gas mixts. contg. C_2H_2 and H may be used such as coke-oven gas or gas mixts. obtained by passing coke-oven gas or a mixt. of CH_4 and H through a high tension elec. arc. The condensation may be effected at temps. of 250–500° and the subsequent hydrogenation at 150–250°. Various details of procedure are described.

Apparatus for polymerizing diolefins. I. G. FARBENIND. A.-G. Fr. 689,824, Feb. 13, 1930. The vessels used for polymerizing diolefins are lined with paper, bitumen or a layer of "Devarda" alloy which is itself covered with a nitrocellulose or gelatin varnish to insure easy removal of the product.

Organic oxygen compounds. HENRY DREYFUS. Fr. 689,342, Feb. 3, 1930. Org. O compds., particularly MeOH, are obtained by heating mixts. of H and CO or CO_2 under pressure in the presence of a catalytic mass in which the catalytic metal is present as the sulfide, such as sulfides of Zn, Cu, Pb or Cd, which may be mixed with Cr_2O_3. Cf. *C. A.* 24, 1649.

Sulfonating inorganic and organic materials. PAUL BAUMGARTEN. Ger. 499,571, June 1, 1926. The org. or inorg. material is subjected to the action of anhydro-*N*-pyridinium sulfonic acid, with or without solvent or suspension agent. Numerous examples are given, in which NH_3, NH_4F, CH_2NH_2, alc., PhOH and naphthalene are sulfonated. The pyridine formed is distd. off and reconverted into *N*-pyridinium sulfonic acid for further use.

Aliphatic compounds. HENRY DREYFUS. Fr. 691, 209, Mar. 5, 1930. In making org. compds. contg. O, particularly AcOH from a mixt. of gases contg. CO, *e. g.*, CO and MeOH, by circulating the gases under pressure several times through a heated zone contg. one or more catalysts, *e. g.*, phosphoric acid, the gases are passed over or through wood charcoal, active C or SiO_2 gel to absorb paraffin hydrocarbons, before they are returned to the reaction zone. They may also be passed through a condenser to sep. liquefiable products.

Alcohols from acetylene and steam. I. G. FARBENIND. A.-G. Brit. 334,223, Feb. 23, 1929. C_2H_2 (or a mixt. contg. C_2H_2 and its homologs) is passed together with steam over condensation catalysts (such as ZnO pptd. on silica gel) comprising compds. of Al or of metals other than As having a sp. gr. of over 4.4 and belonging to the second to seventh groups of the periodic system, and the products, without isolation, are then conducted over metallic hydrogenating catalysts such as metals of the Fe group, Cu or Pt, in order to produce alcs. such as EtOH.

Alcohols by hydrogenation of olefin oxides. OSKAR LOEHR (to I. G. Farbenind. A. G.). U. S. 1,787,205, Dec. 30. Olefin oxides of primary structure which correspond to the general formula: $R_1R_2C\overset{\frown}{.O.}CH_2$ wherein R_1 stands for an alkyl or aryl residue and R_2 for a H atom or alkyl, aryl or aralkyl group are readily converted into primary alcs by treating them with H in the presence of catalysts, such as Cu or metals of the eighth group of the periodic system such as Ni, Co, Fe, Pt or Pd in a finely divided state. These catalysts may be used singly or mixed with each other or they may be applied upon an inert carrier such as pumice, $CaCO_3$, silica gel, charcoal and the like. The catalytic effect may be enhanced by the admixture with the catalyst of small quantities of other substances acting as promoters; *e. g.*, by adding small quantities of alk. acting agents to a ppt. of Ni hydroxide before reducing it to Ni. An analogous effect is obtained by the addn. of small quantities of Al_2O_3 or ThO_2. Examples are given of the production of PrOH from propylene oxide, BuOH and *sec*-BuOH from a mixt. of α- and β-butylene oxides and phenethyl alc. from styrene oxide, and various details of the prepn. of catalysts are also given. Temps. of about 170–80° are suitable for the alc.-producing reaction.

Alcohols, aldehydes, ketones, hydrocarbons and hydrogen from vegetable substances. E. L. RIVMAN. Brit. 334,724, July 16, 1929. Vegetable substances such

as wood from foliaceous trees, reeds, straw and grass are boiled with a strong soln. of $Ba(OH)_2$ or $Sr(OH)_2$ or both and the soln. thus obtained is evapd. to dryness together with the ppt. which it contains, followed by dry distn. of the residue, preferably in the presence of superheated steam. C powder may be added before evapn. and inorg. substances such as soda, NaOH or hydroxides or oxides of Ca, Mg, Al, Zn or Fe are preferably added during the boiling. MeOH, acetone, Me Et ketone, acetone oils, etc., may be obtained, and the oils produced may be purified by hydrogenation and rectification. The mixed products may be hydrogenated together to produce a *motor fuel*.

Ethers of polyhydric alcohols. I. G. FARBENIND. A.-G. (Albrecht Schmidt, Hans Lange and Karl Ost, inventors). Ger. 510,423, Nov. 29, 1927. The alcs. are mixed with a metal oxide or hydroxide, *e. g.*, NaOH, in the presence of a little MeOH or EtOH, and the alcoholates so obtained are treated with alkyl halides at a raised temp. and pressure. An example is given describing the prepn. of *pentaethylsorbitol*, b_{10} 185–90°.

Hydroxyalkyl ethers of glycerol. I. G. FARBENIND. A.-G. (Oskar Loehr, inventor). Ger. 510,422, Dec. 19, 1925. These are prepd. by treating glycerol with alkylene oxides at a raised temp. Examples are given.

Preparing aldehydes by oxidation of the methyl group of aromatic hydrocarbons. Z. E. ZINKOV. Russ. 56,541, Oct. 17, 1929. The aldehyde soln. obtained during the oxidation process carried out with the original hydrocarbon is continuously removed from the oxidation app. and is continuously extd. with bisulfite. The hydrocarbon is returned into the oxidizer after having been freed from sulfur.

Amino aldehydes. I. G. FARBENIND. A.-G. Fr. 690,206, Feb. 19, 1930. Amino-aldehyde compds. are prepd. by condensing aldehydes of the C_6H_6, $C_{10}H_8$ or $C_{14}H_{10}$ series contg. in their mol. substitutable atoms of halogen, with amides of acids or their mono-alkyl, aralkyl and aryl derivs., by heating with the addn. of an agent capable of neutralizing the acid, preferably with the addn. of a catalyst and in the presence of an appropriate solvent. The arylamino-aldehyde compds. obtained are converted to the free amino-aldehyde compds. by sapon. Thus, 5-nitro-2-*p*-tolylsulfonamidobenzaldehyde, m. 181–2°, is prepd by heating a mixt. of 5-nitro-2-chlorobenzaldehyde with *p*-toluenesulfonamide in the presence of KOH and Cu_2Cl_2. By sapon. 5-nitro-2-aminobenzaldehyde is obtained. Several other examples are given.

Ketones. MAISON C. DUCHEMIN. Fr. 691,160, May 13, 1929. Ketones are made from impure acids by volatilizing the acids, passing them through coke or other absorbent material to remove impurities and then over catalysts. In this way AcOH contained in crude or partially purified pyroligneous acid is converted to acetone.

Ketones. I. G. FARBENIND. A.-G. (Walter Reppe, inventor). Ger. 510,712, Jan. 22, 1928. See Fr. 667,787 (*C. A.* **24**, 1120).

Amines. I. G. FARBENIND. A.-G. Brit. 334,579, Nov. 1, 1928. Primary and secondary amines are made by conducting the vapor of an alc. (other than a cyclic alc.) together with a primary amine or NH_3 at a raised temp. (but not substantially above 300°) over a hydrogenating metal catalyst (such as Ni on pumice), with or without pressure. Butylamine is made from BuOH and NH_3, ethyl aniline from EtOH and $PhNH_2$, and monoethylcyclohexylamine from cyclohexylamine and EtOH. Cf. *C. A.* **24**, 1866.

Amines. COMPAGNIE DE PRODUITS CHIM. ET ELECTROMETALLURGIQUES ALAIS, FROGES ET CAMARGUE. Fr 36,718, Jan. 26, 1929 Addn. to 673,648 (*C. A.* **24**, 2469). Primary or secondary aliphatic or aromatic or mixed amines are made by heating a mixt. of a primary or secondary alc. with NH_3 or a primary amine in the presence of a hydrogenation catalyst other than Ni, such as Co, Cu or Fe.

Aliphatic amines. I. G. FARBENIND. A.-G. (Otto Nicodemus and Walter Schmidt, inventors). Ger. 510,439, Nov. 28, 1928. See Fr. 685,345 (*C. A.* **24**, 5765).

Nitriles. SCHERING-KAHLBAUM A.-G. (Siegfried Fischl and Hans Steiner, inventors). Ger. 512,226, Nov. 30, 1928. Nitriles are prepd. by treating the NH_4 salts of the corresponding acids with an acid chloride in the presence of a feeble base that is incapable of sapong. the nitrile at a raised temp. Suitable acid chlorides are $POCl_3$, PCl_3 and *p*-toluenesulfonylchloride; suitable bases are pyridine and $PhNMe_2$. Both mono- and di-carboxylic acid nitriles are obtainable by this method. Examples are given.

Esters. I. G. FARBENIND. A.-G. Fr. 689,275, Feb. 3, 1930. Esters of higher fatty acids and polyhydric alcs. are prepd. by introducing the component of lower b. p. in the state of vapor into the component of higher b. p., the latter being heated. Thus, vapors of glycerol heated to 230° are introduced into the fatty acid of olive oil at the same temp.

Esters of borneol and isoborneol. SCHERING-KAHLBAUM A. G. (Fritz Ulffers,

inventor). Ger. 510,429, Mar. 20, 1928. Addn. to 508,093 (*C. A.* **25**, 710). The method of Ger. 508,093 is conducted throughout at a temp. of 0° or less.

Converting the lower-boiling dichloroethylene into the higher-boiling form. I. G. FARBENIND. A.-G. (Fritz C. Fertsch, inventor). Ger. 510,576, June 28, 1928. The lower-boiling $C_2H_2Cl_2$ is vaporized and passed over contact agents at temps. above 300°, to be converted into the higher-boiling form. Gases which do not react with the $C_2H_2Cl_2$ at this temp. may be present.

Amino- and *N*-alkylaminoalkylarylcarbinols. SOC. ANON. POUR L'IND. CHIM. À BÂLE. Ger. 512,031, Aug. 23, 1927. The prepn. of these compds. by the catalytic reduction of nuclearly hydroxylated amino- or alkylamino-alkylaryl ketones is effected in alk. soln., suitably with H in the presence of Ni as a catalyst. Examples are given.

Acyl derivatives of *k*-strophanthidin. SCHERING-KAHLBAUM A.-G. (Wilhelm Neumann, inventor). Ger. 510,430, Mar. 9, 1929. See Brit. 323,973 (*C. A.* **24**, 3249).

Acyl derivatives of *k*-strophanthidin. SCHERING-KAHLBAUM A.-G. (Wilhelm Neumann, inventor). Ger. 512,336, Mar. 16, 1929. See Brit. 323,973 (*C. A.* **24**, 3249).

Alkoxy derivatives of 1-aminonaphthalene-8-carboxylic acid cyclic anhydride. RICHARD HERZ and FRITZ SCHULTE (to General Aniline Works). U. S. 1,779,314, Oct. 21. Alkoxy derivs. of 1-aminonaphthalene-8-carboxylic acid cyclic anhydride are obtained by alkylating hydroxy derivs. of 1-aminonaphthalene-8-carboxylic acid cyclic anhydride. The formed alkoxynaphthostyrils can be converted into the corresponding alkoxy derivs. of 1-aminonaphthalene-8-carboxylic acid by treatment with alk. saponifying agents. Details are given of the production of 5-methoxynaphthostyril, which, when crystd. from C_6H_6, m. 223°. When boiled with a 10% NaOH soln. it is converted into 5-methoxy-1-aminonaphthalene-8-carboxylic acid. General mention is also made of the production of 6- and 3-alkoxynaphthostyrils. The free acid such as 5-methoxy-1-aminonaphthalene-8-carboxylic acid may be used together with hydroxy or amino compds. for producing *azo dyes*.

Anthraquinone derivatives. I. G. FARBENIND. A.-G. Fr. 36,990, May 30, 1929. Addn. to 673,825 (*C. A.* **24**, 2757). The products obtained by the condensation of one mol. of α-naphthoquinone or one of its heteronuclear derivs. with one mol. of a 1,3-butadiene hydrocarbon are treated with alk. agents in the absence of agents capable of fixing H, or with acid agents or by heating in the presence or absence of agents capable of fixing H, alone or with solvents or diluents and finally dehydrogenating the products formed. The *1,4-dihydroanthrahydroquinone* the *1,4-dihydroanthraquinone* and their *homologs* and *derivs.* prepd. in this way are stated to be new compds. Cf. *C. A.* **25**, 304.

Anthraquinone derivatives. I. G. FARBENIND. A.-G. (Arthur Lüttringhaus, Heinrich Neresheimer, Wilhelm Schneider, Georg Böhner, and Willy Eichholz, inventors). Ger. 504,646, Sept. 13, 1928. Addn. to 494,433 (*C. A.* **24**, 2757) and 502,043 (*C. A.* **24**, 4791). One mol. of benzoquinone is condensed with 2 mols. of a 1,3-butadiene (or with 1 mol. each of two different 1,3-butadienes), the products heated or treated with acid or alk. reagents, and the non-phenolic compds. so obtained are treated with alcoholates or mixts. contg. the same in the absence of dehydrogenating agents. The products are readily convertible into hexahydroanthraquinones. Examples are given.

Anthraquinone derivatives. I. G. FARBENIND. A.-G. (Karl Wilke, inventor). Ger. 510,453, June 22, 1928. Addn. to 464,863. *o*-Aminocarboxylic esters of the anthraquinone series are prepd. by treating anthraquinone-1,2-isoxazole with alk. reagents in the presence of alcs. or phenols. Thus, methyl 1-aminoanthraquinone-2-carboxylate is prepd. by heating the isoxazole with MeOH and KCN. Other examples are given also.

Carbazole derivatives. I. G. FARBENIND. A.-G. (Georg Kränzlein, Heinrich Greune, Franz Brunnträger and Erich Hesse, inventors). Ger. 510,435, Dec. 30, 1926. Neg. substituted carbazoles are prepd. by introducing neg. groups by the customary processes into carbazole-*N*-sulfonic acid, and then splitting off the sulfo group. These steps may be effected in one working operation. Examples are given. Cf. *C. A.* **24**, 2759.

Carbazole derivatives. I. G. FARBENIND. A.-G. (Friedrich Muth and Albert Schmelzer, inventors). Ger. 510,436, Jan. 24, 1929. Substituted carbazolesulfonic acids are prepd. from aminocarbazolesulfonic acids by replacing the NH_2 group by an anion, *e. g.*, OH, halogen, CN, or SH, by way of the diazo group. Examples are given describing the prepn. of (*inter alia*) *1-hydroxycarbazole-3,6,8-trisulfonic acid, 1-hydroxy-8-iodocarbazole-3,6-disulfonic acid, 1,1'-dicarbazoledisulfide-3,3',6,6',8,8'-hexasulfonic acid,*

1-chloro(bromo- or iodo-)carbazole-3,6,8-trisulfonic acid, *1-cyanocarbazole-3,6,8-trisulfonic acid*, and *carbazole-3,6,8-trisulfo-1-arsonic acid*.

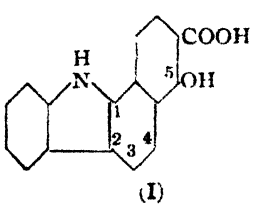
Carbazole derivatives. I. G. FARBENIND. A.-G. (Albert Schmelzer, Friedrich Muth and Fritz Ballauf, inventors). Ger. 512,234, Jan. 13, 1928. Hydroxycarbazolecarboxylic acids are prepd. by the action of CO_2 at a raised temp. and pressure on the alkali compds. of hydroxycarbazoles, or on hydroxycarbazoles in the presence of alkali hydroxides or carbonates. Examples are given describing the prepn. of *2-hydroxycarbazole-3-carboxylic acid*, m. 273–4°; *2-hydroxycarbazole-1-carboxylic acid* m. 271–2°; *1-hydroxycarbazole-2-carboxylic acid*, m. 233–4°; and *1,8-dihydroxycarbazole-o,o'-dicarboxylic acid*, m. above 305° (decompn.).

1-Aminocarbazole and its derivatives. I. G. FARBENIND. A.-G. (Friedrich Muth and Albert Schmelzer, inventors). Ger. 512,233, May 15, 1927. The NH_2 group of 1-hydroxycarbazole and of its derivs. is substituted for the OH group by the customary methods. Examples are given. Cf. *C. A.* **25**, 716.

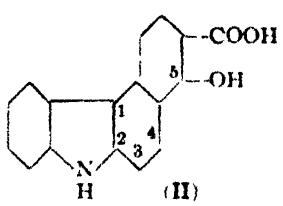
Naphthalene derivatives. I. G. FARBENIND. A.-G. Brit. 334,700, Aug. 28, 1929. *p*-Hydroxyarylaminonaphthalenes are made by treating a 6- or 8-arylamino-2,3-hydroxynaphthoic acid with a *p*-aminophenol in the presence of alkali metal bisulfite, thus effecting replacement of the 2-hydroxy group by arylamino and splitting off of the carboxylic group. Several examples are given. A blue indophenol may be obtained from one of the products described.

Nitrophenyl derivatives of thiazole compounds. JAN TEPPEMA (to the Goodyear Tire and Rubber Co.). Can. 307,701, Jan. 13, 1931. 2-Dinitrophenylbenzothiazyl sulfides are prepd. by heating a dinitrochlorobenzene and mercaptobenzothiazole.

Naphthocarbazole derivatives. I. G. FARBENIND. A.-G. Fr. 689,515, Feb. 6, 1930. Hydroxycarboxylic acids of the naphthocarbazole series are prepd. by treating with CO_2 or combinations thereof hydroxynaphthocarbazoles in the presence of hydroxides or carbonates or bicarbonates of alkali metals or compds. of hydroxynaphthocarbazoles with alkali metals. An example is given of the prepn. of 5-hydroxy-2,1-naphthocarbazolecarboxylic acid of the formula I and 5-hydroxy-1,2-naphthocarbazolecarboxylic acid of the formula II.



(I)



(II)

The 6-hydroxy-2,1- and the 7-hydroxy-2,1- derivs. are also referred to.

Quinoline derivatives. I. G. FARBENIND. A.-G. Brit. 332,911, March 25, 1929, Fr. 689,171, Jan. 31, 1930. 2,4-Diketoquinoline compds. are prepd. by condensing aromatic amines with malonic esters in org. solvents b. above 170° (suitably an excess of the malonic ester itself) and, preferably, distg. off the alc. produced in the reaction as formed. Examples are given of the production of 2,4-diketo-α-naphthoquinoline (from α-naphthylamine and di-Et malonate) and of a 2,4-diketoquinoline methylated in the benzene ring (from *m*-toluidine and di-Et malonate).

Alkali metal ethylates. A. WACKER GES. FÜR ELEKTROCHEMISCHE INDUSTRIE GES. Brit. 334,388, Nov. 24, 1928. See Ger. 505,474 (*C. A.* **24**, 5768).

Catalytic hydrogenation. I. G. FARBENIND. A.-G. Fr. 689,713, Feb. 11, 1930. Carboxylic acid esters contg. at least 2 atoms of C in the mol. (except oxalic esters) are hydrogenated in the carboxylic group by means of very active hydrogenation catalysts such as colloidal SiO_2 and $CuCrO_4$. Examples are given.

Condensation products. SOC. ANON. POUR L'IND. CHIM. À BÂLE. Swiss 138,593, July 28, 1928. One mol. of 1,3,3-trimethyl-2-methyleneindoline is condensed with at least 1 mol. of a compd. of the general formula XHC:NH (where X is a univalent residue split off during the reaction) in the presence of Ac_2O. The product forms yellow needles decompg. 240–7°. An example mentions formimidoethyl ether hydrochloride.

Reduction products. I. G. FARBENIND. A.-G. Fr. 690,276, Feb. 6, 1930. Azoxy or azo compds. are obtained by reducing in an alk. medium arylides of nitroarylcarboxylic acids of the formula HO.R.NH.CO.R'.NO_2 in which R and R' are the same or different aryl groups of the C_6H_4 series, and the NO_2 group is *m*- or *p*- to the CO group, and which are capable of coupling in the hydroxyaryl group with diazo compds., and of which at

least one *o*- or *p*-position with respect to the OH group is not occupied. Thus, *m'*-nitrobenzoyl-*m*-aminophenol (by heating *m*-nitrobenzoic acid with *m*-aminophenol in PhMe and adding PCl_3) is reduced by *d*-glucose in alk. soln. to an azoxy compd. Other examples are given.

Lactones. GEORG SCHROETER and ALEXANDER GLUSCHKE. Ger. 508,482, Oct. 15, 1926. 2-Bromo-1-keto-1,2,3,4-tetrahydronaphthalene is warmed in alc. soln. with $NaCH(COOMe)_2$, yielding di-Me 1-ketotetrahydronaphthalene-2-malonate. The acid obtained from this by sapon. loses CO_2 when heated, and yields *1-ketotetrahydronaphthalene-2-acetic acid*, m. 97–8.5°, which is then reduced to convert the CO group into CHOH. The product, on warming with HCl, yields *1-hydroxytetrahydronaphthalene-2-acetic acid lactone*, m. 106°. Homologs of this can be prepd. if the 1-ketotetrahydronaphthalene-2-malonic ester is reduced before decarboxylation. 1-Hydroxytetrahydronaphthalene-2-acetic acid lactonecarboxylic acid is then obtained which, after esterification, methylation and sapon. yields *1-hydroxytetrahydronaphthalene-2-propionic acid lactone*, a stereoisomeric compd., m. 140–3° and 82–4°. Hydroaromatic polycyclic lactones can be prepd. similarly from substitution products of 2-halo-1-ketotetrahydronaphthalene, or from the corresponding decahydronaphthalene derivs., or from α-halo ketones derived from other polycyclic hydroaromatic hydrocarbons, *e. g.*, octahydroanthracene and octahydrophenanthrene. Further examples are given describing the prepn. of (*inter alia*) *5-methoxy-1-hydroxy-1,2,3,4-tetrahydronaphthalene-2-acetic acid lactone*, m. 134.5°; *5,8-dimethyl-1-hydroxy-1,2,3,4-tetrahydronaphthalene-2-propionic acid lactone*, m. 117–9°; *1-hydroxy-1,2,3,4,5,6,7,8-octahydroanthracene-2-acetic acid lactone*, m. 174°. Cf. *C. A.* **23**, 5195.

Lactones. GEORG SCHROETER and ALEXANDER GLUSCHKE. Ger. 511,887, Jan. 20, 1928. Addn. to 508,482. The hydroaromatic polycyclic lactones described in Ger. 508,482 (preceding abstr.) are now prepd. by a modified method in which cycloketonyl oxalic acids or their esters are used as starting materials. Thus, 5-ketotetrahydronaphthalene-6-oxalic acid is reduced, yielding 5-hydroxytetrahydronaphthalene-6-oxalic acid which is reduced, yielding 5-hydroxytetrahydronaphthalene-6-glycolic acid, which by prolonged warming with mineral acid undergoes mol. rearrangement to 5-ketotetra hydronaphthalene-6-acetic acid, which is then further treated as described in the prior patent. Examples are given.

Azides. OSKAR MATTER. Ger. 510,420, Aug. 29, 1929. Heavy metal azides are continuously prepd. by supplying to a reaction vessel an alkali azide soln., a heavy metal salt soln., and an aq. soln. inert to the reagents but having a limited solvent power for the products, *e. g.*, AcONa soln. The reaction products are continuously withdrawn.

Thiosemicarbazones of hydroxyarsenobenzenes. KARL STREITWOLF and ALFRED PFIRLE (to Winthrop Chemical Co.). U. S. 1,785,660, Dec. 16. Compds. such as thiosemicarbazones of 1,1'-diformyl-3,3'-dihydroxyarsenobenzene, 1,1'-diformyl-2,2'-diamino-3,3'-dihydroxyarsenobenzene, 1,1'-diformyl-2,2'-dichloro-3,3'-dihydroxyarsenobenzene, 1,1'-dihydroxy-2,2'-diacetylarsenobenzene or 1,1'-dihydroxy-2,2'-diacetyl-5,5'-diamino-4,4'-arsenobenzene (forming relatively stable aq. solns. suitable for *therapeutic uses*) may be prepd. either by subjecting the corresponding hydroxyformylarsonic acids and hydroxyacylarsonic acids to the action of thiosemicarbazones and converting the arsonic acid thiosemicarbazones thus obtained into the arseno compds. by means of a reducing agent, or by first reducing the aldehyde- and ketone-arsonic acids into the corresponding arseno compds., then treating the latter with thiosemicarbazide. In order to obtain the phenolates, the arsenohydroxy thiosemicarbazones thus produced are finally transformed in the usual manner into their Na salts which may be sepd., if required, by a suitable precipitant. The thiosemicarbazones are yellow to yellowish red; they melt with decompn. and readily dissolve in aq. caustic alkalies with formation of the respective alkali metal salts, the so-called phenolates. The latter are yellow to brownish red and readily sol. in water. Their aq. solns. show an alk. reaction and they are much more stable than the solns. of the corresponding carbazones which contain no S.

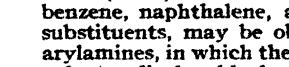
Halogenated sulfonephthaleins. WILTON C. HARDEN (to Hynson, Westcott & Dunning, Inc.). U. S. 1,786,611, Dec. 30. Di- and tetra-halogenated sulfonephthaleins and their analogs can be prepd. by condensing di- or tetra-halogenated *o*-sulfobenzoic acids or the corresponding anhydrides with various phenols and substituted phenols at temps. of 120° to 170°. The di- and tetra-halogenated *o*-sulfobenzoic acids are prepd. by halogenation of *o*-sulfobenzoic acid, its anhydride, or its acid NH_4 salt, in fuming H_2SO_4 at 60–170°. The condensations are brought about with or without the use of a condensing agent such as, *e. g.*, $SnCl_4$, $ZnCl_2$, H_2SO_4, etc., the conditions depending upon the phenols used. Examples of phenols which have been condensed in

this manner are: phenol, resorcinol, cresols and various substituted phenols such as *o*-chlorophenol and *o*-bromophenol. With *o*-halogenated phenols the resulting condensation product is a di-halogenated phenol di- or tetra-halogenated sulfonephthalein, that is, the halogens are present in the phenolic nuclei as well as in the sulfonephthalein nucleus. Another method of prepg. halogenated sulfonephthaleins contg. halogen in the phenolic nuclei, as well as in the sulfonephthalein nucleus, consists in the direct halogenation of a halogenated sulfonephthalein which contains halogen in the sulfobenzoic acid nucleus. Details are given of the prepn. of phenoltetrabromosulfonephthalein, phenoldiiodosulfonephthalein, dichlorophenoltetraiodosulfonephthalein, diiodoresorcinoltetraiodosulfonephthalein and tetrabromophenoltetraiodosulfonephthalein and mention is made of other related compds. which may be made in similar manner.

Substituted mercaptobenzothiazoles. ADOLPHE H. NEY (to Goodyear Tire & Rubber Co.). U. S. 1,788,585, Jan. 13. In forming a product such as 1-mercapto-3-methyl-5-chlorobenzothiazole, the reaction products of S_2Cl_2 upon an arylamine such as *o*-toluidine are subjected to the action of water and the resulting product is subjected to the action of an alkali such as NaOH and CS_2.

Aminothiazoles. I. G. FARBENIND. A.-G. Fr. 688,867, Jan. 25, 1930. 2-Amino or 2-arylaminobenzothiazoles are prepd. by treating mono- and di-arylthioureas with Cl or agents liberating Cl in the presence of appropriate solvents or suspension agents. The aminothiazoles thus formed may be halogenated, preferably in the presence of a halogenating catalyst. The 2 steps may be combined without isolating the aminothiazoles. Examples are given of the prepn. of 2-amino-4-methyl- (m. 138°), 2-amino-6-ethoxy- (m. 160–163°), 2-amino-4-methyl-6-chloro- (m. 200–205°), 6,7-benzo-2-amino- (m. 259–261°), 2-amino-6-methyl- (m. 142°), 2-amino-3-methyl-2,3-dihydro- (m. 123°), 2-phenylamino- (m. 157–159°), 2-amino-6-bromo- (m. 210–212°), dichloro-4-methyl-2-amino- (m. 250–255°), 6-bromo-4-methyl-2-amino- (m. 215–218°), and dibromo-2-phenylaminobenzothiazole (m. 215–217°). The above may be transformed to mercaptans by heating with a caustic alkali lye.

Compounds of the thiazole series. HANS P. KAUFMANN and MAX SCHUBERT (to I. G Farbenind. A.-G.). U. S 1,787,315, Dec. 30. New compds. contg. S, having probably in their mol. a thiazole ring and corresponding to the general formula



R.S.C(:NH).NH or its tautomeric form wherein R means an aromatic residue of the benzene, naphthalene, anthracene or anthraquinone series, which may contain further substituents, may be obtained by allowing a salt of sulfocyanic acid to act on primary arylamines, in which the *p*-position to the amino group is either substituted by a univalent radical or blocked (as in the case of β-naphthylamine), in the presence of a suitable halogen (Cl or Br) and preferably in an acidic medium. The new thiazole compds. are mostly cryst., having a definite m. p. They possess a basic character, but their amino group is masked in most cases, and they usually yield when diazotized in the usual manner, compds. having only a weak capacity for coupling with the usual azo dye components, but are suitable for use as *intermediates in production of dyes* and *pharmaceutical compds.* Several examples are given. U. S. 1,787,316 relates particularly to the production of a compd., probably 1-amino-5-ethoxybenzothiazole, which is, when dry, a cryst. substance, m. about 163° when recrystd. from dil. alc., and yielding a yellowish diazo compd., from *p*-phenetidine in HOAc by reaction with NaCNS and Br. This compd. when diazotized and coupled with resorcinol forms a red, with H-acid a blue and with 2-naphthol-7-sulfonic acid a reddish violet azo dye. Cf. *C. A.* 23, 2301.

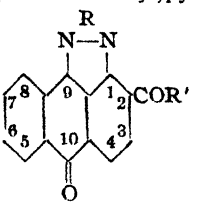
Dehalogenating aromatic compounds. I. G. FARBENIND. A.-G. (Eduard Tschunkur and Fritz Eichler, inventors). Ger. 512,224, Jan. 15, 1927. Aromatic compds. contg. halogen in a side chain are treated with Zn and aq. alkalies or alk. earths, preferably in the warm, whereby the halogen is replaced by H. Thus, benzyl chloride, treated as above, yields toluene and chlorobenzyl chloride yields chlorotoluene.

Aromatic compounds containing both alkoxy and sulfonated aralkyl groups. MYRTIL KAHN and ALFRED THAUSS (to General Aniline Works). U. S. 1,781,981, Nov. 18. A product which in the form of the free acid probably has the formula of a naphthalene deriv., β-$C_6H_{11}OC_4H_3$:$C_6H_3CH_2C_6H_4SO_3H$, being in the form of its alkali metal salt a light colored amorphous substance of soap-like appearance, easily sol. in water to a substantially colorless soln. and having a high wetting action on textile fibers in neutral, alk. and acid solns., and similar new compds. are obtainable by causing aromatic compds. which are substituted by an alkoxy group to react with an aralkyl halide such as benzyl chloride or xylyl chloride, preferably in the presence of a small quantity of a condensing metal and treating the intermediate product obtained with a sulfonating agent. The reaction takes place advantageously at temps.

above 100°, while a hydrohalide is vigorously split off, and, according to the mol. wt. of the starting materials, the new products form more or less viscous, light oils, which are sparingly sol. in alc., but easily sol. in ether, benzene, ligroin and petroleum ether.

Phenolic compounds from benzenesulfonic acids. WM. J. HALE and EDGAR C. BRITTON (to Dow Chemical Co.). U. S. 1,789,071, Jan. 13. In producing products such as phenol by hydrolyzing a benzenesulfonic acid deriv. in aq. alk. soln., diphenyl oxide is added to the reaction mixt. and serves to check further production of diphenyl oxide in the reaction.

Pyrazoleanthrone compounds. HEINZ SCHEYER (to General Aniline Works). U. S. 1,781,248, Nov. 11. In the production of a 2-(dichlorobenzoyl)pyrazoleanthrone or other compds. of the probable general formula



wherein R stands for H or an alkyl radical and R' stands for a residue of an aromatic hydrocarbon which may be substituted by halogen, 1-haloanthraquinone-2-carboxylic acid is at first caused to react with N_2H_4, preferably while heating and in the presence of a diluent such as pyridine. As an intermediate probably 1-hydrazinoanthraquinone-2-carboxylic acid is formed and then ring closure of the hydrazine group occurs, surprisingly with the keto group standing in the 9-position of the anthraquinone nucleus, not with the carboxylic acid group of the 2-position. The pyrazoleanthrone-2-carboxylic acid thus formed is then converted into its acid chloride according to one of the usual methods and the pyrazoleanthrone-2-carboxylyl chloride is condensed with an aromatic hydrocarbon or a halogenated substitution product thereof, in the presence of an acid condensing agent, such as aluminum or iron chloride. The products are *dye intermediates*.

Organometallo mercapto sulfo compounds. WALTER SCHOELLER, ERICH BORGWARDT and ADOLF FELDT (to Chem. Fabrik auf Actien vorm. E. Schering). U. S. 1,784,497, Dec. 9. Compds. of the general formula $X(NHCH_2SO_3Na)(SM)(SO_3y)$ wherein X is an aliphatic, aromatic or heterocyclic radical, M a heavy metal and *y* either H or a metal, preferably an alkali or alk. earth metal, which are employed especially in the form of their water-sol. alkali or alk. earth salts, are produced by the action of formaldehyde bisulfites on amino metallo mercapto sulfonic acids or the salts thereof. The derivs. thus obtained are distinguished by *therapeutic efficiency* and stability, being also nonpoisonous. The new compds. are slightly yellow colored substances which dissolve very readily in water and can be pptd. from such solns. by alc. or MeOH. Examples are given of the production of the compds.: $(NHCH_2SO_3Na)$-$CH_2CH(SAu)(SO_3Na)$, $C_6H_3(SO_3Na)(SAu$ or $SAg)(NHCH_2SO_3Na)$ and $(SO_3Na)(SAu)$-$C_6H_3NHC_6H_3N(NHCH_2SO_3Na)$.

Catalytically hydrogenating aromatic amino compounds. FELIX KLINGEMANN, WILHELM LOMMEL, ERNST KORTEN and THEODOR GOOST (to I. G. Farbenind. A.-G.). U. S. 1,782,729, Nov. 25. In processes exemplified by the production of hexahydroethylaniline from ethylaniline, hexahydrodimethylaniline from dimethylaniline, acetyl-*ar*-tetrahydro-α-naphthylamine from acetyl-α-naphthylamine (and the corresponding β-naphthylamine deriv.), benzoyl-*ar*-tetrahydro-β-napthylamine from benzoyl-β-naphthylamine and 2-amino-*ar*-tetrahydro-3-naphthoic acid from Et 2-acetylaminonaphthalene-3-carboxylate, aromatic amino compds. of the general formula RNX_1X_2 (in which R means an aryl residue of the benzene or naphthalene series, X_1 means H, which may be replaced by alkyl, aralkyl and aryl, and X_2 means alkyl, which may be replaced by aralkyl, or acyl) and H react quickly and smoothly when treated with H in a liquid phase in the presence of a hydrogenating catalyst under pressure. Ni, Co, Cu or mixts. of these metals or oxides thereof, advantageously pptd. on a substratum of large surface, may be used as the hydrogenating catalysts. In the case of the alkyl, aralkyl or aryl derivs. the desired hydrogenated bases are obtained immediately, while in the case of acyl derivs. the acyl group may be removed by saponification, the hydrogenated bases being thus formed.

Nitrogen-containing compounds from acetylene and ammonia, etc. I. G. FARBENIND. A.-G. Brit. 334,193, Feb. 23, 1929. C_2H_2 or aliphatic aldehydes or mixts. of the latter with C_2H_2 or homologs of the latter, in mixt. with NH_3 or amines and with or

without steam, are passed over heated condensation catalysts and the products, without isolation, are passed with H over metallic hydrogenating catalysts. By passing a mixt. of NH_3, C_2H_2 and H at 350° over ZnO and Th oxide on silica gel and then over Ni on silica gel at 150° a condensate may be obtained contg. mainly piperidine and monoethylamine; adding steam increases the proportion of piperidine. NH_3 and acetaldehyde vapor mixed with H and similarly treated yields piperidine and a small quantity of amines. NH_3, C_2H_2, H and vapors of acetaldehyde and ethylamine passed at 400° over ZnO, Th oxide and metallic Cd on silica gel and then at 120° over Ni on silica gel yield ethylamine and piperidines together with small quantities of acetonitrile, propionitrile, pyridine bases and pyrrole derivs. Aniline vapor, C_2H_2 and H passed at 300° over chromic oxide, Al oxide and ZnO on silica gel and then at 200° over Ni on silica gel yield hydrogenated quinolines, mainly tetrahydroquinoline. C_2H_2, H, CH_4 and N mixed with NH_3 and passed at 380° over a mixt. of ZnO and chromic oxide and then at 150° over activated Ni yield ethylamine and acetonitrile. Other hydrogenating catalysts, etc., may also be used.

Concentrating acids. Soc. anon. des distilleries des Deux-Sèvres. Fr 37,056, Mar. 20, 1929. Addn. to 668,935 (*C. A.* **24**, 1651). The process of Fr. 668,935 is applied to the concn. of fatty acids and org. acids in general. Cf. *C. A.* **25**, 116.

High molecular dibasic acids. Pierre M. Baranger. Fr. 679,041, Nov. 27, 1928. Dibasic acids are prepd. by the reaction of esters of acids of high mol. wt. either on C_6H_6, or phenylacetic acid or $C_6H_5CH_2CN$. Examples are given of the prepn. of benzenedihydnocarpic acid, $C_6H_4[(CH_2)_{10}COOH]_2$, $C_6H_4[CH_2COOH][(CH_2)_{10}COOH]$ and $C_6H_4[CH_2CONH_2][(CH_2)_{10}CONH_2]$.

Hydroxyaliphatic acids. Henry Dreyfus. Fr. 36,609, Mar. 27, 1929. Addn. to 671,490 (*C. A.* **24**, 2143). Glycolic acid or other hydroxyaliphatic carboxylic acids are prepd. by submitting oxalic acid or other polycarboxylic aliphatic acids or acid salts of these acids to a catalytic hydrogenation in the presence of a Ni catalyst and in an inert medium. Cf. *C. A.* **24**, 1651.

Anthraquinone-1-carboxylic acids. I. G Farbenind. A.-G. Brit. 334,692, April 11, 1929. Anthraquinone-1-carboxylic acids are made by heating benzanthrone (or its derivs. substituted in the anthrone nucleus) in aq. suspension in the presence of substances having alk. reaction with free O or gases contg. free O to above 180° under pressure. Alk. substances which may be used include: hydroxides of alkali or alk. earth metals or their salts with weak acids such as Na_2CO_3, K_2CO_3 or NaOAc, NH_3 and various org. bases Cf. *C. A.* **24**, 2143.

Haloterephthalic acids. I. G. Farbenind. A.-G. (Hans Schindhelm, inventor) Ger. 512,227, Nov. 12, 1927. *p*-Xylene substituted in the nucleus with 1 or 2 atoms of Cl or Br is treated with Cl or Br under the influence of light, so that the side chains are completely halogenated. The products thus obtained yield haloterephthalic acids when sapond. Thus, 2-chloro-*p*-xylene yields 2-chloroterephthalic acid, and 2,5-dichloro-*p*-xylene yields 2,5-dichloroterephthalic acid. Examples are given.

2-Halo-5-nitroterephthalic acids. I. G. Farbenind. A.-G. (Hans Schindhelm, inventor). Ger. 512,228, Nov. 12, 1927. These are readily prepd. by nitrating monohaloterephthalic acids. Examples are given. *2-Chloro-5-nitroterephthalic acid*, m. 265°, *2-bromo-5-nitroterephthalic acid*, m. 260–2°

Sulfamic acids of secondary bases. I. G. Farbenind. A.-G. (Georg Kränzlein, Heinrich Greune, and Max Thiele, inventors) Ger. 511,525, Dec. 7, 1926. Addn. to 492,024. The method of Ger. 493,024 (*C. A.* **24**, 2759) is modified by using SO_3 instead of $ClSO_3H$.

Acetic acid. British Celanese, Ltd., S. J. Green and E. Handley. Brit 334,207, May 27, 1929. A mixt. comprising formaldehyde (or its condensation products with aliphatic alcs. such as formal) together with CO is heated to 200–450° under high pressure (preferably 100 atm. or more), and the reaction is facilitated by the presence of water, and a suitable catalyst may be used such as H_3PO_4 with Cu or Cu compds. as promoters. A reaction chamber lined with graphite or Au may be used, and the presence in the app. of Fe or other carbonyl-forming metals is avoided, Cu being a suitable metal for lining those portions of the app. in contact with the HOAc formed.

Acetic acid. Henry Dreyfus. Fr. 36,739, Mar. 6, 1929. See Brit. 319,030 (*C. A.* **24**, 2473).

Acetic acid. Soc. française de catalyse généralisée. Fr. 36,719, Jan. 26, 1929. Addn. to 681,958 (*C. A.* **24**, 4306). AcOH is prepd. by passing CO and H over catalysts consisting of different forms of phosphates, silicates and borates of Ni, Co, Cr, Fe and Cu. These may be mixed with metals, oxides or carbonates.

Synthesis of acetic acid and other oxygenated organic compounds. British

CELANESE, LTD., S. J. GREEN and R. HANDLEY. Brit. 334,189, May 27, 1929. HOAc is formed from a mixt. of CO and the vapor of MeOH, passed through a heat exchanger into a reaction chamber contg. a catalyst such as H_3PO_4; and, in general, oxygenated org. compds. may be produced from various starting materials such as CO or its mixts. with H together with MeOH, MeOAc, Me formate or dimethyl ether, by passing over heated catalysts such as those described in Brit. 283,989 (*C. A.* 22, 4133), and the products are freed from undesired condensation products such as paraffin hydrocarbons by the action of absorbents such as active C or silica gel.

Recovery of acetic acid. KURT BRATRING and EMIL ROTH-SCHMIDT. Fr. 689,733, Feb. 11, 1930. AcOH of high percentage is extd. directly from mixts. of acetylcellulose and AcOH resulting from the manuf. of acetylcellulose, by neutralizing the H_2SO_4 used as catalyst, heating the mixt. and pulverizing it in a closed chamber, the AcOH being carried off by hot air or gas from which any acetylcellulose is removed by a dust filter. The AcOH is condensed and the remaining gas used again after reheating.

Arylacetic acids. I. G. FARBENIND. A.-G. Fr. 688,964, Jan. 27, 1930. See Brit. 330,916 (*C. A.* 24, 6031).

Aliphatic anhydrides. HENRY DREYFUS. Fr. 36,747, Mar. 21, 1929. Addn. to 656,901 (*C. A.* 23, 4230). Aliphatic anhydrides, particularly Ac_2O, are made by submitting vapors of aliphatic acids, particularly AcOH, to a thermal decompn. in the presence or not of catalysts. The anhydride formed from the reaction vapors is sepd. by condensation while carrying along the steam by the vapors of one or more liquids the b. p's. of which are between those of the anhydride and the water, *e. g.*, toluene or a xylene. An app. is described.

Aliphatic anhydrides. HENRY DREYFUS. Fr. 36,811, Mar. 20, 1929. Addn. to 634,167. Aliphatic anhydrides are made by passing the vapor of an aliphatic acid over or in contact with a heated catalyst contg. one or more phosphoric acids spread on a support of C, wood charcoal or Carborundum. The temp. used is preferably 400–500° and the vessels are lined with Au, Pt or the like.

Aliphatic anhydrides. HENRY DREYFUS. Fr. 37,089, Mar. 20, 1929. Addn. to 634,167. Higher homologs of Ac_2O are made by the thermal decompn. of the vapors of the corresponding acids in the presence of one or more phosphoric acids The preferred reaction temp. is 400–500°.

Acetic anhydride, etc. H. DREYFUS. Brit. 334,533, June 1, 1929. Ac_2O and other aliphatic anhydrides are made by passing the acid vapor through a heated mass such as Cu turnings (which may be mixed with an alk. earth metal tungstate or other suitable catalysts). Various details and modifications of procedure are described.

Phthalic anhydride. I. G. FARBENIND. A.-G. (Gustav Schneider, inventor). Ger. 512,230, Jan. 1, 1929. Crude phthalic anhydride obtained by the catalytic oxidation of $C_{10}H_8$ is purified by bringing the oxidation products, before condensation, into contact with materials capable of converting the impurities, particularly α-naphthoquinone, into compds. less volatile than the anhydride. Suitably, the oxidation products are passed through fused phthalic anhydride in which a small quantity of a condensing agent, *e. g.*, H_2SO_4 or $AlCl_3$, is dissolved or suspended. Examples are given.

Phthalic anhydride. COMPAGNIE NATIONALE DE MATIERES COLORANTES ET MANUF. DE PRODUITS CHIM. DU NORD, RÉUNIES, ÉTABLISSEMENTS KUHLMANN. Fr. 689,887, Apr. 18, 1929. Crude phthalic anhydride is purified by causing a strong current of air or inert gas to act in or on the surface of the product, preferably kept a few degrees above its m. p., so that the impurities are carried off. The anhydride is then distd. or sublimed. The phthalic acid is recovered from the impurities carried off by the gas.

Bismuth salts of organic arsonic acids. I. G. FARBENIND. A.-G. Brit. 334,449, Nov. 22, 1928. A Bi salt (other than bismuthyl K Na tartrate) such as Bi nitrate is used for prepg. salts by reaction with an alkali metal salt of an acid such as 3-acetylamino-4-hydroxybenzene-1-arsonic acid, *p*-acetylaminobenzenearsonic acid, 3,4-benz(4'-methyl)imidazolonearsonic acid or the formaldehyde-bisulfite compd. of 3-amino-4-hydroxybenzene-1-arsonic acid, in equimol. proportions.

Multivalent metallic salts of half esters of phthalic acid. WM. J. BANNISTER (to Commercial Solvents Corp.). U. S. 1,779,654, Oct. 28. The Zn salt of the Bu half ester of phthalic acid is formed by effecting reaction between BuOH and phthalic anhydride, adding a petroleum hydrocarbon, and neutralizing the resulting product with moist ZnO. In a generally similar manner, there may also be formed various multivalent metallic salts of half esters of phthalic acid with alkyl groups such as Me, Et, Pr, Bu, etc., or aryl groups such as phenyl, tolyl, benzyl or cinnamyl. Multivalent metals such as Zn, Cu, Pb, Fe, Al, Mn, Ni, Co, etc., may be substituted. Although there are some exceptions, the multivalent metallic salts of half esters of phthalic acid are

generally solid, stable, neutral, *resin-like substances*, insol. in water, sol. in org. solvents and exerting a solvent action on nitrocellulose. The Zn and Fe Bu phthalates are plastic solids similar to certain resins in some of their phys. properties, the Zn compd. being colorless and the Fe, reddish brown. The corresponding Cu compd. is a dry powder, bluish green in color.

Multivalent metallic salts of half esters of phthalic acid. WM. J. BANNISTER (to Commercial Solvents Corp.). U. S. 1,779,688, Oct. 28. For the production of the Zn salt of the Bu half ester of phthalic acid, reaction is effected between BuOH and phthalic anhydride in the presence of a solvent such as toluene or a suitable petroleum hydrocarbon material, followed by neutralization with an alkali such as NaOH and reaction with a Zn salt such as $ZnSO_4$. A similar procedure may also be followed in making salts of other half esters and of other multivalent metals such as those generally mentioned in U. S. 1,779,654 (preceding abstract).

Ethylene from acetylene. I. G. FARBENIND. A.-G. Fr. 688,791, Jan. 24, 1930. See Brit. 325,152 (*C. A.* **24**, 3802).

Absorbing propylene in acids. J. W. WOOLCOCK and IMPERIAL CHEMICAL INDUSTRIES, LTD. Brit. 334,228, April 30, 1929. C_3H_6 is absorbed in mixts. of HOAc with H_2SO_4 or with acid isopropyl sulfate (suitably in the presence also of addnl. solvents such as isopropyl alc.) at temps. not exceeding 60°. Isopropyl sulfates and isopropyl acetate are formed and the latter may be recovered by distn. or may be sepd. as a top layer on the addn. of water to the mixt; the sulfuric esters are converted into isopropyl alc. by hydrolysis. C_3H_6 may be sepd. from mixts. by absorbing the higher olefins in cooled 80% H_2SO_4 and then absorbing the C_3H_6 as described (C_2H_4 being substantially unabsorbed). Various details and modifications of procedure are described.

Methanol. ALFRED T. LARSON (to Lazote, Inc., name changed to Du Pont Ammonia Corp. assignor to Canadian Industries, Ltd.). Can. 307,671, Jan. 13, 1931. Methanol is manufd. by passing a gaseous mixt. contg. CO and H, at a pressure of 400–1000 atm. and a temp. of 250–500° over a heated catalyst consisting of the reduction product of a fused mixt. of Cu oxide and an oxide of one of the elements of the group Mn, W, Zn, Cd and Mo.

Methanol. IMPERIAL CHEMICAL INDUSTRIES, LTD. Fr. 689,757, May 9, 1927. MeOH is prepd. by passing a mixt. of CO and H over a catalyst composed of $4ZnO.CrO_3$ at 300–400° and under high pressure. The catalyst is prepd. by suspending ZnO or $Zn(OH)_2$ in water and treating it at ordinary temp. with a slight excess of CrO_3. If the catalyst contains alkali salts higher alcs. are formed.

Synthesis of methanol, etc. I. G. FARBENIND. A.-G. (Mathias Pier, Rudolf Wietzel and Karl Winkler, inventors). Ger. 510,302, Feb. 8, 1924. See Brit. 254,160 (*C. A.* **21**, 2703).

Reactivating catalysts used in methanol synthesis, etc. BRITISH CELANESE LTD., W. BADER and E. B. THOMAS. Brit. 334,251, May 31, 1929. Catalysts such as oxides, *e. g.*, ZnO alone or with metals such as Zn or Cu, employed in the synthesis of MeOH, etc., from CO and H or in like reactions, are reactivated by the action of H or gas mixts. rich in H at temps. higher than those used for the reaction (suitably 370°) and suitably under high pressures such as those employed in the synthesizing reaction (*e. g.*, 100 atm.).

1,3-Butylene glycol. I. G. FARBENIND. A.-G. Fr. 689,002, Jan. 29, 1930. See Brit. 311,671 (*C. A.* **24**, 865).

Acetaldehyde. G. F. HORSLEY and IMPERIAL CHEMICAL INDUSTRIES, LTD. Brit. 334,427, Oct. 21, 1929. Reaction of C_2H_2 with steam is effected (suitably at 300–350°) in the presence of a ZnO catalyst activated by a small proportion of a molybdate or molybdic acid. Various details are described for prepg. and using the catalyst.

Hydrogenating crotonaldehyde to produce butyraldehyde and butyl alcohol. LLOYD C. SWALLEN (to Commercial Solvents Corp.). U. S. 1,788,896, Jan. 13. A mixt. of H and crotonaldehyde in mol. proportion is passed over a reduced Cu silicate catalyst at a temp. of about 170°.

Acetone. HOLZVERKOHLUNGS-IND. A.-G. Fr. 688,437, Jan. 18, 1930. Acetone is prepd. by passing a mixt. of C_2H_2 and steam at a high temp. over contact substances of high activity such as O compds. of heavy metals disposed in thin layers perpendicular to the direction of flow of the reaction gases.

Dihydroxyacetone. I. G. FARBENIND. A.-G. (Karl Böttcher, inventor). Ger. 510,426, Apr. 30, 1926. In isolating dihydroxyacetone from solns. of its alkali bisulfite compds., the latter are decompd. by treatment with a salt of a metal that forms a difficultly sol. sulfite but does not form a stable bisulfite compd. with dihydroxyacetone. $Ba(OAc)_2$ is a suitable salt. An example is given.

Aminosulfonyl chlorides. I. G. FARBENIND. A.-G. Fr. 690,112, Feb. 17, 1930. Aromatic aminosulfonyl chlorides and their ring substitution products are prepd. by the reaction of $ClHSO_3$ on aromatic aminosulfonic acids and their ring substitution products. Thus, 4-chloroaniline-3-sulfonic acid is introduced with cooling into $ClHSO_3$, and gradually heating to 80–90°, whereby the chloride of the acid is obtained. Several other examples and a table of products which can be obtained are given.

β-Hydroxyethyltrimethylammonium monoborate. KARL LÜDECKE. U. S. 1,788,-980, Jan. 13. At least one mol. proportion (but less than 3 mol. proportions) of H_3BO_3 is dissolved in an aq. soln. of β-hydroxyethyltrimethylammonium hydroxide, this soln. is concd. *in vacuo*, the concentrate is redissolved in alc. and the β-hydroxyethyltrimethylammonium monoborate is pptd. from the alc. soln. by a reagent such as acetone. In a modified process, the initial reaction may be effected in alc. soln. Various details of procedure are given.

Benzyl chloride. IMPERIAL CHEMICAL INDUSTRIES, LTD., N. BENNETT, H. DODD, W. C. SPRENT and F. HOLT. Brit. 334,260, June 1, 1929. In the manuf. of benzyl chloride by the action of HCl on crude mixts. contg. benzyl alc. (such as the mixts. recoverable from the manuf. of benzyl cellulose) better yields are obtained by pretreating the mixt. with an alk. substance such as an excess of anhyd. Na_2CO_3. Various details of procedure are described. Brit. 334,261 describes a process in which the crude mixt. contg. benzyl alc. and other products recoverable from the manuf. of benzyl cellulose is treated with Cl, thus forming benzyl chloride and benzaldehyde together with possibly also some benzoyl chloride and nuclear chlorinated derivs., or this treatment may preferably be applied to the residues from benzyl chloride production as described in Brit. 334,260. The production of benzoyl chloride can be avoided by limiting the quantity of Cl used.

2,5-Dichloro-4-aminotoluene. I. G. FARBENIND. A.-G. (Franz Heule and Ernst Hotz, inventors). Ger. 510,306, Mar. 16, 1927. 2,5-Dichloro-4-aminotoluene is obtained, free from isomers, by nitrating 2-amino-5-chlorotoluene in H_2SO_4, diazotizing the nitro deriv. so obtained, exchanging the 2-diazo group for Cl, and reducing the resulting 2,5-dichloro-4-nitrotoluene. The diazotization of the nitrochloroamino compd. should be effected, without isolating the compd., by adding $NaNO_2$ to the nitration mixt after the nitration, and then pouring into water. An example is given.

Chloroxylidines. I. G. FARBENIND. A.-G. (Erwin Hoffa and Erwin Thoma, inventors). Ger. 510,438, Oct 12, 1926. 1-Nitro-2,4-dimethylbenzene is treated with the amt. of Cl or other chlorinating agent required to introduce 1 or 2 atoms of Cl into 1 mol. There is so obtained (1) a mixt., separable by fractional crystn., of *3-chloro-1-nitro-2,4-dimethylbenzene*, m. 46–47°, with *5-chloro-1-nitro-2,4-dimethylbenzene*, m. 42–43°, or (2) *3,5-dichloro-1-nitro-2,4-dimethylbenzene*, m. 79–80°. The products are reduced, yielding *3-chloro-1-amino-2,4-dimethylbenzene*, m. 48–49°, *5-chloro-1-amino-2,4-dimethylbenzene*, m. 98–99°, and *3,5-dichloro-1-amino-2,4-dimethylbenzene*, m. 56–57°. Examples are given.

Phenethyl alcohol. I. G. FARBENIND. A.-G. (K. Brand, inventor). Ger. 504,861, Dec. 4, 1924. The above alc. and its org. acid esters are prepd. by the action of EtNHPh with HNO_2 in a soln. of weak acid such as an org. carboxylic acid. Examples are given.

2,4,6-Tribromoaniline and its acidyl derivatives. BRITISH CELANESE, LTD., and B. F. M. MILLER. Brit. 334,217, May 29, 1929. 2,4,6-Tribromoaniline is purified by sublimation, preferably at 160–5°, and may be treated with AcCl or other acetyl halide or Ac_2O to form substantially pure acyl-2,4,6-tribromoanilides (examples being given of the production of 2,4,6-tribromomonoacetanilide and 2,4,6-tribromodiacetanilide, the last mentioned compd. being suitable for incorporation in compns. of cellulose acetate or other cellulose derivs.).

Dinaphthylene dioxide. I. G. FARBENIND. A.-G. (Josef Binapfl, inventor). Ger. 510,-463, Dec. 16, 1927. 2,2'-Dihydroxy-1,1'-dinaphthyl is treated with O (or gases contg. O) in the presence of an oxide or other compd. of a heavy metal. The reaction may be effected in a solvent, and an org. amine, which acts as an accelerator, may be included in the mixt. The reaction temp. may be 175–85°. Examples are given.

Hydroxythionaphthenes. ERWIN HOFFA and FRITZ MÜLLER (to General Aniline Works). U. S. 1,785,813, Dec. 23. 6-Ethoxyhydroxythionaphthene is made by saponifying at a temp. of between 40° and 70°, 5-ethoxy-2-cyanobenzene-1-thioglycolic acid by the action of H_2O_2 in an alk. soln. so as to form 5-ethoxybenzene-2-carboxamide-1-thioglycolic acid and transforming the latter by the action of an alkali into the 6-ethoxyhydroxythionaphthene, and, in general, hydroxythionaphthenes may be produced by saponifying a cyanoaryl-*o*-thioglycolic acid, $NCRSCH_2COOH$, wherein R stands for an unsubstituted or substituted aromatic hydrocarbon residue, by the action of H_2O_2 in an

alk. soln. so as to form the corresponding arylcarboxamide-*o*-thioglycolic acid, H_2NOC-$RSCH_2COOH$, and transforming the latter by the further action of an alkali into the hydroxythionaphthene.

Hydroxythionaphthenes. I. G. FARBENIND. A.-G. Fr. 36,846, Apr. 27, 1929. Addn. to 652,049 (*C. A.* 23, 3477). In the prepn. of arylcarboxamido-*o*-thioglycolic acids described in Fr. 652,049, org. sulfonic acids, particularly sulfonation mixts. of $C_{10}H_8$ and phenols, are used as sapon. agents.

2-Aminopyridine. SCHERING-KAHLBAUM A.-G. (Curt Räth, inventor). Ger. 510,432, Mar. 8, 1927. 2-Halopyridine is heated with aq. NH_3 in the presence of a catalyst, *e. g.*, $CuSO_4$. Examples are given.

α,α'-Diaminopyridine. KARL PHILIPP (to Pyridium Corp.). U. S. 1,789,022, Jan. 13. Pyridine is added directly to sodamide while the latter is in fused condition.

***C*-Alkylated phenols.** WALTER SCHOELLER, HANS JORDAN and REINHARD CLERC (to Schering-Kahlbaum A.-G.). U. S. 1,788,847, Jan. 13; Ger. 510,442, Oct. 19, 1927. Dihydroxydiphenylmethane is treated with a mixt. of H and an inert gas such as N or water vapor (the water vapor formed in the reaction being suitably left in the reaction mixt.) in the presence of a hydrogenation catalyst, under pressure and at a temp. of about 200°. Examples are given of the production of *p*-isopropylphenol and phenol from di(4-hydroxyphenyl)dimethylmethane and of *m*-cresol and thymol from di(4-methyl-6-hydroxyphenyl)dimethylmethane.

Alkylated phenols. SCHERING-KAHLBAUM A.-G. (Walter Schoeller and Hans Jordan, inventors). Ger. 512,236, Jan. 27, 1928. Addn. to 510,442. The method of Ger. 510,442 (preceding abstr.) is effected in the presence of a "surface catalyst," *e. g.*, fuller's earth or diatomite, on which the hydrogenation catalyst may be pptd.

Extracting *p*-aminophenol from a mixture of compounds obtained in the course of a reaction. M. V. NEVREV and V. S. ROZINA. Russ. 26,475, Apr. 12, 1928. *p*-Aminophenol is sepd. from the mixt. of reaction products obtained in the reduction of *p*-nitrosophenol with iron by the addn. of NaOH, sepn. from the mud, addn. of a weak acid reaction and salting out of the *p*-$HOC_6H_4NH_2.HCl$ by usual methods.

Mono- and di-methylol-*p*-halophenols. I. G. FARBENIND. A.-G. (Max Weiler and Karl Berres, inventors). Ger. 510,447, May 18, 1929. *p*-Halophenols are treated with CH_2O in the presence of an alk. substance. The phenols may contain indifferent substituents, but at least one *o*-position to the OH group must be free. Examples are given describing the prepn. of *2-methyl-4-chloro-6-methylolphenol*, m. 61°, *2,4-dichloro-6-methylolphenol*, m. 70°, *4-chloro-2,6-dimethylolphenol*, m. 165° and *4-bromo-2,6-dimethylolphenol*, m. 150° (decompn.). 2-Methyl-4-bromophenol does not yield methylol derivs. by this method.

Hydroindoleindophenols. FRITZ BALLAUF (to General Aniline Works). U. S. 1,780,058, Oct. 28. Dihydroindole indophenolic compds. are formed by subjecting a dihydroindole of the formula $\overline{R'.NR.CHR.CHR}$ wherein R stands for H, an alkyl, aryl or an arylkyl group and R' stands for a C_6H_6 nucleus which may be substituted by alkyl, aryl, aralkyl, halogen or other univalent group, and an aromatic *p*-aminohydroxy compd. to a reaction leading to the formation of an indophenol. Examples with details of procedure are given for the production of 2-methyldihydroindoleleucoindophenol (from 2-methyldihydroindole and *p*-aminophenol), and of dihydroindoleleucoindophenol, 2-phenyldihydroindoleleucoindophenol, 1,2-dimethyldihydroindoleleucoindophenol and 2-methyldihydroindoleleucodichloroindophenol. These novel leucoindophenols, contg. the dihydroindole nucleus, are usually yellow cryst. substances, easily sol. in water, alc. and H_2SO_4, but much less sol. in salt solns. They form colorless solns. with aq. alkalies, in which the leucoindophenol is easily oxidized, even in contact with atm. O, to the corresponding dark colored indophenols.

***tert*-Butylnaphthol.** FRANZ KOENIGSBERGER (to Dehls & Stein). U. S. 1,788,529, Jan. 13. 4-*tert*-Butyl-β-naphthol is made by mixing together β-naphthol, $AlCl_3$ and *tert*-Bu chloride at room temp., warming gently under a reflux condenser until evolution of HCl ceases, boiling with water and decanting the water, and then distg. *in vacuo*. The product b_8 at about 146° and m. about 102°. Chlorinated and other halogenated derivs. are readily formed from it, and it may be used as a *plasticiser for cellulose derivs.*, as a *dye component*, and for making *pharmaceutical compds.*

Menthol. RHEINISCHE KAMPFER-FABRIK G. M. B. H. Fr. 36,777, Feb. 14, 1928. Addn. to 558,979. See Brit. 285,403 (*C. A.* 22, 4540).

Thymol. RHEINISCHE KAMPFER-FABRIK G. M. B. H. (Karl Schöllkopf and Arthur Serini, inventors). Ger. 511,949, June 2, 1928. See Brit. 312,907 (*C. A.* 24, 865).

Mercaptobenzothiazole. IMPERIAL CHEMICAL INDUSTRIES, LTD. Fr. 690,004,

Feb. 17, 1930. Reactions are carried out continuously by introducing the liquid or liquids under treatment into a pressure chamber from which on completion of the reaction the liquid overflows into a second chamber disposed in the reaction chamber and is drawn off. The app. may be used for prepg. mercaptobenzothiazole from a soln. of S in CS_2 mixed with $PhNH_2$.

Bromomenthane. SCHERING-KAHLBAUM A.-G. Brit. 334,474, Dec. 31, 1928. Menthane is treated with Br in the presence of I as a catalyst.

Caffeine. MONSANTO CHEMICAL WORKS. Brit. 334,741, Oct. 7, 1929. Methyl chloride is used for methylating theobromine or its salts, and when theobromine itself is used a basic substance is added to neutralize the liberated HCl. Various details of procedure are given.

Porphyrins. HANS FISCHER (Paul Halbig, inventor). Ger. 510,433, Mar. 25, 1926. *C*-Tetrasubstituted pyrroles having a CH_2Br group in the α-position and a $COOC_2H_5$ group in the α'-position are heated with acids or water, whereby CH_2Br_2 is split off and dipyrrylmethane derivs. contg. $2COOC_2H_5$ groups are obtained. The corresponding acids, which are easily obtained by sapon., lose CO_2 when heated, yielding porphyrins. Thus, 2-bromomethyl-3-ethyl-4-methyl-5-carbethoxypyrrole, treated as above, yields an isomer of etioporphyrin, while 2-bromomethyl-4-methyl-5-carbethoxypyrrole-3-propionic acid yields isocoproporphyrin. Cf. *C. A.* 20, 2159–60.

Porphyrins. HANS FISCHER. Ger. 511,644, Oct. 9, 1926. Addn. to 510,433 (preceding abstr.). Dipyrrylmethanedicarboxylic acids, prepd. as described in the prior patent, are converted into porphyrins by treatment with acid, particularly HCOOH. Examples are given. Cf. *C. A.* 25, 716.

11—BIOLOGICAL CHEMISTRY

PAUL B. HOWE

A—GENERAL

FRANK P. UNDERHILL

The formation of an enzyme-substrate complex in the system carboxylase–pyruvic acid. YU. V. MEDVEDEV. *Compt. rend. acad. sci. U. R. S. S.* 1930A, 61–6.—Indirect evidence is obtained for the formation of an enzyme-substrate complex ($F'S$) in the system carboxylase-$AcCO_2H$. Insofar as $F'S$ is formed the chem process is retarded, producing the effect of "poisoning." When some of the $F'S$ dissociates, $F'S \longrightarrow F' + S$, the F' concn. increases and consequently the chem. process speeds up. This is the "induction" effect. Expts. were run in which the reaction velocity was measured over a 1-hr. period at 10-min. intervals, sufficient time being allowed at the beginning for all CO_2 from auto-fermentation of the yeast (carboxylase) to be eliminated. The velocity was followed by volumetric detn. of the CO_2 formed. When the amt. of enzyme was the only variant the amt. of poisoning in the initial stages was directly proportional to the resulting relative S concn. When this concn. was high the induction was therefore greater, since after 2.5 hrs. the process reached the same degree of completeness in all cases. The effect of various factors upon the kinetic picture, *i. e.*, upon the $F'S$ concn., was studied. There were (I) slight alterations in the mol. S, *e. g.*, tautomeric modification; (II) change in p_H, 5.5 to 6.8; and (III) addn. of a coenzyme C (boiled yeast broth) both before and after S. The results and conclusions follow: (I) the poisoning effect is greatly lessened by using $AcCO_2Na$ as S, *i. e.*, the compd. $F'S$ is formed only with free $AcCO_2H$. (II) This effect is much smaller at p_H 6.8 than at p_H 5.5, *i. e.*, increase in p_H inhibits formation of $F'S$. (III) C added before S reduces the amt. of poisoning; added after S it does not. C therefore acts by forming a complex CS, but cannot affect $F'S$ if already formed. LEWIS W. BUTZ

Sperma as live fluid crystals. FRIEDRICH RINNE. *Naturwissenschaften* 18, 837–41(1930); cf. *C. A.* 24, 5773.—A review comparing morphological, chem., thermal and optical characteristics of sperma and of fluid crystals. B. J. C. v. D. H.

The position of biology in the scientific thought of this day. OTTO STECHE. *Naturwissenschaften* 18, 841–6(1930). B. J. C. VAN DER HOEVEN

The apparent multiplicity of respiration enzymes. R. P. COOK, J. B. S. HALDANE AND L. W. MAPSON. *Naturwissenschaften* 18, 848(1930).—A suspension of coli bacilli in water satd. with toluene does not oxidize lactic or succinic acid completely as the untreated organism does but burns them to pyruvic and fumaric acids, resp. The 2 reactions were studied at p_H 7.5, also the oxidation of formic acid at p_H 6.3 in Bar-

croft manometers, at 17°, different O_2-CO mixts. being used to find the relative affinities of the Warburg respiration enzyme for these gases. With lactic acid the value of K (approx. the ratio of O_2 and CO affinity) varied from 10.8 to 14.5, av. 12.5 in 6 expts. For formic acid K was 2.67 to 4.72, av. 3.83 in 10 expts. The enzyme-CO compds. are all very little sensitive to light. Conclusion: In the same cell at least 2, probably 3, different respiration enzymes are present; one has the effect of lactic acid dehydrogenase, the other one that of formic acid dehydrogenase. B. J. C. VAN DER HOEVEN

A new sterol in the human brain. IRVINE H. PAGE AND EUGEN MÜLLER. *Naturwissenschaften* **18**, 868(1930).—Crude cholesterol extd. from the brain by acetone was recrystd. twice from EtOH and once from benzine; it gave an almost pure white product, m. 149°. The mother liquors of the recrystns., concd. and freed of crystals, were evapd. to a red-brown sirup; this was sapond. with EtONa and the fatty acids were pptd. with $CaCl_2$. The sterol fraction obtained from the product by ether extn. was white after repeated EtOH recrystn. and hexane recrystn.; it m. 144°. Acetylation and fractional crystn. of the acetyl product gave a small quantity of acetylsterol, crystg. from MeOH in long thin needles; this was different from cholesteryl acetate. The new sterol acetate had a sharp m. p. of 105°, sp. rotation in $CHCl_3$ $\alpha_D^{25} = -25.17°$. Sapon. by EtONa and recrystn. of the sterol gave a product m. 132–5°, rotation in $CHCl_3$ $\alpha_D^{22} = -18.95°$; analysis showed 83.16 C, 12.41 H, *i. e.*, $C_{25}H_{44}O$. No maxima were found in the absorption spectrum above 240 mμ. B. J. C. VAN DER HOEVEN

Determination of the molecular weight of coconut globulin. R. SPYCHALSKI. *Roczniki Chem.* **10**, 630–50 (651 English)(1930).—Two methods of The Svedberg utilizing the measurements of the sedimentation velocity and sedimentation equil. in strong centrifuged fields are described by which mol. wts. of numerous proteins are detd. and a summary is given of all the results obtained by these 2 methods in the Laboratory of Physical Chemistry of the University of Upsala during the past 5 yrs. The mol. wt. of the coconut globulin was detd. by ultracentrifugal methods. This protein is rather unstable, being easily decompd. during the process of prepn. It is a mixt. of 2 main constituents of approx. mol. wt. of 208,000 and 104,000, the larger mols. being present in much greater amt. than the smaller one. The mol. wt. of coconut globulin is considered within exptl. limits, to be the same as that of other oil-seed globulins studied earlier; the smaller mols. represent the first stage of the protein cleavage. J. KUČERA

The effect of split products on enzymic proteolysis. P. RONA, H. KLEINMANN AND E. DRESSLER. *Biochem. Z.* **228**, 6–76(1930); cf. *C. A.* **24**, 5314.—It is again shown that in digestion expts. in which the mixt. is analyzed by a micro-nephelometric method no inhibition of hydrolysis is observed even in the presence of a great excess of hydrolysis products. However, the findings of other observers, who using macro methods have noted a very marked inhibition of hydrolysis in mixts. contg. about 50 times as much substrate and 20 times as much enzyme, have also been corroborated. It is stated that this difference in results is not due to analytical procedures but to the way in which the digestion mixt. is prepd. It is assumed that the combination of the enzyme with the hydrolysis products in the presence of small quantities of enzyme is completely dissociable, but with enzyme concns. beyond this limit the combination begins to exert an inhibiting effect upon further hydrolysis. At a given enzyme concn. an increase in the concn. of split products or a diminution of the substrate concn. equally depresses the hydrolysis. The inhibition in the peptic digestion is entirely different from that in the system casein–trypsin or trypsin–kinase. In this case the results by the micro and macro procedures are also different but they are due to methods of analyses. Where the matter is studied by titrating the hydrolysis products there was always observed an inhibition, but this was never found where the unchanged substrate was measured nephelometrically. In other words, where the primary change in the protein mol. is such that it no longer gives a turbidity with alkaloids, *i. e.*, where the disaggregation by pepsin can be detected, there no inhibition of the process becomes manifest, but the splitting off of COOH groups following the primary disaggregation is definitely inhibited. This sepn. of the digestive process into 2 phases, one of which is inhibited and the other of which is not inhibited, is observable in pepsin but not in trypsin digestion. It still remains, however, as a possibility that even with pepsin it might be practicable to reduce the enzyme concn. to such a low level that the combination will be completely dissociable and the process will not be any longer inhibited. S. M.

Kinetic considerations of the stereochemical specificity of human liver esterase. P. RONA, H. FISCHGOLD AND R. AMMON. *Biochem. Z.* **228**, 77–88(1930).—Optical inversion has been observed in the Me ester of mandelic acid as was already done by

Bamann for the Et ester. This depends entirely upon the substrate concn. The hydrolysis products have no influence on the optical orientation. The mechanism of this inversion has not been discovered, and cannot be elucidated from the viewpoint of interaction of the affinity and hydrolysis consts. of the intermediate reaction products. S. MORGULIS

The influence of sodium monoiodoacetate on the enzymes of zymase and the fermentation of hexosediphosphate. IZUE YAMASAKI. *Biochem. Z.* **228**, 123–6(1930).—The glycolase and the carboxylase enzymes of yeast are little affected by $NaCO_2ClH_2$ in concns. as used by Lundsgaard. The carboxylase, perhaps, is somewhat more affected since the yield of CH_3COCO_2H is only 70% of the control. It is thought possible that the $NaCO_2ClH_2$ inhibits the phosphatese; at any rate, it does not seem to affect the fermentation of hexosediphosphate by the yeast maceration juice. S. M.

The zymatic system of Saccharomyces Johannisberg. IZUE YAMASAKI. *Biochem. Z.* **228**, 127–34(1930).—The presence of glycolase is demonstrated by the formation of methylglyoxal from Mg hexosediphosphate with alc.-ether prepns. of this yeast. The presence of carboxylase is shown by the fermentation of CH_3COCO_2H. Its phosphate esterification capacity is not very great; nevertheless a hexosediphosphate was isolated which showed levulose reactions, so that the mechanism for converting aldose to ketose is effective. S. MORGULIS

The chemical structure of the associated components obtained from gelatin and from gelatin peptone. VII. Fractionation of gelatin peptone and the chemical structure of the fractions. A. FODOR AND CH. EPSTEIN. *Biochem. Z.* **228**, 310–4(1930); cf. *C. A.* **24**, 4312.—A study of one of the gelatin peptone fractions (P III) (cf. *C. A.* **23**, 618, 4956) which is a glycylprolylalanylglycylhydroxyprolylalanine which is isolated from the gelatin peptone treated with Ac_2O. This assocd. component is represented by the structural formula gl—pr—al—gl—oxypr—al. **VIII. The nature of the acetylated peptide associations obtained from gelatin decomposed by glycerol.** *Ibid* 315–26. S. MORGULIS

Studies on the chemical constitution of serum and organ proteins. III. ALFRED BLANKENSTEIN AND ANTON FISCHER. *Biochem. Z.* **228**, 437–42(1930); cf. *C. A.* **24**, 5364.—The importance of using *exactly* neutral $(NH_4)_2SO_4$ in the pptn. of blood proteins is emphasized. Different proteins were also prepd. from kidney, liver and lung which could not be identified as similar or as resembling the proteins of serum and muscle. S. MORGULIS

Oxidation of leuco-methylene blue. ALBERT REID. *Biochem. Z.* **228**, 487–90 (1930).—Sublimed leuco-methylene blue shaken in O_2 with an acetate buffer of p_H 4.5 is oxidized through the catalysis by the Cu present in traces as impurity in the acetate mixts. Added Cu promotes the oxidation while CO reacting with Cu^+ inhibits the oxidation. H_2O_2 is produced in this oxidation. The oxidation does not proceed and is not materially advanced by heavy metals in a phosphate buffer of p_H 7.5 contg. protein, nor is it inhibited either by CO or HCN but is inhibited by narcotics. This indicates that the oxidation of the leuco-methylene blue is a surface phenomenon. S. M.

The natural chemical equilibrium regulative of growth by increase in cell number. FREDERICK S. HAMMETT. *Protoplasma* **11**, 382–411(1930); cf. *Protoplasma* **7**, 297–322(1929); *C. A.* **24**, 4313.—Using the technic previously described, H. tested the effect of a series of S compds. chiefly org. The -SH group was found to be specifically stimulative of cell division. Oxidation products of that group have the opposite effect. M. H. SOULE

Action of several powdered organs upon the amylase of powdered pancreas. A. BADREAU. *J. pharm. chim.* [8], **12**, 20–31(1930).—The following powders were prepd. from defatted materials dried for 4 hrs. in a current of air at 7–9°: salivary glands (ox), mucous membrane of the stomach (hog); pancreas of hog, ox and horse; bile; duodenum (hog). All powders, even the salivary and bile, were decidedly acid to litmus, acidities (cc. of 0.1 *N* NaOH per 1 g.) were, resp., 3, 4.5, 5.5, 6, 6, 2.5, 6.5; p_H was practically uniform: 6 to 6.3. The powd. salivary glands and duodenum were also found to contain amylase. A markedly increased effect upon the amylase of powd pancreas and other amylase-contg. powders by admixt. with other powd. organs whether contg. amylase or not is noted. This effect is not caused by any presence of maltase, but rather by the presence of amino acids in these powders. Peptones rich in amino acids have the same enhancing amylolytic effect, increasing the speed of hydrolysis; hence the *amino acids* may be regarded as the *coenzyme* (Bertrand) necessary to the action of amylase in powd. pancreas. S. WALDBOTT

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B—METHODS AND APPARATUS

STANLEY R. BENEDICT

The neutral red test in pernicious anemia. S. J. COHEN, M. J. MATZNER AND IRVING GRAY. *Arch. Internal Med.* **46**, 979–83(1930).—A method for the detn. of neutral red in the gastric contents is described. Since other investigations have shown that this dye is secreted in the bile and in some of the intestinal secretions, its presence in the stomach may be due to duodenal regurgitation and therefore does not preclude a diagnosis of pernicious anemia. J. B BROWN

Determination of ammonia and amino acids in urine. A. AGRESTINI AND M. STANGANELLI. *Ann. chim. applicata* 20, 582–8(1930).—In comparing the results of detns. of NH_3 in org. liquids, especially urine, the authors found that the different methods did not always give comparable results. The methods of Schiff-Sörensen and Folin were both found to give low results in the presence of amino acids. To eliminate this difficulty, 40 cc. of soln. was treated with 20 cc. of 7.5% Na_2HPO_4 and 1·2 g. of $MgCO_3.Mg(OH)_2$, and the sides of the beaker were rubbed with a stirring rod After 4 hrs., the ppt. was filtered and the amino acids in the filtrate were detd. on an aliquot by the method of Sørensen. A qual. test with KI and NaOCl was also developed. If to 5–10 cc. of soln. 5–10 drops of 10% KI and a few drops of NaOCl are added, the presence of NH_3 is shown by the appearance of a black color in the soln. The reaction is only sensitive to 1/50,000 but S ion, SH, etc., do not interfere, and the test can be applied to colored solns. A. W. CONTIERI

A micro determination of copper in blood. F. GRENDEL. *Pharm. Weekblad* **67**, 1345–51(1930).—The method, previously described by G. (*C. A.* **24**, 5885), consists in ashing the sample with H_2SO_4, electrodeposition of the Cu, dissolving in HNO_3 and detg. colorimetrically with Et_2NCS_2Na. It is now modified for micro detn. in the blood, where the available sample is 5 cc. or less, representing 0.005–0.015 mg. Cu. The electrolysis is performed in a micro app. with a current of 2–3 v. and 15–30 milliamp. The other modification consists in extg the colored reaction product with CCl_4 and comparing with a standard prepd. in the same manner and contg. 0.015 mg. Cu. Analyses reported are: ox blood, 0.0038 mg. Cu in 5 cc.; horse blood, 0.0044 mg. in 3 cc.; human blood, 0.003 mg. in 4 cc. A. W. DOX

Quantitative estimation of urine sugar via Bertrand. FELIX JÜSTEN. *Arch. Pharm.* **268**, 559–65(1930).—A crit. study of this method inclusive of results obtained with certain modifications in the procedure. W. O. E.

Progress and results in the examination and diagnosis of urine. E. SPAETH. *Arch. Pharm.* **268**, 594–622(1930); cf. *C. A.* **24**, 638.—A digest of recent literature on this subject. W. O. E.

Compilation of certain disturbing factors in the examination of urine. ERNST PFAU. *Apoth. Ztg.* **45**, 1601–2(1930).—The various disturbing influences in the estn. of sugar, blood, pus, AcMe, acetoacetic acid and albumin are noted in tabulated form. W. O. E.

Cell for the measurement of the specific conductivity of the blood serum. WM. R. ASHBY. *Biochem. J.* **24**, 1557–9(1930).—The cell combines large electrodes, with a high resistance, and needs only 1 cc. serum. BENJAMIN HARROW

Stannous chloride as a preventive of the formation of "melanin substance" in the acid hydrolysis of protein. FUJIO NARITA. *J. Agr. Chem. Soc. Japan* **6**, 292–306 (1930); *Bull. Agr. Chem. Soc. Japan* **6**, 23–5.—In the analyses of protein by acid hydrolysis, "melanin substance" interferes with the accurate estn. of amino acids. Hlawetz and Haberman succeeded in preventing the formation of "melanin substance" by means of the addn. of $SnCl_2$. The application of $SnCl_2$ to the detn. of N distribution by Van Slyke's method was tried. The amt. of "melanin substance" could not be expressed by the N value, because tin sulfide, produced on the removal of Sn, adsorbed not merely melanin but also other nitrogenous compds. Arginine, histidine, cystine and tryptophan especially were adsorbed by stannic sulfide. When the formation of "melanin substance" is not large, the protein analysis can be made with good results. Y. KIHARA

The precipitation of uroselectan from its acid solutions at different p_H values. RUGGERO ASCOLI. *Biochim. terap. sper.* **17**, 277–86(1930).—Uroselectan, the Na salt of the 5-iodo-2-hydroxypyridine-*N*-acetic acid, is pptd. from its solns. in urine at a p_H from 4.4 to 4.6. For its use in pyelography, the urine must be of low acidity or neutral. A. E. MEYER

A modification of the apparatus of Folin for the determination of urea in blood. ANTONIO NERI. *Biochim. terap. sper.* **17**, 379–87(1930).—The reaction tube and titration tube are connected on a support in a way that permits them to rest on a water bath. Both tubes carry stoppers perforated by burets with stopcocks, so that the measured liquids may be added without opening the app. The connection is made by a glass tube, all rubber connections being avoided. The first part of this tube forms a serpentine, to permit the sepn. of liquid particles carried along by the air stream. Besides it carries 2 stopcocks; between them, the tube is enlarged and has an opening with a glass stopper. This permits insertion of an azolitmin paper into the tube, when one supposes that the reaction is over and to find out if NH_3 is still passing. A. E. M.

Determination of sulfide sulfur in the stools. J. ST. LORANT AND F. REIMANN. *Biochem. Z.* **228**, 300–9(1930).—Stools are thoroughly mixed and rubbed in a ball mill with the aid of dil. borax soln. An aliquot of the suspension is acidified and freed of its H_2S by drawing air through it. The air is passed through a soln. of Zn acetate wherein the H_2S is absorbed. To prevent the entrance of SO_2 or of O_2, the air before passing through the stool suspension was bubbled through 2 wash bottles contg. KOH and pyrogallol. Fresh stools were preserved in a glass container with 5% borax. The vol. was made up with borax to 750 cc. This was transferred to a porcelain ball mill, washed with 250 cc. of the borax soln. and shaken 20 min. Of the suspension 20 cc. was placed in a large test tube connected to 2 other test tubes, each contg. 20 cc. 10% KOH and 20 cc. 10% pyrogallol. The air passed directly into a graduated cylinder contg. 20 cc. of a soln. of 50 g. Zn acetate, 10 g. Na acetate and 0.05 g. NaCl per l. To the tube contg. the stool suspension 20 cc. 50% H_3PO_4 is added whereupon the aeration is started slowly. Gradually the aeration is increased and is continued for 30 min. The contents of the cylinder are then dild. to 35 cc. with H_2O and 7.5 cc. of a special reagent is quickly added and the cylinder closed. The reagent consists of 1 g. dimethyl-*p*-phenylendiamine sulfate dissolved in 100 cc. H_2O in a 2 l. vol. flask and at once treated with 400 cc. purest H_2SO_4, sp. gr. 1.71. The soln. is cooled and made up to vol. Then, just as quickly, are added 2 cc. of a soln. contg. 25 g. ferric NH_4 sulfate and 5 cc. of the H_2SO_4 in 200 cc. The color due to the formation of methylene blue attains a max. in a few seconds and does not change any longer. The colorimetric reading is made after 1 hr. One cc. of alc. is added and the vol. is adjusted exactly to 50 cc. Data on the H_2S content of feces on different diets are recorded in this paper. S. MORGULIS

The staining of calcium. G. R. CAMERON. *J. Path. Bact.* **33**, 929–55(1930); cf. *C. A.* **24**, 5326.—$AgNO_3$ is not a test for Ca or phosphate, the black reaction is given by a variety of solid deposits of which the anion is more important than the metal. Alizarin is a nearly sp. stain for Ca. It reacts readily *in vitro* and *in vivo* with recently deposited Ca phosphate or carbonate, normal or pathol. but often fails to stain older deposits. Hemotoxylin does not stain Ca salts though it often identifies areas favorable to the deposition of Ca. The reaction obtained in these areas depends partly on the presence of Fe but mostly on a peculiar ground substance which is normally present in bone and cartilage, which if mordanted with Al or Cr stains deeply with hemotoxylin.
J. T. MYERS

A micro determination of copper with urobilin. A. EMMERIE. *Chem. Weekblad* **27**, 552–4(1930).—Urobilin, which is best prepd. by the method of Terwen (cf. *C. A.* **19**, 3501), gives in the presence of NH_4OH with small amts. of Cu colors varying from yellow to red. Quantities from 0.01 to 0.0001 mg. can be detected colorimetrically. For the detn. of small quantities of Cu in biol. material the org. part is destroyed with H_2SO_4 and HNO_3 and the Cu pptd. electrolytically. Ag and Au do not influence the detn. but Hg does. If the latter is present KI is added KI prevents the color reaction with Hg. When both Ag and Hg are present the ppt. of AgI is dissolved with $Na_2S_2O_3$.
E. SCHOTTE

Mechanism of the Liebermann-Burchard reaction. Application to the differentiation between sterols of animal or of vegetable origin. K. MEESEMAECKER AND H. GRIFFON. *J. pharm. chim.* [8], **11**, 572–80(1930).—The reaction consists in an emerald-green color produced in a $CHCl_3$ soln. of cholesterol, phytosterol or ergosterol upon addn. of Ac_2O and H_2SO_4. Variations of this test on the 3 sterols were studied; Ac_2O was replaced by Et_2O, AcOEt, AcCl (then $CHCl_3$ is not needed as a solvent); and H_2SO_4, by $KHSO_4$, P_2O_5, CaO, $ZnCl_2$, $CaCl_2$ Table I of the results indicates certain differences in color reactions between sterols. Table II summarizes the color effects of 18 different org. solvents on the 3 sterols when Ac_2O is retained, together with H_2SO_4, or $KHSO_4$, P_2O_5 and $ZnCl_2$ as dehydrating agents. Different solvents (hydrocarbons and Cl derivs., CS_2, esters, pyridine) give very decided color tests, but MeOH, EtOH and AmOH give no reactions whatever regardless of the dehydrating agent used. Pos. reactions for cholesterol and phytosterol are practically limited to the use of H_2SO_4 or $KHSO_4$. Ergosterol is rich in tests with most of the dehydrators and most solvents. H_2O causes the green color to disappear; after total expulsion of the H_2O, the residue will respond to the test again. With cholesterol and phytosterol, $ZnCl_2$ clearly inhibits the reaction (cf. ergosterol, *C. A.* **24**, 1657); however, when the regular test with cholesterol has reached its max. intensity (30 min.), and then $ZnCl_2$ is added, the tint will keep for 24 hrs.
S. WALDBOTT

A new colorimetric test for the estimation of adrenaline. J. RAE. *Pharm. J.* **125**, 451(1930); cf. *C. A.* **4**, 50, 3253; **7**, 2047; **14**, 2838.—R.'s method applied to tannin (*C. A.* **23**, 356) may be used for adrenaline (*A*). Add 2 cc. of a 10% aq. soln. of NH_4 molybdate to 1 cc. of soln. of *A*-HCl (Brit. Pharm.) in a 50-cc. Nessler tube and dil. with H_2O to 50 cc. The red-brown color develops at once and is permanent for several hrs. Compare it with that of a standard prepd. either with a soln. of *A* of known strength, or with a 1% aq. soln. of pure *tannic acid* previously dried in a desiccator to const. wt. Treat 1 cc. of this soln. with 2 cc. of the reagent and dil. with H_2O to 50 cc. Five cc. of this soln. when dild. to 50 cc. matches exactly the color given by 1 cc. of the official soln. of *A*-HCl, equiv. to 1 mg. of *A*. The test is not interfered with by 1% soln. of cocaine-HCl, kerocaine, stovaine, benzamine lactate, borax and NaCl, satd. soln. of boric acid, chloretone, aq. $CHCl_3$, aqua rosae and aqua sambuci. Reducing substances, *e. g.*, ferrous salts, alc., bisulfites, etc., should be absent. The test cannot be used for the detn. of *A* in urine, as the latter also gives a color with the reagent. Synthetic *A* gives the same depth of color as the natural product. S. WALDBOTT

Method for the determination of peroxidase activity. JOHN D. GUTHRIE. *J. Am. Chem. Soc.* **53**, 242–4(1931).—The method is based on the formation of indophenol from a mixt. of p-$C_6H_4(NH_2)_2$ and α-$C_{10}H_7OH$ in a citrate buffer of p_H 4.5. The substrate consists of 200 cc. of a citrate soln. (21 g. cryst. citric acid and 170 cc. *N* NaOH made up to 1 l.), 200 cc. H_2O, 1 g. p-$C_6H_4(NH_2)_2$.HCl and 20 cc. 4% α-$C_{10}H_7OH$ in 50% EtOH. To this is added, at 25°, 0.5–2.0 cc. of the juice or ext. contg. the enzyme and 5 cc. 0.05 *N* H_2O_2. After 10 min. the reaction is stopped by adding 5 cc. of 0.1 aq. KCN. The indophenol is extd. with PhMe and compared with a standard. The optimum amt. of H_2O_2 is 5 cc. of 0.05 *N* soln. The enzyme activity is linear with the concn. up to an activity of about 4. With potato juice the av. indophenol value was 1.48 mg. with an av. error of ±0.03 mg.
C. J. WEST

C—BACTERIOLOGY

CHARLES B. MORREY

Carbohydrate and serological determinations of the bipolar gas-forming and non-gas-forming organisms isolated from lymph glands of slaughtered cattle. ONOFRE GARCIA. *Philippine J. Sci.* **43**, 565–75(1930).—Both gas-forming (I) and non-gas-forming (II) bipolar organisms which are morphologically alike were isolated from slaughtered cattle affected with lymphatic adenitis. I fermented glucose, galactose, levulose, maltose, sorbitol, dulcitol, inulin and mannose. II was identified as *P. bovi-septica*. Neither I nor II grew on eosin-methylene blue-lactose agar and each gave definite and distinct biochem. and serological reactions; both I and II are pathogenic for rabbits and guinea pigs. Some immunological phenomena like the early appearance of immunity before antibodies are demonstrable (commonly noted with hemorrhagic septicemia organisms) were observed in the animals injected with I. N. A. LANGE

Azotobacter. P. KALANTARIAN AND A. PANOSSIAN. *Bull. univ. etat R. S. S.-Arménie* No. **5**, 221–4 (in German 224–5)(1930).—K. and P. studied the influence of *Aerobacter aerogenes* upon the biology of *Azotobacter* with reference to N fixation. When starch and sucrose are employed as the source of carbohydrate *Azotobacter* alone or symbiotically with *A. aerogenes* fixes only traces of N in the artificial medium. When mannitol and dextrose are used, the fixation of N by *Azotobacter* in symbiosis with *A. aerogenes* is $1^1/_2$ times as great and with xylose and arabinose 3 times as great as by a pure culture of *Azotobacter*. Since xylose and arabinose are pectin-split products the authors believe that the influence of *A. aerogenes* upon the fixation of N in the soil is of great importance. B. S. LEVINE

The chemistry of the lipoids of tubercle bacilli. XXII. The carbohydrates of the purified wax. E. GILMAN ROBERTS AND R. J. ANDERSON. *J. Biol. Chem.* **90**, 33–43 (1931); cf. *C. A.* **25**, 521.—*d*-Arabinose and traces of glucosamine-HCl and inositol have been isolated from the H_2O-sol. material resulting from the hydrolysis of the purified wax from tubercle bacilli by dil. HCl. If the wax is sapond. with alc. KOH, the Et_2O-sol. constituents are liberated and a complex carbohydrate or polysaccharide remains which on acid hydrolysis yields mannose, *d*-arabinose and galactose and also other, as yet unidentified, reducing sugars. The 3 sugars represent only 55.5% of the polysaccharide. **XXIII. Separation of the lipoid fractions from the timothy bacillus.** ERWIN CHARGAFF, MARY C. PANGBORN AND R. J. ANDERSON. *Ibid* 45–55.—The timothy bacillus is an acid-fast non-pathogenic bacillus belonging to the same class as the pathogenic tubercle bacillus. The following substances from 3173.3 g. of dried bacilli (1602 cultures) have been isolated: phosphatide 0.59, Me_2CO-sol. fat 2.75, polysaccharide 3.90, $CHCl_3$-sol. wax 4.61, yellow wax 0.37, dried bacterial residue 87.70 and pigment 0.05%. The lipoid content of the avian (15.26) and bovine (13.40) is much less than that of human (23.78) tubercle bacilli and the timothy bacillus has the least of all (8.37%). As the lipoids decrease, the amt. of polysaccharide which passes into the alc.-Et_2O ext. increases, the timothy bacillus yielding nearly 4 times as much as the other bacteria. The chem. compn. and biol. reactions of the various lipoid fractions will be compared with corresponding fractions isolated from tubercle bacilli. A. P. LOTHROP

The nucleic acid of the timothy bacillus. ROBERT D. COGHILL. *J. Biol. Chem.* **90**, 57–63(1931); cf. *C. A.* **23**, 1926.—The nucleic acid of the timothy-hay bacillus, *Mycobacterium phlei* (Moeller), on hydrolysis yields guanine, adenine, uracil and cytosine but no thymine and contains at least 20% of pentose. It is, therefore, a plant nucleic acid in sharp distinction to the nucleic acid of the animal type obtained from the supposedly closely related tubercle bacillus. The nucleic acid was extd. from the bacilli, to the extent of approx. 2%. It would seem that such a wide difference in chem. make-up would furnish a much more fundamental basis of classification of bacteria than the older method based on external appearances and staining reactions. A. P. L.

Variation in the fatty acids of Sterigmatocystis nigra as a function of the mineral composition of the culture liquid. CHARLES PONTILLON. *Compt. rend.* **191**, 1148–51 (1930).—Four culture media were prepd. One considered normal contained NH_4NO_3; another was made acid with NH_4Cl; another contained KNO_3 and tended to become alk.; a fourth was made by buffering the normal with $CaCO_3$. At intervals of 2, 3, 4 and 7 days analytical samples were taken. The p_H, the fatty acid content and the dry wt. of the culture as well as the m. p. and I nos. of the fatty acids were detd. The acid culture yielded the least fatty acids. The other yields were about equal although the production was slower in the alk. media. The fatty acids with the highest m. p.

were extd. from the acid culture. The lowest I nos. were obtained from the normal culture. C. M. McCay

Biochemical production of optically active glyceraldehyde. C. Neuberg. *Biochem. Z.* **228**, 259–61(1930).—A method is described for obtaining optically active glyceraldehyde from the racemic compd. by means of *A. aerogenes* and *E. coli*. S. M.

New phosphate ester in lactic acid fermentation. Artturi I. Virtanen and J. Tikka. *Biochem. Z.* **228**, 407–8(1930).—When live *Bact. casei e* ferment glucose 100% of the lactic acid is recovered, Robison's hexose mono-phosphate ester forming an intermediate step. But if the fermentation is carried out with dried bacteria only 50% of the Robison ester is recovered as lactic acid, the other 50% being converted to a new, stable H_2PO_4 ester. S. Morgulis

The chemistry of lipoids of tubercle bacilli. XIX. The composition of the phosphatide fraction isolated from the bovine type of tubercle bacilli. R. J. Anderson and E. Gilman Roberts. *J. Biol. Chem.* **89**, 599–610(1930); cf. *C. A.* **25**, 128.—Hydrolysis of the phosphatide previously isolated from bovine tubercle bacilli, m. 205–8°, yielded from the Et_2O-sol. fraction, 27% palmitic acid, 7% oleic acid, 16% of an optically inactive liquid satd. fatty acid, with which the biol. activity of the phosphatide is associated, and similar to tuberculostearic acid, $C_{18}H_{36}O_2$, and also 5% of a wax-like substance. The water-sol. fraction contained mannose (isolated as phenylhydrazone,) inactive inositol, an org. phosphoric acid similar to glycerophosphoric acid (isolated as the Ba salt), and a mucilaginous substance which caused excessive foaming. The substance also contained 1.0% N and 5.33% ash. **XX. The occurrence of mannose and inositol in the phosphatide fractions from the human, avian and bovine tubercle bacilli.** *Ibid* 611–7.—From 2 to 9 g. of the water-sol. sirup, obtained on hydrolyzing the phosphatide A_3 from human tubercle bacilli, were sepd. 0.82 g. mannose, isolated as phenylhydrazone, 0.80 g. crude inactive inositol, and 0.46 g. of a dried sirup, $[\alpha]_D^{25} = -10.3°$, which contained glucose and a ketose and resembled invert sugar. Further analysis of the water-sol. fraction obtained on hydrolyzing the phosphatide from avian tubercle bacilli (*C. A.* **24**, 1134) yielded mannose and inactive inositol. K. V. T.

The chemical study of bacteria. The presence of *d*-mannose and *d*-arabinose in a complex carbohydrate isolated from the culture medium after the growth of tubercle bacilli. Alice G. Renfrew. *J. Biol. Chem.* **89**, 619–26(1930).—From Long's synthetic medium (*C. A.* **20**, 2535) on which human tubercle bacilli had been cultured for 14 months, was isolated a carbohydrate giving a definite precipitin reaction at 1:1500000 diln., and having $[\alpha]_D^{25} = +32.0°$. It contained 1% reducing sugars before, and 65% after, hydrolysis, and yielded 19.7% of mannose (isolated as phenylhydrazone), and about 10% of *d*-arabinose (isolated as benzylphenylhydrazone), $[\alpha]_D^{25} = +16.1°$ (1:1 CH_3OH and pyridine). Pure *l*-arabinose benzylphenylhydrazone, has $[\alpha]_D^{25} = -16.7°$ (1:1 CH_3OH and pyridine) and the *d*-deriv. in the same solvent $+18.2°$; mixing of the 2 forms lowers the m. p. by 10° (cf. Fischer, Bergmann and Schotte, *C. A.* **14**, 3075). K. V. Thimann

Glucuronic acid, a constituent of the gum of root nodule bacteria. E. W. Hopkins, W. H. Peterson and E. B. Fred. *J. Am. Chem. Soc.* **53**, 306–9(1931); cf. *C. A.* **24**, 5789.—Glucuronic acid has been identified as a constituent of the gum produced by the root nodule bacteria of pea and red clover. The acid was isolated, after hydrolysis of the gum, as the Ba salt and identified as the *p*-bromophenylosazone. Further evidence of the identity of the sugar produced by hydrolysis of the gum with glucose is given. C. J. West

Germicidal action of α-mercapto and α-disulfo soaps. Arnold H. Eggerth *J. Exptl. Med.* **53**, 27–36(1931).—The α-mercapto acids were obtained in the best yields by the action of K xanthate with the α-Br soaps and breaking down the resulting compds by NH_4OH. The disulfo acids were prepd. by oxidizing the mercapto acid in EtOH with I. The following m. ps. are reported for the mercapto and disulfo acids, resp caprylic, both oils; capric, 47°, 37°; lauric, 59°, 48°; myristic, 66°, 56°; palmitic, 72°, 63°; stearic, 80°, 72°. In the α-mercapto series, the soaps with 12 and 14 C atoms are the most germicidal; in the disulfo series, the dicaprate, dilaurate and dimyristate are the most germicidal. The optimum no. of C atoms varies with the test organism used. These soaps, like others previously studied, show a markedly selective germicidal action. C. J. West

Action of testicle, kidney and spleen extracts on the infective power of bacteria. M. Pijoan. *J. Exptl. Med.* **53**, 37–42(1931).—The addn. of testicle ext. to cultures of 20 different bacteria just prior to inoculation enhances their infectious activity to a high degree. Kidney exts. enhance the infections of staphylococci to a less degree

than testicle exts., while spleen exts. never give rise to enhancement and often cause the lesion to be less than would ordinarily be the case. C. J. WEST

DOPTER, CH., AND SACQUÉPÉE, E.: **Précis der bactériologie. T. I.** 4th ed. Paris: J.-B. Bailliere et fils. 618 pp. F. 48.

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SMIT, JAN: **Die Gärungssarcinen. Eine Monographie.** Jena: G. Fischer. 59 pp. M. 9.

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Cultivating bacteria. I. G. FARBENIND. A.-G. (Gerhard Domagk, inventor). Ger. 510,490, Feb. 15, 1929. Highly active bacterial cultures for treating malignant tumors are prepd. by including albumin from the tumor in the nutrient medium.

D—BOTANY

THOMAS G. PHILLIPS

Pulsation in the plant. JOH. RICHTER. *Pharm. Zentralhalle* **71**, 789–91(1930).—A description of the *sphygmograph* and its use in demonstrating pulsation in plants, notably the stimulation produced by certain substances like camphor, musk, etc. W. O. E.

Hydrolysis in the living plant by polarized light. ELIZABETH S. SEMMENS. *Bot. Gaz.* **90**, 412–26(1930).—Plants grown in polarized light alone, succeeded by periods of darkness, show (1) disappearance of starch and other reserve products; (2) temporary phototropism; and (3) leaf fall and signs of starvation in whole plant B. H.

Biochemical studies on the bamboo. II. Chemical development in the growth of bamboo shoots. 1. CHOJI TANAKA. *Anniversary Vol. Masumi Chikashige* **1930**, 139–48. (All papers in English.)—Data are given on the content and distribution of H_2O, total and alc.-sol. N, protein, sugar, cellulose, lignin, pentosans and ash in bamboo shoots. **III. Chemical development in the growth of bamboo shoots. 2.** DENYA KAMIYA. *Ibid* 149–59. **IV. Chemical development in the growth of bamboo sheaths.** TAKESUKE TASHIMA. *Ibid* 161–5.—Data similar to those given for bamboo shoots are tabulated. **V. Chemical developments in the growth of bamboo shoots. 3.** KUNITAKA NISHIOKA. *Ibid* 167–73. **VI. The carbohydrates and organic acids of bamboo shoots.** YASUO SASAOKA. *Ibid* 175–81.—*d*-Glucose, *l*-xylose, and glucuronic, oxalic, tartaric, citric and lactic acids were identified in the expressed juice from bamboo culms. An unidentified sugar yielding an osazone of m. p. 188° was isolated and is being investigated. **VII. Seasonal variations in the chemical composition of the madake (Phyllostachys quilioi F. M.).** TORU NAGASAWA. *Ibid* 183–93.—The content of H_2O, ash and total N gradually decreases with age while the fat, cellulose and lignin increase. Reducing sugars reach a max. in Jan. and gradually decrease to a min. in Sept. K. D. JACOB

Physiological studies on Drosera. I. The proteolytic enzyme of Drosera rotundifolia. KUNIO OKAHARA. *Science Repts. Tôhoku Imp. Univ.* [4], **5**, 573–90(1930).—The glycerol ext. of *Drosera* leaves contains a powerful enzyme which in a strong acid medium hydrolyzes proteins to proteoses and peptones. The optimum temp. for its action is about 40° and the optimum acidity is at approx. p_H 1.5. This acidity is rarely known for any other enzymes of plant origin and rather resembles the optimum acidity for pepsin. In this respect *Drosera* enzyme may rank as an animal pepsin. *Drosera* leaves were found to contain HCO_2H. The effect of poisons on the action of this enzyme and of pepsin was studied. When quinine-HCl was added to a mixt. of *Drosera* enzyme and edestin at 39°, so that the concn. of poison in the mixt. was 0.5%, digestion was accelerated; when edestin was added to a mixt. of enzyme and quinine-HCl at 39°, digestion was not affected. In similar tests quinine-HCl was found to repress the digestive action of pepsin. When atoxyl was added to a mixt. of *Drosera* enzyme and edestin (or pepsin and edestin) digestion was accelerated; addn. of edestin to a mixt. of *Drosera* enzyme and atoxyl resulted in acceleration of digestion, whereas addn. of edestin to a mixt. of pepsin and atoxyl resulted in the repression of digestion. LOUISE KELLEY

The other extractives of white leaves of cabbage. I. Animal experiment. JUN-

ICHI OZAKI. *J. Agr. Chem. Soc. Japan* **6**, 633–42(1930).—The white leaves of cabbage do not contain vitamin A, but contain as much vitamin B as do the green leaves of cabbage. Irradiation of the ether ext. of the white leaves by ultra-violet light produced in it an action like that of vitamin D. The nutritive value of the ether ext. was much less than that of triolein. **II. The composition of the oil.** *Ibid* 688–700.—From the ether ext. of white leaves of cabbage, substances insol. in acetone and petroleum ether were removed. A brownish black oil was obtained, which had sapon. value 144.06, acid value 21.24, Hehner value 61.59, I value 103.44, unsaponifiable matter 21.66%, Reichert-Meissl value 2.0. Of the acids of the ether ext. 83.7% were unsatd. Of the satd acids arachidic acid (10%) and palmitic acid (80% or more) were isolated. A small amt. of myristic acid was found; stearic acid was absent. From the unsatd. acid fraction a dihydroxystearic acid (m. 118–9°), an isomer of sativic acid (m. 162–3°), linusic acid (m. 201°) and isolinusic acid (m. 176°) were obtained as the oxidation products by potassium permanganate. Hence an isomer of oleic acid and an isomer of linoleic acid are present. If calcns. are made from the yields of bromination products, hexabromide, tetra and di-bromide, the ratio of the original acids is 1:7.3:1. Therefore, the unsatd. acids consist of linolenic 10%, an isomer of linoleic 75% and an isomer of oleic acid 10% or more. Y. KIHARA

The function of hexuronic acid in the respiration of the cabbage leaf. ALBERT SZENT-GYÖRGYI. *J. Biol. Chem.* **90**, 385-93(1931); cf. *C. A.* **23**, 1423.—"Hexuronic acid plays an important part in the respiration of the cabbage leaf. It connects, as H carrier, the system in which the mol. O_2 enters into reaction with the system which supplies H and is involved in the oxidation of the foodstuff. There is in the cabbage leaf a highly active enzyme, *hexoxidase*, which in the presence of O_2 rapidly oxidized hexuronic acid to its reversible oxidation product." The properties of this enzyme are described. A. P. LOTHROP

The preparation and properties of franguloside (frangulin) from the bark of alder buckthorn of commerce. M. BRIDEL AND C. CHARAUX. *Compt. rend.* **191**, 1151–3 (1930).—The bark of alder buckthorn contains a water sol. enzyme which splits the glucoside of the water ext. with the formation of cryst. frangulin. The pure compd. is prepd. by mixing a kg. of powd. bark with 4 l. H_2O. After 12 hrs. the compd. is extd. with Et_2O. After crystn. from EtOH, it is recrystd. from AmOH and then from a mixt. of pyridine and H_2O (2:1). Yield 25 g. Pale yellow crystals, $C_{21}H_{20}O_9 \cdot H_2O$, $[\alpha]_D$ = —134, m. 246–9°. The glucoside is reduced by the method of Bertrand. Hydrolysis produced 38.8–40% rhamnose. C. M. MCCAY

The presence in a number of vegetables of allantoin with or without allantoic acid, allantoinase and uricase. R. FOSSE, A. BRUNEL, P. DE GRAEVE, P. E. THOMAS AND J. SARAZIN. *Compt. rend.* **191**, 1153–5(1930).—Allantoin has been isolated from the seeds of *Triticum sativum, Hordeum vulgare, Zea mays, Soja hispida, Cicer arietinum, Phaseolus vulgaris* and *Pisum sativum*. It occurs in the roots of *Brassica napus*. Both allantoin and allantoic acid are much higher in newly formed beans than in old ones. Allantoic acid and allantoinase were not found in wheat, barley, corn or in turnips. Uricase was absent in barley, turnips and cauliflower. Cauliflower contained allantoin and allantoinase. It was also rich in allantoic acid. C. M. MCCAY

Physiological-morphological studies on Funaria hygrometrica L. in pure culture. G. SCHWEIZER. *Ber. deut. botan. Ges.* **48**, 75–84(1930).—Spores of *F. hygrometrica* germinated equally well in a series of Detmer solns. made up in agar and adjusted to p_H values varying from 1.56 to 3.19 by the addn. of phosphoric, citric and humus acids. There was also no difference in the growth of the protonema but the formation of leafy shoots was slightly delayed in the more acid media; this difference was no longer apparent after further growth. Moss plants were produced in equal nos. in the various media. The plants in cultures with humus acid formed more antheridia and archegonia than those in the other cultures. The media darkened by humus acid became completely decolorized as growth took place. LAWRENCE P. MILLER

Polar permeability. LEO BRAUNER. *Ber. deut. botan. Ges.* **48**, 109–18(1930). The seed coat of *Aesculus hippocastanum* is about 60% more permeable to water from the outside in than in the opposite direction. There is a potential difference of several millivolts between the two sides of the swollen membrane, the epidermal side being positive. This effect can be explained by the assumption that the testa is composed of an electrolyte-containing double membrane, consisting of 2 layers of varying permeability. The observed potential difference either hastens or retards the movement of water depending upon whether the streaming potential is in the same direction or opposite to that of the membrane. LAWRENCE P. MILLER

Extensibility and turgor tension of cell membranes. H. R. OPPENHEIMER. *Be*

deut. botan. Ges. **48,** 192–206(1930).—The periphery of cells soaked in water and in sugar solns. of various concns. was studied. Strong cell walls prevent any measurable change while in certain less rigid cells changes of 20% were noted. The release of the osmotically extended cell wall does not take place proportionally to the increasing conc. of the outside solns.; it takes place at first more slowly, and then, as the plasmolytic concn. is approached, more rapidly. LAWRENCE P. MILLER

The dependence of the intake of nutrient salts upon the reaction of the substrate. PAUL DAHM. *Ber. deut. botan. Ges.* **48,** 312–6(1930).—An effect of p_H on the intake of nutrient salts by higher plants could not be established by any of the methods used in this investigation. None of these methods, however, was entirely satisfactory LAWRENCE P. MILLER

Changes in the nitrogenous groups of tobacco in the course of roof ripening. A. I. SMIRNOV AND V. P. IZVOSVIIKOV. *Biochem. Z.* **228,** 329–53(1930).—Fasting, which is the first phase in the drying of tobacco leaves, occasions the following alterations in the N products. The protein content diminishes considerably, much more in the protein-rich young leaves than in full-grown leaves. Likewise the compn. of the protein of the young leaves is less stable under this condition, becoming enriched in bases and thus more like that of the full-grown leaves. These effects of the roof-ripening process are attributed to the fact that young leaves contain more of the easily altered reserve proteins, whereas the older leaves contain principally the more stable plasma proteins. The polypeptides of the tobacco leaf sol. in hot water become rapidly poorer in bases during fasting and richer in acid amides. In the early stages of the fasting not only a decompn. of polypeptides takes place but also a synthesis. The formation of melanin N in the hydrolysis of the portion of tobacco insol. in hot water diminishes in the course of the fast whereas this increases in the aq. ext The non-protein N components increase during the fast, just as the concn. of free N compds. increases at the cost of combined N substances, although the increase in free amino acids is less than expected. A part of the amino acids are bases liberated from the polypeptides changes to NH_3, but no direct proportionality between the two processes exists because of the fact that some of the NH_3 is used in the synthesis of amides, and to a certain extent also of bases. At the beginning the synthesis of acid amide in young leaves is very energetic but diminishes in the course of the fast when there is a great accumulation of NH_3. The accumulation of NH_3 is generally more pronounced in the old tobacco leaves. In old leaves the nicotine content diminishes at the beginning of fasting but in young leaves there is at first a slight increase in the nicotine content followed, however, later by a destruction. In the ppt. obtained by Barnstein's method for protein detn. the N is 91–96% of the N insol. in the hot water, the rest consisting of the polypeptides which do pass into the aq. ext. It is also stated that the nicotine-N is not pptd. by $Cu(OH)_2$. S. MORGULIS

Growth of Aspergillus niger and the copper content of the nutritive medium. L. K. WOLFF AND A. EMMERIE. *Biochem. Z.* **228,** 443–50; *Nederland. Tydschr. Hyg. Microbiol. and Serol.* **5,** 66–75(1930).—Cu is necessary both for growth and sporulation of *Aspergillus niger*, the former requiring a min. of 0.2 γ (0.001 mg), the latter of 0.3 γ per 250 cc. of the nutritive fluid For the formation of the black spores as much as 1 γ per 10 cc. is required; they appear quickest in media contg. 1 γ Cu per cc. The *Aspergillus* grown on media deficient in Cu shows no degenerative changes. S. M.

Comparative studies on the action of light and increasing temperature on the carbon dioxide assimilation at different illuminations. KARL NEYDEL. *Biochem. Z.* **228,** 451–86(1930).—The photosynthetic activity of *Cladophora* shows periods of depression during the exposure to direct sunlight at a sharp angle, but not to the same degree as in the case of *Trichomanes*. The depression seems to vary according to the physiol. condition of the cells and with the same illumination it may be as low as 19 or as high as 52%. Corresponding to the much smaller photic inactivation observed in *Cladophora* no morphological or physiol. evidence is found in the cells of the "sunstroke," and unlike that in *Trichomanes* causes neither destruction of chlorophyll nor colloidal alterations in the chloroplasts and cytoplasm. The inactivation process is always reversible. With a const. and not vigorous illumination by means of elec. lamps an intensity can be selected at which both types of algae will continue assimilating for hrs. at a practically const. and similar rate. A rise in temp. from 13° to 23° causes a lowering of about 60% in the assimilation in weak illumination, and of 4% with an illumination of 2.5 times that intensity, and an actual increase of 16% when the illumination intensity is 6-fold. But a rise in temp. from 23° to 33° has a depressing influence at all intensities. Furthermore, while the photosynthetic effect in *Cladophora* is attained chiefly by an increase in intensity of the light, this is accomplished

in *Trichomanes* by an increase in temp. The ecological significance of these facts is elaborated. S. MORGULIS

Absolute viscosity by means of the Brownian movement. II. Viscosity determination of the cell sap of epidermal cells of Allium cepa and of ameba protoplasm. J. PEKAREK. *Protoplasma* **11**, 19–48(1930).—The viscosity of cell sap at 8° and 20–23° is about twice and of endoplasm at 24° about 6 times that of H_2O at the same temp. Vacuole liquid decreases in viscosity with rising temp. in about the same ratio as H_2O. The applicability of the method is demonstrated and its features are discussed. M. H. SOULE

The chemical nature of protein compounds in living cells. OSCAR LOEW. *Protoplasma* **11**, 196–209(1930).—In plant synthesis of protein the labile, active form is first produced. This form is readily coagulated by Et_2O, $CHCl_3$ and CS_2. Dilute NH_3 (1:10,000) causes rapid solidification; NH_2NH_2 (0.2%), NH_2OH (0.5%) and HCN (2%), speedily produce hardening. The mode of protein formation in root and stem is not the same as in ripe seeds. In the stem, reduction of NO_3^- and SO_4^{--} occurs but in the seed N and S are in the form of amino acids. Leaves greatly assist seeds in the production of protein, the process in both being the same, *i. e.*, condensation with introduction of H and S. M. H. SOULE

Salt permeability of the protoplasts. H. WEIXL-HOFMANN. *Protoplasma* **11**, 210–77(1930).—The plasmometric method of Höfler was used to study the action of KCl and $CaCl_2$ on red epidermal cells of *Lamium purpureum*. Freshly cut sections immediately dipped in 0.50 g. mol. KCl were ready for measurement in 2–10 min. In an hr. the absorption was equiv. to 0.02–0.03 g. mol. KCl. Permeability decreased with time, increase in concn. of salt or addn. of Ca^{++}. The results indicate that permeability to alkali salts does not depend on preliminary injury of the cell by the salt. There are some 50 tables of data and 75 references. M. H. SOULE

The feeding power of plants. WALTER THOMAS. *Plant Physiology* **5**, 443–89 (1930).—A crit. review and summary accompanied by a bibliography of 214 papers. WALTER THOMAS

Electric correlation potentials in the leaf of Bryophyllum. E. J. LUND AND M. BUSH. *Plant Physiology* **5**, 491–508(1930); cf. *C. A.* **19**, 3512; **23**, 429.—In the leaf of *Bryophyllum* there exists a complex but characteristic system of continuous elec. currents of variable magnitude. The elec. energy of these currents is continuously dissipated and supplied from sp. types of biochemical processes, probably cell oxidation (*C. A.* **23**, 429). The distal part of the petiole is positive to growing points and to selected points on the lamina of the leaf; but all growing points are not positive to any point on the lamina A point on the lamina close to a growing point may be positive to another growing point. The total e. m. f. in a transverse strip from the leaf and having a growing point at each end of the strip is equal to the algebraic sum of a complex system of e. m. fs. of individual cells of the strip. It is suggested that the phloem is a specialized tissue producing these continuous bioelectric currents assocd. with growth processes. The paper is illustrated with 3 plates including a drawing of the app. used. WALTER THOMAS

Respiration of apple twigs in relation to winter hardiness. W. A. DE LONG, J. H. BEAUMONT AND J. J. WILLAMAN. *Plant Physiology* **5**, 509–34(1930).—The app. used was that previously described (*C. A.* **22**, 4583) but with the substitution of an oil bath for an air bath. The continuous aspiration method was adopted (*C. A.* **23**, 413). The wound respiration from excised twigs was found to be small and a relatively const. fraction of the total respiration. The rate of CO_2 production as measured at any temp. is conditioned by the previous temp. environment of the twigs. If the previous temp. has been higher, a const. level of CO_2 emission is gradually obtained. If the previous temp. has been lower, there is a peak of CO_2 evolution for several hrs., after which a level is gradually attained. The lower the previous temp., the higher is the peak amt. of CO_2. Evidence has been obtained that this temporary excess of CO_2 represents that which was produced during the previous period but which remained dissolved in the twig sap, and which diffuses out of the twigs at the higher temps. because it then becomes less sol. (cf. following abstr.). Hardier varieties of apples show a lower peak of CO_2 evolution than do the more tender varieties. The order of increasing tenderness among 11 varieties coincides almost exactly to that of increasing CO_2 during the peak. Twigs stored at —2°, —6° and —10° for periods up to 30 days with and without aspiration of the surrounding air did not show striking changes in chem. compn. In the measurement of the respiratory rate of any plant tissue the effect of dissolved CO_2 and hence the previous temp. history of the material must be kept in mind. The paper is illustrated with 7 graphs and 8 tables. W. T.

Carbon dioxide dissolved in plant sap and its eff
J. J. WILLAMAN AND WM. R. BROWN. *Plant Physiol.* 413.—The method consists essentially in submerging the twigs in boiling 95% alc. in a closed container and then removing the CO_2 with reduced pressure. The CO_2 is led into standard alkali and titrated (*C. A.* **18**, 2481). The amt. of CO_2 in apple twigs varies with the temp. At 0° it is approx. 150–250 mg. per kg. In plant respiration studies a distinction must be made between the *production* of CO_2 and its *output*. The one may or may not be the same as the other, because of the various factors which affect the amt. of dissolved CO_2. The factors known at present are temp., partial pressure of CO_2 in the atm. around the tissue, and the kind of tissue. The dissolved CO_2 may explain at least 3 phenomena of plant "respiration" measurements, *viz.*: (1) The temporary peak of CO_2 attained when apple twigs are raised from a lower to a higher temp. is probably caused by the lower soly. of the CO_2 at the higher temp. (cf. preceding abstr.). (2) The temporary peak of CO_2 produced when the rate of CO_2 output is measured from plant tissue which has been stored in a closed chamber may be caused by the higher acidity of the sap during the period of accumulation of CO_2 in the closed chamber and partly by the diffusion of the previously formed CO_2 held in soln. because of the higher partial pressure of the CO_2 in the surrounding tissue. (3) Those varieties of apples which possess the greatest winter hardiness show the lowest output of CO_2 and contain the lowest amt. of dissolved CO_2. What the causal connection is between the two is not known at present. A drawing of the app. used and detailed descriptions of the manipulation are given. WALTER THOMAS

Physiological studies on the anthocyanins. L. W. KUILMAN. *Proc. Acad. Sci. Amsterdam* **33**, 876–88(1930).—Anthocyanin in leaves usually does not reduce CO_2 assimilation. The latter, per gram of chlorophyll, was greater in the red leaves than in the green leaves of *Corylus maxima*, *Acer platanoides*, *Malus pumila* and *Chaenomeles japonica*. It was the same in both kinds of leaves of *Paeonea albiflora* and *Berberis neuberti*, and was less in the red leaves of *Fagus sylvatica*. When seedlings of *Fagopyrum esculentum* were exposed to light until they began to redden and then placed in the dark at 5°, 20° and 35° they acquired the most red at the lowest temp. J. J. WILLAMAN

The conception of balance with respect to the absorption of nitrogen, phosphorus and potassium by plants and the influence of the level of nutrition. WALTER THOMAS. *Science* **72**, 425–7(1930).—When only two of the critical fertilizer elements, N, P and K, are applied to a soil the absorption of the third element is depressed on an infertile, but increased on a more fertile soil. T. discusses various explanations of the phenomenon. J. J. WILLAMAN

The lipase of Aspergillus niger. p_H optimum on glycerides of fatty acids. ALEXANDRU IURACEC. *Bull. sect. sci. acad. roumaine* **13**, 103–10(1930).—Acting on triacetin, the p_H optimum for exts. of mycelium was 7.8 for both fresh and dried mycelium, although the latter had the weaker action. *Ibid* 169–76. The optimum p_H is 7.8 on both triacetin and triolein, although the action is weaker on the latter. J. J. W.

The exudation of water from the leaf-tips of Colocasia antiquorum. H. H. DIXON AND G. J. DIXON. *Sci. Proc. Roy. Dublin Soc.* **20**, 7–10(1930).—The exuded water is devoid of solutes, although it is in contact with solns. within the leaf. An *osmometer* is described which imitates this phenomenon and furnishes the probable explanation for it. J. J. WILLAMAN

Acidity changes associated with the keeping quality of apples under various storage conditions (PLAGGE, GERHARDT) **12**. Deguelin. I. Preparation, purification and properties of deguelin, a constituent of certain tropical fish-poisoning plants (CLARK) **10**.

GODWIN, H.: **Plant Biology.** An Outline of the Principles underlying Plant Activity and Structure. Cambridge, England: The Univ. Press. 265 pp. 8s. 6d. Reviewed in *Sci. Progress* **25**, 539(1931).

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E—NUTRITION

PHILIP B. HAWK

The effect of vitamin deficiency on light sense in cases of xerosis and pigmentation of the conjunctiva. C. H. CHOU. *Natl. Med. J. China* **16**, 365–9(1930).—A study of 31 cases showed that discoloration of the conjunctiva in adults was one of the earliest signs of avitaminosis, similar to the Bitot's spots in children. WM. H. ADOLPH

Ski running at high altitudes after ingestion of phosphorus-containing beverage. A. LOEWY. *Arbeitsphysiol.* 3, 276–86(1930); cf. *C. A.* 23, 5223.—The urines of 25 participants of the Swiss military patrol in a 28- and an 18-km. run on skis were collected after the run and the total nitrogen, NH_3, urea, creatine and creatinine and p_H were determined. The NH_3 N was in all cases under 2% of the total N, the urea nitrogen was over 80% of the total N in 54% of the cases, and from 60 to 80% in 46%. The preformed creatinine N averaged 2.13% of the total N in 80% and in 7 cases the total creatinine N was 2.52% of the total N. The p_H varied between 5.3 and 8.4+; many of the urines were either nearly neutral or alkaline. The results are ascribed to the ingestion of 250 to 300 cc. of a beverage "Eviunis" contg. 0.25 to 0.3 g. P. This beverage was prepd from green plants and contains a phosphorus-vitamin complex in which the P is organically bound in the form of Ca and Mg salts of inositolhexaphosphoric acid. T. M. CARPENTER

Effects of the ingestion of tartrate or sodium aluminum sulfate baking powders on growth, reproduction and kidney structure in the rat. J. F. LYMAN AND ERNEST SCOTT. *Am. J. Hyg.* 12, 271–82(1930).—Dietaries contg. varying amts. up to 2% of a com. alum-type baking powder or up to 4% of a com. tartrate powder were fed to albino rats through several generations. No appreciable effect on rate of growth, av. adult size, reproduction, longevity or kidney structure was noted S. B. FOSTER

The effects of the habitual use of tartrate and aluminum baking powders upon the utilization of food in the rat. RUTH M. KRAFT. *Am. J. Hyg.* 12, 283–7(1930).—Male albino rats were fed a mixed dietary contg. baking powder residues which were prepd by moistening portions of 2 com. powders (cf. preceding abstr.) and heating the moist mixtures to 103° for one hr. Rats were fed from early life to 16 months on diets contg approx. 2% of the alum residue and 4% of the tartrate residue. After 16 months, coeffs. of digestibility were detd. in the conventional manner and when compared with similar data from control animals, there was found to be no appreciable difference in the utilization of food. S. B. FOSTER

Vitamins A and D in fish oils. E. M. NELSON AND JOHN R. MANNING. *Ind. Eng. Chem.* 22, 1361–3(1930).—A number of fish body oils were tested for vitamins A and D. Salmon oil had about one third the vitamin A potency of a good cod-liver oil, while sardine, Alaska herring and tuna oils were one tenth as potent. No vitamin A could be detected in menhaden oil. Tuna and sardine oils were found to be as good as, or better than, cod-liver oil in vitamin D potency. Menhaden, salmon, Alaska herring and Maine herring were found to be much less effective. The com. significance of the data is discussed. S. B. FOSTER

Human-milk studies. VI. Vitamin potency as influenced by supplementing the maternal diet with yeast. SYLVIA S. MCCOSH, ICIE G. MACY AND HELEN A. HUNSCHER *J. Biol. Chem.* 90, 1–13(1931); cf. *C. A.* 22, 2965.—When the maternal diet was supplemented with 10 g. of yeast daily, some substance (other than the antineuritic vitamin since it did not stimulate the appetite) was carried over into the milk which brought about a better utilization of the food consumed by the exptl. animals. In all cases more cals. were consumed during the preëxptl. period than during the exptl. period to produce the same amt. of growth and in some cases less growth. Elaboration of body tissue occurred at a more effective rate on a smaller amt. of food. The vitamin B content of the 3 milks used was inversely proportional to the quantity of milk secreted daily. A. P. LOTHROP

The manganese metabolism of the rat. J. T. SKINNER, W. H. PETERSON AND H. STEENBOCK. *J. Biol. Chem.* 90, 65–80(1931).—The primary object of this investigation was to make a more detailed and coördinated study of the metabolism of Mn than has heretofore been reported. On a stock ration contg. 10.47 mg. of Mn per kg. the total Mn in the rat increased from 0.0015 mg. at birth to 0.0676 mg. at 180 days of age. The concn. was highest at birth, decreased during the 1st 12 days, rose to a 2nd peak at 21 days and decreased thereafter. The chief storage tissues are liver, muscle, bone and hide, the concn. in the liver being the highest. When Mn was added to the ration the amts. in bone, hide, liver and kidney were increased 191, 79, 29 and 29%, resp. Adult rats excreted 80% of the Mn in the feces on the stock ration but this proportion was increased to 99% on adding 5 mg. to the ration daily. On a whole milk diet young rats retained approx. 60% of the Mn ingested over a period of 7 weeks; on a diet of milk plus Mn they contained 3 times as much although weighing only 1/3 more than those on milk alone. The retention of Mn was decreased when Cu and Fe, either singly or together, were added to the diet. If the mother is subjected to a high intake of Mn during the gestation period, the Mn content of the rat at birth can be raised 40% but these mothers, after rearing several litters, are unable properly to nourish their young.

storage of Mn was slow when the young received only mother's milk and the storage was not increased by addn. of Mn to the mother's ration. Bibliography of 20 references.
A. P. LOTHROP

The effects of vitamin deficiency upon the coefficients of digestibility of protein, fat and carbohydrate. R. REDER ST. JULIAN AND VICTOR G. HELLER. *J. Biol. Chem.* **90**, 101–10(1931).—The metabolism of animals on a diet deficient in a given vitamin has been compared with that of animals on the same diet supplemented with the missing vitamin. With vitamins, A, B_1, B_2, C and D, the coeffs. of digestibility of protein, fat and carbohydrate were the same with or without the vitamin. It appears unlikely, therefore, that the digestive process is affected by the vitamins studied. A. P. L.

The nature of the highly unsaturated fatty acids stored in the lard from pigs fed on menhaden oil. J. B. BROWN. *J. Biol. Chem.* **90**, 133–9(1931); cf. *C. A.* **24**, 5057.—A mobilization of highly unsatd. acids occurs in pigs fed a diet contg. about 14% of menhaden oil. There was a storage of 2.7% of highly unsatd. acids in the lard which were of about the same mol. wt. and of lower I no. than the mixt. of acids isolated from the original oil. The pig apparently burns the more highly unsatd. acids from the oil, depositing the remainder while the rat stores acids which are more unsatd. than those of the original oil. A. P. LOTHROP

The ineffectiveness of manganese in nutritional anemia. W. E. KRAUSS. *J. Biol. Chem.* **90**, 267–77(1931).—Mn, when added alone (0.1 mg.) or in combination with Fe (0.5 mg.), did not bring about improvement in rats suffering from nutritional anemia induced by an exclusive liquid whole milk diet. The conflicting results obtained by other workers (cf. Titus, Cave and Hughes, *C. A.* **23**, 1160) are probably not due to impurities in the salts used but to slight differences in the technic of housing and feeding the exptl animals; contamination may occur, the cause of which is not always detectable. Glass equipment throughout should always be used. Results obtained with Cu under most adverse circumstances again emphasize the role played by this element as a specific factor for hemoglobin regeneration in nutritional anemia. A. P. L.

Further evidence of the complex nature of vitamin B. II. Evidence that a third factor exists. CHARLES H. HUNT AND WILLARD WILDER. *J. Biol. Chem.* **90**, 279–91 (1931); cf. *C. A.* **24**, 4081.—A 3rd factor exists in the vitamin B complex of yeast which is distinct from the antineuritic and antipellagric factors. The antineuritic factor (vitamin B) is heat labile in an alk. and acid medium, the antipellagric factor (vitamin G) is thermostable under all conditions tried; the 3rd factor is thermolabile in an alk. medium (p_H 9) when autoclaved for 5 hrs. at 15 lb. All 3 factors are necessary for the growth and well being of the rat. A. P. LOTHROP

A new factor in nutrition. A. BAKKE, MLLE. V. ASCHEHOUG AND CHR. ZBINDEN. *Compt. rend.* **191**, 1157–9(1930).—A concd. ext. of vitamin B fed with a B free basal diet caused the coats of black rats to become silver gray. These animals differed in coat coloring from the whitish gray shown by anemic animals. The silver-gray coat coloring was not accompanied by anemia. The animals developed eye symptoms resembling xerophthalmia although their ration contained vitamin A. The animals were either sterile or gave birth to poor young incapable of living. Since the original B concn. was obtained from wheat germ, the authors extd. wheat germ oil. It failed to produce the peculiar coat coloring nor did it show the toxic properties claimed by other workers. In a new exptl. series one group of rats was fed whole wheat and another wheat germ. The black coats assumed the characteristic gray change upon the germ but not on the whole-wheat diet. If the germ diet was continued the coat coloring changed to normal. The authors infer that wheat germ contains a toxic element which is neutralized by feeding the whole grain. They also assume a development of immunity to the toxicity after long feeding of wheat germ when the coat color becomes normal again. C. M. MCCAY

The distribution of vitamin B and its components in the peanut. F. W. SHERWOOD AND J. O. HALVERSON. *J. Elisha Mitchell Sci. Soc.* **46**, 14(1930). -Whole raw peanuts are fairly rich in vitamin B and contain less vitamin G. The red skins of the peanuts contain more vitamins than the nut meats proper. A. L. MEHRING

Defective diet. Notes on the feeding of tubers with special reference to the question of toxic effects. E. A. SEAGAR. *Trop. Agr.* (Trinidad) **7**, 120–2(1930).—Expts. are described in which rats were fed various carbohydrate storage tubers to det. their nutritive value. The results were similar for the different varieties except that tannia and dasheen sustained life as the sole food for longer periods than yam, sweet potato or Irish potato. Death ensued much quicker with each kind of tuber when it was fed raw. In every case death appeared to be due to deficiency of protein and vitamin A

rather than to the presence of any toxic substance, although the greater nutritive value after cooking might be due to the destruction of a toxic substance upon boiling.
A. L. MEHRING

The nitrogen metabolism of the suckling calf on a milk diet. S. J. ERLER AND K. J. PAVLOVSKII. *Biochem. Z.* **228**, 89–100(1930).—The daily N elimination undergoes small oscillations from day to day. The urine is alk. The urea N constitutes a smaller % of the total N than in the full-grown animal of the species. The calf urine is apparently free from uric acid, but always contains creatine. It contains considerable amts. of hippuric acid. On a milk diet no NH_3 is excreted through the urine. The creatinine coeff. of the calf is 20.3.
S. MORGULIS

Influence of salted yeast on the growth of young rats. L. ROSENOW AND MAX ROSENOW. *Biochem. Z.* **228**, 163–4(1930).—Food yeast can be very effectively preserved by salting, such yeast assuming the odor and taste of cheese. Addn. of such salted yeast to bread causes an increase of 36–60% in growth of young rats in 24 days.
S. MORGULIS

Nutrition and the effect of thyroid. I. Effect of casein in hyperthyroid metabolism. I. ABELIN. *Biochem. Z.* **228**, 165–88(1930).—The hormones undergo continuous catabolism and anabolism just as protein, fat and carbohydrate. The hormone metabolism is associated principally with those particular processes which the hormone stimulates. So in the case of insulin it is the sugar metabolism, of parathyroid the Ca metabolism and of the thyroid the energy metabolism. The more thyroid hormone is available for the body cells the more hormone undergoes catabolism and the more must the energy metabolism increase. The great increase of basal metabolism during hyperthyroidism is regarded as an effort of the organism to destroy and remove the hormone. Some glandular organs, particularly the liver, act as protectors against the flooding of the organism with the thyroid hormone. At first, on feeding thyroid, the liver can destroy and eliminate through the bile considerable quantities of hormone, and the initial effect on metabolism depends probably largely on the increased liver activity. Later, however, the protective action of the liver begins to fail, also its power to store glycogen and fat, or to effect the creatine-creatinine transformation, and thus more of the thyroid hormone must be released into the circulation. The excess amts. of the hormone are used up by the muscles, heart, respiratory organs, digestive tract, etc., which likewise suffer injury manifesting itself in the loss of reserves and an inability of restoration. The nervous system is also an important place where the thyroid hormone exerts its action but little is yet known about this. As soon, however, as it is possible to strengthen the liver in its hard struggle with the hormone excess and to maintain its physiological activity (glycogen storage) the rise in basal metabolism and the general body injury become noticeably slower and less pronounced, and the best means to achieve this is dietary. Only such foods must be employed as will spare and invigorate the liver as well as stimulate the anabolic processes in the cells. A rich supply of casein is shown to exert a very favorable action in this respect. Mild exptl. hyperthyroidism is greatly activated whereas severe hyperthyroidism is thus successfully combated. The liver of rats fed thyroid and casein does not lose so quickly its ability to accumulate glycogen. **II. Effect of vitamins on the course of experimental hyperthyroidism.** I. ABELIN, M. KNUCHEL AND W. SPICHTIN. *Ibid* 189–210.—The hyperthyroid condition is characterized by an abnormal rise in energy metabolism and by the considerable deficiency in anabolic processes. The latter effect can be successfully overcome by nutritional measures for which the vitamins are very essential. The vitamin requirement of the organism affected by hyperthyroidism is increased because the thyroid intoxication causes a diminution in the vitamin content of the organism. By feeding of vitamin-rich products (cod-liver oil, egg yolk, beer yeast, tomatoes, carrots, spinach, etc.) it is possible to reduce or even to check the damage done to the carbohydrate metabolism in exptl. hyperthyroidism. Feeding of bone marrow rich in fat, lipoids and vitamin A was particularly effective, even when in conjunction with very large amts. of thyroid gland the glycogenetic function of the liver did not suffer. Bone marrow promoted the new formation of glycogen and its fixation in the muscles, where a considerable excess of glycogen is found in spite of the thyroid feeding. **III. Influence of definite food mixtures on the hyperthyroid metabolic disturbances.** I. ABELIN. *Ibid* 211–32.—The assumption of a general injurious effect especially of animal proteins on the progress of hyperthyroidism is not sustained experimentally. With a suitable diet contg. 30–40% casein manifestations of hyperthyroidism could be averted. Even after 33–35 days of thyroid feeding the rise in basal metabolism was relatively small, the liver and muscles deposited normal amts. of glycogen and the symptoms of intoxication were either mild or missing entirely. Meat protein exerts an unfavorable

influence on the course of hyperthyroidism. A certain amt. of fat may also counteract the thyrotoxic effect on the liver. In special expts. with variable quantities of fat in the diet, the best results were obtained with a 15% fat mixt. However, a rich vitamin supply is very essential as the same dietary components are much less effective when cod-liver oil, egg yolk and yeast are omitted. The value of a lactovegetarian diet in the hyperthyroidized organism is questioned. S. MORGULIS

Thyroxine and thyroid. I. ABELIN. *Biochem. Z.* **228**, 233–49(1930).—The thyroid gland proteins release certain protective reactions of the organism not obtained with thyroxine, which may be also detd. by the carbohydrate metabolism of the liver. This can be shown by feeding rats 8–10 days with the dry gland or thyroxine. On repeating this 2–3 months later, it is found that the animals tolerate much better small or medium doses of the thyroid proteins than they did previously. Also, whereas during the first feeding storage of glycogen in the liver is inhibited, frequently considerable accumulation occurs during the second feeding. With thyroxine, on the contrary, in both the first and the subsequent expt. the liver is unable to convert the sugar to and store it as glycogen. Likewise, during the second treatment with thyroxine the basal metabolism is increased more readily and to a greater extent. S. MORGULIS

The metabolism of tricaprylin and trilaurin. MAUDE POWELL. *J. Biol. Chem.* **89**, 547–52(1930); cf. Eckstein, *C. A.* **24**, 401.—The depot fat of rats on a diet contg. 25% of trilaurin yielded 25.2% lauric acid; with tricaprylin, however, only a trace of caprylic acid could be obtained. In both cases the I no. of the depot fat is lowered; with trilaurin the sapon. no. is raised from 199 (normal) to 218, but with tricaprylin it is unaffected. K. V. THIMANN

Observations on the serum calcium, proteins and inorganic phosphorus in experimental vitamin B deficiency and inanition. VICTOR SCHELLING. *J. Biol. Chem.* **89**, 575–80(1930).—Dogs deprived of the vitamin-B group showed no significant decrease in serum Ca and no appreciable change in serum proteins or inorg. P in 15 weeks. In dogs fasting after 3 weeks on vitamin-B-free diet, the serum Ca decreased considerably and the inorg. P increased slightly, but only after the body wt. had fallen below 80%. Discrepancies in previous work on blood Ca in avitaminosis B (Ungar, *C. A.* **21**, 2019, Smith, *C. A.* **21**, 2502) are attributed to divergent diet conditions. K. V. T.

A comparison of the influence of iodized milk and of potassium iodide administered directly on the size and iodine content of the thyroid gland of rats. W. E. KRAUSS AND C. F. MONROE. *J. Biol. Chem.* **89**, 581–8(1930).—The feeding of iodized milk, or normal milk to which small quantities of KI have been added, results in a reduction in the size of the thyroid gland of rats, and an increase in the I content of the gland when compared to rats on normal milk. On the high-Ca low-P diet of Steenbock and Black (*C. A.* **19**, 2090), with or without irradiation, the wt. of the thyroid gland was double the normal. The iodization of the general milk supply is suggested. K. V. T.

A study of the antimony trichloride color reaction for vitamin A. IV. The source of vitamin B complex in the biological assay of vitamin A and the stability of vitamin A and of the chromogenic substance in various diluting oils. EARL R. NORRIS AND ANNA E. CHURCH. *J. Biol. Chem.* **89**, 589–98(1930); cf. *C. A.* **25**, 537.—Flattening of the growth curve of rats on diets rich in vitamin A previously attributed to the toxicity of the vitamin A-contg. oil can be prevented by addn. of sufficient vitamin B to the diet. The use of peanut, olive, or coconut oils as solvent causes considerable deviation from the linear relationship between diln. and intensity of $SbCl_3$ color reaction. The chromogenic substance is slowly destroyed in the first 2 oils, but the destruction is prevented by addn. of 0.05% hydroquinone. K. V. THIMANN

The source of excess calcium in hypercalcemia induced by irradiated ergosterol. JAMES H. JONES, MILTON RAPOPORT AND HORACE L. HODES. *J. Biol. Chem.* **89**, 647–56(1930).—The conclusion of Hess, Weinstock and Rivkin (*C. A.* **24**, 3537, 5805), that the excess Ca of the hypercalcemia produced by irradiated ergosterol is not derived from the food, is based on expts. in which the diet Ca was small but sufficient. Dogs on a wholly Ca-free diet, contg. 0.1 cc. irradiated ergosterol soln. of 1500 D per kg. body wt. per day, show no marked rise in serum Ca in 3 weeks, while controls on a Ca-contg. diet developed marked hypercalcemia in 2 weeks. The source of the excess Ca is therefore the food and not the body tissues. K. V. THIMANN

Some observations on the behavior of vitamin A in or from primary sources. E. J. QUINN, J. G. HARTLEY AND M. A. DEROW. *J. Biol. Chem.* **89**, 657–63(1930); cf. *C. A.* 22, 3912.—**Dry spinach lost 70% of its vitamin-A content on storing 15 months in diffused light. The addn. of rancid butter fat over the same period slightly increased the vitamin destruction. Exposure of the petr. ether ext. of carrots to ultra-violet light for 3-5 hrs. completely destroyed the vitamin-A content, and at the same time decolorized**

the ext. The vitamin A of dried tomato, carrot and broccoli is readily extd. by peanut oil. K. V. THIMANN

Bile salt metabolism. V. Casein, egg albumin, egg yolk, blood and meat proteins as diet factors. H. P. SMITH AND G. H. WHIPPLE. *J. Biol. Chem.* **89**, 689–704(1930); cf. *C. A.* **23**, 1161.—Previous detns. of the efficiency of various substances for production of bile salt in the bile-fistula dog are continued. The standard salmon-bread diet yields a const. value of about 100 mg. taurocholic acid per 24 hrs. per kg. body wt. Liver, kidney and beef muscle produce 200–300 mg. per 24 hrs. per kg., casein 125–190, but ovalbumin only 50. Since the endogenous output in fasting or sugar-feeding averages 30–40 mg. per kg. the effect of ovalbumin is very small. Whole beef blood considerably increases the output; red blood cells alone, however, decrease it. Sweet breads give the same output as the standard diet. Tryptic digestion of beef reduces its potency to the level of the standard diet, possibly because of destruction of some amino acids. **VI. Proline, tryptophan and glycine in diet.** G. H. WHIPPLE AND H. P. SMITH. *Ibid* 705–17.—Proline added to the salmon-bread diet increases the taurocholic acid output by 50%; added to an ovalbumin diet it increases it 100%. Tryptophan does not increase the output on an ovalbumin diet, but on a gelatin diet increases it 150%. Glycine also increases the output on an ovalbumin diet. Proline and tryptophan have a cholagog effect; glycine has not. **VII. Indene, hydrindene and isatin.** *Ibid* 719–25.—Indene and hydrindenedicarboxylic acid are without effect on the taurocholic acid output, although from the indene-ring formula of cholic acid an effect would be expected. Isatin increases the output very slightly. Both indene and isatin are powerful cholagogs. **VIII. Liver injury and liver stimulation.** *Ibid* 727–38.—Mild injury of the liver by chloroform immediately reduces the taurocholic acid output, which, however, returns to normal in a few days. Liver fractions active in pernicious and secondary anemia, ferric citrate and apricots are all inactive in increasing the output on the standard salmon-bread diet. Daily refeeding of all bile secreted increases the bile salt output to a high level, but the surplus bile, although it slowly decreases, is not excreted in the urine, as shown by Schmidt and Merrill's method (*C. A.* **18**, 698). **IX. Eck fistula modifies bile salt output.** H. P. SMITH AND G. H. WHIPPLE. *Ibid* 739–51.—The bile salt output of dogs with both Eck and bile fistulas (Smith and Jones, *C. A.* **24**, 5323) is unaffected by liver, Fe salts, or ovalbumin with or without glycine, is reduced by a tryptic digest of meat, and considerably reduced by inhalation of $CHCl_3$. Bile refeeding does not increase the output to such a high level as in the normal dog. Sensitivity to cholagog action is also reduced. The output of bile salt on the standard salmon-bread diet is in many cases lower than in the normal dog. K. V. THIMANN

Studies on the creatine and nitrogen content of the whole rat after the feeding of a variety of diets and after nephrectomy. ALFRED CHANUTIN. *J. Biol. Chem.* **89**, 765–74(1930); cf. *C. A.* **24**, 889.—Creatine analyses of the fat-, ash-, and moisture-free carcass tissue of large nos. of rats on diets rich in casein, edestin, gelatin and dried extd. beef, as well as on protein-free diets, show no appreciable variation. The creatine and N concn. are unchanged 48 hrs. after nephrectomy, indicating that the excess creatine is destroyed or utilized. Rats fed on high-protein diet throughout their entire life show the same creatine content as normal animals. A 10% creatine diet produces apparent creatine "satn." after the first day. Formation of tissue creatine from exogenous sources, as suggested by Mitchell, Nevens and Kendall (*C. A.* **16**, 2713) and others, is considered to be improbable. K. V. THIMANN

Cerebellar disorder in chicks, apparently of nutritional origin. ALWIN M. PAPPENHEIMER AND MARIANNE GOETTSCH. *J. Exptl. Med.* **53**, 11–26(1931).—Growing chicks maintained on a diet consisting of milk powder, casein, starch, yeast, cod-liver oil, salts and filter paper develop ataxia, tremors, retraction or twisting of the head, clonic spasms of the legs and stupor. These symptoms may appear suddenly, usually between the 18th and the 25th day and may end in death. If recovery takes place, the chicks may go on to normal development. This may be a true nutritional deficiency disease, although the nature of the relationship is, however, by no means clear. C. J. WEST

Physiological action of xanthophyll. P. KARRER, H. VON EULER AND M. RYDBOM. *Helv. Chim. Acta* **13**, 1059–62(1930).—Chickens, as well as rats (cf. *C. A.* **23**, 3254), show no growth when fed xanthophyll (0.03 mg. per day). All chickens died in 3–5 weeks. Xanthophyll stearate likewise does not promote growth. A. W.

Relationship of carotene content to vitamin-A activity in various plant substances. H. V. EULER, V. DEMOLE, P. KARRER AND O. WALKER. *Helv. Chim. Acta* **13**, 1078–83(1930).—The carotene and xanthophyll contents of the unsaponifiable portion of the ether ext. from the dry leaves of spinach, beech, *Lolium pirenne* mixed with other

grasses, lettuce and nettles and from the flowers of the marsh marigold and kernels of corn were found to vary from 1.9 to 22.8 mg. and 2.3 to 41.2 mg. per g., resp. The vitamin-A activity of the unsaponifiable matter was found to run parallel to the carotene content. Lycopin, physalin and phaeophytin showed no vitamin-A activity. Dried grass showed an activity equal to about 60% that of fresh grass. A. WIEBEN

H transition in cholesterol (SCHÖNHEIMER) 10.

F—PHYSIOLOGY

E. K. MARSHALL, JR.

Recent advances in the physiology of digestion. III. The ruminant stomach. H. H. DUKES. *J. Am. Vet. Med. Assoc.* **31**, 92–7(1931).—A review of mech. and chem. factors in the rumen, reticulum, omasum and abomasum. RACHEL BROWN

Various modes of sugar breakdown in the animal organism. ERWIN BUMM AND KARL FEHRENBACH. *Z. physiol. Chem.* **193**, 238–50(1930).—Animal tissues may be grouped into 2 classes according to their mode of carbohydrate utilization: striated muscle, which prefers glycogen and is able to split hexosephosphoric acids, and tumor, cerebral cortex, spleen and embryonic tissue, which are more active toward glucose. The thermolabile coenzyme T, which functions in the anaerobic utilization of glucose, is especially abundant in tumors. Addn. of T to brain cortex or to kidney tissue doubles the extent of glucolysis. In such tissues the quantity of coenzyme present is the limiting factor in lactic acid formation. The thermostable cozymase of yeast, on the other hand, activates glucolysis by an intermediary formation of hexosephosphoric acid. Striated muscle of rabbit, chicken or rat causes a vigorous breakdown of glycogen, but does not attack glucose unless cozymase is added. Coenzyme T has no effect here; hence the 2 activators are not identical. With white muscle the response is quite different. Both glycogen and glucose undergo glucolysis without addn. of activator; coenzyme T increases the glucolysis of sugar but not that of polysaccharide, while cozymase acts in the reverse manner. To det. whether the cleavage of glycogen and that of sugar are 2 independent processes, or whether they proceed by way of common intermediates, the activation by cozymase and that by coenzyme T were measured separately and then compared with the glucolysis of a system contg. all 4 components. The total glucolysis was equal to the sum of the 2 sep. glucolyses. The processes of glycogen and sugar breakdown are, therefore, independent. If both cleavages lead through the same intermediates the presence of both coenzymes should yield the max. performance. In contrast to white muscle, kidney tissue is activated by both coenzymes, each of which increases the glucolysis 2–3 times. Both glucolytic processes are in operation here, one via hexosephosphoric acid and activated by cozymase, the other independent of cozymase and activated by coenzyme T. A. W. DOX

New internal secretion of the pancreas, the circulatory hormone calicrin and its application. E. K. FREY. *Pharm. Monatsh.* **11**, 271(1930).—An address. W. O. E.

Recent results in hormone investigation with pharmaceutical products related thereto. HANS KAISER. *Süddeutsche Apoth.-Ztg.* **71**, 19–21, 29–31(1931).—An address. W. O. E.

The cycle of iron in the organism. E. STARKENSTEIN. *Naturwissenschaften* **18**, 875–9(1930).—A review of recent work on the role of Fe in the organism (cf. *C. A.* **21**, 1494; **22**, 1407; *Klin. Wochschr.* **7**, 267 (1928); *Z. exptl. Med.* 68 (1929); *Erg. Med.* 14, 565 (1930); S. and Weden, *C. A.* **23**, 208, 890; **24**, 4081). B. J. C. V. D. H.

The chemistry of muscle contraction. J. K. PARNAS. *Naturwissenschaften* **18**, 916(1930).—Expts. on frog muscles poisoned by iodoacetic acid were made to study their NH_3 formation. Isolated poisoned rigid muscle (rigidity caused either by irritation or by prolonged rest) has an NH_3 nitrogen content of 7 to 10 mg. %. However, contrary to the opinion of Embden (*C. A.* **24**, 5352), who attributed this to a lack of reversibility of the NH_3 formation in the poisoned muscle, evidence is advanced that the NH_3 accumulation follows the contractions and is only indirectly caused by them. Immediately after 120 faint contractions (2 per sec.) the NH_3 found is equal to that of normal muscle (1.2 to 1.9 mg. %); one hr. later the content is 7 mg. %, whereas a non-irritated poisoned muscle has only 1.9 mg. % after the same period. Processes caused by the contractions bring about the subsequent NH_3 formation simultaneously with the ultimate rigid condition. In rest condition at 14° the poisoned muscle has after 3 hrs. little NH_3; after another 3 hrs. it has 8 to 9 mg. % NH_3. At the same time it has become stiff. The NH_3 formation in poisoned muscle is irreversible.

B. J. C. VAN DER HOEVEN

Muscle contraction, chemical contraction and lethal rigidity. EDGAR WÖHLISCH. *Naturwissenschaften* **18**, 931–4(1930).—A review of W.'s work and discussion of the problem of the nature of lactic acid action in the muscle (*C. A.* **22**, 3699). Many references are given. B. J. C. VAN DER HOEVEN

The composition, specific gravity and p_H of colostrum. B. VAN DER BURG. *Nederland. Tijdschr. Hyg., Microbiol., and Serol.* **5**, 56–65(1930).—The following detns. were made on a large no. of samples of colostrum and the results extensively tabulated: protein (N × 7.0), fat, lactose, ash, dry substance, Cl, d_{16}^{15}, and p_H. The following averages were found: protein 17% (max. 26.6, min. 6.6), fat 3.3% (max. 12.0, min. 0.5), lactose 2.5%, (max. 3.9, min. 0.5), ash (sulfate ash) 1.04% (max. 1.61, min. 0.70), Cl 165.5 mg. per 100 g. (max. 460.5, min. 53.8), dry substance 23.8% (max. 38.2, min. 13.6), sp. gr. 1.0652 (max. 1.0936, min. 1.0366), p_H 6.22 (max. 6.88, min. 5.95). J. C. J.

Biochemical studies on skin, bone and shell. I. Sexual differences in the composition of bone. HIROMICHI HARA. *J. Agr. Chem. Soc. Japan* **6**, 655–8(1930); *Bull. Agr. Chem. Soc. Japan* **6**, 35–6.—The bones of rabbit, pig and mackerel were investigated. Ca was generally higher in the female, and P higher in the male. When these data were calcd. on the basis of N = 100, the contents of both Ca and P were higher in the female. Y. KIHARA

The elimination of uric acid after intravenous injection. GINO BERGAMI. *Biochim. terap. sper.* **17**, 310–22(1930); cf. *C. A.* **24**, 1897.—A soln. of 1 g. uric acid, 0.28 g. Li_2CO_3 and 1.35 g glucose in 100 cc. H_2O was intravenously injected into dogs and rabbits and the elimination detd. The uric acid disappears rapidly from the blood. The increase in non-protein N is continued after the uric acid disappears. The latter is fixed in the kidneys, which become edematous; it disappears from the kidneys within some hrs. During the following days, the elimination of uric acid, allantoin, urea and NH_3 in the urine is increased, but not in proportion to the uric acid injected. A certain part of it is eliminated in an unknown way. A. E. MEYER

Metabolism during stimulation and response of the nerve. O. MEYERHOF AND W. SCHULZ. *Biochem. Z.* **228**, 1–5(1930).—The increased oxidation results from the general response of the whole nerve and not from the locality of the irritation. This holds only for the peripheral nerves. S. MORGULIS

The biochemistry of carbohydrate metabolism in washed muscle tissue. A. UTEVSKII. *Biochem. Z.* **228**, 135–45(1930).—The formation of acetaldehyde transformation products of pyruvic, fumaric and malic acids was followed in normal and in washed muscles, also in washed muscle and boiled juice. In washed muscle tissue undergoing autolysis aldehyde is produced in very minute amts. or practically not at all, and this is not altered by the addn. of glycogen, glucose, fructose or glycerol. In the presence of EtOH or of lactates a small amt. accumulates. In the presence of pyruvates acetaldehyde accumulates in the same amt. as in unwashed muscle, showing that the decarboxylase activity is unaffected. The ability to form acetaldehyde by the muscle is restored through the addn. of boiled juice. The transformation of pyruvates by the washed muscle tissue is greatly reduced, indicating that the oxido-reductase is destroyed although the decarboxylase is unaffected. The former, however, is restored by the addn. of boiled juice. The change of fumaric to malic acid proceeds equally well in the washed and unwashed muscle tissue, but the further transformation of malic acid by washed muscle is very much decreased. The addn. of boiled juice corrects this also. It is maintained that the washing does not merely remove substances which are H donors, but that coenzymes necessary for the enzymic processes are lost, and are restored by the addn. of the boiled juice. S. M.

Influence of thyroid gland substances on the total creatinine content of liver and muscles. I. ABELIN AND W. SPICHTIN. *Biochem. Z.* **228**, 250–6(1930).—Feeding rats on thyroid substance causes a great diminution in the total creatinine content of the liver and of the striated muscles. The loss of creatine-creatinine, the almost complete absence of glycogen and strong reduction of the fat depots are all manifestations of the injuries to the hyperthyroid metabolism. S. MORGULIS

Studies on the extra-hepatic bile pigment formation in surviving organs. V. Is there a relation between the bilirubin production of the surviving spleen and the quantity of red cells lodged in the spleen parenchyma? Z. ERNST AND E. HALLAY. *Biochem. Z.* **228**, 354–65(1930).—The dog's spleen perfused with defibrinated blood can produce bile pigments. To test whether this is due to the destruction of the red cells which pass outside the capillaries of the parenchyma and whose hemoglobin is changed to the bile pigments, the quantity of red cells in the spleen parenchyma was greatly increased by raising the arterial pressure and establishing venous stasis at the same time, but

the bile pigment production was not affected. Conclusion: Other factors besides the no. of red cells undergoing destruction must be responsible for the pigment production. Cf. *C. A.* **20**, 1276. S. MORGULIS

The ammonia content and the ammonia production in the frog muscle. VII. J. K. PARNAS, W. LEWINSKI, J. JAWORSKA AND B. UMSCHWEIF. *Biochem. Z.* **228**, 366–400(1930); cf. *C. A.* **23**, 3000.—The frog muscle is quickly rubbed up in a glass mortar in a few cc. of cold satd. borax soln. made previously NH_3-free by boiling. This procedure can be employed only with very small muscles which are at once reduced to a pulp by pressure of the pestle. The NH_3 is detd. by the method of Parnas. It is maintained that the facts do not support the view that the NH_3 formed during muscle contraction disappears in a few seconds after the contraction. This is particularly well shown on the living frog where the NH_3 accumulated during activity disappears very slowly, and is still found even after 30 min. This, of course, also occasions variations in the NH_3 content of the muscles of normal frogs. The NH_3 furthermore escapes from the muscle into its surrounding fluid, and in the *in vitro* expt. can be found in the Ringer soln. and *in vivo* in the venous blood from the muscle, and this may also be erroneously attributed to a resynthesis. S. MORGULIS

Experiments on extracting hormones with the aid of a special vividiffusion method. CARL MÜLLER. *Endokrinologie* **7**, 401–15(1930).—The method depends upon a slow perfusion of the peritoneal cavity with physiol. saline soln., the peritoneum being used as a seat of vividiffusion. The presence of hypophysin and of adrenaline in the perfusate could be demonstrated quantitatively in biol. tests, with the perfusate for intravenous injections. This indicates that both hormones freely circulate in the organism without undergoing rapid destruction. S. MORGULIS

Urinary galactose in men and women after ingestion of galactose. VICTOR J. HARDING AND OLGA MOBERLEY. *J. Biol. Chem.* **89**, 535–45(1930); cf. *C. A.* **24**, 2784.—The urinary excretion of galactose after ingestion varies widely in men and women, being in some cases slightly higher in women. Since the diuretic response of women to the water ingested with the galactose is greater, however, the concns. of galactose in the urine of the women are lower, and are close to the threshold of sensitivity of the qual. Bertrand test. The results of Rowe (*C. A.* **24**, 650, 1668; *Endocrinology* **13**, 263(1929)) which were based on this test appeared to show a greater tolerance to galactose in women than in men. K. V. THIMANN

The recovery process after exercise in the mammal. I. Glycogen resynthesis in the fasting rat. C. N. H. LONG AND RHODA GRANT. *J. Biol. Chem.* **89**, 553–65(1930).—Fasting rats were exercised artificially by electrical stimulation so as to reduce the total body glycogen by const. amts., and the liver, blood and carcass separately analyzed. The blood lactic acid, which reaches 150–200 mg. % immediately after the exercise, is completely reduced to normal in 1 hr.'s recovery, but on the other hand the carcass glycogen is not restored to its normal value for more than 5 hrs. The glycogen content of the liver (cf. Cori and Cori, *C. A.* **22**, 1623, 4590) is not greatly altered during and after exercise, so that if glycogen is resynthesized in the liver from lactic acid, it is not stored there, but probably returned to the blood as glucose. The lactic acid content of the whole body returns to its normal value after 2 hrs.' recovery. The blood sugar is lowered during the exercise but returns to normal after about 1 hr.'s recovery. K. V. THIMANN

Metabolism of amines. II. Dimethylamine. WILSON D. LANGLEY AND RICHARD J. WEBER. *J. Biol. Chem.* **89**, 567–74(1930); cf. *C. A.* **24**, 1148.—From rabbits fed with 92–220 mg. of $NHMe_2$ per kg. body wt., given as hydrochloride with $NaHCO_3$, 1–30% of the amine was recovered in the urine. If 2 equivs. of $NaHCO_3$ were given, the recovery was 29–61%. Only traces of tri- and mono-methylamines were recovered. Most of the N which is metabolized is excreted as urea. K. V. THIMANN

An apparent effect of normal variations in the respiratory rate upon the excretion of chloride and water. ROGER S. HUBBARD AND CATHERINE B. ALLISON. *J. Biol. Chem.* **89**, 627–30(1930); cf. *C. A.* **24**, 407, 4819.—The conditions which tend to produce an alk. urine in achlorhydria patients also tend to increase the excretion of fluid, but the Cl excretion is increased more than would be expected from the vol. increase. The results are similar to those of Simpson and Wells (*C. A.* **22**, 978). K. V. T.

Geographic location and the iodine content of the thyroid gland. F. FENGER, R. H. ANDREW AND J. J. VOLLERTSEN. *J. Am. Chem. Soc.* **53**, 237–9(1931).—Calcd. on the desiccated fat-free basis, the yearly av. for hog thyroid glands from N. Dakota is 0.32% I, while that of Texas glands is 0.60% I. The seasonal variation in the I content is most pronounced in the northern glands. The higher I level of the Texas glands and

the greater seasonal fluctuations of the N. Dakota thyroids are attributed to the geographic location of the 2 states. C. J. WEST

Influence of uric acid on the permeability of membranes. VIRGILIO CHINI. *J. Exptl. Med.* **53**, 1–9(1931).—Congo red (I) injected *in vivo* together with uric acid (II) gives rise to more intense and diffuse red coloring in rats, especially in the subcutaneous and peri-articular tissues, than is the case in control rats injected with dye alone. II added *in vitro* to solns. of I or trypan blue increases the speed of diffusion of these dyes, both through gelatin and the animal membranes (dialyzers). These results support a view long maintained by Rondoni, that some factor of an endothelial-capillary nature must be taken into consideration in manifestations of hyperuricemia and of gout. C. J. WEST

Factors which determine renal weight. XI. Renal function. EATON M. MCKAY AND BURRELL O. RAULSTON. *J. Exptl. Med.* **53**, 109–13(1931).—The amt. of functioning renal tissue as measured by the wt. of the kidneys in the albino rat is directly proportional to the renal function as measured by the ratio: urine urea rate/blood urea concn. under certain special conditions. C. J. WEST

Absorption from the pericardial cavity. CECIL K. DRINKER AND MADELEINE E. FIELD. *J. Exptl. Med.* **53**, 143–50(1931).—Physiol. salt soln. is absorbed from the pericardial cavity of medium-sized rabbits at a rate of approx. 1.3 cc. per hr. This absorption is via the subepicardial blood capillaries. Rabbit and horse serums are absorbed extremely slowly, an indication of the low-grade lymphatic drainage of the pericardial sac. Graphite particles of bacterial dimensions are also removed very slowly. Such particles enter the lymphatics only after phagocytosis. C. J. W.

Ratio of the glomerular and tubular eliminations of the urinary constituents. SAKAE YOSHIDA. *Proc. Imp. Acad.* (Japan) **6**, 381–2(1930).—Chloride is eliminated with H_2O almost exclusively through the glomeruli and reabsorbed partly in the tubules, while other urinary constituents are excreted mainly from the glomeruli and only partly from the tubules. C. J. WEST

Glucose threshold in kidney. SHICHIRO IMAGAWA. *Proc. Imp. Acad.* (Japan) **6**, 383–4(1930).—From a study of phlorhizin, $HgCl_2$ and KCN, it is shown that in the glomerular circulation the drugs cause glucosuria even in very high diln., while in the capillaries around the tubules, it is necessary to establish a much higher concn. (up to 200 times). These exptl. results can be interpreted more readily by accepting the existence of the threshold for blood sugar in the glomerulus. C. J. WEST

BERG, RAGNAR: **Kontrolle des Mineralstoffwechsels.** Leipzig: S. Hirzel. 87 pp. M. 5.

G—PATHOLOGY

H. GIDEON WELLS

A chemical study of sclerema neonatorium. T. T. CHEN. *Nat. Med. J. China* **16**, 360–4(1930).—Subcutaneous fat and fat-free skin of 8 sclerema and 4 non-sclerema babies were analyzed. The fat samples showed no differences in m. p., iodine no. and sapon. no. The Ca and P contents of the tissues also were about the same. WM. H. ADOLPH

The purification of tuberculin. I. ERNST MASCHMANN AND EMIL KÜSTER. *Z. physiol. Chem.* **193**, 215–37(1930).—The protein-free nutrient medium of Sauton (*C. A.* **6**, 2945) is well adapted to the prepn. of an active tuberculin. After 6 or more weeks at 38° the culture is filtered through paper, then through Berkefeld filters, and its potency is detd. by ascertaining the min. dose fatal to tuberculous guinea pigs within 24 hrs. after subcutaneous injection. The soln gives characteristic reactions for proteins and protein decompn. products, and the Molisch reaction for carbohydrates. The presence of proteins and carbohydrates is obviously due to autolysis of dead tubercle bacteria. The specific active substance in tuberculin diffuses readily through animal membrane (so-called fish bladder). Higher mol. proteins may be removed without loss of the sp. substance by acidifying the crude or the partially dialyzed tuberculin to p_H 3.8 with AcOH. After this treatment the sp. substance is adsorbed at p_H 3.8 on kaolin purified by electrodialysis, leaving the carbohydrates in the residual soln. It is then extd. in good yield by elution of the kaolin adsorbate with very dil. NH_4OH. The purity of the sp. substance is now 20 times that of the crude tuberculin. The prepns. all give feeble biuret and ninhydrin, some give Millon, but none the tryptophan or Molisch reactions. The carbohydrate remaining from the kaolin adsorption has the properties of glycogen. A. W. DOX

Copper and tuberculosis. PAULO SEABRA. *Arch. Pharm.* **268**, 565–7(1930).—A

preliminary study shows that tuberculosis decreases the Cu content of the lung. This decrease appears to depend on the extent of the lesion. W. O. E.

A contribution to our knowledge of leak disease, bone hardening and softening with especial reference to the chemical significance. E. RITTER. *Landw. Jahrb. Schweiz* **43**, 491–526(1929).—The disease is prevalent in Switzerland. There has not been a satisfactory explanation of the cause, which R. now assumes is either the proteins and their different biol. activities, the vitamin content or the mineral matter of the food. Phosphate fertilization of soils and the use of molasses, prepd. chalk and other minerals in the food have resulted in a decrease in the disease and improvement in the infected animals. It is believed that building up the soil so that the crops are higher in mineral content will have a beneficial effect. GEORGE R. GREENBANK

Emmanuel and Rosenfeld's mastic test for the cerebrospinal fluid and its significance for the diagnosis of syphilis of the central nervous system. G. EMMANUEL AND H. ROSENFELD. *Med. Klin.* **26**, 553–5(1930); *Bull. Hyg.* **5**, 725.—A mastic soln. in C_2H_5OH and a buffered NaCl soln. of p_H 7.5 are used. Dilns. of the cerebrospinal fluid are made up to 1 to 1024. With normal serum only the first two tubes show a slight turbidity. Grades of reaction are recognized as in the gold sol test. Flocculation in the first two tubes due to excess globulin is characteristic of syphilis. Blood may cause turbidity in the tubes of moderate diln. GEORGE R. GREENBANK

The fading of tropeolin OO in the titration of organic acids in urine. K. LUCILLE MCCLUSKEY. *J. Biol. Chem.* **90**, 197–201(1931).—A substance, probably of endogenous origin, has been found in certain pathol. samples of urine, which causes a fading of tropeolin OO when this indicator is used in the Van Slyke and Palmer method for the detn. of org. acids. It is easily oxidized and can be removed from urine by aeration in the presence of HCl. It may be an unoxidized S compd. arising from the destruction of tissue protein. It occurs in the urine at intervals in 30–40% of persons very ill from tuberculosis but it is probably present in other diseases. A. P. LOTHROP

The decrease of the capillary buffer power in cancerous serum. W. KOPACZEWSKI. *Compt. rend.* **191**, 1155–7(1930).—The surface tensions of sera from 59 normal and 14 cancer (face and tongue) cases were detd. after the addn. of amts. of Na glycocholate varying from 0 to 0.005%. Values for normal sera were 1-3 dynes/cm. higher than those for the cancerous. C. M. MCCAY

Congenital porphyria with polyneuritic symptoms. FERDINANDO MICHELI AND GIORGIO DOMINICI. *Minerva med.* 1930, II, 505–19.—Cases of porphyria in a mother and a daughter are described. The clinical findings are given in minute details. Both patients showed a marked hyperpigmentation of the skin which was greatly accentuated when exposed to the action of sunlight. The nosography is discussed and a classification of the various forms of the disease is given. The syndrome is closely related to metabolic disorders which result in the abnormal production and elimination of porphyrins in the feces and urine and their increase in the blood and duodenal fluid. The nervous phenomena are attributed to degenerative changes in the cells of the anterior horn, of the cells of the spinal ganglia and of the peripheral nervês. Essential for the diagnosis of the disease is the elimination of dark urine, of a port-wine color. The urine shows a red fluorescence and is rich in coproporphyrin and uroporphyrin. The feces, blood serum and duodenal fluid may also show these. A spectroscopic examn. is necessary for the diagnosis. Therapeutic measures are also given and in cases of hypersensitiveness of the skin avoidance of sunlight is a requisite. PETER MASUCCI

Chloremia and chlorine metabolism in various pathological conditions. C. CIPRIANI AND G. C. DOGLIOTTI. *Minerva med.* 1930, II, 549–55.—Systematic studies were made on chloremia and on the metabolism of chlorine in clinical cases of intestinal occlusions. From the results obtained, the assertion is made that the hypochloremia of high intestinal occlusions resembles somewhat the toxic hypochloremia with and without vomiting. The pathogenesis of toxic hypochloremia in intestinal occlusions is attributed not only to an increased elimination of chlorine but also to a disturbance of the equil. of NaCl in the blood, tissues and kidneys. PETER MASUCCI

A substance producing hyperthermy, contained in brewers' yeast. ANTONIO SPINELLI. *Biochim. terap. sper.* **17**, 397–401(1930).—Mix 500 cc. H_2O, 250 g. yeast and 10 cc. 5% NaOH and autolyze during 15 to 25 days at room temp. When 0.7–0.8 cc. of the filtered liquid is injected intravenously into a rabbit, a rise of the temp. to 41.8° during 5 to 6 hrs. is observed. The prepn. is recommended for production of artificial fever in animal expts. A. E. MEYER

The products of protein cleavage in the spinal fluid. GUISEPPE AIELLO. *Biochim. terap. sper.* **17**, 414–8(1930).—The tryptophan reaction is positive in the spinal fluid in tuberculous meningitis, but in few other conditions. The values of N vary between

0.41 and 2.4 in this disease but are not proportional to the gravity of the case or to the intensity of the tryptophan reaction. For the diagnosis, the detn. of the amino acids is of value only in assocn. with the clinical data. A. E. MEYER

Human isoagglutination in serum sickness. GUISEPPE GELLI AND GIANCARLO TAROZZI. *Biochim. terap. sper.* **17**, 419–27(1930).—In cases of diphtheria treated with serum, the titer of the isoagglutinins decreases to normal when the anaphylactic conditions have scarcely passed. A. E. MEYER

The action of some colloidal solutions on diphtheria toxin. G. ROSSI. *Biochim. terap. sper.* **17**, 437–44(1930).—Colloidal S inactivates diphtheria toxin when the two are mixed and injected in guinea pigs. Congo red, HgS and As_2S_3 have no effect. A. E. MEYER

The spinal fluid of the new born. CARLOS M. PINTOS. *Semana méd.* (Buenos Aires) **1930**, II, 1815–20.—In 98% of the babies tested xanthochromia was observed during the first 10 days. For the yellow fluid in 88% of the cases the indirect reaction of van den Bergh was positive. A. E. MEYER

Glucolysis in blood with special reference to lactic acid formation. OTTO JERVELL. *Acta Med. Scand.* **74**, 221–34(1930).—No difference was found in the glucolytic power of bloods under various pathol. conditions, and the glucolysis was practically always the same. A glucolytic enzyme in the serum of cancer patients could not be demonstrated. The increased glucolytic power of cancer tissues is attributed to the relatively high cell content of those tissues rather than to any alteration in general metabolism. The greatest loss of sugar occurred during the first hr., and after 4 hrs. the largest part of it disappeared. With the aid of the Hagedorn-Normann Jensen method the av. residual reduction was 15.4 mg. %. In 18 cases, or 60% of the total, the sugar value after the termination of glucolysis increased; this may be due to a new synthesis. The glucolysis is independent of the initial concn. of the blood sugar, and insulin either given by injection or added directly to the patient's blood has no effect on it. The lactic acid production did not correspond to the sugar deficit, and in 23 cases it accounted for only 58%; it is suggested that the glucolysis results only partly in lactic acid. S. M.

Sugar content of cerebrospinal fluid. II. Studies on the influence of the glucose-adrenaline hyperglucemia on the cerebrospinal fluid in organic diseases. CARL J MUNCH-PETERSEN. *Acta Med. Scand.* **74**, 235–83(1930); cf. *C. A.* **25**, 744.—In the absence of definite endocrine involvement a change in reaction from the normal, *i. e.*, outside the limit 0.015 to 0.030%, may betray a deep-seated affection of the central nervous system. S. MORGULIS

A study of the parathyroid enlargement in osteitis fibrosa generalisata. E. ASK-UPMARK. *Acta Med. Scand.* **74**, 284–323(1930).—The enlargement of the parathyroid gland is considered to be the rule in osteitis fibrosa generalisata, although in some rare cases there was no enlargement present. The parathyroid enlargement is considered primary to the bone disease, the Ca metabolism of the patient being noticeably disturbed. Improvement of the condition in Recklinghausen's disease generally follows parathyroidectomy but the danger of postoperative tetany is present. S. M.

The biology of the meal worm Tenebrio molitor. I. The water content. FR. N. SCHULZ. *Biochem. Z.* **227**, 340–53(1930).—*Tenebrio molitor* is extraordinarily resistant to desiccation. In vacuum-dried bran the full-grown larvae can be kept for months in a dry air current, where they undergo metamorphosis. The growth of the larvae stops, and the non-puppated larvae remain in this stage for months. The metabolic H_2O condenses on the dry bran around the larvae, but since there is complete cessation of growth it is an open question whether this moisture does any good. The adjustment to the extreme conditions of desiccation is through a limitation of the vital processes and the condensation of the metabolic H_2O on the surface. Furthermore, there is production of a wax-like substance which evidently serves to prevent evapn., and, together with the animal's covering of chitin, makes it possible for the meal worms to maintain their water content. The worms consume much smaller quantities of bran under the condition of desiccation. S. MORGULIS

Note on the metabolism of tumors. OTTO WARBURG. *Biochem. Z.* **228**, 257–8 (1930).—Degenerating cells lose their respiratory function sooner than their glucolytic ability, so that they begin to glucolyze aerobically. This is found in the case of cells in the process of dying, but also in asphyxiated embryonic tissues. The latter, whose respiration is irreversibly destroyed, show a metabolism like that of tumors, yet they do not develop into tumors. Transplanted subcutaneously, the asphyxiated embryonic tissues may give rise to teratomas or disintegrate, but they do not become tumors. Only when the injury to the oxidative process is transmitted from cell to cell in the course of cell division can tumors originate. S. MORGULIS

Purification and concentration of diphtheria toxin and anatoxin with special reference to active immunization of man. S. SCHMIDT AND A. HANSEN. *Biochem. Z.* **228**, 263–90(1930).—By a combination of adsorption of toxin and anatoxin by means of Willstätter's $Al(OH)_3$ and charcoal very concd., colorless and odorless prepns. were made which retained the specific immunological properties of the crude toxin and anatoxin. With the described technic of prepn., toxin and anatoxin were obtained with 500–1000 units per cc. with the same protein content, however, as that of the crude prepn. With this anatoxin prepn. it is possible to produce a strong and lasting immunity against diphtheria by a single injection. S. MORGULIS

Purification and concentration of diphtheria toxin and anatoxin by precipitation with acids. S. SCHMIDT AND K. A. KJAER. *Biochem. Z.* **228**, 291–9(1930).—By adjusting the p_H of crude toxin or anatoxin to 3.5–4.1, ppts. are obtained which when sepd. by centrifuging and dissolved in alk. soln. retain 50–60% of the specific activity of the substance but only traces of the non-specific protein. Certain alterations, however, take place under the influence of the acid, since the immunizing action of the purified anatoxin is less than that of the crude anatoxin. S. MORGULIS

Diphtheria toxin-antitoxin precipitate. FERNANDO MODERN AND RAÚL WERNICKE. *Anales asocn. quím. Argentina* **18**, 47–56(1930).—Diphtheria toxin-antitoxin ppt. requires a min. acidity of p_H 3.6 to go into soln. completely. At greater p_H it is incompletely sol. Keeping acid the soln. of the toxin-antitoxin causes dissocn., setting free the antitoxin. Recovery is a max. for media of p_H 3.2–3.6. Recovery depends upon the temp. of the acid soln., the max. being at 10–15°. In the course of time, starting with the instant of soln. of the toxin-antitoxin ppt., dissocn. increases simultaneously with increase in the unit content of the soln. The yield of antitoxin units recovered by dissocn. of the toxin-antitoxin ppt. increases with its diln. in acid soln., and in some cases the ratio of antitoxin units to protein reaches values greater than 18 times that of the original serum. E. M. SYMMES

Tests on purification of antidiphtheria serum by adsorption with aluminum hydroxide. RAÚL WERNICKE AND FERNANDO MODERN. *Anales asocn. quím. Argentina* **18**, 98–111(1930). —Dry, powd. $Al(OH)_3$, added to antidiphtheria serum, adsorbs little or no protein and antitoxin. $Al(OH)_3$ pptd. in the serum adsorbs considerable protein and diphtheria antitoxin when practically neutral media are used. Adsorption is less in alk. media, particularly for the antitoxin, thus permitting concn. of the latter. $Al(OH)_3$ shows no marked selective adsorption for antitoxins in neutral media. Soln. in alk. media of $p_H > 8.4$ gives quant. recovery of the proteins and antitoxins adsorbed by $Al(OH)_3$. E. M. SYMMES

Occurrence of seasonal variations in the goiter of rabbits produced by feeding cabbage. BRUCE WEBSTER, DAVID MARINE AND ANNA CIPRA. *J. Exptl. Med.* **53**, 81–91 (1931).—The evidence presented indicates that cabbage maturing in the spring and summer months has little goiter-producing power. Cabbage maturing in the late summer has much greater goiter-producing power, although this shows considerable variation in different years. It has not been possible to correlate available meteorological data with these variations C. J. WEST

LAROCHE, GUY, RICHET, CHARLES, FILS, AND SAINT-GIRONS, FRANÇOIS: **Alimentary Anaphylaxis (Gastro-Intestinal Food Allergy).** Translated by Mildred P. Rowe and Albert H. Rowe. Berkeley, Calif.: Univ. of Calif. Press. 139 pp. $2, postpaid.

I—ZOÖLOGY

R. A. GORTNER

Spectrographic analysis of animal tissues. H. MUNRO FOX AND HUGH RAMAGE. *Nature* **126**, 682(1930); cf. *C. A.* **23**, 5429.—All of the annelids, molluscs and phylla (146 in all) examd. showed the presence of Fe and Cu. Mn was found in all 19 polychetes examd., in numerous organs of marine gastropods, but was absent from *Haliotis*. Ni and Co (Co usually less than Ni) were present in certain tissues. The foot of *Haliotis* had 0.004% Ni with no Co. The liver of *Archidoris tuberculata* contained 0.003% Co with no Ni. Pb and Ag occur spasmodically. Humans absorb these 2 elements selectively, indicating an absence of functional significance. The highest quantity of Ag was found in the liver and kidney of *Pinna pectinata*. Cd was found in all 11 *Pecten maximus* individuals examd. Li is widespread. Rb is less common. None with Cs was found. Sr was present in 17 of 19 *Polychaetes* and in 51 of 67 tissues of molluscs. Ba was absent. CaF_2 was found only in the body wall of *Archidoris tuberculata*. ARTHUR FLEISCHER

Physicochemical conditions of the habitat of Nereis japonica Izuka. SHICHIROKU NOMURA. *Science Repts. Tôhoku Imp. Univ.* [4], 5, 549–53(1930).—The H_2O of the habitat of *Nereis japonica* Izuka was analyzed. The Cl content varied from 1.75 to 18.35 g. per l. Values found for d_4^{16} on different days were 1.01729 and 1.02430. p_H values were 7.5, 8.3, 8.1. *Nereis*, in general, lives in the sand or mud of the seashore between the tide marks. Changes in the salinity at low tide may not affect *Nereis* to any extent, either because of retention of sea water in the sand or because of protection of *Nereis* by a tube of sand particles cemented together with mucus secreted around the body. These circumstances seem to aid the animal in surviving a wide range of external changes. When the animals were kept in sea water (Cl content 18.30 g. per l.), and tap water or distd. water was added gradually so that the salinity was decreased to about 70% of that of ordinary sea water they became sluggish and did not live as long as in sea water. Their death in this case was probably caused by osmotic relationships. LOUISE KELLY

Chemistry of cell division. I. Effect of glutathione on cell division in Ameba proteus. CARL VOEGTLIN AND H. W. CHALKLEY. *U. S. Pub. Health Repts.* 45, 3041–63(1930).—A method is described for the study of the influence of chem. substances upon the division of *Ameba* under conditions which almost completely eliminate the uncontrollable nutritional factors. With this technic the following results were obtained: (1) The percentage of occurrence of nuclear divisions and cell divisions and the no. of polynuclear cells found at the end of the expts. vary directly with the vol. of cells used. The process of cell division, therefore, depends on the cell vol. (2) The percentage of occurrence of nuclear, and probably of cell, division apparently varies directly with the H-ion concn. over the range covered. (3) Exposure of *Ameba* to SH or S-S glutathione results in more nuclear and cell divisions and more polynucleate cells than in the controls. This is true for nuclear division, and to some extent for cell division, between p_H 6.0 and 8.1. However, the percentage increase in nuclear division in SH glutathione over that in the controls is probably not influenced by the H-ion concn. over the range covered. (4) The percentage increase in nuclear division and cell division and the no. of polynuclear cells in SH glutathione soln., as compared with the controls, vary with the vol. of the cells used, and reach a max. in all 3, when the cells used are about 0.002 to 0.0025 cu. mm. in vol. (5) The effect of SH glutathione is much greater on nuclear division than on cell division in cells having vols. between 0.00125 and 0.0022 cu. mm. This indicates that glutathione exerts a more marked influence on nuclear division than on cell division in cells of this range of vol. (maturity). J. A. KENNEDY

Modifications of the interior of anadromous fish in the course of reproduction. FONTAINE. *Compt. rend.* 191, 736–7(1930).—The osmotic pressure and the chloride content of the blood serum were detd. upon specimens from marine lampreys and *Alosa commune* while they were in excellent health just before spawning. Similar detns. were run during the exhausted period following the spawning season. The debilitation that follows spawning is characterized by the low osmotic pressure and the low Cl content of the serum. C. M. MCCAY

Hormones producing color changes. GOTTFRIED KOLLER AND EVA MEYER *Biol. Zentr.* 50, 759–68(1930).—Substances which produce the change of the color in crawfish are not specific for a single species only when given by injection. Ext. from the eyes of *Crangon vulgaris Praunus inermis* and *flexuosus* produces pigmentation in *Idotea tricuspidata*. Effects on the melanin of certain fishes were also observed. A. E. MEYER

Ammonia formation in the frog heart. I. P. OSTERN. *Biochem. Z.* 228, 401–6 (1930).—The functioning frog heart produces considerable quantities of NH_3 which are apparently proportional to the work performed. The traumatic NH_3 production of the frog heart is much slower than that of the skeletal muscle. S. MORGULIS

Effect of feeding of certain organs of internal secretion from young and old animals on the development of frog tadpoles. G. DESSY. *Endokrinologie* 7, 432–45(1930).—The growth and metamorphosis of tadpoles fed on heart from old cows proceeds much more rapidly than of those fed on heart from young cows, the development of the forelimbs though not of the hind limbs being twice as rapid. The disappearance of the tail was twice as rapid in the tadpoles fed with heart from young as from old animals. The mortality was greater in the tadpoles fed on old hearts. S. MORGULIS

Amytal anesthesia in fishes. A. B. KEYS AND N. A. WELLS. *J. Pharmacol.* 40, 115–28(1930).—Amytal in a 1 or 2% soln. was given intraperitoneally to the salt-water fishes *Girella migricans* and *Clinocottus analis*, and to the fresh water fishes *Apomotis cyanellus* and *Carassius auratus*. The dose to produce complete anesthesia lasting

4–18 hrs. was 40–54 mg. per kg., the anesthesia in fresh water fishes being slower in onset and more prolonged than in the salt-water fishes. The respiration rate fell markedly. O_2 intake also was below normal during anesthesia but increased after the fish had recovered. C. RIEGEL

Micrurgical studies in cell physiology. VII. The action of the chlorides of sodium, potassium, calcium and magnesium on vacuolated protoplasm. R. CHAMBERS AND R. B. HOWLAND. *Protoplasma* **11**, 1–18(1930).—Immersion and injection expts. on the grossly vacuolated protoplasm of *Actinosphaerium* and *Spirostomum* indicate that NaCl and KCl have a liquefying action; $CaCl_2$ and $MgCl_2$ are coagulants. The order of toxicity is KCl > NaCl > $MgCl_2$ > $CaCl_2$. M. H. SOULE

Vital coloring and the effect of poisons. TAKEO KŌNO. *Protoplasma* **11**, 118–56 (1930).—Paramecia, carefully handled to avoid injury, were treated with neutral red, indulin scarlet, Janus green, trypan and isamine blue and fuchsin S. Non-toxic concns. were used as detd. by the decadic method and an immersion period of 24 hrs. K. noted the influence of various accessory reagents on the staining properties of the dyes and activity of the animals. Six classes of these reagents were tried—narcotics, fixatives, diuretics, neutral salts, alkaloids and hormones—a total of over 50 different materials. Most of these scarcely influence the staining by basic dyes. The action of neutral dyes is affected only when they are very dil. Acid dyes do not color healthy cells. In some cases the reagent hinders the action of basic dyes. NH_4^+ is most effective in this respect. Occasionally the toxicity of dye plus reagent is greater or less than that of either alone. No present theory adequately explains the various results. A bibliography of about 70 references is included. M. H. SOULE

Iodine content of American marine animals. GULBRAND LUNDE, JENS BÖE AND KARL CLOSS. *J. Conseil Intern. Exploration Mer* **5**, 216–25(1930).—Analyses of marine animals from the west and east coasts of the U. S. (Calif. and Mass.) were made in order to det. the I content of animals from seas other than the Norwegian, and to compare this with the Norwegian results previously reported. A slightly modified von Fellenberg method was used. The results were compared with those of other investigators made on a number of invertebrates and teleosts of the American coasts. In some cases the values found varied greatly. The authors believed that these differences were related to fishing ground and time of collection, with the exception of haddock. An evident difference in I content of the teleosts off the Norwegian and American coasts was found. For nearly all of the species the Norwegian forms showed a higher I content. For haddock only, the figures were of about the same order. The skins of fishes off the American coasts contained a higher I content than the lean parts of the flesh. This had previously been found for the Norwegian coast fishes. G. E. Y.

12—FOODS

F. C. BLANCK AND H. A. LEPPER

Interpretation of bromatological analysis. A. BEYTHIEN, C. HARTWICH AND M. KLIMMER. *Anales oficina quím. provincia* **3**, 38–47, 118–25(1929); cf. *C. A.* **24**, 199.—Methods of analysis for detg. the purity and suitability for food purposes of spices, coffee, chocolate and eggs are given. L. E. GILSON

Microchemical detection of benzoic acid, salicylic acid and esters of *p*-hydroxybenzoic acid in foods and in medicaments. ROBERT FISCHER AND FRITZ STAUDER. *Mikrochemie* **2**, 330–6(1930).—Esters of *p*-hydroxybenzoic acid (nipagin and nipasole) have recently been recommended as preservatives for food and for drugs. The method of Weiss serves for the identification of napagin but requires too large quantities of reagents and of original material. A method has been developed, therefore, which can be carried out with smaller quantities and which serves not only for the detection of the Me, Et and Pr esters of *p*-hydroxybenzoic acid but for the detection of benzoic and salicylic acids as well. Of marmalade, fruit sirups, etc., take 1–1.5 g. and make slightly acid with HCl. If the material is lumpy, first triturate with a little hot water. If a fat, take 2–3 g. and digest it with 2–3 cc. of hot dil. $NaHCO_3$ soln., pour off the liquid and make it acid with HCl. Add a few cc. of ether and shake vigorously in a test tube. Pour off the ether ext. and evap. the soln. on a paraffin bath kept at 50°, using a small subliming tube to hold the ethereal soln. Finally cover the tube with a watch glass and heat the residue from the ethereal soln. by placing the narrow end of the subliming tube in the paraffin bath which is now heated to 60°. If benzoic acid is present, a sublimate of feathery crystals and characteristic plates will be obtained.

By changing the cover glasses, it is easy to get 3–4 samples of sublimate. To one portion add a drop of water, heat to dissolve the crystals, cool and add a tiny fragment of $Hg(OAc)_2$. Soon microscopic needles of Hg benzoate will form, starting at the crystal of original Hg salt. The crystals should not give any red color with Millon's reagent nor any violet coloration with $FeCl_3$. If the crystals are obtained, it must be remembered that benzoic acid may have been present in the original fruit juices and is not necessarily added as preservative. If no further sublimation takes place at 60°, raise the temp. to 70° but take care to keep the cover glass properly cooled. If crystals are now obtained, it indicates the presence of one of the esters of *p*-hydroxybenzoic acid. Add a little Millon's reagent and a raspberry-red coloration will appear quickly on heating if one of the esters is present. Salicylic acid gives a brown coloration with the reagent and benzoic acid no color. Det. the m. p. of the crystals, drying a short time over H_2SO_4 before making the test. Nipasol m. 97°; the Et ester m. 116° and nipagin m. 109–112°. The latter temp. is about 14° lower than is obtained in the Roth app. and as stated in the literature. Raise the temp. to 85° to test for salicylic acid, which can be identified by the cryst. appearance and the color test with 1% $FeCl_3$. W. T. H.

Contamination of food cooked or stored in contact with nickel-chromium-iron alloys. A. C. Titus, H. B. Elkins, H. G. Finn, L. T. Fairhall and C. K. Drinker. *J. Ind. Hyg.* **12**, 306–13(1930).—Several Ni-Cr-Fe alloys were tested by inserting strips of the metal into foods which were being cooked or stored. Detns. were made of the wt. changes of the alloys, of the character of the film formed on the metal, and of the degree to which traces of the constituent metals entered the food. The results show that the total dissolved metal is very small; Fe is the most readily dissolved of the 3 metals present in the alloys. For the foods investigated, the quantity of metal dissolved in the food at a H-ion concn. of 3 was no greater than at a concn. of 6. These Ni-Cr-Fe alloys are considered safe for cooking utensils. N. M. Naylor

Cereal chemistry in 1930. T. H. Fairbrother. *Food Manuf.* **6**, 5–7(1931). E. H.

An apparatus for the instantaneous measurement of the water content of grain without altering its composition. L. Montlaur. *Compt.-rend. acad. agr. France* **16**, 931–7(1930).—This simple app. is based on the fact that the capacity of a condenser is changed by placing a dielectric between the plates. The dielectric in this case is the grain and the value of the dielectric const. of the grain depends primarily on the quantity of moisture in the sample. Thus, on putting the sample of grain between the plates the capacity of the condenser is changed and this change referred to the proper curve will give the percent moisture in the sample. For a curve covering 0–20%, 1% humidity corresponds to a deviation of 5 ma. at the upper end of the scale. J. R. Adams

Wheats entered for the Royal Agricultural Society's show, 1930. G. W. Norris. *Agr. Gaz. N. S. Wales* **41**, 827–33(1930).—Results of chem. analyses and milling tests are tabulated. K. D. Jacob

New technic for the colorimetric study of wheat and wheat flour. P. Brière and J. Fleckinger. *Compt.-rend. acad. agr. France* **16**, 996–9(1930).—Dil. solns. of bromocresol green and phenosafranine are found to be valuable aids in studying both the grain and flour. The former imparts a blue color to the proteins while the latter stains the husks a rose color. J. R. Adams

Bound water of wheat-flour suspensions. R. Newton and W. H. Cook. *Can. J. Research* **3**, 560–77(1930).—The bound-water method was modified for use with flour suspensions and provided a simple means for the direct measurement of the approx. hydration of the colloidal constituents in dil. lactic acid. The av. hydration of the dry matter in 15% suspensions was in the region of 40 to 50%, the value being slightly higher in washed suspensions. Starch maintained a hydration close to 30% under all conditions investigated. The prepd. proteins, in dil. lactic acid, were hydrated about 85%. The calcd. hydration of the proteins as they occurred in the flour was about 100% in unwashed and 200% in washed suspensions. No significant differences were found by this method in the hydration of strong and weak flours, and it is thought that such differences as may exist are too small to be of major importance as factors in baking quality. The exptl. results are harmonized with the facts concerning viscosity and the behavior of bread dough by assuming micellar aggregation of the gluten. J. W. Shipley

Iodometry of flour products. II. K. Fuchs, W. Ruziczka and E. Kohn. *Z. Untersuch. Lebensm.* **59**, 573–85(1930); cf. *C. A.* **24**, 5384.—About 0.5 g. of the sample is digested with 15 cc. of 96% EtOH and 10 cc. of H_2O at 20°, 20 cc. of an alc. 0.2 *N*

soln of I and 190 cc. of water are added, and the excess of I is titrated with 0.1 *N* $Na_2S_2O_3$ soln. after 5 min. (I value), and after 24 hrs. (periodine value). The I and periodine values increase with the fineness of grinding of wheat and rye flours. There is good agreement between different millings of the same flour, and an advantage is claimed over the Pékar method in that results are unaffected by such bleaching agents as NO, benzoyl peroxide or Cl. The acid value usually decreases with increase in fineness of grinding. The acid value is detd. by titration of 5 g. of flour, after digestion for 30 min. at 20° with 10 cc. of EtOH and 100 cc. of H_2O, with 0.1 *N* NaOH soln. in the presence of phenolphthalein. Kolthoff's method for acidity detns. was found to be especially useful for fine, acidic flours, 5 g. being digested with 10 cc. of EtOH and 100 cc. of H_2O at 20°, and the mixt. titrated with a 0.1 *N* soln. of I in KI 30 min. after the addn. of 3 cc. of 10% KI, 2 cc. of 3% KIO_3 and 5 cc. of 0.1 *N* $Na_2S_2O_3$ solns. The p_H value is detd. colorimetrically on 0.5 g. of flour digested with 10 cc. of water and filtered after standing overnight. The p_H increases with the fineness of grinding. The above iodometric methods were successfully applied also to natural and prepd. oatmeals, to corn and bean meals and to barley and pea flours. C. R. FELLERS

Detection of corn cockle in flour and bread. R. FISCHER AND E. RIEDL. *Z. Untersuch. Lebensm.* 59, 595–8(1930).—The method depends upon the isolation of saponin by means of capillary analysis with a strip of filter paper contg. a band of cholesterol, which fixes the saponin as cholesteride. Shake a 5-g. sample for 6 to 20 hrs. with 20 cc. of H_2O, filter, centrifuge and place 10 cc. of the clear liquid in a cylindrical glass vessel, 10 cm. long and 4 cm. wide. Cut 1 end of a 20 × 3-cm. strip of filter paper to 5 cm. long and 1 cm. wide and place 0.05 to 0.1 cc. of a 1% soln. of cholesterol in EtOH or Et_2O on this portion so as to form a barrier 3 cm. from the end and 1 cm. long. Place the end of the paper strip so that it reaches to the bottom of the glass cylinder, let stand for 24 hrs., suspend in H_2O for 2–3 hrs., the cholesteride being thus washed by capillarity, transfer to water for 2 hrs., dry, heat with a little xylene, wash in Et_2O and place in blood gelatin. A blood corpuscle-halo is observed (cf. Kofler, *C. A.* 23, 4020) in 20 hrs. in a concn. of corn cockle of 1:17,000; in 15 hrs. for 1:10,000; and in 30 min. for 1:2500. Thus the method is roughly quant. With slight variations the method is applicable to the detection of corn cockle in bread. C. R. FELLERS

Baking tests of bread. RAFAEL ILLESCAS. *Rev. quím.* 6, 15–8(1930).—Practical tests are recommended. E. M. SYMMES

Study of the relative values of honey and sucrose in bread manufacture. W. F. GEDDES AND C. A. WINKLER. *Can. J. Research* 3, 543–59(1930).—Honey was substituted for com. sucrose in various straight-dough bread-baking formulas, and the doughs were fermented for varying times and proofed and baked in the usual manner. No significant difference in loaf vol., flavor or other bread characteristics could be detected, indicating that honey possesses no superiority over sucrose but is of equal value when compared on the basis of equiv. sugar content. The baking tests were supplemented by studies on the rate of gas production in doughs and also by detns. of the reducing-sugar content of the doughs at the end of the proof period. Rates of gas production were similar and the reducing-sugar contents of the doughs were of the same order. A comparison of the results obtained by the different baking formulas indicates the importance of considering the formula in relation to the apparent fermentation tolerance of a flour. No difference was observed in the rate of gas production in partially buffered yeast-honey and yeast-sucrose suspensions of equiv. sugar content prepd. in a manner to simulate conditions in fermenting bread doughs. Studies on the rate of inversion of sucrose by yeast showed that the rate of invertase action exceeds the speed of zymase action and indicated that sucrose inversion is not a limiting factor in the rate of gas production in bread doughs. An extension of the market for honey in the baking industry would seem to lie in the direction of increasing its use in sweet goods where its flavor, higher sweetening power and greater hygroscopicity are particularly advantageous. In bread manuf. these properties do not come into play since the relatively low percentage of sugar used is to a large extent removed by fermentation. J. W. S.

Emulsions. I. A. EICHSTADT. *Milchwirtschaft. Forsch.* 9, 388–95(1930).—The addn. of milk to fat gives an emulsion of milk in fat; the opposite order of addn. gives an emulsion of a creamy nature. Rapid addn. of fat or simultaneous mechanical admixt. gives a double emulsion. The first type is required for margarine emulsions, the stability of which is greater when coconut or hardened peanut oil is used, and when small quantities of emulsifiers are added. **II. Stability of emulsions in relation to viscosity of fat, surface tension and the formation of adsorption films.** W. MOHR AND A. EICHSTADT. *Ibid* 396–408.—The reasons for greater stability of certain

milk-in-fat emulsions are discussed. The formation of an adsorption film at the interface fat-skim milk is a factor. GEORGE R. GREENBANK

The effect of increasing the quantity of coconut and palm kernel meal in the ration on the fat content of the milk. F. HONCAMP, W. HELMS, G. KODDER AND A. PETERMAN. *Milchwirtschaft. Forsch.* 9, 161–78(1929).—There was some increase in fat content, but there is no proportionality between the amt. of fat in the ration and the fat content or yield of milk. GEORGE R. GREENBANK

Determination of the milk proteins. GEO. M. MOIR. *Analyst* 56, 2–9(1931).—The chemistry of casein and the state in which it exists in milk are discussed to show the desirability of using an acid reagent for the purpose of its analytical sepn. By mixing 90 ml. of *N* AcOH with 35 ml. of *N* NaOH, so that the acid and AcONa concns. were, resp., 0.44 *N* and 0.28 *N*, a mixt. of p_H 4.42 was obtained of which 5 ml. was added to 10 ml. of milk which had been dild to about 50 ml. A buffer soln. of this type can be used on milk of widely varying compn., but to obtain a max. pptn. of casein it was found best to add the soln. in 2 parts: first the acid and then the AcONa soln. Instead, therefore, of using only 1.5 ml. of 10% AcOH per 10 ml. of milk, it seems advisable to modify the A. O. A: C. "official" method, by adding 4.5 ml. of 0.25 *N* NaOAc after the acid has been added in a manner to be described later. W. T. H.

Detection of heated milk and a new method for the detection of pasteurization. S. ROTHENFUSSER. *Z. Untersuch. Lebensm.* 60, 94–109(1930).—The method (cf. *C. A.* 3, 459) is entirely revised. The Pb serum of the milk is prepd. by adding to 100 cc. of the sample the min. excess of basic Pb acetate soln. required to produce complete pptn. The mixt. is well shaken and filtered. The filtrate should contain no casein, fat, phosphates or citrates. The p_H is 6.6 to 6.7 and the acidity equiv. to 1 cc. of 0.25 *N* NaOH soln., and in the serum from fresh milk both peroxidase and diastase are present. For milk heated to a relatively high temp. "paratetrol sulfite" (1 g. p-$C_6H_4(NH_2)_2$.HCl in 12 cc. H_2O mixed with 4 g. guaiacol in 100 cc. 96% alc., made up to 150 cc. with alc., and treated with 30 drops of 20% $NaHSO_3$ soln.) is used as a reagent. To 10 cc. of serum or milk are added 4 drops of 3% H_2O_2 and 10 drops of the reagent. Raw milk or milk heated for 30 min. below 70° gives a violet ring immediately; milk heated for a short period above 79° or for a long period at 70–75° gives no color; while milk heated for 30 min. at 75° gives color after 1 min. Storage in ice for 14 days after heating did not affect the intensity of the color reaction. With milk pasteurized at 63° for 30 min., the action of the peroxidase is upset and it is necessary to utilize the diastatic activity of the serum. The test is made by shaking 30 cc. of the milk with 1.6 cc. of the Pb reagent in a conical centrifuge tube, adding 2 cc. of HCl-free trichloroethylene or $CHCl_3$, shaking the mixt. again and centrifuging. The clear serum, 10 cc., is then mixed with 1 cc. of starch soln. (specially prepd.), and after 15 hrs. at room temp., or 3.5 hrs. at 40°, 1.5 cc. of this is poured into a small tube and 1.5 cc. of 0.002 *N* I soln. added. A yellow color in the mixt. denotes a slight degree of heating, insufficient to destroy the character of the raw milk; brown indicates a short period of heating at 60–3° or a long period at 55°; red-violet, 30 min. at 60–3°; violet, prolonged heating at 63° (permanent pasteurization); and a full blue color, the complete absence of active diastase. Both methods are influenced by substances and treatments other than heating which affect the activities of the enzymes, but the results are considered strictly reliable. C. R. FELLERS

Solubility of milk powder and its significance. J. C. MARQUARDT. *Creamery and Milk Plant Monthly* 19, No. 12, 32–3(1930); cf. *C. A.* 25, 360.—A study of the soly. of skim milk powder has shown that ice cream and cream cheese quality are not affected by the soly. of the powder. Undesirable flavors in milk powders are not assocd. or related to the solubilities of the powders, but if the powders do have undesirable flavors such flavors are transmitted to the manufd. ice cream. Storage temps. ranging from 40 to 70°F. and humidity are minor factors in detg. the keeping quality of skim milk powders stored in sealed containers. The suitability of skim milk powder for ice cream and cream cheese manuf. is enhanced by storage in sealed containers. A slight decrease in soly. of skim milk powders is assocd. with exposure to light and air. H-ion concn. detn. with a limited no. of samples indicated that the powders changed slightly toward the acid side during storage. Chem. detn., rennet pptn. and phys. observations have shown that the nature of the insol. portion of powders may vary widely in different powders. However, it has been definitely shown that the insol. portion of highly sol. powders is protein while the insol. portion in highly insol. powders may be protein or sugar and protein in varying proportions. A. H. JOHNSON

The knowledge of the electrical conductivity of milk and its use in the detection of abnormal milk. O. DOUNHOFER AND F. MOSER. *Molkerei-Ztg.* (Hildesheim) 44,

149–54(1930).—A cond. of 52-54 × 10^4 is regarded as suspicious and of over 54 × 10^4, as abnormal; these studies were made on 350 samples of milk. The measurement was made at 18° and at an acidity of not over 8.5 Soxhlet-Hinkle. Formalin, xylene or toluene may be used as preservatives without effect. GEORGE R. GREENBANK

Frozen and thawed milk. W. KOENIG. *Molkerei-Ztg.* (Hildesheim) **44**, 289–91 (1930).—In partially frozen milk the frozen part after thawing has properties and compn. resembling those of watered milk. The f. p. and solids-not-fat are low. The fat is normal or may be high. In the unfrozen part the fat is often lower than normal and the solids-not-fat are high. Completely thawed and well mixed milk is normal. GEORGE R. GREENBANK

Analyses of spoiled milk. P. GUARNIERI. *Atti III congresso naz. chim. pura applicata* **1930**, 482–3.—Fat and total nitrogenous substance are detd. The latter varies from 3.35 to 3.80. The ratio of total fat to total nitrogenous substance is normally above 0.8. E. M. SYMMES

Research as applied to dairy engineering. H. A. RUEHE. *Creamery and Milk Plant Monthly* **19**, No. 12, 27–9(1930).—R. outlines the effects which research has had in changing methods of operation in the various branches of the dairy industry and suggests the directions which future research may take. The effects of this research are considered to be most notable in the fresh milk and ice cream industries. A. H. JOHNSON

A review of the literature on metals in the dairy industry. OSTERBURG AND T. LIEPUS. *Milchwirtschaft, Literaturber.* **36**, 181-210(1930).—This is a study of plain and tinned Cu, tinned Fe, Al and its alloys, Cr and Ni steel, Ni, bronze, metallic coating and glass-lined equipment. The properties of the different metals and their value in the various types of equipment are discussed. A bibliography of over 200 references is given. GEORGE R. GREENBANK

Whipping properties of chocolate ice cream. W. H. E. REID. *Creamery and Milk Plant Monthly* **19**, No. 12, 101-7(1930).—Sugar influences the whipping properties of a chocolate ice cream mixt. by depressing the ability of the mixt. to incorporate air. The decrease in this ability prolongs the freezing time and causes difficulty in obtaining the desired overrun. Proper balancing of the chocolate mixt. with respect to the sugar content will furnish a mixt. that can be whipped to the same overrun in the same freezing time as obtains for vanilla ice cream The type of chocolate paste and the time of adding it to the mix reflect directly on the whipping properties of the mix. The ability of the chocolate mixt. to whip to the desired overrun affects the body and texture of the finished ice cream to a marked degree. A. H. JOHNSON

The content of salt in cheese. F. MÜNCHBERG. *Milchwirtschaft. Zentr.* **59**, 201–2 (1930).—From 1 to 2 g. of cheese is boiled with 10 cc. of halogen-free HNO_3. (d 1.40) and 10 cc. of 0.1 *N* $AgNO_3$. Ten % $KMnO_4$ soln. is gradually added until the soln. is clear. The soln. is dild. to 150 cc. with distd. H_2O and cooled. Two cc. of a satd. soln. of $Fe_2(SO_4)_3$ and $(NH_4)_2SO_4$ is added and the excess of Ag titrated with 0.1 *N* NH_4CNS. One cc. of 0.1 *N* $AgNO_3$ equals 0.005856 g. NaCl. As the NaCl content should be based on the dry weight the moisture should be detd. by mixing with sand and drying to const. weight at 105°. The sample should be stirred frequently while drying. Tables show the moisture and NaCl in various kinds of cheese. G. R. G.

Process and package cheese discoloration by tin foil. A. E. OTTICKER. *Molkerei-Ztg.* (Hildesheim) **44**, 583–4(1930).—O. compares Zn and Sn foil on different types of cheese. Acidity is not the principal cause of discoloration, as it occurs often on mild cheese which is low in acid. O. recommends that Zn foil be used instead of Sn. His analysis shows 0.03–0.05% Pb and 3% Sb. GEORGE R. GREENBANK

Acidity changes associated with the keeping quality of apples under various storage conditions. H. H. PLAGGE AND FISK GERHARDT. Iowa Agr. Expt. Sta., *Research Bull.* No. **131**, 342-58(1930).—Measurements were made on Grimes Golden and Jonathan apples of total titratable acid, p_H, and sp. gr. of the juice. Though total acidity declined rapidly in the Grimes variety during 2 weeks' delay in the orchard, the p_H value remained practically const. However, after 3 weeks, the p_H abruptly dropped, the drop occurring simultaneously with the appearance of soggy breakdown disease. In Jonathan apples, the p_H was decidedly more const., indicating a difference in buffer stability between the 2 varieties. An inverse relationship existed between the % of total acid loss and the susceptibility toward Jonathan spot. A low acid loss during cold storage usually produced a high % of spotted tissue. Total acidity decreased more in Grimes apples during the 2–3 weeks' delayed orchard storage than during the entire period held in cold storage. During storage 2 conditions influence the total amt. of acid lost: (1) initial acid content when stored and (2) the storage temp. Less total

acid was lost at 0° than at 2–3°. To prevent soggy breakdown in Grimes apples, the fruit must be picked when mature and immediately placed in cold storage. A decided increase in the sp. gr. of the juice from Grimes apples during delayed storage at the orchard indicates definite changes in the metabolism of the fruit. Little or no change in sp. gr. occurred in cold-storage fruit which had previously been held in the orchard for 2–3 weeks. On the other hand, the juice of Jonathan apples was relatively const. irrespective of a delayed storage period in the orchard. The storage capacities of some varieties of apples may be forecast by changes appearing in the sp. gravities of their juices. C. R. FELLERS

Canning quality of certain commercially important Eastern peaches. CHARLES W. CULPEPPER AND JOSEPH S. CALDWELL. U. S. Dept. Agr., *Tech. Bull.* 196, 45 pp. (1930).—Chem. and phys. examns. were made of the more important Georgia varieties of peaches, and these data were correlated with canning quality. Complete analyses were made at short intervals from the immature stage to the fully ripe stage of Carman, Belle, Hiley, Yellow Hiley, Arp, Early Rose and J. H. Hale varieties. In all the varieties, the development of full characteristic flavor was delayed until the fruit was fully ripe and rather soft. This increase in palatability was attributed in part to progressive increase in sugars and decrease in total acidity and astringency, and in part to progressive formation of the characteristic flavoring substances and the soln. of the middle lamellae of the cell walls, thus permitting better contact of the cell contents with the organs of taste. Peaches were satisfactorily *lye-peeled* by immersing in a 2% NaOH soln. for 30–60 sec. J. H. Hale and Elberta proved superior for canning purposes. C. R. FELLERS

Composition of fruits as used for jam manufacture in Great Britain. T. MACARA. *Analyst* 56, 35–43(1931).—The analytical data published by the British Assoc. of Res. for Cocoa, Chocolate, Sugar, Confectionery and Jam Trades will be of interest to food chemists. The method of analysis is described and the results of hundreds of analyses on all kinds of fruit are tabulated. W. T. H.

Effect on foods of fumigation with hydrogen cyanide. G. W. MONIER-WILLIAMS. *Analyst* 56, 46–8(1931).—The results of many analyses indicate the effectiveness of ventilation in removing excess HCN after fumigation to destroy insects and vermin pests in food, except in dried and liquid milk, dried fruit and possibly cheese. Absorption of HCN is greatest in moist, finely-divided, unwrapped foods. Orange and apple skins resist absorption, while peaches and bananas are more easily penetrated. Cooking removes nearly all the absorbed gas. Foods treated with less than 1 vol. of HCN in 200 vols. of air and subsequently exposed to fresh air usually retain less than 20 parts HCN per million of food. Fertile hen eggs are killed by fumigation with 1% HCN at 3° in 4 hrs., although the quantity of HCN absorbed is very small. W. T. H.

Large-scale experiments in sulfuring apricots. E. M. CHACE, C. G. CHURCH AND D. G. SORBER. *Ind. Eng. Chem.* 22, 1317–20(1930).—Apricots were treated with SO_2 in thermally controlled boxes under varying conditions of gas concn., temp. and time of exposure. As the gas concn. increases, the retention of SO_2 by the fruit rapidly increases. The SO_2 retention also increases during the entire time of exposure and this is particularly rapid in the first $^1/_2$ hr. Good fruit results from exposure for 2 hrs. in 3% gas. Temp. has very little effect. The best results are obtained at 100–110°F., while above 120°F. the product has a reddish tinge. J. R. ADAMS

Mineral elements in bean sprouts. LANG-RU TING. *Science* (China) 14, 1631–46 (1930).—Bean sprouts are everyday items in the Chinese dietary, and are important sources of mineral elements in nutrition. Soy-bean sprouts contain approx. 0.1% CaO and 0.3% P_2O_5; mung-bean sprouts, 0.05% CaO and 0.2% P_2O_5. The Ca and P contents of both varieties can be increased by sprouting in water contg. not less than 0.5% CaO and 0.2% P_2O_5. WM. H. ADOLPH

Effect of pure culture inoculation on the quality and chemical composition of sauerkraut. CARL S. PEDERSON. N. Y. State Agr. Expt. Sta., *Tech. Bull.* No. 169, 3–29(1930).—Of 72 exptl. batches of sauerkraut, 25 were inoculated with pure cultures of some one of the following organisms: *Streptococcus lactis, Leuconostoc mesenterioides, Lactobacillus buchneri, Lactobacillus pentoaceticus, Lactobacillus delbrücki, Lactobacillus plantarum,* and *Lactobacillus brassicae.* Normal sauerkraut completed its fermentation at 24–7° in 2–3 weeks, the resulting acidity being 1.5% (lactic). The EtOH content was usually less than 0.6% and the ratio of volatile to non-volatile acid was about 0.24. Inoculation with pure cultures of *Streptococcus lactis* improved the quality of the kraut and did not affect the by-products produced. *L. brassicae, L. cucumeris* or *L. plantarum* when used for inoculations gave detrimental results, the

quality of the kraut being poor and the predominant fermentation of the pure lactic acid type with little AcOH, EtOH or CO_2. Krauts inoculated with pure cultures of *L. pentoaceticus* were fair in quality but had an abnormal flavor and an abnormally high volatile acid content. Many of the pure culture krauts were particularly susceptible to yeast spoilage. For the present, the manuf. of kraut by pure culture methods is not advocated. A bibliography is included. C. R. FELLERS

Analysis of sea cucumber. HSI-CHEN LIU. Yenching Univ. *Science* (China) **14**, 1308–24(1930).—Analyses of sea cucumber, the Chinese delicacy which appears at banquets under the name *sea slug*, gave: H_2O 8.64, protein 63.75, fat 0.82, ash 9.86 and N-free ext. 16.93%. WM. H. ADOLPH

The groups of extractives in coffee. CIUPKA. *Chem.-Ztg.* **54**, 803(1930).—The following figures give, resp., values for natural ext. of a raw Costa Rican coffee expressed in percentage of dry substance, the ext. of the roasted residues expressed in percentage of dry matter, and the ext. content of a roasted Costa Rican coffee expressed in percentage of the dry raw coffee: (1) Total water-sol. exts. 28.2, 4.1, 22.6; alc.-sol. fraction 1.6, 0.12, 0.06; ether-sol. fraction 0.1, 0.04, 0.45; (*a*) residue from (1) dried and extd. with alc. 16.7, 0.4, 11.8; (*b*) residue from (1) dried and extd. with ether 14.2, 0.5, 11.5; (*c*) residue from (1*a*) dried and extd. with ether 0.12, 0.15, 0.48; (*d*) residue from (1*b*) dried and extd. with alc. 0.9, 0.4, 1.3; (2) total ether-sol. ext. 16.2, 0.4, 14.8; (*a*) residue from (2) dried and extd. with alc. 5.1, 0.3, 6.0; (*b*) residue from (2*a*) dried and extd. with water 22.1, 4.0, 18.2; (3) total alc.-sol. ext. 21.2, 0.7, 18.3; (*a*) residue from (3) dried and extd. with ether 0.35, 0.25, 0.5; (*b*) residue from (3*a*) dried and extd. with water 22.0, 3.7, 19.3. RUSSELL C. ERB

Maltol and its colorimetric determination in malt coffee. T. MERL. *Z. Untersuch. Lebensm.* **60**, 216–7(1930).—Maltol was prepd. by heating a prepn. of malt diastase, 1:100, at 180–200°, and was sepd. by steam distn. and extn. of the distillate with Et_2O. The Et_2O ext. was dried over Na_2SO_4, evapd. under reduced pressure, and the maltol obtained as crystals, m. 153–5°. Other plant materials such as larch and other barks yield maltol if heated, especially if collected in the spring. It gives characteristic phenol reactions. To det. maltol in malt coffee, grind 50 g. so as to pass a 0.5-mm. sieve, digest 10 g. with 5 cc. of H_2O for 1 hr., then mix with 3 cc. of H_2O, 15 g. of sand and 1.5 g. of blood charcoal, and ext. for 5 hrs. with CCl_4 in a Soxhlet app. Shake the ext. with 100 cc. of H_2O contg. 3 drops of 10% $FeCl_3$ soln. and 2 cc. of *N* HCl, and compare the color in a Duboscq colorimeter with that produced in the same way from a standard soln. of salicylic acid. One mg. of maltol per 100 cc. in a layer 54 mm. deep matches 1.75 mg. of salicylic acid per 100 cc. in a layer 25 mm. deep. Malt coffees prepd. by a no. of different methods gave maltol contents of from 1 to 9 mg. per 10 g.; those made from dried and roasted barley, as distinct from normally roasted barley, always gave a value of less than 6 mg. per 10 g. This figure is proposed as the basis of a test for the specification of malt coffee, namely that it should contain at least 70% of half-grown barley corns, the figures actually obtained for artificial mixts. contg. 25, 50 and 75% of dried roasted barley being 5.6, 4.2 and 2.7 mg., resp. The biol. function of maltol as an antioxidant for fats and oils is briefly discussed. C. R. FELLERS

Digestibility and food value of tapioca and fish fodder meal. H. EDIN, G. KIHLÉN AND AD. GUSTAFSSON. *Kgl. Landtbruks-Akad. Handl. Tid.* **69**, 882–904(1930).—The digestibility coeff. of the org. substance of finely ground tapioca was 94.5, of crude protein content —26, of crude fat 80, of crude fiber 47 and of N-free ext. 99. The negative value for crude protein shows that the digestible crude protein of tapioca is much too low. The food value was 126 fodder units and 95 kg. starch value per 100 kg. of org. substance. Feeding with tapioca did not raise the available supply of digestible albumin in the swine tested, but decreased it 0.5%. The digestibility of coarse tapioca was 2% less, and it was not eaten as readily. The av. digestibility coeff. of fish meal was 78 for org. substance and 85 for crude protein. Utilization was not so good on forced feeding. An av. of 99% crude fat content was digested and for N-free ext. —170 was found. E. M. SYMMES

The yields and losses in raw and digestible nutritive matter during the second and third mowing of clover and meadow grass according to experiments at the Königsberger Animal-Raising Institute. W. KIRSCH. *Tierernähr.* **1**, No. 1, 104–18(1929).—Digestible protein increases on the second and third mowing in clover and clover grass mixt. The starch value is also increased. The time between mowing varies, but usually averages 1–2 months. Similar increases are noted in meadow grass. Tabular data are presented with corrections for losses in nutritive matter due to drying, mechanical treatment of the grasses, fermentation of the wet grasses, etc. RUSSELL C. ERB

I content of American marine animals (LUNDE, *et al.*) **11I. Measuring the H-ion concentration in opaque colloidal solutions** (Ger. pat. 510,623) **13.**

FORNET, ARTUR: **Die Theorie der praktischen Brot- und Mehlbereitung.** 5th ed., revised. Berlin: F. A. Günther & Sohn. 352 pp. Linen, M. 8.

KIRSCH, WERNER, AND HILDEBRANDT, HERMANN: **Die Silofutterbereitung nach dem Kaltgärverfahren.** Berlin: P. Parey. 216 pp. Linen, M. 12.

MORRES, WILHELM: **Praktische Milchuntersuchung.** Anleitung zur zweckmäss. Ausführung d. einfachsten Verfahren d. Untersuchung von Milch und Molkereiprodukten. 5th ed., revised. Berlin: P. Parey. 98 pp. M. 4.80.

PFIZENMAIER, KARL: **Die Untersuchung von Milch und Molkereiprodukten sowie Molkereihilfsstoffen.** Für d. Gebr. im Molkerei- und milchwirtschaftl. Laboratorium. Stuttgart: E. Ulmer. 224 pp. Linen, M. 11.

SCHMORL, KARL: **Mehlchemischer Lehrkursus mit einer Einführung in die Chemie.** 2nd ed. Leipzig: M. Schäfer. 102 pp. M. 4.

Food preparation. MATRO G. M. B. H. Ger. 510,156, May 17, 1927. See Brit, 309,097 (*C. A.* **24**, 442).

Spark-discharge apparatus for generating a bleaching gas for flour, etc. FRITZ STUFF. Ger. 510,419, Dec. 23, 1927.

Thermometer for dough and like pasty masses. FRITZ KEMPTER. Ger. 510,371, Nov. 10, 1927.

Bread. VOLKMAR KLOPFER and DR. VOLKMAR KLOPFER'S NAHRUNGSMITTEL-A.-G. Fr. 688,834, Jan. 25, 1930. See Ger. 509,033 (*C. A.* **25**, 750).

Milk. HEINRICH BÜNING. Fr. 36,671, April 9, 1929. Addn. to 645,941 (*C. A.* **23**, 2224). The content of fat in milk is increased by injecting 30-40 parts of warm fat into 60–70 parts of milk under high pressure. The milk is then or previously homogenized with egg yolk with heat under pressure.

Colorimetric apparatus for determining the acidity of milk. CHRISTIAN HACKMANN. Ger. 503,245, Sept. 30, 1927.

Preserving eggs. HENRIETTE BELHOMMET (NÉE LYS). Fr. 691,104, Mar. 5, 1930. See Belg. 358,655 (*C. A.* **24**, 901).

Apparatus for determining the starch content of potatoes. ANTON ARLAND. Ger 510,374, Aug. 26, 1926. The app. measures the increase in vol. when a given wt. of potatoes is treated with a given vol. of water.

Dies for macaroni manufacture. FREDERICK PENZA. U. S. 1,788,689, Jan. 13. Structural features.

Edible salt. COMPAGNIE DE PRODUITS CHIM. ET ÉLECTROMÉTALLURGIQUES ALAIS, FROGES ET CAMARGUE. Fr. 689,943, Apr. 26, 1929. An edible salt in liquid form is made by concg. sea water to 25–34° Bé. and eliminating partially or wholly the $MgSO_4$ either by cooling or converting it to $MgCl_2$ by means of an alk. earth chloride.

Edible salt. PAUL WOOG. Fr. 36,795, Feb. 18, 1929. Addn. to 674,401 (*C. A.* **24**, 2556). An edible salt is made by adding to NaCl, either solid or in soln. finally evapd., the salts contained in sea water and separately prepd. If a product not affected by moisture is desired, the Mg salts are converted to carbonates.

Confectionery. AKT.-GES. FÜR MEDIZINISCHE PRODUKTE. Ger. 510,318, July 17, 1928. Addn. to 509,034 (*C. A.* **25**, 751). To margarine for use in the manuf. of puff pastry there is added a small quantity of a mixt. of malonic acid with another dicarboxylic acid, *e. g.*, tartaric or citric acid. Salts of the acids may also be used.

Tea. J. P. CROFT. Brit. 334,224, March 1, 1929. Ordinary tea is treated with a soln. of theine or caffeine, to increase its strength and reduce the excess of tannin. Details of treatment are given and mention is also made of the production of malted tea.

Coffee. KARL LENDRICH. Fr. 688,638, Jan. 21, 1930. Grains of coffee are improved by submitting the green coffee grains to hydrolysis for at least an hr. with steam under pressure. A small quantity of an alkali or a mineral acid may be added to the coffee before the treatment.

Coffee substitute. JOSEPH F. EURY. Fr. 689,951, April 29, 1929. A product which may be used as a substitute for or addn. to coffee is obtained by wetting coffee marc with a very dil. soln. of a fixed or volatile alkali, free or carbonated, then heating in an autoclave to about 120° for $^1/_2$ hr. and afterward drying.

Apparatus for treating waste animal or fish products with steam or solvent vapor in a continuous manner. AUGUST SOMMERMEYER. Fr. 690,048, Feb. 15, 1930.

13—GENERAL INDUSTRIAL CHEMISTRY

HARLAN S. MINER

Chemical resources and industries of the South. LAUREN B. HITCHCOCK. *Ann. Am. Acad. Political and Social Sci.* **153**, 76–83(1931).—Twenty index chem. industries of national character and of 15 southern states are used in a study based on the 1927 Census of Manufactures. Twenty-one % of Southern industry proves to be devoted to chem. manufactures; 11% of all U. S. industry is chem. Twenty-six % of all U. S. chem. manufactures originate in the South. Factors influencing development in this region are cited. L. B. HITCHCOCK

Cornstalks as an industrial raw material. O. R. SWEENEY AND LIONEL K. ARNOLD. Iowa Eng. Expt. Sta., *Bull.* **98**, 48 pp.(1930). E. H.

The development of the iodine industry and its present industrial position. W. ROMAN. *Z. angew. Chem.* **44**, 9–15(1931). E. H.

What is an insulator? A. MEISSNER. *Z. Physik* **65**, 158–66(1930).—The characteristic of an insulator is: a material consisting of elementary cells contg. pos. and neg. ions, held together by high-valency forces. This is brought into evidence by the process of "formation", which may be achieved by exposing the molten insulator (*e. g.*, asphalt) to a high elec. field on solidification. The piezoelec. moment due to such a formation is often 50 times larger than that of quartz. Disturbing effects such as transition of charges from the electrodes into the insulator or the migration of ions in the insulator and the space charges resulting therefrom are discussed with special reference to *mica*. EGON BRETSCHER

Natural resins—synthetic resins (NAGEL) **26**. Pb in chemistry and pharmacy (DYSON) **2**. Measurement of abrasion resistance (SCHUH, KERN) **26**. Air filtration (OLLETT) **14**. Material suitable for roofing, insulating, etc. (U. S. pat. 1,789,284) **20**. Rubber composition with linseed oil [for electric insulation] (U. S. pat. 1,789,062) **30**.

Beiträge zur Geschichte der Technik und Industrie. Bd. XX. Jahrbuch der Vereins Deutscher Ingenieure. Edited by CONRAD MATSCHOSS. Berlin: V. D. I.-Verlag. 2221 pp. Linen, M. 12.

BÖHME, ARTHUR, AND LUCANUS, CARL: **Der Verlauf der Staublungenerkrankung bei den Gesteinshauern des Ruhrkohlengebietes.** Berlin: J. Springer. 147 pp. M. 18.

CALVET, ENRIQUE: **Quimica general aplicada a la industria, con practicas de laboratorio. T. 11. Quimica organica. Parte 1. Compuestos aciclicos.** Barcelona: S. A. Salvat. 827 pp. Ptas. 40.

Enzyklopädie der technischen Chemie. Edited by FRITZ ULLMANN. 2nd ed. **Bd. VI. Lfg. 27.** Pp 161–320. M. 8. **Lfg. 28.** Pp. 321–480. M. 9. Berlin: Urban & Schwarzenberg. Cf. *C. A.* **24**, 5087.

Fortschritte in der anorganisch-chemischen Industrie. Bd. III. Abt. 4. Edited by ADOLF BRÄUER AND JOSEF REITSTÖTTER. Berlin: J. Springer. Pp. 1153–1524. M. 58. Cf. *C. A.* **24**, 2814.

MEMMLER, KARL: **Materialprüfungswesen.** 4th ed., revised. **Bd. I. Metallische Werkstoffe.** 136 pp. **Bd. II. Nichtmetallische Werkstoffe und wirtschaftswichtigen Verbrauchsstoffe.** 110 pp. **Bd. III. Hilfsmittel d. Maschinentechnik. Materialprüfungsmaschinen—Messgeräte—Überwachung und Eichung von Prüfmaschinen.** 110 pp. Berlin: W. de Gruyter & Co. Each part, M. 1.80.

SCHOOFS, F. **Hygiène et toxicologie industrielles.** Paris: Masson et Cie. 273 pp. F. 15.

Catalytic oxidation. THE SELDEN CO. Fr. 689,610, Feb. 8, 1930. Catalytic oxidations in the vapor state of org. compds. to intermediate products, or the removal of org. constituents by preferential oxidation is carried out by mixing with the vapors to be oxidized one or more supplementary vapors of an org. or nuclear substance, which is more easily or less easily oxidized than the substance to be oxidized, and passing the mixt. over a catalyst at reaction temps. By the above method the reaction is more easily controlled. Several examples are given.

Catalytic processes. I. G. FARBENIND. A.-G. Fr. 688,927, Jan. 27, 1930. In treating gases catalytically under pressure, mixts. of lubricating oil from the circulating pumps, etc., are removed from the gases by solid absorption agents such as active charcoal or SiO_2 before they reach the catalysts.

Endothermic operations. FRIED. KRUPP GRUSONWERK A.-G. Fr. 689,456, Feb. 5, 1930. In endothermic operations in which the substance to be treated is charged into a furnace with fuels and in which the amt. of air necessary for the reaction is blown wholly or in part through the charge, the furnace is displaced in a continuous or discontinuous manner and the mixt. of fuel and substance to be treated is caused to pass before different rows of air blowers placed one behind the other. Cf. *C. A.* **24**, 2215.

Purification of gases. COMPAGNIE FRANÇAISE DE PRODUITS ORGANOCHIMIQUES (Anciennement soc. anon. des Engrais et Noir animal). Fr. 36,982, May 28, 1929. Addn. to 636,162 (*C. A.* **23**, 223). In the app. of the prior patent a part of the purified cooled gases coming from a cooler placed after the first absorber is diverted for the purpose of cooling the absorbent charcoal. The operation is thermometrically controlled.

Gas purification. HUMPHREYS & GLASGOW, LTD. Fr. 689,970, Feb. 14, 1930. Gas is purified in an ascending current by projecting oil in a finely divided state into the gas in the direction of flow of the gas; the path of the mixt. is lengthened for a sufficient distance to allow the oil to agglomerate into drops and fall back into the current of gas. An app. is described.

Drying gases. DEUTSCHE GLÜHFADENFABRIK RICH. KURTZ & PAUL SCHWARZKOPF G. M. B. H. Ger. 510,916, Apr. 21, 1926. The gases are led through porous walled tubes surrounded by jackets contg. concd. H_2SO_4.

Filtering gases. METALLGES. A.-G. (Adam Arras, inventor). Ger. 512,222, Feb. 12, 1930. This relates to the supervision of gas-filtering plant by leading a portion of the filtered gases to an instrument for indicating and recording any residual dust, the test portion being directed against the instrument under pressure through a fine nozzle. The improvement consists in reducing the vol. of the test portion, and making good the vol. by clean air or gas, with a view to avoiding blockage of the nozzle.

Moistening gases. SIEMENS-SCHUCKERTWERKE A.-G. (Carl T. Buff, inventor). Ger. 510,330, July 10, 1929. A portion of the gases to be moistened is continuously by-passed at a steady rate through a cooler in which a predetd. part of its moisture content is condensed, a moistening device for the gases being automatically regulated in accordance with the amt. of condensate obtained per unit of time. App. is shown. Reference is made to the moistening of blast-furnace gases, etc., prior to elec. pptn.

Apparatus for conserving and gasifying liquefied gases. SOC. L'AIR LIQUIDE (SOC. ANON. POUR L'ÉTUDE ET L'EXPLOITATION DES PROCÉDÉS GEORGES CLAUDE). Fr. 690,573, Apr. 30, 1929.

Purifying solutions. SOC. ANON. MAXIMINE. Fr. 690,483, Feb. 24, 1930. Solns contg. colloidal impurities such as impure *sugar solns.* are purified by means of an active colloidal C in the state of a "sol," extremely finely divided, kept in its original moist state and used with a content of water of 50-90%. The C is prepd. by finely powdering org. substances, dissolving as completely as possible and hydrolyzing under pressure. The reaction mass is heated to produce evapn. of water to a thick consistency and to destroy the carbonaceous materials, and then in a closed vat under a pressure of 3-5 atm. to a temp. of 200-300°.

Sterilizing liquids. GEORGE LAKHOVSKY. Fr. 688,887, April 13, 1929. Liquids are sterilized by introducing into the liquid a metal such as Ag, which by contact with the bacteria forms a short-circuit and by thus preventing the bacteria oscillating kills them.

Determining the viscosity of liquids. RICHARD V. DALLWITZ-WEGNER. Ger. 510,624, Jan. 10, 1926 and 510,625, Jan. 19, 1926. The viscosity is determined by measuring the pressure differences at the ends of capillary tubes through which the liquid is passing.

Distillation. I. G. FARBENIND. A.-G. Fr. 689,822, Feb. 13, 1930. In distg. under reduced pressure, particularly substances of high b. p., the gaseous space of the distillate receiver is connected to the still by a pipe dipping into the liquid to be distd., and the gas in the app. is redirected into the liquid by a pump interposed in the pipe

Measuring the hydrogen-ion concentration in opaque colloidal solutions. N. GERBER'S CO. M. B. H. Ger. 510,623, Mar. 22, 1929. The colloid is pptd. and the remaining turbidity removed by a dispersion agent of higher sp. gr. than that of the liquid. The whole is then centrifuged and the clear liquid tested for its p_H value by indicators in the usual way. The *method is suitable for milk, cream, etc.*

Method and plant for regulating the under-pressure in evaporators connected to condensers. METALLGES. A.-G. Ger. 512,221, April 7, 1927.

Introducing powdered material into vessels under pressure. I. G. FARBENIND. A.-G. Fr. 690,534, Feb. 25, 1930. In operations such as destructive hydrogenation under high pressure, powd. coal or other powd. substance is introduced into a vessel

kept under pressure through an intermediate chamber (for measuring the amt.), the whole space of which is filled by a sliding compressor before communication between this chamber and the pressure chamber is broken.

Operating furnaces with working media of explosive character. JAMES L. MCFARLAND (to General Elec. Co.). U. S. 1,789,187, Jan. 13. A furnace such as may be employed for brazing, annealing, etc., is initially heated substantially to its operating temp. while filled with air, then purged with a non-explosive medium such as a mixt. of N and H and then supplied with its working medium, such as H. Various structural details are described.

Canister for respiratory apparatus. RANDOLPH MONRO and JOHN C. GOSHORN. U. S. 1,789,262, Jan. 13. Structural features.

Removing toxic gases including cyanogen chloride from air (as in canisters of respiration apparatus). PAUL O. ROCKWELL. U. S. 1,789,194, Jan. 13. The gas is passed through a layer of granular activated C impregnated with $(CH_2)_6N_4$, a layer of granular alkali material such as pumice treated with caustic alkali, and another layer of substantially dry granular activated C impregnated with $(CH_2)_6N_4$.

Refrigerating agents. FRIGIDAIRE CORP. Fr. 689,618, Feb. 8, 1930. Hydrocarbon derivs. such as $CHFCl_2$, $CFCl_3$, CF_2Cl_2, CHF_2CH_2Cl and $CHF_2.CHFCl$ are used for producing cold in refrigerators.

Materials for submarine cables. BELL TELEPHONE LABORATORIES, INC., and WESTERN ELECTRIC CO., LTD. Brit. 334,553, June 5, 1929. Strands which are insulated from each other along most of their length are connected at intervals, suitably by blocks of solder or Cu-Zn alloy. A coating of Cu oxide on the strands may serve as the intervening insulation. Cf. *C. A.* **24**, 5899.

Plastic masses for heat insulation. RHEINHOLD & CO. VEREINIGTE KIESELGUHR- UND KORKSTEIN-GES. and JOSEPH S. CAMMERER. Ger. 512,326, Oct. 22, 1927. Powd. insulating materials are mixed with colloidal earth of a kind stated to be known in America as clayoid.

Rubber electric insulation. W. S. SMITH, H. J. GARNETT, J. N. DEAN and H. C. CHANNON. Brit. 334,587, June 6, 1929. Non-rubber substances are removed from rubber by heating it under pressure in a solvent of low b. p. such as benzene or benzine, decanting or filtering, and removing the solvent from the product as by steam-blowing. For insulating submarine cables, the purified rubber is hardened by vulcanization or by admixt. with gutta-percha or balata (which may be purified as described in Brit. 307,390 (*C. A.* **23**, 5255)) or with a high m.-p. low-ash bitumen low in free C as described in Brit. 322,208 (*C. A.* **24**, 2816).

14—WATER, SEWAGE AND SANITATION

EDWARD BARTOW

Surface water supply of the United States 1926. II. South Atlantic slope and Eastern Gulf of Mexico basins. NATHAN C. GROVER, A. H. HORTON, J. J. DIRZULAITIS, E. D. BURCHARD AND W. R. KING. *U. S. Geol. Survey Water-Supply Paper* **622**, 118 pp. (1930); cf. *C. A.* **24**, 3844. E. H.

Surface water supply of the United States 1927. IV. St. Lawrence River basin. NATHAN C. GROVER, S. B. SOULE, H. E. GROSBACH, LASLEY LEE, A. W. HARRINGTON AND H. B. KINNISON. *U. S. Geol. Survey Water-Supply Paper* **644**, 156 pp. **IX. Colorado River basin.** NATHAN C. GROVER, ROBERT FOLLANSBEE, A. B. PURTON AND W. E. DICKINSON. *Ibid* 649, 99 pp. Cf. *C. A.* **25**, 756. **X. The Great basin.** NATHAN C. GROVER, A. B. PURTON, H. D. MCGLASHAN, F. F. HENSHAW, G. H. CANFIELD AND ROBERT FOLLANSBEE. *Ibid* 650, 97 pp. (1930). E. H.

Public water supplies in British India. HAROLD E. BABBITT. *Eng. News-Record* 105, 678–82(1930).—Conditions in general relative to water supply in British India are discussed, and the supply systems of Bombay, Rangoon and Calcutta are described briefly. Most supplies are inadequate, expedients adopted under these circumstances being low pressures and intermittent supply. The latter is not very effective, and with both methods there is danger of contamination. It has been found that even where mains are always under some positive pressure, suction may be created in a service pipe because of high-velocity flow in the main, the action being similar to a jet pump. Most supplies are municipally owned. Nearly all cities are sewered, the sewage being discharged directly into rivers without treatment; this necessitates filtration of all supplies derived from such sources. Slow sand filters are widely employed and stand in high

favor. Algae growths are a problem. All surface supplies are chlorinated.
R. E. THOMPSON

Lake Monte (Guaminí, Argentina). Character and properties of its waters. CARLOS A. GRAU. *Anales oficina quím. provincia* (Buenos Aires) **3**, 1-26(1929).—Numerous complete analyses are given. The water averages about 2% salts, principally chlorides, sulfates and carbonates of Na and K. Fish are abundant. L. E. GILSON

Water supply scheme of Yallourn (Victoria). L. T. GUY. *Proc. 1st Commonwealth Conference on Pub. Health Eng.*, Dept. Health (Australia) Service, *Publication* No. **2**, 37–62; *U. S. Pub. Health Eng. Abstracts* **10W**, 92(Sept. 6, 1930).—The treatment for a town of 1000 consisted of dosage with alum, followed by sedimentation for 9–15 hrs. The p_H value of the water is adjusted to obtain optimum coagulation conditions. From 2.0–2.5 gr. per gal. of alum together with a retention period in the sedimentation basins up to 13 hrs. gives very good results. Chlorination has been found to be unnecessary. C. R. FELLERS

The drinking water problem in Nanking. G. L. KUO. *Chem. Ind.* (China) [2], **5**, 58–67(1930).—Nanking has no modern water supply system. Analyses indicate that river water is preferable to well water. Improved methods are suggested for city-wide transportation for domestic supply. WM. H. ADOLPH

Progress in water supply and purification during the past year. NORMAN J. HOWARD. *Contract Record and Eng. Rev.* **44**, 1625-32(1930).—cf. *C. A.* **24**, 1687.—An extensive review of progress during 1930 in the waterworks field. Noteworthy advances were the more widespread employment of softening and the extending use of the ammonia-chlorine process for taste prevention. Many large water-works construction programs are in progress in Canada. R. E. THOMPSON

Experimental studies of water purification. V. Prechlorination in relation to the efficiency of water-filtration processes. H. W. STREETER AND C. T. WRIGHT. *U. S. Pub. Health Repts.* **45**, 3105–28(1930); *J. Am. Water Works Assoc.* **23**, 22–52(1931); cf. *C. A.* **24**, 4878.—*Conclusions.*—(1) Raw-water prechlorination, when properly controlled, affords an effective and economical means of reënforcing the bacterial efficiency of rapid-sand water-filtration processes, the expts. having indicated that the permissible density of *B. coli* in the raw water could be slightly more than doubled by use of this measure. (2) Maintenance of a controlled low residual Cl in the applied water, averaging 0.05 p. p. m. and not exceeding 0.10 p. p. m., gave more consistent and, in general, more satisfactory results than did superchlorination, with a high residual Cl. (3) The bacterial efficiencies of filtration and of postchlorination appear, from these observations, to be measurably reduced as the result of prechlorination. (4) Although the length of filter run was not increased by prechlorination under the conditions of these expts., the development of growths of microscopic organisms was perceptibly retarded by this treatment. (5) The application of prechlorinated water to rapid sand filters appears to lower the bacterial content and the biochem. O demand of the filtering medium. Variations in both of these elements were found to bear a fairly definite relation to concurrent variations in the residual Cl of the applied water. More general observations made in the course of the expts. confirmed the prevalent impression that it is advantageous to prechlorinate before, rather than after, preliminary sedimentation in order to utilize the stabilizing effect of basin treatment prior to applying prechlorinated water to filters. They also indicated, however, that even with the stabilizing influence of such basin treatment, careful technical supervision and lab. control are necessary to maintain a relatively const. Cl content of water applied to filters, which appears to be a desirable condition for consistently effective filtration. Although the ability of well-ripened filters to absorb excessive amts. of Cl for considerable periods of time constitutes a valuable operating factor of safety, insofar as the production of overchlorinated effluents is concerned, any undue burdening of filters with excessively chlorinated water may be expected, as shown in these studies, to result in a measurable impairment of their bacterial efficiency. The main advantage of prechlorination, from the viewpoint of this study, may be summed up as being its effectiveness and relative economy as a measure for reënforcing the over-all bacterial efficiency of the rapid sand filtration process, when considered as a whole. Its principal disadvantage appears to be its tendency to cause a perceptible decrease in the bacterial efficiency of filtration and of postchlorination. From a practical standpoint this advantage appears, from the study herein described, to be outweighed by the advantage above indicated, though it should be taken into account in casting up a balance sheet of performance to be expected in applying this method of treatment. J. A. KENNEDY

Purification of highly turbid waters. JOHN D. FLEMING. *J. Am. Water Works Assoc.* **22**, 1559–76(1930).—See *C. A.* **24**, 5088. D. K. FRENCH

Observations on suspended matter in the San Juan River. C. S. HOWARD AND S. K. LOVE. *Eng. News-Record* **105,** 620–1(1930).—Data obtained in studies carried out in 1928 and 1929 are given. At certain times the San Juan is one of the muddiest rivers in the U. S. In general, the river carries larger percentages of suspended matter with greater vols. of discharge, but the quantity carried at any given discharge may cover a wide range. During the period July 1–Sept. 21, 1929, the mean content of suspended matter was 7.30% and the mean daily load more than 1,500,000 tons, the mean flow being about 8,000 ft.-sec. On one occasion the suspended-matter content was as high as 40.8%. R. E. THOMPSON

An early chapter in the history of water filtration. CHARLES F. MARSH. *Eng. News-Record* **105,** 609–10(1930).—Interesting data are given regarding what is generally accepted to be the first slow sand filter, installed at the Chelsea Eng. Waterworks Co.'s plant by James Simpson in 1829. The filtration works at Manchester and Glasgow visited by Simpson prior to that date are believed to have consisted of infiltration galleries in gravel and sand adjacent to rivers. R. E. THOMPSON

Difficulties encountered in the operation of Spencer Filtration Plant. TOM CONNEL. W. Va. Univ., *Tech. Bull.* No. **3,** 107–11; *U. S. Pub Health Eng. Abstracts* **10W,** 90 (Sept. 6, 1930).—The plant comprises a circular mixing flume, a circular sedimentation basin, 2 filter units, a small clear well in which the water is chlorinated and a large distributing reservoir equipped for spray aeration. The raw water is collected by impounding the flow from a watershed of $^3/_4$ sq. mile. The water carries a turbidity of 40–1800 p. p. m. and is highly colored. From 3.5 to 7.6 gr. per gal. of alum and 1.9 to 3.5 gr. per gal. of soda ash are used as coagulants. The CO_2 content of the filtered water ranges from 10–35 p. p. m. The effective detention period is about 1 hr. Formerly during hot, dry weather an offensive taste and an odor of H_2S appeared. Prechlorination at the mixing flume at the rate of 1 p. p. m. removed the H_2S taste and odor but not tastes due to algae. C. R. FELLERS

Water softening and purification methods. J. A. MCGARIGLE. *J. Am. Water Works Assoc.* **22,** 1609–24(1930).—Clarification and softening are discussed. The use of mech. agitators with or without added clay is advocated. Vertical steel tanks have advantages over horizontal concrete tanks. The consideration of water softening includes the use of evaporators with or without previous treatment—hot lime-soda treatment, phosphate addns., zeolite softening and various combinations of these 3 methods. D. K. FRENCH

Zeolite water-softening plant installed at Springdale, Pa. J. F. PIERCE. *Eng. News-Record* **105,** 800–2(1930).—The recently completed softening plant at Springdale is described and illustrated. The well water, which has a temporary hardness of 190–368 p. p. m. and a permanent hardness of 0–127 p. p. m., is pumped to an elevated tank, from which it flows under a uniform head to the 2 upward-flow base-exchange softening units, which have a combined capacity of 610,000 gal. per day. The flow is upward during regeneration and washing also, the rate of flow during softening being 6 gal. per sq. ft. per min., and during washing and regeneration 4 to 8 gal. per min. Sufficient hard water is by-passed to adjust the final hardness to 4 grains per gal. The strength of brine employed for regeneration is 6%. Both the length of runs and the wash period are controlled by soap tests. The water is chlorinated prior to distribution. R. E. THOMPSON

Oil burner used in recarbonation of lime-softened water. JAMES A. WORSHAM. *Eng. News-Record* **105,** 649(1930).—The new water supply of Bloomington, Ill., derived from Money Creek, although softer than the water formerly supplied from deep wells, contains about 250 p. p. m. of hardness. The water is softened by the excess-lime method and recarbonated with CO_2 produced in a com. oil burner installed in a low-pressure boiler, which supplies heat and hot water for the offices. The flue gases are diluted with air from 15 to 4% CO_2, scrubbed, compressed and dried, the scrubber consisting of a bed of coke sprayed with water. The oil consumption is 3 quarts per hr. The daily water consumption is about 2 million gal. per day. R. E. THOMPSON

Colloid chemical questions of feed-water treatment with particular consideration of desilicifying. R. STUMPER. *Die Wärme* **53,** 859–62(1930).—Colloids have recently gained importance in boiler operation in consideration of such problems as silicate boiler scale, foaming and corrosion. Foaming and the effect of colloidal material on the origin of precipitates in boilers have been theoretically treated by Langmuir (cf. *C. A.* **22,** 470). The practical application of this work is discussed. Stabilizing of the colloidal state may be of use in the prevention of boiler scale, but it may also bring about foaming. The application of colloidal boiler-scale inhibitors must be tested under operating conditions. The importance of a consideration of silicic acid and the char-

acteristics of silicate boiler-scale formation are discussed. Three processes are suggested for desilicifying: (1) condensation of H_2SiO_3 to colloidal silicic acid, (2) pptn. of H_2SiO_3 as an insol. silicate, and (3) a combined chem. and colloidal process. Through protective action of known colloids, *e. g.*, humus materials, pptn. of scale in the water softener and boiler can be retarded, while pptd. material will be kept in the colloidal state. ALLEN S. SMITH

Of what importance is sodium phosphate in boiler-feed water treatment? HAENDELER. *Die Wärme* **53**, 881–3(1930).—The effect of Na_3PO_4 in feed water is 3-fold. It removes the residual hardness, inhibits corrosion and removes scale previously formed. Well treated feed water will have a residual hardness of 0.25° to 2.0° which is concd. by evapn. With an excess of soda the residual hardness is pptd. as a loose carbonate sludge in boilers operating at pressures under 15 atm. Above that pressure scale is formed, since the high temp. decomposes the soda. Na_3PO_4, in contrast, is stable and forms a difficultly sol. and finely divided alk. earth phosphate. The higher cost of Na_3PO_4 will prohibit its use where cheaper reagents produce an equal residual hardness. The presence of Na_3PO_4 produces a definite protective action against corrosion. The effect of Na_3PO_4 is 500-fold greater than that due to an equal amt. of sulfate and therefore it may be used in smaller concns. The lower salt content will improve the quality of the steam by decreasing foaming and knocking (cf. *C. A.* **23**, 3287). With a small excess of phosphate, scale which has formed is dissolved. The soln. of the scale is a slow base-exchanging process. Analytical methods for the detn. of phosphate offer difficulties. Colorimetric methods are described. The concn. of Na_3PO_4 in boiler-feed water should be maintained at 15 to 30 mg. per l. calcd. as PO_4. ALLEN S. SMITH

Determination of phosphates in presence of silica in boiler water. ELWOOD W. SCARRITT. *Ind. Eng. Chem., Anal. Ed.* **3**, 23(1931).—The presence of silicic acid causes the development of a blue color similar to that produced by H_3PO_4 in the colorimetric detn. with molybdate. By properly adjusting the H-ion concn., however, it is possible to overcome the error, but the tests with the standards must contain the same H-ion concn. Directions are given in detail. W. T. H.

Removal of dissolved gases from boiler water for prevention of corrosion. W. A. S. HARMON. *Petroleum World and Oil Age* **27**, 90–3, 95, 118, 120(1930).—*Deaerators* of boiler H_2O for the reduction of corrosion are of the following types: (1) In the flashtype deaerator, the heated H_2O is admitted to a chamber under vacuum so that the H_2O boils or flashes, throwing off the dissolved gases. This is particularly effective for the removal of NH_3 or H_2S. (2) The heated H_2O is injected into a vessel through which steam at the same temp. as the H_2O is sweeping. (3) The heated H_2O rains over evapg. tubes carrying steam. (4) The H_2O cascades first over a series of heating trays, then over a series of deaerating trays. The steam atm. in the deaerating section is gas-free, hence the films of H_2O continuously give off their dissolved gases to it. A p_H value of 7 is usually taken as representing a neutral H_2O. In severely corrosive waters, securing a p_H value of 9.5 after deaeration will inhibit corrosion. EMMA E. CRANDAL

How a county farm solved its sewage disposal question. R. E. MCDONNELL. *Munic. Sanitation* **2**, 18, 19, 39(1931).—An activated-sludge plant of the mech. aeration type was built at a cost of $30,000 to treat wastes from a population of 2000. The plant produces an effluent that runs for 3 miles through a dry stream bed without causing offense. G. L. KELSO

Origin, operation and economics of the new clarification-pond plant at the military camp at Grafenwohr. W. HUBER. *Gesundh.-Ing.* **52**, 871, 886(1929); *U. S. Pub. Health Eng. Abstracts* **10**, S, 71(July 5, 1930).—A plant of settling tanks and fish ponds, with arrangements for distributing the sewage from a collecting reservoir to both plants, is described. The preclarification tanks of the new plant are on the Dyckerhoff and Widmann system and are in duplicate to meet the requirements of varying flow and possible epidemics. The unit consists of settling tank, septic-sludge tank, tank for the septic water displaced by the sludge and an arrangement for uniting this liquid after digestion with the fresh settled sewage from the settling tank. In case of an epidemic, the effluent can be treated with NaOCl and $Na_2S_2O_3$, though recognized injury to carp and tench in the ponds has been carefully considered. The handling, care and feeding of the fish are described. The revenue for the sale of fish aids in paying the running expenses of the plant. C. R. FELLERS

Calculations for sand traps and clarification tanks. V. MANN. *Wasserkraft Wasserwirtsch.* 1929, 237; *U. S. Pub. Health Eng. Abstracts* **10**, S, 71(July 5, 1930).—The effect of sand traps and clarification tanks depends on the speed of the flow and

also on the speed of settling of the particles. The latter speed increases from zero until it reaches a point when the resistance of the water is equal to the accelerating power of gravity. The time of acceleration is short and, in practice, can be disregarded, and the final speed can be better estd. by practical observations in settling flasks or tanks than by calcn. C. R. FELLERS

Modern clarification plants for town sewage. J. HAUSEN. *Tech. Rundschau, Woch. Berl. Tagebl.* May 1, 1929; *U. S. Pub. Health Eng. Abstracts* **10**, S, 71(July 5, 1930).—Sludge digestion in Emscher or 2-storied sedimentation tanks decrease, with the amt. of sludge, facilitates the dewatering of the sludge and prevents objectionable odors. The amt. of CH_4 which is liberated during sludge digestion and collected in gas reservoirs is greatly increased, and the size of the septic tanks may be decreased by raising the temp. of the sludge to 25°, circulating the sludge and mixing ripe with fresh sludge. The activated-sludge process gives a much greater sepn. of sludge from sewage. The sewage from the Emscher tanks is treated with activated sludge in aeration tanks and then freed from the sludge in secondary clarification tanks. Part of the sludge is returned to the aeration tanks and part is taken to the septic tank, where it is digested with the fresh sludge from the preliminary purification. C. R. FELLERS

Centrifuges for the desiccation of mud in installations for clarifying urban drainage. JUAN PÉREZ. *Quím. e ind.* **7**, 229–31(1930).—Mud may be rapidly removed with the centrifuge and dried in air. Such app. has been installed in Hamburg, Hannover and Frankfort-on-Maine. The process "Ter Meer," which utilizes the centrifuge, gives a product which contains 65% moisture and which is similar to moist humus earth. The effluent used to contain 1–2% of finely divided solid and did not meet conditions usually imposed by river and canal regulations. By modifying the form of the drum of the centrifuge this trouble was overcome. Various working data are given.

S. L. B. ETHERTON

Chemical precipitation of humic pigments. C. P. MOM. *Water and Water Eng.* **32**, 476–7, 526–8(1930); cf. *C. A.* **24**, 3583.—Coagulation of humic matter by means of $Al_2(SO_4)_3$ is effected by simultaneous influence of H ions, Al ions and colloidal Al_2O_3. If a ferric salt is used as a coagulant, coagulation is effected by the simultaneous influence of H ions, ferric ions and colloidal Fe_2O_3. If in these processes free Cl happens to be present, a part of the org. matter is withheld from coagulating by the destructive effect of the Cl on the humus colloids. ALICE W. EPPERSON

Large activated-sludge plant for San Antonio, Tex. H. R. F. HELLAND. *Eng. News-Record* **105**, 886–7(1930).—Since 1901 the sewage of San Antonio has been stored in a 900-acre reservoir (Mitchell's Lake) and used for irrigation. The new 30-million gal. per day activated-sludge plant now under construction, consists of revolving and bar screens, an incinerator for screenings, grit chambers, pre-settling tanks, activation channels of the spiral-flow type, final settling tanks, heated sep. sludge-digestion tanks, sludge lagoons and lab. The settling tanks will be equipped with revolving sludge scrapers. The activation channels are designed for a 5-hour aeration period, at the rate of 1.5 cu. ft. of air under 8 lb. pressure per gal. of sewage, and 20% of returned sludge. The 4 digestion tanks will provide 45 days' storage and will be heated by means of hot-water coils around walls. The gas collected in the domes provided for that purpose will be used to heat water for the coils and to burn the screenings. The effluent will flow to Mitchell's Lake and thence either into the San Antonio and Medina Rivers or to irrigation ditches. The estd. cost of the plant is $900,000, or $30,000 per million gal. per day. The sewage flow is estd. at 75 gal. per capita per day. R. E. T.

Sanitation and potable water for China. A. M. SHAW AND J. A. L. WADDELL. *Far Eastern Rev.* **25**, 396–7(1929).—Water-carriage methods of sewage disposal cannot be employed in China because of the lack of adequate public water supply and the need for conserving all fertilizer material. A simple *digesting cell* is suggested, constructed to yield material of max. fertilizing value. WM. H. ADOLPH

British methods of dealing with river pollution. H. MACLEAN WILSON. *Munic. Sanitation* **1**, 672–6(1930).—Much early legislation on river pollution in England led to complicated and tedious legal methods of conducting sanitary affairs. Since most public water supplies for drinking purposes came from wells or impounding reservoirs, the action to prevent stream pollution was caused by the foul condition of the streams. This condition menaced the health of the people, made stream water unfit for any use and destroyed all fish. Domestic sewage is treated by screening, passing through detritus tanks, aerating and settling. Sludge is digested and dried in earthen lagoons. In general, trade refuse is coagulated and settled and the sludge filtered. G. L. K.

Air filtration. E. T. OLLETT. *Domestic Eng.* **49**, 150–4(1929); *U. S. Pub. Health Eng. Abstracts* **10**, AC, 12(July 12, 1930).—Methods of dust removal are described.

Dry cloth filters are effective when the air velocity is under 20 ft. per min. A water spray is effective in air velocities up to 500 ft. per min., when it removes 95% of dust other than soot and 70% of the soot. An oil film on metal mesh arranged in cells removes 98% of dust: It does not remove fog unless air is dried to drive off water filming each dust particle. Water sprays and oil films may be combined so that the spray removes fog while the film removes soot. For removing industrial dusts, cyclone separators are useful only for large, heavy particles. Settling chambers remove heavy particles over 0.1 mm. diam. if the velocity is under 10 ft. per sec. Particles under 10μ will not settle under any com. conditions. Textile bag filters deal effectively with fine dusts and some smokes. Electrostatic methods of dust settling are described. For general use, the textile bag filter is recommended, provided it is fitted with the automatic, self-scavenging device. C. R. FELLERS

Hygiene of indoor swimming baths, their development and appropriate construction. C. L. P. TRUB. *Veröff. Geb. Medizinalverwaltung* 19, 520(1929); *U. S. Pub. Health Engr. Abstracts* 10, Sw, 7(July 12, 1930) —From personal investigation and questionnaires, T. concludes that the only hygienically satisfactory method is the circulation of the water with disinfection and filtration, combined with daily renewal of the whole of the water. Disinfection with Cl is the most common method used in Germany, but the method of addn. and the amt. required need further investigation. The continued effect of Cl or ozone is preferable to the temporary effect of ultra-violet light, which also requires very complete preclarification. C. R. FELLERS

Greensand bibliography to 1930 with a chapter on zeolite water softeners (SHREVE) **8.** Clarifying device for the waste waters of the cellulose and paper industry (Ger. pat. 512,323) **23.**

Purifying water. FIRMA ROBERT KUNER. Ger. 510,178, Sept. 30, 1926. In purifying water by addn. of soda soln., a satd. soda soln. having a temp. between 40° and 104° is used. Within that temp. range, the soly. of soda varies with the temp. less than at lower temps., and a more accurate regulation of the amt added is accordingly possible.

Purifying water. SOC. GÉNÉRALE D'ÉVAPORATION (PROCÉDÉS PRACHE ET BOUILLON). Fr. 690,559, April 29, 1929. An app. is described for purifying water by bringing it into intimate contact with chem. reagents.

Water filter. ROY B. EVERSON (to Everson Filter Co.). U. S. 1,788,510, Jan. 13. Structural features.

Filter for water, sewage, etc. OSKAR KARV. Ger. 510,088, May 17, 1928.

Base-exchange substances suitable for softening water. SVEIN DAHL-RODE (to Cochrane Corp.). U. S. 1,788,805, Jan. 13. Reaction is effected between iron furnace slag and NaOH (suitably by stirring them with water); after drying the reaction product it is treated for removal of undesired compds. and then subjected to successive washings with hot salt soln., acidulated with HOAc. An arrangement of app. is described. Cf. *C. A.* **24**, 1451.

Base-exchanging substances. GENERAL ZEOLITE CO. Brit. 334,677, July 27, 1929. An alkali metal silicate soln. contg. 0.25–2.0 mols. of silica to each mol. of alkali metal oxide is caused to react with a soln. of amphoteric metal hydroxide contg. 1–2.5 acid equivs. to each equiv. of amphoteric metal oxide. Preferably the conditions are such that a gel embracing all or most of the reacting substances is obtained. The gel is dried, with or without pressing, preferably below 100°, and washed free from sol. salts. Cf. *C. A.* **24**, 909.

Gel zeolites, etc. GENERAL ZEOLITE CO. Brit. 334,676, July 27, 1929. Concd. reacting solns. such as those of Na silicate and Al sulfate are brought into contact in proportioned quantities in a coalescing flow, mixing and reaction being effected during the flow and in a mixing chamber. The mixt. is collected in a suitable tank where the gel is allowed to develop (the process being carried out at ordinary temp.).

Apparatus for separating gases, vapors and oil from boiler-feed water. M. N. LUTZENKO. Russ. 58,337, Nov. 14, 1929. Constructional details.

Electrode system and construction for preventing pitting, corrosion or scale formation in steam boilers, condensers, etc. LEWIS O. GUNDERSON. U. S. 1,788,485, Jan. 13.

Preventing boiler incrustation. ALFRED PFEIFFER. Ger. 510,299, Sept. 22, 1928. The water is brought into contact with a sheet of fabric that has been coated with a paste prepd. by mixing equal parts of tannin and sulfite cellulose lye, and rolled into a spiral.

Removing boiler incrustation. GEORG KROPFHAMMER and ROBERT TOCHTERMANN. Ger. 510,054, July 7, 1925. Dil. acids are used to which albuminous material has been added.

Utilizing waste waters from coal-gas manufacture. HEINRICH BRUNS. Ger. 481,306, May 21, 1925. The waste waters from the treatment of coal gas by the direct ammonia process, especially the condensate obtained from the final cooling of the gases, are treated with NaOH to fix the phenols and then distd. to yield a concd. phenolate lye and water suitable for use as *boiler-feed water*. Preferably, the waste waters are preliminarily concd. by using them for the indirect cooling of the gases. A multiple-effect app. may be used for the distn. Cf. *C. A.* **24**, 5404.

Utilizing industrial waste waters. HEINRICH BRUNS. Ger. 510,056, July 19, 1929. Addn. to 481,306. The method of Ger. 481,306 (preceding abst.) is applied to waste waters obtained in the distn. of lignite, the waters being first freed from tar in the usual way.

15—SOILS, FERTILIZERS AND AGRICULTURAL POISONS

J. J. SKINNER AND M. S. ANDERSON

Advances in agricultural chemistry since the year 1918. A. JACOB. *Z. angew. Chem.* **44**, 1–9(1931). E. H.

Soils of the eastern townships of Quebec. R. R. MCKIBBIN AND L. I. PUGSLEY. MacDonald College, McGill Univ., *Tech. Bull.* No. 6, 3–64(1930).—All soils in this region have a high percent of org. matter concd. in the surface layer. They also have a relatively low Ca and P content and a low nitrate N content throughout the growing seasons. Three main kinds of soil are found: heavily podsolized, brown forest and muck swamp soils. The podsol and brown forest soils have high CaO requirements and a high p_H value. They are also better supplied with Ca, Mg and sesquioxide bases than are the surface soils. The forest crops from a large section of this area should be of great value while the muck swamp tracts should prove highly fertile if they could be drained. J. R. ADAMS

The dispersion and mechanical analysis of certain soils high in sesquioxides. L. T. ALEXANDER. *Soil Research* (*Suppl. to Proc. Intern. Soc. Soil Sci*) **2**, No. 1, 72–6(1930).—Certain lateritic soils high in sesquioxides and of low base-exchange capacity are more readily dispersed for mech. analysis by NaOH than by $Na_2C_2O_4$. With such soils it is recommended that 5 cc. 0.6 *N* NaOH be used as the dispersing agent instead of the usual 10 cc. of 0.5 *N* $Na_2C_2O_4$. I. A. DENISON

Relation between soil humus and climate. HANS JENNY. *Naturwissenschaften* 18, 859–66(1930).—This is a review of the recent work of J. in which math. relationships between the humus content of the soil (N) and temp. or rainfall are derived (cf. *C. A.* **22**, 4702; **23**, 3044; **24**, 2822, 4114). B. J. C. VAN DER HOEVEN

The laws of soil colloidal behavior. III and IV. Isoelectric precipitates. SANTE MATTSON. *Soil Science* **30**, 459–95(1930); **31**, 57–77(1931); cf. *C. A.* **24**, 1695.—Isoelec. ppts. of Al and ferric "hydroxides" are prepd. from the respective chlorides and sulfates by the addn. of NaOH. When NaOH is added to the respective sulfates the isoelec. point is reached at a lower p_H than when chlorides are used. The SO_4 content in terms of equivs. is higher at the isoelec. point than is Cl when the chlorides are used. The ferric complex is isoelec. at a lower p_H than the Al complex. When phosphate and silicate ions enter into the sesquioxide complex the isoelec. point is reached at a lower p_H than when these ions are absent, because they displace diffusible acid anions as well as the hydroxyl ions. When phosphates and silicates are present numerous compns. may be formed. Increasing the quantity of these ions tends to lower the p_H value at which the isoelec. point is reached. In high concns. of these ions, the isoelec. complex approaches but never fully attains satn.; *i. e.*, $P_2O_5/Al_2O_3 = 1$ and $SiO_2/Al_2O_3 = 3$. All the ions in the system mutually displace one another according to the energy of each. At the isoelec. point the dissocn. of anions and cations must be equal. There is a balance between cations and anions in the complex but a stoichiometrical relationship between any 2 ions must be accidental. There is definiteness of compn. within the crystal lattice but not on the surface of the colloids. The data given serve to explain the presence of colloids with high silica and high base content in arid soils, and the removal of these constituents with the consequent increase in sesquioxides under humid conditions. Systems studied include $AlCl_3$ and $FeCl_3$ treated with varying quantities of "Na humate," Na_2SiO_3, H_3PO_4 and bentonite. The humus compd. is prepd. by digesting peat with NH_4OH, allowing it to stand for 2 months, then acidifying the superna-

tant liquid with HCl and electrodialyzing the ppt. 100 g. NaOH is added to 35 g. of the electrodialyzed material to make the "Na humate." The humates differ from the silicates and phosphates in that the colloidal humic complex is quantitatively pptd. by $AlCl_3$ and $FeCl_3$. They show an electropositive max. on the acid side of the isoelec. point and, when the proportion of humus is high, have a second isoelec. point. The ferric "humates" are isoelec. at much lower p_H values than the Al "humates" of corresponding compn. The "humate" ion or ion complex displaces the PO_4 ion and, to a still greater extent, the SiO_3 ion. The PO_4 ion strongly displaces the SiO_3 ion. There is no apparent displacement of the PO_4 ion by the SiO_3 ion, for in the presence of the latter the proportion of P_2O_5 in the complex increases somewhat. This anomaly may be due to the formation of an addn. complex. Mineral soil colloid complexes react with salts of Al and Fe, forming isoelec. ppts. in exactly the same manner as the humus complex. M. S. ANDERSON

Studies on soil acidity, particularly in relation to electrolyte content of soil suspensions. ARNO TERÄSVUORI. *Valtion Maatalouskoetoiminnan Julkaisuja* No. 29, 7–200(1930) (in German).—As a rule, keeping soil samples in dry air does not affect appreciably the acidity or the content of sol. electrolytes in the samples. However, a few exceptions to this rule were found In some cases drying produced an increase and in other cases a decrease of the p_H. The changes were in most cases very small, seldom more than 0.2. When the p_H increased the electrolyte content decreased and *vice versa*. In soil samples rich in ferrous iron or other strongly reducing substances the changes in p_H values produced by drying were sometimes appreciable, particularly when the p_H value in the raw samples was either very low or very high. Warming air-dried mineral soil samples for 3 hrs. at 100–110° resulted generally in a considerable rise in electrolyte content and in lowering of the p_H. In peat soils the changes were smaller. Keeping soil samples at moisture contents of $^1/_3$, $^2/_3$ and full water capacity during varying periods of time (1–4 months) affected the p_H and electrolyte content as follows: In water-satd. soil samples the electrolyte content decreased somewhat and the p_H increased. In samples kept at medium humidity the electrolyte content increased considerably while the p_H decreased. In samples kept at lower humidity the changes were in the same direction as in those kept at medium humidity, but were smaller. In soils low in easily sol. electrolytes additions of acids and salts had a greater effect on p_H value than in soils rich in electrolytes. This must be borne in mind in investigating the buffer strength of soils in relation to acid addns. On investigating the effect of artificial fertilizers on acidity of soils it should be noticed that changes taking place in the p_H of soils cannot serve as a final indication whether acidity has changed and to what extent *E. g.*, a large addn. of superphosphate (1000 kg. per ha.) affects definitely a soil low in electrolytes in reducing the p_H, while it hardly affects the p_H of a soil which is not particularly poor in buffer substances. Extensive tables are given showing results of the investigation. S. L. MADORSKY

Determination of carbonates in soil. C. J. SCHOLLENBERGER. *Soil Science* 30, 307–24(1930).—Application of precautions previously noted (*C. A.* **24**, 4347) as necessary in detg. CO_3^{--} in soil is described, with full description of app. and details of procedure. The method is *applicable to the detn. of* CO_3^{--} *in all kinds of samples*, and suggested modifications for preventing interference by other volatile acids are made. Accuracy, speed and assurance of complete expulsion of CO_2 and its collection in the absorbent are advantages claimed. The app. consists of a 200-cc. round-bottom flask contg. the sample, connected to a similar l. flask for the absorbent by a vertical condenser. The app. is connected and air exhausted. Standard $Ba(OH)_2$ in measured excess is drawn into the absorption flask from a pipet. Dil. HCl, etc., for decompn of the sample is allowed to enter the sample flask. Upon warming the latter, the mixt. boils at a low temp., expelling CO_2 and driving it into the flask contg. the $Ba(OH)_2$ for absorption; this is completed within 8 min. after the CO_3^{--} in the sample is decompd. Excess $Ba(OH)_2$ is titrated in the absorption flask with 0.1 *N* HCl and thymolphthalein in presence of $BaCO_3$, or under some circumstances it may be necessary to collect the latter. E. J. C

The Neubauer method of determining assimilable potash and phosphoric acid anhydride in soils. M. SARTORI. *Atti III congresso naz. chim. pura applicata* 1930, 547.—The Neubauer method is advocated. E. M. SYMMES

The carbonic acid-bicarbonate and water extracts for determining the phosphoric acid requirements of soils. B. DIRKS AND S. SCHEFFER. *Landw. Jahrb.* **71**, 74–99 (1930).—Solvents usually employed for the extn. of available phosphate from the soil have a much lower p_H than the root sera of the plants. For this purpose the authors use a $CaCO_3$ soln. satd. with CO_2 for neutral and alk. soils, and CO_2-free H_2O for acid

soils. The content of a single ext. serves as a measure of a temporary condition; for the total, 4 or 5 extns. are necessary. A single extn. bears a relation to the Neubauer values. Thirty g. of air-dried soil is mixed with 75 cc. of solvent and shaken for 1 hr. The mixt. is then filtered and the H_3PO_4 detd. by the method of Wrangell (*C. A.* **21**, 2752). Before extn. 0.0125% of KCl is added to the CO_2-free H_2O to aid in filtration. A series of tables shows the relation to other methods. D. and S. think the citric acid method not accurate because the p_H is too low. GEORGE R. GREENBANK

Effect of superphosphate on the reaction, base saturation and buffering power of acid mineral soils. LUDWIG SCHMITT. *Das Superphosphat* **6**, 219–27(1930).—A no. of field expts. over a period of years showed that superphosphate behaves in the soil as a physiologically neutral salt and has practically no effect on the reaction, base satn. and buffering power of acid mineral soils. K. D. JACOB

The oxidation of pyrite and sulfur as influenced by lime and magnesia. A 12-year lysimeter study. W. H. MACINTIRE, W. M. SHAW AND J. B. YOUNG. *Soil Science* **30**, 443–57(1930).—Twelve-year lysimeter expts. showed an increase in outgo of sulfate when various forms of lime and magnesia were present Sulfate outgo from $FeSO_4$ addns. was in the order of heavy magnesia, light magnesia, light lime, S material alone and heavy lime. The order of outgo from pyrite was light lime, pyrite alone, heavy lime, light magnesia and heavy magnesia. Complete recoveries of sulfate were obtained from the $FeSO_4$ addns. with CaO and MgO but not from the $FeSO_4$ alone or $FeSO_4$ plus 32 tons of lime. Complete recovery of sulfate equivalences of elemental S were made from the 2 MgO supplements but not from the others. Complete recovery of S was not obtained from any of the 5 pyrite addns. The formation of insol sulfates and the reduction of sulfates are considered as factors responsible for incomplete sulfate recoveries. The total losses of Ca and of Mg from the several addns. were generally in close agreement. The liming treatments effected a decrease in the outgo of K. Some increase in total nitrate outgo was induced by single addns. of liming materials while unsupplemented S materials caused a decrease in nitrate outgo. M. S. ANDERSON

The determination of the plant-assimilable nutrients in soils. M. WRANGELL. *Landw. Jahrb* **71**, 149–69(1930).—To det. the assimilable phosphate content, 1 g. of soil is shaken with 100 cc. of H_2O for 5 hrs. and the suspension centrifuged. The residue is similarly treated with an addnl. 100 cc. of H_2O. The total assimilable phosphate is calcd as $a^2/(a-b)$, where a and b are phosphate contents of the first and second exts., resp. Results agree with the Neubauer values and field trials The method is suitable for detn. of the relative availability of phosphatic fertilizers. A similar process is used for detn. of the assimilable potash in soils, but the exact significance of the results is less clearly defined. In H_2O-culture expts. the use of very dil. solns. corresponding in concn. to soil solns. is preferable to the common introduction of relatively concd. solns. GEORGE R. GREENBANK

Influence of inorganic nitrogen compounds on reaction and replaceable bases of Norfolk sand. R. M. BARNETTE AND J. B. HESTER. *Soil Science* **30**, 431–7(1930).—A study is made of the influence of different carriers of N on the p_H of the deep phase of a Norfolk sand sodded to lawn and golf green grasses. $(NH_4)_2SO_4$ increases acidity and $NaNO_3$ decreases it. NH_4 phosphate causes some increase in acidity but is less effective than $(NH_4)_2SO_4$. A dressing of 3 in. of clay decreases the effect of both NH_4 phosphate and $(NH_4)_2SO_4$ in decreasing the p_H value of the soil. Bivalent cations predominate in this soil. Applications of $(NH_4)_2SO_4$ decrease replaceable bivalent cations more rapidly than the replaceable univalent cations. This decrease is correlated with increase in H-ion concn. and with a decrease in total equivs. of replaceable cations. M. S. ANDERSON

Nitrogen and organic matter in Hawaiian pineapple soils. A. L. DEAN. *Soil Science* **30**, 439–42(1930).—N and org. matter of a large no. of Hawaiian soils are given. These soils are rich in N compared with those from the southern states, and their org. matter contains a higher % of N than is frequent in soils of the temperate zone. The av. C:N ratio is about 7 to 1. M. S. ANDERSON

Variations in soil reaction affect nitrification. P. E. BROWN AND G. V. C. HOUGHLAND. *Proc. Iowa Acad. Sci.* **36**, 93–7(1929).—The data as a whole show very clearly the significant effects of the reaction of the soil on its nitrifying power. Apparently when the differences in p_H are not very great, the influence of greater acidity may be quite large, and where wide variations occur, the reaction of the soil may overshadow the effects of soil treatments. If the treated soils are more acid, nitrification will be reduced and fertilizer treatments which would ordinarily stimulate the process will have no effect. It should be emphasized that the great acidity in the fertilized soils

is not a result of fertilization but a natural variation in soil reaction in such a soil type as the Carrington loam which is closely assocd. with the Clarion loam, a type contg. lime in the subsoil. Measurements of nitrification or the nitrifying power of treated soils should include tests of reaction or H-ion concn. if the results are to be correctly interpreted. If the reaction varies the treatments will probably show no effect. With wide variations and especially high acidity the nitrification process will be reduced in spite of the treatment which, of course, in some cases may reduce the injurious effects of the acidity. Further, it is not impossible that the treatments may entirely overcome acidity effects. This may, of course, be interpreted to mean that the reaction or acidity limits possible beneficial effects from the treatments. W. G. GAESSLER

Studies on methods of measuring the nitrate-assimilating power of soils. RAY A. PENDLETON AND FREDERICK B. SMITH. *Proc. Iowa Acad. Sci.* **36**, 75–8(1929).—The results so far obtained show quite conclusively that soils have a definite nitrate-assimilating power which may be favored by addns. of org. matter. The data also indicate that it may be possible to measure this nitrate-assimilating power and correlate it with other microbiological activities. W. G. GAESSLER

The spontaneous culture method for studying the non-symbiotic nitrogen-fixing bacteria of the soil. R. H. WALKER AND JOHN L. SULLIVAN. *Proc. Iowa Acad. Sci.* **36**, 53–61(1929); cf. *C. A.* **24**, 4883.—From work of a preliminary nature it appears quite probable that the spontaneous culture test may serve as a biol. method for comparing the fertility of soils. Its greatest value will probably be in its use for testing soils for their lime and phosphate needs. Possibly it may serve as a test for a lack of such other constituents as org. matter, K, S or other essential plant food elements. This method has many advantages as it is simple in manipulation, it requires only a comparatively short time to obtain results and, most important of all, it permits of the study of the N-fixing bacteria in their natural habitat and under practically the same environmental conditions to which they are accustomed in the soil in the field. A short bibliography is appended. W. G. GAESSLER

Influence of humus on the fixation of nitrogen: Azotobacter chroöcoccum and Clostridium pastorianum in impure mixture. Conclusions concerning the biochemical action of humus. JULIU VOICU AND ELENA LUNGULESCU. *Bul. soc. chim. Romînia* **12**, 82–9(1930).—The action of humus on *Cl. pastorianum* and *A. chroöcoccum* should be considered as the result of the slowing up of the process of oxidation. The effect is similar to that produced by the lowering of the O tension. The N of humus is in a difficultly oxidizable complex and is always available to the plants. The resistance of humus to oxidation is a result of its interference with the activity of aerobes. RACHEL BROWN

Nitrogen fixation by Rhizobium meliloti and Rhizobium japonicum. G. GORDON POHLMAN. *J. Am. Soc. Agron.* **23**, 22–7(1931).—This paper gives the results of an attempt to clarify the question as to the ability of *Rhizobium* to fix N in the absence of the host plant. The results obtained are largely neg. but it seems probable that certain species of *Rhizobium* may be able to fix appreciable quantities of N if they are cultivated under the proper conditions. J. R. ADAMS

The direct isolation of Rhizobia from soil. O. N. ALLEN AND I. L. BALDWIN. *J. Am. Soc. Agron.* **23**, 28–31(1931).—A yeast ext., mannitol medium, exerts the most selective chemotactic effects on *Rhizobium meliloti* and *Rhizobium trifolii*. Capillary tubes, sealed at 1 end, were autoclaved in a dish of the medium and were then filled with the sterile medium and suspended with the open end down in an aq. suspension of the soil to be examd. Frequently as high as 90% of the colonies on plates poured from tubes suspended for 12 hrs. resembled cultures of *Rhizobia*. J. R. ADAMS

The effect of various treatments on microörganisms in the soil under a five-year rotation. P. E. BROWN AND B. A. TOMLIN. *Proc. Iowa Acad. Sci.* **36**, 79–85(1929).—It seems evident from this work that such normal soil treatments as manuring, liming, the use of rock phosphate, superphosphate and the addn. of crop residues will stimulate bacterial development and such desirable activities as nitrification and non-symbiotic N fixation. The beneficial effects of such treatments on crop yields, as so often and in fact, usually noted may be due, therefore, in part at least to effects on the soil microörganisms and their activities. In some cases the most important effects of certain soil treatments are undoubtedly bacterial. W. G. GAESSLER

Bacterial activity in soils variously treated. P. E. BROWN AND D. I. AQUINO. *Proc. Iowa Acad. Sci.* **36**, 87–91(1929).—The application of manure in normal amts. to soil under a 5 year rotation will bring about large increases in nos. of bacteria and in the ammonifying, nitrifying, N fixing and sulfofying powers of the soil. The addn of vigorous microörganisms or the supplying of food and energy materials by the manure

apparently has a very important and beneficial effect on these groups of organisms. The Carrington loam is known to be benefited materially by addns. of manure, and increased crop yields follow its use. Thus there is a direct correlation between bacterial nos. and the activities of these groups of organisms and the crop-producing power of soil as affected by manuring. W. G. GAESSLER

Methods of counting the number of legume bacteria in the soil. G. GORDON POHLMAN. *J. Am. Soc. Agron.* **23**, 70–7(1931).—Indications are that it is not possible to isolate and count the legume bacteria in soil by the use of N-free media nor does the use of dyes in media give satisfactory results. The Wilson method (*C. A.* **21**, 787) or some modification of it appears to give approx. figures but it is rather lengthy. Results obtained in the study of dye tolerance indicate the possibility of using dyes in media for sepg. various strains of organisms within species. J. R. ADAMS

Influence of exchangeable ions in soil colloids on bacterial activity and plant growth. N. V. JOSHI AND A. N. PURI. *Mem. Dept. Agr. India, Bacteriol. Ser.* **2**, 65–81 (1930).—Ammonifying, nitrifying and N-fixing bacteria are not present in fully unsatd. soil freed from exchangeable bases. Cultures of these bacteria, when introduced in such a soil, did not survive, and plants did not thrive in them. Some evidence was obtained indicating that this effect of fully unsatd. soil is due to the surface-active H-ions present. The bases used to neutralize the unsatd. soil although combined with the mineral complex can serve as nutrient material for both bacteria and plants. Three equivs. of surface-active H ions are recognized in a fully unsatd. soil. Bacterial activity and plant growth are checked in such a soil, but normal growth can be obtained by neutralizing one equiv. of the H. Nitrification, N fixation and plant growth are inhibited in soils having a part or the whole of surface-active H ions free, but ammonification seems to proceed normally in such soils. There is no evidence to show that exchangeable Na ions are directly toxic to plants, their toxicity most probably being due to adverse phys. conditions set up by the exchangeable Na. K. D. JACOB

The agronomic significance of base exchange. W. P. KELLEY. *J. Am. Soc. Agron.* **22**, 977–85(1930).—The president in his annual address before the Am. Soc. of Agron. clarifies the essential features of base exchange and draws a true picture of the importance of this phenomenon. J. R. ADAMS

Present trends and future prospects in fertilizer manufacture. C. L. BURDICK. *Chem. Met. Eng.* **38**, 24–7(1931). E. H.

The influence of aerial fertilizer on plants. E. N. BAZUIRINA AND V. A. CHESNOKOV. *Bull. acad. sci. union rép. soviét. social., Classe sci. phys.-math.* 1930, 513–24.—Aerial fertilizer directly increases the daily productiveness of the photosynthesis but no proportionality can be noticed between the concn. of CO_2, on the one hand, and the energy of the photosynthesis, on the other. The action of the aerial fertilizer upon the daily productiveness of the photosynthesis may vary considerably. *E. g.*, with the onion the percentage of increase of productiveness is proportional to the intensity of the work done by the plant under normal conditions, while with beans, the increase of the CO_2 content in the air only completes the lack of assimilators and its action is in inverse proportion to the work done by the plant under normal conditions. L. JACOVLEFF

An attempt to codify fertilizer experiments for tropical cultivation. F. MAIN. *Rev. botan. appl. agr. trop.* **10**, 641–8, 723–37(1930).—The regulations of the Intern. Commission of the Inst. of Rome are modified so as to be applicable to fertilizer expts. in the hot countries. Reports should all contain details of climate, soil, exptl. plot, nature of fertilizer, plant requirements, variation of the elements, conditions of application and interpretation of results with emphasis on the nature of the fertilizer and the plant requirements. Each section is taken up in some detail and a form for the report is suggested. J. R. ADAMS

Measurement of the drillability of fertilizers. A. L. MEHRING. *Ind. Eng. Chem., Anal. Ed.* **3**, 34–8(1931); cf. *C. A.* **24**, 677.—Directions are outlined for measuring the angle of repose, apparent sp. gr. and av. particle diam. of fertilizers and for substituting these measurements in an equation to get a coeff. of rate of flow. Ways of making practical use of these detns. in the manuf. and use of fertilizers are suggested. A. L. MEHRING

The effect of some nitrogen fertilizers on nitrification. RAY A. PENDLETON, P. E BROWN AND F. B. SMITH. *Proc. Iowa Acad. Sci.* **36**, 99–103(1929).—The results indicate that the addns. of the various fertilizers all increased the nitrate content of the soils. $NaNO_3$ was superior in this respect to all the other fertilizers used. The treatments also stimulated the nitrifying power of the soil, the $NaNO_3$ showing the greatest effect when the soil alone was used in the tests. When $(NH_4)_2SO_4$ was used in the test, the various fertilizers all stimulated nitrification but there were no definite differences

between the various materials. The results were very similar in the test where $(NH_4)_2SO_4$ and $CaCO_3$ were employed. Apparently in the amts. used here all the fertilizers increased nitrification but the effects from the different materials were very similar.
W. G. GAESSLER

The study of urea fertilizer. JEAN BORDAS AND GASTON MATHIEU. *Compt. rend. acad. agr. France* **16**, 904-6(1930).—The transformation of urea into NH_3 is faster when the soil is richer in org. matter. This action is promoted by the addn. of soy-bean urease or ammoniating bacteria and this activation is especially noticeable in the naturally less active soils. Urea-, nitrous- and nitric-N are found to coexist in soils where the hydration of urea is slow. The best results in culture tests have been obtained by using some soy-bean urease or fresh manure in addn. to the urea.
J. R. ADAMS

Influence of potash sources and chlorine content of fertilizers on yield of cotton. J. J. SKINNER. *J. Am. Soc. Agron* **23**, 13-21(1931).—KCl is as good a source of K_2O for cotton as K_2SO_4 but kainite does not show up quite as favorably. The Cl from either KCl or from kainite in the quantity found in mixed fertilizers for cotton will not become an unfavorable factor as it is far below the limit of Cl endurance for cotton in most soils. This limit seems to be about 118 lb. of Cl per acre. When compounding fertilizers, especially from pure chemicals, it would appear advisable not to have the entire source of K_2O and N from KCl and NH_4Cl. The amt. of Cl from such a mixt. applied at the rate of 900 lb./acre supplies an excessive amt. of Cl for the best growth and yield of cotton.
J. R. ADAMS

Cover crops and green fertilizers. MISS J. GALY-CARLES. *Rev. botan. appl. agr trop.* **10**, 683-8(1930).—The cover crops are divided into 2 groups: those that prevent erosion of the soil and those that act as a green fertilizer. A no. of cover plants are described as to source, description and use.
J. R. ADAMS

Fertilizer ammoniation, a step forward in the industry's progress. F. G. KEENEN *Fertilizer Green Book* **12**, No. 1, 16-8(1931).—The com. treatment of superphosphate with anhyd. NH_3 is briefly described and the advantages of ammoniated superphosphate to the fertilizer industry are discussed.
K. D. JACOB

Should a change be made in analytical procedure for evaluating available phosphoric acid content of fertilizer materials? C. C. HOWES AND C. B. JACOBS. *Ind. Eng. Chem., Anal. Ed.* **3**, 70-2(1931).—The citrate soly. of the P_2O_5 in ammoniated superphosphate contg. more than about 2% NH_3 depends on the p_H of the citrate soln., the length of time that the sample is digested in citrate soln. and the wt. of sample for analysis. The last factor is very important because the official method specifies that a 2-g. sample shall be taken for the citrate digestion. Consequently the citrate soly. of the P_2O_5 in a mixed fertilizer contg. ammoniated superphosphate is found to be different from that of the P_2O_5 in the original material and the soly. varies with the proportion of ammoniated superphosphate in the mixt. A plea is made for a change in the official method that will eliminate these discrepancies.
K. D. JACOB

Production of artificial farm manures. F. B. SMITH, W. H. STEVENSON AND P. E. BROWN. Iowa Agr. Expt. Sta., *Research Bull.* **126**, 167-95(1930).—A good grade of well-decomposed manure can be made by composting straw or corn stalks with such chemicals as $CaCO_3$, $(NH_4)_2SO_4$ or superphosphate, provided a sufficient supply of water is added to keep the compost heap moist. Small amts. of sol. N salts greatly hastened the decompn. of straw into manure; similarly mixts. of sol. N compds. with phosphates and $CaCO_3$ acted very beneficially in the ripening process in straw composts. From 800 to 1000 gal. of water per ton of straw gave the optimum moisture content for efficient artificial manure production. Limited aeration is necessary but too much aeration is decidedly detrimental. Inoculation of the compost with fresh manure, cultures of molds or Adco culture speeded up the decompn. process and produced good manures in most cases. Straw directly from the thresher may be mechanically mixed with chemicals, manure or cultures and immediately wetted down into a compost mass. Better results are obtained if the straw is ground up before composting. The decomposing mass is kept well wetted down and mixed up after 2-3 months. The manure is well decomposed in 5-8 months. Cornstalks or grain straw gave very good results when composted with sweet clover in the ratio of 4:1. The N content of the finished manure varied from 1.7 to 2.9%. The pentosan content was considered the best measure of decompn. in artificial manures. The yield of manure (80% H_2O content) from a ton of straw or cornstalks varied widely but averaged 2230 lb.
C. R. F.

Effects of artificial farm manures on soils and crops. F. B. SMITH AND P. E. BROWN. Iowa Agr. Expt. Sta., *Research Bull.* No. **127**, 199-236(1930).—Well-rotted

farm manure was compared to artificial manures composed of straw, sweet clover, red clover, Adco, etc., in lab. greenhouses and, in some cases, field expts. to det. nitrification, CO_2 production, nitrate assimilation and yield. Well-rotted manure had a much greater effect on CO_2 production in sand cultures than did any of the artificial manures, but some of the artificial manures produced as great an influence as did the fresh manure. Nitrate accumulation was depressed equally by the farm and artificial manures when applied at the rate of 7.5 or 15 tons per acre. The straw-clover manure and the sweet clover manure showed a greater nitrifying effect than farm manure. Artificial manures, in general, produced slightly less stimulation of nitrate-assimilating organisms than the well-rotted farm manure, though the differences were slight. Field expts. covering a 4-yr. period with variously prepd. artificial manures as compared with farm manure showed that nitrate assimilation, nitrification, nitrate accumulation and the nos. of molds, bacteria and actinomycetes were very similarly affected by the addns. of the several manures. The proper composting of straw and cellulose residues may permit the production of artificial manures which will give similar effects on bacteriol. conditions in the soil and on crop yields to those occasioned by farm manure. The reduction in nitrate content in the soil following the application of artificial manures is no greater than that resulting from farm manure. No fear need be felt relative to the use of artificial crop residue manures in normal soils. C. R. FELLERS

The rate of decomposition of some artificial manures. FREDERICK B. SMITH. *Proc. Iowa Acad. Sci.* **36**, 69–73(1929).—The data show that the Adco reagent stimulated the production of CO_2 markedly at first and then decreased it to a rate of about the same as that in the untreated culture. The culture treated with the Iowa reagent produced only slightly more CO_2 than the check for the period of 6 weeks but lost a considerable amt. of N in the form of NH_3. Probably less N would have been lost if some $CaSO_4$ or superphosphate had been added in the reagent. W. G. GAESSLER

The action of ammonium sulfate and the saltpeters on the development of the sugar beet and corn when used in nutrient solutions containing certain salts. T. G. DIKKUSSAR. *Landw. Jahrb.* **72**, 80–103(1930).—Sugar beets develop normally in sand when nutrient solns. are used. The actions of $(NH_4)_2SO_4$, of NH_4NO_3, and of the N of the nitrite depend upon the p_H of the solns. The action is the same for the beets and corn. The $(NH_4)_2SO_4$ is similar to the $NaNO_3$ but less efficient than NH_4NO_2 and NH_4NO_3. At p_H 7 and certain concns. of Ca, Mg and K salts $(NH_4)_2SO_4$ is the best source of N. The nitrite and nitrate are less effective. Increased concns. of Ca, Mg and K salts in the nutrient solns increase the action of $(NH_4)_2SO_4$ but have little effect on the action of $NaNO_3$. Decreasing the concn. of Ca, Mg and K below the optimum decreases the action of $(NH_4)_2SO_4$ and increases that of $NaNO_3$. Altering the concn. of the nutrient soln. alters appreciably the action ratio between $(NH_4)_2SO_4$ and $NaNO_3$. The nutrient salts are found to differ in their effect on the infiltration of Ca, Mg and K ions as indicated by an analysis of the ash. GEORGE R. GREENBANK

The effect of lime on nitrification in the Grundy silt loam. R. H. WALKER AND L. G. THOMPSON, JR. *Proc. Iowa Acad. Sci.* **36**, 45–51(1929).—The results show the pronounced effect of lime on the nitrifying power of this soil, and that nitrification is affected much more by lime than by manure or superphosphate. In fact, the nitrifying power was as high in the soils that had received lime alone as it was where lime, manure and superphosphate had been applied. The data contained in tables and graphs indicate quite definitely that the outstanding need for increased nitrification in the Grundy silt loam is sufficient lime to neutralize the acidity. If the nitrifying power of the soil is a measure of fertility then lime is certainly the treatment most needed for better crop growth on this soil. Unless sufficient lime has been added to correct the acidity of this soil the largest effects from the use of manure and com. fertilizers cannot be expected. A short bibliography is appended. W. G. GAESSLER

Effects of the freeze of the winter of 1928-9 on walnut trees. L. RIGOTARD. *Compt.-rend. acad. agr. France* **16**, 939–43(1930).—The injurious effects of the extreme cold on the walnut trees were somewhat alleviated by the addn. of large amts. of fertilizer. Superphosphate, slag and KCl are strongly recommended as sources of P_2O_5 and K_2O. $(NH_4)_2SO_4$ should be used as a source of N in calcareous soils and $NaNO_3$ or $Ca(NO_3)_2$ in acid soils. J. R. ADAMS

Tests with Norway saltpeter and German lime nitrate. C. LARSON AND E. MANELL. *Kgl. Landtbruks-Akad. Handl. Tid.* **69**, 905–40(1930).—German lime nitrate is Ca nitrate contg. about 14.5% nitrate N and 1% NH_3 N. Norway saltpeter is Ca nitrate contg. 12–13% N. The latter is not now produced, but instead there is a product like the German. Both are very deliquescent but very sol. Tests with Norway saltpeter were made to det. its value on grasslands and clover fields, particularly on

mineral soils having an acid reaction. As a top dressing, Norway saltpeter was quite as good as Chile saltpeter. On soils having an acid reaction it was better than Chile saltpeter. No appreciable difference in clover content of the field could be found. Chem. analyses of the crops showed the same Ca and N contents. Badische lime nitrate has been tested widely in Sweden, but for some crops the no. of comparisons is too small. The quantity of Chile saltpeter required to replace 100 kg. of Badische lime nitrate is calcd. by the Mitscherlich formula. With fodder, turnips and oats, lime nitrate is slightly superior; with barley and turnips it is the same; with clover grass it is somewhat less favorable than Chile saltpeter. With sugar beets, Chile saltpeter is decidedly superior, as well as with winter wheat. This differs markedly from tests in other countries. E. M. SYMMES

Insect poisons. XI. The constitution and synthesis of the pyrethrins. H. STAUDINGER, L. RUZICKA AND E. REUSS. *Ann. Acad. Sci. Fennicae* **A29**, No. 17, 8 pp. (1927); cf. *C. A.* **18**, 2135.—Previous work on pyrethrum is summarized. Either the formula proposed by Yamamoto for pyrethronic acid is incorrect or the active poisons differ in Japan and Dalmatia. The spatial arrangement of the mol. is very important in toxicity; the pyrethrin from synthetic *trans*-chrysanthemumic acid has only slight insecticidal activity in comparison with natural pyrethrins. Research is reported on cyclopentenolone derivs., α-methylcyclopentenolone from wood oil being used as a base. The *O-allyl ether*, b_1 87.5°, was prepd. *Methylallylcyclopentanolone* prepd. by reduction (colorless oil $b_{0.8}$ 84-6°) gave an inactive pyrethrin on esterfication with natural chrysanthemumic acid. **XII. The estimation of the pyrethrin content of insect powder.** H. STAUDINGER AND H. HARDER. *Ibid* No. 18, 14 pp.—Increasing the pyrethrin I and II contents of insect powders by plant breeding is suggested. Two methods of analysis are described which it is proposed to use in plant breeding research. *The acid method.*—Ext. pyrethrum with light petroleum ether for 18 hrs. Evap. the solvent in a current of CO_2, removing the final traces *in vacuo*. Ext. the residue (I) several times with CH_3OH, warming each ext., cool and filter. Add water to the filtrate to 10% and place the soln. in a freezing mixt. for 2 hrs., filter and concentrate *in vacuo*. After 8 hrs.' sapon. with alc. NaOH ext. the neutral substances with Et_2O, acidify the soln. with H_2SO_4 and distil the monocarboxylic acid (II) in steam. Titrate the distillate contg. (II) with 0.1 *N* NaOH. Ext. the chrysanthemumdicarboxylic acid (III) from the distn. residue with Et_2O, after clearing with animal charcoal. Distil off the solvent and titrate III with NaOH. Calc. the pyrethrin content from these results. The residue from CH_3OH extn. (I) was analyzed similarly, but the amount of steam-volatile and water-sol acids was insignificant. *Method of estn. by detn. of the crude semicarbazones.*—Treat the CH_3OH ext. with semicarbazide-HCl and CH_3COONa. After 24 hrs. distil the solvent *in vacuo*. Ext. the crude semicarbazones with Et_2O, and shake the soln. several times with H_2O. Distil the Et_2O, det. in the residue by the Kjeldahl method, and calc. the pyrethrin content from this. It appeared that the pyrethrins are the only carbonyl compds. present in the crude oil ext. These methods are useful in detecting adulteration, but the acid anilide deriv. should always be made as a final proof. Analysis of Dalmatian and Swiss samples of pyrethrum indicated that stalks also contain some pyrethrins (0.04–0.1%). Flowers contained 0.4–0.6%. No significant differences in pyrethrin content were found between open, half-open and closed flowers. There appeared to be no correlation between the amts. of pyrethrin I and II in the samples. Alc. should not be used as an extg. agent, since an ester interchange occurs; this effect is more evident with CH_3OH than with C_2H_5OH. If soap is used in the prepn. of an emulsion (for insecticidal purposes) the activity of the pyrethrins will be quickly lost as the simple chrysanthemum esters as well as pyrethrolone have no insecticidal power. Indifferent solvents such as C_6H_6, petroleum ether, $CHCl:CCl_2$ or CH_3COCH_3 should be used for extn. Such exts. can easily be emulsified by the addn. of Turkey-red oil. Cf. also a dissertation by H. Harder, Zurich, 1927. HENRY H. RICHARDSON

A new insecticide against the maize stalk-borer. L. B. RIPLEY AND G. A. HEPBURN. *Farming in S. Africa* **5**, 285–7(1930); cf. *C. A.* **24**, 3597.—Improved derrisol (a soln. of derris in an org. solvent that does not burn the plants) promises to be an excellent insecticide for controlling the corn borer. Although its toxicity is much higher than that of cryolite it has the disadvantage of volatilizing appreciably during hot weather. Preliminary expts. indicate that the best results can be obtained by the use of a suspension of cryolite in derrisol. Natural cryolite is slightly more toxic to the corn borer than synthetic; both materials cause plant burning to about the same extent. Because of its finer state of division synthetic cryolite adheres to foliage better. Resin soap should not be used as an adhesive in insecticides contg. derris, because it

reduces the toxicity of the latter, but gelatinized starch and size gave promising results. K. D. JACOB

The insecticide and anticryptogam treatments of walnut trees. A. PAILLOT. *Compt.-rend. acad. agr. France* **16**, 885–9(1930).—The trees should be treated not later than the middle of June with a mixt. contg 1% of $CuSO_4$, 1% of hydrated lime and some lime or Pb arsenate. The first treatment should be followed by 2 subsequent treatments. Supplementary precautions can be taken, such as exposing the walnuts to SO_2 and treating the trees in the winter with a mineral oil emulsion. J. R. A.

Codling-moth experiments, 1929-30. S. L. ALLMAN. *Agr. Gaz. N. S. Wales* **41**, 834–44(1930).—In general, the results confirmed those obtained during the previous season (N. S. Noble, *C. A.* **25**, 765). K. D. JACOB

Organic mercury compounds for the control of scab and rhizoctonia of potatoes. B. A. BROWN. Conn. (Storrs) Agr. Expt. Sta., *Bull.* **164**, 87–106(1930).—Twelve treatments for the control of scab and 18 for the control of rhizoctonia were tested during a 2-yr. period. Eight of the treatments were new DuPont mercurials 2 were Semesan and 3 Bayer products. $HgCl_2$, CH_2O and no-treatment plots were used for controls. Very few, if any, differences were detected in the germination and vine growth of the several treatments. Corrosive sublimate, 1:960, was clearly the best control for rhizoctonia. Hot CH_2O (1:120) and Bayer Dipdust were about equal in effectiveness but much less effective than the $HgCl_2$. The cold CH_2O treatment commonly recommended for scab prevention was very ineffective. In general, the new mercurials were less effective for the control of potato scab and rhizoctonia than the older prepns. C. R. FELLERS

When to treat quackgrass most effectively with chlorates. H. K. ROWLEY. *J. Am. Soc. Agron.* **23**, 41–2(1931).—Double applications of 10% $NaClO_3$ soln. applied at the rate of 250 gals./acre practically eradicate quackgrass irrespective of the time of application. Applied at this rate it does not prove highly toxic to Kentucky bluegrass. J. R. ADAMS

N developments in 1930 throughout the world (TYLER) **18**. Determination of nicotine in commercial solutions and insecticides (SABATIÉ) **7**. *Azotobacter* (KALANTARIAN, PANOSSIAN) **11C**. Phosphates and nitrates (Fr. pat. 689,277) **18**. Phosphates (Fr. pat. 689,302) **18**. $NH_4H_2PO_4$ (Fr. pat. 691,332) **18**. Purification of gas [in production of fertilizer] (Fr. pat. 689,440) **21**.

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KAYSER, E.: **Microbiologie agricole.** 2 volumes. 5th ed. Paris: J.-B. Baillière et fils. 754 pp. F. 36.

TERÄSVUORI, ARMO: **Über die Bodenacidität, mit bes. Berücksichtigung des Elektrolytgehaltes der Bodenaufschlämmungen.** Helsingfors: Akad. Buchh. 207 pp. Fmk. 50.

Fertilizer. REINHARD GOLDBERG and KARL O. SCHMITT (to I. G. Farbenind. A.-G.). U. S. 1,788,828, Jan. 13. Crude phosphate is decompd. with HNO_3 at least 10% in excess of the quantity required for decompn., K_2SO_4 is added and $CaSO_4$ is sepd. by filtration, and the soln. is at least partly neutralized by an agent such as NH_3 which introduces no inert materials.

Fertilizers. ERNST STREICHER. Ger. 510,097, Feb. 22, 1927. Soft earthy crude phosphates, *e. g.*, Algiers phosphate, are opened up by treatment first in the natural state, and then after grinding, with waste solns. of acid character derived from vegetable materials. Suitable solns. are water expressed from peat, sap from green fodder, waste waters from the distn. of wood and peat and spent tanning liquors. Peat dust and sulfates or chlorides of alkali or alk. earth metals may be added to the phosphates, to accelerate the process.

Fertilizers. CARL EHRENBERG. Ger. 510,925, Feb. 10, 1929. Lime nitrogen is made up into non-dusty, non-corrosive, useful form by mixing with C humus and briquetting under pressure. Cf. *C. A.* **25**, 767.

Fertilizers. NIKODEM CARO and ALBERT FRANK. (Hugo Heimann, inventor). Fr. 689,041, Jan. 28, 1930. A fertilizer is made by submitting humic acids or vegetable materials contg. humic acids or a substance tending to form humic acids such as lignite or peat to a moderate oxidation at a temp. between 50° and 300° by means of air

and afterward passing NH_3 over the products obtained. Other gases such as CO_2 and steam may also be present.

Fertilizers. KALI-CHEMIE A.-G. Fr. 689,351, Feb. 3, 1930. K fertilizers, practically free from Cl and contg. phosphate, are prepd. by decomposing KCl or a mixt. of KCl and NaCl with mineral acids such as H_2SO_4, H_3PO_4 or acid salts of these acids, or HNO_3, and using the HCl produced by the reaction for decomposing phosphates. Cf. *C. A.* 25, 767.

Fertilizers. LOUIS A. GARCHEY and BERTHE GARCHEY (NÉE GODILLOT). Fr. 689,908, Apr. 22, 1929. Powd. substances, particularly fertilizers, are preserved by mixing with them powd. $MgSiO_3$ (talc).

Fertilizers. I. G. FARBENIND. A.-G. Fr. 688,857, Jan. 25, 1930. An easily spread fertilizer is made by projecting a concd. soln. of urea and $Ca(NO_3)_2$ which has been evapd. down to a water content of about 5%.

Fertilizers. LOUIS NOMBLOT and COMPAGNIE MINIÈRE DU M'ZAITA. Fr. 36,761, Apr. 11, 1929. Addn. to 652,427 (*C. A.* 23, 3536). In the process of the prior case the soln., after elimination of the $(NH_4)_2SO_4$, is evapd. to dryness on the water bath without any addn., the HCl in excess being eliminated by evapn. The last traces of HCl are removed by dilg. with water, adding the required amt. of CaO or $CaCO_3$, and evapg. again.

Fertilizers. PATENTVERWERTUNGS AKT.-GES. ALPINA (SOC. ANON. POUR L'EXPLOITATION DE BREVETS ALPINA, PATENTE EXPLOITATION CY ALPINA, LTD.). Fr. 688,617, Jan. 21, 1930. The agglomeration to a hard mass of fertilizers ordinarily occurring in fine grains is prevented by bringing the material into a form having larger grains.

Fertilizers. RUHRCHEMIE A.-G. Fr. 690,117, Feb. 17, 1930. Simple or mixed fertilizer salts which may be preserved or spread at will, particularly salts having a nitrate basis, are made by limiting the amt. of conversion liquid whereby large grains are obtained. The manuf of several fertilizers and details of procedure are given.

Fertilizers. SOC. CHIM. DE LA GRANDE PAROISSE (AZOTE ET PRODUITS CHIM.). Fr. 36,710, Jan. 11, 1929. Addn. to 679.017 (*C. A.* 24, 3599) The double decompn. of $NaNO_3$ with KCl described in the prior case is carried out in the mother liquors themselves.

Fertilizers. SOC. D'ÉTUDES SCIENTIFIQUES ET D'ENTREPRISES INDUSTRIELLES. Fr 691,285, Mar. 6, 1930. NH_4Cl, KCl and a salt of P are made by treating solns. of NaCl and KCl, *e. g.*, solns. of ores such as sylvenite, with phosphoric acid and NH_3, free or combined in the proportion of 1 mol. of acid to 2 of NH_3, sepg. by cooling the P salt formed, and then sepg. the KCl and NH_4Cl either separately or together After sepn. of the P salt the soln. may be boiled and treated with NH_3 in excess to crystallize a salt of the formula $Na(NH_4)_2P_2O_6$ which is sepd along with or before the KCl and NH_4Cl.

Fertilizers. SUCRERIE AGRICOLE DE BOLBEC-NOINTOT. Fr. 691,129, May 10, 1929. Slimy residues from sugar manuf. are made suitable as fertilizers by adding water-absorbing substances such as CaO.

Fertilizers. NAUCHNUI INSTITUT PO UDOBRENIYAM IM. YA. V. SAMOILOV V. S. N. KH. SSSR and I. VOLFKOVICH. Russ. 58,272, Nov. 13, 1929. $CaCN_2$ is decomposed with H_3PO_4 or by a mixt. of H_3PO_4 with other inorg. acids in the presence of sulfates or phosphates of NH_4 or K.

Urea fertilizers. I. G. FARBENIND. A.-G. Fr. 691,245, Mar. 6, 1930. See Brit. 332,948 (*C. A.* 25, 554).

Urea. I. G. FARBENIND. A.-G. Brit. 334,564, April 2, 1929; Fr. 690,090, Feb. 17, 1930. Urea or mixts. contg. it and suitable for use as *fertilizer* are prepd. by heating a carbamate such as that of NH_4 to about 150–250° in the presence of a quantity of NH_3 equal to at least three times that combined with CO_2 in the carbamate and under a partial pressure of the NH_3 higher than the crit. pressure of NH_3. Catalysts such as C, Al or Mg chloride, HCl or H_3PO_4 may be added.

Supplying carbon dioxide to plants. FRIEDRICH RIEDEL. Ger. 512,319, Dec. 4, 1928. Fuel-combustion gases to be supplied to plants are enriched in CO_2 by mixing $CaCO_3$ or other suitable carbonate with the fuel, the proportion of fuel to $CaCO_3$ being higher than that necessary to decomp. the $CaCO_3$. Alternatively, a mixt. of $CaCO_3$ with the amt. of fuel required to decomp. it may be burnt in a shaft kiln, and the excess of fuel may be burnt in an ordinary oven, the combustion products being mixed. The fuel and carbonate mixt. may be briquetted. Addnl. details are given. Cf. *C. A.* 24, 4575.

Insecticide. ARPAD DE WICZWINSZKY. Fr. 689,815, Feb. 13, 1930. Insecticides

are prepd. by the action of pyridine or its salts on pyrethrum or on the active principles of pyrethrum isolated or in soln.

Insecticides. SCHERING-KAHLBAUM A.-G. (Herbert Schotte and Karl Görnitz, inventors). Ger. 510,376, Feb. 11, 1925. Nicotine is mixed with gypsum and the mixt. is hydrated and cast.

Insecticides. SCHERING-KAHLBAUM A.-G. (Herbert Schotte and Karl Görnitz, inventors). Ger. 511,983, Feb. 13, 1925. Addn. to 510,376. The compn. described in Ger. 510,376 (preceding abstr.) is modified by including a superficially active material, *e. g.*, C or silica gel. The nicotine content of the compn. can then be raised.

Insecticides. SCHERING-KAHLBAUM A.-G. (Georg Kirschbaum, inventor). Ger. 510,377, Mar. 15, 1925. Nicotine is mixed with $MgCO_3$ or magnesia usta. The mixt. may be compressed into tablets.

Destroying insects. I. G. FARBENIND. A.-G. Ger. 512,361, Oct. 10, 1928. Use is made of secondary or tertiary amines contg. at least $2C_6H_5$ groups attached to the N atom, or their halogen or alkyl derivs.

Disinfectants for the earth. HANS HAUNSCHILD and JOHANN WIDMANN. Fr. 689,451, Feb. 5, 1930. A disinfectant for the ground contains tar or its distn. products and caustic lime and the lime is slaked by adding water.

Fungicides. SACCHARIN-FABRIK A.-G. VORM. FAHLBERG, LIST & Co. Ger. 510,411, Sept. 17, 1924. Fungicides for dry application to seeds are prepd. by mixing water-insol. Cu compds. with water-sol. cyanomercury compds. $CuCO_3$ 1 and Na cyanomercuricresolate 1 part is a suitable mixt.

16—THE FERMENTATION INDUSTRIES

C. N. FREY

The effect of Steffen waste on the fermentation of pentosans from the corn-stalk. E. I. FULMER, C. H. WERKMAN, R. M. HIXON AND A. L. WILLIAMS. *Proc. Iowa Acad. Sci.* 36, 111(1929).—It was found that Steffen waste furnishes a suitable source of N, salts and buffers for the growth of *Aerobacter pectinovorum* on pentosan material prepd. from corn-stalks. W. G. GAESSLER

Detection of isopropyl alcohol in spirits. K. BODENDORF. *Z. Untersuch. Lebensm.* 59, 616–7(1930); cf. *C. A.* 25, 166.—Distil a mixt. of 5 cc. of the sample with 5 cc. of H_2O from a 50-cc. flask through a condenser tube with a right-angled bend (each arm 20 cm. long). When 5 cc. of the distillate is obtained, mix 2 cc. with 4 cc. of H_2O and 0.2 g. of charcoal, filter and pipet 2 cc. of the filtrate as a layer on 1 cc. of a fresh soln. of *m*-nitrobenzaldehyde in 50 cc. of concd. H_2SO_4. Place the tube in hot water for 1 min.; in the presence of 0.1% of isopropyl alc. a bright ring is observed at the junction of the liquid. If a pale yellow ring is obtained, it is advisable to repeat the charcoal extn., though the sensitivity of the test is thus somewhat lessened. C. R. F.

Nature of the optically active substance precipitated with gypsum in lime defecation of black liquor from regeneration in the tartaric acid industry. FILIPO PERCIABOSCO. *Atti III congressonaz. chim. pura applicata* 1930, 526–8.—The substance looks like gum arabic, is rather insol. in alc., is optically active and contains 56.39% of ash, mainly Fe_2O_3 and phosphates of Al and Ca. It has not been identified. E. M. SYMMES

The regeneration of potassium salts from mother liquors of tartaric acid plants. FILIPPO PERCIABOSCO. *Atti III congresso naz. chim. pura applicata* 1930, 513–9.—It is better to regenerate the K salts from K acid tartrate plants by direct crystn. as KCl and K_2SO_4 than to ppt. them as alum. Figures are given. E. G.-F.

Study of the use of "rapidase" in brewing. M. VERSCHAEVE. *Bull. assoc. élèves inst. sup. fermentations Gand* 31, 319–32, 348–51(1930).—The use of "rapidase" (an amylolytic diastase obtained from cultures of various bacteria, particularly *B. mesentericus*) enables a max. yield to be obtained, irrespective of the grade of malt and proportion of raw grain used, even with insufficiently disintegrated malts. It therefore permits of conducting the malting process in such a manner as to obtain desired characteristics in the finished beer, regardless of the influence such processing may have on the diastatic properties of the malt. Rapidase being chiefly a liquefying agent, its use greatly simplifies the working of raw grains and other malt substitutes. The starchy material is mixed with an equal wt of water and added, together with the rapidase, to a suitable amt. of water previously heated to 80–5°; when operating in this way, liquefaction of the starch is almost instantaneous; the optimum p_H for liquefaction undergoes no change. Rapidase also easily permits of complete recovery of

all the starch from the spent grain by dilg. with water, boiling a few min., cooling to saccharifying temp. and adding the enzyme. A. PAPINEAU-COUTURE

Nitrogen balance in brewery mashes and spent washes. I. Electrolyte precipitation of protein substances in brewery mashes. B. BLEYER AND W. DIEMAIR. *Landw. Jahrb.* 71, 1–16(1930).—Examn. is made of the changes occurring in the nitrogenous matter during the customary processes of prepn. and fermentation of potato mash. The Scherning method for the fractional pptn. of proteins is successfully adapted to the clarification of protein pptn. during steaming, the activity of the proteolytic enzymes during mashing, and the further pptn. and decompn. of the proteins during fermentation. GEORGE R GREENBANK

The first malts of the 1930 season. S. PICKHOLZ. *Brau- und Malzindustrie* 11, 188(1930).—A table is given showing the chem. and phys. analysis of the first malts of 1930 from Austria, Czechoslovakia and Yugoslavia. S. LAWFER

Additional malts of the 1930 season. S. PICKHOLZ. *Brau- und Malzindustrie* 12, 208–9(1930).—Analyses of 1930 malts from Central Europe are given S. L.

Notes on the barleys of 1930. J. RAUX. *Brasserie malterie* 20, 258–69(1930).—A comparison of the compn. and quality of 1929 and 1930 barleys from the standpoint of their suitability for brewing purposes. A. PAPINEAU-COUTURE

Barleys of the 1930 crop. D. KULKA. *Brau- und Malzindustrie* 8, 131–3(1930).—A valuation is given of Austrian and Czechoslovakian barleys of 1930, with a table showing their phys. and chem. analyses. S. LAWFER

Barleys of the 1930 crop. S. PICKHOLZ. *Brau- und Malzindustrie* 9, 149–52 (1930).—Analyses of 1930 barleys from Austria, Czechoslovakia, Hungary and Germany are given. S. LAWFER

Additional barleys of the 1930 crop. S. PICKHOLZ. *Brau- und Malzindustrie* 11, 187–8(1930).—Analyses of 1930 barleys from Central Europe are given. S. L.

Oats of the 1930-31 crop. M. GOETHALS. *Bull assoc. élèves inst. sup. fermentations Gand* 31, 352–9(1930).—A discussion of their brewing qualities, dealing in turn with the products from the various districts of France and comparing them with the previous year's crop. A. PAPINEAU-COUTURE

Iron and copper in white wines. J. RIBÉREAU-GAYON. *Ann. fals.* 23, 535–44 (1930); cf. *C. A.* 24, 1462, 2561.—A study and discussion of the effects of Cu and Fe and the mechanism of their pptn. in wines contg. free SO_2. Even when the wine has been exposed to the atm. for a considerable length of time, most of the Fe is in the ferrous state; on the other hand, there is nearly always a small quantity of Fe^{+++} even when the wine is deprived of O, unless it has stood for a very long time In certain cases, on addn. of Fe all or part of the added Fe^{+++} (not Fe^{++}) is converted into a complex ion which no longer reacts with $K_4Fe(CN)_6$; on standing out of contact with the atm., the complex ion slowly reverts to Fe^{+++}. In the absence of catalysts, there is no appreciable oxidation of SO_2 in the course of 7 days at 15°; there is considerable oxidation in the presence of Fe or Cu, and more in the presence of both, the oxidation increasing with the Cu content. The oxidation of tannin is very slight in the absence of Fe; it is catalyzed by Fe, but not by Cu. In the absence of metallic salts, tannin catalyzes strongly the oxidation of SO_2; in the presence of metallic salts it acts as an antioxygen. On removing increasing amts. of Fe (by adding $K_4Fe(CN)_6$ and filtering) the oxidizability decreases, very sharply at first because the Cu is removed first, and then progressively till it becomes nil for a few days; on standing longer the dissolved O content decreases slightly. On again adding Fe the oxidizability increases according to the amt. of Fe added, but does not recover its initial oxidizability even with high Fe contents. The initial oxidizability is restored by adding the original amts. of Fe and Cu. Cu has a higher catalytic power than Fe. A. PAPINEAU-COUTURE

Determination of potash and alkalies in wines and musts. LUCIEN SEMICHON, MICHEL FLANZY AND (MISS) LAMAZOU-BETBEDER. *Ann. fals.* 23, 517–26(1930).—The principle of the method consists in destroying org. matter with HNO_3 with Hg as catalyst, and detg. K_2O as $KClO_4$. The following technic has been worked out and is recommended: evap. 50 cc. to sirupy consistency in a 200-cc., round-bottomed Pyrex flask (evapn. may even be carried to caramelization, or to partial carbonization, but should preferably be stopped when sirupy consistency is reached), add 25 cc. concd. HNO_3 and 2 drops Hg, evap. to 1 cc. If the soln. blackens showing incomplete destruction of org. matter, repeat the addn. of HNO_3 and evapn. till the org. matter is completely destroyed. Add 10 cc. boiling water to the hot soln., add excess of satd. $Ba(OH)_2$ soln. (about 5–10 cc.), boil, ppt. $Ba(OH)_2$ by passing a current of CO_2 for 2 min., boil 2 min., pass a moderate current of H_2S for 30 sec., boil off the excess of H_2S, wash into a 100-cc. volumetric flask, cool, make up to vol., filter. To 50 cc. of filtrate in a 75-cc. evapg.

dish add a few drops of 1 + 2$HClO_4$, evap. to 10 cc. on the water bath, add 10 cc. of 1 + 2$HClO_4$, evap. on the water bath, heat carefully on a sand bath until the excess of $HClO_4$ is evapd., let cool, wash with 15, 2, 2, 2 and 2 cc. 96% alc. contg. 0.2% $HClO_4$, triturating each time and decanting through a filter, dissolve the $KClO_4$ in boiling water, add a little $HClO_4$, evap. first on the water bath and then on the sand bath as before, wash with alc as before, transfer to a tared Gooch crucible, heat at 125–30° to const. wt. and weigh. The remaining alkalies can be detd. in the alc. filtrate by adding H_2SO_4 and igniting to sulfates, the amt. of alk.-earths being negligible. Na can be detd. *via* Blanchetière (*C. A.* **17**, 3006). The work carried out in developing the method is described, giving data justifying the various steps of the technic. It is shown more particularly that the methods based on the detn. of K bitartrate give very unreliable results; they should be completely discarded, total tartaric being detd. by the Kling and Lassieur method (*C. A.* **4**, 1590; **6**, 3382) and total K_2O by the above method. A. PAPINEAU-COUTURE

The influence of leavens on the attenuation of beer. J. RAUX. *Brasserie & malterie* **20**, 228–36, 246–53(1930).—An address. A. PAPINEAU-COUTURE

Acidity and the bacteriological stability of beer. MARC H. VAN LAER. *Bull. assoc. élèves inst. sup. fermentations Gand* **32**, 20–7(1931).—An address. A. P.-C.

Pilsen beers. J. RAUX. *Brasserie & malterie* **20**, 309–15(1931).—A discussion of the manuf. of Pilsen beers and of the factors giving them their characteristic properties. A. PAPINEAU-COUTURE

A study of pasteurization (of beer). M. EPSTEIN. *Bull. assoc. élèves inst. sup. fermentations Gand* **31**, 360–5(1930).—A beer having the following compn., apparent solids 3.081, true solids 4.851, solids of original wort 13.722, alc. 3.54, total N 0.406, apparent attenuation 77.55, true attentuation 64.65, p_H 4 5, was divided into several lots, which were pasteurized successively at monthly intervals. Beers pasteurized after keeping at least 12–13 weeks kept well after pasteurization. The nature of the glass and the corks used may also have considerable effect on the success of pasteurization. The results obtained by pasteurizing beer contg. colupulin were about the same, but it did not keep as long as that contg. no colupulin. Beer made with distd. water and from grain from which the bran had been sepd remained clear over 6 weeks after pasteurizing; when the bran was not sepd. from the grain, the beer became turbid a few days after pasteurizing. This is attributed to pptn. of SiO_2. When tap water or dil. NaCl soln. was used instead of distd. water, there was little or no difference in the keeping qualities after pasteurizing, with or without presence of bran. Addn. of 1.5 g. "tausul" (found to contain 25% tannin and 60% $KHSO_3$) per hl. pptd. about 35% of the total N, irrespective of the p_H of the beer. A. PAPINEAU-COUTURE

Measuring the surface tension of beer and worts. J. DE CLERCK. *Bull. assoc. étudiants école sup. brasserie univ. Louvain* **30**, 136–50(1930).—The Traube stalagmometer method is studied in detail. The instrument has been modified by placing the capillary above and in a straight line with the graduated pipet, to which it is connected by a ground-glass joint; in addn., there is provided an auxiliary T-tube connected to the top of the capillary by rubber tubing, the purpose of which is to regulate the rate of flow of the liquid from the pipet. The latter is filled by connecting one tube of the T to a suction pump and sucking up the liquid in the pipet; the cock is then closed, the other tube of the T is immersed in water, the 2nd cock is opened; the rate of flow from the pipet decreases as the water rises in the leg of the T-tube, and when the desired rate of flow is reached the T-tube is raised from the water and the flow continues at the same rate. According to King (*C. A.* **19**, 2680) the limiting rate required to obtain the static surface tension is 1 drop in 5 min.; as this is not practical, de C. recommends a rate of about 10 drops per min., the important point being to have always exactly the same rate of flow. Instead of counting the no. of drops from the calibrated portion of the pipet, it is simpler to weigh a given no. of drops, at least 25 and preferably 50 The chief precautions to be observed are: scrupulous cleanliness of the instrument, and especially of the flow nozzle; avoidance of formation of bubbles at the flow nozzle and vibrations; operation always at the same temp. A. PAPINEAU-COUTURE

Surface tension and the part it plays in brewing. J. DE CLERCK. *Bull. assoc. étudiants école sup. brasserie univ. Louvain* **30**, 127–36(1930).—The theory of surface tension is briefly explained, and the part played in brewing by surface tension at the free surface of the liquid, surface tension at the walls of the containers and surface tension around the dispersed phases present in worts and beer is discussed. A. P.-C.

The growth of yeast and increase of its components in large-scale production. H. CLAASSEN. *Biochem. Z.* **228**, 154–62(1930).—The increase in the dry substance, protein, N-free material and ash was followed in fermentation expts. The protein

formation was greatest at the time when there was available (in the wort) sugar and easily assimilable N, especially NH_3 N. The increase in non-nitrogenous components of the yeast was greatest toward the end of the fermentation when there was no sugar, but amino acids, alc. and N-free org. acids. Addn. of NH_2N does not increase the total mass of yeast, but the yeast becomes richer in protein and contains less N-free substance. S. MORGULIS

Effect of pure culture inoculation on the quality and chemical composition of sauerkraut (PEDERSON) 12. Asphaltic bitumen and its use in breweries (Aerts) 20. Multistage evaporating apparatus [in cellulosic fermentation] (Brit. pat. 334,623) 1. Sucrose from impure solutions containing invert sugar (U. S. pat. 1,788,628) 28.

Rectifying alcohol. SOC. ANON. DES DISTILLERIES DES DEUX-SÈVRES. Fr. 689,914, Apr. 23, 1929. Very pure alc. is obtained directly from fermented worts, wines or weak alc. solns. by submitting the liquids to a purification before the distn. of the alc., to remove all the heavy impurities or fusel oils and a part of the volatile impurities, and afterward distg. the alc. and concg. it at the same time by eliminating the remainder of the volatile impurities. The first purification is carried out on a liquid titrating at most a few degrees Gay-Lussac; only a part of the liquid is vaporized and treated while avoiding all concn. of the alc. A suitable app. is described.

Butyl alcohol and acetone. HUGO WERTHEIM and WALTER POLLAK. Fr. 690,395, Feb. 21, 1930. BuOH and acetone are prepd. by fermentation of worts contg. carbohydrates by means of bacteria of the species *B. amylobacter* A. M. and Bredemann which have been habituated by cultivation to increasing amts. of acid. Fr. 690,396 describes the prepn. of BuOH and acetone by fermentation in which the carbohydrate mashes of the main fermentation are acidulated from the beginning by the addn. or fermentative generation of non-volatile org. acids, preferably lactic acid.

Butylacetonic fermentation. DAVID A. LEGG (to Commercial Solvents Corp.). U. S. reissue 17,930, Jan. 13. Reissue of original pat. No. 1,668,814 (*C. A.* **22**, 2235).

Citric acid. ARTHUR M. PEAKE (to Commercial Solvents Corp.). U. S. 1,788,739, Jan. 13. Enzymes of citrous fruits such as those of lemon pith are added (apart from their essential oils) to solns. or suspensions of pectinous materials such as apple pulp or "wood dextrins" and a catalyst such as Mn sulfate or Ti salts.

Apparatus for drying and roasting malt. SOC. ANON. DES ANCIENS ÉTABLISSEMENTS SKODA À PLZEN and RUDOLF SCHLENK. Fr. 689,030, Jan. 28, 1930.

Wine. RÉNÉ TROTTIER and HIPPOLYTE LUQUET. Fr. 690,616, May 6, 1929. An app. consisting of a series of connected vats is described for the continuous fermentation of wort for the production of wine.

Rectification of wine. SOC. DES ÉTABLISSEMENTS BARBET. Fr. 36,954, Feb. 26, 1929. Addn. to 664,585 (*C. A.* **24**, 915). The double rectification of the prior case is applied to the existing plant whether of the direct or indirect type.

Yeast. DISTILLERS CO., LTD., and E. A. MEYER. Brit. 334,502, May 1, 1929; Fr. 689,238, Feb. 1, 1930. In a continuous process of yeast manuf. (as from a nutrient soln. formed with molasses) with continuous addn. of nutrients and continuous withdrawal of yeast-contg. liquid, growth of undesirable organisms is inhibited without detrimental action on the yeast by continuous addn. of substances such as Cl, Br, I, pyridine or nicotine or other alkaloids which are, as used, non-toxic to yeast but which have a bactericidal action. Bleaching powder may be used.

17—PHARMACEUTICAL CHEMISTRY

W. O. EMERY

Evaluation of chenopodium oil. KURT BODENDORF. *Apoth. Ztg.* **45**, 1636–8 (1930).—From the author's own expts. and methods proposed by other investigators it would appear that the development of an exact quant. method based upon iodometric procedure is highly improbable. W. O. E.

1-Hydroxy- and 1-aminoalkyl derivatives of theobromine. C. A. ROJAHN AND HEINZ FEGELER. *Arch. Pharm.* **268**, 567–72(1930).—The present study was undertaken to discover if possible certain derivs. of theobromine suitable for subcutaneous or intravenous injection. Among the compds. prepd. and characterized were the following: *1-hydroxyethyltheobromine* (I) (by heating in sealed tube at 125° theobromine, NaOH soln. and $HOCH_2CH_2Cl$), $C_9H_{12}O_3N_4$, m. 193°, gave with PCl_5 *1-chloroethyl-*

theobromine, $C_9H_{11}O_2N_4Cl$, m. 152°, the latter in turn yielding with Et_2NH *1-diethylaminoethyltheobromine* (*picrate*, $C_{19}H_{24}O_9N_8$, yellow warty crystals, m. 155–6°), and with $PhNH_2$ *1-p-phenylaminoethyltheobromine*, $C_{15}H_{17}O_2N_5$, m. 171°. Similarly, *1-p-ethoxyphenylaminoethyltheobromine*, $C_{17}H_{21}O_3N_5$, m. 156°. The *acetate* of I m. 139°, the *benzoate* m. 151°, the *phenylurethan* m. 125°. *1-β-hydroxypropyltheobromine*, $C_{10}H_{14}O_3N_4$ (from the Na or Ag deriv. of theobromine in xylene suspension with β-chloropropanol in a tube at 110° to 120°) m. 129° (*acetate*, $C_{12}H_{16}O_4N_4$, leaflets, m. 112°; *benzoate*, $C_{17}H_{18}O_4N_4$, m. 162°; *phenylurethan*, $C_{17}H_{19}O_4N_5$, m. 175–6°); *1-β-chloropropyltheobromine* (*picrate*, yellow warty masses, m. 179–81°); *dimethylaminopropyltheobromine* (*picrate*, $C_{18}H_{22}O_9N_8$, m. 250°). W. O. E.

Examination of spiritus saponatus and spiritus saponis kalini D. A.-B.VI. WALTER MEYER. *Arch. Pharm.* **268**, 572–85(1930).—A study has been made of these prepns. with a view to their improvement and their methods of evaluation. W. O. E.

Examination and evaluation of chlorophyll and its preparations. URSULA DREHMANN. *Arch. Pharm.* **268**, 585–9(1930).—A discussion and study (by means of the analytical quartz lamp) of chlorophyll and its more important com. prepns. (notably chlorosan), the results obtained being presented in tabulated form. W. O. E.

Estimation of the alkaloidal content of Extractum belladonnae siccum cum Rad. liquirit. paratum 1 + 1. G. BÜMMING. *Arch. Pharm.* **268**, 590–2(1930).—The results obtained in the examn. of various control samples of this official Ger. prepn. are recorded. W. O. E.

Constituents of a previously unknown drug (Patrisia acuminata). K. W. MERZ. *Arch. Pharm.* **268**, 592–3(1930).—The examn of a small sample of the root showed it to be relatively highly toxic, the m. l. d. for a 20 g. mouse being 0.005 g. of the crude drug. Among other substances thus far isolated from the alc. ext. was a brittle glassy hygroscopic material 40 times more toxic than the crude, but of as yet undetd. compn. Further study is contemplated. W. O. E.

Seasonal variations in the alkaloidal content of Indian Ephedra species. T. P. GHOSH AND S. KRISHNA. *Arch. Pharm.* **268**, 636–41(1930).—The present study shows *E. nebrodensis* possesses the highest, and *E. intermedia* the lowest, alkaloidal content. *E. intermedia* from Chini Range, Bashahr Division, Punjab, contains a high % of pseudoephedrine (1.8%) and can therefore serve as raw material for the production of this alkaloid. The highest content of ephedrine, namely, 1.93%, was obtained from *E. nebrodensis* collected in October in Lahoul. The Indian *Ephedra* species show no rise in alkaloidal content corresponding with the altitude of their occurrence. The alkaloidal content of *Ephedra* growing in moist places is low, and indeed lowest during the rainy season and highest in the fall. *Ephedra* should be collected in October immediately before the advent of frost, dried in the sun and stored in dry places entirely free from moisture. Et_2O dild. with $CHCl_3$ can safely be used in the investigation of the drug without fear of converting the ephedrine into its HCl salt. W. O. E.

Influence of habitat and time of collection of the rhizome of male fern. LUDWIG KOFLER AND ERHARD MÜLLER. *Arch. Pharm.* **268**, 644–52(1930).—The generally prevailing impression in the literature that root collected in the upland is superior to that from the lowland and that the fall product is superior to that gathered in the spring has been tested anew. Of 22 different upland and lowland samples, in which the ext. and filicin contents were detd. and a biol. test was carried out on fishes, no effect of the habitat on the value of the root was apparent. Six samples collected in the spring had chem. and biol. values like those of similar samples gathered in the fall. Of the aforesaid 22 samples only 3 met the requirements of the Ger. Pharm. with respect to ext. and filicin content. This result would indicate a too stringent pharmacopœial standard. Six old samples selected for comparison showed by their action on fish a markedly lower potency than that of fresh stock, although the filicin content was fairly const. It would appear then that the rhizome of male fern deteriorates with age, as indicated by the behavior toward fish rather than by its filicin content. W. O. E.

Application of ethyl *p*-hydroxybenzoate in maintenance of sterility, in sterilization and in disinfection. TH. SABALITSCHKA. *Arch. Pharm.* **268**, 653–73(1930).—An address. W. O. E.

Estimation of morphine in aqueous solutions. H. BAGGESGAARD-RASMUSSEN AND SVEND AAGE SCHOU. *Arch. Pharm.* **268**, 673–80(1930).—The method suggested involves extn. of the relatively concd. (to 20 cc.) morphine soln, treatment with $NaHCO_3$ and Na_2CO_3, with an $CHCl_3$ + iso-PrOH mixt. (3 to 1), and subsequent titration of the recovered alkaloid, after addn. of 0.1 *N* HCl in excess, with 0.1 *N* borax soln. in the presence of methyl red soln. (2 drops) and methylene blue soln. (1 drop). It is

necessary to carry out the extn. with reasonable expedition. The method is inapplicable to sirups of low morphine content. W. O. E.

New method for estimating nicotine in oriental tobacco. JAMES BURMANN. *Helv. Chim. Acta* **13**, 785–7(1930).—The essential features of the method are: Moisture detn. is effected by drying 10 g. of the sample in an air bath at 100° to const. wt. For the nicotine detn. weigh out in a porcelain capsule (10 cm. diam.) 3 g. of the dry sample, add little by little 3 cc. 30% NaOH (or KOH) soln., stirring the mixt. several min. with a glass rod (note evolution of NH_3). Add 3 g. plaster of Paris, stirring several min., during which time the mass should become powdery and dry. Introduce this powder into a 150-cc. flask closed with a rubber stopper carrying a 3-way glass stopcock, evacuated by the aid of a water pump, discharge the vacuum, add 75 cc. pure Et_2O, agitating the mixt. from time to time over a period of an hr. After the liquid is allowed to stand a further hr. or two, pass it through a folded filter. Transfer 50 cc. of the Et_2O soln. (= $^2/_3$ of the sample) to a 150 cc. Erlenmeyer flask, evapg. the solvent by heating on a steam bath at 50° Repeat this operation 3 times with 5-cc. portions of abs. Et_2O for complete elimination of all traces of NH_3. To the residue add 20 cc. pure Et_2O, 50 cc. distd. neutral H_2O (p_H 7), evap the Et_2O on a steam bath, cool and add 1 drop of a 1% bromocresol purple in alc., then titrate with 0.1 *N* HCl, comparing the end point with a standard (50 cc. H_2O + 1 drop of indicator and 1 drop of 0.1 *N* HCl). The percentage of nicotine = no. of cc. 0.1 *N* HCl × 0.081. W. O. E.

Effect of sunlight on ephedrine solutions. EDMOND E. MOORE AND MARJORIE B. MOORE. *Ind. Eng. Chem.* **23**, 21–3(1931).—Solns of ephedrine alkaloid were found to be unstable in sunlight. O is essential for this decompn. Benzalephedrine is one of the chief decompn. products of the aq. soln. Ephedrine carbonate has been isolated and its properties have been detd. W. O. E.

Leonurus cardiaca L. B. PATER. *Pharm. Monatshefte* **11**, 154–6(1930).—The ash of this plant was found to contain: SiO_2 10.5, Cl 1.5, Fe_2O_3 + Al_2O_3 2.1, CaO 22.0, MgO 8.9, P_2O_5 20.3, SO_3 2.9, K_2O 13.2, Na_2O 18.2%, I in traces. The plant contained in addn. saponin and a minute quantity of essential oil. W. O. E.

Increasing importance of adsorptive disinfection. ERICH HERRMANN. *Pharm. Presse* (July) **35**, 100–2(1930).—The exptl. work of Bechhold and co-workers, as also the results of clinical experience, has shown the superiority of mineralized adsorbents over those until recently in common use. Adsorgan and silargel may be successfully applied in all cases of stomach and intestinal affections involving chem. and infectious diseases, more particularly in intoxications and autointoxications. The mineralized adsorbents operate prophylactically in inhibiting intestinal infectious disorders as dysentery, cholera, paratyphoid, etc. W. O. E.

Essential oil content of camomile flowers. MAX BERGMANN. *Pharm. Zentralhalle* **71**, 785–9(1930).—A series of expts. is described tending to the improvement of the present official method for detg. the oil, now only in part recovered under the present procedure. The main improvement suggested involves a notable increase in the vol. of distillate. W. O. E.

Raw material and finished product in pharmaceutical practice. K. H. BAUER *Pharm. Zentralhalle* **71**, 801–9(1930).—An address. W. O. E.

Infusion of ipecacuanha root. H. STEUDEL. *Pharm. Ztg.* **75**, 1450–1(1930).—A discussion is made of the official method of prepn. and the alkaloidal content of such prepns. as usually found in the apothecary, in connection with suggestions for improvement in quality. A low alkaloidal content may be due, among other things, to the varying quality of the crude drug, its fineness, method of filtration, etc. W. O. E.

What is novacyl? E. DINSLAGE AND B. STEMPEL. *Pharm. Ztg.* **75**, 1478–9(1930).—Recent examn. of this product showed it to consist of acetylsalicylic acid 64.4, Mg acetosalicylate 29.7 and MgO 5.86%. According to Gehe's Codex novacyl consists essentially of H_2O-sol. Mg acetosalicylate. W. O. E.

Detection of artificial honey in oxymel scillae. H. ABB. *Pharm. Ztg.* **75**, 1479 (1930).—The results obtained in various authentic and control samples would seem to indicate that there is at present no certain method for detecting artificial honey in oxymel scillae. W. O. E.

Sterile solutions in hospital practice. HANS TRUNKEL. *Pharm. Ztg.* **75**, 1499 (1930).—Comments are made on the character and type of glass containers used, notably those of Jena or similar compn., in connection with their resp. stoppers. W. O. E.

New drugs and specialties during the 3rd quarter of 1930. F. ZERNIK. *Süddeutsche Apoth.-Ztg.* **70**, 692–4(1930).—A commentary on certain novelties. W. O. E.

Refracto-densimetric investigation of certain official tinctures. F. WRATSCHKO

AND JOSEFINE KOWARZ. *Pharm. Presse* **35**, 97–9, 115–22, 131–5, 146–51(1930).—The purpose of the present investigation was to det. whether the refracto-densimetric method is capable of yielding values nearly equiv. to those obtained by the direct estn. of the alc. and ext. content. The importance of such a procedure would be particularly striking in the evaluation of mixts. like camphor spirit. A series of tinctures has been examd. and the results obtained were tabulated and otherwise graphically represented. The ext. material chiefly affects the refractive index; the alc. content, on the other hand, chiefly effects the d. For practical purposes it would appear that the new phys. procedure possesses about the same accuracy as the more commonly used dry-residue method. W. O. E.

Etrats. RAPP. *Süddeutsche Apoth.-Ztg.* **71**, 35–6(1931).—This new type of drug, its manner of prepn. and its advantages over the older type of exts. are discussed. Etrats are obtained by exhaustion of the suitably powd. crude drug with a series of solvents (alc., H_2O, glycerol, MeAc, etc.), and subsequent distribution of exts. thus obtained over and in the exhausted marc. Etrats are offered in dry powder form as well as granulated condition. W. O. E.

Black draught. WM. PARTRIDGE. *Analyst* **56**, 29(1931).—*Mistura Sennae Composita* is an article subject to change in every edition of the Brit. Pharm. A table showing the sp. gr., total solids and ash of 11 samples bought in 1930 show that there is something wrong in the "Schedule of Standards" of the Local Government Board of Ireland. W. T. H.

The determination of citronellol and rhodinol in presence of geraniol and nerol. L. S. GLICHITCH AND Y. R. NAVES. *Parfums de France* **8**, 326–33(1930).—From a brief crit. review of the various methods proposed to date, it is concluded that the hot formylation method is the best one available at the present time; but as the results published by different investigators indicate that the various technics give considerable differences in the results, a study was made of the various factors involved in order to obtain as accurate results as possible. The results of the investigation (which are given in detail) led to recommending the following technic: mix the sample with 2 vols. of 90% formic acid (d_{15}^{15} 1.2088) in an acetylation flask connected to a reflux condenser, heat 1 hr. on a boiling water bath shaking every 5 min., let cool, ext. successively in a separatory funnel with 2 × 50 cc. H_2O contg. 10% NaCl, 2 × 50 cc. H_2O contg. 10% NaCl and 2% Na_2CO_3 and 25 cc. distd. H_2O, dry over anhyd. Na_2SO_4, and det. the sapon. no., using 30 cc. 0.5 *N* KOH for 2 g. of the acetylation product with products high in citronellol and rhodinol and 20 cc. with oil of geranium, roses, etc., boiling 45 min. in all cases. Application of this technic to the analysis of several 100 samples of oil of geranium of known purity gave the following limits for the citronellol content: French oils 36–43.8%, Algerian oils 26–40% (exceptionally up to 43%), Réunion oils 44–52% (exceptionally 41–55%). The following are given as very exceptional results obtained on one French and 2 Algerian oils distd. by G. and N.'s firm: d_{15} 0.8923, 0.8929, 0.9009; α —11°14′, —11°24′, —8°25′; n_{20} 1.4637, 1.4645, 1.4688; acid no. 1.12, 3.64, 6.86; esters (as tiglates) 28.46, 24.78, 27.58; total alcs. by acetylation 73.48, 67.33, 70.14; free alcs. 54.90, 51.17, 52.14; apparent rhodinol 58.14, 59.33, 18.85; soly. in 65% alc. sol. in 2.8 vol. with pptn. of paraffin above 12 vol., sol. in 5.5 vol. with turbidity above 7.5 vol., sol. in 5.5 vol. with turbidity above 6 vol.; soly. in 68% alc. sol. in 2.5 vol. with pptn. of paraffins above 10.5 vol., sol. in 3 or more vol., sol. in 3 or more vol. It is shown that Tiemann and Schmidt's method (*Ber.* 29, 922–5 (1896)), consisting in detg. citronellol and rhodinol by means of PCl_3 and geraniol by difference, is inaccurate. The max. error in the detn. of citronellol and rhodinol by hot formylation, when carried out by the technic described above, is 2%, irrespective of the amt. present in the sample analyzed. A. PAPINEAU-COUTURE

Oil of verbena. ÉTABLISSEMENTS ANTOINE CHIRIS. *Parfums de France* **8**, 334 (1930).—The consts. of oil of *Verbena triphylla* l'Hérit. are: d_{15} 0.890–0.912 (exceptionally up to 0.920), α_D —10° to —18°, n_{20} 1.482–1.488, citral (via bisulfite) 26–38% (generally 32–38%), sol. in 1–6 vol. of 80% alc. with occasional turbidity on diln. which persists even in the 90%-alc.-soly. test. Examples are given of exceptional compn. of oils of known purity: (1) n 1.4810, with normal citral content; (2) n 1.4793; (3) citral 39%, α —10°49′, n 1.4810, sol. in 0.5 or more vol. of 80% alc. The compn. of C.'s Algerian oils is generally fairly close to that of the oils of Southern France: they are generally lighter (mostly 0.893–0.900) having higher α (without exceeding the max. of —18°), are lower in citral (generally 25–32%, but falling as low as 20%), have a much lower soly. (about 20 vol. of 80% alc. and 0.5–8 vol. of 85% alc.), and have a slightly lower alc. content. A. PAPINEAU-COUTURE

Oil of myrtle. Établissements Antoine Chiris. *Parfums de France* **8**, 334–5 (1930).—Oils of known origin and purity were recently encountered having consts. outside the generally accepted limits. Corsican oils having otherwise normal consts. had high alc. contents, the Ac nos. of 2 samples being 50.4 and 53.2, instead of 30–38% given by Gildemeister and Hoffmann. An oil distd. in Algeria had: d_{15} 0.9185 (0.881–0.887), α_D^{18} 25°38′, n_D^{20} 1.4702 (1.464), Ac no. 75.5 (39.2), ester no. 28 (17–20.6), esters 9.8%, total alcs. 21.58%, free alcs. 13.88%, sol. in 9.5 and more vol. of 80% alc. and in 0.8 and more vol. of 85% alc. (the figures in brackets are the generally accepted consts. for Algerian oils); the compn. of this oil is similar to that of Syrian oils. The characteristics of Sicilian oils are similar to those of Corsican oils, but with lower d_{15} (*e. g.*, 0.879, 0.8836, 0.8833), higher ester no. (42.7, 55.6, 59.5 instead of 13–25) and higher Ac no. (83.3, 95.2, 101.15, instead of 30–38); alcs. detd. by cold acetylation are practically the same as by cold formylation, showing the presence of little or no tertiary alc. A. Papineau-Couture

Oil of ylang-ylang. Établissements Antoine Chiris. *Parfums de France* **8**, 350–60(1930) (in French and English.)—A review of production and of the properties of the oils of different origins. A. Papineau-Couture

Assay of pharmacopeial sodium hypophosphite. Maurice François and (Mlle.) Laure Seguin. *J. pharm. chim* [8], **11**, 193–7(1930).—See *C. A.* **24**, 3605. S. W.

Assay of alcoholic solutions of nitroglycerin. H. Caron and D. Raquet. *J. pharm. chim.* [8], **12**, 109–18(1930); cf. *C. A.* **24**, 4584, and Richmond, *C. A.* **14**, 2987.—Sapon. methods give irregular results. In the absence of free HNO_3 in the sample the following rapid but only approx. *colorimetric* method may be used: To 0.1 cc. of the 1% trinitrin soln. (*A*) add 1 cc. of the reagent (concd. H_2SO_4 + 10% PhOH or salicylic acid (cf. *C. A.* **5**, 1380)). Mix, then add 10 cc. H_2O, 10 cc. NH_4OH and compare the yellow color with that obtained from a definite quantity of KNO_3. The following *reduction* method is simple and accurate: Put into a Schloesing distg. flask 10 cc. of *A*, 2–3 g. of powd. Devarda's alloy (*C. A.* **2**, 3347), 100 cc. H_2O and 25 cc. of soap lye; when evolution of H is nearly ended, distil the NH_3 formed into 20 cc. 0.1 *N* H_2SO_4 and titrate back with 0.1 *N* NaOH, with Na alizarin-sulfonate as indicator (cf. Mestrezat, *C. A.* **14**, 2291; Fleury, *C. A.* **18**, 1625). Each cc. 0.1 *N* H_2SO_4 consumed indicates 0.00757 g. nitroglycerin. Results by this method are slightly lower than those by the gravimetric method (U. S P.); probably the com. product contains traces of mono- or dinitrin, or perhaps also oxidation products of glycerol. S. Waldbott

Chrysophanic acid, chrysarobin and sulfur. R. Huerre. *J. pharm. chim* [8], **12**, 145–9(1930).—Chrysophanic acid (*A*) was omitted from the French Codex Supplement 1920, in favor of the lower-priced chrysarobin (*B*) ("purified araroba"); *A* and *B* were believed to be equal in therapeutic value (cf. Léger, *C. A.* **7**, 866; **9**, 1972). However, Hesse (cf. *C. A.* **11**, 2328) concluded that only *B*, an anthranol, is effective in dermatology, while *A*, an anthraquinone, has no action. Since recent therapeutically active com. samples are claimed to be *A* and are proposed to be used in pills for which *B* would be dangerous, H. devised the following method to distinguish sharply between *A* and *B*. Put into a test tube or capsule 0.25–0.30 g. of *A* or *B*, 0.10 g. of S and heat the mixt. on a sand bath until (at 180°) H_2S gas is given off. With *B* the resulting mass is green, and after cooling it dissolves almost completely in $CHCl_3$ with an intensely green color If *A* is used, the mass is dark brown, and the soln. in $CHCl_3$ is an intense yellow brown. In mixts. of *B* with *A* (1:1 or 1:3) the color is intensely green, and this color is still visible with a mixt. of 15:85. Extn. of com. *B* with 1% KOH yields upon addn. of H_2SO_4 to the filtered soln. a yellowish brown mass which upon fusion with S gives the test for *A*, confirming Hesse (2 to 8% *A*). S. Waldbott

Chemical and physiological assays of aconite preparations. A. Malmanche *Thesis* (Paris) 1929; *J. pharm. chim.* [8], **12**, 476–8(1930); cf. *C. A.* **23**, 3774.—From sep. studies of the root, the tincture, alcoholature and ext., M. concludes that no concordance exists between results of the chem. and physiol. assays, because of the fact that the proportions of aconitine and allied bases in aconite are variable. It is important to ascertain the value of the crude drug regardless of its geographical origin. Both the flowering and the lateral tubercles have qualitatively the same activity. Proper desiccation of the root does not reduce its activity. The chem. assay should be supplemented by a very simple physiol. test on the guinea pig; this test is sensitive and gives uniform results. The tincture of aconite with p_H 5 is quite permanent for 1 yr. In drugs of the same origin, the alkaloids of the leaves or roots and in the tinctures are identical. The Codex strength of the alcoholature of the leaves should be raised to 0.20–0.25 per 1000. The present Codex formula (1908) for ext. of aconite root should be replaced by demanding evapn. *in vacuo* and at low temp., because prolonged heat

partly transforms aconitine into inert substances. Of the galenical prepns. of aconite root the tincture alone will give reliable therapeutic results provided the chem. assay is supplemented by physiol. titration. S. WALDBOTT

Analytical studies on protargol; determination of alkalinity and silver content. (MME.) ADÈLE LISSIEVICI DRAGENESCO AND (MME.) EUGÉNIE WEINBERG-SACHETTI. *J. pharm. chim.* [8], **12**, 536–9(1930).—To det. alky. in com. protargol (*A*), dissolve 0.25 g. in 50 cc. H_2O, which forms a dark yellow, often brown soln. difficult to titrate. However, when 1 g. of neutral $Na_2S_2O_3$ is added (cf. Daniel, *C. A.* **21**, 2626), the brown color turns to yellow. Add 1 cc. of phenolphthalein soln. (*B*), which produces dark red. At the same time prep. a check soln. without addn. of *B* and titrate the soln. contg. *B* with 0.1 *N* H_2SO_4 until the red color has disappeared and the fluid has the same tint as the standard. Two samples of *A* required 0.567–0.60 cc. of the acid, 2 samples of Ag proteinate 0.89–0.90 and 1.98–1.994 cc. Irritation produced at times in the application of *A* is possibly caused by too high an alky. The Ag content of *A* (8% required) is detd. by titrating with 0.1 *N* NH_4CNS after destroying the org. matter either by calcination at low heat, or by means of $KMnO_4$ and H_2SO_4; the latter method seems preferable. S. WALDBOTT

Pb in chemistry and pharmacy (DYSON) **2**. Microchemical detection of benzoic acid, salicylic acid and esters of *p*-hydroxybenzoic acid in foods and in medicants (FISCHER, STAUDER) **12**. The preparation and properties of franguloside [frangulin] from the bark of alder buckthorn of commerce (BRIDEL, CHARAUX) **11D**. The presence in a number of vegetables of allantoin with or without allantoic acid, allantoinase and uricase (FOSSE, *et al.*) **11D**. Recent results in hormone investigation with pharmaceutical products related thereto (KAISER) **11F**. Compounds of the thiazole series (U. S. pat. 1,787,315) **10**. Thiosemicarbazones of hydroxyarsenobenzenes (U. S. pat 1,785,660) **10**. Sulfo derivatives of 1-aminonaphthalene-8-carboxylic acid (U. S. pat. 1,780,077) **25**. Organometallic mercapto sulfo compounds (U. S pat. 1,784,497) **10**. Depilatory paste (Fr. pat. 689,734) **29**. Bleaching compositions (Brit. pat. 334,531) **18**. *tert*-Butylnaphthol (U. S. pat. 1,788,529) **10**.

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Synthetic drugs. I. G. FARBENIND. A.-G. (Max Bockmühl and Gustav Ehrhart, inventors). Ger. 510,304, Mar. 26, 1926. Mol. compds. having pronounced analgesic properties are prepd. by fusing 4-dimethylamino-1-phenyl-2,3-dimethyl-5-pyrazolone with trialkylacetamides, or by bringing these components together in soln. Examples are given.

Synthetic drugs. I. G. FARBENIND. A.-G. (Karl Streitwolf, Alfred Fehrle and Walter Herrmann, inventors). Ger. 510,437, Nov. 8, 1928. Benzimidazolonestibinic acids are prepd. by treating *o*-diaminobenzenestibinic acids with $COCl_2$. Examples

are given. The products are useful in treating diseases caused by protozoa. Cf. *C. A.* **25**, 559.

Synthetic drugs. I. G. FARBENIND. A.-G. (Karl Streitwolf, Alfred Fehrle and Walter Herrmann, inventors). Ger. 511,738, Nov. 8, 1928. Addn. to 510,437 (preceding abstr.). Benzimidazolonestibinic acids are prepd. by the action of antimonous acid on the diazo compds. from aminobenzimidazolones. Examples are given.

Synthetic drugs. I. G. FARBENIND. A.-G. (Hans Schmidt, inventor). Ger. 510,440, Dec. 6, 1928. Carbamylarylstibinic acids are prepd. by the reaction of antimony oxide or hydroxide with diazo compds. from 4-carbamylaniline or its nuclear substitution products. An example is given. The salts of the products are useful for treating beri-beri and like diseases.

Synthetic drugs. I. G. FARBENIND. A.-G. (Werner Schmidt, inventor). Ger. 510,449, June 1, 1927. 6-Hydroxybenzylamino-3-arsonic acid and its acyl derivs. are prepd. by condensing *p*-hydroxyphenylarsonic acid in acid soln. with methylol amides, *e. g.*, methylolbenzamide, or methylolphthalimide, and sapong. the acyl derivs. if desired. Examples are given.

Synthetic drugs. I. G. FARBENIND. A.-G. (Karl Streitwolf, Alfred Fehrle and Hubert Oesterlin, inventors). Ger. 510,451, Sept. 4, 1928. See Brit. 318,491 (*C. A.* **24**, 2241).

Synthetic drugs. I. G. FARBENIND. A.-G. (Fritz Schönhöfer, inventor). Ger. 512,406, June 18, 1927. Addn. to 499,826, (*C. A.* **24**, 4521). The prepn. of synthetic drugs from *N*-substituted aromatic aminohydroxy and diamino compds. or their derivs., and nuclear substituted products, described in 499,826, is extended to include compds. in which the aromatic amino groups are replaced by basic hydroaromatic or heterocyclic residues. Thus, the compd. *N*-β-1-piperidylethyl-*m*-phenylenediamine obtained by the action of piperidylethyl chloride on *m*-nitroaniline, is reduced with Fe and AcOH. The compd. b 158–60°. Other examples are given.

Synthetic drugs. SCHERING-KAHLBAUM A.-G (Curt Räth, inventor). Ger. 506,425, May 12, 1927. 2-Hydroxypyridines substituted in the 3- and (or) 5-positions with halogen are converted into water-sol compds., having a better therapeutic action than the initial materials, by treatment with alkylating agents, *e. g.*, alkyl halides, or carboxyalkylating agents, *e. g.*, halo fatty acids, preferably in the presence of an acid-binding substance. Thus, 2-hydroxy-5-iodopyridine, heated on the water bath in alc. KOH soln. with MeI, yields *N-methyl-2-keto-5-iodo-1,2-dihydropyridine*, m. 73–4°. 2-Hydroxy-5-bromopyridine, treated similarly with ClCH$_2$COOH, yields *2-keto-5-bromo-1,2-dihydropyridine-N acetic acid*, m. 237–8°. The prepn. of *3,5-dibromo*, m. 240–41°, *3,5-diiodo*, decompg. 244°, and *3-bromo-5-iodo-1,2-dihydro-2-ketopyridine-N-acetic acid*, m. 244–45°, is described. Cf. *C. A.* **25**, 381.

Synthetic drugs. SCHERING-KAHLBAUM A.-G. Ger. 510,066, June 19, 1926 Addn. to 481,392 (*C. A.* **23**, 4950). The method of 481,392 for producing colorless products by fusing 4-dimethylamino-1-phenyl 2,3-dimethyl-5-pyrazolone with dialkylbarbituric acid, is modified by replacing the latter component by other cyclic ureides, ureas or urethans. Examples are given.

Therapeutically active preparations. SOC. ANON. POUR L'IND. CHIM. À BÂLE. Swiss 140,867, Apr. 11, 1928. The method of 128,855 (*C. A.* **23**, 2785) and 139,324 (*C. A.* **25**, 776) for grinding up female and male secretory organs when these are congealed by low temps., is extended to animal products generally which contain hormones, such as hypophysis, cardiac or splenic tissue, bone marrow, blood, etc. Cf. *C. A.* **24**, 4120.

Azo dyes suitable for use as therapeutic agents against germ infections. IWAN OSTROMISLENSKY (to Ostro Research Laboratories, Inc.). U. S. 1,785,327, Dec. 16. A product suitable for use as a therapeutic agent or as a germicide and coloring agent in foods may be prepd., *e. g.*, by diazotizing *p*-phenetidine, coupling with *m*-phenylene diamine, and purifying the product, and, in general, products of similar properties may be obtained by diazotizing an alkoxyaniline, coupling with a *m*-diaminobenzene and purifying, *e. g.*, by effecting pptn. from MeOH soln. by cooling on ice. The description covers generally products of the formula (*p*-ROC$_6$H$_4$N:N)C$_6$H$_3$(NH$_2$)$_2$-2,4, where R may be H or C$_n$H$_{2n+1}$, *n* being less than nine, and the benzene nuclei are free from acidic substituents.

Basic phenol alkyl ethers. HANS HAHL (to Winthrop Chemical Co.). U. S. 1,787,519, Jan. 6. Pharmaceutical products which are basic phenol alkyl ethers are obtainable by reacting upon a compd. of the general formula *o*-YC$_6$H$_4$ORX, wherein R represents an alkylene radical contg. at least 2 C atoms, X stands for a halogen, Y stands for an unsatd. aliphatic residue, such as the allyl, crotyl or propenyl group

and wherein the benzene nucleus may be substituted with an alkoxy group, with a primary aliphatic amine such as ethylamine, propylamine, isobutylamine, as well as unsatd. aliphatic amines, such as allylamine and the like. Details are given of the production of the monoethylaminoethyl ether of 6-allyl-2-methoxyphenol, b_{18} 159–61°, and of the corresponding monoallylaminoethyl ether, b_{10} 170–4°. These products form cryst. salts with acids such as HCl.

Alkylaminoalkyl ethers of phenols. I. G. FARBENIND. A.-G. (Hans Hahl, inventor). Ger. 510,450, Jan. 26, 1928. Addn. to 433,182 and 446,606. Phenols having an unsatd. substituent in the *o*-position to the OH group (other than derivs. of *N*-acyl aminophenols) are treated with an alkylene dihalide in the presence of alkali, and the products are condensed with monoalkylamines. Thus, 2-methoxy-6-allylphenol may react with $(CH_2)_3Br_2$, yielding 2-methoxy-6-allylphenol γ-bromopropyl ether, which is then condensed with NH_2Et to yield the corresponding γ-ethylaminopropyl ether, b_2 142–143°. Other examples are given also. The *products are therapeutically useful.*

Esters of 2-penten-4-ol. I. G. FARBENIND. A.-G. (Karl Boettcher, inventor). Ger. 512,232, Feb. 28, 1925. The hydrohalide esters of 2-penten-4-ol are prepd. by interaction of the strong acid and the alc. at atm. temp. Examples are given. *4-Chloro-2-pentene*, b_{12-13} 18–20°; *4-bromo-2-pentene*, b_8 22°; *4-iodo-2-pentene*, b_9 35–40°. The products are *intermediates for drugs.*

Cyclohexenealdehyde derivatives. SOC. ANON. M. NAEF & CIE. Swiss 139,986 to 139,988, Apr. 17, 1928. Addns. to 136,907 (*C. A.* **24**, 4306). A mixt. of 4,6-dimethyl-Δ^3-cyclohexenealdehyde is produced by condensing isoprene with crotonaldehyde by heating. The end product b. 71–4° at 12 mm. (136,907). 2,2,6-Trimethyl-Δ -cyclohexenealdehyde, b_{12} 79–81°, is produced by heating 1,1-dimethylbutadiene with crotonaldehyde (139,987), and 3,4,6-trimethyl-Δ^3-cyclohexenealdehyde-2, b. 80–81° at 12 mm., is produced by heating 2,3-dimethylbutadiene with crotonaldehyde. The substances are useful as *perfumes* or starting materials for the *manuf. of perfumes.* Cf. *C. A.* **24**, 2243.

Piperidine derivatives. CARL MANNICH. Ger. 510,184, June 3, 1927. Esters of 2,6-dimethyl-4-ketopiperidine-3,5-dicarboxylic acid and its homologs are prepd. by condensing esters of acetonedicarboxylic acid with AcH and NH_3 or primary alkyl- or aralkylamines or their salts. Thus, a dil. alc. soln. of diethyl acetonedicarboxylate, AcH and $CH_3NH_2.HCl$, left for 24 hrs. in the cold, yields *diethyl 1,2,6-trimethyl-4-ketopiperidine-3,5-dicarboxylate*, the nitrate of which m. 123–124°. Other examples are given describing the prepn. of *dimethyl 1,2,6-trimethyl-4-ketopiperidine-3,5-dicarboxylate*, m. 75–76°, (nitrate m. 136°); *dimethyl 1-benzyl-2,6-dimethyl-4-ketopiperidine-3,5-dicarboxylate* m. 97–98°, (nitrate m. 130–133°); and *dimethyl 1-β-phenylethyl-2,6-dimethyl-4-ketopiperidine-3,5-dicarboxylate-HCl*, m. 122–124°. The products are *intermediates for drugs.*

Piperidine derivatives (local anesthetics). SAMUEL M. MCELVAIN. U. S. 1,784,903, Dec. 16. Piperidine derivs. of the general formula

$$\text{CHY.CHY.CHY.CHY.CHY.N}(CH_2)_x\text{OCOR}$$

in which R is an aromatic radical, *x* is an integer, and Y in one place is an aliphatic group and in each of the four other places is a H atom are produced by first causing a reaction of a halogen-substituted alc. with one of the following two substances: (*a*) a substituted piperidine in which a C-linked H of piperidine has been replaced by an alkyl group, and (*b*) a benzoylating agent; and subsequently causing a reaction of the other of such two substances with the result of the first reaction. Details are given of the production of γ-(2-methylpiperidyl)propyl benzoate-HCl, m. 167–9°; γ-(2-propylpiperidyl)propyl benzoate-HCl, m. 184–6°; γ-(3-methylpiperidyl)propyl benzoate-HCl, m. 178–80°; β-(3-methylpiperidyl)ethyl benzoate-HCl, m. 134–6°; γ-(3-carbethoxypiperidyl)propyl benzoate-HCl, m. 161–3°; γ-(3 methylpiperidyl)propyl *p*-aminobenzoate-HCl, m. 158–60°, and the corresponding nitro compd., m. 190–2°; and γ-(3-carbethoxypiperidyl)propyl *p*-aminobenzoate-HCl, m. 110–12°, and the corresponding nitro compd., m. 177–9°. Mention is also made of the production of various isomeric analog of these compds. The products are of sufficiently low toxicity and sufficiently low irritating properties to be suitable for clinical use.

Basic nitro derivatives of 9-aminoacridine. HEINRICH JENSCH and OTTO EISLEB (to Winthrop Chemical Co.). U. S. 1,782,727, Nov. 25. Therapeutically active basic nitro derivs. of 9-aminoacridine, such as 2-β-diethylaminoethoxy-6-nitro-9-aminoacridine (a red cryst. powder, m. 237–8°, and forming a dihydrochloride with 3 mols. of H_2O of crystn. readily sol. in water) are formed by causing compds. of the formula

RNH_2 in which R stands for H or alkyl to act upon nitroacridines substituted in the 9-position by halogen and substituted at another C atom of the acridine ring by a radical contg. at least one aliphatically bound N atom. Examples are also given of the production of 2-β-diethylaminoethoxy-6-nitro-9-isoamylaminoacridine, 2-β-piperidylethoxy-6-nitro-9-aminoacridine, 4-β-diethylaminoethoxy-6-nitro-9-aminoacridine, 2-β-diethylaminoethyl-6-nitro-9-aminoacridine and 2-γ-diethylaminopropoxy-6-nitro-9-aminoacridine and properties of these compds. and their hydrochlorides are given. Cf. *C. A.* **24**, 4521.

Alkali metal salts of the dimercury derivative of bromofluorescein. WILLARD L. VOGEL (one-tenth to Paul W. Prutzman). U. S. 1,789,204, Jan. 13. By reaction in MeOH of 1 mol. proportion of bromodihydroxymercurifluorescein (details of production of which are given) with 4 mol. proportions of caustic alkali such as NaOH, salts are obtained such as the tetra-Na salt which are powerful and non-irritating local antiseptics and preventives of infection.

2,6-Dihydroxy-4,5-dihydropyrimidine acetic acid (dihydrouracylacetic acid). LEO BRODMANN. Swiss 141,019, Mar. 20, 1928. Diethyl hydroxymethylenesuccinate is condensed with urea, hydrogenated and sapond. The *substance* m. 247–250° and *is used in medicine.*

Thymol acetylsalicylate. SCHERING-KAHLBAUM A.-G. (Albrecht Thiele, inventor). Ger. 510,448, Apr. 1, 1927. An alkali thymolate is treated with acetylsalicyl chloride in an indifferent org. solvent. An example is given. The *product*, m. 72–74°, *is therapeutically useful.*

α-Ethyl-α-isopropyl-α-bromoacetamide. GUSTAV HILDEBRANDT, ERWIN LEUBE AND WILHELM BIEHLER (to Knoll A.-G., Chemische Fabriken). U. S. 1,780,131, Oct. 28. This compd., m. 51°, possesses hypnotic and sedative properties, is much less toxic than the corresponding propyl compd., and may be made by (*a*) brominating ethylisopropylacetamide; (*b*) treating ethylisopropylbromoacetic acid ester with NH_3; (*c*) splitting off water from, or dehydrating, NH_4 ethylisopropylbromoacetate; or (*d*) brominating ethylisopropylacetonitrile and subsequently saponifying the bromo compd. to obtain the amide. Various details of manuf. are given.

Stabilizing and purifying chloroform. V. M. KULIKOV. Russ. 60,716, Dec. 20, 1929. $(CH_2)N_4$ or other ammonia-aldehyde compds. are added to $CHCl_3$.

Antipyrine. GOSUDARSTVENNUII INSTITUT PRIKLADNOI KHIMII (GOVERNMENT INSTITUTE FOR APPLIED CHEMISTRY). Russ. 25,925, Mar. 31, 1928; 32,202 Aug. 24, 1928. 1-Phenyl-3-methyl-5-pyrazolone is heated with MeBr.

Preparing codeine. AKTZ. O-VA PROISVODSTVA I TORGOVLI KHIMIKO-FARMATZEVTICHESKIMI PREPARATAMI I MEDITZINSKIM IMUSHCHESTVOM "POSMEDTORGPROM." Russ. 18,224, July 18, 1927. Morphine is acted upon by $PhMe_2NOH$, and the $PhNMe_2$ formed is distd. off with steam after acidification of the reacting mixt. with lactic, formic, tartaric or oxalic acid. The codeine is then sepd. from the residue by usual methods.

Purifying cephalin. R. A. KONOVALOVA. Russ. 51,926, July 27, 1929. A soln. of a salt of crude cephalin is added gradually to a soln. of NH_3 and ether under agitation. The cephalin is then crystallized out from ether by usual methods.

Lecithin preparations. SOC. ANON. POUR L'IND. CHIM. À BÂLE. Ger. 510,186, Dec. 28, 1926. See Swiss 136,239 (*C. A.* **24**, 4358).

Alkaloids. BYK-GULDENWERKE CHEMISCHE FABRIK A.-G. Ger. 510,185, May 21, 1926. Raw materials contg. alkaloids are extd. with dil. acid, and the ext. is then purified by careful treatment with NaOH, after addn. of a buffer compd. to assist in keeping the H-iôn concn. at that most favorable for pptg. the impurities. Examples are given. The extn. of conessine in this way is disclaimed.

Oxidation products of porphyrins. HANS FISCHER (Alfred Treibs, inventor). Ger. 510,434, May 28, 1927. Yellow oxidation products termed xanthoporphinogen compds. are prepd. by treating porphyrins in AcOH-$CHCl_3$ soln. with PbO_2. The *products are* reducible to porphyrins, and are *of therapeutic value.*

Emulsions. THE GOLDSCHMIDT A.-G. Fr. 690,330, Feb. 20, 1930. Esters of polyhydric alcs. with satd. or unsatd. higher fatty acids, still contg. free OH groups or derivs. of such esters are emulsified with water or aq. solns. in the presence of acylalkyldiamines or their derivs. Thus, a good "*cold cream*" is made from glycerol-monostearic acid ester 18, white wax 1, white petrolatum 6, suint 4, paraffin oil 7, sweet almond oil 5, glycerol 3, water 55.5 and diethylaminoethyl oleylphosphate 0.5%.

Perfumes. DEUTSCHE HYDRIERWERKE A.-G. Ger. 505,814, June 24, 1926. Perfume-bearing substances are dissolved or fixed by treatment with esters of dicarboxylic acids arising from the oxidation of partly hydrogenated naphthalene with a

completely hydrogenated ring, or hydronaphthol and hydronaphthone. Thus, 2-decahydronaphthol is treated with HNO_3 and NH_4 vanadate to give cyclohexanediacetic acid (I); the di-Et and diisobutyl esters of I are also mentioned.

Perfumes. I. G. FARBENIND. A.-G. Fr. 689,063, Jan. 20, 1930. Perfume mixts. are made with the use of $C_6H_{11}CH_2CH_2CHXCHO$ (X = alkyl) or their ring substitution products. Several examples are given.

18—ACIDS, ALKALIES, SALTS AND SUNDRIES

E. M SYMMES

The reconstruction of sulfuric and nitric acid mixtures. ALVARO-ALBERTO. *Ann. acad. brasil. sci.* **2**, No. 3, 113–29(1930).—A mathematical discussion and application of formulas for the detn. of H_2SO_4 and HNO_3 contents of mixts., such as could be applied to the revivifying of commercial mixed acids by oleum. J. M. L.

Cottrell process for sulfuric acid recovery. P. E. LANDOLT. *Petroleum Mech. Eng.* **1930**, 98–102.—A review and bibliography is given of the Cottrell app. in acid concn., sludge-acid recovery, vacuum concn., acid gas scrubbing and mist and dust removal. Costs are shown. E. M. SYMMES

Utilization of liquid oxygen obtained as a by-product in the manufacture of synthetic ammonia. M. SUKHAREVSKII. *J. Chem. Ind.* (Moscow) **6**, 1671–4(1929).—In connection with the proposed development of the synthetic NH_3 industry in Russia, the possible utilization of the O_2 obtained as a by-product is discussed. Liquid O_2 is superior to gaseous O_2 from the viewpoint of storage, transportation and utility. Liquid O_2 can be evaporated readily where O_2 gas is needed. The liquid form can be used in blasting explosives. It is now used extensively in France and the United States for this purpose. D. K.

Production of ammoniated phosphate and double superphosphate. PIETRO LEONE. *Atti III congresso naz. chim. pura applicata* **1930**, 486–95.—$2Ca_3(PO_4)_2 + 6H_2SO_4 = 6CaSO_4 + 4H_3PO_4$, $Ca_3(PO_4)_2 + 4H_3PO_4 = 3Ca(H_2PO_4)_2$. These reactions give a product having advantages over the usual mixt. $Ca(H_2PO_4)_2 + 2CaSO_4$. The reactions $Ca_3(PO_4)_2 + 3H_2SO_4 + 4NH_3 = 3CaSO_4$ (sludge) $+ 2(NH_4)_2HPO_4$, and $Ca_3(PO_4)_2 + 4H_2SO_4 + 4NH_3 = [2CaSO_4 + Ca(H_2PO_4)_2 + 2(NH_4)_2SO_4]$ are discussed. E. M. SYMMES

Calcium arsenate and its applications. PABLO HOPE Y HOPE. *Rev. quím.* **6**, 5–14 (1930); cf *C. A.* **24**, 5942. E. M. SYMMES

The hydrates of calcium sulfate. F. KRAUSS AND G. JÖRNS. *Tonind.-Ztg.* **54**, 1467–8, 1483–4(1930).—The behavior of the hydrates of $CaSO_4$ depends much upon the previous history, upon the grain size and upon the exptl. conditions, so that the lack of agreement among previous investigators is plain. By starting with freshly pptd. dihydrate and heating to above 70° to start the reaction and then cooling quickly to hinder the formation of anhydrite, it is possible to get pure hemihydrate. The change takes place at 59° and at 7 mm. in the absence of air. The hemihydrate has a zeolitic character, confirming the work of Linck and Jung (*C. A.* **18**, 3566). F. O. A.

Catalytic reduction of carbon monoxide under ordinary pressure. VI. The action of an iron catalyst on carbon monoxide formation. SHINJIRŌ KODAMA. *J. Soc. Chem. Ind., Japan* **33**, Suppl. binding 299–400(1930).—See *C. A.* **25**, 496. E. M. SYMMES

The lime industry in Canton. B. F. WONG. *Science J.* (China) **1**, 47–58(1929).—The old type of kiln yields an irregular product and can no longer compete with the foreign product. Methods of improving the old kiln are suggested. W. H. A.

Forgotten methods of potash manufacture and their use in the nitrogen and zinc industries. BRUNO WAESER. *Metallbörse* **20**, 2611–2(1930).—Wood ashes contained some Na_2CO_3; only tartar gave pure K_2CO_3. Vinasse was also burned to give high-grade K_2CO_3. K_2SO_4 was converted into K_2CO_3 by the Leblanc process. K_2SO_4-$MgSO_4$ mixt. was reduced with C, and $BaCO_3$ reacted with K_2SO_4. K_2SO_4 was converted to K_2SiO_3, and the latter causticized to K_2CO_3. K_2SO_4 was causticized by PbO. Thomas slag was heated with Fe ore and silicate in a blast furnace to make Fe-P-Mn alloys; the latter were then treated with K_2SO_4 to give alkali phosphate, which was causticized by $Ca(OH)_2$. Alkali chlorides were reacted with $PbCl_2$. KCl was pptd. by H_2SiF_6, and K_2SiF_6 causticized by $Ca(OH)_2$. Electrolysis was used in 1851. An important method was $2KCl + 3(MgCO_3.3H_2O) + CO_2 = 2(KHCO_3.MgCO_3.4H_2O) + MgCl_2$, $2(KHCO_3.MgCO_3.4H_2O) + Mg(OH)_2 = K_2CO_3 + 3(MgCO_3.3H_2O) + H_2O$. Another method was $8KCl + 10ZnO + 11CO_2 + 8H_2O = 4K_2O.6ZnO + 11CO_2.8H_2O + 4ZnCl_2$, the

double salt in hot water giving $4K_2CO_3 + 6ZnCO_3 + CO_2 + 8H_2O$. KCl and $NH_4CO_2NH_2$ in liquid NH_3, heated with a little H_2O, give NH_3, CO_2 and K_2CO_3. E. M. S.

Potash in 1929. A. T. COONS. Bur. Mines, *Mineral Resources of the U. S. 1929*, Pt. II, 139–45(preprint No. 12, published December 2, 1930). E. H.

Salt, bromine and calcium chloride in 1929. A. T. COONS. Bur. Mines, *Mineral Resources of the U. S. 1929*, Pt. II, 147–60(preprint No. 13, published December 8, 1930).

Elimination of silica in treatment of leucite with acid. GIAN A. BLANC. *Atti III congresso naz. chim. pura applicata* 1930, 226–30.—Repeated recirculation of the saline acid soln. through granular leucite eliminates SiO_2. E. M. SYMMES

The synthetic nitrogen industry in Italy. Old and new processes. GIACOMO FAUSER. *Atti III congresso naz. chim. pura applicata* 1930, 263–79.—A review, with statistics. E. M. SYMMES

Nitrogen developments in 1930 throughout the world. CHAPLIN TYLER. *Chem. Met. Eng.* 38, 42–46(1931). E. H.

Activated charcoal: its preparation and commercial applications. T. W. HUGHES. *Chem. Eng. Mining Rev.* 23, 113–6(1930). E. H.

The storage of activated charcoal. JOSEF KADLEC. *Listy Cukrovar.* 49, 169–70 (1930).—Brick storehouses with brick flooring are fitted with a layer of beams covered with planks, ventilation beneath the bin being thus permitted. Activated charcoal is placed in the bins in 20-cm. layers. The moisture content changes continually with that of the atm. of the storehouse. Turning the charcoal over once every month is recommended. Bagging of the charcoal is not recommended; the acidity of the charcoal disintegrates the bags. A greenish white moldy growth occurs with old material; it is caused by *Penicillium glaucum*. Fermentation leading to spontaneous combustion also has occurred. A moldy appearance is sometimes due to cryst. NaCl and occurs with incomplete washing of the charcoal. Activated charcoals show no loss of effectiveness up to a temp. of 280°. FRANK MARESH

Ozone and its applications. EMILIO CRESPI. *Atti III congresso naz. chim pura applicata* 1930, 478–81.—Com. uses in bleaching are discussed briefly. E. M. S.

Selenium, its properties and uses. R. M. SANTMYERS. *Chem. Markets* 28, 46–8 (1931). E. H.

Slate in 1929. OLIVER BOWLES AND A. T. COONS. Bur. Mines, *Mineral Resources of the U. S. 1929*, Pt. II, 161–74 (preprint No. 14, published December 22, 1930). E. H.

Greensand bibliography (SHREVE) 8. Apparatus for separating solids from gases [for furnaces producing SO_2] (Fr. pat. 690,558) 1.

Die Ammoniaksynthese und das Casaleverfahren. Auf Veranlassung der Ammonia Casale s. a. veröffentlicht. Rome: L'Universale. 44 pp.

KAUSCH, O.: **Der Graphit.** Bd. 24 of "Monographs Kohle-Koks-Teer." Halle, Wilhelm Knapp. 224 pp. Unbound, M. 25; bound, M. 26.70. Reviewed in *Colliery Guardian* 141, 1140; *Ceram Abstracts* 9, 1059(1930).

Boric acid. CHEM. FAB. GRÜNAU LANDSHOFF & MEYER A.-G. Ger. 510,421, Oct. 23, 1929. Borax and H_2SO_4 are added to a satd. soln. of Na_2SO_4 at a temp. of 100°. The pptd. anhyd. Na_2SO_4 is sepd., and the soln. is cooled to 30–35°, whereupon $B(OH)_3$ free from sulfate crystallizes out and is sepd. Fresh amts. of borax and H_2SO_4 are then added to the mother liquor. The method takes advantage of the peculiar soly. properties of Na_2SO_4.

Hydrocyanic acid. I. G. FARBENIND. A.-G. (Reinhold Fick and Fritz Nicolai, inventors). Ger. 510,407, May 1, 1923. Addn. to 485,989 (*C. A.* 24, 1185). The method of 485,989 for the production of HCN by passing $HCONH_2$ and NH_3 over catalyzers at 400° is modified by using $HCOONH_4$ or a mixt. of $HCOONH_4$ and $HCONH_2$ instead of $HCONH_2$ and NH_3. HCOOH may also be added. Cf. *C. A.* 25, 562.

Phosphoric acid. I. G. FARBENIND. A.-G. Fr. 36,845, April 27, 1929. Addn. to 655,062 (*C. A.* 23, 3780). In the process of Fr. 655,062 a part of the phosphoric acid obtained in the double decompn. is each time added to the mixt. of crude phosphate and H_2SO_4 during the next operation.

Phosphoric acid. SOC. D'ÉTUDES POUR LA FABRICATION ET L'EMPLOI DES ENGRAIS CHIMIQUES (R. Flatt and E. Rist, inventors). Fr. 688,801, Jan. 24, 1930. Phosphoric acid is prepd. by heating $CaH_4(PO_4)_2$ with water preferably in an autoclave to above

100°, filtering, and concg. the filtrate by evapn. until pptn. of the non-hydrolyzed phosphate is complete.

Concentration of phosphoric acid. EMIL COLLETT. Fr. 691,296, Mar. 6, 1930. H_3PO_4, obtained from Ca phosphates and H_2SO_4, and solns. of phosphates, obtained by the action of NH_3 on this H_3PO_4, are concd. in Fe-Si vessels contg. 12–18% of Si, after reducing the content of acid F compds. in the H_3PO_4 soln. to less than 2 g. per l.

Preparing phosphoric acid and hydrogen. V. N. IPAT'EV. Russ. 44,431, April 6, 1929. P, PH_3 or lower oxidation products of P are oxidized by water under pressure and at high temp. (cf. *C. A.* **24**, 5946) in the presence of catalysts of the first and the eighth groups of elements of the periodic system. These elements are either sol. in the original products at the beginning, or they may dissolve temporarily in the first stages of the process, while during the process proper they sep. in the form of a ppt. contg. a catalytically active metal.

Nitric acid. AMMONIAQUE SYNTHÉTIQUE ET DÉRIVÉS (SOC. ANON.). Fr. 36,978, May 27, 1929. Addn. to 651,093 (*C. A.* **23**, 3312). NH_3 is oxidized at atm. pressure and, after condensation of the water vapors formed by the reaction, the nitrous oxides are compressed. Only a part of the reaction water is used for the reaction with the oxides of N, while the excess is eliminated immediately after the condensation. The dil. acid contg. the nitrous oxides is transformed to concd. acid by oxidation with compressed O at a raised temp.

Apparatus for the recovery and concentration of vapors of nitric and sulfuric acids. ARMAND G. VAUGUÉ. Fr. 36,872, May 7, 1929. Addn. to 654,055 (*C. A.* **23**, 3779). Constructional improvements are described.

Sulfuric acid. HUGO PETERSEN. Ger. 512,318, Oct 13, 1926. See Brit. 270,988 (*C. A.* **22**, 1657).

Chamber for sulfuric acid manufacture. MARIO COLOMBO. U. S. 1,788,482, Jan. 13. In the upper portion of the chamber are a plurality of sections of trapezoidal shape, these sections corresponding in width to the width of the chamber but of predetd. breadth and depth; pipes connect the portions of the chamber between the sections.

Sulfuric acid and hydrochloric acid. SOC. DES PHOSPHATES ET SUPERPHOSPHATES DE TEBBAKA and YVES LE MONIÈS DE SAGAZAN. Fr. 690,603, May 3, 1929. H_2SO_4 and HCl are made by the reaction of Cl and SO_2 in the presence of water to give a soln. of H_2SO_4 and HCl. The soln. is heated to above 100° to remove the HCl, and the rest is concd.

Ammonia. NITROGEN ENGINEERING CORP. Ger. 510,711, April 3, 1928. See Fr. 651,899 (*C. A.* **23**, 3546).

Mixing air with ammonia. H. PAULING. Brit. 334,448, Jan. 7, 1929. A mixt. of air and NH_3 under pressure is prepd. by passing a stream of compressed air countercurrent to a strong soln. of NH_3. App. and details of operation are described.

Storing alkali metals, etc., in capillary tubes. INTERNATIONAL GENERAL ELECTRIC CO. Ger 512,261, Aug. 1, 1928. See Brit. 296,347 (*C. A.* **23**, 2538–9).

Alkali metal hypochlorites. V. SZIDON. Brit. 334,364, Aug. 14, 1929. Solid or semi-solid products, suitable for bleaching purposes, are obtained by adding to aq. solns. of the hypochlorites compds. such as Na laurate or caprylate. Other materials such as Na_2CO_3 or Na silicate also may be added.

Recovering alkali metal sulfite from fusion liquors. CARL L. MASTERS (to Elko Chemical Co.). U. S. 1,788,955, Jan. 13. Na sulfite is recovered from a phenol soln., such as that resulting from alkali fusion of org. sulfonates, by distg. off the phenol with steam, cooling the residual soln. to about 0° and sepg. the Na sulfite crystals formed from the cooled soln. A diagram of app. arrangement is given.

Alkaline earth cyanamides. NIKODEM CARO and ALBERT R. FRANK (Heinrich Franck, inventor). Fr. 689,590, Feb. 7, 1930. In the manuf. of alk. earth cyanamides from alk. earth carbonates, CO and synthetic NH_3, the NH_3 is produced from H prepd. partially or wholly by means of CO. The reaction of NH_3, CO and carbonate is used for the prepn. of the H, a closed cycle being obtained. Fr. 689,591 describes the prepn. of $CaCN_2$ by calcining $(NH_4COO)_2Ca$ and fixing on the product obtained, in a second step, NH_3 and CO to transform it to $CaCN_2$ at a temp. between 600° and 800°. The $(NH_2COO)_2Ca$ is prepd. by the reaction of aq. ammoniacal solns. of NH_2COONH_4 with compds. of Ca such as $Ca(OH)_2$, and cooling to sep. $(NH_2COO)_2Ca$. Cf. *C. A.* **25**, 175.

Dehydrating crystal hydrates. G. A. YAKOVKIN. Russ 26,386, April 10, 1928. Crystals are dehydrated by passing over them vapors of solvents which are not miscible

with water and do not react chemically with the dehydrated compd. Such solvents are, for example, gasoline, kerosene or ligroin vapors.

Preparation of iodates. O. Yu. Magidson and A. G. Baichikov. Russ. 62,756, Jan. 20, 1930. Free I is oxidized by hypochlorites in H_2SO_4 medium in the presence of a chloride in the cold.

Phosphates. Jean Margoles. Fr. 689,302, Jan. 6, 1930 Natural phosphates are rendered sol. by mineral acids by introducing the phosphate and then adding the amt. of acid strictly necessary for transforming it to a sol. form. Cf. *C. A.* **24**, 4361.

Phosphates and nitrates. Francesco C. Palazzo and Fortunato Palazzo. Fr. 689,277, Nov. 16, 1928. $CaHPO_4$ and synthetic nitrates are made by using as starting materials natural phosphates, HNO_3 and an alk. base which may be NaOH, NH_4OH or KOH. Details of the process are given.

Metal carbonyls. I. G. Farbenind. A.-G. Fr. 691,100, Mar. 5, 1930. Carbonyl compds. of metals are made by submitting substances contg. the metals to a reduction with solid or liquid reducing agents rich in ashes, and then treating with CO. An example is given of the treatment of pyrites cinders contg. 55% of Fe.

Compounds of aluminum. Chemische Fabrik vorm. Sandoz. Fr. 689,587, Feb. 7, 1930. Stable compds. of Al clearly sol. in water are made by combining Al with gluconic acid in the manner used for making salts, *e. g.*, by double decompn. of Al salts with alk. earth gluconates.

Aluminum compounds; phosphoric acid. I. G. Farbenind. A.-G. (Otto Balz, Adolf Leber and Rudolf Schulze, inventors). Ger. 512,130, May 5, 1929. Materials contg. Al and H_3PO_4 are dissolved in HCl, and the soln. is treated with HCl gas to ppt. $AlCl_3$, which can then be worked up to Al_2O_3, etc. H_3PO_4 is recovered from the residual soln.

Purification of bismuth salts. Friedrich Spira. Ger. 510,140, June 16, 1929. Bi salt soln. obtained by extg. Bi ores, etc., with a feebly acid, concd. soln. of an alkali or alk. earth chloride is treated with an oxidizing agent, *e. g.*, $KClO_3$, in such an amt. that the base-metal impurities, *e. g*, As, Sb, Sn, Mo, Fe and Mn, are present in their highest stage of oxidation. The soln. is then neutralized, whereby the impurities are pptd. Examples are given.

Potassium salts. Chemieverfahren-Ges. m. b. H. Fr. 36,992, May 31, 1929. Addn. to 673,851 (*C. A.* **24**, 2553). See Brit. 316,548 (*C. A.* **24**, 1943).

Zinc salt solutions. Metallges. A.-G. Brit. 334,458, Dec. 7, 1928. Raw materials contg. ZnO are first leached with acid as described in Brit. 302,924 (*C. A.* **23**, 4305) to ext. most of the Zn without extg. other metals present; the residue is then leached with considerable excess of acid, and the acid liquor thus obtained is treated with H_2S or a sulfide such as that of Fe or Zn to free it from metals such as Cu, Cd, As and Sb. Details for further purification of the soln. to remove residual Fe, Ni, Co, Pb, etc., also are given. Pb may be recovered as sulfate. Cf. *C. A.* **24**, 1473.

Alumina. Jean C. Séailles. Fr. 36,971, Mar. 13, 1929. Addn. to 634,430 (*C. A.* **22**, 3745). In the process of Fr. 634,430 for the extn. of Al_2O_3 from non-halogenated ores, NaCl or $CaCl_2$ is added to the water used, whereby the reaction takes place with 3 mols. of CaO instead of 4 for each mol. of Al_2O_3. Cf. *C. A.* **25**, 780.

Aluminum formate solution. Zschimmer & Schwarz Chemische Fabrik Dölau (Oskar Jochem, inventor). Ger. 510,575, Mar. 15, 1929. $(HCOO)_3Al$ soln. of over 25% strength is prepd. by treating solid $(HCOO)_2Ca$ with concd. $Al_2(SO_4)_3$ soln. at temps. ranging from room temp. to 70°. Examples are given.

Crystals of ammonium chloride. Imperial Chemical Industries, Ltd. Fr 689,040, Jan. 28, 1930. Crystals of NH_4Cl are obtained by constantly stirring an aq. soln. of NH_4Cl contg. a small quantity (*e. g.*, 0.1%) of a chloride forming mixed crystals with NH_4Cl, such as a chloride of Mn, Fe, Co, Ni or Cu.

Ammonium phosphate. Soc. d'études pour la fabrication et l'emploi des engrais chim. (Pierre Jolibois, inventor). Fr. 691,332, May 21, 1929. $NH_4H_2PO_4$ is made by pulverizing the natural phosphate and then submitting it to a treatment with HCl followed by a calcination. The residue is afterward treated with $(NH_4)_2CO_3$ (or a mixt. of CO_2 and NH_3) in excess under high pressure.

Diammonium phosphate. Édouard Urbain. Fr. 691,132, May 10, 1929. $(NH_4)_2HPO_4$ is made by first pptg. $(NH_4)_3PO_4$ and then transforming the latter by heat under pressure into $(NH_4)_2HPO_4$.

Ammonium sulfate. N. V. De Bataafsche Petroleum Maatschappij. Ger. 510,331, Feb. 17, 1929. $(NH_4)_2SO_4$ practically free from sulfite is prepd. by reacting NH_3 and SO_2 in the absence of water, and then treating the product, preferably immediately after its formation, with water (or steam) and O (or air). Somewhat less

water than is theoretically necessary may be used. The process may be effected at 100–120°. App. is shown.

Ammonium sulfate and sulfur. HEINRICH KOPPERS A.-G. Fr. 689,983, Feb. 14, 1930. For the production of $(NH_4)_2SO_4$ and S from mixts. of bisulfite with sulfite or thiosulfate, polythionates with sulfite or thiosulfate, thiosulfite with SO_2 or H_2SO_4, in the presence or absence of NH_4CNS, the app. used is made of alloys of the Cr-Ni or the Cr-Ni-Fe group with or without Cu or Mo, or is covered with such alloys. If an excess of SO_2, H_2SO_4, bisulfite or polythionates is present, the conversion is not pushed to completion; this avoids attack of the metallic parts of the app. by H_2SO_4 in the converted solns.

Barium carbonate. B. LAPORTE, LTD., I. E. WEBER and V. W. SLATER. Brit. 334,709, Sept. 5, 1929. $BaCO_3$ substantially free from S compds. is prepd. by addn. of BaS, Ba hydrosulfide or other Ba-sulfur compd. to a soln. of CO_2 or $Ba(HCO_3)_2$ in such proportion that there is always CO_2 or $Ba(HCO_3)_2$ present. Details of both a continuous and a discontinuous procedure are described. Flue gas may be used and a p_H below 7 is suitable. The H_2S evolved may be used for producing S or SO_2.

Calcium cyanamide. I. G. FARBENIND. A.-G. Fr. 689,823, Feb. 13, 1930. See Brit. 333,353 (*C. A.* **25**, 564).

Calcium nitrate. APPAREILS ET ÉVAPORATEURS KESTNER. Fr. 36,618, April 3, 1929 See Brit. 329,145 (*C. A.* **24**, 5442).

Calcium nitrate and ammonium nitrate. KUNSTDÜNGER-PATENT-VERWERTUNGS-A.-G. (Frans Georg Liljenroth, applicant in Switzerland). Fr. 36,674, Apr. 10, 1929. Addn. to 663,066 (*C. A.* **24**, 472). In the process of the prior case the $CaSO_4$ is first produced in the state of a semi-hydrate by the use of a high temp. and high concn. of the reacting soln. The semi-hydrate is afterward recrystd. to $CaSO_4$.

Dicalcium phosphate. AUGUST HOLZ (to Theodore V. D. Berdell). U. S. 1,788,952, Jan. 13. In a process for the continuous com. production of di-Ca phosphate, a soln. of an alkali metal chloride such as NaCl is electrolytically decompd. to produce H, Cl and a soln. of the alkali metal hydroxide; the Cl and an equiv. quantity of SO_2 are simultaneously passed into water to produce a mixt. of HCl and H_2SO_4. Tri-Ca phosphate is treated with this acid mixt., $CaSO_4$ is sepd. from the resulting reaction products by filtration, and the filtrate is treated with alkali metal hydroxide, thus producing di-Ca phosphate and regenerating the alkali metal chloride.

Dry carbon dioxide. DRYICE EQUIPMENT CORP. Fr. 690,394, Feb. 21, 1930. Water and other liquid impurities are sepd. from liquid CO_2 by evapg. part of the CO_2 to freeze out the water, etc.

Forming and compacting solid carbon dioxide. MASCHINENFABRIK ESSLINGEN and J. STOFFELS. Brit. 334,682, Aug. 7, 1929. App. and various details of operation are described.

Freeing hydrogen of phosphine. NAUCHNUI INSTITUT PO UDOBRENIYAM IMENI YA. V. SAMOILOVA V. S. N. KH. SSSR. and I. A. MIRKIN. Russ. 69,446, May 3, 1930. HCl is added to the H, and the whole is compressed up to 100 atms. at a temp. of 30–40°.

Hydrogen peroxide. J. D RIEDEL-E. DE HAËN A.-G. (Leo Löwenstein, inventor). Ger. 510,064, July 22, 1924. The distn. of H_2O_2 from solns. of $H_2S_2O_8$ or persulfates, etc., is effected by drawing the soln. upwardly through narrow, externally heated tubes.

Oxidizing hydrogen sulfide. I. G. FARBENIND. A.-G. Ger. 510,488, June 4, 1925. H_2S is oxidized, and the oxidation products are obtained as NH_4 salts, by passing a gas contg. H_2S and NH_3, *e. g.*, coke-over gases, with an addn. of O if necessary, at a raised temp. over a catalyst comprising 2 metals, one of which is capable of binding S, *e. g.*, Fe, Ni or Cu, while the other acts as an oxygen-carrier, *e. g.*, W, V or Cr. Oxides or oxygenated salts of the metals may also be used. Addnl. details and an example are given.

Oxidizing hydrogen sulfide to anhydrous sulfuric acid. AKZIONERN. O-VO KOKSOBENZOLNOI PROMUISHLENNOSTI "KOKSOBENZOL." Russ. 21,188, Nov. 25, 1927. H_2S is oxidized to SO_3 by iron oxides and Mn catalysts. These catalysts are pptd. in a fine layer on silicic acid, which is first mixed with a soln. of the above metal salts and then dried in a stream of air or oxygen. A. A. BOEHTLINGK

Phosphorus oxychloride and thionyl chloride. JOHN G. SCHUDEL (to Elko Chemical Co.). U. S. 1,788,959, Jan. 13. Reaction is effected between a mixt. of SO_2, Cl and PCl_3. An arrangement of app. is described. Cf. *C. A.* 24, 2556.

Regenerating potassium ferricyanide. RICHARD BRANDT. Ger. 511,898, July 4, 1928. Addn. to 503,118. App. for the method of Ger. 503,118 (*C. A.* 24, 4994) is described.

Preparing potassium and sodium permanganates. M. I. BELOTZERKOVSKII. Russ.

70,674, May 24, 1930. Mn oxides which were preliminarily hydrated are evapd. to dryness together with the alkali and are then oxidized with air or with O in the presence of CaO, which combines with the water and makes the mass fluffy.

Sodium carbonate. HERMAN B. KIPPER. U. S. 1,789,235, Jan. 13. A mixt. of NaCl brine, NH_3, H and CO_2 is rapidly stirred and simultaneously cooled, externally and internally, in a stationary vessel to ppt. $NaHCO_3$ and produce an NH_4Cl soln. The inner surface of the vessel is subjected to scraping at a rate slower than the stirring, and the ppt. and NH_4Cl are expelled from the vessel and sepd by filtration. The $NaHCO_3$ is heated by hot waste gases from a lime kiln to decompose it into Na_2CO_3, CO_2 and steam. App. is described.

Sodium silicate. EDWARD A. TAYLOR and WORTHINGTON T. GRACE (to Canadian Industries, Ltd.). Can. 307,399, Jan. 6, 1931. A purified soln. of Na silicate is produced by dissolving water glass by the action of water and steam, adding less than 1% of $Ca(OH)_2$ and Na_2CO_3 (on the wt. of the silicate) and removing the ppt. formed.

Sodium sulfide and other substances. KALI-CHEMIE A.-G. Fr. 36,788, Jan. 30, 1929. Addn. to 595,282. Na_2S and other substances are obtained in granular form or small pieces by dropping them in a molten state on to a surface previously treated with very viscous oils or fats having a repellent action on water.

Zinc oxide. JOSEPH M. H. CORNILLAT. Ger. 499,536, Aug. 4, 1926. ZnO is obtained by melting down metallic Zn by burning mazout in a furnace, and keeping the molten mass in const. motion. The furnace is connected with condensers, so that the vapor formed is oxidized and condensed. The app. is described.

Zirconium oxychloride. KALI-CHEMIE A.-G. (Friedrich Rüsberg and Paul Schmid, inventors). Ger. 510,574, Oct. 28, 1926. A fused Zr-CaO mixt. is treated with HCl and $CaCl_2$ in such proportions that a neutral soln. is produced which during crystn. out of the oxychloride, is satd. with $CaCl_2$ and supersatd with the oxychloride. Thus, a fused mass contg. 48% CaO, 31% ZrO_2, 14% SiO_2 and 7% Fe + Al_2O_3, is powd. and treated with $CaCl_2$ lye. $ZrOCl_2$ crystallizes out on cooling.

Arsenic. OTAVI MINEN- UND EISENBAHNGESELLSCHAFT (Karl Kubel, inventor) Ger. 510,750, July 11, 1928. Materials contg. As, especially those contg As and Cd, are worked up by heating with alkali lye to about 200° under suitable pressure. The As is then leached out. Oxides of As contg. Pb and Cd are treated in the same way to separate the As and Pb from the Cd. The Pb is then pptd. from the As-Pb soln by leading in CO_2. The As which crystallizes out from the alkali lye contains alkali hydroxide and is sepd. therefrom by hydrolysis. Several examples are given.

Iodine. OLINTO D. LUCIA. Fr. 688,854, Jan. 25, 1930. I is extd. from solns of salts of I by treating the solns. after filtration in an emulsifier with reagents capable of liberating the I and a solvent capable of dissolving it.

Extracting iodine from dilute solutions. P. I. KAMINSKII. Russ. 68,574, April 18, 1930. Straw, sawdust, etc., are used to absorb I compds from dil. soln. The absorbents are then treated with Na_2CO_3 and burned, and the I is extd. from the ashes by one of the known methods.

Purification of oxygen or hydrogen. ARMAND MAUSELIN. Fr. 691,315, May 16, 1929. H or O in mixts. contg. one of these in predominance is purified by feeding an explosion motor with the mixt. contg. them. The resultant product contains steam and the gas which was predominant. The process may be applied in the manuf. of chlorates by electrolysis, by collecting the H, O and Cl, sepg. the Cl and then treating the mixt. of H and O as above.

Condensing phosphorus from gases and vapors. HERMANN LANG (to I. G. Farbenind. A.-G.). U. S. 1,788,838, Jan. 13. The gases or vapors, at a temp. below the dew point of P, are subjected to the action of rapidly moving, finely divided drops of liquid such as water, acid solns., etc., under such conditions of subdivision and velocity as to form an emulsion of the P with the liquid.

Graphite purification. EUGÈNE RABETRANO. Fr. 691,128, May 10, 1929. See Brit. 328,697 (*C. A.* 24, 5445).

Treating phosphatic rocks. KUNSTDUNGER-PATENT-VERWERTUNGS-A.-G. Fr. 690,013, Feb. 14, 1930. In the treatment of phosphatic rocks with HNO_3 and K_2SO_4, a part of the soln. obtained in the extn. process is sepd. from the pptd. $CaSO_4$ and freed from part of its content of KNO_3 by cooling and crystn. and is then employed as a dilg. agent in the continuation of the extn. treatment. During the greater part of the reaction the amt. of K_2SO_4 is deficient, the amt. necessary to ppt. the lime remaining in soln. being added toward the end of the reaction. The $CaSO_4$ is pptd. as its dihydrate in the presence of an NH_4 salt.

Purifying carbon. I. G. FARBENIND. A.-G. Brit. 334,190, May 27, 1929. Carbon

obtained by splitting CO by use of metals of the eighth group of the periodic system is freed from carbonyl-forming metals or their carbides by treating the C at a temp. of 50–210° with CO (which may be under pressure) after a preliminary treatment with H or inert gas at 400–500° or with a weakly oxidizing gas at 200–400°. A small quantity of S may be added to serve as a catalyst for the formation of carbonyl.

Active carbon. I. G. FARBENIND. A.-G. (Ludwig Klebert, inventor). Ger. 510,090, Dec. 14, 1928. See Fr. 686,322, (*C. A* 25, 565).

Improving active carbons. CORNELIS LOURENS (to General Norit Co., Ltd.). U. S. 1,788,466, Jan. 13. For improving its adsorption efficiency, an active C is prepd. contg. from 0.3 to 5.0% of HCl or other acid.

Adsorbing and filtering materials containing active carbon. MAX HAMBURG and EDUARD JALOWETZ. Ger. 512,018, Jan. 7, 1928. See Austrian 116,236 (*C. A.* 24, 2560).

Regenerating absorbent charcoal. COMPAGNIE FRANÇAISE DE PRODUITS ORGANO-CHIMIQUES (Anciennement soc. anon. des Engrais et Noir animal). Fr. 36,985, May 29, 1929. Addn. to 636,165 (*C. A.* 23, 246). The admission of steam into the absorber is greatly reduced, the steam being used only for driving out the air or gases therein.

Bone black. BAUGH & SONS Co. Ger. 512,484, April 4, 1930. Bone black is prepd. by a continuous process in which the bones are first dry-distd. at a relatively low temp., *e. g.*, 500–700°, for a relatively long time, *e. g.*, 1–2 hrs.; the charred bones are then heated at a higher temp., *e. g.*, 800–1100°, for a short time, *e. g.*, 5–15 mins. App. comprising two externally heated rotary retorts is described.

Apparatus for making lampblack from petroleum hydrocarbons. I. I. BEGROV. Russ. 14,204, Feb. 18, 1927. A coil consisting of a number of banks is placed in a furnace. Light petroleum fractions are admitted into the upper end of the coil after passing a hydraulic seal. The oil, being gradually heated during its downward movement, is partially converted into vapor, which is discharged through perforations provided in the lowest pipe. A liquid seal outside of the furnace connected to one of the pipe banks in the furnace serves to discharge the excess of oil which was not evapd. The oil pressure is regulated by a valve attached to a manifold connected in front of the liquid seal for hot oil. The vapors are burned to produce lampblack.

Catalyst suitable for ammonia oxidation. BAMAG-MEGUIN A.-G. Brit. 334,466, Feb. 8, 1929. A wire netting is used composed of a metal such as Rh or an alloy of Rh and Pt together with some wires of pure Pt

Catalysts suitable for oxidizing sulfur dioxide to trioxide. IMPERIAL CHEMICAL INDUSTRIES, LTD., and J. A. WEIL. Brit. 334,268, June 1, 1929. Catalysts are prepd. by admixt. of a V compd (such as an alkali metal vanadate or vanadite, vanadyl salts or double salts such as vanadyl sulfate or NH_4 vanadyl oxalate) with a siliceous diluent such as ground silica, siliceous brick, sand or kieselguhr and siliceous material in the form of a wet hydrogel such as wet silica gel. The mixt. may be formed into pellets or other masses and treated with burner gas at 450–500°.

Catalytic materials. HENRY DREYFUS. Fr. 691,210, Mar. 5, 1930. Catalytic materials, which are exhausted or poisoned in gas reactions such as the synthesis of MeOH, are reactivated or regenerated by submitting them to the action of gases rich in H at temps. not appreciably above those used in the catalytic operation.

Catalyst supports. MONSANTO CHEMICAL WORKS. Fr. 691,356, Nov. 21, 1929. A support for catalysts consists of a porous mineral substance such as kieselguhr, covered with a layer of SiO_2 and preferably having the form of uniform pellets. The support may be used for compds. of V or Pt in the manuf. of SO_3 from SO_2 and O.

Condensation products. SOC. ANON. POUR L'IND. CHIM. À BÂLE. Swiss 140,428, June 15, 1928. The condensation product from 1 mol. urea and at least 2 mol. CH_2O is treated with thiourea in such quantity that there is at least 2 mol. CH_2O to each mol. of the urea-thiourea mixt. The end product is worked up in such a way that most of the free CH_2O is taken up. Thus, 120 parts urea is dissolved in 334 parts CH_2O (36%) and mixed with blood charcoal and filtered. The soln. is neutralized with KOH and 45 parts thiourea are added. On leaving for 2 days the free CH_2O decreases from 6 to 0.5 vol. %. Other examples are given.

Hardening formaldehyde-urea condensation products. I. G. FARBENIND. A.-G. (Robert Griessbach and Müller von Blumencron, inventors). Ger. 510,513, Oct. 17, 1925. CH_2O and urea condensation products and derivs. are hardened by subjecting the surface to the action of gaseous or dissolved SO_2. The reaction may be carried out either cold or warm. Examples are given.

Impregnating fibrous materials with phenolic condensation products, etc. I. J. NOVAK. Brit. 334,232, May 27, 1929. An impregnating material is prepd. by con-

densing cresylic acid with formaldehyde in the presence of at least 1 mol. proportion of NH_3 for every 4 mol. proportions of cresylic acid, mixing this condensation product with china wood oil, and heating the mixt. until it is sufficiently clarified to remain limpid when cool. Any excess of cresylic acid may be removed by adding $(CH_2)_6N_4$ or polymerized formaldehyde.

Compositions resistant to the electric arc. BAKELITE CORP. Fr. 689,126, Jan. 30, 1930. Compns which are resistant to the elec. arc are prepd. by condensing together by heat a fatty oil such as tung oil and a phenol in the presence of a promoter (such as phosphoric acid), the phenol being in excess with respect to the amt. necessary to produce a resinoid with the fatty oil, then eliminating the free phenol or combining it with a hardening agent such as hexamethylenetetramine. A cellulosic material may be added as a filler.

Plastic compositions. I. G. FARBENIND. A.-G. (Karl Daimler, Kurt Sponsel and Gerhard Balle, inventors). Ger. 508,930, Feb. 14, 1925. Films, folios, coatings, etc., insol. in water and difficult to swell, are prepd. from cellulose ethers and albuminous material in the presence of NH_3 or its volatile derivs. Thus, a mixt. of Me cellulose soln., tannin, NH_3 and water are poured on a glass plate to form a film. Other examples are given.

Plastic materials. DEUTSCHE GASGLÜHLICHT-AUER-GES. M. B. H. Fr. 688,962, Jan. 27, 1930. Azelaic acid is esterified with glycerol, with or without the addn. of condensation agents Part of the glycerol may be replaced by other mono- or polyhydric alcs., and part of the azelaic acid may be replaced by other uni- or multi-valent acids.

Plastic materials from carbohydrates and alkylene oxides. I. G. FARBENIND. A.-G. Brit. 334,282, June 4, 1929. Materials such as potato meal, dextrin or cotton are treated with ethylene oxide or propylene oxide and alkali soln. such as NaOH of 20% strength or less, at ordinary temp. and without application of pressure, to form water-sol. products of varying soly. in org solvents.

Thermoplastic material. SIMMONS CO. Fr. 691,094, Mar. 5, 1930. A material of cellular structure which sets on heating is made by mixing a substance which sets on heating, such as a synthetic resin, with a substance which liberates gas under the action of heat, such as hexamethylenetetramine, and heating the mixt. in a hermetically sealed mold.

Artificial masses. SOC. ANON. POUR L'IND. CHIM. À BÂLE. Swiss 141,223, Oct 23, 1928, and 141,224, Nov. 6, 1928. One mol. of an aromatic amine is condensed with not more than 1 mol. of an aldehyde in the presence of an acid, and the resinous product is pressed with a further amt. of aldehyde after removal of the acid. Thus, 1 mol. $PhNH_2$ is condensed with 1 mol. 40% CH_2O in HCl. The acid is removed and the resin (m. 180–200°) hardened by further CH_2O. Other examples are given The CH_2O hardening agent may be replaced by alc., acetone, C_6H_6, etc., and the whole pressed.

Porous masses. A. A. BRYUSHKOV, P. I. YUDINSON and P. N. SHABLUIKIN. Russ. 66,013, Mar. 9, 1930. Porous masses prepd. with saponin alginate froth are characterized by the addn. of tripoli contg. a natural admixt. of lime and preliminarily burned at a temp. not exceeding 1000°. This mixt. is given the required shape, and it is then steam-treated in boilers.

Adhesive compositions. BAKELITE CORP. Fr. 691,293, Mar. 6, 1930. An adhesive is composed of a wax-like chlorinated $C_{10}H_8$ and a natural resin or deriv of a natural resin, such as colophony, copal, latex, rubber or esters of resins.

Colloidal solutions or pastes. I. G. FARBENIND. A.-G. Fr. 689,711, Feb. 11, 1930. Colloidal solns. or pastes of insol. substances, such as inorg. salts or oxides or org. dyes, are obtained by means of polymerization or transformation products of butadiene or its homologs substituted in the 1 position or 1 and 4 positions, which do not distil without decompn., or their derivs., alone or with other substances. Cf. *C. A.* 25, 420.

Gluing wood with starchy materials. EUGEN ABRAMOWITSCH. U. S. 1,788,608, Jan. 13. Starch-contg. substances such as corn, potato or rice flours in unconverted state are applied to wood surfaces to be glued, and the substances are then converted into strong adhesives by heating under pressure to about 90°. Polymerized formaldehyde or $MgCl_2$ may be added.

Separating soluble substances after crystallization together. IMPERIAL CHEMICAL INDUSTRIES, LTD., and H. E. COCKSEDGE. Brit. 334,169, March 14, 1929. The sepn. may be effected by sieving followed by elutriation in an inert liquid, and the size of the particles may be controlled, during crystn., by seeding, addn. of supersatd. solns. or

addn. of colloids such as gelatin. Examples are given of the sepn. of $NaNO_3$ and KNO_3 by sieving followed by elutriation in a soln. satd. with both salts, and of the sepn. of Na_2CO_3 and NaCl by control of particle size during crystn. followed by sieving or elutriation or both.

Furnace for powdered materials such as limestone rocks or cement. JULIEN BELLAY. Fr. 36,855, May 1, 1929. Addn. to 663,106 (*C. A.* **24**, 699).

Superposed-hearth rabble furnace suitable for roasting sulfide ores. HANS KLENCKE. U. S. 1,788,767, Jan. 13.

Derivatives of iron carbonyl. I. G. FARBENIND. A.-G. (Robert Zell, inventor). Ger. 512,223, Apr. 8, 1928. Compds. such as $Fe(CO)_4Br_2$ and $Fe(CO)_4(CNS)_2$ are prepd. by reacting an iron carbonyl with a halogen, CN or CNS in the absence of water. The products are more stable to heat than $Fe(CO)_4$ and yield pure CO when treated with water. They may be used for *destroying vermin.*

Synthetic stones. I. G. FARBENIND. A.-G. Fr. 689,679, Feb. 10, 1930. The surface of synthetic stones such as corundum or rubies is made smooth by a short treatment with fused borax.

Condensation products. SOC. ANON. POUR L'IND. CHIM. À BÂLE. Fr. 37,012, June 6, 1929. Addn. to 638,082 (*C. A.* **23**, 248). The final treatment of concn., in the presence of a catalyst, of the soln. obtained after the addn. of thiourea or a mixt. of thiourea and urea to the primary condensation soln. is carried out only after the greater part of the free CH_2O has been fixed and this in a neutral medium at ordinary or slightly raised temp.

Halogenated albumin from blood serum. AKT.-GES. FÜR MEDIZINISCHE PRODUKTE. (Ernst Flater, inventor). Ger. 510,305, Mar. 13, 1926. Crude blood serum is treated with an alc. soln. of a halogen. Examples are given.

Steeping dried casein. FRITZ SCHMIDT. Ger. 510,693, Sept. 20, 1924. Dried casein is steeped in a mixt. of water and water-sol., neutral, readily volatile org. substances such as alc., acetone, ethyl lactate, etc., and warmed to a temp. well below 100°. The process is suitable for the manuf. of *artificial horn, etc., from casein.*

Agglomerates. COMPAGNIE FRANÇAISE D'EXPLOITATION DES PROCÉDÉS PLINATUS. Fr. 36,636, Jan. 3, 1929 Addn. to 665,430 (*C. A.* **24**, 933). Fillers such as sawdust are added to the agglomerates of the prior case.

Filling compositions. BAKELITE CORP. Fr. 691,294, Mar. 6, 1930 A filling or coating compn. contains chlorinated $C_{10}H_8$ (corresponding with $C_{10}H_4Cl_4$) 39, gilsonite 27 and fossil wax 34%. Bitumen may be added to the compn.

Material for gaskets or sheet packing. MERRITT T. RHODES. U. S. 1,789,114, Jan. 13. Asbestos paper free from inorg. filler is treated with an admixt. of glue, glycerol and formaldehyde and cured by heat (the asbestos fiber remaining in the product substantially the same as in the asbestos paper), and the material is provided with a flame-proof coating formed of casein, formaldehyde and phenol. An acid- and moisture-proof, heat-resisting material is thus obtained.

Etched printing plates. A. AXTHELM. Brit. 334,629, June 13, 1929. The design on the plate is coated with resin or other suitable resist powder, and the plate is then exposed to the action of a vapor from which liquid is pptd. to convert the powder into a smooth layer. App. is described.

Lithographic printing plates. RUDOLPH A. GLASER (to Gardner Abbott, as trustee). U. S. 1,789,138, Jan. 13. An image is projected directly onto the plate by the action of high-intensity actinic light rays upon a lithographic coated printing surface permeable to such a light, the light-struck portions of the plate are impregnated with an asphaltum ink soln. to form an ink-receiving image, the light-struck portions of the coating are washed away, and the bare surface of the plate is cleaned to form a surface capable of taking moisture and resisting ink.

Composition for making and treating rollers of printing apparatus. S. BEAUNE. Brit. 334,183, May 22, 1929. Inking rollers are provided with an elastic and easily cut coating, such as may be formed of wax, whitening, gelatin and glycerol; wiping rollers have a coating of similar compn. which are rinsed with alc. and then treated in a satd. alum soln., kept at about 3° for at least 24 hrs and rubbed with chamois leather to prepare the rollers for use. A solvent such as CCl_4 may be used for cleaning. Various structural details are also described

Wetting agents. I. G. FARBENIND. A.-G. Fr. 689,357, Feb. 3, 1930. Derivs. of sulfuric esters of higher fatty acids or hydroxy fatty acids are prepd. by treating sulfuric esters of higher fatty acids or hydroxy fatty acids with alkylating agents or treating the alkali salts with univalent lower alcs., preferably with the addn. of an acid agent acting as a catalyst. Examples are given. The products have high wetting powers.

Wetting, etc., agents. DEUTSCHE HYDRIERWERKE A.-G. Fr. 690,352, Feb. 21, 1930. A product which may be used as a wetting, cleaning, washing or emulsifying agent is composed of alkali salts of phosphoric and boric acids with sulfonates of org. materials and with or without alcs. of high mol. wt. Thus, a mixt. of Adrinople red oil, borax and terpineol may be used.

Wetting and emulsifying agents. BRITISH DYESTUFFS CORP., LTD. Fr. 36,744, Mar. 19, 1929. Addn. to 635,264. The sulfonation of the prior case is carried out at a temp. of or below 65°.

Artificial sponge. I. G. FARBENIND. A.-G. Fr. 36,662, Mar. 28, 1929. Addn. to 672,136 (*C. A.* 24, 2257). In the manuf. of artificial sponge from viscose and a filling material, mixts. of neutral salts free from water of crystn. and neutral salts contg. water of crystn. are used as filling material. An example is given in which a soln. of viscose is mixed with fibrous material, crystd. Na_2SO_4 and calcined Na_2SO_4. Cf. *C. A.* 24, 500.

Artificial sponges. I. G. FARBENIND. A.-G. Fr. 37,092, Mar. 29, 1929. Addn. to 672,136 (*C. A.* 24, 2257). Artificial sponges are made from viscose and a filling substance, the elimination of which gives the desired porous structure, fibrous materials being used if necessary. The mixt., after molding, preferably with heat, is submitted to a complementary treatment in an atm. of air, gases or vapors kept under pressure and satd. with steam, and to which a gas combining with bases, such as CO_2, may be added. Cf. *C. A.* 24, 500.

Compositions resistant to liquids. BAKELITE CORP. Fr. 691,295, Mar. 6, 1930. An artificial moldable compn. contains a phenolic resin and a substance which prevents deformation, occasioned by absorption, of objects made from the compn., *e. g.*, 3–5% of water.

Bleaching compositions. PILOT LABORATORY, INC. Brit. 334,531, May 27, 1929. Higher fatty acid peroxides and peroxy compds such as valeryl, caproyl, capryl, lauryl, palmityl, oleyl, stearyl and ricinolyl peroxides and peracids, suitable for *bleaching*, for use in *pharmaceutical prepns.*, for synthesis, as *bactericides*, as *internal antiseptics*, for use in *skin-bleaching creams* and in *dentrifices*, are prepd. by treating higher fatty acid chlorides with a soln. of an alkali metal peroxide preferably of a concn. not over 10%. Various details and examples are given Cf. *C. A.* 24, 4364.

Polishes. GASTON ROELANDTS. Fr. 37,088, Mar. 9, 1929. Addn. to 652,410 (*C. A.* 23, 3588). A polish for a nitrocellulose or cellulose ester varnish contains an agent which will soften without dissolving the surface. An example given contains nitrocellulose 30, AcOBu 45, toluene 18, EtOH 7 and tricresyl phosphate or butyl phthalate 20 parts.

Metal-cleaning compounds. GRINNELL JONES. Can. 307,581, Jan. 13, 1931. A metal polish comprises an intimate mixt. of Mg, Na acid tartrate and Cu oxide. An abrasive such as infusorial earth may be added.

Metal-cleaning compound. GRINNELL JONES. Can. 307,582, Jan. 13, 1931. A compn. for cleaning tarnishable metals comprises an intimate mixt. of finely divided Zn 33.3 g., Na acid tartrate 100.0 g. and Cu oxide 10 g., the mixt. being dispersed in a non-aq. medium.

Heat-producing composition. WILMER C. GANGLOFF (to The Dracket Chemical Co.). Can. 307,690, Jan 13, 1931. A heat-producing compn. comprises 19 oz. NaOH and 1 oz. Al plus a metal that does not ordinarily undergo an exothermic reaction with NaOH alone. The compn. is used for cleaning sink drain pipes, sewer pipes, sewage-disposal lines, etc.

Coating composition. RAY P. DINSMORE (to The Goodyear Tire and Rubber Co.). Can. 307,702, Jan. 13, 1931. Metallic bodies are coated with several thin films of a material comprising gelatin and polyglycerol, each film being subjected to the action of alum, formaldehyde or other tanning agent. This compn. is used for the joints of sectional bodies

Iodide paper. VIKTOR BAUSCH. JR. Ger. 512,381, Sept. 1, 1929. Iodide paper for telegraphy, particularly for transmitting pictures, contains a no. of different metal iodides, *e. g.*, KI and CdI_2, with or without ZnI_2.

Cardboard from mineral constituents. GOSUDARSTVENNOYE VSESOYUZNOYE OB'EDINENIE BUMAZHNOI PROMUISHLENNOSTI. Russ. 8630, May 10, 1926. Mined asbestos, slate and similar material are broken up into pieces, and dried to a 7–12% water content, depending on the amount of fibrous material to be later incorporated. The mixt. is disintegrated by the usual methods and sifted to sep. the mineral dust of varying grain size. The mineral fiber is then mixed with this dust in different proportions and worked up into board by the usual methods.

Inert atmospheres. WESTINGHOUSE ELECTRIC & MANUFACTURING CO. Fr.

37,091, Mar. 28, 1929. Addn. to 590,307. A deoxidizing material to establish an inert atm. over oils used for elec. app., particularly transformers, is composed of a mixt. of charcoal treated to remove constituents forming ash and H, with a substance facilitating oxidation of the charcoal at a moderate temp., such as a chloride of Co, Mn, Ni or Na, Na_2SO_4, KI or NaOH, and a binding agent. The whole is formed into a block. Constituents forming ash and H may be removed by a treatment with Cl at about 600°.

Magnetic materials. LE MATÉRIEL TÉLÉPHONIQUE (SOC. ANON.). Fr. 689,570, Feb. 7, 1930. The characteristics of magnetic materials are improved by a gaseous or solid cementation.

Magnetic cores. INTERNATIONAL STANDARD ELECTRIC CORP. Ger. 510,231, Dec. 8, 1927. In the manuf. of cores from superficially oxidized particles of a magnetizable metal, the oxide layer is produced by warming the powd. metal in an atm. richer in O than air. The metal powders may be mixed with a compd. evolving O, *e. g.*, Sb_2O_5 or PbO_2.

Diaphragms for loud-speakers, telephones, microphones, etc. H. VOGT. Brit. 334,605, June 8, 1929. Diaphragms are made from foil of an alloy formed mainly of Al (suitably 94%) together with Cu (suitably 4%) and Si (suitably 2%). Details of tempering, etc., are described.

Dental floss. CARL PFANSTIEHL. U. S. 1,789,052, Jan. 13. The floss is passed through a heated liquid bath contg. galactonic lactone and withdrawn through a superposed layer of melted waxy material such as beeswax, paraffin or ceresin. App. is described.

Fireproofing wood, textile fabrics, etc. I. G. FARBENIND. A.-G. Brit. 334,408, Sept. 28, 1929. The material is impregnated or coated with solns. or suspensions of combustion-retarding substances such as NH_4 phosphate or sulfate, silicates, or Zn salts and urea-formaldehyde condensation products (which adhere to the material and prevent crystn.). Glue, starch, etc., also may be added. Several examples with details of treatment are given. Cf. *C. A.* 24, 4364.

Foam for fire extinguishers. EXCELSIOR FEUERLÖSCHGERÄTE A.-G. Ger. 510,533, Sept 2, 1926. A device for producing foam by directing water under pressure on to powd. chemicals such as a mixt. of $NaHCO_3$, $Al_2(SO_4)_3$ and saponin is described. Cf. *C. A.* 24, 4907.

Use of methyl bromide, pentachlorothane, carbon dioxide, etc., in fire extinguishers. PYRENE CO., LTD., and J. N. HUNTER. Brit. 334,552, June 5, 1929. Various details of fire-extinguisher construction and operation are described.

Device for quenching fires in containers for inflammable liquids with carbon dioxide, etc. ERICH GRÄBER. Ger. 510,698, Dec. 6, 1924.

19—GLASS, CLAY PRODUCTS, REFRACTORIES AND ENAMELED METALS

G. E. BARTON, C. H. KERR

Antique artistic glass. E. BERL. *Chem.-Ztg.* 54, 913–4(1930).—The compn. of an ancient glass cup is 72.8% SiO_2, 19.3% K_2O + Na_2O, 5% CaO, *i. e.*, approx. that of lab. soft glass. A fragment heated in steam for 6 hrs. at 200° is strongly attacked. Restoration involves careful annealing partially to remove the network of fine cracks covering the surface. As a protective coating, cellulose ester lacquer is suggested.
B. A. SOULE

Note on the influence of various radiations on the coloration of glass. A. LECRENIER AND P. GILARD. *Rev. belge ind. verrieres* 1, 214–5(1930).—Ultra-violet radiation modifies the internal compn. of glass by producing different states of oxidation. The modifications disappear at the softening temp. The action of radioactivity may be purely phys. Some glasses are rendered radioactive and luminescent. Investigations were made on glasses of various compns.
M. A. E.

The decoloration of glass. GEORG JAECKEL. *Glastech. Ber.* 8, 257–65(1930).—Distinction is made between phys. (Nd, Ni, Co) and chem. (Mn, Ce) decoloration. It is shown that with Fe a change of color can be accomplished only by changing the oxidation state of the Fe. The effects of Mn, Ce, Nd, Co and Ni as decolorizers are presented in a color chart. Se presents difficulties; its use in the form of Zn selenide is suggested. X-ray treatment affects color of Mn and Se glass but not of Ni or Co glass.
M. A. E.

The refining of glass. G. GRUBHOFF, H. KALSING AND M. THOMAS. *Glastech.*

Ber. **8**, 1–24(1930).—"Refining" is defined as the freeing of the glass melt from visible seeds. The efficiency of the following in refining an alkali-lime batch has been investigated: Na_2SO_4; Na_2SO_4 with C; C; Na_2SO_4 with KNO_3; KNO_3; As; As with nitrate; NH_4 salts; alkali chlorides; F compds. The literature on these and other refining materials is surveyed, and a gas-pressure theory of refining developed. A later report will present a quant. comparison of various refining materials. M. A. E.

Influence of the size of the opacifying particles on the form of the dispersion curves of opaque glasses. H. Schoenborn. *Glastech. Ber.* **8**, 280–3(1930).—The size of the opacifying particles dets. the relation between the direct and the total transmission, both in opaque solns. and in technical opaque glasses. M. A. E.

Constituents and advance calculation of soda-borosilicate glasses. Oscar Knapp. *Glastech. Ber.* **8**, 154–8(1930).—The influences of varying the percentages of Na_2O and B_2O_3 on the working qualities and on the coeff. of expansion are presented in tabular form. Comparison is made with calcd. values of the coeff. of expansion. M. A. E.

Investigation on the colloidal nature of cadmium sulfide glass. G. A. Suckstorff. *Glastech. Ber.* **8**, 270–5(1930).—The absorption spectrum and the Tyndall cone were investigated in relation to percentage of coloring material and to temp. in 3 technical CdS glasses. From these expts. S. has concluded that CdS glass is not normally colloidally colored glass. The form of the absorption spectrum is due to various causes. Probably the lack of a sharp limit in the short-wave region is due to destruction of CdS at high temps. M. A. E.

X-ray transmission of some beryllium glasses. C. Gottfried. *Glastech. Ber.* **8**, 283–5(1930).—Values calcd. from the compn. are compared with observed values for 22 glasses which contain varying percentages of Si, Be, Al, Ca, Mg, Na and O. M. A. E.

Determination of the state of oxidation of iron and manganese in glass. Franz Salaquarda. *Glastech. Ber.* **8**, 265–70(1930).—Various quant. procedures are given. The independence of color in respect to Fe_2O_3 content is discussed. The formation of the higher Mn oxide depends on oxidizing conditions during melting. When both Fe and Mn are present, MnO_2 gives off O during the melting and remains in the glass as MnO. M. A. E.

Influence of moisture in sand on the mixing of the glass batch. I. I. Kitaigorodski and Ya. A. Shkolnikov. *Keram i Steklo* **6**, 415–9(1930).—The results of tests showed that a min. quantity of moisture of 0.2 to 1.3%, depending on the kind of sand used, greatly increased the homogeneity of the batch. The permissible max. was 3.5%. M. V. Kondoidy

Ancient Chinese chemical industries. V. Pottery. J. P. Li. *Chem. Ind* (China) [2], **5**, 43–57(1930).—A review. Wm. H. Adolph

Measurement of the plasticity of clays. G. W. Scott Blair. *J. Phys. Chem.* **35**, 374–82(1930).—When different clay pastes are compared at the same concns., it is found that the mobilities and yield values depend upon the hydration capacity rather than upon the plasticity. For clays flowing under low shearing stresses there is a critical shearing stress which is closely related to the plasticity of the clay. Electrolyte mixts. contg. both a coagulant and a peptizer increase plasticity. S. B. S.

Simple method for determining the refractoriness of clay. P. A. Zemyatchenskii and F. A. Zenkovich. *Trans. Ceram. Research Inst* (Moscow) No. **24**, 1–29(1930).—Clays were pulverized, mixed into a paste and molded into cones. When the clay samples did not fuse, fluxes were added, and relative refractoriness was thus obtained. Fe_2O_3 and CaO, which do not produce a eutectic, proved to be the best fluxes. Tables were compiled from which the fusing points could be detd. M. V. Kondoidy

Velocity of temperature increase in testing deformation [of refractory clays]. V. Zegshda. *Trans. Ceram. Research Inst.* (Moscow) No. **24**, 66–73(1930).—The rate of heating greatly affected results and must not exceed 5° per min. M. V. K.

Report on red roofing tile. W. Emery. *Brit. Clayworker* **39**, 351–7(1930).—Water smoking consumes 82% of the firing time but only 17% of the fuel. R. A. H.

Russian and Slovakian magnesite. E. Dworzak. *Feuerfest Ofenbau* **6**, 145–50 (1930).—Chem. analysis and mech. testing of Russian and Slovakian brick show that the former contains 10% more MgO (*i. e.*, 92%), has a higher softening point, impact resistance and porosity, shows less sintering and brittleness, and has a lower sp. gr. They have the same slag resistance. Granular refractories from both sources have the same sintering properties. The best size to use is 5 mm. or smaller. Anything larger requires the addn. of fines. Steel works may increase sintering of Russian material by adding up to 15% Martin slag of 5-mm. diam. B. A. Soule

Mullite formations in ceramic bodies. L. SOLODOVNIKOVA. *Trans. Ceram. Research Inst.* (Moscow) No. 25, 45–56(1930).—By microscopical investigations of different ceramic bodies, S. found mullite formations, the size and quantity of which depend on the temp., duration of firing and porosity. The investigation of a porcelain tube of a thermo element subjected to a temp. of 1600° showed the body changed into a vitrified ground mass with mullite as needle crystals. Their prism angle was 89°26′; $n_g = 1.655$ and $n_p = 1.643$; double refraction = 0.125; $2V = +49°30'$. An old glass-melting pot showed crystalline mullite needles with n of 1.64 to 1.65 and a double refraction of about 0.012. Several kaolin cones, grog pieces and mixts. of kaolin and Al_2O_3 were also studied. M. V. KONDOIDY

The milling of pottery materials. LEONARD ANDREWS. *Pottery Gaz.* 55, 1891–7 (1930). R. A. HEINDL

Nepheline cyanite and nepheline apatite in porcelain industry. V. M. PERMYAKOV. *Keram. i Steklo* 6, 456(1930).—P. discusses the possibilities of using nepheline cyanite and nepheline apatite instead of feldspar in the porcelain and faïence industries, although these minerals are rich in Fe_2O_3 (5 to 6%). Investigations showed that by lowering the Fe_2O_3 content to 0.7 to 0.9% the nepheline cyanite and nepheline apatite, whose deposits are very large in U. S. S. R., can be used with success instead of feldspar. M. V. KONDOIDY

Kaolin as a raw material for refractories. E. KÖHLER. *Trans. Ceram. Research Inst.* (Moscow) No. 25, 1–44(1930).—The testing materials were prepd. from 50% raw kaolin and 50% grog which was fired to 1200°, 1250° and 1600°. The compn. and properties of the materials used are tabulated. The samples were fired to 1200°, 1350°, 1600° and 1750° and tested. The refractoriness of all kaolins was Cone 36. A special app. used for detg. deformation showed, that by firing to high temps., it is possible to prepare very resistant products which show no deformation with 2 kg./sq. cm. pressure at temps. over 1550°. Kaolin is a valuable raw material for refractories. M. V. KONDOIDY

Effect of gases from bagasse and coffee hull fuels on boiler masonry. F. W. FREISE. *Feuerfest Ofenbau* 6, 150–2(1930).—Tests of some 20 materials for boiler masonry where the fuel is high in K_2O (bagasse 34.66%, coffee hulls 45.15%) indicate that acid refractories are strongly attacked. Masonry for boilers on heavy duty should contain over 60% Al_2O_3. Tables of compn., properties and reactions of materials tested are given. B. A. SOULE

Specifications for tank blocks. W. J. REES. *Pottery Gaz.* 55, 1898–901(1930). R. A. HEINDL

Discovery of boric acid in the glazes of Aretine vases. R. NASINI. *Compt. rend.* 191, 903–5; *Nature* 126, 877–8(1930).—With the assistance of R. Grassini, N. has definitely established the fact that H_3BO_3 is a constituent of the glazes on vases excavated at Arezzo. J. H. MOORE

Glazes without lead. O. V. CHEREPOV. *Keram. i Steklo* 6, 537–8(1930).—The compn. of these glazes for earthenware is tabulated. Glazes contg. MgO were best; they had a smooth, lustrous surface, and did not affect the quality of the colors under the glaze. M. V. KONDOIDY

CHAMOT, M.: **English Medieval Enamels.** London: Ernest Benn, Ltd. 7s. 6d.

JEBSEN-MARWEDEL, HANS, OPPERMANN, GUSTAV, AND ZIMPELMANN, ERICH: **Gemenge-Bereitung. Bericht.** Frankfurt: Deutsche Glastechnische Ges. 21 pp. M. 4.

LECRENIER, AD., AND GILARD, P.: **La vie du verre.** Liége: Georges Thone. 186 pp. Reviewed in *Ceram. Abstracts* 9, 1040(1930).

PUKALL, W.: **Pukall's Keramische Abhandlungen.** Coburg, Germany: Sprechsaal, Müller und Schmidt. 350 pp. Reviewed in *Z. angew. Chem.* 43, 764–5; *Ceram. Abstracts* 9, 894(1930).

ZSCHACKE, F. H.: **Glas. Seine Herstellung und Verwendung.** Dresden: Th. Steinkopff. 208 pp. M. 12; bound, M. 13.50.

Glass. DEUTSCHE VERBAND DER FLASCHENFABRIKEN G. M. B. H. Ger. 510,944, June 23, 1926. A device for placing molten glass at the bottom of the glass mold is described.

Apparatus for feeding mold charges of molten glass. THEODORE C. STEIMER (to Hartford-Empire Co.). U. S. 1,788,413, Jan. 13. Structural features.

Apparatus for feeding mold charges of molten glass. LAX & SHAW, LTD., J. E. BRANFORD and J. F. SHAW. Brit. 334,213, May 29, 1929. Structural features.

Apparatus for feeding mold charges of molten glass. C. H. RANKIN and RANKIN AUTOMATIC GLASS FEEDER CO., LTD. Brit. 334,560, March 6, 1929. Various details of construction and operation are described.

Apparatus and mechanical operations for forming molded and blown glass articles. UNITED GLASS BOTTLE MANUFACTURERS, LTD., and T. C. MOORSHEAD. Brit. 334,586, June 6, 1929.

Apparatus for making blown glass articles such as bottles. W. L. VAN NESS (to Corning Glass Works). Brit. 334,453, Dec. 18, 1928. Numerous details of construction and operation are described.

Blowing hollow glassware such as bottles. A. C. FORSTER. Brit. 334,186, May 27, 1929. App. and various details of operations are described.

Apparatus for shaping glass tubing. GEORGE A. MILLAR (to General Electric Vapor Lamp Co.). U. S. 1,788,926, Jan. 13. Structural features of an app. adapted for making switch-body bulbs, etc. U. S. 1,788,927 also relates to app. suitable for working hollow glass articles.

Apparatus for splicing hollow glassware such as tubes and bulbs. ROY D. MAILEY and WILFORD J. WINNINGHOFF (to General Electric Vapor Lamp Co.). U. S. 1,788,954, Jan. 13. Structural features.

Water-cooled casting table for forming and rolling glass plates or sheets. Y. BRANCART. Brit. 334,488, Feb. 21, 1929. Structural features.

Apparatus for sheet-glass production. NESTOR MAMBOURG (to Libbey-Owens-Ford Glass Co). U. S. 1,788,923, Jan. 13. Structural features.

Cooling glass plates. N.-V. MIJ. TOT BEHEER EN EXPLOIT VAN OCTROOIEN. Ger. 510,506, June 4, 1927.

Protecting glassware from the attack by hydrofluoric acid. N. F. ZHIROV. Russ. 51,673, May 24, 1929. Glassware is protected by a layer formed by a mixt. of ceresin, rosin and tar.

Laminated glass sheets (safety glass). A. G. WORRALL (to L. J. Kolb). Brit 334,768, Oct. 30, 1928. App and various details of manuf. are described.

Uniting glass sheets with sheets of pyroxylin composition or the like. LIBBEY OWENS GLASS CO. Brit. 334,378, Aug. 30, 1929. The glass sheets are coated with a mixt. of gelatin, a solvent for the gelatin such as water, a cellulose deriv. such as nitro cellulose and a solvent for the latter such as acetone, and a mutual solvent such as HOAc. Various details and modifications of compns. and procedure are described

Safety glass. HANS KINON. Fr. 688,846, Jan. 25, 1930. The sheets of glass are artificially roughened by chem. or phys. means to create points of adherence for the intermediate layer.

Safety glass. SOC. DES USINES CHIM RHÔNE-POULENC. Fr. 688,884, April 1929. Safety glass is made by joining sheets of glass covered with an appropriate adhesive with a sheet of plastic material at ordinary temp. The process takes place in a bath composed of a volatile liquid, which is a non-solvent for the plastic material in the cold and a solvent when hot; afterward pressure is applied in a heated autoclave.

Safety glass. SOC. DES USINES CHIM. RHÔNE-POULENC. Fr. 36,863, May 4, 1929 Addn. to 658,563 (*C. A.* **23**, 5291). The assembled sheets after removal from the bath described in Fr. 658,563 are submitted to a light pressure of short duration and placed in an autoclave contg. a gaseous fluid under pressure and preferably above ordinary temp.

Glass-making furnace. LA TECHNIQUE VERRIÈRE (SOC. ANON. FRANÇAISE) Fr 689,276, Feb. 3, 1930.

Open-hearth glass-melting furnace. A. V. GRUM-GRZHUIMAILO. Russ. 7217, Mar. 16, 1926. Constructional details.

Furnace for annealing glass objects. JACQUES CHAUDRON. Fr. 689,898, April 10, 1929.

Annealing furnace for glass products. THEODOR TEISEN. Fr. 690,155, Feb. 1930.

Chamotte-, Dinas- and similar bricks. ROBERT AUGUSTIN. Ger. 510,556, June 21, 1928. The dry or half-dry molded bricks are subjected to pressure, wetted and again pressed.

Device for filling the hollow separating walls of ceramic kilns with sand. BORKESSEL & CO. M. B. H. Ger. 510,872, Nov. 29, 1928.

Gravity-feed tunnel kiln suitable for burning ceramic products. TAINE G. McDOUGAL (to A C Spark Plug Co.). U. S. 1,788,885, Jan. 13.

Drier for ceramic products. JEAN RAPPOLD. Fr. 690,627, May 6, 1929.

Chamber drier for tiles, etc., arranged directly above the annular kiln. JULIUSZ JANASZEWSKI Ger. 510,050, Aug. 28, 1928.

Tunnel furnace for baking porcelain, etc. RENÉ M. D'ARLEUX and ÉMILE VIOLETTE. Fr. 36,615, Mar. 30, 1929. Addn. to 593,695.

Making ceramic nozzle plates for artificial fibers. FIRMA CARL ZEISS. Ger. 510,069, Jan. 25, 1925. Manipulative features are described.

Vitrified stone ware. GEWERKSCHAFT WESTEND. Ger. 510,700, April 7, 1927. Finely ground chamotte or brick dust is mixed with clay to form the ware, and the plasticity is diminished by adding chamotte or brick dust previously heated to glowing at 900–1000°. The ware is then vitrified at 1250–1280°.

Making quartz objects. LA SOCIÉTÉ QUARTZ & SILICE. Ger. 510,507, Feb. 16, 1927. The parts of the object are made separately of quartz and then heated *in situ* till they become plastic and stick together.

Fused silica. W. GLEICHMANN. Brit. 334,720, Sept. 20, 1929. For obtaining fused silica free from bubbles, pieces of rock crystal, which have been preheated to about 600°, are fed into the flame of an O-H blowpipe so that they are projected by the flame against a surface where they gather to form a fused mass. App. is described.

Refractory objects. MARCEL FOURMENT. Fr. 36,973, Mar. 14, 1929. Addn. to 638,843 (*C. A.* **23**, 495). In heating refractory materials as described in the prior case, the conducting piece serving as heating element inside the refractory material is made of a substance having a m. p. near the baking temp., so that at the end of the operation it may be melted and poured away.

Blocks for lining furnaces. RAYMOND C. BENNER and GEORGE J. EASTER (to Carborundum Co.). U. S. 1,789,131, Jan. 13. Blocks of refractory material such as SiC or graphite are pressed in a direction perpendicular to the plane of the exposed faces of the blocks in order to lessen their permeability.

Enamels. SOC. INDUSTRIELLE DE FUSION, RECHERCHES ET APPLICATIONS DU QUARTZ. Fr. 689,742, Feb. 12, 1930. Quartz or silica glass is used as a support for enamels.

Enamel coatings. OSCAR HOMMEL. Fr. 688,994, Jan. 28, 1930. Metallic objects are coated with a layer of an oxide of a metal of the Fe group before coating with enamel.

20—CEMENT AND OTHER BUILDING MATERIALS

J. C. WITT

Electrofused cement. M. KAUCHTSCHISCHWILI. *Siemens-Z.* **10**, 536–41, 560–2 (1930).—Alumina cement possesses numerous known advantages over the best portland cement. The chem. compn., properties, uses and advantages are discussed. The elec. fusion process is most suitable for the prepn. of a uniform product. A high yield is obtained with an elec. arc tapping furnace which may be operated continuously or intermittently. An elec. furnace designed and installed by Siemens and Halske A.-G. for the manuf. of alumina cement is described. The furnace is built for multi-phase current operation and is provided with 3 C electrodes arranged in a triangle. A special masonry is used to protect the bottom, and the walls are water-cooled. Production and efficiency are increased by the use of continuous electrodes. The raw materials, alumina, lime, iron oxide and SiO_2, are crushed, mixed and introduced into the furnace, the bauxite having been previously heated at 800° to remove moisture. Since the m. p. of the molten mixt. is relatively low, 1400°, over-heating must be prevented to reduce objectionable side reactions and vaporization loss. This may be accomplished by use of electrodes of large cross section, small c. d., relatively high arc tension, and large bath surface. The fluid cement is tapped from 2 holes into cast-iron troughs of 275 to 325 kg. capacity, after which it is treated in the usual manner for cement klinker. For each ton of cement are required 0.7–0.8 ton of bauxite, 0.4–0.45 ton of calcined lime, 700–800 kw. hrs. and 7–8 kg. of electrodes. ALLEN S. SMITH

Concrete control saves cement, yields high strengths and speeds work. ERNEST A. HAGY AND CHARLES T. KENNEDY. *Eng. News-Record* 105, 850–2(1930).—A brief description of the system of concrete control employed during construction of the Carew Tower Building, Cincinnati, involving the placing of approx. 40,000 cu. yd. of concrete. The results demonstrate that the water-cement ratio law applies in the field of building construction, and that intelligent design and rigorous control can be depended upon to produce uniform high-strength concrete with increased workability and decreased cost of materials and labor. Forms were removed in 3–4 days.

R. E. THOMPSON

Overheating of aggregates found detrimental to concrete. Wm. H. Bachelder. *Eng. News-Record* **105**, 973(1930).—Strength and flow tests on concrete prepd. with aggregates and mixing water heated to give batch temps. of 70°, 100° and 130°F. when discharged from the mixer are shown graphically. Measuring workability by flow, 5.7 gal. of water per sack of cement was required for 70° concrete, 6.07 gal. for 100° concrete and 6.85 gal. for 130° concrete to obtain the same workability when using a 1:2.07:3.12 mix by wt. Strength tests indicated that concrete placed at 130° loses approx. 20% of its strength and that less than half the loss in strength is due to the higher water-cement ratio. No attempt was made to prevent loss of heat after concrete was placed. Tests for water content indicated that about $^1/_6$ of the addnl. water used in the 100° concrete and about $^1/_4$ of that used in the 130° concrete were lost before the concrete was tamped. As would be expected, the time of setting was reduced by heating the mix. R. E. T.

The preparation of a new road binder. C. F. Broadhead. *Gas World* **93**, 298 (1930).—A reply to Broadhead (*C. A.* **24**, 4912). New data are submitted on the ultramicroscopic C particle no. of distd. tar and "Bitural." For distd. tar the C particle count per cc. was found to be 4×10^8 and for "Bitural" 17×10^8. It is claimed that the higher C particle no. of "Bitural" is indicative of its superiority as a road tar.

F. H. Bergeim

Asphaltic bitumen and its use in breweries. L. Aerts. *Bull. assoc. étudiants école sup. brasserie univ. Louvain* **30**, 106–10(1930).—A brief outline of the uses of asphalt in the building industry, more particularly as regards its applications in the brewing industry. A. Papineau-Couture

Manufacture of portland cement and cupriferous Fe from slag (Bradbury) 9. Fireproofing wood, etc. (Brit. pat 334,408) 18. Furnace for powdered materials such as limestone rocks or cement (Fr pat. 36,855) 18. Apparatus for separating solids from gases (lime and cement industries) (Fr. pat. 690,558) 1.

Breger, Joh.: **Über die Elastizität von Gesteinen.** Berlin: Preuss. Geolog. Landesanstalt. 53 pp. M. 3.75. Reviewed in *Tonind.-Ztg.* **54**, 1138; *Ceram. Abstracts* **9**, 1093(1930).

Graf, Otto: **Versuche mit verschiedenen Kiessanden, namentlich zur Beurteilung der für gewöhnlichen Eisenbeton und der für Eisenbeton** mit besonders guter Kornzusamensetzung zu wählenden Körnungen. Versuche mit Würfeln verschiedener Grösse. Einfluss der Art der Ermittelung der Würfelfestigkeit Vorausbestimmung der Druckfestigkeit des Betons. Berlin: W. Ernst & Sohn. 30 pp. M. 9.15.

Grundy, R. F. B.: **Builders' Materials.** London: Longmans, Green & Co. 240 pp. 5s. Reviewed in *Intern. Sugar J.* **32**, 591(1930).

Losach, Pierre: **L'industrie des agglomérés. La fabrication des carreaux** de **ciment.** Paris: Revue des matériaux de construction et de travaux publics. 39 pp

Wecke, Friedrich: **Zement.** Dresden: Th. Steinkopff. 96 pp. M. 4.80; bound, M. 6.

Yoshida, Hirohiko: **Über das elastische Verhalten von Beton mit bes. Berücksichtigung der Querdehnung.** Berlin: J. Springer. 114 pp.

Cement. Antoni Eiger. Swiss 137,693, Feb. 11, 1929. See Austrian 115,702 (*C. A.* **24**, 2265).

Cement. Soc. des ciments portland artificiels de Couzon. Fr. 690,021, Feb. 15, 1930. An artificial portland cement is made from a primary material composed of a single deposit of sedimentary origin, contg. in mixt. the essential elements of cement but in disproportionate amts. The elements are sepd. by heating the mixt. to a temp. below that at which they combine, grinding, whereby the lime elements are reduced to a finer powder than the hard siliceous elements, and sifting.

Grinding mill and associated cooling chambers suitable for use in cement manufacture. Lionel D. Parker (to Vickers-Armstrongs, Ltd.). U. S. 1,789,021, Jan 13 Structural features.

Apparatus for partial dehydration of cement mud before its admission into the rotary kiln. A. A. Vorobyev. Russ. 62,191, Jan. 11, 1930.

Rotary cement kiln. A. A. Vorobyev. Russ. 63,537, Feb. 1, 1930.

Rotary kiln for making fusible cement, with means for separately preheating the ingredients. Studienges. zur Bauxitverwertung G. m. b. H. Ger. 510,049, Sept. 25, 1929.

Asbestos-cement tiles. Waagtaler Syenit Asbest Schieferfabrik A.-G. Ger.

510,787, Feb. 25, 1928. A dry cement dye mix is scattered on the tiles, which are to be colored on one side, and sucked into the material by a vacuum app.

Device for removing rolled asbestos-cement tubes while still plastic. KARL HERZOG. Ger. 510,550, Sept. 23, 1928.

Aluminous cement castings. SPERANZA SEAILLES and JEAN SEAILLES (to Alfred P. Bourquardez). U. S. 1,789,197, Jan. 13. Castings having a polished translucent surface are formed of aluminous cement contg. less than 1.5% of Fe.

Concrete. RÖCHLINGSCHE EISEN- UND STAHLWERKE A.-G. Fr. 689,363, Feb. 3, 1930. Blast-furnace dust, from the treatment of minette either alone or mixed with fine ores in the furnace, is concreted by mixing it with lime-contg. substances such as converter waste, slaked lime or the equiv.

Concrete pipes. ALPHONS HORTEN. U S. 1,788,718, Jan. 13. A plastic cement compn. is formed around a heated tapered hollow core formed with an enlarged portion at the end of larger diam., and is allowed to set first in air and then in hot water. A cooling medium is circulated through the core while continuing the heating of the set plastic material, in order to facilitate sepn. of the core from the concrete pipe.

Concrete piles. AUGUST E. SCHUTTE. U. S. 1,788,748, Jan. 13. After forming a concrete pile, it is surrounded (before setting) with an adherent coating comprising a mixt. of portland cement "grout" and asphalt.

Monolithic concrete paving slabs. BERTRAND H. WAIT. U. S. 1,788,785, Jan. 13. Structural features.

Paving material. WM. T. RAGLAND. U. S. 1,788,887, Jan. 13. A substantially liquid binder such as heated mineral pitch is placed in a mixing app.; there is then blown into the app. in diffused and scattered condition the different grades of aggregate; and the materials are agitated upon the introduction of each grade of aggregate. Cf. *C. A.* **24**, 5129.

Bituminous paving compositions. E. C. WALLACE. Brit. 334,588, June 6, 1929. See U S. 1,749,651 (*C. A.* **24**, 2267).

Bituminous paving material. SOUTH METROPOLITAN GAS CO. and H. PICKARD. Brit. 334,336, July 23, 1929 A material suitable for spreading while hot on a road foundation comprises coal 18–25% dispersed in tar (which may be admixed with not exceeding 25% its wt. of pitch), and hard stone of size between about 1 cm. down to dust. Various details of prepg. the mixt. are given.

Artificial stone. ROBERT KUNZ. Ger. 512,467, Nov. 27, 1928. In the manuf. of plates from fibrous material and a hydraulic binder, a small quantity of an oil or fat, particularly mineral oil, is added at any convenient stage. Breakage under the action of heat is thus avoided.

Artificial stone resembling travertine. JOHN A. RICE (to Bubblestone Co.). U. S. 1,788,592, Jan. 13. A stiff foam formed by beating a mixt. of casein and rosin is distributed through a cementitious material and the latter is then allowed to set.

Treating stones. JOSEPH GIOVANNINI. Fr. 688,990, Jan. 28, 1930. Stones are given the appearance of marble by heating them in a furnace to about 250°, then putting them into an aq. soln. of a salt such as a metallic sulfate, NaCl, alum, borax or $MgCO_3$ and polishing.

Imitation marble slab or the like. NATHAN E. NEWMAN. U. S. 1,789,111, Jan. 13. An asbestos slab is dried, immersed in a waterproofing bath such as a vegetable oil and naphtha and, after being permitted to dry, is treated with a filler and with a coating of lacquer; the lacquered surface is rendered smooth and there is transferred to it by a photogravure process a facsimile marble pattern; over this is placed a coating such as lacquer and the coating is highly polished.

Cellular blocks, etc. SOC. LORRAINE DES ACIÉRIES DE ROMBAS. Fr. 690,045, Feb. 15, 1930. Cellular agglomerates which may be made in the shape of blocks, etc., are made by mixing the sand obtained by granulating blast-furnace slag with cement obtained from slag.

Antiweathering agent. WALTER GURNIK. Ger. 510,871, May 12, 1929. An antiweathering agent for coating building materials, especially cement, consists of a mixt. of Euphorbiaceae oil and resin hardened with $ZnCrO_4$. Color may be added. The example mentions 38 parts resin melted with 1.9 parts $ZnCrO_4$ with 32 parts oil of *Dryandria cordata* and boiled linseed oil, and 30 parts drying material.

Stucco or plaster. LOUIS E. CHASSEVENT. Ger. 510,699, May 16, 1926. Plaster, etc., is made by stirring gypsum with warm water so that the temp. of the mixt. is maintained above 60°.

Plaster of Paris. OTTO RICHTER. Ger. 512,325, July 24, 1929. A mortar from

which hard, weather-resistant objects can be made is prepd. by mixing gypsum with water and $Al(OAc)_3$.

Artificially colored materials such as granulated blast-furnace slag for surfacing roofing, etc. HAROLD L. LEVIN (to Patent and Licensing Corp.). U. S. 1,788,625, Jan. 13. Granules of blast-furnace slag are provided with a coloring formed *in situ* (suitably by heating with $FeSO_4$ or dichromates) and fused onto the surfaces by a sintering together of the microscopic projections on the surfaces, without vitrification of the surface texture.

Material suitable for roofing, insulating, etc. ALBERT C. FISCHER (to Philip Carey Mfg. Co.). U. S. 1,789,284, Jan. 13. Material such as roofing felt is satd. with an oil and coated with a bituminous compn. or other suitable mastic of lasting adhesiveness which is sticky to the touch. U. S. 1,789,285 relates to generally similar material satd with a drying oil such as China wood oil (which may be used with a non-drying oil also). U. S. 1,789,286 relates to generally similar material satd. with a mixt of bituminous material such as pitch or gilsonite and a non-drying oil such as castor oil. U. S. 1,789,287 describes a similar product which may be formed of felt or paper satd. with waterproofing material such as a suitable oil and coated with a sticky bituminous material such as a tacky road oil together with resin, castor oil and rubber, "mineral rubber" or a varnish gum. Cf. *C. A.* **24**, 4609.

Artificial wood. MARC J. A. A. LEFRANCQ. Fr. 691,311, May 16, 1929. Waste wood with the addn. of 1–3% of a siccative such as MnO_2 and 2–8% of a drying oil is molded under pressure and heat.

Preserving wood. I. G. FARBENIND. A. G. Fr. 36,639, Jan. 26, 1929. Addn. to 663,356. Mercurized aliphatic hydrocarbons such as mercurized ethyl bromide are used for preserving wood.

Wood impregnation. I. G. FARBENIND. A.-G. Brit. 334,202, May 28, 1929. Salts or salt-like compds. are used such as those formed from 2,4-dinitrophenol, 3,5-dinitro-2-hydroxy-1-methylbenzene or like nitrated phenols and hydroxyalkylamines such as mono- and di-hydroxyethylaniline, mono-, di- and tri-hydroxyethylamine and the corresponding hydroxypropylamines. Other preservatives, fungicides, etc., may be conjointly used.

Impregnating wood with a bituminous composition. A. V. GRIDNEV. Russ. 54,827, Sept. 17, 1929. The wood is placed in a container charged with about 27 parts by wt. of Syrian asphalt and 5 parts blown linseed oil dissolved in 68 parts C_6H_6. The temp. is then raised to 50–60° and the pressure to about 3–4 atm.

21—FUELS, GAS, TAR AND COKE

A. C. FIELDNER

The rational processing of fuels. HECTOR HARDY. *Bull. soc. belge. ing. ind* 10, 623–63(1930).—A dissertation on the principles of fuel preparation in which the applications of coal washing, flotation, briquetting, high- and low-temperature carbonization and solvent treatment are discussed. H. L. OLIN

Sulfur in motor fuels. GIORGIO ROBERTI. *Atti III congresso naz. chim pura applicata* 1930, 540–6.—The S content of motor fuels in various countries is shown, as well as the corrosive action of high S content on motor cylinders. Methods of S removal in refining are reviewed. E. M. SYMMES

New ways for recovery and application of coal. H. A. J. PIETERS. *Chem. Weekblad* **27**, 542–6(1930).—A short review. B. J. C. VAN DER HOEVEN

The Jharia coal field. C. S. FOX. *Memoirs Geol. Survey India* **56**, 255 pp.(1930). F. gives a thorough discussion of the geology of this area (125 pp.) and of the coal reserves (65 pp.). Natural coke occurs in the regions intruded by igneous rocks. Workable coal seams occur in 6 of the 12 stages into which the Damuda group of sediments have been sub-divided in this field. Typical analyses of coal from each of the 6 stages, Telmucha, Murulidih, Bhagaband, Jialgora, Caleira and Muraidih are, resp.: moisture 2.11, 2.20, 1.80, 1.59, 0.70, 0.65; volatile matter 28.40, 27.68, 28.80, 24.00, 18.75, 14.20; fixed C 52.80, 57.20, 59.30, 62.40, 63.05, 68.00; ash 18.80, 15.12, 11.09, 13.60, 18.20, 17.8%; and calorific value 6607, 7403, 7209, 7403, 6882 and 7141. In addn. 122 other analyses are tabulated. Details of grading and classification of coal by the Indian Coal Grading Board are given. Reserves in millions of tons are: to 500 ft.—1707; to 1000 ft.—3122; to 2000 ft.—4237. Good coking coal (to 1000 ft.) reserves are 800 million tons. ALDEN H. EMERY

The proposed British standard specification for the sampling and analysis of coal. R. LESSING. *Gas World* 93, 440–1(1930).—A discussion. F. H. BERGEIM

The plastometer. A new instrument for measuring the plastic properties of coal. JOSEPH D. DAVIS. *Ind. Eng. Chem., Anal. Ed.* 3, 43–5(1931).—The app. is described and tests on a few coking coals are given. J. H. MOORE

Combustion tests with Illinois coals. ALONZO P. KRATZ AND WILBUR J. WOODRUFF. Univ. Ill. Eng. Expt. Sta., *Bull.* No. 313, 58 pp.(1930).—This report covers the results of an investigation of Illinois coals from La Salle, Peoria, Franklin and Williamson counties, undertaken to compare their performance characteristics as detd. by their influence on the overall efficiency, temp. of the flue gases, combustion rate and draft required when the boiler unit was operated at given steaming capacities; and to study the incidental factors, such as excess air and ash-pit and flue-gas losses, as influenced by the phys. and chem. characteristics of the coals. The boiler employed was a B and W unit of 5080 sq. ft. heating surface, designed to operate at 160 lb. and equipped with a chain grate stoker with flat suspended ignition arch, natural draft being used. Results showed (1) that av. overall efficiencies based on all tests were 62.9% for the northern coals and 65.6% for the southern; (2) that the max. attainable capacity with the furnace used varied inversely as the ratio of volatile matter to fixed C in the coal; (3) that the setting must be high to permit the combustion of Illinois coals without loss due to unburned hydrocarbons; (4) that the Williamson and the Peoria county coals displayed a tendency to coke at low loads, resulting in ash-pit loss on the chain grate, while those from Franklin and La Salle counties were non-coking; (5) that draft requirements were not materially different for the 4 coals but that the use of sized coals resulted in higher capacities than were possible with unsized fuel. H. L. OLIN

Nature of bitumens from coal. G. STADNIKOV AND R. WAHNER. *Brennstoff-Chem.* 12, 23–5(1931).—Bitumen extd. by a C_6H_6-C_2H_5OH mixt. at atm. pressure following HCl treatment of coal, already extd. with C_6H_6-C_2H_5OH in a Soxhlet app. (bitumen A) and C_6H_6 under pressure (bitumen B), has been named bitumen C. These 3 bitumens extd. from the various layers of the Chachareisky, the Tscheremchorsky and the Schilkinsky deposits have been completely examd. Comparative data are tabulated for yields, m. p., acid, sapon. and I nos., and C and H contents. Bitumen is a product of the decompn. at extn. temps. of org. acids; CO_2 seps. in the depolymerization. F. W. JUNG

The influence of inorganic constituents in the carbonization and gasification of coal: the liberation of ammonia. A. H. EASTWOOD. *Gas J.* 192, 745(1930).—The tests were carried out on a fusible coal contg. 1% ash. Lime, $CaCO_3$ and Fe oxide were added in amts 5% by wt. of the coal and the mixts. were carbonized in atms. of N_2, H_2 and steam N_2 contg. 60% steam. The time of carbonization was 9 hrs., the temp. being advanced in stages of 100° from 200° to 1000°. With coal alone NH_3 evolution commences at 300° and reaches a max. at 700°. In a neutral atm (N_2) carbonization up to 1000° yields 17% of the N of the coal as NH_3. With a H_2 atm. the yield of NH_3 is 33.3%, and with steam and N_2 the yield is 25%. When the inorg. constituents referred to above were added to the coal NH_3 evolution began at 300° in all cases. Lime or $CaCO_3$ raises the NH_3 obtained up to 1600° from 17 to 22% with a N_2 atm. while Fe oxide decreases the yield to 15%. With an atm. of H_2, $CaCO_3$ increases the yield from 33 to 37%. CaO gives a slightly less increase and Fe oxide has no effect. In the presence of steam N_2, CaO raises the yield from 25 to 34%, $CaCO_3$ to 32% and Fe oxide raises it slightly. The mechanism of the effects of the inorg. constituents is discussed. F. H. BERGEIM

Investigation of benzine prepared from brown coal by high-pressure hydrogenation without addition of tar. J. VARGA AND I. MAKRAY. *Brennstoff-Chem.* 12, 21–2(1931).—Eocene brown coal from the Tataer district was hydrogenated in a rotating autoclave, with an initial H pressure of 110 atm., by holding 1–2 min. at 470° As catalyst, 330 g. Fe_2O_3 was used with each charge of 2200 g. pulverized coal. A yield of 440 cc. oil boiling under 230° was obtained per run, 50% of the ash- and moisture-free coal being made sol. in C_6H_6. Six yields of oil, each distd. to 230° from an Fe flask, were combined, dehydrated with fused Na_2SO_4, and twice redistd. to 230° from a Cu flask, giving an oil of d. 0.884 and 21% sol. in 14% alkali. The compn. was: bases (chiefly tertiary) 3.00, phenol 1.58, cresols and higher phenols 19.42, unsatd. compds. 6.60, C_6H_6 0.70, toluene 2.02, xylenes 2.65, other aromatic compds. 6.13, paraffins and hydroaromatic compds. 53.80%; naphthalene was absent. Boiling ranges and gravities are given for the various fractions. F. W. JUNG

The Valdarno lignite industry. The Castelnuovo mine of the Società mineraria del Valdarno. DARIO RAFFO. *Atti III congresso naz. chim. pura applicata* 1930, 163–70.—Descriptive. E. M. SYMMES

Developments in the study of combustibles. MARIO G. LEVI. *Atti III congresso nas. chim. pura applicata* 1930, 171–88.—A review of recent methods of fuel research, with illustrations. E. M. SYMMES

Thermal measuring equipment in the economical operation of gas works. A. GRUNWALD AND W. LIESEGANG. *Siemenschrift* 1930, No. 4–5; *Gas u. Wasserfach* 73, 1170–3(1930).—Various points where temp. or vol. may be measured are mentioned. Resistance thermometers permit distant reading. Mention is made of the Ardometer, which follows the pusher of a coke oven-plant and permits detn. of wall temps. A water-cooled head eliminates radiation effects. Boiler flue gas analyzers for CO_2 and CO + H_2 are mentioned. The article is illustrated. R. W. RYAN

Re-forming natural gas. W. W. ODELL. Bur. Mines, *Tech. Paper* 483, 54 pp. (1930); cf. *C. A.* 24, 710.—When the ignited fuel bed of a water-gas generator is alternately blasted with air and a hydrocarbon gas such as natural gas, the resultant gas is comprised largely of H_2, the remainder being CH_4. C is entrained in the gas and can be recovered. As much as 8 lb. per 1000 cu. ft. of natural gas treated was recovered Operating data and factors influencing the results are given. When the ignited fuel is alternately blasted with air and both steam and natural gas in controlled proportions, re-formed gas is produced substantially without entrained C, the gas consisting of CO, H_2 and lesser CH_4. The thermal efficiency and gas-making capacity are higher in generating re-formed gas in this manner than in making water gas and the fuel used per 1000 cu. ft. of re-formed gas is lower. Operating data and factors influencing results are given. Propane and butane were re-formed in a similar manner with similar results The relative amts. of steam required for various hydrocarbon gases are different. Equations showing this relation are given. By using the re-forming process natural gas can be used during periods of off-peak demand in the generation of city gas having a relatively lower calorific value; the re-formed gas thus made, when enriched with natural gas, has a compn. and a sp. gr. comparable to that of city gas manufd. by other standard methods. ALDEN H. EMERY

Liquefied petroleum gas. O. M. SETRUM. *J. Western Soc. Eng.* 35, 448–65(1930) A story relating how natural gas has been "made portable, put on wheels, as it were, and widely distributed." Many large plants make use of this new means of gas generation and enrichment. The properties of these fuels have been carefully detd. By controlling the mfg. process, by lab. tests and checks and the strict adherence to rigid specifications, products of unusual uniformity are obtained. A brief résumé is tabulated of the characteristic properties of com. propane and com. butane. The liquefied petroleum gases are especially valuable to the gas industry, being readily transported as a liquid and converted into a gas at the utilization point. Utilization is classified into 3 major groups, based on the methods of distribution and application of the liquefied petroleum hydrocarbons, as follows: (1) direct gas service, (*a*) individual domestic distribution in cylinders, (*b*) community distribution in pipe lines, (*c*) industrial use, (2) gas enrichment and cold carburetion, (*a*) enriching water gas, blue gas or other gases of low thermal value to meet calorific standards, (*b*) re-carburetion to offset thermal loss due to compression and transmission of manufd. gas; (3) base material for mfg. gas, (*a*) meeting peak-load conditions, (*b*) reforming to produce a low-gr. gas of high thermal value, (*c*) butane air carburetion, the Philfuels process of gas manuf A diagrammatic flowsheet is shown of a plant using butane to make gas. W. H. B

Carbureted water gas and the influence of temperature on the composition of the tar formed. T. B. GLOVER. *Gas J.* 191, 702–4; 192, 38–42(1930).—Carbureted water gas produced under the usual operating conditions is always satd. with $C_{10}H_8$. When blended with coal gas from vertical retorts the mixed gas has a higher $C_{10}H_8$ content than can be tolerated. Three series of expts. were used in the study of water-gas production: (1) the series detg. the conditions of protective atm. and time of contact, (2) the effect of changing the cracking temp. of the oil on the nature of the products, (3) the effect of the different oil vapor concns. obtained by varying the rate of oil input. The tests were carried out on a Davison Partner generator of 10 ft. 6 in. external diam and having a gas-making capacity of 1½ million cu. ft. per 24 hrs. The gas oil used for the carbureting had the following percent compn.: olefins 17, aromatics 3, paraffins and naphthenes 80 and polycyclic compds. traces. The cracking temps. used were 720°, 740°, 770°, 800°, 820°, giving, resp., tars of the following polycyclic compound content calcd. as $C_{10}H_8$: 14.7, 16.1, 18.9, 21 and 23. The sp. grs. of the tars were 1.060, 1.087, 1.095, 1.090 and 1.120. In another series of tests the temp. was kept const. at 770° and the addn. of oil in gals. per min. was varied as follows: 4.22, 5.88, 7.68. The resp. sp. gr. and polycyclic compd. contents of the resultant tars were 1.425, 1.11, 1.058 and 29.9

26, 21.9. **Distn. tests are given on the tars produced and hydrocarbon group analyses on the distillates.** F. H. BERGEIM

Generation of power from wood waste. OSWALD WANS. *Chem. Age* (London) **23**, 546–7(1930).—A generator suitable for producing fuel gas from wood waste is described. Air is passed freely through a bed of burning wood waste. The issuing gas consists largely of CO and N, with a calorific value of about 155 B. t. u. per cu. ft. The gas generation takes place more freely than with coke, probably because of the lower d. and porous nature of the charcoal. The gas may be used in gas engines or for heating purposes. When used for heating, oxide purifiers are not required because the wood gas is practically free from S compds. The consumption of wood waste is said to be about 2.25 lb. per h. p. hr. with a typical sawmill waste with an av. moisture content of 20–25%. CHANNING W. WILSON

Possible improvements in gas producers. JENS RUDE. *Gas World* **93**, 320 (1930).—The advantage of introducing steam into the producer is treated from a theoretical standpoint. F. H. BERGEIM

Corrosion of cross stream plate air heaters and its prevention. K. BURWICK. *Die Wärme* **53**, 875–7(1930).—It is demonstrated that corrosion of flue gas air heaters must occur if the temp. of the entering air lies essentially below the dew point of the heating flue gas (10° to 15°). A set of curves shows the dew points of flue gases from important fuels. Three processes, with diagrams, are given for preheating the cold air to the dew point temp.: (1) part of the heated air is returned to the intake of the heater; (2) the cold air passes first through a heater warmed by the heated air; and (3) steam or hot water is used. ALLEN S. SMITH

Some experiments on vertical retorts. H. B. KENDRICK. *Gas World* **93**, 571–3 (1930).—In a retort it is contact with highly heated surfaces and not radiant heat that is most active in destroying hydrocarbons. The central core of coal in a vertical retort is the cool zone and the lower coke zone is the hot zone. The gases evolved from the cool zone are richer in hydrocarbons. Approx. 2 vols. of gas are evolved from the hot zone to 1 vol. from the cool zone. Poking during carbonization improves the quality of the gas and lowers the temp. of the exit gas. F. H. BERGEIM

The control of vertical retorts (for continuous carbonization). H. B. KENDRICK. *Gas J.* **190**, 306–9(1930).—Reasons are given for the contention that continuous vertical retorts are more amenable to scientific control than intermittent systems such as horizontal retorts. A Glover-West setting is described. By use of the author's methods of control the thermal yield has been increased to 90%. In operating a vertical retort it is objectionable to attempt to increase the yield and alter the quality of the gas by increasing the vacuum in the gas stream as this loads the gas with inerts, lowers the efficiency of conversion and draws in an excess amt. of air through pores in the setting. A very low vacuum in the heating chamber is desirable. The retort should be kept under a slight pressure. The quality of the gas is best controlled by first adjusting the quantity of steam to the temp. of the retort and making the final adjustment for quality by regulating the throughput of coal. Over-steaming must be guarded against as it may seriously affect the efficiency of the plant. F. H. BERGEIM

The impact hardness, abrasion hardness and reactivity of coke. T. A. MOTT. *Gas World* **93**, Coking Section, 97(1930).—See *C. A.* **24**, 5981. F. H. BERGEIM

The utilization of coke breeze by the Trefois producer. A. L. HOLTEN AND H. C. APPLEBEE. *Gas World* **93**, 340–4(1930).—The Trefois producer installed experimentally has proven satisfactory for the manuf. of producer gas from coke breeze. F. H. BERGEIM

The dry quenching of coke. W. O. RENKIN *Blast Furnace & Steel Plant* **18**, 1803–6(1930).—The Sulzer dry-quenching system is described and illustrated. Dry-quenched coke (through 3-inch or 2-inch screen) stands up better against the standard shatter test than wet-quenched coke. The utilization of the sensible heat to produce steam derives a revenue that in many cases pays for the dry quencher in a very short time. Heat recovery is approx. 1,000,000 B. t. u. per net ton of coke, and an efficiency of 95%. Where the coke ovens are fired with producer gas there is a saving, due to the ability to use dry-quenched coke all through a $^7/_8$ inch screen, and use approx. 25 lb. (11.4 kg.) less of fuel per net ton (909 kg.) produced. Absence of moisture in the extreme coke fines produced makes it more readily mixable with the coal charged to the ovens. The arrangements of several types of plants are indicated. W. H. BOYNTON

Semi-silica versus lime-bonded silica for coke-oven walls. H. D. BENNIE. *Gas World* **93**, Coking Section 113(1930).—Semi-silica bricks have the following properties: (*a*) immunity from spalling, (*b*) permanency of vol. under modern coking conditions, (*c*) sufficient refractoriness under the loads imposed by modern oven design, (*d*) the

min. of thermal reversible expansion, (*e*) the peculiar property of improving in use as regards cond., diffusivity and refractoriness without any accompanying evils.

F. H. BERGEIM

Modern steam technic in the cellulose industry (MALM) **23.** The micro structure of wood tracheids, from observations on the fibrous material of fossil wood (OPFERMAN, RUTZ) **23.** The fiber structure of lignite (LUFT) **23.** The preparation of a new road binder (BROADHEAD) **20.** The origin of coal (BERL, *et al.*) **8.** Alcohols, aldehydes, ketones, hydrocarbons and H from vegetable substances (Brit. pat. 334,724) **10.** Purifying oils, etc. (Fr. pat. 689,625) **22.** Utilizing waste waters from coal-gas manufacture (Ger. pat. 481,306) **14.** Utilizing industrial waste waters (Ger. pat. 510,056) **14.** Introducing powdered material into vessels under pressure (Fr. pat. 690,534) **13.** Gas purifier (Russ. pat. 39,069) **1.**

GWOSDZ, J.: **Kohlenwassergas.** Bd. 19 of "Monograph Kohle- Koks-Teer." Halle: Wilhelm Knapp. 204 pp. Unbound, M. 18; bound, M. 19.50. Reviewed in *Colliery Guardian* **141,** 1140; *Ceram. Abstracts* **9,** 1088(1930).

Taschenbuch für Gaswerke, Kokereien, Schwelereien und Teerdestillationen. Edited by HEINRICH WINTER. 5th ed. Halle (Saale): W. Knapp 606 pp. M 12.50; bound, M. 14.

WEISS, M.: **Das Trochnen der Kohle.** Bd 25 of "Monographs Kohle- Koks Teer." Halle: Wilhelm Knapp. 196 pp. Unbound, M. 15; bound, M. 16.60 Reviewed in *Colliery Guardian* **141,** 1140; *Ceram. Abstracts* **9,** 1087(1930).

Fuel. JEAN F. A. BRUZAC. Fr. 689,021, Jan. 28, 1930. A fuel suitable for Diesel engines is made by treating crude petroleum, schist oils, lignite oils, etc., with ozonized air or ozone, washing with a 2% NaOH soln and distg. Gasoline is first distd and then an oil of gas-oil type which is the product desired.

Synthetic fuels. JACQUES LOUIS FOHLEN Fr. 37,076, Dec 23, 1927. Addn to 631,927. The carbonaceous materials used for the reduction of an ore on the one hand and the manuf. of synthetic liquid fuels on the other are present in higher percentage than in a simple metallurgical operation. The yield in liquid fuels is increased by using a high speed of ascending gases with respect to the speed of the descending solids.

Pulverulent fuel for internal-combustion engines. RUDOLF PAWLIKOWSKI Ger 510,311, May 11, 1927. The pulverulent fuel, *e. g.*, coal, lignite, peat, or coke, is freed from low-melting mineral constituents by treating with acid and washing. If the removal of such constituents is not complete, reagents may be added to convert them into difficultly fusible compds. Details of the grinding, washing and drying processes are described.

Liquid fuels. COMPAGNIE INTERNATIONALE POUR LA FABRICATION DES ESSENCES ET PÉTROLES. Fr. 691,172, May 15, 1929. Liquid fuels comprising light hydrocarbon mixts. are prepd. by distg. carbonaceous materials at low temp., purifying and enriching the product with H in the presence of a catalyst, and further hydrogenating the gaseous products of this process. The distillate is again distd. to give light and medium oils, the latter being cracked to give further light oils, the whole of these light oils being vaporized and the vapors returned to the main gas stream.

Motor fuels. JEAN H DE LIGNAC. Fr. 36,884, Feb. 5, 1929. Addn to 679,101 (*C. A.* **24,** 3632). About 20% by vol. of water is added to crude benzene, and the mixt is distd. The benzene is sepd. from the water which retains the impurities.

Treatment of carbonaceous materials. WILLARD C. ASBURY (to The Standard Oil Development Co.). Can. 307,956, Jan. 20, 1931. Carbonaceous material, solid at normal temp., is converted to hydrocarbon oils by grinding and making it into a fluent mass with hydrocarbon oil, subjecting the mass to treatment with a gas rich in H under conditions for hydrogenation, allowing the mass to settle, withdrawing a suspension of solid material in oil and withdrawing oil substantially free of solid material.

Distillates from carbonaceous materials. ROBERT P RUSSELL (to The Standard Oil Development Co.). Can. 307,957, Jan. 20, 1931. Finely divided, solid carbonaceous material suspended in heavy hydrocarbon oil is maintained at an elevated temp. under high pressure in contact with a gas rich in free H, a part of the suspension is withdrawn, and the pressure on the part withdrawn is reduced, whereby a substantial part of the hydrocarbon liquid is vaporized. The vapor is separately condensed.

Oven for the low-temperature distillation of finely granular fuels. METALLGES A.-G. Ger. 512,220, Aug. 17, 1928.

Apparatus for low-temperature carbonization of bituminous material. I. G. FAR-

BENIND. A.-G. Brit. 334,443, Nov. 6, 1929. In app. of the general character described in Brit. 306,723 (*C. A.* **23**, 5313), in which the material is passed through a bundle of tubes in which it is internally heated, each tube is made to taper from the inlet end to the discharge end.

Coal agglomerates. PAOUL GHEZZI. Fr. 689,796, Feb. 12, 1930. Coal is agglomerated with sulfite cellulose liquor to which slaked fat lime or black fused cement is added.

Grading sieve for large and small coal. PAUL DURST and PETER COLLAS. Ger. 510,796, Sept. 21, 1928.

Washing and classifying device for coal and ores. CLÉMENT CLOUWEZ. Ger. 512,317, Mar. 26, 1925.

Sand separator for coal dust. ZEITZER EISENGIESSEREI UND MASCHINENBAU A.-G. Ger. 510,702, July 17, 1928. Addn. to 507,771 (*C. A.* **25**, 799).

Separating mixtures of coal and oil. I. G. FARBENIND A.-G. Fr. 689,274, Feb. 3, 1930. Oils are sepd. from mixts. of oil and coal, particularly residues from hydrogenation of coal, tars, etc., by filtering them in a fluid state at a high temp. through a layer of filtering material or screen, and eliminating the rest of the oil by distn., extn. or emulsification. The distn. is preferably carried out on the filter in such a way that the vapors pass through the filter.

Dehydrating coal, etc. I. G. FARBENIND. A.-G. Fr. 36,611, Mar. 28, 1929. Addn. to 669,519 (*C. A.* **24**, 1961). The process of the prior case in which water is eliminated from carbonaceous material by distn. in the presence of solvents, is applied to the drying of coal, peat, etc., which are to be treated with H under pressure for conversion to valuable products.

Apparatus for carbonizing coal. AMERICAN ENGINEERING CO. Fr. 688,739, Jan. 23, 1930. The coal is heated and distd. to a state of semi-coke. The semi-coke is burnt in a suitably adapted furnace and the combustion gases are used for drying, pre-heating and distg. the coal.

Apparatus for carbonizing coal, schists, etc., at low temperature and for the treatment of ores. JOHN E. HACKFORD. Fr. 690,502, Feb. 24, 1930.

Hydrogenation of coal. ALFRED MENTZEL. Fr. 689,386, Feb. 4, 1930. Coal is hydrogenated for the production of liquid hydrocarbons in layers of not more than 5 mm. thickness and in contact with catalysts by hydrogenating gases. The coal may be caused to travel over a surface which may itself form the catalyst.

Hydrogenating coal and similar materials. A. MENTZEL. Brit. 334,389, Oct. 12, 1928. Coal or the like, in granular form, is subjected, in thin layers not exceeding 5 mm. in thickness, to the action of hydrogenating gases in the presence of catalysts, and preferably so that the gas stream employed effects loosening and movement of the granular particles under treatment. Various details of procedure are described.

Hydrogenation processes. N.-V. DE BATAAFSCHE PETROLEUM MAATSCHAPPIJ. Fr. 691,303, Mar. 6, 1930. Valuable products such as oils, etc., are obtained by heating coal, lignite, tar, mineral oils and their derivs., cellulose, wood, etc., under pressure with H in the presence of a catalyst composed of a mixt. of 2 or more metals or metallic compds., *e. g.*, metal oxides or hydrates. Thus a mixt. of oxides of Fe and Al contg. water or not may be used.

Briquetting fine coal or semi-coke. GUSTAV HILGER. Ger. 510,807, June 10, 1928. Addn. to 437,528. Details of the app. are given.

Apparatus for determining the melting point of materials such as coal ash. GERRIT A. DEGRAAF (to Eimer & Amend). U. S. 1,789,098, Jan. 13. An app. is arranged for electrically heating a specimen while carried on a support in a controlled atm. and while under observation through a pyrometer and magnifier, both of which are focussed on the specimen.

Montan wax. I. G. FARBENIND. A.-G. (Wilhelm Pungs and Michael Jahrstorfer, inventors). Ger. 510,485, Feb. 18, 1927. Crude or deresinified montan wax is bleached with a regenerated CrO_3 soln. contg. Cr compds. (calcd. as Cr_2O_3) 70–140, free H_2SO_4 200–440 and total H_2SO_4 250–550 g. per l. Cf. *C. A.* **25**, 800.

Olefins. I. G. FARBENIND. A.-G. Fr. 36,812, Mar. 12, 1929. Addn. to 643,413. A gas rich in olefins is obtained by introducing coal into the median zone of a furnace heated to an appropriate temp. and allowing the gaseous products to escape at the top of the furnace, while the coal in its descent is freed from all volatile constituents.

Plant for treating adsorption oil containing benzene and dilute aqueous ammonia. G. V. KOPELEVICH. Russ. 47,970, May 25, 1929. Constructional details.

Gas. HUMPHREYS & GLASGOW, LTD. Fr. 690,533, Feb. 25, 1930. A gas suitable for domestic or industrial use is made by passing blue water gas over an appropriately

heated catalyst to transform an appreciable part of the H and CO in the gas into CH_4, CO_2 and steam, passing more water gas with steam over a heated catalyst to transform an appreciable part of its CO into H and CO_2, adding the second gaseous product to the first and sepg. CO_2 and steam.

Purification of gas. Soc. Belge d'electro-synthèse "Sobelsyn" (Soc. anon.). Fr. 689,440, Feb. 5, 1930. Ammoniacal waters from the distn. of coal, etc., are treated with $FeSO_4$, filtered and used for removing NH_3 and S from distn. gases. The wash waters may be electrolyzed in the anodic compartment of an electrolytic bath, the diaphragm of which is composed of a layer of crude natural phosphate deposited on the cathode for the production of a *fertilizer*.

Removing sulfur compounds from gases. I. G. Farbenind. A.-G. Brit. 334,526, March 2, 1929. S-bearing gases such as coal gas, coke-oven gas or producer gas are purified, with recovery of sulfate and S, by at least partially converting the H_2S into SO_2 by catalytic oxidation, and bringing the hot gases produced into contact with a liquid contg. thiosulfates, decompg. them with formation of sulfates and S. Various details and modifications of procedure are described. Cf. *C. A.* **25**, 400.

Combustible gas. Humphreys & Glasgow, Ltd. Fr. 689,969, Feb. 14, 1930. A light combustible gas is made by the following operations: air is blown through an ignited mass of fuel thereby producing gases, Fe_2O_3 is reduced and metallic Fe is heated by contact with these gases, H is produced by passing steam in contact with the Fe which becomes oxidized, water gas is produced by injecting steam through the fuel and the H is mixed with the water gas. An app. is described.

Combustible gas. Humphreys & Glasgow, Ltd. Fr. 690,356, Feb. 21, 1930. A gas suitable for domestic or industrial purposes is made by removing part of the CO from water gas and transforming the rest of the CO and the whole or part of the H into CH_4, using the removed part of the CO for the production of H and adding the H thus produced to the gas contg. CH_4. Or part of the CO is removed from coal gas and used for the production of H which is added to the coal gas or to water gas contg. CH_4.

Synthetic products from industrial gases. I. G. Farbenind. A.-G. Fr. 690,091, Feb. 17, 1930. In the manuf. of synthetic products such as alcs., aldehydes, acids or NH_3 from industrial gases contg. CO, excess CO in the gas not required for the synthesis is removed by using it for the prepn. of Fe carbonyl.

Operating industrial gas burners. Askania-Werke A.-G. vorm. Centralwerkstatt Dessau und Carl Bamberg-Friedenau. Ger. 510,207, Aug. 6, 1927. The air and the gas supplied to large gas burners for Cowper app., etc., are given, before they are mixed, a velocity substantially above the ignition velocity of the mixt.

Coal-gas purification. Gas Light & Coke Co., H. Hollings, S. Pexton and W. K. Hutchison. Brit. 334,619, June 11, 1929. NH_3 is recovered from gas by scrubbing it with weak ammoniacal liquor previously formed by cooling the gas and contg addnl. CO_2. An arrangement of app. and various details and modifications of procedure are described.

Dry purifier for coal gas, etc. Thyssen'sche Gas- und Wasserwerke G. m. b. H. and Andreas Borchardt. Ger. 510,127, Dec. 8, 1928.

The utilization of spent lyes from the purification of liquid hydrocarbons extracted from coal gas. Heinrich Schmidt. Ger. 510,487, Nov. 25, 1928. The NaOH lyes are uniformly mixed with the water used to wash out NH_3 from the gas, the mixing being effected when the water has dissolved a certain amt. of NH_3.

Washing flue gases. London Power Co., Ltd., and S. L. Pearce. Brit. 334,660, July 16, 1929. Various details of app. are described, comprising atomizers, baffle-board scrubbers and towers. After washing with an alk. liquor, the gas may be passed through a moisture eliminator, and in one of the treating chambers the gas may be brought into contact with a ferruginous or other suitable catalyst for oxidizing the SO_2 fumes present. Ozone or hot air may be supplied to the gas at the base of a chimney.

Device for purifying flue gases. August Hildenbrand. Ger. 510,602, April 7, 1929.

Apparatus for treating furnace or residual gases. London Power Co., Ltd., and Standen L. Pearce. Fr. 689,269, Feb. 3, 1930.

Water gas. Dampfkesselfabrik vorm. Arthur Rodberg A.-G. Fr. 690,126, Feb. 17, 1930. Means is described for recovering the heat lost in the manuf. of water gas

Water gas. N.-V. Silica en Owenbouw Mij. Fr. 689,854, Feb. 13, 1930. Water gas is made simultaneously with the cooling of incandescent coke by passing steam or water through the coke and leading the resulting mixt. to a chamber contg. a reducing agent such as small coke kept at a temp. sufficient to reduce CO_2 to CO.

Carbureted water-gas apparatus. Wm. J. McClurg. U. S. 1,788,400, Jan. 13. Various details of construction are described.

Oil and water gas. Humphreys & Glasgow, Ltd. Fr. 690,302, Feb. 20, 1930. A combustible mixt. of oil gas and water gas is made by blowing air into an ignited mass of fuel in a generator and causing the combustion of the gaseous products of this blowing in a heat-storing receiver communicating with the generator. A fluid hydrocarbon is at the same time introduced into the generator and a further quantity of fluid hydrocarbon into the receiver. The hydrocarbon is caused to pass in 2 currents, one through the generator and the mass of fuel where C is deposited, and the other through the receiver. The resulting oil gases are evacuated from the generator and the receiver and steam is injected into the mass of fuel to insure combustion of the excess C deposited therein and form water gas which may be carbureted with a hydrocarbon in the receiver and mixed with the oil gases.

Mixed oil gas and water gas. H. G. Terzian (to Humphreys & Glasgow, Ltd.). Brit. 334,485, July 11, 1929. Various details of app. and procedure are described of a process of the type in which oil gas is passed through an ignited fuel bed and the C deposited from this step is used in water-gas production. Cf. *C. A.* **25**, 194.

Oil-gas generator. F. J. West, E. West and West's Gas Improvement Co., Ltd. Brit. 334,346, Aug. 1, 1929.

Gas producer. Humphreys & Glasgow, Ltd. Fr. 690,089, Feb. 17, 1930.

Gas producers. I. G. Farbenind. A.-G. Fr. 36,660, Mar. 27, 1929. Addn. to 631,948. The gasifying agents are heated in the shaft of the producer above the charge of coal by the heat from the gases produced.

Gas producers. I. G. Farbenind. A.-G. Fr. 36,817, Mar. 27, 1929. Addn. to 631,948. Means for introducing the gasifying agents is given.

Gas producers. I. G. Farbenind. A.-G. Fr. 36,858, May 2, 1929. Addn. to 669,789 (*C. A.* **24**, 1962).

Gas generator for moist fuel. Jules U. Marguet. Ger. 510,601, June 28, 1929. An app. is described for the distn. of wood, etc., in which provision is made for condensing and removing the water.

Automatic valve for gas lines. David L. Brown (two-fifths to George Acuff). U. S. 1,788,368, Jan. 13. Various structural details are described of a valve which shuts off flow in pipe lines in case of breakage.

Electrically-controlled pressure-regulating system suitable for gas-supply systems. Jacob C. Groble (to Groble Gas Regulating Co.). U. S. 1,788,429, Jan. 13. Structural features.

Separating gaseous mixtures by liquefaction. Soc. l'air liquide (Soc. anon. pour l'étude et l'exploitation des procédés Georges Claude). Ger. 510,418, June 12, 1925. In the manuf. of H by partial liquefaction of coke-oven gases, etc., the removal of CO and CH_4 is completed by expanding the H, then introducing liquid N and allowing it to evap., and circulating the cold gas around the tubes in which the final condensation is effected under pressure. The method may be applied to other gas mixts., a suitable liquefied gas being substituted for the N. Cf. *C. A.* **24**, 902, 5469.

Treating tar. V. E. Rakovskii and A. A. Vinogradov. Russ. 25,150, July 5, 1928. Tars obtained from low-temp. and high-temp. carbonization of peat, brown coal, etc., are steam-distd. to remove light fractions. The residue is dissolved in gasoline and the bottoms left over are treated with a 10–40% H_2SO_4. The method is characterized by cooling the gasoline soln. to 8–10° to sep. the crystallizable components. The remaining soln. is treated with a strong alkali, and fractionated with steam or under a vacuum. The paraffin is then sepd. from the higher-boiling fractions by cooling and crystn.

Fractionating tars, oils, etc. Eugen Kárpáti. Fr. 691,360, Dec. 31, 1929. Tars, tar oils, mineral oils, etc., are sepd. into industrially utilizable fractions by dissolving the crude material in aq. solvents such as 55% alc. with pressure obtained by heating. The various fractions are afterward sepd. from the soln. by a gradual lowering of the solvent power of the solvent, in the order of their increasing soly. If the crude material is difficultly sol. the last fraction need not be dissolved and is thus sepd.

Tar distillation. The Barrett Co. Fr. 688,837, Jan. 25, 1930. Tar is heated in a continuous manner in an exteriorly heated distn. app. at a temp. above the b. p. of part of the oily constituents and then brought in direct contact with hot gases from the carbonization or gasification of coal. Fr. 688,838 describes an app. in which the tar is heated in an exteriorly heated distn. app. to a temp. sufficient to ext. by distn. a part of the oils. The vapors of constituents of low b. p. which are difficult to condense when mixed with gases are extd. and condensed separately and the residues are submitted to a

fresh distn. by direct contact with hot gases from the carbonization or gasification of coal.

Distilling tars. COMPAGNIE TECHNIQUE DES PÉTROLES. Fr. 689,294, Dec. 10, 1929. Tars from lignite, coal or bituminous schists are decomposed by non-destructive distn. into 2 fractions, one of which contains pressable paraffin and the other unpressable paraffin, these fractions being freed separately from paraffin.

Coal-tar products. FRANK COOKE. Ger. 510,940, Dec. 25, 1928. Plant is described for the direct production in a coke furnace of road-surface tar and by-products. Crude tar is condensed from the coke-furnace gases in air-cooled tubes and led to a container maintained at 160–190°. Part of the tar is used to trickle over the plant to maintain the temp. and the remainder is washed with steam. The resulting vapor is passed into an NH_3-satd. washer and the tar led to a steam distn. app. after which it is thickened by heating. The light hydrocarbons are sepd. from the vapor and the cresote oil is led back to the tar.

Plastic pitch or artificial bitumen from tar, etc. C. F. BROADHEAD and R. S. ANDREWS. Brit. 334,380, Nov. 29, 1928. Tar is heated with a small proportion of an aldehyde such as formaldehyde, acetaldehyde or furfuraldehyde (about 1–4%) and a catalyst such as NH_3, $(NH_4)_2SO_4$, H_2SO_4 or HCl (suitably at 80–95° for 8–16 hrs.) and subsequently air or other oxidizing gas is passed through or over the material until it has hardened (suitably at 100–200° for 10–30 hrs.). Before this latter treatment, a second catalyst may be added, such as Fe sulfate or Cu sulfate.

Coke. ALFRED POTT. Fr. 689,278, April 26, 1929. A valuable coke in small pieces is made by drying and heating coal in an app. to a temp. which is near, and if possible directly below, the decompn. temp. of the coal, the product thus obtained being afterward introduced into another app. in which it is submitted to a partial carbonization the 2nd app. being exteriorly heated and brought to a sufficiently high temp. before introducing the material.

Coke ovens having vertical chambers. EVENCE COPPÉE & Co. Fr. 36,650, Mar 1, 1929. Addn. to 616,460.

Regenerating coking oven. WILHELM MÜLLER. Ger. 512,219, Oct. 7, 1928 Addn. to 489,840 (*C. A.* **24**, 2279).

Method and plant for discharging coke-oven retorts. INTERNATIONAL HOLDING DE DISTILLATION ET COKEFACTION À BASSE TEMPERATURE ET MINIÈRE (HOLCOBAMI) SOC. ANON. Ger. 510,126, Feb. 19, 1930.

Combined coke-cooler and water-gas producer. C. OTTO & Co. G. M. B. H. Ger. 510,328, Feb. 15, 1929.

Cooling glowing coke. C. OTTO & Co. G. M. B. H. Ger. 510,915, April 17, 1927. An app. is described in which glowing coke is discharged down a chute against a countercurrent of cooling water or steam, with simultaneous production of superheated steam.

Coking or carbonizing. I. G. FARBENIND. A.-G. (Heinz Thienemann, inventor Ger. 510,065, Jan. 14, 1925. Initial materials for use in continuous coking processes are prevented from caking during the process by preliminary compression. The method is particularly applicable to the manuf. of active C in rotary retorts.

Coking lignite. FRITZ SEIDENSCHNUR. Ger. 512,387, Aug. 14, 1925. Dried or briquetted lignite is treated with hot gases in a countercurrent app. under such conditions that the lignite is heated as rapidly as possible to a temp. approaching 400°. The method results in the production of *light oils*, as well as *tar rich in bitumen*, and a good *burning coke*.

Coking lignite. KARL NOWAK. Ger. 510,573, Jan. 12, 1926. Addn to 488,500 (*C. A.* **24**, 2586). The method of Ger. 488,500 is modified by using a bituminous binder, *e. g.*, coal-tar pitch, for the lignite briquets.

22—PETROLEUM, LUBRICANTS, ASPHALT AND WOOD PRODUCTS

W. F. FARAGHER

The constituents of petroleum distillates. II. Determination of the aniline point of low-boiling paraffin-naphthene mixtures. A. SCHAARSCHMIDT, H. HOFMEIER AND HANS LEIST. *Z. angew. Chem.* **43**, 954–7(1930).—The *naphthene content* of a mixt. of paraffin and naphthene hydrocarbons can be calcd. from the formula: $N = (A - A_m)/(A - a)$, in which A is the *aniline point* of the component having the higher aniline point,

A_m is the aniline point of the mixt., and a is the aniline point of the other component. The method is more reliable with higher-boiling than with lower-boiling compds. To what extent the errors can be eliminated by detg. the aniline point in a sealed tube is now being investigated. The naphthene content of ternary and quaternary mixts. of naphthenes and paraffins can also be calcd. by combining the hydrocarbons of each class and detg. the aniline points of those combinations before detg. the aniline point of the whole. The method is reliable only for detecting changes in known mixts. It can give only approx. results for unknown mixts. because of the great variation in the aniline points of the naphthenes. EMMA E. CRANDAL

Investigating Sakhalin crude oil. S. S. NAMETKIN AND S. S. NIFONTOVA. *Neftyanoe Khozyaistvo* **19**, 421-2(1930) —A sample of crude oil from the river Chakrui had a sp. gr. of 0.943. E_{50} of 4.38, Pensky-Martens flash 98°, cold test —15°, and excise resins 28%. An Engler distn. yielded 4% below 250°, 13.5% up to 275°, 29% up to 300°, residue 68.0% and loss 3%. This is an asphalt-base crude oil, without any gasoline fraction and with a very small amt. of kerosene. A vacuum distn. of the residue yielded about 20% of lubricating-oil distillate of —5° cold test. The crude oil from Lyangri had a sp. gr of 0.951, E_{50} of 3.6, P.-M. flash 104°, cold test —19° and excise resins 19%. An Engler distn. produced 1% below 250°, 12.5% below 275°, 27.5% below 300°, 70.0% residue and 2.5% loss. A vacuum distn. of the residue yielded about 18% of a lubricating-oil distillate of +3.5° cold test, with a probably small content of paraffin. Both crude oils were weathered, and the samples supplied were insufficient to make a complete investigation. A. A. BOEHTLINGK

The true value of the Alberta asphaltic crude oils. C. C. COULTER. *Petroleum Times* **24**, 3-5(1930).—The Wainwright, Ribstone and Skiff oil fields in Alberta, Canada, yield a crude oil having a lubricating-oil content of about 50%. The anticline extending for 200 mi. in a general north and south direction in eastern Alberta will probably be found to contain important deposits of crude oil, sufficient to reduce materially Canada's dependence upon the United States for many petroleum products. E. E. C.

Distillation of heavy bottom oils by the Pengu-Gurvich-Nersesov method. G. TER-GRIGORYAN. *Azerbaidzhanskoe Neftyanoe Khozyaistvo* **1930**, No. 11, 74–82.—Heavy bottom oils obtained in the distn. of petroleum were passed through an asphalt heat exchanger, leaving it at 180-200°, and were pumped through a pipe still and heated to 400-410°. They were then flashed together with steam admitted through nozzles in the lower part of the evaporator and passed through a layer of Raschig rings through the upper part of the evaporator subdivided into seven chambers, each of which delivered a certain cut. Thirty-two to thirty-five % of the bottom oils was condensed in this column; the vapors and steam were passed through a large vapor line on the top of the column into the top of a second column where an addnl. 5-6% was condensed, together with steam. Permanent gases were removed and an abs. pressure of the order of 100 mm. was maintained in the unit by a vacuum pump connected to the upper part of a barometric condenser, the latter being connected to the second column. From 4 to 7% of oil was recovered in the barometric condenser. The semiasphalt pptd. on the bottom of the evapg. drum was passed through the heat exchanger for preheating the feed and was then worked up for asphalt. Cooling coils placed in the drums were cooled by steam H_2O which was recirculated after being chilled in water coolers. The Nersesov-type pipe still used in the above unit had two combustion chambers and two chambers in which the oil-heating pipes were placed. It also had two chambers for superheating steam. The oil-heating pipes were arranged in two banks in each chamber. The two upper banks were located near the roof of the combustion chamber, which was 2 m. high. They were heated by radiant heat, while the two lower banks were placed between the roofs where they were heated by convection and radiation. The hot combustion gases then passed into the superheater chamber which had also a sep. furnace to superheat the steam (if necessary) to higher temps. than could be obtained by the heat from the oil-heating furnace. The unit had a throughput of 50-75 metric tons of charging stock, and it is claimed that there was practically no decompn. The furnace had an efficiency factor of 0.58. Oils produced in this unit are similar to the American bright stocks except for their higher cold test. A detailed description of the parts of the equipment, a layout of the plant and analyses of intermediate and final products are furnished. A. A. BOEHTLINGK

An examination of shales associated with oil-bearing strata in the United States. E. MCKENZIE TAYLOR. *J. Inst. Petroleum Tech.* **16**, 681-3(1930).—In samples of 19 oil-bearing shales from the U. S., replaceable Na and Ca, and p_H value were detd. All the clays were alk. and in all of them the replaceable Na greatly exceeded the replaceable Ca. This is the condition which would be found if the clays had undergone base exchange with solns. of Na salts and the Na clays had subsequently been hydrolyzed by

contact with fresh water. This has been the invariable inference from all the previous examns. of oil shale. The 19 samples covered the geological range from Ordovician to upper Miocene. EMMA E. CRANDAL

Hydrogenation adapted to the oil refinery. M. W. BOYER. *Chem. Met. Eng.* **37**, 741–5(1930); cf. *C. A.* **24**, 5987.—B. describes the pilot hydrogenation plant at the Standard Oil of Louisiana refinery (Baton Rouge), and gives data on typical hydrogenated distillates. T. H. CHILTON

Industrial uses of fuel oil. I. LUBBOCK. *Petroleum Times* **24**, 671–3, 719–20 (1930).—Oil has peculiar advantages as a fuel for heating glass tanks, china, pottery and brick kilns, and enameling muffles, for drying bricks and tea, for bread, biscuit and cake baking, for tube-welding furnaces, for smelting tin ore, in reverberatory furnaces, and for other ore- and metal-treating operations. Pure Ni castings weighing 860 lb. each, free from porosity, were made by oil heat. This metal required a pouring pt. of 1600°. Losses of Sn, Al, brass, bronzes and gun metals in the combustion gases are low. EMMA E. CRANDAL

Breaking emulsions. N. BALUKHOVSKII. *Neftyanoe Khozyaistvo* **19**, 460–1 (1930).—Heavy Voznesenskii crude oil of 0.900 and higher sp. gr. was dehydrated by passing it through a Cornwall steam boiler in which it was heated to about 100°. The crude oil was continuously passed through this boiler into a settling tank from which it overflowed into a storage tank. The oil so obtained contained less than 0.25% of water. A. A. BOEHTLINGK

Safety in oil-cracking operations. E. M. MATSON. *Petroleum Times* **24**, 755–7, 779–80, 839–40(1930). EMMA E. CRANDAL

Cross cracking units. A. MARGULOV. *Azerbaidzhanskoe Neftyanoe Khozyaistvo* **1930**, No. 11, 107–19.—A Cross unit installed in the Ponca City refinery of the Continental Oil Company was charged with a mixt. consisting of 35–40% of a gas oil of 0.850 sp. gr. and 65–60% of condensate, the capacity of this unit being 2500 bbls. The following yields were obtained: gasoline 27, condensate 57, heavy residue 10 and gas and loss 6%. A detailed description is given of Cross units installed in the Champlin Refinery Co.'s plant in Enid, Okla., the Continental Oil Co. refinery in Ponca City, Okla., and the Barnsdall Oil Co. refinery in Okmulgee, Okla., including layouts, flow sheets, temps., construction details, etc. A. A. BOEHTLINGK

Cracking of Rangoon paraffin in vapor phase. J. W. HEYMANS. *J. Inst. Petroleum Tech.* **16**, 661–77(1930).—Rangoon paraffin in liquid form was introduced at const. rate into an Fe tube filled with glass tubing and heated in an elec. furnace. All products of cracking except the uncondensable gases were collected and analyzed. Time in the reaction tube was calcd. The pressures maintained in the 5 expts. were: 10 (max.), 10 (max.), 10, 30 and 30 mm.; temps., 450°, 600°, 600°, 700° and 700°; cracking periods, 1.7, 1.4, 1.2, 3.8 and 1.54 sec. More cracking occurs at 450° in vapor than in liquid phase as the consequence of the greater activity of the gas mols. and more contact with the tubing and the hot walls. H_2 splits off even at 360°. After cracking at the end of the hydrocarbon chain, cracking proceeds from point to point along the chain, breaking up the mol. by degrees. At 700°, nearly all the nongaseous products of cracking were unsatd. compds. EMMA E. CRANDAL

Removing naphthenic acids. YU. EMMUIL. *Azerbaidzhanskoe Neftyanoe Khozyaistvo* **1930**, No. 11, 90–5.—An app. constructed by E. exts. 85–90% of the naphthenic acids from the oil. It consists of a vertical cylinder, the middle section of which has a steam coil to heat the gas oil and other distillates to 70–75°. The oil enters at the bottom through a perforated pipe and leaves through the top. The caustic soln. is passed from the top countercurrent to the oil and is discharged through the bottom together with the soap. A high efficiency is claimed as well as low consumption of steam and caustic. The naphthenic acid contents of various cuts of Baku petroleum and statistical data are also given. A. A. BOEHTLINGK

Adsorption power of Grozny clays. V. BARANOV. *Neftyanoe Khozyaistvo* **19**, 446–59(1930).—Over 200 samples of Russian and some American clays were used in the expts. Some Russian clays had a higher adsorbing power (under identical conditions) than known American and German brands, both before and after activation. A. A. BOEHTLINGK

The influence of engine conditions on the antiknock rating of motor fuels. R. STANSFIELD AND F. B. THOLE. *Engineering* **130**, 468–70, 512–4(1930); cf. *C. A.* **23**, 2813.—The method of conducting tests is described in detail, with a method for calibrating an engine in the audibility test. The speed used is 750 r. p. m.; fuels likely to pre-ignite can be detected by increasing the speed to 1200. Different engines checked antiknock ratings by using a 12° spark advance, which is slightly overadvanced for max

power. Some abnormal spirits will yield inconsistent results unless a finished inlet system is used, though most fuels cause no trouble if preheated to 120°F. From the results of 24 different engines, it was found that a general comparison is obtained if the rise in the highest useful compression ratio (H. U. C. R.) from a standard reference fuel to that under test is given. A change from cast-Fe to Al pistons caused a rise in the H. U. C. R. by 0.3 for the reference standard fuel (a straight-run spirit). When engines are calibrated in terms of the change in ratio for a given pinking intensity from the pro-knock standard up to the max. C_6H_6 blend which may be used, the results agree within 2%, irrespective of engine or operator. The bouncing pin is suitable only for small cylinders if the design is such that there is no risk of pre-ignition with heavy continuous pinking. The time lag with the bouncing pin is decreased by having a not too clean or too dirty engine. For fuels showing a time lag, duplicate tests should be made. The change of rating of C_7H_{16} blends with rise in the jacket temp. decreases as the amt. of C_7H_{16} decreases. For a blend 73% of C_6H_6 and 27% of C_7H_{16}, there is no detectable difference at 120° and 350°F. Results with ethyl fluid check Bartholomew's detns. There is no evidence that C_6H_6 loses its effect at high temp. For the 73/27 C_6H_6-C_7H_{16} mixt., no change was detected on varying the inlet air temp. from 60° to 120° and 180°F. The throttling effect causes an increasing deviation between the bouncing-pin and the audibility methods as the antiknock value of the sample rises. An alteration of plug-point gap and plug reach causes a very small change and was detected for one fuel only. The humidity is unimportant at 65°F. if H_2O is present as vapor. Above this temp. a correction must be applied. ARTHUR FLEISCHER

Dry distillation of tolu balsam. JUSTIN DUPONT AND JEAN-JACQUES GUERLAIN. *Compt. rend.* **191**, 716–7(1930) —Dry distn. of tolu balsam gives appreciable quantities of monomethyl ethers of pyrocatechol and of its homologs, identical with those that Behal and Choay extd. from the creosote of wood pitch. ALICE W. EPPERSON

Colorimetric method for determining turpentine oil in the atmosphere (KORENMAN) 7. A new buret for the determination of unsaturated and aromatic hydrocarbon oils (FORMÁNEK) 1. X-ray investigations of oils, fats and lubricants (TRILLAT) 27. Asphaltic bitumen and its use in breweries (AERTS) 20. Geology of the oil fields of Baku (SCHREITER) 8. Fuel (Fr. pat. 689,021) 21. Gas generator for moist fuel (Ger. pat. 510,601) 21. Distilling tars (Fr. pat. 689,294) 21. Hydrocarbons (Fr. pat. 688,713) 10. Coking lignite (Ger. pat. 512,387) 21. Filter head for oil filters (U. S. pat. 1,788,884) 1. Apparatus for carbonizing coal, schists, etc., at low temperature (Fr. pat. 690,502) 21. Apparatus for separating oil and water, etc. (Ger. pat. 510,087) 1. Apparatus for filtering oils or other liquids under pressure (Brit. pat. 334,663) 1. Purifying waxes, resins and hydrocarbons (Fr. pat. 690,536) 27. Fractionating tars, oils. etc. (Fr. pat. 691,360) 21. Liquid fuels (Fr. pat. 691,172) 21. Hydrogenation processes (Fr. pat. 691,303) 21.

Sampling apparatus for petroleum products. P. I. VYAKHIREV. Russ. 33,094, Sept. 25, 1928. Constructional details.

"Sweetening" sour petroleum oil. HUGH H. CANNON and WRIGHT W. GARY (to Cannon-Prutzman Treating Processes, Ltd.). U. S. 1,789,167, Jan. 13. "Sour" oil is treated with an incoherent comminuted solid reagent comprising $Ca(OH)_2$, PbO and S, "sweetened" oil is sepd. from the reagent, and further quantities of "sour" oil are treated with the sepd. reagent and with addnl. S. U. S. 1,789,168 describes a process for "sweetening" sulfurous petroleum oils by converting mercaptans into Pb mercaptides by treatment with a powd. solid reagent contg. PbO and a hydroxide of an alk. earth metal.

Separating constituents of petroleum-water emulsions. FRANZ R. MOSER (to N.-V. de Bataafsche Petroleum Maatschappij). U. S. 1,788,684, Jan. 13. The emulsion is treated with a colloidal material obtained by treating mineral lubricating oil, substantially free from substances likely to resinify, with an excess of strong H_2SO_4, dilg. the sludge with water and sepg. unaltered oil from the aq. liquid contg. the colloidal matter.

Separating petroleum soaps. E. V. STOCK. Russ. 46,666, May 8, 1929. Alkali sludge is first acidified so as to sep. a very small quantity of free naphthenic acids and then is salted out.

Apparatus for heating petroleum oils before distillation. ÉTIENNE J. F. ROUSSEL. Fr. 689,004, Jan. 28, 1930.

Apparatus for distilling petroleum. BETHLEHEM STEEL CO. Fr. 690,266, Jan. 29, 1930.

Pipe still suitable for use in distillation of petroleum oils. GEORGE W. WATTS (to Standard Oil Co. of Ind.). U. S. 1,789,267, Jan. 13.

Fractionating tower suitable for distillation of petroleum oils. THOMAS DEC. TIFFT and WM. MENDIUS (to Sinclair Refining Co.). U. S. 1,789,059, Jan. 13.

Oil-distillation apparatus. RICHARD F. GILDEHAUS, JR. U. S. 1,788,947, Jan. 13. A continuous closed distn. app. for hydrocarbon oils comprises 2 stills, with an outlet for the first still running from a point substantially above its bottom, and a pump adapted to circulate oil in the other still, a pipe being connected with the outlet of the first still so as to permit oil to flow by gravity to an intake for the pump, and a U-bend being provided in the pipe to compensate for pressure differences in the stills. Various details of the installation are described.

Distilling hydrocarbon oils. GENTRY CASH (to Standard Oil Co. of Ind.). U. S. 1,788,982, Jan. 13. Oil is passed in a confined stream through a heating zone such as a pipe coil and thence discharged into an enlarged chamber in which sepn. of vaporized products takes place. Unvaporized oil is removed from this chamber and forced under applied mech. pressure such as that of a pump into a stripping zone where it is subjected to direct contact with steam to remove lighter constituents, and the steam and assocd. vapors are forced into the stream of heated oil at an intermediate point in the heating zone. App. is described. Cf. *C. A.* **25**, 412.

Distilling hydrocarbon oils. PHILIP L. KRAUEL (to Standard Oil Co. of Ind.). U. S. 1,789,004, Jan. 13. A process and app. are described generally similar to those of U. S. 1,788,982 (preceding abstract) except that inert gas such as steam is injected into the unvaporized oil and serves to force it to the stripping zone.

Fractionating hydrocarbon oils. IRA B. FUNK. U. S. 1,789,173, Jan. 13. A mixt. of light and heavy hydrocarbons such as absorption oil and natural gas gasoline is vaporized and mixed with steam, and the mixt. is fractionated to eliminate undesired heavy hydrocarbons; the light desired hydrocarbons are condensed in 2 stages, and a portion of the condensed desired light hydrocarbons is continuously cycled through the vaporous light desired hydrocarbons in the first condensing stage, and condensed steam is sepd. and withdrawn from the reflux liquid in the first condensing stage. An arrangement of app. is described.

Hydrocarbons. I. G. FARBENIND. A.-G. Fr. 37,096, May 2, 1929. Addn. to 643,413 (*C. A.* **23**, 1415). Gaseous olefins, benzines and aromatic hydrocarbons are made by soaking porous material such as pumice stone, slags or coke with tars, mineral oils, residues from the distn. of oils or residues from the hydrogenation under pressure of coal, tars, mineral oils, etc., and passing the soaked material through a chamber heated to a high temp.

Liquid hydrocarbons. I. G. FARBENIND. A.-G. Fr. 691,244, Mar. 6, 1930. Valuable liquid hydrocabons are obtained by submitting the residues from the condensation or refining of hydrocarbons such as mineral oils, tar oils or oils obtained by hydrogenation under pressure, to a hydrogenation under pressure in the absence of catalysts, or in the presence of catalysts not sensitive to S. Examples are given.

Refining hydrocarbons. COMPAGNIE DES MINES DE VICOIGNE, NOEUX & DECOURT. Fr. 691,118, May 8, 1929. Oils obtained by the distn. at high or low temps. of schists, lignites, etc., and petroleum oils (specially those obtained by cracking) are desulfurized and refined by heating them with or without pressure with metallic halides, particularly $TiCl_4$, which transform the unsatd. hydrocarbons and the stable S compds. into satd. hydrocarbons and unstable S compds. easily eliminated by Na plumbite.

Nozzle for injecting hydrocarbons into fused metals or salts, for distillation or cracking. PREUSSISCHE GEWERKSCHAFT RAPHAEL. Ger. 512,427, May 27, 1928.

Cracking hydrocarbons. N. V. DE BATAAFSCHE PETROLEUM MAATSCHAPPIJ. Brit. 334,241, May 30, 1929. C_4H_{10} and other hydrocarbons are cracked by passing them through molten baths of non-metallic substances such as a fused mixt. of equimol. proportions of $CaCl_2$ and $BaCl_2$, m. about 500°. Butane thus treated at 750° yields a mixt. contg. about 18% each of C_3H_6 and C_2H_4. Various other chlorides may be used for the molten baths, and molten Te also may be employed, serving as a catalyst. An app. with an Al lining may be used.

Cracking hydrocarbon oils. EUGENE C. HERTHEL (to Sinclair Refining Co.). U. S. 1,789,072, Jan. 13. Vapors from pressure cracking are passed through a reflux condenser, at an intermediate point of which they are brought into direct contact with raw oil to be supplied for the pressure distn. There is also introduced into the reflux condenser in direct contact with the vapors passing through it, at a plurality of points spaced further along the path of vapor travel, a light oil that is vaporized substantially completely under the conditions prevailing in the reflux condenser. The oil mixt. including condensate and unvaporized raw oil is returned from the reflux condenser to the pressure distn., so that entrainment in the reflux condensate of light constituents

suitable as components of the desired distillate is reduced. The app. is described. Cf. *C. A.* **25**, 199,808.

Cracking hydrocarbon oils. FRANK C. VANDE WATER (to Petroleum Laboratories, Inc.). U. S. 1,788,933, Jan. 13. A body of oil is subjected to a vaporizing temp., the moving vapors are subjected to a superheating temp. in a restricted elongated space such as a pipe coil and the vapors are then permitted to expand to reduce their velocity while subjected to substantially the same temp. (the entire operation taking place under substantially atm. pressure) An app. is described.

Cracking process. N. V. DE BATAAFSCHE PETROLEUM MAATSCHAPPIJ. Fr. 689,551, Feb. 7, 1930. Petroleum oils contg. heavy substances easily coked are cracked by a combination of a cracking process of short period with a cracking process of long period. In this combination the treated oil is first submitted to a short primary cracking and afterward joined with the flow from the long secondary cracking, the heavy easily cokable material being afterward eliminated from the reunited current. The distillate and the gases formed in the 2 cracking phases, being sepd. from the heavy vapors remaining untransformed, are returned to reflux and passed in the secondary process of the long period. An app. is described.

Fractional extraction of mineral oils with nitrobenzene. SEYMOUR W. FERRIS (to Atlantic Refining Co.). U. S. 1,788,569, Jan. 13. A viscous oil contg. paraffinic and naphthenic hydrocarbons is sepd into fractions, relatively more concd. in these different kinds of hydrocarbons, by extg. the oil with $PhNO_2$ which has a greater solvent action on the naphthenic hydrocarbons.

Refining mineral oils. DEUTSCHE GASOLIN A.-G. Fr. 690,068, Feb. 15, 1930. Oil is removed from kaolin which has been used for refining mineral oil, by heating the kaolin with a dild. mineral acid in a closed vessel to a temp. above the b. p. of the dild. acid. The kaolin may first be treated with org. solvents.

Purifying crude mineral oil. KIDD W. HICKEY. U. S. 1,789,233, Jan. 13. A soln. of $NaHCO_3$ and borax is added to the oil, and, separately and simultaneously, HCl is added to produce a violent reaction and effect sepn. of water and assocd. impurities.

Oil for heating. IDELEANU G. M. B. H. Ger. 512,020, Oct. 8, 1927. A heating oil comprises the cracking residues of heavy hydrocarbons, to which the ext obtained from mineral oils by means of liquid SO_2 is added, in order to prevent sepn. of asphaltic and like constituents.

Purifying oils, etc. I. G. FARBENIND. A.-G. Fr. 689,625, Feb. 8, 1930. Finely dispersed impurities of a colloidal nature are sepd. from oils or other liquids by filtration through the finely divided residues contg. coal obtained in the hydrogenation, extn. or cracking of coal, tars, mineral oils, etc.

Gas and liquid separator suitable for use at oil wells. LEO C. DUGGAN. U. S. 1,788,990, Jan. 13. Structural features.

Removing naphthenic acids and their salts from bore-hole waters. S. I. RYABCHENKO. Russ. 54,532, Sept. 12, 1929. The waters are purified by consecutive treatments with H_2SO_4 to destroy naphthenic acids, settling out of naphthenic acids and adsorption of the last acid particles by adsorbents.

Recovering sulfonic acids from cracked residues. M. A. BESTUZHEV and A. N. SAKHANOV. Russ. 29,699, July 3, 1928. Residues obtained in cracking heavy oil are treated with strong H_2SO_4, which should not contain free SO_3, and the sulfonic acids are then extd. from the products of reaction by the usual methods.

Precipitating acid sludge. I. B. BARSAMOV. Russ. 64,820, Feb. 20, 1930. Acid sludge obtained after treatment of heavy lubricating oils with H_2SO_4 is pptd by a treatment with a soln. of caustic obtained after the first neutralization of acid-treated oil. This soln. is, as a rule, 3.5° to 4° Bé., and for the above treatment it should be brought up to 5° Bé.; it also must be freed of floating org. substances.

Sulfonic acids. SUDFELDT & Co. (Milan Gelbke, inventor). Ger. 510,303, Aug. 30, 1923. The acid tars obtained in purifying mineral oils or lignite- or shale-tar oils are treated with alkali, purified (if desired) by distn. *in vacuo* with superheated steam and then treated with a soln. of alkali in an org. solvent, *e. g.*, MeOH or EtOH. The unsulfonated constituents sep., and the clarified soln. is evapd. and acidified. The sulfonic acids so obtained have strong fat- and oil-splitting properties.

Apparatus for a continuous treatment of gasoline and kerosene. I. G. TZURIKOV. Russ. 15,565, Jan. 3, 1927. A treating vessel has a number of vertical mixing chambers and settling chambers arranged above the treating chambers. They are combined into a continuous chain in which parts having identical shapes are placed in terraces. The reagent is mixed with the petroleum product in a vessel which has a perforated inverted

cone supported in its upper part by edges tightened between flanges and which connects with the lower part of the mixing chamber.

Motor fuel. FRANÇOIS M. C. A. LECLÈRE. Fr. 691,348, May 23, 1929. An improved fuel contains, *e. g.*, gasoline 73–74, benzene 25 and an oxygenated combustible such as alc. 1–2% by vol.

Motor fuels. I. G. FARBENIND. A.-G. Fr. 691,101, Mar. 5, 1930. Agents added to fuels to raise their *antiknock properties* are made of a mixt. of Fe carbonyl and aromatic amines or their *N*-alkyl or *N*-aryl derivs. or primary or secondary aliphatic amines contg. up to 3 C atoms in the side chain. Other substances such as alcs., lubricants or dyes may also be added.

Motor fuel. I. G. FARBENIND. A.-G. Brit. 334,181, April 27, 1929. Gasoline or the like is mixed with over 0.2 g. per gal. of Fe carbonyl (suitably about 0.1%) and with an aromatic amine contg. at least 1 alkyl radical, such as 1–15% of toluidine, methyl- or ethyl-aniline or *N*-methylxylidine. Various other substances for increasing the critical compression ratio may also be added, such as ethylene chloride, $CHCl_3$, CCl_4, PhCl, hexachlorobenzene, chloronaphthalene, the corresponding Br and I compds., NH_4 halides and their org. derivs. (as methyl NH_4 chloride), boric acid methyl or ethyl ester, silicic acid ethyl ester, Et_4Si, tricresyl phosphate, Et_4Pb, Zn oleate, Zn isovalerate, Cl propionate, Al palmitate and compds. of acetoacetic ester with Al, Mg or Fe or Cu naphthenate.

Oxidation products from crude paraffin and the like. MARTIN LUTHER and ERNST WILLFROTH (to I. G. Farbenind. A.-G.). U. S. 1,788,799, Jan. 13. Products contg. a large proportion of saponifiable substances are obtained by treating molten crude paraffin or the like with gases contg. O and nitric oxides in the presence of filler bodies such as Raschig rings and of a metal enolate such as Ba acetylacetonate or Mn acetylacetonate (suitably at temps. of 140–150°). Gases obtained by oxidation of NH_3 may be used, and use of other catalysts is mentioned such as CaO or Al_2O_3. Cf. *C. A.* **24**, 3354.

Lubricating composition. FREDERICK W. SULLIVAN, JR. (to Standard Oil Co. of Ind.) U. S. 1,789,026, Jan. 13. A product formed largely of a viscous hydrocarbon oil is given a lower "cold test" than that of the oil alone by adding the Zn or Mg compds. of acidic products derived from the oxidation of paraffin.

Lubricating oils. HENRY M. WELLS and JAMES E. SOUTHCOMBE. Fr. 689,282, July 17, 1929. About 1% of an org. acid such as oleic acid or of an alc. contg. more than 5 C atoms is added to hydrocarbon lubricating oils to increase the viscosity of the film of hydrocarbon in contact with the carrying surface. Cf. *C. A.* **24**, 2595.

Refining lubricating oil containing tarry and asphaltic substances. WALTER S. BAYLIS (to Filtrol Co. of Calif.). U. S. 1,788,653, Jan. 13. The oil is mixed with adsorbent clay and the resulting mixt. is passed in a restricted stream through a heating zone such as a pipe still where it is heated to a temp. sufficient to vaporize lighter fractions of the lubricating oil. The heated mixt. is discharged into a fractionating zone or column at a point substantially above the bottom of the latter so that the oil flows downward toward the bottom of the fractionating zone; lighter fractions are released from the mixt., the released vapors ascend toward the upper portion of the fractionating zone and are subjected to fractional condensation above the point of introduction of the heated mixt., and condensed fractions are separately removed, the mixt. of unvaporized lubricating oil and clay is withdrawn from the lower portion of the fractionating zone, and the clay is sepd. from the unvaporized oil. App. is described. U. S. 1,788,654 relates to refining crude oil of the Pennsylvania type for the production of lubricating stock, by mixing decolorizing clay with the oil and subjecting the material to treatments generally similar to those described in U. S. 1,788,653.

Purification of used lubricating oil of internal-combustion engines. LEE H. CLARK (to Sharples Specialty Co.). U. S. 1,788,911, Jan. 13. The oil is heated and water is passed in heat-exchange relation with the oil in co-directional variation by quantity with the temp. of the oil to produce steam in order to further evapn. of contaminating liquids from the oil. App. is described.

Insulating oils. SOC. ANON. DES PROCÉDÉS R. AUDUBERT (S. A. P. R. A.). Fr. 690,618, May 6, 1929. Fresh insulating oils are improved and used oils are restored by submitting them to a filtration so effective that the tensions at which a spark and an arc are established are noticeably increased and take practically the same value.

Reclaiming asphalt from asphaltic residuum oil. RUSSELL P. CROTHERS. U. S. 1,788,792, Jan. 13. Heated fuel oil is added to and fluxed with a heated mass of petroleum-residuum oil of asphaltic character; free C is permitted to settle out of the fluxed mass; the latter is withdrawn from the settled C and is reheated and cooled with settling

out of more C and high m. p. asphalt; the mass is withdrawn from the substances last settled out and is reduced to the desired consistency.

Emulsions of asphalt, fatty acids, oil, tar, etc. I. G. FARBENIND. A.-G. Brit. 334,426, Oct. 20, 1928. Emulsions prepd. with humic acid, humates or similar synthetic products prepd. by treating coal, lignite or pitchy substances with oxidizing or nitrating agents are stabilized against freezing and thawing by adding a small proportion of a volatile org. liquid such as MeOH, EtOH, acetone, formic acid or "wood vinegar."

Bituminous emulsions. ASPHALT COLD MIX, LTD. Fr. 36,752, Mar. 23, 1929. Addn. to 564,943. Stable bituminous emulsions are made by the use of soft water, pure olein and pure alkali.

Bituminous emulsions. N. V. DE BATAAFSCHE PETROLEUM-MAATSCHAPPIJ. Fr. 690,242, May 22, 1929. The stability of an emulsion of bitumen, soap and water is increased and its time for solidification reduced by adding an emulsion of asphalt, clay and water. Cf. *C. A.* **24**, 5478.

Turpentine. FREDERICK W. KRESSMAN. Fr. 689,731, Feb. 11, 1930. Turpentine contg. "resene" and abietic acid is distd. under high vacuum and at a temp. not above 260°. The distillate is sepd. into several fractions or the vapors are condensed. An app. is described.

Fatty acids. Soc. DES ÉTABLISSEMENTS BARBET. Fr. 36,953, Feb. 21, 1929. Addn. to 649,121 (*C. A.* **23**, 2722). The process of Fr. 649,121 is made applicable to forest charcoal installations. The vapors from the retort pass into a column of $CaCl_2$ which is in the form of a horizontal absorber provided with rotating vertical plates. A part of the AcOH vapor after concn. and cooling is extd. from the app., while a reflux is brought into the soln. of $CaCl_2$ to concentrate it before its entry into the absorber.

23—CELLULOSE AND PAPER

CARLETON E. CURRAN

Some national aspects of the cellulose problem. FRANCESCO C. PALAZZO. *Atti III congresso naz. chim. pura applicata* **1930**, 210–25.—A review of national resources.

E. M. SYMMES

Characterization of technical celluloses by the iodine number. MAX BERGMANN AND HANS MACHEMER. *Ber.* **63B**, 2304–6(1930).—It had been shown (*C. A.* **24**, 2877) that the hydrolytic and acetolytic degradation products of cellulose reduce cold alk. I soln. The consumption of I is limited selectively to the oxidation of free CHO groups to CO_2H, and the detn. of the I no. (no. of cc. of 0.1 *N* I consumed by 1 g. of substance) affords a simple chem. method of detg. the mol. wt. of more or less homogeneous degradation products. But the I no. also affords a welcome chem. means of characterizing cellulose prepns. of non-defined chem. homogeneity, such as technical celluloses. As such prepns. are insol. in the alk oxidizing fluid, the reaction in the heterogeneous systems is complete only after several hrs. Accordingly, the following technic was adopted: The finely powd., air-dry substance, previously defatted if necessary, was ground for a short time until homogeneous with 200 cc. 0 25 *N* NaOH in a ball mill with hard porcelain balls, 50 cc. 0.1 *N* I was added, and after 4 hrs., without stopping the mill, the excess of I was titrated in the presence of 10 cc. $CHCl_3$ (to dissolve out all the I adsorbed by the cellulose) and 10 cc. of 5 *N* H_2SO_4; at the end, 10 cc. of 2% sol. starch soln. were added. Numerous expts. showed that oxidation beyond 4 hrs. did not increase the amt. of I consumed, and that, in fact, the end value is closely approached after only 1.5 hrs. Duplicate detns. checked within about ±3%. The results obtained with some 30 cellulose prepns. are reported. The I no. of unbleached cotton decreases on bleaching; evidently CHO groups are oxidized in the bleaching. Overmercerized cotton with a high content of alkali-sol. substances and very small tearing strength has no greater I no. than a good technical cellulose suitable for artificial silk; the destruction due to mercerization does not result in an accumulation of free CHO groups. On the other hand, the reducing groups of a Hoesch sulfite cellulose were markedly increased by long treatment with 5 *N* NaOH. Technical celluloses for artificial silk, with an I no. of 1.2, are easily distinguished from many celluloses used for other purposes, which have much higher I nos. Different technical artificial silks show distinct differences in their I nos. Three acetylcelluloses (1, Me_2CO-sol., Eichengrün-Miles, 52.7% AcOH; 2, low viscosity, 54% AcOH; 3, high viscosity, 53.9% AcOH) showed practically the same I nos. (1.06, 1.24, 1.11) in spite of their different viscosities.

C. A. R.

Acetolysis of bamboo cellulose. SUTEZO OGURI AND MASAAKI NARA. *J. Soc. Chem Ind., Japan* **33**, Suppl. binding 516–7(1930).—Cellulose prepd. by the Cl method from Madake (*Phyllostachys bambusoides*) and Mosochiku (*P. pubescens*, H. Leh.) gave the same yield of cellobiose octaacetate as standard cotton cellulose prepd. by the method of the Cellulose Comm. of the Am. Chem. Soc. The octaacetates obtained from the bamboo celluloses had the same m.-p. and the same $[\alpha]$ as the octaacetate from the cotton cellulose. A. PAPINEAU-COUTURE

Modern steam technic in the cellulose industry. L. V. LAGE MALM. *Svensk Pappers-Tid.* **33**, 833–46, 871–7(1930).—Modern practice favors radiating boilers or vertical tube boilers, water-cooled combustion chambers and pulverized coal as fuel. WILHELM SEGERBLOM

Acetate silk. ETTORE VIVIANI. *Atti III congresso naz. chim. pura applicata* **1930**, 150–9.—A review. E. M. SYMMES

The microstructure of wood tracheids, from observations on the fibrous material of fossil wood. E. OFFERMANN AND G. RUTZ. *Papier-Fabr.* **28**, Tech.-Wiss. Teil, 780–6(1930).—Fibers isolated from the cellulose-rich fragments of lignite, designated as "fossil wood," have been studied microscopically, and the structure as altered by swelling in cuprammonium soln. has been compared with that of wood fibers similarly treated. The fibers appear to consist, like those of wood, of layers of spirally wound fibrils. The characteristic swelling behavior (pearl-bead formation, cf. Hess, *C. A.* **24**, 3357) of wood fibers in cuprammonium is not exhibited, however. Apparently the constricting outer membrane, local rupture of which causes this swelling effect, has been destroyed in the process of lignite formation. In many cases the cellulose fibrils have been entirely freed of primary lamella and hemicelluloses, while still retaining their arrangement in the fiber; the views of Hess on the structure of the fiber are thus confirmed. Tests of the isolated and bleached fossil wood fibers gave ash 0.6, α-cellulose 78.0%, no pentosan and relative viscosity in cuprammonium 44–55. Numerous photomicrographs are shown. RANDALL H. DOUGHTY

The fiber structure of lignite. F. LUFT. *Papier-Fabr.* **28**, Tech.-Wiss. Teil, 787–91 (1930).—Purified fibers of "fossil wood" (cf. preceding abstr.) gave the Debye Scherrer diagram of native cellulose. From the fiber diagrams of thin lamellas of the lignite, the fibers appear to consist of alternate flat layers of fibrils arranged at ±20° to the fiber axis. Such a structure could be produced by sidewise pressure on a fiber in which the fibrils were spirally arranged in concentric cylindrical layers with alternating direction of rotation. Similar diagrams were obtained from the spines of *Opuntia papyracantha* (a South American cactus) which, like the fossil wood, can be sepd. into concentric lamellas along natural lines of cleavage. RANDALL H. DOUGHTY

The wood research institute of the Eberswalde Technical High School. C. G. SCHWALBE. *Papier-Fabr.* **28**, Tech.-Wiss. Teil, 791–4; *Wochbl. Papierfabr.* **61**, 1521–6 (1930).—Equipment and work are described. R. H. DOUGHTY

Studies on the barking of (pulp) wood, with especial reference to the Thorne barker. HANS G. KLEIN AND EGON KURZHALS. *Papier-Fabr.* **28**, Tech.-Wiss. Teil, 645–53, 661–9, 678–81(1930).—Extensive expts. are reported covering in detail the power requirements, personnel, efficiency and losses for hand, knife and Thorne barking of pulpwood. The barking loss varies from 15 to 20%, depending on method, operator and the nature, quality and size of the wood. RANDALL H. DOUGHTY

The influence of scientific investigation on pulp production in the last fifty years. K. G. JONAS. *Papier-Fabr.* **28**, Tech.-Wiss. Teil, 741–4; *Wochbl. Papierfabr.* **61**, 1458–63(1930).—General. RANDALL H. DOUGHTY

Central-Asiatic reed (Pragmites communis) as a raw material for pulp. N. L. KARAVAEV AND I. M. KRIVOVYAS. *Papier-Fabr.* **28**, Tech.-Wiss. Teil, 654–6(1930).—Analysis of the air-dry stalks gave moisture 8.5, ash 5.6, cellulose 42, and lignin 28%. Pulping for 8–9 hrs. at 6 atm. with 10% NaOH soln. (quantity not stated) gave pulp of fair phys. quality 36, analyzing cellulose 90, pentosans 7 and lignin 1.5%. A bibliography is included. RANDALL H. DOUGHTY

Cornstalks in paper making. JOSEPH ROSSMAN. *Paper Trade J.* **91**, No. 23, 51–4 (1930).—A review of U. S. patents. A. PAPINEAU-COUTURE

Alkaline pulping reactions of the long-leaf pine. HARRY F. LEWIS AND EDWIN R. LAUGHLIN. *Paper Trade J.* **91**, No. 25, 57–60(1930).—Long-leaf pine meal (40- to 60-mesh) was extd. with alc. and C_6H_6 to remove resins and was studied in the same manner and, as nearly as possible, under the same conditions as Bray used to investigate the alk. cooking of spruce wood (*C. A.* **23**, 974), except that the present investigation was extended to include cooks at 200°. The relationships established from the exptl. data checked closely those of Bray for spruce. It is suggested that the rather sudden

increase in the "lignin" content of the pulp, when cooking at 200° is carried beyond 2 hrs., is possibly due to the formation at high temps. of cellulose-lignin condensation products which are stable toward 72% H_2SO_4 and therefore appear as lignin in the analytical method. A. PAPINEAU-COUTURE

White papers from Southern pines. I. Pulping loblolly pine for strong, easy-bleaching sulfate pulp. C. E. CURRAN AND M. W. BRAY. *Paper Trade J.* 92, No. 1, 47–52(1931).—The sulfate process was modified so as to make it adaptable to loblolly pine for the production of an easy-bleaching pulp of good strength. The best results were obtained by cooking about 2.5 hrs. at a max. temp. of 170° with a cooking liquor contg. a relatively high ratio of chemical to wood, provided the concn. of the chemicals was maintained at a low value. The kraft pulp thus produced can be bleached to a fair degree of whiteness in a one-stage treatment with 20 5% of bleaching powder; it can be bleached so well that the resulting pulp, having a strength factor of 0.7 point, may be used in various com. grades of paper. It can also be bleached without loss in strength, to a relatively high degree of whiteness in a 2 stage treatment by a modified method consisting of a chlorination followed by a Ca hypochlorite bleach; the resulting bleached pulp can be used for the production of high-grade, strong white papers **II. A modified bleaching process for easy-bleaching sulfate pulps.** C. E. CURRAN, R. H. DOUGHTY AND M. W. BRAY. *Ibid* 92, No. 2, 45–52.—Work carried out on pulps produced by the modified sulfate process described in the previous paper showed that: (1) Bleaching with hypochlorite alone in one stage caused considerable degradation of the pulp. (2) Bleaching with hypochlorite in 2 stages resulted in decreased bleach consumption but in no improvement in pulp quality. (3) The use of various extn. treatments did not produce any change in the foregoing results. (4) The use of Cl water in place of bleaching powder in the 1st stage of a 2-stage bleaching resulted in a decreased bleach consumption and in marked improvement in pulp quality. (5) Optimum results were obtained when the Cl used in the 1st stage was kept between 45 and 50% of the total bleach requirement, which narrow optimum range is apparently peculiar to the specially cooked pulps used and would be different for other pulps. (6) Addn of small quantities of Na silicate during bleaching of the chlorinated pulps had a beneficial effect on the final color but increased the time of bleaching. A. PAPINEAU-COUTURE

Wood-pulp testing for fine-paper mills. S. R. H. EDGE. *World's Paper Trade Rev.* 94, 1818–22, 1874, 1876, 1966–72, 2148–62; *Paper Mill* 53, No. 52, 16–7, 20–1(1930).—A description is given of the changes made in the wood-pulp testing for the fine-paper mills of the Wiggins Teape and Alex. Pirie groups as a result of the work of the pulp evaluation comm. of the Technical Section of the Papermakers' Assoc. of Gt. Britain. The initial-strength test alone is practically valueless for fine-paper mills; the pulp is therefore subjected to treatment for a definite no. of revolutions (13,500) in a Lampen ball mill and the strength again detd. Though the beaten-strength value thus found is not the same as that obtained in the paper mill, comparison with the initial strength indicates in a general way, though not completely, the behavior of the pulp on beating. During 2 yrs. of application in the mills, it has been particularly successful in finding pulps for special purposes and in preventing the waste which accompanies a mill trial of a pulp really inferior to that normally used for any particular paper. The Lovibond tintometer was found the most satisfactory instrument for measuring the color of the pulp, both unbleached and after bleaching under standard conditions with 10% bleach. The discussion of the members present at the reading of the paper is reported. A. PAPINEAU-COUTURE

Pulping and paper-making properties of selected New Zealand woods. C. E. CURRAN, P. K. BAIRD, E. R. SCHAFER, W. H. MONSSON, G. H. CHIDESTER AND A. R. ENTRICAN. *New Zealand State Forest Service Bull.* No. 6, 100 pp.(1930).—The report presents the results of a study at the U. S. Forest Products Lab. of the following 6 New Zealand grown woods, the 1st 2 being indigenous and the last 4 being introduced softwoods: rimu (*Dacrydium cupressinum*), a softwood; tawa (*Beilschmiedia tawa*), a hardwood; insignis pine (*P. radiata*) (Monterey pine); Corsican pine (*P. laricio*); Austrian pine (*P. austriaca*) and European larch (*Larix europea*). The fiber lengths and diam. of the different species are tabulated, and photomicrographs of typical pulp fibers of the various woods are given. The New Zealand softwoods fibers are similar to those of American softwoods. Tawa, however, has a shorter fiber than American hardwood fibers and has a low ratio of length to greatest cross-sectional dimensions. In chem. compns., the New Zealand pines are similar to the American northern jack pine (*P. banksiana*), and rimu, which is not a true pine, is also similar to jack pine. Insignis pine possesses certain characteristics of both jack pine and spruce. European larch corresponds closely to the western larch (*Larix occidentalis*) of the U. S. Tawa

is similar in chem. compn. to sugar maple (*Acer saccharum*). In general, groundwood pulps from insignis pine were equal to spruce in strength, but inferior in color and cleanliness. Elimination of the pith or core rot in the growing tree by appropriate mycological and sylvicultural control would reduce the dirt count materially. The power requirements for grinding insignis pine are relatively greater than those for spruce. Tawa, being a hardwood, produces a mech. pulp much inferior to spruce in strength but of excellent color and comparatively free from dirt. The indicated power requirements per ton were not excessive, and the possibilities of the fiber as a filler are good; a comparatively sharp stone should be used to minimize the loss of fine material in the white water. Insignis pine can be reduced to a suitable quality of sulfite pulp for use in newsprint without bleaching, the yields and strength quality being comparable with those of white spruce sulfite, although not entirely equiv. to this pulp in all respects. Young, immature timber is preferable to older timber contg. heartwood Immature tawa can be readily pulped by the sulfite process, the nature of the product being detd. by the cooking methods used. By using a $10^1/_2$- or 11-hr. cooking schedule, a satisfactory, easily bleaching pulp for book paper can be produced. Reduction of the total time to about 9 hrs. can give a high yield of news-grade sulfite. Mature tawa can also be pulped by the sulfite process but requires special processing. The cooking conditions for immature insignis pine and tawa are similar, and mixts. of the 2 woods can be pulped without difficulty. Rimu can be readily pulped by the sulfite process and, while the product is too dark for use in newsprint in the unbleached state, it can probably be used in such products as glassine, wrapping paper and specialties. European larch, like the North American larches, is difficult to pulp by the standard sulfite process, and the product is of doubtful value. Tawa is suitable for pulping by the soda process and is adapted to the manuf. of a bleached pulp for book or similar grade paper production. The sulfate process can be readily applied to rimu, or to any of the pines, or European larch, and a pulp produced comparing favorably with the so-called No. 1 kraft pulps on the American market. Of the several species, rimu yielded the most satisfactory pulp from the standpoint of strength. The application of the semi-kraft process to rimu, insignis pine and European larch showed that savings in chemicals and increased yields are possible at some sacrifice of pulp strength and appearance by the use of this method. The expenditure of addnl. power in beating semi-kraft pulps would result in materially increased strength. The application of the semi-chem. process to tawa was only moderately successful in its principal objective of producing newsprint, but the strength developed in these pulps by continued rod-mill treatment indicated possibilities in the way of wrappings, boards and other products. In the semi-com. paper-making tests, mixt. of insignis pine groundwood and insignis pine sulfite furnished papers that were stronger than the av. for American newsprint, but were yellower and dirtier. These papers ran well on a modern newspaper press. Both semi-com. and com. paper mill trials showed that a furnish of 20% insignis pine sulfite with 50% tawa sulfite and 30% tawa groundwood can be converted into satisfactory newsprint, with standard mill equipment, at speeds of 300–450 ft. per min. A certain amt. of beating is necessary to reach the required strength quality in tawa sulfite, and a refining effect, such as rod-mill treatment, is necessary for the elimination of shives. The same pulps can be used also in the production of machine-finished book (rotogravure) and dry-finished wrapping papers. Bleached European larch can be substituted for the insignis-pine sulfite in the above mixed softwood-hardwood furnish in approx. the same amt. to produce a satisfactory news sheet. Bleached rimu also can be substituted for insignis-pine sulfite, but it would probably be necessary to use a greater amt. to give the required strength. Tawa cooked by the semi-chem. process did not produce an entirely satisfactory newsprint but may possibly be used to some extent in a news furnish. A. PAPINEAU-COUTURE

Determining the strength of pulps. K. G. JONAS. *Papier-Fabr.* **28**, Tech.-Wiss. Teil, 800–5; *Wochbl. Papier-Fabr.* **61**, 1526–34(1930).—In continuation of earlier work (*C. A.* **24**, 3362) a milling and sheet-forming app. for testing pulp with analytical precision has been developed. The milling app. is constructed to operate by centrifugal force. A complete test beating can be performed in a short time, and duplicate tests check to within 3%. The sheet machine, of rectangular form, is specially designed to secure thorough mixing of the stock and a reproducible draining of stock on the wire. The test sheet, couched on a fiber board, is pressed with a loaded roller, this being considered more reproducible than flat-plate pressure. Sheets, on the basis of the tensile test, are reproducible within 1 or 2%. In a general discussion the importance of taking into account both beating time and freeness in connection with a beating strength test is emphasized. The presence of a max. in the strength-basis wt. curve

is shown, and it is recommended that all test sheets be made of the crit. wt. (90 g./sq. m.).
RANDALL H. DOUGHTY

A new method for the determination of mechanical pulp. AUGUST NOLL AND FRITZ HOLDER. *Papier-Fabr.* **28,** Tech.-Wiss. Teil, 700–2(1930).—Various methods of detg. the mech. pulp content of mech.-chem. pulp mixts. are discussed, and a volumetric method is described, which gives results accurate to ±5%. A 4-g. pulp sample is treated with $KMnO_4$, and the mech. pulp content estd. from the $KMnO_4$ consumption with the aid of a prepd. table for which, as well as for details of the method, the original must be consulted. A correction must naturally be made for ash content if this is very high, and any dye present must be destroyed. The results agree well with those of the microscopic method, and the operation is very much simpler. R. H. DOUGHTY

The Roe-Genberg chlorination number of pulp. F. H. YORSTON. *Research Notes* **2,** 21–2(1929).—Failure to sweep all the air out of the pulp chamber when introducing Cl, unavoidable irregularities in temp. control, variations in the soly. of Cl in the water moistening the pulp due to changes in temp. and pressure, and vol. changes due to evapn. or condensation of water are factors which have less effect on the results than the distribution of the pulp inside the pulp chamber. This last factor dets. the rate of soln. of Cl in the moisture present, and hence in the "blank," and seems to be the factor which limits the accuracy of the method; some definite technic for prepg. the pulp samples should therefore be adopted and adhered to throughout any one investigation. If allowance is made for differences in the blank, the amt. of Cl absorbed by a pulp is independent of the partial pressure of the Cl. The reliability of the method was checked by detg. the chlorination nos. of mixts. of bleached and unbleached sulfite and bleached sulfite and groundwood; the relation between compn. and Cl no. was linear, in agreement with Genberg and Houghton (*C. A.* **23,** 4065). A. P.-C.

Microscopy in process control and the need of courses in microscopy. C. G. SCHWALBE. *Papier-Fabr.* **28,** Tech.-Wiss. Teil, 809–10; *Wochbl. Papier-Fabr.* **61,** 1622–4 (1930).—Microscopic control of pulp beating might develop considerable value if observers were properly trained. RANDALL H. DOUGHTY

Beater room control. A. J. WILDMAN, JR. *Paper Mill* **53,** No. 49, 5, 27–8(1930).—The beating-control system used at the mill of the Becket Paper Co. is based on the fact that, with a given roll pressure, the freeness of the stock drops by equal amts. in equal time intervals; as the av. time of beating in this mill is $2^3/_4$ hrs., a freeness test is made 2 hrs. after furnishing, which gives sufficient time to decide on the disposal of a beaterful that has not been properly beaten. Sizing is controlled by means of p_H detns., which obviates accidental omission of size or alum from the furnish. The operation of the control lab. is briefly described, and the benefits derived from beater control are outlined.
A. PAPINEAU-COUTURE

The beating of wood pulp in laboratory and mill. I. The determination of beaten strength. H. AINSWORTH HARRISON. *World's Paper Trade Rev.* **94,** 1988–94, 2060–6, 2104–10(1930).—A detailed description is given of the method used in the lab. of the Cooke & Nuttall mill for evaluating the beaten strength of pulp. Over 80 pulps (mostly kraft and sulfite) tested by this method showed no variation from mill experience. *Procedure.*—Soak for 4 hrs. 4 24-g. (oven-dry basis) lots of air-dry pulp (moist pulps need not be soaked), dil. to 4 l. with H_2O at 15–20°, disintegrate as described in the 1929 report of the pulp evaluation committee of the Technical Section of the Papermakers' Assocn. of Gt. Britain (*C. A.* **23,** 3087, 5576), conc. each lot through a 200-mesh sieve to 3% consistency (800 cc.), and beat in the large Lampen mill (10-kg. bronze ball) for the no. of revolutions equiv. to periods of 15, 30, 60 and 120 min. if a sulfite pulp, and to 30, 60, 120 and 240 min. if a kraft pulp, with the mill running at 300 r.p.m., no adjustment of the p_H being made; dil. the beaten stock to 2 l., clear from lumps by disintegration for 7500 revolutions and dil. to 10 l. Det. Schopper-Riegler wetness in triplicate on 833 cc. of stock (2.0 g. fiber) dild. to 1 l., no corrections for fiber content and temp. variations being required. Make 6 sheets from each lot of beaten stock, using 500 cc. of dild. stock (1.2 g. fiber) and following the procedure of the pulp evaluation comm.; retain 1 sheet as a sample; condition the other 5 at least 4 hrs. (preferably 12–8 hrs.) at 65% relative humidity; test for bursting, tensile and tearing strength, stretch, basis wt. and apparent sp. gr. as described by the pulp evaluation comm., and air permeability by the Gurley densometer. Each property is plotted against time of beating. In order to have a single value to express the strength properties of pulp, the *strength factor* is calcd. from (bursting factor multiplied by 2) + (breaking length/100) + (tear factor/5), a value being given which, though arbitrary and empirical, represents the 3 kinds of strength in something like their relative importance in H.'s mill. The *pulp value* is the strength factor (corrected to 65% relative humidity) of a pulp at 40° Schopper-

Riegler. The *time value* is the time in min. taken to reach a wetness figure of 30° Schopper-Riegler. The *paper value* is calcd. from the results of the tests carried out on the paper in the same way as the strength factor of the pulp. When an abridged test is required, fairly accurate results may be obtained by carrying out only one beating operation, provided it is for such a period that the max. wetness value met with in mill practice is reached or passed. Single beating tests may be relied on to give results within 4–5% of each other, and by conducting a series of beating operations for different periods the limit of error is probably not more than 2–3%. The *drainage time* (time in sec. required for the standard column of water on the sheet-making machine to disappear) is an important property which gives valuable information regarding the condition of beaten stock; it shows markedly the changes taking place in the character of the pulp at high degrees of wetness, of which the Schopper-Riegler beating tester gives only slight indication; it also differentiates between the rate of drainage of a mech. pulp and of a beaten chem. pulp, both of which may have the same Schopper-Riegler wetness but which would work differently on the paper machine wire. Ordinary changes in temp. of the water entering the sheet machine produce appreciable variations in the bursting strength, which increased with decreasing temp.; this possibly confirms the impression of many paper makers that paper made in winter is stronger than that made in summer. The av. of 200 readings showed that the bursting strength is 1.4% lower when the detn. is carried out with the glazed side of the sheet down. II. *Ibid* **94**, 2241, 2244–50, 2336–40(1930).— Data are submitted to indicate some of the possible applications of the Lampen mill in conjunction with the British standard sheet-making equipment to the solution of phenomena of practical and theoretical interest in paper mill operations. Two kraft pulps made from the same wood, one cooked normally and the other overcooked, had the same rate of increase of wetness on beating, but the latter had a more rapid rate of increase in strength though the max. strength was lower. On aging (6 months) the bursting and tensile strength of both pulp and paper fell off appreciably; the tearing strength was unaltered in the pulp, but somewhat lower in the paper. On beating dry kraft pulp at 100° for 20 hrs., soaking 4 hrs. and beating for 30 min., the bursting and tensile strengths were much reduced and the tear was increased. A comparison of the behavior of moist (55% H_2O) and air-dried pulp showed that: (*a*) the greatest difference in strength between moist pulp and the same pulp when air-dry occurs in the unbeaten state; (*b*) air drying of pulp does not result in an irreversible colloidal change of fiber surface, since by adequate beating air-dried pulp develops equal strength to the same pulp kept moist; (*c*) dry pulp increases in strength much more rapidly than moist pulp during the first few min. of beating, the regain in strength being approx. equiv. to that lost during the drying process; (*d*) moist pulp does not increase in wetness (Schopper-Riegler degrees) more rapidly than dry pulp, provided the latter has been soaked 4 hrs. Results of a preliminary investigation on the blending of pulps showed that, as regards wetness, strength and especially drainage time and air permeability, the values for the blended pulp cannot be calcd. from the values for the components. A study of mill-beaten and mill-refined stock, before and after subjecting to lab. beating, showed that: (*a*) refining contributes about the same wetness effect as lab.-beating, (*b*) lab.-beating decreases stretch considerably more than does refining; (*c*) refining produces appreciable increase in wetness only at the expense of tear; it greatly increases resistance to air penetration. The difference between lab. sheets made from mill-refined stock and the mill paper made from the same stock must be due to the conditions to which the stock is submitted during its passage from the machine chests to the reel end of the paper machine; in one example, the mill paper was 31.4% weaker in burst, 25.3% weaker in tensile, and 20.4% stronger in tear than lab.-made paper of about the same substance no. It would seem that the pulp disintegrater and Lampen mill together may be considered as the lab. equiv. of the mill beater and refiner, but with the following 3 main differences: (1) The lab. method produces a fall in tearing strength at a Schopper-Riegler wetness at which the tearing strength may still be increasing in the mill. (2) It produces a greater reduction of fiber length with consequent decrease in tear; the more or less irregular formation of mill paper may also produce a higher tear than those having the best formation possible on the sheet machine. (3) Even under the most favorable conditions, during mill beating it is not possible to treat all the fibers alike; some fibers escape the action of the roll completely, while others are extensively damaged. The strength of pulp after beating 1 hr. in alc. was but very little more than the unbeaten strength (the actual increase is probably due largely to the imbibition of H_2O with which the fibers came in contact after the beating operation in the formation of the sheet), while the cutting was greater than that after 17 hrs.' beating in water. In an attempt at analyzing

the fundamentals of the strength of paper, H. discusses the 4 factors which he considers as primarily influencing paper formation, hydration and strength: felting, fibrillation, surface cohesion and individual fiber strength. A. PAPINEAU-COUTURE

Effect of beating upon certain chemical and physical properties of pulps. C. E. CURRAN, F. A. SIMMONDS AND H. M. CHANG. *Ind. Eng. Chem.* **23**, 104–8(1930).—The chem. constitution of a stuff beaten 4 to 6 hrs. in an approximately neutral water suspension was found to be the same as that of the unbeaten pulp. A slight oxidation of the cellulosic constituent in the sulfate pulp was indicated, possibly caused by alkali adsorbed from the digestion liquor. An apparent correlation between the hydrolysis number and the corresponding tearing-strength factor was observed. The results of the fiber measurements, in conjunction with the strength tests, indicated that, aside from the surface conditions of the fibers, the max. strength of a paper depends upon an optimum ratio of relatively large to small particles. F. A. SIMMONDS

The grinding and beating process. LUDWIG E. WALTER. *Papier-Fabr.* **28**, Tech.-Wiss. Teil, 677–8(1930).—The conception that all the energy put into these processes is transformed into heat, though persistent, is erroneous. A part, though so small as to escape measurement with present methods, goes into the formation of new fiber surfaces. The increase of surface is the object of grinding and beating operations, and any means by which this can be accomplished with less loss of energy as heat will result in increased efficiency of the processes. RANDALL H. DOUGHTY

α- and β-Ligninsulfonic acid. PETER KLASON. *Svensk Pappers-Tid.* **33**, 791–2 (1930); cf. *C. A.* **24**, 3358.—K. takes exception to some of the statements by Hägglund on this topic (cf. *C. A.* **24**, 5152) and refers to some of his own work to support his objections (cf. *C. A.* **22**, 1361, 1680, 2147). WILHELM SEGERBLOM

Advances in burning sulfite waste liquor. J. HAUSEN. *Papier-Fabr.* **28**, Tech.-Wiss Teil, 632–4(1930).—Data are presented showing that 27° Bé. liquor can be burned successfully with coal by spraying. The cost of concg. liquor of less than 9° Bé. is, however, greater than the profit on the steam generation. Concn. of the liquor with waste furnace gases appears promising. RANDALL H. DOUGHTY

Some problems of the German sulfite pulp industry. DEUTSCH. *Papier-Fabr.* **28**, Tech.-Wiss. Teil, 778–80(1930).—The general problem of wood supply might be solved by application of the sulfite process to new species better than by attempts to develop new processes. To do this efficiently requires study of heat economy in pulping, of the mechanism of the pulping reactions and of bleaching. The development of some outlet for waste liquors large enough to be economically important is also a very pressing problem. RANDALL H. DOUGHTY

The Albenielsen sulfate pulping process. MARQUARD H. LUND. *Paper Trade J.* 91, No 26, 53–5(1930).—The essential feature of the process resides in a cylindrical evaporator in conjunction with the digester. One evaporator can serve 1 or 2 digesters. The merits of the process are briefly discussed. It is claimed that the process can be adapted to sulfite cooking. A. PAPINEAU-COUTURE

The sedimentation of causticizer mud in the sulfate pulp process. BO. WIESLER. *Papier-Fabr.* **28**, Tech.-Wiss. Teil, 559–60(1930).—SiO_2 from straw pulping or from siliceous limestone, and FeS, are mentioned as causes of slow settling of causticized liquor. Heating to as high a temp. as possible speeds the settling. R. H. D.

General analysis of (sulfate) black liquor. FRANCIS J. CIRVES. *Paper Trade J.* 91, No. 19, 55–6(1930).—A scheme of analysis is outlined, comprising the following detns.: partial, total and active alkalies, Na_2CO_3, total and partial I values, Na_2SO_3, $Na_2S_2O_3$, Na_2S, NaOH, total solids, ash, combustible non-volatile org. matter, alky. of ash, NaCl, SiO_2, fats + resins + lignins, oxyacids + saccharides + lactones, fatty acids, resins, alc.-sol. lignin, hot-sol. lignin, insol. lignin and total lignin. An example is given of the results obtained on a sulfate black liquor by the procedure outlined. Most of the procedures are standard, or modified to obtain the most favorable results. A. PAPINEAU-COUTURE

Investigation of sulfate waste liquor. FRANCES J. CIRVES. *Paper Trade J.* **91**, No. 19, 56–8(1930).—Acidification of sulfate black liquor with dil. H_2SO_4 gives a voluminous chocolate-brown ppt. representing about 10% by wt. and 30% by vol. of the liquor, and consisting principally of ligneous matter with some fats and resins. The lignin remaining after removal of the fats and resins can be fractionated as follows: (1) treatment with cold alc. removes lignin I, a brown, amorphous powder, readily sol. in caustic solns. and in NH_4OH, from which it is repptd. by acid with development of a strong humus odor; on 2nd and subsequent repptns. there is a marked vanillin odor; (2) treatment with boiling glacial AcOH dissolves out lignin II, which exhibits great adhesive properties on slight cooling of the soln., has a lustrous reddish brown color,

and behaves much like a gum or resin, as it is sol. in both boiling AcOH and boiling alc.; (3) the residue of lignin III is insol. in strong caustic solns. and in NH_4OH, but readily sol. in very dil. NaOH soln. All 3 forms of lignin are sol. in Me_2CO in the order named. Approx. mol. wt. detns. based on the combining wt. with NaOH calcd. on the basis of both 1 and 2 atoms of Na per mol. of lignin gave for lignin I 862, 431 and for lignin II 536, 268. Lignin III gave a very low value (117) which is possibly due to the fact that its combination with NaOH may be an adsorption phenomenon rather than the formation of Na lignate, since it is insol. in 17.5% NaOH but more sol. on excessive diln. with H_2O, which is conducive to hydration and mol. adsorption. Comparison of the yield and compn. of Mosinee pulp and of the compn. of Mosinee sulfate black liquor and of sulfate and soda black liquors produced by 2 foreign processes (not specified) showed that: (1) about 12% of the original solid content of the wood is lost as volatile compds. in the Mosinee pulping process; (2) Mosinee black liquor has a higher fat and resin content (probably because green wood is used, instead of dry wood in the other 2 processes); (3) the oxyacid and lactone content was 6–8% higher in the Mosinee liquor, but it contained practically no AcOH or formic acid (of which about 9–10% were present in the other liquors, based on the wt. of total solids in the liquor); (4) humic compds. were absent from the Mosinee liquor, whereas they were present in the soda black liquor. The latter fact, together with the practical absence of AcOH and formic acid from the Mosinee liquor, indicates that the process used at the Mosinee mill is milder than the others and produces less decompn. of the incrusting wood substances. A. PAPINEAU-COUTURE

Multi-stage bleaching process. EMIL HEUSER. *Papier-Fabr.* **28**, Tech.-Wiss. Teil, 794–800(1930); cf. *C. A.* **24**, 5492. R. H. DOUGHTY

Bleached groundwood pulp. A. O. BRAGG. *Pulp Paper Mag. Can.* **30**, 535–7, 554(1930).—A description of its manuf., properties and applications. A. P.-C.

Bleaching influence on viscosity of soda pulp. J. H. ROSS, C. R. MITCHELL AND F. H. YORSTON. *Paper Trade J.* **91**, No. 20, 53–4(1930).—Results are given of an attempt to utilize the cuprammonium viscosity test (Bialkowsky, *C. A.* **24**, 3366) as a means of fixing the proper set of conditions to be used in arriving at a pulp bleached to a shade desired and estd. by means of optical instruments. The test was found particularly useful in connection with expts. on the influence of H-ion concn. in bleaching exptl. soda pulp. If (as generally believed) the first reaction in ordinary Na or Ca hypochlorite bleaching is an addn. of HOCl to the lignin or coloring matter, the alky of the bleach liquor should increase; the fact that no such increase takes place is attributed to: (1) a balance between 2 phenomena, first, adsorption of alkali by the cellulose, 2nd, addn. of HOCl to the lignin (exptl. evidence is presented in support of this hypothesis); (2) oxidation of incrustants, as opposed to chlorination, in the course of which the alk.-reacting hypochlorites are converted into neutral chlorides; (3) production of acidic compds. during bleaching. Of various procedures studied, the optimum conditions found so far for exptl. bleaching at 2% consistency consisted in a 2-fold chlorination, followed each time by extn. with 0.1 *N* alkali, and followed finally by bleaching at a p_H of 10; so little bleach was required in the final treatment to obtain a good white that the p_H could be kept absolutely fixed by means of the usual *M*/2 borate and phosphate buffers, because the concn. of soda bleach at the low consistency used was small compared with that of the buffer. A. PAPINEAU-COUTURE

Paper-pulp industry on the Pacific Coast. FOLKE-JOHANSSON. *Svensk Papperstid.* **33**, 877–83(1930).—Descriptive and statistical. WILHELM SEGERBLOM

Present problems of paper-pulp production and ways to their solution. ROLAND RUNKEL. *Techn. u. chem. Papier-Zellstoff-Fabr.* **27**, 81–8, 97–110(1930).—One serious problem is that of raw-material supply. Literature on the subject of increased or improved utilization is reviewed, and a *new pulping process* designed to produce a superior yield and class of pulp from inferior wood is described. The process has been tested with spruce, bamboo, pine, oak and beech woods. Detailed data are given for the latter only. Standard beech-wood pulp chips were soaked 4 hrs. in 2% NaOH at 100°, freed from bark, washed and treated for 2 hrs. more at 100° with 10% of NaOH in 3–3.5% soln. The treated material, after rod milling, gave 80% good pulp and 2% screenings (basis original wood). The pulp was treated with excess Cl_2, in 0.4% NaOH at 6% consistence, given a H_2O and dil. NaOH wash, and again chlorinated (no excess) in 0.1% NaOH at 5% consistence. The final product, of good color and strength, was obtained in yields of 50–55%, as against yields of 30 and 40%, resp., by the standard soda and Mitscherlich sulfite processes from the same wood. R. H. DOUGHTY

Cunninghamia lanceolota for paper making. JOHN B. CALKIN. *Paper Trade J.* 91, No. 22, 53–5(1930).—Results are given of grinding tests and soda and sulfate cooking

tests carried out on *Cunninghamia lanceolota* (Lamb) Hook, from China, known locally as "charm." Grinding in a com. 3-pocket grinder gave a groundwood of very low strength, probably because of the condition of the stone used. Cooking with 28.9% NaOH (on the dry wt. of the wood) at a concn. of 66.3 g. per l., for 4.5 hrs., at an av. pressure of 115 lb. per sq. in. and av. temp. of 170°, yielded 39.7% of pulp having a bleach requirement of 26.4, strength ratio 19.53, relative compactness 2.61, tearing ratio 114.62, and comparing very favorably with exptl. spruce soda pulp obtained under approx. similar cooking conditions. The sulfate cooks did not show any increase in strength over the soda cooks except in one instance where there was an increase in the tearing ratio. The wood contains a good proportion of cellulose, and, by taking into account the slightly higher resin content as compared with spruce, it should give results comparable to those obtained from spruce in com. practice. A. P.-C.

Measurement of average fiber length. JOHN B. CALKIN. *Paper Trade J.* **91**, No. 20, 54(1930); cf. *C. A.* **24**, 5486.—A correction. A. PAPINEAU-COUTURE

Deterioration of the Herzberg stain. F. L. MINNEAR AND JAMES R. WITHROW. *Paper Trade J.* **91**, No. 24, 51–5(1930).—The Herzberg stain, when preserved in a tightly fitting ground-glass stoppered, dark bottle, has a "life" of more than 1 yr. The conclusion of former workers that this can be preserved well for only 2 weeks is therefore erroneous. Slides of rag, sulfite and soda fibers stained with the Herzberg stain may be preserved for about 2 months by paraffining the edges to prevent change in moisture and I content of the stained fibers. The rag fibers "bleach" sooner than either the sulfite or soda. Volatilization of free I from the Herzberg stain is probably the most common cause of deterioration of this reagent. By making up a larger stock batch, which is checked and standardized against known fiber compns., then by drawing smaller portions from it for active use, the possession of a satisfactory stain will be assured. A. PAPINEAU-COUTURE

The use of chlorine for slime elimination [in paper mills]. O. T. BIRKENESS. *Paper Trade J.* **91**, No. 20, 51–2(1930).—Elimination of existing slime and prevention of its formation can be efficiently accomplished by appropriate use of free Cl, the quantities and points of introduction varying widely according to the particular mill conditions. The Cl required per ton of paper produced for different grades is roughly as follows: paper board 1–4, book paper 0.5–2, kraft paper 1–3, tissue paper 1–2, roofing felt 2–5 lb. Accurate control of the treatment should be maintained. The benefits of the treatment are indicated. A. PAPINEAU-COUTURE

The Thyle consistency control. H. L. RAMMER. *Paper Trade J.* **91**, No. 21, 51–3 (1930).—A brief description is given of the principle and operation of the Thyle consistency regulator, with a brief discussion of its merits. A. PAPINEAU-COUTURE

The Fresk digester-filling system. OTTO F. KREISSLER. *Paper Trade J.* **91**, No. 26, 56–8(1930).—A discussion of the disadvantages of ordinary gravity filling of digesters and of packing the chips by stamping, and of the advantages of the use of the Fresk filling system by which the chips are uniformly distributed and packed in the digester. A. PAPINEAU-COUTURE

Direct versus indirect steaming. C. H. CHRISTIANSEN. *Paper Mill* **53**, No. 47, 24, 26(1930).—The relative merits and disadvantages of stationary and tumbling digesters using direct steam are compared with stationary digesters using indirect steam with forced circulation. A. PAPINEAU-COUTURE

Control of acidity improves sizing. BENNETT, LTD. *Pulp Paper Mag. Can.* **30**, 724(1930).—The following p_H values, though not applying equally well in all cases, are generally recognized as being standard conditions giving the most satisfactory results: stock before alum and size are added 6.5–7.5, av. 7.0; white water in tray at paper machine 4.5–6.0, av. 5.0. If the stock is acid before addn. of the size, local coagulation of the size will take place with resulting loss in sizing efficiency, irregular sizing and even size spots. If the stock has a high alky. (p_H 7.5 or more) before addn. of the size, it should be tested for Ca salts, which are very detrimental to sizing. A PAPINEAU-COUTURE

Calibration of Canadian standard freeness tester. W. BOYD CAMPBELL AND W. E. ADLINGTON. *Pulp Paper Mag. Can.* **31**, 750–1(1931).—Instructions are given for maintaining the instrument in condition for accurate work. A. PAPINEAU-COUTURE

Testing the Schopper-Riegler freeness tester, with automatic valve, for uniformity of results. KORN. *Papier-Fabr.* **28**, Tech.-Wiss. Teil, 683–7; *Wochbl. Papier-Fabr.* **60**, 1336–41(1930).—A new design of this app. arranged to eliminate the personal equation in opening the drain valve is described. Data are presented for 10 tests made by each of 3 individuals on each of 8 pulps. After correction for variations in sample weight

the greatest deviation from the mean in 10 tests was 1°, while the greatest deviation between the av. values found by the 3 operators was 0.5°. RANDALL H. DOUGHTY

An improved Schopper-Riegler freeness-consistency chart. D. S. DAVIS. *Paper Trade J.* **91**, No. 21, 49–50(1930).—It is shown that the nature of Korn's freeness-consistency data (*C. A.* **23**, 5577) permit the construction of straight-line charts for the purpose of correcting freeness to the standard consistency basis. Two such charts are given. A. PAPINEAU-COUTURE

Paper in the electrical industry. W. H. ANDERSON. *Paper Mill* **53**, No. 52, 11–2, 14(1930).—A general description is given of the various uses to which paper is put in the elec. industry and of the properties of the different grades so used. A. P.-C.

Paper-mill slime. DONALD K. PATTILLO. *Paper Mill* **53**, No. 51, 4, 6, 8, 32 (1930).—A review of the development and operative work during the past 3 yrs. on the elimination and prevention of the formation of slime in paper mills. The benefits of properly controlled chlorination are summarized. A. PAPINEAU-COUTURE

Slime in pulp and paper mills with special reference to methods of prevention. CLARA W. FRITZ. *Research Notes* **2**, 9–10(1929).—A study of slime conditions in 4 Canadian pulp and paper mills showed it was present throughout the groundwood, sulfite and paper-mill systems. The bulk of the slime was usually found to be composed of filamentous fungi of the mold type, which formed a matted tangle in which bacteria, yeasts and unicellular animals were frequently found developing. It originates from the raw materials (particularly the water) and the air carrying spores and viable vegetative fragments from pieces of dried slime and pulp in the mill. The fungi tolerate a wide range of temp. variation (3–19°) and a wide H-ion concn. (p_H 4.6–7.6). $CuSO_4$ and NaOH for preventing slime were found practically useless; some satisfactory results were obtained in certain cases with Cl. Treatment of the piping, etc., with NaOH, followed by flushing with clean water, removes the slime. A. P.-C.

Progress of research on paper making from eucalypts in Australia. J. L. SOMERVILLE. *World's Paper Trade Rev.* **94**, 2329–34(1930).—A brief review of the work done on the paper-making properties of Australian eucalypts (see Benjamin and S., *C. A.* **22**, 3776; **23**, 3089). A. PAPINEAU-COUTURE

The durability of paper. JAMES STRACHAN. *Paper Mill* **53**, No. 51, 12–3(1930).—This is a brief discussion, bringing out the difference between chem. deterioration and mech. deterioration. A. PAPINEAU-COUTURE

Bursting-tester standardization. G. F. UNDERHAY. *World's Paper Trade Rev.* **94**, 2268–78(1930); **95**, 24–8(1931).—Results are given of a comparative study of the Mullen and Schopper bursting testers, sources of errors being shown and remedies for these being suggested. The Schopper tester can be easily improved to obtain a practically uniform rate of pressure increase by fitting it with a Dewrance valve of the type used in conjunction with pressure gages, which should be placed as close as possible to the needle valve supplied by the makers. It is shown that a thin red rubber diaphragm is preferable to that supplied with either instrument; by use of the diaphragm supplied with the Schopper tester it was impossible to record with any certainty a burst of less than 10 lb. per sq. in., while with a thin red rubber diaphragm bursts of 5 lb. could be recorded accurately. A. PAPINEAU-COUTURE

Obtaining efficiency by careful selection of recording instruments. W. O. HERBERT. *Paper Ind.* **12**, 1402–3(1930).—A brief discussion of the importance and advantage of continuously recording the SO_2 content of S burner gases in sulfite mills. A. P.-C.

Chromium plating in the paper industry. D. H. BISSELL. *Paper Ind.* **12**, 1390–9 (1930).—An outline is given of some of the many interesting and highly successful applications of Cr plate, particularly on equipment used in paper manuf. A. P.-C.

The Zeiss photometer in the paper mill. GIRO SYLVIO. *Papier* **33**, 963–74 (1930).—A description is given of the instrument and its operation and of its use for measuring the gloss of paper, for the examn. of fillers and for measuring transparency. A. P.-C.

Surface temperatures and water evaporation on the drying part of a paper machine. FR. MÜLLER AND R. TRENSCHEL. *Papier-Fabr.* **28**, Tech.-Wiss. Teil, 812–9, 825–30; *Wochbl. Papierfabr.* **61**, 1534–44(1930).—Detailed data are presented for a newsprint and a greaseproof machine, the thermal efficiencies of which were found to be 66 and 72%, resp. It is pointed out that in detg. the surface temps. of rotating cylinders an unknown error is introduced by frictional heat. RANDALL H. DOUGHTY

Machine for testing the strength and elongation of a single fiber (AOKI, ATSUKI) **25. Cornstalks as an industrial raw material** (SWEENEY, ARNOLD) **13. Arsenic in writing materials** (KAPPELLER) **26. Recovery of AcOH (Fr. pat. 689,733) 10. Hydrogenation**

processes (cellulose, wood, etc.) (Fr. pat. 691,303) **21.** *tert*-Butylnaphthol [as plasticizer for cellulose derivatives] (U. S. pat. 1,788,529) **10.** Producing designs on surfaces composed of cellulose derivatives (Fr. pat. 689,007) **5.**

Cellulose. ALBERT E. NIELSEN. Fr. 689,245, Feb. 1, 1930. An app. is described for making cellulose from wood, etc., by the indirect application of steam and circulation of the cooking liquid outside the oven.

Cellulose. ERNST SCHMIDT. Fr. 689,291, Nov. 30, 1929. Cellulose is obtained from wood, etc., particularly woods which are not easily dissolved by the ordinary process, by adding to the sulfite lye metals such as Fe, Ag, Cu, Al, Zn, Sn, Pb, Co, Ni, Cr, Mn or their salts or oxides.

α-Cellulose. LAURI I. L. DURCHMAN. Can. 397,799, Jan. 20, 1931. α-Cellulose is produced by cooking wood chips with black and white sulfate liquor with the addn. of Na_2SO_3 in the proportion of 0.8–1.0% based on the air-dry wt. of the wood chips, boiling the resultant pulp under atm. pressure with a mixt. contg. NaOH and NaCl, bleaching, treating the bleached pulp at room temp. for 3–6 hrs. with a 5–12% soln. of NaOH, recovering the NaOH, washing and treating with oxalic acid to neutralize the residual alkali and to facilitate extn. of other residual and coloring impurities. Cf. *C. A.* **25,** 204.

High-grade α-cellulose. LAURI I. L. DURCHMAN. Can. 307,798, Jan. 20, 1931 Incrusting substances of wood pulp are converted into water-sol compds. by treating the pulp for 4–6 hrs. at 20 to 60 lb. pressure with a soln. contg. 2–5% NaOH and 1–3% Na_2SO_3, bleaching, treating the bleached pulp at room temp. for 3–5 hrs. with white liquor to effect removal of incrusting substances for obtaining a high-grade α-cellulose, treating the pulp with oxalic acid to ppt. the Ca compds. and to dissolve the Fe compds and washing the pulp to remove the Fe and Ca compds.

Straw cellulose. V. P. TELEZHKIN. Russ. 43,202, Mar. 21, 1929. Straw cut into small pieces is treated at 50° with a soln. of compds. obtained by a sulfonation of fusel oils together with naphthalene. The boiling is then carried out in rotating containers and in caustic.

Saccharification of cellulose. SOC. ANON. DES DISTILLERIES DES DEUX-SÈVRES. Fr. 691,350, May 14, 1929. Cellulose in the form of waste wood, etc., is saccharified by converting it into cellulose formates by treatment with HCOOH and hydrolyzing the formates obtained, this hydrolysis being completed by boiling in aq. soln. in the presence of a mineral acid with or without pressure. Cf. *C. A.* **24,** 3112.

Cellulosic materials. HENRY DREYFUS. Fr. 36,935, May 18, 1929. Addn. to 675,354 (*C. A.* **24,** 2880) Cellulosic materials are made more apt to react in view of esterification in 2 steps by treating the materials with one or more org. acids applied alone or mixed with inert diluents and then treating them with one or more org. acid anhydrides and (or) one or more org. acids. A condensation agent may be added during the 2nd step and is neutralized before the end of the step.

Decomposing cellulosic substances. OSKAR A. MULLER. Fr. 689,624, Feb. 8, 1930. Substances contg. lignin and cellulose are decomposed by chlorination in the moist state. The chlorolignin is liberated by treatment with an org. solvent contg. a mineral acid and miscible with water. The cellulose is isolated from the elements sol. in the org. solvent, after which the chlorolignin is sepd. from the ext. obtained, the solvent is removed by distn., the tanning substances are isolated by extn. and the aq. residue is submitted to a fermentation.

Method and plant for dewatering packed cellulose, etc., with a number of presses. J. M. VOITH MASCHINENFABRIK. Ger. 512,379, May 16, 1925.

Cellulose products. IMPERIAL CHEMICAL INDUSTRIES, LTD. Fr. 690,215, Feb. 19, 1930. Benzylcellulose is modified so that it gives clear solns., and the viscosity of its solns. is diminished by treating it with $C_6H_5CH_2Cl$ or other aralkyl halide and with water and steam at ordinary or increased pressure. Further, a reaction mass obtained by the action of $C_6H_5CH_2Cl$ on ripened alkali-cellulose, the esterification taking place in a single phase without isolation of the intermediate products, is purified until it contains 3–25% of $C_6H_5CH_2Cl$ or other aralkyl halide, the latter being transformed into aralkylalc. The processes give *lacquers* which dry with a polished surface.

Cellulose films. LA CELLOPHANE. Fr. 689,072, Jan. 29, 1930. Cellulose films which are more or less opaque and more or less mat are made by producing or incorporating in the film or in the starting material, either a finely divided inert solid or a liquid capable of forming a stable emulsion with the viscose or an insol. compd. when treated with appropriate reagents.

Cellulose derivatives. CAMILLE DREYFUS. Fr. 689,134, Jan. 30, 1930. Cellulose

esters such as the acetate are fractionated by a fractional pptn. of their solns. Thus, water or other nonsolvent may be added to a soln. of cellulose acetate in a mixt. of C_6H_6 and EtOH or MeOH, or the soln. may be fractionated by cooling.

Cellulose derivatives. HENRY DREYFUS. Fr. 36,814, Mar. 23, 1929. Addn. to 671,921 (*C. A.* **24**, 2290). Mixed derivs. of cellulose are made by treating cellulose materials so as to replace a part of the OH groups by alkacyl groups and another part by alkoxyalkacyl groups, *e. g.*, by means of Ac_2O and methoxy acetic anhydride. Metallic chlorides or H_2SO_4 may be used as catalysts. The products have their solubilities changed by treating them in soln. or suspension with org. or inorg. acids, acid salts, salts having an acid reaction or aromatic amines or their salts.

Cellulose derivatives. SOC. ANON. POUR L'IND. CHIM. À BÂLE. Fr. 689,557, Feb. 7, 1930. New cellulose derivs. are prepd. by the action of halides of cyanohydric acid on cellulose rendered active. An alkali cellulose prepd. by treating cellulose with alc. solns. of KOH may be used. A treatment with CS_2 may take place before or during the treatment with the halide, and the treatment may take place in the presence of org. bases, or the reaction products are submitted to the action of water, bases or alcs. Cf. *C. A.* **25**, 812.

Compositions containing cellulose derivatives. I. G. FARBENIND. A.-G. Ger. 512,321, July 25, 1925. Aliphatic esters of maleic and fumaric acids are used as solvents or softening agents for cellulose derivs., alone or with other solvents, diluents, etc. Examples are given.

Cellulose acetate. COURTAULDS, LTD. Ger. 512,225, April 6, 1927. See Brit. 269,012 (*C. A.* **22**, 1473).

Cellulose acetate. ALEXANDER WACKER GES. FÜR ELEKTROCHEM. IND. G. M. B. H. (Wolfgang Gruber, inventor). Ger. 510,425, Jan. 10, 1926. Cellulose acetate insol. in acetone is converted into the acetone-sol. form by treatment at a temp. below 30° with chloroacids contg. water of crystn. and derived from bivalent metals of the first or second periodic group. Suitable acids are $HZnCl_2$ $2H_2O$ and $3HgCl_2.4HCl.14H_2O$. Other acids or neutral salts may be added with the chloro acids. Examples are given.

Cellulose acetate. KODAK-PATHÉ (SOC. ANON. FRANÇAISE). Fr. 689,200, Jan. 31, 1930. Cellulose acetate is prepd. by submitting cellulosic material to a preliminary treatment, *e. g.*, to the action of AcOH, and distg. the mixt. in the presence of a liquid which forms an azeotropic mixt. with water, such as ethylene chloride, to remove the water from the mixt. and afterward continuing the esterification of the cellulosic material.

Composition cellulose acetate films, etc., for tipping cigarets. C. MÜNCH. Brit. 334,271, April 4, 1929. A non-transparent composite film comprises a very thin layer in which the color or pigment, if any, such as bronze powder, is in such limited proportion as not to destroy the waterproof character of the film, and another very thin layer contg. sufficient finely divided pigment to render the layer non-waterproof and to give it a mat surface. Various details of manuf. are described.

Cellulose esters. SOC. DES USINES CHIM. RHÔNE-POULENC. Fr. 689,244, Feb. 1, 1930. Sol. cellulose esters of carboxylic acids contg. at least 8 atoms of C in the mol. are made by treating cellulose or its near transformation products with the anhydrides of the acids in question in the presence of a catalyst composed of sulfo derivs. of aliphatic hydrocarbons such as methanesulfonic acid and in the presence or not of diluents. Cf. *C. A.* **24**, 2290, 5495.

Cellulose esters. SOC. KODAK-PATHÉ (SOC. ANON. FRANÇAISE). Fr. 690,115, Feb. 17, 1930. Mixed cellulose esters are prepd. by digesting an aryl ester of cellulose, such as the acetate, with an aliphatic or aromatic mono or dibasic acid contg. an OH group in the α-position, such as lactic, tartaric, racemic, glycolic, glyceric or malic acid. Cf. *C. A.* **25**, 813.

Cellulose esters. SOC. KODAK-PATHÉ (SOC. ANON. FRANÇAISE). Fr. 690,458, Feb. 22, 1930. Mixed cellulose esters are made by digesting an acyl ester of cellulose, such as cellulose acetate with an acid contg. a keto group in the α- or γ-position, such as pyruvic, α-ketobutyric, α-ketovaleric, α-ketocaproic or levulinic acid. Cf. *C. A.* **25**, 813.

Cellulose ester compositions. SOC. DES USINES CHIM. RHÔNE-POULENC. Fr. 691,337, May 21, 1929. Films, etc., are made of cellulose acetate to which tri(*m*-hydroxyphenyl) phosphate is added as a plastifying and fireproofing agent.

Cellulose ester films. SOC. KODAK-PATHÉ (SOC. ANON. FRANÇAISE). Fr. 689,574, Feb. 7, 1930. Films of cellulose esters which do not shrink are prepd. by submitting the film to a drawing while in a swollen state and drying it while drawing. An app. is described.

Mottled plastic products from cellulose ester compositions. DANIEL D. PAYNE (to du Pont Viscoloid Co.). U. S. 1,789,081, Jan. 13. Various details are described of assembling and subdividing bundles of units of differently colored material.

Cellulose ester and ether products. SOC. POUR LA FABRICATION DE LA SOIE RHODIASETA. Ger. 512,160, Feb. 17, 1925. Artificial filaments and films are prepd. by dissolving a cellulose ester or ether and an albuminous material in an aq. soln. of one or more derivs. of thiocyanic or isothiocyanic acid and coagulating the soln. in an aq. bath which may contain a neutral salt, *e. g.*, Na_2SO_4. Before the soln. is spun, it may be allowed to ripen and then made alk. by addn. of NH_3 or an org. base. The method is particularly useful with cellulose formate.

Cellulose ether-esters. I. G. FARBENIND. A.-G. (Ernst Teupel, inventor). Ger. 510,424, Jan. 21, 1928. An alkyl cellulose contg. not more than 1.5 alkyl groups is acylated in the presence of a small quantity of a catalyst so as to yield a product in which a total of 2–2.5 OH groups of the cellulose mol. ($C_6H_{10}O_5$) are substituted. The amt. of catalyst does not exceed 0.5% when H_2SO_4 is used. The products are useful for making films, lacquers, etc. Examples are given. Cf *C. A.* 25, 104.

Cellulose ether products. I. G. FARBENIND. A.-G. (Kurt Sponsel and Gerhard Balle, inventors). Ger. 509,304, Aug. 13, 1925. Films, filaments, etc., are prepd. from water-sol. alkyl ethers of cellulose by extruding their aq. solns. into hot water.

Cellulose ether solutions. I. G. FARBENIND. A.-G. (Hans Persiel, inventor). Ger. 509,067, Mar. 18, 1927. Solns. contg. a water-sol. cellulose ether and a tanning agent are prepd. with an aq. org. solvent. Thus, an aq. soln. of methylcellulose may be mixed with an alc. soln. of tannin, or methylcellulose may be dissolved in a soln. of tannin in aq. propanol. The solns. may contain albumins, resins, etc., and may be used for making coatings, filaments, etc. Cf. *C. A.* 25, 592

Cellulose ether solutions and plastics. GERHARD STEIMMIG (to I. G. Farbenind. A.-G.). U. S. 1,788,781, Jan. 13. A cellulose ether such as ethylcellulose is used with a monoaryl ether of ethylene glycol such as the monocresyl ether and with other solvents, etc.

Nitrocellulose. VICTOR PLANCHON. Fr. 36,714, Jan. 18, 1929. Addn. to 643,454 (*C. A.* 23, 1504). The process of the prior case is extended to sheets of all cellulosic material similar to wood pulp.

Nitrocelluloses. VICTOR PLANCHON. Fr. 691,138, May 8, 1929. Nitrocelluloses are made supersol. in the usual solvents by submitting them to the action of a strongly alk. substance, such as NH_3, washing, decolorizing and drying

Nitrocellulose. MILTON O. SCHUR and BENJAMIN G. HOOS (to The Brown Co.). Can. 307,372, Jan. 6, 1931. Cellulose fiber is treated with an aq dispersion of nitrocellulose, is preferably dried, and is then nitrated.

Producing designs on celluloid. PAUL M. S. SCHLOCHOFF. Ger. 510,177, Aug. 7, 1929. A glass sheet is dull-etched over its whole surface by means of HF or a sand blast, and the dulled surface is then etched again in the desired design so that different etching tones are perceptible. The celluloid, etc., sheet is then moistened with a solvent and pressed on to the glass by means of a roller.

Pyroxylin compositions. HAMILTON BRADSHAW (to Canadian Industries, Ltd.). Can. 307,396, Jan. 6, 1931. A cellulose ester compn. contains tetrahydrofurfuryl alc., a resin, a solvent softener, and ester of butyl alc., an alc. and a hydrocarbon oil. The compns. are suitable for use as brushing lacquers or enamels.

Artificial masses. I. G. FARBENIND. A.-G. Fr. 689,170, Jan. 31, 1930. Dry masses which, by the addn. of solvents, form mastics, dressings, insulators, cements, foundation paints, etc., are made from cellulose derivs. and binding agents such as resins or oils with or without fillers. Examples are given of the use of nitrocellulose and ethylcellulose.

Viscose. LOUIS C. P. JARDIN. Fr. 36,888, Feb. 9, 1929. Addn. to 641,866 (*C. A.* 23, 1268). An app. is described for obtaining alkali cellulose in the compressed and the noncompressed state for the manuf. of viscose. Cf. *C. A.* 24, 1980.

Viscose. STECKBORN KUNSTSEIDE A.-G. Swiss 140,972, Nov. 16, 1928. Mat fibers, films, etc., are produced from viscose contg. finely divided insol. particles. The particles are introduced by adding org. substances which are sol. in the viscose at first (*e. g.*, esters, leuco compds., etc.) but which are pptd. by the action of substances such as alkali or O in the viscose.

Apparatus for withdrawing gases evolved from viscose spinning baths. CARL HAMEL A.-G. Ger. 512,320, Mar. 20, 1928.

Device for spinning viscose solution. KALLE & CO. A.-G. (Julius Voss, inventor).

Ger. 510,946, Oct. 14, 1928. The drawing-out device is arranged to be set at a variable distance from the nozzle.

Artificial silk. BRITISH CELANESE, LTD., W. I. TAYLOR and R. P. ROBERTS. Brit. 334,195, March 28, 1929. Products of relatively reduced luster are obtained directly by the dry spinning method by adjusting the temp. of the spinning soln. so that it may be about 10–20° below that of the evaporative medium and below the minimum temp. required to produce highly lustrous products. The process is applicable to solns. of various cellulose esters and ethers, and numerous details and modifications of procedure are given. Brit. 334,198 relates to a similar process in which water or other diluent of higher b. p. than the solvent is added to the spinning soln. Cf. *C. A.* **24**, 5169.

Artificial silk. ALEXANDER WACKER GES. FÜR ELEKTROCHEMISCHE IND. G. M. B. H. Fr. 688,989, Jan. 28, 1930. Fine threads of artificial silk are made in the dry spinning process, by charging the thread before it is completely solidified with a swelling agent and afterward submitting it to a known drawing process.

Artificial silk. I. G. FARBENIND. A.-G. Fr. 689,121, Jan. 30, 1930. In making artificial silk by the wet method the threads from the spinning nozzles are caused to pass over a heated roller, etc., before reaching the winding cylinder. The roller may be sprinkled to prevent crystn. thereon of salts from the coagulating bath.

Artificial silk. NOVASETA A.-G. ARBON. Swiss 141,268, Oct. 8, 1928. A pptg. bath for artificial silk consists of meteoric water to which a small quantity of alkali hydroxide and hydrosulfite has been added to render the gases harmless.

Artificial silk. HENRY DREYFUS. Fr. 36,751, Mar. 23, 1929. Addn. to 531,816. Filaments or threads of artificial silk are made by extruding downward solns. of cellulose derivs. in the form of filaments received into a spinning chamber and passing for 3–6 m. or more through an evaporative medium and winding the filaments outside the chamber.

Artificial silk, etc. HENRY DREYFUS. Fr. 689,135, Jan. 30, 1930. Solvents used in the manuf. of artificial threads or filaments are recovered by heating the thread etc., and submitting them to a vacuum. A small quantity of air or other gas may be brought into contact with the threads during the treatment. Cf. *C. A.* **24**, 3360.

Artificial silk and similar products. BRITISH CELANESE, LTD., W. I. TAYLOR, R. P. ROBERTS and L. W. GREGORY. Brit. 334,563, March 28, 1929. Opaque, relatively insol. metallic compds. are formed in filaments, threads, etc., formed at least in part of cellulose acetate or other cellulose esters or ethers by spinning their solns., by the interaction of reagents, one of which is introduced into the spinning soln. while the other is applied to the materials during or after their formation. Numerous details and examples are given, among which is the production of $BaSO_4$, Pb sulfate or Ba phosphate, use of dyes with fixing agents comprising metal salts, etc.

Artificial threads. LÉON LILIENFELD. Fr. 37,021, June 10, 1929. Addn. to 666,178 (*C. A.* **24**, 1509). The extensibility of threads produced from viscose is increased by treating the dry, wet or damp threads with a caustic alkali soln. contg. 2–5% of alkali hydroxide (calculated as NaOH).

Artificial threads, etc. HENRY DREYFUS. Fr. 688,625, Jan. 21, 1930. Filaments, threads, etc., are made from solns. of cellulose acetate or other org. derivs. of cellulose in which a proportion of a wetting agent such as Turkey-red oil has been incorporated or the wetting agent is contained in the spinning bath.

Artificial threads, bands, etc. GLANZSTOFF COURTAULDS, G. M. B. H. Fr. 689,377, Feb. 3, 1930. Spinning solns. capable of being drawn out for the production of threads, bands, etc., are made by adding to viscose, sulfonated fatty oils such as Turkey-red oil, or their derivs., 0.3–2%. Before or after the addn. of sulfonated oils, insol. oil may be added to the viscose.

Artificial threads, ribbons, etc. HENRY DREYFUS. Fr. 690,432, Feb. 22, 1930. In making threads, ribbons, etc., by extruding solns. of cellulose esters or ethers into an evapg. agent, a relatively low luster is obtained by keeping the spinning soln. at about 10–20° below the min. required for the manuf. of products of normal luster.

An apparatus for washing cakes of artificial silk from the spinning pots. I. G. FARBENIND. A.-G. Fr. 688,806, Jan. 24, 1930.

Artificial silk spinning device. CARL HAMEL SPINN- & ZWIRNEREIMASCHINEN A.-G. Swiss 140,970, April 27, 1929.

Spinning nozzles for artificial silk. CAMILLE DREYFUS. Fr. 691,297, Mar. 6, 1930.

Spinning pot for artificial silk. WILHELM NIESSEN. Ger. 512,265, Dec. 9, 1928.

Spinning tubes for artificial silk. VEREINIGTE GLANZSTOFF-FABRIKEN A.-G. Fr. 690,214, Feb. 19, 1930.

Multiple draw plate for artificial silk manufacture. HENRI COLOMB. U. S. 1,788,660, Jan. 13.

Apparatus for artificial silk-thread manufacture. WM. H. FURNESS (to Cellocilk Co.). U. S. 1,788,484, Jan. 13. Structural features.

Treating wood, etc. KARL G. BERGSTRÖM and ARTHUR F. ZENNSTRÖM. Fr. 689,560, Feb. 7, 1930. Wood or other vegetable products are treated to obtain cellulose, with recovery of by-products, by exhaustion with a feeble alkali lye at ordinary temp. to recover AcOH, HCOOH and other acids. With a resinous wood a further treatment with heated stronger lye is given. The lignin obtained is used for the production of a pure C.

Sulfite lyes. PIERRE A. BARBOU (Pierre Weill, inventor). Fr. 36,977, Mar. 16, 1929. Addn. to 628,775. In the recovery of SO_2 and Na_2O from sulfite lyes the treatment with lime is followed by a treatment with CO_2 to transform the NaOH into Na_2CO_3 which will react to form $CaCO_3$ and $NaHSO_3$.

Organic materials from sulfite lyes. SOC. BARBOU ET CIE (Pierre Weill, inventor). Fr. 36,975, Mar. 15, 1929. Addn. to 642,270. In recovering org. materials contained in lyes from the treatment of vegetable materials with Na_2SO_3, $NaHSO_4$ is used instead of H_2SO_4 in the process of the prior case.

Cellulose pulp from lignocellulose material. ROBERT B. WOLF, RAYMOND P. HILL and RAYMOND S. HATCH. U. S. 1,788,555, Jan. 13. Material such as wood is treated with a non-aq. liquid contg. SO_2, *e. g.*, anhyd. liquid SO_2.

Bleaching paper pulp. WILHELM HIRSCHKIND (to the Great Western Electro-Chemical Co.). Can. 307,440, Jan. 6, 1931. Wood pulp is treated with $Na_2S_2O_4$ in the presence of moisture as a final bleaching step prior to the making of paper.

Apparatus for washing and pressing paper-making pulp. OTTO MANTIUS. U. S. 1,788,840, Jan. 13. Structural features.

Clarifying device for the waste waters of the cellulose and paper industry. FRITZ ARLDTER. Ger. 512,323, Feb. 29, 1924.

Paper. KODAK-PATHÉ (SOC. ANON. FRANÇAISE). Fr. 691,394, Feb. 27, 1930. Satd. higher fatty acids in the form of a salt having an I no. below 40, and preferably below 5, are added to paper pulp as sizing agents. Suitable acids are palmitic and stearic acids. Cf. *C. A.* **25**, 416.

Paper. I. G. FARBENIND. A.-G. (Kuno Franz and Carl Dankert, inventors). Ger. 510,855, July 2, 1929. Paper, etc., is treated on the side to be subsequently glazed, with a soln. of starch to which alkylcellulose has been added.

Paper and paper board. LEVIS M. BOOTH. U. S. 1,788,790, Jan. 13. In the manuf. of paper or paper board, a chlorinated material such as chlorinated lime is added to the stock and the inorg. residue is allowed to remain in the product.

Paper-making apparatus. PAPETERIES NAVARRE. Brit. 334,766, Oct. 31, 1928. Structural features.

Cylinder-mold screen for paper-making apparatus. JOHN S. LITTLE (to Western Elec. Co.). U. S. 1,788,531, Jan. 13. In applying celluloid strips to a cylinder mold screen, the strips are moistened with a solvent and joined with the screen by pressure.

Suction roll for paper machine. WM. H. MILLSPAUGH. Ger. 510,163, Jan. 31, 1929. This corresponds to Brit. 308,679 (*C. A.* **24**, 501).

Centrifugal separator for paper materials, cellulose, etc. PAUL ERKENS. Ger. 510,980, April 27, 1927.

Centrifugal sifting drum for paper, cellulose, etc., manufacture. SEIDL & MAYER and FIRMA FRITZ KIENZLE. Ger. 512,461, May 14, 1927.

Moistening device for traveling materials, such as paper. GUSTAV SCHLICK. Ger. 510,274, June 2, 1929.

Moistening device for traveling materials, such as paper. GUSTAV SCHLICK. Ger. 511,699, Mar. 30, 1930. Addn. to 510,274 (preceding abstr.).

Sizing paper. YA. G. KHINCHIN and B. YA. KUKIS. Russ. 38,274, Jan. 7, 1929. An aq. soln. of NaOH or Na_2CO_3 (0.5–1% of the wt. of the fiber) is added to the pulp simultaneously with, or before, the incorporation of a soln. of rosin glue.

Device for pulverizing waste paper. JAGENBERG-WERKE A.-G. Ger. 510,979, Aug. 17, 1928.

Removing printer's ink, etc., from paper. N. A. KUZIN. Russ. 52,792, Aug. 12, 1929. The paper is placed in a bath with a weak aq. soln. of NaCl which is then electrolyzed.

24—EXPLOSIVES AND EXPLOSIONS

CHARLES E. MUNROE

Consumption of explosives in November, 1930. W. W. ADAMS AND L. S. GERRY. Bur. Mines, *Rept. of Investigations* 3075, 9 pp.(1931).—Domestic sales of explosives manufd. in the U. S. in Nov. were 9,147,500 lb. of black blasting powder, 4,279,000 lb. of permissible explosives and 21,258,000 lb. of high explosives other than permissibles.

ALDEN H. EMERY

Stabilization of smokeless powder. ERMENEGILDO ACCOSSATO. *Rivista chim. sci ind.* 1, 273–9, 307–12(1930).—A review.

E. M. SYMMES

Black powder. K. A. HOFMANN. *Sitzb. preuss. Akad. Wiss.* 1930, No. 25 7, 432–6.—It has been shown previously (*C. A.* 24, 966) that the usual content of S in black powder influences its effectiveness considerably and that the velocity of combustion is favored autocatalytically. The reaction $2KNO_3 + S = K_2SO_4 + 2NO$ makes more readily available the combined O. In the second, or reduction, process, K_2SO_4 affords with excess C a further gas development, $4K_2SO_4 + 7C = 2K_2CO_3 + 2K_2S + 5CO_2$, and with excess S still more, $4K_2CO_3 + 7S = K_2SO_4 + 3K_2S_2 + 4CO_2$. A part of the S is regenerated, and re-enters the reaction. S-free powders burn more slowly, but involve the reactions $CO_2 + 2KNO_3 = K_2CO_3 + 2NO + 1.5\,O_2$ and $CO + 2KNO_3 = K_2CO_3 + 2NO + O_2$. Powder contg. S ignites at 290–300°, S-free powder at 320°, and S-KNO_3 mixts. at 430–70°. Exact thermal analyses show that S and black powder charcoal contg. gases produce, at 150°, H_2S and other sulfides, which attack vigorously KNO_3 at 285–90°, forming K_2SO_4. This rise in temp. melts KNO_3 and only molten KNO_3 can react with molten S and charcoal. S-free powder produces more CO. A powder contg. KNO_3 75 and red charcoal 25 gives a corrected gas vol. of 273 cc. contg. CO_2 8.3, CO 18.9, H_2 5.5, while a powder contg. KNO_3 71, S 11.2, red charcoal 17.8 gives 240 cc. of gas contg CO_2 23.5, CO 5.8, H_2 0.0, H_2S 3.5. The presence of S avoids formation of poisonous KCN dust.

E. M. SYMMES

The reconstruction of H_2SO_4 and HNO_3 mixtures (ALBERTO) 18.

Explosives. PAUL R. DE WILDE. Fr. 689,265, Feb. 3, 1930. See Swiss 130,658 (*C. A.* 24, 4397).

Smokeless powder. SERENO G. NORTON (to Hercules Powder Co.). U. S 1,788,438, Jan. 13. An abietate such as ethyl, phenyl or benzyl abietate (suitably in the proportion of about 5–10% of the total weight of the powder) is used with nitrocellulose and nitroglycerin, for improving the safety of manuf. and lessening burning temp and muzzle flash, etc.

Storing explosive gases. L'OXYHYDRIQUE INTERNATIONALE. Fr. 689,399, Feb. 4, 1930. Gases such as C_2H_2 dissolved in a solvent such as acetone are stored in the presence of a porous mass composed of large grains having a max. diam. of 1.5 mm. and small grains having a min. diam. of 0.5 mm, the ratio between the extreme dimensions having a max. of 2.

Indicator for explosive gas mixtures. I. F. MUKHARTOV. Russ. 51,129, July 13, 1929. An elec. testing device is specified.

Percussion bomb for rifles or bomb-firing appliances. RAIMONDO BOSSONE. U.S 1,788,856, Jan. 13. Structural features.

25—DYES AND TEXTILE CHEMISTRY

L. A. OLNEY

A new group of anthraquinone vat colors containing the CONH linkage. R. N. LULEK. *Ind. Eng. Chem.* 23, 96–8(1931).—Dyes were prepd. by substituting anthronecarboxylic acid chloride derivs. in the NH_2 group of aminoanthraquinones. 1,9-Anthraisothiazole-2-carboxylic acid chloride was condensed with various substituted aminoanthraquinones. In general, this group brightens the shade similarly to the benzoyl group, and gives greater tinctorial value than the latter. The colors are cold-dyeing. Substitution of both NH_2 groups in diaminoanthraquinones gives dyes inferior in strength and other properties. The anthraisoselenazole-2-carbonyl group gives about the same tinctorial value as the corresponding thiazole compds., but deepens the shade,

having a stronger auxochromic effect. The anthraisothiophene-2-carbonyl group deepens the color more than the corresponding thiazole group, but decreases the tinctorial value. The deeper color is attributed to the fact that the C=C linkage in the thiophene ring is a stronger chromophore than the C=N in the thiazole ring. In all these products, Cl in the 6 position has greater tinctorial value than α-Cl, and —CONH in the β position gives greater tinctorial value and deeper shades than in 4 or 5.

I. H. ODELL

Technological factors of dyestuff production in Italy. Anthraquinone derivatives. VITTORIO MOLINARI. *Atti III congresso naz. chim. pura applicata* 1930, 499–508.—The attempt is made to produce vat dye in Italy. Difficulties encountered in the prepn. of anthraquinone derivs. of the indanthrene series are mentioned. However, it is believed that they can be overcome in time. E. GEBAUER-FUELNEGG

Perylene dyes. E. VECCHIONI AND G. MATSCHER. *Atti III congresso naz. chim. pura applicata* 1930, 569–72.—The experiences with the synthesis of perylene and its derivs. are reported. 3,10-Perylenequinone is obtained by direct oxidation of the perylene with chromic acid. The halogen derivs. are prepd. by bromination and chlorination in nitrobenzene suspension. The dyes obtained are extremely fast. The transformation of perylene in 3,9-benzoylperylene is as easy as the ring closure to isoviolanthrone. The latter and its halogen derivs. are of unusual quality and purity and compare favorably with the resp. indanthrene prepns. When nitroisoviolanthrone is oxidized with hypochlorite on the fiber a valuable gray or, in higher concns., Indanthrene Black B. is obtained. The yields are very satisfactory. Higher chlorinated products are easily prepd. and of interest as fast blacks for wool. Work on the perylene nitriles and carboxylic acids will be reported later. E. GEBAUER-FUELNEGG

New procedure for the preparation of chromium acetate. O. METZGER, M. GRANDJEAN AND M. ZURCHER. *Bull. Soc. Ind. Mulhouse* 96, 632–4(1930) (Sealed communication of 1913).—$Cr(OAc)_3$ *for mordanting* may be prepd. by dissolving 1 mol. of $Na_2Cr_2O_7$ and 1 mol. NaOAc in 5 mols. of 30% HOAc, then adding slowly 3 mols. $NaHSO_3$. The violet form of $Cr(OAc)_3$ is pptd. at the end of the reaction, while some remains in soln as the green form. If only 3 mols. HOAc are used, the product is $Cr(OAc)_3$.

I. O. ODELL

Dyeing **and finishing celanese fabrics.** HERBERT PLATT. *Proc. Am. Assoc. Textile Chem. Colorists* 1930, 15–21; *Am. Dyestuff Reptr.* 19, 19–25; *Dyer, Calico Printer* 63, 225–9, 231(1930). A. K. JOHNSON

Theory **of the dyeing of cellulose acetate silk.** E. CLAYTON. *J. Soc. Dyers Colorists* 46, 367–8(1930).—Certain data are grouped to advance a theory that cellulose silk is dyed by forming a solid soln. of the dye in the fiber through intimate contact produced in a highly dispersed bath. ROBERT HOUGHTON

The **importance of azo-dye-sulfites in connection with bleached and dyed wool.** A. J. HALL. *Am. Dyestuff Reptr.* 19, 725–8, 753–4(1930).—An account is given of some new and interesting developments regarding the reducing activity of Na bisulfite

MILTON HARRIS

The dyeing **of rayon mixture fabrics.** E. ROBERTSON. *Rayon Record* 4, 1149–51 (1930). A. K. JOHNSON

Construction **of celanese fabrics as related to dyeing and finishing methods.** HARRY PRICE. *Proc. Am. Assoc. Textile Chem. Colorists* 1931, 17–21; *Am Dyestuff Reptr.* 20, 19–23(1931).—If natural luster of fiber is to be preserved, temps. in wet processing should not exceed 180°F. The use of strong alkalies should be avoided. Satins, twills, taffetas and failes are dyed in the jig. Flat or warp knit fabrics are dyed on reels. Voiles and ninons may be dyed in open tanks. Celanese velvets may be dyed in the Star dyeing machine. Yarn may be either dyed by hand with the two stick method or in the standard dyeing machine. MILTON HARRIS

Dyeing **silk hosiery.** NOEL D. WHITE. *Am. Dyestuff Reptr.* 19, 741–4(1930).—In boiling off hosiery properly, about 20% of soap based on the amt. of silk is necessary. The goods should be washed in a hot water bath at 160°F. for 15 min. and then given a second rinse at 120°F. After boil-off and wash, the dyestuff is applied and the required amt. of Glauber salt entered. When the desired color is obtained, the goods are washed and finished. MILTON HARRIS

Factors involved in single bath, degumming and dyeing of silk hosiery. L. J. MCGINTY AND F. L. LA QUE. *Proc. Am. Assoc. Textile Chem. Colorists* 1931, 6–13; *Am Dyestuff Reptr.* 20, 8–15(1931).—No reduction will take place in the absence of sericin. Reduction may be prevented or controlled by aerating the soln. The use of degumming solns. having a p_H lower than the crit. value of 9.4 would eliminate the reduction of the dye. Since no reduction occurs at temps. below 203°F., it would

seem advisable to conduct the dyeing operations at as low a temp. as possible. MILTON HARRIS

Utility of the Hussong dyeing machine. J. HARRY THOMPSON. *Am. Dyestuff Reptr.* **19**, 746–7(1930).—This machine is used for dyeing raw stocks of cotton, wool, worsted, jute, hemp and flax yarns, also for ribbon and hosiery. MILTON HARRIS

The treatment of water for bleaching and dyeing. C. D. BLACKWELDER. *Am. Dyestuff Reptr.* **20**, 29–31(1931); cf. *C. A.* **25**, 597.—A discussion of difficulties encountered in bleaching and dyeing operations when unsuitable water is used. M. H.

Determination of the action of light upon dyes. PAUL KRAIS. *Am. Dyestuff Reptr.* **20**, 31(1931).—See *C. A.* **24**, 5162. MILTON HARRIS

Some notes on peroxide bleaching. H. G. SMOLENS. *Proc. Am. Assoc. Textile Chem. Colorists* **1931**, 2–4; *Am. Dyestuff Reptr.* **20**, 4–6(1931); cf. *C. A.* **24**, 5505.—Wool stock should be well scoured before bleaching. Wool piece goods are usually fulled after scouring, then washed, peroxide bleached by being run on an overhead reel through a bleaching soln. in a tub. Silk is bleached mostly in the form of piece goods, may be bleached on jigs, by immersion in stationary liquors in tubs, by padding and shelling and in continuous machines. Cotton stock is lightly peroxide bleached, usually in pressure machines as a prepn. for dyeing with vat colors. Cotton yarns are peroxide bleached in skeins, warps or packages. Cotton knit goods are handled in a manner similar to that of the yarns. The best bleaching of cotton piece goods is to prep. as for chemic bleach. MILTON HARRIS

The examination of selected combed tops with observations on continental measurements. C. G. WINSON. *J. Textile Inst.* **21**, 524–45T(1930).—The purpose of this study was to prep. a basis for an international scale of standards for combed tops with reference to the attribute of fineness. A complete range of tops collected by the Bradford Chamber of Commerce, the British Wool Federation and the U. S. A. Government were examd. and the mean cross-sectional area of the fiber was taken as the measurement of fineness. Measurements were also carried out on the British tops in which the results were expressed in terms of the wt. per unit length (10 m.) at 18¼% regain Fair agreement between the 2 methods was obtained except for the lowest qualities for which the latter method was found to be inadequate. RUBY K. WORNER

Staple fiber: Its production and use. M. HALAMA. *Rayon Record* **4**, 1183–9 (1930). - A description is given of the essential features for viscose staple fiber differing from making of ordinary long-filament viscose rayon, and modifications to give staple fiber of dull luster and fine filaments. A. K. JOHNSON

The production of staple fiber yarns: Spinning on the cotton system. H. SPIBEY *Rayon Record* **4**, 1191–5(1930).—The phys. characteristics of staple fiber and cotton are compared. Necessary modifications to cotton machinery are considered and various spinning processes are described. A. K. JOHNSON

Machine for testing the strength and elongation of a single fiber. TAMOTSU AOKI AND KATSUMOTO ATSUKI. *J. Soc. Chem. Ind. Japan* **33**, Suppl. binding, 383–5(1930). A testing machine for the measurement of the tensile strength and elongation of a single textile or paper fiber was designed and constructed so as to record the behavior of the fiber stretched by an increasing tension, photographically, in a manner giving a stress-strain curve. The position of the clamps holding the fiber was recorded on a film placed on a revolving drum as tension was applied to the fiber. The load may be calcd from the calibration curve of the spring used to stretch the fiber. From the photograph the load and elongation may be obtained for any point up to the breakdown. A. S. S.

Porosity: A primary property in textiles. I. The milling of wool fabrics. J. SCHOFIELD *J. Soc. Dyers Colourists* **46**, 368–72(1930).—The process of milling or felting in wool fabrics is essentially a diminution in the porosity. The limiting value is detd. by the min. of porosity along with the loss by surface attrition. The general properties of the fabric vary exponentially with the time of milling. **II. The thickness of cloths.** *Ibid* 372–5.—The detn. of cloth thickness is described. M. H.

The elastic properties of yarns, with special reference to tire cords. H. P. GURNEY AND E. H. DAVIS. *J. Textile Inst.* **21**, 463–80T(1930).—The nature of the elasticity of tire cord, its origin, its technical interest to tire designers and possible methods of measuring its value are considered; also the degree to which different possible measures of elasticity are intercorrelated. RUBY K. WORNER

The foundations of yarn-strength and yarn-extension. III. The clinging power of cotton. HARIRAO NAVKAL AND A. J. TURNER. *J. Textile Inst.* **21**, 511–23T(1930); cf. *Ibid* **19**, 286–314T; also *C. A.* **23**, 1753.—Adderley's method for detg. clinging power was modified so that 10 cotton fibers instead of 1 were pulled between pads made from parallelized fibers of the same cotton and subjected to a known pressure.

The force required to pull the 10 fibers through the pads under a known pressure is called the clinging power. According to the modified method, a greater force is required and can be measured more accurately. The results obtained with it are much more consistent than those with the previous method. Tests were carried out on some standard Indian cottons. RUBY K. WORNER

The moisture relations of cotton. VII. A study of hysteresis. ALEXANDER R. URQUHART AND NORMAN ECKERSALL. *J. Textile Inst.* **21**, 499–510T(1930); cf. *C. A.* **21**, 2069; **23**, 5380.—It is shown that the absorption and desorption curves for cotton form the boundaries of an equil. area, any point on which is capable of representing the amt. of water present in cotton under appropriate conditions of humidity and prehistory. Consequently in textile testing, fixing the temp. and relative humidity at const. values may not be sufficient to ensure comparable conditions, and addnl. precautions may be necessary if there are large differences of prehistory. The description curve above 80% relative humidity is indefinite in that above this value the amt. of H_2O retained is greater the greater the original excess above the satn. value. A definite curve can, however, be obtained when H_2O is removed from cotton contg. at least 40% H_2O. Cotton taken direct from the boll, or while still wet after kier-boiling or mercerizing, has an exceptionally high adsorptive capacity. Suggestions regarding the practical application of this property in technical processes are given. Data are given on the adsorption and desorption of H_2O by Sakel cotton, raw and soda-boiled at 25°; and by raw Webber and Acala cottons, and by soda-boiled and mercerized Sakel cotton at 20°. RUBY K. WORNER

Crimp in wool as a periodic function of time. MABEL H. NORRIS AND P. J. J. VAN RENSBURG. *J. Textile Inst.* **21**, 481–98T(1930).—In samples of Merino wool of widely different qualities and from various sources and in 2 samples of New Zealand Romney wool, the no. of crimps per fiber, in each lock, was found to be entirely independent of the fiber length, and to remain approx. const. for fibers of all lengths, except the very shortest. Conclusion: Crimp formation is a periodic function of time and is independent of the rate of growth of the fiber. RUBY K. WORNER

Some experiments in the soaking of silk. HARVEY A. NEVILLE AND THEODORE H. MARSHALL. *Ind. Eng. Chem.* **23**, 58–62(1931).—By means of dilatometers, measurements were made of the hydration or adsorption of water by silk during the process of soaking in oil-in-water emulsions to soften the fiber. In pure water there is first a contraction due to hydration, followed by an expansion attributed to bacterial action. Hydration decreases with increasing p_H and increasing temp., but the time required to reach equil. is greater at lower temp. In general, those conditions causing max. hydration cause min. increase in weight of silk because of adsorption of oil, as detd. by the boil-off method. The hydration in dye solns. is greater than that in pure water. In emulsions made with soap, the proportion of soap affects the degree of dispersion, stability, and action of the emulsion, as shown by photomicrographs. Increasing concn. of soap causes a decrease in hydration but an increase in the gain of weight. Emulsions of sulfonated oil give lower values of hydration and gain in weight than do soap emulsions. The use of triethanolamine as oleate alone or in combination with sulfonated oil results in improved dispersion and penetrating qualities, so that the desired gain in weight can be obtained in less time and with a lower concn. of oil.
I. H. ODELL

Strained viscose threads. Observations on previous tests and a new improved test. A. J. HALL. *Rayon Record* **4**, 1347–9(1930); cf. *C. A.* **25**, 203.—Strained viscose rayon and oxycellulose reduce $Fe_2(SO_4)_3$ to, and absorb, $FeSO_4$. $FeSO_4$ produces blue with Na ferricyanide. Glycerol allows addn. of caustic soda without pptn. The reagent has the following compn. in 100 cc. total vol.: 20% $Fe_2(SO_4)_3$ 5 cc.; glycerol 10 cc.; 10% NaOH 0–40 cc. Mix glycerol and $Fe_2(SO_4)_3$ and warm to 50° for a few min. Add the caustic hot (any ppt. redissolves); it can be safely heated on a boiling water bath ½ hr., in testing. In use have the reagent hot, immerse the material to be tested for a few min., rinse well in water, immerse for several min. in a dil. soln. of K ferricyanide acidified with HCl or H_2SO_4. Blue color slowly develops in steamed viscose or with oxycellulose. A. K. JOHNSON

Recent developments in the finishing of rayon materials. A. J. HALL. *Textile Colorist* **52**, 809–13(1930); cf. *C. A.* **25**, 821.—A review of the recent developments in finishing rayon materials which affect the softness, creasability and luster of these materials. RUBY K. WORNER

The prevention of stains in knitwear. S. R. TROTMAN. *Textile Mercury* **83**, 487 (1930).—A brief discussion is given of stains due to residual fiber impurities, soap, metals, oil, molds, bacteria and chemicals. A. K. JOHNSON

Changes in the absorption spectrum of a dye solution due to the introduction of a colloid (BOUTARIC, DOLADILHE) **3. Conductometric determination of soap in technical baths** (STUHLMANN, FABER) **27. New method of preparing soluble oils** (VOLTZ) **27. Preparation of 1-amino-5-chloroanthraquinone and of 1-amino-5-tolylaminoanthraquinone** (MAKI, NAGAI) **10. Apparatus for extracting fluids from cloth or other materials** (U. S. pat. 1,789,132) **1. Fireproofing textile fabrics, etc.** (Brit. pat. 334,408) **18.** *tert*-**Butylnaphthol** [as dye component] (U. S. pat. 1,788,529) **10. Pyrazoleanthrone compounds** (U. S. pat. 1,781,248) **10. Alkoxy derivatives of 1-aminonaphthalene-8-carboxylic acid cyclic anhydride** (U. S. pat. 1,779,314) **10. Compounds of the thiazole series** (U. S. pat. 1,787,315) **10. Azo dyes for use as therapeutic agents against germ infections** (U. S. pat. 1,785,327) **17.**

CAPEY, RECO: **The Printing of Textiles.** London: Chapman & Hall. 138 pp. 13s. 6d., net.

SANCHEZ, MANUEL R.: **Quimica aplicada a la industria textil. T. II. Blanqueo de fibras textiles.** Barcelona: M. Marin. 400 pp. Ptas. 14.

Dyes. CHEMISCHE FABRIK VORM SANDOZ. Fr. 686,738, Dec. 16, 1929. Polysulfonic acids of 1-amino-4-arylaminoanthraquinone which contain 2 SO_3H groups distributed on the 2 benzene rings of the anthraquinone complex are prepd. by heating, in aq. soln., halogen derivs. of anthraquinone sulfonated in the 5-, 6-, 7-, or 8-position with a sulfite in the presence or absence of PhOH. Examples are given. The products dye animal fiber in an acid bath.

Dyes. I. G. FARBENIND. A.-G. (Walter Bruck, inventor). Ger. 512,235, June 15, 1928. See Brit. 322,209 (*C. A.* **24**, 2891).

Dyes. I. G. FARBENIND. A.-G. (Erwin Hoffa and Fritz Müller, inventors) Ger. 510,479, Dec. 14, 1926. Orange to scarlet dyes are prepd. by coupling cyanaryl diazo compds. with the customary components, in substance or on the fiber. Numerous examples are given. Cf. *C. A.* **24**, 3651.

Dyes. IMPERIAL CHEMICAL INDUSTRIES, LTD., E. H. RODD and F. L. SHARP. Brit. 334,689, Aug. 19, 1929. Triarylmethane dyes are made by condensing a diaryl dialkyldiaminodiphenylbenzohydroldisulfonic acid with *m*-2-xylidine and oxidizing (suitably with $Na_2Cr_2O_7$) in a single operation.

Dyes. SOC. ANON. POUR L'IND. CHIM. À BÂLE. Brit. 334,706, Nov. 29, 1928. Equimol. proportions of a cyclic NH_4 salt contg. a reactive methyl group in α-position or the methylene base thereof and a compd. of the general formula $H—C\langle^{X}_{NH}$, in which X represents a univalent substituent such as NH_2, Cl, O-alkyl or O-acidyl, or a salt thereof, are condensed together to form an intermediate which, by further condensation with an equimol. proportion of the same or a different cyclic NH_4 salt having a reactive α-methyl group or the methylene base thereof, gives a polymethine dye. The cyclic NH_4 salts or their methylene bases may be condensed with imino ethers, imino esters, amidines and imino halides. Several examples are given.

Soluble dyes. THE TWITCHELL PROCESS CO. Fr. 690,505, Feb. 24, 1930. Dyes and intermediate products are made sol. by means of "mahogany" sulfonates, particularly true "mahogany" sulfonates. The method is very suitable for dyeing cellulose acetate.

Dyes and lakes. I. G. FARBENIND. A.-G. Brit. 334,754, Oct. 12, 1929. Monoazo dyes and lakes are made by coupling diazotized aminohydroquinone dialkyl ethers or their derivs. with 1-benzoylamino-8-naphthol-4,6-disulfonic acid or its derivs. substituted in the benzene nucleus, and, if desired, converting the products into lakes with alk. earth metal salts. The products dye wool fast violet and the lakes may be used for lithographic printing and in nitrocellulose lacquers. Examples are given.

Dye preparations. I. G. FARBENIND. A.-G. Fr. 689,488, Feb. 5, 1930. Dry prepns. suitable for the manuf. of dyes are prepd. by grinding alk. pastes of alkali salts of nitrosamines with neutral salts capable of absorbing water and dry components of azo dyes in the form of their free OH compds. or their alkali salts, capable of being coupled and having a substantive character but contg. no SO_3H or COOH groups. Examples are given.

Dye preparations. I. G. FARBENIND. A.-G. Fr. 690,393, Feb. 21, 1930. Stable prepns. sol. in water or alkalies, suitable for dyeing or printing, consist of dry mixts. of diazoamino compds. with naphthols, naphtholates or like coupling components.

The dyes are made by dissolving the mixt. in water or alkali when required. A long list of components and of the shades obtained is given.

Azo dyes. ERNST FELLMER (to General Aniline Works). U. S. 1,784,343, Dec. 9. Dyes dyeing silk reddish blue to black shades of good fastness to water and which can be discharged to a pure white with hyposulfite are obtained by combining the diazo compds. of *p*-diamines, *e. g.*, *p*-phenylenediamines, which are substituted in one of the two amino groups by an acyl radical, *e. g.*, formyl, acetyl, oxalyl, etc., and in the benzene or naphthalene nucleus, by, *e. g.*, halogen, alkyl and alkoxy groups with azo dye components, splitting off the acyl radical by saponification, diazotizing the resulting compd. and combining it with a hydroxynaphthalenesulfonic acid. The new dyes have most probably the general formula: RN:NX(Y)N:NR′, where X represents the residue of a *p*-diamine of the benzene or naphthalene series having not more than ten C atoms in nuclear linkage, Y represents a halogen, alkyl or alkoxy substituent, and R and R′ represent hydroxynaphthalenesulfonic acid azo-dye coupling components, the hydroxy groups of which stand in *o*-position to the azo groups. An example is given in which there are used as components 5-amino-4-chloro-2-oxyalylaminoanisole, 2 naphthol-6-sulfonic acid and 1-hydroxynaphthalene-5-sulfonic acid.

Azo dyes. RICHARD STÜSSER (to General Aniline Works). U. S. 1,785,845, Dec. 23. Azo dyes of the general formula 3,4-(HOOC)(RN:N)C_6H_3XC_6H_3(N:NR)(COOH)-4,3, where R represents the residue of any coupling component contg. in *o*-position to the azo group a substituent of the group comprising amino, arylamino, acylamino, hydroxyl and the desmotropic keto group; and X represents one of the groups azoxy and azo, may be obtained by subjecting 2 mol. proportions of dyes having the general formula 2,5-(RN:N)(NO_2)C_6H_3COOH, where R represents any coupling component contg. an auxochrome group, to careful reduction with alk. reduction means, *e. g.*, reduction by grape sugar and alk. agents, particularly NaOH soln. In this way there are obtained at first the azoxy compds. and then, by enhancing the reducing action, the corresponding azo compds. The azo compds. generally possess a deeper coloration than the corresponding azoxy compds. and the reduction process can be controlled by watching the coloration of the reaction mixt. In many cases, however, the reduction process cannot be controlled exactly and the reaction products in these cases represent mixts. of the azoxy compds. and the corresponding azo compds. The new dis- and poly-azo dyes obtained are generally sol. in water with a yellowish to bluish black coloration, sol. in concd. H_2SO_4 with a yellowish to bluish coloration, and dye cotton orange to blue to black shades which may be rendered fast to washing and to light by after treatment with heavy metal salts such as, *e. g.*, salts of Cu, Cr and Co. Several examples with details of procedure are given.

Azo dyes. JOHANN HUISMANN, HUGO SCHWEITZER and RICHARD STÜSSER (to General Aniline Works). U. S. 1,788,299, Jan. 6. Dyes producing good yellow dyeings on wool and forming yellow lakes of good properties, and which in general have the formula $CH_3COCH(N:NR)CONHR'$, where R represents an aromatic nucleus which is substituted by a nitro group in *o*-position to the azo group and which may be further substituted by any substituent with the exception of a sulfo group and R′ represents an aromatic nucleus which is substituted by a sulfo group and which may be further substituted, can be prepd., *e. g.*, by coupling a diazotized *o*-nitroarylamine with an acetoacetarylide and treating the azo dye thus obtained with a sulfonating agent in the usual manner, *e. g.*, sulfuric acid monohydrate or chlorosulfonic acid in an inorg. or org. solvent such as sulfuric acid monohydrate or chlorobenzene, thus converting the same into derivs. which are sulfonated in the aryl nucleus of the coupling components or alternatively by coupling a diazotized arylamine with an acetoacetarylide compd. which is substituted in the aryl residue by a sulfonic acid group. Several examples with details of procedure are given. U. S. 1,788,300 relates to production of dyes of the same general type and character, as, *e. g.*, by reacting with one mol. of 4-chloro-2-nitrobenzene-1-azoacetoacetic acid chloride dye upon one mol. of 2-anisidine-4-sulfonic acid, dissolved in pyridine at a temp. of about 30°.

Azo dyes. DANIEL ZINNER (to Newport Chemical Corp.). U. S. 1,789,279, Jan. 13. Dyes generally dyeing orange shades are formed by coupling tetrazotized 4,4′-diamino-2,2′-dimethyldiphenylmethane with one coupling component such as 1-(2′,5′-dichloro-4′-sulfo-)-phenyl-3-methyl-5-pyrazolone or 1-phenyl-3-methyl-5-pyrazolone and with a second coupling component such as 1-naphthol-4-sulfonic acid, β-naphthol, α-naphthol, 2-naphthol-6,8-(or 3,6-)disulfonic acid, 2-naphthol-6-sulfonic acid, 2-naphthol-7-sulfonic acid, 1-naphthol-5-sulfonic acid, 2-amino-5-naphthol-7-sulfonic acid, 2-benzoylamino-5-naphthol-7-sulfonic acid, 2-amino-8-naphthol-6-sulfonic acid or 1-naphthol-4-sulfonic acid.

Azo dyes. HENRY DREYFUS. Fr. 688,623, Jan. 21, 1930. New azo dyes are prepd. by coupling a diazo compd. of an *ar*-tetrahydronaphthylamine with a suitable coupling component, or coupling diazo compds. with an *ar*-tetrahydro-α-(or β)-naphthylamine or derivs. thereof. The dyes may be used as aq. dispersions for dyeing cellulose acetate. Examples are given. Fr. 688,624 describes the prepn. of new dyes by condensing an *ar*-tetrahydro-α(or β)-naphthylamine or a deriv. with an aromatic nitrated compd. contg. one or more labile halogen atoms. The compds. are *N*-nitroaryl-*ar*-tetrahydro-α(or β)-naphthylamines. Examples are given.

Azo dyes. I. G. FARBENIND. A.-G. Fr. 691,216, Mar. 5, 1930. Cellulose esters or ethers are dyed by treating them with arylamides of 2,3-hydroxynaphthoic acid in an alk. bath contg. org. solvents, miscible with water, which constitute solvents or swelling agents for the esters or ethers and which are at the same time capable of dissolving the arylamides and their alkali salts (the solvent being added to the bath in amt. sufficient to swell but not dissolve the cellulose material) and developing by means of diazo compds. of aromatic bases. Examples are given.

Azo dyes. I. G. FARBENIND. A.-G. Fr. 689,631, Feb. 8, 1930. Azo dyes insol. in water are prepd. by coupling 2,3-hydroxynaphthoylarylamines with diazo compds. of aromatic bases of the formula NH_2-R^1 . . . . . R^2-NHaryl, in which R^1 . . . . . R^2-represents a polynuclear or aromatic condensed system, the arylamino group being free from groups which render the products sol. in water, *e. g.*, SO_3H or COOH groups, and in which one of the N atoms is attached to R^1 and the other to R^2, and treating the dyes with a reducing or sapong. agent.

Azo dyes. IMPERIAL CHEMICAL INDUSTRIES, LTD. Fr. 690,642, Feb. 25, 1930. See Brit. 329,056 (*C. A.* **24**, 5507). Fr. 690,643. See Brit. 329,961 (*C. A.* **24**, 6029).

Azo dyes. SOC. ANON. POUR L'IND. CHIM À BÂLE. Fr. 689,111, Jan. 30, 1930. New diazo dyes are prepd. by the union of the appropriate diazo compds. with the ethers of 1-amino-2-naphthol and their 6- or 7-sulfonic derivs., diazotization of the monoazo dyes thus obtained and coupling with the SO_3H derivs. of 2,5- or 2,8-aminonaphthols and their *N*-substitution products, in so far as they do not contain an external NH_2 group and, if necessary, sapon. of the products thus obtained. Thus, aniline 2-sulfonic acid is diazotized and coupled with 1-amino-2-methoxynaphthalene-6-sulfonic acid. The product is diazotized and coupled with 2-phenylamino-5-hydroxynaphthalene-7-sulfonic acid, giving a product which dyes artificial silk a bright blue. Other examples and a table of components which may be used and the shades obtained are given.

Azo dyes. SOC. ANON. POUR L'IND. CHIM. À BÂLE. Swiss 140,600 to 140,606, May 10, 1928. Addns. to 138,024 (*C. A.* **25**, 822). An azo dye contg. metal is prepd. by treating the chromed dye obtained from nitrated 1-diazo 2-hydroxynaphthalene-4-sulfonic acid, β-naphthol and $(HCOO)_3Cr$, with a Ni salt in the warm and in the presence of AcONa. Examples are given. The dye colors wool and silk black. The Ni may be replaced by Mn, Cu, Na or NH_4 and Cu

Soluble azo dyes. I. G. FARBENIND. A.-G. Brit. 334,529, May 1, 1929. Compns. for dyeing and printing material with azo dyes sol. in water or alkali are made by incorporating, in the dry state, a water-sol. diazoamino compd. prepd as described in Brit. 320,324 (*C. A.* **24**, 2612) or Brit. 324,041 (*C. A.* **24**, 3382) with a coupling component for producing azo dyes free from sulfonic and carboxylic groups such as a 2,3-hydroxynaphthoic acid arylide. Numerous examples are given.

Azo dyes and intermediates. IMPERIAL CHEMICAL INDUSTRIES, LTD. Fr. 690,311, Feb. 20, 1930. Monoazo and disazo dyes are prepd. by combining diazotized oxamic acid derivs. of 4,4'-diaminodiphenylmono- or tri-sulfide with coupling components. In the case of disazo dyes one mol. proportion of the diazo component may be replaced by one mol. proportion of another diazo component. The oxalyl group may be removed by hydrolysis and the resulting aminoazo, aminodisazo or diaminodisazo compds. may be diazotized or tetrazotized and coupled with components to obtain disazo, trisazo or tetrakisazo dyes. The oxamic acid derivs. are obtained by boiling the diamino compds. with an aq. soln of oxalic acid. Several examples are given.

Diazo dyes. I. G. FARBENIND. A.-G. Fr. 689,419, Feb. 4, 1930. Diazo dyes insol. in water are prepd. by combining in substance or on a support, particularly vegetable fiber, tetrazo compds. of diamino bases which are obtained by condensing aromatic amines contg. no SO_3H or COOH groups with ketones, with azo components which contain no solubilizing groups such as SO_3H or COOH. Thus, the product obtained by condensing 2 mols. of $PhNH_2$ with 1 mol. of acetone is tetrazotized and the product poured into an alk. soln. of β-naphthol, giving a yellowish red powder. Other examples and a table of components with the colors obtained are given.

Blue trisazo dyes. HENRY JORDAN (to E. I. du Pont de Nemours & Co.). U. S. 1,788,797, Jan. 13. Blue trisazo dyes for cotton, of good fastness to light, are formed by diazotizing a 1-amino-8-naphtholdisulfonic acid (such as the 3,6-disulfonic acid) having only one sulfo group in each nucleus, coupling the diazo compd. to α-naphthylamine or other amino compd. having a free *p*-position and not contg. a free OH, sulfo or second amino group, diazotizing the amino-azo compd., coupling it to 2-amino-5-naphthol-7-sulfonic acid, diazotizing the disazo dye and coupling it with a coupling component of the naphthalene series having at least one OH group such as 1,8-aminonaphthol-3,6-disulfonic acid. Cf. *C. A.* **24**, 2304.

Disazo dyes. ALFRED GRESSLY (to General Aniline Works). U. S. 1,787,676, Jan. 6. Dyes are obtained by combining an arylamide of 2,3-hydroxynaphthoic acid wherein the aryl may be substituted, with a diazotized aminoazo compd. of the general formula,

$$\left[R_1—N{=}N—R_2\right]\begin{matrix}—NH_2\\—SO_3H,\\—X\end{matrix}$$

where R_1 and R_2 are aryl residues which may be substituted by univalent groups and X is a sulfonic or a carboxylic acid group. The new dyes correspond to the general formula:

$$1,2,3=\left(\left[R_1—N—N—R_2\right]\begin{matrix}—N{=}N—\\—SO_3H\\—X\end{matrix}\right)(OH)(CONHR)C_{10}H_5,$$ where R, R_1, R_2 and X have the aforesaid meaning. They dye wool blue to bluish black shades of a good fastness to washing, hot-pressing and light. The dyeings may be after-chromed if the dyes applied contain the well-known groups suitable for this after-treatment. Among the starting materials which may be used are: 1-aminonaphthalene-4-sulfonic acid, 1-aminonaphthalene-7-sulfonic acid and 2-hydroxynaphthalene-3-carboxylic anilide; 1-aminonaphthalene-3,6-disulfonic acid, α-naphthylamine and 2-hydroxynaphthalene-3-carboxanilide; and *p*-aminosalicylic acid, 1-aminonaphthalene-7-sulfonic acid and 2-hydroxynaphthalene-3-carboxanilide.

Disazo and polyazo dyes. WINFRID HENTRICH, MAX HARDTMANN, RUDOLF KNOCHE and JOSEF HILGER (to General Aniline Works). U. S. 1,788,295, Jan. 6. Dyes of various colors are prepd. by reacting upon a heterocyclic compd. contg. 2 successively replaceable halogen atoms with 1 mol. proportion of an aminoazo compd. and one mol. proportion of an amino compd., the radical of which is capable of coupling with diazo compds. after condensation, and reacting upon these condensation products with a diazo compd. Among the starting materials which may be used are: 5-chlorouracilic acid chloride, trichloropurine, trichloropyrimidine, methyldichloropyrimidine, phenyldichloropyrimidine, dichlorobenzopyridazine, dichloroacetylguanamide, 2,4-dichloroquinazoline, 2-phenyl-(3′-carbonic acid chloride)-4-chloroquinazoline, 2,4,7-trichloroquinazoline, 2,4-dichloro-5,7-dibromoquinazoline, 1-phenyl-(4′-carboxylic acid chloride) 4-chlorophthalazine, 2-chloroquinoxaline-3-carboxylic acid chloride, 2,3-dichloroquinoxaline-6-carboxylic acid chloride, 2,4-dichlorocopazoline, 2,4-dichloro-10-monazine-1,3 diazine (cf. *Ber.* **34**, 1341 (1901)) and 2,4-dichloro-1,3-diazine-5,8 diazine. There may be employed for the introduction of aminoazo residues: the monoacylarylenediamines, phenylenediamine, the 3- or 4-nitroarylamines and the 3- or 4 arylenediaminesulfonic acids. The following are examples of amino compds., the radical of which is capable of coupling with a diazo compd after the condensation: amino hydroxy compds of the naphthalene series, such as aminonaphtholsulfonic acids, naphthalenediamines, such as 1,8-naphthalenediamine-4-sulfonic acid and substitution products thereof, and also aminoarylpyrazolones with an unoccupied 4-position in the pyrazolone ring. Numerous details with examples of procedure are given.

Vat dyes. I. G. FARBENIND. A.-G. Brit. 334,240, May 30, 1929. Vat dyes producing violet to blue shades on cotton are prepd. by condensing *Bz*-3,5-dichloro-4-chloranthraquinone-2,1(*N*)-acridone with amides of aromatic carboxylic or sulfonic acid and the products may be saponified if desired. Several examples with details of procedure are given.

Vat dyes. I. G. FARBENIND. A.-G. (Max A. Kunz and Karl Koberle, inventors). Ger. 510,481, Dec. 9, 1928. Addn. to 457,493. Dyes contg. halogen are prepd. by treating *allo-ms*-naphthodianthrone or its derivs. with one or more halogens or halogenating agents while suspended or dissolved in an inorg. liquid, *e. g.*, H_2O, H_2SO_4 or oleum. When products contg. only one of the halogens are to be made, the solvent or diluent may be dispensed with. Catalysts may be present. The products may be

identical with those described in Ger. 468,988 (*C. A.* **23**, 3352) and 470,948 (*C. A.* **23**, 2042), but new products are also obtainable. Examples are given.

Vat dyes. I. G. FARBENIND. A.-G. (Rudolf M. Heidenreich, inventor). Ger. 510,482, Mar. 11, 1928. New products useful as vat dyes or intermediates are prepd. by converting amino- or halo-anthranthrones into the corresponding nitriles by the Sandmeyer reaction or by heating with CuCN. Examples are given describing the prepn. of *2,7-dicyanoanthanthrone* and a *monocyanoanthanthrone.*

Vat dyes. I. G. FARBENIND. A.-G. (Max A. Kunz and Karl Köberle, inventors). Ger. 510,600, July 8, 1929. Addn. to 499,169 (*C. A.* **24**, 4168). The method of Ger. 499,169 is carried out at a temp. above 50°. The products have a greater ratio of Br to Cl than those of the prior patent, and give different blue to violet shades on vegetable fibers. Examples are given.

Vat dyes. I. G. FARBENIND. A.-G. Fr. 688,560, Jan. 20, 1930. Vat dyes contg. S are obtained by treating 2,5-diarylamino-3-mercapto-1,4-benzoquinones by oxidizing agents. Thus, 2,5-dianilino-3-mercapto-1,4-benzoquinone (by treating 3,6-dianilino-2-chloro-1,4-benzoquinone with Na_2S in an aq. alc. soln. and pptg. the product by dil. HCl) is boiled in $PhNO_2$. The product which seps. on cooling dyes wool in intense brown shades, and is 3-anilinophenothiazine. Other examples are given.

Vat dyes. I. G. FARBENIND. A.-G. Fr. 689,172, Jan. 31, 1930. Blue vat dyes of great fastness are prepd. by mixing with *N*-dihydro-1,2,2′,1′-anthraquinoneazine or its substitution products such as its monochloro deriv., the dyes capable of being prepd. by treating *N*-dihydro-1,2,2′,1′-anthraquinoneazine, the Blue Indanthrene RS of commerce, with sulfonating agents having a controlled action, preferably in the presence of H_3BO_3 or according to the methods of the 4th and 5th patents of addn. to Fr. 670,562.

Vat dyes. I. G. FARBENIND. A.-G. Fr. 36,631, Oct. 29, 1928. Addn. to 651,152 (*C. A.* **23**, 3351). Vat dyes are prepd. by condensing N compds. of the dibenzanthrone or isodibenzanthrone series, which have at least one atom of substitutable H fixed to the N, with mono- or poly-nuclear heterocyclic compds., contg. fixed to the heterocyclic rings one or more neg. substituents, or with their derivs. or their homologs so that the neg. residues are in part or wholly replaced by the dibenzanthrone or isodibenzanthrone group. The products if they still contain neg. substituents may be condensed with other appropriate compds. Examples are given of the condensation of aminodibenzanthrone with cyanuric bromide and with 2,4,6-trichloro-1,3,5-triazine and of amino-isodibenzanthrone with 2,4-dichloroquinazoline.

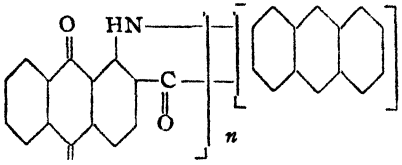
Vat dyes. I. G. FARBENIND. A.-G. Fr. 36,782, Nov. 13, 1928. Addn. to 651,152 (*C. A.* **23**, 3351). Vat dyes are prepd. by treating, in the presence of solvents or diluents, nitro compds. of the dibenzanthrone or isodibenzanthrone series with a reducing agent insufficient to reduce all the NO_2 groups to NH_2 and condensing the mixts. which result from the reduction, preferably in the presence of solvents or diluents of high b. p., and if necessary with the addn. of catalysts or acid-fixing agents or both. The reduction may be carried out so that less than half the NO_2 groups are reduced, and one or more N compds. having at least one replaceable H fixed to the N are caused to react with the reduction mixt. during or after its condensation. Or, more than half the NO_2 groups are reduced and one or more aromatic compds. contg. one or more neg. substituents are caused to react on the reduction mixt. during or after its condensation. Examples are given.

Vat dyes. I. G. FARBENIND. A.-G. Fr. 36,908, May 8, 1929, Addn. to 650,501 (*C. A.* **23**, 3353). The condensation products from halogenated anthanthrones and aminoanthraquinones and still contg. free NH_2 groups in the mol. are treated with acylating agents, or halogenated anthanthrones are condensed with aminoanthraquinones which contain acylamino groups as well as a free NH_2 group in the mol. The products have greater affinity for vegetable fiber and better dyeing qualities than the nonacyl compds. of the prior case. Examples are given.

Vat dyes and intermediates. I. G. FARBENIND. A.-G. Fr. 687,798, Jan. 7, 1930. Vat dyes or dye intermediates are obtained by heating to a high temp. 2-amino-3-cyanoanthraquinone or its derivs. or substitution products in indifferent solvents, preferably in the presence of Cu or Cu compds. Examples are given of the treatment of 2-amino-3-cyanoanthraquinone and its bromo deriv., prepd. by brominating 2-amino-3-cyanoanthraquinone in $PhNO_2$. Vat dyes are obtained in each case.

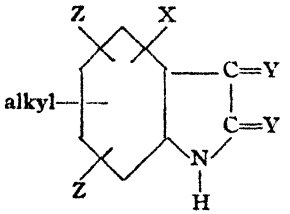
Brown vat dyes of the anthraquinone series. WERNER ZERWECK (to General Aniline Works). U. S. 1,785,801, Dec. 23. Brown dyes of good fastness to light are obtained by condensing amines of the anthracene series with 1-chloroanthraquinone-2-carboxylic acid. The process may be carried out by prepg. first the corresponding

anthryl-1-aminoanthraquinone-2-carboxylic acid and transforming it into the corresponding acridone, while splitting off water, or by transforming the anthryl-1-aminoanthraquinone-2-carboxylic acid into the chloride and converting the latter into the acridone, while splitting off HCl. But it is preferable to produce the acridone in a single operation by condensing aminoanthracenes with 1-chloroanthraquinone-2-carboxylic acid. The new dyes thus obtained correspond probably to the general formula



where *n* means the number 1 or 2 and the anthracene as well as the anthraquinone nuclei may contain further substituents. Several examples with details of procedure are given.

Indigoid vat dyes from dihaloalkylisatins. CARL KRAUSS (to General Aniline Works). U. S. 1,784,452, Dec. 9. Dyes of the general formula



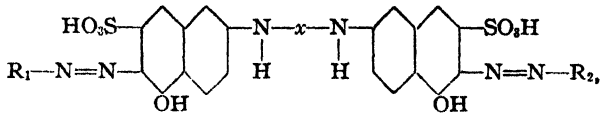
where Z represents Cl or Br, X represents H or alkyl, one Y represents O, the other Y stands for the residue of a cyclic ketomethylene compd., are dark-colored powders, sol. in concd. H_2SO_4 with characteristic coloration and form with hyposulfite solns. usually yellow colored vats from which cotton is dyed fast shades ranging from a bright red to deep navy-blue shades. They may be prepd., for instance, by condensing dihaloalkylisatin or a dihaloalkylisatin compd., in which the α-C atom is substituted by a reactive substituent with a cyclic ketomethylene compd. Suitable reactive substituents are, for instance, halogen atoms, particularly Cl, S, arylamino groups, alkoxy groups, etc. Compds. of this type may be exemplified by 5-bromo-6-chloro-7-methylisatin α-chloride and 5,7-dichloro-6-methylisatin-α-anilide, and the cyclic ketomethylene compds comprise such aromatic compds. as contain a desmotropic oxy group as, for instance, 1-naphthol, 4-chloro-1-naphthol, anthrol, which supposedly react in their tautomeric ketomethylene forms, ketothionaphthenes, ketonaphthothiophenes, indoxyls, naphthindoxyls, etc.; 3-ketothionaphthene-2-carboxylic acids react in a similar manner, CO_2 being split off during the reaction and such carboxylic acids are, for purposes involved, considered equiv. to the ketothionaphthenes themselves.

Trimethylthionaphthene vat dyes. ERWIN HOFFA and HANS HEYNA (to General Aniline Works). U. S. 1,782,724, Nov. 25. 4,6,7,4',6',7'-Hexamethylthionindigo has good fastness to light, besides the other good tinctorial properties, and can be obtained by subjecting the 3,5,6-trimethylbenzenethioglycolic acid or a substitution product thereof contg. in 2-position the carboxy, carbonyl or cyano group to condensation according to one of the usual methods and oxidizing the hydroxythionaphthene thus produced so as to form the desired dye. Also the products, obtainable by condensing the new hydroxythionaphthene according to the usual methods, exhibit fastness properties similar to those of the dye obtainable by oxidizing the said hydroxythionaphthene. Details of preparation are given.

Leuco esters of vat dyes. I. G. FARBENIND. A.-G. Fr. 688,748, Jan. 23, 1930. Leuco esters of vat dyes are prepd. by treating the leuco derivs. with halides of sulfobenzoic acids, $HO_3CC_6H_4SO_2X$ (X = halogen). An example is given of the treatment of leucothioindigo with the chloride of sulfobenzoic acid in pyridine.

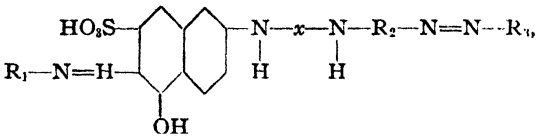
Dyes containing metals. HANS GUBLER, GUILLAUME DE MONTMOLLIN and JOSEPH SPIELER (to Soc. Chem. Ind. in Basle). U. S. 1,783,083, Nov. 25. Dyes producing orange, red, Bordeaux and brown shades fast to light on cotton, and on re-

generated cellulose products, comprise metals such as Cu, Cr or Mn in combination with azo dyes of the general formula



where x stands for an org. residue contg. C at least one atom, the —NH— groups being linked to such C atoms of said residue which are united by a double bond with a N, O or S atom, and where R_1 is the residue of a benzene nucleus characterized by the presence of a COOR group (R=H or alkyl) standing in *o*-position to the —N:N— group, and R_2 is the residue of a benzene nucleus characterized by the presence of a COOR or OR group (R=H or alkyl) standing in *o*-position to the —N=N— group Numerous examples and details of manuf. are given.

Dyes containing metals. Hans Gubler (to Soc. Chem. Ind. in Basle). U. S. 1,783,084, Nov. 25. Complex metal compds. such as those of Cu, Co, Ni, Al, V, Cr, Ti, Mn, Fe, Mo, Ce and U with azo dyes of the general formula



where x stands for an org residue contg. at least one C atom, the —NH— groups being linked to such C atoms of said residue which are united by a double bond with a N, O or S atom, and where R_1 is the residue of a benzene nucleus characterized by the presence of a COOR group (R=H or alkyl) standing in *o*-position to the —N=N— group, R_2 is an aryl nucleus, and R_3 an aryl nucleus which carries a carboxyl group and a OH group standing in *o*-position to each other, yield on the vegetable fiber, as well as on artificial fibers of the group of the regenerated cellulose, such as viscose or cuprammonium silk tints, particularly orange to brown, red, Bordeaux and brown, which are of good fastness to light. Various examples with details of procedure are given

Sulfur dyes. I. G. Farbenind. A.-G. (Friedrich Muth, inventor). Ger. 510,483, Sept. 16, 1927. See Brit. 297,123 (*C. A.* **23**, 2578).

Sulfur dyes. I. G. Farbenind. A.-G. (Erwin Kramer, Bernhard Bollweg and Ludwig Zeh, inventors). Ger. 510,484, Sept. 1, 1927. Red-brown dyes are prepd by heating β-binaphthol at 60–100° with halides of S, with or without S. Indifferent solvents may be present. Examples are given. Cf. *C. A.* **24**, 1989, 3654.

Sulfur dyes. I. G. Farbenind. A.-G. Fr. 36,984, May 28, 1929. Addn. to 653,785 (*C. A.* **23**, 3816). S dyes are prepd. by treating at higher temps. dinaphthylene dioxide with S halides with or without diluents. Examples are given using S_2Cl_2 in which temps. of 250–80° are used.

Green sulfur dyes. N. A. Zaitzev. Russ. 21,830, Dec. 16, 1927. Green sulfur dyes are prepd by fusing polysulfides, in the presence of Cu, with leucoindophenols from *p*-aminophenol and 1-arylnaphthylamine-8-sulfonic acids. The mixture, obtained after the reduction of indophenol by Na_2S in the leuco compd., to which a Cu salt has been added, is treated with NaCl and AcOH to ppt. the complex Cu indophenol compd. The ppt. so obtained is fused with Na polysulfide by the usual methods after the soln. has been sepd.

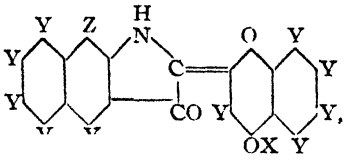
Sulfo derivatives of 1-aminonaphthalene-8-carboxylic acid. Richard Herz and Fritz Schulte (to General Aniline Works). U. S. 1,780,077, Oct. 28. By reacting under mild conditions (as with milk of lime at 200–250°) with an alk. agent upon a nuclear substitution product of 8-cyanonaphthalene-1-sulfonic acid contg. a further sulfonic group in the nucleus in a β-position (such as the Na salt of 8-cyanonaphthalene-1,6-disulfonic acid) there are produced compds. such as 8-amino-3-sulfo-1-naphthoic acid (I) or its 1,8-cyclic anhydride (II). I when dry is a colorless powder sol. in dil. soda soln., diazotizable and capable of combining with diazo compds; in the form of its anhydride it is a yellowish powder neither diazotizable nor capable of combining with diazo compds. These compds. may be used as *dye intermediates* and in the manuf. of *pharmaceutical compds.*

Sulfonated water-soluble dyes of the diaminobiphenyl series. Karl Thiess and Bernhard Deicke (to General Aniline Works). U. S. 1,780,048, Oct. 28. Diaminobi-

phenyls of the formula, $NH_2C_6H_4C_6H_4NH_2$, wherein the H atoms of the phenyl groups may be substituted or not, such as benzidine, dichlorobenzidine, diphenyline (2,4'-diaminobiphenyl), can be condensed in both amino groups with a compd. of the general formula, $(NO_2)(Hlg)R\text{-aryl-}SO_2OX$, wherein Hlg stands for an exchangeable halogen atom, R for a nitro group or H and X for H or a metal, and the yellow to brownish red condensation products thus obtained are sol. in water and dye animal fiber greenish yellow to brownish red tints. They are more homogeneous and faster to light and give purer shades than the similar dyes prepd. as described in German pat. 22,268 by sulfurizing the corresponding nitroamines. The condensation can be effected in water in an open vessel at a temp. of about 100° or in an autoclave at a temp. up to about 200° with the addn. of an acid-binding agent such as Na_2CO_3, NaOAc or the like and gives a very good to quant. yield. In some cases the reaction can be accelerated by the addn. of org. solvents as, for instance, alc., there may also be added a catalyst such as Cu powder. Numerous examples are given, one of which relates to the condensation of *o*-anisidine with 2 mol. proportions of K 1-chloro-2-nitrobenzene-4-sulfonate in the presence of water and Na_2CO_3 for 12 hrs. at a temp. of 120-30°.

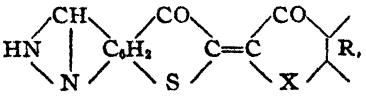
Acid wool dyes. GEORG KRÄNZLEIN, FRITZ ROEMER and ERICH KRONHOLZ (to General Aniline Works). U. S. 1,780,976, Nov. 11. Dyes of good leveling power are obtained by causing a 1-amino-4-haloanthraquinone-2-sulfonic acid to react with *m*-aminomethylacetanilide or other suitable base of the general formula, $m\text{-}NH_2C_6H_4NXY$ wherein X stands for an alkyl or aralkyl group and Y stands for an aliphatic acyl residue, in the presence of Cu or a Cu compd. while heating. The new dyes correspond to the general formula: $1\text{-}NH_2\text{-}2\text{-}MO_3S\text{-}4\text{-}(m\text{-}XYNC_6H_4NH)C_6H(CO)_2C_6H_4$, wherein X stands for an alkyl or aralkyl group, Y for an aliphatic acyl residue and M for a metal or for H. They are generally of blue color. Cf. *C. A.* **24**, 2307, 2895.

Indigoid dyes. WILHELM BAUER, WILHELM NEELMEIER and THEODOR NOCKEN (to General Aniline Works). U. S. 1,782,706, Nov. 25. Indigoid dyes of the general formula:



where X stands for an alkyl residue, Y for H or any other substituent and Z represents a halogen atom, may be prepd. by causing a reactive α-deriv. of a 2,3-naphthisatin substituted in the 1-position by halogen to be acted upon by a monoalkyl ether of the 1,4 dihydroxynaphthalene or a deriv. thereof, which is not substituted in the *o*-position to the hydroxyl group. They are generally dark bluish green cryst. powders, sol. with difficulty in cold concd. H_2SO_4 mostly with a green coloration, dyeing the textile fiber from a reddish brown vat in fast green shades. Examples are given.

Indigoid dyes. I. G. FARBENIND. A.-G. Fr. 687,061, Dec. 20, 1929. New dyes of the indigoid series giving bluish gray to olive shades are prepd. by transforming a 6-aminoindazole or its substitution product into the corresponding *o*-mercaptan, treating this with $ClCH_2COOH$ to form the corresponding thioglycolic acid, then transforming this in the usual manner into a hydroxythionaphthene compd., and treating the hydroxypyrazolethionaphthene thus obtained with an oxidizing agent or condensing it with a compd. capable of forming indigoid dyes. The compds. probably correspond to the general formula



in which the CH group is para with respect to the CO group, the benzene and pyrazole rings may have substituents, R is an aromatic residue and X represents NH or S.

Indigoid dyes. SOC. ANON. POUR L'IND. CHIM. À BÂLE. Fr. 689,230, Feb. 1, 1930. New dyes are prepd. by condensing 4,5-dichloro-7-methyl-3-thionaphthenone, if necessary after its transformation into the corresponding thionaphthenequinonic derivs. (*e. g.*, by condensation with *p*-nitrosodimethylaniline), with the components usually employed for the prepn. of indigoid dyes. The fastness of the dyes may be improved by halogenation. The 4,5-dichloro-7-methyl-3-thionaphthenone may be conveniently

prepd. by treating chlorotoluidine (CH_3,NH_2,Cl = 1,2,4) with Ac_2O, chlorinating and sapong. to get 4,5-dichloro-*o*-toluidine, which, by diazotization, action of K xanthogenate, sapon. and condensation with $ClCH_2COOH$ is transformed to 3,4-dichloro-6-methyl-1-phenylthioglycolic acid. The latter is transformed to the thionaphthenone by the usual methods. Examples are given.

Triarylmethane dyes. IMPERIAL CHEMICAL INDUSTRIES, LTD. Fr. 689,109, Jan. 30, 1930. Lakes of basic triarylmethane dyes and acid dyes of this series contg. basic groups are prepd. by treating the leuco compd. of such a dye with a soln. contg. a complex inorg. acid and an oxidizing agent. Several examples are given.

Mordant dyes. DURAND & HUGUENIN S. A. Fr. 690,539, Feb. 25, 1930. Mordant dyes are prepd. by submitting to an oxidation, preferably with $Ca(OCl)_2$, amino monoazo or amino polyazo dyes corresponding to the general formulas: $R'.N:N.R^n.NH_2$, $R'.N:N.R^2.N:N.R^3. \ldots N:N.R^n.NH_2$, in which R' is an aromatic ring contg. the necessary constituents for a mordant dye, *e. g.*, COOH and OH in the *o*-position, R^2, R^3, etc., signify intermediate rings joined by azo groups and which may contain substituents preferably SO_3H or COOH, and R^n is a terminal ring which can contain besides the NH_2 in *p*-position to the azo group, other substituents, preferably SO_3H or COOH. Examples are given.

Mordant dyes. I. G. FARBENIND. A.-G. (Werner Lange, inventor). Ger. 510,480, Feb. 12, 1927. Mordant dyes are prepd. by coupling 1 mol. of resorcinol or its nuclear substitution products with 2 mols. of a diazo compd. or compds. from one or more 4-amino-1-hydroxyaryl carboxylic acids. Examples are given. The products give brown shades when chrome-printed.

Mordants for dyes. CHEMISCHE FABRIK VORM. SANDOZ. Fr. 689,807, Feb. 12, 1930. See Brit. 325,388 (*C. A.* **24**, 4169).

Making basic dyes fast to light. I. G. FARBENIND. A.-G. Fr. 36,864, May 3, 1929. Addn. to 639,469 (*C. A.* **23**, 716). A dye of rhodamine B extra on a mordant of Sb and tannin is treated for ½ hr. at 50–60° with a soln. of 0.1–0.2 g. of the reduction compd. of Mo, W and P referred to in the prior case in 100 cc. of water and dried without rinsing, to increase its fastness to light.

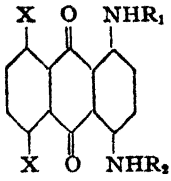
***o*-Aminoaryl mercaptans.** RICHARD HERZ and MAX SCHUBERT (to General Aniline Works). U. S. 1,784,441, Dec. 9. 1-Methyl-2-amino-5-chlorobenzene 3-mercaptan, and, in general, *o*-aminoaryl mercaptans (intermediates for making thioindigo dyes) of the general formula 1,2-$(NH_2)(SH)$-aryl-Y-4, wherein Y means that the 4-position is either substituted or blocked are made by treating *o*-aminoaryl thiocyanates of the general formula 1,4-(NH_2)-Y-aryl-SCN-2, wherein Y has the aforesaid significance, obtainable, *e. g.*, by causing an inorg. thiocyanate and a halogen to act on a primary aromatic amine having the *p*-position to the amino group blocked in the presence of a solvent of a neutral character, with alk. saponifying agents, under exclusion of air, preferably in the presence of a reducing agent. Advantageously alk. agents having simultaneously a reducing effect as, for instance, an aq. or alc. soln. of alkali sulfides or polysulfides may be used. Several examples are given.

Halogenated anthraquinoneacridone. I. G. FARBENIND. A.-G. Fr. 688,789, Jan. 24, 1930. A halogenated anthraquinoneacridone is obtained by sepg. from the intermediate product produced by the action of Cl on 1-anilido-2-methylanthraquinone or on 1-*o*-toluidoanthraquinone in org. solvents, the component more sol. in the org. solvents, and eliminating Cl or HCl from this component, preferably in the presence of reducing agents or at a high temp. or both. Thus, Cl is passed into a soln. of 1-anilido-2-methylanthraquinone in $C_6H_3Cl_3$ at 170–180°, and the reaction mixt. allowed to cool and filtered. The filtrate is allowed to stand a few days and the product which separates is boiled with *o*-dichlorobenzene and phenol. HCl is evolved and the product dyes *cotton* in bluish red shades.

***o*-Aminoaryl mercaptans.** RICHARD HERZ and MAX SCHUBERT (to General Aniline Works). U. S. 1,788,297, Jan. 6. Products suitable for use as intermediates in the manuf. of dyes of the indigo series are obtained by treating at a temp. exceeding 100° a 1-aminoarylene thiazole compd. wherein arylene means a substituted residue of the benzene series or a residue of the naphthalene or anthracene series substituted or not and wherein the benzene nucleus adjacent to the thiazole ring in the 4-position to the azole N atom is either substituted or blocked with a concd. caustic alkali soln. The production of 1-ethoxy-4-amino-3-thionaphthol (which may be pptd. as its Zn salt) is described and from this compd. by condensation with chloroacetic acid there may be obtained 1-ethoxy-4-aminonaphthalene-3-thioglycolic acid, the anhydride of which m. 227–8°. 1-Methyl-2-amino-5-chlorobenzene-3-mercaptan yields 1-methyl-2-amino-5-chlorobenzene-3-thioglycolic acid. 1-Amino-4-ethoxybenzene-2-mercaptan yields 1

amino-4-ethoxybenzene-2-thioglycolic acid. Details are given of the production of these compds. Cf. *C. A.* **24**, 2470, 3248.

Anthraquinone derivatives. Soc. pour l'ind. chim. à Bâle. Fr. 687,299, Dec. 27, 1929. New derivs. are prepd. from products of the general formula



in which one X signifies a nitro group and the other X an NHR_1 group, R_1 signifies H or an alkyl group, R_2 an aromatic or hydroaromatic group, by transforming the NO_2 group into NHR_3, in which R_3 signifies H, an alkyl, aralkyl or hydroaromatic group. The products may be sulfonated, alkylated or acylated as desired. The products dye acyl- or alkyl-celluloses or Zapon lakes in fast shades of blue to greenish blue. Several examples are given.

Diazoamino compounds. I. G. Farbenind. A.-G. (Eugen Glietenberg, Wilhelm Neelmeier and Josef Haller, inventors). Ger. 510,441, May 1, 1928. Water-sol. diazoamino compds. *useful in dyeing and printing* are prepd. by the action of aromatic diazo compds. on sulfonated or carboxylated compds. of the formula $NHR_1(R_2)$, where R_1 is the residue of an aliphatic or hydroaromatic carboxylic acid or of an aralkylsulfonic or carboxylic acid, and R_2 is the same as R_1 or an alkyl, aralkyl or hydroaromatic residue, or the residue of an alkyl sulfurous acid. An acid-binding agent is included in the reaction mixt. Thus, the diazo compd. from 2-amino-4-chlorotoluene may react with sarcosine. Other examples are given also.

Quinoline derivatives. I. G. Farbenind. A.-G. (Werner Müller and Wilhelm Schnurer, inventors). Ger. 510,431, Mar. 13, 1929. Nitroquinoline derivs. *useful as azo dye components* are prepd. by treating 2,4-dihydroxyquinoline or *N*-substituted 1,2-dihydro-4-hydroxy-2-ketoquinolines in H_2SO_4 with HNO_3. Examples are given.

Carbazolesulfonic acid derivatives. I. G. Farbenind. A.-G. Fr. 688,603, Jan. 27, 1930. Intermediate products for dyes are prepd. by diazotizing aminocarbazolesulfonic acids or their derivs. and replacing the diazo group by anions such as OH, Cl, Br, I, CN, SCN, SH, AsO_3H_2. Examples and lists of compds. which may be prepd. are given.

Aromatic methyleneamino compounds. Myrtil Kahn, Wilhelm Schepss and Edwin Zinn (to General Aniline Works). U. S. 1,781,982, Nov. 18. *Dye intermediates* are obtained by the interaction of a halomethyl deriv. of a hydroxy compd. of the aromatic series such as chloromethyl-*o*-cresotic acid with an aromatic amine such as 2-amino-8-naphthol-6-sulfonic acid, at room temp. Several examples are given of the production of different products which, in general, are whitish powders sol. in dil. alkalies, producing azo dyes with diazo compds. and having most probably the following general formula: 4,3,5-(HO)XYC$_6$H$_2$CH$_2$NRR′, wherein R stands for a benzene or naphthalene radical contg. at least one of the groups —OH and —SO_3H, R′ stands for H, alkyl or aryl, X means H or a substituent and Y means H or the carboxy group.

Carbazoleindophenol compounds (dye intermediates). Fritz Ballauf, Friedrich Muth and Albert Schmelzer (to General Aniline Works). U. S. 1,781,966, Nov. 4. By causing primary and sec. aliphatic amines to react, in the presence of condensing agents, with carbazolecarboxylic acids, carbazolecarboxylic acid alkylamides (mono- or dialkyl) are obtained and these condense easily with nitrosophenols. The different carbazolecarboxylic acids can be used, the carbazole-1- and the carbazole-2-carboxylic acids being the most easily available. Details are given of the production of 6-(*p*-*hydroxyanilino*)-*N,N-dimethyl-2-carbazolecarboxamide* which is a reddish blue powder, sol. in concd. H_2SO_4 with a reddish blue color; it is readily reduced to the corresponding leuco compd. when treated in alk. soln. with Na_2S or NaSH.

Dyes and intermediates. I. G. Farbenind. A.-G. Brit. 334,565, April 6, 1929. 5,8-Dihalo-1,2-benzanthraquinones are converted into dyes or dye intermediates by at least partially replacing the halogen atoms by the same radicals of the general formula X—R, in which X represents —NR′— (R′ being H or an org. residue), —S— and R represents H or an org. residue; *e. g.*, 5,8-dichloro-1,2-benzanthraquinone (which may be prepd. as described in Brit. 332,192 (*C. A.* **25**, 215)) is condensed with *N*-methyl-*p*-toluenesulfamide, *p*-toluenesulfamide, *p*-toluidine, *p*-thiocresol, aminoanthraquinone

or phenol, producing dyes of various colors suitable for use on cellulose acetate rayon, and yielding wool dyes by sulfonation.

Dyes and intermediates. I. G. FARBENIND. A.-G. Fr. 689,968, Feb. 14, 1930. Compds. which are either dyes or intermediates for dyes are prepd. by treating with nitrating agents the derivs. of 1,1'-dianthracyl, in which the 2 $C_{14}H_{10}$ radicals are joined to one another by at least one ring of 6 members in such a way that one is the mirror image of the other and replacing, if necessary, the NO_2 groups in the products by other groups. The NO_2 groups may be reduced to NH_2 groups, the H atoms of which may be replaced by any groups or the NH_2 groups themselves may be replaced. The nitration may be carried out in the presence of solvents or diluents such as $PhNO_2$, or HNO_3 alone or mixed with H_2SO_4 may be used. A large no. of examples of the nitration of *meso*-benzo-, *allo-meso*-naphtho-, and *meso*-anthra-dianthrone and their derivs., and the conversion of the products to other derivs. is given.

Dyes and intermediates. SCOTTISH DYES, LTD. Fr. 689,583, Feb. 7, 1930. See Brit. 333,506 and 333,507 (*C. A.* **25**, 604).

Dyes and intermediates. I. G. FARBENIND. A.-G. (Fritz Mayer and Karl Zahn, inventors). Ger. 512,237, Sept. 8, 1927. See Brit. 296,761 (*C. A.* **23**, 2579).

Dyes and intermediates of the anthracene series. I. G. FARBENIND. A.-G. (Arthur Wolfram and Emil Hausdörfer, inventors) Ger. 512,229, Dec. 31, 1927. See Brit. 303,375 (*C. A.* **23**, 4579).

Dye intermediates. I. G. FARBENIND. A.-G. (Erich Fischer, inventor). Ger. 506,441, Oct. 19, 1926. Compds. of the formula 1-X-2(or 4)-Y-3,5-$(NO_2)_2C_6H_2$, in which X is $—SO_2N(R)$aryl or —CON(R)aryl (R being an alkyl or an aralkyl group) and Y is a halogen, are prepd. by the action of sec. aromatic amines on the corresponding compds., in which X is SO_2(halogen) or CO(halogen). Examples are given describing the prepn. of *4-Cl-3,5-*$(NO_2)_2C_6H_2SO_2NPhMe$, m. 161°, and *4-Cl-3,5-*$(NO_2)_2C_6H_2CONPhMe$, m. 150°.

Dye intermediates. I. G. FARBENIND. A. G. (Max A. Kunz and Karl Kobetz, inventors). Ger. 508,396, Oct. 14, 1927. Halo-*ms*-naphthodianthrones are prepd. by treating *ms*-naphthodianthrone or its derivs. with a halogen or a halogenating agent in the presence or absence of catalysts and preferably in the presence of a solvent or diluent. Like products may be prepd. by treating halo-*ms*-benzodianthrones with acid condensing agents, *e. g.*, $AlCl_3$, or with oxidizing agents in acid soln. Examples are given.

Dye intermediates. H. A. E. DRESCHER, J. THOMAS and SCOTTISH DYES, LTD. Brit. 334,166, Feb. 21, 1929. 1-Amino 2-chloro- and 2-amino-3-chloro anthraquinone are obtained by treating the urea of 3'-amino-4'-chloro-2 benzoylbenzoic acid with H_2SO_4 under ring-closing conditions, and sepg. the mixt. of products by diln.

Coloring agents. I. G. FARBENIND. A. G. Fr. 689,050, Jan. 29, 1930. Soln. of dyes in org. solvents contg. rubber or its transformation products or condensation products of butadiene hydrocarbons are used for coloring wood, glass, artificial substances, films, artificial silk, etc.

Dyeing fibers. ECLIPSE TEXTILE DEVICES, INC. Ger. 510,801, Jan. 8, 1929. App. is described for locally dyeing textile fibers which can absorb liquids.

Dyeing fibers with azo dyes. I. G. FARBENIND. A.-G. Fr. 36,748, Mar. 22, 1929. Addn. to 670,216 (*C. A.* **24**, 1988). Azo dyes are obtained on fiber by printing on the article in the usual manner the condensation products of diazo, tetrazo or diazotized aminoazo compds. with secondary bases, along with suitable coupling component and developing by treating with acid agents. Examples are given.

Dyeing vegetable fibers. CHEMISCHE FABRIK, VORM. SANDOZ. Fr. 690,280, Feb. 10, 1930. The dyeing properties of cotton or other vegetable fibers are altered by boiling the undyed fibers with aq. alk. lyes to which may be added OH derivs. of the aromatic or alicyclic series, and afterward treating them with solns. of aromatic carboxylic or sulfonic chlorides or halides of P in indifferent liquids not miscible with water.

Dyeing animal fibers with ester salts of leuco vat dyes. DURAND ET HUGUENIN SOC. ANON. Brit. 334,508, May 27, 1929. In dyeing animal fibers with ester salts of leuco vat dyes as described in Brit. 218,649 (*C. A.* **19**, 579), emulsifying agents are added which remain sol. and efficacious in an acid medium such as "Sapamines" or sulfonic acids of fatty acids such as those described in Brit. 288,612 (*C. A.* **23**, 605). The emulsifying agents are preferably added to the acid oxidizing baths used for development, and dyeings are obtained which are very fast to rubbing. Examples are given.

Dyeing textiles. HENRY DREYFUS. Fr. 36,696, April 22, 1929. See Brit. 316,529 (*C. A.* **24**, 1991).

Dyeing textiles. BRITISH CELANESE, LTD., and G. H. ELLIS. Brit. 334,518,

April 29, 1929. In producing discharge effects, textile materials are impregnated with a substance of acid reaction prior to the application of a discharging agent for a coloring matter or coloring matter component, and discharge is effected in the presence of the acid substance, which may be oxalic, tartaric, citric, salicylic, benzoic or naphthoic acid, a benzenesulfonic acid or sulfonic acid of phenol, naphthalene or naphthols or an acid salt such as $Al_2(SO_4)_3$ or $ZnSO_4$. The process is applicable to cotton, silk, regenerated cellulose and cellulose esters and ethers or mixts. of these materials. Numerous details and examples are given.

Dyeing and finishing textiles, etc. HERMANN HELTEWIG. Ger. 510,802, Oct. 12, 1928. The treated pieces of fabric are carried through rollers over the dyeing or finishing vats and the squeezed-out liquor is removed and replaced by fresh liquor.

Dyeing cellulose esters or ethers. HENRY DREYFUS. Fr. 688,755, Jan. 23, 1930. Cellulose acetate or other esters or ethers of cellulose are dyed by oxidizing on the material an aromatic amine in the presence of an amt. of mineral acid chemically equiv. to this amine and in the presence of a supplementary substance of acid reaction such as a mineral or org. acid or acid salt or salt having an acid reaction. In an example, $PhNH_2$ in the presence of HCl and AcOH is oxidized with a chlorate to give a deep black. Other examples are given.

Dyeing cellulose esters and ethers. I. G FARBENIND. A.-G. (Erich Fischer and Carl Erich Muller, inventors). Ger. 505,885, Oct. 19, 1926. A brown color is produced by using a dye free from free SO_3H groups, formed by the condensation of *p*-aminodiphenylamine or its homologs or substitution products, with dinitrohaloaryl groups of the general formula 2,4,6-X C_6H_2Y, where Y is a halogen and at least 2 of the X groups are NO_2 groups and the third is an optionally substituted group, the completed dye contg. at least 1 COOH group. In an example, the dye 2-(*p*-$PhNHC_6H_4$-NH)-3,5-$(NO_2)_2C_6H_2COONa$ dyes acetate silk a yellow brown. Many other examples are given.

Black dyeing of cellulose esters and ethers with disazo dyes. ERIC A. SPRIGHT (to Imperial Chemical Industries Ltd.). U. S. 1,780,320, Nov. 4. Full black shades are obtained on "acetate silk" or like materials by direct dyeing with secondary disazo dyes of the general formula:



where one X represents H and the other X represents H or a sulfonic group, R represents the coupled residue derived from diazotized amines of the glass comprising aniline and the homologs and halogenated derivs. of the same, and Y represents an OH or NH_2 group. Dyes of this type may be made by diazotizing aniline or equiv. amine, for instance, toluidine, xylidine, chloroaniline, chlorotoluidine, etc., and coupling with 1-naphthylamine or the 6- or 7-sulfonic deriv. thereof. The aminoazo compd. thus formed is diazotized and coupled with 1,5-naphthylenediamine or 1,5-aminonaphthol to form the disazo dye. Various details and examples are given.

Coloring cellulose esters and ethers. MAX J. THEUMANN (to E. I. du Pont de Nemours & Co.). U. S. 1,789,122, Jan. 13. A lake is formed *in situ* in a soln. of the cellulose deriv. and the colored cellulose deriv. is then isolated (suitably by pptn. with water).

Coloring cellulose esters and ethers. MAX J. THEUMANN (to E. I. du Pont de Nemours & Co.). U. S. 1,789,121, Jan. 13. A soln. of cellulose acetate or other cellulose deriv. to be colored is treated with substances such as $FeCl_3$ and $K_4FeC_6N_6$ which are capable of reacting together to form an inorg. coloring material, and the mass is treated with a liquid (suitably with water in the treatment of an acetone soln. of cellulose acetate) miscible with the solvent but in which the cellulose deriv. and coloring material are insol., so that pptn. of a colored product is effected.

Dyeing regenerated cellulose materials. IMPERIAL CHEMICAL INDUSTRIES, LTD. Fr. 689,799, Feb. 12, 1930. See Brit. 328,706 (*C. A.* **24**, 5510).

Dyeing regenerated cellulose materials. RAINALD BRIGHTMAN (to Imperial Chemical Industries Ltd.). U. S. 1,789,134, Jan. 13. Disazo dyes, some of which are now obtained by tetrazotizing 1,5-diaminonaphthalene and coupling with one mol. of a phenol or naphthol or a carboxylic or sulfonic deriv. thereof or an aminonaphtholsulfonic acid and one mol. of another coupling component, other than 2-amino-5-naphthol-7-sulfonic acid or a deriv. thereof, are applied to the dyeing of a regenerated cellu-

lose rayon, for instance, viscose rayon in even shades. For the production of the best results there must be present in the dye mol. at least one sulfonic acid group for each naphthalene nucleus combined as a coupling component. Several examples are given of dyes giving various violet, blue, brown and maroon shades, and details of the dyeing process are given.

Dyeing knitted and woven fabrics. CHARLES CALLEBAUT and JULIEN DE BLICQUY. U. S. 1,788,980, Jan. 13. The articles are immersed in a pool of dyeing liquor and air is alternately introduced into the body of liquor at opposite sides of the pool so as to produce successive rotation of the body of liquor and articles immersed in it in opposite directions. App. is described.

Dyeing and printing. DURAND & HUGUENIN S. A. Ger. 512,438, April 27, 1928. See Brit. 310,478 (*C. A.* **24**, 732).

Dyeing or printing textiles. DURAND & HUGUENIN S. A. Fr. 36,764, April 22, 1929. Addn. to 571,264. Textiles are dyed or printed by oxidizing, in acid medium esters of leuco derivs. of vat dyes with Cu salts, such as the sulfate, as oxidizing agent Examples are given.

Dyeing and printing cellulose esters and ethers. BRITISH CELANESE, LTD., and G. H. ELLIS. Brit. 334,543, April 29, 1929. The chlorates used as discharging agent in the process described in Brit. 312,655 (*C. A.* **24**, 973) are replaced wholly or in part by chromates, and colored discharges may also be obtained by incorporating resistant insol. or difficulty sol. coloring matters of the nitrodiarylamine, aminoanthraquinone or acidylaminoanthraquinone series in the oxidizing discharge pastes, which may contain chlorates, chromates or oxidizing agents such as those specified in Brit. 315,005 (*C. A.* **24**, 1522). Numerous details and examples are given.

Printing textiles. SOC. PAULE A. LEONARD. Fr. 688,858, Jan. 25, 1930. In printing by the method of "discharge colors," salts called reserves, such as the Na salt of *m*-nitrobenzenesulfonic acid, which neutralize the action of the discharge agent are applied to certain parts of the previously colored cloth.

Printing wool. I. G. FARBENIND. A.-G. Fr. 689,346, Feb. 3, 1930. Colors which may be discharged are obtained on wool by printing with monoazo dyes obtained by coupling 4-nitro-1-aminobenzene-2-sulfonic acid with sulfonic acids of 2-aminonaphthalene or their *N*-alkyl derivs. An example is given.

Printing woolen fabrics with ester salts of leuco vat dyes. I. G. FARBENIND. A.-G. Brit. 334,419, Oct. 11, 1928. In a process such as is described in Brit. 298,648 (*C. A.* **23**, 3111), reducing agents are added to the printing pastes, for obtaining colored discharges. Examples are given

Vat assistant for use in dyeing. JEAN G. KERN and CHARLES J. SALA (to E. I. du Pont de Nemours & Co.). U. S. 1,782,122, Nov. 18. Either the dye paste or the dye bath is mixed with substituted aliphatic amines contg. hydroxyl groups in the aliphatic radicals, which are very strongly basic and possess a high degree of solubilizing power. The general formula for substances of this class is $R_1R_2NC_nH_{2n}OH$, R_1 and R_2 representing either an alkyl group $C_nH_{(2n+1)}$, H, or a hydroxyalkyl group $C_nH_{2n}OH$. Also any one of these substituents may be replaced by a compd. contg. the group $C_nH_{2n-1}(OH)_2$.

Dyeing apparatus. ARCHIBALD J. HALL. U. S. 1,789,040, Jan. 13. Structural details are described of a closed vat app provided with pipe connections for air or gas supply and proportioned flow to waste a part of the air or gas.

Apparatus for dyeing hanks. GIOVANNI RAMELLA-LEVIS. Ger. 510,082, Aug. 31, 1926.

Variable-speed apparatus for dyeing yarn hanks. G. S. LORD. Brit. 334,[illegible], March 26, 1929. Structural features.

Apparatus for dyeing artificial silk or other materials in skeins. E. BLASCHKE. Brit. 334,382, Aug 9, 1929. Structural features.

Machine for bleaching, dyeing, etc., yarn in loose or spooled form. F. G. SCHLUMACHER and JOHANN J. MÜLLER. Swiss 140,679. June 12, 1929. Details are given.

System of tanks and dipping apparatus for dyeing, washing or other treatments of materials by immersion in liquids. M. DASSONVILLE. Brit. 334,730, March 9, 1929. Structural features.

Dye-bath table. I. G. FARBENIND. A.-G. Fr. 688,960, Jan. 27, 1930. A table for reading directly in a rapid manner the amt. of dyes and chem. products necessary for the prepn. of dye baths is described; it consists of a flat rectangular box in which a plate slides.

Mill for pulverizing dyes, etc. ALFRED E. G. MACCALLUM. Ger. 510,526, Jan 17, 1929.

Treating textiles. ACETA G. M. B. H. Fr. 689,984, Feb. 14, 1930. The elec. charge on textile fibers made of cellulose esters or ethers is reduced during their prepn. or manuf. by impregnating the fibers with a mixt. of oils or fats to which org. bases sol. in the oil such as dibutylamine or triethanolamine are added.

Treating textiles. CAMILLE DREYFUS. Fr. 690,406, Feb. 21, 1930. The properties of textiles, particularly those composed of, or contg. cellulose derivs. such as cellulose acetate, are improved by treating them with a dispersion of rubber latex and preferably by an inorg. or org. pigment or other substance which is practically insol. in water. Examples are given of the use of rubber latex and rubber latex with graphite or ZnO.

Treating textiles. CAMILLE DREYFUS. Fr. 36,860, May 2, 1929. Addn. to 636,608 (*C. A.* **23**, 719). Cloth is given the appearance of lace, gauze or other perforated effects by submitting cloth contg. threads composed of filaments derived from cellulose acetate or other org. derivs. of cellulose and threads composed of vegetable fibers such as cotton or linen, to a carbonization wholly or in parts. The cloth may also contain animal fiber such as natural silk or wool, and designs may be produced by the application of different mixts.

Bleaching textile fibers. I. G. FARBENIND. A.-G. Fr. 690,220, Feb. 19, 1930. Textile fibers are bleached by alternate treatments with H_2O_2 and Cl (acid) with intermediate washings with NaOH lye.

Sizes for textiles. AGATHE WOLFF. Ger. 510,084, Mar. 24, 1928. Highly viscous sizes or finishes for textiles are prepd. by treating starch with malt exts. having a strong liquefying action but little or no saccharifying action. Suitable exts. are those obtained at a higher temp. than usual (up to 70°)

Apparatus for treating textiles, particularly linen, with ozone. OSCAR HOFFMANN. Fr. 689,377, Feb. 4, 1930.

Finishing fabrics. HEBERLEIN & CO., A.-G. Brit. 334,756, Oct. 12, 1928. Fabrics formed, at least in part, of vegetable fibers are pressed at a temp. above 100° and subsequently treated with one or more swelling baths (suitably H_2SO_4, H_3PO_4, HNO_3, alkali lye, ammoniacal Cu oxide or $ZnCl_2$ soln.) to give the material a linen-like appearance.

Washing and fulling fabrics as a finishing operation in their manufacture. EMIL MUSSDORF. U. S. 1,788,777, Jan. 13. The fabrics are passed between the washing and fulling rollers in the direction of the weft of the fabric.

Treating vegetable fibers. THE TWITCHELL PROCESS CO. Fr. 690,434, Feb. 22, 1930. The natural impurities contained in vegetable fibers are eliminated by heating the fibers in an aq. soln. contg. true "mahogany" sulfonates.

Maceration of flax, etc. E. N. FITZNER and N. N. ZUIRIN. Russ. 15,593, Dec 17, 1927. An enzyme for the maceration of flax, etc., is obtained by treating hemp stalks with water for 2-3 hrs. at 60-70°.

A bacterial method of maceration and cottonization of flax, hemp, etc. E. N. FITZNER and N. N. ZUIRIN. Russ. 36,464, Dec. 4, 1928. The maceration is carried out in the usual way with a maceration liquid prepd. from the stalks of *Urtica dioica* or of *Urtica urens*.

Charging silk. RENÉ CLAVEL. Fr. 37,045, June 14, 1929. See Brit. 332,778 (*C. A.* **25**, 422).

Working up waste silk. I. G. FARBENIND. A.-G. (Ernst Rossner, inventor). Ger. 510,480, Nov. 15, 1928. Waste silk is dissolved in H_3PO_4 to form a relatively stable soln. which is coagulated by means of a salt soln. and spun into filaments, hairs, bands, etc. Thus, silk waste 1 may be dissolved in 85% H_3PO_4 10 parts and the soln., after allowing it to stand, may be spun into a satd. soln. of NaCl contg. 5-10% of $HCONH_2$.

Viscose silk. I. G. FARBENIND. A.-G. Fr. 689,712, Feb. 11, 1930. The quality of viscose silk and its aptitude for dyeing are improved by treating the freshly prepd. viscose silk still in the wet state by an aq. soln. of ammoniacal-CuO free from caustic alkali under such conditions that it only dissolves a small percentage of the dry wt. of the viscose.

Artificial silk. RENÉ CLAVEL. Fr. 36,920, May 13, 1929. Addn. to 629,042. Textiles of, or contg., artificial silk are charged by treating with a metallic salt such as $SnCl_4$, drying and introducing them directly without washing into a bath of fixing acid such as a soln. of NaH_2PO_4 to which may be added acids or acid salts as well as protective colloids. Instead of NaH_2PO_4, a soln. of Na_2HPO_4 made acid by the addn. of acids or acid salts may be used.

Artificial threads, films, etc. HENRY DREYFUS. Fr. 689,800, Feb. 12, 1930. Filaments, threads, textiles, etc., of diminished luster, of, or contg., cellulosic esters or

ethers are made by forming in the material a non-colloidal metallic compd. by the reaction of a pptg. agent on a sol. metallic compd. The cellulosic material is preferably in a swollen state. Examples are given of the pptn. in the material of $BaSO_4$.

Films or ribbons of cellulose derivatives. F. Loozen. Brit. 334,525, Jan. 12, 1929. Films or ribbons of great length, such as those formed of viscose or cellulose acetate, are cut into the form of threads, fibers or wadding suitable for spinning or other working. App. and various mech details are described.

Pile fabrics. Albert W. Drobile. U. S. 1,788,989, Jan. 13. A pile fabric has loops of the pile contg. animal fiber united to the backing fabric by a solidified pliable compn. resulting from the coagulation *in situ* on the backing of an aq. dispersion of rubber permeating the interstices of the fabric.

Artificial wool. Frédéric G. Maillard. Fr. 689,891, April 18, 1929. Vegetable fibers are given the appearance of wool by steeping in a bath contg. alkali carbonate at 60° and then treating with Na sulforicinate with the addn. of an alkali carbonate. The product is then bleached and dressed.

Mothproofing wool, etc. I. G. Farbenind. A.-G. Fr. 686,721, Dec. 16, 1929 See Brit. 324,962 (*C. A.* **24**, 3912).

Fabric for covering aircraft. Isadore M. Jacobsohn and Starr Truscott. U. S 1,788,394, Jan. 13. A flexible fabric impermeable to gases comprises a rubberized base fabric and a film of plasticized reverted cellulose or "cellulose rubber." Cf. *C. A.* **24**, 2617.

Apparatus for drying and finishing tubular textile fabrics by treatment with hot air. Emile B. Bates. U. S. 1,789,093, Jan. 13. Structural features.

Reconditioning dry-cleaning solvents. R. R. Stolley Corp. Brit. 334,208, May 27, 1929. The dry-cleaning solvent is prepd for re-use by passing it upwardly through a caustic alkali soln. and "Darco" activated charcoal, potash or other cleansers and then through water and $CaCl_2$. App. is described. Cf. *C. A.* **24**, 2900.

26—PAINTS, VARNISHES AND RESINS

A. H. SABIN

Studies in the plasticity of paints. F. H. Rhodes and W. J. Jebens. *J. Phys. Chem.* **35**, 383–404(1930).—Water, Na oleate and Ca oleate increase the yield value and decrease the mobility of paints prepd. from nearly neutral linseed oil. The same changes are observed when water is added to the above paints in the presence of either soap Fatty acids increase the consistency of a ZnO paint, while small quantities of water counteract the effects of the fatty acids. Fatty acids have little effect upon white lead paints. $ZnSO_4$ does not change the flow characteristics of ZnO paints. Heating at 150° for 1 hr. reduces the consistency of a ZnO paint made from acid linseed oil.

S. Bradford Stone

Chalking (of paints). III. Is chalking to be considered as desirable or not? Richard Kempf. *Farben-Ztg.* **36**, 553–5(1930); cf. *C. A.* **25**, 422.—The desirability of chalking depends both upon the purpose of the paint (whether gloss or mat effect is desired) and upon whether chalking or cracking be the lesser evil (if it is assumed that one or the other takes place). It is undesirable for any surface with which people come into phys. contact. It is desirable when high reflection factors are wanted, *e. g.*, on oil tanks, tunnels, sign posts, etc.

G. G. Sward

Field tests on quick-drying house paints. H. A. Gardner and L. P. Hart. *Am. Paint & Varnish Mfrs.' Assoc.*, Circ. No. **374**, 32–52(1931).—A preliminary report is made on exposure tests on a no. of quick-drying house paints conducted at Gainesville, Fla. The vehicles included bodied tung-linseed oil mixts., glycerol phthalate compns., other synthetic resins and nitrocellulose lacquers. Formulation, spreading rates and comments on brushing properties are given.

G. G. Sward

Measurement of abrasion resistance. I. Paints, varnishes and lacquers. A. E. Schuh and E. W. Kern. *Ind. Eng. Chem., Anal Ed.* **3**, 72–6(1931).—A method of measuring the abrasion resistance of materials in the form of thin films is described While designed primarily for the study of paints, lacquers and varnishes, it should be useful also for a large no. of other materials, *e. g.*, the wearing quality of electrodeposits The principle of the method is a modification of Gardner's falling-sand method. Essentially it consists in the following: Carborundum powder of uniform particle size is admitted at a const. rate to a directed stream of air under const. pressure and humidity and the resulting Carborundum-air blast allowed through a nozzle to impinge upon a film

of the test material mounted at a fixed angle. The wt. of Carborundum required to wear through a unit thickness of material is taken as the abrasion resistance of the material. The present method has made possible measurements of high precision when uniform and accurately measured films are observed. D. THUESEN

Comparison of some light sources for accelerated weathering tests. G. G. SWARD AND L. P. HART. *Am. Paint & Varnish Mfrs.' Assoc.* Circ. No. 375, 53–8(1931).—The outdoor weathering of a no. of different coating materials was compared with that produced by accelerating devices using (1) a pair of 13-amp. enclosed carbon arcs, (2) a 50-amp. flaming C arc using "Sunshine" carbons, (3) a 50-amp. flaming C arc using therapeutic "C" carbons and (4) a low-pressure Hg-in-quartz arc. The accelerated cycle consisted of continuous light and a water spray twice each hour. Typical outdoor failures were obtained with (1) and (2), the latter being 2 to 3 times faster than the former. Failure by chalking predominated with 3 and 4 even in materials which failed by checking out of doors. A combination of arcs to produce both checking and chalking is suggested. The operating costs are approx. (1) 22 cents; (2) and (3) 21 cents; and (4) 8.5 to 13 cents per hr. These do not include capital investment or time of operator. G. G. SWARD

A dressing plant for "Bideford Black." H. M MORGANS. *Bull. Inst. Mining Met* 315, 7–8, 9–22(1930); cf. *C. A.* 25, 423.—Discussion. ALDEN H. EMERY

Arsenic in writing materials. G. G. KAPPELLER. *Z. Untersuch. Lebensm.* 60, 213–5(1930).—Of 14 samples of violet C paper, 5 contained As. Three of German origin contained 0.95–3.8 g. per 100 g., or 16.1–59.6 mg. per sheet, while 2 American papers contained 0.9–3.0 g. of As per 100 g., or 19.8–45.4 mg. per sheet. Two English violet typewriter ribbons contained 0.5–1.1 g. of As per 100 g. or 5.8–15.4 mg. per m. Four violet pencils and 2 aniline ink-powders were free from As. The possibility of contamination through use of oxides of As in the manuf. of fuchsin, methyl violet, Prussian blue, etc., is discussed. C. R. FELLERS

The possibilities of inorganic paint vehicles. NÖEL HEATON. *J. Oil & Colour Chem. Assoc.* 13, 330–40(1930).—Org. paint vehicles possess more or less satisfactory durability on most types of surfaces except plaster. Fresco is limited to a certain type of plaster and must be applied within a few hrs. of the plaster. Stereochromy is likewise limited to a certain plaster, is tedious and costly Si esters offer promise in that they may be applied on any type of plaster and at any time. The chief disadvantages are poor storageability and poor working properties. G. G. SWARD

Drying oils. XIV. Rate of oxidation of linseed oil at 160°. J. S. LONG AND H. D. CHATAWAY. *Ind. Eng. Chem.* 23, 53–7(1931); cf. *C. A.* 24, 4173.—Samples of raw linseed oil (I), linseed oil acids and synthetic esters of oleic and linolenic acids were blown with O in a closed app. supplied with an electromagnetic circulating pump. The H_2O and CO_2 evolved during oxidation were absorbed in H_2SO_4 and soda lime. The hydrocarbons evolved were burned to H_2O and CO_2, which were likewise absorbed. The rate of O absorption of each material is plotted against cc. of O absorbed. Gelation of the pure oil occurred after 5 hrs. when approx. 12.5% of O had been absorbed. Diln. of the O stream with 50% N increased the time of gelation to over 9 hrs. and decreased the O absorption by 5.7%. Samples contg. Mn, Co or Pb driers gelled sooner than the pure oil but absorbed approx the same total amt. of O. 0.032% of Co caused rapid absorption during the first hr. but the rate soon fell to that of the pure oil. No marked difference was noted between 0.1% and 0.3% of Pb. Triolein (II), linolenic triglyceride (III), the synthetic triglycerides of the mixed fatty acids of linseed oil, linseed oil-free acids and the pentaerythritol ester of linolenic acid (IV) gelled in 12.1, 2.9, 4.1, 7.3 and 2.3 hrs. and absorbed 18.5, 11.4, 11.8, 15.4 and 8.8% of O, resp. In one expt. IV was partially oxidized, heated 7 hrs. in N and again oxidized. At gelation it had absorbed only 5.3% of O. Gelation ensues when a certain degree of complexity of the mols. is reached and the influence of the degree of unsatn. or oxidation and of the presence of driers is secondary. Increasing rates of oxidation at the beginning of each expt. is explained as due to the gradual disappearance at 160° of antioxidants naturally present in the oil Though the free linseed oil acids gelled slowly and absorbed much O, the presence of 15% of them accelerated the gelling of I. A second set of expts. was made with I, II, III and IV in which the wt of volatile products and gain in wt. of the samples were measured and ultimate analyses of the gel made The results of the latter indicate that gelation occurs when each :C=C: of II has acquired 2 atoms of O to form peroxide groups, when each mol of I or III has acquired 1 peroxide group and before each mol. of IV has acquired such a group. H. K. SALZBERG

Influence of antioxidants on the rate of oxidation of linseed oil. I. Hydroquinone. A. M. WAGNER AND J. C. BRIER. *Ind. Eng. Chem.* 23, 40–9(1931).—After a

futile attempt to obtain reliable results by exposing hydroquinone-linseed oil systems in the form of films, W. and B. resort to blowing 400-g. charges of the samples under rigidly controlled conditions with air and expressing the state of oxidation in terms of *n* and Wijs I values. The app. is described in detail. Runs were made at 30° and 100° on pure raw linseed oil and on samples of the same oil contg. varying amts. of hydroquinone (I) or of oxidized oil and I. At 100° the oxidation rates of 7 samples of the pure oil were practically identical until an I value of 130 was reached (starting values 179–84), when they began to differ widely, gelation occurring at an I value of approx. 110. At this temp. no induction period was noticeable. At 30° the induction period was approx. 450 hrs. and gelation occurred at an I value of 120. The oxidation rate at 100° is much greater than at 30° after the induction period. Preliminary runs showed that the vapor pressure of an antioxidant is an important factor in its effect, especially when blowing at the higher temps. Concns. of I of less than 1:10,000 had no appreciable effect at 100°, but at 30° concns. as low as 1:100,000 had a measurable effect. At both 100° and 30° the induction period was prolonged to an extent directly proportional to the concn. of I, but the rate of oxidation following this period was the same for all samples and the pure oil. Addns. of I made during the induction period to samples already contg. I in 1:1000 concn. at 100° prolonged the induction period but had no effect on the rate of oxidation following this period. Addns. of I after the start of active oxidation had no influence whatever. At 30°, however, addns of I made at any time during the oxidation of samples already contg. I prolonged the oxidation. Therefore, the velocity of oxidation dets. the degree to which the antioxidant will be effective, and above a crit. velocity no effect is observable. The addn. of 1.25% of partially oxidized linseed oil (II) to pure oil or to oil contg. I in 1:1000 concn. shortened the induction period by an amt. proportional to the amt. of II added at both 30° and 100°. The presence of excess I at 100° prolongs the induction period to gelation, oxidation having progressed slowly during the entire period. At 30°, however, oxidation during the induction period is too slow to be detected. Polymerization does not seem to occur during the induction period.

H. K. Salzberg

Technic of the modern industrial varnish industry. Franco Grottanelli *Atti III congresso naz. chim. pura applicata* **1930**, 122–33. —A review. E. M. S.

Blooming of varnish films. Hans Wolff. *Farben-Ztg.* **36**, 505–6(1930).—Higher magnification shows that the crystals described by Krumbhaar (*C. A.* **25**, 220) are in reality a honeycomb structure of the film. Blooming of films is assocd. with low water absorption. The cases described by K. confirm this conclusion. The conditions of drying are as important as the compn. of the varnish. *E. g.*, many varnishes that do not bloom when dried under normal atm. conditions may be caused to bloom when dried in a dry atm., *e. g.*, an oven. G. G. Sward

The problem of mat varnishes. H. Deckert. *Farben-Ztg.* **36**, 453, 504–5(1930).—The labor involved in producing rubbed finishes has been largely eliminated by the production of coatings which dry with a mat surface. The effect is obtained by the incorporation of materials such as waxes, metallic soaps and pigments. Waxes produce soft drying varnishes difficult to handle. The best results are obtained with metallic soaps, especially with a highly basic Al palmitate characterized by insoly. in mineral thinners. The optics of mat finishes is briefly discussed. G. G. Sward

Cadmium pigments in cellulose lacquers. Gg. Siebert. *Farben-Ztg.* **36**, 506–7 (1930).—Cd pigments in lacquer vehicles are more light fast than the chromes. They are non-bleeding, but when exposed to the weather they fade, being converted to Cd carbonate. G. G. Sward

Study of "run" amber. I. C. Plonait. *Farben-Ztg.* **36**, 555–6(1930).—Seventy-five % of the amber obtained from the State Amber Works at Palmnicken is rendered suitable for varnish making by "running." The product is sepd. according to color in 5 grades with av. acid and sapon. nos., resp., as follows: (1) 23.6, 47.07; (2) 16.4, 45.44; (3) 17.5, 44.98; (4) 12.4, 53.92; (5) 12.8, 19.05. G. G. Sward

Solvents and non-solvents for nitrocotton. Fritz Zimmer. *Farben-Ztg.* **36**, 701 (1930).—Solvent power for nitrocotton seems to be assocd. with a —CO— group found in esters, ethers and ketones. Alcs., except MeOH and EtOH, do not dissolve nitrocotton. However, alcs. do not ppt. nitrocotton as do the non-solvent hydrocarbons. The various theories of solvents for nitrocotton are briefly stated. The formation of solvate complexes with nitrocellulose is suggested. G. G. Sward

Solvent problem. Alfred Heinemann. *Farben-Ztg.* **36**, 270(1931); cf. preceding abstr.—Before the solvate theory can be accepted, many phenomena, such as the relation of viscosity to the size of solvated mols., must be explained. Note by Zimmer. G. G. Sward

The photoactivity of rosin. G. NORKIN AND B. SHADIN. *Chem. Umschau Fette, Oele, Wachse Harze* **37**, 340–1(1930).—Exptl. results on the photoactivity of Russian rosin lead to these conclusions: Increase in surface increases photoactivity, powdered rosin affecting the photographic plate most, both Russian and U. S. rosins being used. The active rays emitted by rosin pass readily through air, less through thin white paper, least through black paper; a glass plate is entirely opaque. A list of 18 references is appended. P. ESCHER

The color reactions of colophony. M. MARINI. *Peintures, pigments, vernis* **6**, 830–3(1929).—A review. B. H.

The optical rotation of resins. III. Optical rotation as a criterion for genuine pressed amber. C. PLONAIT. *Chem. Umschau Fette, Oele, Wachse Harze* **37**, 342–4 (1930); cf. *C. A.* **25**, 832.—Artificial resins have a sp. gr. of above 1.22 and n over 160; amber has a sp. gr. of 1.050–1.096 and n 1.55–1.58. Copals have the consts. of amber but they may be distinguished by their appearance, hardness, soly. and S content. Mixts. of varying amts. of copals with amber were extd. by P. with various solvents, but no quant. results could be obtained from their soly. Sharp distinctions, however, were found by polarizing the ether, benzene or alc. exts. of these mixts. in solns. of dioxane or ether at 20° in the 50-mm. or 100-mm. tube, *viz:* amber ext. solns. showed in all cases a reading of +20.5 to +29.1, while the copals (Zanzibar and Congo) showed a strong *l*-rotation; mixts. of amber and copal fell between these extremes and a detn. is therefore made possible by this method. P. ESCHER

Natural resins—synthetic resins. W. NAGEL. *Metallbörse* **20**, 2133–4, 2190–1 (1930).—The properties of rosin, shellac and copal are compared with those of phenol-formaldehyde condensation products and coumarin resins, particularly in respect to the *suitability of elec. insulating materials.* Expts. have shown that the elec. insulating ability of materials prepd. from phenol-formaldehyde resins, such as insulating card boards, falls considerably when a spark once was permitted to take place. This was not observed with materials prepd. from shellac. Conclusion: The decompn. products of phenol formaldehyde resins are conductive, those of shellac indifferent. A slight increase in temp. induces stickiness to films of shellac substitutes, while the elasticity remains practically the same. Films of natural shellac under the same conditions increase in elasticity but do not stick. This is explained by the ability of films of natural shellac to retain considerably more solvent than the substitutes. The mechanisms of the formation of various synthetic resins are briefly discussed. D. THUESEN

The manufacture of synthetic resins. L. V. REDMAN. *Can. Chem. Met.* **15**, 13–5 (1931). Phenol-formaldehyde condensation products are considered principally. Heat hardening condensation products are termed "resinoids" and the permanently fusible type, "Novolaks" (now termed "resins"). Commercially the resinoids are much more important. Seven basic forms of phenolic condensation products are listed and recent developments touched upon. W. H. BOYNTON

Colorimetric method for determining turpentine oil in the atmosphere (KORENMAN) 7. Multivalent metallic salts of half esters of phthalic acid (U. S. pat. 1,779,654) 10. Cellulose products [lacquers] (Fr. pat. 690,215) 23. Rubber composition with linseed oil (U. S. pat. 1,789,062) 30. Purifying waxes, resins and hydrocarbons (Fr. pat. 690,556) 27.

MARGIVAL, F.: **Couleurs et Pigments.** Paris: Gauthier-Villars et Cie. 192 pp. Paper, F. 25.

RIDDELL, GEORGE L.: **A Physico-Chemical Study of Certain Aspects of Lithographic Printing.** London: London School of Printing. 82 pp.

WENZEL, JOHANNES, AND ALVENSLEBEN, KONRAD: **Die Beseitungung der beim Tauch- und Spritzlackieren entstehenden Dämpfe.** 2nd ed., revised. Berlin: J. Springer. 47 pp. M. 3.90.

Paints. WILLY BÖHMER. Fr. 689,438, Feb. 5, 1930. A silicate paint resistant to hydrocarbons, damp, heat and cold contains, *e. g.*, minium 10, litharge 2, glycerol (27 sol. Bé.) 3 and sol. glass (36° Bé.) 9 parts

Paints. I. G. FARBENIND. A.-G. Fr. 691,201, Mar. 5, 1930. Paints resistant to weather are made by choosing the amt. of metallic base in the paint sufficiently high to transform the free fatty acids, the glycerides and the fatty acids finally formed into metallic soaps.

Pigments. I. G. FARBENIND. A.-G. Fr. 689,462, Feb. 5, 1930. Pigments having

a high degree of dispersion are obtained by forming the pigments in a viscous aq. soln. of a cellulose deriv. such as methylcellulose, which is coagulated by heating.

White lead. E. C. WALKER. Brit. 334,751, Oct. 11, 1929. Corroding gases such as CO_2 and vapors of HOAc and water are used for treating Pb buckles passing down a stack inclined at an angle just greater than the angle of rest of the buckles so that the latter roll gradually down the bed. App. and various details are described. Cf. *C. A.* **24**, 252.

Titanium compounds. LUCIEN PELLERAU, MAURICE JACMART and GUENHAIL LE BRIS Fr. 690,348, Feb. 21, 1930. Pure TiO_2 for *pigments* is prepd. by heating a mixt. of ilmenite, Na_2CO_3 and anthracite dust to 800° in a rotating furnace and the product is allowed to fall into water. The product is washed and the soln. carbonated to recover Na_2CO_3. The Fe is removed by dil. H_2SO_4. The powder obtained after filtering and drying is treated at 150-180° with H_2SO_4 to dissolve the TiO_2 and then the temp. is raised to 200-225° so that the H_2SO_4 attacks the coal to produce SO_2, which reduces the Ti to the titanous form, the Fe remaining in the ferrous state. On cooling, the product is taken up with warm water and hydrolyzed. Fr. 690,349 describes the heating of ilmenite with Na_2CO_3 to 700-800°. The product is washed to eliminate sol. salts and to transform the Na titanate to TiO_2.

Apparatus (with grinding cylinders) for grinding pigments. GUSTAV A. VASH U. S. 1,788,964, Jan. 13. Structural features.

Emulsion comprising clay and calcium silicate. ROY CROSS (to Silica Products Co.). U. S. 1,788,706, Jan. 13. An emulsion which may be used in cheap *paint mixts.* comprises a major proportion of gelatinizing clay and a minor proportion of Ca silicate or portland cement in finely divided form adapted to form a gel with water. Oil, asphalt, ZnO, etc., also may be added.

Ink. JOHN H. CLEWELL (to Canadian Industries, Ltd.). Can. 307,397, Jan. 6, 1931. An ink comprises diacetone ale., a nigrosine base and orange shellac. The rate of drying is increased by the addn. of acetone and decreased by the addn. of triacetin. This ink is used for marking motion-picture films and cellulose ester articles.

Quick-drying ink suitable for intaglio printing. E. WINSHIP. Brit. 334,570, Aug. 23, 1929. A homogeneous mixt. is formed from water, gilsonite or the like and petroleum or coal tar distillate, and pigment. Details of manuf. are given. Cf. *C. A.* **25**, 833.

Varnish. MYRON E. DELANEY (to The Bakelite Corp.). Can. 307,653, Jan. 13, 1931. A coating compn. comprises a varnish of the oleoresinous type contg. chlorinated naphthalene and Al powder. Cf. *C. A.* **25**, 833.

Varnish. I. G. FARBENIND. A.-G. Ger. 510,937, April 11, 1929. The oil and fats neutralized by C_2H_4O described in Ger. 504,128 (*C. A.* **24**, 5523) are used for the manuf. of varnishes. Thus, linseed oil neutralized with C_2H_4O is mixed with ZnO, a diluent and a Pb Co drying agent (*e. g.*, naphthenic acid Pb Co). Other examples are given.

Varnish for wires. I. G. FARBENIND. A.-G. Fr. 689,104, Jan. 30, 1930. Wires are covered with a varnish composed of condensation products of dicarboxylic acids and ethers, if necessary in admixt. with other polybasic acids and polyhydric alcs. in the molten or dissolved state, and the varnish is then hardened. Thus, the condensation product obtained from 2 mols. of diglycolic acid, 1 mol. of succinic acid and 2 mols. of glycerol is dissolved in a mixt. of the Et ether of glycol, the Me ether of glycol, MeOH, AcOMe and AcOEt. The varnish is coated on to wires after the addn. of ZnO and cobalt blue. Other examples are given.

Colored polymerized vinyl ester varnishes. I. G. FARBENIND. A.-G. Brit. 331,115, Dec. 3, 1928. Polymerized vinyl ester varnishes such as those of vinyl acetate are colored by adding substances such as 1,4-diamino-2,3-diphenoxyanthraquinone (red), 1,4-di-*p*-toluinoanthraquinone (green), 1-methylamino-4-*p*-toluinoanthraquinone (greenish blue), or 1,4-di-*p*-toluino-8-hydroxyanthraquinone (olive green); substances such as Al or Cu or other metal powders, softening or hardening agents, solvents and various fillers also may be added.

Varnish and lacquers. WILLIAM H. MOSS (to Camille Dreyfus). Can. 307,989, Jan. 20, 1931. A varnish or lacquer contains cellulose acetate, a resin prepd. from phenol and aldehyde in the presence of $SnCl_2$, and a volatile solvent.

Lacquers and similar coating compositions. I. G. FARBENIND. A.-G. Brit. 334,567, May 6, 1929. Coating compns. suitable for application to materials such as wood, natural or imitation leather, brickwork, asbestos, paper or textile fabrics, etc. by brushing, printing, immersion or spraying are prepd. by emulsifying solns. of water-insol. cellulose derivs. such as nitrocellulose, cellulose acetate or various other simple or

mixed cellulose esters or ethers in substantially water-insol. org. solvents, with aq. solns. of water-sol. colloids (other than albumins) such as polymerized vinyl alcs., starch, urea-formaldehyde resins, or Al salts of conversion products of phenol-formaldehyde condensation products with halogenated fatty acids, with various coloring and modifying agents, etc. Numerous details and examples are given.

Colored lacs. Soc. anon. pour l'ind. chim. à Bâle. Swiss 140,719, Dec. 8, 1928. A greenish yellow light-fast lac is obtained by using a dye of the general formula 2-*p*-alkoxyphenylazo-*p*-cresol (OH = 1). In the example, the alkyl group is CH_3 and the dye is used in making up a Japan lacquer.

Apparatus for drying lacquered goods, etc., with a circulating current of hot ozonized air. Luftheizungs- und Abgasverwertungs-G. m. b. H. Ger. 510,791, Jan. 13, 1928. Addn. to 506,121 (*C. A.* **25**, 424).

Drying oil. I. T. Osnos. Russ. 48,948, June 10, 1929. A mixt. of oil and metal oxides which correspond to the following quantities of metals, Pb 2.25–3.50%, Mn 0.75–1.00% and Co 0.25–0.40%, is passed first through a colloid mill and then heated as usual.

Coating composition containing nitrocellulose. Earle C. Pitman (to E. I. du Pont de Nemours & Co.). U. S. 1,788,406, Jan. 13. A soln. of reduced viscosity suitable for use as an enamel or lacquer comprises nitrocellulose of a N content of 10.11.5%, of a stability of 30 min. (German test) and which is completely sol. in 95% EtOH.

Colored glaze. Paul Hofer and Alfred Schmid. Fr. 689,173, Jan. 31, 1930. A colored glaze fast to light is produced from artificial resins free from phenols or their condensation products and halogens even in small quantities, *e. g.*, condensation products of urea or thiourea and CH_2O and a pigment.

Plastic compositions. Bakelite Corp. Fr. 689,015, Jan. 28, 1930. Plastic compns. are composed of a reactive resinoid (*e. g.*, a phenolic resinoid) and a fibrous filling material, which is impregnated with the resinoid.

Resinous condensation products. Howard W. Matheson and Frederick W. Skirrow (to Canadian Electro Products Co., Ltd.). U. S. 1,788,772, Jan. 13. A fusible and sol. condensation product such as may be derived from C_2H_2 and phenol, together with added aldehyde such as paraldehyde, forms a compn. capable of being dild. by solvents or softened by heating to liquid, semi-liquid or plastic condition for casting, molding, surface coating or impregnating other materials, and also capable of being converted by the action of heat and pressure to a hard, infusible condition.

Condensation products of resin and phenol. Arnold Doser and Alfred Thauss (to I. G. Farbenind A.-G.). U. S. 1,788,371, Jan. 13. By heating a mixt. of colophony and PhOH with dil. H_2SO_4 there is obtained a yellowish resin-like product, insol. in water, sol. in aq. alk. solns. and in org. solvents, which is suitable for sulfonation to produce *tanning agents*. U. S. 1,788,372 describes a process by which the condensation product from colophony and PhOH is treated with H_2SO_4 monohydrate to form a yellowish resin like substance, the alkali metal salts of which are sol. in water and suitable for use as *tanning*.

Ester resins. I. G. Farbenind. A.-G. (Gerhard Balle, inventor). Ger. 510,446, June 20, 1928. Addn. to 463,842 (*C. A.* **22**, 4262). Hard resins sol. in hydrocarbons are prepd. by heating phenol-aldehyde resins or phenol alcs. with an excess of resin acid, and esterifying the excess of acid in the product by treatment with C_2H_2, preferably in the presence of a solvent and a catalyst, *e. g.*, $HgSO_4$. Examples are given.

Artificial resins. Bakelite G. m. b. H. Fr. 690,335, Feb. 20, 1930. Resols are united with oils drying in the air by taking condensation products of phenols and aldehydes, which may be hardened, and mixing them with the oils which have been totally or partially oxidized or which contain their products of oxidation, preferably in the presence of a solvent mixt. capable of dissolving both. The solvent is eliminated by distn. in a vacuum.

Molding articles such as butter dishes from synthetic resins. Brookes & Adams, Ltd., and A. E. Brookes. Brit. 334,258, June 1, 1929. Mech. features.

Synthetic resins. Bakelite Corp. Fr. 689,014, Jan. 28, 1930. A coating compn. is composed of a resinous product obtained by the reaction of a mixt. of *p*- and *o*-hydroxydiphenyl with an agent contg. methylene or by the reaction of a phenolic substance contg. 2 or more C_6H_4 rings with an agent contg. methylene and a fatty oil. Examples are given.

Synthetic resins. Bakelite Corp. Fr. 690,457, Feb. 22, 1930. A compn. drying in the air to form a hard coating or film is made by the reaction of a phenolic substance with a fatty oil such as abrasin, adding an agent contg. mobile CH_2 or hexamethylenetetramine in amt. sufficient to obtain a resinoid and producing a fresh reaction until a

more viscous product or jelly is obtained. The product is ground and dispersed or suspended in a solvent, and, if necessary, the reaction is continued until the resinoid has little or no penetrating power when it is applied as a coating on an indicator paper.

Synthetic resins. COMPAGNIE FRANÇAISE POUR L'EXPLOITATION DES PROCÉDÉS THOMSON-HOUSTON. Fr. 36,837, Apr. 24, 1929. Addn. to 616,463. Synthetic resins are prepd. by condensing polyhydric alcs. and polybasic acids in the presence of org. compds. of multivalent metals known under the generic name of soaps. Examples are given of the use of Co linoleate, Al stearate, Fe or Bi lactate, etc.

Synthetic resins. LOUIS NOLET. Fr. 690,588, May 1, 1929. Condensation products of urea and CH_2O are obtained by using oxides, hydroxides or basic salts of heavy metals as catalysts, the medium being previously rendered acid to methyl orange but not to tournesol. This acidity is obtained by the addn. of NH_4 salts or salts of aromatic or aliphatic amines either to the mixt. of urea and CH_2O or to the urea before mixing with the CH_2O.

Synthetic resin compositions. H. HÖNEL. Brit. 334,572, May 8, 1929. Thin or thick oils, or gelatinous or rubber-like materials, suitable for molding or for use in coating, impregnating or binding compns., are obtained by reaction of an ester with a primary condensation product of low mol. wt. obtained by the use of an alk. catalyst from formaldehyde and a phenol in which not more than 2 of the reactive positions *o*-, *o*- and *p*- to the phenolic group or groups are unsubstituted (no solvent or dispersing agent being present during the reaction with the ester). Water is evolved during the reaction Low-mol. crystalloid esters such as those of benzoic acid and univalent alcs. yield thin or viscous oils or gelatinous masses. Esters of the same alcs. with polybasic acids give gelatinous products with less of the phenol-CH_2O compd. More suitable are fusible esters of rather high mol wt. obtained from mixts. of polybasic and monobasic carboxylic acids and a polyhydric alc. such as glycerol or from a polybasic acid, with or without a monobasic acid, and a mixt. of polyhydric and univalent alcs. Some of these are converted into rubber-like products by reaction with a very small proportion of the phenol-CH_2O compd. Glycerides, fats, oils, waxes and esters of phenols with inorg. acids also may be used. A large number of details and examples are given.

27—FATS, FATTY OILS, WAXES AND SOAPS

E. SCHERUBEL

Lipoids—phosphatides—fats. RICHARD ROSENBUSCH. *Chem.-Ztg.* **54**, 965-7 (1930).—Definitions are discussed. It is difficult to draw sharp lines of division between the 3. L. E. GILSON

Determination of total fatty acids. A. K. CHURCH. *Oil and Fat Ind.* **8**, No. 1, 23–5(1931).—See *C. A.* **25**, 426. E. C. K.

Moisture determination in fats and soaps by the distillation method. J. DAVIDSOHN. *Chem.-Ztg.* **54**, 934–5(1930).—Detns. of water in fats and soaps are usually low, even with the recently adopted (in Germany) new app., in which the xylene is refluxed while the water distils over. Apparently the soap retains some of the water and liberates it only after adding a quantity of water-free oleic acid. Similar low results are obtained with butter, but correct values are found when water-free oleic acid is added either at the beginning or during the distn. P. ESCHER

X-ray investigations of oils, fats and lubricants. JEAN J. TRILLAT. *Metallwirtschaft* **9**, 1023–8(1930).—The length of the carbon chain of fatty acids increases linearly with the no. of carbon atoms. By means of the crystal rotation method applied to a drop of liquid, it can be shown that fatty acids are oriented on the surface of water or glass, since the surface of the liquid has a crystal structure while the interior of the liquid does not. The attraction of the acid radical of the fatty acid for the surface of metals accounts for the lubricating qualities of the oil, inasmuch as the COOH group neutralizes to a certain extent the intense electromagnetic field radiated from the metal and thereby reduces friction. MALCOLM DOLE

Complementary applications of the phthaleinoscope. I. Determination of the acidity of oils and fats. II. Titration in colored alkaline media. BRUÈRE. *Ann. fals.* **23**, 532–4(1930); cf. *C. A.* **24**, 3193.—The method has been adapted to the titration of the acidity of oils or fats by using as solvent a 2:1 mixt. of $CHCl_3$ and 95% alc. 15 cc. of the solvent is placed in the cell, the indicators are added, the solvent is brought to neutrality, the oil or fat is added and dissolved and the acidity titrated with 0.1 *N* alc. KOH. The use of iso-PrOH instead of $CHCl_3$-EtOH is being studied, as it would

have the 2-fold advantage of using a single solvent and of permitting the use of an aq. standard alkali. For alkalimetric detns., place a measured vol. of the alk. soln. in the soln., add an excess of standard acid and titrate with standard alkali. A. P.-C.

Action of antioxygens in the oxidation of unsaturated fatty oils. II. Inhibitory effect of diphenylamine, diphenylguanidine and hydroquinone. BUNNOSUKE YAMAGUCHI. *Rept. Aeronautical Research Inst., Tokyo Imp. Univ.* **5**, 287–305(1930); cf. *C. A.* **24**, 4410.—The antioxygenic effects of these compds. on olive oil were studied. Diphenylamine lowers the initial rate of oxidation in a remarkable degree, although it does not inhibit the oxidation as completely as unsym. diphenylhydrazine. The oxidation of the olive oil contg. diphenylamine starts initially with a very small but sensible rate corresponding to the same length of time as the period of incubation for the oil contg. no antioxygen. After the antioxygen has been lost from the oil in the course of oxidation, the reaction then proceeds unimolecularly as for the pure olive oil The value of the velocity coeff. of the unimolecular reaction is slightly smaller than that for pure olive oil. This seems to be due to the effect of a certain weak antioxygen, which may be gradually formed from diphenylamine in the course of oxidation either through its oxidation, through thermal decompn. or through some reaction with certain oxidation products of oil. Hydroquinone acts as a strong inhibitor, prolonging the induction period in a remarkable degree just as unsym. diphenylhydrazine. The length of the period thus prolonged depends upon the added amt. of hydroquinone, and the former increases almost in direct proportion to the latter. After this period the oxidation proceeds as for oil contg. no antioxygen. The antioxygenic power of diphenylguanidine resembles the curve for the oil with diphenylamine. The results of the expts. can be explained by the theory of the mechanism of inhibition developed in a previous paper. On the basis of this theory an equation has been deduced to calc. the form of the velocity curve for the oxidation of oil contg. diphenylamine, and it has been shown that the equation agrees with the results of expts.

E. SCHERUBEL

The fatty oil of the seeds of Couepia grandiflora, Benth., one of the so-called oiticica oils. J. VAN LOON AND A. STEGER. *Chem. Umschau Fette, Oele, Wachse Harze* 37, 337–40(1930).—The name oiticica oil is applied to oil from many species of nuts; the name couflor oil is proposed for the oil from *Couepia grandiflora*, Benth., of Brazil. The av. nut weighs 5.8 g. and the kernel 4.2 g. The kernels grind easily, yielding on extn. with petr. ether 57.7% oil, or 41.3% on the basis of the nuts, and 28.4% hulls and 30.3% extn. residue. The oil is viscous, light yellow, of wood-oil odor and wood-oil properties; it is perfectly clear at 51° but solid constituents sep. on standing at room temp.; d^{15} = 0.9440, acid no. 0 92, sapon. no. 188.3, ester no. 187.4, R.-M. no. 0.56, true I no. 231 (the highest I no. of any known oil), n_D^{21} 1.5184, n_D^{46} 1.5090, n_D^{70} 1.5002, unsaponifiable 0.30–0.41, satd. acids 11.21–11.63%. The high n indicates highly unsatd. acids with conjugated double bonds. The acids have true I no. 243, acid no. 196.7, mean mol. wt. 285.2, m. 70–78°, n_D^{78} 1.4998. The satd. acids have sapon. no. 210, mean mol. wt. 266, m. 56–57.5°, suggesting a ratio of 35% stearic acid to 65% palmitic acid P. ESCHER

New method of preparing soluble oils. T. VOLTZ. *Bull. soc. ind. Mulhouse* **96**, 636–42(1930).—(Based on sealed communication of Charles Sunder.) One hundred g castor oil was esterified by treating for 12 hrs. at 30° with the product of the reaction of 200 g. chlorosulfonic acid and 1.5 l. of pyridine. The *trisulfuric ester of castor oil*, $C_3H_5(OOC\text{-}C_{17}H_{32}OSO_3Na)_3$ (I), was isolated by neutralizing with Na_2CO_3 and distg. *in vacuo* at 40°, and purified by soln. in abs. alc. One hundred g. of (I) was sapond. at the boil for 3 hrs. with a 10% soln. of NaOH; by diln., acidifying with H_2SO_4, and salting-out, $HOOCC_{17}H_{32}OSO_3Na$ (II) was obtained as cryst. needles. By boiling (II) with HCl in alc., neutralizing with Na_2CO_3, evapg. off the alc., and extg. with ether, $C_2H_5COOC_{17}H_{32}OH$ (III) was obtained as a mobile liquid. By sapon. of (III), ricinoleic acid (IV) was prepd. and identified by its Ba salt. As a check, (IV) was esterified with chlorosulfonic acid and pyridine to give (II). Similar esterification of (III) gave $C_2H_5COOC_{17}H_{32}OSO_3Na$. The ester (I) showed indications of desirable properties in *alizarin lakes*. I. H. O.

The "coin test" for oils. New technic. Reaction of various oils and particularly of oils extracted with carbon disulfide. Spontaneous sulfuration of olive oils. R. MARCILE. *Ann. fals.* **23**, 527–30(1930).—The following technic is recommended for the test: In 40 cc. of oil contained in a 60-cc. Erlenmeyer flask place a piece of Ag foil 6 mm. × 12 cm., place in an oven at 115–20°, and observe the immersed portion of the foil after 24 and 48 hrs. Peanut, cottonseed, soy-bean and sunflower seed oils gave a neg. reaction. Colza oil gave a slight pos. reaction, equiv. to that of olive oil contg. 10% of refined CS_2-extd. oil. Extra and superfine olive oils gave a neg. reaction; some burning-grade olive oils gave a more or less marked pos. reaction before, but not after, refining.

Tunisian refined CS_2-extd. olive oils all gave intense reactions, though some of the oils were 10 yrs. old, and could be detected when present to the extent of only 5% in pressed oils. Various French and Spanish unrefined burning-grade oils gave clear pos. reactions, but only about $^1/_4$ as strong as those of the corresponding Tunisian oils. No reaction was obtained with unrefined oils obtained by extn. with trichloroethylene or with petr. ether. When allowed to stand in contact with impure water which may undergo putrefaction, olive oil can form stable compds. with the H_2S produced, and these are not removed by agitation with alk. solns. A. PAPINEAU-COUTURE

Corn-oil preparation and usefulness. G. A. MOORE. *Oil & Fat Ind.* **8**, 15–6(1931) E. H.

Determination of unsaponified oil in soap or fatty acids. E. LESTER SMITH *Analyst* **56**, 9–14(1931).—To test qualitatively, decomp. the fat with dil. HCl, skim off the fat without attempting to dry it, weigh out 1 g., melt it if necessary, and add 60 ml of 65% alc. (by vol.) and 1 ml. of 7.5 *N* NH_4OH. Run a blank with pure fatty acid and compare. A turbidity indicates unsapond. oil. The test can be made quant. by dissolving 0.5 g. of the fatty acid in 20 ml. of 90% alc. and adding 0.5 ml. of NH_4OH. Measure the vol of water necessary to produce incipient turbidity, finally comparing the result with that obtained with standards. If the procedure is carefully followed in the manner described in the paper, 0.05% of unsapond. oil can be detected. W. T. H

Conductometric determination of soap in technical baths. H. C. STUHLMANN AND H. FABER. *Chem. Fabrik* 1930, 531-2.—The method depends on the sharp rise in cond at the moment the soap is all neutralized. J. H. MOORE

Bile as a valuable filler for soap. W. OBST. *Seifensieder-Ztg.* **57**, 853-4(1930). A review of the literature. O considers oxgall a valuable filler for soaps, especially for use on woolen goods, on account of its emulsifying power and its mild action on the fiber P. ESCHER

Laundry experiments. W. KIND. *Seifensieder-Ztg.* **57**, 888-9(1930). K. points out the importance of the hardness of water in washing tests, not only in the soap soln proper but also in the rinsing water; this leads to insol. soaps in both cases. Oxycellu lose detn. and the bleaching-out of methylene blue are unreliable criteria in washing expts. P. ESCHER

Esters (Fr. pat. 689,275) **10.** Apparatus for separating oil and water, etc. (Ger pat 510,087) **1.** Apparatus for filtering oils or other liquids under pressure (Brit. pat 334,663) **1.** Sulfonic acids (Ger. pat. 510,303) **22.**

Einheitliche Untersucungsmethoden für die Fett- und Wachsindustries. Teil 1. 2nd ed. Teil 2. 1st Ed. Stuttgart: Wissenschaftliche Verlags 241 pp. Linen, M 15. Reviewed in *J. Intern. Soc. Leather Trades Chem.* **15**, 51(1931).

Extracting fatty materials. JEAN M. DE GIRVES. Fr. 690,579, May 1, 1929 Fatty materials are extd. from grape residues by the same process as is used for extg. the seeds, with dichloroethylene as solvent.

Bleaching fats, fatty acids and waxes. I. G. FARBENINDUSTRIE. Russ. 17,496, Sept. 13, 1926. Fats, fatty acids and waxes are treated with a mixt. of chlorate and permanganate in an acid soln.

Sulfonated fatty acids. N. V. CHEMISCHE FABRIEK SERVO and MEINDERT D ROZENBROEK. Fr. 688,637, Jan. 21, 1930. Fatty acids of high mol. wt. or their derivs are sulfonated to a high content of combined H_2SO_4 by carrying out the sulfonation in the presence of chlorides of S, $COCl_2$, $SOCl_2$, SO_2Cl_2, BCl_3, H_3BO_3 or its anhydride, or mixed anhydrides of AcOH or its homologs with inorg. acids such as H_3BO_3, H_2SO_4, chromic acid, oxyacids of P, sulfoacetoacetic acid, etc. Examples are given.

Sulfonated oils. SOC. ANON. POUR L'IND. CHIM. À SAINT DENIS. Fr. 690,022, Feb. 15, 1929. Sulfonated oils, which are stable toward lime and magnesian waters and toward acid solns., are prepd. by sulfonating fatty acids or their glycerides in the presence of a catalyst with a large excess of H_2SO_4 at a temp. below 0°. An example is given of the sulfonation of ricinoleic acid.

Apparatus for distilling oils from plants at low pressure. FELIX EYSSERIC and FÉLIX BLANCHARD. Fr. 36,915, May 8, 1929. Addn. to 625,972.

Castor oil. ÉMILE A. ANDRÉ. Fr. 36,877, Oct. 30, 1928. Addn. to 677,360 (*C. A.* **24**, 3124). The process of Fr. 677,360 for obtaining several qualities of castor oil by selective soln. is applied to used castor oil.

Saponifying glycerides and other esters. VAMAN R. KOKATNUR. Ger. 510,427, April 23, 1926. See Brit. 251,290 (*C. A.* **21**, 1367).

Purifying waxes, resins and hydrocarbons. I. G. FARBENIND. A.-G. Fr. 690,536, Feb. 25, 1930. Resins, waxes or hydrocarbons (with the exception of montan wax, carnauba wax and like vegetable waxes and paraffin) are purified by mixing them, preferably in soln., with more than 50% of their wt. of decolorizing powder, such as active C, and extg. with solvents.

Saponaceous cleansing compositions. S. ZIMMERMANN. Brit. 334,177, Oct. 2, 1928. A fat or fatty acid is saponified with less than the stoichiometric quantity of alkali such as NaOH in the presence of PrOH or iso-PrOH; solvents such as benzene, gasoline, terpenes or halogenated hydrocarbon derivs. are added before, during or after saponification. Various details, proportions, etc., are given.

Soap. HENKEL & CIE. G. M. B. H. (Wilhelm Pape, inventor). Ger. 512,428, Nov. 24, 1927. Soap contg. less than 80% of fatty acid is improved by addn of a little $(NH_4)_2S_2O_8$. The $(NH_4)_2S_2O_8$ may be formed *in situ*, *e. g.*, from $(NH_4)_2CO_3$ and $Na_2S_2O_8$. Cf. *C. A.* **24**, 4948.

Solution tank suitable for supplying soap solutions for washing. ROBERT C. MURRAY (to Economics Laboratory, Inc.). U. S. 1,788,404, Jan. 13. Structural features.

Bleaching soap. CHARLES F. SCHUMAKER (to Mathieson Alkali Works). U. S. 1,788,848, Jan. 13. Soap is subjected to a milling operation in admixt. with solns. of NaOCl and formaldehyde.

Detergent compositions. DOUGLAS D. BROOKS. Fr. 689,051, Jan. 29, 1930. See Brit. 326,755 (*C. A.* **24**, 4943).

28—SUGAR, STARCH AND GUMS

J. K. DALE

Mill sanitation and juice deterioration. A critical study of acidity increase, mill sanitation and possible loss during the extraction of the sucrose from the cane. R. H. KING. *Sugar News* **11**, 640-55(1930).—Data obtained by allowing juices to remain for varying periods indicate that the acidity increases rapidly after 2 hrs.' standing, the increase going up to 100% after 16 hrs. The p_H decreases less rapidly. After 68 hrs. acidity increased from 2.2 to 12.70, the p_H decreased from 5.31 to 4.75, glucose increased from 1.21 to 4.61, while the apparent purity dropped from 87.67 to 50.83. The acidity, p_H and drop in apparent purity from mill to mill seems to be related to the quality of the cane and the maceration water applied. Use of hot water at 3-hr. intervals together with periodic removal of accumulations of bagasse and sediment, and the use of deep, sloping juice pans and troughs will reduce mill juice decompn to a min. The use of lime or chemicals is not recommended.

V. G. LAVA

Filtration of cold raw cane juice. C. F. ARMSTRONG. *Intern. Sugar J.* **37**, 576–7 (1930). In studying the adaptability of the metafilter to the Javan sugar industry, some expts. were carried out based on Zerban's work (*C. A.* **14**, 1920) on the clarification of cane juice without chem. treatment. Hyflo-Supercel was employed instead of the ordinary kieselguhr used in the former expts. Cold raw juice was collected from the mill strainer, mixed with 1% Hyflo-Supercel (calcd. on the Brix of the juice) and filtered through a small lab. filter. At low pressure a rapid filtration was obtained, but the filtrate was cloudy and of a light brown color. The cloudy filtrate was then heated to 70°, and sufficient milk of lime added to bring the p_H to 8 and then sufficient SO_2 to bring it back to 6.8. The filtrate was brilliant, clear, of a light yellow color and its purity showed a rise of 2° above the original purity of the raw juice. On account of the clogging of the filter cloths a metafilter of 2 sq. m. was used, and this was first precoated with Hyflo-Supercel, 500 g. per sq. m. of filter. The first filtrate, when treated with CaO and SO_2 as above described, filtered with the rapidity of water, and the amounts of the clarifying agents used amounted to about one-quarter of that ordinarily required in a sulfitation factory. If the pressure of filtration of the cold raw juice rose above 10 lb. per sq. in., the filtrate was clear but filtration practically ceased. It is evident, therefore, that as a result of the peculiar nature of the solids of cold raw juice there is a film formation.

W. L. OWEN

Conductometric formula for determining the ash in both raw and refinery sirups and molasses. LOUIS SATTLER AND F. W. ZERBAN. *Ind. Eng. Chem., Anal. Ed.* **3**, 38-40(1931); cf. *C. A.* **21**, 2394; **24**, 1242, 1243, 4418.—The methods previously de-

scribed required different formulas for raw sugar products, on the one hand, and refinery products on the other. By substituting H_3PO_4 for the HCl formerly specified, it has been possible to devise a method which gives accurate results for both classes of products with one formula. Each 100 ml. of soln. to be used for the measurement of the initial cond. contains 0.5 g. of the product plus 4.5 g. sucrose. If K is the corrected sp. cond. $\times 10^6$ at 20° of this soln., K_2 that of 200 ml. of the original soln. with the further addn. of 5 ml. of 0.25 N KOH and K_3 that of 200 ml. soln. plus 5 ml. N H_3PO_4, the % ash in the sample equals $0.01937\ K - 0.002249\ K_2 - 0.00121\ K_3 + 3.07$. The corrected sp. cond. at 20° of 5 ml of the KOH soln. plus 200 ml. cond. water should be 0.001422, and that for the H_3PO_4 soln. dild. in the same way should be 0.001925. A nomograph is shown from which the % ash may be read off directly. F. W. ZERBAN

Ash and electrical conductivity of refined cane sugars. F. W. ZERBAN AND LOUIS SATTLER. *Ind. Eng. Chem., Anal. Ed.* **3**, 41–3(1931); cf. preceding abstr.—The % ash (sulfated less 10%) in refined cane sugars such as granulated and remelt, contg. less than 0.3% ash, is found by dissolving 25 g. of the sugar in cond. water to a vol. of 100 ml., detg. the sp. cond. of the soln. at 20° and multiplying the result, after correcting for the cond. of the water, by 530. To find the % ash in soft sugars, 5 g. is used in 100 ml. soln., as with raw sugars; the appropriate av. factor which varies from place to place may then be detd. for each refinery, or else the following general method may be employed: Five g. of soft sugar, or if the ash is expected to be above 1%, 2.5 g. soft sugar plus 2.5 g. sucrose, is used for every 100 ml. of soln., and the sp. cond. is measured at 20°. This figure, multiplied by 10^6, is K. A 2nd cond. detn. is made on 200 ml. soln. plus 5 ml. 0.25 N HCl, as previously described for raw sugars; this figure $\times 10^6$ is K_1. The % ash equals $0.001695\ (0.913\ K + 193.5 - 0.1\ K_1)$. If 2.5 g. soft sugar plus 2.5 g. sucrose has been used, the final result must be multiplied by 2. The same method is also applied to remelt sugars contg. from 0.3 to 2% of ash. If the ash is higher, 0.5 g. product plus 4.5 g. sucrose is used, and the result is multiplied by 10, as with sirups and molasses. The article concludes with practical recommendations for equipment and methods to be used in routine work on all types of cane products. F. W. ZERBAN

New scheme for the withdrawal of diffusion juice. M. B. LUISYANSKII. *Zhur. Sakharnoi Prom.* **4**, 298–9(1930).—Design of the scheme with explanation is given. V. E. BAIKOW

Advantageous limits for beet drying. V. P. CHEFRANOV. *Zhur. Sakharnoi Prom.* **4**, 277–81(1930).—A technical and mathematical discussion. V. E. BAIKOW

Thermocontrol of beet dryers. I. I. EGOROV. *Zhur. Sakharnoi Prom.* **4**, 281–8 (1930). V. E. BAIKOW

Efficiency of evaporating stations. G. G. GABERMAN. *Zhur. Sakharnoi Prom.* 4, 288–94(1930). V. E. BAIKOW

Vapor heating at Pioneer. G. W. TOMPKIN. *Repts. Assoc. Hawaiian Sugar Technologists 9th Ann. Meeting*, Oct. 20–3, 1930, 19–20.—The low price of sugar calls for greater economy in the use of steam. At Pioneer, vapor from the 3rd effect is re-used in 2 juice heaters, with a resultant saving of 130 lb. of steam per ton of cane, and of 25% in the amt. of condenser water. F. W. ZERBAN

Slow-boiling massecuites. S. A. WICKEY. *Repts. Assoc. Hawaiian Sugar Technologists 9th Ann. Meeting*, Oct. 20–3, 1930, 5–7.—This difficulty, experienced at Koloa for a no. of yrs., has finally been traced to the overliming of settlings, and has been overcome by liming them to only 8.0 to 8.3 p_H. Blank boilings have been completely eliminated by this means. The lime added to juices from certain fields has also been reduced, with good effect; only sufficient lime is added to assure a sirup of 7.0 p_H. F. W. ZERBAN

Seeding low-grade massecuites. G. F. MURRAY. *Repts. Assoc. Hawaiian Sugar Technologists 9th Ann. Meeting*, Oct. 20–3, 1930, 3.—In factories with limited low-grade pan capacity a seed strike, sufficient for 8 to 16 low-grade strikes, may be boiled as follows: C molasses is drawn into the pan and it is boiled under 24 to 25 in. vacuum to heavy string proof (92–93 Brix). Steam is immediately shut off, the vacuum raised to normal by increasing injection water and 1 lb. of screened, powd. sugar is drawn into the mass. After 10 to 15 min., when the grain is large enough to be seen with a small microscope, the steam is again turned on, and the strike fed with small charges of sirup and molasses, tightening up between charges, until the grain has reached the proper size, after which the strike is finished to 200 cu. ft. on molasses, and struck at about 90 Brix to a receiving tank below. F. W. ZERBAN

Cooling coils in crystallizers. J. E. BIELA. *Repts. Assoc. Hawaiian Sugar Technologists 9th Ann. Meeting*, Oct. 20–3, 1930, 9.—Both the time necessary for graining low grade massecuites, and the purity of the resulting molasses, have been reduced at Kohala

by equipping half of the crystallizers with cooling coils. The water is turned on into the coils 24 hrs. after the strike is dropped, and kept on until 1 day before drying. The massecuites are then dild. to make them ready for drying. F. W. ZERBAN

A study on the incrustations in the evaporation apparatus. PIETRO BALBONI. *Ind. saccarif. ital.* **23**, 259–63(1930).—The evapg. capacity is decreased by 10–15% by incrustations. In the water evapd. at the start of the sugar season and after a month in a 4-unit plant a reduction was noted of 0.8, 1.0, 2 and 2.7%. The crusts at the end of the season were removed from the evapn. tubes after washing with a 1.5% HCl soln. and a 2.5% NaOH soln., but not from the plates. Samples taken from the 2nd unit had much Fe and only traces of Cu; those from the tubes contained much Cu. The last unit had steel tubes, and the 3 others brass; the crusts were more easily detached from the brass than from the Fe. The Cu in the crust was due to mech. detachment and to the solvent action of NH_3. R. SANSONE

Effect of sodium bisulfite upon polarizing power of sugars and the use of sodium bisulfite in sugar analysis. YOSHINORI TOMODA AND TAMIO TAGUCHI. *J. Soc. Chem. Ind., Japan* **33**, Suppl. binding 434–41(1930).—$NaHSO_3$ lowers markedly the polarizing power of glucose, arabinose, galactose and lactose, and slightly that of maltose, but that of mannose, fructose, sucrose, raffinose and dextrin is practically unchanged. The rotation of glucose-bisulfite mixts. has been studied over a wide range of concns., and the results are shown in tables and graphs. At a concn. of 30 g. $NaHSO_3$ in 100 ml. the rotation of glucose becomes practically 0, being —0.5° Ventzke (V) for 10 g. glucose, and +0.8°V. for 25 g. glucose, in 100 ml. at 20° in a 200-mm. tube. The combination of glucose and bisulfite does not strictly follow the mass action law. The effect of $NaHSO_3$ may be used for the analysis of glucose-fructose mixts., such as honey and invert sugar. If x is g. glucose, and y is g. fructose in 100 ml., P the °V. of the mixed soln. at 20° in a 200-mm. tube, and P' that in the presence of 30 g. $NaHSO_3$ in 100 ml., then $x = 0.3225\ (P - P')$, and $y = 0.1859\ (-P')$. The max. error is ±6.5%. Glucose (x), and maltose (y), may be detd., with the same accuracy, in mixts. of the 2, the equations being $x = 0.3225\ (P - 1.2P')$, and $y = 0.1247\ (1.2P')$. The factor 1.2 corrects for the slight effect of $NaHSO_3$ on the rotation of maltose. The method may also be applied to hydrolyzed starch and similar products. F. W. ZERBAN

Apparatus for filtering sugar solutions or other liquids under pressure (Brit. pat. 334,663) **1**. Fertilizers [from sugar manufacture] (Fr. pat. 691,129) **15**. Purifying sugar] solutions (Fr. pat. 690,483) **13**. The storage of activated charcoal (KADLEC) **18**.

Sugar juices. RAYMOND S. DE VILLÈLE. Fr. 689,765, Dec. 27, 1929. Substances in suspension in sugar juices are pptd. by adding $(AcO)_2Pb$. The juice is filtered and submitted to the action of an elec. current, whereby the Pb is carried to the neg. electrode and is deposited there.

Presses for separating sugar juice from raw materials. ÉTABLISSEMENTS MOLLET-FONTAINE. Fr. 690,491, Feb. 24, 1930.

Refining sugar juice. ELEKTRO-OSMOSE A.-G. (GRAF SCHWERIN GES.) (Bruno Böttcher, inventor). Ger. 510,903, June 17, 1926. Sugar juice is placed between diaphragms of a neg. character and subjected to an elec. current. The liquid sepg. around the anode is electrolytically refined juice.

Drying apparatus for sugar-cane residues, especially green bagasse. HENRY W. HOLGATE. Ger. 510,684, Oct. 4, 1928.

Sucrose from impure solutions containing invert sugar. HOLGER DEF. OLIVARIUS (to Calif. Packing Corp.). U. S. 1,788,628, Jan. 13. The impure soln. is concd. to 35° to 65° Brix so as to allow subsequent fermentation of invert sugar to take place without material inversion of sucrose, and the material is then subjected to fermentation by the action of ordinary yeasts.

Carbohydrates. SCHERING-KAHLBAUM A.-G. Fr. 36,743, Mar. 18, 1929. See Ger. 486,801 (*C. A.* **24**, 1539).

29—LEATHER AND GLUE

ALLEN ROGERS

The action of oxygen on tannin. J. JANY. *Collegium* **1930**, 453–60.—Although atm. O can oxidize tannin, the absorption of O by a tan liquor was not increased by addn. of hide powder; therefore atm. O has no influence on the vegetable tanning proc-

ess. Absorption of O by tannin is the result of its phenolic character. Tannin and pyrogallol absorbed O to about the same extent, 6–7% (by wt.) per hr. from a 1% soln. at p_H 12. Below p_H 9 absorption ceased. I. D. CLARKE

Proposed directions for the filter method of quantitative tannin analysis. FRITZ STATHER. *Collegium* 1930, 480–93.—The International method for tannin analysis is not yet perfected. The shake method has been official since 1906, but a filter method has been most used in Germany, although different labs. do not agree as to details. A proposed filter method is given. Data are included showing the influence of small changes in certain details. I. D. CLARKE

Specific gravity, poured gravity and storage weight of solid tanning extracts. WILHELM VOGEL. *Ledertech. Rundschau* 22, 129–31(1930).—The sp. gr. detd. in toluene at 20° of solid quebracho, chestnut, mimosa and mangrove exts. contg. 16–20% H_2O was between 1.40 and 1.55. Powd. exts. had approx. the same sp. gr. as solid exts. except 2 quebracho (1.01–1.07) and 1 hemlock ext. (1.15). Powd. ext. poured into a 100-cc. vessel had an apparent sp. gr. of 0.40–0.77 for loose and 0.60–1.16 for packed powder. The storage space required for ext. in sacks is shown. I. D. CLARKE

Rapid liming for upper leather. V. KEILIN. *Vestnik Kozhevennoi Prom. i Torgovli* (*Vestnik of Leather Ind. and Trade*) 1930, 26–7; *Ledertech. Rundschau* 22, 118–20 (1930).—Pyrolignite of lime liquors, heated to about 31°, dehaired skins in about 4 days or half the usual time. Satisfactory leather was produced from the skins. I. D. CLARKE

Some density data on leather. IRA D. CLARKE. *Ind. Eng. Chem.* 23, 62–7 (1931).—Actual d. and apparent d. of leather strips were measured in tubes by displacement of kerosene; for actual d. while the leather was immersed in kerosene air was removed from the voids by suction. Moisture in the leather affected the results slightly, but no general correction was found. Actual d. was nearly const. regardless of the kind of skin, position in the skin or nature of the tanning and finishing process, all values were between 1.327 and 1.433. Since actual d. is nearly const., apparent d. and percentage voids are closely related, the latter vary widely for different leathers. Dry hide powder had an actual d. of 1.346 and some dry tanning exts. had an actual d. between 1.484 and 1.589. I. D. CLARKE

The fine structure of gelatin micellae. OTTO GERNGROSS, KARL HERRMANN AND WALTER ABITZ. *Biochem. Z.* 228, 409–25(1930); cf. *C. A.* 25, 231.—Gelatin is studied by means of Röntgen rays. S. MORGULIS

Condensation products of resin and phenol [in tanning] (U. S. pat. 1,788,371–2) 26.

MACHON, HUBERT: **Die Bestimmung und Bedeutung der Wasserstoffionenkonzentration (p_H) in der Gerberei.** Freiberg: Selbstverlag d. Vf. 50 pp. M. 2.50

Dehairing skins. E. LENK & F. LIPPNER (FIRM). Fr. 689,858, Feb. 13, 1930. Material for dehairing and cleaning skins is made by growing proteolytic bacteria on nutritive albumin-contg. substances such as meat or finely divided vegetable substances with the addn. of catalysts. The mixt. of bacteria, their digestive products and enzymes are dried by the addn. of indifferent substances.

Removing hair or wool from skins. HILAIRE A. BARE, MARIE J. KERREMANS and HENRI M. J. A. DE COSTER. Fr. 691,196, Mar. 5, 1930. See Belg. 368,267 (*C. A.* 25, 839).

Depilatory paste. INES PAGLIANI and MARIO A. ERCOLINI. Fr. 689,734, Feb. 11, 1930. A depilatory paste contains colophony, virgin wax and chlorophyll.

Tanning. B. P. ALEKSANDROV and A. P. ALEKSANDROV. Russ. 63,527, Feb. 1, 1930. The hide prepd. in the usual way is impregnated with chromic acid salt soln. and subjected to the action of x-rays.

Tanning agents. I. G. FARBENIND. A.-G. (Hermann Schütte, inventor). Ger. 510,445, Aug. 24, 1927. Tanning agents are prepd. by condensing phenol alcohols with resorcinol or its homologs under such mild conditions that water-sol. products are obtained. The condensation may be effected in the presence of a small quantity of acid at a temp. not above 60°. Examples are given. Cf. *C. A.* 24, 1542.

Tanning agents. I. G. FARBENIND. A.-G. (Hermann Schütte, inventor). Ger. 512,405, Apr. 1, 1928. Addn. to 510,445 (preceding abstr.). Tanning agents are prepd. by condensing resorcinol or its homologs under mild conditions with the methylol compds. obtainable by treating an aromatic hydroxycarboxylic acid with CH_2O, or reagents yielding CH_2O, in the presence of a base. Examples are given.

Tanning extracts. S. D. BALAKHOVSKII. Russ. 47,965, May 25, 1929. Phenol is added to water used in the extn. of tannin from bark.

Apparatus for treating solids with liquids particularly for tanning. VICTOR A. COLLINS. Fr. 689,831, Feb. 13, 1930.

Chromium sulfate. WYDLER & L'EPLATTENIER. Swiss 141,035, Jan. 10, 1929. Fe-free $Cr_2(SO_4)_3$ soln. usable directly for *tanning* is obtained by dissolving Cr-Fe ore in H_2SO_4 and sepg. the $FeSO_4$ by crystn.

Imitation leather. O. G. BOHLIN. Brit. 334,361, Aug. 10, 1929. Material with a rubber base and a surface more solid than the underlying material is prepd. by first subjecting the surface to cold vulcanization (as with use of S chloride or "ultra-accelerators") and then hot vulcanizing in the usual manner. Rubber and animal or vegetable fibers may be used as raw materials

Gluing veneer. B. P. ALEKSANDROV and A. P. ALEKSANDROV. Russ. 63,527, Feb. 1, 1930. Chromic acid salts are added to the glue and the finished veneer is exposed to the action of x-rays.

30—RUBBER AND ALLIED SUBSTANCES

C. C. DAVIS

Rubber. Newer theoretical and practical developments. HARRY L. FISHER. *J. Chem. Education* **8**, 7 29(1931).—An illustrated review and discussion dealing with latex, non-rubber components, the rubber hydrocarbon and its purification, chem. derivs. of rubber, the phys. structure of rubber, vulcanization, acceleration, aging and practical developments. C. C. DAVIS

Laboratory methods in a rubber factory. T. W. FAZAKERLEY. *Caoutchouc & gutta-percha* **27**, 15307-8(1930).—A discussion of lab. costs. C. C. DAVIS

Further rubber pigments. F. HARRIS COTTON. *India Rubber J.* **80**, 865–6(1930); cf. *C. A.* **25**, 841. C. C. DAVIS

A method of estimating with methylene blue the adsorption power of commercial carbon blacks. Other properties of blacks. R. DITMAR AND K. H. PREUSSE. *Rubber Ind.* (London) **11**, 416-8(1931).—English version of *C. A.* **25**, 842. C. C. DAVIS

Fillers and their functions. V. Oil substitutes. F. HARRIS COTTON. *India Rubber J.* **80**, 411–3(1930); cf. *C. A.* **25**, 841. C. C. DAVIS

The manufacture of synthetic molding powders. F. A. BATH. *Rev. gén. caoutchouc* **7**, No. 66, 19-21(1930).—A review and discussion of general problems. The pressure used in molding is considered to be the most important factor in manuf. C. C. D.

The plasticizing of rubber. F. JACOBS. *Rev. gén. caoutchouc* **7**, No. 66, 9–14 (1930); cf. *C. A.* **25**, 840.—The discussion includes various French softeners and wood tars and resins. C. C. DAVIS

Behavior of antioxidants in rubber stocks containing copper. PAUL C. JONES AND DAVID CRAIG. *Ind. Eng. Chem.* **23**, 23 6(1931).—The expts. deal with the behavior of antioxidants of various types (paraffin wax, 4,4'-diaminodiphenylmethane, *N,N'*-di-*p*-tolyl 1,2-ethylenediamine, phenyl-α-naphthylamine, phenyl-β-naphthylamine, *N,N'*-diphenyl-*p*-phenylenediamine, *N,N'*-di-β-naphthyl-*p*-phenylenediamine, aldol-α-naphthylamine and tetraphenylhydrazine) in vulcanizates of different compns, each of which was cured with and without Cu stearate. The aging effects were observed by natural storage in darkness, by heating in air at 70° and by heating in O under 300 lb. per sq. in. pressure at 70°. The results show that some of the antioxidants retarded the deterioration caused by the Cu stearate. In this respect the secondary aromatic amines were by far the most effective. In general, however, it is difficult to distinguish clearly the relative effects of different antioxidants on the phys. changes during aging because of differences in the effect of the different antioxidants on the rate of vulcanization. The effects obtained with some of the antioxidants warrant their use in practice where rubber products undergo extensive oxidation as a result of the action of Cu or Cu compds., *e. g.*, when they are in contact with brass. C. C. DAVIS

Mechanical properties of rubber in compression at low temperature. W. D. DOUGLAS. *India Rubber J.* **80**, 899-901(1930).—A study of the stress-strain curves of the compression of cured rubber at 20°, 10°, 0°, —10°, —20°, —30°, —40° and —50°. The *method* and technic are described and the results are recorded graphically. The stress-strain curves include both static and dynamic deflections. C. C. DAVIS

Toxic substances in the rubber industry. XVIII. Hydrogen sulfide. P. A. DAVIS *Rubber Age* (N. Y.) **28**, 405–6(1931); cf. *C. A.* **25**, 843.—H_2S is so toxic

that it should be classed with HCN and CO, and where it is a const. factor the operations should be in a closed system and the H_2S eventually burned. The concn. in the open should be below 0.01 part per 1000. C. C. DAVIS

Rubber in the shoe industry. G. DUMONTHIER. *Rev. gén. caoutchouc* **7**, No. 66, 31–2(1930).—A general discussion with representative formulas. C. C. DAVIS

The manufacture of rubber belts. THOS. FAZAKERLEY. *Rev. gén. caoutchouc* **7**, No. 66, 15–7(1930).—A general description, with representative rubber formulas. C. C. DAVIS

Testing of railway brake and heating hose. ANSELM TALALAY. *India Rubber J* **81**, 21–2(1931).—The specifications of the German State Railways are described and illustrated. C. C. DAVIS

Flax versus cotton in tire fabric construction. H. WALTER GROTE. *Rubber Age* (N. Y.) **28**, 355–6(1931).—A new process for defibration of flax fiber may make linen a substitute for cotton fabric in tires. C. C. DAVIS

Accelerators of vulcanization. F. JACOBS. *Caoutchouc & gutta-percha* **27**, 15258–62 (1930); cf. *C. A.* **25**, 233.—The accelerators include certain amines and guanidines. C. C. DAVIS

Modern accelerators and their capabilities. F. HARRIS COTTON. *India Rubber J.* **80**, 481–2, 605–7(1930). A review and discussion. C. C. DAVIS

Vulcanization accelerators. A survey of the patent literature of the last few years. VI. ALADIN. *Gummi-Ztg.* **45**, 153(1930); cf. *C. A.* **25**, 233.—The tabulated data and information are concluded with a total of 227 accelerators. C. C. DAVIS

The adsorption theory of the combination of sulfur during vulcanization. WOLFGANG OSTWALD. *Gummi-Ztg.* **44**, 1743(1930).—A criticism of certain features of a book by Kindscher (*Handbuch der Kautschukwissenschaft*). C. C. DAVIS

The adsorption theory of the combination of sulfur during vulcanization. HEINRICH LOEWEN. *Gummi-Ztg* **45**, 622(1931).—Comments on a paper by Ostwald (cf. preceding abstr.). C. C. DAVIS

Hot vulcanization. PAUL BREDEMANN. *Gummi-Ztg.* **45**, 502–3(1930); cf. *C. A.* **25**, 843. C. C. DAVIS

Studies of the conditions affecting the vulcanization of rubber. V. The effect of accelerators on the heat of vulcanization. Y. TOYABE. *J. Soc. Chem. Ind., Japan* **33**, Suppl. binding 275–6(1930); cf. *C. A.* **24**, 3397.—The heats of vulcanization of rubber mixts. contg. different proportions of S and 10 different accelerators, resp., were measured by means of a differential thermocouple. The course of the curves was similar to that of the curves with unaccelerated mixts., but the temp. maxima occurred sooner with the accelerated than with the unaccelerated mixts. The expts. show that these accelerators promote the disaggregation of micellar structure of rubber, as shown in the previous expts. (cf. T., Fukunaga and Fukuda, *C. A.* **24**, 4664; T. and Fukunaga *C. A.* **24**, 4664) before the chem. combination of rubber and S. By reducing the size of the individual rubber micelle, they increase the no. of chem. units of rubber entering the reaction with S, *i. e.*, the probability of combination of the two becomes greater. The time at which the temp. maxima appear in the expts., which is shortened by accelerators, shows that this theory holds good if it is considered that the temp. maxima correspond to the disaggregation maxima of the rubber hydrocarbon in question. C. C. D.

Imitation leather (Brit. pat. 334,361) **29.**

BARY, PAUL: **La régénération des caoutchoucs.** Paris: l'Edition technique. 145 pp.

SEIDEN, RUDOLF: **König Kautschuk. Kautschuk in Wissenschaft, Wirtschaft und Technik.** 4th ed. Stuttgart: Dieck & Co. 80 pp. M. 1.80; bound, M. 2.80

Rubber. I. G. FARBENIND. A.-G. Fr. 689,128, Jan. 30, 1929. The aging of natural or artificial rubber is prevented by adding indanphenols which have, *e. g.*, the formula $C_6H_4.CH_2.CH_2.CHR$, in which R is an aromatic group substituted by at least one OH group, and all the groups may contain univalent substituents (cf. *e. g.*, Fr. 636,606).

Rubber. I. G. FARBENIND. A.-G. Fr. 690,043, Feb. 15, 1930. Lampblack is introduced into rubber or the polymerization products prepd. from butadiene hydrocarbons or their derivs., by making a mixt. of lampblack and a liquid product obtained

by incomplete polymerization of a hydrocarbon or hydrocarbon deriv. and incorporating the mixt. with the rubber, etc.

Rubber. I. G. FARBENIND. A.-G. Fr. 690,453, Feb. 22, 1930. Tars obtained from the controlled carbonization of lignites, etc., and deprived of their volatile fractions by distn. are used as fillers for natural or synthetic rubber instead of lampblack. The residue from the distn. may be extd. with acetone or other compds. before use.

Rubber from latex. ALFRED ZANGGER. Fr. 689,424, Feb. 4, 1930. Rubber is extd. from latex of plants growing in the temperate zone and trees other than those called rubber trees by the action of CCl_4.

Rubber deposition by electrophoresis, etc. DUNLOP RUBBER CO., LTD., R. G JAMES and D. F. TWISS. Brit. 334,581, June 6, 1929. In the electrophoretic deposition of materials such as rubber from a dispersion the particles of which normally carry a neg. charge, the H-ion concn. is increased in the presence of formaldehyde to effect reversal of the charge on the particles without causing coagulation; deposition is then effected on the cathode or a porous or semipermeable mold surrounding it. Various details, examples and modifications of procedure are described.

Electrophoretic deposition of rubber. THE ANODE RUBBER CO., LTD. Ger. 512,170, Sept. 5, 1925. This corresponds to Brit. 257,885 (*C. A.* **21**, 3141), but gives specific examples.

Treating rubber. DEUTSCHE HYDRIERWERKE A.-G. Fr. 689,541, Feb. 7, 1930. Ales. of high mol. wt. such as dodecylic or octadecylic ales. are used as accelerators or protectors against aging in the treatment of rubber.

Preserving rubber from aging. ALBERT M. CLIFFORD (to Goodyear Tire & Rubber Co.). U. S. 1,788,860, Jan. 13. Small proportions of substances such as α-amino-β-naphthol or α chloro-β-naphthol (suitably about 1%) are added to rubber compns.

Preserving rubber against aging. WM. D. WOLFE (to Goodyear Tire & Rubber Co.). U. S. 1,788,903, Jan. 13. Amino-*p*-hydroxydiphenyl (suitably about 1%) is used as an antioxidant or age-retarder, and may be prepd. (by a process details of which are given) from *p*-hydroxydiphenyl by nitration and subsequent reduction.

Rubber compositions. JACQUES DELPECH. Fr. 689,445, Feb. 5, 1930. Rubber is made non-slippy by the addn. of powd. leather, cotton, wool, etc.

Rubber composition with linseed oil. EUGENE E. AYRES, JR. (to B. A. S. Co.). U. S. 1,789,062, Jan. 13. An aq. dispersion of rubber is emulsified with linseed oil, heated with agitation, and air is blown through the material. A product is thus obtained which is suitable for waterproofing, elec. insulation, floor covering, paint and varnish manuf., etc.

Coloring rubber. IMPERIAL CHEMICAL INDUSTRIES, LTD., A. J. HAILWOOD, W. J. S NAUNTON, A. STEWART and A. SHEPHERDSON. Brit. 334,688, Aug. 15, 1929. The pigments used for coloring rubber as described in Brit. 304,376 (*C. A.* **23**, 4848) are prepd. by coating the filler with the vat dye by oxidizing an alk. soln. or suspension of the leuco compd. of the vat dye in the presence of the filler (such as $MgCO_3$), the latter being treated (before or after incorporation of the dye) with a soap. The use of soap produces pigments giving brighter shades than those prepd. without soap.

Recovery of rubber. CAOUTCHOUC RÉCUPÉRÉ RÉNO. Fr. 689,904, April 22, 1929. Rubber and textile fibers in used tires, etc., are sepd. and recovered in 2 stages: in the first the waste rubber is soaked and made to swell by oil obtained by the dry distn. of waste rubber, and in the 2nd the textiles and rubber are sepd. by mech. operations. The rubber is preferably regenerated by treatment with NaOH.

Rubber articles. SOCIETÀ ITALIANA PIRELLI and UGO PESTALOZZA. Fr. 36,738, Mar. 7, 1929. Addn. to 651,684 (*C. A.* **23**, 3509). In making rubber articles by local heating according to Fr. 651,684, a di-substituted aromatic compd. of guanidine such as *sym*-diphenylguanidine, *sym*-phenyl-*o*-tolylguanidine or *sym*-di-*o*-tolylguanidine is added to the latex before heating.

Apparatus for "plasticating" rubber (comprising feeding screws and an extrusion nozzle, etc.). W. A. GORDON (to Farrell-Birmingham Co.). Brit. 334,509, April 23, 1929. Structural features.

Covering fabric with rubber. V. D. OTSING. Russ. 34,708, Nov. 1, 1928. The fabric is first impregnated with a sol. Mg salt and then treated with NH_4OH to ppt. MgO on the fabric. The dried fabric is treated with rubber by the usual methods.

Cords for use in vehicle tire manufacture. WALLACE H. PAULL and REGINALD TRUESDALE (to Dunlop Tire and Rubber Corp. of America). U. S. 1,788,439, Jan. 13. Fibrous ramie and artificial silk are used together.

Corrugated rubber tubing covered with twill of similar material. DUNLOP RUBBER

Co., LTD., and F. W. WARREN. Brit. 334,440, Nov. 1, 1929. Various details of manuf. are described.

Paints for rubber tires, shoe soles, etc. W. E. FRITH. Brit. 334,693, Aug. 23, 1929. Celluloid paint mixed with fine sand is applied to provide a non-slipping surface, and to preserve and waterproof the material.

Synthetic rubber. I. G. FARBENIND. A.-G. Brit. 334,184, May 25, 1929; Fr. 688,790, Jan. 24, 1930. A diolefin such as butadiene is polymerized in the presence of alkali or alk. earth metals (such as Na wire or Na dust) and in the presence of a cyclic di-ether such as dioxane or its derivs. to facilitate polymerization (suitably at a temp. of 40–65° in a rotary autoclave). Solvents or diluents such as benzene, gasoline or ether also may be present. Cf. *C. A.* **25**, 845.

Synthetic rubber. I. G. FARBENIND. A.-G. Fr. 689,070, Jan. 29, 1930. Synthetic substances of the nature of rubber are improved by a treatment with org. nitro compds such as $PhNO_2$, $C_6H_4(NO_2)_2$, dinitronaphthalene and $C_6H_3(NO_2)_3$. Several examples are given, the rubber compd. being heated with the nitro compd. in soln. in an org. solvent.

Synthetic rubber. I. G. FARBENIND. A.-G. Fr. 689,404, Feb. 4, 1930. Synthetic rubber, particularly suitable for vehicle tires, is made by polymerizing mixts. of dimethylbutadiene with other butadiene hydrocarbons such as butadiene or isoprene or a mixt. of butadiene and isoprene

Synthetic rubber compositions. I. G FARBENIND. A.-G. Brit. 334,554, June 5, 1929. Finely divided C is added to mixed hydrocarbon-artificial rubber products such as mixts. of polymers of butadiene and of 1,3- or 2,3-dimethylbutadiene, mixts of "heat" butadiene rubber and "emulsion" butadiene rubber or mixts. of butadiene-Na rubber and isoprene "emulsion" rubber.

Rubber-like mass. GOSUDARSTVENNOYE VSESOYUZNOYE OB'EDINENIE BUMAZHNOI PROMUISGLENNOSTI. Russ. 11,305, Oct. 11, 1926. Fungi belonging to the types Polyporaceae or Agaricaceae are dried, disintegrated to a fine powder, and agitated with turpentine, acetone, ether and similar org solvents until a uniform consistency is reached. The mass is passed through rollers or other app. used in the rubber and paper industries and then formed into the desired shape

Artificial materials. I. G. FARBENIND A.-G. Fr. 690,484, Feb. 24, 1930. Artificial materials of all sorts are made from derivs. of polymerization products not distillable without decompn of butadiene hydrocarbons. The derivs. are prepd. by introducing by addn. or substitution, elements or uni- or multi-valent groups. Thus, when butadiene hydrocarbons are polymerized with Na, the Na may be replaced by COOH by treatment with CO_2. Examples are given.

Artificial materials. I. G. FARBENIND. A.-G. Fr. 691,357, Nov. 21, 1929. Artificial materials are made by heat treatment of the polymerization products of butadiene hydrocarbons in a finely divided state, and in a form capable of being hardened. Other substances capable of being hardened may be added.

Rubber vulcanization accelerator. HOWARD W. MATHESON (to Canadian Electro Products Co.). U. S. 1,788,773, Jan. 13. An accelerator is produced by condensing acetaldehyde and the fractions b. 200–275° from the distn. of a product resulting from the passage of C_2H_2 into aniline at a temp. of 60–120° in the presence of a catalyst such as Cu_2Cl_2. Cf. *C. A.* **24**, 752.

Composition for use as an accelerator in the vulcanization of rubber. CLAYTON O. NORTH (to Rubber Service Laboratories Co.). U. S. 1,787,258, Dec. 30. A product is formed by combining the reaction product of substantially 3 mol. proportions of butyl aldehyde and 1 mol. proportion of aniline, the reaction product of substantially 3 mol proportions of AcH and substantially 2 mol. proportions of aniline, creosote oil and pine oil. Cf. *C. A.* **25**, 618

Vulcanizing agent for rubber. HENRY C. L. DUNKER. Ger. 510,837. Mar. 20, 1928. Se is used as the vulcanizing agent in the manuf. of rubber shoes.

Apparatus for vulcanizing rubber tires. J. FERGUSON & SONS, LTD., and A. S WELCH. Brit. 334,601, June 7, 1929. Structural features.

Vulcanizing rubber tires, etc. INDUSTRIAL PROCESS CORP. Brit. 334,695, Nov. 26, 1928. In a process for vulcanizing products such as tires in which mixed gases are employed as the heating medium in a gas bag (as described in Brit. 205,577 (*C. A.* **23**, 4756)), the gas bag is brought to a desired temp. before each operation, to ensure uniformity of treatment. Cf. *C. A.* **24**, 4426.

CHEMICAL ABSTRACTS

Vol. 25. MARCH 20, 1931 No. 6

1—APPARATUS AND PLANT EQUIPMENT

W. L. BADGER

A molecular velocity filter. JOHN A. ELDRIDGE. *Proc. Iowa Acad. Sci.* **36**, 307 (1929).—A method has previously been described by which the velocity of mols. could be measured. A qual. combination of Maxwell's distribution law was obtained. A filter is being constructed which will have much greater resolving power and also greater sensitivity. W. G. GAESSLER

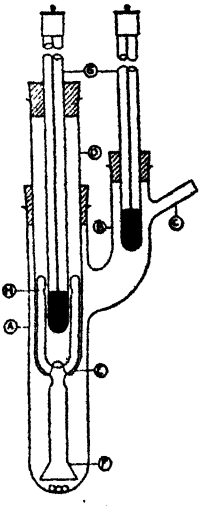
Apparatus for hot filtration of saturated solutions. S. H. BERTRAM AND W. A. VAN MEURS. *Chem. Weekblad* **27**, 7–8(1930).—A simple app. for filtering satd. solns. in volatile solvents, in which the filter is heated by means of the vapor of the solvent, is described. B. C. A.

Theoretical research concerning the settling of dust from streaming air and its application to the theory of the dust filter. FRITZ ALBRECHT. *Physik. Z.* **32**, 48–56 (1931). W. E. VAUGHAN

Filtrations. C. A. GUIDINI. *Schweiz. Apoth. Ztg.* **68**, 283–4(1930).—For effective filtering, *Seitz filters*, in which finely divided and purified fibrous asbestos is used, are recommended. S. WALDBOTT

An adjustable drop-control for burets. FRANKLIN HOLLANDER. *Science* **73**, 45–6 (1931).—A clamp on the sleeve of the stopcock carries an adjustable pin. A rod, set to strike the pin when the flow just begins, is attached to the handle of the plug, and by adjusting the pin the rate of flow is regulated. J. H. MOORE

Molecular-weight apparatus for the boiling-point method. EDWARD M. HOSHALL. *J. Chem. Education* **8**, 353–4(1931).—In the Pyrex assembly (see diagram) a modified Cottrell pump, *F*, discharges the boiling soln. over the bulb of one Beckman thermometer, *G*. The other thermometer, in *B*, indicates the temp. of pure solvent. *F* should be short for a low-boiling system. B. A. SOULE



A new micro melting-point apparatus. LUDWIG KOFLER AND HANS HILBCK. *Mikrochemie* **3**, 38–44(1931).—The instrument furnished by C. Reichert of Vienna gave fairly good results at low temps., but erroneous readings were obtained when the m. p. was above 150°. After considerable experimentation a new instrument was prepd., for the prepn. of which detailed directions are given. Results with various org. substances show that the new, electrically heated instrument will give results within 1° when the m. p. is below 200° and within 2° when the m. p. lies between 200° and 300°. The m. p. is observed under the microscope with magnification up to 135 diams. W. T. H.

New microbalance. JULIUS DONAU. *Mikrochemie* **3**, 1–14 (1931).—A balance is described which overcomes most of the difficulties encountered with the Nernst microbalance. Directions for making, setting up and adjusting the balance are given, and a series of weighings shows that the results obtained are comparable in accuracy with those obtained with an ordinary balance and much larger quantities of material. The original paper must be consulted for details. W. T. H.

The polarimeter H.P.2 of the firm of Dr. Steeg & Reuter, Bad Homburg. K. SEILER. *Schweiz. Apoth. Ztg.* **68**, 493–5(1930); cf. *C. A.* **24**, 4667.—A 10-cm., an 18.94-cm. or a 20-cm. tube and white or Na light may be used in the app. For white light, the easily measurable concns. of dextrose solns. are between 5 and 10% by vol., although S. in using the 18.94-cm. tube and white light was able to det. 25% of dextrose to within 0.350%, 15 to 0.15%, etc. The deviations were about equal to those observed with other app. Detns. in Na light, however, gave excellent results for

dextrose contents of 1, 5, 10, 15, 25 and 50%, the abs. max. deviation being only 0.035%. The instrument (No. 1739) fully conforms to the requirements of urine analysis and of detns. demanded by the forthcoming Pharm. Helv. V. S. WALDBOTT

The Zeiss circular polarimeter. K. SEILER. *Schweiz. Apoth. Ztg.* **68**, 629–31 (1930); cf. preceding abstr.—The advantages of this app. are: The stand supports the (horizontal) polarimeter tube at its end; opposite to it, also attached to the stand at a definite distance, is the lighting device for white (a 15-Watt Osram lamp) or Na light. For the latter, a flat Bunsen flame touches a square salt plate, producing a uniform and lasting yellow light. By means of magnifying glasses laterally attached to the eye piece, the vernier may be read to an exactness of 0.05°. The 3-sectioned field of vision (cf. *C. A.* **24**, 4667) is very clear, permitting exact observation of color changes. With this app. only 5 to 10% of dextrose may be detd. in white light, but these results, also those with 1–50% of dextrose detd. in Na light, are very exact. S. WALDBOTT

Improved apparatus for growth of metal crystals. A. G. HOYEM. *Proc. Iowa Acad. Sci.* **36**, 301(1929); cf. *C. A.* **23**, 2862.—The availability of a small quantity of exceedingly pure Zn has made it necessary to design app. of such a nature that a series of crystals may be grown with predetd. orientations, distributed at intervals of several degrees from 0° to 90°, and without oxidation or waste of the material. W. G. G

A new simplified apparatus for exact gas analysis of gas mixtures of 3–4 cc. or more. ALBERT SCHMIDT. *Gas u. Wasserfach* **73**, 1137–44(1930).—The Reichanstalt has developed a new const.-vol. gas-analysis app., the change in pressure due to absorption of gas constituents being read on a manometer. The absorption pipet is of simple construction and is also used as the slow combustion pipet (Pt wire). The smallest usable quantities of absorbents are introduced into the absorption pipet during the analysis, the effect of gas soly. in large vols. of absorbent being thus avoided. A sep. pipet is provided for fuming H_2SO_4. When using 3–5 cc. gas, the errors in measurement are ±0.05%, and with 30–80 cc. gas ±0.01%. Methods of procedure for typical gases and calcn. of results are given. Changes in temp. or pressure may be reduced to negligible amts. but may be compensated for in calcns. Const.-volume gas measurements are more accurate than const.-pressure measurements. R. W. RYAN

Heat conductivity instruments for gas analysis. C. A. ROBAK. *Tek. Ukeblad* 76, 249–51(1929).—A review. C. A. ROBAK

New analytical balance with air-damping and milligram projection. LUDWIG KÖHLER. *Chem.-Ztg.* **54**, 977(1930).—Ströhlein and Co.'s rapid balance "Rekord" is described. J. H. MOORE

A new apparatus for rapid determinations of nitrogen in series by the Kjeldahl method. K. SCHARRER. *Tierernährung* **2**, 376–80(1930).—A description and illustration of a macro app. for N detn. in *forage* analogous to the micro method of Pregl. Results are excellent, and a no. of analyses in series can be run in a very short time and with a saving of material. J. C. JURRJENS

New electrode vessels for rapid p_H determinations. W. KORDATZKI. *Chem. Fabrik* 1931, 25–7.—Descriptions, with 7 cuts, of app. for measurements with the Pt-H_2 and Pt-quinhydrone electrodes against the satd. KCl-Hg_2Cl_2 electrode. A porous diaphragm seps. the electrolytes. Results are tabulated. J. H. MOORE

Simple apparatus for fluorescence microscopy and for fluorescence photomicrography. P. METZNER. *Mikrochemie* **3**, 72–91(1931).—A simple arrangement is shown suitable for the study of fluorescence under the microscope with reflected light; a parabolic mirror is used for the illumination. The arrangement is suitable, particularly when a quartz lamp is used as source of light, for taking photographs of fluorescent bodies placed under the microscope. The technic for carrying out the work is described in detail, and the method is illustrated with 18 pictures obtained by the described procedure. A bibliography is appended. W. T. H

Ionometer system of P. V. Golovin. P. V. GOLOVIN AND T. N. PATER. *Zhurnal Sakharnoi Prom.* **4**, 274–7(1930).—A newly invented potentiometer is described by which p_H detns. can be made without any calcns. V. E. B.

Bisulfate fusion. S. R. SCHOLES. *Glass Ind.* **11**, 237(1930).—A small Erlenmeyer flask of Pyrex glass is more satisfactory than a Pt crucible for $NaHSO_4$ or $KHSO_4$ fusions, since it is sufficiently refractory and more resistant to corrosion, and the operations of soln. and transfer are avoided or simplified. H. F. K.

Colloid mills. AUGUST CHWALA. *Kolloid-Z.* **54**, 117–23(1931).—A review of German patents. A. FLEISCHER

High-speed dispersion machines. A contribution to [the history of] their development and mode of operation. H. GROHN. *Chem. Fabrik* **1931**, 1–4, 13–5, 27–8; cf.

C. A. **24,** 5186.—After a review of the older theories those based on recent investigations are discussed, such as: the disadvantages of the excentric placing of the beaters in the housing, the significance of the relative speed of the beaters and the material over the beater-plates, and the advantages of more beater-plates. The advantages of the Vacuumtrockner (successor to E. Passburg Co.) mill over the Plauson and the Oderberger mills are summarized. J. H. MOORE

Apparatus for measuring the surface tension of liquids. MARCEL CHOPIN. *Compt. rend.* **191,** 1293–5(1930).—The app. described (with 1 cut) depends on the adhesion between the surfaces of 2 cylinders moistened with the liquid. With a cylinder 40 cm. diam. a detn. can be made with 0.3 cc. of liquid; with 120 cm. diam. fair results can be obtained with 0.15 cc. liquid. J. H. MOORE

A new fire-damp detector. ROMAN MOGILNICKIJ. *Montan. Rundschau* **23,** 10–4 (1931).—A detailed description is given of a portable app. with which CH_4 up to 5% can be detd. accurately in about 90 sec. by passing over a hot Pt spiral and reading the change in height of a water column. J. H. MOORE

Note on a simple one-piece electrodialysis apparatus. L. REINER. *J. Phys. Chem.* **35,** 423–4(1931).—The app. described by R. (*C. A.* **21,** 2588) has been improved by fusing in 2 Jena-glass filter plates as supports for the collodion membranes. J. H. MOORE

Low-vacuum pressure-control apparatus. L. A. RICHARDS. *Rev. Sci. Instruments* **2,** 49–52(1931).—The app. is easily constructed and gives dependable and accurate pressure regulation down to a few mm. Hg. With only 1 pump the pressure may be controlled in any no. of tanks independently. J. H. MOORE

Unfired pressure vessels. W. SPRAGEN. *Ind. Eng. Chem.* **23,** 220–6(1931).—A general discussion of the design of unfired pressure vessels to be fabricated by fusion welding with brief notes on material, methods of welding, inspection, testing and application of the Kinzel-Miller formula for safe working stress. A. W. HOLMES

Purification of mercury. ERLING BOTOLFSEN. *Teknisk Ukeblad* **76,** 314–5 (1929). A continuous *lab. app.* is described with illustration. C. A. ROBAK

An experimental study of the absolute temperature scale. I. The construction of several types of platinum resistance thermometers. JAMES A. BEATTIE, DAVID D. JACOBUS AND JOHN M. GAINES, JR. *Proc. Am. Acad. Arts Sci.* **66,** 167–84(1930).—The authors have described in min. detail and illustrated by diagrams and photographs from the construction of templets for drilling and notching the mica to the assembly of the parts, the construction of 25 ohm Pt resistance thermometers (using 175 cm. of 0.1 mm. wire for each) of the mica cross, calorimetric and strain-free types. A commutator for connecting any no. of potential-type terminal thermometers to a Mueller bridge (cf. *C. A.* **11,** 1) is also described. E. R. SCHIERZ

Electric furnace for micro-elementary analysis by the method of F. Pregl. BONIFAZ FLASCHENTRÄGER. *Mikrochemie* **3,** 15–9(1931).—The combustion furnace described by P. in 1928 has been simplified; it can be obtained from W. C. Heraus in Hanau, a. M. W. T. H.

Packing for autoclaves, etc. (Ger. pat. 511,761) **18.** Graphical treatment of the thermodynamics of the rectifying column (KEESOM) **2.**

Official Directory of the British Chemical Plant Manufacturers' Association, 1931. London: The British Chemical Plant Manufacturers' Assoc. 152 pp.

Air filter. CHESTER P. HEGAN (to American Air Filter Co.). U. S. 1,789,931, Jan. 20.

Gas filter (plate type). AMERICAN AIR FILTER CO., INC. Ger. 514,011, Nov. 23, 1927. See Brit. 288,992 (*C. A.* **23,** 550).

Rotating drum filter. EDWARD W. WOLFE-KEENE. Fr. 691,595, Mar. 8, 1930. Constructional features are described.

Suction-cell rotary filter. MASCHINENFABRIK BUCKAU R. WOLF A.-G. Ger. 511,944, May 9, 1928.

Filtering apparatus using paper pulp. SOC. DES ÉTABLISSEMENTS DAUBRON. Fr. 692,438, June 17, 1929.

Filter (with a ribbon-like filtering element) suitable for filtering engine oil. SUMNER WILTSE. U. S. 1,790,036, Jan. 27. Structural features.

Filter-press (with an inspection chamber through which the filtered liquid passes). ALLIANCE ARTIFICIAL SILK, LTD., W. H. YATES and J. A. BLACK. Brit. 335,191, June 13, 1929.

Apparatus for screening and filtering materials such as sewage or pulp mill or canning factory effluents. CHARLES T. CABRERA (to Electro Dialyzer Corp.). U. S. 1,789,425, Jan. 20. Structural features.

Cleaning device for filters with granular filtering material. THE CYCLE CO. Ger. 509,932, Mar. 27, 1925. Details are given.

Apparatus for separating oil, etc., and water. KOM.-GES. ROSENTHAL & CO. Ger. 511,367, Feb. 6, 1929.

Cooling and dust-separating apparatus for hot gases. A. HOLTER. Norw. 45,518, Sept. 3, 1928. The gases are introduced in tangential, and let out in axial direction in a drum, the walls of which are sprayed with water.

Settling device for separating dust from gases. EMIL WURMBACH and PAUL WURMBACH. Ger. 513,289, Feb. 20, 1929.

Settling apparatus for separating dust from gases. DEUTSCHE ERDÖL-A.-G. Ger. 497,315, Dec. 24, 1925.

Optical apparatus for estimating dust in gases. "DELBAG" DEUTSCHE LUFTFILTER-BAUGES M. B. H. Ger. 514,208, July 12, 1928.

Centrifugal gas cleaner. MORITZ VOIT. Ger. 514,169, Feb. 22, 1928.

Emulsifying centrifuge. RAMESOHL & SCHMIDT A.-G. Ger. 514,170, May 4, 1929.

Centrifugal apparatus for dewatering finely granular materials. LUDWIG ALIPETER. Ger. 511,300, Aug. 20, 1927

Centrifugal pump for pulpy masses. KRISTOFFER MÖRCH. Norw. 45,603, Sept 24, 1928. Air accumulating in the pump is let out through a channel through the propulsive shaft.

Machine for the forming of soft soap and other materials of a similar consistency into pieces of fixed weight and shape. BIRGER JAEGER. Norw. 47,052, Oct. 14, 1929

Laboratory distilling column. SOC. DES PRODUITS CHIM. DE CLAMECY and ERNEST CHARLES. Fr. 691,521, May 30, 1929. A laboratory distg. column consists of a glass tube in which rings are piled one above the other and between the rings bubbling plates are placed. The vapors are condensed by an ordinary condenser and part of the condensate may be returned to the column.

Baffle plate column suitable for distilling or scrubbing operations, etc. CLAUDE B SCHNEIBLE (to C. B. Schneible, K. F. Schrier and B. B. Schneider, trustees). U. S 1,790,596, Jan. 27.

Weighing dish. N. GERBER'S CO. M. B. H. Ger. 513,318, Aug. 12, 1927. The dish is made of glass and has an attached shank which is ground until the wt. of the dish is that of a given tare. The dish is intended particularly for a series of butyrometric detns. of fat in cream, etc.

High-frequency crucible. HERAEUS VACUUMSCHMELZE A.-G. Ger. 512,819, Aug 9, 1927. Details of construction without using Fe are described.

Electric recording calorimeter. HEINRICH BRINKMANN. Ger. 513,151, Feb. 19, 1926.

Liquids for hydraulic apparatus. I. G. FARBENIND. A.-G. Ger. 513,482, Nov. 15, 1928. Glycols or polyglycols or their ethers or mixts. of these, with or without water and (or) polyalcs., are used with the addn. of a wetting agent, *e. g.*, Turkey-red oil or an alkylaryl sulfonate.

Nephelometer. ERNST LEITZ G. M B. H. Ger. 513,490, June 9, 1929.

Viscometer. ERWIN MADELUNG. Ger. 513,493, Aug. 29, 1929. The detn is based on the speed of rise or fall of a test piece enclosed in a small horizontal tube contg the liquid, means being provided for inclining the tube to a predetd. extent. The tube is rotated, to keep the test piece away from the wall.

Thermometer. O. T. CLORIUS Brit. 335,410, Oct. 22, 1928. Structural features

Means for controlling high temperatures, particularly for annealing. AUGUSTE KURPJUHN. Fr. 690,825, Feb. 28, 1930.

Throttling steam-calorimeter. ERWIN H. HAMILTON. U. S. 1,789,705, Jan 20

Centrifugal steam purifying device. CHARLES G. HAWLEY (to Centrifix Corp.). U. S. 1,790,305, Jan. 27. Structural features are given of a device suitable for sepn of liquid and solid particles.

Spray apparatus for cooling salt solutions. PAUL H. MÜLLER. Ger. 511,115, Jan. 24, 1926. Spray nozzles of rubber or other elastic, heat-insulating material are used

Apparatus for obtaining large crystals by cooling salt solution under vacuum. SOC. ANON. DES ATELIERS DE CONSTRUCTIONS MÉCANIQUES ESCHER WYSS & CIE. Fr. 691,794, Mar. 12, 1930.

Apparatus for indicating the condition of a vapor. SCHÄFFER & BUDENBERG G. M.

B. H. Ger. 513,063, May 9, 1929. The app. includes a manometer and a thermometer connected to a common indicator.

Apparatus for cutting glass tubing into lengths by the action of a flame. JOHNSEN & JÖRGENSEN FLINT GLASS, LTD. and E. ASHFORD. Brit. 335,249, June 20, 1929. Various structural details are described.

Hydraulic machine for testing tensile strength, bending and compression resistance of materials. A. J. AMSLER. Brit. 335,253, June 21, 1929. Structural features.

Electric discharge lamp. N.-V. PHILIPS' GLOEILAMPENFABRIEKEN. Brit. 334,998, July 15, 1929. Various details are described of a device with a gas-filled column, suitable for use with a. c. of 3 or more phases and which may have 3 anodes of Mo or graphite mounted in sep. chambers leading to a common channel in which may be mounted an electron-emitting electrode such as W or an alloy of Th with W or Mo or a Wehnelt cathode.

Electrode for discharge tubes. FRED HOTCHNER. U. S. 1,789,901, Jan. 20. Structural features.

Cathodes for discharge tubes. VEREINIGTE GLÜHLAMPEN UND ELECTRIZITÄTS A.-G. Austrian 119,779, July 15, 1929. In the manuf. of cathodes comprising a core wire coated with an alk. earth oxide, the core is first coated with an oxide, sulfide, or halide of a difficultly fusible metal, *e. g.*, Mo or W, not alloyable with the alk. earth metal. This may be done by treating the core with a soln. of NH_4 tungstate, thiotungstate, molybdate, etc., and then heating. The coated core is then treated with the vapor of an alk. earth metal, which reacts with the coating, and the product is finally heated to a high temp. Cf. *C. A.* **24**, 2645.

Glowing-cathode Röntgen-ray tube. C. H. F. MÜLLER A.-G. (Wilhelm Daumann, inventor) Ger. 511,565, May 31, 1925.

Device for determining the strength of Röntgen rays. C. H. F. MÜLLER A.-G. Ger. 512,652, Feb. 27, 1930.

Gas washer. THE BARTLETT HAYWARD CO. Ger. 512,826, Dec. 6, 1928.

Centrifugal apparatus for washing and cleaning gases. FIRMA EDUARD THEISEN. Ger. 513,288, Aug. 8, 1929.

Rotating mechanical washer for reaction gases. I. G. FARBENIND. A.-G. (Karl-Heinz Gebhardt, inventor). Ger. 507,790, July 13, 1927.

Apparatus for gas purification. HENRY HAEGLER. Ger. 511,984, Feb. 22, 1925. A tube filter for removing dust, etc., is described.

Apparatus for catalytic gas reactions. COMPAGNIE INTERNATIONALE POUR LA FABRICATION DES ESSENCES ET PÉTROLES. Fr. 692,080, May 27, 1929. Reaction chambers and purification chambers for catalytic gas reactions are joined together in such a way that the chambers fulfil the part alternatively of a reaction chamber, of a purification chamber in a period of activity and then of a purification chamber in a period of regeneration.

Apparatus for catalytic gas reactions. HOLZVERKOHLUNGS-INDUSTRIE A.-G. Brit. 333,111, Nov. 28, 1928. Various details are described of an app. with narrow catalyst chambers having parallel walls and which may be connected in series, parallel, or series parallel, in any suitable order. Cf. *C. A.* **24**, 4562.

Apparatus for measuring the ion content of an ionized gas stream. INSTITUT FÜR PHYSIKALISCHE GRUNDLAGEN DER MEDIZIN. Ger. 513,134, Mar. 8, 1928.

Device for estimating the combustible gas in gas mixtures. SIEMENS & HALSKE A.-G. (Heinz Gruss, inventor). Ger. 508,826, Dec. 11, 1926. The gas mixt. is burned by catalyzers under elec. heating. The method is specially applicable to flue gases.

Gas-pressure regulator. ALLGEMEINE VERGASUNGS-GES. M. B. H. Ger. 511,312, Mar. 28, 1930. Addn. to 272,920 and 456,564.

Manometer for gas analysis apparatus, etc. CHARLES B. FRANCIS. U. S. 1,790,044, Jan. 27.

Apparatus for removing oil and water vapor from gases such as air by condensation. CLYDE C. FARMER (to Westinghouse Air Brake Co.). U. S. 1,790,205, Jan. 27. An automatic regulator is provided for varying the temp. of the app. to melt congealed condensate in accord with accumulation of the latter. Various structural features are described.

Apparatus for effecting reactions between gases and solids. SULPHUR & SMELTING CORP. Fr. 690,667, Feb. 25, 1930. An app. for carrying out reactions such as the chlorination of Fe ores consists of a vessel contg. pebbles, relatively displaceable, between which the solid is fed.

Valve for pipe conduits for gases or liquids. EINAR KINDEM and A. WATZINGER.

Norw. 45,489, Aug. 20, 1928. The working body consists of a wire spiral, the threads of which lie close to each other in the tight position of the valve.

Device for saturating liquids with gases e. g., water with carbon dioxide. MAX GUGGENBÜHL. Ger. 512,628, July 3, 1927.

Apparatus for saturating liquids with gases, particularly for making beverages. MAX GUGGENBÜHL. Ger. 513,265, July 3, 1927.

Apparatus for mixing liquids. ROBINSON BROTHERS, LTD., and WM. BUTLER & CO. Ger. 511,642, July 16, 1929. The app., especially for mixing bituminous and oily liquids, is described.

Apparatus for continuously mixing or emulsifying liquids. PAUL L. A. THIBERGE Ger. 513,023, May 28, 1929 See Brit. 312,649 (*C. A.* **24**, 758).

Rotary-vane apparatus for mixing liquids with soluble substances. MASCHINENFABRIK-AUGSBURG-NÜRNBERG A.-G. Ger. 513,360, Feb. 21, 1930.

Device for the analysis of volatile liquids. SOC. ANON. DES CHARBONS ACTIFS ET PROCÉDÉS EDOUARD URBAIN. Ger. 509,849, May 18, 1929. The absorption spectra of the vapor produced by elec. heating are studied.

Device for determining the viscosity of liquids. JENÖ TAUSZ. Ger 512,835, July 14, 1928.

Apparatus for drying atomized liquids by hot gases. A.-G. NIRO. Ger. 512,795, July 18, 1926.

Instrument for measuring the turbidity, color, etc., of liquids. WM. G. EXTON Ger. 513,489, Jan. 27, 1929. See Brit. 328,556 (*C. A.* **24**, 5187).

Furnace. WILHELM SCHUH and HERMANN CUNZ. Ger. 511,661, Mar. 22, 1928 Details are given of a stepped grate for the direct introduction of air to the fuel distn gas for complete combustion.

Furnaces. L. and C. STEINMÜLLER. Ger. 511,566, Feb. 21, 1928. The furnace has an inclined hearth and an arrangement for charging the fore-hearth.

Industrial furnaces. ALFRED MUSSO. Fr. 690,925, Feb. 19, 1930. An industrial furnace, simple or in floors or multiple compartments, is described for carrying out chem reactions; it comprises a retort, means for creating a reduced pressure in the retort for the introduction of gases and, preferably, stirring means.

Heating industrial furnaces. THEODOR WUPPERMANN. Ger. 514,017, May 9, 1928. A grate on which fuel is partly burnt and partly gasified is provided, together with a sep. coal-dust burner. The secondary air for burning the fuel gasification products is supplied through the coal-dust burner.

Furnace for pulverized coal. ALLGEMEINE ELEKTRIZITÄTS-GES. (Friedrich Reinhardt and Theodor Schröder, inventors). Ger. 512,948, Dec. 17, 1926. The furnace has multiple air-blast nozzles in the fire-chamber cover.

Burners for powdered fuel. PERCY W. GRIFFIN. Fr. 692,340, Mar. 20, 1930

Coal-dust furnace plant. GEWERKSCHAFT DES BRAUNKOHLEN-BERGWERKS "JEAN PAUL." Ger. 512,868, Dec. 22, 1927.

Burner device for coal-dust furnace plant. STUG KOHLENSTAUBFEUERUNG PATENTVERWERTUNG. G. M. B. H. Ger. 511,829, Mar. 23, 1929.

Muffle furnaces. METALL-INDUSTRIE J. KLEPISCH Ger. 512,992, April 27, 1929 and 512,993, April 27, 1929.

Shaft furnace for inferior granular fuel. HEINRICH KÜPPERS Ger. 511,580, Oct. 14, 1928. Details of construction are given.

Shaft furnace for treating solid materials with gases. AKTIESELSKAPET NORSK STAAL (Elektrisk-Gas-Reduktion). Norw. 46,010, June 24, 1929. The reaction chamber of the furnace is built up by means of a number of separately removable containers, open at top and bottom, in which the solid materials are placed.

Grate furnace, with drying shaft for the fuel. FRANZ HOF SCHORNSTEIN- UND FEUERUNGSBAU and FRANZ HOF. Ger. 511,330, Jan. 3, 1930.

Inclined-grate furnace, with superposed grates. FIRMA K. H. PAUL LUDWIG Ger. 514,105, Sept. 29, 1929.

Travelling-grate furnace. L. and C. STEINMÜLLER. Ger. 511,532, Oct. 24, 1929

Travelling-grate furnace. A.-G. FÜR ZELLSTOFF- UND PAPIERFABRIKATION. Ger 511,662, Dec. 6, 1928.

Rotating furnaces. RENÉ P. É. ROMAN and THÉODORE LAFITTE. Fr 690,919, Feb. 17, 1930. An improved construction is described whereby pressures at all temps may be maintained.

Rotating furnace for cement, lime, ores, etc. MIKAEL VOGEL-JÖRGENSEN Fr 691,678 and 691,679, Mar. 10, 1930.

Rotary tubular apparatus for heating air or other gases supplied to rotary furnaces

or driers. GUSTAV BOJNER, ALFRED P. PEHRSON and ADAM H. PEHRSON. Ger. 513,123, Jan. 19, 1927. See Brit. 264,825 (*C. A.* **22**, 188).

Burners for twin wind furnaces. C. OTTO & Co. G. M. B. H. Ger. 511,515, Dec. 4, 1925. Addn. to 480,746. Details of arrangement are given.

Charging chamber furnaces. C. OTTO & Co. G. M. B. H. Ger. 511,017, July 10, 1928. Addn. to 480,763 (*C. A.* **23**, 5034).

Device for charging furnaces with different kinds of fuel simultaneously. GERSCHWEILER ELEKTRISCHE CENTRALE G. M. B. H. Ger. 511,964, Aug. 24, 1926.

Transportable device for charging shaft furnaces of rectangular cross-section. METALLGES A.-G. (Otto Hubmann and Franz Voerkel, inventors). Ger. 514,245, Feb 4, 1927.

Mechanical fuel-charging device. DEUTSCHE BABCOCK & WILCOX DAMPFKESSELWERKE A.-G. Ger. 512,741, July 26, 1928.

A suspended cover for a furnace. SCHEIDHAUER & GIESSING A.-G. (Hugo Ackermann, inventor). Ger. 512,702, June 9, 1928.

Automatic combustion regulator, particularly for boiler furnaces. SIEMENS-SCHUCKERTWERKE A.-G. (Ferdinand Köhler, inventor). Ger. 514,264, Mar. 16, 1927.

Regulating device for oil burners. ADOLF FROMHEIN. Ger. 498,042, Aug. 31, 1926.

Coal dust, oil, or gas burner for boilers. SCHMIDT'SCHE HEISSDAMPF-GES. M. B. H. Heinrich Peperkorn, inventor). Ger. 513,349, Mar. 27, 1927.

Gas burner. C. H. KEMPTON and W. BISSELL. Brit 335,256, June 21, 1929.

Gas burner (suitable for pilot lights of oil burners). AUGUSTUS J. FRAME (to Franklin Oil Heating, Inc.). U. S. 1,789,973, Jan. 27.

Slide valve for gas burners, particularly for blast heaters. ZIMMERMANN & JANSEN G. M. B. H. Ger. 513,109, Nov 29, 1928.

Electric water heater. L. P. HAUSSAUER. Brit. 335,323, Aug. 2, 1929.

Water heater and steam condenser. JOHN H. HUDSON. U. S. 1,790,306, Jan. 27.

Apparatus for heating molten salt baths, etc., by circulating oil. CHARLES C. PLUMB. U. S. 1,790,555, Jan. 27. Structural features.

Heat exchanger for gas mixtures. MESSER & Co. G. M. B. H. Ger. 512,825, Nov. 9, 1929.

Heat-exchange apparatus suitable for treating oil or other liquids. HARLAN W. HOW (to Struthers-Wells Co.). U. S. 1,790,151, Jan. 27. Structural features.

Heat-exchange apparatus suitable for use as a condenser. PATRICK J. MCINTYRE (to Wolverine Tube Co.). U. S. 1,789,591, Jan. 20. Structural features.

Heat-exchange apparatus (tank with internal coils and headers) suitable for cooling water or other liquids. NORMAN H. GAY. U. S. 1,789,739, Jan. 20. Structural features.

Tubular heat-exchange apparatus suitable for heating or cooling milk or other liquids. CLIFFORD MORROW (to H. H. Miller Industries Co.). U. S. 1,790,015, Jan. 27. Structural features.

Tunnel kiln. WOODALL-DUCKHAM (1920), LTD., DOULTON & Co., LTD., and C. BATEY. Brit. 334,951, June 14, 1929.

Preventing incrustation in rotary kilns. F. KRUPP GRUSONWERK A.-G. Brit. 334,868, April 20, 1929. To prevent incrustation in the preheating zone of a rotary kiln, the waste gases are throttled at the feed end of the kiln by dampers arranged to control the full cross section of the kiln and part of the gases is withdrawn through openings at the beginning of the reaction zone so that they do not contribute thereafter to the heating of the pre-heating zone. Various details of construction and operation are described.

Steam-heated apparatus. CURT ROSENBLAD. Ger. 513,287, Jan. 9, 1929. Means is described for increasing the thermal efficiency of steam-heated app. in which 2 or more coils or other heating surfaces are arranged in series. The app. includes a throttle and a water-separator between each two coils, etc.

Siphon apparatus for discharging liquids from tanks. AUGUSTINE DAVIS, JR. U. S. 1,789,864, Jan. 20. A system is described adapted for discharging liquid from any one of a plurality of assocd. tanks.

Lining molds. FRIEDRICH MAYER. Ger. 511,101, Oct. 30, 1923. A coating compn. for the inner surfaces of permanent molds consists exclusively of an aq. colloidal soln. of a mineral substance, *e. g.*, graphite, talc or clay.

Machine for making threaded castings from celluloid or like plastic material. NIEDERRHEINISCHE MASCHINENFABRIK BECKER & VAN HÜLLEN A.-G. Ger. 514,039, Aug. 29, 1929.

Apparatus for drying salt crystals. ADLER & HENTZEN MASCHINENFABRIK. Fr 690,651, Feb. 25, 1930.

Combined drying drum and ball mill. BERNHARD SÄGEBARTH. Ger. 513,280, Mar. 19, 1927.

Device for the continuous drying of casein, etc. PASQUIER, MEESE & CIE. Ger. 511,543, Mar. 10, 1928. Details of arrangement are given.

Acetylene generator. ÉMILE LAUFFER. Fr. 691,712, Mar. 11, 1930.

Acetylene generator. JACOB KNAPPICH. Ger. 511,403, Nov. 10, 1929. The lime and water removed from the generator are passed through a closed container having a gas space connected to that of the generator. Gas from unreacted particles of carbide is thus recovered.

Acetylene generator (water to carbide type). JOHANNES BUTTGEREITH. Ger. 513,049, Nov. 24, 1928.

Acetylene generator (carbide to water type). CARL KEEL. Ger. 514,107, May 11, 1929.

Closure for acetylene generator. AUTOGENWERK SIRIUS G. M. B. H. Ger. 511,136, May 25, 1929. Addn. to 489,089 (*C. A.* **24**, 2017).

Apparatus for stretching thin disks of material such as viscose or "cellophane" after softening for making sound records. A. A. PENTEADO. Brit. 334,830, June 12, 1929. Structural features.

Thermostat for control of electric circuits. ADOLPH A. THOMAS. U. S. 1,780,608, Jan. 20. Structural features.

Thermostatic device suitable for control of electric heaters, etc. REUBEN S. TICE and ARTHUR L. HOLCOMB. U. S. 1,790,121, Jan. 27. Structural features.

2—GENERAL AND PHYSICAL CHEMISTRY

FREDERICK L. BROWNE

Professor Dr. Adolf Cluss. W. KLUGER. *Oesterr. Chem.-Ztg.* **34**, 11–2(1931). Obituary. F. H.

Edward Morell Holmes. TSCHIRCH. *Schweiz. Apoth. Ztg.* **68**, 551–3(1930). A necrology and personal reminiscences. S. WALDBOTT

František Wald (1861–1930). J. BABOROVSKÝ. *Chem. Obzor.* **5**, 281–3(1930); cf. *C. A.* **25**, 626.—Biographical sketch with a portrait. J. KUČERA

František Wald. J. Z. SCHNEIDER. *Chem. Obzor* **5**, 283–6(1930).—Obituary. J. KUČERA

Amount of ozone in the earth's atmosphere and its relation to other geophysical conditions. IV. G. M. B. DOBSON, H. H. KIMBALL AND E. KIDSON. *Proc. Roy. Soc.* (London) **A129**, 411–33(1930); cf. *C. A.* **23**, 2612.—The distribution of O_3 in regions occupied by cyclones or anticyclones was shown graphically, also the av. distribution over the world. Possible methods of formation and decompn. of O_3 are discussed. FRANK URBAN

A new relation chart of the carbohydrates. C. W. EDDY. *J. Chem. Education* **7**, 2692–6(1930).—A chart is presented that is designed to aid the student in visualizing the configurational and chem. interrelationships in the monosaccharide group. The chart is similar to that of Rosanoff (*J. Am. Chem. Soc.* **28**, 114(1906)) but employs actual structural formulas instead of schematic symbols. The possible chem. inter-transformations are indicated by arrows of four different types representing, respectively, (1) the Kiliani synthesis, (2) the Van Ekenstein transformation, (3) exchange of aldehyde and primary alc. groups and (4) transformations between aldoses and ketoses. R. C. HOCKETT

Mathematical color definition from photoelectric measurements. HAROLD D. ELLSWORTH AND PAUL MCMICHAEL. *Am. Photoelec. Corp., New York City, Separate* 8 pp.; in briefer form in *Electronics* Oct. No., 1930; cf. *C. A.* **24**, 1531. E. J. C.

Determination of structure with acoustic oscillations. A. MEISSNER. *Z. Physik* **65**, 145–57(1930).—A plate of quartz is excited with high frequency and the elec. axes are found from the glow discharges which appear when the crystal is placed in a vacuum or from the mech. oscillations revealed with the help of lycopodium. By combining the observations made on various quartz plates, it is found that the three elec. axes are very nearly perpendicular to each other. On the assumption that their direction corresponds to the planes of greatest d. of the Si atoms, the correct at. distance is obtained from the d. and Avogadro's no. From the optical activity of quartz, the size

of the elementary cell and the no. of atoms in it are deduced from purely macroscopic measurements. EGON BRETSCHER

Micro-stereo observations and their photographic measurement. RUDOLF LORENZ. *Papier-Fabr.* **28,** Tech.-Wiss. Teil, 805–9(1930).—An app. for taking stereophotomicrographs is described, and a method of estg. the thickness of the object illustrated, for kaolin particles (av. 1μ thick). The possible value of such methods in *measuring paper* and *textile fibers* is pointed out. R. H. DOUGHTY

Metallic reflection. JOSEF ZAHRADNIČEK. *Z. Physik* **65,** 814–23(1930).—The formulas for metallic reflection are obtained in a more general form than by Drude. Measurements of the reflecting power are carried out on the (100) face of PbS, with light of λ = 5875.7 A. U. EGON BRETSCHER

Freezing point of nickel as a fixed point on the International Temperature Scale. H. T. WENSEL AND WM. F. ROESER. *Bur. Standards J. Research* **5,** 1309–18(1930).—The f. p. of Ni was detd. by measuring with an optical pyrometer the ratio of brightness of red light of a wave length 0.6533μ emitted by black bodies at the f. ps. of Ni and Au, resp. The Ni was frozen in magnesia crucibles *in vacuo*. The f. p. was found to be 1455° (on the International Temp. Scale) with an uncertainty of 1°. The temp. coeff. of resistance of the 2 sep. ingots of Ni used was approx. 0.0067 in the interval 0–100°. The chem. analysis indicated the Ni to be 99.94% pure. The importance of the Ni point in optical pyrometry is discussed. The f. p. of pure Ni in magnesia crucibles was found to be very satisfactory as a fixed point in accurately extending the high temp. scale beyond the Pt point. LEOPOLD PESSEL

A heterodyne method for determining the dielectric constant of conducting liquids. W. GAEFUNDER AND R. WEBER. *Z. Physik* **65,** 723–5(1930).—The usual heterodyne method of *measuring* the *dielec. const.* is restricted to insulators. To measure conducting liquids a variable resistance is set across the measuring capacity and this resistance is adjusted so that the damping is the same if the capacity contg. the conducting liquid is connected to the circuit or the measuring capacity + resistance. A valve voltmeter is used to control the damping and a variable resistance (whose capacity must remain const. for all values of resistance) is built up from two radio tubes, whose resistance is varied by adjusting the filament current. EGON BRETSCHER

Comparison of two methods for determining the contact potential between two metals. GUNTHER MÖNCH. *Z. Physik* **65,** 233–43(1930).—The contact potentials of Cu-Fe (—0.35 v.), Cu-Ni (—0.23 v.) and Cu-Ag (+0.03 v.) were measured by Thomson's method of variable capacity. A process of detg. the shift of the anode characteristics in a radio tube that contains the metal combination on the grid is described. Both methods give the same results with an accuracy of 0.01 v. EGON BRETSCHER

The automatic maintenance of solid-liquid equilibrium in metals. PAUL A. ANDERSON. *Rev. Sci. Instruments* **1,** 764–7(1930).—The method is based on the abrupt change in resistivity at isothermal fusion, and is generally applicable to pure metals. A diagram shows the connections by which a Zn bath was held at its m. p. for 12–48 hrs. in the prepn. of *single metal crystals*, the current being controlled by a photoelec. cell. The app. functioned satisfactorily for 18 mos. J. H. MOORE

Relative advantage of ring marks vs. point indicators for determining gas specific gravity by the Bunsen-Schilling apparatus. L. ZIPPERER AND W. ROTTENGATTER. *Gas u. Wasserfach* **73,** 1190–2(1930).—The point indicator permits a higher degree of precision in sp. gr. readings, and decreases the discrepancy between several observers, as compared with the usual ring marks. R. W. RYAN

Relation of molecular polarization of propyl chloride and 1,2-dichloroethane to temperature, especially regarding free rotation. R. SÄNGER. *Physik. Z.* **32,** 21–6(1931). Consideration is given detns. of mol. polarization, P, of propyl chloride. There exists a linear relationship between P and $1/T$. The elec. moment is calcd. as $2.040 \pm 0.007 \times 10^{-18}$. Comparison is made with MeCl and EtCl. A theoretical discussion and interpretation of the data are given. The results lead to the conclusions that either there is unhindered free rotation of the end groups C—Cl and C—CH_3 about the axis of the C—C bond or that two mol. forms exist in approx. const. ratio. Original data on 1,2-dichloroethane are tabulated. P does not vary linearly with $1/T$; this agrees with other data. The fact is interpreted on the basis of pure assocn. at lower temps. The permanent elec. moment may be explained on the basis of a strong deformation of the carbon valence tetrahedra in the C—C bond, while the possibility of unhindered free rotation is retained. WILLIAM E. VAUGHAN

Dependence of molecular polarization on temperature and its relationship to free rotation. LOTHAR MEYER. *Z. Elektrochem.* **36,** 743–6(1930); cf. *C. A.* **24,** 4194. A. P. SACHS

Quantized rotation of atoms. E. LOEDEL-PALUMBO. *Physik. Z.* **31**, 926-9 (1930).—Loyarte's "addn. potential" of 1.4 v. for Hg and his const. $\Delta\nu = 11{,}316$ have no phys. meaning. As good agreement may be obtained with many other arbitrary values, in harmony with probability calcns. The idea of a quantized rotation of the Hg, K and Tl atoms lacks a phys. foundation. FRANK URBAN

The existence of the addition and subtraction potential of 1.4 v. in the mercury atom. R. G. LOYARTE. *Physik. Z.* **31**, 929–39(1930).—A crit. discussion based on the data of Franck and Einsporn (*C. A.* **14**, 3360); Jarvis (*C. A.* **21**, 3153); Pavlov and Sueva (*C. A.* **23**, 3626). FRANK URBAN

The drying of gas streams. LOUIS L. BIRCUMSHAW. *J. Chem. Soc.* **1930**, 2213–5 A stream of H_2 (flowing at 15 cc./min. for 6 hrs.) must be so dried that during its prolonged passage through Pb, Sn, etc., heated just above their m. ps. no oxide film is formed. It is shown that the ice fog formed on sudden cooling in the first trap (constructed as usual) is destroyed by passing through a length of glass tubing at room temps., and the resulting water is collected in the next trap. In the method chosen from several as the most effective and the cheapest, the gas is passed through the first trap, immersed in a thermos flask contg. an ice-salt mixt., then by means of a short length of lagged tubing connected to it through a second trap in solid CO_2-acetone, and finally through a long piece of glass tubing and a third trap. With this method a heavy ring of ice is observed in the second trap, and at most only the faintest trace in the third trap. J. BALOZIAN

The critical constants of carbon dioxide-oxygen mixtures. H. S. BOOTH AND J. M. CARTER. *J. Phys. Chem.* **34**, 2801–25(1930).—Crit. phenomena were observed in 5 different mixts. of CO_2 and O_2 contg. 50, 60, 70, 80 and 90% O_2, resp. This investigation covers the range of higher O content than original work of Keesom (*Z. physik. Chem.* **54**, 498(1906)). Tables and graphs show the temp.-pressure relations for the above mixts. for pressures up to 140 atms. and temps. to —65°. Crit. temp. and max. temp. of condensation decrease with increase in O_2 content of the mixt. Retrograde phenomena were observed for all mixts. A thermodynamic explanation is given. The soly. of solid CO_2 in liquid O_2 near its crit. point was demonstrated by the fact that a liquid mixt. of CO_2 and O_2 can be obtained at a temp. of —115° which is 3° above the crit. temp. for O_2. H. M. STARK

Light scattering at the critical point. G. PLACZEK. *Physik. Z.* **31**, 1052–6(1930); cf. Ornstein and Zernike, *C. A.* **21**, 3152.—The dimensions of the scattering vol. must be considered in light scattering at the crit. point. If this is taken account of, the objections of Rocard to the Ornstein-Zernike theory are not substantiated. Formulas for lateral scattering and extinction are given on which exptl. tests of this theory can be made. S. LENHER

Remarks on the van der Waals' equation. E. NEUSSER. *Physik. Z.* **31**, 1041–51 (1930).—The coeffs. a and b of van der Waals' equation, assumed to be independent of pressure and temp., are calcd. from vols. measured at 2 but slightly diff. pressures and at the same temp. The exact value of the gas const. R is calcd. as 0.082051 atms./degree mol. and the ice-point is calcd. as 273.20° T. Dependence of the exptl. values of a and b for H_2 and CO_2 on pressure and temp. are given in diagrams. The vapor pressure of CO_2 from 0° to 30° and approx. crit. data are calcd. S. LENHER

Direct relationship of equation of state and internal friction. LEON SCHAMES *Physik. Z.* **32**, 16–20(1931).—A theoretical discussion. The virial coeffs. of He, H_2, Ne, N_2, air, A and O_2 at various temps. are tabulated. WILLLIAM E. VAUGHAN

Determination of viscosity at low temperatures. ERNST SCHLENKER. *Brennstoff Chem.* **12**, 25–6(1931).—The difficulties encountered are discussed briefly. A simple app. is described whereby the time required at the temp. desired for oil or other liquid to climb to a height in a capillary-tipped pipet compensating a certain water displacement in a closed vessel connected to the top of the pipet, is used to compare viscosities. Viscosity curves obtained for different heights of rise through adjustment of the discharge tube on the bottom of the displacement vessel, are not wholly parallel, possibly because of small pressure differences due to altitude variations. Ingress of air moisture to the oil cup, which is surrounded by a double salt-ice bath and cover fitted with thermometer, is prevented by a $CaCl_2$ tube while a film of oil on the water in the displacement vessel seals the other end of the pipet from moisture. By the use of a receiver under the discharge water tube, immediate return of the oil to the cup and rapid repetition are possible by the raising of the displacement vessel. Max. differences in time of only 2% were obtained at temps. of —20° to +50°. For standardization, an oil is used which at 20° has a viscosity of 20° Engler and is equivalent to a climbing time of 50 sec. F. W. JUNG

Comparative methods for determining viscosities of liquids. A. TER-POGOSYAN. *Azerbaidzhanskoe Neftyanoe Khozyaistovo* **1930**, No. 11, 120–7.—Notwithstanding certain defects of the Engler viscometer it is satisfactory for practical work provided the formula of H. Vogel (*C. A.* **17**, 318) is used for interpreting results in abs. units. For kinematic viscosities below 2, Engler viscometer readings are not comparable with abs. viscosities, but Stoke's formula and the torsion-balance method give satisfactory results. V. KALICHEVSKY

Equations for vapor pressure and latent heats including approximate equations for solid compounds containing a gaseous component. LOUIS J. GILLESPIE. *Proc. Am. Acad. Arts Sci.* **66**, 153–65(1930).—A math. paper in which, by a method similar to Gibbs', thermodynamic equations are derived for vapor pressures and latent heats as well as approx. equations for decompn. pressures of solids and their latent heats. Methods for applying the equations to exptl. data are given. E. R. SCHIERZ

Vapor pressure of a liquid. I. Vapor pressure, heat of vaporization and chemical constant of a pure liquid substance. KEIICHI WATANABE. *Sci. Repts. Tokyo Bunrika Daigaku.* Sect. A, **1**, 1–13(1930).—For the vapor pressure of a pure liquid in air at P atm. pressure is given the equation: $\ln p = \alpha(P - p) - \frac{(U_2 + PV_2) - (U_1 + PV_1)}{RT} + \left(\int^{T} \frac{C_{1p}}{RT} dT\right)_{(P)} - \left(\int^{T} \frac{C_{1p}}{RT} dT\right)_{(P)}$ where the equation of state of the vapor is $pV_2 = RT(1 + \alpha P)$. p is the vapor pressure of the liquid, U and V are the internal energy and vol., resp. of one mol. of substance, C_p is the mol. heat at const. pressure, R the gas const. and T the abs. temp. Subscript 1 denotes the liquid state and subscript 2, the vapor state. The chem. const. and heat of vaporization also are discussed. P. T. NEWSOME

The vapor pressures of selenium tetrachloride. The existence of selenium dichloride. DON M. YOST AND CHARLES E. KIRCHER. *J. Am Chem. Soc.* **52**, 4680–5(1930).—By vapor-pressure and vapor-density measurements it is shown that, over the temp. range 100° to 220°, the vapor from $SeCl_4$ consists entirely of $SeCl_2$ and Cl_2. P. T. NEWSOME

Boiling- and dew-point curves for mixtures of ethyl alcohol and water up to fifteen atmospheres. JOH. A. GRUMBT. *Tech. Mech. Thermodynamik* **1**, 309–15, 349–57 (1930).—EtOH-H_2O mixts. studied in a bomb and examd. with the refractometer, aneroid barometer and resistance thermometer give the relations between boiling points and dew points at higher pressures and temps. Detd. curves are given at 1.033, 3, 5, 12 and 15 atms. and calcd. to 1–15 atm. in 0.5 atm. intervals. F. D. S.

Diffraction of x-rays in liquids: effect of temperature. E. W. SKINNER. *Proc. Iowa Acad. Sci.* **36**, 306–7(1929).—With an x-ray spectrometer similar to that used by G. W. Stewart, expts. were carried out on the effect of varying temp. on scattering by cyclohexane (27° and 83.5°) and heptylic acid (28° and 193°). The planar spacing giving the distance between mols. increases with increase in temp. (0.28 A. U. for heptylic acid and 0.16 A. U. for cyclohexane). This change is attributed to the vol. expansion of the liquid. In heptylic acid, the dimension denoting the length of the mol. was not changed, which shows that expansion takes place in only one direction relative to the lengths of the mols. The width of the peak increases at the higher temps. This is due to the disrupting of the mol. groupings by thermal agitation, which produces a more diffuse scattering. With increase in temp. a decrease in intensity (about 20%) of the peak denoting mol. widths was observed. This is probably due to (*a*) expansion of the liquid, (*b*) disarrangement of the scattering centers. These results and conclusions are found to be in harmony with the theory of the cybotactic condition. W. G. G.

Further investigation of x-ray diffraction in liquids. II. Benzene, cyclohexane and their homologs. SHINSUKE TANAKA AND AKIRA TSUJI. *Mem. Coll. Sci. Kyoto Imp. Univ.* Ser. A **13**, 169–73(1930); cf. *C. A.* **24**, 3163.—With narrow slits instead of circular openings to limit the x-rays, x-ray diffraction pictures were obtained for benzene, toluene, ethylbenzene, *o*-, *m*- and *p*-xylene, mesitylene, pseudocumene, isopropylbenzene, *p*-cymene, cyclohexane, cyclohexene, methylcyclohexane and 1,3-dimethylcyclohexane. A second max. found in the diffraction band for C_6H_6 enabled the diam., 4.76 A. U., and the thickness, 3.13 A. U., of the C_6H_6 mol. to be calcd. Cyclohexane and its homologs gave a single sharp max., which indicates a spherical mol. form. III. **Influence of temperature.** *Ibid* 337–42.—X-ray diffraction bands were photographed for pyridine, pyrrole, cyclohexane, nitrobenzene, heptane, heptyl alc. and oleic acid at temps. ranging from —9° to 225°. The position of the diffraction bands decreased, the bands became wider and the edges more diffuse, the inner scattering increased and the intensity decreased with rise of temp. MALCOLM DOLE

X-ray diffraction by organic solutions. ALFRED W. MEYER. *Proc. Iowa Acad. Sci.* **36**, 303–4(1929).—Series of ionization diffraction curves of 2 org. solns. with varying concns. were obtained with Mo K_α radiation. The solns. used were BuOH with *o*-dimethylcyclohexane and EtOH with cyclohexane. The diffraction peaks shift from the peak of one member to that of the other as the soln. changes from 100% of one member to 100% of the other. Also the width of the peak varies in the same manner except that the width is a max. at a low percentage of the liquid, the peak of which is of least width. There is no evidence of a double peak, indicating that the liquids do not diffract individually. A curve is obtained by using the components separately but measuring the diffraction of both liquids simultaneously and this curve clearly shows the peaks of both liquids. This proves that the spectrometer can resolve the peaks of both liquids if they are present in the diffraction by the solns. Stewart, Morrow and Skinner (*C. A.* **22**, 1098) have shown that the diffraction peaks of org. liquids indicate a grouping of the mols. and that the Bragg law approx. the spacings. The soln. diffraction curves then indicate that the mols. of both constituents form a single type of group and that the spacing is detd. by the proportion of the constituent present. The width of the curve may indicate that the grouping is less perfect than in the pure liquids. These conclusions are very similar to those found in the case of the diffraction by solid soln. W. G. GAESSLER

The nature of the solid state. M. POLANYI. *Umschau* **34**, 1001–7(1930). This is an address on the solid state, cryst. (ordered) and amorphous (unordered), accompanied by drawings of models and photographs of cryst. metals illustrating the effect of pressure and tension on the orientation of the atoms in the crystal lattice. E. R. S.

Atomic sizes and isomorphism. G. NATTA AND L. PASSERINI. *Atti III congresso naz. chim. pura applicata* 1930, 365–70.—By the powder method, x-ray examn. of 2- and 3-component systems of certain bivalent oxides and hydroxides shows a classification into 3 groups (cf. *C. A.* **23**, 4124). These are complete soly., partial soly. or immiscibility. With the radius of the O ion as 1.32 A. U., radii of the bivalent cations in A. U. are: Zn, 0.75; Ni, 0.77; Mg, 0.78; Co, 0.80; Fe, 0.82; Mn, 0.89; Cd, 1.01; Ca, 1.08. Two cubic oxides of bivalent metals will form solid solns. in all ratios, if the at. radius of the larger cation is not greater than 13% of the other. For partial soly., the difference between the radii must be less than 25%. No solid soln. is obtained when the difference is greater than 30%. For 3 oxides, the limit of soly. increases with increase in the size of the elementary cell. For 3 rhombic hydroxides, the ratio of the at. radii must be 16% for soln. For carbonates, the ratio is 30%. G. M. MURPHY

Systematic structure theory. II–IV. C. HERMANN. *Z. Krist.* **69**, 226–70, 250–70, 533–55(1929). B. C. A.

Crystal structure of anhydrous halides of the bivalent metals. ADOLFO FERRARI. *Atti III congresso naz. chim. pura applicata* 1930, 452–60.—Cell consts. and other data are given for fluorides of Mg, Zn, Ni, Co, Fe and Mn, that belong to the *rutile* type, and for those of the *fluorite* type, Cd, Ca, Sr, Pb and Ba. It is not yet possible to establish the existence of 2 isomorphous series for the chlorides and bromides. The chlorides of Pb, Hg, Ni, Co, Mg, Fe, Mn, Cd, Zn, Ca, Sr, Pb and Ba and the bromides of Zn, Sn, Hg, Pb, Co, Fe, Mg, Mn and Cd are discussed. The iodides of Co, Fe, Mn, Cd and Pb belong to the CdI_2 type. G. M. MURPHY

Relation between point of fusion and crystal structure. ADOLFO FERRARI. *Atti III congresso naz. chim. pura applicata* 1930, 449–51.—For the halides of Li, Na, K and Rb, the m. p. decreases with increasing at. wt. in passing from fluoride to iodide. For halides of Co, Fe, Mg, Mn, Pb and Hg, the regularity holds only for Co. For a face-centered crystal lattice, the m. p. is approx. represented by $(\sqrt{\text{at. wt.}} \times 270) - 5$. The following numbers give a in A. U., exptl. m. p. and calcd. m. p. for V, Mo, W, Ta resp.: 3.04, 1988, 2085; 3.14, 2773, 2690; 3.155, 3643, 3670; 3.272, 3303, 3386. For a body-centered crystal lattice, the formula is $\sqrt[4]{\text{at. wt.}} \times 400$. The results, as before, for Al, Ag and Au, are: 2.86, 931, 912; 2.876, 1233, 1288, 2.87, 1336, 1199. G. M. MURPHY

Water in the crystal lattice. GIULIO NATTA. *Atti III congresso naz. chim. pura applicata* 1930, 347–64.—Examn. of the crystal structure of $SrO_2.8H_2O$ by the powder method shows that it belongs to the tetragonal system with 1 mol. in the elementary cell. Its vol. is 222×10^{-24} cc., a = 6.32 A. U., c = 5.56 A. U. The vol. is smaller than that of $Sr(OH)_2.8H_2O$ (cf. *C. A.* **23**, 3178). A similar structure is obtained with $ZrOCl_2.8H_2O$ and with $BeSO_4.4H_2O$. For the latter, a = 5.62 A. U., c/a = 0.946, d. calcd. = 1.754, d. exptl. = 1.725. The diams. of the bivalent O in the H_2O of crystn. and the Sr ion are, resp., 2.06 and 2.54 A. U. The av. value of the vol. of the OH ion

in 6 bivalent rhombic hydroxides is 16.75 × 10^{-24} cc., from which the g.-mol. vol. of H_2O is 14.2 cc. Hydrates of variable compn. such as those of Co and Sb are discussed. Classification of hydrates in the following 4 groups is suggested. (I) Hydroxides, with definite compn. They contain strongly polarizable OH ions, with a vol. of approx. 16 × 10^{-24} cc. (II) Hydrates of definite compn. The H_2O is distributed in a definite way around the coördinate ion and has a vol. of about 23.5 × 10^{-24} cc. (III) Hydrates of indefinite compn. in which the H_2O enters the crystal lattice but does not alter the position that the atoms would occupy in the anhydride. (IV) Hydrates of indefinite compn., the H_2O not penetrating the crystal lattice but being retained by capillarity or superficial absorption. G. M. MURPHY

Crystal structure of silicon. A. G. NASINI AND A. CAVALLINI. *Atti III congresso naz. chim. pura applicata* 1930, 463–70.—Samples of Si were obtained from Al and Zn alloys, from K_2SiF_6, from thermal decompn. of $SiHCl_3$, hydrolysis of SiS_2, and decompn. of SiH_4. All show the characteristic diamond-type structure with a = 5.421 A. U. for the $K\alpha$ ray of Cu. The powder method was used. The Si prepd. from SiS_2 and SiH_4 gave diffuse spectrograms, characterized by minute cryst. particles. G. M. MURPHY

Crystal structures of organic compounds. STERLING B. HENDRICKS. *Chem. Reviews* 7, 431–77(1930).—A review is given of x-ray results that have a bearing on structural org. chemistry. The difficulties of x-ray analysis arise from the low symmetries of org. compds. and undetd. intensity factors of radiation scattered from atoms of low at. no. such as O, N, C and H. X-ray data lead to a detn. of the unit of structure and space group of the compd., symmetry of the mol., and position of each atom in the mol. In iodoform, the hexagonal unit of structure contg. 2 mols., has a = 6.87 A. U., c = 7.01 A. U. with I atoms at space-group C_6^6. The min. mol. symmetry is probably a 3-fold axis. The min. I-I distance in the same mol. is 3.57 A. U., while the I atoms of 2 mols. are at the corners of octahedra with edges 3.94 and 4.43 A. U. In hexabromo- and hexachloro-cyclohexane the cubic units of structure contg. 4 mols. have a = 10.49 A. U. ($C_6H_6Br_6$) and a = 10.07 A. U. ($C_6H_6Cl_6$). The halogen atoms are at space-group T_h^4. The min. mol. symmetry is a 3-fold axis and a center. The assumed structure gives a tetrahedral distribution of the C valences. For C_2Cl_6, C_2Br_6, $C_2Cl_4Br_2$, $C_2Br_4F_2$, $C_2Cl_2Br_2$ and $(CH_3CBr_2)_2$ the dimensions of the orthorhombic unit of structure contg. $4C_2X_aY_{6-a}$ are summarized by table. The space-group is V_h^{16}. Both cryst. modifications of $C_2Cl_4Br_2$ have the probable formula CCl_3CClBr_2. Iodosuccinimide, *m*-iodobenzoic acid, CI_4, CBr_4, hexachloro- and hexabromo-benzene, tetrachloronaphthalene, and 1,2,3,4,5,8-hexachloronaphthalene 1,2,3,4-tetrahydride also were examd. Interference in x-radiation and electron beams scattered from vapors of org. compds contg. Cl are noted. CCl_4 patterns show that the Cl-Cl distance in a mol. is 3.3 A. U. or 3.14 A. U. while the corresponding C-Cl distance is 2.02 or 1.91 A. U. The Cl-Cl distances in *cis*- and *trans*-1,2-dichloroethylene and 1,1- and 1,2-dichloroethane are a_{cis_2} = 3.6 A. U., a_{trans} = 4.1 A. U., $a_{1,1}$ = 3.4 A. U., and $a_{1,2}$ = 4.4 A. U. The structure of diamond is cubic with each C atom surrounded by 4 others at the corners of a regular tetrahedron. The C-C distance is 1.54 A. U. The structure of graphite is hexagonal with the C atoms in one plane 1.42 A. U. apart at closest approach forming a hexagon. The C-C distance in separate planes is at least 3.40 A. U. For hexamethylenetetramine the body-centered cubic unit of structure contg. $2C_6H_{12}N_4$ has a_0 = 7.02 A. U. Each C atom is surrounded by 4 atoms, two of which are N at the vertices of a regular tetrahedron. The N atoms are equidistant from 3 C atoms, but are not in the C atom plane. The min. N-C distance is about 1.44 A. U. Only the possible H positions are indicated. Urea is tetragonal with 2 mols. in the unit with a = b = 5.73 A. U., and c = 4.77 A. U. The urea mol. has C-O distance 1.05–1.42, C-NH_2 1.07–1.30 A. U. Crystal structures bear out the heteropolar characteristics. The at. positions for orthorhombic $CS(NH_2)_2$ have not been detd. The complete structure of CH_3CONH_2 is undetd.; the mol. is asym. (space-group C_{2v}^6). Hexamethylbenzene is the only aromatic compd. whose structure is satisfactorily detd. It is triclinic with one mol. in the unit. The space-group is C_i^1 a = 9.010, b = 8.926 and c = 6.344 A. U. with $[\alpha]$ = 44° 27′, $[\beta]$ = 116° 43′ and $[\gamma]$ = 119° 24′. Methane at liquid H temps. has a cubic close-packed structure with a_0 = 6.35 A. U. Ethane has a hexagonal unit contg. $2C_2H_6$ with a = b = 4.46 A. U. and c = 8.19 A. U. The methane and ethane mols. are rotating groups. For long-chain aliphatic compds. some data are summarized graphically. The increases in spacing with the addn. of a methylene group are (1) about 1.30 A. U.; (2) about 2.60 A. U.; (3) intermediate values (1) and (2) are the changes or twice the changes in length of the chain while

(3) are due to a co-planer "zig-zag" arrangement of C atoms. Nonacosane is probably orthorhombic with 4 mols. in unit. The space group is C_{2v}^9. Detailed results were obtained for $C_{36}H_{72}$ and $C_{70}H_{142}$(?) Crystals of lauric, stearic, bromostearic, stearolic and behenolic acids are monoclinic prismatic; the space-group is C_2^h. The x-ray results together with measurements for some dicarboxylic acids are tabulated. X-ray patterns from single crystals of primary, tertiary and quaternary alkylammonium halides, tetramethylammonium perchlorate and permanganate, and alkylammonium chlorostannates and chloroplatinates were measured. Primary *n*-amylammonium chloride, taken as typical, is tetragonal; at room temp. it has 2 mols. in unit with $a = b = 5.01$ A. U. and $c = 16.69$ A. U. At liquid-air temps. the true structure contains 4 mols. in the unit cell with $a = b = 7.0$ A. U. and $c = 16.6$ A. U. "Rotation of the mol. about its long axis takes place at room temp. in the solid state giving rise to a pseudo unit. The space-group is C_{2h}^5 and the structure monoclinic for naphthalene, anthracene, biphenyl, phenanthrene, fluorene, bimesityl and bibenzyl The width of the benzene ring is proposed as 2.50 A. U. For *o*-, *m*- and *p*-dinitrobenzenes unit of structure and space-group detns. are given by table. Fiber diagrams of cellulose, hair, muscle, etc. are in accord with the phys. properties of the materials. The at arrangement in each class of compds .is shown diagrammatically, with the mol. configurations, units of structure and mol. symmetries. Seventy-seven references are included.

H. W. WALKER

Molecular structure of benzene, cyclohexane and their derivatives—a study in x-ray diffraction. G. W. STEWART. *Proc. Iowa Acad. Sci.* **36**, 305–6(1929); cf. *C. A* **24**, 1261.—An examn. by the x-ray diffraction ionization method was made of C_6H_6, toluene, *o*-, *m*- and *p*-xylene, mesitylene, EtPh, isopropylbenzene, cyclohexane, methylcyclohexane, *o*-, *m*- and *p*-dimethylcyclohexane, phenol, aniline, cyclohexanol, cyclohexanone, 2-hydroxy-1,3-dimethylbenzene *o*-, *m*- and *p*-toluidine, and *o*-, *m*- and *p*-cresyl methyl ether. The diffraction peaks are taken to be caused by the semi orderly space arrangement of the mols. in the liquid, or cybotactic condition and the distances of sepn. of the planes contg. diffraction centers are computed by Braggs' diffraction law. Both assumptions have previously proved justifiable (cf. *C. A* **22**, 1098; **24**, 3409). The structures of the C_6H_6 and cyclohexane rings are shown to be distinctly flat, having a thickness of 4.70 A. U. and 5.10 A. U., resp. The proof of the flatness rests upon the effect of substitutions and the relative prominence of diffraction peaks. The general dimension in a plane perpendicular to the thickness is indicated by a diam. of approx. 6 A. U. The similarity of the thickness to the diam of paraffin and alc. chain indicates the general correctness of the ring conception It is shown that the thicknesses of the C_6H_6 and cyclohexane "rings" depend upon the relative positions of the substituents. The conclusions are in harmony with current investigations from other viewpoints and strengthen the theory of semi-orderly and temporary space arrangements of the mols. in a liquid, or the cybotactic condition

W. G. GAESSLER

Crystal forms of single crystals of copper. I. Crystals produced by the stress-annealing method. SETSUZO TAKEYAMA. *Mem. Coll. Sci. Kyoto Imp. Univ.*, Ser A, **13**, 353–62(1930).—The outer crystallographic form of the Cu crystals obtained by the stress-annealing method *in vacuo* and those developed by etching were examd. by the method of optical reflection and by photomicrographs. It was found that the crystal faces developed depended on the manner of treatment of the surface of the crystal. Fine structures of the etching figures were also observed. Polysynthetic twinning relation of the spinel type was detected in the part of the crystal that showed banded structures. **II. Crystals deposited on the surface of a single crystal plate by electrolysis.** *Ibid* 363–7.—By electrolyzing Cu on to a single crystal of Cu, it was possible to obtain a perfect single crystal of the same orientation as that of the mother crystal at first, but continued deposition gave rise to microcrystals having orientations scattered somewhat from that of the mother crystal. MALCOLM DOLE

Peltier effect in single crystals of bismuth. H. D. FAGAN. *Proc. Iowa Acad. Sci.* **36**, 300–1(1929); cf. *C. A* **24**, 3163.—Some preliminary data on the Peltier effect in Bi single crystals are obtained. The reference metal used is Cu. The results so far obtained seem to be in fair agreement with the data computed from the thermal e. m. f measurements of Boydston (*C. A.* **22**, 720) and Bridgman (*C. A.* **19**, 425; **20**, 326; **23**, 1328, 2620). W. G. GAESSLER

Thomson effect in single-crystal zinc. L. A. WARE. *Proc. Iowa Acad. Sci* **36**, 301(1929).—Results for a series of crystals made from Kahlbaum Zn are much more consistent than any previously reported by W. (*C. A.* **22**, 4295; **24**, 1263; 3687). The

Voigt-Thomson symmetry relation appears to be satisfied for the Thomson effect. The sp. resistance and temp. coeff. of resistance were also measured for all the crystals.
W. G. GAESSLER

Resistance change in a magnetic field of single crystals of bismuth. ROY A. NELSON AND G. R. WATSON. *Proc. Iowa Acad. Sci.* **36**, 304(1929).—The work is a continuation of that of Schneider (*C. A.* **22**, 3822). Crystals were made from several different samples of Bi and by 2 methods. The fractional change in a longitudinal field of about 3000 gausses is found to be a min. for 0° orientation and a max. for 90°. The crystals, however, fall into 2 classes, the reason for which has not been detd. The supposition of any considerable fissures along the cleavage planes appears unlikely.
W. G. GAESSLER

Calculation of the limit of plasticity of polycrystalline aggregates from v. Mises' equations for the plasticity of single crystals. JOH. DEJMEK. *Z. Physik* **65**, 139–43 (1930).—Math.
EGON BRETSCHER

Piezoelectric experiments on the principle of the method of Giebe and Scheibe. ALFRED HETTICH. *Z. Physik* **65**, 506–11(1930).—An improved oscillator especially suitable for piezoelec. expts. is described and the method is used to study the piezoelec. properties at various temp. *Pentaerythritol* remains piezoelec. up to the point of decompn. KIO_3 is piezoelec. and therefore cannot belong to the monoclinic prismatic class. A point of transition exists possibly between 140° and 150°. CCl_4 is not piezoelec. at −80°. *Camphor* seems to change its modification at low temp. E. B.

The change of resistance of purest electrolytic iron in a longitudinal magnetic field. O. STIERSTADT. *Z. Physik* **65**, 575–88(1930).—The variation of resistance of absolutely pure Fe in a magnetic field is much larger than that of ordinary Fe and is free from hysteresis effects. Moreover this change parallels the magnetization and depends on the cryst. structure of the sample. It seems possible that Franks' theory (*C. A.* **24**, 4674, 5549) also holds for ferromagnetic substances in a strong field. E. B.

The variation of the metallic resistance in a strong magnetic field. N. H. FRANK. *Z. Physik* **64**, 650–6(1930); cf. *C. A.* **24**, 5549.—Sommerfelds' application of the Fermi statistics to the variation of metallic cond. in a magnetic field of small intensity leads to the relation: $d\rho/\rho = BH^2$ (ρ = resistance, H, magnetic field). These calcns. are generalized to include also strong fields and result in the formula: $d\rho/\rho = BH^2/(1 + CH^2)$, which leads to Sommerfelds' formula when H is small (compared with $\sqrt{1/C}$). Kapitzas' measurements are well represented by the new expression. E. B.

Measurements with the aid of liquid helium. IX. The supraconductivity of carbides and nitrides. W. MEISSNER AND H. FRANZ. *Z. Physik* **65**, 30–54(1930); cf. *C. A.* **24**, 5565.—The following compds. are supraconducting at the abs. temp. T: TiN(T 2.6 or 1.1), VN(T 1.3), ZrN(3.2), ZrN-TiN(3.0), TiC(1.1), WC(2.8), Mo_2C(2.4), MoC(7.7), TaC(9.2), CbC(10.1). The compds. which are not supraconducting are: VC, ScN, CdO, Mo_2O_5, WO_2. *Conclusions.*—The temp. of transition to supraconduction of a carbide or nitride is higher than that of the pure metal. Supraconduction is not restricted to a single crystal structure, but seems to be related to the smallest distance of 2 atoms, when a compd. is formed (*e. g.*, Ta 2.83×10^{-7} mm., TaC 3.17×10^{-7} mm.).
EGON BRETSCHER

Studies on the diffusion of metals in the solid state. I. SHINSUKE TANAKA AND CHICHIRO MATANO. *Mem. Coll. Sci. Kyoto Imp. Univ.* Ser. A, **13**, 343–51(1930).—A strip composed of alternate layers of Ag and Au deposited electrolytically was placed in a vacuum furnace and heated to 450° at the rate of 4° per min. Its resistance was measured every 5 min. and was found to increase sharply at 250°. X-ray powder photographs indicated the formation of an alloy. If the temp. is kept const. at 250°, the increase in resistance of the strip is given by the equation $R = Ae^{-\alpha/t}$ where R is resistance, t is time, A and α are consts.
MALCOLM DOLE

Strontium amalgams. G. DEVOTO AND E. RECCHIA. *Gazz. chim. ital.* **60**, 688–92 (1930).—The prepn. of Sr by electrolysis of $SrCl_2$ has been undertaken by various experimenters, but with only fair results. The yields obtained by the method of Neumann and Bergve (*C. A.* **8**, 2114), *i. e.*, with a eutectic mixt. of $SrCl_2$ and KCl at 750°, can be increased by replacing the Fe cathode with a Ni cathode, to which Sr adheres better, by substituting KBr for KCl, and by employing a temp. just below 800°. For prepg. the amalgams, electrolytic Sr and triple-distd. Hg were used. The amalgams with lesss than 2% (in atoms) of Sr were prepd. directly by electrolysis of satd. aq. $SrCl_2$ on a Hg cathode. The amalgams with higher Sr content were prepd. by heating Hg and Sr at 300° for 48 hrs. in a closed tube. Thermal analyses were made: (1) in the range from room temp. to the b. p. of Hg (with a ferro-constantin couple), and

(2) in the range —30° to —60° (with 3 thermocouples in ferro-constantin series). The amalgams were kept out of contact with air. Aside from the eutectic point, and the b. p. of Hg, no characteristic point was observed. But with a *differential method* which is described, a break in the %-temp. curve at 262° was observed. Comparative measurements with the corresponding break at 266° of Ca-Hg showed that the evolution of heat is 5–6 times as great with Ca-Hg as with Sr-Hg. In Sr amalgams the *compd.* is $SrHg_6$. A very slight and ill-defined break in the curve at 39° was observed, which may represent the $SrHg_{12}$ of Kerp (cf. *Z. anorg. Chem.* **17**, 284(1895)). In conjunction with other expts., the results show that the more electropos. the metal the more complex the compd., *viz.*, $MgHg_2$, $CaHg_6$, and $SrHg_6$, as with the alk. earth metal amalgams which pass from $LiHg_3$ to $CsHg_{10}$. This variation is probably related closely to the at. radii, which increase greatly from Li to Cs and from Mg to Ba. Moreover, the b. p increases in the amalgams, *viz.*, Hg-Ca 337° and Hg-Sr 390°. At room temp. the affinity for Hg increases with the at. wt., as can be calcd. from the potentials at 25° (cf. Devoto, *C. A.* **22**, 4347; **23**, 2626); Ca^{++}/Ca, $E_{298} = 2.895$ v.; Sr^{++}/Sr, $E_{298} = 2.94$ v.; Ba^{++}/Ba, $E_{298} = 2.96$ v., and from the e. m. f. values of the piles at 25° (cf. Danner, *C. A* **19**, 434): $SrHg_x$, $SrCl_2$ (0.1 *N*), HgCl, Hg $E_{298} = 2.024$ v., where x is approx. the same in each case. The difference in the activity of the $SrCl_2$ and $BaCl_2$ solns. is negligible

C. C. Davis

Some physicochemical studies of organometallic compounds. Henry Gilman, L. L. Heck and J. A. Leermakers. *Proc. Iowa Acad. Sci.* **36**, 270(1929).—The physicochem. properties such as mol. wt., cond. and absorption spectra were detd with a miscellany of organometallic compds. in connection with studies on their dissocn and their constitution. Also, their reactions toward O, N_2O and H (catalytic with Pt) were investigated for the same purpose as well as to test electronic structures proposed for the constitution of N_2O and organometallic compds.

W. G. Gaessler

Hydrochloric acid solutions of iodine monochloride. Frederick A. Philbrick *J. Chem. Soc.* 1930, 2254–60.—The form in which ICl exists in aq. HCl soln. can be detd. by the effect of its addn. on the chloride-ion concn. of HCl solns. To do this, the distribution coeff. of I between aq. ICl-HCl-KCl (from KIO_3, I, HCl, H_2O) and comparison solns. with equal HCl-KCl concn. is detd., by bringing them into equil. with the same I-CCl_4 soln. Then by substituting in: $D = (2.54a_1 + 1.35)/(2.54a_2 + 1.36)(a_1 + 0.54)/(a_2 + 0.54)$, (where a_1 and a_2 are the HCl concns. with the same chloride-ion concns. as the ICl solns., and D is the distribution coeff.) the change in the chloride ion concn. due to the ICl addn. is detd. It is thus shown that in HCl soln., ICl is a highly ionized electrolyte, while undissocd. ICl or any compd. of it with HCl does not exist in soln. These results confirm the view that the formation of electrovalencies is promoted by a large cation and a small anion. The app. (glass) used in detg the distribution coeffs. of I is so constructed that the I-CCl_4 is circulated through the 2 solns., each contained in a cylindrical bulb. These bulbs are so interconnected with tubing that the I-CCl_4 drops first through one and then through the other soln. A microtitration vessel for detg. the I (3 mg. of I to 0.1%) with $Na_2S_2O_3$ is described, and is so designed that the tip of a wt. buret is brought into contact with the liquid to be titrated.

J. Balozian

The conductivity of cod-liver oil. L. W. Butler. *Proc. Iowa Acad. Sci* **36**, 299–300(1929).—Expts. were made on the cond. of cod-liver oil under different conditions. These expts. were carried out in a cond. cell with brass plates placed in some instances about 0.003 in. apart and at other times at about 0.020 in. The temp. of the oil was raised to approx. 50° and allowed to drop slowly to 3° or 4° below zero, readings of the cond. being made at frequent intervals. The cond. decreased as the temp. was lowered, the decrease becoming very rapid at the lower temp. When the temp. was raised, the cond. increased, the cond.-temp. curves being approx. the same in the 2 cases. The general shape of all the cond.-temp. curves obtained with samples of different oils or with samples of the same oil under varying circumstances were the same, but the values of the conductivities varied widely. If the oil was exposed to the air for a short time, the cond. decreased slightly, but when exposed for about 24 hrs. the cond increased to nearly double its former value. Bubbling air through the oil at 90°, which destroys the vitamin A content, almost halved the cond. Expts. to det. whether the oil is photoelec. under the action of ultra-violet light gave neg. results. The sp. resistance of the oil appears to vary from 10^{10} ohms per cm. to 10^{13} ohms per cm. according to the brand of oil tested and its previous treatment.

W. G. Gaessler

Mechanical properties of surface energy. V. Ducceschi. *Kolloid-Z.* **54**, 13–7 (1931).—The spreading of camphor, menthol and thymol on water surfaces causes a propeller to rotate or exerts a measurable pressure. This mechanical effect resulting

from the two-dimensional scattering of mols. may be responsible in a special way for effects such as those in *muscle contraction.* ARTHUR FLEISCHER

A method for measuring wetting tension and several results. WALTER HALLER. *Kolloid-Z.* **54,** 7–13(1931); cf. *C. A.* **25,** 630.—The forward and reverse displacement velocities of a meniscus are measured when moving to equil. in a horizontal capillary; the liquid pressure is varied to make a series of detns. Extrapolation to 0 velocity gives the difference in liquid levels which is directly related to the wetting tension by the equation $\beta = \alpha - 2(h_r - h_v)d/r$, where β is the wetting tension, h_r is the height of capillary rise on the inward (reverse) movement or the height with complete wetting, h_v is the height on the outward movement or with incomplete wetting, α is the surface tension, d the d. of the liquid, and r the radius of the capillary. Wetting tensions on glass at 20° were detd. for the following liquids and are expressed in dynes/cm.: isoamyl alc. 22.7, heptyl acetate 23.9, petroleum 24.8, hexanol 25.6, benzyl alc. 37.0, lactic acid 38.5, aniline 39.7, acetophenone 40.6, glycol 43.9, water 50.5, glycerol 62.6. A hysteresis phenomenon appears in the measurements which is quite singular. Acetophenone leaves a very unstable film on the glass. Liquids like water, glycol, glycerol, and lactic acid leave stable films and on repeat measurements the curve shows the characteristics of a completely wetting liquid ($h_r - h_v = 0$). By coating the inner walls of the capillary with a film, wetting tensions on ceresin, nitrocellulose, gelatin, and acetylcellulose can be detd. Acetylcellulose films show a marked aging effect. Liquid mixts. and solns., especially of capillary-active substances, behave differently from pure liquids. Butanol in water lowers the surface tension but not the wetting tension on glass. When the surface tension is less than 51 dynes/cm. the soln. wets glass completely. The effect of a solute on the wetting tension depends on the nature of the adsorption film formed. With unstable films, there is no change in the wetting tension, but the wetting velocity is affected; with metastable films, there is a decrease in the wetting tension; with stable films, there is an increase in the wetting tension. Capillary-active substances with no effect on the surface tension of the soln. may cause a large effect on the wetting tension. Sugar solns. with 0.05% sugar concn. raise the wetting tension and give films that display vivid interference colors.

ARTHUR FLEISCHER

Studies in electrocapillarity. III. The surface tensions of solutions containing two surface-active solutes. J. A. V. BUTLER AND CHAS. OCKRENT. *J. Phys. Chem.* **34,** 2841–59(1930); cf. *C. A.* **24,** 5562.—Langmuir's theory of adsorption is applied to the simultaneous adsorption of two solutes from soln., and the surface tension effects in such solns. are evaluated. It is shown that in the absence of any interaction between mols. in the surface layer, the surface-tension lowering produced in the presence of a surface active substance at const. concn. c_1 by a second substance at concn. c_2 is $\Delta\gamma_2 = b_2 \log(1 + c_2)/a_2(1 + c_1/a_1)$, where the surface tension lowering of the first substance alone is given by Szyszkowski's equation: $\Delta\gamma_1 = b_1 \log(1 + c_1/a_1)$. Measurements were made of the surface-tensions at the air-soln. interface of aq. solns. of (1) EtOH and PrOH, (2) PrOH and PhOH, which agree well with these equations. A modified form of Szyszkowski's equation for highly active solutes is given and the same treatment is extended to solns. contg. two solutes. The electrocapillary curves of solns. contg. a wide range of concns. of caffeine and phenol were detd. The surface tension lowerings are in reasonable agreement with the modified theory for highly active solutes. The electrocapillary curves of mixed solns. of Na cinnamate and Na *o*-toluate were detd. The crit. concn. of Na cinnamate in the presence of which the effect of 0.05 *M* Na *o*-toluate is first observable was found. The effect of Na *o*-toluate on the surface tension of Na cinnamate solns. is less than predicted by the theory and the deviations are ascribed to the effect of the elec. charges of the adsorbed cinnamate ions hindering the adsorption of further ions of the same sign. H. M. STARK

The relation between the balloelectric phenomenon and the potential difference at the interface gas/solution. A. FRUMKIN AND A. OBRUCHEVA. *Kolloid-Z.* **54,** 2–7 (1931); cf. *C. A.* **19,** 3046; **21,** 201.—The balloelec. effect (B) detd. by Christiansen (cf. *C. A.* **7,** 3069; **11,** 2427; **14,** 490) for solns. contg. a non-capillary-active electrolyte and a capillary-active nonelectrolyte, recalcd. on the basis of the value of a 1 *M* C_2H_5OH and 0.05 *M* NaCl soln. equal to 50, were compared with data on the potential difference (e) at the interface for the same solns. Detn. of B and e in 0.5 *M* KCl soln. with varying concn. of EtOAc, CCl_3COOH, or propionic acid show that both decrease with decrease in nonelectrolyte concn., with their ratio almost const. The B effect is very greatly dependent on the electrolyte concn. while e is practically independent except at very high, concns. where the salting out effect appears. Salts of halogenated fatty acids behave like the free acids, yielding a neg. B effect. Other capillary-active electrolytes

such as substituted amine salts (*e. g.*, $C_6H_5NH_3.HCl$) show an effect opposite in sign to that of the free base. Phenols on the addn. of small quantities of alkali show pos. effect, whereas the free phenols show a neg. effect. ARTHUR FLEISCHER

Potential differences at air-liquid interfaces. JOHN W. WILLIAMS AND V. A. VIGFUSSON. *J. Phys. Chem.* **35**, 345–53(1931).—A discussion of methods of measuring p. ds. perpendicular to the surface at air-liquid interfaces. MALCOLM DOLE

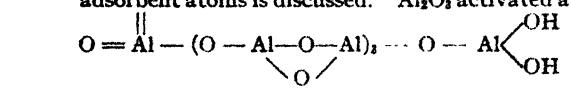
Studies on electrokinetic potentials. VI. Electrical phenomena at interfaces. HENRY B. BULL AND ROSS AIKEN GORTNER. *J. Phys. Chem.* **35**, 309–30(1931).—The ζ-potential and surface cond. at a cellulose interface were measured for aq. solns. of KCl, NaCl, $MgCl_2$, $CaCl_2$, K_2CO_3, K_2SO_4, K_3PO_4 and $ThCl_4$ over a concn. range up to approx. 0.001 *N*. The ζ-potential decreases as the concn. increases due probably to a decrease in the thickness of the double layer although the charge on the particle may actually increase. MALCOLM DOLE

Influence of size, shape and conductivity on cataphoretic mobility and its biological significance. HAROLD A. ABRAMSON. *J. Phys. Chem.* **35**, 289–308(1931); cf. *C. A.* **24**, 5568.—By suspending glass, quartz or other particles in a protein soln., both particles and flat surface of the cataphoresis cell can be coated with the same substance, fulfilling the condition of chem. similarity of glass and particle surface. Under these conditions, the ratio of cataphoretic to electroösmotic mobility was found to be one. The mobility of mammalian red cells at p_H 7.35 in *M*/15 phosphate buffer varied from 0.55μ/sec./v./cm. for rabbit to 1.65μ/sec./v./cm. for the dog. FRANK URBAN

Electrophoresis and the diffuse ionic layer. MELVIN MOONEY. *J. Phys. Chem.* **35**, 331–44(1931).—The theory of the diffuse ionic layer and its influence on the electrophoresis of a sphere are outlined, and a theoretical equation for the limiting slope of the mobility-curvature curve is given. Equations are given for *surface charge* and *surface cond.* Various anomalous effects in cataphoresis suggest a plastic adsorbed layer which seems to have a profound effect on the electrokinetic potential. The *Debye-Hückel cataphoresis equation* is limited to conditions in which the colloidal particle is much smaller than its diffuse ionic layer. FRANK URBAN

Density, surface tension and adsorption in the water-ammonia system at 20°. H. H. KING, J. LOWE HALL AND GLEN C. WARE. *J. Am. Chem. Soc.* **52**, 3128–35(1930); cf. *C. A.* **22**, 2092.—The surface tension and d. of water-NH_3 were detd. (without transferring the liquid) by the use of a special pycnometer having a capillary side tube. Very complete data are given for the range of concns. of NH_3 from 50 to 100%. Observed surface-tension values agree well with calcd. values except in the middle region, where a depression conforms to Worley's rule (*C. A.* **8**, 1369) for perfectly miscible liquids. The relation of this deviation to adsorption is discussed. The surface tension of liquid NH_3 at 0°, 10° and 20° was accurately detd. By the Ramsey-Shields method used the mol. wt. of liquid NH_3 at 0–20° was found to be 24.5. An equil. system corresponding approx. to $(NH_3)_2$ (60%) $\rightleftharpoons$ 2 NH_3 (40%) is suggested. A. L. J.

The chemical theory of adsorption phenomena. E. V. ALEKSEEVSKII. *J. Russ. Phys.-Chem. Soc.* **62**, 817–26(1930).—Adsorption due to secondary valencies of the adsorbent atoms is discussed. Al_2O_3 activated at 400° is considered to have the structure



which corresponds to a water content of 4.2%. The addn. of H_2O to the "unsatd." Al atom renders it inactive. This explains why nonelectrolytes such as alcs. are readily adsorbed from the vapor phase but not from aq. soln. Heating to higher temps. transforms the chain structure into a closed ring in which all the Al atoms are inactive. B. SOYENKOFF

Poisoning effects of water vapor on the adsorption of carbon dioxide by manganese dioxide. H. W. FOOTE AND J. K. DIXON. *J. Am. Chem. Soc.* **53**, 55–8(1930); cf. *C. A.* **24**, 3937.—The adsorption isotherms at 25° of CO_2 on MnO_2 with and without adsorbed water were detd. and the corresponding behaviors of CO toward MnO_2 with and without adsorbed water were qualitatively detd. The adsorption of CO_2 on MnO_2 is reversible. Water reduces the adsorption markedly, the results indicating the presence of active adsorption patches on the oxide surface, since the first portion of water adsorbed results in the greatest lowering of the CO_2 adsorbed. Adsorption of CO on MnO_2 is more complicated and is highly irreversible, but the presence of water has an effect similar to its effect on the adsorption of CO_2. With CO_2 when approx. 35% of the surface was covered with water the amt. of CO_2 adsorbed was reduced by 50%. J. W. SIMPLEY

The activation and sorption of the rare gases by palladium (argon, neon, helium).

M. E. KLARMANN. *Z. Physik* **65**, 358–84(1930).—Suitable heat treatment activates Pd ribbon in such a way that 1 vol. of Pd adsorbs the rare gases to the following extent: Ne 446 vols., A 319 vols. The increase of resistance amounts in the first case to 33%, in the second to 24%. Adsorption of He is demonstrated, but quant. data are not given. EGON BRETSCHER

Investigation on the influence of adsorbed gases on the high-frequency resistance of platinum wire. HANS DOBRETSBERGER. *Z. Physik* **65**, 334–57(1930).—A short-wave oscillator is coupled with a resonance circuit, contg. the wire whose resistance is to be measured or a resistance of known value. An indicator circuit measures the energy of the resonance circuit by compensation. The resistance of the wire is detd. in high vacuum and after it has been charged with gases. *Results.*—It is possible to study gas adsorption by means of the skin effect. Pt adsorbs on the surface N_2 and CO_2 as shown by the increase of the high-frequency resistance, and it is found that the process is reversible. H_2 is adsorbed (as shown by the variation of the high-frequency resistance) and absorbed as well (as shown by the change of resistance for continuous current). EGON BRETSCHER

The effect of disintegration of charcoal on the adsorption of fatty acids. B. BRUNS. *Kolloid-Z.* **54**, 33–5(1931).—Unactivated, pure sugar charcoal showed the same reversal of Traube's rule as found by Dubinin (cf. *C. A.* **23**, 1549) with a HNO_3-treated charcoal. After grinding, the charcoal obeyed the rule except with HCOOH. The increase in adsorption increases with increase in the no. of C atoms in the fatty acid. The reversal of Traube's rule depends on the presence of pores which are not accessible to compds. with great mol. vols. ARTHUR FLEISCHER

The nomenclature of atmospheric disperse systems. HANS GRIMM. *Kolloid-Z.* **54**, 1–2(1931).—Inconsistencies are pointed out in the nomenclature applied in German literature to disperse systems with air as the continuous dispersing phase. A. F.

Magnetic properties of thin cobalt films, electrolytically deposited. E. P. T. TYNDALL AND W. W. WERTZBAUGHER. *Proc. Iowa Acad. Sci.* **36**, 297(1929).—Initial magnetization curves and hysteresis loops of Co films from 40 to 100 millimicrons thick show the same general characteristics as Fe films (*C. A.* **22**, 1897) of the same range of thickness. The sp. properties, however, depend largely on the acidity of the electrolyte. The linear relation between thickness and reciprocal of coercive force discovered for Fe films is not in general true for Co, though it is approximated in some series of films. W. G. GAESSLER

Diffusion of electrolytes, nonelectrolytes and colloidal electrolytes. JAMES W. MCBAIN AND TSUN H. LIU. *J. Am. Chem. Soc.* **53**, 59–74(1930).—The Northrop diffusion cell with diaphragm of sintered glass was used to det. rates of diffusion, giving results reproducible within a few tenths of a percent in a time relatively short as compared with the laborious classical methods. Diffusion coeffs. for various concns. of KCl at 25° into H_2O and of K laurate into H_2O and into less concd. solns. of K laurate at 25° are given. The results for a number of electrolytes and for soap were found to be independent of the nature and porosity of the diaphragm. The Nernst equation for electrolytes at great diln. and the Einstein equation for uncharged spherical particles are generalized in the equation $D = \frac{iRT}{\text{sum of resistances}} = \frac{iRT}{\Sigma(1/U_m)}$, where $1/U_m$ is the resistance to movement of a particular species. The predominant influence is the value of the van't Hoff i factor. The data for sugar solns. show that the viscosity contributed by the dissolved substance is not that which dets. the rate of diffusion. The diffusion column of one substance may by the bombardment of its mols. accelerate, retard or even reverse the diffusion of another substance. J. W. SHIPLEY

Liquid ammonia as a lyophilic dispersion medium. ROBERT TAFT. *J. Phys. Chem.* 34, 2792–2800(1930); cf. *C. A.* **24**, 1563.—Samples of various substances of 0.1 g. were placed in tubes contg. 10 cc. anhyd. NH_3, the tubes sealed off and kept in liquid NH_3 bath for 48 hrs. Observations for dispersion were made while the substance was at the temp. of boiling liquid NH_3 and also at room temp. Dextrin, cellulose acetate, inulin, glycogen and the nitrocottons dispersed well in liquid NH_3 at its b. p. Proteins and related substances did not disperse, except zein, gliadin, nucleic acid, proteose, peptone and bacto-peptone. Gums and resins dispersed poorly. Most marked dispersion in this class was that of gamboge, ammoniac gum and benzoin gum. All dyes tested showed some soly. but in no case was it in excess of 1%. Soaps were not dispersed by liquid NH_3. The author discusses the probability that these substances are in the colloidal state when dispersed. Also Ostwald's view that Na and sulfur are colloidally dispersed in liquid NH_3 is discussed. H. M. STARK

Photometric measurements of the concentration and dispersity in colloidal solutions. II. TORSTEN THORELL. *Kolloid-Z.* **54**, 58–66(1931); cf. *C. A.* **25**, 876.—The dispersity quotient (DQ) is defined as the ratio of the consts. defined by the equation $K = (1/d)\lg(I_0/I)$ and detd. at a short and a long wave length. In the equation, d is the thickness of soln. layer, I_0 is the incident intensity, and I is the emerging light intensity. Theoretically, DQ is a const. equal to 5.7 at very high dispersions up to 35$\mu\mu$, in the region in which Rayleigh's law is valid. From 35 to 75$\mu\mu$ particle sizes decreases almost linearly to a value of 1, which is the lower limit of its value. DQ is easy to measure when light intensities at two separated wave lengths are used. It is independent of the concn. It may be used as a dispersity control for the reproduction of sols. By the use of standard curves it is possible to det. concn. in sols with unknown dispersities. It makes it possible to det. abs. particle sizes without knowing the concn. of the dispersed phase. Time measurements of the flocculation of mastic sol by $CaCl_2$ and Fe_2O_3 sol by Na_2SO_4 by DQ measurements give a curve of the type $100(K_t - K_0)/K_0 = qt^m$. The aging process of a mastic sol shows a similar curve. ARTHUR FLEISCHER

Preparation of water-soluble colloidal mercury. A. F. GERASIMOV AND B. M. KOZUIREV. *J. Russ. Phys.-Chem. Soc.* **62**, 833–8(1930).—To 30 cc. Paal's mixt. (cf. *C. A.* **23**, 3840) is added 24 cc. glacial AcOH, the whole heated on a water bath until it no longer smells of H_2S (or a few min. if no H_2S is present) and a soln. of 0.375 g. $HgCl_2$ in water is added drop by drop. The colloid is pptd. with Na_2CO_3, washed with water at least 4 times and redissolved on addn. of NaOH. The soln., when evapd. on a water bath, yields a black powder contg. 27.6% Hg. Its 1% soln. is not affected by air and can therefore be preserved indefinitely. The colloid particles are negatively charged. In the above prepn., the protein mixt. itself (mainly its diffusible components) acts as the reducing agent. AcOH hinders the reduction; on the other hand, it increases the stability of the resulting sols. The amt. of NaOH used in redissolving the colloid should be just sufficient to produce a clear soln.; an excess of the alkali will cause a partial pptn. when the soln. is evapd. The sol is pptd. by AcOH, but it dissolves in excess. In acid soln., the coagulating power of the electrolytes increases to a greater extent with the valence of the cation than with that of the anion. In alk. soln. the cation is again much more important, satd. KCl and K_2SO_4 producing only a partial pptn., while small concns. of $AlCl_3$ completely coagulate the sol. The chlorides in general, render the alk. sol more resistant toward AcOH. B. SOYENKOFF

Preparation of water-soluble colloidal antimony. A. F. GERASIMOV AND I. S. MOROZOV. *J. Russ. Phys.-Chem. Soc.* **62**, 827–32(1930).—Two methods are suggested. (1) A mixt. of 24 cc. glacial AcOH and 30 cc. Paal's protein mixt. is warmed for 10 min. on the water bath; 3 cc. of $SbCl_3$ soln. (14.69 g. $SbCl_3$ + 14 cc. glacial AcOH + 14.4 g. tartaric acid + 25 cc. H_2O) is then added, followed by 4.5 cc. of 10% H_3PO_2 soln. Heating is continued until the mixt. is dark colored (15–20 min.). On cooling, the colloid is pptd. with Na_2CO_3 soln., washed and dissolved in H_2O on addn. of 2–3 drops 20% NaOH. The soln. is evapd. on the water bath, a partial vacuum being applied, and H_2 is passed through. (2) To 54 cc. of acid protein soln. (24 cc. glacial AcOH + 30 cc. Paal's mixt.) is added 7 cc. glacial AcOH, and the whole warmed for 10 min. Next are added 20 cc. of 5% potassium antimonyl tartrate, 4 cc. of 10% H_3PO_2 and, drop by drop, 0.5 cc. of HCl of sp. gr. 1.19. The heating is continued for about 10 min. (until the color deepens to dark brown). The remainder of the procedure is similar to (1). Glistening black powder is obtained contg. 39% Sb, 99.9% of which is in the free state. The powder dissolves rapidly in water, yielding a negatively charged sol of dark-red color. It is advisable to fractionate Paal's mixt. by adding a small quantity of glacial AcOH and filtering the ppt., and to use the filtrate in preparing colloid Sb. Paal's mixt. that has been aged is preferable to a freshly prepd. sample. The reduction process requires the presence of HCl or some other strong acid, an excess of HCl, however, will redissolve metallic Sb. The sol should be kept in a closed container, since atm. O_2 decolorizes it. The powder is very stable. B. SOYENKOFF

Preparation of water-soluble colloidal copper. A. F. GERASIMOV AND G. P. MARVEEV. *J. Russ. Phys.-Chem. Soc.* **62**, 839–42(1930).—To 30 cc. of Paal's mixt. is added 27 cc. glacial AcOH, the whole heated for 4–5 min. on the water bath, then 4 cc. of 15.68% $CuSO_4$ introduced, again heated for 4–5 min., about 5 cc. of 10% H_3PO_2 added and the heating continued for 5–6 min. On cooling the colloidal Cu is pptd. completely with Na_2CO_3 soln., washed 3–4 times and redissolved in H_2O on addn. of a few drops of NaOH soln. The resulting sol, when evapd. on the water bath, yields a water sol. powder contg. 25% Cu. The protein mixt. used in the above prepn. should be "aged" for 2 months in order to free it from H_2S. BASIL C. SOYENKOFF

The effect of pressures up to 17,000 atmospheres upon some colloidal suspensions. ROBERT WILSON AND THOS. C. POULTER. *Proc. Iowa Acad. Sci.* **36**, 295–6(1929).—Colloidal $Fe(OH)_3$ was found to be pptd. immediately, when subjected to pressures of 300 atm. or above. When subjected to pressures of much less than 300 atm. pptn. was a little slower and pressures of as low as 100 atm., were found to ppt. colloidal $Fe(OH)_3$ completely within about 30 min. Colloidal S is pptd. very little by pressures of less than 9000 atm. But the pptn. is rather rapid and complete, when pressures as high as 17,000 atm. are used. Colloidal Ag is pptd. very slightly by pressures much below 9000 atm. But it is completely pptd. within a few min. by pressures of 17,000 atm. Prussian blue requires a pressure of approx. 2000 atm. or above for immediate and complete pptn. Red colloidal Au prepd. by the tannin method, is readily pptd. by pressures above 2000 atm. Of the colloidal suspensions studied Mo blue was the only one not completely pptd. by pressures above 9000 atm., if the colloid is allowed to remain under pressure from several min. to a half hr. Mo blue showed some color change not noticed in any of the other suspensions studied. Samples subjected to pressures of 2000 to 9000 atm. changed from blue to green and showed very little pptn. However, at pressures above 9000 atm. the suspension retained its original color and was slightly pptd. Mo blue was the only one remaining in the suspended state after the pressure had been above that necessary for the formation of ice six, which is between 8000 and 9000 atm. W. G. GAESSLER

The precipitate rule in the system: cellulose-cupric ammonium hydroxide-sodium hydroxide. I. SAKURADA. *Kolloid-Z.* **54**, 43–6(1931).—With increase in the quantity of ppt., the Cu-alkali-cellulose increases to a max. and then decreases. If the comparison is made in solns. with the same proportion of ppt. combined with Cu, Ostwald's pptn. rule is followed. The cellulose is changed by a topochem. reaction to a compd. with different soly. characteristics. ARTHUR FLEISCHER

Ion exchange on the surface of colloidal platinum. S. W. PENNYCUICK. *Kolloid-Z* 54, 21–32(1931); cf. *C. A.* **22**, 709, 2305, 4306; **23**, 3389.—Ion exchange on unfiltered Pt sol with 0.13 to 0.15 g. Pt/l. and prepd. by sputtering in cond. water was detd. in HCl, KCl, NaCl, $BaCl_2$, $CaCl_2$, $AlCl_3$, $FeCl_3$, $AgNO_3$, KCN solns. up to 0.0014 *N* by measurement of the cond. at 18°. The results with HCl show that no acid is adsorbed and that chloride ion is not adsorbed. The ion exchange is cation of the salt for H ion present on the Pt surface. Ba and Ca show very small effects while the exchange with Na is within the exptl. error. $AgNO_3$ shows a high exchange despite the low value at which coagulation occurs. The expts. show that there is no sudden change at the coagulation point. That ionic exchange is a cause of coagulation is seen from the $\sqrt{c}$ concn. curves. The ionic exchange is equiv. except where hydrolysis occurs. The results with KCN show the importance of hydrolysis in ion exchange. A. F.

The flocculation of ferric hydroxide sols by various electrolytes and the Schulze-Hardy law. AUGUSTIN BOUTARIC AND JEAN BOUCHARD. *Compt. rend.* **191**, 613–5 (1930).—A $Fe(OH)_3$ sol of concn. corresponding to 1.28 g. Fe_2O_3 per l. was prepd. by hydrolysis of $FeCl_3$. The mg. equiv. required to cause flocculation of one l. when added as a *N* soln. of K salt (except where noted otherwise) of anions was found to be as follows: Cl^- (80.0), I^-(77.8), Br^-(73.6), NO_3^-(73.6), ClO_3^-(72.8), ClO_4^-(72.8), CNS^-(24.8), MnO_4^- (0.0), $CH_3CO_2^-$(6.0), $H_2PO_2^-$(5.8), F^-(1.24), OH^-(0.36), CN^-(0.35), $(Na)_2S_2O_3^-$ (0.75), $(Na)HSO_2^-$(0.72), CO_3^{--}(0.36), SO_4^{--}(0.36), CrO_4^{--}(0.35), PO_4^{---}(0.36), $CrH(O_4)^{--}$ (0.34). The exceptions to the rule of Schulze-Hardy in the above list indicate that other factors than valence must be considered and adsorption is suggested. The results in this paper do not agree well with those obtained by Freundlich (*Z. physik. Chem.* 44, 131(1903)), who used other than K salts in many cases. A. L. T.

The coagulation of methylene blue with mercuric chloride. N. N. ANDRONIKOVA. *Kolloid Z.* 54, 82–4(1931).—Na, K, Mg, Ca, Ba, Fe, Al and Mn chlorides do not coagulate methylene blue solns. Fifty cc. of soln. contg. 0.05 g. of methylene blue is first coagulated on the addn. of 0.06 g. $HgCl_2$. The color of the ppt. depends on the amt. of $HgCl_2$ varying from blue to violet. The $HgCl_2$ in the ppt. reaches a max. with increasing Cl_2 in soln. and then decreases through a min. The coagulation is reversible; heat or dilu. causes soln. of the ppt. KSCN shows the same behavior with methylene blue. ARTHUR FLEISCHER

Preparation and study of some hydroxide jellies. SATYA PRAKASH AND N. R. DHAR. *J. Indian Chem. Soc.* **7**, 591–606(1930); cf. *C. A.* **22**, 1080; **24**, 4977.—The jellies of $Fe(OH)_3$, $Cr(OH)_3$ and $Al(OH)_3$ were obtained by treating the metallic chlorides or nitrates with NaOAc, $(NH_4)_2SO_4$ and NH_3 in suitable concns., the details of which were investigated in a comparative way by varying the concn. of different jelly-forming constituents. The jelly of $Zr(OH)_4$ was obtained by the addn. of NaOAc only to Zr-

$(NO_3)_4$ soln. The addn. of SO_4 ions favored the formation of this jelly; but addn. of NH_3 was not necessary. The jelly of $Sn(OH)_4$ was obtained by the addn. of NaOAc and $(NH_4)_2SO_4$ to $SnCl_4$ soln. No addn. of NH_3 was necessary unless there was much free acid in the $SnCl_4$ soln. The mechanism of the formation of these hydroxide jellies is explained on the assumption of the formation of colloidal hydroxides by the action of NaOAc on the metallic salts, which are stabilized by the adsorption of metallic and H ions. The function of NH_3 is to reduce the H ions to such an extent as to make the system liable to coagulation by $(NH_4)_2SO_4$. The $(NH_4)_2SO_4$ gradually reduces the pos. charge of the colloidal particles and the system thereby becomes more viscous and hydrated, and finally the jellies are obtained. All of these jellies were obtained in acid medium. A comparative study of H-ion concns. of the jelly-forming systems showed that the jellies of different metals cannot be obtained at the same H-ion concn. The jellies most readily obtained are of those metals, as Zr and Sn, that on the addn. of jelly-forming constituents give a medium of greatest H-ion concns. These jellies are, however, less stable than those obtained in a medium of less H-ion concns., such as Al, Cr and Fe. The hydroxide jellies of Ni, Co, Cu, Cd, Hg and Th could not be obtained by the methods used for Fe, Cr, etc. It appears that in the case of these substances, the agglomeration tendency of the particles is more pronounced than the hydration tendency. W. C. FERNELIUS

Hydrogels. X. Manganese dioxide hydrate. A. SIMON AND F. FEHER. *Kolloid-Z.* **54**, 49–58(1931); cf. *C. A* **23**, 1334; **24**, 1782.—Isobaric vapor pressure curves at 10 mm. were detd. from 50° to 400° for 6 differently prepd. MnO_2 gels with H_2O content varying from 0.39 to 0.53 mol. All of the curves were continuous and indicated the absence of a definite hydrate. MnO_2 behaves very much like PbO_2. Peptization expts. show MnO_2 to be an irreversible gel that ages very rapidly. A. F.

The influence of volume in swelling. D. JORDAN LLOYD. *Kolloid-Z.* **54**, 16–9 (1931); cf. *C. A.* **23**, 5082.—The swelling of gelatin at 0° in NaOH solns. up to p_H of 13 was detd. At each p_H a given quantity of gelatin was treated with 3 different vols. of soln. The detns. fall on a single curve, showing that swelling is independent of the vol. of soln. when hydrolysis is repressed. The swelling effect in NaCl solns. to 1 *M* at 0°, 18° and 25° is independent of the vol. of soln. used. Salts such as $NaNO_3$ which cause a rapid soln. of the gelatin show a time-swelling curve that is S-shaped. ARTHUR FLEISCHER

Blocking effect of membranes. G. H. BISHOP, FRANK URBAN AND H. L. WHITE. *J. Phys. Chem.* **35**, 137–43(1931).—Blocking of membranes may be due to differences in streaming potentials of individual membrane capillaries. The capillary having the higher streaming potential will transport water electroösmotically through the capillary of low streaming potential. Cellophane membranes treated with $ThCl_4$ showed markedly decreased blocking, presumably due to lower streaming potential values. Preliminary detns. of streaming potentials with Pyrex capillaries of less than 50μ radius indicate a size-difference in streaming potential. FRANK URBAN

A photomicrographic study of Liesegang rings. SUZANNE VEIL. *Compt. rend.* 191, 611–2(1930).—A gelatin soln. impregnated with $K_2Cr_2O_7$ was spread thin on a glass plate and a single drop of $AgNO_3$ soln. placed on this. The Liesegang rings that developed were examd. photomicrographically. The principal rings were found to be so spaced that the square root of the distance between successive rings varied in a simple arithmetic series. This quantity when plotted against the numerical order fell closely on a straight line. A. LLOYD TAYLOR

The optical properties of protein sols and the influence of neutral salts and p_H. N. YERMOLENKO. *Kolloid-Z.* **54**, 66–73(1931).—Index of refraction (n) measurements of 1 and 2% gelatin solns. at 25° showed no change with time. A 2.5% soln. heated to various temps., and rapidly cooled to 25° showed the same value of n under all the conditions. The n does not seem to be a function of the condition of aggregation of the colloid. The same results were obtained with a glutin (fish glue) soln. Gelatin solns. from 0.59 to 2.5% treated with H_2O, *N* NaCl and *N* $CaCl_2$ gave equations $K = (n - n_1)/c$ with the consts. H_2O 0.00167, NaCl 0.00275 and $CaCl_2$ 0.00328. Measurements on a 1% gelatin at p_H from 1.22 to 10.9 showed very little effect on n. Glutin solns. in 0.5 *N* solns. of Li, K, Na, Mg, Ca, Ba, Al and Fe chlorides showed a const. n after correction for the salt was made. ARTHUR FLEISCHER

The preparation of colloids by the method of condensation of molecular rays. N. TOMASHEVSKII. *Kolloid-Z.* **54**, 79–81(1931); cf. Semenov and Shalnikov, *C. A.* **20**, 3622.—Na sol in ether was stable for a month and showed an absorption spectrum from 6238 to 4696 A. U. with the violet end polarized. The xylene sol was stable for 12–20 hrs.; the benzene sol had a dirty-violet color and was stable for 3 days; the

hexane sol was very much like the benzene sol and was difficult to prepare. K sol in ether had a blue color and was stable for 2 months; in xylene it had a green-blue color and was stable for 10 days. Rb and Cs sols in ether had a dark-blue color and were stable only for 20 min. Hg in H_2O and Cd in ether were of gray color and stable for 20 hrs. The particle dimensions are greater than mol. ARTHUR FLEISCHER

The action of polyhydroxy compounds in the synthesis of hydrosols. IV. Sugars. A. V. DUMANSKII AND L. G. KRAPIVINA. *J. Russ. Phys.-Chem. Soc.* **62**, 1713–21(1930); *Kolloid-Z.* **54**, 73–9(1931); cf. *C. A.* **24**, 3939.—The results of the systems: NaOH–$FeCl_3$–sugar are effectively represented by the triangle plot. The order for decreasing effectiveness of peptization is lactose, levulose, maltose, galactose, glucose, sucrose and raffinose. The property depends on the structure of the sugar. ARTHUR FLEISCHER

A theory of solubility. P. A. BOND. *Proc. Iowa Acad. Sci.* **36**, 262–3(1929).—The theory supposes that soly. is due to 2 forces: first, one that tends to arrange substances into the lattice forms that they would have in the solid state, second, to thermal forces tending to break up such lattice forms. The fundamental assumption is made that lattice forms consisting of combinations of solvent and solute must tend to form where soln. exists. It is shown that an ideal soln. based on tendencies to form lattice structures between solute and solvent equal to those of the original solute and solvent conforms to Raoult's law. Double layers, complex ions, hydrolysis, etc., find ready explanation by the theory. W. G. GAESSLER

The state of distribution of lichosan in dissolved and solid states. HANS PRINGSHEIM AND CURT LAMM. *Kolloid-Z.* **54**, 36–42(1931); cf. *C. A.* **23**, 376, 377.—Cryoscopic, b. p. and viscosity measurements and fluoroscopic tests were made on lichosan pptd. from soln. with alc. Lichosan prepd. by the hydrolysis of lichenin triacetate in acetone or chloroform, on cold pptn. shows an aggregation of 5 mols. of $C_6H_{10}O_5$; hot pptn. shows an initial aggregation of 3 mols., which increases on aging of the soln. Fluoroscopically, there is a decided difference between aged and unaged samples; the smaller mol. aggregate shows the greater fluorescence. Lichosan prepd. by the hydrolysis of lichenin in glycerol shows a mol. wt. of about 825 when cold-pptd. and values from 200 to 1290 for hot pptn., the value depending on the treatment of the soln. ARTHUR FLEISCHER

The mobility of the perchlorate ion in methanol. E. D. COPLEY AND (SIR) HAROLD HARTLEY. *J. Chem. Soc.* **1930**, 2488–91.—The elec. conductivities of 0.0001–0.002 *N* LiClO$_4$, NaClO$_4$ and AgClO$_4$ solns. in MeOH are detd. at 25°, from resistance measurements by the method of Frazer and Hartley (*C. A.* **20**, 136). The detd. cond. values agree with those calcd. from: $\Lambda_c = \Lambda_0 - x\sqrt{c}$ (where, Λ_0 is the cond. at infinite dilu., and x is a const.), excepting in the more dil. AgClO$_4$ solns. The calcd. (from the Debye-Hückel-Onsager equation: $x = 0.957\ \Lambda_0 + 158.1$) and observed values of x agree well. The mean value for the ClO_4^- mobility (detd. by subtracting the mobilities of the resp. cations found by F. and H., from the Λ_0 values) given by LiClO$_4$ and NaClO$_4$ is 70.85, and the corrected value for Ag^+ is 50.3, in MeOH at 25°. The high mobility of the complex ClO_4 ion is explained by assuming that it is less solvated than other simpler ions, because of the weaker elec. field in its vicinity. J. B.

The conductivity of some uni-univalent salts in ethyl alcohol. E. D. COPLEY, D. M. MURRAY-RUST AND (SIR) HAROLD HARTLEY. *J. Chem. Soc.* **1930**, 2492–8.—The conductivities of LiCl, LiNO$_3$, AgNO$_3$, NaBr, KI, RbI, LiClO$_4$, NaClO$_4$ and AgClO$_4$, and the mobility of the ClO_4 ion are detd. in 0.0001–0.002 *N* EtOH solns. at 25°, a method being developed for *prepg. cond. EtOH*. The Λ_0 values for the perchlorates show that in EtOH the ClO_4 ion has a greater mobility than the other anions, indicating that it is less solvated. The graphs of the results show, in agreement with the theory for strong electrolytes, that the decrease in cond. is proportional to the square root of the equiv. concn. To prep. cond. EtOH (with sp. cond. = 0.003×10^{-6} mhos) first most of the H_2O in the alc. is removed by refluxing for 24 hrs. with freshly fired lime; then it is distd. through a long fractionating column; the last traces of H_2O are removed by distn. from Al ethoxide (made by warming the lime-dried alc. with Al amalgam for some hrs.), and finally volatile impurities are removed by refluxing in a current of pure air in the presence of CuSO$_4$ (anhyd.). J. BALOZIAN

Application of the Debye theory to binary liquid mixtures. III. Derivatives of ammonia. JOHN M. FOGELBERG AND JOHN W. WILLIAMS. *Physik. Z.* **32**, 27–31 (1931). Mol. fractions, densities, dielec. consts., mol. polarization of the solns., P_{12}, and mol. polarization of the solute, P_2, are tabulated for benzene solns. of *o*-chloroaniline, *m*-chloroaniline, *p*-chloroaniline, dimethylaniline, methylaniline, triethylamine and diethylamine. Data for these and other ammonia derivs. are tabulated with the

detd. dipole moments. The data are discussed from the viewpoint of stereochemistry. It is shown that the dipole moments of such mols. can, in general, be computed only if account is taken of the position in space of the characteristic vectors of the groups on the basis of (1) the stereochemistry of the atoms which constitute the groups, and (2) the attraction and repulsion between the groups. WILLIAM E. VAUGHAN

The partial specific volume of potassium octoate in aqueous solution. DAVID G. DAVIES AND CHARLES R. BURY. *J. Chem. Soc.* 1930, 2263–7.—The d_{25}^{4} of various aq. K octoate solns. (0–28%) are detd. by the method of Hartley and Barrett (*C. A.* 5, 2996), and the partial sp. vols. calcd. by Hildebrand's method ("*Solubility*," 1924, 64). The abrupt change in the slope of the d.-concn. curve at 6–9% of soap is attributed to the existence of a crit. concn. for micelles and is far less marked at higher temps. This shows that the tendency to form micelles decreases with increasing temp. The curve of the partial sp. vol. of K octoate against % K octoate resembles very closely that of butyric acid (Grindley and Bury, *C. A.* 23, 3616); the rapid rise indicates the crit. concn. for micelles and occurs at 7.5–8.0% of soap. This crit concn. decreases with increasing temp. J. BALOZIAN

The calculation of activity coefficients from solubility measurements. II. Thallous iodate. CECIL W. DAVIES *J. Chem. Soc.* 1930, 2410–21.—The activity coeffs. of dil. aq. $TlIO_3$ solns. in the presence of uni-univalent (KCl, NaCl, KNO_3, NaNO) and uni-bivalent (K_2SO_4, Na_2SO_4) salts are calcd. (*C. A.* 25, 949); the undissocd. parts of the salts present are taken into consideration. The results of LaMer and Goldman (*C. A.* 23, 5085) for $TlIO_3$ at 25° are used. If the incomplete dissocn. of the salt concerned is taken into consideration, the activity coeffs. of $TlIO_3$ lose all abnormality. In uni-univalent salt solns. sp. influences are not appreciable at concns. below 0.1 *N*, and with multivalent electrolytes not below 0.05 *N*. In its limiting form the Debye-Huckel equation for the activity coeff. of a sparingly sol. uni-univalent salt is $-\log f = A(\mu)^{1/2}$ (where, f = the activity coeff., μ = the ionic strength, and A = a const. (0.47 is obtained by D. for dil. $TlIO_3$ solns.)). The value of A varies from salt to salt, but is always less than Debye-Huckel's value of 0.50. Bronsted's theory of the sp. interaction of ions (*C. A.* 16, 2057; 18, 779) is not supported by the soly. data for $TlIO_3$. The value of the dissocn. const. of the $MgIO_3^+$ ion is 0.19. **III. The unsymmetrical valence type.** *Ibid* 2421–6.—The calcns. of the preceding paper are extended to multivalent electrolytes, the results of LaMer and his co-workers for the solubilities of luteocobaltic dianminotetranitrocobaltiate (LN_3), luteocobaltic diamminodinitroöxalatocobaltiate (LO_3), and $La_2(IO_3)_3$ in very dil. K_2SO_4 solns. being used. It is shown that the deviations from the Debye-Huckel theory of dil. solns. ("the elec. type effect" or "the unsymmetric valence type effect") are due wholly to the incomplete dissocn. of the salts concerned. In the calcns. it is assumed that at these high dilns. only the 2 ions of high valency are assocd. (in these cases the L^{+++} or La^{+++} and the SO_4^{--} ions), the salt being otherwise completely dissocd. Thus, the deviation of the actual soly. from the theoretical (as detd. by the Debye-Huckel limiting equation) is due in these solns. to either the LSO_4^+ or $LaSO_4^+$ ions, whose concns. in the solns. are calcd. The value of the dissocn. const. obtained for the $LaSO_4$ cation agrees closely with that derived from the cond. of $La_2(SO_4)_3$ solns. J. BALOZIAN

Thermodynamic properties of weak acids and bases in salt solutions, and an exact method of determining their dissociation constants. HERBERT S. HARNED AND BENTON B. OWEN. *J. Am. Chem. Soc.* 52, 5079–91(1930).—The method of calcg. dissocn. consts. from e. m. f. of cells without liquid junction developed in an earlier paper by Harned and Robinson (*C. A.* 23, 752) is extended in a study of HCOOH in *M* solns. of KCl and NaCl. The equation $\log k' - \sqrt{\mu'} = \log k^0 - 2B\mu'$ is shown to be valid in dil. solns. by plotting $\log k' - \sqrt{\mu'}$ against μ' for HOAc′ and HCOOH and obtaining a straight line. The values of the dissocn. const., K, calcd. without extrathermodynamic postulates are: for the acids, HOAc (1.75×10^{-5}), and HCOOH (1.77×10^{-4}), and for the bases derived from NH_3 (1.79×10^{-5}), CH_3NH_2 (43.8×10^{-5}), $(CH_3)_2NH$ (52.0×10^{-5}) and $(CH_3)_3N$ (5.45×10^{-5}). Full details of the method of calcn. are given. A. LLOYD TAYLOR

The temperature coefficient of dissociation of acetic acid in potassium and sodium chloride solutions. HERBERT S. HARNED AND GEO. M. MURPHY. *J. Am. Chem. Soc.* 53, 8–17(1931).—E. m. f. measurements at 20°, 25° and 30° were made of the cells H_2 | HCl (0.01 *M*), MCl (*m*) | AgCl | Ag and H_2 | AcOH (0.2 *M*), MCl (*m*) | AgCl | Ag where MCl = KCl and NaCl and *m* varied from 0 to 3.0 *M*. Temp. coeffs. of the cells were calcd. from a linear formula. From the results, the activity coeffs. and relative partial heat content of HCl in the salt solns. were calcd. The H-ion concn. and ionic

activity coeffs. were calcd. for AcOH in the salt solns. The dissocn. const. of AcOH varies very little from 20° to 30° and is found to be 1.75×10^{-5}. The excess or elec. contribution to the partial molal heat content of HCl in the salts solns. is found to be approx. proportional to the square root of the total molality. G. M. MURPHY

Activity coefficients of electrolytes. V. The principle of specific interaction in cadmium and magnesium sulfate and chloride solvents. HAROLD B. FRIEDMAN AND VICTOR K. LAMER. *J. Am. Chem. Soc.* **53**, 103-5(1931); cf. *C. A.* **23**, 5085.—Soly. measurements at 25° were made of $TlIO_3$ and $La(IO_3)_3$ in 0.05 *M* soln. of $MgSO_4$, $CdSO_4$, $MgCl_2$ and $CdCl_2$. The ratio Mg/Cd in soln. of the 2 satg. salts is almost identical when the anion present is SO_4. The $(SO_4/Cl)Mg$ ratio is lower than previously reported but may be due to analytical error. The results for $CdCl_2$ indicate that the specific interaction principle does not hold for this salt G. M. MURPHY

A summary of oxidation-reduction potentials. (a) Ferric-ferrous electrode; (b) mercuric-mercurous electrode; (c) manganese dioxide electrodes. STEPHEN POPOFF, A. H. KUNZ, J. A. RIDDICK AND W. W. BECKER. *Proc. Iowa Acad. Sci.* **36**, 263-4 (1929).—(*a*) The standard oxidation-reduction potential of the ferric-ferrous electrode was detd. from e. m. f. measurements of the cell: Pt, H_2 | HCl | HCl + $FeCl_3$ + $FeCl_2$, Pt. The concn. of the HCl was kept the same in both half cells in each series but the concn. of the ferric and ferrous salts was varied, the ratio being maintained equal to one. The acid concn. in the series consisted of 0.05, 0.1, 0.2, 0.5 and 1 molal HCl. From inspection of the equation $E = E_0 - 0.05915 \log \frac{C_{Fe^{\cdots}}}{C_{Fe^{\cdot\cdot}}} - 0.05915 \log \frac{\cdots}{Fe} \pm E_1$ it can be seen that the terms to the right of E_0 must be made equal to zero in order that E may equal E_0. By suitable math exptl. and graphical treatments, the foregoing were reduced to zero, and thus 2 of the former difficulties in interpreting oxidation-reduction potentials were eliminated. These difficulties are the uncertainty in regard to liquid-junction potentials and activity of one ion in the presence of other ions (see *C. A.* **23**, 1802). (*b*) E. m. f. measurements of the cell Pt, H_2 | $HClO_4$ | $HClO_4$ + $Hg(ClO_4)_2$ + $Hg_2(ClO_4)_2$, Pt were made. The mode of attack was similar to that in (*a*). (*c*) Attempts to measure the potentials of the $MnO_4^- - H^+ - MnO_2$ electrode and that of the MnO_2, H^+, Mn^{++} electrode failed because of secondary reactions of the electrode and because of the irreversibility of these electrodes (see *C. A.* **24**, 4465). W. G. GAESSLER

The theory of surface polarization. W. J. MÜLLER. *Z. Elektrochem.* **36**, 679-86 (1930). The present conflicting theories are reconciled by assuming that each of the 3 principal theories previously proposed (the oxide-film theory, the O theory and the metal theory) participate. A. P. SACHS

The determination of oxidation-reduction potentials from equilibrium data. STEPHEN POPOFF, V. B. FLEHARTY AND E. L. HANSON. *Proc. Iowa Acad. Sci.* **36**, 265(1929).—The detn. of the oxidation-reduction potentials is more reliable from equil. data than from e. m. f. data. The potential of the ferric-ferrous electrode was calcd. from the experimentally detd. equil. const. of the reaction: $2Fe(ClO_4)_3 + 2Hg \rightleftharpoons 2Fe(ClO_4)_2 + Hg_2(ClO_4)_2$. The perchlorates, Hg and $HClO_4$ are better suited for the detn. of the equil. const. than the nitrates, Ag and HNO_3 employed by Noyes and Brann (*C. A.* **6**, 3350). The true equil. const. of the reaction was detd. by suitable exptl. procedure and subsequent math. and graphical analysis. W. G. GAESSLER

Theory of passivity. XII. The passage of current through anodes, covered with an insoluble layer. WOLF J. MÜLLER. *Monatsh.* **56**, 191-6(1930); cf. *C. A.* **24**, 4786. With the aid of the law of Kirchhoff the relation between the current in the coating layer and that in the pores of a coated anode is expressed in a formula. With a poorly conducting layer the current in the pores is the total current and with increasing cond. the current goes more to the layer. The localized current metal-electrolyte in the pores of the layer is practically zero before the decompn. potential of the anode has been reached and reaches only values of a few ma. The theoretical potential of the formation of ferrate by the electrolysis of Fe in hot concd. alkalies is —0.15 v.; however, the observed potential is 0.65. The p. d. in the pores must be 0.84 v. E. SCHOTTE

Potential measurements of hydrogen electrodes in acid solutions in ether. GEROLD SCHWARZENBACH. *Helv. Chim. Acta* **13**, 896-907(1930).—The app. and materials used and the method of investigation are described in detail and the results tabulated for various concns. of H_2SO_4 for CCl_3CO_2H, HCl + alc., H_2SO_4 + alc., AcOH, and AcOH + varying amts. of H_2SO_4. In spite of uncertainties in the measurements it

is concluded that the acidity of acids in Et_2O soln. is much greater than in H_2O; over 10,000 times for a 2 *N* soln. of H_2SO_4, the acidity being almost independent of the concn. The Et_2O soln. of CCl_3CO_2H shows a strong acidity increase with concn., a 2 *N* soln. being as acid as H_2SO_4 and notably more so than HCl. Alc. and AcOH lower the acidity of H_2SO_4 as the H_2SO_4 concn. decreases and the quantities added increase. J. H. MOORE

Low-temperature oxidation. III. The lag in ignition of some hydrocarbons. JOHN S. LEWIS. *J. Chem. Soc.* 1930, 2241–54; cf. *C. A.* 24, 2715.—A comparative and qual. study was made of the effect of catalysts on the lag in ignition of hydrocarbons, by a modification of the "crucible" or drop method of Moore (*C. A.* 11, 1745). Catalysts that promote oxidation of hydrocarbons raise their ignition point and lower the temp. at which ignition ceases, when present in fairly large quantity. At higher temps. and in the presence of a min. amt. of catalyst, the time of lag is diminished. Those catalysts that do not promote this oxidation or have slow action (Zn and Sn in polished strips) affect the ignition temp. and lag but little. By the drop method, the promoters and inhibitors of knocking can increase the ignition temp. and the lag of paraffins. In general, the activities of pro- and anti-knock reagents cannot be compared by their effects on the ignition temp. and the lag. In the theory of Charch, Mack and Boord (*C. A.* 20, 1510), the idea of flameless combustion is substituted for active combustion ahead of the flame front induced by Pb particles and Et radicals. J. BALOZIAN

The influence of p_H values on the oxidation of ferrous sulfate. JACOB CORNOG AND ALBERT HERSHBERGER. *Proc. Iowa Acad. Sci.* 36, 264–5(1929).—Weighed quantities of $FeSO_4$ were dissolved in buffered solns. after which the resulting buffered solns. of $FeSO_4$ were aerated for 3 hrs. The quantity of Fe remaining unoxidized after 3 hrs.' aeration was, in each case, detd. by titrating the aerated soln. with $KMnO_4$ soln. The degree of oxidation was found to vary both with the initial concn. of $FeSO_4$ and with the p_H of the soln. These data indicate that under the exptl. conditions used little or no Fe is oxidized in soln. having a p_H less than 5. In solns. buffered to a p_H 5 the degree of oxidation increases with increasing Fe concn., but in solns. buffered to a p_H = 10 the degree of oxidation decreases with increasing Fe concn. The influence of the length of time of aeration on the degree of oxidation of a 0.01 *M* $FeSO_4$ soln. buffered to p_H 5 was studied. Different portions of the same 0.01 *M* $FeSO_4$ that had been buffered to p_H 5 were aerated for different periods of time. After aeration each portion was titrated with $KMnO_4$ soln. to det. the portion of Fe still unoxidized. The relation between the duration of oxidation and the percentage of Fe oxidized is expressed by the following equation: $\ln T = 0.032x - 0.01$. In this equation x is the percentage of Fe oxidized by aeration in T hrs. W. G. GAESSLER

A simple electrochemical method for the simultaneous determination of the constitution and equilibrium constant of complex ions in solution. Application to complex silver ions. FREDERICK K. V. KOCH. *J. Chem. Soc.* 1930, 2053–63.—A method is described for simultaneously detg. the constitution and equil. const. (when small) of complex ions in soln. from e. m. f. (E) measurements, showing its application to the Ag ion in NH_3-H_2O, acetonitrile-H_2O, pyridine-H_2O, and pyridine-EtOH mixts. In the first 3 cases E is det. exptly. for the cell $Ag \left| \begin{matrix} AgNO_3 \text{ in} \\ H_2O\ (c) \end{matrix} \right| \left| \begin{matrix} AgNO_3 \text{ in} \\ \text{mixt. } (c) \end{matrix} \right| Ag$, where c = 0.1 *M*, 0.01 *M*, or 0.001 *M*. Substituting this value for E in: $E = (RT/nF).\log_e[\gamma_{AB} \div (K_m/m^x)]$, ($K_m$ = equil. const. for concns. in g.-mols./l., γ_{AB} = the ratio of the soln. tensions in the solvents A and B, and has been previously detd. (*C. A.* 22, 1893), and x = no. of mols. of A with which a Ag ion is solvated), $\log_{10} K_m/m^x$ can be detd. This equation is a special case obtained from the general formula (deduced in the text) by assuming the liquid-liquid potential to be negligible. To det. $\log_{10} K_m/m^x$ when a pyridine-EtOH mixt. is used cond. detns. are made (*loc. cit.*) and used in conjunction with: $(RT/nF).\log_e[\gamma_{AB} + (K_m/m^x)] = (RT/nF).\log_e \gamma_{sat} - 0.126$. By plotting $\log_{10} K_m/m^x$ against $\log_{10} m$, K_m and x can be detd. simultaneously. Such a graph shows the points to lie about a straight line with slope $x = 2$ in accordance with $Ag_2A_2^{++}$. The acetonitrile-H_2O mixts. gave points which did not lie on a straight line, showing that the conditions for the detn. of the equil. const. were not fulfilled. J. B.

Molecular attractive forces and the velocity of chemical reactions. C. C. COFFIN AND O. MAASS. *Can. J. Research* 3, 526–39(1930); cf. *C. A.* 22, 2139, 2140.—The reactions between HCl and α, β and γ-butylene were investigated in both the liquid and the gaseous states. The effect of temp., 0–25°, and the concn. of the reactants on the reaction velocities was studied and the reaction products were examd. In the liquid state the γ-isomer reacts rapidly, the α- much more slowly and the β- most slowly of

the three. In the gaseous state at atm. pressure only γ-butylene shows a measurable reaction which is bimol. and probably heterogeneous. Where possible, the f.-p. curves of the systems were detd. in order to ascertain the extent of mol.-compd. formation. No phys. evidence of high concn. mixts. of HCl and olefin as solns. of mol. compd. in HCl was obtained. In spite of the absence of any abrupt change in phys. properties the results are believed to indicate a relationship between mol. attraction and reaction velocity. A catalytic factor peculiar to the liquid state is suggested. J. W. S.

Effect of intensive drying on the velocity of gaseous reactions. C. C. COFFIN AND O. MAASS. *Can. J. Research* 3, 540–2(1930); cf. preceding abstr.—An attempt to study the reaction HCl + NH_3 when both had been subjected to intensive drying was frustrated by the failure to obtain HCl sufficiently free from moisture as a result of the formation of oxychloride and H_2O in the reaction of HCl with P_2O_5. Redistd. P_2O_5 from an elec. furnace contg. spongy Pt and in an atm. of O_2 was used as the drying agent for CO_2, the CO_2 being kept in contact with the P_2O_5 for 3 months. NH_3 was dried in contact with CaO followed by contact with BaO for 3 months. When the dried gases were mixed no reaction took place. The mixt. of gases was condensed by liquid air and then permitted to warm up. Most of the CO_2 vaporized before the NH_3 melted but the residual CO_2 immediately reacted with the liquid NH_3 to form solid ammonium carbamate. It is concluded that the reaction in the liquid condition indicates a catalytic effect of the liquid phase. J. W. SHIPLEY

Kinetics of the reaction between persulfate and thiosulfate ions in dilute aqueous solution. CECIL V. KING AND OTTO F. STEINBACH. *J. Am. Chem. Soc.* 52, 4779–95 (1931).—The velocity of the uncatalyzed reaction $S_2O_8^{--} + 2S_2O_3^{--} \longrightarrow 2SO_4^{--} + S_4O_6^{--}$ is approx. pseudo-unimol. and is independent largely of $[S_2O_3^{--}]$; but the salt effect shows that the rate-detg. reaction is between 2 neg. ions. From the reaction catalyzed by I^- the const. for the bimol. reaction $S_2O_8^{--} + 2I^-$ is calcd. and is 20% lower than when the rate is measured independently. The const. for the $S_2O_8^{--} + Cu^{++}$ reaction is calcd from the reaction catalyzed by Cu^{++}. The $S_2O_8 + Cu^{++}$ reaction is between two neg. ions as shown by the salt effect and since Cu^{++} is reduced to $Cu(S_2O_3)_y^{-x}$ by $S_2O_3^{--}$. Sugar increases the velocity of the $S_2O_8^{--} + S_2O_3^{--}$ reaction and of the $S_2O_8^{--} + 2I^-$ reaction in the presence of $S_2O_3^{--}$. S. LENHER

The influence of solvent on the decomposition of trichloroacetic acid. J. N. PEARCE AND A. C. NELSON. *Proc. Iowa Acad. Sci.* 36, 251–60(1929).—The velocity of decompn of CCl_3CO_2H to $CHCl_3$ and CO_2 was detd. for its solns. in water, aniline and in binary solvent mixts. of aniline and $CHCl_3$, and of aniline and toluene. In all of these the decompn. follows the general unimol. reaction law. In EtOH and MeOH and in $CHCl_3$, toluene and pyridine there is no measurable decompn. The reaction is found to proceed more rapidly in the light than in the dark, regardless of the nature of the solvent. The temp. coeffs of the reaction in the light are greater than those in the dark for all of the solvents studied, except in pure aniline and in the aniline-$CHCl_3$ mixt. contg. 87.5 mol.-percent of aniline. Only in the last 2 solvents is the photocatalytic influence of the light believed possible. In all of the other solvents studied the light seems to act only by increasing the absorbable radiation density of the system. The heats of activation per mol. of acid are calcd. for each solvent. The velocity consts. calcd. from the heats of activation by the equations of Dushman and of Lewis do not agree even approx. with the experimentally detd. values. W. G. G.

Kinetics of acetylene-oxygen reaction. ROBERT SPENCE AND GEORGE B. KISTIAKOWSKY. *J. Am. Chem. Soc.* 52, 4837–47(1930); cf. *C. A.* 25, 20.—The reaction rate is accelerated by O_2 when C_2H_2 is in excess, but is retarded by it when in excess. At the optimum O_2 concn. the rate is proportional to $[C_2H_2]^2$; with less O_2 it is proportional to a lower power of $[C_2H_2]$. N_2 retards the rate slightly. In the presence of reacting C_2H_2, HCHO is oxidized much faster than when alone. S. LENHER

Physical measurements of short-lived intermediate products. H. SCHMID. *Z. Elektrochem.* 36, 769–71(1930).—See *C. A.* 24, 4690. A. P. SACHS

Graphic demonstration of a theorem of Roozeboom. A. MAZZUCCHELLI. *Gazz. chim. ital.* 60, 719–21(1930).—In dealing with the 3 curves of univariant equil. which, in [illegible] nt system, depart from each invariance point, Roozeboom (cf. *Heterogene Gl.* 1, 98), demonstrated a theorem according to which at const. pressure m pr[illegible] to the invariant point the transformation curve of max. heat absorption which [illegible] middle position. Related to this is a theorem of Duhem, according to of max. const. temp. in proximity to the invariant point the transformation curve diminution of vol. occupies the middle position. These 2 theorems were [illegible] curves. In the present paper it is shown that the same result is obtained by

a graphic method based on the simple application of the Le Chatelier law.
C. C. DAVIS

Graphical treatment of the thermodynamics of the rectifying column. W. H. KEESOM. *Proc. Acad. Sci. Amsterdam* **33**, 901–8(1930). E. H.

Thermodynamic study of the phasial equilibria in the system: iron–carbon. CHU-PHAY YAP. *Am. Inst. Mining Met. Eng., Tech. Pub.* No. **381**, 26 pp.(1931).—Previously published Fe-C diagrams are reviewed and the disagreements regarding the shapes of the liquidus and solidus are pointed out. Y. then replotted the Fe-C diagrams and calcd. C as mol. % and as mol. % Fe-C. Thermodynamic laws of solns. that apply to a diagram of this type were calcd. and values taken from the various Fe-C diagrams were substituted to det. which was the more nearly correct. The results indicated that in the liquid state C exists mainly as Fe_3C, but in the solid γ Fe it is dissolved as C. The correct liquidus bounding the field Δ + melt is probably that of Ruer and Goerens (*C. A.* **12**, 2524) which is slightly convex. In the delta field C is dissolved as such in the melt. Heat of fusion of γ Fe is calcd. as 66.4 cal. per g. Heat of fusion of γ Fe is calcd. as 66.4 cal. per g. Heat of transition of γ to Δ Fe is about 2.0 cal. per g. and accordingly the heat of fusion of Fe is about 64.4 cal. per g.
A. W. HOLMES

Influence of dissolved carbide on the equilibria of the system: iron–carbon. CHU PHAY YAP. *Am. Inst. Mining Met. Eng., Tech. Pub.* No. **382**, 19 pp.(1931).—Previously published data on the Fe-C diagram are used to discuss the shape of the solidus. The straight solidus is obtained by cooling a sample from the melt, while the curved solidus is obtained by heating samples that have already reached room temp. Fe_3C exists as a structurally stable phase that the austenite must redissolve. This leads to the conclusion that within a certain range of temp. the C in soln. in austenite must be in the form of a carbide. A. W. HOLMES

The catalytic action of hydrogen on the carbon monoxide flame. W. E. GARNER AND D. A. HALL. *J. Chem. Soc.* 1930, 2037–47.—The effect of H_2 on the CO flame is investigated, the "dry" mixt. and others contg. 0.019, 0.0315, 0.0537, 0.101, 0.200, 0.517 and 2.02% H being used. The app. is essentially that of Garner and Roffey (*C. A.* **23**, 4406), quartz windows being employed instead of the fluorite to minimize radiation losses due to absorption of the gases ahead of the flame. Radiation by log speed and radiation-pressure curves show a "step" at 0.03% H_2 for gases initially at 1 atm. At the "step" the H_2 pressure is greater the lower the combined CO and O_2 pressures; thus $p_{H_2}p_{gas}$ = const. The radiation-pressure curves for H_2-O_2 flames are concave to the radiation axis and pass through the origin; for the "dry" CO flame it is linear and intercepts the pressure axis at p = 12 cm.; and, for H_2-CO flame, the curves are concave to the pressure axis. The radiation-pressure curve for the "dry" CO flame is concluded to be mainly chemiluminescent. An irregularity appears in the curves above the "step," this irregularity moving lower with increasing H_2 concn. The extinction coeffs. of gases in front of the flame were calcd. from radiation readings through quartz and through fluorite windows. Below 0.03% H_2 the decrease in radiation is given by: $R = R_0k_1/(k_1 + k_2[H_2O])$, ($R_0$ = radiation of H_2-free gas). The fall in radiation at the step is proportional to that above the step. J. BALOZIAN

Acid and salt effects in catalyzed reactions. XXIV. A study of the catalytic effects produced by acetic acid and acetate buffers under conditions of effectively constant ionic environment. HARRY M. DAWSON AND ERIC SPIVEY. *J. Chem. Soc.* 1930, 2180–9, cf. *C. A.* **24**, 2945.—A study was made of the catalytic effects assocd. with the acetone-I reaction in the presence of (*a*) const. AcOH + variable AcONa buffers, (*b*) AcOH, (*c*) AcOH + HCl and (*d*) isohydric buffers, in 0.75 *N* NaCl soln. (to insure an approx. const. ionic environment). Since the catalytic effects of H_2O, and the H and OH ions are very small in acetate buffers, the existence of a further catalytic agent, a complex acetate ion ($CH_3.CO_2H$, $CH_3.CO_2)^-$, is postulated. There is close agreement between the observed and the calcd. values of the reaction velocity (v), the equation used in calcg. being: $v = k_h[H^+] + k_a[A^-] + k_a'[HA_2^-] + k_m[HA] + k_{OH}[OH^-] + k_w[H_2O]$, where k_h = 561 × 10^{-6} (for the H ion), k_a = 3.35 × 10^{-6} (for the acetate ion), k_m = 1.30 × 10^{-6} (for undissocd. AcOH), $k_a'K'$ = 3.5 × 10^{-6} (for the complex ion), k_{OH} = 7 (for the OH ion) and $k_w[H_2O]$ = 0.006 × 10^{-6} (for undissocd. H_2O), all being referred to an acetone concn. of 20 cc./l. at 25°. Under the conditions of these investigations the relations are the same as in earlier ones in which the reactants were dissolved in H_2O. J. BALOZIAN

Autocatalysis in oxidation. II. Action of catalysts on the autoxidation of abietic acid. G. DUPONT AND J. LÉVY. *Bull. inst. pin* 1930, 248–52.—See *C. A.* **24**, 2945.
A. PAPINEAU-COUTURE

Reactions at the surface of hot metallic filaments. IV. The reaction of $CO_2 + H_2 \longrightarrow H_2O + CO$ on tungsten and thoriated tungsten. B. S. SRIKANTAN. *J. Indian Chem. Soc.* **7**, 745–57(1930); cf. *C. A.* **24**, 2036.—After W wire had been used a short while, it attained a steady state of activity for the interaction of CO_2 and H_2. The temp. coeff. and energy of activation decreased with rising temps. and the reaction velocity increased with the pressure of H_2. Since the surface became satd. with CO_2 below 200-mm. pressure, further increases in the pressure of CO_2 did not change the reaction velocity. Thoriated wire was not found to give a const. state of activity.
L. P. HALL

Comments on the paper by Fenton and Garner entitled "The heats of association of acetic and heptoic acids in the vapor state." HANS DOHSE AND MANFRED DUNKEL *J. Chem. Soc.* 1930, 2409–10; cf. *C. A.* **24**, 3703.—To compare the heat of dissocn. of the double AcOH mol with the heat of vaporization, the latter should be detd. from the change of vapor tension with temp. rather then calorimetrically (as F. and G. detd. it). The value given by them for AcOH should be cut in two (6900 cal.). The heat of assocn. of 2 g.-mols. of benzoic acid is calcd. by the van't Hoff isochore as 1.12×10^4 cals. (5700 cals./mol.). Exception is taken to F. and G.'s conclusion that the assocn. of acetic is concerned with a "chem." combination, since the forces between the mol. are apparently caused by the mutual electrostatic influence of 2 dipoles. J. B

Heat of combustion of camphor, azobenzene and hydrazobenzene. W. SWIETOSŁAWSKI AND J. BOBIŃSKA. *Bull. intern. acad. Polonaise* **1929A**, 621–30(in French) — see *C. A.* **24**, 1790.
J. WIERTELAK

Heats of adsorption and isotherms in the system platinum-hydrogen. EDWARD B. MAXTED. *J. Chem. Soc.* 1930, 2093–2100.—The curves of the *heat of adsorption* (I) of H_2 by Pt are detd., and the effect of "aging" of the catalyst (Pt-black) on I and on the H_2 isotherm is investigated. The app. used is essentially similar to that of McKie (*C. A.* **23**, 1550), the Pt-black being prepd. by the method of Mond, Ramsay and Shields (*J. Trans.* **186A**, 657(1895)) and at no time during the expts. exposed to temps. above 100°. The curves of the differential I per mol. H_2 against the H_2 adsorbed fail to show a pronounced max. which becomes flattened (by elimination of the peak) on "aging." The total heat evolved during the adsorption of a given amt. of H_2 is found to decrease with the age of the Pt catalyst. The isotherms, obtained by plotting pressure (mm.) against H_2 adsorption (cc.), show an initial stage in which most of the H_2 is adsorbed almost instantaneously at low pressures (94% in 3 min., 96% in 7 min.). After this a relatively large increase in pressure does not greatly influence the adsorbed H_2 content. The isotherms shift gradually toward the pressure axis with time. It is suggested that both I and the H_2 isotherms are specific for the particular condition and history of the hydrogenation catalyst. In the adsorption of H_2 on various metals, the heat effect is due, principally, to a common process, specific for the H and independent of the metal.
J. BALOZIAN

The heats of adsorption of organic vapors on charcoal at 25° and 50°. G. H. REED AND J. N. PEARCE. *Proc. Iowa Acad. Sci.* **36**, 262(1929).—The method of Pearce and McKinley (*C. A.* **22**, 1524) was used to det. the heats of adsorption of certain org. vapors on charcoal at 25° and 50°. The vapors used, CCl_4, $CHCl_3$ and CH_2Cl_2, were chosen with the purpose of ascertaining the possible effect both of the mol. configuration and the no. and nature of the substituents upon the heat of adsorption. The results indicate only 2 conclusions: (1) If there is a temp. coeff. of heat of adsorption it is very small, and (2) the successive addn. of Cl atoms to a mol. does not produce a regular variation in the mol. heat of adsorption. The heat of adsorption increases as the no. of Cl atoms in the mol. is increased.
W. G. GAESSLER

A method which enables one to follow the change in the number of particles in the process of formation and transformation of a colloidal solution (BOUTARIC) **11A.** Open-hearth steel process as a problem in chemical kinetics (JETTE) **9.** The solubility of Ag in Cu (MOLLER) **9.** The electrical conductivity of Cu (ELSNER, SIEBE) **9.**

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SUBATOMIC PHENOMENA AND RADIOCHEMISTRY

W. ALBERT NOYES, JR.

The proper energy of the electron. WERNER HEISENBERG. *Z. Physik* **65,** 4–13 (1930).—Math. E. BRETSCHER

The distribution of electrons in the atom. L. GOLDSTEIN. *Compt. rend.* **191,** 766–8(1930).—Dirac's method is extended to obtain a differential equation for the at. potential. Using the Fermi statistics the at. potential can be represented as having 2 terms, the 2nd term being a resonance effect. S. BRADFORD STONE

Characteristics of nuclear electrons. J. KUDAR. *Physik. Z.* **32**, 34–7(1931).—Theoretical. A discussion of continuous beta-ray emission on the basis of modern quantum theory. WILLIAM E. VAUGHAN

A possible conception of nuclear phenomena. MAURICE DE BROGLIE. *Compt. rend.* **191**, 689–90(1930).—Disintegration is not a purely internal process. In the nucleus the mean mass of the proton is a little less than that of the free proton (packing effect). At the moment of formation of the nucelus there is a loss of internal energy. The nuclear stability depends on grouping. The stability of the atoms varies; the packing coeff. varies; the abs. internal energy of the nucleus should not remain const. An absorption and emission of protons by the nucleus can hardly be imagined, but a sort of equil. of radiation is implied. It becomes necessary to consider the nuclei surrounded by an external radiation. This idea is distinct from that of Jean Perrin to explain radioactivity by a kind of photo effect of radiation. L. D. ROBERTS

The structure of ultra-radiation. I. W. S. PFORTE. *Z. Physik* **65**, 92–101 (1930).—Previous expts. with 2 ionization chambers by G. Hoffmann and W. S. Pforte (*Physik. Z.* **31**, 347(1930)) revealed fluctuations of intensity of the ultra-γ-radiation. Expts. were now carried out to show that this effect was not due to exptl. error. A completely automatic compensation for the ionization chambers was set up in a salt mine, the residual ionization detd. and the influence of Ra-γ-radiation on the fluctuations of the current studied. *Result.*—The fluctuations observed by H. and P. are real and not due to exptl. error. EGON BRETSCHER

Supplementary note to my paper: The probability law for the decomposition of radioactive materials in very small concentration. G. I. POKROVSKII. *Z. Physik* 65, 133–8(1930); cf. *C. A.* **24**, 1279.—According to the law of radioactive decay the no. of radioactive atoms ought to be a function of time *t*: $\lg N = \lg N_0 - mt \lg e$, N_0 being const. This process was studied by counting the no. of scintillations on a ZnS screen contg. a radioactive substance in very low concn. ($c \sim 10^{-12}$ g. Ra equiv./sq. mm.) It is found that N_0 is not a const. and that the deviation from the const. becomes larger the smaller the concn. of the radioactive prepn. EGON BRETSCHER

Artificial excitation of the nuclear γ-radiation. W. BOTHE AND H. BECKER. *Z. Physik* **66**, 289–306(1930); cf. *C. A.* **24**, 5220.—Thin plates of materials are bombarded with Po α-radiation and the γ-radiation resulting therefrom is traced with a Geiger counter. The following elements and compds. are investigated: Li_2CO_3, Li, Be, B, C (graphite), paracyanogen, Ca, CaF_2, sugar, Ne, fused Na_2CO_3, Al, Mg and Ag. Of these only Be, Li, F, Al, Mg or compds. contg. these elements give rise to a secondary radiation (Be is the strongest and the following elements are radiators of diminishing intensity). From the absorption in Pb, it is concluded that the wave length of this radiation must be of the same order of magnitude as that from Ra. The intensity of the radiation from Be as function of the energy of the α-particles possesses probably a max. value for a certain velocity of the α-particles, pointing thus to a quantum mech. resonance effect. The hardness of the γ-radiation does not perceptibly change with the range of the exciting α-particles. A discussion of the possible course of the excitation mechanism is given which is based on Gamov's potential model and on the exptl. data on the disintegration expts. (H-rays of Pose, *C. A.* **24**, 5219.) EGON BRETSCHER

A γ-radiation from polonium. W. BOTHE AND H. BECKER. *Z. Physik* **66**, 307–10; *Naturwissenschaften* **18**, 894–5(1930).—Previous expt. (cf. preceding abstr.) revealed the existence of a weak γ-radiation from Po. This is further confirmed and it is assumed that these rays are of secondary nature and due to self-excitation of the decaying Po nucleus. EGON BRETSCHER

The removal of radon from an emanation chamber after use. C. L. UTTERBACK AND D. DEVAPUTRA. *Rev. Sci. Instruments* **2**, 53–4(1931).—The description of a simple app. is given in which the chamber can be cleaned out in about 0.5 hr. after use with natural H_2O contg. 10^{-10} g. Ra per l., and in 1.5–3.0 hrs. with H_2O contg. 4×10^{-6} g. J. H. MOORE

The radioactivity of Stone Mountain springs. JAMES A. HOOTMAN AND V. NELMS. *Am. J. Sci.* [5], **21**, 37–8(1931).—Electroscopic measurement of the Ra emanation from 14 samples of water from springs around Stone Mt. showed 0.40 to 1 av. 4.2, millimicrocuries per l. ALDEN H. EMERY

Experiments with high-velocity positive ions. J. D. COCKCROFT AND E. T. S. WALTON. *Proc. Roy. Soc.* (London) **A129**, 477–89(1930).—Detailed description of a 300-kv. thermionic rectifier, used in connection with a tube for the production of accelerated canal ray protons. FRANK URBAN

A new method for recording electrons. PERCY H. CARR. *Rev. Sci. Instruments* **1**,

711–43(1930).—Some of Cole's work (*C. A.* **20**, 3638; **21**, 207) was repeated with the original app. and with a new glass camera which is described in detail. Metal surfaces are affected by electron bombardment (*C. A.* **24**, 4455) even at the low speed of 12 v., and expts. with Au and Ag are given in detail, while expts. were made on brass, Pt, Ni and Cu, with good results except with Cu. The expts. indicate that the effect is not due to elec. charging or polarizing of the gas film on the metal surface, but may be due to freeing the surface of the gas film. Other possible causes are discussed. Other advantages of metals over dry plates are: they do not build up potentials which alter the paths of the electrons. Relatively high c. d. permits shorter exposures, and metals are unaffected by light. J. H. MOORE

Polarization of electrons. G. P. THOMSON. *Nature* **126**, 842(1930).—The detection of polarization by successive reflection from thin gold films is possible only with large angles of scattering. ARTHUR FLEISCHER

Application of the diffraction of electrons to the study of organic substances—structure of cellulose. A. DAUVILLIER. *Compt. rend.* **191**, 708–11(1930); cf. *C. A.* 24, 4212.—To obtain clear interference figures from electrons, the object under investigation must be very thin (100 A. U.) to prevent excessive absorption of electrons and static charges. Films of nitrocellulose, cellulose acetate and celluloid were made by evapg. solns. on Hg surfaces and on water. The diffraction patterns at 11–21 kv. are entirely different from those obtained by x-rays as they consist of 3 concentric halos. In the case of one film coated on a water surface, evidence was obtained that the micelles were orientated normal to the plane of the films. J. G. MCNALLY

The effective cross section of krypton for slow electrons. J. HOLTSMARK. *Z. Physik* **66**, 49–58(1930).—The effective cross section of Kr is calcd. using D. R. Hartree's at. field. The mutual polarization energy (which for large values of r is proportional to r^{-4}) has to be taken into account. Agreement with the curves of Ramsauer and Kollath is obtained and the cross section for rectangular deflection agrees with the exptl values up to 15 v. EGON BRETSCHER

New measurements of the effective cross section of gases and vapors. F. SCHMIEDER. *Z. Elektrochem.* **36**, 700–4(1930).—The relationship between HCN, C_2H_2, N_2, $(CH_3)_2O$, $(CH_3)_2NH$, etc., according to Grimm's law is confirmed by position and shape of effective cross section-electron velocity curves. Isomers give various curves, e. g., almost identical (*n*-pentane and $C(CH_3)_4$; butane and isobutane) to totally different (CH_3OH and C_2H_5OH), the difference in the latter case being probably due to dipole moments. A. P. SACHS

Remarks on the paper by Bröse and Saayman: Cross-section measurements of molecules other than inert gases with slow electrons. E. BRÜCHE. *Ann. Physik* [5], 7, 577–87(1930). **Answer.** H. L. BRÖSE AND E. H. SAAYMAN. *Ibid* 588–95. **Rebuttal.** E. BRÜCHE. *Ibid* 596–600.—Cf. *C. A.* **24**, 5218. L. ONSAGER

Discharges in neon. P. JOHNSON. *Phil. Mag.* **10**, 921–31(1930); cf. Townsend and Nethercot, *C. A.* **23**, 5408.—As found in the case of N_2, the mean elec. force in the luminous column of a high-frequency discharge in Ne is independent of the current from 1 to 10 ma. and of the wave length of the oscillator from 30 to 120 m. A. F.

Investigation of high-frequency discharges. II. Methane, methyl chloride, dichloromethane, chloroform, carbon tetrachloride. P. N. GHOSH AND B. D. CHATTERJI. *Z. Physik* **65**, 102–6(1930).—The study of the visual aspect of high-frequency discharges passing through org. vapors is continued (*C. A.* **24**, 778). If the pressure, at which a certain no. of striations appear is plotted against the mol wt., a curve is obtained which approaches asymptotically the mol.-wt. axis. EGON BRETSCHER

High-frequency electrodeless discharge characteristics. OTTO STUHLMAN, JR. AND M. D. WHITAKER. *Rev. Sci. Instruments* **1**, 772–9(1930).—The expts. were made with a spherical Pyrex bulb contg. Hg vapor at 25° and air at pressures of 3–60 microns, placed in a helical coil carrying damped high-frequency currents with range of 1800–555 kilocycles and current of 0.8–1.6 amps. The visual intensity was measured with a L. & N. flicker photometer. No simple relation was found between visual intensity and air pressure, current or frequency, but there were consistent irregularities. Const. current and pressure max. values of visual intensity were found for wave lengths of 252, 358 and 490 m., corresponding to frequencies of n, $n + k$, and $n + 2k$. References are given. J. H. MOORE

An investigation of the critical potentials of the spark spectrum of cadmium. DEVER COLSON. *Proc. Iowa Acad. Sci.* **36**, 307(1929).—The direct spectroscopic method was used in which the spectrum was excited by electron impact. The accelerating voltage on the electrons was varied from 8.8 (ionization potential of Cd) up to 200 v.

Measurements on the films were made with a microphotometer. The effects of change of plate current and vapor pressure were investigated. W. G. GAESSLER

Collisions of the second kind between electrons and excited mercury atoms. G. D. LATUISHEV AND A. I. LEIPUNSKII. *Z. Physik* **65**, 111–23(1930).—See *C. A.* **24**, 4703. EGON BRETSCHER

The temperature dependence of the interfacial photoelectric effect observed on copper-copper oxide cells. HORST TEICHMANN. *Z. Physik* **65**, 709–13(1930).—This photoelec. effect is observed on the boundary of unipolar half conductors with metals on irradiation with light. The photoelec. current is 25 times larger when the temp. is lowered from room temp. to —80°. Potential, current and resistance are stated as function of temp. EGON BRETSCHER

The origin of photoelectrons in copper-cuprous oxide photoelectric cells. W. SCHOTTKY. *Physik. Z.* **31**, 913–25(1930).—An electrode was placed on a Cu_2O layer which covered a Cu plate. The photoelec. current which flowed, without superimposed voltage, between Cu and the electrode was measured. If the Cu_2O is illuminated by a pencil of light parallel to the electrode, the photoelec. current decreases exponentially with the distance between the electrode and the pencil of light. The origin of the current is assumed to be the boundary between Cu_2O and Cu. The quant. formulation of the phenomenon is based on a chain conductor model, composed of series and parallel resistances. FRANK URBAN

The spectral distribution of the inner photoelectric effect in plastic deformed sodium chloride crystals. M. N. PODASHEVSKII. *Z. Physik* **65**, 799–805(1930).—The absorption curve of rock-salt plates, which were sensitized by irradiation with x-rays, is detd. before and after the material has been subjected to mech. stress. The max. of the curve is lowered and shifted toward the long waves by this treatment. In some cases this process has been found to be reversible. EGON BRETSCHER

Influence of the adsorption of cesium on salt layers on the photoelectric properties. J. H. DE BOER AND M. C. TEVES. *Z. Physik* **65**, 489–505(1930).—A CaF_2 suspension is sprayed on the wire of an incandescent lamp and the deposit sublimed *in vacuo* to the wall of the bulb. Cs is now distd. on to this base and the spectral absorption and the photoelec. emission are studied as functions of the thickness of the metal layer. The spectral absorption of Cs depends very much on the base on which it is placed. This shift of absorption is explained by the elec. field of the crystal lattice acting on the highly polarizable Cs atom. The max. photoelec. sensitivity of Cs on CaF_2 is found at 7000 A. U.; of Cs on BaF_2 at 7300 A. U.; but for Cs on Cs_2O it lies between 1 and 1.2μ. The sensitivity has been increased from 0.17 ma./lumen for the pure metals to 12.0 ma./lumen for Cs on Cs_2O. The sensitivity increases at first with increasing size of the alkali metal layer but diminishes again and attains later a const. value. E. B.

Use of x-rays in practice. BRANKO BOŽIĆ. *Arhiv hem. farm.* **4**, 194–212(1930).—A brief discussion and description of the modern methods of investigation of materials. J. KUČERA

Some remarks on the angular intensity distribution of continuous x-ray spectrum. III. YOSHIKATSU SUGIURA. *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) 15, 37–9(1930).—A correction to *C. A.* **24**, 3425. C. C. KLESS

Free electrons in metals and the role of the reflections of Bragg. L. BRILLOUIN. *J. phys. radium* [7], **1**, 377–400(1930); cf. *C. A.* **24**, 5600.—Math. When an electron beam penetrates a metallic crystal, abnormal de Broglie waves are formed, showing discontinuities in the energy. These are due to the periodic potential within the crystal and correspond to x-ray reflection from the lattice plane. The nature of the waves can be investigated by the perturbation method of Schrödinger. The waves corresponding to various electron levels can be specified and a level n gives waves of length approx. $2d/n$, where d is the lattice space. By simple transformations and use of an apparent numbering of the waves, the energy can be represented by a formula similar to that which is valid for free electrons in space. An apparent mass is also required which may become neg. This is similar to the apparent quantum no. in the Rydberg formula. If the electrons are considered as a completely degenerate gas, the de Broglie waves have a certain min. length. From this min., it is shown that selective reflection cannot take place for univalent metals of face-centered or body-centered cubic lattice. These are the metals with high elec. cond. For multivalent metals of cubic hexagonal and diamond-type structure, selective reflection can take place for their free electrons. G. M. MURPHY

Reflection of x-rays of long wave length. J. THIBAUD. *J. phys. radium* [7], **1**, 404(1930).—T.'s formula for the reflection of x-rays (*C. A.* **24**, 4453) reduces to that of Valouch (cf. *C. A.* **24**, 2372) and gives the same value for the limiting power. The

difference between the limiting angles as measured by T. and V. comes from the use of different kinds of glass. G. M. MURPHY

A vacuum spectrograph for precise measurements of x-rays of long wave lengths. CARL E. HOWE. *Rev. Sci. Instruments* **1**, 749–57(1930).—The app. has 4 special features: a slit system which excludes optical light and gives excellent collimation of the x-rays; a grating support by which the plane grating may be set at any angle or removed from the ray path without disturbing other adjustments; a set of 2 parallel plate-holders at a fixed distance apart and at right angles to the slits and an x-ray tube with interchangeable targets mounted on a micrometer slide by which the focal spot can be lined up with the slit system. J. H. MOORE

Remark on the paper of W. Busse: Extension and intensity of Debye lines or rings as function of the dimensions of the tube focus, the camera and the preparation. M. A. BREDIG. *Z. Physik* **65**, 430(1930); cf. *C. A.* **25**, 248.—Polemical. A round focus of an x-ray tube gives the same intensity as a linear one if the slit is parallel to the plane of the anode. EGON BRETSCHER

Röntgenspectroscopic measurements of the *L*-absorption of elements 74 tungsten to 92 uranium. ARNE SANDSTRÖM. *Z. Physik* **65**, 632–55(1930).—To obtain the wave length of the *L*-absorption edge with high precision, a Siegbahn spectrometer was used and the absorbing material brought between the slit and the photographic plate. The suitable size of the absorption layer has been calcd. so that the intensity difference on both sides of the edge is a max. The following results were obtained for the L_I, L_{II} and the L_{III} absorption edge (in X. U.) W: 1212.9, 1071.7, 1023.5; Re: 1175.5, 1035.4, 987.3; Os: 1139.0, 999.8, 955.8; Ir: 1103.8, 965.4, 922.3; Tl: 977.8, 841.9, 807.2; Pb: 949.2, 814.3, 781.2; Bi: 922.1, 787.8; U: 755.9; Th: 760.0, 629.3, 603.9, 720.8, 591.3, 568.0. EGON BRETSCHER

X-ray spectrum of the element 91—ekatantalum. I. *L* series. A. V. GROSSE. *Compt. rend. acad. sci. U. R. S. S.* **1930A**, 402–4.—The element of at. no. 91, ekatantalum, was discovered. Forty mg. of its most stable isotope (protoactinium) was obtained. The method of prepn. will be described later. The *L* series of the spectrum was studied by the Siegbahn method, an x-ray spectrograph of the Bragg type being used. The oxide of the element, El_2O_5, was used for that purpose. The wave lengths of 21 lines of ekatantalum were detd. by comparison with those of Br, Sr, Mo, Ag and found to have λ's from 1088.5×10^{-11} to 586.6×10^{-11} cm. The only impurity of the prepd. oxide used was about 0.5% Ta_2O_5. J. G. TOLPIN

The scattering of x-rays by copper and silver. ALEXANDER RUSTERHOLZ. *Z. Physik* **65**, 226–32(1930).—The scattering function of metallic Ag and Cu is obtained from the photometrically detd. integral intensities of Debye-Scherrer lines. The scattering function of Cu agrees with the results of A. H. Armstrong (*C. A.* **24**, 1027) and the values for Ag are in accord with the scattering function calcd. on the bases of the Thomas-Fermi distribution of elec. density. EGON BRETSCHER

The structure of the *K*-radiation in the ultra soft x-ray region. MARTIN SÖDERMANN. *Z. Physik* **65**, 656–61(1930); cf. *C. A.* **25**, 24.—The x-ray emission lines of C (λ = 44.54 A. U.), B (λ = 67.71 A. U.), Be (λ = 115.7 A. U.) are shown to be simple, contrary to Faust (*C. A.* **23**, 3406; **24**, 5605). EGON BRETSCHER

Calculation of the electron affinity of the hydrogen atom. P. STARODUBROVSKII. *Z. Physik* **65**, 806–13(1930).—The Hylleraas method of approximation (*C. A.* **24**, 2951) is criticized. S. obtains in 4th approximation for the electron affinity of the H atom the value E = 16.40 ± 0.03 kg.-cal./mol. EGON BRETSCHER

Intensity of mercury lines excited by positive ions. D FRISCHE. *Proc. Iowa Acad. Sci.* **36**, 307–8(1929).—Observations were made concerning the intensity of lines of the Hg spectrum as excited by pos. ions. The results were compared with corresponding data on the electron spectrum given by previous observers. Intensity measurements were made with a microphotometer. W. G. G.

An extension of simple spectra. F. PASCHEN. *Sitzb. preuss Akad. Wiss.* **1930**, 574–8.—The ordinary simple spectra, the explanation of which is based on only a single electron, acquire an extension when several electrons are excited simultaneously. In the case of 2-electron spectra with the ground state $ns\ ns\ ^1S$ excitation of the latter type leads through $np\ np$, $np(n+1)s$, $np\ 3d$, etc., finally to double ionization as the limit of the extended spectrum. Examples are drawn from the He I, Be I and Al II spectra. W. F. MEGGERS

The relativity separations of the spectrum lines of hydrogen-like elements in parallel and crossed electric and magnetic fields. D. P. ROY-CHAUDHURI. *Z. Physik* **65**, 824–9(1930). EGON BRETSCHER

The influence of the breadth of the slit on the distribution of intensity of a spectral

line. P. H. VAN CITTERT. *Z. Physik* **65**, 547–63(1930).—The distribution of intensity across a spectral line depends not only on the diffraction of the spectral app. and the size of the slit, but also on the manner of illumination of the slit. EGON BRETSCHER

The shift of the hydrogen terms in strong electric fields. C. LANCZOS. *Z. Physik* **65**, 431–55(1930).—The Stark effect of H is calcd. for very strong fields It is shown that the usual series development of the perturbation calculus becomes divergent for strong fields. EGON BRETSCHER

The continuous spectra of the atom and of the molecule of hydrogen. D. CHALONGE AND NY TSI ZÉ. *J. phys. radium* [7], **1**, 416–25(1930).—When an uncondensed elec. discharge passes through H at several mm. pressure the secondary spectrum is emitted, and also a continuous spectrum of mol. origin with an energy max near 2350 A. U. (cf. *C. A.* **24**, 2050). When the discharges are condensed so as to suppress the secondary spectrum, the Balmer lines reach great intensity and the continuous spectrum changes and becomes purely at. In this case the energy distribution appears to be related to the Balmer and Paschen series; it is nearly uniform between the different wave lengths of each series but is much more intense in the 1st than in the 2nd The continuous spectrum has been photographed to about 9200 A. U. in the infra-red W. F. MEGGERS

Energy levels of atoms in an electric field. J. S. FOSTER. *Nature* **126**, 845 (1930).—Further exptl. evidence that Stark levels with equal m values do not intersect (cf. *C. A.* **24**, 5620) is found in some expts. on Ne (cf. *C. A.* **23**, 2363). Ishida's conclusion that the selection rule is broken is believed due to exptl. error due to an imperfect adjustment of the double-image prism with reference to the axis of the Lo Surdo tube. The unknown series lines he discovered are concerned with π components which vanish or become very weak as they pass the zero field positions and have been observed previously. ARTHUR FLEISCHER

New ultra-violet spectrum of helium. JOHN J HOPFIELD. *Astrophs. J.* 72, 133–45(1930).—The resonance series of He in the ultra-violet has been extended to 10 members, the first line being at 584.328 A. U and the 10th at 506.56 A. U. Continuous bands have been found superimposed upon at. lines and intense continuous spectra of mol. origin have been discovered in the interval 500-1125 A. U. This is the only strong continuous spectrum that has yet been found in the region 500 to 900 A. U. To account for the observed facts 2 distinct species of He mol. are postulated, one of which consists of loosely bound, practically unexcited atoms and the other is made by the union of 2 atoms, one or both of which are excited to the 2^3S metastable state. The former would be closely assocd. with the resonance lines and the latter is the source of the visible bands and of the 2nd continuous spectrum. The first absorption spectra to be obtained in the region 500 900 A. U. are those of O_2 and H_2 W. F. MEGGERS

Numerical calculation of the 2*S* terms of ortho- and par-helium. EGIL A. HYLLERAAS AND BJARNE UNDHEIM. *Z. Physik* **65**, 759-72(1930).—The energy of the ground term of ortho-He is found in abs. agreement with the exptl. value. The result for the 2*S* term of par-He differs 2.5% with respect to the total energy. E. B

Determination of the distribution of electricity in the lithium atom. B. ASAKATSU AND PAUL SCHERRER. *Helv. Physica Acta* **3**, 428 35(1930).—The scattering of x-rays from fine Li powder is investigated to det. the scattering function of the Li ion (as the valency electron may be considered to be free). The lattice of Li is found to belong to the cubic face-centered system and to possess the dimension $a = 3.5$ A. U. The atom scattering curve F is obtained from the photometrically detd. intensities after the elimination of the structure factor and the temp. factor. To represent the latter the Debye-Waller formula is used with the characteristic temp. $\theta = 510°$ as detd. by Simon. The F curve thus obtained experimentally agrees excellently with Brindley's values (*C. A.* **24**, 3162) obtained on the basis of wave mechanics, if zero point energy is taken into account. Cu K_α radiation was used for the expts. E. B

The hyperfine structure of bismuth. P. ZEEMAN, E. BACK AND S. GOUDSMIT *Z. Physik* **66**, 1–10(1930). **Appendix.** E. BACK AND J. WULFF. *Ibid* 10–12. The hyperfine structure of the Bi arc lines (10 components) shows that the Bi nucleus possesses an angular momentum of $(9/2)(h/2\pi)$. The intensities agree remarkably well with those calcd. from Pauli's theory of nuclear spin. EGON BRETSCHER

The Paschen-Back effect of the hyperfine structure. S. GOUDSMIT AND R. F. BACHER. *Z. Physik* **66**, 13–30(1930).—The formulas of the Paschen-Back effect for ordinary multiplets are generalized so as to include also the hyperfine structure due to the nuclear spin. These relations are applied to the Zeeman effect of the hyperfine

structure of Bi, which has been studied by Back and Wulff (cf. preceding abstr.). EGON BRETSCHER

The Zeeman effect of the hyperfine structure of λ = 3775 A. U. of thallium. E. BACK AND J. WULFF. *Z. Physik* **66**, 31-48(1930).—The Goudsmit and Bacher formulas (cf. preceding abstr.) for the Zeeman effect of the hyperfine structure are verified experimentally in the case of λ = 3775 A. U. of Tl. The agreement with theory is perfect for weak, medium and strong fields. EGON BRETSCHER

The arc spectrum of carbon (C I). F. PASCHEN AND G. KRUGER. *Ann. Physik* [5], **7**, 1-8(1930).—The arc spectrum of C was observed in the light emitted by hollow cathodes when a discharge was passed through a stream of He. The observed wave lengths lie in the ultra-violet between 2584 A. U. and 1112 A. U. These lines represent groups of series as follows: (1) series of $2pns\,^3P$, $2pnd\,^3D$, $2pnd\,^3P$ terms, all with $2p^2\,^3P$ as limit; (2) series of $2pnd\,^1F$, $2pnd\,^1D$, $2pnd\,^1P$ terms with $2p^2\,^1D$ as limit; and (3) a series of $2pns\,^1P$ terms with $2p^2\,^1D$ and $2p^2\,^1S$ as limits. Inter-series lines have also been found. Calcn. of the series gives 90,836 cm.$^{-1}$ as the value of the ground term $2p^2\,^3P_2$, corresponding to an ionization potential of 11.21 v. for the neutral C atom. The tables contain the term values and classifications of the observed lines. C. C. K.

Large displacements in the spectra of ionized nitrogen. KWAN-ICHI ASAGOE. *Science Reports Tokyo, Bunrika Daigaku* **B1**, 47-61(1930).—The behavior of the spectra of ionized N was studied when excited by heavily condensed discharges in air at 7 mm and by sparks between metallic electrodes in air at one atm. Lines belonging to N II were found to be shifted redward. These shifts have been measured and have been correlated with the terms from which the lines arise. On the other hand lines of N III appear to be shifted toward the violet, although the displacements, if real, are very small. C. C. KIESS

The oxygen spectrum O I. F. PASCHEN. *Z. Physik* **65**, 1-3(1930); cf. *C. A.* 24, 5621.— A powerful discharge under specified conditions gives rise to 3 new lines observable in the pos. column. They have the following wave lengths and relative intensities (J): 6500.03 A. U. (J = 5) 4664.07 A. U. (J = 3), 3691.0 A. U. (J = 1) and correspond to the transitions: $(2p)^4\,^1D_2 \longrightarrow (2p)^4\,^3P_{2,1,0}$. EGON BRETSCHER

Spectrum of singly ionized chlorine (Cl II). KIYOSHI MURAKAWA. *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) **15**, 41-67(1930).—The spectrum of Cl II was obtained by passing a condensed discharge through a Geissler tube with powd. NaCl on one electrode. Wave lengths were measured on grating and quartz prism spectrographs extending from 6759 A. U. in the red to 2321 A. U. in the ultra-violet. Many of these lines have been classified as combinations between quintet, triplet and singlet terms derived from ^4S, ^2D and ^2P of Cl III. From series of terms the ground state of Cl II has been fixed as $^3P_2$ = 187249 cm.$^{-1}$, which gives an ionization potential of 23.22 v. The numerical details are given in the tables. C. C. KIESS

New resonance series of selenium. HALINA GRÜNBAUM. *Bull. intern. acad. Cracovie* **1929A**, 611 5(in French); *Sprawozdania i Prace Polskiego Towarzystwa Fizycznego* **4**, 357 63(1929)(in Polish); cf. B. Schmidt, *C. A.* **23**, 1056.—Selenium (Se) vapor excited by waves of the length 4811 and 4680 A. U. (Zn spark) and 4678, 4663 and 4113 A. U. (Cd spark) shows a faint fluorescence which cannot be photographed. If, however, the vapor is excited by Ca spark of the wave length 3934 and 3969 A. U., 2 distinct resonance series appear. They become visible at 350° and show great intensity at 600°; the d. of the vapor corresponds to a satn. at 320°. The observed resonance series are in concordance with Rosen's (*C. A.* **21**, 2846) formula: $\nu = A - 397.5\,n - 1.32\,n^2$, where A = 28,517 for 3934 A. U., and 28,292 for 3969 A. U. The absorption of the rays corresponds to the passage from the normal state of the pool n = 8 to the excited state n' = 5 for 3934 A. U. and from n = 8 to n' = 4 for 3969 A. U. The results permit extension of the scheme of the known Se series. J. WIERTELAK

The spectrum of trebly ionized cerium (Ce IV). J. S. BADAMI. *Proc. Phys. Soc. London* **43**, 53-8(1931).—The spectrum of the condensed spark of Ce was investigated in the ultra-violet and doublet combinations similar to those in Cs I, Ba II and La III spectra were found. Eight Ce IV lines ranging in wave length from 2778.23 to 1853.15 A. U. are classified; these involve 8 spectral terms, the lowest of which is $^2D_{3/2}$, 210,895.3 cm.$^{-1}$ corresponding to an ionization potential of 26.0 v. W. F. MEGGERS

The spectrum of doubly ionized arsenic. K. R. RAO. *Proc. Phys. Soc. London* **43**, 65-71(1931).—The doublet system of As III published by Lang (*C. A.* **23**, 2101) has been amended and extended in the light of new observations. Thirty-eight lines

(7240 to 603.79 A. U.) have been classified; term values have been evaluated and an ionization potential of about 28.19 v. is deduced for As^{++}. W. F. MEGGERS

A spectrophotometric and spectroscopic study of Phi Persei. HERBERT F. SCHIEFER. *Proc. Iowa Acad. Sci.* **36**, 281–93(1929).—A standard calibration curve for the reduction of photograms made with the Moll self-registering photomicrometer was prepd. and an intensive study of the H lines observed in the spectrum of Phi Persei was made. A short bibliography is appended. W. G. G.

Absorption lines of sulfur (S III and S II) in stellar spectra. F. E. ROACH. *Astrophys. J.* **72**, 191–8(1930). W. F. MEGGERS

The coexistence of stellar and interstellar calcium lines in the eclipsing binary U Ophiuchi. OTTO STRUVE. *Astrophys. J* **72**, 199–201(1930). W. F. MEGGERS

Heights in the chromospheres. S. A. MITCHELL. *Astrophys. J.* **72**, 146–86 (1930).—A spectrum study; cf. *C. A.* **24**, 2670. W. F. MEGGERS

Simple relations of molecular spectra with the structure of the molecule. H. DESLANDRES. *Compt. rend.* **191**, 1404–7(1930).—An attempt to show that infra red frequencies derived from Raman-effect data and residual rays are expressible as multiples of d_1/t, where t is a small whole no. and $d_1 = 1062.5$ cm.$^{-1}$. Cf. *C. A.* **23**, 2884, 5005. W. F. MEGGERS

The natural breadth of line of the radiation of a harmonic oscillator. V. WEISSKOPF AND E. WIGNER. *Z. Physik* **65**, 18–29(1930).—Previous calcns. (*C. A.* **24**, 5602) are extended to cover the harmonic oscillator. Perfect agreement with the classical formula results. EGON BRETSCHER

Intensities and summation rules of normal quadripole multiplets. A. RUBINOWICZ. *Z. Physik* **65**, 662–76(1930). EGON BRETSCHER

The validity of the Hill and van Vleck intensity formulas for the NO γ-bands. R. SCHMID, T. v. NEUGEBAUER, D. v. FARKAS AND CHARLOTTE BARABAS. *Z. Physik* **65**, 541–6(1930); cf *C. A.* **24**, 2050. —The intensity sequence of the $^2\Sigma_{(b)} \longrightarrow {}^2\Pi_i$ transitions of the branches of the NO γ-band is correctly given by the Hill-van Vleck formula (*C. A.* **23**, 34) if the relation for the "general intermediate case" is used. EGON BRETSCHER

The frequency dependence of Raman's scattered radiation. L. S. ORNSTEIN AND J. REKVELD. *Z. Physik* **65**, 719–22(1930).—It is shown that the the method by which G. S. Sirkar (*C. A.* **25**, 31) obtained a deviation from the usual λ^{-4} law is very objectionable. Correct scattering measurements on CCl_4 show that the absorption is negligible in the region of the Hg lines 4358 to 3152 A. U. (in contradistinction to Sirkar). EGON BRETSCHER

Experimental result on the scattering of light in the range of small angles. G. I. POKROVSKII. *Z. Physik* **65**, 130–2(1930).—A beam of light passes through a layer of *water* or an *alcohol-water mixture* and the light scattered is received on a photographic plate, the primary beam being removed by interposition of a little screen. The intensity of the light scattered, as function of the distance R from the primary beam is obtained photometrically and it is shown to vary proportionally with $1/R$ as required by the author's theory (*C. A.* **24**, 2923). EGON BRETSCHER

Investigation of the Raman effect of crystals. CLEMENS SCHAEFER, F. MATOSSI AND H. ADERHOLD. *Z. Physik* **65**, 289–318(1930); cf. *C. A.* **24**, 552.—*Calcspar* gives Raman lines corresponding to the following frequencies: 65, 35.5, 14, 9.2, 6.06 and 5.74μ. The latter is a combination frequency corresponding to λ = 14.16μ and 9.1μ. Higher temp. gives rise to an anti-Stokes line corresponding to λ = 9.2μ. *Aragonite* possesses the same Raman spectrum. *Magnesite* has an optically inactive frequency at 1–9.2μ. *Cerussite* exhibits internal oscillations at 9.5, 7.34, 6.78μ and external at 56.5, 68.5, 85, 98, 5, 135 and 169μ. $NaNO_3$ shows frequencies corresponding to 5.96, 7.2, 9.35, 13.75, 54 and 105μ; $Ba(NO_3)_2$ 9.56μ; $NaClO_3$ 9.75, 10.15, 10.3, 10.7, 16, 20.6, 80μ; $NaBrO_3$ 11.90, 12.5, 27, 28μ; $Cd(BrO_3)_2$ 12.7μ; $BaSO_4$ 8.80, 10.15, 15.6, 16.3, 21.7μ. $KLiSO_4$ and *gypsum* give the well-known frequencies corresponding to the SO_4 radical and 2 lines resulting from the water of crystallization. *Magnesium ammonium selenate* (λ = 12μ), *ammonium phosphate* (λ = 10.85μ) and *ammonium chlorate* have also been studied, though with less satisfactory results. It is emphasized that the inactive infra-red frequency appears mostly with great intensity. Two active and 2 inactive frequencies have generally been observed in compds. of the type XY_4. L. B.

The polarization of the Raman radiation of crystals. CLEMENS SCHAEFER, F. MATOSSI AND H. ADERHOLD. *Z. Physik* **65**, 319–29(1930); cf. preceding abstr.—The direction of polarization of the Raman lines from crystals (*calcspar*, *gypsum* and $NaNO_3$) as a function of the direction of the incident light with respect to the crystal axes is

idied. No agreement is found with the Leontowitsch theory (*C. A.* **24**, 5631).
EGON BRETSCHER

Raman spectra of some isomers. H. MLODZIANOWSKA. *Z. Physik* **65**, 124–9 930).—Raman lines of the *o-*, *m-* and *p-dichlorobenzenes*, the *nitrotoluidines* and the *uidines* are listed. The frequency shift $\Delta\nu$ is found to decrease in a regular way passing from the *o*-dichlorobenzene to the meta and para compds. E. B.

The Raman effect of crystalline and dissolved sulfates and carbonates. NIKOLAUS EMBIRIKOS. *Z. Physik* **65**, 266–9(1930).—The inactive frequencies of the following solid sulfates and carbonates are detd.: $Li_2SO_4{\cdot}H_2O$ ($\Delta\nu$ = 1003.1 cm.$^{-1}$), K_2SO_4 92.1), $(NH_4)_2SO_4{\cdot}H_2O$ (990), $MgSO_4{\cdot}7H_2O$ (986.8), $CaSO_4{\cdot}2H_2O$ (1010.1), $ZnSO_4{\cdot}H_2O$ (9920), $CdSO_4 3/8\ H_2O$ (1003.2), $MnSO_4{\cdot}5H_2O$ (993.9), $CaSO_4$ (1087.6). A coarse ystal powder of these compds. was used and benzene was added to increase the transrency. Most of the salts (and in addn. Na_2CO_3 and K_2CO_3) were also studied *N* and 2 *N* aq. soln. The frequency shift was generally smaller in soln. than for ie solid substance. The Raman lines of the crystals become more diffuse with increasg no. of mols. of water of crystn. EGON BRETSCHER

The polarization of Raman lines: some hydrocarbons. S. BHAGAVANTAM. *Indian Physics* **5**, 603–8(1930); cf. *C. A.* **24**, 5230.—The polarizations of the Raman lines benzene, cyclohexane and pentane were measured. Those showing the most comete polarization are 992 of benzene and 800 and 992 of cyclohexane. These lines present inactive oscillations of the mols. and appear faintly or not at all in the infrad absorption spectra. All the other Raman lines of benzene are nearly completely ipolarized, whereas those of cyclohexane and pentane are well polarized. C. C. K.

The origin of the continuous spectra in Raman scattering. N. N. PAL AND P N. EN GUPTA. *Indian J. Physics* **5**, 609–10(1930).—When BzH was kept colorless by ntinuous circulation in a Woods tube it gave sharp Raman lines without a continuous pectrum. When the circulation was stopped photochem. action caused the appearance the BzH of a yellow product which in turn gives a continuous spectrum extending ell into the red. C. C. KIESS

The characteristic Raman frequencies of radicals in different chemical combinaons. N. N. PAL AND P. N. SEN GUPTA *Indian J. Physics* **5**, 611–4(1930).—A review f the frequencies attributed to the CN radical in different types of compds. shows a nge from 2266 for org compds., to 2066 for some complex cyanides. The nature f the bond rather than the mass of the substituent radical seems to be the predominant ictor in the detn. of the frequency. C. C. KIESS

Further studies on the Raman spectrum of diamond. S. BHAGAVANTAM. *Indian . Physics* **5**, 573–86(1930).—With larger and better specimens of diamond than those sed previously (*C. A.* **24**, 4987) the following faint Raman lines were observed in addn. o the strong 1332 line previously reported: 1382, 1431, 1480, 1585, and the anti-Stokes ne 1332. These correspond to infra-red absorption frequencies observed by Reinober, although the frequency corresponding to 1332 is weakest in absorption and herefore represents an optically inactive frequency of the diamond mol. In the fluorescent band system of the diamond 2 more components have been found, making 5 in ll. The intensity of 1332 was found to be about 6 times that of the 992 line of C_6H_6. C. C. KIESS

Raman effect with cadmium arc excitation. P KRISHNAMURTI *Indian J. Physics* **5**, 587–91(1930).—A Cd-Sn alloy arc has been found to be a suitable source or the excitation of Raman spectra. The Cd lines 5085.8 and 6438.5 A. U. are particularly effective. With this source the colored crystals $FeSO_4.7H_2O$ and $NiSO_4.7H_2O$ failed to show a line corresponding to the absorption line at 10μ. But the crystals showed the previously observed Raman lines and a new one corresponding to a shift of 183 cm.$^{-1}$. C. C. KIESS

Further investigations on the intensities of lines in Raman spectra. S. C. SIRKAR. *Indian J. Physics* **5**, 593–601(1930).—To test the 4th power law for Raman lines having large shifts the abs. intensities of the displaced lines of cyclohexane (2853 and 800) and of C_6H_6 (3080 and 990) were detd. by a method of photographic photometry. In harmony with previous results (*C. A.* **25**, 31) it was found that the deviation from the 4th power law is more for lines excited by ultra-violet than by visible lines, and that the deviation is greater for lines of greater shift. C. C. KIESS

Forms of oscillation of the benzene ring in Raman effect. S. BHAGAVANTAM. *Indian J. Physics* **5**, 615–31(1930).—From the theory of the vibrations of an elastic solid circular ring it is shown that the vibrations of a hexagonal ring consist of 6 flexural oscillations, 3 in the plane of the ring and 3 perpendicular to it. The Raman frequencies 607, 851, 992 and 1181 of C_6H_6 are attributed to the hexagonal C ring. Of these the

most intense is 992, which also appears in the Raman spectra of various compds. contg. the C_6H_6 nucleus. It is nearly completely polarized and appears only feebly in the infra-red absorption spectrum, being optically inactive because it represents an oscillation in which the 6 C atoms move tangentially, 3 at alternate corners moving in one phase, the other 3 in the opposite phase, so that the elec. moment of the mol. does not change. The frequency 607 represents an alternate expansion and contraction of the hexagon, whereas 851 and 1181, which agree with infra-red absorption bands, represent unsym. extensional oscillations. Long exposures have revealed 3 new Raman frequencies of C_6H_6 of 694, 1970 and 2181 cm.$^{-1}$, of which the first 2 agree with infra red bands. C. C. KIESS

Raman spectra of inorganic crystals. I. Substances containing XO_3 and XO_4 groups. P. KRISHNAMURTI. *Indian J. Physics* 5, 633–50(1930).—The crystal method was employed to det. the Raman spectra of $NaClO_3$, $KClO_3$, $Ba(ClO_3)_2.H_2O$, $NaBrO_3$, $KBrO_3$, KIO_3, HIO_3, $NaClO_4.H_2O$, NH_4ClO_4, KIO_4, $3(NH_4)_2O.7MoO_3.4H_2O$ and $Na_2WO_4.2H_2O$. The principal Raman shift 930 of the chlorates is represented by 2 shifts, 770 and 842, in the bromates, and by 4, 733, 751, 784 and 808, in the iodates. All the frequencies observed for the chlorates are active and correspond to observed infra-red absorption bands. Aq. solns. of the crystals studied give Raman lines in the same positions. The perchlorates give Raman lines at 462, 633 and 933, which remain unchanged in aq. solns. The Raman lines of KIO_4 are 794 and 841, which are altered in aq. solns. The molybdate gives the shifts 932 and 880, and the tungstate gives the shift 928, all unchanged in aq. solns. C. C. KIESS

Raman spectra of inorganic crystals. II. Some hydroxides, cyanides and thiocyanates. P. KRISHNAMURTI. *Indian J. Physics* 5, 651–62(1930).—The Raman spectra of NaOH, $Sr(OH)_2.8H_2O$, $Ba(OH)_2.8H_2O$, NaCN, $Hg(CN)_2$, $K_4Fe(CN)_6.3H_2O$, KCNS, NH_4CNS and $Ba(CNS)_2$ were observed by the crystal method. An aq. soln. of $KAg(CN)_2$ was also examd. The shift 3630 was found for the OH ion, which corresponds to the 2.66μ absorption band of water vapor. The principal frequency of CN shows a progressive change through a series of compds., being 2085 for NaCN and 2192 for $Hg(CN)_2$. These frequencies are affected but little in soln. For the CNS ion 2 Raman shifts were observed, a stronger one of about 2050 cm.$^{-1}$ due to the ion S–C–N and the other of about 750 cm.$^{-1}$ due to the S–CN oscillation. C. C. KIESS

The relative intensities of different Raman lines due to different exciting frequencies. S. C. SIRKAR. *Indian J. Physics* 5, 663–8(1930).—The intensities of the 2 very close Raman lines 1342 and 1582 scattered by nitrobenzene have been measured under excitation due to the Hg lines 4358 and 5461 A. U. The intensity ratios 1.59:3.1 and 6.5:2.74, resp., have been found. The abnormal intensity with which one of the lines corresponding to the active frequency of the NO_2 group is scattered is attributed to the partial absorption of the exciting line 4358 by the NO_2 ion. C. C. KIESS

Measurements on rock salt in the infra-red to test the theory of dispersion. M. CZERNY. *Z. Physik* 65, 600–31(1930); cf. *C. A.* 24, 1292.—The refractive index n and the absorption coeff. x of *rock salt* and *sylvine* are obtained from the measurements of transparency and power of reflection. Beside the well known max. of reflection at 52μ for rock salt and 62μ for sylvine, secondary ones are found at 39μ and 46μ resp. The values of n and x are fitted into the equation of dispersion consisting of 2 terms. A discrepancy is observed on the short-wave side of the proper frequency where the ordinary dispersion equation does not satisfactorily represent the observations. *Exptl. method:* grating and method of residual rays. To obtain thin plates of NaCl (sic) a special app. has been constructed permitting the scraping of the crystals with a razor blade to produce the necessary size. EGON BRETSCHER

Structure of resonance line groups of sulfur vapor. P. SWINGS. *Bull. internat. acad. polonaise* **1929A**, 616–20(in French); cf. *C. A.* 24, 5626.—S. repeats his previous investigations (*C. A.* 24, 3169, 4221, 5226) on the resonance spectrum of S_2 vapor with greater accuracy, using very strong light and high dispersion (about 1 A. U. per mm.). Four doublet series, *A*, *B*, *C* and *D*, are produced by Hg light of the wave length 3132, 3126, 2968 and 3655 or 3650 A. U. *D* represents several line doublets with distances of the components $\Delta = 34$ cm.$^{-1}$ and differences in the av. frequency about 670. From theoretical considerations it is concluded that *D* corresponds to quantum no. 4, while *A*, *B* and *C* correspond to quantum no. 2, being long doublet series with $\Delta = 18, 16, 8$ and 16 cm.$^{-1}$, resp. In addn. to groups of strong intensity one observes a certain no. of faint rays; those for 3132 A. U. are given. With a feeble dispersion this group appears to consist of 5 rays of equal intensity. Different pressures and temps. cause differences of the resonance intensity, which are very pronounced in the case of *A* and *B*. J. WIERTELAK

Extinction coefficients of the mixtures of chromates and dichromates. N. R. TAWDE AND G. R. PARANJPE. *Indian J. Physics* **4**, 533–8(1930).—A measurement of extinction coeffs. of mixts. of chromates and dichromates by the Nutting photometer in conjunction with a spectroscope is used to est. the percentage of chromate and dichromate in the presence of each other. H. W. WALKER

The absorption of ultra-violet light by methoxybenzoic acid. ANATAZY BORYNIEC AND L. MARCHLEWSKI. *Bull. intern. acad. polonaise* **1929A**, 631–5(in English).—As formerly shown, *p*-derivs. of benzene absorb ultra-violet light much more strongly than *m*- and *o*-derivs. (cf. *C. A.* **24**, 2052). On the basis of this peculiarity one could assume a quinoid structure of the *p*-compds. It has been found, however, that *p*-methoxybenzoic acid behaves in the same manner as the free acid. The strong absorption of the *p* derivs. remains, therefore, unexplained. *o*-Methoxybenzoic acid, m. 98.5–99°, in aq. soln. obeys Beer's law. The spectrum shows 2 bands at 2850 and 2300 A. U. and is almost identical with that of salicylic acid, which also shows 2 bands at 2950 and 2295 A. U. *p*-Methoxybenzoic acid, m. 184.2°, in EtOH obeys Beer's law, but shows only one band at 2535 A. U. The extinction curves of both substances, together with those of *m*- and *p*-hydroxybenzoic acids are given in a diagram. J. WIERTELAK

Residual luminescence of photoluminescent crystals and microcrystals in the infra-red. F. MARTIN. *J. phys. radium* [7], **1**, 401–3(1930).—After being kept in darkness for 6 months, various substances were illuminated with infra-red light. The residual luminescence was observed with the eye and with a photoelec. cell. The intensity of the luminescence varies widely among the substances studied and when the duration of reëmission of light falls to 10^{-8} sec., the extinction effect, fugitive illumination and residual luminescence all disappear. The last 2 effects seem to be 2 aspects of the same phenomenon. G. M. MURPHY

The phenomena of ionization of gases during photochemical reactions in solid bodies. P. P. LAZAREV AND N. L. RODZEVICH. *Compt. rend. acad. sci. U. R. S. S.* 1930A, No. 5, 105–6.—In photochem. reactions in certain dyes held suspended in a gaseous medium, the neg. charges appearing on the gas mols. depend on the nature of the gas. This effect is multiplied considerably (sometimes 100 and more %) in gases which cause fading of the dye. It is also greater when a layer of dye spread out on a quartz plate is illuminated from the side exposed to the gas than from the side adjacent to the quartz plate. S. L. MADORSKY

The photochemical reaction between oxygen and hydrogen chloride. ARTHUR J. ALLMAND AND REGINALD G. FRANKLIN. *J. Chem. Soc.* 1930, 2073–92.—Cl_2 can be formed and destroyed in concd. aq. HCl soln. contg. dissolved O_2 (according to: $4HCl + O_2 \rightleftharpoons Cl_2 + 2H_2O$) by ultra-violet light of wave lengths 254–365 mμ. A condition of true equil. in this reaction is reached at the stationary state, the cessation here of the oxidation of the HCl soln. resulting from the Cl_2 formed. With increasing HCl concn. the Cl_2 concn. required at the stationary state increases, being 0.08×10^{-3} *N* Cl in 5.5 *N* HCl soln. and 1.6×10^{-3} *N* Cl_2 in 11 *N* HCl. Light of 250–270 mμ causes the formation of Cl_2 at concns. below the stationary state, and causes the disappearance of Cl at concns. above this. Again, those wave lengths which induce the Cl_2 reaction at concns. above the stationary state have no such action below this. In the gaseous state HCl is oxidized only very slightly by O_2 in light from a quartz-Hg lamp, but the reaction goes nearly to completion in the sunlight. The reaction is sensitized by Cl_2 and retarded by the removal of H_2O vapor. The "gaseous" oxidation is believed to take place in a film of concd. aq. HCl formed on the walls of the contg. vessel. The quantum efficiency of the reaction in the aq. soln. at 260 mμ is about 0.2, decreasing rapidly with increasing wave length. J. BALOZIAN

Studies on the photosensitizing action by iodine; isomeric transformation of allo-cinnamylideneacetic acid into the normal form in methanol, ethyl alcohol, chloroform, and in mixtures of alcohol, chloroform and water. J. C. GHOSH, D. N. DAS-GUPTA, N. C. ROY AND H. K. CHATTERJEE. *J. Phys. Chem.* **34**, 2771–81(1930).—The authors summarize the results of previous studies on the above transformation when I is the photocatalyst. For the same solvent, excitation by green light is the most effective, then blue, yellow and red in decreasing order of effect. For the excitation by the same quality of light, the solvents decrease in the order of MeOH, EtOH, mixts. of EtOH and H_2O, and mixts. of $CHCl_3$ and MeOH. In $CHCl_3$ the velocity is negligible as compared with solvents contg. the OH group. The theory of the photocatalytic action of I is discussed. H. W. LEAHY

The fluorescence of cod-liver oil. C. A. MOREHOUSE. *Proc. Iowa Acad. Sci.* **36**, 297(1929).—The fluorescence was produced by the radiation from a Cooper Hewitt quartz Hg vapor lamp. A Corex "A" blue-purple filter was used to filter out that

part of the spectrum of the exciting light in which the fluorescence appeared. The filtered light, which was almost entirely in the ultra-violet, was focused directly on the surface of the cod-liver oil by means of a quartz lens. The fluorescence spectrum was detd. by means of a const.-deviation glass-prism spectrograph. A bright band was obtained for the cod-liver oil in the region extending from 546 mμ to 436 mμ. With a 1% soln. of the cod-liver oil in alc., the same band was found but it was much fainter. A soln. of cholesterol in alc. also gave a fluorescence band in this same region, *i. e.*, 546 mμ to 436 mμ. This cholesterol had been previously tested and shown to be capable of being activated by ultra-violet light. W. G. GAESSLER

The waters of Montecatini [radioactivity] (NASINI) **14.** Application of the Debye theory to binary liquid mixtures (FOGELBERG, WILLIAMS) **2.** Electrophoresis and the diffuse ionic layer (MOONEY) **2.** Spectrochemistry of furan and its derivatives (HUGHES, JOHNSON) **10.**

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HAAS, ARTHUR: **Einführung in die theoretische Physik: mit besonderer Berücksichtigung ihrer modernen Probleme. Band II.** 5th and 6th editions. Berlin Walter de Gruyter & Co. 448 pp. M. 17. Cf. *C. A* **24,** 3423

HAAS, ARTHUR: **La mécanique ondulatoire.** Paris: Gauthier-Villars et Cie 198 pp. F. 30. Reviewed in *Am. J. Sci.* **21,** 182(1931).

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4—ELECTROCHEMISTRY

COLIN G. FINK

Outline for systematic study of electrochemistry. ERNESTO DENINA. *Comunicazione alla XXXIV riunione Ann. A. E. I. Pescara-Francavilla,* **7,** 11 pp.(Sept. 22 to 28, 1929). GEO. T. MOTOK

A new type of electrically heated muffle furnace. T. R. BALL. *J. Chem. Education* **8,** 355–7(1931).—Construction details are given for a rectangular crucible furnace, the top of which opens. This makes the entire floor easily accessible, an important

advantage over the end-opening furnace in which dishes at the front interfere with the removal of those behind. Heating characteristics of both types are given.
B. A. SOULE

Electric furnaces: Their development and application. VERDON O. CUTTS. *Metal Ind.* (London) **38**, 78–80, 99–100(1931). E. H.

The Detroit rocking electric furnace as applied to the production of high-test gray iron. CARL H. MORKEN. *The Iron and Steel Ind. and British Foundryman* **4**, 87–90(1930).—See *C. A.* **24**, 4989. C. H. LORIG

Electrothermic zinc. A. WALTER. *Trans. Am. Electrochem. Soc.* **59**, preprint, 5 pp.(1931); cf. *C. A.* **24**, 5639.—The development of electrothermic Zn during the past 30 yrs. is briefly reviewed, with particular emphasis on the many difficulties to be overcome before the process became commercial. The smelting is carried out in an arc furnace of the Heroult type. The operation is continuous and comparatively simple. The Zn vapors pass out of the furnace and into a condenser, from which the Zn is tapped at regular intervals. The crude 93–95% Zn thus produced is refined by resublimation in a sep. elec. furnace. The final product averages 99.85% Zn. The process outlined is applicable to all kinds of Zn ores, and high recoveries of accompanying metals such as Cu, Pb, Au and Ag are possible. The total elec. energy consumption amounts to 5600 kw.-hr. per 1000 kg. of 99.85% slab Zn. C. G. F.

Electrothermic zinc. G. NEWTON KIRSEBOM. *Eng. Mining J.* **131**, 55(1931).—A brief review. W. H. BOYNTON

A new experiment to demonstrate the "pinch" effect. E. BLAICH. *Elektrotech. Maschinenbau* **48**, 1083–5(1930).—An expt. is described which served to demonstrate that in an elec. furnace in which the molten metal serves as a conductor, a contraction or pinching of the cross section of the metal occurs at certain points and is accompanied by violent local currents in the molten metal. This turbulence produces a pressure effect at certain spots which can be demonstrated and measured. This phenomenon is said to be due to electromagnetic forces. H. STOERTZ

Electrolytic copper refining at Mount Lyell, Tasmania. WM. HART. *Eng. Mining J.* **131**, 3–7(1931).—The refinery at Queenstown, Tasmania, has been in operation for 25 years. A plan, photographs and sections of the electrolytic refinery are shown, and the operations outlined. The method of starting operations is probably unique, because no attempt is made to heat the electrolyte, the current being turned on when the soln. is cold. The addn. of 44 cells will increase the capacity to 13,000 long tons per annum.
W. H. BOYNTON

Cathodic forms of electrolytic tin. F. FOERSTER AND H. DECKERT. *Z. Elektrochem.* **36**, 901–23(1930).—Crude *m*-cresolsulfonic acid in the electrolysis of a H_2SO_4 soln. of $SnSO_4$ can repress the tendency of the Sn to form needles growing perpendicular to the surface of the cathode, and to form the Sn ppt. in a smooth and even surface. The by-products formed in the sulfonation of *m*-cresol influence the sepn. of the Sn because they are absorbed by the ppt. The amt. and nature of the by-products depend upon temp. and time of sulfonation. Above 120° colloidal by-products are also formed. When the concn. of impurities is low, the Sn deposit is needle-like to spongy. As the concn. increases, the deposit becomes granular or smooth, and when high the crystals become fine and arranged in unordered patterns. Finally the plated Sn becomes structureless and milk-white in color and a point is reached when colloidal material ppts. with the Sn. The absorption is less at high temps. and greatest at low temps. JOHN R. HILL

A comparative measurement of throwing power in electroplating practice. L. K. WILSON. *Metal Ind.* (N. Y.) **28**, 522–3(1930).—The interest of the com. electroplater lies mainly in the color, appearance and covering power of the plates produced in various electrolytes, rather than in comparative current efficiency. An electrolyte which does not "throw" well leaves the hollows and depressions of a cathode unplated, or else "burns" the projecting portions before the bottoms of the depressions are coated. With reference first to a no. of methods for measuring the throwing power of plating solns. (*C. A.* **16**, 2270; **17**, 3457; **18**, 3147; **20**, 1359; **24**, 2380, 3953, 4990), the article describes a method in which test tubes made of Fe or brass, or with a thin flash of Cu, Sn, Zn, Pb, Cd or other desired metal to be coated, are placed in an instrument and immersed in a plating tank. At the end of the plating period (2–20 min.), the depth of throw is measured by a throw scale calibrated every 0.05 in. and numbered from 1 to 25; comparative data of value to com. and exptl. platers are thus obtained. C. L. W.

The electrodeposition of silver-cadmium alloys. COLIN G. FINK AND BASIL G. GERAPOSTOLOU. *Metal Ind.* (N. Y.) **28**, 519–21, 562–3(1930).—From solns. of the complex cyanides of Ag and Cd, Ag-Cd alloys were deposited. The effects upon the compn. of the deposits caused by changes in the conditions of deposition were investi-

gated and the following conclusions drawn: Increased Cd/Ag ratio in the bath causes an increased Cd/Ag ratio in the deposit. Increased c. d. causes an increase in Cd in the deposit. Increased temp. decreases the Cd content of the deposit and makes the deposit more brittle. Agitation causes increased anode corrosion and decreased Cd content of the deposit. Microscopic investigation revealed a mixt. of a Ag-rich solid soln. (or else pure Ag) and a Cd-rich solid soln. Ag-Cd alloys of high Ag content do not seem to resist tarnish any better than pure Ag, when exposed to the action of H_2S.

CURTIS L. WILSON

Electrodeposition of chromium-iron alloy. G. FUSEYA AND K. SASAKI. *J. Soc. Chem. Ind. Japan* **33**, Suppl. binding 474–82; *Chem. News* **141**, 407–8(1930); cf. *C. A.* **25**, 1195.—Expts. were performed to find the best conditions of electroplating stainless iron, *i. e.*, iron contg. more than 16% Cr. A mixed soln. of $FeSO_4$ and $Cr_2(SO_4)_3$ was finally used. A soln. of violet $Cr_2(SO_4)_3$, prepd. from Cr alum, changed partly into a green form in soln. An acidity a little less than that produced in the formation of the green form of $Cr_2(SO_4)_3$ proved the best for the deposition of bright Cr; higher acidity caused H evolution; too low an acidity caused the inclusion of much hydroxide in the deposit. Free H_2SO_4 (0.05–0.1 mol.) was the most suitable acid; NaOH was added to the soln. until the required acidity was attained. To maintain this acidity, boric, oxalic or tartaric acid could be used. The free H_2SO_4 was detd. by pptg. with acetone all salts and hydroxide present, filtering and distilling off the acetone from the filtrate. Values for acid content agreed fairly well with those obtained colorimetrically with thymol blue. In practice two anodes, Fe and magnetite, had to be used and $Cr(OH)_3$ was added at intervals to replace the Cr deposited. For about 20 min. the current efficiency remained almost const., after which it decreased (because of the low overvoltage of the alloy), the Cr content of the alloy also decreasing. The higher the c. d., the greater was the Cr content of the alloy and also the current efficiency. The greater the acidity of the soln., the smaller was the Cr content of the deposit and also the current efficiency. Temp. had an effect similar to that of acidity, because the H over voltage became smaller as the temp. rose. An increase in $FeSO_4$ concn. increased the current efficiency and lowered the Cr content of the deposit. The deposits contained always some oxide (up to 10%). The amount became larger, the larger the c. d. and the lower the acidity; it decreased with increase in temp. The deposits appeared cloudy or dark when the O content was more than 5%. The deposit resisted the action of satd. solns. of NaCl, NH_4Cl, oxalic or tartaric acid, of a concd. soln. of acetic acid, or a 6 *N* soln. of NH_4OH. The Cr produced at room temp. with c. ds. below 15 amp. sq. dm. had a body-centered cubic form; with c. ds. above 18 amp. per sq. dm. a hexagonal close-packed form was obtained. For the alloy deposition not more than 15 amp. sq. dm. was used; the deposit was a solid soln. of the body-centered cubic form, having nearly the same structure as have the alloys produced by fusion. Bright deposits of metallic luster are best obtained from a soln. of 1.0–2.5 mol. Cr, 0.5 mol. Fe and 0.05–0.1 mol. free H_2SO_4 per l., at about 15°, and with c. d. of 8–15 amp. sq. dm. These conditions gave deposits contg. Fe 60–70, Cr 30–45 and O 1–5%. The current efficiency became somewhat greater when a combination of magnetite and iron anodes was used than when magnetite anodes alone were used. This plating soln. has low current efficiency (max. value shown, 24%, most values given on the graphs being below 14%), and very small throwing power.

EDWARD B. SANDELL

The electromotive activation of oxygen. ARTHUR B. LAMB AND LUCIUS W. ELDER, JR. *J. Am. Chem. Soc.* **23**, 137–63(1931).—In an effort to improve the activation of O at inert electrodes by means of catalysts dissolved in the bulk of the electrolyte, the velocity of oxidation of $FeSO_4$ solns. by gaseous oxidation was studied from the standpoint of rate of stirring, concn. of the O, concn. of H_2SO_4, concn. of the $FeSO_4$, concn. of neutral salts and effect of $CuSO_4$ coconut charcoal, Pt black and SiO_2 gel. Cu ions, coconut charcoal and Pt black have pronounced accelerating effects as does a decrease in the concn. of the H_2SO_4 below 0.1 *M*. H_2SO_4 solns. after exposure to the charcoal were able to liberate I_2 from KI, thereby proving the presence of peroxide in the charcoal and indicating that the accelerating effect of the catalyst is due to its ability to form a specific peroxide. A direct measurement of the depolarizing activity of the ferrous sulfate solns. contg. the charcoal catalyst showed that O_2 electrodes thus prepd. exhibited, at higher c. d., a higher working potential, a higher energy output and a much lower polarization than any previously studied.

MALCOLM DOLE

The effect of pressures up to 16,000 atmospheres upon the electromotive force of the Weston standard cell. THOMAS C. POULTER, CARTER RICHEY, ROBERT WILSON AND JOHN FULTON. *Proc. Iowa Acad. Sci.* **36**, 304(1929).—Weston standard cells of a variety of types were constructed and the e. m. f. was found to increase with the pressure

The shape of the curve was effected somewhat by the material of which the cell case was constructed. W. G. GAESSLER

Investigations on the electrochemical preparation of zinc and lanthanum persulfates. VICENTA ARNAL. *Helv. Chim. Acta* **13**, 1254–7(1930).—Attempts at direct prepn. of these compds. were unsuccessful. J. H. MOORE

The electrolytic production of dicalcium phosphate from apatite in India. SURENDRALAL DAS. *J. Soc. Chem. Ind.* **49**, 490–2T(1930).—Indian apatites generally contain only 15–20% P_2O_5, which limits their use in *fertilizer manuf.* to $CaHPO_4$ production by the electrolytic process. This process is used because the presence of deleterious substances leads to the waste of H_2SO_4, which is neither cheap nor abundant in India. The solv. of apatite in $HClO_4$ and other working details of the electrolytic process are noted. C anodes and Pt foil cathodes were used. A 40% soln. of $NaClO_4$ gave satisfactory results. $CaHPO_4$ is applicable to more soils than superphosphate, and the H_2 produced at the cathode can be utilized in subsidiary industries. W. H. BOYNTON

Characteristics of secondary batteries under high pressure. II. Variation of capacity of pasted-type storage battery under high pressure. SAKAE MAKIO. *Trans. Electrochem. Soc.* **59**, (preprint) 8 pp.(1931); cf. *C. A.* **24**, 1299.—A Pb storage battery was charged at 1 atm. (normal) and then discharged at various rates at a pressure of 80 atm. The capacity at 80 atm. is as much as 47% above that at normal. However, the increase in capacity is not permanent. Upon reducing the pressure to 1 atm., the capacity rapidly drops to normal. In other words, the after-effect is very short-lived, so on the whole there appears to be no practical advantage in operating batteries at high atm. pressures. Details of the high-pressure app. and a discussion of results are included. C. G. F.

Carbon tubes offer advantages in Cottrell units. A. D. CAMP. *Chem. Met. Eng.* **37**, 636–7(1931).—C is susceptible to attack only by O_2 at temps. exceeding 315°, by oxidizing agents such as HNO_3, and by CO_2 and water vapor at comparatively high temps. C has high elec. cond.; it does not soften or melt; and it has an extremely low coeff. of thermal expansion. The method of suspending the C tubes in a H_2SO_4 plant is illustrated. There are now in operation in H_2SO_4 and H_3PO_4 plants 21 Cottrell units equipped with C pptn. tubes; 23 are working in connection with the recovery of HF in oil refineries and chem. plants. C precipitator tubes show no trace of deterioration after 4 yrs.' continuous service in contact with HF and H_3PO_4. W. H. B.

The industrial development of the electrical purification of gases. LÉVÊQUE. *Rev. gén. sci. et ind.* **27**, 513–21(1930); 7 illus.—L. refers to the application of the *Cottrell method* to the recovery of losses from *lampblack factories* and of metallic fumes from smelters, but deals especially with the *purification of blast-furnace gas* at Homécourt, details of which are given. J. H. MOORE

Developments in the electrical industry during 1930. JOHN LISTON. *Gen. Elec. Rev.* **34**, 1–9, 92(1931).—The review includes chapters on: Emmet mercury vapor process; photoelectric control; elec. welding; television; vacuum tubes; lightning arresters; industrial heating. C. G. F.

Chemistry of leaching bornite (SULLIVAN) **9**. Effect of electrodeposited metals on the resistance of materials to repeated stresses (BARKLIE, DAVIES) **9**. Distribution of crystals of Cr electrodeposited in thin plates (EWING, *et al.*) **9**. Three crystalline modifications of electrolytic Cr (SASAKI, SEKITO) **9**. Rubber deposition by electrophoresis (Brit. pat. 334,871) **30**. Rubber (Fr. pat. 691,912) **30**. Dicalcium phosphate (Brit. pat. 335,097) **15**. Adsorbent comprising C, Fe and Fe oxide [for electrode manufacture] (U. S. pat. 1,789,507) **18**. Refractory lining construction suitable for electric furnaces (U. S. pat. 1,789,474) **19**. Feeding stuff from cellulose (Norw. pat. 52,801) **12**

BARY, PAUL: **Où en est l'électrochimie?** Paris: Gauthier-Villars et Cie. 200 pp. Paper, F. 30.

Die Siemens-Konzern im Bilde. Berlin: V. D. I.-Verlag. 199 pp. Linen, M. 7.50

PLUSIN, GEORGES: **Électrothermie appliquée. I. Les calculs électrothermiques—les pertes de chaleur dans les fours—le carbone en électrothermie—les électrodes en charbon et en graphite.** Published as a part of "Encyclopédie de chimie industrielle," edited by M. Matignon. Paris: J. B. Baillière et Fils. 380 pp. F. 70; bound, F. 85. Reviewed in *Ind. Eng. Chem.* **23**, 247(1931).

Handbuch der technischen Elektrochemie. Issued by Victor Engelhardt. **Band I, Tl. 1 Die technische Elektrolyse wässeriger Lösungen. Theoret. und allgem.**

Teil. A. Die techn. Elektrometallurgie wässeriger Lösungen. Eisen, Mangan und Chrom, Nickel, Kobalt, Zink, Cadmium, Wismut, Antimon, Zinn, Blei, Quecksilber. Edited by GEORG EGER, R. GROSS, MARTIN HOSENFELD, *et al.* Leipzig: Akad. Verlagsges. 613 pp. M. 56; bound, M. 58.

KRAUSE, H.: **Galvanotechnik (Galvanostegie und Galvanoplastik).** 6th ed., enlarged. Leipzig: Max Jänecke. 255 pp. M. 5.40.

KREMANN, ROBERT, AND MÜLLER, ROBERT: **Elektromotorische Kräfte, Elektrolyse und Polarisation. Tl. 2. Elektrolyse und Polarisation.** Bd. 8, Tl. 2 of "Handbuch der allgemeinen Chemie." Leipzig: Akademische Verlagsges. 835 pp. M. 74; bound, M. 78. Cf. *C. A.* **25**, 646.

PFANHAUSER, W.: **L'électro-déposition des métaux.** Paris: Ch. Béranger. 850 pp. F. 180.

VALENTINER, S.: **Elektrische Messmethoden und Messinstrumente.** Brunswick: Verlag F. Vieweg & Sohn. 152 pp. M. 10.20; bound, M. 12.

Electric battery. WESTON ELECTRICAL INSTRUMENT CORP. Brit. 335,452, Nov. 28, 1929. Various details are given of the manuf. of a standard cell of the Weston type which may have a glass container with electrodes of Cd amalgam, Hg and Pt, and an electrolyte of $CdSO_4$ soln.

Dry cells. SOC. ANON. LE CARBONE. Ger. 511,583, Dec. 2, 1924. The elements for dry batteries have a solid depolarizer such as MnO_2 surrounding the pos. electrode as a dry porous mass.

Forming pressed graphite and pyrolusite depolarizing elements for dry cells. JACOB SUNDHEIMER. Ger. 511,889, May 22, 1929.

Carbon caps for galvanic cells. GEBR. KLEINMANN. Ger. 511,952, Feb. 1, 1930.

Galvanic element. SOCIÉTÉ ANON. LE CARBONE. Ger. 512,889, July 3, 1925. Addn. to 388,237. The porous mass is protected against infiltration of liquid by a skin formed by colloids mixed with the electrolyte. Thus, arrow-root is mixed with the electrolyte NH_4Cl for this purpose.

Accumulators. TH. GOLDSCHMIDT A.-G. Ger. 512,480, Aug. 1, 1929. A filling material for accumulator plates consists of highly dispersed litharge mixed with vaporized Pb, or Pb compds. and gas, and condensed and pressed.

Accumulators. COMPAGNIE GÉNÉRALE D'ELECTRICITÉ. Fr. 690,923, Feb. 18, 1930. Jars for Pb accumulators are made of a thermoplastic material composed of animal or vegetable fibers agglomerated with S and contg. fillers if desired.

Accumulators. MEYER WILDERMAN. Fr. 691,434, Mar. 7, 1930. Arrangement of porous separators almost filling the spaces between the electrodes is described.

Accumulators. EDWARD W. SMITH. Fr. 691,806, Mar. 12, 1930. Separators for elec. accumulators are made by forming a layer of inert fibrous material such as glass wool, Na_2SiO_3 and siliceous powder such as infusorial earth, allowing the mass to set and harden and then treating it with H_2SO_4 to dissolve out Na_2SO_4 and leave a porous mass.

Dry electric rectifier. SÜDDEUTSCHE TELEFON-APPARATE-, KABEL- UND DRAHTWERKE A.-G. Ger. 512,817, Oct. 31, 1928. The plate electrodes are sepd. by a layer contg. about 5% alkali metal.

Electrolytic deposition of metals. IMPERIAL CHEMICAL INDUSTRIES, LTD. Fr. 692,044, Mar. 17, 1930. See Brit. 324,589 (*C. A.* **24**, 3715).

Electrodeposition of metals. METALLGESELLSCHAFT A.-G. Ger. 512,913, Nov. 8, 1927. The metallic cathodes are covered with non-conducting material to avoid deposition of metal.

Electrodeposition of chromium. OSKAR HAHN (to Chrome-Plate, Inc.). U. S. 1,789,523, Jan. 20. The electrolyte is prepd. by the action of H_2O_2 on a soln. which may contain chromic acid or its suitable compds.

Revolving-drum apparatus suitable for electroplating. EDGAR S. THOMSON U. S. 1,790,289, Jan. 27. Structural features.

Apparatus for electroplating wares. SIEMENS & HALSKE A.-G. Ger. 511,022, Sept. 23, 1928. Details of arrangement are given.

Apparatus for electroplating metal objects. MAJOR ENGINEERING CORP. Fr. *690,956, Feb. 28, 1930.*

Chromium plating. *ELECTRO-MÉTAUX.*

... petroleum, which removes the bubbles.

ating with chromium. E. V. HAYES-GRATZE. **Brit. 335,161, June 13.**

troplating with Cr with the use of anodes of Pb or Pb alloy, auxiliary cath-

odes are employed to prevent excessive deposits on certain portions of the articles being plated such as automobile radiator shells; and insulating shields may be used to deflect the ions and prevent accumulation of pockets of gas. Various details of app. and procedure are described.

Chroming bath for electroplating. WILHELM A. F. PFANHAUSER. Ger. 505,864, Aug. 20, 1926. Details of construction.

Stripping chromium-plated articles. TERNSTEDT MANUFACTURING CO. Ger. 511,416, Feb. 12, 1930. The articles are subjected to anodic treatment in an aq. soln. of an org. acid that is capable of reducing Cr in soln. from the sexavalent to the tervalent state. This treatment removes the Cr without rendering the base metal passive to a second deposit. A suitable bath contains 60–120 g. of oxalic acid per l., and may be used at a temp. of 25–30° and at a voltage of about 12. Cf. *C. A.* **25**, 882.

Electric condensers impregnated with chlorinated naphthalene or the like. GRIGSBY, GRUNOW CO. Brit. 335,330, Aug. 9, 1929. Various details of manuf. are described.

Electrolytic cell (condenser). ALEXANDER GEORGIEV (to Aerovox Wireless Corp.). U. S. 1,789,949, Jan. 20. Structural features.

Weaving diaphragms for electrolytic cells from wires and asbestos threads, etc. I. G. FARBENIND. A.-G. Brit. 335,151, March 22, 1929. Mech. features.

Electrolytic cell with bipolar electrodes. ELEKTRIZITÄTS-A.-G. VORM. SCHUCKERT & CO. and ANTON FISCHER. Ger. 513,290, Apr. 12, 1929.

Electrolyzer with bipolar graphite electrodes for making alkali hypochlorites. ORONZIO DE NORA. Ger. 514,171, Dec. 19, 1929.

Electrolytic cell for extracting metals from salt solutions. I. G. FARBENIND. A.-G. (Konrad Teufel, inventor). Ger. 513,188, Feb. 22, 1927.

Electrolytic cell for generating oxygen and hydrogen. A. E. KNOWLES. Brit. 334,901, July 6, 1929. Various details are described of a cell suitable for use with NaOH or KOH soln. as electrolyte.

Electrolytic cell for the production of hydrogen and oxygen. DE NORDISKE FABRIKER, DE-NO-FA, A/S and CARL F. HOLMBOE. Norw. 46,781, Aug. 12, 1929. Structural features.

Electrolytic production of hydrogen and oxygen. NORSK HYDRO-ELEKTRISK KVAELSTOFAKTIESELSKAB. Norw. 45,860, Dec. 3, 1928. A hollow electrode contains an electrically conducting filling material on which the gas formation chiefly takes place.

Apparatus for electrolysis. DE NORDISKE FABRIKER, DE-NO-FA, A/S and CARL F. HOLMBOE. Norw. 45,940, Jan. 7, 1929. Structural features.

Cutting cavities or apertures in metal bodies by electrolytic action. W. GUSSEFF. Brit. 335,003, July 24, 1929. Various details of app. and procedure are described in which there may be used as electrolyte a 3–8% HCl soln.

Electrolysis of fused halides. I. G. FARBENIND. A.-G. (Johannes Brode, Carl Wurster and Erich Büttengenbach, inventors). Ger. 514,125, Apr. 27, 1929. Anodes made of, or coated with, W are used at a temp. below red heat.

Eliminating the anode effect in fused electrolytes. DET NORSKE AKTIESELSKAB FOR ELEKTROKEMISK INDUSTRI. Norw. 45,694, Oct. 15, 1928. A stirring app. is introduced through a hollow electrode.

Electrical treatment of liquid hydrocarbons, etc. RHENANIA-OSSAG MINERALÖLWERKE A.-G. Ger. 514,320, July 8, 1923. Liquid hydrocarbons are polymerized or converted into other compds. by treatment in an elec. condenser with a. c. of high tension and high frequency in the presence of an indifferent or reactive gas, *e. g.*, O. The condenser is provided with a dielectric of porcelain, hard paper, mica or the like, and the gas is preferably injected in a finely divided state into the liquid. Alcs. and fatty oils, etc., may be treated similarly; *e. g.*, the hydrogenation of oleic acid is described. App. is shown.

Fluorine. KARL FREDENHAGEN. Ger. 511,808, July 18, 1928. Thoroughly dried acid alkali fluoride (*e. g.*, KF.HF) is electrolyzed between a Cu cathode and graphite anode. The fluoride is fused and subjected to a dry air current to prevent the access of moisture from the atm. Cf. *C. A.* **24**, 3449.

Hydrogen peroxide. I. G. FARBENIND. A.-G. (Georg Pfleiderer, inventor). Ger. 514,172, June 21, 1929. In the electrolytic manuf. of H_2O_2 at atm. or raised pressure, the anolyte and the catholyte are separately renewed, either periodically or continuously. App. is shown. Cf. *C. A.* **24**, 2065.

Sodium perchlorate. I. G. FARBENIND. A.-G. (Udo Ehrhardt, inventor). Ger. 514,340, Oct. 30, 1929. In the manuf. of $NaClO_4$ by electrolyzing a soln. of $NaClO_3$, an electrolyte contg. at the beginning at least 800 g. of $NaClO_4$ per l. is used, and more

$NaClO_3$ is added during the process so that the concn. of $NaClO_3$ does not fall below 150 g. per l. until the $NaClO_4$ content is about 1000 g. per l. The electrolysis is then continued until the $NaClO_3$ is substantially exhausted. It is necessary to work at 40–50°. An example is given.

Furnace for the electrolytic production of aluminum. P. E. Fröland. Norw. 46,412, April 29, 1929. Structural features.

High-voltage arc furnace. Aktieselskapet Norsk Staal (Elektrisk-Gas Reduktion). Norw. 46,645, July 1, 1929. Structural features.

Rotary electric cylinder furnace. Aktieselskapet Norsk Staal (Elektrisk Gas-Reduktion). Norw. 45,331, Dec. 31, 1928. The furnace is built with two or more rotating sections and intermediary stationary sections carrying the arrangements for the elec. heating.

Electric furnace suitable for dental uses. Ewald Carl Glitzke. Ger. 511,238, Nov. 22, 1927. See Brit. 298,001 (C. A. 23, 2668).

Electric foundry furnace. Demag-Electrostahl G. m. b. H. Fr. 691,453, Mar. 7, 1930.

Electric furnace for fusing metals. Emil F. Russ. Fr. 691,638, Mar. 10, 1930.

Multiple-hearth electric smelting furnace. Siemens-Schuckertwerke A. G. (Hans Freiherr von Droste and Rudolf Grundmann, inventors). Ger. 511,052, June 29, 1929.

Charging electric smelting furnaces for iron and steel, etc. Demag A.-G. Ger. 503,010, June 18, 1927. The charge is packed in a crate or the like made of the same material as the charge. Cf. C. A. 23, 1067.

Electric reduction furnace. Ivar Hole. Norw. 47,081, Oct. 21, 1929. Deviation of the current to the upper parts of the charge is avoided by means of a mantle surrounding the electrode and insulated from the latter. The mantle is carried gas-tight through the vault of the furnace.

Muffles and heating elements for electric furnaces. Établissements Bikso. Fr. 692,298, Mar. 19, 1930.

Electrically heated industrial oven. Heraeus-Vacuumschmelze A.-G. and Wilhelm Rohn. Ger. 514,354, Dec. 29, 1925.

Electrically heated annealing oven. Siemens-Schuckertwerke A.-G. (Johann Schnepf, inventor). Ger. 514,235, July 1, 1928.

Electrically heated annealing oven. Akt.-Ges. Brown, Boveri & Cie. Ger. 514,353, Apr. 19, 1928.

Electric induction heater for low-temperature heating. T. E. Beaumont and J. N. Waring. Brit. 335,337, April 30, 1930. Structural and elec. features.

Electric induction furnaces. Associated Electrical Industries, Ltd. Fr. 691,598, Mar. 8, 1930.

Electric resistance furnace. Elektriske Industriovner A/S. Norw. 45,402, Aug. 13, 1928. Structural features regarding the arrangement of heating elements above the charge are described.

Electrical heating resistances. Elektro-Hriz- und Wärme- G. m. b. H. Ger. 481,796, Mar. 20, 1927. A mixt. of C and metal oxide is molded, pressed and heated. During the heating, the carbonate layer fuses with reduced metal. The oxides mentioned are ZrO_2, ThO_2, CaO and U_3O_8.

Electrical resistances. Elektroterm A.-G. Ger. 512,264, Jan. 23, 1930. Addn. to 481,796 (preceding abstr.). Graphitic acid is added to the mixt. of C and metal oxides described in 481,796 to prevent the formation of carbides when the resistance is heated.

Electrical resistance element for producing infra-red energy. Carroll H. Bowles (to Burdick Corp.). U. S. 1,789,301, Jan. 20. A resistance element such as a suitable wire is mounted on an insulator such as a grooved rod and then coated with a compn. formed of non-metallic heat-cond. material such as SiC powder and Na silicate or other suitable binder while in a semi-liquid state; it is placed in an oven to set and dry, and then cured by heating to a high temp.

Electric heating resistances. Elektroterm. A.-G. Ger. 510,068, Apr. 4, 1928. A dry mixt. of C and metal oxides is mixed with about 10% of dry tragacanth powder and then kneaded with about 20% of water. The gummy product is extruded to form threads or bands, which are twisted and dried before baking.

Electric heating elements. Heraeus-Vacuumschmelze A.-G. and Wilhelm Rohn. Ger. 511,097, Dec. 2, 1927. Elec. heating elements are manufd. from alloys contg. more than 85% of Cr, *e. g.*, Cr 85–95 and Mo or W 15–5%.

Electrical immersion heater. J. H. CROSSLEY and ASSOCIATED ELECTRICAL INDUSTRIES, LTD. Brit. 335,354, Sept. 3, 1929. Structural features.

Cooling and regulating the temperature conditions of reactions in connection with electrothermic reaction processes. AKTIESELSKAPET MALMINDUSTRI. Norw. 45,608, Oct. 1, 1928. Steam alone or together with water is used for the cooling; the temp. is regulated by regulating the pressure of the steam.

Burning of electrodes. DET NORSKE AKTIESELSKAB FOR ELEKTROKEMISK INDUSTRI. Norw. 46,761, Aug. 5, 1929. Electrodes are burned during the operation of the elec. furnace by means of the heat developed in the electrode by the elec. current. The current is applied to the electrode through a number of contact sticks inserted in the electrode at different levels. The extension of the burning zone in the electrode is regulated by applying the current to contacts located in more or less unburned parts of the electrode.

Self-burning electrodes. DET NORSKE AKTIESELSKAB FOR ELEKTROKEMISK INDUSTRI. Norw. 45,726, Oct. 22, 1928. Structural features.

Self-burning electrodes. DET NORSKE AKTIESELSKAB FOR ELEKTROKEMISK INDUSTRI. Norw. 46,285, March 25, 1929. The electrode mass is filled in at the top of a stationary guiding mantle and passes continuously downward through the mantle as it burns to a solid self-supporting electrode. In order to avoid sticking of the material to the mantle a non-metallic coating is placed between the mass and the mantle; the coating is removed by burning or by mech. means before it reaches the elec. contacts. Cf. C. A. **24**, 2386.

Reenforcement for self-burning electrodes. DET NORSKE AKTIESELSKAB FOR ELEKTROKEMISK INDUSTRI. Norw. 45,981, Jan. 14, 1929. For self-burning electrodes in Al furnaces the mantle around the electrode, which is usually made of sheet iron, cannot follow the electrode into the metal bath, as the Fe would contaminate the Al. The reenforcement is therefore made in 2 parts: (1) a mantle of Al which follows the electrode, and (2) a number of ribs of iron which are removed before they reach the melting zone. Other structural features are given.

Furnace electrodes. DET NORSKE AKTIESELSKAB FOR ELEKTROKEMISK INDUSTRI. Ger. 513,226, Mar. 16, 1927. A method of making self-baking electrodes is described.

Electrode for electrometallurgical, particularly electrolytic, furnaces. AKTIESELSKABET NORSK ALUMINIUM COMPANY. Norw. 46,762, Aug. 5, 1929. Structural features.

Holder for furnace electrodes. DET NORSKE AKTIESELSKAB FOR ELEKTROKEMISK INDUSTRI. Norw. 45,137, May 7, 1928.

Electrodes for electrolytic cells for development of gases such as oxygen and hydrogen from water. KARL ROTH (to I. G. Farbenind. A.-G.). U. S. 1,790,248–9, Jan. 27. Structural features.

Electrode curtain for electric gas cleaner, comprising interlocked wire rings. METALLGESELLSCHAFT A.-G. (Theodor Bantz, inventor). Ger. 511,207, Nov. 23, 1929.

Automatic device for cleaning the discharge electrodes of electric gas cleaners. SIEMENS-SCHUCKERTWERKE A.-G. (Erich Wolfsdorf, inventor). Ger. 513,413, Mar. 1, 1927.

Electrical gas purification plant. METALLGESELLSCHAFT A.-G. Ger. 511,643, Oct. 21, 1928. Details of cleaning the electrodes by an electromagnetic tapping device are given.

Apparatus for the electrical purification of gases. METALLGESELLSCHAFT A.-G. Fr. 691,772, Feb. 27, 1930.

Electric apparatus for thermal treatment of metal filaments and wires. FIRMA CHRISTIAN WANDEL. Ger. 511,327, June 22, 1927.

Cleaning metal surfaces. MAX WOMMER. Ger. 514,157, Feb. 3, 1927. Fe and other metals are electrolytically cleaned with the aid of an a. c. and a superimposed d. c. App. is shown.

Hardening water-glass cements. STETTINER CHAMOTTE-FABRIK A.-G. VORM. DIDIER. Ger. 513,425, Sept. 10, 1927. In hardening water-glass cements used for lining metallic vessels, a d. c. is passed through the cement, the vessel constituting the pos. pole. The current decomposes the water-glass, or renders it reactive to siliceous materials, which may be added to the cement to accelerate the hardening in known manner. A current of a few milliamps. per sq. dm. of metal surface is suitable, the hardening being complete after about 3 days. App. is shown.

Lampblack, acetylene and hydrogen. I. G. FARBENIND. A.-G. Fr. 690,869, Mar. 1, 1930. Lampblack, C_2H_2 and H are made by treating hydrocarbons such as CH_4

or mixts. contg. it in an elec. arc at temps. of 2500° or above, under any pressure and under such conditions that the vol. of gas passed per hr. through the arc, measured in cu. m., is to the power of the arc, measured in kilowatts, below about 0.6.

Electric system for exploring the subsoil for detection of minerals, etc. MINES DOMANIALES DE POTASSE D'ALSACE. Brit. 335,051, Feb. 21, 1929; and Brit. 338,093, April 8, 1929.

Mercury-vapor device for flickering light effects. BRITISH THOMSON-HOUSTON CO., LTD. and C. G. GARTON. Brit. 334,949, June 14, 1929. In a device for producing flickering light effects by boiling Hg in a sealed container, the latter is filled with an inert gas, preferably N, with 5–15% of H at atm. pressure and a small quantity of inert powder, such as iron dust, is added to reduce the tendency of Hg globules to adhere to the walls of the device.

Electric luminous tubes. PATENT-TREUHAND-GES. FÜR ELEK. GLÜHLAMPEN M. B. H. (Marcello Pirani and Georg Gaidies, inventors). Ger. 513,306, Aug. 30, 1929. Elec. luminous tubes having a filling of alkali metal vapor are made of borosilicate glass contg. less than 50% of SiO_2. Part of the SiO_2 may be replaced by oxides of rare earth metals, *e. g.*, La_2O_3. Constructional details are given.

Filaments for lamps. SOC. D'ÉTUDES SCIENTIFIQUES ET INDUSTRIELLES Fr. 692,420, June 14, 1929. Filaments for wireless lamps are made from colloids of alkali, alk. earth or other metals or oxides of rare earth metals in the colloidal state.

5—PHOTOGRAPHY

E. P. WIGHTMAN

Micelle theory of the latent photographic image. F. WEIGERT. *Z. wiss. Phot.* (Schaum Festschrift) 29, 191-201(1930).—Within a micelle consisting of Ag halide, water, gelatin and "Ursilber," and which may also contain Ag_2S and dye mols., exposure causes an energy increase. Such micelles with increased energy represent the latent image. Development is then an activation of the developer mols. by the collected energy. This is therefore a chem. intermicellar process. The special photographic effects are explainable partly by the photomicellar process, which can absorb a great number of quanta in the same particle, and by the optical structure of the micelles. The S-shaped course of the density curve is caused by the internal development of the Ag halide by strong exposure which forms metallic Ag while at the same time the energy available for the development decreases. A. P. H. TRIVELLI

Early use of light filters in practical photography. E. STENGER. *Z. wiss. Phot.* (Schaum Festschrift) 29, 43–7(1930).—In the early days of the Daguerre process blue glass was used to decrease the effect of light intensity on the eye. Yellow and red glass was employed to increase the latent image obtained by shorter exposures (Becquerel effect) and green glass for landscape photography by the collodion process. William Crookes tried to eliminate the action of ultra-violet light by using a soln. of quinine bisulfate as a filter. Later he tried to get the same effect by the use of yellow glass filters. A. P. H. TRIVELLI

Amyl acetate in sensitometry. R. KIESER. *Z. wiss. Phot.* (Schaum Festschrift) 29, 87–90(1930).—The possibilities of the Am acetate lamp in sensitometric work depend upon the purity of the com. Am acetate. This can be tested with an Abbe refractometer at 15°. A. P. H. TRIVELLI

Sensitometry with spectrum and color chart. H. ARENS AND J. EGGERT. *Z. wiss. Phot.* (Schaum Festschrift) 29, 239–61(1930).—The foundations of color sensitometry are formulated with the spectrum and a color chart. Simple spectrum pictures give only qual. comparisons between different photographic emulsions and not abs. sensitivity. To obtain this, it is necessary to know the energy distribution or the intensity distribution over the whole spectrum. Sensitometric investigations show that every photographic emulsion has a typical density distribution over the spectrum which is independent of the failure of the reciprocity law. The photographic reproduction of pigments is made with a color chart. The color charts generally used are criticized and it is shown that in order to obtain quant. data, special gray scales must be photographed at the same time. A. P. H. TRIVELLI

The sensitivity of photographic emulsions for x-rays in relation to grain size. J. EGGERT. *Z. Elektrochem.* 36, 750–3(1930).—With 6 different exptl. photographic emulsions of different grain size it is shown that the photographic action of x-rays is directly proportional to the projective area of the grains. In spite of the great differ-

ences between the photographic action of x-rays and light there is also a similarity in behavior against desensitizers and the temp. coeff. A. P. H. TRIVELLI

Relation between photographic reversal and the sensitivity of the silver halide grain. FRANK E. E. GERMANN AND D. K. SHEN. *J. Phys. Chem.* **35**, 93–9(1931); cf. *C. A.* **23**, 5122.—In order to test the conclusion that only the larger grains are supplied with sensitizing material, the grains were sepd. by repeated centrifuging into the extremes of size, and coated in single grain layers. Developability-exposure curves obtained from these for the large- and small-grained fractions coincided with that of the uncentrifuged emulsion, which indicates that the lack of developability of 83% of the grains cannot be due to depletion of sensitivity-promoting material during the early part of formation. It has been found that treatment of the grains of AgI with certain developers prior to exposure increases their max. developability from 17% to higher percentages, up to 100%, depending upon the time of bathing. This increase is not removable by washing. From expts. it is concluded that the role of a sensitizer appears to be that of preventing or delaying reversal. The insensitivity of AgI emulsions is probably due to the existence of a wide range of specks among the grains combined with the phenomenon of quick reversal. The nature of photoretrogression, which is very marked in AgI, is probably due to the same causes as reversal. E. P. WIGHTMAN

Colored development of silver halide emulsions. R. E. LIESEGANG. *Z. wiss. Phot.* (Schaum Festschrift) **29**, 23–5(1930).—Development of colored pictures built up of colloidal Ag from AgCl paper emulsions is discussed. Theoretically the behavior of ... crent papers is explained on the basis of the Ag structure. A. P. H. TRIVELLI

Determination of the resolving power of photographic layers by the contact method. H. SCHNTZING. *Z. wiss. Phot.* (Schaum Festschrift) **29**, 266–80(1930).—The relative resolving power of a photographic layer is detd. as the difference in mμ of the smallest width of an opaque wedge increasing in steps of 2%, printed by contact at optimal exposure between transparent lines of more than 0.01 mm. thickness. This method is discussed as being preferable to any other method. The resolving power is governed by the turbidity, contrast, sharpness, exposure, wave length of the light, thickness of the lines, distance between the lines, time of developmental effects and the shrinkage of gelatin. A. P. H. TRIVELLI

Correct tone reproduction of color in photography. K. JACOBSOHN. *Z. wiss Phot.* (Schaum Festschrift) **29**, 202–8(1930).—A color tablet is described with which it is possible to det. at once the correct tone reproduction of color by placing the color in a gray surrounding (like the neutral color circle of Matthäi) which, to the eye, has the same neutral reflection power as the tone of the color. A. P. H. TRIVELLI

Exposing ripening specks. LÜPPO-CRAMER. *Z. wiss. Phot.* (Schaum Festschrift) 29, 5–7(1930).—Expts. on the laying bare of ripening specks in AgCl emulsions by KI treatment are described. It was shown that such emulsions have more specks within the grains than ordinary negative emulsions, which is in agreement with the higher reducibility of AgCl and the fact that photochloride is more stable than the other photohalides A. P. H. TRIVELLI

The ripening process of silver bromide. "Ursilber" and lysidine as sensitizers. J. M. EDER. *Z. wiss. Phot.* (Schaum Festschrift) **29**, 20–2(1930).—As early as 1881 E. ... posed the theory of sensitivity increase by the formation of Ag nuclei ("Ursilber") through the slow reduction of Ag halide by gelatin. Weigert and Luhr, and Schmidt and Pretschner have substantiated this by quant. analysis. Lysidine, a new sensitizer, when added to an emulsion which is not ammoniacal, increases the sensitivity 2 or more times. This would seem to be an increase of sensitivity which is not due to the formation of a Ag compd. contg. S. A. P. H. TRIVELLI

New methods of analysis of photographic products and raw materials. VII. Detecting silver iodide and silver chloride in photographic materials. H. BAINES. *J. Soc. Chem. Ind.* **49**, 473–4T(1930); cf. *C. A.* **24**, 2069.—A *spot test for AgI* is described which depends on the characteristic color of TlI and its insoly. in cyanide soln. About 1 cc of 0.2 *M* KCN soln. is gently poured onto the product, and when the covered portion is completely fixed most of the soln. is transferred by pipet to a white porcelain slab or developing dish. One or 2 drops of 1% $TlNO_3$ soln. is added. If I is present a yellow ppt is formed, whereas bromide or chloride gives a white or pale cream ppt. almost invisible on the porcelain. The method readily indicates the presence of 0.5% AgI in an iodobromide emulsion. *Test for AgCl.*—0.1 *N* NH_4CNS soln. is applied thinly to a few cm^2 of the product by means of cotton wool. After 16 sec. the product is washed in running H_2O for 15 min., removed and blotted. A few drops of ferric alum soln. free from added acid is applied to the treated portion (a red coloration indicates incomplete washing), and a little solid NaCl is now added. In the original absence of AgCl

the crystals of NaCl are colored pale yellow because of the formation of $FeCl_3$, but if AgCl were originally present the blood-red color of $Fe(CNS)_3$ is produced. The method depends on the intermediate soly. of AgCNS between AgBr and AgCl. Double decompn. with formation of AgCNS takes place only if AgCl is present. After the washing out of sol. salts the addn. of excess chloride ions reverses the original double decompn., the sol. thiocyanates thus formed being converted into the highly colored Fe salt by the ferric alum. **VIII. Determination of residual nitrate in washed emulsions.** H. BAINES. *Ibid* 479–81T.—Most of the known methods were inadequate. A modification of the Winkler method (*Chem.-Ztg.* **23**, 454(1899); **25**, 586(1901)) by Haase (*C. A.* **20**, 2472), which depends upon the production of a yellow color by addn. of a soln. of brucine to solns. contg. 0.5 to 20 mg. HNO_3 per l., in the presence of H_2SO_4, was tried and gave consistent but low results in the presence of gelatin. The method finally adopted to overcome this was to det. the quantity of nitrate forced through a membrane from an emulsion into distd. H_2O by the passage of a definite current for a definite time. This quantity would be no criterion of the original concn. of nitrate in the emulsion because of the variable quantity of other ions, but the difficulty was overcome by partial electrodialysis in the presence of a relatively large excess of an anion other than nitrate and by comparison of the quantity of nitrate ion transmitted with that obtained by a similar electrodialysis with standard nitrate soln. under the same conditions. The anion added was SO_4^{--} in the form of H_2SO_4, which gave the addnl. advantage that the p_H of the emulsion was lowered below the isoelec. point of the gelatin which caused it to migrate to the cathode. The diffusion membrane used was collodion contg. 2.5% camphor. Its method of prepn. is described. E. P. WIGHTMAN

Polysaccharide ether esters (for films, lacquers, etc.) (Brit pat. 334,897) **10.**

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DAVID, LUDWIG AND RHEDEN, J.: **Photographisches Praktikum: Lehrbuch.** 7th and 8th editions, newly edited. Halle (Saale): W. Knapp. 807 pp. M. 16.

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HAUBERRISSER, GEORG: **Lernt richtig photographieren.** Leipzig: Ed. Liesegang's Verlag. 160 pp. M. 1.60.

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Veröffentlichungen des Wissenshaftlichen Zentral-Laboratoriums der Photographischen Abteilung—AGFA. Bd. I. Issued by I. G. FARBENINDUSTRIE AKT. GES. Leipzig: S. Hirzel. 155 pp. M. 10. Reviewed in *Ind. Eng. Chem.* **23**, 343(1931).

Photography. LOUIS WESTON. Ger. 511,874, July 6, 1928. Non-inflammable films are treated with dil. aq. NH_3 for 6 hrs. between 30° and 50° to prevent their shrinking or wrinkling during the developing process.

Photography. I. G. FARBENIND. A.-G. (Wilhelm Schneider, inventor). Ger. 512,613, Oct. 31, 1929. A halation-preventing layer for photographic plates and films contains fuchsone dyes with one or more COOH groups in the mol. Aurine dicarboxylic and monocarboxylic acids are mentioned in examples. Cf. *C. A.* **25**, 652.

Photography. KALLE & CO. A. G. (Hermann Neuroth and Ulrich Ostwald, inventors). Ger. 514,057, Oct. 31, 1929. Images in tanned gelatin or other colloid are prepd. by bringing the colloid and an aryl azide on to a suitable support, *e. g.*, glass or paper, and exposing. The product may be worked up by the usual chromate process, and the image may be colored by dusting on a pigment or by applying a greasy pigment. An example is given. Cf. *C. A.* **24**, 3187.

Photography. N. V. CHEMISCHE FABRIK L. VAN DER GRINTEN. Ger. 514,084, Feb. 25, 1927. Photographic layers are prepd. by bringing on to paper or other support an aromatic diazo compd. contg. a tertiary N atom in the *p*-position to the diazo group, and free from substituents capable of yielding an anhydride with the diazo group. The diazo compd. from *p*-aminodimethylaniline is suitable. Development is effected by

treatment with an azo dye component, and the layer may include a salt, *e. g.*, $BaCl_2$, that hinders bleeding of the dye so produced.

Color cinematography. A. BERNARDI and RAYCOL, LTD. Brit. 335,310, July 18, 1929. Details are described of a system in which 3 or more images are simultaneously made, each through a color filter; the images are subsequently projected, one or more without color filters and the others through color filters.

Color cinematography. I. G. FARBENIND. A.-G. Brit. 335,432, Nov. 12, 1928. A high-speed panchromatic emulsion is used which contains a mixt. of coarse and fine grains of AgBr, of which the highly sensitive coarse grains are chiefly affected during the camera exposure, while the less sensitive fine grains are affected during a second or reversal exposure, in forming pictures intended for additive synthesis.

Optical system for color cinematography. F. J. CHESHIRE. Brit. 335,038, Aug. 30, 1929.

Measuring change of color in photographic layers. OTTO REEB. Ger. 511,167, Jan. 10, 1930. The degree of darkening, due to liberation of Ag, is detd. by placing the layer between two stationary condenser plates and observing the change in the capacity of the condenser.

Apparatus for developing light-sensitive materials in photography. FIRMA HANS VON SIERN. Ger. 512,769, Dec. 13, 1927. The app. is designed for the use of liquids that evolve gas.

Photographic sensitive surfaces. F. BUYLE. Brit. 335,357, Sept. 9, 1929. For prepg. surfaces for producing copies having a "charcoal or pastel like" appearance, supports such as wood, earthenware, metal, paper or "tissue" are coated with adhesive material and sprinkled with finely powd. material such as sand, glass, china clay or chalk, and a sensitive emulsion having a "minimum" of binding material such as gelatin or starch is applied. Cf. *C. A.* **24**, 4475.

Photographic films, etc. KALLE & CO. A.-G. (Maximilian Paul Schmidt and Wilhelm Krieger, inventors). Ger. 470,731, Feb. 23, 1926. Photographic films and layers are prepd. from mixts. of alkyl cellulose solns. with light-sensitive materials.

Photographic prints. KALLE & CO. A.-G. Ger. 512,614, Mar. 31, 1929. Diazo prints are obtained by applying diazo compds. of haloaminoalkylarylamines to a suitable carrier layer, exposing to light and developing in a bath contg. azo components. Thus, a paper is treated with the $SnCl_4$ double salt of diazotized 4-amino-3-chloro-6-methyl-1-ethylaniline, tartaric acid, H_3BO_3 and thiourea. After exposure, the print is developed in a soln. contg. NaOH, Na_3PO_4, NaCl and phloroglucinol. The result is a dark brown to black print on a white ground.

Photographic chromate-colloid prints. C. ROEHRICH. Brit. 335,128, April 23, 1929. A chromate-colloid print is improved after exposure by moistening it with water and then exposing it again to uniform light, and, before the second exposure, moisture is removed which adheres to the parts hardened by the first exposure (as by use of alc. or ether, heating, or the action of drying rollers).

Reflex prints. I. G. FARBENIND. A.-G. (Konrad Hebbel, inventor). Ger. 511,280, Aug. 21, 1929. Addn. to 509,762. In producing reflex prints by the method of 509,762 (*C. A.* **25**, 652), the film is treated with a hardening bleaching out soln. prior to treatment with the oxidizing soln.

Photographic line print. ARTHUR R. BAKER and WALTER N. BAKER. U. S. 1,789,013, Jan. 20. A base material such as tracing cloth is coated with a collodion or lacquer compn. and deliniating work is placed on the basic coating by photographic exposure of a light-sensitive coating contg. a dichromate, the portions of the basic coating between the parts being made substantially bare and exposed to the atm., and there is applied to the deliniated work and basic coating a solvent for the latter, such as alc. and ether, and more or less of the resulting soln. is removed from the base between the parts of the work, to leave such portions of the base free for drawing or writing on them.

6—INORGANIC CHEMISTRY

A. R. MIDDLETON

Boron hydrides and "triphenylborylsodium." FRANZ FALTIS. *Z. anorg. allgem. Chem.* 187, 369–78(1930).—The structure of the B hydrides is discussed on the same principles as those developed by Ephraim (cf. *C. A.* **23**, 785) and Hellriegel (cf. *C. A.* **24**, 2619). The compd. $B(C_6H_5)_2Na$ explains the radical formation from hexarylethanes and triarylhydrazines. The cause of the dissocn. is not excessive valency

but the tendency to the formation of $(Ar:)_3A$. The central atom A surrounded by 3 aryl or similar groups is able to combine with another electron. E. SCHOTTE

Structure principles of boron hydrides. EGON WIBERG. *Z. anorg. allgem. Chem.* **187**, 362–8(1930).—The hypothesis of Hellriegel (cf. *C. A.* **24**, 2649) is attacked and the argument is based on the theory developed by W. (cf. *C. A.* **23**, 2897). E. S.

Reduction of nitrates with ferrous hydroxide. C. SANDONNINI AND S. BEZZI. *Gazz. chim. ital.* **60**, 693–700(1930); cf. *C. A.* **24**, 3962.—A review of the literature shows a certain lack of agreement regarding the nature of the oxidation of $Fe(OH)_2$ by nitrates, particularly in the works of Baudisch and Welo (*C. A.* **19**, 3182, 3333) and of Carslev (*C. A.* **24**, 1048). In view of this, expts. were carried out in which aq. $NaNO_3$, NaOH and $FeSO_4$ were boiled in the absence of O: (1) in proportions corresponding to the reaction $8Fe(OH)_2 + NaNO_3 \longrightarrow 4Fe_2O_3 + NH_3 + NaOH + 6H_2O$ and (2) with twice the proportion of $NaNO_3$ in the above equation. The quantity of NH_3 evolved and the rate of its formation were detd. The results show that, whether or not there is an excess of $NaNO_3$, the latter is reduced to NH_3 more rapidly in neutral soln. than in alk soln. (up to 20% free alkali). The % reduction was calcd. for the oxidation of $Fe(OH)_2$. In strongly alk. solns., the formation of NH_3 corresponds to oxidation of $Fe(OH)_2$ and to the Fe^{++}/Fe of the Fe_3O_4. In neutral soln. the mass becomes black (Fe_3O_4), and from the quantity of NH_3 finally evolved, it was calcd. that the reaction stops when the Fe^{++}/Fe ratio reaches the value for Fe_3O_4, which therefore is not in turn oxidized. In alk. soln. with 3–20% free NaOH, reduction is greatly retarded, and under the same conditions as with the neutral solns.; the reduction was in no case over 20%, and, instead of a black product, the $Fe(OH)_2$ was oxidized to a greenish gray mass, and the Fe^{++}/Fe ratio was, under all conditions, greater than that corresponding to Fe_3O_4. In the more strongly alk. solns. the mass became black, and the NH_3 reached 130% that corresponding to the reaction: $12Fe(OH)_2 + NaNO_3 \longrightarrow 4Fe_3O_4 + NH_3 + 10H_2O + NaOH$ and in every case oxidation of $Fe(OH)_2$ proceeded further than that corresponding to the Fe^{++}/Fe ratio. When the product from a neutral reaction mixt. with Fe^{++}/Fe ratio corresponding to Fe_3O_4 was boiled for many hrs. more, no further NH_3 was evolved, but when NaOH was then added more NH_3 was evolved. This was tested with various concns. of NaOH, and the results show that in neutral soln. Fe_3O_4 is not oxidized further, but that in alk. medium it is oxidized at a rate which depends upon the concn. of NaOH. With 2–20% free NaOH, oxidation of Fe_3O_4 is very slow, but with higher NaOH contents it becomes rapid. In weakly alk. solns. the product never becomes black, even after prolonged boiling, indicating that, parallel with the diminished reactivity, the $Fe(OH)_2$ loses its capacity of combining with ferric compds. (cf. Mjamoto, *C. A.* **21**, 1744), because of a rapid and extensive agglomeration. In strongly alk solns. both $Fe(OH)_2$ and Fe_3O_4 become sol. (cf. *Compt. rend.* **109**, 266(1889); *Pogg. Ann* 43, 117). If the soly. of $Fe(OH)_2$ is a result of the formation of a compd. of the type described by Baudisch and Welo (*loc. cit.*), at least it cannot be confirmed in any way. The fact that Fe_3O_4 reduces nitrates in neutral soln. indicates that Fe_3O_4 itself (given the soly. of the $Fe(OH)_2$ and $Fe(OH)_3$ in hot aq. caustic alkalies) is in part decompd., and the resulting $Fe(OH)_2$ is capable of a subsequent reduction. C. C. DAVIS

Amphoteric hydroxides, their aqueous solutions and crystalline compounds. XI. Synthesis and decomposition of high molecular, inorganic compounds in solution, for example, of molybdate, polymolybdate and polymolybdenum acids. GERHART JANDER, KARL JAHR AND WILHELM HEUKESHOVEN. *Z. anorg. allgem. Chem.* 194, 383–428(1930); cf. *C. A.* **25**, 631.—By use of the method previously described (*C. A.* 23, 1810, 3639) the H^+ range was accurately detd. for all Mo acids, their mol. values were fixed and an explanation was given for the reaction whereby higher mol. forms are built up from the lower forms or decompd. into lower forms. The following alkali salts of different Mo acids crystg. from aq. solns. were studied: normal molybdates, dimolybdates, paramolybdates, trimolybdates, tetramolybdates, octomolybdates or acid metamolybdates, dekamolybdates and 16-molybdates. Diffusion coeffs., light absorption, conductometric titration and thermometric titration of these compds. are described in detail. A comparison is made with the results of Sand and Rosenheim (*C. A.* 1, 599; 7, 1452) on polymolybdates. M. MCMAHON

Reversibility of the reactions between sulfur dioxide and lime and between calcium sulfide and calcium sulfate. J. ZAWADZKI AND Z. SYRYCZYŃSKI. *Roczniki Chem* 10, 715–27(727–8 French)(1930).—The equil. in $CaS + 3CaSO_4 \rightleftharpoons 4CaO + 4SO_2 - 238.6$ Cal. (1) was studied from both directions. The equil. pressures of SO_2 were found identical in all cases although, according to the secondary reaction $CaS + 2SO_2 \rightleftharpoons CaSO_4 + S_2 - 58.9$ Cal. (2), the compn. of the solid phase of the system (1) was altered. The pressures of SO_2 in contact with CaO at the beginning of the satn. by passage of the

gas across a solid layer are a little smaller than those of the equil., whereas the pressures of the same gas at the beginning of the decompn. of CaS + $3CaSO_4$ exceed those of the final equil. The results seem to exclude the possibility of explaining these anomalies by admitting the formation of solid solns. and intermediate compds. The abbreviated Nernst equation was used for calcg. the thermic effects. The heat of reaction (1) was found to be 232.4 to —5.5 Cal., av. 234.1 Cal.; that of reaction (2), 61.1 —57.2 Cal.
J. KUČERA

Permanganate decomposition in alkaline media. R. H. FERGUSON, WM. LERCH AND J. E. DAY. *J. Am. Chem. Soc.* **53**, 126–37(1931).—$NaMnO_4$ and $KMnO_4$ are converted into manganates with a loss in O in the presence of their respective concd. hydroxides. The reaction is speeded up by increased OH-ion concn. and by rise in temp. No MnO_2 was observed as a reaction product. R. H. FERGUSON

Purification of disodium phosphate. M. LEMARCHANDS AND C. TRANCHAT. *Compt. rend.* **192**, 50–1(1931).—Na_2HPO_4, as prepd. commercially by the action of Na_2CO_3 on $Ca_3(PO_4)_2$, contains various impurities, the most important of which is Na_2SO_4. The removal of Na_2SO_4 is rather difficult, but L. and T. have shown that it can be accomplished by adding $BaHPO_4$ to the soln of the impure phosphate.
LOUISE KELLEY

A laboratory process for the preparation of sulfuryl chloride. JULIUS MEYER. *Z. angew. Chem.* **44**, 41–2(1931).—Danneel's process, *C. A.* **21**, 1235, for the combination of Cl_2 and SO_2 with activated C is simplified. A ball condenser with 6 balls loosely packed with glass wool and granular C was used as the catalyst chamber. To prevent mutual gas loss the charge of the top ball was moistened with 1 cc. of liquid sulfuryl chloride. The gases enter the reaction chamber through a H_2SO_4 wash bottle which serves also as a flow indicator. 150 g. of SO_2Cl_2 may be prepd. per hr. at a gas flow of 3–4 bubbles per sec. Quant. combination of the gases is obtained at temps. up to 20°. The raw product is very pure and requires only 1 fractionation. In contrast to the Danneel process, the advantages of the method lie in the simplified app., the use of a small quantity of activated C, and the lack of a need for low temp. A. S. S.

Studies on zinc and barium ferrites. JOSEPH GUILLISSEN AND PIERRE J. VAN RYSSELBERGHE. *Trans. Am. Electrochem. Soc.* **59**, (preprint) **1**, 11 pp.(1931).—The formation of Zn ferrite by the direct addn. of Zn and Fe oxides was studied at various temps. between 580° and 660°. During the first 2 or 3 hrs. of heating, the reaction obeys Tamman's log law on reactions between solid phases. An apparent equil. appears afterward. At 580° the reaction takes place extremely slowly. It is found by thermal analysis that there is no evidence for the formation of a compd. contg. more ZnO than corresponds to $ZnFe_2O_4$, at least not below 1070°. The soly. of Zn ferrite in *N* and 2 *N* H_2SO_4 is studied. A mixt. of 7.5% SO_2 in air, passed over Zn ferrite heated at 450°, decomposes it slowly and liberates the Zn as $ZnSO_4$. The formation of Ba ferrite resulting from the heating of a mixt. of $BaCO_3$ and Fe_2O_3 was studied at 720°. It also obeys Tamman's law. The apparent equil. toward which the reaction tends is destroyed when the mixt. is stirred and heated again at the same temp.; the reaction goes on according to Tamman's law, the velocity of reaction being, however, considerably smaller than the original velocity. The results are discussed and explained on the basis of diffusion. C. G. F.

Stannites of calcium, strontium and barium. SETSURO TAMARU AND HARUO SAKURAI. *Z. anorg. allgem. Chem.* **195**, 24–34(1931); cf. *C. A.* **24**, 774.—When SnO is heated in the presence of CaO a reduction in vapor pressure indicates formation of a compd. Mixts. of SnO and CaO were heated in N_2, ground and heated *in vacuo*. With 1 hr heating in N_2 less than 1% of SnO volatilized if CaO:SnO > 1:1. With lower ratios the amt. volatilized increases. When CaO:SnO = 1:1 5 excess SnO was always present; with a ratio of 1:1, CaO is in excess. By heating CaO and ZnO in adjacent dishes *in vacuo* at 900°, with frequent grinding of the CaO, conversion to CaO.SnO was almost complete. Heating CaO-SnO mixts. in N_2 and H_2O at 800° forms $2CaO.SnO_2$ with some $2SnO_2.SnO_2$. By use of a similar procedure, SrO.SnO and BaO.SnO were prepd. from $BaCO_3$ or $SrCO_3$ and SnO. Attempts to prep. stannites of Mg, Zn and similar oxides were not successful, and no lowering of the vapor pressure of SnO occurred.
FOSTER DEE SNELL

Thiostannites of calcium, barium and strontium. SETSURO TAMARU AND YASUO TANAKA. *Z. anorg. allgem. Chem.* **195**, 35–40(1931); cf. preceding abstr.—By heating CaO-SnS mixts. in various proportions at 800° and volatilizing excess SnS *in vacuo* SnS.2CaO is isolated. Similarly SnS.2BaO and SnS.2SrO were formed. With MgO and ZnO the vapor pressure of SnS is not lowered and no compd. formation occurs. The thiostannites are gray powders readily purified by volatilizing the excess SnS used

in forming them. The sp. gr. is SnS.2CaO = 3.683; SnS.2SrO = 3.880; SnS.2BaO = 4.464. They dissolve in water with some hydrolysis. FOSTER DEE SNELL

A borate of silver. A. P. ROLLET. *Compt. rend.* **191**, 488–90(1930).—$AgNO_3$ was added to mixts of H_3BO_3 and $Na_2B_4O_7$ of varying compn. When the compn. of the mixt. exceeds $5B_2O_3$ to $1Na_2O$, then the white silver borate which ppts. has the formula $2B_2O_3 \cdot Ag_2O \cdot 2H_2O$; this borate is slightly sol. in H_2O, but the soly. increases in the presence of H_3BO_3. E. G. VANDEN BOSCHE

Carbon monosulfide. A. KLEMENC. *Z. Elektrochem.* **36**, 722–6(1930).—When CS_2 vapors are conducted through the region of a silent elec. discharge no new kind of gaseous mol. results, but the CS_2 becomes activated. This activated form of CS_2 releases its energy on coming in contact with the glass walls and decomposes to CS + S. Under certain conditions this reaction takes place with almost explosive violence and with the emission of light. The activated form of CS_2 may be frozen out with liquid air and preserved for as long as 2 hrs. On raising the temp., however, the activated CS_2 decomposes with a characteristic flame. Polymerized CS is brown in color. W. C. P.

Reactions with liquid chlorine. JULIUS MEYER AND WILLI AULICH. *Z. anorg. Chem.* **44**, 21–3(1931).—Liquid Cl shows little action upon metals below its b. p. except on Se and Te. Water accelerates the reaction. At room temp., a sudden chlorination takes place with V with evolution of heat. Au and Ag are readily chlorinated at 80° in the presence of water. Pt is hardly attacked at 100°. The tri- and di-chlorides are formed with Mn, V and Pb. MARY E. LEAS

Ceric selenate. JULIUS MEYER AND FRANZISKA SCHULZ. *Z. anorg. allgem. Chem.* **195**, 127–8(1931).—By crystn. from 50% H_2SeO_4, anhyd. $Ce(SeO_4)_2$ is obtained. This hydrolyzes with H_2O and is reduced by H_2O_2 to a sol. cerous salt. Because of the insoly. of $Ce(SeO_4)_2$ in dil. H_2SeO_4 double salts with alkali selenates could not be prepd. FOSTER DEE SNELL

Neodymium selenates (and sulfates). JULIUS MEYER AND CHARLOTTE KLEMANN. *Z. anorg. allgem. Chem.* **195**, 121–6(1931).—The following compds. were prepd. with approx. solubilities in g. per 100 g. H_2O at 0° as indicated: $Nd_2(SeO_4)_3 \cdot 5H_2O$ 4, $Nd_2(SeO_4)_3 \cdot 8H_2O$ 30; $KNd(SO_4)_2 \cdot H_2O$ 1.7; $RbNd(SO_4)_2 \cdot 2H_2O$ 1.3; $RbNd(SO_4)_2$ 1.2, $KNd(SeO_4)_2 \cdot 4H_2O$ 15; $RbNd(SeO_4)_2 \cdot 4H_2O$ 12.5; $NaNd(SeO_4)_2 \cdot 2H_2O$ 7. F. D. S.

Catalytic formation of hydrocyanic acid. II. Formation of hydrocyanic acid from hydrocarbons and ammonia. G. BREDIG, E. ELÖD AND ERNST DEMMLER. *Z. Elektrochem.* **36**, 991–1003(1930); cf. *C. A.* **21**, 3254.—The action of NH_3 on C_2H_2, C_2H_2 and CH_4 in the presence of catalysts was investigated. At temps. above 700° HCN formed, the yield rising through a max. with increasing temp. Under given conditions the HCN yield is highest with C_2H_4. The reaction between NH_3 and C_2H_4 is a catalytic surface reaction, catalyzed preferably by a mixt. of quartz and clay or by pure clay. The highest yields of HCN, based on NH_3 used, were from the proportions $NH_3 : C_2H_4$ = 1:1. The action of NH_3 on C_2H_4 or CH_4 is not direct, but by disproportionation of the hydrocarbon, *e. g.*, $C_2H_4 \longrightarrow 2C + 2H_2$, $2C_2H_4 \longrightarrow 2C + 2CH_4$, both reactions can be influenced by H or CH_4 addn. The relation of H formed to CH_4 formed depends upon temp., but at the test temp. of 800° it is quite independent of gas velocity. In the action of NH_3 on C_2H_2 the HCN yield is independent of duration of contact within the limits investigated. CH_4 forms HCN only at temps. at which the thermodynamic conditions for C_2H_2 formation are present. It is probable that HCN formation from C_2H_4 and NH_3 or CH_4 and NH_3 proceeds via intermediate formation of C_2H_2. III. **Formation of hydrocyanic acid from carbon monoxide and ammonia.** G. BREDIG, E. ELÖD AND RUDOLF MÜLLER. *Ibid* 1003–7.—The reaction between NH_3 and CO was investigated at 500°, 600° and 700°. The catalysts used were oxides of Al, Th and Ce the first without support and on broken stoneware, the second in admixt. with Al_2O_3 without support, the latter with and without support. The best HCN yields were with Al_2O_3 without support and with Ce oxide on stoneware support. SiO_2 gel and admixts. with Al_2O_3 and ThO_2 were unsatisfactory. With Ce oxide on stoneware the HCN yields, based on NH_3 used, increase with temp. rise and CO excess, but diminish on increase in velocity. With a 20-fold excess of CO and velocity of 12 l. per hr., or duration of contact 0.1 min., at 700° about 65% of the NH_3 is converted into HCN, with simultaneous NH_3 loss of 14% due to dissocn. With a 10-fold excess of CO the max. yield at 700° was about 48%; with 5-fold about 34%. Dissocn. of NH_3 is about 25–20% of the HCN yield; at 500°, 2–6%; at 600°, 5–12%; at 700°, 7–18%. From analyses of the final gases no conclusions can be drawn as to NH_3 dissocn. The reactions $NH_3 + CO = HCN + H_2O$, and $H_2O + CO = H_2 + CO_2$ take place together. IV. **Formation of hydrocyanic acid from carbon monoxide and ammonia.** G. BREDIG, E. ELÖD AND G. KORTÜM. *Ibid* 1007–23.—Increasing the excess of CO favors HCN

formation more than increasing the amount of NH_3. Addn. of N_2 causes merely a slowing down of the reaction. H_2 and CO_2 affect unfavorably the apparent equil. of HCN formation, CO_2 more so than H_2. Addn. of H_2 reduces decompn. of NH_3 into its elements. Moisture hinders HCN formation, not by displacing the equil. but by a secondary sapon. of HCN. The most probable main reactions are $2CO + NH_3 = HCN + CO_2 + H_2$, $CO_2 + H_2 = CO + H_2O$, with the following partial reactions: $2CO = C + CO_2$, $C + NH_3 = HCN + H_2$. C does not sep. in solid form, else it would coat the catalyst. The reaction $HCN + H_2O$ was investigated, but no definite conclusions were reached. Tests were made for intermediate formation of $HCONH_2$, but this was unstable at the temp. used. **V. Cerium oxide as catalyst in the formation of hydrocyanic acid.** G. Bredig, E. Elöd and Walter König. *Ibid* **37**, 2–11(1931).—The formation of appreciable quantities of Ce nitride, Ce hydride or Ce carbide as intermediate products of reaction gas and catalyst during catalysis of HCN from $CO + NH_3$ does not come into consideration. NH_3 formation by the action of N_2 and H_2 upon metallic Ce is complete only in the presence of O_2 and with simultaneous oxidation of Ce to CeO_2. It was detd. by x-rays that CeO_2 during catalysis suffered neither change of crystal structure nor lattice arrangement. Apparently the formation of HCN from CO + NH_3 takes place *via* nascent, free C. On this basis, the course of the reaction is shown. Under the conditions, no NH_4CNO is formed as intermediate product in the formation of HCN. There is apparently a relation between crystal size, adsorption power and catalytic activity of ceric oxides of the same properties, which have undergone various preliminary treatments. E. M. Symmes

Chemical reaction of formalin on potassium ferrocyanide. III. Everitt's salt. Takashi Kirigakubo. *J. Soc. Chem. Ind., Japan* **33**, Suppl. binding 513–5(1930).—A greenish white ppt. is formed by the reaction of $K_4Fe(CN)_6$ soln. and HCHO (*J. Soc. Chem. Ind., Japan* **32**, 1123; Suppl. binding 357–9(1929)), having properties similar to Everitt's salt produced in the prepn. of HCN. Analysis showed that the 2 salts are identical. Literature on crystallography of the salt is scant. The greenish white ppt. obtained as above is much more nearly pure than Everitt's salt, which contains a minute quantity of granules. The relation between the rhombohedral crystal and the minute grains is not yet known, but they are perhaps isomers. Pure Everitt's salt is greenish white and stable in the air. HCHO acts on $K_4Fe(CN)_6$ soln. as a weak acid. E. M. S.

A contribution on the study of the chlorides of antimony. L. I. Saviuc. *Bull. soc. chim. Romania* **12**, 36–43(1930).—A discussion of the antimony compds. of higher order with bivalent and tervalent metals. Properties are given and formulas discussed of various salts, such as, $SbCl_5C_6H_5N.HCl$, $SbCl_5C_9H_7N.HCl$; $SbCl_6K.H_2O$; $SbCl_7Mg.9H_2O$; $SbCl_8Cr.10H_2O$; $SbCl_6Na.3H_2O.NaCl$; $2SbCl_6Cu.3H_2O.SbCl_6H.5H_2O$; $(SbCl_5)_2Cd.12CdCl_2.2H_2O$. These and more complex salts were analyzed and formulas based on the analyses are compared with theoretical formulas. Alice W. Epperson

Some combinations of cobalt and nickel salts with 2,3-diaminobutane. J. Frejka and (Miss) L. Zahlova. *Collection Czechoslov. Chem. Comm.* **2**, No. 10, 639–51(1930) (in French).—The authors have prepared derivs. of Co and Ni and diaminobutane containing the SO_4, Cl, Br, I, NO_3, CN and CNS radicals. The diaminobutane for the expt. was obtained by the authors' method of the catalytic reduction of dimethylglyoxime (*C. A.* **23**, 3662). It has been established that the behavior of 2,3-diaminobutane with respect to the salts of Co and Ni is similar to that of ethylenediamine and propylenediamine. In the prepn. of the sulfates, which previous authors have used as the starting points for other compds., certain difficulties were encountered since, by the action of $NiSO_4$ and diaminobutane (= bn)—even in the presence of excess of the ammonium—only the sulfate $[Nibn_3.2H_2O]SO_4.2H_2O$ was obtained, whereas other Ni salts under the same conditions gave only salts of the type $[Nibn_3]A.xH_2O$ and never salts of the type $[Nibn_2(H_2O)_2]A_2.H_2O$. The Ni salts reported are (s = sol., vs = very sol., ss = slightly sol., in H_2O): $[Nibn_2.2H_2O]SO_4.2H_2O$, fine, blue-violet crystals, ss; $[Nibn_3]Cl_2.H_2O$, red-violet crystals, vs, $[Nibn_3]Br_2.H_2O$, red-violet crystals, s, less than Cl compd.; $[Nibn_3]I_2.4H_2O$, red-violet needles, ss; $[Nibn_3](NO_3)_2.H_2O$, red-violet crystals, vs; $[Nibn_3](CNS)_2.H_2O$, violet needles, ss; $[Nibn_3](CNS)_2.H_2O$, violet needles, soly. not given, and $[Nibn_3][Ni(CN)_4]$, rose crystals, ss. The Co salts reported are: $[Cobn_3]Br_3$, small orange-red crystals, soly not given; the corresponding Cl compd. did not crystallize; $[Cobn_3]I_3.2H_2O$, yellow-brown powder, vs, and $[Cobn_3](CNS)_3.6H_2O$, orange-yellow powder, ss cold, s hot water. Details of the prepn. and analyses of these compds. are given.

Edward B. Sanigar

Stannic acid esters and stannic acids. P. A. Thiessen and O. Koerner. *Z. anorg. allgem. Chem.* **195**, 83–104(1931).—Ethyl stannate prepd. from $SnCl_4$ and EtONa

in abs. alc. was crystd. as $Sn(OEt)_4.2EtOH$ corresponding to a complex acid $H_2Sn(OEt)_6$. By very slow hydrolysis in abs. alc. soln. the ester is converted to a porous zinc hydroxide. The decompn. isotherms indicate the existence of the following hydrates: $2SnO_2.5H_2O$; $SnO_2.2H_2O$ (orthostannic acid); $4SnO_2.7H_2O$; $2SnO_2.3H_2O$ (pyrostannic acid, orthodistannic acid); $SnO_2.H_2O$ (metastannic acid) and $2SnO_2.H_2O$ (metadistannic acid) Of these only the last 2 are stable in a dry atm. The stable hydrates were isolated and x-ray interference bands recorded for them, for SnO_2 and for the freshly pptd. hydrate. FOSTER DEE SNELL

Action of boric acid on alkali chlorides and nitrates. L. HACKSPILL, A. P. ROLLET AND L. ANDRÈS. *Compt. rend.* 192, 48–50(1931); cf. *C. A.* 5, 3882.—When the chlorides of K, Cs, Rb and Li are heated at 100–150° with H_3BO_3 (I) in a current of steam, HCl is set free and the anhyd. pentaborate is formed in each case. With NaCl and an excess of I (50 mols. per mol. of NaCl), the removal of HCl ceases when 80% has been eliminated, indicating the formation of a chloroborate, $NaCl.(Na_2O.5B_2O_3)_2$. KNO_3 and $LiNO_3$, treated as above, give anhyd. pentaborates, but $NaNO_3$, even with a very large excess of I, gives the triborate, $Na_2O.3B_2O_3$. LOUISE KELLEY

Ammonium and potassium-dimagnesium acid carbonates. EDOUARD URBAIN. *Compt. rend.* 191, 1339–40(1930).—The reaction $MgCO_3 + KHCO_3 = MgKH(CO_3)_2$ was studied. The Mg carbonate is mixed in a little water charged with $MgCO_3$ in a current of CO_2 and variable quantities of $KHCO_3$ are added; the CO_2 current aids agitation. The end of the reaction occurs when the mother liquor rises clear above the cryst. material which should be cooled to 0° for the greatest yield. The compn. of the reaction product is upheld by analysis. This carbonate can also be prepd. by double decompn. of KCl and NH_4 dimagnesium acid carbonate. The NH_4-dimagnesium carbonate is prepd. in the same manner as the K-dimagnesium acid carbonate. A mixt. of isomorphous KCl and NH_4Cl gives a mixt. of the 2 carbonates with this method. M. MCMAHON

The stability of complex cobalt and chromium salts as solid phases. II. A. BENRATH AND H. STEINRATH. *Z. anorg. allgem. Chem.* 194, 351–7(1930).—In continuation of the investigation of the complex Cr amines (*C. A.* 23, 2899) a study was made of the reaction of these amines with HCl, HBr, HNO_3 and NH_3. The results are tabulated showing the stable phases; *e. g.*, the halogen pentamine compds. of Cr are stable toward NH_3 while the hexamine compds. change to the pentamine salts with HCl and HBr. III. A. BENRATH AND H. PITZLER. *Ibid* 358–68.—In continuation of the investigation of complex Co amines the system $(Co(NH_3)_5Cl)Cl_2 + 2HBr \rightleftharpoons (Co(NH_3)_5Cl)Br_2 + 2HCl$ was studied. The synthesis of complex Co nitrate amines in ammoniacal soln. and their decompn. in acid soln. indicated that only the hexamine salts are stable in synthesis while on decompg. the stable forms are the simple Co salts. The lower amines are metastable intermediate forms. M. MCMAHON

Studies on complex ions. III. The relative stabilities of the halogenoplatinates H. I. SCHLESINGER AND R. E. PALMATEER. *J. Am. Chem. Soc.* 52, 4316–31(1930); cf. *C. A.* 24, 2394.—For the reaction $PtBr_6^{--} + 6Cl^- \longrightarrow PtCl_6^{--} + 6Br^-$ to go 99% to completion the concn. of the chloride ion must be approx. 660 times that of the bromide ion. For the reaction between iodoplatinate and bromoplatinate ions there must be 25,000 times as much bromide as iodide ion, and completely to convert PtI_6^{--} to $PtCl_6^{--}$ there must be roughly 16,000,000 times as much chloride as iodide ion. A study of the absorption spectra of the various equil. mixts. indicates that in these reactions intermediate compds. are formed in soln. Solid intermediate compds. which have been reported in the literature are shown to be mixts. C. L. READ

Gmelins Handbuch der anorganischen Chemie. 8th ed. **System-Nr. 59:** Eisen. **Teil A, Lfg. 3.** Issued by Deutschen Chemischen Gesellschaft. Berlin: Verlag Chemie. 274 pp. M. 32 (to subscribers). Cf. *C. A.* 25, 658.

HOOTON, W. M.: **Inorganic Chemistry for Schools.** 2nd ed. London: Edward Arnold and Co. 408 pp. 5s.

7—ANALYTICAL CHEMISTRY

W. T. HALL

Nephelometric titrations. I. The equal-opalescence end-point. CLYDE R. JOHNSON. *J. Phys. Chem.* 35, 540–2(1931).—A possible source of error in the equal-opalescence end-point used in nephelometric at. wt. detns. is pointed out and work is to be undertaken to study the magnitude of such error. W. T. H.

Potentiometric precipitation titration of silver iodide. E. LANGE AND R. BERGER. *Z. Elektrochem.* **36**, 980–8(1930).—The expts. described show that $AgNO_3$ can be titrated potentiometrically with KI soln. with an accuracy of 0.003%. To obtain this accuracy, however, considerable attention was paid to the avoidance of possible errors. The titrating vessel was placed in a Cu vessel through which steam was passed to keep the temp. at 35° during most of the titration but raising it to 90° at the end. The calomel cell was connected with an electrolytic siphon tube contg. NH_4NO_3 soln. which, together with the calomel cell, was kept at 11° during the expt. by a bath of running water. The $AgNO_3$ and KI solns. were used from wt. burets and the KI soln. was kept in contact with N_2 gas. W. T. H.

Diphenylamine as indicator in the determination of iron in silicates. C. J. SCHOLLENBERGER. *J. Am. Chem. Soc.* **53**, 88–98(1931).—Fluoride (cf. Szebellédy, *C. A.* **24**, 4729) or phosphate increases the sensitivity of Ph_2NH as indicator in titrating Fe^{++} with $K_2Cr_2O_7$ by decreasing the Fe^{+++} concn. and so lowering its oxidation potential below the point at which the indicator shows color (cf. Kolthoff and Sarver, *C. A.* **25**, 48). In detg. FeO in silicates by Sarver's method (*C. A.* **21**, 2238), H_3BO_3 should not be added prior to titration with $K_2Cr_2O_7$, as Mn^{++} does not interfere and, by titrating in the crucible without delay, Fe^{++} is not oxidized by air. Org. matter may cause high results for FeO by "induced oxidation" (cf Kurtz and Lang, *C. A.* **23**, 4638). The Fe^{++} titration with $K_2Cr_2O_7$ and Ph_2NH may be followed by a $TiCl_3$ and KCNS titration for total Fe^{+++} after addn. of H_3BO_3. Procedures for the decompn. of silicates and the titrations are described. C. J. SCHOLLENBERGER

Determination of oxygen dissolved in sea water. MAURICE NICLOUX. *Bull. Inst. Oceanographique* No. **563**, 19 pp.(1930); cf. *C. A.* **24**, 4999.—The microdetn. of O_2 in sea water with 5–25 cc. samples and a special reaction tube is described in detail. During the expt. a ppt. of $Mn(OH)_3$ is formed which is treated with acid and KI and the liberated I_2 is titrated with $Na_2S_2O_3$. W. T. H.

Determination of sulfur in nickel. WILH. STAHL. *Metallbörse* **20**, 2613(1930).—Decompose 5 g. of finely divided metal in a covered beaker with aqua regia, heating until the metal is all dissolved. Transfer the soln. to a covered porcelain dish and add Na_2O_2 slowly. Evap. the soln. to dryness, add 20 drops of concd. HCl to the residue and 10 min. later 300 cc. of H_2O. Filter and det. SO_4^{--} in the filtrate in the usual manner. E. M. SYMMES

Technic of the determination of sodium. ERNEST KAHANE. *J. pharm. chim.* [8], **11**, 425–8(1930).—See *C. A.* **24**, 3457. S. WALDBOTT

New method for determining small concentrations of mercury vapor in air. B. L. MOLDAVSKII. *Zhur. Prikladnoi Khim.* **3**, 955–64(1930).—The method is based on absorption of Hg vapors from the air by gaseous Br_2 followed by absorption of the resulting $HgBr_2$ in water. V. KALICHEVSKY

New method to determine the content of mercury in air. KURT MÜLLER. *Z. Physik* 65, 739–58(1930); cf. *C. A.* **24**, 3727 —The absorption of light in air contg. various amts. of Hg was studied, a Hg-resonance lamp being used as the source of radiation and photoelec. cells to compensate fluctuations in the intensity of the Hg arc. With an absorption tube of 50 cm. length 3.9 to 1050 10^{-6} g. Hg per cu. m. can be detd. Observations were carried out in different labs., and compared with the results of chem. analysis (Stocks method). The latter gives much lower results than the phys. procedure which requires only 5 min. EGON BRETSCHER

New method for determining mercury in mercuric cyanide. E. CATTELAIN. *Bull. soc. chim.* **47**, 1406–7(1930); *J. pharm. chim.* [8], **12**, 529–31(1930).—C. recently detd. conditions most favorable for the reduction of mercuric salt to Hg_2Cl_2 by H_3PO_2 in the presence of H_2O_2 (cf. *C. A.* **24**, 5068) but with $Hg(CN)_2$ such treatment results in the formation of Hg. If, however, the cyanide is first oxidized by a satd. soln. of $KMnO_4$ in the presence of NH_4OH, the ppt. of Hg_2Cl_2 can be obtained. The excess $KMnO_4$ was reduced by heating the ammoniacal soln. with a little alc. and the ppt. of MnO_2 dissolved by HCl. W. T. H.

Content of iron soluble in hydrochloric acid in asbestos used with Gooch crucibles. E. CATTELAIN. *J. pharm. chim.* [8], **12**, 540–1; *Bull. soc. chim.* [4], **47**, 1404–6; *Ann. falsi.* **23**, 530–1(1930).—In 6 com. samples of white carded asbestos fibers to be used with Gooch crucibles, the Fe content varied from 1.187 to 8.553%; 2 gray samples had 5.369 and 12.783% and 4 samples of powd. asbestos from 0.067 to 5.179% Fe. Besides, traces of Mn were detected in all of a total of 14 samples. S. WALDBOTT

Determination of metallic iron in ores. W. ACKERMANN. *Chem.-Ztg.* **55**, 30–1 (1931).—Now that considerable quantities of Fe sponge are produced by the reduction of solid Fe ores at 700–1100°, the detn. of metallic Fe in the presence of oxides becomes

more and more important. The $HgCl_2$ method of Wilner-Merck was tested, therefore, with many synthetic mixts. As a rule the results were good but with ores contg. MnO_2, limonite, minette, and with mixts. contg. cementite, Fe_3P and FeS the results were unsatisfactory. The conclusion is drawn that in any given case it is necessary to try special tests to see whether anything is present that is likely to affect the results before relying upon the accuracy of the $HgCl_2$ method. W. T. H.

New method for the titrimetric determination of Caro's acid, persulfuric acid and hydrogen peroxide in the presence of one another. KARL GLEU. *Z. anorg. allgem. Chem.* **195**, 61-74(1931).—There are good methods known for the detn. of any one of these acids but no method previously described is infallible when H_2SO_5, H_2O_2 and $H_2S_2O_8$ are all present. Of these 3 acids, the oxidizing power diminishes in the order named. In dil. H_2SO_4 soln. at room temp., Caro's acid is reduced by an excess of HBr, liberating Br_2 for each mol. of H_2SO_5 present, and the reaction is complete before any appreciable quantity of H_2O_2 is reduced. If an excess of H_3AsO_3 is present, the liberated Br_2 oxidizes it to H_3AsO_4 and the excess can be titrated with $KBrO_3$. Then, if $MnSO_4$ is added, the H_2O_2 can be titrated with $KMnO_4$, the formation of a slightly yellow color (due to Br_2) being used as the end point. Finally, by adding an excess of H_3AsO_3, followed by H_2SO_4 and boiling 10 min., the $H_2S_2O_8$ is all reduced and the excess arsenite can be titrated with $KBrO_3$. The procedure is carried out as follows: The soln. of the 3 acids should, at the start, contain 10-20 milli-equiv. of H_2SO_4 in a vol. of 50 cc. Add a measured vol. of 0.1 *N* As_2O_3 soln. and 5 cc of *N* KBr. After 1-2 min. add 0.1 *N* $KBrO_3$ soln. dropwise from a buret until free Br_2 is present as shown by the yellow color. At once remove this with As_2O_3 soln. Continue titrating in this way until finally after 1 min. standing only a little Br_2 is developed which is removed with As_2O_3. From the vols. of As_2O_3 and of $KBrO_3$ used, compute the H_2SO_5 content. Now add 2 cc of 4 *N* $MnSO_4$ soln. and titrate with $KMnO_4$ until a slightly yellow color is obtained. This gives the H_2O_2 content. Finally add a measured excess of As_2O_3 soln. followed by 10 cc. of 18 *N* H_2SO_4; boil 10 min. and titrate back with $KBrO_3$ soln. Numerous test analyses of synthetic mixts. are given. W. T. H.

Determination of hygroscopic moisture of some mineral salts under production conditions. V. P. ZEMLYANITZIN. *J. Chem. Ind.* (Moscow) **6**, 1685-6(1929). Z describes the use of CaC_2 in detg. moisture. DAVID KAZ

Various observations on the analysis of sodium sulfate. A. NOEL. *Ind. verrieres* **1**, 123-4(1930).—Detn. of Fe by pptn. and titration and direct detn. of Na_2SO_4 are discussed. M. A. L.

New method for determining small quantities of water and carbonic acid in silicates. E. DITTLER AND H. HUEBER. *Z. anorg. allgem. Chem.* **195**, 41-59(1931).—The method consists in heating the substance in a Pt boat within a quartz tube in a stream of dry O_2 to 1200-1400°, leading the gases from the combustion tube into molten α naphthylene chlorophosphine, $C_{10}H_7POCl_2$, whereby 2 mols. of HCl are formed for every H_2O mol. evolved from the silicate. This HCl is carried by the O_2 stream into a measured vol. of NaOH soln. and, after the expt., the excess base is titrated against standard HCl with methyl orange as indicator. The tube contg. the phosphine deriv. is designed specially to ensure complete reaction between the H_2O and phosphine. Before starting the expt. the tube is heated in an oil bath, while a stream of dry O_2 is passed through it until no more HCl is evolved. A blank expt. showed that subsequent HCl evolved from the reagent amounted to only 3×10^{-5} g per hr., which need be considered only when the H_2O content of the silicate is low. When CO_2 is evolved, it is also absorbed by the base but can be detd. together with the HCl from the H_2O by a double indicator titration with methyl orange and phenolphthalein, or by using $Ba(OH)_2$ as absorbent and titrating first the excess $Ba(OH)_2$ and then adding excess acid, boiling off CO_2 and titrating the excess acid. The results obtained indicate that the method is good. W. T. H.

Detection and determination of small quantities of water in ethyl alcohol. F. SCHÜTZ AND W. KLAUDITZ. *Z. angew. Chem.* **44**, 42-4(1931).—Young's method of distg. with anhyd. benzene will serve to detect 0.1% H_2O in alc. by the formation of a ternary mixt. b. 64.5°. For practical purposes, however, the use of Dupré's test of adding CaC_2 and measuring the vol. of C_2H_2 evolved is more advantageous. But the following method of forming Cu acetylide with the C_2H_2, treating it with acid and Fe^{+++} salt and titrating the Fe^{++} formed is preferable. As app., a round-bottomed flask, connected with a condenser and the latter with an absorption flask, is shown with all connections of ground glass. The flask is dried carefully and weighed with and without the alc., 10-15% as much CaC_2 is added and the mixt. boiled 1.5-2 hrs. with reflux condensation. The evolved gas is passed through 50 cc. of $CuSO_4$ soln. which has been dild. with a little water. The resulting ppt. is filtered through a glass filtering crucible

the crucible and ppt. are placed in an acid soln. of Fe^{+++} salt and the titration is carried out with $KMnO_4$. The method is also applicable to detg. water in other liquids, *e. g.*, benzene and toluene. The results appear to be excellent. W. T. H.

Separation and determination of alkali chlorides, bromides and iodides in mixtures. Extension of the method to chlorates, bromates and iodates. COUSIN AND DUFOUR. *Trav. pharm. chim.* [8], **12**, 439–44(1930).—The detn. of Cl, Br and I in mixed aq. solns. of the alkali salts proceeds in 3 stages: (*a*) In a definite vol. of the mixt. det. the vol. of 0.1 *N* $AgNO_3$ soln. consumed in pptg. the total halogens as Ag salts by the Charpentier-Volhard method. (*b*) In another equal vol. of the mixt., set free the I by means of a nitrite soln. of *ferric ammonium alum*. Distil the I into a cooled aq. soln. of KI and det. I with 0.1 *N* $Na_2S_2O_3$. (*c*) In the well-cooled residual fluid from (*b*), liberate the Br by means of *PbO_2* in dil. AcOH soln., distil the Br into aq. KI soln. and titrate the I equiv. to Br with 0.1 *N* $Na_2S_2O_3$. PbO_2 in dil. AcOH soln. does not set free Cl from chlorides. To calc. the Cl present, subtract from the above total vol. of $AgNO_3$ soln. the sum of the two vols calcd. from the detd. quantities of I and Br. A quant. recovery of the halogen salts and their mixts. was made by this method. For quant. sepn. of chlorates, bromates and iodates reduce these first with Zn in neutral soln. by boiling on the water bath under reflux for 1 hr. A mixt. of bromates and iodates is also reduced with concd. HCl soln., excess of SO_2 must then be expelled by prolonged boiling, *i. e.*, for at least 30 min. S. WALDBOTT

Detection of fluorides using the zirconium lake of alizarin. IRWIN STONE. *J. Chem. Education* **8**, 347–9(1931).—To prep. the lake, mix a soln. of 0.5 g. alizarin in 200 cc. of alc with one of 1.5 g. $ZrCl_4$ in 75 cc. alc., filter and wash with alc. Suspend the moist ppt. in alc. to make 25 cc. and, as reagent, use 5 cc. of this suspension with 100 cc. of water. To 2.5 cc. of the soln. to be tested, add an equal vol. of concd. HCl and 0.5 cc. of the reagent. If the soln. contains more than 0.3 g. of F^-, the red color will turn to yellow almost immediately. Any oxidizing agent that liberates Cl_2 from HCl interferes by bleaching the reagent. As a rule it can be removed by a preliminary treatment with sulfite. In the detection of Al by the Atack-Yoe method, the presence of traces of F^- interferes with the test and large quantities make it useless. In fact the Atack-Yoe could be used in the above test for fluorides but is more sol. in HCl which is quite advantageous. W. T. H.

Stop-watch method for the determination of iodide in mixtures of halides. H. LEVY. *J. Soc. Chem. Ind.* **49**, 481–2T(1930).—The test depends upon the pseudo-catalysis by I^- of the oxidation of $S_2O_3^{--}$ by HNO_2. HNO_2 itself does not oxidize $S_2O_3^{--}$ but reacts with HI to give I_2 which in turn oxidizes $S_2O_3^{--}$ to $S_4O_6^{--}$. If the quantity of I^- is small, the second reaction takes place more rapidly than the first and the concn. of I_2 at any time is too small to give the starch test. If more than 1 mol. of HNO_2 is present for each mol. of $S_2O_3^{--}$, the complete oxidation of the latter is marked by the accumulation of I_2 in the soln. The speed of the oxidation of $S_2O_3^{--}$ by HNO_2 will depend on the quantity of I^- present. Directions for carrying out the test are given in detail. W. T. H.

Determination of iodide in the presence of bromide and chloride. FRIEDRICH L. HAHN. *Z. anorg. allgem. Chem.* **195**, 75–82(1931).—Iodide can be detd. potentiometrically in the presence of CCl_4 with the MnO_4^- reduced to Mn^{++} and the I^- oxidized to IO_3^-, or in the absence of CCl_4, to the formation of ICl with twice as much $KMnO_4$. If not more than 1 mol of I^- not more than 10 mols of Br^- are present, the first method is decidedly preferable but with larger quantities of Br^- it depends upon the properties of the potentiometer used which method will give the better results. The second end point can be detd. without the potentiometer if CCl_4 is present and the titration is continued until the soln. no longer shows the presence of any free I_2. W. T. H.

Spot test for nitrite. FRIEDRICH L. HAHN. *Mikrochemie* **3**, 31–3(1931).—Directions are given for prepg. pure α-naphthylamine oxalate and for cleaning, moistening and drying filter paper in such a way that a suitable test paper is obtained. When all the proper precautions are taken the test for nitrite is very sensitive. W. T. H.

Determination of the persulfate ion. A. KURTENACKER AND H. KUBINA. *Z. anal. Chem.* **83**, 14–36(1931).—No less than 169 expts. are described which were performed in testing the various methods that have been proposed for the detn. of $S_2O_8^{--}$. Exact results were obtained by the following procedure: Treat 45 cc. of 0.1 *N* $FeSO_4$ with 1 cc. of H_3PO_4, d. 1.7, add the persulfate soln., dil. to 100–200 cc. and titrate the excess with $KMnO_4$. W. T. H.

Colorimetric determination of cobalt in the presence of nickel. E. S. TOMULA. *Z. anal. Chem.* **83**, 6–14(1931); cf. *C. A.* **24**, 3727.—Take 40 cc. of the neutral soln. contg. Co on a 100 cc. measuring flask. Add 5 g. of NH_4CNS and 50 cc. of acetone,

Mix well and make up to the mark. Compare the color of the soln. (due to $(NH_4)_2[Co(CNS)_4]$) with that obtained with standard Co solns. treated similarly The standard soln. used in a diln. expt. should not be over twice as strong as the soln. analyzed or *vice versa*. When the concn. of Co is 8×10^{-3} mol. per l., a satisfactory test is obtained if no more Ni than Co is present. With more dil. solns. relatively more Ni can be present. In the test analyses the total Co content varied from 45.1 to 0.034 mg.
W. T. H.

Separation of lead from barium, strontium and calcium with ammonium acetate. J. MAJDEL. *Z. anal. Chem.* **83**, 36–45(1931); cf. *C. A.* **24**, 3194.—The conclusions drawn from the expts. described are as follows: When $PbSO_4$ is pptd. together with $BaSO_4$ some of the Pb is pptd. as $BaPb(SO_4)_2$ and this double salt does not dissolve, like $PbSO_4$, in NH_4OAc soln. and the error resulting is greater as the Ba content is increased With Sr a similar double salt is produced which is, however, sol. in NH_4OAc so that the Pb results may be as much as 20% too high if based on the assumption that only $PbSO_4$ dissolves. With a mixt. of $CaSO_4$ and $PbSO_4$ the results are better although not perfect with a single sepn.
W. T. H.

The evolution of elementary organic microanalysis. J. V. DUBSKÝ. *Chem. Weekblad* **28**, 46–52(1931).—See *C. A* **24**, 803.
E. C. K.

Physicochemical contribution to organic analysis. MAURICE LECAT. *Gazz. chim. ital.* **60**, 704–19(1930).—See *C. A.* **24**, 2083, 3195, 3935.
C. C. DAVIS

Preparation of organic reagents in the analytical laboratory. III. Diacetyldioxime. K. H. SLOTTA AND K. R. JACOBI. *Z. anal. Chem.* **83**, 1–5(1931); cf *C. A* **24**, 2734.—Me Et ketone is converted into diacetylmonoxime by treatment with Et nitrite in ethereal soln. Then, without removing the monoxime, Na hydroxylaminedisulfonate is added; this gives the desired product. The last reagent is prepd from Na_2CO_3, SO_2 and $NaNO_2$. Directions are given in detail and a complete bibliography is appended.
W. T. H.

Microanalytical determination of carbon and hydrogen in organic mercury compounds. MAX FURTER. *Mikrochemie* **3**, 27–30(1931).—The results obtained by burning some org. compds. contg. C, H, Hg, S and N indicate that there are 2 difficulties to be overcome. (1) There is danger of some Hg distg over and being absorbed in the drying tube and (2) the PbO_2-asbestos filling of the combustion tube is likely to become poisoned so that it does not catalyze properly the combustion of C and H. The observation of Verdino (*C. A.* **22**, 3603) that Hg compds. can be burned without difficulty needs modification.
W. T. H.

Microdetermination of carbon and hydrogen by the method of Fritz Pregl. A. FRIEDRICH. *Mikrochemie* **3**, 20–6(1931).—Good results have been obtained in the microdetn. of C since pains have been taken to make sure that the O_2 used in the combustion is free from impurities. Sometimes the H results were unsatisfactory and the trouble was eventually traced to the moisture from the soda lime in the bubble counter It was found that passage of the gas through 50% KOH served to remove all CO_2 from the preheated gas and the soda lime was, therefore, omitted from the bubble counter and the results were then much better.
W. T. H.

Determination of hydrogen sulfide, methane and hydrocarbon vapors in the air. E. POZNER AND R. A. MELIKOVA. *Zhur. Prikladnoi Khim.* **3**, 965–77(1930).—H_2S is absorbed in NaOH soln., hydrocarbon vapors are adsorbed by activated charcoal (CH_4 is not affected), and methane is detd. by combustion.
V. KALICHEVSKY

A new color test for aromatic amines. I. DE PAOLINI. *Atti accad. sci. Torino* (Classe di sci. fis., mat. e nat.) **65**, 201–4(1930).—Benzoyl peroxide, in the presence of even traces of aromatic amines, produces a reddish brown to violet color. The test is carried out by adding the amine to an EtOH suspension of Bz_2O_2, and warming slightly. The test is general for all classes of aromatic amines and is probably due to the formation of quinones by oxidation.
A. W. CONTIERI

Bromo-iodometric investigations. I. Determination of urea, ammonium salts and formates. J. H. VAN DER MEULEN. *Chem. Weekblad* **27**, 550–2(1930); cf *A.* **24**, 5115.—To det. urea, take 25 cc. of a soln. contg. 35 to 40 mg., add 50 cc. H_2O, 10 cc. *N* $KHCO_3$ soln. and finally 10 cc. 0.5 *N* Br_2 soln. in 10% KBr. Stopper the flask and allow the soln. to stand for 30 min. Then add 10 cc. *N* KI and 15 cc. *N* HCl and titrate with $Na_2S_2O_3$. Titration of a blank soln. will give the cc. $Na_2S_2O_3$ equiv. to the urea. Instead of bicarbonate, borax can be used and is sometimes preferable. NH_4 salts and formates can be detd. in a similar way. **II. Determination of iodine in iodides.** *Ibid* 558–60.—To 25 cc. of soln. contg. about 0.1 g. I in a 250 cc. flask add 50 cc. H_2O, 10–15 cc. of Br-KBr soln., followed by 10 cc. *N* $KHCO_3$ soln. and 10 cc. urea soln. (10 g. urea per 1000 cc.). Heat the mixt. until all Br_2 has disappeared and then cool. Add KI

and HCl and titrate as above described. **III. Determination of the components of a mixture of iodates and bromates.** *Ibid* 578–9.—In the mixt. the bromate is decompd. with HBr. Then an excess of a carbonate or borate is added and also a reducing agent. In this way the bromate is destroyed and the iodate can be titrated. In a part of the original soln. the total iodate and bromate is detd. by the addn. of HI and titration of the I_2 liberated. **IV. Determination of components in a mixture of bromate, iodate and iodide.** *Ibid* 618–9.—The total amt. of bromate, iodate and iodide is detd. by addn. of excess Br water and consequent reduction of the excess Br. In a second portion iodate and bromate are detd. by addn. of HI. In a third portion iodate and iodide are detd after reduction of the bromate and addn. of enough excess Br water to convert the iodide into iodate. E. SCHOTTE

New method (gravimetric) for the determination of formaldehyde and of urotropine (hexamethylenetetramine). MIRCEA V. IONESCU AND CORNELIU BODEA. *Bull. soc. chim.* **47**, 1408–19(1931).—Ionescu (*C. A.* **22**, 3374) has called attention to the fact that menthone soln. is an excellent precipitant for HCHO and for urotropine and Verlander (*C. A.* **23**, 4646) has also described methods based upon this reaction. A series of expts. is described which were undertaken to det. the best conditions for carrying out the pptn. of the insol. product ($C_{17}H_{24}O_4$) which is formed with both urotropine and with HCHO. The soln. should be neutral and fairly dil., an excess of 5–10% menthone soln should be added and the mixt. allowed to stand 6 hrs. in the cold before filtering. Or, after adding the reagent, the soln. can be boiled for 10 min. and filtered when cold but long boiling causes decompn. The ppt. can be weighed after washing well with cold water and drying at 110–115°. Not more than 0.3 g. of urotropine should be present. If the soln. is acid at the start, it should be neutralized with Na_2CO_3 and then made barely acid with AcOH. Then use at least 3 times the amt. of menthone theoretically necessary and let stand twice as long. W. T. H.

A simple method for the detection of β-naphthol. G. DE HAAS. *Pharm. Weekblad* 68, 29–32(1931).—The green fluorescence obtained with AcOH and concd. H_2SO_4 distinguishes β-naphthol from α-naphthol, thymol and other phenols. The test is performed by adding to 1 cc. of the aq. β-naphthol soln. (1:1000), 5 cc. of glacial AcOH and a lower layer of 5 cc. of concd. H_2SO_4. A yellowish green zone forms at the interface of the 2 liquids and a green fluorescence develops on shaking. Thymol, cresols, phenol, guaiacol, creosote and α-naphthol give violet, brown or red colors but no fluorescence. The reaction is sensitive to concns. of 1:100,000, where the Millon and Br reactions are neg. It is useful for detecting β-naphthol in the presence of α-naphthol. The reaction evidently depends on the formation of a sulfonic acid. The fluorescent substance cannot be shaken out with Et_2O, petr. ether or $CHCl_3$. J. J. L. ZWIKKER. *Ibid* 63: The fluorescence is due to AcH present as impurity in the AcOH used by de Haas. With pure AcOH distd. over CrO_3 no trace of fluorescence is obtained, but an intense fluorescence occurs when a soln. of AcH is used in place of AcOH. A. W. D.

Determination of piperidine in a mixture with pyridine and its higher homologs. A. TRAVERS AND FRANQUIN. *Compt. rend.* **191**, 1340–3(1930).—Titration curves show that piperidine can be titrated electrometrically with the H_2 or quinhydrone electrode in the presence of pyridine, α-picoline, 2,4,6-collidine and α,α'-lutidine. W. T. H.

Some reactions of antipyrine and pyramidone. Detection of antipyrine in pyramidone. M. RIBÈRE. *J. pharm. chim.* [8], **12**, 444–7(1930); cf. *C. A.* **13**, 216; **20**, 1887. The following 4 reagents differentiate between antipyrine (*A*) and pyramidone (*B*): (*a*) CCl_3CO_2H (20%) and (*b*) $HClO_4$ produce only with *A* white ppts. sol. in excess of the reagent, or on heating. (*c*) *Ammoniacal* $AgNO_3$ is reduced at once by warming with *B*; *A* does not affect it. (*d*) *Acid* $HgNO_3$ *soln.* (*C*).—Dissolve Hg 2 g. in HNO_3 20 g.; after several days add 10 drops of a 5% soln. of $NaNO_2$. When 10 drops of *C* is added gradually to 2 cc. of a 1% soln. of *A*, a white turbidity appears and then a white ppt. is formed which becomes granular on shaking. Upon boiling, the ppt. disappears, but returns on cooling with brick-red color. Under the same conditions, *B* forms a violet color. For an approx. detn. of *A* in *B*, modify reagent *C* by adding an equal vol. of 20% CCl_3CO_2H (*D*). Add 10 drops of *D* to 2 cc. of a soln. of 0.10 g. of the *A*-*B* mixt. in 10 cc. H_2O. If *A* = 25%, the reactions are the same as for *A* alone, shading off for *A* = 15 and 10%. For *A* = 1%, the test is still pos. as follows: Carefully underlay with a pipet 2 cc. of the soln. with 1 cc. of *D*. A violet ring is seen (oxidation of *B*), and above it a white turbidity about 1 cm. high, indicating *A*. The limit of this test is at about 0.1% *A*. S. WALDBOTT

Titrating aldose sugars with standard iodine and alkali. G. M. KLINE AND S. F. ACREE. *Bur. Standards J. Research* **5**, 1063–84(1930); cf. *C. A.* **24**, 5670.—Expts. show that the customary procedure of adding a large excess of I and NaOH in the

titration of aldose sugars results in overoxidation and gives high values. A better utilization of the reagents is obtained by slow addns. of small portions of the reagents alternately to the sugar soln. Ketoses and non-reducing sugars are so slightly attacked that their presence does not interfere with routine detn. of aldoses in mixed samples. The method also provides an accurate means of standardizing the I against the NaOH soln. or *vice versa* by employing an excess of pure dextrose. In the procedure recommended, a sample which will react with approx. 20 cc. of 0.1 *N* iodine is dissolved and if necessary made neutral to phenolphthalein, 5 cc. of iodine is added from a buret, then 7.5 cc. 0.1 *N* NaOH dropwise. The process is repeated until 22 cc. of I soln. and 35 cc. of NaOH have been added, the whole requiring 5–6 min. After 2 min. the soln. is acidified with HCl and the liberated I titrated with 0.1 *N* $Na_2S_2O_3$. The excess of HCl may be titrated as a check. For best results, the excess I should require between 1.5 and 3 cc. of $Na_2S_2O_3$. R. C. HOCKETT

Analysis of photographic products (BAINES) **5.**

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8—MINERALOGICAL AND GEOLOGICAL CHEMISTRY

EDGAR T. WHERRY AND J. F. SCHAIRER

Further contributions to talc formation. EDUARD ENK. *Kolloid-Z.* 54, 314–6 (1931); cf. *C. A.* **24,** 3731.—An explanation of the mechanism of the action of SiO_2 solns. on dolomite and of $Mg(OH)_2$ solns. on SiO_2 to form heterogeneous Mg silicate gels. ARTHUR FLEISCHER

A new finding of palygorskite in Ukraine. B. A. GAVRUSEVICH. *Compt. rend. acad. sci. U. R. S. S.* **1930A,** No. 13, 337–40.—A new discovery of palygorskite was made at Zhezhelev, Berdichev, Ukraine. It forms a crust 2–3 mm. thick. Its interest lies in the fact that its mineralogical nature is more pronounced than that of any previous find, that it establishes a definite paragenesis with kaolin, opal and Fe oxides, and that through it a definite connection is established between palygorskite and granites rich in plagioclases. S. L. MADORSKY

Some factors of solidification in relation to metallurgical and geological problems. S. W. SMITH. *J. Chem. Met. Mining Soc., S. Africa* **31,** 49–50(1930); cf. *C. A.* **24,** 3060, 5004, 5675.—Further discussion. ALDEN H. EMERY

Boxwork siderite: An analogous occurrence of silica and chrysocolla. EDWIN B. ECKEL. *Econ. Geol.* **25,** 290–2(1930).—E. describes a silica boxwork assocd. with oxidized Cu ores in the Mineral Hill District, Pima Co., Arizona. The structures are considered analogous to those described from Bisbee, but conditions were more highly oxidizing and gave rise to different products. There is at Mineral Hill little or no siderite, and what has been observed is assocd. with secondary calcite, but never as boxwork. ALICE W. EPPERSON

Thinned polished sections. A new technic for the investigation of ores in thin slices. J. D. H. DONNAY. *Econ. Geol.* **25**, 270–4(1930).—The method devised by D. has been applied to investigation of disseminated Cu ores. The chip is polished first, then mounted with the polished surface against a strip of glass, and ground to the standard thickness of 0.03 mm. The thin slice is transferred so that the polished side faces a cover glass and finally remounted on another mounting glass. Difficulty in focusing is overcome by using oil immersion lenses. Advantages and difficulties are discussed. ALICE W. EPPERSON

Michipicoten River map-area, Algoma District, Ontario. L. J. WEEKS. Can. Dept. Mines, Geol. Survey, *Summary Rept.*, **1928**, Part C, 1–11(1930). **Southwestern part of Sudbury nickel irruptive.** W. H. COLLINS. *Ibid* 12–6. **Mineral deposits of the eastern part of Rush River map-area, Woman River District, Ontario.** H. M. BANNERMAN. *Ibid* 17–27. **Desmeloizes area, Abitibi District, Quebec.** J. B. MAWDSLEY. *Ibid* 28–82. **Some mineral occurrences of economic interest in New Brunswick.** F. J. ALCOCK. *Ibid* 90–3. **Deep borings in Ontario, Quebec, and other Maritime Provinces.** D. C. MADDOX. *Ibid* 94–111. C. H. LORIG

The mining industry of Yukon, 1929. W. E. COCKFIELD. Can. Dept. Mines, Geol. Survey, *Summary Rept.*, **1929**, Part A, 1–15(1930). **Taku River District, B. C.** F. A. KERR. *Ibid* 16–29. **Preliminary report on Iskut River area, B. C.** F. A. KERR. *Ibid* 30–61. **Owen Lake mining camp, B. C.** A. H. LANG. *Ibid* 62–91. **Mineral deposits at Buck Flats, B. C.** A. H. LANG. *Ibid* 92–3. **Geology and mineral deposits of Quatsino-Nimpkish area, Vancouver Island.** H. C. GUNNING. *Ibid* 94–143. **The serpentine belt of Coquihalla Region, Yale district, B. C.** C. E. CAIRNES. *Ibid* 144–97. **Geology and ore deposits of Nickel Plate Mountain, Hedley, B. C.** H. S. BOSTOCK. *Ibid* 198–252. **Mineral developments in Salmo map-area, B. C.** J. F. WALKER. *Ibid* 253–73. **Clearwater Lake area, B. C.** N. F. G. DAVIS. *Ibid* 274–96. **Deep borings in British Columbia.** D. C. MADDOX. *Ibid* 297–8. C. H. LORIG

Zinc and lead deposits of Canada. F. J. ALCOCK. Can Dept. Mines, Geol. Survey, *Econ. Geol.* Series No. **8**, 406 pp.(1930).—The character and occurrence of Zn and Pb minerals are described. Deposits are classified, and their occurrence in eastern and central Canada is discussed separately from that in western Canada. Each deposit is described. Foreign occurrences are touched on briefly. C. H. L.

Mineral occurrences in Woman River district, Ontario. H. M. BANNERMAN. Can Dept. Mines, Geol. Survey, *Summary Rept.* **1929**, Part C, 1–19(1930). **Obatogamau River area, Abitibi territory, Quebec.** C. TOLMAN. *Ibid* 20–32. **Deep borings in Ontario, Quebec, and Maritime Provinces.** D. C. MADDOX. *Ibid* 33–44. C. H. LORIG

Hydrothermal origin of the Rand gold deposits. I. Testimony of the conglomerates. L. C. GRATON. *Econ. Geol.* **25**, Supplement to No. 3, 1–185(1930).—The Witwatersrand Au region of South Africa is the greatest metal mining district of the world, having in 45 yrs. produced more than half of the world's stock of Au accumulated during all time. It is the deepest mine in the world, 7640 ft. The origin of the deposits involves the future of the district. This paper summarizes the impressions favoring an epigenetic origin for the Au, rather than the placer hypothesis. Evidence is given as to the origin of the conglomerate reef, which leads to the conclusion that syngenetic accumulation of detrital Au with the reef gravels is so highly improbable and so unlike any of the detg. conditions under which Au placer deposits have been formed that the detrital hypothesis cannot be accepted. The evidence afforded by the conglomerates as possible and actual channel-ways has been considered and summarized and leads to the conclusion that the Au is and must be of hydrothermal introduction. ALICE W. EPPERSON

Beardmore-Nezah gold area, Ontario. GEO. B. LANGFORD. *Econ. Geol.* **25**, 251–69(1930).—The Au area lies 45 miles north of Lake Superior and east of Lake Nipigon. The general geology is given in detail. All consolidated rocks are of pre-Cambrian age, the basement member consisting of volcanics, plutonics and a minor quantity of sedimentary rock. The igneous rocks are all of basic types and are altered until they come under the general name of green-stones. Timiskaming Fe formations are the only ones held to be economic possibilities, although no com. ore bodies are developed. Au occurs in fissure veins of high-temp. origin. A bibliography is given. ALICE W. EPPERSON

Zoning in Michigan copper deposits. R. D. HOFFMAN. *Econ. Geol.* **25**, 285–6 (1930).—H. refers to Broderick's article (*C. A.* **23**, 4651) and emphasizes its value. The indication that Cu deposition may extend over a range of 20,000 ft. along the dip of the lode allows the geologist to measure one of the factors entering into the estn. of the

extension in the depth of a given ore body and opens up interesting exploration possibilities in the upper portions of the Keweenawan series. ALICE W. EPPERSON

The Sherrit-Gordon copper-zinc deposit. J. F. WRIGHT. *Econ. Geol.* **25**, 286–9 (1930); cf. Bruce, *C. A.* **23**, 4910.—W. presents evidence that the supposed syncline is more probably an overturned anticlinal fold. ALICE W. EPPERSON

Antimony and molybdenum deposits near Novotroïtsk on the Unde River, Transbaïkalia. A. A. SAUKOV. *Compt. rend. acad. sci. U. R. S. S.* **1930A**, No. 13, 345–9.—Ore samples taken from these deposits analyzed 10–30% Sb_2S_3, hand-picked ones as high as 57.9% Sb_2S_3, with 0.52 g. Au per ton. Molybdenite deposits were found in the same district but were rather poor. S. L. MADORSKY

The Tin Mountain spodumene mine, Black Hills, S. D. G. M. SCHWARTZ. *Econ. Geol.* **25**, 275–85(1930).—The mine is located about 7 miles west of Custer, S. D., and closely resembles the Etta mine, which is the largest producer of Li minerals. The deposit is on the opposite side of the batholith from the Etta mine. The geology of the deposit is described, and the minerals observed are noted, those most abundant being microcline, quartz and spodumene. Tourmaline is very scarce. Pollucite is present and an analysis of it is given. The principal minerals of the 2 mines are the same, with the striking difference of an abundance of pollucite in the Tin Mt. mine. A. W. E.

Lignin and coal formation. ANTONIO PULT. *Atti III congresso naz. chim. pura applicata* **1930**, 529–32.—A review of various theories of the part played by lignin in coal formation. E. M. S.

Geology of southern Alberta and southwestern Saskatchewan. M. Y. WILLIAMS AND W. S. DYER. Can. Dept. Mines, Geol. Survey, *Memoir* **163**, 160 pp.(1930).—There are extensive coal mines and a very large untapped reserve of gas in the region. Enormous quantities of fine quality semi-refractory clays are also available.

C. H. LORIG

Occurrence of petroleum in North America. SIDNEY POWERS *Am. Inst. Mining Met. Eng., Tech. Pub.*, No. **377**, 46 pp.(1931). E. H.

Analyses of oil and gas from distillation of sediments. P. D. TRASK AND C. C. WU. *Econ. Geol.* **25**, 235–41(1930).—Preliminary results are given of an investigation on origin and environment of source sediments of Am. Petroleum Institute research program, its object being to study conditions under which sediments that may in future be source beds of petroleum are now accumulating. Analyses are given of oils from marine sediments, of the black ppt. which forms in the watery portion of the distillate, and of gases from sediments. The oils are similar and appear to be unsatd. and to contain S. The ppt. is high in Fe, H and C. The gases are so similar that it is thought impracticable to interpret the analyses of gas from sediments. Tables of analyses are given.

ALICE W. EPPERSON

Origin and environment of source sediments of petroleum deposits. J. D. HASSMAN. *Bull. Am. Assoc. Petroleum Geol.* **14**, 1465–8(1930).—A vast amt. of humic acids is formed in swampy regions where there is more sand than clay (*N. Y. Acad. Sci* 22, 1912, pp. 9–112; *Bull. Am. Assoc. Petroleum Geol.* **5**, 75–9(1921)). The origin of asphalt and hydrocarbons from humic acid in a Florida vandyke-brown lime has been shown. H considers that nature activates or energizes Si- and C-contg. materials so that they emit subatomic energy which produces chem. reactions at ordinary temps. and pressures by means of specific H ions. Evidence is offered that hydrocarbons are synthesized from humic acids by such emissions. ALDEN H. EMERY

Vanadium in carbonaceous minerals. JUN YOSHIMURA. *Bull. Inst. Phys. Chem. Research* (Tokyo) **9**, 878–81(Abstracts 84(in English) published with *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) **14**, No. 271–3)(1930).—A peculiar-looking *semi-anthracite coal*, found in the prefecture of Fukui in a Jurassic deposit assocd. with sandstone, shale, liparite and clay, has been studied. It contains little water and gives a large quantity of ash. Detns. of the ash by Hillebrand's method gave a content of 0.01–0.03% V_2O_5—about the same as in the neighboring rocks. From these results it is concluded that the coal did not come from a vegetable source as usual but was partially carbonized through geological agencies. The ash of a coal from Heijo showed 0.091% V_2O_5. J. B. AUSTIN

Chemical composition and properties of Crimean keffekilite. I. D. KURBATOV AND V. A. KARGIN. *Compt. rend. acad. sci. U. R. S. S.* **1930A**, No. 13, 321–4.—Samples of Crimean keffekilite were studied as to compn. and adsorptive properties. The material contains on the average about 50% SiO_2, 15% Al_2O_3 and over 20% H_2O. It cannot be used for purification of mineral oils but can be used, after preliminary activation, for purification of aq. acid solns. It adsorbs aniline dyes well from solns. S. L. M.

Experiments bearing on the biochemical reduction of sulfate waters. GEORGE

THIEL. *Econ. Geol.* **25**, 242–50(1930).—T. attempted to measure the role of bacteria as agents in biochem. reduction of meteoric sulfate solns. in carbonaceous sediments. In each of 7 types of sediments with varying amts. of org. matter, reduction was greater when microbian decompn. was undisturbed. There was some reduction in sterilized sediments, especially those high in $CaCO_3$. Conclusion: Too much emphasis has been placed on the importance of "dead org. matter" in ore genesis, especially as applied to carbonaceous sedimentary rocks. Expts. indicate that at the time of ore deposition org. matter was still being broken down by bacterial activity into its component parts, which by mutual interactions were capable of reducing sulfates. ALICE W. EPPERSON

Corrosion and regeneration of porphyry-quartz. G. G. LEMMLEIN. *Compt. rend. acad. sci. U. R. S. S.* **1930A**, No. 13, 341–4.—Quartz crystals having irregular outlines are sometimes found. This irregularity is usually explained on the basis of corrosion by the magmatic melt just preceding solidification. A study of such corroded crystals was made. S. L. MADORSKY

Blast-furnace slags on Kola Peninsula and Novaya Zemlya Island. D. S. BELYANKIN. *Compt. rend. acad. sci. U. R. S. S.* **1930A**, No. 10, 245–50.—Fragments picked up here proved on chem. and phys. examn. to be blast-furnace slags. The Novaya Zemlya fragment resembled the Cleveland, England, blast-furnace slag, and the Kola fragment resembled that of Lehigh Valley, Pennsylvania. The theory is advanced that fragments were carried from the respective countries to the White sea region by the Gulf Stream. S. L. MADORSKY

Patina on quartz as a time indicator. E. GEHRCKE. *Physik. Z.* **31**, 970–3(1930).—The patina on specimens of quartz and flint can serve for the detn. of geological age. A layer 0.3 mm. thick can be formed in 6 months at 20° by 10% NaOH but requires 50,000 years if the alkalinity is 0.7 mg. NH_3/l. FRANK URBAN

Colloid-chemical theory of salt lakes. S. A. SHCHUKAREV AND T. A. TOLMACHEVA. *J. Russ. Phys.-Chem. Soc.* **62**, 777–816(1930).—Kurnakov, and after him Krotov (*C. A.* **22**, 4424), regard the deposition of salts from seashore lakes as the result of ionic interchange, whereby first SO_4 ions (reaction between $MgSO_4$ and $CaCO_3$) and then Mg ions (reaction between $MgCl_2$ and $CaCO_3$) are removed from the soln. The above view fails to explain the accumulation of sulfates and carbonates in inland lakes, a phenomenon which can be accounted for on the basis of exchange adsorption by the silt colloids. The greater concn. of Na and Mg ions causes them to displace Ca ions from the clay and humus material of colloidal nature. Geological and climatic changes may transform the sea lake into an inland salt deposit; NaCl is subsequently leached out by the rain water, and the adsorption proceeds in the opposite direction, Ca ions being removed from soln. in exchange for Na as Na_2SO_4 and Na_2CO_3. The above theory, as applied to Lake Sakskoye (Crimea), was experimentally tested by studying the adsorbent properties of the lake silt. It was necessary, in order to remove the adsorbed metallic ions, to wash the silt with HCl, although such treatment resulted in the loss of $Fe(HS)_2$ and consequent change in adsorption power. The residue consisted of finely divided clay contg. 2% org. matter. It was suspended in water, and H-electrode titrations were made with $BaCl_2$, $CaCl_2$, $MgCl_2$, NaCl and LiCl solns. For bivalent ions, the adsorption order was Ba > Ca > Mg, for univalent, Na > Li. In solns. more dil. than 0.3 *N*, the adsorption conformed to Freundlich's isotherm. The adsorption capacity of the silt for H ion appeared to be greater than for Ba ion. The adsorption of Ag ion was followed with the aid of a Ag electrode. Suspensions of the silt were also titrated with NaOH and $Ba(OH)_2$ solns., the buffer action in the latter case being greater. Addn. of neutral salts also increases the buffer action, which thus depends on the adsorption of cations. The changes in the compn. of the water of salt lakes lying near the sea are caused by biochem. reduction of the sulfates and exchange adsorption. The latter process prevails when the sulfates disappear rapidly from soln. (as in the case of lakes which do not communicate with the open sea). B. SOYENKOFF

Dressing of Fe pyrites and heavy spar at Meggen (GLATZEL) **9**. Application of geology to deep well water supplies (MCQUEEN) **14**. Salt Flat oil field, Caldwell County, Texas (MCCOLLUM, *et al.*) **22**. Does petroleum form in sediments at time of deposition? (TRASK, WU) **22**.

Handbuch der Mineralchemie. Edited by CORNELIUS DOELTER AND HANS LEITMEIER. **Band IV. Bog. 41–50.** Dresden: Th. Steinkopff. Pp. 641–800. M. 8. Cf. *C. A.* **24**, 5680.

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9—METALLURGY AND METALLOGRAPHY

D. J. DEMOREST, H. W. GILLETT AND RICHARD RIMBACH

The role of chemical engineering in mining and metallurgy. W. E. GIBBS. *Bull Inst. Mining and Met.* **306**, 3–22(1930); cf. *C. A.* **24**, 1825.—Discussion. A. H. E.

Metallurgical and chemical progress in British Columbia during 1930. F. H MASON. *Can. Chem. Met.* **15**, 30–1(1931).—A review. W. H. BOYNTON

The microscope in metallurgy. O. W. ELLIS. *Can. Chem. Met.* **15**, 25–6, 28 (1931).—The microscope aids: in the investigation of the constitution of metals and alloys; in the solution of problems of manuf.; and in the control of production. A figure shows a portion of the equil. diagram for the alloys of Al and Mg contg. up to 20% Mg. Applications of the microscope in aiding the manufacturer and in the control of metallurgical operations are noted. W. H. BOYNTON

Refractory products in metallurgy. H. FORESTIER. *Chimie & industrie* 24, 797–804(1930).—An address reviewing the methods of control and investigation of these products and discussing the properties of SiO_2 bricks, of silico-aluminous refractories and special refractories, showing that none of the moderately priced refractories combines the 3 fundamental properties which are: rigidity at high temp., high m. p. and chem. neutrality. A. PAPINEAU-COUTURE

Research laboratories of the New Jersey Zinc Company. RICHARD RIMBACH *Metals & Alloys* **2**, 13–17(1931). A. J. MONACK

Chemistry of the chlorinating roasting of copper and silver ores. F. R. HIEMANN *Metall u. Erz* **27**, 617–9(1930).—Comment on paper under the same title by V. Tafel (*C. A.* **24**, 5683). H. STOERTZ

The lead, zinc and cadmium industries of the Empire. A. G. CHARLES. *Metal Ind.* (London) **38**, 65–8(1931). E. H

The world's vanadium resources. HARALD CARLBORG *Jernkontorets Ann* 114, 52–75(1930). E. J. C

Uniform terminology and formulas for ore dressing. Ore dressing committee of the Gesellschaft deutscher Metallhütten und Bergleute e.V. *Metall u. Erz* **27**, 637–42 (1930).—In this comm. report a standardization of hearth terminology is recommended and a method for calcg. ore dressing efficiency is suggested. The relation of the practical degree of sepn. at any time to the max. degree of phys. sepn. is designated "*efficiency*," while by "*max. efficiency*" is understood the relation between the max. practical degree of sepn. and the max. theoretical degree of phys. sepn. An explanation by H. MADEL is included. H. STOERTZ

Dressing of iron pyrites and heavy spar at Meggen. GLATZEL. *Metall u. Erz* **27**, 642–54(1930); **28**, 7–14(1931).—A thorough discussion of the dressing of these ores, including also the geology of the deposits, chronological development of their treatment, equipment used, power requirements, efficiency, water consumption, waste water purification and cost. H. STOERTZ

Development of world copper economy in relation to progress in mining, ore dressing, and smelting technic. ERNST HENTZE. *Metall u. Erz* **28**, 1–7(1931).—Mine and smelter production as well as world consumption of Cu has increased about 100% since 1920. The technical progress of mining, ore dressing and smelting during this period has been such that the production has come more and more into the hands of a few large companies, and Cu therefore today costs relatively no more than before the war. Annual production and cost data are given for 20 large American producers. H. STOERTZ

Flotation fundamentals. I. Dept. Mining and Met. Research, Univ. of Utah, *Tech. Paper* 1(1928).—**The floatability of pure minerals and synthetic mixtures of pure minerals under standardized conditions.** A. M. GAUDIN, HARVEY GLOVER, M. S. HANSEN AND C. W. ORR. *Ibid* 3–5. **Galena.** A. M. GAUDIN. *Ibid* 6–30.—The effect on the floatability of galena of various collectors, depressing agents and toxic agents is

shown in an extensive series of graphs of recovery vs. amt. of reagent per ton. **Pyrite.** A. M. GAUDIN AND C. W. ORR. *Ibid* 31–49.—A similar series of graphs is given for pyrite. When K Et xanthate is used as a collector, pyrite is the most floatable of the sulfides of Fe, Pb and Zn. The amt. of collector required for complete recovery frequently would barely form a complete monomol. film on the mineral grains. Depression of pyrite can be produced by pptg. insol. compds. on the mineral surface. **Differential flotation of synthetic mixtures of galena and sphalerite, and galena and pyrite.** A. M. GAUDIN AND C. W. ORR. *Ibid* 50–55.—With mixts. of galena and sphalerite, both NaCN and $ZnSO_4$ are depressing agents for sphalerite; their joint effect is better than either singly. K chromate depresses galena, but fails to help to float sphalerite. $CuSO_4$ floats sphalerite but fails to depress galena. The use of $CuSO_4$ + K chromate gives the desired sepn. CaO or NaOH depressed both pyrite and galena. Cyanide depressed pyrite and floated galena. **Flotation of carbonate minerals by fatty acids as affected by soluble salts.** A. M. GAUDIN AND MAHLIN S. HANSEN. *Ibid* 56–77.—All carbonate minerals tried (calcite, magnesite, cerussite, siderite and rhodochrosite) were floated. Differential flotation of one from another may be possible by the use of suitably selected fatty acids as collecting agents. **Flotation of some oxide and silicate minerals.** A. M. GAUDIN AND HARVEY GLOVER. *Ibid* 78–101.—*Quartz* can be floated with oleic acid or Na oleate when a sufficient amt. of frothing agent is added to form elastic bubbles. The amt. of oleic acid is < the amt. to form a complete monomol. film. Pb and Cu salts greatly activate, while quadrivalent and tervalent salts inhibit, the flotation of quartz when Na oleate is used as a collector. Flotation of quartz is very sensitive to acidity; a slightly alk. circuit is best. Na silicate is the best depressing agent for quartz when Na oleate is used as a collector. *Cassiterite* can be floated with Na oleate and with satd. fatty acids provided a suitable frothing agent is used. *Hematite* can be floated with Na oleate and some of the satd. fatty acids when a suitable frothing agent is used. Cu and Pb salts decrease the recovery of hematite. *Feldspar* can be floated with Na oleate and satd. fatty acids provided a suitable frother is added. Although quartz is floated by these same reagents, feldspar floats first. Sol. salts affect feldspar similarly to quartz. II. **The floatability of pure minerals and synthetic mixtures of pure minerals under standardized conditions. Chalcocite.** A. M. GAUDIN AND PAUL M. SORENSEN. *Ibid* **4**, 25 pp.—The effect on the floatability of chalcocite of various collectors, depressing agents and toxic agents is shown in an exhaustive series of graphs. Anions that form insol. Cu salts inhibit the flotation of chalcocite. Complete depression is accomplished by the addn. of small quantities of thiosulfate, sulfite, sulfide, ferrocyanide or ferricyanide ions. III. **Floatability of pure minerals and synthetic mixtures of pure minerals under standardized conditions. The flotation of the carbonates of copper, malachite and azurite.** A. M. GAUDIN AND J. SHELDON MCLAUGHLIN. *Ibid* **5**, 37 pp.—Malachite and azurite can be floated from a siliceous gang by means of suitably selected satd. fatty acids and fatty acid soaps. These reagents will not effect a sepn. of Cu carbonates from a calcite gang because of the formation, by the Cu and Ca ions present, of identical surfaces on the 2 carbonates. Relatively large amts. of several N-contg. org. substances such as amines and hydrazines will float $CuCO_3$ from calcite. Org. N-S reagents, such as thiocarbamates, are more powerful. Xanthates and thiocarbamates have been shown to collect because of the formation of insol. Cu compds. on the surface of the $CuCO_3$. Org. hydrosulfides act similarly. **IV. Floatability of pure minerals and synthetic mixtures of pure minerals under standardized conditions. Sphalerite.** A. M. GAUDIN, C. B. HAYNES AND E. C. HAY. *Ibid* **7**, 40 pp.(1930).—Sphalerite is difficultly floatable. Heteropolar org. compds. whose hydrocarbon groups contain < 5 C atoms usually do not collect the mineral satisfactorily. H-ion concn. of the pulp is very important, several collectors requiring control of the p_H within very narrow limits. Surprisingly few collectors were found. The most powerful was diisoamylammonium diisoamyldithiocarbamate; others were the xanthates higher than hexyl, the thiocresols, thioalcohols, trithiocarbonates, certain amines and hydrazines. The mineral is very amenable to activation by salts of the metals whose sulfides are less sol. than ZnS; the most powerful are Ag, Cu, Hg and Pb salts. The sequence of potency of these various activators is not the same for all collectors, but depends on the insoly. of the salt formed by the anion of the collector with the cation of the activator, as well as the insoly. of the sulfide coating on the sphalerite. Cyanide is not a depressing agent for pure sphalerite, but it is most suitable to undo the activation brought about by Cu salts. **V. Floatability of pure minerals and synthetic mixtures of pure minerals under standardized conditions. Some attempts at reducing the cost of floating copper carbonate ores. A. M. GAUDIN AND ARVID E. ANDERSON.** *Ibid* **9**, 25 pp.(1930).—By the use of Pb salts,

particularly $Pb(NO_3)_2$, in connection with Am xanthate, the cost of floating $CuCO_3$ ores can be reduced about 1/3. $Zn(NO_3)_2$ and possibly other Zn salts have been found of value as activators under certain restricted conditions. No collector more effective than Am mercaptan has been discovered. The possibility of regenerating the reaction product from the collector that usually goes with the concentrate has been outlined. Some data pertaining to the flotation of malachite and of cerussite at various p_H values and with various added substances have been detd. A. H. E.

Progress in flotation and equipment. S. G. SWAINSON. *Eng. Mining J.* **131**, 69–71(1931).—Significant recent developments in flotation technology are noted in connection with Mn, phosphate rock, fluorspar, barytes and coal. On a lab. scale other non-metallic minerals have been floated such as: bauxite, mica, calcite, kaolinite and feldspar. Every plant in the Michigan Cu country has adopted flotation, and concentrates running 50–60% Cu are being produced from tailing of 0.30–0.60% Cu In Northern Rhodesia a new process under development reduces the Cu to the metallic state; it is then sepd. by flotation. Crushing machinery, fine grinding and classification, flotation machines, traction thickeners and filters are briefly discussed.
W. H. BOYNTON

Application of a reclassification method to the flotation process for the improvement of ore dressing results. H. BÖRNER. *Metall u Erz* **27**, 654–9(1930).—An investigation of metal distribution in the flotation process with the aid of sieve and uniformity analysis, as applied to Au ores, and the dependence of metal recovery upon the grain size of the flotation slime. Whether this reclassification process can be applied depends upon the value of the metal being recovered. H. STOERTZ

The effect of dissolved substances on gravity concentration. F. J. TROMP AND E. BEYERS. *J. Chem. Met. Mining Soc. S. Africa* **31**, 130–1(1930); cf. *C. A.* **24**, 3200, **25**, 268.—Discussion. ALDEN H. EMERY

A new concentrator at Rio Tinto. R. O. STOKES. *Can. Mining J.* **52**, 97–9 (1931).—This 2000-ton flotation plant treats disseminated Cu sulfides. The novel arrangement of classifiers and ball mill is noted. A general flowsheet of the concentrator and a flowsheet of the flotation section are shown. The pipe arrangement of ball mill and classifier is illustrated. Flow meters are of the restricted orifice type and work on the principle of the difference of pressure on each side of an orifice plate, which pressure is transferred to a Hg U-tube, one limb contg. a float. The provision of d. recorders on both the rougher and cleaner flotation circuits thus enables the operator to see at a glance what the diln. is at any moment and gives a clue to other changes which cannot be detected immediately. Also in *Mining Mag.* **43**, 329–36(1930)
W. H. BOYNTON

The Lake Shore mine. A. BRIAN. *Can. Mining J.* **52**, 89–92(1931).—An outline of the development of the mine and a description of some of its present equipment are given. Several illustrations are included. W. H. BOYNTON

Kowkash gold area. L. F. KINDLE. *Can Mining J.* **52**, 94(1931).—A preliminary rept. and recommendations for prospecting are given. W. H. BOYNTON

Central milling in the Tri-State district. ELMER ISERN. *Eng. Mining J* **131**, 49–54(1931).—The trend toward central milling is growing. The operations along these lines on the holdings of the Commerce Mining & Royalty Co. in the western part of the Kansas-Oklahoma section of the Tri-State Zn-Pb district are described. The flowsheet of the Bird Dog Mill is shown and the operation of the mill outlined.
W. H. BOYNTON

Sizing by elutriation of fine ore-dressing products. A. M. GAUDIN, J. O. GROH AND H. B. HENDERSON. *Ind. Eng. Chem.* **22**, 1363–6(1930).—A study has been made of the functioning of the type of elutriator designed by Gross, Zimmerley and Probert (*C. A.* **23**, 4655). Tables are given showing the rates of flow required in elutriators of a given cross section to sep. a given mesh size of particle. Temp. corrections are also given for water and acetone. Non-polar liquids like kerosene cause flocculation of most particles. Heteropolar liquids like alcs. cause flocculation of silicates but not sulfides. Acetone gives results in about one-fourth the time required for water. Microscopic measurements show good agreement between actual and calcd. particle size.
H. C. DOTS

Chemistry of leaching bornite. JOHN D. SULLIVAN. Bur. Mines, *Tech. Paper* 486, 20 pp.(1931).—Bornite can be leached with $Fe_2(SO_4)_3$. The rate of soln. was virtually independent of the strength of $Fe_2(SO_4)_3$ if enough reagent was present. As Fe^{+++} salts reduce current efficiency and necessitate higher current densities in electrolytic pptn. it is desirable to keep their concns. as low as possible. If the Fe^{+++} remained const., the rate of soln. was independent of acid strength (0.25–10%). The rate for

10–28-mesh particles was practically identical with that for 100–200-mesh mineral. Smaller material was attached only slightly more rapidly and larger material only slightly more slowly. Temp. had a marked effect. Leached particles retained practically their original form. The final particle was composed of S and insol. material. H_2SO_4 and air will attack bornite more slowly than $Fe_2(SO_4)_3$. $FeCl_3$ was more effective than $Fe_2(SO_4)_3$. ALDEN H. EMERY

Recovering smelter dust and oxide. N. F. KEPNER, W. ROMANOFF AND C. O. THIEME. *Eng. Mining J.* **131,** 60–4(1931).—The practice and equipment and tech. control in the modern secondary-metal smelter of H. Kramer & Co., Chicago are briefly described. The prepn. of scrap for the smelting furnace and furnace operation are summarized. The dust-collecting equipment is calcd. to be of sufficient capacity to handle the gases and dust from 3 reverberatories or 2 furnaces and a 42-in. blast furnace operating simultaneously. Cr-Ni-Fe alloy flue branches and a manifold were necessary because of excessive temps. A spray chamber with water from a high-pressure pump was necessary. A general layout of the flue system as far as the spray chamber is given and indicates the manner in which the branch flues lead to the manifold "A." Pyrometric control was found necessary to preserve the life of the high-temp.-resistant steel branches. W. H. BOYNTON

The development of the foundry technic during the later years. SIXTEN NILSSON. *Teknisk Ukeblad* **76,** 34–9, 44–7(1929).—An illustrated review. C. A. ROBAK

Air discharge of circular tuyères. RICHARD S. MCCAFFERY AND DANIEL E. KRAUSE. *Am. Inst. Mining Met. Eng., Tech. Pub.* No. **385,** 10 pp.(1931).—The report of a gain in efficiency with lower blast pressure by using a diverging tuyère made it desirable to investigate the shape of the air streams issuing from various types of tuyères. Model tuyères were made a $^1/_8$ scale, and air was supplied at a pressure of $1^1/_2$ in. of Hg. The blast from a single tuyère was discharged into the atm. and a Pitot tube was used to explore the air stream. A diverging tuyère broadens the air stream. The longer the diverging portion of a tuyère, the broader the air stream. The diverging tuyères have considerably less linear velocity than those of the converging type. A diverging tuyère is most efficient when the angle of divergence is between 9° and 10°. The 12° divergence gives a greater discharge for short tuyères but does not give as great a discharge as a 10° divergence when the length is increased to 4 times the throat diam. A converging tuyère with greater velocity causes more turbulence. The benefits derived from the use of a diverging tuyère are probably due to better distribution of air in the furnace. A. W. HOLMES

Open-hearth combustion control. MARTIN J CONWAY. *Iron Steel Eng.* **8,** 29 (1931).—The most important step in open-hearth furnace control is automatic stack draft control. The approximation to perfect combustion and waste-gas control have resulted in increased output and a marked increase in furnace life and lowered fuel costs. The use of control app. requires a trained and intelligent personnel. W. H. BOYNTON

Cleaning, distribution and uses of blast-furnace gas. WILLIAM A. HAVEN AND C. B. THORNE. *Iron and Steel* (*A. S. M. E. Trans.*) **52,** 81–9(1930).—The Fe blast furnace is the largest producer of by-product gaseous fuel of all metallurgical processes. Many American plants use the gas exclusively in boilers. A more advantageous distribution is an important factor in pig-Fe costs. For every ton of pig Fe produced, about 135,000 cu. ft. of gas is generated, with a fuel value of about 90 B. t. u. per cu. ft. From 25 to 35% is required for the stoves. The remainder may be used to generate power, but a more profitable use is suggested in the steel furnaces and coke ovens. These uses involve cleaning, with a cost of 1.179 cents per ton of pig Fe for gas cleaned to 0.15 grain per cu. ft., and 5.455 cents when cleaned to 0.08 grain per cu. ft. The use to which the gas is to be put will det. the degree of cleanliness desired and thus the cost of cleaning. CURTIS L. WILSON

Heating [pig-iron] mixers with blast-furnace gas. K. D'HUART. *Stahl u. Eisen* **50,** 785–8(1930).—The construction of several types of mixer fired with blast-furnace flue gas is illustrated, and a new direct-fired regenerative mixer and ancillary plant is briefly described with reference to diagrammatic plans. B. C. A.

Statistical analysis of blast-furnace data. RICHARD S. MCCAFFERY AND RONALD G. STEPHENSON. *Am. Inst. Mining Met. Eng., Tech. Pub.* No. **384,** 13 pp.(1931).—A preliminary study of the daily operating reports of 15 blast furnaces. Because of the quantity of data and the no. of variables to be compared, the method of elec. tabulating and accounting machines of the International Business Machines Corp. was adopted. The original data were recorded by punching on cards. A sorting machine sorted the cards for the different variables, and a printing machine made a record of sorted cards.

Special comparisons were used in classifying the slag. An inspection of some of the results showed that for each 1% increase of Si in the pig the daily tonnage decreased by 2%. The consumption of coke per ton of Fe is increased 100 lb. for each 1% increase of Si. S elimination varies directly with Si. S in the slag approaches a limit of 2.20% as Si increases to max. of 4.25%. S in the metal does not change materially. The ratio of S in the slag to S in the metal also increases with the Si content of the metal. A. W. HOLMES

Blast-furnace slags. RICHARD S. MCCAFFERY. *Am. Inst. Mining Met. Eng., Tech. Pub.* No. 383, 5–26(1931).—A progress report is made on work being done at the Univ. of Wisconsin on iron blast-furnace slags. Both actual blast-furnace slags and slags synthetically produced in the lab. have been used in the studies. At present the viscosity of slags covering the range of silica 25–55, alumina 0–35, lime 25–55 and magnesia 0–20% has been studied. These measurements were made at temps. 1250–1650°. Some of the slag viscosity diagrams are reproduced in the report. A. W. H.

Determination of viscosity of iron blast-furnace slags. RICHARD S. MCCAFFERY, CLARENCE H. LORIG, IRA N. GOFF, JOSEPH F. OESTERLE AND OSCAR O. FRITSCHE. *Am. Inst. Mining Met. Eng., Tech. Pub.* No. 383, 27–54(1931).—The app. used in the Univ. of Wisconsin slag viscosity tests is described. An Ajax-Northrup high-frequency induction-type furnace operated from a 35 kv. amp. high-frequency converter supplies energy for heating. The secondary was a graphite crucible and its molten charge. This crucible is supported from the bottom through a graphite support, and water cooled metal connections by a vertical reduction gear, which will revolve the crucible at speeds of 10 to 40 r. p. m. When the slag in the crucible is molten a square graphite spindle is immersed in it. This spindle is suspended by a spring filament and is carefully centered. When the crucible contg. the molten slag is rotated within the furnace at a const. speed, the slag tends to drag the spindle around and displace it angularly with respect to its original position in the molten slag. The angle of displacement is a measure of the viscosity of the slag. Round spindles were tried but were not as accurate because the molten slags did not all wet the graphite and this allowed slip between spindle and slag. A. W. HOLMES

A new arrangement for the granulation of blast-furnace slag with water and air. F. SPIES. *Stahl u. Eisen* 51, 10–14(1931).—The liquid blast-furnace slag is brought together with a small quantity of water in a channel. The excess water runs off through slots at the end of the channel where, through one or more nozzles, compressed air is supplied, which hurls the slag in the supply container. The water content of the finished slag can be regulated by the amt. of water added; it *can be used in cement or brick*. The advantages of this method are the low cost of the outlit and the fact that very little water is required. J. A. SZILARD

Effect of magnesia on slag viscosity. RICHARD S. MCCAFFERY, JOSEPH F. OESTERLE AND OSCAR O. FRITSCHE. *Am. Inst. Mining Met. Eng., Tech. Pub.* No. 383, 55–68(1931).—Slags with 5% magnesia are decidedly more fluid than those with zero magnesia and with increasing amts. of magnesia up to 20% the fluidity increases. When magnesia is present increase in temp. causes greater increase in fluidity. When magnesia is present there is not so much difference in viscosity caused by other elements. These results have been detd. on silica-alumina-lime and magnesia melts in which Fe and Mn were absent. A. W. HOLMES

The calibration of reduction rolls for seamless tubes. P. GOROL. *Stahl u. Eisen* 51, 33–7(1931).—Methods are discussed to obtain seamless pipes of any desired size by using reduction rolls. J. A. SZILARD

The iron industry of China. KARL WENDT. *Stahl u. Eisen* 51, 1–8(1931).—The development of the Fe industry, the location of the ore and coal deposits and a description of the foundries in China are given. J. A. SZILARD

The production of high-test cast iron. RICHARD MOLDENKE. *Iron Steel Can.* 14, 1–2, 17–9(1931); cf. *C. A.* 24, 4989.—A review. E. H.

Developments in products at Lukens Steel Company. J. H. MCELHINNEY. *Iron Steel Eng.* 8, 6–8(1931).—A brief review. W. H. B.

Air filtration as applied to the steel industry. M. R. ROBINSON. *Iron Steel Eng.* 8, 15–20(1931).—Air filtration becomes an intimate part of air conditioning and finds an important field to serve in the protection of expensive elec. equipment in the steel industry. Emphasis is placed on the importance and value of air filtration for conditioning the air about the steel mill. Information is included on the cost of four ventilation frequency changer set, showing savings. W. H. BOYNTON

Fundamental and applied research on the physical chemistry of steel-making. C. H. HERTY, JR. *Metals & Alloys* 1, 883–9(1930).—See *C. A.* 25, 478. A. J. M.

Open-hearth steel process as a problem in chemical kinetics. ERIC R. JETTE. *Am. Inst. Mining Met. Eng., Tech. Pub.* No. 380, 34 pp.(1931).—An attempt has been made to analyze the complex set of reactions and processes comprised in the open-hearth steel process. The major premise was that the reaction $FeO + C = Fe + CO$ was the rate-detg. reaction. Because of the unknown diffusion consts., variation of catalyst concn., etc., it was not possible to arrive at a complete solution.; nevertheless certain values are gained. From a kinetic standpoint a knowledge of the FeO content is more important than C content. Diffusion consts. are likely to lead to false results. As long as open-hearth practice continues in the use of highly oxidizing finishing slags "overoxidation" is unavoidable. A. W. HOLMES

The design, development and manufacture of special steel castings for locomotive and car construction. H. R. BARTELL. *Eng. J.* (Canada) 13, 677-82(1930).—A review. C. G. F.

The formation and decomposition of cementite. P. PINGAULT. *Compt. rend.* 191, 1007–8(1930).—Pure cementite, prepd. by the action of NaCN upon Fe filings at 650°, was heated in a vacuum at various temps. and subjected afterward to the attack of HNO_3 (d. 1.2). After 10 hrs. at 1000° only faint traces of graphite could be found. After 1 hr. at 1075° the cementite was agglomerated and distinct traces of graphite were found. After 1 hr. at 1175° the cementite was transformed partly into metallic globules having the microscopic characteristics of gray cast Fe and partly into a powder, contg. much graphite. Below 1000°, therefore, the pure cementite may be considered very stable, but as soon as the melting temp. of cast Fe is approached, the decompn. of the cementite becomes rapid. In forming cementite from pure Fe and NaCN in the absence of air, it was found that the cementation of the Fe was negligible at temps. of 600–50° and 850–900°. The same results were obtained in pure and in com. NaCN. Different results obtained in the presence of air are believed to be due to the carbonizing action of the decompn. products of the NaCN. Soft-steel electrodes were immersed in a NaCN bath kept at 650° and a current was passed. The effect varied considerably with the c. d. After 40 hrs. at 1 amp./sq. dm. the anode was much hardened while the cathode remained unchanged. At 20 amp./sq. dm. there was no hardening of the electrodes, but the anode was corroded. At 60 amp./sq. dm. the loss of wt. of the anodes after 15 hrs. amounted to 2.5 g./sq cm. The powder derived from the decomposed anodes contained 6% C and 2–2.5% O. It consisted of cementite detached from the anode on account of the great speed of formation and, on account of its fineness, slightly oxidized by the washing media employed. LEOPOLD PESSEL

Mechanism of the tempering of martensite. P. CHEVENARD AND A. PORTEVIN. *Compt. rend.* 191, 1059-62(1930); cf. *C. A.* 24, 5697.—The phenomena of tempering are complicated by the simultaneous presence of austenite and martensite and the difficulty of obtaining the latter in a pure state. The proportion of austenite was estd. by the dilatometric method and conclusions were thus drawn as to the behavior of martensite itself. The following changes take place simultaneously: Martensite ⟶ cementite + martensite (with less C). Austenite ⟶ cementite + austenite (with less C). Austenite ⟶ cementite + martensite. Some of the physical changes are plotted against the tempering temp., simultaneously with pure martensite and quenched steel. The hardness increases at first because of the fineness of the pptd. cementite particles and the increasing concn. of C in the α phase, but on further increase of temp. it decreases rapidly as a result of the coalescence of the cementite particles. The hardness of the martensitic structure, therefore, passes through a max. As austenite is much softer than martensite, the curve of quenched steel is approx. parallel to that of martensite in the beginning, but it approaches the latter with an increase of temp. in consequence of the decompn. of austenite and merges with it when the change is completed. A similar conformity appears in the dilatometric curves, and should also exist for other phys. and chem. qualities. The corrosion by acids, for instance, is a function of the C content in the α phase, which decreases with rising temp., and is also a function of the no. of cementite particles which pass through a max. A max. of coloration with etching reagents is predicted. LEOPOLD PESSEL

Problems of the metallic state. J. D. BERNAL. *Metallwirtschaft* 9, 983–7(1930).—Although many thermal and microscopic investigations on metals and alloys have been made, the theoretical chemistry of the metallic state has been neglected. After discussing the characteristic properties of metallic atoms and classifying in tabular form the space lattices of the binary alloys of 20 metals, B. concludes that investigation of individual problems is not at present as necessary as a correlation of the structural mech., elec. and magnetic properties of typical metals, compds. and solid solns. CURTIS L. WILSON

Shrinking of plate metals on heating. IKUTARO SAWAI, YOSHIHIRO UEDA AND MORIO NISHIDA. *Z. anorg. allgem. Chem.* **193**, 119–32(1930); cf. *C. A.* **24**, 4497.—Velocity of shrinking of Au and Ag plate was studied in CO_2 and N_2 as well as in air; the results show that O_2 has a profound influence, probably because of the existence of an adsorbed gas layer upon the surface of the metal. Shrinking occurs when $v_2 > v_1$, in which v_2 is the velocity of shrinking and v_1 is the velocity of thermal expansion. In a discussion of theoretical considerations, shrinking at elevated temps. is assumed to be a surface-tension effect. H. STOERTZ

Transformation points in metals. A. SCHULZE. *Z. Metallkunde* **22**, 308–11 (1930).—Conclusion of article previously abstracted (*C. A.* **24**, 3973). This article contains data on the elec. resistance, thermal expansion and thermal e. m. f. of Tl and Co as a function of temp. It is concluded that *Tl has a transformation pt. at 225° and Co at 1128°*. The Tl contained Tl, 99.4, Pb 0.5, Zn 0.1, As 0.02 and Ga 0.01%. Three samples of Co were used, the first was in wire form prepd. from a "pure" powder by sintering, the purity of which is indicated by its temp. coeff. of elec. resistance of 5.92×10^{-3}; the second was prepd. from powder by melting in a quartz tube *in vacuo* and exhibited a temp. coeff. of elec. resistance of 6.58×10^{-3}; the third was technical Co analyzing Co 99.2, C 0.02, Si 0.03, Mn 0.26 and Fe 0.47%. ROBERT F. MEHL

Forming properties of thin sheets of some nonferrous metals. W. A. STRAW, M. D. HELFRICK AND C. R. FISCHRUPP. *Am. Inst. Mining Met. Eng., Tech. Pub.* No. **406**, 14 pp.(1931).—A simple method is described of detg. the forming ability of sheet brass, phosphor bronze and nickel silver which duplicates actual mfg. conditions. Data of direct application in selecting grades, tempers and thicknesses of material for design and manuf. are given in terms of min. radii of 90° forming tools which produce bends without cracking the surface of the materials. Examples are shown of the application of the results in connection with the design of formed parts and forming tools. C. L. MANTELL

Investigations upon the structure of metallic systems by means of x-rays. A. WESTGREN. *Z. Metallkunde* **22**, 368–74(1930).—The usefulness of x-ray detns. of structure in the study of constitution of metal systems is pointed out in detail. The structural analogies already found in the binary systems of Cu, Ag and Au are found to be much more extensive than first thought. The new structural analogies are listed and discussed. This paper is a sequel to those previously abstracted (*C. A.* **23**, 3425, 4915). ROBERT F. MEHL

Metallo-technical Röntgen investigation. New experimental results. A. HERR *Giesserei-Ztg.* **27**, 590–8(1930).—The application of x-rays in detecting defects in large metal parts such as locomotive cylinders is discussed. H. STOERTZ

Effect of surface conditions and electrodeposited metals on the resistance of materials to repeated stresses. R. H. D. BARKLIE AND H. J. DAVIES. *Proc. Inst. Mech. Eng.* (London) **1930**, No. 3, 731–50.—The tensile stress in Ni electrodeposited on steel reduces fatigue limit. The stress increases in a linear manner with the deposition potential. The internal stress can be lowered or eliminated by increasing the temp. and using a. c. superposed on d. c. Electrodeposits of Cu free from internal stress will reduce fatigue limit. Zn and Pb have little effect. Intermediate Pb films between stressed Ni and mild steel insulate the steel from the effects of stressed Ni deposits. The adhesion of the Ni increases with increasing thinness of the intermediate Pb film. Repeated electrochem. treatment destroys the mech. continuity of the surface. An unsuitable cleaning process by permitting occlusion of H during pickling may cause abnormal brittleness. Circumferential grooves have a more serious effect on the safe stress in hard steel than in mild. ANN NICKOLSON HIRD

The properties of forging ingots of electrolytic copper, reverberatory copper, arseniferous copper, aluminum bronze with 4% aluminum in relation to the conditions of working. P. SIEBE AND G. ELSNER. *Z. Metallkunde* **22**, 238–45(1930).—Conclusion of article previously abstracted (*C. A.* **24**, 3976). This portion of the article discusses arseniferous Cu and Al-bronze with 4% Al. The values of tensile strength, elongation, reduction in area and notch-impact strength obtained after various types of forging treatment are listed and a summary table is given in description of the structural changes observed in the 4 types of metal studied with hot- and cold-working and with various types of heat-treatment. *Conclusions.*—At low forging temps. the tensile strength and elongation of a crude ingot are increased but the reduction of area decreased. At higher temps. of heating the decrease in the strength values is greater in the cold-forged material. This is explained by the greater grain-growth in the ingots forged at the lower temps. Cold-drawing in general increases the strength of the cold-forged ingot, but the reduction in area decreases, whereas it remains const. in the hot-forged ingot. R. F. M.

Three crystalline modifications of electrolytic chromium. KUMAZO SASAKI AND SINKITI SEKITO. *J. Soc. Chem. Ind., Japan* **33**, Suppl. binding, No. **11**, 482–5(1930); cf. Ollard, *Metal Ind.* (London) **28**, 153(1926); Smith, *Metal Ind.* (London) **28**, 456(1926); Bradley and Ollard, *C. A.* **20**, 2600; Sillers, *C. A.* **21**, 1617.—The authors have confirmed, by x-ray analyses, the existence of the hexagonal close-packed modification, and of the body-centered cubic modification of Cr as well, obtaining a modification of the same type as that of α-Mn, contg. 58 atoms in a unit cube. The Cr was obtained by electrolyzing solns. of $Cr_2(SO_4)_3$ contg. 1–2.5 mols. of Cr and 0.20–0.35 mols. free H_2SO_4, with Cu-wire cathodes and artificial magnetite anodes. Fe, Zn, Co and Cr cathodes gave the same results. For the x-ray spectrograms the anti-cathode was of Cr, and the spectra were obtained of the deposits on the wires to avoid transformation of the modifications. At c. ds. below 15 amp./sq. dm. the body-centered cubic form was deposited, above 18 amp./sq. dm. the hexagonal close-packed form, and at intermediate c. ds. a mixt. of the 2 forms. The temp. had to be kept below 20° for the hexagonal form to be given. At 26° the body-centered cubic form only was given even at a c. d. as high as 30 amp./sq. dm. The variety (violet or green) of $Cr_2(SO_4)_3$ and its concn. in the soln. were without effect on the structure of the deposits. The lattice const. of the body-centered form was calcd. to be 2.877 ± 0.003 A. U. The axial ratio of the hexagonal form was found to be 1.626, and the distance between neighboring at. centers 2.717 A. U. The lattice const. of the cubic form of the α-Mn type was found to be 8.717 A. U. The sp. grs. of the above forms are calcd. to be 7.21, 6.08 and 7.48, resp. Spectrograms of the hexagonal and the α-Mn forms taken at intervals showed that, at room temp., both changed to the body-centered cubic form, the former after 40 days and the latter after 230 days after deposition. This showed the different spectra to be those of different modifications of Cr and not due to oxide inclusion in the deposits.

EDWARD B. SANIGAR

Distribution of crystals of chromium electrodeposited in thin plates. D. T. EWING, H. E. PUBLOW AND C. D. TUTTLE. *Mich. Eng. Expt. Sta., Bull.* No. **33**, 20 pp. (1930).—The purpose of the investigation was to study the nature of crystal formation of metals deposited electrolytically. The work was limited to the initial stages of deposition in order to note the effect of the compn. and the phys. condition of the basis metal upon the nature of the deposit. The compn. of the plating soln., the c. d. and certain other factors were not varied, but the temp. and time were varied. A study was made of the crystal growth of Cr deposited on carefully polished surfaces of steels with C contents of 0.20, 0.85, 1.20 and 1.50% and on Armco iron. The time of plating varied from 15 sec. to 8 hrs., and temps. of 45° and 55° were used. The Cr plating soln. contained 250 g. CrO_3 and 2 g. Ba_2SO_4 per l. The initial Cr deposits were not microscopically uniform; invariably the Cr deposited first upon the cementite and spread rapidly to the ferrite within the pearlite areas. This effect was noted in the samples of low C content as well as in those in which cementite was concentrated within the crystal boundaries. It was found that Cu and Ni, however, deposited evenly, not selectively, over the surface of the steels, and Cr deposited over the Cu and Ni was uniformly distributed over the metal surface. The color of the deposits changed during the first stages of deposition; up to 15 sec. the deposits were dull, after which they became brighter. At the higher temp. (55°) the changes noted above were accelerated and the basis metal was more uniformly covered in shorter time. The higher temp. also decreased the tendency for Cr to deposit selectively. Short cracks formed after the first few min. of deposition; no correlation was found between the cracks and the crystal boundaries of the basis metal. Thirty-three photomicrographs are included of the steels used as basis metals and of the deposits obtained. E. B. S.

The electrical conductivity of copper. G. ELSNER AND P. SIEBE. *Z. Metallkunde* **22**, 397–401(1930).—A study of the influence of cold-working and annealing upon the elec. cond. of Cu. Two types of electrolytic Cu (99.90 and 99.80% Cu) and two types of refined Cu (99.80 and 99.64% Cu) were studied. The Cu was in the form of wires, heated at temps. from 100° to 800° and cold-drawn from 30 to 97%. The heat treatment for the production of max. cond. is in the moderate temp. ranges. With decreasing purity this temp. is displaced downward. The decrease in elec. cond. after the attainment of max. value depends probably upon structural conditions. Cold-working in general diminishes the cond. The differences in cond. produced by the preceding heat treatment more or less completely disappear in the highly worked material; this depends upon the degree of purity. In the refined Cu, with low purity, the effect of heat treatment still appears after cold work, a pptn. process probably interfering.

ROBERT F. MEHL

The solubility of silver in copper. F. MÖLLER. *Metallwirtschaft* **9**, 879–85(1930).—

The soly. of Ag in Cu in Cu-rich alloys was detd. by resistance measurements on wires contg. 4, 5 and 6% Ag, at different temps. A break in the temp.-resistance curve occurred at the point where there was a transition from solid soln. to mixed crystals for each alloy. Plotting this transition temp. against the compn. of the alloy gave the boundary of the mixed-crystal field. In the same expts. the solid-liquid line was obtained. The triple point occurs at 7% Ag. The discrepancies between these results and those obtained by Weinbaum (*C. A.* **24**, 1607) by x-ray and hardness measurements on quenched alloys, and the mechanism of the process of quenching are fully discussed. CHANNING W. WILSON

Thermomagnetic property of manganese. YOSOMATSU SHIMIZU *Sci. Repts Tohôku Imp. Univ.* 1st Ser. **19**, 411–7(1930).—The modifications of Mn were studied by detg. its magnetic susceptibility at different high temps. The purity of the metal used was 99.9%. A specially designed elec. furnace, using a carborundum tube as resistance element, was used in conjunction with a du Bois electromagnet. The magnetic susceptibility of Mn of 99.9% purity at room temp. was found to be 7.55×10^{-6}, a value which is smaller than that obtained by previous investigators working with a less pure material. At 810° the magnetic susceptibility undergoes an abrupt increase. The change from α- to β-Mn takes place at that point. At 1100° there occurs another similar increase, indicating the change from β- to γ-Mn. The magnitude of the change in susceptibility at the $\beta \longrightarrow \gamma$-transformation is much greater than that at the $\alpha \longrightarrow \beta$-transformation. LEOPOLD PESSEL

Properties of pure nickel. LOUIS JORDAN AND WM H. SWANGER, *et al* *Bur. Standards J. Research* **5**, 1291–1307(1930). –Rather pure electrolytic Ni was further purified by annealing in H. A study was made of suitable refractory crucibles and of melting conditions to produce extremely pure, compact metal. The ingots finally prepd. had a purity of 99.94%, contg. not more than 0.001% O. Details of the methods are given which lead to the following values: density 8.907 g./cc. at 23° (as cast), 8.901 (worked and annealed), 8.917 (calcd. from lattice dimensions); length of side of unit cube (face-centered) 3.525 A. U.; m. or f. p. 1455° (International Temp. Scale), elec. resistivity 7.236 microhms/cm. at 20° (annealed); temp. coeff. of elec. resistance 0.0067 ohm per degree per ohm at 0° (from 0° to 100°); satn. value of intrinsic induction 6150 gausses; magnetic transformation 370–380° (by magnetometer measurements); thermal transformation 350° (by thermal analysis); thermal e. m. f. with Pt 1.485 mv. at 100°, 6.165 mv. at 500°, 12.130 mv. at 1000° (Ni is thermoelectrically neg. to Pt); av. coeff. of thermal expansion: 13.3×10^{-6} (25–100°), 14.4×10^{-6} (25–300°), 16.5×10^{-6} (300–600°), 17.8×10^{-6} (600–900°); hardness: Baby Brinell 68–78, scleroscope 5.0, Rockwell 42–44; tensile strength 46,400 lb./sq. in. Curves are reproduced showing the ultra-violet reflectivity. LEOPOLD PESSEL

Cadmium bearing metal. A. J. OCCLESHAW. *Commonwealth Eng.* **18**, No. 5, 177–9(1930).—An alloy contg. Cd 96.7, Cu 3.1 and Mg 0.2% has the properties requisite for a high-class bearing metal. Under the microscope 2 constituents are visible, one being a network of a relatively hard high-Cu material, and the other a matrix of relatively soft low Cu eutectic. Brinell hardness is 48, while tin-base alloys have hardness of 26.5. The freezing range is 380–320°, which is about 100° higher than that of tin-base metals. The Cd alloy casts well but not quite as sharply as tin-base alloys. The Cd alloy contracts more on solidification. Tests made on properties as bearing metal indicated that it was equal to phosphor bronze, both showing small distortion at 2500 lb. per sq. in. It is better than tin and lead white bearing metals which rarely run on test machine at 1500 lb. per sq. in. without distortion or flow. The Cd bearing metal is suitable for use at high loads and speeds. A. W. HOLMES

Strengthening in reversed loading and gliding resistance. P. LUDWIK. *Z. Metallkunde* **22**, 374–8(1930).—The relations between the yield pt., ultimate tensile strength, breaking strength, hardness and the fatigue limit were studied. Hardness detns. during the fatigue test upon electrolytic Cu showed increases up to 6.5% at stresses at the fatigue limit. At stresses smaller or greater than the fatigue limit smaller hardness increases were observed. Expts. were made to det. the effect of notches upon the fatigue limit, and the sensitivities of different industrial alloys were studied from this standpoint. The corrosion fatigue limits of several non-ferrous alloys were detd. Comparable expts. with bending fatigue and torsional fatigue with polished specimens gave a ratio of torsional fatigue limit to bending fatigue limit of 0.577 ± 6%, which is the same ratio as the yield points on torsion and tension static loading. Cast iron gave a different ratio because of the internal notch effect induced by the graphite flakes. With similar types of notches sensitivity on torsion was found to be only 0.575

that on bending. The amt. of exptl. data is too great to be included in an abstract. R. F. M.

Strengthening by reversals of stress. W. SCHWINNING AND E. STROBEL. *Z. Metallkunde* **22**, 378–81(1930).—Steel with 0.05% C and brass with 72% Cu were studied by subjecting wires of these materials to reversals of stress (bending) and then detg. the ultimate tensile strength, the yield point and the elastic limit. Data collected are given graphically. More data and conclusions will be given in a concluding article. ROBERT F. MEHL

Bearing properties affected by variations in composition. CLAIR UPTHEGROVE. *Foundry* **59**, 72–4(1931). LEOPOLD PESSEL

Hydrogen development in pickling. HEINZ BABLIK. *Korrosion und Metallschutz* **6**, 223–8(1930).—The H_2 development of 4 kinds of Fe sheet varying in chem. compn. was detd. in HCl and H_2SO_4 of varying concns. and the results were plotted in curve form. Although the chem. compn. of the specimens showed only relatively small differences, considerable differences of the speeds of soln. existed. The latter also depend upon a time factor which is different with each material. The speed of soln. is higher at the beginning of the attack, but soon drops to a fairly const. value. Under the conditions under which H_2SO_4 is used, it develops considerably more H_2 than does HCl. The relative soly. of the 4 kinds of Fe remained the same in both acids. The influence of inhibitors upon the H_2 development and the influence of HCl and H_2SO_4 upon the quantity of absorbed H_2 are discussed. The necessity of pickling a sensitive material with nothing but HCl is emphasized. LEOPOLD PESSEL

Sheet and tinplate rolls. An investigation into the roll loads, stresses and the cause of roll breakage. J. SELWYN CASWELL. *Proc. S. Wales Inst. Eng.* **46**, 813–34 (1930). cf. *C. A.* **24**, 5694.—Discussion. ALDEN H. EMERY

Metal spraying. S. H. GRIFFITHS. *Proc. Staffordshire Iron and Steel Inst.* **45**, 60–5(1929–30).—The most common type of metal-spraying pistol is illustrated and its operation and design are discussed. The careful control of the sandblasting operation previous to the application of the metal spray is of the utmost importance in attaining an adhesive coating. The advantage of metal spraying is pointed out for *in situ* application. DOWNS SCHAAF

The influence of superheating molten cast iron. J. E. HURST. *Foundry Trade J.* **43**, 55(1930).—Cast Fe was superheated to as high a temp. as possible in a coke-fired crucible furnace, approx. 1550–1600°, and then cast on a centrifugal-casting machine. The tensile strength, modulus of elasticity, and Brinell hardness were slightly higher than those of Fe cast at 1200–1250°. Loss of Si in the superheated material caused easy machineability and complete loss of chill, from which the conclusion is drawn that superheating produces a grayer iron. Cf. *C. A.* **24**, 808. CURTIS L. WILSON

Simple methods of improvement and control of gray-iron manufacture. L. F. C. GIRARDET. *Trans. & Bull. Am. Foundrymen's Assoc.* **1**, 624–43(1930).—Practical control methods for securing the desired properties in gray iron castings are discussed and described under 3 classifications: (1) mech. properties, (2) metallographic structure, (3) chem. analysis. The Fremont shear test is advocated as a means of showing the properties of the casting itself. C. L. READ

Aluminum improves malleable-cast-iron properties. JOHN H. HRUSKA. *Foundry* **59**, No. 1, 70–1(1931).—Expts. were carried out on a large scale under mfg. conditions to det. the influence of Al upon malleable cast Fe. The material, to which Al was added in form of Al shot of 92.86 Al, was made in a 25-ton air furnace and one 800-lb. ladle of molten metal was used to pour 11 sets of test bars. After malleablizing the bars were machined to size and tested for tensile and bending properties. Up to approx. 0.1% Al the fractures appear normal. At 0.1–1.0% Al the fractures become gray and then dull with irregular crystn. Excess of Al (above 0.1%) changes the round globules of graphite into irregular, flaky shapes. A rapid change in phys. properties takes place. Elongation and reduction of area become extremely low when Al exceeds 1.0%. Heat treatment cannot restore any of these properties in bars contg. more than 0.5% Al. A small addn. of Al, 0.01–0.05%, has a marked beneficial effect upon elongation, reduction of area and tensile strength. LEOPOLD PESSEL

Nickel-vanadium and nickel-molybdenum cast irons. I. Nickel-vanadium cast irons. JEAN CHALLANSONNET. *Rev. métall.* **27**, 573–603; *Bull. assoc. tech. fonderie* **4**, 291–315(1930).—A study was made of the effect of Ni and V and Ni-V mixts. (1) on a synthetic cast iron contg. 3.70% C and 0.08% Si and (2) on 3 types of common cast irons. The synthetic cast iron was melted at 1700° in a high-frequency furnace and alloyed at 1600° with 1 and 2% Ni, 0.25 and 0.50% V and with Ni-V mixts. in the percentage concns. 1 + 0.25, 1 + 0.5, 2 + 0.25, 2 + 0.5. All these alloys were sand-

cast at 1500° in 2 cylindrical molds of 25 and 8 mm. diam. Dilatometric and micrographic investigation showed: Ni did not displace the Curie point (200°), while 0.25 and 0.5% V lowered it to 160° and 130°. The Ac_1-point (700°) and the Ar_1-point (630°) were both lowered by Ni but not by V, while in the Ni-V alloys the V overcame the lowering effect of Ni. With Ni alone, graphitization on heating begins at temps of 1000° and lower, while V alone prevents graphitization (at least up to 1100°). In Ni-V cast irons V raises the temp. of beginning graphitization, 0.25% V neutralizing the lowering effect of 1% Ni. The amt. of graphite pptd. was about 0.4% when 2% Ni was added. The special alloys made with com. cast irons contained the same percentages of Ni, V and Ni-V, but the percentages of C and Si were 3.55 + 1.46 for type A, 3.7 + 2.7 for type B, and 2.5 and 2.5 for type C. The amts. of Mn, P and S were in all cases approx. the same: 0.5% Mn, 0.08% P and 0.035% S. The samples were melted in a gas furnace of 45 kg. capacity and sand-cast in a mold of special construction, providing specimens for mech., dilatometric and phys. tests. The dilatometric curves obtained with thin rods (in which cooling had taken place rapidly) showed that for alloy-type A addn. of 1 and 2% Ni led to a lowering of the cementite content, at the same time producing a martensitic structure. The heating curve indicated that the temp. of beginning graphitization falls below the Ac_1-point. Addn. of 0.25 and 0.5% V represses the formation of graphite and does not favor the martensitic quench. The Curie point is lowered 20° and 70° while the temp. of beginning graphitization on heating is raised from 900° to 925° and 975°. In the specimens contg. both Ni and V, the latter opposes the graphitizing effect, of Ni while Ni does not influence the effect of V on cementite. In cast irons of type B and C, V does not noticeably raise the temp. of graphitization. The effect of different rates of cooling was studied by providing the mold with a special limb of regularly decreasing width, in such a way that the cooling was fastest at the bottom (thickness 3 mm.) and slowest at the top (thickness 35 mm.). The lower portions were hardest and showed mostly the structure of white cast iron, particularly in those alloys contg. V, either alone or with Ni, while in the thicker sections there was found mottled and (or) gray cast iron. The curves obtained by plotting the Brinell hardness as a function of the thickness showed that Ni alone tends to equalize the hardness in the different layers, its effect being least in alloys of type B. The effect of V on the hardness is, for identical C content, greater the lower the percentage of Si. The amt. of Si remaining the same, V produces greater hardness the lower the percentage of C. In cast irons contg. both Ni and V, Ni opposes the quench-hardness of V, the more so the higher the C and Si content of the alloy. With regard to the tensile strength and the resistance to shearing the improvements in the cast irons can be traced (1) to the refining action of Ni on the pptd graphite and (2) to the increase in combined C content caused by the V. In alloys of type B the influence of V is less marked than in alloys of type A, because of the greater Si content and the correspondingly smaller quantity of combined C in the alloy. H. S. v. K.

Oil-hardening and air-hardening cast iron. J. E. Hurst. *Foundry Trade J.* **43**, 385–6, 395–6; *Iron and Steel Ind. and British Foundryman* **4**, 91–5(1930). The strength properties of cast Fe contg. 1.32–3.37% Ni and 0.44–0.61% Cr were investigated as cast centrifugally, after hardening by quenching in oil and air blast, and after tempering. The Brinell hardness increased from 236 to 259 for the specimens as cast up to 460–474 after quenching in oil, from 850° to 875° and to 407 after quenching in air from 875°. The hardness diminished progressively upon tempering in a salt bath down to 342 for a tempering temp. of 495°. The tensile strength decreased from 21.3–24.6 tons per sq. in. as cast to 13.85–15.4 for the quenched material, recovering to a max. of 22.5–25.4 after tempering at 375°. Microscopic examn. showed the structure as cast to be pearlitic, after hardening somewhat martensitic, and after tempering sorbitic. Curtis L. Wilson

The problem of age-hardening on the basis of experience with iron alloys. W. Köster. *Z. Metallkunde* **22**, 289–96(1930).—The changes in properties in Fe alloys resulting from quenching from the eutectoid temp. and subsequent storage at room temp. or at slightly elevated temps. (*Vergütung*) are discussed on the basis of the systems Fe–C, Fe–N, Fe–Cu. These changes are similar to those exhibited by the well-known age-hardening Al alloys of the duralumin class. The changes in properties of iron and steel following cold deformation and storage at room temp. and at slightly elevated temps. (*Altern*) are likewise discussed. It is concluded that these changes may also be explained upon the basis of a pptn. process. Robert F. Mehl

The theoretical foundations of age-hardening of the duralumin type in ternary systems upon the basis of phase relationships. E. Scheil. *Z. Metallkunde* **22**, 297–302(1930).—It is proposed that the cryst. phase exhibiting a metastable satn. surface

defines the course of pptn. of 2 types of cryst. phases from a supersatd. solid soln. The course which the compn. of the solid soln. describes during pptn. is given with simple assumptions for 3 basic cases. The conditions are given for the dissolving of one type of crystal. A special case is described of significance for the hardening of alloy steels.
ROBERT F. MEHL

Change of density in iron and steel caused by cold-working and by tempering. KANZI TAMARU. *Sci. Repts. Tohoku Imp. Univ.* 1st Ser., 19, 437–48(1930).—Armco Fe of a com. grade was forged, annealed, cold-rolled and tempered at different temps. Its d. was decreased by cold-working 0.12%. When tempered at different temps. the d. shows a max. at 150° and a min. at 400°. At higher temp. the d. increases until it resumes the value which it had before rolling. The hardness shows corresponding changes at 150° and 400°. Steel also shows a similar change, but smaller in magnitude. In electrolytic and Armco Fe, which were remelted in a vacuum, the change in d. due to cold-working and that due to tempering were very small. In the case of the same metals, which were remelted in air, the d. is normally decreased by cold-working. This seems to be due to the soundness of the ingots which results from the deoxidizing agents. In the case of Armco Fe which underwent a high degree of cold-working and was more compact, the slight initial increase of d. is due to the ordinary effect of tempering and the following decrease of it up to 400° is to be attributed to the increase of available internal stress at the cost of an unstable one. The increase of d. at a higher temp. is caused by recrystn. and the release of internal stresses. The max. and min. of d. of 0.1% C steel are explained in the same way as those of Armco Fe. Their magnitude diminishes with an increase of C, being hardly noticeable in 0.2 and 0.4% C steels. This is due to the difficulty of removing internal strains in steels contg. hard cementite in larger amts.
LEOPOLD PESSEL

The structures of the high-chromium stainless steels and irons. EDGAR C. BAIN. *Blast Furnace Steel Plant* 18, No. 11, 1690–7; *Heat Treating and Forging* 16, 1419–26 (1930). A brief compilation is made of the structural nature of these irons and steels.
J. B.

Heat resistance of aluminum steels and aluminum coats over iron. A. HAUTTMANN. *Stahl u Eisen* 51, 65–7(1931).—The heat resistance of Al steel alloys was measured by the amt. of O taken up in g. per sq. m. in 48 hrs. when heated in air in an elec. furnace at 1000°. The alloys were prepd. from Armco-Fe and ferro-aluminum. The heat resistance of the alloys as a function of the Al content shows a sudden increase between 4 and 9% Al. With 0% Al the increase in wt. is 45.7 g./sq. m.; with 1.84% Al, 36.2 g./sq. m.; with 3.72% Al, 31.5 g./sq. m.; with 9.44% Al, 0.57 g./sq. m.; with 22.91% Al, 0.29 g./sq. m.; and with 38.32% Al, 0.14 g./sq. m. After exposure the first 3 samples were covered with a heavy grayish black layer of Fe-scale. The last 4 samples were covered with a thin layer of red to white Al_2O_3. It is assumed that the protective effect of the Al is a reduction of the Fe_3O_4 formed by at. Al to Fe, with the formation of Al_2O_3. It was also found that up to 4% Al the sp. gr. of the alloy corresponded to the calcd. values. Above 4% the sp. gr. detd. is higher than the calcd. values. This indicates that alloying causes an increase in density. The more densely packed atoms may account for the increased heat resistance. Two methods for Al coating were investigated: the coating by heating Fe rods in powd. 52 or 59% ferro-aluminum and the coating by dipping the rods in molten pure Al. The samples prepd. by the 2 methods were compared for heat resistance at 1000°. In this case not the increase in wt. but the time required to develop Fe_3O_4 blooming on the surface was taken as the measure of heat resistance. The protective layers were destroyed more quickly than expected because of the formation of cracks in the coating surface. Of the 2 types of coatings the one obtained by heating the Fe rods in powd. ferro-aluminum (59%) for 300 hrs. at 1000° was the best. Curves are given showing the increase in the Fe thickness and the depth of the diffusion layer as function of the heating period temp.
J. A. SZILARD

Aging of iron and steel. R. F. MEHL. *Iron and Steel Can.* 13, 265–9(1930).—A brief review, especially of aging theories.
ROBERT F. MEHL

The age-hardening of steel. G. SACHS AND W. STENZEL. *Metallwirtschaft* 9, 959–65(1930).—The fact that steel becomes harder after cold work and subsequent aging at room temp. or tempering at low temp. has been known since the beginning of testing materials. That it also becomes harder upon quenching from below A_1 and subsequent aging has been recognized only recently. This phenomenon is considered analogous to the age-hardening of duralumin. Expts. were made to det. the effect of degree of cold work, time and temp. of tempering, and whether "work-aging" might not be considered simply "quench-aging" accelerated by cold work. Speci-

mens of a soft 0.04%-C iron wire were annealed at 940° and cooled slowly. For work-aging, they were deformed by twisting, and the tensile strength was measured after aging at various temps. for various lengths of time. While the original annealed material showed no improvement with time, the cold-worked material increased in strength, aging most rapidly at 100°. For quench-aging, pieces were heated to 700° and quenched in water. In both types of aging the max. effect was reached at room temp. only after days or even months, while at 100° it was reached in a few min. Work-aging occurred up to 400°. With quench-aging, no effect was noticed above 120°. Both aging effects seemed due to pptn. from supersatd. solid solns., pptn. taking place, however, at different velocities. CURTIS L. WILSON

X-ray study of grain size in steels of different hardness. W. A. WOOD. *Phil Mag.* **10**, 1073–81(1930).—A Moll microphotometer is used to det. the half-breadths of the Fe lines. The relation of particle size to the breadth of x-ray interference lines is applied. A relation is found to exist between the measured half-breadths and the hardness nos. of the various steels investigated. A definite linear relationship is found between the hardness and the inverse square of the particle size. This relationship is discussed and the relation may be explained on the assumption that the hardness varies inversely as the superficial area of the grains. The data are given. W. E. V.

Transformation and constitution of high-chromium steels. TAKEJIRO MURAKAMI, KOJIN OKA AND SEIJI NISHIGORI. *Tech. Repts. Tôhoku Imp. Univ.* **9**, 405–45(1930). The transformation and constitution of high-Cr steels contg. 10–30% Cr and less than 1.1% C were investigated by magnetic, dilatometric and microscopic methods. By means of magnetic analysis isothermal curves for the A_2 point were obtained, its relation to the compn. of the steel was shown, and the compn. ranges, in which the lowering of the transformation takes place, were detd. The A_2 point descends with increasing Cr content when the C content is const., while it rises with increasing C content when the Cr content is const. In the same alloy the Ar″ change increases in magnitude as the max. heating temp. rises or the cooling rate increases, though in high Cr steels, in which no γ phase is formed, no transformation is observable. The Ar″ transformation decreases in magnitude with increasing Cr, when the C content is const., while the transformation is more readily lowered in medium-C steels than in high or low-C steels when the Cr content is const. By measurement of the thermal dilation with slow rates of heating and cooling the A_2 and A_1 points were detd. When the C content is const., the magnitude of the A_1 and A_2 transformations gradually decreases, until it vanishes, as the Cr content increases. When the Cr content is const., the A_2 transformation increases in magnitude and its beginning temp. on heating descends, as the C content increases. The temp. of the transformation rises gradually at first and then rapidly as the Cr content increases. When the Cr content is const. the A_2 transformation increases in magnitude and its beginning temp. on heating descends as the C content increases. These relations were also shown with the isothermal lines for the A_1 point. By means of microscopic observation the section diagrams for const. C content and those for const. Cr content were constructed. By means of isothermal diagrams the change of structure accompanying the changes of temp. and compn. is described in detail. A general diagram was constructed and conclusions are drawn as to the process of crystn. of several alloys belonging to the resp. fields. The influence of different heat treatments upon the change of microstructure of the typical alloys is illustrated by means of photomicrographs. LEOPOLD PESSEL

Chromium cast steels resist heat and corrosion. H. D. PHILLIPS. *Foundry* **59**, 65–9(1931).—A review of the chem., phys. and metallurgical characteristics of these materials, with special consideration of their casting and heat treatment. L. P.

Nickel steels. The effect of nickel on the heat treatment and physical properties of steel. V. N. KRIVOBOK. *Iron & Steel Can.* **13**, 219–20(1930).—Ni steels with 2.5–3.5% Ni have the same metallographic constituents as the C steels, yet the mech. properties are much improved. Most Ni steels contain 0.5–5.25% Ni and 0.20–0.50% C. One % of Ni lowers the Ac_3 transformation about 45°F. (25°C.), and the Ac_1 only 18°F. (10°C.) Ni retards the grain growth. G. T. MOLOK

Thermo-diffusion of elements in steel. JOHN H. HRUSKA. *Heat Treating and Forging* **16**, 1397–9(1930).—A brief summary. J. BALOZIAN

Corner ghost in steel ingots. SOJI MAITA. *Blast Furnace Steel Plant* **18**, 1701–5 (1930).—Corner ghost may occur in all kinds of steel because they are caused by stresses. Chem. compn. of the steel also affects the formation of corner ghost. A slow and controlled cooling may reduce or eliminate the corner ghost in steels. G. T. MOLOK

Effect of heat treatments on efficiency of high-speed steels. ERDMANN KOTHNY. *Iron Age* **126**, 1848–52(1930).—Results of tests are given which show that the cutting

efficiency of high-speed tools working hard and medium-hard steels, can be considerably increased by tempering at 590°. R. S. DEAN

The selection and heat treatment of gear steel. E. F. DAVIS. *Fuels and Furnaces* 8, 1341–8, 1385(1930).—The chem. compn. and hardness of various gear steels used in the automotive industry, with their quenching temps., are given. The 3½% Ni steel is cited as being the most extensively used, and the 5% Ni steel as the best of all gear steels from the standpoint of impact strength and fatigue properties. C. L. W.

The mechanism of quenching high-carbon steel tools. PERCY J. HALER. *Fuels and Furnaces* 8, 1653–9(1930).—The methods of quenching steel tools of various shapes are discussed with reference to plunging velocity and distortion. The effects of low and high plunging velocities upon the stream lines in the cooling media are illustrated. CURTIS L. WILSON

Hot-hardness characteristics of some modern tool steels and alloys. E. G. HERBERT. *Proc. Inst. Mech. Eng.* (London) 1930, No. 3, 681–92.—Hot-hardness of tool steel may be greatly modified by a superhardening process, produced artificially or as a result of abrasion by the chip in normal cutting. In superhardened steel max. hardness occurs just under the skin. Alloy steels are capable of greater induced hardness than plain C steels of the same original hardness, an important quality in cutting hard material where the tool becomes superhardened. Even a water-cooled tool may be heated above its softening temp. while cutting. Co tool steels such as "S. O. B. V." show abnormally high induced hardness and a tool life 84% higher than others. Hot-hardness curves, obtained by the Herbert Pendulum Hardness Tester, are given for "Widia," both heating and cooling, up to 800°. Hot-hardness which fell off at 600° is regained on cooling. Hot-hardness curves are given comparing nitrated steel, high-speed steel and high-C steels up to 600°. The hardness due to the superhardening by the Cloudburst Process persists up to 600°. Comparison curves of hardened and superhardened modern tool steels are given. ANN NICKOLSON HIRD

Influence of the atmosphere on the scaling of mild steel. W. H. BLACKBURN AND J. W. COBB. *J. Soc. Chem. Ind.* 49, 455–62T, 463–6T(1930); cf. *C. A.* 21, 1437.—Small specimens of mild steel were heated for 3 hrs. at 1000° in various atms. and the increase of weight was detd. The loss of metallic iron, when no excess of O was present, was found to be 0.43% with oil as fuel and 0.24% with coke. With 3% O in the atm. the losses were 1.27% and 1.09%. The exclusion of O is of the greatest importance, if scaling is to be minimized. The addn. of 0.5% O results in rapid scale formation. The mixing of the fuel gas with O and the elimination of free O should be completed before the metal is reached. In the absence of free O scaling was definitely lessened by fuels which were rich in C and low in H. The use of high-temp. coke with a low moisture content is recommended. The influence of the addn. of various reducing gases to the furnace atm., upon complete prevention of scaling and upon 50% reduction of scale formation, was detd. The amt. of reducing agent necessary to secure complete absence of scaling or even a reduction to 50% was much larger than could be used in ordinary practice, representing a quantity of potential heat of the same order as that of the primary fuel. H was the most effective agent for the complete prevention of scaling, involving the least thermal expenditure, while CO involved the greatest. Even with H as anti-scaling agent, however, the thermal expenditure amounted to 1.3 or 0.8 times the thermal value of the fuel, depending on whether oil or coke was used. The thermally stable methane was much less effective than either ethylene or acetylene, which are both readily decompd. by heat. The free C (soot), however, present in a smoky atm., was found to have a negligible effect in preventing scale A clear atm., with the same reducing gases, CO and H, was found to be equally effective. In adding CO and H to the furnace atm., the former was found to be more efficient up to the point where scale formation was reduced 43%. Beyond this, H was more efficient. There seems to be no ground for assuming that a smoky reducing flame from bituminous coal would be any more effective in minimizing scaling than a clear reducing flame from coke. The "neutral" atm. from coke would be definitely less scaling than that from coal on account of the lower content of water vapor. Also in *Blast Furnace Steel Plant* 19, 273–6(1931). LEOPOLD PESSEL

steels. S. J. HEWITT. *Ind. Chemist* 7, No. 80(1931); cf. *C. A.* 24, 1325. E. H.

Nitride hardening of alloy steel for Diesel-engine use. C. R. ALDEN. *Oil and Gas Power* (*A.S.M.E. Trans.*) 52, 57–63(1930).—The process of nitriding, or surface-hardening special steels at a low temp. by the action of anhyd. NH_3, is described and illustrated, together with the sequence of operations preceding nitriding. The properties of nitrided Nitralloy steels which make them valuable on various parts of engines

are discussed in detail, such as extreme surface hardness; resistance to wear, scoring, abrasion and corrosion; min. distortion in hardening; hardness maintained at high temp.; and machineability and forgeability. C. L. W.

Alloys of the transition elements. A. WESTGREN. *Metallwirtschaft* 9, 919–24 (1930).—In a comprehensive review of the work of various investigators upon the at. structure of the transition elements and the space lattice of their intermetallic compds., W. concludes that the existing data are not yet sufficient to create a complete and harmonious picture of the conditions under which these elements react in their alloys. CURTIS L. WILSON

Aluminum and aluminum alloys as materials of construction in the chemical industry. DORNAUF. *Metallbörse* 20, 1913(1930).—Experience in using pure Al, Al-Si and Al-Mg alloys is described. Duralumin and Al-Cu are not useful, but must be plated with pure Al. Pure Al (99.5–99.8%) is used to handle concd. HNO_3, org. compds. and in the dairy, brewing and food industries. Its disadvantages are poor casting properties and low tenacity. Al-Si and Al-Mg alloys have twice the strength of pure Al, cast well, and have as high chem. corrosion resistance. The Si alloy is used for valve bodies, stirrers, mixers, filter frames, retorts, evaporators, acid equipment and contact app., and the Mg alloy for pump cylinders, elevator buckets and stills. Often lab. corrosion tests give results different from actual practice, because of voltage produced under liquids by contact with other metals or because of welding. E. M. S.

Casting studies on light aluminum alloys. Influence of the chemical composition. ANDRÉ COURTY. *Compt. rend.* 191, 1128–30(1930); cf. *C. A.* 24, 3475.—Al-Si, Al-Cu and Al-Zn alloys of varying compn. were examd. by a method described previously. The following conclusions were reached: In detg. the casting qualities it is necessary to consider the d. of the metal as well as its compn. In the light Al alloys investigated, the "castability" diminishes, within the proximity of the range of pure metal, with an increase of metals in solid soln. In the Al-Si alloys, in spite of the rapid elevation of the fusion point and the distinct decrease in d., the "castability" was found to be superior in the high-Si alloys (up to 21.72% Si) as compared with the eutectic (13% Si). In the Al-Cu alloys the alloy of 6% Cu has the "castability" of Al and the alloy of 12% Cu surpasses in "castability" pure Al by 20%. Within the large zone of the solid soln. diagram of the Al-Zn alloys the "castability" is diminished with an increase in Zn, in spite of the rapid increase of the d. It requires 30% Zn to obtain an alloy of the "castability" of pure Al. LEOPOLD PESSEL

Constitution of high-purity aluminum-titanium alloys. WM. L. FINK, KENT R VAN HORN AND P. M. BUDGE. *Am. Inst. Mining Met. Eng., Tech. Pub.* No 393, 18 pp.(1931).—A survey of the existing literature showed that the constitution of the binary Al-Ti system had not been definitely established. The present investigation of this system included thermal, microscopic and x-ray studies of a no. of high-purity alloys. Cooling curves are not reliable for the detn. of the liquidus because the thermal point representing primary crystn. in the region investigated is weak and lowered by undercooling. Accurate results were obtained by detg. the soly. of $TiAl_3$ in Al by chem. analysis of the supernatant melt. The constitutional diagram for Al-rich Al-Ti alloys is given. The Al-Ti constituent occurring as plates in the Al-rich alloys was chemically sepd. and found to have the compn. represented by the formula $TiAl_3$. X-ray diffraction data were obtained by the powder, Laue and rotating-crystal methods. Diffraction patterns showed that $TiAl_3$ crystals are tetragonal with lattice dimensions of $a_o = 5.424$, $c_o = 8.574$, $(c_o/a_o) = 1.58$. The application of the theory of space groups to the x-ray data resulted in a unique soln. of the at. arrangement of $TiAl_3$, $4d$-8 (a, b, c, d). This soln. was verified by comparing the calcd. and observed intensities of the powder reflections. C. L. MANTELL

Fabrication of chromium-nickel-iron alloys. J. S. EWING. *Proc. Am. Assoc. Textile Chem. Colorists* 1931, 13–5; *Am. Dyestuff Reptr.* 20, 15–7(1930).—An alloy contg. 8% Ni and 18% Cr is austenitic in character and nonmagnetic; tensile strength 90,000 lbs./sq. in.; yield point 45,000 lbs./sq. in.; hot-working range 2150–1750°F. It can be arc-, gas-, resistance- or spot-welded. MILTON HARRIS

The influence of third metals upon the constitution of the brasses. III. The influence of tin. O. BAUER AND M. HANSEN. *Z. Metallkunde* 22, 387–91(1930); cf. *C. A.* 24, 2094.—A continuation of the comprehensive work of B. and H. on ternary brasses. Earlier work upon the Sn–Zn–Cu system is critically reviewed here. ROBERT F. MEHL

Deposition of black copper oxide on brass. HENRY L. KELLNER AND HARRY A. CURTIS. *Ind. Eng. Chem.* 22, 1321–4(1930).—An investigation of the "black-bronzing" of brass, carried out by dipping the cleaned brass in a bath composed of basic Cu car-

bonate and aqua ammonia, revealed that the Cu carbonate does not dissolve as such but decomposes, the carbonate and some of the hydrate going into soln., leaving a residue of partially dehydrated hydroxide. The bath corrodes the surface of the brass, and the black deposit, which consists of partially hydrated CuO, is laid down over the roughened surface. This deposit is translucent when viewed under the microscope.
C. L. READ

Die pressing of brass and copper alloys. JOHN R. FREEMAN, JR. *Am. Inst. Mining Met. Eng., Tech. Pub.* No. 391, 8 pp.(1931).—The die pressing or hot forging of brass and Cu alloys is discussed, including the advantages of die pressings as compared to castings. A description is given of shearing the slugs from extruded rods or shapes; and the different types and relative advantages of crank, drop and screw presses are discussed. The importance of die design is emphasized. Types of dies are illustrated by drawings.
C. L. MANTELL

Effect of combinations of strain and heat treatment on properties of some age-hardening copper alloys. W. C. ELLIS AND EARLE E. SCHUMACHER. *Am. Inst. Mining Met. Eng., Tech. Pub.* No. 395, 13 pp.(1931).—For the purpose of developing combinations of higher strength and cond. than are obtainable by heat treatment alone in the age-hardening Cu alloys, an investigation has been made of the effects of combinations of heat treatment and strain hardening on the properties in question. Hard drawing after heat treatment increased the tensile strength of a Cu-Ni-Si alloy contg. 4% of Ni plus Si from 113,000 to 148,000 lb./sq. in. The properties of the alloy were further improved after hard drawing by low-temp. aging. Aging for 4 hrs. at 300° increased the cond. 19% without appreciably decreasing the tensile strength. Strain was found to accelerate pptn. in this system, which is in line with observations on other dispersion hardening systems. Cu alloys contg. Co and Si did not show as pronounced aging effects after hard drawing as did the Cu-Ni-Si alloys. As a result of the study a material suitable for use as an elec. conductor combining high strength with reasonably high cond. has been developed. Representative values for strength of this material are 145,000 lb./sq. in. combined with an elec. cond. of 38% that of annealed Cu.
C. L. M.

Age-hardening mechanism in copper-aluminum alloys. SADAJIRO KOKUBO AND KÔTARÔ HONDA. *Sci. Repts. Tôhoku Imp. Univ.* 1st. Ser. 19, 365–409(1930); cf. *C. A.* 24, 5208.—Specimens contg. from 0 to 12% Cu were heated for 30 min. at 545° and then quenched in water at 15°. After aging for 10–20 days at room temp., each specimen was heated for 6 hrs. at different temp. up to 500°, then cooled slowly in the furnace. The d., elec. resistance and hardness were than detd. and the relation between the changes in these qualities and the Cu content were studied. The dilation and thermal curves for quenched specimens were also taken during slow heating. The d., elec. resistance and hardness of Al-Cu alloys contg. from 0 to 12% Cu are greater in the quenched than in the forged state. The amt. of this difference increases with the content of Cu. During aging at temps. below 150° the d. and the hardness of the alloys increase with time, rapidly at first and then slowly, tending to a max., but the elec. resistance, while increasing at first, decreases afterwards. The change in elec. resistance, due to a given period of aging at 30°, increases linearly with the content of Cu up to 6% and decreases afterwards. The alloys were first quenched, aged at room temp. and then heated for 6 hrs. at different temps. After a slow cooling, their d., elec. resistance and hardness were detd. During heating the d. is slightly increased, reaches a max. at 150° and then begins to decrease. In the same range of temp. the resistance continuously decreases. The hardness decreases slightly at first and shows an inconspicuous min. at 60°. Afterwards it increases rapidly, attaining a conspicuous max at 70°. The d. falls rapidly in the range 170–270°, attaining a conspicuous min at 2[illegible] The elec. resistance and the hardness also show similar decreases in the same range of temp. In the range 270–500° the d. increases rapidly, finally nearly reaching its initial value. The elec. resistance decreases at first but shows a slight increase afterwards. The magnitude of these changes increases linearly with the Cu content of the alloys up to 6%, but decreases linearly afterwards. The age-hardening of Al-Cu alloys is being explained on the basis of Konno's theory and the untenability of the pptn. theory demonstrated.
LEOPOLD PESSEL

The nature of the β-transformation in copper-tin alloys. I. HIROSHI IMAI AND ICHIJI OBIN. *Mem. Ryojun Coll. Eng.* 3, No. 2C, 117–35(1930).—A no. of Cu-Sn alloys ranging in compn. from 20.22 to 33.13% Sn were sand-cast in round bars. After being annealed for 50 hrs. at 700° the sample rods were studied both in the fully annealed state and in the chilled condition (1) by means of measurements of elec. resistance at different temps., (2) by plotting differential heating curves and (3) microscopically.

The results obtained suggest a eutectoid breakdown at 525° in the following sequence $\beta \longrightarrow \beta' \longrightarrow \beta'' \longrightarrow \alpha + \delta$. The martensitic needle structure observed in the β-solid soln. is ascribed to an incomplete transformation of β into β'. The thermal effect at 590° is probably due not to a change of phase but to a change in at. energy, comparable to the A_2-effect in Fe-C alloys. H. S. VAN KLOOSTER

Plasticity of copper-zinc alloys at elevated temperatures. ALAN MORRIS. *Am Inst. Mining Met. Eng., Tech. Pub.* No. 390, 9 pp.(1931).—A series of drop-hammer tests at elevated temps. has been made on brasses ranging upward from 62% Cu. The alloys usually considered most difficult to hot-work show the least plasticity. α-Brasses that have been heated so as to develop a large grain appear to have a greater tendency to crack than samples of the same alloy that have not been so overheated. A method of calcg. the av. resistance of the sample to the blow is offered, which may prove to be a means of correlating the work of various investigators, although they have used samples of different sizes and different weights of blow. The calcd. resistances of Pb, Sn, Al and Zn at room temp. are compared with the plastic flow points, as detd by ordinary test. The relation between these 2 quantities varies with the different metals. The calcd. resistance of Pb, Sn and Zn are much higher than the plastic flow points while in Al the difference is not so great. This difference is probably due chiefly to greatly increased speed of deformation under the hammer, but to some extent may be due to strain hardening. C. L. MANTELL

Studies upon the Widmanstätten structure. II. The copper-zinc alloys and the copper-aluminum alloys. ROBERT F. MEHL AND O. T MARZKE. *Am Inst. Mining Met. Eng., Tech. Pub.* No. 392, 32 pp.(1931); cf. *C. A.* **24**, 5195. The pptn of the α- and γ-phases from the β- in the Cu–Zn system and of the α- from the β- in the Cu–Al system have been studied. These alloys were of special interest since it was possible to ppt. phases of different crystal structures (α- and γ-) from the same basic lattice (β) and thus to decide unequivocally whether the structure of the parent lattice is solely determinative in the type of Widmanstätten structure obtained. It is shown that the α-ppt. in Cu–Zn alloys is in the form of true needles nearly parallel to the (111) direction in the β lattice. The true direction of the needles is in the neighborhood of (553), thus exhibiting 12 families. The etching effects of the α-needles show that the α lattice in each needle family bears the same relationship in orientation to the β lattice. The γ-ppt. on cooling or on quenching and reheating takes the form of stars, which on longer heating shrink into well defined polyhedrons. The atom plane in the β-lattice bounding these polyhedrons is the (110) plane, and the atom plane in the γ lattice is very probably also the (110) plane. Reasons are advanced for the formation of needles in the α-pptn. and of dodecahedrons in the γ-pptn. The formation of these 2 distinctly different types of Widmanstatten figure adds further support to the previously enunciated theory (*C. A.* **24**, 5195) that the type of Widmanstatten figure is controlled not entirely by the structure of the present solid soln. but by a cooperation between the lattices of the parent solid soln. and of the ppt. The pptn. of the α phase from the β- in the Cu–Al system is closely analogous to that in the Cu–Zn system. Because of the far-reaching structural analogies in metal systems, it is suggested that Widmanstätten structure analogies exist also. C. L. MANTELL

Equilibrium diagram of the iron-vanadium carbon system. MASAKICHI ŌYA. *Sci. Repts. Tôhoku Imp. Univ.* 1st Ser. **19**, 449–72(1930); cf. *C. A.* **24**, 4496. The equil. diagram of the Fe–V–C system, contg. under 9.9% C, has been detd by means of thermal, x-ray and microscopic analysis. No ternary compd. exists in this system, but 5 liquidus surfaces, for the γ, α, (Fe_3C), ϵ and β phases, exist. The following binary eutectic and peritectic reactions exist in this system: melt $\longrightarrow \gamma + (Fe_3C)$, melt $\longrightarrow \gamma + \epsilon$, melt $\longrightarrow (Fe_3C) + \epsilon$, melt $\longrightarrow \alpha + \epsilon$, melt $\longrightarrow \epsilon + \beta$, melt $\longrightarrow \alpha + \beta$ and $\delta +$ melt $\longrightarrow \gamma$. In this system, the following two ternary eutectic reactions and also a peritectoeutectic reaction take place: (1) melt $\longrightarrow \gamma + (Fe_3C) + \epsilon$, (2) melt $\longrightarrow \alpha + \beta + \epsilon$, (3) $\delta +$ melt $\longrightarrow \gamma + \epsilon$. The compns. and temps. of these non-variant points are as follows: (1) 3.4% V, 4.2% C, 1122°, (2) about 35.0% V, 1.0% C, (no temp. stated), (3) 7.0% V, 2.3% C, 1330°. In the region of the γ-phase there exist 3 soly. surfaces, on which α, ϵ and (Fe_3C), resp., begin to sep. and 3 binary eutectoid curves along which the reactions $\gamma \longrightarrow \alpha + \epsilon$, $\gamma \longrightarrow \alpha + (Fe_3C)$, and $\gamma \longrightarrow (Fe_3C) + \epsilon$ take place. A number of photomicrographs and the proposed equil. diagram are enclosed. L. P.

Crystal forms of galvanizer's dross and zinc-iron alloys. WALLACE G. IMHOFF. *Iron Age* **126**, 1772–5, 1853–4, 1932–4(1930); cf. *C. A.* **24**, 5706.—Galvanizer's dross is a mixt. of Zn with needle-like crystals of Zn-Fe alloy. These crystals are rhombohedrons when formed below 900°F. and pyramids of the first order in the hexagonal system when formed at 950°F. The crystals break down if the temp. is increased.

with the sepn. of Zn. The higher Fe crystals so formed take up Zn, however, if the temp. is lowered and revert to the original dross. The results showed conclusively that sweated dross does not give good metal and such practice should be abandoned since the metal changes back again when put in with good Zn and makes more dross by changing back to the lower form of alloy crystals. Any operations to obtain Zn from dross should be so performed as merely to crowd the Zn-Fe alloy crystals closer together at a temp. not over 850°F. R. S. DEAN

Zinc and zinc-alloy use in the automotive industry. I. ROBERT M. CURTS. *American Metal Market* **38**, No. 21, 13(1931).—A brief review of the part that Zn and its alloys have played in the past and a discussion of recent developments in Zn-base alloys, which have enhanced their field of use in the automotive field. This instalment covers electro-zincing, rolled Zn and rolled-Zn alloys. It is now possible to apply a very satisfactory Ni or Cr plate to rolled-Zn parts. W. H. BOYNTON

The influence of phosphorus in iron-carbon alloy. YOICHI YAMAMOTO. *Bull. Inst Phys. Chem. Research* (Tokyo) **9**, 838 51 (Abstracts 82 (in English) published with *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) **14**, 271–3(1930). —The influence of C on the soly. of P and the mode of occurrence of Fe_3P have been investigated. The effects of P on Brinell hardness and on graphitization have been studied. When C was above 2.0% and P above 0.5%, flakey graphite sepd. No other results are given in the English abstract. J. B. AUSTIN

Examinations of metals and alloys for resistance against attack by salt solutions. I. Influence of variations of experimental conditions. E. MAASS AND W. WIEDERHOLT. *Korrosion und Metallschutz* **6**, 218–23(1930).—An investigation was made of the attack of mother liquors of sylvinite, carnallite and Glauber salt upon sheets of iron, electrolytic Cu, brass, Al and an Al alloy contg. 3% Mn, 2.5% Mg and 0.5% Sb. The extent of corrosion was detd. by the loss of wt. method. The attack is severest with Cu and less severe with Fe. Al stood up relatively well at room temp., but is severely attacked at 95–100°. The Al alloy showed the pit type of corrosion. With ordinary immersion methods the mother liquor of sylvinite shows the greatest corrosiveness, the mother liquor of carnallite shows less and the mother liquor of Glauber salt least. At higher temp. the carnallite liquor is more corrosive than sylvinite liquor, because of the dissocn. of the $MgCl_2$. By moving the sheets or the soln., the formation of protective layers in the Glauber salt soln. is disturbed. The losses of wt., therefore, are greater here than in sylvinite liquors under similar conditions. The corrosion is diminished by the exclusion of air, and increased 2.5 times by the introduction of O, 5.4 times by stirring the soln. and 8.6 times by heating the soln. to 95–100°. **II. Influence of solid salts upon metals and alloys.** *Ibid* 241–50. The attack of solid salts upon 40 different metal sheets was investigated by spreading the salts over the specimens and leaving them undisturbed for the period of one year, under atm. conditions as far as temp. and moisture was concerned, but protected against rain. The salts investigated were: $MgCl_2$, carnallite, Hartsalz, KCl, NaCl and $MgSO_4$. The metals investigated included Ni, Cu, Ni-Cu alloys, Ni-Fe-Cr alloys, bronze, brasses, Al, Al-alloy and a number of Fe and steel specimens. A detailed description of the corrosion pictures obtained is given. The corrosiveness of the salts decreased in the above mentioned order. None of the materials was found to be absolutely resistant. The Ni-Cr steels stood up fairly well against NaCl and $MgSO_4$, but showed slight pit attack under the other conditions. These steels, as well as the non ferrous metals, show the attack in isolated pits, while the ferrous metals generally show a more evenly distributed, although much more severe, attack. Aside from the Cr-Ni steels pure Ni showed the least attack. With increasing Cu content the pits become broader and more numerous. The Ni-Fe-Cr alloys show relatively little attack. The formation of a brown corrosion product indicated that the Fe in the alloy was being attacked. Among the Cu alloys electrolytic Cu stood up best. Bronze showed a similar behavior. Among the brasses, those contg. a mixture of α and β crystals were more severely attacked than the pure α-brasses and were covered with a white corrosion product. The α-brasses, with Cu varying between 63% and 72%, show no indication of any influence of this variation upon their corrosion resistance. The Al alloy showed more or less severe pit corrosion. Further development of the bronzes by proper choice of additional alloying constituents seems to offer some promise. LEOPOLD PESSEL

Fundamentals of corrosion. G. MASING. *Z. Metallkunde* **22**, 321–6(1930).—A review of theories. ROBERT F. MEHL.

Methods of corrosion testing. ERICH K. O. SCHMIDT. *Z. Metallkunde* **22**, 328–33 (1930). The testing methods for the detn. of corrosion resistance of light metal plates developed during the last 5 years at the Deut. Versuchsanstalt für Luftfahrt are de-

scribed and the different methods of evaluation given. The corrosion tests are reproduceable and agree well with practical experience. ROBERT F. MEHL

The corrosion of metals. G. L'HOIR. *Bull. assoc. étudiants école sup. brasserie univ. Louvain* 30, 101–6(1930).—A brief review of the electrolytic theory of corrosion and of the causes facilitating corrosion. A. PAPINEAU-COUTURE

Corrosion of metals. F. MÜLLER. *Z. angew. Chem.* 43, 225–9(1930).—A review of recent theories and expts B. C. A

Corrosion and metal protection in steam power plants. III. Examination of a cracked condenser tube. R. STUMPER. *Korrosion und Metallschutz* 6, 217–8(1930); cf. *C. A.* 24, 3299.—Examn. of a cracked brass condenser tube led to the conclusion that the cracking was due to severe internal stresses of the cold-drawn tube and not to any special form of corrosion. In order to prevent cracking, the tube should have been annealed after cold drawing, or if greater hardness was desired, it should have been heated to 250–300°. LEOPOLD PESSEL

Influence of sodium chloride solutions of different concentrations upon the course of the corrosion attack in the intermittent immersion test. ERICH K. O. SCHMIDT. *Korrosion und Metallschutz* 6, 250–5(1930).—Specimens of lautal, 0.5 mm. thick, were immersed in an intermittent immersion app. in NaCl solns. of 1, 3, 5, 10 and 20% concns. The extent of corrosion was detd. by examn. of the surface, of the microstructure and of the tensile qualities. The corrosion attack of the NaCl solns. of 3, 5, 10 and 20% concns. shows differences only at the beginning of the corrosion test but later becomes uniform. In the 1% NaCl soln., however, the corrosion attack is considerably less. The explanation for this phenomenon lies in the fact that, after the first corrosion attack has roughened the specimens, the quantity of the adhering liquid will be approx. the same, in spite of the different concn. As these salt solns. are gradually drying in the air, the further corrosion attack is caused by moist NaCl, the abs. quantity of which has little influence. L. P

The corrosive action of quenching solutions upon metals. T. LIEPUS AND H. OSTERBURG. *Metallwirtschaft* 9, 904–6, 926–7, 946–8(1930).—The most common quenching baths consist of aq. solns. of NaCl, $MgCl_2$, $CaCl_2$, or mixts. of these. In order to det. to what extent such solns. attack various metals at low temp., small sheets of carefully cleaned wrought Fe, Cu (contg. Cu_2O), Sn and Zn of high purity, and com. 99.5% Al, were placed in the solns. at —5° and under other conditions approximating those of com. practice. The metals were removed every 10 days for 90 days, weighed and exaind. The 6 solns. used were "Reinhartin," a com. prepn. contg. CaCl, $MgCl_2$ and org. addns.; KCl with 29.9% salt; alk. KCl with 29.9% salt plus 0.3% NaOH; NaCl with 22.4% salt; alk. NaCl with 22.4% salt plus 0.77% soda; and $MgCl_2$ with 20.6% salt. The expts. showed that Sn resists the corrosive action of the solns. best of all, with Al second, Zn third, Cu fourth and Fe fifth. The usefulness of the cooling baths depends largely upon the metal used, the alk. solns. being the most favorable with Fe, but with Zn and Al the most unfavorable. CURTIS L. WILSON

Mode of action of corrosion inhibitors in metal pickling. H. PIRAK AND W. WENZEL. *Metallborse* 20, 2539–40, 2589(1930).—A review of various theories. Some preference is given to that of Chappell, Roetheli and McCarty (*C. A.* 22, 2910). L. E. GILSON

Corrosion and protection against corrosion in rolled aluminum alloys used in aircraft. P. BRENNER. *Z. Metallkunde* 22, 348–55(1930).—The influence of heat-treatment and cold-working upon the corrosion resistance of duralumin and other age-hardening Al alloys is discussed. For aircraft manuf. the new alloy "Duralumin-Legierungen ZB" is important because of its increased strength, higher elastic limit and yield point without diminished corrosion resistance. The improvement in corrosion resistance from artificial oxide coatings and by platings is marked. The improvement may be made even greater by a combination of the 2 methods. ROBERT F. MEHL

Action of oxygen on the corrosion of iron and steel in aqueous solution. HIKOZÔ ENDO AND SHIGENORI KANAZAWA. *Sci. Rept. Tôhoku Imp. Univ.* 1st Ser. 19, 425–35 (1930).—Expts. were carried out to investigate the action of dissolved O upon the corrosion of Fe and steel. By means of potential measurements the theory of O concn. cells was confirmed. The corrosion of Fe and steel in aq. solns. is considered to take place in 2 stages, and dissolved O is thought to have an accelerating effect upon both of them. The primary action of dissolved O lies in the formation of concn. cells and the ensuing acceleration of the soln. of Fe, forming a soln. of ferrous ion. The secondary action of O concerns the removal of the H film and the oxidation of the $Fe(OH)_2$. Various phenomena of corrosion are explained by considering these 2 sep. factors. LEOPOLD PESSEL

Corrosion and heat resistant nickel-copper-chromium cast iron. J. S. VANICK AND P. D. MERICA. *Iron & Steel Can.* 13, 241–2, 260–1, 263(1930).—The development of a cast Fe contg. approx. 14% Ni, 6% Cu, 2–3% Cr, 3% C and as much Si as ordinary cast Fe is described and the qualities of this material are discussed. Amsler wear tests of the brake shoe type indicated a wear resistance approx. 5 times that of ordinary cast Fe. The arbitration bar transverse strength can be varied between 2500 and 4000 lbs., the arbitration bar transverse deflection between 0.2 and 0.3 in., the tensile strength between 20,000 and 35,000 lb./sq. in. Izod impact tests, made with a special light-wt. hammer, gave readings of 80–110 ft.-lb., as against 9–15 ft.-lb. in ordinary cast Fe. Corrosion data are given showing the superiority of this material in comparison with ordinary cast Fe. In some cases it gives even better results than brasses and bronzes and can then be substituted for them, usually at a lower cost. It is especially recommended for contact with relatively strong acids and has a low corrosion rate in caustics, organic acids, tap water and the atmosphere. The heat resistance of this material in an oxidizing atmosphere is considerable in the range of 1200–1500°F. and may be 12–15 times greater than that of plain cast Fe under the same conditions. In the range of 1600–1700°F, however, this diff. is considerably decreased. It also resists well the combined attack of high temp. and chem. corrosion. It shows less growth at elevated temp. than ordinary cast Fe because of its austenitic character; it shows less tendency to graphitization; and its loss of strength at increased temp. is also smaller. The alloy is non-magnetic and has a high elec. resistance (1.75 % of the cond. of Cu). By special heat treatment it can be made magnetic or non-magnetic. The coeff. of thermal expansion is 50% greater than that of ordinary cast Fe and is similar to that of bronze. This feature may render the material important for sleeves in combustion engines. Up to 2% Cr the material has the machinability of cast Fe, which is reduced, however, if the Cr content exceeds 3%. The material can readily be welded by arc or acetylene, giving a soft, machinable weld. It is also suitable as a filler rod for the welding of ordinary cast Fe. LEOPOLD PESSEL

Knowledge of the corrosion process from the corrosion of copper-bearing steel. C. CARIUS. *Z. Metallkunde* 22, 337–41(1930); cf. *C. A.* 24, 1835, 2411.—It is concluded that an enrichment of Cu upon the surface takes place during the rusting of Cu-bearing steel. The manner of formation of the Cu ppt.—coherent ppt. during rusting in distd. water, incoherent during rusting in salt solns.—influences the rusting process fundamentally. By comparison of the oxidation potential of an aq. corrosion agent with the characteristic potential of the metal, a conception of the susceptibility of the metal toward attack by the soln. concerned may be obtained. The smaller the difference with respect to the oxidation potential of the soln., the smaller is the attack in the case where the metal has the tendency to pass into soln. as ions. R. F. M.

The corrosion of lead and its significance in a general knowledge of corrosion. M. WERNER. *Z. Metallkunde* 22, 342–6(1930).—Grain size plays a role in the corrosion of Pb but not more so than in the corrosion of other metals. The addn. of other metal forming local elements helps only if a passive layer is formed. The occurrence of a eutectic between Pb and the added metal can nullify the improvement. If the passive layer does not form, the effect of local elements is just as harmful as in other known cases. The changes in corrosive behavior from cold-work do not appear with Pb because of its recrystn. at room temp. The best lead from a corrosion-resistance standpoint is probably that least contaminated with O. The lack of trustworthy methods of test makes the study of the corrosion of lead difficult. Attempts should be made to develop sound methods. ROBERT F. MEHL

The periodical inspection of the first series of painted steel plates exposed to aerial corrosion at Southampton. J. A. NEWTON FRIEND. *Dept. Sci. Ind. Research, Deterioration of Structures in Sea Water, 11th. Rept. Comm. of the Inst. Civil Eng.* 1930, 6; cf. *C. A.* 24, 3977.—These plates have now been exposed more than 5 yrs. Galvanized plates are still in good condition, as are those covered with 2 or 3 coats of Fe_2O_3, although a few of the latter have begun to rust. Asphaltum paints continue to be as bad as coal-tar varnish. Dehydrated coal-tar has roughened and rusted somewhat, but the plates with coal-tar over red lead are still in good condition. I. H. ODELL

Examination of the tarred steel plates exposed at Weston-super-Mare and at Southampton (third series of painted plates). J. A. NEWTON FRIEND. *Dept. Sci. Ind. Research, Deterioration of Structures in Sea Water, 11th. Rept. Comm. of the Inst. Civil Eng.* 1930, 7–9; cf. *C. A.* 24, 3978.—This final report covers exposures of 28.5 months at Southampton and 17.5 months at Weston-super-Mare. Addn. of CaO to horizontal-retort tar had a beneficial effect, but this was not observed in the case of vertical-retort tar. Paraffin wax (5%) usually improved the protection of the latter.

The results as to temp. of application were similar to those given in the last report, the conclusion is that the plates need only to be warm enough to insure complete dryness, and the tar hot enough for the requisite fluidity. Plates tarred with the mill-scale still adherent were in good condition except where the scale was broken.
I. H. ODELL

Fatigue strength of welded steel joints. W. HOFFMANN. *Z. Ver. deut. Ing.* **74,** 1561–4(1930).—Welded pipe joints have an av. vibratory strength about 50% that of the material. The strength is influenced by the width and thickness of the weld as well as the ease with which the material is welded. The nature of the fluxing material is also of importance to the strength of the weld. Red short welds show little fatigue resistance. In general, burning depth should be as deep as possible and the weld should have a flat surface. Both impact and vibratory fatigue strength are higher for welded joints than for riveted joints. H. STOERTZ

X-ray inspection of welds in pressure vessels. ANGEL ST. JOHN. *Iron Age* 126, 1828–32(1930).—A detailed description of the x-ray equipment in use by the Babcock & Wilcox Co. for the testing of welds. R. S. DEAN

Significance of acetylene welding for the construction of apparatus in large-scale chemical manufacture. H. HOLLER. *Z. Ver. deut. Ing* **72,** 1579–84(1930).—The high development of acetylene welding has now made it possible to use all tech. metals in the construction of large equipment for the chem. industry. The significance of this is discussed. H. STOERTZ

Technical safety questions in acetylene welding. EDUARD SAUERBREI. *Z. Ver. deut. Ing.* **74,** 1591–5(1930).—A discussion of the various *causes of explosions* in acetylene welding, including the formation of detonating gas and the possibility of igniting explosive mixts. Air penetrates into the equipment in a number of ways, among them removal of sludge and renewal of H_2O. Ignition of C_2H_2-air mixts. is brought about by spark formation, incandescent carbide, open flames, striking back of flames, sucking back of O during the welding operation and handling frozen equipment.
H. STOERTZ

Influence of nitrogen upon electric arc welding. JULIUS FUCHS. *Z. Ver. deut. Ing.* **74,** 1569–72(1930).—The effect of N content (0.034–0.150%) upon the mech. properties of welds was studied. No very definite effect was observed, but it was found that bare com. wire could not be used for elec. welding. H. STOERTZ

Significance of burning depth in arc welding and means for its improvement. ERNST SCHWARZ. *Z. Ver. deut. Ing.* **74,** 1565–7(1930).—Welding wires with low C content give a greater burning depth. Diminishing the velocity of feed and increasing the welding current also increase burning depth within certain limits. As the most favorable burning depth the following recommendations are made for various types of welds: butt welds 2 mm.; for V-welds the depth must be at least sufficient that hollow space in the vertex of the angle be avoided; for cast Fe welds the greatest possible depth attainable should be used. H. STOERTZ

The diffusion of zinc into tin and lead into tin in the liquid state. (A contribution to the kinetics of the soldering process.) A. MERZ AND E. BRENNECKE. *Z. Metallkunde* **22,** 234–7(1930).—Conclusion of previous article (*C. A.* **24,** 3977). From the Nernst theory of reaction velocity in heterogeneous systems and the principle of the slowest reaction the diffusion const. is deduced as the essential factor for the velocity of the soldering process. It is shown that for the systems "solid Zn–liquid Sn" and "solid Pb–liquid Sn" the process of merging of the solid and the solvent is defined merely by soln. and diffusion. Contact between solid Cu and liquid Sn leads to the formation of Cu_3Sn which inhibits the interaction of the 2 metals. The diffusion consts. for the metal pairs Zn-Sn and Pb-Sn were detd. in the temp. range 260–360° according to the Graham-Stefan method; an app. for performing this detn. is described. Likewise the temp. coeffs. of the diffusion consts. for Zn-Sn (260–370°) and for Pb-Sn (260–555°) were detd. The diffusion consts. are independent of the concn. in the ranges studied. ROBERT F. MEHL

The industrial development of the electrical purification of gases (LÉVÊQUE) **4.** Some experiences with blast-furnace tar (JAQUES) **21.** The influence of higher temperatures and salt additions on the CaO-CO_2 equilibrium in H_2O and the formation of the rust-resistant coating (TILLMANS, *et al.*) **14.** Some factors of solidification in relation to metallurgical problems (SMITH) **8.** Unfired pressure vessels (SPRAGEN) **1.** Sn-covered Cu for water-supply pipes (MASSINK) **14.** Separating fuels, ores, etc., of differing specific gravities by tangential washing currents (Ger. pat. 511,571) **21.** Adsorbent comprising C, Fe and Fe oxide (U. S. pat. 1,789,507) **18.**

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Apparatus **for grinding and classifying ores.** HENRY G. LYKKEN. Fr. 691,943, Mar. 14, 1930.

Aerating **apparatus for flotation plant for ores, etc.** CESAG CENTRAL-EUROPÄISCHE SCHWIMM AUFBEREITUNGS-A.-G. (Robert C. Gibbs, inventor). Ger. 513,119, Jan. 22, 1929.

Aerating **apparatus for flotation plant for ores, etc.** CESAG CENTRAL-EUROPÄISCHE SCHWIMM AUFBEREITUNGS-A.-G. Ger. 514,337, Feb. 17, 1929. Addn. to 513,119 (preceding abstr.).

Extracting **iron, etc.** ALLGEMEINE ELEKTRICITÄTS-GES. Ger. 513,110, Sept. 22,

1926. **Fe ores are reduced by heating with coke obtained by the low-temp. distn. of fuels, the reduction retort being heated by combustion of the gases obtained from the fuels.** The oven in which the fuels are distd. is heated by the hot gases from the reduction retort. If addnl. heat is required for the reduction, the tar is not sepd. from the fuel distn. products, but these are cracked by leading them over the hot coke. The spongy Fe or steel obtained is melted by an elec. arc arranged at the discharge end of the retort. Other metals may be extd. similarly.

Removing iron from bauxite. WILHELM GAUS (to I. G. Farbenind A.-G.). U. S. 1,789,813, Jan. 20. The bauxite is treated with water gas at a temp. of about 250° and a pressure of about 100 atm. and the Fe carbonyl thus formed is removed.

Roasting iron ores. HUNDT & WEBER G. M. B. H. Ger. 511,385, Oct. 20, 1928. Economy of fuel is effected by excluding air during the roasting. Gases contg. CO are then evolved from the ore, and are burnt to provide heat for the process. The gases may be enriched with solid, gaseous or liquid fuel, or by passing them over glowing C, or by removing CO_2. Also, fuel may be mixed with the ore. The treatment is particularly applicable to spathic iron ore and spherosiderite, but not to carbonaceous iron stone.

Roasting or sintering fine ore materials such as zinc ores. ADOLPHE D. H. J. FASSOTTE. U. S. 1,789,895, Jan. 20. The material is preliminarily subjected to a mixing and thread-forming operation in which threads of uniform small diam. are expressed against a conveyer band which is uniformly moved without shaking, being bent by the movement of the conveyer and broken into substantially uniform short pieces; these are allowed to dry and then subjected to blast roasting in thin layers. App. is described.

Roasting sulfide ore. AKTIESELSKAPET MALMINDUSTRI. Norw. 46,434, Dec. 30, 1929. The ore is roasted at such high pressures that the gas leaves the app. at the same pressure, for instance, 3 atm., under which the subsequent absorption is carried out.

Extracting metal values from sulfidic ores. ALBERT E. SMAIL. U. S. 1,780,032, Jan. 20. In treating materials contg. ferrous and non-ferrous metal sulfides assocd. with precious metal values, for recovery of all the metal values, by roasting to produce max. soly. of the non-ferrous values except precious metals, and max. insoly. of the ferrous values, followed by leaching to remove the sol. values, the leached residue contg. precious metal values is subjected to selective gravity classification to concentrate the precious metal values and segregate for recovery of assocd. metal values. Numerous details of procedure are described.

Removing arsenic from tungsten ore. JOSEPH H. BRENNAN (to Electro Metallurgical Co.). U. S. 1,790,088, Jan. 27. Free S is added to the ore and the latter is heated to above the b. p. of S and sufficiently high to volatilize the major portion of the As present.

Removing copper from molybdenite. M. RAEDER. Norw. 44,764, Dec. 31, 1928. Cupriferous molybdenite concentrate is heated in the absence of air and oxidizing gases to a temp. above the decompn. temp. of chalcopyrite but below the decompn. temp. of molybdenite, after which Cu is extd. by treating with acid solns. of tervalent metals, preferably a soln. of $Fe_2(SO_4)_3$ in dil. H_2SO_4. The ferrous salt formed may be continuously reoxidized by the introduction of hot air during the extn.

Treating cupriferous purple ore. AKTIESELSKAPET NORSK STAAL (ELEKTRISK GAS-REDUKTION). Norw. 42,301, Dec. 31, 1928. Purple ore is treated with a reducing gas to convert Fe_2O_3 to Fe_3O_4. The reaction product is sepd. magnetically. The magnetic material contains, beside Fe_3O_4, the Cu in easily sol. form. This is sepd. by leaching.

Working up aluminiferous materials. VEREINIGTE ALUMINIUM-WERKE A.-G. Ger. 512,564, Dec. 25, 1929. Minerals contg. Al, especially bauxite, are subjected to a preliminary working up by briquetting with pyrites mixed with sufficient powd. Fe to combine with the S, and smelting with C.

Briquets of magnetite. EMIL EDWIN. Norw. 43,721, Dec. 31, 1928. Spongy iron is pressed into briquets of a sp. gr. approx. that which is obtained by complete gas reduction of compact magnetite. The briquets are then treated with H_2O or CO_2 at high temp.

Extracting metals by cementation. EMANUEL FEUER. Austrian 119,939, June 15, 1930. The initial material is treated in the solid phase, preferably in suspension in a liquid. Thus, $PbSO_4$ may be treated with Fe in a rotary drum at 80°.

Extracting precious metals by amalgamation. DIEDERICK ENZLIN and JOHN A. EKLUND. Ger. 511,334, Aug. 19, 1928. See Brit. 320,185 (*C. A.* 24, 2415).

Crucible arrangement for metal founding. WALTER ARCONIA. Ger. 511,531, Feb. 9, 1929.

Parting-material for foundry molds. KELLY GRAPHITE MILLS. Brit. 334,857, June 5, 1929. See Fr. 677,093 (*C. A.* **24**, 3092).

Method and plant for making tubes, etc., by centrifugal casting. OSTERMANN & [illegible] A.-G. Ger. 514,201, May 27, 1928.

Method of making hollow metal bodies by centrifugal casting in unbaked greensand molds. SOC. ANON. DES HAUTS FOURNEAUX & FONDERIES DE PONT-A-MOUSSON. Ger. 514,153, Sept. 13, 1925.

Casting metals. BRUNO FASSL. Austrian 119,999, June 15, 1930. Addn. to 117,528. The method of mfg. hollow metal castings described in Austrian 117,528 (*C. A.* **24**, 3479) is modified by using a compound core comprising a metal annulus surrounding a carrier made of clay, chamotte, etc. Attainment of the proper wt. ratio between core and casting is thus facilitated.

Casting and brazing locomotive plates. METALLGESELLSCHAFT A.-G. (Paul Hartung, inventor). Ger. 511,750, Apr. 17, 1928.

Aluminum ingots. ALUMINIUM, LTD. Fr. 690,914, Feb. 11, 1930. In making ingots of Al or its alloys, an improved product is obtained by causing a progressive solidification from the base upward while applying heat to the unsolidified portion above the solidification plane.

Finely divided metals. I. G. FARBENIND. A.-G. Fr. 690,991, Mar. 3, 1930. In the thermal decompn. of carbonyl compds. under vacuum to obtain finely divided metals the heat for the decompn. is supplied partly from the outside through the walls of the furnace and partly from an internal source of heat. Cf. *C. A.* **25**, 907.

Pure metals. I. G. FARBENIND. A.-G. (Carl Müller and Walter Schubardt, inventors). Ger. 511,564, July 7, 1926. Addn. to 500,692 (*C. A.* **25**, 481). The method of 500,564 for prepg. pure Fe by the thermic decompn. of $Fe(CO)_4$ is extended to other metals. $Co(CO)_4$ alone or mixed with $Fe(CO)_4$ is heated in a current of indifferent gas or vapor to produce Co or Co + Fe. The carbonyls of Ni and Mo may be similarly decompd. Cf. *C. A.* **24**, 3480.

Copper. REYMERSHOLMS GAMLA INDUSTRI AKTIEBOLAG. Ger. 513,149, Oct. 3, 1929. Pyrites is roasted under chloridizing conditions and then extd. with water in 2 stages. The first ext. contains mostly chlorides, and the second ext. contains mostly sulfates. Cu is pptd. from the first ext. as $Cu(OH)_2$ or $CuCO_3$, and from the second ext. as CuCl. The ppts. are sludged together in a chloride soln. and treated with Fe to ppt. the Cu. Details are given.

Purification of copper. EPAMINONDA CRIVELLI. Fr. 691,632, Mar. 10, 1930. Subdivided Cu is purified by deoxidizing it by heat in the presence of a suitable reducing agent with rapid cooling of the mass out of contact with the air, *e. g.*, by rapid immersion in water. The mass is then immersed in a bath which will dissolve the impurities and finally washed.

Device for condensing zinc. FRANZ JURETZKA. Ger. 511,484, Jan 27, 1927.

Condenser of metallic vapors such as those of zinc. GEORGE T. MAHLER, ERWIN C. HANEWERK and EARL H. BUNCE (to New Jersey Zinc Co.) U. S. 1,790,012, Jan. 27. Structural features.

Carbon articles. DEUTSCHE EDELSTAHLWERKE A.-G. Ger. 513,278, Sept. 21, 1928. Sugar charcoal is used for the manuf. of C articles for tech. purposes, *e. g.*, *metallurgical crucibles*. The charcoal is mixed with sugar soln., shaped and baked. It is then treated with sugar soln. and heated cautiously, these treatments being repeated several times. Finally, the article is heated to a temp. above 1000°.

Smelting furnace suitable for treating iron ore. JOHN T. MCCOURT. U. S. 1,789,[illegible], Jan. 20.

Smelting furnace fired with coal dust. WILHELM REITMEISTER. Ger. 511,665, June [illegible], 1929.

Annealing and smelting furnace. RUDOLF GUNKA. Ger. 511,596, Nov. 1, 1927. The furnace is heated by gaseous fuel and O or compressed air.

Furnace for annealing or other heat treatments of bars, tubes, metal strips, etc. A. SMALLWOOD and J. FALLON. Brit. 334,965, April 25, 1929. Structural features.

Metallurgical furnace suitable for heating sheets, etc. WM. H. SMITH. U. S. 1,789,[illegible]7, Jan 20. Structural features.

Furnace for heating metal sheets while suspended by their upper edges. E. GRIFFITHS. Brit. 335,234, May 21, 1929. Structural features.

Continuous heating furnace for heating billets, sheet bars, etc. ALBERT L. CULBERTSON. U. S. 1,789,966, Jan. 27. Structural features.

Arching and heat treating metal sheets such as those of ferrous metal. WM. E. WATKINS (to Copper Plate Sheet & Tube Co.). U. S. 1,789,853, Jan. 20. The arched

sheets are passed into a furnace, the crown of each sheet is preheated to relieve the tension within the sheet and each sheet is then uniformly heated throughout. App. is described

Cupola furnace. L. A. BENTLEY. Brit. 334,917, June 12, 1929.

Cupola furnace with forehearth and slag separator. BADISCHE MASCHINENFABRIK & EISENGIESSEREI VORM. G. SEBOLD and SEBOLD & NEFF. Ger. 514,328, Sept. 17, 1927.

Oil-fired cupola furnace, with refining hearth. PETER MARX. Ger. 511,242, Jan. 4, 1930. Addn. to 469,704 (*C. A.* **23**, 4922).

Regenerative open-hearth furnace. ALBERT W. SMITH and RICHARD B. JONES U. S. 1,790,172, Jan. 27.

Furnace for steel. LOUIS A. M. J. DE THY. Fr. 692,129, June 7, 1929. In a furnace for the direct production of steel, the ore and very finely powd. coal are in suspension or fall very slowly in a current of ascending reducing gases carried to a suitable temp

Lining for converters and metallurgical furnaces. COMPTOIR TECHNIQUE ALBERT KNAFF ET LÉON MAYER. Ger. 511,117, Oct. 19, 1928. Addn. to 469,863 (*C. A.* 23, 1488) Disintegrated sintered dolomite is mixed with finely ground pitch and up to 25% (calcd. on the pitch) of heavy tar oil. Mixing may be effected at high temp.

Cleaning metal surfaces. JACOB JANZ (Wilhelm Meyer, inventor). Ger. 513,451, May 25, 1928. A hydrosulfite is added to the known alk. cleaning baths, to remove oxide from the metal surface

Cleaning metals with acids. FRANK D. BURKE (to Passivation Products Co.) U. S. 1,789,805, Jan. 20. In processes such as pickling ferrous metals with H_2SO_4, action of the acid on the metal itself is inhibited by the addn. of a small proportion (suitably about 10% or less) of an α-amino acid such as cystine.

Detinning metal. PAUL MARTH. Ger. 512,749, Oct. 18, 1928. Metals coated with tin are treated with alkali soln. in the presence of metal, *e. g.*, Cu, Ag, Au, which have as small a soln. tension as Sn Oxidizing agents may be present and the process may be carried out under raised or reduced pressures.

Method and apparatus for producing metal powders for bronzing, etc. HARTSTOFF METALL A.-G. (HAMETAG). Ger. 511,369, Oct. 23, 1928. Addn to 410,514.

Rolls for cold-rolling metals. K. G. HALLIN. Brit. 334,929, May 13, 1929 Rolls are formed with an outer shell of cast iron or steel and a case of other metal such as cast, pressed or forged alloy steel (the shell after heating to hardening temp. being shrunk on the core).

Local case-hardening of metals. VEREINIGTE SCHWEISS- UND APPARATEBAU WERKE G. M. B. H. Ger. 513,465, July 25, 1929. The parts that are not to be hardened are protected by a metal coating comprising at least 1 metal melting above the hardening temp. and at least 1 metal melting below that temp. The metals constituting the coating may be alloyed with one another or may be applied successively or mixed, *e. g.*, by spraying. A mixt. or alloy comprising Cu 85, Pb 10 and Sn 5% is suitable.

Apparatus for annealing metal sheets. REGNIER EICKWORTH. Ger. 512,888, Dec. 22, 1926. Details of the app. are given.

Improving the electric conductivity of commercial aluminum. SIEMENS & HALSKE A.-G. (Georg Masing, inventor). Ger. 513,017, Aug. 22, 1926. The hammered metal is heated for more than 5 hrs. at a temp. between 100 and 270°.

Blowpipe apparatus for cutting metals by fusion. OBERBAU GES. and W. HUTMANN. Brit. 334,815, Dec 20, 1929 Structural features.

Permanent magnet. DEUTSCHE EDELSTAHLWERKE A.-G. Fr. 690,768, Feb 27, 1930. See U. S. 1,773,793 (*C. A.* **24**, 5016).

Plating pipes with metals such as zinc and lining them with enamel. KURT T. POTTHOFF (to U. S Galvanizing & Plating Equipment Corp.). U. S. 1,789,596, Jan. 20. Various details of procedure and automatic app. are described.

Lining steel bearing shells. FREDERICK C. JONES and VERNE SKILLMAN (to Bohn Aluminum & Brass Corp.). U. S. 1,789,979, Jan. 27. The surface of the shell is treated with a molten metal such as an alloy of Cu and Pb and a coating of lining metal such as similar alloy is cast on the surface of the shell while maintaining the shell substantially free from contact with the air. App. is described.

Iron. FRIEDRICH BORGGRÄFE. Ger. 511,219, Feb. 1, 1929. Addn. to 486,236. The method of Ger. 486,236 (*C. A.* **24**, 2101) is modified by adding Cu and S (or pyrites) to the charge, so that the final product contains S 0.15, Cu 0.2 and P 0.15% (all approx.) A product suitable for the manuf. of screw blanks and like machined parts is thus obtained

Iron. I. G. FARBENIND. A.-G. (Walter Schubardt and Leo Schlecht, inventors) Ger. 513,362, Jan. 14, 1928. See Brit. 318,499 (*C. A.* **24**, 2101).

Iron metallurgy. JOSEPH K. SMITH (to Granular Iron Co.). Can. 308,140, Jan. 27, 1931. Pyritic ores are mixed with coal and lime in a reducing vessel and the ore is reduced in a non-oxidizing atm. at a temp. below the m. p. of iron.

Iron for chemical apparatus. I. G. FARBENIND. A.-G. Brit. 334,926, April 15, 1929. The pure iron referred to in Brit. 293,077 (*C. A.* **23**, 1317) is rendered resistant to aging by heating above the crit. point Ac3 and quenching. The treatment may be repeated several times. The product is suitable for app. for various chem. reactions with gases, vapors or liquids contg. free or combined O, H or S.

Decomposition of iron carbonyl. VEREINIGTE STAHLWERKE A.-G. Fr. 691,557, Mar. 7, 1930. Heated quartz, corundum, glass, porcelain and other ceramic materials are used for receiving the deposit of Fe in the decompn. of Fe carbonyl. The Fe is easily removed from the above material.

Iron and steel. COMPTOIR TECHNIQUE ALBERT KNAFF ET LÉON MAYER. Fr. 692,314, Mar. 19, 1930. In the manuf. of soft Fe and steel the air is introduced not only at the bottom but also at the sides on a level with the surface of the bath of metal.

Special steel. FELIX P. THUAUD, PIERRE M. CROIZARD and CHARLES S. SAINT-DONAT. Fr. 692,124, June 7, 1929. A steel for tools contains besides Fe and C suitable proportions of Mn, Co, Cr, Mo, V, Ti, U and Si. The steel may be used for cutting-tools without the necessity for a heat treatment. An example given is C 0.6–1.2, Mn 2–14, Cr 15–25, Mo 8–15, Co 1–8, V 0.6–2, Ti 0.25–0.7, U 0.3–0.6 Si 0.25–0.5, P 0.03–0.05, S 0.025–0.04% and Fe the rest

Conditioning articles of manganese steel. TAYLOR-WHARTON IRON & STEEL CO. Brit. 335,076, Oct. 4, 1929. Articles of Mn steel are subjected to cold working before being put into use to prevent self-conditioning in service, the treatment being applicable to liner plates for ball or rod mills, crusher and hammer parts of mills, hollanders of paper making app., rag slitters, excavating teeth and tips, drill blades, chain links, chutes, wheels, etc. Alloys may be treated contg. 10–15% Mn together with various other specified ingredients and various details of manuf. and working of the alloys are described

Metals and alloys. JEAN DEBUIGNE. Ger. 513,112, Sept. 1, 1923. Metals and alloys, particularly Mn, free from C and having a low content of Si, are prepd. by an aluminothermic process in which inert substances, particularly slaked CaO, are added to the mixt. in such an amt. that the temp. is reduced sufficiently to prevent the reduction of SiO_2.

Alloys. N. V. PHILIPS' GLOEILAMPENFABRIEKEN. Fr. 691,823, Mar. 12, 1930. An elastic alloy contains Cu, Mn and about 4% of Si, *e. g.*, Cu 95.5, Mn 0.5 and Cu 4%.

Alloys. BRAUNSCHWEIGER HÜTTENWERK G.M.B.H. Ger. 513,273, July 3, 1926. Homogeneous compns. comprising a metal and a non-metal, *e. g.*, Al and graphite, are prepd. by mixing the non-metal with the fused metal *in vacuo*.

Alloys. I. G. FARBENIND A.-G. (Peter Assmann, inventor). Ger. 512,986, June 20, 1926 Objects with a strong resistance to the action of chemicals, especially HCl, are prepd. from Ag alloys contg. 80% Ag, 0–20% Al and 0–19.5% Mn

Alloys with high resistance to sea water. RICHARD MÜLLER. Ger. 513,016, Sept. 19, 1926. Al alloys contg. Mg 1–6 and Ti 0.05–1% are used for purposes for which a high resistance to sea water is required.

Alloys for electric contact terminals. A. PACZ. Brit. 335,081, Oct. 7, 1929. Alloys are formed of W or Mo 50–95, Cu 5–50 and Si 0.2–5.0%, and in some cases part of the Cu may be replaced by Ag and a metal of the Fe group may be present. Various details for making the alloys are described.

Thermal treatment of noble metal alloys. DEUTSCHE GOLD- UND SILBER-SCHEIDEANSTALT VORM. ROESSLER and W. C. HERAEUS G. M. B. H. Ger. 514,126, Apr. 18, 1925. Alloys contg. Au or Ag as the main constituent, together with Al and another metal forming an aluminide, are kept for 2–6 hrs. at 850–900°, chilled and then kept for 1–6 hrs. at 500–600°. Like alloys contg. Pt or Pd in place of Au or Ag are kept at 1150–1400° in the first stage, and at 500–900° in the last stage. The aluminide-forming metal may be Co, Ni, Fe or Cr, or (when Au is the main constituent) Cu, Pd or Pt, or (when Pt or Pd is the main constituent) Mo, W or Ta.

Aluminum alloys. METALLGES. A.-G. Brit. 335,105, Dec. 7, 1928. Al alloys are formed which contain Cu 1–6 and Zn 2–4%, together also with both Mg and Li, with or without Si, Ti, Mn, Ni, Cd, Ag or Cr. The Mg is preferably less than 1% and the Li less than 0.5%. The alloys may be heated to about 500°, quenched and then annealed at 100° or higher in cast or worked form.

Aluminum alloys. AKT.-GES. DER EISEN & STAHLWERKE VORM. GEORG FISCHER and METALLGUSSWERK SCHWARZWALD A.-G. Fr. 690,771, Feb. 27, 1930. An auto-refining

of Al alloys takes place by adding to the alloy ready for casting, 0.2–5% of an alloy of a binary metal and Mg, preferably Ni-Mg or Cu-Mg. Cf. *C. A.* **25**, 909.

Purifying aluminum and its alloys. ARMAND GODEFROID. Ger. 490,349, Apr. 1, 1926. To remove absorbed gases and non-metallic impurities from Al and its alloys these are heated above the m. p. so as to increase the amt. of gas absorbed, and are then subjected to reduced pressure, whereby a sudden and practically complete degasification occurs, the escaping gas carrying the non-metallic impurities to the surface of the molten metal. App. is shown.

Beryllium alloys. LEWIS J. KEELER (to Beryllium Corp. of America). U. S. 1,790,155, Jan. 27. A fused bath such as $2NaF.BeF_2$ is electrolyzed to liberate Be and there is alternately supplied to the bath a Be compd. such as Be oxide and a compd. of an alloying metal such as Cu carbonate so that the metals are liberated for alloying with each other.

Alloy for use with cast iron. AUGUSTUS F. MEEHAN (to Meehanite Metal Corp.). U. S. 1,790,552, Jan. 27. An alloy for use in the treatment or manuf. of cast iron comprises Si not less than about 50%, an alk. earth metal such as Ca over 25%, a metal such as Ni in a substantial proportion up to 5%, and a second alk. metal of the Ca–Mg group (such as Mg) in a quantity somewhat less than half the quantity of the first alk. metal.

Ferrochromium. KENNETH M. SIMPSON. Fr. 690,692, Feb. 26, 1930. Ferrochromium is prepd. by mixing chrome ore with a carbonaceous material as hard as coal and the mixt. is afterwards broken and heated in a tunnel furnace to a temp. between 1200 and 1450°. The reaction is completed after sepn. of the residual material from the metallic particles which result from the reduction.

Lead alloy containing antimony and bismuth. MARTIN THIELERS. Fr. 691,600, Mar. 8, 1930. See U. S. 1,779,784 (*C. A.* **25**, 66).

Alloys of lead, tin and copper. WM. J. MERTEN (to Westinghouse Elec. & Mfg. Co.). U. S. 1,790,164, Jan. 27. In forming alloys contg. Pb 10–28, Sn 2–10, Cu 62–88% and minor impurities, the ingredients are melted together, CaC_2 is added to the molten alloy to facilitate dispersion of the Pb and the alloy is permitted to cool.

Magnesium alloys. THE DOW CHEMICAL CO. Fr. 692,240, Mar. 18, 1930. An alloy of Mg is made by stirring molten Mg with a reducible compd. of a metal to be alloyed with the Mg in a bath of molten diluent, such as the molten bath of an electrolytic cell producing metallic Mg. The process is particularly suitable for making alloys of Mg with Mn or Ce.

Magnesium and its alloys. I. G. FARBENIND. A.-G. Fr. 690,654, Feb. 25, 1930. The resistant properties, particularly resistance to compression, of Mg and its alloys are improved by lowering the speed of formation to at least half of the normal, and after cessation of the exterior forming forces, the metal is brought quickly to a temp. below that at which any modifications of size or disposition of the crystn. structure could take place.

Tough corrosion-resistant alloy steel. SHELLEY M. STOODY (to Stoody Co.). U. S. 1,790,177, Jan. 27. An alloy steel which is suitable for tools or welding rods contains C 1–4, Cr about 25–35, Ni about 5–15, Si about 3.5–8.0%, the remainder being principally Fe.

Sintered alloys containing tungsten carbide, etc. R. WALTER. Brit. 300,675, Dec. 3, 1928. Products are formed which contain 50–80% of W carbide or carbonitride or both, together with metals such as Fe, Mn, Ni, Co, Cr, W, Mo and U or their carbides. Free W 5–30% and some B may be present. Cf. *C. A.* **24**, 5712.

Zinc alloy containing copper and silver. LELAND E. WEMPLE and FLOYD A. ASHREN (to Illinois Zinc Co.). U. S. 1,789,854, Jan. 20. An alloy of substantially greater hardness than that of Zn contains Zn 100, Cu 0.25–2.0 parts and Ag 0.1–20% the quantity of the Cu. The alloy may be rolled into sheets or strips.

Alumino-thermic mixture. ELEKTRO-THERMIT G.M.B.H. Ger. 511,990, Apr. 18, 1929. Alloyed Fe and steel filings are added to the Al-Fe_2O_3 mixt.

Alumino-thermic mixture. TH. GOLDSCHMIDT A.-G. Ger. 511,991, June 22, 1929. A thermite compn is made by mixing powd. Al with the oxide obtained by heating Fe cylinders from 800° or 900° to 1250°. The $Fe_2O_3.Fe_3O_4$ mixt. so obtained contains FeO.

Thermocouple. OTTO FEUSZNER (to the firm W. C. Heraeus G.m.b.H.). U. S. 1,789,733, Jan. 20. At least one element of a thermocouple is composed of an alloy of more than 2 precious metals including a highly gas-absorptive Pt metal, a precious metal of group one of the periodic system and a third component which is another Pt group metal. The alloy may contain Pd 55, Pt 35 and Au 10% and may be associated with another element formed of steel contg. Ni or Cr.

Fusion welding of heavy-walled steel or iron tubes. AIR REDUCTION CO. Brit. 305,459, Dec. 10, 1928. App. and various details of heating and mech. treatment are described.

Welding with a flame produced from alkali-metal vapor and chlorine or other reactive gas. MICHAEL POLANYI and STEPHAN VON BOGDANDY. Ger. 514,289, Jan. 18, 1929.

Electrode for electric welding. LA SOUDURE ÉLECTRIQUE AUTOGÈNE S. A. Fr. 692,113, June 6, 1929. The electrodes are surrounded by a substance to form a flux containing 0.25–30% of Be in powder, or the metal forming the electrode such as Cu or Al is alloyed with Gl.

Coating welding or soldering "sticks" or electrodes. LA SOUDURE ÉLECTRIQUE AUTOGÈNE S. A. Ger. 511,329, July 12. 1928. See Brit. 314,400 (*C. A.* **24**, 1337–8).

Composition for soldering and welding. PER KVANAAS. Norw. 46,104, Feb. 11, 1929. A mixt. of cryolite, borax and boric acid is specified.

Soldering steel. HERMANN J. SCHIFFLER. Fr. 691,035, Mar. 3, 1930. Refractory Mo tools are soldered by using a refractory steel which does not contain Al as con[illegible] refractory metal.

10—ORGANIC CHEMISTRY

CHAS. A. ROUILLER AND CLARENCE J. WEST

Advances in organic chemistry 1924–1928. Pyridine chemistry. HANS MAIER-[illegible] *Z. angew. Chem.* **44**, 49–55(1931). E. H.

Catalytic decomposition of some gaseous ethers. PAUL A. K. CLUSIUS. *J. Chem. Soc.* **1930**, 2607–15.—The catalytic effect of I on the decompn. of Me_2O, MeEtO, Me_2CHOMe and *tert*-BuOMe in the gaseous state has been investigated. I has no catalytic effect on the decompn. of Me_2O. MeOEt is catalytically decompd. between 450° and 550° according to the following consecutive reactions: $MeOEt \longrightarrow CH_4 + MeCHO$, $MeCHO \longrightarrow CH_4 + CO$. The heat of activation of the 1st reaction is 38,000 cals. Me_2CHOMe is decompd. simultaneously between 450–520° in 2 different ways: $Me_2CHOMe \longrightarrow CH_4 + Me_2CO$ and $Me_2CHOMe \longrightarrow CH_2O + C_3H_8 \longrightarrow CO + H_2 + C_3H_8$. The heat of activation is 29,500 cals. for the net reaction. Me_3COMe shows a very pronounced reaction in the presence of I but is not decompd. in a simple manner. The results illustrate clearly the fact that the activation of a reactant mol. is dependent upon the structure of the whole mol. and not upon the presence of a certain group. The catalyst attacks the mol. at a sp. point and the observed reactions can in every case be interpreted as the migration of a H atom from an O atom, which is also connected with an O atom, to a 2nd C atom. C. J. WEST

The action of nitrogen pentoxide on ethylene hydrocarbons. N. YA. DEM'YANOV. *Compt. rend. acad. sci. U. R. S. S.* **1930A**, 447–51.—N_2O_5 with unsatd. hydrocarbons gives glycol nitrates and addn. products in which N is linked to C. $Me_2C:CMe_2$ (I) yields 3 cryst. substances of the latter type: $C_6H_{12}N_2O_6$, $C_6H_{12}N_2O_5$ and $C_6H_{12}N_2O_4$, which are reduced to pinacol, glycolamine and diamine, resp. No cryst. products could be isolated from $CH_2:CH_2$ (II) but the nitrate was detected by its explosive character, and glycolamine was obtained after reduction, indicating $C_2H_4N_2O_5$. Some $(CH_2NH_2)_2$ was also found. Haines and Adkins (cf. *C. A.* **19**, 1855), with a different method observed no reaction with II, and obtained no cryst. substances from I. They did observe the formation of green and blue compds. in soln. These are probably nitroso compds. D. finds that N_2O_5 adds easily to I and *cyclohexene*. Nitric esters are the principal reaction products; the dinitro compds., nitro alcs., and nitro nitrates are also formed. D. thinks the colored nitroso compds. may be intermediates according to the following scheme: $Me_2C(NO)C(NO_2)Me_2 + O \longrightarrow (Me_2CNO_2)_2$ and $Me_2C(NO)C(NO_2)Me_2 + O \longrightarrow Me_2C(NO_2)C(ONO_2)Me_2$. LEWIS W. BUTZ

Latent heats of evaporation of nitromethane and benzonitrile. JAMES C. PHILIP AND [illegible] C. WATERTON. *J. Chem. Soc.* **1930**, 2783–4.—The latent heats of evapn., with Campbell Brown's method (*J. Chem. Soc.* **83**, 987(1903)), for $MeNO_2$ and PhCN are found as 135.4 and 106.5 cal./g. With these figures the van't Hoff formula gives for Λ values 2.05 and 4.01, resp., only slightly higher than the exptl. values (1.86 and [illegible]). C. J. WEST

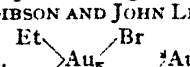
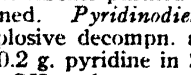
Interaction of ammonium sulfite with certain polybromoparaffins. WM. J. POPE AND [illegible] B. KIPPING. *J. Chem. Soc.* **1930**, 2591–4.—Attempts to prep. paraffin poly-SO_3H acids from I and II by interaction with aq. $(NH_4)_2SO_3$ have resulted in failure; in the former case a di-SO_3H acid was produced and in the latter, salts of isomeric SO_3H

acids were isolated. β,γ-Dimethylbutadiene (10 g.) and Br in AcOH give 28 g. of the *α,β,γ,δ-tetra-Br deriv.* (I), m. 138°; with $(NH_4)_2SO_3$, boiled 16 hrs., there results 80% of the *Ba β,γ-dimethylbutylenedisulfonate*, needles with 1 mol. H_2O; the salt absorbs 1 mol. Br; the free acid could not be obtained cryst. *NH_4 salt*, plates; *Na salt*, needles, *pyridine salt*, m. 215–6°; *acid chloride*, m. 125–6°. $(MeCHBr)_2$ (II) and $(NH_4)_2SO_3$, boiled 22 hrs., give a mixt. of *β-hydroxybutane-γ-sulfonic acids*, the *brucine salts* m. 270°, $[\alpha]^{20}_{5461}$ —23.9° (H_2O, *c* 0.58) (the *l-menthylamine salt* of this fraction m. 196°) and m. 180–5°, $[\alpha]^{20}_{5461}$ —29.6° (*c* 0.57). C. J. West

Reducing action and constitution of the Grignard reagent. C. R. Noller. *J. Am. Chem. Soc.* 53, 635–43(1931).— Solns. of $(iso\text{-}Bu)_2Mg$ which are practically halogen-free have been shown to reduce Ph_2CO to Ph_2CHOH, as well as the original Grignard reagent contg. halogen. The Grignard reagent prepd. from iso-BuBr at a concn of about 1.3 molar exists to the extent of 75% in the form of $(iso\text{-}Bu)_2Mg$. When the original Grignard reagent is used to reduce Ph_2CO, the reduction product ppts. as a white cryst. compd. which yields, on decompn. with H_2O, 1 mol. of Ph_2CHOH, 1 equiv. of basic hydroxyl and 1 equiv. of halogen. When a soln. of $(iso\text{-}Bu)_2Mg$ is used, the reduction product remains in soln. presumably in the form $(Ph_2CHO)_2Mg$, but can be pptd. by the addn. of a soln. of $MgBr_2$ to give a compd. identical by analysis with that obtained from the original Grignard soln. It is believed that the constitution of the Grignard reagent represented by the equil. $R_2Mg \cdot MgX_2 \rightleftarrows R_2Mg + MgX_2$ best fits these facts and that the Et_2O-insol. benzohydryl Mg salt has the compn $(Ph_2CHO)_2Mg\ MgBr_2$. C. J. West

The lability and relative reactivities of organic radicals. Henry Gilman, Edith L. St. John and L. L. Heck. *Proc. Iowa Acad. Sci.* 36, 269–70(1929). Studies have been made of the rates of many reactions involving organometallic compds., by means of the color test of Gilman and Schulze (*C. A.* 1, 2473; 22, 942). These rate studies comprise: (1) the relative reactivities of a variety of compds. toward a typical organometallic compd.; (2) the relative reactivities of a series of related compds. like nitriles or azo compds. with an organometallic compd., (3) and, the differences in rate of reaction of a series of organometallic compds. toward other compds. The same method has been used in a study of the effect of concn., temp. and catalysts on reaction rates. Also, it has been shown to be of service in a study of the mechanism of reactions, like the 2-stage conversion of esters to ketones to tertiary alcs., and the lability and relative electronegativities of radicals. W. G. Gaessler

The organic compounds of gold. I. Diethylgold bromide and some derivatives. Charles Stanley Gibson and John Lionel Simonsen. *J. Chem. Soc.* 1930, 2531–6

Diethylgold bromide,  (I), and some of its derivs. are prepd., it being proved that in these compds. Au has a coördination no. of 4. To obtain I (m. 58°), an EtMgBr soln. (from 6 g. Mg and 27 g. EtBr) is forced by a N_2 stream through a fine muslin filter into a $AuBr_3$ soln. (30 g. $AuBr_3$ in 250 cc. Et_2O) in a 3-necked flask with a stirrer and a condenser (the mixing taking about 1 hr., both solns. being cooled in a freezing mixt.), is stirred for 0.5 hr., the bath then replaced by cold H_2O, stirred for 0.5 hr. more, cooled in ice, powd. ice added (to avoid violent reaction), dil. HBr added, poured into a sepg. funnel, the Et_2O soln. sepd. and washed several times with H_2O (rejecting the first aq. soln.), the final Et_2O soln. dried rapidly with $CaCl_2$, evapd. first in a N_2 current under reduced pressure and at as low a temp. as possible and then completely in a desiccator over H_2SO_4, the residue treated with ligroin (b. 40–60°), filtered, the filtrate evapd. in a vacuum desiccator over H_2SO_4, and the cryst. residue further purified by washing with a little MeOH. Three g. of the desired I is obtained. *Pyridinodiethylgold bromide*, $Et_2AuBr\ C_5H_5N$, (m. 59–60° (decompn.) and explosive decompn. at 79°) is prepd. by mixing 0.5 g. I suspended in 1.5 cc. MeOH and 0.2 g. pyridine in 2 cc. MeOH, pptg. by adding H_2O, and purified by dissolving in MeOH and repptg. with H_2O. *Ethylenediaminodiethylgold bromide*, $[(CH_2NH_2)_2 \rightleftarrows AuEt_2]Br$ (plates, decompn. starting at 182°), seps. on adding a slight excess of $(CH_2NH_2)_2$ to a I-ligroin soln., and is crystd. from abs. alc. *Diethylgold acetylacetone*,  (II) (m. 9–10° (thermometer in liquid)), prepd. from a mixt. of 1.52 g. thallous acetylacetone suspended in abs. EtOH and Et_2AuBr 1.63 g. I in sufficient abs. EtOH, the mixt. stirred (finally at 40°), filtered and washed, the filtrate and washings evapd. over H_2SO_4 in a desiccator, the resi

due dissolved in ligroin (b. 40–60°), filtered, evapd., and crystd. *Diethylgold iodide* (III), corresponding to I (m. 67–8° and vigorous decompn. at 70–1°), is prepd. by adding H_2O to a mixt. of II and NaI (slight excess) in abs. alc., the ppt. sepd., dried, extd. with ligroin (b. 40–60°) and evapd. *Ethylenediaminodiethylgold iodide* (m. 162° (decompn.)) is prepd. from III and $(CH_2NH_2)_2$, similarly to the bromide. J. B.

The formation of diisobutylene from acetone under high pressure. A. D. Petrov and I. Z. Ivanov. *Bull. soc. chim.* [4], **47**, 1270–4(1930).—Me_2CO was heated under pressure to 280–300° in the presence of 10% of $ZnCl_2$. A considerable quantity of gas was obtained consisting of CO, paraffins and olefins of which 90% was C_2H_4. Of the portion of the liquid products b. to 150°, 50% distd. at 100–10°, consisting of branched-chain olefins, mainly $CMe_3CH_2CMe{:}CH_2$ (I). It is suggested that the C_2H_4 polymerizes to $Me_2C{:}CH_2$ and this, in turn, to I. These last reactions are known. The quantity of naphthenes formed in the decompn. of Me_2CO is very small. Also in *J. Russ. Phys.-Chem. Soc.* **62**, 1489–92(1930). I. M. Levine

Constitution of homomesityl oxide. S. G. Powell and C. H. Secoy. *J. Am. Chem. Soc.* **53**, 765–8(1931).—The structure of homomesityl oxide (I) is definitely established as $MeEtC{\cdot}CHCOEt$ by the following reactions: I is obtained in 85 g. yield from 500 g. 2-butanone by the use of BaO in place of CaC_2; it b. 164–6°, d_4^{21} 0.8633, n_D^{21} 1.4445. Catalytic reduction gives $MeEtCHCH_2COEt$ (II), b. 158°, d_4^{24} 0.829, n_D^{24} 1.412; semicarbazone, m. 96°; oxidation gives AcOH and $MeEtCHCH_2CO_2H$. Reduction of I with Na and moist Et_2O gives $MeEtCHCH_2CH(OH)Et$, b. 155°, d_4^{25} 0.8425, n_D^{24} 1.433. $EtMeCHCH_2MgBr$ and EtCHO give the same alc., which is oxidized to II. If I had the structure $EtMeC{\cdot}CMeCOMe$, it should give $EtMeCHCH_2MeCOMe$ on reduction; however, this compd., prepd. from Et *sec*-butylmethylacetoacetate, is different from II; it b. 158°, d_4^{22} 0.8295, n_D^{22} 1.412; semicarbazone, m. 124–6°. C. J. West

The decomposition of the optically active diazo ester from aminolauronic acid. P. P. Ray and W. R. Bunting. *Proc. Iowa Acad. Sci.* **36**, 271–4(1929); cf. *C. A.* **24**, 4017.—About 20 g. of the diazo compd. from the *cis*-acid was prepd. and decompd. This gives, on distn., an unsatd. fraction that corresponds to 60.5% of the distillate. R. and B. failed to find any of the ether acid that Skinner (*C. A.* **17**, 2270) found only in the decompn. of the *trans*-amino ester. The *cis*-diazo compd. follows the same course in its decompn. as the *cis*-amino acid. It is reasonable to suppose that the *trans*-diazo compd. will follow the course of the *trans*-amino ester. If the 2 diazo compds. give different products, it must be allowed that diazo C retains its asymmetry, as that is the only manner in which the 2 compds. differ W. G. Gaessler

Constituents of adsuki bean (Phaseolus radiatus, L. var. Aurea, Prain). E. Miyamoto and H. Yamada. *J. Pharm. Soc. Japan* **50**, 1095–1100(1930); German abstr. 147.—M. and Y. detd. the following constituents of adsuki bean: water 20.0%, fat 0.55%, fatty acids 0.71% (solid acids (I) 53.90% and liquid acids (II)) 46.10%, and saponin 0.27%. I contains palmitic, stearic and arachic acids and II linolic, linolenic and oleic acids. F. I. Nakamura

Action of phenylmagnesium bromide on ethyl diethylcyanoacetate. A. Mavrodin. *Compt. rend.* **191**, 1064–6(1930).—The first products obtained from the interaction between PhMgBr and $NCCEt_2CO_2Et$ (I) consists of Ph_2CO and *Et α-diethyl-γ-ethylbutyl acetate*, $Et_2CHCOCEt_2CO_2Et$ (II), b_{18} 138°. A suggested mechanism may be represented by the following series of equations: (a) $PhMgBr + I \longrightarrow PhCN + BrMgCEt_2CO_2Et$ (III), (b) $PhCN + PhMgBr \longrightarrow BrMgN{:}CPh_2 \longrightarrow HN{:}CPh_2 \longrightarrow Ph_2CO$, (c) 2 III $\longrightarrow$ $EtOMgBr + BrMgCEt_2COCEt_2CO_2Et \longrightarrow$ II. Sapon. of II yields $(Et_2CH)_2CO$. I. M. Levine

The preparation, properties and uses of glycerol derivatives. II. Acetals, amines and resins. A. Fairbourne, G. P. Gibson and D. W. Stephens. *Chemistry and Industry* **49**, 1069–70(1930).—The acetals were prepared from glycerol and aldehydes or ketones in the presence of HCl. These compds., mainly mixts. of isomers, are obtained in good yields, and are good solvents for cellulose esters, resins, gums, and org. substances generally. The following gives b. p., d_4^{25}, n_D, soly. in H_2O: Methylideneglycerol, b_{760} 195°, b_{20} 95–7°, 1.215, 1.450 (19°), miscible. Ethylideneglycerol (from $C_2H_4(OH)_2$ + glycerol), b_{760} 180–197°, b_{40} 96–116°, 1.131, 1.442 (25°), miscible. Isopropylideneglycerol, b_{760} 201°, b_{40} 107–8°, 1.063, 1.435 (25°), miscible. Benzylideneglycerol, b_4 145–52°, 1.190, 1.536 (23°), less than 1%. A mixt. of mono-, di- and triglyceryl-amines is obtained from $CH_2(OH)CH(OH)CH_2Cl$ and $NH_4OH + NH_3$ (15° for 24 hrs.). The product contains 10–11% N. The dichlorohydrin gives analogous results. These bases combine with fatty acids to give soaps sol. in org. liquids. Treatment of these amines with Ac_2O, abietic or phthalic acids gives resins, sol. in C_6H_6. These may be

valuable in lacquers. Rosin may be rendered fit for use in lacquers by addition of a little glycerylamine to neutralize acidity. G. R. YOHE

The preparation of some dimethylamino fatty acids. V. PRELOG. *Collection Czechoslov. Chem. Comm.* **2**, 712–22(1930).—*Dimethylammonium acid succinate*, $C_8H_{15}O_4N$, m. 159–60°, was prepd. from a mixt. of equiv. amts. of aq. Me_2NH and $C_4H_6O_4$. *Dimethylammonium acid adipate*, $C_8H_{17}O_4N$, obtained similarly, m. 75°. These salts were heated just below the decompn. point to complete loss of H_2O vapor, and the product was distd. *in vacuo*. *Succinic bisdimethylamide*, $C_8H_{16}O_2N_2$, m. 80–1°, and *adipic bisdimethylamide*, m. 85°, were isolated from the distillates. The distillates subjected to electrolytic reduction gave about 40% of the *monoamide* and about 10% of the *diamine*, *N,N,N',N'-tetramethyl-1,4-diaminobutane*, b_{740} 168° (*picrate*, m. 198–9°; *chloroplatinate*, m. 233.5° (decompn.); *chloroaurate*, m. 207°); *N,N,N',N'-tetramethyl-1,6-diaminohexane*, b_{732} 208.5° (*picrate*, m. 163–4°; *chloroplatinate*, m. 222°; *chloroaurate*, m. 169°). The reduction of succinic dimethylamide also yielded *4-dimethylaminobutyric acid*, $C_6H_{13}O_2N$ (I), b_{10} 135–7°, b_2 145–50°, m. 102–4°; *HCl salt*, hygroscopic, m. 145–7°; *chloroaurate*, m. 151–2°. Crude I (50 g.) treated with 250 g. EtOH, satd. with HCl and the product dried and distd. gave 70% of the Et ester of I, d_{15} 0.9187, n_α 1.42414, n_D 1.42640, n_β 1.43226, n_γ 1.4371. Crude I (1.3 g.) in 10 cc. MeOH was treated 24 hrs. with 1.7 g. MeI and the I pptd. with Ag_2O. From the filtrate concd. on the H_2O bath there was obtained *4-dimethylaminobutyric acid methohydroxide*, $C_7H_{15}O_2N$, m. 77°; *chloroplatinate*, m. 225–6°; *chloroaurate*, m. 184.5° Prolonged desiccation at the fusion point gave the corresponding *betaine*, m. 219° The reduction of adipic dimethylamide similarly yielded *6-dimethylaminocaproic acid* (II), m. 107–9°; *HCl salt*, hygroscopic; *chloroaurate*, m. 97–9°. The *methohydroxide* (III) of II m. first 115°, and after solidification 254–5° and had the compn. $C_9H_{19}O_2N$, *chloroaurate*, m. 149°. The distn. of III gave the *Me ester* of II, b. 209–10°. R. B.

Tautomerism of α-diketones. H. MOUREU. *Ann. chim.* [10], **14**, 283–405(1930); cf. *C. A.* **23**, 1339, 2705, 4214, 4215, etc. A connected account is given of previously published results. BEN H. NICOLET

Acetoacetic ester condensation. II. Reaction of aliphatic esters with sodium. JOHN M. SNELL AND S. M. MCELVAIN. *J. Am. Chem. Soc.* **53**, 750–60(1931); cf. *C. A.* **23**, 5468.—A study is reported of the action of Na and AcOEt (I), $EtCO_2Et$ (II), $PrCO_2Et$ (III), iso-$PrCO_2Et$ (IV) and Me_2CO_2Et (V) in Et_2O, C_6H_6 and excess of the ester, at the b. p. of the solvent. The Na salts were decompd. by 35% H_2SO_4 and the acid fraction was extd. with 20% Na_2CO_3. The following fractions were dctd. and the yields (in g.) are given in this order: RCOCOR, RCH(OH)COR, higher-boiling products, RCO_2H and higher acids. In Et_2O: I (88 g.), 3, 10, 23, 2, 7; II (102 g.), 5, 30, 14, —, —; III (116 g.), 5, 52, 7, 3, —; IV (116 g.), 3, 54, 2, 4, 4; V (100 g.), 21, 41, —, —, —. In C_6H_6: II (102 g.), 4, 17.5, 10, 1, 3; III (116 g.), 5, 44, 13, 3, 2; IV (116 g.), 6, 48.5, 3, 4, 9; V (50 g.), 5, 20, —, 3, —. Data are also given when an excess of the ester is used as the solvent. There is no perceptible difference in the rate at which the 3 esters, III, IV and V, react with Na nor is there any great difference in the completeness with which they react in the inert solvents to form diketones and acyloins. The need, therefore, of a special mechanism to account for the slowness and incompleteness of reaction of those esters which cannot enolize does not exist (cf. Scheibler and Emden, *C. A.* **18**, 389). It is also evident that the diketone is an intermediate product in the formation of the acyloin rather than the result of an oxidation of the acyloin (cf. Egorova, *C. A.* **23**, 2935). The reaction is therefore formulated as: $2RCO_2Et + 2Na \longrightarrow [RC(ONa)OEt]_2$; $[RC(ONa)OEt]_2 + 2Na \longrightarrow [RC(ONa):]_2 + 2EtONa$. With an excess of ester as the solvent, the acetoacetic ester condensation takes place with I and II; with III very little of the diketone and acyloin, but considerable higher-boiling material with the characteristic yellow color of the diketones is produced; with IV, the combined yield of diketone and acyloin is only about 13% lower than those obtained when C_6H_6 was used but the amt. of higher-boiling material is correspondingly higher; the very high yield of the acyloin and the absence of any diketone in the case of V must be due to the favorable conditions for the reaction when the ester is used as the solvent. The fact that the diketones are readily polymerized and rearranged by EtONa indicates that they are responsible, in part at least, for the high-boiling materials. The acids, RCO_2H, may be due to the hydrolysis of the salt of the ortho ester; this is supported by the fact that high yields of acids were obtained in each case when an excess of the ester was used as a solvent. C. J. WEST

Ethyl aminomalonate and its derivatives. R. LOCQUIN AND V. CERCHEZ. *Bull. soc. chim.* [4], **47**, 1274–9(1930).—After many unsuccessful attempts to reduce HON C-

$(CO_2Et)_2$ (I) with the object of prepg. *Et aminomalonate*, $CH(NH_2)(CO_2Et)_2$ (II), the reduction was finally accomplished as follows: 5/3 of the theoretical quantity of Al foil (0.3 mm. in thickness) was amalgamated and added to I in Et_2O. To the agitated mixt. maintained at the b. p. of the Et_2O, water was added, little by little, in a quantity equal to 6 times the wt. of the Al. The Al was in this way obtained as a powder; it is due to this that the reduction was successful. The Al and Et_2O were removed by filtration and distn., resp., leaving a 65% yield of II, b_{12} 116–8°, b_{16} 122–3°. Because of the instability of II, it is advisable to isolate it in the form of the *oxalate*, $H_2(CO_2H)_2$, m. 138°, which may be converted into II by means of K_2CO_3 soln.

I. M. LEVINE

Mercuration of compounds containing the reactive methylene group. K. G. NAIK AND C. C. SHAH. *J. Indian Chem. Soc.* 7, 655–62(1930).—$CH_2(CO_2Et)_2$, mercurated by the method of Neogi and Chatterjee (*C. A.* 22, 4112) gives *Et dichloromercurimalonate* (I), m. above 300°. I boiled with HCl yields *Et monochloromercurimalonate* (II), which turns grey at 192–5°. II is formed from I and aqueous KI; boiling I with alc. KI 0.5 hr. removes both Hg atoms. Mercuration of malonamide yields *dichloromercurimalonamide* (III), which shrinks at 191–2° and m. 220° (decompn.). III and Br water give dibromomalonamide. The following *dichloromercurimalondialkylamides* were prepd. similarly: *methyl*, m. 241° (decompn.); *ethyl*, yellows at 191°; *propyl*, m. 173–5°; *butyl*, m. 90°; *isobutyl*, m. 108–9°; *amyl*, m. 143° (decompn.); *isoamyl*, m. 105°; *heptyl*, (IV) m. 117°. IV boiled with alc. KI loses both Hg atoms; heated with HCl it gives malondiheptylamide. *Malondiamylamide*, prepd. by the method of Backes, West and Whitely (*C. A.* 15, 2070) in 80% yield, m. 126°; *malondiisoamylamide*, prepd. similarly in 20% yield, m. 55°.

A. F. SHEPARD

Synthesis of diisopropylmalonic acid and some related compounds, with observations on the polar character of the isopropyl radical. FREDERICK C. B. MARSHALL. *J. Chem. Soc.* 1930, 2754–61.—The mixt. of 90% of the mono- and 10% of diisopropylcyanoacetic ester produced by Hessler's method (*C. A.* 7, 3506), treated with more Na and Me_2CHI gives 95% of the diiso-Pr deriv., b. 238–41°. $NCCH_2CO_2Et$ with 2 equivs. of EtONa and Me_2CHI give a mixt. contg. 40% of the dialkylated ester. Hydrolysis of the ester with 33% KOH gives *diisopropylcyanoacetic acid*, m. 97.5° (*Ag salt*); KOH fusion gives *diisopropylacetonitrile*, b. 170–1°, d^{23} 0.8105, n_D^{23} 1.4158; hydrolysis with concd. H_2SO_4 at 100° for 20 hrs. gives *diisopropylmalonamic acid* (I), m. 168° (decompn.) (*Ag salt*). *Diisopropylacetamide*, m. 149°. I and CH_2N_2 or Me_2SO_4 on the Ag salt and MeI give the *Me ester* of I, m. 105°; with nitrous fumes this gives the *Me H ester* of II, m. 110°, hydrolyzed by 45% KOH in 36 hrs. to *diisopropylmalonic acid* (II), m. 197° (decompn.); Ag salt; Cu salt, deep blue; heating gives *diisopropylacetic acid*, b_{760} 214°, d^{20} 0.9106, n_D^{20} 1.429 (*Ag salt*). *Et isopropyl-α,γ-dimethylisopropylmalonate*, b_{760} 258–9°, d^{20} 0.9594, n_D^{20} 1.4380; *Et H ester*, b_{20} 152–8°, d^{20} 1.015, n_D^{18} 1.455. The inability to introduce a 2nd iso-Pr radical into Et isopropylmalonate under the usual conditions may be due to steric hindrance depending on the bulk of the groups about the central C atom or to the polar effect of the iso-Pr group.

C. J. WEST

Dehydration of citric acid and the technical preparation of anhydrous citric acid. FILIPPO PERCIABOSCO. *Atti III congresso naz. chim. pura applicata* 1930, 509–12.—Citric acid loses nearly all its water of crystn. at 70°. The loss is completed at 90° and decompn. begins at 130°. The anhyd. acid can be prepd. by either drying at 70–80° for 12 hrs. or by crystn. from solns. at approx. 100°.

E. G.-F.

The synthesis of agaric acid. MARIO PASSERINI AND GASTONE BANTI. *Atti III congresso naz. chim. pura applicata* 1930, 343–6.—In order to prove that agaric acid actually has the structure of 1-cetylcitric acid the following synthesis was accomplished: The mono-Na deriv. of $CO(CH_2CO_2Et)_2$ is treated with cetyl iodide: only a small portion of cetylacetonedicarboxylic acid ester could be isolated for identification. After hydrolysis from NaI the raw product was treated in ether with PhNC and AcOH (cf. *C. A.* 19, 822) in equimol. proportions and kept in the cold for 40 days. The condensation product was not isolated but was hydrolyzed with alc. KOH. The evolution of CO_2 is noticed upon acidifying and a ppt. is formed. The ppt. is treated with NaOH, Me heptadecyl ketone, m. 81–3°, remaining undissolved. The small sol. part is reppted with acid and washed with cold benzene. The benzene-sol. part, finally crystd. from MeOH, m. 33°, was identified as cetylmethylfumaric anhydride. The benzene-insol. part, recrystd. from water, m. 130–2°. It analyzed for cetylcitric acid with 1.5 mols water. It represents the *dl*-product.

E. GEBAUER-FUELNEGG

The oxime of carbonyl bromide. I. DE PAOLINI. *Atti accad. sci. Torino* (Classe

di sci. fis., mat., e mat.) **65**, 196–200(1930).—In a previous paper (*C. A.* **24**, 1632) it was mentioned that by the action of Br_2 on hydroxyglyoximecarboxylic acid, $HO_2C[C(:NOH)]_2OH$ a product was formed which was identical with that formed by the action of Br_2 on monohydroxyglyoxime, $H(C:NOH)_2OH$. This same product also results from similar reactions with oximinoacetic acid, $HC(:NOH)CO_2H$, and dihydroxytrioxime, $HO[C:NOH]_3OH$. The compd. is *carbonyl bromide oxime*, $Br_2C:NOH$. Its constitution is proved by the fact that this compd. also results from the action of Br_2 on fulminic acid: $CNOH + Br_2 \longrightarrow Br_2C:NOH$. It is best prepd. by the action of Br_2 on $HC(:NOH)CO_2H$ at 0°, CO_2 being evolved. Extd. with Et_2O and crystd. from petroleum ether, it m. 70.1°. It has a high vapor pressure even at low temps., the vapors being strongly irritant. The aq. soln. gives a red color with $FeCl_3$, green with $Cu(OAc)_2$. Treated in soln. with $Hg(NO_3)_2$ and distd. with steam, the dibromofuroxan is formed, $Br[(C_2N_2O)O]Br$. A. W. C

The structure of nitroamides and the points of view of Professor Hantzsch. A. Angeli. *Gazz. chim. ital.* **60**, 665–8(1930).—Several weaknesses in the arguments of Hantzsch (cf. *C. A.* **24**, 4001) are pointed out. C. C. Davis

Degradations in the sugar group. Venancio Deulofeu. *J. Chem. Soc.* 1930, 2602–7.—*d*-Arabinose oxime was converted into tetraacetylarabononitrile (**I**), which gives with Ag_2O after 36 hrs. at room temp. 40% of *d-erythrosediacetamide*, m. 210°; hydrolysis with H_2SO_4 gives *d*-erythrose. The production of triacetyl-*d*-erythrose by the action of Ag_2O on I and also of erythroseimine (Wohl, *Ber.* **32**, 3671(1889)) has been confirmed. Degradation of I by Zemplen's method (MeONa or $Ba(OH)_2$ and Ag_2CO_3) gave only a small amt. of erythrosazone (II). Tetraacetylxylononitrile treated in the same way, gave only small amts. of II. The sirup obtained by the action of MeONa, on oxidation with HNO_3, gives tartaric acid. *l*-Rhamnonoamide, m. 135°, with NaOCl, gives methylerythrose, isolated as the osazone. Degradation by Zemplen's methods gave small quantities of the same deriv. Pentaacetylgalactononitrile with MeONa gives 30% and with Ag_2CO_3 and $Ba(OH)_2$, 22% of lyxose. *Pentaacetylmannononitrile*, m. 94°, with Ag_2O, gives 32% of *d* arabinosediacetamide, m. 187°; Zemplen's methods give 61 and 56%, resp., of arabinose. Degradation of Ca mannonate gives only 23% by Ruff's method (H_2O_2 and $Fe(OAc)_2$). C. J. West

Glucose and the structure of the cycloses. A. L. Patterson. *Nature* **126**, 880 (1930).—A hypothesis is advanced to explain the fact that although there are 50 theoretically possible cycloses with 4, 5 or 6 hydroxyl groups, only 7 have been discovered in nature. An assumption that all the natural substances of this class originate from glucose and contain the configuration characteristic of that sugar, limits the no. of isomers to 14 and perhaps tends to explain the small no. which have been found in spite of the large vol. of work which would naturally lead to their discovery. R. C. H.

Reactive form of glucose oxime. M. L. Wolfrom and Alva Thompson. *J. Am. Chem. Soc.* **53**, 622–32(1931).—Aldehydoglucose pentaacetate (10 g.) in 100 cc. EtOH to which is added a mixt. of 2.3 g. $NH_2OH \cdot HCl$ and 5 g. AcOK in the dry form, gives 7.3 g. of the *oxime* (**I**), m. 99–9.5°, $[\alpha]_D^{24}$ 57.2° (0.2096 g. in 10.02 cc. MeOH); no rapid or appreciable mutarotation was observed in MeOH contg. 0.005% dry HCl. I (10 g.) 30 cc. Ac_2O and 60 cc. C_5H_5N at 0° give 8.9 g. of the *oxime hexaacetate* (**II**), m. 79°, then solidifies and m. 119.5°, $[\alpha]_D^{24}$ 41° (0.2029 g. in 10.06 cc. MeOH), $[\alpha]_D^{25}$ 45.9° (0.4022 g. in 10.06 cc. $CHCl_3$), does not show mutarotation. The lower-melting form is very unstable and changed spontaneously into the other, after which all attempts to obtain the 79° isomer failed; these are considered the *syn-* and *anti*-forms, although the possibility of an unstable pseudomorph is not excluded. II forms elongated prisms of the orthorhombic system, α 1.460, β 1.497, γ 1.504; other crystallographic data are given. β-Glucose oxime hexaacetate, prepd. according to Behrend (*C. A.* **1**, 2374), m. 113–5°, $[\alpha]_D^{25}$ 7.3° (0.4018 g. in 10.06 cc. $CHCl_3$), $[\alpha]_D^{24}$ —1.3° (0.4026 g. in 20 cc. MeOH); this is the ring form, corresponding in structure to glucose oxime; from the low rotation this is probably the β-isomer. *Mannonic acid nitrile pentaacetate*, from the oxime, Ac_2O and AcONa at 85–90°, m. 92–3°, $[\alpha]_D^{30}$ —1.1° (0.3525 g. in 10.06 cc. $CHCl_3$). Gluconic acid nitrile pentaacetate (**III**), m. 83–4°, $[\alpha]_D^{31}$ 48.3° (0.3505 g. in 10.02 cc. $CHCl_3$). β-Glucose oxime (**IV**), m. 142–3°, $[\alpha]_D^{25}$ —8.9°, final value —1.9° (1.0200 g. in 25 cc. H_2O). I and MeOH-NH_3 at 0° for 24 hrs. give **IV**. I at 200° begins to decomp.; only unchanged I was isolated from the partially decompd. product. II, heated at 135–40°, decomps. to III; the β-isomer did not form III on heating alone or with Ac_2O and AcONa. IV, Ac_2O and AcONa, heated at 75–80° for 1 hr., give mainly III but some II is also found, showing that the ring form of glucose oxime shifts to the

open-chain form on undergoing nitrile formation. AcOH and not H_2O is split off on nitrile formation from the oxime. C. J. WEST

Structure of carbohydrates and their optical rotatory power. I. General introduction. WALTER N. HAWORTH AND EDMUND L. HIRST. *J. Chem. Soc.* **1930**, 2615-35.—H. and H. discuss the validity of the "principle" of optical superposition, as proposed by Hudson (*C. A.* **24**, 2726), especially since optical rotations of sugars have usually been recorded for 1 solvent only and for light of one selected wave length. Hudson recognizes at least 2 categories of sugars, (a) those in which the additive principle seems to hold on the supposition of 1 general structure and (b) those in which different additive relationships seem to hold; H. and H. ask what exptl. justification has Hudson for suggesting that structural and not configurational differences are responsible for the lack of uniformity in the possible application of the principle of optical superposition to all the 6 common aldoses and confess that they find no such sanction in any of his writings. H. and H. point out (see part V) that where rotational values so remote from one another as 65° and —50° are given by 1 simple deriv. of mannose (in various solvents) any attempt to establish a fixed arithmetical or additive relation for the individual asym. centers of mannose derivs. will have a doubtful validity. H. and H. also criticize the nature of the structural proofs accepted by Hudson; they point out, *e. g.*, that he can provide no evidence for the 1,5-ring in any of the sugars to which he assigns it, except from the methylation data which he discards. A fundamental thesis in Hudson's recent scheme is the denial of structural identity to α- and β-mannose and to all their derivs.; this is based on differences in the sp. rotations in H_2O of α- and β-mannose and α- and β-glucose (47° as compared with 94°). However, when the rotations of tetramethyl-α- and β-methylmannosides are detd. in EtOH, the discrepancy of the mol. rotational differences disappears almost entirely and these 2 substances fall into line with the H_2O or EtOH values for several other methylated glucosides. A study of several pyranosides (1,5-ring) and furanosides (1,4-ring) shows that the glucosides preserve, in general, the same order of stability in their methylated forms and that, for glucosides of the same sugar, the furanoside form is much more easily hydrolyzed than the corresponding pyranoside form. When the true ring structures of α-Me glucoside and α-Me mannoside are compared, constancy of "epimeric differences" ceases to have any rational meaning. In commenting on Hudson's new formulas for di and polysaccharides, it is shown that a scheme of approx. accurate rotation values can be calcd. upon assumptions which are directly opposed in essential features to the structural views of Hudson. The elasticity of the methods of "proving" the ring structures of carbohydrates by rotational data is obvious. The rotational data of derivs. of 4-glucosido and 4-galactosidomannose are compared, and the ring structure of the 2 Me derivs. established by their cleavage with emulsin to the normal α-Me mannoside, which makes invalid Hudson's assumption that the α-mannose residue is the hypothetical variety for which he has calcd. the rotation to be $[\alpha]_D$ 77°. H. and H. conclude that the interpretation of the data on which they based the pyranose (1,5) structure of α-Me mannoside remains sound and receives further confirmation from these facts. **II. 4-Glucosido-α-mannose and its derivatives.** W. N. HAWORTH, E. L. HIRST, HARVEY RICHARD L. STREIGHT, HARRY A. THOMAS AND JOHN I. WEBB. *Ibid* 2636-44.—Details are given for the prepn. of cellobial (I). If the temp. rises to 30.5° during the reduction of heptaacetylcellobiosidyl bromide, there results *hexa-ac-2-deoxycellobiose*, m. 196°, $[\alpha]_D^?$ −15° ($CHCl_3$, *c* 1.5); it reduces boiling Fehling soln. and shows no unsatn. when tested with Br in $CHCl_3$. I with BzO_2H in MeOH-Et_2O gives *4-glucosido-α-methylmannoside* (II), m. 227-8°, $[\alpha]_D^{17}$ 46° (H_2O, *c* 1.0); hydrolysis with emulsin gives α-Me mannoside in 46% yield. I gives a *hepta-Ac deriv.* (III), m. 184°, $[\alpha]_D^{18}$ 30° ($CHCl_3$, *c* 1.0), 36° (Me_2CO, *c* 1.4), 21.5° (C_6H_6, *c* 1.5); deacetylation gives **II**. 4-Glucosido α-mannose was prepd from I and BzO_2H in Et_2O; it m. 175.6°, $[\alpha]_D^{18}$ 20° (H_2O, initial value), 12.5° (equil. value); in reducing power 155% of the sugar are equiv. to 1 g. of glucose. The rate of mutarotation is of the same order as that of α-mannose but rather slower. The value of $[\alpha]_D^{18}$ —1° was calcd. for the 4-glucosido-β-mannose. Octaacetyl-4-glucosido-α-mannose was transformed into heptaacetyl-4-glucosido-α-mannosidyl bromide, which gives **III** with Ag_2CO_3 in MeOH; quinoline gives the same compd. The mol. rotational difference of the α- and β-forms of the biose is similar to that of the α- and β-forms of mannose itself, although it was the supposed anomaly of this difference which led Hudson to ascribe different ring structures to the 2 mannoses. **III. 4-Galactosido-α-mannose and its derivatives.** W. N. HAWORTH, E. L. HIRST, MILLICENT M. T. PLANT AND REGINALD J. WM REYNOLDS. *Ibid* 2644-53.—The following results furnish a proof of the presence

of the ordinary α-mannoside residue in derivs. of 4-galactosido-α-mannose and demonstrate that the 1,4-ring structure cannot apply to the normal α-Me mannoside; these results are diametrically opposed to the contention of Hudson. Lactose was converted through its acetobromo deriv. into lactal, m. 191–2°, $[\alpha]_D^{23}$ 27.5° (H_2O, *c* 1.6); BzO_2H in MeOH-EtOH gives *4-galactosido-α-methylmannoside* (I), m. 207°, $[\alpha]_D^{19}$ 66° (H_2O, *c* 0.7); Ac_2O and AcONa or Ac_2O and C_5H_5N give the *hepta-Ac deriv.*, which could not be crystd., $[\alpha]_D^{18}$ 36° ($CHCl_3$, *c* 1.5), $[\alpha]_D^{28}$ 19° (C_6H_6, *c* 1.6). Hydrolysis of I by emulsin gives α-Me mannopyranoside and galactose, for which a method of sepn. is given; Lactal and BzO_2H in Et_2O give 70% of *4-galactosido-α-mannose* (II), crystg. with 1 mol. H_2O, m. 150–60°, $[\alpha]_D^{20}$ 38° (H_2O, initial), 27° (equil. value); in reducing power 162 parts of II are equiv. to 100 parts of glucose; the rate of mutarotation is of the same order as that of α-mannose. The rotation of the β-form of 4-galactosidomannose is calcd. to be $[\alpha]_D$ 16° in 76% EtOH, which is about that given by Bergmann. IV. Derivatives of α- and β-methyl mannopyranoside. HAROLD G. BOTT, W. N. HAWORTH, E. L. HIRST AND ROBERT S. TIPSON. *Ibid* 2653–9.—Contrary to Hudson (*C. A.* **24**, 2726), mannose (I) undergoes condensation by heating with 2% MeOH-HCl with the formation of both the α- and β-forms of Me mannopyranoside (II); 10 g. I and 95 cc. MeOH-HCl were boiled 1 hr. and kept at —10° for several hrs.; 6.1 g. α-II crystallizes out; after removing the acid with $PbCO_3$, the resulting gum is acetylated with C_5H_5N and Ac_2O, giving 3.7 of the tetra-Ac deriv. of β-II, m. 161°, $[\alpha]_D^{18}$ —46.8°; excess of Me_2NH in MeOH, heated 4 hrs. at 100°, gives *β-Me mannopyranoside* (III), yellow glass, $[\alpha]_D^{21}$ —66° (H_2O, *c* 1.05); 0.5 *N* NaOH gives the same product The rate of hydrolysis of III in 0.01 *N* HCl at 100° is very slow; $[\alpha]_D^{20}$ —64° (initial) changes to —59°, —55°, —50° and —46° after 2, 4, 7 and 10 hrs., resp.; even with 0.1 *N* HCl 15 hrs. were required for complete hydrolysis, 15° (final value). III, or the tetra-Ac deriv., with Me_2SO_4, Me_2CO and aq. NaOH gives the *tetra-Me deriv.* (IV), $b_{0.08}$ 90°, $b_{0.1}$ 110–2°, m. 36–7°, n_D^{17} 1.4535 (supercooled), $[\alpha]_D^{20}$ —79° (MeOH, *c* 0.52), —80° (H_2O, *c* 1.0), —87° ($CHCl_3$, *c* 0.46), —72° (C_6H_6, *c* 0.7), —82° (EtOH, *c* 0.4); the equil. rotation in 1% MeOH-HCl is 60°. Hydrolysis gives tetramethylmannopyranose, identified as the anilide. Methylation of I with Me_2SO_4 and 30% aq. NaOH and finally with Ag_2O and MeI gives a mixt. of the α- and β-forms of IV, contg. 32% of the β-form. Simultaneous deacetylation and methylation of tetraacetyl-α-methylmannopyranoside give almost quant. tetramethyl-α-methylmannopyranoside, also obtained by methylation of α-Me mannopyranoside. Thus, the normal forms of α- and β-Me mannoside give rise on methylation and hydrolysis to one and the same tetramethylmannose and this yields the tetramethyl-δ-mannonolactone, which has been shown to undergo epimerization to tetramethylgluconolactone. The rotations for tetramethylmethylmannopyranoside are (α- and β-forms): H_2O, 43°, —80°; $CHCl_3$, 57°, —87°; EtOH, 75.5°, —82.5°; C_6H_6, 77°, —72°. Although the discrepancy in mol. rotation values, noted by Hudson, is shown in H_2O, it almost disappears when the rotations are taken in EtOH. V. Optical rotatory powers of methylated lactones derived from the simple sugars. W. N. HAWORTH, E. L. HIRST AND JAMES A. B SMITH. *Ibid* 2659–63.—Those sugars which have *cis*-HO groups situated on the 2nd and 3rd C atoms, *viz.*, mannose, lyxose and rhamnose, display rotational relationships different from those observed with glucose, galactose or xylose. Since Hudson holds the view that these rotational divergences have their origin in differences in ring structure and not in configurational effects, it was important to obtain definite information concerning the presence or absence of such effects in cases where both the structure and the configuration of the substance under consideration have been established beyond doubt. With H_2O, $CHCl_3$, Et_2O and C_6H_6, resp., as solvents, the following results were obtained: *Mannose series.*—δ-Mannono-(*d*) 150, 59.5, 35, 20; γ-mannono-(*d*) 65, —10, —36, —50; δ-lyxono-(*d*) 35.5, —60, —87, —102; γ-lyxono-(*d*) 82.5, —28, —70, —70; δ-rhamnono-(*l*) —130, —68, —39, —15; γ-rhamnono-(*l*) —56.5, 13, 65, 87. *Glucose series.*—δ-Glucono-(*d*) 98, 103, 123, 121; γ-glucono-(*d*) 62, 42, 67, 68; δ-xylono-(*d*) 0, 9, 12, 17; γ-xylono-(*d*) 88, 81, 84, 106. *Galactose series.*—δ-Galactono (*d*) 153, 101, 96, 128; γ-galactono-(*d*) —34, —13, —11, —11; δ-arabono-(*l*) 181, 125, 105, 166; γ-arabono-(*l*) —44, —9, —3, 16. These results indicate that *cis*-MeO groups, when present in the mol., have a profound influence on the optical rotatory powers of substances which cannot alter their ring structure under the influence of solvents; it is thus clearly impossible to say with any degree of security that configurational effects play no part in the anomalous rotations of α-mannose and its derivs.

C. J. WEST

Ring structure of mannose. The optical rotation of 4-glucoside-α-mannose. HORACE S. ISBELL. *Bur. Standards J. Research* 5, 1179–87; *Proc. Nat. Acad. Sci.* 16, 704–7(1930).—4-Glucosido-α-mannose monohydrate was prepd. by the method of Brauns and its properties redetd.; $[\alpha]_D^{20}$ initial 14.7°, final 5.7°. The mutarotation approximated the monomol. course, $k_1 + k_2 = 0.016$ at 20°. A comparison of the initial mol. rotation with that of β-cellobiose gave an epimeric difference of 16,900. This agrees approx. with the value (14,900) obtained from the pair α-*d*-glucose (113) and α-*d*-mannose (30) and that (15,300) from the pair α-Me *d*-glucoside (157.9) and α-Me *d*-mannoside (79) but deviates from that predicted by Hudson (6700) (*C. A.* 24, 2726) who considers that the members of these pairs of monosaccharides have different rings while the disaccharides should have the same ring since the 1,4-linking is excluded in their case. The epimeric difference calcd. from the rotations of 4-galactosido-β-mannose and -lactose is approx. 5130 which agrees fairly well with the value obtained (6480) from the rotations of the pair β-*d*-glucose (19) and β-*d*-mannose (−17). Thus it appears that the derivs. of α-mannose and α-glucose parallel one another throughout while the derivs. of β-mannose and β-glucose also parallel one another, but no decision between the rival ring classifications of Hudson (*loc. cit.*) and Haworth (Constitution of Sugars, London, 1929) can be derived. An improved method for deacetylation with $Ba(OMe)_2$ in abs. MeOH is given. R. C. HOCKETT

New crystalline calcium chloride compound of α-*d*-gulose and its rotation and mutarotation in aqueous solution. HORACE S. ISBELL. *Bur. Standards J. Research* 5, 711–55(1930); cf. *C. A.* 24, 2726.—Pure gulose has never been crystd. but its rotation has been detd. by means of the cryst. $CaCl_2$ addn. compd. ($C_6H_{12}O_6 . CaCl_2 . H_2O$) (I) (cf. *C. A.* 23, 4932). The latter exhibits mutarotation and gives $[\alpha]_D^{20}$ extrapolated initial 37.7°, at equil. −15.4° + 0.78 *C*, where *C* is the concn. of the compd. in g. per 100 cc., $k_1 + k_2 = 0.0193$ at 20°. When the $CaCl_2$ is removed from a freshly prepd. soln. of I by means of dry $(CO_2Ag)_2$ the resulting soln. of pure α-*d*-gulose (II) shows a rate of mutarotation ($k_1 + k_2 = 0.0206$) close to that of I and near to that of mannose. The mol. rotation of II is 11,100 which differs very little from the value of 11,650 for I. The equil. rotation of II in the absence of $CaCl_2$ is not appreciably altered by small changes in the concn. of sugar, but that of I is greatly altered by small changes in concn. Concd. solns. of I on diln. with water exhibit a mutarotation rate approx. equal to that of II, showing that the salt changes the equil. rotation of *d*-gulose by altering the relative amts. of the different forms of the sugar in soln. R. C. HOCKETT

Synthesis of a methoxyketose. ERIC FRANK HERSANT AND WILFRID H. LINNELL. *Nature* 126, 844(1930).—A *5-methoxyketohexose* was prepd. by condensing $CO(CH_2OH)_2$ with *α-methoxyglyceric aldehyde* (I) in 5% aq. soln. contg. 0.25% of $Ba(OH)_2$ for 3 weeks at room temp. I was prepd. by methylation of *α-chloro-β-hydroxypropiondiethylacetal* with NaOMe to give *α-methoxy-β-hydroxypropiondiethylacetal*, b_6 100–2°, which was hydrolyzed with dil. mineral acid to I. The condensation products were converted into osazones, and fractionated from AcOEt into a product m. 183° and one m. 130°. The former was converted through the osone to a ketose, m. 80–5°, which analyzed correctly for a monomethoxyketohexose. It required 48 hrs. to condense with MeOH to *monomethoxymethylketoside*, thus confirming the supposition that because of the position of the MeO group it cannot be a γ-form which would condense in 1 hr. On complete methylation to *tetramethoxymethylketoside*, the product behaved like a normal fructose deriv. toward alk. $KMnO_4$ and was converted by hydrolysis with 3% aq. HCl for 3 hrs., to a cryst. *tetramethoxyketose*, m. 95–6°, which did not depress the m. p. of an authentic specimen of tetramethoxyfructose. HNO_3 oxidation of the product m. 130° gave *trimethyllactol acid* which was converted by alk. $KMnO_4$ to a *trimethylarabonolactone*, identical in its behavior on hydrolysis with the lactone from normal fructose but not with that from tetramethoxyl-γ-fructose. H. and L. conclude that the evident identity of the synthetic ketose derivs. in which a 5-atom ring is impossible with derivs. of normal fructose excludes the furanose constitutions for the latter and lends support to the accepted pyranose constitutions. R. C. HOCKETT

Individualities of anhydrofructose and difructose anhydride. R. F. JACKSON AND S. VAN GORGEN. *Bur. Standards J. Research* 5, 733–4(1930); cf. *C. A.* 23, 4452–3.—The cryst. anhydrofructose described by Irvine and Stevenson (*C. A.* 23, 3907(1929)) simultaneously with the description of difructose anhydride by J. and G. is not the same compd. as the latter. The former compd. is deliquescent, $[\alpha]_D^{26}$ 30.17°, m. 143–5° (acetate, $[\alpha]_D^{20}$ 1.5°, m. 123°), mol. wt. 162, and it crystallizes in transparent spheroids. The latter is not deliquescent, $[\alpha]_D^{20}$ 27.0°, m. 162–4° (acetate, $[\alpha]_D^{26}$ 0.5°, m. 137° (sinters 125°)), mol. wt. 307, and it crystallizes in laminated spheres. R. C. H.

Polysaccharides. XLIII. Effect of heating polysaccharides in glycerol. P. KARRER AND E. v. KRAUSS. *Helv. Chim. Acta* **13**, 1071–3(1930); cf. *C. A.* **24**, 1538.—Acetylated starch (44.7% Ac) when heated in glycerol at 200–20° for several hrs. gives a product (I) contg. 7–10% Ac. This shows that hydrolytic processes occur which may affect glucosidic linkages. Cu nos. of the partially deacetylated compds. vary about 2. Yields were not quant. and the stronger reducing portions remain in the mother liquor after pptn. with alc. I which dialyzes quickly and completely through collodium membranes is like starch (II) in regard to its behavior with AcBr by means of which it is degraded to acetobromomaltose and then to hepta-acetylmaltose (III) in yields about the same as that obtained from II. These results are similar to those obtained by Pictet and Vogel (*C. A.* **73**, 4676) by heating II in glycerol, in which isotrihexosan (IV) was formed. IV, dextrinosan (obtained by heating II with glycerol at 240°), and dextrinose (V) (obtained by the action of $H_2C_2O_4$ or malt diastase on IV) were degraded with AcBr. The first 2 gave yields of III, about the same as that from II, but with V the yield was less. These substances, therefore, are most correctly viewed as partially hydrolytically attacked but not yet profoundly changed starch. **XLIV. Chitin.** P. KARRER AND S. M. WHITE. *Ibid* 1105–13.—As reported previously (*C. A.* **23**, 2478) reacetylated chitosan (I) is degraded to acetylglucosamine by chitinase (snail ferment) (II). It is shown now that *formyl-*, *propionyl*, *butyryl*, and *benzoychitosan* are not affected by II, showing this ferment to be sp. for I. *α-Naphthalenesulfonyl deriv.* of I and the foregoing derivs. are prepd. by standard procedures. The type of union of N in chitin and I is discussed in the light of various publications and some new information is presented but results do not allow a definite conclusion. Methylation expts. argue against primary amino groups since a quaternary salt could not be obtained. On the other hand, I and $PhSO_2Cl$ give *N benzenesulfonyl chitosan* which is difficultly sol. in H_2O and easily sol. in dil. alkali. *Monomethylchitosan* and $PhSO_2Cl$ give a *N deriv.* insol. in dil alkali. The chem. behavior of I and its derivs. in many respects is similar to those of glucosamine-glucosides. The N (8%) of I can be split off quantitatively by the van Slyke method, on the basis of which I still contains 12% Ac which cannot be bound to N. FREDERICK C. HAHN

Constant occurrence of non-reducing disaccharides in hydrolyzed inulin. RICHARD F. JACKSON AND EMMA MCDONALD. *Bur. Standards J. Research* **5**, 1151–60(1930); cf. *C. A.* **23**, 4452.—Pure inulin (I) extd. from wild chicory, dandelion, golden rod, burdock and Jerusalem artichoke yields on hydrolysis with H_2SO_4 approx. 91% fructose, 3.7% glucose and 5.3% of non-reducing difructoses regardless of source. The same compn. was previously found for I from dahlia tubers (*loc. cit.*). Eleven-fold recrystn. of dahlia I with rejection of the mother liquors has no appreciable effect upon its compn. Related polysaccharides do not give these difructoses so that the latter cannot be considered by-products of the hydrolysis. They appear, therefore, to be an integral part of the I mol. Expts. as yet incomplete indicate that at least 3 disaccharides are present in the mixt. If the isomerism is due to the process of hydrolysis and only 1 such group is present in a mol. of I, the min. possible mol. wt. becomes 6000 while if all 3 groups which appear as non-reducing disaccharides on hydrolysis are present in 1 mol., the mol. wt. of I must be at least 18,000. This is greater than that usually claimed but closest to the f. p. value of Tanret (*Bull. soc. chim.*, 227, 622(1893)) who gave 4827. R. C. HOCKETT

Reactions of heterocycles with phenols. The reaction of ethylene oxide with phenol. RICHARD A. SMITH AND JOSEPH B. NIEDERL. *J. Am. Chem. Soc.* **53**, 806–8(1931).—$(CH_2)_2O$ and PhOH with concd H_2SO_4 in the cold give 65% of *o*-vinylphenol (I), b_{10} 56°, b_{15} 77°, m. 29–9.5° (cor.); $O{:}C_6H_4{:}O$ is a good inhibitor to polymerization. This was further identified by the prepn. of the tetra-Br deriv., m. 105°, and *o*-vinylphenoxyacetic acid, m. 137°. Heating PhOH and $(CH_2)_2O$ 6 hrs. at 150° gives $HOCH_2CH_2OPh$ (II), b_{80} 163–7°; 0.2 mol. concd. H_2SO_4 with this ether for 1 week gives I. It is assumed that $(CH_2)_2O$ and H_2SO_4 first form $HOCH_2CH_2OSO_2OH$, which then reacts with PhOH to give II, which then splits off H_2O to give I. C. J. WEST

Preparation of *o*-chlorotoluene from *p*-toluenesulfonyl chloride. L. MCMASTER AND J. CAROL. *Ind. Eng. Chem.* **23**, 218–9(1931).—Chlorination of *p*-$MeC_6H_4SO_2Cl$ in the presence of $SbCl_3$ at 70–80° and subsequent hydrolysis of the 3,4-$ClMeC_6H_3SO_2Cl$ with 10% H_2SO_4 to 3,4-$ClMeC_6H_3SO_3H$ and further hydrolysis of the latter with 80% H_2SO_4 and superheated steam gave *o*-ClC_6H_4Me in 90% yield. RACHEL BROWN

Derivatives of 3-amino-4-methoxytoluene. L. CHAS. RAIFORD AND OLIVER GROSZ. *Proc. Iowa Acad. Sci.* **36**, 268(1929).—This product, known technically as cresidine, was first obtained by Hofmann and Miller [*Ber.* **14**, 573(1881)]. Before the present work, however, only 2 substitution products had been obtained from it, *viz.*, the 6-nitro

and the 6-Cl derivs. In this work a mono-Br deriv. has been prepd. and its structure established. It readily forms a quaternary NH_4I, therefore the Br atom does not occupy position 2, adjacent to the amino group, as this would hinder the formation of such a salt. 3,5,4-$Br_2(MeO)C_6H_2Me$ was synthesized and found to be different from the di-Br deriv. obtained from the compd. in question by replacement of the amino group by Br. This leaves the structure of the mono-Br deriv. as *3-amino-4-methoxy-6-bromotoluene*. The new Br compd. was characterized by the prepn. of the *N-Ac* and *N-Bz derivs.* and *3-acetylamino-4-methoxy-6-bromobenzoic acid*.

W. G. GAESSLER

The effects of substituents in the formation of thiocarbanilides. L. CHAS. RAIFORD AND G. MERVIN MCNULTY. *Proc. Iowa Acad. Sci.* **36**, 269(1929).—It is well known that many reactions of C_6H_6 derivs. are hindered by the presence of substituents that are ortho as respects the reacting group. In the work here reported such hindrance has been observed when the substituent occupies the *m*-position. *p*-$H_2NC_6H_4NHAc$ reacts very readily with CS_2 in alc., forming the corresponding thiocarbanilide. When a Me radical is meta to the amino group the reaction velocity is decreased by about ½. If one or both *m*-positions are occupied by Br atoms, the reaction is completely prevented. A single Br atom in the *o*-position caused inhibition, also. This reaction was studied with the following compds.: 2,4- and 3,4-$Br(NH_2)C_6H_3NHAc$, 2,6,4- and 3,5,4-$Br_2(H_2N)C_6H_2NHAc$. The Ac groups of the above-mentioned thiocarbanilides cannot be removed from these compds. by any method of hydrolysis tried in this work without, at the same time, decompg. the ureas.

W. G. GAESSLER

4-*p*-Tolylthiosemicarbazide and its reactions with ketones. R. W. BOST AND W. F. SMITH. *J. Am. Chem. Soc.* **53**, 652–4(1931).—4-*p*-Tolylthiosemicarbazide was obtained in 90% yield from *p*-MeC_6H_4NCS and $N_2H_4 \cdot H_2O$ in EtOH; it m. 137°; *HCl salt*, m. 173°. Condensation products were prepd. as follows: *acetone*, m. 142°; *Me Et ketone*, m. 75°; *acetylacetone* (I), m. 100°; *Et acetoacetate*, m. 107°, *cyclohexanone*, m. 125°, *acetophenone*, m. 165°; *benzophenone*, pale yellow, m. 158°; *benzoylacetone*, pale yellow, m. 126°; *benzoin*, cream, m. 161°; *benzil*, cream, m. 164°; *carvone*, cream, m. 147°. Refluxing I in abs. EtOH 1 hr. gives a mixt. of 3,5-dimethylpyrazole and *p*-tolylthiourethan.

C. J. WEST

Condensation products of methylolamines with phenolic ethers. LYDIA MONTI WITH GUGLIELMO VERONA. *Gazz. chim. ital.* **60**, 777–86(1930). In continuation of earlier expts. on condensation products of methylol acid amides and many aromatic compds. (cf. *C. A.* **24**, 4013), the same reaction was utilized to prep. directly some hydroxyalkylbenzylamines from multivalent phenolic ethers and methylol acid amides. Einhorn has already described a similar condensation reaction with *p*-$O_2NC_6H_4OEt$ and β-$C_{10}H_7OMe$ (cf. *Ann.* **343**, 288(1905); *C. A.* **2**, 2682), and consequently a corresponding reaction was to be expected with other multivalent phenolic ethers. By carrying out the reaction with equimol. proportions of phenolic ether and methylol acid amide there was formed in some cases, besides the benzylamine derivs., derivs. of xylylenediamines by condensation of 2 mols. of methylol acid amide with 1 mol. of phenolic ether. Sapon. of these products, both in acid and in alk. medium, yields the corresponding amines, which were characterized by HCl salts and picrates. Thus prepd., the methoxybenzylamines are of special interest because of their constitutional relation to certain natural alkaloids. Methylolchloroacetamide (I) and methylolbenzamide (II) were prepd. according to the directions of Einhorn (cf. *Ann.* **343**, 223, 282(1905)). Veratrole (2.2 g.), I (2 g.), glacial AcOH (25 cc.) and fused $ZnCl_2$ (5 g.), heated until completely dissolved, let stand 48 hrs., poured into water, extd. with boiling CCl_4, the ext. evapd. and the residue recrystd. from CCl_4, yield 3,4-$(MeO)_2C_6H_3CH_2NHCOCH_2Cl$ (III), m. 116.8° (cf. 117–7.5° of Jacobs and Heidelberger, *C. A.* **9**, 1612). The residue from the extn. with CCl_4, crystd. from water and AcOH, yield 3,4,1,6-$(MeO)_2C_6H_2(CH_2NHCOCH_2Cl)_2$ (IV), m. 169–70°. III (2 g.), refluxed with 20% HCl (50 cc.), evapd. to a very small vol., the cryst. residue dried on a porous plate and washed with Et_2O, yields *3,4-dimethoxybenzylamine-HCl* (V), blackens 240°, m. 246° (decompn.). Satd. aq. picric acid (VI), added to aq. V and the ppt. recrystd. from water, yields the picrate, $(C_9H_{13}O_2N).C_6H_2(NO_2)_3OH$, lemon-yellow, m. 169–70° (same m. p. as that reported by Douetteau, *C. A.* **6**, 605, for a prepn. by another method). IV, boiled with 20% HCl as with III (*loc. cit.*), yields *3,4-dimethoxyxylylenediamine-HCl* (VII), not, however, in a form pure enough to be analyzed. Concd. aq. VI and aq. VII yield, after recrystn. of the ppt. from boiling water, the *picrate*, $C_{10}H_{16}O_2N_2.(C_6H_2(NO_2)_3OH)_2.2H_2O$, orange-yellow, loses its H_2O of crystn. at 100–20° (becomes lemon-yellow), m. 216–8° (decompn.). 2,3,4-$C_6H_3(OMe)_3$ (2.7 g.), I (2 g.), glacial AcOH (25 cc.) and $ZnCl_2$ (4 g.), heated until the latter is dissolved, let stand 2 days, poured

into water and the ppt. recrystd. from boiling water, yield *2,3,4-trimethoxychloroacetylbenzylamine* (VIII), m. 98–9°, insol. in cold. aq. alkalies, sol. in hot, dil. acids and in cold concd. acids. VIII (2 g.) and 20% HCl, refluxed 2 hrs., filtered and the filtrate evapd. to a relatively small vol., yield a deliquescent mass of *2,3,4-trimethoxybenzylamine-HCl* (IX). Attempts to obtain the free base (X) by neutralizing IX with alkali gave a reddish yellow oil with disagreeable odor and an alk. reaction. Neither did NH_4OH liberate the base from IX. Aq. IX and satd. aq. VI yield, after recrystn. of the ppt. from boiling water, the *picrate* of X, $C_{10}H_{15}O_3N.C_6H_2(NO_2)_3OH$, golden yellow, begins to alter at 205°, m. 208–10° (decompn.). *Chloroplatinate* of X, yellow, blackens around 200°, does not m. up to 300°. 1,2,3-$C_6H_3(OMe)_3$ (XI) (5 g.) in AcOH, II (4.5 g.) in AcOH and $ZnCl_2$ (10 g.), heated until the latter is dissolved, let stand 24 hrs., poured into cold water and the paste recrystd. from boiling C_6H_6, yield a fraction, m. 172–5°, and a fraction, m. 120–5°. The 1st fraction recrystd. repeatedly from dil. AcOH (with animal charcoal) yields *2,3,4-trimethoxydibenzoylxylylenediamine*, $(MeO)_3C_6H(CH_2NHBz)_2$ (XII), silky, m. 189–90°. The 2nd fraction, recrystd. from dil. AcOH, yields *2,3,4-trimethoxybenzoylbenzylamine*, 2,3,4-$(MeO)_3C_6H_2CH_2NHCOBz$ (XIII), lustrous, m. 125–6°. If, in the condensation of II and XI, the reaction mixt. is refluxed 2–3 hrs. or if H_2SO_4 is used instead of $ZnCl_2$, only XII is formed. XII and XIII are insol. in aq. alkalies, but are sol. in cold. concd. acids. Unlike III and IV, XII and XIII do not react when refluxed with 20% HCl. They can, however, be sapond with alc. KOH. XIII (5 g.) and 30% alc. KOH (40 cc.), refluxed 6–8 hrs., the EtOH eliminated, the residue dild. with water, extd. with Et_2O, yield a yellow oil identical with that from VIII. Under similar conditions XII yield a reddish yellow oil, probably *2,3,4-trimethoxyxylylenediamine*. Treated with satd. aq. IV, it ppts. the *picrate*, $C_{11}H_{16}O_2N_2.(C_6H_2(NO_2)_3OH)_2$, which, recrystd. from boiling water, is golden yellow, m. 215.5°. I (2 g.), 1,3,4-$C_6H_3(OMe)_3$ (2.6 g.) and $ZnCl_2$ (4 g.), refluxed until the latter is dissolved, the soln. (dark blue with violet fluorescence) let stand 48 hrs., poured into water and the ppt. purified with animal charcoal and recrystn. from CCl_4, yield *2,4,5-trimethoxychloroacetylbenzylamine* (XIV), m. 115–6°, insol. in aq. alkalies and cold, dil. acids. XIV (2 g.) and 20% HCl (50 cc.), refluxed 2 hrs., yield *2,4,5-trimethoxybenzylamine-HCl*, 2,4,5-$(MeO)_3C_6H_2CH_2NH_2$, does not liberate the base with NH_4OH, but in concd. aq. soln. and satd. aq. IV it ppts. the *picrate*, $C_{10}H_{15}O_3N.C_6H_2(NO_2)_3OH$, which recrystd. from boiling water, is orange-red and m. 200–2°. 3,4,5-$(MeO)_3C_6H_2CO_2H$ (XV) (3.5 g.), I (2 g.) in glacial AcOH (25 cc.) and $ZnCl_2$ (5 g.), refluxed until dissolved, let stand 3 days, poured into water and the ppt. purified by washing with boiling C_6H_6 (to remove XV) and recrystg. from water contg. AcOH, yields *3,4,5-trimethoxy-2-chloroacetylbenzylamine-o-carboxylic acid*, 2,3,4,5-$ClH_2CCONHCH_2(MeO)_3C_6HCO_2H$ (XVI), m. 189–90°. XVI, sapond. as before, and the crude product purified by evapg. the acid soln. to a very small vol., drying the cryst. mass on a porous plate and washing with Et_2O, yields *3,4,5-trimethoxy-2-benzylamine-o-carboxylic acid-HCl*, 2,3,4,5-$ClH_2NCH_2(MeO)_3C_6HCO_2H$, m. 153–4° (decompn.); its concd. aq. soln. and satd. aq. IV give the *picrate*, intense yellow, m. 150–2°. C. C. Davis

Decomposition of benzenediazonium sulfate by aliphatic alcohols. Herbert H. Hodgson and Arnold Kershaw. *J. Chem. Soc.* 1930, 2784–5.—PhN_2HSO_4 is decompd. by the aliphatic alc., giving either an ether and C_6H_6 or C_6H_6 and an aldehyde, ether formation greatly predominating; the data given show decreasing formation of C_6H_6 from $PhCH_2OH$ to BuOH, MeOH being an exception. The results, expressed as mol. % aldehyde on mol. amt. of sulfate taken, are: $PhCH_2OH$, 19.7; MeOH, unweighable; EtOH, 9.5; PrOH, 4.7; iso-PrOH, 4.8 (with H_2O, 3.6); BuOH, 1.3. C. J. West

The action of acids on diazoaminobenzene. II. J. C. Earl. *Proc. Roy. Soc. N. S. Wales* **64**, 96–100(1930); cf. *C. A.* **24**, 2115.—Further expts. have led to the isolation and identification of I, the substance formed when very dil. alc. HCl acts on diazoaminobenzene (II), as *benzenediazoaminoazobenzene*, $PhN_2C_6H_4NHN_2Ph$, and its formation can be detected in any of the reactions which effect the conversion of II into aminoazobenzene (III). It is suggested that the formation of I by means of AcOH is an essential intermediate stage in the conversion of II into III as follows: (a) $2PhN_2NHPh \longrightarrow PhN_2C_6H_4NHN_2Ph + PhNH_2$; (b) $PhN_2C_6H_4NHN_2Ph + PhNH_2 \longrightarrow PhN_2C_6H_4NH_2 + PhNHN_2Ph$. Further work on this mechanism will be the subject of a later communication. When 7.5 g. powd. II was kept in 90 cc. cold AcOH at 14° for 20 min., then poured with stirring into a large excess of ice water, allowed to stand in an ice bath for 45 min., filtered, the ppt. washed, dissolved in hot alc. contg. a little NH_3, a small quantity of water added and cooled, 0.7 g. of impure I sepd.;

repeated recrystn. gave pure I, m. 119.5°. Mixts. of I and II show a remarkable resistance to sepn. by crystn. from either aq. alc. or petr. ether. N. A. LANGE

Group influence on the colors of substituted benzeneazophenols, including *o*-azophenols. HERBERT HENRY HODGSON AND WOLF ROSENBERG. *J. Soc. Chem. Ind.* 49, 405–8T(1930); cf. *C. A.* **24**, 2735.—Differences between isomeric 2- and 4-hydroxyazobenzenes, and the influence of NO_2, SO_3H, Cl, Br, I and Me groups either in the primary or in the secondary dye component are discussed from the standpoint of the theories of Lapworth and Robinson and of Ingold. K. H. ENGEL

Diarylacylhydrazine series. II. Salt formation in the benzidine and semidine rearrangements. JOHN J. RITTER AND FRANK O. RITTER. *J. Am. Chem. Soc.* 53, 670–6(1931); cf. *C. A.* **24**, 4001.—The monoacetylhydrazines previously described, on oxidation with $K_2Cr_2O_7$, fall in 2 classes; the *N*-Ac derivs. give the corresponding azo compds., while the *N'*-derivs. give brilliant, intensely colored red or violet solns. from which highly colored cryst. products may be isolated. The production of the colored oxidation products appears to depend upon the presence of the group PhNH- and is undoubtedly caused by air oxidation of the original unrearranged products. The oxidation of the hydrazo compds. in the presence of HCl was found to be quite parallel to the oxidation of their Ac derivs. with $K_2Cr_2O_7$; this behavior is most readily explained by assuming that the hydrazo compds. in acid soln. form mono salts, which may involve the N or N' atom, and oxidize to new colored substances on the one hand, or to the azo compds., on the other, depending on the N atom involved in the salt formation. Consideration of the rearrangement of 78 hydrazo compds. indicates that when salt formation takes place on a N atom attached to an aryl nucleus in which the *p*-position is open, diphenyloids result, while semidines are formed when the salt in question involves a N atom attached to a nucleus carrying a *p*-substituent. The following new compds. are reported: *p-Acetoxyhydrazobenzene*, m. 117–8° (all m. ps. cor.); *N-acetyl-p-iodohydrazobenzene*, m. 135–6°; *N'-ac deriv.*, m. 156–7°; *N-acetyl-p-carboxyhydrazobenzene*, m. 207–8°; *N'-acetylbenzenehydrazo-p-phenetole*, m. 108°, by reduction of benzeneazo-*p*-phenetole with Zn and glacial AcOH; *N-acetyl-p-acetoxyhydrazobenzene*, m. 105–6°. C. J. WEST

***p*-Cymene studies. XIV. 2-*p*-Cymylhydrazine.** ALVIN S. WHEELER AND THOS. L. KING. *J. Am. Chem. Soc.* **53**, 809–10(1931); cf. *C. A.* **23**, 5470.—The following salts of *p*-cymylhydrazine-2 have been prepd.: *acetate*, m. 63–4°; *lactate*, m. 134.5°; *oxalate*, m. 167°; *benzoate*, m. 72–5°; only the lactate is stable with H_2O. *m-Nitrobenzaldehyde 2-p-cymylhydrazone*, rich red (yellow by transmitted light), m. 143°, stable toward H_2O. Unstable products were obtained with various other CO-contg. compds., reddish, viscous oils, do not crystallize at —30°. This hydrazine is not a good reagent for the CO group. C. J. WEST

Derivatives of phenylboric acid, their preparation and action upon bacteria. WM. SPAMAN AND JOHN R. JOHNSON. *J. Am. Chem. Soc.* **53**, 711–23(1930).—Me borate, purified by washing with cold concd. H_2SO_4, b_{750} 67–7.8°, d_4^{20} 0.932, n_D^{24} 1.3558. Addn. of PhMgBr to Me borate in Et_2O gives 30% of $PhB(OH)_2$, m. 215.5–9° (preheated bath) 221° (cor., block). Nitration with fuming HNO_3 at —15° to —9° gives 70% of the *m*-NO_2 deriv. and 10% of the *o*-NO_2 deriv. The *m*-NO_2 deriv. m. 275–6.5° (preheated bath to 250°), 273° (cor.), 319° (cor., block); dried to constant wt., it m. 287.6° (cor.), probably that of the anhydride, $O_2NC_6H_4BO$; the structure was established by the formation of *m*-$BrC_6H_4NO_2$ by the action of $HgCl_2$ and Br. Fuming HNO_3 added slowly to $PhB(OH)_2$ in Ac_2O at —15° gives 60% of the *o*-NO_2 *deriv.*, yellow, m. 139.2–40.8° (cor.) in a bath heated from 20°, 138.7–9.2° in a bath preheated to 120°, m. 147.5° (block); dried to constant wt., the anhydride m. 143.5–7.7° (cor.); there also results about 2% of the *p*-NO_2 *deriv.*, yellow, m. 305° (decompn.), did not m. 360° (block). Reduction with $Fe(OH)_2$ gives 44–8% of *m-aminophenylboric acid*, m. 92.8–3.8° (cor.), m. 176° (cor., block); the anhydride m. 193° (cor.); *Ac deriv.*, m. 274.5° (cor.); *Bz deriv.*, m. 290° (cor.). *Benzoyl-o-aminophenylboric acid*, m. 283.4° (cor.), 319.5° (cor., block). Bacteriological tests showed that $PhB(OH)_2$ and the 3 NO_2 derivs. exert a bacteriostatic effect upon *Staphylococcus aureus;* the *m*-NH_2 deriv. and its derivs. do not produce this effect. The NO_2 derivs. are more highly bacteriostatic than $PhB(OH)_2$, which in turn is much more effective than H_3BO_3. Although no direct comparison was made, it appears that the *m*-NO_2 deriv. (1:200) approaches or slightly surpasses PhOH (1:70) in its bactericidal action toward *B. typhosus* but $PhB(OH)_2$ (1:200) is much weaker than PhOH. C. J. WEST

II. **Aromatic arsenic compounds containing sulfur groups attached to the nucleus. Thiocyano and disulfido groups.** HARRY J. BARBER. *J. Chem. Soc.* **1930**, 2725–9;

cf. *C. A.* **25**, 92.—4-$H_2NC_6H_4AsO_3H_2$, diazotized and treated with CuSCN and KSCN, gives 30% of *4-thiocyanophenylarsonic acid*, prisms; boiling with 2 *N* NaOH gives an amorphous product, which is oxidized by I-KI in $NaHCO_3$ to diphenyl disulfide-4,4'-diarsonic acid. The *2-thiocyano deriv.* is comparatively unstable and on mild oxidation gives the *2,2'-diarsonic acid*, also obtained from 2-sulfinophenylarsenious oxide (I) with SO_2 and HI, followed by oxidation; *N* NaOH hydrolyzes the disulfide to thiol or thioarsenite. *3-Nitro-4-thiocyanophenylarsonic acid*, yellow leaflets (50% yield), boiling with 2 *N* NaOH gives NH_3; after acidification, SO_2 is liberated and a brown tarry mass results. I in glacial AcOH and $H_4P_2O_6$ contg. KI, boiled 5 min., gives the *compd.* $C_6H_4\langle^{As:As}_{S\quad S}\rangle C_6H_4$, lemon-yellow, m. 177-8°; this was also obtained with other strong reducing agents; it is unaffected by boiling alkali but concd. H_2SO_4 gives a yellow-orange soln.; it is slowly oxidized by I in $NaHCO_3$ suspension, giving the disulfide arsonic acid; concd. HNO_3 rapidly oxidizes it to 2-sulfophenylarsonic acid; heating at 300° produces a complex decompn.; heating with Cu bronze did not give thianthrene. C. J. West

Action of trichloromethyl chlorocarbonate upon phenols. N. N. Melnikov. *J. prakt. Chem.* **128**, 233-8(1930); cf. *C. A.* **24**, 5725.—$Cl_3COCOCl$ (I) (30 g.) and 16.2 g. *p*-MeC_6H_4OH in 75 cc. 2 *N* NaOH give 16 g. *p-tolyl trichloromethyl carbonate* (II), b_{10} 162°, m. 47°; with 10.9 g. *p*-MeC_6H_4OH and 5 g. I, there results di-*p*-tolyl carbonate, m. 114°. I (20 g.) and 14.4 g. *β*-$C_{10}H_7OH$ give 18 g. of the *β-naphthyl deriv.* (III), m. 128°, while 14.4 g. *β*-$C_{10}H_7OH$ and 5 g. I give 10 g. di-*β*-naphthyl carbonate, m. 175°. *p-Chlorophenyl deriv.* (IV), m. 109°; *p-nitrophenyl deriv.* (V), pale yellow, m. 132°. II and $PhNH_2$ in Et_2O give *p*-$MeC_6H_4OCONHPh$, m. 114°; III gives *β*-$C_{10}H_7OCONHPh$, m. 154°; IV gives *p*-$ClC_6H_4OCONHPh$, m. 137-8°; V gives *p*-$O_2NC_6H_4OCONHPh$, m. 147°. The use of NaOH gives larger yields and purer products than with KOH, since normal carbonates are also formed with KOH. Also in *J. Russ. Phys.-Chem. Soc.* **62**, 1671-5(1930). C. J. West

Formation of aromatic thiosulfonic acids from disulfides. Ernest W. McClelland and Leonard A. Warren. *J. Chem. Soc.* 1930, 2690-3.—2,2'-*o,o'*-Dithiodiphenyl-4,5-dihydroglyoxaline with SO_2 gives a product (*C. A.* **24**, 1376) which is now represented as a *thiosulfonic acid* (I, R = SO_3H), since KCN yields the *thiocyanate* (I, R = CN), m. 180°; the same product was obtained when the HBr salt of II in hot H_2O is mixed with aq. KCN and cooled. The thiosulfonic acid is also obtained from I (R = H) and SO_2 in boiling EtOH; decompn. gives the disulfide. *2-Phenyl 4,5-dihydroglyoxaline-m-thiosulfonic acid*, pale yellow, m. 246° (decompn.); the *p*-isomer m. 248° (decompn.); KCN gives the *p-thiocyanate*, yellow, m. 265°. The following disulfides, dissolved or suspended in EtOH, were recovered unchanged after prolonged treatment with SO_2: di-*p*-tolyl disulfide, 3,4,3',4'-tetramethoxy-, 5,5'-dibromo-3,4,3',4'-tetramethoxy-, 4,4'-dinitro- and 2,5,2',5'-tetrabromo-diphenyl disulfides, di-2-naphthol-1-disulfide and dibenzyl disulfide.

$$RSC_6H_4—C\begin{matrix}\!\!=\!\!N\\ \!\!-\!\!NH\end{matrix}—CH_2 \quad (I)$$

$$S\begin{matrix}-\!\!-N\\ |\quad\;\;|\end{matrix}-CH_2 \quad (II)$$
$$C_6H_4\;\;C{:}N\;\;CH_2$$

C. J. West

The synthesis of aromatic hydroxy ketones. I. *o*- and *p*-Acylphenols with normal C_4 to C_9 chains. G. Sandulesco and A. Girard. *Bull. soc. chim.* [4], **47**, 1309-14 (1930). *o*- and *p*-Acylphenols, HOC_6H_4COR, were prepd. with the object of studying their hypnotic properties in comparison with that of 1,2-$HOC_6H_4CO_2H$, the relationship between soly. in the lipoids and hypnotic activity was also of interest. The method of prepn. was as follows: PhOH was energetically mixed with finely divided $AlCl_3$ (1 mol.) and heated to 100° (1 mol. of HCl is evolved); 1 mol. of RCOCl was then added and heated to 125-30° for 1 hr. The Al complex was decompd. with water, and the oil was sepd., washed and fractionated. The yields of the *o*- and *p*-isomers were 45-60 and 30-40%, resp.; the total yield was 80-90%. The *o*-compds. are differentiated from their isomers by the soly. of the former in Et_2O, insoly. in alkali, greater difficulty in their reduction and lower m. and b. ps. Due to the insoly. in alkali, all attempts to prep. the ether derivs. of the *o*-compds. failed. The compds. prepd. and their properties were as follows (d. at 24°, *n* at 25.3°): ***o*-Butyrylphenol** (yield 45%), b_8 119°, m. 10.5-0.6°, d. 1.0683, *n* 1.5375 (***semicarbazone***, m. 192-3°); ***p*-butyrylphenol** (yield 50%), b_{10} 130°, d. 1.0435, *n* 1.5309 (***semicarbazone***, m. 204-5°); ***p*-valerylphenol** (yield 29%), b_{10} 197.5-8.5°, m. 63° (***benzoate***, m. 92°); ***o*-caproylphenol** (yield 50%), b_{10} 142-3°, m. 17.2-7.4°, d. 1.0260, *n* 1.5254 (***semicarbazone***, m. 179°); ***p*-caproylphenol**

(yield 34%), b_{10} 207–8°, m. 61° (*benzoate*, m. 105.5°); *o-heptoylphenol* (yield 48%), b_{10} 155–6°, m. 9.8°, d. 1.0110, *n* 1.5209 (*semicarbazone*, m. 162°); *p-heptoylphenol* (yield 41%), b_9 214°, m. 91–1.5° (*benzoate*, m. 96.5–7.0); *o-octoylphenol* (yield 45%), b_{11} 169–70°, m. 22.3°, d. 0.9989, *n* 1.5169 (*semicarbazone*, m. 157–8°); *p-octoylphenol* (yield 38%), b_{10} 224–5°, m. 62° (*benzoate*, m. 107–8°); *o-nonoylphenol* (yield 55%), b_{10} 180°, m. 18.4°, d. 0.9887, *n* 1.5139 (*semicarbazone*, m. 164°); *p-nonoylphenol* (yield 35%), b_{10} 232°, m. 54.5° (*benzoate*, m. 99.8–100°). The ketophenols were reduced to alkylphenols with Zn-Hg. In the *p*-series a yield of 75–90% was obtained. In the *o*-series the reduction was accomplished in a mixt. of 50% by vol. each of HOAc and fuming HCl, with yields of about 80%. The consts. were as follows: (d. at 23°, *n* at 25.5°, *n* of benzoates at 45.6°, Ac = $PhOCH_2CO_2H$ deriv.). *o-Butylphenol* (yield 83%), b_{10} 109.5–110°, d. 0.9774, *n* 1.5180 (*Ac* m. 105.5°); *p-butylphenol* (yield 86%), b_{11} 125–6°, m. 22°, *n* 1.5165 (*benzoate*, m. 27°, *n* 1.5082); *o-amylphenol* (yield 72%), b_{11} 122–4°, d. 0.9635, *n* 1.5132 (*Ac* m. 77–7.5°); *p-amylphenol* (yield 79%), b_{10} 134–6°, m. 23°, *n* 1.5119 (*benzoate*, m. 51–1.5°, *n* 1.5038); *o-hexylphenol* (yield 80%), b_{10} 135–6°, m. −2°, d. 0.9524, *n* 1.5089 (*Ac* m. 89.5–90°); *p-hexylphenol* (yield 77%), b_{10} 146–7°, m. 28° (*benzoate*, m. 26.5°, *n* 1.4996); *o-heptylphenol* (yield 90%), b_{10} 147–8°, m. 2–3°, d. 0.9432, *n* 1.5058 (*Ac* m. 71.5°); *p-heptylphenol* (yield 73%), b_9 157°, m. 26° (*benzoate*, m. 40.5–41°, *n* 1.4969); *o-octylphenol* (yield 79%), b_{11} 160–2°, m. 18–18.5°, d. 0.9362, *n* 1.5029 (*Ac* m. 88–8.5°); *p-octylphenol* (yield 85%), b_{10} 169°, m. 41–2° (*benzoate*, m. 40.5°, *n* 1.4938); *o-nonylphenol* (yield 85%), b_{13} 176–7°, m. 19–20°, d. 0.9309, *n* 1.5005 (*Ac* m. 75.5°), *p-nonylphenol* (yield 80%), b_{10} 180–1°, m. 42.5° (*benzoate*, m. 36.2°, *n* 1.4920). I. M. LEVINE

Catechol of the cacao bean. W. B. ADAM, F. HARDY AND M. NIERENSTEIN. *J. Am. Chem. Soc.* **53**, 727–8(1931). - The catechol of the cacao bean is identical with 1 of the 3 catechols present in the heartwood of the cutch-producing acacias, *viz.*, *l*-catechol. Both m. at 229° and have $[\alpha]_D$ −69° (H_2O); the penta-Ac deriv. m. 151° and has $[\alpha]_D$ −12 ($C_2H_2Cl_4$). C. J. WEST

New type of oxidation product derived from quinones. W. H. HUNTER AND MURRAY M. SPRUNG. *J. Am. Chem. Soc.* **53**, 700–11(1931).—Oxidation of 3,4,5,2,6-$Br(MeO)_2C_6OH$ (I) in 900 cc. 50% AcOH at 80° with 6.6 g. CrO_3 for 15–20 min., filtering from the phenoxyquinone and pouring into 1200 cc. cold H_2O gives about 32% of a colorless *compd.* **IIa** or **IIb** (R = 3,4,5,2,6-$Br_3(MeO)_2C_6$), $C_{28}H_{18}O_{15}Br_6$, m. 206–7° (bath heated to 200°, decompn.); oxidized very slowly by hot alk. $KMnO_4$, hot acid $KMnO_4$ and boiling concd. HNO_3. Boiling $AgNO_3$ in 95% EtOH produces only a slight murkiness. Dilg. a soln. in concd. H_2SO_4 gives **I**. I (1.2 g.) with AcCl and 2 drops concd. H_2SO_4 gives 1.1 g. of the *Ac deriv.*, $C_{16}H_{12}O_9Br_4$, m. 141–4° (decompn.); this is derived from the monomeric form of the acid; with 6% KOH there results **I**. Hydrolysis of **II** with 6% KOH gives 63.2% **I**; the filtrate contains the Br ion. Hydrolysis could also be effected by NH_4OH or $PhNH_2$. Oxidation of 3,5-dibromo-6-methoxy-2-(3,4,5-tribromo-2,6-dimethoxyphenoxy)-*p*-benzoquinone with CrO_3 also gives II. Oxidation of 3,4,5,2,6-$Cl_3(MeO)_2C_6OH$ (**III**) gives the *compd.* (**IV**, R′ = 3,4,5,2,6-$Cl_3(MeO)_2C_6$), $C_{14}H_{10}O_8Cl_4$, m. 187.4–7.8° (decompn.); the substance is inert to most common chem. reagents; diln. of a soln. in concd. H_2SO_4 gives **III**. The *Ac deriv.*, $C_{16}H_{12}O_9Cl_4$, m. 135–6° (decompn.). **IV** is also obtained by the oxidation of chlorinated phenoxyquinones. The mechanism of the formation of these oxidation products is discussed, leading to the following possible structures:

$$RO_2CCOC(OMe):CBrCO_2C(CO_2R).C(OMe):CBr.CO.O$$

IIa. Ester of Br analog of **IV** (keto form)

$$O[C(CO_2R).C(OMe):CBr.CO.O]_2$$

IIb. Ether of Br analog of **IV**

$$HOC(CO_2R').C(OMe):CCl.CO.O$$

(**IV**)

C. J. WEST

The occurrence of 2,6-dimethoxyquinone in Adonis vernalis L. WALTER KARRER. *Helv. Chim. Acta* **13**, 1424–8(1930).—O:C C(OMe):CH C(:O) CH:COMe (I) in an av. yield of 1.3 g. can be extd. from 200 g. of *Herba adonidis vernalis*. It is thought by K. that I exists as such in the living plant and is not a decompn. product. It is one of the very few derivs. of $C_6H_4O_2$ found in plants. I. M. LEVINE

Nitration of certain substituted benzaldehydes and the stability of the aldehyde group. HERBERT H. HODGSON AND ERNEST W. SMITH. *J. Soc. Chem. Ind.* **49**, 408–10T (1930). Further nitration of 3-$O_2NC_6H_4CHO$ could not be effected without simul-

taneous oxidation of the CHO group. Anils (Schiff's bases) could be nitrated only in the aniline nucleus. *3-Nitrobenzal-2'-methylanil*, m. 73–5°, treated with fuming HNO_3 and then hydrolyzed, gave the unchanged aldehyde and nitrotoluidines. *3-Nitrobenzal-2':5'-dichloroanil*, m. 103°, reacted similarly. $3,4\text{-}O_2N(AcNH)C_6H_3CH(OAc)_2$, in Ac_2O resisted nitration. $4\text{-}MeOC_6H_4CHO$ in concd. H_2SO_4 gave the $3,4\text{-}O_2N(MeO)C_6H_3CHO$ (I) of correct m. p. (86°). On further nitration of I in concd. H_2SO_4 the CHO group was replaced, $2,4,6\text{-}(O_2N)_3C_6H_2OMe$ being obtained. On adding I to fuming HNO_3 $2,4\text{-}(O_2N)_2C_6H_3CHO$, m. 87°, resulted. $4\text{-}EtOC_6H_4CHO$ gave *3-nitro-4-ethoxybenzaldehyde* (II), m. 62°. On further treatment with fuming HNO_3, II yielded $2,4,6\text{-}(O_2N)_3C_6H_2OEt$, m. 79°. $4\text{-}ClC_6H_4CHO$ gave *4-chloro-3-nitrobenzaldehyde*, m. 62°. Continued treatment with HNO_3 simply oxidized this compd. to *4-chloro-3-nitrobenzoic acid*, m. 181–2°. $4\text{-}BrC_6H_4CHO$ gave $4,3\text{-}Br(O_2N)C_6H_3CHO$ m. 103°, which, on further nitration, yielded *4-bromo-3,5-dinitrobenzaldehyde*, m. 126° $2\text{-}MeOC_6H_4CHO$ gave a good yield of *5-nitro-2-methoxybenzaldehyde*, m. 89°.

K. H. ENGEL

Aldehydes. III. Synthesis of simple and of substituted alkylcinnamic aldehydes. MARSTON T. BOGERT AND GARFIELD POWELL. *Am. Perfumer* **25**, 617–9, 620(1930); cf. *C. A.* **24**, 1932.—In the present paper the following new aldehydes of the usual Perkin synthesis type are recorded: *Bis(α-ethylcinnamylidene)acetone*, m. 104–5°; *α,p-dimethylcinnamic aldehyde*, m. 128.5–30.5°; *α-ethyl-p-methylcinnamic aldehyde*, b_{10} 137.5°; *α-o-anisalpropionaldehyde* (*o-methoxy-α-methylcinnamic aldehyde*), $b_{4.25}$ 128°; *α-o-anisalbutyraldehyde* (*o-methoxy-α-ethylcinnamic aldehyde*), m. 48.2–8.7°, $b_{5.5}$ 140° (*oxime*, m. 126–9°; the *phenylhydrazone* gave positive reaction for the Knorr pyrazoline test and yields a condensation product with AcMe); *α-piperonylidenepropionaldehyde*, b_6 150–5° (*oxime*, m. 124–5°; *phenylhydrazone*, yellow, m. 121–3°); *α-piperonylidenebutyraldehyde*, yellowish, m. 56–7°, b_4 155–60° (*oxime*, m. 141–3°; *phenylhydrazone*, yellowish, m. 118–20°); *α-piperonylideneënanthaldehyde*, yellow, m. 85–7°, b_2 165–7°. The foregoing aldehydes are yellowish in color.

W. O. E.

Chemistry of lignin. V. Distillation of alkali lignin with zinc dust in an atmosphere of hydrogen. MAX PHILLIPS. *J. Am. Chem. Soc.* **53**, 768–74(1931); cf. *C. A.* **24**, 1353.—Alkali lignin from corn cobs, distd. with Zn in a H atm. gives an aq. portion, contg. MeOH, Me_2CO, an acid (detd. as AcOH) to the extent of 1.48, 0.36 and 0.24%, resp. (calcd. on the basis of the wt. of lignin used), and catechol, and an oil (16% of the wt. of the lignin used), 55% of which was alkali-sol., in which guaiacol was definitely identified; a phenol contg. the MeO group and yielding a 3,5-dinitro benzoyl deriv., m. 110°, was also obtained but not further identified. The isolation of catechol and guaiacol as degradation products of lignin is believed to lend support to the hypothesis that lignin contains an aromatic nucleus. The evolution of CO_2 in the Zn distn. of lignin in a H atm. indicates that, in all probability, the lignin mol. contains at least 1 C atom directly united to 2 O atoms. This may indicate the presence of either a CO_2H group, free or esterified, or a lactone group in the lignin mol.

C. J. WEST

The decomposition of dibenzoyl peroxide by ultra-violet light. FR. FICHTER AND A. SCHNIDER. *Helv. chim. Acta* **13**, 1428–33(1930).—Bz_2O_2 in a quartz tube was subjected to the action of ultra-violet light from a Hg lamp. From the portion decompd. a yield of about 80% of the theoretical quantity of CO_2 and Ph_2 was obtained. The residue, an amorphous resin, was not characterized.

I. M. L.

Preparation of benzamide. C. H. KAO AND SHAO-YÜAN MA. *J. Chem. Soc.* 1930, 2788.—BzOH (200 g.), 180 g. $(NH_4)_2CO_3$ and 300 cc. 95% AcOH, heated gradually to boiling and then distd. so that not more than 100 cc. passed over in 1 hr., until the temp. at the head of the column was 150°, and the residue poured into 2 vols. of cold H_2O and neutralized with NH_4OH, gave 96–8 g. $BzNH_2$; about half of the BzOH was recovered.

C. J. WEST

The Hoesch-Houben synthesis in the preparation of aromatic ketimines and hydroxyphenylimino esters. EVA BRESSON AND J. B. CULBERTSON. *Proc. Iowa Acad. Sci.* **36**, 266(1929).—This synthesis involves the condensation of a phenol with a nitrile (aliphatic or aromatic). It is effected by the passage of dry HCl through their soln. in anhyd. ether, with or without the addn. of dry $ZnCl_2$. Anhyd. $AlCl_3$ was substituted for $ZnCl_2$ in some cases. In the present study PhCN was employed in every case with the following phenols and phenol ethers: phenol, the 3 cresols, quinol, catechol, pyrogallol, carvacrol, resorcinol mono- and di-Me ethers. With phenol, the 3 cresols, catechol, pyrogallol and carvacrol, no definite condensation products could be isolated. Quinol gave a double compd. of $p\text{-}HOC_6H_4OC(:NH)Ph$ with $ZnCl_2$;

without $ZnCl_2$ the free *p*-$HOC_6H_4OC(:NH)Ph$ was obtained. *m*-HOC_6H_4OMe gave free $HO(MeO)C_6H_3C(:NH)Ph$ when $AlCl_3$ was employed and an addn. compd. with $ZnCl_2$. W. G. GAESSLER

The synthesis of 4-hydroxy- and 2-hydroxydiphenyl ketimines. PAUL VITTUM, RICHARD ANDERSON AND J. B. CULBERTSON. *Proc. Iowa Acad. Sci.* **36**, 266–7(1929).—These syntheses were carried out through the action of the corresponding HO-nitrile upon PhMgBr in anhyd. ether. Over 2 equivs. of the Grignard reagent were employed, one to react with the phenol group and the other with the nitrile. The addn. compd. was decompd. with water and NH_4Cl at about —15°. The ketimine extd. with ether was pptd. as the HCl salt by the addn. of dry HCl. The hydroxy nitriles were prepd. from the corresponding hydroxy aldehydes by the action of Ac_2O on their oximes. Some modifications were worked out in the prepn. of the oximes and the nitriles. W. G. GAESSLER

Configuration of norvaline. P. KARRER AND H. SCHNEIDER. *Helv. Chim. Acta* **13**, 1281–91(1930).—Cryst. *brucine d(−)-allylhippurate* (I) (103 g.) was prepd. by cooling a mixt. of 75.3 g. allylhippuric acid, 75.3 cc. 5 *N* NaOH, 160.3 g. brucine, 75.3 cc. 5 *N* HCl, and 250 cc. H_2O which had previously been heated on the water bath and filtered. Recrystd. from water I gave $[\alpha]_D^{20}$ —40.9°. The Et_2O ext. of I treated with HCl gave cryst. *d(−)-allylhippuric acid* (II), m. 89°, $[\alpha]_D^{20}$ —32.11°. From the mother liquor of II *l(+)-allylhippuric acid* (III), m. 90°, was obtained, $[\alpha]_D^{18}$ +32.9°. 1.0228 g. III, 9cc. *N* KOH, 1.15 g. $KMnO_4$ in 40 cc. H_2O, and 1.4 cc. concd. H_2SO_4 warmed, filtered and concd. *in vacuo* gave 9.36 g. cryst. *l(+)-benzoylaspartic acid*, m. 176°, $[\alpha]_D^{19}$ +22.4°. Some racemization had occurred. *d(−)-Benzoylaspartic acid*, prepd. similarly from II, m. 175°. *dl-Benzoylaspartic acid* (IV) was prepd. in the same way from *dl*-allylhippuric acid. Oxidation with $KMnO_4$ or O_3 gave IV as a monohydrate sintering 70°, m. 119°. III in *N* KOH reduced by H_2 in the presence of Pt gave the hydrate of *l(+)-benzoylnorvaline*, m. 64°, which, dried over P_2O_5, gave *l(+)-benzoylnorvaline*, m. 95°, $[\alpha]_D^{?}$ 14.0°. *d(−)-Benzoylnorvaline* (V), m. 97°, $[\alpha]_D^{19}$ —13.1°, was similarly prepd. from II. *d(−)-Norvaline* (VI), $[\alpha]_D^{19}$ —21.84°, was prepd. by splitting the brucine salt of *dl*-formylnorvaline. The Et esters of VI and VII were prepd. with EtOH and dry HCl in 59% yield. VII in C_5H_5N with BzCl gave *Et d(+)-benzoylnorvaline* (VIII), m. 59°, $[\alpha]_D^{19}$ 7.98°. VIII in alc. NaOH gave the hydrate of V, m. 64° which dried to V, m. 93°, $[\alpha]_D^{19}$ —15.0°. RACHEL BROWN

Structure of the compounds produced by the addition of mercuric salts to olefins. II. ESTHER GRIFFITH AND C. S. MARVEL. *J. Am. Chem. Soc.* **53**, 789–92(1931); cf. C. A. 20, 1986.—In the 1st paper only 2 optically active isomers were isolated although 4 were theoretically possible; in the present work only 2 isomers were obtained and characterized. *l-Menthylamide* of *cinnamic acid*, m. 158–9°, $[\alpha]_D^{25}$ —82.9° (MeOH); 47% yield; $Hg(OAc)_2$ gives an unstable compd. unsuitable for fractional crystn. *d-* and *l-octyl cinnamates*, b_6 174–7° and b_6 175–80°, $[\alpha]_D^{30}$ 42.4° and $[\alpha]_D^{27}$ —43.3°, resp.; the yields were 73 and 50%; the addn. products with $Hg(OAc)_2$ were low-melting compds.; the Br compds. were also unsatisfactory for fractional crystn. *d-Bornyl cinnamate*, b_{6-7} 200–2°, $[\alpha]_D^{27}$ 32.8° (MeOH), 32.3° (AcOEt). $Hg(OAc)_2$ in MeOH gives *d-bornyl β-methoxy-α-acetoxymercurihydrocinnamate*, a mixt. m. 90–100°, which could not be sepd. by crystn. The *α-Br deriv.*, obtained from the Ac deriv. with NaBr, was resolved into 2 isomers, m. 131–2°, $[\alpha]_D^{25}$ 17.3°, and m. 147–8°, $[\alpha]_D^{25}$ 14.9°. C. J. WEST

3-Chloro-*o*-toluic acid and its conversion into 3-chloro-α-hydroxyphthalide. LEOPOLD F. LEVY AND HENRY STEPHEN. *J. Chem. Soc.* **1930**, 2788.—*3-Chloro-o-toluic acid*, m. 91.5°, was prepd. from the $3\text{-}NH_2$ deriv. through the Sandmeyer reaction. The molten acid, treated with Br and then warmed with dil. NaOH, gives *3-chloro-α-hydroxyphthalide*, m. 138°. C. J. WEST

Stability of magnesium *dl*-mandelate. ALEXANDER FINDLAY AND ALAN N. CAMPBELL. *J. Chem. Soc.* **1930**, 2721–4; cf. *C. A.* **22**, 3632.—The soly. of Mg *l*- and *dl*-mandelates is given at 5° intervals from 0 to 40°; the soly. of the *l*-salt gives a simple curve, rapidly ascending at temps. above 30°; the solid phase is the anhyd. salt. The *dl*-salt gives a 3-branched soly. curve, indicating the existence of 2 hydrates, with 1 H_2O, stable up to about 12°, and with 0.5 H_2O, stable between 12–29°; above 29° the salt is anhyd. Data are given for the *vapor pressure* of the hydrates. Mg *dl*-mandelate exists as stable solid phase throughout the temp. range investigated; the system is complicated by the existence of hydrates and it is practically impossible to deduce the temp. of the

transition point for the active antipodes and the racemate; the presumption is that the point lies at a fairly low temp. C. J. WEST

Syntheses of glucosides. VI. Preparation of β-glucosides of phenols. ALEXANDER ROBERTSON AND ROY B. WATERS. *J. Chem. Soc.* 1930, 2729–33.—Dry "active" Ag_2O (5 g.), added to a paste of 1 g. PhOH, 9 g. *O*-tetraacetyl-α-glucosidyl bromide and 10 cc. quinoline, agitated 15 min. and kept in a desiccator for 1 hr., the filtered AcOH soln. poured into H_2O and crystd. from EtOH, gives 3.5 g. of the tetraacetate, m. 128°, of β-Ph glucoside, m. 176°; in the same way, 4 g. β-$C_{10}H_7OH$ gives 13 g. of the tetra-Ac deriv., m. 135°, of β-2-naphthyl glucoside, m. 188°, $[\alpha]_D^{20}$ —26.7° (in 95% Me_2CO) *m*-$C_6H_4(OH)_2$ (1 g.) gives 4 g. of *O-octaacetyl-β-m-phenylenediglucoside*, m. 203°, $[\alpha]_D^{20}$ —83.1° (in Me_2CO). *O-Monobenzoylquinol*, m. 161°, gives the *tetraacetylglucoside* of *quinol monobenzoate*, m. 154–5°, $[\alpha]_D^{20}$ —63.97° (Me_2CO); hydrolysis with MeOH-NH gives 70% of arbutin. Helicin and *O*-tetraacetyl-β-glucovanillin were similarly prepd. C. J. WEST

New constituent of the ethereal oil from the wood of Chamaecyparis obtusa. I. GAKUJI TAKAHASHI, YASO YOSHIKI AND TOKUZO YAGINUMA. *Proc. Imp. Acad.* (Japan) 6, 393–6(1930).—Two new substances have been isolated from the ethereal oil extd. from the wood tar of *Chamaecyparis obtusa* Sieb and Zucc. and sepd. mechanically. The 1st compd., $C_{20}H_{32}O_2$, m. 236°, rhombic, bisphenoidal, *a:b:c* = 1.6684:1:0.6367 (polarization microscope), 1.6605:1:0.6360 (Goldschmidt reflection goniometer), α 1.5975, β 1.6004, γ 1.6185, V 26° 35′. The 2nd compd., $C_{23}H_{22}O_7$, d_4^{23} 1.337, m. 64°, rhombic, bisphenoidal, *a:b:c* = 0.7115:1:0.6237(P), 0.7107:1:0.6292(G), α 1.5743, β 1.5946, γ 1.6401, V 34° 37′; 2 mols. Br give the *compd.* $C_{23}H_{20}O_7Br_2$, m. 134–5°, d_4^{3} 1.664, rhombic, bisphenoidal, *a:b:c* = 1.1461:1:0.4716, α 1.6442, β 1.6533, γ 1.6691, V 37° 34′; excess Br gives a *compd.* $C_{14}H_{16}O_4Br_2$, m. 117°, rhombic, *a:b:c* = 0.6367:1:1, α 1.5145, β 1.5777, γ 1.978, V 25° 50′. C. J. WEST

Higher terpene compounds. XLII. Dehydration and isomerization of agathicdicarboxylic acid. L. RUZICKA AND J. R. HOSKING. *Helv. Chim. Acta* 13, 1402–23 (1930); cf. *C. A.* 23, 3711.—Agathicdicarboxylic acid, $C_{20}H_{30}O_4$ (I), a dibasic, dicyclic acid derived from Hartmanila copal, was further characterized by its destructive dehydrogenation and isomerization products. Dehydrogenation was brought about by heating with Se for 42 hrs. at 290–340°. The products, isolated as the picrates, consisted of 1,5,6-$C_{10}H_5Me_3$ (II), 1,7-dimethylphenanthrene (III), a *compd.* $C_{17}H_{20}$ (IV) of unknown structure, and an unknown compd. (V), the picrate of which m. 210°. II was synthesized starting from *o*-$MeC_6H_4CH_2CH_2OH$ through the compds. $MeC_6H_4CH_2CH_2Br$, b_{20} 120°, $MeC_6H_4CH_2CH_2CMe(CO_2Et)_2$, b_{16} 192–3° (in 50% yield, with $NaCMe(CO_2Et)_2$), $MeC_6H_4CH_2CH_2CHMeCO_2H$, b_{16} 179–80° (by hydrolysis), $MeC_6H_4CH_2CH_2CHMeCOCl$ (VI), b_{16} 146–7°, (with $SOCl_2$), *1,6-dimethyl-5-keto-5,6,7,8-tetrahydronaphthalene* (VII), b_{16} 153–5°, m. 41–2° (*semicarbazone*, m. 194–5°) (from 6 g. of VI in petroleum ether boiled with 5 g. of $AlCl_3$, in a 90% yield), *1,5,6-trimethyl-7,8-dihydronaphthalene* (VIII), b_{11} 130–1°, d_4^{20} 0.9760, n_D^{20} 1.5672, M_D calcd. 55.97, found 57.63 (from VII and MgMeI, and distn. of the products over Na). Dehydrogenation of VIII with Se yielded II, b_{11} 147–8°, m. 31–2°, d_4^{22} 1.0103, n_D^{22} 1.6093, M_D calc. 55.50, found 58.32 (*picrate*, m. 137–8°, *styphnate* (addn. compd. with trinitroresorcinol), m. 131°). Oxidation of II (2.8 g.) with $K_3Fe(CN)_6$ yielded the corresponding *tribasic acid* (2.2 g.), m. 90–1°. IV, $b_{0.8}$ 138–9°, m. 36–7°, d_4^{16} 1.027, d_4^{70} 0.992, n_D^{16} 1.6056, n_D^{70} 1.5847, M_D calcd 73.50 and 71.77 for 6 and 5 double bonds, resp., found 75.25 and 75.67 at 16° and 70°, resp. picrate, m. 138–9°; *styphnate*, m. 153–4°. Catalytic hydrogenation of IV in HOAc in the presence of PtO yielded $C_{17}H_{24}$ (IX). Se had no effect on IV alone or on IX. A *ketodibasic acid*, $C_{16}H_{12}O_5$, m. 304–5° (decompn.) (*di-Me ester*, $b_{0.8}$ 165–70°, m. 155–6°, *oxime*, m. 240°), is obtained when IV is oxidized with $K_3Fe(CN)_6$ and KOH. Upon oxidation of III, m. 85–6° (*picrate*, m. 132–3°; *styphnate*, m. 159°), with CrO_3, a *quinone*, m. 166°, is obtained. Dehydrogenation of I can also be brought about by heating with S, giving smaller yields of II and III but no IV or V. The tetrahydro deriv. of I yields II, IV and V but not a trace of III, when it is dehydrogenated with Se. Heating I with 95% HCO_2H at 120–30° produces its isomer, *isoagathic acid*, $C_{20}H_{30}O_4$ (X), m. 287–8°, $[\alpha]_D$ 12.84°; *di-Me ester* (7.9 g. from 9 g. of X and MeI through the Ag salt), m. 121–2°, $[\alpha]_D$ 6.09°; *di-Et ester*, m. 102–3°, $[\alpha]_D$ 9.67°, d_4^{111} 1.014, d_4^{104} 1.018 (calcd.), n_D^{104} 1.483, M_D calcd. 109.27, found 108.96. Catalytic hydrogenation of X at 60° yields the *dihydro deriv.*, $C_{20}H_{32}O_4$, m. 308–10°, $[\alpha]_D$ 16.03°, *di-Me ester*, m. 110–1°, $[\alpha]_D$ 9.11°, d_4^{131} 1.027, d_4^{120} 1.033 (calcd.), n_D^{120} 1.477, M_D calcd. 100.50, found 99.72. Similar to

the behavior of **I, X** undergoes decompn. when heated above its m. p., evolving CO_2 and yielding *isonoragathic acid*, $C_{19}H_{30}O_2$ (**XI**), m. 177–8°, $b_{0.2}$ 181–2°, $[\alpha]_D$ 2.13°; *di-Me ester*, m. 98–9°, $[\alpha]_D$ 2.65°, d_4^{112} 0.978, d_4^{102} 0.985 (calcd.), n_D^{102} 1.4864, M_D calcd. 89.14, found 88.80. By reduction, **XI** takes up 1 mol. of H_2 to yield the *dihydro acid*, $C_{20}H_{34}O_2$, which could not be crystd.; the *Me ester* of this compd. m. 80–1°, $[\alpha]_D$ 35.34°, d_4^{111} 0.9714, d_4^{102} 0.9767 (calcd.), n_D^{102} 1.4793, M_D calcd. 89.61, found 88.97. Dehydrogenation of **X** with Se yields **III** and an *unknown compd.*, the picrate of which m. 164°. No trace of **II** or **IV** was found. The conclusions that may be drawn from the work are: (1) **I** is a bicyclic compd. having one double bond in the 3,4-position and another in a side chain. (2) **X** is a mono-olefinic tricyclic compd. having a phenanthrene skeleton. The 3rd ring is formed around the double bond in the 3,4-position in **I**. This new ring may be formed by the action of both HCO_2H and Se. I. M. LEVINE

Menthone series. VIII. Further characterization of the optically active menthylamines. JOHN READ AND RALPH A. STOREY. *J. Chem. Soc.* **1930**, 2761–9; cf. *C. A.* **24**, 1857.—The following relative mol. configurations assigned to the stereoisomeric menthylamines (**I–IV**), appear to be sustained by the phys. and chem. evidence given below. A study of the rotatory powers of these 4 bases and their derivs. discloses the following relationships: The 4 sets of values are generally related; the 4 bases fall into 2 well-defined families, depending upon their derivation from menthone or isomenthone; *d*-rotatory **IV** belong configurationally to the *l*-series; in general the sign of the optical rotation is changed by reversing asym. center (3) but not by reversing either of the remaining asym. centers, (1) or (4); the lowest rotatory powers, considered numerically,

Me– –H	Me– –H	Me– –H	
–NH_2	H_2N– –H	H_2N– –H	H– –NH_2
H– –iso-Pr	Hi– –iso-Pr	iso-Pr—H	iso-Pr—H
l(or *d*)-Menthylamine (**I**)	*d*(or *l*)-neo-Menthylamine (**II**)	*d*(or *l*)-iso-Menthylamine (**III**)	*d*(or *l*)-neoiso-Menthylamine (**IV**)

are shown by substances of the iso- and neoiso-series, that is, by configurations having the most sym. distribution of like (H) or similar (Me and iso-Pr) groups about a plane passing through the characteristic group (3) at right angles to the plane of the ring, the sequence being usually *l* > *l*-neo > *l*-iso > *d*-neoiso. The m. ps. of derivs. of the *d*-neo- and *l*-bases (menthone series) are usually higher than those of the corresponding derivs. of the *d*-neoiso- and *d*-iso-base (isomenthone series); in each series the neo-derivs. have the higher m. p., the general sequence being *d*-neo > *l* > *d*-neoiso > *d*-iso. The following phys. consts. are reported for *d*-**I**, *d*-**II**, *d*-**III** and *d*-**IV**: b_{12} 81–2°, b_{13} 84°, $b_{13.5}$ 87°, $b_{14.5}$ 89°; d_4^{25} (cor. to vac.) 0.8525, 0.8551, 0.8632, 0.8636; n_D^{25} 1.4600, 1.4614, 1.4659, 1.4670; $[\alpha]_D^{25}$ —44.53°, 15.12°, 28.96°, 2.32°; $[\alpha]_{5461}^{25}$ —53.21°, 17.42°, 34.06°; values are also given for a $CHCl_3$ soln. For the following derivs., the m. p. and $[\alpha]_D$ and $[\alpha]_{5461}^{25}$ ($CHCl_3$, *c* approx. 1) are given. The order is *l*-**I**, *d*-**II**, *d*-**III** and *d*-**IV**. *Acetyl*, 102–3°, —83.8°, —; 117–8°, 53.8°, —; 45–6°, 31.3°, —; —, —3.9°, —. *Acetoacetyl*, 145°, —81.7°, —; 169–70°, 53.0°, —; 77–9°, 30.7°, —; 99–100°, —2.6°, —. *Propionyl*, 88°, —86.6°, —89.6°; 149°, 48.3°, 56.6°; 83°, 27.7°, 32.1°; 103°, 0°, —1.0°. *Butyryl*, 73°, —70.9°, 79.4°; 104°, 46.8°, 53.5°; —, 23.9°, 27.7°; —, —1.0°, —2.0°. *Isobutyryl*, 128°, —66.5°, —75.0°; 160–1°, 47.5°, 54.7°; 116°, 22.8°, 25.9°; 128°, —3.7°, —5.4°. *Isovaleryl*, 110°, — 64.7°, —76.7°; 132°, 42.8°, 51.3°; 82°, 27.0°, 29.1°; 99°, —4.1°, 6.5°. Hexoyl, 60°, —60.0°, —71.2°; 65°, 40.0°, 45.0°; —, 24.9°, 27.5°; 50°, 0°, 1.7°. *Octoyl*, 57°, —53.2°, —63.8°; 78°, 36.7°, 42.4°; —, 23.3°, 26.0°; 55°, —1.2°, 2.9°. *Chloroacetyl*, 76°, —71.9°, —86.6°; 150°, 50.7°, 57.7°; 82°, 30.0°, 35.0°; 80°, 9.8°, —13.0°. *Bromoacetyl*, 103°, —61.6°, —73.1°; 160°, 40.9°, 46.2°; 80°, 30.3°, 37.1°, 100°, —7.5°, —10.3°. Benzoyl, 157°, —62.8°, —; 121.5°, 22.7°, —; 97–8°, 18.3°, —; 151°, —10.4°, —. *Phenylacetyl*, 106°, —60.4°, —72.1°; 120°, 34.5°, 41.0°; 103°, 33.3°, 38.4°; 109°, —3.4°, —5.1°. β-Naphthalenesulfonyl, 135°, —53.3°, —; 208°, 43.7°, —; 80–1°, —2.8°, —; 120°, —10.7°, —. *Anisoyl*, 183°, —57.7°, —69.0°; 130°, 21.1°, 24.0°; 121°, 25.3°, 30.7°; 150°, —9.5°, —11.8°. An inspection of configurations **II** and **I** suggests that the NH_2 group of **II** should react with greater ease than that of **I**, since this group is situated in the *cis*-position to a H atom and an iso-Pr group, resp. Similarly, **IV** should react more readily than **III**. Competitive expts. were there-

fore carried out with binary mixts. of these compds. with various sym. reagents; the compn. of the reaction product was calcd. from its optical rotatory power in $CHCl_3$ and the result checked by a detn. of the rotatory power of the HCl salt prepd. from the recovered mixt. of unchanged bases. Distinct evidence was obtained in this way of the following comparative rates of reaction: *d*-II > *l*-I; *d*-III > *l*-III; *d*-IV > *l*-IV; *d*-II > *d*-III; *d*-IV > *d*-III. Preliminary expts. with *d*- or *l*-camphor-10-sulfonyl chloride showed that the reaction was distinctly more rapid between a *d*-rotatory mol. of 1 reagent and a *l*-rotatory mol. of the other than between a *d*- or *l*-mol. of each kind. The original should be consulted for the details of these expts. C. J. West

Piperitone. XI. Syntheses of optically inactive and active piperitylamines, piperitols and α-phellandrenes. John Read and Ralph A. Storey. *J. Chem. Soc.* **1930**, 2770–83; cf. *C. A.* **24**, 97.—Piperitone and N_2H_4 (1.25 mols.), boiled in dil. MeOH for 6–8 hrs., give a yellow mobile sirup, apparently a hydrated azine, $C_{20}H_{34}N_2O$, α_D 161.6° (EtOH, *c* 2.9145), which loses H_2O at 95° and changes to a dark red, viscid liquid, α_D 35.9°; another prepn. showed α_D 201.1 and 48.3° before and after drying. Upon reducing the quantity of N_2H_4 to 1 mol. proportion, much of the piperitone was recovered unchanged, even after the mixt. had been heated 6 hrs. at 120°. Reduction of this azine with Zn in glacial AcOH gives piperitylamine, b_{16} 97.5–8.5°, α_D 0.5–3.7°, n_D^{16} 1.4802, n_D^{25} 1.4769, d_4^{25} (vac.) 0.8801; *Ac deriv.*, m. 108°; *Bz deriv.*, m. 130°; *anisoyl deriv.*, m. 161°; *HCl salt*, m. 191°; these were optically inactive; the *d*-tartrate had $[\alpha]_D$ 12.6° and after 2 crystns. from H_2O, —43.0°. *l*-Piperitylamine, b_{19} 101–2°, b_{16} 98.2°, d_4^{25} (vac.) 0,8789, n_D^{16} 1.4800, n_D^{25} 1.4770, $[\alpha]_D^{25}$ —80.35°, $[\alpha]_{5461}^{25}$ —95.15°, in $CHCl_3$ (*c* 3.8455), $[\alpha]_D^{25}$ —70.0°, $[\alpha]_{5461}^{25}$ —82.8°; *HCl salt*, m. 213° (decompn.), $[\alpha]_D^{16}$ —83.5° (H_2O, *c* 1.1855); *H d-tartrate*, m. 217°, $[\alpha]_D$ —43.0° (H_2O, *c* 1.0800); *Ac deriv.* m. 102–3, $[\alpha]_D^{25}$ —153°, $[\alpha]_{5461}^{25}$ —183° ($CHCl_3$, *c* 1.2225); *Bz deriv.*, m. 102–3 $[\alpha]_D^{25}$ —173°, $[\alpha]_{5461}^{25}$ —208° ($CHCl_3$, *c* 1.1975); *anisoyl deriv.*, m. 142–3°, $[\alpha]_D^{25}$ —175°, $[\alpha]_{5461}^{25}$ —212° ($CHCl_3$, *c* 1.0725; *phenylacetyl deriv.*, m. 89–90°, $[\alpha]_D^{20}$ —130.5° ($CHCl_3$, *c* 1.1990). When treated with HNO_2 these bases yield piperitols; in practice, however, the most satisfactory results have been attained by steam-distg. mixts. of the iodides and Ag_2O. *dl-Piperityltrimethylammonium iodide*, pale yellow, m. 88° (decompn.), distn. with Ag_2O gives *dl-neopiperitol*, b_{15-5} 94–6°, $n_D^{19.5}$ 1.4740, and *dl-piperitol*, b_{19-5} 100–6°, n_D^{18} 1.4769. Similarly, the active base gives *d-neopiperitol*, b_{15-5} 96.5–8.5°, n_D^{17} 1.4769, n_D^{25} 1.4729, d_4^{25} (vac.) 0.9119, $[\alpha]_D^{16}$ 21.22°, and *d-piperitol*, b_{16} 101–4°, n_D^{16} 1.4770, d_4^{25} (vac.) 0.9200, $[\alpha]_D^{16}$ 40.22°. A complete sepn. of the 2 stereoisomeric piperitols is not claimed at this stage of the investigation. The piperitols, as α,β-unsatd. sec. alcs., undergo dehydration so readily that cryst. esters have not been prepd. In addn to the piperitols, there also results *dl*-α-phellandrene and the *d*-isomer, b_{16} 66–8°, n_D^{16} 1.4827, n_D^{25} 1.4777, d_4^{25} (vac.) 0.8463, $[\alpha]_D^{16}$ 86.4°. On heating the iodide at 150–200°, there results a mixt. of α-phellandrene and α-terpinene. This work thus throws new light on the assocn. of *l*-α-phellandrene with *l*-piperitone in eucalyptus oils. It is also possible to proceed from *l*-piperitone of eucalyptus oils to *d*-piperitol and *d*-piperitone on *Andropogon* species. C. J. West

Crystalline complexes from bornyl and isobornyl acetates. Georges Brus and J. Vebra. *Compt. rend.* **191**, 667–9(1930); cf. *C. A.* **24**, 5294.—Cryst. compds. are formed between isobornyl and bornyl acetates and H_3PO_4, $H_4P_2O_7$, H_3AsO_4, PCl_5, $SbCl_3$, $BiCl_3$, $SnCl_4$ and $ZnCl_2$. The compd. is composed of equimol. ratios except for $H_4P_2O_7$ and isobornyl acetate where the ratio is 2 mols. ester and 1 acid. All these cryst. complexes are unstable and on decompn. regenerate the original ester without isomerization. If bornyl and isobornyl formates react, the complexes are not cryst. Propionates, butyrates and valerates do not react. An oxonium salt structure is suggested. J. G. McNally

Dependence of optical rotatory power on chemical constitution. IX. (a) Rotatory dispersion of the stereoisomeric oxymethylenecamphors, *p*-phenylenebisaminomethylenecamphors, and 1,4-naphthylenebisaminomethylenecamphors; (b) the structure of oxymethylenecamphor and the kinetics of its mutarotation. Bawa Kartar Singh and Bhutnath Bhaduri. *J. Indian Chem. Soc.* **7**, 771–9(1930); cf. *C. A.* **25**, 98.—A phenomenal depression of the optical rotatory power occurs if the conjugation of the azethenoid group involving the C atoms of the terpene nucleus and the N atoms of the side chain is broken, *i. e.*, $C_6H_4(NC_2O{:}C_8H_{14})_2$ has $[M]_D$ = 6160° and gives $C_6H_4(NHC_2HO{:}C_8H_{14})_2$ with $[M]_D$ = 469°. A. P. Sachs

New complex hydrocarbon of the probable formula $C_{16}H_{16}$. Charles S. Gibson

AND JOHN D. A. JOHNSON. *J. Chem. Soc.* 1930, 2785–6.—$(ClCH{:}CH)_2AsCl$ (1 mol.) and 1.1 mol. $AlCl_3$ in C_6H_6, heated 1.5 hrs. and the product decompd. with HCl and C_6H_6, give a fraction b_8 145–230°, from which the *compd.* $C_{16}H_{14}$, pale yellow, m. 179–80°, was obtained from EtOH; it is stable to $KMnO_4$; Br in CCl_4 gives a *di-Br deriv.*, golden yellow, does not m. 310°. C. J. WEST

Some arsonic acids of fluorene and its derivatives. F. E. CISLAK AND CLIFF S. HAMILTON. *J. Am. Chem. Soc.* 53, 746–9(1931).—The diazo compd. from 2-aminofluorene and $NaAsO_2$ with a little $CuSO_4$ give *2-arsonofluorene;* in the same way *2-arsonofluorenone* was prepd. 2-Amino-7-nitrofluorene and Ac_2O in AcOH give 75% of the *Ac deriv.*, m. 250–3° (cor.); reduction with Zn and $CaCl_2$ in EtOH gives 60–5% of the *2-acetamido-7-aminofluorene*, m. 188–92° (cor.); the *arsono deriv.* was obtained in 2–2.5% yields as a dull yellow powder. C. J. WEST

"Supernumerary" isomers. III. Condensation of fluorene with piperonal and *p*-dimethylaminobenzaldehyde. ERNST BERGMANN. *Ber.* 63B, 2598–9(1930); cf. *C. A.* 24, 4025; 25, 919.—In the alk. condensation of fluorene with piperonal and *p* $Me_2NC_6H_4CHO$ de Fazi obtained, along with the expected 3,4-methylenedioxy- and 4-dimethylaminobenzalfluorenes, more deeply colored compds. which, from his analyses, he assumed to be isomeric with the benzalfluorenes. Recently B. (*C. A.* 24, 4515) found that fluorene with BzH, *p*-$MeOC_6H_4CHO$ and α-$C_{10}H_7CHO$ gives, in addn. to the normal fulvenes, their more deeply colored vinylene homologs. This made it seem likely that de F.'s colored compds. might be *3,4-methylenedioxy-* (I) and *4-dimethylaminocinnamylidenefluorene* (II), a supposition confirmed by the synthesis of I and II from $CH_2O_2C_6H_3CH{:}CHCHO$ and $Me_2NHC_6H_4CH{:}CHCHO$ with fluorene. I, yellow, m. 196–7°, did not depress the m. p. of de F.'s compd. (for which he gives 183–4°). II, red, m. 169–70°. C. A. R.

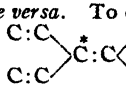
Reduction of triphenylmethane dyes and related substances with the formation of free radicals. JAMES B. CONANT AND NEWELL M. BIGELOW. *J. Am. Chem. Soc.* 53, 676–90(1931).—The action of sol. reducing agents, such as VCl_2, on solns. of Ph_3CH dyes has been investigated, using malachite green as an example and *p*-$Me_2NC_6H_4CPh_2OH$ as a transition compd. between the dyes and Ph_3COH. The first product of the reaction is a free radical, which may be isolated in the assocd. form (deriv. of C_2Ph_6); it shows the typical behavior of these compds. Under the influence of acids, the free radical may further undergo rearrangement or reduction and oxidation to the corresponding methane and carbinol. *p*-$Me_2NC_6H_4CPh_2OH$ in AcOH with VCl_2 or $CrCl_2$ in a N atm. gives *sym-p,p'-tetramethyldiaminohexaphenylethane* (I), flesh-colored, colored bright red on its surface by a crust of oxidized material; even momentary exposure to air decomps. it to a deep red tar, evolving heat and the odor of HCHO; the O absorption of the amorphous powder in PhBr is 75–80% of the theory; the apparent mol. wt. in *p*-ClC_6H_4Me is 458–507 (theory, 572.5); the product could not be recrystd. The relative rates of decompn. in acids of varying strengths are given. The Et_2O soln., exposed to the air, gives *p-dimethylaminotriphenylmethyl peroxide*, light brown, m. 145–50°. With 1% Na-Hg there results the red *Na p-dimethylaminotriphenylmethide;* if the shaking is continued overnight, the soln. becomes colorless and there results *p*-$Me_2NC_6H_4CPh_2H$ and a compd., m. 138°; with CO_2 there results about 29% of *p-dimethylaminotriphenylacetic acid*, amorphous, whose *Me ester* m. 141°. *p*-$Me_2NC_6H_4CPh_2OH$ in Me_2CO and HCl with $CrCl_2$ gives the *compd.* $C_{48}H_{40}N_2$, m. 165° ("Chichibabin product"). Continued action of $CrCl_2$ or $TiCl_3$ in AcOH transforms *p*-$Me_2NC_6H_4CPh_2OH$ to the methane, which also results from I in AcOH after 48 hrs. with or without $TiCl_3$. Malachite green is reduced by VCl_2 in AcOH and AcONa to *sym-p,p',p'',p'''-octamethyltetraaminohexaphenylethane* (II), amorphous powder, light brown in its interior and bright green on its surface; exposure to the air gives a black tar and HCHO; the O absorption varies with the solvent; it is decompd. by AcOH or AcOH-HCl (the latter in 10 min.). Reduction of malachite green in HCl by $CrCl_2$ gives the "Chichibabin product" $C_{46}H_{50}N_2$, m. 231–2°, slowly turns green on standing. The light red of II in Et_2O is discharged by 1% Na-Hg, the resulting product being (*p*-$Me_2NC_6H_4$)CHPh, m. 93–5°. II in AcOH-AcONa with $TiCl_3$ gives 34% of (*p*-$Me_2NC_6H_4)_2CHPh$. Reduction of 1 g. of *p*-$Me_2NC_6H_4CHPhOH$ with $CrCl_2$ in concd. HCl and Me_2CO gives a mixt. of 0.3–0.4 g. of *p,p'-tetramethyldiaminotetraphenylethane*, m. 206–7°, and 0.2 g. of the *isomer*, m. 264–7°; the lower-melting isomer is obtained by the action of Na-K in Et_2O C_6H_6 upon (*p*-$Me_2NC_6H_4CPh{:})_2$. Michler's ketone and $SOCl_2$ in C_6H_6 give the dichloride, bronze-green powder, which is reduced by VCl_2 in Me_2CO-HCl to $(Me_2NC_6H_4)_2C{:}C(C_6H_4NMe_2)_2$, m. 296° (60% of the original ketone). Reduction of $[(Me_2NC_6H_4)_2C(OH)]_2$ with $CrCl_2$ in concd. HCl gives (*p*-$Me_2NC_6H_4CPh{:})_2$ and the octa-Me

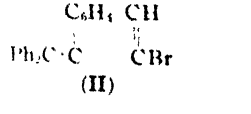
deriv. *p*-Dimethylaminophenylisopropylcarbinol is reduced by $CrCl_2$ in HCl to a mixt of 2 *isomers*, $C_{24}H_{36}N_2$, m. 174° and 239–40°. C. J. WEST

Derivatives of optically active triarylcarbinols and their halochromic salts. EVERETT S. WALLIS. *J. Am. Chem. Soc.* **53**, 812–3(1931); cf. *C. A.* **24**, 2741.—Optically active $PhC_6H_4(C_{10}H_7)CPhSCH_2CO_2H$ (I) gives deep violet halochromic compds. with H_2SO_4, $HClO_4$ and $HgCl_2$, which yield the inactive carbinol, $PhC_6H_4(C_{10}H_7)CPhOH$ on pouring into ice H_2O. $TiCl_4$ in $CHCl_3$ gives a similar compd., which gives with H_2O inactive I. The I regenerated from the $FeCl_3$ salt, however, is optically active. This is evidence against a quinoid formulation for the explanation of color. C. J. W.

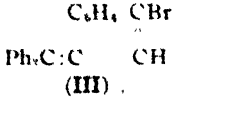
Some alkali-organic experiments (also remarks on the work of Wittig and Leo on the polarizability of the ethylene bond). ERNST BERGMANN *Ber* **63B**, 2593–7 (1930).—W. and L. (*C. A.* **24**, 3776) have convincingly shown, on the basis of much exptl. evidence, that the ethylene double bond can propagate valence-chem. effects in undiminished strength, hence, that it is easily polarizable. B. believes, however, that the case which W. and L. themselves extensively studied has nothing to do with the question. $(Ph_2C.CHCl_2)_2$ with an alkali metal forms an alkali-org. compd. which on hydrolysis (replacement of the metal by H) yields $Ph_2C{:}CHMe$ and with CO_2 (introduction of CO_2 between the metal and the org. residue) gives $Ph_2C{:}CHCH_2CO_2H$. The alkali org. compd. is therefore assigned the structure $Ph_2C{:}CHCH_2M$ (I, M = alkali metal). The explanation of W. and L. is that the valence-requiring action of the Ph groups on the 1- and 6-C atoms is propagated through the double bond to C atoms 3 and 4, so that the C_3–C_4 union is weakened and ruptured by the alkali metal with formation of I. This, however, is not in agreement with the behavior of double bonds toward alkali metals (which add with especial ease to phenylated double bonds) and does not take into consideration the possibility of allyl shifting. B. thinks that the alkali metal first adds at the 1,6-positions and the liberated valences on C atoms 2 and 5 mutually sat. themselves with formation of the cyclobutane deriv. $Ph_2CMCH\,CH_2.CH_2.CHCMPh_2$ which, because of ring tension, is unstable and decomps. into 2 mols. $Ph_2CMCH{:}CH$ and this with H_2O and CO_2 yields $Ph_2C{:}CHMe$ and $Ph_2C{:}CHCH_2CO_2H$ by allyl shifting. This is supported by the behavior of *1,1,8,8-tetraphenyl-1,7-octadiene* (II), readily obtained through the *1,8-octanediol* (III) from di-Me suberate and PhMgBr. It takes up 2 atoms Li to form an intensely brown-red compd. giving on hydrolysis *1,2-dibenzhydrylcyclohexane* (IV); the lack of tension in the cyclohexane system makes a secondary reaction unnecessary. The instability of the cyclobutane system results in an entirely similar secondary decompn. on removal of the metal from compds. of the type $(Ph_2CMCH_2)_2$ (V), with formation of $Ph_2C{:}CH$. That V, which is obtained only by addn. of Na to $Ph_2C{:}CH_2$, really contains the butane skeleton is shown by the fact that it is also obtained from $[Ph_2C(OMe)CH_2]_2$. The removal of the alkali metal is best effected by shaking with Hg. This was explained by Schlenk and Bergmann as due merely to the heat of formation of Na–Hg being greater than that of the alkali org. compd. Ziegler and Colonius (*C. A.* **24**, 3777) recently expressed the opinion that an equil. $PhCHNaCHNaPh + Hg \rightleftharpoons PhCH\underset{Hg}{\overset{}{\quad}}CHPh + Na$ is established and that the 3-membered Hg ring is unstable, decompg. into the ethylene and Hg and thus continuously shifting the equil. at the expense of the alkali compd. Ph_2CHNa also establishes an equil. with Hg but the Hg compd., having no ring tension, does not decomp., the equil. is not disturbed and the Ph_2CHNa remains for the most part unchanged. B. has found, however, that, contrary to the statement of Z. and C., Ph CHNa gives $(Ph_2CH)_2$ quite readily with Hg (*C. A.* **2**, 4515). *Di-Me suberate*, from the acid and CH_2N_2, b_{21} 138–40°. **III**, m. 110°, gives with AcOH contg. some H_2SO_4 on the H_2O bath **II**, m. 92–3°, mol. wt. in camphor 380. **IV**, m. 212–3°, mol. wt. in camphor 397–401. *1,1,4,4-Tetraphenylbutane-1,4-diol di-Me ether* (**VI**), from the diol with H_2SO_4 in MeOH-dioxane, m. 230°, mol. wt. in camphor 375. With K and MeI in boiling xylene the diol gives the *mono-Me ether*, m. 175–6°. *1,1,4,4-Tetraphenyl-2-butine-1,4-diol di-Me ether* (**VII**), from the diol and H_2SO_4 in MeOH, m. 115–6°; attempts to convert it into **VI** by catalytic hydrogenation with Pd–$BaSO_4$ in boiling PrOH resulted in splitting off of one MeO group with formation of *1,1,4,4-tetraphenyl-1-butanol Me ether*, m. 140–1°. **VII** reacts normally with Na, each OMe group being replaced by Na; hydrolysis of the brown product gives 2 hydrocarbons, m. 97° and 167°, to be described elsewhere, and treatment with PhNCS gives *1,1,4,4-tetraphenyl-2-butine-1,4-dithiocarboxanilide*, yellow, m. 204°, mol. wt. in camphor 577.

The double bond. I. Action of halogens on fulvenes. ERNST BERGMANN AND

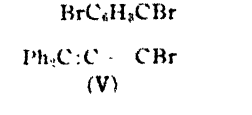
ALFRED FREIHERR VON CHRISTIANI. *Ber.* **63B**, 2559-71(1930).—It was shown recently (Schlenk and B., *C. A.* **24**, 3778) that the more easily an ethylene adds halogens, the more difficultly does it add alkali metals, and *vice versa*. To obtain further exptl. data the study has been extended to the fulvenes,  . Staudinger had concluded, on the basis of Thiele's partial valence theory, that the characteristic C atom (marked with an *) in these compds. would possess very little residual affinity while expts. in the field of alkali-org. compds. had shown that it has to a very high degree the ability to add alkali metals. A study of the action of halogens (Cl and Br) has now shown that this C atom is practically entirely unable to add halogens. Addn. to an ethylene is in every case primarily asym.; the halogen first adds molecularly to one of the C atoms and the resulting intermediate compd. changes into the final reaction product only in a 2nd phase by intramol. neutralization of valences. This stabilization may take place in various ways—by a change of the intermediate product into the normal dibromide of the ethylene (the usual reaction) or by the formation, within the same mol., of substitution products by the molecularly bound halogen. It is probable that in a secondary valence compd., such as the intermediate product may be assumed to be, the mol. union of the halogen atoms is loosened, *i. e.*, the halogen is activated and thereby enabled to effect substitutions. The yellow diphenylbenzofulvene (**I**) reacts smoothly with 2 atoms Br in $CHCl_3$, forming HCl and a yellow mono-Br substitution product (**II** or **III**). **III** is given the preference as the entrance of halogen in the α-position of a fulvene generally results in a deepening of the color. Certain it is, as shown especially by the yellow color of the product, that the characteristic fulvene double bond has not been attacked. With more than 2 atoms Br it is not possible to obtain the di-Br deriv. (**IV**) which is substituted in the C_6H_6 nucleus with such extraordinary ease that when 4 atoms Br is used with **I**, a part of the **I** reacts with 6 atoms Br to form the red-yellow tri-Br deriv. (**V**) which on oxidation yields *2,3,6-tribromoindone* (**VI**), whose structure seems to be established by the fact that 2,3-dibromoindone, obtained from PhCBr $CBrCO_2H$, forms an oxime which with Br yields a tri-Br oxime identical with the oxime of **VI**. The 3rd Br atom is probably in the *m*-position to the fulvene C atom, for in diphenyldibenzofulvene (**VII**) Br enters the *m*-position (see below) and bromination of Ph_2CO gives $(m\text{-}BrC_6H_4)_2CO$. Toward Cl, **I** reacts essentially the same as toward Br. With 1 mol. Cl it forms a bright yellow *mono-Cl deriv.* (**VIII**); 4 atoms Cl give an orange-red *di Cl deriv.* (**IX**) (probably because Cl has a lower substituting power than Br), oxidized to 2,3 dichloroindone and Ph_2CO; still more Cl gives a dichloride (**X**) of **IX** which on fusion decomps. into **IX** and Cl. In triphenylbenzofulvene, Cl substitutes the α H atom, giving the red-violet 1-benzohydrylidene 2-chloro-3-phenylindene (**XI**), while Br gives a di-Br deriv. (**XII**), in which 1 of the Br atoms is substituted on the C_6H_6 nucleus and which is oxidized to a *2,6-dibromo-3-phenylindone* (**XIII**). Diphenylfulvene with excess of Br gives, in moderate yield, a tetra-Br deriv. which, because of its bright blue color, is assigned the structure **XIV**. **VII** yields a di-Br deriv. (**XIVa**) oxidized to Ph_2CO and 2,7 dibromofluorenone. Staudinger has already shown that the "open" fulvene $(PhCH{:}CH)_2C{:}CPh_2$ yields a tetrabromide $(PhCHBrCHBr)_2C{:}CPh_2$, and it has now been found that $(PhCH{:}CHCH{:}CH)_2C{:}CPh_2$, with its 5 double bonds, consumes exactly 4 mols. Br when titrated with Br. In view of the above, it might perhaps seem surprising that $(C_6H_4)_2C{\cdot}C(C_6H_5)_2$ (**XV**), as found by Graebe and Mayer, can add Br and Cl. B. and von C. believe that this is due to the fact that it



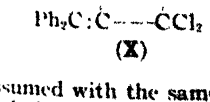
(**II**)



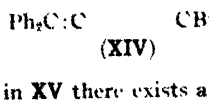
(**III**)



(**V**)



(**X**)

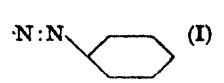


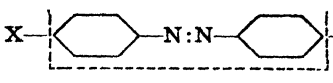
(**XIV**)

can only be assumed with the same strictness that in **XV** there exists a crossed conjugation. Hexanthylene (**XVI**) and benzalxanthene (**XVII**), however, in which the double bonds of the C_6H_6 nuclei are fixed in the positions requisite for a crossed conjugation, also add halogen at the characteristic C atom. But the chem. properties of the halogen addn. products of **XV, XVI and XVII** show that they are compds. of a peculiar kind whose

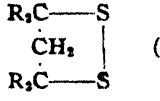
halogen cannot be compared with, say, the Br in $(CH_2Br)_2$. Thus the Br compd. of XV regenerates XV with alc. KOH instead of giving a glycol. No normal dibromide could be obtained from XVI and XVII; XVI gives a hexabromide (XVIII) and XVII a *tetrabromide* (XIX). Both of these compds. contain labile Br. XVIII converts $PhNMe_2$ into Me violet on warming, and XIX in boiling $CHCl_3$ splits off Br and HBr and gives *ω-bromobenzalxanthene* (XX). XVIII and XIX must therefore be perbromides, formed for the same reason that triarylmethyl halides have a tendency to form perhalides; in the triarylmethyl halides, the entire affinity of the halogen is not used up and the residual affinity can come into play in the formation of a mol. addn. compd. So, also, the union of halogen to fulvene C atoms does not use up the whole valence energy of the halogen. These facts point to a parallelism between the triarylmethyls and fulvenes; it had already been established that all ethylenes are in equil. with a diradical form and that, with the fulvenes especially, the latter form is favored at the expense of the true ethylene form. A large no. of colored fulvenes, when cooled in liquid air, show a distinct lightening of color, and XV, which is almost colorless at room temp., gives a reversible intensely blue color when heated in high-boiling solvents. *1-Benzohydrylidene-2(3)-bromoindene* (II or III), m. 151°, mol. wt. in camphor 328, is almost colorless in liquid air, with CrO_3-AcOH it gives a bright red *compd.* $C_{28}H_{14}O_3$, m. 236°, giving a bright emerald-green color with concd. H_2SO_4. *1-Benzohydrylidene-2,3,6-tribromoindene* (V), m. 168°, mol. wt. in camphor 516–23, almost colorless in liquid air. VI, golden-yellow, m. 145°, mol. wt. in camphor 358–65, forms with $PhNHNH_2$ in boiling PrOH *2,3-bis(phenylhydrazino)-6-bromoindone phenylhydrazone*, brown-red, decomps. 250°. *Oxime* of VI, m. 231° (decompn.). *2,3-Dibromoindone oxime*, m. 222° (decompn.). *1-Benzohydrylidene-2(3)-chloroindene* (VIII), m. 142–4°, mol. wt. in camphor 277–85. IX, m. 130–1°, mol. wt. in camphor 325–54. *1-Benzohydrylidene-2,2,3,3-tetrachlorohydrindene* (X), yellowish, m. 170° (decompn.), mol. wt. in camphor 382–8. *1-Benzohydrylidene-2,6-dibromo-3-phenylindene* (XII), red, m. 145–6°. XIII, brick-red, m. 163°, mol. wt. in camphor 396–7°. *1-Benzohydrylidene-2,3,4,5-tetrabromocyclopentadiene* (XIV), m. 190–1°. *2,7-Dibromo-9-benzo-hydrylidenefluorene* (XIVa), m. 220–2°. XIX, bright red, m. 140° (decompn.). XX, m. 110° (decompn.). II. (Also significance of dipole measurements for the stereochemistry of carbon. IV.) Spatial configuration of aromatic azo compounds. ERNST BERGMANN, LEO ENGEL AND STEFAN SÁNDOR. *Ibid* 2572–5; cf. *C. A.* 25, 242.—The azo group resembles the ethylene system as regards possibilities of isomerism; the *syn-anti* isomerism of the diazotates corresponds to the *cis-trans* isomerism of substituted ethylenes. In principle such an isomerism is also possible in the azo hydrocarbons, although it had hitherto not been observed, probably because this question had never been seriously discussed and also because there was no method of settling it with certainty. This, however, can be done by the dipole method. Two laws have been firmly established, both theoretically and experimentally: (1) Centro-sym. mols. have the dipole moment 0. (2) In any given mol. there is always a greater part which is centro-sym. and therefore has the moment 0; from it there go out valence lines to other substituents. The latter have characteristic moments, directed magnitudes whose direction (at least in the simple cases discussed in this paper) coincides with the valence line. The vectorial summation of these individual moments gives the dipole moment of the mol. Azobenzene, if it has the centro-sym. form I, must have the moment 0. *p*-Substituted azobenzenes (II) must, if the formulation corresponding to I holds, have a moment which can be calcd. on the basis of (2). From the large centrosym. part of the mol. (designated by the dotted line) there go out the vectors of the substituent moment M_X and that (M_H) of the H atom in the other *p*-position. The moment of the mol. is therefore $M_X - M_H$. Since the moment of aromatically bound H is, by definition, 0, the moment of the mol. must be equal to that of the halogen X if the *trans*-formulation is correct, otherwise not. *p,p'*-Disubstituted azobenzenes with identical substituents must have a moment 0 if they have the centro-sym. structure, otherwise they must have a strong finite moment. As a matter of fact, PhN:NPh has the moment 0, *p*-chloro- and *p*-bromoazobenzene have exactly the dipole moment of Cl and Br, which is that of PhCl or PhBr, resp., and (*p* $BrC_6H_4N:)_2$ has the moment 0. The azo hydrocarbons, therefore, have the *trans*- or *anti*-structure. This is supported by the fact that PhN:NPh forms mixed crystals with stilbene (*trans*-) but not with isostilbene. The dipole moment was detd. in the usual way from the orientation polarization (P_{A+O}), the latter being the difference between the total polarization P and the electron polarization P_E. P is obtained from the dielec. consts., P_E is equal to the mol. refraction. For PhN:NPh, however, the mol. refraction, both as measured and as calcd. from the equivs. for a double bond and 2 tertiary N atoms, was greater than the measured total polarization. Since,

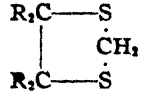
theoretically, the electron polarization cannot be greater than the total polarization, the electron polarization for PhN:NPh was taken as equal to its total polarization and this value was used in calcg. P_E for the other compds. by subtracting 1 (or 2) H equivs. and adding a Br or Cl equiv. The moments for *p*-ClC_6H_4N:NPh and *p*-BrC_6H_4N:NPh


(I)


(II)

were found to be 1.55 and 1.42 × 10^{-18} electrostatic units, resp. **III. Aromatic thio ketones, especially their reaction with diazomethane.** ERNST BERGMANN, MICHAEL MAGAT AND DAVID WAGENBERG. *Ibid* 2576–84.—Staudinger and Kon had found that, although Ph_2CS (I) is blue and the C:S group is therefore a strong chromophore, the introduction of auxochromic groups lightens instead of deepens the color; (*p*-MeO-$C_6H_4)_2CS$ (II) forms solns. with a distinct reddish tinge and (*p*-$Me_2NC_6H_4)_2CS$ pure red solns. Also, the reactivity towards Ph_2CN_2 *decreases* in the order I ⟶ II ⟶ III. Wieland, Popper and Seefried observed a similar lightening of the color on the introduction of *p*-Me_2N groups into the triarylmethyls. This anomaly of the triarylmethyls and aromatic thio ketones is probably due to similar anomalies in mol. structure, *i. e.*, the thio ketones contain tervalent C and the color of aromatic thio ketones is due to the fact that they exist entirely or in part in the form of diradicals: $R_2C{:}S \rightleftharpoons R_2C.S$ (cf. B. and Engel, *C. A.* **24**, 4274). Further evidence in favor of this view is presented. Like Ph_3C, 2 mols. I take up 1 mol. O_2 to form an unstable peroxide, III is quite stable to atm. O but while II is also quite stable its solns. gradually become colorless in the air. The color of thio ketones lightens on cooling; II in PhMe in Me_2CO-CO_2 cooling mixt. has a color very similar to the red of III and again becomes blue on warming. Unlike C:O compds., in the thio ketones it is the C, not the S, which is first attacked on reduction. With satd. alc. NH_4SH, I, II and III yield disulfides, $(R_2CS)_2$. With CH_2N_2, I, II and xanthione (IV) form well-crystd. compds. of the compn. $2R_2CS + CH_2$ which, *a priori*, might have the structure V or VI. The compd. obtained from II gave, with Zn and AcOH-HCl, [(*p*-$MeOC_6H_4)_2C{:}]_2$ (VII), showing that the structure VI is the correct one and the compd. is ***4,4,5,5-tetra-p-anisyl-R-trimethylene 1,3-disulfide*** **(VIII)**. The authors do not agree with Meerwein that the difference in the behavior of aromatic ketones and thio ketones toward CH_2N_2 is due to the fact that the dipole moment of the thio ketones is increased by the great polarizability of S, for the red 2,3-diphenylindone also has a larger moment (3.3 × 10^{-18} electrostatic units) than is normally the case for ketones and yet does not react with CH_2N_2. They believe also that the role of H_2O in the action of CH_2N_2 on Me_2CO is not to be explained by an addn of H_2O on the C:O group resulting in an increase of the moment of the C:O group or a liberation of a spatially enclosed or electrostatically screened dipole, but rather that under the catalytic influence of ions (especially H ions) the CH_2N_2 decomps. into CH_2 and N_2 and in the presence of H_2O the CH_2 adds H_2O to form MeOH. *Tetra-p-methoxydibenzohydryl disulfide*, m. 128° without color, becomes blue only at a higher temp VIII, m. 161–2° (blue melt). *Tetra-p-anisylethylene* **(VII)**, m. 177° (yellow), colored blue by H_2SO_4 and by PbO_2-AcOH, mol. wt. in camphor 426, also obtained


(V)


(VI)

from II with Cu bronze in CO_2 at 210°. ***4,4,5,5-Tetraphenyl-R-trimethylene 1,3-disulfide***, from I, m. 166–7° (deep blue), mol. wt. in C_6H_6 439. ***4,5-Bisxanthylene-R-trimethylene 1,3-disulfide***, from IV, m. 224° (with the color of IV), mol. wt. in C_6H_6 426. III gave a compd. m. 144°, mol. wt. in C_6H_6 307, whose compn. (C 70.1, H 7.8, S 10.1%) did not correspond with any definite formula. C. A. R.

Action of diphenylmethyl sodium on aromatic ketones and thio ketones. ERNST BERGMANN AND DAVID WAGENBERG. *Ber.* **63B**, 2585–92(1930).—Like aromatic ketones, thio ketones also give, with Ph_2CHNa, tertiary thio alcs. which, to be sure, are relatively labile and on heating alone or, better, with AcCl, lose H_2S and yield the corresponding ethylenes. With (*p*-$Me_2NC_6H_4)_2CS$ the thio alc. could not be isolated in pure form as it decompd. into the ethylene on even a slight elevation of the temp. Attempts to methylate the thio alcs. with CH_2N_2 failed, nor could the corresponding

O compds. be methylated with K and MeI. Well-characterized derivs. can be prepd., however, from their Na compds. as obtained directly from the ketones with Ph_2CHNa. Thus, $Ph_2CHC(ONa)Ph_2$, obtained from Ph_2CO, although it is decompd. by PhNCS into $(Ph_2C:)_2$ and NaOH, gives the *phenylurethan*, $Ph_2CHC(O_2CNHPh)Ph_2$ (I) with PhNCO. BzCl in its reaction occupies an intermediate position; with an excess of BzCl only $(Ph_2C:)_2$ is formed, probably as the result of a secondary reaction for less than 1 mol. BzCl gives the expected *benzoate* (II) which m. 155° but resolidifies about 180° and m. again around 210° ($(Ph_2C:)_2$ m. 222°). $(PhCH:CH)_2CO$ (III) and $(PhCH:CHCH:CH)_2CO$ (IV) do not form tertiary alcs. The reaction with IV probably consists in 1,4-addn. with formation of *1,9-diphenyl-3-benzohydryl-1,6,8-nonatrien-5-one* (V): IV + Ph_2CHNa ⟶ $PhCH{\cdot}CHCH{:}CHC(ONa){:}CHCH(CHPh_2)CH{\cdot}CHPh$ ⟶ V; the product still contains 3 double bonds. III, on the other hand, gives a fully satd., HO-free product which is supposed to be *3,4,4,5-tetraphenylcyclohexanone* (VI). *1,1-Di-p-tolyl-2,2-diphenylethanol*, from $(p\text{-}MeC_6H_4)_2CO$ and Ph_2CHNa, m. 155–6°, gives with boiling AcCl *1,1-di-p-tolyl-2,2-diphenylethylene*, m. 161°. *1,1-Di-p-anisyl-2,2-diphenylethanol*, m. 183°; *ethylene*, m. 155°, mol. wt. in camphor 351. *1,1,2,2-Tetraphenylethaneëthiol*, from Ph_2CS and Ph_2CHNa, m. 167–8°. *1,1-Di-p-anisyl analog*, m. 155°. *2,2-Diphenyl-1-xanthyleneëthanethiol*, from xanthione, m. 159° to a red-green dichroitic liquid (xanthione). I, m. 163.5° (decompn.). VI, m. 170–2°. V, m. 145–6°.

C. A. R.

The ketene-imines and the tautomerism of nitriles. Georges Mignonac and Charles Hoffmann *Compt. rend.* **191**, 718–20(1930).—MeCN treated with EtMgBr forms a cryst. compd $CH_2(CN)MgBr$ (I). This latter compd. forms $AcNH_2$ in water at 0° under such conditions that MeCN does not hydrolyze. M. and H. believe that I reacts with H_2O to form a ketene imide, which rearranges to acetamide. Evidence that this may be so was obtained from the reaction between cyanodesoxybenzoin and $PhCH_2CH_2NH_2$, where a yellow-green compd is formed which is thought to be a salt of the pseudo acid Ph(PhCO)C C·NH (II) and $PhCH_2CH_2NH_2$. On raising the temp. of the soln., the green color vanishes. The change is considered to be caused by the rearrangement of II to the colorless nitrile Ph(PhCO)CHCN. J. G. McNally

Optically active diphenylhydroxyethylamines and isohydrobenzoins. IV. Di-*p*-methoxyphenylhydroxyethylamine and di-3,4-methylenedioxyphenylhydroxyethylamine. John Read and Isbbel Grace Macnaughton Campbell. *J. Chem. Soc* **1930**, 2674–81; cf. *C. A.* **25**, 289. $H_2NCH_2CO_2H$, *p*-$MeOC_6H_4CHO$ and NaOH in MeOH, kept 10 hrs. at 50°, give the *anisylidene deriv.*, m. 116°, of *dl-di-p-methoxyphenylhydroxyethylamine* (I), m. 135.5°; *mono-Ac deriv.*, m. 145.7°; *di-Ac deriv.*, m. 169–71°; *benzylidene deriv.*, m. 125–6°; *salicylidene deriv.*, pale yellow, m. 134.5°; *chloroplatinate*, bright yellow, m. 171° (decompn.) *l*-I (II), m. 111.2°, $[\alpha]$ 150° (abs. EtOH, *c* 0.9520), was obtained through the *H d tartrate*, m. 110.1°, crystals with 1 mol. H_2O, $[\alpha]_D^{15}$ —66.7 (H_2O, *c* 1.0645); *HCl salt*, m. 188–90°, $[\alpha]_D^{15}$ —99° (H_2O, *c* 0.5805); *mono-Ac deriv.*, m. 128–9°, $[\alpha]_D^{15}$ —16.9° (abs. EtOH, *c* 0.5025); *di-Ac deriv.*, m. 160–1°, $[\alpha]_D^{15}$ 44.6° (abs. EtOH, *c* 1.1650); *benzylidene deriv.*, m. 136° (abs. EtOH, *c* 0.5050); the *d*- and *l*-camphor-10-sulfonates were vitreous substances but the *l-salt* crystd. after 2 months, m. 163°, $[\alpha]_D^{15}$ —76.9° (H_2O, *c* 1). The action of $NaNO_2$ on II in *N* H_2SO_4 gives *cis-α,β-di-p-methoxyphenylethylene oxide* (III), m. 142–3°, optically inactive and stable on boiling 3 hrs. with 7.5% H_2SO_4 or 8% NaOH and unchanged by cold concd. H_2SO_4 after 6 hrs.; mol. wt. detn. in C_6H_6 did not indicate polymerization. The mother liquor contained hydroanisoin. I, MeI and MeONa give the *trimethylammonium iodide*, m. 155° (decompn.); with Ag_2O in H_2O this yields III; II gives an *iodide*, m. 145° (decompn.), $[\alpha]_D^{15}$ —34.6° (MeOH, *c* 1.5475), which likewise gives III with Ag_2O. With piperonal and $H_2NCH_2CO_2H$ there results *dl-di-3,4-methylenedioxyphenylhydroxyethylamine* (IV), m. 159°; *piperonylidene deriv.*, pale yellow, m. 177°; *chloroplatinate*, deep yellow, m. 184° (decompn.). *l*-IV, m. 164°, $[\alpha]_D^{15}$ —196° (abs. EtOH, *c* 0.7320) was obtained through the *H d-tartrate*, m. 208° (decompn.), $[\alpha]_D^{15}$ —104.2 (H_2O, *c* 1.0930); *HCl salt*, vitreous mass, $[\alpha]_D^{15}$ —131°; *di-Ac deriv.*, m. 222–4°, $[\alpha]_D^{15}$ —38.5° (abs. EtOH, *c* 0.2850); *d*-IV, m. 164°, $[\alpha]_D^{15}$ 196° (abs. EtOH, *c* 0.4575); *H d-tartrate*, m. 145°, $[\alpha]_D^{15}$ 117.1° (H_2O, *c* 0.7680), crystals with 1 mol. H_2O. V. **β-Hydroxy-β-phenylethylamine and some derivatives.** *Ibid* 2682–5.—Details are given of the prepn. of $HOCHPhCH_2NH_2$ (I) from styrene, Br-H_2O and concd. NH_4OH; the HCl salt m. 213° (decompn.); the Bz deriv. m. 148°; the *benzylidene deriv.* m. 111–2°; the *d-methylenecamphor deriv.* m. 106–8°, $[\alpha]_D^{15}$ 230° (abs. EtOH, *c* 1.0550); the *d-camphor-10-sulfonate* m. 125–6°, $[\alpha]_D^{16}$

52.8° (H_2O, *c* 1.0090). Resolution of **I** was effected by *d*-tartaric acid. ***d*-I *d-tartrate***, m. 210°, $[\alpha]_D^{15}$ 46.1° (H_2O, *c* 0.9650); the *d*-base was obtained as a mixt. with the carbamate, m. 67°, $[\alpha]_D^{15}$ 28.3° (abs. EtOH, *c* 1.7655); with MeI and MeONa there results 80% of the ***trimethylammonium iodide***, m. 223-4°, $[\alpha]_D^{15}$ 4.5 (MeOH, *c* 1.6725); on steam distn. with Ag_2O there results some BzMe, possibly a little $PhCH(OH)CH_2OH$ and ***d*-phenylethylene *oxide***, $b_{0.5-1.0}$ 200°, $n_D^{17.5}$ 1.5572, $[\alpha]_D^{15}$ 36.4° (C_6H_6, *c* 3.1815), 28.9° (abs. EtOH, *c* 2.7790); this may be a polymeric form. The action of HNO_2 was not studied. C. J. West

1-Methylnaphthalene derivatives. Karol Dziewoński and Tadeusz Waszkowski. *Bull. intern acad Polonaise* **1929A**, 604-10(in German).—1,7-$C_{10}H_6MeSO_3H$ (**I**) may be prepd. by dropping cond. H_2SO_4 into $C_{10}H_7Me$ (b. 240-3°), previously heated to 150°; the fused mixt. is kept at 165-70° for 5-6 hrs., cooled, dissolved in water, washed with C_6H_6 and the **I** pptd. with $BaCO_3$ as the Ba salt (finally recrystd from hot water), $BaC_{22}H_{18}O_6S_2$ (**II**), difficultly sol. in water. The Na salt $NaC_{11}H_9O_3S$ (**III**), prepd. by interaction of **II** with Na_2CO_3, leaflets from boiling dild. EtOH, very sol in water. The aniline salt, $C_{17}H_{17}O_3NS$, from boiling water, m. 248-50°. Chloride (**IV**) from **III** with PCl_5, m. 120-2°. Amide, prepd. by refluxing **IV** with 10 parts aq. NH_3, m. 188-9°. 1-Methyl-7-hydroxynaphthalene (**V**) is prepd. by fusing **III** with KOH plus a little water at 180°, heating the reaction mass at 260° for 10 min., dissolving the cake in water and acidifying with HCl. The ppt. is sol. in EtOH, Et_2O, C_6H_6, difficultly sol. in cold water. It may be recrystd. from ligroin or much boiling water. 1-Methyl-7-benzoyloxynaphthalene m. 107-8°. 8-Benzeneazo-1-methyl-7-hydroxynaphthalene is prepd. by coupling PhN_2Cl with **V** in alk. carbonate soln., vivid red, m. 137°, moderately sol. in most of the org. solvents, difficultly sol. in alkalies. 8-(4'-Nitrobenzeneazo)-1-methyl-7-hydroxynaphthalene is obtained by coupling p-$O_2NC_6H_4N_2Cl$ with **V** in alk. carbonate soln; carmine-red, m. 258-60°, slightly sol. in EtOH, AcOH, readily sol. in toluene, xylene, insol. in aq. alkalies. 1-Methyl-7-aminonaphthalene is prepd. by heating **V** with $(NH_4)_2SO_3$ and concd. NH_4OH with little water in a sealed tube at 150-70° and fractionating the resulting dark oil, bright yellow oil, b_5 170-80°, congeals to fine needles which, recrystd. from ligroin, m. 46-7°. The crystals become rose-colored in the air and are sol. in Et_2O, EtOH, C_6H_6 and difficultly sol. in boiling water. 1-Methyl-7-acetylaminonaphthalene m. 146°. J. Wiertelak

Labile compound of benzeneazo-β-naphthol and β-naphthol. Herbert H. Hodgson and Wolf Rosenberg. *J. Chem. Soc.* **1930**, 2787-9.—PhN_2X and β-$C_{10}H_7OH$ in 1 equiv. aq. NaOH and excess NaOH give a *compd* of ***benzeneazo-β-naphthol*** and ***β-naphthol***, crystg. with 1 mol. C_6H_6, m. 62-4°; this effloresces, leaving the brick-red *compd.*, m. 79-80°, crystn. from AcOH, C_5H_5N or EtOH gives benzeneazo-β-naphthol (**I**), m. 133-4°, which is the only product obtained when the coupling is carried out in aq. NaOH, $NaHCO_3$, AcONa or Na_3BO_3. PhN_2HSO_4 and β-$C_{10}H_7ONa$ in equimol. proportions give the double compd. exclusively. Neither β-$C_{10}H_7OH$ nor **I** forms a compd. with C_6H_6. C. J. West

Potentials and the decomposition reactions of *o*-quinones in acid solution. Louis F. Fieser and Mary A. Peters. *J. Am. Chem. Soc.* **53**, 793-805(1931).—By means of potentiometric analysis it is shown that β-naphthoquinone (**I**) decomps. in dil. acid soln. to give equal parts of β-naphthohydroquinone (**II**) and 2-hydroxy-1,4-naphthoquinone (**III**). Since the reaction is monomol., it is concluded that the first step in the disproportionation is the addn. of the elements of H_2O to **I**. 3,4-Phenanthrenequinone (**IV**) behaves in a similar manner and it is presumed that the reaction is characteristic of all of the unsubstituted *o*-quinones. Discontinuous titration of **I** at 25° with $K_3Mo(CN)_8$ gives the normal oxidation-reduction potential of the system as 0.5760 v. The speed of the reaction **I** + H_2O controls the velocity of decompn. of the reaction product into **II** and **III**. The titration curve for dinaphthyldihydroquinone is given; this shows 2 distinct inflections; the first half of the curve refers to the potentials of the system formed by the reductant and dinaphthyldiquinhydrone; the upper half refers to the equil. between the monoquinone and the diquinone, dinaphthyldiquinone; the normal potentials detd. were 0.5723 and 0.6420 v. The normal potential of **IV** was detd. to be 0.6215; the decompn. products of **IV** contains more hydroquinone than hydroxyquinone, because of the cleavage of the hydroxyquinone in acid soln. 1,2-Dihydroxyphenanthrene has a normal potential of 0.6601 v. Catechol in 0.5 *N* H_2SO_4 has a normal potential of 0.7943 v.; in *N* H_2SO_4, 0.7891 v. C. J. West

Derivatives of aminomethylhydroxyanthraquinones and of dihydroxydianthraquinonylethylene. III. Henri de Diesbach, Paul Gubser and Henri Spoerenberg. *Helv. Chim. Acta* **13**, 1265-74(1930); cf. *C. A.* **24**, 2744.—To prep. ***1-chloro-2-***

aminoanthraquinone (I) 2-$C_6H_4(CO)_2C_6H_3NHAc$ was chlorinated in HOAc, the product recrystd. and hydrolyzed with concd. H_2SO_4 on the water bath. I was heated at 180–200° with 10 parts of a mixt. of 70 g. $NaNO_2$ and 1 l. concd. H_2SO_4, cooled, and the resulting *1-chloro-2-hydroxyanthraquinone* (II) recrystd. from EtOH, m. 224°. II (2 g.) in 20 cc. concd. H_2SO_4, shaken with 3 g. $CCl_3CONHCH_2OH$ for 3 hrs., cooled on ice, the ppt. washed, dried, extd. in a Soxhlet app. with EtOH yielded *3-trichloroacetylaminomethyl-1-chloro-2-hydroxyanthraquinone* (III). III, recrystd. from a 50% mixt. of HOAc and cyclohexanol, m. 204°. It was slightly sol. in Et_2O, EtOH and C_6H_6, but dissolved readily in HOAc and org. solvents of high b. p. In concd. H_2SO_4 it gave an orange and in caustic alkali a red soln. One part III was boiled 15 min. with 10 parts 10% NaOH, the product acidified with HOAc and the ppt. extd. in a Soxhlet app. with HOAc. The residue, recrystd. from $PhNO_2$, was assumed to be *3,3'-(2,2'-dihydroxy-1,1'-dichlorodianthraquinonyl)-α-hydroxy-β-aminoethane*, m. about 250°, in which the labile Cl atom could easily be replaced by NH_3 liberated in the reaction, thus accounting for low Cl and high N values found on analysis. In concd. H_2SO_4 it gave a brown and in caustic alkalies a brown-red soln. It did not dye cotton. These properties indicate the 3- and not the 4-position for the methylol combination. Alizarin (IV) was condensed with dimethylolurea (V) by adding 2 g. V to 2 g. IV in 20 cc. concd. H_2SO_4. The product, washed with EtOH and recrystd. from $PhNO_2$, gave *α-[(1,2-dihydroxyanthraquinonyl-3)-methyl]-β-hydroxymethylurea* (VI), m. 204°. It was yellow-red in concd. H_2SO_4 and blue in caustic alkali. *3-Phthaloylaminomethyl-1,2-dihydroxyanthraquinone* (VII), m. 310°, was similarly formed from methylolphthalimide. One part VI was hydrolyzed with 10 parts concd. H_2SO_4 at 60°, the temp. raised to 160°, and the acid dild. with water to 60%. The mixt. was cooled, neutralized to a blue color and treated with HOAc until colorless. A ppt. of *3-aminomethyl-1,2-dihydroxyanthraquinone* (VIII) formed. It could not be crystd. In HCl VIII gave a yellow, in concd. H_2SO_4 a brown soln. Five g. VI, heated 4 hrs. at 170° in a sealed tube with 20 cc. HOAc satd. with HCl, gave a ppt. of VIII contg. 1 mol. HOAc. VIII, heated with 23% NaOH, cooled, acidified and heated 4 hrs. with HOAc at 170°, gave *3,3'-(1,1',2,2'-tetrahydroxydianthraquinonyl)-α-hydroxy-β-aminoethane*. *1,1'-(2,2'-Dihydroxydianthraquinonyl) dimethylurea* (IX), m. 250°, was obtained from 6 g. 2-hydroxyanthraquinone in 60 cc. concd. H_2SO_4 and 2.4 g. V. IX heated in a sealed tube at 150° with concd. HCl gave dianthraquinonylethylenediamine mixed with the corresponding glycolic deriv. *1,1'-(2,2'-dihydroxy-3,3'-dicarboxydianthraquinonyl)dimethylurea* (XI) was obtained similarly from 6 g. 2,3-$C_6H_4(CO)_2C_6H_2(OH)SO_3H$ and 2.6 g. V in 120 cc. concd. H_2SO_4. The pyridine salt of XI decompd. 318°. It was yellow in concd. H_2SO_4 and red in alk. soln. XI, boiled 4 hrs. with concd. HCl, gave *2-hydroxy-3-carboxyisopyrroleanthrone* (XII) and the corresponding amine (XIII). XII and XIII were not transformed into ethylene derivs. by HNO_2 or by O_2 in alk. soln., but when heated with HCl at 150° or HOAc at 170° in a sealed tube the 2 mols. united and with auto-reduction gave the ethylenediamine deriv. mixed with the corresponding glycolic deriv. RACHEL BROWN

5,6,5',6'-Dibenzo-*N*, *N'*-dihydro-1,2,1',2'-anthraquinonazine. ERW. SCHWENK AND HANS WALDMANN. *J. prakt. Chem.* **128**, 320–6(1930).—4,2-Cl(1-$C_{10}H_7CO$)-$C_6H_3CO_2H$ and concd. H_2SO_4, heated at 58–60° for 1.5 hrs., give *2-chloro-5,6-benzanthraquinone*, yellow, m. 222–3°; heating with concd. NH_4Cl with a little $CuCl_2$ at 180° for 20 hrs. gives the *2-NH_2 deriv.*, orange-red, m. 283–5°; concd. H_2SO_4 gives a greenish yellow color; the sulfate and HCl salt are light yellow, and may be crystd. from AcOH but are hydrolyzed by H_2O. Heating the NH_2 deriv. with an equiv. amt. of AcOK and 10 parts KOH (added in portions) at 250–70° gives *5,6,5',6'-dibenzo-N,N'-dihydro-1,2-anthraquinonazine*, metallic glistening needles, which gives a blue color in alk. hyposulfite, changing to a brown-violet on further reduction; cotton is colored a dirty greenish blue, changing to a pure blue on treating with dil. AcOH; with air or on heating with a dil. soap soln. a clear bluish green color results. 2,3-$C_{10}H_6(CO)_2O$ and PhCl with $AlCl_3$, heated on the H_2O bath, give *2-(4'-chlorobenzoyl) 3-naphthoic acid*, m. 215–20°; concd. H_2SO_4 gives a deep red color, unchanged at 180°; above this temp. ring closure and sulfonation take place; $ZnCl_2$ and a little AcOH at 200–50° give 2-chloro-6,7-benzanthraquinone, yellow; alk. hyposulfite gives a green color. C. J. WEST

1-Hydroxyphenanthrenequinone. K. BRASS, E. WILLIG AND R. HANSEN. *Ber.* **63B**, 2613–6(1930).—Shortly after the preliminary announcement of the synthesis of 1-hydroxyphenanthrenequinone (I) (*Z. angew. Chem.* **42**, 602(1929)), Fieser (*C. A.* **23**, 4468) described its prepn. from phenanthrenequinone-1-sulfonic acid. B. and his collaborators made it by the Scholl reaction from *o-methoxybenzil* (II) with $AlCl_3$. The corresponding *o-methoxybenzoin* (III) was obtained in 70% yield by mixed acyloin

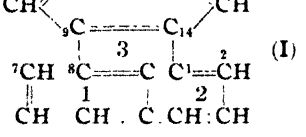
condensation from BzH and *o*-$MeOC_6H_4CHO$. Since Hörbye (*Diss. Dresden*, 1917) showed that in unsym. substituted benzoins the secondary alc. group is adjacent to the unsubstituted Ph residue, III is assigned the structure $PhCH(OH)COC_6H_4OMe$. Attempts to purify it showed that it consisted of a colorless solid and a yellow liquid form. Attempts to obtain *o*-hydroxybenzoin failed; *o*-$H_2NC_6H_4CHO$ and BzH gave no mixed benzoin. Oxidation of the crude III with alk. $KMnO_4$ yielded 60% pure II. When II is treated with $AlCl_3$, not only is aromatic H split off intermolecularly but dealkylation also occurs and I is obtained, although in only 1% yield. I is dark red, only difficultly sol. in aq. alkali, reacts with pyroboroacetate, forms a black *inner complex salt* with $SnCl_4$ and dyes mordanted fibers violet but the colors are not fast. The 2-, 3- and 4-HO isomers of I dye mordanted cotton only weakly but the colors on wool mordanted with Cr oxide (2-deriv. reddish violet, 3- and 4-derivs. red-brown) are as deep as that produced by I; probably, being stronger acids, they act on wool as acid wool dyes and, moreover, form with the metal oxide ordinary salts which are more stable than the 6-membered secondary valence ring of the inner complex salts of I. III, light orange-yellow oil, b_{16} 235°, and colorless crystals, m. 56–7°, sol. in concd. H_2SO_4 with yellow color turning to green, reduces Fehling soln. in MeOH. II, pale yellow, m. 71–2°, sol. in H_2SO_4 with red color; *2,4-dinitrophenylhydrazone*, yellow, m. 176–7°, sol. in H_2SO_4 with orange-red color; the corresponding *osazone* exists in an orange α-form, m. 227–8°, rearranging into the β-form, red, m. 295°; boiling AcOH produces the same rearrangement. I, m. 218–9°, forms a violet sublimate, dissolves in H_2SO_4 with dark olive-green color, forms a yellow $Na_2S_2O_4$ vat, gives in Ac_2O with pyroboroacetate a violet color changing to yellow-brown on warming. C. A. R.

Unsymmetric *o*-disubstituted benzils and their conversion into analogous phenanthrenequinones. K. Brass and R. Stroebel. *Ber.* **63B**, 2617-21(1930); cf. preceding abstr.—After the synthesis of 1-hydroxyphenanthrenequinone had been effected, the next problem was the synthesis of the difficultly available 3,4-di-HO compd. (morpholquinone (I). Unsym. *o*-substituted benzils are unknown, however, and of the corresponding benzoins only benzopiperoin (II) has been described (Hörbye). The prepn. of II has been improved and its oxidation with Fehling soln. gave *benzopiperil* (III) in good yield *o-Dimethoxybenzil* (IV), however, was obtained in only 13% yield. The benzoin (from 3,4-$(MeO)_2C_6H_3CHO$ and BzH) always contains some of the sym. compd. and oxidation of the product gave a mixt. of IV and the tetra-MeO compd. (14:1), the latter of which can readily be sepd. because of its slight soly. The pure IV exists in a yellow and a colorless form. With $AlCl_3$ it can theoretically give 2,3- or 3,4-dimethoxyphenanthrenequinone or a mixt. of the 2; it actually gave 6% of Pschorr and Buckow's 2,3-di-MeO compd. (V) and the tetra-MeO compd., but the formation of 2,4-dihydroxyphenanthrenequinone (VI) (see following abstr.) was also observed, *i. e.*, there also occurred a partial dealkylation of the benzil, condensation of the resulting dihydroxybenzil to I and rearrangement of the latter. III likewise gave 3–4% of (presumably *2,3-)methylenedioxyphenanthrenequinone* (VII) which, however, could not be dealkylated with even the most energetic reagents (PCl_5). Similarly, all attempts to dealkylate V were unsuccessful. II, obtained in 32% yield from piperonal, BzH and KCN in aq. MeOH, m. 115°. III (70% yield), m. 120°, forms yellow solns. (greenish yellow in concd. H_2SO_4), is stable toward cold 10% alkali, is not hydrolyzed by concd. H_2SO_4, boiling 10% HCl or concd. HI but gives *o*-dihydroxybenzil (see following abstr.) with PCl_5. With $SnCl_4$ in dry C_6H_6 it forms a dark red *mol. compd. 2,4-Dinitrophenylhydrazone*, red, m. 183–4°, sol. in H_2SO_4 with orange-yellow color; *osazone*, m. 270° (decompn.). IV, m. 117.5°, sol. in H_2SO_4 with yellow-green color changing slowly to greenish brown. VII, red-brown, m. 258–9°, sol. in H_2SO_4 with brown-olive color, forms a light yellow vat with alk. $Na_2S_2O_4$. V, dark red, m. 303° (cor.), sol. in H_2SO_4 with deep yellow color, forms a green-yellow vat with alk. $Na_2S_2O_4$. *Tetramethoxyphenanthrenequinone*, from the benzil with $AlCl_3$ in $PhNO_2$ (30% yield), olive-green, m. 258°, forms deep red solns. (red-brown in H_2SO_4). C. A. R.

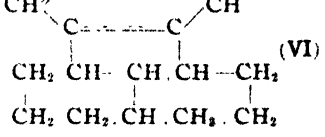
Action of aluminum chloride on *o*-dihydroxybenzil. K. Brass, F. Luther and K. Schoner. *Ber.* **63B**, 2621-7(1930).—As shown in the preceding abstr. the C_6H_6 nuclei of *o*-dimethoxybenzil and probably also of benzopiperil condense in the Scholl reaction in such a way as to yield 2,3-dimethoxy- or 2,3-methylenedioxyphenanthrenequinone. It was thought that possibly in *o-dihydroxybenzil* (*2,3-, 3,4-* or *m,p-dihydroxybenzil*) (I), with its free HO groups, the loosening action of the $AlCl_3$ would extend to other H atoms and lead to the formation of morpholquinone (3,4-dihydroxyphenanthrenequinone) (II). At first, all attempts to bring about a reaction between I and $AlCl_3$ failed and it was only by using $PhNO_2$ at 100° and heating a short time to

160° that there was obtained 25% of a compd. (III) having the compn. of a dihydroxyphenanthrenequinone but which was neither II nor the 2,3-compd. It greatly resembled II, to be sure, but differed from it in that the cherry-red soln. of its diacetate in NaOH-MeOH soon turned olive-green, while that of the diacetate of II becomes deep blue. Moreover, the III itself dissolves in alkali with olive-green color while II gives a deep blue and the 2,3-di-HO compd. a red-violet soln. III in Ac_2O is unchanged by pyroboroacetate, indicating the absence of a 1-HO group and thus excluding 7 of the 16 possible dihydroxyphenanthrenequinones. Further, oxidation gave o-$C_6H_4(CO_2H)_2$, showing that the two HO groups are in the same nucleus, thus excluding 6 more of the possible isomers, and, since II and the 2,3-compd. are also excluded, leaving only the structure of *2,4-dihydroxyphenanthrenequinone* for III. The reaction, therefore, has resulted not only in ring closure to a phenanthrenequinone but also in migration of one of the HO groups. Among the products were also found some unchanged I and a very small amount of II. The Scholl reaction, therefore, possibly gives II primarily which then rearranges into III; unfortunately, not enough II was available to test this point. III is characterized by its soly. in many solvents and the intense red color of the solns. It possesses dyeing properties, probably because of its acid nature. The I was obtained in 57% yield from benzopiperil with PCl_5; it exists in a colorless and a yellow form and is characterized by its soly. and the intense yellow color of its solns.; aq. solns of a certain concn. have a colloidal character. All attempts to synthesize II have failed, and the best way for its prepn. would still seem to be to start from codeine (or methylmorphimethine) or from morphine. The small quantity of pure II finally obtained from acetylmethylmorpholquinone formed a red powder which did not suffice for prepn. in analytically pure form. It did not melt and darkened at 300° with formation of a violet sublimate. It dissolved in H_2SO_4 with brown-red color and the yellow soln. in Ac_2O gave a red-violet color on addn of pyroborate and on heating. With $SnCl_4$ it forms a complex (deep blue soln.), also with $AlCl_3$ in $PhNO_2$ (blue ppt.). Of the colors formed with metallic oxide mordants, the deep violet color with Sn mordants is the most beautiful, but they are not fast. I, m. 157.5°, soly. in boiling H_2O 1.24 : 100, seps. from Et_2O and C_6H_6 in yellow crystals, dissolves in alkalies with red-yellow, in H_2SO_4 with lemon-yellow color, gives a deep green color with aq. $FeCl_3$, cannot be acetylated but readily yields a light yellow *dibenzoate*, m. 98.5 9.5°, and is methylated to the di-MeO compd., m 114 5°. Cl in AcOH gives a *di-Cl deriv.*, m 189-90° III, dark-brown needles, red in incident light, decomps. 240°, m above 300°, dissolves in dil. alkalies with olive-green, in H_2SO_4 with olive-yellow color, gives a dark-brown color with aq. or alc. $FeCl_3$, forms with 3,4-$(H_2N)_2C_6H_3Me$ in boiling AcOH a *quinoxaline* whose almost colorless *diacetate* m. 219° and dissolves in H_2SO_4 with violet-red color *Diacetate* of III, brown-yellow crystals with golden luster, m. 197-8°, mol wt. in camphor 322-29.8. C. A. R.

Fluoranthene and its derivatives. II. Julius v Braun and Gottfried Manz *Ber.* **63B**, 2608 12(1930); cf. *C. A.* **23**, 2713. —The formula (I) recently established,



(I)



(VI)

by synthesis, for fluoranthene opened up the possibility of easily carrying out numerous transformations with I. A study of these transformations on a broad basis has been undertaken, and in this paper are described the substances which can be obtained by its more or less exhaustive hydrogenation. Goldschmiedt with Na-Hg and with HI under not too vigorous conditions had obtained a dihydro compd., $C_{15}H_{12}$, m. 76°, and by more energetic treatment with HI a liquid $C_{15}H_{18}$. Repetition of the latter part of his work showed that HI at temps. above 200° gives a mixt. of hydrogenated derivs. which cannot be sepd. by distn., whereas Na-Hg at 180° gives almost quantitatively 1,2,3,4-tetrahydrofluoranthene (II), m. 75°, identical with the product which had been synthesized in the prepn. of I. Its exclusive formation under these conditions shows that one-half of the $C_{10}H_8$ complex in I is more readily hydrogenated than the C_6H_6 nucleus 4. A dihydro deriv. is probably an intermediate product but it has thus far not been possible to demonstrate its formation; Na and moist ether or H activated

by Pt or Pd have no appreciable action on I at room temp., and under pressure II is the 1st product which can be isolated. If somewhat less than 10 atoms H is used the product chiefly contains, in addn. to **II**, *1,2,3,4,9,10,11,12,13,14-decahydrofluoranthene* (**III**); with more than 10 atoms H, II disappears and a little *perhydrofluoranthene* (**IV**) is formed. **III** can be sepd. from the IV by sulfonation and cleavage of the SO_3H acid and on rehydrogenation under pressure gives **IV** quantitatively. **III**, also formed from I and II with Na and alc., gives 1,2,3-$C_6H_3(CO_2H)_3$ on oxidation and, like **II**, regenerates I when dehydrogenated with PbO; a partial dehydrogenation to the *9,10,11,12,13,14-hexahydrofluoranthene* (**V**) could not be detected, even when it was attempted to substitute two Br atoms alicyclically in III and then split off 2 mols. HBr. Nor could V be found along with II or the decahydro compd. **VI** along with its isomer III among the hydrogenation products. In short, I is first hydrogenated in ring 2, then 4 and finally 1. **III**, b_{12} 181-3°, d_4^{22} 1.043, does not solidify in ice-salt, is stable toward atm. O. **IV**, b_{12} 168 70°, d_4^{22} 0.9811. **II**, m. 74-5° after crystn. from alc., b_{12} 203-5°, forms no picrate. C. A. R.

Homochromanone. S. G. Powell and Lucile Anderson *J. Am. Chem. Soc.* **53**, 811(1931).—$PhOCH_2CH_2CH_2CO_2H$ and P_2O_5 in C_6H_6 give a poor yield of homochromanone, obtained as a lemon-yellow oil; the *semicarbazone* m. 228-9°, and the *oxime* m. 99°. C. J. West

Utilization of agricultural wastes. Henry Gilman, R. E. Brown, J. B. Dickey, A. P. Hewlett and G. F. Wright *Proc. Iowa Acad. Sci.* **36**, 265-6(1929).—The *syn-* and *anti*-oximes of δ-benzylfurfural have been examd. in connection with sweet tasting compds. The *syn-* is sweeter than the *anti*-compd. and also sweeter than saccharin. δ-Bromofurfural has been prepd. by the bromination of furfural diacetate. Organometallic compds. and derivs. from them have been prepd. from 1-tetrahydrofuryl-3-bromobutane. Tetrahydrofuryl *p*-toluenesulfonate has been prepd. and tested for its alkylating action. A series of halogen furoic and furylacrylic acids has been prepd. in antiseptic studies, and their Hg and Cu salts are being tested for their possible applications as *fungicides*. W. G. Gaessler

Spectrochemistry of furan and its derivatives. Everett C. Hughes and John R. Johnson *J. Am. Chem. Soc.* **53**, 737-46(1931).—The d. and *n* (in the visible region of the spectrum) are given for furan, 2-methylfuran, furfuryl alc., furfuryl acetate, Et furylpropionate, furylbutanone, furylpentanone, 2-chlorofuran, 3-chlorofuran, 2-bromofuran, 3-bromofuran, 2-methyl-3-carbethoxyfuran, Et furoate, Et 5-chlorofuroate, Et 3-chlorofuroate, furyl cyanide, furylethylene, furylbutenone, furylpentenone, Et furylacrylate and furfural pinacolone. The absorption spectra are reported for furylethylene, Et furylacrylate, furylbutenone, 2-furoic acid and its 5- and 3-Cl derivs. and 2-methyl-3-furoic acid. From the mol. refractions and the exaltations of the dispersion, calcd. from these data, the furan derivs. are divided into 2 classes: 1 in which the value *E*MR is neg., including furan and all of the derivs. in which the substituents do not contain a double bond on the atom immediately attached to the ring, in the α-position; and a 2nd, in which this value is pos., including all of the derivs. in which the side chain contains a double bond forming a conjugated system with the ring. Isomeric α- and β-substituted furan derivs. may be distinguished from each other by spectrochem. means, the exaltations of the dispersions for the α-isomers being envariably higher than for the β-isomers. For 5 furan derivs. (furylethylene, furylbutenone, furylpentenone, Et furylacrylate and furfural pinacolone) the wave lengths of the absorption max. (in the near ultra-violet) calcd. from the Sellmeir dispersion formula are in agreement with the wave lengths of the absorption max. actually observed. Electronic formulas for the furan ring have been proposed and discussed from the standpoint of interpretation of reactions of furan derivs. C. J. West

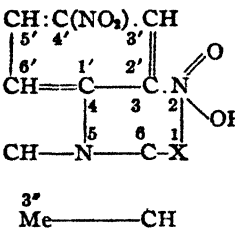
Coumaryl-2-aldehyde and a few other coumarone derivatives. Tadeus Reichstein and Ignaz Reichstein. *Helv. Chim. Acta* **13**, 1275-81(1930).—*Coumarilyl acid cyanide* (**I**), RCOCN (R = O C_6H_4.CH:C—) (42 g.), was prepd. from 54 g. of the

chloride (**II**), RCOCl, in dry Et_2O with 23 g. dry HCN. **II**, b_{14} about 130°, was prepd. from 50 g. coumarilic acid refluxed with excess $SOCl_2$ and the product distd. *in vacuo*. I b_{11} about 115°; recrystd. from C_6H_6, it m. 100-1°. I breaks up in the presence of H_2O into coumarilic acid and HCN. Boiled with EtOH the Et ester is formed, m. 29-30°. I (20 g.), shaken 1 week with 120 cc. concd. H_2SO_4, gave a mixt. of *coumaroylformic acid* (**III**), $RCOCO_2H$, and its *amide* (**IV**). A NaOH soln. of the mixt. extd. with Et_2O gave in the NaOH soln. **III**, m. 153°, and in the Et_2O soln. **IV** which, recrystd. from water, m. 187-8°. In the presence of alkali IV is easily converted into III. III

distd. in a high vacuum and recrystd. from toluene gave pale yellow plates, m. 157–8°. III (10 g.), boiled 10 min. with 25 g. $PhNH_2$, cooled, acidified with 60 cc. concd. HCl and extd. with Et_2O, and the ext. distd. *in vacuo*, gave 3.5 g. (45.6% yield) *coumarilaldehyde* (V), RCHO, b_1 90–100°. Purified with $NaHSO_3$, V was obtained colorless, b_{13} 130–1°, m. 9–9.5°; *semicarbazone*, m. 245–6°; *phenylhydrazone*, m. 136–8°; *β-naphthylamide*, m. 116.5–8°. The $NaHSO_3$ compd. gave the cyanohydrin, m. 66.5–68°. I reduced with Zn dust in HOAc gave the semicarbazone in 42% yield. V, oxidized with Ag_2O in alk. soln., gave coumarilic acid, m. 197–8°. V, shaken in KOH soln., satd. with CO_2, extd. with Et_2O and shaken with $NaHSO_3$, gave *coumarylcarbinol* (VI), RCH_2OH, an oil, b_1 105–10°, which crystd. and m. about 26°. The *p-nitrobenzoate* m. 145–6°. III in EtOH, heated with $N_2H_4.H_2O$ and EtONa, the product boiled with animal charcoal and distd. *in vacuo*, gave *coumarylacetic acid* (VII), RCH_2CO_2H, recrystd. from C_6H_6, m. 98–9°. RACHEL BROWN

Constitution of the complex metal compounds of indigo (preliminary communication). K. KUNZ. *Ber.* **63B**, 2600(1930).—Several papers have appeared in recent years which do not agree with K.'s conception of a purely complex union of the metal in the metal compds. of indigo (cf., among others, Machemer, *C. A.* **25**, 102). K. has no new exptl. material of his own in this field, and the papers referred to make the formation and compn. of the compds. appear in a new light. K. intends again to take up the question experimentally and to resume the study of the action of Fe carbonyl on indigo. C. A. R.

***aci*-Form of 1-*m*-dinitrophenyl-3-methyl-5-hydroxypyrazole and its amino and thio analogs.** C. A. ROJAHN AND HEINZ FEGELER. *Ber.* **63B**, 2510–19(1930).—While the Cl in 1-phenyl-3-methyl-5-chloropyrazole is firmly held, like the "atomatically bound" Cl in PhCl, NO_2 groups on the 1-Ph nucleus labilize the Cl to a remarkable degree, so that it can be removed from 1-*m*-dinitrophenyl-3-methyl-5-chloropyrazole (I) in the cold, like aliphatically bound Cl, by the most varied basic reagents. KOH in MeOH (EtOH, BuOH) gives 3 Cl-free products: one colorless (II), one red (III) and one yellow (IV). II and IV are readily isolated in pure form, but III is very sensitive and quickly changes into IV. II is the alkyl ether of the 5-hydroxypyrazole while III and IV are K salts sol. in H_2O, the soln. giving ppts. with heavy metals and, on acidification, a colorless compd. of pronounced acid character which is believed to have the structure



(V, X = O). In agreement with this structure are the facts that 2 atoms K are necessary for the formation of III and IV, V gives no green NO compd. with HNO_2 and no 5-chloropyrazole with $POCl_3$, and the corresponding NH_3, $PhNH_2$ and $PhNHNH_2$ derivs. (V, X = NH, NPh, etc.) likewise form salts and always yield V with hot alkali. KSH in alc. also yields a colorless thio ether analogous to II and red and yellow salts of V (X = S). *1-m-Dinitrophenyl-3-methyl-5-methoxypyrazole* (II), m. 182°. *5-EtO homolog*, m. 112°. *5-BuO compd.*, m. 99°, changes into the 5-EtO compd. on repeated crystn. from EtOH. *K salt* (IV) of (*4'-nitrobenzo*)-(*2',1':3,4*)-(*3''-methylpyrazolo*)-(*1'',5'':5,6*)-*N*²-*hydroxy*-*N*²-*oxoöxdiazine-1,2,5* (V, X = O), does not m. 350°; free V, m. 126°, decomps. below 100° (evolution of NO) *in vacuo*. *N*¹-*Phenyl*-*N*²-*hydroxy*-*N*²-*oxotriazine-1,2,5 analog* (V, X = NPh), from I and $PhNH_2$ in xylene, yellow, m. 190° (in 1 expt. an *isomer*, m. 156°, changing to 190° after some time, was also obtained), dissolves with red color in alc. KOH on gentle warming and is repptd. unchanged by acids, but if it is heated some time with alc. or aq. alkali it changes into IV; Sn and concd. HCl reduce it to *1-m-diaminophenyl-3-methyl-5-phenylaminopyrazole*, m. 184° (*di-HCl salt*, begins to sublime about 200°, m. 242°). *N*²-*Hydroxy*-*N*²-*oxotriazine-1,2,5* (V, X = NH), from I and alc. NH_3 at 140°, red and yellow crystals changing on standing or recrystn. into the yellow form, m. 204°, forms no picrate, HCl salt, Ac or Bz deriv. *N*¹-*p-Tolyl deriv.* (V, X = NC_6H_4Me), from I and *p*-$MeC_6H_4NH_2$ in xylene, yellow, m. 166°. *N*¹-*Formyl compd.* (V, X = NCHO), from I and $HCONH_2$ in xylene, egg-yellow, m. 286°. *N*¹-*Phenylamino compd.* (V, X = NNHPh), from I and $PhNHNH_2$ in boiling PhMe, lemon-yellow, m. 216° (de-

compn.), also obtained at room temp. from V (X = O) and $PhNHNH_2$. Attempts to benzoylate V (X = O) in C_5H_5N gave a yellow *pyridine compd.* $C_{15}H_{13}O_5N_5$, m. 226° (decompn.), loses C_5H_5N and forms the K salt of V with hot KOH. *1-m-Dinitrophenyl-3-methyl-5-cyanopyrazole*, obtained in small amt. (together with much IV) from I and alc. KCN, m. 169°, insol. in dil. alkali but converted by boiling alkali into IV. *5-p-Toluenesulfonyl compd.*, from I and *p*-$MeC_6H_4SO_2Na$ in dil. alc., m. 219°. *5-Ethylmercapto compd.*, yellow, m. 259°; *K salt* of *aci*-form (V, X = S), deep red; free acid, *(4'-nitrobenzo)-(2',1':3,4)-(3"-methylpyrazolo)-(1",5":5,6) - N^2 - hydroxy - N^2 - oxothiodiazine-1,2,5*, yellowish, m. 179°. C. A. R.

Polymerization product of ring-forming amino acids. E. MIYAMICHI. *J. Pharm. Soc. Japan* **50**, 1100–3(1930); German abstr. 146.—*2-Phenyl-5-glyoxalone* (m. 141°) was treated with glycerol (about 8–10 times) and $Ba(OH)_2$ as polymerizing agent at 120–5° for 2 hrs. The product was obtained in colloidal form by adding water to the cooled reaction mixt. It gave the characteristic reactions of natural proteins. *2-Phenyl-4-(glycocollethylamidimido)benzyl-5-ethylimidoöxazoline* (m. 143°), *2-phenyl-5-ethoxyoxazole* (b_{12} 150–2°), and *2-phenyl-5-ethoxythiazole* (b_{12} 137–40°) were treated as above at 180°, 155–60° and 140°, resp., and the products obtained gave the characteristic reactions of natural proteins. F. I. NAKAMURA

Synthesis of *l*-2-thiolhistidine. JULIUS N. ASHLEY AND CHARLES R. HARINGTON. *J. Chem. Soc.* **1930**, 2586–90.—In connection with the search for *2-thiolhistidine* (I) among the products of hydrolysis of zein and other proteins, the following synthesis was carried out. Histidine was converted into the Me ester di-HCl salt; BzCl gives Me α,γ,δ-tribenzamido-Δ$^\gamma$-pentenoate, transformed by MeOH-HCl into Me α,δ-dibenzamido-γ-ketovalerate, which, boiled with 20% HCl for 1.5 hrs., gives *α,δ-diamino-γ-ketovaleric acid-di-HCl*, which could not be obtained cryst. but with NaSCN, on heating 1 hr., there results I, darkens 290°, does not m. 310°, $[\alpha]_{5461}$ —9.5° (*c* 2.01 in *N* HCl); I gives the ninhydrin reaction; aq. I decolorizes alk. $KMnO_4$ in the cold; on warming with $FeCl_3$, H_2SO_4 is liberated; evapn. with concd. HCl gives the *di-HCl salt*, m. 197–9° (decompn.); *monopicrate*, orange-red, m. 156°; I is pptd. from H_2O by Ag salts at p_H 5, by $HgSO_4$ in 5% H_2SO_4 and by $HgCl_2$ in faintly acid soln. Oxidation with $Fe_2(SO_4)_3$ gives histidine. C. J. WEST

Action of nitric acid on acetylene. III. A. QUILICO AND M. FRERI. *Gazz. chim. ital.* **60**, 721–44(1930).—After having established the constitution of α-isoxazolecarboxylic acid (I) (cf. *C. A.* 24, 3484) and of α,β'-diisoxazolyl ketone (cf. *C. A.* 24, 3788), a study was begun of the other more complex products of the reaction of C_2H_2 and fuming HNO_3, particularly of the explosive compd. $C_4H_2N_6O_7$ (II) and its decompn. product $C_4H_2N_4O_3$ (III). Great difficulties were encountered, both because of the low yields and because of the behavior of the products, which, in general, are very resistant toward reagents, and when finally attacked, form too simple decompn. products. The present paper partly completes the investigation. Under the conditions already described (*C. A.* 24, 3484) which give the highest yield of I, only a small yield of II is obtained. A higher yield of II is obtained in the following way. Fuming HNO_3 (180–200 cc. of d. 1.48) divided in 2 Lunge tubes in series treated with a current of C_2H_2 (washed with $NaHSO_3$) for 3–4 days (until the reaction mixt. passes from brown-red to green-yellow), poured into cold water (800 cc.), let stand several hrs., filtered, the residue washed with cold water, and dried *in vacuo* over P_2O_5 and KOH, yields 1.8–2.5 g. of II. Thus prepd., II is straw-yellow, m. around 78° (decompn.). II is so unstable that it is very difficult to recrystallize it from AcMe or glacial AcOH. It gives yellow solns. in cold aq. 10% alkalies and red-orange solns. in alc. KOH and in alc. KOEt. When its soln. in 10% NaOH is boiled, NH_3 is evolved. In EtOH, II gives with $PhNH_2$ a dark green soln., which then becomes blood-red and finally brown and by evapn. yields a pitchy *substance*. Boiled with water or dil. mineral acids, II decomps. and on cooling a cryst. *compd.* (IV), m. 108°, seps. (see later). Colorless solns. are obtained with $SnCl_2$, Zn + AcOH, etc., whereas with Na-Hg and water intense orange-yellow solns. are formed, as a result of the formation of the compd. $C_4H_6N_6O_3$ (V) (see later). In boiling water, II decomps. and the soln. contains HNO_3. II (4 g.), added slowly, with vigorous agitation, to $SnCl_2$ (40 g.) in concd. HCl (40 cc.) (keeping cool), let stand several hrs. at room temp. in contact with granulated Sn (to reduce $SnCl_4$ to $SnCl_2$), dild. with boiling water (1000 cc.), the Sn pptd. with H_2S, filtered, the filtrate concd. to a small vol., let stand *in vacuo* over KOH until crystn. is complete, filtered and dried on a porous plate, yields 1.5–2.0 g. of crude product, which after purification with animal charcoal and recrystn. from water contg. a trace of HCl, gives *oxyamidoöxime-HCl*, $(C_3H_4N_6O)C(:NOH)NHOH.HCl$ (VI), decomps. around 182°, is very stable in air and in acid soln.; in water it gives with $FeCl_3$ a dark blue-

green color, and with excess $FeCl_3$ a flocculent ppt. of the same color seps. With $AgNO_3$ **VI** ppts. a yellowish *substance* mixed with AgCl, which slowly becomes black. With $Cu(OAc)_2$ **VI** ppts. a brown-black *substance*, insol. in AcOH, sol. in HCl. With acidic KI, **VI** liberates I. The mother liquor from the prepn. of **VI** yields $HONH_3Cl$. With alkalies, aq. **VI** gives intense orange-yellow solns. which become of a lighter color on addn. of mineral acids. The same phenomenon occurs with NH_4OH, Na_2CO_3 and $NaHCO_3$ but not with NaOAc. Ice-cold aq. **VI** (2 g. in 2–3 cc.), made alk. with 50% KOH, acidified with glacial AcOH, the ppt. washed with water and recrystd. from boiling water, yields the *compd.* $C_4H_5N_5O_2$ (**VII**), yellow, m. 185–90° (decompn.), in water with $AgNO_3$ ppts. a brick-red *compd.*, with aq. $FeCl_3$ gives a brown-red color, gives intense orange-yellow solns. in aq. alkalies and alk. carbonates (repptd. by neutralization) which on boiling become brown-yellow and evolve NH_3. When yellow solns. of **VII** in concd. HCl are boiled and dild. with water, an unidentified *compd.* is ppt. With BzCl in aq. NaOH or Na_2CO_3, **VII** gives a *Bz deriv.*, $(C_4H_4N_5O_2)Bz$ (**VIII**), light yellow, m. 218° (decompn.). **VIII** is also formed from BzCl and aq. **VII** contg. NaOAc. When **II** is heated in petr. ether the product is **III**, which has the compn. $O_2NCH_2\overset{\frown}{C}:N.O.N:\overset{\frown}{C}CN$, mixed with pitchy substances and an oil $C_{12}H_{22}N_2O_5$ (cf *Gazz. chim. ital.* **32**, 202(1902)). When carried out in AcOH, the decompn. leads to a better yield and without secondary products. **II** (5 g.) in glacial AcOH (30 cc.), heated (at first cautiously) until decomp. is complete, and then more actively until most of the AcOH is evapd., dild. with water (4–5 vols.), filtered, washed with cold water and the residue recrystd. from EtOH or C_6H_6, yields 90% of **IV**, $C_4H_2N_4O_3$, m. 108°, sol. in warm concd. H_2SO_4 (addn. of a trace of PhOH to this soln. gives a green color), gives no color with $FeCl_3$, does not react with $PhHNNH_2$, does not react with boiling $SOCl_2$, reacts easily with alkalies; in cold 10% KOH it gives with $NaNO_2$ and H_2SO_4 an orange-red color, very stable toward oxidizing agents, partially decompd. to CO_2, HCN and N by $KMnO_4$ in H_2SO_4. **IV** (3 g.), added slowly (with cooling) to $SnCl_2\ 2H_2O$ (14 g.) in concd. HCl (14 cc.), let stand several hrs. with granular Zn, dild. with boiling water (500 cc.), the Sn eliminated with H_2S, filtered, evapd. to a small vol., cooled, filtered, the residue (2 g.) dried on a porous plate and purified with animal charcoal and recrystd. from water, yields *furazanmethylamine-HCl*, $C_3H_6N_3OCl$, probably $\overset{\frown}{CH}:N.O.N:\overset{\frown}{C}CH_2NH_3Cl$ (**IX**), m. around 185° (decompn.), has strong reducing powers, with aq. H_2PtCl_6 turns green and ppts. Pt black, gives with aq. $AgNO_3$ a Ag mirror at room temp., with $Cu(OAc)_2$ ppts. a brown-black substance, difficultly sol. in AcOH but sol. in HCl, does not give any color with $FeCl_3$ (though the $FeCl_3$ is reduced to $FeCl_2$). N is evolved in all these reductions. Cryst. AcONa and a little BzH, added to **IX** in 50% AcOH, heated on a water bath for 0.25 hr., cooled and the ppt. recrystd. from EtOH, yield the condensation *compd.* $C_{10}H_9N_3O$, m. 154°, behaves like a Schiff base, with boiling HCl forms **IX** and BzH. $NaNO_2$ (0.4 g.), added to aq. **IX** (0.5 g.), evolves N and forms a light yellow *oil* with intense sweet odor like that of dimethylfurazan. On steam distn. the oil is obtained in colorless form, but in too small yield to identify. It is probably an *alc.* $C_3H_3N_2OH$ corresponding to the primary amine. By the Schotten-Baumann method in NaOH soln., a Bz deriv. does not sep. in the reaction of **IX** with BzCl, but in $NaHCO_3$ soln. a ppt. is obtained immediately and on recrystn. from hot EtOH this yields a *mono-Bz deriv.* of **IX**, $C_{10}H_9N_3O_2$, m. 198° (decompn.), sol. in dil. alkalies. **IX**, boiled 1 hr. with Ac_2O and AcONa, dild. with water, filtered, the residue washed with water and recrystd. from EtOH (with animal charcoal), yields a *tri-Ac deriv.* of **IX**, $C_9H_{11}N_3O_4$, m. 75°. It is probable that Ac_2O reacts in some complicated way, with secondary reactions. From **IX** dissolved in 50% KOH the *free base* $C_3H_5N_3O$ seps. as an oil, very unstable, turns brown from decompn. when left overnight in the KOH soln. **IV** is very stable toward acids, but when heated in a closed tube with concd. HCl (1 g. of **IV** in 20 cc.) for 2 hrs. at 140°, evapd. *in vacuo* over KOH to remove HCl, the residual oil dild. with a little water, extd. with Et_2O, the ext. evapd., leaves an *oil* (**X**) with sweet odor, heavier than water, does not contain Cl. The aq. liquor contains considerable NH_4Cl but no $(CO_2H)_2$ or NH_2OH. The NH_4Cl probably results from the sapon. of a CN group and the CO_2 evolved by elimination of the CO_2H formed in this sapon. **X** is probably *nitromethylfurazan*, $\overset{\frown}{CH}:N.O.N:\overset{\frown}{C}CH_2NO_2$, corresponding to the amine $C_3H_5N_3O$. **IV**, refluxed with concd. HCl, evolves CO_2, with formation of NH_4Cl and **X**. To establish by esterification the CO_2H group which is so easily eliminated, the action of alc. HCl was tested. **IV** (1.8 g.) and abs. EtOH (40 cc.), satd. with HCl in a sealed tube, heated 1 hr. at 120–30° (EtCl and CO_2 are

liberated), evapd. on a water bath to remove most of the EtOH, dild. with water, extd. with Et_2O, the ext. dried over $CaCl_2$, distd., the residue freed of oil on a porous plate and recrystd. from EtOH + C_6H_6, yield the *compd.* $C_4H_6N_2O_2$ (or $C_6H_9N_3O_3$), m. 124°, neutral, decomps. above its m. p. with evolution of white fumes and a HCN odor and with considerable carbonization, is insol. in alk. carbonates, reduces $KMnO_4$ in aq. alkalies. A study of the action of aq. and alc. alkalies on **IV**, both of which attack it easily, is still unfinished, but a few preliminary results are reported. **IV** (2 g.), mixed with 50% KOH (20 cc.), evolves heat, becomes violet-red, acquires a characteristic sweet odor and forms an oil emulsion. When heated gently, the liquid becomes clear red, contains K_2CO_3 and the yellow oil seps. The oil is **X**, and is formed by elimination of CO_2 from the acid resulting from sapon. of the CN group of **IV**. The alk. liquor (after sepn. of **X**), refluxed 0.5 hr. (NH_3 is evolved), the orange liquid concd. on a water bath, the K_2CO_3 which seps. filtered off and the filtrate evapd., yields an unidentified *K salt*, carbonizes when heated; its aq soln. gives with $FeCl_3$ an intense red color which vanishes when acidified. It is probably a K salt of a NO_2 acid. **IV** (2 g.), added slowly to 25% KOH in MeOH (25 cc.), the red soln. heated cautiously for 0.5 hr., filtered, the residue washed with MeOH, the filtrate evapd. to obtain more salt and the combined residues dried, yields a *salt* (**XI**) which is probably that of a CO_2H acid; its aq. soln. acidified with AcOH gives with $AgNO_3$ a yellow *Ag salt* which when dry explodes upon being heated. Aq **XI**, acidified with dil. H_2SO_4, evolves CO_2 and yields a turbid liquid which, extd. with Et_2O, the ext. evapd. and the residue recrystd. from boiling water, yields a *compd.* with pearly aspect, m 163.5° (decompn.). Its quantity was too small for analysis, but it is probably a CO_2H acid. In water it is acid to litmus and it decomps. alk. carbonates. Heated above its m. p., it evolves CO_2. The expts. suggest that the constitution of **II** is $HON{:}C(NO_2)\overset{O}{\overset{\frown}{C}}{\cdot}N\ O\ N\ \overset{O}{\overset{\frown}{C}}C(NO_2){:}NOH$ or $HON{:}C(ON\ O)\overset{O}{\overset{\frown}{C}}{\cdot}N\ O\ N{\cdot}\overset{O}{\overset{\frown}{C}}C(NO_2){\cdot}NOH$, and that it is formed from C_2H_2 thus: $C_2H_2 \xrightarrow{HNO_3} O_2NCH_2CHO \xrightarrow{HNO_2} HON{:}C(NO_2)CHO \xrightarrow{HNO_2} HON{\cdot}C(NO_2)C(:NOH)H \xrightarrow{-H_2O} HON\overset{O}{\overset{\frown}{C}}(NO_2)CN \longrightarrow HON{\cdot}C(NO_2)CNO + 2HON{:}C(NO_2)CNO \longrightarrow HON{\cdot}C(NO_2)\overset{O}{\overset{\frown}{C}}{\cdot}N{\cdot}O\ N(O){:}\overset{O}{\overset{\frown}{C}}(NOH)NO_2 \longrightarrow$ **II** + O. This is rendered probable by the expts of Wieland on nitrile oxides and their polymerization products. C. C. DAVIS

Amino-1-methylbenzoxazoles and their conversion into the arsonic acids of *o*-aminophenol. MONTAGUE A. PHILLIPS *J. Chem. Soc.* **1930**, 2685-90.—1-Methylbenzoxazole is obtained in 15% yield from *o*-$AcNHC_6H_4OH$ and 5 *N* HCl by heating 40 min. at 90° or by the action of 2 *N* NaOH at 90° for 1 hr.; Et_2O-HCl in Ac_2O gives the *HCl salt*, prisms, readily hydrolyzed by cold H_2O. The NO_2 derivs were obtained in 60-80% yields by distg. at 10-20 mm. the corresponding nitroacetyl- or -diacetylaminophenols. The *3-NO_2 deriv.*, pale yellow from Ac_2O, m. 125°; *4-NO_2 deriv.*, m. 154° (*HCl salt*, readily dissocd. by H_2O); 5-NO_2 deriv., m. 151°, also gives a *HCl salt* readily hydrolyzed by H_2O; the *6-NO_2 deriv.*, b_{18} 240-50°, m. 112°; it may be recrystd. from 30% AcOH. The NH_2 derivs. were obtained by reduction with Fe in boiling 10% AcOH; *3-NH_2 deriv.*, m. 67° (*Ac deriv.*, m. 218°); *4-NH_2 deriv.*, b_{20} 160-70°, m. 77-8°; *di-HCl salt*, readily sol. in H_2O; *Ac deriv.*, m. 205° (soly. 1 part in 90 parts boiling H_2O); the *5-acetamido deriv.*, m. 120°, forms a *dihydrate*, m. 83°. The *6-NH_2 deriv.* m. 106° (soly. 1 part in 100 parts boiling H_2O); *Ac deriv.*, m. 145-6°. 5,2-$H_2N(AcNH)C_6H_3OH$ gives a *HCl salt* with concd. HCl. *5-Nitro-2-carbethoxyaminophenol*, yellow, m. 170°; *5-NH_2 deriv.*, m. 129° (*Ac deriv.*, m. 233°). Application of the Bart reaction to the above NH_2 derivs. gives the corresponding acetamidohydroxyphenylarsonic acids. *4-Carbethoxyamino-3-hydroxyphenylarsonic acid*, hexagonal prisms; hydrolysis gives 80% of the 4-NH_2 deriv. C. J. WEST

Pseudo bases in the isoxazole series. IV. E. P. KOHLER AND W. F. BRUCE. *J. Am. Chem. Soc.* **53**, 644-51(1931); cf. *C. A.* **25**, 514.—When the salts that are obtained by alkylating 3-phenylbenzisoxazole are treated with bases they yield a pseudo base, which readily loses H_2O and passes into an anhydro compd.; this is a metoxazine deriv. Since the anhydro compd. can be formed only from a pseudo base which has the HO group in the 3-position, its formation shows that in the rearrangement from a base to a pseudo base the HO group may enter this position when the hindrance to every other type of rearrangement is sufficiently great. Phenylbenzisoxazole is ethylated less readily than those previously studied; the Et deriv. was isolated as the *$FeCl_3$ salt*, $C_{18}H_{14}ONCl_4Fe$, pale yellow, m. 134° (87% yield); *chloride*, m. 95-7°, very hygro-

scopic; *$HgCl_2$ salt*, m. 119–20°; *picrate*, yellow, m. 132–3°; *perchlorate*, m. 183–4°. The *pseudo base*, BzC_6H_4ONHEt, results by digesting the ethylation mixt. with HCl and extg. with Et_2O; it m. 79–80° and slowly changes to the anhydro deriv. at room temp., but appears to be stable at —10° for over a year. The Me ether could not be prepd. $NH_2OH.HCl$ and KOH give the *oxime*, $EtHNOC_6H_4CPh{:}NOH$, m. 135.6° (decompn.); with HCl and $FeCl_3$ it gives the above salt, m. 133–4°. PhNCO in C_6H_6 gives the *urea deriv.*, $BzC_6H_4ONEtCONHPh$, m. 128° (*oxime*, m. 145–50° (decompn.)). Heating the pseudo base at 95° *in vacuo* gives the *anhydro compd.*, $C_6H_4.CPh{:}N.CHMe.O$,

m. 33–5°, b_{11} 175–7°; *HCl deriv.*, pale yellow, m. 104°, decomps. slowly at 110°; the H_2O soln. soon deposits the anhydro compd. as a yellow oil; *$FeCl_3$ salt*, yellow, m. 139–40°; *picrate*, bright yellow, m. 128–9°; *$HgCl_2$ salt*, yellow, m. 180–1°. Hydrolysis gives NH_2, AcH and *o*-HOC_6H_4Bz; it is also easily cleaved by $PhNHNH_2$. The anhydro compd. is methylated in the usual manner but the resulting salts are extremely unstable. The *$FeCl_3$ salt* of the *Me deriv.*, $C_{16}H_{16}ONCl_4Fe$, deep yellow, m. 119–20°; hydrolysis gives *o*-HOC_6H_4Bz, AcH and $MeNH_2$. C. J. West

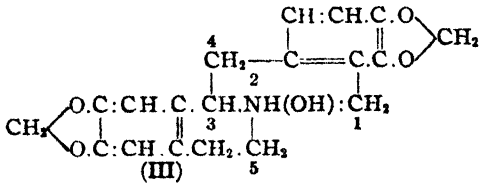
Thiazoles. XVI. Synthesis and study of new aminotoluthiazoles and derivatives from 2,5-diaminotoluene-4-thiosulfuric acid. Marston T. Bogert and Manasseh G. Sevag. *J. Am. Chem. Soc.* 53, 660–9(1931); cf. *C. A.* 23, 5184.—2,5-$(H_2N)_2C_6H_3Me$, $Na_2S_2O_3$ and $AlCl_3$ give 15% of *2,5-diaminotoluene-4-thiosulfuric acid* (I); a potentiometric titration shows its ionization const. to be 5.56×10^{-6} at 25°. In the course of the titration, it was noticed that, after reaching a certain stage in the expt., the potential began to drop to a final equil. much lower than the initial one; this phenomenon occurred only within the range p_H 7.66–9.58 and may be due to occlusion of acids. Refluxing I and *o*-$O_2NC_6H_4CHO$ in glacial AcOH for 20–30 min and then more strongly for 1 hr. gives 36% of *2-(o-nitrophenyl)-5-methyl-6-aminobenzothiazole* (II), yellow, m. 144° (all m. ps. cor.); removal of the 6-NH_2 group gives 2-(*o*-nitrophenyl)-5-methylbenzothiazole, m. 91.5–2°, thus establishing the structure of I. *2-(m-Nitrophenyl) deriv.*, orange-red, m. 233.5° (58.5% yield); the PhMe soln. has a yellowish red fluorescence. I and *p*-$O_2NC_6H_4CHO$ give as the main product *2-(p-nitrophenyl)-5-methyl-6-(p-nitrobenzalamino)benzothiazole* (III), dark red, m. 279°; the $C_6H_4Me_2$ soln. exhibits a greenish yellow fluorescence; a very small amt. of a bright orange compd., m. 312 5° (not cor.), is probably the 6-NH_2 deriv.; III is very stable to hydrolysis and is unchanged after refluxing several hrs. with 30% H_2SO_4 or concd. HCl; cold concd. HNO_3 gives a *mono-NO_2 deriv.*, reddish orange, m. 247.5°. *2-(o,p-Dinitrophenyl)-5-methyl-6-aminobenzothiazole*, red, m. 239.2° (30% yield); the C_6H_6 soln. has a greenish fluorescence. Reduction of II by Sn and concd. HCl gives 70% of the *2-(o-aminophenyl) deriv.* (IV), yellow or reddish violet, m. 251°; *2-(p-aminophenyl) deriv.*, orange-yellow or greenish yellow, m. 255.5°; the EtOH soln. has a purple fluorescence. IV, sulfonated and oxidized with NaOCl, gives a dye of Columbia Yellow type, black, amorphous, which is probably a mixt. of the di- and tetra-SO_3H acids. The *p*-NH_2 deriv. gives a mixt. of the di- and tetra-SO_3H acids, lustrous black solid. These dye unmordanted unbleached cotton a deep orange-tan, of approx. the same fastness as other dyes of this type. Diazotizing and coupling expts. with β-$C_{10}H_7OH$ indicate that the dye still retains free NH_2 groups; the azo dyes so produced were likewise direct dyes for cotton. *2-(o,p-Diaminophenyl)-5-methyl-6-aminobenzothiazole*, orange, m. 285.5° (not cor.); the EtOH soln. has a sky-blue fluorescence. A thiosulfuric acid of 2,4-$(H_2N)_2C_6H_3Me$ could not be prepd. by the above method. C. J. West

Triazole compounds. III. Alkylation of nitro-1,2,3-benzotriazoles. Oscar L. Brady and Cedric V. Reynolds. *J. Chem. Soc.* 1930, 2667–73; cf. *C. A.* 22, 1357.—6-Nitro-3-methyl-1,2,3-benzotriazole (I) and Me_2SO_4, warmed on the water bath for 1 hr., give *6-nitro-1,3-dimethyl-1,2,3-benzotriazolinium Me sulfate* (II), m. 110° (decompn.); boiling 2 *N* HCl gives the *chloride* (III), m. 136° (decompn.); heating II or better III regenerates I. 6-Nitro-1,2,3-benzotriazole, heated with excess of MeI for 2 hrs. at 100°, gives the iodide corresponding to III; similarly Me_2SO_4, heated 30 min. on the water bath, gives II; however, methylation with Me_2SO_4 in 2 *N* NaOH gives nearly quantitatively a mixt. of *6-nitro-1-methyl-1,2,3-benzotriazole* (IV), pale yellow, m. 187°, and I. III and Me_2SO_4, 30 min. at 100°, gives II. Reduction of III with $Na_2S_2O_3$ in EtOH gives the *6-NH_2 deriv.*, m. 201°. 7-Nitro-5-methyl-1,2,3-benzotriazole (V) and Me_2SO_4 in 2 *N* NaOH give some 1,5-di-Me deriv. (VI) and a larger amt. of the *3,5-di-Me deriv.* (VII), pale brown, m. 196°; reduction of the latter gives the *7-NH_2 deriv.*, m. 190°. V and Me_2SO_4, heated on the water bath for 10 min., gave a Me sulfate which did not crystallize; the chloride from this gave only VI when heated.

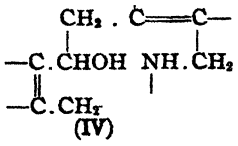
VII and Me_2SO_4 also gave an uncrystd. Me sulfate; the corresponding chloride, when heated, gives only VI. C. J. WEST

Rotenone. XI. Relation between isorotenone and rotenone. H. L. HALLER. *J. Am. Chem. Soc.* **53**, 733–7(1931); cf. *C. A.* **25**, 105.—Rotenonic acid, gently heated in concd. H_2SO_4 and AcOH until soln. results, isomerizes to *β-dihydrorotenone*, $C_{23}H_{24}O_6$ (I), m. 156°, $[\alpha]_D^{34}$ —26.5° ($CHCl_3$, *c* 5.86); it is insol. in alkali and is not a mixed anhydride, since it is recovered unchanged on refluxing in MeOH for 3 hrs.; it absorbs no H in AcOEt with Pt oxide; it reduces Fehling soln. Refluxing in EtOH-KOH for 3 hrs. gives *β-dihydrotubaic acid*, $C_{12}H_{14}O_4$, m. 175–6° (decompn.), gives a purple color with $FeCl_3$; this acid also results on alkali fusion of I. Oxidation of I with CrO_3 gives *β-dihydrorotenonone*, yellow, decomps. about 310°, while with $K_3Fe(CN)_6$ there results *dehydro-β-dihydrorotenone* (II), $C_{23}H_{22}O_6$, m. 269°, and with I in EtOH-AcOK, *β-dihydrorotenolone* (III), cream, m. 274°; boiling this with EtOH-H_2SO_4 gives II; the filtrate from III contains an *Ac deriv.* of III, m. 224°. Refluxing II with EtOH-KOH and Zn for 1.5 hrs. gives *dehydrodihydroxy-β-dihydrorotenonic acid*, m. 149°, which is oxidized with H_2O_2 in 5% NaOH to derric acid. A possible explanation is given of the fact that rotenone is readily reduced and isorotenone is not, and a relation between the two is indicated. C. J. WEST

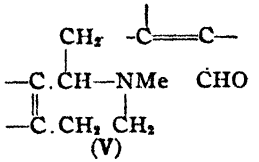
Constitution of chelidonine. F. v. BRUCHHAUSEN AND H. W. BERSCH. *Ber.* **63B**, 2520–7(1930).—The structure assigned by Schwarz (*Diss. Marburg*, 1928) to chelidonine (I) on the basis of his observation that oxidation of the methine gives hydrastic acid and 2,4,5-$Me_2NCH_2(CH_2O_2)C_6H_2CO_2H$ (II) does not explain many of the reactions of I. The investigations of Kling (*Diss. Marburg*, 1927) gave the impression that the N is attached to two $PhCH_2$ groups. From this and from phylogenetic considerations



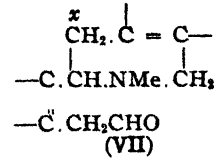
(III)



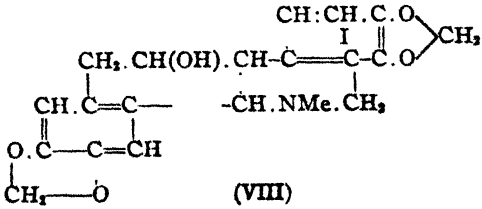
(IV)



(V)



(VII)



(VIII)

v. B. and B. have derived a structure for I which agrees most satisfactorily with all the known facts. Especial emphasis is laid on the close relationship between I and protopine (II) on the one hand and between homochelidonine and allocryptopine on the other. The 2 pairs have the same empirical formulas, $C_{20}H_{19}O_6N$ and $C_{21}H_{23}O_6N$, resp., and the same side chains (two CH_2O_2 groups in the 1 pair, one CH_2O_2 and two MeO groups in the other). The mother substance of II with its 10-membered ring may be considered to be tetrahydrocoptisine (III). Shifting of the HO group to C atom 3 would give a dihydronorprotopine (IV) which by addn. of HCHO on the N would yield the methanolamine and this by intramol. oxidation and reduction would form II. Shifting of the HO to C atom 1 would in the same way lead through an aldehyde (V) to bases (VI) of the type of narcotine and hydrastinine. Finally, shifting of the HO to C atom 5 would give a substituted $PhCH_2CHO$ (VII) which by intramol. aldol condensation with a reactive CH_2 group (*x* in formula VII) might yield I having

the structure **VIII**. **VIII**, however, on degradation should give 2,3,4-$Me_2NCH_2(CH_2O_2)$-$C_6H_2CO_2H$ (**IX**), not the 2,4,5-compd. (**II**), and, as a matter of fact, it was readily shown that the degradation product of **I** is really **IX**. The vinyl side chain in anhydrocryptopine is reduced by Pd-charcoal and H in MeOH, with formation of *allodihydroanhydrocryptopine* (**X**) (isomeric with the anhydrodihydrocryptopine B obtained by Perkin by reduction of the stilbene double bond with Na-Hg) which with Na-Hg gives *tetrahydroanhydrocryptopine* (**XI**), and **XI**, after *N*-methylation and renewed boiling with alkali, yields *des-N-tetrahydroanhydrocryptopine* (**XII**) which on oxidation gives *2-ethyl-4,5-dimethoxybenzoic acid* (**XIII**) and *2-dimethylaminomethyl-3,4-methylenedioxybenzoic acid* (**IX**), identical with Schwarz's supposed **II**. This was further confirmed by converting S.'s acid, after treatment with CH_2N_2 and exhaustive methylation, into 2,3,4-$Me(CH_2O_2)C_6H_2CO_2H$ by reductive degradation according to Emden. The structure **VIII** for **I** satisfactorily explains the Hofmann degradation of **I**.MeI and the conversion of **I** into chelerythrine. Homochelidonine may, in view of its relationship to allocryptopine, be considered as an **VIII** in which the CH_2O_2 group in nucleus I is replaced by two MeO groups, and Winterfeld's methoxychelidonine as **VIII** with a MeO group at *x*. **X**, yellow sirup quickly turning brown in the air; *methiodide*, m. 233° (cor., decompn.). **XI**, yellow-brown oil; *methiodide*, m. 222° (cor., decompn.). **XII**, faintly yellow, m. 99° (cor.). **XIII**, m. 146° (cor.). **IX** was isolated as the *chloroaurate*, m. 191°, in 0.08 g. yield from 1 g. **XII** with $KMnO_4$ in Me_2CO and in 0.25 g. yield with O_3 in 20% AcOH. C. A. R.

Tephrosin. I. Composition of tephrosin and its relation to deguelin. E. P. Clark. *J. Am. Chem. Soc.* **53**, 729-32 (1931).—The ext. from the leaves of *Cracca vogelii*, derris root and the roots of *Lonchocarpus nicou* (Cubé root), on fractional crystn. gives deguelin (**I**), m. 171° (cf. *C. A.* **25**, 938), and tephrosin (**II**), m. 198°. **I** and **II** form a mixt. which is difficult to sep. by fractional crystn. and which appears to be the material designated by Hanriot (*C. A.* **1**, 1013, 1435) as **II**. **II** may also be isolated by destroying **I** with CrO_3 in AcOH. **II**, $C_{23}H_{22}O_7$, n_α 1.590, n_β indeterminate, $n_\gamma > 1.74$, n_1 1.680. **II** is a dimethoxylactone, which gives with concd. H_2SO_4 in AcOH at 60° or with Ac_2O and AcOK, dehydrodeguelin. Oxidation with $KMnO_4$ gives *tephrosindicarboxylic acid*, $C_{23}H_{22}O_{11}$, m. 220° (decompn.), n_α 1.530, n_β indeterminate, n_γ 1.640. It is suggested that **II** is a hydroxydeguelin. C. J. West

Reaction of organic halides with piperidine. I. Alkyl bromides. Joseph Semb and S. M. McElvain. *J. Am. Chem. Soc.* **53**, 690-6 (1931).—The rate and course of the reaction between piperidine (**I**) and 18 alkyl bromides has been detd. Primary and sec. bromides, with the exception of cyclohexyl bromide, react with **I** to form tert. amines. Cyclohexyl bromide and the tert. bromides which were studied react, in the main, to lose HBr and form, presumably, an unsatd. compd. As a class the primary bromides react quite completely in 48 hrs.; iso-BuBr is an exception. There appears to be a distinct alternating effect of the Ph group on the reactivity of $PhCH_2Br$, $PhCH_2CH_2Br$ and $Ph(CH_2)_3Br$ when they are compared after a 4 hr. period of reaction. The sec. and tert. bromides are exceedingly unreactive at 90° when compared with the primary bromides; at 125-35° iso-PrBr and *sec*-BuBr definitely react to form a tert. amine but cyclohexyl bromide, when forced into a more complete reaction, shows practically the same tendency as the tert. bromides to lose HBr. This fact would seem to lend support to the suggestion that the sec. bromides which react with **I** to form a tert. amine probably rearrange to primary bromides before reacting and react as such. C. J. West

***ms*-Dichloroanthracene and its β-sulfonic acid as starting materials for manufacturing alizarin.** V. I. Minaev and B. P. Fedorov. *Zhur. Prikladnoi Khim.* **3**, 881-93 (1930); cf. *Zhur. Khim. Prom.* **6**, No. 7-8 (1929). Chlorination of anthracene in nitrobenzene: 178 g. dry anthracene suspended in 1200 g. $PhNO_2$ was directly chlorinated at 7-10° under const. stirring. When the increase in wt. was equal to that required by theory, the HCl formed was removed by air blowing, the mixt. settled 12 hrs. and the *ms*-dichloranthracene (**I**) (m. 202.7°, after recrystn. from C_6H_6, m. 209°) was filtered out, washed with EtOH and dried. The yield is 87%. Chlorination of anthracene in *o*-dichlorobenzene: 89 g. anthracene in 225 g. $C_6H_4Cl_2$ was chlorinated in a similar manner. Care must be taken in blowing air through the mixt. because of the volatility of the $C_6H_4Cl_2$ which may lead to excessive chlorination if the reaction is controlled by weighing the flask. The yield is 88%. Either method gives a pure product which does not require further purification. *ms*-Dichloroanthracene-β-sulfonic acid (**II**) was obtained as specified in Ger. pat. 292,590. Ten g. **I** was added to 36 g. benzene and 20.8% fuming H_2SO_4 mixed with 15 g. $PhNO_2$ was introduced by drops during 1 hr. 40 min., the temp. being kept at 9-11°. Stirring was continued for 6 hrs.

Next morning 40 cc. water was added and the $PhNO_2$ distd. with steam. The product was boiled in 1 l. water and filtered hot. The acid in the form of the Na salt was obtained from the filtrate by boiling with 20 g. NaCl. The yield is 81.5%. By using the exact amt. of free SO_3 in fuming acid required by the reaction the yield was raised to 93.3%. Only free SO_3 is active and the *mono-SO_3H acid* is practically the only product formed. Alizarin must be prepd. from anthraquinone-β-sulfonic acid (III) which is made from I by oxidation with HNO_3 or NO_2. The yield is 62.5%. The following new method was developed which gives 71.5% yield: I (+ SO_3 + HNO_3)⟶III⟶ alizarin. Add 62 g. technical I to 200 g. $PhNO_2$ and introduce at 8-12° during 2 hrs. 100 g. fuming H_2SO_4 (20% free SO_3) Stir for 2.5 hrs. longer and add 320 g. ice. Distil off the $PhNO_2$ with steam. Add carefully 32.3 cc. HNO_3 (d. 1.2), keeping the mixt. boiling under a reflux condenser Filter off the ppt. of unknown compn. Neutralize the filtrate by boiling with $CaCO_3$, filter and heat the filtrate with Na_2CO_3 to obtain the Na salt Mix 23.5 g. of this salt with 12 cc. water and add to 60 g. NaOH + 7.3 g. $NaNO_3$ + 70 cc. hot water. Heat in an autoclave for 28 hrs. at 179-183° and 9-11 atm. Dil. the product in 1200 cc. water and neutralize while boiling with 50% H_2SO_4 (about 120 cc). Boil for 1 hr. longer, cool and filter out the alizarin. V. K.

ω-Cyano-ω-arylideneacetanilides and the conversion of their *o*-nitro derivatives into quinoline derivatives. Mohammad Ishaq and Jñanendra Nath Rây *J. Chem. Soc.* **1930**, 2739-41.—It seemed that naphthinoline (Reissert, *Ber* **27**, 2244(1894)) might be obtained from I; however, reduction gave II. $PhNHCOCH_2CN$, m. 195°, with piperonal in pyridine contg. a trace of piperidine, heated at 60-70° for 1.25 hrs., gives *ω-cyano-ω-piperonylideneacetanilide*, m. 182°; *m-methoxybenzylidene deriv.*, m. 141°; *3,4-dimethoxybenzylidene deriv.*, m. 168°; *o-nitrobenzylidene deriv.* (I), yellow, m. 206°; *6-nitro-3,4-methylenedioxybenzylidene deriv.*, m. 227°; *6-nitro-3,4-dimethoxybenzylidene deriv.*, m. 169°. *α-Cyano-3,4-dimethoxybenzylideneaceto-p-toluide*, m. 198°; *m-methoxybenzylidene deriv.*, m. 144°, *o-nitrobenzylidene deriv.*, m. 182°; *6-nitro-3,4-methylenedioxybenzylidene deriv.*, m. 216°; *6-nitro-3,4-dimethoxybenzylidene deriv.*, m. 174° Reduction with Zn dust in boiling AcOH gives quinoline derivs. *2-Anilino-3-cyanoquinoline* (II), pale yellow, m. 208°; 6,7-methylenedioxy deriv., pale yellow, m. 287°; *6,7-dimethoxy deriv.*, m. 237°; *2-p-toluino-3-cyanoquinoline*, m. 221-2°, *6,7-dimethoxy deriv.*, m. 253°. C. J. West

Some indenoquinoline derivatives. Gurcharan Singh and Jñanendra Nath Rây. *J. Indian Chem. Soc.* **7**, 637-45(1930). *5,11-Indenoquinoline* (I) is best prepd by the following sequence of reactions *o*-$O_2NC_6H_4CHO$ (0.1 mol.), 1-hydrindone (0.1 mol) and Ac_2O (40 cc.) are refluxed for 2 hrs. giving *2'-nitrobenzylidine-1-hydrindone* (II), m. 167° Heating II with Zn and HOAc 1 hr. gives I, which was isolated as its HCl compd., pale yellow, m. 170.5° Derivs. of I are prepd similarly except that the reaction with Zn and HOAc must be performed in a H_2 atm The presence of air during the reduction causes a brilliant fluorescence which may be due to oxidation at the 5-carbon ring of I to give derivs of cyclopentamethine (cf Armit and Robinson, *C. A.* **16**, 2672); the isolation of such substances is being attempted The following substituted 1-hydrindones were prepd.: *6'-nitro-3',4'-methylenedioxybenzylidene*, yellow, m. 178°, *6'-nitro-3',4'-dimethoxybenzylidene*, yellow, m. 210°; *6'-nitrobenzylidene-4,5-methylenedioxy*, yellow, m. 212°, *6'-nitro-3',4'-methylenedioxybenzylidene-4,5-methylenedioxy*, deep yellow, m. 232°; *6'-nitro 3',4'-dimethoxybenzylidene-4,5-methylenedioxy*, yellow, m. 250°; *6'-nitrobenzylidene-4,5-dimethoxy*, lemon yellow, m. 188°; *6'-nitro-3',4'-methylenedioxybenzylidene-4,5-dimethoxy*, yellow, m. 232°; *6'-nitro-3',4'-dimethoxybenzylidene-4,5-dimethoxy*, yellow, m. 237°. These were converted into the corresponding derivs. of I which follow in the same order as the above: *methylenedioxy, HCl salt*, brick-red, m. 197° (decompn.); —; *methylenedioxy*, shrinks at 195° and m. 202°; *bis(methylenedioxy)*, m. 283°; *dimethoxymethylenedioxy, HCl salt*, yellow, shrinks at 255° and m. 257° (decompn.), *dimethoxy, HCl salt*, yellow, m. 232° (decompn.); *methylenedioxydimethoxy, HCl salt*, yellow, m. 270°; *tetramethoxy, HCl salt*, m. 235° (decompn.). Alk. condensation of desoxybenzoin and *o*-$O_2NC_6H_4CHO$ yields *3-o-nitrophenyl-1,2-diphenyl-Δ²-1-propenone*, yellow, m. 210°. A. F. Shepard

Action of guanidine and urea on some hydroxymethylene ketones. Erich Benayr. *Ber.* **63B**, 2601-8(1930).—In general, aliphatic and aliphatic aromatic hydroxymethylene ketones readily yield the corresponding aminomethylene compds with primary or secondary org. bases (*C. A.* **24**, 4507). In this connection the behavior of MeCOCH:CHOH (I) toward guanidine (II) was also studied. The Na deriv of I reacts with salts of II in alc. at room temp. with formation of 2-amino-4-methylpyrimidine (III), *i. e.*, not only is the HO group replaced by the guanidine residue but ring formation, with further elimination of water, also takes place. The reaction is quite general:

analogous products were obtained with the hydroxymethylene derivs. of MeCOEt, MeCOPr, methylheptenone (IV), MeCOPh, $MeCOC_6H_4Me$ and $MeCOC_6H_4OMe$. The III, now readily available, gives with Br in water a Br deriv. (V) in which the Br is held exceedingly firmly and must, therefore, be on the nucleus, probably in position 5. With acid chlorides, however, it readily forms *N*-derivs.; the $ClCH_2CO$ compd. (VI) with hot alc. NH_3 regenerates III in most part while a small part remains unchanged. The pyrimidine formation also takes place with the derivs. of cyclic ketones. Hydroxymethylenecyclohexanone yields *Bz-tetrahydro-2-aminoquinazoline* (VII) and the hydroxymethylene derivs. of cyclopentanone, menthone and carvone behave in the same way; as these require heat for the reaction and are, in general, more stable than the aliphatic compds., the desired products are most simply obtained by boiling the free hydroxymethylene compds. with I carbonate in alc. The reaction can be used quite generally to characterize those cyclic ketones which can yield hydroxymethylene derivs. All the bases so obtained do not turn litmus blue and their NH_2 group is held very firmly. The bases can be boiled a long time with dil. HCl without appreciable change and HNO_2 also generally has no action on them. Hydroxymethylenecamphor (VIII) treated as above gives only a trace of quinazoline (IX) which, however, is obtained quite smoothly in boiling AmOH instead of EtOH. Rupe found that with urea VIII splits off only 1 mol. water to form methylenecamphorurea, and B. has now found that ring formation likewise does not occur in the reaction of VIII with $CS(NH_2)_2$ or of hydroxymethylenecyclohexanone with urea. MeCOC(:CHOH)Me behaves in the same way. The hydroxymethylene ketones, therefore, resemble $AcCH_2CO_2Et$ in their behavior toward urea and II. With hydroxymethyleneacetoacetic ester, II gives iminomethyluracil, resulting from the action of II on $AcCH_2CO_2Et$, *i. e.*, the HOCH group is split off in the reaction. III is obtained in 51% yield. *5-Br deriv.* (V), m. 195°. *N-Chloroacetyl deriv.* (VI), turns green about 165°, then brown and completely decomps. 235°. *5-Me deriv.*, from MeCOC(:CHOH)Me, m. 216–7° (*N-chloroacetyl deriv.*, m. 145–8°). *4-Pr homolog* of III, m. 122–3°. *4-Ph analog*, m. 165°, easily sol. in dil. HCl. *4-p-Tolyl homolog*, m. 189–91°. *4-p-Methoxyphenyl compd.*, m. 185–7°. *4-(4'-Methyl-4'-pentene)-2-aminopyrimidine*, from the hydroxymethylene deriv. of IV, m. 155–9°. VII, m. 206–10°. *4,5-Trimethylene-2-aminopyrimidine*, from hydroxymethylenecyclopentanone, m. 206–8°. *5-Methyl-8-isopropyl-2-aminoquinazoline*, m. 139–41°; *Ac deriv.*, m. 125–7°. *2-Amino-5,6-dihydro-5-isopropenyl-8-methylquinazoline*, from hydroxymethylenecarvone, m. 165–7° (13 g. from 45 g. carvone). *2-Aminobornylenepyrimidine* (IX) (yield, 55%), m. 249–53°; *Ac deriv.*, m. 154–5°; *chloroacetyl deriv.*, m. 156–9°. *Methylenecamphorthiourea*, m. 213–4°. *Methylenecyclohexanoneurea*, light yellow, m. 229–30° (decompn.). *Methylenemethylethyl ketoneurea*, $MeCOC(:CHNHCONH_2)Me$, m. 156°. C. A. R.

Fungus dyestuffs. X. Xylindein, the dye from "green-rotted" wood. 2. Fritz Kogl and Hanni Erxleben. *Ann.* **484**, 65–84(1930); cf. *C. A.* **20**, 406; **25**, 291.—Xylindein (I), dissolved in concd. H_2SO_4 and AcOH and treated with H_2O_2 and 2 *N* HCl, gives 65–70% of a *compd.*, $C_{22}H_{26}O_{12}Cl_4$, yellow, decomps. 225–30°, sol. in alkali with a ruby-red color and giving a brown amorphous product on acidifying. Titration of I with NaOH indicates the formation of a tetra-Na salt, giving a malachite-green soln. in H_2O; I forms a di-Ag salt; MeI in $CHCl_3$ gives a *di-Me ester* of xylindeic acid (II), $C_{36}H_{44}O_{12}$, deep blue-violet needles, whose *tetra-Ac deriv.* forms yellow needles and whose *disemicarbazone* forms brown prisms. Reduction of the ester with Zn in Ac_2O-AcONa gives *di-Me hexaacetyltetrahydroleucoxylindeate* (III), light yellow needles. These facts indicate the presence of 2 enol-lactone groups in I. In the catalytic reduction of I 4 atoms of H are taken up, giving a yellow product, changing to green in the air; NaOH, followed by $AgNO_3$, gives a tetra-Ag salt, which reacts with MeI in $CHCl_3$ to give *di-Me tetrahydroxylindeate di-Me ether*, violet, which gives a *tetra-Ac deriv.*, $C_{36}H_{50}O_{17}$, yellow needles. The reducing acetylation of the ester by Zn in Ac_2O-AcONa gives a *compd.* $C_{40}H_{52}O_{17}$, yellow needles. Titration of the Na deriv. of I with $Na_2S_2O_4$ indicates that 2 atoms of H are absorbed per mol. of I. Tetraacetylxylindein gave only a trace of CH_4 with MeMgI, while *tetraacetylleucoxylindein*, $C_{36}H_{36}O_{16}$, yellow, shows the presence of 2 HO groups. Quant. oxidation of the Na deriv. of I indicates the consumption of 36 atoms of O and the formation of about 3 equivs. of volatile acids. Catalytic reduction of II gives a yellow leuco compd.; with CH_2N_2 this gives *di-Me hexahydroxylindeate tetra-Me ether*, yellow-brown, m. 247°. The sensitivity toward $KMnO_4$ and the resistance to hydrogenation may be easily explained by assuming that I contains a complicated quinone structure, whose double bonds are polyene-like through several nuclei. Taking up 2 H atoms causes the transformation into a stable benzoic system. Heating I at 175° with EtOH-KOH for 3 hrs. gives a little $PrCO_2H$ an

AcOH and about 18% of an *acid*, $C_{17}H_{14}O_{12}$, m. 199°, contg. 2 Ac groups (the product was acetylated to induce crystn.); CH_2N_2 gives the *compd.* $C_{20}H_{18}O_{12}$ or $C_{20}H_{20}O_{12}$, yellow, m. 165°, contg. 3 MeO groups; sapon. of the above acid gives the *compd.* $C_{18}H_8O_{10}$ or $C_{18}H_{10}O_{10}$, dark brown, m. 216°. Zn distn. of the acid m. 199° gave products from which no cryst. compd. could be isolated. Catalytic reduction of the acid gives a brown compd., m. 180–4°; alk. $KMnO_4$ oxidizes the acid, about 15 atoms of O being consumed. Zn distn. of III gives phenanthrene. C. J. WEST

The constitution of the artificial resins. M. KOEBNER. *Brit. Plastics* **2**, 197–8 (1930); *Plastics & Molded Products* **6**, 653–4; cf. *C. A.* **24**, 6039.—On addn. of 25 parts concd. HCl to a soln. of 168 parts *p*-cresol dialc. (I) in 1000 parts *p*-cresol a substance m. 215° (II) was obtained. On addn. of HCl to a mixt. of 2 parts *p*-cresol and 1 part 30% CH_2O the same substance together with another m. 126° (III) was obtained. An elementary analysis of these substances yielded almost the same % of C and H, but the mol. wt. was 228 and 348 for III and II, resp. As the simplest explanation for this the constitution 4,2,6-Me[5,2-Me(HO)$C_6H_3CH_2$]$_2C_6H_2OH$ was assumed for the "tri-body" (II) and [5,2-Me(HO)C_6H_3]$_2CH_2$ for the "di-body" (III). These formulas, which were confirmed by further investigations, gave reason to believe that the properties of the novolacks, resols and resites might be explained by the length of the chains. Contrary to PhOH and its homologs, *p*-cresol was found to give crystd. substances and the formation of the "tri-body" (II) at once showed the way to prep. chains of any length. The "tetra-, penta-, hexa- and hepta-body" were prepd. by condensing, resp., 2 mol. III with 1 mol. CH_2O, 2 mol. III with 1 mol. I, 2 mol. II with 1 mol. CH_2O and 2 mol. II with 1 mol. I. These formations and the properties of the substances support the hypothesis of Blumfeldt (*C. A.* **23**, 5179). Substances having chains with less than 7 links could be dissolved in aq. NaOH whereas such with 7 or more links were insol. A closer study indicated that the latter formed Na salts which were quite insol. in water. This apparent insoly. of the many-link chain substances in NaOH has misled many investigators. They concluded from the insoly. of the resites in NaOH that their phenolic character might have been lost by etherification or esterification. A splitting off of water as hitherto generally assumed in the transition of alkali-sol. resols to alkali-insol. resites and which by esterification or etherification should yield about 8% water cannot be considered as such substances thereby would be rendered completely unserviceable when they are to be converted from a fusible into an infusible state. The above-mentioned substances which seemed to be insol. in aq. NaOH could be readily dissolved in alc. NaOH. In this respect they differ from the resites, as, *e. g.*, prepd. from PhOH, which absorb NaOH without dissolving. This is not surprising considering the fact that PhOH renders possible far more complicated substitutions than *p*-cresol. *m*-Cresol behaves as PhOH, while *o*-cresol takes a middle place. The present explanation of the insoly. of the resites may be applied to almost all synthetic resins. D. THUESEN

The determination of amino acids formed by the hydrolysis of proteins. III. Application of the process of esterification and acetylation to the hydrolysis products of proteins. E. CHERBULIEZ, PL. PLATTNER AND S. ARIEL. *Helv. Chim. Acta* **13**, 1390–1402(1930); cf. *C. A.* **23**, 5161.—The esterification and acetylation of amino acids to yield stable products of the type RCH(NHAc)CO_2Et was applied to the mixt. obtained upon hydrolysis of serum albumin, casein and silk fibrin. It was found best to eliminate NH_3 and cystine (I) before esterification because the presence of acetylated esters of these compds. hinders the smooth distn. of the acetylated mixt. It is advisable to remove tyrosine (II) since its acetylation product is not found in the distillate. This finding is contrary to that expected from the behavior of the pure substance. The amino acids from serum albumin, after sepn. of NH_3 and I by addn. of phosphotungstic acid, yielded products that b_3 110–200°. From the fraction, b_3 105–15°, *active acetylleucine*, m. 181°, $[\alpha]_D^{29}$ —16.99°, was isolated. This product is purer than that obtained by Karrer (*C. A.* **15**, 1288) by direct acetylation of leucine. The m. p. is higher than that of the *racemate*, m. 161° (*Ber.* **34**, 449(1901)). Distn. of the acetylation products of a mixt. contg. I results in decompn.; a *gum* practically free from S is obtained. This gum is pptd. from its colloidal suspension in water by NH_4Cl soln. It does not give the biuret test and is not reduced by Fehling soln. The product from I alone yields the same gum. From the quantity formed, C., P. and A. confirm the idea that the S in serum albumin originates in I. Casein (500 g.) yielded 374 g. of acetylated esters. By means of a N balance, it was found that the yield of products from silk fibrin from which II and $NH_2CH_2CO_2H$ had been sepd. was very much higher than that obtained by other authors by direct acetylation. I. M. LEVINE

The action of chloral and trichloroacetic acid on cholesterol. XII. E. MONTIGNIE. *Bull. soc. chim.* [4], **37**, 1323–5(1930).—Isomerization of cholesterol (I) was brought about by heating in the presence of 4–5 times its wt. of Cl_3CCHO or Cl_3CCO_2H. The compds. $Cl_3CCO_2C_{27}H_{46}.H_2O$, m. 121°, and $Cl_3CCO_2C_{27}H_{45}$ (isomer), m. 140°, were isolated. More of the latter was formed at 100° than at 60°; 3% of meta-cholesterol, m. 140.5°, was isolated when Cl_3CCHO was used. An attempt to condense I with α- or β-$C_6H_7Ac_5O_6$ in the presence of HCl failed, proving the non-existence of a glucoside. I. M. LEVINE

Chlorophyll series. IV. The degradation of chlorophyll and allomerized chlorophyll to simple chlorins. J. B. CONANT, J. F. HYDE, W. W. MOYER AND E. M. DIETZ. *J. Am. Chem. Soc.* **53**, 359–73(1931); cf. *C. A.* **24**, 4047.—An improved method for the prepn. of pyrochlorin *e* (I) consists in boiling 1 g. of chlorin *e* with 100 g. Ph_2 5 min., pouring into 1 l. Et_2O and extg. with 1% HCl (15% yield); Me ester (II), m. 184°; the spectra of I in 8% HCl and of II in Et_2O and 10% HCl are given. The previous statement that I is unstable has not been verified; a soln. of II in glacial AcOH was boiled 24 hrs. without apparent change, decompn with EtOH-KOH and C_5H_5N at 220° for 5 hrs. gives phylloporphyrin. The Cu salt of II gives a deep blue-green color in Et_2O (spectrum given); the Fe salt gives a deep green ether soln. which, shaken with dil. NaOH, becomes brown, with an altered spectrum; shaking with acid restores the color and the original spectrum. The Zn salt in Et_2O is pure blue; 10–15% HCl exts. it with a pure green color. The reduction of I with H (catalytic or HI) gives a phyllochlorin. The prepn. of pyrochloroporphyrin and its reduction are described. Partial hydrolysis of crude pheophytin (*a* and *b*) with KOH in PrOH gives dimethylpheopurpurin 7, further hydrolyzed by the same agent to pheopurpurin 7 (III), a characteristic product of the phase test, allomerization and the phase test appear to be equiv. processes. III (a mono-Me ester) on pyrolysis loses CO_2 and CO, forming the mono-Me ester of a simple chlorin which appears to be a hydrogenated rhodophorphyrin; the mono-Me ester of chlorin *f* (IV) crystallizes in 8-sided plates, acid no. 11, giving a pure blue HCl soln. and a clear green Et_2O soln.; the soly. in Et_2O is about the same as that of chlorin *e*. CH_2N_2 gives the *di-Me ester*, needles, m. 182° (block), acid no. between 13–14, acid soln. blue. Porphyrin 8 is bluish green in acid soln. with a slight red fluorescence and crystallizes in prisms; porphyrin 6 crystallizes in plates and gives a purplish blue acid soln. The corresponding dibasic acid is formed by the action of hot EtOH-KOH on III, $(CO_2H)_2$ being split off; chlorin *f* gives a deep blue acid soln., the acid no. in 10 and the Et_2O soln. is green; the porphyrin was obtained in very small quantities, has an acid no. of 5–6 and gives a light blue acid soln. with a purplish red fluorescence. These facts show that III is an α-keto acid. Pyrolysis of chlorin *f* gives a mixt. of porphyrins, among which is pyrroporphyrin. The alkali decompn. of IV gives rhodoporphyrin, as does the decompn. of porphyrin 6 and 8. Sapon. of allomerized chlorophyll *a* yields III. I is a simple chlorin of the unallomerized series, it still contains the C atom which is eliminated as CO in the allomerized compd. It appears to be isomeric with phylloporphyrin. All these facts point to an oxidation-reduction process as being involved in the phase test and allomerization. C. J. W.

Porphyrin syntheses. XXXVI. Transformation of mesoporphyrin IX into a porphyrin monopropionic acid and several porphyrin syntheses. H. FISCHER AND A. ROTHHAAS. *Ann.* **484**, 85–112(1930); cf. *C. A.* **25**, 301.—Mesochlorin, obtained from mesoporphyrin IX (I), on reduction with Zn and AcOH and reoxidation, does not give I but a di-Me ester, m. 207° and giving a depression of 20° with the di-Me ester of I. It was therefore necessary to study the Zn-AcOH reduction of mesoporphyrins. The Zn-AcOH reduction of I and crystn. of the Na salts gives at least 3 compds. The Et_2O soln. of the porphyrins, extd. with very dil. NH_4OH (5 drops per l. H_2O), gives a product whose *di-Me ester*, $C_{36}H_{42}O_4N_4$, needles, m. 197° (cor.) (80–100 mg. from 4 g. I); it gives a depression of about 20° with the Me ester of isomesoporphyrin and the esters of mesoporphyrin I, VI, VIII, XI and XII. Further extn. of the Et_2O with 5–10% NH_4OH gives a product whose *Me ester* (150–200 mg.), $C_{36}H_{42}N_4O_2$ (?), does not have a const. m. p. (218–240°) and gives a considerable depression with the natural meso ester; the *Cu complex salt*, $C_{36}H_{40}N_4O_2Cu$, m. 175° (cor.). A 3rd ester (40 mg.), $C_{36}H_{44}O_6N_4$, m. 257° (cor.), which also gives a depression with the Me ester of I; *Cu complex*, m. 277° (cor.); *Fe complex*, bluish black needles. The crude porphyrin mixt., transformed into rhodins, gives a neutral fraction, bluish black needles, m. 259–60°, spectroscopically identical with mesorhodin (1.5–2% yield); the acid fraction, repeatedly fractionated from 1% HCl and esterified, gives needles, m. 205°, analyzing for $C_{37}H_{40}O_8N_4$, or a tripropionic acid. Zn-AcOH reduction of *mesoporphyrin XI* (II) gives 3 Me esters, m. 206°, 165.9° and 245.6°, resp. II was synthesized from the methenes

from opsopyrrolecarboxylic acid and the brominated methene from cryptopyrrolealdehyde and hemopyrrole; *Fe complex*, bluish black needles; *Cu complex*, red, does not m. 299°; *di-Me ester*, m. 174.5° (*Fe complex*, bluish black, m. 263°; *Cu complex*, m. 189°). 3-Ethyl-4-methyl-5-carboxyl-2-pyrrolealdehyde and 2,4-dimethyl-3-propylpyrrole with HBr and then with Br-AcOH give *4,3'-dimethyl-3-ethyl-4'-propyl-5-bromo-5'-bromomethylpyrromethene-HBr*, orange-red, decompg. 195°; with 3,5,3'-trimethyl-4-ethyl-4'-propionic acid-5'-bromopyrromethene-HBr this gives mesoporphyrin V and *1,3,5,8-tetramethyl-2,4-diethyl-6-propyl-7-propionic acid porphin*, whose *Me ester*, blue violet, m. 237° (cor.) (1.8% yield). 3,5-Dimethyl-4-propyl-2-pyrrolealdehyde and opsopyrrole in 48% HBr and EtOH give *3,5,3'-trimethyl-4-propyl-4'-ethylpyrromethene-HBr*, orange-red, m 211° (cor); with 4,5,3'-trimethyl-3-ethyl-4'-propionic acid-5'-bromopyrromethene-HBr there results mesoporphyrin II and 1.7% of *1,3,5,8-tetramethyl-2,4-diethyl-7-propyl-6-propionic acid-porphin*, whose *Me ester* m. 215° (cor.). Cryptopyrrolecarboxylic acid aldehyde and hemopyrrolecarboxylic acid in EtOH with concd. HCl or 48% HBr give *3,4',5,5'-tetramethyl-3',4-dipropionic acid-pyrromethene-HCl* or *HBr* (III), analyzed as the *di-Me esters*, yellow, m. 169–70°, and red, m. 180° (decompn.), resp; III with Br in AcOH gives *3,4'-dimethyl-3',4-dipropionic acid-5,5'-dibromomethylpyrromethene-HBr*, m. 191°. III and 3,3'-diethyl-4,4'-dimethyl-5,5'-dibromopyrromethene-HBr give *mesoporphyrin VI*, whose *di-Me ester* m. 199°, acid no. 2.4–2.5 (*Fe complex*, nearly black rods; *Cu complex*, red, m. 210°). The free mesoporphyrin VI has an acid no of 1.0, the HCl salt forms needles, the *Fe complex* is dark blue; the *Cu complex*, red, m. 314°. 3,3'-Dimethyl-4,4'-diethyl-5,5'-dibromopyrromethene-HBr and III give *mesoporphyrin VIII*, whose *di-Me ester*, red, m. 184–6° (cor.) and gives an *Fe complex*, bluish black, m 223°, and a *Cu complex*, red, m. 210° (cor.) The free porphyrin has an acid no of 1 and gives a bluish black *Fe complex*. The spectra of these compds. are given C. J. WEST

The bile acids. XXIX. MARTIN SCHENCK *Z. physiol. Chem.* **194**, 33–42(1931); cf. *C. A.* **24**, 5761.—Oxime acids of the bile acid series behave differently toward HNO_2 according to the position of the NOH. If this is on the 7-C atom of ring II there occurs merely a splitting off of the N-contg. group with formation of the corresponding keto acid. If, however, the NOH is on the 12-C atom of ring III there is formed a blue or greenish blue nitroso compd. or eventually a colorless nitro compd. Four addnl. examples of these 2 types have now been studied. Isodesoxybilianic acid oxime and cilianic acid oxime, representing the 1st type, yielded the keto acids isodesoxybilianic acid and cilianic acid, resp., in fulfilment of prediction. Isobilianic acid oxime lactam and isobilianic acid dioxime, representing the 2nd type, yielded with HNO_2 bluish green solns. from which dull-blue ppts. sepd on addn of water The lst of these NO derivs. could not be obtained pure, but when recrystd from AcOH the color disappeared and a ketolactamtricarboxylic acid was formed which differed from the parent substance only in the replacement of NOH by O. In contrast to the instability of the intermediate NO deriv. in this reaction, the NO deriv. from the dioxime acid was isolated but not in sufficient yield or purity for a satisfactory analysis An unsuccessful attempt was made to subject the oximinohydroxamic acid, obtained from 3,7,12-trioximinocholanic acid by reduction of its nitrohydroxamic acid, to the Beckmann-Wallach rearrangement with 90% H_2SO_4. The only substance isolated was the original material. A. W. DOX

Sterol group. X. Relationship of the fully saturated derivatives of ergosterol and sitosterol. FRANK S. SPRING. *J. Chem. Soc* **1930**, 2664–7; cf. *C. A.* **24**, 1388.—The crude product prepd. by hydrogenation of ergosterol in the usual manner, when fractionally crystd., gives 3 fractions of nearly pure α-ergostenol, the 4th fraction gave *γ-ergostenol* (I), m. 129 30°, $[\alpha]_D^{22}$ 5.1° ($CHCl_3$, *c* 3.2); fractionation of ergosterol and hydrogenation of the less and the more sol. fractions gave the same products; the isomer responsible for the appearance of I is concd. in the more sol. fractions of yeast ergosterols. I gives an *acetate*, m. 140°, which, with HCl in $CHCl_3$, gives the *acetate*, m. 103–4°, $[\alpha]_D^{22}$ 4.05° ($CHCl_3$, *c* 3.1) of *iso γ-ergostenol* (II), m. 129°, $[\alpha]_D^{22}$ 3.7° ($CHCl_3$, *c* 1.75). On catalytic reduction II absorbs 2 atoms of H, giving *γ-ergostanol*, m. 136°, $[\alpha]_D^{23}$ 29°, which appears to be identical with the sitostanol, m. 136°, $[\alpha]_D^{23}$ 26°, prepd. from cottonseed oil sitosterol. C. J. WEST

Some combination of Co and Ni salts with 2,3-diaminobutane (FREJKA, ZAHLOVA) **6.** Hexacosanol (RABATE) **11A.** Substitutes for morphine and codeine: dilaudid, dicodid, eucodal, acedicon (HAZARD) **17.** Crystal structures of organic compounds (HENDRICKS) **2.** X-ray diffraction by organic solutions (MEYER) **2.** Relation of molecular polarization of Pr chloride and 1,2-dichloroethane to temperatures, especially

regarding free rotation (SÄNGER) **2.** A new relation chart of the carbohydrates (EDDY) **2.** Hydrogenation catalysts (Fr. pat. 691,913) **18.** Treating waste liquors from soda or sulfate pulp manufacture (Brit. pat. 335,371) **23.** Esters of organic acids and olefins (U. S. pat. 1,790,521) **22.** Secondary amyl alcohol from olefins produced in oil cracking (U. S. pat. 1,790,523) **22.** Amylenes and butylenes from oil cracking (U. S. pat. 1,790,522) **22.** Unsaturated hydrocarbons from mixtures such as oil-cracking effluents (U. S. pat. 1,790,519) **22.** Secondary alcohols from olefins produced in cracking petroleum oils (U. S. pat. 1,790,517) **22.** Secondary alkyl sulfates from olefins produced by oil cracking (U. S. pat. 1,790,520) **22.** Sulfonic acids (Ger. pat. 514,080) **18.**

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Reducing organic compounds. N.-V. DE BATAAFSCHE PETROLEUM MAATSCHAPPIJ. Fr. 690,911, Feb. 7, 1930. Org. O compds. such as phenols, cresols or mixts. thereof with hydrocarbons are converted into compds. free from O by heating them under pressure with H and in the presence of a catalyst composed of a finely divided substance, such as charcoal or absorption C, intimately mixed with Mo or Mo compds. or substance contg. Mo. The conditions of the reaction are such that no splitting of the rings takes place.

Oxygenated organic compounds. I. G. FARBENIND. A.-G. (Heinrich Hopff, inventor). Ger. 512,718, Nov. 6, 1927. Aliphatic hydrocarbons are subjected to the action of CO in the presence of anhyd. $AlCl_3$ at temps below 100° under pressure. Several examples are given. In one, normal C_6H_{12}, CO and $AlCl_3$ are heated to 60° in a high-pressure bomb at 120–150 atm. The product includes a carboxylic acid $C_6H_{12}O_2$, b. 190–191°, and a ketone $C_6H_{12}O$, b 114–116°. Cf. *C. A.* **24,** 2755.

Temperature control in gas-phase partial oxidation of organic compounds. CHAS R. DOWNS (to Barrett Co.). U. S. 1,789,809, Jan. 20. In effecting catalytic reactions such as production of phthalic acid from naphthalene, a substantially constant and uniform temp. is maintained by the vaporization of a liquid such as Hg distributed within the zone of reaction in heat transfer relation with the catalyst but out of direct contact with it (as in tubes passing through the body catalyst). App. is described. The application on which this pat. was granted was filed June 11, 1919.

Introducing thiocyano groups into organic compounds. HANS P. KAUFMANN (to I. G. Farbenind. A.-G.). U. S. 1,790,097, Jan. 27. An inorg. thiocyanate such as NaSCN and a halogen such as Br or Cl (suitably with the use of HOAc as a solvent) are used together for introducing the SCN group into various org. compds. Examples are given of the treatment of ethylene (to form 1,2-dithiocyanoethane), styrene (to form 1-phenyl-1,2-dithiocyanoethane), anethole (to form 1-*p*-methoxyphenyl-1,2-dithiocyanopropane), aniline (to form *p*-thiocyanoaniline or 2,4-dithiocyanoaniline), diphenylamine (to form *p*-dithiocyanodiphenylamine), salicylic acid (to form 5-thiocyanosalicylic acid), 1-naphthol (to form 4-thiocyano-1-naphthol or 2,4-dithiocyano-1-naphthol) and 1- and 2-naphthylamine to form corresponding derivs. The products may be used as therapeutic agents, dye intermediates, etc. Cf. *C. A.* **24,** 4307.

1-Methyl-2-cyano-3-thiocyano-5-chlorobenzene, etc. I. G. FARBENIND. A.-G. (Richard Herz and Max Schubert, inventors). Ger. 511,211, Mar. 18, 1927. See U. S. 1,766,820 (*C. A.* **24,** 4308).

Hydrocarbons. URBAIN CHANDEYSSON. Fr. 691,886, Mar. 12, 1930. A hydrocarbon is obtained by incorporating CS_2 in a soln. of Na_2CO_3 in water and stirring for some days until a clear yellow liquid of Na_2S is formed which can be decanted from the

C which remains as a pure white liquid. H is passed in and combines with the C to form a hydrocarbon of d. corresponding to the amt. of H passed in.

Hydrocarbons. Soc. d'études scientifiques et d'entreprises industrielles. Fr. 692,395, June 12, 1929. Unsatd. hydrocarbons, particularly C_2H_2. and gaseous mixts. for the synthesis of oxygenated org. products and NH_3 are made by sepg coke-oven gas into its constituents by liquefaction, mixing the H or gas rich in H thus obtained with N obtained by sepn. of air into its constituents, using the O from this air for the regulated combustion of air or a part of the CH_4 or gas rich in CH_4 from the coke-oven gas sepg. the unsatd. hydrocarbons from the combustion and joining the residual gases of this sepn. composed of H, CO and some N, with the H from the coke-oven gas to form a mixt. suitable for the *synthesis of compds. such as MeOH and* NH_3.

Aromatic hydrocarbons. A. S. Ramage. Brit. 335,353, Sept. 3, 1929. Hydrocarbons such as benzene, toluene and zylene are produced by contact of a mixt. contg. unsatd. hydrocarbons (such as may be obtained by dehydrogenating light weathered products and casing-head gasoline vapors over ferric or cupric oxide) with CO and H (suitably water gas) with metallic iron at atm. pressure and a temp. of about 540–815° (the catalyst being maintained active by the presence of an excess of the hydrocarbon, and the reacting gases being, if necessary, freed from satd. hydrocarbons by passage over cupric or ferric oxide). An arrangement of app is described.

Polymerization of unsaturated hydrocarbons. I. G. Farbenind A.-G. Fr. 688,450, Jan. 18, 1930. In chem. reactions promoted by elec. wave discharges from dielec. surfaces or alternating elec. fields, such as the polymerization of unsatd. hydrocarbons, the reaction products are removed from the reaction chamber by heating the latter to a temp. at which all the products are gaseous or vapors.

Products from ethylene. N.-V. de Bataafsche Petroleum Maatschappij. Fr. 690,935, Feb. 26, 1930. Valuable products are prepd. from C_2H_4 and (or) its homologs by submitting the C_2H_4, etc , to a chem. treatment, in the presence or not of a catalyst, under pressure and at a high temp., in the presence or not of H, the reaction being carried out in a liquid medium which may be inert or not. As liquid medium there may be used hydrocarbon oils, oils from the destructive hydrogenation of carbonaceous materials, vegetable oils, phenols, water, an aq. soln. of a salt or the prepn. called "Edeleanu ext." Examples are given of the prepn. of AcOH and benzine hydrocarbons.

Purifying higher alcohols. I. G. Farbenind. A.-G. Fr. 690,958, Mar. 1, 1930. Resins are eliminated from products contg. higher alcs. such as montan wax, caranuba wax or beeswax by means of solvent for the resins, using solvents which form a homogeneous soln. such as aromatic and aliphatic hydrocarbons and solvents which give a dispersed soln. such as alcs., esters or ketones. The crude materials may first be sapond. to eliminate fatty acids. Thus, crude montan wax is melted and C_6H_6 is added, and the mixt. is allowed to cool with stirring. Cold alc. is then added while continuing to stir and on allowing to settle the soln. of resin is decanted.

Oxidization of alkylbenzenes. Joseph Binapfl and Willi Krey. U. S. 1,789,924, Jan. 20. Oxidation of alkylbenzenes with a side chain connected with 2 C atoms of the benzene nucleus is effected in liquid phase with a gas contg. O at a temp. above 50° (suitably 80° or higher in various examples given) in the presence of an oxidation catalyst such as finely divided oxides of Cu, Fe or Ni or mixts. of these with each other with or without carriers such as pumice, $CaCO_3$, silica gel or the like. Benzopolymethylene compds. such as hydrindene, tetrahydronaphthalene and substitution products such as those with a free α-position in the alicyclic ring are readily oxidized to alcs. and ketones. Several examples are given.

Substituted 1,3-diamino-2-propanols. Otto Eisleb (to Winthrop Chemical Co.). U. S. 1,790,042, Jan. 27. A secondary base such as diethylamine is caused to react with epichlorohydrin in mol. proportion, the intermediate product thus obtained is treated with caustic alkali, and the resulting compd. is treated with a N base such as NH_3 or a primary or secondary amine, for producing various 1,3-diamino-2-propanols, the asym. substituted derivs. of which may be used as intermediates in production of *therapeutic compds.* Details are given of the production of 1-amino-3-diethylamino-2-propanol and α-diethylaminoepihydrin, 1-ethylamino-3-diethylamino-2-propanol, 1-amino-3-piperidino-2-propanol and piperidinoepihydrin, and 1-amino-3-(phenylmethylamino)-2-propanol and α-phenylmethylaminoepihydrin.

Alkylcyclohexanols and -cyclohexanones. Schering-Kahlbaum A.-G. (Walter Schoeller, Hans Jordan and Reinhard Clerc, inventors). Ger. 512,881, Oct. 21, 1927. Addn. to 510,442. The hydrogenation process described in Ger. 510,442 (*C. A.* **25**, 974) is continued until the alkylphenols and other products formed have been completely hydrogenated. Examples are given.

Cyclic ketones. I. G. FARBENIND. A.-G. (Fritz Mayer, inventor). Ger. 513,204, Mar. 17, 1926. $C_{10}H_8$ or a halogen or alkyl substitution product is condensed with a β-halo fatty acid halide, the ketone so produced is caused to lose HCl, and the resulting unsatd. ketone is treated with condensing agents, whereupon ring closure occurs. The last two stages may be combined. Thus, α-methylnaphthalene is condensed with β-chloropropionyl chloride, giving 1-methyl-4-(β-chloropropionyl)naphthalene, which, when heated with H_2SO_4 and poured into water, yields *6-methyl-4,5-benzo-3-indanone*, m. 133°. Other examples are given also describing the prepn. of *1,6-dimethyl-4,5-benzo-3-indanone*, m. 70°; *6-chloro-4,5-benzo-3-indanone*, m. 143°; *4,5-benzo-3-indanone*, m. 103°; and *4,5-(2',6'-dimethylbenzo)-3-indanone*, m. 91°. Cf. *C. A.* **24**, 2469

Polycyclic ketones. I. G. FARBENIND. A.-G. (Otto Nicodemus and Walter Berndt, inventors). Ger. 512,717, Sept. 16, 1925. These are formed by passing the vapor of aromatic or heterocyclic ketones, which contain halogen in the *o*-position to the keto group and which are volatile under normal pressure or *in vacuo* (or their derivs. or substitution products), over highly porous heated bodies in the presence or absence of catalyzers. Thus, 1-*o*-chlorobenzoyl-2,6-dimethylnaphthalene gives 4-*Bz*-2-dimethylbenzanthrone, m. 152°; 1-*o*-chlorobenzoyl-2-methylnaphthalene gives 4-methylbenzanthrone, m. 127°, and *o*-chlorobenzoylbenzene gives fluorenone, m. 83°. Other examples are given. The yield in each case is 30–50%.

Substituted isocyclohexanols and corresponding ketones. SCHERING-KAHLBAUM A.-G. (Walter Schoeller and Hans Jordan, inventors). Ger. 512,719, June 30, 1926. Alkylisoalkylcyclohexanols and the corresponding ketones are prepd. by treating alkylisopropylenephenols with H under raised pressure and temp., in the presence of catalyzers, until 6 or 8 atoms are taken up. Thus, 3-methyl-6-isopropylenephenol is heated with H to above 150° under pressure, with a suitable catalyzer, until 8 H atoms are taken up. A 90% yield of menthol and a 5% yield of menthone results. The solidifying point of the mixt. is 12–7°. If the reaction is stopped after the taking up of 6 atoms of H, an almost 100% yield of menthone results. Another example is given.

Monocyclic lactones. SOC. ANON. M. NALF & CIE. Ger. 511,884, June 19, 1928. See *C. A.* **23**, 4483.

Separating amines. I. G. FARBENIND. A.-G. Fr. 691,614, Mar. 8, 1930. Primary and secondary aliphatic amines are sepd. by the reaction of the mixt. of aliphatic bases with an aromatic aldehyde, eliminating the secondary amine by distn., decomposing the aldehyde which remains by heating it with mineral acids and sepg. in the usual way the acid soln. of the primary amine from the aldehyde. Thus, $EtNH_2$ is sepd. from Et_2NH by BzH. Other examples are given.

Alkyl ethers of hydroxyalkylphenols. I. G. FARBENIND. A.-G. (Hans Hahl, inventor). Ger. 511,950, July 30, 1926. Basic alkyl ethers of hydroxyalkylphenols are prepd. by the action of basic alkyl halides on the phenols in the presence of alk. agents. Thus, the Na salt of 2,6-dimethyl-1-hydroxy-4-methylbenzene is heated with diethylaminoethyl chloride to give the corresponding ether as a thick oil which becomes a yellow liquid at 213–8° at 12 mm. Other examples are given.

Polysaccharide ether esters (for films, lacquers, etc.). I. G. FARBENIND. A.-G. Brit. 334,897, June 11, 1929. By causing a carboxylic acid having more than 6 C atoms to act on a polysaccharide ether, while heating, with or without use of a solvent, "indifferent liquid" or catalyst, products are obtained such as butylstarch linoleate, ethylcellulose esterified with fatty acids from coconut oil, benzylcellulose linoleate, ethylcellulose stearate and butylcellulose linoleate. H_3BO_3 may be used in small quantity as a catalyst and mention is made of the production of various products formed by the action of acids such as benzoic, salicylic, phenylacetic, undecylic, lauric, palmitic, stearic, oleic, linoleic, wood oil or abietic or other resin acids with ethers and mixed ethers of sucrose, starch, cellulose, etc.

Esters from nitriles. LUDWIG J. CHRISTMANN (to American Cyanamid Co.). U. S. 1,790,262, Jan. 27. In forming an ester such as ethyl lactate, a mixt. of a nitrile such as lactonitrile and an alc. such as EtOH in approx. theoretically combining proportions is treated with an inorg. acid which may be generated *in situ* (such as HCl generated by the action of H_2SO_4 on $CaCl_2$) to effect substantially complete reaction.

Carbohydrate esters. I. G. FARBENIND. A.-G. Fr. 691,031, Mar. 3, 1930. Carbohydrates or their conversion products are esterified with the amt. of fatty anhydride calcd. to form the triacyl compd. in combination with a fatty acid different from that of the anhydride used, in the presence or not of catalysts or diluents. Examples are given of the prepn. of the acetobutyrate and the butyropropionate of cellulose and the acetobutyrate of starch. Cf. *C. A.* **24**, 1650.

Esters of 4-hexen-3-ol. I. G. FARBENIND. A.-G. (Karl Böttcher, inventor)

Ger. 513,364, Mar. 27, 1925. Addn. to 512,232 (*C. A.* **25**, 1037). Esters of 4-hexen-3-ol with halogen hydracids are prepd. by interaction of the alc. and the concd. acid at atm. temp. Examples are given. *4-Bromo-2-hexene* b_9 40–2°.

Silicic acid esters. I. G. FARBENIND. A.-G. (Martin Müller-Cunradi and Grete Lechner, inventors). Ger. 512,716, Jan 19, 1927. The esters are prepd. by the action of alcs. on $SiCl_4$ in the presence of indifferent diluents. Thus, $SiCl_4$ and EtOH are allowed to react under exclusion of moisture, diluted with a large vol. of C_6H_6. A 70% yield of $(Et)_2SiO_3$ is distd. off between 162–5°. Other examples are given.

Basic products from imido esters of the higher fatty acids. I. G. FARBENIND. A.-G. (Max Bockmühl and Robert Knoll, inventors). Ger. 512,721, Mar. 20, 1928. Basic products are obtained by condensing the imido esters of higher fatty acids with diamino compds. in which the amino groups are bound by an aliphatic or hydroaromatic linkage. Thus, a suspension of the imido-ethyl ester of palmitic acid in abs. alc. and 1-diethylamino-2-hydroxypropylamine are heated together for 6-8 hrs. On distg. off the alc. the new substance is obtained as a thick oil. The monohydrochloride m 38–9° and the dihydrochloride m. 156°. Other examples are given. Cf. *C. A.* **24**, 2244.

Diesters of carboxylic acids. CANADIAN ELECTRO PRODUCTS CO., LTD., F. W. SKIRROW and G. O. MORRISON. Brit. 335,223, March 18, 1929. Esters such as ethylidene diacetate are produced as described in Brit. 308,169 (*C. A.* **24**, 129). Any vinyl ester formed is returned to the reaction chamber and converted into the diester. Examples and details are given.

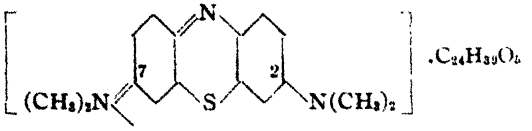
Polysulfides of aromatic carboxylic acids. ROBERT EDER. Ger. 512,567, May 10, 1928. See U. S. 1,769,423 (*C. A.* **24**, 4522).

Arylides of hydroxycarboxylic acids. I. G FARBENIND. A.-G. Fr. 690,662, Feb 25, 1930. Arylides of hydroxycarboxylic acids are prepd. by heating hydroxyphenylarylaminocarboxylic acids (obtained by heating the alkali salts of *m*-hydroxyphenylarylamines with CO_2 under pressure) or their *N*-acyl compds. with arylamines in dispersing agents or solvents, in the presence of condensing agents, and sepg., if necessary, the acyl group. Several examples and a long list of components with the m. ps. of the products are given Cf. *C. A.* **24**, 5308.

Cyanoformic arylides. DEUTSCHE GOLD- UND SILBER-SCHEIDEANSTALT VORMALS ROESSLER. Ger. 511,886, Feb. 21, 1928. See Fr. 669,678 (*C. A.* **24**, 1867).

Disubstituted ureas and their reaction products. HEINRICH VON DIESBACH. Ger. 511,210, Dec 11, 1928. Hydroxy or amino compds. of the C_6H_6 or $C_{10}H_8$ series are condensed with dimethylolurea (I). According to the proportions taken, the condensation may affect one or both of the methylol groups. On sapong., benzylamine derivs. are generally obtained from products of the C_6H_6 series, and *sym*-diarylethanes from products of the $C_{10}H_8$ series. Condensation and sapon. may be effected in one working operation. According to some of the examples, (1) PhOH and I yield *α-hydroxymethyl-β-(2-hydroxybenzyl)urea*, m 155°; (2) *p*-cresol and I yield *2,2'-dihydroxy 5,5'-dimethyldibenzylurea*, m. 70°; (3) *p*-nitrophenol and I yield *α-hydroxymethyl-β-(2-hydroxy-5-nitrobenzyl)urea*, decompg. 181°; (4) *o*-nitrophenol and I yield *sym-4,4'-dihydroxy-5,5'-dinitrodibenzylurea*, m. 215–6°, which yields 5-nitro-4-hydroxybenzylamine when heated with concd. HCl; (5) resorcinol and I yield *2,2',4,4'-tetrahydroxydibenzylurea*, decompg 134–40°; (6) 2-naphthol and I yield *di(1-methyl-2-naphthol)urea* (II), m. 205°; (7) 1-naphthol-2-carboxylic acid and I yield *di(4-methyl 1-hydroxy-2 carboxynaphthalene)urea*, m. 202°; (8) II is sapond. with alc. HCl, yielding *α,β-di(2-hydroxynaphthyl)ethane*.

Bile acid salts of thiazine. CHEMISCHE FABRIK VORM. SANDOZ Ger. 511,810, Dec 30, 1927. These salts are prepd. by the action of bile acids on diaminophenothiazine or its *N*-alkyl- or nuclear alkyl- or alkoxy-substitution products. Thus, 2,7-tetramethyldiaminophenothiazonium chloride in water is treated with Na cholate to give salt



Other examples describe the salts formed by the other thiazonium chloride compds. with Na desoxycholate, Na taurocholate and Na glycocholate. *The salts are strong bactericides.* Cf. *C. A.* **24**, 629.

Alkali salts of aromatic sulfohaloamides. CHEM. FAB. VON HEYDEN A. G. (Curt

Philipp, inventor). Ger. 514,094, July 7, 1927. These are prepd. by the reaction of aromatic sulfodihaloamides in aq. soln. with 2 or more mols. of alkali in the presence of aromatic sulfonamides. Thus, toluenesulfodichloroamide (1 mol.) reacts in aq. soln. with NaOH (2 mol.) in the presence of toluenesulfonamide (1 mol.), and the soln. then evapd. to yield the Na salt of toluenesulfochloroamide.

Hydroxy sulfonylchlorides. ERICH GEBAUER-FÜLNEGG and EUGEN RIESZ. Austrian 119,960, June 15, 1930. Hydroxy sulfochlorides prepd. by the reaction of phenols with HSO_3Cl are isolated by pouring the reaction mixt. into concd. HCl, the sulfochloride then sepg. out. Examples are given describing the prepn. of *phenol-2,4-disulfonylchloride*, m. 89°, *1,3,5-trihydroxybenzene-2,4-disulfonylchloride*, m. 184°, and *3-hydroxytoluene-2,4,6-trisulfonylchloride*, m. 151°.

Sulfurized compounds of phenols. ALFRED THAUSS and ALFRED GÜNTHER (to General Aniline Works). U. S. reissue 17,940, Jan. 27. Reissue of original pat. No. 1,450,463 (*C. A.* **17**, 1893).

Derivatives of α-hydroxyallyl alcohol. SCHERING-KAHLBAUM A.-G. (Hermann Fischer, inventor). Ger. 514,093, Feb. 24, 1929. Acetone glycerol-α-chlorohydrin is distd. over alk. reagents, whereby HCl is split off and the acetone deriv. of α-hydroxyallyl alc. is obtained. The same or corresponding derivs. may be prepd. similarly from other esters of acetone glycerol or from esters of condensation products of glycerol with other carbonyl compds. Cf. *C. A.* **15**, 686.

Derivatives of di-*o*-benzoylene-1,10,6,5-pyrene (pyranthrone). I. G. FARBENIND. A.-G. Fr. 677,549, June 28, 1929. Derivs. of di-*o*-benzoylene-1,10,6,5-pyrene are prepd. by replacing the NO_2 groups in the NO_2 derivs. by other groups. The NO_2 compds. may be reduced to NH_2 compds. and one or both H atoms may then be replaced by univalent radicals. Examples are given of the prepn of monochloro, tetrachloro, benzoylamino and tetrahydroxy derivs. and condensation products of the amino derivs. with 1-chloroanthraquinone and monobromodibenzanthrone. Cf. *C. A.* **24**, 2307.

Derivatives of 4-aminodiphenylamine. I. G. FARBENIND. A.-G. (Johann Büsdorf and Fritz Löflund, inventors). Ger. 512,722, Feb. 16, 1929 Addn. to 499,824 (*C. A.* **24**, 4521). The method of 499,824 for producing the above derivs. is modified by condensing equimol. amts. of nitrobenzene and *o*-substituted nitrosobenzene with a free *p*-position, and treating the product with reducing agents. Thus, nitrosobenzene and *o*-nitrosoanisole in glacial AcOH are condensed in the presence of concd. H_2SO_4, and the product, m. 153°, salted out. This product is reduced by Na_2S to give 4-amino-3-methoxydiphenylamine, m. 87°. Another example is given

Aminodiphenylamine derivatives. I. G. FARBENIND. A.-G. (Johann Büsdorf and Fritz Löflund, inventors). Ger. 511,526, Feb. 16, 1929. Addn to 499,824 (*C. A.* **24**, 4521). The method of 499,824 for producing derivs. of 4-aminodiphenylamine is modified by condensing equimol. mixts. of *p*-substituted nitrosobenzene and non-substituted nitrosobenzene and treating the product with reagents. Thus, *p*-chloronitrosobenzene and nitrosobenzene are condensed and treated with glacial AcOH and H_2SO_4, giving a product m. 143°. This is treated with NaOH or anhyd. Na_2S to give 4-amino-4'-chlorodiphenylamine, m. 70–71°. Another example is given.

Anthraquinone derivatives. IMPERIAL CHEMICAL INDUSTRIES, LTD. Ger. 511,320, Sept. 27, 1929. This corresponds to Brit. 322,576 (*C. A.* **24**, 2896), but includes also the treatment of 1-aminoanthraquinone-2-sulfonic acids unsubstituted in the 4-position. Addnl. examples are given also.

Benzanthrone derivatives. I. G. FARBENIND. A.-G. (Arthur Lüttringhaus and Paul Nawiasky, inventors). Ger. 511,946, Jan. 17, 1926. Benzanthrone having an O-contg. residue in the *Bz*-1-position is treated with acid halides. Thus, *Bz*-1-phenoxybenzanthrone is treated with *o*-chlorobenzoyl chloride. Cf. *C. A.* **24**, 2148.

Benzanthrone derivative. I. G. FARBENIND. A.-G. (Gustav Reddelien and Hans Lange, inventors). Ger. 511,951, Aug. 1, 1928. Addn. to 442,774. ω-Aminomethylbenzanthrone is prepd. by the action of benzanthrone on ω-halomethylphthalimide. $ZnCl_2$ may be present as a catalyzer. Cf. *C. A.* **25**, 712.

Carbazole derivatives. I. G. FARBENIND. A.-G. (Friedrich Muth and Albert Schmelzer, inventors). Ger. 511,021, Jan. 3, 1928. Addn. to 507,797 (*C. A.* **25**, 716). Substituted carbazolesulfonic acids other than the 1-amino compd. of 507,797 are used. Examples mention the prepn. of 1,8-dihydroxycarbazole (m. 211–2°) from K 1,8-dihydroxycarbazole-3,6-disulfonate, 1-amino-8-hydroxycarbazole (m. 216–7°) from Na 1-amino-8-hydroxycarbazole-3,6-disulfonate, 1-nitrocarbazole (m. 184°) from the di-Na salt of 1-nitrocarbazole-3,6,8-trisulfonic acid and 1-chlorocarbazole (m. 125°) from Na 1-chlorocarbazole-3,6,8-trisulfonate. Cf. *C. A.* **25**, 965, 966.

Guanidine derivatives. SCHERING-KAHLBAUM A.-G. (Herbert Schotte, inventor). Ger. 512,880, Feb. 25, 1927. Addn. to 506,282. The method of Ger. 506,282 (*C. A.* **25**, 304) is improved by working with an amt. of solvent insufficient to dissolve completely the amine salt. Examples are given. Cf. *C. A.* **25**, 712.

Guanidine derivatives. SCHERING-KAHLBAUM A.-G. (Herbert Schotte, inventor). Ger. 514,248, Sept. 13, 1927. Substituted guanidines are prepd. by treating a disubstituted cyanamide with an amine salt in the presence of free amine. Thus, diethylcyanamide and $PhNH_2.HCl$, heated for 10 hrs. at 100° in the presence of $PhNH_2$, yield *N,N*-diethyl-*N'*-phenylguanidine. Other examples are given also. In some cases the reaction mixt. need not be heated.

Naphthalene derivative. I. G. FARBENIND. A.-G. (Richard Herz and Fritz Schulte, inventors). Ger. 511,022, Dec. 21, 1928. A β-aminonaphthalenesulfocarboxylic acid is prepd. by nitrating the anhydride of 1,8-naphthalenesulfocarboxylic acid and reducing the nitro compd. An example is given. Cf. *C. A.* **25**, 966.

Pyridine derivatives. DEUTSCHE GOLD- UND SILBER-SCHEIDEANSTALT VORM. ROESSLER (Gerd Kochendoerfer, inventor). Ger. 513,293, Jan. 25, 1925. Amino- or hydroxy-pyridines or their nuclear substitution products are iodized by treatment with I, or reagents yielding I, in a feebly alk. or neutral medium and in the presence of an acid-binding agent, *e. g.*, Na_2CO_3 or borax. Examples are given describing the prepn. of 2-amino-5-iodopyridine, *2-hydroxy-3-iodo-5-nitropyridine*, m. 203°, and 2-hydroxy-3,5-diiodopyridine. Cf. *C. A.* **24**, 2472.

Quinoline derivatives. I. G. FARBENIND. A.-G. (Fritz Schönhöfer, inventor). Ger. 511,466, Dec. 18, 1927. Aminoalkyl derivs. of quinoline are prepd. by condensing *o*-aminobenzaldehyde or *o*-aminoacetophenone with aliphatic amino ketones. The reaction may be effected at ordinary or raised temp., and a catalyst may be present, *e. g.*, NaOH or piperidine. Examples are given. Cf. *C. A.* **25**, 966.

Quinoline derivative. I. G. FARBENIND. A.-G. (Paul Baumgarten, inventor). Ger. 512,720, Aug. 22, 1928. 2,4-Diketo-1,2,3,4-tetrahydroquinoline is prepd. by heating the amide of malonic acid or one of its alkyl or aryl derivs., with primary or secondary aromatic amines. Thus, the diamide of ethylmalonic acid is heated to 220° with N-methylaniline in a reflux condenser till NH_3 is evolved. The excess of methylaniline is removed by HCl and a 90% yield of 1-methyl-3-ethyl-2,4-diketo-1,2,3,4-tetrahydroquinoline, m. 184–185° (uncor.), obtained by crystn. Other examples are given.

Condensation products. I. G. FARBENIND. A.-G. (Myrtil Kahn, Wilhelm Schepss and Ludwig Zeh, inventors). Ger. 513,207, Oct. 10, 1926. Addn. to 484,837 (*C. A.* **24**, 1120). The methods of 484,837 and 494,803 (*C. A.* **24**, 3516). for forming aromatic condensation products from primary and secondary amines and hydroxybenzyl halides is modified by replacing the latter substances by hydroxyarylhalomethane compds. which contain more than one benzene nucleus. Thus, monomethylaniline is condensed with 1-ω-chloromethyl-2-hydroxynaphthalene-3-carboxylic acid. Other examples are given.

Condensation products of the perimidone series. I. G. FARBENIND. A.-G. (Walter Mieg and Rudolf M. Heidenreich, inventors). Ger. 511,948, Dec. 17, 1925. See U. S. 1,749,955 (*C. A.* **24**, 2149).

Separating mixtures of formic and acetic acids. I. G. FARBENIND. A.-G. (Irnfried Petersen and Curt Engelbrecht, inventors). Ger. 513,024, Feb. 8, 1928. The acids are sepd. by distn., after addn. to the mixt. of a liquid which is miscible with AcOH but immiscible or only slightly miscible with HCOOH, and which forms an azeotropic mixt. with HCOOH. Suitable liquids are C_2HCl_3, CCl_4, C_6H_6 and benzine. Examples are given.

Glycidic acids. A. A. KAUFMANN. Brit. 335,391, Oct. 8, 1929. See Fr. 682,471 (*C. A.* **24**, 4306).

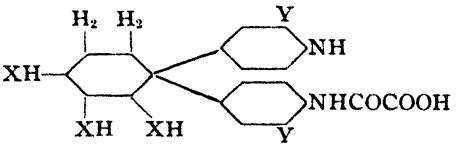
1-Bromo-2-aminoanthraquinone-3-carboxylic acid. I. G. FARBENIND. A.-G (Max. A. Kunz and Erich Berthold, inventors). Ger. 511,470, Aug. 19, 1927. 2-Nitro-3-methylanthraquinone is treated with Br at ordinary or raised pressure, preferably in the presence of a solvent or diluent. The product m. 323–5° (decompn.). Examples are given.

Anthraquinonesulfonic acids. JOHN THOMAS (to Scottish Dyes, Ltd.). U. S. 1,790,448, Jan. 27. β-Monosulfonic acids of anthraquinone are formed by mixing together 2-benzoylbenzoic acid, an excess of oleum and V pentoxide and heating to about 150°.

Sulfonic acids of nitrohalodiaryl ketones or sulfones. I. G. FARBENIND. A.-G. (Winfrid Hentrich, Rudolf Knoche, Ernst Tietze and Josef Hilger, inventors). Ger. 514,234, July 5, 1928. These sulfonic acids are readily prepd. by sulfonating nitro-

halodiaryl ketones or sulfones contg. halogen in the nitrated nucleus. The SO_3H group is believed to enter the unnitrated nucleus in the *m*-position to the CO or SO_2 group. The sulfonic acids may be further treated to replace the halogen atom by NH_2 or OH, or to reduce the NO_2 group. Useful *intermediates for dyes* are so obtained. Examples are given. Cf. *C. A.* **24**, 3250.

Mono-oxamic acids of 4,4'-diaminodiarylcyclohexane compounds. GEORG KALISCHER and RICHARD FLEISCHHAUER (to General Aniline Works). U. S. 1,789,903, Jan. 20. Mono-oxamic acids of 4,4'-diaminodiarylcyclohexane compds. which correspond to the general formula:



(wherein one X means H or Me, the other X's H and the Y's stand for H, halogen, Me or alkoxy groups) are obtained by treating 4,4'-diaminodiarylcyclohexane compds. with oxalic acid. The starting bases are heated with oxalic acid until they have mostly disappeared, advantageously in the presence of a solvent, as water or an inert org. solvent, care being taken that the quantity of the oxalic acid applied does not substantially surpass that necessary for dissolving the bases. The mono-oxamic acids are difficultly sol. in water and in org. solvents. Their Na and K salts are difficultly sol. in cold water, more sol. in hot water. The new products contg. a free amino group capable of being diazotized, are *intermediates for the production of dyes*. Several examples are given.

Acetic anhydride. IMPERIAL CHEMICAL INDUSTRIES, LTD., H. HEPWORTH and F. D. LEICESTER Brit. 334,986, July 4, 1929. Ac_2O is sepd. from vapors contg. HOAc and steam by use of active carbon. Various details of operation are described

Acetic anhydride. A. L. SHAPIRO. Russ. 58,598, Nov. 25, 1929. Addn. to Russ. 17,216. A mixt. of $AcNH_2$ and glacial AcOH is acted upon with HCl instead of H_2SO_4.

Crystalline phthalic anhydride. LLOYD C. DANIELS and CHRISTIAN J. SCHWINDT (to Selden Research Engineering Corp.). U. S. 1,789,967, Jan. 27. Cryst. phthalic anhydride substantially free from phthalic anhydride dust is prepd. by disintegrating needle crystals in app. such as a dough mixer.

Aromatic mercaptans and thioglycolic acids. I. G FARBENIND A.-G. (Richard Herz and Max Schubert, inventors). Ger. 513,208, Mar. 25, 1927. *o*-Cyanoaryl mercaptans are prepd. by treating *o*-cyanoaryl thiocyano compds. in aq. or alc. soln. with alk. sapong. agents in the presence of reducing agents ($Na_2S_2O_4$ or Zn), or with alkali sulfides or polysulfides Thus, 1-methyl-2-cyano 3-thiocyano-5-chlorobenzene, heated with Na_2S_2, yields 1-methyl-2-cyano-5-chlorobenzene-3-mercaptan. Other examples are given also. *o*-Cyanoaryl thioglycolic acids are prepd. by condensing the mercaptans with $ClCH_2COOH$.

1,1,2-Trichloroethane. CONSORTIUM FÜR ELEKTROCHEMISCHE IND G. M. B. H. Fr. 690,767, Feb. 27, 1930. 1,1,2-Trichloroethane is prepd. by passing vinyl chloride and Cl in the presence of 1,1,2-trichloroethane or other solvents over Cl carriers, particularly $SbCl_5$.

1,1,2-Trichloroethane. I. G. FARBENIND. A.-G. Fr. 690,655, Feb. 25, 1930 Crude chloroethylene obtained by incomplete substitution from C_2H_2 and HCl, with intervention of a catalyst, is treated directly with Cl. Cf. *C. A.* **23**, 2724.

1-(4'-Aminophenyl)-1-hydroxy-2-methylaminopropane. FIRMA E. MERCK. (Otto Dalmer and Max Oberlin, inventors). Ger. 511,469, Aug. 8, 1929. 1-Phenyl-1-hydroxy 2-methylaminopropane or its salts is nitrated at a temp. not exceeding 20°, and the nitro compd. is reduced. Examples are given. The product m. 114–6° and is less poisonous than the initial material. Cf. *C. A.* **24**, 4793.

Acetylene. I. G. FARBENIND. A.-G. (Bernhard C. Stuer and Walter Grob, inventors). Ger. 511,634, Mar. 6, 1915. C_2H_2 is converted into AcH and other condensation or oxidation products by leading it, mixed with at least 3 times its own vol. of steam, over catalyzers at high temps. Thus, the mixt. is led through a tube contg. powd. bog Fe ore at 400–420° to give AcH, AcOH, acetone and phenolic condensation products.

Acetylene. INTERNATIONAL INDUSTRIAL & CHEMICAL CO. Fr. 692,451, June 19,

1929. CH_4 is transformed into C_2H_2 by a heat treatment of 750–2,000°, C_2H_4 being a by-product of the reaction. The pressure and speed of the gas is varied according to the compn. of gas product desired. Fr. 692,452 describes the conversion of CH_4 into C_2H_2 and the hydrogenation of the latter into C_2H_4 which is condensed with water gas to higher hydrocarbons. The product of the first conversion contg. C_2H_2 is cooled rapidly to stabilize it.

2,6-Xylidine. IMPERIAL CHEMICAL INDUSTRIES, LTD. Fr. 692,041, Mar. 17, 1930. See Brit. 328,418 (*C. A.* **24**, 5309).

2,4-Xylidine. SILESIA, VEREIN CHEMISCHER FABRIKEN. Fr. 691,911, Mar. 14, 1930. 2,4-Xylidine is extd. from tech. mixts. of xylidine by dissolving the mixt. in an anhyd. solvent which does not mix with water, such as benzene, benzine and ether, and pptg. the hydrochloride of 2,4-xylidine by introducing dry HCl gas.

Methanol. BRITISH CELANESE, LTD., W. BADER and E. B. THOMAS. Brit. 334,924, April 12, 1929. ZnS (alone or mixed with Cr oxide or other promoters) is used as catalyst in synthesizing MeOH from C oxides and H (suitably at 360–400° and under 100 atm. pressure). Details for prepg. the catalyst are given

Aluminum alcoholates. A. WACKER GES. FÜR ELEKTROCHEMISCHE INDUSTRIE GES. Brit 334,820, June 13, 1929. Al alcoholates contg. some $AlCl_3$ (suitable for use as catalysts for conversion of AcH into EtOAc) are prepd. by treating Al (suitably in the form of chips) and an alc. such as abs. EtOH with Cl or a Cl compd. such as HCl which is capable of parting with Cl to Al Various details of procedure are described.

Urea. I G. FARBENIND. A.-G. (Wilhelm Meiser, inventor). Ger. 511,465, Mar. 20, 1929; Fr 691,069, Mar. 4, 1930. This relates to the removal of combined NH_3 and CO_2 from urea prepd. by the reaction of NH_3 and CO_2 under pressure. CO_2 and some NH_3 are first removed by distn. under high pressure in the presence of an excess of NH_3, and the residual NH_3 is then removed by distn. at a relatively low temp. and pressure. An example is given

Formamide. I. G FARBENIND A.-G. (Reinhold Fick, inventor). Ger. 511,885, June 8, 1924. Addn to 485,989 (*C. A.* **24**, 1185). For the production of HCN by the catalytic decompn of $HCONH_2$ and $HCOONH_4$ by the methods of 485,989 and 510,407 (*C. A.* **25**, 1040), the $HCONH_2$ is obtained by passing $HCOONH_4$ or HCOOH or both mixed with NH_3, over catalyzers at high temps. Thus, water-free $HCOONH_4$ and NH_3 are led over glowing bauxite at 140–170°. The gases are then cooled to 60° and the $HCONH_2$ is sepd. by addn. of water.

Benzene. GES. FÜR LINDE'S EISMACHINEN A.-G. Ger. 511,567, Aug. 5, 1926. The sepn. of C_6H_6 and hydrocarbons from distn. or similar gases by expansion, cooling and condensing, is described. The layout is indicated. Cf. *C. A.* **25**, 583

5-Chloro-2-amino-1-methoxybenzene. I. G. FARBENIND. A.-G. (Wilhelm Fitzky, inventor). Ger. 511,468, Jan. 18, 1928. *sym*-Di(*o*-methoxyphenyl)urea is chlorinated and the dichloro deriv. so obtained is treated with alk. reagents. An example is given

Thiophenols. I. G FARBENIND. A.-G. (Alfred Thauss and Fritz Ballauf, inventors). Ger. 510,444, Jan 1, 1929. Addn. to 496,903 (*C. A.* **24**, 3518). The method of 496,903 for producing colorless thiophenols by sulfurizing PhOH with salts of org. carboxylic or weak inorg. acids as catalyzers, is modified by using excess of PhOH and recovering the unsulfurized PhOH by distn

Catalytic reduction of anthraquinone compounds. I. G. FARBENIND. A.-G. (Julius von Braun and Otto Bayer, inventors) Ger. 511,576, Mar. 4, 1925. See U. S 1,751,670 (*C. A.* **24**, 2471).

1-Chloro-2-methylanthraquinone. W. SMITH, J. PRIMROSE, J. THOMAS and SCOTTISH DYES, LTD. Brit. 335,232, April 15, 1929. 2-Methylanthraquinone is chlorinated in oleum of strength not exceeding about 20% at temps. not exceeding 15° (the process being applicable as a step in the conversion of 4'-methyl-2-benzoylbenzoic acid into 1-chloranthraquinone-2-carboxylic acid without isolation of intermediate products, as described in Brit. 207,840 (*C. A.* **18**, 1504)). Examples and details of procedure are given.

Dihydroxyanthraquinone and its derivatives. JOHN W. ORELUP. U. S. 1,790,510, Jan. 27 Mixed *o*-chlorophenol and *p*-chlorophenol with phthalic anhydride are heated in concd. H_2SO_4 in the presence of H_3BO_3.

Anthraquinoneazines. PAUL NAWIASKY and LUDWIG EIFFLAENDER (to General Aniline Works). U. S. 1,790,109, Jan. 27. In forming *N*-dihydro-1,2,1',2'-anthraquinoneazines, a 2-aminoanthraquinone is subjected to the action of a caustic alkali melt in the presence of a salt of a lower aliphatic acid such as NaOAc together with an

alkali metal compd. of an alc. contg. at least 3 C atoms such as Na glycerate. Especially good yields are thus obtained.

Phenazones. I. G. FARBENIND. A.-G. (Arthur Wolfram, Emil Hausdörfer and Ludwig Schörnig, inventors). Ger. 513,206, Sept. 28, 1928. Phenazones are prepd. by the action of $AlCl_3$ on azobenzene and its homologs and substitution products having one *o*-position to each N atom unsubstituted. The reaction may be effected in the presence of fluxes and diluents, and in the presence or absence of air or other oxidizing agent. The reaction temp. may be 60–120°. Examples are given.

***o*-Hydroxybiphenyl.** GES. FÜR TEERVERWERTUNG M. B. H. and OTTO KRUBER. Ger. 513,027, May 17, 1929. Biphenylene oxide is treated with nascent H at a raised temp. Alkali metals need not be present (cf. Ger. 492,064 (*C. A.* **24**, 2475)). Thus, biphenylene oxide and steam superheated to 300° may be passed through a tinned iron tube filled with active C and heated to 850°.

Triazines. I. G. FARBENIND. A.-G. Brit. 334,887, June 10, 1929. 2,4-Bis(nitrophenyl)-6-halo-1,3,5-triazines (such as the 6-chloro deriv.) are made by treating a 2,4-di(nitrophenyl)-6-hydroxy-1,3,5-triazine with a P halide such as P oxychloride or pentabromide. The products may be used as *dye intermediates* or in making *pharmaceutical compds.* Cf. *C. A.* **24**, 4520.

Polyglucosans. F. HOFFMANN-LA ROCHE & Co. A.-G. Ger. 513,126, Feb. 29, 1928. Tetraglucosan and other polyglucosans are prepd by heating glucose with a quantity of an org. or inorg. acid at ordinary or reduced pressure or in an inert gas. A diluent may be present. Examples are given.

Chloranil. MARIA HEIMBERG NÉE KRAUSS. Ger. 511,209, April 6, 1929. Chloranil is prepd. by treating mononuclear isocyclic aromatic or hydroaromatic hydroxy compds. at a raised temp. with Cl and $HClSO_3$ together or in turn. The reaction is preferably effected in a medium of H_2SO_4 or oleum, and the $HClSO_3$ may be generated *in situ*, *e. g.*, by passing in HCl or by adding chlorides to the mixt. Examples are given.

Isoeugenol, etc. THOMAS S CARSWELL (to Monsanto Chemical Works). U. S. 1,789,352, Jan. 20. A mixt of alkyloxyisoeugenol and alkyloxyisochavibetol is subjected to such treatment (suitably by use of CaO or $Ca(OH)_2$) as to convert the mixt into the Ca salts of the isomers, and the Ca salts are sepd. (suitably by use of alc as a selective solvent) and the sepd. Ca salts are treated with acid.

Naphthostyrils. I. G. FARBENIND A.-G. (Richard Herz and Fritz Schulte, inventors). Ger. 511,212, May 12, 1926. Addn. to 441,225 and 504,342 (*C. A.* **24**, 5307). The methods of the prior patents mentioned are modified by using alk. earths instead of caustic alkalies The reactions are preferably conducted under pressure Examples are given. Cf. *C. A.* **24**, 5767.

Styrene. OMAR H. SMITH (to Dominion Rubber Co., Ltd.). Can. 308,122, Jan. 27, 1931. Styrene is produced by heating a mixt. of benzene and ethylbenzene to 600–750° in the presence of a dehydrogenating mixt. comprising ethylene chloride and S.

Porphyrins. HANS FISCHER. Ger. 511,319, Mar. 14, 1928. Porphyrins are prepd. by fusing halodipyrrylmethenes. An example is given. Cf. *C. A.* **25**, 716.

11—BIOLOGICAL CHEMISTRY

PAUL E. HOWE

A—GENERAL

FRANK P. UNDERHILL

Pectin. IV. Oxidation of pectin by Fenton's reagent and its bearing on the genesis of the hemicelluloses. A. G. NORMAN AND F. W. NORRIS. *Biochem. J.* **24**, 402–9(1930); cf. *C. A.* **24**, 133.—Pectin may be readily oxidized by means of Fenton's reagent. The reaction temp. must be 30–5°. The products of this reaction yield on hydrolysis galactose and galacturonic acid and resemble in appearance and general properties the structural hemicelluloses such as those obtained from wheat bran, beech wood and cereal straws. They are possibly polymerides contg. mainly galactose-monogalacturonic acid and galactose-digalacturonic acid, although the presence of other conjugated acids contg. galactose and galacturonic acid is not excluded. Hemicellulose may be formed in nature by the protracted mild oxidation of pectin. B. C. A.

Use of sulfur in biological chemistry. DE REY-PAILHADE. *Bull. soc. chim. biol.*

11, 1143–5(1929).—H_2S is evolved when certain biol. materials are mixed with S at 40°, even if the nitroprusside reaction is not given B. C. A.

Validity of blood-sugar determinations. VI, VIII. Variation in results obtained by deproteinization with tungstic acid and mercuric nitrate. VII. Sugar in the plasma. IX. Phenomenon of "mercurial dilution." G. FONTÈS AND L. THIVOLLE. *Bull. soc. chim. biol.* 12, 264–98(1930); cf. *C. A.* 24, 4816.—VI, VIII. Blood filtrates obtained by means of tungstic acid always give higher values for reducing sugars than those prepd. by Hg pptn. $Hg(NO_3)_2$ gives the same results on the tungstic acid filtrate as on the original blood filtrates, and these, after brief hydrolysis with dil. acid, become almost equal to the original values of the tungstic acid filtrate. The presence of a glucoside possibly accounts for these phenomena. Subcutaneous injection of adrenaline in dogs (1 mg. per kg. body-wt.) produces a rise in the glucoside content of the blood as well as in the dextrose content, while compression of the portal vein or injection of morphine does not affect it. Insulin decreases the amt. of reducing carbohydrate until, at the crisis, it is nonexistent. This sugar is entirely metabolized by yeast and living animal cells. VII. Rapid production of insulin hypoglucemia affects the plasma sugar only, although the sugar of the corpuscles is also affected after prolonged hypoglucemia. The sugar of the corpuscles acts as a reserve for that of the plasma. IX. If more than two vols. of water are added to whole blood or plasma before the Hg pptn., min. results for blood sugar are not obtained (mercurial diln.). This phenomenon persists after injection of insulin and in the filtrate from the tungstic acid pptn., and it appears to be due to some substance other than the reducing carbohydrate which appears in the tungstic acid filtrate. B. C. A.

Oxidation of some constituents of the body by activated charcoal. O. FÜRTH AND H. KAUNITZ. *Bull. soc. chim. biol.* 12, 411–2(1930); cf. *C. A.* 24, 871.—Amino acids of high mol. wt. are deaminized more readily than those of low mol. wt. Amides, some dipeptides, proline and histidine are not affected by charcoal. Phenolic substances are rapidly destroyed. Ordinary sugar charcoal is almost as active as animal charcoal. Deamination is in no case complete. B. C. A.

Normal antithrombin and its relation to the production of thrombin by cytozyme or chloroform. P. BORDET. *Compt. rend. soc. biol.* 100, 753–5(1929).—Serum activated by $CHCl_3$ can be inactivated by addn. of aged inactive serum, and it cannot then be activated by $CHCl_3$. Antithrombin is decomposed at 65° and is pptd. from soln. with $CHCl_3$. Thrombin originating from the action of cytozyme on serum is also decomposed by antithrombin. B. C. A.

Micelle changes produced by the addition of crystalloids to serum. G. CLUZET. *Compt. rend. soc. biol.* 101, 458–61(1929).—The viscosity and n of serum have maxima at p_H 5.5, but the max. cond. occurs at p_H 7.0. Electrolytes affect these phys. properties but sucrose and dextrose do not. B. C. A.

Electrostatic properties of human fibrinogen. G. VON FARKAS AND B. GROÁK. *Z. ges. exptl. Med.* 66, 590–613(1929).—The optimal p_H for pptn. depends on the method of sepn. and on the buffer mixt. used; the double optimum is ascribed to the presence of 2 proteins, both of which are coagulable. B. C. A.

Does the unipolarity of the air exert a physiological action? A. BELÁK, S. HOLIK AND ST. KELEMEN. *Z. Hyg. Infektionskrankh.* 111, 703–10 (1930).—A method is given for establishing the unipolarity of the atm. ions in a closed room. No effect could be observed on the blood pressure, pulse, respiration rate or phys. efficiency of the humans treated. RACHEL BROWN

The kinetics of ester hydrolysis by enzymes. III. The influence of indicator dyes on the activity of esterases. EUGEN BAMANN AND MARIA SCHMELLER. *Z. physiol. Chem.* 194, 1–13(1931); cf. *C. A.* 24, 3252.—Many indicators have an inhibitory effect on liver esterase. When the enzyme activity is detd. by titration after hydrolysis has taken place in the presence of indicator, there may be a considerable error unless a suitable choice of indicators has been made. Esterases from different sources show varying degrees of inhibition. The enzymes from sheep liver, human liver and horse liver show increasing inhibition by bromothymol blue in the order named. While the sensitivity of certain enzymes to light in the presence of fluorescent substances like eosin is non-specific, that of esterases to indicator dyes is specific. The inhibition depends on the reactivity of the substance with the enzyme, with the substrate or with the enzyme-substrate compd. The phthalein dyes especially, because of their lactone character, have a tendency to form complexes with the ester substrate. A suitable medium for comparing the effect of different indicators is a soln. contg. 100 cc. H_2O, 0.05 cc. $PrCO_2Me$ and 0.1–0.7 cc. of the enzyme prepn. representing 0.03–0.2 lipase units. Any considerable amt. of protein is to be avoided since it tends to adsorb the

dye and remove it from the sphere of action. The enzyme solns. were made by extg. the dry powd. liver, previously treated with MeAc and Et_2O, with 50 parts of 0.025 *N* NH_4OH, neutralizing with dil. AcOH and dialyzing. Addn. of 0.4 mg. of bromothymol blue or phenolphthalein to 100 cc. of the reaction system causes a decided inhibition of enzymic hydrolysis at p_H 6.8. The inhibition increases with increasing concn. of the indicator and with decreasing concn. of the ester. It decreases with increasing OH-ion concn., and at p_H 8.9 there is even an acceleration of hydrolysis. This is attributed to a transition from the lactone to the quinoid salt of the indicator. The p_H at which such change from inhibition to activation occurs varies with the turning point of the indicator. Bromocresol purple (dibromo-*o*-cresolsulfonethalein) in a concn. sufficient for indicator purposes (0.04 mg. per 100 cc.) is without influence on ester hydrolysis at p_H 6.8, but in greater concn. and at higher p_H it causes activation. A comparison of bromothymol blue with bromocresol purple (1 mg. per 100 cc.), both at p_H 7.0, showed 31% inhibition with the former and 23% activation with the latter. The decrease in inhibition by indicators in the presence of higher enzyme concn. is probably due to an increase in proteins which remove the dye by adsorption. Dyes other than those of phthalein structure may also be inhibitory. Rosolic acid gives an indistinct end point and *m*-$HOC_6H_4NO_2$ requires an inhibitory concn. *p*-$HOC_6H_4NO_2$ is not inhibitory but its turning point, p_H 6.0, is too far on the acid side. Neutral red is fairly satisfactory. For detn. of ester hydrolysis by liver esterase the choice of indicators rests with bromocresol purple (0.04 mg. per 100 cc.) and neutral red (0.3 mg. per 100 cc.). **IV. The behavior of esterases toward lactones.** *Ibid* 14–20.—Lactones, although they may be regarded as inner esters, are not hydrolyzed by esterases which attack the ordinary open-chain esters Butyrolactone, γ-valerolactone, cumarin and santonin in alk. medium show no appreciable hydrolysis by liver esterase prepns. which are reactive toward $PrCO_2Me$. On the contrary, they inhibit the cleavage of $PrCO_2Me$. Probably the lactone and the enzyme form a stable complex. The inhibition is proportional to the lactone concn. and inversely to the ester concn. By forming a complex with the enzyme the lactone diminishes the concn. of esterase-ester compd. and thus retards the ester hydrolysis. If the lactone ring is opened up, as in $MeCH(OH)CH_2CH_2CO_2NH_4$, the inhibitory effect is overcome. A. W. Dox

The nature of proteases. VII. Comparative investigations on the pepsin of cold- and warm-blooded animals. N. P. Pyatnitzkii. *Z. physiol. Chem.* **194**, 43–52 (1931); cf. *C. A.* **24**, 4796.—Gastric juice was obtained from frogs by the Smirnow method, which consists in ligating the stomach at the cardia and duodenum after the animal has swallowed numerous small pieces of cork, sewing up the abdomen, then removing the stomach after 24 hrs. and collecting the secretion. The latter contains 20–40 Gross pepsin units per cc., and digests 10 mm. of albumin in Mett tubes in 18 hrs. at 38°. The p_H varies between the limits 1.52 and 3.9. The gastric juice is relatively rich in combined HCl, deficient in free HCl and has a relatively high total acidity. The optimum p_H lies between 1.0 and 1.4 and coincides apparently with that of warm-blooded animals. The ext. of frog stomach is much less active than that of dog stomach. The pepsin of cold-blooded animals is evidently identical with that of warm-blooded animals. A. W. Dox

The action of arginase. VI. S. Edlbacher and H. Burchard. *Z. physiol. Chem.* **194**, 69–75(1931); cf. *C. A.* **22**, 96.—An arginase prepn. was obtained free from dipeptidase by dilg. a glycerol ext. of calf liver, treating the soln. with $Al(OH)_3$ and centrifuging. The soln. thus obtained was inert toward glycylglycine, leucylglycine, Witte peptone and gelatin at p_H 8, but vigorously attacked arginine. The arginase activity at p_H 9.2 was measured by detg. the liberated urea with urease. The dipeptidase-free arginase was examd. for its action on the dipeptide arginylarginine obtained by partial hydrolysis of clupein with 70% H_2SO_4 at 37°. This dipeptide contains 1 free NH_2 group as shown by the Van Slyke detn. After subjecting it to the action of purified arginase, the dipeptide yielded an amt. of urea corresponding to 85% of the theory for 1 arginine. The unpurified enzyme, however, which contained dipeptidase, yielded twice this amt. of urea. Arginase, therefore, attacks only 1 of the 2 guanidyl groups and leaves the peptide linkage intact. Contrary to statements in the literature both NH_2 groups of lysine react quantitatively in the Van Slyke detn. during 5 min. shaking at 20°. Under the same conditions ornithine yielded 88% of its total N. This behavior of lysine supports the theory that the free NH_2 of proteins represents the terminal NH_2 of the lysine component. The residual dipeptide of ornithine and arginine, resulting from the arginase cleavage of arginylarginine, contains 2 NH_2 groups which react in 5 min. in the Van Slyke detn. The action of arginase on only 1 of the 2 guanidyl groupings in arginylarginine is of especial interest in view of the recent

findings of Dauphinee and Hunter (*Biochem. J.* **24**, 1128) that the combined action of trypsin and arginase on proteins attacks only half of the arginine present. By the use of dipeptidase-free proteases it should be possible by this method to det. whether proteins contain arginylarginine, as does clupein, or whether the arginine groupings occur singly in the peptide chain. A. W. Dox

Hemoglobin preparation, fluorohemoglobin, papain cleavage of hemoglobin, and hemoglobin in pernicious anemia. Felix Haurowitz. *Z. physiol. Chem.* 194, 98–106 (1931).—The procedure previously described for the prepn. of cryst. methemoglobin depends on temp. and illumination and is difficult to control. Pure cryst. methemoglobin is obtained more easily and uniformly by 6–10 days' treatment of horse oxyhemoglobin with 5% EtOH at 37–40°. The transformation of methemoglobin into its F deriv. by treatment with 25% KF occurs very slowly, an equil. being reached in about 30 min. The previously described absorption curve does not correspond to this final stage and requires correction. The max. of absorption in the red lies at about 606 $m\mu \pm 1\ m\mu$. The action of papain-HCN on the blood pigment at p_H 5 resembles that of activated trypsin at p_H 9 and results in formation of a hemin proteose. In pernicious anemia only normal human hemoglobin is found, not the alkali-resistant fetal hemoglobin of the new-born. A. W. Dox

Biological action of Röntgen rays on the blood and spleen. I. Changes in the blood picture following x-ray radiation of the spleen. Shigetsugu Katsura. *Tôhoku J. Exptl. Med.* **16**, 241–59(1930).—The total leucocyte count of rabbits, and particularly that of the pseudo-eosinophiles, is larger in the afternoon. Following irradiation of the splenic area for several hrs. there is a slight decrease in the red cell count and hemoglobin, with a gradual return to normal within 6 weeks. There is a transitory leucocytosis (several hours); a slight leucopenia is observed several weeks later, reaching a max. in about 2 weeks. The pseudo-eosinophiles are particularly affected. There is a change in the Arneth formula following strong irradiation, presumably due to increased bone marrow function. **II. The changes in blood viscosity and serum protein following irradiation of the spleen.** *Ibid* 260–76.—Following strong irradiation of the splenic area ($^1/_2$ H. E. D.) there is a decrease in blood viscosity, a decrease in serum protein, but no change in serum viscosity. With weaker irradiation ($^1/_{25}$ H. E. D.) there is an increase in both blood and serum viscosity, but no change in the total protein. In both cases there is a relative increase in the globulin fraction which lasts for 2 weeks. Qualitatively similar results are obtained by irradiating the lower extremity, or the splenic area following splenectomy. The results are interpreted as due partly to blood diln. following strong irradiation, partly to a relative increase in globulin. H. Eagle

Pyrophosphate and cell structure. W. A. Engelhardt. *Klin. Wochschr.* **9**, 1550(1930); cf. *C. A.* **25**, 331.—Hemolysis by saponin, water or freezing is accompanied by an enormous acceleration in the decompn. of pyrophosphate into orthophosphate. H. Eagle

The oxidation-reduction potentials of living cells and their significance. Eugen Aubel. *Z. angew. Chem.* **43**, 939–43(1930).—The potential of aerobic cells varies according to the conditions, between +0.273 and —0.210 v. at p_H 7.0; the anaerobic cells between —0.050 and —0.490 v. at p_H 7.0. When it is possible to use electrodes, differences are established between electrodes of different metals and even electrodes of the same metal. The general curve, however, is the same in all cases and the limits are similar if the cells are uninjured. When the cells are autolyzed or compressed, more strongly neg. values are obtained. Their physiol. significance is naturally uncertain. In all expts. a definite reduction power was measured but it is doubtful whether a true oxidation-reduction potential in the thermodynamic sense is measured. The cell potential is dependent upon the cell synthesis. Russell C. Erb

The copper content of livers and liver extracts. G. N. Quam. *Proc. Iowa Acad. Sci.* **36**, 267–8(1929).—Stated in mg. per kg. beef liver has been found to contain 16 to 30 mg. for the adult and for calf liver McHargue has reported 161.3 mg. while Robscheit-Robbins and others reported 145 mg. Adult hog liver yielded an av. of 50 mg. per kg. A human fetal liver yielded 69.36 mg. per kg.; that of a still-born child, 28 mg.; while an adult liver (cirrhosis), 20 mg. Van Itallie and Van Eck reported 26.1 mg. per kg. for a still-born liver and White reported 19.1 mg. for an adult liver (sepsis). A sample of Armours live ext. (liquid) yielded 4.5 mg. per kg. of the original which calcd. to 0.5 mg. per kg. of the equiv. wt. of raw liver. Apparently only a small fractional part of the total Cu was recovered. Abbots liver ext. (dry) yielded 403 mg. per kg. of the original product or 25 mg. per kg. of the equiv. amt. of raw liver. Apparently little or no Cu was lost in the processing. Hart and others reported 160 mg. per kg. for their Ely Lilly and Co. product Lot No. 343 N. N. R. This disagreement

among investigators as to the potency of liver exts. and liver in the treatment of various types of anemia may be in some way assocd. with the lack of consistency in the Cu content of liver exts. W. G. GAESSLER

Ultrafiltrate in vivo. L. BRULL. *Compt. rend. soc. biol.* **99**, 1607–8(1928); *Physiol. Abstracts* **14**, 482.—On ultrafiltration *in vivo* the Cl, dextrose and nonprotein N pass fully through the filter; the mineral P and Ca are only in part obtained. G. G.

Cleavage of plasma proteins. Proteic sugar. H. BIERRY. *Compt. rend. soc. biol.* **101**, 20–2(1929); *Physiol. Abstracts* **14**, 338.—By heating to 120° in the presence of acids or alkalies, a cleavage of plasma proteins occurs. After prolonged action of potash, 1 or 2 non-reducing polysaccharides may be sepd. by fractional pptn., from which reducing sugars are produced. One of these is a hexose, another a biose. The latter is dextrorotatory and gives an osazone in concd. soln. G. G.

Plasma proteins and proteic sugar. H. BIERRY. *Compt. rend. soc. biol.* **101**, 544–6(1929); *Physiol. Abstracts* **14**, 649.—After cleavage of plasma proteins with potash it is possible to isolate a polysaccharide which is non-reducing. In presence of acids this is readily converted to reducing sugars. In particular, *d*-mannose and *d*-galactose may be obtained at a certain stage of the hydrolysis. It is not possible to say whether the 2 hexoses are combined or exist separately in the mol. G. G.

Protein sugar and animal species. H. BIERRY. *Compt. rend.* **191**, 1381–2(1930); cf. preceding abstract.—Protein sugar may vary quantitatively and qualitatively with the animal species. B. S. LEVINE

Displacement of iodine by irradiated cholesterol. E. ROUSSEAU. *Compt. rend. soc. biol.* **100**, 158–60(1929); *Physiol. Abstracts* **14**, 595; cf. *C. A.* **23**, 4953.—The displacement of I from KI by irradiated cholesterol in olive oil (1 hr.) is greater than that due to natural cod-liver oil. The appearance of acidity in the olive oil, with or without cholesterol, on irradiation may explain a part of the action in displacing I. The chem. power of oil plus cholesterol is distinctly greater than that of the oil alone. G. G.

Amylase protecting substances. I. Introduction and preliminary tests. HIROICHI NAKAMURA. *J. Soc. Chem. Ind., Japan* **33**, Suppl. binding 521–2(1930).—The rate of digestion of starch at 50° by taka-diastase is practically const. between p_H 4.9 and 5.8. Solns. contg. 0.1% taka-diastase heated to 50° for 1 hr. were partially inactivated, the degree of inactivation varying from about 70% at p_H 4.7 to almost nil at p_H 5.8. More concd. solns. were inactivated to a greater degree under similar conditions. **II. Protective action of proteases.** *Ibid* 523–4.—The addn. of a small amt. of a protease to the taka-diastase soln. before partially inactivating it as previously described greatly decreased the effect of the heating. Papain and papayotin almost completely prevented inactivation; pepsin was less effective. Proteases previously boiled 20 min. were as effective as active proteases. No activating effect was observed **III. Protective action of proteins and their digestion products.** 524–6.—Peptone and the solns. obtained by digesting egg white, gelatin, or casein for various periods with pepsin or papain all partially inhibited the heat inactivation of taka-diastase at 50°, but had no activating effect. Digested gelatin solns. were most effective, casein least. L. E. GILSON

Carbohydrate complex of serum proteins and the clinical determination of bound sugar in the blood. CLAUDE RIMINGTON. *Nature* **126**, 882–3(1930); cf. *C. A.* **23**, 4714.—A further study of the carbohydrate complex obtained by hydrolysis of the proteins of horse serum has led to the conclusion that it is not a disaccharide but a trisaccharide, possibly polymerized, which contains 1 mol. of glucosamine assocd with 2 mols. of mannose and which is optically inactive. A similar complex has been isolated from ox blood and the mucoid of blood serum is under examn. for such substances. Contradictory observations of various authors regarding "bound sugar" of the blood are held to be due to the fact that alk. hydrolysis of the proteins leads to a non-reducing complex which is unattacked by enzymes while acid hydrolysis gives reducing substances. Removal of the protein with $Hg(NO_3)_2$ also ppts. glucosamine while phosphotungstic acid does not. R. C. HOCKETT

Catalytic splitting of casein. V. S. SADIKOV AND E. A. POZHILTZOVA. *Zhur. Prikladnoi Khim.* **3**, 895–904(1930); cf. *C. A.* **24**, 4062.—By using H_2SO_4 in place of HCl or H_3PO_4 in a higher concn. and by increasing the time of heating in the autoclave as compared with the usual methods cyclopolypeptides are easily isolated. A cyclotripeptide (cyclo-prolylprolylleucine), $C_{18}H_{28}N_3O_3$, was obtained in this manner. V. KALICHEVSKY

Sugars and their precursors in hen egg. H. BIERRY. *Compt. rend. soc. biol.* **101**, 579–80(1929); *Physiol. Abstracts* **14**, 654.—It is possible to set free reducing sugars from egg albumin. The sugar-forming substances are more abundant than is generally

recognized, and it is necessary to take account of this in expts. in autogenesis.
E. C. K.

Hexacosanol, a new alcohol of the fatty series C_{26}, obtained from the cortex of Amelanchier vulgaris Moench. J. RABATE. *Bull. soc. chim. biol.* **12**, 758–64(1930).—Eight g. crude hexacosanol ($C_{26}H_{54}O$), m. 77.5°, was obtained from 3 kg. dried material by extn. with alc. and ether, followed by sapon. and crystn. from ether. Aq ether was the best solvent for final purification. The acetate, iodide and hexacosanoic acid were prepd. and their mol. wts. detd.
C. G. KING

A method which enables one to follow the change in the number of particles in the process of formation and transformation of a colloidal solution. Application to blood serum. AUGUSTIN BOUTARIC. *Compt. rend.* **191**, 1332–4(1930).—B. assumes that the increase in the size of suspended spherical particles in the evolution of a colloidal suspension results from the process of (1) particles coalescing without any change in the H_2O content of the suspensoid, leading to a reduction in the no. of suspended spheres; (2) H_2O absorption by the suspended particles with a resulting swelling, leaving the original no. of spheres unchanged. By the application of the principle of Lord Rayleigh according to which a colloidal suspension possesses a coeff. of absorption (optic density) as per formula: $h = ANv^2 (n^2 - n_0^2)/(n^2 - 2n_0^2)$, where h = coeff. of absorption, A = a const. depending upon the wave length, N = no. of particles per unit vol., v = their vol., n = index of suspended substance, n_0 = index of the suspension media, B. is able to det. which of the 2 processes obtains in a given instance. The conclusion of Lecomte du Noüy that in the process of serum inactivation by heat the size of the suspended particles is increased without any change in their no. is corroborated.
B. S. LEVINE

The state of biochemical substances, proteins in particular, in anhydrous solution. JEAN LOISELEUR. *Compt. rend.* **191**, 1391–3(1930).—Biochem. substances, proteins in particular, are sol. in aliphatic acids and in the absence of water form true solns. The transition of a true soln. into a pseudo soln. may be brought about by the simple addn. of water, which interferes more dielectrically than as a chem. solvent. These properties are common to all biochem. substances, and the state of their soln. depends less upon their resp. constitution than upon their behavior toward the solvent.
B. S. LEVINE

Studies on urease. IV. The variations in ammonia in circulating blood through the action of urease. M. RIGONI *Arch. sci. biol.* (Italy) **15**, 342–5(1930); cf. *C. A.* **24**, 5359.—Supplementing observations referred to in earlier work, R. detd. NH_3 after introducing various doses of urease into the blood of the rabbit, using the Nash-Benedict method instead of the Folin-Denis method previously used. With this method, small variations in the NH_3 content of the blood were noted after the introduction of non-lethal doses of urease which escaped detection by the Folin-Denis method.
P. M.

Reversibility of protein coagulation. M. L. ANSON AND A. E. MIRSKY. *J. Phys. Chem.* **35**, 185–93(1931); cf. *C. A.* **24**, 1399, 3523.—Studies of the absorption spectra indicate that hemoglobin may be reversibly coagulated. It is probable that most proteins are reversibly coagulable.
FRANK URBAN

Adsorption in biology. R. FABRE. *J. pharm. chim.* [8], **11**, 529–39, 584–96(1930).—Typical examples are given of adsorption of gases, liquids and solids on charcoal, kaolin, etc.; its mechanism is explained on the basis of surface tension and elec. charges involved. The laws of Gibbs (cf. *C. A.* **4**, 2406) and Freundlich (cf. Trividic, *C. A.* **23**, 3613, 4121) are discussed. The importance of adsorption in biology is based on the great surface reactivity of the colloidal protein matter of the living cell. Detailed reference is made to the investigations of Hugounenq and Loiseleur on the nature of proteolytic enzymes (*C. A.* **18**, 109; **19**, 3493, 3499; **20**, 2105; **21**, 919), to those of Willstätter, *et al.* on enzyme purification, including the sepn. of the pancreatic enzymes (*C. A.* **16**, 938, 3320; **20**, 2339) based on the work of Michaelis (*C. A.* **3**, 920); also the purification of insulin (*C. A.* **17**, 3884; **18**, 541, 1730, 1731, 2351) and of vitamins by adsorption (cf. Seidell, *C. A.* **12**, 562; **16**, 3113). Many examples of the pharmacol. and toxicol. application of selective adsorption are quoted, *e. g.*, Ehrlich's work; Wittgenstein and Krebs (*C. A.* **20**, 1465), Sbarsky and Subkowa (*C. A.* **20**, 1276, 3737), Billard (*C. A.* **21**, 2007; **24**, 3261), Vincent (*C. A.* **20**, 3187) and Binet and Fabre (*C. A.* **24**, 4865).
S. WALDBOTT

Membrane equilibria and their application in biology. L. AMY. *J. pharm. chim.* [8], **12**, 79–89(1930).—A clear exposition of the law of Donnan and its application to the phenomena of osmotic pressure, swelling of gels, viscosity, membrane potential and equilibria in blood.
S. WALDBOTT

Studies on the oxidation-reduction power of tissues. I. Introduction. R. FABRE AND H. SIMONNET. *J. pharm. chim.* [8], **12**, 97–101(1930). **II. Studies on the perfused liver.** *Ibid* 193–213; *Bull. soc. chim. biol.* **12**, 777–99. **III. Studies on liver pulp.** *J. pharm. chim.* [8], **12**, 253–66(1930); *Bull. soc. chim. biol.* **12**, 800–14.—A record of expts., with conclusions (*C. A.* **24**, 4816–7). Also cf. *C. A.* **15**, 3119; **21**, 2708, 3373; **24**, 1876. S. WALDBOTT

Effect of ethylene upon the hydrolysis of salicin by emulsin. D. T. ENGLIS AND F. A. DYKINS. *J. Am. Chem. Soc.* **53**, 723–6(1931).—The fact that C_2H_4 hastens coloration of many fruits and vegetables gave rise to the belief that its effect might be associated with the activation of the enzyme responsible for the hydrolysis of many glucosides. For this reason a study was made of its influence upon the rate of hydrolysis of salicin by emulsin. The rate of hydrolysis was followed by polarimetric observations and detns. of reducing sugar. No acceleration of the reaction was observed in favor of the treated samples over the controls. The results are in accord with the idea that C_2H_4 does not directly affect the activity of enzymes but acts indirectly through its effect upon the living matter. C. J. WEST

Heat-coagulable protein from gelatin. S. E. SHEPPARD, J. H. HUDSON AND R. C. HOUCK. *J. Am. Chem. Soc.* **53**, 760–5(1931).—Gelatin prepd. from calf-skins usually contains a small amt. (less than 1%) of a heat-coagulable protein as an impurity. The protein approaches albumin (egg albumin and serum) in N content (about 14%). Its org. S content is considerably higher than that of gelatin (0.8 compared to 0.24%). Its isoelec. point lies at about p_H 4.0. It is suggested that the so-called "insol." gelatin of various investigators is identical with this protein impurity. C. J. WEST

Studies on phylloerythrin. L. MARCHLEWSKI. *Bull. intern. acad. Polonaise* **1929A**, 599–603.—In English. See *C. A.* **24**, 605, 4309. J. WIERTELAK

Influence of size, shape and conductivity on cataphoretic mobility and its biological significance (ABRAMSON) **2.**

Biological Applications of Absorption Spectrophotometry. London: Adam Hilger, Ltd. 12 pp. Gratis. Reviewed in *J. Phys. Chem.* **35**, 672(1931).

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C—BACTERIOLOGY

CHARLES B. MORREY

Do significant physiological strains of Bacillus amylovorus (Burr.) Trev. exist? FRANK L. HOWARD. *Proc. Iowa Acad. Sci.* **36**, 105–10(1929).—On a physiol. basis sufficient differences have probably not been demonstrated, as yet, to warrant the assumption that strains of *Bacillus amylovorus* occur. This species might be considered

exceptionally const. when the widespread sources of the cultures are considered. A short bibliography is appended. W. G. GAESSLER

Physiological behavior of the propionic acid group of bacteria. SARA E. KENDALL AND C. H. WERKMAN. *Proc. Iowa Acad. Sci* **36**, 111(1929).—The group comprises a no. of species of bacteria producing large quantities of EtCOOH from carbohydrates. The generic diagnosis of the group is: *Propionibacterium*, Orla-Jense, 1909. Gram-pos., non-sporulating, non-motile short rods showing marked morphological variation in acid media or when grown under aerobic conditions; normal growth anaerobic. Cultures are catalase-pos. Carbohydrates, glucosides and alcs. are attacked with the production of EtCOOH, AcOH and CO_2. The species are differentiated on the basis of sugar fermentation, nitrate reduction, pigment production and morphology. A key to the species is given with a description of each. W. G. GAESSLER

The production of propionic acid from pentoses by Propionibacterium pentosaceum. C. H. WERKMAN, R. M. HIXON, E. I. FULMER AND C. H. RAYBURN. *Proc. Iowa Acad. Sci.* **36**, 111-2(1929).—*Propionibacterium pentosaceum* attacks pentoses (xylose, arabinose) with the production of EtCOOH and AcOH. The medium employed was dried yeast (Harris Lab) 10 g., K_2HPO_4 1 g. $CaCO_3$ 5 g., pentose 15 g., H_2O 750 cc. The medium was brought to boiling, cooled and adjusted to p_H 7.1 electrometrically. It was then sterilized for 15 min. at 20 lb. pressure. The inoculum consisted of 25 cc. of a 10-day culture of *P. pentosaceum* in Sherman's $NaC_3H_5O_3$ medium. Incubation was at 30° for 10 days. The xylose employed was prepd. from corn cobs by a method of acid hydrolysis. In addn. to the pentoses a no. of other fermentable substances were employed to furnish comparative data. Small quantities of a substance, apparently succinic acid, were found in all cases, probably derived from the proteins. Both EtCOOH and AcOH are produced from xylose and arabinose by *P. pentosaceum*. Only EtCOOH is produced from glycerol by this organism in significant quantity. W. G. GAESSLER

Virulence of hemolytic streptococci. I. The influence of oxygen on the production of glossy variants. E. W. TODD. *Brit. J. Exptl. Path.* **11**, 368-92(1930).—Virulent cultures of hemolytic streptococci are degraded to glossy, avirulent variants by long-continued subcultivation on aerobic agar. This change is due to natural selection of the variants by bacterial peroxide and the following factors contribute to the process of selection: (*a*) The glossy variants of certain strains are more resistant to inhibition by peroxide than the virulent forms. (*b*) Virulent colonies produce more peroxide, and therefore suffer earlier autosterilization than glossy colonies. The process of selection does not occur in anaerobic cultures when no peroxide is found; it is accelerated by adding reagent H_2O_2 to the medium and by using media which preserve peroxide. Natural selection of glossy variants is prevented and virulence is maintained if accumulation of bacterial peroxide is prevented by adding catalase to the agar used for subcultivation; on the other hand, peroxidase does not appear to accelerate, and possibly tends to retard, the natural selection of glossy variants by peroxide. HARRIET F. HOLMES

Properties of the aerobe, the non-sporulating lactose-fermenting bacteria in feces and soil in the tropics and the importance thereof for the analysis of drinking water (HOLWERDA) **14**. Derivatives of phenylboric acid, their preparation and action upon bacteria (SEAMAN, JOHNSON) **10**.

EISENBERG, ARTHUR A. AND HUNTLY, MABEL F.: **Principles of Bacteriology; in Fifteen Lessons.** 5th ed. London: Henry Kimpton. 322 pp. 10s. 6d. net.

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PARK, W. H., WILLIAMS, A. W. AND KRUMWIEDE, C.: **Pathogenic Microörganisms.** 9th ed., revised. Philadelphia: Lea and Febiger. 819 pp. $6.50. Reviewed in *Military Surgeon* **68**, 150(1931).

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D—BOTANY

THOMAS G. PHILLIPS

A method for the growth of leguminous plants under bacteriologically controlled conditions. E. W. HOPKINS, P. W. WILSON AND E. B. FRED. *J. Am. Soc. Agron.* **23**, 32–40(1931).—The seeds are sterilized by immersion *in vacuo* in 1:1000 $HgCl_2$ soln. The seeds were then sprouted after which all transferring, planting and growing were carried out in a transfer chamber which is described. J. R. ADAMS

The chemical composition of some pollens. E. ELSER AND J. GANZMÜLLER. *Z. physiol. Chem.* **194**, 21–32(1931).—Microchem. analyses of alder, pine and hazel pollen gave the following values, resp.: H_2O 7.11, 7.45, 2.33; dry substance 92.89, 92.55, 97.77; fat 23.55, 14.59, 8 81; protein 23.44, 12.55, 16.19; invert sugar 4.60, 1.61, 6.43; sucrose 0, 5.82, 3.95; catalase +, +, +; amylase +, —, +; sucrase +, —, —; total ash 3.78, 2.88, 4.53; SiO_2 0.90, 0.20, 1.01; K_2O 1.85, 0.94, 2.46; CaO 0.339, 0.252, 0.353; Fe_2O_3 0.315, 0.040, 0.114; P_2O_5 1.13, 1.39, 1.37; MgO 0, 0, 0; Cl 0, 0, 0. The significant findings are the entire absence of Mg and Cl, the absence of sucrase from 1 variety, and the differences in enzyme makeup of the 3 varieties. The sucrase content is insignificant compared to that of honey. Pine pollen is avoided by bees because of its high cellulose content. The protein and the mineral constituents are important nutrients for the bees, but the carbohydrates are negligible in comparison to the honey. The wax of the comb is not derived from pollen but is a specific product of the bees' metabolism. A. W. DOX

Quercetin in Magnoliaceae and its distribution in the vegetable kingdom. TH. WEEVERS. *Proc. Acad. Sci. Amsterdam* **33**, 778–85(1930).—The petals of *Magnolia yulan* var. *Soulangiana* contain quercetin (I), which was not found at all (or only in traces) in the petals of *M. stellata*. Neither I nor quercitin was found in the leaves and twigs of *M. yulan*. When the petals were frozen at —5° and then melted, they turned brown. Since I could then be isolated from them, I is not the chromogen which on oxidation gave the brown color. There was no indication of a connection between anthocyanins and I in the metabolism of the petals of *M. yulan*. Along with a marked increase in anthocyanin during petal development, the quantity of I increased. The presence of I in different plants does not indicate a closer genetic relationship between these species. LOUISE KELLEY

Relation of nutrients to perithecial production under ultra-violet irradiation. F. L. STEVENS. *Philippine Agr.* **19**, 265–72(1930).—The production of the sexual stage in fungi, *Glomerella cingulata* and *G. lagenarium*, was studied in relation to nutrients and ultra-violet light. Irradiation with ultra-violet light greatly stimulated conidial production in certain strains. Sucrose, levulose and maltose strongly favored mycelial growth; raffinose, lactose and galactose favored it to a less extent. Those sugars that most stimulated growth also increased perithecial production most upon irradiation. Certain strains never produced perithecia under any circumstances. Various vitamins caused excessive development of the mycelium but had no effect on the production of perithecia. Certain strains which had never been known to form perithecia before did so after irradiation if either pepsin, raffinose or $MgSO_4$ was added to the nutrient. This result was particularly striking with added pepsin. A. L. MEHRING

The fermentable principle in the tubers of Asphodelus. C. NEYRON. *Bull. sci. pharmacol.* **37**, 539–48, 603–13(1930).—The morphology of the tubers of *Asphodelus microcarpus, albus* or *ramosus* is described. Exts. were observed by the polariscope before and after hydrolysis with acids and with sucrase. From 8 to 10% of the carbohydrates is sucrose. The rotatory power of exts. of bulbs of varying age and at different seasons of the year and of the rhizome has been studied. A. E. MEYER

The necessity and function of manganese in the growth of Chlorella sp. E. F. HOPKINS. *Science* **72**, 609–10(1930); cf. *C. A.* **20**, 3177; **21**, 2489; **22**, 610.—It is shown that Mn is essential for the growth of a unicellular green alga, *Chlorella sp.* The growth of the alga is studied in comparative culture solns. in the presence and in the absence of Mn. Without Mn, only a few mg. of dry felt is obtained; at p_H 7.0, the increase due to Mn is 17-fold and at p_H 8.0 about 170-fold. It is also shown that Mn is toxic to the plant as the amt. added is increased. Since Mn and Fe are both

essential to plant growth, it is suggested that the function of the Mn is to control the ratio of Fe^{++} to Fe^{+++} in the culture or in the cell. N. M. NAYLOR

The classification of plant juices: nitrate concentration in large and small leaves. DONALD E. FREAR. *Science* **72**, 634–5(1930).—A method is described for securing plant juices used for the detn. of nitrate N by the phenoldisulfonic acid method (*C. A.* **18**, 725). The plant tissue, which has been frozen, is thawed and the juice expressed by hydraulic pressure. To an aliquot sample of the clear juice is added 5 cc. of satd. Ag_2SO_4 soln., 1 cc. of *N* $CuSO_4$ soln., and 0.2 g. $Ca(OH)_2$ and the mixt. made to a vol. of 100 cc. It was found that the colloidal ppt. formed by the above reagents absorbs the coloring matter of plant juices so that a suitable soln. is obtained for the nitrate N test. The midrib of the leaves contains more nitrate than the rest of the leaf and since the proportion of midrib to leaf varies with the size of leaf, it is thought to be more consistent to make detns. for nitrate N on leaves from which the midrib has been removed. N. M. NAYLOR

Studies on toxic action. I. Preliminary observations on the swelling and shrinkage of plant tissue in solutions of toxic substances. WALTER STILES. *Protoplasma* **11**, 349–81(1930).—Disks of potato, 2.2 cm. in diam. by 1 mm. thick, were immersed in various solns. for a definite time, then removed, superficially dried and weighed. The change in wt. was considered a measure of the toxicity of the solute when compared with results obtained with distd. water. A reduction in rate of swelling was produced by $Hg(CN)_2$, $CuSO_4$, quinine-HCl and $CHCl_3$. An initial acceleration of swelling was produced by H_2SO_4, osmic acid, $HgCl_2$ and the primary aliphatic alcs. The order of decreasing toxicity is quinine-HCl, $HgCl_2$, $CHCl_3$, $CuSO_4$ and EtOH. M. H. S.

Distribution of moisture, dry matter and sugars in the maturing corn stem. F. A. WELTON, V. H. MORRIS AND A. J. HARTZLER. *Plant Physiology* **5**, 555–64(1930).—The percentage of "residual dry matter" (*i. e.*, the total dry matter minus the total sugars) and that of sucrose were, in general, larger in the upper part of the corn stem than in the lower part. The percentage of moisture was larger in the lower part of the stem. The percentage of "residual dry matter" and of sucrose increased and the percentage of reducing sugars and of moisture decreased progressively from the tasseling stage to maturity. The total amt. of "residual dry matter," moisture and sugars per segment (consisting of an internode and the node above) reached a max. in the region of the second, third or fourth segment and decreased rapidly toward the upper part of the plant. The lowest 4 segments, constituting about 0.25 of the total length of the stem, contained over 50% of the total amts. of these constituents of the stem.
WALTER THOMAS

Adolf Engler, Botanist, 1844–1930. A. BECHERER. *Schweiz. Apoth. Ztg.* **68**, 671–2(1930).—An obituary. S. WALDBOTT

The action of x-rays on the development of plants. MME. S. LALLEMAND. *Thesis*, Strasbourg, 1929; *J. pharm. chim.* [8], **12**, 45–6(1930).—A systematic study is made of the effect of x-rays on the development of seeds, dry or in process of germination, of *Panicum miliaceum, Lepidium sativum, Brassica napus, Triticum sativum, Lens esculenta, Phaseolus vulgaris*, also of the bulb of *Allium cepa*. The study of the biol. effects of graduated doses of x-rays led to the observation of "*radiophylaxy*," *i. e.*, the application to a cell of a small dose of x-rays protects it against a new but much stronger irradiation, but only after the lapse of a certain time between the 2 exposures. If the cells are kept at a low temp. where metabolism is much retarded, radiophylaxy does not take place. Thus the latter is a function of the physiol. activity of the cell, independent of radiosensitivity. S. WALDBOTT

Chemical study of cranberries (MORSE) **12**. The occurrence of 2,6-dimethoxyquinone in *Adonis vernalis* (KARRER) **10**.

F—PHYSIOLOGY

E. K. MARSHALL, JR.

A contribution to the iodine question. J. HANSEN. *Tierernähr.* **1**, No. 1, 119–24 (1929).—A general article on the metabolism of I in cows. Numerous tables are given to show the effects of I on milk and fat production. RUSSELL C. ERB

Energy metabolism of sheep. E. G. RITZMAN AND F. G. BENEDICT. N. H. Agr. Expt. Sta., *Tech. Bull.* **43**, 3–23(1930).—By the surface-area method the heat production was detd. on 115 sheep. For these body measurements the formula $S = 0.124\ W^{0.561}$ was used, in which S equals surface area in sq. m. and W equals the live body wt. in kg. The technic involved and a description of the app. are not given in this bulletin

but will be published separately. Standard metabolism signifies a measure of the animal's heat production while standing during 3 or 5 half-hr. periods beginning 24 hrs. after the last food intake. Rams and sucking lambs showed highest basal metabolism values. Energy requirements of sheep are extraordinarily high at birth and during the early part of the suckling period, but drop rapidly thereafter and by the end of the fourth month of life reach a level below which there is only a relatively small further decrease, due purely to advance in age. C. R. FELLERS

Estrus-producing hormone in the urine of cattle during pregnancy. C. W. TURNER, A. H. FRANK, C. H. LOMAS AND C. W. NIBLER. Univ. Missouri Agr. Expt. Sta., *Research Bull.* **150**, 5–43(1930).—A study is reported of the rate of secretion of the estrus-producing hormone in the urine of 45 dairy cows and 32 beef cows. The urine was collected every 2 hrs. by a new method of induced micturition. A 24-hr. collection period was the min. period during which a representative sample of urine could be obtained. The estrus-producing hormone was extd. from the urine by shaking 2 l. of the urine with 20–50 cc. of pure olive oil, allowing it to settle in a separatory funnel, centrifuging the oil to clarify it, and assayed by the method of Allen and Doisy (*C. A.* **17**, 3929); spayed, white rats were used. During the advance of the stage of gestation, the daily secretion of the hormone began at a low level and increased gradually until the time of parturition. The course of the hormone secretion during pregnancy can be represented by the equation $H = Ae^{Kt}$, where H is the daily hormone secretion at any day during pregnancy t, A (93.0) is the initial daily level of hormone secretion, K (0.0126) is the rate of increase of the hormone, and e the base of natural logarithms. The increasing secretion of the hormone during pregnancy is probably required for the normal development of the mammary glands. Little difference was noted between Jersey and Holstein cattle, though dairy cows as compared with beef types showed greater hormone secretion after 100 days following gestation. The vol. of urine increases for the first 100 days, then gradually declines until parturition. Changes in age and milk production did not perceptibly influence the vol. of urine secreted. Full bibliography. C. R. FELLERS

Comparative studies on the osmotic resistance and permeability of the red blood corpuscles of mother and child. K. J ANSELMINO AND F. HOFFMANN. *Arch. Gynakol.* **142**, 649–61(1930).—By the use of the method of partial hemolysis it has been shown that in the blood of the new-born child 40–50% of the blood corpuscles are osmotically less resistant than those of the mother and 50–60% are more resistant. The interval between the beginning and end of hemolysis is greater with the blood corpuscles of the child and may exceed 3 atms. of osmotic pressure while with the blood corpuscles of the mother hemolysis is complete with 2 atms., which is also the normal value in non-pregnant women. The cell membrane of the red blood corpuscle is made up of a mosaic-like arrangement of lipoid and protein phases in a supporting stroma. The permeability of the lipoid phases of the cell membrane is greater in the new-born child than in the mother as is shown by the more rapid entrance in the corpuscles of the child of arabinose, galactose and glucose, substances which are known to enter through the lipoid phase. Substances such as erythritol, a tetrose, that enter through the protein (globin) phase enter with equal rapidity the corpuscles of the blood of both mother and child which indicates that there are no differences in the protein phase of the cell membranes. HARRIET F. HOLMES

The Reid-Hunt reaction and pregnancy. II. H. EUFINGER AND H. WIESBADER. *Arch. Gynakol.* **142**, 662–7(1930); cf. *C. A.* **23**, 4731.—The resistance of white mice to a lethal dose of acetonitrile is heightened by a previous series of injections of serum from a woman in the later stage of pregnancy. The hormone from the anterior lobe of the hypophysis increases the acetonitrile resistance enormously and the increase of resistance does not seem to be dependent on the abs. quantity of the hormone. Preparatory treatment with ovarial hormone also increases the acetonitrile resistance, though to a far less degree. The increase of the acetonitrile resistance, therefore, cannot be attributed solely to the increased presence in the serum of pregnant women of thyroxine-like substances, but it is probable that an increase of the hormone of the anterior lobe of the hypophysis and perhaps an increase of ovarial hormone are of marked importance. HARRIET F. HOLMES

Iron storage in splenectomized rabbits. F. S. FOWWEATHER AND C. J. POLSON. *Brit. J. Exptl. Path.* **11**, 362–8(1930).—It is shown by means of parallel expts. on intact and splenectomized rabbits, that the absence of the spleen does not affect the storage of Fe, the principal site of Fe storage being the liver. Confirmation is obtained of previous expts. with the intravenous administration of Fe. Failure to secure an adequate reservoir of Fe in the lungs precluded observations on the possible function of

the spleen in the transfer of Fe from lungs to liver. A new feature in these expts. was the appearance in the liver of a non-ferruginous pigment which had the staining reactions ascribed to hemofuscin by Mallory, Parker and Nye (*C. A.* **16**, 3339). Since the only new factor was the addn of mangels to the diet, it is possible that this feed may be responsible for the appearance of the pigment. HARRIET F. HOLMES

Sex differences from the standpoint of biochemistry. TETSUTORO TADOKORO. *Med. Bull. Univ. Cincinnati* **6**, 1-31(1930).—Acidic muscle proteins of female animals compare with those of males as follows: higher in ash and P content, lower p_H, less specific rotatory power, greater quantity of combined HCl, less development of the acidity of muscle fibers in neutral salt solns., greater histidine N, less arginine, a greater no. of acetyl groups in acetylated proteins and greater N content. The physicochem. characteristics of oryzenin of glutinous rice closely resemble those of female proteins. The same chemistry must occur in both plant and animal cells. Methods of sex diagnosis must be based on the following chemisms: the female body cells are richer in fat, contain proteins of higher acidity, are superior in reduction and are more anaerobic in respiration. MARY E. LEAR

Investigations on the reciprocal relation intervening between the secretory function of the stomach and the chlorine equilibrium and the acid-base metabolism of the organism. II. The influence of the mobilization of tissue chloride by novasurol and of the period of low chloride intake on gastric secretion. ANASTAZY LANDAU AND JERZY GLASS. *Med. Doswiadczalna i Spoleczna* **12**, 313-56(1930).—Injection of 2 cc. of novasurol causes an increased secretion of Cl in the urine which is reflected in a noticeable manner on the secretory function of the stomach and in the blood. One hr. after a meal contg. alc. with a simultaneous injection of novasurol, the plasma Cl slowly falls as compared with the amt. in the blood after a meal with alc. alone. The corpuscular Cl is thus not affected. The Cl content of gastric secretion is increased after novasurol, and so is the acidity (phase 1). There follows then a fall in Cl content and in the free and total acidity (phase 2). During a period of low Cl intake the gastric juice is not appreciably altered. Alc. has the same effect as before. After 2 hrs. the curve of Cl secretion is lower than the normal. The Cl index in the period of low Cl intake is greater than normal. The secretion in the urine is also above the normal. Only in the 2nd phase does the Cl fall. It is suggested that in a period of low Cl intake the stimulation of the secretory function of the stomach produces a compensatory mobilization of tissue Cl. G. H. W. LUCAS

Contribution to the study of the physiological variations and the internal secretions of the pancreas. E. ZUNZ AND JEAN LA BARRE. *Arch. Intern. Physiol.* **33**, 142-58 (1930).—The introduction of HCl into the duodenum of dogs stimulates the flow of pancreatic juice. This increased flow is accompanied by a decrease in blood sugar if the adrenals have been removed from the system. These expts. indicate a relation of the internal and external secretions. C. M. MCCAY

Study of the acid secretion of the stomach. I. Secretion of the isolated mucus of the frog stomach. Technic. Action of histamine and pilocarpine. G. DELRUE. *Arch Intern. Physiol.* **33**, 196-216(1930).—The mucous membrane of the stomach of a frog can be easily sepd. and clamped in position so that it forms the dividing wall of 2 cells Ringer's soln. can be placed in these cells and the p_H measured at regular time intervals. Under such conditions the membrane remains alive. It develops an acidity in the one cell that is similar in magnitude to that of the intact stomach. The acid secretion is stimulated by treating the membrane with histamine or pilocarpine. C. M. MCCAY

Experimental investigation on the fate of bilirubin introduced into the blood vessels. I. Changes of bilirubin concentration in the blood vessels and its limit of excretion into bile, urine and cerebrospinal fluid. SANETOSHI SAIKI. *Japan. J. Gastroenterology* **2**, 203-12(1930).—Bilirubin injected into the circulation of rabbits and dogs rapidly disappears from the blood plasma. It passes into the bile and urine very easily. Dog kidneys are more permeable than those of the rabbit. C. M. MCCAY

The significance of the liver glycogen in the liver function. I. The pigment excretion from the liver in cases where the liver glycogen is diminished. TANESABURO IKUSHIMA. *Japan. J. Gastroenterology* **2**, 213-9(1930).—The rate of excretion of azorubin S by the bile was measured after the injection of 0.5 cc. of 1% soln. per kg. of body wt. into the blood stream of rabbits. The time of the first appearance in normal animals is about 3 min. The total excretion requires 60-75 min. in winter and 75-90 min. in summer. After the glycogen of the liver is decreased by fasting, or by the injection of phlorhizin, strychnine or adrenaline the time of excretion may extend to 2 hrs. The pigment excretion function of the liver falls when the glycogen content

decreases. **II. The pigment excretion from the liver in cases where the liver glycogen is increased.** *Ibid* 220–5.—The glycogen was increased in the livers of different rabbits by feeding glucose, fructose, galactose, saccharose, maltose and lactose. Increase of glycogen content produces acceleration in the rate of dye excretions. C. M. McCay

Experimental studies on the halogen excretion from the liver. I. Studies on the chlorine-excreting portion of the liver. Yoshimasa Maruno. *Japan. J. Gastroenterology* **2**, 231–8(1930); cf. *C. A.* **24**, 1431.—Rabbits were injected intravenously with 5 cc. of 10% NaCl soln. per kg. body wt. Alterations in the Cl of the blood and bile were measured in a series of samples. The blood Cl increases after the injection and then drops to the normal after 2–3 hrs. The bile Cl attains a max. in 15–30 min. and remains above normal after 23 hrs. Injury to the liver by means of CCl_4, P or liver emulsion disturbs the Cl excretion. Since blockading the stellate cells with India ink produces no effect, the Cl excretion must be through the parenchymatous cells. C. M. McCay

Some observations made by means of the double gastro-duodenal tube, with particular reference to the opening and closing function of the pylorus. Niro Endo. *Japan. J. Gastroenterology* **2**, 239–46(1930).—A double tube permits the collection of both gastric and duodenal samples at the same time. The test meal of 50 cc. of whole milk permits the use of a small food vol. By the use of this technic it was shown that the more the acid secretion of the stomach is accelerated, the more delay results in the passage of stomach contents into the duodenum. The upward flow of duodenal contents is rarely found. No definite relation exists between the acidity of the gastric juice and the quantity of duodenal juice. C. M. McCay

Biological and chemical studies of extracts of the anterior lobe of the pituitary. E. A. Spaul and W. W. Myddleton. *J. Exptl. Biol.* **8**, 30–43(1931).—AcOH exts. of the anterior lobe of the pituitary stimulate metamorphic activity of tadpoles. Part of the active substance is pptd. by an I soln. (6.35 g. I_2 and 15 g. KI per l.). Similar AcOH exts. of other tissues such as liver and exts. of anterior lobes with other solvents do not give the same ppt. The metamorphic factor is destroyed rapidly by trypsin and slowly by pepsin. It is reduced by boiling. C. M. McCay

The phosphate content of the anterior lobe of the pituitary. E. A. Spaul and W. Myddleton. *J. Exptl. Biol.* **8**, 44–54(1931).—There is a rough correlation between the phosphate P of the I ppt. and its metamorphic activity. The active factor is insol. in EtOH, $CHCl_3$ and Et_2O. The melanophore stimulant has no relation to phosphate content. There is a small amt. of phosphate pptd. from posterior-lobe exts. C. M. McCay

The physicochemical theory of sex. Ph. Joyet-Lavergne. *Compt. rend.* **191**, 682–4(1930).—Hormone and chromosome theories of sex have serious difficulty in explaining the metabolic aspect of sex. Chromosomic and other morphological characteristics are manifestations of a phys.-chem. equil. of cell constituents, which must be more thoroughly understood to explain the question of sex. J. G. McNally

The influence of various kinds of agricultural work upon the alkali reserve of the blood of horses. I. The physiology of work in agricultural draft-animals. W. Schaper. *Z. Tierzucht. Zuchtungsbiol. Tierernahrung* **20**, 79–96(1930).—The values for alkali reserve of the blood of resting horses are subject to considerable variations at different hrs. on the same day and from one day to another. No significant changes occur in the mean values as a result of work. There appears to be a relationship between the nature of the ration and alkali reserve. Body temp. was found higher after work in 16 cases, lower in 9 and unchanged in 5. L. A. Maynard

Studies concerning the hemoglobin of the blood of healthy swine. Hans von Falck. *Z. Tierzücht. Zuchtungsbiol. Tierernähr.* **20**, 97–120(1930).—The hemoglobin content of the blood of new-born pigs is very high—15 to 16 g. This value, which is higher than that of the mother, drops quickly during the first few days, then more slowly, reaching a min. during the second week. It then commences to rise and reaches a value between the 5th and 8th week which is comparable to that of full-grown hogs. The hemoglobin values of sows in advanced pregnancy and of sows nursing litters are markedly lower than those of sterile sows and sows in early pregnancy. L. A. Maynard

The unitary versus the multiple hormone theory of posterior pituitary principles. John J. Abel. *J. Pharmacol.* **40**, 139–69(1930).—Methods are briefly described for the prepn. of a colorless powder having all the physiol. properties of the international standard pituitary powder with an increase in potency of 50 to 60 times the standard. Impurities make up 50% of this powder, chiefly proteins of an albumose-like character. It contains also a cryst. org. compd. contg. N. Boiling with 0.25% AcOH causes

hydrolysis of the unitary product, with production of physiologically active cleavage products. A. believes that "pitressin" is a mixt. of 3 active principles (vasopressor, melanophore and antidiuretic) with inert materials, and some unhydrolyzed unitary product. "Pitocin" contains chiefly the oxytocic cleavage product. It is estd. that the unitary product if pure would have an activity of 100 times that of the standard powder and that each of the 4 cleavage products if isolated in the pure state would have an activity 300–400 times that of the standard powder. Some evidence for this is presented. C. RIEGEL

Iron and manganese in the human organism. G. CHEVALIER. *Thesis*, Paris 1929; *J. pharm. chim.* [8], **12**, 480(1930).—In physiol. organs, the Fe and Mn contents do not differ much from an av. for each organ; muscle has the least Fe or Mn; liver has the most Fe or Mn; the ratio of Fe to Mn varies with each organ. In pathol. organs, the av. values for Fe are more variable; but the Mn content is rather const., being about parallel with, although slightly lower than, that in healthy tissues. S. W.

Chemistry of the hormones. F. LAQUER. *Klin. Wochschr.* **1930**, No. 3; *Therap. Ber.; Schweiz. Apoth. Ztg.*, **68**, 581–3, 601–3(1930); cf. *C. A.* **22**, 4599; **23**, 1437.—A review of the present state of our knowledge of glands and their hormones. S. W.

Mechanical properties of surface energy (DUCCESCHI) **2.**

CROFTON, W. M.: **An Outline of Endocrinology.** 2nd ed. New York: William Wood & Co. 163 pp. Reviewed in *Arch. Internal Med.* **45**, 823(1930).

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G—PATHOLOGY

H. GIDEON WELLS

Local specific immunity of the skin. M. A. KUSCHMARJEW. *Z. Immunitäts.* **65**, 517–23(1930).—The intracutaneous injection of anatoxin produces a local immunity of the skin against diphtheria toxin. The immunity is sp. and depends on the satn. of the cell receptors which are sensitive to toxin. The grade of immunity produced in the skin is proportional to the concn. of anatoxin or its content of sp. haptoform groups. JULIAN H. LEWIS

The time of the appearance of isohemagglutinating properties in the human blood. M. A. DYCHNO AND G. D. DERTSCHINSKY. *Arch. Gynäkol.* **142**, 740–9(1930).—The blood was examd. for agglutinins and agglutinogens in 14 fetuses aged 3–7 months, 76 new-born infants and 24 children aged 2 days to 18 months. The agglutinogens appear early in intrauterine life and were well developed in a fetus of $3^1/_2$ months. Agglutinins were found for the first time in an almost full-term child. At the end of the third week of extrauterine life the agglutinins had disappeared from the serum of the child. The agglutinins reappeared at the second month. Toward the end of the second year the blood had the characteristics of adult blood. It is probable that the agglutinins present in the serum of the child at birth are the agglutinins of the mother, which gradually disappear and are replaced by the child's own agglutinins. The group reaction of the blood of 8.8% of the girls and 19.04% of the boys was different from that of the mother but in no case was any effect noted on the development or weight of the child. HARRIET F. HOLMES

The effect of injury on cellular permeability to water. B. LUCKÉ AND M. MCCUTCHEON. *Arch. Path.* **10**, 662–70(1930).—The unfertilized egg of the sea urchin, *Arbacia punctulata*, was used as a cell in which injury can readily be recognized and permeability to water accurately measured. It was found that injury (induced by high temp. and by anisotonic solns.) causes a marked increase in cellular permeability to water, and that this increase in permeability can be correlated with the degree of injury. HARRIET F. HOLMES

Experimental subacute amyloid nephrosis in rabbits. E. M. BUTT. *Arch. Path.* **10**, 859–68(1930).—Amyloid nephrosis may be produced in rabbits by subcutaneous injections of Mn chloride. The production of the lesion of the kidney depends on giving Mn chloride over a long period of time, thus making it necessary to regulate the dose to the individual tolerance of the animal. This may be done by following the daily weights and the detn. of albumin in the urine. HARRIET F. HOLMES

Further observations upon electric charge in its relation to hemolysis and phagocytosis. J. C. BROOM AND H. C. BROWN. *Brit. J. Exptl. Path.* 11, 305–10(1930).—The amt. of complement fixed by sensitized bacteria depends on the concn. of NaCl present. $K_4Fe(CN)_6$ inhibits serum hemolysis *in vitro*, and *in vivo* its administration to mice exerts a protective action against a lethal dose of a hemolytic serum. This salt also markedly interferes with the phagocytosis of bacteria. It is probable that all these effects are dependent upon the relative elec. charges of the reacting components.
HARRIET F. HOLMES

Tar cancer in mice. II. The condition of the skin where modified by external treatment or diet, as a factor in influencing the cancerous reaction. A. F. WATSON AND E. MELLANBY. *Brit. J. Exptl. Path.* 11, 311–22(1930).—The carcinogenic activities of a sample of coal tar were increased when each of its periodical applications to the skin of the mouse was preceded by treatment of the skin with certain fluid fats or fatty substances. A petr.-ether ext. of the tissues of mice was found to be particularly effective in producing this acceleration. In addn. to a relatively larger no. of skin tumors and their accelerated growth, these increased carcinogenic activities were reflected in the greater no. and development of the assocd. nodules situated in the lung tissues. The carcinogenic activities of the tar were also increased if the exptl. mice were maintained on a diet contg. a high proportion of fat in the form of butter. Under these conditions the coats of the animals assumed a characteristic fatty condition which probably facilitated the periodical absorption of the tar. The preliminary treatment of the skin with petr. ether under certain conditions was found to produce the opposite effect to that produced by the local treatment of the skin with suitable fluid fats. This was shown by a decrease of skin tumors and lung nodules, together with inhibited growth in the former. HARRIET F. HOLMES

The theoretical carbon dioxide dissociation curve in acid-base disturbance of childhood. N. MORRIS AND S. GRAHAM. *Brit. J. Exptl. Path.* 11, 322–8(1930); cf. *C. A.* 24, 1667.—The capacity of the blood for holding CO_2 depends upon 2 factors, the available alkali and the degree of buffering. The relative importance of these 2 factors in maintaining acid-base equil. is revealed by the theoretical dissocn. curve described by Barcroft, *et al.* (*C. A.* 20, 2878). In the blood of a normal child the theoretical dissocn. curve agreed with that actually detd. In congenital pyloric stenosis the CO_2 dissocn. curve is definitely hypercapnic. A theoretical dissocn. curve constructed from the blood of an infant showing very marked symptoms was much higher and flatter than normal, which indicates that the blood contains much more than the usual amt. of CO_2 at any given tension. The slight flattening of the curve is due to the low degree of buffering, while the height of the curve is the result of the large amt. of available alkali. The theoretical dissocn. curve from the blood of a child showing symptoms of salicylate poisoning was definitely lower than normal and the lowness is due solely to the diminution in the degree of buffering as the amt. of available alkali is well within normal limits. HARRIET F. HOLMES

The secretion of mucus by the colon. H. FLOREY. *Brit. J. Exptl. Path.* 11, 348–61(1930).—Application of agents capable of causing cell damage calls forth a secretion from the goblet cells of the colon. This secretion might be caused either by the direct action of the noxious agents on the goblet cells or by the liberation of some chem. substance which then stimulated the goblet cells Tests with histamine (which is active on the skin), acetylcholine, adenosine and peptone solns. have failed to give evidence that they stimulate mucus production from the goblet cells. Exts. prepd. from colonic mucosa did not have an observable influence in stimulating mucus production. It appears, therefore, that the goblet cells directly react to the insult of the noxious agent in contradistinction to the accompanying vascular reaction which, judging from the results on skin, is due to the liberation of some histamine-like body.
HARRIET F. HOLMES

The index of nucleic phosphorus in normal and neoplastic tissues. A. H. ROFFO AND P. PILONI. *Neoplasmes* 9, 201–10(1930).—By the use of the technic of Javillier and Allaire (*C. A.* 19, 3100) detns. were made of the total P, nucleic P and lipoid P in the blood and organs of normal rats and of rats with tumors and in the tumors. The nucleic P in the blood of a normal rat is lower than that in the blood of a tumor rat, while the nucleic P in the liver or spleen is very much less than that in tumor tissue. These differences appear more marked if the indices (nucleic P × 100)/total P and (nucleic P × 100)/lipoid P are considered. The following values were obtained for nucleic P/total P: liver 4.36, spleen 4.35, sarcoma 19.6 and carcinoma 31.67, and for nucleic P/lipoid P: liver 12.91, spleen 23, sarcoma 70 and carcinoma 152. The results are explained as in relation to the nuclear contents of the tissues. The nuclear

content is known to be high in neoplastic tissue, but there seems also to be a hyperfunction with increased mitotic activity. HARRIET F. HOLMES

The chlorine content and the chlorine distribution in the blood and their relation to acid-base equilibrium. A. LANDAU, J. GLASS AND S. KAMINER. *Compt. rend. soc. biol.* **101**, 594–6(1929); *Wiener Arch. inn. Med.* **20**, 375–428(1930).—The Cl content of the blood and its distribution in plasma and corpuscles were studied in 10 convalescents and in 64 patients with various pathol. conditions. The normal Cl content of the blood shows little variation and is as follows: Cl of the total blood 2.7–3.02 g. per l.; Cl of the plasma 3.4–3.62 g.; Cl of the blood corpuscles 1.7–1.95 g. The Cl index of the blood corpuscles or the ratio of Cl concn. of the blood cells to Cl concn. of the plasma is 0.47–0.55. In pathol. conditions the variations are more marked and the amplitude of variation in the blood corpuscles is nearly twice as large as those in the plasma. In 14 cases the Cl content of the blood corpuscles was greater than normal and in all these cases there was acidosis. In 45 cases without acidosis this condition was found only once, in a case in which there had been a long-continued administration of chlorides in considerable amount. The rise of the Cl index of the blood corpuscles over normal values was noted 20 times, in 16 of which there was acidosis. The rise of the Cl content of the blood corpuscles over 2.30 g. per l. and the rise of the Cl index of the blood corpuscles over 0.65 were found only in cases with most severe acidosis and the prognosis is extremely unfavorable in these cases. There is, however, no strict parallelism between the lowering of the alkali reserve in cases of acidosis and the degree of shifting of Cl from plasma to blood corpuscles. In 7 cases in spite of pronounced acidosis the Cl content of the blood corpuscles and the Cl index were not increased. H. F. H.

The cause of anaphylactic shock. V. YELIN. *Arch. Path. Anat.* (Virchow's) **278**, 35–41(1930).—A series of histological changes develops in the organism following the parenteral introduction of protein, including, particularly, an increased glycogen deposition in the liver. In anaphylactic shock, produced by reinjection of the same protein, a sudden passage of glycogen from the liver, and possibly also the muscles, into the blood occurs. Anaphylactic shock is the result of a glycogenemia and consequent glycogen poisoning. E. R. LONG

Placental transmission of foreign proteins in rabbits. FRANCES E. HOLFORD. *J. Immunol.* **19**, 177–216(1930).—Horse hemoglobin was not found to pass the rabbit placenta, but egg albumin horse or beef serum, the pseudo-globulin fraction of beef serum, and the globulin fraction of horse serum, injected into pregnant rabbits near term, in a no. of instances passed the placental barrier in quantity sufficient for demonstration in the serum of the fetus. These facts may explain the occasionally observed sensitization of the fetus *in utero* to foreign protein. E. R. LONG

The relationship between complement and opsonin. Experiments with Congo red. J. GORDON. *J. Immunol.* **19**, 303–5(1930).—Congo red and similar dyes prevent the bactericidal and hemolytic (complement) activities of normal serum, but a serum the complement of which has been inactivated by Congo red is still able to exert opsonic activity. E. R. LONG

Molecular movement, viscosity and agglutination. STEPHEN WENT. *J. Immunol.* **19**, 347–56(1930).—The viscosity of the dispersing medium affects the Brownian movement of bacteria greatly. With a certain degree of internal friction mol. movement ceases. The intensity of this movement depends on the abs. temp. Bacteria may flocculate spontaneously if the viscosity of the medium is increased to a certain degree. The sensitiveness in this relation depends on the amt. of bacterial surface. Media of high viscosity hinder the bacterial agglutination caused by immune sera; this is an effect on the first phase of immune agglutination, *i. e.*, the process of adsorption of the immune bodies. E. R. LONG

The relation of the bacterial precipitin reaction to the Ramon flocculation phenomenon. ELIZABETH LEE HAZEN. *J. Immunol.* **19**, 393–403(1930).—Flocculation in mixts. of filtrate of *C. diphtheriae* and antitoxin is not limited by agglutination types of the organism serving for toxin production. Pptn. in mixts. of toxic filtrate and agglutinating serum is restricted to agglutinating types. The property in the toxic filtrate essential for flocculation with antitoxin is destroyed at 60°, when this temp. is maintained 0.5 hr., whereas the property essential for pptn. of agglutinating serum withstands 85° for 1 hr. Removal of the bacterial antibody from antitoxic serum by adsorption of the serum with bacterial exts. does not prevent subsequent flocculation of the serum with the toxic filtrate, whereas the agglutinating serum treated in the same manner no longer ppts. with the toxic filtrate. The Ramon reaction is probably due to interaction between toxin and antitoxin and not between bacterial precipitinogen and precipitin. E. R. LONG

The dialyzability of proteins. ARTHUR F. COCA. *J. Immunol.* **19**, 405–10(1930).—The dialyzability of the excitants of atopic hypersensitiveness in egg white reported by W. Jadassohn (*Schweiz. med. Wochschr.* **1926**, No. 27) is confirmed. Dialyzates were prepd. by the use of 3 different membranes, the collodion sac, the air bladder from fish and the parchment diffusion shell. With the aid of specific antisera and chem. methods the dialyzable excitants were shown to be native proteins, and these proteins proved to have antigenic capacity. E. R. LONG

The heat stability of the diphtheria toxin. K. ANDO AND H. NISHIMURA. *J. Immunol.* **19**, 465–71(1930).—The heat sensitiveness of diphtheria toxin depends on its p_H when heated. The more acidified the toxin is, the more heat stable it is. Diphtheria toxin is practically destroyed by heating to 80–90° for 30 min., but some toxicity remains even after 30 min. boiling. When acidified to a p_H of 2.0 before boiling the toxin preserves $^1/_{1000}$ to $^1/_{700}$ of its original toxicity after boiling for 30 min. E. R. L.

Experiments on the concentration of antipneumococcic and antimeningococcic horse sera. KENNETH GOODNER. *J. Immunol.* **19**, 473–84(1930).—During immunization of horses against the meningococcus and pneumococcus there is generally an increase in the serum of a euglobulin of low soly. The antibody of the immune serum is assocd. with this protein, particularly with its least sol. fraction. This fact makes it unnecessary to conc. the protein as a whole. E. R. LONG

The action of formaldehyde on diphtheria toxin. WM. E. BUNNEY. *J. Immunol.* **20**, 47–59(1931).—Toxoid formation does not appear to be the result of direct action of HCHO on diphtheria toxin, but seems to be due to the action of a compd. resulting from the reaction between HCHO and the amino group of an amino acid. A method for making toxoid on this principle is suggested. It consists in concg. low-grade toxins and then diluting in a glutamic acid soln. to which HCHO has been added. E. R. LONG

Advantages and disadvantages of the buffered diluent for diphtheria toxin. WM E. BUNNEY AND BENJAMIN WHITE. *J. Immunol.* **20**, 61–70(1931).—The buffered diluent of Glenny, Pope and Waddington (*J. Path. and Bact.* **31**, 133(1928)) dissolves diphtheria toxin pptd. by acid, and preserves toxicity and flocculation value for at least 10 months in cold storage. It is not a practical diluent for Shick toxin prepns. E. R. LONG

A new diluent for diphtheria toxin in the Shick test. WM. E. BUNNEY. *J. Immunol.* **20**, 71–84(1931).—A 2% soln. of peptone contg. 0.85% NaCl and 0.5% phenol maintains the toxicity of certain diphtheria toxins dild. to 0.25 M. L. D. per cc. for at least 2 months. E. R. LONG

Biochemical investigation of the blood in cases of experimental disturbance of liver function. I. Liver function and carbohydrate metabolism. TSUNEJIRO [illegible]DA *Japan. J. Gastroenterology* **2**, 191–202(1930).—The blood sugar of rabbits was detd. by the method of Bang before and after injury to the liver. The livers of various rabbits were impaired by feeding $CHCl_3$, CCl_4 and yellow P. The blood sugar increases in the early period of poisoning and falls below the normal in later stages. Injury through *Schistosomum japonicum* causes the blood sugar to rise to a max. about 30 days after infection. At the time of the animal's death on the 70th day the values were normal Injury to the liver by Röntgen ray irradiation produced a rise in blood sugar for 3 days. Partial hepatectomy decreases blood sugar from the beginning. Ligation of the common bile duct causes an initial increase followed by a decrease. One or two rabbits were used for each expt. The fluctuations regarded as significant are frequently close to the author's normal. C. M. MCCAY

The biological diagnosis of gout. PEDRO ESCUDERO AND ADOLFO ESCUDERO *Semana méd.* (Buenos Aires) **1930**, II, 1945–54.—The patient is kept on a diet free from purines for 10 days and the av. of purine elimination in the urine is detd. On the test day, 100 g. beef ext contg. 1 g. purine substances is given. Patients suffering from gout retain between 50 and 85% of the purine. The method of Deniges for the detn. of uric acid, directions for the diet and clinical records are given. A. E. MEYER

A large calculus formed within the prepuce. COUILLAUD. *J. pharm. chim.* [8], 12, 31–4(1930).—In a case of phimosis affecting a native of Bamako, W. Africa, a hard calculus weighing 645 g., of about 10 yrs.' formation was removed. The urine contained CaC_2O_4, Ca phosphate and uric acid. The stone consisted of 2 concentric layers (*A*, *B*), resp., 4 and 3.5 cm. thick, and an outer (*C*) and an inner nucleus (*D*), wt. 4 g. CaC_2O_4 was absent throughout. *A* contained $CaCO_3$ and Ca phosphate, also $MgNH_4PO_4$, but no uric acid or urates (murexide test). Results in *B* were the same except that $MgNH_4PO_4$ was more pronounced. This was chiefly present in *C* which contained

little Ca, but also some uric acid and Na urate. *D* contained traces of $MgNH_4PO_4$ and of $CaCO_3$, but showed the murexide test abundantly. S. WALDBOTT

Anti-hookworm measures in West Flores, Dutch East Indies (LALLEMANT) **14.**

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H—PHARMACOLOGY

A. N. RICHARDS

Cutaneous absorption of phosphorus. F. ZERNIK. *Z. ges. exptl. Med.* **70**, 1–15 (1930).—The absorption of yellow P through the skin of guinea pigs depends on the solvent. P. could be demonstrated in the skin 5 days after application. A 1% soln. of dichloroamine in CCl_4 inhibited the cutaneous absorption of P. Rules for handling P by men are recommended. F. L. DUNN

Variations of the glucemia level in dogs under the influence of an injection of colloidal silver and adrenaline. H. GNOIŃSKI. *Med. Dosawiadczalna i Spoleczna* **11**, [illegible]ench 117–8)(1930).—Intravenous injection of colloidal Ag causes hyperglucemia on the av. of 35% and at the same time a diminution of hepatic glycogen. Adrenaline alone causes hyperglucemia on the av. of 70%. Injections of colloidal Hg and adrenaline cause hyperglucemia on the av. of 43%. About the same hyperglucemia is caused by subcutaneous injection of adrenaline 4 hrs. after the injection of colloidal Ag. The hyperglucemia after the injection of colloidal Ag is apparently not caused by the stopping of the reticulo-endothelial system. J. KUČERA

The tolerance of normal subjects to levulose. Factors influencing the variations in rise in blood sugar. NORMAN JOLLIFFE. *J. Clin. Investigation* **9**, 363–80(1930).—In normal subjects the max. blood sugar following oral ingestion of 30 to 50 g. of levulose rarely exceeds 115 mg. %. A rise to 125 mg. % was considered abnormal. Tests on convalescent patients and triplicate tests on normals showed no significant variation. A level of blood sugar above 95 to 110 mg. % seems to stimulate a sugar-storage mechanism which rapidly lowers the blood sugar. The rapidity of disappearance of the blood sugar probably depends on the glycogen-forming ability of the sugar used. J. B. B.

Studies in congestive heart failure. VI. The effect of overwork and other factors on the potassium content of the cardiac muscle. J. ALFRED CALHOUN, GLENN E. CULLEN, GURNEY CLARKE AND T. R. HARRISON. *J. Clin. Investigation* **9**, 393–403(1930); cf. *C. A.* **25**, 736.—The water content of the ventricular muscles of patients dying of congestive heart failure was not changed There was diminished K of the right ventricle in pneumonia and massive collapse and in myocardial insufficiency, resulting in pulmonary congestion. In hepatic and systemic edema from myocardial insufficiency there was decreased K of the right ventricle. The cause of loss of cardiac K was not edema, but rather overwork which is the predisposing factor to cardiac fatigue and failure. **VII. The effect of overwork on the potassium content of skeletal muscle.** J. ALFRED CALHOUN, GLENN E. CULLEN AND T. R. HARRISON. *Ibid* 405–8.—"Overwork of the muscles of one leg of a dog, produced by stimulation of the sciatic nerve,

usually leads to a diminished content of K in these muscles as compared with those of the opposite unstimulated leg." J. B. BROWN

The treatment of oriental sore with berberine acid sulfate. B. M. DAS GUPTA. *Indian Med. Gaz.* **65**, 683–5(1930).—A 2% soln. of the salt is used; 2 cc. of this is injected into several points, thoroughly to infiltrate the area. FREDERICK G. GERMUTH

Tryptophan and histidine are hematogenous amino acids. GEORGES FONTÈS AND LUCIEN THIVOLLE. *Compt. rend.* **191**, 1088–90(1930).—Subcutaneous injections of the two acids, tryptophan and histidine, into rabbits and dogs cause an increase of 1,040,000 in erythrocytes and 6:100 in hemoglobin, after one day. The use of both (1:2) is superior to the use of either alone. Rats fed on a diet deficient in these 2 acids show a marked decrease in hemoglobin index. It is suggested that they be called hematogenous amino acids. MARY E. LEAR

Hypoglucemic action of bulbs of Allium cepa L. MAURICE-MARIE JANOT AND JEAN LAURIN. *Compt. rend.* **191**, 1098–1100(1930).—Exts. of certain bulbs, when injected subcutaneously into rabbits, show an action similar to that of insulin. Exts. stabilized in solid CO_2 give better results than those treated with boiling 95% alc. Analysis shows mannose and glucose, 26.5 g. per 100 in terms of glucose; pyrocatechuic acid; nitrogenous and S compds. Sugar may be responsible for the failure to establish glucemic equil. MARY E. LEAR

The influence of amino acids on the glycogen mobilization in the toad liver through adrenaline. YOICHIRO TANIUCHI. *Folia Pharmacol. Japon.* **10**, No. 1, 64–99(1930). Lately Abderhalden and his pupils have reported that the so-called optone, as well as certain amino acids, strengthen the adrenaline action on heart activity, vessel contraction and intestinal function. These substances appear to sensitize the nerve endings in the organs to adrenaline. Perfusion expts. have been performed on toad livers with glycocoll, tryptophan, histidine and cystine in certain concns. of adrenaline to det. the glycogenic effect. The sugar was estd. by the Hagedorn method. Glycocoll and tryptophan in concn. 1–20,000 or 40,000 are weak in sugar production, while histidine and cystine are actionless. Each amino acid in certain concns. strengthens more or less the sugar mobilization of the adrenaline; histidine and cystine are especially active. Livers perfused with Ringer soln. contg. histidine or cystine an hr. before adrenaline is added show remarkable adrenaline action; glycocoll and tryptophan do not. The combined effect of 2 amino acids is much weaker than their action separately and is also weaker on the adrenaline action. The sugar mobilization does not parallel the concn. of amino acid or the combination with adrenaline. All observations on toad livers could be paralleled by the action on blood vessels in warm-blooded animals. H. G. W. LUCAS

The detoxication of adrenaline through the reticulo-endothelium apparatus. II. TORANOSUKE UEMORI. *Folia Pharmacol. Japon.* **11**, No. 1, 42–56, Breviaria 3 4 (1930); cf. *C. A.* **25**, 351. In connection with earlier expts. with India ink, U has investigated the effect in rabbits of electrargol Clin and lithium carmine. Intravenous injection of these intensify remarkably the adrenaline sensitivity. Repeated injections give an increased effect After loading the reticulo-endothelium cells with these colloids, the adrenaline action by the mesenteric vein is much greater than by the ear vein The silver colloid and lithia carmine strongly influence the reticulo-endothelium cells in their detoxication of adrenaline. These cells in the liver play an important role. The Congo red index after electrargol rises insignificantly; *i. e.*, the Congo red accumulative possibility of these cells after being filled with the silver colloid remains almost unchanged **III.** *Ibid* 57–74, Breviaria 4 5. —Artificial perfusion of fresh rabbit liver through the portal vein with adrenaline-contg. Ringer soln shows that a considerable decrease in adrenaline has taken place in the perfusion fluid. The loss is very small if the rabbits are first injected intravenously with India ink, electrargol or lithia carmine. Repeated injections are most effective. The liver has a conspicuous detoxicating effect on adrenaline through its reticulo-endothelium system. Perfusion through the liver artery also shows a loss of adrenaline but it is small compared to the loss through the portal vein. Colloids do not affect the loss of adrenaline so much when perfusion is made through the artery. Perfusion of the spleen shows that much adrenaline is removed After preliminary intravenous treatment with the colloid, the adrenaline detoxication is greatly hindered. The reticulo-endothelium of the spleen stands in intimate relationship with the adrenaline inactivation by this organ. G. H. W. LUCAS

The relationship between the vomiting, blood sugar and uric acid regulation center from the pharmacological standpoint. I. The influence of emetics on the vomiting and blood sugar. MOKKIU MUN. *Folia Pharmacol. Japon.* **11**, No. 1, 75–83, Breviaria 5(1930).—Apomorphine-HCl, Cu sulfate, emetine-HCl, wine of antimony and erycon

have been employed in a series of comparative expts.; they were injected subcutaneously in dogs. The rapidity with which vomiting is produced is in the order given above. Emetine produces more frequent vomiting, and wine of antimony the least. In reduction of blood sugar, the series is thus—emetine-HCl, antimonial wine, Cu sulfate, erycon and apomorphine-HCl. Apparently simultaneously with stimulation of the vomiting center by emetica in the dog the blood center is also affected and the blood sugar falls. G. H. W. LUCAS

The influence of synthetic β-(1-piperidyl)ethyl acetyltropate (navigan) on the blood sugar mobilization in the liver. KIKUO TODA, YOICHIRO TANIUCHI AND MITSUTAKA NAKANO. *Folia Pharmacol. Japon.* **11**, No. 2, 15 Breviaria(1930).—It is generally assumed that atropine depresses the parasympathetic nerve ending app. exclusively. It appears that this view has not sufficient grounds. In many organs it acts antagonistically to adrenaline, and appears to fatigue sympathetic nerve endings. In the toad liver, it depresses the sugar mobilization after adrenaline. Expts. with navigan in perfusion of toad livers show that it slightly increases the sugar content and that when it is injected together with adrenaline, it depresses, on the other hand, the sugar mobilization of the adrenaline. This latter action is stronger the longer the foregoing adrenaline stimulation continues. This is in harmony with earlier data of other investigators and supports their assertion that atropine is a fatigue poison of sympathetic endings. G. H. W. LUCAS

Studies on chronic morphine poisoning. I. The blood picture of morphinism. MASASUE SUO. *Folia Pharmacol. Japon.* **11**, No. 2, 127–43, Breviaria 9(1930).—The blood of morphine addicts compared with that of normal persons shows a lower red count, which leads one to assume the presence of an anemia. In normal persons as well as in addicts and addicted dogs, a leucocytosis appears 30–60 min. after a morphine injection. The increase in lymphocytes is greater than in polynuclear neutrophiles. This change in the leucocytes is only transient and becomes normal in 90–120 min. In addicts and addicted dogs which show a leucocytosis, the percentage of lymphocytes is greater than that of the other leucocytes. During the period of abstinence in the addict, the increase in leucocytes is due to the no. of polynuclear neutrophiles. **II. The sedimentation of the blood corpuscles in the morphine addict and the addicted dog.** *Ibid* 143–152, Breviaria 10.—The sedimentation of the red cells in the addict and the addicted dog is much more rapid than normal. In the addict, the sedimentation is more rapid in the period of habituation than in the abstinence period. Withholding of the morphine doses only retards the sedimentation. This retardation increases in the abstinence period. In the withdrawal period, the sedimentation is slower in well-nourished patients than in emaciated ones. It is also slower in patients who have had small daily doses than in those who have had large daily doses. G. H. W. LUCAS

The study of Leonurus sibericus L. II. Pharmacological study of the alkaloid "Leonurin" isolated from Leonurus sibericus L. SEIKO KUBOTA AND SEIKICHI NAKASHIMA. *Folia Pharmacol. Japon.* **11**, No. 2, 159–67, Breviaria 11–2(1930); cf. *C. A.* **25**, 771.—The M. L. D. of leonurin injected subcutaneously per g. body wt. of frogs is between 0.0004 and 0.0006. In mice when injected it produces irritation, convulsions and respiratory paralysis. The heart continues to beat for some time. The M. L. D. per g. body wt. is between 0.0006 and 0.0007, injected intravenously in a cat. It produces a temporary fall in blood pressure, which may be followed by a slight rise. On the excised frog heart, a small dose has a stimulant action, but a large dose a depressant one. Perfusion expts. on toads showed that the alkaloid contracted blood vessels. Similar results were obtained on rabbits. Small doses in a cat act as a respiratory stimulant, quickening the frequency and magnifying the amplitude. Excessive doses produce respiratory paralysis. The alkaloid acts on motor nerve endings as curara does. On isolated intestine it appears to stimulate the musculature directly. The tonus of the excised uterus is increased and the movements are magnified. Intravenously injected in a rabbit it produces a marked diuresis. It has a hemolytic action on rabbit blood in concns. up to 1/1000. G. H. W. LUCAS

The influence of some drugs of the quinine group on the growth in vitro of cultures of fibroblast. SEIICHI SEMURA. *Folia Pharmacol. Japon.* **11**, No. 2, 168–80, Breviaria 12(1930).—The influence of quinine, quinidine, cinchonine, cinchonidine and optochine on the growth *in vitro* of cultures of fibroblast has been measured. Fibroblast cultures 1–2 months old from the ventricle of chick embryo were used in the usual cover glass method. The nutrient medium was chick plasma with an addnl. vol. of embryo tissue fluid. Fixed and stained prepns. of normal cultures were made as controls at the same time. The above-mentioned drugs were poisonous and their poisonous effect varied directly with their concn. High concns. completely inhibited growth; the tissue de-

generated rapidly and died. The cells showed irregular polygons or rounded-off forms in the growth zone. In the cytoplasm appeared an aggregation of fat granules with more or less small vacuoles. Optochine was the strongest poison; cinchonine and cinchonidine were the weakest. G. H. W. LUCAS

The drugs employed in Chinese medicine as antidiabetica. NORIYUKI SUGIHARA. **III. Experimental investigation on the influence of the drugs employed in Chinese medicine as antidiabetica on the blood sugar of rabbits.** PIUNGKI MIN. *Folia Pharmacol. Japon.* **11**, No. 2, 181–7, Breviaria 13(1930); cf. *C. A.* **25**, 741.—Alc. exts. of *Bupleurum falcatum, Lycium chinense, Fritillaria verticillata* and *Anemarrhena asphodeloides* increase the blood sugar rapidly. The max. is reached in ½ to 1 hr., after which there is a gradual decrease to normal values in 5–6 hrs. Alc. exts. of *Cannabis sativa, Pachyma coccus, Astragalus membranaceus, Morus bombycis, Atractylis ovata, Phellodendron amurense, Pueraria hirsuta* and *Rehmannia lutea* act to increase the sugar and then to decrease it. After 2–3 hrs. a gradual hyperglucemia occurs. G. H. W. L.

The influence of various conditions on the resorption of sodium salicylate from the pleural cavity, as well as the absorption path of this drug. MASAYOSHI OGAWA. *Folia Pharmacol. Japon.* **11**, No. 2, 188–201, Breviaria 13–4(1930).—Sodium salicylate (0.1 g. per kg.) was injected into the right pleural cavity of a rabbit, and at various intervals after the injection the salicylate content of the serum was estd. in blood taken from the jugular vein, according to the method of Herissey. The resorption of salicylate from the pleural cavity decreases after section of the phrenic nerve on the side in which the injection was made. This is more distinct after double-sided phrenectomy. However, after phrenectomy on the other side, there is practically no effect. It is thought that the spreading of the injected soln. due to the respiratory movement plays an important role. This is quite evident after phrenectomy where there is a decrease in resorption when respiration is decreased on the side injected. Disturbance of the circulation of the lung also influences the resorption. When an animal is curarized and artificial respiration is employed, the rate of resorption is increased with an increase in respiratory frequency. After a unilateral closed pneumothorax the rate of resorption on the same side is depressed and on the other side is increased. This shows clearly that resorption and blood circulation on the damaged side are decreased, while on the uninjured side, they are strongly compensated. G. H. W. LUCAS

The fluctuation of cholesterol, calcium and sugar pictures in blood of rabbits poisoned with thallium. SHIGEYOSHI KOYANAGI. *Folia Pharmacol. Japon.* **11**, No. 2 202–13, Breviaria 14–5(1930).—The relationship between Tl and the endocrine system has been investigated frequently, but no definite conclusions have been reached. It is known that the metabolism of cholesterol, Ca and sugar is closely related to the inner secretion functions. Expts. performed by K. show that the cholesterol content of the blood after repeated subcutaneous administration of Tl undergoes a more or less marked rise which is most noticeable during the falling out of the hair. There is also a rise in free cholesterol and cholesterol esters, particularly of the latter. Following subcutaneous or intravenous injections of Tl, the Ca falls in varying degrees. Intravenous administration of Tl results in hyperglucemia. Subcutaneous injection shows two different forms, one in which there is a tendency to hyperglucemia and one in which an initial fall is superseded by a rise in blood sugar. In Tl-poisoned rabbits, the hyperglucemia resulting from adrenaline is more or less weakened. G. H. W. LUCAS

Studies upon the action of certain amino acids upon the isoelectric point of human serum. F. VLÈS AND A. DE COULON. *Compt. rend.* **191**, 1166–8(1930).—Previous repts. have shown the isoelec. point of the plasma can be altered by the injection of amino acid mixts. Cancers in mice have been cured by such injections. Six cancer patients were injected with a mixt. of alanine, proline and cystine. The amt. used ranged from 4 to 14 g. Before the injections the isoelectric points of the plasmas ranged from p_H 8.3 to 11. After the injections they attained minima from p_H 5.0 to 8.0 in the course of 1–2 months. Single detns. and not minimal values are given for the isoelec. points before the injections. C. M. MCCAY

The formation of compounds between lead and lipoids in the organism. The behavior of the fatty acids of the liver in lead poisoning. G. ORESTANO. *Arch. sci. biol.* (Italy) **15**, 204–14(1930).—See *C. A.* **24**, 4863 PETER MASUCCI

The pharmacologic study of dye adsorption compounds. G. SPAGNOL. *Arch. sci. biol.* (Italy) **15**, 216–48(1930).—The basic dyes used were Janus green, Victoria blue 4R, Nile blue, safranine, methylene blue, and trypaflavine; the acid dyes were Congo red, trypan red, trypan blue, lithium carmine, indigo carmine, eosin, alizarin red and orange G. The proportion of the 2 dyes used was varied so that the adsorption compd. had a pos. or neg. elec. charge. Six different classes of compds. were prepd.: (1) colloidal

basic, colloidal acid dye; (2) colloidal basic, crystalloidal acid; (3) semi-colloidal basic, colloidal acid; (4) semi-colloidal basic, crystalloidal acid; (5) crystalloidal basic, colloidal acid; (6) crystalloidal basic, crystalloidal acid. The compds. were injected intravenously into rabbits, and their actions studied with particular reference to their distribution in the tissues, toxicity, and rate of scission into their resp. dyes. The compds. were distributed in the organism in an entirely different manner from that of the two-component dyes. When the acid or basic dyes were injected singly they were distributed throughout the organism but when injected in the form of the adsorption compd. they were fixed almost exclusively in the lungs, in the hemopoietic organs, or occasionally in the kidneys. The difference in their distribution depended not only on the proportion of the mixt., but also on their dispersion. Those which had well-marked colloidal characteristics showed the most difference, whereas those which had crystalloidal characteristics showed the least. The compds. were split into their component parts either in circulation or after they had been fixed in the tissues. The rate of scission was slow in those compds. in which both dyes had marked colloidal properties and was much more rapid in the compds. in which one or both dyes had crystalloidal properties. The compds. showed toxicities different from those of the components; this difference varied according to the organotropism and rate of scission. In general, when they were fixed by the lungs, their toxicities increased and at times were greater than those of either component; when they were fixed by the hemopoietic organs, their toxicities decreased and at times they were almost innocuous, especially when the rate of scission was very slow. The differences in the distribution of the dyes in the form of the compds. are explained by the phys. and chem. changes which the particles of opposite charge undergo when they are united in the compd. The variations in toxicity are explained by their organotropism and by their rapid or slow rate of scission. These results may have not only theoretical but also practical therapeutic importance. PETER MASUCCI

The results of the sclerotic injections of sodium salicylate in the treatment of hemorrhoids. RAFFAELLO PAZZAGLI. *Minerva med.* **1930**, II, 519–24.—Numerous cases of hemorrhoids in various stages were treated by means of injections of 20–40% Na salicylate. The sclerotic action of this drug has given excellent results. No counter indications have yet been established. On account of the simplicity of treatment P. recommends this form of therapy as useful and effective. PETER MASUCCI

The influence of insulin on glycogen distribution in marine fishes. R. W. ROOT, F. G. HALL AND I. E. GRAY. *J. Elisha Mitchell Sci. Soc.* **46**, 15-6(1930).—Injections of 40 units of insulin per kg. body wt. into scup fish, *Stenotomus chrysops* (Lin.), caused first a transient hyperglucemia and then a very low blood sugar level. The glycogen supply dropped in the liver and increased in the muscle for about 6 hrs. after the injections. A. L. MEHRING

Narcosis. II. The coefficient of distribution between water and lipides of various contents of double linkages. ILARIA MALANDRUCCO. *Biochim. terap. sper.* **17**, 287–94 (1930), cf. *C. A.* **20**, 2540.—The prepn. of bromural is described. Its coeff. of distribution between water and oils of different I values showed no relation to the latter. A. E. MEYER

The lipases present in blood after the action of anesthetics. MARCO PAZZI DEMURTAS. *Biochim. terap. sper.* **17**, 402–13(1930); cf. *C. A.* **24**, 2803.—The blood of dogs contains after $CHCl_3$ narcosis a quinine-resistant lipase, which is not present in normal conditions. The activity of the normal blood lipase is increased by the presence of the quinine-resistant lipase. The quantity of the latter does not depend on the quantity of $CHCl_3$ used, but on the resistance of the organism. It is of hepatic origin. Its estn. may be used as a test for the liver function after narcosis. A. E. MEYER

The anagotoxic power of mineral waters and chemotherapy. MAURICE PERRIN AND ALAIN CUÉNOT. *Presse méd.* **38**, 633–4(1930).—An emulsion of $MgCO_3$ in H_2O (1.4000) is anagotoxic to the poisoning effect of picrotoxin on mosquito larvae. Previous treatment of the larvae with $MgCO_3$ does not make them more resistant. The alkaloid and $MgCO_3$ must be in contact for a certain time. A. E. MEYER

Salicylates in the treatment of acute articular rheumatism. R. LUTEMBACHER. *Presse méd.* **38**, 634–6(1930).—Salicylates of Na, K and Ca in 5% soln. at the same ratio as in Ringer's soln. were used. The mixt. is better tolerated than the soln. of a single salt alone. A. E. MEYER

Danger of intracardiac injections of adrenaline and the value of atropine in secondary chloroform syncope. L. GARRELON AND GEORGE PASCALIS. *Presse méd.* **38**, 649–51(1930).—The heart stop observed in $CHCl_3$ poisoning after administration of adrenaline is explained by mobilization of the thyroid hormone by the adrenaline and a consequent oversensitization of the heart to the $CHCl_3$. Intracardiac injections of

0.5 mg. of atropine restore the action of the heart by making it more resistant to the poisoning effect. A. E. MEYER

Magnesium thiosulfate in conditions of shock. G. BOISSEL. *Presse méd.* **38**, 670–2(1930).—Shock of anaphylactic or other origin was successfully treated with MgS_2O_3 in 4 to 5 daily doses of 0.5 g. each or in severe cases by intramuscular injection of 10 cc. of a 10% soln. In spasmodic coryza, hay fever, etc., adrenaline was also used. In asthma and vomiting in pregnancy good results were obtained. The injections are not painful. A. E. MEYER

Mercury poisoning, its treatment with sodium thiosulfate. J. C. GONZÁLES PODESTÁ AND ROBERTO E. TORVISO. *Semana méd.* (Buenos Aires) **1931**, I, 19–24.—The $Na_2S_2O_3$ was given in intravenous injections, 10–20 cc. of a 20 or 40% soln. once or several times a day and for 5, 10 or more days. When the treatment was started several hrs. after the poisoning, 42% of the cases were saved. Unfavorable secondary effects were never observed. Anuria and azotemia give a bad prognosis. A. E. MEYER

The influence of toxic substances and of lipoids on the growth of experimental tumors. II. ELISA MORELLI. *Sperimentale* **84**, 443–55(1930); cf. *C. A.* **24**, 5379.—Lesions caused by snake poison and by tar are similar. Both produce subcutaneous hemorrhages and degeneration of the organs. The snake poison acts as an activator in the growth of tar tumors. A. E. MEYER

Experimental histological changes caused by ichthyol. ANTONIO SEVERI. *Sperimentale* **84**, 457–87(1930).—When NH_4 ichthyolate was applied directly on internal organs of animals or when given intravenously, new formations in the epithelium were observed. Conclusion: A prolonged application of ichthyol may form the stimulus to the formation of neoplasms. A. E. MEYER

Biochemical changes in the organism following the use of hypersol. O. TRAVINA. *Acta Med. Scand.* **74**, 105–28(1930).—Hypersol is an artificial serum contg. in 100 cc soln. 5 g. NaCl, 1.0 g. Na_2SO_4 crystals, 0.5 g. NaH_2PO_4, 0.4 g $NaHCO_3$ and 0.35 g. KCl This soln. is injected intramuscularly into patients with arteriosclerosis the injections being repeated 30–40 times Patients with sclerosis yield in a larger degree to this treatment than do persons suffering from uric acid diatheses. The injections of hypersol cause considerable variation in the blood cholesterol with a general tendency to an increase, this increase being apparently of hemolytic origin. The blood Ca also undergoes much variation with a marked tendency to diminution, to which effect the therapeutic value of the hypersol is ascribed. The hypersol actually induces an increased Ca elimination and thus frees the organism from excess Ca; it also increases the uric acid elimination, although this is either preceded or followed by a rise in the blood uric acid level. The best results with the hypersol treatment were obtained in cases with an initially abnormally high cholesterol content, whereas in persons with a normal cholesterol and Ca content the results were usually negative. S. MORGULIS

The influence of insulin on the physiological alimentary increase of the blood sugar. H. F. HÖST. *Acta Med. Scand.* **74**, 186–90(1930). Expts. on 6 healthy individuals demonstrate that the normal alimentary hyperglucemia is decreased by the administration of insulin. Furthermore, by the proper selection of the dose the hyperglucemic effect may be entirely destroyed. S. MORGULIS

The effect of chemically pure carbon monoxide, illuminating gas, and automobile exhaust gas on the fragility of red blood cells. MAY R. MAYERS, HELEN RIVKIN AND FRANCES KRASNOW. *J. Ind. Hyg.* **12**, 300–5(1930) —The fragility of blood cells was tested by examn. for hemolysis of a suspension of them in solns. of NaCl ranging in concn. from 0.25 to 0.6%. When normal blood was exposed to pure CO, there was no increase in the fragility of the blood cells. A sample of normal blood exposed to illuminating gas and another exposed to automobile exhaust gas both showed a tendency to increased hemolysis of the red blood cells, the former sample showing a greater hemolysis. This effect seems to be due to the presence of other toxic constituents of the gases rather than to their CO content. The hemolysis is not due to a change in H-ion concn. of the blood. N. M. NAYLOR

The effect of carbon dioxide on the nervous centers of the eye. P. P. LAZAREV *Compt. rend. acad. sci. U. R. S. S.* **1930A**, 209–10 —The sight-adaptation curve depends upon the space dimensions. It does not change for the first hr. on a subject placed in a small, soundproof, room. Then sharp fluctuation and a drop occur, thus indicating instability of the nervous centers; this is caused by accumulation of the expired CO_2 In 1–2 min. the curve rises, fluctuating, until it reaches the normal (2–4 min.). The drop of the sensitiveness varies with the amt. of CO_2 inhaled. Y. P.

A practical test for the antidiuretic action of pituitary. O. S. GIBBS. *J. Pharmacol*

40, 129–37(1930).—Pituitary ext. prevented the diuresis produced in mice by intraperitoneal injection of water. C. RIEGEL

The amide nitrogen of blood. V. A theory of ammonia metabolism. SIDNEY BLISS. *J. Pharmacol.* **40**, 171–93(1930); cf. *C. A.* **23**, 3239.—Injection of NH_3 into the femoral artery of the dog causes an increase in amide N of the blood from the femoral vein. Injection of acid into the blood results in an increase of amide N of the blood at a time when urinary NH_3 is increased, while injection of alkali results in a decrease of amide N of the blood and NH_3 of the urine. In the acidosis found in phlorhizinized dogs there is also an increase in amide N of the blood. B. believes that NH_3 neutralizes the excess acid in the blood, the NH_3 appearing in a detoxified form as amide N; it is excreted by the kidney as NH_3 again. C. RIEGEL

Mydriasis affected by sympathomimetic agents. F. F. YONKMAN. *J. Pharmacol.* 40, 195–206(1930).—The isolated iris sphincter muscle (circular fibers) from dogs and steers was placed in a bath of Ringer-Locke or Tyrode soln. Cocaine, ephedrine or adrenaline added to the bath all produce relaxation. This action is attributed to stimulation of sympathetic inhibitory fibers in the sphincter. C. RIEGEL

Resistance to morphine in experimental uremia. EATON M. MACKAY AND LOIS LOCKARD MACKAY. *J. Pharmacol.* **40**, 207–14(1930).—There was an 80–190% increase in tolerance to morphine in rats made uremic by removal of the kidneys. C. R.

The effects of barbituric acid hypnotics on basal metabolism in humans. HAMILTON H. ANDERSON, MEI-YU CHEN AND CHAUNCEY D. LEAKE. *J. Pharmacol.* **40**, 215–28(1930).—The following compds. were studied: (1) ethylisoamylbarbituric acid (amytal); (2) Na diethylbarbiturate (sodium barbital); (3) diallylbarbituric acid (dial); (4) calcium ethylisopropylbarbiturate (ipral); (5) butylethylbarbituric acid (neonal), (6) cyclohexenylethylbarbituric acid (phanodorn); (7) ethylphenylbarbituric acid (phenobarbital). All the drugs decreased tactile discrimination and increased respiratory rate. Nos. 2, 4, 5 and 6 caused decreased O_2 consumption. Nos. 1 and 7 increased O_2 consumption, while No. 3 had inconstant effects. Barbital had a more consistent effect in decreasing the pulse rate and lowering the blood pressure than the other drugs. C. RIEGEL

The action of drugs on the oxygen consumption of the frog's isolated auricle. J. CHRISTODOSS DAVID. *J. Pharmacol.* **40**, 229–34(1930).—Adrenaline caused an increase in consumption and in the rate of the heart. Strophanthin in low concn. caused a slight initial increase followed by a fall, while in high concn. it caused a decrease in O_2 consumption, and in rate of the heart. Pilocarpine was followed by a decrease in O_2 consumption and in rate. C. RIEGEL

The action of sympathetic and parasympathetic poisons on isolated veins. L. WATERMAN. *Arch. néerland. physiol.* **15**, 545–64(1930).—By means of Van Herk's photographic method W. studied the action of adrenaline pilocarpine and acetylcholine on a number of isolated veins. Adrenaline nearly always produced a vasoconstriction, while the results with the other two were somewhat uncertain. A bibliography of 98 references is appended. M. H. SOULE

Animal calorimetry. XL. The metabolism of glucose administered to the fasting dog. MARGARET DANN AND WM. H. CHAMBERS. *J. Biol. Chem.* **89**, 675–88(1930); cf. *C. A.* **24**, 1412.—On ingestion of 50 g. glucose after a fast of 19–31 days, dogs showed hyperglucemia and glucosuria, and oxidized on the first day after the fast only 4–12% of the amt. which could be oxidized under normal conditions. The non-protein respiratory quotient rose from 0.72 on the 1st day after the fast to 0.97 on the 4th. Injection of 2–6 units insulin per kg. body wt. at the time of glucose ingestion only partially increased the carbohydrate utilization. The specific dynamic action of the glucose under these conditions was apparently independent of the amt. of sugar burnt and of the blood sugar level. K. V. THIMANN

Alkaloidal aminoxides, genalkaloids; a chemical, biological and pharmacodynamical study. M. POLONOWSKI. *J. pharm. chim.* [8], **11**, 385–95, 429–44(1930).—A systematic outline is given of the work done by P. on geneserine (*C. A.* **12**, 40; **13**, 1316, 1317), genatropine, genhyoscyamine, etc. (cf. *C. A.* **18**, 231, 2709; **19**, 1426; **20**, 1114; **23**, 4271, etc.). S. WALDBOTT

Diuretic action of cacodylate of bismuth. A. BESNIER. *J. pharm. chim.* [8], **11**, 465–78(1930).—Intravenous injection of Bi cacodylate (*A*) in man is rapidly followed by diuresis, similar to the behavior of Hg [illegible] on dogs showed that with [illegible] hydrous and [illegible] secretion, although the abs. quantities of NaCl are also in- [illegible] rate of elimination of urea during 24 hrs. seems const., but tends towards [illegible] Recording graphs show that blood pressure is not modified by *A*, whether

in the general circulation or in the renal region. *A* acts essentially on the mode of filtration of the renal cell, producing in larger dose an increase of urea in the blood.
S. WALDBOTT

Pharmacodynamic study of tropanol. Relations between the secondary alcohol function and the cardiovascular action of this compound. RENÉ HAZARD. *J. pharm. chim.* [8], **11**, 513–22(1930).—A summary of previous papers, illustrated by graphs, describing the contrasts in pharmacol. actions of tropanol *vs.* pseudotropanol (*C. A.* **23**, 4271), the aminoxide derivs. of both (*C. A.* **23**, 3019; **24**, 2192), the products of demethylation of both (*Ibid*), and the action of tropanone, its oxime and semicarbazone (*C. A.* **23**, 904).
S. WALDBOTT

Acetylcholine. L. LEMATTE, G. BOINOT AND E. KAHANE. *J. pharm. chim.* [8], **10**, 220–8(1930).—A review of pharmacol. studies on acetylcholine (*A*) and derivs., notably by Hunt and Taveau (*C. A.* **1**, 582), Hunt and Renshaw (*C. A.* **19**, 1912), Gautrelet (*C. A.* **3**, 329, 1638; **4**, 782, 1761), Fourneau and Page (*C. A.* **8**, 3435) and by Villaret, Schiff-Wertheim and Justin-Besançon (*C. A.* **22**, 2991). The fact is emphasized that toxicity of *A* is small in therapeutic doses of this powerful hypotensor medicament.
S. WALDBOTT

Some past and present aspects of therapeutics. RALPH STOCKMAN. *Pharm. J.* **125**, 556–9; *Chemist and Druggist* **113**, 725–7(1930).—An historical outline of progress of medical treatment with drugs from antiquity to the present day. Among the retarding agencies have been the forced com. introduction of many useless synthetic drugs. The medical curriculum should be amended.
S. WALDBOTT

Toxic properties of tuberculoproteins and polysaccharides. FLORENCE R. SABIN, FRANKLIN R. MILLER, CHARLES A. DOAN AND BRUCE K. WISEMAN. *J. Exptl. Med.* **53**, 51–80(1931).—The temp. reaction in tuberculous and normal guinea pigs and rabbits is elicited by the tuberculoprotein and probably not at all by the polysaccharides. The polysaccharides may have some killing power under certain conditions but this is not as consistently related to dosage as in the case of the proteins. Both proteins and polysaccharides cause a change in the white blood cells when introduced by any route.
C. J. WEST

Uricolytic drugs (SPOTO) **17**. The active principles of plants of the genus "Ryania" or "Patrisia" (LE COINTE) **17**.

DEINHARDT, DIETRICH: **Der Einfluss des Alkohols auf den Harn.** Heft 6 of "Pharmakologische Beiträge zur Alkoholfrage," edited by H. Kionka. Jena: Gustav Fischer. 36 pp. M. 3.

FRANK, ERICH AND WAGNER, A.: **Insulintherapie einschl. der Indikationen bei nichdiabetischen Erkrankungen.** Leipzig: G. Thieme. 99 pp. M. 4.80.

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GUINIER, HENRI: **Essai d'histoire thérapeutique du mercure.** Paris: Arnette. 56 pp F. 6.

LIPOWSKI, ISRAEL: **Moderne Pharmakotherapie. Grundzüge d. klin. Arzneimittellehre.** Dresden: Th. Steinkopff. 166 pp. M. 8.50; bound, M. 10.

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MAGNUS, R.: **Lane Lectures on Experimental Pharmacology and Medicine.** London: Oxford Univ. Press.

MONESTIER, JEAN: **L'intradermoréaction au ferricyanure de potassium dans les ictères.** Paris: Arnette. 40 pp. F. 5.

MUNCH, JAMES C.: **Bioassays: A Handbook of Quantitative Pharmacology.** Baltimore: Williams & Wilkins Co. 958 pp. Cloth, $10.

NISSANIAN, M.: **Syphilithèrapie par le bismuth-calomel.** Pairs: M. Vigné. 60 pp. F. 6.

Pharmakologie der Haut. Arzneimittel. Allegemeine Therapie. Edited by A PERUTZ, C. SIEBERT AND R. WINTERNITZ. Band V of "Handbuch der Haut- und Geschlechtskrankheiten." Berlin: Hirschwaldsche Buchhandlung. 798 pp. M. 110, bound, 118.

TIFFENEAU: **Abrégé de pharmacologie.** Paris: Vigor frères. 168 pp. F. 25.

12—FOODS

F. C. BLANCK AND H. A. LEPPER

Advances in food chemistry in Czechoslovakia. FRANTIŠEK HRUŠKA. *Chem. Obzor* **5**, 224–9(1930). F. KUČERA

The microchemical determination of crude fiber. TH. VON FELLENBERG. *Mitt. Lebensm. Hyg.* **21**, 385–90(1930).—From 0.01 to 0.5 g. of the material is boiled with 10 cc. of a reagent consisting of glacial AcOH 8, HNO_3 (sp. gr. 1.4) 1 and H_2O 2 vols., filtered and washed with EtOH and Et_2O to remove fat, and the raw fiber remaining is oxidized with H_2CrO_4. Then 1 cc. 0.1 *N* $K_2Cr_2O_7$ is equiv. to 0.675 g. cellulose. F. L. S.-J.

The determination of ash in grain products. TH. VON FELLENBERG. *Mitt. Lebensm. Hyg.* **21**, 376–84(1930).—Simple ashing gives low results on materials with an acid ash, such as grain products. The addn. of a few cc. of 0.1 *N* NaOH before ashing, soln. of the weighed ash in 0.1 *N* HCl and back titration give correct results. The use of Mg acetate or $La(NO_3)_3$ gives too low results. F. L. SEYMOUR-JONES

Treating grain for the destruction of injurious insects. LAUREL DUVAL. *Food Ind.* **2**, 541–4(1930).—Ethylene oxide-solid CO_2 mixts. proved to be uniformly successful in the destruction of grain-infesting insects, when used as a fumigant. The proportions recommended are 3 lb. of ethylene oxide to 30–5 lb. of solid CO_2 per 1000 bu. of grain to be treated. Closed bins or tanks contg the grain, either closed or open top, were equally well fumigated. C. R. FELLERS

Colorimetric microreactions of glutenogenous proteins and of cellulose-like gels of wheat grains. PAUL BRUÈRE. *Compt. rend.* **191**, 792–4(1930).—By use of a soln. of 0.01 g. of *bromocresol purple*, *bromocresol green* or *phenosafranine* in 20 cc. 60% alc., a cross section of wheat grain is stained blue, purple or green at the site of glutenogenous proteides and brilliant rose or orange at the site of cellulose-like gels. Amylaceous pentosan gels and lipoids are not stained. T. H. RIDER

Influence of fertilization on the baking quality of bread cereals. M. P. NEUMANN AND O. NOLTE *Mitt. deut. landw. Ges.* **44**, 447–9(1929).—Wheat grown with complete fertilizers produces the same loaf vol. as that from unfertilized soil, but this figure decreases when unbalanced fertilizers are used. B. C. A.

The temperature effect on the solubilities of nickel, tin, copper, steel (chromium) and zinc in raw cow milk. G. N. QUAM. *Proc. Iowa Acad. Sci.* **36**, 261–2(1929); cf. *C. A.* **23**, 4277.—The soly curves for Ni, Cu and Zn show a max. within a range of 75° to 85°. Sn shows an accumulation of sturdy corrosion product above 75°, while the Cr steel (Super-ascoloy) shows no apparent change. W. G. GAESSLER

Acid-proteolytic bacteria in pasteurized milk. CONSTANTINO GORINI. *Compt. rend.* **191**, 885–6(1930).—The thermophylic, acid-proteolytic bacilli of the subtilis group are among the most harmful to the preservation of pasteurized milk The preservation of milk after pasteurization depends more upon the no. of bacteria which have resisted the heat treatment than upon the types present. T. H. RIDER

Semi-micro methods for the analysis of condensed milk. E. ELSER. *Mitt. Lebensm. Hyg.* **21**, 314–20(1930).—About 8–9 g. of condensed milk is dild. to 200 cc. with water. For total solids 20 cc. is evapd. with pumice on the steam bath, then at 100° *in vacuo* for 2 hrs. For sugars the proteins in 50 cc. are pptd. with $CuSO_4$ soln., and 20 cc of the filtrate is taken for lactose and similarly for sucrose. Total protein and albumin-globulin are detd. by the micro-Kjeldahl method. Fat is estd. in 11 cc. with the Gerber butyrometer. Cl is detd. by treating 20 cc. with concd. HNO_3 and 0.02 *N* $AgNO_3$, destroying proteins with perhydrol and titrating back with 0.02 *N* KCNS. Ash is detd. on the undiluted product, which is dried first at 70° and then at 120° *in vacuo* before ashing. The ash is dissolved in HNO_3 and used for detn. of Ca, K, Fe and P_2O_5. F. L. SEYMOUR-JONES

A simple and accurate method for the identification of added fats in milk or butter. S. CAMILLA. *Ann. chim. applicata* **20**, 527–34(1930).—See *C. A.* **24**, 4339. A. W. C.

The year's research record. A. C. DAHLBERG. *Ice Cream Trade J.* **26**, No. 10, 35–8(1930).—D. reviews the progress of research in the *dairy industry* during the previous 12 months. A. H. JOHNSON

Frozen sweet cream as an ingredient of ice cream. M. J. MACK. Mass. Agr. Expt. Sta., *Bull.* **268**, 184–93(1930).—The storage of frozen cream contg. 10% sugar is a satisfactory method of preserving surplus cream for later use in ice cream. Its quality depends upon the initial quality and the length and temp. of storage. Holding periods of less than 6 months at below —18° are recommended. The frozen creams lose a part of their whipping properties, require a longer time in the freezer to reach a definite overrun,

and show a lower max. overrun than sweet creams. Frozen cream mixes were higher in viscosity than sweet cream mixes; the fat globules are larger and more irregularly shaped. Homogenization of frozen cream did not improve its properties for ice cream making. The addn. of gelatin did not greatly improve the whipping properties of frozen cream. C. R. FELLERS

The advantages of direct expansion. N. E. OLSON. *Ice Cream Trade J.* **26**, No. 11, 60–2(1930).—The advantages of using the direct expansion system for freezing ice cream mixes are reviewed. The effects of various constituents of the mix on the properties of the whipped and frozen mix are given. A. H. JOHNSON

Packaged ice cream. K. E. WRIGHT. Mass. Agr. Expt. Sta., *Bull.* **269**, 196–206 (1930).—Lack of popularity of factory-packaged ice cream is attributed to lighter wt. and poorer texture. The light wt. may be compensated for by drawing the mix at an overrun of about 50% and also by increasing the fat content of the mix. The texture of packaged ice cream is detd. largely by the temp. of the semi-frozen product at the beginning of the hardening process, the rate of freezing either in the freezer or in the hardening room being of little significance. Texture improvement by the addn. of gelatin and by aging was the result of aging the gelatin. Because of the low overrun required in packaged goods, the overrun of easily whipped mixes must be retarded to permit drawing the mix at the proper consistency. The substitution of butter for a part of the cream was the most practical effective means of obtaining a low const. overrun. C. R. F.

The effect of high temperatures in the processing of the mix. C. D. DAHLE AND G. S. BARNHART. *Ice Cream Trade J.* **26**, No. 11, 41–3(1930); cf. *C. A.* **24**, 3063.—Processing the ice cream mix at temps. of 170° and 180°F. decreases the degree of fat clumping, reduces viscosity and freezing time and increases protein stability. The difference obtained between the temps. of 170° and 180°F. is not sufficiently great to warrant using temp. much in excess of 170°F. The greatest benefits to be had in using the high temp. result when the mix is both pasteurized and homogenized at the high temp. Lowering the temp. of the mix from 170° or 180°F. to 150°F. for homogenizing vitiates some of the advantages obtained, particularly when mixes heated to 180°F. are cooled to a temp. of 150°F. for homogenizing. The high temp. at which the mix is pasteurized has more effect on viscosity, overrun and protein stability than high homogenization temp., while high homogenization temp. has a greater effect on fat clumping than high pasteurization temp. A. H. JOHNSON

Manufacture of margarine. AAGE W. OWE. *Tek. Ukeblad* **76**, 123–7, 135–40 (1929).—An illustrated review. C. A. ROBAK

The methylene blue reductase test. Its underlying principles and a consideration of its value compared with other methods of grading milk for cheese manufacture. H. R. WHITEHEAD. *New Zealand J. Sci. Tech.* **12**, 100–7(1930).—Both the reductase test and direct microscopic count can give valuable service in improving milk supplies and consequently the quality of the resulting cheese. H. W. LEAHY

Water content of cheese. K. TEICHERT AND H. SCHLAG. *Milchwirtschaft. Forsch* **7**, 259–70(1929).—Av. values for cheese contg. 40–50 (or 20–30)% of fat are: Emmental 35, Dutch 43 (50), Tilsit 43 (52), Limburg 50 (60), Camembert 55 (62). In young cheese higher values are permissible. B. C. A.

A spectrophotometric study of the color of meats. A. A. BENEDICT. *Proc Iowa Acad. Sci.* **36**, 301–2(1929).—The rapid change in the color of meat when exposed to the air has made it very difficult to make accurate comparisons of the colors of different samples. During this investigation it was found that this change could be prevented by placing the sample of meat between glass plates immediately after cutting. A comparison of the intensity of the light diffusely reflected from various cuts of meat was made by means of a spectrophotometer in the spectral region between 500 mμ and 700 mμ. At the present time the most common method of measuring the color of meats consists in a comparison of the surface with a Munsell Color Disc. This method is considered quite satisfactory by some authorities, but its reliability is seriously questioned by others. A spectrophotometric study of the Munsell Color Disc set for different cuts of meat shows that it does not give a true indication of the spectral color of the meat W. G. GAESSLER

Occurrence and distribution of iodine in fish and fish products. GULBRAND LUNDE. *Tek. Ukeblad* **75**, 201–3, 214–6(1928).—See *C. A.* **22**, 2531. C. A. R.

Iodine content of shrimp waste. HAYWOOD PARKER, JR. AND FRANK C. VILBRANDT *J. Am. Chem. Soc.* **53**, 633–5(1931).—The wastes of shrimp fisheries showed an I content of 16.9 parts per million (dry basis); EtOH extn. indicated 44.14% org. + inorg. I. Et_2O extn. indicated 55.86% lipoid I. No thyroxine could be detected in the ext. of shrimp waste when tested by the Kendall method. C. J. WEST

Preserving fruits by freezing. I. Peaches. J. G. Woodroof. Ga. Agr. Expt. Sta., *Bull.* **163**, 3–46(1930).—Exptl. and com. methods of freezing peaches are described. When peach tissue is heated to 60–70°, more darkening occurs than at higher or lower temps. The temp. of the lye bath is more important in discoloration than the concn. of the lye. Optimum conditions for lye-peeling peaches are: Immerse for 2 min. in 10% lye (NaOH) soln. at a temp. of 60°; wash in running water and pass through a 2% citric acid soln. to neutralize the excess of alkali and to retard browning. Peach tissue freezes at 2.06° and has an osmotic pressure and f. p. similar to those of 30% sucrose soln. A 30–35% sucrose sirup added at the rate of 1 part sirup to 3 parts of peach, produces the least change in frozen or thawed peach tissue. Peaches frozen in glass containers oxidized more rapidly than those in paper or Sn containers because of the presence of air plus light. Vacuum packing greatly reduced oxidation and discoloration of the fruit. Of the substances used to prevent discoloration, 2% citric acid, 2% NaCl, 4% H_3PO_3 and 2% H_2SO_3 gave the most promising results. When air comes in contact with peach tissue, O_2 is activated through the agency of peroxidase, probably by the formation of an org. peroxide, and this in turn oxidizes the chromogen, a substance of tannoid nature; the latter, upon oxidation, gives rise to the brown pigment. **II. Figs.** J. G. Woodroof and J. E. Bailey. *Bull.* **164**, 3–11(1930).—Color, taste and texture are not affected by exposing peeled figs to the air for an hr. or more. As in freezing peaches, a 35% sugar sirup gave the best results. Fresh figs contain H_2O 70–86, sugar 10–20, acid 0.05–1.0, ash 0.4–0.5, and other org. matter 11–20%. Figs cannot be peeled by the use of lye. A very low temp. destroys the red pigment in the seed cavity. More satisfactory results were obtained at 18°, or even higher, than at lower temps. Fresh figs freeze at about —3.3°; when packed in a 35% sugar sirup the f. p. is lowered to —4.4°, and the mass remains in a solid frozen condition at —7.2°.

C. R. Fellers

California progresses in preserving citrus juice. M. A. Joslyn and George L. March. *Food Ind.* **3**, 71–3(1931).—Valencia oranges have a better sugar-to-acid ratio than navel oranges for juice purposes. To avoid inclusion of the strong oil and bitter flavor of the peel, revolving cone extractors are preferred. After screening to remove the coarser pieces of pulp, the juice is either vacuum concd. or quickly frozen, the latter method being considered the more successful. Citrus juices may be preserved by heating to 180°F. The principal cause of deterioration of frozen citrus juices is air oxidation.

C. R. Fellers

Tomato-juice manufacture. R. H. Winters. *Glass Packer* **4**, 69–71(1931).—Cold pulping is especially harmful, because it introduces O into the product and thus destroys a part of the vitamin C. Loss of vitamin C is minimized by hot pulping. Homogenization of the juice gives uniformity of texture and helps to prevent sepn. Cu, brass, bronze, galvanized and Fe equipment imparts a distinct metallic taste to tomato juice. Sterilization at 180°F. is recommended.

C. R. Fellers

Behavior of natural and artificial fruit essences towards sodium *p*-toluenesulfonchloroamide (Heyden Chloramine). A. Miermeister. *Z. Untersuch. Lebensm.* **59**, 585–94(1930).—One cc. of essence, 20 cc. of H_2O, 50 cc. of a 0.01 *N* soln. of chloramine-T reagent (*C. A.* **24**, 430) and 0.5 cc. of AcOH are kept for 4 hrs. in diffused daylight, KI and dil. H_2SO_4 are added, and the I is titrated with 0.01 *N* $Na_2S_2O_3$ soln. and starch indicator (*A*). Another 1-cc. portion is shaken with 100 cc. of H_2O and 80 cc. of Et_2O, the filtered ethereal ext. is evapd. at ordinary temp., the residue is dissolved in 2 cc. of EtOH and 20 cc. of H_2O, and the chloramine value (*B*) is found as described, the blank given by the reagent being deducted. The values *A* were detd. for 22 natural and artificial essences, and with anise, vanilla, strawberry, raspberry and mandarin, the ratios of the values for the natural to those for the artificial products were 12.3:0.9; 24.7:38.9; 6.8:29.0; 1.8:17.0; and 10.0:35.2, resp. With volatile aromatic liquids the chloramine values of five 12-cc. fractions, distd. from 1 cc. of essence and 100 cc. of H_2O, were found. With essences of natural citrus fruits, apple, mandarin and orange, artificial apple, banana, pear, apricot, anise and mandarin essences, the sum of the chloramine values of the fractions equalled the direct value *A*, but in other cases *A* was the greater, the balance being accounted for by the chloramin value of the residue after distn. The difference between the values of *A* and *B* is, therefore, taken as the chloramine value of the nonvolatile reducing substances. The results indicate that cocoa, coffee, anise, vanilla, currant, strawberry, raspberry and artificial strawberry, gooseberry, raspberry and vanilla essences contain only a small proportion of steam-volatile matter. Further directions are given for treating various beverages contg. these essences. In general, the liquids should be filtered and CO_2 removed by tossing. The reagent, $CH_3C_6H_4SO_2NNaCl$, is obtained from *p*-toluenesulfonic chloride, a by-product of the manuf. of

saccharin, and is sold as a disinfectant under the names of aktivin, mianin, chlorazene or tolamine. It is also prepd. by sulfonation of toluene, treatment of the Na salt of the sulfonic acid with PCl_5, and conversion of the resulting sulfonic chloride into sulfonamide by means of NH_3. The action of a slight excess of an alk 1.5 *N* soln. of NaOCl then produces chloramine-T, which crystallizes from the liquor. Its solns. are clear and stable for approx. 1 month, but it is decompd. by acid or alk. hydrolysis into NaCl and O_2. C. R. FELLERS

The sulfuring of apricots. A. V. LYON. *J. Council Sci. and Ind. Research* **3**, 161–6(1930).—A report of expts in Australia seeking an improvement in the method of sulfuring apricots to avoid exceeding the overseas tolerance of 14 grains of SO_2 per lb. of dried fruit. An open system with small vents and consequently slow burning gave good results with SO_2 concns. on the fruit well below the tolerance limit. A closed system caused a still lower deposition of SO_2 but produced fruit of an unsatisfactory color. Deposition was not affected by light spraying with water, spraying with a 2.5% salt soln. or by a delay of 4.5 hrs. after cutting, prior to sulfuring. J. R. NELLER

Chemical study of cranberries. F. W MORSE. Mass Agr. Expt. Sta., *Bull.* **265**, 89–102(1930).—A study of the chem. changes occurring in cranberries while ripening on the vines was made during 2 seasons. Total sugar was found to increase rapidly as the berries ripen, while total acid remained nearly unchanged. Cranberries do not acquire their max. proportion of sugar until fully ripe on the vines. Studies of cranberries in cold storage covered 2 seasons and showed that they steadily lose sugar by respiration. The total acid decreases also, but at a smaller rate. While cranberries remain sound, they contain enough acid to maintain their tart flavor 116 different lots of cranberries representing 61 distinct varieties were analyzed for total acid, total sugar and dry matter. The range in percentages of total acid was from 1.87 to 2.71 and in total sugar from 2.45 to 5.66. Thirty-five samples contained more than 4.5% sugar, 49 were between 3.5 and 4.5%, while 32 lots were under 3 5% sugar. The samples lowest in sugar were, as a rule, only partly ripe when harvested. C R. FELLERS

Increasing the color of cranberries after removal from the vines. BONNIE R FUDGE. N. J. Agr. Expts. Sta., *Bull.* 504, 3 24(1930).—Ethylene produced no effect upon the red pigment anthocyanin, but it did destroy the chlorophyll in the berries. The amt. of chlorophyll in cranberries is so small, however, that the effect of the C_2H_4 is scarcely noticeable and would not increase the market value of the berries. Chem. analyses of the sugars and acids in the berries gave no results which could warrant the com. use of C_2H_4. The effects upon respiration of the same concn. of C_2H_4 at different temps. and the effects of different concns. at the same temp. were small. C_2H_4 was most effective at the highest temp. Temp. was found under all conditions to be considerably more effective than C_2H_4 in increasing the respiration of cranberries. Bibliography. C. R. FELLERS

Pickling green olives. W. V. CRUESS. Calif. Agr. Expt. Sta., *Bull.* 498, 3–42 (1930).—The com. and exptl. pickling processes for green olives are described. The optimum NaOH concn. was 1.7–2.0% for Manzanillo, Mission, Barouni and Ascelano varieties and 1.6% for the Sevillano variety. The best depth of lye penetration was $^1/_8$–$^1/_4$ the distance to the pit for most varieties. From 5 to 6 hrs. in the lye gave sufficient penetration in most cases. Approx. 30 hrs. was required to leach out the NaOH with frequently changed water. The color formed by undue exposure during washing was permanent and greatly decreased the com. value of the product. The initial brine concn. for Manzanillo, Mission and Barouni varieties was 11%, but for Sevillano and Ascolano olives, an initial concn. of 5% gradually increased after several days to 7–8%, prevented shrinking. Eleven % NaCl brine was lowered to approx. 7$^1/_2$% after fermentation. Small quantities of vinegar, AcOH or lactic acid, as well as the addn. of active "starter," hastened the fermentation. Small quantities of dextrose aided the fermentation and resulted in increased acidity. Exclusion of air from the fermenting olives is essential because of the acid destruction by *Oidia* and film yeasts. Glass jars proved to be suitable containers for packing the finished pickled green olives. Sn cans were suitable for a few months storage only; the olives from the Sn cans turned a greenish blue color on exposure to air. Prolonged storage in Sn cans resulted in the formation of swelled cans because of H gas. The H resulted from the action of the brine on the Sn plate of the can. The oil content of Calif. green olives compares favorably with that of imported green olives, the av. being 15.98% for Manzanillo Calif. olives and 14.28% for the imported Manzanillos. C. R. FELLERS

The function of mannitol in the olive. R. NUCCORINI. *Ann. chim. applicata* 20, 535–46(1930); cf. *C. A.* 24, 3260.—The amt. of mannitol occurring in the olive tree varies from 6.11% in January to 2.19% in June and then gradually increases to 4.76%

in December. The glucose content shows a similar fluctuation, *i. e.*, from 1.46 to 0.04, then back to 0.20%; fructose and oleanolic acid show the reverse, fructose increasing from 0.46 to 1.29%, then down to 0.42, and oleanolic acid, from 0.91 to 3.71% and then down to 1.85%. N. assumes that the mannitol results from the reduction of fructose and aids in the formation of oleanolic acid, from which, in turn, the glycerides are derived. A. W. CONTIERI

Methods for determining the jellification power of pectin. A. MEHLITZ. *Konserven-Ind.* **17**, 624-6, 640-5, 654-7, 671-3(1930).—Methods of detg. the jelly strength and percentage pectin are described. The AgI method of Zeisel as described by Griebel and Weiss (*C. A.* **23**, 1680) yielded results agreeing within 3.4%. The von Fellenberg method of forming CH_3OH from pectin by the action of alkali and estn. of the CH_3OH by the colorimetric method of Denigé yielded results agreeing within 3.5% when a Duboscq colorimeter was used and 5.5% with a set of color standards. The jelly strength was detd. by the wt. of Hg necessary to break the surface of the jelly. An agreement between CH_3OH content and the jelly strength of the liquids was observed. F. P. GRIFFITHS

The inversion of sugar in the preparation of fruit preserves. S. BERLINGOZZI AND M. LIQUORI. *Ann. chim. applicata* **20**, 501-21(1930).—The conditions under which sugar contained in preserves, marmalades, etc., will crystallize out and cause "graininess" have been studied. No sugar sepd. where the proportion of invert sugar was between the limits 20 and 75%. The greatest amt. of sepn. was noted in samples contg. over 90% invert sugar. The presence of pectin greatly retarded the rate of inversion, providing the preserves were not held at temps. of over 107° for prolonged periods (60–90 min.). The percentage of inverted sugar present can be detd. roughly by the use of the polariscope. A soln. contg. 15% sugar (detd. with a refractometer) is used. The curve showing the relation of the *n* to percentage invert sugar is detd. with solns. of known compn. A. W. CONTIERI

The determination of the water content of marmalades, jams, jellies, fruit, apple and beet pulp. G. BENZ. *Konserven-Ind.* **17**, 717–9(1930).—The direct distn. of the water from a 20-g. sample with $CHCl_2{\cdot}CHCl_2$ as the refluxing liquid yielded results agreeing closely with those obtained by drying to const. wt. The method is similar to that of Bidwell and Sterling (*C. A.* **19**, 620), but the app. is modified to enable the use of a liquid heavier than water. F. P. GRIFFITHS

Cotton oils used for food. A. PERDRIGEAT. *J. pharm. chim.* [8], **12**, 307–12 (1930).—Com. French oils for some time have shown a deviation at 22° of +13° to +14° in the Jean and Amagat oleorefractometer as against +17° to +23° heretofore observed, while other consts. have remained practically the same The principal cause is a difference of origin, the oil being now imported from Egypt, formerly from Texas, U. S. A. S. WALDBOTT

Introducing the "plumit." LOWELL B. KILGORE. *Glass Packer* **2**, 65–7, 90 (1931).—A description is given of a simplified method of *measuring the gel structure* of a stiff emulsion such as mayonnaise. A graduated scale on the instrument enables readings to be taken directly as soon as the "plumit" has been dropped 1 ft. into an 8 oz. jar of the emulsion. C. R. FELLERS

Temperature control is a factor in mayonnaise manufacture. D. M. GRAY AND C. E. MAIER. *Glass Packer* **4**, 23-5, 40(1931).—Optimum consistency was obtained by emulsification at 60–70°F. In general, the lower the temp., the higher the consistency, but cold-emulsified mayonnaise lost its initial high consistency more rapidly. C. R. FELLERS

Rancidity of mayonnaise. BENJAMIN R. HARRIS AND ALBERT K. EPSTEIN. *Glass Packer* **3**, 543-6(1930).—The incorporation of an inert gas such as N or CO_2 instead of air is suggested. Four samples of mayonnaise showed variations in air content of 7.5-15.5 cc. per 100 g. The use of inert gases greatly delayed rancidity changes during storage. Egg yolk also had a protective action in preventing rancidity of the oils. The addn. of the unsaponifiable residue of corn oil to cottonseed oil greatly increased the resistance of the latter to rancidity. C. R. FELLERS

Improving cacao beans by extraction. GEORGE DEFREN. *Food Ind.* **2**, 499–502 (1930); cf. *C. A.* **24**, 5082.—A method of extn. in a continuous diffusion type of app. is described. The sol. constituents of the cacao bean are thus extd., the oil remaining in the ground residue. The cacao butter in liquor made from Accra beans, was increased by this process from 54.5 to 65%. Applications of the method are outlined. C. R. FELLERS

Analysis of chocolates. I. Determination of the constituents of pure chocolates composed solely of cacao, sugar and cacao butter. R. LECOQ. *J. pharm. chim.* [8], **12**,

101–9(1930); cf. *C. A.* **25**, 153; Bordas and Touplain, *C. A.* **3**, 811.—In 5 tables, complete analytical figures are given of pure chocolates without or with added sugar or added cacao butter, as a useful guide for the analyst. **II. Other additions to chocolates.** *Ibid* 149–59.—Further analytical data are recorded for chocolates contg. abnormal quantities of shells and germs, or added gluten flour and starch for diabetics, or added coffee, or nuts (hazel nuts, almonds, etc.), finally for milk chocolates. With the latter, detn. of casein permits calcn. of the quantity of dried milk used. With chocolates contg. hazel nuts only, or almonds only, the quantities of the nuts added may be calcd. from the I no. of the extd. fat; if mixed nuts are used, detn. of their quantity by the I no. becomes impossible. Addn. of oils or foreign butters and fats may be recognized by means of their chem. and optical consts. (Table V) detd. in the fat extd. from the chocolates. S. WALDBOTT

New processes for liquid coffee. G. L. WENDT. *Glass Packer* **3**, 581–4, 601 (1930).—Cereal taste in coffee is due to sugars and starches which are extd. from the bean and which are caramelized when the ext. is evapd. This caramel flavor is noticeable in powd. coffees but is avoided in liquid coffees when properly made. Spoilage of coffee is due to 2 factors (1) fermentation of the sugars, which is the least serious, and (2) the oxidation and rancidity of the fats which are present in the kernel of the bean and which are extd. by hot water. It is the fat in coffee which causes the stickiness of coffee grounds and the need of frequent thorough cleaning of urns and percolators. Because of the tannic acid present, only glass-lined or special inert alloy equipment can be used in the manuf. of liquid coffee. Great care is necessary in blending coffees of varying character to secure a uniform and pleasing blend. C. R. FELLERS

Preventing beverage spoilage by pre-fermentation. WILLIAM OWEN. *Food Ind.* **3**, 65–6(1931); cf. *C. A.* **24**, 171.—Pre-fermentation with yeasts, followed by filtration through Seitz filters, is recommended as a means of preserving various beverages from subsequent fermentation. It may be possible to replace chem. preservatives by pre-fermentation. Only occasional yeasts are found which do not produce unpleasant flavor changes. It is believed the yeast consumes the small amt. of N present in the beverage. C. R. FELLERS

Vanilla and vanillin during the last decade. G. MALCOLM DYSON. *Perfumery Essential Oil Record* **22**, 4–11(1931). E. H.

"Vanirom," a new substitute for vanillin in vanilla sugar, and its identification. J. J. J. DINGEMANS. *Chem. Weekblad* **27**, 694(1930).—This new substitute for vanillin is the ether of protocatechualdehyde; it is 4 times as strong as vanillin. To identify it, dissolve the residue of the ether extn. of 10 g. of the sugar in a little water, and to this add a few cc. of a satd. soln. of hydrazine sulfate; after a few min. add a few cc. of 4 *N* HCl. "Vanirom" produces a lemon-yellow ppt., while vanillin produces an orange-red one. Even in dil. soln. the color distinction is sharp. J. C. JURRJENS

Investigations on silage. I. The chemical composition of silage and its milk-producing value. H. ISACHSEN AND O. ULVESLI. *Meldinger Norges Landbruks-høiskole* **9**, Nos. 10–11, 573–625, English abstr., 625–8(1929); *Expt. Station Record* **62**, 802–3.—Of silage made from turnip tops, from sunflowers and from a mixt. of sunflowers, oats, tares and peas, the turnip-top silage had the largest protein content, the sunflower product the lowest. The nitrogenous constituents computed as crude protein had a variable compn., the NH_3 content ranging from 10 to 20%, the amino acids and peptones from 35 to 45%. The proportion of NH_3 was considered an index of the degree of decompn. of the protein content of the feed. The org. acids, especially butyric acid, were found in widely varying quantities. The greater part of the volatile org. acids disappeared in the drying of the samples. **II. A survey of the biochemical course of the process of ensilage.** S. HJORTH-HANSEN. *Ibid* 629–49, English abstr. 646–7.—The process of ensilage is considered to take place in two main stages. The first, or aerobic stage, which occurs while the plant mass contains air, is characterized by very active respiration and no formation of acids. The second, or anaerobic, stage is considered to take place in two periods, in the first of which org. acids, lactic acid especially, were found to be produced in quantities sufficient to give a H-ion concn. equiv. to p_H 3.7 to 4, the respiration in this first period of the second stage being described as "intramol." Atm. O having been entirely used up, O must be obtained from the carbohydrates, which are thereby converted into alc., acids of the formic acid series and lactic acid. The second period of the anaerobic stage is considered to begin when the acidity has reached that above stated. The enzymes are regarded as unable to work in so acid a medium, so that chem. and microbiol. processes accordingly cease. In 2 Norwegian silages examd. there were found formic, acetic, propionic, butyric and isovaleric acids, together with lactic acid. E. C. K.

Testing of Fingerling's method for siloing green forage plants. M. GERLACH. *Tierernähr.* **1**, 179–93(1930).—In Fingerling's method the chopped green material is tightly packed in the silo with the addn. of enough 0.6% HCl to cover it. The equiv. of 600 g. 100% HCl per 100 kg. green fodder is used. When the silo is full, the surface is covered with a layer of lubricating oil. Expts. were made on mustard, vetch and clovers. If the acid soln. is put in the silo first and the chopped forage added and pressed down, the acid is partly neutralized or adsorbed by the first material added, and extensive fermentation may take place in the upper layers, or throughout the greater part of the mass, with formation of acetic, lactic and butyric acids, and the mass will putrefy to such an extent as to become worthless. If the HCl soln. is sprinkled in gradually as the silo is filled, a little acetic, and sometimes lactic, fermentation occurs, but no butyric acid is formed. After several months the silage retains its structure and much of its green color, and the juice contains 0.4–0.56% free HCl and 0.2–0.4% AcOH. Almost no food value is lost. Under the same conditions it was found that 0.2% HCl would prevent butyric fermentation of green mustard but did not prevent putrefaction of serradella. The effect on the health of cows of feeding this acidified silage has not been detd.

L. E. GILSON

Comparison of roughages for finishing steers. D. S. BUCHANAN. Miss. Agr. Expt. Sta., *Bull.* **278**, 2–11(1930).—Corn, sorghum and sagrain silages and cottonseed meal were compared. Six yr. averages gave the following compn. of the feeds: cottonseed meal, ash 5.9, crude protein 42.07, fat 7.09, fiber 8.73 and N-free ext. 18.42%; corn silage, ash 1.48, crude protein 2.23, fat 0.85, fiber 7.11 and N-free ext. 15.54%; sorghum silage, ash 1.26, crude protein 1.15, fat 0.74, fiber 6.58 and N-free ext. 13.87%; sagrain silage, ash 2.17, crude protein 2.56, fat 1.05, fiber 8.06 and N-free ext. 18.96%. Exptl. feeding tests showed that 100 lb. of cottonseed hulls were equal to 189 lb. of corn silage, 272 lb. of sorghum silage or 249 lb. of sagrain silage. C. R. FELLERS

Botanical-chemical studies on the composition of hays of the Modena Province. ALDO FABBRI. *Ann. staz. sper. agraria. Modena.* [N. S.] **1**, 221–32(1930).—The botanical compn. is explained. The chem. compn. is: protein 7.64–14.70% (the max. content in the Leguminosae), cellulose 26.0–34.65 (the max. of cellulose corresponding to the min. of protein) and ash 7.22–10.20%. G. A. BRAVO

Determination of the digestibility of crude proteins by animal experiments and artificial methods. WERNER WÖHLBIER. *Tierernähr.* **1**, 426–48(1930).—The digestibility coeff. of the proteins in feeds, defined as the ratio of total protein in the feed eaten less protein in feces to total protein in the feed eaten, was detd. by feeding expts. with sheep. The values obtained were compared with the "solubility values," which was the proportion of the total protein dissolved when 2 g. of the feed was digested with 500 cc. of pepsin + HCl soln. by Stutzer's method. With feeds contg. over 60% crude protein (fish meals) the two values are practically identical. With feeds contg. 30–60% crude protein the two methods gave nearly the same values for seed meals, but the feeding method values were 5–7% lower for whale meal and dried milk. With seed meals contg. 16–29% protein the two methods agree within ±5%. With hays and vegetable feeds contg. less than 16% protein the two methods sometimes agree but more often differ so widely as to have no practical significance, the pepsin method usually giving a much higher value. L. E. GILSON

Proteins. II. Uniformity of the protein fraction extracted from orange-seed meal by salt solutions. FELIX SAUNDERS. *J. Am. Chem. Soc.* **53**, 696–700(1931).—The alkali halides in normal concn. all ext. the same amt. of N from orange-seed meal. There is no evidence for the existence of a lyotropic series in the extg. power of different salts on this meal. The protein isolated from the meal by extn. with different salts is probably the same in every case. C. J. WEST

Feeding experiments on milk cows with safflower cake. H. BÜNGER. *Tierernähr.* **1**, 408–20(1930).—The safflower, or bastard saffron, seed press cake used was similar to that described by F. Honcamp, *et al.* (*C. A.* **25**, 546). The inclusion of about 2 kg. in the daily ration of dairy cows caused a drop of 22–24% in the butter-fat content of the milk. Honcamp found a similar effect. No bad effect on the health of the cows was noticed. Cf. following abstract. L. E. GILSON

The effect of safflower cake on the quality of the milk and butter fat. A. MEETZ AND A. EICHSTÄDT. *Tierernähr.* **1**, 421–5(1930).—The chem. and phys. properties of the butter fat were not changed when safflower seed cake was fed to dairy cows as described in the preceding abstract. L. E. GILSON

Effect of [feeding with] lupine-fish meal on the quality of milk and butter fat. O. MROZEK, H. SCHLAG AND A. EICHSTÄDT. *Milchwirtschaft. Forsch.* **7**, 495–501(1929).—The proportion of large fat particles is reduced. The I value of the fat tends to rise and

the Polenske value to fall, while the sapon. and Reichert-Meissl values remain unchanged. B. C. A.

Investigation of poisoned barley from the United States. M. POPP AND J. CONTZEN. *Tierernähr.* **2**, 315–55(1930).—In the autumn of 1928 pigs fed with barley from the U. S. showed symptoms of illness not observed before. Upon examn. it was found that the grains were strongly attacked by microörganisms, among which *Gibberella saubinetti* (*Fusarium roseum*) was predominant. Pure cultures did not prove to be poisonous; normal barley could not be made poisonous by artificial means. Chem. analysis showed, in conformity with American reports, an alteration in the compn. of the grain, especially decompn. of proteins. Toxic albumins and similar toxic nitrogenous products had formed, causing the illness. Extn. with hot water removed part of the poisons, but it is not practical for large quantities. The infection of the barley took place during the growing period and especially in years following moist autumns, as the straw, often left to rot in the fields, forms, when putrifying, a favorable culture medium. German grain can be infected by the above-mentioned organism, but does not seem toxic.

J. C. JURRJENS

Feeding value of alfalfa hay treated with Ca arsenate (FREDERICK) **15.** Oil of Para chestnuts [as food] (CALLIER) **27.** A new apparatus for rapid determination of N in series by the Kjeldahl method (SCHARRER) **1.** Detection of fats by ultra-violet light (LENFELD) **27.** Determining the concentration of suspensions [milk] (Ger. pat 513,491) **13.** Sterilizing and pasteurizing liquids such as milk or beer (U. S. pat. 1,790,117) **13.** Apparatus for screening and filtering materials such as canning factory effluents (U. S pat. 1,789,425) **1.** Tubular heat-exchange apparatus suitable for heating or cooling milk or other liquids (U. S. pat. 1,790,015) **1.** Weighing dish (Ger. pat. 513,318) **1.** Caramel (Ger. pat. 511,112) **28.**

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SCHMORL, KARL: **Vom Getreidekorn zu Mehl und Backwaren. Moderne Nahrungsmittelchem. Betrachtgn. von Mehl und Teigzutaten.** Coburg and Leipzig: M Schäfer. 115 pp. M. 3.

SNODGRASS, KATHARINE: **Margarine as a Butter Substitute.** No. 4 of "Fats and Oils Studies." Stanford Univ.: Food Research Inst. 333 pp. Cloth, $3.

THIEME, PAUL: **Über Mutterkorn in Getreide, Mehl und Brot, seinen Nachweis und die Verhütung von Mutterkornvergiftungen.** Band 33, H. 1 of "Veroffentlichungen aus d. Gebiete d. Medizinalverwaltg." Berlin: R. Schoetz. 53 pp. M. 3.

Food. MASCHINENFABRIK BUCKAU R. WOLF A.-G. Ger. 498,557, July 16, 1927. App. for pulverizing, dehydrating and drying potatoes is described. The dehydration of the potato mash is carried out by a rotary suction cell filter, and the final drying by heating.

Desiccated foods. CALIFORNIA FRUIT GROWERS EXCHANGE. Ger. 511,994, Dec. 16, 1927. Fruit juices and milk are mixed, homogenized and desiccated by evapn.

Preserving milling produce. DONATH'S OBSTKELTERBI UND ÄLTESTE SÄCHSISCH. KELTERBI ALKOHOLFREIER NATURMOSTE GEBR. DONATH. Ger. 513,328, Jan. 17, 1929 Maize grits, bran and other milling produce are preserved by mixing them with concd. fruit juice, without addn. of sugar, and drying in the air. Juice of apples, grapes, or cherries is suitable, preferably fresh juice that has been concd. *in vacuo* at a temp. below 50°.

Working up lupines. GES. FÜR LUPINENINDUSTRIE M. B. H. Ger. 513,075, Feb 22, 1924. An albuminous product suitable as *food* or *fodder* is prepd. from lupines, particularly *Lupinus albus*, by shelling, removing fat and the poisonous and bitter constituents in known manner, grinding and then sifting. The coarse residue from the sifting may be mixed with the non-poisonous portion of the extd. substances to produce a fodder.

Grain meal. JOHANN EHRENZELLER. Ger. 512,549, Oct. 23, 1927. Flour and cereal grain generally, is sterilized, bleached and improved for baking purposes, by the

addn. of SiO_2 gel which contains amts. of NO_x, Cl, Br, etc., due to previous treatment with these gases.

Determining moisture in substances such as flour. H. C. FREEMAN. Brit. 335,308, July 17, 1929. A weighed quantity of the material to be tested is mixed with CaC_2 in a closed vessel, and the pressure of the gas produced from the mixt. is measured. App. is described.

Flour for baking. J. DAPPER. Brit. 335,214, June 19, 1929. For improving the baking properties of flour or dough, there are added small proportions of bromate and persulfate (such as those of K) together with an acid-neutralizing agent such as $CaCO_3$ or $MgCO_3$ or both, preferably in greater proportion.

Bread, etc. FRANZ LÖW. Ger. 511,105, Jan. 3, 1928. A two-stage baking process is described in which the loaves, etc., after being baked until the dough has risen, are kept in an atm. of water vapor and (or) alc. vapor at 15–25° before the baking is completed in the second stage.

Milk, cream, cheese, etc. AKT. GES. FÜR MEDIZINISCHE PRODUKTE. Fr. 691,752, May 31, 1929. Fatty food such as milk, cream or cheese is aromatized and preserved by the addn. of diketones in the keto or enol form, such as diacetyl. Instead of the diketones, compds. which form them such as 2,3-butyleneglycol or 2,3-butanol and an oxidizing agent such as H_2O_2 may be used.

Apparatus for testing milk for solid impurities. FERDINAND REX. Ger. 511,680, Sept. 16, 1928.

Apparatus for pasteurizing milk and other liquids. HALVOR HOLTE. Norw. 45,271, June 18, 1928.

Heat-exchange apparatus suitable for the treatment of milk. BERGEDORFER EISENWERK A.-G. Brit. 335,395, Oct. 19, 1928. Structural features.

Apparatus for heating solutions such as milk, whey or buttermilk to facilitate recovery of solids. GEORGE W. GANE. U. S. 1,789,738, Jan. 20. Structural features.

Whippable "artificial cream." A. BERGSVIK, VITACREAM, LTD., and R. HELLERUD. Brit 334,863, June 8, 1929. Earth-nut oil or fat hardened to a m. p. of 32° is injected (preferably under 180–200 atm. or higher pressure through an orifice of not over 0.4 mm. diam.) into milk to which egg yolk or water-sol. proteins from egg yolk have been added (preferably at a temp. of about 60–65°), and the product is subsequently heated to a pasteurizing temp. Various details and modifications of procedure are described Cf. *C. A.* **24**, 3290.

Treating fats or fatty mixtures for the production of margarine and similar products. L. NORENBERG and V. FAURSKOV. Norw. 45,491, Aug. 20, 1928. The material is introduced between cylinders rotating with a peripheral speed of not less than 30 m per min. and preferably between 50 and 200 m per min. In this way the material present in the space before the opening between the cylinders is brought into a strong whirling motion and in a thin layer is forced through the slit opening under high pressure.

Cheese. HEINRICH JENA and JOHANNA JENA NÉE GASSNER. Ger. 511,992, Dec. 4, 1928. The ripening of cheese is accelerated by adding crumbled matured cheese to the milk prior to curdling with rennet or acid.

Cheese. HEINRICH JENA and JOHANNA JENA NÉE GASSNER. Ger. 511,993, Mar. 28, 1929. A vitamin-rich cheese is prepd. by adding fruit juices, neutralized by alkali such as $NaHCO_3$, to the cheese mass during its prepn.

Forming pressed products from alimentary pastes. GIOVANNI CRESPI. U. S. 1,790,368, Jan. 27. App. is described.

Concentrating fruit juices such as grape juice. PAUL GARRETT. U. S. 1,790,140, Jan. 27. A juice sufficiently concd. to inhibit fermentation, although contg. organisms capable of effecting fermentation within 6 days when the concentrate is dild. with 3 times its quantity of water, is prepd. by passing juice, before substantial fermentation has taken place, through a zone where it is heated to about 35–38° and concg. by the action of a vacuum while the juice is in mist form and subjecting to recycling and continuation of concg. treatment until a concentrate is obtained of a d. above 60° Balling. App. is described.

Drying fruit juices. CONSERVENFABRIK UND TROCKNUNGSWERKE HESSENLAND G. M. B. H. Ger. 513,407, Nov. 2, 1926. About 1% of pectin (calcd. as dry substance) is added to the juices before evapn. A non-deliquescent product is so obtained. The method is particularly useful with spray-drying.

Pectin. ROGER PAUL and ROBERT H. GRANDSEIGNE. Ger. 513,275, Feb. 19, 1927. A pure white pectin is prepd. by treating a pectin soln. with acetone, pressing the resulting gel, treating the pressed product again with acetone, pressing again and drying at a low temp.

Pectin. A. F. BROOKE. Brit. 334,974, May 3, 1929. See Australia 19,871 (*C. A.* **24**, 3065).

Food product from honey. OTTO A. SIPPEL. Ger. 513,329, Nov. 15, 1928. Cryst. or granulated honey is ground and aerated at atm. temp. to produce a creamy product that can easily be spread. App. is shown.

Tea-drying apparatus [with endless conveyers for continuous operation]. F. KRUPP GRUSONWERK A.-G. Brit. 335.018, Oct. 1, 1928. Structural features.

Coffee substitute. RENÉ A. B. DE CHOISY. Fr. 692,163, Jan. 14, 1930. A substitute for coffee contains coffee 50, "pois chiche" 25 and chicory 25%.

Food for animals. "LA ZOOTECNICA" DI FORTI VIVANTI, E. ROTH. Fr. 691,668, Mar 10, 1930. A food for animals is made from a mixt. of lactic, proteolitic and saccharolitic enzymes in pure and living cultures in an appropriate vehicle such as milk. A sterilized soln. of NaCl or Na phosphate may be added.

Feeding stuff from seaweed. HANS LANDMARK. Norw. 45 745, Oct. 22, 1928. The seaweed is used as a feeding substratum for fungi, particularly blastomyces, by which a partial conversion of the nutrient substances is brought about with formation of aromatic substances desirable in the product to be used as a fodder.

Feeding stuff from cellulose. ALBERT HIORTH. Norw. 43,861, Dec. 31, 1928 Materials contg. cellulose are decomposed by treating with alkali and Cl by passing them first through the alkali-producing part of an app. for electrolysis of alkali chloride, and afterward though the Cl-producing part of the same app.

13—GENERAL INDUSTRIAL CHEMISTRY

HARLAN S. MINER

Progress in the fine chemical industry during 1930. R. R. BENNETT. *Ind. Chemist* **7**, No. 72, 7–8(1931). E. H.

1930 in the American chemical industry. WM. HAYNES. *Ind. Chemist* **7**, No. 72, 22–4(1931); cf. *C. A.* **24**, 1438. E. H.

Industrial research laboratories of the United States, including consulting research laboratories. CLARENCE J. WEST AND CALLIE HULL. *Bull. Natl. Research Council*, 4th Ed., No. **81**, 267 pp.(1931); cf. *C. A.* **24**, 4560. E. H.

The German chemical industry in the year 1930. WALTER ROTH. *Ind. Chemist* **7**, No. 72, 35–7(1931). E. H

The chemical industry of Austria in 1930. J. POLLAK. *Oesterr. Chem.-Ztg.* **34**, 1–2(1931). E. H.

Patents and secrets in chemical industry. C. P. CASPARI. *Teknisk Ukeblad* **76**, 524–5(1929).—A review. C. A. ROBAK

"Steam" distillation with alcohol vapor. E. WASER. *Mitt. Lebensm. Hyg.* **21**, 343–53(1930).—Spent H_2CrO_4 solns. from the production of synthetic camphor by oxidation of camphene to camphor contain small quantities of AcOH and other volatile acids which attack the Pb electrodes used in regenerating the H_2CrO_4 solns. In detg. these volatile acids, they are not completely removed by steam distn. but can be by distg. MeOH vapor through the soln. A small part of the MeOH is oxidized to H.COOH which is immediately esterified, while practically all of the volatile acids are esterified and distd. over. F. L. SEYMOUR-JONES

Thermotechnical measuring arrangement of a boiler house in the plan of an industrial power plant. A. GRUNWALD. *Die Wärme* **53**, 923–6(1930).—Control panels and control instruments (pyrometers, flow meters and flue-gas analyzers) are discussed in regard to their design, selection, installation and arrangement for a modern boiler plant. A. S. S.

Protecting workmen against dusts and gases. F. SCHOOPS. *Rev. hyg. méd. prév.* **52**, 909–12(1930).—The usual methods of dust removal, *i. e.*, filtration, agglomeration, aq. pptn. and elec. purification are discussed. There is great need for better protection of workers in France against dusts and noxious gases. C. R. FELLERS

What is the place of silicosis among diseases due to dust? D. GLIBERT. *Med. travail.* **1**, 51–62(1930); *U. S. Pub. Health Eng. Abstracts* **10**, IHS, 6(Dec. 6, 1930).—The course of dust-tuberculosis is traced as follows: Fine dust of SiO_2 in the lungs is slowly dissolved, whereupon it reacts with the tissues. The same result is obtained by injecting a suspension of SiO_2 intravenously. Macrophages which take up the particles of SiO_2 lose their vitality to colors. Such cells collect together and after a time the surrounding tissue becomes fibrosed. Varying with exposure to dust, this fibrosis requires

from 5 to 20 yrs. to develop. The dust cells collect to form pseudo-tubercles and at a later stage, tubercle bacilli center themselves. It is this later stage that lends seriousness to the silicosis question. Remedial measures are advocated. C. R. FELLERS

Notes on hydrogen sulfide poisoning. L. B. ALLYN. *Ind. Eng. Chem.* **23**, 234 (1931).—A case is described in which 2 persons were killed, practically instantaneously by H_2S from a discarded cylinder in a deep ravine on a hot, sultry day. I. H. O.

The Underwood typewriter and lead poisoning. LIPKOVICH. *Vestnik Sovreennoi Med.* (Moscow) July, 1929; summarized in *Bull. office intern. hyg. pub.* **22**, 166–7(1930); *U. S. Pub. Health Eng. Abstracts* **10**, IHS, 7(Dec. 6, 1930).—The cushion upon which the letter characters rest is Pb. The backstrokes of the type wear away the Pb and generate Pb dust. At Leningrad several large offices showed the presence of 0.15–0.19 mg. of Pb per cu. m. in the air at the level of the typist's mouth. Dust removed from beneath typewriters consisted of 57% Pb. When typists washed their hands in weak AcOH soln. 0.33–0.59 mg of Pb was recovered. Pb-poisoning symptoms were present to a greater extent in typists than in other workers. It is recommended that the Pb cushion on typewriters should be replaced by cork covered with velvet. C. R F.

Some notes on underground cables. E. S. SIMKINS. *Iron Steel Eng.* **8**, 32–4 (1931).—Three predominant kinds of insulating mate ials for underground cables are rubber, varnished cambric and paper. The max. allowable operating temps. for these are: rubber, $60° - E/4$; varnished cambric, $75° - E$; and paper, $90° - E$, where E = the kv. of the line. Knowledge of conditions is the key to the successful operation of cables Mech. and elec. properties of the cable must receive consideration. Protection of cables after installation is essential to their life. W. H. BOYNTON

Graphical treatment of the thermodynamics of the rectifying column (KEESOM) **2.**

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Treating gases with successive liquid sprays. CARRIER ENGINEERING CO., LTD. and C. L SAINTY. Brit. 335,241, June 18, 1929 Gas is treated with successive sprays of liquid so circulated by a pump at each stage that used liquid from a preceding stage forms at least a part of the spray for the succeeding stage, so that substances which are sol. or miscible with the liquid are removed from the gas in progressive increments (the spray in any stage being of less concn. than the body of liquid in that stage). An arrangement of app. and various details of operation are described. Cf. *C. A.* **24**, 532

Separating gases by liquefaction. GES. FUR LINDE'S EISMASCHINEN A.-G. Ger. 513,032, Apr. 20, 1929. Addn to 490,878 (*C. A.* **24**, 2214).

Extraction of constituents of liquid materials. E. LANGFELDT and R. HELLERUD Brit. 334,950, June 14, 1929. For dissolving constituents of emulsions, solns. or suspensions, solvent vapors are introduced into the liquid in finely distributed condition (suitably through porous or finely perforated walls) while the liquid treated is at a temp below the b. p. of the solvent so that the latter condenses as fine drops. Various details of operation are described.

Separating solids of different densities by gravity and use of air currents. H M. CHANCE. Brit. 334,877, May 7, 1929. App. and various details of operations are described for sepg. granular materials according to density.

Separating substances from solutions or suspensions. CHEMISCHE FABRIK UND SERUMINSTITUT "BRAM" G. M. B. H. (Bruno Böttcher, inventor). Ger. 514,168, June 22, 1926. See Brit. 272,968 (*C. A.* **22**, 1815).

Separating soluble substances. IMPERIAL CHEMICAL INDUSTRIES, LTD. Fr. 691,642, Mar. 10, 1930. Sol. substances are sepd. by crystallizing them from a common soln. and sepg. the crystals by sorting them according to their dimensions and according to their densities. The dimensions of the particles may be regulated by a granulation, by a colloid added to the soln. or by a rapid cooling.

Determining the concentration of suspensions. ALEXANDER SLAWINSKI. Ger

513,491, Aug. 5, 1928. Sediments of the suspension are formed in a horizontal and a vertical elec. cond. cell. The difference in cond. between the contents of the cells is then detd., and also the height of the sediment in the vertical cell. From these data the concn. of the suspension is calcd. Reference is made to the detn. of the concn. of blood and the investigation of milk. App. is shown.

Method and apparatus for mixing liquids and sludges, using compressed air. A. BORSIG G. M. B. H. (Theodor Steen, inventor). Ger 513,340, Mar. 29, 1928.

Treating pulverulent or finely granular materials with liquids. THEODOR KITTL. Ger. 514,092, July 15, 1927. See Austrian 114,604 (*C. A.* **24**, 903).

Effecting exothermic reactions such as calcium chloride production. I. G. FARBENIND. A.-G (Karl Staib, inventor). Ger. 513,361, July 11, 1926. See U. S. 1,764,582 (*C. A.* **24**, 4125).

Temperature control in exothermic chemical reactions. CHARLES R. DOWNS. U. S. 1,790,369, Jan. 27. For temp. control in effecting reactions in the liquid phase by removing heat from the liquid as latent heat of vaporization of a second liquid, the latter is distributed in a suitable container such as a connected tube system throughout the body of reacting liquid and moved in the body of reacting liquid. Various details of app. are described.

Effecting photochemical reactions. I. G. FARBENIND. A.-G. (Walter Frankenburger and Christian Steigerwald, inventors). Ger. 513,461, Nov. 21, 1926. Addn. to 458,756. According to Ger. 458,756, photochem. reactions in the gas or vapor phase are effected by mixing a metal vapor with the reagents and irradiating the mixt., *e. g.*, with a Hg-vapor lamp arranged concentrically in the reaction vessel. This method is now improved by carefully purifying the reagents. Thus, a mixt. of CO and H is passed over glowing Cu, washed with NaOH soln., dried, then passed over Hg at 60°, and finally irradiated as described above, with the result that 1% of the CO is converted into aldehydes instead of only a trace if the preliminary treatment is omitted. Cf. *C. A.* **24**, 1036.

Sterilizing liquids. GEORG A. KRAUSE. Fr. 690,713, Feb. 26, 1930. Liquids are sterilized by metallic salts in extremely low concns., *e. g.*, oligodynamic, sufficient time for the sterilization to take place being allowed. After the addn. of the salt the liquid is kept out of contact with any metal less noble than the metal of the sterilizing salt. Cf. *C. A.* **24**, 3580.

Sterilizing and pasteurizing liquids such as milk or beer. HENRI STASSANO. U. S. 1,790,117, Jan. 27. The liquid is caused to flow for a few sec. in the form of a substantially uniform layer about 0.8 mm. thick through a long path between surfaces of metal, such as Cu, which are maintained at a temp. of about 70–75° throughout substantially their entire extent. App. is described.

Use of vapors of mercury, sulfur, diphenyl oxide and like high-boiling substances for heating water-tube steam boilers. BABCOCK & WILCOX, LTD. Brit. 335,153, April 13, 1929. Various details of app. and operation are described.

Making colloidal dispersions. THE ANODE RUBBER CO., LTD. Ger. 511,154, Feb. 24, 1927. See Brit. 293,071 (*C. A.* **23**, 1453).

Emulsions. DEUTSCHE HYDRIERWERKE A.-G. (Richard Hueter, inventor). Ger. 512,979, June 29, 1928. Substances insol. or only partly sol. in water are emulsified by the agency of acid esters of polybasic org. acids and high mol. alcs., or their salts. Other agents may be mixed with the esters. The examples describe the emulsification of peanut oil, etc., by esters of adipic acid and oleic or sperm oil alcs.

Preserving granular substances containing unstable substances. ALFRED MENTZEL. Fr. 692,266, Mar. 19, 1930. Granular substances contg. easily decomposable, hygroscopic or volatile substances such as salt *fertilizers* are submitted to a surface treatment whereby the unstable substance is transformed, in the surface layer of each granule, into substances of a more stable nature. Thus, if NH_4HCO_3 is the substance to be preserved, the surface of the crystals is treated with a soln. of NaCl.

Use of bismuth as a gas-tight seal in spark-plug manufacture. DOWNS SCHAAF (to Stitt Ignition Co.). U. S. 1,790,445, Jan. 27. A Bi seal is used between the electrode and insulator.

Heat insulators. RENÉ MORITZ. Fr. 692,125, June 7, 1929. Agglomerates for heat insulators are made by submitting plastic $MgCO_3$ in dry powder, treated with asbestos or not, to pressure or ramming; a small quantity of water is added.

Heat-insulating material comprising superposed layers of threads of spun glass. FIRMA OSCAR GOSSLER. Ger. 511,455, Oct. 27, 1925. See U. S. 1,771,216 (*C. A.* **24**, 4563).

Heat-insulating materials. I. G. FARBENIND. A.-G. Fr. 691,008, Mar. 4, 1930.

Alkali silicates are heated, preferably in very concd. solns., in the presence of CO_2 or gaseous mixts. contg. it. In an example a temp. of 450° is reached.

Heat insulating for "chill rooms," etc. J. GARLAND. Brit. 334,884, June 10, 1929. A mixt. of cork, MgO and $MgCl_2$ soln. is applied and, after setting, is covered with a facing layer formed from wood flour, MgO and $MgCl_2$ soln.

Insulating material for refrigerators. HERMANN KOCH. Ger. 514,177, July 4, 1928. The material consists of a vulcanized mixt. of rubber and an insulating filler, *e. g.*, cork chips.

Cable insulation. HERCULES POWDER CO. Ger. 512,803, Mar. 29, 1929. The cables are soaked in an antioxygen prepn. consisting principally of pure abietic acid or resin and free from resenes. Hydrocarbon oils may be added.

Cable insulation. ELEKTRIZITÄTS A.-G. VORM. W. LAHMEYER & CO. Ger. 512,804, Aug. 10, 1928. Concentric ceramic insulators are sepd. by poured-in layers of phenol- or cresol-CH_2O condensation products.

Insulation for electric cables. W. S. SMITH, H. J. GARNETT and J. N. DEAN. Brit. 334,840, May 9, 1929. The conductor of a cable is provided with an insulation comprising a layer of thermoplastic insulating material such as gutta-percha, rubber or a rubber-bitumen mixt., treated to develop a cellular structure (as by inclusion of air or other gas under pressure followed by release of the pressure or by addn. of a substance such as NH_4 carbonate or bicarbonate which develops gas on heating). A sponge rubber tape may be wound around the conductor. A waterproofing layer such as gutta-percha is applied over the cellular layer, and a cable thus covered is stated to have a low electrostatic capacity. Various details and modifications of manuf. are described.

14—WATER, SEWAGE AND SANITATION

EDWARD BARTOW

The waters of Montecatini. Problems of chemical hydrology. RAFFAELLO NASINI. *Atti III congresso naz. chim. pura applicata* **1930**, 95–117.—Analyses and *radioactivity* are shown. E. M. SYMMES

The drinking water and sewerage project for Linares, Nuevo León. ALEJANDRO SAVA. *Ingeniería* **4**, 349–57(1930).—A complete project, with maps and drawings, is given. E. M. SYMMES

The East Hamburg water supply. W. HOLTHUSEN. *Gas u. Wasserfach* **73**, 1180–3 (1930).—A discussion of plants to supply Hamburg, and the territory east of it, with water. R. W. RYAN

The Nürnberg water supply. FR. KRAUSS. *Gas u. Wasserfach* **73**, 1156–9(1930).—Measures to increase water supply are discussed. R. W. RYAN

The Spa problem and the Czechoslovak Spas. A. KOLINSKY. *Trans. 1st Intern. Congr. Sanit. Tech. and Communal Hyg.; U. S. Pub. Health Eng. Abstracts* **10**, PHA, 16(Nov. 15, 1930).—Many of the largest and richest mineral springs of Europe are in Czechoslovakia, among them the famous Karlsbad Spa. The sanitary management of these State-controlled resorts is outlined. C. R. FELLERS

The new Venturi meter installations in the Munich water system. E. HENIE. *Gas u. Wasserfach* **73**, 1225–32(1930).—Venturi meters have been installed on the various water sources and overflows, and these permit a check on water consumption at any given time. New Venturi meters have been designed which operate on much lower head than those used heretofore. R. W. RYAN

Sanitation and improvement program of the Houston water supply. J. A. SAULS AND CLYDE R. HARVILL. *Proc. 12th Texas Water-Works Short School* **1930**, 21–4; *U. S. Pub. Health Eng. Abstracts* **10**, W, 141(Dec. 20, 1930).—When floods inundated the supply wells and reservoirs, emergency sterilization with liquid Cl and chloride of lime was resorted to. Duplicate chlorination equipment was installed throughout the system to provide against interruption of service. Cl dosage was checked every hr., the dosage varying from 1.45 to 3.25 lb. per million gal. The residual Cl was checked by the *o* tolidine test and varied from 0.2 to 0.25 p. p. m. C. R. FELLERS

Water works and sewerage activities in Ontario. A. E. BERRY. *Contract Record Eng. Rev.* **44**, 1633–7(1930); cf. *C. A.* **24**, 1689, 4344, 5906.—A review of works recently completed, in progress and projected in Ontario. At the close of 1930 there were 275 municipal water works systems in operation, capable of supplying in excess of 2,000,000 people. Practically all communities of 1000 or more population are now served by public systems. Surface sources provide water for 60% of the systems,

deep wells for 26% and springs for 14%. Over 80% of the water supplied is chlorinated and 35% is filtered. There are nearly 70 municipal sewage disposal plants, 25 of which are of the activated sludge type. Sludge digestion in heated separate tanks is practiced at 7 plants and glass-covered drying beds are employed at 10 plants. The trend in sewage disposal in the United States and Europe is reviewed briefly. R. E. T.

Report of the Sanitary Water Board (Pennsylvania). THEODORE B. APPEL, Harrisburg, Pamphlet 25 pp.(1929); *U. S. Pub. Health Eng. Abstracts* **10,** S, 119–20 (Dec. 27, 1930).—The waters of the state are classified in accordance with their present and probable future use and condition. Industrial wastes and stream pollution are considered in a general way. C. R. FELLERS

Iola filtration and water-softening plant. *Proc. 8th Ann. Water-Works School* (Univ. of Kansas) **1930,** 34–6; *U. S. Pub. Health Eng. Abstracts* **10,** W, 107(Oct. 18, 1930).—The new treatment plant will include rapid sand filters and a softening plant. A lime dry-feed machine and slaker and baffled mixing chamber are described. C. R. F.

Determining factors in municipal water softening with special reference to the water supplies of Kansas. H. B. CRANE. *Proc. 8th Ann. Water-Works School* (Univ. of Kansas) **1930,** 22–33; *U. S. Pub. Health Eng. Abstracts* **10,** W, 107(Oct. 18, 1930).—Most Kansas public water supplies contain over 200 p. p. m. of total hardness. The 3 methods used for water softening are lime-soda ash, zeolites and a combination of the soda lime and zeolite methods. Typical flow sheets and costs are given for each type of softening. C. R. FELLERS

Efficiency of chlorination at Chicago. H. H. GERSTEIN. *J. Am. Water Works Assoc.* **23,** 53–62(1931).—If there is strict supervision, the Great Lakes water of widely varying pollution may be treated by chlorination alone to produce a safe drinking supply according to U. S. Treasury standards. The data cover a five-year period. As pollution increases, however, it will be necessary to add filtratio to insure a safe supply. D. K. FRENCH

Unusual uses of chlorine in a water department. R. W. KEHN. *Proc. 8th Ann. Water-Works School* (Univ. of Kansas) **2,** 86–9; *U. S. Pub. Health Eng. Abstracts* **10,** W, 121(Oct. 25, 1930).—The use of Cl for the sterilization of new water mains, distribution tanks, gravel from polluted river beds used in the construction of wells and the disinfection of ground water supplies in times of flood is discussed. In some new water mains of Kansas, pollution was found even after 3–12 months; the av. time required for new installations to clear themselves was 6½ months. C. R. FELLERS

Application of geology to deep well water supplies. H. S. MCQUEEN. *5th Ann. Rept. Missouri Water and Sewerage Conf.* **1930,** 79–81; *U. S. Pub. Health Eng. Abstracts* **10,** W, 144(Dec. 27, 1930).—The application of geology to water supply problems, such as drilling conditions, has proved very useful. An example is given of the failure of wells at Mansfield, Missouri, being directly traceable to a fault in the sandstone. By relocating the wells, 1 mile distant, water conditions were entirely normal. C. R. F.

Chlorination an integral part of purification. H. W. STREETER, *et al. Water Works and Sewerage* **77,** No. 1, 6(1930); *U. S. Pub. Health Eng. Abstracts* **10,** W, 118 (Oct. 25, 1930).—Studies by the U. S. Pub. Health Service on over 30 representative plants demonstrated that chlorination must be regarded as more than a factor of safety, *i. e.*, an integral and essential part of filter plant operation. Without chlorination most raw waters cannot be made to produce effluents conforming to the Treasury standards. For river waters of the Ohio River type, the limiting raw water *B. coli* index corresponding to a standard quality of filter effluent without chlorination is about 60 per 100 cc. For Great Lakes waters, the max. is less than 10 per cc. Prechlorination is advocated with all heavily polluted raw waters. C. R. FELLERS

Supplying (drinking) water on Great Lakes freighters. ARTHUR E. GORMAN. Wallace and Tiernan Co., *Pamphlet* 17 pp.(1929); *U. S. Pub. Health Eng. Abstracts* **10,** W, 110(Oct. 18, 1930).—Small automatic chlorinators are recommended to replace the present distn. app. in common use on these vessels. The cost of chlorination equipment compares very favorably with that of the distn. method. C. R. FELLERS

Chlorination practices and policies. A. E. GORMAN. *Proc. 12th Texas Water-Works Short School* **1930,** 94–8; *U. S. Pub. Health Eng. Abstracts* **10,** W, 105(Oct. 18, 1930).—Approx. 82% of the water supplies in N. America is chlorinated, and is used by over 60 million people. G. favors splitting the Cl dosage at 2 or more progressive points in the treatment system when a heavily polluted water is being chlorinated. To prevent aftergrowths in the distribution system, prechlorination is recommended. The control of chlorination by maintaining 0.2 p. p. m. residual Cl and making frequent tests is urged. C. R. FELLERS

Benefits derived from prechlorination. JOHN J. QUINN. Wallace and Tiernan Co., *Tech. Pub.* No. 132, 14–8; *U. S. Pub. Health Eng. Abstracts* 10, W, 123(Nov. 29, 1930).—Following filter trouble at the Knoxville, Tenn., filter plant, a month's expt. with prechlorination resulted not only in definite improvement of the filters but also of the basin and the water. Prechlorination, especially in the summer, is strongly recommended. C. R. FELLERS

Prechlorination of water supplies. WELLINGTON DONALDSON. Wallace and Tiernan Co., *Tech. Pub.* No. 132, 3–13; *U. S. Pub. Health Eng. Abstracts* 10, W, 127(Nov. 29, 1930).—Prechlorination is defined as the routine application of Cl or NaOCl at any point ahead of the filters, and in doses not requiring the subsequent use of anti-chlor or dechlorination treatment. Prechlorination should be used whenever bacterial loading has reached a point where the usual processes of coagulation, settling, filtration and effluent chlorination do not suffice at all times to give an effluent of Treasury standard quality. Advantages of prechlorination are enumerated. A bibliography is appended. C. R. FELLERS

Recent improvements in dry chemical feeders and chlorinating equipment. R. C. CLEMENT AND E. P. JOHNSON. *Proc. 5th Ann. Conference on Water Purification*, W. Va. Univ. Eng. Expt. Sta., *Tech. Bull.* No. 3, 14–5(1930); *U. S. Pub. Health Eng. Abstracts* 10, W, 116(Oct. 25, 1930).—The advantages claimed for the new dry-feed machines are elimination of arching of the chemicals, high range of feed, low power consumption compactness and cleanliness. New direct-feed chlorinators and ammoniators are recent developments. C. R. FELLERS

Simple method of testing for residual chlorine. JANE H. RIDER. *Proc. 12th Texas Water-Works Short School* 1929, 118–9; *U. S Pub. Health Eng. Abstracts* 10, W, 128(Nov. 29, 1930).—White enameled cups may be painted to serve as inexpensive and accurate standards in the *o*-tolidine test for free Cl. The method is outlined. C. R. F.

Ozone and its applications. P. OTTO. *Bull. soc. franç. élec.* 9, 129(1929); *U. S. Pub. Health Eng. Abstracts* 10, W, 141(Dec. 20, 1930).—Industrial methods of ozone production and utilization are discussed. Ozone possesses several advantages over Cl in the sterilization of drinking water. Several installations are described. C. R. FELLERS

Concerning the control and the degree of reliability of the chlorinating process of purifying drinking water, especially in relation to the use of chloramine for this purpose and the chlorine process as applied to water containing ammonia in solution. II. K HOLWERDA. *Mededeel. Dienst Volksgezondheid Nederland.-Indië* 19, Pt. 2, 325–85 (1930); cf. *C. A.* 23, 1704.—In continuation H. studies the chem. action of hypochlorites on H_2O contg. NH_3 by varying the ratio of Cl_2:NH_3 at low concns. and at p_H 6.5–6.8. It is found that when the ratio is lower than 6.3:1 (mg. per l.) only NH_2Cl with traces of $NHCl_2$ and NCl_3 remains, but with higher ratios HClO is left besides increasing amounts of NCl_3 as the ratio increases. In the course of the work methods were devised for detg. NCl_3, $NHCl_2$, NH_2Cl and HClO in mixts. of all 4. A comparison was also made of the different methods of detg. active Cl. It was found that Mn and Fe do not seriously interfere with the *o*-tolidine test but that 2 mg. NO_2 per l. of H_2O will give a color comparable to 0.5 mg. Cl per l. after a 5-min. contact with *o*-tolidine. It is recommended that both *o*-tolidine and methyl orange be used to det. the active Cl. In relation to the disinfection of H_2O contg. NH_3 H. finds that in NH_3-free H_2O of p_H 6.8 the coli count is reduced from 310 to 0 in 1 min. when 0.1 mg. Cl per l. is added, but when 0.03 mg. NH_3 per l. is present the count is only reduced from 310 to 100 in 20 min. Further expts. showed that in the presence of NH_3 there was a marked disinfectant action due to NCl_3 and $NHCl_2$. H. concludes that the *o*-tolidine test does not always give a reliable figure on which conclusions may be based in regards to the reliability of chlorination. H. W. LEAHY

Increasing the bacterial efficiency of water-purification plants. H. W. STREETER. *Proc. 8th Ann. Water-Works School* (Univ. of Kansas) 1930, 37–44; *U. S. Pub. Health Eng. Abstracts* 10, W, 107(Oct. 18, 1930).—Methods of outstanding merit as detd. by the U. S. Pub. Health Service are double-stage coagulation-sedimentation and raw water chlorination. Each of these methods has given definite evidence of effecting a substantial and consistent increase in the efficiency of rapid sand water purification plants. However, the use of improved mixing and reaction devices for coagulation, the prolongation of sedimentation periods and the addn. of larger amts. of coagulants also afford possibilities for increasing bacterial efficiency. C. R. FELLERS

Use of activated carbon in water treatment. L. V. CARPENTER. *Proc. 5th Ann. Conference on Water Purification*, W. Va. Univ. Eng. Expt. Sta., *Tech. Bull.* No. 3, 25–34(1930); *U. S. Pub. Health Eng. Abstracts* 10, W, 116(Oct. 25, 1930).—Lab. expts. showed that activated C was very effective in removing excess Cl and phenols from

water. An economical means of revivifying the activated C is at present lacking. C. R. F.

Removal of iron from water supply, Punta Gorda, Florida. CHARLES K. DODD. *J. Am. Water Works Assoc.* 23, 77–80(1931).—The supply studied carried 19.6 p. p. m. Fe and Mg and was objectionable. The treatment included moderate aeration by splashing over broken terra cotta pipe followed by upward flow filtration through a 7 ft. gravel bed. Oxidation of the Fe is started during aeration and completed during the filtration. Too much aeration does not give satisfactory removal. D. K. F.

Control of filter growths by chlorination. E. E. SMITH. *Sewage Works J.* 3, 387–93(1930).—Cl was used successfully at the Elgin, Ill., treatment plant to eliminate a severe case of pooling. The efficacy of the Cl treatment was beautifully demonstrated by chlorinating only 1 of 2 identical filters; the other filter was used as a blank. E. H.

Research into the properties of the aërobe, the non-sporulating lactose-fermenting bacteria in feces and soil in the tropics and the importance thereof for the analysis of drinking water. K. HOLWERDA. *Mededeel. Dienst Volksgezondheid Nederland.-Indië* 19, Pt 2, 289–324(1930).—H. has made a survey of the types of coli-like bacteria in native feces and soil in the Dutch East Indies The organisms were isolated from feces by planting a fresh suspension on lactose-peptone-agar (contg. 0.5% Na taurocholate). The strains from soil were obtained by preliminary enrichment in lactose broth (sometimes contg. 0.5% Na taurocholate). Of 674 strains from feces, 24 were V.-P. + and 650 V.-P −. Of the 650 V.-P. − cultures only 1 was citrate +, while 649 were citrate −. From 953 soil cultures 672 were found to be V.-P. + and 279 V.-P. −. Of the latter 151 were citrate + and 128 citrate −. Contrary to other workers, H finds a higher per cent of aerogenes in habited soils than in soils from uninhabited places H. concludes that the quant. evaluation of the number of coli-like organisms together with the identification of the organisms should be considered in the bacterial analysis of H_2O H. W. LEAHY

Comparison of the Dominick-Lauter test for B. coli in water with that of "standard methods." Final report. HAROLD W. LEAHY, J. W. FREEMAN AND CHRIS P. KATSAMPES. *Am. J. Pub. Health* 21, 11–8(1931); cf *C. A.* 25, 368.—1116 samples of water from 358 different sources have been tested according to the procedure of "Standard Methods of Water Analysis" and compared with the new methylene blue bromocresol purple medium of Dominick and Lauter (cf. *C. A* 23, 4986). The % confirmation for the total no of tubes showing gas and the total no. of samples showing gas was much higher in both cases for the new medium than for the standard lactose broth. The % confirmation for the standard lactose tubes showing gas in 24 hrs. was higher than the % confirmation for the standard lactose broth tubes showing gas in 48 hrs., but the % confirmation with the Dominick-Lauter tubes showing gas in 24 and 48 hrs. was approx. the same in each case. The % confirmation for standard lactose broth increased as the amt. of pollution in the water being treated increased, whereas the % confirmation for the new medium remained approx. the same. Of the total no. of samples showing a pos. presumptive test 100% was confirmed for the new medium whereas only 68.7% was confirmed for the standard lactose broth. The new Dominick-Lauter medium was found to be far superior to standard lactose broth for the detection of *B. coli* in water. J. A. KENNEDY

A comparison of lactose broth and lactose bile as enrichment media for the detection of pollution in farm well waters. A. G. LOCHHEAD AND D. G. HEWER. *Can. Pub. Health J.* 22, 10–15(1931).—The results of comparative tests with lactose broth and lactose bile on 482 samples of farm well waters are tabulated. The lactose broth was prepd. in accordance with "Standard Methods," and the lactose bile medium contained 10 g. peptone, 10 g. lactose and 50 g. ox bile per l., Difco dehydrated products being employed throughout. Two 10-cc. portions, two 1-cc. portions and one 0.1-cc. portion of each sample were planted in each medium, the tubes being incubated at 37°. Pos. tests were confirmed by transfers to Levine's eosin methylene blue agar, 2 isolated colonies being transferred to agar slants, preference being given to those considered to be of fecal type. Cultures thus obtained were exaind. by the usual procedures. Gram-negative, non-liquefying, lactose-fermenting rods were considered members of the coli-aerogenes group, while those which, in addn., gave a pos. methyl red test and neg. Voges-Proskauer test and showed black, usually with a more or less pronounced metallic sheen, on eosin methylene blue agar were considered *B. coli*. The results after 24 and 48 hrs. incubation of the presumptive tubes are shown separately, distinction being also made between the formation of gas occupying more or less than 10% of the inverted vial. Of 2410 tubes of each medium inoculated, 1263 and 1199 tubes of lactose broth and lactose bile, resp., showed gas formation, coli-aerogenes

group organisms being isolated from 960 of the former and 962 of the latter and fecal type *B. coli* from 649 of the former and 782 of the latter. It is of interest to note that coli-aerogenes group organisms were isolated from 61 of 229 tubes of lactose broth showing less than 10% of gas in 48 hrs., and from 29 of 172 similar lactose bile tubes, the isolations of fecal *B. coli* from these tubes being 26 and 22, resp. These results indicate that there is no advantage in employing lactose bile if the presence of coli-aerogenes group organisms is regarded as the criterion of pollution, but that lactose bile is to be preferred if fecal type *B. coli* are regarded as the index of pollution. R. E. THOMPSON

Controlling algae growths at Winslow. R. C. CLINE AND D. E. LEWIS. Ariz. State Board of Health, *Bull.* No. 54, 28–31(1930); *U. S. Pub. Health Eng. Abstracts* 10, W, 144(Dec. 27, 1930).—Following a severe storm during which the city storage reservoir received much run-off water and debris, the domestic supply developed an offensive taste and odor. Algae were found in abundance in the supply. By completely draining the reservoir, washing it down with $CuSO_4$ and adding Cl and $CuSO_4$ to the intake, all objectionable tastes and odors were eliminated. C. R. FELLERS

Experience at Charleston (W. Va.) with odor and taste control. LAWSON HAYNES *Proc. 5th Ann. Conference on Water Purification*, W. Va. Univ. Eng. Expt. Sta., *Tech. Bull.* No. 3, 35–6(1930); *U. S. Pub. Health Eng. Abstracts* 10, W, 115(Oct. 25, 1930).—Phenol tastes caused much trouble in 1929–30 in the water supply. A 2% $KMnO_4$ soln. applied at rates of 0.12–0.18 p. p. m. caused some improvement. NH_3 applied at the rate of 0.18 p. p. m. and sufficient Cl to maintain a residual of 0.2–0.3 p. p. m. at the effluent end of the sedimentation basin, both applied to the raw water entering the basin, were entirely successful in removing a serious phenol taste. C. R. FELLERS

Proper filter operation and maintenance. HARRY E. JORDAN. *J. Am. Water Works Assoc.* 23, 103–4(1931).—A decalogue for filter plant operators through which perfect results should be obtained. D. K. FRENCH

Rapid sand filtration at Durban Municipal Water Works. A. W. RUSSELL. *S African Soc. Civil Eng.* 1929, 140; *U. S. Pub. Health Eng. Abstracts* 10, W, 129(Nov. 29, 1930).—A description is given of the rapid sand filtration plant installed at the Durban Municipal Water Works to deal with 10 million gal. of water per day, drawn from the Shongweri Reservoir. $Al_2(SO_4)_3$ soln. is fed to the raw water in measuring chambers at a rate of 0.25–4 grains per gal., for turbidities of 70–200 p. p. m., with a retention period of 90 min. in the sedimentation tanks. The removal of bacteria is 91% in coagulation, 8% in filtration and 1% in chlorination. Details are given of the filter beds, media and operation. Cl is admitted to the absorption tower at a pressure of 10 lb. per sq in., a dose of 0.25–0.5 p. p. m. being sufficient to leave the necessary excess for destruction of bacteria. A typical "draw-off analysis sheet" is given which shows that turbidity was reduced from 85 to 0.7, and solids in soln. from 38 to 0.7 p.p.m. C. R. FELLERS

Ferric coagulants. L. L. HEDGEPETH. *Proc. 8th Ann. Water-Works School* (Univ of Kansas) 1930, 47–50; *U. S. Pub. Health Eng. Abstracts* 10, W, 106(Oct. 18, 1930).—The method of oxidizing copperas ($FeSO_4$) with Cl is described. The principal objection to the use of ferric coagulants is the difficulty of keeping the residual Fe to the same or a lower point as with alum treatment. The liquid and solid ferric coagulants are compared with respect to ease of application and comparative costs. C. R. FELLERS

Cold-weather troubles in the operation of the water-purification plant, Lawrence, Kansas. C. T. HOUGH. *Proc. 8th Ann. Water-Works School* (Univ. of Kansas) 1930, 55–7; *U. S. Pub. Health Eng. Abstracts* 10, W, 114(Oct. 25, 1930).—Water softening and disinfection troubles are outlined. As a result of experience in operating the plant in cold weather H. concludes: Ample retention of water should be considered in the design of settling basins for the application of Cl and also for water-softening treatment for water at low temps. Better results are obtained by double chlorination or by the application of Cl prior to the application of lime The effectiveness of Cl depends upon the contact period as well as the p_H value of the water at low tmps. C. R. F.

Home-made alum at Kansas City, Kan., filter plant. L. B. MANGUN. *Proc 12th Texas Water-Works Short School* 1930, 87–93; *U. S. Pub. Health Eng. Abstracts* 10, W, 114(Oct. 25, 1930).—The prepn., properties and relative values of com. and home-made or Hoover solid alums for use as a water coagulant are discussed. For a 5-yr. period, the cost per ton averaged $24.85. C. R. FELLERS

Residual alum in North Carolina filtered waters. J. W. KELLOGG. *J. Am. Water Works Assoc.* 23, 92–102(1931).—The conditions that result in the retention of Al are outlined. Very complete tables show the Al content of N. C. supplies. The "jar test" is suggested for control labs. and detailed instructions for this test, as well as the Hatfield hematoxylin test for Al, are given. D. K. FRENCH

Determination of ammonia in water. M. W. E. EVERS. *Verslag Mededeel. Betreffende Volksgezondheid* **1930**, 1089–103; *U. S. Pub. Health Eng. Abstracts* **10**, W, 135(Dec. 13, 1930); cf. *C.A.* **24**, 5667.—Conclusions: If water contains less than 46 p. p. m. of HCO_3^-, it is necessary to add either Na_2CO_3, $MgCO_3$ or $CaCO_3$ for quant. distn. of all saline NH_3; if more than 46 p. p. m. is present, the detn. can be performed independently of Ca, Mg or Na. This is because $CaCO_3$ is formed during the distn. and if the water contains sufficient $Ca(HCO_3)_2$ then $CaCO_3$ must be added. Care should be taken that the $CaCO_3$ is free from CaO and NH_4 compds. C. R. FELLERS

Microdetermination of potassium in waters. H. GRIFFON AND MLLE. A. BERNARD. *J. pharm. chim.* [8], **12**, 118-24(1930).—The micro method used is that of Leulier, Velluz and Griffon (*C. A.* **22**, 4405; **24**, 3549). Results of the examn. of 24 samples of French waters, each in duplicate, or more, are tabulated. They agree well for each sample, but differ from other recorded results; *e. g.*, Barral (*C. A.* **24**, 907) found 2.15 mg. K per l.; an old record gives 1.64; G. and B. found 3.77 and 3.79 mg. S. WALDBOTT

The determination of manganese in potable waters. EDWARD BARTOW AND HARRIS THOMPSON. *Proc. Iowa Acad. Sci.* **36**, 245-50(1929).—Mn was detd. in 12 samples of water by the Na bismuthate, $(NH_4)_2S_2O_8$ and K periodate methods. The total Fe, chlorides and alky. to methyl orange were also detd. on these samples but no relationship was found between the presence of Mn and varying alkalinities, chlorides and Fe. The periodate method of analysis for Mn is fully as accurate as the 2 methods in general use at the present time. The new method is much shorter than the persulfate method because all chlorides are oxidized to Cl gas which is removed in evapn.; this the pptn. of chlorides by $AgNO_3$ is unnecessary. It is shorter than the Na bismuthate method because the excess of KIO_4 is colorless and sol. in the acid soln. and need not be removed before comparing with color standards. A true permanganate color was always obtained in the periodate oxidation. The cost of KIO_4 is small because only 0.3 g. is needed for each analysis. No special app. is necessary for its use except 50 cc. Nessler tubes for color comparisons. W. G. GAESSLER

Nitrate determinations in drinking water. K. SCHERINGA *Pharm. Weekblad* **67**, 1362-3(1930).—To a sample contg. approx. 0.1 mg. NO_3 add 1 cc. of 0.5% Na salicylate and evap. to dryness on the water bath. Cool, add 1 cc. of concd. H_2SO_4 and allow to stand 10 min. Rinse with H_2O into a colorimeter glass, add 10 cc. of NaOH or NH_4OH and compare with the standard. If much chloride is present multiply by the factor $100/(100 - 10a)$, in which a represents mg. Cl. A. W. DOX

Method for taking small samples of water for gas analyses. H. FORTNER AND H. KALMUS. *Intern. Rev ges. Hydrobiol. u. Hydrog.* **22**, 346(1929); *U. S Pub. Health Eng. Abstracts* **10**, W, 130(Nov. 29, 1930).—A description and diagrams are given of an app. for the removal of small quantities of water for the quant. estn. of the O_2 content by Risch's method. The app. consists of an evacuated glass tube, about 18 mm. internal diam. and 10 cm long, sealed off to a point at 1 end and drawn out to a narrow thick-walled capillary at the other. The sample is withdrawn by breaking off the end of the capillary under water and sealing it off again when the sample has been filled. The sample is emptied into the Risch app. by breaking off the end of the capillary, inserting the latter through the hole of the glass cock of the Risch app., tilting to prevent the formation of bubbles and breaking the pointed end of the sampling tube. The method was used successfully and has the advantage that the app. occupies very little space. Bibliography. C. R. FELLERS

Report of the Committee on Painting Standpipes. ANON. *J. New Eng. Water Works Assoc.* **44**, 553-60(1930).—The prepn. of the tanks for painting and the character of painting materials and other coating permissible are outlined. D. K. FRENCH

Tin-covered copper for water-supply pipes. A. MASSINK. *Verslag. Mededeel. Betreffende Volksgezondheid* **1930**, 1069-80; *U. S. Pub. Health Eng. Abstracts* **10**, W, 135(Dec. 13, 1930).—Sn-covered Cu piping should have the following requirements: The coating must be practically without pores; the content of Cu should not exceed 0.5 mg. when the varnish is removed; the min. quantity of Sn should be 15 g. per sq. m.; the Pb content of the Sn coating must not exceed 0.5%. C. R. FELLERS

Copper and health. WM. G. SCHNEIDER. *J. New Eng. Water Works Assoc.* **44**, 485-94(1930).—Cu is taken almost daily into the system with the food and is essential to the diet. While it accumulates in the system to a certain extent, no resulting injury has been observed. It would be almost impossible to take a toxic dose because of its taste and the sickness which it would produce. The use of Cu pipe even in an acid water or the use of $CuSO_4$ in reservoir treatment should cause no anxiety. D. K. FRENCH

Sterilization of water mains. G. T. LUIPPOLD. Ariz. State Board of Health, *Bull.* No. 54, 26–8(1930); *U. S. Pub. Health Eng. Abstracts* 10, W, 144(Dec. 27, 1930).—Liquid Cl is most satisfactory and soln. feed is superior to dry gas because it gives a much better diffusion through the mains. The Cl should be applied on the suction side of the pump, and continued until a residual is obtained as indicated by the *o*-tolidine test. The sterilization efficiency should be checked by making a bacteriol. examn. for *B. coli*. $CaCl_2$ is unsatisfactory because the salt loses its strength very rapidly upon exposure to air; likewise "blowing off" the lines is unsafe. New lines should always be sterilized before use. C. R. FELLERS

Corrosion and discoloration in the water supplies of Perth, W. A. H. E. HILL. *Chem. Eng. Mining Rev.* 23, 35–40(1930).—The water supply of Perth consists of 3 types: (1) shallow catchment or hills water, (2) shallow bore or artesian water (550–800 ft. depth) and (3) deep bore water (1000–2100 ft.). Water discoloration, in certain well-defined areas, varied between a slight brown tinge and a deep coffee-brown, and was due to rust. The corrosion problem involved the deterioration of and reduction of carrying capacity of the city water mains and the accumulation in them of rust deposits and the resultant "dirty" water. The results are summarized as follows: Discoloration was due to the extremely light flocculent type of rust formed in the mains particularly by the hills catchment water. Lime treatment of the water and improved circulation in the pipes alleviate the trouble considerably. The Bayliss method of establishing a $CaCO_3$ protective coating on the insides of the water mains by a lime treatment to a p_H above the soly. curve for $CaCO_3$ failed because of the high concn. of chlorides. W H. BOYNTON

The influence of higher temperatures and salt additions on the lime-carbon dioxide equilibrium in water and the formation of the rust-resistant coating. J. TILLMANS, PAUL HIRSCH AND WILH. R. HECKMANN. *Gas u Wasserfach* 74, 1–9(1931).—Previous articles (cf. *C. A.* 23, 1973, 4987) have indicated that for a given concn. of free CO_2 in water at a given temp., there is an equiv. concn. of bound carbon dioxide (HCO_3^-) below which Ca carbonate will not be pptd., and below which no protective coating is possible. Previous data on this equil. have been available only for 17°, but this paper presents exptl. data for 40°, 60°, 80° and 100°. Free CO_2 was detd. by the method of Tillmans and Heublein (*C. A.* 6, 3301) and "bound" or bicarbonate carbon dioxide by titration against 0.1 *N* HCl, with methyl orange. These values were plotted for the above temps. as mg. CO_2 per l. Any concn. of bound carbon dioxide above the equil. curve for a given temp. will cause $CaCO_3$ to be pptd. and a rust-protective coating of Fe oxide and $CaCO_3$ to be formed, if O is present. A water may be "lime aggressive" at atm. temp., forming no protective coating, but non-aggressive at higher temps., forming a protective coating. Several practical examples are given. Low concns of NaCl have only a slight effect on the lime-CO_2 equil., but $MgCl_2$ concns. above 20 mg. MgO per l. require a much greater bicarbonate concn. (with a given free CO_2 concn.) to form a protective coating. R. W. RYAN

Diagram gives flow of water in pipes. H. L. POWELL, JR. *Eng. News-Record* 106, 78(1931).—Directions are given for the prepn. of a simple nomograph, based on the Chezy formula, for solving problems relating to the flow of water in pipes. R. E. THOMPSON

High pressure pays. M. K. DREWRY. *Power Plant Engineering* 35, 249–50 (1931).—Corrosion is considered a more serious problem than scale formation. Many methods have been worked out for the control and elimination of O, which is the agent most responsible. D. K. FRENCH

Hydraulic service characteristics of small metallic pipes. G. M. FAIR, M. C. WHIPPLE AND C. Y. HSIAO. *J. New England Water Works Assoc.* 44, 499–532(1930).—Seven varieties of pipe were used in the tests; both treated hot (140°F.) and untreated cold water was circulated. CO_2 was higher in the cold water and alky. higher in the hot The tests are described in detail. The carrying capacities of Cu and brass pipe were almost unchanged in hot as well as in cold water. Galvanized iron and steel came next, while steel and wrought iron gave very poor results because of corrosion. The superiority of galvanized iron pipes over uncoated iron pipes, however, diasppears when the protective coating is destroyed. D. K. FRENCH

Recent instances of embrittlement in steam boilers. FREDERICK G. STRAUB *Trans. A. S. M. E.* 52, No. 27, 339–45(1930).—Conditions observed in recent cases of boiler embrittlement are reported. A boiler failure at Crossett, Ark., is attributed to embrittlement resulting from the use of Na_2CO_3 treatment on a water too low in sulfate content. Emphasis is placed upon the necessity for regular inspection of leaky seams

in boilers, particularly when the boiler water does not meet the A. S. M. E. specifications. H. L. OLIN

Embrittlement in boilers. FREDERICK G. STRAUB. Univ. Ill. Eng. Expt. Sta., *Bull.* No. 216, 125 pp.(1930).—This report is a partial reprint of Bull. No. 155 and No. 177 bearing on the subject of embrittlement of boiler plate (*C. A.* 20, 2814; 22, 3125) together with new matter dealing chiefly with the solubilities of embrittling inhibitors in boiler waters, and with the concns. of solns. in capillary spaces. In general, (1) embrittlement in boiler plate is caused by the combined action of stress and chem. attack. The stresses are inherent in the construction and operation of the boiler, while the chem. attack is caused by the presence of NaOH in the boiler water. (2) Certain methods of water treatment tend to convert some safe waters into the dangerous type, *e. g.*, the treatment of waters low in sulfates with soda ash. (3) Lab. tests with special app. have shown that concns. of NaCl up to 150 g. per l. may be built up in capillaries while the strength in a large connecting tube was only 2 g. per l. (4) The presence of Na_2SO_4 retards the embrittling action and, if in proper proportions, prevents it entirely. (5) The presence of phosphates, tannates, chromates, nitrates and acetates also inhibits the embrittling action of NaOH and some of these are now in use in large power plants. (6) No steel suitable for boiler plate has been found which is resistant to the embrittling action of the caustic. H. L. OLIN

Plankton of the Lower Lake at Lunz: Its distribution in space and time during the years 1908 to 1913 (including some chemical studies). F. RUTTNER. *Intern. Rev. ges. Hydrobiol. u. Hydrog.* 23, 1. 161(1929); *U. S. Pub. Health Eng. Abstracts* 10, W, 130–1 (Nov. 29, 1930). C. R. FELLERS

The Sewage Treatment Works of Zurich, Switzerland. MAX SUTER. *Sewage Works J.* 3, 419–23(1930).—The Zurich plant is a sep. sludge digestion plant with grit chambers and sedimentation basins. The capacity of the digestion tanks is 1.24 cu. ft. per capita. E. HURWITZ

Operation of the Sewage Treatment Plant of the Bloomington and Normal Sanitary District. J. J. WOLTMAN. *Sewage Works J.* 3, 404–11(1930).—The treatment works comprise bar screens, grit chamber, pumping station, Imhoff tanks, sludge drying beds, sprinkling filters and secondary tank with Dorr clarifier. An av. of 5.5 m. g. d. are treated at an annual cost of $10.50 per m. g. E. HURWITZ

Treatment plant and intercepting sewers for Klamath Falls, Ore. CLYDE C. KENNEDY. *Western Construction News* 5, 448–52(1930); *U. S. Pub. Health Eng. Abstracts* 11, S, 7(Jan. 3, 1931).—The new plant, completed in 1929, consists of a primary sedimentation tank with provisions for continuous sludge removal and skimming, sep. sludge digestion with gas collection and heating of the digesting sludge, and chlorinating the effluent. The av. flow of sewage is 1,750,000 to 3,000,000 gal. per day contg. approx. 400–600 p. p. m. of settleable solids. With a daily *gas production* of 6600 cu. ft., the plant operates on this gas alone. C. R. FELLERS

Progress made in sewage treatment. C. K. MATTHEWS. *5th Ann. Rept. Missouri Water and Sewerage Conf.* 1930, 60–3; *U. S. Pub. Health Eng. Abstracts* 10, S, 113(Nov. 22, 1930).—Development in sewage treatment has been secured principally because of the demand for a better type effluent to prevent the pollution of water courses and in the hope of developing more economical methods of sewage treatment. Treatments are described. C. R. FELLERS

Observations on sewage farming in Europe. GEORGE A. MITCHELL. *Eng. News-Record* 106, 66–9(1931); cf. *C. A.* 24, 1690.—A discussion of sewage irrigation practice in Europe, particularly in Berlin, Paris and Moscow, and of the hygienic aspects of this method of disposal and its possibilities in the United States. R. E. THOMPSON

Purification of sewage. C. A. CAMERON. *Ind. Australian and Mining Standard* 1930, 83, 94; *U. S. Pub. Health Eng. Abstracts* 10, S, 109(Nov. 22, 1930).—Sewage purification by microörganisms is largely the result of enzyme action. The sewage of Melbourne travels a considerable distance to a sewage farm and anaerobic conversion is well advanced at the time of arrival. It is then applied to carefully graded and drained land, where the purification process is satisfactorily completed without nuisance. C. R. FELLERS

Domestic and foreign experiences of biological treatment of garbage. J. J. VAN LOGHEM. *Verslag Mededeel. Volksgezondheid.* 1930, 221–30; *U. S. Pub. Health Eng. Abstracts* 10, GR, 21–2(Oct. 11, 1930).—The cells used in Villeneuve-St. George near Paris in France and at Groningen and Utrecht in Holland are placed on posts to facilitate aeration through a hole in the bottom. Sewage is added to the garbage. The liquid dripping from the mass has a strong putrefactive odor. Gaseous odors were led to an ozone app. but this was unnecessary. The temp. of the mass reached 175°F. Com-

plete decompn. required several months, but after 20–25 days, the mass could be moved. The product is relatively inoffensive and non-infectious and can be used as a *fertilizer*. The mass is greatly reduced in vol. after decompn. is complete. C. R. FELLERS

The influence of chlorine on sewage sludge digestion. C. E. KEEFER AND HERMAN KRATZ. *Sewage Works J.* 3, 338–46(1930).—Of 7 tests made to det. the effect of chlorination of raw sewage on the digestion of the solids removed by sedimentation, two showed a decided increase over the blank in the speed of digestion; two, a slight increase; one, little difference; and two indicated a slight decrease. The chlorinated solids produced more total gas in 4 tests and more CH_4 in 5 tests. The p_H value of chlorinated solids does not drop as rapidly as that of unchlorinated solids. E. H

Symposium: Standard methods for the examination of sewage and sewage sludge. I. JACK J. HINMAN, JR. *Sewage Works J.* 3, 349–52(1930).—H. urges that complete directions for examn. of sewage be included in standard methods for the examn. of water and sewage. He recommends careful discussion of the various phases of the biochem O demand detn. before final adoption of a standard method, and the development of a standard method for detn. of settleable solids. **II.** STUART E. COBURN. *Ibid* 353.—(1) Samples for composites in the study of industrial waste should be no less than 4 liters and should be taken every 10 or 15 min. (2) A water bath with samples submerged should be included as an alternative to water seals in the detn. of biochem. O demand. (3) Mineralized distd. water should be used as dilg. water for comparison of sewages and effluents in different places. Stream water should be used in studying the effect of sewage or effluent on a stream. **III.** A. J. FISCHER. *Ibid* 353–56.—*Putrescible solids in grit samples* can be detd. as follows: 100 g. of drained sample is rotated at 120 r. p. m. in a 2-qt Dazy churn with 1100 cc. clear water. The paddles are then removed and the contents gently stirred to cause the seeds and other floating material to settle out. After 30 sec. settling, 1000 cc. of supernatant liquor is siphoned off. Four more washings are made with 1000 cc. of clear water each time. The supernatant liquors are composited, evapd. to dryness, weighed and ignited to drive off the volatile matter. The loss in wt. after ignition represents the putrescible solids in 100 g. wet grit. The wt. of the dry solids left in the jar is then detd. and the putrescible solids content calcd. to the dry basis as follows:

$$\%\ \text{putrescible solids} = \frac{(\text{Wt. of dry solids in washings} \times \%\ \text{loss on ignition})}{(\text{Wt. of dry solids in washings} + \text{wt. of dry solids left in jar})^*} \qquad \text{IV.}$$

LINN H. ENSLOW. *Ibid* 356–7.—L. discusses several accepted methods for H_2S detn. and suggests that the method of detg. residual Cl_2 in sewage and sewage effluents be standardized. **V.** W. RUDOLFS AND H. HEUKELEKIAN. *Ibid* 357–60.—A sep. section should be included in "Standard Methods" devoted to special methods for industrial waste studies. An appropriate method for the detn. of C in sewage and sewage effluents should also be included. The authors make suggestions for changes in several other phases of sewage analysis. **VI.** MORRIS M. COHEN. *Ibid* 360–3.—C. urges standardization of the method of reporting results of operation of treatment works as well as standardization of the methods of analysis. **VII.** T. C. SCHAETZLE. *Ibid* 363–5.—The drying temp. of "total residue" should be 103°. Volatile solids should be ignited at 600°. A definite preservative should be adopted for sewage samples. **VIII.** EMERY J. THERIAULT. *Ibid* 365–7.—In the detn. of dissolved O the use of permanganate is unnecessary in the absence of nitrites or iron. In the presence of much org. matter $KMnO_4$ gives lower results than the ordinary Winkler method. $KMnO_4$ gives unreliable results in sulfite waste liquors. More accurate results are obtained by use of Cl or hypochlorites, the excess oxidant being removed with I. A buffered water is recommended for use in the biochem. O demand detn. in place of tap water in cases where a suitable diln. water cannot be obtained. **IX.** CHAS. C. HOMMON. *Ibid* 367–8.—*To det. plant efficiency* it is suggested that the percent settleable solids removed be detd. as follows: It is assumed that if a settling tank is designed for a 3-hr. retention period and a representative sample of sewage is allowed to settle 3 hrs. in an Imhoff cone, the quantity of settleable solids removed in the cone would be 100% of the matter capable of being removed by sedimentation. Then the difference between the suspended solids found in the raw sewage and that found in the supernatant liquor of the Imhoff cone represents the total quantity of solids capable of being removed by the sedimentation process. The quantity of suspended solids actually in the tank effluent divided by this figure gives the percent efficiency of the tank. **X.** C. K. CALVERT. *Ibid* 368–70.—The relative stability method should be used for plant control work and the direct aeration method should be reserved for accurate check up work. The status of the dilution method for determination of biochem. O demand is still too muddled and indefinite to be regarded as a standard method. **XI.** WILLIAM

D. HATFIELD. *Ibid* 370–4.—H. recommends the inclusion in "Standard Methods" of a chapter on microörganisms common to fresh and polluted water and septic and activated sludges. This chapter should accompany numerous hand drawings. **XII.** F. W. MOHLMAN. *Ibid* 374–8.—The nitrate method for detn. of biochem. O demand should be abandoned in favor of the diln. method. Of several synthetic waters tried in an effort to find a suitable diln. water, one contg. definite quantities of $NaHCO_3$ seems the most promising. The incubation temp. and period for biochem. O demand detns. should be made standard at 20° for 5 days. **XIII.** A. M. BUSWELL AND G. E. SYMONS. *Ibid* 378–84.—The *quantity of settling solids* can be detd. by placing 1 l. of the sample in a glass tube $1^3/_4$ in. in diam. × 3 ft. long with a stopper at one end. After an hour of quiescent settling the tube is rotated gently to loosen particles adhering to the sides and allowed to stand quietly for another hour. The supernatant liquor is then siphoned down to about 50 cc. The remaining sludge and liquor are run into an evapg. dish by removing the stopper. The measuring cylinder and tube are washed down with 50 cc. of distd. water which is added to the liquor in the dish. This is then evapd. on a steam bath and the residue weighed. This wt. times 1000 gives the residue in p. p. m. A correction is made for dissolved and non-settleable solids contained in the liquid portion of the sample. The method gives more accurate results than the Gooch crucible method for this detn. The authors also describe a method for the detn. of sludge drainability. **XIV.** MAX LEVINE. *Ibid* 384.—L. describes a modified method for the detn. of nitrate in sewage. **XV.** W. S. MAHLIE. *Ibid* 385–6.—M. suggests that Sierps direct oxidation method for biochem. O demand be included in "Standard Methods" and points out need of a reliable method for the detn. of H_2S in sewage and sludges. E. HURWITZ

Studies on the function of ripe sludge. H. HEUKELEKIAN. *Sewage Works J.* **3,** 313, 337(1930); cf. *C. A.* **24,** 187.—The function of ripe sludge in sludge digestion is to regulate the p_H value of the digesting mixt. and to furnish the flora necessary to accelerate digestion. Studies by H. show the following: (1) The age of the sludge affects the rate of decompn. and gasification of the solids added to it. The sludge best suited to seeding purposes is that which has reached complete decompn., as measured by reduction in volatile matter, and has not been stored too long. (2) The optimum stage of decompn. of ripe sludge for seeding purposes occurs when the decompn. is just completed and for about a month thereafter. The presence of large quantities of raw material in the sludge and storage periods longer than a month impair its seeding value. (3) Inoculation of seeded mixts. of sludge with liquor from other digesting mixts. at different stages of decompn. resulted in acceleration of the rate of gas production when the inoculum was taken from material at the peak of gasification. (4) The neutralization of the initial acidity with lime and the addn. of NH_4 carbonate and bicarbonate and K_2HPO_4 to unseeded fresh solids regulate the p_H value of material so that the acid period of digestion is materially reduced in comparison with the untreated fresh solids or fresh solids that have been treated initially with lime. The regulation of p_H accomplished with these salts compares favorably with the maintenance of p_H by the repeated addn. of lime. These salts are of no material benefit in properly seeded and limed mixts. because the p_H is already regulated by the ripe sludge and lime E. HURWITZ

Sewage fish-pond installation in Amberg and its results up to 1929. A. WALTER. *Allgem. Fischerei-Ztg.* **1929,** 147, 162; *U. S. Pub. Health Eng. Abstracts* **10,** S, 116(Nov. 22, 1930).—The sewage clarification plant at Amberg consists of 3 Kremer tanks with adjacent sludge digestion chambers. After clarification the sewage is mixed with well water in the ratio of 1:2.3 and supplied to the fish ponds by means of a concrete channel. The ponds are 30–80 cm. deep with a total surface of 10 hectares Although carp and tench did well and gained weight it is believed that the ponds should be deeper and the diln. at least doubled. C. R. FELLERS

Making dangerous gases in sewers [conduits] harmless. A. SALMONY-KARSTEN. *Chem.-Ztg.* **54,** 858–9(1930).—Large quantities of sewer and conduit gases are removed by aspiration through manholes. An elec. car carrying the suction app. is the means employed in the removal of the dangerous gases. RUSSELL C. ERB

Production and collection of sewage gas. GEO. S. RUSSELL. *5th Ann. Rept. Missouri Water and Sewerage Conf.* **1930,** 44–5; *U. S. Pub. Health Eng. Abstracts* **10,** S, 111(Nov. 22, 1930).—See *C. A.* **24,** 5090. C. R. FELLERS

Preliminary studies on causes and remedies for mosquito breeding in sewage disposal plants. JOSEPH M. GINSBURG AND LEROY FORMAN. *Sewage Works J.* **3,** 412–8 (1930).—Most breeding places encountered in sewage treatment plants may be permanently eliminated by mech. methods. When this is not possible resort may be had

to various oils or mixts. of oils with a larvicide without seriously impairing the efficiency of the filter bed or tank on which they are spread. Oils recommended are furnace oil, light fuel oil and kerosene; the larvicides are cresylic acid and exts. of pyrethrum.
E. HURWITZ

Waste waters from sugar factories. C. MANUELLI AND S. ANSELMI. *Atti III congresso naz. chim pura applicata* 1930, 607–26.—The disposal of sugar factory effluents is very important in Italy because of the lack of deep wells for domestic use, and also particularly difficult, because the factories are massed closely together. The total water used varies from 6000 to 30,000 cu. m. per 24 hrs. per factory. Most of this water is used for washing and transporting beets, and this is relatively innocuous The diffusion, press and pulp waters are more difficult to eliminate. Previous literature is reviewed, and a brief critical description of mech., chem. and biol. disposal methods is given. The repeated use of water and the sprinkling of large areas with the waste waters are also discussed. Combinations of these methods are now used successfully in Italy, the exact method depending on local conditions. A table is appended, showing the production of beets and sugar in Italy for each yr. from 1910 to 1929.
F. W. ZERBAN

Are waste waters from a potato-starch factory injurious to fish? E. PAROW. *Z. Spiritusind.* 52, 26(1929); *U. S. Pub. Health Eng. Abstracts* 10, S, 117(Nov. 22, 1930).—The waters used for washing the potatoes in potato-starch factories contain only earthy substances; those from the starch contain sol. compds., a little starch, fibers, insol. nitrogenous compds. and sand. Other effluents contain the sol. compds. from the potato such as sugar, acids, albumin, amides and mineral substances. The insol. substances are deposited at the bottom of the stream and are harmless. The sugars and nitrogenous bodies need only be considered when the water is stagnant and ferments, in which case H_2S is formed and O_2 absorbed. The diln. is, however, very great and in winter no injurious fermentation is possible. In the running water these substances are, on the contrary, advantageous and supply food to the flora. A detailed description is given of an expt. which showed that the waste waters in question are completely inoffensive to fish.
C. R. FELLERS

The research laboratory and public health work. ARISTIDES AGRAMONTE. *Am. J. Pub. Health* 21, 19–25(1931).—An address.
J. A. KENNEDY

The health problem in Mexico. RAFAEL SILVA. *Am. J. Pub Health* 21, 31–6 (1931).
J. A. KENNEDY

Sanitary engineering and public health in Manila. HAROLD E. BABBITT. *Eng News-Record* 105, 808–10(1930).—A description of sanitation in Manila, P. I., including water supply (cf. *C. A.* 22, 3245), sewage disposal and mosquito control. The sewer system serves only about one-third of the city, the remainder being served by septic tanks, which discharge into surface drains, or by pail or dry system. The sewage is discharged into the ocean about $\frac{1}{2}$ mile from shore. The mortality rates for typhoid and dysentery in 1928 were 57.31 and 40.7 per 100,000, resp.
R. E. THOMPSON

The investigation of atmospheric pollution—report of the standing conference of coöperating bodies for the year ending March 31, 1929. NAPIER SHAW, *et al. Dept. Sci. Ind. Research 15th Rept.* 1(1930).—The object of the investigation is to obtain exact scientific information with an ultimate purpose of giving to public authorities, and to industry, assistance in dealing with the smoke problem and other questions of public health.
W. H. BOYNTON

Report of the Atmospheric Pollution Research Committee for the year ended March 31, 1929. G. C. SIMPSON, *et al. Dept. Sci. Ind. Research 15th Rept.* 2–3(1930); cf. *C. A.* 24, 4110.—A brief review of the work of the Comm. Considerable progress is noted in the measurement of S impurities in the air. SO_3 is not a normal constituent of the atm.; it appears only during fog. Progress is reported in the measurement of daylight. By the use of 2 different wave lengths fairly complete information as to quality and quantity of daylight is possible. Two methods of detg. water in fog are the Kohler and the Owen. In the former the fog-laden air is warmed until the moisture is all evapd. and the total moisture content detd. by means of a wet and dry bulb hygrometer. This method can be operated as a continuous flow method. The Owens method measures the free water alone. It is proposed to consider the construction of an app. for detg. the water content gravimetrically to provide a standard of comparison
W. H. BOYNTON

Report of the superintendent of observations. ANON. *Dept. Sci. Ind. Research 15th Rept.* 4–64(1930).—Detailed tabulated results are given on suspended matter in the atm. of London. Results with the deposit gage, with the automatic filter and showing the effect of summer and winter times on the distribution of suspended impurities

are noted. A few figures are given on the measurement of daylight. Numerous charts are included. W. H. BOYNTON

Typhoid fever epidemic in a leper hospital. LEE S. HUIZENGA. *Am. J. Pub. Health* **21**, 50–1(1931).—There were at least 60 cases of which only 3 are known to have recovered, though 5 are said to have done so. There were in total 200 inmates. Two months earlier a new group of lepers was admitted without any regular period of quarantine. Excreta of the patients has been thrown outside, and has undoubtedly found its way into the water supply contaminating both the water used for cooking and the oyster beds. J. A. KENNEDY

Term of existence of typhoid bacilli in hot-spring water and other waters. N. WATANABE. *J. Pub. Health Assoc. Japan* **6**, No. 6, 1–10(1930); *U. S. Pub. Health Eng. Abstracts* **10**, W, 135(Dec. 13, 1930).—Typhoid bacilli lived 12 days in summer and 18 days in winter, diln. 1:100, in water from the Fukushima supply. Death occurs more rapidly in polluted water than in clear water. Nakanosawa and Takayu hot springs possess disinfecting properties because typhoid bacilli perish very promptly when introduced into them. C. R. FELLERS

Bacterial analyses of swimming water. ANON. Detroit, Dept. of Health, *Swimming Pool Review*, Series 4, No. **6**, 1–2(1930); *U. S. Pub. Health Eng. Abstracts* **10**, Sw., 12(Nov. 8, 1930).—Out of 18,392 tubes contg. plantings of 0.1 cc. portions of water, in 1929, only 84 tubes showed gas formation. In 1930 only 308 out of 23,055 were pos. The use of 1 cc. plantings in tubes has been discontinued. The present standard procedure consists in making agar plates with 1.0 and 0.1 cc. portions and planting 5 ten-cc. amts. in lactose broth. Gas formers are confirmed on brilliant green bile. C. R. F.

Anti-hookworm measures in West Flores, Dutch East Indies. M. AVE. LALLEMANT. *Arch. Schiffs- u. Tropen- Hyg.* **32**, 175–8(1928); *U. S. Pub. Health Eng. Abstracts* **10**, RS, 3(June 28, 1930).—The entire population is infected with hookworm, the hemoglobin index being 58–67. The soil is heavily infested with larvae, but exposure to sun and wind greatly reduces the nos. Treatment which gives very good results consists of $2^1/_2$ cc. of CCl_4 with 15 drops of oil of chenopodium. Out of 237,000 persons treated, 6 deaths resulted. C. R. FELLERS

Dressing of Fe pyrites and heavy spar at Meggen (GLATZEL) **9**. Air filtration as applied to the steel industry (ROBINSON) **9**. Apparatus for screening and filtering materials such as sewage (U. S. pat. 1,789,425) **1**.

E. von Esmarch's Hygienisches Taschenbuch. Ein Ratgeber der praktischen Hygiene für Medizinal- und Verwaltungsbeamte, Ärzte, Techniker, Schulmänner, Architekten und Bauherren. 5th ed., revised and edited by H. Reichenbach. Berlin: J. Springer. 452 pp. Bound, M. 19.80.

POPP, CAMILLO: **Die festen städtischen Abfallstoffe, ihre Beseitgung und industrielle Verwertung.** Munich: R. Oldenbourg. 142 pp. M 7.60.

Purifying water. I. G. FARBENIND. A.-G. Fr. 692,364, Mar. 20, 1930. The last traces of silicic acid are eliminated from water with recovery of the eliminating agents by using metallic hydrates not dissolved with higher H-ion concn. values and, on the other hand, the regeneration of the hydrates is effected with lower H-ion concn. values.

Sterilizing water. CHARLES RIBBE. Fr. 690,874, July 10, 1929. Water is sterilized by distg. it at low pressure after the addn. of non-volatile antiseptics. Cheap sources of heat are used.

Apparatus for softening water by use of base-exchange materials. LYNN G. LINDSAY (to Trupar Mfg. Co.). U. S. 1,789,314, Jan. 20. Structural features.

Apparatus for softening water by treatment with base-exchange material. JOHN ASTROM (one-half to Deister Machine Co.). U. S. 1,789,961, Jan. 27. Structural features.

Apparatus for degasifying boiler-feed water, etc. KARL MORAWE. Ger. 511,005, Jan. 27, 1928.

Preventing fur in steam boilers. FILTRATORS, LTD., and VADIM SAKS. Ger. 512,698, May 19, 1926. The fur is removed or prevented from forming, by high-pressure steam and linseed-oil emulsion. Cf. *C. A.* **24**, 3584.

Preventing furring of boilers. WALTER BAUR. Ger. 512,862, Sept. 25, 1927. Furring is prevented by a mixt. contg. castor oil and metal oxide, heated to 280–300° to form a waxy mass, to which C and, optionally, metal powder, are added.

Settling tank and associated apparatus for treating sewage. C. J. HARTLEY. Brit. 334,851, April 10, 1929. Structural features.

15—SOILS, FERTILIZERS AND AGRICULTURAL POISONS

J. J. SKINNER AND M. S. ANDERSON

Soils from Merridin, Ghooli, Salmon Gums, Wongan Hills, Chapman, Baker's Hill and Lake Brown. L. J. H. TEAKLE. *J. Roy. Soc. W. Australia* 15, 115-23(1929).—The soil types studied, with the use of a 1:2 water ext., include in the order mentioned above dark-brown clay loam, red silt loam, gray calcareous loam, bearing mallee, gray sand with a small amt. of sticky clay, red sandy loam, white sands and alk. soils. The results show: (1) a wide variation in the concn. and compn. of the soil solns.; (2) near absence of sol. phosphate; (3) deficiency of certain soils (Baker's Hill) in sol. Ca; (4) increase of phosphate in the ext. by addn. of sol. phosphate; and predominance of NaCl in the alk. soils. The latter are rich in the materials required for plant growth. Mn was found in the ext. from the Wongan Hills soil only.
W. L. HILL

Brown soils of Crimea and Caucasus. L. I. PRASOLOV. *Chem. Erde* 4, 461-74 (1930).—A review of Russian papers. B. C. A.

Physical-chemical investigations of the moors of Tekir-Ghiol and Agigea. N. T. DELEANU AND RUDOLF HOFMANN. *Bull. sect. sci. acad. roumaine* 13, 111-28(1930).—From a therapeutic standpoint the moorland soil of Tekir-Ghiol is more valuable because it is richer in sulfides and I. The content of org. and colloidal S is also higher The moorland soil of Tekir-Ghiol has a higher percentage of particles of colloidal dimensions and a higher heat capacity. JOHN R. HILL

A soil survey of the Woorinen Settlement, Swan Hill Irrigation District, Victoria. J. K. TAYLOR AND F. PENMAN. Australia Council Sci. Ind., *Research Bull.* No. 45, 3-41(1930).—In addn. to descriptions of soils and their mech. analyses, extensive chem. data are given. General chem. analyses include N, P_2O_5 and CaO. Complete analyses of sol. salts show NaCl to predominate with considerable Na_2SO_4 and $NaHCO_3$ present. Carbonates, however, are not abundant. The reaction of all the soils of this region is alk.; the p_H range is from 7.5 to 9.2. Replaceable bases are moderately high, ranging from 10 to 32 milliequivalents per 100 g. of soil. An unusual feature of the data is the high content of replaceable Mg which often exceeds the Ca content These extreme values for replaceable Mg do not appear to confer any abnormal character on the soils as regards fertility. In fact, there is no obvious connection between any of the replaceable base figures and soil fertility. M. S. ANDERSON

Chemical composition of New York soils. J. A. BIZZELL. Cornell Univ. Agr Expt. Sta., *Bull.* 513, 3-25(1930).—Chem. analyses of 101 soils and subsoils, representing 85% of the surveyed area of the State, are presented and discussed for the purpose of discovering similarities or differences. With regard to the total N, P, S, K and Mg, the types are neither distinct nor are the soils within each type closely similar. The total Ca content, however, appears to be a distinctive characteristic of a soil type Comparison of all samples on a basis of texture, without regard to soil series, shows a tendency for N, P, S, K and Mg to increase with an increase of fineness of the soil The Ca content shows no significant trend. There are pronounced differences between surface soils and subsoils. N and S are higher, and K and Mg are lower, in surface soils than in subsoils. The content of Ca varies, depending on the soil type P varies, also, with different soil types. The soils of New York are medium to high in total N, P, S, K and Mg. A majority of the most extensive soil types are low in Ca
C. R. FELLERS

Humic materials and amino nitrogen of some Indo-China soils. MARCEL RIGOTARD. *Rev. gen. sci.* 41, 580-2(1930).—Soils may be grouped according to intensity of production and accumulation of amino products. To det. the quantity of amino N in the soil 20 g. of fine dry soil is treated with 100 cc. of 1.25% HCl soln for 24 hrs. The clear liquid is decanted and the treatment is repeated with fresh acid. At the end of 48 hrs. the 2 portions of liquid are combined and filtered and to 100 cc. of the filtrate is added a little H_2SO_4 and the soln. is evapd. to a small vol. This liquid is then digested in a Kjeldahl flask with $CuSO_4$ and H_2SO_4, distd. and titrated. The N from any NH_3 is also included in the result but is so small it may be neglected. The data show that there is a relation between the rate of deterioration of the humus and its proportion in the soil. The argillo-siliceous soils have more amino N than the light soils and the

ratio (amino N/humus) × 100 of permeable soils is double that of the compact soils. Amino N varies from traces up to 0.58 part per 1000. The yellow and red soils may have the same amount of amino N but the red basaltic soils of South Indo-China will show a much larger quantity. J. R. ADAMS

Acid and alkali soils, two important soil problems in China. T. Y. TANG. *Lingnan Sci. J.* 9, 195–7(1930).—Most of the acid soils of China are found below the Yangtze River where there is a plentiful rainfall while the alkali soils occur in the northern part where there is less than 20 in. of rain annually. In some of the alkali soils there is as much as 15% of $CaCO_3$ and 1% of Na_2SO_4. The occurrence of these soils is discussed as well as the cause and correction of excess alky. or acidity. J. R. ADAMS

Character of the colloidal materials in the profiles of certain major soil groups. M. S. ANDERSON AND HORACE G. BYERS. *U. S. Dept. Agr. Tech. Bull.* 228, 24 pp. (1931) —A study is made of the influence of each of 3 major soil-making processes on the character of the colloidal materials developed in a soil profile. The processes include calcification, podsolization and lateritization. Each profile studied is representative of the dominating influence of a single one of these processes operative to the extent of developing a typical profile of its kind. Chem. analyses of each of the colloids are given, together with data for various properties which seem to characterize the materials such as heat of wetting, adsorption of H_2O vapor, moisture equivalent, content of exchangeable bases and base-exchange capacity. The calcification process leads to uniformity of colloidal material throughout the profile insofar as major constituents are concerned and property values are high. The podsolization process leads to the formation of profiles with widely differing colloidal materials in the different horizons, the SiO_2 sesquioxide ratio is high in the A horizons and markedly lower in the B horizons. Many of the property values do not correspond with those usually accompanying similar features of major chem. compn. Org. matter plays an important part in properties of these colloids. The lateritization process develops colloids of low silica sesquioxide ratio and low property values. Colloids of kaolinized material possess very low property values. H-ion concn. of electrodialyzed colloids is variable. There is, however, some tendency toward a direct relationship between H-ion concn. and silica-sesquioxide ratio. Long standing of colloids after electrodialysis brings about an increase in p_H values. M. S. ANDERSON

The nature of the base-exchange material of bentonite, soils and zeolites, as revealed by chemical investigation and x-ray analysis. W. P. KELLEY, W. H DORE AND S. M. BROWN. *Soil Science* 31, 25–55(1931); cf. *C. A.* 24, 452.—Replaceable bases of several samples of bentonite are detd. before and after grinding in a ball mill for different lengths of time. Grinding greatly increases the exchangeable bases, particularly the Mg and K. 72 hrs. grinding serves to render most of the bases exchangeable. Grinding Ca-satd. bentonite and beidellite has little effect on the exchangeable Ca but greatly increases the exchangeable Mg and K. The exchangeable bases of soil colloids are increased by grinding in a manner similar to that of bentonite. X-ray studies of these various colloidal materials shown them to be cryst., and the lines shown in the x-ray patterns are greatly dimmed by grinding. The results indicate that certain of the soil colloids are closely related to the montmorillonite-beidellite clays, others to the potash bentonites and still others to the halloysite type of clay minerals. Chem. and x-ray data clearly establish the fact that inorg. soil colloids are not zeolites The bases that occur at, or near, the surface of the crystals may be replaced by Ca or Na in the natural state, but the results of grinding expts demonstrate that Ca and Na do not extend to the centers of the crystals. The exchangeable bases of bentonites and soil colloids are but little affected by heating to 350° but the zeolites lose much of their base exchange by this treatment. In all cases base exchange is almost entirely destroyed by heating to 750°. M. S. ANDERSON

Soil efflorescences. II. H. PUCHNER. *Kolloid-Z.* 54, 87–92(1931); cf. *C. A.* 12, 734.—Qual. expts. on the form of efflorescence on the surface of dolomitic and quartz sands impregnated with dil. $NaNO_3$, Na_2SO_4, NaCl, Na_2CO_3 and Na_3PO_4 solns. are described. ARTHUR FLEISCHER

Soil sampling with a compressed air unit. H. F. BLANEY AND C. A. TAYLOR. *Soil Science* 31, 1–3(1931).—A description is given of a soil-sampling app., operated by compressed air. The time of sampling is cut to 1/8 of that required for hand work. M. S. ANDERSON

New apparatus for the mechanical analysis of soils by displacement. J. H. GOLLAN. *Bull. soc. chim. biol.* 11, 940–2(1929).—An app. is described whereby analyses of soils are effected to comply with the standard of the International Soil Conference (Washington). B. C. A.

Examination of grain sizes in clays. JOHS. GRENNESS. *Teknisk Ukeblad* **75**, 41–4, 50–2(1928).—The sample is subjected to a pre-treatment according to the standard method of Oden, cf. *C. A.* **19**, 1746. The coarser particles (above 0.045 mm.) are removed and classified by wet sifting through a set of 3 small sieves, 900-, 2500- and 16,400-mesh per sq. cm. The finer particles are classified by means of a pelometer, a vertical floater with a horizontal plate upon which sedimentation takes place, and which is provided with a long, thin, graduated, vertical stem, by which the successive sinking of the floater can be observed. C. A. ROBAK

The determination of the p_H of soils by means of the quinhydrone electrode. ROBERT FROGNIER. *Ann. Soc. Sci. Bruxelles* **50**, Ser. B., 135–44(1930).—A study has been made of the applicability of the quinhydrone electrode to p_H detns. in soils. Conclusions: (1) It is possible to det. with this electrode the p_H of soil suspensions if the suspension is concd. A soil/H_2O ratio about 1/1 is sufficient. (2) One should try to eliminate all diffusion of KCl in the suspension. (3) The purity of the quinhydrone should be checked. This is very important if a soil filtrate or centrifugate is to be examd. (4) It is better not to introduce the Pt-glass junction of the electrode into the liquid under examn.; a long Pt wire dipping in the liquid should be used. J. B. A.

Mechanism of buffer action in soils. PHILIP B. MYERS AND G. M. GILLIGAN Del. Agr. Expt. Sta., *Bull.* **166**, 3–37(1930).—The removal of dialyzable bases from the colloidal fraction of a soil by subjecting the material to electrodialysis results in the loss of its buffer capacity. H-ion concn. of the colloidal material increases as the bases are progressively removed by electrodialysis. H-ion concn. of the colloidal fraction of a soil is an index to the degree of satn. of the colloidal material with bases. H-ion concn. of different soil types is not an index to their relative buffer capacities. When acid, in excess of that required to unite with the replaceable bases of a soil colloid, is added to a dispersion of soil colloidal material the colloidal acid formed has no appreciable influence upon the ionization of the acid in excess and hence no appreciable influence upon the reaction of the resulting dispersion. Exptl. evidence indicates that the mechanism of buffer action in soils is as follows: When acid is added to a soil it reacts with the salts of colloidal acids, forming colloidal acids and crystalloidal salts. The resultant reaction of the system is only slightly altered in consequence of the weakness of the colloidal acids. When acid is added in excess of that required to react with the cations of the colloidal salts, the crystalloidal salts formed, having an ion in common with the added acid, tend to repress the ionization of the latter. The net result is a small change in the H-ion concn. of the soil dispersion. Twenty references are appended. C. R. FELLERS

Effect of calcium and phosphorus content of various soil series in Western Washington upon the calcium and phosphorus composition of oats, red clover and white clover. HENRY F. HOLTZ. Wash. Agr. Expt. Sta., *Bull.* **243**, 3–45(1930).—One hundred soil samples representing 17 series under 4 geologic soil-forming agencies and the oats and clover crops grown upon them were analyzed for Ca and P. The Olympic, a residual series, is lowest in Ca, and Whatcom, an upper glacial series, is lowest in P. The Sacramento, an alluvial series, is highest in Ca, and Spanaway, a glacial series, is highest in P. The residual and upper glacial soil series are low in both total and available P, and the residual series are also low in Ca. The lower glacial and alluvial series are the highest in Ca and P. The alluvial soils are higher in Ca than either the residual or glacial soils from which they are derived. The Ca content of oats is closely proportional to that found in the residual, upper glacial, depression deposits, and org. soils, but in the other geologic classes of soils no relation exists. The P content of oats follows the P content of the soil in each geological soil class, except in the residual and lower glacial. The P content of red clover follows the P content of the soil only in org. soils. The P content of oats follows more closely the total P content of the soil, while that of red clover follows the available P content of the soil more closely. The Ca and P content of oats grown in western Washington is lower than that of oats grown in the eastern and mid-western states, while that of red clover is about the same in the 3 areas. A large no. of samples of oats, and some of red clover, from western Washington are below the Ca and P content required for nutritional deficiency disease protection. In order to det. how the mineral content of the various hay and pasture crops may be increased, field fertilizer plots, plant house and lab. expts. are being continued. C. R. FELLERS

Influence of soil conditions, fertilizer treatments and light intensity on growth, chemical composition and enzymic activities of sugar beets. JAMES TYSON. Mich. Agr. Expt. Sta., *Tech. Bull.* **108**, 3–44(1930).—The mineral contents of both leaves and roots of beets are greatly influenced by soil conditions and fertilizer treatments,

while the intensity of light presented to the plant is more closely assocd. with the utilization of the elements than with the absorption of them. Certain soil conditions and fertilizer treatments permit the sugar beet plant to absorb mineral nutrients in amts. and ratios which are favorable to their growth. The most favorable found in these investigations was on Brookston silt loam fertilized with 100 lb. Chilean $NaNO_3$, 400 lb. superphosphate, and 100 lb. KCl per acre. The order and percentages of minerals found in the leaves were K 6.9, P 3.4, N 1.7, Ca 1.3, Mg 0.9 and the percentages in the roots were K 0.9, P 0.8, N 0.6, Mg 0.2 and Ca 0.15. Whenever the elements occurred in different order from the above the size of beets produced was smaller. The seasonal fluctuations in mineral nutrient content varied with the soil, the fertilizer treatment and the stage of growth; usually the percentages of minerals were highest in the spring, low during the summer, and, if sufficient minerals were present in the soil, high in the fall. The sugar content of the beets was increased by the use of K fertilizer on the soil which was most deficient in K but on the other soils it had little influence. The sugar content was usually highest on the plots which produced the best yield of beets on each soil. When large quantities of $NaNO_3$ were applied or when the $NaNO_3$ was applied late in the season, the sugar content was lowered. Relative sugar content was not influenced by the intensity of the light, until growth was inhibited. Catalase activity is positively correlated with vigor of growth and size of plants. Oxidase activity is greater in every case in which the growth of the plant is inhibited. Forty-six references are cited. C. R. FELLERS

Lysimeter investigations. I. Nitrogen and water relations of crops in legume and non-legume rotations. R. C. COLLISON AND J. E. MENSCHING. N. Y. Agr. Expt. Sta., *Tech. Bull.* **166**, 5–90(1930).—An unproductive soil was used in 8 tanks while a fertile Ontario loam was used in 12. In the main, 2 rotations were compared, first alfalfa 2 yrs. followed by barley and wheat, and second, timothy 2 yrs. followed by barley, then wheat. In these legume and non-legume rotations special attention was paid to N relationships. Sufficient P and K were added to all tanks to insure an excess of these elements. Practically all drainage occurred between Nov. 1 and May 1 each yr. The amt. of drainage varied with the pptn., cropping system, kind of crop, and with temp. The amt. of drainage from any tank was largely a reflection of the total amt. of dry matter removed in the crops. From an av. annual rainfall of 35.4 in. only 9 in. for the Hill soil and 7 in. for the Ontario loam were accounted for in the drainage. Moisture may have been inadequate for max. plant growth, though crop yields were large. Alfalfa in the rotation was the single factor responsible for high yields on both soils. The crop immediately following alfalfa derived the greatest benefit. Almost all N lost in the drainage water was in the form of nitrate, most of the N being lost the first and fourth years of the rotations. Nitrates were almost completely exhausted from the soil by growing crops of either timothy or alfalfa. Nine lb. of N per acre per yr. was added to the soils by natural pptn. The greatest N loss in soils was in crop removal. From 4 to 6 times as much N was removed by the crops as in the drainage water. The quantity of N lost during 12 yrs. was approx. $^1/_4$ of the total soil N present at the beginning of the expts. The content of N in crops increased materially with an increased available soil N supply. Under some conditions cereal straw had twice as much N as when grown in N-poor soils. Four-ft. deep tanks produced more dry matter than either 2- or 8-ft. tanks. Twenty-seven references are appended. C. R. FELLERS

Desert guano in Chile. W. WETZEL. *Chem. Erde* **5**, 260–75(1930).—Desert guano is found in the Toco desert, central Atacama, at spots which were formerly the breeding grounds of sea birds. It contains the mummified remains of birds and of lower organisms. The material is humus-like and is largely sol. in NH_3 soln.; sandy impurities and salts (P_2O_5 3.89%) are present in smaller quantity. The org. (mummy) substance contains C 41.2, H 5.2, O 37.1, N 16.2%, and the chitinous material, insol. in NH_3 soln., contains C 38.4, H 5.7, O 37.9, N 20.1%. B. C. A.

Liming experiments [on soils]. O. NOLTE AND M. RAUTERBERG. *Mitt. deut.-Ges.* 1929, 565.—The importance of liming in conjunction with the increasing use of artificial fertilizers is emphasized. Field trials show that the effect of lime on crop yields can be closely correlated with the soil's content of exchange acidity and $CaCO_3$ but not with the total Ca content and H-ion concn. B. C. A.

Alterations of soil structure by natural and artificial fertilizers. G. HAGER. *Mitt. deut. landw. Ges.* **1929**, Stück 1, 143.—Humus and basic Ca compds. are indispensable for the maintenance of good soil structure. $CaCl_2$, $Ca(NO_3)_2$ and gypsum are less effective, since they are not intimately assocd. with the soil particles and cannot remove soil acids. Basic Mg compds. are similarly favorable to soil structure but to a smaller extent

than the corresponding Ca salts. On account of the formation of $(NH_4)_2CO_3$ from the urea contained in liquid manure, the latter tends to incrust and "puddle" heavy soils. Superphosphate has no effect on soil structure, and no unfavorable effects result from the use of $(NH_4)_2SO_4$ or combined fertilizers contg. NH_4 salts. The unbalanced use of potash salts and of $NaNO_3$ is injurious to soil structure, but the ill effects may be avoided by the judicious combination with other fertilizers. B. C. A.

Thermophosphates from Khibinsk apatite-nepheline rocks. S. N. Rozanov. *Udobrenie i Urozhai* (*Fertilizers and Crops*) **2**, 105–9(1930).—Two samples of the phosphates, one contg. 11.55% of P_2O_5, the other contg. 31.52% P_2O_5, were treated by various thermal fusion methods. By the Wiborg method (fusion with Na_2CO_3) at a temp. of 1000° for 1 hr. the first sample of phosphate (low in P_2O_5) became citrate sol. (100%) when treated with 25% Na_2CO_3, while the second sample required 50% Na_2CO_3 to obtain similar results. Fusions by the Volter method at 1000° with various proportions of Na_2CO_3, $CaCO_3$, SiO_2, and coal did not give as good results as the Wiborg method. Sample one gave higher yields of citrate-sol. P. There was very little increase in sol. P when the temp. was increased from 1000° to 1250°. Fusions were also made with carnalite (20 min. at 700°) according to the Easthard method and the highest yield obtained was 71% with the low-grade phosphate. For the Rhenania process 100 parts of the phosphate was mixed with 25 parts $CaCO_3$ + 25 parts of Na_2SiO_3 or 10 parts $CaCO_3$ + 50 parts Na_2SiO_3 and heated at 1200°. The results were favorable only with the higher amts. of Na_2SiO_3. Mixts. of the rock with nepheline and KCl at 1000° gave no results. Of all the processes tested the Na_2CO_3 fusion proved to be the best. J. S. Joffe

Commercial fertilizers, 1930. James M. Bartlett. Maine Agr. Expt. Sta., *Official Inspection Bull.* **137**, 38–64(1930).—Inspection analyses are given. *Colloidal phosphate*, a new rock phosphate flour from Fla., showed 20.5% P_2O_5 and no K_2O or N. Field expts. with this fertilizer were inconclusive. C. R. Fellers

"Nitrophoska" as a fertilizer. O. Nolte and M Rauterberg. *Mitt. deut. landw.-Ges.* **44**, 62(1929).—Fertilizer trials in 1928 confirm the satisfactory nature of "Nitrophoska" as a complete fertilizer. Soils must be well limed to insure regular and certain results from this fertilizer. B. C. A.

Flax and mineral fertilizers. A S. Mitrofanov. *Udobrenie i Urozhai* (*Fertilizers and Crops*) **2**, 86–93(1930).—M. reports fertilizer expts. conducted on the non-chernozem soils with flax in various rotations. The calcns. were made with the Mitscherlich formula. The following results were obtained: Flax responds best to a complete fertilizer. N is more effective in combination with P. Heavy applications of N and P have an injurious effect on the yield of fiber and its quality. This is especially true with N. Potash applications somewhat decrease this injury. There were no sharp differences from the various sources of N or K. A light application of a complete fertilizer on the crops succeeding clover and preceding flax is very favorable. At a p_H 4.5 obtained with a salt ext. high applications of lime had no effect. J. S. J.

Summary of the results obtained from field experiments with fertilizers. XIII. Fertilization of flax. L. L. Balashev. *Trans. Sci Inst. Fertilizers* (Moscow) No. 69, 5–46(1930); cf. *C. A.* **23**, 231; **24**, 1925, 5098.—The response of flax to fertilizers differs from the grains inasmuch as it has been shown that flax takes from the soil only 1/3 of its nutrient requirements in the first 45 days of its vegetative period and continues to absorb nutrients to the end of its vegetative life. Flax is very sensitive to an increase in the concn. of the soil soln. and naturally is sensitive to mineral fertilization. High applications of lime adversely affect the seeds. NaCl is favorable for the fiber quality. Phosphates act beneficially on heavy soils. N and especially K are beneficial for light soils. Thomas slag is more efficient than acid phosphate. The quality of fiber is improved by P applications. **XIV. Influence of fertilizers in the Government of Kiev.** S. T. Antoshin. *Ibid* No. 71, 17–166.—A. reviews the fertilizer expts. conducted in the region with rye, potatoes, oats, lupines, sugar beets and wheat on some chernozem and degraded chernozem soils. P was found to be lacking in all soils, followed by N; K showed beneficial effects on meadows and light soils. J. S. J.

The response of various plants to a complete fertilizer. F. A. Shwartz. *Udobrenie i Urozhai* (*Fertilizers and Crops*) **2**, 102–4(1930).—A complete fertilizer, $(NH_4)_2SO_4$, superphosphate, and 40% potash salts, was applied (40 kg. each of N, P_2O_5 and K_2O) to spring wheat, barley, oats, vetch and oats, flax and potatoes. All the crops except spring wheat responded very favorably. Spring wheat responded to fertilizer applications (18 tons per hectare) or when following clover. J. S. Joffe

Fertilizer and crop rotation experiments. T. E. Odland, S. C. Damon and J. L. Tennant. R. I. Agr. Expt. Sta., *Bull.* **224**, 5–42(1930).—Very satisfactory yields of

all crops have been maintained without the use of stable manure in the non-manure rotations. The greatest gain from including legumes in the rotation was realized on the hay crops. Reducing the P in the fertilizer by 50% did not reduce the yields of potatoes or hay, but did materially reduce the yields of the following corn crop. Corn yielded as well on low K plots as on the high K ones, but potatoes, hay, alfalfa, and clover showed markedly reduced yields when sufficient K was not furnished. Moderate N applications proved beneficial to all crops except potatoes, in which case, high applications were harmful. Increasing the amts. of the same fertilizer indicate that 700–1000 lb. of a 4-8-7 fertilizer was sufficient for corn; 2000 lb. for potatoes; 700 lb. for rye; and 1050 lb. for hay. C. R. FELLERS

Ammonium calcium balance: A concentrated fertilizer problem. L. G. WILLIS AND J. R. PILAND. *Soil Science* **31**, 5-23(1931).—Pot culture expts. were made with a sandy Norfolk soil of low absorptive capacity to study the toxicity of $(NH_4)_2HPO_4$, KNO_3 and KCl to cotton seedlings. The rate of application was 9.6 lb. per acre of a fertilizer analyzing 17.5% N, 35% P_2O_5 and 17.5% K_2O. Injury to seedlings was related in some way to $(NH_4)_2HPO_4$. Free NH_3 formed by hydrolysis appeared to be the most toxic factor. No injury was observed from the use of $(NH_4)_2SO_4$, NH_4Cl or NH_4NO_3, nor did the alky. of the $(NH_4)_2HPO_4$ appear to contribute to the injurious effect. Ca salts, and also Mg salts to some degree, were antagonistic to the NH_3 toxicity. The conversion of free NH_3 to $(NH_4)_2CO_3$ in the soil and its partial neutralization by reaction with Ca salts could account for the greater part of the beneficial effect of Ca salts but physiological antagonism was probably also a factor. $NH_4H_2PO_4$ alone produced a lesser degree of injury than did $(NH_4)_2HPO_4$. This relation was, however, reversed when $CaSO_4$ was admixed. M. S. ANDERSON

Effect of fertilizers on cranberry land. CHARLES S. BECKWITH. N. J. Agr. Expt. Sta., *Bull.* **501**, 3-16(1930).—The cranberry bog, because of its peculiar soil and water conditions, requires a special fertilizer mixt. Mud bottom cannot be safely treated with com. fertilizers unless the vine growth is very poor, and then only occasionally. Feore bottom, when the vine growth is poor, can be treated every 4 or 5 yrs. with 500 lb. of complete fertilizer to the acre with good results. Thirty pounds of N can be used efficiently on poor savannah land. On savannah land, $NaNO_3$ gave large increases during the first 5 yrs. as compared with dried blood, but during the remainder of the test, dried blood gave larger increases. About half of the N should be in the form of $NaNO_3$. Fertilizer applications increase the size of the berries and improve their keeping quality. C. R. FELLERS

The perspective of nitrogen fertilizers in the northern part of Ukrainian chernozem. S. P. KULZHINSKII. *Udobzenie i. Urozhai* (*Fertilizers and Crops*) **2**, 168–75(1930).—A comparison of the relative effectiveness of $NaNO_3$ and $(NH_4)_2SO_4$ with potatoes and sugar beets has shown that Chili saltpeter was superior. The applications which were made in connection with P and K fertilizers ranged from 15 kg. to 90 kg. per hectare. The sugar content in beets fertilized with $(NH_4)_2SO_4$ was lower than in those fertilized with $NaNO_3$. J. S. JOFFE

Nitrogen fertilization of wheat. A. DRAGHETTI, A CURINI-GALLETTI AND C. VIVIANI. *Ann. staz. sper. agraria Modena* [N. S.], **1**, 31-68(1930).—Field expts. were conducted for 3 yrs. on soils very low in N; Gibertini's method (wintry fertilization) is used with Ca phosphates, $CaCN_2$ and K_2SO_4. The wintry nitrification permits the regular adsorption of the salts, independently from the external conditions, and the method is very useful in very hard winters. G. A. BRAVO

The diphenylamine and brucine reagents in the control of nitrogen fertilization of wheat. A. DRAGHETTI. *Ann. Stas. sper. agraria Modena* [N. S.], **1**, 133–51(1930).—The sensitivity of the reagents was examd. Diphenylamine is the most sensitive, giving a pos. reaction with 0.001% KNO_3 soln. G. A. BRAVO

The forms and rate of application of nitrogenous fertilizers for oats. A. L. VELIKOLEPOV. *Udobrenie i Urozhai* (*Fertilizers and Crops*) **2**, 93–6(1930).—$NaNO_3$, $(NH_4)_2SO_4$, and $CaCN_2$ with phosphates, with lime, with both of them and without either one were tested as sources of N. The rates varied from 30 kg. to 120 kg. of N per hectare. It was found that with oats the best combination was N (in either form) with Ca and the combination of lime and P. The P alone did not show such good effects. High applications (120 kg. per ha) of $NaNO_3$ favored the availability of P. $(NH_4)_2SO_4$ with lime and phosphates was more effective than either $NaNO_3$ or $CaCN_2$. Very high applications of N favored greatly the yield of straw, much more than the grain. J. S. JOFFE

The action of nitrogen fertilizers on the yield and nicotine content of Nicotiana rustica. M. GÓRSKI AND S. KLARNER. *Roczniki Nauk Rolniczych i Lesnych* **24**, 208

(1930); cf. *C. A.* **24**, 5916.—Field expts. were made with increasing amts. of $NaNO_3$ and $(NH_4)_2SO_4$. With the application of $NaNO_3$ the yield increases nearly proportional to the quantity of fertilizer. $(NH_4)_2SO_4$ acts much more weakly than $NaNO_3$, especially with larger quantities; this is apparently due to its physiol. acidity. N fertilizing has a decided influence on the N content of *Nicotiana rustica* and therefore $(NH_4)_2SO_4$ is less suitable than $NaNO_3$. JOHN R. HILL

Relation of nitrogen fertilizer to the firmness and composition of strawberries. J. S. SHOEMAKER AND E. W. GREVE. Ohio Agr. Expt. Sta., *Bull.* **466**, 3–20(1930).—The Premier variety of strawberries produced slightly softer fruit when fertilized with spring applications of N. No significant results were obtained as to differences in moisture content or in shipping quality. N application appreciably increased the N content of the fruit; similarly, catalase activity was increased. The p_H value of the juice of berries from the N plots was consistently higher than that of the control plots. The content of reducing sugars, sucrose and total sugars increased with successive pickings. The reducing and total sugars of strawberries decreased in amt. where N was added; sucrose showed no consistent change. Late summer or fall fertilization, rather than spring, is recommended. C. R. FELLERS

Phosphorus fertilization of meadow land. II. E. TRUNINGER. *Landw. Jahrb. Schweiz* **43**, 653–98(1929).—Fertilization for 10 yrs. with 90 kg. P_2O_5 per hectare annually did not produce phosphate satn. in the top layer. Various types of P fertilizer were compared; application of superphosphate to acid soil is not recommended. B. C. A.

The response of winter wheat to phosphorus in the form of raw phosphates. F. V. CHIRIKOV. *Udobrenie i Urozhai (Fertilizers and Crops)* **2**, 96–8(1930).—From a series of tests with phosphates on degraded chernozem it was found that for winter wheat an application of 90 kg. of P_2O_5 as raw phosphate was equal to 45 kg. of P_2O_5 as superphosphate. It was also found to be effective on some deep chernozems. J. S. J.

The influence of gypsum on the availability of phosphoric acid from raw phosphate A. G. MIKHALOVSKII. *Udobrenie i Urozhai (Fertilizers and Crops)* **2**, 99–102(1930). Results of pot expts. on degraded chernozem with millet are: A double application of raw phosphates gave just as good results as a single application of sol. phosphate. A triple application was less effective. S is effective in solubilizing raw phosphates. The application was 2 g. of S per 3.5 kg. of soil. Equiv. amts. of S in the form of gypsum gave just as good results. J. S. JOFFE

Complete weed-eradicating fertilizers and their distribution. G. JAGUENAUD. *Compt.-rend. acad. agr. France* **16**, 1089–94(1930); cf. *C. A.* **23**, 3535; **24**, 195. A 3-5-6 mixt. is recommended for soils poor in N and a 1-4-6 mixt. for soils contg. more N. The efficiency of fertilizers as weed eradicators can be increased by the addn of $(NH_4)_2SO_4$. The best results were obtained with the 1-4-6 mixt. to which had been added $(NH_4)_2SO_4$ in proportions varying from $^1/_4$ to $^1/_{10}$ of the mixt. This mixt. should be prepd. just before application and should be dusted while the leaves are moist. J. R. ADAMS

Feeding value of alfalfa hay treated with calcium arsenate. H. J. FREDERICK. Utah Agr. Expt. Sta., *Bull.* **223**, 8 pp.(1930).—Alfalfa hay, dusted with 3–6 lb. of Ca arsenate to the acre and fed for 40 days to horses, cattle, and sheep with no other feed except water and salt, showed no actual injurious effects on livestock. Alfalfa dusted with 2 lb. of Ca arsenate to the acre, the amt. commonly used for destroying alfalfa weevil, may be fed to livestock with impunity for at least 1 feeding season. Where treated alfalfa hay was fed, more water but not so much hay was consumed, as As in the treated hay seemingly acted as a stimulant or tonic for the animals. C. R. F.

The composition of commercial calcium arsenate. C. M. SMITH AND C. W. MURRAY. *Ind. Eng. Chem.* **23**, 207–8(1931).—The av. analysis of 16 com. calcium arsenates is given and an av. mol. quotient CaO/As_2O_5 of 3.4 is obtained. This establishes the presence of a basic arsenate. The av. com. product contains 80 to 85% of what is probably a mixt. of $Ca_3(AsO_4)_2$ and this basic arsenate, together with about 6.5% each of $Ca(OH)_2$ and $CaCO_3$ and small amts. of other impurities. J. R. ADAMS

Calcium arsenate as a universal preparation against injurious insects. N. SAKHAROV. *Udobrenie i Urozhai (Fertilizers and Crops)* **2**, 114–5(1930).—Tests with Ca arsenate dusting (38% As_2O_5) on mustard and sugar beets gave very good results against the various insect pests. J. S. JOFFE

A preliminary summary of investigations for the year 1929 on the effectiveness of various chemical methods in combating insect pests and diseases which attack plants. G. D. UGRYUMOV AND I. I. TRAUT. *Udobrenie i Urozhai (Fertilizers and Crops)* **2**, 45–53(1930).—The authors discuss the results of expts. on the methods of treating grain against wet smut, extermination of rodents, and measures against insect pests.

With the smut it was found that the order of effectiveness of the various substances was: Hg poisons (germisan, trillantin), formalin, Cu sulfate, arsenates, Paris green, Cu carbonate and K chromate. For the extermination of rodents chloropicrin gave better results than CS_2 in most of the regions, except Siberia. Ca cyanide gave even better results than chloropicrin. *p*-Dichlorobenzene was used successfully against fleas in the nests of the rodents. Tl sulfate, F prepns. and strychnine were used as bait; strychnine was most effective. The Tl sulfate gave good results with rats. The Na compds. of F proved even better than As compds. against insect pests. A series of tests was made with polysulfides and the Ba salt proved to have higher fungicidal power than the Na or Ca. Besides it does not burn the leaves. As to sticking qualities a mixt. of Ba polysulfide and Bordeaux mixt. (only 0.5% Cu sulfate) gave very good results. Soil disinfection was also studied. It was found that the character of the soil and amt. of rainfall are of primary importance. Sandy soils lend themselves to disinfection better than heavier soils. *p*-Dichlorobenzene on heavy soils proved to be a failure. Polychlorides which have a higher vapor pressure and a high toxicity have a higher killing power than *p*-dichlorobenzene. The introduction of polychlorides in the upper soil horizons against phylloxera proved to be very effective. J. S. JOFFE

New protection against stored-grain insects. W. P. FLINT AND C. O. MOHR. Ill. Agr. Expt. Sta., *Bull.* **359**, 377–88(1930); cf. *C. A.* **24**, 3596.—Some of the common oil emulsions and miscible oils used in spraying fruit trees will protect ear corn dipped in these mixts. from attack by many insects that injure stored grain. The highly refined oils were equally effective and did not injure germination. Boiled home-made lubricating oil emulsion was very effective in protecting ear seed corn against damage by insects. K oleate in the emulsions did not injure germination. Preliminary feeding tests indicate that the treated corn can be fed to hogs, cattle, horses and chickens without harmful effect. C. R. FELLERS

Carbolineum as insecticide from the physicochemical standpoint. S. JENČIĆ. *Arhiv hemiju. Farm.* **4**, 176–93(193–4 German)(1930). -Reference is made to the work of Chwala, Houben and Hillgendorff, Trappmann and others. The various tar emulsions, found on the market, their stability, evaluation and analyses are discussed. As the toxicity is closely related to their ability to form stable emulsions, the stability, the fixing and adhering ability of various grades were investigated in some detail. J. KUČERA

The determination of pyrethrins in pyrethrum-base insecticides. LS. A. DESHUSSES AND J. DESHUSSES. *Mitt. Lebensm. Hyg.* **21**, 304-12(1930).—The Tattersfield-Hobson method (*C. A.* **23**, 5538) gives errors of 3% for pyrethrin 1 and 7% for pyrethrin 2 With emulsions the emulsion is broken by the addn. of $MgCl_2$ or $CaCl_2$, excess of plaster of Paris is added and the dried mass extd. with pure ether, which gives satisfactory checks. F. L. SEYMOUR-JONES

Control of celery blights. J. D. WILSON AND A. G. NEWHALL. Ohio Agr. Expt. Sta., *Bull.* **461**, 3–30(1930).—Spraying with a 5-5-50 Bordeaux mixt. and dusting with a 20-80 $CuSO_4$, H_2O-$Ca(OH)_2$ dust were equally effective methods of control of celery blight (*Septoria apii*). The use of oil spreaders did not materially increase the efficiency of the Bordeaux mixt.; similarly kaolin and infusorial earth were of doubtful value as adhesives for the spray or dust. Increasing the metallic Cu content of a dust over the usual 7% increased somewhat, its fungicidal efficiency, though not sufficiently to pay for the increased cost of the Cu. C. R. FELLERS

Combating damping-off of tomatoes by seed treatment. JAMES G. HORSFALL. N. Y. Agr. Expt. Sta., *Bull.* **586**, 3–22(1930).—Seeds soaked in a $CuSO_4$ soln., 1 lb. in 8 gals. of H_2O, for 10 min. to 24 hrs., gave a remarkable increase in stand and freedom from disease of the merged seedlings in greenhouses. Tomato seeds are extremely resistant to Cu injury for they can successfully stand in a 7.2% soln. of $CuSO_4$ for 2 hrs without injury. Seedling plants may be injured by as little as 0.5% soln. applied to the soil at the rate of 1 qt. per sq. ft. A $CuCO_3$ dust also gave good results in disease control. $Cu(CN)_2$ caused serious germination injury as did calomel, HgS, HgO, Semesan, Ceresan and Dipdust. C. R. FELLERS

Sodium acid sulfate as a disinfectant against Salmonella pullorum in poultry-yard soils. P. W. ALLEN AND M. JACOB. Tenn. Agr. Expt. Sta., *Bull.* **143**, 3–14(1930).—Poultry was protected against infection from contaminated soil when a 5% soln. of $NaHSO_4$ was applied to the soil at the rate of 1 gal. to 1 sq ft of soil. No harmful effects on the fowls were noted There was little or no detrimental effect on the growth of grass. There is some evidence that the $NaHSO_4$ is of value in controlling internal parasites in poultry. Undesirable properties are: corrosion of metals, destructiveness to cloth and irritation of hands. The sterilizing effect of $NaHSO_4$ is attributed to the free acid content. C. R. FELLERS

Control of bunt or stinking smut of wheat. F. D. HEALD AND E. F. GAINES Wash. Agr. Expt. Sta., *Bull.* **241**, 5–30(1930).—$CuCO_3$ when used at the rate of 3 oz. per bu. for treating spring wheat gave an av. control of 99.55% against bunt (*Tilletia* sp.). Of the 17 samples of $CuCO_3$ tested, none was markedly superior. Both $CuSO_4$, 20% soln., and 1 to 320 CH_2O, when applied for 10 min. to winter wheat seed, gave moderately good results, but not nearly as good as with spring wheat. A new com. org. Hg disinfectant called Ceresan was fully as effective as $CuCO_3$ in protecting wheat from bunt infection. The use of bunt-resistant varieties of wheat is recommended, especially for winter sowing. C. R. FELLERS

Influence of fertilization on the baking quality of bread cereals (NEUMANN, NOLTE) **12.** N and its compounds (JOHNSON) **18.** The electrolytic production of $CaHPO_4$ from apatite in India (DAS) **4.** Domestic and foreign experiences of biological treatment of garbage [use as fertilizer] (VAN LOGHEM) **14.** Enriching Khibinsk apatite by flotation (ERCHIKOVSKII) **18.** Polymerization and solubility of phosphates (DRAGUNOV) **18.** The composition of sugar beets in various crop rotations (NADEZHDIN) **28.** Utilization of agricultural wastes (GILMAN, *et al.*) **10.** Fumigant solution (U. S. pat. 1,790,095) **17.** Preserving granular substances containing unstable substances (Fr. pat. 692,266) **13.** Compositions for combating animal or vegetable pests, particularly for treating seeds (Ger. pat. 514,284) **18.**

GRAY, A. N.: **Phosphates and Superphosphates.** London: International Superphosphate Manufacturers' Assoc. 276 pp. Limp leather, $2. Reviewed in *Chem. Trade J.* **88**, 51, 53(1931).

HULBERT, ARCHER B.: **Soil.** New Haven: Yale Univ. Press. 227 pp. Reviewed in *Soil Science* **31**, 83(1931).

KREBIG, L. VON: **Die Bedingungen der Wirtschaftlichkeit der Handelsdüngemittel.** Berlin: P. Parey. 128 pp. Reviewed in *Soil Science* **31**, 79(1931).

LUNDEGÅRDH, HENRIK: **Klima und Boden in ihrer Wirkung auf des Pflanzenleben.** 2nd ed. Jena: Gustav Fischer. 480 pp. Reviewed in *Soil Science* **31**, 81(1931).

Lime nitrogen. CARL EHRENBERG. Ger. 514,253, Aug. 26, 1928. A granular product is prepd. by mixing lime nitrogen with about 15% of a dry humate, preferably an alkali or NH_4 humate, compressing the mixt. into briquets, and granulating the briquets.

Urea. N.-V. DE BATAAFSCHE PETROLEUM MAATSCHAPPIJ. Brit. 335,421, Nov. 13, 1928. A suitable NH_3-CO_2 compd. is mixed with an indifferent viscous liquid of high b. p., such as transformer oil, and brought under pressure at an elevated temp. (a pressure of 100 atm. and temp. of 150–200° are used) with or without presence of a catalyst. Unconverted NH_3 and CO_2 may be recovered from the product by distn. and an aq. soln. of urea sepd. from the oil. Addnl. substances may be introduced at different stages in the course of the process to form mixed *fertilizers*.

Carbon dioxide fertilizer plant. FRIEDR. RIEDEL. Ger. 511,809, May 3, 1928. The plant consists of a coal-burning furnace to produce the CO_2 mixt. and an irrigation tower up which the gas passes against a current of water to remove constituents harmful to plants. Cf. *C. A.* **25**, 1026.

Dicalcium phosphate. A. HOLZ and T. VAN D. BERDELL. Brit. 335,007, July 30, 1929. Rock phosphate is treated with a mixt. of HCl and H_2SO_4 in equiv. proportions. $CaSO_4$ is filtered off and the filtrate contg. H_3PO_4 and $CaCl_2$ may be treated with NaOH and $Ca(OH)_2$ to form di-Ca phosphate and a soln. of alkali metal chloride. The acid mixt. used may be produced by electrolyzing a soln. of alkali metal chloride and passing the Cl evolved with an equiv. proportion of SO_2 into water (the alkali metal hydroxide formed being also used in the process). Various details and modifications of procedure are described. Cf. *C. A.* **24**, 4889.

Converting phosphoric acid into a product suitable for transportation and for use as a fertilizer. NORSK HYDRO-ELEKTRISK KVAELSTOFAKTIESELSKAB. Norw. 45,688, Oct. 15, 1928. H_3PO_4 is mixed with SiO_2 or silicates and the mixt. is heated to temps. not exceeding 650°. Compds. of the type $xP_2O_5.ySiO_2$ are obtained which contain the P_2O_5 in water-sol. form.

Fertilizer. NORSK HYDRO-ELEKTRISK KVAELSTOFAKTIESELSKAB. Norw. 45,714, Oct. 22, 1928. "Silica-phosphate" (cf. preceding abstract) is used in mixt. with other fertilizing materials, the plant nutrient substances of which are converted into a more sol. or, in other respects, more suitable form by means of the phosphoric acid.

Fertilizer. NORSK HYDRO-ELEKTRISK KVAELSTOFAKTIESELSKAB. Norw. 46,524, June 3, 1929. A mixt. of NH_4NO_3 and $CaCO_3$ is heated with const. stirring, in the presence of moisture, until agglomeration takes place.

Fertilizers. SIEMENS & HALSKE A.-G. (Georg Erlwein, inventor). Ger. 513,416, Sept. 13, 1928. The product obtained by opening up crude phosphate with HCl in known manner is heated in an elec. induction oven. P vapor is evolved, and is passed to a reaction vessel supplied with H_2O and Cl gas, a mixt. of H_3PO_4 and HCl being produced. This mixt. is sepd. by distn., and the H_3PO_4 is either converted into $(NH_4)_2HPO_4$ or reacted with crude phosphate. The HCl is used again in the process.

Fertilizers. I. G. FARBENIND. A.-G. Fr. 690,870, Mar. 1, 1930. Solid $(NH_4)_2HPO_4$ is made by drying a concd. soln. of $(NH_4)_2HPO_4$ after mixing it with solid $(NH_4)_2HPO_4$. If a fertilizer is required one or more fertilizing salts are added before drying.

Fertilizers. SOC. VILAIN FRÈRES. Fr. 691,396, Feb. 28, 1930. Mg rocks such as giobertite, magnesite, periclase, carnallite, kainite, serpentines, steatites and dolomite are sorted, washed, treated with a mineral acid such as HCl, HNO_3, H_2SO_4 or H_3PO_4 or with an acid salt or at a high temp. with CO_2, NH_3, H_2SiO_3, C, N, etc. The products are used directly as fertilizers or for the prepn. of complex NH_4-Mg fertilizers. Cf. *C. A.* **24**, 2539.

Protecting agent and stimulant for plants, etc. KURT LEVIN Ger. 514,155, April 1, 1926. A protecting agent and stimulant for wet or dry application to plants or seeds comprises MnF_2 or its addn. compds., *e. g.*, $KMnF_3$ or NH_4MnF_3, alone or with other stimulants, fungicides, diluents, etc.

Insecticide. ALBERT P. SACHS (to Larvex Corp.). U. S. 1,789,565, Jan. 20. A compn. for moth-proofing textile materials comprises Na_2SO_4, NaF and a bitter ext. such as ext. of aloes or quassia.

Insecticide. RURIC C. ROARK and RICHARD T. COTTON (to the Government and People of the U. S. A.). U. S. 1,789,322, Jan. 20. A non-inflammable mixt. is formed by mixing a non-inflammable liquid such as CCl_4 or C_2Cl_4 with an ester of a halogenated aliphatic acid such as Me, Et, iso-Pr or Bu monochloroacetate. The mixt. is suitable for use as a spray, for fumigating grain, etc.

Insecticide. SCHERING-KAHLBAUM A.-G. (Walter Schoeller and Herbert Schotte, inventors). Ger. 512,871, Feb. 9, 1929. Insecticides contg. poison and hormone-like substances are described. Examples mention thyroxine with $Ca_3(AsO_4)_2$, and $Cu(OH)_2$, and hormone prepns. from mammals blood with As_2O_3.

Insecticides. STANDARD OIL DEVELOPMENT CO. Fr. 690,775, Feb. 27, 1930. An insecticide is composed of a white petroleum oil, an ext. from a plant having insecticide properties, such as the pyrethrum type, and an emulsifying agent. Cf. *C. A.* **24**, 2849.

Emulsions of oil and water suitable for spraying trees and plants. CHARLES E. OLIVER. U. S. 1,790,070, Jan. 27. A mixt. of oil and rosin is mixed with an aq. casein soln. separately prepd.

Protecting potatoes against rot. CHEMISCHE FABRIK VON HEYDEN A.-G Ger. 514,045, Dec. 31, 1926. Sulfohaloamides or their salts are applied to the soil. The Mg salt of *p*-toluenesulfochloroamide is specified.

Facilitating germination of seeds. WARREN-TEED SEED CO. Brit. 335,102, Nov. 15, 1928. Seeds such as those of clover, alfalfa, onion or sweet pea are soaked for 20–60 min. in a liquid such as a saccharin soln., preferably at a temp. of 20–45°; the swelled seeds are sepd. by screening and use of a current of water and the remaining seeds are moderately scarified and again soaked and the swollen seeds are sepd. and the remaining seeds scarified, the seeds being subsequently mixed together and sown. A 22° Bé. glucose soln. may be used for the soaking. Weed seeds that do not readily swell are sepd. when the swollen seeds are removed after the last scarification.

Immunizing seed grain. I. G. FARBENIND. A.-G. Brit. 334,847, May 1, 1929. In treatments such as immunizing seed wheat from stone blight, there are used hydroxy diaryl- and triarylmethane compds. contg. one or more halogen phenol radicals such as the product obtained by condensing formaldehyde with 2 mol. proportions of *p*-chlorophenol in the presence of H_2SO_4 or similar compds. (which may be mixed with a diluent such as powd. talc). Several examples are given.

Apparatus for generating gases for fumigating grain, etc. JOHN FOX. U. S. 1,790,139, Jan. 27. Structural features.

Fungicides for seeds. I. G. FARBENIND. A.-G. (Wilhelm Bonrath, Karl Marx, Carl Taube and Karl Brodersen, inventors). Ger. 514,210, Aug. 17, 1929. Quinoneimides or their derivs. are used, alone or with other fungicides, diluents, adhesives or wetting agents.

Fungicides for seeds, etc. IGNAZ KREIDL. Austrian 119,968, June 15, 1930.

Insol. or difficultly sol. fungicides for dry application to seeds, etc., are mixed with hygroscopic compds., preferably such as will convert the fungicides into sol. compds. Thus, $CuCO_3$ 3 may be mixed with $Ca(NO_3)_2$ or $CoCl_2$ 1 part.

Cauterizing agent for seed goods. I. G. FARBENIND. A.-G. (Adolf Steindoff, Kaspar Pfaff and Paul Igler, inventors). Ger. 512,951, April 29, 1926. The prepn. contains mercurized arylarsonic acids or salts. Mercurized 3-acetamido- or 3-nitro-4-hydroxyphenylarsonic acids are mentioned as examples. Cf. *C. A.* **25**, 768.

Compositions for killing weeds. R. N. CHIPMAN. Brit. 335,203, Dec. 22, 1928. Weed-killing compns. such as solns. of Na, K or Ca chlorates are rendered more efficient by making them neutral or acid by the addn. of various specified common inorg. or org. acids or acid salts. Cf. *C. A.* **24**, 2828.

Animal dip. KARL BRODERSEN and WERNER EXT (to Winthrop Chemical Co.) U. S. 1,789,668, Jan. 20. A dip suitable for treating sheep comprises Na arsenite, colloidally dispersed As_2S_3, colloidally dispersed S and cell pitch (from sulfite cellulose liquor). Cf. *C. A.* **24**, 213.

Animal pest preventative. I. G. FARBENIND. A.-G. (Karl Marx and Karl Brodersen, inventors). Ger. 511,544, Mar. 7, 1929. The prepn. contains alkylene oxides which have at least 3 C atoms and which boil below 100°, so that they give off vapor at relatively low temps. to prevent, *e. g.*, the attacks of grain weevil. C_2H_4O and C_3H_6O are mentioned as examples.

Combating subterranean pests. ALEX DERICHSWEILER. Ger. 483,066, Mar. 30, 1926. CH_2O, C_6H_6 or other disinfectant is absorbed in calcined Na_2SO_4 or other suitable salt, and the granules of the non-coherent mass so obtained are coated by treatment with concd. waterglass. The compn. is then applied to the soil.

16—THE FERMENTATION INDUSTRIES

C. N. FREY

Formation of acids during fermentation. W. WINDISCH, P. KOLBACH AND R. ILLIES. *Wochschr. Brau.* **47**, 417–21, 427–31, 437–41(1930).—The Windisch, Reimers and Hirschbruch method for detg. esters in beer is improved. The influence of the CO_2 upon these tests is eliminated. Different mashes were prepd. by changing the p_H, resulting in worts with various p_H values and N contents. The fermentation of these worts did not show a regular correlation between acid formation and compn. Worts started with identical p_H showed some correlation in acid formation and NH_3 consumption insofar as the strongest acid formation was observed on the samples with highest NH_3 consumption. The compn. of the wort was changed on 2 malt samples by using different mashing processes. Mashing with a long protein rest increased the action of proteases and phosphatases. One of the 2 malt samples examd. showed less acidity with longer protein rest; no such correlation, however, was found on the other sample. It was found that the changes in mashing affected the compn. of the wort in so many respects that the effect of the individual factors on the fermentation could not be detd. Therefore, later expts. were confined to a study of the effect of acidity. The p_H was adjusted by NaOH and HCl. The assertion that yeast tends to produce a certain optimum acidity regardless of the acidity of the wort could not be confirmed. The effect of different acids (HCl, H_2SO_4, H_3PO_4 and lactic acid) upon the acid formation was studied, but no differences were found. Addn. of increasing amts. of AcOH seems to cause a const. decrease of the acidity during fermentation. The reasons are discussed. Increasing amts. of buffer with the same starting p_H raised the acidity during fermentation with non-fermentable buffer salts. The formation of esters is considered to be of minor importance. Correlation between total-N and formol-N assimilation, resp. and acid formation could not be detected. S. JÓZSA

The present position of citric acid fermentation. ALFRED FREY. *Chem.-Ztg.* 55, 40(1931). E. H.

Xylose as a nutritive substratum for citric acid fermentation. ALFRED FREY. *Z. angew. Chem.* **44**, 16–21(1931).—Xylose wort prepd. by the Scholler-Tornesch method must be purified to use as a substrate for citric acid formation by *Citromyces*. Furfural and other aldehydes must be removed by steam distn. or by treatment with active charcoal. By increasing the area of reaction the acid yield can be raised to 20% of the added reducing sugar. The addn. of $CaCO_3$ increases the yield. The amt. of acid is only a fraction of the 50% yield possible with pure sugar. MARY E. LEAR

Fermentation of molasses produced from refined sugar factories. N. TAKETOMI

AND T. MATSUMOTO. *J. Soc. Chem. Ind., Japan* **33**, Suppl. binding 531(1930).—The low yield of EtOH from fermentation of Formosan cane molasses is due to the presence of glutose, and in some cases to insufficiency of nitrogenous yeast nutriment (*J. Soc. Chem. Ind, Japan* **30**, 389, 109B; **31**, 856, 206B). NH_4 salts increase greatly the fermentation velocity of refined sugar molasses, but Mg and Ca salts and K diphosphate have no noticeable effect. A suitable amt. of $(NH_4)_2SO_4$ or NH_4 phosphate is 0.1–0.4 g. per 100 cc. of 16.5–17.5° Brix molasses. Refined sugar molasses contains 4.5–6% of glutose, an unfermentable hexose. Glutose phenylosazone was prepd. and photomicrographs are shown. E. M. SYMMES

New process of drying potatoes and the manufacture of alcohol therefrom. B. LAMPE AND W. KILP. *Z. Spiritusind.* **53**, 191–3, 199–200(1930).—The process combines drying plant and distillery processes. One part of potato juice is obtained from 2 parts of washed macerated potatoes. The remainder of the potato pulp contains 60% of moisture. The potato juice, which contains a considerable amt. of salts, proteins and small quantities of starch, will be utilized in the distillery as a mashing liquor to soak and saccharify the dried potatoes. The pulp is dried carefully and the temp. is not allowed to go above 50° during the first 3 hrs. Thereafter it is gradually raised to 100°, resulting, after 6 hrs. of total operation, in potato flakes of 14% moisture. The use of the juice as mashing liquor makes low mashing temps. possible and a slope of high feeding value is obtained. Three different mashing processes were studied on a lab. scale, and their yield results are given. Practical directions to be followed in processing dried potatoes for distilleries with and without the use of potato juice are finally given. S. JÓZSA

The determination of extract and sugar in wine vinegar and cider vinegar with consideration of the presence of acetylmethylcarbinol. J. PRITZKER AND ROB. JUNGKUNZ. *Mitt. Lebensm. Hyg.* **21**, 354–62(1930); cf. *C. A.* **20**, 2386.—Indirect extn. by the Swiss official methods gives equal or higher results than the direct extn., because of the presence of acetylmethylcarbinol (*A*) in vinegar, which also affects the detn. of sugars because of its reducing action on Fehling's soln. *A* can be detd. by oxidizing it to the diacetyl compd. with $FeCl_3$ and pptg. it as the Ni dimethylglyoxime. In detg. sugar in vinegar *A* must be removed by repeated evapn. with added water. F. L. SEYMOUR-JONES

Monoiodo- and monobromo-acetic acid poisonings in carbohydrate breakdown. RAGNAR NILSSON, KARL ZEILE AND HANS V. EULER. *Z. physiol. Chem.* **194**, 58–68 (1931).—Poisoning of dried yeast by ICH_2CO_2H or $BrCH_2CO_2H$ suppresses the formation not only of hexosediphosphoric acid but also that of hexosemonophosphoric acid. NaF under the same conditions suppresses only the hexosediphosphoric acid formation. A further difference between ICH_2CO_2H and NaF poisoning is the absence of AcH reduction in the presence of glucose and hexosediphosphoric acid when ICH_2CO_2H is added. Lundsgaard's observation (*C. A.* **24**, 3256) that the respiration and the fermentation functions of yeast can be sepd. by ICH_2CO_2H poisoning is corroborated. The sepn., however, is possible only with a definite concn. of the poison; with higher concns. the respiration also is inhibited. Reduction of methylene blue is likewise suppressed by the higher concns. The inhibition of fermentation without impairment of respiration probably does not involve the entire anaerobic reaction chain. It may be that the fermentation process stops just short of its final stage where the remaining step is not essential to respiration. A. W. DOX

Metafiltration and the brewing industry. J. A. PICKARD. *J. Inst. Brewing* **36**, 179–88(1930).—It is possible to filter beer so that it is sterile on leaving the filter. For hazy beers some metisil is added to the beer during filtration. The filter is cleaned by reversing a flow of water through it and draining the loosened cake. PETER J. F. WEBER

Comparative brewing trials with certain new and commercial varieties of hops. W. T. SMITH AND A. J. C. COSBIE. *J. Inst. Brewing* **36**, 91–6(1930); cf. *C. A.* **22**, 1430; **23**, 1463.—Brewery trials of some hybrids of Continental and Oregon hops with English male hops produced beers with hop flavor which resembled the foreign parents, and indicated that these hops should be judged as substitutes for foreign hops, rather than compared with the differently flavored English hop varieties. The brews also proved conclusively the superiority of the brew method of judging flavor over any other method, and showed particularly the limitations of hand examn. P. J. F. W.

Notes on hop drying in the Saaz and Hallertau Districts. A. H. BURGESS. *J. Inst. Brewing* **36**, 97–8(1930).—Kiln drying of hops appears to have entirely superseded the old practice of drying without artificial heat. Kilns used were of the "Linhart" and "Saazia" type; they are described in detail. PETER J. F. WEBER

An investigation of the desirability of extra-compression of hops. T. K. WALKER, J. J. H. HASTINGS AND A. G. ALDOUS. *J. Inst. Brewing* 36, 99–104(1930).—Hops which were compressed to a vol. half the normal size, without inflicting mech. damage, deteriorated so much less that the extra-compressed hops stored in an ordinary warehouse had preservative power and appearance equal to normally pressed hops in cold storage. When similarly stored the extra-compressed hops showed up better than the ordinary pressed hops. PETER J. F. WEBER

The chemical composition of the 1927 barley crop and malt and the worts and beers made therefrom. W. WINDISCH, P. KOLBACH AND E. SCHILD. *Wochschr. Brau.* 47, 357–61, 369–74, 381–4(1930).—The expts. were similar to those carried out on the 1926 barley crop (cf. *C. A.* 23, 4528). The formation of NH_3 was followed from barley to beer. The formation of volatile acids was detd. in wort and beer. The total P content was detd. in barley and in malt and also in their infusions. The org. P and the P not precipitable by Ba were also detd. on these infusions. The results are summarized. S. JÓZSA

Effect of varying the steeping period on barley. C. H. JOYCE. *J. Inst Brewing* 36, 131(1930).—Analyses are given of malts made with 4 types of barley which had been steeped for varying lengths of time. PETER J. F. WEBER

Technology of malting. Beers from floor malt and compartment malt. E. JALOWETZ. *Brau- und Malzind.* 23, 185–6(1930).—The biol., phys. and chem. examn of beers brewed from malts which have been produced from the same barley under comparable malting conditions by the flooring system and by the compartment system, gave values in very close agreement. S. L.

Technology of malting. IX. Comparative investigation of floor malt and pneumatic malts. (a) Drum malt. E. JALOWETZ. *Brau- und Malzind.* 23, 99–102 (1930); cf. *C. A.* 25, 555.—Comparative malting expts. were carried out on the same barley by means of the flooring system and by means of the drum system The mech. and chem. analyses showed that the 2 resulting malts were of equal quality and quant. compn. **(b) Compartment malt.** *Ibid* 167–71.—Equal results were obtained when the barley was malted under comparable conditions by the flooring system and by the compartment system Tables with analysis are given. **X. The influence of different steeping periods and germination temps. on the malt quality.** *Ibid* 205–8.—The quality of malt was not affected when the time of steeping and the germination temp. varied within certain limits. S. LAUFER

Musts and wines of the Modena Province. R. CARTENY. *Ann staz. sper. agrar. Modena* [N. S.], 1, 183–8(1930).— Analyses of the musts of 1928 and 1929 gave, resp. reducing sugars 16.5, 21.0%, total acid (calcd. as tartaric acid) 0.35, 1.30%. Analyses of wines of 1928 and 1929 gave, resp.: alc. 5.0–11.0, 8.0–14.5%, total acid 0.45–1.25, 0.5–1.1%. G. A. BRAVO

Experiments on different glasses used in bottle manufacturing. G. KEPPELER. *Wochschr. Brau.* 47, 352–4(1930).—K. analyzed 35 different glasses and concludes that chem. changes are not responsible for the changes taking place in bottles. He found that the color of the glass is very important. The spectral analysis revealed that in glasses transmitting a larger no. of short waves the beer showed increasing turbidity. Protein content and p_H were exactly checked on each sample and no differences were found. The haze which appeared in the bottles was found to be due to an increased pptn. of hop tannins and proteins. Brown glass, which proved in several cases less resistant to the chem action of beer, was found to afford greater protection against haze formation, and this was due only to the greater light absorption S. JÓZSA

Bottle glasses [for beer] (KEPPELER, MAENICKE) **19.** Apparatus for saturating liquids with gases, particularly for making beverages (Ger. pat. 513,265) **1.** Sterilizing and pasteurizing liquids such as beer (U. S. pat. 1,790,117) **13.**

JALOWETZ, E.: **Pilsner Bier im Lichte von Praxis und Wissenschaft.** 2nd ed., unchanged. Vienna: Verlag Institut für Gärungs-industrie. 138 pp.

C. N. RIIBER: **Ratio between the Content of Dry Matter and the Specific Gravity in Wort and Beer Extract [in Norwegian].** Trondhjem, Norway: F. Brun. 22 p. kr. 1.50.

Denaturing alcohol. I. G. FARBENIND. A.-G. (Carl Müller, Leo Schlecht and Hans Rötger, inventors). Ger. 512,712, Nov. 6, 1927. Alc. is denatured by the condensation product obtained by leading NH_3 and unsatd. hydrocarbons (especially

C_2H_2, etc.) over catalyzers at high temps. Thus, 96% alc. is denatured by the product obtained by passing NH_3 and C_2H_2 over a catalyzer at 350°.

Denaturing alcohol. I. G. FARBENIND. A.-G. (Leo Schlecht and Hans Rötger, inventors). Ger. 513,410, Aug. 3, 1928. Addn. to 512,712 (preceding abstr.). Alc. is denatured by addn. of S-contg. condensation products obtained by the action of S vapor or S-yielding compds. on unsatd. hydrocarbons. Thus, C_2H_2 and H are led over pyrites at 350° and the product used to denature alc.

Concentrating alcohol. ZELLSTOFFFABRIK WALDHOF and O. LÜHRS. Brit. 335,132, Jan. 10, 1929. In concg. aq. alc., such as 94% alc., by distg. with "calcined chalk" under pressure, small pieces of "chalk" carried over by the alc. vapors are removed by passing the vapors through a layer of abs. alc. before condensation.

Acetic and butyric acids, etc., by fermentation. H. LANGWELL. Brit. 334,900, June 11, 1929. In a fermentation process in which acids such as HOAc and butyric acid are neutralized to the required extent, as formed, with NH_3 or suitable NH_3 compds. such as the carbonate or substituted ammonias, NH_3 is subsequently liberated by decompn. of the resulting salt by the action of a non-volatile base such as lime or $CaCO_3$ and is recovered by distn. (suitably in successive stages with intermediate filtration of the liquid). For the fermentation, there may be used organisms such as those derived from fermenting vegetable matter, septic sewerage, soil, corn cobs, etc.

2,3-Butyleneglycol. T. H. VERHAVE. Brit. 335,280, June 26, 1929. A suitable carbohydrate mash contg. suitable phosphatic and N-contg. substances is fermented with bacteria capable of producing 2,3-butyleneglycol and, after an initial fermentation period, the alc. which is also formed is distd. off, a new portion of mash is added, reinoculated with bacteria (unless the distn. has been at such a low temp. that this is unnecessary) and further fermentation is conducted, followed by recovery of the alc. and 2,3-butyleneglycol produced. Various details and modifications of procedure are described. Cf. *C. A.* **24**, 1652.

Coloring sugar. FÉLIX ALBRECHT. Fr. 691,704, Mar. 11, 1930. A coloring sugar for beer, liquors, etc., is prepd. by liquefying solid sugar by means of concd. aq. NH_3 and heating the liquid in an autoclave to 105–120° for some time. The product is cooled and heated again to 105–120° and the pressure is reduced. Volatile products are removed by steam and the product removed from the autoclave.

Apparatus for the continuous distillation and rectification of wines, ciders, fermented liquids, benzene, gasoline, etc. ÉMILE GAZAGNE. Fr. 691,995, Mar. 15, 1930.

Rotary heater for beer-brewing coppers. "MIAG" MÜHLENBAU UND INDUSTRIE G. Ger. 512,556, Jan. 9, 1930.

Apparatus for fermenting wort and producing pure yeast cultures. VULKAN-WERKE A.-G. FÜR BRAUEREIBEDARF. Ger. 512,555, Mar. 6, 1927. Addn. to 349,258. The wort is circulated through spent hops.

Dried potatoes. MASCHINENFABRIK BUCKAU R. WOLF A.-G. Ger. 511,696, Feb. 13, 1929. Addn. to 498,557 (*C. A.* **25**, 1298). In drying potatoes by the method of 498,557, lactic acid pure cultures are added to the potato mash before the suction filtering process.

Yeast. VULKAN-WERKE A.-G. FÜR BRAUEREIBEDARF. Ger. 511,111, Mar. 3, 1929. In prepg. pure yeast cultures, a part of the culture is withdrawn after the fermentation into an auxiliary container from a level in the fermentation vessel at which impurities cannot settle. The yeast in the auxiliary container is used to initiate the next fermentation, after the fermentation vessel has been emptied, cleaned and recharged with fresh wort.

Yeast. M. FISCHL'S SÖHNE and FRANZ ROSENBERG. Austrian 119,946, June 15, 1930. In the manuf. of yeast by the aeration method, a quantity of seed yeast is supplied with an amt. of nutrient medium such as will enable the yeast to multiply at about the ideal rate, *i. e.*, logarithmically with the time, while substantially exhausting the nutrient medium. The yeast so obtained is used without sepn. as the initial material for a second similar fermentation and so on, the whole process thus comprising a series of fermentation "phases" of increasing vol., each phase being a complete fermentation in itself. The entire amt. of nutrient soln. required for each phase is added at the start of that phase and the process is continued until, on account of accumulation of poisons, etc., propagation at an approx. ideal rate is no longer attainable. A typical process is conducted in 7 phases of a total duration of 26.5 hrs. The theoretical basis of the method is fully discussed, and detailed examples are given. App. comprising a series of fermenting vats of successively increasing vol. is described.

17—PHARMACEUTICAL CHEMISTRY

W. O. EMERY

Limitations of phenol coefficients of coal-tar disinfectants. C. M. BREWER AND G. L. A. RUEHLE. *Ind. Eng. Chem.* **23,** 150–2(1931).—Data from 206 samples of coal-tar phenol disinfectants are given so that a comparison can be made between the *B. typhosus* and *Staph. aureus* phenol coeffs. The data show that it is unreliable to est. the efficiency of a disinfectant against other species of pathogenic bacteria from the *B. typhosus* phenol coeff. The coeff. is limited in usefulness to comparisons of different disinfectants against the test organisms. J. R. ADAMS

Chemical and photochemical oxidation of commercial adrenaline solutions. T. VACEK. *Compt. rend. soc. biol.* **100,** 583–4(1929).—The p_H values of com. adrenaline solns. varied between 1.6 and 4.0. The rate of oxidation with H_2O_2 and in light is independent of the p_H, while an increase in the rate with increasing p_H was observed with pure solns. of adrenaline-HCl. The intensity of photooxidation depends on the intensity of the light and on the wave length; irradiation with ultra-violet light alone causes less change than that with visible and invisible rays at the same time. B. C. A.

Significance of the degree of dissociation of acids in the oxidation of adrenaline. T. VACEK. *Compt. rend. soc. biol.* **100,** 585–6(1929).—The speed of oxidation of adrenaline solns. is directly proportional to the H-ion concn. only when the same solvent is employed. B. C. A.

Pharmacognostic themes. V. Mutation, heredity and selection. L. E. GORSTER. *Pharm. Weekblad* **68,** 41–59(1931); cf. *C. A.* **21,** 3934 – A discussion of the effect o, domestication, crossing of strains, and selection on *Hyoscyamus niger, Mentha piperita* rhubarb, *Piper cubeba* and *Pyrethrum cinerariaefolium.* A. W. DOX

Peroxide formation of pharmacopeial tinctures. TAYURU ARAKAWA. *Tôhoku J. Exptl. Med.* **16,** 111–7(1930).—Many pharmacopeial tinctures give a distinct color when poured with a tincture of guaiacum into cow milk. This activity is absent in the freshly prepd. tincture, develops upon exposure to air, and is probably due to peroxide formation. H. EAGLE

Peroxide formation of alcoholic solutions of guaiacum and benzidine; its relation to hydrogen-ion concentration. TAYURU ARAKAWA. *Tôhoku J. Exptl. Med* **16,** 236–40 (1930).—The formation of peroxide in alc solns. of guaiacum is most rapid in alk. reaction (p_H 8.4) while the optimum for benzidine is at acid reaction (p_H 3.6). H. E.

Oil of Artemesia afra. G. W. B. VAN DER LINGEN. *Perfumery Essential Oil Record* **21,** 473(1930).—Steam distn. of the fresh leaves and stalks of this S. African shrub resulted in a 0.3% yield of a greenish yellow rather bitter oil, having the consts.: d. 0.9528, $n_D^{21.4}$ 1.4804, acid no. 22.12, ester no. 77.49, Ac no. 109.88. The "cold-relieving" property of the aq. plant ext. is probably due to the liberation of cineole, which has been detected in the oil. W. O. E.

Fluidextracts from domestic drug plants. LUDWIG KROEBER. *Pharm. Zentralhalle* **71,** 51–3, 148–50, 388, 533–4, 659–62(1930); **72,** 4–8, 19–22(1931); cf. *C. A.* **24,** 1465.—The following figures show, resp., d_{19}, percent dry residue and percent ash: Ext. *Cirsii olerace* 1.051, 14.14, 2.44; ext. *Rubiae tinctorum* 1.0542, 11.50, 0.56; ext. *Saniculi europaeae* 1.070, 18.60, 2.40; ext. radicis *Dentariae enneaphyllae* 1.099, 21.88, 1.92; ext. *Scrophulariae nodosae* 1.147, 17.20, 2.80; ext. fructus *Phaesoli vulgaris* sine semine 1.044, 11.90, 2.58; ext. *Droserae rotundifoliae* 1.053, 19.05, 1.25. W. O. E.

Early popular medicine. O. TONN. *Pharm. Zentr.* **71,** 582, 611–3(1930).—A few examples are cited, as the use of liver in pernicious anemia, of digitalis in dropsy, chorion in pregnancy instead of opium, human feces in dysentery, etc. W. O. E.

New physical methods for testing essential oils and related products. ARNO MÜLLER. *Riechstoffind.* **5,** 102–4, 126–8(1930).—Certain published methods for the examn. of the germicidal powers and capillary activities of essential oils are discussed in connection with M.'s method and app. (illustrated) for detg. the consts., d., surface tension and viscosity. The values obtained in the examn. of certain oils and synthetic perfume products are reported. W. O. E.

Practical suggestions in olfactory analysis. PAUL JELLINEK. *Riechstoffind.* **5,** 120–4(1930).—Among the numerous suggestions offered in the olfactory analysis of compns. are the use of paper strips of varying absorptive capacities; diln. of the samples with water or paraffin oil (thus: dil. a sufficient amt. of the sample (previously

freed from alc. by distn.) with water (100 parts) or paraffin oil (10 parts), shake vigorously, allow to stand in a cool place for purposes of clearing, transfer to a separatory funnel if 2 layers form, or if only cloudy pass through filter paper until clear). W. O. E.

From the lemon to the violet through classical chemistry. HANS MÜLLER. *Riechstoffind.* **5**, 124–6(1930).—M. traces the odor of the lemon (citral), through iris (irone) and its various synthetic substitutes to ionone. W. O. E.

Perfume ideas of modern times. C. E. WALD. *Riechstoffind.* **5**, 152–5(1930).—A discussion is given and comments are made on the modern trend in perfumes, notably certain trade-marked brands like "Quelque Fleurs," "Belle Fleurs," "Bouquet de Fleurs," etc., with suggestions for duplicating the specialty "Millefleurs" of Cerbelaud according to the formula as stated or by substitution of certain of its ingredients. W. O. E.

Characterization of perfumes by their odorous intensity and permanence. ALBERT ELLMER. *Riechstoffind.* **5**, 156–9(1930).—E. has undertaken, in the examn. of a large series of perfume materials, an enumeration of the outstanding qualities, as general character of odor, head perfume, after-odor, persistence of odor in hrs, etc. W. O. E.

Problems in fixation. PAUL JELLINEK. *Riechstoffind.* **5**, 159–63(1930).—The development, purpose and tendency in *perfume* fixation are discussed. W. O. E.

Application of the analytical quartz lamp in the investigation of perfume principles. E. EKMAN AND A. SAMYSCHLAYEWA. *Riechstoffind.* **5**, 164–5, 182–4, 196–7(1930).—A study has been made of the fluorescence phenomena produced by the quartz lamp on a series of perfume materials, as alcs., aldehydes, ketones, acids, esters and phenols, the results obtained being grouped with the characters of the materials in question. W. O. E.

Influence of altitude on rose culture. ALBERT ELLMER. *Riechstoffind.* **5**, 193–5 (1930).—A comparative study of the varying conditions under which rose culture is carried on in Bulgaria and southern France, at altitudes for the former of 0 to 1000 m. and for the latter 0 to 300 m. Notably in southern France about 20 km. above Grasse and at an altitude up to 1120 m. recent observations have shown that, while the harvest is 2 to 3 weeks later than in the lowlands, the quality of the roses obtained is in point of perfume superior, as also the quantity of oil greater, than that resulting from lower situations. W. O. E.

Lichen from Evernia prunastria. JAN HOREL. *Chem. Obzor* **5**, 322–4(324–5 English)(1930).—A lichen of *Evernia prunastria* growing in Slovakian forests on leafy trees and Coniferrae is described which serves as a raw material for the manuf. of an aromatic essential oil, called essence de mousse de chêne. This lichen, exported from Czechoslovakia to France, is extd with low-boiling solvents, purified and decolorized One hundred kg. of the lichen yields 0.2–0.3 kg. raw ext. and 20–30 g. pure essential oil. The chem. compn. of the oil is briefly discussed. J. KUČERA

Studies on uricolytic drugs. I. Lithium salts. POMPEO SPOTO. *Arch. sci. biol.* (Italy) **15**, 324–41(1930); cf. *C. A.* **24**, 4446.—The soly. of uric acid in distd. water was 0.1 g. per l. The soly. of uric acid in various concns. of Li acetate was detd. S. concludes that the soly. is related to the concn. of Li acetate and to H-ion concn. The soly. of uric acid in solns. of Li acetate at various p_H values but const. Li concn. was also detd. The results show that the increase in soly. of uric acid in the alk. range in contrast to its soly. in Li acetate alone is directly proportional to the amt. of free alkali present, an equiv. of Li was needed to dissolve an equiv. of uric acid. In the acid zone the soly. of uric acid depends on the H-ion concn. due to the dissocn. and concn. of AcOH present. The curve showing the soly. of uric acid at different H-ion concns. corresponds exactly to the neutralization curve between AcOH and an alkali. The soly. of uric acid varies little at the neutral point (between p_H 7 and 8). It varies markedly, however, with small variations of p_H above p_H 8 and below p_H 7. The soly. of uric acid in Na acetate at different p_H values was also studied. The results were identical qualitatively and quantitatively with those obtained with Li acetate. It is not possible to attribute any particular solvent action to Li in contrast to Na. The soly. of uric acid in blood serum is equal to that noted in Li acetate, namely, 0.1 g.-equiv. per l. at a p_H and temp. equal to that of the serum. Since the concn. of Na in blood serum approaches 0.1 g.-equiv. per l. the influence of serum colloids on the soly. of uric acid is questioned. P. M.

The alkaloid content of galenic preparations of Lobelia inflata L. M. MASCRÉ AND M. CARON. *Bull. sci. pharmacol.* **37**, 657–61(1930); cf. *C. A.* **24**, 3083.—For the detn. of the alkaloids in the drug, mix 12.5 g. of the powder dried at 100° with 40 g. of 90% EtOH and 4 g. NH_4OH, some hrs. later add 360 g. Et_2O, filter after 4 hrs., take 360 cc. (4/5 of the total) and evap. to 10 cc. Dissolve in 150 cc. Et_2O, shake with 15 cc. *N* HCl, then 4 times with 5 cc. Evap. the Et_2O from the acid exts. at low temp., add 10 cc. of

silicotungstic acid (5%), filter after 12 hrs., wash with *N* HCl and incinerate. The wt. of the residue multiplied by 0.414 gives the wt. of the alkaloids. Com. drugs had an alkaloid content between 4.05 and 4.70%. For the analysis of tinctures, 100 g. is evapd. between 50° and 55° to 10 to 15 cc. After the addn. of 5cc. NH_4OH, ext. with Et_2O and proceed as before. The values in com. tinctures varied between 0.08 and 0.42%. The alkaloid content was rather const. within 6 months, also in solns. in water. Exts. had values from 0.55 to 1.70%. A. E. MEYER

The active principles of plants of the genus "Ryania" or "Patrisia" (Flacourtiaceae). P. LE COINTE. *Bol. esc. chim. ind.* (Belem) 1930, No. 1, 43–7; *Chimie & industrie* 24, 907.—The active principle of the root of *Ryania acuminata* was sepd. in a state of purity as follows: the finely powd. root is extd. with 50% alc. and the resin sepd.; addn. of neutral $Pb(OAc)_2$ to the liquid produces a Pb lake from which the coloring matter is removed by H_2SO_4, by neutralizing the H_2SO_4 with $BaCO_3$ the coloring matter is isolated as a dark-red powder; the filtrate from the Pb lake is concd., filtered, treated with H_2S, refiltered and treated with basic Pb acetate which produces a small quantity of light yellow ppt.: the washed ppt. on treating with H_2S yielded a liquid which, on evapn. *in vacuo*, yielded yellowish needles insol in Et_2O, benzine, $CHCl_3$ and Me_2CO; the filtrate from basic Pb acetate ppt. was treated with ammoniacal basic Pb acetate, yielding a heavy ppt.; treating the ppt. with H_2S, followed by filtration and evapn. *in vacuo*, gave an uncrystallizable, blackish brown, sirupy liquid; the filtrate from the last $Pb(OAc)_2$ ppt. was freed from excess Pb with H_2S, filtered and evapd. *in vacuo* over H_2SO_4, finally yielding a very hygroscopic mass of very fine colorless needles or small plates, which easily changed to a brownish sirup on exposure to the air. The crystals contain a glucoside, *ryanin*, which is the active principle; the brown sirup is *ryanetin*, a product of hydrolysis of ryanin. Ingestion *per os* by 7-kg. dogs of an aq. soln. contg. 10–20 cg. ryanetin (or 2 crystals of ryanin) produced congestion of the eyes, convulsions, accelerated breathing, paralysis of the lower limbs and finally death with tetanism after 30 min. ($1^1/_2$ hrs. with ryanin). Cf. following abstr. A. PAPINEAU-COUTURE

Chemical study of the glucosides of the root of Ryania acuminata. G. BRET. *Bol. esc. chim. ind.* (Belem) 1930, No. 1, 48–50; *Chimie & industrie* 24, 907.—B. considers that the glucosides are present in the roots of the plant as K and Ca salts. For their sepn. he used a slight modification of Le Cointe's technic (preceding abstr.): the filtrate from the neutral $Pb(OAc)_2$ ppt. is freed from Pb by H_2S, filtered, concd. *in vacuo* to sirupy consistency, and treated with abs. alc. to ppt. the glucosides in a pulverulent condition; after decantation of the supernatant liquid, the glucosides are dissolved in 50% alc., and converted into sulfates by adding H_2SO_4 till acid to litmus; the soln. is evapd. to dryness *in vacuo*, the mass is taken up in 50% alc., the metal sulfates are filtered out, and the filtrate is evapd. *in vacuo*. During evapn. glucoside A (Le Cointe's ryanin) crystallizes out, and evapn. to dryness *in vacuo* of the mother liquor gives glucoside B (Le Cointe's ryanetin). The free glucosides are liberated from the sulfates by treating with NH_4OH: glucoside *A* is cryst.; *B* is amorphous. One of them is possibly produced by hydrolysis of the other during the process of sepn. The sulfates of both glucosides are hydrolyzed by 1% HCl with production of glucose and an insol. resin. They are sol. in H_2O and dil. alc., insol. in abs. alc., very slightly sol. in Et_2O and benzine. Glucoside *B* is slightly sol. in $CHCl_3$. A. PAPINEAU-COUTURE

The fluorescence of aromatic substances. RENÉ ESCOURROU. *Chimie & industrie* 24, 779–84(1930); cf. Müller, *C. A.* 22, 4715.—The fluorescences (detd. by means of Wood's light) of a large no. of essential oils, tinctures, absolutes and synthetic perfumes, both pure and in alc. soln., are tabulated. The results confirm Müller that fluorescence is generally useless for detg. the purity of such substances. The fluorescence in alc. soln. is frequently quite different from that of the pure substance; more especially, pure citrus oils generally have but a very slight fluorescence, which, on addn. of small amts. of a solvent having an alc. OH, acquires a violet tinge, deepening and turning violet-blue on addn. of further amts. of the solvent. Addn. of compds. contg. a phenolic OH, of ketones, aldehydes or esters does not produce the violet fluorescence. Fractionation of oil of lemon with a large Robert column did not sep. the constituent producing the violet fluorescence in presence of alcoholic OH. Addn. of traces of certain substances in some cases materially alters the fluorescence. It is suggested that this might be used by mfrs. of essential oils who, by adding such substances to their products, would have a ready means of identifying their own products as compared with those of other mfrs. in case of dispute; it could also be useful in detecting the presence of small quantities of adulterants added to improve the aroma of lower grade products. A. P.-C.

Caryophyllene. L. N. NOGUIER. *Parfumerie moderne* 24, 685, 687(1930).—A brief review of its consts. and identification by production of caryophyllenic alc., caryo-

phyllene nitroside, caryophyllene nitrosate and caryophyllene nitrosochloride. A. PAPINEAU-COUTURE

The determination of nicotine by physical-chemical conductivity. G. A. PIGNET. *Mitt. Lebensm. Hyg.* **21**, 312–4(1930).—A nicotine soln. of about 0.001 *M* is titrated with 7–10% silicotungstic acid and the resistance plotted on squared paper. Since nicotine titrated alone with acid gives no break in the curve, 0.1 *N* HCl or H_2SO_4 is added as in the gravimetric detn., this giving a sharp pt. of inflection. F. L. S.-J.

Stabilization of gentian roots by alcohol vapors. CH. BÉGUIN. *J. pharm. chim.* [8], **12**, 49–63(1930). S. WALDBOTT

Influence of the pulping of fresh gentian root on the contained glucides. CH. BÉGUIN. *J. pharm. chim.* [8], **12**, 213–9(1930); cf. *C. A.* **24**, 5936. S. W.

A new color reaction for ephedrine. JOSEPH SIVADJIAN. *J pharm. chim.* [8], **12**, 266–9(1930); cf. Feng, *C. A.* **22**, 2017.—The reagent (*A*) is a mixt. of official H_2O_2 soln. and 4% NaCl. To 4 cc. of *A* in a test tube add a few mg. of ephedrine (*B*); if a salt of *B* is used, add 6 drops of 0.1 *N* NaOH. Heating for 1 min. in a boiling water bath produces a red color. On cooling, the color darkens, turning red-violet, which persists for several hrs. If NaCl is absent, *B* is split up, giving off an odor of BzH. The color test is not quite sp. for *B;* it is also given by the homologs of *B* (cf. Fourneau and Barrelet, *C. A* **24**, 352). For the test to be pos., the simultaneous presence in the mol. of 2 secondary functions, (CHOH) adjoining the nucleus, and ($NHCH_3$), seems essential. Aminoketones, primary alcs. or tertiary amines do not give the test. Strangely, pseudo-*B* the stereoisomer of *B*, and its homologs give an orange-yellow color with *A*. The latter is also a *test for pyramidone* (*C*) (cf. Charonnat and Delaby, *C. A.* **24**, 851): Warm *A* to about 90° and put in a crystal of *C;* with slight shaking, the liquid turns a beautiful blue which disappears after 5 min. S. WALDBOTT

The laudanum of Sydenham. F. PANCIER. *J. pharm. chim.* [8], **12**, 303–7(1930); cf. *C. A.* **7**, 1580, 2093.—The French Codex Supplement 1920 modified the 1908 formula for laudanum de Sydenham; as a result, the required 1% of morphine is more easily attained. In 6 out of 12 com. samples this was the case; in the other 6 (from 1 source) the percentage was low (0.695–0.725%). In all of them, the percentage of dry ext. (4.29–5.76%) was much lower than previously recorded results (6.925–8.673%; cf. *C. A.* **8**, 1846). P., in prepg. a laudanum from powd. opium contg. 11.04% morphine, found 7.93% ext. before the essences of cloves and cinnamon were added, and 10.52% afterward; the % of morphine changed from 0.975 to 0.942%. The possible causes of low ext. in the com. samples are discussed. S. WALDBOTT

Substitutes for morphine and codeine; dilaudid, dicodid, eucodal, acedicon. RENÉ HAZARD. *J. pharm. chim.* [8], **12**, 312–20(1930).—A résumé of the prepn., chem. structure, properties and therapeutic actions of dilaudid (*C. A.* **21**, 2934; **22**, 2984; **23**, 206), dicodid (*C. A.* **18**, 880; **21**, 962), eucodal (*C. A.* **13**, 3272; **15**, 1161) and acedicon (*C. A.* **23**, 3305, 3975). S. WALDBOTT

Biological experimental study of the lupine alkaloids. A. GUILLAUME. *Thesis*, Paris, **1930**; *J. pharm. chim.* [8], **12**, 335–6(1930); cf. *C. A.* **24**, 3811.—Reference is made to the basic work of Goris (*C. A.* **10**, 3093). In detg. alkaloids, the silicotungstic method is used. The migrations of alkaloids in the adult plant are studied under the influence of nutrition, light, climate, etc., also the migrations during germination of the grain and formation of plantules. The effect upon the alkaloids of drying the plant under different conditions is likewise considered. S. WALDBOTT

A report on the first stage in the French manufacture of silk threads ("crins de Florence") (for surgical ligatures). BRUÈRE. *J. pharm. chim.* [8], **12**, 345–9(1930).—An account is given of the manuf and different grades of this article. Italy and notably Spain (near Murcia) have been the European centers of the industry for which the eggs of the silk worms have heretofore been supplied by Southern France (cf. Ch. Secrétain, *Bull. soc. d'encouragement l'ind. nationale*, March **1928**, 216). S. WALDBOTT

Isotonic soap solution for injections. M. PICON. *J. pharm. chim.* [8], **12**, 481–4 (1930); cf. Netter, *et al.*, *C. A.* **21**, 1288.—Treat 100 g. ricinoleic acid prepd. by alcoholysis (Haller, *C. A.* **1**, 715) with 70 cc. of 10% alc. NaOH (which sats. half the acid). With gentle heating, a limpid, very slightly alk. liquid is obtained. Distil off the alc., heat on the water bath and dry at 100°. The product is completely sol. in water and even in 5% soln. is hardly alk. (p_H 7.7 to phenol red; alk. to litmus, acid to phenolphthalein). To prep. an isotonic soln., dissolve by gently heating Na ricinoleate 10 g., NaCl 7 g., H_2O sufficient to make 1000 cc. Filter through paper, fill into 10 cc. ampoules and sterilize for 30 min. at 120°. On cooling, the liquid is limpid, but becomes very slightly turbid afterward; re-warming will clear it again. This soln. is more stable and distinctly less alk. than aq. solns. of other soaps. S. WALDBOTT

Report on the functioning of the Control laboratory of Swedish pharmacies. A. RISING. *Schweiz. Apoth. Ztg.* **68**, 76–80, 90–2(1930); cf. *C. A.* **21**, 624. S. W.

Succus juniperi inspissatus. R. MAEDER. *Schweiz. Apoth. Ztg.* **68**, 126(1930).—The following mode of prepn. is superior to that of Pharm. Helv. IV: Stir crushed juniper berries (10 kg.) with 15 kg. hot H_2O; after 24 hrs. press off the residue. Again mix it with 15 kg. of hot H_2O and allow to stand 24 hrs., stirring occasionally. Press off the residue, strain the united juices and evap. to about 4 kg.; add 1.5 kg. sugar and 5 g. of solbrol (cf. *C. A.* **23**, 3516) to a total of 5.5 kg. Bring the sirup to a boil and skim it, then strain it through a moistened cloth. S. WALDBOTT

The new Supplement (V) to the German Pharmacopeia VI. J. BÜCHI. *Schweiz. Apoth. Ztg.* **68**, 313–7(1930); cf. *C. A.* **24**, 3320.—The new features of the supplement are pointed out, and frequent comparisons are made with the articles of Pharm. Helv. V. S. WALDBOTT

Composition of specialties and nostrums. E SCH. *Schweiz. Apoth. Ztg.* **68**, 529–31(1930); cf. *C. A.* **24**, 5111.—Results of the analyses of 32 prepns. examd. by different analysts are given. S. WALDBOTT

The deportment of monobrominated camphor in reference to compressed medicinal tablets. GEO. E. ÉWE. *J. Am. Pharm. Assoc.* **19**, 1307–8(1930).—At ordinary temps monobrominated camphor (*M*) volatilizes slowly; it volatilizes more rapidly as the temp. rises. In the manuf. of tablets serious losses of *M* may occur during granulation unless the temp. be controlled carefully. As high as 43% loss has occurred. On standing in the cold tablets may become encrusted with crystals of *M*. Such tablets after being brushed to remove the external *M* assayed about 98% of the original. Various batches of tablets were stored at room temp. for 1 yr. All showed crystals of *M* on the surface. Assays indicated losses of 3–9%. One sample in a partially filled container lost 9.8%. E. concludes that tablets of *M* should be stored in a cool place. L. E. WARREN

Oil of cayate [use in perfumery] (CALLIER) **27.** Vanilla and vanillin during the last decade (DYSON) **12.** Behavior of natural and artificial fruit essences towards Na *p*-toluenesulfonchloroamide (MIERMEISTER) **12.** Medicinal soap (Ger. pat. 511,240) **27.** Caramel (Ger. pat. 511,112) **28.** Organic thiocyano compounds (Ger. pat. 511,211) **10.** Triazines (Brit. pat. 334,887) **10.** Substituted 1,3-diamino-2-propanols (U. S. pat. 1,790,042) **10.**

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TSCHIRCH, A.: **Handbuch der Pharmakognosie. Lfg. 5.** 2nd ed., enlarged. Leipzig: Bernhard Tauchnitz. M. 8 Cf. *C. A.* **25**, 1035.

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Synthetic drugs. I. G. FARBENIND. A.-G Fr. 680,146, Aug. 9, 1929. The H-ion concn. of diformaldehyde bisulfite compd. of arseno(1-phenyl-2,3-dimethyl-4-amino-5-pyrazolone) is reduced by neutralizing the aq. soln. by the addn. of salts having an alk. reaction such as Na_2SO_3, Na_2CO_3, Na phosphates and pptg. by adding alc. or ether.

Synthetic drugs. I G. FARBENIND. A.-G. (Hans Schmidt, inventor). Ger. 513,205, Oct. 7, 1927. See Brit. 298,234 (*C. A.* **23**, 2786).

Synthetic drugs. I. G. FARBENIND. A.-G. (Karl Streitwolf, Alfred Fehrle and Hubert Oesterlin, inventors). Ger. 513,210, Feb. 22, 1929. Addn. to 510,451 (*C. A.* **25**, 1036). Hydroxyacylaminoaryl compds. of As and Sb are prepd. by substituting the OH group for NH_2 or halogen in compds. of the formula $Y.Ar.NHCO(CH_2)_nX$, where Y is a residue contg. ter- or quinque-valent As or Sb, *e. g.*, AsO_3H_2, Ar is an aryl residue, *n* is 1 or more and X is NH_2 or halogen. Thus, 4-chloroacetylaminobenzenearsonic acid (prepd. from *p*-aminophenylarsonic acid and $ClCH_2COCl$) may be boiled with aq. NaOH. Numerous other examples are given also.

Synthetic drugs. I. G. FARBENIND. A.-G. (Karl Streitwolf, Alfred Fehrle and Walter Herrmann, inventors). Ger. 513,026, Mar. 31, 1929. Addn. to 510,437 (*C. A.* **25**, 1035). Benzimidazolonestibinic acids are prepd. by treating *o*-diaminobenzenestibinic acids with the amt. of chloroformic ester required to react with one NH_2 group, and heating the urethans so obtained in mineral acid soln. An example is given. Cf. Ger. 511,738 (*C. A.* **25**, 1036).

Synthetic drug. LABORATORIUM REUMELLA ADOLF BOAS. Ger 511,093, Aug. 20, 1927 *α-Chloro-γ-iodo-β-propyl salicylate*, m. 57°, is prepd. by treating α,γ-dichloro-β-propyl salicylate with an alkali iodide in acetone soln. An example is given. The product is useful in treating rheumatism.

Synthetic drugs. SCHERING-KAHLBAUM A.-G. (Adolf Feldt, Walter Schoeller and Erich Borgwardt, inventors). Ger. 511,303, Dec. 13, 1925. The disodium salts of 4 ω sulfomethylamino 2-metalmercaptobenzenesulfonic acids are prepd. by the action of CH_2O bisulfite at a raised temp. on Na 4-amino-2-metalmercaptobenzenesulfonates Examples are given describing the prepn. of the auromercapto, argentomercapto and bismuthmercapto compds. Cf. *C. A.* **22**, 845; **25**, 1036

Synthetic drugs. SCHERING-KAHLBAUM A.-G. (Walter Schoeller and Hans G. Allardt, inventors) Ger. 511,467, Aug. 7, 1927. See Brit. 321,968 (*C. A.* **24**, 2836–7).

Synthetic drugs. SCHERING-KAHLBAUM A.-G. (Walter Schoeller and Hans G. Allardt, inventors). Ger. 512,723, Oct. 15, 1927. See Brit. 321,968 (*C. A.* **24**, 2836–7).

Cascara extracts. A. ROBERTSON and J. TAYLOR (TRONGATE), LTD. Brit. 335,115, Nov 25, 1929. The disagreeable flavor is removed from an aq. cascara ext. by the action of O, preferably produced in the ext. by adding a soln. of H_2O_2 and a reducing agent such as charcoal (preferably at a temp. of about 40°), followed by removal of the charcoal by filtration and addn., if desired, of glycerol and liquorice.

Calcium salts of organic acids. CHEMISCHE FABRIK MARIENFELDE G. M. B. H. Ger 511,947, Apr. 10, 1929. Ca salts of org. acids contained in vegetable and animal oils and fats, especially in cod-liver oil, are prepd. by sapong. the raw oil or fat with alkali and treating with $CaCl_2$ in the presence of finely divided substance such as steam to assist the pptn. of the Ca salts. The salts are used in *therapy*.

Amylcresol. JOSEPH MARSHALL (to Boot's Pure Drug Co., Ltd.). U. S. 1,789,410, Jan 20. In the production of a normal amylcresol, reaction is effected between a cresyl valerate and $AlCl_3$ and the resulting ketone is reduced (suitably by use of Zn and HCl). Cf. *C. A.* **24**, 5939.

Sterol derivatives. KNOLL AKT.-GES. CHEMISCHE FABRIK. Ger 514,095, July 24, 1927. Esters of sterols with oxygenated acids of P are prepd. by treating sterols with halogen compds. of P, directly or in an anhyd. solvent. Examples are given describing the prepn. of *monocholesteryl phosphate*, m. 195-6°; *dicholesteryl phosphate*, m. 186°; *cholesteryl phosphite*, m. 158°; and *sitosteryl phosphite*, m. 153°. The products are of pharmacol. value.

6,8-Diethoxyquinoline. FRITZ MIETZSCH and HEINRICH KLÖS (to Winthrop Chemical Co.). U. S. 1,790,066, Jan. 27. This compd., b_3 about 153° and m. 60°, an

intestinal remedy, is made by ethylating the 6,8-dihydroxyquinoline. The 6,8-dimethoxyquinoline is similarly produced.

Tertiary amines containing the 1-amino-2-hydroxypropyl residue. HEINRICH JENSCH (to Winthrop Chemical Co.). U. S. 1,790,096, Jan. 27. Tertiary amines of the general formula $H_2NCH_2CH(OH)CH_2N'XY$ wherein N′ represents nitrogen of a tert. amine, and X and Y stand for alkyl, aryl or carbon atoms belonging to a heterocyclic nitrogen-contg. nucleus, can be prepd. by causing sec. amines to act upon 3-halo-2-hydroxypropylamine salts (cf. Gabriel and Ohle, *C. A.* **12**, 688). Instead of using the 3-halo-2-hydroxypropylamine salts obtained by sapon. of 3-halo-2-hydroxypropylphthalimide it is also possible to cause the sec. amines to act upon 3-halo-2-hydroxypropylphthalimide (cf. Gabriel and Ohle, *C. A* **12**, 688) and then split off the phthalic acid residue. The new tert. amines are sepd. by means of an alkali and purified by distn. They are of *therapeutical value* and have a blood-sugar reducing action, being also useful as intermediate products for the manuf. of other medicines. 1-Amino-3-dimethylamino-2-propanol is a colorless, oily compd., b_{28} 103°, and forms salts readily sol. in water. 1-Amino-3-diethylamino-2-propanol, b_{80} about 115°. The product obtained from 3-chloro-2-hydroxypropylphthalimide and piperidine b_{22} 148–50°; and the product derived from 3-chloro-2-hydroxypropylphthalimide and monomethylaniline b_{20} 205–10°.

Glucosides. CHEMISCHE FABRIK VORMALS SANDOZ. Ger. 511,794, Mar. 17, 1927. Glucosides which act upon the heart are obtained by extg. an aq. mash of squills with org. solvents non-miscible with water in the presence of salts not readily sol. Thus, fresh squills are pulverized with water and NaH_2PO_4 and AcOEt. The mass is filtered, pressed and the residue further treated with AcOEt. The AcOEt layer of the filtrate contains the glucosides which are obtained by evapn. Other examples are given. Cf. *C. A.* **24**, 1469.

Glucoside from digitalis. CARL MANNICH Ger 514,096, Oct. 5, 1928. A new glucoside is prepd. by crystg from acetone, or from alc. of about 70% concn., that portion of the crude digitalis glucosides that is difficultly sol. both in $CHCl_3$ and also in alc up to 35% concn. (or in MeOH). An example is given. The product m. about 245° when rapidly heated, and is optically and physiologically active. Its formula is $C_{41}H_{66}O_{17}$. The new glucoside is best prepd. from the leaves of *Digitalis lanata*.

Vegetable lecithin. HERMANN BOLLMANN Ger. 511,851, Oct 22 1929 Vegetable lecithin is improved by the action of H_2O_2 on its aq emulsions. The H_2O_2 soln. is added to the emulsion of lecithin, oil and water and the whole is then dried.

Improving the odor of phenols. GEWERKSCHAFT MATHIAS STINNES. Ger. 514,341, Oct. 9, 1927. Crude or purified phenolic fractions for use as *disinfectants*, etc., are improved in odor by partial esterification, *e. g.*, with Ac_2O

Vitamin-containing products. AAGE W OWE. Norw. 44,018, Dec. 30, 1929. Vitamin-contg fats are saponified, preferably by means of slaked lime and the resulting product is extd. with an edible fat or oil Cf. *C. A.* **24**, 4901.

Heart-stimulant substances extracted from muscular tissue. I. G. FARBENIND. A.-G. Brit. 335,202, June 10, 1929. Muscular tissue is extd. with water-sol. org. solvents such as MeOH, EtOH or acetone, lipoids being removed by treating the tissue before extn. or by treating the ext. obtained with a water-insol. solvent such as ether or methylene chloride. Various details and modifications of procedure are described.

Purifying extracts containing sexual hormones. SCHERING KAHLBAUM A.-G. Ger. 511,116, Mar 16, 1929. The exts. are treated with Al amalgam. An example is given.

Hormones. I. G. FARBENIND. A.-G. Brit. 334,808 June 11, 1929. Hormones or active substances of the posterior lobe of the hypophysis are extd. and sepd. into those which act on the uterus and those which increase blood pressure. Various details of extn. and fractionation by successive pptn., etc., are given.

Antiseptics. GRAN. CHEM-PHARM. PRODUKTE G. M. B. H. and ERICH FREUND. Ger. 512,960, Apr. 21, 1928. An antiseptic $(CH_2)_6N_4CH_2(H_2PO_4)_2$, is prepd. by treating $(CH_2)_6N_4$ with an equimol. amt of $CH_2(H_2PO_4)_2$ in the presence of a solvent.

Intestinal disinfectants. CHINOSOLFAB. A.-G. Ger. 513,127, Jan. 31, 1928. Equimol. amts of 8-hydroxyquinoline, H_2SO_4 and $Al_2(SO_4)_3$ or $MgSO_4$ are caused to react. The reaction may be effected in an aq. medium or in the presence of org. solvents. Examples are given.

Disinfectants and bactericides. I. G. FARBENIND. A.-G. Fr. 690,820, Feb. 28, 1930. Products of the hydroxydi- or hydroxytri-arylmethane series contg. at least one univalent halophenol group are used as disinfectants and bactericides. Examples

are 2,2′-dihydroxy-5,5′-dichloro- and 2,2′-dihydroxy-3,5,3′,5′-tetrachlorodiphenylmethane.

Fumigant solution. HARRY W. HOUGHTON (to Safety Fumigant Co.). U. S. 1,790,095, Jan. 27. A soln. is formed for liberating a substantially permanent lethal and lachrymatory gas by evapn. on exposure in shallow layers and which comprises acetone and a carbohydrate such as glucose or glycerol together with HCN and CNCl.

Cleansing creams. GEORGES ROHFRITSCH and RODOLPHE LEUTZ. Fr. 691,635, Mar. 10, 1930. A cream for removing dirt from the hands without the use of water contains casein 9, lime water 16, NH_3 0.5, soda 1, oxycellulose or hydrocellulose 9, perfume 0.5 and water 64 parts.

Intermediates for perfumes and drugs. SCHERING-KAHLBAUM A.-G. (Hans Jordan, inventor). Ger. 511,464, Aug. 13, 1927. The condensation product from *m*-cresol and acetone described in Ger. 486,768 (*C. A.* **24**, 2256) is treated with Ac_2O in the presence of a small quantity of H_2SO_4. A new ketone $C_{24}H_{28}O_4$, m. 122–123°, is obtained, which loses one Ac group when sapond. with alc. KOH, yielding another new ketone $C_{22}H_{26}O_3$, m. 194–5°. An example is given.

Expanding tobacco by gas pressure and sudden release. WILFORD J HAWKINS (to American Machine & Foundry Co.). U. S. 1,789,435, Jan. 20. For increasing the vol of cured and conditioned tobacco, the material is permeated with air, CO_2, steam or other suitable gas under pressure, and the pressure is then suddenly released. App. is described. Flavoring substances may be added with the treating gas.

18—ACIDS, ALKALIES, SALTS AND SUNDRIES

E. M. SYMMES

The chamber process. XXII. Automatic nitric acid feeder to chamber system. Photoelectric method. MOTOTARŌ MATSUI AND TOKITI NODA. *J. Soc. Chem. Ind., Japan* **33**, Suppl. binding 518-21(1930); cf. *C. A.* **25**, 560.—The relation between gas concn or gas pressure and photoelec. current proportional to intensity of light transmitted through the gas layer was investigated. Photoelec. current was detd. by deflection of a galvanometer having a sensitiveness of 4.7×10^{-10} amp. for a 1-m. scale. The whole circuit was insulated carefully by an equipotential shield (White, *C. A.* **9**, 3). The cell was of the K hydride type; the voltage applied, 150. A 5-megohm resistor was in the circuit for protection. An incandescent lamp was used as the light source. NO_2 was prepd. from pure $Pb(NO_3)_2$ purified by several redistns. and recrystns. Gas pressure was read by cathetometer. Dry air was introduced between Hg and NO_2. The gas temp. was 25 ± 0.1°. The sensitivity of the cell was checked after each detn. The *absorption spectrum of* NO_2 consists of a large no. of fine bands from 600$\mu\mu$ to 225$\mu\mu$; that of N_2O_4, of 2 continuous bands, one max at 340$\mu\mu$, the other max. further up in the ultra-violet. At 366$\mu\mu$ both NO_2 and N_2O_4 must have absorption bands. $E = d(p_{NO_2} + k_2/K(p_{N_2O_4})^2]$, where $K_p = (p_{NO_2})^2/p_{N_2O_4} = 0.1456$ at 25° (Bodenstein, *Z.* **16**, 1896), d = thickness of gas layer. Consts. k_1 and k_2 were found to be 5.99 and 53, resp. If mol. concn. is used instead of partial pressure, $k_1 = 1.47$ for NO_2, $k_2 = 62$ for N_2O_4. For white light from an incandescent lamp, $\log (I_0/I) = 5.85 d p_{NO_2}$; for $\lambda = 0.465\mu\mu$, $\log (I_0/I) = 5.92 d p_{NO_2}$. Very small concns. of NO_2 or N_2O_4 can be detd this way, and vacuum-tube amplification can control automatically the supply of NO_2 to the chamber system. E. M. SYMMES

By-product and synthetic ammonia. P. PARRISH. *Gas Eng.* **48**, 31-2, 36(1931); cf. *C. A.* **24**, 4375.—An economic discussion. E. H.

Potassium salts from insoluble minerals. G. CALCAGNI. *Ann chim. applicata* 20 522-7(1930).—By use of a technic similar to that used in the prepn. of sol. nitrosophosphates from insol. phosphates (cf. *C. A.* **24**, 459), *i. e.*, by bubbling N_2O_4 through a suspension of leucite [$K_2Al_2Si_4O_{12}$] in cold water, it was possible to bring into soln. up to 80% of the K_2O present. At the same time Al_2O_3 and SiO_2 may be recovered. Most of the N_2O_4 may be regenerated by igniting the nitrates formed. This method could not be applied to feldspars, as only traces of K_2O were brought into soln., even after prolonged treatment with N_2O_4. A. W. CONTIERI

The sulfates in industry, a review of the water-soluble products, sodium sulfate, ammonium sulfate and aluminum sulfate. CHARLES H. BUTCHER. *Chem. Trade J.* 87, 633-4(1930); **88**, 51-3(1931).—The forms in which these salts are found in com. use are noted and these uses mentioned. W. H. BOYNTON

Polymerization and solubility of phosphates. S. S. DRAGUNOV. *Zhur. Prikladnoi*

Khim. **3**, 797–805(1930).—A critical survey of the literature, with particular reference to $Ca(PO_3)_2$ which is as yet little investigated. Kahlbaum $Ca(H_2PO_4)_2.H_2O$ was heated for 1.5 hrs. at various temps. and rapidly cooled. Its soly in aqua regia (12 cc. HCl of d. 1.19 and 8 cc. HNO_3 of d. 1.42) was detd. by boiling 2 g. of the salt in 20 cc. of acid for 30 min. The soly. of the sample treated at 1020°, when fusion takes place, was detd. by shaking with distd water at 25°. After 68 days the soln. contained 2.3 g. P_2O_5 per 100 cc. (0.3 g. after 1 day; 0.4 after 2 days; 1.8 after 32 days). Mol. wt. could not be detd. This fused salt is a good *fertilizer*, but the high temp. at which it is obtained and the necessity of fusion are the difficulties which must be confronted in its manuf.

V. KALICHEVSKY

Preparation of potassium nitrate and alumina by double decomposition of potassium chloride and aluminum nitrate. I. The system $3KCl + Al(NO_3)_3 \rightleftharpoons 3KNO_3 + AlCl_3$. HIROMU TANAKA. *J. Soc. Chem. Ind., Japan* **33**, Suppl. binding 488–92 (1930).—The solubilities of KCl and KNO_3 at various temps. are well known, but those of $AlCl_3$ and $Al(NO_3)_3$ are confusing. Redetn. showed great differences from Gerlach (Solubilities of Inorganic and Organic Compounds, Seidell (1919); cf. *C. A.* **14**, 380) and that soly. of $Al(NO_3)_3$ changes abnormally between 0° and 5°. Isothermal data at 10° and 0° of 4 ternary systems, each consisting of H_2O and 2 salts giving common ions by dissocn., are shown, as well as the quaternary system (K, Al)$(NO_3$, Cl$)$–H_2O at 10°. In prepn of KNO_3 by double decompn. of KCl and $Al(NO_3)_3$ the theoretical % utilization can be calcd. **II. Treatment of clay with nitric acid.** *Ibid* 493–5.—The soln. velocity of Al_2O_3, contained in clay, in HNO_3 is about the same as that in H_2SO_4 under the same conditions. The relation between the velocity consts. of soln of Al_2O_3 and temp. is expressed by the Arrhenius formula $T_1T_2/T_1-T_2 \log K_1/K_2 = 4460$ (approx.). Soln. velocity of Al_2O_3 is affected slightly by HNO_3 concn.

E. M. SYMMES

Reduction of sulfur dioxide. GEORGE J. YOUNG *Eng. Mining J.* **131**, 7(1931).—J. W. Beckman reduced SO_2 in the presence of a simple catalyst. A cylindrical chamber is heated by elec. means for maintaining the contact mass at 427–670°; SO_2 gas, mixed with natural gas or CO, is passed through a contact mass and discharges a gas from which elemental S condenses. The reactions are exothermic. Expts. have been confined to a lab. scale so far.

W. H. BOYNTON

Barite and barium products in 1929. R. M. SANTMYERS AND B. H. STODDARD Bur. Mines, *Mineral Resources of the U. S. 1929*, Pt. II, 209–18(preprint No. 17 published January 7, 1931).

E. H.

A study of the properties of polyhalite pertaining to the extraction of potash. III. Calcination of polyhalite in a rotary kiln of laboratory size. LOYAL CLARKE, J. M. DAVIDSON AND H. H. STORCH. Bur. Mines, *Rept. of Investigations* **3061**, 12 pp.(1930). cf. *C. A.* **24**, 3198.—A 2 × 36 in. exptl. rotary kiln has been found satisfactory for the calcination of polyhalite sized between 28 and 150 mesh. Optimum conditions for the calcination and extn. treatments of 65–100 mesh material have been detd. Polyhalite extns. contg. up to 11.4 g. K_2SO_4 per 100 g. H_2O have been obtained with >95% extn Extns. of calcined 10–100 mesh polyhalite were inferior to those with the more finely ground material.

ALDEN H. EMERY

Enriching Khibinsk apatite by flotation. G. O. ERCHIKOVSKII. *Udobrenie i Urozhai* (*Fertilizers and Crops*) **2**, 109–14(1930).—E found that with crude birch tar (1.3 kg. together with 0.3 kg of KOH per ton of apatite) more than 85% of apatite was extd. Good results were obtained by using 0.6 kg of birch tar, 0.15 kg. KOH and 0.24 kg. of water glass per ton. Expts. with oleic acid (0.7–0.13 kg. per ton of apatite) gave even better results than birch tar. Guaiacol, one of the compds. of birch tar, also gave very good results.

J. S. JOFFE

Nitrogen and its compounds. BERTRAND L. JOHNSON. Bur. Mines, *Information Circ.* **6385**, 33 pp.(1931).—Occurrence of N and its compds., the uses, mining and treatment of natural $NaNO_3$, fixation of atm. N, by-product N, world N industry, N industry in the U. S. and N industry in foreign countries are discussed. A 3 page bibliography is given.

ALDEN H. EMERY

The development of the Norwegian nitrogen industry and the reconstruction plans of the Norsk Hydro. AXEL AUBERT. *Teknisk Ukeblad* **75**, 218–21, 228–31(1928).—A review.

C. A. ROBAK

Sulfur and pyrites in 1929. ROBERT H. RIDGWAY. Bur. Mines, *Mineral Resources of the U. S. 1929*, Pt. II, 175–94(preprint No. 15 published December 18, 1930)

E. H.

Adsorptive properties of commercial lampblack. M. M. DUBININ AND S. A. TOROPOV. *Zhur. Prikladnoi Khim.* **3**, 843–55(1930).—Several grades of com. lampblack

were investigated. Ignition or activation with steam or with HNO_3 only partially cleans up the surface of the lampblack. Lampblack has a porous structure, with the pores of a size suitable for capillary condensation of org. solvents, *e. g.*, C_6H_6, PhMe. Methylene blue and I are well adsorbed from water solns. Adsorption of acids is very slight and of a complex nature. Successive treatment of lampblack with KOH and HCl cleans its surface rather thoroughly and yields a product which possesses normal adsorptive properties of an activated medium-grade carbon. V. KALICHEVSKY

Preparation and properties of an active alumina catalyst for industrial purposes. E. V. ALEKSEEVSKII AND I. G. PREIS. *Zhur. Prikladnoi Khim.* **3**, 859–62(1930); cf. *C. A.* **24**, 4442.—A dehydrating catalyst is prepd. by mixing 70% air-dried hydrated alumina, ground to pass a sieve contg. 900 openings per sq cm., with 30% kaolin from Glukhov, steaming the mixt. for 1 hr., adding enough H_2O to form a paste and forming hollow rings 12 mm. in diam. and 20 mm. high, which are dried for several hrs. at 150°. Hydrated Al_2O_3 is best prepd. by pptg. it with HCl from Na aluminate soln. or with NH_3 from $Al_2(SO_4)_3$ soln. The catalyst is used commercially for dehydrating EtOH. V. KALICHEVSKY

Preparation of an active platinum catalyst for industrial purposes. E. V. ALEKSEEVSKII AND I. D. MAKAROV. *Zhur. Prikladnoi Khim.* **3**, 857–8(1930); cf. *C. A.* **24**, 2246.—The method is similar to the one previously described. Kaolin-clay-charcoal rings were ignited for several hrs. at 950° and soaked in H_2PtCl_6 soln. so as to absorb 8% Pt by wt. of the rings. They were dried on a water bath and reduced at 120–150° with electrolytic H contg. HCHO vapors. V. KALICHEVSKY

Preparation of an active palladium catalyst for industrial purposes. E. V. ALEKSEEVSKII, A. P. MUSAKIN AND I. D. MAKAROV. *Zhur. Prikladnoi Khim.* **3**, 863–6(1930); cf. *C. A.* **24**, 2246.—Asbestos cloth soaked for 12–15 hrs. in a soln. of $PdCl_2$ in a 2*N* HCl soln. is dried on the water bath and reduced for 12 hrs. in an elec. furnace in an atm. of H satd. with moist HCHO, then cooled in the presence of H_2 and washed first with hot distd. water and then for 12 hrs. in cold water. Washing with water is highly important in activating the catalyst. Expts. show that the initial reaction velocity is always very slow, particularly if little Pd is deposited on the cloth. With 0.5% or less Pd by wt. the catalyst must be heated. The best results are obtained with 8% Pd, but in com. practice 2% Pd is the economic limit. Porous asbestos cloth should be used. V. K.

Adsorption phenomena on the surface of vanadium catalyst. I. E. ADADUROV. *Zhur. Prikladnoi Khim.* **3**, 833–42(1930); cf. *C. A.* **24**, 3610.—O is not adsorbed. SO_2 is adsorbed somewhat in proportion to the moisture content of the gases, reducing V from the quinque- to tervalent state. From the color of the catalyst, it is noted that this reducing action does not take place if the mixt. of SO_2 and air is properly contacted. By displacing adsorbed gases with N, SO_3 is chiefly obtained, which shows that SO_3 and not SO_2 is adsorbed during the reaction. As velocity of the gases through the catalyst does not influence the efficiency of contact, it is possible that the reaction takes place in the gaseous phase. The compn of the catalyst (SiO_2, SnO_2 and V_2O_5) also suggests that only O is activated, which is not adsorbed by the catalyst. V. KALICHEVSKY

Asbestos in 1929. OLIVER BOWLES AND B. H. STODDARD. Bur. Mines, *Mineral Resources of the U. S. 1929*, Pt. II, 195–207(preprint No. 16 published December 18, 1930) E. H.

Talc and soapstone in 1929. OLIVER BOWLES AND B. H. STODDARD. Bur. Mines, *Mineral Resources of the U. S. 1929*, Pt. II, 219–27(Preprint No. 18 published December 22, 1930) E. H.

The composition of commercial Ca arsenate (SMITH, MURRAY) **15.** Hydrocarbons (Ger. pat. 692,395) **10.** Device for the continuous drying of casein, etc. (Ger. pat. 511,543) **1.** Hardening water-glass cements (Ger. pat. 513,425) **4.**

British Chemicals and Their Manufacturers, 1931. London: Assoc. of British Chemical Manufacturers 405 pp.

GROSSMANN, HERMANN AND WEICKSEL, PAUL: **Die Stickstoffindustrie der Welt.** Berlin: Allg. Industrie-Verlag. 199 pp. M. 14.

Handbuch der Kali-Bergwerke, Salinen und Tiefbohrunternehmungen. Berlin: Verlag d. Kuxen-Zeitung. 688 pp. Linen, M. 40.

Kali-Kalender, 1931. Taschenbuch für Kalibergbau und Kali industrie. Edited C. HERMANN. Halle: Knapp. 186 pp. Linen, M. 5.20.

Hydrocyanic acid. I. G. FARBENIND. A.-G. (Walter Reppe, inventor). Ger.

511,517, Oct. 20, 1923. Addn. to 485,989 (*C. A.* **24**, 1185). In the prepn. of HCN by the methods of 485,989 and 510,407 (*C. A.* **25**, 1040), by heating $HCONH_2$ or $HCOONH_4$, or a mixt. of both, with indifferent gases over catalyzers, the temp. is kept above 250°. Examples are given.

Nitric acid. I. G. FARBENIND. A.-G. (Ernst Jänecke and Hermann Klippel, inventors). Ger. 512,639, July 2, 1929. Nitrous gases are enriched by passing them into a soln. of K_2SO_4, H_2SO_4 and HNO_3 and adding sufficient solid K_2SO_4 to ppt. the double salt $K_2HSO_4NO_3$, which is heated under reduced pressure to obtain the HNO_3 or N oxides directly.

Nitric acid. AMMONIAQUE SYNTHÉTIQUE ET DÉRIVÉS. (SOC. ANON.). Fr. 690,810, Feb. 28, 1930. HNO_3 is concd. in an app. in which the acid is preliminarily concd., and the steam from this concn. is used to denitrify H_2SO_4, and the acid is given a final concn. by the denitrified H_2SO_4. The heat of the HNO_3 vapors resulting from the initial concn. is used for concg. more HNO_3. Cf. *C. A.* **25**, 1041.

Concentrating nitric acid. NORSK HYDRO-ELEKTRISK KVAELSTOFAKTIESELSKAB. Norw. 46,338, April 8, 1929. The concn. is carried out under reduced pressure by means of boiling and dephlegmation without application of drying substances.

Phosphoric acid and alkali nitrates. SOC. D'ÉTUDES POUR LA FABRICATION ET L'EMPLOI DES ENGRAIS CHIM. (Pierre Jolibois and Georges Chaudron, inventors). Fr. 691,005, Mar. 3, 1930. An alkali chloride is reacted with $Pb(NO_3)_2$ to give an alkali nitrate and $PbCl_2$, which by the action of a natural phosphate dissolved or not in HCl is transformed into a Pb phosphate or chlorophosphate, and this is used to regenerate $Pb(NO_3)_2$.

Sulfonic acids. I. G. FARBENIND. A.-G. Ger. 514,080, Nov. 30, 1926. The products obtained by condensing $C_{10}H_8$ or its derivs. with olefins are sulfonated, alkylnaphthalenesulfonic acids being obtained. *The acids or their salts are useful as wetting or emulsifying agents.* Examples are given.

Sulfuric acid. LOUIS SIMPSON. Can. 308,293, Feb. 3, 1931. Dried and pulverized anhydrite is mixed with dried and pulverized oil yielding shale fines or pulverized retorted oil-yielding shale, and the mixt. is burned or calcined. The SO_2 is drawn off and converted into H_2SO_4 in a known manner. The clinker residue may be pulverized to make portland *cement*.

Sulfuric acid concentration. WM. C. MAST (to Chemical Construction Corp.) U. S. 1,790,507, Jan. 27. Acid is passed through a plurality of chambers in series, and a stream of hot gases is successively delivered to and released beneath the surfaces of the bodies of acid so as to pass upwardly through them in succession. App. is described.

Recovering and purifying dilute sulfuric acid from acid sludge. FRANKLIN E. KIMBALL. U. S. 1,790,049, Jan. 27. Acid sludge is treated with water to effect sepn. of oil, the oil is removed from the dil. acid, the latter is heated to above its atm. b. p. to effect further sepn. of oil and the dil. acid is removed from sepd. oil.

Sodium hydroxide and ammonia. ALFRED MENTZEL. Fr. 690,680, Feb. 26, 1930. $NaHCO_3$ is converted into NaCN by adding C and reacting on the mixt. with N at a high temp., and this is converted to NaOH and NH_3 by the action of steam at 400–500°.

Regenerating carbonated ammoniacal solutions. ALBERT GOSSELIN (to Soc. l'air liquide, Soc. anon. pour l'étude et l'exploitation des procédés Georges Claude). U. S. 1,790,303, Jan. 27. The soln. to be regenerated is circulated in "indirect contact" with and countercurrent to the regenerated soln., and the latter is heated by an external source of heat at the end of the regeneration and before return for countercurrent heat-exchange. App. is described.

Alkali metal cyanides. I. G. FARBENIND. A.-G. (Julius Drucker, Paul Lueg and Paul Weise, inventors). Ger. 512,700, Sept. 23, 1926. See Brit. 301,565 (*C. A.* **23**, 4304).

Alkali phosphates from iron phosphate. METALLGES. A.-G. (Freiherr Conway von Girsewald and Hans Weidmann, inventors). Ger. 514,246, May 18, 1929. The manuf. of alkali phosphate by the reaction of $FePO_4$ with an alkali carbonate soln. is effected under pressure, *e. g.*, in an autoclave at 200°.

Metallic cyanamides. NIKODEM CARO and ALBERT R. FRANK. (H. Heinrich Franck, inventor). Ger. 512,640, Feb. 9, 1929. See U. S. 1,745,753 (*C. A.* **24**, 1709).

Fluorides. WILHELM PIP. Fr. 691,419, Mar. 7, 1930. Double fluorides of Al and alkali are prepd. by mixing a soln. of an alkali fluoride, *e. g.*, NaF, with a soln. of AlF_3. The alkali fluoride is prepd. by the reaction of an alkali hydroxide or carbonate on H_2SiF_6, formed, *e. g.*, by the transformation of SiF_4 with water, or on an alkali silicofluoride with sepn. of the SiO_2 produced. The AlF_3 is obtained by treating compds. of Al such as

oxides, silicates or clay with H_2SiF_6, formed by the transformation of SiF_4 with water, or with a silicofluoride of Al.

Phosphates. Soc. d'études scientifiques et d'entreprises industrielles. Fr. 690,648, Feb. 25, 1930. $(NH_4)_2HPO_4$ is made by absorbing in boiling H_3PO_4 an amt. of NH_3 above one and below 2 mols. of NH_3 for 1 mol. of H_3PO_4, then in a 2nd operation at a temp. below about 60–70° causing the resulting liquor to absorb the remainder of NH_3 necessary to form $(NH_4)_2HPO_4$.

Soluble phosphates. Compagnie générale des superphosphates Pyrénéens (Soc. anon.). Fr. 691,748, Mar. 11, 1930. The sublimation products obtained from the treatment of phosphates, SiO_2 and C in an elec. furnace are used for making soluble further quantities of phosphates. The sublimation products may also be used for making soluble the residues from the furnace, which still contain phosphates.

Monophosphates of alkali and alkaline earth metals. Ingenuin Hechenbleikner (to Chemical Construction Corp.). U. S. 1,790,502, Jan. 27. A comminuted reagent such as phosphate rock or a Na salt is caused to react with dil. H_3PO_4, and the reaction products are subjected to spray desiccation to obtain a dry powd. monophosphate. Dust formed in the atomization of the material is scrubbed with part of the dil. H_3PO_4. App. is described.

Polysulfides. Ignaz Kreidl. Austrian 119,764, Mar. 15, 1928. Solid stable polysulfides for treating plants are prepd. by heating metal sulfides, oxides or other suitable compds. with S in the presence of a stable, non-drying dehydrating agent, *e. g.*, glycerol. To avoid evapn. or decompn. of the dehydrating agent, the reaction is effected at about 100° in the presence of a catalyst, *e. g.*, a sulfite or thiosulfate. Reference is made to the manuf. of polysulfides of the alk. earth metals, As, Cu and Pb. An example is given. Cf. *C. A.* **24**, 1178.

Removing soluble ferrocyanides from ammonium thiocyanate solution. Josef Schröter (Wilhelm Gluud, Konrad Keller and Walter Klempt, inventors). Ger. 511,575, Dec. 7, 1927. The NH_4CNS is heated to above 100°, with optional addn. of gaseous or aq. HCNS, and the ppt. so obtained filtered off. The method is applicable to crude NH_4CNS obtained in Fe vessels. The sol. $(NH_4)_4FeC_6N_6$ present is decompd. by heating into $H_4FeC_6N_6$ and NH_3, the former splitting up further into HCN and insol. polymerized ferrocyanide.

Metal carbonyls. I. G. Farbenind. A.-G Brit. 334,976, June 24, 1929; Fr. 691,993, Mar. 15, 1930. CO is caused to react with carbonyl-forming materials, which may be in solid form or in the presence of inert liquids or melts as described in Brit. 323,332 (*C. A.* **24**, 3329), in a plurality of sep. reaction vessels, through at least 2 of which either the gases or liquids contg. CO or the carbonyl-forming materials, or both, are at least in part passed in series. Various details of app and procedure are described. Cf. *C. A.* **24**, 5441.

Heavy metal azides. Jos. Meissner. Ger. 514,012, Sept. 26, 1929. Equiv. amts. of NaN_3 soln. and a heavy metal salt soln are fed continuously to a mixing chamber arranged at the top of a column fitted with baffles. The reaction products flow down the column, the purpose of which is to give the crysts. of pptd azide time to grow to the required size. A partial sepn. of crysts. and mother liquor is effected at the foot of the column.

Producing metal compounds with the aid of complex hydrofluoric acids. Albert F. Meyerhofer. Ger. 514,149, Dec. 21, 1923. A metal or its oxide, carbonate, etc., is treated with H_2SiF_6, the fluosilicate so obtained is converted into the desired compd. by double decompn. and the fluosilicate by-product is removed. H_2SiF_6 is regenerated by heating the fluosilicate to form a metal fluoride and SiF_4, by causing the metal fluoride to react with an oxide or carbonate and treating the fluoride then obtained with H_2SO_4 and SiF_4. The manuf. of $ZnCl_2$ by converting ZnO into $ZnSiF_6$ and decompg. this with NaCl is described by way of example, the Na_2SiF_6 also obtained being heated to give SiF_4 and NaF, which reacts with $CaCO_3$ to give CaF_2 and Na_2CO_3. H_2SiF_6 is regenerated from the CaF_2 and SiF_4. Other complex hydrofluoric acids may be used instead of H_2SiF_6. Cf. *C. A.* **24**, 5441.

Compounds of sexivalent chromium. Marvin J. Udy (to Electro Metallurgical Co. of Canada, Ltd.). Can. 308,128, Jan. 27, 1931. $CaCrO_4$ is made by roasting an intimate mixt. of finely ground ferrochrome, lime and alkali metal carbonate. The compd. is easily converted into other chromates or dichromates, or chromic acid or chromic anhydride.

Aluminum compounds. Trygve Greiff. Norw. 45,918, Dec. 31, 1928. The oxidic constituents of the raw material are passed into anhydrous F compds. The volatile F compds. are sepd. from the non-volatile compds., and the latter by treating

with NH_4Cl, are converted into chlorides including $AlCl_3$. The $AlCl_3$ is volatilized and can be decomposed into Al_2O_3 and HCl by treating with H_2O.

Pure alumina. Norsk Hydro-Elektrisk Kvaelstofaktieselskab. Norw. 45,196, May 29, 1928. Solns. of $Al(NO_3)_3$ or $AlCl_3$ are treated with sufficient CaO or $CaCO_3$ to ppt. Fe. This is filtered off, and Al_2O_3 is finally pptd. from the filtrate by further addn. of pure CaO or $CaCO_3$.

Ammonium and alkali sulfates. Kali-Forschungs-Anstalt G. m. b. H. Ger. 514,319, Nov. 12, 1924. This relates to the sepn. of alkali and ammonium sulfates from solns. contg. both. Alkali sulfate is caused to sep. by concg. the soln. at a high temp., at which the double alkali-ammonium sulfates are unstable, and this concn. is continued until $(NH_4)_2SO_4$ also begins to sep The sepd. alkali sulfate is removed, and the mother liquor is cooled. A double sulfate then seps., leaving a mother liquor satd in $(NH_4)_2SO_4$, this liquor being removed and concd. until alkali sulfate also begins to sep. with the $(NH_4)_2SO_4$. Further crystn. of the sulfates may be induced by addn. of alkali chloride and NH_4Cl at the appropriate stages. Modifications in the process are described, and detailed examples are given.

Ammonium nitrate in granular form. Norsk Hydro-Elektrisk Kvaelstofaktieselskab. Norw. 45,862, Dec. 3, 1928. The salt mass is moistened with concd. H_2SO_4 (in the place of H_3PO_4 as in Norw. 44,691) after which the moistened acid mass is treated with gaseous NH_3.

Ammonium nitrate and calcium carbonate. Odda Smelteverk Aktieselskap and Erling Johnson Fr. 690,757, Feb 27, 1930. A product contg NH_4NO_3 and $CaCO_3$ is made by treating a soln of $Ca(NO_3)_2$ with NH_3 and CO_2 and removing the water.

Ammonium phosphate and calcium nitrate. Norsk Hydro-Elektrisk Kvaelstofaktieselskab. Norw. 46,807 Aug. 19, 1929. Raw phosphate is converted to $Ca(NO_3)_2$ and NH_4 phosphate through the intermediary product $CaHPO_4$ by a combination of the following processes: partial reaction of the $CaHPO_4$ with $(NH_4)_2CO_3$, treatment of the residue consisting of $CaHPO_4$ and $CaCO_3$ with a quantity of HNO_3 sufficient only for the soln. of the carbonate, and further treatment of the remaining $CaHPO_4$ with $(NH_4)_2CO_3$.

Ammonium phosphate. Ingeniuin Hechenbleikner (to Chemical Construction Corp.) U. S. 1,790,503, Jan 27. Reaction is effected between NH_3 and dil. H_3PO_4 to produce a neutral phosphate soln., and the latter is subjected to spray desiccation to produce a powd. NH_4 phosphate, gases liberated in the spray drier being scrubbed with dil. H_3PO_4. An arrangement of app. is described.

Ammonium sulfate. Firma Carl Still. Ger 513,292, April 29, 1928 See Fr 673,994 (*C. A.* **24**, 2554).

Saturator and auxiliary plant for making ammonium sulfate. Eschweiler Bergwerks-Verein (Hans Hasenjager and Richard Middeldorf, inventors). Ger. 511,091, Jan. 12, 1927.

Barium salts. Sachtleben A.-G. für Bergbau und chem. Ind (Hans Volquartz, inventor). Ger. 513,462, Oct. 26, 1926 Sol. Ba salts are prepd. by the reaction of solid hydrated BaS with suitable dry NH_4 salts without applying heat. Thus, cryst. hydrated BaS and crys . NH_4Cl may be shaken together without heating; whereupon the mixt. liquefies and cools to —20°, with sepn. of $BaCl_2.2H_2O$

Production of carbon monoxide and phosphorus pentoxide or phosphoric acid. Norsk Hydro-Elektrisk Kvaelstofaktieselskab. Norw. 45,994, Jan. 21, 1929 Phosphorus is oxidized according to Norw. 45,018 A quantity of air is introduced together with CO_2 in such proportions as to produce a H-N ratio of 3:1 when the gas, after sepn. from P_2O_5, is made to react with H_2O.

Solid carbon dioxide. Hermann Hamburger and Hugo Hamburger Austrian 119,947, June 15, 1930. CO_2 is liquefied, and the liquid is further cooled in molds until it has crystd.

Utilizing solid carbon dioxide. Franz Lejeune. Austrian 119,944, June 15, 1930. The solid is rendered available for use in *satg. benzine* or *prepg. beverages* by introducing it into containers of such a size that the gasified CO_2 exerts a pressure of about 2 atm. A suitable container and a charging device are described.

Carbon disulfide, etc. H. Oehme and Chemische Fabrik Kalk Ges. Brit. 334,856, Oct. 2, 1928. In the process described in Brit. 314,060 (*C. A.* **24**, 1187) for the manuf. of CS_2 from H_2S, the mixt. of H_2S and H obtained after removing the CS_2 from the mixt. coming from the reaction chamber is returned to the original crude gas instead of being treated for the extn. of H_2S, or the H_2S may be removed from the mixt. and used for producing elemental S, salts contg. S or S compds. other than CS_2. Instead of using

ammoniacal NH_4 sulfide soln. for absorbing the H_2S, alkali or alk. carbonate solns. or adsorbent materials of large superficial area may be employed.

Compounds of hydrogen peroxide. I. G. FARBENIND. A.-G. Fr. 692,026, Mar. 17, 1930. Compds. of H_2O_2 with solid substances are made by the reaction of the solid substances with gaseous H_2O_2 dild. by other gases. Thus a mixt. of H with 3% of O and 4 7 g. of H_2O_2 per cu. m. obtained by elec. discharge is passed through a layer of dry cryst. urea cooled by ice water. A product contg. 33.3% of H_2O_2 is obtained. With anhyd. Na_2SO_4 a product contg. 6.26% of H_2O_2 is obtained.

Iodine monochloride. SCHERING-KAHLBAUM A.-G. Ger. 512,563, Feb. 22, 1930. Solns of ICl are prepd. by the action of Cl on a suspension of I in equimol. proportions. I compds. in which the I is liberated by Cl, *e. g.*, KI, may be substituted for the I. Thus, a current of Cl is led into a suspension of I or KI in concd. HCl.

Lead phosphate. SOC. D'ÉTUDES POUR LA FABRICATION ET L'EMPLOI DES ENGRAIS CHIM (P. Jolibois and G. Chaudron, inventors). Fr. 690,744, Feb. 27, 1930. A Pb phosphate or chlorophosphate is made by grinding natural phosphate, treating it with HCl, adding a Pb salt such as $PbCl_2$, litharge or $PbCO_3$ and sepg. the ppt. A salt corresponding to the formula $PbCl_2.3(P_2O_5.3PbO)$ is obtained.

Phosphoric acid and phosphates. SOC. D'ÉTUDES POUR LA FABRICATION ET L'EMPLOI DES ENGRAIS CHIM. (P. Jolibois and G. Chaudron, inventors). Fr. 690,818, Feb. 28, 1930. H_3PO_4 is obtained in a form directly usable by the reaction of a Pb phosphate, such as $P_2O_5.3PbO$ or the $PbCl_2.3(P_2O_5.3PbO)$ described in Fr. 690,744 (preceding abstr.), with an acid which forms an insol. Pb salt. If a salt such as $(NH_4)_2CO_3$ is used, a phosphate is obtained.

Concentrating solutions of magnesium chloride. SHELDON B. HEATH (to Dow Chemical Co.). U. S. 1,789,385, Jan. 20. The soln. is evapd. by heating it by means of a Ni heating surface such as heating coils of Ni tubing while maintaining the soln. and Ni in contact with a body of Al, which serves to prevent corrosion of the Ni.

Nitrogen oxides. FREDRIK W. DE JAHN (to Frank A. Bower). U. S 1,789,580, Jan 20. Various details are described of an app. for producing N oxides from an NH_3-air mixt., including a pre-heater, oxidizing app., coils within the latter for reducing the temp of the N oxides immediately after their formation, and connections for utilizing the N oxides as a heating medium in the pre-heater.

Potassium nitrate. NORSK HYDRO-ELEKTRISK KVAELSTOFAKTIESELSKAB. Norw. 45,861, Dec. 3, 1928. KCl and H_3PO_4 react to form K_3PO_4 and HCl, the latter is removed by heating, and K_3PO_4 is treated with hot HNO_3. The soln. is then cooled until the KNO_3 ppts.

Potassium and ammonium phosphates. I. G. FARBENIND. A.-G. (Kurt Röhre and Robert Griessbach, inventors.) Ger. 513,267, Feb. 6, 1927. In order to sep. phosphates of K and NH_4 from solns. contg. both, the soln. is treated with H_3PO_4, or with NH_3 or alkali, in the amt. required to form the dipotassium and diammonium salts. After concg. and cooling, $(NH_4)_2HPO_4$ seps. out. The residual soln. is then treated with H_3PO_4 in the amt. required to form the monopotassium and monoammonium salts and is further concd. if desired. KH_2PO_4 then seps. out. An example is given.

Recovering potassium salts used in treating phosphates. CHEMIEVERFAHREN G. M. B. H. Ger. 511,214, Nov. 29, 1928. In opening up crude phosphates by treatment with K_2SO_4 and an acid, *e. g.*, HNO_3, the sepd. $CaSO_4$ carries with it some K_2SO_4 in the form of a double salt. To recover the K_2SO_4, the $CaSO_4$ is washed twice with water acidified with HNO_3 and is stirred between the washings. The second wash liquor may be used in treating a fresh batch of phosphate.

Treating potassium feldspar and other potash-containing silicates. A. KVALHEIM. Norw. 42,628, Dec. 10, 1928. The silicates are treated with Cl in the presence of C at suitable temp. The chlorides formed are sepd. by aid of the difference in their b. ps. The $SiCl_4$ is electrolyzed to form Si and Cl.

Recovery of sodium carbonate from natural alkaline waters or brines. JAMES G. MILLER and ALEXIS C. HOUGHTON. Can. 308,001, Jan. 27, 1931. Brines contg. Na_2CO_3 and dissolved silica are treated with sufficient caustic alkali to prevent the sepn. of silica and chilled to approx. 5° to ppt. $Na_2CO_3.10H_2O$. Cf. *C. A.* **24**, 3613.

Furnace for making sodium sulfate, etc. FRIEDRICH BÖHM. Ger. 511,463, May 4, 1927. A method is described of securing the scrapers, not involving the use of screws.

Reducing sulfur dioxide. MAITLAND C. BOSWELL. Can. 308,238, Feb. 3, 1931. A catalyst is prepd. by the action on an oxide of a metal of the Fe group of SO_2 and H to cause the oxide to take up S and form a porous mass. SO_2 and H are passed through the mass in the proportions of 1 to 2 at 300° to reduce the SO_2. Cf. *C. A.* **24**, 4126.

Sulfur trioxide from sulfur dioxide. CYRIL B. CLARK (to General Chemical Co.). U. S. 1,789,460, Jan. 20. In a process involving the catalytic oxidation of SO_2 to SO_3 in stages, a portion of the hot, partially converted gas is removed from the conversion system and cooled to below the temp. suitable for further conversion, and the cooled portion is introduced into the hot gas of the system to regulate its temp. An arrangement of app. is described Cf. *C. A.* **24**, 1474.

Sulfur trioxide. S. ROBSON and P. S. LEWIS. Brit. 334,862, June 8, 1929. A catalyst for oxidation of SO_2 is prepd. by mixing a V compd. which will react with SO_2 to yield vanadyl sulfate with an inert carrier such as pumice, kieselguhr, diatomaceous earth or pptd. silicic acid, and treating while cold with an acid gas such as SO_2 until the product gives an acid reaction to litmus and gas is no longer absorbed (the temp. is maintained sufficiently low to avoid substantial removal of water present). Catalyst promoters such as salts of Sn, Bi or Mn may be added. The catalyst thus formed is immune to poisons and converts 94–95% of SO_2 to SO_3 when used at 400°.

Filtering titanium sulfate solutions. I. G. FARBENIND. A.-G. (Paul Weise and Friedrich Raspe, inventors.) Ger. 513,291, July 23, 1929. The filtration of crude acid solns. of $Ti(SO_4)_2$, obtained from Ti ores and H_2SO_4, is readily effected by reducing the soln. so that some of the Ti is present in the tervalent state, cooling to below 35°, and filtering through nitrated filter cloth. Cf. *C. A.* **24**, 696.

Zinc chloride purification. JESSE O. BETTERTON (to American Smelting and Refining Co.). U. S. 1,789,299, Jan. 20. $ZnCl_2$ contg. impurities such as Pb, Pb chloride and Pb oxychloride is melted with an excess of metallic Zn, and portions of the molten salt material are recirculated through the adjacent metal in the container; a slag of purified $ZnCl_2$ is allowed to form on the surface of the bath and is removed. Cf. *C. A.* **24**, 1710.

Zinc oxide. ORKLA GRUBE-AKTIEBOLAG. Norw. 45,612, Dec. 31, 1928. $ZnCl_2$ solns. contg $MgCl_2$ are treated with CaO in amts. less than that required to convert the Zn content into $Zn(OH)_2$. The oxychlorides of Zn obtained, after being completely or partially sepd. from the mother liquor, are treated at a higher temp. (70° or more) with CaO in amts not exceeding that required to convert them into ZnO or $Zn(OH)_2$ A minor content of Cl should be retained in the resulting ZnO.

Zinc sulfide. ST. JOSEPH LEAD CO. Fr. 691,826, Mar. 12, 1930. See Can. 306,140 (*C. A.* **25**, 782).

Zirconium oxychloride. KALI-CHEMIE A.-G. (Friedrich Rüsberg and Paul Schmid, inventor). Ger. 512,402, Jan. 4, 1927. Addn. to 510,574 (*C. A.* **25**, 1044). In the production of $ZrOCl_2$ by the method of 510,574, *i. e.*, treating a fused product of ZrO_2, CaO, SiO_2 and $Fe_2O_3 + Al_2O_3$ with HCl and $CaCl_2$, a smaller quantity of HCl than is necessary to produce $ZrOCl_2$ and neutral $CaCl_2$ is used for dissolving the mass, and further HCl added after the sepn. of the insol. constituents and before the production of $ZrOCl_2$ by crystn.

Active carbon. I. G. FARBENIND. A.-G. Ger. 512,798, Nov. 6, 1923. Addn. to 461,884. Wood, cork, etc., in granular form is heated to glowing with alkali compds (*e. g.*, KOH) and K_2S or K polysulfide, and optionally K_2CO_3, to form a highly active decolorizing C. Cf. *C. A.* **25**, 1045

Carbon of low electrical resistance. CARLETON B. EDWARDS and HAROLD R. HORNER (to Peter C Reilly). U. S. 1,789,380, Jan. 20. In prepg. a carbon suitable for electrode manuf., pitch coke is fed into the upper end of a vertical retort having a relatively small cross-sectional area. At a lower portion of the retort the coke is subjected to a temp. of about 1790°, and at this portion of the retort air is drawn through its walls and passed upwardly through the descending charge of coke; the carbon produced is gradually withdrawn from the lower end of the retort. App is described.

Adsorbent comprising carbon, iron and iron oxide. CHRISTIANUS J. G. AARTS. U. S. 1,789,507, Jan. 20 Finely divided Fe oxide is distributed over a voluminous carbonaceous carrier, such as wood wool, filling substantially an entire reaction space, and a gas contg. CO is passed through the material at a temp. (suitably about 350–450°) at which the Fe oxide is reduced for the most part but not entirely. The product is suitable for *decolorizing sugar juices*, etc., or for use as a *pigment* or *carburizing agent* or for *electrode manuf.* Cf. *C. A.* **24**, 2256.

Absorption agents. MAXIMINE (SOC. ANON.). Fr. 690,684, Feb. 26, 1930. Porous products having a basis of active charcoal are made by incorporating a carrier such as finely divided wood pulp with active charcoal, expelling excess water, compressing to the desired shape and drying.

Hydrogen. MARIA CASALE-SACCHI. Austrian 119,928, June 15, 1930. In the manuf of H by reacting CO with steam and sepg. the mixt. of H and CO_2 so obtained,

the CO_2 is led with O through glowing coke to regenerate CO, which is freed from SO_2 (derived from the coke) and used again.

Hydrogen from steam and carbon monoxide. JOHN S. BEEKLEY (to duPont Ammonia Corp.). U. S. 1,789,538, Jan. 20. A Cr oxide catalyst is employed which is preliminarily heated in a non-oxidizing atm. to about the reaction temp. Cf. *C. A.* **24**, 3331.

Hydrogen producer. BAMAG-MEGUIN A.-G. Ger. 491,789, Feb. 23, 1928. Details are given of a periodically operated steam-Fe H producer with an overhead heating chamber. Cf. *C. A.* **24**, 1945, 4596.

Production of a mixture of nitrogen and hydrogen in proportions suitable for ammonia synthesis. EMIL EDWIN. Norw. 39,562, Dec 30, 1929. A gas mixt. consisting chiefly of CO and H_2, with possibly some N_2 and CO_2 or H_2O, is produced by reaction of gaseous, solid or liquid carbonaceous materials with H_2O in an elec. high-voltage arc or flame. The heat of the gas is utilized in carrying out such gas reactions with air, steam or atomized water as will produce a gas mixt. consisting chiefly of N_2 and H_2 in the desired proportions, from which the constituents other than H_2 and N_2 are afterward removed.

Phosphorus. VICTOR CHEMICAL WORKS. Fr. 691,872, Mar. 13, 1930. P is obtained by making briquets of a mixt. of ore contg. P and carbonaceous material for the reduction and a siliceous material, though it is preferred to add the siliceous material separately to the furnace. The briquets are heated in a furnace, and the P is liberated and volatilized.

Phosphorus. VICTOR CHEMICAL WORKS. Fr. 692,296, Mar. 19, 1930. Briquets contg. a P ore, a reducing agent such as a carbonaceous material with or without a siliceous material have incorporated therewith the "fumes" coming from the gases escaping from the plant for the volatilization of the P.

Apparatus for melting sulfur. EVERETT E. BRAGG (to General Chemical Co.). Can. 308,133, Jan. 27, 1931. Structural features.

Hydrogenation catalysts. E. I. DU PONT DE NEMOURS & Co Fr. 691,913, June 6, 1929 A catalyst for hydrogenation, dehydrogenation and the synthesis of org. compds. is composed of a difficultly reducible basic oxide and a difficultly reducible acid oxide, the latter being in excess of that necessary to give a neutral catalyst. A catalyst with which a practically pure MeOH is obtained from H and CO may be prepd. by gently heating a basic chromate of Zn and NH_4. Small quantities of alkali metal compds. *e. g.*, 0.25–5%, may be incorporated with the catalysts for the production of compds. of higher mol. wt. such as higher alcs., ketones, esters and aldehydes. Cf. *C. A.* **24**, 1649.

Sulfonated aliphatic compounds. H. TH. BÖHME A.-G. Fr. 691,976, Mar. 15, 1930. Sulfonated fatty acids and esters, free from unsulfonated elements, are obtained by treating sulfonated oils after neutralization with hydrocarbons or other appropriate solvents and sepg. them from the layer of solvent. The products are *used as wetting, purifying, emulsifying and impregnating agents.*

Urea and products containing urea from calcium cyanamide. E. JOHNSON. Norw. 45,319, July 9, 1928. $CaCN_2$ is decomposed by water, and the soln. of H_2CN_2 is hydrolyzed with formation of urea. During the hydrolysis the soln. is concd. *in vacuo* with application of heat.

Plastic masses. ALFRED ROGLER. Fr. 691,875, Mar. 13, 1930. From 5 to 30% of oil-sol acids such as cinnamic, phthalic, salicylic or lactic acid and a basic metallic compd. sufficient for neutralization (*e g.*, Ti white, white lead, MgO or lithopone) are added to vegetable oils such as linseed, wood, poppy or castor oil and the mixt. heated until a uniform plastic mass of the desired consistency is obtained.

Plastic materials. WALTER HENGSTMANN. Fr. 691,728, Mar. 11, 1930. A plastic material is composed of a mixt. of a cellulose ether, natural or artificial resin and an ester of a dibasic acid of the aliphatic series. Thus, ethylcellulose is dissolved in a mixt. of benzene, ethylacetate and acetone, the soln. is mixed with a soln. of resin in benzene and a small quantity of adipic acid is added. The mixt. is pressed into blocks or plates under high pressure at about 60° and allowed to dry. S or compds. liberating S may be added to the mixt. which is then vulcanized during molding by heating to 150°.

Condensation products soluble in water. I. G. FARBENIND. A.-G. Fr. 690,688, Feb. 26 1930. Condensation products which are sol. in water are prepd. by treating at a moderate temp. under vacuum the condensation products obtained under moderate conditions from CH_2O and aliphatic aldehydes or ketones or mixts. thereof. Examples are given.

Condensation product of urea with formaldehyde. OSCAR A. CHERRY (to Economy Fuse and Mfg. Co.) U. S. 1,790,461, Jan. 27. Urea and CH_2O are condensed at a H-ion concn. of about 1×10^{-3}, free water is distd. from the condensation product at a H-ion concn. of about 1×10^{-7} and the condensation product is converted into a final product at a H-ion concn. of from 1×10^{-5} to 1×10^{-3}. Numerous details of procedure are described. Cf. *C. A.* **24**, 930.

Condensation products. I. G. FARBENIND. A.-G. (Carl Müller v. Blumencron and Ernst Hochheim, inventors). Ger. 511,979, Jan. 13, 1926. Addn. to 510,513 (*C. A.* **25**, 1045). Urea-CH_2O condensation products are hardened by acids instead of the SO_2 of 510,513. Volatile acids are preferred. The examples mention H_3PO_4, HCOOH, HBr, HCl, H_2SO_4 and HF.

Adhesive. I. G. FARBENIND. A.-G. (Erich Richter, inventor). Ger. 511,297, Aug. 21, 1928. An adhesive for securing mouthpieces to cigaret paper comprises an org. solvent soln. of a cellulose deriv., a softener and a resin. Examples are given.

Adhesive. OTTON GENACHOW. Austrian 119,948, June 15, 1930. An adhesive for securing metal foil, etc., to wood, paper, etc., comprises albumin, NH_4Cl, and glycol, erythritol or other polyhydric alc. No proportions are specified. After applying the adhesive, the materials to be united are heated in a hydraulic press to 120° and allowed to cool before the pressure is released.

Preserving adhesives such as starch paste. I. G. FARBENIND. A.-G. Brit. 334,876, May 1, 1929. Adhesives are preserved by addn. of a small proportion of a hydroxydiarylmethane or hydroxytriarylmethane contg. 1 or more halophenol radicals such as methylenebis-2,4-dichlorophenol or similar compds. (various examples of which are given).

Vegetable glue. ELLERY H. HARVEY (to Perkins Glue Co.). U. S. 1,790,346, Jan. 27. A glue suitable for use, without dilu., for general furniture veneering is formed by dissolving starch such as cassava starch of a "specific viscosity less than 60,000" in about 3 times its quantity of water in the presence of a sufficient quantity of an Fe compd. such as $FeSO_4$ for increasing the viscosity to form a fluent glue with a "specific viscosity of at least about 80,000."

Barite. BARYT G. M B. H. Ger. 512,546, Jan. 23, 1925. Crude heavy spar is worked up by calcining, slaking and suspending in water. The heavy spar collects at the bottom of the vessel, and the principal impurity, Ca, can be poured off as milk of lime. The heavy spar can then be further refined by treating with a small quantity of HCl.

Crystallizing constituents from brines. RUSSELL W. MUMFORD (to American Potash & Chemical Corp.). U. S. 1,790,436, Jan. 27. In cooling a brine such as Searles Lake brine contg. constituents, two of which such as borax and KCl have solubilities decreasing on cooling and one of which is capable of a higher degree of supersatn. than the other, the brine is subjected to an initial stage of evaporative cooling to reduce the temp. to nearly the satn. point with respect to the constituent such as borax capable of a higher degree of supersatn., while pptg. the other constituents, and the brine is then subjected to rapid cooling while further pptg. the latter and maintaining the other constituent in a state of supersatn. Cf. *C. A.* **24**, 209, 928.

Synthetic gems. WIEDE'S CARBIDWERK FREYUNG M. B. H. Ger. 511,945, Aug. 15, 1928. Spinel with a morganite-like pink color is formed by the crystn. of an Al_2O_3 and Mg mixt. to which Fe, Be and Ti (or their compds) are added, after fusing in a crucible. In the example, 0.2 g. TiF_4, 0.5 g. BeO and 10 g. Fe_2O_3 are fused with 500 g Al_2O_3 and 100 g. Mg powder.

Synthetic materials. I. G. FARBENIND. A.-G. Fr. 691,901, Mar. 14, 1930. The crude polymerization products of butadiene hydrocarbons or their transformation products or their preliminary products are sepd into fractions by means of solvents. These fractions may be mixed with natural rubber or fractions thereof. An example is given in which the first fraction is suitable for the manuf. of *artificial silk*, and the second for *coatings* or for *impregnating paper*. Other examples are given in which fractions suitable for vulcanization to *synthetic rubber* are obtained.

Effecting reactions such as those between phosphate rock and sulfuric acid. OTTO BALZ and WILHELM WAGNER (to I. G. Farbenind. A.-G.). U. S. 1,790,220, Jan. 27. A small quantity of metaphosphoric acid (suitably about 0.3–10% the quantity of phosphate rock) is added to facilitate the sepn. of $CaSO_4$ formed.

Treating gypsum for cement and sulfuric acid production. FRITZ ROTHE and HANS BRENEK (to Rhenania Verein chemischer Fabriken A.-G.). U. S. 1,790,023, Jan. 27. A mixt. of gypsum and silica is heated in an oxidizing atm. to above 1100° by use of heating gases contg. at least 15% by vol. of steam.

Furnace for calcining gypsum. ANDRÉ BOURDET. Ger. 514,068, Feb. 6, 1930.

The gypsum is passed through 2 heated tubes, the first being the hotter. Hot gases pass in the same direction as the gypsum in the first tube, and countercurrent to the gypsum in the second tube.

Purifying pyrites-burner gases. I. G. FARBENIND. A.-G. (Franz Vorländer, inventor). Ger. 514,318, May 21, 1925. In purifying pyrites-burner gases by an acid wash followed by filtration or elec. cleaning, the washing acid used is of such concn. that it boils above 100° and slightly above the temp. of the gases supplied to the washer. Thus, the gases may be cooled to 125° and washed with H_2SO_4 of 45° Bé. Better results in the final purification are then obtained.

Apparatus for cleaning, classifying and grading materials such as asbestos. ROGER Q. KYLE. U. S. 1,790,429, Jan. 27. Structural and mech. features.

Bleaching. CHEMISCHE FABRIK VON HEYDEN A.-G. (Max Kahlert, inventor). Ger. 512,863, Nov. 24, 1925. A bleaching lye of metal hydroxide or oxide soln. or suspension, and gaseous Cl, is prepd. by satg. the liquid with Cl mixed with indifferent gas (*e. g.*, air) by allowing the gas to flow up a tower, down which the liquid is allowed to trickle.

Clarifying agent. MAXIMINE (SOC. ANON.). Fr. 690,992, Mar. 3, 1930. A clarifying agent is made by peptizing carbonized org. substances by grinding them in the moist state with appropriate colloids. The colloids used are chosen to suit the purpose to which the clarifying agent is to be put. Thus, albumin is used for the sugar industry and gelatin for wine making. The process allows active charcoals in paste form to be dried without passing to the non-reversible gel state.

Waterproofing compositions. E. I. DU PONT DE NEMOURS & CO. Fr. 691,915, July 8, 1929. See Brit. 315,228 (*C. A.* **24**, 1742).

Treating plants. J. SEIBT & BECKER. Ger. 511,066, May 4, 1929. Bleached and (or) dyed parts of plants, fresh or dried, are impregnated with an aq. soln. of a fatty acid salt, *e. g.*, a potassium soap, to which glycerol or other hygroscopic substance may be added. The treatment preserves the appearance of the fresh parts and imparts a fresh appearance to dried parts

Iodide and iodide-starch paper. VIKTOR BAUSCH and FELIX SCHOELLER & BAUSCH. Ger. 511,164, Dec. 2, 1927, and 511,165, Jan. 19, 1928, addn. to 511,164. Iodide or iodide-starch paper for use in telegraphy includes a reducing agent in small quantity, *e. g.*, rongalite 1 to KI 100 g., to prevent sepn. of I when the paper is stored. The starch used may be crude insol. starch, with or without sol. starch (511,164). The stability of the paper can be further improved by adding an alk. substance, *e. g.*, $NaHCO_3$, as well as a reducing agent (511,165). Cf. *C. A.* **25**, 1048.

Strip metal matrices for production of ribbon sound records. H. WATSON and J. GOOD. Brit. 335,181, June 17, 1929. Various mech. details of manuf. are described.

Gramophone disks. CHEMIE & TECHNIK J. M. S. GES. and H. MENZ. Brit. 335,219, June 19, 1929. A compn. is used composed of old gramophone disk material contg. shellac and vulcanite, and waste material of the character described in Brit. 335,194 (*C. A.* **25**, 1401), the old disks being ground, mixed with the waste compn. and boiled in bone oil with the addn. of spirit.

Materials for diaphragms of loud-speakers, telephones, microphones, etc. H. VOGT. Brit. 335,248, Oct 4, 1928. A vibratable diaphragm is placed face to face with a condenser plate or between 2 condenser plates from which it is insulated by a nitrocellulose varnish or the like contg. a more conductive pulverulent material such as slate powder or Pb oxide. Cf. *C. A.* **25**, 1049.

Heat-conducting mixture for bending metal blocks, etc. FULLER LEHIGH CO. and BABCOCK & WILCOX, LTD. Brit. 335,086, Oct. 15, 1929 A mixt. suitable for bending metal blocks, tiles, linings, etc., of steam generators or other app. subjected to high temps. is formed of Na silicate soln., glycerol and graphite, with or without lubricating oil. Cf. *C. A.* **24**, 4604.

Colloidal mixture suitable for use as a cleaner, polisher and binder. EMIL L. JEASMAN. U. S. 1,790,272, Jan. 27. A satd. soln. of Na phosphate is mixed with sufficient bentonite to form a mixt. of heavy paste-like consistency.

Detergent for use on metals, painted surfaces, glass, etc. W. J. A. HUYZER. Brit. 335,005, July 26, 1929. Natural magnesite is ground to pass a 250-mesh screen, preferably being first ground to 100 linear mesh, heated to 900° to eliminate moisture and then further ground to 250 linear mesh, and may be mixed with various other detergent materials such as "petrol," olein, "methylated spirit" and NH_3 to form an emulsion.

Polish for metal ware. RICHARD BLASBERG. Ger. 512,838, Dec. 7, 1928. A mixt. of neutral soap soln., org. acids or salts, and alc. is used.

Composition for defrosting windshields. WM. M. WEGMANN. Can. 308,080,

Jan. 27. 1931. A compn. for melting ice and snow from windshields of automobiles consists of a fused mass contg. 6 parts of $CaCl_2$ and 1 part of NaCl.

Activating filaments. LINCOLN THOMPSON (to Victor Talking Machine Co.). U. S 1,790,449, Jan. 27. A filament which may be formed of Pt wire is amalgamated, treated with one or more activating substances (such as by electrolyzing in a soln. of $BaCl_2$ and $SrCl_2$) and then heated to drive off Hg.

Magnet cores. PHILIP N. ROSEBY (to Associated Telephone and Telegraph Co.). U. S. 1,789,477, Jan. 20. Particles of pure iron are covered with a coating of Fe phosphate by boiling them in a soln. of Zn phosphate; the particles are then covered with a binding material such as bakelite varnish, and a mass of the coated particles is formed into a solid body in a heated mold by pressure sufficient to give the product a sp. gr. approx. that of pure iron.

Painting in relief. MARIE A. MAJOR NÉE ODAU Ger. 514,086, Aug. 26, 1928 A waterproof, rapidly drying adhesive is used comprising crude crepe rubber 10 in C_2HCl_3 80, C_2Cl_4 20, AcOEt 25 and methylated spirit 15 parts. Powd. mica or like material is dusted on after applying the adhesive.

Sealing composition (substitute for sealing wax). J. LESIUK. Brit. 334,936, June 12, 1929. A sealing compn adapted for use without flame or heat comprises a mixt. of a "gum paper or similar fibrous material," a compd. such as a cellulose ester and a solvent for the latter, preferably with addn. of a sugar and with or without resinous material. The material is dispensed in collapsible tubes or the like and sets after a few min exposure to the air.

Coating articles such as airplane propellers with metal. WM. E. GWALTNEY (to Westinghouse Elec. & Mfg Co). U. S. 1,790,213, Jan 27. A material such as laminated fabric and phenolic condensation product having a normally smooth and nonporous surface is subjected to a superficial grinding to pull out one of the constituents and form counter-sunk recesses; metal such as Cu, phosphor-bronze or Cr is then mechanically deposited on the prepd. surface.

Friction material for brakes, clutches, etc. FREDERICK C. STANLEY (to Raybestos Manhattan, Inc.) U. S 1,790,176, Jan. 27 Asbestos fiber is used with about 1–5% each of powd or granular graphite and powd or granular Pb or other metal of relatively low m. p., held together by a hardened binder. Cf. *C. A.* **25**, 566

Dentifrice. AKTIESELSKAPET SI-KO. Fr. 690,714, Feb. 26, 1930. An acid dentrifice is made by grinding at a relatively high temp., *e. g.*, 70°, a mass composed of a silicic acid gel, water and glycerol and a compd. which will maintain the mass liquid at the temp. used while allowing it to coagulate at a lower temp., *e. g.*, tartaric acid, benzoic acid or boric acid. Cf. *C. A* **23**, 242.

Cellulose compositions for making dental plates. VERCINGÉTORIX AUGUSTE LAPIERRE. Fr 692,400, June 13, 1929 Cellulose acetate dissolved in a solvent and combined with ores, earths, mineral oxides, etc., is used for making dental plates, etc.

Destroying pests. BODO HABENICHT. Ger. 509,454, Nov. 18, 1928. Cuprous or mercurous tripyridyl and like complex metal pyridyl compds. are used. No method of prepg. the compds. is described.

Compositions for combating animal or vegetable pests, particularly for treating seeds. PERMUTIT A.-G. (Otto Liebknecht, inventor). Ger. 514,284, June 15, 1926 Antimony fluorides or oxalates or their double compds. with one another or with alkali compds., are used, alone or mixed with one another or with diluents, etc.

Device for producing foam for fire-extinguishing or other purposes. N. SANDOR Brit. 335,358, Sept. 9, 1929. Structural features.

Device for producing fire-extinguishing foam. JOHN R. HAMILTON. U. S. 1,790,621, Jan. 27. Structural features.

System for producing fire-extinguishing foam from water and dry foam-forming materials. RADCLIFFE M. URQUHART (to Amdyco Corp.). U. S. 1,790,125, Jan. 27. App. and various details of operation are described. Cf. *C. A.* **24**, 2849.

Fire-extinguishing foam. MINIMAX A.-G. Ger. 511,503, Oct. 1, 1925. Foam forming liquid such as saponin is satd. with CO_2 or similar gas under pressure in a suitable container.

Foam for extinguishing fires. OTTO TREICHEL. Ger. 513,165, Dec. 25, 1925 Rapid soln. of the foam producer, *e. g.*, saponin, is ensured by mixing it with a diluent, *e. g.*, china clay, or a protective colloid, *e. g.*, albumin.

Extinguishing fires. I G. FARBENIND. A.-G. (August Ruppert, inventor). Ger 513,191, Aug. 26, 1928. In extinguishing fires with CCl_4, production of $COCl_2$ is minimized by adding to the CCl_4 a hydrocarbon and NH_3 in small quantities. An addn of solvent naphtha 5, and NH_3 0.5-1% is suitable Cf. *C. A.* **24**, 2849, 3093.

19—GLASS, CLAY PRODUCTS, REFRACTORIES AND ENAMELED METALS

G. E. BARTON AND C. H. KERR

Calculation of glass compositions from the batch and vice versa. C. E. GOULD AND W. M. HAMPTON. *Glass Ind.* 11, 249–52(1930).—The calcns. include these 3 factors which cause variations in the compn. of the glass: (*a*) presence of impurities in the raw materials, (*b*) loss of constituents from the glass by volatilization, (*c*) soln. of refractories in the glass. H. F. K.

Glass calculations simplified: primary calculations without the use of chemical symbols. R. R. SHIVELY AND V. H. REMINGTON. *Glass Ind.* 11, 223–6(1930).—Methods are given for calcg. the weight of glass produced from the batch, the percentage lost in melting, chem. substitutions in batches and the coeff. of cubical thermal expansion. H. F. K.

Fusing glass containing blast-furnace slag. I I. KITAIGORODSKII AND I. P. KAREV. *Keram. i Steklo* 6, 465–6(1930); cf. *C. A.* 24, 5954.—Investigations showed that granulated blast-furnace slag (compn. given) can be used as an admixt. in glass. Glass contg. 30% of its weight in blast-furnace slag was composed of silicic acid 70, alumina 3.2, CaO 16 and Na_2O 10%. The glass obtained was of good quality. The batch was made up of sand 1000, sulfate 275, soda 160, slaked lime 180 and charcoal 10 kg. The glass contained 15% Na oxide. M. V. KONDOIDY

Structure of glasses: The evidence of x-ray diffraction. J. T RANDALL, H. P. ROOKSBY AND B. S. COOPER. *J. Soc. Glass Tech.* 14, 219–29 T(1930); cf. *C. A.* 24, 4697.—Numerous glasses were subjected to x-ray analysis in an app. of the Debye-Sherrer type. With Cu K_α radiation a single intense band at 4.33 A. U. was obtained with vitreous silica. The strongest band for α-cristobalite occurs in almost the same position. Thus it appears that vitreous SiO_2 is composed of cristobalite crystallites, probably consisting of an av. of 20 mols. each. "Amorphous" or pptd. SiO_2 gives almost the same pattern, indicating that the difference between the cryst. and amorphous or vitreous states is one of degree, not of kind. Al and B do not destroy the SiO_2 lattice, while the strongly electropositive elements, as Ca and Na, do. The densities of glasses, their melting, electrolytic, expansion and viscous properties are briefly considered in the light of cryst. characteristics. Also in *Z. Krist.* 75, 196 214(1930). H. F. K.

Thermal endurance of glass. C. E. GOULD AND W. M. HAMPTON. *J. Soc. Glass Tech* 14, 188–204T(1930).—Numerous beakers were blown from the same tank providing a wide range in the beaker wall thickness. These were tested by heating a quantity of paraffin wax in them to a definite temp. and plunging the beaker and contents into cold water, this being repeated at 5° intervals until fracture occurred. The breaking temp. was found to rise as the thickness of the glass decreased. A math. investigation was carried out on the rise of stress in infinite flat plates of various thicknesses, on the assumption that the surface of the plate was cooled on one side in accordance with Newton's law and on the other was maintained const. Comparisons of the theoretical and the observed thermal endurances are given. H. F. K.

Bottle glasses with special regard to their stability. G. KEPPELER AND RICHARD MAENICKE. *Sprechsaal* 64, 7–10, 28–30, 46–9, 65–8(1931).—A series of beer glasses was analyzed and their solubilities in beer were detd. Compns. were plotted in both the 4-component system, CaO–SiO_2–Al_2O_3–Na_2O and in the 3-component system, CaO–SiO_2–Na_2O. C. H. LORIG

Data on grinding and polishing (glass). F. W. PRESTON *Glass Ind.* 11, 235 (1930). H. F. K.

Suggested relations of sodium silicate, adhesion tension and angle of contact, to liquid absorption in clays. GEO. I. WHITLATCH. *J. Am. Ceram. Soc.* 14, 154–61 (1931).—This is a progress report in a study of the effect of electrolytes on the liquid absorption of clays tempered to max. plasticity. Na silicates have an influence on absorption when added to the tempering water. Observed results are explained on the basis that the Na silicate reduces the angle of contact and increases the adhesion tension of the clay–water system. An extension of this principle may explain, in part at least, some of the phenomena of deflocculation and plasticity. C. H. KERR

Organic compounds as electrolytes and their effect on the properties of clay slip and on the life of plaster molds. C. W. PARMELEE AND C. G. HARMAN. *J. Am. Ceram. Soc.* 14, 139–47(1931).—Ethylamine, piperidine or tetramethylammonium hy-

droxide are good electrolytes and attack molds less than does Na_2CO_3 or Na silicate. C. H. KERR

Strength tests on roofing tile. NORMAN W. KELCH. *J. Am. Ceram. Soc.* **14,** 133–8(1931).—Rupture of the whole tile on standard edges seems to be the most reliable test. The Clay Products Inst. of Calif. has adopted these specifications: (*a*) absorption, not over 15% during 48 hrs. in water; (*b*) soundness, free from injurious cracks and ringing clear when lightly tapped; (*c*) strength (flat pan or bottom tile or flat shingle or flat decorative tile are not included), when supported on turned-down edges at points 6" each side of the center, and with load concd. at the center, the av. breaking load for 5 tiles shall be not less than 400 lb. C. H. KERR

Ceramic testing and research laboratories, Ottawa. HOWELLS FRECHETTE. Can. Dept. Mines, Mines Branch, *Memorandum Series* No. **44,** 7 pp.(1931); cf. *C. A.* **24,** 478. ALDEN H. EMERY

Heat efficiency in ceramic burning ovens. OTTO TH. KORITNIG. *Sprechsaal* **64,** 63–5(1931); cf. *C. A.* **24,** 3336. C. H. LORIG

The heat balances of some ceramic kilns. HOWARD H. MANSUR. *J. Am. Ceram. Soc.* **14,** 89–124(1931).—Two round downdraft kilns, 1 muffle, 1 rectangular horizontal draft, 1 semi-continuous and 1 continuous kiln were investigated. Results and a bibliography are given. C. H. KERR

Waste gas utilization from the muffle furnace. E. GUNTHER. *Sprechsaal* **63,** 975 (1930). C. H. LORIG

Testing laboratories for refractory materials. L. LITINSKY. *Feuerfest* **6,** 1–11 17–25, 33–9, 49–57(1930). E. H.

The determination of zinc in refractory bodies and slags. EDWARD E MARBAKER *J. Am. Ceram. Soc.* **14,** 162–75(1931). The method consists in pptg. Fe and Zn sulfides from an ammoniacal soln. contg. the 3 ions, in which the Al_2O_3 is held in soln. by the presence of citric acid. C. H. KERR

Construction of [enameled] refrigerator linings. C. H. WOLFF. *J. Am. Ceram Soc.* **14,** 148–53(1931). C. H. KERR

Refractory products in metallurgy (FORESTIER) **9.** Experiments on different glasses used in bottle manufacturing (KEPPELER) **16.** A new arrangement for the granulation of blast-furnace slag with water and air (SPIES) **9.** Examination of grain sizes in clays (GRENNESS) **15.** Plating pipes with metals such as Zn and lining them with enamel (U. S. pat. 1,789,596) **9.**

AUSCHER, E. S. **Les porcelaines et les faiences. Tome II.** Paris. Librairie Garnier Frères 209 pp. F. 25. Reviewed in *Pottery Gaz.* **55,** 1924(1930); *Ceram Abstracts* **10,** 129(1931)

KEPPELER, GUSTAV **Die Glasfabrikation. Bd. I.** 2nd ed. London: Glass Publications. 778 pp. 65s.

KORACH, MAURIZIO: **Caolini e argille refrattarie della Sardegna. Materie prime nazionali.** Faenza: C. Colombo. 23 pp.

VIGREUX, HENRI: **Le soufflage du verre.** Paris: Dunod. 276 pp. F. 35 Reviewed in *J. Phys. Chem.* **35,** 672(1931).

Glass. MAX METH (to Isaac R. Stewart). U. S. 1,789,658, Jan. 20 A glass having a low coeff. of expansion is formed from a batch which may contain soda 9, lime 16, silica 74 and a Be compd. 1%.

Glass. PITTSBURGH PLATE GLASS CO. Ger. 511,666, Feb. 22, 1929. In rolling plate glass, air, gas or vapor is blown under the glass as it leaves the rollers.

Glass. GLASFABRIK SOPHIENHÜTTE RICHARD BOCK G. M. B. H. Ger. 513,453, Apr. 18, 1926. A borosilicate glass resistant to chem. influences contains at least 4 oxides of elements of the second periodic group, at least 1% of each oxide being included. A suitable compn. has alkali up to 15, Al_2O_3 at least 6, B_2O_3 not more than 5 and SiO_2 more than 50%, together with the 4 oxides as stated above. Part or all of the Al_2O_3 may be replaced by ZrO_2.

Hollow glass. GUSTAV KEPPELER. Ger. 512,904, Mar. 3, 1927. Hollow glass is improved by adding material which evolves gas combining with alkali on further heating, *i. e.*, substances giving off H_2O, CO_2, SO_2, H_2S, HCl, H_2SO_4, HCOOH, CH_3COOH, etc.

Glass making. SOC. ANON. DES MANUFS DES GLACES ET PRODUITS CHIM. DE SAINT-GOBAIN, CHAUNY ET CIREY. Fr. 692,390, June 11, 1929. Means is described for pouring out the molten contents of the crucibles.

Feeding mold charges of molten glass. LEONARD D. SOUBIER (to Owens-Illinois Glass Co.). U. S. 1,789,480, Jan. 20. Mech. features.

Blocks for building glass-melting tanks. P. G. WILLETTS (to Hartford-Empire Co.). Brit. 334,799, Dec. 15, 1928. The blocks are heat insulated over the major portion of their outer surface, other parts such as the edges being left uncovered so that the joints between the blocks may be kept cool. Various structural details are described. Cf. *C. A.* **24**, 3337.

Apparatus for making hollow glass articles such as bottles. BYRNE MCGOVERN (to Owens-Illinois Glass Co.). U. S. 1,789,471, Jan. 20. Structural features.

Apparatus for manufacture of molded glass articles such as bottles or jars. PIERRE ARBEIT (to Hartford-Empire Co.). U. S. 1,790,633, Jan. 27. Structural features.

Blown glass articles such as "paste mold ware." WM J. WOODS and DAVID E. GRAY (to Corning Glass Works). U. S. 1,790,397, Jan. 27. The articles are progressively and sequentially blown from a ribbon of glass as it moves away from the point of its formation. App. is described.

Glass-making furnace. COMPAGNIES RÉUNIES DES GLACES ET VERRES SPÉCIAUX DU NORD DE LA FRANCE. Fr. 691,883, Mar. 13, 1930.

Apparatus for making sheet glass. MAX BICHEROUX. Ger 514,113, Aug. 26, 1928. Addn. to 423,449.

Apparatus for rolling and annealing glass plates. N.-V MIJ. TOT BEHEER EN EXPLOITATIE VAN OCTROOIEN. Ger. 511,244, April 11, 1928. See Brit. 309,444 (*C. A.* 24, 703).

Annealing glass. N.-V MIJ. TOT BEHEER EN EXPLOITATIE VAN OCTROOIEN. Ger 511,668–9, April 8, 1928.

Glass-annealing leer. KARL E PEILER (to Hartford-Empire Co.). U. S. 1,790,630, Jan. 27. Structural features.

Leer for annealing glassware. VERGIL MULHOLLAND (to Hartford-Empire Co.). U. S. 1,790,434, Jan. 27. Structural features of a continuous tunnel leer with conveyor and temp.-controlling flues.

Rust-preventing composition. GLASFABRIKEN UND RAFFINIEREN JOSEF INWALD A.-G. Ger. 513,372, Aug. 7, 1926. A compn. for protecting molds for glass and glass-working tools against rust comprises a mixt. of mineral oil and ceresin m. 35–40° emulsified with CaO 5 and concd. NaOH soln. 2%.

Safety glass. LIBBEY-OWENS GLASS CO. Fr. 691,946, Mar. 14, 1930. The intermediate layer, having a basis of cellulose, for the manuf. of safety glass is treated with a solvent of high b. p. and low vapor pressure such as dibutyl phthalate so that the formation of bubbles during use is avoided. Cf. *C. A.* **24**, 4132.

Safety glass. SOC. DES USINES CHIM. RHÔNE-POULENC. Fr. 690,803, Feb. 28, 1930. Safety glass is made by dipping 2 sheets of glass and an intermediate sheet of plastic material having a basis of cellulose acetate, nitrocellulose, etc., superficially softened and free from volatile solvents, into a bath composed of plastifiers for the plastic material, removing air bubbles, pressing the sheets lightly together and then removing them to an autoclave into which a heated gas under pressure is introduced. Cf. *C. A.* **25**, 1052.

Laminated safety glass. W. C. DOUGAN. Brit. 334,858, June 6, 1929. Various details of app. and procedure are described for uniting assembled sheets in a tank contg. adhesive and enclosed in a heated pressure chamber.

Adhesives. SOC. DES USINES CHIM. RHÔNE-POULENC. Fr. 690,751, Feb. 27, 1930. Adhesives are made by polymerizing vinyl butyrate, in the absence of water, mixed with softening or adhesive agents or an org. solvent. The product may be used for *joining the component sheets of safety glass.*

Machine for the matting of the interior surface of electric bulbs and similar glass containers. DRAMMENS LAMPEFABRIK A/S. Norw. 45,413, July 30, 1928. The matting is carried out by treating with etching liquid, washing with water and drying with air.

Open-trough washer for breaking up lump clay, etc. JAKOB HILBER. Ger. 513,107, Feb. 13, 1927.

Cleaning ollas or other clay products. ROBERT W. MCCARTY and CALVIN W. MCCARTY. U. S. 1,789,657, Jan. 20. The outer surface of the olla or the like is treated with an acid soln. such as HCl and is then sanded and brushed. App. is described.

Fireproof tile. CHRISTIAN W. HALL. U. S. 1,790,418, Jan. 27. Tiles are formed of ingredients such as cinders and other materials of the approx. analysis: SiO_2 24.4, Fe oxide 1.4, lime 16.4, Al_2O_3 10.6, MgO 2.3, Na_2CO_3 3.3, S 5, and carbonaceous matter 33.6% with addn. of about 14% of moisture.

Driving means for mechanical stoker for brick or tile kilns. INGENIEUR GAIRING MASCHINENFAB. G. M. B. H. Ger. 513,099, Jan. 22, 1930.

Indirectly heated ceramic tunnel kilns. PORZELLANFABRIK KAHLA, ZWEIGNIEDERLASSUNG FREIBERG. (Ludwig Wirth, inventor). Ger. 513,458, June 10, 1928. The gases in the kiln circulate countercurrent to the materials. Cf. *C. A.* 25, 791.

Device for transferring cement meal from the granulating drum to the kiln. G. POLYSIUS A.-G. Ger. 514,069, Feb. 23, 1930.

Ceramic furnaces. ARMAND BISCH. Fr. 690,979, Mar. 3, 1930.

Tunnel kiln for pottery, etc. R. M. D'ARLEUX and E. VIOLETTE. Brit. 335,154, April 15, 1929. Structural features.

Container for use in firing ceramic goods. HANS STÖBERER. Ger. 514,070, May 20, 1930.

Ceramic body. HANS NAVRATIEL and ALBRA H. FESSLER (to A C Spark Plug Co.). Can. 308,308, Feb. 3, 1931. A ceramic batch contg. Al_2O_3, SiO_2 and Li, the Al_2O_3 being in excess of the SiO_2, is completely fused and rapidly cooled to produce small crystals. The grog thus produced is intimately mixed with clay, molded and fired. Cf. *C. A.* 24, 2853, 3338.

Ceramic masses. JAMES MCC. LAMBIE and DONALD W. ROSS. Can. 308,218, Feb. 3, 1931. A ceramic casting slip contains NH_4OH 0.10–0.62, NaOH 0.010–0.14, Rochelle salt 0.010–0.10, oxalic acid 0.010–0.10 and litharge 0.010–0.10% of the dry mix.

Porcelain articles. GIOVANNI FUSCHI and MAURIZIO KORACH. Fr. 691,744, Mar. 11, 1930. Porcelain articles which are afterward to be subjected to heat are baked without glaze and then polished, whereby cracking of the glaze is avoided.

Insulators. I. G. FARBENIND. A.-G. Fr. 690,835, Feb. 28, 1930. An insulating substance for spark plugs is composed of a mass (contg. at least 60% of Al_2O_3) the basis of which is corundum and the surface of which is polished. Cf. *C. A.* 24, 3338.

Molds for Carborundum, etc. OSKAR DIENER. Ger. 513,445, Jan. 12, 1927. Molds made of hard-baked "artificial carbon" are used for making hard articles from powd. materials by compression at a temp. above 1300° and a pressure of 50–300 kg. per sq. cm. The manuf. of whetting stones from Carborundum or the like, with or without addns. of less refractory material, is instanced.

Refractory material. BORGESTAD FABRIKKER. Norw. 46,250, June 24, 1929. The material contains exclusively or chiefly compds. of SiO_2, Al_2O_3 and MgO. The content of free MgO should not exceed 25%. The content by wt. of SiO_2 should not exceed 0.78 MgO + 0.3 Al_2O_3. The content of Al_2O_3 should not exceed 2.55 MgO + 0.85 SiO_2. The content of MgO should not be less than 1.33 SiO_2 + 0.40 Al_2O_3.

Refractory bricks, etc. HERAEUS-VACUUMSCHMELZE A.-G. and WILHELM ROHN. Ger. 513,457, Aug. 30, 1925. Granular natural or artificial corundum, preferably mixed with 5–20% of calcined Al_2O_3, is sintered at 1300–1400° in a sheet-iron mold, without addn. of a binder.

Refractory products from silicon carbide. MINER L. HARTMANN (to Carborundum Co.) U. S. 1,790,474, Jan. 27. In order to increase its resistivity to oxidizing conditions at high temps., "commercial" SiC is treated (suitably by magnetic sepn. and use of acid) to effect removal of compds. of easily reducible metals (those falling below Mn in the electrochem. series and capable of accelerating the oxidation of SiC at high temps.), mixed in granular form with a bond contg. kaolin clay and feldspar (the bond also being free from catalytic materials which would accelerate oxidation of the SiC) which reduces the permeability of the product to penetration by oxidizing gases, shaped and fired.

Refractory lining construction suitable for electric furnaces. HARRY R. ORWICK and EDWIN J. BOGNAR (to Corundite Refractories, Inc.). U. S. 1,789,474, Jan. 20.

Glazed ceramic tiles with curved front surfaces. NILS H. CEDERQUIST. U. S. 1,790,227, Jan. 27. Various mech. details of manuf. and glazing are described.

Fusing glass onto enameled metal. HILDEGARD ADLER. Austrian 119,976, June 15, 1930.

Glazing wooden insulators. PORZELLANFABRIK PH. ROSENTHAL & Co. A.-G. Ger. 514,327, Mar. 21, 1926. The wood is coated to protect it against carbonization and a fused ceramic glaze is then applied by spraying.

Oven, dip tank and conveyer suitable for enameling metal plates, etc. VERNIE A. FOX (to Young Brothers Co.). U. S. 1,790,501, Jan. 27.

Zirconium opacifiers for vitreous enamels. CHARLES J. KINZIE (to Titanium Alloy Mfg. Co.). U. S. 1,789,311, Jan. 20. An opacifier contg. Na Zr silicate and Zr silicate is prepd. by heating a mixt. of Zr silicate about 78 and Na_2CO_3 about 22% to about 900–950° and cooling and disintegrating the product.

20—CEMENT AND OTHER BUILDING MATERIALS

J. C. WITT

Impermeability and permanence of cements. EDMOND MARCOTTE. *Ciment* **35**, 476–82(1930); **36**, 6–12(1931).—The French cements are briefly described and the classic work of Michaelis on pozzuolanas is reviewed in detail. The slowness of the reaction between the lime and the silica is brought out. Apparently good results have been obtained with pozzuolanas, especially against sea water. The French pozzuolana, *gaize*, found near Paris, is being ground commercially with portland cement to produce a cement resistant to sea water. It contains about 33% alkali-sol. SiO_2. F. O. A.

The evolution of German cement specifications. K. A GOSLICH. *Tonind.-Ztg.* 55, 4–7(1931).—Historical. F. O. A.

Temperature and humidity control in cement testing. H. S. MATTIMORE. *Eng. News-Record* **106**, 36(1931).—High-strength cement, especially the product termed "high-early-strength cement," is more sensitive to temp. and humidity conditions during testing than the cement produced several years ago. The tolerance of 5% allowed in specifications is too broad in some cases, instances having occurred of specimens maintained at 65° showing strengths below that specified, while similar specimens maintained at 70° or over were satisfactory. The moist-air cabinet employed in the Pennsylvania Dept. of Highways is described briefly. The humidity is maintained at 95–98% by water flowing down the sides of brass screens located about $^3/_8$ in. from the walls of each section, the temp. of the water being adjusted before it enters the cabinet. Records over a period of many weeks show a max. variation of 2° from 70°. R. E. THOMPSON

Cement admixtures, their action and absorbing power. P. MECKE. *Tonind.-Ztg.* 55, 33–6(1931).—Water glass, oleic acid and a few other water-repellent materials in rather large concn. (as high as 8%) did not yield very good results. F. O. A.

Trass and sand as additions to cement. R. GRÜN. *Chem. Erde* **5**, 113–45(1930):—Tests were made on the addn. of trass and sand to portland cement and slag cements, the materials being either ground together or simply mixed. The products were tested after exposure to air, water or $MgSO_4$ soln. for various periods of time (3 days to 24 months). The addn., by simple mixing, of up to 40% of trass increases the strength and resistance to wear of the product B. C. A.

The chemistry of Rhenish trass. HEINRICH HART. *Tonind.-Ztg.* **55**, 65–6, 84–6 (1931).—With solns. of C_6H_6 and $CHBr_3$ the trass was sepd. into fractions of different sp. gravities, the lighter contg. more water in combination. The trass is variable in mineralogical compn.; it seems to consist of alkali aluminosilicates in varying stages of hydration. F. O. A.

Technical problems in the portland cement industry. EMIL SARLIN. *Tek. Fören i Finland Förh.* **50**, 219–26(1930).—Historical with reference to practice in Pargas cement works (Finland). H. C. DUUS

Free lime in portland cement and volume stability. KATSUZO KOYANAGI. *J. Soc. Chem. Ind., Japan* **33**, Suppl. binding, 496–7(1930) (in German).—One group assumes that, in burning, only a part of the CaO combines chemically, with formation of Ca silicate or Ca_3 silicate; the other group that all CaO combines chemically to form Ca_3 silicate. The former believe that no more basic silicate exists than Ca_3 silicate and assume the presence of greater amts. of free CaO or CaO in solid soln. in the portland cement. Those who favor Ca_3 silicate as the main ingredient of clinker deny the presence of free CaO. The cause of swelling of portland cement was investigated by using the recent glycerol method of detg. free CaO. The amts. of free CaO in numerous clinker samples of various degrees of burning were detd. and compared with the vol. stability of the cements. CaO "swellers" were added to stable cement to make various mixed cements, and tested in the same way. Then CaO "swellers" were made stable by storage, samples being taken from time to time and tested for free CaO and vol. stability. Swelling cements were found to contain considerable quantities of free CaO; well-burned, stable cements, very little. At a fineness equiv. to 4% residue on a 4900-per-sq. cm. screen, if free CaO in cement is above 1% the boiling tests show instability; if free CaO exceeds about 2.2% both boiling and water tests show instability. Whether the free CaO in cement detd. by the glycerol method is absolutely free or in the form of so-called "exploded particles" is not yet explained, but it is certain that this CaO has an intimate relation to vol. stability of portland cement. Tensile strength of almost all swelling cements is low, and if by storage they are rendered stable their tensile strength is increased. It is

probable that there is some relation between tensile strength and swelling tendency. E. M. SYMMES

Automatic buret for measuring mixing water. F. V. REAGEL. *Eng. News-Record* **106,** 37(1931).—A brief description is given of an automatic buret, accurate to approx. 0.25 cc., for measuring mixing water for cement mortar briquets. R. E. T.

Testing oil-carrying quality of earth. J. W. POWERS. *Eng. News-Record* **106,** 38 (1931).—The method employed by the Arizona Highway Dept. is outlined. The material, graded to specifications, is mixed with what is considered sufficient oil (asphaltic residue 65% plus by the Brown evaporator) and allowed to stand overnight for absorption. That portion passing a 10-mesh sieve is hand-tamped into a circular mold, 3 in. in diameter and 2 in. deep, and is further compacted by applying a load of 2000 lb. per sq. in. by means of a universal testing machine. Pressure is applied to the material by means of a die cut to fit the mold, and the material is pressed against a face plate so as to bring it flush with one end of the mold. The bottom is sealed with paraffin, after which the whole app. is immersed in water. Appreciable swelling above the original plane at the end of 12 hrs. or more is evidence of instability with oil. The max. amt. of swell which a material may have that is considered safe to use has been tentatively set at $^1/_{16}$ in. R. E. THOMPSON

Stone in 1929. A. T. COONS. Bur. Mines, *Mineral Resources of the U. S. 1929,* Pt. II, 229-66 (preprint No. 19, published December 30, 1930). E. H.

Methods used in testing masonry specimens for bending, tension and shear. NORMAN W. KLICH *J. Am. Ceram. Soc.* **14,** 125–32(1931).—Twenty-four walls, $4^1/_2$ ft. wide, $5^1/_2$ ft. high and 8–12 in. thick, were tested for bending after 60 days, and after 6 months. Aging of lime mortar is essential. Failures in shearing tests were also due to immature mortar C. H. KERR

Effect of the mixing water on mortar strength. E. PROBST AND K. E. DORSCH *Zement* **19,** 1009–11(1930).—A general survey of the concrete construction and materials tests in the principal cities of Germany showed considerable differences in concrete and mortar strengths which apparently were due to chem. differences in the mixing waters used. Two ordinary portland cements, a high-early-strength cement, a slag cement, and an aluminous cement were compared in mortars mixed with distd. water and Karlsruhe water having an av. hardness equiv. to 150 mg. CaO per l. It was found that the distd. water gave roughly 10% higher tensile strength but considerably lower compressive strength in general than did the Karlsruhe water. H. F. K.

Aggregates and the physical properties of concretes: their coefficients of elasticity and their resistance to compression, tension, bending, shear and impact. R. DUTRON *Rev. matériaux construction trav publics* **1930,** 258–62, 293–8, 343–9, 383–9, 431–5, 473–7.—Expts. were made with 2 cements in 3 proportions, at 3 consistencies and with 3 gradings of aggregate. The chief object was to compare in respect to phys. properties concretes made in whole or in part with crushed stone (mostly porphyry) with those from water-worn aggregates, including sands and gravels from the rivers Rhine and Meuse. The rounded aggregates gave better compressive strength. It is covered by the formula, $C = K[(c/w) - K]$ within ±15%, for the cement-water ratio c/w from 1.3 to 2.5. The coeff. of elasticity under compression was obtained from the expansion of two sides of a cube. It increases with the fluidity of the mix, but decreases as the cement increases It depends upon the quality of the cement, upon the grading of the aggregate and upon the ratio of coarse to fine aggregate. Water worn aggregate gives a stiffer concrete under compression than does crushed stone Tensile results were different, crushed coarse aggregate giving better results than gravel and fine rock better than sand. The ratio of compressive to tensile strength decreases parabolically with age, for crushed stones it lies in the range 0.093 to 0.075 and for river aggregates, 0.070 to 0.052. The coeff. of elasticity under tension depends upon the age. Crushed stone produces concrete of max. deformability, while rounded aggregates make concrete much less deformable under tension. The formulas are $E_T = 34700\ T^{0.600}$ and $E_T = 43200\ T^{0.622}$, resp. E decreases with repeated loading. E_T is very similar to E_C for loads equal to the same fraction of the ultimate loads The flexural strength within 12.5% equals 1.63 times the tensile. The resistance to shear was detd. by making beams with an offset central part and was found to be closely proportional to the compressive strength, S (kg./sq. cm.) = $16 + 0.32\ C$. The resistance to impact was detd. by allowing a 5-kg. ball to fall 10 cm. the first time, increasing up to 180 cm. by increments of 10 cm., thereafter remaining const. until rupture. Specimens were broken under compressive and flexural impacts. Specimens made of crushed rock withstood the pounding better than those made of sand and gravel. F. O. A.

A percentage balance for concrete aggregates. W. J. EMMONS. *Eng. News-*

Record **106,** 37(1931).—A percentage balance for use in the rapid detn. of the grading of concrete aggregates is described. The balance, which has a capacity of 13 kg. and sensitivity of 1 g., has 2 scale arms. Sliding poises enable 5 kg. of coarse aggregate to be weighed with one arm and 500 g. of sand with the other. The percentage of material passing each screen can be read directly. The grading of a sample of coarse aggregate can be obtained in about 4 min., and of a sample of sand in approx. 10 min. The cost of the balance is about $50. R. E. THOMPSON

The protection of concrete with coatings containing metallic aggregates. GEORGE DUPONT. *Ciment* **35,** 462–74(1930).—Mortars made of metallic aggregates and cement are useful in providing durable and impervious coatings for concrete exposed to sea water or other aggressive solns., to frost action or to erosion of running water. F. O. A.

Rocker screen speeds up field test operations. C. R. STOKES. *Eng. News-Record* **106,** 39(1931).—A brief description is given of a rocker screen set for test-pitting and controlling concrete mixts. by means of which the time required for screening can be reduced to 50% of that required for hand screening. R. E. THOMPSON

The drying of wood with the aid of chemical methods. FRIEDRICH MOLL. *Kunststoffe* **20,** 270–1(1930).—A discussion of the physicochem. factors affecting the removal of water from wood, with a list of patents on processes involving covering of the wood with chem. agents, boiling with non-aqueous solvents, or impregnation with oil. The first 2 methods are said to be practically never economical, while the last can be used for a few high-priced products. I. H. ODELL

Some aspects of wood preservation in Australia. J. E. CUMMINS, H. E. DADSWELL AND G. F. HILL. *J. Council Sci. Ind. Research* **3,** 133–46(1930).—The results of a survey of the economic situation in Australia with reference to timber utilization and preservation are presented. Jarrah, karri and Tasmanian stringy bark are the main woods used for railway sleepers and transmission poles. The only treating plant is located in W. Australia, where 8,000,000 cu. ft. has been treated by the Powell process since 1911 and 750,000 cu. ft. since 1926 by the fluarizing process (NaF, As_2O_3 and Na dinitrophenol; cf. *C. A.* **22,** 422). An outline of the research program of the govt. Forest Products Lab. is included. The relation between durability and the chem. compn. of wood is discussed. The toxicity to wood-destroying fungi and to termites of the extractives and volatile oils of cypress pine (genus *Callitris*) is being studied. Other naturally resistant woods will also be investigated. A brief account of termites and their habits is given. ALFRED L. KAMMERER

New developments in mine-prop preservation. WILHELM ENGELS. *Intern. Bergwirtschaft Bergtech.* **23,** 339–45(1930).—The results of tests with Fluralsil, a new preservative for mine timbers, are presented. Fluralsil is a water-sol. cryst. salt (compn. not given) highly toxic to wood-destroying fungi and having the property of being fixed by wood fiber and therefore non-leachable. On account of these qualities empty-cell treatment processes may be used for the injection of its solns. into wood, thus effecting a considerable economy in the cost of preservative and subsequent seasoning of the treated wood. A 2–3% soln. is recommended. ALFRED L. KAMMERER

A new arrangement for the granulation of blast-furnace slag with water and air (SPIES) **9.** Preparation of quick-drying wood stains (TODD) **25.** Treating gypsum for cement production (U. S. pat. 1,790,023) **18.** Impregnating textiles, wood and other materials (Brit. 335,247) **25.** Working up scrap rubberized fabric (Ger. pat. 511,087) **30.** [Cement in production of] H_2SO_4 (Can. pat. 308,293) **18.**

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Cements. NATIONAL BUILDING MATERIALS, LTD. Fr. 690,967, Mar. 1, 1930. A cement consists of a granulated or finely powd. mixt of $CaCO_3$ and $MgCO_3$ with their respective oxides. A colloidal material may be added to retard the cement or another substance such as $CaSO_4$ to accelerate it.

Cement, lime, etc. AUGUST BUES. Ger. 505,258, April 14, 1928. Cement, lime, etc., are manufd. in a shaft into which the raw materials are blown at the top, while a mixt. of fuel and air is blown through an upwardly directed nozzle at the bottom. The improvement consists in introducing the raw materials in sludge form through a downwardly directed nozzle.

Lime and cement. HUGO VIERHELLER. Ger. 511,513, Oct. 3, 1929. The water content of crude lime and cement sludge is diminished by adding a small quantity of waste contg. animal or vegetable decompn. or fermentation products to the slaking water. Liquid manure is mentioned as the example.

Fused cement. ERNST MOYAT. Ger. 511,521, Nov. 18, 1924. The starting materials (*e. g.*, bauxite and lime) are blown into a rotating heated cylinder with fuel and the crust formed in the cylinder by the reaction is scraped off and ground.

Oxychloride cement compositions. E. WOOD. Brit. 335,428, Nov. 5, 1929. In forming products from ingredients such as MgO, $MgCl_2$ and sand, the oxychloride soln. is divided into 2 portions, one of which is heated to the b. p., allowed to cool and added to the other portion together with sufficient water to bring the sp. gr. to between 16° and 24° Bé. The sand is purified as by washing with a NaOH soln., and aniline dyes, pigments, etc., also may be added.

Silicate cement for binding mineral aggregates, sawdust, etc. CEMSIL SOC. ANON. IT. and G. BOGGERO. Brit. 334,831, March 9, 1929. A soln. of **alkali metal** silicate or a mixt. of silicates is treated with a weak acid such as CO_2, SO_2 or H_3BO_3 or acid salts with const. stirring up to the max. permissible degree preceding coagulation and when used for binding mineral aggregate, sawdust, bone dust, cement or other materials a fixing agent such as $CaCl_2$ is used for treating the product. The waterproofing properties of the soln. may be improved by adding S (preferably in colloidal state). Various details are given for forming and treating artificial stone slabs, etc.

Waterproof cement. PAUL MECKE. Ger. 512,876, July 7, 1925. Dry powd. NH_4 or alkali salts are fused or mixed with fatty acid, and mixed with cement or lime. Thus, $(NH_4)_3PO_4$ is well mixed with oleic acid and the product mixed with sand and cement.

Water-glass cements, etc. EMIL HORNSTEIN. Austrian 119,743, May 15, 1930. In the manuf. of water-glass cement or artificial stone with the use of oxides such as CaO or MgO, the latter are added in a finely divided, but partly deactivated, state prepd. by treating the sintered oxides with hot water or steam, under pressure if desired. Too rapid hardening is thus avoided. The other customary fillers may be included.

Treating blast-furnace slag. SVEN MICHELSEN. Austrian 119,963, June 15, 1930. Blast-furnace slag for use in making *cement* is rendered more reactive by mixing it with about 5% of $CaSO_4$ or other compd. of S and heating the mixt. with a reducing flame so that part of the MnO in the slag is converted into MnS. The CaO content of the product is then adjusted in known manner.

Rotating furnace for cement, etc. ADOLPHE BUSCH. Fr. 692,300, Mar. 19, 1930. Method of feeding the substance to be calcined into the furnace is described.

Rotary tube kiln for fused cement. ARNO ANDREAS. Ger. 513,409, June 19, 1928.

Casting concrete dams, walls of buildings, etc. STEFAN D. TÖNNESSEN and ALFRED T. KNUDSEN. U. S. 1,789,791, Jan. 20. The concrete is cast against molds of glass plates which are left in place until the hardening and contracting of the concrete has progressed so far that irridescent zones visible between the glass plates and the surface of the concrete have disappeared.

Road-making composition. VERKAUFSVEREINIGUNG FÜR TEERERZEUGNISSE G. M. B. H. Ger 511,456, Oct. 8, 1926. Anthracene oil is oxidized sufficiently to render it capable of taking up water, and the product is mixed with pitch. A liquid compn. which can be applied in wet weather is thus obtained. The oxidation may be effected at 100° with air.

Pavement construction. OLIVER M. PADDLEFORD. U. S. 1,789,447, Jan. 20. Rocks and clay and asphalt are separately heated, and then mixed so that each rock is encased in an elastic adhesive mixt., the mass is poured while hot on a roadway, and is rolled while hot.

Flooring or paving materials. R. J. CUTHBE and S. W. M. SILVER. Brit. 335,150, March 13, 1929. A waterproof material is manuf. by securing to rubber, wood blocks, linoleum or tiles or the like a thin Pb sheet, which in turn is secured to a foundation by a bituminous or other waterproof cement. Various details of manuf. are described.

Artificial stone. EMIL TELTSCHIK & CO. Austrian 119,974, June 15, 1930. Comminuted ivory nuts are mixed with a magnesia cement. The comminuted nuts should be pretreated by steeping in dil. acid or alkali at atm. temp., washing and drying. Other fillers may be included. Details are given. Cf. *C. A.* 24, 2857.

Artificial stone. DEUTSCHE HERAKLITH A.-G. Ger. 513,097, Sept. 11, 1928. Plates, etc., made from fibrous materials and a sorel cement are set and dried by blowing hot gases through the material in alternating directions. App. is shown. Cf. *C. A.* 25, 793.

Artificial marble. J. J. BURKE. Brit. 335,107, Nov. 8, 1929. See Fr. 684,077 (*C. A.* 24, 5457).

Porous building material. GEORG O. RICHTER & SCHÄDEL. Ger. 513,279, Sept. 3, 1927. In the manuf. of porous building material from a mixt. of cement, etc., and Al or other metal that evolves a gas when the mixt. is treated with water, the metal used is activated, *e. g.*, by heating it with $HgCl_2$.

Bituminous roofing. WILHELM REINER. Ger. 512,707, Mar. 7, 1928. Addn. to 367,476. The material contains finely ground bituminous material, such as asphaltlime stone, as filling material, mixed with a relatively small quantity of bitumen. Blast-furnace slag or fine sand may be added. Cf. *C. A.* 24, 2574.

Sheet roofing material. HAROLD L. LEVIN (to Anaconda Sales Co.). U. S. 1,789,443, Jan. 20. A foundation layer such as asphalted roofing felt is provided with a coating comprising granular material such as crushed slate, the individual particles of which are coated with a film of Cu, Pb or other suitable metal.

Sheets or slabs of asbestos and cement mixtures. R. KUNZ. Brit. 335,106, Nov. 23, 1928. Slabs or the like formed on a paper machine from a mixt. such as asbestos and cement are rendered more resistant to disintegration from sudden heating by adding about 5% of light mineral lubricating oil to the mixt. at some stage of the manuf.

Laminated material for airplane construction, etc. FREDERICK H. AULD. U. S. 1,789,288, Jan. 20. Celluloid sheets the surfaces of which have been partially dissolved are used for uniting a metal surface layer such as Al with an underlying layer of composite wood construction.

Corrugated building board of hot-pressed vegetable fiber. WM. H. MASON (to Masonite Corp.). U. S. 1,789,825, Jan. 20. A product intended for use in building as a substitute for corrugated sheet iron is prepd. by pressing to give the material a sp. gr. of 1.0 or more. Various details of manuf. are described and as raw material there may be used wood waste pulped and treated with 1.5–3.5% of paraffin or petrolatum.

Pressed fiber board. DANIEL M. SUTHERLAND, JR. U. S. 1,790,178, Jan. 27. A marginal edge of the material is compressed to a greater d. than the body of a pressed fiber board or plank and is united with the main body of the board by a zone of varying d., so that nailing is facilitated.

Plaster-board. ALEXANDER S. SPERR (to Certain-teed Products Corp.). U. S. 1,790,252, Jan. 27. Mech. features and app. are described.

Sheet material for use as a lumber substitute. T. B. MUNROE and E. C. LATHROP. Brit. 335,052, Sept. 14, 1929. Cellulosic material such as bagasse, contg. about 50% water, is subjected to a pressure of about 500 lbs. per sq. in. and a temp. of about 175°,

after a preliminary fermentation, digestion, beating and sheeting on a paper machine. A minor proportion of paper stock may be added.

Artificial wood. KURT KÜRSCHNER. Fr. 691,004, Mar. 3, 1930. In making objects from reduced or waste wood, the binding agent used is a soln. of wood or cellulose made by means of caustic soda lye, CS_2 or ammoniacal CuO, which is afterward removed.

Apparatus for impregnating lumber with preservatives. HENRY B. CLARK. U. S 1,789,999, Jan. 27. Structural features.

Preserving wood. RÜTGERSWERKE. A.-G. (Hans Pflug, inventor). Ger. 511,568, Jan. 3, 1928. A soln. of $HgCl_2$ contg. less than double the equiv. amt. of alkali cyanide is used. Other insecticides, fungicides and anti-inflammable agents may be added. Examples mention $HgCl_2$ and KCN with $Na_4As_2O_7.2H_2O$, $Na_2HPO_4.12H_2O$ and NH_4OH.

21—FUELS, GAS, TAR AND COKE

A. C. FIELDNER AND ALDEN H. EMERY

Experiences in Sweden with motor fuels containing alcohol. E HUBENDICK *Petroleum Z.* **26**, *Motorenbetrieb und Maschinen-Schmierung* No. 12, 3-9(1930).—"Lätt bentyl," a motor fuel contg. 25-30% of alc., has met with favor in Sweden and is used both in summer and winter. It has a higher antiknock value than gasoline alone and is more efficient. No increase in corrosion and lubricating-oil requirements was observed. Neither was any HOAc formed. Motor fuels with varying quantities of alc were investigated as to their power output. The required heat units per h. p. hr. diminish with increase in alc content, reaching a min. with about 20% of alc., and then steadily rise. With about 25% of alc. the power output is about the same as it is for gasoline. Thus it is not necessary to make any adjustments in the engine when the fuel is changed from gasoline to "Lättbentyl" and *vice versa*. Accidental addn. of H_2O to the latter had practically no effect upon it as a motor fuel even when it sepd into 2 layers; this phenomenon is probably due to the fact that the alc layer had retained a portion of the gasoline. Addn. of H_2O to gasoline, however, prevented locomotion until the water, collected in the carburetor, had evapd. In the winter, ice had formed in the fuel line and carburetor; no progress was made until the system had been sufficiently warmed to melt the ice, and the water removed. I. M. LEVINE

Low-temperature distillation. A. MAILHE. *J. usines gaz* **54**, 347-9(1930). Results of low- and high-temp distn. of 4 typical soft coals are compared from a practical standpoint. Distn. of 5-kg. samples below 500° gave gases of high calorific value, [illegible] to 1/4 those of high-temp. distn

converting heavy oils (50% of the tar) into motor fuels is the most [illegible] of low-temp. distn. Tar acids are abundant, but PhOH, economically the most important, occurs only in traces. K. H. ENGEL

Chemical and microscopical investigations of the coals from the Witbank and Ermelo coalfields. P. E. HALL. *J. Chem. Met. Mining Soc. S. Africa* **31**, 127-39 (1930); cf. *C. A.* **24**, 3198, 4374, 4915, 5133, 5969; **25**, 394.—Discussion. A. H. E

Analyses of Wyoming coals. Bur. Mines, *Tech. Paper* **484**, 159 pp.(1931).—**The Wyoming coal fields.** C. E. DOBBIN. *Ibid* 1-9.—Wyo. coal ranges from low-rank subbituminous to high-rank bituminous. **Methods of mining and preparation of coal.** E. H. DENNY. *Ibid* 10-12. **Production, distribution and use.** F. G. TRYON. *Ibid* 13-20.—Figures are given for production by counties and districts, coal loaded by machine, tons per man per day, amt. of coal prepd. by different types of screening equipment, shipments by sizes, uses, distribution and competition with other fields. **Relation of mine samples to commercial shipments.** N. H. SNYDER, L. N. PLEIN AND R. D. REEDER. *Ibid* 21-24. **Analyses of delivered coal.** N. H. SNYDER, L. N. PLEIN AND R. D. REEDER. *Ibid* 25-33.—Analyses are given of 125 samples. **Analyses of mine samples.** A. C. FIELDNER, H. M. COOPER AND F. D. OSGOOD. *Ibid* 35-77.—Analyses are given of about 550 samples. **Description of mine samples.** F. D. OSGOOD. *Ibid* 78-154. ALDEN H. EMERY

Recent developments in coal cleaning. R. LESSING. *Chemistry and Industry* 50, 84-7(1931); cf. *C. A.* **24**, 2268. E. H.

Washability studies of the Mary Lee bed at Hull Mine, Dora, Ala. B. M. BIRD, A. C. RICHARDSON AND G. D. COE. Bur. Mines, *Rept. of Investigations* **3067**, 24 pp.

(1931); cf. *C. A.* **24**, 3879.—The problem of washing the Mary Lee bed at the Hull mine is confined to ash reduction. A washed coal low enough in ash to permit its use in the manuf. of coke is not obtainable in the coarse sizes without recrushing to $^3/_{16}$ in. ALDEN H. EMERY

The constitution of coal. II. P. LEBEAU AND H. LEROUX. *Ann. combustibles liquides* **5**, 579–613(1930); cf. *C. A.* **25**, 795.—The results of the thermal fractionation of the various products obtained from the Durham coal are given in detail. E. S.

The new age of coal. Coal dust firing, production of oil and gasoline from coal. KARL BAY. *Teknisk Ukeblad* **75**, 115–8, 126–8(1928).—A review, considering particularly the importance of the Bergius process. C. A. ROBAK

Agglomeration of soft coals and the action of solvents. L. CRUSSARD. *J. usines gaz* **54**, 429–42(1930).—The action of C_5H_5N, PhOH, C_6H_6 and NaOH upon coal is discussed from a theoretical standpoint. The exts. contain those substances which cause agglomeration during the coking process. Generally, the less sol. (or the more complex) these bituminous exts. are, the greater is their agglomerating power. Not the total C_5H_5N ext., but rather the asphaltic bitumen content (petroleum ether-insol.) represents a measure of the coking tendency of coals. K. H. ENGEL

Coal storage in silos. O. O. WEHRMANN. *Gas u. Wasserfach* **73**, 1144–6(1930).—Two bituminous coals were stored in silos and the air was analyzed at intervals. The CO_2 began to appear only after 4 months, gradually reaching 0.2–0.4%, depending on the coal. No SO_2, CO or CH_4 was found. These expts. confirm the results of Grunenwald, who found that the elementary analysis of coal which had been stored in the open showed a decrease in the C content and a marked increase in the O and N content. Danger of damage to concrete silos by the sulfate content of water clinging to washed coals is mentioned. R. W. RYAN

Hydrogenation of coal and oil. OTTO HUPPERT. *Petroleum Z* **26**, 1250–1(1930).—Coal is liquefied by hydrogenation under high temps. and pressures with or without catalysts and indirectly by hydrogenation of CO obtained from coal. None of these processes is operated on a com. scale. Of the products formed, the heavy oils are used again in the coal-hydrogenation cycle, the middle oils are converted into gasoline by hydrogenation in the presence of catalysts, the character of which may be changed according to the product desired. In a similar manner petroleum distillates yield gasoline with practically no residue. A small quantity of gasoline is also obtained in the primary hydrogenation of coal. I. M. LEVINE

Low-temperature carbonization and hydrogenation of coals. J. F. GRAM. *Teknisk Ukeblad* **75**, 342–5(1928).—A review C. A. ROBAK

The peat problem in a new light. J. F. GRAM. *Teknisk Ukeblad* **76**, 13–6(1929).—A review. A new drying app. of Thomas Gram, which has a substantially better efficiency and economy than all formerly known app. for the drying of peat, is considered. The new app. is based upon the drying of previously air-dried peat with not more than 80% moisture, which is disintegrated and in powder form is blown through narrow outwardly heated vertical cylinders. In order to facilitate the disintegration, the air-dried product is first mixed with a suitable portion of dry peat. The drying is carried out in 2–4 steps according to the water content of the starting material, in order to improve the heat economy. **Reply.** J. G. THAULOW. *Ibid* 28–31.—T. agrees that the drying should be based upon air-dried peat as the raw material. Thus it is possible to produce a peat fuel on a profitable basis by means of other drying methods than that mentioned by Gram, often in connection with steam power plants heated with peat powder. C. A. ROBAK

Some chemical and chemical engineering problems associated with modern gas practice. R. S. ANDREWS. *Proc. Soc. Chem. Ind. Victoria* **30**, 414–22(1930).—The problems are discussed under the following headings: (1) the selection of the coal, (2) the compn. of coal gas, (3) gas dehydration, (4) recovery of by-products and (5) future development of the gas industry. In selecting coal it is generally agreed that a good gas coal should give a high yield of gas of definite B. t. u. and its coking properties should be such that a marketable coke may be produced. In the U. S., where most of the carbonizing plants are coke ovens because of the demand for metallurgical coke, good coke production is as important as gas production. Almost invariably a coal possessing marked swelling properties produces a dense, hard coke, and is suited to coke ovens but is unsuitable for vertical retorts because of its tendency to impede the travel of the coal through the retort. When coal is heated water and occluded gases are evolved up to 200° when a decompn. point is reached and water of constitution and oxides of C begin to appear. At 350° olefins are evolved and above 350° thick resinous oils. From 350° to 700° there is a rapid evolution of tar and gas. H_2 appears

in increasing amts. as the temp. is raised still higher. B. t. u. in the form of CH_4 are more useful to the consumer than B. t. u. in the form of styrene and indene, which form gummy deposits. In the dehydration of gas the preferred method is the use of a 40% soln. of $CaCl_2$. A problem of first magnitude in by-product recovery is the conversion of vertical retort tar into suitable road material. In England it is blended with horizontal retort and coke-oven tar. In Australia an attempt has been made to convert it by means of catalysts in an oxidizing atm., to polymerize the unsatd. substances, and also to form condensation products with tar acids and added aldehyde, *in situ*. Two thousand tons of this converted tar has been used successfully on roads. For NH_3 recovery the most commonly used method is to wash the NH_3 from the gas with water and steam-distill the ammoniacal liquor thus formed. The recovery of benzene is practically confined to the coke-oven industry. The usual practice is to scrub the benzene from the gas with creosote or paraffin oil in tower scrubbers or rotary washers, and then remove the benzene from the absorption oil by steam distn. Vertical retorts give a smaller yield of cyanides than horizontal retorts or coke ovens. There is a modern tendency toward complete gasification of coal in a single unit as a substitute for carbonization and water-gas production in sep. units. F. H. BERGEIM

Work of the gas appliance section of the German Gas Association. E. H. LUDWIG. *Gas u. Wasserfach* **73**, 1153–6(1930).—A discussion of gas meter and appliance standards, publicity, etc. R. W. RYAN

Possible use of natural gas for chemicals. HAROLD M. SMITH. *Refiner and Natural Gasoline Mfr.* **10**, No. 1, 79(1931). See *C. A.* **25**, 397. J. L. ESSEX

Rectification of natural-gas hydrocarbons. I. N. BEALL. *Refiner and Natural Gasoline Mfr.* **10**, No. 1, 110(1931).—The principles involved in rectification and the properties of the individual hydrocarbons found in natural gas are given. J. L. ESSEX

Most recent progress in the construction of gas producers for automobile trucks. AUCLAIR. *Bull. inst. pin* **1930**, 254–6(1930).—An address. A. P.-C.

Operation and maintenance of inclined retorts. J.-P. LABRUNE. *J usines gaz* **54**, 342–4(1930). K. H. ENGEL

Mechanical revivification of oxide purifier material. F. T. TURNER. *Am. Gas J* **134**, 58–9(1931). E. H.

Slow combustion of ethane. WILLIAM A. BONE AND S. GERALD HILL. *Proc. Roy. Soc.* (London) **A129**, 434–57(1930).—The induction period is shortened or obliterated by the addn. of small quantities of moisture, EtOH, HCHO, I_2 or N_2O_4 to a dry $C_2H_6 + O_2$ medium, without altering the nonexplosive character of the ensuing combustion. Addn. of 1% of AcH vapor causes instantaneous inflammation of the medium. The reactivity of a $C_2H_6 + O_2$ mixt. is largely detd. by the relative C_2H_6 concn. Peroxidation and intermediately formed aldehydes seem to be the more probable cause of "knock." FRANK URBAN

Researches on purifying materials for acetylene. KIYOAKI SUMIYA AND SAKAI YAMADA. *J. Soc. Chem. Ind., Japan* **33**, Suppl. binding, 527–9, 530(1930).—The main impurities in C_2H_2 made from CaC_2 are PH_3, H_2S and NH_3. The standard purifying agent for comparison was colored acid earth with 10% HCl contg. 5% $HgCl_2$. "Acagin" (bleaching powder 85, Pb chromate 15), and "Puratylen" (bleaching powder 70, CaCl 20, CaO 10) purify C_2H_2 but introduce Cl. "Heratol" (compn. not given) purifies well and does not contaminate. "Catalysol," "Epurene" and "Booer's Purifying Material" were tested, the last being by far the most efficient, and regenerable by air. Addn. of a min. quantity of $HgCl_2$ to the material contg. infusorial earth and FeCl as the main ingredients accelerates the purifying activity of $FeCl_3$ on C_2H_2. When a small quantity of $CuCl_2$, $CuSO_4$, $Cu(OAc)_2$ or powd. Cu is added to the purifying mixt comprising mainly infusorial earth and $FeCl_3$ with a min. admixt. of $HgCl_2$, recovery of the once lost purifying power by the action of air is markedly accelerated. $Fe(OAc)_2$ acts similarly. E. M. SYMMES

Technical measurement supervision of Diesel engines. W. LIESEGANG. *Die Wärme* **53**, 966–9(1930).—The sepn. of the recording and indicating instruments, an advantage of elec. measuring processes, is desirable for Diesel operation. Resistance thermometers for oil temp. measurement, pyrometers for detn. of the flue gas temp. of each cylinder, flue gas analysis, and the estn. of oil consumption are discussed. ALLEN S. SMITH

The phenols of a primary tar of the Saar. J. PAIRA. *Ann. combustibles liquides* 5, 651–76(1930).—From a primary tar of a Saar coal the phenols were sepd. and the different fractions were extd. with NaOH and petroleum ether (cf. *C. A.* **24**, 3100). For the identification of the various phenols the *p*-nitrobenzoic and the hydroxyacetic acid

derivs. were used. The presence of ordinary phenol in the tar is definitely established. E. SCHOTTE

Continuous tar dehydration and light-oil removal at the Limoges gas works. A. CABRIER. *J. usines gaz* **54**, 368–9(1930).—Raw tar is circulated through 2 communicating columns. It enters the larger one, with storage capacity, and gravitates into the heating pot. The generated vapors propel the tar upward through an ejection syphon into the head of the large column, where water and oil vapors are taken off, the dried tar returning to its starting point to be recirculated until the proper road-tar specifications have been attained. A steam jet may be introduced into the heating chamber. The temp. of the vapors is not allowed to exceed 250°. The app. may be applied to the drying and reclaiming of wash oils, the concn. of NH_3 liquors, etc. K. H. ENGEL

Testing of creosote oils from coal tar. PONTIO AND GANDIN. *J. usines gaz* **54**, 181-2(1930).—See *C. A.* **24**, 3102. K. H. ENGEL

Some experiences with blast-furnace tar. A. JAQUES. *Chemistry & Industry* **49**, 1094–5(1930).—The Scotch furnace is the oldest low-temp. carbonization plant in operation. After sepn. from the ammoniacal liquor the tar is distd. and yields "virgin blast-furnace creosote oil," which begins to boil at 170°, and blast-furnace pitch. Mineral matter and pitchy material deposited from the tar while being carried out of the furnace along with the gas tend to foul the gas mains, necessitating periodical cleaning. To reduce the cost of cleaning the gas mains, a section of main was erected which was provided with sprays. After a few days' operation the tar in the reservoir tank suddenly boiled over. A lab. study of the polymerization showed that its speed increases rapidly as the temp. rises. Tar maintained at 100° gave 43% of oil when distd. to 320°, while tar maintained at 85° gave 58%. Untreated tar gave 61%, calcd. on the dry basis. The polymerization is exothermic. Blowing air through the tar during distn. reduced the oil production to 30–40%. A distn. plant erected at the Ab-der-Halden plant gave satisfaction and yielded oil, calcd. on the dry tar, to 55–60%, against an av. of 22% for the old stills. W. H. BOYNTON

Determination of phenols in coking-plant waters. A. TRAVERS AND AVENET. *J. usines gaz* **54**, 229–30(1930).—See *C. A.* **24**, 4919–20. K. H. ENGEL

The by-product coking industry in 1930. G. E. FOXWELL. *Gas Eng.* **48**, 27–8, 29 (1931). E. H.

Coke-oven operation and maintenance. F. J. PFLUKE. *Am. Gas J.* **134**, 50–3 (1931). E. H.

Coke ovens for large-scale production. COLLARD. *J. usines gaz* **54**, 454–67 (1930).—A discussion of principles and tendencies in modern retort construction, as exemplified by the leading types. K. H. ENGEL

Cleaning, distribution and uses of blast-furnace gas (HAVEN, THORNE) **9**. Fluorescence analysis of coal pitch and petroleum pitch (TEUSCHER) **22**. By-product and synthetic NH_3 (PARRISH) **18**. Distillation of oil shale (CROZIER) **22**. Relative advantage of ring marks *vs.* point indicators for determining gas specific gravity by the Bunsen-Schilling apparatus (ZIPPERER, ROTTENGATTER) **2**. Lignin and coal formation (PLUT) **8**. V in carbonaceous minerals (YOSHIMURA) **8**. Purifying light oils derived from coal gas (Brit. pat. 335,155) **22**. Apparatus for catalytic gas reactions (Brit. pat. 335,411) **1**. Device for estimating the combustible gas in gas mixtures (Ger. pat. 508,826) **1**. Purifying higher alcohols (Fr. pat. 690,958) **10**.

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MOTT, R. A., AND WHEELER, R. V.: **Coke for Blast Furnaces.** London: Collier

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PENNEWITZ: **Das Schleifen und Formlegen in Braunkohlenbrikettfabriken.** Heft 7 of "Abhandlungen aus d. Braunkohlen- und Kali-Industrie." Halle (Saale): W. Knapp. 28 pp. M. 1.80.

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ZAEPKE, O.: **Studien über Normung und einheitliche Prüfung der festen mineralischen Brennstoffe.** Berlin: Deutsche Verband für die Materialprüfungen der Technik. 134 pp. M. 3.50.

Fuel. AUGUST HALLER (Oskar Neuss and A. Thieme, inventors). Ger 512,956, Jan. 19, 1929. $(CH_2)_6N_4$ is mixed with an inorg. or org. scorifying agent of low m. p., for use as fuel or heating material. In the example $(CH_2)_6N_4$ is mixed with powd. Na K tartrate.

Separating fuels, ores, etc., of differing specific gravities by tangential washing currents. SUSQUEHANNA COLLIERIES CO. Ger. 511,571, July 12, 1927.

Motor fuels. SOCIÉTÉ H/H OIL CO. AKTS. Fr. 691,430, Mar. 7, 1930. Aromatic hydrocarbons are treated with HNO_3, the liquid is allowed to stand and the acid decanted. The hydrocarbons are afterward treated with H_2SO_4, the excess removed and the product washed. Other or heavier hydrocarbons are added and the mixt. is distd. and satd. with O at the desired temp. Alc., the water of which is emulsified with salts favorable to combustion such as NH_4NO_3, and a fatty acid may be added to the fuel.

Solid fuel. REINOLD V. SMITH. U. S. 1,790,356, Jan. 27. A fuel suitable for briquetting under light pressure is formed of 76–84% of carbonaceous material such as coal together with gilsonite 2.5–9.0, water 5–8 and petroleum residue 8–13%. An arrangement of app. for prepg. the fuel is described.

Distillation of solid fuel. JEAN LIGER. Fr. 692,091, June 4, 1929. Solid fuel, particularly schists, is introduced in a finely ground condition and with about 1/3 of its wt. of inert material into a horizontal rotating chamber heated to about 500°. The materials are energetically stirred. Fr. 692,092 describes a similar furnace, a small proportion of inert material and a temp. of about 350° being used.

Destructive hydrogenation. N.-V. DE BATAAFSCHE PETROLEUM MAATSCHAPPIJ Brit. 335,386, Nov. 7, 1928. The material designated as "luxmass," pretreated as described in Brit. 314,859 (*C. A.* **24**, 1493) and Brit. 335,513 and used as a catalyst in the destructive hydrogenation of coal or other carbonaceous materials, is rendered more efficient by mixing it with Mo or Mo compds. such as ferric molybdate. Brit. 335,513 relates to the obtainment of liquid or lower b. p. products from coal or other carbonaceous materials by heating under pressure in the presence of H and using, in one or more stages of the process, a catalyst obtained by dissolving "luxmass" (an alk. ferric hydroxide) so far as possible in HNO_3, pptg. with NH_3 and drying. Various details of procedure are given. Cf. *C. A.* **24**, 5983.

Destructive hydrogenation. H. W. STRONG and IMPERIAL CHEMICAL INDUSTRIES, LTD. Brit. 335,215, June 19, 1929. In the liquid-phase destructive hydrogenation of carbonaceous materials such as oils or suspensions of coal in oils, the catalyst employed is in the form of an extended solid metallic surface formed by the deposition of one metal on another, such as iron or mild steel coated with Sn or iron coated with Ni, the walls of the reaction vessel may be similarly coated. Catalysts such as tinned iron or steel are activated by a preliminary treatment which may remove part of the coating metal, as with a 5–10% HCl soln. or a 10% NaOH soln., and 5% of urea may be added to the acid soln. to form a surface layer of $Sn(OH)_2$ which is subsequently reduced in the course of the process; or the plates may be immersed in a bath of a molten salt such as Na metaphosphate or borax at 900–1000°; or tin plate may be heated for half an hr. or longer in a bath of oil or paraffin at 350° to effect alloying of most of the Sn with the Fe. The activated catalysts may be heated in moist H at 500° under pressures up to 500 atm. Brit. 335,216 describes the prepn. and use of similar catalysts. Brit. 335,217 relates to the use as catalysts of Sn alloys which are not molten at the reaction temp., such as alloys of Sn with Fe, Cu, Mg or P, which may be carried on a support of steel contg. Cr and Ni. Brit. 335,218 describes the combined use of massive and porous catalysts. The massive catalyst is preferably composed of at

least 2 metals such as iron coated with Sn or Ni, or a metal such as Sn and a metalloid such as As, Sb, Bi, Se or Te. As porous catalyst, bog iron ore, Fe_2O_3 or Fe_2O_3 contg. Al_2O_3 1–5% may be used on a support such as pumice or magnesia (the oxides being reduced by H before use as catalysts). The 2 catalysts may be used in the same or in sep. reaction vessels.

Apparatus for distilling carbonaceous materials at low temperatures. INTERNATIONAL HOLDING DE DISTILLATION ET COKÉ-FACTION À BASSE TEMPÉRATURE ET MINIÈRE (HOLCOBAMI). Fr. 691,832, Mar. 12, 1930. Cf. *C. A.* **24**, 5984.

Retorts for the low-temperature distillation of carbonaceous materials. THE CARLTON MAIN COLLIERY CO., LTD. Fr. 690,939, Feb. 27, 1930.

Carbonizing fuels. "CARLSHÜTTE" A.-G. FÜR EISENGIESSEREI UND MASCHINENBAU. Ger. 514,317, Jan. 20, 1925. See Brit. 283,259 (*C. A.* **22**, 3979).

Apparatus for carbonizing wood, peat, lignite, etc. SOC. ANON. "LA CARBONITE." Ger. 513,125, Feb. 23, 1926. Addn. to 439,884. The materials are dried, carbonized and cooled while packed in annular containers having impervious outer walls and perforated inner walls.

Swinging oven for low-temperature carbonization, with direct or partly direct heating. GEORG MERKEL. Ger. 514,010, Sept 9, 1928.

Vertical annular retort for low-temperature carbonization of coal. PHILIP CROSBY POPE. Ger. 513,202, April 11, 1929. See Brit. 309,387 (*C. A.* **24**, 713).

Apparatus for distilling coal, etc. FREDERICK DEACON MARSHALL. Ger. 513,124, Nov. 30, 1926. See Brit. 261,919 and 261,927 (*C. A.* **21**, 3493).

Retort for the distillation of coal. ILLINGWORTH CARBONIZATION CO., LTD. Ger. 511,588, Nov. 23, 1929

Coal distillation. WILHELM HECKEL (to C H. Ellsworth). U. S 1,789,549, Jan. 20 For producing products such as coke, low-temp. tar relatively free from naphthalene, oils of the aliphatic series having lubricating properties and a gas rich in hydrocarbons of the ethylene and paraffin series, the material is heated to not more than about 500° to cause distn of volatile products, and the distn. is continued at not to exceed 500° until the treatment is completed. Volatile products are withdrawn at not above 500° and are progressively cooled to successive cooling stages of about 135° in the first stage to cause condensation of one portion of low-temp. tar, 65° in the second stage to cause condensation of another portion of low-temp. tar, and 35° in a third stage to cause condensation of oils of lubricating properties, and the volatile products still remaining uncondensed are collected.

Refining coal. TELEX APPARATEBAU, G. M. B. H. Ger. 511,514, Sept. 1, 1922. App for removing dust from coal, etc., is described.

Experimental apparatus for investigating the coking of coal. C. OTTO & CO. G. M. B. H. (Wilhelm Schluter, inventor). Ger. 511,252, Mar. 15, 1928. This relates to app. of the kind comprising a horizontal refractory tube, closed at one end, which contains the sample of coal and is connected to absorbers for the distn. products. Improved elec. heating means for the tube is described, designed to ensure that the temp. conditions in the part of the tube traversed by the distn. products shall approx. to those in the upper part of a coking chamber.

Coking powdered coal. INTERNATIONAL COMBUSTION ENGINEERING CORP. Ger. 511,792, Feb. 28, 1926. Details of heating, drying and distg. the coal are given.

Cooler for lignite, etc. MASCHINENFABRIK BUCKAU R. WOLF A.-G. Ger. 514,339, Dec 16, 1928.

Tube drier for lignite, etc. VIKTOR KASPER. Ger. 511,723, Jan. 21, 1928.

Montan wax. HANS FRIEDLANDER. Ger. 512,823, Sept. 13, 1925. Crude montan wax is refined by heating to 170–270° and leading in an air current.

Gas. HUMPHREYS & GLASGOW, LTD. Fr. 690,798, Feb. 28, 1930. A mixt. of hydrocarbon and water gas is made in a plant comprising a vessel contg. a combustible gas in ignition, a vessel contg. a regenerative material and means for extg. tar. Steam is produced in the tar-extg. material and this steam is passed through the ignited mass. Cf. *C. A.* **25**, 1061–2.

Gas. HUMPHREYS & GLASGOW, LTD. Fr. 690,868, Mar. 1, 1930. A mixt. of hydrocarbon and water gas is made in a plant composed of 3 vessels, one contg. solid fuel and the other 2 being heat storers. The 2 heat-storing vessels are heated by internal combustion of the gas produced by blowing air into the 3rd, a hydrocarbon is introduced alternatively into one and then into the other of the heat-storing vessels and a part at least of the hydrocarbon gas is passed through the mass of fuel after extn. of tar.

Desulfuration of gases and vapors. N.-V. DE BATAAFSCHE PETROLEUM MAATSCHAPPIJ. Brit. 335,394, Oct. 23, 1928. See Dutch 22,257 (*C. A.* 24, 5087).

Drying illuminating gases by filtration through fibrous material. ERNST CHUR. Ger. 512,827, Aug. 30, 1929.

Fuel gas. MATHILDE LOTZ NÉE BLICKLE, AUGUSTE LOTZ, ARTHUR LOTZ, MATHILDE SPANKE NÉE LOTZ, MARIA KOWSKY NÉE LOTZ, ROBERT LOTZ and WALTER LOTZ. Ger. 513,233, Jan. 24, 1928. This relates to the manuf. of fuel gas by gasifying coal and then treating the glowing coke with steam. The improvement consists in superposing a charge of fresh coal on the coke before passing in steam. App. is shown.

Measuring the calorific value of fuel gas. ALBERT HERBERHOLZ. Ger. 514,042, April 27, 1927. To det. the calorific value of the gas as supplied, the calorimeter reading is automatically influenced by measuring instruments, *e. g.*, a thermometer, a hygrometer, and a manometer, located in the gas main or at the place of use. The calorimeter may indicate simultaneously or alternately the calorific value of the gas reduced to standard conditions. App. is shown.

Apparatus for producing fuel gas by carbureting air. CHARLES PERDRISAT. Ger. 514,108, Jan. 6, 1929.

Means for withdrawing fuel-distillation gases from the lower part of vertical gasifying chambers. KURT BEUTHNER. Ger. 511,316, Jan. 4, 1929.

Combustible gas free from carbon monoxide obtained from coal. W. BERTELSMANN and A. C. BECKER. Brit. 335,228, March 18, 1929. CO is removed from coal gas (suitably in part by liquefaction under compression or by passage with steam over Fe oxide, Cr oxide, porous C or other catalyst, followed by conversion of the remaining CO into CH_4 by contact with Ni under pressure) and the sp. gr., heating value and speed of ignition of the gas are then restored by adding H, constituents of flue gas, etc. Various details of treatment are described.

Burning gas. HENRY C. CALDWELL (to Caldwell Experimental Corp.). U. S. 1,789,542, Jan. 20. Initial mixing of gas is effected with air in proportions sufficient for substantially complete combustion, in a refractory combustion chamber. App. is described.

Tower for air-cooling of waste furnace gases. O. OVERMANN. Brit. 335,299, July 10, 1929.

Catalytic treatment of gases emitted by internal-combustion engines. JOSEPH C. W. FRAZER. U. S. 1,789,812, Jan. 20. For eliminating combustible constituents such as CO, etc., from the products of emission of internal-combustion engines during their intermittent operation, a continuous uncooled stream of the products in the presence of O is subjected to the action of a catalyst comprising an artificially prepd. metallic chromate such as that of Fe or Zn. App. is described.

Oil-gas generating apparatus. FRANK J. NOLAN (to Thermo Industries, Inc.). U. S. 1,790,166, Jan. 27. Various details of construction are described.

Apparatus for generating water- or producer-gas. OSCAR NYGAARD and BENJAMIN H. SNOW (to Bernitz Furnace Appliance Co.). U. S. 1,790,110, Jan. 27. Various details of generator construction and operation are described.

Gas producer. C. OTTO & Co G. M B. H. Ger. 511,659, Sept. 28, 1927. Details of regulating the feed hole and air supply are given.

Gas producers. ZAHN & Co. G. M. B. H. Ger. 512,654, Dec. 19, 1928. App. for gasifying fuel such as lignite briquets is described.

Gas producer with horizontal or inclined chambers. INDUGAS INDUSTRIE- UND GASOFEN-BAUGES. M. B. H. Ger. 513,232, Mar. 21, 1929.

Gas producer with a jacket of upright tubes for producing steam. POETTER G. M. B. H. Ger. 511,660, July 13, 1929.

Water jacket for gas producer, with removable outer wall. GEBR. KÖRTING A.-G. Ger. 513,231, July 24, 1928.

Producer for making water gas from coal dust. GAS UND TEER G. M. B. H. (Hermann Hillebrand, inventor). Ger. 471,328, Aug. 25, 1927.

Control device for periodically operating gas producer. BAMAG-MEGUIN A.-G. Ger. 513,136, Oct. 28, 1928.

Suction-gas producer suitable for use on automobiles or boats. A. E. HODGSON, N. C. JONES and MOTOR OWNER'S PETROL COMBINE, LTD. Brit. 334,888, June 10, 1929. Structural features.

Gas retort for powdered fuel. ALBERT LEDEBUR. Ger. 511,658, Feb. 27, 1929. Addn. to 477,581 (*C. A.* 23, 4330). Details of construction are given.

Apparatus for removing dust from flue gases, etc. GOTTLOB BURKHARDT. Ger 475,436, Mar. 12, 1927.

Storing gases. SOCIÉTÉ SVENSKA AKTIEBOLAGET GASACCUMULATOR. Fr. 691,795, Mar. 12, 1930. Porous material for storing C_2H_2 and like gases under pressure is composed of cement and substances such as pumice, pumiceous tuff, trass and natural or artificial slags.

Storing acetylene. AUGUST CAPPEL. Ger. 511,304, Oct. 25, 1927. Porous org. materials, with or without pulverulent inorg. materials, that are to be used as fillers for vessels for storing C_2H_2, are impregnated with a soln. of animal or vegetable albumin, treated with a tanning soln. or vapor, and then dried.

"Waterless" gas holder. R. & J. DEMPSTER, LTD., N. H. KNIGHT, C. ANDREWS and WATERLESS GASHOLDER CO., LTD. Brit. 335,296, July 6, 1929.

Purifying coke-oven gases, etc. SOC. L'AIR LIQUIDE (SOC. ANON. POUR L'ÉTUDE ET L'EXPLOITATION DES PROCÉDÉS GEORGES CLAUDE). Ger. 511,100, Oct. 17, 1924. See Brit. 224,863 (*C. A.* **19**, 1940).

Chamber-oven plant for producing gas and coke. C. OTTO & CO. G. M. B. H. Ger. 514,167, Jan. 5, 1930.

Oven for producing gas and coke, with horizontal chambers. C. OTTO & CO. G. M. B. H. Ger. 514,008, Oct. 6, 1928.

Device for straightening the chamber walls of ovens for producing gas and coke STETTINER CHAMOTTE-FABRIK VORM. DIDIER. Ger. 514,009, July 17, 1929.

Coke oven. HUGO SCHRÖDER. U. S. 1,790,597, Jan. 27.

Coke oven. C. OTTO & CO. G. M. B. H. Ger. 511,516, Dec. 18, 1926. Details.

Coke oven. C. OTTO & CO G. M. B. H. Ger. 511,805, July 31, 1929. Addn. to 502,903 (*C. A.* **24**, 5470) Details are given of an internally cooled device for expelling coke.

Multiple regenerative coke oven. HEINRICH KOPPERS A.-G. Ger. 512,797, Sept. 28, 1929. Details of construction are given.

Automatic closing device for horizontal coke ovens. N. V. SILICA EN OVENBOUW MIJ. Fr. 691,874, Mar. 13, 1930.

Apparatus for quenching coke to give steam free from acid or water gas. JOSEF KOY. Fr. 690,943, Feb. 27, 1930.

Coking. C. OTTO & CO. G. M. B. H. Ger. 511,563, Sept. 10, 1924. An upright chamber furnace for coking coal and simultaneously producing water gas by blowing steam through the hot coke is described.

22—PETROLEUM, LUBRICANTS, ASPHALT AND WOOD PRODUCTS

W. F. FARAGHER

The petroleum situation in America. REPT. OF THE COMMITTEE ON PETROLEUM ECONOMICS TO THE FEDERAL OIL CONSERVATION BOARD, Nov. 6, 1930; *Mining J.* 171, 1011–3(1930).—The demand for gasoline for the 6 months ending March 31, 1931 will not exceed that of the yr. before and may be less. The industry is operating on a basis geared to a 7% increase in gasoline consumption. Reduction in operating rates is necessary. A curtailment of 7% from the Oct. rate of gasoline supply is necessary to balance a break-even demand if spring inventories are not to exceed 45 million bbls. If this is divided proportionally among the various sources (straight-run 47.3, cracked 37.1, natural 11.1, imports 4.0 and benzene 0.5%), then a crude run to stills of 2,310,000 bbls. per day and a domestic crude-oil production of 2,270,000 bbls. per day are indicated. This can be allocated as follows: Calif. 542, Okla. 542, Texas 730, and others 456 thousand bbls. daily. Should gasoline demand prove more adverse or curtailment be confined to straight-run operations, addnl. restrictions would be needed and tables are provided to cover these contingencies. ALDEN H. EMERY

Petroleum potentialities of Gulf Coast petroleum province of Texas and Louisiana. DONALD C. BARTON. *Bull. Am. Assoc. Petroleum Geol.* **14**, 1379–1400(1930).—The petroleum potentialities of the Texas-La. Gulf Coast area have been greatly increased in the last 3 yrs. Ultimate recovery will be at least 3.5 billion bbls., probably 5.5 billion and possibly 10 billion bbls. Increasing depth has been accompanied by increasing Baumé gravity of the oil. ALDEN H. EMERY

Oklahoma City oil field, Oklahoma. HOMER H. CHARLES. *Bull. Am. Assoc. Petroleum Geol.* **14**, 1515–33(1930).—Analyses of oil from the Arbuckle limestone and from the Simpson sand are given. ALDEN H. EMERY

Salt Flat oil field, Caldwell County, Texas. L. F. MCCOLLUM, C. J. CUNNINGHAM

AND S. O. BURFORD. *Bull. Am Assoc. Petroleum Geol.* **14**, 1401–23(1930).—The stratigraphy and structure of this field, the origin of the oil and its compn. are discussed.
ALDEN H. EMERY

Observations on principles in flowing oil wells. S. F. SHAW. *Petroleum Times* **23**, 383-4(1930).—See *C. A.* **24**, 5990.
EMMA E. CRANDAL

Does petroleum form in sediments at time of deposition? PARKER D. TRASK AND C. C. WU. *Bull. Am. Assoc. Petroleum Geol.* **14**, 1451–63(1930).—Chem. analyses of large quantities of recent marine sediments from 4 regions in which deposits rich in org. matter are now forming indicate that liquid petroleum probably does not occur in sediments at the time of their deposition The presence of small quantities of solid paraffins suggests that some normal constituents of petroleum occur in newly deposited sediments. The 3 marine samples contained 5% of org. matter and yielded 2 gals. of oil per ton. One sample is probably a mother rock of a rich oil shale, contg. 50% of org. matter and yielding 28 gals. of oil per ton. Fatty acids are normal constituents of the sediments, ranging from 2 to 6 parts per 100,000 in the marine and 16 parts in the lake sample. They are cerotic ($C_{26}H_{52}O_2$), montanic ($C_{28}H_{56}O_2$) and melissic ($C_{30}H_{60}O_2$) in all but one sample and caproic acid ($C_6H_{12}O_2$) in that. Fatty acids + hydrocarbons form about 0.04% of the sediment, < 1% of the org. content, seemingly inadequate to account for the petroleum Org. S compds. form about 30 parts per 100,000, pigments 5 parts, free S 22–104 parts and small quantities of sterols A. H. E

Hydrogenation of petroleum and its industrial importance. V. VALGIS. *Azerbaidzhanskoe Neftyanoe Khozyaistvo* **1930**, No 11, 4–15.—A historical review stating that Ipatiev has priority over Bergius in the hydrogenating processes V. K.

The modern large-scale distillation of petroleum. P. P. PRANDSTETTEN. *Petroleum Z* **26**, 1209–11(1930); *Oesterr. Chem- Ztg.* **34**, 2–7(1931).—A lecture I. M. L.

The decolorization of mineral oils. LEOPOLD SINGER. *Petroleum Z.* **26**, 1220–2(1930).—A review of the technical and patent literature. I. M. LEVINE

Highest vacuum in the mineral oil industry. E. HOFFMANN. *Petroleum Z* **26**, 1262–3(1930).—A process for distn of crude oil is discussed. The pressure is reduced to 0.5 mm. and the oil is heated by steam and hot-water coils, the temp. of which is maintained at 10–20° above the b. p. of the oil. The advantages of the process are (1) Because of the low distn temp., cracking of the oil is avoided, *e. g.*, the av. b. p. of a fraction is reduced from 455°F. at 40 mm to 260°F. at 0.5 mm (2) Practically no loss is sustained, because of the evenness with which the distn proceeds. (3) The residue is free from suspended matter. (4) The life of the plant is longer and the risk less because of the indirect method of heating I. M. LEVINE

Distillation of Ragusa shales. GIORGIO ROBERTI. *Atti III congresso naz. chim. pura applicata* **1930**, 533–9. Conditions of distn., yields and grades of oil produced are shown.
F. M. S

Distillation of oil shale. R. H. CROZIER. *Chem. Eng. Mining Rev.* **23**, 58–60(1930).—By means of the Crozier distn. process, Tasmanian oil shale yields 30–40 gal. of oil per ton. From the oil may be obtained gasoline, kerosene, Diesel, fuel or gas oil and pitch, all of which can be made marketable with a light refining treatment The equipment consists of a vertical retort, heated from the side with gas formed in the operation, and also by means of an ascending current of steam superheated by heat exchange with the bed of hot coke at the bottom of the retort. The shale is fed into the retort from the top; the vapors are continuously withdrawn as soon as they are formed and passed to the condensers, which are so constructed that the various fractions may be obtained without need of rerunning. The equipment may also be used for the *distn. of coal.*
I. M. LEVINE

The dressing of oil sands. K. KELLERMANN AND A. VOGT. *Petroleum Z.* **26**, 1141–8, 1157–64(1930). Of the oil in the sands only about 20% is brought to the surface. Since pure sand is a hydrophile and is wet by oil but very slowly, water should displace oil from the sand This does not occur unless the sand is wet with water before it is satd. with oil. Under these conditions only, does the addn. of water cause a clean sepn of the 3 phases With a sand freed from oil by extn. but not purified further, its relations to water and oil, resp., may be the reverse of those applying to meticulously pure sand. This less pure sand may be wet by oil and not by water The impurities are apparently capillary-active substances which would influence not only the solid-liquid but also the oil-water interfaces. This idea was tested in detail Oberg-Peine crude oil was fractionated both *in vacuo* and at atm. pressure. The interfacial tension between each fraction and varying concns. of Na_2CO_3 from 0.001 *N* to *N* was measured by means of a stalagmometer whereby the no. of oil drops was detd in a definite vol. It was assumed that the no. is inversely proportional to the inter

facial tension σ. σ decreased with increase in concn. of the Na_2CO_3 and generally with rise in the b. p. of the fraction. This indicates that the active substances are concd. in the higher-boiling fractions. Sapon. of these substances led to the formation of soaps which are not as capillary-active as the substances themselves; thus, σ is raised. This effect is aided by the decrease in concn. of the Na_2CO_3 due to sapon. Several instances are given in which the negative effects were greater than the positive, *i. e.*, σ increased with increase in b. p. That the lower-boiling fractions are devoid of capillary-active substances was shown by tests on C_5H_{12} and $(CH_2)_6$ and also by the fact that when the fractions were obtained by atm. distn. σ dropped to a min. and then rose sharply with the b. p. This reversal was due to the presence of low-boiling materials resulting from cracking, which was also evidenced by the high Br, I and O numbers, when compared with those of the corresponding fractions obtained in the vacuum distn. σ decreases with increase in temp., and theoretically vanishes at the crit. temp. The active substances are amphoteric as shown by the fact that dil. solns. of acids also decrease σ. The most effective material is NaOH, followed by H_2SO_4, HCl and Na_2CO_3. HOAc has a slight effect due to its low H-ion concn. and also to its soly. in both the oil and aq. layers. As a well-known corollary of the decrease in σ there is the adsorption of the active constituents in the interface. The Na_2CO_3, etc., was also thought to be concd. in the interface and its mols. orientated in such manner that the Na was closest to the oil surface. Cond. measurements before and after a Na_2CO_3 soln. was brought into contact with the crude oil fractions signified that there was a decrease of electrolyte in the body of the soln. Adsorption, like the decrease in σ, was affected by sapon. which was so great for Sumatra and Borneo oil, which are known to contain a quantity of saponifiable material that negative, values were obtained. The adsorption of Na_2CO_3 and capillary-active constituents in the interface should tend to make the oil and oil-satd. sand hydrophiles. If a mechanical force were now applied that would expose the surface of the sand to the aq. soln., the displacement of the oil would be effected. An expt. was conducted in which gas bubbles were relied upon to furnish this force. Oil-soaked sand was placed in a cylinder above a layer of $NaHCO_3$, and at 45°, CO_2 bubbles were formed. In a very short time oil drops 0.2–0.3 mm. in diam. rose through the aq. soln. and were lifted by the bubbles to which they were attached. The displacement was lively and in 2 hrs. the oil was completely sepd. from the sand. Attempts to accomplish the sepn. by contacting the sand with concd. solns. of $MgCl_2$, $CaCl_2$ and $BaCl_2$ failed. The oil sand was also subjected to a d. c. of 500 v. without any effect excepting that of oxidation and polymerization by the O liberated at the anode when water or a dil. soln. of an electrolyte was also added to the sand. I. M. LEVINE

Oil refining in the Soviet Union. S. S. SHIPMAN. *Refiner and Natural Gasoline Mfr.* 9, No. 10, 78(1930). J. L. ESSEX

Manufacture of low pour-point oils. E. R. LEDFRER AND E. W. ZUBLIN. *Refiner and Natural Gasoline Mfr.* **10,** No. 1, 73(1931).—The progress that has been made in dewaxing oils, including the latest solvent process, is discussed. J. L. ESSEX

Rectification of natural-gas hydrocarbons. I. N. BEALL. *Refiner and Natural Gasoline Mfr.* **9,** No. 12, 67(1930).—B. discusses the compn. of natural gases, the means for fractionating them into *n* fractions, selecting the proper no. of plates, the proper reflexing material, and the volatility index. The manuf. of liquefied petroleum gases as well as all the factors such as crit. temp. and pressure, uniformity of raw material, procedure, size of column and proper blending of gases are discussed fully. J. L. E.

Detonation characteristics of some paraffin hydrocarbons. W. G. LOVELL, JOHN M. CAMPBELL AND T. A. BOYD. *Ind. Eng. Chem.* **23,** 26-9(1931).—The relative knock ratings of 27 paraffin hydrocarbons in admixt. with gasoline have been detd. Upon the basis of mol. structure and the antiknock effect of $C_6H_5NH_2$ as a standard, it was found that, in homologous series, knocking increased with increase in the length of the C chain, while in isomeric series the knocking usually decreased as the no. of side chains increased and the successive introductions of CH_3 groups into a C chain of any given length also decreased the knock tendency by a substantial increment per CH_3 group. The $C_6H_5NH_2$ equiv. of 2,2,4-trimethylpentane (isooctane) is +16 and that of heptane is −14; the compression ratios for these 2 compds. were 6.9:1 and 2.75:1, resp. J. L. ESSEX

The formation of peroxides in the direct oxidation of hydrocarbons with air. P. MONDAIN-MONVAL AND B. QUANQUIN. *Compt. rend.* **191,** 299-301(1930); cf. *C. A.* **24,** 1512.—An oily yellow mixt. of peroxides is formed from C_6H_{12}, C_6H_{14}, C_7H_{16} or gasoline by oxidation with air at about 300°. By operating a few degrees below the temp. at which white fumes appear, 20-5 cc. is obtained from 70 g. of C_6H_{14}. The

mixt. may be vacuum-distd.; at 200° it decomposes exothermally with a blue luminescence but without flame to give CH_2O, other aldehydes and white fumes. When added to NaOH soln., it evolves H_2, and MeOH and HCOOH are found in the soln. CH_3OOH and probably its homologs are present. Formation of these peroxides may explain *knocking in motors*. A. F. SHEPARD

Cracking urged as answer to Europe's oil problems. PAUL TRUESDELL. *Refiner and Natural Gasoline Mfr.* 9, No. 10, 90(1930). J. L. ESSEX

Vapor-phase cracking in England. W. MCKECHNIE ROBSON. *Refiner and Natural Gasoline Mfr.* 9, No. 10, 73(1930). J. L. ESSEX

Italy is building an oil industry based on cracking. GUSTAV EGLOFF. *Refiner and Natural Gasoline Mfr.* 9, No. 10, 75(1930). J. L. ESSEX

The reaction mechanism for cracking. NIKOLAUS MAYER. *Petroleum Z.* 26, 1248–50(1930).—Gurvitch advanced the idea that under cracking conditions hydrocarbons undergo decompn. similar to the decompn. of $CaCO_3$ to CaO and CO_2, with the difference that cracking is momentarily nonreversible. M. asserts that the nonreversibility is of longer duration. In a manner analogous to the dissocn. of $(Ph_3C)_2$, hydrocarbons may dissoc. under the proper conditions into compds. in which C contains less than 4 valences, these compds. being stable under the conditions. By condensation and addn. these primary products may then be converted to other products, also more heat-resistant than the original compds. In agreement with this idea is the fact that the high-boiling fractions of a cracked product are more difficult to crack than are analogous fractions of a crude oil. In further analogy to the behavior of $(Ph_3C)_2$, the extent of the dissocn. of which depends upon the quantity of solvent used and on the temp., the cracking of hydrocarbons in the liquid phase is aided by the dissocn. effect of the liquid (solvent). Thus cracking should take place in the liquid phase at a lower temp. than that necessary for cracking in the vapor phase. The high pressure necessarily imposed upon the system to maintain the oil in the liquid phase at the cracking temp., would have the effect of increasing polymerization reactions The most favorable yield of gasoline should, therefore, result when the oil is brought to the cracking temp., the liquid phase being maintained, and then suddenly expanded by releasing the pressure. I. M. LEVINE

A new type of cracking process. GEORGE REID. *Refiner and Natural Gasoline Mfr.* 9, No. 11, 81(1930).—The Pratt vapor-phase process (cf. U. S. pat. no. 1,752,264, *C. A.* 24, 2594) is discussed. A 26° A. P. I. gr. Midcontinent topped crude oil produced 42% of 225° end point gasoline having a benzene equiv. of 80%, 38% of a 14° A. P. I. gr. cracked fuel oil, and 20% of coke, gas and loss. Three gal. of gasoline is recovered from each 1000 cu. ft. of gas. No cracking chamber or coke accumulator is used. J. L. ESSEX

Experimental cracking unit has interesting features. BRAD MILLS. *Refiner and Natural Gasoline Mfr.* 10, No. 1, 89(1931).—The *Hoge cracking process* is described. The reaction chamber contains baffles. The operating temp. is 540–680°, operating pressure is 2 lb. per sq. in. and vapor velocity is 900 ft. per min. Yields of 80% of gasoline are obtained from Kern County crude oil. J. L. ESSEX

Effect of time and temperature on the cracking of oils. J. C. GENIESSE AND RAYMOND REUTER. *Ind. Eng. Chem.* 22, 1274–9(1930).—Expts. in cracking a Midcontinent gas oil at atm. pressure indicated that the gasoline product was nearly the same in character whether the temp of cracking was low and the time long or the temp. high and the time short. The time for attaining a given result can be halved by raising the temp. 17°. EMMA E. CRANDAL

Cracking of California kerosene and stove oil at relatively low pressures. G. EGLOFF. *Petroleum Z.* 26, 1263–4(1930); cf. *C. A.* 24, 5472. I. M. LEVINE

Mexican kerosene cracked at 300 pounds gives good antiknock gasoline. GUSTAV EGLOFF AND E. F. NELSON. *Refiner and Natural Gasoline Mfr.* 9, No. 11, 77(1930).—See *C. A.* 25, 195. J. L. ESSEX

Natural gasoline in California. G. ROSS ROBERTSON. *Ind. Eng. Chem.* 22, 1268–73(1930).—The gasoline-absorption plant of the Los Nietos Producing and Refining Co. at Kettleman Hills utilizes a small portion of its stripped gas as fuel and for driving turbines which service the pumps. Some 90 billion B. t. u. are wasted daily in the gas which must be permitted to escape into the atm. The compact criss-cross system of heat exchange between the fat and lean absorption oil is so efficient that the diff. in temp. at the cold fat-oil end is only 20° F. EMMA E. CRANDAL

New natural gasoline specifications. ANON. *Refiner and Natural Gasoline Mfr.* 10, No. 1, 126(1931).—The basis for the new specifications is the Reid vapor pressure and the temps. at which 10%, 35% and 60% are evapd. The new requirements

are: vapor pressure of 10–34 lb. abs. per sq. in. at 37.8°, percent evapd. at 60°, 25–85; at 135° not less than 90, end point not over 191°, corrosion neg., Doctor test neg. and color not below 25 Saybolt. There shall also be 24 grades. The max. vapor pressure of the several grades is to be 14, 18, 22, 30 and 34 lb., resp., and the min. percent evapd. at 60°, 25, 40, 55 and 70. The grades shall be marked, for example, 22-25, indicating the pressure and percent evapd. The temp. of 60° must be corrected for barometric pressure at the rate of 0.55° for each 14 mm. difference in pressure. The reasons for adopting these specifications are set forth The specification becomes effective Jan. 1, 1932, but is optional from Jan. 1, 1931. J. L. Essex

Final Report of the Departmental Committee on ethyl gasoline. A. G. Francis, Dixon, R. A. Hepple, *et al. Ministry of Health, Gt. Britain* 91 pp.(1930); *U. S. Pub. Health Eng. Abstracts* **10**, IHS, 7(Dec. 6, 1930).—It is concluded that no public health reasons exist for prohibiting the use of *ethyl gasoline* in automobiles so long as reasonable precautions are taken. The recommended precautions include labeling the cans and pumps, and dyeing the gasoline which should not contain more than 1 part of PbEt in 1300 parts by vol., or about 1 in 650 by wt. A *new and accurate method of detecting the presence of small amts. of Pb* is described. By use of the method, the Pb in urine, dusts and in garages was deted. More Pb was found in crank-case oils in automobiles using ethyl gasoline. No amt. likely to create danger was found in lubricating oils, either as a result of spilling or from the exhaust gases in city traffic. By animal expts., the daily application of ethyl gasoline to the skin caused neither local irritation nor impairment of the general health. Only under the most exceptional circumstances is there any danger from ethyl gasoline exhaust gases in garages or on city streets. C. R. Fellers

The formation of gum in motor fuel. R. Brunschweig and L. Jacqué. *Compt. rend.* **191**, 1066–8(1930).—Two benzene motor fuels contg. olefins, one fuel (I) having received a higher degree of refining than the other (II), were exposed for a period of 4 months (*a*) to air in the dark, (*b*) to sunlight alone and (*c*) to sunlight and air. Air alone had very little effect on either the color or gum content (residue upon evapn. of 100 cc. of the oil). Sunlight alone caused an increase in the gum content from 3 to 42 mg. for I and from 1 to 47 mg. for II. Exposure to both air and light brought the gum content up to 430 and 147 mg., resp. A small quantity of resin adhered to the walls in the case of I. Under the same circumstances the gum content of a com. gasoline rose from 20 mg. after artificial aging to 927 mg. of dissolved and 392 mg. of pptd. gum. The following conclusions may be drawn: (*a*) the production of color and gum are interdependent; (*b*) a motor fuel stable under ordinary storage conditions may become unsuitable under a lengthy exposure to sunlight and air; (*c*) light-stability is not a rigorous test of the quality of a fuel. I. M. Levine

Disorders in the operation of motor vehicles and their connection with the motor oils used. Ernst W. Steinitz. *Petroleum Z.* **26**, *Motorenbetrieb und Maschinen-Schmierung* No. 11, 9–14(1930).—Disorders that occur in the operation of motor vehicles, namely, residues in the combustion chamber, gasoline line, valves and crank-case, crankcase dilution, knocking, loss in power and difficulty in starting are discussed and related to the properties of the motor fuel and lubricating oil used. I. M. Levine

A modern German commercial distillation unit in Baku. Hans Siebeneck. *Petroleum Z.* **26**, 1257–61(1930).—The distn. unit is described. The essential elements are a pipe still, set in a furnace, a vaporization chamber and 3 fractionating columns each furnished with coolers. Various fractions can be obtained directly. By means of heat exchangers the raw oil is heated to 140° before it enters the furnace. I. M. L.

Stabilization and recovery plant. L. S. Gregory. *Refiner and Natural Gasoline Mfr.* **9**, No. 11, 74(1930); cf. *C. A.* **24**, 5472.—The advantages and disadvantages of removing C_3H_8 and C_4H_{10} are set forth. For every 1% of C_3H_8 removed from a pressure distillate more than 3.5% of C_4H_{10} may be added without increasing the vapor pressure of the blend, giving a net increase of 2.5%. Because of the first cost and operating cost, C_4H_{10} should not be removed unless the treating and rerunning losses are excessive. Removal of C_3H_8 saves the evapn. losses only. A typical plant is described. J. L. Essex

Determination of hydrogen sulfide in refinery still gases. A. R. Scharnagel and A. W. Trusty. *Ind. Eng. Chem., Anal. Ed.* **3**, No. 1, 29(1931).—A modified method consisting in the absorption of the gas in 2 scrubbers, each contg. 100 cc. of 0.1 *N* Pb acetate, the second scrubber acting as an indicator for the complete satn. of the first. The soln. in the first scrubber is filtered and the unused Pb titrated with NH_4 molybdate soln.

Fractionation for absorption plants. I. N. Beall. *Refiner and Natural Gasoline Mfr.* 9, No. 11, 86(1930); cf. *C. A.* 24, 3893.—The principles involved in the design and operation of the fractionating column of an absorption plant are discussed from a math. and a graphical viewpoint. Such factors as volatility ratio, liquid and vapor flow, heat balance, reflux cooling, no. of plates and caps and spacing of plates are also discussed. J. L. Essex

Reclaiming absorption oil as aid to plant efficiency. C. D. Gard. *Refiner and Natural Gasoline Mfr.* 9, No. 12, 74(1930). Dirty absorption oil lowers the efficiency of absorption because of increased mol. wt., lower oil rate due to the presence of inert asphaltic particles and water content, it increases heating and pumping costs as the result of lower fluidity and higher sp. gr., gums up the heat exchangers, increases pressure drop, and causes premature shut down. G. maintains a clean oil by passing less than 0.2% of the whole through a steam still, although a rate of 1.0% is maintained for the first 2 weeks. The loss is only about 4 gal. per hr. for a 100,000 gal. circulation of lean oil per hr. For a plant of 10,000,000 cu. ft. of gas contg. 0.65 gal. of C_4H_{10} per 1000 cu. ft., the gasoline recovery per day will be increased 400 gals. and the steam consumption will not exceed 18 boiler horsepower. J. L. Essex

Determination of evaporation losses. G. W. Chenicek and W. G. Whitman. *Refiner and Natural Gasoline Mfr.* 9, No. 11, 115(1930). The application of the vapor pressure method for detg. evapn. losses in gasoline storage tanks shows that unprotected tanks lose about 0.25% per month and tanks equipped with breather bags lose only 0.03% per month. On displacement tests a loss of 0.05% is found for tanks having a standard roof and 0.004% for those with floating roofs. The samples may be collected at some distance and sent to the lab. for analysis without loss of accuracy. J. L. Essex

Catalytic reactions of organic sulfur compounds. Hugh S. Taylor. *Refiner and Natural Gasoline Mfr.* 9, No. 12, 83(1930). A general survey of the problem of the reactivity of S compds. in petroleum when brought into reaction in the presence of contact agents is given; it is assumed that the reactions are like those of compds. contg. O and N. The variations attributable to temp., pressure, catalyst and reacting gas are summarized and the importance of the type of S compd. treated, as d. to the ease and extent of removal, is shown. J. L. Essex

Action of alkali hydroxides on elementary sulfur and mercaptans dissolved in naphtha. V. Vesselovsky and V. Kalichevsky. *Ind. Eng. Chem.* 23, 181–4(1931). KOH and NaOH (anhyd. or dissolved in org. solvents relatively free from water) remove elementary S and mercaptans from their solns. in naphtha. KOH is particularly effective in removing S, and NaOH in removing mercaptans. On prolonged contact in the presence of air, S and mercaptans reappear in soln. in consequence of oxidation and hydrolysis of the sludge formed. V. Kalichevsky

A new apparatus for sweating of paraffin. Laboratories of the Koninklijke Shell Groep. *Petroleum Z.* 26, 1217–20(1930). I. M. Levine

The de Florez furnace. Paul F. Swanson. *Refiner and Natural Gasoline Mfr.* 9, No. 11, 69(1930). A good description of the up shot heater having a capacity of 45,000,000 B. t. u. per hr. and 5500 sq. ft. of surface is given. Even distribution of heat to all tubes and the utilization of the max. radiant heat energy of the products of combustion are accomplished by closer contact of the combustion gases and tubes. The furnace operates at 65–75% efficiency at an overall heat transfer of 6500 B. t. u. per hr. per sq. ft. of external tube surface. The excess air is 25%. This furnace is used in a vapor-phase cracking unit where temps. of 570° are required. J. L. E.

Flue gas for reducing fire hazards. A. E. Pew, Jr. *Refiner and Natural Gas Mfr.* 9, No. 12, 122(1930). Various methods are given for using flue gases in tanks and refinery equipment to exclude air or dilute to such a degree that explosive mixts. are not formed. This system also eliminates the danger of discharge from static or bound charges, spontaneous ignition of pyrophoric Fe and S corrosive compds. which are ignition agents in the presence of explosive atm. J. L. Essex

Fluorescence analysis of coal pitch and petroleum pitch, so-called bitumen. W. Teuscher. *Chem. Ztg.* 54, No. 102, 987(1930). cf. *C. A.* 24, 2053.—An easy and simple method is described for the detection of coal tar in bitumen by means of the Haitinger and Reich (*C. A.* 23, 4889). Bitumen in solvents like benzene, alc., acetone and benzine gives a red-blue color in ultra-violet light. Coal tar in the same solvents is green-blue. A mixt. of both bitumen and coal tar is green-blue. Julius Wilh.

Kir. Edmund Graefe and Rudolf Schreiter. *Petroleum Z.* 26, *Asphalt und Strassenbau* No. 11, 3–8(1930).—Previous work on the definition and geographical and geological occurrence of kir is reviewed. This substance may be considered a

local term for asphalt more or less associated with sand and silt. A sample of kir originating in the Baku district was investigated. It was of low ductility, soft and unhomogeneous, being mixed with some oil. It had an ash content of over 52%. Asphalt acids were isolated, existing in the kir both in the free state and as alk. earth soaps. It is suggested that the asphalt was formed as a result of oxidation by air, of a petroleum residue, remaining after the lighter portions had evapd. The oxidation led to the formation of both higher mol. wt. hydrocarbons and acids, part of which reacted with the inorg. material with which it was closely assocd. The material may be used locally for roofs and floors inside houses. I. M. LEVINE

Petroleum coke. F. L. WALLACE. *Refiner and Natural Gasoline Mfr.* **9**, No. 11, 103(1930). J. L. ESSEX

Lubricating oils. J. TAUSZ AND A. STAAB. *Petroleum Z.* **26**, 1117-24, 1129-40 (1930).—The effect of diln. on the viscosity and mol. wt. of a lubricating oil with an oil of low mol. wt. was studied with the end in view of the use of the results in the detn. of the value of an oil as a lubricant. Viscosity was expressed as a function of diln. by the equation, $\eta_{\text{diln. oil}} = \eta^{x}_{\text{undiln. oil}}$ (*A*). The change of viscosity with temp. was expressed by a similar equation, $\eta_t = \eta^{x}_{20}$ (*B*), where η_t and η_{20} are the viscosities at $t°$ and 20°, resp. The values of x in *A* and *B* decrease with increase in diln. and temp., resp., and, in general, with decrease in mol. wt. of the lubricating oil. Both values of x are higher for vegetable oils than for mineral oils. However, x_A gives a truer comparison of the values of 2 oils than does x_B. x_A expresses this difference, but x_B does not, since it is practically the same for both oils. The mol. wt. of the mineral oils decreased with increase in diln. The decrease of both viscosity and mol. wt. with diln. signifies that the oil is dissocd. by the solvent. On the other hand, the mol. wts. of vegetable oils increase with increase in diln. although the viscosities change in the opposite direction. The explanation is offered that the dissocn. produced by the diluent is counteracted by solvation of the oil. The vol. change upon diln. of castor oil and Mobiloil by $C_{10}H_{18}$ and C_6H_6 was also detd. While in $C_{10}H_{18}$ the vol. increase is small for both oils but greater for castor oil, in C_6H_6, the vol. increase for Mobiloil is very large, while for castor oil there is a small increase up to the 50% point and then a decrease. The η in centipoises at 20°, of the following compds. is given: C_5H_{12} 0.2344, C_5H_{12} 0.3701, C_7H_{16} 0.5115, C_8H_{18} 0.6515, PhMe 0.5880, $C_6H_4Me_2$ 0.6560, cyclohexane 0.9765, methylcyclohexane 0.7202, $C_{16}H_{32}$ 2.3490, $C_{16}H_{18}$ 2.6920. I. M. LEVINE

Chemical structure of lubricating oils. G. H. B. DAVIS AND E. N. MCALLISTER. *Ind. Eng. Chem.* **22**, 1326-9(1930).—Evidence has been found supporting the view that Pennsylvania *lubricating oil melts* are a combination of *naphthene rings* and paraffin chains. The no. of C atoms that are in naphthene rings in a mol., N, can be calcd. from the formula $N = 0.358$ mol. wt. $+ 7.7 - 0.3$ mol. vol. This was verified experimentally on narrow fractions of a Pennsylvania lubricating oil by calcg. mol. formulas from the values of N and comparing them with the results of elementary analysis. The viscosity index, an index of the change in viscosity of an oil with temp. (cf. *C. A.* **24**, 5761), is also proportional to the percentage of the C atoms that are in naphthene rings. EMMA E. CRANDAL

The acid treatment of lubricating distillates. H. M. WEIR, W. F. HOUGHTON AND F. M. MAJEWSKI. *Ind. Eng. Chem.* **22**, 1298-1300(1930). The effects of varying the H_2SO_4 treatment of Solar reduced oil as to concn. and quantity of acid used and as to temp. of treatment, upon gravity, color, n and viscosity are reported. There is reason to believe that the action of H_2SO_4 is mainly phys. rather than chem. The following are probably the changes caused by the acid: (1) the formation of indicator-like substances, (2) the flocculation and absorption of (colloidally ?) dissolved bitumens, (3) soln. of other color substances contg. chromophores, (4) some sulfonation and oxidation. EMMA E. CRANDAL

Machine elements and the elements of lubricating technic. ERICH KADMER. *Petroleum Z.* **26**, *Motorenbetrieb und Maschinen-Schmierung* No. 11, 3-6(1930). I. M. LEVINE

The lubrication of ball and roller bearings in the steel mill. D. E. BATESOTE. *Iron Steel Eng.* **8**, 8-12(1931).—The rapidly growing use of antifriction bearings in the steel mill and particularly the introduction of such bearings in new and hitherto untried fields of application has made the problem of bearing lubrication a most important one. A good general lubricant specification called for by one large user of ball and roller bearings is: free acid, nil; neutral saponifiable, 1.0%; free alkali, 0.1%; S, 0.03%; resin, nil; ash, 1.5%; moisture, 2.0%; and abrasive particles, nil. The frequency and methods of lubricating ball and roller bearings are discussed, also methods of sealing against oil leakage. Numerous illustrations are included. W. H. B.

Detonation as affected by mineral lubricating oils. R. O. KING AND H. MOSS. *Engineering* **131**, 1–4(1931); cf. *C. A.* **24**, 5996.—Tests to det. the deleterious effect of various mineral lubricating oils on the antiknock properties of motor fuels with and without antidetonants show that the results depend on the particular mineral oil, the blend of motor fuel, the antidetonant (if used), and the induction temp. The deleterious effect increases directly with the compression ratio at which the fuel can be used, the effect being nearly independent of the compn. of the fuel, except that within a certain range fuels contg. naphthenes are less affected by oil than are fuels contg. aromatics. With doped fuels the effect seems to be on the metallic dope content, since the action of ethyl fluid increases to a max., then decreases in spite of increases in compression ratio. D. F. BROWN

The purification of used compressor oils. L. PIATTI. *Petroleum Z.* **26**, *Motorenbetrieb und Maschinen-Schmierung* No. 11, 7(1930).—The lubricating oil used in gas compressors contains $C_{10}H_8$ and H_2S. The impurities are sepd. by steam distn., the steam being admitted after the oil has been heated to 120°. The reclaimed oil has practically the same viscosity, flash and flame point as the fresh oil. The sp. gr., however, is high. I. M. LEVIN

The neutralization of castor oils. MARIE T. FRANÇOIS. *Ann. combustibles liquides* **5**, 733–5(1930).—See *C. A.* **24**, 4927. E. SCHOITE

Composition of turpentines. B. A. ARBUZOV. *Zhur. Prikladnoi Khim.* **3**, 867–73 (1930); cf. *C. A.* **23**, 4057; **24**, 1209.—A sample of com turpentine (d_{15} 0.8660, α_D^{15} + 22.53°, coeff. of rotary dispersion (α_v/α_j) 1.136 after treatment with lime and distn. with steam) was distd. in the app. previously described (*C. A* **24**, 3896) and the fractions were analyzed. It contained *d*-α-pinene 58.3, *d*-Δ^3-carene 20.5, dipentene and *d*-limonene 10.6, terpinolene with traces of α-terpinene 3.0, alcs. 6.0, sesquiterpenes 1.0 and residue 1.5 V. KALICHEVSKY

Composition of turpentines from Pinus silvestris. V. KRESTINSKII, A. LIVEROVSKII AND V. MALMBERG. *J. prakt. Chem.* **129**, 97–103(1931).—See *C. A.* **25**, 197.

***l*-Rotatory turpentine from Pinus silvestris.** V. KRESTINSKII AND L. BAZHENOVA-KOZLOVSKA. *J. prakt. Chem.* **129**, 104–14(1931).—See *C. A.* **25**, 197. E. C. K.

Composition of the alcoholic fraction of turpentines. V. KRESTINSKII, F. SOLODKII AND G. TOLSKII. *J. prakt. Chem.* **129**, 115–20(1931).—See *C. A.* **25**, 197. E. C. K.

Oil of cayate (in lubrication of fine machinery) (CALLIER) **27**. Hydrogenation of coal and oil (HUPPERT) **21**. Slow combustion of CH_4 (BONE, HILL) **21**. Analyses of oil and gas from distillation of sediments (TRASK, WU) **8**. Low-temperature oxidation. III. The lag in ignition of some hydrocarbons (LEWIS) **2**. Origin and environment of source sediments of petroleum deposits (HASEMAN) **8**. New constituent of the ethereal oil from the wood of *Chamaecyparis obtusa* (TAKAHASHI, *et al.*) **10**. Apparatus for carbonizing wood, peat, lignite, etc. (Ger. pat. 513,125) **21**. Apparatus for separating oil, etc., and water (Ger. pat. 511,367) **1**. Apparatus for the continuous distillation and rectification of benzene, gasoline, etc. (Fr. pat. 691,995) **16**. Distillation of solid fuel (Fr. pat. 692,091) **21**. Heat-exchange apparatus suitable for treating oil or other liquids (U. S. pat. 1,790,151) **1**. Apparatus for mixing liquids (Ger. pat. 511,642) **1**.

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Das Erdöl, seine Physik, Chemie, Geologie, Technologie und sein Wirtschaftsbetrieb. Established by Carl Engler and Hans Höfer. 2nd ed. Edited by JENÖ TAUSZ. **Bd. 2, Tl 2.** Spezielle Geologie des Erdöls in Europa ausschliessl. Russlands. Leipzig: S. Hirzel. 454 pp. M. 62; Linen, M. 65. For Bd. 4 see *C. A.* **24**, 5475.

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PORTER, HOLLIS P.: **Petroleum Dictionary.** Houston, Texas: The Gulf Pub. Co. 234 pp. $3. Reviewed in *Oil Bull.* **17**, 151(1931).

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WINKLER, HENRY VON, ÖPIK, A., REINWALDT, J., MIDDENDORFF, K. VON, OTTOSON,

J., AND RENNENKAMPFF, W. VON: **Der estländische Brennschiefer: Untersuchung, Gewinnung und Verwertung.** Revel: F. Wassermann 350 pp.

Treating petroleum oil containing mercaptans. HERBERT G. M. FISCHER and WM. J. ADDEMS (to Standard Oil Development Co.). U. S. 1,789,335, Jan. 20. The oil is agitated with preformed PbS, NaOH and S in sufficient amount to convert the mercaptans into polysulfides.

Petroleum distillation control. WARREN K. LEWIS (to Standard Oil Development Co.). U. S. 1,789,339, Jan. 20. For controlling the lowest-boiling constituents of bottoms obtained in fractional distn. of petroleum oils, a minor part of the bottoms to be controlled is continuously abstracted at a substantially uniform rate and heated under conditions of substantially uniform heat input to produce vapor and an unvaporized residuum, the vapor thus produced is rectified, the temp. of the rectified vapor is measured and the conditions of the first distn. are modified as may be necessary to hold such temp. near a predetd. point. App. is described.

Separating paraffin from petroleum oils. JULES VERNER (to Standard Oil Development Co.). U S. 1,789,347, Jan. 20. A mixt. of oil carrying suspended paraffin is forced through a combined filtering and sweating zone to form first a filtrate and a layer of slack-wax in this zone, the filtrate is conducted away, and heat is then applied to the slack-wax *in situ* in the same zone sufficient to produce a liquid phase and a residuum of paraffin, the liquid phase is conducted away, and the paraffin is afterward melted and conducted away. App. is described. Cf. *C. A.* **24,** 3637.

Removing gum-forming compounds from cracked petroleum distillates. RUDOLPH C. OSTERSTROM, JULIUS HYMAN and CARY R. WAGNER (to Pure Oil Co.). U. S. 1,789,413, Jan. 20. The distillates are vaporized in the presence of polymerized compds. contg. Na sulfonates to accelerate the polymerization of the gum-forming compds. in the vaporized distillates, and the light desirable oils are then sepd. and condensed separately from the polymerized compds. An arrangement of app. is described.

Preventing gum formation in hydrocarbon materials. WM. S. CALCOTT and IRA E. LEE (to E. I. du Pont de Nemours & Co.). U. S. 1,789,302, Jan. 20. An acyl deriv. of an aromatic amine such as acetanilide is added to a petroleum distillate fuel such as gasoline.

Dephlegmating tower suitable for treating hydrocarbon vapors. WALTER M. CROSS (to Gasoline Products Co.). U. S. 1,789,670, Jan. 20.

Recovering sulfur dioxide in its use as liquid for treating hydrocarbon materials. JOHN C. BLACK. U. S. 1,789,510, Jan. 20. Sepd products from liquid-SO_2 treatment are subjected, in sep. containers, to a pressure distn. at a temp. sufficient to cause the major portion of the SO_2 to vaporize and the SO_2 is sepd., condensed and collected under the same pressure; the remainder of the SO_2 still retained by the hydrocarbon products is then vaporized, condensed and collected in an oil cooled to the liquefying temp. of SO_2 at the pressure employed (the last-mentioned distn. is conducted at 10 lb. gage pressure or lower). An arrangement of app. is described.

Cracking hydrocarbons. SIGBERT SEELIG. Fr. 690,661, Feb. 25, 1930. A mixt. of hydrocarbons is heated in a cracking zone and sepd. in an evaporator into vapor and liquid, the mixt. being projected and pulverized on to heating tubes traversing the evaporator.

Cracking hydrocarbons. SINCLAIR REFINING CO. Fr. 691,739, Mar. 11, 1930. For the manuf. of gasoline a current of oil of high b. p. is heated to a high cracking temp. under a low pressure and the hot products from this operation are introduced into a coking retort; a current of oil of higher b. p. is heated to a lower cracking temp. under a higher pressure and the hot products of this operation are transferred to the coking retort after reduction of the pressure; the mixt. of hot vapors from the coking retort is transferred to the interior of a liquid mass of oil contained in a washing vessel, below the surface of the oil; a fraction of oil from this liquid mass is supplied to the coking retort in which, conjointly with the non-vaporized components of the hot products from the distinct heating operations, it is reduced to coke; the hot vapors from the washing vessel are transferred successively by a primary and a secondary fractionation, a fraction of high b. p. in the second fractionation being used for the heating at low pressure, and a fraction from the primary fractionation being used for the higher pressure heating, both referred to above. A gasoline fraction is also obtained from the secondary fractionation.

Cracking oils. ANGLO-PERSIAN OIL CO., LTD. Ger. 511,133, May 17, 1928. See Brit. 293,889 (*C. A.* **23,** 1748).

Expansion valve for use in cracking oils under pressure. CARBUROL A.-G. Ger. 514,263, Oct. 1, 1927.

Heating hydrocarbon oils. POWER SPECIALTY CO. Ger. 514,262, April 29, 1927. See Brit. 283,032 (*C. A.* **22**, 3983).

Distilling heavy hydrocarbon oils. ALEXANDER S. KNOWLES (to Tar and Petroleum Process Co.). U. S. 1,789,312, Jan. 20. Material to be treated, such as tar, is deposited upon the upper portion of a loose porous bed of material, such as carbonaceous material, exposed to extraneous heat from below and held in a rotatable basket, and residual liquid is continually drained from the bed. Various details of app. and procedure are described. Cf. *C. A.* **24**, 950.

Decolorizing hydrocarbon oils and residues. N.-V. MIJNBOUW- EN CULTUURMAATSCHAPPIJ BOETON. Brit. 334,833, Jan. 30, 1929. "Cracked petrol" or other materials are decolorized by treatment at substantially atm. temp. with a 58% or stronger aq. soln. of one or more hygroscopic heavy metal chlorides such as $ZnCl_2$ or $FeCl_3$ or both. The treatment may be effected in stages with the use of successively stronger solns., and after sepn. from the treating soln the material may be neutralized and distd. and fractionated. The aq. soln. may be sepd. from polymerization products, concd. and reused. Further refining of the products, such as "white spirit" and kerosene fractions, may be effected at a temp. above 60° with a concd. soln. of chloride such as that of Fe, Cu, Ni, Al or Zn, or dark-brown lubricating oil may be similarly treated at 35°.

Refining mineral oils. ARTHUR LACHMAN (to Richfield Oil Co. of Calif.). U. S. 1,790,622, Jan. 27. Vapor of an oil such as gasoline is passed through, or in contact with, a maintained aq soln. of $ZnCl_2$ and then condensed. App. is described.

Lubricating oils. I. G. FARBENIND. A.-G. (Wilhelm Pungs and Erich Frese, inventors). Ger. 511,963, June 26, 1927. See U. S. 1,787,951 (*C. A.* **25**, 810).

Purifying light oils derived from coal gas. A. R. ALBRIGHT (to Koppers Co.) Brit. 335,155, Oct. 10, 1928. In the acid-alk. phenate purification of light oils extd. from coal gas, the phenolate soln. used is obtained by washing with alkali soln. the liquid or gas used to remove phenols from the ammoniacal gas liquor, a 7% H_2SO_4 and about equal proportions of NaOH and NaOPh being suitable. The phenols may be recovered by treating the used washing liquid with $NaHCO_3$ or CO_2.

Tank and baffle for separating oil and gas. JAY P. WALKER (40% to Guy O. Marchant and 6% to C. G. Wells). U. S. 1,789,612, and U. S. 1,789,613, Jan. 20. U. S. 1,789,716 and U. S. 1,789,717 also relate to generally similar app. for the same purpose.

Extracting benzene hydrocarbons from gases. FRITZ BREITBACH (to the firm of Carl Still). U. S. 1,790,571, Jan. 27. In treating gases such as distn. gases with wash oil contg. naphthalene, the benzene-charged wash oil is distd. to obtain a liquid distillate contg. naphthalene, the distillate is continuously rectified, and the liquid naphthalene-contg. residue from the rectification is returned while still warm to the main stream of wash oil circulating through the gas-scrubbing plant. An arrangement of app. is described.

Unsaturated hydrocarbons from mixtures such as oil-cracking effluents. HAROLD S. DAVIS (to Petroleum Chemical Corp.). U. S. 1,790,519, Jan. 27. Mixts. such as products from oil cracking contg. hydrocarbons having secondary and tertiary base structures are subjected to hydrohalogenation in a cold aq. soln. of a hydrohalogen such as HCl which is maintained at substantially const. satn. and the resulting hydrohalogenated derivs. of the hydrocarbons of tertiary base structure are sepd. from the unchanged hydrocarbons of secondary base structure by fractional distn.

Amylenes and butylenes from oil cracking. HAROLD S. DAVIS and WALLACE J. MURRAY (to Petroleum Chemical Corp.). U. S. 1,790,522, Jan. 27. A fraction is segregated from products of oil cracking contg. over 80% of unsatd. hydrocarbons including amylenes and butylenes and substantially free of C compds. of lower mol. wt. than C_3H_6.

Secondary alcohols from olefins produced in cracking petroleum oils. HAROLD S. DAVIS and WALLACE J. MURRAY (to Petroleum Chemical Corp.). U. S. 1,790,517, Jan. 27. For producing secondary alcs. with 4 and 5 C atoms to the mol., an olefinic fraction is sepd. from the cracked products consisting predominantly of secondary and tertiary olefins of the same no. of C atoms per mol. as the alcs. to be produced, tertiary olefins are removed from the fraction (suitably by use of 60-65% strength H_2SO_4) and the remaining secondary olefins are sulfated with aq. H_2SO_4 of suitable concn. and temp. and the sulfated material may then be used for obtaining alcs. U. S. 1,790,518 (HAROLD S. DAVIS) describes converting butylenes of cracked petroleum into secondary and

tertiary alc. by absorbing the butylenes under pressure in a mixt. of liquid olefins b. under 100° and treating the mixt. under pressure with H_2SO_4 of about 65% strength at a temp. below 30° and then treating with acid of over 70% concn. and allowing the temp. to rise to 35–45°.

Secondary amyl alcohol from olefins produced in oil cracking. HAROLD S. DAVIS and WALLACE J. MURRAY (to Petroleum Chemical Corp.). U. S. 1,790,523, Jan. 27. By fractional distn. of products from oil cracking there is obtained a fraction consisting predominantly of secondary and tertiary olefins of 5 C atoms per mol., tertiary olefins are removed from this fraction (suitably by H_2SO_4 of 60–65% strength) and the secondary olefins are sulfated with aq. H_2SO_4 of suitable concn. and temp. and the sulfation product is used for alc. production.

Secondary alkyl sulfates from olefins produced by oil cracking. HAROLD S. DAVIS (to Petroleum Chemical Corp.). U. S. 1,790,520, Jan. 27. Olefinic material consisting predominantly of secondary and tertiary olefins of not over 6 C atoms per mol. are hydrochlorinated with HCl of such concn. and temp. as will selectively convert the tertiary olefins into HCl addn. products, unchanged hydrocarbons are sepd. from the reaction products (suitably by fractional distn.) and the secondary olefins in the unchanged hydrocarbon constituents are sulfated with aq. H_2SO_4 of suitable concn. and temp.

Esters of organic acids and olefins. HAROLD S. DAVIS and CHARLES G. HARFORD (to Petroleum Chemical Corp.). U. S. 1,790,521, Jan. 27. Tertiary olefins are selectively removed from a mixt. of tertiary and secondary olefins produced in oil cracking and the remaining hydrocarbon mixt. is esterified with an org. acid such as HOAc in the presence of a catalyst such as H_2SO_4.

Rectifying gasoline such as that derived from natural gas. NATHANIEL E. LOOMIS (to Standard Oil Development Co.). U. S. 1,789,470, Jan. 20. Constituents for gasoline production are absorbed from a gas such as natural gas or still gas in a miscible absorbent such as oil and the resulting soln. is passed into, and downwardly through, a vapor and liquid contact tower, the lower end of which is heated, and there is passed downwardly through the upper portion of the tower a second relatively cool liquid such as fresh absorption oil which is substantially non-volatile under the prevailing conditions and adapted to absorb constituents less volatile than propane desired to be retained in the tower, and the vapors are withdrawn An arrangement of app. is described

Motor fuel. WILLARD C. ASBURY (to The Standard Oil Development Co.). Can. 308,408, Feb. 3, 1931. Low-boiling oils are produced from heavier hydrocarbon oils by destructive hydrogenation in the liquid phase at pressures in excess of 100 atm. and temps. 750–925°F. The fractions thus formed are sepd. and the fraction of intermediate b. p. is treated in the vapor phase with H under a pressure of 100 atm. at 925–950° F., whereby it is converted largely into low-boiling aromatic oil.

Motor fuel. STANDARD OIL CO. (an Indiana Corp.). Fr. 691,931, Mar. 14, 1930. A small proportion (0.05%) of an aminophenol compd. such as methylaminophenol or benzylaminophenol is added to the product obtained by cracking a hydrocarbon fuel in the vapor state to prevent the formation of gum or resinous products.

Lubricants. ALOX CHEMICAL CORP. Brit. 335,152, Dec. 18, 1928. Lubricants for machinery cutting tools and molds comprise a lubricating oil together with oxidation products such as those which may be derived from waxes from shale or brown coal or petroleum or heavy petroleum distillates as described in Brit. 303,560 (*C. A.* **23**, 4593) or Brit. 309,382 (*C. A.* **24**, 718). Various details and examples are given. Cf (*C. A.* **24**, 4928.

Lubricants. JULIEN MILLE. Fr. 692,289, Mar. 19, 1930. A mixt. of S, graphite and chlorophyll is added to an ordinary lubricating oil to prevent heating of machinery. An example contains oil 68, flowers of S 7, graphite 14 and chlorophyll 11%.

Lubricant. OLE ROLFSEN. Norw. 46,533, June 3, 1929. Glycerides of fatty acids of marine origin are introduced into mineral oil in which has been dissolved a product obtained by incomplete hardening of oils from whale, seal or other marine mammals.

Lubricant for combustion motors. OLE ROLFSEN. Norw. 45,365, July 16, 1928. Mineral oil is mixed with marine fatty oils which have previously been treated with H_2SO_4, dried and filtered.

Lubricant for gears. STANLEY D. WHITE and CARL L. KNOPF (to Sinclair Refining Co.). U. S. 1,789,614, Jan. 20. A lubricant is described comprising an oxidized blend of light lubricating oil, heavy flux oil and Na soaps of petroleum acids substantially free from water, having a MacMichael viscosity of 70–85 poises at 38° and a

Knopf viscidity not exceeding 12 oz. at about —18°. App. for testing viscidity and adhesiveness of oils is described.

Lubricating textile machine bearings. ARMAN E. BECKER (to Standard Oil Development Co.). U. S. 1,789,331, Jan. 20. Parts of machinery which may come into contact with the textile product are lubricated with a petroleum oil having a viscosity of about 50 to 250 sec. Saybolt at 38° to which has been added about 0.15 to 1.5% of a water-sol. alkali metal soap.

Lubricating oil. COPPERIZED STEEL, LTD. Ger. 512,056, Jan. 19, 1926. Metal parts which are subjected to high-temps. under non-oxidizing conditions are lubricated by applying in the cold a mineral oil having an asphaltic base. The subsequent heating of the parts then results in the production of an adherent carbonaceous lubricating layer.

Lubricating oils. STANDARD OIL CO. (an Indiana Corp.). Fr. 690,966, Mar. 1, 1930. A lubricating oil is made by polymerizing unsatd. hydrocarbons resulting from the cracking of hydrocarbon materials, which contain a much higher percentage of normal paraffin hydrocarbons than does distd. Pennsylvania oil. $AlCl_3$ may be used as polymerizing agent. Examples of temps. and proportions are given.

Heating lubricating oils with phenol. REGINALD K. STRATFORD (to The Standard Oil Development Co.). Can. 308,405, Feb. 3, 1931. Lubricating oil is agitated with 100–150% of undild. liquid phenol at a temp. not above 140°F. in one of a series of agitators. An oil layer and a phenol layer are sepd. and the phenol layer is transferred into the next agitator in contact with another oil layer according to the counter-current principle. The sepd. oil layer is submitted to distn. to remove absorbed phenol.

Purifying and using waste oils. CHARLES A. É. POULAT. Fr. 692,325, Mar. 20, 1930. Waste oil from motors is mixed with an equal vol. of gasoline, petroleum or other fuel used. An inert powder is added to the liquid which is filtered and added to the fuel used in the proportion of about 1–3%. Anticarbon products such as PhNO, or antiknock products such as CCl_4 may be added before or after filtering.

Bituminous compositions. MARCEL BOUTIN. Fr. 692,138, June 8, 1929. A bituminous or asphaltic compn. for use as a mastic, etc., is made by mixing a bituminous, etc., emulsion with a powd. mineral substance such as a siliceous material and stabilizing the mixt. by simple heating.

Apparatus for determining the shear-resistant qualities of bituminous mixtures. HUGH W. SKIDMORE and GENE ABSON (to Chicago Paving Laboratory, Inc.). U. S. 1,789,846, Jan. 20.

Mixing apparatus for making emulsions such as those of asphalt or heavy hydrocarbon oils. MAXWELL G. GREGG (to Flintkote Co.). U. S. 1,789,897, Jan. 20. Structural features.

Apparatus for mixing materials such as ingredients of asphalt emulsions. FREDERICK C. OVERBURY (to Flintkote Co.). U. S. 1,789,320, Jan. 20. Structural features.

23—CELLULOSE AND PAPER

CARLETON E. CURRAN

Peptization and coagulation of nitro- and acetyl-cellulose. A. YA. DRINBERG. *Zhur. Prikladnoi Khim.* 3, 915–50(1930).—Peptization and coagulation of nitro- and acetyl-cellulose depend on concn., dispersing medium, degree of depolymerization of the cellulose ester and temp. V. KALICHEVSKY

The relation of temperature to viscosity of cellulose ester solutions. II. P. KARRER, E. BERL AND H. UMSTÄTTER. *Z. physik. Chem.*, Abt. A, 152, 150–2(1931). The same equation which has been found to hold for solns. of rubber is now found to hold for these ester solns. The fluidity is a function of the ln of the temp. V. F. HARRINGTON

The physical and chemical nature of nitrocellulose. A. BECK, L. CLÉMENT AND C. RIVIÈRE. *Chimie & industrie* 24, 1068–72(1930).—An acetone soln. of nitrocellulose was fractionated (1) by addn. of successive amts. of Me_2CO contg. 20% H_2O, (2) by evapn. *in vacuo*. In each case the viscosity and N content of each fraction were detd., and in each case it was found that the viscosity decreased in successive fractions, but that the N content was the same for all fractions as for the original nitrocellulose. It is concluded that nitrocellulose is chemically homogeneous but physically heterogeneous. A. PAPINEAU-COUTURE

The structure of celluloid. J. J. TRILLAT. *Compt. rend.* **191**, 654–6(1930).—The addn. of 5% camphor to a nitrocellulose film decreases the intensity of the internal x-ray diffraction rings; these completely disappear when the film contains 10–15% of camphor. At the same time, the external halo becomes more intense and its diam. decreases as the camphor content increases. The rate of decrease is rapid with the first 20% of camphor added, after which the curve slowly tends to approach the value for camphor alone. No evidence of crystn. is found in ratios of camphor to nitrocellulose as high as 3 to 1. T. suggests the formation of a camphor-nitrocellulose combination of the nature of a solvate. At higher camphor concn. the complex dissolves in excess camphor, forming a solid solution. J. G. MCNALLY

Methods for distinguishing between viscose and cuprammonium rayon. R. GEIER. *Textile Forsch.* **12**, 1–3(1930); *Chimie & industrie* **24**, 1183(1930).—Viscose is scarcely colored by direct dyes at 20°, while cuprammonium rayon is dyed deeply. Dyeing 2 min. at 20° in presence of Na_2SO_4 is sufficient to give a difference in shades satisfactory for distinguishing between the two. Viscose which has been previously treated with soda has much more affinity for the dyes, but even in this case the dyeing must be carried out considerably above 20° to give as deep shades as are obtained on cuprammonium rayon. A. PAPINEAU-COUTURE

Rayon waste and staple fiber prospects for 1931. E. W. DUTTON. *Rayon* **12**, No. 1, 22–4(1931). CHAS. E. MULLIN

Wood grinding and modern grinding apparatus. TRYGVE KITTELSEN. *Teknisk Ukeblad* **75**, 476–8(1928).—A review. C. A. ROBAK

The modern paper industry of Canada. WESSEL WAAL. *Tek. Ukeblad* **75**, 321–3 (1928).—A review. C. A. ROBAK

Oak chips from tan-works as raw material for paper. V. NERECHTSKII. *Bumazhnaya Prom.* **1929**, No. 2/3; *Zellstoff u. Papier* **9**, 835–6(1929).—Waste chips may be used for the manuf. of cellulose, but the bark, which cannot be removed after the lixiviation process, is detrimental to the properties and quality of the pulp. Oak wood contains 5–6.5% of tanning material, of which the heartwood contains 82%, the sapwood 2% and the bark 16%. By de-barking the wood and removing the sapwood before extn. and improved tannin ext. is obtained. The sapwood can then be used for the manuf. of cellulose, while a second tanning ext. can be obtained from the bark; the residue of the latter serves as fuel. Alternatively, the bark can be burned without extn., thus giving an increased yield of heat. De-barked, lixiviated waste chips give 51.3% of unbleached cellulose or 46.1% of bleached material; this corresponds to 27.7% on the original wood. The unbleached pulp may be used for the manuf. of packing papers, the price of which is lower than that of similar papers from straw cellulose The properties of such papers and of pasteboards made from waste-chip cellulose are also superior to those of corresponding materials from straw cellulose. For the economical conversion of the waste chips into paper the lixiviation and paper works should have a common steam-power plant. B. C. A.

Chinchin's sizing process (for paper). A. MARTYEMIANOV. *Zellstoff u. Papier* **9**, 838–9(1929).—Papers of different kinds were sized by the usual process, in which the necessary ingredients, pulp, filling, rosin, alumina, etc., were simultaneously mixed together before beating, and by Chinchin's method, in which softened water was used and the alumina was added 30–40 min. after admixture of the rosin milk with the other ingredients. In the latter case, 41.6–50% saving of rosin and 27–33% saving of alumina were effected. This behavior is similar to that found for the Delthirna process. The most satisfactory results were obtained by the use of a size contg. 50–4% of combined rosin. The superiority of Chinchin's process is demonstrated by a comparison of the rosin and alumina consumptions on a price basis. B. C. A.

Structure of cellulose (DAUVILLIER) **3.** Micro-stereo observations and their photographic measurement (in measuring paper) (LORENZ) **2.** Chemistry of lignin (PHILLIPS) **10.** Impregnating textiles, wood and other materials (Brit. pat. 335,247) **25.** Polysaccharide ether esters (for films, lacquers, etc.) (Brit. pat. 334,897) **10.** Apparatus for screening and filtering materials such as pulp-mill effluents (U. S. pat. 1,789,425) **1.** Degumming textile plants (Fr. pat. 692,429) **25.** Tribromoaniline and its derivatives (Fr. pat. 692,370) **24.** Synthetic materials (Fr. pat. 691,901) **18.** Solvent for carbohydrates (Fr. pat. 691,624) **28.** Apparatus for stretching thin disks of material such as viscose or cellophane after softening for making sound records (Brit. pat. 334,830) **1.** Machine for making threaded castings from celluloid or like plastic material (Ger. pat. 514,039) **1.** Cellulose compositions for making dental plates (Fr. pat. 692,400) **18.**

HUNTER, DARD: **Papermaking through Eighteen Centuries.** New York: William Edwin Rudge. 358 pp. $17.50.

Verein der Zellstoff- und Papier-Chemiker und Ingenieure. Auszüge aus der Literatur der Zellstoff- und Papierfabrikation. Edited by VEREIN D. ZELLSTOFF- U. PAPIER-CHEMIKER U.-INGENIEURE, 1929. (Covering the literature from Jan. to Dec., 1929). **1. Chem. Tl.** 194 pp. **2. Mechan. Tl.** 90 pp. **3. Patente.** Berlin: O. Elsner Verlagsges. 227 pp. M. 2.

WEIHREICH, HANS: **Wie beurteile ich Papier?** Stuttgart: Franckh'sche Verlagsbuchhandlung. 103 pp. M. 6.50.

Cellulose. GÉRARD DE BARTILLAT. Fr. 692,105, June 5, 1929. Cellulose is obtained by the action of a soln. of SO_2 or salts or solns. of salts in which SO_2 enters into combination (sulfites, bisulfites, etc.) on wood in an autoclave heated from 100° to 110° at a pressure of 20–25 atm. Catalysts such as Pb, Al or their oxides may be added to the soln.

Cellulose. SOCIÉTÉ CHIMIQUE DES USINES DU RHÔNE. Ger. 511,793, Feb. 10, 1925. Cellulose is acylated in the presence of a solvent for the end product, in a rotary cylinder of large capacity. Globes or rollers may be fitted in the cylinder to work up the viscous mass. Cf. *C. A.* **24**, 2882.

Cellulose. I. G FARBENIND. A. G. (Max Hagedorn and Georg Hingst, inventors). Ger. 511,978, Nov. 2, 1927. A moldable substratum for films, etc., consists of water-resisting cellulose derivs. having in the mol., a fatty acid residue contg. more than 10 C atoms. Cellulose stearate and cellulose acetate laurate are mentioned in the examples. Cf. *C. A.* **24**, 5156

Cellulose. VEREIN FÜR CHEMISCHE INDUSTRIE A.-G. (Karl Werner and Roland Runkel, inventors). Ger. 512,958, Apr 16, 1926. Acetylcellulose is deacidified in fibrous or curdy form by treatment with aq. alc. and pressing. The app. is described

Cellulose. CHEM. FAB. POTI & CO (Ferdinand Schoeller, inventor). Ger 514,083, Aug. 26, 1926. Lignin and other incrusting substances are removed from cellulosic materials by means of aq. solns. of chlorinated aromatic sulfonic acids, with or without hydrocarbons, alcs or ketones Thus, unbleachable sulfite cellulose may be boiled with an aq. soln. of chlorinated isopropyl-β-naphthalenesulfonic acid. Chlorinated sulfonic acids of tetrahydronaphthalene and of the anthracene or phenanthrene series may also be used.

Cellulose from cottonseed hulls. BELA DORNER U. S. 1,789,354, Jan. 20. For recovery of filamentous material from them, cottonseed hulls are sufficiently dried to render them brittle, then subjected to moist air for a time only sufficient to allow the filamentous material to reabsorb moisture without restoring any substantial moisture content to the hulls themselves, the brittle hulls are chopped up or ground into particles without disrupting the filamentous material, and the latter is sepd. and recovered, and may be used for paper manuf

Production of cellulose. HAGB. HANSEN. Norw. 45,426, Dec 31, 1928 Cellulose-contg. material together with the boiling liquid is passed continuously through a number of digesters, being subjected to boiling in each of them.

High α-cellulose fiber. GEORGE A RICHTER (to Brown Co.). U. S 1,790,170, Jan. 27. Predigested wood pulp is digested in fresh alk liquor contg Na compds such as NaOH or Na_2CO_3 and sufficient spent liquor from the digestion is mixed with spent kraft liquor to make up Na losses suffered in the kraft digesting cycle, and Na constituents are recovered from the spent mixed liquors. Cf. *C. A.* **24**, 1218.

Alkali cellulose. I. G. FARBENIND. A.-G. (Fritz Melms, inventor). Ger. 513, 203, Mar. 8, 1929. A band of cellulose is drawn through a drying chamber and an alkalizing bath; the product is then pressed between rollers, the pressure applied by the rollers being kept const by automatically adjusting the gap between them according to the thickness of the cellulose band A product of uniform compn. is thus obtained App. is shown.

Apparatus for making tubes of regenerated cellulose. KALLE & CO. A.-G. (Julius Voss and Arthur Schade, inventors). Ger. 513,241, Feb. 24, 1928, and 513,242, April 18, 1929, addn. to 513,241.

Cellulose esters. I. G. FARBENIND. A.-G. (Max Hagedorn and EugenGuhring, inventors). Ger. 514,150, Oct. 27, 1926. Cellulose esters of inorg. acids are prepd by the reaction of alkali cellulose with inorg. acid chlorides. Examples are given.

Solvents for cellulose esters. Soc. KODAK PATHÉ (SOC. ANON. FRANÇAISE). Fr. 692,051, Mar. 17, 1930. A solvent for mixed cellulose esters contg. an α-hydroxy, α-ketonic or γ-ketonic acid radical and sol. in acetone or its homologs or in a 50–70%

aq. soln. of alc., consists of a mixt. of ethylene chloride and an aliphatic monohydroxy alc. contg. 1–5 atoms of C.

Cellulose esters and ethers. I. G. FARBENIND. A.-G. (Max Hagedorn, Otto Reichert and Eugen Gühring, inventors). Ger. 511,208, May 2, 1926. Mixed cellulose esters or cellulose ether-esters are prepd. by treating a cellulose ester or a water-insol. cellulose ether contg. reactive OH groups with acid chlorides. The ester or ether is used in soln. or swollen in an org. solvent, and an acid-binding agent may be present. The treatment of cellulose esters with chlorides of higher fatty acids is disclaimed. Examples are given describing the prepn. of an acetate-phosphate, a nitrate-benzoate, and a laurate-phosphate of cellulose, and of a silicate and a phosphate of ethylcellulose. The products may be used for making filaments, films and lacquers. Cf. *C. A.* **25**, 1083.

Cellulose esters and ethers. WOLFF & CO. KOM.-GES. AUF AKTIEN and HANS SCHULZ. Ger. 511,020, Jan. 26, 1927. Addn. to 440,844. According to Ger. 440,844, cellulose esters and ethers and artificial materials made therefrom are purified and stabilized by boiling with water under pressure, after first removing gases occluded in the materials by boiling with water at atm. pressure, or by steaming, or by a vacuum treatment at atm. or raised temp. This method is now modified by omitting the preliminary treatment, the gases being removed, during the pressure treatment, by passing steam or a gas through the aq. suspension.

Cellulose ethers. I. G. FARBENIND. A.-G. (Hans Henecka and Eduard Dörr, inventors). Ger. 511,019, Oct. 11, 1927. See Brit. 321,651 (*C. A.* **24**, 2882).

Cellulose ether compositions. HORACE H. HOPKINS and JOHN B. SEGUR (to Canadian Industries, Ltd.). Can. 308,108, Jan. 27, 1931. A cellulose ether compn. comprises rosin ester, linseed oil, butyl lactate, butyl alcohol and gasoline. Cf. *C. A.* **24**, 960.

Cellulose acetate. I. G. FARBENIND. A.-G. (Hans O. Hartlein, inventor). Ger. 513,363, Dec. 3, 1927. In acetylating cellulose with the use of H_2SO_4 and $ZnCl_2$ together as catalysts, the production of a product giving turbid solns. is avoided by adding to the mixt. a little HCl or a substance yielding HCl. An example is given.

Cellulose acetate. KODAK-PATHÉ (SOC. ANON. FRANÇAISE). Fr. 692,365, Mar. 20, 1930. Cellulose acetate is made by treating cellulosic material with the vapor of Ac_2O, following which the vapor of AcOH liberated by the acetylation is maintained in contact with the material until it is acetylated. The air is preferably removed from the reaction space before commencing the reaction. The product retains the original fibrous structure and is sol. in $CHCl_3$ when the reaction is pushed to the end. Cf. *C. A.* **25**, 1082.

Cellulose acetate. SOC. DISPERSOID FRANÇAIS. Fr. 692,106, June 5, 1929. Cellulose which has been reduced to the colloidal state is acetylated in a non-solvent medium.

Furfural; saccharifying cellulose. GUSTAV GANZ. Austrian 119,956, June 15, 1930. Cellulosic materials are treated with acid in two stages, the conditions in the 2 stages favoring, resp., the production of furfural and saccharification. Thus, the first stage may comprise treatment with H_2SO_4 of 4–5% concn. under 1 atm. steam pressure, whereby the pentosans are converted into pentoses, which are extd. and worked up separately to furfural. Or the first stage may be conducted under a higher pressure, e. g., 5 atm., whereby furfural is produced directly and may be removed by steam distn. In each event, the cellulosic residue is saccharified by heating with H_2SO_4 of 0.5–1% concn. under a pressure of at least 10 atm. An example is given.

Filaments, films, etc., from cellulose derivatives. H. DREYFUS. Brit. 334,853, May 31, 1929. In the coagulation incident to their formation or as an after-treatment, products such as those formed from cellulose acetate solns. or similar cellulose esters or cellulose ethers are treated with an "organo-mineral acid" of a concn. of 20% or high (suitably 30–50% or even the pure acid in some cases) such as methyl- or ethylenesulfonic acids, 1,2- or 1,3-propanedisulfonic acid, sulfoacetic acid, sulfosuccinic acid, ethanolsulfonic acid, α-toluenesulfonic acid, benzenesulfonic acid, phenolsulfonic and disulfonic acids, sulfosalicylic acid, sulfophthalic acid, naphthalene- and naphtholsulfonic acids, dimethylphosphinic acid and nitrophenylphosphonic acid. Various solvents may be present, and after the treatment the acid is preferably removed from the material by washing with water or an alk. soln. such as NH_3 soln. The temp. of treatment may range from 0° to atm. temp. or somewhat higher, and substantial hydrolysis of cellulose esters treated is preferably avoided. Various details and examples are given, and the treatment may be applied to mixed products contg. cotton, etc.

Cellulose derivatives and products resembling cork. I. G. FARBENIND. A.-G. (Max Hagedorn, inventor). Ger. 513,061, Nov. 9, 1927. See Brit. 300,207 (*C. A.* **23**, 3573).

Waste celluloid. WILHELM SATOR. Fr. 692,012, Mar. 15, 1930. Waste celluloid is regenerated by dissolving it in acetone, adding trichloroethylene, and removing the acetone by distn., whereby the nitrocellulose is pptd. The camphor dissolved in the trichloroethylene is recovered by a steam distn.

Plastic celluloid-like masses. I. G. FARBENIND. A.-G. (Gerhard Balle and Kurt Sponsel, inventors). Ger. 512,912, June 10, 1925. Nitrocellulose, sol. methylcellulose and camphor are worked up above 16°. High-boiling, non-volatile alc. may be added.

Viscose. I. G. FARBENIND. A.-G. (Wilhelm Eller, Karl Marx, Richard Hofstadt and Karl Brodersen, inventors). Ger. 512,896, Oct. 4, 1927. Viscose is pptd. in a bath contg. sulfonic acids, H_2SO_4 and sulfates. The sulfonic acids present are obtained by sulfonating mineral oil, especially brown-coal-tar oil, with oleum or $ClHSO_3$. Examples are given. Cf. *C. A.* 24, 239.

Viscose. I. G. FARBENIND. A.-G. (Adolf Kämpf, inventor). Ger. 512,897, July 21, 1928. Viscose is spun with a mixt. of mineral acid and salts, and nitrogenous aromatic sulfonic acids in which the N is present in bridging or side chains. Examples of such acids are diphenylaminedisulfonic acid, dibenzylaminedisulfonic acid, dimethyl anilinesulfonic acid, etc.

Gear-wheel pump for forcing viscose solutions to spinning nozzles, etc. W KIMMIG and M. HÖLKEN, GES. Brit. 335,091, Oct. 26, 1929. Structural features.

Artificial silk. ALGEMEENE KUNSTZIJDE UNIE N.-V. Ger. 512,592, April 21, 1929. The $MgSO_4$ concn. in H_2SO_4 of viscose pptg. baths is maintained const. by addn of the necessary amt. of $MgCO_3$ and the equiv. amt. of H_2SO_4.

Artificial silk. FABRIQUE DE SOIE ARTIFICIELLE DE TOMASZOW. Fr. 690,795, Feb 28, 1930. Artificial silk is made by adding compds. of B such as H_3BO_3 or borax, if necessary in combination with fats or free fatty acids, alcs., invert sugar or hydrocarbons, to collodion, acetate, viscose or other starting material for making silk or to the half made products

Artificial silk bands. VEREINIGTE GLANZSTOFF-FABRIKEN A.-G. Ger. 513,376, Jan. 8, 1928. Small bands of artificial silk having a width from 8 to 20 times their thickness are prepd. by spinning aq. solns of cellulose contg. a carbonate, particularly viscose contg. Na_2CO_3, into acid pptg. baths under such conditions of delayed coagulation that hollow filaments are first produced which collapse before they are completely coagulated, with the result that their uncoagulated inner walls unite An example is given.

Artificial silk, films, etc. HENRY DREYFUS. Fr. 690,772, Feb. 27, 1930. Silk, films, etc., are made by extruding solns. of cellulose derivs., particularly the acetate into mineral acids, *e. g.*, H_2SO_4 of 30–50%, or concd. acid esters. The extrusions may first pass through the usual coagulating bath. Cf. *C. A.* 25, 1084.

Artificial filaments, films, etc. BRITISH CELANESE, LTD., R. P. ROBERTS, R. I. R. DEAN and L. W. GREGORY. Brit. 334,838, May 9, 1929. Solns. such as an acetone soln of cellulose acetate or other suitable soln. of an org. cellulose deriv. are extruded into coagulation baths consisting of strong solns. of inorg. acids such as H_2SO_4, HCl or H_3PO_4 or into solns. of acid esters of inorg. acids such as ethylsulfuric acid or mono- or di ethylphosphoric acid, or the process may be modified by effecting extrusion into any suitable coagulation bath and then conducting the products into a bath contg. an acid ester of an inorg. acid The coagulated products are preferably given an "air run" and then washed to remove acidic substances. Various examples and details of procedure are given.

Artificial filaments. ACETA G. M. B. H. Ger. 513,375, May 2, 1928. Artificial filaments are prepd. from cellulose esters or ethers with the use of aq. pptg. baths contg. salts having a swelling action on the cellulose deriv., and also colloidal substances such as molasses, sol. starch, albumins or degraded keratin. The baths may include also other salts and org. solvents or swelling agents for the cellulose deriv. Examples are given.

Washing and treating artificial silk. I. G. FARBENIND. A.-G. Fr. 692,362, Mar. 20, 1930. Spinning cakes of artificial silk are washed and treated on tubular perforated supports, alternatively or simultaneously with a sprinkling and immersion in water or treating liquids. Cf. *C. A.* 25, 1084.

Washing and treating artificial silk. I. G. FARBENIND. A.-G. Fr. 692,001, Mar. 15, 1930. Cakes of artificial silk produced on centrifugal machines are washed and treated by causing the washing and treating liquids to traverse under pressure from the interior of the cakes solidly assembled in rows on horizontal perforated tubes which may be rotatable.

Spinning pumps for artificial silk. FREDERIC MCINTYRE. Fr. 691,843, Mar. 13, 1930.

Centrifuge for spinning artificial silk. BERLIN-KARLSRUHER INDUSTRIEWERKE A.-G. Brit. 335,307, July 16, 1929.

Centrifugal spinning pot for production or treatment of artificial textile threads, etc. J. L. RUSHTON, H. HILL and D. L. PELLATT. Brit. 335,049, Sept. 11, 1929. Structural features.

Apparatus for producing artificial-silk filaments from solutions such as those of cellulose acetate by the dry-spinning method. FRANK SHEDDEN, ALBERT E. DELPH and NOEL G. BAGULEY (to Courtaulds, Ltd.). U. S. 1,790,599, Jan. 27. Various details for regulating a supply of gas for control of operating conditions are described.

Treating waste liquors from soda or sulfate pulp manufacture. E. L. RINMAN. Brit. 335,371, July 15, 1929. Waste liquors are treated with oxides or hydroxides of Ba or Sr or both, preferably mixed with those of Ca, Mg, Al, Zn or Fe, before dry distn., and neutral substances such as C powder or alk. earth carbonates may be added. The product is preferably evapd. to a non-sintered mass below 150°, crushed and then fed through a distn. furnace heated to 600–700° at one end and 200° at the other end (steam at 500° being introduced into the hotter end), and the distillate thus formed may comprise *MeOH, acetone, Me Et ketone, acetone oil, other heavy oils and H*, contaminated with mercaptans and sulfides if sulfate lyes are used. Soda may be recovered from the distn. residue, and various details of procedure are given.

Fibers from potatoes. AMELIA UBBELOHDE NÉE POPPE. Ger. 514,298, July 17, 1928. Addn. to 460,837. Ger. 460,837 describes the manuf. of fibers, *useful in making paper*, from the residual pulp obtained in extg. starch from potatoes. The pulp is heated until it gelatinizes and is then allowed to ferment at about 30° until the fibers have settled out. The fibers are then cleaned by subaqueous sifting and flotation. App. is shown. This method is now modified by gelatinizing the pulp while it is in motion, e. g., on a heated traveling band.

Separating pith and fiber of cornstalks. ELTON R. DARLING (to Cornstalk Product Co.). U. S. 1,790,001, Jan. 27. Mech. features, involving beating, cleansing and subdividing the stalks, conveying under spray lines of water to a container, sepn. and removal to a sep. container of the fiber. A paper-making pulp is obtained.

Parchment-paper stock from cornstalk pith. ELTON R. DARLING (to Cornstalk Products Co.). U. S. 1,790,002, Jan. 27. The cleansed pith is digested in water under heat and pressure to sep. the pith into fibrous and non-fibrous constituents, the fibrous constituents are filtered off, the pithy constituents are bleached, and the pith is hydrated by agitation with water at a temp. of about 57°.

Cooking cellulose. EINAR MORTERUD. Norw. 45,641, June 24, 1929. The charge of raw chips after being introduced into the digester is swelled by application of hot, or superheated, liquid, preferably water or used cooking liquor, which is afterward tapped off. The pressure in the digester is reduced before or during the following introduction of the boiling liquid.

Defibering apparatus for cellulose and similar fibrous materials. KRISTIAN HOLTER and OLAF ØVILLER. Norw. 47,301, Dec. 16, 1929.

Sorting apparatus for cellulose and mechanical wood pulp. AKTIESELSKAPET THUNES MEK. VERKSTED. Norw. 47,217, Nov. 18, 1929.

Sorting apparatus for wood pulp. JOHAN HANSEN. Norw. 46,389, April 22, 1929.

Wood pulp. DONALD E. CABLE (to Oxford Paper Co.). U. S. 1,790,260, Jan. 27. Material such as wood chips is subjected to the digestive action of a reagent such as a bisulfite soln. under an initial "pentration-boosting pressure" of a non-oxidizing gas such as N which is permanently gaseous at ordinary temp. and pressure and is not substantially absorbed in the digestive process.

Regulating the concentration of paper pulps or other substances suspended in liquids. TORSTEN KÄLLE. U. S. 1,789,386, Jan. 20. There is imparted to the material to be regulated a forward rotary movement and the moving material is constrained to actuate an impulse member (by direct impact action in the case of higher concns. and by impact action effected by a rotary movement in the case of lower concns.) and this impulse member (of an app. details of which are described) sets in operation devices by which the concn. of the material is controlled. Cf. *C. A.* 24, 1911.

Apparatus for regulating the consistency of the pulp in pulp and paper mills. OSCAR OLSSON and ØISTEIN MEIDELL. Norw. 47,282, Dec. 9, 1929. Mech. features.

Cellulose digester with direct heating. EINAR MORTERUD. Norw. 47,043, Oct. 14, 1929. A number of sep. inlets for the heating steam are placed in several levels upward along the cylindrical middle part of the vessel.

Digester for sulfite cellulose boiling with forced circulation of the liquid. EINAR MORTERUD. Norw. 47,005, Oct. 7, 1929.

Apparatus for charging cellulose digesters. T. F. CHRISTIANSEN. Norw. 46,349, April 8, 1929.

Reversible circulation of the liquor in cellulose digesters. EINAR MORTERUD. Norw. 45,642, Oct. 1, 1928. A reversible pump is installed in the interior of the digester.

Discharging cellulose digesters. EINAR MORTERUD. Norw. 45,855, Nov. 26, 1928. Mech. features.

Waste gases from cellulose digesters. METALLGESELLSCHAFT A.-G. Ger. 512,957, May 31, 1927. Addn. to 437,531. Waste gases from cellulose digesters are cooled by stages to give water, water-oil emulsion, oil and leave SO_2. The lay-out of the plant is indicated.

Apparatus for the dewatering of cellulose and mechanical wood pulp. JULIUS STEPHANSEN. Norw. 45,375 and 45,376, July 16, 1928.

Strainers for cellulose and wood pulp. SVERRE THUNE. Norw. 45,818, Nov. 12, 1928. The straining sheets are made from aluminum or an Al alloy, for instance, duralumin.

Bleaching cellulose and other fibrous materials. CARL B. THORNE. Norw. 46,572, June 10, 1929. The bleaching is carried out in towers in a continuous process, without stirring of the pulp. The concn. of the pulp is high, about 18–25%.

Treating cellulose and paper pulp in screw-presses. KRISTIAN HOLTER and OLAF QVILLER. Norw. 46,023, Jan. 21, 1929. Air, steam, water or other washing liquids are applied to the mass in the pressing app. after the mass has passed the pressing screw, in order to attain an efficient washing out of boiling liquid and bleaching liquid in connection with the pressing process. The washing liquid is introduced through the hollow shaft of the pressing screw.

Containers of cellulosic or fibrous material. DUNLOP RUBBER CO., LTD., D. F. TWISS, G. W. TROBRIDGE and W. G. GORHAM. Brit. 335,271, June 25, 1929. The containers are provided with protective coatings by treatment with rubber or similar vegetable resinous materials in the form of aq. emulsions or dispersions in admixt. with an aq. dispersion of one or more waxes, and such usual rubber compounding ingredients as are of harmless character may be added.

Paper. LOUIS P. SCHWEITZER. U. S. 1,789,452, Jan. 20. For continuously measuring and controlling the wt. per area of the paper produced, a web formed of stock contg. excess water is treated, first mechanically and then thermally, gradually to diminish its water content, and the elec. resistance of a predetd. area of the web is continuously measured, across the width of the web, at that crit. stage of treatment where the remaining water is no longer mechanically removable, in order to effect proper control of pulp concn. An arrangement of app. is described.

Paper. HANS MEYER G. M. B. H. Ger. 511,769, Jan. 3, 1929. Details are given of discharging and washing out cellulose digesters.

Paper. I. G. FARBENIND. A.-G. (Arthur Franz, inventor). Ger. 512,927, May 22, 1927. Vegetable fibers are disintegrated by a soln. contg. chlorate, $HClO_3$ and a small quantity of HCl as catalyzer. Cf. *C. A.* **25**, 1085.

Paper. PAPIERFABRIKEN IN FRIEDLAND PAUL BARTSCH KOMM.-GES. Ger. 514,331, Mar. 29, 1928. A patterned paper is manufd. by craping the moist sheet, stretching, drying and satining. The pattern formed by the craping persists.

Paper making. HERVEY G. CRAM and ROY V. WELDON (to Great Northern Paper Co.). U. S. 1,789,515, Jan. 20. Mech. features.

Paper-making apparatus. ALONZO ALDRICH. U. S. 1,790,082, Jan. 27. Structural features.

Paper-making apparatus. AUSTIN E. COFRIN. U. S. 1,790,536, Jan. 27. Structural features.

Paper-making apparatus. E. VON ASTEN. Brit. 335,376, Sept. 30, 1929. Structural features.

Apparatus employing water jets for severing torn portions of the web on a paper-making apparatus. N. A. JACOBSEN. Brit. 335,143, Jan. 25, 1929.

Suction roll for paper-making apparatus. WM. H. MILLSPAUGH (to Paper & Textile Machinery Co.). U. S. 1,789,445, Jan. 20. Structural features.

Suction box for paper, etc., machines. ERNST KRAMER. Ger. 511,163, Sept. 14, 1929.

Hollander. GERALD STRECKER and ULRICH KIRCHNER. Ger. 514,215, Nov. 15, 1928.

Producing colored designs on paper, fabric, etc. HEINRICH BONGARTZ. Ger. 511,202, Nov. 9, 1928. In the method in which colors are sprayed on to the material

from the interior of a no. of rotating cylindrical stencils, a rapidly drying cellulose soln. is used as the medium for conveying the colors.

Colored and tinted parchment paper. ROBERT I. COWEN. U. S. 1,790,367, Jan. 27. The formed paper is passed through an acid bath such as a H_2SO_4 parchmentizing bath in which "Erie fast scarlet" or other suitable dye is suspended, and the paper thus treated is subsequently passed through a water bath to dissolve and diffuse the dye deposited in the amyloid film formed upon the fiber of the paper while passing through the acid bath and to wash out any excess of acid still present. Cf. *C. A.* **25**, 206.

Waterproof paper covering for food or tobacco packages, etc. WM. L. TAYLOR. U. S. 1,789,887, Jan. 20. A covering comprises a layer of paper coated with adhesive material consisting of asphalt and having superposed on the adhesive asphalt a layer of paper surface-coated with cold unmelted paraffin.

Paper. JACQUES F. M. CROLARD (to British-American Tobacco Co., Ltd.). U. S. 1,790,574, Jan. 27. See Fr. 688,350 (*C. A.* **25**, 817).

24—EXPLOSIVES AND EXPLOSIONS

CHARLES E. MUNROE AND C. G. STORM

Consumption of explosives in December, 1930. W. W. ADAMS AND L. S. GERRY. Bur. Mines, *Rept. of Investigations* **3087**, 10 pp. (1931); cf. *C. A.* **25**, 1086. A. H. E.

Some experiments on certain accessory components of smokeless powders. MICHELE GIUA AND GIOVANNI RACCIU. *Atti accad. sci. Torino* **65**, 205–12(1930).—The action of oxides of N on 3 com. petrolatums was studied to find any possible relation between such action and the action of petrolatum as a stabilizer of smokeless powders. Petrolatum samples showing higher Br_2 absorption (over 0.04 g. Br_2/g. petrolatum) fixed more N as oxides (N_2O_3, N_2O_4, N_2O_5 were studied). A. W. CONTIERI

The detonation of solid explosives. P. LAFFITTE AND M. PATRY. *Compt. rend.* 191, 1335–7(1930).—With the addn. of an arc lamp to the arrangement previously described (*C. A.* **20**, 1324) a photographic study was made of the luminous phenomena of detonation of Hg fulminate, dynamite, picric acid, tetryl, etc., in a glass tube. To avoid optical interference of the glass walls of the tube, the tube was placed between 2 steel plates with horizontal openings 1 mm. high. These openings were in the same horizontal plane as the tube axis. On explosion the glass becomes partially or completely opaque, a non-luminous compression wave or shock wave is propagated in the air at the same time that the luminous gases are thrown forward. These 2 phenomena are distinct, that of the gas ending much more rapidly than the shock wave.
M. McMAHON

Manufacture of trinitrotoluene. A. A. TOPP. *Proc. Soc. Chem. Ind. Victoria* **30**, 385–411(1930).—The process and equipment at Maribyrnong are described.
E. M. SYMMES

New method for the preparation of tetryl. LOUIS DESVERGNES. *Chimie & industrie* **24**, 1304–16(1930); cf. *C. A.* **25**, 207. A. PAPINEAU-COUTURE

Propagation of combustion in hydrocarbon mixtures. M. AUBERT AND R. DUCHÊNE. *Ann. combustibles liquides* **5**, 737–9(1930).—See *C. A.* **24**, 5160. E. SCHOTTE

Technical safety questions in C_2H_2 welding (SAUERBREI) **9**. Making dangerous gases in sewers harmless (KARSTEN) **14**.

STELLINGWERF, G.: **Le Mine. L'impiego pratico degli esplosivi e il modo di calcolare e far brillare ad uso dei tecnici, civili e militari, costruttori, esercenti di cave e miniere.** Milan: Ulrico Hoepli. L. 16.

Explosives. DYNAMIT-A.-G. VORM. ALFRED NOBEL & Co. Ger. 513,397, Dec. 22, 1926. Gelatinous explosives and gelatinized smokeless powders are prepd. by gelatinizing with nitrocellulose the explosive oils obtained by nitrating a soln. of sorbitol in glycerol, glycol or like alc. The usual addns. may be included. Thus, a dynamite may comprise explosive oil (as above) 62, nitrocellulose 3, wood meal 8 and $NaNO_3$ 27%. Cf. *C. A.* **24**, 6020.

Treatment of nitrocellulose smokeless powder. EDGAR H. NOLLAU and JULIUS M. R. LINHART (to Canadian Industries, Ltd.). Can. 308,109, Jan. 27, 1931. Nitrocellulose smokeless powder is treated with a liquid soln. rich in aliphatic nitrocellulose solvent as a softening agent and contg. a nitrocellulose non-solvent as a gelatinization-

preventing agent, *e. g.*, ethyl acetate, alc. and water. The treated powder can be quickly dissolved in suitable solvents and may be used for making solns. and jellies used in the manuf. of artificial leather.

Tribromoaniline and its derivatives. HENRY DREYFUS. Fr. 692,370, Mar. 20, 1930. 2,4,6-Tribromoaniline is purified by sublimation at 160–65°, and the purified product may be acylated with Ac_2O or AcCl. The acyl derivs. are used for diminishing the inflammability of compns. having a basis of a cellulose deriv.

Nitroglycerin. ROBERT EVERS. Ger. 513,396, Aug. 19, 1927. Nitrating acid falls freely onto glycerol flowing in a thin sheet under pressure over a spherical surface, with the result that droplets of glycerol are entrained by the acid, the mixt. passing through a cooling coil fitted with mixing devices. App. is shown.

Pyrotechnic "salute." CHARLES SCARDONE. U. S. 1,789,372, Jan. 20. The casing of a salute is formed, of approx. spherical shape, from a solid block of material such as wood excavated to form an explosive chamber, and provided with a permanently secured closure.

25—DYES AND TEXTILE CHEMISTRY

L. A. OLNEY

General process for the application of synthetic indigo in China. N. S. WONG LING. *Dyestuffs* **31**, 177–85(1930). CHAS. E. MULLIN

Nitroso colors. M. F. POZDIEV. *Izvestiya Tekstilnoi Prom. i Torgovli* **9**, No. 4–5, 86–8(1930); *Chimie & industrie* **24**, 1410(1930).—From the results of a study of the optimum conditions for the production of Fe lakes, P. concludes that it is best to start from $FeSO_4$ rather than other Fe^{++} salts and to use 1 mol. for 5 mol. nitroso-β-naphthol, which would indicate that the Fe combines in the lake in the Fe^{+++} state. Steaming is best carried out for 3–5 min at 103–5° in the case of fabrics dyed with vat dyes, *i. e.*, in a reducing atm. As it was found that when the nitroso color was printed on naphtholated goods a better yield was obtained than on a white ground, P. deduced that this improvement was due mainly to the fat in the naphthol bath, or in other words, to the formation of a triple Fe-nitroso-fat lake. He finally adopted the following formula: nitroso paste (=10.7% β-naphthol) 300, 38° Bé. $NaHSO_3$ 65, solvent salt B 15, neutral thickener 500, 28% $FeSO_4$ 70, vaseline oil 40 g. A. PAPINEAU-COUTURE

Process for the rapid fixation of chrome colors. V. BORISOV AND N. SOKOLOV. *Izvestiya Tekstilnoi Prom. i Torgovli* **9**, No. 3, 101(1930); *Chimie & industrie* **24**, 948.—After numerous lab. and com. expts., the following mordant was developed for the fixation of chrome colors by a short steaming treatment: dissolve 250 g. $Na_2Cr_2O_7$ in 550 cc. hot water and gradually add 200 g. glycerol; the originally yellow soln. gradually darkens and finally becomes dark green, at which point the mordant is ready for use. Two examples of formulas are given: (1) alizarin blue S 100, dissolved in water 200, T thickener 600, mordant 30, water to 1000; (2) seed ext. 100, boiling water 200, brilliant green 10, MeOH 50, T thickener 600, mordant 20, water to 1000. The formula of the T thickener is: corn starch 1200, 18° Bé. HCl 5, oleic acid 25, castor oil 10, water to 10,000. The goods are steamed 4 min. at 100–2° with low-pressure steam and washed with hot water. The fastness of the shades is as good as that obtained in the usual way. A. PAPINEAU-COUTURE

Preparation of quick-drying wood stains. R. J. TODD. *Dyestuffs* **31**, 152(1930).—From 4 to 6 oz. of suggested dyestuffs are heated on the water bath with 15 to 25 oz. of either ethylene glycol or diethylene glycol until soln. is complete, and this is diluted to 1 gal. with synthetic MeOH. These stains do not raise the grain of the wood. CHAS. E. MULLIN

Aniline black in the printing of naphtholated goods. B. A. RAZUNOV AND M. F. CHMEKEV. *Izvestiya Tekstilnoi Prom. i Torgovli* **9**, No. 1–2, 145–6(1930); *Chimie & industrie* **24**, 944.—Aniline black for printing on naphtholated goods has the following compn.: paramine 3, aniline 60, 18° Bé. HCl 95, thickener (starch, gum tragacanth) 520, $NaClO_3$ 40, H_2O 42, $K_4Fe(CN)_6$ 240. In com. work this formula gave slight brownish shades, particularly with very finely engraved designs; this defect, which could not be observed in the lab. tests, was overcome by increasing the amt. of 18° Bé. HCl to 115 g., so that sufficient acid is supplied to all points of the printed fabric completely to neutralize the naphtholate. This black can be roll-printed on naphtholated goods on reserves prepd. with basic dyes and thickened diazo salts; it does not soil the roll and does not corrode the scrapers. The strength of the fabric is the same as when printed with aniline in the usual way. A. PAPINEAU-COUTURE

Control of the operation of quick-steaming apparatus for aniline black. P. P. SAZANOV AND N. N. PETROVA. *Izvestiya Tekstilnoi Prom. i Torgovli* 9, No. 1–2, 127–35(1930); *Chimie & industrie* 24, 942.—A careful analysis of the operation of the app. shows the necessity of providing a suitable humidifying system in advance of the steaming app. proper to counteract the heating of the goods during the reaction. The chief factors to be taken into consideration are: the formation of aniline black is an exothermic reaction, max. evolution of heat occurs around 75–80°, oxidation of aniline black takes place rapidly, and all the more so that the acidity of the bath is higher. The steaming app. should be constructed so that the prepd. goods can be introduced in a short time, sufficient to start the reaction, and so that they can be taken out at the time of max. evolution of heat to cool them somewhat; a humidifying chamber should also be provided to regulate the temp. and moisture content of the goods. It is also advisable to make periodical analyses of the atm. of the app. and of the condensation products formed. A. PAPINEAU-COUTURE

Bismark brown in aniline-black dyeing. I. FEIGUIN. *Izvestiya Tekstilnoi Prom. i Torgovli* 9, No. 1–2, 155(1930); *Chimie & industrie* 24, 943.—Use of Bismark brown catalyzes the production of aniline black, enabling the production of better and deeper shades, entirely out of proportion with the small quantity of Bismarck brown used and with an increase of 8–18% in the tensile strength of the fabric. A. P.-C.

Sulfur black. HARRY FISCHER. *Dyestuffs* 31, 149–51(1930).—The properties and application of sulfur blacks are considered and formulas suggested for the standing bath. CHAS. E. MULLIN

Influence of the halogens on the color of azo dyes. The spectral absorption of certain mono-azo dyestuffs. DUNCAN GRAHAM FOSTER. *J. Am. Chem. Soc.* 53, 654–60(1931).—A series of dyes, made by coupling diazotized *o*-, *m*- and *p*-Cl, Br and I derivs. of $PhNH_2$ with R salt were prepd. and their spectral absorptions in H_2O were compared with those of the halogen-free dye. The results show no simple relationship between the dyes attributable to variations in mol. wt. but a complicated effect distributed in different portions of the spectrum. The effect of position isomerism is for the most part the same as that observed by other workers. The chief absorption bands appear to be composed of 2 or more constituent bands. These have in 1 instance been calcd. The results are given as curves. C. J. WEST

Latest developments in the dyeing of insoluble azo colors. R. W. MARSSON. *Proc. Am. Assoc. Textile Chem. Colorists* 1931, 33–9; *Am. Dyestuff Reptr.* 20, 43–9(1931).—The following topics are discussed: the substantivity of the naphthols of the AS range; substantive naphthols in padding; proper rewetting in the coupling bath of material that has been dried after impregnation; dead cotton in naphthol dyeing; exhaustion of naphthol by use of common salt; the influence of formaldehyde in naphthol solns. and on naphtholated material; alkali-binding agents and their influence on the stability of diazo solns. in dyeing. MILTON HARRIS

The development of rayon dyestuffs. II. Viscose rayon dyes. R. BRIGHTMAN. *Ind. Chemist* 7, 3–4(1931); cf. *C. A.* 25, 595. E. H.

The action of diazonium salts on silk. P. SISLEY, A. SIMONNET AND J. P. SISLEY. *Bull. soc. chim.* [4], 47, 1389–94(1930); cf. *C. A.* 22, 1857, 4515.—The diazotized solns. of bases of the following types, when neutralized or used in the presence of AcONa in a cold bath for 30 min., give yellow, orange-yellow, or brown-yellow colors on silk: mono- and dichloroaniline, nitroaniline, nitrochloroaniline, chloro- and nitroanisidine, chloro- and nitrotoluidine, thioaniline, acetyl-*p*-phenylenediamine and dianisidine. Some of these amines give colors of industrial importance on account of their stability to scouring and bleaching. The following aminoazo compds. when diazotized couple with silk to yield interesting colors: aminoazobenzene and diethoxy, dimethoxy and ethoxymethoxy derivs., aminoazotoluene and aminobenzeneazo-*p*-aminotoluene. The silk, in addn. to the dye formed by coupling with the fiber, holds a certain amt. of the noncoupled diazo compd. which, on boiling with soap, forms a hydroxy deriv. which in turn couples with the unchanged diazo compd. to give a complex absorbed on the silk. Thus, when silk dyed with diazotized primuline is soap-boiled, a fast yellow is obtained, since the diazo compd of primuline is stable and it is the azofibroinazoprimuline dye which predominates. To study the coupling of *p*-nitrodiazobenzene (I) with fibroin, silk was treated with a cold soln. of I (neutralized by $CaCO_3$ or treated with AcONa) for 2 hrs., after which time there was no deepening of shade. Titration showed the coupling of an amt. of I corresponding to a silk content of 5.4% tyrosine. Tyrosine gives a yellow dye with I. Silk dyed with I, soap-boiled and rinsed, when reduced with $Na_2S_2O_4$ gave *p*-$H_2NC_6H_4NH_2$. Dyed with diazotized *o*-$O_2NC_6H_4NH_2$ and similarly treated, silk yielded *o*-$H_2NC_6H_4NH_2$ (cf. *C. A.* 23, 1134). The presence of the NO_2 group in silk dyed with diazo-

tized *o*-, *p*- or *m*-$O_2NC_6H_4NH_2$, or *p*-nitro-*o*-anisidine was shown by reduction with Na_2S. The resulting NH_2 group permitted the fiber to be diazotized and coupled with α-$C_{10}H_7NH_2$ and with β-$C_{10}H_7ONa$, giving violet-black and vivid red colors, resp. The azo dyes formed by coupling a diazo compd. with the tyrosine group of fibroin are comparable, in shade and reactions, with dyes such as *p*-nitrobenzeneazo-*p*-cresol, the difference in fastness to scouring being attributable to the large protein mol. C. R. ADDINALL

Dyeing processes for artificial silks and for several important artificial silk combinations. W. E. v. GRONOW. *Kunststoffe* **20**, 275–7(1930).—A review of the classes of dyes suitable for use with various kinds of artificial silks and their combinations with other fibers, including detailed directions for a no. of special cases. I. H. ODELL

Dyeing of wool and silk mixed fabrics. E. H. STAAB. *Dyestuffs* **31**, 145–8, 158–60 (1930).—Dyestuffs, formulas and methods are suggested. CHAS. E. MULLIN

The fastness of khaki-colored sulfur dyeing as a function of the preliminary treatment of the fabrics. A. Y. ITKIN. *Niti* (*Suppl. to Izvestiya Tekstilnoi Prom. i Torgovli*) **1**, No 3, 12–5(1930); *Chimie & industrie* **24**, 924. Comparative tests carried out on samples taken at various stages of the mfg. process and also on lab.-prepd. samples showed that, while the preliminary operations (removal of the sizing and fats) facilitate the penetration of the dye, they have no effect on the fastness. A. P.-C.

Effect of the valence of electrolytes in substantive dyeing. P. P. VIKTOROV AND A. A. LEBEDEV. *Izvestiya Tekstilnoi Prom. i Torgovli* **9**, No 1–2, 121–7(1930); *Chimie & industrie* **24**, 943.—The action of electrolytes toward substantive dyes increases according to the valence of their cations, increasing from univalent to tervalent cations, which confirms the law of valences according to which the coagulating power of an electrolyte increases with the valence. Expts. show that, in spite of the higher degree of dissocn. of univalent electrolytes, their coagulating action is lower than that of tervalent electrolytes, indicating that valence as well as degree of dissocn. affects the coagulation of the dye. In printing with direct dyes, the fiber takes up 10 times as much color in the presence of univalent electrolytes as in the absence of electrolytes, and 30% more in the presence of tervalent than in presence of univalent electrolytes. A. P.-C.

"Shibori" and "Kasuri" (dyeing in Japan). N. TAKATA. *Dyestuffs* **31**, 153–5 (1930).—Shibori is indigo-dyed by the tied-and dyed system to give white resists. Kasuri is cloth woven from indigo-dyed yarn in which both warp and weft has been tied and dyed to give resisted patterns in the woven goods. General instructions are given. CHAS. E. MULLIN

Screen printing on textiles. LLOYD H. WINNELL. *Dyestuffs* **31**, 165–73(1930). Method and formulas are given CHAS. E. MULLIN

Marking-off and bleeding of vat-dyed colored-effect cotton goods in kier boiling. CHAS. E. MULLIN. *Melliand* **2**, 88–9(1930). The marking-off and bleeding of vat dyed colored-effects in cotton piece goods in kier boiling may be caused by the presence of O in the kier, which forms oxidized cellulose very readily in the alk. kier liquor at high temps. It has been proved that oxidized cellulose has reducing properties and that it will reduce vat dyes, such as flavanthrene, etc. CHAS. E. MULLIN

Padding—its limitations and possibilities. E. W. PIERCE. *Proc. Am. Assoc. Textile Chem. Colorists* **1931**, 45–8; *Am. Dyestuff Reptr* **20**, 55–8(1931).—Padding in general is recommended on account of its great uniformity and production; the results compare favorably with any other method of coloring. Goods which cannot be penetrated by either piece dye or jig dyeing may be colored through on a padder. Delicate fabrics, such as voiles, chiffons, and various goods made of rayon are not subjected to the wear and tear of the other processes and its possibilities are not yet exhausted. MILTON HARRIS

Washing-fastness tests. HUGH CHRISTISON. *Proc. Am. Assoc. Textile Chem. Colorists* **1931**, 55–7; *Am. Dyestuff Reptr.* **20**, 77–9(1931).—Test 1: Treat with 5 g. 88% dry soap per l., 2 g. dry Na_2CO_3 per l. 8 hrs. in the Launderometer at 120° F. Test 2: Use the same soln. 2 hrs. Test 3: Treat with 5 g. 88% dry soap per l. 2 hrs. Test 4: Use 5 g. 88% dry soap per l. for 0.5 hr. MILTON HARRIS

Fastness of dyes to perspiration. C. C. N. VASS. *J. Soc. Dyers & Colourists* **47**, 9–10(1931); cf. *C. A.* **24**, 4637. ROBERT HOUGHTON

Abnormal fading. WM. H. CADY. *Proc. Am. Assoc. Textile Chem. Colorists* **1931**, 39–42; *Am. Dyestuff Reptr.* **20**, 49–52(1931).—The action of light on various dyestuffs is discussed. MILTON HARRIS

Textile conditions, processes and products in Europe. CHAS. E. MULLIN. *Textile Colorist* **53**, 13–6; *Am. Dyestuff Reptr.* **20**, 17–9; *Melliand* **2**, 1329–31(1931).—European textile conditions and the dyeing and finishing processes and equipment are compared with the American processes, conditions, and app. CHAS. E MULLIN

Mineral oil sulfonates applied to textiles. B L. HATHORNE. *Proc. Am. Assoc. Textile Chem. Colorists* **1931**, 25–30; *Am. Dyestuff Reptr.* **20**, 35–40(1931).—Mineral oil sulfonates are extremely stable, even under conditions that completely destroy sulfonated animal and vegetable products. They are sol. in water and in mineral oils, vegetable oils, fats, waxes and org. solvents. Emulsifying properties exceed those of soap and sulfonated castor oil. They will stand up in the presence of weak acids or alkalies, are very resistant to hard water, since they do not form insol. lime and Mg salts as rapidly as do soap and sulfonated castor oil. MILTON HARRIS

Hard industrial water in the textile industry. M. MÜNCH. *Z. ges. Textil-Ind.* **33**, 664–6, 678–9(1930).—An illustrated description is given of the harmful action of lime soaps on textiles, and their possible emulsification by the use of such sol. oils as "Intrasol" in dyeing and rinsing operations. H. F. LEUPOLD

Starch products in textile finishing. IRA L. GRIFFIN. *Proc. Am. Assoc. Textile Chem Colorists* **1931**, 49–52; *Am. Dyestuff Reptr.* **20**, 71–4(1931).—A discussion of various starches including their origin, properties and application to textiles. M. H.

Trisodium phosphate, its manufacture and [illegible]

[illegible] of Na_3PO_4 from H_3PO_4, Na_2CO_3 and NaOH takes place in two steps: (*a*) the formation of Na_2HPO_4 and (*b*) the causticizing of Na_2HPO_4 with NaOH. It is used in boiling-off cotton goods or raw stock, wool scouring on raw stock piece goods, rayon scouring and in dye baths where the water contains Ca and Mg hardness. MILTON HARRIS

Detection of active chlorine or active oxygen in textiles. K. SCHWARZE. *Z. angew. Chem.* **44**, 44(1931). —Moisten the fabric with dil. mineral acid, place KI-starch paper on both sides and two clean glass plates on the other side of each piece of paper and place in a press. If Cl_2 is present the paper will turn blue A similar procedure will serve to detect traces of acid or base in cloth; water to wet the goods and suitable indicator papers are used. W. T. H.

Study of the structure of vegetable fibers by solution in concentrated sulfuric acid. A. I. ZAKOCHTCHIKOV. *Izvestiya Tekstilnoi Prom i Torgovli* **9**, No. 1–2, 137–40(1930); *Chimie & industrie* **24**, 944. —If a drop of 65.5° -Bé. H_2SO_4 is added to a vegetable fiber on a microscope slide, the fiber dissolves before the phenomenon can be followed under the microscope but if a drop of glycerol is added after the H_2SO_4 the soln. phenomenon is stopped and can be studied under the microscope at any desired stage. Z. first observed this with flax, and noted that the solvent action of H_2SO_4 is not uniform: certain portions are destroyed first, revealing clearly defined membranes similar to 2 adhering sheets. The regular arrangement of these membranes indicates that they form part of a definite structure of the fiber, with a different chem. compn. as they are more resistant to the action of H_2SO_4. Hemp, "kendyr," "kenaf" and ramie also have these membranes. Washing with Cl water, or even better with a soln. contg. 10 parts $ZnCl_2$ and 1 part KI, after addn. of glycerol brings out the morphological characteristics more clearly, the portions attacked by H_2SO_4 becoming bluish black. With cotton, the membranes show up only after addn. of the $ZnCl_2$ KI soln and of lactic acid. A. PAPINEAU-COUTURE

Chemical composition and mechanical properties of "kenaf" fiber as a function of watering of the plants. V. T. IVANOVA. *Izvestiya Tekstilnoi Prom. i Torgovli* **9**, No. 1–2, 140–4(1930); *Chimie & industrie* **24**, 944.—In southern U. S. S. R., where the cultivation of "kenaf" has been undertaken on a large scale, drought is frequent. Systematic artificial watering results in a higher yield of stronger fiber, increases the cellulose, lignin, fat and resin contents of the fiber, and reduces its moisture and ash contents. A. PAPINEAU-COUTURE

Effect of moisture on the strength and elongation of yarn. P. D. ERMOLENKO *Izvestiya Tekstilnoi Prom. i Torgovli* **9**, No. 3, 39–44(1930); *Chimie & industrie* **24**, 945. —Yarn tested at a relative humidity of 60–80% was 11–51% stronger and had 8–42% greater elongation than dry yarn tested in an absolutely dry atm. A. P.-C.

Micelle structure of the wool fiber. J. B. SPEAKMAN. *Nature* **126**, 565(1930).—Existence of micelles within the wool fiber were proved by swelling and adsorption studies and by the action of Na_2S on wool. It was deduced that the micelles are lamellar in shape H. H. MOSHER

Effects of water treatments and steam treatments on the hygroscopic properties of wool fibers. N. A. ARKHANGELSKII. *Niti* (*Suppl. to Izvestiya Tekstilnoi Prom. i Torgovli*) **1**, No. 3, 11–8(1930); *Chimie & industrie* **24**, 947.—Wool treated with water and with steam and untreated wool were conditioned 2 weeks in an atm. at 60% relative humidity and then dried to const. wt. at 102–9°. While the results obtained so far are

insufficient to draw definite conclusions, they indicate that, after conditioning, the water-treated wool contained a little more moisture and the steam-treated wool a little less moisture than the untreated wool. A. PAPINEAU-COUTURE

The oiling of wool fibers with aqueous emulsions of fats. LOUIS MEUNIER AND JACQUES CORBIÈRE. *Compt. rend.* **191**, 661–3(1930).—Adsorption by wool fibers from emulsions of olive oil stabilized by NH_4 oleate was studied. Oil particles less than 1μ in diam. were not adsorbed. Particles of 2μ were adsorbed in the greatest no., but the largest mass of the adsorbed oil was accounted for by a comparatively small no. of 8–11μ droplets. When the soap content of the emulsion amounts to 15% of the oil, the amt. of adsorbed oil decreases because of the increased stability of the emulsion. The compn of the adsorbed material is identical with the material in the emulsion when the oleic acid concn. is below 6.5%. Above this proportion, oleic acid is preferentially adsorbed. Wool shows a rapid increase in oil adsorptions between p_H 4.5 and 3 and a slower increase between 3 and 1. Swelling of the wool was at a min. at p_H 4.5. Above this p_H the proportion of oleic acid in the adsorbed layer also increased. J. G. MCNALLY

Action of sodium sulfide on wool. J. B. SPEAKMAN. *J. Soc. Chem. Ind.* **50**, 1–7T (1931).—Microscopically, it was shown that wool cuticle is far more resistant to Na_2S than the cortex, and that the reagent produces dimensional changes. Chemically, it was proved that the reaction between wool and Na_2S is partially reversible and undergoes rapid acceleration by increases in the concn. of the soln. and time Neither the elastic phase nor the hygroscopic properties of wool partially destroyed by Na_2S were influenced by the reaction, though the permanent set produced by steaming was eliminated. The nature of this set suggests that the disulfide group in wool is masked by an anhydride group, and the action of wool treated with Na_2S toward water, forces the conclusion that the micelles of the wool fiber are lamellae, which are attacked and eaten away at the edges, leaving the ratio of surface to mass unaltered. It is also suggested that the disulfide linkage in wool is the point of attack by Na_2S, and lies in a plane that makes an angle with the main face of the micelles. H. H. MOSHER

The utilization of reindeer wool. V. N. PETELINA. *Niti* (*Suppl. to Izvestiya Tekstilnoi Prom. i Torgovli*) **1**, No. 3, 18–9(1930); *Chimie & industrie* **24**, 946.—To obtain a general idea of the compn. of a sample obtained from a female reindeer from the Island of Jamala, Ouralsk province, 4 g. was gathered into a bundle, washed with Et_2O and sepd. mechanically into down (55.81%, 13.5–44 mm. long), live hair (1.26%, 22–40 mm long), shives ("arête") (0.33%, 8–22 mm. long), and dead hair (42.6%, 23–40 mm. long) The thickness of the down (the only portion which might be of com interest) detd. on 100 samples was 0.013 mm., with a variability, calcd. from Sommer's formula, of 14.51%
A. PAPINEAU-COUTURE

Cooking flax yarn with sodium oxalate. G. A. KORZHENIOVSKII. *Niti* (*Suppl to Izvestiya Tekstilnoi Prom. i Torgovli*) **1**, No. 3, 15(1930); *Chimie & industrie* **24**, 946.—Comparison of the boiling of flax with H_2O, Na_2CO_3 and $Na_2C_2O_4$ showed that $Na_2C_2O_4$ does not effect as complete purification of the fibers as Na_2CO_3, that the oxidizable substances are eliminated as easily by Na_2CO_3 as by $Na_2C_2O_4$, that the loss in wt. is much greater with Na_2CO_3, and that bleaching is much more rapid after boiling with $Na_2C_2O_4$. A. PAPINEAU-COUTURE

Experiments on the application of neutral salts to the cottonization of flax. A. P. ZAKOCHTCHIKOV, I. A. KOHYENIOV AND E. YKIOUCHKIN. *Izvestiya Tekstilnoi Prom i Torgovli* **9**, No. 3, 91–5(1930); *Chimie & industrie* **24**, 949.—The action of $(NH_4)_2C_2O_4$ as pectin solvent has long been known, and expts. on flax gave very good results. $Na_2C_2O_4$ behaves similarly, but not free $H_2C_2O_4$ The specific action of neutral alkali salts of $H_2C_2O_4$, which is not shown by other alkali metal salts, *e. g.*, NaCl, is explained as follows: whereas the Ca-Mg salt of anhydroarabinogalactosemethoxytetragalacturonic acid, which constitutes pectin, is insol., its Na salt is sol. in H_2O, and in this form it can be easily removed from flax. This salt is produced by double decompn., and at the same time CaC_2O_4 ppts. out, as shown by the turbidity of the bath. The accuracy of this hypothesis is also shown by the fact that the neutral alkali salts of acids giving difficultly sol. Ca or Mg salts can also be used for cottonizing flax: *e. g.*, NH_4F, $Na_2B_4O_7$, Na_2CO_3, but the best yields are obtained with Na or NH_4 oxalates. A. P.-C.

The problem of the cottonization (of flax). A. A. AKSIPETROV AND G. N. RIOUMIN. *Izvestiya Tekstilnoi Prom. i Torgovli* **9**, No. 3, 89–91(1930); *Chimie & industrie* **24**, 948 **The following process is recommended: the previously moistened flax is steamed 2 hrs at 120–50°, washed thoroughly, and centrifuged. This removes most of the pectin compds., and the fiber is easily carded. The phenomenon consists of an acid hydrolysis as the liquid draining from the centrifuge is acid, and also the distillate collected during the steaming.** A. PAPINEAU-COUTURE

Effect of certain methods of cottonizing on the quality of the product obtained. B. M. LOTAREV. *Niti (Suppl. to Izvestiya Tekstilnoi Prom. i Torgovli)* **1**, No. 1–2, 17–8(1930); *Chimie & industrie* **24**, 942–3.—There are 3 processes for cottonizing flax fibers: cooking with NaOH, oxidizing with hypochlorite, mercerizing. Comparison of the 3 processes showed that the greatest sepn. of the fibers is obtained by mercerizing, followed in order by alk. cooking and oxidation with hypochlorite. None of the processes appreciably weakens the fibers. A. PAPINEAU-COUTURE

Observations on Aspergillus on cotton. V. A. KUTIEICHTCHIKOV. *Izvestiya Tekstilnoi Prom. i Torgovli* **9**, No. 3, 57–60(1930); *Chimie & industrie* **24**, 945–6.—Mech. operations such as spinning and weaving do not eliminate *Aspergillus* from cotton, nor does sizing because the heating to which the cotton is subjected during sizing is insufficient. The acid and alk. treatments generally used are not sufficiently drastic completely to eliminate the fungus, the only one of the usual chem. treatments which is really efficient for the purpose being the boiling under pressure with NaOH.
A. PAPINEAU-COUTURE

The rayons and acetate silk. CHAS. E. MULLIN. *Textile Colorist* **52**, 17–20, 93–5 (1930).—A review of some of the developments in this industry, as well as in dyeing, finishing, and handling the synthetic yarns. CHAS. E. MULLIN

The process of silk soaking. FOSTER D. SNELL AND CYRIL S. KIMBALL. *Proc. Am Assoc. Textile Chem. Colorists* **1931**, 57–9; *Am. Dyestuff Reptr.* **20**, 79–81(1931).—The alkali content of the soaking bath should be kept low, depending mainly on absorption of the oil and water for softening effect. If the soap content is low, the formation of the alkali sericin compd. will be at a minimum. MILTON HARRIS

Uniformity of singeing. Heat treatment and its effect on the processing of textile fabrics. JOHN T. TRAVIS. *Am. Dyestuff Reptr.* **20**, 33–4, 61–3(1931).—The normal moisture content of the yarn or cloth should be eliminated before singeing, as disintegration and combustion, to at least some extent, may result with loss of tensile strength in the individual fibers. Oxycellulose developed without any change in the C content of the fiber will result in a higher luster and a greater affinity for dyestuffs. Uniformity and effectiveness of heat treatment in preparatory work are without doubt essential features in fabric processing. MILTON HARRIS

Seraceta. C. P. ATKINSON. *J. Soc. Dyers Colourists* **47**, 5–7(1931).—Seraceta acetate warp yarns are usually heavily sized with gelatin; its removal is essential. The ideal method is: Soak in cold water a short time, jig treat in water, raising the temp. to 80°. Pad with "Courtauld's Desizing Compound" ($4^1/_2$ lb. Monopole Soap No. 1, 4 pints NaOH 40° Tw., $2^3/_4$ pints xylene). Let stand overnight, scour regularly and prop. The tables show the effect of p_H on delustering and of soaps and of soap-phenol mixed solns. on degumming and delustering and on phys. and dyeing properties of Seraceta and of silk. Various crepeing conditions are mentioned. The properties of Opaceta are described. A. K. JOHNSON

New bleaching process. A. P. ORANSKII. *Izvestiya Tekstilnoi Prom. i Torgovli* **9**, No. 1–2, 136–7(1930); *Chimie & industrie* **24**, 943–4.—The process is carried out as follows: the fabric is impregnated on the jigger with a 0.5°-Bé. NaOH soln., placed in a Thies boiler where it is heated 1 hr. at 85° with circulation of the liquor, washed in the boiler first with hot and then with cold water; after a light souring, the goods are treated for 40 min. at 35° with hypochlorite soln. contg. 1 g. available Cl per l., washed, acidified with 0.3% H_2SO_4 at 20° for 20 min., washed twice and dried. By working carefully the goods are of as good quality as those bleached in the usual manner, except that they contain more oxycellulose because of the higher concn. of hypochlorite used. The process has been adopted by the largest dyeing and printing works in the U. S. S. R. (formerly Emile Zundel). A. PAPINEAU-COUTURE

Continuous bleaching process. N. V. FILIPPOV AND B. S. VORONKOV. *Izvestiya Tekstilnoi Prom. i Torgovli* **9**, No. 1–2, 135(1930); *Chimie & industrie* **24**, 943.—In the proposed bleaching process the usual souring and boiling operations (which require 6–12 hrs.) are replaced by a relatively short (30–40 min.) treatment in open tanks with 3–4°-Bé. NaOH contg. a wetting agent (soap, Na sulforicinate or ricinate, etc.) and alkali metal salts (Na silicate, Na and K sulfites, etc.); the goods are washed first with hot and then with cold water, and the bleaching is continued as usual by passing for 30 min. in a 0.2–0.5°-Bé. Ca hypochlorite soln., washing, acidifying, washing and drying. The strength and other properties of fabrics treated in this way are practically the same as when bleached in the usual way. A. PAPINEAU-COUTURE

"Bleach killing" of furs. JOSEPH CASPE. *J. Tech. Assoc. Fur Ind.* **1**, 161–7 (1930); *cf. C. A.* **24**, 3906.—Expts. were carried out to det. the effects of varying concns. of NH_4OH and H_2O_2 on the rate of protein hydrolysis in the raw skins and hair of Aus-

tralian rabbit, by the same method as in the previous work. The amt. of H_2O_2 consumed was also detd. On skin and hair together, treated for 2 hrs. at 25°, increasing the concn. of H_2O_2 to 1.5% caused the protein hydrolyzed to increase gradually to 5%; further increase in H_2O_2 to 3% gave no further effect. With the same treatment of hair alone, a plateau was reached at 1.875% H_2O_2, with hydrolysis values 60% higher than in the case of hair with skin; this indicates that the main action is on the hair. Increasing the time of treatment to 6 hrs. gave only slight increases in percent of hydrolysis. Raising the temp. to 35° increased the speed of hydrolysis but had no other effect; high temp. should, therefore, be avoided to prevent too rapid decompn. In the absence of NH_4OH practically no hydrolysis occurred. The protein hydrolysis has no direct bearing on the amt. of H_2O_2 consumed, but is related to the concn. of H_2O_2. I. H. ODELL

French manufacture of silk threads for surgical ligatures (BRUÈRE) **17.** Fertilization of flax (BALASHEV) **15.** Micro-stereo observations and their photographic measurement [in measuring textile fibers] (LORENZ) **2.** Fungus dyestuffs (KOGL, ERXLEBEN) **10.** 1-Hydroxyphenanthrenequinone (BRASS, *et al.*) **10.** Anthraquinone derivatives (Ger. pat. 511,320) **10.** Producing colored designs on paper, fabric, etc. (Ger. pat. 511,202) **23.** Mono-oxamic acids of 4,4'-diaminodiarylcyclohexane compounds (U. S. pat. 1,789,903) **10.** Sulfonic acids of nitrohalodiaryl ketones or sulfones (Ger. pat. 514,234) **10.** Coating compositions, etc., from synthetic rubber (Brit. pat. 334,961) **30.** Organic thiocyano compounds (Ger. pat. 511,211) **10.** Triazines (Brit. pat. 334,887) **10.** Synthetic materials (Fr. pat. 691,901) **18.**

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RUF, EUG.: **Die Praxis der Baumwollwarenappretur.** Berlin: J. Springer. M. 15. Reviewed in *Tiba* **8,** 1273(1930).

SCHULTZ, GUSTAV: **Farbstofftabellen.** 7th ed. Revised and enlarged by Ludwig Lehmann. **Bd. I. Lfg. 12–13.** Leipzig: Akad. Verlagsges. Pp. 481–576. M. 16. *C. A.* **24,** 6028.

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Textilchemische Erfindungen. Berichte über neuere deutsche Reichspatente aus d. Gebiete d. Färberei, Bleicherei, Appretur, Mercerisation, Wäscherei, u. s. w., der chem. Gewinnung d. Gespinstfasern d. Carbonisierens sowie der Teerfarbstoffe. Established by Adolf Lehne, continued by Karl Th. Hegel. **Lfg. 6.** (July 1–Dec. 31, 1929). Wittenberg: A. Ziemsen. 136 pp. M. 10. Cf. *C. A.* **24,** 3377.

ZÜHLKE, E.: **Praktischer Leitfaden zum Färben von Textilfasern in Laboratorien.** Berlin: J. Springer. 234 pp. Paper, M. 9.50. Reviewed in *Textile Colorist* **52,** 848(1930); *J. Soc. Dyers Colourists* **47,** 16(1931).

Dyeing textiles. DEUTSCHE HYDRIERWERKE A.-G. Ger. 512,638, Feb. 5, 1927. The wetting-out and permeating properties of alkali baths for textiles (*e. g.*, dyeing, washing, mercerizing, etc., baths) are improved by adding sulfaminocarboxylic acids (*e. g.*, obtained by condensing org. sulfo acids and aminocarboxylic acids) or their homologs, substitution products or water-sol. salts. Examples mention tetrahydronaphthalenesulfaminoacetic acid.

Dyeing textile materials. I. G. FARBENIND. A.-G. Brit. 335,048, Sept. 7, 1929. Discharge effects are produced by impregnating textile materials with a coupling component such as 2,3-hydroxynaphthoic acid, a naphthol or a deriv. of 1-naphthol-4-carboxylic acid, printing the impregnated material with a paste contg. an ester-salt of a leuco-vat dye, an insol. chromate such as Ba or Pb chromate and an alkali metal sulfite, and developing with a diazo compd. without previous steaming. Several examples are given.

Dyeing materials such as cotton and wool. D. A. W. FAIRWEATHER, J. THOMAS and SCOTTISH DYES, LTD. Brit. 334,921, March 7, 1929. Products, believed to be tetrasulfuric esters of tetrahydrodianthraquinoneazines, obtained by oxidizing 2-aminoanthrahydroquinone-9,10-disulfuric ester or a substitution product having the 1-position free in alk. soln., are used in dyeing fibers, with or without isolating the products from their solns. Various details are given for dyeing materials such as cotton and wool. The dye may be developed with HCl and $CuSO_4$.

Dyeing animal fibers. I. G. FARBENIND. A.-G. Fr. 691,996, Mar. 15, 1930. The absorptive capacity of animal fiber for acid and direct dyes in a neutral bath is reduced

or annulled by previously treating the fibers with di- or poly-aralkylaryl compds. contg. SO_3H or COOH groups, or by adding such compds. to the dye bath. Examples are given of the use of 3,5-di(6′-hydroxy-3′-chloro-5-sulfobenzyl)-4-hydroxy-1-chlorobenzene and of the condensation product of *o*-benzylphenol with benzyl chloride-4-sulfonic acid.

Dyeing silk. Soc. anon. pour l'ind. chim. à Bâle. Fr. 691,972, Mar. 15, 1930. Charged or uncharged silk is dyed by metallized derivs. of azo dyes obtained from *o*-aminophenols or diazotized *o*-aminocarboxylic acids and aminonaphtholsulfonic acids or their *N*-substituted derivs. A table of components and the shades obtained is given.

Dyeing artificial silk. Soc. pour la fabrication de la soie "Rhodiaseta." Fr. 692,432, June 17, 1929. Black artificial silk is obtained by suspending very finely divided C, particularly lampblack, in a collodion having a basis of cellulose esters and afterward spinning the collodion thus colored. The collodion may be filtered before spinning if desired.

Dyeing; printing. Durand & Huguenin S. A. Ger. 513,357, June 10, 1928, and 513,358, Sept. 16, 1928. See Brit. 313,407 (*C. A.* **24**, 1228) and 319,021 (*C. A.* **24**, 2614).

Printing. I. G. Farbenind. A.-G. (Paul Nawiasky, Alfred Ehrhardt and Gustav Bernardy, inventors). Ger. 514,166, July 1, 1928. Animal, vegetable or artificial fibers are printed with an alk. paste contg. an alkali-sol. condensation product obtained as described in Ger. 483,154 (*C. A.* **24**, 508). The blue-green color is developed by oxidation, *e. g.*, with $K_3Fe(CN)_6$ or $(NH_4)_2S_2O_8$. An example is given.

Printing textile materials. I. G. Farbenind. A.-G. Brit. 334,907, May 11, 1929. Textiles are printed with use of the stable reduction products of 4,4′-dimethyl-6,6′-dihalothioindigo or of 6,6′-diethoxythioindigo (which may be obtained as described in Brit. 334,878, Brit. 334,919 or Brit 334,920). If reducing agents are concurrently applied they are generally used in smaller quantities than when printing with unreduced dyes. Various details of procedure are described.

Printing fabrics. I. G. Farbenind. A.-G. Fr. 691,070, Mar. 4, 1930. Fabrics are printed with dyes with which polyvinyl alc. and if necessary other substances such as starch are incorporated as thickening agents, but no alkalies, and the fabrics are subsequently treated with a bath contg. an alkali and if necessary a reducer.

Printing cellulose ester or ether materials. British Celanese, Ltd., and J. A. Wainwright. Brit. 335,206, June 19, 1929. Fabrics, etc., formed with esters such as formate, acetate or propionate or butyrate of cellulose or methyl, ethyl or benzyl cellulose or the product produced by treating alkalized cellulose with *p*-toluenesulfonylchloride are printed with plates or rollers engraved to varying depths to produce graded color effects. Various details of procedure are described.

Apparatus for examining dyed cloth under artificial light. Imperial Chemical Industries, Ltd. Fr. 690,855, May 1, 1930.

Experimental dyeing apparatus. I. G. Farbenind. A.-G. (Theodor Kircheisen, inventor). Ger. 513,285, Sept. 15, 1929.

Dyeing, bleaching, etc., apparatus for treating sheet materials with circulating liquids or gases. Eduard R. Müller. Austrian 119,695, May 15, 1930.

Apparatus for dyeing or other treatment of textile materials in lengths. Wilhelm B. Bronander. U. S. 1,790,132, Jan. 27. Structural features.

Apparatus for dyeing yarn locally. Eclipse Textile Devices, Inc. Ger. 511,734, Jan. 9, 1929.

Oxidizing apparatus for aniline-black dyeing. Paul Baumert. Ger. 511,204, Sept. 16, 1926.

Apparatus (with superposed trays) for dyeing or other liquid treatments of packages of yarn or other textile materials. John C. Hebden (to Dyeing Processes Corp.). U. S. 1,789,745, Jan. 20. The trays are arranged in variable spaced relation for holding the packages of material between them and are provided with passages for supplying the treating liquid to the packages.

Apparatus for treating fibers with liquids such as dyes, etc. Compagnie nationale de matières colorantes & manufactures de produits chimiques du nord réunies. Ger. 512,715, May 24, 1928. Details of arrangement are given.

Treating fabrics. Société pour la fabrication de la soie "Rhodiaseta." Ger. 512,637, July 31, 1927. Fibers or fabrics of acetate silk are given a mat wool-like finish by treatment with $CaCl_2$, $MgCl_2$ or $LiCl_2$ soln. in the cold, and immersion, for a short time, in aq. mineral or org. acid of under 0.1*N* strength. Several examples and a table of acids, strengths and results produced are given.

Kier treatment of textile materials. Eugene D. Jefferson (to Rodney Hunt Machine Co.). U. S. 1,789,953, Jan. 20. An app. is described in which liquid flows

intermittently into the central portion of a mass of the goods in the kier and onto the goods from above, with provision of seepage intervals between sprays.

Degumming textile plants. URBAIN J. L. THUAU. Fr. 692,429, June 15, 1929. Textile and vegetable plants are degummed for their use in *textile industries, paper making*, etc., by means of sulfonic acids, particularly naphthalenesulfonic acids in the presence or not of NaCl or other mineral salts. The product is then neutralized.

Wet spinning of flax, hemp and other textile fibers. GRIGORI PETROV (one-half to Nicolai Aleskeev). U. S. 1,789,414, Jan. 20. Moistening is facilitated by adding to the water used for wetting a very small quantity of an aromatic sulfonic acid having a "mean mol. wt." not over 350, such as a naphthalenesulfonic acid.

Machine for the wet treatment of fabrics in open width. MASCHINENFABRIK BENNINGER A.-G. Ger. 513,198, July 21, 1929.

Apparatus for the wet treatment of yarn. PETER CALDWELL and THE BRITISH COTTON AND WOOL DYERS' ASSOCIATION, LTD. Ger. 511,735, Mar. 5, 1926.

Smoothing and dressing yarn, thread, cords, etc. FIRMA A. MONFORTS. Ger. 511,114, July 12, 1928. See Brit. 315,304 (*C. A.* **24**, 1750).

Impregnating textile fibers. JEAN E. C. BONGRAND and LÉON S. M. LEJEUNE. Ger. 512,796, Nov. 19, 1929. The wound fibers are enclosed in a vessel with natural or artificial rubber latex and N under pressure. The spools of fiber are then washed to remove excess of latex, immersed in a bath of rubber latex, rewound, dried and coagulated.

Impregnating textiles, wood and other materials. I. G. FARBENIND. A.-G. Brit. 335,247, June 20, 1929. To increase their resistance to wear and exposure to weather and to acids and alkalies, mixed cotton and wool fabrics, other textile materials, wood, paper, etc., are impregnated with solns. in org. solvents of water-insol. cellulose derivs. such as nitrocellulose or ethyl cellulose and bituminous substances such as coal pitch or petroleum pitch, in such diln. that the pores remain free (suitably with various modifying and auxiliary substances examples of the use of which are given). Cf. *C. A.* **24**, 2815.

Impregnating cloth. SIEGMUND KOCH. Fr. 691,607, Mar. 8, 1930. Jute sacks, tent canvas, etc., are impregnated with a soln. of balata in a solvent formed of equal parts of CS_2 and trichloroethylene and to which known fillers such as Zn white or asbestos powder are added.

Metallizing fibrous material such as lace and other fabrics. FRITZ NEUBER and RUDOLF NOWAK (to Oskar Trebitsch). U. S. 1,790,615, Jan. 27. A noble metal such as Ag is pptd. upon fibrous material by reduction from a salt of the metal, incompletely reduced substances are dissolved out with a solvent contg. a protective colloid such as glue or gelatin, and the material is compressed to produce a strongly adherent covering of pure metallic appearance on the fibrous material.

Artificial threads. HEBERLEIN & CO. A.-G. Fr. 691,026, Mar. 3, 1930. Artificial threads are made from solns. of cellulose in ammoniacal-CuO using as pptn. bath an alkali lye of the concns. usually employed for mercerization and cooled to below 0°. The threads may first be pptd. and then passed through the cooled lye.

Artificial threads, films, etc. HEBERLEIN & CO. A.-G. Fr. 692,371, Mar. 20, 1930. Threads, ribbons, films, etc., of regenerated cellulose are made by pptg. cellulosic solns. in concd. mineral acids contg. pyridine, its homologs or their derivs., as free bases or salts miscible with the bath.

Artificial threads, films, etc. HEBERLEIN & CIE A. G. Fr. 692,273, Mar. 19, 1930. Films, threads, etc., are made from regenerated cellulose by pptg. solns. of cellulose with concd. mineral acids contg. CH_2O, its condensation products or derivs.

Artificial threads. I. G. FARBENIND. A.-G. Fr. 692,027, Mar. 17, 1930. Curled and waved artificial threads or fibers are prepd. by treating threads, etc., obtained from the polymerization or transformation products of butadiene or its homologs, *e. g.*, those substituted in the 1 or 1 and 4 positions or their derivs., with liquid, emulsions or suspensions composed of org. agents, preferably those which cause a swelling of the thread. Hydrocarbons or their halogen derivs., ethers, esters, monohydric alcs., aldehydes, sulfonic acids or sulfuric esters may be used. Examples are given of the use of dipentene, dipentene and toluene, a mixt. of alc., glycol, $C_6H_5CH_2OH$ and toluene, and other mixts.

Artificial silk. W. MARSHALL. Brit. 335,176, June 17, 1929. Softness, extensibility, elasticity, tensile strength and even dyeing properties of regenerated cellulose threads and films and of textile materials coated or impregnated with regenerated cellulose are improved by treating the material with NaOH or KOH soln. of not less than 28° Tw. and the removing at least most of the alkali by washing with aq. solns. of

NaCl, KCl, Na_2SO_4, K_2SO_4, $NaNO_3$, KNO_3, $NaClO_3$, $KClO_3$, $Na_2S_2O_3$, NH_4Cl, $(NH_4)_2SO_4$, sucrose, glycerol or glucose. Various details of procedure are described.

Finishing fabrics comprising artificial cellulose derivatives. BRITISH CELANESE, LTD. Brit. 335,138, Jan. 12, 1929. Crepe, pebble and crinkled effects are produced on netted, woven or knitted fabrics formed of org. derivs. of cellulose such as cellulose acetate by the local application of a soln. of HNO_3 of 10–60° Tw. (which may be applied by engraved or embossed rollers or blocks or by brushing or spraying through stencils or by a light spray in spots or stripes, with or without a dye or thickening substance).

Dulling cellulose esters and ethers. I. G. FARBENIND. A.-G. (Richard Fischer and August Baumert, inventors). Ger. 512,399, April 8, 1928. See Fr. 672,217 (*C. A.* 24, 2291).

Treating fabrics of cellulose acetate, etc. BRITISH CELANESE, LTD., W. A. DICKIE and R. W. MONCRIEFF. Brit. 335,180, June 17, 1929. Fabrics are formed contg. both shrunk and unshrunk yarns of cellulose acetate or other org. cellulose derivs. so that on treating them with a shrinking agent (such as HNO_3 of 20–45° Tw.), crepe, semi-crepe, pebble or other ornamental effects may be produced while the fabric is capable of being dyed a level shade. The shrinking agent may be applied locally if desired to produce local effects or designs.

Treating knitted fabrics comprising cellulose acetate, etc. BRITISH CELANESE, LTD. Brit. 335,139, Jan. 12, 1929. A shrinking agent such as HNO_3 is applied to knitted fabrics formed, at least in part, of cellulose acetate or other org. deriv. of cellulose and reduces the tendency of the fabrics to develop faults such as laddering, running or splitting and also reduces the luster of the material to some extent. The fabrics may also contain silk, cotton or regenerated cellulose.

Fabrics comprising cellulose acetate or other organic cellulose derivatives. BRITISH CELANESE, LTD., W. I. TAYLOR and C. DREYFUS. Brit. 335,204, June 15, 1929. In order to reduce the luster of articles such as stockings, made of cellulose acetate or the like, abrasive material is rubbed over their surface. Pattern effects may be produced by localized application of the abrasive material Various details of procedure are described.

Crepe effects on acetylcellulose fabrics. SOC. POUR LA FABRICATION DE LA SOIE "RHODIASETA" Brit. 335,020, Aug. 14, 1929 Crepe effects are produced on fabrics formed at least in part of highly twisted cellulose acetate yarns by treatment of the material in a bath having a marked swelling action but little or no peptizing action on the cellulose acetate. Among the substances which may be used for this purpose are: EtOH or MeOH or their mixts. with water and saline solns., benzene, toluene, C_2HCl_3, CCl_4, guaiacol or aniline emulsions or aq. solns. of EtOAc. Fabrics formed in part from viscose and in part from cellulose acetate may be treated.

Warp beams (for artificial silk, etc.) with flanges formed of bakelite suitably reënforced. S. RAPPOPORT. Brit. 335,195, June 18, 1929. Structural features.

Warp-sizing apparatus. C. B. JOHNSON. Brit. 335,162, June 13, 1929. Structural features.

Device for singeing fabrics. M. RIPOCHE (to Electro-Textile). Brit. 335,415, Oct 26, 1928. Structural features.

System for treating cotton fibers in and discharging them from digesters by liquids and compressed air. BRITISH BEMBERG, LTD. Brit. 335,457, Dec. 15, 1928. App. and various details of procedure are described.

Washing wool. ELISÉE C. DUHAMEL and COMPAGNIE GÉNÉRALE DES INDUSTRIES TEXTILES. Ger. 513,094, Sept. 4, 1924. See Fr. 665,345 (*C. A.* 24, 977).

Waterproofing cloth, etc. KARL SLABOK and ALEXANDRE PETRENKO. Fr. 691,769, Feb 19, 1930. Cloth, etc., is waterproofed by a bath contg. $Pb(OAc)_2$ and alum and then washed and dried. Suggested proportion for the bath are $Pb(OAc)_2$ 65–70 and alum 35–30%.

Preparation for airplane wings. I. G. FARBENIND. A.-G. Ger. 512,526, June 27, 1929. The textile coverings of the wings are soaked in or coated with polymerized butadiene hydrocarbons or their derivs. or transformation products.

Metallized dyes. SOC. ANON. POUR L'IND. CHIM. À BÂLE. Fr. 691,974, Mar. 15, 1930. See U. S. 1,783,083 (*C. A.* 25, 1095).

Metallized dyes. SOC. ANON. POUR L'IND. CHIM. À BÂLE. Fr. 691,973, Mar. 15, 1930. Metallized azo dyes are prepd. by treating with agents liberating metals, azo dyes obtained by coupling 5-nitro-2-diazo-1-phenol and its ring substitution products with 1,8-aminonaphtholsulfonic acids in which the sulfo group is in position 4, 5 or 6 and one of the H atoms of the NH_2 group may be replaced by an acyl group. Several examples are given.

Sulfur dyes. I. G. FARBENIND. A.-G. (Fritz Ballauf, inventor). Ger. 511,746, Oct. 27, 1928. Nitro or amino compds. of indole or dihydroindole are treated with S or polysulfides. Thus, nitro-2-methylindole is heated to 220° for 10 hrs. with S, and then for a short time with Na_2S at 100° to give a heat-fast yellow-brown dye. Other examples are given.

Sulfur dyes. I. G. FARBENIND. A.-G. (Erwin Kramer, Bernhard Bollweg and Ludwig Zeh, inventors). Ger. 513,229, Sept. 1, 1927. Red and orange dyes are prepd. by treating the dye described in Ger. 510,484 (*C. A.* **25**, 1096) with alkylating, arylating, or aralkylating agents. The treatment may be effected in substance or on the fiber. Examples are given.

Sulfuretted dyes. CHEMISCHE FABRIK VORM. SANDOZ. Brit. 335,297, July 6, 1929. Dyes giving brownish red, red, reddish violet and violet shades are formed by heating hydroxylated azines (such as aminohydroxyphenazine, aminohydroxytolazine, aminohydroxytolazinecarboxylic acid, dichloroaminohydroxytolazine or ethosafraninone) with alkali polysulfides in the presence of Mo or Mo compds. (suitably under pressure or in the presence of glycerol or alc.).

Dyes of the thioindigo series. I. G. FARBENIND. A.-G. Brit. 334,878, May 11, 1929. Stable reduction products which are insol. or but slightly sol. in aq. alkali are obtained from 4,4′-dimethyl-6,6′-dihalothioindigo by the action of a reducing agent (other than a hydrosulfide) such as Na hyposulfite in the presence of a smaller quantity of an alk. substance such as NaOH, KOH, Na_2CO_3 or NH_3 than used in practice for vatting the dyes.

Dyes of the thioindigo series. I. G. FARBENIND. A.-G. Brit. 334,919, May 11, 1929. Stable reduction compds. of 4,4′-dimethyl-6,6′-dihalothioindigo as described in Brit. 334,878 (preceding abstr.) are made by treating the dyes with alkali and a reducing agent (other than a hydrosulfide) and causing an acid such as CO_2 or SO_2 to act on the soln. thus obtained. Reduction may be facilitated by adding an alc. Brit. 334,920 relates to the application of a similar treatment to 6,6′-diethoxythioindigo

Acid wool dyes. I. G. FARBENIND. A.-G. (Klaus Weinand, inventor). Ger. 511,043, Feb. 26, 1929. See Brit. 332,203 (*C. A.* **25**, 214)

Mordant for dyeing. EUGÈNE JANNIÈRE. Fr. 692,015, Mar. 15, 1930. A mordant for redyeing used cloths consists of 2 powders, the first contg. powd. Florentine iris 12, tellurine 20, trioxymethylene or CH_2O 60.7, MnO_2 or other deriv. of Mn 12.5 and AcOAm 2 parts, the second contg. $FeSO_4$ 40, oxalic acid 40 and $CuSO_4$ 30 parts. The 2 powders are mixed for use in about equal proportions.

Lakes. E. I. DU PONT DE NEMOURS & Co. Brit. 334,874, March 8, 1929. Oil and water-insol. lakes of azo dyes are prepd. by incorporating a metallic compd. such as $CaCl_2$, $BaCl_2$ or a salt of Mg, Pb or Cu in a mixt. of an azo dye of acidic character and a rosin soap in an aq. medium, to form a ppt. of the metallic compds. of rosinate and azo dye in which the rosinate is present to the amt. of 5–60% of the product. Various details, examples and modifications of the process are described.

Diazoamino compounds. I. G. FARBENIND. A.-G. (Winfrid Hentrich, Ernst Tietze, Anton Ossenbeck and Peter Baches, inventors). Ger. 513,209, July 15, 1928. New diazoamino compds. *useful in dyeing and printing* are prepd. by the reaction of aromatic diazo compds. with amines of the C_6H_6 series contg. one SO_3H and one COOH group, or a plurality of COOH groups. The alkali salts of the products are readily sol. in water, and are reconverted to the initial materials on acidification; they are stable to alkalies, warming and rubbing. Numerous examples are given. Cf. *C. A.* **25**, 1099

Acid amides of 7-amino-1,4-naphthoquinone. KARL SCHIRMACHER and KONRAD RENN (to General Aniline Works). U. S. 1,789,884, Jan. 20. Acid amides of 7-amino-1,4-naphthoquinone are formed by treating an acid amide of 7-amino-1-hydroxynaphthalene in an HOAc soln. with chromic anhydride at a temp. of about 0°. Details are given of the prepn. of 7-acetamido-1,4-naphthoquinone (decompg. above 205°), 7-benzoylamino-1,4-naphthoquinone (decompg. above 200°), a corresponding deriv. from 7-*N*-*p*-toluenesulfonylamino-1-hydroxynaphthalene, and the Na salt of 7-benzoylamino-1,4-naphthoquinone-3-sulfonic acid. These compds. may be *used in dye manuf.*

Sulfonic acids. I. G. FARBENIND. A.-G. (Alfred Thauss, Gustav Mauthe and Arnold Doser, inventors). Ger. 513,463, Nov. 1, 1927. *Sulfonic acids useful as assistants in dyeing and printing* are prepd. by condensing a sulfonated aromatic hydroxy compd. with an aralkyl halide at a temp. not exceeding 100°. The reaction is effected in concd. H_2SO_4 soln. while stirring. Examples are given.

Drying colors, pastes, etc. FRITZ HAAS. Fr. 690,954, Feb. 28, 1930. Colors or like gelatinous or pasty substances are dried by alternate admission of dry and moist air.

Dyes. D. A. W. FAIRWEATHER, J. THOMAS and SCOTTISH DYES, LTD. Brit.

334,902, March 7, 1929. Sulfuric esters, apparently tetrasulfuric esters of tetrahydrodianthraquinoneazines, are formed by oxidation in the presence of an alkali of a disulfuric ester of 2-aminoanthrahydroquinone or a substitution product having the 1-position free and isolating the product (suitably by salting out) without allowing the medium to become substantially acid.

Dyes. W. SMITH, S. G. WILLIMOTT, J. THOMAS and SCOTTISH DYES, LTD. Brit. 334,872, March 5, 1929. 2-Benzoylbenzoic acids are condensed with anthraquinones by means of an amino group in the one and a halogen atom in the other, the amino group or halogen being in *o*-position to a nitro group; *e. g.*, 4'-chloro-3'-nitro-2-benzoylbenzoic acid methyl ester is condensed with 1-aminoanthraquinone by heating in $PhNO_2$ in the presence of Cu bronze and Na_2CO_3, forming a brown product which is suitable for dyeing wool or cellulose acetate rayon, or 4'-amino-3'-nitro-2-benzoylbenzoic acid methyl ester is condensed with 1-chloroanthraquinone in the presence of $PhNO_2$, $MgCO_3$, NaOAc and Cu powder. Cf. *C. A.* **24**, 243.

Dyes. I. G. FARBENIND. A.-G. Brit 335,043, June 28, 1929. α-Hydroxyanthracene is condensed (suitably in PhCl) with a 4-methyl-5-halo-7-alkoxyisatin α-deriv. such as 4-methyl-5-chloro- or 4-methyl-5-bromo-7-methoxyisatin α-chloride, forming vat dyes giving bluish green tints fast to light. Details for making the intermediates are given.

Dyes. SCOTTISH DYES, LTD. Ger. 512,820, Dec. 29, 1927. See Brit. 293,328 (*C. A.* **23**, 1651).

Dyes. SOC. ANON. POUR L'IND. CHIM. À BÂLE. Fr. 691,971, Mar. 15, 1930. Dyestuffs are prepd. by condensing dinitrostilbenedisulfonic acid or dinitrodibenzyldisulfonic acid or the products obtained by the action of alkalies upon *p*-nitrotoluenesulfonic acid, in a closed vessel under pressure with aminoazo dyes and in a general way with aromatic substances contg. at least one NH_2 group. The products are different from those obtained in an open vessel, giving deeper shades and being faster to alkalies and light. The products may be submitted to oxidizing agents or to agents liberating metals. Several examples are given.

Azo dyes. I. G. FARBENIND. A.-G. (Erwin Hoffa and Erwin Thoma, inventors). Ger. 512,894, Mar. 11, 1928. A new azo dye is produced by diazotizing 1-amino-2-methyl-4-alkoxy-3,5 dihalobenzene and coupling with the β-naphthylamide of 2,3-hydroxynaphthoic acid. An example is given.

Trisazo dyes. IMPERIAL CHEMICAL INDUSTRIES, LTD. Fr. 691,844, Mar. 13, 1930. Trisazo dyes contg. at least 2 SO_3H or COOH groups or one of each and suitable for dyeing viscose silk are prepd. by tetrazotizing 3,4' diaminoazobenzene or a substitution product thereof, and coupling with 2 mol. proportions of the same or different coupling components. Some of the products may be obtained by diazotizing 3-nitro-4'-aminoazobenzene, coupling with a SO_3H or COOH deriv. of a phenol, a naphthol, a naphthylamine or a *N*-substituted aminonaphthol, reducing the NO_2 group, diazotizing and coupling with a suitable component. Several examples are given. The 3,4 diaminoazobenzene and its derivs. are obtained by coupling a diazotized *m*-nitroamine with amines of the benzene series coupling in *p*-position to the NH_2 group, and reducing the NO_2 group.

Azo dyes. SAMUEL MORGOULEFF. Fr. 692,148, June 10, 1929. Azo dyes are made by diazotizing sulfonated or unsulfonated amines and coupling with naphthol or a sulfonated or other deriv. thereof, the diazotization and coupling taking place in the same vat where all the elements are present, the coupling taking place as the diazo compd. is formed. Examples are given.

Chromium compounds of azo dyes. I. G. FARBENIND. A.-G. Brit. 335,169, May 16, 1929. Cr compds. of chromable azo dyes contg. groups such as sulfonic, carboxylic or sulfamide groups, which induce ready soly., are formed by treating the dyes with chroming agents such as Cr chloride in the presence of an org. base such as dimethylaniline, aniline, hexahydromethylaniline or pyridine. The manuf. of the dye and the chroming may be effected in a single operation. Numerous examples are given. Cf. *C. A.* **24**, 1746.

Tetrakisazo dye. GEORG WOLFSLEBEN (to General Aniline Works). U. S. 1,780,888, Jan. 20). A black tetrakisazo dye is formed by coupling 2 mol. proportions of *p*-diazoacetylaminobenzene with 1 mol. proportion of the disazo dye obtainable from 1 mol. proportion of tetrazotized benzidine by acid coupling with 1 mol. proportion of 1-amino-8-naphthol-3,6-disulfonic acid and subsequent alk. coupling with 1 mol. proportion of *m*-phenylenediamine, and saponifying the resulting tetrakisazo compd. The dye is suitable for dyeing chrome leather and may also be obtained by employing, instead of *p* aminoacetanilide, *p*-nitroaniline, in which case the dye is subjected to reduction

instead of to saponification. In most cases, however, the product is obtained in this way with a smaller yield and in a lower state of purity. Details of procedure for making the dye are given.

Vat dyes. I. G. FARBENIND. A.-G. (Max A. Kunz and Erich Berthold, inventors), Ger. 511,239, Oct. 20, 1928. New vat dyes are prepd. by treating alkyl, aryl or other ethers of pyranthrone with halogenating agents. The products yield bluer or yellower shades than the initial materials. Examples are given.

Vat dyes. I. G. FARBENIND. A.-G. (Robert Berliner, inventor). Ger. 513,045, May 9, 1928. See Brit. 311,283 (*C. A.* **24**, 971).

Vat dyes. I. G. FARBENIND. A.-G. (Heinrich Neresheimer, inventor). Ger. 513,046, May 4, 1929. Vat dyes are prepd. by treating anthraquinonyl-4'-amino-1,2-benzanthraquinones with condensing agents. The colors given by the products vary with the condensing agent used, and also according to whether the initial material is further substituted or not. Thus, α-anthraquinonyl-4'-amino-1,2-benzanthraquinone (prepd by condensing 4'-bromo-1,2-benzanthraquinone with 1-aminoanthraquinone) yields a yellow vat dye when heated with dil. H_2SO_4 or $NaAlCl_4$, but a green-blue dye when treated with $AlCl_3$ in the presence of a tertiary base, or fused with KOH. Examples are given Cf. *C. A.* **25**, 824.

Vat dyes. I. G. FARBENIND. A.-G. (Fritz Baumann, inventor). Ger. 513,227, Mar. 15, 1928. Red to brown vat dyes are prepd. by treating α-amino-1,1'-anthrimidocarbazole or its derivs. with haloanthraquinones or their derivs. The reaction may be effected in a high-boiling org. solvent in the presence of an acid-binding agent and a catalyst, *e. g.*, Cu. Examples are given. Cf. *C. A.* **25**, 824.

Vat dyes. I. G. FARBENIND. A.-G. (Max A. Kunz and Karl Köberle, inventors), Ger. 513,228, Oct. 21, 1928. Violet, blue or green-black vat dyes of the formula RN(X)C(O)R', where R is a dibenzanthrone or isodibenzanthrone residue, X is H or an alkyl group or other radical, and C(O)R' is the residue of a polynuclear acid, are prepd by treating nitrogenous derivs. of dibenzanthrone or isodibenzanthrone, in which at least one replaceable H atom is linked to the N atom, with halides, anhydrides or esters of polynuclear carboxylic acids, *e. g.*, acids of the anthraquinone, benzanthrone, perylene, pyranthrone, anthanthrone, dibenzopyrenequinone or *ms*-anthradianthrone series Alternatively, halodibenzanthrones or haloisodibenzanthrones may be reacted with amides of the acids. The reaction may be effected in a high-boiling solvent in the presence of an acid-binding agent and a catalyst, *e. g.*, CuO. Examples are given. Cf *C. A* **25**, 1093, 1094.

Vat dyes. I. G. FARBENIND. A.-G. (Albert Schaeffer, inventor). Ger. 513,310, Oct. 3, 1926. Black vat dyes fast to Cl are prepd by mixing a nitrodibenzanthrone with the products obtained by fusing an aminohalobenzanthrone with caustic alkali as described in Ger. 445,845. Dibenzanthrone may be included in the mixt An example is given.

Vat dyes. I. G. FARBENIND. A.-G. (Walter Mieg, inventor). Ger. 513,475, June 26, 1928. Dianthraquinonylaminocarbazoles, which contain at least 1 acridone ring and at least 1 acylamino group, are converted into new vat dyes by splitting off the acyl residue of the acylamino group. The conversion of the dianthraquinonylamine into the carbazole deriv. and the removal of the acyl group may be effected in one working operation. Examples are given. Cf. *C. A.* **25**, 824.

Anthraquinone vat dyes. I. G. FARBENIND. A.-G. Brit. 335,014, Aug. 7, 1929. For producing anthraquinone vat dyes, the products obtained by the action of aminoanthraquinones on 5,8-dihalo-1,2-benzanthraquinones (as described in Brit. 334,565 (*C. A.* **25**, 1094)) are treated with condensing agents (suitably by heating with $AlCl_3$ in pyridine). Examples are given of the production of dyes giving brown shades on cotton

Vat dyes of the anthraquinone series. MAX A. KUNZ, FREIHERR G. VON ROSENBERG and EDUARD GOFFERJE (to General Aniline Works). U. S. 1,790,102, Jan. 27. Vat dyes of various colors and which have the general formula —C^1.N:CA.O.C^2— where C^1 and C^2 belong to an anthraquinone nucleus, A indicates another anthraquinone radical and where both anthraquinone nuclei may be substituted or not are obtainable in a variety of ways. *E. g.*, they are formed when aminoanthraquinones which contain a neg. substituent such as a hydroxyl group or a halogen atom in *o*-position to the amino group, are condensed with anthraquinonealdehydes in the presence or absence of solvents and preferably at an elevated temp. Instead of anthraquinonealdehydes there may be used other anthraquinone derivs. with aldehyde properties, for instance, anthraquinoneisoxazoles, or anthraquinonecarboxylic acids or compds. reacting like them such as the acid halides, esters and similarly acting compds. The new products may also be obtained by condensing anthraquinones containing 2 neg. substituents in *o*-position to each

other with anthraquinonecarboxylic acid amides. A modification of prepg. the new anthraquinoneoxazoles consists in condensing anthraquinonecarbonylaminoanthraquinones which are substituted by hydroxyl groups or other neg. substituents in the *o*-position to the amino group; the said anthraquinonecarbonylaminoanthraquinones may be obtained in advantageous manner by condensing an anthraquinonecarboxylic acid halide with an aminoanthraquinone contg. a hydroxyl group or other neg. substituent in *o*-position to the amino group. Numerous examples are given. Cf. *C. A.* 25, 214.

26—PAINTS, VARNISHES AND RESINS

A. H. SABIN

Qualities of red lead required for practice. JAROMÍR HERITES. *Chem. Listy* 24, 218-20(1930).—Red lead from 3 sources was used: Source (1) contained 29.65% PbO_2, possessed an av. particle size 0.7–15.5μ, and a covering power of 250 sq. cm. per g. Source (2) contained 29.88% PbO_2, possessed an av. particle size of 0.8–27.9μ and had a covering power of 85 sq. cm. Source (3) contained 33.55% PbO_2, possessed an av. particle size of 1.0–24.8μ and had an av. covering power of 133 sq. cm. The covering ability depends not upon the PbO_2 content but upon the size of the particles. This is confirmed by sedimentation tests in glycerol (1:99). Red lead from sources (2) and (3) settled out completely in 12 hrs.; source (1) remained dispersed for over a week. The sediment from source (1) after settling a month was readily redispersed and showed no tendency toward hardening or crust formation. For even films, a heterodisperse system in which a variation of particle sizes occurs is most favorable for forming uniform films. An irregular settling occurs: The most coarse particles settle out first, the finer particles fill the spaces in between. The fixation of the pigment becomes complete and the covering power is increased. When applied upon an inclined plane red lead from source (2) and (3) ran down and tore the film while that from source (1) remained in an even layer and showed no tears. Procedures for analyses are given in detail. FRANK MARESH

The paint and varnish industry in 1930. R. S. MORRELL AND W. E. WORNUM. *Ind. Chemist* 7, No. 72, 29–31(1931). E. H.

New tendencies in body-color manufacture. HANS WAGNER. *Kolloid-Z.* 54, 132–7(1931).—A review of recent patents. A. FLEISCHER

Oxide of iron pigments. F. C. BERLING. *Can. Chem. Met.* 15, 16–8(1931).—The natural and manufd. oxides of iron are discussed and (1931) tests and assays of the various oxides are outlined. W. H. BOYNTON

Titanium white. TORBJØRN HANSSEN. *Teknisk Ukeblad* 75, 88–92(1928).—Comparative tests show the superiority of titanium white over other white paints with regard to covering properties, economy and durability. C. A. ROBAK

New rust-preventive pigments as substitute for red lead. JUL. F. SACHER. *Chem.-Ztg.* 54, 781-2(1930).—The pigments ordinarily used as rust preventives are listed in order of their rust-resisting qualities. Red lead possesses the disadvantage of being poisonous and being difficult to cover with other paints. A new lead pigment has appeared under the trade name "Arcanol." It exists partly in the metallic state and partly as an oxide. Paints made from this material dry in 8 hrs. at 0°, possess qualities of high covering power, great expansibility and are very resistant to the action of hot water or steam. A new oil-free rust-preventive paint suitable for use in the tropics dries only by evapn. of the solvent. It is impermeable to air, water or vapors, and resistant toward sea water, hot vapors, flue gas, acid vapors, stable toward cold and is unaffected by temps. from 200° to 250°. Numerous uses are suggested for this material. H. M. STARK

Liquid absorption by pigments of different types of organic liquids. I. Relation of liquid absorption with a series of organic liquids to interfacial tension of these liquids against water. F. E. BARTELL AND A. HERSHBERGER. *Ind. Eng. Chem.* 22, 1304–9 (1930). The liquid absorption values of SiO_2, $BaSO_4$, CaF_2, $PbCrO_4$, ZnO, lithopone, ZnS, Sb_2S_3 (pptd.), Sb_2S_3 (natural), PbS, FeS, HgI_2, Fe, Zn, Sb, Si, Cu and carbon have been measured with H_2O, iso-BuOH, BuOAc, $CHCl_3$, C_6H_6, CCl_4, *o*-C_6H_4Br and $C_2H_2Br_4$. These have been correlated with the interfacial tension of the liquids against H_2O. The results show that the liquid absorption values of zero contact angle liquid with polar solids increase linearly with increase of interfacial tension against water. With non-polar solids there is a linear decrease. Heating and evacuation have practically no influence on an air-dried powder, but the liquid absorption values

are roughly proportional to the sp. surface. For solids of the same particle size it is found that the sulfides are less highly wetted than $BaSO_4$, CaF_2 and SiO_2. H. C. D.

The theory of drying (of oils) and of antioxygen action. G. DUPONT. *Bull. inst. pin* **1930**, 285–8.—According to Genthe (*Z. angew. Chem.* 1906) the oxidation of linseed oil, in both presence and absence of catalysts, is always due to autocatalysis; induced oxidation does not take place in linseed oil, but only oxidation catalyzed by the products of oxidation themselves. D. shows that this theory is in agreement with the results of his own work and that of his co-workers (*C. A.* **24**, 855, 1386, 1629, 2945, 4209, 4693). A. PAPINEAU-COUTURE

Turpentine oil frauds. J. CAPUS. *Compt.-rend. acad. agr. France* **16**, 1061–9 (1930).—Turpentine oil substitutes in paints come from either mineral or vegetable origin. The mineral substitute is a distn. product of petroleum and is known as "White Spirit." It is inferior to turpentine in that the resulting paint is not as durable and in white paints particularly it soon causes a yellowish discoloration. While substitutes from the vegetable origin contain chem. compds. of the terpene family they do not have the qualities of the fresh oil. Neither of these types of substitutes is found satisfactory and precautions should be taken against their indiscriminate use. J. R. ADAMS

Cobalt driers. E. GEBAUER-FUELNEGG AND GOTTFRIED KONOPATSCH. *Ind. Eng. Chem.* **23**, 163–5(1930).—With the hope of getting an insight into the action of siccatives, simple Co compds. of definitely known structure were prepd. and tested as catalysts on China wood oil. Their solns. in org. solvents are efficient driers in a number of cases. Some such siccative solns caused the formation of glass-clear films of China wood oil. A table is given showing the Co compds. and the solvents used. The photomicrographs of the dried films are characteristic of each of the solvents used. Possible explanations are offered of the phenomena encountered. E. GEBAUER-FUELNEGG

Dangers in work with cellulose lacquers and their prevention. BANIK. *Zentr. Gewerbehyg. Unfallverhütung.* **16**, 197–206(1929); *U. S. Pub. Health Eng. Abstracts* **10**, IHS, 5(Dec. 6, 1930).—A full discussion is given of the nature of the nitrocellulose solvents used in spraying automobiles, railroad cars, etc. These solvents and thinners constitute 30–60% of the lacquer. The thinners may be benzine, C_6H_6, toluene, xylene and alcs. When a rapid drying is required, MeOAc and EtOAc are usually used. However, BuOAc, AmOAc, hexalin acetate and its 3 Me derivs. are also frequently encountered. With the exception of benzene, the destructive action of which on the blood-forming tissues is well known, no serious effects from the other substances were observed. Headache and giddiness, oppression of the chest, and dermatitis from the removal of the fat from the hands leading to dryness and cracking are the main results. Stress is laid on the discomfort experienced by workers in the atm. of spray in poorly ventilated work rooms. Control methods are outlined. C. R. FELLERS

Ethylcellulose dope. I. TSURUO ARAKI AND TEIJI NAGAMOTE. *J. Soc. Chem. Ind. Japan* **33**, Suppl. binding, 382(1930).—The authors tried to use benzene-sol. ethylcellulose for airplane dope and detd. the soly. ranges for several solvents and thinners. It is easily sol. in benzene or toluene but the soln. appears turbid. With 3.5 to 37.5% alc. present the soln. is clear. A suitable mixt. for undercoating of airplane fabric was: benzene 60 cc., methanol 13 cc., benzyl alc. 2 g., ethylcellulose 12 g. **II.** *Ibid* 382–3.—The properties of ethylcellulose dope are given. No appreciable change occurs in the dope soln. during $1^1/_2$ yrs.' storage. The film of the tested sample is of a tensile strength of about 5 kg./sq. mm., and is a little more inflammable than the acetylcellulose film, but not dangerous as the nitrocellulose film. H. M. STARK

Detection of synthetic resin in Peru balsam. J. KOK. *Pharm. Weekblad* **68**, 32–3 (1930).—The reaction is much more delicate when the residue obtained by evapg. the petr. ether ext. is treated with HNO_3 without mixing, so that a green or reddish brown ring is formed. A W. DOX

The constitution of phenol-formaldehyde resin. FRITZ POLLAK AND FRANZ RIESENFELD. *Z. angew. Chem.* **43**, 1129–32(1930).—In order to arrive at the structure of Novolak, a product of condensation between CH_2O and PhOH, the reaction between *β*-polyoxymethylene (I) and PhOH was studied quantitatively. It was found that 6 mols. of I react with 7 mols. of PhOH with the formation of a viscous resin, completely sol. in EtOH; 6 mols. of H_2O were also evolved. By action of water or NaOH, 2 mols. of phenol are split off. These facts suggest the formula *1,4-*$HOC_6H_4CH_2$-$(C_6H_3(OH)$-CH_2-$)_3$-C_6H_4OH. Increasing the quantity of I slightly above the required amt. results in a gelatinous product, signifying that the various products obtained from PhOH and CH_2O may be isomeric and not substances of various mol. wts. I. M. LEVINE

Report of the committee on painting standpipes (ANON.) **14.** Oil of Para chestnuts [use in fine paints] (CALLIER) **27.** The constitution of the artificial resins (KOEBNER) **10.** Cellulose esters and ethers (Ger. pat. 511,208) **23.** Polysaccharide ether esters [for films, lacquers, etc]. (Brit. pat. 334,897) **10.** Synthetic materials (Fr. pat. 691,901) **18.** Adsorbent comprising C, Fe and Fe oxide [as a pigment] (U. S. pat. 1,789,507) **18.** Coating compositions, etc., from synthetic rubber (Brit. pat. 334,961) **30.** Purifying higher alcohols (Fr. pat. 690,958) **10.**

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Paints, plastic materials. ERNST KRAUSE and F. WILHELMI A.-G. Fr. 690,987, Mar. 3, 1930. Paints or plastic materials of high mech. and chem. resistance are prepd. by treating fossil resins such as copal or amber with an alk. soln. in the presence of org. solvents and assocg. them in the dispersed phase or after pptn. and resoln. in org. solvents, with esters or ethers of cellulose.

Bactericidal paint. LACKWERKE JAPONIKA GES. Brit. 335,242, June 19, 1929. An oil paint or varnish or "cellulose" or resin coating compn. has added to it a phenolic deriv. of an aromatic hydrocarbon (other than carbolic and cresylic acids) such as phenol homologs with branched side chains or phenols of condensed nuclei, and the pigments used are preferably acid or neutral, such as titanic acid or Zr oxide.

Corrosion-resistant paint. HANS LANDMARK. Norw. 45,727, Oct. 22, 1928. Fine magnetite slime is mixed with linseed oil.

Pigments. FRANK RAHTJEN and MANFRED RAGG. Ger. 513,338, Sept. 11, 1927. Addn. to 486,974 (*C. A.* **24**, 1528). App. for grinding up metals in a finely divided condition for pigments is described.

Pigments. I. G. FARBENIND. A.-G. Fr. 690,708, Feb. 26, 1930. $Zn(OH)_2$ or ZnO which is pptd. and dried at a temp. not above 500° is used for making pigments as it reacts rapidly with binding agents such as linseed oil. Cf. *C. A.* **25**, 1107.

Titanium pigments. I. G. FARBENIND. A.-G. Fr. 690,764, Feb. 27, 1930. Ti pigments free from Fe are made by washing the ppt. of Ti hydroxide on fillers such as $BaSO_4$ or $CaSO_4$, with cold water and then with dil. acid.

Titanium pigments. I. G. FARBENIND. A.-G. Fr. 691,458, Mar. 7, 1930. Ti oxide hydrate is pptd. from a H_2SO_4 soln. with or without filling materials such as $BaSO_4$, $CaSO_4$, H_2SiO_3, etc. Cf. *C. A.* **24**, 2903.

Lithopone, etc. SOC. ANON. DES PRODUITS CHIM. D'ESTRÉE-BLANCHE. Fr. 690,726, Feb. 26, 1930. Lithopone is tinged with blue or blues having a basis of lithopone or other whites are made by dissolving one or more salts in water in which the pigment is suspended, and adding another salt which will ppt. a blue or violet compd. Such pairs of salts are, *e. g.*, $K_4Fe(CN)_6$ and $Fe_2(SO_4)_3$ or Na_2HPO_4 and $CoSO_4$.

Lithographic printing inks containing cellulose esters and ethers. I. G. FARBENIND. A.-G. Brit. 335,074, Oct. 4, 1929. Inks of the general type described in Brit. 318,567 (*C. A.* **24**, 2316) are formed of water-repelling constituents which may include a cellulose ester or ether, a plasticizer, resins, pigments, etc. Several examples are given.

Duplicating process and ink for use in the process. LEO SILBERTSTROM. U. S. 1,789,783, Jan. 20. For effecting duplication by the "Opalograph process," the characters of the original to be duplicated are formed with an ink contg. $(CH_2)_6N_4$, which serves as a sensitizer and stabilizer.

Paint oils. JOHANNES SCHEIBER. Ger. 513,309, Feb. 21, 1928. See Brit. 306,453 (*C. A.* **23**, 5051).

Linseed oil. ROBERT H. ADAMS and BENJAMIN H. THURMAN (to Gold Dust Corp.). U. S. 1,790,494, Jan. 27. In extg. linseed oil, the whole uncracked flaxseed is cleaned to a maximum of about 1.5% dockage and the oil is pressed out at a temp. below 43°.

Linseed oil. BENJAMIN H. THURMAN (to Gold Dust Corp.). U. S. 1,790,514, Jan. 27. Bleaching of linseed oil free from mucilaginous matter is effected by heating to 260–282° *in vacuo* in the presence of steam and then rapidly chilling to about 95°. Cf. *C. A.* 24, 1753.

Treating wood oil for varnishes, etc. JOHANNES SCHEIBER. Ger. 511,044, July 31, 1928. Wood oil for use in making varnishes, etc., is treated with the amt. of H or Cl required to sat. one of its double bonds. The hydrogenation may be effected at 180° in the presence of Ni as a catalyst. The chlorination may be effected during cooling. Examples are given

Lacs. JOHANNES SCHEIBER. Ger. 512,822, July 31, 1928. The distn. residues of ricinoleic acid and octadecadiene-(9,11)-acid (1) are esterified with polyhydric alcs. Oils, resins, etc., may also be added.

Lacs, etc. JOHANNES SCHEIBER. Ger. 512,895, July 31, 1928. The distn. residues from the vacuum distn. of ricinoleic acid are employed in the manuf. of lacs, paints, etc. The residues may be esterified, and other oils, resins, etc., may be added.

Lacquers. WOLFF & CO. KOMM.-GES. AUF AKTIEN and RICHARD WEINGAND. Ger. 513,424, Apr. 4, 1928. Cellulose-ester bronzing lacquers contg. a powd heavy metal are stabilized by addn. of a small quantity of H_2O_2.

Apparatus for coating metal articles with lacquer, etc. I. G. FARBENIND. A.-G. (Adolf Benischek and Carlos Thode, inventors). Ger. 513,093, Aug. 3, 1927.

Method and apparatus for drying lacquered filaments, wires, etc., under reduced pressure. CARL C. ERDMANN. Ger. 513,408, Oct. 23, 1927.

Plastic compositions. COMPAGNIE FRANÇAISE POUR L'EXPLOITATION DES PROCÉDÉS THOMSON-HOUSTON. Fr. 691,896, Mar. 14, 1930. A moldable compn. comprises a polymerized drying oil and a fusible phenolic resin which may be made infusible by heat. A fibrous material or other inert filler may be impregnated with the polymerized oil and resin.

Condensation products. I. G. FARBENIND. A.-G. (Max Paquin, inventor). Ger. 510,428, May 10, 1927. Addn. to 506,963 (*C. A.* 25, 835). The method of 506,963 for producing oily or resinous products by condensing urea with alcs. and ketones, or derivs., in the presence of amino compds., is modified by the added presence of reducing metals such as metals of the alkali, earth alkali or Zn groups. Other examples are given. Cf. *C. A.* 25, 835.

Condensation products. I. G. FARBENIND. A.-G. (Max Paquin, inventor). Ger. 512,231, June 25, 1927. Addn. to 510,428 (cf. preceding abstr.). The reducing metal present during the condensation of urea and alcs. or ketones described in 510,428, is treated with CH_2O or CH_2O-generating substances before the reaction. Cf. *C. A.* 25, 835.

Resins. HERMANN GAMMAY. Fr. 690,988, Mar. 3, 1930. A colophony poor in "Resene" is made by distg. pine resin under vacuum with a small quantity of satd. steam, from which a distn. temp. below 110° is obtained.

Conversion products of natural resins. I. G. FARBENIND. A.-G. (Leo Rosenthal, inventor). Ger. 514,151, Oct. 9, 1925. Natural resins are treated in aq. or aq. alk. soln. or dispersion with a halogen or other halogenating agent, *e. g.*, a hypochlorite or hypobromite. The products contain halogen and are still resinous. Examples are given.

Synthetic resins. ALLGEMEINE ELEKTRICITÄTS-GES. Fr. 691,464, Mar. 7, 1930. In making resins from polyhydric phenols and carbonyl compds. an intermediate condensate is formed by adding only part of the necessary carbonyl compd., and afterward the rest of the carbonyl compd. is added to form the final condensate by a distinct operation. The intermediate condensate may be formed in the presence of fillers such as sawdust, asbestos, talc, natural resins and dyes. Examples are given.

Synthetic resins. BAKELITE CORP. Fr. 690,707, Feb. 26, 1930. Resinous compns. are made by condensing a phenol with an excess of aldehyde such as CH_2O in the presence of a basic catalyst such as Na_2CO_3 and afterwards combining the excess of aldehyde with a resin-forming substance, not phenolic, such as urea in the presence of a weak acid such as H_3PO_4. Cf. *C. A.* 25, 1109.

Synthetic resins. BAKELITE, LTD., J. W. CRUMP and A. LLOYD. Brit. 335,173, June 13, 1929. Urea or thiourea, a phenol or deriv. and an aldehyde such as CH_2O are melted together, without the aid of aq. soln., and heated to complete condensation. If the urea preponderates over the phenol, the reaction mixt. must be neutral or alk., but if the phenol preponderates acid, alk. or neutral condensing agents may be used. Resins may be formed which may be ground to a fine powder and are easily fusible

and may be rendered infusible by further heating. Various details of procedure are given.

Synthetic resins. I. G. FARBENIND. A.-G. Brit. 335,185, March 16, 1928. Ketones contg. an aliphatic chain with one double bond only, such as methylenemethyl ethyl ketone, are polymerized in emulsion with an aq. emulsifying agent such as Na oleate (which in 1% soln. after 8 days at 60° yields a bright yellow resin) or with a colloidal soln.

Synthetic resins. IMPERIAL CHEMICAL INDUSTRIES, LTD., W. BAIRD and E. E. WALKER. Brit. 335,292, July 3, 1929. Non-hydroxylated oils such as olive, tung or linseed oils are incorporated with synthetic resins of the polyhydric-alc.-polybasic-acid type by use of a hydroxylated fatty oil such as castor oil as a vehicle (suitably in a single operation with the formation of the resin from materials such as glycerol and phthalic anhydride). Various details of procedure are described.

Phenol-aldehyde resins. CHEMIE & TECHNIK J. M. S. GES. and H. MENZ. Brit. 335,194, June 18, 1929. Pure phenol is boiled with formaldehyde in the presence of an alk. catalyst comprising both Na_2CO_3 and $NaHCO_3$, and HOAc is added after boiling, to retard the setting. If a colored product is desired a portion of the condensed material is allowed to set and is boiled with bone oil or glycerol to dissolve it, and mixed with coloring matter, and then mixed with the other portion of the condensed material (to which HOAc has been added) and may be formed in heated molds.

Molded objects. BOIS BAKÉLISÉ and LA BAKÉLITE. Brit. 334,804, Dec. 7, 1928. See Fr. 665,398 (*C. A.* **24**, 930).

Large receptacles formed in part at least of artificial resins. JOHANN K. WIRTH. U. S. 1,789,642, Jan. 20. Various details of procedure are described for making receptacles by joining different plates or segments. Cf. *C. A.* **24**, 1754.

Artificial resins. I. G. FARBENIND. A.-G. (Otto Schmidt, Karl Seydel and Nikolaus H. Roh, inventors). Ger. 511,092, Oct. 22, 1925. See Brit. 276,518 (*C. A.* **22**, 2475).

27—FATS, FATTY OILS, WAXES AND SOAPS

E. SCHERUBEL

The oils, fats and soap industries in 1930. REX FURNESS. *Ind. Chemist* **7**, No. 72, 13–5(1931). E. H.

Detection of fats by ultra-violet light. J. LENFELD. *Z. Fleisch-Milch-Hyg.* **39**, 451–4, 477–81(1929).—Changes in appearance observed when various edible fats are exposed to the light of the analytical quartz lamp are recorded. Marked differences in fats from the same species were often observed. B. C. A.

Study of oils of marine animals. The fats of the sperm whale. (MLLE.) M. TH. FRANÇOIS. *Thesis*, Paris; *J. pharm. chim.* [8], **12**, 189–91(1930); cf. *C. A.* **21**, 564, 1720, 3278; **22**, 216.—By catalytic hydrogenation of oil of spermaceti, in which oleic alc. (*A*) is the principal constituent (Tsujimoto), large quantities of octadecylic alc. ($C_{18}H_{38}O$) were obtained. Also a method was found of isolating *A* from oil of spermaceti with a yield of 25% by wt. S. WALDBOTT

***o*-Dichlorobenzene, an ideal fat solvent.** J. EHRLICH. *Oil & Fat Ind.* **8**, No. 1, 19–20(1931).—Com. *o*-dichlorobenzene contains 25% of the para-isomer. The boiling range is from 160° to 200° and the d_{25} is 1.309. It is immiscible with H_2O and is stable. The fire hazard is low; the flash point is 67°, but even above this temp. it will not burn if the flame is removed. This compares favorably with the chlorinated aliphatic hydrocarbons in general use. It is volatile with 1.5 times its wt. of direct steam at atm. pressure. It has a great avidity for fats and exts. them completely even from substances contg. an appreciable quantity of H_2O. E. SCHERUBEL

Solvent extraction successfully applied. CLARENCE F. EDDY. *Oil & Fat Ind.* **8**, No. 1, 11–3(1931).—The following points are suggested for efficient large-scale production: (1) Use the simplest app. possible to wash out the max. amt. of oil with a min. of solvent. (2) Distil only the most concd. solns. obtainable. (3) Solvent loss: a tight system with good recovery app. and min. solvent turnover should be used. (4) Use mech. control of flow of solids and liquids. The future of large-scale solvent extn of vegetable oils lies in continuous countercurrent extn. E. SCHERUBEL

Fatty acids of some Indian seed oils: seed fats of Mesua ferrea, Calophyllum inophyllum and Pistacia vera. D. R. DHINGRA AND T. P. HILDITCH. *J. Soc. Chem. Ind.* **50**, 9–12T(1931).—The fatty acids of *Mesua ferrea* (Malabar) had the following

% compn.: myristic 1.8, palmitic 6.3, stearic 10.7, oleic 49.2, linoleic 7.3, unsaponifiable 24.7. These figures correspond with a sapon. no. of 290.9 and an I no. of 73.2 for the actual glycerides present in the oil. The fatty acids of *Mesua ferrea* (Bengal) in % compn. were: myristic 1.4, palmitic 7.5, stearic 9.2, arachidic 1.7, oleic 58.7, linoleic 9.9, unsaponifiable 11.6. The % compn. of the fatty acids of the neutral glycerides of *Calophyllum* seed fat was: palmitic 15.8, stearic 10.2, oleic 49.4, linoleic 24.0, unsaponifiable 0.6. The I no. of the original oil was 92 1 and the sapon. no. 286.6. The % compn. of the fatty acids of *Pistacia vera* as found was: myristic 0.6, palmitic 8.2, stearic 1.6, oleic 69.0, linoleic 19.8, unsaponifiable 0.8. These figures correspond with a sapon. no. of 291.6 and an I no. of 94.7 for the actual glycerides present. E. S.

The fatty acids of oils of jupaty (Raphia taedigera, Mart.), Para chestnuts (Bertholletia excelsa H. B. K.) and cayate (Omphalea diandra Aubl.). A. Callier. *Bol. esc. chim. (Belem)* 1930, No. 1, 17–25; *Chimie & industrie* 24, 930.—Oil of jupaty has d_{15} 0.917, sapon. no. 194, I no. 77, acidity (as oleic) 19.2%; the fatty acids consist of 33% solid acids (almost exclusively palmitic) and 67% liquid acids (80% oleic and 20% linolic). After decolorization it is suitable for *soap making*. Oil of Para chestnuts has d_{15} 0.918, sapon no. 193, I no. 102, acidity (as oleic) 1.4–1.7%; the fatty acids consist of 25% solid acids (almost exclusively palmitic) and 75% liquid acids (75% oleic and 25% linolic). It is a semi-drying oil and is suitable for use in *fine paints* and as a *food*. Oil of cayate has d_{15} 0.919, sapon. no. 192, I no. 109–116, acidity (as oleic) 0.7%; the fatty acids consist of 20% solid acids (almost exclusively palmitic) and 80% liquid acids (60% oleic and 40% linolic). It is suitable for use in *perfumery* and for the *lubrication of fine machinery*. A. Papineau-Couture

Twitchell reagent. VII. Darkening of fatty acid obtained by Twitchell process. I. Kyosuke Nishizawa and Kiyota Fuzimoto. *J. Soc. Chem. Ind., Japan* 33, Suppl. binding 500–4(1930).—The color of olive oil refined with 60° Bé. H_2SO_4 was studied after treatment with 7 reagents of different types. It was found that the addn. of H_2SO_4 is not the reason for the darkening of fatty acids obtained by the Twitchell process. All reagents increase the depth of color of fatty acids with increase in time of heating; the presence of air also increases the color Exptl. work was done with the following reagents: Idrapid, Divulson, Kontakt, Pfeilring. Twitchell (benzene) (Naphthalein) and (phenol). E. Scherubel

Results of recent experiments in oil milling. M. K. Thornton, Jr. *Oil Miller & Cotton Ginner* 36, No. 6, 15–8(1930).—The effects of varying amts. of hulls added to the meats before cooking were detd and no effect on the color of the oil was noted In expts. on cooking, a temp. of 215–25° F. was found best for quality oil production In pressing, the hotter the press boxes were, the harder the cake was, and the hotter the meats were when put in the boxes, the harder the cake was. Excess moisture resulted in a softer cake. J. E. Laita

Influence of various conditions on the preservation of crude oil obtained by pressing soy bean. V. M. Suichov. *Chinese East Ry, Ltd., Dept. Trans. Agr. Branch* 1928, No. 8, 3–116; *Chimie & industrie* 24, 929–30.—The investigation was carried out on a sample which had been kept for a long time and on one taken directly from the filter press. Least variation of d. occurs in oils kept in a dark damp place; sunlight increases the d., and the increase continues for some time after the oil is placed in the dark. Addn. of 10% H_2O favors constancy of the d. The d. of the dried oil varies quite rapidly, and neutrality of the oil apparently is of no consequence. The viscosity of the oil increases with the d.; the increase is most rapid in elec. light. The oil is decolorized in sunlight and in elec. light, the rate of decolorization depending on the intensity of the light Neutralization, increase in temp. and the presence of air accelerate the rate of decolorization. The presence of non-fatty impurities, water and heat prevent decolorization. Increase in acidity is due somewhat to the action of sunlight, but chiefly to fungi In order to prevent excessive acidity and decompn. of the oil, it should be filtered and protected from the air which is present in the crude oil and causes its decompn. The sapon. no. and proportion of alc. acids increase on exposure to sunlight, elec. light and heat; filtration overcomes these defects The presence of insol. impurities in the oil increases the free acidity, the I no. and the tendency to decompn.; it decreases the sapon. no., the rancidity, the d. and the viscosity. In order that the oil may keep well, it should not contain any insol. org. impurities, the H_2O content should not exceed 0.2% and the container must be clean. A. P.-C.

Reagent for the determination of the acidity of soy-bean oil. N. I. Morozov *Chinese East Ry, Ltd., Dept., Trans. Agr. Branch* 1928, No. 7, 38–44; *Chimie & industrie* 24, 924(1930).—Dil. 10 cc. of satd. fuchsin soln. to 100 cc. with distd. H_2O, boil 30 min. to remove CO_2, add a 10% NaOH soln. to yellowish color, dil. to 100 cc., ext.

in a sepg. funnel with 100 cc. benzine. The reagent is the benzine soln. of fuchsin. The acidity of the oil is detd. by adding 1 cc. of reagent to 5 cc. of sample and comparing the color with that of standard oil solns. A. PAPINEAU-COUTURE

Effect of the humidity of circulating air upon the rate of absorption of moisture in cotton seed. M. K. THORNTON, JR., AND P. P. BRIGGS. *Oil Mill Gaz.* **33**, No. 6, 15–25 (1929).—Data, curves, conclusions, and equations expressing the relation of the absorption rate to relative humidity are given for humidities ranging from 30 to 100%. The conclusions obtained are: (1) The absorption rate is a function of the humidity. (2) An equil. moisture content is reached with const humidity. (3) Rapid deterioration begins at moisture contents in excess of 11%. (4) Meats, and not hulls, are principally responsible for moisture absorption J. E. LATTA

Rapid determination of moisture in cotton seed. M. K. THORNTON, JR., AND J. E. GRAGG. *Oil Miller & Cotton Ginner* **37**, No. 3, 19–20(1930).—A rapid distn. method for detn. of moisture in cotton seed is described. The sample is distd. with xylene in an app. arranged so that the distn. medium is refluxed, and the water is caught in a graduated sedimentation bulb. A 15-min. distn. removes the free moisture and the per cent moisture is obtained from the rise in water level in the bulb which has been calibrated The results obtained by this method are the same as those obtained by the official method. J. E. LATTA

Variation in samples of cotton seed taken from different parts of a slab. M. K. THORNTON, JR., AND W. T. COLEMAN. *Oil Mill Gaz.* **34**, No. 2, 5–7(1929).—Analyses of samples from different parts of a cake are compared with the analysis of the standard sample. The errors of "spot" sampling are evident from the data given. J. E. L.

Rolling and cooking of cottonseed meats. M. K. THORNTON, JR. *Oil Miller & Cotton Ginner* **36**, No. 4, 15–7(1930).—The rolling of the meats into a fine meal was found to lessen the time and lower the temp. necessary to rupture the oil cells. Also, if moisture in the form of steam is added to the meats during cooking, the cell rupture is aided, the quality of the cake is improved, less decompn. of chlorophyll takes place and the refining loss on the oil is decreased. A finishing temp. of 220°F. was found best for cooking J. E. LATTA

Oil from the seeds of Asteriastigma macrocarpa. D. H. PEACOCK AND CHIT THOUNG. *J. Soc. Chem. Ind.* **50**, No 1, 7–8T(1931).—The oil was obtained by extn. of the grated seeds with benzene and the following consts. were detd.: d_{35} 0.9501, N_{29} 1.4790, α_D^{29} + 52.8°, I no. 112.3, sapon. 195.6, unsaponifiable 3.0%. The oil was found to contain oleic and a satd. acid possibly palmitic, and also chaulmoogric or a mixt. of chaulmoogric and hydnocarpic acids. E. SCHERUBEL

Emulsions (Ger. pat. 512,979) **13.** Machine for the forming of soft soap and other materials of a similar consistency into pieces of fixed weight and shape (Norw. pat. 47,052) **1.** Heat-exchange apparatus suitable for treating oil or other liquids (U. S. pat. 1,790,151) **1.** Apparatus for separating oil, etc., and water (Ger. pat. 511,367) **1.** Purifying higher alcohols (Fr. pat. 690,958) **10.**

Rendering fat-containing materials. STANLEY HILLER. U. S. 1,789,751, Jan. 20. Fat contg. solid animal material is digested under high steam pressures to melt fats and oils, and the digested material is continuously dehydrated in a vacuum to a moisture content below 20%, free hot fats and oils are continuously drained from the dehydrated solids, and the residue is continuously expressed to sep. further fats and oils. App. is described. Cf. *C. A.* **24**, 3669.

Apparatus for melting tallow. GUSTAV HÖNNICKE. Ger. 511,132, April 10, 1929.

Steam distillation apparatus for fatty acids, etc. METALLGESELLSCHAFT A.-G. Ger. 511,641, Feb. 26, 1929.

Purifying fats and fatty oils. I. G. FARBENIND. A.-G. Brit. 335,089, Oct. 21, 1929. For removing slime from materials such as crude sesame, linseed or peanut oils or the like, they are heated to 70–200° with a small quantity of β-naphthalenesulfonic acid or other similar sulfonic acids, and the ppt. formed is filtered off after adding a small quantity of kaolin or the like.

Extracting fatty oils from fish, etc. K. F. WILHELM. Brit. 335,438, Oct. 19, 1929. See Fr. 685,002 (*C. A.* **24**, 5523).

Stabilizing vegetable or animal oils and fats. PAUL I. MURRILL and WALTER W. EVANS (to R. T. Vanderbilt Co.). U. S. 1,789,926, Jan. 20. A small quantity (suitably about 0.2–0.5%) of a condensation product of an aldehyde with an alkylenediaryldiamine such as that of aldol with ethylenediphenyldiamine is added to oils or fats such

as olive oil, etc. U. S. 1,789,927 relates to compns. of the same general character, mixed greases, etc.

Rendering animal oils and fats. The Allbright-Nell Co. Ger. 511,131, June 23, 1926. See Brit. 253,952 (*C. A.* 21, 2569).

Centrifugal separator for animal oils. Soc. Aktiebolaget Separator. Fr. 690,867, Mar. 1, 1930.

Extracting oils by compression. Fried. Krupp Grusonwerk A.-G. Ger. 513,311, Nov. 2, 1929. A device is described for regulating the supply of oleaginous fruits to pans in which they are warmed before pressing.

Medicinal soap. Ludwig Konstandt. Ger. 511,240, Nov. 3, 1929. Calcareous tufa is incorporated into soap contg. colloidal S, to act as a protective colloid for the S.

28—SUGAR, STARCH AND GUMS

J. K. DALE

Steam economics in sugar factories. Jar. Turek. *Listy Cukrovar.* 49, 90–2 (1930).—A survey of sugar establishments shows a range of 4.6 to 9.4 kg. of coal used per 100 kg. of sugar beets. Control steam consumption is discussed. F. M.

The influence of the liquor composition upon coloration during boiling. O. Reiss. *Listy Cukrovar* 49, 41–50(1930) —Four hundred g. of a 15% sucrose soln. was digested so that the concn. progressed from 15° to 60° Bg. in an hr.; this required the removal of 300 cc. water. The residue was made up to the original concn. (15° Bg.), filtered through asbestos and measured for color and p_H. The amount of coloration increased with increasing alky. up to p_H 10.4; neutral or acid solns. showed an insignificant color formation. With an addn. of 0.05% invert sugar, coloration occurred in alk. solns. only; the additional amt. of coloration is directly proportional to the quantity of invert sugar added. With solns. ranging from p_H 4 to 10 and contg. sucrose, invert sugar 0.05% and Na aspartate 0.05%, coloration developed only in the alk. digest. The coloration due to aspartic acid and invert sugar increased 88%; that due to invert sugar alone increased 50% under identical conditions. The additional color is due to nitrogenous dyes formed by the condensation of amino acids and invert sugar. By using a condensation product (prepd. by digesting invert sugar with aspartic acid for several hrs. on a water bath) with the above sucrose digests in 0.05% concns., additional coloration developed even in neutral or acid solns. The coloring matter which developed decomposed further (especially in alk. media) into more intensely colored compds; these hastened the decompn. of sucrose and also of invert sugar. The addn. of 0.02% Na_2SO_3 to the sucrose digest caused less coloration than in the control; it reduced colored substances and blocked aldehydes and ketones. The increase with Na_2SO_3 was 37%; with the control, 50%. The addn. of 0.001% $FeSO_4$ increased the color 85 to as much as 214%; the action is one of catalysis. With an increasing concn of the liquors, the colored pigments increase rapidly; this also applies to repeated evapns. Frank Maresh

The course of the first saturation. II. Commercial trials. J. Dědek and Th. Nielsen. *Listy Cukrovar.* 49, 119–29(1930).—A special arrangement by which the studies could be made on a large scale is described; 63 measurements were made during the active season. The alky. against phenolphthalein falls rapidly up to 0.15% CaO; for greater CaO values, the fall in alky. is very small. Fully 95% of all drops in alky. occur in the first period of satn.; the decrease in alky in the first half of the satn. period is 13.5 more rapid than during the second half. With the passage of Ca into the sediment, a more rapid drop in alky occurs than at the beginning of the satn.; the satn. is not retarded. The final period of satn. is marked by an increase in alky., due to an increased soly. of the pptd. CaO or to a recrystn. of the finely pptd. $CaCO_3$ to coarser grains, leaving a smaller surface area and leading to a reversed adsorption. This leads to a rapid release of adsorbed substances. The apparent dry matter detd. by Balling's method roughly follows the refraction readings. Polarization showed a linear drop during the early stages while the alky. remained const.; the sucrose is combined into an insol. form before the first cloudiness appears in the soln. Curves of elec. cond. are also given. Frank Maresh

Rationalization in the sugar mill and refinery. F. Hamous. *Listy Cukrovar.* 49, 149–50(1930). Frank Maresh

Chemical engineering advances in the cane sugar industry. George P. Meade. *Chem. Met. Eng.* 37, 746–50(1930); *Trans. Am. Inst. Chem. Eng.*, New Orleans Meeting, 1930, 12 pp. (adv. copy).—A review. C. L. Mantell

A preliminary record of some of the more important parasites of sugar cane insects in Negros. W. Dwight Pierce. *Sugar News* **11**, 735–6(1930). V. G. Lava

Means of separating foreign articles from beets. Fr. Paulík. *Listy Cukrovar.* **49**, 150(1930). Frank Maresh

The composition of sugar beets in various crop rotations. A. M. Nadezhdin. *Udobrenie i Urozhai* (*Fertilizers and Crops*) **2**, 29–34(1930).—Most of the records obtained were with beets following clover, peas, corn and clean fallow, with or without fertilization. The crop preceding sugar beets exerts a strong influence with respect to the compn. and quantity relations between tops and roots. In this respect the preceding crop exerts more influence than the fertilizers (in the amts. added). By manipulating the fertilization of the sugar beets properly and considering crop rotation effects it becomes possible to influence considerably the compn. of the beet, especially the N and sugar content. J. S. J.

Contribution to the biochemical characteristic of a sugar beet variety. B. A. Rubin, R. V. Feniksova and V. I. Zemskii. *Zhur. Sakharnoi Prom.* **4**, 92–106(1930).—Two varieties were investigated: Yanash—known for its high sugar content—and Khar'kov—known for its yield. For 4 years (1925–28) duplicate samples were taken every month from May through October and analyzed for carbohydrates, total N, protein N, amino acid N, ammonia N, amide N and org. bases. The results are presented in a series of tables and graphs, and the conclusions are summarized. J. S. J.

The use of agricultural and experimental beet studies to increase the efficiency of sugar manufacturing. Jar. Souček. *Listy Cukrovar.* **49**, 25–8(1930).—Sample computations are given in which the quality of beets, area of tilled beets, yield of the crop and method of caretaking are considered in increasing the efficiency of the sugar process. Frank Maresh

The conclusions of V. I. Tovarnitzkii and A. E. Maximovich on the influence of nitrogen on the yield and quality of sugar beets. K. M. Timofeyuk. *Zhur. Sakharnoi Prom* **4**, 89–92(1930).—T. analyzes the conclusions that NH_3 N is not a favorable nitrogenous fertilizer for sugar beets and shows that the p_H of the soil is the controlling factor, not the form of N. J. S. Joffe

The determination of the quotient of purity in beet juices. Frant. Herles. *Listy Cukrovar.* **49**, 139–40(1930).—Fine beet mash (52 g.) obtained from the Herles press is treated with 156.4 cc. H_2O (20°), shaken well in a glass vessel and filtered through paper. The sp. gr. of the filtrate is detd. in a pycnometer or refractometrically. Either 50 or 100 cc. of the filtrate is placed in a volumetric flask, treated with 0.1 of their vol. of a 25% AcOH soln., mixed, filtered and polarized The polarization values give the sugar content in the Schmitz tables. From these data the quotient of purity is obtained. Clarification may be effected with Pb acetate (basic), but the polarization values are decreased about 0.05°. Frank Maresh

Changes in dried sweet cossettes during storage. K. Šandera and C. A. Růžička *Listy Cukrovar.* **49**, 163–6(1930).—Sweet beet cossettes were dried in Eynshan under various conditions. Fluctuations in the range 10–30° caused no change in an 18-month period other than decreasing the reducing substances. Variations in temp. or light had no influence. The atm. humidity had a great effect; in one expt. the whole stock was disintegrated by high humidity. With ventilation, the cossettes retained a faultless appearance and in an 18-month period showed a decrease in the reducing substances when compared with nonventilated stock. To study this decrease, the ventilation rates were changed at various temps.; the entrance of air decreased the content of reducing substances (9% during the first 6 hrs.). The ventilation expt. explains the drop observed in the temp. fluctuation expt. and the experience with drying bins working with large excess of air. Frank Maresh

Notes on various methods of heating beet cossettes ahead of the diffusion battery. J. Zamaron. *Bull. assoc. chim. sucr. dist.* **47**, 442–6(1930).—The various methods of heating beet cossettes prior to and during the diffusion process are reviewed. Z does not consider any of the new processes of continuous diffusion as completely successful, the juices obtained being too dil., or the extn. irregular or insufficient. F. C.-C.

The conductometric determination of ash in raw sugar. K. Šandera. *Listy Cukrovar.* **49**, 21–5(1930).—Questionnaires show that the cond. method and interpretation of results are uniform in Czechoslovakia. The method is compared with procedures used in other countries and is recommended: (1) to replace the combustion method, (2) to obtain a new const. from the detn. of the abs. cond. which will be characteristic for each sugar. (3) to det. inorg. cations in raw sugar instead of an ash detn. Frank Maresh

The use of a single conductivity determination of salts (ash) in raw sugar. K. ŠANDERA. *Listy Cukrovar.* **49**, 151–61(1930).—The use of a technical cond. method is compared with visual indicators. In all detns., a soln. contg. 26 g. sucrose per 100 cc. H_2O was used; the results are computed as percent of sulfate ash and corrected. A correction coeff. computed for results obtained with Lange's method was 2.64×10^{-2}, for Trenkler's 2.66×10^{-2}. For other methods, obtained on foreign sugars, these coeffs. were higher: 2.80–2.90 for Lange's detns., 2.94 for Lundén's; this indicates that Czechoslovakian inorg. nonsugars show an av. higher cond. than those of German and Swedish raw sugars. A diagram is constructed showing graphical results for Zerban's method. From the characteristic cond. consts. the abs. cond. and Lundén's consts. m and n were computed for raw sugars of the 1929–30 season. A direct and consistent const. (n) among the sugars tested did not exist; the av. value was around 8.80. After the cond. is calcd., a table is given for detg. the abs. cond. to 4 decimal places. FRANK MARESH

The use of conductivity methods for the official determination of ash in raw sugars. J. PUCHERNA. *Listy Cukrovar.* **49**, 161–2(1930).—P. has used the Šandera cond. method for detg. ash on samples of sugar arriving at the refinery; ash is detd. at the mill gravimetrically on departing specimens. On the basis of a 2-year period of com. application, P. finds an abs. agreement between the detns. by the 2 methods in 18% of the detns. In 84% of the detns., the variation did not exceed ±0.03%; in 6% of the cases the difference exceeded ±0.04%. In 70.5% of the detns., the variation did not exceed 0.02%. These com. tests agree with the lab. tests of Herles, Šandera, etc. Errors were found to be greater with the gravimetric method than with the cond.; errors in the gravimetric method are due to mech. contamination of the samples. FRANK MARESH

An improved method for removing foam from continuous "Malaxers." FR. PAULÍK. *Listy Cukrovar.* **49**, 140–2(1930).—Angular troughs are described which collect the foam from the surface into a central container. FRANK MARESH

The contamination of pure sugar solutions by the material of the vessels. J. PELLER. *Listy Cukrovar.* **49**, 143–7(1930).—The soly. of glass in a 26% sucrose soln is 3.5 times as great as in H_2O. Studies were carried out at 20° and 100° and with 10, 26 and 45% sucrose solns. The soly. of glass increases with concn. of sucrose both at 20° and 100°; the greatest soly. and regularity of results occurred at 100°. Each curve is characteristic for the make of glass. The following glasses were studied: Cavalier used and new, Jena new and used, Pyrex, T, Maco and Resista; new Cavalier was less sol. than used; Jena glass was the least sol. Cu and Cr vessels were also used but gave inconsistent and irregular results. The greatest portion of the sol. compds. enter soln. during the first hr. of action; the addn. soln. after the first hr. was very small. FRANK MARESH

A simple device for the rapid determination of sugar in desugared cossettes. VL. STANĚK AND P. PAVLAS. *Listy Cukrovar.* **49**, 101–6(1930).—A small press, "kosmos," for yielding juice from desugared cossettes is described. Various degrees of pressure, methods of boiling and particles of raw materials have no effect upon the results. A well-mixed batch of desugared cossettes (0.5–0.75 kg.) is passed through the "kosmos." The first 50 cc. of juice is discarded, the next 100 cc. is digested with 0.75 g. of a powder contg. finely ground CaO 1 part and ordinary Pb acetate 25 parts. The mixt. is filtered and polarized. The sugar content is computed by multiplying the polarization value in a 200-mm. tube by 0.26, or it may be computed from tables. An analysis requires 8.5 min. FRANK MARESH

The isolation of choline from molasses. VL. STANĚK. *Listy Cukrovar.* **49**, 135–7 (1930).—Choline is pptd. in an alk. medium (by Reinecke's salts) in dilns. of 0.002% and in the presence of 20% sugar. Betaine is pptd. only in acid solns. Molasses was diluted with 5 vols. of luke-warm water, made alk. with Na_2CO_3, and permitted to stand. The clear soln. was decanted and treated with Reinecke's salts (0.5 part salt per 100 parts molasses). In a short period delicate crystals appeared. The mixt was left at a warm temp. for 2–3 days, washed by decantation and filtered. The residue while still moist was mixed with H_2O at 50°, treated alternately with $CuSO_4$ soln. and H_2SO_3 until SO_2 was evolved and the soln. yielded a blue filtrate. The soln. was boiled for several hrs., and the CuCNS filtered off. The clear filtrate was treated with an excess $Ba(OH)_2$, filtered, satd. with CO_2 and the final traces of Cu were removed with H_2S. After filtering, the soln. was evapd. to a small vol., acidified strongly with HCl, and evapd. to dryness *in vacuo*. The combined choline-Reinecke salt adsorbs some betaine in alk. soln. For sepg. choline-HCl from betaine-HCl, the dry mixt. was covered with abs. EtOH, and revapd. to dryness to remove the last traces of water. By

repeated extns. with abs. EtOH, choline-HCl crystd. as long colorless needles. The choline was identified as a $PtCl_4$ salt, by reactions with tannic acid, with I-KI soln. and with phosphotungstic acid. Full details for prepg. Reinecke's salt are given. Molasses contained 0.028–0.049% choline. FRANK MARESH

The electrical conductivity of molasses and sugar liquors. J. PELLER. *Listy Cukrovar.* **49**, 76–80(1930).—A special cond. cell permitting cond. measurements in molasses of high viscosity is described. The sucrose content and sp. resistance of the molasses are compared. The cond. of undiluted molasses is affected more by the water content than by the ash. The correlation of cond. and sp. gr. is invalid because of different viscosities with the same content of solids and compn. of nonsugars. During concn. processes, the resistivity of the molasses increases; crude liquors have a low resistance; refined liquors possess the highest. The presence of sugar crystals in molasses increases the resistivity of the liquid by decreasing the effective cross section of the conducting medium and by some unstudied undefined effects. F. M.

Determination of hydrogen-ion concentration by the Hellige comparator. J. GUILLAUME. *Bull. assoc. chim. sucr. dist* **47**, 450-4(1930).—A detailed review of the method of use is given. F. CAMPS-CAMPINS

Some data about calcium carbonate hydrate. V. V. YANOVSKII AND G. M. BUNICH. *Zhur. Sakharnoi Prom.* **4**, 265-73(1930).—If a soln. of sugar and CaO is carbonated with CO_2 to a thick mass, excess of CO_2 removed, the flask tightly stoppered and left at a temp. of about 10° for 20–30 hrs., the amorphous residue will crystallize and the polarization of the filtrate will be somewhat higher than that of the initial soln. of neutralized monosaccharate. Several expts. were performed and it was found: $CaCO_3 \cdot 6H_2O$ can be obtained by different methods at a temp. under 20°. The hydrate forms crystals of the monoclinic system with sp. gr. 1.808; it is sol. in monosaccharate, easily loses its water and changes into a modification of $CaCO_3$ with sp. gr. 2.6205 (probably Vaterit). Sucrose and glucose influence the form of crystallography of $CaCO_3$. Many irregularities in sugar manuf. are probably due to improperly conducted satn., which interferes with the conversion of sol. $CaCO_3$ into the insol. form. Gradual satn., increase of the temp. to 100° at the last period of carbonation with decreasing rate of speed, decrease of alky. to a min. and return of the filter-press cakes to diffusion juice will aid the filtration and quality of the juices. V. E. BAIKOW

The washing of diffusion cells. E. PŠENIČKA. *Listy Cukrovar.* **49**, 166–9(1930).—A washing device is described; it functions at a low pressure head and small vols. of water. It does not form channels and washes the inside wall of the diffusion cells. FRANK MARESH

The commercial production of glucose. A. E. WILLIAMS. *Ind. Chemist* **6**, 495–9 (1930).—After a brief presentation of the chemistry of the hydrolysis of starch and the influence of pressure upon the rate of hydrolysis, W. gives an account of the manuf. and uses of the com. products resulting from this hydrolysis. Two illustrations and a short list of references are included. E. G. R. ARDAGH

Effect of amino acids on rotation of glucose and fructose and its significance to determination of sucrose by double polarization methods. D. T. ENGLIS AND F. A. DYKINS. *Ind. Eng. Chem., Anal. Ed.* **3**, 17–21(1931).—The effect of alky. on the combination of glucose with glycine is extended with studies of the effect of temp. and different mol. relationships. The extent of combination was followed polarimetrically and by an iodometric detn. of uncombined glucose. The combination increases with increase in p_H. At 25° the glucose-glycine complex was almost completely reversed by acidification while at 35° some of the stable type of melanoidal combination was evident. Near 0° the extent of the reaction was very limited. Similar expts. with asparagine in place of glycine gave the same general effects although of different magnitudes. Fructose showed no optical changes in the presence of either glycine or asparagine with increasing p_H, which could not be attributed to alky. alone. The significance of the effect of p_H, of time of standing and of temp. on the detn. of sucrose in the presence of amino acids is discussed. H. W. LEAHY

Determination of glucose in presence of fructose and glycine by iodometric method. F. A. DYKINS AND D. T. ENGLIS. *Ind. Eng. Chem., Anal. Ed.* **3**, 21–3(1931); cf. preceding abstr.—A study is made of the effect of fructose and glycine upon the detn. of glucose by oxidation with alk. I soln. in the presence of NaOH, Na_2CO_3 and phosphate buffers. The rate of oxidation is so rapid that the extent of condensation of the glucose with glycine is negligible, and there is no tendency for low results due to this cause if the soln. is neutral at the beginning of analysis. The results are always higher than those due to glucose alone because of reduction of I by fructose and glycine. Even though the fructose-glycine complex is formed immediately it has little protective ac-

tion against the oxidizing agent. Of the various basic reagents used with I, Na_2HPO_4 had a no. of advantages and gave the most satisfactory results. H. W. LEAHY

Ionometer system of P. V. Golovin (GOLOVIN, PATER) **1.** Waste waters from sugar factories (MANUELLI, ANSELMI) **14.** Are waste waters from a potato-starch factory injurious to fish? (PAROW) **14.** Influence of soil conditions, fertilizer treatments and light intensity on growth, chemical composition and enzymic activities of sugar beets (TYSON) **15.** Polysaccharide ether esters (Brit. pat. 334,897) **10.** Adsorbent comprising C, Fe and Fe oxide [for decolorizing sugar juices, etc.] (U. S. pat. 1,789,507) **18.**

KUKHARENKO, I. A.: **Ratgeber des Zuckerbochers.** 5th ed. Leipzig: Gustav Fock. M. 5. Reviewed in *Intern. Sugar J.* **33**, 38(1931).

WOHRYZEK: **Chimie de l'industrie du sucre.** Paris: Ch. Béranger. 754 pp. F. 235.

Sugar-sap diffuser. ERNST LEHNE. Ger. 512,788, Dec. 31, 1929. Details of construction are given.

Apparatus (with agitating and cooling devices) for obtaining sugar crystals from massecuite. F. L. ALLEN. Brit. 335,022, Aug. 16, 1929. Structural features.

Caramel. FELIX ALBRECHT. Ger. 511,112, Mar. 24, 1929. A soln. of sugar in a strong aq. soln. of NH_3 is heated under pressure at 105–120°. The pressure may be released and restored again during the process. Volatile by-products may be removed by passing steam through the product.

Solvent for carbohydrates. JULIUS BÖLCS and HÉLÈNE GASSELSEDER (NÉE VON VARGHA). Fr. 691,624, Mar. 8, 1930. A solvent for carbohydrates, particularly cellulose, is made by condensing or polymerizing aldehydes or ketones in aq. soln. and in the presence of a reduction product having a catalytic action with derivs. of CO_2 such as urea, sulfourea or their alkyl products or with alcs., and distg. the product obtained

Apparatus for extracting starch by washing. OTTO RIEMANN. Ger. 514,077, Nov. 27, 1927.

Drying starch. MAXIMILIAN SPROCKHOFF. Ger. 514,078, Jan. 27, 1928. Centrifuged starch is mixed with dried starch to produce a mixt. contg. less than 35% of water Relatively high heating-surface temps. can then be applied in drying the mixt.

29—LEATHER AND GLUE

ALLEN ROGERS

Action of pepsin on leather. V. S. SADIKOV AND E. BLINCHIK. *Zhur. Prikladnoi Khim.* **3**, 905–14(1930).—Pepsin has a decided action on leather and shortens the time required for tanning. V. KALICHEVSKY

Detection of the method of tanning used in mineral tanning with a small sample of leather. KARL KLANFER. *Mikrochemie* **3**, 34–7(1931).—*Detection of Cr.*—Shave off a piece of the leather (less than 1 mg.) and fuse its ash with a little Na_2O_2 in a micro porcelain crucible Treat the product with a few drops of 6 *N* H_2SO_4, and add 1–2 drops of 2% diphenylcarbazide soln. in alc. If Cr is present, an intense violet coloration will be obtained. *Detection of Fe.*—Treat the ash from a small sliver of leather with a drop of concd. HNO_3, evap. to dryness, ignite and fuse with a little $KHSO_4$. Dissolve the cold melt in dil. H_2SO_4, and test with a drop of KCNS soln. *Detection of Al.*—Fuse the ash from a little leather with $KHSO_4$, dissolve the melt in a few drops of hot water and test with alizarin or with morin. In the former case, transfer a drop of the soln. to a piece of dry test paper which has been impregnated with $K_4Fe(CN)_6$. This serves to hold back any Fe or Cr, but the Al passes through, forming a circular outer zone on the paper. Add to this a drop of satd. alizarin soln. in alc., and hold the paper over the mouth of an NH_4OH bottle. The violet-colored Al lake is formed. Sometimes, when considerable Al is present, the strawberry-red of Al alizarinate is noticeable but, by heating, this can be made to disappear and the desired violet shade obtained. To apply the morin test, take a drop of the soln. of the melt in a small pointed tube, add 2 drops of hot 2 *N* NaOH, centrifuge and treat the alk. soln. with a little AcOH and a drop of a satd. soln. of morin in MeOH A green fluorescence shows Al is present. W. T. H.

Technical preparation of glue and gelatin. D. GURIAN. *Kolloid-Z.* **54**, 106–12 (1931).—A review of German patents. A. FLEISCHER

Heat-coagulable protein from gelatin (SHEPPARD, *et al.*) 11A.

Tanning. D. L. LEVY. Brit. 335,252, June 21, 1929. See U. S. 1,742,514 (*C. A.* 24, 1247).

Tanning. J. R. GEIGY A.-G. Ger. 514,240, Aug. 6, 1925. Skins are partly tanned by means of H_2SiF_6 or its salts, the tanning being completed simultaneously or subsequently by means of vegetable, mineral or synthetic tanning agents, or sulfite cellulose lye, or mixts. of these. Examples are given.

Tanning skins and leather. MAXIME JOLY and LOUIS MAINGUENEAU. Fr. 692,347, Mar. 20, 1930. Skins and leather are tanned by various chem. solns. used separately or in combination such as sulfates of Cd, Co, Cu, Al, Fe, Ni, Zn and NH_4 vanadate.

Tanning sole leather. CHARLES KANNEL. U. S. 1,789,629, Jan. 20. Cleaned limed skins are treated for 16–24 hrs. in a bath to which K chromate 250, H_2BO_3 200, formic acid 180 and glycerol 50 g. are added for every 100 qt. of water in the bath.

Treating different portions of hides by separate finishing operations. W. B. CAMPBELL. Brit. 334,848, Feb. 25, 1929. For boot or shoe manuf. or other purposes, a hide, after tanning and prepn. to receive a surface finish, is cut into selected parts (according to the varying quality of the hide) for articles to be produced and these parts are then individually finished as required. To enable storage of the hides before finishing, there may be added about 2% of lactic acid to chrome tanning liquor, or the hides may be conditioned after a chrome bath by soaking in a soln. formed with NaCl, Na_2SO_4, glucose and glycerol. Alum-tanned hides may be similarly treated. Fat liquoring and other treatments are also described.

Leather dyeing composition. LYNN A. WATT (to Monsanto Chemical Works). U. S. 1,789,375, Jan. 20. *o*-Dichlorobenzene 30 g., spirit-sol. nigrosine 7.5 g. and "red oil" (oleic acid) 5 g. are mixed with sufficient denatured EtOH to make a total of 100 cc.

"Patent leather." ARTHUR S. HUBBARD (to Turner Tanning Machinery Co.). U. S. 1,789,550, Jan. 20. An app. is described with fused quartz Hg-vapor lamps for treating varnished hides or fabrics with ultra-violet rays and with app. for conditioning and humidifying the air in contact with the material.

30—RUBBER AND ALLIED SUBSTANCES

C. C. DAVIS

The rubber industry in 1930. S. A. BRAZIER. *Ind. Chemist* 7, No. 72, 9–12(1931). E. H.

Structure viscosity of rubber solutions. B. DOGADKIN AND D. PEWSNER. *Kolloid-Z.* 53, 239–45(1930).—The viscosities of pale crepe, smoked sheet and milled rubber solns. in C_6H_6 at 15°, 25° and 45° were measured at varying pressures. Deviations from the Hagen-Poiseuille law were checked. The results may be expressed by the Waele-Ostwald formula: $\eta = KP^{1-n}$. The exponent n of this equation may be used as a measure of structural peculiarities of different rubbers and it characterizes various changes in the aggregation of rubber. With increasing temp., n increases with diminution in viscosity. Milling, which represents colloid-chem. processes of disintegration, causes a large decrease in the structure viscosity exponent. A similar process occurs in the aging of rubber solns. ARTHUR FLEISCHER

Micromanipulations on latex in dark fields. E. A. HAUSER. *Kolloid-Z.* 53, 78–82 (1930).—New investigations have confirmed the previous results of Freundlich and H. (cf. *C. A.* 19, 2280). For latex from trees of different age, the thickness of the solid layer of the latex particle increases with the age of the tree. By coagulation of the latex, particles with noticeable elastic properties are obtained, in which the consistency of the inner and outer layers is not distinguishable. ARTHUR FLEISCHER

Determination of p_H of ammonia latex. J. MCGAVACK AND J. S. RUMBOLD. *Ind. Eng. Chem., Anal. Ed.* 3, 94–7(1931).—Details of expts. are given in which the p_H of latex was detd. at various NH_3 concns. by the use of indicators and with the glass electrode. The 2 curves thus obtained were comparable but not identical. The glass electrode method gives results which are reproducible and accurate up to p_H 9.5, and which are fairly accurate up to p_H 11.0. In more alk. solns. it is necessary to carefully calibrate each electrode. An ordinary galvanometer gave satisfactory results with potentials down to 1 millivolt, and the asymmetry of the glass was negligible. W. T. H.

The constitution of rubber. R. PUMMERER. *Kolloid-Z.* **53,** 75–8(1930).—A chem. method is needed to decide whether the rubber mol. is a system of closed isopentene rings or is a long chain mol. ARTHUR FLEISCHER

Solvent action in rubber. P. STAMBERGER AND C. M. BLOW. *Kolloid-Z.* **53,** 90–5(1930); cf. *C. A.* **23,** 4846.—Osmotic pressure detns. of rubber solns. in toluene at 25° checked the older results of Posnjak, though the rubber samples were from entirely different sources. The plot of $\log P$ against $\log c$ for the equation $P = P_0 c^K$ does not give a straight line, showing that K changes with the concn. There is no difference between the osmotic pressure of gels and solns. Different rubbers gave the same values of the osmotic pressure at like concns. The viscosity-pressure diagrams of petr. ether and benzene solns. of milled rubber were not very different, though optically they were quite different. The viscosity curves of solns. of dead-milled rubber, the same rubber with 15% of gas black dissolved at once and after 30 days, showed increasing viscosities in the above order. These solns. were thixotropic. ARTHUR FLEISCHER

The fusion curve of natural rubber. G. v. SUSICH. *Naturwissenschaften* **18,** 915–6 (1930).—Previously frozen raw rubber has a "m. p." at 35–8°. The crystal interferences in the x-ray diagram disappear at this temp. and the rubber becomes elastic. High stretching raises this m. p. A diagram is given of elongation *vs.* temp., in which the m.-p. curve is shown. Crystn. is characterized by the initial appearance of the (200) interference. For 1000% elongation the m. p. is between 80° and 90°.
B. J. C. VAN DER HOEVEN

Rubber preservatives. RUDOLF DITMAR. *Chem.-Ztg.* **54,** 994–6(1930). —A review, with particular reference to the many patented substances. C. C. DAVIS

Determination of alkalinity of reclaimed rubber. HENRY F. PALMER AND GEORGE W. MILLER. *Ind. Eng. Chem., Anal. Ed.* **3,** 45–8(1931). —A new method for detg. the relative alky. of reclaimed rubber is described, and compared with an earlier method already described (cf. *C. A.* **22,** 1058). The alkali is extd. by digestion of the reclaimed rubber in a mixt. of EtOH, C_6H_6 and water. The expts. show that the new method gives reliable results, which are approx. 4 times as precise as those of the previous method. This greater precision is a result of the elimination of much of the personal error, of extn. of a larger proportion of alkali, and of a closer end point in the titration. C. C. D.

Overflow during vulcanization of rubber and its results. F. KIRCHHOF. *Chem.-Ztg.* **54,** 906–8(1930). —A criticism of a paper by Ditmar and Preusse (cf. *C. A.* **24,** 5179–80) with certain new data on the expansion of rubber mixts. during vulcanization. These new data, in conjunction with the results of D. and P. and other investigators, lead to certain conclusions. (1) Raw rubber and rubber mixts. show in the temp. interval between room temp. and the temp. of vulcanization considerable evolution of heat. (2) The d. of raw rubber and rubber mixts. is, within narrow limits (2–3 decimals), dependent upon the time and temp. of mastication. (3) Upon storage the d. increases as a result of reaggregation. (4) Soft vulcanization in principle involves a contraction of vol., *i. e.*, an increase in d. Under normal conditions this increase is about 2.0% (calcd. on the unvulcanized mixts.). (5) Hard-rubber vulcanization likewise involves a contraction of vol., *i. e.*, increase in d., which may reach 6%. (6) The pressure used in vulcanizing increases the d., and this is of the same order of magnitude as the increase resulting from reaggregation. (7) Certain active fillers (heavy metal oxides and sulfides) when in large proportions have a similar contractive effect to small proportions of Se or considerable S. (8) These effects are probably attributable to capillary or affinity forces. (9) The overflow which takes place during vulcanization in a press is chiefly the result of purely mech. factors (compression) but is to some extent a result of heat expansion and vol. contraction. C. C. DAVIS

Synthetic materials [rubber] (Fr. pat. 691,901) **18.**

Annuaire technique de caoutchouc de la gutta-percha et des industries qui s'y rattachent. Paris: Cillard. 200 pp. Paper, F. 49. Reviewed in *J. Franklin Inst.* **210,** 121(1930).

Antioxidants. Wilmington, Del.: Rubber Chemicals Section, E. I. du Pont de Nemours & Co. 32 pp. Free. Reviewed in *Rubber Age* **28,** 428(1931).

HARPEN, N. H. VAN: **The Electrometric Determination of the Hydrogen-Ion Concentration on the Latex of Hevea Brasiliensis and Its Applicability to Technical Problems.** Medan: Varekamp & Co. 460 pp. Reviewed in *Rubber Age* **28,** 428(1931).

Rubber. THE ANODE RUBBER CO., LTD. Ger. 511,837, Feb. 23, 1927. Aq. disper-

sions of vulcanized or unvulcanized rubber, regenerated rubber, factice, etc., are obtained by adding a dispersion agent or protective colloid, *e. g.*, olein and NH_3, during the mech. working up of the rubber, etc., with alkali.

Rubber. FIRMA TOKYO GOMU KABUSHIKI KAISHA. Ger. 512,747, June 4, 1927. A rubber mixt. which floats in water and withstands mineral oil is prepd. by mixing alkali soap with the rubber from factice S and diphenylguanidine Inorg. filling material is omitted.

Rubber. ISIDOR TRAUBE. Ger. 512,599, July 13, 1926. Latex or latex concentrations are coagulated by addn. of gall or gall-contg. material Org solvents such as C_6H_6, $CHCl_3$, oil of turpentine, etc., may be added before or during the addn. of gall.

Rubber. DUNLOP RUBBER CO., LTD., and THE ANODE RUBBER CO., LTD. Fr. 691,556, Mar. 7, 1930. The alkalinity of rubber latex dispersions, which have been preserved by a base such as NH_3, is reduced by a treatment with absorbent agents belonging to the class which contain SiO_2-gel, colloidal Al_2O_3 and active C.

Rubber. SHERARD O. COWPER-COLES. Fr. 691,912, Nov. 15, 1927. Rubber is prepd. by electrolytic deposition from latex on a suitable base as anode in an intermittent manner, either by passing the current at intervals through the latex or by removing at intervals from the action of the current the surface on which the rubber is deposited. NH_4OAc may be added to the latex to increase the cond. Powd. metal may be deposited at the same time as the rubber

Rubber latex. JACQUES AUMARÉCHAL and GEORGES ROBRIEUX. Fr. 692,076, April 16, 1929. The viscosity of latex is increased by submitting it to a cooking and then pptg. at low temp. the vegetable gelatinous materials without coagulating the globules of rubber by chem. salts having a sp. action on these materials. An example is given using $Pb(OAc)_2$ as pptg. agent. Fr. 692,077 describes the removal of preservers from latex by converting them into accelerators of vulcanization, by the introduction of chem compds. capable of uniting with them without coagulating the rubber. Thus, if NH_3 or aromatic amines are used as preservers, aldehydes or CS_2 are added to convert them to accelerators Fr. 692,078, May 2, 1929, describes an app. for concg. latex.

Rubber deposition by electrophoresis. SIEMENS & HALSKE A.-G. Brit. 334,871, Jan. 17, 1929. The process for electrophoretic deposition of rubber by a. c. described in Brit. 307,747 (*C. A.* **24**, 265) is modified by the introduction of electrolytes (such as $MgCl_2$, NH_4Cl or HOAc) into the latex itself or by satg. the porous molds surrounding the electrodes with electrolytes (instead of or in addn. to the introduction of electrolytes into the electrode spaces). A detailed example is given of the use of electrodes covered with plaster of Paris and satd. with a 20% $CaCl_2$ soln.

Rubber compositions. THE BARRETT CO. Fr. 691,828, Mar. 12, 1930. A softening and dispersing agent for making rubber compositions consists of a tar oil free from cryst. substances at 25°, having a sp. wt. not less than 1.06 at 38° and boiling above 200°. Examples and the properties of the resulting compns. are given.

Preserving aldehyde-amines in rubber batches. SHERMAN I. STRICKHOUSER (to The Dominion Rubber Co., Ltd.). Can. 308,123, Jan. 27, 1931. The deterioration of aldehyde-amine condensation products in rubber batches is retarded by mixing the products with rubber in the presence of hydroquinone.

Antioxidant for rubber. ALBERT M. CLIFFORD (to Goodyear Tire and Rubber Co.). Can. 308,362, Feb. 3, 1931. Rubber is preserved by vulcanizing in the presence of an arylamine deriv. of diaminotriphenylmethane.

Age-resisting rubber. HAROLD W. ELLEY (to E. I. du Pont de Nemours & Co). Can. 308,347, Feb. 3, 1931. Rubber is made resistant to aging by incorporating the reaction product of α-naphthol and an amine in the mixt. before vulcanization. Cf. *C. A.* **24**, 3925.

Retarding the aging or deterioration of rubber. THE NAUGATUCK CHEMICAL COMPANY. Ger. 512,659, Feb. 8, 1930. The process consists of treating rubber with diaminodiphenylmethane or a CH_2O condensation product. Tables showing the effect of these addns on rubber after intervals of artificial aging are given.

Retarding deterioration of rubber. WM. S. CALCOTT and WM. A. DOUGLASS (to E. I. du Pont de Nemours & Co.) U. S. 1,789,696, Jan. 20. There is incorporated with the rubber a small proportion (suitably about 5%) of a reaction product of C_2H_2 with an amino compd such as aniline, benzidine or *p*-aminophenol.

Working up scrap rubberized fabric. WARREN BROTHERS CO. Ger. 511,087, Jan. 21, 1926. Scrap rubberized fabric, *e. g.*, automobile tires, is comminuted and then mixed at a raised temp. with mineral fillers and bituminous material. The compn. so obtained is suitable for *road-making, roofing,* etc Details are given.

Hollow rubber articles. AYRTON SAUNDERS & CO., LTD., and F. TWELLS. Brit. 335,267, June 4, 1929. Articles formed of rubber over a foundation layer such as canvas are provided with a lining of different rubber compn. from the outer rubber facing and contg. about 5% carbon black so that it has a lower capacity for absorbing water.

Material for gas receptacles. A. GOLDBERG. Brit. 335,145, Feb. 5, 1929. A material suitable for making gas receptacles such as those used in respiration expts. comprises 2 rubber sheets with an intervening sheet of metal foil, either stuck or vulcanized together.

Artificial rubber. I. G. FARBENIND. A.-G. (Walter Bock and Eduard Tschunkur, inventors). Ger. 511,145, Jan. 15, 1927. See Brit. 283,840,(*C. A.* **22**, 4274).

Coating compositions, etc., from synthetic rubber. I. G. FARBENIND. A.-G. Brit. 334,961, March 15, 1929. Polymerization products of diolefins produced as described in Brit. 333.872 (*C. A.* **25**, 710) are hardened by any suitable method such as by the action of air or O in the presence of oxidation catalysts, treatment with $AlCl_3$ or action of S or S_2Cl_2 with or without vulcanization accelerators. The hardened material may be used for *lacquer coatings, artificial threads, linoleum manuf.*, etc., with or without admixt. with other materials such as cellulose esters, natural or artificial resins, solvents, softening agents, waxes and drying oils. Numerous details and examples are given.

Polymerizing butadiene hydrocarbons. HANS LECHER and ALBERT KOCH (to I. G. Farbenind. A.-G.). U. S. 1,789,873, Jan. 20. An emulsion such as may be formed of isoprene and Na oleate soln. is homogenized before polymerization.

Rubber for dental purposes. CHRISTE JOANNIDES. Ger. 513,316, June 13, 1923. See Brit. 224,032 (*C. A.* **19**, 1210).

Hollow articles of vulcanized rubber. I. G. FARBENIND. A.-G. (Wilfried Genth, inventor). Ger. 511,056, Mar. 22, 1928. See U. S. 1,765,666 (*C. A.* **24**, 4186).

Vulcanizing rubber objects. ERNST WLCECK. Ger. 513,429, Jan. 16, 1927. Addn. to 452,466. According to Ger. 452,466, prepd. sheets or other rubber articles are vulcanized in the cold by alternate immersion in a 4–10% aq. SO_2 soln. and a satd. aq. soln. of H_2S. The treatment may be repeated as required. This method is now modified by adding to the rubber compn. a compd which will liberate S when the article is immersed in a suitable bath. Thus, CaS and other sulfides may be added to the compn., and the article immersed in an aq. soln. of SO_2.

Vulcanized products. JOSEPH C. PATRICK and NATHAN M. MNOOKIN. Fr. 692,235, Mar. 18, 1930. Rubber is mixed with a plastic material formed of a polysulfide and olefin (see Fr. 656,114, *C. A.* **23**, 4030) and vulcanized by heat. The plastic material and free S are chosen so that the content of S in the product is at least 50%.

Vulcanizing core. DUNLOP RUBBER CO., LTD., and T. NORCROSS. Brit. 335,304, July 12, 1929.

Rubber vulcanization (air and steam supply and regulating system). MELVON A. MARQUETTE (to Fisk Rubber Co.). U. S. 1,790,011, Jan. 27. Various details of procedure are described.

Vulcanizing rubber. FREDERICK W. FARR. Fr. 692,172, Feb. 13, 1930. Rubber or like compns. are vulcanized in the cold by causing dild. S_2Cl_2 to pass through the whole thickness of the rubber, which is cut up into granules or little pieces to allow the penetration of the vulcanizing fluid, or fibrous material is agglomerated with the rubber to allow penetration of the fluid. Cf. *C. A.* **24**, 3400.

Vulcanizing rubber. JOSEPH C. PATRICK. Fr. 691,743, Mar. 11, 1930. Rubber is vulcanized by heating it with a plastic compn. made by the reaction of an alkali polysulfide on a dihalogen olefin and contg. 75% or more of S. Compds. such as ZnO, $(CH_2)_6N_4$, Pb oleate and lampblack may also be added.

Vulcanizing rubber. I. G. FARBENIND. A.-G. Fr. 691,821, Mar. 12, 1930. The vulcanization of natural or artificial rubber is accelerated by adding to the mass to be vulcanized the products of the action of NH_3 on unsatd. aldehydes such as crotonic aldehyde, acrolein, methylpropylacrolein and ethylpropylacrolein.

Vulcanizing rubber, etc. SOCIETÀ ITALIANA PIRELLI. Fr. 691,456, Mar. 7, 1920. Rubber, ebonite, etc., are vulcanized by a preliminary heat treatment in molds and a subsequent complete vulcanization of the objects immersed in water in a suitable autoclave, carried to the vulcanization temp. and kept at a pressure greater than the characteristic pressure of satd. steam at that temp.

CHEMICAL ABSTRACTS

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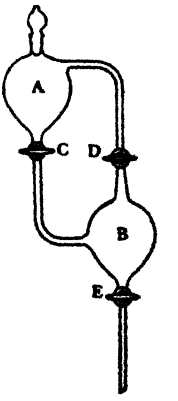
1—APPARATUS AND PLANT EQUIPMENT

W. L. BADGER

A new high-efficiency glass condenser. PAUL R. CRANDALL. *J. Lab. Clin. Med.* **16**, 89–91(1930).—A glass condenser is described which may be used in an all-glass distg. system. Approx. 2 l. of distd. H_2O per hr. may be produced. E. R. MAIN

A simplified apparatus for the extraction of liquids. R. B. FORSTER. *Chemistry and Industry* **50**, 44(1931).—The app. was designed for extg. H_2O solns. with lighter solvents. A tube from the closed bottom of the cylindrical extractor connects with the boiling flask. A by-pass from this tube enters the extractor about half-way up, serving as a passage for the vapor to the condenser on top and as a return for the solvent to the boiling flask. The soln. to be extd. is placed in the lower half of the extractor, the condensate falls into a thistle tube which delivers it at the bottom of the soln., through which it rises and overflows to the boiling flask, its rise being impeded by baffles attached to the stem of the thistle tube. Cf. *C. A.* **20**, 3817. J. H. MOORE

A separatory funnel for washing heavy volatile liquids. HAROLD S. KING. *Proc. Trans. Nova Scotian Inst. Sci.* **17**, 240–1(1930).—Two separatory funnels are sealed together in such a way (see fig.) that a heavy liquid in the first can be sepd. from a supernatant liquid and delivered to the 2nd funnel without contact with the outside atm. After removal of the supernatant liquid, the heavy liquid can be returned to the first funnel for rewashing. RACHEL BROWN



An improved pipet manipulator. D. C. B. DUFF. *J. Lab. Clin. Med.* **15**, 1027–8(1930). E. R. MAIN

Improved slow-combustion pipet for gas analysis. H. R. AMBLER. *J. Sci. Instruments* **8**, 18–9(1931).—O is led into the gas through a capillary side tube entering near the bottom of the Hg in the pipet, thus preventing back-diffusion of the gas. Analyses by absorption in liquids may be made by bubbling the gas through the side tube. J. H. MOORE

Automatic gas-analysis apparatus based on the thermal conductivity of gases, and its use in industry. PAUL JARRIER. *Chaleur et ind.* **11**, 181–5(1930).—A table of densities, viscosities and thermal conductivities of air, N_2, O_2, CO, CO_2, water vapor, H_2, C_2H_2, CH_4, lighting gas, NH_3 and SO_2 is given. The Ranarex app. is described; it gives good results. The principle of the Dommer "Unograph" is illustrated and described. The Siemens elec. CO_2 indicator is described. The elec. measurement of the thermal conductivities of mixts. of gases and its applications are discussed. S. L. B. ETHERTON

A thermal method for the rapid measurement of carbon monoxide. GERHARD STAMPE. *Messtech.* **6**, 267–70(1930).—The Drager app. is described. It depends on measuring the temp. of the gas on entering and leaving a catalyzing chamber in which it is oxidized to CO_2. The theory is discussed, with 7 references. Cf. *C. A.* **24**, 5897. J. H. MOORE

Determination of humidity. G. ALIVERTI. *Nuovo cimento* **6**, cxvii–cxxiii(1929).—A discussion of the use of various types of hygrometer. B. C. A.

A convenient hydrometer for determining the specific gravity of heavy liquids. A. C. TESTER. *Science* **73**, 130–1(1931).—The app. was devised for liquids of sp. gr. between 2.0 and 5.0 for use in *the sepn. of minerals.* Only 5 cc. of the liquid is necessary. The sp. gr. of solids may also be detd. J. H. MOORE

An improved portable p_H apparatus. ARAO ITANO. *Ber. Ohara Inst. landw. Forsch.* (Japan) **4**, 471–4(1930); cf. *C. A.* **23**, 3602.—The app. previously described has been changed to make one instrument serve as both galvanometer and millivoltmeter; it is manipulated by means of a newly constructed double-throw switch. The

wiring diagram and a photograph of the app. are shown. The instrument measures the e. m. f. of the cell: quinhydrone, standard p_H soln. | saturated KCl | sample, quinhydrone. N. A. LANGE

Deposition filter process. ARMIN BLUMENTHAL. *Pharm. Presse wiss-prakt. Heft* 1930, 165–6.—Several illustrations are given of an improved type of filter for large operations; it has compartments filled with frames carrying wire gauze on which the filter mass (asbestos or other suitable material) is flooded and deposited in thin paper-like layers. The various operations are carried out under pressure and suction. W. O. E.

The Schacht-Wheel drier. VON BEZOLD. *Chem. App.* **17**, 217–8(1930).—The drier contains a series of cylinders vertically arranged, over which the material is passed and drops to the wheel below. Hot air is blown upward. The drier will not operate with materials which are larger than hazel-nut size or which are sticky or liable to cause explosion. M. C. ROGERS

The sucking off and precipitation of dust and vapors. A. VOGT. *Chem. App.* **17**, 209–10(1930).—The app. is arranged so that gases contg. dust are put in contact with a stream of water and passed into a settling tank. The sludge settles and the clear liquor overflows to a launder and is pumped again to the mixing chamber. The settled sludge can be pumped off through a discharge opening in the bottom of the settler. M. C. ROGERS

An instrument to measure soil consolidation. CORNELIUS DAVIES. *J. South-Eastern Agr. Coll., Wye, Kent*, No. 27, 225–7(1930).—An instrument for measuring the compactness of soils consists of 2 telescopic tubes within which is a supported spring balance so arranged that a push on the handle of the appliance extends the spring, a scale calibrated in 0.5 lb.; a max. reading indicator; and a set of steel probes of different lengths and diams. K. D. JACOB

Illumination of the half-shadow polarimeter with a mercury-quartz lamp. HANS N. NAUMANN. *Biochem. Z.* 229, 269–70(1930).—The use of the Hg-quartz lamp as a source of illumination increases the accuracy of the polarimeter 2–3 times; this is of great significance in the study of weakly rotating substances. S. MORGULIS

Theory of optical pyrometers and description of some new improvements. S. HELD *Chaleur et ind.* **11**, 403–10, 473–80(1930). S. L. B. ETHERTON

Leonard Hill acetone-methylene blue actinometer. T. W. B. OSBORN AND A. D STAMMERS. *Brit. J. Actinotherapy* 5, 68–9(1930).—Exclusion of air is essential for securing reproducible results. B. C. A.

An air-thermostat for corrosion research. U. R. EVANS. *Chemistry and Industry* **50**, 66–7(1931).—A uniform temp. is maintained by forced circulation of air from the chamber through channels between the double walls and back to the chamber. The elec. heating is controlled by an adjustable contact thermometer. J. H. MOORE

Photoelectric cell has definite place in color measurement (SCOTT) **25.** Electrometric measurement of very low pressures by means of ionization currents; the space charge manometer (MOLTHAN) **2.** Apparatus for determining the tendency of coal and other materials for spontaneous combustion (KREULEN) **21.**

DUBSKÝ, J. V.: **Selbstätige Filtrationsapparate.** Leipzig: Georg Thieme. 64 pp. M. 3. Reviewed in *Chem. News* **142**, 110(1931).

RABALD, ERICH: **Werkstoffe. Physikalische Eigenschaften und Korrosion.** Band I. **Allgemeiner Teil. Metallische Werkstoffe. Band II. Nichtmetallische Werkstoffe.** Leipzig-Reudnitz: Verlag von Otto Spamer. Stitched, M. 128; bound, M 135.

Gas filters. RENÉ LAHAUSSOIS. Fr. 693,035, Mar. 29, 1930. Pilous surfaces are obtained for gas filters with filaments submitted to a treatment such as the action of an electrostatic field so that they become stuck automatically at one end to an adhesive previously applied to the filtering surfaces.

Rotary screen and filter apparatus for reclaiming solid particles from gases. FRANK J. MCDEVITT. U. S. 1,791,102, Feb. 3. Structural features.

Centrifugal dust separators. SOC. HENRY SIMON, LTD., and GEORGE WATTS. Fr. 693,823, April 12, 1930.

Combined hydrometer, liquid casing and suction bulb. J. H. COLLIS. Brit. 335,698, Aug. 29, 1929.

Humidistat. EDWARD A. PORTER. U. S. 1,791,375, Feb. 3.

Calibrated viscometer. RICHARD VON DALLWITZ-WEGNER. Ger. 515,259, Jan. 19, 1926.

Hydrometer syringe for indicating specific gravity of liquids. ELLIS H. BRIDGE (to Electric Storage Battery Co.). U. S. 1,790,696, Feb. 3. Structural details.

Apparatus for the agitation and sedimentation of liquids and solids in suspension. THE DORR CO. Fr. 692,797, Mar. 26, 1930.

Apparatus for delivering liquids in measured quantities. WERNER HANDELSGES. Ger. 515,279, June 4, 1927.

Apparatus for evaporating and concentrating liquids by passing them through a heated centrifuge. MARTIN J. KERMER. U. S. 1,791,317, Feb. 3. Structural features.

Apparatus for effecting hydrogenations and other catalytic reactions between gases and liquids. RING GES. CHEM. UNTERNEHMUNGEN M. B. H. Ger. 515,447, Jan. 25, 1922.

Apparatus for treating gases with atomized liquids. STELLAWERK A.-G. VORM. WILISCH & CO. Ger. 514,413, Apr. 3, 1930. Addn. to 512,128 (*C. A.* **25**, 850).

Apparatus for regulating and indicating the density of mixed gases. SMOOT ENGINEERING CORP. Ger. 515,257, Jan. 29, 1928. See U. S. 1,682,689 (*C. A.* **22**, 3809).

Gas washing apparatus. H. A. BRASSERT (to H. A. Brassert & Co., Ltd.). Brit. 335,648, July 6, 1929. Various structural details are described of an app. comprising alternate rows of oppositely rotating or fixed and rotating bars grouped around an axis and fixed nozzles spraying the bars in an outward direction. Cf. *C. A.* **24**, 1254.

Apparatus with shields for reducing radiation effects in gas temperature determinations. ROBERT E. WILSON. U. S. 1,791,020, Feb. 3. Structural features.

Surface condenser suitable for condensing steam. CHARLES A. PARSONS and FREDERICK ARKLESS (Arkless to Parsons). U. S. 1,790,834, Feb. 3.

Evaporator calandria, etc. OSCAR H. WURSTER. U. S. 1,791,296, Feb. 3. Various details are described of an evaporator suitable for evapn. of crude glycerol.

Shaft drier, with grinding or comminuting means. BERNHARD SÄGEBARTH. Ger. 515,443, Oct. 21, 1927.

Centrifugal apparatus for dewatering linters, wood cellulose, etc. GEBR. BELLMER MASCHINENFABRIK. Ger. 515,463, Nov. 22, 1929. Addn. to 496,059 (*C. A.* **24**, 3139).

Röntgen-ray tube. C. H. F. MÜLLER A.-G. Brit. 335,510, Aug. 27, 1929. Structural and elec. features.

Cathodes for electron tubes. HERMANN LOOSLI. Ger. 515,095, Jan. 25, 1924. Cathodes, comprising an alk. earth oxide on a core of difficultly fusible metal, are prepd. by dipping the core into molten alk. earth metal, which is heated *in vacuo* or in an inert atm., and then oxidizing the metal coating on the core. Alternatively, the core may be embedded in a powd. mass of alk. earth metal which is heated *in vacuo* or in an inert atm.

Electric discharge tubes. J. E. LILIENFELD. Brit. 335,537, Oct. 3, 1928. Various details of manuf. are given of tubes which may be used for the production of Röntgen rays and which may have a cathode of W or Ta pointed by etching and activated by Cs evapd. in an adjacent tube.

Photoelectric cell. N. V. PHILIPS' GLOEILAMPENFABRIEKEN. Fr. 693,043, Mar. 29, 1930. A photoelec. cell contains a photoactive substance such as Cs spread on an intermediate layer contg. a chem. compd. and particles conducting electricity. The Cs is produced in the cell or in a chamber communicating with it by heating a mixt. contg. a compd. of Cs such as Cs chromate and a reducing agent such as Zr. The mixt. also contains a chem. compd. which during the heating is volatilized or reacts with the reducing agent present to form the intermediate layer. Cf. *C. A.* **24**, 2336.

Muffle furnace for calcining "chemicals," pigments or other pulverulent materials. R. KRAUSSE. Brit. 335,659, July 11, 1929. A muffle or retort extends through a furnace fired by burners and is suspended by blade springs so that it may be continuously reciprocated to convey the charge gradually from the inlet to the outlet end. Various details of construction are described. Cf. *C. A.* **24**, 3406.

Apparatus for controlling furnace combustion in accord with furnace boiler pressure variations. CHARLES M. TERRY (to A. W. Cash Co.). U. S. 1,790,685, Feb. 3.

Retort for stoker furnaces. WM. F. RIEGER (to Stoker-Matic Corp.). U. S. 1,790,840, Feb. 3.

Smoke inspection apparatus for boiler furnaces. ROBERT H. WAGER. Ger. 515,258, Feb. 24, 1929. Corresponds to Brit. 327,812.

Roofs for industrial furnaces. MAURICE GILBERT. Fr. 693,588, April 9, 1930.

Suspended roofs for furnaces. SOC. ANON. DES FOYERS AUTOMATIQUES. Fr. 692,542, Mar. 21, 1930.

Closures for annealing or melting furnaces. AKT.-GES. BROWN, BOVERI & CIE. Fr. 693,214, April 3, 1930.

Feeding device for crude lignite trough-grate furnace. FRÄNKEL & VIEBAHN. Ger. 515,403, Dec. 8, 1928.

Tuyère for underfeed stokers. ROBERT A. FORESMAN and DONALD J. MOSSHART (to Westinghouse Elec. and Mfg. Co.). U. S. 1,791,269, Feb. 3.

Step-grate. JOSEF MARTIN. Ger. 515,135 and 515,136, Dec. 15, 1926.

Device for separating dust from gases from rotary kilns, etc. EISEN- UND STAHLWERK HOESCH A.-G. Ger. 515,188, June 6, 1929.

Tilting plant for rotary drum ovens, etc. GEWERKSCHAFT EISENHÜTTE WESTFALIA. Ger. 515,041, Jan. 10, 1929.

Stamping device for use with rotary tube ovens. GEWERKSCHAFT EISENHÜTTE WESTFALIA. Ger. 515,392, Nov. 24, 1929.

Fan for increasing the draft in annular kilns and for cooling the discharge chamber. GUSTAV SCHRÖDER. Ger. 514,386, May 4, 1930.

Recording analyzer for industrial chemical control, more particularly of the purification of boiler-feed water. M. REIGNIER. Belg. 370,021, June 30, 1930. A wheel, operated by a drum which is released at regular intervals, carries 4 hinged beakers. In position 1 the beaker is filled with the sample to be analyzed; in position 2 the titration is carried out and recorded; in position 3 the beaker is emptied, and at 4 it is righted again. On the wheel are mounted spurs which open the cocks for the addn of the 3 reagents. A photoelec. cell opens the cock of the buret and closes it again when the phenolphthalein is decolorized.

Oil-feeding and -regulating device for oil burners. WM. R. RAY (to Ray Burner Co.). U. S. 1,791,012, Feb. 3. An automatic device is provided for varying the pressure on the oil in accordance with the temp. of the surrounding atm.

Gas burner. ALFRED J. REEDY (to A-B Stove Co.). U. S. 1,791,247, Feb. 3.

Gas burner. HARRY E. KERR (to Barber Gas Burner Co.). U. S. 1,791,360, Feb. 3.

Bunsen burners. LOUIS MARTIN. Fr. 693,535, April 8, 1930. Constructional details.

Heat-exchange device suitable for heating or cooling liquids. HERBERT V. DALGLIESH (to Research & Development Corp.). U. S. 1,791,483, Feb. 3. Structural features.

Heat-exchange apparatus suitable for use as a condenser, etc. STANLEY BROWN (to Griscom-Russell Co.). U. S. 1,790,897, Feb. 3. Structural features.

Die-casting machine. A C SPARK PLUG CO. Ger. 515,140, April 19, 1929. Corresponds to Brit. 332,277.

Centrifugal casting machine for making hollow bodies in horizontal molds. AURELIO POSSENTI and CARLO SCORZA. Ger. 515,139, Aug. 14, 1929.

Suction box for felted-sheet-making machines. OSTILIO SEVERINI (to Società Invenzioni Brevetti Anonima-Torino). U. S. 1,791,065, Feb. 3. Structural features.

Apparatus for continuous preparation of emulsions. RUDOLF AUERBACH. U. S. 1,790,967, Feb. 3. Structural features.

Apparatus for sterilizing rags, etc., with hot air and steam. HEINRICH HELI Ger. 515,405, Nov. 2, 1927.

Acetylene generator. DAYTON H. DANLEY. U. S. 1,791,194, Feb. 3. Structural features.

Acetylene generator, with counter-pressure chamber. I. G. FARBENIND. A.-G Ger. 514,437, Oct. 8, 1929.

Rubberized conveyor belts. R. S. CARTER (to Goodyear Tire & Rubber Co.) Brit. 335,475, April 16, 1929. The conveying surface is free from rubber so that it has a low coeff. of friction, while the driving surface is rubberized, and the belt may be formed of layers of fabric, some rubberized and some formed without rubber.

Photographic temperature-recording apparatus (suitable for use in ships' holds). OCEAN STEAM SHIP CO., LTD., and R. H. THORNTON. Brit. 335,644, July 6, 1929. Numerous structural details are described.

Thermostatic device. E. L. FONSECA (to Wilcolator Co.). Brit. 335,819, Nov 27, 1928. Structural and mech. details.

Thermostatic device suitable for control of electric circuits. HAROLD D. EATON (to Bastian-Morley Co.). U. S. 1,791,477, Feb. 3. Structural features.

Thermostatic electric switch. WM. A. RANKIN (to Robeson-Rochester Corp.). U. S. 1,791,225, Feb. 3. Structural features.

2—GENERAL AND PHYSICAL CHEMISTRY

FREDERICK L. BROWNE

The life work of M. W. Beijerinck. JAN SMITH. *Chem. Weekblad* **28**, 94–7 (1931).—A memorial address. G. G.

The scientific career of Henry Louis Le Chatelier. RALPH OESPER. *J. Chem. Education* **8**, 442–61(1931). E. H.

Charles Edward Coates. W. L. OWEN. *Ind. Eng. Chem.* **23**, 339–40(1931).—Biography with portrait. G. G.

Reminiscences of Gibbs by a student and colleague. EDWIN B. WILSON. *Sci. Monthly* **1931**, 211–27. E. H.

Wilhelm Hofmeister. A. H. LARSON. *Plant Physiology* **5**, 613–6(1930).—A biographical sketch accompanied by one plate WALTER THOMAS

Paul Julius. A. LÜTTRINGHAUS. *Z. angew. Chem.* **44**, 109–12(1931).—Obituary with portrait. E. H.

Håkan Sandqvist. ANON. *Svensk Farm. Tid.* **34**, 633–4.—Obituary with portrait. A. R. R.

C. Willgerodt. O. HINSBERG. *Chem.-Ztg.* **55**, 85(1931).—Obituary. E. H.

Nobel prizes in chemistry and physics for 1930: H. Fischer and C. V. Raman. ANON. *Svensk Kem. Tid.* **42**, 293–300(1930).—The accomplishments of these two scientists and their portraits are given. A. R. R.

Unrecognized and unknown facts about the origin of the combustion theory of Lavoisier. MAX SPETER. *Chem. Weekblad* **28**, 79–82(1931); cf. *C. A.* **20**, 1922(German).—The influence of Guyton de Morveau and Mitouart on Lavoisier is described. E. SCHOTTE

Changing attitudes in the history of chemistry. J. N. SWAN. *J. Chem. Education* 8, 510–4(1931). E. H.

An analysis of the college entrance examination board examinations in elementary chemistry for 1921 to 1928. JACOB W. BOORSTEIN. *Science Education* **15**, No. 2, 91–100(1931). E. H.

Questionnaire study of chemistry finances in South Dakota. RALPH DUNBAR AND J. ROBLEY LANE. *J. Chem. Education* **8**, 565–7(1931). E. H.

An administrative study on the teaching of chemistry in the secondary schools of South Carolina. G. G. NAUDAIN. *J. Chem. Education* **8**, 559–64(1931). E. H.

An experiment on the use of journal articles in teaching elementary college chemistry. HOYT C. GRAHAM. *J. Chem. Education* **8**, 531–3(1931). E. H.

Dispensing laboratory solutions. CHARLES F. ECKELS. *J. Chem. Education* **8**, 543–5(1931). E. H.

Fertilizer from the air. A project for chemistry students at the secondary-schools level. HOWARD R. WILLIAMS. *J. Chem. Education* **8**, 462–70(1931). E. H.

An experiment on refractive index for the course in physical chemistry. CREIG S. HOYT. *J. Chem. Education* **8**, 537–8(1931). E. H.

Ashes and the remains of fuel found by the excavation of ruins of a seventeenth-century glass factory near the Keizergracht at Amsterdam. D. J. W. KREULEN. *Chem. Weekblad* **28**, 97–102(1931).—The fuel used in this glass factory was a high-volatile coal of English origin. G. G.

Geochemical distribution laws and cosmic frequencies of the elements. V. M. GOLDSCHMIDT. *Naturwissenschaften* **18**, 999–1013(1930); cf. *C. A.* **24**, 1259.—An elaborate review of the distribution of elements in the different spheres of the earth and in stellar bodies. It is concluded that the manner of distribution of the elements is detd. by properties of their electron shell; the frequency of occurrence of each type of atom, however, is detd. by properties of the nucleus. This frequency of occurrence is apparently the same in all parts of the cosmos. B. J. C. VAN DER HOEVEN

Changeable mass and the second law. S. MOHOROVIČIĆ. *Arhiv. Hem. Farm.* **4**, 169–74(174–5 German)(1930).—Mathematical. J. KUČERA

The calculation of chemical, electrical and gas-mechanical transformations of matter, energy and form by space energetics. RICHARD VON DALLWITZ-WEGNER. *Z. Elektrochem.* **37**, 25–33(1931).—On the basis of space energetics the equations derived for cohesion pressure, the processes in the Daniell cell, the mechanism of the galvanic cell, contact and thermal electricity, gas laws, efficiency and entropy are discussed. H. STOERTZ

Immersion liquids for determining refractivity of solid substances by the embedding method. A. MAYRHOFER. *Mikrochemie* **3**, 52–71(1931).—Purpose. To establish a

standard series of immersion mixts. of a few liquids which could replace the numerous embedding fluids that have been proposed in the literature. The mixts.—water-glycerol, cineole-paraffin oil, paraffin oil-α-bromonaphthalene, α-bromonaphthalene-CH_2I_2—are considered standard mixts. of the first line. The following mixts. have high n and by diln. with mixts. of lower n often serve for direct refractometric testing: paraffin oil-$CHBr_3$, $CHBr_3$-α-bromonaphthalene, $CHBr_3$-CH_2I_2. The percentage compns. of the mixts. studied were detd. by careful measurement of the ingredients in microburets. The regularities with respect to the refraction corresponding to the mixt. rule, the effect of keeping the mixts. for some time and the effects of temp. were studied. W. T. HALL

Electrometric measurement of very low pressures by means of ionization currents: the space charge manometer. WILHELM MOLTHAN. *Z. tech. Physik* **11**, 522–9(1930).—By the use of an electrometer method the sensitivity of pressure measurement by ionization can be raised from 10^{-7} mm. Hg to as low as 10^{-10} mm. Hg. A measuring tube with 4 electrodes is used in a circuit with electrometer and 2 triodes; calibration method and details are given. B. J. C. VAN DER HOEVEN

The development and present state of our knowledge of the natural system of elements (centenary of Lothar Meyer's birthday). F. PANETH. *Naturwissenschaften* 18, 964–76(1930).—A review. B. J. C. VAN DER HOEVEN

The ozone of the upper atmosphere. CH. FABRY. *Scientia* **49**, 11–22(1931). - This is a summary of the evidence relating to the presence and manner of distribution of ozone in the atm. The evidence is derived principally from the absorption spectra of the sun and stars. If the ozone in the atm. were uniformly distributed its concn. would be 60 mg. per 100 kg. of air. Actually, at the earth's surface, air contains about 3 mg. of ozone per 100 kg. Most of the ozone is distributed in the upper regions of the atm. at altitudes which are variable, and which are estd. to be from 20 to 50 kilometers. If the atm. ozone were segregated it would form a layer about 3 mm. thick at atm. pressure. The thickness of this layer, however, varies between extreme limits of 2 and 4 mm. due to seasonal and irregular causes. The origin of atm. ozone is uncertain. Speculations are advanced regarding the relation of atm. ozone to certain phenomena of the upper atm. It is estd. that atm. ozone is responsible for the absorption of about 4% of the sun's energy that is incident on the upper atm. R. H. L.

Unit of atomic weight. F. W. ASTON. *Nature* **126**, 953(1930).—None of the suggestions so far advanced for a new unit of at. wt. is free from objections. While extreme accuracy is not vital for chemists, physicists now need an accuracy of 1 in 10,000. GREGG M. EVANS

Magnetic rotary power of hydrocarbons in the gaseous state. R. DE MALLEMANN AND P. GABIANO. *Compt. rend.* **191**, 1319–20(1930).—By using $\lambda = 578$ mμ, the Verdet const., sp. and mol. rotations for methane, ethane, propane, butane, isopentane and hexane were detd. for the gaseous state and, for the 3 latter, in the liquid state. The dispersion ratios for $\lambda = 546$ mμ and $\lambda = 436$ mμ are 1.125 and 1.84 for all the hydrocarbons. F. W. LAIRD

The magnetic rotatory polarization of fused organic substances. CONSTANTIN SALCEANU. *Compt. rend.* **191**, 1316–8(1930); cf. *C. A.* **24**, 3682.—The variation with temp. of the magnetic rotatory power and magnetic double refraction of fused naphthalene and β-methylnaphthalene was detd. for 3 Hg lines. There is a slight convexity toward the temp. axis of the rotation-temp. curve which is the opposite of that obtained for the magnetic double refraction-temp. variation. The experimentally detd. values for the magnetic rotary dispersion agree fairly well with those calcd. from Mallemann's theory. F. W. LAIRD

Magnetic double refraction of phenol, naphthalene and phenanthrene in the molten state. CONSTANTIN SALCEANU. *Compt. rend.* **191**, 486–8(1930).—By means of the exptl. arrangement of Cotton and Dupouy (cf. *C. A.* **24**, 3682) the magnetic double refraction of phenol at 49° was found to be 1.10°; of naphthalene at 106°, 3.45°; and of phenanthrene at 104°, 7.85°. The double refraction is given at several other temps for each compd., as are the ratios of the double refraction to that for nitrobenzene. The Cotton-Mouton consts. also are given. E. G. VANDEN BOSCH

Molecular field and atomic order in ferromagnetic crystals and in hydrogenated iron. L. W. MCKEEHAN. *Nature* **126**, 952–3(1930).—"The 2 possible ways in which magnetization may change are (1) by reversals, without sensible magnetoresistance changes or magnetostriction, and with small but definite hysteresis losses probably closely conditioned by elec. cond.; and (2) by rotations through less than 180°, with magnetoresistance and magnetostriction, with hysteresis losses of important amount

largely controlled by mechanical strains inherent or induced by applied stresses, and possibly subject to catalytic acceleration." GREGG M. EVANS

Generalization of the virial of Clausius. S. RAY. *Bull. intern. acad. polonaise* **1929A**, 233–9.—Math. The virial of Clausius is applied to the case of a vol. of gas enclosed within impervious walls disposed symmetrically with respect to the coördinate axes. B. C. A.

Entropy, elastic strain and the second law of thermodynamics; the principle of least work and of maximum probability. W. S. KIMBALL. *J. Phys. Chem.* **35**, 611–23 (1931); cf. *C. A.* **23**, 5359.—A new mech. aspect of entropy with reference to a simple, fully excited gas is obtained from the geometrical expression for wt. and by taking strains to include unit extensions in velocity and momentum space as well as ordinary space. The second law of thermodynamics and the automatic increases of entropy that it represents are attributed to increased strain under the action of corresponding stresses, rather than to the unsatisfactory ergodic hypothesis as in statistics. H. F. JOHNSTONE

The nature of the effect of the addition of salt upon the surface tension of sodium taurocholate solutions. MASAIE SHIONO. *J. Biochem.* (Japan) **12**, 317–39(1930).—Various salts added to a soln. of Na taurocholate lower its surface tension to different degrees. At higher concns. the effect is conditioned upon the hydration of the salts while at much lower concns. the effect depends upon the nature of the cations, those forming less dissociable salts being more effective in depressing the surface tension of the Na taurocholate solns. The surface tension of taurocholic acid or of its salts is due to the accumulation of their mols. at the surface of soln. The min. surface tension of the Na, Ca and Cu salts differ from each other, indicating that the surface activities of the films of these various taurocholates differ. S. MORGULIS

Binary mixtures. L. PIATTI. *Z. physik. Chem.*, Abt. A, **152**, 36–46(1931).—The b. p. compn. and the viscosity-compn. diagrams at various temps. were detd. for mixts. of *m*-cresol and PhOMe with EtOH and C_6H_6. At 0° the viscosity curves are nearly straight lines but at higher temps. the deviation is marked. The results are discussed with respect to mol.-compd. formation. V. F. HARRINGTON

Maximum velocity of evaporation of liquids evaporated on heated metallic surfaces. ZOFJA BLASZKOWSKA. *Roczniki Chem.* **10**, 691–713(713–4 French)(1930).—The phenomenon of max. velocity of evapn. of liquids was investigated by evapg. 10 liquids (Et_2O, Me_2CO, $CHCl_3$, MeOH, EtOH, CCl_4, C_6H_6, H_2O, $C_6H_5CH_3$ and C_6H_5Cl) over Al, Fe and brass surfaces heated several tenths of a degree above the boiling temp. On heating the metallic surfaces to temps. still higher a rapid diminution of the velocity of evapn. can be observed; this is due to the Leidenfrost phenomenon, which makes the evapn. very difficult. A small elec.-furnace was constructed which served to study and det. with precision the so-called "temp. corresponding to the max. velocity of evapn.," that is, the temp. of the metallic surface at which the velocity of evapn. attains a max. A series of curves is drawn showing the relation between the time of evapn. of 1 drop of the liquid (approx. 0.01 g.) and the temp. of the metallic surface on which the evapn. takes place. The curves are marked by a min. time of evapn. of the liquid (corresponding to the max. velocity of evapn.) in a certain temp. interval lying above the b. p. of the liquid. On the basis of these exptl. results a technical method is elaborated for a very rapid evapn. of liquids by heating the metallic surfaces to the "temp. corresponding to the max. velocity of evapn." 600 l. of C_6H_6 or $C_6H_5CH_3$ could be evapd. in one hr. per 1 sq. m. Also in *Bull. intern. acad. polonaise* **1930A**, 188–90. J. KUČERA

The rate of shear in capillary tubes. WINSLOW H. HERSCHEL. *J. Rheol.* **1**, 506–7(1930).—A brief math. note suggested by Williamson's paper (cf. *C. A.* **24**, 5193). EUGENE C. BINGHAM

Rheology index. EUGENE C. BINGHAM. *J. Rheol.* **2**, 10–107(1931).—A list of about references to rheological literature arranged alphabetically according to authors. The subjects of papers are included and in many cases the location of abstracts of papers are cited. EUGENE C. BINGHAM

Some fundamental definitions of rheology. EUGENE C. BINGHAM. *J. Rheol.* **1**, 505–17(1930).—This is a revised form of definitions drawn up for the comm. on plasticity, consistency, etc., of the Am. Soc. for Testing Materials (cf. *Proc. Am. Soc. Testing Materials* **29**, II(1929); *C. A.* **23**, 4119, 4861). EUGENE C. BINGHAM

Plasticity and criteria of molecular aggregation. S. E. SHEPPARD. *J. Rheol.* **1**, 471–84(1930); cf. *C. A.* **24**, 1783.—S. discusses the work of Staudinger and his co-workers, Whitby and his co-workers, Kraemer and Williamson, Fikentscher and Mark and attributes the solvation of colloids to monomol. adsorbed layers formed by dipole

orientation for those conditions under which the colloidal solns. obey Poiseuille's law, *e. g.*, in gelatin above 40°. In gelatin above 40° the fluidity steadily increases with time. If the solvation were increasing there would be a dilation, but it is not observed; hence it is inferred that only the linear dimensions of the macromols. are changed.
EUGENE C. BINGHAM

Structure of material in the solid state. ADOLFO FERRARI. *Scientia* [3], **48**, 371-82(1931).—A review is given of the present ideas of crystal structure applied to such cryst. properties as at. radii, amorphism, isomorphism, polymorphism and temp. of fusion.
DON BROUSE

X-ray investigation of the cubic modification of the perchlorates. K. HERRMANN AND W. ILGE. *Z. Krist.* **75**, 41–66(1931).—The cu. form of the perchlorates belongs to either space group T_d^2 or T^2. There are 4 mols. in the unit cell, whose dimensions are as follows: $KClO_4$—7.47 A. U.; NH_4ClO_4—7.63 A. U.; $TlClO_4$—7.61 A. U.; $RbClO_4$—7.65 A. U.; $CsClO_4$—7.96 A. U.; $NaClO_4$—7.25 A. U.; $AgClO_4$—6.92 A. U. General at. positions are given. For NH_4ClO_4 and $NaClO_4$ it is shown that the ClO_4 group forms a close-packed tetrahedron, with the Cl atom at the center. L. S. R.

The influence of RO_4^{--} and related ions on the crystalline form of sodium chlorate. HAROLD E. BUCKLEY. *Z. Krist.* **75**, 15–31(1930)(in English).—$NaClO_3$ normally grows as cubes, with rare appearance of 110, 210 and 111. Expts. using a wide range of impurities show this cubic habit to be rather unresponsive to modification. However, ionizable substances of the RO_4^{--} type cause the 111 planes to appear at the expense of 100. There is a certain crit. concn., *C*, at which the 100 faces just disappear. *C* values are as follows: $3SeO_4$ ions, $2ClO_4$, $1Cr_2O_7$, $1CrO_4$ to $1ClO_3$; $1SO_4$ to $7ClO_3$; $1S_2O_3$ to $20ClO_3$; $1B_4O_7$ to $60ClO_3$; $1S_2O_6$ to $1000ClO_3$. MoO_4, MnO_4, PO_4, AsO_4, CO_3 and SiO_3 have no effect. The effect is attributed to the ions adhering to the surface by means of their O_3 triangles in place of the ClO_3 ions, the configuration of the remainder of the ions causing the variations.
L. S. RAMSDELL

The crystal structure of bixbyite and the C-modification of the sesquioxides. LINUS PAULING AND M. D. SHAPPELL. *Z. Krist.* **75**, 128–42(1930)(in English).—The unit of structure of bixbyite has a = 9.365 A. U. and contains 16 $(Mn, Fe)_2O_3$. The space group is T_h^7. On the assumption that the (Fe, Mn)—O and O—O distances cannot be less than 1.80 A. U. and 2.40 A. U., resp., a final choice is made between 2 possible arrangements, both of which are compatible with the x-ray data. The chosen structure has 8 (Mn, Fe) in 8*e*; 24 (Mn, Fe) in 24*e* with $u = -0.030 \pm 0.005$; 48 O in x, y, z, etc., with $x = 0.385$, $y = 0.145$, $z = 0.380 \pm 0.005$. A detailed description of the structure is given, together with interatomic distances and dimensions for the similar oxides of Mn, Sc, Y, In, Tl, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb and Lu The structure for this series as detd. by Zachariasen (*C. A.* **23**, 1790) is shown to be in error.
L. S. RAMSDELL

The crystal structure of columbite. J. H. STURDIVANT. *Z. Krist.* **75**, 88–108 (1930)(in English).—A crystal of columbite-tantalite (Fe, Mn) $(Cb, Ta)_2O_6$ was found to have an orthorhombic unit with dimensions a = 5.082 A. U., b = 14.238 A. U., c = 5.730 A. U., contg. 4 mols. The space group is V_h^{14}. By the use of the coördination theory and the theory of close packing, several structures were derived, one of which best fits the exptl. data. It consists of octahedra of O ions about a metal ion; each octahedron shares 2 edges with adjoining ones to form strings of either Cb octahedra alone or Fe octahedra alone; the strings are united by the sharing of octahedra corners.
L. S. RAMSDELL

The structure of enstatite, $MgSiO_3$. B. E. WARREN AND D. I. MODELL. *Z. Krist.* **75**, 1–14 (1930)(in English).—From rotation photographs of a hypersthene crystal the axial lengths were calcd. as a = 18.20 A. U., b = 8.86 A. U. and c = 5.20 A. U. If holohedral symmetry is assumed, the space group is V_h^{16}. There are 16 mols. of $(Mg, Fe)SiO_3$ in the unit cell. Coördinates of the at. positions and interatomic distances are given. There is a close relation between this structure and that of diopside. With slight alterations the whole diopside cell corresponds to $^1/_2$ unit of enstatite, with Ca replaced by Mg. The unit cell of the orthorhombic pyroxene corresponds very nearly to 2 cells of monoclinic pyroxene, joined on the (100) plane through a glide plane of reflection. Enstatite has the single type of Si-O chain characteristic of the true members of the pyroxene group.
L. S. RAMSDELL

The crystal structure of benzene and its relation to that of thiophene. II. G. BRUNI AND G. NATTA. *Atti acad. Lincei* **11**, 1058–62(1930); cf. *C. A.* **24**, 2353. The crystal structure of C_6H_6 was detd. at —170° by the powder method with a Ca anticathode. The axial ratios were $a:b:c$ = 0.771:1:0.708; these values closely

checked those obtained by Cox (*C. A.* **22**, 4296) 0.771:1:0.704. These values are near those of thiophene, 0.757:1:0.757, while the vols. of the unit cells are 471 and 498 × 10^{-24} cc., resp., which would explain the formation of solid solns. of these 2, although there is no true isomorphism. A. W. CONTIERI

Lattice constants of mixed crystals of copper-nickel. W. G. BURGERS AND J. C. M. BASART. *Z. Krist.* **75**, 155–7(1930).—Precision measurements on a series of mixed crystals of Cu-Ni show a slight deviation from the values as predicted by Vegard's additive law. The max. deviation was 0.008 A. U. L. S. RAMSDELL

Anomalous crystallized mixed systems of the type iron ammonium chloride. A. NEUHAUS. *Chem. Erde* **5**, 554–624(1930).—NH_4Cl may take up varying amts. of $FeCl_3.H_2O$ (up to 7.5%), giving distorted cu. crystals showing optical anomalies. Crystals of a similar nature are formed with $CoCl_2.2H_2O$ (up to 19%) and $NiCl_2.2H_2O$ (up to 14%). Conclusion: These are not double salts nor true mixed crystals, but rather represent the inclusion of foreign matter along certain faces in the NH_4Cl crystals. The systems $FeCl_3$–H_2O, $CoCl_2$–H_2O and $NiCl_2$–H_2O were also studied in this connection, and data are given for some new cryst. hydrates. B. C. A.

Artifically colored crystals as examples of the so-called anomalous mixed crystals. K. SPANGENBERG AND A. NEUHAUS. *Chem. Erde* **5**, 437–528(1930).—A detailed review is given of artificially colored mixed crystals (*e. g.*, $FeCl_3$ in NH_4Cl, methylene blue in $Pb(NO_3)_2$, etc.) and of the influence of such substances in soln. on the habit of the crystals. It is considered that these are not true mixed crystals but represent an inclusion of foreign material adapted to the structure of the host. In this connection the composite crystals formed by the regular intergrowths of various minerals and salts are considered in detail from a structural viewpoint. B. C. A.

Distribution of foreign substances in crystals. J. NOTHHAFT AND H. STEINMETZ. *Chem. Erde* **5**, 225–32(1930).—The distribution of color and inclusions in various minerals and in crystals of $Pb(NO_3)_2$ grown from solns. contg. various coloring matters is described. In fluorite the bands of color parallel to the cube faces are built up of minute fibers perpendicular to the cube faces, and there are diagonal areas in the crystal free from inclusions. The observations are discussed in connection with the growth of crystals. B. C. A.

Anomalous crystallized mixed systems with organic components or of an organic component in an inorganic host. A. NEUHAUS. *Chem. Erde* **5**, 529–53(1930).—Various inorg. salts when crystd. from soln. may take up org. coloring matters; *e. g.*, $Ba(NO_3)_2$, $Pb(NO_3)_2$ and $Sr(NO_3)_2$ readily take up methylene blue, NaCl and KCl take up murexide, and K_2SO_4 takes up ponceau red and Bismarck brown. Similar anomalous crystals are also formed by certain pairs of org. compds., *e. g.*, $C_{10}H_8$ and dihydronaphthalene. Crystals of this kind are considered in detail especially from a structural point of view. B. C. A.

The points on the isotherms of electrical conductivity of metallic mixed crystals. G. GRUBE AND J. HILLE. *Z. anorg. allgem. Chem.* **194**, 179–89(1930).—The relations between the constitution of binary alloys and their elec. cond. are so far explained that this property may be used to obtain constitution diagrams in cases where thermal analyses do not yield clear results. If a non-dissocd. intermetallic compd. seps. from a continuous series of mixed crystals of 2 metallic components which in turn forms mixed crystals with the components, no displacement of the max. of the cond. isotherm occurs with temp. if both components lower the transformation temp. of the compd. If the transformation temp. is increased by both components, 2 rounded max. occur on the isotherm at temps. adjacent to the transformation temp. of the pure compd., which lie at lower and higher concns. than the compd. If the transformation temp. is increased by one component and lowered by the second, there may occur a flattening and displacement of the max. to other concns. at adjacent temps. The heterogeneous decompn. regions adjoining the α- and β-mixed crystals have the same cond. at the same temp. For the establishment of the phase boundaries, the temp.-resistance curve rather than the cond. isotherm is used. A displacement of the max. of the cond. isotherm with the temp. may also occur if both components lower the transformation temp. of the compd., only however if the compd. is partly dissocd. into its components. ALLEN S. SMITH

Conditions of growth of crystals of difficultly soluble substances. I. D. KURBATOV. *Compt. rend. acad. sci. U. R. S. S.* **1930A**, 429–35(1930).—Conditions of accelerating or decelerating the process of crystn. of difficultly sol. substances were studied, and a distinction was drawn between the methods employed in the labs. and those natural conditions that give rise to the growth of large crystals. A new lab. method for obtaining large crystals, based on exptl. evidence and theoretical considerations, is pro-

posed. Large crystals can be obtained best by using solns. of non-equiv. ionic concns. of the substance to be crystd. To feed crystals formed in satd. solns. and to prevent formation of new centers of crystn., non-equiv. solns. should be used. They present 2 factors favoring growth of large crystals: (1) increase of the soly. product, and (2) decrease of the no. of mols. that can crystallize out of the soln. B. N. DANILOFF

Magnitudes of state of oxygen at low temperatures. FRITZ SCHMIDT. *Z. Ver. deut. Ing.* **74**, 1710(1930).—The thermodynamic properties of O at temps. between +200° and —200° and at pressures from 1 to 150 atms. were detd. by interpolating and extrapolating isothermic curves. The following values for the most important properties were derived:

	Temp.	Pressure	Sp. Gravity γ in kg./dm.³
M. p.	−218.4	1 mm Hg.	1.305
B. p. at atm pressure	−182.8	760 Hg.	1.140
Crit. point	−118.8	51.35 atm.	0.430

The sp. heats were derived from the pv diagrams: sp. heat of liquid c_p = 0.395 kg.-cal./kg. °C at —200° and the heat of vaporization r = 51 kg.-cal./kg. at —182.8° and 760 mm. Hg. M. MCMAHON

The compressibility of nitrogen and hydrogen at pressures up to 5000 atmospheres. JAMES BASSET AND R. DUPINAY. *Compt. rend.* **191**, 1295–7(1930).—The vols. of H_2 and N_2 that occupy 1 cc. at 16° and 1000 kg. per sq. cm. are given at pressures ranging from 1000 to 5000 kg. per sq. cm. Similarly the vols. of H_2 and N_2 that initially occupy 1000 cc. at 0° and 76 cm. are given for these same high pressures. The values for H_2 are in accord with those of Amagat. App. for subjecting gases to 10,000 kg. per sq. cm. and to 25,000 atm. is under construction. F. W. LAIRD

The compressibility isotherms of methane at pressures to 1000 atmospheres and at temperatures from —70° to 200°. HAMLINE M. KVALNES AND V. L. GADDY. *J Am. Chem. Soc.* **53**, 394–9(1931).—Published data were checked and addnl. values obtained to cover 9 temps. and 26 pressures at each temp. B. A. SOULE

A method for the determination of critical temperatures and the critical temperature of hydrogen fluoride. P. A. BOND AND DELLA A. WILLIAMS. *J. Am. Chem. Soc* **53**, 34–7(1931).—The crit. temp. of HF is 230.2°, as detd. by a new method in which the pointer of a balance is set in motion upon the appearance of the liquid phase. The method, which may be used for substances attacking glass, has been checked (*a*) directly on SO_2, (*b*) by substituting in van Laar's equation, $T_c/T_b = K$, values from HF and obtaining for K a value (1.72) very close to that for HCl, HBr and HI. DON BROUSE

The activation energy of adsorption processes. HUGH S. TAYLOR. *J. Am Chem. Soc.* **53**, 578–97(1931); cf. *C. A.* **25**, 629.—Adsorption is not necessarily rapid The assumption that adsorption processes possess their own characteristic activation energies leads to a general theory of adsorption that applies equally well to the so-called primary, or irreversible, and to the secondary, or reversible, adsorption. Those adsorptions are secondary or reversible that have small heats of adsorption and small activation energies. In general, it is the adsorptions with the higher energies of activation that are important in catalytic change. F. L. BROWNE

Velocity of adsorption processes and the problem of promoter action. HUGH S TAYLOR AND ARTHUR T. WILLIAMSON. *J. Am. Chem. Soc.* **53**, 813–4(1931); cf. preceding abstract.—On an active MnO catalyst H_2 is adsorbed immeasurably slowly at 0° and 100°; at 180° the initial rate of adsorption is 8 mm. per hr. and at 305° 78 mm. per hr., corresponding to an activation energy of approx. 10,000 cal. A MnO-Cr_2O_3 catalyst shows an extremely low rate of absorption at 0° but at 184° it has risen to approx. 100 mm. per min. or an increase of about 700-fold by reason of the promoter action of the Cr_2O_3. In considering the mechanism of promoter action attention must be paid not only to extension of surface but also to the velocities with which the activating adsorptions occur. C. J. WEST

Surface films. N. K. ADAM. *Nature* **126**, 955–6(1930).—A comment on a review by Langmuir of A.'s book "The Physics and Chemistry of Surfaces" (cf. *C. A.* 24, 2354). A. disclaims as much disagreement with L. as is inferred by the latter. The liquid expanded state is intermediate between the condensed and the expanded states, and it is to this state only that the statements as to competition between the chains and heads of mols. apply. A. however, reaffirms his belief in the possibility of definite angles of tilt. GREGG M. EVANS

Dialysis, ultrafiltration, osmosis and their applications. A. BOUTARIC. *Chimie & industrie* **24**, 1295–303(1930).—A review. A. PAPINEAU-COUTURE

Finely divided solids as emulsifiers. J. L. VAN DER MINNE. *Chem. Weekblad* **27**, 651–2(1930).—The conclusions of Carrière (*C. A.* **25**, 858) are compared with those of M. (Dissertation Utrecht, 1928); cf. *C. A.* **22**, 2312. B. J. C. VAN DER HOEVEN

A method for measuring average particle size of emulsions. WHEELER P. DAVEY. *J. Phys. Chem.* **35**, 115–7(1931).—When a drop of an oil-in-water emulsion falls into clean neutral water with force enough to break the surface of the water, the drop maintains its identity for some time. A drop of emulsion deposited gently on the water spreads very rapidly. When spreading is complete a layer one colloidal particle deep seems to exist on the surface of the water If it is assumed that the colloidal particles remain spherical, the surface covered by a known quantity of emulsion gives the information necessary for calcg. the diameter of the particles. The emulsion must be dil. enough to avoid aggregation of particles and concd. enough to furnish sufficient particles to cover the surface. Samples of an emulsion at different dilns. indicate the same particle size. The procedure is the same as that employed by Langmuir with oil films. F. E. BROWN

Influence of electrolytes on the dispersion of clays. F. ALLAM. *Chem. Erde* **5**, 276–318(1930) —The results are given of a no. of expts. on the permeability and flocculation of a clay from Silesia with various salt solns. B. C. A.

Liquid ammonia as a lyophilic dispersion medium. II. Ammono-gels of cellulose acetate. ROBERT TAFT AND JESSE E. STARECK. *J. Phys. Chem.* **35**, 578–87(1931).—Sols contg. as much as 60 g. cellulose acetate in 100 cc. of liquid NH_3 were prepd. A mixt. of acetates is more readily dispersed than the cellulose triacetate. The sols of higher concn. were prepd. by evapn. of part of the solvent. There seems to be no limit to the possible concn. of sol. Dil. sols are clear, colorless and mobile; concd. sols are viscous, translucent and light brown. On warming, the viscosity decreased at first but after several hours the sols changed irreversibly to white opaque gels. The time required for gelation is a function of concn., temp., H_2O content and age. Gels were formed by cooling sols to about —60°. These gels were reversible on warming to a temp. somewhat above that of their formation. Heat-irreversible gels seemed to have changed chemically and to have adsorbed water. F. E. BROWN

Determination of the hydrogen-ion concentration in gold sols. T. R. BOLAM AND J. CROWE. *J. Phys. Chem.* **35**, 602–10(1931).—By using a specially designed H electrode requiring only a little soln., it was found possible to det. the p_H values but the sol must be either sufficiently acid or suitably buffered in order to obtain steady and reproducible results. Probably there was some foreign material present during the expts. of Adolf and Pauli, and of Tartar and Lorah, who were unable to obtain satisfactory values. W. T. H.

Solution of colloidal particles by dilution of the sol. ADOLPH J. RABINOVICH AND V. A. KARGIN. *Z. physik. Chem.*, Abt. A, **152**, 24–35(1931).—The previously discovered property of acidoid sols of dissolving on diln. is confirmed with WO_3 and V_2O_5 and the results were checked by electrometric and spectrographic measurements. Because of the formation of H ion by hydration of the inner layers of the particles, these sols behave similarly on diln. of their buffered solns.: their p_H remains const. until the particles are in soln. The Tyndal effect then disappears. The not purely acidoid sols, As_2S_3 and Fe_2O_3, do not behave thus. V. F. HARRINGTON

Polyatomic oxy-combinations that form during the synthesis of electronegative hydrosols. V. Oxy acids. A. V. DUMANSKII AND A. G. YAKOVLEV. *Bull. soc. chim.* [4], **47**, 1211–6(1930); cf. *C. A.* **24**, 3939, 4977.—Triangular diagrams for the sols of the systems comprising $FeCl_3$ 0.1 *N* [A], NaOH and NH_4OH 0.1 *N* [B], and the Na salts of acetic glycolic, succinic, malic, tartaric and citric acids 0.1 *N* [C], are worked out. The oxy acids give peptization diagrams with regions of deposition, of cloudy electroneg. sols, of electroneg. sols without pptn., and of electropos. sols with and without pptn. Equil. is reached very slowly in these systems. The peptizing action is of the order: tartaric acid > glycolic acid > malic acid > citric acid. Increasing the OH groups increases the peptization properties as shown by tartaric, malic and succinic acids. Substituting NH_4OH for NaOH increases the peptizing action. Thirteen diagrams are shown. Also in *J. Russ. Phys.-Chem. Soc.* **62**, 1665–70(1930). H. W. WALKER

The mechanism of formation of colloidal silver. HELEN Q. WOODWARD. *J. Phys. Chem.* **35**, 425–31(1931).—When Ag sols are formed by the Bredig method, Ag reacts with the anion present to form salts, complexes or AgOH. Expts. are reported for arc-

ing in H_2O and in solns. of 14 electrolytes. When the Ag salts form, the cations of the stabilizing salt form bases. In water AgOH forms. F. E. BROWN

Chromium hydroxide. JULJUSZ LISIECKI. *Roczniki Chem.* **10**, 736–42(742 German)(1930).—A Cr_2O_3 sol with as small amt. of peptizing agent as possible was prepd. in a pure and concd. form without dialysis. The excess of peptizing agent can be removed by satn. with a corresponding amt. of gel, in the form of dispersoid instead of by dialysis. The time of prepn. is shortened from several weeks to several hrs. and the exptl. conditions are quant. By this method various metal oxide hydrosols of any concn. can be prepd. with any ratio of the peptizing gel to peptizing agent. A metal oxide hydrosol differs from the dispersoid although it does belong to the disperse systems. The dispersoids show different cataphoretic properties as compared with hydrosols and are not pptd. by electrolytes. As Bredig's expts. have clearly proved, stable hydrosols cannot be prepd. without peptizing substances. Besides mechanical or elec. dispersion, chem. dispersion or peptization is necessary to prep. a permanently stable hydrosol J. KUČERA

Hydrosol of silicic acid. I. Hydrosol made from ethyl silicate by hydrolysis. KENKYO INABA. *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) **15**, 1–15(1930).—Unless the ethyl silicate, prepd. from $SiCl_4$ and EtOH and purified by vacuum distn., contains some HCl, the H_2SiO_3 hydrosol resulting from hydrolysis is unstable. Hydrolysis of pure ethyl silicate in the presence of such peptizing agents as NaOH, KOH, HCl and H_2SO_4 (but not H_2CO_3 or org. acids) gives stable sols. The 2 types of sols studied were prepd. by hydrolysis of ethyl silicate in the presence of (1) HCl and (2) NaOH. Each sol was purified by electrodialysis through a parchment membrane. The highest concn. of SiO_2 that can be stabilized by HCl is 7–8%. The HCl cannot be removed completely without causing coagulation; *e. g.*, a sol contg. 2.56% SiO_2 becomes unstable when the HCl concn. is reduced below 0.0001 *N*. Electrodialysis of NaOH-stabilized sols contg. more than 14% SiO_2 gives unstable sols; with less SiO_2 present strictly neutral sols of high stability can be produced. Because of the relatively high elec. cond. and low viscosity of the neutral sols, the particles must be smaller in the neutral than in the acidic type of H_2SiO_3 hydrosol. This is confirmed by the fact that the amt. of SiO_2 passing through the parchment during electrodialysis is negligible in the acidic but very large (30–50%) in the neutral sols. The stability of the acidic sols varies with the HCl and SiO_2 concns. Addn. of small amts. of HCl to the neutral sols tends to increase the stability. **II. Electrical properties of the hydrosol of silicic acid.** *Ibid* 16–31.—The 4 sols used differed in method of prepn.: *A* was the acidic and *B* the neutral sol described in the preceding abstr.; *C* was made by hydrolysis of $SiCl_4$; *D* was made by dissolving in NaOH soln. some of the H_2SiO_3 sol from hydrolysis of $SiCl_4$ and then decompg. the sodium silicate with HCl. Each sol was purified by electrodialysis: sol *C* resembled *A* in requiring some HCl to stabilize it; although *D* could be obtained in neutral form, not all of the NaCl could be removed. Electrophoresis measurements were made in a U-tube of the Burton type (diam. of tube 1.1 cm. and distance between electrodes 23 cm.). The *movement of the boundary*, which was practically invisible to the naked eye, *was detd. by photography in ultra-violet light*, with an ordinary plate. Under a potential gradient of 1 volt/cm. at 25°, the migration velocities $\times 10^5$ of the boundary (toward the anode) in cm./sec. were 2, 23, 1 and 11 for sols *A*, *B*, *C* and *D*, resp., each contg. approx. the same amt. SiO_2 (0.3–0.4%). The corresponding conductivities (units not specified) were 1.97×10^{-4}, 0.675×10^{-4}, 1.15×10^{-4} and 0.688×10^{-4}. Variation of the HCl concn. (c) revealed a max. migration velocity (x) at low c in sols *A*, *B* and *C*. With increasing c in sols *B* and *D*, x decreased to zero and reversed sign; in sols *A* and *C*, the max. x was followed by an abrupt decrease and then a gradual decrease through zero. The effect of KCl, $BaCl_2$, $CeCl_3$ and $ThCl_4$ on neutral sol *B* was studied. The effect of KCl and $ThCl_4$ upon x was similar to that of HCl. With $BaCl_2$, coagulation took place before an isoelec. point was reached. At concns. of 0.0003–0.0004 *N* $CeCl_3$ the H_2SiO_3 moved toward the cathode, but outside these limits the sol moved toward the anode. The viscosity of the sol shows a min. in the neighborhood of the isoelec. point. The adsorption of neg. ions (Cl or silicate) is as important a stability factor as the charge or hydration and its effect is most marked near the isoelec. point. OSCAR T. QUIMBY

The syneresis of silica gel. J. FERGUSON AND M. P. APPLEBEY. *Trans. Faraday Soc.* **26**, Pt. II, 642–55(1930).—The syneresis of SiO_2 gel was studied under several conditions. The vol. of syneretic liquid expressed exactly equals the decrease in vol. of the gel. The vol. of liquid when plotted against time gave an S-shaped autocatalytic curve. The velocity of syneresis, and the total vol. of liquid expressed were greater, the greater the original SiO_2 concn. of the gel at the time of setting. The

velocity of syneresis was approx. doubled for each 10° rise in temp. The initial velocity of syneresis was greater the more alkaline the gel, but the total vol. finally expressed was greater the more acid the gel. The hydration of the micelles was one mol. of water to one mol. of SiO_2 in neutral gels. The hydration increased with alky., being two mols. of water to one of SiO_2 at a p_H 10. It is concluded that the progress of syneresis is detd. by two factors: (1) the tendency of SiO_2 micelles to consolidate further by the action of unsatd. residual valencies, and (2) the tendency of the structure to resist deformation. L. H. REYERSON

Coagulation of ferric oxide hydrosols. C. HARVEY SORUM. *J. Am. Chem. Soc.* **53**, 812(1931).—Polemical with Dhar (*C. A.* **24**, 5572). C. J. WEST

Pseudo- "irregular series" observed in colloidal gold solution. EIICHI IWASE. *Bull. Inst. Phys. Chem. Research* (Tokyo) **9**, 931–41(1930); (*Abstracts* 89 (in English) published with *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) **14**, Nos. 275-6).—A colloidal Au soln. is prepd. by adding 10 cc. $AuCl_3$ soln. (0.6% $AuCl_3.HCl.4H_2O$) and reducing agent to 500 cc. distd. water stirred well at room temp. The soln. is heated and when it begins to boil KOH or HCl in various concns. is added to det. the influence of the addn. on the stability of soln. As the reducing agent, the following 5 compns. are selected: 3.5 $F^{10}_{0.2KOH}$ (3.5 cc. of soln. prepd. by adding 10 cc. formalin to 90 cc. 0.2 *N* KOH soln.) (I), 3 5 $F^{10}_{0.5KOH}$ (II) 6 $F^{10}_{0.1KOH}$ (III), 8 $F^{10}_{0.1KOH}$ (IV), and 8 $F^{10}_{0.2KOH}$ (V). When (I) is used, the colloidal soln. is stable as long as the concn. of alkali added is less than 1.2 millimol./l. and more than 5.6 millimol./l. The coagulation value of KOH is 21 millimol./l. In (I) and (II) systems the second stable region exists, in general, in the sphere of 5–8 millimol./l. and 4.5–6.5 millimol./l. In (IV) systems the soln. has comparatively a good stability when there is 6 millimol./l. of KOH in the ultimate concn. In (V) it shows a mere tendency to become stable. The addn. of HCl shows no special phenomenon. In each colloidal soln. coagulation values by $BaCl_2$ and NaCl and p_H are resp. measured. Though the phenomenon resembles the so-called "irregular series," it differs from it in that (1) colloidal particles in the second stable region seem to have the same neg. charges as those in the first stable region and (2) the phenomenon is observed only when the addn. is carried out in the course of the reaction of prepn. K. KONDA

Distribution of hydrogen and hydroxyl ions in gelatin cubes. E. J. BIGWOOD. *Compt. rend. soc. biol.* **102**, 600–1(1929); *Physiol. Abstracts* **15**, 11.—Gelatin cubes contg. phenol red were placed in solns. of weak NaOH plus phenol red. In 24 hrs. each presented a yellow center and a red peripheral zone, the thickness of which was the same in all blocks of different sizes. The p_H (8 to 10) of the soln. scarcely changed in the course of a week. In the second week the p_H changed, and in the blocks the acidity increased from the surface toward the center. The values of p_H in the cubes were comparable only when measured at corresponding distances from the surface. G. G.

Distribution of hydrogen and hydroxyl ions in gelatin columns. E. J. BIGWOOD. *Compt. rend. soc. biol.* **102**, 602-4(1929); *Physiol. Abstracts* **15**, 11–2.—The phenomena described in the preceding abstract were studied in the case of gelatin placed in tubes. In the case of agar jelly the red color reaches the bottom of the tube in 2 days. Agar does not react chemically with penetrating electrolytes. In the gelatin tubes a colorless portion remains at the bottom 25 days later. G. G.

Role of structure of jelly in permeability of ions. E. J. BIGWOOD. *Compt. rend. soc. biol.* **102**, 324–6(1929); *Physiol. Abstracts* **14**, 546–7.—The selective permeability of gelatin for cations and anions varies with the p_H of the liquid. The permeability depends on chem. affinities, and not on properties of a membrane of sepn., as suggested by Girard. Protein presents the properties of an active ion. For the setting up of a Donnan equil. it is unimportant whether the particles of protein be grouped in layers or scattered in the gelatinous phase. The eventual role of structure is indirect; it contributes to the semi-solid consistence of the gelatin and to the fixation of the non-diffusible proteic ions. G. G.

Abnormal osmosis at non-swelling membranes. I. K. SÖLLNER. *Z. Elektrochem.* **36**, 36–47(1930).—The magnitude of the p. d. between two solns. of electrolytes sepd. by a collodion membrane depends on the previous treatment of the collodion, whereby the size of the pores is affected. Such membranes contain fine pores of widely differing dimensions, thereby causing potentials to be set up which differ from place to place and from pore to pore and in consequence tend to establish closed-current circuits within and around the membrane. B. C. A.

The freezing of gel. KYOJI KINOSHITA. *Bull. Chem. Soc. Japan* **5**, 261–6(1930).—An app. is described in which solns. of gelatin were frozen. Cooling curves were obtained for solns. varying in concn. from 5 to 60% gelatin. Undercooling was pronounced and is attributed to inhibitive action of gelatin on the formation of ice crystals. Alternate ice and gel layers were found in solns. of concn. up to 15% gelatin. Up to this concn. the freezing temp. fell less than 3°. In the range of solns. between 15 and 30% the freezing temp. fell rapidly to −9.74°. It is concluded that there is almost no water in this region that can be sepd. by freezing. With still greater concn. of gelatin, water must be more firmly bound, since the f. p. is not depressed as rapidly. The f. p.-concn. curve is of an inverted S type. L. H. REYERSON

The vapor pressure of gels. E. H. BUCHNER. *Compt. rend.* **191**, 1323–4(1930).—Two tubes of gelatin gel were placed with their lower extremities in water. In one case the upper portion of the gel was exposed to satd. water vapor and in the other the end of the tube was closed. After one month the upper portions of both gels appeared firm and analysis showed that the upper extremity in each case contained more gelatin than the lower. Further, the final content of the upper ends was less than the original, indicating absorption of water in both cases through ascension. F. W. LAIRD

The vapor pressure of gels. PAUL BARY. *Compt. rend.* **191**, 1325–6(1930); cf. *C. A.* **24**, 4202.—A controversy with M. Buchner concerning the vapor pressure of a gel and its swelling liquid. F. W. LAIRD

The denaturation of albumin. WILDER D. BANCROFT AND J. E. RUTZLER, JR. *J. Phys. Chem.* **35**, 144–61(1931).—It has been assumed that proteins are irreversibly coagulated and that this process is really denaturation followed by, or accompanied by, coagulation. Denaturation was supposed to be a chem. change. It is found that there really is no denaturation and KI, KCNS, $(NH_2)_2CO$, NH_4CNS, $NaHCO_3$, CH$_3$CO and cane sugar peptize heat-coagulated egg-white sols. The peptized sols produce the same immuno-biological test as the original egg white, and have the same isoelec. points. Ether exts from egg-white sols a substance that acts like crude lecithin. After this substance was extd. from egg-white sols, immersion in boiling water for 15–20 min. failed to produce coagulation or cloudiness in a 10% sol. The coagulation and peptization of egg-white are reversible colloidal changes. An extensive literature review is included. F. E. BROWN

Scattering of light in protein solutions. I. Gelatin solutions and gels. K. KRISHNAMURTI. *Proc. Roy. Soc.* (London) **A129**, 490–508(1930); cf. *C. A.* **24**, 1578. Gelatin sols are considered polydisperse systems, in which part of the gelatin is present in the molecularly dispersed condition, and the rest as polymol. micelles. Cooling below 25° produces supersatn., as a result of which fresh particles are formed. These become large as a result of the condensation of the molecularly dispersed gelatin on them. During the gel-sol transformation the gel micelles are gradually dispersed to the original mol. condition. The variation of the intensity of the scattered light with the concn. of gelatin sols and gels was examd. The depolarization of the scattered light first decreases and then increases when gelatin sols are cooled to 10°. The significance of this in revealing the change in the size and shape of micelles is pointed out. The turbidity at the isoelec. point is caused by the aggregation of gelatin mole- F. E.

The colloidal structure of egg white as indicated by plasticity measurements. J. I. ST. JOHN AND E. L. GREEN. *J. Rheol.* **1**, 484–505(1930); cf. *C. A.* **24**, 5080. Egg white consists of a thin portion 32% and a thick portion 68%. The plastometer of St. John was used to study the apparent fluidity of both portions. The values given range from 0.167 to 0.305 for the thick portion and from 14.77 to 20.7 for the thin portion. The data were irregular. Some of the flow curves were far from linear; others indicated a neg. yield value and some had a neg. slope. Many expts. proved that it was impossible to obtain accurate values with the material sepd. by simple decantation even where the material was as fresh as possible. The effort was made to obtain consistent results by passing the material repeatedly through the pores of a Gooch crucible, but the results were unsatisfactory, since the fluidity obtained depended upon the no. of times the material was passed through the crucible. EUGENE C. BINGHAM

The temperature dependence of the solubility of inert gases in liquids. G. TAMMANN. *Z. anorg. allgem. Chem.* **194**, 159–61(1930).—Values for the expression $(1/\log l)(d \log l/dT)$ were obtained for He, Ne and A for temps. between 15° and 37°. If Q, the heat tone, is negligible in comparison to A, the external work, and the gas soly., l, is less than 1, *i. e.*, the concn. of gas in the liquid is smaller than that in the gas phase, the gas soly. increases with increasing temp. If Q is greater than the heat corresponding to the work, A, the soly. decreases with increasing temp. If $Q=0$, $(1/\log l)(d \log l/dT)$

should be equal to $-1/T$. This is found to be only approx. true for single values but for the av. of all the values for the soly. of the gases in the liquids used it is accurate. MeOH, EtOH, acetone, benzene and cyclohexane were used. The soly. of A in water decreases appreciably with increasing temp. The soly. of He is independent of the temp. between 15° and 30° while that of Ne decreases somewhat. ALLEN S. SMITH

Solubilities in hydrogen fluoride. P. A. BOND AND V. M. STOWE. *J. Am. Chem. Soc.* 53, 30–4(1931).—The solubilities of different salts in anhyd. HF (prepd. by distn. of dry KHF_2) were detd. in a "bomb" of Monel metal. The soly. of $LiHF_2$, expressed as mols. LiF per mol. HF, varies between 0.33 and 0.46 over the range of 0° to 40°. ZnF_2, MgF_2 and CaF_2 are very insol. KI reacts with liquid HF. CrF_3 is sol. to an undetd. extent. The solvent action of HF is similar to that of water. D. B.

The solubilities of alkali chlorides and sulfates in anhydrous alcohols. E. R. KIRN AND H. L. DUNLAP. *J. Am. Chem. Soc.* 53, 391–4(1931).—At 20° the solubilities of NaCl, KCl and Na_2SO_4 in MeOH, EtOH, PrOH, iso-PrOH, BuOH and iso-BuOH over the temp. range 20–50°, in moles times 10^2 of salt per mole of alc., are:

	MeOH	EtOH	PrOH	iso-PrOH	BuOH	iso-BuOH
NaCl	0.778	0.115	0.004	0.096	0.007	0.003
KCl	0.833	0.127	0.007	0.123	0.008	0.003
Na_2SO_4	0.555	0.143	insol.	0.089	insol.	insol.

B. A. SOULE

The solubilities of silver salts. KOSAKU MASAKI. *Bull. Chem. Soc. Japan* 5, 340–5(1930).—The soly. was detd. from the e. m. f. of the cell Ag | 0.01 *N* $AgNO_3$ | NH_4NO_3 (satd.) | Ag salt in 0.1 *N* K salt (except KCN which was 0.01 *N*) by the equation $e = 0.53 \times 2 \times 0.0581 \ln(ca/x)$, where 0.53 is the transference no., a is 0.93, c is 0.1 or 0.01 and x is the concn. of Ag^+ in the K salt soln. The mean e. m. f. and the soly. in mol./l. at 18° are: SCN 0.549 v. and 1.0×10^{-6}; Br 0.570 v. and 7.0×10^{-7}; CN 0.571 v. and 2.1×10^{-7}; and CO_3 0.205 v. and 1.1×10^{-4}. V. F. HARRINGTON

Theory of hydrotropy. CARL NEUBERG AND FRITZ WEINMANN. *Biochem. Z.* 229, 366–79(1930).—The ability of many salts of org. acids to make insol. substances, especially nonelectrolytes, water-sol. is designated as hydrotropy. Expts. with K salts of camphoric acid lead to the conclusion that this phenomenon is explained in the formation of a compd. between the hydrotropic salt and the dissolved substance. S. M.

Refraction of electric waves (λ = 12 cm.) in some electrolytes. K. ZAKRZEWSKI AND F. NAYDER. *Bull. intern. acad. polonaise* **1930A**, 30–41.—Measurements were made of the n of water and of aq. solns. for damped elec. waves of wave length 12 cm. The method employed consists in measuring the deviation produced in a narrow pencil of waves by a hollow glass prism filled with the liquid. The angle of the prism used was very small (3°56′), but large enough to eliminate inaccuracy due to reflections on the interior of the prism. The oscillator and detector were of the types described by Zakrzewski (*C. A.* 22, 2103). Within exptl. error the n of water for this wave length is the same as that for very long waves. The ns of Cu sulfate of up to 3% concn. and of NaCl solns. of up to 1% show no perceptible difference from those of pure water. B. C. A.

Electrical conductivity and viscosity of aqueous solutions. M. CHANOZ AND G. CRUZET. *Compt. rend. soc. biol.* 100, 1205–7(1929).—The elec. conductivities of solns. of KCl, NaCl, NaOH, Na_2SO_4, HCl, H_2SO_4 and $CuCl_2$ are reduced by addn. of sucrose, glycerol, agar or gelatin. B. C. A.

The thermodynamic properties of molten solutions of lithium bromide in silver bromide. E. J. SALSTROM AND J. H. HILDEBRAND. *J. Am. Chem. Soc.* 52, 4650–5(1930).—The energy changes of molten AgBr upon diln. with LiBr were detd. at mole fraction of LiBr varying from 0 to 0.89 between 450° and 600°. The free energy of formation of pure molten AgBr is given by the equation $\Delta F_0 = -21{,}510 + 6.7\ t$ between 440° and 575°. Density detns. of 0.5 mole fraction LiBr in AgBr were made between 517° and 555° and may be expressed by the equation $d^t = 4.504 - 0.000877\ t$. The results are discussed on the basis of simple assumptions as to ionization, but without taking into account any changes in interionic forces upon diln. E. H.

A discussion of the new view in the theory of solutions. GIOVANNI B. BONINO. *Atti III congresso naz. chim. pura applicata* **1930**, 231–48.—A review of the Debye-Hückel theory. J. B. AUSTIN

Dissociation theory of solutions. BERKELEY. *Nature* **126**, 313(1930).—Two formulas are given connecting the osmotic pressure, sp. vol., vol. of solute and the no. of g. mols. of solvent of salt solns. The formulas held for aq. solns. of cane sugar, α-

methylglucoside and isodulcitol at both 0° and 30° within variations of about 5%.
J. W. SHIPLEY

Proton and electron activity in solvents in general. GEROLD SCHWARZENBACH. *Helv. Chim. Acta* 13, 870–96(1930).—Modern conceptions of acids and bases are reviewed critically with 81 citations. Brönsted's definitions (*C. A.* 24, 2922) are somewhat modified. *Acids* are substances that can yield protons; *bases* are substances that can take up protons. Acids and bases may be either uncharged molecules or ions. An acid can yield a proton only in the presence of a base that can take it up. There are no free protons in solns. The proton is in homopolar combination with the acid and can probably penetrate even into the electron shell. The *normal acidity potential* of an acid, E_{ac}, is defined by the equation: $E = E_{ac} + RT/F.\ln[acid]/[base]$ in which E is the potential of a H_2 electrode and [acid] and [base] are the molar concns. multiplied by the activity coeffs. for the acid and base, resp. E_{ac} varies with the dielec. const. of the solvent but is independent of the acidity or basicity of the solvent. Strong acids have high E_{ac}, weak acids low E_{ac}. The difference in behavior between strong and weak acids is more marked the less basic the solvent. Thus HOAc behaves much like HCl in liquid NH_3, in H_2O the two acids differ materially, and in EtOH they differ still more markedly. In non-basic solvents E attains enormous and indefinite values because pure acids have no tendency to yield protons. Study of the acidimetry of such solns. is unprofitable. In the absence of solvent, acids have a self-buffering action. Study of such systems is very difficult because traces of impurities affect the potential enormously. Proton active substances in the pure state are always both basic and acidic to some extent at least, that is, they are amphoteric. F. L. BROWNE

The dissociation of strong electrolytes. III. Complete dissociation and optical properties. MORRIS B. JACOBS AND CECIL V. KING. *J. Phys. Chem* 35, 480–7(1931); cf. *C. A.* 24, 3417, 3606.—Additivity of color or light absorption, of refraction and of dispersion by the ions in solns. of strong electrolytes was not found in all cases. The most exact recent work shows discrepancies that must be explained by some means other than the degree of ionization. H. F. JOHNSTONE

The electrode potentials of the silver halide electrodes against a mixture of different halide solutions. JUZABURO TANIDA. *J. Biochem.* (Japan) 12, 411–8(1930).—The potential of Ag halide electrode immersed in a soln. contg. halogen ions, against a calomel electrode, is detd. mainly by the activity of the halogen ions of the largest mol. wt. Other halogen ions of smaller mol. wt. as well as anions other than the halides are indifferent. The potential is the same whether a AgCl, AgBr, AgI or a blank Ag electrode is used. S. MORGULIS

The reactions between atoms and molecules of nitrogen and hydrogen. W. STEINER *Z. Elektrochem.* 36, 807–14(1930).—An app. is described for separately activating N and H by elec. discharge, allowing the gases to react and finally collecting the products of reaction. H atoms show no reaction with N mols. The reaction between N atoms and H atoms gives NH_3, while the reaction between N atoms and H mols. furnishes N_2H_4 and NH_3, the former in much the smaller quantity. It seems probable that the NH_3 is formed through a triple collision: $N + H + X \longrightarrow NH + X'$, followed by the reaction of NH with mol. H: $NH + H_2 \longrightarrow NH_3$, while the N_2H_4 arises thus: $N + H_2 + X \longrightarrow NH_2 + X''$ and $2NH_2 \longrightarrow N_2H_4$. If such be the case, only every hundredth or thousandth triple collision between N and H_2 is effective in causing reaction. W. C. FERNELIUS

The action of carbonic acid, under pressure, on salts of the alkaline earth metals. I. Action on calcium phosphate. ERNST MÜLLER AND JULIUS KNÖFEL. *Z. anorg. allgem. Chem.* 194, 258–60(1930).—Under pressure a soln. of CO_2 decomposes secondary and tertiary Ca phosphate forming $Ca(HCO_3)_2$. At 60 atm. the soly. of $CaHPO_4$ is 6 times that at ordinary pressure. Soly. decreases with increase in temp. $Ca_3(PO_4)_2$ dissolves to the extent of 0.754 g. of P_2O_5 per l. *Bone ash* gives a soln. contg. 0.589 g. and 0.333 g. P_2O_5 per l. at 0° and 20°, resp. *Phosphorite* is sol. to the extent of 0.035 g. P_2O_5 per l. at 0°. The action on natural phosphates is less than that on synthetic samples because of the greater compactness of the former. **II. Action on alkaline earth silicates.** ERNST MÜLLER AND WALTER LUBBERGER. *Ibid* 261–7.—At 20° and 50 atm. 2 or more hrs.' action forms a soln. of bicarbonate equiv. to 3.49, 3.79 and 5.75 g./l. of $CaSiO_3$, $SrSiO_3$ and $BaSiO_3$, resp. At 0° the action is greatest, the soly. decreasing with increase in temp. The min. soly. is reached at 100°. $[H^+]$ is greatest at 30 atm. Hydrolysis and adsorption effects obscure the reaction mechanism. The soly. of ignited silicates at 50 atm. is 10 times that at ordinary pressure and $1/_5$ that of non-ignited samples. A method for the prepn. of carbonate-free silicates is given.
B. A. SOULE

Action of water vapor on sodium chloride at higher temperatures. STANISLAW BRETSZNAJDER. *Roczniki Chem.* **10**, 729–35(735 German)(1930).—The equil. of the reaction NaCl + H_2O = NaOH + HCl was detd. The value of K_p (= $p_{NaOH} \cdot p_{HCl}$) was found approx. 1.6×10^{-7} at 750°. J. KUČERA

Hydrolysis equilibria of triphenylchloromethane and triphenylbromomethane. The free energy of some reactions of triphenylchloromethane, triphenylbromomethane and triphenylcarbinol. J. O. HALFORD. *J. Am. Chem. Soc.* **53**, 105–12(1931).—A C_6H_6 soln. of the carbinol or carbinol halide was shaken in contact with an aq. soln. of the halogen acid of such strength that at equil. measurable concns. of carbinol and halide were produced. For the reaction $(C_6H_5)_3CCl$ (in C_6H_6) + $H_2O(g)$ = $(C_6H_5)_3COH$ (in C_6H_6) + HCl(g), K_{298} = 0.0518 and $\Delta F°_{298}$ = 1755 cal. For the reaction $(C_6H_5)_3CCl$ (s) + H_2O (g), = $(C_6H_5)_2COH$ (s) + HCl (g), K_{298} = 0.2195 and $\Delta F°_{298}$ = 900 cal. In obtaining these values K was detd. by analysis of equil. mixts. and $\Delta F°$ was calcd. from the equation $\Delta F° = -RT \ln K$. Similarly 14 other free energy relations of $(C_6H_5)_3COH$, $(C_6H_5)_3CCl$ and $(C_6H_5)_3CBr$ were detd. or calcd. These include solubilities and ionizations in C_6H_6 and in H_2O as solvents. F. E. BROWN

Double decomposition in the absence of solvent. I. The reciprocal system: AgCl + KBr $\rightleftharpoons$ AgBr + KCl. A. P. PALKIN. *Acta Univ. Asiae Mediae, Series VI, Chem.* No. **4**, 3–17(1930).—The reciprocal system AgCl + KBr $\rightleftharpoons$ AgBr + KCl was studied. The systems AgBr–AgCl and KBr–KCl form unbroken series of solid solns., and the systems AgBr–KBr and AgCl–KCl form eutectics. In order to det. the space equil. diagram of the quaternary system the following systems were studied and their phase diagrams detd. by means of heating and cooling curves: AgCl–KBr; eutectic (25.1 mol. percent KBr) at 320°. AgBr–KCl; eutectic (23.5% KCl) at 318°. AgBr (50% KBr + 50% KCl); eutectic (74.8 AgBr, 12.6% KCl, 12.6% KBr) at 302°. KBr–(70% AgBr + 30% AgCl); eutectic (54.1% AgBr, 23.2% AgCl, 22.7% KBr) at 318°. KCl–(35% AgBr + 65% AgCl); eutectic (26.4% AgBr, 49.1% AgCl, 24.5% KCl) at 321°. KBr–(42.5% AgCl + 57.5% AgBr), eutectic at 325°. (50% AgBr + 50% AgCl)–(50% KBr + 50% KCl); eutectic (10.9% KCl, 10.9% KBr, 39.1% AgBr, 39.1% AgCl) at 323°. (62.5% AgCl + 37.5% AgBr)–KBr; eutectic (43.2% AgCl, 28.8% AgBr, 23% KBr) at 323°. The liquidus surface of the entire quaternary system consists in 2 fields of crystn. intersecting along the eutectic line. The lowest point on the eutectic line (285°) corresponds to the eutectic compn. of the system AgBr–KBr. Shifting of equil. toward AgBr was noted; it was indicated on the open space model by the wave on the liquidus surface, and on the projection of the eutectic line, by the max. located nearer to the AgBr field. This agrees with the lower solv. of AgBr. **II. The reciprocal system: AgBr + KI $\rightleftharpoons$ AgI + KBr.** *Ibid* 19–40.—This system resembles the previously investigated system AgCl + KBr $\rightleftharpoons$ AgBr + KCl in relation to its general character. The binary systems AgBr–AgI and KBr–KI both form continuous series of solid solns. The binary system AgBr–KBr forms a eutectic (68 mol. percent AgBr, 285°), and the system AgI–KI forms an unstable compd. KI.4AgI, and a eutectic at 243°. Several diagonal sections of the "equil. square" of the quaternary system were studied by means of heating and cooling curves and the following results were obtained: The system AgBr–KI; eutectic (80.3 mol. percent AgBr) at 264°. AgI–KBr; eutectic (84 mol. % AgI) at 361°. AgBr–(50% KBr + 50% KI); eutectic (76.4% AgBr, 11.8% KBr and 11.8% KI) at 273°. AgI–(50% KBr + 50% KI); eutectic (81.4% AgI, 9.3% KI, and 9.3% KBr) at 336°. (70% AgI + 30% AgBr)–KI; eutectic (25.2% AgBr, 58.6 AgI, 16.2% KI) at 360°. (50% AgI + 50% AgBr)–KI; eutectic (42.3% AgI, 42.3% AgBr, 15.4% KI) at 334°. (6% AgBr + 94% AgI)–KI; eutectic (24.5% KI, 71% AgI, 4.5% AgBr) at 283°, and a transition point (21.5% KI, 73.8% AgI, 4.7% AgBr) at 285°. (7.5% AgBr + 92.5% AgI)–KI; eutectic (20.4% KI, 73.6% AgI, 6% ABr) at 300°, and the transition point (21.3% KI, 72.4% AgI, 5.9% AgBr) at 298°. (87.5% AgBr + 12.5% AgI)–KI, eutectic (17.8% KI, 71.9% AgBr, 10.3% AgI) at 253°. (74% AgBr + 26% AgI)–KI; eutectic (16.9% KI, 61.5% AgBr, 21.6% AgI) at 253°. The system (9% AgBr + 91% AgBr)–KI: the triple transition point of simultaneous crystn. of the solid soln AgI, AgBr, the solid soln. KI, KBr and the compd. KI.4AgI, occurs at 317°, and corresponds to the compn. 20.5% KI, 7.1% AgBr and 72.4% AgI. The displacement of equil. manifests itself here even more clearly than in the system AgCl + KBr $\rightleftharpoons$ AgBr + KCl; the system gives in the direction of the upper arrows a pos. thermal effect of 8.8 cal. The definite unstable compd. KI.4AgI, decomposable at 267°, is formed in the lateral binary system AgI–KI, and forms its crystn. field on the liquidus surface of the quaternary system. The latter, therefore consists of the 3 fields of crystn.: (*1*) solid solns. of KI and KBr, (*2*) solid solns. of AgBr and AgI, and (*3*) compd. KI.4AgI.

The eutectic lines meet at the triple point (317°, 20.5% KI, 7.1% AgBr, 72.4% AgI). The eutectic point of the system KI–AgI is, however, below the triple point (243° at 69.5% AgI). The projection of the eutectic line on the vertical AgBr–AgI plane rises rapidly to a max. (about 15% AgBr). The system described here as well as the system AgCl + KBr $\rightleftharpoons$ AgBr + KCl can be regarded as a representative of the type of systems that forms a transition from purely reversible to irreversible systems.

B. N. DANILOFF

Contribution to the study of the equilibrium, $FeS_2 \rightleftharpoons FeS + S$. FRANZ DE RUDDER. *Bull. soc. chim.* [4], 47, 1225–1254(1930).—The reversibility of the reaction, $FeS_2 \rightleftharpoons FeS + S$, was established by distn. of pyrites. A new synthesis was demonstrated. The intermediate compds., Fe_7S_8 to $Fe_{16}S_{17}$, postulated by others to be formed by the desulfurization of pyrites, do not exist and are considered as simple crystallographic forms of mixts. of FeS_2, FeS and S. During the distn. As_2S_3, present as an impurity, is given off together with SO_2 and H_2S formed from water present in the pyrites. Dissocn. curves for pressures of 9 mm. to 768 mm. with extreme temps. of 600° and 689°, resp., exhibit a clearly defined flat portion corresponding to the heat of absorption. The heat of reaction absorbed by the liberation of one S atom from FeS_2 is 18,513 cals. as calcd. from the Nernst equation. The roasting of pyrites in industrial furnaces gives FeS as an intermediate product, involving as a first reaction the dissocn. of pyrites.

H. W. WALKER

The affinity of metals for sulfur. I. The thermal equilibrium between hydrogen and the sulfides of iron, tin, cadmium, bismuth and antimony. E. V. BRITZKE AND A. F. KAPUSTINSKII. *Z. anorg. allgem. Chem.* 194, 323–50(1930).—The flow method of Jellinek (*C. A.* 19, 1513; 23, 5400) was used to study the above equil. between 400° and 1000°. By combining their data for the equil. const. (in the sulfide reduction) with those in the literature on the dissocn. const. of H_2S, B. and K. calcd. the partial pressure, p, of S_2 over the various sulfides. Within the range studied log p is a linear function of T. At ordinary temp. the metals stand in the following order of decreasing affinity for S: Cd, Sn, Fe, Sb and Bi. The mol. heats of formation (in large cal at 0°) from rhombic S and metal are: CdS 19.80; SnS 20.51; FeS 17.98; Sb_2S_3 42.50; Bi_2S_3 67.20.

OSCAR T. QUIMBY

Velocity of solution of aluminum in alkali solutions. M. TZENTNERSHVER AND W. WITTANDT. *Bull. intern. acad. polonaise* **1930A**, 50–61.—In agreement with Jablczyński, Hermanowicz and Wajchselfisz (*C. A.* 23, 3396), it is found that the rate of soln. of Al in NaOH soln. is proportional to the free surface area of the metal and to the sq. root of the NaOH concn. KOH, LiOH, $Ba(OH)_2$ and $Ca(OH)_2$ solns. all show the same order of reaction as the NaOH soln. $Ca(OH)_2$ shows a lower velocity of reaction than the corresponding concns. of the other hydroxides, but this is probably due to the formation of a protective film of the insol. Ca aluminate. With weak bases such as NH_3, ethylamine, diethylamine and triethylamine the reaction velocity is more closely proportional to the fourth root of the base concn., but this is proportional to the sq. root of the OH-ion concn. for weak bases. It is concluded that the velocity of soln. of Al depends only on the OH-ion concn., and this is supported by the fact that for different bases the rate of soln. is approx. proportional to the OH-ion concn. of the solns. This yields a convenient method of detg. the hydrolysis consts. of Na_2CO_3 and K_2CO_3, which are both about 1.4×10^{-4}. The reaction velocities have a temp. coeff. of about 2 for 10° and are independent of the rate of stirring of the soln.; hence it is a true reaction velocity which is measured and not a rate of diffusion.

B. C. A

Reactions involving hydrogen peroxide, iodine and iodate ion. I. Introduction. WM. C. BRAY AND HERMAN A. LIEBHAFSKY. *J. Am. Chem. Soc.* 53, 38–44(1931). A crit. review and discussion of various reactions of H_2O_2 in acid solns. contg. I and iodate or iodide are based on the following table:

Reaction of H_2O_2 with

	I^-	I_2	$I_2 + IO_3^-$	IO_3^-
10^{-1} *M* $\overset{+}{H}$	(*a*) —	(*d*) $I_2 \longrightarrow I^-$ very rapid	(*g*) $I_2 \longrightarrow I^-$ very rapid	(*j*) —
10^{-5} *M* $\overset{+}{H}$	(*b*) $I^- \longrightarrow I_2$ moderate	(*e*) $I_2 \longrightarrow I^-$ moderate	(*h*) —	(*k*) $IO_3^- \longrightarrow I$ and I^- very slow
10^{-1} *M* $\overset{+}{H}$	(*c*) $I^- \longrightarrow I_2$ faster than *e*	(*f*) —	(*i*) $I_2 \longrightarrow IO_3$ rapid	(*l*) $IO_3^- \longrightarrow I_2$ faster than *k*

...eparation of iodic acid. Preliminary rate measurements. WM. C. BRAY ...ULKINS. *Ibid* 44–8.—Values of K, the first-order rate const., are nearly

const., 0.6 ± 0.1 at concns. of I_2 from 1×10^{-3} to 3×10^{-4} M but always fall off markedly at lower concns. K is independent of the concn. of iodate, acid and peroxide within the ranges investigated. The simplest explanation is that the first-order reaction is the rate of hydrolysis of I and the that rapid decrease of K at low I concn. is due to the effect of the reverse reaction as the hydrolysis equil. is approached. The oxidation of I by H_2O_2 furnishes a direct method of investigating the rate of hydrolysis of I.
Don Brouse

The velocity of decomposition of the carbonato-tetrammine-cobaltic ion and its dependence on the hydrogen-ion concentration. Kai Julius Pedersen. *J. Am. Chem. Soc.* **53**, 18–30(1931).—In glycolate buffer solns. the reaction $[Co(NH_3)_4CO_3]^+ + 2H^+ + H_2O \rightleftharpoons [Co(NH_3)_4(H_2O)_2]^{+++} + CO_2$ is practically complete; in some acetate buffers it is balanced. "When the CO_2 pressure is low and the H-ion concn. not too small, the velocity may be expressed as the sum of 2 terms, one being independent of the H-ion concn., the other being proportional to the H-ion concn. No general acid catalysis was found." (Cf. Brønsted, *C. A.* **22**, 4334.) Don Brouse

Kinetics of the formation of malonamide from ethyl malonate and ammonia in homogeneous solution. A reaction of the third order. Kenneth C. Bailey. *Proc. Roy. Irish Acad.* **39B**, 567–73(1930).—Although the reaction between $CH_2(CO_2Et)_2$ and NH_3 in homogeneous medium might easily proceed stepwise through the formation of the half amide, it proves to be a true termol. reaction. The reaction was studied in dil. EtOH at 0°, 25° and 33.8°. The resp. values for $k \times 10^3$ are 31.1, 117 and 177. The temp. coeff. is 1.68–1.70. As the concn. of the EtOH is increased, the reaction velocity decreases; thus under the conditions of these expts. the reaction velocity in 76% EtOH was less than 1/6 its value in 44.5% EtOH. The reaction, however, continued termol. An unexpected increase in k was obtained toward the conclusion of the expt. carried out at 33.8° and it is uncertain whether this was due to unrecognized exptl. error or to some accelerating factor developing in the reaction.
C. H. Peet

Pressure-temperature diagrams for definite phase numbers. P. Niggli. *Chem. Zeit.* **5**, 201–24(1931).—Fifty pressure-temp. diagrams are given for 1- to 5-phase systems.
B. C. A.

Theory of arranged mixed phases. Carl Wagner and Walter Schottky. *Z. physik. Chem.*, Abt. B, **11**, 163–210(1930).—Binary systems in which the atoms or mols. are shown by x-ray investigations to be arranged in regular lattice arrangement are designated "arranged" mixed phases, as contrasted with those in which the atoms or mols. are distributed haphazardly. A surplus of one or the other component causes a lattice disturbance. The superfluous atoms may (*1*) occupy an intervening position in the space lattice, (*2*) produce vacancies in the space lattice, or (*3*) occupy a position in the space lattice of the other component. If the component in excess requires less space than the other, position (*1*) is noted; if a larger space, position (*2*) is noted. Where both components require about the same space, as in the case of most intermetallic compds., position (*3*) occurs. The chem. potential and activity, calcd. thermodynamically, det. the relation between the elec. resistance and the compn. The systems Fe–N, Hg–Zn, Au–Hg and Au–Cu are considered.
Curtis L. Wilson

Fusion diagram of the systems mercuric bromide–mercuric sulfate and mercuric chloride–mercuric sulfate. M. Paic. *Compt. rend.* **191**, 1337–9(1930).—By use of a method previously described (*C. A.* **24**, 4208) diagrams are derived for $HgBr_2$–$HgSO_4$. A eutectic mixt. fusing at 236° contg. less than 1% $HgSO_4$ is indicated. The fusion curve mounts rapidly, 506° being the fusion point for 30% $HgSO_4$. From this point values are extrapolated up to the fusion point of $HgSO_4$. The soly. of $HgSO_4$ in fused $HgBr_2$ is less than in $HgBr_2$; the fusion point of a mixt. contg. 10% $HgSO_4$ is 512°.
M. McMahon

System: **chromium–carbon.** A. Westgren and G. Phragmén. *Z. anorg. allgem. Chem.* **187**, 401–3(1930).—The results of Kraiczek and Sauerwald (*C. A.* **24**, [illegible] contradict in certain important respects those previously obtained by the authors (*C. A.* **22**, 2913). The Cr-Cr carbide eutectic is at 3.4% C and not at 4.5%. A cubic carbide of the formula Cr_7C_3 is indicated both by x-ray and micrographic observations in addition to the carbides Cr_4C and Cr_3C_2. There is no series of mixed crystals in the Cr-C interval around 9% C. These discrepancies are attributed to an error on the part of K. and S. in the prepn. of sections for examn.
B. C. A.

The vapor pressure and the activity of a volatile component in binary alloys at high temperatures. Karl Jellinek and Gustav A. Rosner. *Z. physik. Chem.*, Abt. A, **151**, 467–94(1931).—**The vapor pressure of Cd alloys with Pb, Sn and Cu at concns. of 10 to 60% Cd and temps. from 500° to 700° and the vapor pressure of Cu-Zn of the**

concns. from 600° to 800° were measured. The activities of Cd and Zn were calcd. and compared with the electrometric measurements of Taylor. The heat of vaporization and mixing were also calcd. V. F. HARRINGTON

The electrical conductivity and the thermal expansion of magnesium-cadmium alloys. G. GRUBE AND E. SCHIEDT. *Z. anorg. allgem. Chem.* **194,** 190–222(1930).—Investigation of Mg-Cd alloys by thermal analysis does not yield max. or min. points on the solidification curve. An exhaustive systematic investigation of the constitution diagram of the alloys was undertaken by elec. cond. and thermal expansion methods from room temp. to near the m. p. The cond. isotherm of the alloys at 50° shows 3 decided points at 25, 50 and 75% Mg. This confirms the compd. MgCd and proves the previously unknown compds. Mg_3Cd and $MgCd_3$. The 3 compds. are revealed only at lower temps.; $MgCd_3$ results at 89° on cooling the Cd-rich α-mixed crystals sepd. from the melt; Mg_3Cd on cooling the Mg-rich β-mixed crystals to 150°. Cd and $MgCd_3$, as well as $MgCd_3$ and MgCd, form a continuous series of mixed crystals. In comparison, MgCd and Mg_3Cd are only limitedly sol. in one another. At room temp. stable Cd-rich α′-mixed crystals extend from 0 to 65% Mg. Mixed crystals between the concn. boundary of the β′-mixed crystals cannot be accurately detd. but lie in the neighborhood of 60% Mg. The transformation of α′- or β′-mixed crystals into the α or β, stable at high temps., results on heating through heterogeneous double compn. regions whose boundary curve is placed between 20 and 83% Mg. It was shown that in the region of 40–60% Mg and of 70–80% Mg the elec. resistance and the length of the test piece increase with heating, first with a const. temp. coeff. and then in a temp. region of 70–80° below the true transformation interval the temp. coeff. slowly increases. In the transformation interval it increases suddenly and then decreases to a small const. value. The transformation therefore proceeds in 2 steps. The first occurs with the temp. slowly increasing, disarranging the ordered distribution of the atoms, stable at low temps. The second follows the transition of the yet partially ordered into the completely irregular distribution of mixed crystals stable at higher temp. ALLEN S. SMITH

Lattice deformation and catalytic activity. NICOLA PARRAVANO. *Atti III congresso naz. chim. pura applicata* 1930, 45–50.—The behavior of a no. of metals and metallic oxides as catalysts is considered. It is claimed that in some cases catalysis is due to the crystn. of an amorphous powder. It may also be due to a disturbance of the force field around the atoms or mols. by deformation of the crystal lattice. J. B. AUSTIN

The catalytic activity of nickel in the form of aerosol and aerogel. W. E. GIBBS AND H. LIANDER. *Trans. Faraday Soc.* **26,** Pt. II, 656–62(1930). Ni aerosol was prepd. in gas mixts. of CO and H (*1*) by forming an elec. arc between Ni electrodes and (*2*) by thermal decompn. of Ni carbonyl. The aerosol prepd. by these 2 methods showed almost no catalytic activity in the formation of CH_4 from CO and H_2. Ni aerogel was formed (*1*) by the condensation of Ni vapor formed when an arc was struck between a graphite cathode and a Ni ingot anode, (*2*) by the decompn. of Ni carbonyl. These aerogels were used as catalysts in the formation of CH_4 from CO and H_2. They exhibited almost no activity under the same conditions that a Ni + 15% Al_2O_3 catalyst gave about 90% conversion. The Ni aerogel from the arc showed greater activity in the hydrogenation of C_2H_4. Conclusion: Finely divided Ni prepd. by these methods did not produce active catalysts in spite of the large surface formed. L. H. REYERSON

Catalytic experiments with a high-pressure circulation apparatus. E. BERL AND R. BEMMANN. *Z. angew. Chem.* **44,** 34–9(1931). —Water gas was subjected to catalytic high-pressure synthesis in a circulation app. in which the liquid reaction product is sepd. from the gas mixt. A sketch of the app., and details of the design of the high pressure bomb, sepg. vessel, fittings and device for measuring gas velocity are given. The results, in general, confirmed data reported in the literature. Alkali-free ZnO catalyst forms MeOH chiefly. In contrast, higher alcs., acids and aldehydes are formed by the use of an alkali-contg. ZnO. S has an injurious effect on the catalyst. The prepn. and reduction of the catalyst are of great importance. The gas velocity over the catalyst has considerable influence on the reaction. With increasing velocity more unstable intermediate compds. are obtained, while at low velocities the stable end products predominate. ALLEN S. SMITH

The catalytic oxidation of carbon monoxide. J. C. W. FRAZER. *J. Phys. Chem.* **35,** 405–11(1931).—Carefully purified, finely divided MnO_2, Co_2O_3 and Ni_2O_3 are extremely active catalysts for the union of CO and O_2 at temps. as low as 0°. Extreme purity, not the presence of promoters, is important for catalytic activity. Impurities may be removed by electrolysis of an aq. suspension of the oxides. None of 17 other

unnamed oxides studied was effective. The 3 active oxides differ from the others in one significant particular, namely, their compn. is indefinite. By an adsorption app. it was shown that the O_2 pressure in equil. with a sample of one of these oxides depends on the compn. of the oxide. Condensation of water vapor within the pores of these oxides destroys their catalytic activity. Extreme drying does not destroy the activity. These oxides (hopcalite) completely protect a worker when used in a gas mask but they are not yet adapted to the treatment of the exhaust gases of internal-combustion engines. References are made to several dissertations not indexed in chem. literature. F. E. BROWN

Colloidal ferric oxide and various factors that influence its ability to catalyze the decomposition of hydrogen peroxide. I. The temperature coefficient, the effect of catalyst concentration and the effect of electrolytes. RAYMOND J. KEPFER AND JAMES H. WALTON. *J. Phys. Chem.* **35**, 557–77(1931).—Decompn. of H_2O_2 was catalyzed at 50°, in the dark, by chloride-free Fe_2O_3 prepd. in a special high-temp. dialyzer according to Sorum. The reaction seemed to be monomol. The velocity consts. increased as the reaction progressed. The temp. coeff. of the reaction velocity between 30° and 60° was 2.33 for each 10° rise in temp. This indicates that a chem. change, not a diffusion, governed the rate of decompn. The rate of decompn. was multiplied by 2.2 when the concn. of catalyst was doubled between the limits 0.286 and 2.281 g. of Fe per l. When NaCl, $BaCl_2$ and K_2SO_4 were added, the rate of decompn. of H_2O_2 followed typical flocculation curves which show the effects of adsorption of electrolyte on the colloid, flocculation of the sol, and subsequent adsorption on the pptd. Fe_2O_3. When NaH_2PO_4, Na_2HPO_4, HCl, NaOH and $CuSO_4$ were added, similar curves were obtained, but these latter curves were modified by the effect on decompn. of H_2O_2 exerted by the added electrolyte. The activity of this colloidal Fe_2O_3 was about 1000 times the activity of the $FeCl_3$ that it contains. The major catalytic effect is due to Fe_2O_3 and not to $FeCl_3$ as sometimes claimed. It is probable that the formation of higher oxidation products of Fe, such as FeO_2, Fe_2O_5, FeO_3 or H_2FeO_4, is one of the steps in the decompn. of H_2O_2 in the presence of Fe_2O_3. F. E. BROWN

The heat of dilution of salts of several bivalent metals with univalent anions at high dilution at 25°. I. $MgCl_2$, $CaCl_2$, $SrCl_2$, $BaCl_2$ and $MgBr_2$, $CaBr_2$, $SrBr_2$, $BaBr_2$. E. LANGE AND H. STREECK. *Z. physik. Chem.*, Abt. A, **152**, 1–23(1931).—The heats of dilu. for these salts are measured at concns. from 0.1 to 0.0001 *M*. The interpolated value for V_m and m are, at least below 0.01 *M*, in good agreement. The V_m curve is only approx. proportional to $\sqrt{m}$. The extrapolated initial slope agrees with that calcd. by the Debye-Hückel theory. The deviation of m is discussed with respect to the theory, the activity and the osmotic coeffs. and the radius of the unhydrated ions. V. F. HARRINGTON

A comparison of certain suspending agents (BATESON) **17.** The reversibility of coupled reactions in biological systems and the second law of thermodynamics (BURK) **11A.** The p_H stability regions of the proteins (SVEDBERG) **11A.** The state of water in colloidal and living systems (GORTNER) **11A.** Packing of atoms in alloys (WESTGREN, ALMIN) **9.**

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3—SUBATOMIC PHENOMENA AND RADIOCHEMISTRY

W. ALBERT NOYES, JR.

Connection between the quantum mechanics "uncertainty" and the structure of elementary particles and a calculation of the masses of the proton and electron based thereon. R. FÜRTH. *Z. Physik* **57**, 429–46(1929); *Physik. Z.* **30**, 895–8(1929); cf. *C. A.* **23**, 5405; **24**, 1019.—Theoretical. While the radius of the electron has a definite meaning in the classical electron theory, matters become very complicated on applying quantum mechanics. The Heisenberg "uncertainty" relationship is applied first to a light quantum, and then to protons and electrons. The change of matter into radiation and inversely is considered, and the masses of the electron, proton and neutron are obtained. Eddington's theory of the elementary quantum, in which it is described in 16-dimensional space, is also considered, and the above calcns. are carried out

B. C. A.

Is there dualism between corpuscles and waves? E. SEVIN. *Ann. soc. sci. Bruxelles* **50**, Ser. B, 121–5, 129–34(1930).—S. rejects the explanation of electron diffraction based on the wave mechanics. He assumes (1) that when a beam of electrons of homogeneous velocity v impinges on a crystal the shock produces a "classical" wave, *i. e.*, a beam of parallel x-rays of wave length $\lambda = h\sqrt{1 - (v^2/c^2)}/Mv$. The direction of the x-ray beam is the same as if the incident electron stream were replaced by a beam of x-rays. (2) This "classical" wave immediately entrains the electrons which have just been stopped and only those. The mechanism of the entrainment is identified with the Compton effect. **Reply.** C. MANNEBACK. *Ibid* 125–9.

J. B. AUSTIN

Spectroscopic apparatus in industry. CHARLES C. NITCHIE. *Mech. Eng.* 53, 123–6(1931). E. H.

Canal-ray collisions. CHR. GERTHSEN. *Physik Z.* **31**, 948–53(1930).—The intensity of canal rays can be exactly measured by detg. the ionization in a gas chamber sepd. from the evacuated app. by means of a thin window. Primary currents of 10^{-17} 10^{-20} amp. can still be measured. The laws of canal-ray collisions are as well understood as those of related rays. Several briefly reviewed papers show this. F. L.

The action of Geiger counting chambers. C. BOSCH AND H. KLUMB. *Naturwissenschaften* **18**, 1098(1930).—An investigation was made of the influence of the surface properties of sensitive "points" as used in Geiger counters on disruptive discharges (counter impulses). Geiger-Muller counters used were of the conventional type, cylindrical anode, coaxial filament. The filament could be cleaned by glowing or by ion bombardment. Filaments of Cu, Ag, Au, Fe and Zn were used in He with admixtures of H_2 or O_2. Electronegative admixtures favor the counting effect; pure electrodes and He filling of the tube gave no counting effect whatever, although recovery was noticed after some time. Immersion in liquid air had the same effect of reducing the counting effect. It is concluded that an adsorbed film on the filament has great influence on the counting efficiency, probably a H_2O film. B. J. C. v. D. H.

Characteristic velocity of electrons diffused from metallic surfaces. G. BERNARDINI. *Atti. accad. Lincei* **11**, 1096–9(1930).—There are 3 kinds of secondary electronic emissions: reflected, which do not lose any appreciable velocity; diffused, which lose a little in velocity; secondary electrons, released from the metal reflector and having considerably lower velocity. There are no characteristic velocities to distinguish these classes of electrons, but it has been found recently that at 300–500 v. (Rudberg, *C. A.* **24**, 3431) and also at 150 v. (Brown and Whiddington, *C. A.* **21**, 2221), have noted discontinuities in spectra from secondary emission suggesting inelastic collisions. B working at 34–40 v. and using Cu, Al and Zn reflectors has noted discontinuities with Cu and Zn only. No explanations have been advanced for the phenomena.

A. W. CONTIER.

Electric conduction in metals. W. M. Hicks. *Nature* **126**, 954–5(1930); cf. Fowler, *C. A.* **24**, 3424.—The fact that free electrons in metals do not affect the sp. heat relation as a perfect gas is explainable by their being in the interatomic spaces an insufficient length of time to absorb the energy of the space completely. As they fall into atoms the energy is absorbed by the nucleus, the electrons are distributed in their selected orbits and the energy radiated according to the $nh\nu$ formula. This equalization of energy by the nucleus may explain the behavior of an atom as a perfect sphere and a perfect machine. Gregg M. Evans

Evidence of protons in metals. A. Coehn. *Z. Elektrochem.* **35**, 676–80(1929); cf. *C. A.* **22**, 1904.—Three methods are described to show that electrolytically generated H diffuses through a Pd cathode and thereby imparts to the various points on the electrode the potential which would be assumed by a H electrode. In the first expt. 0.1 N H_2SO_4 soln. was electrolyzed between a Pt and a bent Pd cathode, and after stopping electrolysis the potential at different points on the latter was compared with that of the calomel electrode. At first certain points on the wire showed the O electrode potential as a result of exposure to air, but after 80 hrs. the potential became equal to that of the H electrode. The 2nd method was to observe the variation in elec. resistance of the Pd-wire electrode as a result of the diffusion through it of H. In the 3rd method advantage was taken of the ready oxidation of H contained in Pd by O to form H_2O_2. B. C. A.

The mechanism of spark discharges. J. Slepian. *J. Franklin Inst.* **210**, 473–5 (1930).—Reply to Loeb (*C. A.* **24**, 5611). M. Farnsworth

Infra-red sensitive cells. Fritz Michelssen. *Z. tech. Physik* **11**, 511–5(1930).—The action of photoelec cells sensitive in the infra-red was studied. Cells of Se-Te were prepd. by cathodic evapn. on glass, the film of alloy being extremely thin; the electrical resistance was reduced by prepg. the glass with 2 sets of dovetailed comb-shaped gratings, rubbed in with colloidal graphite and using these as electrodes. The alloy was subsequently deposited on the grating. The distance between the electrode grooves was 0.1 mm., their length 10 mm. The evapn. took place in an A glow discharge. The dark space reached from the Se-Te cathode halfway to the glass plate by proper adjustment of the A pressure. For proper grain size the plate was heated later to 210° for 2 hrs., then enclosed in an evacuated vessel. The light used for the tests on the sensitivity was filtered through proper glass filters which cut off light below 0.745 or 0.675μ. Curves on spectral sensitivity distribution were also made. The data show an active infra-red interval from 0.75μ to 1.2μ for 7 to 13.6 at. % Te in Se. The opinion of Gripenberg (*C. A.* **6**, 449; **7**, 2007) was confirmed on the sensitivity curve toward short λ of plain Se cells when used in a thin film. It is believed that the increased sensitivity of the Se-Te mixt. is due to a changed crystal form of the Se. The case "thallofide" cell was examd. (*C. A.* **14**, 2107). These cells were prepd. by thermal evapn. in O_2 at 0.8 mm. The results were quite satisfactory for practical application of the cells to fog telegraphy. B. J. C. van der Hoeven

A new kind of photoelectric cell. B. Lange. *Physik. Z.* **31**, 964–9(1930).—The new Cu_2O photoelec. cells and their use in photometric measurements are described. Sunlight falling on a cell of this type having a surface of 49 sq. cm. drove a small motor in the Siemens lab. Frank Urban

Remark on the experiment of Rupp on a relation between electron scattering maxima and the emission of soft x-radiation. H. W. B. Skinner. *Naturwissenschaften* **18**, 1097–8(1930).—Recent work of Rupp (*C. A.* **25**, 870) is explainable in a different manner without relating the emission of soft x-rays to crystal structure. Whatever angle of incidence causes a max. reflection of electrons (*i. e.*, a Bragg interference max.) will also cause a min. loss of energy of the electrons to the crystal and thus a max. chance for excitation of the x-rays. Max. x-ray intensity will, therefore, automatically coincide with max. energy scattering of the electrons. **Reply.** E. Rupp. *Ibid.* 1098. B. J. C. van der Hoeven

Determination of atom distances in gas molecules by x-rays and cathode rays. J. M. Bijvoet and H. J. Verweel. *Chem. Weekblad* **27**, 648–50(1930).—A review. B. J. C. v. d. H.

Scattering of electrons by crystals and adsorbed gas films. H. J. Verweel and J. M. Bijvoet. *Chem. Weekblad* **27**, 626–9(1930).—A review. B. J. C. v. d. H.

Energy distribution in continuous Röntgen spectra. K. K. Aglintzev. *Zhur. Prikladnoi Fiziki* **6**, No. 2, 38–46(1929) (Published in *Trans. State Phys.-Tech. Lab.* (Moscow), No. 11(1929)).—A general method for the theoretical detn. of energy distribution is developed analytically (from the current-voltage-time relationship) and graphically (from oscillographs), and applied to inductors and transformers. It is

shown that the exptl. results, after the introduction of necessary corrections, are in agreement with Kulenkampff's (*C. A.* **17**, 1752) law of distribution of energy in Röntgen spectra. B. N. DANILOFF

X-ray investigation of easily deformable crystals. L. CHROBAK. *Bull. intern. acad. polonaise* **1929A**, 497–505.—The technic of obtaining undeformed specimens of easily deformed crystals for x-ray investigations is given. New app. for the work is also described including a simple precision chamber for Laue photographs. B. C. A.

Technic of radiography by γ-rays. CHARLES S. BARRETT, ROY A. GEZELIUS AND ROBERT F. MEHL. *Metals and Alloys* **1**, 872-9(1930).—A technic for taking radiographs by means of γ-rays is given with charts and tables of exposure times for Ra and for Ra emanation. Factors influencing the quality of radiographs and the rapidity of photographic action with γ-rays are discussed. A. J. MONACK

The scattering of hard γ-rays. L. LANDAU. *Naturwissenschaften* **18**, 1112(1930).—It is claimed that Beck (*C. A.* **25**, 871) is in error and that the possible scattering of hard γ-rays by at nuclei is not more than 0.0001 as great as the Compton effect. B. J. C. VAN DER HOEVEN

Theoretical treatment of atomic destruction. GUIDO BECK. *Physik. Z.* **31**, 945–6 (1930); cf. *C. A.* **25**, 248.—An interpretation is given of the problem of collisions between α-particles and nuclei in terms of the quantum theory of aperiodic phenomena FRANK URBAN

Internal conversion of nuclear energy. H. CASIMIR. *Nature* **126**, 953–4(1930).—When a nucleus passes from an excited state to one of less energy, either a γ-quantum is given off or an extra-nuclear electron is emitted with energy equal to the γ-quantum less the ionization energy. This latter is called internal conversion of nuclear energy. The probability of this conversion will be measured by the no. of γ-quanta times a factor K (a function of the frequency). An expression for K is given, based on Dirac's equation. For hard γ-rays such as those from Ra C the electron ejection is mainly nuclear. GREGG M. EVANS

Can lead be rendered radioactive? G. GUÉBEN. *Ann. soc. sci. Bruxelles* 50, Ser. B, 117–21(1930). An attempt was made to detect radioactivity in a series of Pb disks which had been exposed to sunlight, ultra-violet light, x-rays and γ-rays by comparing them with a series of Al disks similarly treated. No activity was observed. Conclusion: Pb is not radioactive and the activity reported by others is probably due to a deposit from the atm. J. B. AUSTIN

The absolute intensities and internal conversion coefficients of the γ-rays of radium B and radium C. C. D. ELLIS AND G. H. ASTON. *Proc. Roy. Soc.* (London) A129, 180–207(1930).—The relative intensities of the γ-rays of Ra B and Ra C and of the photoelec. groups assocd. with them are investigated. In a fraction, α, of the cases the radiation is absorbed in the electronic structure and gives rise to a photoelectron; in the remaining fraction, $1-\alpha$, the γ-ray is emitted clear of the atom. The object of this paper is to describe measurements of the various quantities, α, and on the basis of these results to discuss the question of the mode of energy interchange between the nucleus and electronic system. MARIE FARNSWORTH

The rate of loss of energy by β-particles in passing through matter. E. J. WILLIAMS. *Proc. Roy. Soc.* (London) **A130**, 310–27(1931); cf. *C. A.* **24**, 5219. Exptl. results for the rate of loss of energy by β-particles with velocities from 0.1 to 0.97 c are given. The values for slow electrons are obtained by the cloud method and those for fast electrons in expts. with thin metallic foil. The results have been cor. for the effect of scattering and straggling. The observed values for the rate of loss of energy are 50–80% greater than the theoretical values as calcd. by Bohr and Gaunt using, resp., the old and new quantum mechanics. G. M. MURPHY

The loss of energy by β-particles and its distribution between different kinds of collisions. E. J. WILLIAMS. *Proc. Roy. Soc.* (London) **A130**, 328–46(1931); cf. preceding abstract.—Classical and quantum mechanics indicate approx. the same av. rate of loss of energy by β-particles but the distribution of the energy loss between different kinds of collisions is very different. The results of the quantum theory calcn. agree more closely with expt., particularly in connection with the phenomenon of primary ionization. Quant. agreement is not good for the rate of loss of energy and primary ionization. For collisions in which the energy loss is large and in case of slow electrons, the agreement is within exptl. error. Gaunt's calcns. extended to the case of fast electrons and for non-relativistic quantum theory give a much smaller no. of collisions than expt. This indicates the nature of the relativity correction. G. M. M.

Speculations concerning the α-, β- and γ-rays of radium B, C, C'. I. A revised

theory of the internal absorption coefficient. R. H. FOWLER. *Proc. Roy. Soc.* (London) **A129**, 1–24(1930).—This paper is a math. development of the absorption of γ-rays in a species of photoelec. effect by the planetary electrons of the parent atom, which gives rise to the sharp lines of the β-ray spectrum. MARIE FARNSWORTH

A new method of analysis of groups of α-rays. I. α-Rays from radium C, thorium C and actinium C. ERNEST RUTHERFORD, F. A. B. WARD AND C. E. WYNN-WILLIAMS. *Proc. Roy. Soc.* (London) **A129**, 211–34(1930).—The paper describes some of the applications of the "Greinacher" type of counter for α-rays, in which the ionization current due to a particle is amplified linearly by means of thermionic valves, there being no ionization by collision. By using a double ionization chamber with this type of counter it is possible, in working with complex beams of α-particles, to record only those particles which stop within the chamber itself, and not those which pass right across it, thus giving a measure of the no. of particles having ranges between x mm. and $x + 2$ mm. This differential counter is applied to the study of groups of α-particles emitted from various sources. The 8.6-cm. α-particles from Th C′, the 7.0-cm. particles from Ra C′, and the 3.9-cm. particles from Po all appear to be homogeneous groups. The 5.5-cm. particles from Act C are found to consist of 2 well-marked groups, differing in range by 4.2 cm. The 4.8-cm. particles from Th C form also a complex group, in agreement with the results of Rosenblum, who showed that they consisted of at least 5 groups of particles. The missing short-range α-particles emitted in the dual disintegration of Ra C are found and their consts. detd. It is found that these α-particles are present to an extent of about 1 in 4,000 of the main 7.0-cm. particles from Ra C′; they appear to consist of 2 groups—the main one of range 4.1 cm. and a smaller one of range 3.9 cm. MARIE FARNSWORTH

α-Particles of the actinium series. PAOLO MISCIATTELLI. *Atti III congresso naz. chim. pura applicata* **1930**, 388–94.—M. has studied the range of α-particles emitted by radioactinium and actinium X as a function of the time elapsed since their prepn. The results are interpreted to show the appearance of various decompn. products. J. B. AUSTIN

An assumed transformation of lead. Remarks on the notes of Smits, Boutaric and Lepape. STEPHANIE MARACINEANU. *Bull. sect. sci. acad. roumaine* **13**, 55–8(1930); cf. 24, 204, 2950, 3427, 4454, 4699.—S., B. and L. confirm the radioactivity of ancient Pb coverings, but consider the cause of the radioactivity debatable. M. presents arguments in favor of solar action. H. W. WALKER

Experiments to discover a stable isotope of polonium. G. v. HEVESY AND A. GEIGNER. *Z. anorg. allgem. Chem.* **194**, 162–78(1930).—Of the elements of the radioactive decompn. series, only elements 81, 82 and 83 have stable, as well as radioactive, isotopes. In order to discover a possible stable Po isotope, large quantities of the Te minerals, hessite, calaverite, nagyagite, and the Bi minerals, Bi telluride, bismuthinite, and metallic Bi were used with Po as an indicator. The Po was added to the soln. of the mineral and at the end of the expt. was again sepd. A possible present stable Po isotope would sep. with the Po. It is pointed out that the Po ppt. weighed only about 0.1 mg. and contained less than 1% of the element sought as detd. by x-ray spectroscopic investigation. It is concluded that the minerals investigated did not contain the element sought, or contained less than 10^{-11} g. per g. of mineral. Methods were worked out for the chem. and electrolytic sepn. of Po from large amts. of foreign substances especially Te and Bi. A systematic investigation of the electrolytic sepn. of the different metals gave the most favorable results with the use of Mo as the cathode. ALLEN S. SMITH

The isotopic constitution and atomic weights of zinc, tin, chromium and molybdenum F. W. ASTON. *Proc. Roy. Soc.* (London) **A130**, 302–10(1931).—Expts. with Cd and Ge were unsuccessful. The following figures give the mass no. and percentage abundance of the isotopes, the isotopic moment, mean mass no., at. wt. and packing fraction, resp.: *Zn:* 64, 48.0; 65, 2.5; 66, 25.9; 67, 5.3; 68, 17.1; 69, 0.85; 70, 0.58, 1.41; 65.452; 65.380 ± 0.02; —9.9. *Sn:* 112, 1.07; 114, 0.74; 115, 0.44; 116, 14.19; 117, 9.81; 118, 21.48; 119, 11.02; 120, 27.04; 121, 2.96; 122, 5.03; 124, 1.77; 118.82; 118.72 ± 0.03; —7.3. *Cr:* 50, 4.9; 52, 81.6; 53, 10.4; 54, 3.1; 0.31; 52.068; 52.011 ± 0.006; —10 ± 3. *Mo:* 92, 14.2; 94, 10.0; 95, 15.5; 96, 17.8, 97, 9.6; 98, 23.0; 100, 9.8; 1.87; 96.025; 95.97 ± 0.06; —5.5. These results include correction of the order of abundance for Zn and Sn and the discovery of 3 new isotopes of Cr and 7 of Mo. G. M. MURPHY

The radioactive properties of rocks, soils, crude oil and waters from Southern California. J. LLOYD BOHN. *J. Franklin Inst.* **210**, 461–72(1930); cf. *C. A.* **24**, 4699.—This paper contains measurements on waters from Lake Arrowhead, Arrowhead

Hot Springs, Harlem Hot Springs, the Pacific Ocean and from numerous wells and tunnels of the Pasadena and neighboring water supplies. It also contains measurements on rocks, soils and crude oil. MARIE FARNSWORTH

Nature and size of the luminescent center. J. EWLES. *Proc. Roy. Soc.* (London) **A129**, 509–19(1930).—By reasoning in accord with recent knowledge of luminescent solid solns., and free from the doubtful assumptions used by Merritt, an equation relating brightness of luminescence and concn. of activator has been derived. This expression is similar to that of Brüninghaus. It was found to apply to solid solns. Sb_2O_3, Bi_2O_3 and PbO each in CaO, to uranin and Rhodamine 6G in water, and to fluorescein in EtOH. FRANK URBAN

The scattering of slow α-particles by helium. P. M. S. BLACKETT AND F. C. CHAMPION. *Proc. Roy. Soc.* (London) **A130**, 380–8(1931).—The scattering of particles by an inverse-square law is the same in classical and quantum mechanics. Mott (*C. A.* **24**, 2040) by means of wave mechanics has shown the scattering to be quite different from the classical when the scattered and scattering particles are of the same kind. The scattering of α-particles by He is a case of collision of particles of the same kind that have no spin and obey the Einstein-Bose statistics. Photographs of 50,000 α-rays from Po were made with the Wilson cloud method in He-O_2 mixt. The results agree with Mott's theory. G. M. MURPHY

Recoil atoms in a gaseous medium. LA. GOLDSTEIN. *Compt. rend.* **191**, 145–7 (1930).—It has been shown previously that the degree of activation of a negatively charged electrode immersed in a mixt. of radon and air varies with the pressure of the mixt. At low pressures the degree of activation is very feeble, because the high velocities of the recoil atoms, Ra A and Ra B, are not slowed down by the low gas pressure sufficiently for them to be diverted to the charged electrode. As the pressure increases the degree of activation of the electrode increases to a max. because the path of the recoil atoms is shortened by the increased gas pressure. Then, after passing through a max., the degree of activation of the electrode decreases as the pressure of the gas mixt. increases. In the present paper expts. are described in support of the following hypothesis regarding this decrease. As the pressure increases, the ionization of the gas increases in consequence of the better utilization of the paths of the α-rays, and the decrease in degree of activation is due to the recombination of the positively charged recoil atoms with the negatively charged ions of the gas. It is further shown that the degree of activation of an anode increases constantly with the pressure of the gas, under the same conditions that cause the degree of activation of a cathode to pass through a max. and then decrease. Also, that increase of the ionic density does not sensibly decrease the degree of activation of an anode. Expts. designed to explain this behavior of the anode are in progress. R. H. LOMP

Space distribution of *H*-particles liberated from aluminum by α-rays of polonium. H. POSE. *Physik. Z.* **31**, 943–5(1930).—Absorption curves of *H*-particles ejected from Al by Po α-rays were detd. for the angles of 48°, 65°, 105° and 135° between primary and secondary rays. Excellent agreement was found with values calcd. by the method of Bothe. FRANK URBAN

Absolute intensity of the aurora line in the night sky and the number of atomic transitions required to maintain it. LORD RAYLEIGH. *Proc. Roy. Soc.* (London) A129, 458–67(1930).—The standard instrument used in measuring the green auroral light of the night sky was calibrated. If the transmitted light is assumed to consist entirely of λ5577, the brightness corresponding to the zero reading of the instrument was found to be 8.65×10^{-8} candles/sq. m. Deducting the fraction attributable to the continuous background, the brightness of the line becomes 3.2×10^{-8} candles/sq. m. The energy required to maintain it is 6.4 ergs/sec./sq. m. and the no. of at. transitions required to supply the energy is 1.81×10^{12}/sec./sq. m. FRANK URBAN

Change in electron coupling in the rare gases. C. J. BAKKER. *Naturw.* 126, 955; *Naturwissenschaften* **18**, 1100(1930).—*g* values for *SL* and *JJ* couplings for $^3P_2$ and $^3P_1$ levels are given for Ne I, A I, Kr I and Xe I. The agreement is good except in Xe I, where first-order calcns. are probably not sufficiently accurate for large values of spin orbit reaction. GREGG M. [illegible]

Interferometric measurements in the arc spectrum of iron. C. V. JACKSON. *Proc. Roy. Soc.* (London) **A130**, 395–410(1931).—Interferometric measurements were made of 10 lines in the Fe arc spectrum between 4000 and 4400 A. U., by comparison with the red Cd line and the secondary Ne standards. Measurements have also been made of 68 lines between 2300 and 3100 A. U. in the Fe arc and 5 lines in Hg from 2652–2920 A. U. The results are in good agreement with other investigators and with calcd. results obtained from energy levels. G. M. MURPHY

Apparatus for determining optical and magnetic rotatory dispersion in the ultra-violet. AUGUST HAGENBACH. *Helv. Phys. Acta* **3**, 168–79(1930). EGON BRETSCHER

The effect of crossed electric and magnetic fields on the Balmer lines of hydrogen. WALTER STEUBING. *Naturwissenschaften* **18**, 1098–9(1930).—Preliminary results are given. The effect was not the appearance of new lines but consisted of a shift of the Stark-effect components and intensity changes. Weak magnetic fields do not influence the intensity distribution materially; strong fields suppress all Stark-effect components. B. J. C. VAN DER HOEVEN

Bergmann series in the argon spectrum. EBBE RASMUSSEN. *Naturwissenschaften* **18**, 1112 3(1930).—Until now Bergmann series were only known for Xe (Meggers, de Bruin, Humphreys, *C. A.* **24**, 1287). Similar series have now been found in A by using a plane grating and neocyanine plates and an A tube at 2 mm. pressure. The results are given in tables, including derived values for the terms $3d_6$ to $3d_3$ and $3d_2$ to $2s_5$ and $3s''$. B. J. C. VAN DER HOEVEN

The fluorescence of excited mercury atoms. Z. ZAJAC. *Compt. rend.* **191**, 1304–6 (1930).—Hg vapor in a sealed tube was simultaneously subjected to an oscillating elec. discharge and to an intense, low-pressure Hg-vapor arc. External electrodes were used. A greenish blue luminous color was observed in the pos. column limited by the contour of the exciting rays. It started at a pressure of 0.05 mm. and attained its max. intensity at 0.3 mm. and at a temp. of 140°. At 1 mm. a continuous intense spectrum excited by the discharges was observed which masked the fluorescent light so that it was no longer visible at pressures above 1.5 mm. Raising the temp. of the vapor at const. pressure does not noticeably influence the phenomenon. Photographing the spectrum gives the 5461, 4358 and 4047 Hg lines, which are intensified by the simultaneous excitation. Each of the 3 lines is capable of causing the fluorescence, but with different degrees of intensity. The yellow lines 5790 and 5769 do not cause it. The intensities of all lines seen during the fluorescence are proportional to the intensity of the exciting light. F. W. LAIRD

Analysis of the ultra-violet hydrochloric acid bands. M. KULP. *Physik. Z.* **21**, 9–10(1930), cf. *C. A.* **24**, 5228.—The bands between 3000 A. U. and 4000 A. U. have been rephotographed and analyzed. FRANK URBAN

New band group in the ultra-violet absorption spectrum of selenium vapor. (MLLE.) M. STORCZEWSKA. *Bull. intern. acad. polonaise*, **1930A**, 17–9.—A new band group has been observed in the absorption spectrum of Se vapor in the spectral region 2100–2 [illegible] A. U. Like other Se bands they are degraded toward the red, but unlike the other Se band series no rotational fine structure could be detected with the dispersion employed. The frequencies of 12 band heads have been measured and are expressed by the formula $\nu = 43{,}210 + 368n - 0.2n^2$. Since the bands appear in the satd. Se vapor at relatively low temp., 200° ($p = 0.001$ mm.) to 400° ($p = 4$ mm.), and since the mean frequency difference is 363 cm.$^{-1}$ as against 200–250 cm.$^{-1}$ for the bands in the visible region, it is suggested either that the carrier of this spectrum is not Se_2' but a [illegible] Se mol., or, more probably, that this spectrum corresponds with a different electron jump from that corresponding with the bands previously observed. B. C. A.

Spectroscopic observations of photochemical reactions. R. MECKE. *Z. wiss.* [illegible] (Schaum Festschrift) **29**, 72–6(1930).—Photochem. reactions which are in agreement with Einstein's equivalence law can be regarded as single reactions. Those reactions which do not follow the equivalence law may be regarded as being chain reactions. A. P. H. TRIVELLI

The chemical effects of cathode rays. I. The decomposition of ammonia. G. R. PAINE AND T. E. ALLIBONE. *Proc. Roy. Soc.* (London) **A130**, 346–66(1931).—A beam of electrons from a Lenard tube with 240 kv. and currents up to 4 microamp. was passed through Al foil into NH_3. The decompn. products are N_2H_4, N_2 and H_2. From 5.75 to 1 cm. initial gas pressure, the rate of formation of permanent gas is approx. proportional to the pressure and independent of the nature of the surface. The relative yield of N_2H_4 is greater at low pressures for the same relative amt. of decompn. A manometer is described for the measurement of the energy of the electrons entering the reaction vessel. It gives results for the amt. of energy reacting per mol. of the same order of precision as may be obtained with α-particles. The results are in good agreement with those obtained in the same reaction with α-particles and agree qualitatively with decompn. in the silent discharge and in ultra-violet light. For each ion-pair formed, 1.2 mols. of NH_3 are decomposed. G. M. MURPHY

Sorption and chemical reactions in atomic rays. M. LANCUCKI. *Bull. intern. acad. polonaise* **1930A**, 20–9.—A study has been made of the close relationship which

exists between the absorption of N in an elec. discharge tube, Fe or Al electrodes being used, and the disintegration of these metals. The amts. of N absorbed and of Fe disintegrated are equiatomic and depend on the gas pressure, the cathode fall, the c. d., and the temp. of the cathode. If the cathode is constructed of Fe nitride, the latter is disintegrated without absorption of N. The Fe nitride formed by this process is not ferromagnetic. B. C. A.

The action of electrical discharge on gaseous hydrocarbons. The effect of high-speed cathode rays on paraffin hydrocarbons. S. C. Lind, B. M. Marks and G. Glockler. *Trans. Am. Electrochem. Soc.* 59 (preprint) 8 pp.(1931).—It has been found that the hydrocarbons methane, ethane, propane and butane are decomposed by the high-speed electrons (125,000 v.) which are emitted through the thin glass window of a Slack-Lenard cathode-ray tube. H is one of the products of decompn. An estimate is made of the no. of mols. reacting per electron crossing the reaction tube and of the no of ion pairs produced in the reacting gas per electron traversing it. The comparison of these ratios shows that the no. of mols. reacting and the no. of ions pairs formed are of the same order of magnitude. C. G. F.

Physical methods in the chemical laboratory. XVI. The effect of electrical discharges on gaseous elements and compounds. H. Gehlen. *Z. angew. Chem.* **44,** 30-4 (1931).—The formation of active N and H, the synthesis of acetylene, the polymerization of benzene, and the decompn. of thiocyanic acid and carbonic acid in the elec discharge are reviewed. Methods and app. are discussed. Chem. reactions of the active substances as reported by numerous investigators are summarized with an extensive bibliography. Allen S. Smith

The dielectric constant and the conductivity of ionized gases. Th. V. Jonescu and C. Mihul. *Compt. rend* **191,** 1436-8(1930). The gas was ionized by a current of electrons in a glass tube provided at one end with a W filament, at 4 mm. from this with a grid, at 7 cm. a Cu ring, and at 17 cm. an Al plate. When the ring and plate were at the same potential, ΔC and $1/\rho$ were proportional to the electron current, ΔC being the change in capacity due to the change in dielec. const, and $1/\rho$ the cond. of the gas. If λ is the wave length supplied by the oscillator, and if the results are reduced to a current of 1 milliamp., then C/λ^2 is neg. for wave lengths between 2 and 12 m., and then becomes pos. C/λ^2 is independent of the value of the accelerating potential. The wave length for which C/λ^2 changes sign is independent of the intensity of the current between 0 and 2 ma. The conductance, $1/\rho\lambda^2$ is proportional to the intensity of the ionization. Its variation with λ is less simple. For an accelerating potential of 400 v it has maxima at λ = 2.4 m., and 6 m.; and a min. at 3.3 m. For greater wave lengths it decreases rapidly and approaches 0 for $\lambda = \infty$. For 1600 v. $1/\rho\lambda^2$ remains const up to 6 m., and then approaches 0 rapidly as λ increases. R. H. Lombard

The hypothetical existence of Hertzian frequency resonators in water. P. Girard and P. Abadie. *Compt rend.* **191,** 1300-2(1930).—The dielec. consts of distd. water obtained by using wave lengths ranging from 49.13 to 63.56 cm. are recorded together with the dielectric consts. of 1.5×10^{-4} *N* Na_2SiO_3 at 10° for wave lengths ranging from 50.18 to 60.28 cm. The dispersion bands noticed by Weichmann and Frankenberger were not obtained in this region. The hypothesis for the existence of Hertzian resonators of a new type is found untenable because of the lack of confirmation of exptl. data. F. W. Laird

Excitation of fluorescence in benzene at —183° by monochromatic light. J. Starkiewicz. *Bull. intern. acad. polonaise* **1929A,** 287-94; cf. Pringsheim and Reimann, *C. A.* **19,** 439; Pringsheim, *C. A.* **21,** 1059.—The fluorescence spectra excited in C_6H_6 at —183° by the almost monochromatic radiation from electrodes of Zn (λ = 2502 and 2558 A. U.) and of Cd (λ = 2265 and 2313 A. U.) are in all respects similar to each other and to that obtained in similar circumstances by Reimann with a Hg lamp. This independence of fluorescence of wave length is due not as in the case of the vapor, to collisions, but, as supposed by Pringsheim, to some intramol. mechanism. B. C. A.

The influence of the wave length of the exciting rays on the fluorescence spectrum of etioporphyrin. The structure of this spectrum in the infra-red and ultra-violet. J. Aharoni and Ch. Dhéré. *Compt. rend.* **190,** 1499-1501(1930); cf. *Compt. rend.* **183,** 321(1926).—With the wave length of the exciting rays varying from 365-546 mμ there were no noticeable variations in the no., position or intensity of bands in the fluorescence spectrum of etioporphyrin. T. H. Rider

Spectrophotometric study of the cupric-pyridine ion in aqueous solution. Aumeras and Tamisier. *Compt. rend.* **191,** 99-100(1930).—The absorption curves for various mixts. of $Cu(NO_3)_2$ and pyridine were detd. There is a max. in the curve, corresponding

to 20% $Cu(NO_3)_2$, showing the existence of $[Cu(C_5H_5N)_4](NO_3)_2$. The stability const. for the deep blue complex ion is 3.1×10^{-4} at 18°. E. G. VANDEN BOSCHE

The photoelastic dispersion of vitreous silica. L. N. G. FILON AND F. C. HARRIS. *Proc. Roy. Soc.* (London) **A130**, 410–31(1931).—The dispersion of the double refraction produced by stress has been accurately investigated with 2 blocks of vitreous silica. Results have been obtained for 23 standard Fe lines between 4602 and 6495 A. U. Values are given for the stress-optical coeff. at 6 different loads from 10 to 40 kg. The photoelastic dispersion curve shows anomalous dispersion. This may be due to natural periods of Si, as some of the irrregularities in the curve correspond to lines in the Si spectrum. G. M. MURPHY

Is the blackening and blanching of exposed lithopone a photographic phenomenon. H. STOBBE. *Z. wiss. Phot.* (Schaum Festschrift) **29**, 209–18(1930).—An investigation is made of the light and dark reaction of ZnS and lithopone under different conditions. Phototropism is termed a photochem. reaction in which, by light exposure, a solid acquires a darker color which disappears again in the dark. S compared the behavior of lithopone in light and dark with well-known photographic reactions and found differences which show that lithopone is not a photographic substance. A. P. H. T.

Behavior of dispersed systems in filtered ultra-violet light. KARL BORGMANN. *Suddeut. Apoth.-Ztg.* **71**, 70–2(1931).—A general discussion. W. O. E.

Luminous artificial filaments (U. S. pat. 1,791,199) **23**. Geochemical distribution laws and cosmic frequencies of the elements (GOLDSCHMIDT) **2**. Absorption spectra and the constitution of the desoxybenzoin series (SZEGÖ, OSTINELLI) **10**. New photochemical effect on celloidin paper as a radiation problem (MEWES) **5**. Spectrography of the flavone series (HATTORI) **10**. Absorption spectra of azoxy derivatives and analogous compounds (SZEGÖ, OSTINELLI) **10**. Spectrochemical study of amino acid anhydrides (ASAHINA) **10**. The influence of light on the methylene blue reduction (TAMIYA, *et al.*) **10**.

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Handbuch der Astrophysik. Edited by G. EBERHARD, A. KOHLSCHÜTTER AND H. LUDENDORFF. **Band III. Grundlagen der Astrophysik. Hälfte 1.** W. WESTPHAL: Warmestrahlung. E. A. MILNE: **Thermodynamics of the Stars.** A. PANNEKOEK: Die Ionisation in den Atmosphären der Himmelskörper. S. ROSSELAND: **The Principles of Quantum Theory.** 473 pp. M. 74; bound, M. 77. **Hälfte 2.** W. GROTRIAN: Gesetzmässigkeiten in den Serienspektren. O. LAPORTE: **Theorie der Multiplettspektren.** K. WURM: **Bandenspektra.** E. A. MILNE: **Theory of Pulsating Stars.** 358 pp M. 58.80; bound, M. 62. Berlin: J. Springer.

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4—ELECTROCHEMISTRY

COLIN G. FINK

Recent developments in the design of electric annealing furnaces for metals. W. MECKENHAUSER. *Metal Ind.* (London) **38**, 159–62(1931). E. H.

1930 steel plant electrical developments. A. F. KENYON. *Blast Furnace Steel Plant* **19**, 245–8, 254(1931). E. H.

Development of chromium plating. J. G. ROBERTS. *Metal Ind.* (London) **38**, 167–9, 194(1931). E. H.

Industrial electric heating. J. I. BERNARD. *Elec. Eng. Australia and New Zealand* **7**, 365–8(1931).—A review. C. G. F.

The production of high-manganese slag in the electric furnace. T. L. JOSEPH, C. E. WOOD AND E. P. BARRETT. Bur. Mines, *Rept. of Investigations* **3080**, 9 pp.(1931). Elec. furnace tests made with 150-lb. charges of spiegel, contg. about 15% Mn and 0.5% P, indicate that 2 types of high-Mn slag may be produced from metal of this type. When SiO_2 was used as a thinning agent, the slag had an av. compn. of MnO 68.1,

FeO 5.2, SiO_2 14.3, P 0.11 and Al_2O_3 8.2%. With the exception of frothy slags, Al_2O_3 worked as well as SiO_2 as a thinning agent, the resulting slag being of the following av compn.: MnO 69.6, FeO 6.1, SiO_2 8.7, P 0.16 and Al_2O_3 13.0%. The SiO_2 and Al_2O_3 may b varied over a wide range provided their sum is about 22% of the slag. A continuous cycl gave better results than a batch operation. From 85 to 90% of the Mn could be r covered in the slag, 3–6% in the metal, and 6–8% was lost. More strongly reducing con ditions can be established in the elec. furnace than in the open-hearth, more positiv control of P and Fe in the slag being thus permitted and the treatment being reduced to about 1/2. ALDEN H. EMERY

The coreless induction furnace in a new role. A. G ROBIETTE. *Iron and Ste Ind. and British Foundryman* 4, 125–9(1931); cf. *C. A.* 24, 5638.—Expts. were mad to det. the possibilities of refining low-grade steel scrap of various compns. and po irons, the extent of the elimination of the elements Si, Mn, P, C and S under varying conditions, and the speed of their elimination. Si is removed as rapidly as ore is charged P elimination is rapid and complete under suitable slag conditions. C removal is rapi in both the slag reaction process and the air-blast method. S removal is general erratic; it increases with the CaF_2 addn. Products of deoxidation are removed in few sec through rapid circulatory motion of the charge. An auxiliary arc above th slag surface to keep it fluid is suggested. C. H. LORIG

Hydrometallurgy of copper at the Bagdad property. CHARLES T. BAROCH *Trans Am. Electrochem. Soc.* 57, 205–29(1930).—The ore minerals are principally chalcopyr te and chalcocite. Cu in the ore averages 1 to 1.25%. After roasting the ore it was leached with spent sulfate electr dyte, Cu extns as high as 91% resulting. The soln. builds up in Cu to a concn. of 60 g./l. and more, the free H_2SO_4 dropping to 1 g./l. By diverting part of the spent electrolyte into this soln. coming from the leach plant, the Cu is brought down to 50 g./l. and the acid up to 25 g./l., an electro of good elec. cond. resulting. The c. d. of the Cu cells is 2.1 amp./sq. dm. (voltage has ranged from 1.97 to 2.12 v. C. G.

The electrolytic zinc plant of the Evans-Wallower Company at East St. Louis, Ill U. C. TAINTON AND DANIEL BOSQUI. *Trans Am. Electrochem. Soc.* 57, 241–53(1930). The Joplin district will probably continue for many years to be the chief Zn-producing district of the U. S. Hitherto, all Zn from this field has been produced by the old process of retort smelting. The paper describes the first plant to treat these ores electrolytically. Flotation concentrates are roasted in Wedge furnaces, the roaster gas being converted to H_2SO_4 by the contact process. After passing over magnetic separators the concs. are leached in spent electrolyte (28% H_2SO_4). The heat of the reaction raises the temp. to the b. p. Residues contg. Pb, Ag and Au are shipped to the Pb smelter. Leached soln. is purified with Zn dust to ppt. Cu, Cd, Co and Ni. The Cd is sepd. from the Cu and recovered electrolytically, while the Cu goes to a Cu smelter. In the Zn cells, Al cathodes are used at a c. d. of 10.7 amp./sq. dm. Anodes are in grid form and are composed of Pb alloy contg. 1% Ag. During electrolysis MnO_2 is pptd., a high-grade product free from Fe, Cu, Ni, etc., being the result. The electrolytic Zn produced is 99.99% pure. The daily capacity of the plant is 50 tons of electrolytic Zn and 1/2 ton of Cd. C. G. P.

Germanium in relation to electrolytic zinc production. U. C. TAINTON AND E. P. CLAYTON. *Trans. Am Electrochem Soc* 57, 279–88(1930); *Metal Ind.* (London) 37, 229–30, 326(1930).—Certain impurities in the Zn soln., if not removed, will deposit with the Zn and lower the overvoltage below the critical point. In the "high acid, high-density" process, Sb, Co, Ni and As, which are objectionable impurities, are readily removed. However, a hitherto unsuspected impurity which gave rise to low current efficiencies was, after careful investigation, found to be Ge. Concns. as low as 1 mg./l. are sufficient to cause serious losses in Zn cathode efficiency. Ge may be adsorbed and removed from soln. by means of $Fe(OH)_3$ pptd. by ZnO in the leaching operation. C. G. P.

The cathode precipitate as a function of exterior factors in solution of zinc sulfate. A. GLAZUNOV AND K. RÖSNER. *Chem. Obzor* 5, 221–3, 253–63(263 English)(1930). The theoretical conditions of Zn pptn. from $ZnSO_4$ soln. and the influence of various factors were investigated. High c. d., low temp., low H-ion concn. and the presence of clay particles were favorable for the formation of a smooth and thin deposit. The concn. change from 25 to 110 g./l. Zn has practically no influence on the type of the deposit. The expts. are elucidated by numerous diagrams. F. KUČERA

Some experiments on the electrodeposition of gold from alkaline cyanide solutions. E. T. DUNSTAN. *J. Chem. Met. Mining Soc. S. Africa* 31, 118–27(1930).—No evidence of regeneration of cyanide by electrolysis of a working cyanide soln. was found; in fact,

a further loss occurred. The use of a rotating cathode does not materially increase the current efficiency, which is extremely low, because of the dil. solns. employed. Electrolytic methods cannot economically improve upon Zn pptn. It is doubtful if space and power would be saved, as the soln. required 4 passes through the cell. The rotating cathode has a depolarizing effect, probably because the friction of the soln. keeps the surface free from bubbles of gas, which enables a lower voltage and higher c. d. to be employed. Also in *Metal Ind.* (London) **38**, 295–7(1931). ALDEN H. EMERY

A new abnormality in the properties of aqueous solutions of cadmium salts. ELMER JESCHE AND PIERRE J. VAN RYSSELBERGHE. *Trans. Electrochem. Soc.* 59 (preprint) 7 pp. (1931).—Electrolysis of aq. solns. of CdI_2 yields cathode deposits contg. a large amt. of adsorbed CdI_2. $CdBr_2$ behaves in the same way, while $CdCl_2$ yields normal deposits of pure Cd. The phenomenon is ascribed to the adsorption of neutral mols. An explanation for the difference of behavior of the iodide and the bromide on one hand, and of the chloride on the other hand, is suggested. C. G. F.

Cadmium as a rust preventive. BERNHARD PLANNER. *Z. Elektrochem.* **37**, 33–49 (1931); cf. *C. A.* **24**, 2059.—Cd is successfully deposited from an alk. cyanide bath at 40–60° and at current densities of 50–150 amp. per sq. m., with or without the addn. of colloids. In acid baths conditions must be carefully controlled. With increasing temp. and c. d., the current efficiency increases but the grain size of the deposit also increases. The best results are obtained at 40° with a c. d. of 100–150 amps. Acid baths are non poisonous, and in them there is no decompn. of the anion. With increasing mol. wt. of the electrolyte the grain size of the Cd deposit falls. This is greatest in H_2SO_4 solns. and smallest in phenolsulfonic acid solns. Bright deposits can be obtained from fluosilicic and phenolsulfonic acid baths with added colloidal material, but such deposits are quite brittle and show poor adherence to the ground metal. H. S.

Addition agents in bismuth electrolytes. EDWARD F. KERN AND THOMAS R. JOSEPH. *Trans. Am. Electrochem. Soc.* **57**, 255–72(1930).—Solns. of fluosilicate, fluoborate, cresol sulfonate, perchlorate, fluoride, sulfate and chlorides were tested for electrolytes of Bi, the result being the selection of $BiCl_3$ solns. contg. NaCl, $CaCl_2$ or $MgCl_2$ as the most suitable electrolytes. The addn. agents tried were glue, goulac (sulfite liquors) gum arabic, tannin, aloin, aloes curacoa, hydroquinone, benzoic acid, pyragallol and resorcinol. Pyragallol and resorcinol added to the electrolytes produced the brightest and densest deposits of Bi; hydroquinone was next in order, benzoic acid next, and the other addn. agents were not beneficial. C. G. F.

High-speed nickel plating as practiced in England. ERNEST R. CANNING. *Trans. Electrochem. Soc* **59** (preprint) 4 pp. (1931).—In England current densities of 2.2 amp./sq. dm. and over are used. Continuous filtration of the electrolyte, kept at 32° to 35°, is necessary to eliminate suspended foreign matter and pinholes. Because of considerable loss in throwing power, C. advises against very high current densities. The preferred p_H is 5.6 to 5.8. The cathode efficiency is 96 to 97%. A plate 0.025 mm. thick is obtained in 45 min. with a variation in thickness of not more than 45%. For adequate protection of the steel, a Ni plate of at least 0.025 mm. is necessary. For subtropical countries composite deposits of Ni-Cu-Ni are recommended. C. G. F.

Chromium plating. E. J. DOBBS. *J. Soc. Chem. Ind.* **49**, 161–5T; *Metal Ind.* (London) **36**, 435–6, 459–60(1931).—A brief history of modern practice. The tendency in the U. S. is to aim solely at cond. and to overcome the disabilities attendant in high concentration on the outstanding points of a recessed article, by the use of auxiliary cathodes or "robbers." In England research has been centered on increased "throwing power" without auxiliary cathodes or the use of specially shaped anodes. In England flat lead anodes are used. For articles subjected to atm. conditions a thick undercoat of Cu is essential. It is well to have the plating vats lined with hard Pb. This obviates any possibility of the continued formation of $Cr_2(CrO_4)_3$ and yet cannot cause any burning of the work from too large an anode surface, because of the screening action of the glass lining fitted to the latest types of vats to protect the Pb from mech. injury. The matters of temp., c. d., and prepn. of the articles for Cr plating and the stripping of Cr deposits are discussed. W. H. BOYNTON

Variations in the electromotive force during the formation of alloys by the wet method. E. PACE. *Gazz. chim. ital.* **60**, 811–8(1930).—In connection with studies of Marchelli on the formation of binary metal alloys by the wet method, the phenomenon was examd. from the electrochem. point of view. Similar expts. have been carried out by Tammann but under different conditions and with a different object (cf. *C. A.* **14**, 671). The present paper deals with variations in the e. m. f. of the voltaic combination $A \mid A^+$ soln. $\mid B$, during the entire transformation in the following systems: Cu–Sb, Sb–Sn, Au–Cd, Ag–Cd, Au–Sn and Ag–Sn. A high initial e. m. f

would be expected because of the difference between the 2 potentials A | A^+ soln., and B | A^+ soln., where the first remains const. throughout and the 2nd is electrochemically indefinite as a result of the nominal absence of B^+ ions and theoretically is infinite. Practically, however, the 2nd has a definite value either because of soln. of traces of B (by the action of atm. O or by double decompn. with A^+ cations), or, in case the B electrode is completely passive, because of the oxidizing potential which it acquires in contact with the soln. The app. is described in detail. In the *Cu–Sn system*, during the formation of Cu_3Sn (cf. *Ber.* **27**, 630(1897)) the e. m. f. at 100° was initially 0.131, and this rose slowly to a max. of 0.214. In the *Sb–Sn system*, the e. m. f. at ordinary temp. with open circuit varied from 0.31 to 0.33, while with a closed circuit it diminished gradually to a min. value of 0.80 after several hrs., and this again increased to 0.300 when the circuit was opened. In the *Au–Cd system*, the e. m. f. at ordinary temp. was 0.73 and at 100° was 0.77, and this diminished rapidly with the circuit closed until it reached 0.12 after 1 hr. at ordinary temp. and 0.013 after 20 hrs., while at 100° it diminished to 0.96 after only 15 min. In the *Ag–Cd system*, the initial e. m. f. at ordinary temp. was 0.67, and this increased slowly to a max. of 0.73. With the couple in a closed circuit at ordinary temp., the e. m. f. diminished slowly from 0.72 to 0.42 after about 30 min. and reached 0.01 after 2 hrs. In the *Au–Sn system* at ordinary temp., the initial e. m. f. was 0.39 and diminished only to 0.37 after 6 hrs., while with the circuit closed it diminished from 0.37 to 0.05 after 20 min. When the temp. was increased to 100°, a closed circuit for only 3 min. was sufficient to reduce the e. m. f. from 0.36 to 0.05. In the *Ag–Sn system* at ordinary temp., the e. m. f. was approx. 0.35, and with the couple in a closed circuit this diminished to 0.01 after only 2 min. At 100° the behavior was substantially the same, except that the changes were accelerated. C. C. Davis

Electrodeposition of cobalt-nickel alloys. II. S. Glasstone and J. C. Speakman *Trans. Faraday Soc.* **27**, 29–35(1931).—The investigations of the compn. of alloys deposited from mixed buffered solns. of Co and Ni sulfates under various conditions reported previously (*C. A.* **25**, 459) have been extended to higher temps., approx. 50° and 90°. In the present work it has been found that the variation with increasing c. d. of the compn. of the Co-Ni alloys is very different at high and at low temps. At 15° the compn. of the alloy is almost independent of c. d. until the rate of removal of ions from soln. by electrodeposition exceeds the rate of diffusion of these ions to the electrode; at 50° the proportion of Co increases rapidly with increasing c. d. before a const. compn. is reached (cf. *C. A.* **21**, 3025; **22**, 3588). The exptl. conditions in the present work were as reported in Part I, and graphs of the atomic % of Co plotted against c. d. in amps./sq. dm. are given. The relative tendency for Co and Ni to deposit is independent of the H-ion concn. of the electrolyte. The alloys deposited at very low c. ds. contain decreasing proportions of Co as the temp. is raised, this proportion is, in general, less than that in the soln. for depositions made at 90°. With increasing c. d. the fraction of Co in the alloy increases rapidly until a max. Co content, independent of c. d., is attained; this max. decreases with increased temp. The influence of Co on the deposition of Ni at 50° and 90° is very similar to that of Fe at 15° and 50°, resp. In general, the current efficiency increases, for the reason that the deposition potential decreases more rapidly than the H overvoltage, with increasing temp. The theoretical basis of the results is discussed in terms of the deposition potentials and overvoltages of the metals concerned. Edward B. Sanigar

Polarographic studies with the dropping-mercury cathode. XV. Positive and negative maxima on current-voltage curves. J. Heyrovský and M. Dillinger *Collection Czechoslov. Chem. Comm.* **2**, 626–38(1930).—The anomalies observable on electrocapillary curves obtained by the drop-wt. method have been shown (*C. A.* **24**, 2675) to be indicated on the current-voltage curves by prominent max. which are given under conditions of imperfect polarization of the dropping-Hg cathode. Theoretical treatment of these anomalies is given in the present paper, and it is shown that the presence in soln. of a highly absorbable substance, *e. g.*, an org. dye, prevents this imperfect polarization and, therefore, the anomalous shape of the current-voltage curve. The max. occurring on current-voltage curves when solns. contg. electroreducible substances are electrolyzed with the dropping-Hg cathode are termed "positive" or "negative" according as they are given at potentials more pos. or more neg. than the abs. electrocapillary zero (*i. e.*, −0.56 v. from the *N* calomel zero). The shape of the electrocapillary curve, simultaneously derived from the polarized dropping Hg cathode, indicates the sign of the max. Just as the pos. branch of the electrocapillary curve is affected by the presence of adsorbable anions, and the neg. branch by adsorbable cations, the presence of such anions has been shown to affect the pos. max., while neg. max. have been shown to be sensitive to cations. The current-voltage

curves were obtained in the usual manner (*C. A.* **19**, 2905), and the electrocapillary curves by catching and weighing 50 drops of Hg (from the dropping cathode) at various applied e. m. fs. Adsorbable, or multivalent anions, such as CN^-, OH^- and SO_4^{--} and acidic dyes and neg. colloids, suppress pos. max., leaving the neg. ones unaffected, while multivalent cations, even in dil. soln., suppress neg. max. and are without effect on pos. ones. The degree of suppression of pos. max. given by the ion OH and that by the SO_4 ion are identical at equiv. concns., while that of the NO_3 ion is much less; this is exactly parallel to their respective effectiveness in the pptn. of $Fe(OH)_3$ sols.

EDWARD B. SANIGAR

The reduction potential of the ceric-cerous electrode. ADOLF H. KUNZ. *J. Am. Chem. Soc.* **53**, 98–102(1931).—Measurements at 25° of the e. m. f. of cells consisting of Pt + H_2, H_2SO_4 (0.5 or 1.0 *f*), H_2SO_4 (0.5 or 1.0 *f*) + $Ce_2(SO_4)_3$ + $Ce(SO_4)_2$, Pt. The e. m. f. was found to be 1.461 v. for 0.5 *f* H_2SO_4 and 1.443 v. for 1.0 *f* H_2SO_4. The activities of ceric and cerous ions are always proportional to the concn. of the respective salts.

E. G. VANDEN BOSCHE

A reënforced, colloidal, pseudo liquid diaphragm, designed for the electrolytic decomposition of water. GEO. F. JAUBERT. *Compt. rend.* **191**, 1447–9(1930).—If a KOH soln. (25 g. KOH in 100 g. H_2O) which contains in colloidal suspension a hydrogel such as $Fe(OH)_3$, $Ca(OH)_2$, colloidal asbestos, etc., is electrolyzed with a Ni anode and an Fe cathode, O_2 and H_2 are evolved, and the Ni anode gradually becomes covered with a uniform layer of the colloidal material several mm. thick. Similarly, if a screen of fine iron wire is interposed between the electrodes, it is covered by a uniform, pseudo-rigid layer of the colloid. This layer is of very low elec. resistance, but it is quite impermeable to the gases in their mol. form, it serves as a perfect diaphragm for the sepn. of the O_2 from the H_2. About 72 hrs. is required for its formation. Electrolytic cells provided with colloidal diaphragms of several sq. m. area, and operating with 5000 amp., produced H_2 100% pure, and O_2 99.5% pure. The 0.5% H_2 which occurs in the O_2 as an impurity will be the subject of a future note.

R. H. LOMBARD

The relation between the hydrogen overvoltage and composition of brass. M. DE KAY THOMPSON. *Trans. Electrochem. Soc.* **59** (preprint), 5 pp (1931).—The H overvoltages on brass are measured for compns. varying from pure Cu to pure Zn. The points on the overvoltage-compn. plot would lie nearly evenly distributed about a straight line drawn between the values for pure Cu and pure Zn, except for a decided min. in the brass. Max. have been found in other alloys, but this is the first sharp min. There is no close connection of the overvoltage with the equil. diagram.

C. G. F.

Hydrogen overvoltage. M. G. RAEDER. *Tids. Kemi Bergvesen* **10**, 37–40, 56–9 (1930); cf. *C. A.* **23**, 2091.—A theoretical discussion.

B. C. A.

Reduction of alkaline chlorites in electrolytic cells. G. R. LEVI AND D. GHIRON. *Atti accad. Lincei* **11**, 1104–7(1930).—The reduction of chlorites in neutral solns. has been studied by detg. the e. m. f. of a number of cells in which $KClO_2$ was one of the electrolytes. In all cases the positive side was Pt | $KClO_2$ (0.1 *M*). The cells studied and voltages at 20° were: KCl (0.1 *M*) + Hg_2Cl_2 | Hg, 0.363 v.; K_2S (0.2 *M*) | Pt, 1.19; KNO_2 (0.1 *M*) | Pt, 0.3905; $K_4Fe(CN)_6$ (0.025 *M*) | Pt; $Na_2S_2O_3$ (0.1 *M*) | Pt, 0.437; KI (0.1 *M*) | Pt, 0.285; $N_2H_4 \cdot H_2SO_4$ (0.1 *M*) | Pt, 0.370; $(NH_2OH)_2 \cdot H_2SO_4$ (0.1 *M*) | Pt, 0.350.

A. W. CONTIERI

Reactions occurring at the electrodes in electrolysis and some metallic compounds produced. A. P. ROLLET. *Ann. Chim.* [10], **13**, 137–252(1930).—Electrolysis with a c. of dil. aq. solns. of alkali or H_2SO_4 with Au or Pt electrodes, or of dil. alkali solns. with Ag electrodes, yields no evolution of gas until the c. d. exceeds a certain limiting value. The products of electrolysis appear to be fixed by the electrodes, with decompn. followed by recombination. This view is confirmed by the evidence of a Ag electrode being alternately coated with oxide and with powdery metal. Above a certain c. d. a point is reached at which the electrodes are unable to fix all the O_2 liberated during a half cycle, and the excess is given off, while the H_2 above the amt. equiv. to the Cr is similarly released. Au, Ni, Co, Fe, Cu and Pb behave like Ag, whereas Pt and Pd act in a reverse manner. Similar results are obtained when sol. electrodes are used. No decompn. of any kind occurs unless the max. c. m. f. in the cycle exceeds the decompn. tension for water with the particular electrodes used. The crit. c. d. in the electrolysis of KOH solns. to which CO_2 is added changes discontinuously when the amt. of CO_2 is just sufficient to convert the whole of the alkali into the normal salt, if the electrodes are of one of the metals which fix CO_2. From this it would appear that several degrees of oxidation are possible. It has been possible to study the oxidation by combining such an electrode, anodically polarized with a d. c., with a reference electrode and observing the c. m. f.-current strength relationship when the cell is allowed to dis-

charge. The formation of the oxide, Ag_4O_8, on a Ag electrode has thus demonstrated, and similar expts. with accumulator plates have yielded results supporting the theory that Pb subsulfate is formed on the neg. plate at discharge, but no definite evidence of the presence of Pb_2O_5 on the charged pos. plate could be obtained (cf. Féry, *C. A.* **13**, 1676; Féry and Chéneveau, *C. A.* **20**, 1181). In the Edison accumulator, the active material on the charged Ni plate is mainly NiO_2 if the alkali concn. exceeds about 6 *N*.

W. H. BOYNTON

The Volta effect in electrochemistry. OSCAR SCARPA. *Atti III congresso naz. chim. pura applicata* 1930, 83–94.—S. has devised an electrometer in which the displacement of a metallized quartz fiber suspended between two metal plates measures the p. d. between the plates. With this instrument he has measured the p. d. between a Zn and a Cu plate when they have been attached to the Zn and Cu electrodes, respectively, of a *Daniell cell*. He has also measured the p. d. between a Zn and a Cu plate connected by a Cu wire and between two Cu plates connected to the electrodes of a Daniell cell. In the first case the e. m. f. was 0.23 v., in the second 0.85 v., and in the third 1.08 v. The first case S. calls the true or surface Volta effect and ascribes it to the e. m. f. of contact between the electrodes and the solns. and between the two solns. The second or internal Volta effect is the contact potential of the two metals. J. B. AUSTIN

Formation of methane during the electrolysis of potassium acetate and the mechanism of Kolbe's electrosynthesis. S. N. SHUKLA AND O. J. WALKER. *Trans. Faraday Soc.* **27**, 35–40(1931).—Evidence has been obtained that CH_4 is formed at the anode during the electrolysis of aq. acetate solns. under certain conditions. It is suggested that the presence of CH_4 has been overlooked by previous investigators, because their analyses of the gaseous products of electrolysis have been confined almost entirely to the mixed anode and cathode gases (*i. e.*, to mixts. contg. a large proportion of H) resulting from electrolysis at high c. d. If it is assumed that only C_2H_6 and H are present in the combustible residue, after the removal of the other constituents, the presence of small amounts of CH_4 may remain undetected since $2CH_4 = C_2H_6 + H_2$, *i. e.*, the CH_4 simply acts as a mixt. of C_2H_6 and H. In the present work the anode gases were analyzed separately from the H given at the cathode. The combustible residue of the anode gas, after the removal of the O_2 and CO_2 in a Boue and Wheeler app. over Hg, was transferred to an evacuated tube and cooled in liquid air to remove the C_2H_6, the contraction after cooling being a measure of the C_2H_6 present. After some time the uncondensed gas was pumped off by a Topler pump and exploded. The ratio, contraction on explosion (*C*)/ amount of absorption by potash (*A*), was approx. 2, whereas the *C*/*A* ratio for the condensed gas was 1.25 (the theoretical ratio for C_2H_6), showing that CH_4 was present in the above anode gases. In the electrolysis a Pt wire anode (4.4 cm. long, 0.1 cm. diam.) was used, and the anode gases were collected separately. Solns. of K acetate (contg. an equiv. amount of acetic acid) of different concns. were electrolyzed at various c. ds. at ordinary temp. A table of exptl. results is given. The results show that under certain conditions CH_4 is present with C_2H_6 in the anode gases produced during the electrolysis of K acetate solns., the conditions favorable to the formation of CH_4 being low c. d. and high concn. of electrolyte. The quantity of CH_4 was appreciable only when the c. d. was less than about 10 ma./sq. dm. In the most favorable instance, with a 3.5 *N* K acetate soln. plus 3.5 *N* acetic acid, at a current of 1.5–2.0 ma., almost twice as much CH_4 as C_2H_6 was produced, the total exptl. results for this soln. being CO_2, 67.3, O_2 0.4, CH_4 19.8, C_2H_6 10.5 and residue 2.0%. The results also show that CH_4 is formed only along with C_2H_6; no CH_4 is evolved so long as O_2 is the main gaseous product. With ordinary c. ds. such as are used in the electrolytic prepn. of C_2H_6, no appreciable amt. of CH_4 is produced. The mechanism of Kolbe's electrosynthesis and the recent work of Fichter are discussed. The abnormally high value of 2.54 v. for the discharge potential of the acetate ion (as put forward by Preuner and Ludlam, *C. A.* **2**, 12) is not correct; C_2H_6 is evolved below this potential.

EDWARD B. SANIGAR

Self discharge of dry cells. SABURO MAKINO. *J. Soc. Chem. Ind., Japan* **33**, Suppl. binding 521(1930).—To investigate the mechanism of self discharge a positive electrode only was immersed in an electrolyte, and the same electrode was immersed as an anode with the usual neg. electrode. Decrease of e. m. f. and capacity during open circuit occurs first at the anode, then gradually at the cathode, the degree depending upon the amt. of Fe contained as impurity in the MnO_2 used. E. M. S.

High-speed photographs of arcs in liquids. CHESTER LICHTENBERG. *Elec. World* **97**, 321, 323(1931).—Arcs sprung in insulating liquids ordinarily persist 0.01–0.1 sec. A high-speed, successive-image camera for studying these arcs is illustrated. It clearly records 24 individual successive images at a rate of 550 images per sec. The arcs were

started by opening a single-phase, 6000-v., 25-cycle a. c. carrying 50 amp. at 0.45 power factor. The same general phenomenon is observed in all the photographs. The arc starts at the contacts, and immediately oil or other liquids in the vicinity of the arc is gasified. A gas globule forms around the contacts. As the contacts continue to sep., the gas globule expands as a sphere till the sides of the containing vessel or a baffle plate alters its shape. Simultaneously the oil level is raised a distance proportionate to the size of the gas globule. Finally the arc punctures the globule, releasing the pressure within. Sometimes the release is violent. Then the oil level is distorted and broken, some oil being thrown upward. The remainder descends, cools the arc and extinguishes it. W. H. BOYNTON

A study of the physical processes in the so-called electrical purification of gases. II. The action of the electrical wind (Cottrell process). R. LADENBURG AND W. FIETZE. *Ann. Physik* [5], **6**, 581–621(1930); cf. *C. A.* **24**, 3447.—This is an investigation of the effect of the elec. wind (*EW*) on the velocity of dust particles being pptd. from a gas by elec. pptn. Using the corona discharge from a neg. charged wire to a grounded wall, the authors have found that for particles of diam. $\leqq 10^{-4}$ cm. the *EW* is the detg. factor on the velocity (v) which at 10^{-6} amps. and 5×10^{-6} amps./glow-discharge point is 0.56 and 1.23 m./sec., resp. v decreases with distance from glow-discharge point, being for 5×10^{-6} amps. at 3 mm. 1.20 m./sec. and at 60 mm. 0.80 m./sec. For particles of diam. $= 10^{-4} - 10^{-3}$ cm. the *EW* is still an important factor. The measurement of v made by comparing the effect of a current of air of known velocity with that of the *EW* on a stream of CO_2, tobacco smoke or CO_2 in a specially constructed cylindrical pptn. chamber was recorded photographically. Description and drawings of the app. and photographs of the effects are given. E. R. SCHIERZ

High-voltage surge testing—the cathode-ray oscillograph. F. D. FIELDER. *Elec.* [illegible] 28, 106–7, 119(1931).—The cathode-ray oscillograph accurately measures voltage and time relationships. It depends for its operation on the influence of elec. fields upon the electron beam. The Dufour and Norinder types are illustrated and their operations outlined. The deflection of the cathode ray by an elec. field is a pos. motion, and oscillograms indicate it with an accuracy of 2%. W. H. BOYNTON

1930 developments in electrical equipment for steel mills. H. A. WINNE. *Iron Trade Eng.* **8**, 21–5(1931).—The synchronous motor has very largely superseded the induction motor for const. speed mill drives, except where flywheels are necessary. The year's developments on d. c. main drives, switchgear, motor room ventilation, auxiliaries, *vacuum tubes* and *elec. furnaces* are noted. W. H. BOYNTON

Low-temperature carbonization and the production of electricity in Germany (ROSIN) **21.** Pb (THOMPSON) **9.** The calculation of chemical, electrical and gas mechanical matter-, energy- and form-transformation by space energetics (DALLWITZ-WEGENER) **2.** Some properties of protective films on metals (HEDGES) **9.** Refractory materials for electric furnaces (SEARLE) **19.**

Handbuch der technischen Elektrochemie. Band I, Hälfte 1. Die technische Elektrolyse wässeriger Lösungen. Edited by VICTOR ENGELHARDT. Leipzig: Akad. Verlag. 613 pp. M. 56; bound, M. 58. By subscription, M. 50.40; bound, M. 52.20.

Dry cell electric battery assembly. SIEMENS & HALSKE A.-G. Brit. 335,758, Oct. 19, 1928. Structural features.

Electric dry cell battery assembly. JOHN S. ZOOK (to Burgess Battery Co.). U. S. 1,790,784, Feb. 3. Structural features.

Storage battery. SOLOMON L. VAN MEYER, JR. U. S. 1,791,152, Feb. 3. Structural features.

Alkaline storage battery. J. J. DRUMM and CELIA, LTD. Brit. 335,587, March 27, 1929. Ag or Ag oxide mixed with Ce oxide is employed as active material for the pos. electrode. Various details of prepn. are given.

Storage-battery plate. ALBERT S. HUBBARD (to Gould Storage Battery Corp.). U. S. 1,791,208, Feb. 3. In making a tubular container to form a part of a storage-battery plate and to contain a core surrounded by active material, a sheet of non-porous insulating material such as hard rubber stock is rolled out, laminae of porous material such as cloth, wood or felt are embedded in the sheet, and the latter is cut into a plurality of washer-like sections which are then stacked and vulcanized.

Selenium cell. HANS THIRRING (to "Selenophon" Licht- und Tonbildges. m. b. H.). U. S. 1,790,850, Feb. 3. Various details of manuf. are described.

Accumulators. MAURICE MATROT. Fr. 692,917, June 27, 1929. The electrolyte of an accumulator having a Zn neg. electrode is composed, *e. g.*, of H_2SO_4 (45°Bé.) 500 cc., $ZnSO_4$ 350, dimethylglyoxime 4, Na_2SO_4 50 and $MgSO_4$ 20 g.

Tin plating. SIEMENS & HALSKE A.-G. Fr. 692,813, Mar. 27, 1930. In the electrolytic formation of coatings of Sn of any thickness, alk. electrolytes and sol. or insol. anodes being used, the content of free alkali is kept between the limits of 1.5 and 8%, so that no spongy formation is produced during the time necessary to obtain the desired thickness of Sn.

Electrolytic production of chemical compounds. ANTONIO L. CLARIANA. Fr. 693,150, April 2, 1930. In electrolytic processes for the production of chem. compds. the cathode is made of or coated with a metallic sponge of finely divided metallic particles which are easily oxidized in contact with the air. The operation is intermittent, the cathode, when reduced by the H produced, being brought into the air until again oxidized.

Electrolytic apparatus for cleaning the surface of metals. THE BULLARD CO. Fr. 693,199, April 2, 1930.

Electrolytic gas generator. PAUL HAUSMEISTER. Ger. 514,391, April 20, 1924.

Electrolytic refining of copper. UNITED STATES METALS REFINING CO. Fr. 693,678, April 10, 1930. The cathode used in the refining of Cu have parallel corrugations extending in 2 different directions.

Electrolyte for the production of iron or iron alloys. ORLANDO ORLANDI. Fr. 693,812, April 12, 1930. See Belg. 360,116 (*C. A.* **24**, 793).

Electrolytic manufacture of tungsten, etc. HELLMUTH HARTMANN. Ger. 514,365, Sept. 11, 1928. W is manufd by electrolyzing a soln of WO_3 in fused alkali phosphate, with or without H_3PO_4 or other phosphates. An example is given. Other heavy metals, *e. g.*, Mo, Ta, V and Nb, may be extd. similarly.

Electrolytic zinc bath. GIUSEPPE BIANCO. U. S. 1,791,082, Feb. 3. A bath suitable for use in coating iron or steel with Zn is formed from a Zn amalgam, alkali metal phosphate, H_2SO_4, $Al(OH)_3$ and water.

Light metals. SOC. ANON. POUR L'IND. CHIM. À BÂLE. Fr. 692,491, Mar. 21, 1930. In electrolyzers for the prepn. of light metals by electrolysis of their molten halogen salts, a cathodic arrangement for gathering the light metal formed is used. It is composed of an exteriorly insulated metal piece in the form of a longitudinal channel, or provided on its lower face with longitudinal channels, in elec. connection with the cathode which is placed below the said piece parallel to the direction of the channels and descends relatively low into the electrolyte.

Magnesium. THE MAGNESIUM PRODUCTION CO., LTD. (Pierre Cames-Casse, inventor). Fr. 693,387, Apr. 4, 1930. In the manuf. of Mg by the electrolysis of a soln. of $MgCl_2$ and KCl, a part of the electrolyte is removed from the vat, and $MgCl_2$ is added so that the compn. of the electrolyte is maintained practically constant and the KCl follows a closed cycle.

Purifying liquids. JEAN BILLITER. Fr. 693,799, April 12, 1930. Liquids are purified electrolytically, while suppressing electroosmosis as much as possible, by using mean differences of tension of less than 20 v. (preferably 8–16).

Hydrogen from water. ALBIN WERLEN THIÉBAUT KUENEMANN, ÉDOUARD SILBERMANN and CHARLES GOETSCH. Fr. 693,637, Jan. 21, 1930. In the production of H from water an anode composed of a Hg-Cu-Zn catalyst, a depolarizer composed of an alkali phosphate and an Al cathode are used.

Butyl alcohol. R. RILEY, S. W. ROWELL and IMPERIAL CHEMICAL INDUSTRIES, LTD. Brit. 335,683, Aug. 13, 1929. BuOH obtained by the catalytic hydrogenation of aldol, crotonaldehyde or butylaldehyde is purified by electrolytic reduction in aq. electrolyte, either acid or alk., such as H_2SO_4 or $NaHSO_3$ soln. The product may sep. into 2 layers, the upper of which when neutralized and distd. forms a distillate also sepg. into 2 layers, the upper of which contains the purified BuOH substantially free from aldehyde.

Electric furnace for aluminum manufacture. PEDER ELIASEN FRÖLAND. Ger. 515,229, Mar. 6, 1928.

Induction furnace. EMIL F. RUSS. Ger. 514,357, Dec. 12, 1929.

Electric induction crucible furnace. C. LORENZ A.-G. Brit. 335,766, Oct. 25, 1928. Structural and elec. features.

Electric-arc furnace suitable for making tungsten carbides. OSCAR L. MILLS (to Mills Alloys, Inc.). U. S. reissue 17,954, Feb. 3. Reissue of original pat. No. 1,719,558 (*C. A.* **23**, 3863).

Heating elements for electric furnaces. EMIL F. RUSS. Fr. 693,413, April 5, 1930.

Apparatus for electrical precipitation of suspended particles from gases. HARRY WINTERMUTE (to Research Corp.). U. S. 1,791,338, Feb. 3. Structural features.

Apparatus for electrical precipitation of suspended particles from gases. HARRY V. WELCH (to International Precipitation Co.). U. S. 1,790,961, Feb. 3. Structural features.

Armoured electric deep-sea cables. FELTEN & GUILLEAUME CARLSWERK A.-G. Brit. 335,804, Jan. 23, 1929. Various structural details are described of cables with a pressure-protecting covering formed of profile wires and covered by a water-tight sheathing of gutta percha, "gutter-gentzch" or washed rubber.

Electric incandescent lamps. N.-V. PHILIPS' GLOEILAMPENFABRIEKEN. Brit. 335,617, June 29, 1929. Various structural details are described of a lamp which is adapted to be mounted within a parabolic reflector and the bulb of which is preferably colored by surrounding it by a template or stencil and spraying with a "Bakelite" lacquer. A yellow layer may be obtained by burning in Ag oxide.

Metal filament for incandescent electric lamps. C. SENEN. Belg. 370,823, July 31, 1930. The filament is formed of an alloy of W, Th, Ir, Ni and Cr, or of an alloy of W, Th and Zr. It has an elongated cross-section, either an ellipse or a double parabola.

Lamp filaments. SOC. D'ÉTUDES SCIENTIFIQUES ET INDUSTRIELLES. Fr. 693,275 June 1, 1929. Filaments for wireless lamps are made of Ba_3N_2 or Ba alloys such as Na-Ba, Bi-Ba or Sn-Ba. Cf. *C. A.* **25**, 1170.

5—PHOTOGRAPHY

E. P. WIGHTMAN

Preparation of fine grain emulsions. E. FUCHS. *Phot. Ind.* **28**, 1172–4(1930).—The graininess observed in photographic materials is due to the clumping or aggregation of grains rather than to the individual grains themselves. Other things being equal, graininess is proportional to the size of the individual grains, but the prepn. of fine grain emulsions is largely a matter of colloidal principles aimed at preventing formation of aggregates of grains. In the ammonia process, substitution in part by Na_2CO_3 is recommended for the first ripening, followed by a quick second ripening of the well-washed material. C. E. MEULENDYKE

Preparation of silver bromide emulsion. MARX REO, T. NISHIMURA, H. HAYASHIHARA, T. ASAI AND S. MURATA *Repts. Imp. Ind. Research Inst. Osaka, Japan* **11**, No. 13(1930).—The methods of prepn. of AgBr emulsion together with its properties are given. F. I. NAKAMURA

Solubility of silver bromide in photographic emulsion. MICHIO MIYATA. *Repts. Imp. Ind. Research Inst. Osaka, Japan* **11**, No. 12 (1930). —The use of the pptn. method in detg. the solv. of AgBr in photographic emulsions is given. F. I. NAKAMURA

Toning by addition. S. JASIENSKI. *Atelier Phot.* **37**, 113–5(1930).—Processes for toning Ag images fall into two groups: the substitution methods, in which the Ag of the image is changed to another form, as Ag_2S, and the addn. methods, in which some substance is added to the Ag, as the U toning process. The final deposit obtained when a $HgCl_2$ bleach is used for sulfide toning is partly sol. in Farmer's reducer. It cannot, therefore, be Ag_2S but is probably a complex Hg-S compd. H. PARKER

Alkaline selenosulfates and their use for the toning of silver images. A. SEYEWETZ. *Sci. ind. phot.* [2], **1**, 436; *Rev. franç. phot.* **11**, 332; *Photographe* **17**, 475–6(1930).—Seleno-sulfates can be obtained from NH_4, Li, Na and K sulfites. Because of its great soly. the last is the most interesting. On dilg. a concd. soln. of K selenosulfate with water, Se is pptd., but on dilg. with a K_2SO_3 soln., the soln. remains colorless. Silver selenosulfate decomposes, readily pptg. Ag_2Se; hence, the soln cannot be used to tone prints. Several prints may be fixed and toned simultaneously with a fresh soln. of hypo contg. in addn. K selenosulfate. After fixing 2 or 3 prints, however, clear whites are no longer obtained because of the decompn. of the Ag selenosulfate. L. A. STAIB, JR.

History of the invention of silver chloride developing-out paper of the Velox type. R. NAMIAS. *Il prog. fot.* **37**, 397(1930).—In a discussion of this subject, Eder claimed that AgCl papers were originated by himself and Pizzighelli. Baekeland replied that in his papers the emulsion was not washed, and that the present type of developing-out paper therefore originated with the introduction of Velox. Baekeland's claims are supported by N. C. E. K. MEES

Determination of so-called Ur-silver in photographic gelatin. H. H. SCHMIDT AND F. PRETSCHNER. *Z. wiss. Phot.* **28**, 293–7(1930); cf. *C. A.* **25**, 42.—The previous

differentiation of the Ag content between atomic Ag and an organic Ag compd. does not hold. The Ag is not the result of the action of $AgNO_3$ on gelatin, but is due to differences in the diffusion velocities of Ag and halogen ions within the gelatin during washing. Ag halide and Ag formed by exposure cannot be sepd. with neutral $Na_2S_2O_3$. The best available substance is Na_2SO_3. Its use, however, is limited to the investigation of AgCl and AgBr. A. P. H. TRIVELLI

Origin and the chemical nature of the silver content. H. H. SCHMIDT AND F. PRETSCHNER. *Z. wiss. Phot.* **28**, 302-11(1930).—The Ag content arises by hydrolysis through differences in the diffusion velocities of halogen and Ag ions and consists of Ag_2O. This Ag_2O has a tanning action on gelatin, forming a difficultly sol. complex. The total amt. of detectable Ag_2O in the gelatin after washing depends upon the relations between the soly. of Ag halide and the Ag_2O gelatin complex. With the same soly. of the Ag complex, the Ag content increases with increasing soly. of the Ag halide. The total amt. of Ag_2O formed very quickly approaches a limit when as much Ag_2O dissolves as is formed by hydrolysis of Ag halide. The Ag content resulting from AgCl is perfectly sol. AgBr and AgI were also studied. It is possible that the Ag_2O formed by hydrolysis influences ripening. In any case, Ag_2O is more easily reducible than Ag halide. A. P. H. TRIVELLI

Silver content and the fixing process. H. H. SCHMIDT AND F. PRETSCHNER. *Z. wiss. Phot.* **28**, 297-302(1930); cf. *C. A.* **24**, 2069.—The soly. of Ag is less in Na_2SO_3 than in $Na_2S_2O_3$ soln. Therefore, the total removal of Ag from a washed emulsion by Na_2SO_3 soln. is due to a sol. Ag compd. which has been shown to give Ag ions. The very small amts. of Ag left in the emulsion are of the same order as those obtained if pure gelatin is treated with thiosulfate and the sulfite complex compd. solns. Very probably this Ag is Ag_2S. The soly. of Ag in thiosulfate solns. is too great for the use of the latter in accurate analytical investigation. A. P. H. TRIVELLI

Mechanism of the color change of silver images due to selenium. A. SEYEWETZ. *Sci. ind. phot.* [2], **1**, 435(1930).—Se dissolved in alkaline sulfites or sulfides can be used to tone Ag images. Sodium selenosulfate and sodium selenosulfide react with Ag to give Ag_2Se. This reaction has been verified by removing the image from plates and paper and detg. analytically the ratio of Ag to Se. A slightly larger percentage of Se was found in the selenosulfate toned image. Satisfactory agreement with the theoretical ratio was obtained for the selenosulfide image. L. A. STAIB, JR

Orthochromatism, panchromatism and dye filters. GUILLIMINOT AND BOESPFLUG. *Photo-Revue* **42**, 309-11, 325-6(1930).—An estn. of the chromatic sensitivity of negative materials may be obtained: (1) by photographing a color chart with and without filters, (2) by means of the Eder-Hecht sensitometer wedge; (3) by means of spectrographic curves. Examples of each method are shown. H. D. RUSSELL

Glycocoll-copper for daylight filter. R. LUTHER. *Kinotechnik* **12**, 453(1930).—The advantages are: (1) it is easy to prepare in C. P. form and easy to compound; (2) it contains no volatile and easily oxidized material; (3) it is neutral and does not attack the glass walls of the cell; (4) it is practically stable with time; (5) the absorption is more independent of temp. The disadvantages are: (1) the soln. can develop mold, (2) it is sensitive to alkali and acid, its prepn. being thus made more troublesome; (3) its soly. is low at room temp. If necessary, a greater thickness of cell may be chosen. The extinction curve is shifted 8 or 10 mμ farther toward the red, and the density is less in the ultra-violet than is that of the Davis-Gibson filter. It appears to give a closer match to the curve of the ideal filter than does a $CuSO_4$-pyridine-mannitol cell. O. E. M.

Raising the sensitivity of bichromated colloid films. K. JACOBSOHN AND E. WAGNER. *Atelier Phot.* **37**, 98-100(1930).—The addn. of $CeCl_3$ to the sensitizing bath as advised by F. J. Tritton, was not found to increase the sensitivity of bichromated gelatin. Bathing in a soln. of methylene blue after the usual sensitizing with $K_2Cr_2O_7$ gave increased red sensitivity. The loss in the green and yellow balances the gain in the red, so there is no gain in the total sensitivity. H. PARKER

Oleobrom. J. D. JOHNSTON. *Camera* (Dublin) **10**, 235-6(1930).—Technic of bromoil making is simplified by the introduction of a new bromide paper. The developed print is bleached and dried in the usual way. The dry print is charged with ink from a special roller. The print is then placed in water and a clean roller run over the print. This rolling removes the ink from the highlights and deposits it on the shadows. After the proper contrast has been obtained, the print is removed from the water and is either dried or the tones altered by hand manipulation. R. A. PURDY

New photochemical effect on celloidin paper as a radiation problem. H. MEWES. *Z. wiss. Phot.* **28**, 311-24(1930).—AgCl papers exposed to different substances (ele-

ments of the periodic system) in a nonconducting box of ebony, or metal-free, colorless paper maché, and developed in dild. rodinal developer (1:825) at 18° for 15 min., give pictures which show the effect of radiation and not the effect of emanation of H_2O_2. This radiation M. calls *L-rays*. Different properties of these L-rays are discussed.
A. P. H. TRIVELLI

Testing wash water for hypo. *Atelier Phot.* **37**, 117-8(1930).—Several methods are described for testing for the presence of $Na_2S_2O_3$: (1) A dil. (light red) soln. of $KMnO_4$ is decolorized in less than a min. after the addn. of water contg. $Na_2S_2O_3$. (2) Two cc. of a 1% soln. of $AgNO_3$ acidified with HAc, mixed with a glass full of the wash water, give a brown color if $Na_2S_2O_3$ is present. (3) A drop of satd. $HgCl_2$ soln. added to a small amt. of the wash water gives a brown color with $Na_2S_2O_3$ present. The method of Crabtree and Ross using a soln of $HgCl_2$ and KBr is also described. H. PARKER

Ferrous oxalate developer. SPÖRL. *Atelier Phot.* **37**, 100 2(1930).—For over-exposures, the FeC_2O_4 developer gives better results than dild. or restrained org. developers, and the time of development is normal. Two stock solns. are used: (*A*) 1:3 (33%) $K_2C_2O_4$ and (*B*) 1:3 (33%) $FeSO_4$, with a drop of H_2SO_4. Three parts of *A* to one part of *B* gives the strongest developer, increasing the proportion of *A* weakens it, or KBr may be added to correct overexposures still further. One or 2 drops of hypo increases the energy, but an excess causes fog. A good reducer may be made from the used developer. Fifteen g. of oxalic acid is dissolved in a liter of the heated developer. The green crystals of ferric potassium oxalate formed when the developer cools are made up as a 1:20 soln., and hypo is added equal to 5 times the wt. of the green crystals whose action is between that of $K_3Fe(CN)_6$ and persulfate.
H. PARKER

Is the blackening and blanching of exposed lithopone a photographic phenomenon? (STOBBE) **3.** The Spierer lens and what it reveals in cellulose and protoplasm (SEIFRIZ) **11A.**

Photographic coating sensitive to electronic discharge. AUSTIN G COOLEY. U. S. 1,791,053, Feb. 3 Finely divided conducting particles such as metal are distributed through a sensitive coating to render it suitable for use in recording app.

Three-color cinematograph film. LEON J. B. DIDIER. U. S. 1,790,978, Feb. 3. A blue image is printed on one face of a film coated on one side with a gelatin bromide layer and on the other with a neutral gelatin layer; the film is coated with a soln. of a dichromate, and there are printed simultaneously on the sides of the film a yellow and a red image, resp., the film being then dried and provided with a colored gelatin strip on each side.

Production of colored photographic and cinematographic positives. L. J. DASSONVILLE. Belg. 372,003, Aug. 31, 1930. A Ag salt image is first produced in the sensitized emulsion. After resensitization by means of a salt of another metal, a 2nd image is produced It is obtained colored by pptn. of a colored salt.

Photographic plates and films. I. G. FARBENIND. A.-G. Fr. 693,659, April 10, 1930. Anti-halo layers for photographic plates and films contain fuchsone dyes with one or more COOH groups in the mol. Examples are given of the use of aurindicarboxylic acid, aurinmonocarboxylic acid and hydroxycarboxyfuchsone.

Light-sensitive layers. KALLE & CO. A.-G. Fr. 693,032, Mar. 29, 1930. Light-sensitive layers are prepd. on appropriate supports using diazo compds. of aromatic amino-acylamines of the general formula NH_2 R NH CO X and NH_2 R NH.CO.NH R' NH_2 in which R and R' are substituted or unsubstituted groups and X is an aliphatic, aromatic or aliphatic-aromatic group and the CO may be replaced by CS. Examples are given.

Protecting surfaces. VLADIMIR REVOS. Fr. 692,800, Mar. 26, 1930. Fragile surfaces such as photographic negatives or papers, films, pictures, etc., are protected by a thin layer of a transparent soln. of celluloid, etc., in an appropriate solvent such as AcOAm.

Printing molds. ERNST BECHERT. Fr. 692,794, Mar. 26, 1930. In the production of printing molds, safranine or like substance is added to the light-sensitive layer to neutralize the latteral or undesired illumination.

6—INORGANIC CHEMISTRY

A. R. MIDDLETON

Researches on the role of water in the salts: aquo combinations of ruthenium-IV-ammines. R. CHARONNAT. *Compt. rend.* **191**, 1453-5(1931).—In partial support of his theory of hydrolysis Werner made use of certain transformations of salts of Ru-IV-nitrosohydroxotetrammine which are caused by suitably heating the salts with acid, namely: $X_2[Ru(NO)(OH)(NH_3)_4]$ (I) $\longrightarrow$ $X_3[Ru(NO)(H_2O)(NH_3)_4]$ (II) $\longrightarrow$ $X_2[Ru(NO)(NH_3)_4]$ (III). In his investigation of the role of water in salts of type II, C. prepd. 2 new salts having the compns. $Ru(NO)en_2Cl_2.H_2O$ and $Ru(NO)py_2Cl_3.H_2O$ (en = ethylenediamine and py = pyridine). The properties of these complex aquo salts indicate that they are really hydrochlorides of hydroxides having the following structures: $Cl_2[Ru(NO)(NH_3)_4(ClHOH)]$, $I_2[Ru(NO)en_2(ClHOH)]$, and $[Ru(NO)py_2(ClHOH)Cl_2]$. The mol. of HCl is joined to the O of the group (HCl . . . O A) by a secondary valence, the O possessing tri-coordinance. R. H. LOMBARD

A new method for the conversion of alkali sulfate to alkali chloride for use in silicate analysis. WERNER MYLIUS. *Sprechsaal* **63**, 972-5(1930).—A new method for converting the alkali sulfate to the chloride in the quant. detn. of K and Na in silicates to replace the more bothersome $BaCl_2$ method consists in a double evapn. of the finely pulverized neutral sulfate with $N_2H_4.2HCl$. C. H. LORIG

The reaction between iodic acid (alkali iodates) and hypophosphorous acid, phosphorous acid or their salts. (II). V. HOVORKA. *Collection Czechoslov. Chem Comm* **2**, 609-25(1930)(in French); cf. C. A. **25**, 468. This part deals with the oxidation of the lower acids of P by HIO_3 in the presence of substances capable of removing, by the formation of insol. iodides, the I produced by the reaction between the HIO_3 and the HI formed during the oxidation of the phosphorous acids. Salts of Pb, Ag, Hg^{++} and Cd were used, but with Pb and Cd salts free I was always formed. Excess of the perchlorates of Ag and Hg^{++} was finally used. The work was carried out with acidified (H_2SO_4) alkali phosphite or hypophosphite solns. to which KI and excess metallic perchlorate were added. With Ag and Hg^{++} perchlorates the corresponding iodides were formed, so that very little direct oxidation of the acids by the HIO_3 occurred. The oxidation in the presence of $AgClO_4$ was complicated by the pptn. of almost all the I present as $AgIO_3$ when the $AgClO_4$ was added, and also by the reduction of the $AgClO_4$ to finely divided Ag. The results show that only half the H_3PO_2 was oxidized. After the oxidation the soln. contained principally H_3PO_3 and very little H_3PO_4. H_3PO_4 only began to be formed after about 50% of the H_3PO_2 had been oxidized. At ordinary temp. the oxidation of H_3PO_2 to H_3PO_3 was the main reaction, the oxidation of H_3PO_3 alone was always slow. With $Hg(ClO_4)_2$ no HgI was pptd. since it dissolved in the perchlorate immediately on formation. As with the Ag salts, the Hg^{++} salts were the real oxidizing agents of the phosphorous acids. The Hg^{++} salts oxidized both H_3PO_2 and H_3PO_3 to H_3PO_4, while $AgClO_4$ only oxidized the H_3PO_2 to H_3PO_3. The oxidation by the Hg^{++} salt occurred at ordinary temp., the rate depending on the quantity of $Hg(ClO_4)_2$ present. According to the quantity of Hg^{++} salt added, either the Hg^{+} salt alone, or the Hg^{+} salt and metallic Hg, were formed. Detailed descriptions of the courses of the reactions, of solns. obtained and of ppts. formed are given, together with detailed equations representing the various oxidations. EDWARD B. SANIGAR

The reduction of soda by hydrogen. P. VILLARD. *Compt. rend.* **190**, 1329-31 (1930).—A study was made of the action of H at high temp. upon free alkali, soda by preference because of the ease with which one can detect Na vapor. A current of H was passed over fused soda spread on the internal wall of a tube of extremely refractory glass or contained in a tube of Ag lightly closed at both ends to retain the soda and placed in the glass tube. The results were as follows: At 800° in the heated part of the tube contg. the soda the current of H was charged with vapors absorbing Na light very strongly. With a spectroscope and white light the absorbing vapor gave the characteristic spectrum of Na. It did not seem to be a question of dissocn., even at the higher temps. utilized (in the neighborhood of 900°) since the phenomena of the absorbing vapor disappeared entirely when H was replaced by N. R. H. CARTER

The system: thorium nitrate-ether-water between 0° and 20°. P. MISCIATELLI. *Gazz. chim. ital.* **60**, 833-8(1930).—It is necessary to have data on the quaternary system: $UO_2(NO_3)_2$-$Th(NO_3)_4$-H_2O-Et_2O, and therefore in turn of the ternary systems: $UO_2(NO_3)_2$-Et_2O-H_2O and $Th(NO_3)_4$-Et_2O-H_2O, to establish the conditions for the sepn.

of Th from U in the presence of water by the aid of Et_2O (cf. M., *C. A.* **23**, 1554). Of the systems: Et_2O–H_2O, $Th(NO_3)_4$–Et_2O and $Th(NO_3)_4$–H_2O, only the latter is unknown, so this was first studied. The following data give the temp. and the no. of g. of $Th(NO_3)_4$ in 100 cc. of satd. soln.: cryoscopic method: —0.2, 1; —0.5, 2; —1, 5.2; —1.5, 9; —2.1, 13; —2.9, 16; —4, 20; —4.6, 23.5. —5.4, 26.4; —5.6, 27.3; —6, 33; —6.6, 37; —9, 41; —11.2, 43; —12.2, 44.5; —13.5, 46.2; —15, 47.7; —16.6, 49.8; —19.1, 51; —23.3, 53.1; —25, 55.7; —28.6, 58; —31.3, 59.2; —35, 60.6; —40.6, 62; —43.5, 64; synthetic method: —43.5, 64 ($Th(NO_3)_4.6H_2O$); analytic method: —22, 64.2; 0, 65; 10, 65.2, 20, 65.6. Equil. in mixts. of $Th(NO_3)_4$, Et_2O and water was very slow, in some cases 20 days being required. The results of the measurements at 0° and 20° are given in tables and triangular diagrams, which must be consulted for the quant. data. The method used for obtaining these data is described in detail. In the *prepn. of anhyd.* $Th(NO_3)_4$, the ordinary nitrate was freed of traces of Ce by pptn. with $Na_2S_2O_3$ and H_2O_2, crystn. as $Th(NO_3)_4$, distn. of N_2O_5 over this to remove $4H_2O$, and treatment of the residue with a current of dry air for several days. C. C. Davis

The system: uranyl nitrate–ether–water between 0° and 20°. P. Misciatelli. *Gazz. chim. ital.* **60**, 839–42(1930). The binary systems: Et_2O–H_2O, $UO_2(NO_3)_2$–Et_2O and $UO_2(NO_3)_2$–H_2O are already known. Equil. in the ternary system was much more rapid than with $Th(NO_3)_4$–Et_2O–H_2O. A method of *prepn. of anhyd.* $UO_2(NO_3)_2$ was developed, viz., by distg. its mixt. with N_2O_5 and drying the residue in a current of dry air at 110°. Incipient decompn. of the anhyd. salt is obvious from a change in color to orange-yellow. No basic salts are formed in this thermal decompn. (cf. Guempel, *C. A.* **24**, 2367). The data for the isotherms at 0° and at 20° are given in tables and triangular diagrams, which must be consulted for the quant. values. Cf. preceding abstr. C. C. Davis

The structure of hydrogen phosphide and of hydrogen arsenide. G. Natta and E. Casazza. *Gazz. chim. ital.* **60**, 851–9(1930). In previous expts. on the structure of hydrides of elements of the 5th and 6th groups (cf. N., *Giorn. chim. ind. applicata* **12**, 37(1930)), analogies were found in the form and dimensions of the elementary cells of NH_3, PH_3 and AsH_3, but this was limited to a comparison of the lattice consts., and it was not proved whether a perfect isomorphism exists. In the present paper, more refined methods have made it possible to settle this problem. Of the binary compds. of H with elements of the 5th group, only NH_3 has been studied by the x-ray powder method (cf. Mark and Pohland, *C. A.* **20**, 130; de Smedt, *C. A.* **20**, 1735), but the arrangement of the atoms in the mol. was not established. A new examn. of NH_3 gave x-ray photographs of extraordinary clearness, and these will be described in a later paper, with the data of the structure. The lattice const. at —170° was 5.08 A. U., a value lower than that of the other experimenters, probably because of the thermal contraction at the lower temp. SbH_3 and BiH_3 appeared to be isomorphous but of a different structure from NH_3, PH_3 and AsH_3. However, the weakness and lack of clarity of the lines leave this problem unsettled. Good results were obtained with PH_3 and AsH_3. PH_3 was prepd. from Ca phosphide and water and purified by drying with $CaCl_2$, freezing out of heavier hydrides and sepn. from H by solidification with liquid air. It b. —87.4° and m. —132.5°. AsH_3 was prepd. from pure Zn and As_2O_3 in aq. HCl, drying with $CaCl_2$ and freezing of the AsH_3 with liquid air. Examn. of both PH_3 and AsH_3 was carried out with an app. already used (cf. N., *C. A.* **24**, 4973). At approx. 100° (abs.) PH_3 and AsH_3 are quite stable and do not oxidize in air, even when traces of other H phosphides or arsenides are present. PH_3 crystallizes in the cubic system. Its elementary cell contains 4 mols., has a dimension of 6.31 ± 0.01 A. U. at —170° and a vol. of 251×10^{-24} cc. Its d. is 0.896. AsH_3 is isomorphous with PH_3. Its elementary cell contains 4 mols., with a dimension of 6.40 ± 0.02 A. U. at —170° and a vol. of 262×10^{-24} cc. Its d. is 1.96. The position of the P and As atoms corresponds to a face-centered structure. The x-ray data did not permit the establishment of the position of the H atoms in the lattice. From considerations based on the size of the constituent atoms, it is probable that both PH_3 and AsH_3 belong to 1 of the 2 spatial groups Th^2 and Oh^4. The relations between these and the structure of NH_3 will be the subject of a later paper. C. C. Davis

Salts of bivalent vanadium. Julius Meyer and Margot Aulich. *Z. anorg. allgem. Chem.* **194**, 278–92(1930). The soly. of specially purified V_2O_5 in various concns. of H_2SO_4 is tabulated. If 3 g. of V_2O_5 is dissolved in 30 g. of 10% H_2SO_4, the soln. diluted and reduced with SO_2, blue vanadyl sulfate is produced. Electrolysis of the SO_2-free soln. in an inert atm. with a Pt, Pb or Hg cathode, 8–10 v. and 2–3 amp. causes further reduction. Purple crystals of $VSO_4.7H_2O$ (I) sep. upon evapn. This product

is very unstable. The NH_4, K and Pb complexes, *e. g.*, $(NH_4)_2V(SO_4)_2.6H_2O$, are more stable. Treatment of I with alkali salts of other acids gives only solns. Salts of org. acids decompose readily. Soln. of metallic V in mineral acids yields green vanadic solns. The metal as cathode or anode does not form V^{++}. B. A. SOULE

Germanium. XXXVI. Extraction of germanium and gallium from germanite. I. W. I. PATNODE AND R. W. WORK. *Ind. Eng. Chem.* **23**, 204–7(1931).—About 1200 g. of germanite is chlorinated and the volatile chlorides are distd. The distillate includes the anhyd. chlorides of Ge, As, Si, S and Ga. These are subjected to fractional distn. This distillate contains HCl and $GeCl_4$, which are sepd. by gravity. The $GeCl_4$ may then be hydrolyzed again to the dioxide. The yield is 85–90% of the Ge content of the ore. AMY LE VESCONTE

The halides of the rare earths. IV. Samarium diiodide and the thermal decomposition of samarium triiodide. G. JANTSCH AND N. SKALLA. *Z. anorg. allgem. Chem.* **193**, 391–405(1930).—Pure anhydrous SmI_3 is prepd. by treating a mixt. of 1 mol. of ordinary H_2O-contg. SmI_3 and 6 mols. of NH_4I with a current of HI, the temp. being gradually raised to 350° and finally to 600–650° to remove NH_4I. After cooling the HI is replaced with N. To avoid the formation of basic salts the gases must be quite dry and free from O. SmI_3 so obtained can be reduced to SmI_2 by heating in a Au boat in a current of dry H, the temp. being raised slowly in the course of 11 hrs. to 750–760° and held at this temp. for 1.5 hrs. After cooling the tube is filled with pure N. SmI_2 is a deep green, almost black in color, and dissolves in H_2O to give a deep red color. The soln. evolves H_2 and is gradually decolorized with sepn. of a basic Sm^{III} salt. SmI_2 is more stable than the chloride but is vigorously decomposed by acids, even AcOH, with evolution of H_2. The thermal decompn. of SmI_3 was carefully studied in a quartz tube under a pressure of 0.01 mm. of Hg. The temp. rose to 800° in 4 to 5 min. At 550–570°, I began to come off, the reaction being very vigorous at 680–720°. Above 750° evolution of I was very slight. The material was heated at 800° for 45 min., then at 900° for 15 min., and then allowed to cool, an atm. of pure dry N being finally admitted. The product of this decompn. is SmI_2. SmI_2 at 680° reacts as follows: $3SmI_2 \longrightarrow Sm + 2SmI_3$. SmI_3 melts with decompn at 840° and is extremely sensitive to H_2O, forming a red basic iodide in a few mins. in air. Cond. measurements verify the rapid decompn. of SmI_2 in H_2O solns. as follows: $2SmI_2 + 2H_2O \longrightarrow 2Sm(OH)I_2 + H_2$. If SmI_2 is dissolved in air-free H_2O at 0° and treated with a cold satd. soln. of Na_2SO_4, $SmSO_4$ is pptd. It is a bright, orange-red cryst. powder, slowly decomposed by H_2O and sol. in acids with decompn. H. STOERTZ

Trichloromethyl perchlorate. L. BIRCKENBACH AND J. GOUBEAU. *Naturwissenschaften* **18**, 530(1930).—In presence of a little HCl, CCl_4 reacts with $AgClO_4$ at the ordinary temp., yielding trichloromethyl perchlorate, CCl_3ClO_4, in 60–70% yield. By repeated fractionation in a vacuum in absence of moisture this can be obtained as a colorless liquid which solidifies at about −55° to colorless crystals. With water it yields $HClO_4$ and liberates I with iodides. With ale. and other org. substances, *e. g.* tap grease, it reacts at the ordinary temp. with detonation. When heated it explodes, liberating Cl. B. C. A.

The action of bivalent metals on persulfates of the alkali group. Synthesis of double salts of the type $M_2^+M^{++}(SO_4^{--})_2$. OSSIAN ASCHAN. *Z. anorg. allgem. Chem.* **194**, 139–46(1930).—Reduction of K, Na or NH_4 persulfates with metallic Cu, Mg, Zn, Cd, Mn, Fe, Ni or Co gives a double salt, *e. g.*, $K_2Zn(SO_4)_2.6H_2O$. The reaction is practically quant. B. A. SOULE

Alkyloxyvanadylsalicylates. P. BRAUMAN. *Compt. rend.* **192**, 166–7(1931).—MeOH (or EtOH(+$VOCl_3$ + $LiOC_6H_4CO_2Me$ gives $MeO(VO)OC_6H_4CO_2Me$ (or the EtO compd.) These are analogous to the Mo (Rosenheim et Bertheim, *Z. anorg. Chem.* **34**, 440(1903)) and the Cu and Ni compds. (Doak and Packer, *C. A.* **23**, 829). V. F. HARRINGTON

Complex thiocyanates of quadrivalent molybdenum. G. A. BARBIERI. *Atti accad. Lincei* **12**, 55–61(1930).—The thiocyanates of quadrivalent Mo, previously unknown, have been prepd. by oxidizing the pyridine as well as the hexamethylenetetramine salts $(C_5H_5N)_2H_2Mo(CNS)_6$ and $(C_6H_{12}N_4)_2H_2Mo(CNS)_6$, with $K_4Fe(CN)_6$. Both of the above salts are insol. in water; so the reaction is carried out by grinding each with $K_4Fe(CN)_6$ in a mortar in the presence of water. With the C_5H_5N salt, an intense blue-violet solid results, while with the tetramine, a green-violet solid results. The analyses indicate that the products are $(C_5H_5N)_2H_2Mo(CNS)_6$ and $(C_6H_{12}N_4)_2H_2Mo(CNS)_6$. To prove that quadrivalent Mo is present, a method was developed by B.; the method depended on the observation that any Mo salt can be oxidized to Mo^{VI} by a cold soln of ammoniacal $Fe(CN)_6^{III}$, this being in turn reduced to $Fe(CN)_6^{II}$. The equivs. of $Fe(CN)_6^{III}$ reduced are a measure of the oxidation. The Mo was thus found to be

quadrivalent. The estn. of $Fe^{II}(CN)_6$ and $Fe^{III}(CN)_6$ in solns. of CN and SCN as well as halogens has already been worked out by B. (*C. A.* **24**, 4724). A. W. CONTIERI

Studies on some complex chromiselenates. I. P. B. SARKAR AND S. N. BHATTACHARYA. *J. Indian Chem. Soc.* **7**, 765–9(1930).—The close analogy between the properties of complex chromisulfates and complex chromiselenates is discussed. The methods of prepn. and analysis of chromoselenic acid, $H[Cr(SeO_4)_2]$, chromoselenomonosulfuric acid, $H_2[Cr_2(SO_4)(SeO_4)_3]$, chromoselenodisulfuric acid, $H_4[Cr_2(SO_4)_2(SeO_4)_3]$, chromoselenotrisulfuric acid, $H_6[Cr_2(SeO_4)_3(SO_4)_3]$, and the corresponding K salts are outlined. Na chromoselenic alum is described. L. L. QUILL

The system MgO–FeO–Fe_2O_3 in air at one atmosphere (ROBERTS, MERWIN) **8.**

WOLF, LUDWIG: **Grundzüge der anorganischen Chemie.** 2nd ed., revised Leipzig: F. Deuticke. 230 pp. M. 6; bound, M. 8.

7—ANALYTICAL CHEMISTRY

W. T. HALL

Differential potentiometric titration. IV. (a) Adaptation of the method to the use of hydrogen electrodes. (b) Test of standards for precise acidimetry. DUNCAN A. MACINNES AND IRVING A. COWPERTHWAITE. *J. Am. Chem. Soc.* **53**, 555–62(1931).—The way in which the differential electrometric method of titration can be adapted to the use of H electrodes is described in detail and 2 cuts show the necessary app. Expts. with electrometric detn. of the end point by the method described, using const.-boiling HCl, K acid phthalate and benzoic acid as standards, gave results agreeing to within 0.01% or better. W. T. H.

Improved apparatus and method for the analysis of gas mixtures by combustion and absorption. MARTIN SHEPHERD. *Bur. Standards J. Research* **6**, 121–67(1931).—The app. described is of the Orsat type but contains many improvements. A buret is provided which prevents parallax errors; a device gives good illumination; a manometer-compensator is provided which is compact and less fragile than the usual type, the pressure balance being obtained by electric contact; a special stopcock insures accuracy; a water jacket is provided which does not require a very large rubber stopper; a distributor, or manifold, eliminates much capillary dead space; the absorption pipet works very rapidly, the combustion pipet eliminates the undesirable features of the common type; a sampling pipet is designed to permit manipulation without danger of contamination; sources of leakage are avoided; the complete assembly is unusually convenient; the app. is supported entirely by metal; the assembly and replacement of parts is easily accomplished. Several procedures are given for making technical and accurate gas analyses. The app. was designed for the purpose of getting more accurate results and saving time. The original paper must be consulted for details. W. T. H.

Quantitative study of the boric acid-alcohol flame test. W. STAHL. *Acta Univ. Latviensis Kim. Fakultat. Serija* **1**, No. 13-17(in German 399-400)(in Lettish 369-99)(1930).—The H_3BO_3 esters give the green flame test when the reacting components are at about 100° below the b. p. of the EtOH or MeOH used. With rise in temp. the effect is increased. The concd. H_2SO_4 used in the test serves not only to liberate H_3BO_3 and remove H_2O but also has an effect upon the flame. The color can be estd. with the aid of a colorimetric scale. The best flame test is obtained when the temp. is not far from the b. p. of the alc. and the best reaction mixt. is 5 vol. MeOH to 1 vol. concd H_2SO_4. The dimensions of the app. have an effect upon the smallest quantity of H_3BO_3 that can be found but with the micro app. described in this paper, as little as 0.005 mg. H_3BO_3 can be detected. As much as 3% of water in the MeOH does not have any noticeable effect. W. T. H.

Spectrum analysis in assaying. A. A. FITCH. *Mining Mag.* **43**, 81–5(1930).—Procedure is outlined for the most valuable types of applications: (1) Qualitative test for a particular metal. This is recommended for sorting steel scrap. (2) Qualitative test for all metals present. This is valuable esp. in complete assays of Pt metals and rare-earth concentrates. (3) Approx. quantitative analysis—done by comparison with standard spectra. (4) More accurate quantitative detn.—done by measurement of intensity of lines by spectrophotometry. The accuracy of the method is about 5%. It is suitable for rapid analysis of steels where highest accuracy is not required.

Numerous other applications are suggested, the greatest advantage being rapidity. A. BUTTS

Role of silica in the decomposition of fluorides. P. FUCHS. *Chem. Erde* 5, 99–105 (1930).—In the Berzelius method for the decompn. of insol. fluorides, *e. g.*, fluorspar, by fusion with alkali carbonate mixed with SiO_2, the part played by the SiO_2 is in the formation of a double NaCa silicate. The carbonate and SiO_2 may be fused beforehand to avoid frothing in the actual analysis; the addn. of NaOH is advantageous. B. C. A.

Cobaltic sulfate as an oxidizing agent. SHERLOCK SWANN, JR., AND THEODORE S. XANTHAKOS. *J. Am. Chem. Soc.* 53, 400–4(1931).—$Co_2(SO_4)_3$ is best used as an analytical reagent for the quant. oxidation of certain org. compds. to CO_2. An electrolytic method is described for prepn of the reagent. B. A. SOULE

The use of hydrogen sulfide and ammonium sulfide in analytical laboratories. E. CATTELAIN *J. pharm chim.* [8], 12, 367–76(1930).—Useful practical notes on the prepn. of these reagents and precautions to be taken in pptg., washing and weighing the various metal sulfides are given. Their analytical properties are summarized in 5 tables. S. WALDBOTT

Organic reagents in qualitative inorganic analysis. B. TOUGARINOFF. *Ann. Soc. Sci. Bruxelles* 50, Ser. B, 145–246(1930). The paper contains data concerning the use of about 100 different org. compds which have been recommended for the qual testing of inorg materials A bibliography is given, also a statement concerning the nature of each reaction, the method of applying the test and the sensibility. Numerous tests for the following cations are described: Al, Sb, Cu, Bi, Ba, Cd, Ca, Cr, Co, Sn, Fe, Mg, Hg, Mn, Ni, Pb, Sr and Zn No less than 24 different tests are given for Cu, 13 for Fe, 10 for Mg, etc. After giving these data, the latter part of the paper states the results obtained in trying out some 15 of these tests the alizarin test for Al, the rhodamine B, pyrogallol, benzidine and urotropine tests for Sb, the urotropine dimethyglyoxime and rhodamine B tests for Bi, the antipyrine and K xanthogenate tests for Co, the alizarin test for Mg, the benzidine test for Pb, the diphenylamine diethylaniline and orange IV tests for Zn The sensitiveness and specificity of each test are discussed critically and the 3 tests for Zn, the alizarin test for Al, the rhodamine B test for Sb and the dimethylglyoxime test for Bi are recommended especially W T H

Determination of small quantities of hydrogen and oxygen in active charcoal. ALFRED STOCK, HERMANN LUX AND JOHN W R KAYNER *Z anorg allgem Chem* 195, 158–63(1931) Degasify the charcoal and then burn it with a known vol of O Condense the resulting water, and from the quantity obtained, compute the H content Then, since the vol of CO_2 is equiv to that of the O_2, the residual gas, corrected for the O_2 in the water, gives the vol of O_2 from the O in the original coal An app is shown which is suitable for the analysis and the method is described in detail. W. T H

Rapid colorimetric estimation of potassium. EARLE R CALEY. *J. Am. Chem. Soc.* 53, 539–45(1931); cf. C. A. 24, 2081. Dissolve in 1 cc of water the dry residue from a soln. and add 7.5 cc of a satd soln of picric acid in 95% alc After a ppt begins to form in the stirred soln, allow the mixt. to stand at 20° for 45 min with stirring at 5-min. intervals. Filter and wash the ppt with ether. Dissolve the ppt. and compare the color with that obtained similarly from known quantities of K. W. T. H

Determination of magnesium in portland cement and similar materials by the use of 8-hydroxyquinoline. J. C. REDMOND AND H. A. BRIGHT. *Bur. Standards J. Research* 6, 113–20(1931). Digest 0.5 g of cement with 20 ml of 6 *N* HCl, heating gently Dil. to 150 ml. and add Me red indicator and concd NH_4OH until the soln is distinctly yellow Boil 1–2 min., allow the ppt to settle and filter promptly To the filtrate, add 1 ml. of concd NH_4OH and 25 ml of 4% NH_4 oxalate soln Boil 2–3 min., digest on the water bath for 30–60 min., filter and wash 5–6 times with hot water. Heat the filtrate (about 350 ml.) to 60–70° and add 20 ml of reagent (25 g. 8-hydroxyquinoline dissolved in 60 ml. of glacial AcOH and dild to 2 l with cold water) and 4 ml. of concd NH_4OH per 100 ml. of soln. Stir mechanically for 10–15 min. Filter and wash the Mg ppt. with hot 0.37 *N* NH_4OH. Dissolve the ppt. in 50–75 ml. of hot 1.2 *N* HCl, dil. to 200 ml., add 15 ml. of concd. HCl, cool to 25° and det. the hydroxyquinoline content by the KBr-$KBrO_3$ method of Berg. The results obtained with standard argillaceous limestone were excellent. The experienced analyst can det. MgO within 2 hrs. by this method. W. T. H.

Determination of magnesium as pyrophosphate. STANKO S. MIHOLIC. *Bull. Soc. Chim. Yoy. Yougoslavie* 1, Pt. II 16–24(1930). –To avoid the error due to rapid heat-

ing of $MgNH_4PO_4$, it is recommended to use Jena filtering crucibles and heat the ppt. for 2 hrs. at 480° in an elec. oven. W. T. H.

Electrolytic separation of lead and antimony and its application to the determination of lead in tartar emetic. ELLA M. COLLIN AND HENRY J. S. SAND. *Analyst* **56**, 90-3(1931).—A study of the deposition potentials of Sb^{+++}, of Sb^{+++++} and of Pb^{++} in tartrate solns. showed the possibility of sepg. Pb and Sb electrolytically from such solns. The method described depends upon the oxidation of the Sb to the higher state by I_2 in the presence of HCO_3^-. Tartaric acid is added and the soln made alk. with KOH. It is then electrolyzed by a current derived from an external source or from internal electrolysis. Dissolve 5 g. of tartar emetic in water, add 3 g. of $NaHCO_3$ and oxidize the SbO^+ with KI_3 soln. Then add 4 g. KOH and 2-3 g. of tartaric acid. Dil. to 300-350 cc. and electrolyze cold, using a Pt cathode which has been coated with Cu. Rotate the anode. In 15-20 min., quantities of 1-6-3-3 mg. of Pb can be detd. accurately. Directions are given for carrying out the method by internal electrolysis with a Zn anode and a 10% KCN soln. in the anode compartment. W. T. H.

Analysis of lead peroxide and of red lead. G. BRUHNS. *Chem.-Ztg.* **55**, 50-1 (1931). Instead of using $FeSO_4$ or oxalic acid to reduce PbO_2 or Pb_3O_4 in the presence of acid, it is now recommended to use a soln. of $Fe(NO_3)_2$ and HNO_3. A suitable soln. can be prepd. by treating $FeSO_4$ soln. with an excess of $Pb(NO_3)_2$ and allowing the ppt. to settle. Add the soln. from a buret until the PbO_2 or Pb_3O_4 dissolves completely in the added HNO_3 and titrate the excess Fe with $KMnO_4$. Excellent results were obtained in the 13 analyses cited. W. T. H.

Analytical chemistry of rhenium. II. Determination of rhenium as nitron perrhenate after previous precipitation as sulfide. W. GEILMANN AND F. WEIBKE. *Z. anorg. allgem. Chem.* **195**, 289-308(1931). To ppt. Re as sulfide, the soln. should be 3-6-4-2 *N* in HCl and the current of H_2S should be continued for at least an hr. It is well to start with the soln. hot and pass the gas for 2-2.5 hrs. while the soln. is cooling. Wash the ppt. with 0.3 *N* HCl which has been satd. with H_2S. Treat the sulfide with 3-5 cc. of 5% NaOH and with 2-3 cc. of perhydrol which converts the S to SO_4^{--} and the Re to ReO_4^-. After removing the excess peroxide by boiling, neutralize with 2 *N* H_2SO_4 and ppt. the hot soln. with nitron. The oxidation of the sulfide can also be accomplished by fusion with Na_2O_2 which is particularly advantageous with sulfide ppts. that have been dried and aged. Cf. *C. A.* **25**, 50. W. T. H.

Estimation of small quantities of tin. J. E. CLENNELL. *Mining Mag.* **43**, 9-13 (1930). The accuracy of the usual volumetric method of reduction of a stannic salt in HCl soln. with Fe or Ni, followed by titration with I, was tested for detg. 1 to 30 mg. of Sn. Results with the smaller amts. were shown to be unsatisfactory. A colorimetric method that gives better results for 0.1 to 1 mg. of Sn is based on the blue color given by stannous salts with $(NH_4)_2MoO_4$. Several other reducing agents give the same color, so that the Sn must first be isolated. From the HCl soln. As and Sb are pptd. by Cu, which in turn is pptd. by Pb. The Sn is then pptd. on Zn from a slightly acid soln. This is dissolved in HCl and the soln. reduced by boiling with Pb foil. It is then poured into 10 cc. of alk. molybdate soln. (about 1% $(NH_4)_2MoO_4$ with 2% NaOH). A. BUTTS

The lead reduction method for the determination of tin and the interference with it by copper and antimony. S. G. CLARKE. *Analyst* **56**, 82-89(1931).—The reduction of Sn from the quadrivalent to the bivalent conditions can be accomplished by boiling the soln. (1.2 *N* in HCl) with a strip of Pb foil for 1.5 hrs. in an atm. of CO_2. The reduced soln. may be cooled and titrated with I_2, the results being accurate if air is kept out by the stream of CO_2 during the entire expt. If, however, Cu is present in the soln., the results are low and the error is proportional to the Cu content. When Sb is present, the error is less but distinctly noticeable. The conclusion is drawn that the method should be applied only after the removal of Cu and Sb if accurate results are desired. W. T. H.

The analysis of crude platinum and palladium. W. P. HORNE. *Mining Mag.* **43**, 278-80(1930). Detailed procedure is given for analysis of material contg. 98 to 99.85% Pt or Pd, with detn. of the impurities and other precious metals present, as well as the Pt or Pd. A. BUTTS

Rapid determination of zinc in brass. G. BRUHNS. *Chem.-Ztg.* **55**, 41(1931). KARL ALTMANNSBERGER. *Ibid* 41-2.—Thews and Harbison (*C. A.* **25**, 661) recommended the approx. detn. of Zn by the color of the metal drillings, stating that more accurate results can be obtained by detg. the Cu and estg. the Zn by difference. B. points out that the KCNS-KI method is excellent for the rapid volumetric detn. of the Cu, and A. that the conventional iodide method gives excellent results. W. T. H.

The analysis of wolframite and scheelite. C. STANSFIELD HITCHEN. *Mining Mag.* **43**, 208-20(1930).—The effect of W on the sepn. of other elements makes a complete ore analysis difficult, and esp. so in presence of Ta, Cb, Sn and Ti. The occurrence and mineralogy of W are described and analytical methods discussed at length, with recommendations and a diagrammatic scheme for procedure. A bibliography is also given. A. BUTTS

Sulfur-print tests. L. E. BENSON. *Electrician* **106**, 4–5(1931).—The value of the S-print test, its simple operation and its sensitiveness are pointed out. The test can be applied to practically all steels of importance except when the Cr content is high, as in stainless steels and some non-magnetic steels. W. H. BOYNTON

Rapid determination of carbon dioxide in carbonates. THEODOR HECZKO. *Z. angew. Chem.* **44**, 85-6(1931).—Place the sample in a boat, cover with V_2O_5, heat in a current of O_2 to 1200° and collect the resulting gas. After measuring the volume in a gas buret, absorb the CO_2 in KOH; the diminution in vol. gives the CO_2. W. T. H.

Improved method for determining carbon dioxide. C. A. JACOBSON AND JOHN W. HAUGHT. *Bull. West Va. Univ. Sci. Assoc.* **2**, No. 4, 8–13(1930); cf. *C. A.* **24**, 4237. – The carbonate is decompd. with 20 cc. of 15% $HClO_4$, the evolved gas escapes through a condenser into a bubble tube, is dried with "dehydrite" and the CO_2 absorbed in ascarite. The results obtained in over 40 expts. are reported. W. T. H.

Assay of calcium carbide and Czechoslovakian standards. R. VONDRAČEK *Chem. Listy* **24**, 193-7(1930).—The provisional Czechoslovakian standards make use of a modified Caro's app. for the assay of CaC_2, this method is not exact, and an app giving more accurate results is described. The yield of C_2H_2 should not be given in cc. of moist gas, as the Gay-Lussac formula is only applicable to dry gases. The exptl error in the assay of carbide should not exceed 2%. B. C. A.

Determination of free acidity of chrome alum. J. R. GUASCH. *Afinidad* **10**, 157-8(1930); *Chimie & industrie* **24**, 1082(1930). The various alums (K, Fe, Cr) obtained as by-products in several mfg. processes cannot generally be used directly on account of their free H_2SO_4 content, which must be neutralized, and therefore detd., before use. Bellucci and Lucchesi's method, which is used in $Al_2(SO_4)_3$ plants, is based on the colorimetric reaction of hydrolyzed salts with methyl orange, and cannot be used for Cr alum on account of the color of the Cr ion. A suitable method is based on the insoly. of Cr alum in alc. A 15% soln. of the alum is treated with 3.5 times its vol. of 96% alc., allowed to stand 24 hrs., filtered and titrated with 0.2 *N* K_2CO_3 in the presence of phenolphthalein. A. PAPINEAU-COUTURE

Colorimetric determination of the sulfate ion in water, coal, etc. P. GUARNIERI *Ind. ital. cons. alim* **3**, 161(1930). *Chimie & industrie* **24**, 814.—The method consists in treating 100 cc. of the water at the boiling temp. with an HCl soln. of $BaCrO_4$, neutralizing with $CaCO_3$, filtering the ppt. and comparing the color of the filtrate with that of standards. A. P. C.

Determination of iodide in the presence of other halides. HUGO DITZ *Z. anorg. allgem. Chem.* **194**, 147-50(1930). The statement of Gorbachev and Kasatkina (*C. A.* **24**, 4240) that IO_3^- cannot be used as an oxidizing agent for the detn. of I^- in the presence of other halogens is refuted. Early expts. of Ditz and Margosches (1901) led to the conclusion that it is possible to base a simple and exact process for the detn. of I^- with Br^- and Cl^- on the different behavior of the halides toward IO_3^- with definite H^+ concns. Further investigations (1904) led to a process for the detn. of I^- by which a definite excess of KIO_3 soln. and a definite amt. of H_2SO_4 are added to the I^- soln. The liberated I is sepd. and titrated with $Na_2S_2O_3$ soln. A. S. S.

A new microdetermination of the calcium ion and of phosphorus. M. MOUSSERON AND (MLLE.) N. BUISSON. *Bull. pharm. Sud-Est; Schweiz. Apoth. Ztg.* **68**, 654-8(1930); cf. *C. A.* **24**, 4731.—To det. both Ca^{++} and PO_4^{---} in a single sample, ppt. the P as $FePO_4$ by adding $FeCl_3$ and carrying out a basic acetate sepn. Dissolve the ppt. in HNO_3 and det. P by the molybdate method. Take the filtrate and ppt. Ca with Na tungstate. S. WALDBOTT

Determination of small quantities of volatile organic acids in sulfuric acid solutions. D. N. CRAIG. *Bur. Standards J. Research* **6**, 169-92(1931). –In the study of the corrosive effect of various org. substances on the plates of Pb accumulators, it was found that sometimes small quantities of AcOH in the electrolyte caused corrosion of the + plates. In this connection, as well as in the study of the adequacy of treatment of wood separators, it became necessary to det. small quantities of AcOH in the presence of 30–40% H_2SO_4. It was also desirable to test for formic acid. Fifty ml. samples of the acid were treated with sufficient 20% NaOH soln. to neutralize about 35 ml.

of the acid. The mixt. was carefully evapd. to dryness by a bath kept at 65–75° until most of the liquid was evapd. and then heated about 10° higher. Water was added and the evapn. repeated to make certain that all volatile acid was removed. The app. used for the distn. was ingeniously devised so that there was no danger of any spattered acid getting into the distillate. The total acidity of the distillate was detd. The neutralized soln. was then treated with Na_2CO_3 and $KMnO_4$ to destroy the formic acid and then another distn. with H_2SO_4 served to remove AcOH alone. The acidity of the distillates was detd. by electrometric titration using the differential method of MacInnis and Dole, somewhat modified. The values obtained were also compared with those obtained by indicator titrations using phenolphthalein. The potentiometric method was found excellent for titration solns. of low acidity as obtained from electrolytes contg. about 0.1% of AcOH or formic acid in 40% H_2SO_4. W. T. H.

Microdetermination of urea by Nicloux and Welter's method. R. Guillemet and P. Golaz. *Compt. rend. soc. biol.* **101**, 726–8(1929).—The rapidity and precision of the method are increased by pptg. the serum with Tanret's reagent, treating the filtrate with 0.2 cc. of a 5% soln. of xanthydrol in MeOH (or 1% in AcOH), and collecting the ppt. on a Jena filter. After washing, finally with satd. alc. dixanthylcarbamide, the ppt. is dried in a current of air at 125° for 5 min. B. C. A.

A new method for the conversion of alkali sulfate to alkali chloride for use in silicate analysis (Mylius) **6**. Calorimetric method for determining silicon (King) **11B**. Density of H_2SO_4 solutions of $CuSO_4$ (Chapas, *et al.*) **18**.

Curtman, Louis J.: **A Course in Qualitative Chemical Analysis.** New York: The Macmillan Co.

Engelder, Carl J.: **Laboratory Record Book in Qualitative Analysis.** 110 pp. **Laboratory Record Book in Quantitative Analysis.** 120 pp. New York. John Wiley & Sons, Inc. $1 each.

François, Maurice: **Manipulations de chimie analytique appliquée,** analyse des produits pharmaceutiques, chimiques et galéniques, analyses des matières alimentaires, hydrologie et analyse des eaux, analyses biologiques et toxicologiques. Paris: Le François. 372 pp. F. 50.

Talbot, Henry P.: **Quantitative Chemical Analysis.** Revised by L. F. Hamilton and S. G. Simpson. New York: The Macmillan Co.

Analyzing gases by absorption. I. G. Farbenind. A.-G. Ger. 513,492, Feb. 10, 1927. Manipulative features and app. are described.

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8 MINERALOGICAL AND GEOLOGICAL CHEMISTRY

EDGAR T. WHERRY AND J. F. SCHAIRER

Optical data for some rare minerals. T. Barth and H. Berman. *Chem. Erde* **5**, 22–42(1930).—Mention is made of various media of high n and of the dispersion method for detg. under the microscope the ns of immersed mineral particles. Optical data are given for some 30 minerals. B. C. A.

Algodonite and whitneyite. F. Machatschki. *Neues Jahrb. Mineral. Geol.*, Abt. A, Beilage Bd. **59**, 137–58(1929).—The minerals are crystallographically inhomogeneous. The regular crystals, apparently metallic Cu contg. As, have a 3.647–3.651 A. U. The hexagonal crystals contain less Cu than corresponds with the formula Cu_3As and have a 2.599, 2.598; c 4.215, 4.213 A. U., with d. 8.71, 8.72 B. C. A.

The system MgO-FeO-Fe_2O_3 in air at one atmosphere. H. S. Roberts and H. E. Merwin. *Am. J. Sci.* [5], **21**, 145–57(1931).—The system MgO-FeO-Fe_2O_3 has been investigated at temps. above 1000° on the isobar $\frac{1}{5}$ atm. O_2. In the binary system MgO-Fe_2O_3 the only compd. is MgO.Fe_2O_3 which dissociates slightly on heating and begins to melt at 1750 ± 25°. Solid soln. extends for a short distance toward MgO. In the binary system FeO-Fe_2O_3 the stable phase at temps. below 1386 ± 5° is a hematite solid soln. contg. less O than Fe_2O_3; just above 1386° the stable phase is a magnetite solid soln. contg. considerably more O than Fe_3O_4. The ternary system contains 2 solid soln. fields. The first begins at MgO below 1000° and extends with increasing temp. toward MgO.Fe_2O_3 and FeO; a liquid phase appears at 1770 ± 25°, where the solid contains Fe oxide equiv. to 73% Fe_2O_3. The second solid soln. extends with increasing temp. from MgO.Fe_2O_3 toward the Fe oxide boundary, which it reaches

at 1386 ± 5°; solid solns. of about 1% MgO in $MgO.Fe_2O_3$ are possible from 1750 to 1000° or below. ALDEN H. EMERY

The genesis of lodestone. MARK C. BANDY. *Econ. Geol.* **25**, 871–5(1930).—B. discusses recent articles by Newhouse (*C. A.* **23**, 4649) and Gruner (*C. A.* **23**, 4167), on the origin of lodestone. The theory proposed by N., that lodestone is due to a brownish oxidized magnetite, does not meet all the conditions under which it occurs naturally and is formed artificially. The theory that it is formed by the magnetic field of the earth is equally inadequate. Lightning striking outcrops of magnetite ore is suggested as a theory for the origin of lodestone. ALICE W. EPPERSON

A contribution to the study of moonstone from Ceylon and other areas and of the stability relations of the alkali feldspars. EDMONDSON SPENCER. *Mineralog. Mag.* **22**, 291–367(1930). —Moonstone feldspar from pegmatite near Ambalagoda was found to possess a microperthitic structure. The lamellas (or, ab) have sepd. mainly along the plane Δ (13.0.2) which is also the plane of schiller. A coarser but fainter perthite occurs, which sepd. at an earlier stage along the prism planes 110 and 320. Schillerized feldspars from Kandy, Burma and Colorado were found to be similar. The schiller color is dependent on the size and abundance of microperthite lamellas and is mainly due to the reflection and scattering of light at the boundaries of these. The sp. gr., optical axial angle and extinction angles are dependent on the proportions of the 2 feldspars present. The schiller color and microperthitic structure can be destroyed by heat treatment, and there is a reduction in sp. gr., optical axial angle and extinction angle. The changes appear to be due to a re-soln. of the (or, ab) members into each other to form the original (Or, Ab) phases. Structures can be developed on cleavage faces where there is little evidence of microperthite by heating with water and CO_2 under pressure, causing selective decompn. The phenomena observed on heating indicate that there are 2 solid-soln. changes, at (*a*) 900–1000° between a single solid soln. phase and the 2 (Or, Ab) phases, and (*b*) 500–700° for the (or, ab) sepn. either from the 2 (Or, Ab) phases or from one of them. Structure in the Ambalangoda microcline-microperthite indicates that the conversion to microcline evidently took place prior to the exsoln. of the microperthite and hence probably above 700°. It undergoes none of the changes in properties found for moonstone feldspar and no re-soln. takes place on heating. Microcline appears to be the stable form of K feldspar and to be incapable of holding albite in solid soln. up to temps. near its m. p. A. M. B.

Mineralogy of Western Australia. EDWARD S. SIMPSON. *J. Roy. Soc. W. Australia* **15**, 99–113(1928–29); cf. *C. A.* **24**, 3969. Descriptions and in most cases chem. analyses are given for: apatite; gray and white beryl (contg. Cs_2O 0.72 and 0.92%, resp.), cinnabar; glaucophane, siderite and corundum, manganilmenite and menaccanite; manganocolumbite, Ta_2O_5 10.48, Cb_2O_5 62.34%, resp., microlite, Ta_2O_5 77.00, Cb_2O_5 3.64; spinel; tourmaline, both schorl and dravite; and vesuvianite. W. L. HILL

Minerals from the Adamello Mountains (Trentino). C. GOTTFRIED. *Chem. Erde* **5**, 106–12(1930); cf. *C. A.* **24**, 4243. The minerals described are from marble (metamorphic limestone) at contact with tonalite. Garnet as reddish brown dodecahedra, with d. 3.512 and n_{Na} 1.7585, gave analysis I, corresponding with grossular 80.55, andradite 8.13, almandine 4.48, pyrope 6.85%. Vesuvianite as olive-green crystals with $a:c$ = 1 : 0.5391, d. 3.336, ω 1.719, ϵ 1.715, gave analysis II, agreeing with Tschermak's formula $Si_{17}Al_{10}Ca_{18}Mg_2H_6O_{72}$. X-ray rotation photographs gave a unit cell of dimensions a 22.03, c 11.89 A. U., contg. 2.3 such mols., *i. e.*, 168 O atoms. The space-group is D^4_{4h}.

	SiO_2	TiO_2	Al_2O_3	Fe_2O_3	FeO	MnO	MgO	CaO	H_2O
I	39.66	0.46	18.77	2.52	1.92	0.07	2.06	34.79	0.07
II	37.03	0.75	16.25	3.13	1.09	0.04	2.45	36.39	2.29

II also ZnO 0.29, Na_2O 0.28, K_2O 0.03, F 0.31, total less O for F 100.15%. B. C. A.

Analytical determination of the isomorphous variation in rock-forming minerals. H. VON PHILIPSBORN. *Chem. Erde* **5**, 233–53(1930). —The powd. rock, a pyroxene granulite from Hartmannsdorf, Saxony, was sepd. into different fractions with Clerici soln. and an electromagnet. Analysis I*a* is of the heavier and darker fraction (d. 3.55–3.58, $n[= \frac{1}{2}(\alpha + \gamma)]$ 1.715) of the hypersthene and I*b* of the lighter and paler fraction (d. 3.49–3.55, n 1.706), II*a* of the heavier fraction (d. 3.40–3.42, n 1.708) and II*b* of the lighter fraction (d. 3.37–3.40, n 1.698) of the monoclinic pyroxene. Analysis III is of the heavier fraction (d. 2.69–2.71, n 1.555–1.560) of the plagioclase, correspond

ing with $Ab_{47}An_{53}$; the lightest fraction with n 1.549 corresponds with $Ab_{70}An_{30}$. Analysis IV is of the garnet (d. 3.92, n_{Na} 1.766) and V is ilmenite. From optical data on the still lighter and heavier fractions of the pyroxenes their compn. is arrived at by extrapolation. VI is the bulk compn. of the rock (d. 3.181), corresponding with hypersthene 28.53, monoclinic pyroxene 29.60, plagioclase, 32.59, orthoclase 0.44, garnet 3.31, ilmenite 4.35, magnetite 0.35, apatite 0.83%.

	SiO_2	TiO_2	Al_2O_3	Fe_2O_3	FeO	MnO	MgO	CaO	Na_2O	K_2O	Total
I*a*	49.42	0.54	2 64	3.42	23.15	0.26	18.17	0.94	1 23	0 19	99.96
I*b*	50.30	0.53	3 26	3.26	20.09	0.26	20 14	1.41	1.28	0.22	100.75
II*a*	49 50	0.69	4.39	2.81	9 90	0 24	11 87	19 34	1.47	0.16	100.37
II*b*	50 12	0 65	4.74	2.01	8 57	0 24	12 87	19.84	1 60	0 14	100.78
III	55.41	—	29.42	0.40	—	—	-	11 11	n d	n d.	96.34
IV	38 50	0 88	21 77	1.47	19 64	0 72	8 75	8 50	- -	-	100 23
V	- -	48.3	- -	10.3	38 3	0 3	1 7	—	-	-	100.4
VI	48 61	2.45	12 33	3 22	9 64	0 17	10 12	10 37	2.92	0 18	100.47

V, also insol. silicates 1.5; VI, also P_2O_5 0.36, Cr_2O_3 0.10%.

B. C. A.

Chemical formula of the zirconium pyroxenes and zirconium pectolite. W. H. ZACHARIASEN. *Norsk Geol. Tids.* 11, 216-8(1930).—From a study of analytical data obtained from the Zr pyroxenes, låvenite, wöhlerite, and hiortdahlite and the Zr pectolite, rosenbuschite, it was found that the general formula $R_4Si_2X_9$ held for all 4 minerals where R represented all cations save Si, and X the anions. This proves that the names "Zr pyroxenes" and "Zr pectolite" have no chem. justification. H. H. MOSHER

Sapphirin from Alpe Brasciadega, Val Codera, Italy. H. P. CORNELIUS AND E. DITTLER. *Neues Jahrb. Mineral. Geol.*, Abt. A, Beilage Bd. **59**, 27-64(1929). —The sapphirin, isolated by means of H_2SO_4 and HF contained SiO_2 15.19, TiO_2 0.25, Al_2O_3 61.69, FeO 4.31, MnO 0.12, CaO 0.49, MgO 16.23, H_2O+ 1.60, H_2O- 0.19%, corresponding with the formula $Mg(Fe, Mn, Ca, H_2)_{11}Al_{24}Si_5O_{57}$. B. C. A.

Isomorphous series in the tourmaline group and the genetic relationships between tourmaline and the micas. W. KUNITZ. *Chem. Erde* **4**, 208-51(1929).—Theoretical.

B. C. A.

Tourmaline group. F. MACHATSCHKI. *Chem. Erde* **4**, 455-7(1930).—A criticism of the formula of tourmaline proposed by Kunitz (preceding abstract). B. C. A.

Thuringite from Schmiedefeld, Thuringia. H. JUNG AND E. KOHLER. *Chem. Erde* **5**, 182-200(1930). Olive-green material consisting of a compact aggregate of fine scales with d. 3.187 gave on analysis: SiO_2 20.82, TiO_2 trace, Al_2O_3 17.64, Fe_2O_3 8.70, FeO 37.96, MgO 4.15, H_2O+ 10.31, H_2O- 0.07, total 99.65%. The analysis agrees with the formula $14(Fe,Mg)O.5(Al,Fe)_2O_3.12H_2O.7SiO_2$. Most of the water is expelled at about 420°, and the dehydration curve is very similar to that of kaolin. X-ray powder photographs of thuringite have been compared with those of quartz, magnetite and kaolin; some of the magnetite and kaolin lines correspond, but those of quartz are absent. Magnetite has a unit cube of edge 8.393 A. U. contg. 8 mols.

B. C. A.

Studies on the zeolites. I. General review. MAX H. HEY. *Mineralog. Mag.* 22, 422-37(1930).—A review of the general characteristics of the zeolites and their relations to other groups of minerals and to certain artificial products, preparatory to a detailed examn. of the various species. A bibliography is given. A. M. BRANT

Steatite from the Münchberg gneiss area. F. DEUBEL. *Chem. Erde* **5**, 87-95 (1930).—A new occurrence of steatite has been found near Schwarzenbach a. d. Saale on the southeast border of the Münchberg gneiss area in Bavaria. It is shown to be a replacement of quartzite, no doubt by hydrothermal action. Analysis of the material gave: SiO_2 61.95, Al_2O_3 0.87, FeO 0.57, MgO 32.16, loss on ignition 4.99, total 100.54%.

B. C. A.

Dehydration and rehydration of kaolin. P. SCHACHTSCHABEL. *Chem. Erde* **4**, 395-419(1930). —Kaolin after being heated at 400-800° is capable of taking up H_2O again. This is effected very slowly at 110°, but under pressure at 175-205° all is restored after 100 hrs. The rehydrated kaolin differs from the original material by being partly sol. in HCl, in its dehydration curve, n and x-ray pattern, but these differences become less marked after prolonged heating of the material in H_2O at 200°. B. C. A.

Halloysite from Elbingerode [Harz]. O. H. ERDMANNSDÖRFFER. *Chem. Erde* **5**, 96-8(1930).—Nodules of grayish green halloysite (analysis I) coated with white powdery material (analysis II) occur in limonite in the "Grosse Graben," which has been worked for Fe and Mn ores and pyrite. Both are optically isotropic with n = 1.515-1.528.

II gives the ratios $SiO_2:Al_2O_3:H_2O$ = 2.20:1:4.90. Between 105° and 400° very little water is lost and the material then behaves like kaolin. An x-ray powder photograph shows a few faint lines coinciding with those of kaolin. The ignited material gives no x-ray spectrum.

	SiO_2	Al_2O_3	Fe_2O_3	FeO	MgO	CaO	Na_2O	K_2O	H_2O (105°)	H_2O (ign.)	Total
I	36.27	29.53	5.31	0.10	0.02	0.23	1.60	0.64	14.19	12.70	100.59
II	39.00	30 07	2 98	0.01	0.04	0.40	1.31	1 24	12.70	15.15	101.09

Also traces of P_2O_5, TiO_2, SO_3, CO_2, MnO. B. C. A.

Nontronite. W. Noll. *Chem. Erde* **5**, 373–84(1930).—Weinschenk (*Z. Kryst Min.*, **28**, 135–64(1897)) regarded nontronite as analogous to kaolin; he gave the formula as $H_4Fe_2Si_2O_9$, but very few analyses agree with such a formula. Dehydration curves and x-ray powder photographs also show no relation to kaolin. The water is "zeolitic." A new analysis of green greasy nontronite from Tachau, Bavaria, gave SiO_2 40.02, Al_2O_3 10.55, Fe_2O_3 26.16, FeO 1.37, H_2O 21.83, total 99.93%, corresponding with the ratios $R_2O_3:SiO_2:H_2O$ = 1:2.49:4.53. B. C. A

The chemical composition and crystallographic and optical properties of a Vesuvian lithidionite. Guido Carobbi. *Atti III congresso naz. chim. pura applicata* 1930, 336–7.—A blue Vesuvian lithidionite of the formula (Cu, Na_2, K_2) Si_2O_7, m. p. 780°, was sepd. into Cu-poor and Cu-rich fractions by flotation in a heavy liquid. The former contained blue monoclinic crystals with d. 2.48–2.37, $a:b:c$ = 0.4506:1:0.3997, β 114.3°. The latter had d. 2.74, was optically —, and had the plane of the optic axes perpendicular to the plane of symmetry. The n_Ds. were 1.548 and 1.574. Chem. analyses of both fractions are given J. B. Austin

Blomstrandite from Kabuland. Harald Bjørlykke. *Norsk Geol. Tids.* 11, 232–9(1930).—This deposit of possible industrial importance was found in gang chiefly composed of xenotime, orthite, feldspar, quartz and magnetite. Two cryst. forms were noted, the typical blomstrandite and a euxenite-like type. The mineral yielded upon analysis: Ta_2O_5 19.11, TiO_2 31.84, UO_2 3.78, ThO_2 1.46, rare earth oxides 35%, FeO 4.30, CaO 0.88, MgO 0.38, ignition loss 3.70%. By spectro-analysis Y, Th, Ill Cp, Yb, Tu, Er, Ho, Dy, Tb, Gd, Sm and Nd were detected. H. H. Mosher

Chemical and spectrographic investigations on an apatite in Chinese strata of recent origin. Guido Carobbi. *Atti III congresso naz. chim. pura applicata* **1930**, 338–40. A specimen of apatite from Tsingtao was examd. It was a solid soln. of fluoroapatite, chloroapatite, hydroxyapatite and oxyapatite. The crystals, which were badly formed, appeared to be uniaxial, −, with d. 3.23; ϵ = 1.628, ω = 1.630. Spectroscopic examn. showed no Ce but the presence of La, Sm, Eu, Er and Yt. A chem. analysis is given. J. B. Austin

Cupriferous melanterite from the Skouriotissa mine, Cyprus. Max H. Hey. *Mineralog. Mag.* **22**, 413–8(1930).—A cluster of large greenish blue crystals of melanterite was found in an ancient caved stope in the ore body near Lefka, Nicosia district, Cyprus. The crystal habit is unusual, being tabular on b(010). Partial analysis gave CuO 2.15%. The crystallographic measurements are given. A. M. Brant

A suspected meteoric specimen from northern Arizona. L. F. Brady. *Am. J. Sci.* [5], **21**, 173–7(1931).—The specimen analyzed: metallic Fe 37.440, Fe as FeCl 0.680, Fe as FeO 3.287, S 0.073, Si 0.432, Mn 0.120, Cl as $FeCl_2$ 1.300, P 1.110, Ni 4.040, Co 0.047, C (graphite) 46.530, combined C 2.202, O as FeO 0.943 and insoluble (mainly FeO and SiO_2) 1.796%. The outer surface resembles weathered hematite. In section it appears to be an intergrowth of cryst. Ni-Fe in a ground mass of graphite. Etched surfaces show very fine Neumann lines. Its sp. gr. is 3.7. A. H. E.

A new iron meteorite from Pojoaque, New Mexico. L. F. Brady. *Am. J. Sci.* [5], **21**, 178(1931).—The specimen is of Ni-Fe. There are several spherical inclusions of chrysolite which seem to be surrounded by a layer of kamacite. Its sp. gr. is 6.2. Alden H. Emery

New observations on the tectites of Indochina. A. Lacroix. *Compt. rend.* 191, 893–9(1930). cf. *C. A.* **23**, 2395 6.—The tectites in Indochina are widely disseminated. In order to consider the uniformity of their chemical compn., tables of results of analyses of tectites taken from widely sepd. places are given. These show very close agreement. Various theories of origin are discussed, and the only one considered not impossible is that of cosmic origin, as meteorites. Indications defending this hypothesis are cited and discussed. Alice W. Epperson

Synthetic sulfide replacement of ore minerals. James C. Ray. *Econ. Geol.* 25, 433–51(1930).—Geochem. expts. were carried on with the object of detg. the point at

which dispersion of bornite in chalcocite occurs as well as such replacement phenomena as might be induced under lab. conditions. Tabulated data are given, as are results of microscopic examn. of the repolished surfaces of the treated ore fragments. The expts. show that mixed sulfides in the presence of H_2O only can generate their own conditions to bring about changes in these sulfides without addn. of metals to the local system in which the changes are taking place. R. advances the hypothesis of "deep-seated supergene alteration" for this type of massive deep-seated bornite, and believes the principles here advanced have a general application to Cu deposits of hydrothermal origin, although the discussion is based specifically on the Butte ores. A. W. E.

The texture and origin of some banded or schistose sulfide ores. W. H. NEWHOUSE AND G. F. FLAHERTY. *Econ. Geol.* **25,** 600-20(1930).—Conclusions: Criteria of flowage and plastic deformation of an ore mass, based on apparent flow structures as seen in hand specimens, are usually unreliable. An ore mass composed in whole or in part of galena, sphalerite and chalcopyrite, which has been strongly deformed, will show in its texture that flowage has taken place unless complete recrystn. has occurred. Extent of recrystn. and size of crystals are a function of strain and compn. in the crystal and of time and temp. Unless complete recrystn. of the entire ore mass takes place, 2 generations of each mineral should be found. Quartz is an introduced mineral in schist replacement deposits, showing no preferred direction of elongation or orientation. Ores are particularly discussed occurring at Blue Hill, Me., Milan, N. H., Mandy, Manitoba and Rammelsberg, Goslar, Germany. ALICE W. EPPERSON

Pseudo-eutectic textures. G. M. SCHWARTZ AND CHARLES F. PARK, JR. *Econ. Geol.* **25,** 658-63(1930).—S. and P. discuss Lindgren's paper (*C. A.* **25,** 265) and describe a specimen of ore contg. covellite intergrowths, which furnishes addnl. proof that graphic intergrowths may form by replacement. It is considered that pseudo-eutectic textures develop by replacement, even if supergene, and they may also develop by more or less contemporaneous crystn. as in ilmenite and silicates, though ilmenite could not form a eutectic with several minerals in the same rock. It is possible for the texture to develop in hard minerals, but it is relatively uncommon and has not been observed except in gabbro and titaniferous magnetites. A. W. E.

A colloidal origin of some of the Kennecott ore minerals. S. G. LASKY. *Econ. Geol.* **25,** 737-57(1930).—The sulfides that make up Kennecott ore bodies were transported in highly dispersed condition and were flocculated on reaching such an ideal flocculating agent as limestone. Alumina along thin gouge seams also served to flocculate sulfides as well as to dam back the solns. Chalcocite and S were always present. The chalcocite, in addn. to the covellite that it was able to dissolve from the surrounding material at high temp., contained in soln. also a certain amt. of covellite formed by reaction with excess S, which at this stage was present in relatively small quantity. With lowering of the temp., the covellite tended to unmix and did so in part until equil. was reached. The equil. pt. lies apparently above 8% CuS A. W. E.

The incipient oxidation of galena. ALFRED L. ANDERSON. *Econ. Geol.* **25,** 528-42 (1930).—Study of incipient states of alteration of galena indicates it to be more generally oxidized by air-water processes than by solns. of ferric sulfate. Much of the limonite represents a later addn. from external sources. The first product obtained by oxidation of galena is always anglesite. With admixt. of pyrite and chalcopyrite, the reactions become more complex. Because of formation of electrolytic cells between various sulfides in contact with the oxidizing solns., the attack on galena is greatly aided, while the oxidation of pyrite or chalcopyrite is retarded. On this basis galena oxidizes earlier and with more ease than most other sulfides, except sphalerite. Galena remains in the oxidized croppings only because the coating of insol. alteration products prevents ready access by fresh oxidizing solns. Covellite is a common but not abundant mineral formed by replacement of galena. Four main types of structures may be recognized: (1) regular borders, (2) botryoidal structures, (3) stranded borders and (4) platy structures, each referring to the relation the covellite bears to the galena. ALICE W. EPPERSON

Limonite types derived from bornite and tetrahedrite. ROLAND BLANCHARD AND P. F. BOSWELL. *Econ. Geol.* **25,** 557-80(1930).—Neither bornite nor tetrahedrite contains sufficient S to dissolve itself completely. Field evidence has not established definitely the proportions of pyrite needed to effect complete oxidation of bornite and tetrahedrite in nature. Hydrolysis of $Fe_2(SO_4)_3$ during oxidation liberates acid and may reduce below the theoretical ratio the pyrite needed for complete oxidation of bornite and tetrahedrite. Field evidence shows that an overwhelming proportion of pyrite is needed to prevent formation of indigenous limonite after bornite, and such proportion is not usual. Five limonite types derived from oxidation of bornite have

been identified and described, a triangular boxwork being most distinctive. Leached outcrops derived from bornite generally carry a "relief" limonite—a characteristic product, orange colored, with soft texture on fresh surfaces. Two limonite types derived from oxidation of tetrahedrite have been identified and described. That called contour boxwork is more distinctive. Leached outcrops from tetrahedrite usually carry local incrustations of Sb oxides that assist in identification. A. W. E.

A mother lode gold ore. CARLTON D. HULIN. *Econ. Geol.* **25**, 348–55(1930).—H. describes specimens from the Kennedy Mine, one of the largest of the Au mines operating on the Mother Lode, in Amador County, Cal. The relative degree of favorability of the several host minerals for Au as observed in these ores is: chalcopyrite, pyrite, galena, apatite, carbonates; pyrite, sphalerite; and quartz, the first 5 minerals are about equally favorable, and quartz is the least favorable. A. W. E.

Geology of the Panamint silver district, California. F. MAC MURPHY. *Econ Geol.* **25**, 305–25(1930).—The paper includes a history of mining in the district, its location and topography, a description of the rocks and their structure, and a discussion of the ore deposits. The occurrence of numerous clean-cut Ag-bearing quartz veins is described. They outcrop in limestone, schist or slate, but those in limestone are more numerous and persistent. The principal and almost exclusive vein filling is milk white, sometimes glassy, quartz of coarsely crystl. massive texture. Ag is almost wholly contained chemically bound in tetrahedrite, the principal sulfide mineral. Oxidation and supergene enrichment products are not abundant in the ores, but the following minerals have been identified: malachite, azurite, anglesite cerusite, smithsonite, bindheimite, cerargyrite, stromeyerite, chalcocite and covellite. The deposits are classified as those formed at intermediate depths and suggest a genetic relationship with an intrusion of granite porphyry. An unusual vein in the district carries, in order of deposition, pyrite, quartz, pyrrhotite, chalcopyrite, marcasite and siderite, the latter overlapping with marcasite and chalcopyrite. ALICE W. EPPERSON

Observations on secondary copper and silver sulfides in the Broken Hill Lode. F. L. STILLWELL. *Proc. Australasian Inst. Mining and Met.* No. **67**, 187–219(1927); No. **77**, 71–9(1930).—The primary ore (apart from gang) consists essentially of sphalerite and galena with minor amts. of arsenopyrite accompanied by a Ni-Co-Sb mineral, chalcopyrite, pyrrhotite and cubanite, chalcostibite and tetrahedrite, meneghinite, dyscrasite, pyrargyrite and berthierite. The oxidized zone consists of a manganiferous ironstone capping covering large masses of cerussite frequently rich in oxidized Ag and Cu minerals. Zn salts from the primary sulfide ore have been largely removed in soln. The abundance of cerussite is partly due to the abundance in the meteoric H_2O of carbonates derived from the primary calcite ore. Only minor amts. of anglesite resulted. The surface waters contained small quantities of phosphate, derived from apatite, which converted small quantities of the sulfate or carbonate into pyromorphite or Pb phosphate. At varying depths the sulfides appear. The secondary sulfides including Ag and Cu occur as coatings resembling soot on the primary. The secondary sulfides have been partially oxidized as denudation has progressed. A. H. E.

The Engels copper deposits, California. CLARENCE N. FENNER. *Econ. Geol.* **25**, 420–5(1930).—The article by Knopf and Anderson (*C. A.* **25**, 265) is discussed. The authors' statements in favor of gaseous transfer of mineral matter are approved, and their discussion is supplemented. ALICE W. EPPERSON

The ores of the northern Rhodesia copper belt. ALAN M. BATEMAN. *Econ. Geol.* **25**, 365–415(1930).—This belt will constitute the greatest Cu mining center of the world. Production and important mines are named. The region is a peneplain 4000 ft. high. The rocks consist of an old pre-mineral basement complex unconformably overlaid by ore-contg. Roan series, probably of pre-Cambrian age, intruded by younger granites and basic intrusives, the granites being the probable source of the Cu. The ore deposits consist of beds of the Roan series uniformly metallized with specks of CuS. Ores are largely sulfide, and oxidation extends hundreds of ft. below the water level. Chalcocite is the most important sulfide, followed by bornite and chalcopyrite. Linnaeite is not uncommon and pyrite is rare. Eight types of chalcocite intergrowth are described and discussed, the conclusion being that the chalcocite is in part hypogene and in part supergene. Sulfides have been introduced after consolidation and folding of the rocks and have clearly replaced the rock silicates. Localization of the ore minerals in the sediments was probably due to the superior permeability of the ore beds. This Cu belt constitutes a great metallogenetic province of Cu mineralization. It is linked with the adjacent Katanga Cu region by similar features of geology and ores and the common occurrence of the rare mineral linnaeite. A. W. E.

The correlation of the ore-bearing sediments of the Katanga and Rhodesian copper

belt. ANTON GRAY. *Econ. Geol.* **25**, 783–804(1930); cf. preceding abstract.—The principal Cu deposits of the Katanga and Rhodesia occur in the lower series of the System of the Katanga, known locally by various names. In view of the fact that these rocks were first studied in the Katanga, where the ore-bearing beds were called the Série des Mines, this name has been applied by G. to the rocks over the entire Cu belt. The sulfide ore bodies of Rhodesia are found near the base of the Serie des Mines. They lie stratigraphically below the oxidized ores of the Katanga, which are found in the dolomites of the upper Roan group, and to a lesser extent in the M'Washia. No evidence of unconformity has been found between the Série des Mines and the Kundelungu series, and it is considered that these beds should be grouped together under the name of the Katanga system, as proposed by Van Doorninck. A geologic map is included. ALICE W. EPPERSON

Some remarks on the metallogenesis of the copper beds of Katanga and northern Rhodesia. ANDRÉ DEMAY. *Rev. univ. mines* **4**, 38–46(1930); cf. preceding abstract.—The upper part of the Cu-bearing beds of Katanga are chiefly replacement deposits; impregnation predominates in the lower part; most beds are highly mineralized but "spotty." In Northern Rhodesia impregnation plays the principal part in the enrichment of the sediments, which are less highly mineralized but more uniform. Although the ores now being mined in Katanga are almost exclusively carbonates or oxides, the primary mineralization was undoubtedly in the form of sulfides. In Rhodesian beds, below the superficial zone of oxidation, the principal zone contains Cu sulfides. In Katanga, Fe, Mn, Co, especially Pb, Zn and even U and Ra, mined in a particular bed, together with Cu, constitute an indisputable metallogenic association. In northern Rhodesia the Cu veins are related to an intrusion of granite that penetrates the lower beds of the Roan series. In Katanga there is no direct proof of an igneous vein having affected the beds, although there are some indications that the Cu veins may have been influenced by acid magma C. W. OWINGS

The Sherritt-Gordon copper-zinc deposit, northern Manitoba. E. L. BRUCE. *Econ. Geol.* **25**, 868–70(1930). B. discusses the communication by J. F. Wright, (*C. A.* **25**, 1186) regarding B.'s paper (*C. A.* **23**, 4910). B. explains some apparent disagreements in the 2 papers, gives some addnl. data and states that in the main his statements and those of Wright agree ALICE W. EPPERSON

Spectrum analysis of Mansfeld copper shale. A. CISSARZ. *Chem. Erde* **5**, 48–75 (1930). To the long list of elements previously detected by ordinary analytical methods the following are now added: Sn, W, Pt, Ir, Pd and Yt, bringing the total up to 42. B. C. A.

Lead-zinc and pyrites ores of the Deutsch-Bleischarley mine, Upper Silesia. H. SCHNEIDERHÖHN. *Chem. Erde* **5**, 385–95(1930). These ores are known to contain As, they were examd. by the metallographic method for As minerals. In the Pb-Zn ore, shelly blende surrounds cores of galena and jordanite ($Pb_4As_2S_7$), but in the pyrites ore, consisting of a mixt. of pyrite, marcasite and shelly blende, no As mineral could be detected. Chem. tests showed that much As is present in the pure pyrite (no doubt in isomorphous mixt.) and only traces in the marcasite and blende. B. C. A.

Microscopic and spectroscopic investigation of the platinum-bearing rocks of the Bushveld igneous complex (Transvaal). H. SCHNEIDERHÖHN. *Chem. Erde* **4**, 252–86 (1929). A description is given of the rocks and assocd. ore minerals from the Rustenburg, Potgietersrust and Lydenburg districts, together with an account of the genesis of the deposits. In the pegmatites and contact metamorphic zone sperrylite and stibiopalladinite occur, whereas in the unaltered intrusive rocks the Pt metals are entirely present in the form of platiniferous sulfides of other metals, free Pt, Pd and Au are encountered only as secondary occurrences in the weathered rocks. Investigation of the minerals by means of the quartz spectrograph showed that the Pt metals occurred solely in the pyrrhotite, pentlandite and nickeliferous pyrite, the greatest quantity being present in the oldest minerals. Pt and Pd are present in practically equal amts., Ir, Rh and Ru occur to the extent of 1–10% of the Pt present, while Os is present in traces only B. C. A.

Hydrothermal oxidation and leaching experiments; their bearing on the origin of Lake Superior hematite-limonite ores. I. JOHN W. GRUNER. *Econ. Geol.* **25**, 697–719(1930).—G. has previously suggested that hematite ores of the Soudan formation of the Vermillion range had been leached of SiO_2 and oxidized by hot ascending waters from a large basic magma, and new expts. support the hydrothermal hypothesis and its extension to other districts of the Lake Superior region. Leaching of SiO_2 from the Fe formation is discussed, and expts. on soln. of SiO_2 in hot H_2O and on oxi-

dation of minerals contg. Fe^{++} are described. The SiO_2 was found to be very sol., and tables are given showing the solubilities of different minerals, SiO_2 from gabbro being found less sol. than quartz. It was found that the oxidation of ferrous minerals by water at high temp. begins at or below 200°. The expts. and methods used are described in detail. II. *Ibid* 837–67.—Expts. show that SiO_2 from SiO_2 gel, chalcedony, and greenalite taconite is sol. to an extraordinary extent in water at temps. from 200 to 300°. The soly., except of SiO_2 from gabbro, is many times as great at 200° as at room temp. Oxidation of Fe^{++} in minerals takes place in hot H_2O or steam in the absence of air at temps. as low as 160° provided the H given off in the decompn. can escape. Siderite is oxidized to magnetite, and magnetite to hematite. Expts. support the hypothesis that Lake Superior hematite-limonite ores were oxidized and leached hydrothermally. These ores have similar counterparts in the leached ores of South Africa. Arguments supporting the weathering hypothesis and G.'s hypothesis are discussed and the latter is upheld. ALICE W. EPPERSON

The iron deposits of the Sierra de Imataca, Venezuela. ERNEST F. BURCHARD. *Econ. Geol.* **25**, 549–50(1930).—A paper by Zuloaga on Pao Fe ore deposits is discussed in connection with one by B. (*A. I. M. M. E. Tech. Pub.* **295**, Jan., 1930). Similarities and dissimilarities in the ores of the 2 regions are pointed out. A. W. E.

Graphic intergrowth of niccolite and chalcopyrite, Worthington Mine, Sudbury. CARL LAUSEN. *Econ. Geol.* **25**, 356–64(1930).—The general geology of the region and the ore deposits are described, and the origin of the graphic texture and sequence in the deposition of the ores is discussed. The mineralization is described as taking place in 3 stages: the 1st was a high temp. hydrothermal stage, producing magnetite, pyrrhotite, pentlandite, chalcopyrite; the 2nd and 3rd were moderate temp. hydrothermal stages, producing resp. gersdorffite, maucherite, niccolite-chalcopyrite intergrowths and pyrite, sphalerite and galena. ALICE W. EPPERSON

A qualitative and quantitative determination of the ores of Cobalt, Ont. I. ELLIS THOMSON. *Econ. Geol.* **25**, 470–505(1930).—Methods of analysis are given, and development of new etching reagents is described. Geology of the region is discussed, and detailed descriptions are given of specimens from Mining Corporation, Nipissing and O'Brien Mines. The old mineralogical title of smaltite-chloanthite for the hard white mineral associates of the native Ag and niccolite of this region is no longer applicable, these 2 minerals being exceeded in rarity only by the Ni mineral gersdorffite. Cobaltite is much the commonest of these minerals. Common structures are noted for the 9 minerals, listed in order of prevalence as follows: cobaltite, arsenopyrite, safflorite, skutterudite, rammelsbergite, loellingite, smaltite, chloanthite, gersdorffite. II. *Ibid* 627–52.—Eight new microchem. reagents have been developed for differentiation of the 9 hard white As minerals which are common in this district. Crystal habits, modes of occurrence, interrelationships and assocns. with Ag of each of these minerals are discussed. Relative abundance of the common minerals is given; smaltite and chloanthite are placed among the rarer minerals of the group with cobaltite at the top of the list. Relation between quant. proportions of the other common minerals of this district and their proximity to the diabase sill is worked out and compared to a similar relation for native Ag. It appears that larger quantities of assocd. arsenopyrite, cobaltite, loellingite, rammelsbergite or skutterudite have been favorable to the deposition of native Ag, while niccolite, tetrahedrite and safflorite in larger quantities are inimical to it. The occurrence of rarer minerals is recorded as observed by other investigators. Details of ore genesis, as outlined by previous observers, are amplified to include the occurrence of such minerals as safflorite and marcasite, which are new for the district, and to fit the commoner occurrence of other minerals which were heretofore considered rare. ALICE W. EPPERSON

A qualitative and quantitative determination of the ores of Cobalt, Ont. M. N SHORT. *Econ. Geol.* **25**, 764–71(1930); cf. preceding abstract.—The work of Thomson is discussed at length, and S. makes suggestions, giving his own methods of detn of the hard arsenides. ALICE W EPPERSON

Origin of chromite deposits. F. E. KEEP. *Econ. Geol.* **25**, 425–6(1930); cf. *C. A* **25**, 899.—The paper of Fisher (*C. A.* **24**, 1319) is discussed. K. agrees with F. as to the possible cause of the chromite in the Great Dyke, but disagrees with the statement that the Great Dyke is younger than the rocks of the Bushveld Complex and gives evidence that the 2 intrusions were more or less contemporaneous. A. W. E.

The chrome deposits of Umvukwes district. F. E. KEEP. *S. African Mining and Eng. J.* **41**, Pt. II, 105–6(1930).—The chrome ore occurs in seams in serpentinized enstatite-olivine-rock and in websterite. The ore was formed by magmatic segregation.

The seams are expected to extend to some depth without change. The uses of chrome ore are discussed. ALDEN H. EMERY

Supergene cassiterite in tin veins. FRIEDRICH AHLFELD. *Econ. Geol.* **25**, 546–8 (1930).—The paper by Singewald (*C. A.* **25**, 899) is discussed. Results of investigations in Bolivia are given. Meteoric waters are not capable of dissolving cassiterite since they (in Bolivia) are always acid. Alk. surface waters are not present in Bolivia. ALICE W. EPPERSON

Supergene cassiterite in tin veins. J. B. SCRIVENOR. *Econ. Geol.* **25**, 663–4 (1930); cf. preceding abstract.—The citation of bony tissue replaced by cassiterite is thought to refer to certain Cornish stags' horns which were said to be impregnated with SnO_2, but which were found by the writer to contain no Sn, but to have grains of quartz in cavities of the bone, evidently washed in by water. No evidence was found by the writer in Cornwall, or in Malaya, of soln. of cassiterite by ground water. ALICE W. EPPERSON

Origin of the strontium in the strata of the lower Muschelkalk and Röt formations near Jena. K. DINGER. *Chem. Erde* **4**, 167–77(1929).—The celestite occurring in certain strata of the lower Muschelkalk and Röt formations is not primary, but is due to secondary enrichment. The Sr has been transported in soln., probably as $Sr(HCO_3)_2$, and pptd. as sulfate by interaction with gypsum, since the deposits of celestite occur only where this mineral is, or has been, present. Spectroscopic and chem. examn. of the various strata of the above 2 formations showed the presence of traces of Sr in practically all cases, derived initially from sea water through the agency of certain radiolaria which abstract it to form their shells. B. C. A.

Search for phosphate deposits in U. S. S. R. A. D. ARKHANGELSKII. *Compt. rend. acad. sci. U. S. S. R.* **1930A**, 97–101.—Possible sources of phosphates in Russia have not been so far thoroughly investigated. A thorough study is recommended, especially in Crimea, Caucasus and Turkestan, not only of known types of deposits, but also of general distribution of phosphates in sedimentary rocks. Most of the deposits known at present are of low P content and are scattered among other minerals over a large area in thin layers. Formation of phosphates from limestones by means of reaction with NH_4 phosphate originating from deposits of guano is outlined, and possibility of this phenomenon in Russia given consideration ROBERT SCHLESS

Asbestos milling in Rhodesia. F. E. KEEP. *S. African Mining and Eng. J.* **41**, Pt II, 89–90(1930); cf. *C. A.* **24**, 3198.—Serpentinization and the formation of chrysotile asbestos in the Great Dyke of Rhodesia are probably due to surface waters. The zones are localized in zones of weakness. Of the rock passing the grizzly at the mill head, 8–12% passes to the cleaning mill as fiber and grit. ALDEN H. EMERY

Genesis of the emery deposits near Peekskill, New York. JOSEPH L. GILLSON AND JOSEPH E. A. KANIA. *Econ. Geol.* **25**, 506–27(1930).—These deposits, still mined on a small scale, are located 35 mi. N. of N. Y. City on the east bank of the Hudson, along and on both sides of the contact of the Manhattan schist and Cortlandt intrusives. G. and K. present data disproving the assimilation theory of the deposits and proving that they are contact-metamorphic in origin and were formed by gaseous or liquid emanations from the magma reservoir which passed upward through the already solid border of the igneous mass and into the schist. A detailed mineralogical and petrographical description of the rocks and ores is given. ALICE W. EPPERSON

The origin of the talc and soapstone deposits of Virginia. J. D. BURFOOT, JR. *Econ. Geol.* **25**, 805–26(1930).—The geographic distribution of these deposits is discussed, and their characteristics described. The presence or absence of talc, soapstone or steatite in this region is thought to depend, in part at least, on the occurrence of the correct segregation product—pyroxenites, peridotites or dunites; on the presence of feeding channels leading to these rocks; and on the invasion of the correct type of solns., that is, solns. of the correct chem. character with the requisite temp. and pressure. The condition of differential stress is not necessary for the formation of talc. The mineral association and paragenesis seem to indicate that talc is formed under deep or intermediate vein zone conditions. ALICE W. EPPERSON

Origin of the white clays of Tuscaloosa age (Upper Cretaceous) in Alabama, Georgia and South Carolina. GEORGE I. ADAMS. *Econ. Geol.* **25**, 621–6(1930).—A. believes that the white clays in the district were not the result of marine deposition, as held by Newmann. Deposition of clayey material in small shallow fresh-water lakes is more commensurate with the extent of the white clay bodies, but does not explain the massive character of the beds. It is suggested that the massive character and purity of the clay are the result of the local alteration of deposits of impure clays. No attempt is made to explain the chem. processes which are involved. A satisfac-

tory explanation must be applicable to all the white clays in the region which are similar in character, whether their sources were the crystallines and metamorphics, or the sedimentary areas, and whether they occur in the Tuscaloosa or other formations.
ALICE W. EPPERSON

Clays of the Jackson Purchase region, Kentucky. JOSEPH K. ROBERTS. *Econ. Geol.* 25, 832–6(1930).—The geological formations of this region range from the limestone and chert of Mississippian to the Recent surficial deposits. Detailed descriptions are given of a number of the clays. Tables of chem. analyses are included.
ALICE W. EPPERSON

Geology of Tshasoff-Jar fireclay deposits. P. A. ZEMYATCHENSKII. *Trans. Ceramic Research Inst.* (Moscow) **1929**, No. 20, 7–29(in German 182–3).—The fireclay occurs in beds in Tertiary Pollawa sands. Intact, horizontal layers are found, frequently curved or folded, sometimes compressed or even torn off the main mass. Perpendicular sections are not uniform in sand content, color and $Fe(OH)_3$ inclusions. There is also included lowigite and alunite, usually in white and yellow nodules from the size of a pea to 20–30 cm. The clay bed is 4.5–6 m. thick, sandy at the top. The area worked is about 1200 hectares, by several concerns and at 24 places. Without careful sorting, the quality of the clay suffers from the presence of lowigite, which on burning gives SO_2 and SO_3, causing swelling and blistering. Na_2SO_4 remaining from the lowigite is a good flux, and if coned. at certain points can cause holes to form in the ceramic object. It is proposed to levigate the clay to make it uniform and to purify it. Based on surveys, about 15 million tons of clay are available.
F. M. SYMMES

Composition of clay from the Tshasoff-Jar deposits. V. ISKYUL. *Trans. Ceramic Research Inst.* (Moscow) **1929**, No. 20, 30–87 (in German 184–7). cf. preceding abstr. Examn. by microscope and detn. of *n*s showed the clay to be mainly kaolinite in the form of shredded flakes, muscovite in colorless scales and slightly rounded quartz grains. Tourmaline and limonite were present, the former in free, prismatic particles or em bedded in quartz grains, the latter as compact clusters or granules distributed through out the clay. Rutile grains were found in only the finest clay fractions, zircon in long grains or whole crystals usually in the coarse fraction. Strongly weathered feldspar, lowigite and alunite were found in rounded grains, and biotite in brown plates. The clay was sepd. by the Sabanin and Robinson method into fractions > 0.05 mm., 0.05–0.01 mm. and < 0.01 mm. Chem. analyses showed high alkali content. About 1.2% TiO_2 was always found, but not much Fe_2O_3, CaO and MgO. SO_3 was present, derived from lowigite and alunite. The org. content corresponded to humus. The crude clay reacts very little with Na_2CO_3 soln. or with 2 and 10% HCl, but ignited clay reacts easily, Fe_2O_3, CaO, MgO and alkali being extd. The clay is a kaolinite mica quartz rock.
E. M. SYMMES

Mineralogical composition of Doubrovka kaolin and its fractions by rational analysis. T. KRASENSKAYA. *Trans. Ceramic Research Inst.* (Moscow) **1929**, No. 21, 3–25 (in German 26–7). The change of mineral compn. of kaolin on alteration from coarse to fine fractions was detd. and mineral impurities were identified. The kaolin was decompd. by 10% HCl after dehydration at 600°, followed by a 2-hr. extn. by 5% Na_2CO_3 soln. Microscopic examn. of kaolin showed the presence of kaolinite, quartz, mica and feldspar. Ease of decompn. of mica and feldspar is not given in the literature. Their proportions were estd. by microscopic count. Mica was 95% decompd. by the HCl and Na_2CO_3, and feldspar about 23%. Tables show the mineralogical compn. of unground kaolin and its coarser fractions. In the finer fractions kaolinite rises, but mica, feldspar and quartz diminish.
E. M. SYMMES

Bohemian clay. G. LINCK AND E. KÖHLER. *Chem. Ztrde* **4**, 459–60(1930).—A clay from the Tertiary lignite beds was analyzed in bulk and also the portion sol. in HCl after ignition at 600°; the dehydration curve is plotted. It contains kaolin 47.58 with amorphous material 18.94%, quartz 40% and some mica, pyrite and org. matter.
B. C. A.

A new locality of gaylussite in eastern Mongolia with associated natural soda. K. NIINOMY. *Econ. Geol.* **25**, 758–63(1930). The topography of the region is described, and the occurrence of Na minerals and of gaylussite is given, with typical analyses. The origin of these minerals is discussed, but no definite theory is formulated.
ALICE W. EPPERSON

Geological aspects of the formation of coal. CYRIL S. FOX. *Proc. 16th Indian Science Congress, Geology Sect.*, October 25, **1929**; *Fuel in Science & Practice* **9**, 548–59(1930).—Stratigraphical and petrological data obtained from field investigations and lab. studies of Indian coals are presented in a detailed discussion of their occurrence, quality, origin, constitution and formation. From these data and the results of nu

merous other researches—39 references are included—F. draws 16 conclusions concerning the formation of coal. The main processes in the conversion of peat into primary coal are considered to be of a chem. character and involve all the plant components. Coalification proceeded under water, under anaerobic conditions, sometimes before deposition of overlying sediments. Primary coal became heated because of pressure and was thus changed into bituminous or anthracite coal depending upon the degree of carbonization. In some cases where carbonization proceeded far enough locally, as a result of catalytic action in capillary spaces, fusain was formed. D. A. R.

Coal as a recorder of incipient rock metamorphism. MARIUS R. CAMPBELL. *Econ. Geol.* **25,** 675-96(1930).—Evidence is given to indicate that 8 stages in the metamorphism of coal can be recognized and explained by the processes that have been active in the earth coincident with the development of plant life on the land, and that at least 6 of these stages have left few if any marks on the compn. or phys. appearance of the sediments assocd. with the coal. They may, therefore, be classed as incipient stages of rock metamorphism. ALICE W. EPPERSON

Studies in the development of Dakota lignite. V. Extraction and study of the benzene-soluble portion of Dakota lignite. E. E. HARRIS, C. F. BELCHER AND A. W. GAUGER. *Ind. Eng. Chem.* **23,** 199-204(1931) Lignite from the Velva deposit in N. D. was extd. by the Fisher (*C. A.* **11,** 1739) and Bone (*C. A* **23,** 951) methods and a study made of the C_6H_6 sol. portion. Up to 4.3% of the dry, ashless coal substance was extd by the Bone method That portion of the ext obtained up to 17 atm. has a compn. closely analogous to *Montan wax* from German brown coal. A. H E.

Some chemical aspects of the origin of petroleum. S. C. LIND. *Science* **73,** 19-22(1931) - The chem complexity of petroleum is little less miraculous than its abundance This discussion is directed toward the origin of the complexity rather than the initial source of natural hydrocarbons Processes, either thermal or ionic, are now known by which progression both up and down the hydrocarbon series is effected. This leads directly to the complexity found in natural petroleums, and also found in synthesized ones. Consequently, the starting material, whether of vegetable, animal or mineral source, does not need to be a complex mixt., but may be a single chem. species, from which a high degree of complexity is obtained by steps which appear simple when chem and thermodynamic properties of hydrocarbons are considered. The simplicity of such a mechanism may lend indirect support to the old idea of inorg. origin from one or a few hydrocarbon gases such as might be produced by action of water on metallic carbides in the earth's interior. On the other hand, it does not preclude animal or vegetable origin, but strongly suggests that the primary material, whether gaseous, liquid or solid, is later subjected to thermal (or ionic) agents or both, which produce the complexity found in nature ALICE W. EPPERSON

Study of the black shale overlying the cap rock of the Cromwell sand in relation to the origin of the Cromwell oil dome, Oklahoma. OLIVER R. GRAWE. *Econ. Geol.* **25,** 326-47(1930). An investigation of 54 samples of this shale has shown that its lithologic properties and its compn. are as const as can be expected of any rock No variations occur which can be correlated with local metamorphism produced by structure-forming forces Slight differences in color are independent of the structure and seem to accompany changes in compn. (especially in carbonate content) which may be best explained on the basis of sedimentation. Although shales from different stratigraphic horizons show increase in sp. gr. with depth, sp. gr. of the shale from a single horizon is constant, regardless of structure. Gardner's suggestion that a careful study of properties and compn. of the shale in the low domelike structures of the Mid-Continent field may prove the presence of slight localized metamorphism has not been substantiated, and it is unlikely that local forces of the type postulated by Gardner could have produced the Cromwell dome. ALICE W. EPPERSON

Limestone oil reservoirs of the northeastern United States, and of Ontario, Canada. A. N. MURRAY. *Econ. Geol.* **25,** 452-69(1930) On theoretical grounds the most effective, if not the only, way in which sufficient porosity can be developed in limestone to provide a reservoir of commercial importance, is as a result of soln. above a water table. The porous limestone reservoirs in the northeastern U. S. and Ont. all have been shown to have been subjected to erosion before the time of deposition of the formation now overlying them, with the possible exception of the limestones of Traverse age in Mich. It is therefore suggested that erosion caused the development of porosity in the case of all these limestone reservoirs. ALICE W. EPPERSON

Some properties of limestone as a reservoir rock. W. V. HOWARD AND W. W. LOVE. *Econ. Geol.* **25,** 720-36(1930).—The expts. described indicate that oil will migrate through limestone, but that most of the oil is absorbed by the rock, particularly

the lighter fractions of oil. In a thick reservoir heavy residues may collect in tighter zones within the reservoir with the result that porous limestone is divided into "pays" separated by an asphaltic limestone, as well as by other impervious beds. Such division into zones makes difficult the application of exptl. results to field conditions. It appears that normal production methods will remove from the area tributary to any well all oil which that well can be expected to produce, regardless of rate of production. The low sp. gr. typical of oils from limestone reservoirs appears to be the result of absorption of lighter fractions by the rock ALICE W. EPPERSON

Chemical and petrological investigation of bituminous rocks of various ages from northern Germany. F. HIEBENTHAL. *Chem. Erde* **4**, 343–68(1929).—Bituminous material from 4 different formations (Alluvial, Diluvial, Tertiary and Cretaceous) has been examd. chemically and petrologically. The bitumens from these marine sediments show increasing C content with age, but unlike those of terrestrial origin there is no corresponding decrease in the H content. Elementary S was found in the specimen from the Alluvium, and a stable "metabitumen" was detected in the Tertiary rock. B. C. A.

A tholeritic phase of the quartz-dolerite magma of central Scotland. FREDERICK WALKER. *Mineralog. Mag.* **22**, 368–76(1930).—The rocks near Dalmeny and Kinkell are described, with chem. analyses, and shown to contain chlorophaeite. The analyses and *ns.* indicate that the residual glass is of acid compn. in both cases. A. M. BRANT

Granitic rocks of Tsukuba district and their associated injection-rocks. KEN-ICHI SUGI. *Japan J. Geol.* **8**, Nos. 1/2, 29–112(1930).—Around the granite rocks of the district hornfelses and injection-rocks are extensively developed. Biotite-granites (granodioritic) constitute the main body of the igneous rocks, being assocd. with aplitic granites, aplites and pegmatites which occur as small sheets and are especially abundant near the contact borders of the granites. These granitic rocks may have intruded during the Mesozoic era. The metamorphic rocks are believed to have been derived from the sedimentary complex of the Chichibu series, the metamorphism being due to the igneous intrusions. Of the hornfelses which occupy the eastern part of this area, the predominant types are those derived from argillaceous sediments, andalusite- or cordierite-hornfels, which show gradual transitions to the injection-rocks of the western area. The latter, derived largely from argillaceous sediments, are grouped in 4 main types, *viz:* sillimanite-biotite-, biotite- with shimmer aggregates, cordierite-biotite and biotite fels. There are also metamorphic rocks derived from Ca-Mg-bearing sediments, which are almost free from igneous injection but not from its effects. A few chem. analyses are given. W. L. HUH

Geological and petrographical examination of the granites quarried in Silesia. W. BECKER AND F. MACHT *Chem. Erde* **5**, 412–36(1930).—Details are given of the stone from several quarries in the neighborhood of Strehlen, including the jointing of the rock, the size of grain of each constituent mineral and the relative proportions of each mineral These are points of importance in the quarrying of the stone and in its suitability for various purposes B. C. A.

Phonolites and trachytes of the Laacher See district. W. AHRENS. *Chem. Erde* **5**, 1–21(1930).—Trachytoid phonolitic tuffs at Burgbrohl, belonging to the Alluvial period, are of later age than the main mass of trachytes of the Laacher See district The contained blocks of trachytoid phonolite lava are described petrographically with chem. analyses. The analyses are compared with published analyses of the trachytes and plotted on diagrams, showing that at this later period the magma became more acid. B. C. A.

Mineralogy and petrography of the Rhön Mountains. F. HEIDE. *Chem. Erde* **5**, 396–411(1930).—Petrographical descriptions are given of phonolite rocks, with one chem. analysis. B. C. A.

Basalt from the Atlantic Ocean. C. W. CORRENS. *Chem. Erde* **5**, 76–86(1930). A description with chem analysis is given of a fragment (62.7 g.) of basalt raised from the floor of the Atlantic at a depth of 2000 m. in lat. 1°56′ S., long. 12°40.7′ W. It has a glassy crust which has been acted on by sea water. B. C. A.

Basalt of the Stöffel, Westerwald [Nassau]. E. LEHMANN. *Chem. Erde* **5**, 319–72 (1930).—From this hill of Miocene basalt 600,000 tons of stone are quarried annually The basalt is penetrated by dikes of essexite-porphyry, which is a product of differentiation of the basaltic magma. Detailed petrographical descriptions with chem. analyses are given of these rocks. B. C. A.

Dolomitization of Middle Devonian [limestone] in the Eifel. P. MÜLLERS. *Chem. Erde* **4**, 431–54(1930).—Many analyses are given of the dolomite rock in the Gerolstein

basin. They show in the majority of cases 80–96% of dolomite ($CaCO_3.MgCO_3$), but in a few streaks only 1–2%. The rock is a coral-reef formation; the dolomitization took place contemporaneously by the action of the sea water. The undolomitized streaks represent lagoon deposits. B. C. A.

Rocks of Gomera, Canary Islands. W. Müller. *Chem. Erde* **4**, 369–94(1930).—The Tertiary or post-Tertiary volcanic rocks of the island of Gomera are underlaid by a series of extensively weathered rocks which were believed by Gagel (*C. A.* **20**, 3414) to represent a much older "Grundgebirge." A detailed examn. with several analyses of these rocks shows that they are only the weathered equivs. of the ordinary types of volcanic rocks, which include basalts, trachytes and trachytic phonolites. Analyses are also given of the portion of the weathered rocks sol. in HCl. B. C. A.

Red marls of the Trias formation. H. E. Krauss. *Chem. Erde* **4**, 188–207 (1929).—A no. of marls from the red Trias formation have been subjected to chem. and rational analysis, and their mineral compn. has been calcd. After subtraction of clastic minerals (quartz, feldspar and carbonates) and recalcn. of the results to 100% it is found that the ratio of $Al_2O_3:SiO_2:H_2O$ in the residual material is practically the same as that in specimens of "terra rossa." It is therefore concluded that both these substances represent similar products of weathering. B. C. A.

"Terra rossa" as residue from solution of marine limestones. Wilh. Graf zu Leiningen. *Chem. Erde* **4**, 178–87(1929).—A series of comparative analyses of "terra rossa" from a no. of localities and of material left after the soln. of various limestones is adduced as addnl. evidence in support of L.'s view that the first-named substance is to be regarded as a soln.-residue of certain marine limestones. B. C. A.

"Terra rossa" as solution residue of marine limestones. E. Blanck. *Chem. Erde* **5**, 43–7(1930). The analyses by Leiningen (preceding abstr.) support the view first expressed by B. in 1915 B. C. A.

Natural weathering and a comparison of chemical and natural weathering of building stones. E. Kaiser. *Chem. Erde* **4**, 290–342(1929).—In a study of the effects of natural weathering in a region, the properties of the underlying strata are important, since the nature of these often greatly influences the effects due to climatic weathering, certain oases furnish instances of this kind. The weathering of building stones caused by various gases present in the atm. is fully discussed, and the analogy with natural weathering is traced. Analysis of a block of sandstone taken from Regensburg Cathedral showed that of the salts formed by weathering, $CaSO_4$ tended to be concd. in the outermost layers, while $MgSO_4$ and Mg chlorides had penetrated deeply into the stone. The presence of alumina and silica in the sol. salts due to weathering was also noted, but it is uncertain in what form they occur. Chem. weathering is intensified by light, and building stones exposed to full light are more rapidly corroded than those in a more shaded position. B. C. A.

Bleaching processes [in rocks]. H. Harrassowitz. *Chem. Erde* **5**, 146–64 (1930). Many different geological processes may give rise to much the same result. Exogene bleaching and endogene bleaching are distinguished; the former is due to ordinary weathering at the surface, and the latter to fumarole and hydrothermal actions. By the removal of certain constituents the rocks may be altered to kaolin, bauxite, alunite, etc., or even to a pure quartz sand B. C. A.

Weathering of shell limestone and soil formation near Jena. W. Hoppe. *Chem. Erde* **5**, 165–81(1930).—Several chem. analyses are given of limestones from different strata in the "Muschelkalk," of the weathered rocks and of the overlying soils. These show a gradual removal of lime and an accumulation of the residual constituents of the limestone. B. C. A.

The abundance of elements of the vanadium group in eruptive rocks. G. v. Hevesy, E. Alexander and K. Würstlin. *Z. anorg. allgem. Chem.* **194**, 316–22 (1930). Two hundred and eighty-two samples of eruptive rocks were examined for V, Cb, Ta and protoactinium content. The mean Cb and Ta content was 3.2×10^{-7} or 2.4×10^{-7} g per gram of rock. The relation of at. abundance of Cb and Ta is 2.6. The V content was 2×10^{-4} and the protoactinium content (calcd. from the Ra content of 1.2×10^{-12}) 7×10^{-13} per gram. A comparison was made of the abundance of these elements of the V-group in the eruptive rocks and in meteorites. M. M.

The significance of silicate synthesis for geochemistry. Wilhelm Eitel. *Naturwissenschaften* **18**, 1019–20(1930).—A review of recent work in silicate chem.
B. J. C. van der Hoeven

The age of the earth. Otto Hahn. *Naturwissenschaften* **18**, 1013–9(1930).—A review.
B. J. C. van der Hoeven

A study of the pedogenic processes in an area of lower paleozoic shales (JONES) **15. Geochemical distribution laws and cosmic frequencies of the elements** (GOLDSCHMIDT) **2.**

STADNIKOV, GEORG: **Die Entstehung von Kohle und Erdöl. Die Umwandlung, organ. Substanz im Laufe geolog. Zeitperioden.** Heft 5/6 of "Schriften auf d. Gebiet d. Brennstoff-Geologie." Stuttgart: F. Enke. 254 pp. M. 20.

Standards and Specifications for Nonmetallic Minerals and Their Products. Washington, D. C.. Supt. of Documents, Government Printing Office. 680 pp. $2.75.

9 METALLURGY AND METALLOGRAPHY

D. J. DEMOREST, H. W. GILLETT AND RICHARD RIMBACH

Metallurgy and the power industry. J. B. ROMER. *Metals and Alloys* **1**, 868-70 (1930).—A review. A. J. MONACK

Metallurgy in South Africa. S. W. SMITH. *Mining Mag.* **43**, 265-9, 336-41 (1930); **44**, 24-31(1931). A survey of operations at various works, especially those for Au, Pb, Cu and Fe, with discussion of papers presented at the Empire Congress. A. BUTTS

Lead. G. W. THOMPSON. *Am. Metal Market* **38**, No. 35, 3, 5, 10 (Feb. 20, 1931).—The great increase in consumption of Pb has been in the elec. industry, where it is chiefly used for cable coverings. The problem in the future of the Pb and Cu industries will depend largely upon the demand created by the elec. industry. Properties of Pb and its alloys with Sb or Sn or both are discussed. W. H. BOYNTON

The Roan Antelope copper mine. A. G. MCGREGOR. *Mining Mag.* **43**, 270-6 (1930). A description of the mine, mill and smelter, with several flow sheets and diagrams. Initial production will be 50,000 tons of Cu yearly. A. BUTTS

Milling practice at Fresnillo. R. E. BYLER. *Mining Mag.* **42**, 137-47(1930). A description of practice in cyaniding an oxidized Ag ore and differential flotation of Pb-Ag-Zn sulfide ore. The cyanide is regenerated by treating the soln. with SO_2 and absorbing the liberated HCN in alk. soln. A. BUTTS

Amulet flotation mill practice. W. G. HUBLER. *Can. Mining Met. Bull.* No. **226**, 295-306(1931). Operations at the new 300 ton mill treating Cu-Zn-Fe ore by selective flotation are described, and the use of various reagents is discussed. A. BUTTS

The new smelter and concentrator of the International Nickel Company at Copper Cliff, Ontario. L. M. SHERIDAN. *Eng. J.* (Can.) **13**, 682-7(1930). After coarse crushing by hand at the mines, the ore is shipped to Copper Cliff where it is crushed to 200-mesh and sent through a wet concn. to remove the rock. In the concn. process the sulfides are floated, and the lighter rock material sinks to the bottom. By selective flotation a rough sepn. is made of the Cu and Ni. Smelting comprises roasting in multiple-hearth roasters, in reverberatory furnaces and blowing in basic-lined Bessemer converters. The product is an 80% Cu-Ni mat. The layout of the smelter and concentrator is shown in a diagram. W. H. BOYNTON

The Hollinger assay office. W. R. DODGE. *Can. Mining Met. Bull.* No. **225**, 115-22(1931). The equipment and work of the lab. of the Hollinger Consolidated Gold Mines are described. A. BUTTS

Review of iron and steel literature for 1930. E. H. MCCLELLAND. *Blast Furnace Steel Plant* **19**, 258-61(1931). E. H.

Recent developments and researches in cast iron. J. W. DONALDSON. *Roy. Tech. Coll. Met. Club J.* (Glasgow) **1929-30**, No. 7, 38-40. E. H.

Evaluation and testing of the properties of raw materials and key-products in the iron industry. A. WAGNER. *Stahl u. Eisen* **50**, 655-68(1930).—The present state of our knowledge of the properties of coal, coke and Fe ore used in the production of Fe and steel and of the pig Fe produced from various types of ore is reviewed, and modern methods of detg. the value of these materials for their particular purposes are briefly discussed. Lab. tests of the coking power of coal and chem. analyses of Fe ore do not give sufficient information as to the value of the coke and ore for metallurgical purposes, as no account is taken of their phys. condition, which is of considerable importance in detg. their behavior in smelting. Similarly, chem. analysis of pig Fe affords little information as to its value for subsequent operations, but, in combination with an examn. of its micro- and macro-structure and a detn. of its mech. properties after remelting under standard conditions, the analysis gives a fairly accurate idea of the com. value of the metal. B. C. A

Calorific value, heat and gas flow, the physical bases of metallurgical processes. H. BANSEN. *Stahl u. Eisen* **50**, 668-78(1930).—Diagrams have been constructed to show the heat balance in various stages of Fe smelting—the blast furnace, gas producer, acid and basic open-hearth furnaces, converter and sponge Fe producer—and the effect of preheating the gas and air is illustrated. A knowledge of the calorific value of the fuel and the rate of flow and heat content of the various gases is shown to be of paramount importance in the correct and efficient operation of the various processes. The resistance of the column of charge in the blast furnace to the flow of gas through the furnace dets. to a large extent the output of the furnace, and any factor which increases this resistance reduces the efficiency of the furnace. One of these factors is the deposition of C from the flue gases in the upper part of the blast-furnace shaft; an app. is described and illustrated for the detn. of the magnitude of this deposition from blast-furnace gas. B. C. A.

The carbon-oxygen equilibrium in liquid iron. H. C. VACHER AND E. H. HAMILTON. *Am. Inst. Mining Met. Eng., Tech. Pub.* No. **409**, 13 pp.(1931).—The product of the C and O concns. in liquid Fe at 1620° was found to be 0.0025 at 1 atm. pressure. The same const. was obtained over a range of 0.01–0.94% C and 0.003–0.19% O. Expressed as the product of FeO and C it becomes 0.011. H. C. PARISH

Improving castings with the double forehearth. CARL REIN. *Giesserei-Ztg.* **27**, 8–11(1930).—Cast Fe melted in a cupola can be improved by a complete deslagging. This is accomplished by allowing the melt to stand a while, so that the slag particles may rise to the top. Where various mixts. are melted in the same furnace, the double forehearth has the advantage of keeping the individual melts sep. It is heated to a white heat with an oil burner before tapping, so as to not cool the charge. C. L. W.

Development of the modern blast furnace. GEO. F. ROSE. *Blast Furnace & Steel Plant* **19**, 255–7(1931). E. H.

The cupola furnace and its main dimensions. LEOPOLD SCHMID. *Giesserei-Ztg.* **26**, 567–77(1929).—A discussion of the construction and operation of the Fe-foundry cupola, with and without forehearth. CURTIS L. WILSON

The combustibility of coke in cupola practice. J. GWOSDZ. *Giesserei-Ztg.* **26**, 578–82(1929).—A dense, hard, difficultly combustible coke is the most suitable for cupolas, as it does not reduce CO_2 back to CO so readily. CURTIS L. WILSON

The selection of coke for foundry purposes. OTTO HUPPERT. *Giesserei-Ztg.* **27**, 35–7(1930).—Low H_2O, ash, and S content and high strength are desirable. For cupola coke, low activity (velocity of reducing CO_2 to CO) is debatable. This activity is attributed to the unsatd. amorphous C atoms. When activity is desired, the graphitization caused by coking at too high a temp. is to be avoided. Cf. *C. A.* **24**, 224. CURTIS L. WILSON

Wrought iron, some pros and cons, and the need for research. H. W. GILLETT. *Metals & Alloys* **2**, 25–30(1931). A correlated abstract. A. J. MONACK

Producing hydraulic cylinder castings. F. LONGDEN. *Iron and Steel Ind. and Brit. Foundryman* **4**, 115–8(1931). C. H. LORIG

Character of change of hardness of iron ruptured by tension. M. MIKHAILOV AND I. CHURBANOV. *Acta Univ. Asiae Mediae*, Series XI, Tech., No. **3**, 1–5(1929).—Hardness tests (Shore scleroscope and Rockwell) made on samples of iron broken by tension showed that the hardness of the surface and of deeper layers increased in all parts of the specimen except the necked portion. On the portions corresponding to the neck the hardness of the surface layers decreased 21%, but the hardness of the inner layers increased 20%. B. N. DANILOFF

The strength of gray cast iron at elevated temperatures. J. W. DONALDSON. *J. West Scot. Iron Steel Inst.* **38**, Pt. II, 11–20(1930). Cast irons comprising 2 plain irons contg. 0.65 and 1.48% Si, resp., and alloy irons contg. (*a*) 2.43% Mn, 0.40% Cr, 0.75% Ni, 0.12% V, 0.48% W and (*b*) 0.61% Cr, 0.30% Ni, 0.02% V, resp., were investigated to det. (1) the temp.-stress curves of a series of plain and alloy irons, (2) the influence of previous heat treatment on the temp.-stress curves, and (3) the effect of low Si and various alloy addns. on the strength of cast Fe at elevated temps. both as cast and after heat treatment. DOWNS SCHAAF

Plastic and elastic deformation. E. KIEFT. *Iron Steel Eng.* **8**, 54–66(1931).—The compression-resistance of wrought iron and mild steel increases to unknown values when we compress plastic material. The rate is very great when the height is very small as compared with the diam., because of the rapid increase of expansion or horizontal resistance. An observed increase in resistance per sq. in. was from 50,000 to 230,000 lb. The applied force works vertically and is transmitted by deformation or displacement of the molecules into horizontal direction. Expansion work must be considered along

with compression work when deriving a formula in which tensile strength or compression strength of steel is taken as a const. during the whole operation. The soln. of problems relating to plastic and elastic deformation involves application of the law of least resistance or least work. Twenty-two equations are evolved relative to the plastic flow of hot steel, of cold steel and of elastic flow. The strength can be improved, and a considerable amount of material can be saved by proper design of frames, rollstands or similar structures. Application of the theory of least work, credited to Castigliano, yields the same result as indicated in the formulas. W. H. BOYNTON

Wearing tests on iron and steel. ARVID JOHANSSON. *Jernkontorets Ann.* **114**, 551–71(1930).—A critical discussion is given of various tests for wearing resistance, including the Robin, Brinell, Spendel and Amsler tests. The general conclusions are that wearing resistance increases with increased C content, with increased coarseness of structure and with increased speed of rotation. The general status of the results is, however, highly uncertain. Problems for further research are the effect of crystal structure as detd. by chemical analysis, heat treatment, final working temp., and slag inclusions. Seven references are included. H. C. DUUS

Investigation of a raw steel from pre-Roman times. H. HANEMANN. *Stahl u. Eisen* **51**, 67–8(1931).—A steel bar from the pre-Roman La Tène period was subjected to chem. and metallographical analysis. The irregular structure showed dark parts consisting of pearlite and cementite and lighter parts consisting of ferrite and pearlite. The chem. analysis showed 0.44% C, 0.065% Si, 0.10% Mn, 0.042% P, 0.012% S, traces of Cu and no other metals. The steel of that period could only have been made in the bloomery hearth. Forging expts. showed that sharp knives could be made from this steel but not without some difficulty due to the formation of cracks. This steel bar, over 2000 years old, is a good example of the great stability of cementite. J. A. SZILARD

Testing method for the determination of the surface characteristics of [steel] plates. E. GEROLD. *Stahl u. Eisen* **51**, 104–6(1931).—The luster of the surface of iron plates is a measure of their smoothness. Several methods to measure the luster of plates are described. The polarization luster measuring apparatus built by Schmidt and Haensch (cf. K. Kieser, *Z. angew. Chem.* **32**, 357 (1919)) utilizes a polarization photometer to measure the amt. of polarized light in rays reflected from the surface to be tested. The stray luster measuring device, built according to Kempf-Flugge by the same firm, photographs the image of a small slit by means of the rays reflected from the surface to be tested. The clearer the image of the slit, the better the reflecting power and the smoother the surface of the plate. The Askania luster-measuring app. is built on the same principle except that, instead of exposing a sensitive paper, the observer reads the luster of the surface under test directly by comparing the divergency of the rays from the same point of the surface. The app. designed by the research lab. of the Vereinigte Stahlwerke Dortmund is similar to the above, except that a photoelectric cell is used to measure the amt. of light reflected from the surface. Because of the comparatively small surface area possible to cover with the above app., this method is not suitable as an acceptance test for plates. However, it gives valuable information on the surface characteristics of plates when the adhesion of paints and varnishes is being studied. J. A. SZILARD

Influence of high-frequency oscillations on the treatment of metallurgical products G. MAHOUX. *Compt. rend.* **191**, 1328–30(1930).—All expts. were made on rods 15 mm. in diam. Steel contg. 3% Ni, 3% Cr and 1% Mo was heated 9 hrs. at 500° in a current of NH_3, with a blank not electrically treated. The Brinell-Vickers no. was raised from 380 to 1030, the resilience from 9 to 11.8 kg., and the nitride penetration was 0.35 mm. The only change in the blank was a nitride penetration of 0.01 mm. The B.-V. no. of steel contg. 8% Ni, 19.8% Cr and 4% W, treated 10 hrs. at 500° in NH_3 was raised from 235 to 1035 at the surface, to 570 1 mm. beneath the surface, and to 472 at the center. A soft steel electroplated with Cr and treated 9 hrs. at 530° showed a Cr penetration of 0.35 mm.; the blank showed no penetration. **Comments on the preceding communication.** LEON GUILLET. *Ibid* 1331–2.—The results have been confirmed by Aubert and Duval for steel and many alloys. A Ni coating on steel is absorbed at 450°. The treatment opens a fertile field for research. J. H. M.

The formation of cracks in steel castings. K. SINGER AND H. BENNEK. *Stahl u. Eisen* **51**, 61–5(1931).—The possibilities of the formation of so-called hot cracks during the cooling of steel castings and the filling up of these cracks or fissures by the liquid part of the casting are reviewed with reference to practical examples. The cracks are caused by great temp. differences in the casting, by the manner of heat transfer from one part of the casting to the other and mainly by the size and shape of the coldest

part of the casting, from which during solidification contraction forces are acting on the rest of the casting. There is no direct relationship between piping and cracks, although by working toward a pipe-free casting, the better temp. conditions prevent the formation of cracks and help in filling up those formed by the liquid part of the casting during the cooling period. The importance of the proper contraction of the casting is emphasized. Were it possible to control the shrinking of the casting, the danger of the formation of cracks would be greatly reduced. It is pointed out that in a casting solidifying in a field of a high frequency coil the induction current would counterbalance the radiation losses, thereby preventing the formation of cracks. J. A. SZILARD

Aging of steel castings. A. POMP. *Stahl u. Eisen* **50**, 440–1(1930).—The impact strength of mild-steel castings (notched bars) contg. C 0.1–0.27, Si 0.16–0.46, Mn 0.45–1.37, P 0.05–0.06 and S 0.04% decreases on aging at 250° for 1 hr. after forging to a reduction in area of 7–10%, but not nearly to the same extent as it does after completely annealing. The values obtained for the annealed metal at 20° to —20° were consistently below 2 m. kg./sq. cm., whereas those for the aged metal varied from about 6 m. kg./sq. cm at 20° to about 2·3 m. kg./sq. cm. at —20°. B. C. A.

Effect of various annealing temperatures on cold-worked low-carbon steel. H. E. PUBLOW *Metals & Alloys* **2**, 18–9(1931).—The results are expressed by 3 graphs which show (1) the *relation between annealing temps. and Rockwell hardness* of 4 low-C steel brake drums, (2) the *relation between annealing temps. and ductility* and (3) the relation between annealing temps. and hardness and ductility of cold-worked low-C steel. A. J. MONACK

Cold-rolled steel. GEORGES DELBART. *Aciers spéciaux* **5**, 483–508(1930).—This work covered (1) influence of *cold rolling and successive annealings on the tensile strength and elongation*, (2) *hardness*, (3) *corrosion by* H_2SO_4, (4) *attack by fuming* H_2SO_4, (5) *influence of cold rolling and successive annealings on the impact strength and* (6) *influence of cold rolling and rapid annealings on the magnetic permeability*. Data and graphs are given in connection with each of the items above. A large number of *photomicrographs* is included. A. J MONACK

Steels for cold pressing. G. R. BOLSOVER. *Iron and Steel Ind. and Brit. Foundryman* **4**, 101–2(1930).—Low-C rimming steels used for deep drawing do not work-harden readily. The tensile strength varies approx. as one-third the % reduction in steel thickness. When steel is stretched more than 5%, brittleness is encountered on reheating to 200° to 300°. Age hardening after quenching increases the tensile strength of dead mild steel 67%. For deep drawing purposes stainless steel must be low in C and should be quenched from a high temp C. H. LORIG

Tensile strength at high temperatures of steel containing small quantities of nickel and molybdenum. W. LIEBSTMANN AND C. SALZMANN. *Stahl u. Eisen* **50**, 442–6 (1930). The tensile properties of steel with C 0.2, Mn 0.8, Si 0.25, Ni 0.4–2.2 and Mo 0.2–0.6% have been detd. at 500° after annealing at 900–950°. Ni and Mo both increase the tensile strength and yield point but reduce the ductility, 0.1% Mo increasing the ultimate strength by 1 kg./sq. mm. and the yield point by 2 kg./sq. mm., and 0.5% Ni increasing the former by 2 kg./sq. mm and the latter by 1.8 kg./sq. mm. With higher proportions of Mo the ratio ultimate strength/yield point is unfavorably affected, but further addn. of Ni improves this ratio. The steel with 2.1% Ni and 0.5% Mo has a yield point of 25.5 kg./sq. mm., a tensile strength of 42 kg./sq. mm., an elongation of 11% and a reduction in area of 20% at 500°. B. C. A.

Solution of cementite in carbon steel and the influence of heterogeneity. ERIK WALLDOW. *Engineering* **131**, 27–30(1931). —Transformation of α-iron to γ iron starts from the grain boundaries. Com. steels show a transformation interval, the transformation starting at different temps. in different parts of the specimen. A new material, "sorbo-troostite," is found when heating at 3·5–5.2° above Ac_1 for 1 hr. or less. Its structure is less distinct than that of sorbite and it is not so strongly attacked by HNO_3 as troostite. It appears to be residual undissolved ferrite and cementite and never to have been in the γ-state. It is found in the peripheral parts of austenite grains. Varying soly. of pearlite grains is not due to alloying elements as contaminators but to their irregular occurrence in the structure. ANN NICHOLSON HIRD

The development of nitriding plants. F. BRÜHL. *Krupp. Monatsh* **11**, 287–90 (1930).—A description is given of the development of nitrided steel together with a discussion of the requirements demanded of nitriding equipment. A number of installations are described. H. STOERTZ

The case-hardening of commercial steels by means of nitrogen. B. JONES. *Iron and Steel Ind. and Brit. Foundryman* **4**, 77–86, 99(1930).—Five British com. austenitic steels of various compns. were nitrided at 500° for 90 hrs. Except for a 13.20% Mn

steel with 1.25% C, the increase in hardness was inappreciable. The austenite in the Mn steel was partially decompd. into troosto-martensite. Nickeliferous austenite does not harden on treatment. The effects of certain elements were ascertained by nitriding 20 com. steels of different chem. compns. for 90 hrs. at 500°. Contrary to published information, plain C steels are nitrided. Mild steels harden to a greater extent than do high-C steels. Nickel steels do not nitride. With Cr and V the retarding effect of Ni is not so great. The effects of the combination Al, Cr, Mo appear to be more than additive. C. H. LORIG

Use of zirconium alloys in steel manufacture. PH. GUY. *Aciers spéciaux* **5**, 509-21(1930).—The following are discussed: (1) action of Zr on the impurities contained in steel, (2) phys. properties of Zr steels and (3) steels for which the use of Zr is recommended. Data and photomicrographs are given. A. J. MONACK

New manganese-silicon alloys for the deoxidation of steel. C. H. HERTY, JR., AND G. R. FITTERER. Bur. Mines, *Rept. of Investigations* **3081**, 14 pp.(1931).—By using Mn-Si alloys for deoxidation, larger inclusions were formed than by using Si alone. The av. size of the inclusions formed when using Si was 15×10^{-4} cm. The size increased with increasing Mn, until at a Mn/Si ratio of 4-18 the largest particles in dead-killed steels were 1000 cm $\times 10^{-4}$. These large particles would rise at a much more rapid rate (600-2400 in. per min.) than the small SiO_2 particles (0.15-1.5 in. per min.). Tests in commercial acid and basic open hearths show the same results on steels of from 0.12 to 0.60% C using alloys with a Mn/Si ratio of 4-5-6-0. Mn efficiencies of 75-85% have been obtained when forging-grade steels have been deoxidized with these alloys. ALDEN H. EMERY

Some important advances in the properties and treatment of metallic alloys. LEON GUILLET. *Rev. métal.* **27**, 449-66(1930); *Rev. univ. mines* **4**, 221-30, 296-306. General review. H. C. DUUS

Examination of the resistance of metal alloys against attack by salt solutions. III. E. MAASS AND W. WIEDERHOLT. *Korrosion u. Metallschutz* **6**, 265-77(1930); cf. *C. A.* **25**, 1205.—Solns. of sylvinite, carnallite, Glauber's salt and bitter salt were used as corrosive media, in which the specimens previously specified were immersed under various conditions. The testing period was 4 months in the expts. carried out at room temp., and 8 days with those carried out at 90°. The losses of wt. and the appearance of the corroded surfaces and of the corrosion products are given in detail. The greatest losses of wt. were observed in the group of the various forms of iron. By addn. of Cr and Ni the material is considerably improved, and Cr-Ni steels give the best results that were observed. The second best group is the Cr-Ni-Fe alloys. Ni and the other Ni alloys show a similar behavior, although they are not quite as good. Between them and plain iron rank Cu and the Cu alloys. No essential difference is observable between Cu, bronze and brass. The losses of wt. of the *β brasses* are slightly lower. The magnitude of the attack, generally speaking, is not so great in solns. as when the sheets are covered with solid salt. The corrosion is mainly restricted to the surface, without penetrating deeper into the metal. The penetration amounts to approx. 0.02 mm. in 4 months. Perforation of the sheets by pits was not observed. A soln. of sylvinite was found to possess the greatest corrosiveness. Generally speaking, the effect of Glauber's salt was much smaller and that of carnallite even less, although exceptions were observed in the series where O_2 was passed through the solns. The influence of the experimental conditions was considerable. The losses of wt. were doubled by using the double quantity of corroding soln. per sq. cm. of area. The same holds true if there is a boundary line of liquid and air. Introduction of O_2 causes losses 5 times as high. The corrosion at 90° was found to be greater after 8 days than that at room temp. after 4 months. LEOPOLD PESSEL

Structure analogies of intermetallic phases. A. WESTGREN AND W. EKMAN. *Arkiv. Kemi. Mineral. Geol.* **10B**, No. 11, 1-6(1930).—In intermediate phases of the β-brass type contg. either Cu, Ag or Au, it has been found that there is a ratio of valency electrons to atoms of 3:2, while in the lattices of the γ brass type the ratio is 21:13. Recently metallic compds. have been found not contg. Cu, Ag or Au with atomic groupings resembling β- or γ-brass, *viz.*, NiAu, MnAl and FeAl, where the atoms of the transition elements behave as if they had a valency of zero. To test the validity of this remarkable rule the authors made a series of alloys corresponding to the general formula A_5B_{21}, where A is a transition element (Co, Ni, Rh, Pd, Pt), and B is either Zn or Cd. The alloys were made in sealed evacuated quartz tubes by heating for about a week at 900-1000°. In all cases where alloying succeeded, a homogeneous material of γ-brass structure resulted, as was evidenced by the powder photograms. The homogeneity range extends for Co-Zn alloys from 15 to 22 at. % Co and for Ni-Zn alloys from

15 to 19 at. % Ni. It was noticed that alloying of transition elements with Al, Zn or Cd gives a much more pronounced decrease in vol. than is the case with alloys formed with atoms having complete inner electron shells. The contraction for Ni_5Cd_{21} amounted to almost 8.7%, although Ni occupies only 19 at. % in the alloy. H. S. v. K.

Packing of atoms in alloys. A. WESTGREN AND A. ALMIN. *Z. physik. Chem.*, Abt. B, **5**, 14–28(1929).—The variation of the linear lattice dimensions with compn. of the alloy has been investigated in the α-phases of the systems Ag–Al, Cu–Al and Ni–Al, and in all cases the parameters are less than those calcd. by Vegard's addn. law from the parameters of the components. From calcns. of the vol. occupied per atom in the various phases of the above systems, and of the systems Cu–Zn, Ag–Zn, Ag–Cd, Cu–Mg and Fe–W, it is shown that, in general, a contraction in at. vol. accompanies the formation of the intermediate phases. The at. vols. in contiguous phases of any system differ only slightly, so that the curves of vols. drawn for a series of phase regions are almost continuous. The vol. contraction is especially marked in Ni-Al alloys, and it is suggested that this depends on the fact that such alloys are formed by the union of an atom which is deficient in a nuclear electron with one of normal type. B. C. A.

The influence of temperature upon the notch toughness of aluminum alloys. TORAO KOBAYASHI. *Mem. Kyojun Coll. Eng.* **3**, 145-53(1930).—Duralumin, Y-alloy and other com. Al alloys were worked, quenched and aged 20 days, after which test pieces were placed in an impact machine and tested at temp. intervals of 50° up to 550°. The heating arrangement was attached to the testing machine and could be removed simultaneously with the release of the pendulum. The notch toughness was found to resemble plasticity, in that it increased with increasing temp., reaching a max. at 450°. CURTIS L. WILSON

Volume change during solidification of manganese and some alloys. KOTARO HONDA, YOSHIHARU MATSUYAMA AND YATSUGU ISOBE. *Bull. Inst. Phys. Chem. Research* (Tokyo) **9**, 906–10(1930); (*Abstracts* 88 (in English) published with *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) **14**, Nos. 275–6). Vol. changes during solidification of Mn and some alloys contg. Mn, Ni or Co are measured by using the thermobalance. Values of V'/V'% (V = vol. of liquid sample at m. p.; V' = contraction by solidification) obtained are: pure Mn (Mn 99.9%, C 0.01%, Al 0.03%, Fe 0.05%, Si trace), −4.50; Mn–C (C 1.10%), −1.60; Ni–C (C 2.23%), +2.06; Co–C (C 2.20%), +2.03. K. KONDA

Macro-etching of tin-base bearing metals. ERNEST B. DRAKE. *Metals & Alloys* **2**, 20–4(1931). A *method* for macro-etching tin-base babbitts of various compns. is suggested. The failures in connecting-rod bearings which have been run in test engines appear most often in the finely crystalline babbitts near the joint. The macro-etched babbitts indicate fairly well the size and distribution of the micro-constituents which may be expected. Centrifugally cast main- and connecting-rod bearings show SnSb cubes, which are generally associated with a smaller no. of CuSn needles than when the SnSb cubes are absent, all imbedded in a groundmass of Sn-rich eutectic when the babbitt is of the type: 85% Sn, 7.5% Sb, 7.5% Cu. The die-cast main- and connecting-rod bearings show no SnSb cubes but do show a larger amt. of CuSn needles imbedded in a groundmass of Sn rich eutectic and delta solid soln. when the babbitt is of the type: 85% Sn, 7.5% Sb, 7.5% Cu. A. J. MONACK

Production of lead-tin alloys from tin slag. EDMUND R. THEWS. *Metallbörse* **21**, 3–4(1931). Sn slags are smelted with Pb or Sn-poor alloys. A purer product is obtained by using type metal. Pb residues can be used with Sn slags to produce an alloy of 8% Sn. For alloys richer in Sn this product is oxidized and used as raw material for the next smelt. Sulfurous ores require a preliminary roasting. The presence of much As is harmful because of the formation of viscous iron arsenides. A coking mixt. contg. 10–25% wood charcoal is best. ANN NICHOLSON HIRD

Zinc and zinc-alloy use in the automotive industry. II. ROBERT M. CURTS. *Am. Metal Market* **38**, No. 22, 5, 10(1931).—This installment deals with Zn wire, extruded Zn shapes, die-castings, the use of fully automatic machines, the introduction of high-grade Zn in die castings, Zn alloys for body hardware, and other equipment. Some data are given on the Zn-Al alloy system. **III.** *Ibid* No. 23, 5.—This instalment deals with heat treatment of Zn base die-casting alloys, water-vapor tests, the disastrous effects of contamination, phys. tests on die casting alloys, and the use of inserts in these alloys. **IV.** *Ibid* No. 24, 5, 10.—Cleaning, etching and Ni plating are discussed. A series of tests indicates that Cd plate may be applied directly to die-casting with no appreciable harmful effects. Attractive coats of enamels, japans and lacquers may be applied to Zn and its alloys. Metallic Zn is used in the automotive industry

for electro-galvanizing as a constituent of brass, as rolled sheet and strip for a variety of fabricated products and in the production of a great no. of die-cast parts. The phys. properties of the various Zn alloys and the ease of application of attractive and durable plated finishes have resulted in annual increases in Zn consumption for automobile parts. Tables show the A. S. T. M. specification B 6-18 for Spelter and the phys. and elec. properties of Zn die-casting alloy contg. 4% Al, 3% Cu, 0.05–1.0% Mg and the balance Zn. W. H. BOYNTON

Fatigue strength of unwelded and welded cast and rolled materials. WALTER B. BARTELS. *Z. Ver. deut. Ing.* **74**, 1423–6; *Giesserei-Ztg.* **27**, 607–16, 637–45, 661–4 (1930).—The type of graphite sepn. is of special significance for fatigue strength. In fine eutectic form a considerable increase in vibratory strength is obtained, even with welded bars. The skin produced on the surface of castings by melting of quartzite is of little significance for increased static or dynamic strength, but the grain structure of the outer zone is important. Annealing in all cases lowers the fatigue resistance of cast Fe. The effect of welds upon low-C steel was studied. The dynamic strength of the weld was greatly influenced by the dynamic strength of the materials welded. The weld in general has a stiffening effect, and hammered welds increase resistance to fatigue. H. STOERTZ

Building up metals with electric arc welding. K. TEWES. *Giesserei-Ztg.* **27**, 585–9(1930).—In arc welding it is customary to add materials to the electrodes which will improve the quality of the weld. Si and Mn have been widely used to bring about deoxidation of the weld, but Ti appears to be more suitable. It combines energetically with O and materially reduces the quantity of oxides in the weld. The TiO_2 which is formed readily floats to the top and can be removed with the slag. Greater homogeneity of the weld results in improved mech. properties. Ti also tends to form nitrides, Ti_3N, TiN, Ti_2N_2 and Ti_3N_4, which greatly increase the hardness of the steel H. STOERTZ

Soft steel welds deposited by the electric arc. D. ROSENTHAL AND M. MATHIEU. *Compt rend.* **191**, 484–6(1930).—The nature of the weld of soft steel bars produced by the elec. arc depends on the manner in which the molten metal is protected from oxidation. Metallographic examn. shows that welds protected with a covered electrode have more regularly formed grains than non-protected welds. X-ray diagrams show the existence of strains in non-protected welds. E. G. VANDEN BOSCHE

Non-corroding and acid-resisting alloys. BO KALLING. *Tek. Ukeblad* **75**, 101–3 (1928).—A review. C. A. ROBAK

Some properties of protective films on metals. ERNEST S. HEDGES. *Chemistry and Industry* **50**, 21–5(1931).—A review of film properties is given, with special consideration of the work carried out by Evans and by the author. A theory of anodic polarization is offered, according to which OH ions are discharged simultaneously with other anions, such as SO_4 ions for instance, if a certain crit. c. d. is reached and more SO_4 ions are discharged than can be replaced. This has the effect of producing a layer of oxide or basic salt on the surface. The presence of SO_4 ions renders this film non-protective, but it has the effect of raising very greatly the effective c. d. at those areas of the electrode which are uncovered. The consequence will be that in some spots the discharge will consist of OH ions only, which give a perfectly continuous oxide film. The discontinuous film first formed will be thrown off the electrode by the subsequent evolution of O_2. LEOPOLD PESSEL

The mechanism of the suppression of corrosion velocity by colloids. W. BECK AND F. v. HESSERT. *Z. Elektrochem.* **37**, 11–20(1931).—The decrease in corrosion velocity of Fe in H_2O or strong acid solns. is due to the presence of hydrophilic colloids, and is dependent upon the type as well as the concn. of added colloid. The authors suggest the possibility of the formation of coagulation layers upon the surface of the metal, due to the action of the Fe ions upon the negatively charged particles of the hydrophilic colloid. The colloidal materials studied were agar, starch, silicic acid and gelatin, and the metals, "Armco," electrolytic, "carbonyl" and pure Fe. H. STOERTZ

Protection of large steel structures from rust. HENRY E. WEITKAMP. *Het Gas* **50**, 480–4(1930).—A review. B. J. C. VAN DER HORVEN

Initial corrosion rate of steels. H. O. FORREST, B. E. ROETHELI AND R. H. BROWN. *Ind. Eng. Chem.* **22**, 1197–9(1930).—Studies of corrosion rates in distd. water, of oxide-free, low-C, 14% Cr steel and of (18–8) Cr-Ni steels were made during the initial stages of corrosion. After 10 min. the rates for the Cr and Cr-Ni steels became essentially zero, while the rate for C steel decreased but slightly, indicating the formation of invisible, adherent, protective films on the resistant steels. A method for obtaining reproducible results is described. B. B. ROETHELI

Rust-free steels, their properties and preparation. E. HOUDREMONT. *Krupp. Monatsh.* **11**, 270–86(1930).—H. discusses the various types of stainless steels as classified under the headings martensitic, ferritic and austenitic steels. The system Fe–Cr–Ni is studied together with the effect of C upon it. A table is given contg. the range of C, Si, Mn, Cr, Ni, W, Mo and Cu in typical examples of these steels. The prepn. of V2A in a Siemens-Martin furnace and the prepn of a Cr steel by reduction of a Cr ore in a basic furnace are described. Heat treatment, hot and cold working and recrystn. are considered in relation to their effects upon mech. properties. H. S.

Behavior of rustless steel toward dilute sulfuric acid. J. FRITZ. *Krupp. Monatsh.* **11**, 267–9(1930).—Conclusions drawn by various investigators that rustless steel is attacked by H_2SO_4 are incorrect. If practical requirements are adjusted so that the passivity of the rustless steel can be maintained, it is possible to use it in many solns. contg. free H_2SO_4. H. STOERTZ

Influence of a small addition of copper on the corrosion resistance of structural steel. O. BAUER, O. VOGEL AND C. HOLTHAUS. *Mitt. der deut. Materialprüfsanstalt.* Sonderheft **XI** 25 pp.(1930). Extended abstract by V. V. KENDALL in *Metals & Alloys* **1**, 890–5(1930).—The samples covered a range of soft steels, structural steels and 0.25 to 0.35% C steels. The tests were conducted as follows: (*A*) at room temp., (1) in distd. H_2O, (2) in Spree River H_2O, (3) in North Sea H_2O, (4) in humic acid soln., (5) alternating wet and dry in (*a*) 1% NaCl soln. and (*b*) distd. H_2O, (6) in the atm., (7) in 1% H_2SO_4 and (8) in 1% HCl; (*B*) at temp. of 50°, (1) in distd. H_2O, (2) in Spree River H_2O, (3) in North Sea H_2O, (4) in humic acid soln. and (5) in 1% H_2SO_4. Data and graphs are given. A. J. MONACK

Corrosion of metals by phosphoric acid. PETER R. KOSTING AND CONRAD HEINS, JR. *Ind. Eng. Chem.* **23**, 140–50(1931).—Tables are given of corrosion rates of 52 metals and alloys with pure and crude phosphoric acid of various strengths. Notes on passivity and corrosion inhibitors present in H_3PO_4 are added. ANN NICHOLSON HIRD

Furnace for metallographic examination of specimens at high temperatures. B. A. ROGERS. *Metals & Alloys* **2**, 9–12(1931).—The furnace is described. Expts. with the furnace have shown that it is possible to observe marked surface changes upon some elements as these pass through certain allotropic transformations. Observations at a magnification of 50 to 75 diams. were conducted on samples heated above 1500° and at higher magnifications when the temp. did not exceed 1000°. Photographs were taken at magnifications of about 150 diams. for temps. up to 1000°. Ten photomicrographs are given. A. J. MONACK

Investigations on wearing in the Amsler machine. C. J. GUMMAR MALMBERG. *Jernkontorets Ann.* **114**, 572–92(1930).—Ring material for trolleys and railway coaches was used. Aside from the quality of the material, the amount of wear is shown to be dependent on (1) the total load, (2) the local strains, (3) the slippage and (4) the wearing distance. Standardization requires fixation of load (P), diam. (D), r. p. m. (n), and the time (T). In the actual runs, the test cylinders (60 mm. diam.) were turned out of wrought iron, while the whetting cylinders (60–55 mm. diam.) were punched from rolled rods which were not heat treated after the rolling. The diam. of the rolls was essentially of no influence between 35 and 50 mm., with 10% positive slippage, but the wear was only about 25% as great for 50 mm. as for 35 mm., with 170% negative slippage. Increasing C from 0.6 to 0.8% quadrupled the wear, but the min. wear was with 0.90%. The wear also increases with the slippage. Wear on the test cylinder and the whetting cylinder tends to run parallel. The wear decreases with increased Brinell hardness, and the total wear is a min. when the hardness of the test cylinder exceeds that of the other cylinder. Oil-hardened test cylinders wore down the whetting cylinder much more than did water-hardened test cylinders. Structure plays a large part in wearing resistance No great difficulty should be encountered in standardizing dimensions of the test piece, load, slippage, r. p. m. and duration of test. H. C. D.

The relation between the H overvoltage and composition of brass (THOMPSON) **4**. The electrolytic Zn plant of the Evans-Wallower Company at East St. Louis (TAINTON, BOSQUI) **4**. 1930 steel plant electrical developments (KENYON) **4**. An air-thermostat for corrosion research (EVANS) **1**. Annual review number [of *Eng. Mining J.*] (GRANT, *et al.*) **18**. Decorating [metal surfaces] (Brit. pat. 335,788) **19**. Recovering dry palm oil from its admixtures with water [formed by washing palm oil from tin plate] (U. S. pat. 1,790,748) **27**. Rotary kiln for burning ores (U. S. pat. 1,791,282) **20**. Fuel briquets [from ores] (U. S. pat. 1,791,077) **21**.

Aluminum in Aircraft. Pittsburgh: Aluminum Co. of America. 159 pp. 50 cents. Reviewed in *Metals & Alloys* **2**, Book Review Sect., 53(1931).

GROSSMAN, M. A., AND BAIN, E. C.: **High Speed Steel.** New York: John Wiley & Sons. 173 pp. Cloth, $3.50. Reviewed in *Metals and Alloys* **2**, Book Review Sect., 55; *Ind. Eng. Chem.* **23**, 341(1931).

Ingot Contour and Its Relation to Sound Steel. Baltimore: Gathmann Engineering Co. 90 pp. $1. Reviewed in *Metals & Alloys* **2**, Book Review Sect., 53(1931).

Iron and Steel Industry Handbook and Directory. London: Louis Cassier Co., Ltd. 234 pp. 10s. Reviewed in *Metals & Alloys* **2**, Book Review Sect., 54(1931).

Jahresbericht der Abteilung für Metallchemie und Metallashcutz. Reprint from "Jahresbericht VIII." Berlin: Verlag Chemie. 54 pp. Paper, M. 6.40. Reviewed in *Metals & Alloys* **2**, Book Review Sect., 54(1931).

Metal Industry Handbook and Directory. London: Louis Cassier Co., Ltd. 400 pp. Not sold; given to subscribers to *Metal Industry*, London. Reviewed in *Metals & Alloys* **2**, Book Review Sect., 54(1931).

Metallurgie Agenda Dunod, 1931. Paris: Dunod. 497 pp. Cloth, Fr. 23.50. Reviewed in *Metals & Alloys* **2**, Book Review Sect., 54(1931).

SCHUT, W.: **Ferrosilicium.** The Hague: Algemeene Landsdrukkerij. 47 pp.

STERNER-RAINER, LUDWIG: **Die Edelmetall-Legierungen in Industrie und Gewerbe.** Leipzig: Diebener. 154 pp. M. 8.75.

Vanadium ores. ALPHONSE GILDEMEISTER and ÉMILE COMPAGNE. Fr. 692,654, June 24, 1929. Ores of V, particularly vanadates of Pb or other metals, are submitted in the presence of a suitable flux, to a regulated reducing action to obtain the heavy metals in the metallic state and the V in the form of the insol. trioxide.

Treating rare metal silicate ores. CHARLES V. IREDELL (to Westinghouse Lamp Co.) U. S. 1,791,272, Feb. 3. An ore such as zircon is heated with C to a sufficiently high temp. (suitably about 1900–2500°) to convert the Si and rare metal content into carbide compds. which are sepd. by dissolving the Zr carbide with dil. HNO$_3$.

Recovery of precious metals from solutions. H. WÖLBLING. Brit. 335,565, Feb. 2, 1929. Acid solns. contg. precious metals such as chlorides of Pt, Pd, Au or Ag obtained from ores and contg. also base metals such as Cu, Fe or Ni are brought into contact with active C, which adsorbs the precious metal compds. Strongly acid solns. are first dild. or partly neutralized. The adsorbed compds. may be recovered by the action of concd. HCl.

Vacuum and pressure filtration apparatus suitable for metallurgical pulps, etc. JOHN T. SHIMMIN. U. S. 1,791,251, Feb. 3. Structural features.

Preparation of oxide ores for reduction. V. J. J. DEFAYS. Belg. 370,110, June 30, 1930. A gas rich in CO is passed over the ore, heated to a suitable temp. to produce a deposit of C, which facilitates the subsequent reduction.

Zinc blende treatment. SOC. ANON. LA NOUVELLE MONTAGNE. Brit. 335,609, March 9, 1929. Zn blende, either raw or roasted, is sintered under forced draught in admixt. with $ZnSO_4$ in the proportion of about 3 mols. sulfate to 2 mols. sulfide in excess of the amt. of sulfide necessary to ensure combustion and a colloid such as gum or dextrin may also be added. Cf. *C. A.* **24**, 5012.

Metallurgical furnace suitable for heat-treating metal sheets, bars, packs, etc. FRANK A. FAHRENWALD. U. S. 1,791,404, Feb. 3. Horizontal shafts pass through the side walls of the furnace and actuate circular disks and eccentric conveyer rolls.

Supporting frame for metallurgical furnaces. DINGLER'SCHE MASCHINENFABRIK A.-G. Fr. 693,045, Mar. 29, 1930.

Rotary furnace for ore treatments such as roasting or reducing with gases. CARL P. DEBUCH. U. S. 1,791,403, Feb. 3.

Improvement in the construction and operation of blast furnaces. V. J. J. DEFAYS. Belg. 370,336, June 30, 1930. The air is blown into the furnace at a pressure considerably above atm. The direction of the air blasts is varied, either continuously or intermittently by appropriate mounting of the nozzles.

Blast furnace, etc., operation. VULCAN-FEUERUNG A.-G. Ger. 515,315, Sept. 6, 1927. The introduction of water into the combustion zone of blast furnaces, cupolas and other shaft furnaces is effected with the use of a solid, liquid or gaseous auxiliary substance, other than the blast, as a carrier. Coke is specified.

Gas burner for blast-furnace stoves or furnaces. WM. R. PAULSEN (to American Heat Economy Bureau). U. S. 1,791,011, Feb. 3.

Drying air for furnace blasts. GÜNTHER MALYOTH. Ger. 515,216, Oct. 5, 1926.

The air is led over CaC_2. The mixt. of air and C_2H_2 thus obtained may be preheated and supplied as such to the furnace, or the C_2H_2 may be burnt, thereby regenerating one half of the moisture initially present in the air. Cf. *C. A.* **24**, 5013.

Tuyère for cupola furnaces. FRIEDRICH SCHINKE. Ger. 515,239, Mar. 21, 1929.

Bessemer process of making steel. FRANK W. DAVIS (to S. G. Allen Trustee to F. W. Davis). Can. 308,761, Feb. 17, 1931. The Bessemer process of making steel with non-Bessemer pig consists in detg. the net blow heat required and then proportioning the amt. of O to the amt. of inert gases in the blast so as to reduce the heat in the waste to a point which will give the blow heat required.

Casting ingots. T. BRINKMANN. Brit. 335,538, March 8, 1929. Mech. features.

Two-part ingot mold. SIEGFRIED JUNGHANS. Ger. 514,360, Jan. 8, 1929.

Ingot mold and hot-top construction. H. J. DARLINGTON (to W. M. Charman). Brit. 335,480, Dec. 31, 1928.

Apparatus for melting metal waste. HIRSCH, KUPFER- UND MESSINGWERKE A.-G. (Otto Götze, inventor). Ger. 514,442, Jan. 20, 1929.

Rare metals. FANSTEEL PRODUCTS CO., INC. Fr. 693,417, April 5, 1930. Difficultly fusible rare metals, particularly Ta, are freed from C which they contain as impurities by mixing the metal with a convenient amt of an oxide of an element which volatilizes at a temp. lower than the m. p. of the metal, the mixt. being afterward heated under vacuum to a temp. at which the C oxidizes and at which the residue left by the oxide volatilizes. The oxide used may be MgO.

Sheet aluminum. VEREINIGTE SILBERHAMMERWERKE HETZEL & CO. Fr. 693,869, Apr. 14, 1930. Sheet Al which is resistant to corrosion is made by welding into one whole, 2 or more laminated plates of Al and afterward transforming into sheets by rolling.

Tin. SOC. D'ÉLECTROCHIMIE, D'ÉLECTROMÉTALLURGIE ET DES ACIÉRIES ÉLECTRIQUES D'UGINE. Fr 692,640, June 22, 1929. In extg. Sn from its ores, alloys or slags, an auxiliary element contg. a proportion of Si which allows the formation of an Fe silicide unattacked by HCl or by an acid soln. of $SnCl_2$, is added to the initial charge.

Removing lead from metals. DUDZEELE CORP. OF AMERICA. Fr. 692,721. Mar. 25, 1930. Layers of Pb are removed from metal objects by immersing the objects in a warm acid soln. of one or more chlorides, *e. g.*, a soln. of NaCl contg. H_2SO_4 or HCl or a soln. contg. $FeCl_3$ and $NaNO_3$.

Lead containing phosphorus in small proportion. AMERICAN MACHINE & FOUNDRY CO. Brit. 335,545, March 19, 1929. A soldering, metal coating or deoxidized lead is prepd. with a content of P (which may be 0.01–0.03%) predetd. in accord with the rate of oxidation and the O content of the metals with which it is to be used in contact.

Magnetic iron and steel. VEREINIGTE STAHLWERKE A.-G. Fr. 693,602, April 9, 1930. Fe or steel free from magnetic aging and to be used as magnetic material is made by lowering the absorption of O and (or) deoxidizing the steel in known manner.

Cementation of steel. H. J. SCHIFFLER. Ger. 514,479, Mar. 19, 1927. Absorption of C in an amt. above the eutectic ratio is hindered by using steel contg. 0.4–4% of Al.

Rustless steel. GEORG MÜLLER. Fr. 692,887, Mar. 28, 1930. A rustless steel contains Cr 0.1–1, Cu 0.25–0.5, Ni 0.04–0.25 and W 0.01–0.05% and is free from Si. The added metals are introduced in the form of an alloy with Fe contg. Cr 20–30, W 5–6, Ni 6–10, Cu 10–15 and C (present in the form of carbide) 2.5–3%.

Treating surfaces of metals such as iron in order to prevent rusting. EARL K. WALLACE (to Rust Prevention Chemical Co.). U. S. 1,790,960, Feb. 3. The surface is treated with a mixt. formed of pure H_3PO_4 42.5, water 56 and casein 1.5%.

System of magnetic testing to determine properties of railway car wheels, etc. CARL KINSLEY (to Magnetic Analysis Corp.). U. S. 1,790,819, Feb. 3

Alloy. VEREINIGTE STAHLWERKE A.-G. Fr. 692,743, Mar. 25, 1930. Hard alloys of the stellite kind, *i. e.*, having a basis of Co, Cr, W and C with or without Mo, Ni, Fe and Mn, are made by using over 2% of C in the form of graphite

Alloys. CAMILLE CONTAL. Fr. 692,634, June 21, 1929. See Ger. 491,815 (*C. A.* **24**, 2420).

Refractory alloys. SOCIÉTÉ ANON. DES ANCIENS ÉTABLISSEMENTS SKODA A PLZEN. Fr. 693,775, Apr. 11, 1930. Refractory Cr alloys are made by compensating the high C content by the simultaneous addn. of Al and Ti so that the critical points of the alloy are displaced above the max. temp. of use. Thus, an alloy may contain a max. of 40% of Cr, C 3, Al up to 15 and Ti up to 15%.

Refining alloys. I. G. FARBENIND. A.-G. Fr. 693,544, April 8, 1930. Alloys of Mg and Ce are refined by adding dehydrated $CeCl_3$ to the mixt. of salts used in the

refining, whereby any moisture in the salts reacts with the $CeCl_3$ and does not affect the Ce in the alloy.

Aluminum and its alloys. WILHELM NEUMANN. Fr. 692,538, Mar. 21, 1930. Al or its alloys is obtained by the electrothermal reduction of Al_2O_3, clay, kaolin, bauxite, etc., the vapor tension of the Al being lowered by means of substances of high b. p. during the reduction operation. The Al and the added substances are sepd. by a phys. process and a distn. Metals of higher b. p. than Al or Si may be used.

Iron alloy containing copper, silicon and aluminum. BYRAMJI D. SAKLATWALLA. Fr. 693,418, April 5, 1930. See U. S. 1,781,527 (*C. A.* **25**, 66).

Iron-chromium-nickel-tungsten alloys. W. ROSENHAIN and C. H. M. JENKINS. Brit. 335,588, April 23, 1929. Alloys are described which contain over 40% Cr and Ni together (the ratio of the Cr to Ni being between 2:3 and 1:1), together with 1% of C or Si or both. The total Cr and Ni content may be about 50–50% and the W 4–20% or more

Lead alloy. ROBERT J. SHOEMAKER (to S. & T. Metal Co.). U. S. 1,791,148, Feb. 3. A tough, slightly hardened, corrosion-resistant alloy suitable for covering cables, pipes, etc., comprises Pb together with Ni 0.01–0.03, Ca 0.1–0.3, Sn 0.25–0.5 and Al 0.02–0.1%.

Magnesium alloys. I. G. FARBENIND. A.-G. Fr. 693,204, April 2, 1930. The properties of alloys having a high content of Mg are improved by a heat treatment which increases the soly of the materials in the alloy, followed by a cooling strongly retarded by artificial means, particularly in the zone from 300–100°, the duration of the cooling in this zone being at least 3 hrs. Cf. *C. A.* **23**, 678, 1214.

Optical mirrors from metals or their alloys. I. G. FARBENIND. A.-G. Fr. 693,816, April 12, 1930. Metallic mirrors of a high and uniform reflecting power for all wave lengths are formed by one or more layers of different metals or their alloys, which are chosen so that the low reflecting power of one constituent for a certain part of the spectrum is compensated by the high reflecting power of another constituent Ag along with Al, Si or Ni is mentioned as suitable.

Salt baths for annealing metals. W. FREY & Co. Ger. 514,366, Jan. 31, 1930. The baths consist of, or contain, NaCl, K_2SO_4, and Na_2CO_3 (or K_2CO_3) in such amts that the ratio Na:K is less than 1. The baths may contain also borax or Na_3PO_4 up to 6, alk. earth oxides or carbonates up to 10 and $NaNO_3$ 0.1–0.2%. An example given is NaCl 28, K_2SO_4 41.5, K_2CO_3 21, borax 4.5, $MgCO_3$ 2.5 and $CaCO_3$ 2.5%. The baths are particularly intended for objects of noble metals or their alloys.

Method of annealing large metal blocks by electric induction heating. C. LORENZ A.-G. (Wilhelm Fischer, inventor). Ger. 515,013, July 3, 1928.

10 ORGANIC CHEMISTRY

CHAS. A. ROUILLER AND CLARENCE J. WEST

Methane synthesis from carbon monoxide and water vapor. P. PASCAL AND E. BOTOLFSEN. *J. usines gaz* **54**, 467–8(1930); cf. *C. A.* **24**, 5282.—CO and H_2O give quant. yields of CH_4 and CO_2 in the presence of NiO at 250°, and practical yields up to 275°. At higher temps. equil. mixts. of CH_4 and H_2 are formed, until at 750° H_2 is quantitatively obtained. K. H. ENGEL

Properties of conjugated compounds. XI. Addition of hydrogen bromide to β,γ- and α,δ-dimethylbutadiene. ERNEST H. FARMER AND FREDERICK C. B. MARSHALL. *J. Chem. Soc.* 1931, 129–37; cf. *C. A.* **24**, 5284.—The mode of addn. of HBr to β,γ-dimethylbutadiene (I) has been studied by Bergmann (*C. A.* **17**, 1420) and by Claisen (*C. A.* **17**, 1619); B. states that I yields a stable α,δ-compd., $Me_2CBrCMe:CH_2$ (II), with 1 mol. HBr, while C. concludes that, although an unstable II is intermediately formed, the stable product is the α,δ-compd., $Me_2C:CMeCH_2Br$ (III). The chem evidence obtained in this study by the degradation of a no. of distd. and undistd specimens of the addn. product of HBr to I points unmistakably to the fact that the primarily formed product (even when addn. is effected at —20° in the absence of excess of HBr) is III; it also appears to be the sole product, although the complete absence of very small proportions of II could not be asserted. The α,δ-isomer gives a mixt. of $MeCH_2CHBrCH:CHMe$ (IV) and $MeCH_2CH:CHCHMeBr$ (V), as shown by conversion into the glycols and mono- and dibasic acids. The 3rd isomer was absent, showing that α,β-addn. takes place in only 1 of 2 possible ways The ratio of IV to V in the reaction product, as shown by the ratio of AcOH to $EtCO_2H$ formed, is approx.

90:10; this figure agrees roughly with the highest estimate of the proportion of AcH produced by ozonolysis of the hydrobromide. It is clear that the manner in which the alkylbutadienes add HBr varies, as it does for other sym. and unsym. addenda, with the position of substituent groups in the unsatd. chain. At present there is nothing to indicate the order of events in the 2-fold process of addendum-attachment and addendum-partition. C. J. WEST

Mercaptan chemistry. WILLIAM M. MALISOFF, ERNEST M. MARKS AND FRED G. HESS. *Chem. Reviews* **7**, 493–547(1930).—A crit. presentation and discussion of the SH compds. under the following headings: (1) phys. characteristics, (2) chem. characteristics, (3) methods of prepn. and purification, (4) detection and detn., (5) special interest attaching to the substances, (6) research problems. Approx. 600 references are given. G. TOENNIES

Nitrosites and nitrosates. LYDIA MONTI. *Gazz. chim. ital.* **60**, 787 97(1930).—The present paper deals with the prepn. of new nitrosates and nitrosites of octylene (I), diisobutylene (II) and hexadecylene (III), the formation of addn. products between these hydrocarbons and N_2O_4 and the decompn. of the nitrosates and nitrosites by heating in an inert gas. The literature describes only the nitrosates and nitrosites of the lowest members of the olefin hydrocarbons up to amylene (cf. Yegorov, *C. A.* **7**, 1477; Wallach, *C. A.* **9**, 1458). Following the usual method of prepn., the final products from I, II and III are yellow oils with the odor of fatty acids, and in certain cases the acids were identified. This formation of acid is attributed to the direct oxidizing action of N_2O_4 or to decompn. with autoxidation which nitrosates and nitrosites (formed at first) undergo spontaneously at room temp (cf. Schaarschmidt and Hoffmeier, *C. A.* **19**, 2634). The expts. prove that addn. products are formed. The gases evolved in the decompn. of the nitrosates and nitrosites contained in all cases N, NO and CO_2 and no othe gases in any appreciable quantity (cf. Schaarschmidt and Hoffmeier, *loc. cit.*, Sommer, *Ber.* **29**, 357(1896)). The formation of N and CO_2 indicates autoxidation and destruction of the mol. The quant. results are of special interest, for though the components are always the same, the proportions of the gases vary greatly One of the chief aims in the investigation is to develop a reliable *method for distinguishing nitrosates from nitrosites.* I was prepd. by refluxing *sec*-octyl iodide (100 g.) with alc. NaOH (25 g. in 500 cc.) for 10–2 hrs., pouring into a large vol. of water, drying the sepd. oil with $CaCl_2$, rectifying and recovering the 121–3° fraction. II was prepd. by the method of Butlerow (*Ann.* **189**, 44(1877)) and III by the method of Bertholet and Péan. In numerous expts. nitrous vapors (from As_2O_3 and HNO_3 of d 1.38) were bubbled through solns. of III in Et_2O or AcOH (6–10 parts of solvent). The liquid became green, but only under certain conditions in AcOH was a cryst. *compd.*, m. 66 7°, obtained in too small quantity to be analyzed. When the solvents were evapd. at room temp., thick yellow-green oils were obtained, and these dissolved in Et_2O, washed with 5 6% aq. Na_2CO_3, the alk. ext acidified with dil. HCl, extd. with Et_2O, the ext. evapd., the residual oil crystd. by cooling, dissolved in 95% EtOH, neutralized with alc. NaOH (phenolphthalein), alc. $AgNO_3$ added, warmed, filtered, the residue washed with EtOH, dissolved in NH_4OH, evapd., the ppt. washed and dried *in vacuo*, yields *Ag pentadecylate*. When the crude oil is let stand several months $(CO_2H)_2$ is deposited (Schaarschmidt has obtained $(CO_2H)_2$ by the slow action of N_2O_4 on satd. aliphatic hydrocarbons: cf. *Z. angew. Chem.* **37**, 938(1924); cf. *C. A.* **18**, 2138). Similar results were obtained by treating cold liquid N_2O_4 by attempting to prep. the addn. product with $AmNO_2$ and HNO_3, by treating III in an inert solvent with $NaNO_2$ and H_2SO_4, and by absorbing N_2O_4 in III under slight pressure at room temp. I and II also gave similar results. The oil from I contained fatty acids, but no Ag salt in a pure enough form to be analyzed was obtained. Here, too, $(CO_2H)_2$ was formed on long standing. With II a thick blue liquid was obtained. Thus, dil. H_2SO_4 (7 cc. concd. H_2SO_4 in 40 cc. water) added to II (8 g.) in ligroin (40 cc.), made ice cold, aq. $NaNO_2$ (10 g. in 20 cc.) added dropwise, the aq. part removed, the ligroin soln. evapd. *in vacuo* over CaO and paraffin, yields a blue liquid which after 8–10 days becomes a greenish yellow thick oil. Treating this oil in the same way as that from III, a *Ag salt* contg. 59.8% Ag was obtained, probably a mixt. of salts. Similar blue liquids were obtained from I and III. The d. of these products is over 1, they do not react with water and they give the Liebermann reaction. They are also formed by bubbling nitrous vapors (from As_2O_3 and HNO_3 of d. 1.38) into ice-cold I, II or III without solvent, stopping the reaction when the liquid has become dark blue, washing the product with water and sepg. by difference in d. The stability of the products varies with the nature of the hydrocarbon. That from II is the most stable, and the color lasts for several days. That from III is [illegible]

after a few hrs. The mol. wt. of the product from II was 179.2, which agrees fairly well with that for the nitrosite $C_8H_{16}O_3N_2$. The formation of addn. products was also proved by detn. of the quantity of N_2O_4 by II at room temp. Quant. data on the absorption of N_2O_4 by I, II and III at room temp. show in all 3 cases absorption which corresponds fairly closely with the addn. of 1 mol. of hydrocarbon with 1 mol. of N_2O_4. That true addn. products are formed is proved by mol.-wt. detns. Thus the mol. wt. of the product from III was 304 (316 calcd. for $C_{16}H_{32}N_2O_4$). A study was then made of the decompn. of *nitrosites and nitrosates*, for which purpose amylene nitrosate (IV) and the isomers styrene α-nitrosite (V) and styrene β-nitrosite (VI) were chosen, for these can be obtained in a very pure form. Further expts. will deal with other analogous compds. IV was prepd. by the method of Wallach (cf. *Ann.* **241**, 292(1887)) and V and VI by the methods of Wieland (cf. *Ber.* **36**, 2559(1903)). The *app.* for their decompn., which is described in detail and illustrated, allows heating of the nitrosate or nitrosite in the dry state in a current of inert gas (CO_2 or N). IV was thus heated at 90–5°, V at 100–25° and VI at 125–35°. In all 3 cases, N, NO and H_2O were evolved, and in no case was any appreciable quantity of a higher oxide of N, of O or of a combustible gas detected. CO_2 was evolved in considerable quantity. The following data give the % N (by wt.) evolved, the % NO evolved, the % total N evolved and the ratio: % N evolved/% N in compd., resp., for IV, V and VI: IV, 5.84, 2.50, 7.00, 0.405; V, 3.28, 6.93, 6.51, 0.418; VI, 4.04, 4.85, 6.30, 0.405. These results show that, although the components in the gaseous decompn. products are in all cases the same, the % compn. varies with the starting substance. In each case, the % N evolved in gaseous form (N + NO) is around 40% of the total N in IV, V or VI. The remaining 60% of solid decompn. products is composed of NO_2 compds., nitriles, etc.

C. C. Davis

Attempted preparation of methanetetrasulfonic acid. Frederic B. Kipping *J. Chem. Soc.* **1931**, 222–3. $I_2C(SO_3K)_2$ and K_2SO_3 in H_2O heated 4–5 hrs. give K methionate. $AcNH_2$ and H_2SO_4 (65 or 30% SO_3) at various temps. give $CH(SO_3K)_3$; with 10% SO_3 below 170–80° only AcOK could be isolated but at 210° K methionate was obtained in a poor yield.

C. J. West

Changes in properties of chemical compounds by complex formation. VI. Methylation of alcohols by diazomethane. Hans Meerwein and Gerhard Hinz *Ann* **484**, 1–25(1931). cf. *C. A.* **23**, 4189.—Aliphatically bound HO groups, as far as is known, do not react with CH_2N_2 (I). The following results were obtained with 0.5% EtOH-I at 0° (cc. N_2 in 1 min.): EtOH, 0.3; PrOH, 0.1; iso-PrOH, 0.18; BuOH, 0.18. Sufficient BuOH does not react with I in 30 hrs. to make the method useful for the prepn. of the ether. Since it would appear that an activation of the HO group might be brought about by complex formation or by the introduction of a polar or easily polarized group in the neighborhood of the HO group, a study of the latter possibility was undertaken. The following results indicate that this is the case and that the alcs. studied were more or less easily methylated by I. In general, the reaction was carried out by passing the I directly into the alc. Ethers retard the methylation in all cases and for this reason the reaction does not go to completion, the resulting ether preventing further methylation. $PhCH_2OH$ gives about 13% of the Me ether. $(CH_2OH)_2$ and its mono-Me ether scarcely react with I. $HOCH_2CH_2OAc$ in EtOH gives a mixt. of AcOEt, $HOCH_2CH_2OMe$, $MeOCH_2CH_2OAc$ and $(CH_2OH)_2$. Without a solvent the yield of the Me ether was about 12%; AcOMe(?) was also formed, although no explanation of its formation can be given. α-Monoacetin gives 25% of the *mono-Me ether*, b_{18} 126–9°, and some di-Me ether, b_{18} 100–10°. $(CH_2)_2O$ (30 g.) and 42 g. Cl_3CCO_2H give 15 g. of *trichloroacetylglycol* (II), b_{12} 130–40°; with I 12 g. II gives 5 g. of the *Me ether*, $Cl_3CC(OCH_2)_2OMe$, m. 77–8°, which is not changed by boiling H_2O or *N* NaOH but splits off Cl_3CCO_2H with 0.25 *N* HNO_3. $ClCH_2CH_2OH$ (15 g.) gives 8 g. of the Me ether, m. 91°. $ClCH_2CH(OH)CH_2OH$ (30 g.) gives 2.5 g. of the *Me ether*, b. 171–2°, d_0^4 1.1832, and 2.3 g. of the di-Me ether; with twice the amt. of I there results 2 and 12 g., resp. $(CH_2Cl)_2CHOH$ (30 g.) gives 26 g. of the Me ether, b. 159.5–61.5°. $HOCH_2CH_2CN$ and I react vigorously, giving in addn. to the *Me ether* (III), b. 162–4°, basic compds. with a C_5H_5N odor. MeO detns. indicate a 52% yield of III, although but 25% could be obtained pure. There was also isolated a *compd.*, $C_4H_7ON_3$, as the *HCl salt*. MeCH(OH)CN gives about 20% of the *Me ether*, b. 113–5°, d_4^{20} 0.8942, n_D^{20} 1.3825. Me_2CO, MeEtCO and $Me_2C.O.CH_2$. $AcCH_2OH$ gives only a small amt. of the Me ether, the principal product (50–60%) being $EtCOCH_2OH$. $BzCH_2OH$ behaves in a similar manner, giving *phenylacetylcarbinol*, bu

140–5°. With 20 g. $HOCH_2CH_2Cl$ as a catalyst, 20 g. PrOH and 8 g. I give 5 g. PrOMe and 5.6 g. $MeOCH_2CH_2Cl$. BuOH (20 g.), 10 g. $(ClCH_2)_2CHOH$ and 7 g. I give 3.2 g. BuOMe and 7 g. $(ClCH_2)_2CHOMe$. BuOH (10 g.), 7 g. Cl_3CCH_2OH and 5 g. I give 2.3 g. BuOMe and 4.8 g. Cl_3CCH_2OMe. Ten g. of a 5% BuOH-$ZnCl_2$ soln. and 2.2 g. I give 2.9 g. BuOMe; 20 g. of a 3.8% soln. of $FeCl_3$ in BuOH and 7 g. I give 6.1 g. BuOMe; 20 g. of a soln. of $MgCl_2$ in BuOH give 5 g. BuOMe. A 5% soln. of $Al(OEt)_3$ in BuOH and I give 83% of BuOMe; iso-PrOH gives 77% iso-PrOMe. $B(OEt)_3$ in EtOH (15 g. of 5% soln.) and I give 13 g. EtOMe; 0.69 g. $B(OMe)_3$ and 13.8 g. PrOH with 6 g. I give 4.1 g. PrOMe; iso-PrOH and BuOH are not methylated in the presence of B esters. $Sb(OBu)_3$ and BuOH give 73% of BuOMe; iso-PrOH scarcely reacts with I in the presence of $(iso\text{-}PrO)_3Sb$. C. J. West

Some aliphatic compounds of arsenic. W. J. Cecil Dyke, Gwyn Davies and Wm. J. Jones. *J. Chem. Soc.* **1931**, 185–8.—Pr_3As b_{17} 84°, b_{27} 92°, b_{79} 113°, which consts. are related by the equation $\log_{10} p = 3215/(t + 273)$. Exposed to the air, the arsine gradually deposits the oxide, also prepd. by shaking the arsine with HgO or the dibromide with Ag_2O. *Tributylarsine oxide*, pasty crystals, and the *Am deriv.* were thus prepd. *Tripropyl-* and *triisobutylarsine sulfides* crystallize as long needles Pr_3AsBr_2 and Ag_2SO_4 in EtOH give *tripropylarsine sulfate*, m. 84°. *Dichlorides* result from the arsine and Cl in CCl_4; *tri-Pr deriv.*, m. 84°, *tri-Bu deriv.*, m. 40°; *tri-iso-Bu deriv.*, m. 130°; *tri-Am deriv.*, sweet smelling liquid. The *dibromides*, prepd. similarly, are highly hygroscopic; Br is expelled by Cl, HNO_3 or H_2SO_4, *tri-Pr deriv.*, m. 95°; *tri-Bu deriv.*, m. 55°; *tri-iso-Bu deriv.*, m. 135°, *tri-Am deriv.*, liquid. The *diiodides* are formed in light petroleum, they become brown on exposure to the air; *tri-Pr deriv.*, m. about 130°, *tri-Bu deriv.*, m. 124°; *tri-iso-Bu deriv.*, m. 117–9°. $HgCl_2$ gives compds. of the general formula $R_3As.HgCl_2$, which may be recrystd. from EtOH; *tri-Pr deriv.*, m. 106°; *tri-Bu deriv.*, m. 70°; *tri-iso-Bu deriv.*, m. 158°. The arsines and MeI in Et_2O give methiodides; *methyltriethylarsonium iodide*, m. 270°; *tri-Pr deriv.*, m. 204°, *tri-iso-Bu deriv.*, m. 254°; in less pure condition were prepd. the *tri-Bu* and *tri-Am derivs.*, also *ethyltributylarsonium iodide*, m. about 107°. *Methyltripropylarsonium chloroplatinate*, m. 219° (decompn.); *tri-iso-Bu deriv.*, orange, m. 224° (decompn.); *tri-Am deriv.*, orange, m. 114°. The arsine methiodides and CdI_2 give the arsonium cadmi-iodides, best crystd. from EtOH; *methyltriethylarsonium cadmi-iodide*, $2MeEt_3AsI.CdI_2$, m. 283°, *tri-Pr deriv.*, m. 279°; *tri-Bu deriv.*, m. 100°; *tri-iso-Bu deriv.*, m. 138°. *Methyltripropylarsonium mercurichloride*, $MePr_3AsCl.HgCl_2$, m. 141°. *Methyltriethylarsonium mercuriiodide*, m. 61°, *tri-Pr deriv.*, m. 90°, *tri-Bu deriv.*, m. 76°; *tri-iso-Bu deriv.*, m. 117°. C. J. West

Parachor and chemical constitution. XVI. Silicon compounds. Samuel Sugden and Henry Wilkins. *J. Chem. Soc.* **1931**, 126–8; cf. *C. A.* **24**, 2651.—$Si(OMe)_4$, b_{759} 121·2° (all b. p. cor.), d_4^{23} 1.032, γ^{18} 24.98, parachor (*P*) 330.9, d_4^t 1.067 − 0.00155*t*. $Si(OEt)_4$, b_{756} 165.3–5.8°, d_4^{17} 0.933, d_4^t = 0.957 − 0.00135*t*, $\gamma^{16.5}$ 22.21, *P* 487.6. $SiEt_4$, for which a method of prepn. is given, b_{754} 153°, d_4^{12} 0.7563, d_4^t = 0.7818 − 0.000791*t*, γ^{12} 23.69, *P* 412.1. $SiPr_4$, b_{751} 213.5°, $d_4^{24.5}$ 0.7809, d_4^t 0.7990 − 0.0007272*t*, γ^{14} 24.65, *P* 565.3. $SiPh_4$, m. 234°, $d_4^{251.5}$ 0.937, d_4^t 0.983 − 0.000883 (*t* − 200), γ^{245} 23.70, *P* 787.5. The mean atomic *P* for Si is 27.8. Various values are given for d. and γ for these compds. C. J. West

Preparation of fatty acids. R. Lukeš. *Chem Listy* **24**, 197–200·1930).—A general method of synthesis of fatty acids from alcs. contg. 4 C atoms less than the desired acid is as follows: The alc. is converted into the alkyl bromide, and this is combined with Mg to yield the corresponding Grignard reagent, which reacts with *N*-methylsuccinimide to yield a 1-methyl-5-alkylpyrrol-2-one. This on hydrolysis yields a γ-keto acid possessing 4 C atoms more than the original alc., and this on electrolytic reduction yields the corresponding fatty acid. Hexoic, heptoic, octoic, nonoic and decoic acids have been prepd. in this way. The following hitherto unknown intermediate products are described: *1-methyl-5-amylpyrrol-2-one*, b_{10} 143–8°; *1-methyl-5-hexylpyrrol-2-one*, b_{10} 148–50°; *γ-ketononoic acid*, m. 69°; and *γ-ketodecoic acid*, m. 70–1°. B. C. A.

The mechanism of the decomposition of alkaline chlorohydrins. Lennart Smith. *Z. physik. Chem.*, Abt. A, **152**, 153–6(1931).—Doubt that this reaction is not monomol. seems not to have been well founded, for S., by using pure samples, has obtained good consts. for $(CH_2OH)_2$ and $Me(CH_2OH)_2$. V. F. Harrington

Formins of glycerol. P. A. Dubois. *Thesis.* Paris, 1929; *J. pharm. chim.* [8],**12**, 478–9(1930).—The objective was a rational and practical method of prepg. *allyl alc.* (I). Summary: (1) The mechanism of the formation of I, starting from HCO_2H and glycerol, is different from that when $(CO_2H)_2$ is used. (2) The esterification of

glycerol by HCO_2H leads principally to the formation of diesters. (3) HCO_2H seems to act more easily on the secondary alc. function of glycerol since the esters which predominate among the isomers of the same degree in the reaction mixt., are 2-monoformin and 1,2-diformin. (4) When esterification is pushed to the diformin stage, a yield of 70% I is easily obtained. S. WALDBOTT

A new form of the two antipodal rhamnitols. F. VALENTIN. *Collection Czechoslov. Chem. Comm.* 2, 689–95(1930).—Hydrated sugar alcs. having definite compn. and enantiomorphic cryst. forms have been prepd. for the first time. *l*-Rhamnitol formed by reduction of ordinary rhamnose with 3% Na-Hg and crystd. slowly from dil. H_2O soln. forms the trihydrate (I), m. 69°, $[\alpha]_D$ 8.83°. The H_2O of crystn. was detd. by drying at 100° *in vacuo*. Crystals of *d*-rhamnitol trihydrate (II), m. 69°, $[\alpha]_D$ −8.89°, were obtained similarly from *d*-rhamnose (see *C. A.* **25**, 84). I is rhombic, $a:b:c$, 0.9947:1:1.1750. The measured angle between the optic axes for Na light is 82.75°. The indices of refraction are α_{Na} (calcd.) 1.44, β_{Na} 1.492, γ_{Na} 1.505. The axial ratios and optical properties of II are the same JANET E. AUSTIN

Dipentaerythritol. WALTER FRIEDERICH AND WILHELM BRÜN. *Ber.* **63B**, 2681–90 (1930).—According to Ger. pat. 390,622, pentaerythritol (I) is prepd. by adding to AcH and 4 mols. HCHO in dil. aq. soln. at 15° 1 equiv. alkali or alk. earth hydroxide in the course of 1 hr. and slowly raising the temp. to 45° during the next hr. The m. p. of the crude product obtained by evapg. the reaction mixt. is raised to about 240° by crystn. from H_2O but again falls on further crystn. It was concluded that I is accompanied by an impurity which is less sol. in H_2O. This by-product has now been shown to be the ether, *dipentaerythritol*, $O[CH_2C(CH_2OH)_3]_2$ (II). Since the I and II cannot be sepd. by crystn., the crude product was nitrated and the nitrates sepd. through their different soly. in Me_2CO. Treatment of the nitration product with Me_2CO leaves undissolved almost pure I tetranitrate (III), the last traces of which are pptd. by cautious addn. of H_2O to the Me_2CO soln. This produces 2 layers: a H_2O-Me_2CO mixt. contg. a little II *hexanitrate* (IV), and a satd. soln. of almost pure IV in Me_2CO and a little H_2O. The latter stirred into 8–10 vols. alc. yields first a yellowish brown sirup and then white crystals, and the sirup, repptd. from Me_2CO with alc., gives a pure white product which is recrystd. from alc. *in vacuo*. The IV cannot be sapond. with alc. KOH because of the oxidizing action of the resulting KNO_3 on the II, but hydrolysis was effected with Zn and HCl or, better, with cryst. Na_2S in boiling Me_2CO-EtOH. The II (yield, 89%), m. 221°, mol. wt. in boiling H_2O 250, d_{15} 1.366, soly. in 100 parts H_2O 0.12 and 11.64 at 15° and 100°, in alc. 0.067 and 0.33 at 20° and the b. p., resp. Perfectly pure I, whose prepn. is to be described elsewhere, cannot be obtained by recrystn.; a prepn. which no longer gives the fuchsin-SO_2 test for II (see below) m. 260°; the m.-p. curve of mixts. with II falls steeply to a min at about 190° with 30% II and shows that an I m. 235°, which for practical purposes may be considered pure, contains 10% II. Radulescu's statement that the by-product m. 220° obtained in the prepn. of I can be converted into pure I, m. 254°, by treatment with alc. was not confirmed; the m. p of pure II was not changed in the slightest by several crystns. from alc. IV (95.7% from II slowly added to cold HNO_3 (d. 1.52) and treated with $^2/_3$ vol. concd. H_2SO_4), m. 75°, d_{15} 1.630 (cryst.), 1.617 (fused), mol wt. in freezing C_6H_6 522; the f.-p. curve of mixts. with III (m. 141°) is almost a straight line with no min. or max. *Hexaformate*, from II refluxed in concd. HCO_2H and fumed down twice with HCO_2H at 120°, yellow, m. 56°. *Hexaacetate*, from II, Ac_2O and NaOAc, heated under a reflux until a violent reaction sets in (yield, 54.8%), m. 73°, mol. wt. in C_6H_6 514. *Hexabenzoate*, from II, BzCl and NaOH below 40° (83.5% yield), m. 183°. *Hexatrityl ether* (97.3% from II and Ph_3CCl in C_5H_5N at 100°), m. 173°, decompd. by atm. moisture and completely hydrolyzed by boiling H_2O. Attempts to increase the yield of II by the use of other alk. condensing agents (KOH, $Ba(OH)_2$, $Pb(OH)_2$, $Zn(OH)_2$, Na_2CO_3) were unsuccessful; boiling for days with NaOH, $Ca(OH)_2$, HCO_2Na, $(HCO_2)_2Ca$, did not change the m. p. of pure I; fusion of I with K_2CO_3 yielded a brown resin contg. no II or other cryst. product. No II was formed when I was heated at 300° under a steam-jacketed head which permitted the H_2O to distil off and condensed the higher-boiling vapors back into the flask, nor when the I was heated at 300° in a sealed tube with 0.25 part H_2O. Pentaerythrose, condensed with AcH and HCHO in the most varied proportions, gave only ordinary crude I and in poorer yield than the method described above. The mixt. of glyceric aldehyde and $CO(CH_2OH)_2$ formed by oxidation of glycerol yielded no cryst. products. $MeCH:CHCHO$ with 8 mols. HCHO and 1 equiv. CaO gave I, m. 248–52°, in 64% yield as detd. by conversion into III. $CH_2:CHCHO$ with 3 mols. HCHO and 0.5 mol. $Ca(OH)_2$ gave 63.4% I. Expts. with AcH, 0.5 mol. $Ca(OH)_2$ and varying amts. (1–8 mols.)

of HCHO showed that the purest I (m. 258°) is obtained (in 73.5% yield) with 5 mols. HCHO and that the most favorable condition for the formation of II is 3 mols. HCHO; the I thus obtained m. 221° and contains 15% II. The compn. of II is established by the results of analyses and mol.-wt. detns. on II, its acetate and nitrate, the presence of 6 HO groups by Bz and Ac detns. on the benzoate and acetate, that 3 HO groups are present as CH_2OH by the formation of the trityl ether, and that II has a structure similar to I by the decompn. of the formate at 270° into CO and II. As regards the union of the two I residues and the 7th O atom, II does not add Br and hence contains no unsatd. union; it does not reduce Fehling soln., indicating the absence of a CHO group; it does not react with $PhNHNH_2$ and is not reduced by Al-Hg; it cannot be a formal, as it does not deposit C with concd. HI. That it is an anhydride derived from 2 mols. I is shown by the fact that when treated with HNO_3 (d. 1.13) it reddens fuchsin-SO_2 and gives the same white insol. oxidation product, yielding $O(CH_2CH:NNHPh)_2$, m. 109°, which Tollens and Wigand had obtained in the same way from I. This oxidation product dissolves on long heating with 20% H_2SO_4 and yields a phenylhydrazone m. 123°, which, from its compn., is apparently the pure $O(CH_2CH:NNHPh)_2$. The oxidation product is therefore a polymer of $O(CH_2CHO)_2$. When *very carefully purified* I, m. 260°, is oxidized in the same way it does not redden fuchsin-SO_2 and forms no insol. product. $O(CH_2CHO)_2$, with the characteristic grouping $>CH_2.O.CH_2<$, is therefore formed only from II. This oxidation with HNO_3 and reaction with fuchsin-SO_2 also affords a convenient means of testing I for purity. Attempts to rupture the ether union in II with HBr or HI (d. 1.7) gave, even in sealed tubes, only a sirup, but with HI, P and a little Ac_2O was obtained a small amt. of needles, m. 106–7°, whose I content corresponded to that calcd. for the *diiodohydrin* of II. HI (d. 2.0), P and Ac_2O at 140° gave *pentaglycerol triiodide*, $MeC(CH_2I)_3$, m. 154° (yield, 50%), hydrolyzed by $N_2H_4.H_2O$ at 140° in an Fe pressure tube to $MeC(CH_2OH)_3$. C. A. R.

Purity and polymorphous transformation of pentaerythritol. L. EBERT. *Ber.* **64B**, 114–9(1931); cf. preceding abstr.—Repeated recrystn. of pentaerythritol (I) from different solvents does not free it from considerable quantities of a stubbornly adhering impurity. E. found that the best method of purification is very careful sublimation at 130° in a high vacuum. Sublimation for several days gave transparent cryst. deposits, some contg. clear, thin leaflets. These leaflets gave the highest values for the m. p., 259° (uncor.) and 260.5° (cor.). E. concludes that all previous work on I has probably been done with impure material. Some of the best crystals were studied in polarized light and were found to be uniaxial; others were optically homogeneous, but weakly biaxial. This contradiction needs explanation. At 179.5–180° tetragonal I, which shows double refraction, is transformed into a cubic modification which does not show double refraction. The transformation is reversible. (The changes undergone by I are described by E. in detail.) The cooling curve of I shows a small break at the m. p. and a marked break at the transformation point. The av. value for this latter point was found to be 179.5°. The heat of transformation is 3–4 times as large as the heat of fusion, which is so small that small quantities of impurities cause large depressions of the m. p. Impurities have practically no effect on the transformation point. LOUISE KELLEY

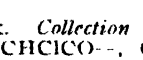
Propylenebisthioglycolic acid and propylenebissulfonacetic acid. J. A. REUTER-SKIÖLD. *J. prakt. Chem.* **129**, 121–8(1931).—$MeCHBrCH_2Br$ and Na_2S in EtOH at 40° give the mercaptan, which reacts with $ClCH_2CO_2H$ in NaOH at 0° to give *propylenebisthioglycolic acid* (I), m. 32–5°, very hygroscopic, purified through the *Cu salt*, light green needles, crystg. with 1 mol. H_2O; in CO_2 Cu_2O gives the salt $C_{14}H_{22}O_8S_4Cu$; *dianilide*. A partial resolution into optical antipodes was effected by crystn. of the neutral brucine or strychnine salt from H_2O. Oxidation of I with $KMnO_4$ gives *propylenebissulfonacetic acid*, m. 185–6°, decompd. by alkali to *2-propene-3-sulfonacetic acid*, isolated as the *Na salt;* the free acid could not be obtained pure. Bromination of the Na salt gives *hexabromodimethyl sulfone*, $(Br_3C)_2SO_2$, m. 131–2.5°. C. J. WEST

Preparation of prolylalanine and prolylpeptides. MAX FRANKEL AND SONJA KUE. *Biochem. Z.* **226**, 221–32(1930).—Detailed directions are given for the prepn. of allyl alc. in quantity and its conversion successively into allyl and trimethylene bromides. The latter is condensed with $NaCH(CO_2Et)_2$ and the product brominated and hydrolyzed to *α,δ-dibromovaleric acid*, m. 172–4°. PCl_5 converts this acid to its acid chloride, which is condensed with *dl*-alanine and the product treated with NH_3 to give prolylalanine. R. CHESTER ROBERTS

A new synthesis of serine. SUSIL K. MITRA. *J. Indian Chem. Soc.* **7**, 799–802 (1930).—A synthesis by Gabriel's method is described, followed by hydrolysis with

concd. HBr at 48°, or hot alc. KOH. To the cooled Na salt from 20 g. $C_6H_4(CO)_2NCH(CO_2Et)_2$ and 1.6 g. Na in Et_2O with the addn. of some EtOH, 9 g. of $ClCH_2OMe$ in 20 cc. Et_2O was added dropwise over a period of 2 hrs., giving 60% of *di-Et methoxymethylphthalimidomalonate*, $C_6H_4(CO)_2N(CH_2OMe)C(CO_2Et)_2$ (I), m. 127°. Ten g. of I and 50 cc. of HBr (d. 1.8), heated, in a sealed tube for 2 hrs., gave the free *acid* (II), m. 102°, in 50% yield. On heating 5 g. of II with 15 cc. of fuming HCl in a sealed tube on a water bath for 9 hrs., filtering off the $C_6H_4(COOH)_2$ formed, and extg. with Et_2O, an aq. soln. was produced which on concn. gave *serine·HCl* (III); yield 50%. III treated with moist Ag_2O gave free *serine*, m. 246°; *phenyl cyanate deriv.* m. 159°. The alk. hydrolysis of I with alc. KOH gave a K salt, $C_{13}H_{10}O_8NK_3$, which on acidification evolved CO_2, forming an oil, hydrolyzed by fuming HCl to III (55% yield)

C. R. Addinall

Osazone-forming groups. E Votoček. *Collection Czechoslov. Chem. Comm.* **2**, 681–8(1930).—The groups CH_2ClCO-, $-CHClCO-$, $CHCl_2CO-$, $-COCH_2NH_2$, $-COCH(NH_2)C-$, $-C(:NOH)C(:NOH)-$ and other N compds. formed from dicarboxyls form osazones. No oxidation of  occurs, the hydrazone being formed. CH_2ClCHO heated with 3 mols. $PhNHNH_2$ (I) in 96% EtOH in the presence of anhyd. AcOH forms *glyoxal phenylhydrazone* (II), m. 170°; $CH_2ClCOMe$ and $PhNH·NH_2AcOH$ (III) in H_2O soln. yield *methylglyoxal phenylosazone* (IV), m. 144–5°; $MeCHClCOEt$ with 3 mols. I in EtOH gave *acetylpropionyl phenylosazone* m. 164–5°; $CHCl_2CHO$ and I in abs. alc. form II; $CHCl_2COMe$ in alc with 2 mols. III and excess NaOAc forms IV. $[MeC(:NOH)]_2$, heated with HOAc, H_2O and 2 mols. of I, yields *diacetyl phenylhydrazone*, m. 240–1°; glucose semicarbazone, $PhNHNH_2$ HCl and NaOAc form ordinary glucosazone, m. 210°. Contrary to Neuberg's rule that secondary aromatic hydrazines easily furnish osazones with the group $-CCOCH_2OH$ and not with $CCH(OH)CHO$, it was found that in certain cases the secondary alc. group is easily oxidized. Thus, *diacetyl methylphenylosazone*, m. 96–7°, is formed by the action of $PhNMeNH_2$ HOAc on freshly distd. $MeCH(OH)COMe$ (V) in H_2O in CO_2 atm. or on Ac_2 (VI), and *diacetyl benzylphenylosazone*, m. 110–1°, by the action of $PhCH_2NPhNH_2$ on V in HOAc and H_2O or VI in alc. V with Ph_2NNH_2 H_2O and HOAc forms *diacetyl diphenylosazone*, m. 187°. J. E. A.

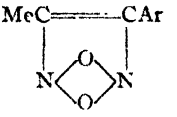
Dioximes. LXVIII. I De Paolini. *Gazz. chim. ital.* **60**, 700–4(1930); cf. *C. A.* **25**, 955.—In an earlier paper (Note LIX, *C. A.* **24**, 1632) it was shown that from $HOC(:NOH)C(:NOH)CO_2H$ (I) and Br is obtained a compd. (II) which is also formed from $HC(:NOH)C(:NOH)OH$ (III) and Br. A further study of the general behavior of hydroxamic acids ($RC(:NOH)OH$) which are hydrolyzed by Br to the corresponding RCO_2H acids (cf. Note XL, *C. A.* **21**, 1100) suggested that II may be formed by the action of Br on $HC(:NOH)CO_2H$ (IV) which is formed either thus: III + H_2O ⟶ IV + NH_2OH, or thus: I + H_2O ⟶ IV + NH_2OH + CO_2. By similar reasoning, II should be the final product of the reaction of $C(:NOH)[C(:NOH)OH]_2$ (V) and Br and of $HO_2C(:NOH)CO_2H$ (VI) and Br, which are both theoretically transformable into IV, thus: V VI Expts. confirm these concepts for by the action of Br on V, on I, on VI, on $HC(:NOH)C(:NOH)C(:NOH)OH$ and on IV, II is always formed. Its compn. and behavior indicate that II is *carbonyl bromide oxime* $Br_2C(:NOH)$. In all cases it is probably formed by the subsequent action of Br and IV, thus. IV + 4Br ⟶ II + 2HBr + CO_2, and the highest yield and the purest form of II is obtained directly from IV. II is most readily obtainable of any simple deriv. of C:NOH (VII), for it may be obtained directly: VII + 2Br ⟶ II, which also confirms its structure. IV is best prepd. by a method already described (cf. Note XLIV, *C. A.* **22**, 577). The best way to prep. II is to add Br water to ice-cold aq. IV, ext. with Et_2O, recrystallize from petr. ether and dry *in vacuo*. It then m. 70–1° (first softening). Heated with 20% HCl, II forms NH_2OH. Heated with $FeCl_3$, aq. II gives a red color and with $Cu(OAc)_2$ a green color, probably as a result of the formation of a $RC(:NOH)OH$ acid. With $NaNO_2$ and NaOH, II gives a red color, indicative of the formation of a nitrolic acid by substitution of a Br by a NO_2 group. With NH_4OH and then $FeCl_3$, II gives a violet-red color, probably a result of the substitution of Br by the NHOH group. Ice-cold aq. C:NONa, acidified with H_2SO_4, treated with an excess of Br-water, let stand several days, extd. with Et_2O, and the ext. evapd., gives a very small yield of impure II. The impurities were not

identified. Concd. aq. $Hg(NO_3)_2$ added to cold aq. II, steam-distd. and the distillate again steam-distd., yields dibromofuroxan, also formed from Br and $(C:NO)_2Hg$ by the Kekulé reaction (cf. Wieland, *Sammlung Chem.-Tech. Vorträge* **14**, 429(1909)). **LXIX.** G. Ponzio. *Ibid* 825 32.—The present paper shows that the behavior toward HCl in Et_2O of the 2 forms of some glyoximes does not agree with the structural configurations which would be assigned to them by the theory of Hantzsch and Werner. The majority of aromatic aldoximes exist in 2 forms, one of which can be isomerized to the other by HCl in Et_2O (cf. Porter, *Monograph on Molecular Rearrangements*, p. 34), whereas only a very few glyoximes have 2 or more forms. The present paper describes 2 more cases of the latter isomerism. Though there are too few expts. on the isomerism of glyoximes to warrant any general conclusions, some authors have attempted to extend to glyoximes the distinction made by Hantzsch for monoximes, *viz.*, that there are forms stable toward acids and forms stable toward bases. This has led to the alleged discovery of glyoxime forms which do not exist. P. has already shown the insufficiency of the Hantzsch theory, and in the present paper only the exptl. results of the action of HCl on the particular glyoximes and their behavior with Ni and $Ni(OAc)_2$ are given. They were transformed into the complex $Ni(DH)_2$ (where DH is the univalent residue after removal of a H atom from an oximino group of the glyoxime DH_2), both by Ni in the presence of water and by Ni^{++} ions in dil. AcOH. In conjunction with the expts. of earlier workers, the results show that HCl in Et_2O isomerizes a form (1) of benzil dioxime which does not give a $Ni(DH)_2$ complex to a form which does give this Ni complex; (2) of chloroglyoxime which does not give a $Ni(DH)_2$ complex to another form which likewise does not give the complex; (3) of phenylglyoxime which gives a $Ni(DH)_2$ complex to a form which does not give the complex, (4) of *p*-tolylglyoxime which does not give a $Ni(DH)_2$ complex to a form which does give the complex and (5) of *p*-tolylglyoxime which gives the $Ni(DH)_2$ complex to a form which does not give the complex. Even without taking into account the contradictions which arise from the configurations of the 2 forms of the glyoximes assigned in the past, and even assuming according to Hantzsch and Werner that the forms which give $Ni(DH)_2$ salts are always *anti*-forms and that the forms which do not give $Ni(DH)_2$ salts are *amphi*- or *syn*-forms, nevertheless the behavior of the different forms of 1 glyoxime cannot be explained by different spatial positions of the oximic OH group. HCl acts in some cases in the same way, and in other cases in different ways, on forms which must have the same configuration, and with α- and β-*p*-tolylglyoxime, which must have different configurations, HCl isomerizes the α-form to the β form and the β-form to the α-form. Dry HCl passed into ice-cold α-phenylglyoxime (I) in anhyd Et_2O, the ppt. washed with Et_2O and dried rapidly *in vacuo*, yields 100% of the *HCl salt* (II) of I, loses completely its HCl when kept in air or in a dry vacuum. I or II, dissolved in dil. NaOH, acidified with AcOH (or treated with NH_4Cl), and the ppt. recrystd. from EtOH, yields purified I, m. 168 72° (slight decompn.). The variability in the m. p. results from the fact that the heating causes its isomerization to β-phenylglyoxime (III), m. 180°. This isomerization begins at 160° or higher and is always accompanied by some decompn. When prepd. directly by oximation of $BzC(:NOH)H$ (IV) (cf. Note LVII, *C. A.* **24**, 845) without passing through II, I has the same properties, and when freed of III by treatment with $Ni(OAc)_2$ in AcOH and when crystd from EtOH, AcMe, $CHCl_3$, dil. EtOH or water, it m. 168-76° (slight decompn.). It may be concluded, therefore, that by the action of heat I isomerizes, even in the solid state, at 160 80° to III, so that it is impossible to assign to I a definite m. p. More on this subject is to be published later. Dry HCl passed into ice-cold III in anhyd. Et_2O until satd., let stand, the ppt. washed with Et_2O and dried rapidly *in vacuo*, yields II, from which, by the method already described, I (free of III) may be obtained. Taking into account the yield of the reaction, it must be concluded that HCl in Et_2O quantitatively isomerizes III into I, a reaction never before observed, and which represents the 1st case of an isomerization of a form which gives the $Ni(DH)_2$ complex to a form which does not give this complex. By utilizing the behavior of I and III toward HCl in Et_2O, extremely pure I can readily be obtained from mixts. of I and III, without having to resort to the elimination of III by means of the $Ni(DH)_2$ complex. It is only necessary to dissolve the product in anhyd. Et_2O and then to pass into the soln. a current of dry HCl. All the III isomerizes to I, which with that already in the mixt. ppts. as II. When further expts. now in progress are completed, the structure of I and II will be discussed, but for the present they cannot be regarded as geometrical isomers; in fact, by the hypothesis of a different spatial position of the oximic OH group it is impossible to explain why only I forms a HCl salt and crystallizes unaltered by cooling its boiling soln. in 6 *N*

NHOH, and why only aq. III attacks Ni, Co, Cu and Fe (cf. Note VI, *C. A.* **17**, 2268), or, in other words, why I has a basic function in which an oximic N atom becomes quinquevalent and III an acid function toward metals of the 8th group. The method of *prepn. of* I *and* III already described (cf. Note VI, *C. A.* **17**, 2268) should be modified as follows: Aq. $HONH_3Cl$ (5.3 g.) and aq. AcONa (11.8 g. in 15 cc.), added to hot alc. V (10 g. in 20 cc.), kept at 60–80° for 12 hrs. (p_H is 5.2–5.4), cooled, the ppt. (6.2 g. of a mixt. of 95% I and 5% III) dissolved in anhyd. Et_2O, made ice-cold, dry HCl passed through the soln., and the ppt. treated with dil. Na_2CO_3, yield 6 g. of pure **I.** The mother liquor, concd. to the point of crystn., yields on cooling 4 g. of a mixt. of 75% of III and 25% of I. The mixt. dissolved in boiling 50% EtOH, glacial AcOH added, excess hot 20% $Ni(OAc)_2$ added, the ppt. washed with EtOH, decompd. with HCl and extd. with Et_2O, yields 2.8 g. of **III.** To isolate the I which remains in the AcOH soln. from which the Ni complex of III seps., the soln. is made basic with NH_4OH, the ppt. is treated with dil. H_2SO_4 and extd. with Et_2O. This yields 1.2 g. of slightly colored **I.** Avogadro (cf. Notes XIII and XLII, *C. A.* **18**, 661; **21**, 1976) has prepd. α- and β-*p*-tolylglyoximes (V and VI, resp.). Dry HCl passed into V in ice-cold anhyd. Et_2O, does not ppt. a HCl salt, but 40% of V isomerizes to VI, and the latter is readily isolated as the Ni complex, $Ni(C_9H_9O_2N_2)_2$. Following the same procedure with VI, 60% of VI isomerizes to V. To isolate the V, the product is washed with Na_2CO_3, the solvent eliminated, the residue dissolved in boiling 50% EtOH, a little glacial AcOH added, excess $Ni(OAc)_2$ then added, the ppt. (Ni complex of VI) removed, the filtrate made alk. with NH_4OH, the ppt. treated with dil. H_2SO_4 and finally extd. with Et_2O. V apparently m. 170–1°, but it has no true m. p. since by the action of heat it isomerizes to VI. **LXX.** *Ibid* 886–93.—A better method for the *prepn. of* PhC(:NOH)-C(:NOH)Cl (I) than that previously described (Note VI, *C. A.* **17**, 2268; Note XXIV, *C. A.* **20**, 746) is to dissolve α- or β-phenylglyoxime (or their mixt. from the oximation of PhCOCH:NOH) in a min. of 98–9% AcOH, cool, pass into the soln. a slight excess of Cl, wash the ppt. with AcOH and dry at 70–80°. It m. 199–200°. I and BzCl (calcd. quantity), heated 1 hr. on a boiling water bath and the product recrystd. from $CHCl_3$, yields *2-benzoylphenylchloroglyoxime*, PhC(:NOBz)C(:NOH)Cl (II), m. 177–8° (slight decompn.), does not form an Ac deriv. with Ac_2O at room temp. II and excess BzCl, heated for a long time at 100° or boiled for a few min., ligroin added and the ppt. recrystd. from EtOH, yield *dibenzoylphenylchloroglyoxime* (III), m. 148–9°. III, dissolved in warm alc. NH_3, the solvent eliminated, the residue dissolved in dil. HCl, cryst. AcONa added and the ppt. recrystd. from water, yields β-phenylaminoglyoxime (IV) (cf. Note VI, *C. A.* **17**, 2268). II in Et_2O, agitated with a slight excess of 6 *N* NH_4OH for a short time, and the ppt. recrystd. from EtOH, yields *2-benzoyl-α-phenylaminoglyoxime*, PhC(:NOBz)C(:NOH)NH_2 (V), m. 171–2° (slight decompn.), insol. in cold dil. NaOH; in EtOH with $FeCl_3$ it gives a light violet-brown color which disappears when dild. with water. V, heated gently with 20% NaOH and a little EtOH, dild. with water and the ppt. recrystd. from water or very dil. EtOH, yields phenylaminofurazan (cf. Note X, *C. A.* **17**, 3875). The alk. mother liquor, neutralized with CO_2, extd. with Et_2O, the ext. evapd. and the residue recrystd. from a mixt. of Et_2O and petr. ether, yields α-phenylaminoglyoxime (VI) (cf. Note VI, *C. A.* **17**, 2268). Alc. II and a slight excess of $PhNH_2$, heated to boiling, dild. with water, acidified with dil. HCl, filtered (the residue is $BzNH_2$), NaOAc added to the filtrate and the ppt. recrystd. from $CHCl_3$, yield α-phenylaminophenylglyoxime (cf. Note VIII, *C. A.* **18**, 661). In the cold, $PhNH_2$ does not react with II. Cold IV, Ac_2O and fused AcONa yield, after crystn. of the product from EtOH, *2-benzoyl-N-acetyl-α-phenylaminoglyoxime*, PhC(:NOBz)C(:NOH)NHAc (VII), m. 190–1° (slight decompn.). That the Ac group is united with the amino N and not to the oximino O is shown by the fact that when VII is heated gently with 20% NaOH and a little EtOH phenylaminofurazan and its Ac deriv. are obtained. In conjunction with earlier expts. (cf. Notes XXXVII, LXIV and LXV, *C. A.* **21**, 1099; **25**, 79, 80), the present expts. show that when BzCl acts at 100° on chloroglyoximes, RC(:NOH)C(:NOH)Cl, where R is H, Me or Ph, the oximino H farthest from the Cl is first replaced by Bz, giving the RC(:NOBz)-C(:NOH)Cl, with which in turn excess BzCl forms RC(:NOBz)C(:NOBz)Cl. The constitution of V corresponds to VI, *i. e.*, it is a deriv. of a form of VI which in the free state is to be regarded as a labile form which is easily isomerized by fusion or by heating in dil. AcOH into IV, a stable form. Since I is transformed by NH_3 into IV, which is not isomerized by NH_3 to VI, in the benzoylation at 100° of I a 2-Bz deriv. is obtained of a form of I incapable of existing in the free state. This bears the same relation to the only known form of I as does VI to IV. HCl can isomerize 1 form of glyoxime to the other form (cf. Note LXIX, preceding abstract), so it is not impossible that a

similar reaction takes place in benzoylation with BzCl at 100°. Observations in the past on the behavior of acyl derivs. obtained from MeC(:NOH)C(:NOH)OH, PhC(:NOH)C(:NOH)OH, HC(:NOH)C(:NOH)Cl and HC(:NOH)C(:NOH)NH_2 have shown, however, that in many cases the acylation of glyoximes proceeds in an abnormal way, even aside from an isomerizing action of HCl. Accordingly, when 1 oximino H atom or both atoms in a glyoxime are replaced by 1 or 2 acyl groups, it is never certain that the acyl derivs. will be of the same form as that of the original compd., even if these acyl derivs. form again on hydrolysis the original form. Acylation is much less simple than is generally assumed, and the Hantzsch and Werner theory is wholly inadequate to explain the phenomena (cf. Notes LXIV and LXVI, *C. A.* **25**, 79, 80). On the assumption (based on the theory of Hantzsch and Werner) that glyoximes which form $Ni(DH)_2$ complexes have *anti*-configurations, and that the Cl of the C(:NOH)Cl group can become ionic only if it is in the *syn*-position to the oxime OH group, in the benzoylation at 100° of phenylchloroglyoxime with BzCl, the HCl liberated should bring about a spatial transposition and the passage from the *anti*- to the *amphi*-configuration: PhC(HON)—CCl(NOH) BzCl → PhC(NOBz)—CNH$_2$(NOH). Moreover, since II and NH_3 form V, phenylaminoglyoxime and its 2-Bz deriv. should be *amphi*-compds.: PhC(NOH)—CNH$_2$(NOH) → PhC(NOBz)—CNH$_2$(NOH). Because of the formation of III from II and of IV in turn from III, and since IV forms the $Ni(DH)_2$ complex and is (according to the Hantzsch and Werner theory) an anti-form PhC(HON)—CNH$_2$(NOH), HCl should under the same conditions bring about a spatial transposition: PhC(NOBz)—CCl(NOH) BzCl → PhC(BzON)—CCl(NOBz) opposite to the preceding transposition (in the 1st case the hydroximino OH group passes from the *syn*- to the *anti*-position with respect to Ph, and in the 2nd case the same OH returns from the *anti*- to the *syn*-position). The simplest explanation is that the NOH group in 1 glyoxime can (whatever the neighboring radical) assume 2 different structures, depending upon the reagent, *i. e.*, glyoximes react either as if they contained 2 NOH groups or as if they contained only 1 NOH group. In this way, it is easy to explain why phenylchloroglyoxime from VI and IV forms a di-Ac and di-Bz deriv., whereas VI, II and V cannot be acetylated in the NOH group in 1-position. LXXI. G. Ponzio and G. Longo. *Ibid* 893–9.—Expts. by earlier investigators on the action of EtMgI on the diphenyl peroxide and methylanisyl peroxide (I) (cf. Wieland and Semper, *C. A.* **2**, 1012), of PhMgBr on the methylpiperyl peroxide (II) (cf. Angeli, *C. A.* **11**, 794) and of MeMgI on II and of PhMgBr on I (cf. Bigiavi, *C. A.* **16**, 1394) showed the varying behavior of these peroxides and, furthermore, did not give any indication of the existence of the isomers of methylaryl peroxides $Me(C_2N_2O_3)Ar$ recently described by P. (cf. Notes L, LI, LIV, LX, LXI and LXII, *C. A.* **23**, 375, 3665; **24**, 363, 1633, 3488, 3774). It was therefore of interest to ascertain whether these new peroxides behave differently toward the Grignard reagent than do their isomers. Since the isomeric methylaryl peroxides are readily transformed to the other form by the action of heat, the reaction was in every case carried out at room temp. for a very short time instead of prolonged heating in C_6H_6. The expts. in the present paper confirm the indications of the earlier work, that the methylaryl peroxides with the higher m. ps. are furoxans, MeC:N(:O).O.N:CAr, and those with the lower m. ps. are dioxdiazines, MeC:N.O.O.N:CAr. Because peroxides are relatively inactive, an extremely active reagent, *viz.*, MeMgI was used instead of PhMgBr, particularly since the latter also gave rise to secondary products. MeMgI was found to be much more active than EtMgI. With furoxans, MeMgI liberated 1 N atom as NH_3, leaving the other N atom as an ArCN compd., while with dioxdiazines both N atoms are detached and liberated as NH_3. The C atom of the furoxans which is united to Me and to the quinquevalent N atom combines with the Me of MeMgI with formation of AcMe, while with dioxdiazines both C atoms which are united to tervalent N atoms combine with the Me of MeMgI with formation of AcMe and a Me ketone. The fact that in furoxans the 2 N atoms behave differently, whereas in dioxdiazines they have an

identical behavior, agrees with the existence in furoxans of both ter- and quinquevalent N and in dioxdiazines of 2 tervalent N atoms, and shows that the $C_2N_2O_2$ group of furoxans has an asym. structure and that of dioxdiazines a sym. structure. Besides confirming the structures of furoxans and dioxdiazines shown above, *i. e.*, of the isomeric methylaryl peroxides, the expts. exclude the possibility that the peroxide with the lower m. p. can be the furoxan $MeC(:N.O.N(:O):CAr)$. The latter would behave like the other furazan $PhC(:N(:O).N:CAr)$, and yield with the Grignard reagent MeCN, which in numerous expts. could not be obtained, either as such or as its hydrolysis product AcOH, by the use of MeMgI, EtMgI or PhMgBr. The reaction between methylaryl peroxides and the Grignard reagent is difficult to interpret. If MeMgI attaches to an ethylenic double bond and thus brings about its rupture, the 2 isomeric peroxides have the same structure:



like that proposed by Green and Rowe for *o*-quinone dioxime peroxides (cf. *C. A.* **7**, 3119; **8**, 1412). This structure may, however, be that of the peroxides with the lower m. ps. which have been regarded as dioxdiazines $MeC(:N.O.O.N:CAr)$. With triphenylisoxazoline oxide, MeMgI adds to the $-C=N=O$ group (cf. Green and Rowe, *loc. cit.*) and then with water forms a compd in which the bond between C and N still exists. The same is true of the methylaryl peroxides with the high m. ps. (furoxans), but is not true of those with the lower m. ps. The latter do not, therefore, have this structure, *i. e.*, are not furoxans. *Exptl.*—Methylphenylfuroxan (5.5 g.), added cautiously to MeMgI in Et_2O (from 21 g. MeI, 250 g. Et_2O (distd. over Na) and 3.4 g. Mg), let stand after the reaction has subsided, the Et_2O evapd., ice-water added, steam-distd. and the distillate collected in dil. HCl, yields insol. PhCN. The latter is removed, and the mother liquor, boiled, yields AcMe in the distillate, while the dry residue is NH_4Cl. Under the same conditions methyl-*p*-bromophenylfuroxan yields *p* BrC_6H_4CN, AcMe and NH_3, and 4-methyl-5-*p*-bromophenyl 1,2,3,6-dioxdiazine (III) yields *p*-BrC_6H_4Ac, AcMe and NH_3. Crystd. from hot EtOH, III m. 92.3° (cf. 89.9° of earlier expts., Note L, *C. A.* **23**, 375). Similarly, methyl-*p*-methoxyphenylfuroxan (IV) and MeMgI yield *p*-$MeOC_6H_4CN$ (V), AcMe and NH_3. With EtMgI, IV reacts only with difficulty, with formation of V, MeCOEt and NH_3. 4-Methyl-5 *p*-methoxyphenyl-1,2,3,6-dioxdiazine (VI) and MeMgI form *p*-$MeOC_6H_4Ac$, AcMe and NH_3. With EtMgI, VI reacts only with difficulty, with formation of *p*-$MeOC_6H_4COEt$, MeCOEt and NH_3. Methyl[3,4-dihydroxyphenyl]furoxan methylene ether and MeMgI yield piperonylic nitrile, AcMe and NH_3. 4-Methyl-5-[3,4-dihydroxyphenyl]-1,2,3,6-dioxdiazine methylene ether and MeMgI yield 3,4-$CH_2O_2C_6H_3COMe$ (acetopiperone), AcMe and NH_3. **LXXII.** E. Durio and M. Bissi. *Ibid* 899–903.—In the oxidation of α-benzil dioxime (I) with alk. $K_4Fe(CN)_6$, Auwers and Meyer (cf. *Ber.* **21**, 806 (1888)) obtained the diphenyl peroxide $Ph(C_2N_2O_2)Ph$ (II) and a secondary product $C_{28}H_{20}O_2N_2$ (III). III has never been described since, yet its formation may be of importance in explaining the dehydrogenation of glyoximes to the so-called peroxides. The present paper shows that III is formed from the α- but not from the β-form of I, and describes the conditions which lead to a much higher yield than the extremely small yield by the procedure of Auwers and Meyers. Aq. 15% $K_4Fe(CN)_6$ (30 g.) added dropwise to I (10 g.) in 10% KOH (200 cc.), keeping ice-cold, the ppt. purified by boiling in EtOH and recrystg. the residue from glacial AcOH, yields 25–30% of the *compd.* $C_{28}H_{20}O_2N_2.2AcOH$; in air it loses slowly at room temp. and rapidly at 100° its AcOH of crystn., leaving III, which was proved to be *dioxotetraphenylpyrazine* $O:N:CPh.CPh:N(:O).CPh:CPh$. It is yellow, m. 322°, gives an intense red soln. in concd. H_2SO_4 (from which it is repptd. by water), is not altered by heating with HCl (d. 1.19) at 160–70° in a sealed tube. Traces of III are also formed by the oxidation of I with NaClO (cf. Note LXI, *C. A.* **24**, 3488). III (5 g.) in glacial AcOH and Zn dust (3 g.), heated several min. on a boiling water bath, filtered and the filtrate cooled, ppts. 3.5 g. of tetraphenylpyrazine (IV). After sepn. of IV, the mother liquor, made alk.

with NaOH and steam-distd., yields a small quantity of tetraphenylpiperazine. III and PCl_5 (equal parts), heated at 140–50°, yield a brown liquid which treated with water solidifies, and crystd. from glacial AcOH, yields *chlorotetraphenylpyrazine* (V), m. 212°, gives an intense red soln. in concd. H_2SO_4. This reaction is similar to that of furoxans under the same conditions (cf. Notes L and LVI, *C. A.* **23**, 375; **24**, 845), *i. e.*, III is first deoxygenated to IV, which then reacts with Cl with formation of V. The formation simultaneously of II and III from I proves that $K_4Fe(CN)_6$ acts on I in 2 distinct ways: (1) simple dehydrogenation which forms II, and (2) a more complex reaction which involves the elimination as HNO_2 of 2 H atoms and 2 NOH groups from 2 mols. of I, thus: $21 + 2O \longrightarrow III + 2HNO_2 + H_2O$. Since under the same conditions β- and α-benzil dioxime (VI and VII) form exclusively II, both NOH groups of VI and VII are dehydrogenated by oxidizing agents, whereas in I, 1 NOH group is dehydrogenated and the other is oxidized, *i. e.*, toward oxidizing agents the NOH groups of VI and VII behave the same and those of I differently. This behavior is analogous to that with Ni^{++} ions, where of the 3 benzil dioximes only I forms the complex Ni-$(C_{14}H_{11}O_2N_2)_2$ by substitution of 1 oximic H atom. The reduction of III by nascent H or PCl_5 to IV shows the presence of 2 extra-nuclear O atoms, confirms the formula

given and excludes the formula: O.O N CPh:CPh N.CPh:CPh. The reactions described in the present paper as well as those already known of glyoximes show that it is impossible to generalize, *e. g.*, α-*p*-tolil dioxime and anisil dioxime, which have many properties in common with I, yield on oxidation with $K_4Fe(CN)_6$ no trace of III.

C. C. DAVIS

Aminomalonic ester. Action of alkyl iodides and bromides on diethylsodioaminomalonate. R. LOCQUIN AND V. CERCHEZ. *Bull. soc. chim.* [4], **47**, 1377–80 (1930).—This is an introductory paper stating that $NH_2CNa(CO_2Et)_2$ reacts with alkyl iodides and bromides to give $RC(NH_2)(CO_2Et)_2$ in 50% yield. These substances are basic; they form cryst. compds. with KOCN and PhNCO. Previous work on $NH_2CH(CO_2Et)_2$ is reviewed.

I. M. LEVINE

Some alkylaminomalonic esters and their immediate derivatives. V. CERCHEZ. *Bull. soc. chim.* [4], **47**, 1381–5(1930).—By the action of 1 mol. of iso-C_4H_9I on 1 mol. of $NH_2CNa(CO_2Et)_2$ either in alc. or in iso-$C_5H_{11}OMe$ there was obtained 50% of *di-Et α aminoisobutylmalonate* (I), $C_4H_9C(CO_2Et)_2NH_2$, b_{14} 136°, n_D^{15} 1.4371, d_4^{15} 1.0109, M. R. 59.93 (calcd. 59.75). Treated with KCNO in AcOH I gave the corresponding *urea*, $C_4H_9C(CO_2Et)_2NHCONH_2$, m. 194°, and with PhCNO in Et_2O the *phenylurea*, $C_4H_9C(CO_2Et)_2NHCONHPh$, m. 128°, in 70% yield. On mixing 2 g. of I with 8 g. of water satd. with NH_3 at 0°, together with a few drops of EtOH and shaking vigorously, the *diamide*, $C_4H_9C(CONH_2)_2NH_2$, m. 153°, was formed on 24 hrs. standing. *Di-Et aminoallylmalonate* (II), $CH_2{:}CHCH_2C(CO_2Et)_2NH_2$, was prepd. from $CH_2{:}CHCH_2Br$ and $NH_2CNa(CO_2Et)_2$. II, b_{17} 134–5°, n_D^{23} 1.4442, d_4^{23} 1.039, M. R. 55.00 (calcd. 54.67); *urea*, m. 173.4°; *phenylurea*, m. 113°. Attempts to make *di-Et aminobenzylmalonate*, $PhCH_2C(CO_2Et)_2NH_2$, resulted in noncryst. oils, decompg. on heating, which gave with KCNO the *urea*, m. 234°, and with NH_4OH the *diamide*, m. 156°.

C. R. ADDINALL

Preparation of α-amino acids by hydrolysis of alkylaminomalonic esters. R. LOCQUIN AND V. CERCHEZ. *Bull. soc. chim.* [4], **47**, 1386–9(1930).—Alkylaminomalonic esters are hydrolyzed either by means of superheated steam at 150° in an autoclave or by refluxing with 10% HCl, to yield α-amino acids, CO_2 and ROH. The use of steam is preferable unless the resulting acid is insol. in H_2O. $NH_2CH_2CO_2H$ (I) (9.5 g. from 25 g. of $NH_2CH(CO_2Et)_2$), leucine, $PhCH_2CH(NH_2)CO_2H$ and $CH_2{:}CHCH_2CH(NH_2)CO_2H$ were obtained in this way. In the prepn. of I, the compd. I.*HCl*, m. 185°, was isolated.

I. M. LEVINE

The structure of some organic molecules. O. HASSEL AND E. NAESHAGEN. *Tids. Kemi Bergvesen* **10**, 126–7(1930); cf. *C. A.* **24**, 2346.—A preliminary notice concerning work on dipole moments, and discussing in this connection *meso*- and *dl*-forms. Racemic and active dichlorosuccinic acids gave almost identical values for the dipole moment (2.93×10^{-18}), the *meso*-form gave lower values (2.47×10^{-18}). β-Hexachlorocyclohexane (*trans*) has a center of symmetry, and dipole moment 0, while α-hexachlorocyclohexane (*cis*) has dipole moment 2.20×10^{-18} e.s.u.

G. R. YOHE

Preparation of bromoacetyl sugars and of acetoglucals. P. A. LEVENE AND ALBERT RAYMOND. *J. Biol. Chem.* **90**, 247–50(1931).—The prepn. of $BrCH_2CO$ derivs. of sugars can be greatly simplified by dissolving the reaction product resulting from the

action of HBr and Ac_2O on the sugar or of HBr in AcOH on the pentaacetate in C_7H_8, concg. the soln. at 40–50° under reduced pressure and renewing the C_7H_8 until all the excess reagents are removed. The $BrCH_2CO$ deriv. generally crystallizes directly in the distg. flask. The procedure in the prepn. of acetoglucals is also much simplified by the use of C_7H_8; it forms an azeotropic mixt. with the AcOH used as a solvent when treating the bromoacetylsugar with Zn dust. A. P. LOTHROP

Crystalline α- and β-methyl *d*-gulosides. HORACE S. ISBELL. *Proc. Nat. Acad. Sci.* **16**, 699–703(1930); cf. *C. A.* **25**, 1223.—Although a sirup of Me gulosides prepd. by condensation of the pure sugar with MeOH in the presence of 1% HCl could not be crystd. directly, the isomeric gulosides were sepd. by means of their cryst. addn. compds. with $CaCl_2$. By removal of $CaCl_2$ with $(CO_3Ag)_2$, the pure cryst. Me gulosides were prepd. and their parent $CaCl_2$ compds. reprepd. as a check on their original purity. The new compds. described are *α-Me d-guloside.*$CaCl_2.2H_2O$, $[\alpha]_D^{20}$ 67°, [M] 22,900; (*α-Me d-guloside*)$_2.CaCl_2.3H_2O$, $[\alpha]_D^{20}$ 83°, [M] 23,000; *α-Me d-guloside.*H_2O, decomps. 77°, $[\alpha]_D^{20}$ 109°, [M] 23,100; *β-Me d-guloside.*$CaCl_2.2H_2O$, m. 155°, moderately sol. in abs. alc., $[\alpha]_D^{20}$ —46°, [M] —15,640; (*β-Me d-guloside*)$_2.CaCl_2$, very slightly sol. in abs. alc., $[\alpha]_D^{20}$ —65°, [M] —16,200; *β-Me d-guloside*, m. 176° (uncor.) $[\alpha]_D^{20}$ —83°, [M] —16,100. The mol. rotations of all the α-forms are in good agreement with one another as are those of the three β-forms. The difference between the mol. rotations of the α- and the β-gulosides is 39,200 which compares favorably with the normal value 37,000. R. C. HOCKETT

β-Lactose. JOHN GORTON. *Svensk Farm. Tids.* **34**, 665–7(1930).—Lactose (100 g.) dissolved in 60 cc. H_2O over a free flame and set aside at 105° to crystallize gave 90% of β-lactose with $[\alpha]_D$ 39°, changing to 53.6° in 3 hrs. The $[\alpha]_D$ of the original lactose was 83.7°. The β-soln. when made alk. with NH_3 gave $[\alpha]_D$ 55.2° and the α, 52.7°. A. R. ROSE

Recent syntheses in the sugar group. AMÉ PICTET. *Atti III congresso naz. chim. pura applicata* **1930**, 36–41.—A brief review is given of the efforts to synthesize sugar with special emphasis on the methods involving condensation of the anhydrosugars and on the synthesis of sucrose. By heating starch with glycerol, 2 series of anhydrides (hexa-, tri- and diglucosans) are obtained which may be considered as polymers of glucosan. The 1st series of compds. is unaffected by I and the last member is an anhydride of maltose. The members of the other series are colored by I and the simplest is an anhydride of isomaltose. The members of the 1st series polymerize readily under the influence of light, giving substances colored by I. The triglucosan of the 2nd series in concd. aq. soln. protected from light, in time deposits a colloidal substance colored violet by I which is strikingly analogous to starch itself. Its acetate shows by f.-p. methods that it must be a dodecaglucosan, $(C_6H_{10}O_5)_{12}$. R. C. H.

Inulin. X. H. PRINGSHEIM, J. REILLY, W. G. HENSEL, W. BURMEISTER, P. P. DONOVAN AND MISS N. HAYES. *Ber.* **63B**, 2636–42(1930); cf. *C. A.* **24**, 3996.—Berner (*C. A.* **24**, 5730) has criticized the observation that inulin dissolves in liquid NH_3, fused $AcNH_2$ and (as its acetate) in AcOH with a mol. wt. corresponding to a difructose anhydride, and that by heat disaggregation and boiling of its acetate with $PhSO_3H$, as well as by soln. in $AcNH_2$, it is converted into an inulan of the same mol. wt. B ascribes the depressions observed to impurities, such as H_2O or alc. in the inulin and $AcNH_2$ in the inulan. The authors have shown by the CHI_3 reaction that the inulin they used was alc.-free and that the 10% of H_2O in the air-dried product is generally given off in 0.5 hr. at 78° *in vacuo* over P_2O_5. The inulan on distn. from alk. soln. gave no more color with Nessler reagent than did distd. H_2O. The mol.-wt. detns. were repeated independently at Berlin and Cork with due regard to these sources of error and the results confirmed by measurements in purified $HCONH_2$. Observing the precautions specified by Freudenberg (*C. A.* **24**, 1846), values corresponding to 2 × $C_6H_{10}O_5$ were in most cases obtained for inulin in both $HCONH_2$ and $AcNH_2$, although double this value was obtained in 2 cases; whether this was due to previous treatment in the prepn. and purification or to the fact that natural inulin, as believed by Schlubach, is not a homogeneous substance remains to be tested. The inulan in H_2O soln., when sufficiently dil., again gave values corresponding to the 2 × C_6-stage. Drying has some influence on its original H_2O-soly. but even after especially vigorous drying at 110° it showed, after soln. in hot H_2O, a mol. wt. (387) not very much higher than 2 × 162. Schlubach and Elsner and Jackson and Goergen have observed that a small amt. of glucose is formed along with the fructose in the acid hydrolysis of inulin. The present authors also observed, by differential titration according to Bertrand on the one hand and Willstätter-Schudel on the other, an aldose content higher than could be accounted

for by exptl. error (Cu:I, 100:7.0–9.4). Expts. on pure fructose under the conditions of the Willstätter titration showed that it is attacked to the extent of about 2.8%, the aldose content in the acid hydrolyzate of inulin thus being reduced to about 5%. Taking this titration error into account, no glucose could be found in the inulinase hydrolyzate, thus confirming Bourquelot and Bridel. This, however, does not prove that inulin contains no glucose, for the max. of hexose obtained by the ferment hydrolysis, as detd. with Fehling soln., was only 90% even after weeks and months.
C. A. R.

Methylated tri- and tetra-saccharides from cellulose and starch. KARL FREUDENBERG AND KARL FRIEDRICH. *Naturwissenschaften* **18**, 1114(1930).—Recently cryst. decamethyl-β-methylcellotrioside, $b_{0.08}$ 216–20°, was prepd. by acetolysis and methylation of cellulose (*C. A.* **25**, 85). The cellobiose deriv., b. 60° lower, is also obtained by the same distn. The methyltetrose $b_{0.1}$ 265–75° and is also obtained in crystals with all the properties of a tridecamethyl-β-methylcellotetroside. Both compds. crystallize easily in water or petr. ether even when the MeO content is 1–2% too low. Repeated methylation of the cryst. prepn. gives an analytically correct and uniform product with the expected mol. wt. in camphor. The methylated trisaccharide, m. 118°, has α_{578}^{18} —17° in water, the methylated tetrasaccharide, m. 139°, α_{578}^{18} —14.6°. From the products of acetylated starch corresponding, but noncrystallizable, fractions were obtained after methylation: a methylated trisaccharide, α_{578}^{19} 133° (water), mol. wt. 613 (calcd. 658), and a methylated tetrasaccharide, α_{578}^{18} 140° (water), mol. wt. 812 (calcd. 862). These products of starch are the α-glucosidic analogs of the methylated oligosaccharides from cellulose, the former having MeO in α- as well as β-positions. From demolition kinetics it was deduced (cf. preceding abstr.) that starch as well as cellulose has a chain structure. The present data are addl. evidence. The same structure is required for inulin contrary to the opinions of Pringsheim (following abstr.), Schlubach (*C. A.* **25**, 245) and Staudinger (*C. A.* **25**, 280). B. J. C. v. D. H.

Chemistry of starch. XXIV. New polyamyloses. I. HANS PRINGSHEIM, ALFRED WIENER AND ALEXANDER WEIDINGER. *Ber.* **63B**, 2628–36(1930); cf. *C. A.* **24**, 3996.—When $AcNH_2$, which, it had been found, can be used as a f.-p. solvent for complex saccharides such as inulin and glycogen, was tried with α-tetraamylose (I), it gave values for the mol. wt. corresponding, not to a tetra- or diamylose, but to a hexose anhydride (162). In view of the possible effect of the high temp. of molten $AcNH_2$ (above 80°) on the labile polyamylose, the mol.-wt. detns. were repeated in $HCONH_2$ but with the same results. At first higher values (never below and often above 2 × 162) were obtained, but this was traced to impurities in the $HCONH_2$ (Schering-Kahlbaum, m. —5° to —7°, with about 1% HCO_2H). When this had been purified until it was acid-free and m. 1.8–2°, it always gave for I a mol. wt. corresponding to a glucose anhydride. Pptn. of the $HCONH_2$ soln. with alc. gave 80% of a cryst. substance (II) sepg. from hot aq. alc. with 1 mol. H_2O in column-shaped prisms having, when dried, the compn. and mol. wt. (in H_2O) of a glucose anhydride and giving with I-KI the long green needles with metallic luster characteristic of α-amyloses. II is therefore designated as *α-amylosan*. The mother liquor from the II, freed of alc. and $HCONH_2$ *in vacuo* and pptd. with EtOH-Et_2O, gave an amorphous product (III), sepg. from dil. alc. in rhombic tables with 1 mol. H_2O, which could best be differentiated from II by means of I-KI which gave brown-red prismatic columns like β-polyamyloses. III, which is called *β-amylosan*, also has the compn. $C_6H_{10}O_5$ but gives a mol. wt. of 2 × 162 in both H_2O and $HCONH_2$. β-Hexaamylose (IV) showed a mol. wt. of 2 × 162 in both $AcNH_2$ and $HCONH_2$ and when pptd. from $HCONH_2$ with EtOH-Et_2O yielded 90% of III. Like the polyamyloses II and III form with org. solvents difficultly H_2O-sol. addn. products by means of which they can readily be isolated from aq. solns. The II and III were further characterized by means of their acetates. In AcOH the acetate of III was dispersed nearly to the C_6-stage in 24 hrs. On heating, the rotations of aq. solns. of II and III change to a final const. value (II, from 150° to 128°; III, from 179° to 150°) and recrystn. of the resulting products from dil. alc. gives well-crystd. substances, α- (V) and *β-isoamylosan* (VI). Neither V and VI nor their I and Br addn. products differ visibly in cryst. form from II and III and their corresponding derivs. In $HCONH_2$ V and VI give the expected mol. wts. and after pptn. their rotations are found unchanged. In H_2O, however, they show a pronounced tendency to aggregate, gradually passing after several days at room temp. into a colloid-dispersed state. II, heated 6 hrs. on the H_2O bath in $HCONH_2$, changed to a substance (VII) sepg. from aq. alc. in 6-sided tables and yielding an especially characteristic I addn. product in black-green prisms. I, II, III and IV in aq. C_5H_5N (7:3) all showed

the same specific rotation (133°). **II**, $[\alpha]_D^{20}$ 144.8–9° (H_2O). **III**, $[\alpha]_D^{20}$ 173–81° (H_2O). *α-Triacetylamylosan*, $[\alpha]_D^{20}$ 120–4° ($CHCl_3$), mol. wt. 256–307 (AcOH). *β-Triacetylamylosan*, $[\alpha]_D^{20}$ 129–32.5° ($CHCl_3$), mol. wt. 332 (AcOH). **V**, $[\alpha]_D^{20}$ 127–33° (H_2O). **VI**, $[\alpha]_D^{20}$ 150–2° (H_2O), 148.5° (H_2O-EtOH, 1:1). C. A. R.

Lignin and cellulose. XIV. The hydrolysis of polysaccharides. KARL FREUDENBERG, WERNER KUHN, WALTER DÜRR, FRITZ BOLZ AND GUSTAV STEINBRUNN. *Ber.* **63B**, 1510–30(1930); cf. *C. A.* **24**, 1846.—In the series of researches relating to the kinetics of the degradation of polysaccharides, the measurements on disaccharides and other sugar derivs. formed a communication preliminary to those on cellulose and starch (*C. A.* **23**, 106). Starch is now investigated under the conditions used with cellobiose and maltose. For cellulose 50% H_2SO_4 was used; soln. and hydrolysis followed just as with starch and cellodextrin (the biosan of Hess). The detn. of the aldehyde groups freed was made with 0.1 *N* I. The Cu method does not work because cellobiose reduces more Cu than 0.5 glucose; the 2nd glucose group is attacked after destruction of the 1st. The velocity const. for the hydrolysis of cellobiose by 50% H_2SO_4 at 18° was found to be 1.07×10^{-4} (t in min.) by means of well-agreeing I titrations and polarimetric observations. With cellulose the degree of hydrolysis as detd polarimetrically is in advance of the degree as detd. by titration with I. The object was to find which of the possible courses of reaction (see last reference, hypotheses II, III and V) best suits the data as obtained by the latter method. Of the consts assumed, k_2 is known from the velocity of hydrolysis of cellobiose. k_1 is the initial velocity const. of the reaction in all 3 cases. It is found either by extrapolation to an infinitely short time from the mean velocity const. P_0, or is detd. from k_2 and any one value of P (P_{50} was chosen, *i. e.*, P for $\alpha = 0.50$) with the aid of the tables calcd from one of the 3 fundamental formulas expressing the relation between k_2, k_1 and k_2/P_{50}. The degree of agreement between the entire courses of the empirical and theoretical curves shows the applicability of the fundamental relation on which the formula used is based. Hypothesis II (k_2 only for cellobiose different from k_1) is eliminated while hypothesis III (k_2 for disaccharide and trisaccharide) gives good and hypothesis V (biosan conception) fairly good agreement. Formula III is the better expression, especially for the final stage of the reaction. The fission of cellulose at 30° gives entirely analogous results. *Hydrolysis of biosan acetate* (Hess and Friese, *C. A.* **21**, 174). Biosan acetate was crystd. from $CHCl_3$-MeOH, extd. with the latter and the Ac group removed according to Fischer and Zemplen; the H_2O-insol. portions of the free dextrin were used. $[\alpha]_{578}$ in 2 *N* NaOH −9.95°. Fission at 18° and 30°. k_1 is as large as in the case of cellulose and here also hypothesis III is better suited than V to explain the kinetics. *Hydrolysis of starch.*—k_2 (maltose) at 18° 1.60×10^{-4}. Kahlbaum's sol. starch, $[\alpha]_{578}$ in formamide (0.5%) 195°. k_1 by extrapolation = 1.07×10^{-4}, by hypothesis III, found 1.19×10^{-4}. The curve constructed according to this agrees well with that found empirically. Hypothesis II is eliminated here, but not the biosan assumption (V). Similar facts hold good for the hydrolysis at 30°. *Hydrolysis consts. of disaccharides.* Solns were 0.1 *N* in 2 *N* H_2SO_4 at 70° (t in min.). gentiobiose 3.06; levoglucosan 6.9, trimethyl levoglucosan 1.0; Me mannoside ($[\alpha]_{578}$ 79° in H_2O) 1.8×10^{-4} in good agreement with similar measurements of Moelwyn-Hughes (*C. A.* **22**, 1888; **23**, 5089, 5393, **24**, 2154). The consts. given by von Meyer, Hopff and Mark (*C. A.* **23**, 4451) for the inversion of maltose are not in agreement. *Optical Rotations.*—In connection with the polarimetric detn of the degree of degradation, it is to be borne in mind that the rotatory power, unlike the I value, does not lie around the half-point between glucose and cellulose (see above). An effort is made to reach a better approximation by assuming the rotations of the tri- and tetrasaccharides to correspond to their position between the disaccharide and polysaccharide. The values calcd. from assumption III are in better accord with the actual detns. than those from V but a close agreement between the values so calcd. and the α-values found titrimetrically is not obtainable. The former (III) remain somewhat behind the detd. values which indicates that the rotations of the tri- and tetrasaccharides are somewhat higher than those indicated by the new assumption. Thus the deviations may be explained without difficulty. In contrast, the biosan theory requires exact applicability of the derived formulas. Large and const. deviations indicate more than mere exptl. errors. From the dependence of the velocity consts. of hydrolysis upon temp. the heats of activation are derived for the fission of the compds. and the thermal proportionality factors. The heats of activation of starch and maltose are not significantly different from one another while those of cellulose and cellobiose are well distinguished, the former being smaller. That, nevertheless, the velocity const. for cellulose is smaller is to be ascribed to the much

smaller thermal proportionality factor. Similar, but less pronounced, are the relations with starch and maltose. The kinetic considerations exclude a 2nd type of linking along with the cellobiose linking. Since fully methylated cellulose decomps. only into 2,3,6-trimethylglucose, the only alternative lies between the α- and β-linkings on C atom 4. A disaccharide more difficultly hydrolyzed than cellobiose or one equally easily split, along with cellobiose, would be comprehensible but one more easily hydrolyzed (like maltose) would make itself noticeable through a more rapid course of reaction. With cellodextrin, the extrapolated initial I consumption indicates a chain length of 30 to 40 glucose residues (mol. wt. around 5000 to 7000). The authors explain the deviation from the lower value of Bergmann and Machemer (*C. A.* **24**, 2877) by the fact that in the free dextrin used, the lower water-sol. parts were removed, and these must have been present in the biosan acetate used by Bergmann. With cellulose, a parallel situation is found, giving a chain-length of 50 glucoses. Cellodextrin is close to cellulose also as indicated by its lower rotation. The chain of cellulose is assumed to be actually longer since small admixts. of lower carbohydrates can raise the I value. The very different properties of cellodextrin from those of cellulose (soly., viscosity) are to be attributed to the proportionate length of chain, the former having been partially shortened, the entirely undegraded fragments especially being absent. From the I requirement, starch indicates a chain-length of 25-30 glucose residues. The sol. starch used was perhaps partly degraded already. A strict literal application of assumption III forces us to make a fundamental distinction between the di- and trisaccharides and the tetrasaccharides. If the middle linking within a long chain always reacts according to k_1, the outer linking according to k_2, then formula III would be a 1st but only a poor approximation. Necessary modifications would have to be made if higher fission consts. of intermediate values between k_2 and k_1 were to be ascribed to the outer bindings. It would be conceivable that the glucoses should be split off more rapidly at 1 or both ends (perhaps according to k_2) while the rest hydrolyzed more or less according to k_1. The detn. thus far of the max. yield of cellobiose depended upon the assumption of similar stability of the linkings throughout the chain. If this proves incorrect, then the cellobiose resulting during all stages of degradation would have to remain under 67%, which agrees with a series of new results (50-60%). With starch, it is more difficult to decide regarding the small difference between the initial and final velocities, but the complete analogy between the degradation and the optical changes makes a chain structure seem likely here also. The high yields of acetobromomaltose which Karrer (*C. A.* **16**, 63) obtained by the AcBr degradation of starch are explained by the fact that that substance is attacked more slowly by AcBr than the chain compds. The diastatic degradation is explained by a similar linking of all the glucose residues of the starch chain, but with a series of accessory assumptions confirmed by kinetic observations. A chain formula is also required for inulin. The newly detd. facts are reconcilable with the chain formulas and a uniform interpretation is possible only with this conception. R. C. HOCKETT

Lignin and cellulose. XV. Lignin and nitrogen peroxide. KARL FREUDENBERG AND WALTER DURR. *Ber.* **63B**, 2713-20(1930); cf. preceding abstr.; Schaarschmidt, *Z. angew. Chem.* **42**, 618(1929).—After it had been found that the reaction of Br on lignin consists in substitution and not addn., it remained to be detd. whether lignin behaves toward nitrating agents also as an aromatic substance. The action of HNO_3 on lignin is not clear cut; the reaction does not stop at a definite stage but comes to a standstill only when products of deep-seated degradation, which are no longer characteristic, have been formed. Better results were to be expected of NO_2, which with aromatic compds. gives substitution derivs., preceded by addn. of 2 mols. NO_2 at the double bond, with subsequent elimination of HNO_2. In preliminary expts. in a N-filled app. in ice, connected with a manometer to record changes in pressure, the pressure, within a few min. after bringing the NO_2 (mixt. of NO_2 and N_2O_4) and lignin together, fell far lower than in blank expts. with NO_2 alone and remained const. for a while, but after about 0.5 hr. it rose slowly for 3 days, owing to the evolution of NO. Attempts to follow the reaction quantitatively failed because of the extraordinary adsorbing power of the lignin and the complex equil. between NO, NO_2, N_2O_4, HNO_2, HNO_3 and H_2O. There is no doubt that the gradual increase in pressure is due to a secondary reaction, evidently an oxidation process, and that only the first rapid phase (decrease in pressure) marks the course of the reaction sought. This is even more evident when methyllignin is used instead of lignin. Etherification seems to block the point of attack for the oxidation reaction; with methyllignin the pressure falls to a min. within a few min. and then remains unchanged for days. The expts. were then conducted under conditions which permitted of converting the nitrous gases in the reaction vessel after

the nitration into a mixt. of nitrite and nitrate which was then analyzed by the method of Meisenheimer and Hein. The gas remaining after absorption of the nitrous gases in aq. $NaHCO_3$ was pure NO; no org. oxidation products (especially no $(CO_2H)_2$) were found in the $NaHCO_3$ soln. and no CO_2 was formed in the nitration. The only cleavage product found was MeOH. The amounts of NO_2 used, of NO, HNO_2 and HNO_3 formed and of N in the nitrated lignin or methyllignin correspond best to a nitration process: —O.C_6H_3(OMe).C.C.C— + $2NO_2$ = —O.C_6H_2(OMe)(NO_2).C.C.C— (I) + HNO_2. Definite proof that double bonds do not come into play at all or only to a small extent is afforded by the fact that the nitrolignin and nitromethyllignin can still be brominated (nitrolignin takes up about 0.7 atom Br per atom of N) and that bromomethyllignin can be nitrated. The cleavage of MeOH (20–33% of that originally present in the lignin) had already been observed in the bromination; as it occurs to the same extent whether lignin or methyllignin is used, there is no doubt that it is the original MeO group in lignin that is split off. This cleavage of MeOH is explained on the basis of Wieland's theory that the substitution of NO_2 is preceded by an addn. Assuming, arbitrarily, that the NO_2 group enters the *p*-position to the MeO group it would be expected that the first product would be a di-NO_2 compd —O.C<CH——CH(NO_2)>C.C.C.C— / C(OMe)(NO_2).CH which for the most part would change normally, by loss of HNO_2, into I, but, to a small extent, the MeO group, reacting with the adjacent NO_2 group as if it were —O.NO, would split off as MeONO and the resulting quinol deriv. would change into the nitrophenol —O.C_6H_2(OH)(NO_2).C.C.C—. Dimethyldehydrovanillin, [5,2,3-OHC(MeO)$_2$$C_6H_2$]$_2$, in solid amorphous form, treated with NO_2 like lignin, is similarly nitrated, with elimination of 2.5 mols. MeOH. Veratrumic acid, both in solid form and in $PhNO_2$, is nitrated but splits off only traces of MeOH. Veratroylcellulose (18.6% MeO) takes up 12.5% NO_2 but almost without loss of MeOH. F. and D. feel that the results of bromination and nitration show that lignin is predominantly an aromatic substance and confirm the the formula —O.C_6H_3(OMe).C.C.C(—O.C_6H_3(OMe).C.C.C—)$_x$ —O.C_6H_3(OMe).C.C.C— previously suggested. These new results show again that all the reactive groups are free since the lignin reacts with the completeness of a permutoid. A further example (the mercuration of lignin) is to be described shortly. Lignin differs from a directed permutoid like siloxene in that the structural elements apparently extend in 3 dimensions entirely without any order, resulting in an extraordinary development of surface, as indicated by the strong adsorbing power. A further peculiarity is that the structural elements are apparently not all entirely identical, although derived from a basic form closely related to coniferyl alc. or guaiacylglycerol; presumably there are differences in the aliphatic chains, and furthermore a small part of the aromatic nuclei are present in the form of the piperonyl residue. The size of the particles formed by condensation also seems to vary widely in one and the same prepn. As a result, the reactions of lignin are by far not nearly so homogeneous as those of permutoids of regular structure. C. A. R.

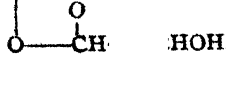
Constitution of cellulose xanthate. III. Th. Lieser. *Ann.* **483**, 132–43(1930); cf. *C. A.* **23**, 3672.—Treatment of methylcellulose with a mixt. of AcOH and Ac_2O contg. H_2SO_4 at 25–30° for 7–20 days gives about 50% of cellobiose octaacetate, indicating that some of the glucose anhydride units in the original product are not methylated. No methylcellobiose acetate could be detected; it is probably decompd. during acetolysis. C. J. West

Action of mercury salts on acetohalogenosugars. IV. Direct preparation of alkyl biosides of the α-series. Géza Zemplén and Arpád Gerecs. *Ber.* **63B**, 2720–4 (1930); cf. *C. A.* **24**, 5730.—It had been found that heptaacetyl-α-alkylcellobiosides can be obtained in faultlessly pure condition by the action of $Hg(OAc)_2$ on acetobromocellobiose (I) in the presence of the appropriate alc., but the results were not always reproducible, especially with the Et compd., and the quality of the product varied

widely with the amt. of the alc. used. Systematic expts. were therefore carried out in which only the quantity of abs. alc. used was varied: the mixt. of I (10 g.), $Hg(OAc)_2$ (2 g.) and EtOH was boiled 2 hrs. in 60 cc. C_6H_6, the cooled reaction mixt. washed 4 times with H_2O, the C_6H_6 soln. dried with $CaCl_2$, evapd. *in vacuo*, then twice with EtOH and the residue dissolved in 50 cc. hot alc. and allowed to stand 6 hrs. at room temp. The product, recrystd. once more from alc., was then tested for reducing power, rotation in $CHCl_3$ and m. p. The results showed that whether the product isolated shall be the α- or the β-form can be controlled by the proper choice of the quantity of alc. used. The α-Et deriv. can be obtained with certainty with an excess in the neighborhood of 100% of EtOH; even with a 200% excess the product is still a quite pure α-deriv. but the yield is no longer satisfactory (with a 100% excess the purity and the yield are as good as in the isomerization of the β-compd. with $TiCl_4$ and the procedure is materially simpler). When the excess of alc. exceeds 300%, however, the reducing power of the product again increases and between a 300 and 400% excess of alc. there is a sharp transition in favor of the β-form. With 10 g. I, a difference of 0.74 g. in the quantity of EtOH used sufficed to change the rotation of the product from 50.86° to —18.26°. With iso-PrOH the α-deriv. can be obtained more easily than with EtOH, a 40–200% excess of the iso-PrOH giving an optically very pure product in good yields; the transition in favor of the β-form with a further increase in the quantity of alc., however, is even more marked than with EtOH. With Pr, Bu, iso-Bu, *sec*-Bu, *sec*-Am, hexyl and $PhCH_2CH_2$ alcs., a 100% excess of the alc. often gave the α-deriv. of highest rotation. To obtain the β-forms, a large excess of the alc. must be used. With the lower alcs., it is advantageous to use the alc. itself as the reaction medium. The β-derivs. can often also be obtained readily with $Hg(CN)_2$ instead of $Hg(OAc)_2$ but attempts to prep. the α-compds. in this way met with but little success. The highest $[\alpha]_D$ in $CHCl_3$ observed for the α- and β-forms, resp., of the *heptaacetylalkylcellobiosides* were: *Me* ——, —25.0°; *Et* 57.23°, ——; *Pr* 58 79°, ; *iso-Pr* 59.29°, —22.7°; *Bu* (m. 172°) 52.40°, —24.60°; *iso-Bu* (m. 174°) 45.51°, 23.04°; *sec-Bu* (m. 193°) 55.76°, —23.20°; *sec-Am* (m. 193°) 52.23, ——; *hexyl* (m. 182°) 53.42°, —24.37°; *β-phenylethyl* (m. 207°) 54.16°, —25.28°. C. A. R.

New substances formed by molds. NADINE WIJKMAN. *Ann.* **485**, 61–73(1931).—The action of *Penicillium glaucum* on sucrose in new glass vessels gives a mixt. of *glauconic acids 1* (I) and *2* (II), sepd. by crystn. from EtOH. I, $C_{18}H_{28}O_{17}$, m. 202°, is optically inactive, contains no MeO group, gives no color with $FeCl_3$ and from its behavior on titration appears to contain 1 or more lactone groups. I is not esterified with MeOH-HCl; with CH_2N_2 N is evolved, giving a product boiling at 210° in high vacuum; it could not be crystd. *Ac deriv.*, m. 175°; *Bz deriv.*, m 170°; *NO_2 deriv.*, m. 159°. Reduction of I with Zn and AcOH gives the *compd.* $C_{18}H_{32}O_{17}$, m. 237°. Distn. of I in N at 215° gives the unsatd. *ketone* (III), $C_7H_{12}O$, b_{146} 120°, which absorbs 2 Br and 2 H (*dinitrophenylhydrazone*, red, m. 173°; *semicarbazone*, m. 183°) and the *compd.*, $C_{11}H_8O_6$, m. 171°. Oxidation of III gives the *compd.* $C_3H_6O_2$, analyzed as the *Ag salt*. II, $C_{18}H_{30}O_{18}$, m. 186°, distd. undecompd. in a high vacuum and titrates as a 4-basic acid. I is probably a HO deriv. of II. C. J. WEST

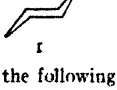
Xylan. J. REILLY, P. P. DONOVAN AND MISS K. BURNS. *Proc. Roy. Irish Acad.* **39B**, 505–14(1930); cf. *C. A.* **23**, 337; **24**, 831, 3996.—The work on the effect of soln. of polysaccharides in $AcNH_2$ (I) and $HCONH_2$ (II) was extended to the pentosans. Abs. EtOH pptd. from a 0.5% soln. of xylan (III) in I a substance which was sol. in cold H_2O while moist but which on drying became horny and insol. in cold H_2O but sol. on short heating to 50°. This ppt. (called *xylanan*) (IV) possessed the same rotatory power as the original III, ($[\alpha]_D^{20}$ —111.1° to —113°), and analysis showed its empirical formula to be $(C_5H_8O_4)_n$. F.-p. detns. of the mol. wt. on III in I at 0.451% concn. gave the values 146 and 147; at 0.95%, 195 and at 1.1%, 231. These values point definitely to depolymerization with formation of the mols. $C_5H_8O_4$ and $(C_5H_8O_4)_2$. Mol.-wt. detns. in H_2O on dried IV from I gave the values 340, 388 and 485 at 0.73% concn. and 353, 412 and 480 at 0.93% concn. Similar detns. on IV from II gave 344, 383 and 453 at 0.926% concn. and 369, 415 and 513 at 1.049% concn. The values indicate the formula $(C_5H_8O_4)_3$ for IV with increasing assocn. on standing. I and II may act as imino acids to produce depolymerization or it may be that the fundamental units of III are assocd. through their residual valences and that these valences are altered when the III is dissolved in I or II. If the units of III are linked through auxiliary valences, the structure of the unit should be:



HOH. C. H. PEET

Resolution of some ester acids of the γ-truxillic acids into the optical components. FRIEDRICH SCHENCK. *Ber.* **63B**, 2706–12(1930).—It has thus far not been possible to resolve the mono esters of α-truxillic and β-truxinic acids into their optical components. Stoermer and Fretwurst showed, however, that the γ-truxillamidic acids are readily resolved with morphine. The present work was undertaken to det. whether the mono-esters of γ-truxillic acid are also resolvable. To obtain the active monoesters, the following active amidic acids, some of which had already been described by Fretwurst, were prepd.: *d*-Me (+)γ-truxill-*l*-amidate (I), *l-Me* (−)*d-amidate* (II), *l-Et* (−)*d-amidate* (III), *l-Pr* (−)*d-amidate* (IV), *d-Bu* (+)*l-amidate* (V). These were converted with N_2O_3 in AcOH into the following truxillic monoesters: *Me* (+)*d-γ-truxillate* (VI), *Me* (−)*l-truxillate* (VII), *Et* (−)*l-truxillate* (VIII), *Pr* (−)*l-truxillate* (IX), *Bu* (+)*d-truxillate* (X). As standards of reference were taken Fretwurst's active amidic acids. The *l*-form corresponds to the negative, the *d*-form to the positive rotation. When such an acid (*e. g.*, the *d*-amidic acid) is esterified it becomes, as regards the ester group, the *l*-form, *i. e.*, the *d*-amidic *l*-ester, for if the amide group should be sapond. and the remaining ester group replaced by NH_2, the *l*-amidic acid should result. Attempts to effect such a replacement have hitherto failed. As with the amidic acids, the *d*-forms of the monoesters have a pos., the *l*-forms a neg. rotation. The direction of the rotation of VII and VIII, which was not detd. directly, was deduced from the m. ps with the active compds obtained by resolution (see below). The inversion of the rotation on esterification of the amidic acids noted by Fretwurst was again observed, as was also the increase in the magnitude of the rotation. To obtain the *dl*-monoesters, γ-truxillic anhydride was boiled with an excess of alc. and about 0.5 mol. Na_2CO_3, and the resolution was effected by bringing together hot satd. alc. solns. of 1 mol. each of the monoester and morphine, the salts of the (−)*l-Me*, (−)*l-Et*, (−)*l-Bu* and (+)*l Pr esters* crystg. out while the antipodes remained in soln. and sepd. only on cautious evapn. With brucine, the antipodes formed the difficultly sol. salts (the Bu ester could not be resolved with this alkaloid). The magnitude of the rotation increases with increasing mol. wt. of the alc., and the m. ps. of the *d* esters decrease while those of the active esters increase with increasing mol. wt., with the exception of the Me ester. *dl-Monoesters: Me*, m. 183.5–4°; *Et*, m. 173–4.5°; *Pr*, m. 170–1°, does not depress the m. p. of the Et ester; *Bu*, m. 142–3°, seps. from H_2O as a *hydrate*, m. 62–3°. II, m. 153–4°. III, m. 153–4. IV, m. 159–60°, $[\alpha]_D^{20}$ −17.7° (all rotations measured in Me_2CO). V, m. 141.5–3°, $[\alpha]_D^{20}$ 18.33°. *Di Bu truxillate* from the acid with BuOH-H_2SO_4, m. 85–6°. VII, from II with N_2O_3 or from the *d* ester with morphine, m. 145.5–7°, a mixt. with VI m. 178–83°. VI, from I and N_2O_3 or from the *dl*-ester with brucine, m. 145.5–7°, $[\alpha]_D^{18}$ 6.48° (prepd. by 1st method) $[\alpha]_D^{20}$ 4.37° (prepd. by 2nd method). VIII, m. 142.5–3°, $[\alpha]_D^{18}$ −16.48°, m. 67–8° when mixed with the (+)*d ester* (from the *dl*-ester with morphine), m. 142.5–3°, $[\alpha]_D^{20}$ 19.14°. IX, m. 148–9°, $[\alpha]_D^{21}$ −21.35° when prepd. from IV with N_2O_3, $[\alpha]_D^{19.5}$ −22.1° when prepd. from the *dl*-ester with brucine, m. 168–70° with the (+)*dl-ester* (from the *dl*-ester with morphine), m. 148–9°, *Bu* (−)*l-γ-truxillate*, from the *dl*-ester with morphine, m. 151–2°, $[\alpha]_D^{18.5}$ −25.70°. X, m. 151–2°, $[\alpha]_D^{21}$ 26.14°. C. A. R.

The structure of the cyclohexane molecule. O. HASSEL AND H. KRINGSTAD. *Tids. Kemi Bergvesen* **10**, 128–30(1930).—Since satd. hydrocarbons have practically 0 dipole moment, a distinction between the possibilities I and II for cyclohexane by dipole measurement is not possible. X ray investigation, with a Debye camera, C_6H_{12} frozen with solid CO_2 acetone mixt., and Fe radiation gave the following data. Lattice, cubic; a = 8.41 ± 0.02 A. U.; 4 mols. per unit cell; d 0.933. The space group is probably T_h^2 or O_h^4. These results indicate the form of the cyclohexane mol. to be I.



I II

G. R. Y.

Two syntheses of heptamethylenimine. ADOLF MÜLLER AND PAUL BLEIBR. *Monatsh.* **56**, 391–406(1930). Reduction of suberone isoxime (α-ketoheptamethylenimine) with Na and EtOH gives 1.5% slightly impure heptamethylenimine (I), b. 162–4°, d_4^{17} 0.869, n_D^{17} 1.5262 (*chloroaurate*, sinters 173°, m. 188°; *picrate*, m. 147–8°; *N*-Bz deriv., b_{13} 196–7°). Oxidation of the *N*-Bz deriv. with $KMnO_4$ at 65° gives 41.3% of ζ-benzamidoheptoic acid, dimorphous, m. 86° and 90°; this also results by benzoylating the amino acid, obtained by heating suberone isoxime with 20% HCl at 150°. Hydrolysis of the reaction product of α,η-dibromoheptane and *p*-$MeC_6H_4SO_2NH_2$ with EtOH-KOH by HCl at 160° yields 0.8% of slightly impure I and α,η-diamino

heptane. Improved methods are given for the prepn. of suberic acid, suberone and its isoxime. C. J. West

Migration of amino groups from one to three in arylamine derivatives of diarylarylethinylcarbinols. Constitution of resulting products. Joseph Robin. *Compt. rend.* **191**, 790–2(1930); cf. *C. A.* **24**, 78.—$PhNH_2$ with *diphenylphenylethinylcarbinyl chloride* ($Ph_2CClC:CPh$) (I) gives a yellow product, *$Ph_2C:CHCPh:NPh$* (II), m. 199–200° A colorless intermediate product, *$C_{27}H_{21}N$* (III), m. 87–8°, has been isolated. III isomerizes easily into II by the action of heat in the presence of $PhNH_2.HCl$, but not in the presence of $PhNH_2$. II has not been converted into III. III is more basic than II, forming an isolable *HCl salt*. With MeOH in dil. H_2SO_4, II gives *β-phenylbenzalacetophenone*, while III gives *diphenylethinylcarbinyl Me ether*. III is probably $Ph_2C(NHPh)C:CPh$. These relationships hold in a variety of similar cases where an arylamine with a diarylarylethinylcarbinyl chloride gives 2 isomers, the unstable product (*a*) of the type of formula II being white, and the stable product (*b*) of the type of formula III being yellow. I with *o-toluidine* gives (*a*), m. 139–40°, and (*b*), m. 192–3°; with *m-toluidine* (*a*), m. 117–8° (*b*), m. 139–40°; with *p-toluidine* (*a*), m. 115–6° (*b*), m. 174–5°; with *o-anisidine* (*a*), m. 140–1° (*b*) not crystd; with *p-anisidine* (*a*) not crystd., (*b*) m. 148–9°. *Diphenyl-p-tolylethinylcarbinyl chloride* with $PhNH_2$ gave (*a*), m. 118–9°, (*b*), m. 162–3°. *Diphenyl-β-naphthylethinylcarbinyl chloride* with $PhNH_2$ gave (*a*), m. 140–7°, (*b*), m. 149–50°. *Diphenyl-p-bromophenylethinylcarbinyl chloride* with $PhNH_2$ gave (*a*), m. 151–2°, (*b*), m. 138–9° T. H. Rider

The action of hexahalogenated benzenes on Grignards. J. F. Durand and Lai-Wai Hsun. *Compt. rend.* **191**, 1460–3(1930).—C_6Cl_6 reacts with neither MeMgI nor PhMgBr. C_6Br_6 or C_6I_6 with MeMgI gives C_6Me_6, m. 157.8°, and with PhMgBr C_6Ph_6, m. 266°, b. 418–20°. V. F. Harrington

Chlorination of *o-* and *p*-nitrotoluene. 3,4,6-Trichloro-2-nitrotoluene and 2,6-dichloro-4-nitrotoluene. Leopold F. Levy and Henry Stephen. *J. Chem. Soc.* **1931**, 76–9.—*o*-$O_2NC_6H_4Me$ (27.4 g.) and 5 g. $SbCl_5$, satd. with Cl, give 5 g. of the *3,4,6-Cl_3 deriv.*, pale yellow, m. 93–4°; further nitration gives the 2,5-di-NO_2 deriv., m. 220.5° (cor.). Reduction with $SnCl_2$ and HCl gives *3,4,6-trichloro-o-toluidine*, m. 89°; *Ac deriv.*, m. 199°; *Bz deriv.*, m. 230°. *p*-$O_2NC_6H_4Me$, chlorinated as above, gives the *2,6-Cl_2 deriv.*, m. 63–4°; HNO_3 and H_2SO_4 give the *3,4-di-NO_2 deriv.*, m. 130°. *2,6-Dichloro-p-toluidine*, m. 55°; *Ac deriv.*, m. 215°, *Bz deriv.*, m. 179° Both of the new Cl derivs. resist oxidation after heating with $KMnO_4$ for 6 days on the water bath. C. J. West

A new color reaction of aromatic amines. I. De Paolini *Gazz. chim. ital.* **60**, 859–62(1930).—Bz_2O_2 (I) is an extremely sensitive reagent for detecting aromatic amines, for it will give a brown-red or violet color reaction with the smallest trace of the amine. This color results from the oxidation of the amine to a quinone, and the reaction has the great advantage over previous color reactions (cf. *Ann.* **27**, 376(1853); *Compt. rend.* **111**, 975(1890); *Ber.* **27**, 3264(1894)) that the oxidation takes place in neutral alc. soln. The reaction of I with aliphatic amines has been studied by Gambarjan (cf. *C. A.* **20**, 372), who found the reaction to be: $I + R_1R_2NH \longrightarrow BzOH + R_1R_2NOBz$. P. has, however, found that with primary amines another aminolysis takes place, thus: $I + RNH_2 \longrightarrow BzO_2H$ (II) + $RNHBz$. II oxidizes in turn a 2nd mol of RNH_2. *E. g.*, $PhCH_2NH_2$ (III) and I yield $PhCH_2NHBz$ (IV), BzH (from the subsequent oxidation of III by II) and $BzONH_2CH_2Ph$ (from combination of III and BzOH, the latter the reduction product of II). Practically, I is added to alc. III until no more is dissolved, and the soln. is dild. with water, which causes pptn. first of BzOH and then of IV. I reacts with other RNH_2 compds., *e. g.*, with alc. NH_2OH or $H_2NNH_2.H_2O$ it forms BzNHOH and $[BzNH]_2$, resp. Gas is evolved in these reactions, because II (which is formed in each case) oxidizes the excess NH_2OH and $H_2NNH_2.H_2O$ to the extent that the mols. are destroyed. In the presence of water and of oxidizable substances, II is formed by the action not only of primary amines, but also of secondary and tertiary amines, as a result of a hydrolysis similar to that with alk. hydroxides, *i. e.*, $I + NaOH \longrightarrow BzONa + II$, as was shown in the present work by using dil. alc. solns. contg. indigo. The great ease of oxidation of aromatic amines to quinones by I probably results from the intermediate formation of II, which in the nascent state is extremely active; in fact the reaction is only feeble in anhyd solvents, *e. g.*, Et_2O or AcMe. The color reaction was obtained with $PhNH_2$, *o-*, *m-* and *p*-$MeC_6H_4NH_2$, asym. *o*-xylidine, *p*-xylidine, *p*-anisidine, *o-* and *p*-$H_2NC_6H_4OEt$, *o-*, *m-* and *p*-$C_6H_4(NH_2)_2$, benzidine, $PhNHCH_2Ph$, PhNHEt, PhNHMe, $PhNMe_2$, $PhNEt_2$, *o-* and *p*-$MeC_6H_4NMe_2$, $PhNEtCH_2Ph$, $MeNPh_2$, *p*-$HOC_6H_4NH_2$, *α-* and *β*-$C_{10}H_7NH_2$, *β*-$C_{10}H_7NHPh$, $Ph_2C(NMe_2)_2$, *o-*, *m-* and *p*-$H_2NC_6H_4CO_2H$, 4,3-Me-

$(H_2N)C_6H_3CO_2H$, 3-bromo-6-aminocuminic acid, 3-aminocuminic acid, 2,4,5-BrMe-$(H_2N)C_6H_3CO_2H$, *o*-, *m*- and *p*-$ClC_6H_4NH_2$, 2,4-$Cl_2C_6H_3NH_2$, *o*-, *m*- and *p*-$BrC_6H_4NH_2$, and *p*-$IC_6H_4NH_2$. In all cases it is best to add the amine to a suspension of I in EtOH, under which conditions a brown-red or violet color appears even when cold, but more rapidly when hot. The reaction is being studied further. C. C. Davis

Asymmetric nitrogen atom. LVIII. Decomposition of active and inactive quaternary ammonium nitrates under the influence of amines; also a contribution to the knowledge of solvate formation by ammonium salts. E. Wedekind and F. Feistel. *Ber.* **63B**, 2743–53(1930); cf. *C. A.* **23**, 5171.—It had been shown that the decompn. of $MePh(PhCH_2)(PhMeNCH_2CH_2)NNO_3$ (I) in $CHCl_3$ is greatly accelerated by amines, secondary bases having a greater influence than primary bases and tertiary bases having little or no effect, whether the I is dissolved directly in the amines or treated in $CHCl_3$ with small quantities of the bases. The reaction was explained as consisting in a primary formation of a solvate (indicated by an increase of the sp. rotation, among other things) which, because of its relative instability, brings about a decompn. of the nitrate into a ditertiary base and $PhCH_2NO_3$ and the latter finally combines with the excess of amine to form a new salt in which an amine H atom is replaced by $PhCH_2$. The renewed salt formation as the result of solvolysis is indicated by a renewed increase in elec. cond. which during the preceding phases decreases along with the rotation. As these expts. were made with a salt (I) which was not completely stable, optically, in $CHCl_3$, they have been repeated with simple active NH_4 nitrates (especially $MePh(PhCH_2)(CH_2{:}CHCH_2)NNO_3$ (II)) and a perchlorate, $Me_2EtPhNClO_4$ (III) (the nitrate is not cryst.), as also with a no. of other amines. To obtain an idea of the qual. decompn. tendency of the halides and nitrates of these NH_4 compds. they were tested for a change in cond. with time. The results in $CHCl_3$ and on addn. of $PhNH_2$, resp., were as follows: (+ indicates decompn., − no decompn., n.t. not tested): $MePh(PhCH_2)(CH_2{:}CHCH_2)NI$ +, n.t.; nitrate (II) −, +. $MePh(PhCH_2)(iso\text{-}Bu)NI$ +, n.t.; nitrate −, +. $MeEtPh(PhCH_2)NI$ +, n.t.; nitrate −, +. $MePrPh(PhCH_2)NI$ +, n.t.; nitrate −, +. *p*-$CH_2[C_6H_4NMeEt(CH_2CH{:}CH_2)]_2Br_2$ (IV) −, −; dinitrate −, −. $Me_2EtPhNI$ (V) −, −; perchlorate (III) −, −. The halides which do not decomp. in $CHCl_3$ (IV, V) also do not react on addn. of $PhNH_2$ and the same is true for the corresponding nitrate and perchlorate. Only those halides decomp. which contain certain groups (Ph and $PhCH_2$ or $CH_2{:}CHCH_2$). Since the nitrates which decomp. on addn. of $PhNH_2$ react essentially alike, kinetic measurements were made first on $MePh(CH_2{:}CHCH_2)NHNO_3$ (VI) and various amines by the method used before (measurement of the decrease in rotation and cond. with time). With 0.1 g. VI and 50 mols. amine in 10 cc. $CHCl_3$ the following half-time values (min.) and av. velocity consts., resp., were obtained. Primary amines: iso-Am 25, 0.0182; iso-Bu 45, 0.0072; Pr 47, 0.0065; Bu 88, 0.0064; $PhCH_2$ 90, 0.0037; Ph 250, 0.0032. Secondary amines: Et_2 26, 0.0259; $Et(PhCH_2)$ 42, 0.0176; $(PhCH_2)_2$ 80, 0.0077; MePh 90, 0.0077; EtPh 150, 0.0055; $Ph(PhCH_2)$ 195, 0.0014; Ph_2 ∞, ——. The tertiary $PhNMe_2$ produced no measurable change in 18 hrs. The relationships between basicity and reaction velocity thus brought out will be discussed elsewhere in connection with further exptl. data. As regards the mechanism of the reaction, and especially the differing behavior of primary and secondary amines on the 1 hand and tertiary amines on the other, it is to be remembered that, according to the hypothesis suggested in connection with the observations on I, the presence of at least one H on the N of the added amine is necessary for the reaction to take place, for it is assumed that a H atom combines with the NO_3 ion to form HNO_3 and is replaced by one of the hydrocarbon residues, leaving a tertiary base: $NR^1R^2R^3R^4NO_3 + H_2NR^5 = NR^1R^2R^3 + R^4NHR^5 + HNO_3$. The HNO_3 may be bound to 1 or both of the bases; it was found that when VI is dissolved in fused *p*-toluidine the cooled solidified mass yields $MeC_6H_4NH_2.HNO_3$, decomps. 199°. The work on I had also led to the conclusion that solvates are formed primarily in the action of amines on the nitrates; the simple method then used for showing their formation (placing the nitrate alone, the amine alone and a mixt. of nitrate and amine in weighed boats and heating them in a high vacuum at gradually increasing temps. up to 111°) was employed in the present work. With those nitrates which decomp. on addn. of the amine, the pure nitrate remained unchanged while the mixt. of nitrate and amine lost wt. until the residue weighed less than the original nitrate, although the presence of amine ($PhNH_2$) could still be detected by the isonitrile reaction. With III and the nitrate corresponding to IV, the wt. of the residue never fell as low as that of the original nitrate or III in the mixt.; there is nothing to prove, however, that these compds. do not also form solvates which are relatively stable as compared with those of the other

nitrates. With tertiary bases ($PhNMe_2$, PhNMeEt) there is no further loss in wt. after the residue has reached the wt. of the original nitrate. No solvate formation between VI and $CHCl_3$ could be detected by this method. The $[\alpha]_D$ of VI in various solvents (Me_2CO 56°, abs. alc. 67°, PhNHMe 73°, $PhNH_2$ 75°, $CHCl_3$ 80°) is smallest in those solvents which are indifferent as regards their influence on the decompn. (Me_2CO, alc.) and highest in those which are known to effect the decompn. In $CHCl_3$, which according to the heating method forms no solvate, the rotation, although higher than in PhNHMe and $PhNH_2$, is independent of the concn., whereas in PhNHMe and $PhNH_2$ it increases with increasing concn. That no solvation occurs in $CHCl_3$ in the absence of an added base was confirmed by f.-p. measurements on II in $CHBr_3$; the mol. wts. found (674.6, 583, at concns. of 2.75, 180) indicated the usual assocn. of NH_4 salts in $CHBr_3$ but gave no evidence whatever of simultaneous solvation. In *p*-toluidine, which causes the decompn. of II in $CHCl_3$, the mol. wt. of II decreases with the length of time it is kept in the molten toluidine until a const. value of 73.40 (calcd. 300.3) is reached, while III, which is not decompd. by the toluidine in $CHCl_3$, gives mol. wts. greater than the calcd. but *decreasing* with increasing concn., indicating the presence of solvates. C. A. R.

Diphenylamine derivatives. K. Dziewoński and M. Russocki. *Bull. intern. acad. polonaise* **1929A**, 506–27.—The conclusions of Merz and Weith (*Ber.* **5**, 283) concerning the proportion of mono- and di-SO_3H acids formed by the action of concd. H_2SO_4 on Ph_2NH are confirmed. With $ClSO_3H$ in $PhNO_2$ below 90°, however, the initial product is the unstable, cryst., $ClSO_3H.NHPh_2$, which at higher temps. readily decomposes, giving nuclear substitution products in accordance with the scheme $Ph_2NHSO_3Cl \longrightarrow Ph_2NSO_3H \longrightarrow PhHNC_6H_4SO_3H$, the proportion of mono- and di-SO_3H acids produced depending on the mol. proportion of $ClSO_3H$ used. Thus with 0.5, 1.0, 1.5 and 2.0 mols. of $ClSO_3H$ for each mol. of Ph_2NH the proportions of mono- and di-SO_3H acids and of unchanged Ph_2NH are, resp., 25, 5, 70, 38, 22, 40; 34, 50, 16; and 0, 99–100, 0 mols. %. Hence with 0.5 mol. of the reagent, diphenylamine-4-sulfonic acid (*aniline salt*, m. 206.5°) is readily sepd. from the reaction mixt. as its Mg salt. Nitration of 4-$PhNHC_6H_4SO_3Na$ with 1 mol. of HNO_3 (d. 1.48) in AcOH gives the *4-nitro-deriv.* (*Mg salt*) converted by hydrolysis with concd. HCl in a sealed tube at 190° into 4-$PhHNC_6H_4NO_2$ (Goldberg, Ger. pat. 185,663(1907)), and further nitrated to *Na 2,4-dinitrodiphenylamine-4'-sulfonate*. Excess of HNO_3 converts 4-$PhNHC_6H_4SO_3Na$ into the 2,4,6-trinitro deriv. identical with a specimen obtained by the condensation of 2,4,6-$Cl_3C_6H_2NO_2$ and sulfanilic acid (Turpin, *J. Chem. Soc.* **59**, 717(1891)) and hydrolyzed by concd. HCl at 180–200° to 2,4,6-$(O_2N)_3C_6H_2NHPh$. The action of Br (2 mols.) on a suspension of 4-$PhNHC_6H_4SO_3Na$ in CCl_4 at 45–50° converts it into its *4-Br deriv.*, while with 6 mols. of Br at 60–70° the product is *Na 2,4,2'-tribromodiphenylamine-4-sulfonate* (*Mg salt*), converted by excess of HBr at 60° into $(2,4\text{-}Br_2C_6H_3)_2NH$ and by dil. HCl at 190° into *2,4,2'-tribromodiphenylamine*, m. 94°, while the action of HNO_3 (d. 1.48) in AcOH at 165 90° yields *2,4,2'-tribromo-6'-nitrodiphenylamine*, m. 215°, together with the corresponding *4',6'-di-nitro deriv.*, m. 179°, and *Na 2,4,2'-tribromo-6'-nitrodiphenylamine-4-sulfonate*. Diphenylamine-4,4'-disulfonic acid (*Mg salt* + $2.5H_2O$, and *aniline salt*, m. 239°) is best obtained by the action of an excess of $ClSO_3H$ on Ph_2NH in $PhNO_2$ at 110–15°. By reactions similar to those described in the case of the mono-SO_3H acid, its Na salt is converted into the *2-nitro-* and *2,2'-dinitrodiphenylamine-disulfonic acids* (converted into $(2\text{-}O_2NC_6H_4)_2NH$, *2,4,2'-trinitrodiphenylaminesulfonic acid*), and $[2,4\text{-}(O_2N)_2C_6H_3]_2NH$, small quantities of the 2,4,6,2',4'-pentanitro- and 2,4,6,2',4',6'-hexanitro derivs. being formed as by-products of the nitrations. Similarly, bromination of 4,4'-$NH(C_6H_4SO_3)_2Ba$ converts it into the *2,2'-di-Br deriv.*, $+0.5H_2O$, together with some *2-Br derivs.*, and, ultimately, into $(2,4\text{-}Br_2C_6H_3)_2NH$. B. C. A.

An improved method of preparation of substituted amides and hydrazides. Sohrab M. Mistry and Praphulla C. Guha. *J. Indian Chem. Soc.* **7**, 793–7(1930).—The condensation between divers types of amines, diamines, hydrazines, thiosemicarbazides, etc., on the one hand and amides such as $CO(NH_2)_2$, $CS(NH_2)_2$, $PhCONH_2$, $C_6H_4(CO)_2NH$ on the other, can be brought about, with excellent yields, by refluxing a mixt. of 1 mol. of the amide and 2 mols. of the amine with sufficient AmOH until the evolution of NH_3 is negligible. With $NH_2NH_2.H_2O$ and $(NH_2)_2CO$ (I), $NH_2NHCONH_2$ is obtained to the exclusion of the expected $(NH_2NH)_2CO$. From I and the requisite amine the following known compds. were prepd.: $(PhNH)_2CO$, $(m\text{-}MeC_6H_4NH)_2CO$, $(p\text{-}MeC_6H_4NH)_2CO$, $(m\text{-}NO_2C_6H_4NH)_2CO$, $(p\text{-}NO_2C_6H_4NH)_2CO$, $(\beta\text{-}C_{10}H_7NH)_2CO$, $(\alpha\text{-}C_{10}H_7NH)_2CO$, $(p\text{-}NHAcC_6H_4NH)_2CO$, $(PhCH_2NH)_2CO$, *o-* and *p*-phenyleneurea

NH.C_6H_4.C_6H_4.NH.CO (from benzidine)(PhNHNH)$_2$CO. With I, *m*-$NH_2C_6H_4OH$ gave (*m*-$HOC_6H_4NH)_2CO$, m. 215°, and *p*-$NH_2C_6H_4OH$ similarly yielded *di-p-hydroxyphenyl urea*, m. 288°. The condensation with I converted *o*-$NH_2C_6H_4COOH$ into *2,4-dihydroxy-tetrahydro-1,2,3,4-quinazoline*, C_6H_4.CH(OH).NH.CH(OH).NH, m. 353° (decompn.). *Di-p-nitrophenylcarbohydrazide*, (*p*-$NO_2C_6H_4NHNH)_2CO$, m. 361° and *di-p-bromophenyl carbohydrazide* were made from *p*-$NO_2C_6H_4NHNH_2$ and *p*-$BrC_6H_4NHNH_2$, resp. The treatment of $NH_2NHCSNHPh$ with I by this method gave 3 compds.: *1-phenyl-2-phenylamino-5-thiol-1,3,4-triazole*, PhN.C(NHPh):N.N:CSH, m. 210°, *2,5-endoxy-1,3,4-triazole*, NH C:N.N:C.O, 250° and *2-keto-5-phenylamino-2,3-dihydro-1,3,4-thiodiazole*, S.CO.NH N:CNHPh, m. 246°. *p*-$AcNHC_6H_4NH_2$ (II) formed $AcNHC_6H_4NHCONHPh$ with $NH_2CONHPh$ and $(AcNHC_6H_4NH)_2CS$ with $(NH_2)_2CS$ (III). III gave $(PhNH)_2CS$ with $PhNH_2$ (IV) but formed $NH_2NHCSNHPh$ with PhNHNH$_2$ (V). $(NH_2CO)_2$ condensed with II, IV and V to yield (*p-AcNHC$_6$H$_4$NHCO*)$_2$, m. above 370°, (*PhNHCO*)$_2$ and (*PhNHNHCO*)$_2$. II, IV and V gave (*p*-$AcNHC_6H_4NHCO)_2CH_2$, m. 235°; $CH_2(CONHPh)_2$ and $CH_2(CONHNHPh)_2$ with $CH_2(CONH_2)_2$ and when condensed with $(CH_2CONH_2)_2$ yielded (*p-AcNHC$_6$H$_4$NHCOCH$_2$*)$_2$, m. 317° (decompn.), $(PhNHCOCH_2)_2$ and $PhNHNHCOCH_2)_2$. AcNHPh was obtained in 80% yield from $AcNH_2$ and IV, on complete removal of AmOH and crystn. of the residue from hot H_2O. C. R. ADDINALL

Chlorination of iodophenols. III. Chlorination of *o*-iodophenol. SAMUEL BUCHANAN AND HAMILTON MCCOMBIE. *J. Chem. Soc.* **1931**, 137-44; cf. *C. A.* **7**, 1706.—o-IC_6H_4OH (I) in CCl_4 gives on chlorination a sequence of unstable iododichlorides and decompn. products very similar to those obtained from the *p* isomer. I *acetate*, oil; dichloride, m. 92-3° (decompn.), unstable. I *benzyl ether*, oil; the dichloride unstable. I *benzoate*, m. 34°; *dichloride*, m. 98-101° (decompn.), stable. I *phenyl carbamate*, m. 121-2°; Cl in $CHCl_3$ gives the *dichloride*, m. 125° (decompn.) of *2-iodophenyl 2,4-dichlorophenylcarbamate*, m. 145°; its constitution was proved by its synthesis from the 2 components. A 10% soln. of I in CCl_4, satd. with dry Cl at 0°, gave *4-chloro-2-iodophenol* (II), m. 78°; its constitution was established by synthesis from 4,2-Cl(O$_2$N)C$_6$H$_3$OH; whose *benzyl deriv.*, m. 84-5°. II *acetate*, oil; the dichloride decomps. rapidly. II *benzyl ether*, m. 60°; dichloride, decomps. 95-7°, decomps slowly over 4-5 days. II *benzoate*, m. 88°; *dichloride*, stable, m. 103-4° (decompn.). II *phenylcarbamate*, m. 128°; Cl in $CHCl_3$ gives the *compd* $C_{13}H_7O_2NCl_3I$, m. 146°. Further chlorination of II in CCl_4 gives *4,6-dichloro-2-iodophenol* (III), m. 62°; this is more easily obtained by rapid chlorination of I. III *acetate*, m. 59°, the dichloride decomps. in 5-6 days. III *benzyl ether*, m. 62°; the dichloride decomps. over several days. III *benzoate*, m. 89°; chlorination does not give the dichloride. III *phenyl carbamate*, m. 181°; no dichloride pptd. with Cl but HCl was evolved. Further chlorination of III gives a small amt. of the *tri-Cl deriv.*, m. 52-4°. *2-Iododiphenyl ether*, m. 55-6°, results from the NO_2 deriv. by reduction and the Sandmeyer reaction; the *dichloride*, m. 81-2° (decompn.), is unstable and decomps. in 2 days. *ω 2'-Iodophenoxyacetophenone*, m. 123°, from I and $BzCH_2Cl$; dichloride, m. 98° (decompn.), moderately stable. I and $COCl_2$ in pyridine give *di-2-iodophenyl carbonate*, m. 88°; *dichloride*, m. 108° (decompn.), stable. I *p-toluenesulfonate*, m. 80°; *dichloride*, m. 95-7° (decompn.), stable. I *allyl ether*, oil; Cl gives the *compd*. $C_9H_9OCl_4I$, m. 81° (decompn.), slowly decomps. in the air. I *dibromopropyl ether*, oil; the *dichloride*, m. 118° (decompn.), decomps. slowly in 4 weeks, giving *4-chloro-2-iodophenyl dibromopropyl ether*, m. 52°. I *Et carbonate*, oil; a dichloride could not be prepd. Chlorination of I in CCl_4 at 60-70° gives chloranil and hexachlorocyclohexadienone. *p*-ClC_6H_4OH and ICl give *4-chloro-2,6-diiodophenol*, m. 106-7°; the dichloride is unstable. Chlorination of a 10% soln. of $PhNHCO_2Ph$ in $CHCl_3$ at 0° gives *4-chlorophenyl 2,4-dichlorophenylcarbamate*, m. 157°; its structure was established by condensing *p*-ClC_6H_4OH with *2,4-dichlorophenylcarbimide*, m. 61°. C. J. WEST

Chlorination and nitration in methanol as a medium. E. PLAZEK. *Roczniki Chem.* **10**, 761-76(776 German)(1930).—In order to investigate the possibility of introducing MeOH as a solvent and diluent in the chlorination and bromination of various compds., PhOH, *m*-cresol, PhOMe, 2- and 3-$HOC_6H_4CO_2H$, benzoic acid, 4-$NO_2C_6H_4OH$, 1,2-acetylphenylenediamine, 4-sulfophenol, 4-$NO_2C_6H_4NH_2$, 2-$NO_2C_6H_4NH_2$

2- and 4-$H_2NC_6H_4CO_2H$ were chlorinated and PhOH, *m*-cresol, 4-ClC_6H_4OH, 2-ClC_6H_4OH, veratrole and *p*-$C_6H_4(OMe)_2$ nitrated in MeOH as a medium. MeOH was found to be a good solvent in chlorinations, equal in value to AcOH; it possesses the advantage of greater volatility and can be more easily regenerated. In some cases the influence of temp. and diln. on the course of chlorination was investigated and found to be insignificant. Analogous expts. with EtOH showed that this solvent is much inferior to MeOH in chlorination and quite unsuitable in nitration. Nitration in MeOH could be performed with success only in the case of PhOH and its derivs., especially 2- and 4-ClC_6H_4OH, veratrole and *p*-$C_6H_4(OMe)_2$. J. KUČERA

New method of reducing aromatic nitro compounds. THEODORA E. DE KIEWIET AND HENRY STEPHEN. *J. Chem. Soc.* **1931**, 82–4.—Cryst. $SnCl_2$ is dehydrated with Ac_2O and the nitro compd. added and heated until soln. results; in this way, *e. g.*, $PhNO_2$ gives nearly quant. *p*-ClC_6H_4NHAc. Difficulty was experienced in the isolation of the anilides resulting from the reduction of *m*-substituted NO_2 compds. and it was found necessary to isolate the free bases by steam distn. in alk. soln. A 30% yield of the anilides may be obtained if the residue after removal of the AcOH is extd. with hot C_6H_6. *3-Chloro-6-acetamidophenol*, m. 186°, and *3-chloro-4-acetamidophenyl acetate*, m. 127°, result by the reduction of 3,6- and 3,4-$Cl(O_2N)C_6H_3OH$. In *p*-substituted NO_2 compds. no chlorination takes place except in the case of *p*-$ClC_6H_4NO_2$ which, only if HCl is present during the reduction, gives 2,4-$Cl_2C_6H_3NHAc$. The reduction of *o*-$O_2NC_6H_4OH$ and certain of its derivs. yielded in each case a *N*-Ac deriv., although sufficient Ac_2O was present to acetylate the HO group. α-Methylbenzoxazoles may be intermediate products in their reduction The reduction products isolated from a no. of compds are listed C. J. WEST

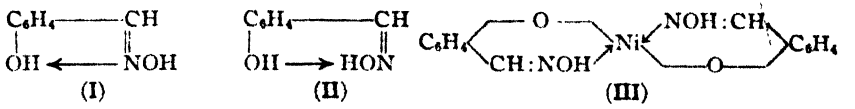
The production of *p*-aminophenol. JULIUS ALTPETER. *Metallborse* **20**, 2803–4 (1930); **21**, 27–8 (1931).—A review is given of the various methods devised for the production of *p*-$NH_2C_6H_4OH$ (I), and of the reactions in which I is a product. Short descriptions are given of the reduction of *p*-$NO_2C_6H_4OH$ by means of metal and acid combinations, by P, I and HCl, by the use of Na_2S, and by catalytic hydrogenation, and of the employment of metal-acid combinations and of Na_2S in the reduction of *p*-NOC_6H_4OH. Prepns. depending on the cleavage of azo compds. include the reduction of *p-dihydroxyazobenzene* by $SnCl_2$ in acid soln., Zn and NaOH and alk. Na_2S. *Benzeneazophenol* (II) in Na_2CO_3, treated with H_2S, gives a mixt. of $PhNH_2$ and I. Other methods for the cleavage of II include treatment with alc. NH_3 satd with H_2S, reduction with metal-acid combinations and fusion with NH_2NHPh. By the reduction of 4,4'-$HOC_6H_4N{:}NC_6H_4SO_3Na$ with Fe and H_2SO_4 80% of I and 95% of $NH_2C_6H_4SO_3H$ are obtained The reduction can also be carried out with Fe and NaCl The *disazo dye* formed by coupling 2 mols of PhOH with tetraazodiphenyl can be cleaved by catalytic hydrogenation into $(C_6H_4NH_2)_2$ and I. Under the heading of various methods of prepn. and formation of I are listed the change of *p*-ClC_6H_4OH into I by NH_4OH and $CuSO_4$; the conversion of PhN_2 by the action of H_2SO_4 in the presence of AcOH; the oxidation of PhNH by $K_2Cr_2O_7$ and of $HO_3SC_6H_4NH_2$ by MnO_2 and H_2SO_4; the transformation of PhNHOH on heating with acid, and a similar transformation following the soln. of $PhNO_2$ in a soln. of S in 35–40% oleum at 20°; the reaction of NOCl with C_6H_6 in the presence of $AlCl_3$; the action of H_2O_2 on $PhNHMgBr$ in Et_2O; the hydrolyses of *N*-phenyl-α-indole oxime and phenolphthalein oxime by 25% H_2SO_4; the cleavage of nitrones and the distn. of 5,2-$H_2N(HO)C_6H_3CO_2H$. The original method of Gattermann for the prepn. of I by the electrolysis of a soln. of NO_2Ph in H_2SO_4 has been modified in many ways. The various changes involving cell construction, electrodes, solns., temp., agitation, c. d., time, by-products of the reaction, etc., are summarized. C. R. A.

Reaction of *p*-anisidine and ethyl methylacetoacetate. WM. O. KERMACK AND JAMES F. SMITH. *J. Chem. Soc.* **1931**, 221–2.—*p*-$MeOC_6H_4NH_2$ (I) and $AcCHMeCO_2Et$ (II) appear to give a *compd.*, $C_{21}H_{28}O_4N_2$, formed from 2 mols. I and 1 mol. II, m. 51°; this is confirmed by analysis, its gradual decompn. in a stoppered bottle, its behavior with Ac_2O and mol.-wt. detn. C. J. WEST

Preparation of an *o*-aminothiophenolsulfonic acid. JAKOB POLLAK AND KARL DEUTSCHER. *Monatsh.* **56**, 365–80 (1930).—$(2\text{-}H_2NC_6H_4)_2S_2$ is decompd. by $ClSO_3H$ at −20° and by fuming H_2SO_4 under various conditions. Phenylenediazosulfide is unaffected by fuming H_2SO_4 (25–70% SO_3) at 160–70°. *o*-$H_2NC_6H_4SH$ could not be sulfonated. 4,3-$Cl(O_2N)C_6H_3SO_2K$ and Na_2S_2 in 96% EtOH give *K 2,2'-dinitrodiphenyl disulfide-4,4'-disulfonate;* in H_2O reduction occurs with either Na_2S or Na_2S_2. The Ba salt of 4,3-$Cl(O_2N)C_6H_3SO_2H$ and K xanthate in H_2O give EtOH, Et xanthate, CS_2 and the *Ba salt* (I) of 2,2'-dinitrodiphenyl sulfide-4,4'-disulfonic acid (II), crystg. with 5 mols. H_2O; with $AcONH_4$ only a small amount of the sulfide is produced. II

and PCl_5 give the *dichloride* of II, orange-yellow, m. 195°, crystg. with 0.5 mol. C_6H_6; oxidation of the chloride with fuming HNO_3 gives *2,2'-dinitrodiphenyl sulfone-4,4'-disulfonic acid*, whose *Pb salt* crystallizes with 3 mols. H_2O and whose *Ba salt* also crystallizes with 3 mols. H_2O; this also results by the oxidation of I. Reduction of I with Sn and HCl gives *2,2'-diaminodiphenyl sulfide-4,4'-disulfonic acid*, crystallizes with 3 mols. H_2O and readily oxidizes in the air. The diazo compd. gives a red disazo dye with β-$C_{10}H_7OH$. Treatment of the reaction product from 4,3-$Cl(O_2N)C_6H_3SO_2Na$ and $Na_2S_2O_3$ with PCl_5 also gives the chloride; when the K sulfonate is treated similarly *Na 2,2'-dinitrodiphenyl sulfide-4,4'-disulfonate* is obtained. 4,3-$Cl(O_2N)C_6H_3SO_2K$ and KHS, heated in H_2O, the soln. evapd. to dryness and the residue reduced with Sn and HCl, give 75% of *2-aminothiophenyl-4-sulfonic acid;* $NaNO_2$ gives a diazo compd. which does not couple with β-$C_{10}H_7OH$. With the K sulfonate there results *K 5-nitrophenothiazine-3,8-disulfonate*, crystg. with 2 mols. H_2O. Numerous attempts to prep. the acid with other S-contg. salts were unsuccessful. C. J. West

Coördination compounds of oximes. II. Nickel and cobalt compounds of *o*-hydroxybenzaldoxime. Oscar L. Brady. *J. Chem. Soc.* 1931, 105–7; cf. *C. A.* **24**, 5296.—*o*-$HOC_6H_4CH:NOH$ (I) has all the properties of a coördination compd. and probably should be formulated as I, rather than II, because it yields a NOAc deriv.



(I) (II) (III)

with Ac_2O at room temp. The *Ni salt*, dark green needles, and the *Co salt*, dark brown powder, are of the the type III. No evidence of the β-isomers could be obtained. Under the conditions specified by Ephraim (*C. A.* **24**, 5665) for the detn. of Cu by I, Ni salts give some ppt.; the presence of salts of weak acids in any quantity would also invalidate the method. C. J. West

Action of mustard oils on oximes. An. Obregia and C. V. Ghrorghiu. *J. prakt Chem.* **128**, 239–319(1930).—α-PhCH:NOH (I) and PhNCS (II) at room temp. in a sealed tube give COS, PhCN and $(PhNH)_2CS$; in boiling C_6H_6 the reaction products are the same, while if the 2 compds. are heated without a solvent to 80°, COS is evolved and S and $(PhNH)_2CO$ are isolated; in EtOH-KOH, $(PhNH)_2CO$, $(PhNH)_2CS$ and $PhNHCO_2N:CHPh$ are the products. The β-oxime and II, heated to 120°, evolve COS and give $(PhNH)_2CO$. In a sealed tube at room temp., there results COS and $(PhNH)_2CS$. In alk. medium, the products are S, PhCN and $(PhNH)_2CS$. I and *o*-MeC_6H_4NCS in C_6H_6 at room temp. give $(o\text{-}MeC_6H_4NH)_2CS$ (III), m. 158°. In a sealed tube, COS, III and PhCN were obtained, while in alk. reaction the products are *carbo-o-toluido-α-benzaldioxime*, m. 124°, and $(o\text{-}MeC_6H_4NH)_2CO$, m. 158°. I and *p*-$MeC_6H_4NCS$ behave similarly. MeCH:NOH and II give COS and $(PhNH)_2CS$ in a sealed tube or in an open vessel; in EtOH or C_6H_6, autoxidation and decompn take place. *o*-MeC_6H_4NCS give S and III. In *o*-$HOC_6H_4CH:NOH$ only the oxime group reacts with II; in alk. soln. the products are the nitrile and $(PhNH)_2CS$; the possible reactions involved in the formation of the nitrile are discussed. *p*-$MeOC_6H_4CH:NOH$ and II in EtOH at room temp. give the nitrile and $(PhNH)_2CS$; the β isomer behaves in the same manner. Furfur-*syn*-aldoxime and II in EtOH-KOH give $(PhNH)_2CS$, $(PhNH)_2CO$, S and the nitrile; the *anti*-oxime behaves similarly in EtOH, while with alkali there results the carbanilino deriv., m. 138°, identical with that obtained by the use of PhNCO. *o*-MeC_6H_4NCS gives only $(o\text{-}MeC_6H_4NH)_2CO$. $Me_2C:NOH$ and II in EtOH at room temp. give $Me_2C:NOCONHPh$, m. 108°, and S. *o*-MeC_6H_4NCS gives *carbo-o-toluidoacetoxime*, m. 81–2°; the *p-deriv.* m. 105–6°. MeEtC:NOH and II, without a solvent, give the *carbanilino deriv.*, $MeEtC:NOCONHPh$, m. 135°; this also results in Me_2CO soln.; in alk. soln. there is also formed $H_2S_2O_3$ or its decompn. products, H_2SO_3 and S. If the reacting compds. are heated, there results the carbanilino deriv. and $(PhNH)_2CS$. *o*-MeC_6H_4NCS gives *carbo-o-toluido methyl Et ketoxime*, m. 80°; the *p-isomer* m. 146–7°. *Carbanilinodiethyl ketoxime*, m. 96–8° (25% yield); *methylpropyl deriv.*, m. 146° (13% yield). Me iso-Bu ketoxime, b. 175°, d_4^{17} 0.8935, n_D^{14} 1.456; *carbanilino deriv.*, m. 117° (20% yield); *carbo-o-toluido deriv.*, m. 184°. MePhC:NOH gives a carbanilino deriv., m. 131.5°; *carbo-o-toluido deriv.*, m. 109°; *p-isomer*, m. 126°. *Carbanilinoresacetophenoxime*, pale yellow, m. 118–20°; *o*-MeC_6H_4NCS did not react. $Ph_2C:NOH$ gives $Ph_2C:NOCONHPh$, m. 176°. $(Me_2NC_6H_4)_2C:NOH$ did not react with II or the *o*-Me deriv. *Carbanilino methyl p-tolyl ketoxime*, m. 112°. Monoximes of diketones do not react with II; α

isonitroso acids, such as $AcC(:NOH)CH_2CO_2H$ or $PhC(:NOH)OH$, also do not react with II. C. J. WEST

The constitution of certain compounds formed by the action of alcoholic hydrochloric acid on unsaturated ketones. BRIAN COFFEY AND HUGH RYAN. *Proc. Roy. Irish Acad.* **B39**, 434–9(1930); cf. *C. A.* **23**, 3213; **24**, 5293.—The dimer formed by the action of alc. HCl on $PhCH:CHCOEt$ (I) yields a monoxime (II), m. 242–3°. II is reconverted into I by treatment with concd. H_2SO_4 or by boiling with alc. HCl and is unchanged by further treatment with $NH_2OH.HCl$ (III), hence it is assumed that I is $CHPh.CHPh.CH(COEt).CHCOEt$ instead of the sym. $EtCOCH.CHPh.CH(COEt).CHPh$. The compd. formed by treating II with P_2O_5 appears to be $EtCOCH.CHPh.CHPh.CHCONHEt$ (IV). IV does not absorb Br_2 nor react with III. Heated with dil. H_2SO_4, extd. with Et_2O, PhH and $CHCl_3$, neutralized with KOH, distd. and the distillate tested with I_2 in NaOH, IV gave the CHI_3 test but none of the exts. left any residue. C. H. PEET

2-Hydroxy-4-methoxy- and 4-hydroxy-2-methoxybenzaldehyde. THEODORA ELIZABETH DE KIEWIET AND HENRY STEPHEN. *J. Chem. Soc.* 1931, 84–5.—*m*-$MeOC_6H_4OH$ (20 g.) in 70 cc. abs. Et_2O and 20 g. HCN, satd. with dry HCl and kept in a refrigerator for not more than 24 hrs. and the pptd. aldimine-HCl dissolved in 2 l. cold H_2O and heated to boiling, give 9.5 g. 2,4-$HO(MeO)C_6H_3CHO$ (I), removed in a current of steam, and 10 g. of 4,2-$HO(MeO)C_6H_3CHO$ (II). II *phenylhydrazone*, yellow, m. 158°; *p-nitrophenylhydrazone*, dark red, m. 255° (decompn.); *semioxamazone*, m. 242°. I *p-nitrophenylhdrazone*, bright red, m. 226.5°; *semioxamazone*, lemon-yellow, m. 247°; *semicarbazone*, m. 230°. C. J. WEST

Condensation of aldehydes with hydrazones. II. Condensation of anisaldehyde and of salicylaldehyde with their respective phenylhydrazones. ANTONINO GIACALONE. *Gazz. chim. ital.* **60**, 818–21(1930).—The expts. are in continuation of the previous ones (cf. *C. A.* **24**, 837) and employ the same method. Each aldehyde can condense with its own phenylhydrazone or with the phenylhydrazone of another aldehyde, so that from BzH, *p*-$MeOC_6H_4CHO$ (I), *o*-HOC_6H_4CHO (II) and phenylhydrazine, 9 condensation products can be obtained. The earlier paper and present paper describe 3 of these; the remainder will be described in later papers. I (3 mols.), mixed with $PhHNNH_2$ (III) (2 mols.), when the reaction is completed $ZnCl_2$ (10 g.) added, heated on a water bath until the mixt. becomes thoroughly hard, finely ground, washed with steam (to remove I), dried in the air, extd. with boiling C_6H_6 and the residue recrystd. from boiling PhMe, yields *p,p'-dimethoxydibenzal-p,p'-dihydrazino-p''-methoxytriphenylmethane*, $MeOC_6H_4CH(C_6H_4NHN:CHC_6H_4OMe)_2$, pale violet, m. 215–6°. Following the same procedure except that the hardened mass is washed with boiling EtOH instead of C_6H_6 before recrystn. from boiling PhMe, II (3 mols.) and III (2 mols.) yield *o,o'-dihydroxydibenzal-p,p'-dihydrazino-o-hydroxytriphenylmethane*, $HOC_6H_4CH(C_6H_4NHN:CHC_6H_4OH)_2$, yellow, blackens 235°, m. 240°, sol. in dil. aq. NaOH from which solns. it is repptd. by acids. **III. Condensation of salicylaldehyde, of anisaldehyde and of *p*-nitrobenzaldehyde with benzalphenylhydrazine.** *Ibid* 821–4.—*o*-HOC_6H_4CHO (5 g.) and $PhCH:NNHPh$ (I) (16 g.) treated with $ZnCl_2$ (5 g.) and a little PhMe to make a uniform paste, heated on a water bath, with agitation until the fused reaction mixt. becomes green and solidifies, a little water added, heated further, finely ground, washed with steam, dried in the air, dissolved in hot C_6H_6, filtered and cooled, ppts. *p,p'-dibenzaldihydrazino-o-hydroxytriphenylmethane*, $HOC_6H_4CH(C_6H_4NHN:CHPh)_2$ (II), m. 185°, insol. in dil. aq. NaOH (suggesting that the OH has taken part in the reaction, but this is disproved by the formation of an Ac deriv.). II, Ac_2O and fused AcONa refluxed 3 hrs., poured into water, let stand until solidified, dried, pulverized, dissolved in AcOH, poured into water and dried in air and then over H_2SO_4 in a desiccator, yield the *Ac deriv.*, $AcOC_6H_4CH(C_6H_4NAcN:CHPh)_2$, m. 109–10°. Similarly anisaldehyde (5 g.), phenylhydrazine (14.5 g.) and $ZnCl_2$ (5 g.), heated until hard, steam-distd., the residue washed with EtOH, dissolved in C_6H_6 and poured into ligroin, ppts. *p,p'-dibenzaldihydrazino-p''-methoxytriphenylmethane*, $MeOC_6H_4CHC_6H_4NHN:CHPh)_2$, yellow, amorphous, m. around 125°, could not be crystd. from any solvent. *p*-$O_2NC_6H_4CHO$ (2 g.), I (5.2 g.) and $ZnCl_2$ (2 g.), heated as before until hard, pulverized, boiled with water and then with EtOH, the residue purified by soln. in hot PhMe, yield *p,p'-dibenzaldihydrazino-p''-nitrotriphenylmethane*, $O_2NC_6H_4CH(C_6H_4NHN:CHPh)_2$, orange-yellow, m. 213–4°. C. C. DAVIS

A simple method for the preparation of phenylglyoxal. CARL NEUBERG AND EDUARD HOFMANN. *Biochem. Z.* **229**, 443–5(1930).—The following reaction is utilized

for the prepn. of phenylglyoxal: $PhCOCH{:}NOH + ONO.SO_3H = PhCOCHO + N_2O + H_2SO_4$. Ten g. of PhCOCH:NOH is dissolved in 35 cc. dioxane, dild. with 10 cc. H_2O and cooled to 0°. With const. shaking 8.5 g. of $NO_2.SO_3H$ crystals is added while the temp. is kept below 5°. Then the mixt. is warmed up to 40°, whereupon a vigorous reaction and evolution of gas occur. The flask must be kept in cold water to prevent the temp. from rising above 60°. This is now transferred with about 100 cc. H_2O to a Claisen flask and evapd. to 70 cc. *in vacuo*. The oily residue is extd. 3 times with 50 cc. ether, and the combined ether exts. are washed several times with small quantities of H_2O. After removing the ether the PhCOCHO is extd. from the oil by boiling twice with 40-cc. quantities of H_2O. The hot soln. is filtered and evapd. *in vacuo* to 30 cc., and on cooling with ice massive crystallization occurs. S. MORGULIS

Dimethylallylbenzylacetic acid and isopropylbenzylvalerolactone. G. DARZENS AND A. LÉVY. *Compt. rend.* **191**, 1455-7(1930); cf. *C. A.* **21**, 581.—$Me_2C{:}CHCH_2OH$ with HBr gas gives $Me_2C{:}CHCH_2Br$, b 120°, which with $PhCH_2CNa(CO_2Et)_2$ gives $Me_2C{:}CHCH_2C(CH_2Ph)(CO_2Et)_2$, b_9 184-7°. This ester on saponn. and heating *in vacuo* to 160° gives 80% $Me_2C{:}CHCH_2C(CH_2Ph)CO_2H$, b_7 157-60°, m. 49.5°, and 20% lactone, m. 25° and b_8 148-50°. This does not condense to give a hydronaphthalene deriv. V. F. HARRINGTON

Spectrochemical study of amino acid anhydrides. IV. Light absorption of derivatives of azlactones, diketopiperazine, hydantoin and thiohydantoin. TIE-ICHI ASAHINA. *Bull. Chem. Soc. Japan* **5**, 354-65(1930); cf. *C. A.* **24**, 298.—The ultraviolet absorption of azlactones of substituted hippuric acids, RCH:C(CO)O(CPh)N where R is *o*- (I), *m*- (II), or *p*-$AcOC_6H_4$ (III), *o*- (IV), *m*- (V), or *p*-$MeOC_6H_4$ (VI); of RCH:C(CO_2H)NHCOPh, where R is furyl (VII), Ph (VIII), *o*-, *m*- or *p*-HOC_6H_4 (XV), *o*-, *m*- or *p*-$MeOC_6H_4$ (XVI); dibenzal- (IX), and difuraldiketopiperazine (X); 4-benzal (XI), and 4-furalhydantoin (XII); 2-thiohydantoin and its following derivs.: 3-acetyl, 3-benzoyl, 3-acetyl-4-benzyl, 4-benzyl, 4-(*p*-hydroxybenzyl), 4-benzal (XIII) and 4-fural (XIV). VII, X, XII and XIV are more bathochromic and hyperchromic than VIII, IX, XI and XIII. I, II and III have an absorption max. near 3580 A. U. IV and VI have the same max. while V is less bathochromic. The azlactones are far more bathochromic than their hydrolysis products, XV and XVI. Absorption curves and methods of prepn. are given. V. F. HARRINGTON

Esterification of 3,5-diamino- and iodobenzoic acids with alcoholic hydrogen chloride. ANTON KAILAN AND ADOLF IRRESBERGER. *Monatsh.* **56**, 407-27(1930).—The unimol. velocity coeffs. of esterification of 3,5-$(H_2N)_2C_6H_3CO_2H$ (I) and *o*-, *m*- and *p*-$IC_6H_4CO_2H$ with EtOH-HCl in the presence and absence of H_2O have been detd. at 25°. With EtOH contg. little H_2O the coeffs. for all the acids are proportional to the concn. of the HCl; in moist EtOH the coeffs. increase much more rapidly. The values for I show that the introduction of a 2nd *m*-NH_2 group into BzOH has a much smaller effect than the first. The retarding action of the halogen atom is most marked with the *o*-I acid and least with the *m*-isomer. For the *o*-halogenobenzoic acids, the coeff. decreases with increasing at. wt. of the halogen atom. All the *m*-halogeno acids have approx. the same coeff., which is less than that for BzOH. C. J. WEST

Behavior of some condensation products of *p*-dimethylaminobenzaldehyde toward bromine and nitrous acid. K. H. BAUER AND MARIE SEYFARTH. *Ber.* **63B**, 2691-5 (1930).—It had been shown that the condensation products of BzH with $PhCH_2CN$, $NCCH_2CO_2Et$ and other compds. do not add Br normally but are unreactive toward it. To det. whether this behavior is influenced by introduction of a Me_2N group into the Ph nucleus, the condensation products of *p*-$Me_2NC_6H_4CHO$ with $PhCH_2CN$, $NCCH_2CO_2Et$, $CH_2(CN)_2$, MeCOPh and Me_2CO were treated with Br and HNO_2. With *p*-$Me_2NC_6H_4CH{:}CPhCN$ (I), *p*-$Me_2NC_6H_4CH{:}C(CN)CO_2Et$ (II), *p*-$Me_2NC_6H_4CH{:}C(CN)_2$ (III) and *p*-$Me_2NC_6H_4CH{:}CHCOPh$ (IV), for the most part no Br or N_2O_3 is added at the double bond but Br is substituted in the $Me_2NC_6H_4$ nucleus in the *o*-position to the Me_2N group, as was shown by synthesis of the products, and N_2O_3 gives the corresponding NO_2 derivs. The yields in all cases were 60-75%. When, however, the PhCO group in IV is replaced by MeCO, *i. e.*, with *p*-$Me_2NC_6H_4CH{:}CHCOMe$, there is formed, by primary addn. of Br at the double bond and subsequent elimination of HBr, ***α-p-dimethylaminophenyl-β-bromo-β-acetylethylene*** **(V)**, whose ***phenylhydrazone*** **(VI)** rearranges in AcOH on the H_2O bath into ***N-phenyl-3-methyl-5-p-dimethylaminophenylpyrazole*** **(VII)**, with loss of H_2O. ***α-Phenyl-p-dimethyl-m-bromocinnamonitrile***, from 3,4-$Br(Me_2N)C_6H_3CHO$ and $PhCH_2CN$ with a few drops KOH in alc. or from I with Br in $CHCl_3$, green-yellow, m. 102°. ***m-Nitro analog***, similarly prepd. from 3,4-$O_2N(Me_2N)C_6H_3CHO$ and $PhCH_2CN$ or from I with $NaNO_2$ in AcOH.

deep red, m. 128°. *Et α-cyano-β-dimethylamino-m-bromocinnamate*, light yellow, m. 107°; *m-nitro analog*, m. 172–3°. *(p-Dimethylamino-m-bromobenzal)malononitrile*, golden yellow, m. 123–4°; *m-nitro compd.*, orange-yellow, m. 147–8°. *(p-Dimethylamino-m-bromobenzal)acetophenone*, pale green-yellow, m. 82°. V, light yellow, m. 92°. VI, green, m. 127°. VII, m. 148–50°, gives the Knorr pyrazoline reaction after reduction with Na and alc. C. A. R.

The mechanism of the action of organomagnesium compounds on the *N*-disubstituted amides of α,β-unsaturated acids. COSTIN D. NENITZESCU. *Bul. soc. chim. Romania* **12**, 48–57(1930).—N. shows errors in the work of Maxim and Ioanid (cf. *C. A.* **23**, 2697; **22**, 4114). M. and I. condensed PhCH:CHCONEtPh with PhMgBr and added AcCl and reported that they obtained the unsatd. ester 3,3-diphenyl-1-ethylphenylamino-Δ¹-1-propenol acetate (I). N. repeated this work and finds that the product is not unsatd. since it does not decolorize Br water or alk. $KMnO_4$ but does yield with $PhNHNH_2$ a hydrazone, m. 178°, which shows that the compd. possesses a ketone group and must be $Ph_2CHCHAcCONEtPh$ (II). Synthesis of II as indicated by the scheme: $Ph_2CHBr + NaOC(Me):CHCO_2Et \longrightarrow Ph_2CHCHAcCO_2Et + PhNHMe \longrightarrow$ II, a compd. which melts at the same point as M. and I.'s compd. to which they give formula I, but yields a hydrazone m. 178° and identical with the hydrazone from II. In the same way M. and I. have erred in the constitution of the products of methyl- and phenylanilides of cinnamic acid with PhMgBr and AcCl. N. also points out that the work of M. and I. is almost an identical repetition of the earlier work of Köhler and Heritage [*Am. Chem. J.* **33**, 21(1905)] and that M and I. apparently did not know of the work of Claisen (*Ann.* **277**, 171) and others showing that AcCl gives a *C*-deriv. instead of an *O*-deriv. or they would not have fallen into this error. N. attempted to prep. the *O*-deriv. by treating the condensation product of PhCH:CHCONEtPh and PhMgBr with $ClCO_2Et$ but obtained a yellow oil which he did not succeed in crystg. but which decolorized Br water and is probably an enol *O*-deriv. Maxim (cf. *C. A.* **24**, 2427) condensed MeCH:CHCONPh₂ with MeMgI and obtained iso-BuCONPh₂ in 1.2 percent yield and a compd $C_{37}H_{34}O_2N_2$ (III) to which M. assigns the formula $MeCH(NPh_2)CH(CONPh_2)COCH_2CHMe_2$ (IV) in 80% yield. M. reports that hydrolysis of IV gives 2 compds. (one from acid hydrolysis and one from alk. hydrolysis) m. 158° and 153°, which are stereoisomers. N. repeated the work of M. but on hydrolysis of 1 g. of III with 10 cc. of 49% HBr obtained Ph_2NH and α-methyl-β-isopropylglutaric acid (V), m. 116–7°. (This name seems to be in error in the paper and should be β-methyl-α-isopropylglutaric acid.) On alk. hydrolysis of III N. obtained a compd. VI, m. 156° which is probably a mixt. of III and III partially hydrolyzed, *e. g.*, at one of the CO_2H groups. Treatment of VI with 15 cc. 49% HBr yielded V. N. attributes the errors of M. to incomplete hydrolysis of III. N. explains the formation of III by the following scheme and shows its constitution to be represented by VII rather than IV. $MeCH:CHCONPh_2 + MeMgI \longrightarrow Me_2CHCH:C(OMgI)NPh_2$ (VIII) + $MeCH:CHCONPh_2 \longrightarrow Me_2CHC(CHMeCH_2CONPh_2):C(OMgI)NPh_2 + H_2O \longrightarrow Me_2CHCH(CHMeCH_2CONPh_2)CONPh_2$ (VII) + MgIOH. VIII possesses enolic properties and adds on to a 2nd mol. of $MeCH:CHCONPh_2$. The mechanism of addn. of organomagnesium compds. to *N*-disubstituted amides of both cinnamic and crotonic acids is at the ends of the conjugated system C:C.C:O and in accord with the work of Köhler and Heritage. ODEN E. SHEPPARD

Two modifications of *p*-hydroxybenzoic acid methyl ester. LUDWIG KOFLER AND ADELHEID KOFLER. *Mikrochemie* **3**, 44–51(1931).—If the ester is sublimed and cooled, crystals are obtained which m. 110° in the micro m.-p. app., but if the sublimation takes place without cooling the vapors (by a piece of wet paper on the cover glass), the crystals obtained m. 126°. By dissolving the lower-melting product and recrystg., the substance with the higher m. p. is obtained. The 2 forms of crystals are also distinguishable in the polarization microscope. W. T. H.

A relation between rotenone, deguelin and tephrosin. E. P. CLARK. *Science* **73**, 178(1931); cf. *C. A.* **24**, 2752; **25**, 1252.—The evidence shows that these substances, which together with toxicarol are the principal toxic constituents of derris and "cube" roots, are closely related chemically. Rotenone upon mild oxidation yields dehydrorotenone, $C_{23}H_{20}O_6$. This compd. when boiled with alc. KOH and Zn dust forms HO acid, $C_{23}H_{24}O_8$, which when oxidized with H_2O_2 yields derric acid, $C_{12}H_{14}O_7$. Deguelin, $C_{23}H_{22}O_6$, when oxidized with $K_3Fe(CN)_6$ gives dehydrodeguelin, $C_{23}H_{20}O_6$, which is analogous to dehydrorotenone. On boiling with alc. KOH dehydrodeguelin yields deguelic acid, $C_{23}H_{24}O_8$, which when oxidized with H_2O_2 also yields derric acid. Tephrosin, $C_{23}H_{22}O_7$, when treated with a mixt. of H_2SO_4 and AcOH forms dehydro-

deguelin. Derric acid thus constitutes one-half of the mol. of rotenone, deguelin and tephrosin. LAWRENCE P. MILLER

Rotenone, the effective constituent of derris root. VIII. The chemical constitution of derric acid and risic acid. SANKICHI TAKEI, SHIKIRO MIYAJIMA AND MINORU ONO. *Bull Inst. Phys. Chem. Research* (Tokyo) **9**, 1016–22(1930); *Abstracts* 95–9(in German) published with *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) **15**, Nos. 278–81); cf. *C. A.* **24**, 4037.—Rotenone (20 g.) and 50 g. anhyd. AcONa in 500 cc. EtOH, treated with 16 g. I_2 in 130 cc. EtOH in 1.5 hrs., followed by boiling for an hr. and filtering off the AcONa, give 14 g. of *dehydrorotenone* (I), m. 216°; 4.3 g. more is obtained from the EtOH filtrate. No Ac deriv. of rotenolone occurs. I (20 g.) in 300 cc. EtOH and 7 g. KOH in 7 cc. H_2O give 16 g. of *derrisic acid*, $C_{21}H_{18}O_6(OMe)_2$ (II), m. 153°, which with $NH_2OH.HCl$ and AcONa gives 80% of *derrisic acid oxime*, $C_{23}H_{24}O_7$:NOH, m. 142°. It gives with $FeCl_3$ the purple color, proving the presence of a phenolic OH radical. Ten g. II in 200 cc. KOH (1%) with 75 g. $KMnO_4$ in 700 cc. H_2O gives 2.6 g. of *risic acid*, 2,5-$(MeO)_2C_6H_3C(OH)(CO_2H)_2$ (III), m. 225°, which is not changed by H_2O_2 oxidation in alk. soln., but entirely decompd. by prolonged heating with $KMnO_4$. III, methylated with CH_2N_2, gives quant. its *di-Me ester*, $C_8H_4O_2(OMe)_4$, colorless, m. 86°, insol. in $NaHCO_3$ but sol. in NaOH; with alkali it is converted into III. Three g. III, heated for 7 mins. at 255–60°, gives 1.3 g. of *decarboxyrisic acid*, $C_8H_6O_2(OMe)_2$ (IV), m. 116°, crystals from H_2O, m. 68–98° but m. 116° when the water of crystn. is lost. The oxidation of III and IV with *N* HNO_3 results in *dimethoxybenzoic acid* (V), yellow, m. 209°, which with CH_2N_2 is converted quant. into the *Me ester*, $C_{10}H_{11}O_6N$, faint yellow, m. 146°, being hydrolyzed by heating for 30 mins. with dil. NH_3-KOH to the original acid. The mixt. of 5 g. III and 20 g. KOH, moistened with a small portion of H_2O, heated for 3 hrs. at 270–300°, gives 0.01 g. of $C_6H_6O_2$, m. 167–8°, whose mixt. with hydroquinone m. 168–9°. It reduces vigorously Fehling soln. and the NH_3-$AgNO_3$. One g. III with 5 g. $KMnO_4$ gives 0.1 g. of *derric acid*, 2,5-$(MeO)_2$-$C_6H_3C(OH)(CO_2H)CH_2CO_2H$ (VI), colorless, m. 171°, which, on fusion, does not liberate CO_2 and is oxidized to III. Regarding the optical isomers of VI and III, another paper will follow. K. KONDA

Condensation products from aryldithioglycolic acids. ERICH GEBAUER-FÜLNEGG AND HELENE JARSCH. *Monatsh.* **56**, 317-21(1930).—Brief details are given of dyes obtained by heating the following compds. with $ClSO_3H$ at 50–60° for 2 hrs.: benzene-1,2-, 1,3- (I) and 1,4-dithioglycolic acids, the 4-Cl and 2,5-Cl_2 derivs. of I and 1,4-benzoquinone-2,3- and 2,5(2,6?)-dithioglycolic acids. The dyes are probably bisthionaphtheneindigo-*x*,*x*'-dithioglycolic acids. They are violet compds. which dye wool from acid baths blue-green tones. C. J. WEST

Synthesis of phenol ketones according to Hoesch. IV. W. BORSCHE AND K. DIACONT. *Ber.* **63B**, 2740–3(1930); cf. *C. A.* **24**, 95.—It was shown in Papers I and II that arylglyoxylic nitriles with multivalent phenols under the conditions of the Hoesch synthesis do not give hydroxylated benzils but lactone imines or ketones of polyhydroxytriphenylacetic acids; thus, PhCOCN and *m*-$C_6H_4(OH)_2$ (I) give the lactone, $HOC_6H_3.CPh[C_6H_3(OH)_2].CO.O$ (II). This reaction seems, however, to be limited to the arylglyoxylic nitriles and to depend on the linking of an aromatic acid radical with CN or CO, for on the one hand II has also been obtained (WITH NIEMANN) from $PhCOCO_2H$ and I in Et_2O with $ZnCl_2$-HCl, and on the other hand, the alkylglyoxylic nitriles thus far tested (MeCOCN and EtCOCN) give with I under the conditions of the Hoesch synthesis only the monoketimines of the diketones 2,4-$(HO)_2C_6H_3CO$-COR. Phloroglucinol unexpectedly reacts much less readily and the products have such unpromising properties that nothing definite can as yet be said as to their compn. and structure. *1-(2,4-Dihydroxyphenyl)propane-1,2-dione*, yellowish, m. 159°; *disemicarbazone*, yellowish, m. 243–5°; *bis(2,4-dinitrophenylhydrazone)*, red, m. 249–50°. *2-(2,4-Dihydroxyphenyl)butane-1,2-dione*, yellowish, m. 150° (the intermediate *monoketimine-HCl* forms brownish crystals); *disemicarbazone*, m. 205°; *bis(2,4-dinitrophenylhydrazone)*, red, m. 245°. C. A. R.

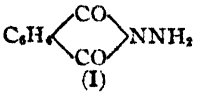
The condensation of catechol tannin. MAX BERGMANN AND GEORGI POJARLIEFF. *Naturwissenschaften* **18**, 1114(1930).—The condensation tendency of catechol is due to its structure of hydroxydihydropyran and by the simultaneous presence of a 2,3-double bond in the pyran ring with a hydroxyl in position 5. Tetramethylcatechol, with all phenol groups methylated, still is easily condensable (unpublished result). The benzene rings are not essential for the condensation, since glucal (Bergmann and Freudenberg, *C. A.* **24**, 1352–3) is condensed in a similar manner by acids; dihydroglucal (a tetrahydropyran) is, however, acid-resistant (Fischer, *C. A.* **8**, 1121). Not all HO groups

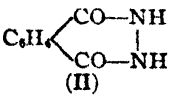
can be removed from catechol without destroying the condensability; anhydroacetobutyl alc. does not condense. B. J. C. VAN DER HOEVEN

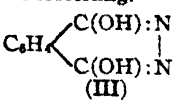
The chemistry of quinic acid. KARL JOSEPHSON. *Svensk. Farm. Tids.* **34**, 649–54(1930).—A critical review on the constitution of $C_6H_7(OH)_4CO_2H$. A. R. R.

Preparation of 4-nitrophthalimide and derivatives. LEOPOLD F. LEVY AND HENRY STEPHEN. *J. Chem. Soc.* **1931**, 79–82.—Nitration of 20 g. $C_6H_4(CO)_2NH$, by adding it gradually to 24 cc. HNO_3 (d. 1.44) and 200 cc. H_2SO_4 (10% SO_3) and holding the mixt. at 80° for 30 min., then cooling and pouring into 400 g. ice, keeping the temp. below 20°, gives 78% of the 4-NO_2 deriv., m. 198°; use of ordinary concd. H_2SO_4 reduces the yield to 40%. Reduction of 20 g. of the NO_2 deriv. with 84 g. $SnCl_2$ and 450 cc. HCl and 450 cc. H_2O gives 15.3 g. of the 4-NH_2 deriv., m. 294°; *Ac deriv.*, pale straw, m. 331° (cor., decompn.); *Bz deriv.*, cream colored, m. 322° (cor., decompn.); $C_6H_4(CO)_2O$ at 180° for 1 hr. gives *4-phthalimidophthalimide*, yellow, m. 319° (cor., decompn.). The diazo compd. couples with PhOH and α- and β-$C_{10}H_7OH$, giving orange, maroon and light brown dyes, resp., and with $PhNH_2$ and α- and β-$C_{10}H_7NH_2$ in acid soln., giving deep red, red and yellow dyes, resp. With CuCl in HCl the diazo compd. gives the 4-Cl deriv., m. 210°; heating the diazo compd. gives the 4-HO deriv., m. 290°. C. J. WEST

The action of hydrazine acetate on 3-nitrophthalic anhydride. M. MIHAILESCU AND L. PROTOPOPESCU. *Bul. soc. chim. Romania* **12**, 95–102(1930).—M. and H. reply to the objections of Radulescu and Georgescu (cf. *C. A.* **20**, 184) to the formula (I) which Mihailescu and Florescu (cf. *C. A.* **18**, 3183) propose for the product of reaction of $N_2H_4.2AcOH$ on $C_6H_4(CO)_2O$ rather than the formula (II) of Forsterling.


(I)


(II)


(III)

M. and H. cite the following properties of this compd. which are not consistent with formula II and its enol (III) but are consistent with formula I and its hydrolysis product $HO_2CC_6H_4CONHNH_2$ (IV). (*1*) The substance is difficultly sol. in water but is hydrolyzed by water to give an acid reaction to litmus. (*2*) It dissolves completely in alkali hydroxides with red color and is pptd. unchanged by acids. (*3*) It dissolves in carbonates and bicarbonates with effervesence but it is not pptd. by an excess of CO_2 as R. and G. erroneously state (*4*) Only monometallic salts are formed. (*5*) Three properties indicate that the substance possesses an NH_2 group: (*a*) It is decompd. by HNO_2 and NaBrO; (*b*) it reacts with aromatic aldehydes to give condensation products; (*c*) its Ac and Me derivs. have properties more like those of *N*- than of *C*-derivs. Ten g. of 3-nitrophthalic anhydride in 150 cc. boiling glacial AcOH reacts with 15 g. $N_2H_4.H_2SO_4$ and 18 g. cryst. AcONa in H_2O to form $NO_2C_6H_4(CO)_2NNH_2$ (V). V does not m. 300°; NaBrO decomps. it; only mono-Ac derivs. are formed by Ac_2O and AcCl; alkali hydroxides, carbonates and bicarbonates dissolve it, producing a red coloration and needle-shaped, golden yellow crystals of only monometallic derivs. which do not m. 300° but above this temp. decomp. with explosion. Ac_2O reacts with V to form the mono-Ac deriv. as needles resembling cotton wool which m. 230°. V reacts with BzCl in hot pyridine to form a mono-Bz deriv. as a sandy powder m. 260°. V in hot NH_4OH reacts with $AgNO_3$ to form a deep yellow Ag salt which is a monometallic salt as indicated from N detns. Ag could not be detd. as explosions resulted in the attempts. The Ba salt of V was prepd. by decompn. of the K salt of V with $BaCl_2$ as yellow needles which analysis showed to be a monometallic salt. V reacts with Me_2SO_4 at 120° to form plates of a mono-Me deriv. m. 265°. H ating V with anisaldehyde and fused AcONa gives needles of $NO_2C_6H_4(CO)_2NN{:}CHC_6H_4OMe$ (VI) which m. 280° aud react with KOH soln. to form $MeOC_6H_4CHO$ and the K salt of V. These properties of V together with the arguments in regard to the structure of I (an analogous compd.) justify the structure assigned to V. ODEN E. SHEPPARD

Menthone series. IX. New optical resolution of *dl*-menthol and of *dl*-camphor-10-sulfonic acid. JOHN READ AND WM. J. GRUBB. *J. Chem. Soc.* **1931**, 188–95; cf. *C. A.* **25**, 1233.—Although the naturally occurring form, *l*-menthol (I), was fairly readily obtained by the optical resolution of the *dl*-form (II) by Pickard and Littlebury (*C. A.* **6**, 1284), the method does not appear to lend itself to the prepn. of *d*-menthol (III) in quantity. I and *d*-camphor-10-sulfonyl chloride (IV) in quinoline or pyridin give 85% of *l-menthyl d-camphor-10-sulfonate* (V), m. 125.5°, crystallizes from light petroleum in slender needles, 5–6 cm. long, from AcOEt in doubly-terminated prisms; the system is tetragonal, $c:a = 1.3788:1$, *a*(100), *m*(110), *p*(111); $[\alpha]_D^{18}$ —20.9° ($CHCl_3$,

c 1.9855). At 153°, V decomps. to *d*-camphor-10-sulfonic acid (VI) and partly racemized *d*-Δ^3-menthene (VII). When steam-distd., V undergoes extremely slow decompn., giving I, VI and VII. V is very stable toward hot EtOH-KOH; Na in hot EtOH gives I and VII. Prolonged boiling with 20% HCl or H_2SO_4 causes a gradual decompn. of the ester; the most satisfactory hydrolyzing agent is hot 50% $(CO_2H)_2$ the products being I, VI and VII. *l-Menthyl l-camphor-10-sulfonate* (VIII), m. 47°, $[\alpha]_D^{16}$ —77.6° ($CHCl_3$, *c* 1.9950); at 153° it decomps. into *l*-camphor-10-sulfonic acid and VII. It is somewhat less resistant to hydrolysis than is V. II and IV in quinoline give an ester with $[\alpha]_D^{15}$ 26.0° ($CHCl_3$, *c* 1.9); 2 crystns. from light petroleum and 2 from AcOEt give 45% of V; decompn. with 50% $(CO_2H)_2$ gives only 10% of pure I. II and *l*-camphor-10-sulfonyl chloride give 42% of *d-menthyl l-camphor-10-sulfonate* (IX), m. 125.5°, $[\alpha]_D^{15}$ 20.8° ($CHCl_3$, *c* 2.0740); decompn. with 50% $(CO_2H)_2$ gives 10% pure III. An equimol. mixt of VIII and IX melted indefinitely over a wide range of temp., and gave no indication of the formation of a partial racemate. Similar behavior was shown by a mixt. of IV and VIII. In both cases, the observed rotatory power in $CHCl_3$ was practically equal to the mean value of the 2 components. An equimol. mixt. of IV and IX appears to give mixed crystals when allowed to sep. slowly from AcOEt. Details are given of the resolution of *dl*-camphor-10-sulfonic acid with l.

C. J. West

Action of Beckmann's mixture on some monocyclic terpenes. II. Terpinolene and "origanene." Thomas A. Henry and Humphrey Paget *J. Chem. Soc.* **1931**, 25–32; cf. *C. A.* **22**, 1346.—Terpinolene (I) was prepd. by shaking *dl*-α-pinene with half its vol. of EtOH-H_2SO_4 (50% by wt.) and also from terpineol by boiling gently with 40% aq. $(CO_2H)_2$ for 30 min. or by keeping it at room temp. for 2–3 days with EtOH H_2SO_4. I was purified through the tetrabromide, which crystallizes in 2 forms; from 2 vols. EtOH, Me_2CO or AcOEt, m. 122°, monoclinic, $a:b:c$ = 0.7804:1:0.9668, β 114° 15′ (cf. Hintze, *Z. Kryst* **10**, 258(1885)), from 10 vols. Me_2CO, monoclinic, rectangular plates, m. 119°, $a:b:c$ = 2.5995:1:2.0333, β 118° 8.5′, $a(100)$, $m(110)$, $c(001)$, $p(101)$. The regenerated I b_{10} 121°, b_{764} 186°, d_{15}^{15} 0.8632, n_D^{26} 1.4886, the same product is obtained from the 2 tetrabromides and on bromination yields 86.8% of the first tetrabromide. I is not very readily attacked by Beckmann's mixt. The principal products of oxidation are levulic acid and AcOH. A small amt of an unsatd. keto lactone is obtained, which is regarded as *β-thujaketo-lactone* (*ε-keto-β-hydroxyisopropyl Δα-heptenolactone*) (II), $C_{10}H_{14}O_3$, m 48–50°; *semicarbazone*, m. 222.3° (cor., decompn.), reduction of II gives homoterpenyl Me ketone. Hydrolysis with warm alkali gives the *acid* $AcCH_2CH_2C(CMe:CH_2):CHCO_2H$, m 130°, which absorbs 4 H, giving *dl* ε-keto-β-isopropylheptoic acid. II is not readily attacked by Beckmann's mixt. but at 60° after 2 days there results terebilic acid in quant. yield. "Origanene" (Pickles, *C. A.* **2**, 2248, 2673) is generally regarded as α-terpinene; this suggestion ignores the fact that origanene yields a nitrosyl chloride, m. 91–4°, a nitrolpiperidide, m. 198°, and a nitrolbenzylamine, m. 104–5°, which have not been obtained from α-terpinene. Reëxamn of residues from the prepn. of carvacrol from *Cyprus origanum* oil shows that α-terpinene is present, but there is also about 1.4% of a terpene giving the above cryst. derivs. and for which the name origanene is again proposed until the constitution can be established.

C. J. West

Pinene and nopinene. Georges Brus. *Bull. Inst. pin* **1929**, 271–6, 293–300; **1930**, 7–16, 33–8, 63–8, 87–96, 109–12, 131–6, 151–4, 175–8, 199–205, 225–8, 244–7, 270–4; cf. *C. A* **17**, 3176, **19**, 487, 2653; **22**, 1347, 3157; **23**, 829.—After reviewing the origin and phys. and chem. properties of *d*- and *l*-pinene and *d*- and *l*-nopinene, a more detailed account is given of the previously published investigations.

A. P.-C.

Production of camphor. Willibald Rehdern. *Riechstoffind.* **5**, 105–8(1930).—The present and past methods for the distn. of camphor-producing material are described.

W. O. B.

Photopolymerization of piperitone. W. Treibs. *Ber.* **63B**, 2738–40(1930).—Piperitone (I) in aq. AcOH or alc. exposed to the light of a quartz Hg lamp begins after several hrs. (depending on the diam. of the containing quartz vessels) to deposit needles which are repeatedly filtered off until no more are formed; they are followed by the sepn. of a yellow oil. This oil, when dissolved in hot alc., gives more of the needles on cooling. The yield of cryst. product is the same whether the soln. is illuminated in an air or H atm., and small quantities of uranyl acetate have but a slight influence if the deposits formed on the walls of the vessel are removed; larger quantities, through their screening action, slow up the reaction. The needles seemed to be quite homogeneous, b. about 365° almost without decompn. and m. 112°, but by re-

peated crystn. from MeOH they were sepd. into 3 fractions having the compn. and mol. wt. (Rast) of a *dimeric piperitone:* (1) needles, m. 162°, form no semicarbazone; (2) silky needles, m. 142–4°, yielding a *semicarbazone*, $C_{20}H_{32}O_2N_6$, m. 228–35° (decompn.) depending on the rate of heating, that sepd. in 2 forms (needles and cubes) which did not depress each other's m. p.; (3) rhombic leaflets, m. 157–9°. (1) and (3) greatly depressed the m. p. of each other. The semicarbazone of (2) regenerates (2) with hot concd. aq. $(CO_2H)_2$. The dimerization in this case evidently has occurred through the double bond in I, probably with formation of a 4-membered ring, but the non-formation of a semicarbazone by (1) and (3) does not necessarily prove that the C:O group is involved in the formation of these dimers, for steric influences may prevent the formation of a semicarbazone even though the C:O group is still intact. In sunlight instead of the light of the Hg lamp, I yields only the dimer (1). Preliminary expts. indicate that carvone which, according to Ciamician and Silber, yields only 1 dimer in sunlight, also forms 2 dimers when exposed to the light of a Hg lamp.

C. A. R.

Correction [autoxidation of cedrene]. A. Blumann *Ber.* **63B**, 2680(1930); cf. *C. A.* **24**, 97. –The unsatd. terpene $C_{15}H_{22}$ (obtained by dehydration of the alc. resulting from the oxidation of cedrene with O and a Co siccative) was described as having $[\alpha]_D$ –125° when, as a matter of fact, it is *d*-rotatory. The prepn. used at the time was insufficiently purified and final values on the consts. of the compd. will be published shortly.

C. A. R.

Fokienol, a new monocyclic sesquiterpene alcohol. L. S. Glichitch. *Compt. rend.* **191**, 1457–60(1930). Distn. of stems of *Fokienia hodginii* gives an oil which is mostly a tertiary monocyclic alc., $C_{15}H_{26}O$, b_2 125.6°, d_{24} 0.9236, $n_D^{22.5}$ 1.4975, α_D 18°35′, mol. refraction 70.18, indicating 2 double bonds. Distn. causes ring closing and the compd. must be isolated through its formate. Acids cause dehydration to a bicyclic diene, $C_{15}H_{24}$, isofokienene. HPO_3 gives the monocyclic fokienene, b_7 112–4°, d_{16} 0.8802, α_{Di} +16°56′, n_D^{13} 1.49594. All 3 on dehydrogenation with S give 1,6,4-$C_6H_3Me_2CHMe_2$.

V. F. Harrington

Heteropolar carbon compounds. XII. New dyestuffs of the aniline blue series and perchlorates of several important triphenylmethane dyes. W. Dilthey and R. Dinklage. *J. prakt. Chem.* **129**, 24–30(1931); cf. *C. A.* **24**, 1855. –Parafuchsin base and *p* $H_2NC_6H_4Ph$, heated with BzOH 6 hrs. at 175–80°, give *tri(4-phenyl)aniline blue*, $(PhC_6H_3NHC_6H_4)_3CCl$, golden glistening crystals with a violet-blue basic color, decompg. about 225°; drying at 110° causes no noticeable decompn. Fuchsin base and *p* $H_2NC_6H_4OPh$ in the same way give *tri(4-phenoxy)aniline blue*, $(PhOC_6H_4NHC_6H_4)_3CCl$, violet, decomps. about 230°. *p* $H_2NC_6H_4SPh$ and parafuchsin base give *tri(4-phenthiol)aniline blue*, $(PhSC_6H_4HNC_6H_4)_3CCl$, blue or violet, decomps. 220–30°. Colors are given for the EtOH, H_2O and H_2SO_4 solns. Little difference is observed in the color of the 3 new dyes. The m. ps. for the following perchlorates are approx.: *Benzaldehyde green*, blue-green, 200°; *brilliant green*, blue-green, 183°; *rhodamin 3B*, red, 167°; *crystal violet*, violet, 239–40°, *methylene blue*, dark blue, 231–2°; *Victoria blue*, blue, in a bath at 320°, decomps. violently; *pararosaniline*, dark red, 317° (block).

C. J. West

Conjugated double bonds. XIV. Addition of maleic acid anhydride to polyenes. Richard Kuhn and Theodor Wagner-Jauregg. *Ber.* **63B**, 2662–79(1930); cf. *C. A.* **25**, 683. –The addn. of maleic anhydride (I) to dienes has often been used in the study of the structure of natural products such as cholesterol and muscarufin, and it seemed of theoretical and practical importance to det. whether the reaction could be extended to compds. with a large no. of conjugated double bonds such as the dyes of the bixin and carotene series. Preliminary expts. showed that all the polyene dyes tested are decolorized by I and an addn. product of Me bixin was isolated as a well-crystd. Na salt. Because of the no. of isomers possible, however, the structure of this product could not for the time being be established and it was to shed light on this question that the present study of the behavior of a series of synthetic diphenylpolyenes toward I was undertaken. Stilbene, although it has only 1 double bond, reacts very readily with I in hot xylene, forming an amorphous, approx. 1:1 addn. product of high mol. wt.; it is presumably cyclic and is to be described in detail elsewhere. $(PhCH:CH)_2$ takes up 1 mol. I, as has also since been found by Diels and Adler (*C. A.* **24**, 96) but the addn. products vary with the conditions of prepn. In xylene are obtained rhombs m. 198° to 203° from prepn. to prepn., which can be sepd., without change in the compn., $C_{20}H_{16}O_3$, into fractions differing in m. p. by at most 4° and which are probably mixts. of isomers. D. and A. carried out the addn. in a molten mixt. of the components and

obtained a compd. m. 207° (apparently uncor.). An isomer m. 212.5–4.5° (cor.) was obtained by rearrangement of the above mixt. with Cl_3CHCO_2H in $CHCl_3$, but its m. p. fell to 196–8° (cor.) on crystn. from C_6H_6. That the I has added at the 1,4-positions in every case is shown by the conversion of the addn. products into terphenyl by hydrolysis and oxidation with $K_3Fe(CN)_6$. The isomers probably differ in the position of the double bond. The isomer m. 198° with hot aq. NaOH gives a *3,6-diphenyltetrahydrophthalic acid* (II), rhombs with 1 H_2O from alc., which when heated loses H_2O and shows the high m. p. of D. and A.'s anhydride. An oily isomer (III) of II is obtained through the *dichloride*, m. 143–4° (cor.), from $(PhCH:CH)_2$ and fumaryl chloride. With HCl in Et_2O III changes into crystals, m. 230–1° (cor.). From its method of prepn., III contains the CO_2H groups in the *trans*-position. Assuming that the double bond occupies the same position in II and III, *cis-trans* isomerism can be explained only if the double bond is in the 3,4- or 4,5-position. The low-melting anhydride of II decomps. to a large extent, when distd. under 12–5 mm., into $(PhCH:CH)_2$ and I. $(PhCH:CHCH:)_2$ with I yields an addn. product $C_{22}H_{18}O_3$ (IV), m. 199.5–200° (cor.), confirming the observation of D. and A. That addn. takes place at the 1,6-positions is shown by simultaneous decarboxylation and dehydrogenation by distn. with anhyd. $Ba(OH)_2$ and Se, which yields *1-phenyl-2-biphenylylethylene* (V), m. 221–2° (cor.), identical with the product obtained by distn. of *p*-$PhC_6H_4COCH_2Ph$ with Zn dust in H. $(PhCH:CHCH:CH)_2$ likewise adds 1 mol. I in boiling xylene but the product (VI) is not identical with the *3-phenyl-6-styryltetrahydrophthalic anhydride*, (IV) above. It m. 192–3° (cor.) and is also obtained by distn. of IV *in vacuo;* it is probably also a 3-phenyl-6-styryltetrahydrophthalic anhydride, for with O_3 it yields BzOH in abundance, and hydrolysis gives an acid which, when dehydrogenated with $K_3Fe(CN)_6$ and decarboxylated or when distd. directly with soda lime, changes into V. The isomerism of IV and VI is probably due to a difference in the position of the double bond in the cyclohexene ring. On hydrolysis VI gives an *acid* m. 190–1° (cor.) with regeneration of VI. $(PhCH:CHCH:CH)_2$ adds 2 mols. I when the mixt. of the components is cautiously fused, forming *6,6'-bis(3-phenylcyclohexene-1,2-dicarboxylic anhydride)* (VII), m. 275° (cor., decompn.), and in boiling xylene is obtained an *isomer* (VIII), m. 264° (decompn.), along with VII. Crystn. from $(Cl_2CHCO)_2O$ raises the m. p. of VIII to 292° (decompn.) which again falls to 264° on crystn. from Ac_2O or *o*-$C_6H_4Cl_2$. On hydrolysis, dehydrogenation with $K_3Fe(CN)_6$ and distn. with soda lime, VIII gives $(p\text{-}PhC_6H_4)_2$, m. 313–4° (cor.); attempts to effect the degradation by direct distn. with soda lime gave a hydrocarbon, $C_{24}H_{18}$, m. 281–2°, whose structure has not been established. Hydrolysis of VIII with concd. NaOH gives an amorphous *dicarboxylic acid*, easily sol. in cold HCO_2H and soon sepg. in crystals, probably as the result of isomerization; the same change was observed when the amorphous acid was warmed in Et_2O with a few drops of HCO_2H. The isomer seps. from dil. alc. with 2 mols. H_2O and when heated to 140° in Cl_2CHCO_2H and pptd. with Et_2O it gives the anhydride m. 290° (see above). Attempts to condense $(PhCH:CHCH:CH)_2$ with only 1 mol. I gave always VII and the unchanged hydrocarbon. Toward fumaryl chloride the tetraene behaves as with I; the resulting *tetracarboxylyl chloride* m. 231.5–2.5° (cor.). $(PhCH:CHCH:CHCH:)_2$ in boiling xylene adds chiefly 2 mols. I; there are obtained 2 *isomers*, $C_{30}H_{24}O_6$, sepd. by fractional crystn. from Ac_2O into the more sol. chief product, m. 235.5°, and a less sol. isomer, m. 255.5° (both cor., decompn.). There is also formed an amorphous substance (apparently a 1:3 product), decomps. 276.5° (cor.). The 235.5° compd. is apparently formed by 1,4- and 7,10-addn.; dehydrogenation and decarboxylation gives a compd. m. 302–3°, apparently identical with a product obtained by dehydrogenation of $(p\text{-}PhC_6H_4CH_2)_2$ and assumed to be *di-p-biphenylylethylene*. $(PhCH:CHCH:CHCH:CH)_2$ reacts readily with I in boiling tetralin, forming a product difficultly sol. even in boiling Ac_2O, dioxane, $PhNO_2$ and BzOEt. Apparently 3 mols. I are in the main added. Simultaneous dehydrogenation and decarboxylation gives a hydrocarbon, begins to m. 320°, having the compn. of a *quinquiphenyl*. $(PhCH:CHCH:CHCH:CHCH:)_2$ behaves like the hexaene, yielding a difficultly sol. product which has not yet been obtained in homogeneous form. These results show that when a large no. of conjugated double bonds are present they each add 1 mol. I with formation of 6-membered rings. The reactive diene groups in the diphenylpolyenes are at the ends of the chains and the behavior of these compds. toward I is to be ascribed to the same cause as their behavior toward H in the formation of dibenzylpolyenes, *viz.*, the greater reactivity of the end methine groups adjacent to the Ph residues.

C. A. R.

2-Methylnaphthalenes. III. K. Dziewoński and A. Wulffsohn. *Bull. intern. acad. polonaise* **1929A**, 143–8.—Sulfonation of 2-$C_{10}H_7Me$ with an equimol. quantity

of $ClSO_3H$ in $PhNO_2$ at 30–40° gave *2-methylnaphthalene-8-sulfonic acid* (*Na salt; chloride*, m. 94–6°; *amide*, m. 172–4°; *anilide*, m. 162–4°). Its constitution was established by conversion into 7-methyl-α-naphthol, m. 109–11° (*acetate*, m. 39–41°; *azo deriv.* with *p*-nitroaniline, m. 250° (decompn.)), by fusion of the Na salt with KOH. B. C. A.

1, 4-Dibenzylnaphthalene and its corresponding keto derivatives. K. Dziewoński, J. Moszew, S. Lepiankewicz and L. Sucheri. *Bull. intern. acad. polonaise* **1929A**, 650–7.—The dibenzylnaphthalene, m. 88°, obtained as one of the products of the action of $PhCH_2Cl$ on $C_{10}H_8$ in presence of $AlCl_3$ or fused $ZnCl_2$ ("β-dibenzylnaphthalene" of Dziewoński and Moszew, *C. A.* **23**, 3220, 3923) is now shown to be *1,4-dibenzylnaphthalene* (picrate, m. 107°), also prepd. by the reduction of *4-benzoyl-1-benzylnaphthalene*, m. 113° (*phenylhydrazone*, m. 155–6°; *oxime*, m. 202–3°). The latter is obtained by the interaction of $1\text{-}C_{10}H_7CH_2Ph$ and BzCl in presence of fused $ZnCl_2$. The orientation of both compds. is established by their oxidation with HNO_3 to the known $1,4\text{-}C_{10}H_6Bz_2$, m. 106° (Scholl and Neumann, *C. A.* **16**, 2143) (*dioxime*, m. 261°). Treatment of $1,4\text{-}C_{10}H_6(CH_2Ph)_2$ with $ClSO_3H$ at the ordinary temp. affords *1,4-dibenzylnaphthalenesulfonic acid*, isolated as the Na salt. Nitration of $4,1\text{-}C_{10}H_6BzCH_2Ph$ yields a *mononitro deriv.*, m. 172–3°. A by-product of the reduction of the same compd. is *1,4-dibenzyltetrahydronaphthalene*, m. 92–3°. B. C. A.

***peri*-Benzoyl and -benzyl derivatives of naphthalene.** K. Dziewoński, J. Auerbach and J. Moszew. *Bull. intern. acad. polonaise* **1929A**, 658–63.—*1-Benzoyl-8-benzylnaphthalene*, m. 142° (*oxime*, m. 220–2°), is prepd. by the action of $PhCH_2Cl$ on $1\text{-}C_{10}H_7Bz$ in the presence of $AlCl_3$ at 160–70°. Oxidation of this with HNO_3 yields *1,8-*$C_{10}H_6Bz_2$ (*bisphenylhydrazone*, m. 270–1°; *dioxime*, m. 270°) (cf. *C. A.* **23**, 3220, 3923). B. C. A.

Synthesis of acetyl derivatives of 1-benzylnaphthalene. I. 4-Acetyl-1-benzylnaphthalene. K. Dziewoński and J. Moszew. *Bull. intern. acad. polonaise* **1930A**, 66–71.—$1\text{-}C_{10}H_7CH_2Ph$ reacts with AcCl in the presence of $AlCl_3$ in CS_2 at the ordinary temp. to give *4-acetyl-1-benzylnaphthalene*, b_{12} 240–5°, m. 75° (*picrate*, m. 113°) (60%), together with a *di-Ac deriv.*, b_{12} 265–70°, m. 135° (10%), as a by-product. The *oxime*, m. 240–1°, of $1,4\text{-}C_{10}H_6(CH_2Ph)Ac$ undergoes a Beckmann rearrangement when its soln. in AcOH and Ac_2O satd. with anhyd. HCl is heated at 100°, to give *4-acetamido-1-benzylnaphthalene*, m. 208–9°, hydrolyzed by boiling 6% HCl to $4,1\text{-}C_{10}H_6(CH_2Ph)NH_2$ identical with a specimen obtained by the action of NH_3 on $4,1\text{-}C_{10}H_6(CH_2Ph)OH$. (*C. A.* **22**, 2164). HNO_3 (d. 1.52) in AcOH at 10–15° converts $1,4\text{-}C_{10}H_6(CH_2Ph)Ac$ into its *5-nitro-deriv.*, m. 153°, while boiling 10% HNO_3 oxidizes it to *4-benzoyl-α-naphthoic acid*, m. 180–1°. B. C. A.

Bromination of 4-nitro-1-methylnaphthalene. John S. H. Davies and Albert E. Oxford. *J. Chem. Soc.* **1931**, 220–1.—$4,1\text{-}O_2NC_{10}H_6Me$ and Br in a quartz flask in ultra-violet light give a *mono-Br deriv.*, yellow, m. 137.5–8.5°, and a very small quantity of a *tetra-Br deriv.*, m. 189–90° (decompn.); the same mixt. was obtained in a sealed tube at 100–20° for 2 hrs. $\alpha\text{-}C_{10}H_7CH_2Cl$, b_{14-16} 146–58°, seps. from EtOH at −15° as silvery flakes, m. 29.5–30.5°; this was previously described as a liquid. $2,4\text{-}(O_2N)_2C_6H_3CH_2Cl$ and NaBr in MeOH, boiled 6 hrs., give the *bromide*, m. 46–7°. C. J. West

Naphthalene series. II. Diaryl- and triarylmethane derivatives of dimethyl-α-naphthylamine. Basker Gokhle and Frederick A. Mason. *J. Chem. Soc.* **1931**, 118–26; cf. *C. A.* **24**, 5296.—$(Me_2NC_{10}H_6)_2CH_2$, m. 181–2.5°, was obtained from $\alpha\text{-}C_{10}H_7NMe_2$ and HCHO in AcOH-HCl and methylal in AcOH-HCl or H_2SO_4; the base was surprisingly resistant to oxidizing agents; chloranil in glacial AcOH at 110° gives 2% of *4,4'-tetramethyldiamino-1,1'-dinaphthylcarbinol*, m. 184–6°; cold AcOH gives a faintly green soln., becoming blue-violet on warming; concd. HCl or H_2SO_4 gives a deep yellow soln. *4-Dimethylamino-1-naphthoyl chloride* and *anilide* were prepd. from the acid. Attempts to prep. the ketone $(Me_2NC_{10}H_6)_2CO$ from this chloride and $\alpha\text{-}C_{10}H_7NMe_2$ in $C_2H_2Cl_4$ gave only tarry products. *4,4',4"-Hexamethyltriaminotrinaphthylmethane*, m. 266–7.5°, is formed from $\alpha\text{-}C_{10}H_7NMe_2$ and $HC(OEt)_3$ with $AlCl_3$ at 70°. $Me_2NC_{10}H_6COCl$ and $PhNMe_2$ with $AlCl_3$ in $C_2H_2Cl_4$ give *4,4'-tetramethyldiaminophenyl-1-naphthyl ketone*, m. 128.5–9°; Et_2O, EtOH and dil. mineral acids give light greenish yellow solns. With $POCl_3$ the ketone condenses with $PhNMe_2$, yielding a deep blue dye, probably identical with "Naphthoblau." Reduction with Na-Hg in EtOH gives the corresponding *carbinol*, pale yellow, m. 62–3°; the AcOH soln. is a brilliant blue. $4\text{-}H_2NC_{10}H_6NMe_2$; obtained by reduction of the 4-NO deriv., yields an *Ac deriv.*, m. 185°. Attempts to prep. the analog of methylene-blue B failed. Ab-

sorption curves of the carbinols in AcOH are given; values calcd. according to Moir's theory agree with the observed maxima. C. J. WEST

Naphthalene-1,5-disulfonic acid as a by-product in the monosulfonation of naphthalene. CEDRIC B. RADCLIFFE AND WALLACE F. SHORT. *J. Chem. Soc.* **1931**, 220.—In the prepn. of 1-$C_{10}H_7CN$ from $C_{10}H_7SO_3Na$ and KCN, there is obtained 1.4 g. 1,5-$C_{10}H_6(CN)_2$ from 100 g. $C_{10}H_8$ employed in the sulfonation; because of the sparing soly. of $C_{10}H_6(SO_3H)_2$ as the Ba salt and the incomplete conversion into the dicyanide, this est. of the degree of disulfonation is a conservative one. C. J. WEST

Theory of halogen substitution. II. PAUL PFEIFFER AND PAUL SCHNEIDER. *J. prakt. Chem.* **129**, 129-44(1931); cf. *C. A.* **24**, 1858.—Previous work showed that certain ethylenes give colored bromides. In order to study the constitution of these the following work was carried out. $Ph_2C:CH_2$ and $(p\text{-}MeC_6H_4)_2C:CH_2$ gave absolutely no color with Br. α-$C_{10}H_7MgBr$ and AcOEt give *α,α-dinaphthylmethylcarbinol*, m. 146°, giving an intense malachite green color with concd. H_2SO_4 and a brick-red color with Br. With concd. HCl there results *α,α-dinaphthylethylene*, m. 107°; concd H_2SO_4 gives the same color as with the carbinol; the ethylene does not show a characteristic behavior with Br; in CCl_4 Br gives a *mono-Br deriv.*, m. 148°; excess of Br gives a *tetra-Br deriv.*, m. 69-70°, sol. in 30% oleum with a grass-green color. Attempts to prep. $(C_{10}H_7)_2C:CHPh$ by the action of $PhCH_2CO_2Et$ upon α-$C_{10}H_7MgBr$ gave only $PhCH_2COCHPhCO_2Et$. *Biphenylphenylethylene*, $PhC_6H_4CPh:CH_2$, m. 94.5°; concd H_2SO_4 gives a brick-red color; Br vapor colors the compd. greenish gray; *Br deriv.*, m. 162°; warming with concd. H_2SO_4 gives an intense red-violet color, Br vapor colors the compd. black-violet and the color is very stable; the *di Br deriv.* m. 155°, Br vapor does not color the crystals. $(PhC_6H_4)_2C:CH_2$, m. 211°, gives a *Br deriv.*, m. 187-8°, colored by Br vapor a red brown, which color quickly disappears. *di Br deriv.*, m. 194.5° *asym-Diphenylmethylethylene*, $(PhC_6H_4)_2C.CHPh$, light yellow, m. 165-6°, sol. in concd H_2SO_4 with a deep red-violet color; Br vapor gives a deep green color stable for only 1-2 secs.; *Br deriv.*, m. 150-2°, Br vapor gives a dirty grayish black color, stable for about 1 hr. *asym-Diphenylphenylethylene*, m. 192-3°, difficultly sol. in cold concd. H_2SO_4, and giving a deep bluish red color on warming. Br vapor gives a grass-green color, stable for only 1 sec.; *Br deriv.*, m. 201-2°; Br vapor gives no characteristic color. C. J. WEST

Organic arsenic compounds. I. J. KLIPPEL. *Recueil Chim.* **10**, 777-83 (783 English)(1930).—*Methylphenyl α-naphthylarsine*, $C_{17}H_{15}As$, m. 60.0-0.5° was obtained by the action of PhMgBr on $Ph(C_{10}H_7)AsCl$. On addn. of Cl or CNBr to this compd., and after decompn. of the addn. products by heating *phenyl-α-naphthylchloroarsine*, $C_{16}H_{12}AsCl$, m. 46.0-6.5°, and *phenyl-α-naphthylcyanoarsine*, $C_{16}H_{12}AsCN$, m. 95.5-100°, resp., were formed. The chloride and cyanide were converted by hydrolysis into *phenyl α-naphthylarsine oxide*, m. 116.5-7.5° which on oxidation by H_2O_2 gave the *arsonic acid*, m. 189.0-9.5°. The chloride and oxide described by Blicke and Smith (*C. A.* **24**, 830) as thick non-crystg. oils are cryst. when in a pure condition. J. KUČERA

The action of bromine on naphthylamine- and aminonaphtholsulfonic acids. GUSTAV HELLER, HERBERT ARNOLD AND JOHANNES SCHMIDT. *Z. angew. Chem.* **43**, 1132-7(1930); cf. *C. A.* **22**, 3653.—1,4-, 1,5- (I) and 1,8-$NH_2C_{10}H_6SO_3H$ react with an excess of Br_2, yielding the corresponding *2,4-di-Br derivs.*, while the 2,5-, 2,6- and 2,7-compds. give the *1-Br derivs.* The products from the 2,8- and 2,1-compds. were not characterized since the reaction in these cases was not under control. 2,3,6- (II) and 2,6,8-$NH_2C_{10}H_5(SO_3H)_2$ (III) yield *dibromonaphthalenesulfonic acids* of unknown structure. In each case 1 SO_3H group has been substituted for a Br atom. In the product from II, a Br atom occupies position 1. Unknown *mono-Br derivs.* of I and III were also prepd. SO_3H derivs. of 1,2-, 1,8-, 2,5- and 2,8-$NH_2C_{10}H_6OH$ yield bromonaphthoquinones upon reaction with Br_2; the halogen replaces the SO_3H group when an excess is used. 2,5,7 (IV) and 2,8,6-$NH_2(OH)C_{10}H_5SO_3H$ and 2,8,3,6-$NH_2(OH)C_{10}H_4(SO_3H)_2$ all yield *1,3,6,7-tetrabromo-2-amino-5,8-naphthoquinone* (V), m. 241°, *Ac deriv.* m. 255°, *di Ac deriv.* m. 160-1°. V reacts with $PhNH_2$, yielding the *anilinotribromo deriv.*, $C_{16}H_9O_2N_2Br_3$, m. 215-6°. Upon reduction of V with $SnCl_2$, 1 of the Br atoms is lost; the product $C_{10}H_6O_2NBr_3$ m. > 300°. IV also reacts with 2 mols. of Br_2, the probable product being *1,3-dibromo-2,5,7 aminonaphtholsulfonic acid*. 1,8,4-$NH_2(OH)C_{10}H_5SO_3H$ and 1,8,4,6-$NH_2(OH)C_{10}H_4(SO_3H)_2$ (VI) both give *2,4,7-tribromo-1-amino-5,8-naphthoquinone*, while *2,4,6,7-tetrabromo-1-amino-5,8-naphthoquinone*, m. 255° (*Ac deriv.* m. 184°) is derived from both 1,8,5-$NH_2(OH)C_{10}H_5SO_3H$ and VI. VI also yields *2,4,x-tribromo-1,8,6-aminonaphtholsulfonic acid* and the K salt of *1,2,4-tribromo-5,8-naphthoquinone-6-sulfonic acid*. This last product indicates that the NH_2 group has been replaced by Br. It was isolated with 2.5 mols. of H_2O, 1.5 mols. of which was

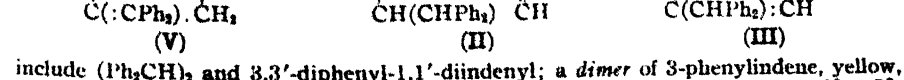
driven off by heating at 150°. The bromination of 1,8,3,6-$NH_2(OH)C_{10}H_4(SO_3Na)_2$ in KCl soln. gives the K salt of *2, 4(?)-dibromo-1-amino-5,8-naphthoquinhydrone-3,6-disulfonic acid*, the reduction of which compd. leads to the formation of the *hydroquinone compd.*, $C_{10}H_7O_8NS_2Br_2$. By heating 0.5 g. of 1,2,4-$NH_2(OH)C_{10}H_5SO_3H$ (VII) with 1 cc. of 50% Br_2 in HOAc at 100°, 0.4 g. of 3,4,1,2-$Br_2C_{10}H_4(:O)_2$ was isolated. When a free flame was used in heating VII with Br_2, 3,2,1,4-$Br(HO)C_{10}H_4(:O)_2$ was obtained. 1,2,4,6-$NH_2(OH)C_{10}H_4(SO_3H)_2$ yields the K salt of *4-bromo-1,2-naphthoquinone-6-sulfonic acid*.

I. M. LEVINE

Reactivity of substituents in the C_5-nucleus. VINCENT JACOBI. *J. prakt. Chem.* **129**, 55–96(1931).—Because cyclopentadiene is not only difficult to prep. but polymerizes quickly at room temp., indene (I) has been used in this study. Much of the chemistry of I is reviewed. Details are given of the reduction of I and the prepn. of its di-Br deriv. Distn. of dibromohydrindene at ordinary temp. gives 5-bromoindene, b_{16} 120°, m. 36°; a trace of concd. H_2SO_4 gives an intense bluish red color; oxidation gives 4-$BrC_6H_3(CO_2H)_2$. Diketohydrindene (II) and *p*-$C_6H_4(CHO)_2$, heated at 110–20°, give *p-aldehydobenzalindandione*, $C_6H_4(CO)_2C{:}CHC_6H_4CHO$, pale yellow, m. 173°; concd. H_2SO_4 gives an intense orange color; $PhNHNH_2$ gives *p*-$C_6H_4(CH{:}NNHPh)_2$ With twice the amt. of II, there results *terephthalidenebisdiketohydrindene*, m 293°; a by-product, yellow, m. over 300°. II and 1 mol MeMgI give unchanged II indicating the structure C_6H_4 C(OH)·CH.CO, even 2 mols MeMgI give unchanged II; 5 mols. MeMgI give *1,3-dihydroxy-2-methylindene*, b_{10} 126°; repeated vacuum distn. or distn. at atm. pressure splits off 1 mol. H_2O, giving *α-methylindone*. The 5-Br deriv. of I and Mg in Et_2O give the Grignard reagent after heating several days; with H_2O it gives I. *1,2,5-Tribromohydrindene (5-bromoindene dibromide)*, oil which decomps. very easily; cooking with 10% EtOH gives *5-bromoindene hydroxybromide*, m. 80.5–1.5°. I dibromide, b_{10} 143.5–4.5°, m. 31.5–2.5°, gives with 10% EtOH *2-ethoxybromohydrindene*, oil, the *2-MeO deriv.* is also an oil. Distn. of the EtO deriv. *in vacuo* gives *1-bromoindene*, b_{11} 135.5–6°; concd. H_2SO_4 gives an intense ruby-red color; the Mg deriv. with CO_2 gives *indene-1-carboxylic acid*, m. about 70° (decompn.). Distn. of indene dibromide at atm. pressure gives *3-bromoindene*, b_{11} 110–20°; Mg in Et_2O followed by CO_2, gives the *3-carboxylic acid*, m. 160° (decompn.). A by-product is *3-indenophenone (diindyl ketone)*, m. 235°; indene is also formed in small amts. *1,2,3-Tribromohydrindene (3-bromoindene dibromide)*, oil which readily decomps.; 10% EtOH gives *3-bromoindene hydroxybromide*, m. 90°. I and Br in H_2O, boiled 3 hrs., give a *tribromoindene*, pale yellow, m. 133.5–4°; HNO_3 gives a dibromophthalic acid, showing that 2 of the Br atoms must be in the benzene ring

C. J. WEST

Alkali organic compounds. OTTILIE BLUM-BERGMANN. *Ann* **484**, 26–51(1930).—Schlenk and Bergmann (*C. A.* **22**, 4495), by the action of Na upon 1-benzohydrylidene-3-phenylindene (I), obtained 2 dihydro derivs., m. 174.5–5° (II) and 133–4.5° (III); Wieland and Kloss (*C. A.* **23**, 3696), by the reduction of 1-benzohydrylidene-3-phenyl-2-chloroindene (IV), obtained a 3rd isomer (V), m. 115°. In order to clear up this matter, II and V have been synthesized. IV is dimorphous, crystg. from benzine as orange-red cubes, m. 147–8°, and red-violet needles, m. 157–8°; reduction with HI and red P in AcOH gives V, needles, m. 115°, or rhombic leaflets, m. 130–1.5°; the leaflets are changed into the needles on repeated crystn. The Li deriv. (VI) of 3-phenylindene and $BzPh$ give I. VI and $ClCO_2Me$ give *di-Me 3-phenylindene-1,1-dicarboxylate*, m. 105–7°; catalytic reduction gives the *dihydro deriv.*, m. 102–3.5°; the free *dicarboxylic acid* m. 175–7° (decompn.); heated above its m. p., it gives *3-phenylhydrindene-1-carboxylic acid*, b_{14} 227–9°, m. 143–4.5°; *Me ester*, b_{13} 204.5–5°; the latter with PhMgBr gives *3-phenyl-1-(α-hydroxybenzohydryl)hydrindene*, m. 122–4°, which loses H_2O when heated with AcCl, giving V. The Li deriv. of fluorene and MeI give 9,9-dimethylfluorene and the 9-Me deriv. The Li deriv. of indene and Ph_2CHBr give 1-benzohydrylindene, m 163–4°. VI and Ph_2CHBr give II, m. 174.5–5°; the by-products



(V) (II) (III)

include $(Ph_2CH)_2$ and 3,3′-diphenyl-1,1′-diindenyl; a *dimer* of 3-phenylindene, yellow, m. 207–9°, and a *compd.* $C_{18}H_{22}$, leaflets, m. 166–7°, and yellow prisms, m 162–4.5°; reduction of the last gives the *compd.* $C_{18}H_{24}$, m. 182–4°. The Li deriv. of 2-phenylindene and Ph_2CHBr give *1-benzohydryl-2-phenylindene*, m. 175°, whose *dihydro deriv.* m. 151°. This shows that the compd. $C_{28}H_{22}$ above is not produced by the wandering

of the Ph group. The action of Al-Hg upon I gives a mixt. of II and III. Reduction of III with Na and AmOH gives 1-benzohydryl-3-phenylhydrindene, m. 133–5°, also obtained by reducing V. In the reduction of anthroic acid, there results a *double compd.* of this acid with the tetrahydro acid, $C_{15}H_{12}O_2$, m. 190–2°, green luster. The action of CO_2 upon the Li deriv. of anthracene gives *9,10-dihydro-9,10,10-tricarboxylic acid*, crystg. with 1 mol. Et_2O, m. 289–92° (decompn.); heating 13 hrs. at 100° splits off the Et_2O; further heating for 14 days also splits off 1 mol. CO_2; *tri-Me ester*, m. 147.5–8°. Heating the acid in AcOH gives α-9,10-dihydroanthracene-9,10-dicarboxylic acid, m. 162–3.5°. Ph_2CNa and $CO(OPh)_2$ give Ph_2CCO_2Ph, m. 124–7°; $CO(OEt)_2$ gives Ph_2CCO_2Et, m. 118–20°; $(Ph_2CNa)_2$ and $CO(OPh)_2$ give $(PhC:)_2$. The Li deriv. of fluorene and $CO(OMe)_2$ give Me biphenyleneacetate and *dibiphenyleneacetone*, m. 230–2° (decompn.). Ph_2CHNa and $CO(OMe)_2$ give $(Ph_2CH)_2CO$, m. 134–4.5°. $(Ph_2CNaCH_2)_2$ and $CO(OMe)_2$ give 1,1,4,4-tetraphenylcyclopentan-5-one. The di-Li deriv. of anthracene and $CO(OMe)_2$ give *bisdihydroanthracyl ketone*, m. 238–40° (evolution of CO); in its thermal decompn., 88.5% of the theory of CO_2 is evolved and a mixt. of anthracene and its dihydro deriv. is formed. The Na deriv. of anthracene behaves in the same way. $(Ph_2CH)_2CO$ with Na in Et_2O gives the *Na salt* of the enolate, $C_{27}H_{21}ONa$; dry distn. gives tetraphenylallene and 1,1,3,3-tetraphenylpropylene. C. J. West

Coupling of diazonium compounds with 2-methoxy-3-naphthoic acid. G. B. Jambuserwala and F. A. Mason. *J. Soc. Dyers Colourists* **46**, 339–41(1930).—The Me ether of β-hydroxynaphthoic acid will couple in H_2O with diazotized *p*-, *o*-, and *m*-nitroaniline, 4- and 5-nitro-*o*-anisidine, sulfanilic acid, benzidine and tolidine. Milton Harris

Keto-oxidation product of α-acetylacenaphthene. K. Dziewoński and J. Reiss. *Bull. intern. acad. polonaise* **1930A**, 62–5.—Contrary to Graebe and Haas (*Ann.* **327**, 77–103(1903)) oxidation of 5-acetylacenaphthene (best prepd. by the action of $AlCl_3$ on AcCl and acenaphthene without solvent) with $Na_2Cr_2O_7$ and AcOH at 50° gives only traces of 4,1,8-$C_{10}H_5Ac(CO_2H)_2$, the main products being *5-acetylacenaphthenequinone*, m. 192–3° [*bisphenylhydrazone*, m. 240–2°; *dioxime*, m. 275–8° (decompn.)], and *2,2'-diketo-5,5'-diacetyldiacenaphthylidene*, m. 295° (decompn.). B. C. A.

Derivatives of 3-bromoacenaphthene. K. Dziewoński, Mlle. J. Schoen and Mlle. A. Glazner. *Bull. intern. acad. polonaise* **1929A**, 636–49.—Oxidation of 3-bromoacenaphthene by $Na_2Cr_2O_7$ in AcOH at 30° yields, besides 4-bromonaphthalic acid, 3-bromoacenaphthenequinone, m. 235–6° (Graebe, *Ann.* **327**, 77–103(1903), gives m. p. 194°) [monophenylhydrazone, m. 179–80°; bisphenylhydrazone, m. 225–6° (literature 153° and 134°, resp.); *dioxime*, m. 230–1° (decompn.); *3-bromoacenaphthaphenazine*, from the foregoing quinone and *o*-$C_6H_4(NH_2)_2$, m. 261–3°], and *3,3'-dibromobiacenedione*, $\left(C_{10}H_{5}Br\begin{matrix}C:\\CO\end{matrix}\right)_2$, m. 320–1° (for nomenclature, cf. *C. A.* **20**, 1234). Nitration of 3-bromoacenaphthene in AcOH gives mainly *3-bromo-4-nitroacenaphthene*, m. 159–61°, converted by $Na_2S_2O_4$ into *3-bromo-4-aminoacenaphthene*, m. 133°. The orientation of these derivs. is established by the further reduction of the latter, by means of Na-Hg and alc., to the known 3-aminoacenaphthene. 3-Bromo-4-nitroacenaphthene is oxidized by $Na_2Cr_2O_7$ to *4-bromo-5-nitronaphthalic acid*, m. 295° (*anhydride*, m. 312°; *Me ester*, m. 162°). Two isomeric SO_3H acids, termed "α" and "β," resp., are obtained by the interaction of $ClSO_3H$ and 3-bromoacenaphthene at the ordinary temp., and are sepd. by means of their Na salts. *3-Bromoacenaphthene-α-sulfonic acid* forms the more sparingly sol. *Na salt* (*aniline salt*, m. 260–1°; *β-naphthylamine salt*, m. 265–6°; *chloride*, m. 134–5°; *amide*, m. 137–8°); oxidation affords *3-bromo-α-sulfonaphthalic anhydride*, isolated as its *Na salt*, *3-Bromoacenaphthene-β-sulfonic acid* (*aniline salt*, m. 256–7°. *chloride*, m. 192–3°; *amide*, m. 233–4°, *Et ester*, m. 140–1°) yields a similar naphthalic acid on oxidation. Sulfonation with H_2SO_4 (d. 1.84) at 80–90° converts 3-bromoacenaphthene into a *disulfonic acid*, isolated as the *Ba salt*; the *di-Na salt* ($+3H_2O$) is readily sol. in water [*dichloride*, m. 181–2°; *diamide*, m. 289° (decompn.); *Et ester*, m. 164°]. B. C. A.

Reduction products of the hydroxyanthraquinones. XII. Gordon F. Attree and Arthur G. Perkin. *J. Chem. Soc.* **1931**, 144–73; cf. *C. A.* **24**, 2456.—2-Methoxyanthraquinone (I) in H_2SO_4 and Cu powder, gradually added and heated to 140° for 1 hr., and the resulting product treated with Ac_2O and C_5H_5N, give the *acetate*, m. 152–4°, of *3-methoxy-9-anthranol* (II), m. 108–9°. II with $FeCl_3$-AcOH and EtOH gives about 30% of *3,3'-dimethoxydianthrone*, m. 215–7° to a green liquid; concd. H_2SO_4 gives a pale yellow soln.; the main product of the reaction is I. *3,3'-Dimethoxydianthranyl 9,9'-diacetate*, m. 228–30°, sol. in H_2SO_4 with a violet-red tint; I in C_5H_5N

transforms this to 3,3'-dimethoxydianthraquinone, yellow, m. 294–5°; the latter in C_5H_5N, exposed to light for 2 weeks, gives 2,2'-dimethoxynaphthadianthrone, orange-red, does not m. 340° and gives a red soln. in H_2SO_4. Isoanthraflavic acid (III), reduced by $SnCl_2$-HCl, gives 3,6-dihydroxy-9-(isoanthraflavic acid)anthrol, m. 183–4° (Roemer and Schwarzer, *Ber.* **15**, 1041(1882), give 173°); $FeCl_3$ in AcOH and EtOH gives *3,3',6,6'-tetraacetoxy-9,9'-dianthranyl diacetate*, pale yellow, m. 280–2°; hydrolysis with HCl-AcOH gives *3,3',6,6'-tetrahydroxydianthrone*, pale yellow, darkens 270°, turns green 300° and does not have a definite m. p. The hexaacetate does not give a dianthraquinone with I in C_5H_5N. III gives a *di-Me ether* (IV), yellow, m. 215–7°; with Cu and H_2SO_4 this yields the *acetate*, pale yellow, m. 180–1°, of *3,6-dimethoxy-9-anthranol*, m. 158–60°; the latter with $FeCl_3$ in AcOH gives *3,3',6,6'-tetramethoxy-9,9'-dianthrone*, m. 242–3°, whose *diacetate*, yellow, m. 255–6°, does not react with I in C_5H_5N. IV and $SnCl_2$-HCl in AcOH give *3-methoxy-6-acetoxy-9-anthranyl acetate*, m. 197–9°, sol. in H_2SO_4 with a bluish red color, becoming yellow; hydrolysis with HCl-AcOH gives *6-hydroxy-3-methoxyanthranol*, m. 234–6°, giving a yellow soln. with a green fluorescence in H_2SO_4; oxidation of the acetate with CrO_3 in AcOH gives the *mono-Me ether* of III, yellow, m. 283–5°, as the *Ac deriv.*, m. 194–6°, giving a crimson color in H_2SO_4; the mono-Me ether also results in very small yields in the action of Me_2SO_4 on III. *6,6'-Dihydroxy-3,3'-dimethoxydianthrone* m. 292–5°. *3,7-Dihydroxy-9-anthranol* and $FeCl_3$-AcOH give *3,3',7,7'-tetrahydroxydianthrone*, m. 315–8°, sol. in H_2SO_4 with an orange-yellow color; the *tetraacetoxy diacetate* darkens about 290° but does not have a definite m. p.; H_2SO_4 gives a scarlet color, changing through brown to green. 2,2',3,3'-Tetrahydroxydianthrone, from hystazarin (V) through acetylhystazarinanthrol, with Ac_2O gives the *tetra-Ac deriv.*, pale yellow, m. 274–7°; with C_5H_5N there results the *tetra-Ac diacetate*, m. 293–5°, sol. in H_2SO_4 with a red color, changing to green and then brown. The di-Me ether of V, with $SnCl_2$-HCl-AcOH, gives the *acetate*, m. 169–71°, of *2,3-dimethoxyanthranol*, pale yellow, m. 143–6°; with $FeCl_3$-AcOH there results *2,2',3,3'-tetramethoxydianthrone*, m. 243–5°, sol. in H_2SO_4 with an orange-red color; the *diacetate* m. 194–6°. Oxidation of the anthrone with $(NH_4)_2S_2O_8$ gives *2,2',3,3'-tetramethoxydianthraquinone* (VI), pale yellow, m. 290–1°, sol. in H_2SO_4 with a dull violet color, quickly passing to a blackish brown; C_6H_6 gives a deep green soln. Exposure to light in C_5H_5N-EtOH for 20 days gives *2,2',3,3'-tetramethoxyhelianthrone*, m. 287–8°, sol. in H_2SO_4 with a deep indigo-blue color; HCl-AcOH at 190° for 3 hrs. splits off the MeO groups, giving the *tetra-HO deriv.*, iridescent metallic leaflets; *tetra-Ac deriv.*, orange, m. 295–7°; CrO_3 and AcOH oxidize this to *2,2',3,3'-tetraacetoxy-1,1'-dianthraquinonyl*, pale yellow, m. 200°, and then 268–70°; H_2SO_4 gives a red-brown soln. Hydrolysis gives the *tetra-HO deriv.*, dull yellow, does not m. 360° and gives a green-blue soln. in alkalies and a brick-red color in H_2SO_4; it dyes Sn-, Al-, Fe- and Cr-mordanted calico, producing bright orange, dull red purple, purple and dull brown shades. VI in C_5H_5N and EtOH, exposed to the light for 6 weeks, gives *2,2',3,3'-tetramethoxynaphthadianthrone*, orange needles; the *tetra-HO deriv.* forms scarlet needles, sol. in H_2SO_4 with a violet-red color; it possesses little affinity for mordanted calico and is a poor dye toward wool mordanted with Sn, Al, Fe or Cr; *tetra-Ac deriv.*, yellow, does not m. 360°. *4,4'-Dihydroxydianthrone*, m. 256–8°, sol. in H_2SO_4 with an orange-red color; the *diacetoxy diacetate* m. 265–7°. *1-Methoxyanthrone* m. 129–31°; $FeCl_3$-AcOH gives *1,1'-dimethoxydianthrone*, pale yellow, does not m. 330°; the *diacetate*, pale yellow, m. 290–1°; the crimson soln. in H_2SO_4 changes to violet and then blue on standing. Iodine and C_5H_5N give *1,1'-dimethoxydianthraquinone*, pale yellow, m. 315–6°; oxidation of a colloidal soln. with alk. $K_3Fe(CN)_6$ did not have any effect; however, exposure of a Me_2CO soln. to the light for 1 month gives *4,4'-dimethoxynaphthadianthrone*, orange-red, does not m. 360° and gives with H_2SO_4 a highly fluorescent, crimson soln.; HBr and AcOH give the corresponding *4,4'-di-HO deriv.*, scarlet needles, does not m. 360°. The other product of the action of light is *4,4'-dimethoxyhelianthrone*, salmon, does not m. 360°, gives a violet color in H_2SO_4; the 4,4'-di-HO deriv., orange-red needles, was insol. in alkalies and does not appear to give an Ac deriv. Anthrarufin di-Me ether (VII) and $SnCl_2$-HCl in AcOH give *1,5-dimethoxyanthrone*, brown-red, m. 181–2°, giving a red soln. in H_2SO_4, quickly changing to green-blue; *acetate*, pale yellow, m. 169–71°. The anthrone and $FeCl_3$ in AcOH give *1,1',5,5'-tetramethoxydianthrone*, m. 305–7°, which is not attacked by Ac_2O and C_5H_5N or by I or $(NH_4)_2S_2O_8$. VII and $SnCl_2$-HCl at 65° for 3 hrs. give *10-hydroxy-1,5-dimethoxyanthrone*, violet, m. 153–5°, sol. in H_2SO_4 with a pure blue color; boiling the mixt. for 1 hr. gives *1-hydroxy-5-methoxyanthrone*, pale yellow, m. 131–3°; *1-acetoxy acetate*, yellow, m. 161–3°; the EtOH soln. has a strong blue fluorescence. *1,1'-Dihydroxy-5,5'-dimethoxydianthrone*, pale yellow, m. 287–9°, sol. in H_2SO_4 with an

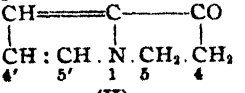
orange-yellow color, quickly passing to greenish blue; *1,1'-diacetoxy diacetate*, pale yellow, m. 250–2°. Chrysazin di-Me ether (VIII) yields *1,8-dimethoxyanthrone*, yellow, m. 196–7°; air oxidation of an alk. soln. gives *1,1',8,8'-tetramethoxydianthrone*, does not m. 340°, gives a red-brown color in H_2SO_4, rapidly changing to dull green, is unchanged by prolonged digestion with Ac_2O and C_5H_5N. $SnCl_2$-HCl and VIII give *1-hydroxy-8-methoxyanthrone*, pale yellow, m. 183–5°; the *1-acetoxy acetate*, m. 164–5°. *1,1'-Dihydroxy-8,8'-dimethoxydianthrone*, pale yellow, does not m. below 330°; Ac compd., m. 284–7°. Alizarin 2-Me ether and $SnCl_2$-HCl give 1-hydroxy-2-methoxyanthrone (IX), oxidized to *1,1'-dihydroxy-2,2'-dimethoxydianthrone*, yellow, m. 195–7°, the *1,1'-diacetoxy diacetate* m. 242–5°; IX and I in C_5H_5N give *4,4'-dihydroxy-3,3'-dimethoxyhelianthrone*, iridescent magenta-like leaflets, does not m. 330°, sol. in H_2SO_4 with an intense greenish blue color; various other methods of prepn. are given. HCl and AcOH give the *tetra-HO deriv.*, maroon-colored, does not m. below 360°; H_2SO_4 gives a deep blue color; NH_4OH gives a violet color; it does not dye mordanted calico but has weak tinctorial power toward mordanted wool; Ac_2O and C_5H_5N give *4,4'-dihydroxy-3,3'-diacetoxyhelianthrone*, iridescent, chocolate-colored needles, m. about 325°. *1,1',2,2'-Tetrahydroxydianthrone*, pale yellow, m. 240–1°; *tetra-Ac deriv.*, m. 245–7°. Purpuroxanthin di-Me ether, on reduction, gives *10-hydroxy-1,3-dimethoxyanthranol*, red, m. 156–8°; reduction of the di-Me ether with $SnCl_2$-HCl in hot AcOH gives a *tri-Ac deriv.*, yellow, m. 154–5°, of 1,3-dihydroxy(purpuroxanthin)anthrone, m. 217–9°. *3,4-Dimethoxy-9-anthranyl acetate*, yellow, m. 146–8°; the *Me ether*, yellow, m. 116–8°. C. J. West

The action of organomagnesium compounds upon furalacetophenone. New ketones in the furan ring. N. N. Maxim. *Bul. soc. chim. România* **12**, 24–7 (1930); cf. *C. A.* **25**, 513.—M. allowed organomagnesium compds. to react upon furalacetophenone and always obtained satd. ketones in the furan ring according to the following equation $2\text{-}C_4H_3OCH{:}CHCOPh + RMgX \longrightarrow 2\text{-}C_4H_3OCHRCH_2COPh$. The furalacetophenone was prepd. according to Kostanecki and Podrajanski (*Ber.* **29**, 2248) by allowing furfural to act upon PhCOMe in the presence of dil. NaOH. From this, M. prepd. *β-furylbutyrophenone*, $MeCH(C_4H_3O)CH_2COPh$, *β-furylvalerophenone*, $EtCH(C_4H_3O)CH_2COPh$ and *β-phenyl-α-furylpropiophenone*. These ketones have been characterized by their semicarbazones and oximes. The yield is almost quant. This reaction can be used as a general method of prepg. satd. ketones in the furan ring. The mechanism of the reaction will be published elsewhere. F. R. G.

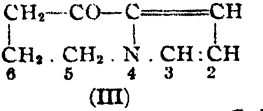
Preliminary work to ring syntheses of porphyrins, etc. IV. A bromovinylpyrrole and its reactions. Hans Fischer and Oskar Süs. *Ann.* **484**, 113–30 (1930); cf. *C. A.* **25**, 961.—2,4-Dimethyl-5-carbethoxypyrrole-3-acrylic acid (I) and Br in CS_2 give a *dibromide*, $C_{12}H_{14}NO_4Br_2$, which does not have a sharp m. p.; the Br is labile and with Me_2CO on the H_2O bath 60% I is regenerated; with EtOH-H_2O on the boiling H_2O bath there results *2,4-dimethyl-5-carbethoxy-3-ω-bromovinylpyrrole* (II), m. 158° (decompn.). Heated with HI-AcOH at 100° for 2 hrs., II is transformed to dimethylpyrrole, catalytic reduction of II gives cryptocarbethoxypyrrole; Br gives a *dibromide*; AgCN in MeOH gives *2,4-dimethyl-5-carbethoxy-α,β-3-dimethoxyethylpyrrole*, m. 112°; Ag or Ag or Cu gives the same product; with EtOH in place of MeOH there results *2,4-dimethyl-5-carbethoxypyrrole-3-ω-vinyl ether*, m. 87°. One mol. II and 1 mol. SO_2Cl_2 give a *mono-Cl deriv.*, $C_{11}H_{13}O_2NClBr$, m. 168°; 2 mols. SO_2Cl_2 give *2-formyl-4-methyl-5-carbethoxy-3-bromovinylpyrrole* (III), m. 140°; the *aldazine* m. 230° (decompn.); the *phenylhydrazone* m. 142° (decompn.); condensation of III and cryptopyrrole with HBr give the *methene-HBr*, $C_{19}H_{21}O_2N_2Br_2$, brick-red, blackens 170° but does not m. 300°. Hydrolysis of III gives *2-formyl-3-bromovinyl 4-methyl-5-pyrrolecarboxylic acid* m. 238° (decompn.), which condenses with cryptopyrrole to a *methene-HBr*, $C_{17}H_{20}ON_2Br_2$, reddish brown needles. Three mols. SO_2Cl_2 and II give a di-CO_2H acid, whose *α-Me α'-Et ester*, $C_{12}H_{14}O_4NBr$, m. 131°; *di-Et ester*, m. 115°; the free *acid*, $C_8H_8O_4NBr$, slowly carbonizes above 230°; catalytic reduction gives 3-ethyl-4-methylpyrrole-2,5-dicarboxylic acid. The *Et ester* (IV) of I, m. 134°, results from I, EtOH and HCl, or by condensation of 2,4-dimethyl-5-carbethoxypyrrole and $HO_2CCH_2CO_2Et$ with $PhNH_2$; the *dibromide* m. 121° (decompn.); the Br is removed by Zn in AcOH, giving IV, while catalytic reduction gives *Et 2,4-dimethyl-5-carbethoxypyrrole-3-propionate*, m. 73°; EtOH-KOH gives *2,4-dimethyl-5-carbethoxy-3-ω-carbethoxy-ω-ethoxyvinylpyrrole*, m. 136°, and a Br-contg. acid, m. 196° (decompn.); with MeOH a compd., $C_{16}H_{23}O_6N$, m. 178°, results. Oxidation of I with CrO_3 gives 2,4-dimethyl-5-carbethoxypyrrole-3-carboxylic acid, m. 271°. C. J. West

New derivatives of pyrrole. I. Synthesis of 3-keto-4,5-dihydro-di-(1,2)-pyrrole and of 8-keto-5,6,7,8-tetrahydropyrrocoline. George R. Clemo and George R.

RAMAGE. *J. Chem. Soc.* **1931**, 49–55.—K pyrrole and $ClCH_2CO_2Et$ in C_6H_6, heated 0.5 hr. at 100°, give the *Et ester*, b_{20} 112°, of *1-pyrrylacetic acid*, m. 91°; *amide*, m. 169°. *β-1-Pyrrylpropionic acid*, m. 62°; *Et ester*, b_{23} 122°; *amide*, m. 81°. Attempts to effect ring closure were unsuccessful. It was also not possible to effect ring closure with *succinobutylimide*, b_{17} 140°. K pyrrole and *p*-$MeC_6H_4SO_2CH_2CH_2Cl$ give *1-β-chloroethylpyrrole*, b_{20} 84°; *β-cyano deriv.* (I), b_{20} 140°; *1-γ-chloropropylpyrrole*, b_{15} 87°. The last compd. is recovered unchanged after prolonged boiling with EtOH-KOH; $AlCl_3$ also failed to effect ring closure. Passing dry HCl through I in dry Et_2O contg. $ZnCl_2$ gives *3-keto-4,5-dihydro-di-(1,2)-pyrrole* (II), m. 54°, best isolated through the *semicarbazone*, m. 211°; *piperonylidene compd.*, pale yellow, m. 194°. $EtO_2CCH_2CH_2COCl$ and K pyrrole give *Et β-1-pyrroylpropionate*, m. 50°; treatment with Na in $C_6H_4Me_2$ and distn. with $CaCl_2$ failed to remove EtOH. Levulyl chloride and K pyrrole give *β-1-pyrroylethyl Me ketone*, b_{16} 148° (*phenylhydrazone*, m. 131°; *semicarbazone*, m. 190°); treatment with acids and alkalies always resulted in amide hydrolysis. *γ-1-Pyrrylbutyronitrile*, b_{23} 152°, with $ZnCl_2$ and HCl, gives *8-keto-5,6,7,8-tetrahydropyrrocoline* (III), m. 34°; *semicarbazone*, m. 193°; *piperonylidene deriv.*, yellow, m. 136°.



(II)



(III)

C. J. WEST

Cyclotellurobutane (tetrahydrotellurophen). GILBERT T. MORGAN AND FRANCIS H. BURSTALL. *J. Chem. Soc.* **1931**, 180–4.—$(CH_2)_4I_2$ and amorphous Te, heated at 130–40° for 5 hrs., give *cyclotelluributane 1,1-diiodide* (I), purple plates or bright red prisms, m. 149–50°; reduction with SO_2 in boiling H_2O gives *cyclotellurobutane* (II), b_{122} 105–6°, b_{761} 166–7°, n_D^{18} 1.6175, penetrating and unpleasant odor, oxidizes readily in the air, reacts explosively with concd. HNO_3 and gives a red color with H_2SO_4; the *mercurichloride* m. 146–7°. II and Cl give *cyclotelluributane 1,1-dichloride*, m. 111–2°; *dibromide* (III), m. 130°, decomps. at 210°. III and IV in equimol. proportions in H_2O or II and Na_2CO_3 or NaOH sufficient to remove half the Br, give the *1,1'-oxydibromide*, $[(CH_2)_4TeBr]_2O$, m. 207° (decompn.); alkalies convert this into the *1-oxide* IV, $(CH_2)_4TeO$, m. 241° (decompn.), also obtained by the oxidation of II or the action of excess alkali on the dihalides; halogen acids regenerate the corresponding dihalides II and MeI give *cyclotelluributane 1-methiodide*, vaporizes without melting at 240°. $(CH_2)_4Br_2$ and Al telluride, heated at 125° for 2 hrs., give *1-δ-bromobutylcyclotelluributane 1-bromide*, $(CH_2)_4Te[(CH_2)_4Br]Br$, obtained from the Me_2CO and EtOH exts. of the reaction product, m. 152 3°; above its m. p. it dissocs. into $(CH_2)_4Br_2$ and II; the corresponding *iodide* m. 175–6° (decompn.); the aq. ext. of the above reaction product contains *tetramethylene-α,δ-biscyclotelluributane 1,1'-dibromide*, $(CH_2)_4TeBr(CH_2)_4TeBr(CH_2)_4$, crystg. with 1 mol. H_2O, m. 225° with dissocn. to $(CH_2)_4Br_2$ and II; *diiodide*, deep yellow, decomps. 215°.

C. J. WEST

Heterocyclic systems containing selenium. IV. Cycloselenohexane. GILBERT T. MORGAN AND FRANCIS H. BURSTALL. *J. Chem. Soc.* **1931**, 173–80; cf. *C. A.* **24**, 4297.—$(CH_2)_6Br_2$ and Na_2Se, refluxed 2 hrs., give a mixt. of yellow polymers and a very small quantity of *cycloselenohexane* (I), b_{48} 105–6°, b_{756} 188–90°, n_D^{18} 1.5470, $d_4^{24.5}$ 1.353, $d_4^t = 1.378 - 0.00101t$; the concd. H_2SO_4 soln. develops yellow to red tints on warming; I is not oxidized in the air; *mercurichloride*, m. 193–4° (decompn.). I and I in EtOH give *cycloselenihexane 1,1-diiodide*, reddish purple, m. 82°; *1,1-dibromide*, yellow, m. 118–9°; it slowly decomps. giving $(CH_2)_6Br_2$ and Se; *1,1-dichloride*, m. 78°; *1-methiodide*, m. 149–50° (decompn.). The more sol. fraction of the polymerides (in petr. ether, b. 60–80°) is a *dimer*, $(C_6H_{12}Se)_2$, m. 92°, depolymerizes above 220°; *dibromide*, pale yellow, m. 145° (decompn.). The less sol. *polymer*, $(C_6H_{12}Se)_x$, is a waxy microscryst. powder, m. 36–7°; mol.-wt. detns. indicate approx. 12 mols. I; the *bromide* decomps. slowly and m. 94–5° (decompn.). Heating this polymer at 220° gives *2-methylcycloselenopentane* (II), b_{48} 90°, b_{764} 169–71°, n_D^{18} 1.5205, d_4^{22} 1.287, $d_4^t = 1.3115 - 0.00111t$; the dichloride is a colorless liquid, the dibromide a reddish yellow gum and the diiodide a deep red gum; *mercurichloride*, m. 112°; *1-methiodide*, m. 164° (decompn.). The constitution of II is shown by heating the dibromide, which gives $Br(CH_2)_3CHMeBr$, which was converted into the dinitrile and α-methylpimelic acid. $(CH_2)_6Br_2$ and KSeCN, refluxed in Me_2CO for several hrs., give *hexamethylene α,ζ-diselenocyanate*, thick yellow oil which decomps. on distn.; oxidation by the air gives *cyclodiseleno-*

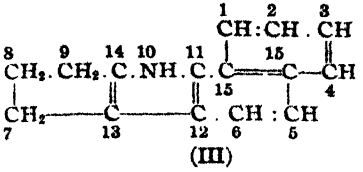
hexane, brown, highly polymerized, m. about 40° and decomps. at 250°, giving II; oxidation of either of these compds. with HNO_3 gives ***hexamethylenediselenious acid***, decompg. 147°. The mean parachor of I (302.1) and of II (304.2) indicates that they are normal liquids. C. J. WEST

Behavior of certain thiophanes in heptane and naphtha solutions. R. W. BOST AND M. W. CONN. *Ind. Eng. Chem.* **23**, 93–5(1931).—Tetramethylene and pentamethylene sulfides have been studied along with Et_2S and thiophene, in heptane and three naphtha solns. $HgCl_2$, $KMnO_4$, H_2O_2, and MeI react with the thiophanes to form definite products easily identified and purified. Br and HgI_2 form unstable products. B. and W. state in general thiophanes resemble alkyl sulfides more than thiophene. M. C. ROGERS

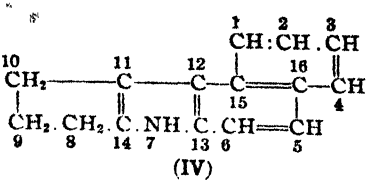
Indophenin. GUSTAV HELLER. *Chem.-Ztg.* **54**, 985–7(1930); cf. *C. A.* **19**, 1277.—A theoretical discussion of the formula proposed by Steinkopf and Roch (*C. A.* **25**, 292) for the constitution of indophenin. JULIUS WHITE

Syntheses of glucosides. VII. Synthesis of 6-bromoindican. ALEXANDER ROBERTSON AND ROY B. WATERS. *J. Chem. Soc.* **1931**, 72–6; cf. *C. A.* **25**, 1232.—*Me 4-bromoanthranilate*, m. 78°, does not react with $ClCH_2CO_2Me$ when heated alone or with AcONa or C_5H_5N. 4-Bromoanthranilic acid and $ClCH_2CO_2H$, heated in 5.5% aq. KOH for several hrs. and the resulting product esterified with MeOH and H_2SO_4, give *di-Me 5-bromophenylglycine-2-carboxylate*, m. 101° (almost quant. yield); Na in C_6H_6 contg. a little MeONa gives *Me 6-bromo-3-hydroxyindole-2-carboxylate* (I), m. 192°; *di-Ac deriv.*, m. 151°. Refluxing the ester with MeOH-NaOH in N for 1.5 hrs. gives 6-bromoindoxylic acid, sepg. from H_2O as the *trihydrate*, m. 198° (decompn.); Ac_2O and AcONa give 6-bromo-1-acetyl-3-acetoxyindole, crystg. from dil. EtOH as the *hydrate*, sinters 122°, m. 150–2°. Adding aq. KOH to I and *O*-tetraacetyl-α-glucosidyl bromide in Me_2CO at 10° gives *Me 6-bromo-3-O-tetraacetyl-β-glucosidoxyindole-2-carboxylate*, m. 171°, $[\alpha]_D^{20}$ —59.7° (Me_2CO); a penta-Ac deriv. could not be obtained. Hydrolysis by heating with MeOH-KOH on the H_2O bath for 1 hr. gives the *K salt* (II) of 6-bromo-3-β-glucosidoxyindole-2-carboxylate, which forms a gel, prolonged hydrolysis by dil. HCl gives 6,6′-dibromoindigotin and glucose. II, AcONa and Ac_2O, heated on the steam bath for 1 hr. and then at 160° for 1 hr., give *penta-acetyl-6-bromoindican* (*6-bromo-1-acetyl-3-O-tetraacetyl-β-glucosidoxyindole*), m. 159°, $[\alpha]_D^{20}$ —48.8° (Me_2CO); with dry NH_3 in MeOH at 0° there results *6-bromo-3-β-glucosidoxyindole* (*6-bromoindican*), crystg. with 4 H_2O, m. 64°, $[\alpha]$ (Me_2CO), drying over P_2O_5 for 60 hrs. gives the *semi-hydrate*, m. 177°; the anhyd. compd. results by heating at 110° for 15 hrs. and at 160° for 5 min. This is rapidly hydrolyzed by warm 2% HCl and by emulsin at 35–7°, with the liberation of glucose and 6-bromo indoxyl, partly oxidized by the air to 6,6′-dibromoindigotin. Hydrolysis by warm 3% HCl in the presence of isatin gives quant. *6-bromoindirubin*, purple with green metallic luster, does not m. 340°; with p-$O_2NC_6H_4CHO$, there results *p-nitrobenzaldehyde-6-bromoindogenide*, brick-red, m. 297–8°. C. J. WEST

Action of nitric acid on polycyclic indole derivatives. IX. STEPHEN A. BRYANT AND SYDNEY G. P. PLANT. *J. Chem. Soc.* **1931**, 93–105; cf. *C. A.* **24**, 114, 1375.—In view of the widely different nature of the products obtained when HNO_3 acts on the acyl derivs. of tetrahydrocarbazole, dihydropentindole, 7,8,9,10-tetrahydro-α β-naphthacarbazole and 8,9,10,11-tetrahydro-α′,β′-naphthacarbazole, and of the deep-seated variations observed in the reactions of substances formed in such cases by the addn. of HO and NO_2 or OH and OH to the double linkage, it is of interest to extend the investigation to certain closely related types. *Cyclopentanone α-naphthylhydrazone* (I), m. 95°; the *β-deriv.* (II), m. 77°. I and dil. H_2SO_4, heated 15 min. at 100°, give *7,8-dihydro-α,β-naphthapentindole* (III), m. 167°; this is also formed by boiling I in glacial AcOH; its picrate, reddish brown, m. 167° (decompn.). III and Ac_2O contg. a little H_2SO_4, boiled 10 hrs., give the *10-Ac deriv.*, m. 157°, and the *1(?)-Ac deriv.*, yellow, m. 215°; stable toward dil. EtOH-KOH; *oxime*, m. 236° (decompn.). II and dil. H_2SO_4 give *9,10-dihydro-α′,β′-naphthapentindole* (IV), m. 103°; *picrate*, brown, m. 189° (decompn.). AcCl and IV in Me_2CO and aq. NaOH give the *7-Ac deriv.*, m. 170°; with Ac_2O and H_2SO_4 this gives the *5(?),7-di-Ac deriv.*, pale green, m. 234°, also obtained from IV and Ac_2O; partial hydrolysis gives the *5(?)-Ac deriv.*, greenish yellow, m. 239°, yielding with BzCl and KOH the *5(?)-acetyl-7-benzoyl deriv.*, pale greenish yellow, m. 163°, which may again be partially hydrolyzed to the *5(?)*-Ac deriv.; *7-Bz deriv.*, pale yellow, m. 196°; *7-carbethoxy deriv.*, m. 160°. The 7-Ac deriv., nitrated in AcOH, yields a *5(?)-NO_2 deriv.*, lemon-yellow, m. 247°; K_2CO_3 splits off the Ac group, giving the *5(?)-NO_2 deriv.* of IV, brick-red, m. 228°.



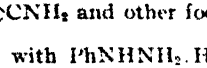
(III)



(IV)

The 7-Bz deriv. also yields a *5(?)-NO_2 deriv.*, yellow, m. 259°. The 7-carbethoxy deriv. yields a *5(?)-NO_2 deriv.*, lemon-yellow, m. 202°, and also a *di-NO_2 deriv.*, yellow, m. 220° (decompn.). 2-Methylcyclohexanone and β-$C_{10}H_7NHNH_2$, heated 0.5 hr. and the resulting oily hydrazone treated with dil. H_2SO_4, give a mixt. of *δ-methyl-8,9,10,11-tetrahydro-α',β'-naphthacarbazole* (V), m. 115° (*picrate*, dark crimson, m. 201° (decompn.)), and 12-methyl-8,9,10,11-tetrahydro-α',β'-naphthacarbazolenine, m. 92° (picrate, bright yellow, m. 166°). A mixt. of V, S and quinoline, boiled for 45 min., gives *8-methyl-α',β'-naphthacarbazole*, m. 144°; this was also synthesized from 2,3-$HOC_{10}H_6CO_2H$ and *o*-$MeC_6H_4NHNH_2$ by heating at 130° and then distg. the 8-methyl-α',β'-naphthacarbazole-6-carboxylic acid with soda lime. 5,6-Dihydro-α,β-naphthacarbazole (Ghigi, *C. A.* **24**, 3797) with Ac_2O contg. a little H_2SO_4 gives the *1(?)-Ac deriv.*, yellow, m. 253° (*oxime*, m. 292° (decompn.)). Benzopentindole gives a *7-Bz deriv.*, pale yellow, m. 187°; with HNO_3 in AcOH there results *14-nitro-6-hydroxy-7-benzoyl-6,14-dihydrobenzopentindole*, m. 169° (decompn.); 20% KOH gives *14-nitro-6-hydroxy-6,14-dihydrobenzopentindole*, m. 200° (decompn.). C. J. West

Diazotization in the pyrazole series. J. Reilly and D. MacSweeney. *Proc. Roy. Irish Acad.* **39B**, 497–504(1930).—The diazonium salts of 4-aminopyrazole derivs. had been shown (*C. A.* **9**, 1173) to be more stable than those of 5-aminopyrazoles contg. a Ph substituent. The stability of the diazonium chloride of 1-phenyl-3,5-dimethyl-4-aminopyrazole (I) showed this stability to be a function of the position of the NH_2 group and not to be due to the presence of the substituent Ph group. From the study of pyrazolediazonium derivs. it appears that the essential factors for diazotization are the grouping $\diagup\!\!\diagdown CNH_2$ and other foci of unsatn. I was prepd. by condensing isonitrosoacetylacetone with $PhNHNH_2.HCl$ (*Ann* **325**, 129–95) and reducing the resulting nitrosopyrazole with Sn and HCl. I forms a yellow, dibasic chloroplatinate, an unstable red ppt. with $AuCl_3$ and a Bz deriv., m. 153–4°. It also condenses with BzH to give a benzylidene deriv., m. 90–1°. 4-Amino-3,5-dimethylpyrazole gives characteristic colors with phenols in alk. soln. and its diazonium chloride forms a triazo deriv. with NaN_3 but I fails to give these reactions. Treatment of an acid soln. of I in dil. EtOH with $EtNO_2$ yielded the diazonium chloride (II) of I which probably has the structure



It is a white powder, very stable under ordinary conditions, and heated at 100° for 6 hrs it loses only about 20% of its coupling power. With KCN in acid soln. it loses its coupling power and yields a yellow ppt. II couples with $PhNMe_2$, $PhNEt_2$, *p*-$MeC_6H_4NH_2$, α-$C_{10}H_7NH_2$, and β-$C_{10}H_7NH_2$ (orange-yellow crystals, m. 195–6°) to give colored azo derivs.; with β-$C_{10}H_7OH$ it gives a red compd. m. 189–90°; with 8,3,6- and 2,6,8-$C_{10}H_4(OH)(SO_3H)_2$ it gives sol. red dyes; with 1,8,3,6-$C_{10}H_4(OH)_2(SO_3H)_2$ it gives a sol. purple dye; and with *m*-$C_6H_4(NH_2)_2$ it gives a red azo chrysoidine color. II also couples with Ac_2CH_2 to give dark yellow crystals, m. 84–5°, and with $AcCH_2CO_2Et$ to give yellow crystals, m. 115–6°. These compds. with diketones are sol. in the usual org. solvents but not in alkalies and may possess one of the following 3 structures: (Pyr = pyrazole nucleus) Pyr.N:N-CH(COR')COR, Pyr.N:NC(COR'):C(OH)R, Pyr.NHN:C(COR')COR.

C. H. Peet

Organic catalysts. V. Investigation of the cleavage of α-keto acids. Wolfgang Langenbeck, Rudolf Hutschenreuter and Robert Jüttemann. *Ann.* **485**, 53–61 (1931); cf. *C. A.* **24**, 4285.—The following study was made in an effort to det. the cause of the retarding action of aldehydes upon the catalytic cleavage of α-keto acids. $BzCO_2H.PhNH_2$ (2 g.) and 0.1 g $BzCO_2H$ (I) or 5 drops BzH, heated at 250° for 5 min., give 0.05 g. of *pentaphenyldihydroimidazole* (II), $C_{33}H_{28}N_2$, pale yellow, decomps. between 400–50°, a part of the compd. being sublimed; it crystallizes with 2 mols. H_2O, which are not lost at 150° *in vacuo*. II also results in 0.5 g. yield from 5 g. desyl chloride

and 2 g. $PhNH_2$ at 140–50° for 1 hr., removing the $PhNH_2$.HCl and again heating with BzH at 150–60° for 1 hr. PhC(:NPh)CHPhNHPh is probably an intermediate product, since with BzH at 150–60° for 1 hr., this yields 72% of II. *Perchlorate* of II, needles from boiling AcOH, decomps. when heated; *periodide*, brown leaflets, becoming colorless at 250°, losing I; *perbromide*, needles; *HCl salt*, needles, decompg. above 300°; with KI this gives the difficultly sol. HI salt. II does not give a cryst. oxidation product with O_3 in AcOH. CrO_3-AcOH gives a chromate but has no oxidizing action. II is probably formed in a similar manner in the catalytic cleavage of I by $PhNH_2$. β-Aminooxindole forms a *picrate* (III), yellow, darkens at 150°. Further expts. on the action of $PhNHCH_2CO_2H$, $BzCO_2K$, p-$MeOC_6H_4NHCH_2CO_2H$, m-$O_2NC_6H_4NHCH_2CO_2H$ and III on I are reported. C. J. West

Absorption spectra and constitution of azoxy derivatives and analogous compounds. L. Szegö and P. Ostinelli. *Atti III congresso naz. chim. pura applicata* 1930, 395–401.—The ultra-violet absorption spectra of alc. solns. of *desoxybenzoin* and the following derivs. have been detd.: *α-p-nitro*, *α-p-amino*, *α-* and *β-p-hydroxy*, *α-* and *β-p-methyl* and *β-p-chloro* (α-form is $C_6H_5COCH_2C_6H_4R$, β-form is $C_6H_5CH_2COC_6H_4R$). *β-p-Chlorodesoxybenzoin* is prepd. as follows: phenylacetyl chloride is condensed with chlorobenzene (I) in the presence of $AlCl_3$ by heating 2 hrs. on a water bath and 2 hrs. at 120°. The excess of (I) is distd. off and the mass decompd. with H_2O and then extd. with ether. This was distd. off and the residue treated with animal charcoal in 95% alc. It was pptd. with H_2O and recrystd. from ether; it m. 102°. The oxime was prepd. by heating an alc. soln. of the ketone with the equiv. quantity of hydroxylamine-HCl and Na_2CO_3 in H_2O. The alc. was evapd. and the product, washed with H_2O dissolved in alc. and pptd. with H_2O, m. 117°. The α-isomers and non-substituted desoxybenzoin behave alike but give a different type of absorption curve from the β-isomers. J. B. A.

Absorption spectra and the constitution of the desoxybenzoin series. L. Szegö and P. Ostinelli. *Gazz. chim. ital.* 60, 677–88(1930).—In a previous paper (cf. preceding abstr.) it was shown that substituents have different effects on the absorption spectra of desoxybenzoin compds. from their effect on those of azoxy compds. (cf. S., *C. A.* **23**, 4406). In the latter the influence of the substituent in the nucleus on the absorption power is less when it is nearer the azoxy group ($XC_6H_4N(:O):NPh$) than when it is in the farther position ($XC_6H_4N:N(:O)Ph$). On the contrary, absorption is greater in $XC_6H_4COCH_2Ph$ compds. than in $XC_6H_4CH_2COPh$ compds. The behavior of the azoxy compds. is explained by the fact that double-bonded O in the azoxy group dampens the effect of the substituent by partial valences, resulting in a more stable condition in the substituted nucleus. This hypothesis is supported by the great similarity between azo and $XC_6H_4N:N(:O)Ph$ compds. The opposite effect in the desoxybenzoin series does not permit a similar hypothesis, so further expts. were carried out with isomers of other desoxybenzoins (substituted in both nuclei), most of which are new. p-$ClC_6H_4CH_2CO_2H$ cannot be prepd. satisfactorily by the method of Petrenko-Kritschenko (cf. *Ber.* **25**, 1240(1892)), so it was prepd. by sapon. of p-$ClC_6H_4CH_2CN$. It was then transformed into p-$ClC_6H_4CH_2CO_2Cl$ (I). The latter condensed with C_6H_6 in the presence of $AlCl_3$ yields p-$ClC_6H_4CH_2COPh$ (II). p-$MeC_6H_4CH_2Cl$ condensed with PhCl in the presence of $AlCl_3$, heated several hrs. at 130°, excess PhCl distd. off, the residue decompd. with water, washed with HCl, then with Na_2CO_3, extd. with Et_2O, the residue dissolved in EtOH, purified with animal charcoal, pptd. with water and crystd. repeatedly from a mixt. of petr. ether and C_6H_6, yields *4-chloro-4'-methyldesoxybenzoin*, p-$MeC_6H_4CH_2COC_6H_3Cl$-p (III), m. 123°. Similarly, condensation of I with PhMe yields *4-methyl-4'-chlorodesoxybenzoin* (IV), m. 113°. $MeC_6H_4CH_2CO_2H$, PhOH and $ZnCl_2$, heated 0.5 hr. at 200°, dissolved in C_6H_6 and a little water, washed free of $ZnCl_2$ by HCl, made alk. with Na_2CO_3, acidified with HCl (d. 1.19), the ppt. purified with animal charcoal and recrystd. from dil. EtOH, yields *4-hydroxy-4'-methyldesoxybenzoin* (V), m. 162°. p-$O_2NC_6H_4CH_2Cl$, PhMe in CS_2 and $AlCl_3$ heated 3 hrs. on a water bath, the CS_2 and PhMe distd., the residue decompd. by water, washed with HCl and Na_2CO_3, crystd. from dil. EtOH, reduced with Sn and HCl in EtOH, made alk., extd. with Et_2O, the ext. evapd., the residue recrystd. from dil. EtOH, diazotized in H_2SO_4 and the product recrystd. from hot water, yields *4-methyl-4'-hydroxydesoxybenzoin* (VI), m. 146°. *4-Hydroxy-3-methyldesoxybenzoin* (VII) was prepd. by the method of Blau (*Monatsh.* **26**, 1149(1905)). $PhCH_2Ac$ was prepd. by dry-distg. a mixt. of $Ca(OAc)_2$ and $(PhCH_2CO)_2Ca$ (2 parts). The measurements of the absorption consts. in the ultra-violet range were carried out by the method already described (*loc. cit.*). The ketones were examd. in hexane (optically pure) (cf. Wolf and Herold, *C. A.* **23**, 5416) and the desoxybenzoins in EtOH (the absorption curves with EtOH and with hexane are identical). The results are tabulated

in complete detail. In all cases the phenomena were similar to those previously described, *viz.*, the max. absorptions of the β-isomers of *p*-chloro-, *p*-methyl- and *p*-hydroxydesoxybenzoin are displaced toward lower frequencies with respect to their α-isomers. The displacement between the 2 OH-isomers is greater than between the 2 Cl derivs., which in turn show greater differences in the isomers with a nuclear Me group. The weak absorption band of the β-isomers of hydroxy-, methyl- and chlorodesoxybenzoin, and to which has been attributed the color, disappears after complete purification. Thus, β hydroxydesoxybenzoin, described by Weisl (*Monatsh.* **26**, 984 (1905)) as orange-red, is colorless when highly purified. In the compds. with substituents in each nucleus, as in the methylhydroxy derivs., V has a great max. displacement compared with that of VI and the displacement increases still more when both substituents are in the nucleus on the CO group, *viz.*, in VII. Similar relations are found in the Me-Cl derivs., where the effect of the Cl prevails over that of the Me group, as with the compds. contg. a single substituent. Therefore the increase in light absorption resulting from proximity to the CO group is not unusual but is found in all compds. The CO group has an effect wholly apart from a dampening of the substituent and its nucleus. The proximity of CO to unsatd. bonds greatly increases the absorption power (cf. Bielecki and Henri, *C. A.* **8**, 691), and even the C_6H_5 nucleus with its conjugated double bonds has a similar influence (cf. v. Auwers, *C. A.* **9**, 1459; **13**, 432-3). Measurements of ketones of the PhCOEt and $PhCH_2COMe$ type show how profound is the influence of the position of CO with respect to the C_6H_5 nucleus. In every case there is an increase in the power of extinction, beginning with compds. with the CO directly on the C_6H_5 nucleus. This effect is much more intense in the ketones than in the desoxybenzoins, since in the ketones the distance between 2 centers of oscillation has a greater influence than in the desoxybenzoins, in which the displacement of frequency indicates only the variations in the state of satn. of 1 C_6H_5 nucleus with respect to the other. The joint effect of the 2 centers of oscillation with unsatd. character leads to greater optical exaltation. In desoxybenzoins the CO group has a lower degree of satn. than the neighboring CH_2 group, while the azoxy -N(:O)= group corresponds to nitric N and involves a greater satn. of the same N atom. Therefore, of the 2 N atoms in the azoxy compds., the quinquevalent N is in the higher state of satn. The proximity of an O or quinquevalent N atom should not have a depressing effect on the substituted nucleus, while the tervalent N has an excitant effect like the CO group, which induces an increase in the absorption power by the reciprocal influence of the 2 unsatd. groups. A comparison of the absorption spectra of the simplest aromatic derivs. having their N in the form of NO_2, NO or NH_2 groups confirms these deductions. The same reasoning may be extended to diazo compds. According to Angeli (*C. A.* **2**, 2991) these are not simply stereoisomers. Cambi (*C. A.* **21**, 3895) on the contrary gives the structures $(RN(:O).N)'K^+$ and $(RN.N.O)'K^+$ to the normal and isodiazotates, resp. Cambi and Szego (*C. A.* **23**, 337) have shown that normal diazotates have continuous absorption spectra with low coeffs. of extinction, whereas the iso derivs. have a max. absorption in the ultra-violet. Based on the formula above of normal diazotates, the quinquevalent N carrying the O is next to the nucleus, while in iso compds. the O is on the terminal N. The optical behavior agrees perfectly with the hypothesis:

$\{p\text{-}XC_6H_4N(:O):N\}'$	$\{p\text{-}XC_6H_4N.N.O\}'$
(normal)	(iso)
smaller absorption	greater absorption

Both in the aromatic ketones with the CH_2CO chain and in azoxy derivs. and diazotates, the variation in absorption power for ultra-violet light depends upon the distance of the 2 centers of oscillation with the lower degree of satn., and it increases when the 2 centers are closer together. C. C. Davis

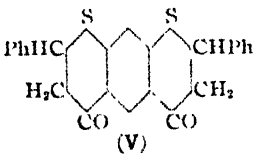
Spectrography of the flavone series. III. The constitution of wogonin. Shizuo Hattori. *Acta Phytochim.* **5**, 99-116(1930); cf. *C. A.* **22**, 3661.—Wogonin (I) is present in small amounts in the roots of *Scutellaria baicalensis* Georgi (*Labiatae*) while baicalin forms the much larger part. I is extd. with benzene and recrystd. from 80% alc., forming yellow needles, m. 201°. The analyses correspond with the formula $C_{16}H_{12}O_5$; it contains two HO and one MeO group. One of the HO groups is methylated by CH_2N_2, forming a Me ether, m. 183°, which gives a brown color with $FeCl_3$. This behavior indicates a free HO group in the *o*-position to the C:O group. Methylation with Me_2SO_4 and alkali yields a di-Me ether, m. 167-8° (II), which does not give a color with $FeCl_3$. Upon hydrolysis with 20% NaOH, PhCOMe and BzOH are obtained. Upon boiling with HI (d. 1.7), I is demethylated with the formation of a deep yellow

product, m. 226–7°, which has three HO groups, probably in the 5,7,8-positions, and the formula $C_{18}H_{10}O_8$. Comparison of the absorption spectra of acetylwogonin with 8-hydroxy- and 8-methoxyflavone showed an analogy from which it is concluded that I has the MeO group in position 8. The structure was finally detd. by synthesizing 5,7,8-trimethoxyflavone and comparing it directly with II. The reaction of $AlCl_3$ with 2,3,4,6-$(MeO)_4C_6HCOMe$ yielded a substance, m. 112–3° (III), identical with 1 of the 4 substances obtained by Bargellini and later by Chapman, Perkin and Robinson (*C. A.* **22**, 961) contg. one HO and three MeO groups. The HO group gave a $FeCl_3$ reaction indicative of being in the *o*-position to the C:O group (2 or 6). Fusion of III with Bz_2O and BzONa yielded a flavone, m. 167–8°, identical with II and not with the known 5,6,7-trimethoxyflavone. I, therefore, is 5,7-dihydroxy-8-methoxyflavone. Absorption spectra are given of 8-methoxyflavone, acetyl-, mono- and dimethylwogonin and wogonin and 5,7,8-trihydroxyflavone. E. GEBAUER-FÜLNEGG

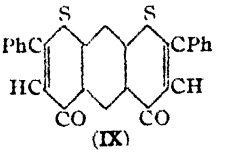
Diflavone group. V. *m*-Methoxybenzaldehyde and diacetoresorcinol. ELIZABETH M. RYAN AND HUGH RYAN. *Proc. Roy. Irish Acad.* **39B**, 425–33(1930); cf. *C. A.* **8**, 1107; **9**, 2229; **10**, 1506, 1848–9, 2209, 2577.—The diacetate of tetrabromodibenzylidenediacetoresorcinol (I) yielded diflavone upon treatment with alc. KOH, but the corresponding anisylidene and veratrylidene compds. yielded dicoumaranones The type of ring formed must depend upon the relative lability of the α- and β-Br atoms and it appeared that a *p*-MeO group increased the lability of the β-Br atoms According to the theory of induced alternate polarities, a *m*-MeO group should have a less marked influence so the *m*-MeO homolog (II) of I was prepd. by condensing di acetoresorcinol with *m*-$MeOC_6H_4CHO$, followed by acetylation and bromination The principal product was the corresponding 3′,3″-dimethoxydicoumaranone (III) but the absence of a diflavone was not proved. Di-*m*-methoxybenzylidenediaceto resorcinol di-Me ether, slightly sol. in EtOH, Et_2O, sol. in PhH, Me_2CO, $CHCl_3$, m. 157–8°, gave a dibromide, m. 213° (decompn.), a tetrabromide (purity uncertain), m 176° (decompn.), and a pentabromide (purity uncertain), m. 186° (decompn.). Di-*m* methoxybenzylidenediacetoresorcinol (IV) was insol. in H_2O and petroleum ether, slightly sol. in EtOH and Et_2O, sol. in dil. KOH, $CHCl_3$, Me_2CO and PhH and m. 157° IV prepd. in EtOH was orange-yellow; better yields were obtained in MeOH but the color was light yellow. The resp. colors of these chromoisomers remained unchanged after repeated recrystns., their m. ps. and mixed m. ps. were the same and they formed the same diacetate, m. 122°. II could not be crystd. III, crystd. from C_5H_5N, m 277–9° (decompn.). Dipiperonylidenedi-*m*-methoxydiflavanone, prepd. by treating a mixt. of 2 g. of IV and 5 g. of piperonal in 60 cc. of $CHCl_3$ with 40 cc. alc. HCl, m 245°. Similarly BzH condensed with IV to give dibenzylidenedi-*m*-methoxyflavanone, m. 249–50°. C. H. PEET

Thiophenols. Dithioflavone and linear dithioflavanone. C. FINZI, G. VENTURINI AND L. SARTINI. *Gazz. chim. ital.* **60**, 798–811(1930).—Previous expts. which dealt with compds. contg. 2 heterocyclic sulfurated nuclei arranged symmetrically in the C_6H_6 nucleus and in which diketothiazine, dithiochromanone and dithioxanthone were prepd. (cf. *C. A.* **20**, 1992; **21**, 740; **22**, 4465), were continued in the present work by the prepn. of dithio derivs. It was necessary in this connection to study the behavior of polythiophenols with unsatd. compds. of the C_2H_2 and C_3H_4 series. Dithioresorcinol (I) was chosen because of the ease of prepn. of its isomers and because from it could be obtained derivs. contg. 2 sym heterocyclic sulfurated groups on the central C_6H_4 nucleus. It was found that I forms addn. products with C_2H_2 and C_3H_4 derivs., each group adding to a double or to a triple bond. The addn. of $PhCH:CHCO_2H$ (II) to I can be accomplished by heating I, II (2 mols.) and glacial AcOH, satd. with HBr at 100° in a sealed tube for several hrs., steam-distg. (to remove excess I), and washing the residue with boiling water, but the yield is very small. A much higher yield is obtained by heating I, $PhCHBrCH_2CO_2H$ (cf. *Ber.* **11**, 1221) (3.5 parts) and AcOH satd. with HBr (17 parts) at 100° in a sealed tube for 5–6 hrs., pouring into water, steam distg., and washing the residue with boiling water. The product is ***m*-phenylenedithio-β-hydrocinnamic acid***, *m*-$C_6H_4[SCH(CH_2CO_2H)Ph]_2$ (III), pitch which cannot be crystd., sol. in aq. alk. hydroxides and carbonates. III (5 g.) in aq. Na_2CO_3, oxidized with aq $KMnO_4$ (5 g.) (the reaction mixt. being partially neutralized with dil. H_2SO_4 during the oxidation), filtered, washed with boiling water, the filtrate concd., acidified with H_2SO_4 and the ppt. recrystd. from EtOH, yields ***m*-phenylenedisulfonyl-β-hydrocinnamic acid***, *m*-$C_6H_4[SO_2CH(CH_2CO_2H)Ph]_2$ (IV), m. 192°. III and $POCl_3$ (15 parts), heated on a water bath for a long time (with vigorous agitation), poured into ice-water (before the reaction product has become too thick), the sepd. green-brown oil allowed to solidify, digested with warm, dil. Na_2CO_3, extd. with boiling EtOH, the ext. concd., and the ppt.

purified by repeated crystns. from EtOH, yield *dithioflavanone* (V), greenish yellow, softens around 65–70°, semifuses at 85–90°, completely fused at 120–5°, gives intense carmine-red solns. in concd. H_2SO_4 (test of thioflavanone group). IV is also formed from III and PCl_5 with anhyd. $AlCl_3$ under the same conditions. I (5 g.) in anhyd. PhMe (40 cc.) and Na (2 g.), boiled several hrs., with frequent agitation, the unaltered Na carefully removed, PhC : CCO_2Et (12.5 g.) in PhMe added, with vigorous agitation, let stand several hrs., water added, acidified with dil. H_2SO_4, extd. with Et_2O, the PhMe-Et_2O ext. extd. with aq. KOH, the PhMe-Et_2O residual soln. dried with $CaCl_2$, and the solvents distd. *in vacuo*, leaves a residue of straw-yellow oil which is a mixt. of *Et m-phenylene-α-dithiocinnamate* and *Et m-phenylene-β-dithiocinnamate*, which could not be crystd. This mixt., sapond. by refluxing with alc. KOH (4 g.) for 2 hrs., dild. with water (equal vol.), the EtOH distd., the aq. residue extd. with Et_2O (to remove traces of styrene formed by decompn. of the acid), the aq. residue acidified with dil. H_2SO_4, the ppt. (mixt. of α- and β-acids) extd. with warm EtOH, and the ext. evapd., leaves *m-phenylene-α-dithiocinnamic acid*, *m*-$C_6H_4[SC(:CHPh)CO_2H]_2$ (VI), oil. The residue from the EtOH extn., recrystd. from boiling AcOH, yields *m-phenylene-β-dithiocinnamic acid*, *m*-$C_6H_4[SC(:CHCO_2H)Ph]_2$ (VII), pale yellowish, m. 224°. VII heated above its m. p. evolves CO_2 and leaves *m-phenylenedithiostyrene*, *m*-$C_6H_4[SC(:CH_2)Ph]_2$ (VIII), oil, cannot be crystd. Also I (3 g.) in anhyd. PhMe and Na (1 g.), refluxed for a long time, cooled, the excess Na removed, agitated with HC : CPh (4.5 g.) in PhMe, let stand, a little water added, acidified with dil. H_2SO_4, extd. with Et_2O, the PhMe-Et_2O ext. extd. with aq. NaOH, the residue washed with water, dried with $CaCl_2$, and the Et_2O and PhMe distd., leaves VIII. Na-Hg (30 g. of 3%) added slowly to VII (1.5 g.) suspended in water, acidified with dil. H_2SO_4, forms an oil which cannot be crystd. This oil (1 g.) in aq. Na_2CO_3, oxidized with concd. $KMnO_4$ (calcd. quantity), filtered, washed with boiling water, the filtrate concd., acidified with dil. H_2SO_4, and the ppt. recrystd. from boiling EtOH, yields IV. PCl_5 (1.95 g.) and then anhyd. $AlCl_3$ (4.5 g.) added with continuous agitation to VII (2 g.) suspended in anhyd. C_6H_6 (20 cc.), warmed gently to complete the reaction, let stand with frequent agitation, cooled, ice added, filtered, the residue washed with water, digested in dil. aq. Na_2CO_3 and the residue recrystd. twice from boiling C_6H_6, yields *dithioflavone* (IX), pale lemon-yellow, m. 255–6°, gives a yellow soln. in concd. H_2SO_4. VII (1 g.), agitated with concd.



(V)



(IX)

H_2SO_4 (5 cc.) (cooling), heated at 50–60° for some time, poured into water, filtered, the residue washed with water, digested in aq. Na_2CO_3 and recrystd. from C_6H_6, also yields IX. VI in oil form (*loc. cit.*) could not be made to cryst. from any solvent, but by acidification of its soln. in aq. Na_2CO_3 it seps. in the solid state, though not cryst. The only means of purification is to dissolve it in dil. Na_2CO_3, filter, reppt. with dil. H_2SO_4 and repeat this operation. Thus prepd., VI is a yellowish amorphous solid, which in time becomes compact and friable. It has no sharp m. p., but softens around 70° and at 73° it becomes a frothy liquid. Hydrogenated with Na-Hg and then oxidized with $KMnO_4$, VI partially decomps., but does not yield crystallizable products. It is decompd. by concd. H_2SO_4, with evolution of SO_2 and BzH, in this case the H_2SO_4 not having the dehydrating action which occurs in the formation of the thiochromanone and thioxanthone nuclei, but rather an oxidizing action which results in cleavage of the double bond. VI, heated at 180–90° until CO_2 is no longer evolved, cooled, washed with aq. Na_2CO_3 (to remove unaltered VI), suspended in EtOH, reduced with a great excess of Na-Hg, the Hg sepd., filtered, the filtrate partially evapd., dild. with a large vol. of water, let stand, yields a light yellow oil which cannot be crystd. and which is *m-phenylenedithioethylbenzene*, *m*-$C_6H_4(SCH_2CH_2Ph)_2$ (X), does not distil up to 300° *in vacuo*. Aq. NaOH (1.2 g.) and then $PhCH_2CH_2Cl$ (4 g.) added to alc. I (2 g.), refluxed 0.5 hr., the EtOH distd., the residue extd. with Et_2O, the ext. dried with $CaCl_2$, and the Et_2O evapd., yields X. This confirms the constitution of VI and VII, for in the reaction between I and PhC : CCO_2Et, the addn. of the thiophenol groups on the C_2H_2 bond takes place in 2 ways: union of the S to the α-C and to the β-C atom of the PhC : CCO_2H, giving rise to 2 groupings: PhC(:CHCO$_2$H) S— and PhCH:C-(CO$_2$H).S—.

C. C. DAVIS

The position of the glucuronic acid linkage in baicalin. KEITA SHIBATA AND SHIZUO HATTORI *Acta Phytochim.* **5**, 117–8(1930).—In baicalin (I), a glucuronic acid deriv. of baicalein (5,6,7-trihydroxyflavone), the glucuronic acid radical (II) can be linked only in positions 6 or 7 since on methylation only 1 mono-Me ether can be obtained which gives a violet-brown color reaction with $FeCl_3$, showing that the HO group in position 5 and ortho to the C:O group is still free. Position 7 for the linkage with II is likely on account of the green color reaction of I with $FeCl_3$ in analogy with the 5,6-dihydroxyflavone. Furthermore cobalti pentammine salts, which are known to oxidize vicinal phenolic derivs., attack alc. solns. of I easily, forming ppts. after a color change. E. GEBAUER-FUELNEGG

Quinoline compounds containing arsenic. II. Synthesis of 6-methoxyquinoline derivatives of aminophenylarsonic acids by the use of 4-bromo-6-methoxy-2-methylquinoline. ROBERT H. SLATER. *J. Chem. Soc.* **1931**, 107–18; cf. *C. A.* **24**, 4039.—An improved method is given for the prepn. of 4-hydroxy-6-methoxy-2-methylquinoline (61% yield); $POBr_3$ gives the *4-Br deriv.* (I), m. 117–8°; the AcOH and dil. HNO_3 solns. exhibit a blue fluorescence and a dil. H_2SO_4 soln. a greenish blue fluorescence, changing to violet on dilu. Heating a mixt. of 8.5 g. I, 5.4 g. *o*-$H_2NC_6H_4AsO_3H$, 70 cc. AmOH, 16 g. K_2CO_3 and a trace of Cu bronze and I at 130–40° for 22 hrs. gives 5.9 g. *o-6'-methoxy-2'-methyl-4'-quinolylaminophenylarsonic acid* (II), m. 302–3° (decompn.); isoelectric pt. p_H 7.3; crystals from dil. AcOH. A colloidal soln. does not give a color with 0.001 *N* I; addn. of a few drops of concd. HCl gives a brilliant violet color, which disappears on addn. of more HCl; the warm concd. H_2SO_4 soln. exhibits a blue fluorescence. Various salts are qual. described. Reduction of II in EtOH-HCl contg. a trace of I with SO_2 gives *12-chloro-7-methoxy-11-methyl-5,12-dihydroquinbenzarsazine* (III), pale yellow, m. 245–7° (decompn.). Oxidation of III with H_2O_2 in AcOH gives *7-methoxy-11-methylquinbenzarsazinic acid*, pale yellow, does not m. 310°; various solns. exhibit a blue fluorescence; salts are qualitatively described. $POCl_3$ below 80° gives the *chloride*, pale yellow, m. 165–7°; the dil. aq. NaOH soln. exhibits a bright blue fluorescence, I (5 g.) and *o*-tolidine (10 g.), heated 9 hrs. at 140–50°, give 7.2 g. of *4-o-tolidino-6-methoxy-2-methoxyquinoline* (IV), pale yellow, crystg. with EtOH, m. 152°; heating 5 hrs. at 100° gives the anhyd. compd., m. 199–200°; the diazo chloride gives a blood-red azo dye with alk. β-$C_{10}H_7OH$; a dil. soln. in EtOH or AcOH gives a reddish brown color with 0.001 *N* I. *Ac deriv.*, m. 182–3°. The diazo compd from IV, pale orange, with Na_3AsO_3 gives *4',6"-methoxy-2"-methyl-4"-quinolylamino-3,3'-dimethyldiphenylylarsonic acid*, m. 304–5°; the warm concd. H_2SO_4 soln. shows a light blue fluorescence, which disappears on dilu. *4-o-Dianisidino-6-methoxy-2-methylquinoline* (V), pale yellow, m. 195–6°, was best prepd. by heating the components at 140° and 10–5 mm.; a dil. EtOH soln. gives a red color with 0.001 *N* I. *Ac deriv.*, crystals with H_2O, m. 140° and then 200–1°; the C_6H_6 soln. exhibits a greenish blue fluorescence; the EtOH soln. gives a brilliant blue color with 0.001 *N* I, while the AcOH soln. gives an intense red color. The Bart reaction with V gives *4',6"-methoxy-2-methyl-4"-quinolylamino-3,3'-dimethoxydiphenylylarsonic acid*, pale grey, m. 243.5° (decompn.); the dil. AcOH soln. gives a dark brown ppt. with 0.001 *N* I. I and (*p*-$H_2NC_6H_4)_2CH_2$, heated at 135–40° and 10–5 mm., give *p-6-methoxy-2-methyl-4-quinolylamino-p'-aminodiphenylmethane*, pale yellow, crystals with 1 mol. H_2O, m. 135–45°; the Bart reaction gives *p-6-methoxy-2-methyl-4-quinolylaminodiphenylmethane-p'-arsonic acid*, pale yellow, chars at 300°; a soln. in concd. H_2SO_4 gives a brilliant purplish blue fluorescence which is destroyed on dilu. with H_2O. *4-Anilino-6-methoxy-2-methylquinoline*, m. 208–9°; *HCl salt*, does not m. 310°. The chemotherapeutic tests will be published elsewhere. C. J. WEST

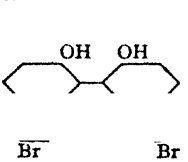
β-Diketones in ring formation. II. UMAPRASANNA BASU. *J. Indian Chem. Soc.* **7**, 815–24(1930); cf. *C. A.* **24**, 5752.—Bz_2CH_2 (I), supposedly 96% enolic, gives 45% of *3-cyano-4,6-diphenyl-2-pyridone*, when condensed with $CNCH_2CONH_2$ (IV). To exam. the influence of the adjacent substituent in the enolic modification in the course of such condensations, IV has been condensed with I, *p*-$MeC_6H_4COCH_2Bz$ (II) and $CH_2(COEt)_2$ (III). I condensed with IV in the presence of NaOEt, gave 5–20% of $\overline{NH.CO.C(CN):CPh.CH:CPh}$, m. 320°. By using Et_2NH as a condensing agent, 55–70% was obtained, a 50% excess of IV improving the yield. The condensation of IV with II by the aid of Et_2NH gave 34% of $\overline{NH.CO.C(CN):CPh.CH:CC_6H_4Me}$, m. 267° (which on heating with H_2SO_4 evolved CO_2 and formed $\overline{NH.CO.CH:CPh.CH:CC_6H_4Me}$, m. 226–8°), and 17% of $\overline{NH.CO.C(CN):C}$

$(C_6H_4Me).CH:CPh$, m. 311–2°, hydrolyzed to $NH.CO.CH:C(C_6H_4Me).CH:CPh$, m. 237–9°. According to B. the main crop is derived from the $PhC(OH):CHCOC_6H_4Me$ modification owing to the greater inhibiting effect of the β-tolyl group in the $MeC_6H_4C(OH):CHCOPh$ form. That the reaction had taken place only through the enolic phase was evident by the isolation of only $NH\ CO.C(CN):CPh.CH:CC_6H_4Me$ from the condensation of IV with $PhC(OMe):CHCOC_6H_4Me$. $NH\ CO\ C(CN):CEt.CH:CEt$, m. 186°, the condensation product of III and IV, was heated with concd. HCl for 3 hrs. at 150° and hydrolyzed to $NH.CO.CH:CEt.CH:CEt$, m. 61–2°. The influence of substituents on the reactivity of the CH_2 group of IV was studied by condensations involving the use of $CH_2(CONH_2)_2$ (VI) and $CH_2(CN)_2$ (VII). Ac_2CH_2 (VIII) and VI formed $NH.CO.C(CONH_2):CMe.CH:CMe$, m. 224–5° (which was hydrolyzed with concd. HCl to *ψ-lutidostyril*, m. 179–80°), whereas $ClCH_2CONH_2$ and $PhCH_2CONH_2$ could not be condensed with VIII. A mixt. of VII and VIII with the addn. of a little Et_2NH gave 77% of *3-cyano-ψ-lutidostyril*, $NH.CO\ C(CN):CMe.CH:CMe$, m. 289°. With $CNCH_2CO_2Et$ and VII, resp., $BzCH_2Ac$ gave $NH.CO.C(CO_2Et):CMe.CH:CPh$, m. 216–7°, and $NH.CO.C(CN):CMe.CH:CPh$, m. 310°.

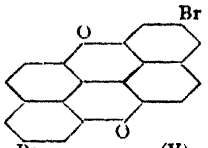
C. R. ADDINALL

Derivatives of dinaphthylene dioxide. A. CORBELLINI AND PASTURINI *Gazz. chim. ital.* **60**, 843–61(1930).—The expts. continue the previous ones (cf. C. and Vietti, *C. A.* **23**, 3458). Concd. β-dinaphthol (I) in AcOH and Br (calcd. quantity) in AcOH, heated on a water bath, cooled, the ppt. removed, the mother liquor concd. until further crystn. is complete, and the combined products recrystd. from C_6H_6 or $CHCl_3$, yield almost 100% of dibromo-β-dinaphthol (II), m. 202–3° (which is far from the 155° obtained by Fosse (cf. *Bull. soc. chim.* [3], **21**, 657), when prepd. in the same way). Methylation of alk. II by Me_2SO_4 with crystn. from PhCl yields the *di-Me deriv.*, $C_{22}H_{16}O_2Br_2$, m. 239.5° (not cor.). To det. the position of the 2 Br atoms the oxidation products of II were studied. With a compd. of this complexity, the products vary with the nature and quantity of the oxidizing agent. II (15 g.) in AcOH, oxidized with CrO_3 (15 g.) on a water bath, when the reaction is completed heated to boiling, concd., dild. with water, acidified with H_2SO_4, the ppt. dissolved in dil. Na_2CO_3, oxidized with $KMnO_4$ (at first cold, then on a water bath), the excess $KMnO_4$ reduced with EtOH, filtered, the filtrate concd. on a water bath, acidified with HCl, extd. with Et_2O, the ext. evapd. almost to dryness, $CHCl_3$ added, the ppt. sublimed *in vacuo* around 150° and the sublimate recrystd. from abs. Et_2O, yields 4-bromophthalic acid (III), m. 105–7° (cf. *Ber.* **20**, 1017(1887); Stephens, *C. A.* **16**, 253). Oxidation in the same way with $KMnO_4$ of the product obtained by extg. with Et_2O the dild. AcOH soln., or that obtained by sepn. on long standing, yields more III. Alk. II (5 g.), oxidized with dil. aq. $KMnO_4$ (8.35 g.) first cold and then on a water bath, the excess $KMnO_4$ reduced with EtOH, filtered hot, the residue washed thoroughly with boiling water (to ext. the slightly sol. K salt), the combined filtrates acidified with HCl and the ppt. recrystd. from $PhNO_2$, yields *2-[2-hydroxy-6-bromo-1-naphthoyl]-5-bromobenzoic acid* (IV), pale brown-yellow, m. 346° (not cor.). The *Na salt* of IV (0.2 g.) and fused KOH (1 g.), kept at a min. temp. until the product is completely sol. in water, dissolved in water and aq. HCl added, ppt. an unidentified *compd.*, does not m. up to 300°, contains no Br, sol. in aq. Na_2CO_3. This reaction with KOH was carried out with the purpose of decompg. IV into III and bromo-2-naphthol, a decompn. which takes place easily with 2-[2-hydroxynaphthoyl]benzoic acid (cf. Walder, *Ber.* **16**, 299(1883)), but in the present case KOH probably merely replaced 2 Br atoms by OH groups, without rupture of the mol. Boiling aq. 6-bromo-2-naphthol (m. 128.5°; cf. Franzen and Stäuble, *C. A.* **16**, 1945) (0.25 g. in 150 cc.), oxidized with boiling aq. $FeCl_3$ (0.3 g.), boiled for some time, filtered, the residue washed with dil. HCl and recrystd. from C_6H_6, yields *2,2'-dihydroxy-6,6'-dibromo-1,1'-dinaphthyl*, m. 203°, mixed with II it melts at the same temp., establishing the constitution of II. II cyclicized by CuO according to the method already used for I (cf. C. and Vietti, *loc. cit.*), the product extd. with PhCl, the ext. concd. and the ppt. sepd. by fractional crystn. from $PhNO_2$, yields 2 products: (1) a less sol. *compd.* $C_{20}H_8O_2Br_2$ (V), m. 361–2° (not cor.), yellow, corre-

sponds in compn. to a di-Br deriv. of dinaphthylene dioxide, sublimes unaltered *in vacuo*, and (2) a more sol. unidentified *compd.* $C_{40}H_{16}O_4Br_2$, red, m. 421–2°, sublimes unaltered *in vacuo*.



(II)



(V)

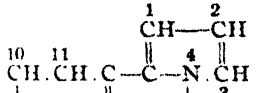
C. C. DAVIS

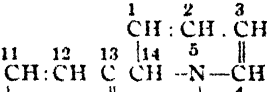
Quinoline compounds. II. Some derivatives of 4-phenyl-2-methylquinoline. UPENDRA N. BRAHMACHARI AND TARAPADA BHATTACHARYYA. *J. Indian Chem. Soc.* **7**, 831–4(1930); cf. *C. A.* **24**, 5875.—The enhanced toxicity of 4-phenyl-2-methylquinoline toward protozoa compared to that of quinoline induced B. and B. to synthesize *6-nitro-4-phenyl-2-methylquinoline* (I) and *8-nitro-4-phenyl-2-methylquinoline* (II). A mixt. of 50 cc. AcPh and 30 cc. $(AcH)_2$, cooled in ice and satd. with HCl was allowed to stand for 48 hrs. After resatn. with HCl, and standing for 24 hrs. the mixt. was added to 58 g. of p-$NO_2C_6H_4NH_2$ and 90 cc. concd. HCl and the whole was heated for 5 to 6 hrs. on a water bath. After dilu. and filtration, the cooled filtrate was freed from p-$NO_2C_6H_4NH_2$ by neutralization with NaOH and filtration. The filtrate was super satd. with NaOH with pptn. of I, m. 141°. I was reduced by $SnCl_2$ and HCl to *6-amino-4-phenyl-2-methylquinoline*, m. 188°, and condensed with p-$Me_2NC_6H_4CHO$ to *6-nitro-4-phenyl-2-p-dimethylaminostyrylquinoline*, m. 64°. II, similarly prepd from o-$NO_2C_6H_4NH_2$, m. 94°, was reduced to *8-amino-4-phenyl-2-methylquinoline* and condensed with p-$Me_2NC_6H_4CHO$ to give *8-nitro-4-phenyl-2-p-dimethylaminostyrylquinoline*, m. 129°. C. R. ADDINALL

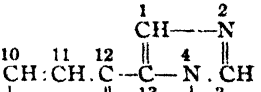
Quinoline derivatives. VII. HANNS JOHN. *Ber.* **63B**, 2657–61(1930); cf. *C. A.* **21**, 914; **25**, 953.—The need for prepg. large amounts of quinuic acid (6-methoxyquinoline-4-carboxylic acid) (I) from quinine or conquinine (II) by oxidation with CrO_3 led to a study of the conditions for obtaining the max. yield in the min. time. The expts., carried out under identical conditions as regards quality of the starting material and reagents and the method of procedure, led to the following results: II by the Skraup method gave 42% I. Addn. of Fe (as $FeSO_4$) raised the yield to 55%. Co, Ni and Vd were without effect. Mn, as MnO_2, $MnSO_4$ or $KMnO_4$, at a concn of 0.1 atom metal per l., gave 75% of very pure I; to obtain this yield, the wt. of CrO_3 used must be at least twice that of the II. The optimum H_2SO_4 concn. is 8%. Replacement of the Mn by Mg, Al, Cu, Ag, Ce and Pb did not raise the yield above 48%, and Hg lowered it to 28%. Cl, As and kieselguhr also did not prove suitable. The procedure for oxidizing 100 g. II in the presence of Mn is given in detail. C. A. R.

1-ω-Halogenoalkylisoquinolines and their derivatives. REGINALD CHILD AND FRANK L. PYMAN. *J. Chem. Soc.* **1931**, 36–49; cf. *C. A.* **24**, 119.—This work was undertaken to prep. substances having amebicidal properties and followed clues indicated by the structure of emetine. The following acyl phenylethylamides were prepd as intermediates from the acid chloride and the amine in Et_2O. *Chloroaceto-β-phenylethylamide* (I), m. 67° (all m. p. cor.); *m-MeO deriv.* (II), m. 56–7°; *β-piperonyl deriv.* (III), m. 72°; *β-veratryl deriv.* (IV), m. 96°; *bromoaceto-β-veratrylethylamide* (V), m. 115°; *cyanoaceto deriv.* (VI), m. 115° but after solidifying m. 127–8°; *hippuro-β-phenylethylamide* (VII), m. 161°; *β-veratryl deriv.* (VIII), crystals with 1 mol. H_2O, m. 85–95°; *β-chloropropiono-β-veratrylethylamide* (IX), m. 102–3°; *γ-bromobutyro deriv.* (X), m. 65°; *chlorovalero deriv.* (XI), m. 60–2°; *Br deriv.* (XII), m. 70–2°. IV (30 g.) in 30 cc. $POCl_3$ and 90 cc. PhMe, heated at 120–30° for 1 hr., give 93.8% of *1-chloromethyl-6,7-dimethoxy-3,4-dihydroisoquinoline-HCl* (XIII), canary-yellow, darkens 210°, effervesces 217°; *picrate*, yellow, m. 196° (decompn.). XIII and KCN in H_2O give *1-chloromethyl-1-cyano-6,7-dimethoxytetrahydroisoquinoline* (XIV), m. 125° (decompn.); if the moist gummy ppt. of XIV is transferred to KCN in H_2O and EtOH and boiled for 0.5 hr., there results 95% of the *1-cyanomethyl deriv.* (XV), corresponding to XIII, m. 173°; the *HCl salt*, pale yellow, m. 205–6° and is readily dissocd. by H_2O; *picrate*, orange-yellow, m. 225° (decompn.); XV also results in 40% yield from VI and $POCl_3$ in PhMe. Reduction of XV with Na and EtOH gives 40% of *1-β-aminoethyl-6,7-dimethoxytetrahydroisoquinoline*, whose *picrate*, yellow, crystg. with 1 mol. EtOH, m. 205°; the *di-HCl salt*, cream colored, m. 276–7° (decompn.). V and P_2O_5, followed by picric acid, give 70% of *1-β-bromomethyl-6,7-dimethoxy-3,4-dihydroisoquinoline*

picrate, orange-yellow, m. 190–1° (decompn.). V and $POCl_3$ give 80% of **XIII**. II and $POCl_3$, followed by picric acid, give *1-chloromethyl-6-m-methoxy-3,4-dihydroisoquinoline picrate*, yellow, m. 169–70° (uncor.); the HCl salt, m. about 170°, appears to contain Me_2CO of crystn. From III there was obtained *1-chloromethyl-6,7-methylenedioxy-3,4-dihydroisoquinoline picrate*, orange-red, m. 179–80° (decompn.); the HCl salt decomps. 204°; it also crystallizes with Me_2CO, m. 150–70°. IX and $POCl_3$ give a mixt. of 2 picrates, m. 235° and 145–85° (both uncor.); the 1st contained no Cl, the 2nd only a trace. Boiling X and $POCl_3$ in PhMe for 30 min. gives a mixt. of 1-γ-chloropropyl-6,7-dimethoxy-3,4-dihydroisoquinoline picrate, which m. 163–4° (not pure), and *4,13-dehydro-9,10-dimethoxy-1,2,3,5,6,13-hexahydrobenzopyrrocolinium picrate*, yellow, m. 201–2°, which is explosive; the *chloride* (**XVI**) crystallizes with $2H_2O$, m. 120–2°, or, anhyd., m. 204–5°; the dry salt is hygroscopic. Reduction of **XVI** with Sn and HCl in EtOH gives 80 5% of *9,10-dimethoxy-1,2,3,5,6,13-hexahydrobenzopyrrocoline*, m. 88–9°; *HBr salt*, m. 186°; *picrate*, yellow, m. 187° (decompn.). **XI** or **XII** with $POCl_3$ give over 90% *1-δ-chlorobutyl-6,7-dimethoxy-3,4-dihydroisoquinoline picrate*, yellow, m. 156–7°; *HCl salt*, m. 172–3° (decompn.); the H_2O soln. has a marked blue fluorescence. With NH_4OH the HCl salt gives 90% of *5,14-dehydro-10,11-dimethoxy-1,2,3,4,6,7-hexahydrobenzopyridocolinium picrate*, golden spangles, m. 185–6°; the *chloride* crystallizes with 1 mol. HCl and 2 mols. H_2O, m. 197–8°; iodide, yellow, m. 210–2°. Reduction gives *10,11-dimethoxy-1,2,3,4,6,7-hexahydrobenzopyridocoline*, m. 59–60°, b_{15} 225°; *HCl salt*, m. 235–7°; *picrate*, bright yellow, m. 172–4°. MeI gives a mixt. of *β-methiodide*, m. 244–5°, and the more sol. *α-methiodide*, m. 228°; heating the latter at 250° gives the *β*-salt. **VIII** and $POCl_3$ give 90% of *9,10-dimethoxy-3-phenyl-5,6-dihydrobenzoglyoxalocoline* (**XVII**), m. 187°; *HCl salt*, m. 286–7° (decompn.), sol. in 25-30 parts cold H_2O; *HBr salt*, m. 293°; *methiodide*, pale cream color, m. 255°; *picrate*, yellow, m. 226–7°; *NO_2 deriv.*, orange-yellow, m. 202°. Heating **XVII** with concd. HCl 5 hrs. at 160° gives the *9,10-di-HO deriv.*, whose *HCl salt* crystallizes with $3H_2O$, m. 293°; $FeCl_3$ gives a deep green color. **XVII** prevented the growth of *Entameba histolytica* in cultures at a dilu. of 1 in 25,000, whereas the control substance, emetine, was effective in a dilu. of 1 to 500,000. All other compds. were far less effective. The salts had no antimalarial activity and were also found to be devoid of trypanocidal activity. The nomenclature used above is based on the following types:


Benzopyrrocoline


Benzopyridocoline


Benzoglyoxalocoline

C. J. West

The γ-triazines. Syntheses of arylaminothioltriazines. A. Ostrogovich and V. Galea. *Atti. accad. Lincei* **11**, 1108–16(1930).—Using the method of prepn. described in a previous paper (*C. A.* **25**, 705), *i. e.*, condensing *cyanoguanidine* with the *arylthiol acid*, 5 new *arylaminothioltriazines* have been prepd.: *phenyl* (I), PhC:N.C(NH_2):N.C(SH):N, m. 281–2° (decompn.); *o-tolyl* (II), m. 243–4° (decompn.); the *m-* (III) and *p- derivs.* (IV), m. 272–3° and 279–80°, resp.; *p-anisyl* (V), m. 282–3° (decompn.). The metallic salts of some of the above, as well as some esters, were prepd. I *picrate*, pptd. from the EtOH soln. by adding picric acid, m. 193–4° (decompn.). I also gives insol. salts with many heavy metals as Ag, Cu, Hg, Pb, Fe, etc. The Ag salt shows very slight discoloration in sunlight. I is also readily methylated by adding the calcd. amt. of Me_2SO_4 and KOH, the product being insol. in alkali, m. 170–1°. II, III, IV and V, form similar salts with the heavy metals as well as picrates. The *picrates* m. 224–5°, 210–1°, 191–2°, 198–9°, resp. A. W. Contieri

The influence of light, carbon monoxide and quinone on the methylene blue reduction. Hiroshi Tamiya, Tatsutaro Hida and Kiyoshi Tanaka. *Acta Phytochim.* **5**, 119–55(1930).—$AcCO_2H$, "Koji" acid, $AcCH_2CO_2Et$, phloroglucinol and resorcinol reduce methylene blue (I) in the absence of O_2 at a certain p_H. Light energy is essential for this reaction. The presence of a mobile H atom in these substances (keto-enol tautomerism) is emphasized. The enzymatic reduction of I was studied with *Bacterium pasteurianum* and liver exts. It also was found to be speeded up by light. The I mol. is activated in this photochem. reaction, not the H donor or the dehydrase.

The I reduction by chem. means or by liver exts. is not influenced by CO (II). However, I reduction by bacterial suspensions was found more or less prevented by II. The ratio I:II dets. the degree of inhibition. The light does not influence it. II apparently prevents the adsorption of I on the bacterial surface. AcOH dehydrase is not affected by II. Small amounts of quinone interfere with the chem. as well as the enzymatic reduction of I. Extensive exptl. data are given and a special app. is described.

E. GEBAUER-FUELNEGG

Thiodiazines. VI. PRAFULLA KUMAR BOSE AND BIRENDRA KUMAR NANDI. *J. Indian Chem. Soc.* **7**, 733–9(1930); cf. *C. A.* **19**, 831.—The mechanism proposed by Guha and Roy-Choudhury (*C. A.* **23**, 139), for the formation of the thiodiazine PhNH-NHC:N.N:CPh.CH_2.S from the action of $PhNHNHCSNHNH_2$ on $BrCH_2COPh$ is different from that suggested by B. who pointed out that varying quantities of thiazoles are formed in the above condensation (*C. A.* **20**, 415). The formation of such thiazoles can be explained by the assumption of an intermediate of the type $NH_2N:C(NHR)SCH_2COPh$. Reactions between thiosemicarbazides and *p*-$MeC_6H_4COCH_2Br$ led, however, either to the formation of a thiodiazine or to a thiazole, but not to both as expected. 4-Substituted thiosemicarbazides gave thiodiazines whereas thiosemicarbazide gave a thiazole. One g. $NH_2NHCSNH_2$ and 2.3 g. *p*-$MeC_6H_4COCH_2Br$ (I) were shaken with 35 cc. abs. alc., and after refluxing for 20 min. the mixt. was cooled and dild. with Et_2O. The crude product was collected, washed with Et_2O, dried and dissolved in dil. HCl. After filtering and neutralizing with Na_2CO_3, the free base *2-keto-4-p-tolyl-2,3-dihydro-1,3-thiazole hydrazone* (II) was pptd., which after recrystn from MeOH, m. 178°; *HCl salt*, m. 133°; *benzylidene deriv.*, m. 205° (identical with the condensation product of PhCH:NNHCSNH$_2$ and I); *isopropylidene deriv.* m. 230°, *Bz deriv.*, m. 201°; *Ac deriv.*, m. 195° (identical with the condensation product of AcNH-NHCSNH$_2$ and I). The formation of the PhCH and Ac derivs. rules out the formulation of II as a thiazole NH:C.S.CH:C(C_7H_7).NNH_2. II reacted with isothiocyanates, forming addn. compds. of the type, NH.C(C_7H_7):CH.S.C:NNHCSNHR (R = Me, Ph, *o*- and *p*-tolyl, m. 146°, 191°, 174° and 166°, resp.), and with HCNS to form HN.C(C_7H_7):CH.S.C:NNHCSNH$_2$ (III), m. 218. III dissolved in abs. alc., condensed with II to give [HN.C(C_7H_7):CH.S.C:N]$_2$, m. 120°. $NH_2NHCSNHMe$ condensed with II to give *2-methylamino-5-p-tolyl-1,3,4-thiodiazine*, MeNH-C:N.NH.C(C_7H_7):CH.S, m. 249° (*HCl salt*, m. 195°); *2-isobutylamino homolog*, m. 159°, was prepd. from II and *iso*-BuNHCSNHNH$_2$ (*HCl salt*, m. 125°; *Ac deriv.*, m. 167°); *2-phenylamino analog*, m. 198° (*HCl salt*, m. 135°; *Ac deriv.*, m. 170°); *2-o-tolylamino compd.*, m. 179° (*HCl salt*, m. 171°; *Ac deriv.*, m. 190°); and *2-p-tolylamino isomer*, m. 187° (*HCl salt*, m. 199°; *Ac deriv.*, m. 154°).

C. R. ADDINALL

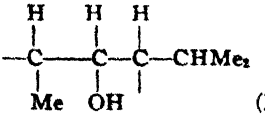
Correction to G. Hahn and W. Schuch: Yohimbehe alkaloids. VI. Two further **secondary alkaloids of yohimbine.** R. LILLIG. *Ber.* **63B**, 2680(1930).—H. and S state (*C. A.* **24**, 5039) that L.'s α-yohimbine does not lose in wt. when dried at 105° and that the 15% loss cannot be ascribed to a const. hydrate or alcoholate. This is due to the use of aq. MeOH instead of EtOH for the recrystn.; from 95% alc. the compd seps. with 1 mol. each of EtOH and H_2O; the loss in wt., compn. and titration results agree with the formula $C_{20}H_{26}O_3N_2$.EtOH.H_2O. The alc. can be detected by rubbing 2 g. of the base with 5 cc. H_2O, distg. off 2 cc. and testing the distillate with I-KI-NaOH or with BzCl-NaOH.

C. A. K

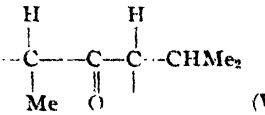
Sulfonation of alkaloids. ZENJIRO KITASATO AND KAKUJI GOTO. *Ber.* 63B, 2696–700(1930).—In general, practically nothing is known as to the reactions which take place between alkaloids and concd. H_2SO_4. K. and G have found that alkaloids having a HO (or MeO) group on the aromatic nucleus, with a free *p*-position, are sulfonated by concd. (not fuming) H_2SO_4 below 10°; the resulting acids generally form well-defined crystals and the SO_3H group always combines with the basic N to an inner salt. In this way were obtained *papaverine-* (I), *apomorphine-* (II) and *sinomeninesulfonic acid* (III). These acids no longer give the diazo reaction and the SO_3H group is probably in the *p*-position to the phenolic HO group. Strychnine, which has no HO (or MeO) group, and brucine, in which the *p*-position to the HO group is not free, are not sulfonated under these conditions, and neither are those derivs. of sinomenine and thebainone, such as bromosinomenine, disinomenine and dithebainone (IV), in which

judging from the failure to give the diazo reaction, the *p*-position to the HO group is not free. For I, the 2-position for the SO_3H group is assumed from analogy with nitropapaverine. To det. whether the color reaction of certain alkaloids with H_2SO_4 is due to the formation of a colored compd. or to a decompn., IV was studied first. It dissolves in concd. H_2SO_4 with deep red color, and when poured on ice forms a colorless soln. which with Na_2CO_3 regenerates the unchanged IV. I m. 301° (decompn.), easily sol. in Na_2CO_3, alkalies and $Ba(OH)_2$. II, needles with $3H_2O$, m. above 300°. III, m. 265–7°. *Sinomeninonesulfonic acid*, from sinomenine hydrate, prisms with 0.5 H_2O, m. 275–80°, gives in MeOH with $NH_2OH.HCl$ a *dioxime*, m. above 300°, also obtained by sulfonation of sinomenine hydrate dioxime. C. A. R.

Saponin of Panax repens, Maxim. IV. Panaxsapogenin. S. Aoyama. *J. Pharm. Soc. Japan* **50**, 1076–95(1930); German abstr. 139–44; cf. *C. A.* **24**, 125.—A. previously has reported on *panaxsapogenin* (I) and *panaxprosapogenin* (II) and shown that II is made up of *panaxsapogenin* ($C_{36}H_{58}O_4$) and gluconic acid. Recently Kotake, Matsubara and Kimoto (*J. Chem. Soc. Japan* **51**, 396–400(1930)) have shown that saponin obtained from *Panax repens, Maxim* is identical to that obtained from *Aralia chinensis, L. var grabrescens*. K. also proposed to change the mol. formula of $C_{36}H_{58}O_4$ (Murayama and Tanaka, *C. A.* **21**, 3359) to $C_{30(39)}H_{52(49)}O_3$, but he could not account for the large mol. wt. of its Ac deriv. A. obtained slightly different results. Analysis of I indicates the mol. formula $C_{36}H_{58}O_4$ as previously reported. *Dihydrosapogenin*, $C_{36}H_{60}O_4H_2O$, m. 290–3°. I probably contains 2 double linkages, but no MeO, hydroxymethylene, ketone or aldehyde groups. I forms a *diphenylurethan*, $C_{50}H_{68}O_6N_2$, decomps. 133–40°, hence contains 2OH groups. *Me ester* of I, $C_{37}H_{60}O_4$, m. 196°, contains 2 alc. OH and 1MeO groups. *Monoacetylsapogenin* (III), $C_{38}H_{60}O_5$, m. 262–4.5°, and corresponds to the $C_{32}H_{54}O_4$ of K. Only 1OH group is acetylated, the other is probably tertiary alc. *Diacetylsapogenin anhydride* (IV), m. 315–8°. IV, when treated with KOH followed by HCl, gave III. *Me ester* of III, $C_{39}H_{62}O_5$ (V), m. 221°. Oxidation of V with CrO_3 gave a diketone, $C_{37}H_{56}O_4$ (VI), m. 182–3°, and an acid decompg. 245–8°. This acid is under further investigation. VI shows neither the Liebermann nor the CHI_3 reaction, hence it contains no —COMe group. VI is an unsatd. ketone. Reduction of VI by Clemmensen's method gave the original compd. *Dioxime* of VI, $C_{37}H_{58}O_4N_2$, decomps. 237°, probably contains a —C CO C:C.C:C— linkage. VI forms a *monosemicarbazone*, $C_{38}H_{59}O_4N_3$, which does not m. 290°. V gives neither the osazone, pyrrolen or pyrazoline reactions, hence the position of the C:O group must be either at 1 and 5 or further apart. A. suggests the following structure to explain the position of OH and CO groups in I and VI:

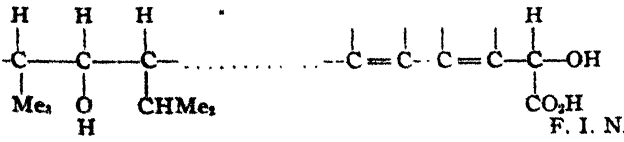


(I)



(VI)

Sapon. of V gave the Me ester, m. 195°, while I gave a compd., $C_{36}H_{56}O_4$ (VII), m. 293°, which did not depress the m. p. of I. VII is probably an isomer of I and is called *α-isopanaxsapogenin*. III and VI also give VII. The exact mechanism of the formation of the isomer is not known. I is stable toward concd. HCl, even on boiling, and also alc. HCl. When treated with dry HCl in excess MeOH I gives a compd. m. 268° (VIII). VIII is probably another isomer of I and is called *β-isopanaxsapogenin*. A. suggests the following partial structure for I:



F. I. Nakamura

Digitalis glucosides. III. Glucosides of Digitalis lanata. Sydney Smith. *J. Chem. Soc.* **1931**, 23–5; cf. *C. A.* **24**, 2753; **25**, 708.—In addn. to digoxin, which was previously reported, gitoxin, m. 285° (cor., decompn.), $[\alpha]^{20}_{5461}$ 3.5° (C_5H_5N, *c* 1.02), has been isolated from the leaves of *Digitalis lanata;* this has hitherto been found only in the leaves of *D. purpurea*. Other glucosides in the leaves are being examd. C. J. West

Brazilin and hematoxylin questions. XI. Hydroxybenzylchromanones. Paul Pfeiffer, Erwin Breith and Hans Hoyer. *J. prakt. Chem.* **129**, 31–54(1931); cf

C. A. **24**, 4301.—Chromanone (I) (0.5 g.) and 0.46 g. *p*-$MeOC_6H_4CHO$ in abs. EtOH with dry HCl at 0° give 0.51 g. *4'-methoxybenzalchromanone*, yellow, m. 134°; 0.0001 mol. in 1 cc. concd. H_2SO_4 gives a blood-red color. I and 0.55 g. vanillin Me ether give 0.28 g. *3',4'-di-MeO deriv.*, pale yellow, m. 117°; color in H_2SO_4 blood-red. I and 0.5 g. piperonal give 0.45 g. *3',4'-methylenedioxy deriv.*, yellow, m. 134.5–7°; color, Bordeaux red. I and 0.5 g. vanillin give 0.62 g. *3'-methoxy-4'-hydroxy deriv.*, yellow, m. 126–9°; color, deep blood-red; *Ac deriv.*, golden yellow, m. 160° (84% yield). I and 0.47 g. 3,4-$(HO)_2C_6H_3CHO$ give 0.42 g. of *3',4'-di-HO deriv.*, golden yellow, m. 224–5°; color, wine-red; *di-Ac deriv.*, m. 166° (52% yield). 7-Methoxychromanone (5 g.) and 4.3 g. isovanillin in abs. EtOH with HCl give 9.2 g. *4',7-dimethoxy 3'-hydroxybenzalchromanone*, bright yellow, m. 153-4°; color, deep orange; *Ac deriv.*, pale yellow, m. 139–40°; catalytic reduction of the Ac deriv. gives the *benzyl deriv.*, red, m. 123–4°; *oxime*, m. 160–1°; *Ac deriv.*, m. 90–1°. 7-Hydroxychromanone and vanillin Me ether give *3',4'-dimethoxy-7-hydroxybenzalchromanone*, brown, m. 245 9°; color, dark red; *Ac deriv.*, yellow, m. 151–2°. *3',4'-Methylenedioxy deriv.*, brown, m. 234 6°; color, blood-red; *Ac deriv.*, yellow, m. 132.5–4°. *3'-Methoxy-4',7-dihydroxy deriv.*, golden yellow, m. 230–1.5°; color, dark red; *Ac deriv.*, m. 151–2.5°. *3',4',7-Trihydroxy deriv.*, yellow, m. 250–3°; color, blood-red; *tri-Ac deriv.*, pale yellow, m. 132–4°. The corresponding *benzyl deriv.*, yellow, m. 201–2°; color, light wine-yellow; *Ac deriv.*, m. 117°. 7,8-Dimethoxychromanone with $AlCl_3$ or concd. HBr give the *7,8-di-HO deriv.*, crystg. with 1 mol. H_2O, m. 188–8.5°; color, citron-yellow; *di-Ac deriv.*, m. 111°; *semicarbazone*, pale brown, m. 224–5° (decompn.). With *p*-$MeOC_6H_4CHO$ and HCl in EtOH there results *4'-methoxy-7,8-dihydroxybenzalchromanone*, greenish yellow, m. 192°; color, deep brownish red; *Ac deriv.*, light yellow, m. 140°. *3',4'-Di-MeO deriv.*, crystg. with 1 mol. H_2O, light yellow, m. 174 5°; color, carmine red; *Ac deriv.*, pure yellow, m. 183°; the corresponding *benzyl deriv.*, reddish needles, m. 177°; *Bz deriv*, m. 177.5 8°. *3'-Methoxy-4',7,8-trihydroxybenzalchromanone*, crystg. with 1 mol. H_2O, yellow, m 206–7°; attempts to remove the H_2O by heating at 17 mm. over PhMe caused decompn.; *Ac deriv.*, m. 180 1°. *3',4',7,8-Tetra-HO deriv*, light yellow, begins to decomp. at 220° and is complete at 265°; color, brick-red; *Ac deriv.*, m. 166 7°; the corresponding *benzyl deriv.*, yellow-red, decomps. above 200°; *Ac deriv*, m. 107–8°. C. J. West

Santonin. Karl Josephson. *Svensk Farm. Tids.* **35**, 29 33(1931).—The lactone ring of santonin is opened by NH_3 in alc. giving santoninic acid amide. This reaction is easily reversed. J. gives a general discussion on the constitution of santonin with bibliography up to Clemo and Haworth (*C. A.* **24**, 4046). A. R. Rose

Hydrolysis of benzoylated amino acids and polypeptides. Stefan Goldschmidt and Wilhelm Füner. *Ann.* **483**, 190-216(1930).—The hydrolysis of various benzoylated mono- and diamino acids, aminohydroxy acids and polypeptides with NaOH (2% usually) at 25° and 100° and H_2SO_4 at 100° is reported. The rate of alk. hydrolysis of the monoamino acids increases with rise in temp. and HO-ion concn.; for a definite HO-ion concn., the coeff. decreases with increasing length of the C chain. Alk. hydrolysis of hippuric acid is increased at both 25° and 100° by the addn. of NaCl but is decreased by added glycine. The *O*-Bz group is eliminated from *O,N* dibenzoyl serine and -tyrosine at 25°; at 100° both Bz groups are readily eliminated from the former compd. Alk. hydrolysis of dibenzoylarginine causes the very ready elimination of 1Bz group with the production of α-benzoylornithine; the velocity of hydrolysis of the second Bz group is measurable when 8% NaOH is used. Similarly, α,ε dibenzoyllysine (I) is first hydrolyzed to the α-Bz deriv. With benzoylated glycyl-, diglycyl- and alanylglycylglycines, the peptide linkings are rapidly broken; during this hydrolysis little BzOH is produced. The rate of hydrolysis of benzoylated mono amino acids by 70% H_2SO_4 at 100° increases with the length of the C chain. Dibenzoyl arginine behaves similarly with acidic hydrolytic agents as with alk., but the behavior of I is reversed, the α-Bz group being eliminated first. The peptide linkings are first broken when the above benzoylated peptides are hydrolyzed with 70% H_2SO_4. The velocity of hydrolysis of benzoylproteins is greater with 30% than with more concd H_2SO_4; the rate corresponds with the sp. cond. of the acid. The velocity of hydrolysis of hippuric acid by 70% H_2SO_4 is increased by the addn. of glycine. C. J. West

A higher alcohol obtained from "Cortinellus Shiitake." Midzuho Sumi. *Bull. Inst. Phys. Chem. Research* (Tokyo) **9**, 966-9(1930), *Abstracts* 92 (in English) published with *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) **15**, Nos. 278-81.—*A higher satd. alc.* $C_{28}H_{48}O$ is obtained from finely powd. *Cortinellus Shiitake*, needles or prisms, sol. in Et_2O, C_6H_6, $CHCl_3$, not easily sol. in EtOH, Me_2CO, etc., m. 245–55°, $[\alpha]_D^{23}$

—22°. *Acetate*, m. 260–5°, $[\alpha]_D^{23}$ —30.2°. *Benzoate*, m. 210°. *Palmitate*, m. 171–2°. The spectrum shows no special absorption band. K. KONDA

The bile acids. XXXI. The constitution of pseudocholoidanic acid. HEINRICH WIELAND, LUDWIG ERTEL AND ELIZABETH DANE. *Z. physiol. Chem.* **194**, 107–18 (1931).—The study of pseudocholoidanic acid has been resumed with the hope of detg. the location of 2 remaining C atoms in the bile acids. The tetrabasic pseudocholoidanic acid $C_{24}H_{34}O_{10}$ is formed along with the pentabasic choloidanic acid, $C_{24}H_{36}O_{10}$, when desoxybilianic acid is oxidized by HNO_3. The former view that this oxidation breaks open ring III is now abandoned in view of the subsequent location of a Me group at C_{11}. Pseudocholoidanic acid forms a neutral tetra-Me ester, but no keto groups can be demonstrated, hence the remaining 2O atoms must be present in ether or lactone linkage. When heated it loses CO_2 and $2H_2O$ and forms a pyropseudocholoidanic acid, $C_{23}H_{30}O_6$, which is monobasic and yields a mono-Me ester, m. 192°. Treatment of the pyro acid with alc. KOH opens up a lactone ring with formation of a dibasic acid, $C_{23}H_{32}O_7$, m. 212°, from which a di-Me ester was obtained with CH_2N_2. The mono-Me ester of pyropseudocholoidanic acid was also obtained by heating the di-Me ester of pseudocholoidanic acid. A by-product in the prepn. of the pyro acid was a dibasic acid, $C_{22}H_{32}O_5$. The open pyro acid is tribasic when titrated hot, due to hydrolysis of an anhydride grouping. Desoxybilianic acid in AcOH takes up 2Br, yielding 50–60% of *dibromodesoxybilianic acid*, m. 215° (decompn.). Treatment of this with *N* KOH in MeOH removes 1HBr with formation of *bromodesoxybilienic acid*, m. 218° (decompn.), in 80% yield; *tri-Me ester*, m. 93°. Both of these brominated acids revert to desoxybilianic acid when reduced with Zn and HCl. Oxidation of the unsatd. bromo acid with HNO_3 yields pseudocholoidanic acid. This new manner of obtaining pseudocholoidanic acid proves it to be a lactonetetracarboxylic acid, in which ring II has been opened by breaking the linkage between C_6 and C_7, since the oxidation product contains no Br. Formulas representing the characteristic groupings of pseudocholoidanic acid and its pyro acid are proposed. **XXXII. Attempts at a new breakdown of desoxybilianic acid.** ELIZABETH DANE AND HEINRICH WIELAND. *Ibid* 119–23.—In dibromodesoxybilianic acid (vide supra) both Br atoms are on C_6. One is easily removed as HBr, but the 2nd is tenaciously held as would be expected from the presence of an adjacent double linkage. Oxidation of the unsatd. bromodesoxybilienic acid by alk. $KMnO_4$ converts it into the tribasic *5-hydroxy-6-ketodesoxybilianic acid*, $C_{24}H_{34}O_9$, m. 233–5°; *oxime*, m. 200°. Esterification with CH_2N_2 yields a *tri-Me ester*, m. 154°, while esterification with MeOH-HCl yields an *isomeric tri-Me ester*, m. 178°. The difference between these isomers is not understood. The HO acid when boiled with AcOH and HCl loses H_2O and forms a *diketolactonedicarboxylic acid*, $C_{24}H_{32}O_8$, m. 258–60°. Catalytic hydrogenation of the latter yields 70% of a *6-ketodesoxybilianic acid*, $C_{24}H_{34}O_8$, m. 255°; *tri-Me ester*, m. 108°. Oxidation of the above HO acid with fuming HNO_3 gave a *pentabasic acid*, $C_{24}H_{36}O_{11}$, m. 180°. A. W. DOX

Tauroisolithocholic acid from chicken bile. TADAO HOSIZIMA, HIROSI TAKATA, ZIRO URAKI AND SIGETOSI SIBUYA. *J. Biochem.* (Japan) **12**, 393–7(1930).—Chicken bile is freed from mucus by alc. and is concd. on the water bath to the original vol. of 1 l. $FeCl_3$ is then added until the acid soln. gives no further ppt. The ppt. is filtered off and is decompd. with warm Na_2CO_3. The filtrate is evapd. and the dry residue extd. with alc. The alc. soln. is decolorized with animal charcoal and evapd., the residue again taken up in alc. and decompd. with H_2SO_4 and mixed with ether. The flocculent ppt. is now filtered off. This ppt. is dissolved in dil. Na_2CO_3, gradually acidified with HCl and extd. by shaking with ether. The ppt. thus formed is recrystd. several times from dil. alc. and gives a yield of 2.13 g. These crystals are not sol. in H_2O, ether, petroleum ether or benzene, but do dissolve easily in alc., AcOH or Me_2CO; they give the Pettenkofer reaction and m. 210–1°. In abs. alc. soln. (0.54%) they have a sp. rotation of 65.74°. Its elementary compn. corresponds to the formula $C_{23}H_{39}OCONHCH_2CH_2SO_3H$. Heated for 24 hrs. under a reflux with 5% NaOH, it gives a mass of beautiful roset-shaped needles. The Na salt was converted to a Ba salt which was recrystd. from dil. alc. by a special procedure. Analyses on this Ba salt show that the bile acid is related to lithocholic acid, and is identified as tauroisolithocholic acid. S. MORGULIS

Magnetic rotatory power of hydrocarbons in the gaseous state (MALLEMANN GABIANO) 2. Trichloromethyl perchlorate (BIRCKENBACH, GOUBEAU) 6. Recent experiments on the pyrolysis of CH_4 (WHEELER, WORD) 21. Kinetics of the formation of malonamide from ethyl malonate and NH_3 in homogeneous solution (BAILEY) 2. Formation of CH_4 during the electrolysis of K acetate and the mechanism of Kolbe's elec-

trosynthesis (SHUKLA, WALKER) **4.** Natural and synthetic rubber (MIDGLEY, HENNE) **30.** Apparatus for effecting gas reactions such as catalytic production of MeOH (U. S. pat. 1,790,853) **18.**

ELLIS, CARLETON: **Hydrogenation of Organic Substances.** 3rd ed. New York: D. Van Nostrand Co., Inc. 986 pp. M. 15. Reviewed in *Ind. Eng. Chem.* **23**, 342 (1931).

Hydrocarbons. ALFONS DESCHAUER. Ger. 515,177, Dec. 1, 1926. Partly hydrogenated polycyclic hydrocarbons are prepd. by treating the acid sulfates of cyclic hydrogenated alcs. with aromatic hydrocarbons in the presence of H_2SO_4. Thus, cyclohexanyl sulfuric acid and C_6H_6 yield phenylcyclohexane. The acid sulfates used as initial materials need not be separately prepd. Thus, an aromatic hydrocarbon may react, in the presence of H_2SO_4, with a cyclic unsatd. hydrocarbon such as cyclohexene, or with a cyclic hydrogenated alc. Examples are given.

Hydrocarbons. I. G. FARBENIND. A.-G. Fr. 693,054, Mar. 31, 1930. Hydrocarbons of high b. p. are converted into hydrocarbons of lower b. p. by cracking or hydrogenation in the presence of catalysts composed of metal compds. of the type of acetylacetonates, with or without other catalysts.

Partial combustion of hydrocarbons. JOHANN S. OHLENDIECK-DOLGE. Ger. 514,394, May 4, 1928. This relates to the manuf. of mixts. contg. CO and H by treating hydrocarbons with air or other oxidizing gas at a raised temp. in the presence or absence of catalysts. The improvement consists in using an alloy of Fe, Cr, and Ni, that has been fused *in vacuo*, for constructing the parts of the reaction chamber that come into contact with the gases.

Condensing diolefins with other hydrocarbons. I. G. FARBENIND. A.-G. Brit. 335,512, July 5, 1929. In the further application of the general type of reactions described in Brit. 315,312 (*C. A.* **24**, 1649), isoprene, toluene and Na are heated in an autoclave at 160° (yielding 3-methyl-5-phenyl-2-pentene or 2-methyl-5-phenyl-2-pentene. β,γ-Dimethylbutadiene, toluene and Na yield 2,3-dimethyl-5-phenyl-2-pentene, and butadiene, tetrahydronaphthalene and Na yield butenyltetrahydronaphthalene. Cf. *C. A.* **24**, 3247.

Aliphatic compounds. HENRY DREYFUS. Fr. 692,736, Mar. 25, 1930. Org. O compds. are synthesized by passing the reaction gases through a no. of reaction vessels in series in an open circuit. An example is given of the prepn. of MeOH from water gas. Cf. *C. A.* **25**, 963.

Organometallic compounds. LOUIS P. V. LECOQ. Fr. 692,949, July 1, 1929. Salts and complex metallic compds. of dithiocamphocarboxylic acid which are sol. in org. solvents, particularly in animal and vegetable oils, are prepd. by double decompn. or by the action of the acid on oxides. Examples are given of the prepn. of the Cu, Au, Ag and Hg salts and of a complex compd. contg. As which is sol. in olive oil, by the reaction of dithiocamphocarboxylic acid with *p*-hydroxy-*m*-aminophenylarsonic acid. Cf. *C. A.* **24**, 2138.

Diazo compounds. I. G. FARBENIND. A.-G. (Erich Lehmann, inventor). Ger. 515,205, Nov. 6, 1928. Diazo compds. of unsulfonated diphenylamine derivs. are salted out from their solns. at atm. temp. by means of neutral, unhydrolyzed salts in the presence of a weak acid, *e. g.*, H_3BO_3, and a compd. capable of reacting with HNO_2, *e. g.*, urea. The oxidation products which sep. after the diazotization should be removed before salting out. The products are stable in the cold and in warm, damp air. Examples are given.

Alcohols from olefins. N.-V. DE BATAAFSCHE PETROLEUM MAATSCHAPPIJ. Brit. 335,551, May 23, 1929. Olefins (including those contg. 2 or more double bonds) are hydrated in the vapor phase in the presence of a metal of the Pt group, Au, Ag, Cu, Fe, Ni, Co, Cr, Ta, V, W, Mo or Mn or their salts or other compds. (most suitably compds. which during the reaction yield the metals such as oxalates, carbonyls and the like, although compds. such as Bi vanadate, Cu vanadate or Cu phosphate also may be used). Several examples with details of procedure are given for treating ethylene and propylene.

Cyclic aldehydes. I. G. FARBENIND. A.-G. (Georg Kalischer, Heinz Scheyer and Karl Keller, inventors). Ger. 514,415, Feb. 3, 1927. The aldehyde group is introduced into oxygenated cyclic compds. by treating these with formyl derivs. of secondary amines and a chloride or oxychloride of P or S. The reaction may be effected in an inert solvent. Thus, β-naphthol may be added to a benzene soln. of the product obtained by treating formylmethylaniline with $POCl_3$, while cooling; 2-naphthol-1-

aldehyde is obtained from the mixt. after standing for about 20 hrs. Other examples are given also. The method may be used to prep. aldehyde derivs. of anthrone, benzanthrone, naphthostyril, hydroxythionaphthene and like compds. Cf. *C. A.* **24**, 3800.

Polycyclic ketones. I. G. FARBENIND. A.-G. (Otto Nicodemus and Walter Berndt, inventors). Ger. 514,416, Dec. 16, 1925. Polycyclic ketones are prepd. from aromatic or heterocyclic ketones having halogen in the *o*- or *peri*-position to the CO group, by treating these at a raised temp. with alkali or alk. earth salts or with feebly alk. acid-binding agents. The ketones may be treated in the gas or liquid phase and in the presence or absence of catalysts, *e. g.*, Cu or $CuCO_3$. Thus, fluorenone may be prepd. by heating *o*-chlorobenzoylbenzene with Na_2CO_3 at 300° for some hrs. Other examples are given also. Cf. *C. A.* **25**, 1260.

Acetals. CONSORTIUM FÜR ELEKTROCHEM. IND. G. M. B. H. (Hans Deutsch and Willy O. Herrmann, inventors). Ger. 513,796, Jan. 26, 1926. Addn. to 502,431. The method of Ger. 502,431 (*C. A.* **24**, 4793) is modified by using alcs. contg. water. The water is converted into AcH, which may be fractionated out of the reaction products or removed by washing, *e. g.*, with the alc. used. The yield of acetals may be increased by partly condensing the reaction products and returning the condensate to the reaction vessel, or by circulating the products through the vessel. Examples are given.

Aldehyde bases. PRODUITS ROCHE, SOC. ANON. Belg. 370,846, July 31, 1930. Hydroaromatic aldehydes are condensed with CH_2O and aliphatic amines.

Aldehyde amines. THE NAUGATUCK CHEMICAL CO. Fr. 692,835, Mar. 27, 1930. The deterioration of condensation products of aldehydes with amines such as heptylic aldehyde with $PhNH_2$ is retarded by treating the products with a polyhydroxylated or polyhydroxy substituted aromatic compd. such as catechol, resorcinol, pyrogallol, dinitrosoresorcinol, hydroquinone or its mono- or di-chloro deriv.

Esters. OTTO FUCHS (to Deutsche Gold und Silber-Scheideanstalt vorm. Roessler). U. S. 1,791,238, Feb. 3. In producing esters such as MeOAc, aliphatic acids such as HOAc and alcs. such as MeOH are caused to react together at temps. of about 100–180°, corresponding to working pressures of 2–10 atm., in the presence of catalysts such as H_2SO_4 or $NaHSO_4$ which are capable of producing moderate H-ion concns., and the ester formed is continuously removed from the reaction mixt. as produced.

Vinyl esters. WILLY O. HERRMANN, HANS DEUTSCH and ERICH BAUM (to Consortium für Elektrochemische Industrie). U. S. 1,790,920, Feb. 3. An excess of C_2H_2 is passed through a monocarboxylic aliphatic acid such as HOAc in the presence of not more than about 4.3% of a Hg compd. such as Hg acetate and the resulting vinyl ester is removed from the reaction mixt. by entrainment with the escaping excess of C_2H_2 and is recovered by rectification. Several examples with details of procedure are given. Cf. *C. A.* **24**, 627.

Conversion products of vinyl esters. CONSORTIUM FÜR ELEKTROCHEM. IND. G. M. B. H. (Hans Deutsch and Willy O. Herrmann, inventors). Ger. 515,307, Mar. 11, 1927. Ketene and other ketones, AcH, acid anhydrides and vinyl ethers are among the products obtained by passing vaporized vinyl esters at a temp. between 250° and 500° and at atm. or raised pressure through a packed reaction vessel which may contain a catalyst. Thus, the reaction vessel may be packed with wood charcoal on which ZnO has been deposited. Examples are given.

Polyvinyl alcohol esters. I. G. FARBENIND. A.-G. Fr. 692,816, Mar. 27, 1930. Sol. mixed esters of polyvinyl alc. are made by the reaction simultaneously or successively of the alc. mixts. with acid halides or condensation products obtained by elimination of halogen hydride from halide acids. The products are converted to an insol. form by heat. Thus, a mixt. of polyvinyl alc., EtCl, naphthenic acid chloride, PhCl and pyridic bases are heated to 35–40° for 24 hrs. The product is sepd. by MeOH and filtering. It can be formed into a film from its soln. in acetone. Other examples are given.

Alkyl chlorides. E. I. DU PONT DE NEMOURS & CO. Fr. 692,790, Mar. 26, 1930. Alkyl chlorides are made by bringing a mixt. of vapors contg. alc. and HCl into contact with an aq. soln. of a metallic chloride such as $ZnCl_2$ or $FeCl_3$ at a temp. of about 100–160°. The mixt. of vapors may be formed by the reaction of NaCl, H_2SO_4 and alc. at a high temp. An example is given of the prepn. of EtCl. Cf. *C. A.* **25**, 303.

Calcium benzoate. TH. GOLDSCHMIDT A.-G. Fr. 692,521, Mar. 21, 1930. Phthalic anhydride is ground with an aq. suspension of $Ca(OH)_2$ and heated to a temp. above 350°. The mixt. is introduced gradually into the reaction chamber and a dilg. agent such as some of the material already transformed may be added to the mixt.

Sulfonates of pyridine and its homologs. I. G. FARBENIND. A.-G. Brit. 335,817, Nov. 26, 1928. In the sulfonation of pyridine and its homologs (suitably with fuming

H_2SO_4), Hg or a Hg salt such as the sulfate is used as catalyst. Examples are given of the sulfonation of pyridine and of α-picoline. Previous use of various other catalysts also is mentioned.

Stabilizing solutions of salts of aromatic stibinic acids. I. G. FARBENIND. A.-G. (Hans Schmidt, inventor). Ger. 515,113, Feb. 25, 1927. A polyhydric alc., *e. g.*, glycerol or glucose, is included in the solns. The alc. and the salt may be present in equal amounts.

Amine derivatives. IMPERIAL CHEMICAL INDUSTRIES, LTD. Fr. 693,180, April 2, 1930. *N,N'*-Thio derivs. of primary and secondary amines are made by the interaction of a primary or secondary amine with a chloride of S in aq., neutral or alk. suspension. Examples are given of the prepn. of $Et_2NSSNEt_2$ from Et_2NH and $(CH_2)_5NSSN(CH_2)_5$ from piperidine.

Anthraquinone derivatives. I. G. FARBENIND. A.-G. (Max Kugel, inventor). Ger. 513,025, June 12, 1927. Mixts. of α- and β-aroylaminoanthraquinones or their halogen derivs. are sepd. by treatment in alc. suspension with caustic alkali at a temp. sufficiently low to avoid sapon. The α-derivs. remain undissolved, while the β-derivs. go into soln., and can be recovered by acidification. Examples are given. Cf. *C. A.* **25**, 965.

Benzanthrone derivatives. I. G. FARBENIND. A.-G. (Heinrich Neresheimer and Willy Eichholz, inventors). Ger. 515,327, Aug. 11, 1926. Addn. to 431,774. According to Ger. 431,774, *Bz*-1,*Bz*-1'-Dibenzanthronyls are prepd. by treating benzanthrone, or its derivs. having the 2-position free, with acid oxidizing agents. It is now found that the reaction proceeds differently if oxidation is effected with MnO_2 and moderately dil. H_2SO_4, products sol. in alkalies and in cold bisulfite soln. being obtained. Like products can be prepd. from benzanthrone derivs. substituted in the 2-position, and in treating these, other acid oxidizing agents may be used. Examples are given. Cf. *C. A.* **25**, 1262.

Naphthocarbazole derivatives. I. G. FARBENIND. A.-G. (Albert Schmelzer, Fritz Ballauf and Heinrich Hefner, inventors). Ger. 514,420, Feb. 9, 1929. See Fr. 689,515 (*C. A.* **25**, 966).

Alkyl cyclohexanols and cyclohexanones. SCHERING-KAHLBAUM A.-G. (Walter Schoeller and Hans Jordan, inventors). Ger. 515,112, Jan 27, 1928. Addn. to 512,881. The hydrogenation process described in Ger. 512,881 (*C. A.* **25**, 1259) is carried out in the presence of a surface catalyst, *e. g.*, Al-Mg hydrosilicate. The hydrogenation catalyst (Ni) may be deposited on the surface catalyst. Examples are given. Cf Ger. 512,236 (*C. A.* **25**, 974).

Phenols. I. G. FARBENIND. A.-G. (Friedrich W. Stauf and Gerhard Kröner, inventors). Ger. 513,798, Mar. 20, 1928. See Brit. 308,220 (*C. A.* **24**, 130).

Improving the odor of phenols. GEWERKSCHAFT MATHIAS STINNES. Ger. 515,467, Oct. 29, 1927. Addn. to 514,341. The method of Ger. 514,341 (*C. A.* **25**, 1336) is modified by partially etherifying the phenols instead of partially esterifying.

Indoles. IMPERIAL CHEMICAL INDUSTRIES, LTD. Fr. 692,590, Mar. 24, 1930. See Brit. 330,332 (*C. A.* **24**, 5770).

Styrenes. THE NAUGATUCK CHEMICAL CO. Fr. 693,876, April 14, 1930. Styrenes are prepd. by heating an alkylbenzene and C_6H_6. A substance such as S or a mixt. of $C_2H_4Cl_2$ and S capable of forming a stable compd. with the H liberated may be added.

Acetic acid. HENRY DREYFUS. Fr. 692,735, Mar. 25, 1930. The vapor of CH_2O alone or mixed with CO is submitted to the action of heat under a pressure of 100–300 kg. or more. A temp. of 300–400° is preferred and the CH_2O may be used in the form of formal and in the presence of steam. Catalysts such as inorg. acids may be used.

Aliphatic anhydrides. HENRY DREYFUS. Fr. 692,537, Mar. 21, 1930. Aliphatic anhydrides, particularly Ac_2O, are made by passing the vapor of aliphatic acids, particularly AcOH, in contact with a heated mass of Cu or other metal of good heat cond. Catalysts known to favor the reaction may be mixed with the Cu.

Aliphatic anhydrides. HENRY DREYFUS. Fr. 693,483, April 7, 1930. Aliphatic anhydrides, particularly Ac_2O, are prepd. by the thermal decompn. of aliphatic acids, particularly AcOH, in the presence of a catalyst composed of or contg. one of more anhydrides or acids of As or Sb or the salts of such acids, such as arseniates or antimoniates of Na, K or Ca. The preferred temp. is 350–700°. Cf. *C. A.* **25**, 971.

Ethyl alcohol and other oxygenated organic compounds. H. DREYFUS. Brit. 335,631, July 2, 1929. EtOH and other products such as higher alcs., esters, aldehydes and ketones are prepd. by heating MeOH vapor in the presence of catalysts comprising compds. of alkali or alk. earth metals in which these are the sole metallic compo-

nents (excluding Mg compds.) such as oxides, hydroxides and alcoholates of Na, K, Ba and Ca, preferably at 400–600°, although higher or somewhat lower temps. may be employed. Various details of app. and procedure are described.

Methyl and ethyl acetates. DEUTSCHE GOLD- UND SILBER-SCHEIDEANSTALT VORM ROESSLER (Otto Fuchs, inventor). Ger. 513,943, Jan. 16, 1927 and 514,744, Mar. 22, 1927. Addns. to 507,205. In applying the method of Ger. 507,205 (*C. A.* **25**, 524) to the esterification of crude pyroligneous acid, the acid is preliminarily purified by heating under pressure (513,943). This purification treatment may be effected in the presence of salts, *e. g.*, 20–40% of a bisulfate (514,744).

Benzanthrone, etc. IVAN GUBELMANN, ROBERT J. GOODRICH and EDWARD T. HOWELL (to Newport Chemical Corp.). U. S. 1,791,309, Feb. 3. In producing anthraquinone derivs. such as benzanthrone or methyl benzanthrone, a starting material such as anthraquinone or methyl anthraquinone is caused to react in concd. H_2SO_4 with a Cu salt such as $CuSO_4$ and a metal such as Zn or Al which is higher than Cu in the electromotive series (suitably at 25–30°).

3-Nitro-5-ketotetrahydronaphthalene. I. G. FARBENIND. A.-G. (Emil Laage, inventor). Ger. 515,111, Apr. 12, 1929. The anil of 5-ketotetrahydronaphthalene is nitrated and the product decompd. with dil. mineral acid. An example is given.

α-Naphthol. I. G. FARBENIND. A.-G. Fr. 693,596, April 9, 1930. α-Naphthol is prepd. by heating α-ketotetrahydronaphthalene with S at about 200°. A catalyst such as Se, finely divided Sn, ZnO, arsenious anhydride or diphenylguanidine may be used.

1,4,1',4'-Tetrahydroxy-2,2'-dianthraquinonyl. I. G. FARBENIND A.-G. (Robert E. Schmidt, Berthold Stein and Kurt Bamberger, inventors). Ger. 515,114, Sept. 22, 1929. Quinizarin is treated with piperidine or its homologs or analogs at atm. or slightly raised temp. An example is given.

1,4,4'-Trihydroxy-2,2'-dianthraquinonyl-3,1'-oxide. I. G. FARBENIND. A.-G. (Robert E. Schmidt, Berthold Stein and Kurt Bamberger, inventors). Ger. 515,115, Oct. 2, 1929. 1,4,1',4'-Tetrahydroxy-2,2'-dianthraquinonyl in nitronaphthalene or other nitro compd. of high b. p. is boiled for a short time. An example is given. Cf. preceding abst.

Triazine derivatives. I. G. FARBENIND. A.-G. Brit. 335,783, Oct. 31, 1928. See Ger. 501,087 (*C. A.* **24**, 4520).

Mercaptobenzothiazole, etc. IMPERIAL CHEMICAL INDUSTRIES, LTD., and K. H. SAUNDERS. Brit. 335,567, March 26, 1929. Mercaptobenzothiazole is prepd. by introducing a soln. of S in CS_2 mixed with $PhNH_2$ into a reaction vessel heated to 200–275° and under pressure, and allowing the mixt., on completion of the reaction, to overflow into a second chamber when it is drawn off. App. is described adapted also for other reactions of liquids and overflow of the reaction products.

β-Hydroxy-α-picoline. I. G. FARBENIND. A.-G. Brit. 335,818, Nov. 26, 1928. α-Picoline-β-sulfonic acid (which may be prepd. as described in Brit. 335,817) is fused with an alkali such as KOH. Production of an *azo dye* by coupling it with diazotized *p*-nitroaniline in Na_2CO_3 soln. is described.

Polymerized vinyl chloride. IWAN OSTROMISLENSKY (to L. A. Van Dyk). U. S. 1,791,009, Feb. 3. For obtaining the β-modification of polymerized vinyl chloride, the vinyl chloride is polymerized until the δ-modification is formed, followed by addn. of aniline, pptn. with alc. and dissolving in $C_2H_2Cl_4$.

Purpurin. HENRY R. LEE and IVAN GUBELMANN (to Newport Chemical Corp.). U. S. 1,790,932, Feb. 3. A soln. of 3-chloroquinizarin in concd. H_2SO_4 is heated at about 220° for a prolonged time (suitably about 20 hrs.).

Quinizarin. IVAN GUBELMANN and HENRY J. WEILAND (to Newport Chemical Corp.). U. S. 1,790,915, Feb. 3. In prepg. a quinizarin, a *p*-chloroaniline is diazotized in H_2SO_4, the diazo compd. thus formed, without isolation, is reacted upon in substantially anhyd. H_2SO_4 with phthalic anhydride in the presence of H_3BO_3 at a temp. of about 200° and this temp. is maintained until condensation is substantially complete, followed by cooling and diln. with water to ppt. the quinazarin compd.

Leuco indigo. IMPERIAL CHEMICAL INDUSTRIES, LTD. Fr. 693,469, April 7, 1930. Leuco indigo is made in a continuous manner by passing a paste of alk. indigo over a Ni catalyst on a rigid or semi-rigid support composed of a granular reticular or tangled mass, in the presence of H under pressure. A temp. of 120–140° is used and the catalyst may be activated with Al_2O_3.

11—BIOLOGICAL CHEMISTRY

PAUL E. HOWE

A—GENERAL

FRANK P. UNDERHILL

Chemical properties of blood pigments and related substances. A. STHERMAN. *Chem. Weekblad* 27, 170–4(1930).—The general chem. and optical properties of hemoglobin and its derivs. are described, and the variations exhibited by various types of blood are discussed. B. C. A.

Philothione as hydrogenase. J. DE REY-PAILHADE. *Compt. rend. soc. biol.* 99, 1700–2(1929).—Egg white, dild. with an equal vol. of water, was used as a source of philothione; the addn. of S liberates H_2S in 30 min. The philothione formed contains the -S-S- linking characteristic of cystine. The reaction does not occur after heating with dil. acid or alk. media; further, the ppt. formed by heating does not give H_2S after the addn. of S. It is maintained that philothione is an enzyme. B. C. A.

The Spierer lens and what it reveals in cellulose and protoplasm. WILLIAM SEIFRIZ. *J. Phys. Chem.* 35, 118–29(1931).—The Spierer lens is an oil-immersion objective in which is inserted a mirror, smaller than the lens, which reflects all direct light coming into the objective. A diaphragm controls the admission of light. Scattered light is picked up by the lens around the mirror. The structure of cellulose and protoplasm as revealed by the Spierer lens is that of tiny rods or supermicelles arranged end-to end to form long parallel striae. F. E. BROWN

The chylomicron emulsion. S. DEW. LUDLUM, A. E. TAFT AND R. L. NUGENT. *J. Phys. Chem.* 35, 269–88(1931).—Chylomicrons are oil droplets in the blood. Their diams. are 1μ and smaller. That they are surrounded by a protective protein layer is indicated by: (*a*) their max. flocculation at p_H 4.8–5.2, (*b*) the reversal of their charges at p_H 4.8–5 and (*c*) coalescence to form larger droplets at a point in acid or alc. concn. at which protein would be salted out. Mixed serum albumin and globulin would behave in exactly this way when acting as protective layers on colloidal particles. The application of the Mudd interface technic gives results similar to those observed for fat globules in milk. These milk globules are believed to be surrounded by protein. The question of the assimilation and storage of fats and the behavior of lipoid droplets in clinical tests, as those for syphilis, make this an important subject for study. The known behavior in these fields is in accord with the assumption of a protein sheath. F. E. BROWN

The end point of tryptic action. J. TEMMINCK GROLL. *Pharm. Weekblad* 68, 109–21(1931).—A study is made of the factors which might be expected to influence the extent of hydrolysis of casein and gelatin by trypsin prepns. from hog pancreas. Ordinarily about 20% of the total N is converted in 1 week into amino N which can be titrated with CH_2O. After several weeks the conversion may be as high as 30%, but this further increase does not represent enzymic action since the control without enzyme behaves similarly. The enzyme does not become inactivated since it readily attacks fresh addns. of substrate. Moreover, the addn. of fresh enzyme does not increase the extent of hydrolysis. The final equil. is not appreciably influenced by the purity of the enzyme prepn., by variations in p_H, nor by the concn. of enzyme. No evidence could be obtained of the formation of an inhibitory substance (Northrop, *C. A.* 16, 1598), nor of an equil. due to the inhibitory effect of decompn. products. Addn. of another protease, *e. g.*, that of yeast, readily carries the proteolysis to a further stage after the tryptic digestion has come to a standstill. A. W. DOX

Proteolytic enzymes in the leucocytes of man. ERIK HUSFELDT. *Z. physiol. Chem.* 194, 137–65(1931).—Different types of leucocytes were examd. separately for their proteolytic enzymes. This is the first time that such expts. have been performed with a single variety of cell, since the organs previously studied, *e. g.*, spleen, liver and even normal blood, contain mixts. of cells. The enzyme material consisted of (1) exudates from acute inflammations where polymorphonuclear neutrophilic leucocytes are present almost exclusively, (2) cells from the blood of a patient with myeloid leucemia where granulocytes and their precursors are exclusively present, (3) cells from normal blood, (4) acute inflammatory exudates of rabbits which consist essentially of polymorphonuclear pseudoeosinophilic leucocytes corresponding biologically to the neutrophilic leucocytes of man. The substrates employed were casein, edestin and synthetic polypeptides, all in solns. in which the p_H was varied by the aid of buffers. Proteinase action was measured by pptg. with CCl_3CO_2H and Kjeldahl detn. of the uncoagulable

N before and after the expt. Peptidase action was detd. by Willstätter's titration with 0.05 *N* KOH in EtOH. In the glycerol ext. of leucocytes from the blood of a patient with myeloid leucemia, where practically all the cells belong to the myeloid system, 2 proteinases were found: a *cathepsin*, active between p_H 3 and p_H 7, showing optimal cleavage of casein at p_H 4.3 and of edestin at p_H 5.2, and a *trypsin* increasingly active from p_H 4.0 on. The cathepsin resembles that of organs and represents the actual autolytic enzyme found in all animal cells. In the autolysis of cells with $CHCl_3$ the trypsin is formed in increasing quantity with progressive destruction of the cells. In the cells from acute exudates (polymorphonuclear leucocytes) trypsin is so abundantly present as to obscure the cathepsin. Attempts to adsorb the trypsin on casein did not give a satisfactory sepn., since so much of the enzyme still remained in soln. that catheptic activity could not be demonstrated. Glycerol exts. of the leucocyte mixt. from normal blood contained a considerable quantity of *peptidases*. These showed a characteristic dipeptide cleavage like the enteric secretion. Alanylglycine was readily hydrolyzed at an optimum p_H of 7.2, while the optimum cleavage of leucylglycine at p_H 8.1 was only $^1/_3$ as great. Tripeptides gave the strongest cleavage, the optimum for alanylglycylglycine being at 7.3. Cleavage of the tetrapeptide, leucylglycylglycylglycine, was less pronounced though distinct. In the glycerol ext. of cells from myeloid leucemia (granulocytes) the same enzymes were present and in the same relative proportions. Certain of the enzymes of the polymorphonuclear leucocytes are bound to the so-called granula of the cells. These granula are droplets of a protein and their isoelec. points can be detd. with the aid of microscopic staining reactions. In different animals the granulations have different isoelec. points. These points, as also the dissocn. of the protein, coincide with the p_H activity curve of the proteinases. The isoelec. point of the pseudoeosinophilic granulations of rabbit leucocytes, *e. g.*, is at p_H 7.0 and the proteinase acts from 7.0 to 3.0. The neutrophilic granulations in the polymorphonuclear leucocytes of man have an isoelec. point at 4.5; the corresponding proteinase is increasingly active from p_H 4.0 into the alk. region. It is possible that the dissocn. of the protein present in the granulations dets. the p_H activity curve of the proteolytic enzyme likewise bound to the protein of the granulations.

A. W. Dox

The cephalin from human brain. II. The question of oxidation and purification of cephalin. Irvine H. Page and Margarete Bülow. *Z. physiol. Chem.* **194**, 166–90(1931); cf. *C. A.* **25**, 718.—In contact with the air cephalin undergoes an oxidative alteration, the progress of which can be followed by noting the decrease in I no. At the same time the values for C, H and N decrease. The P content remains const. and never increases. The neutralization no. rises. A change in all these values does not occur if the cephalin is kept under EtOH. Various prepns. of cephalin show the same relationship between I no. and elementary analysis. Cephalin, like lecithin, may be oxidized by atm. O and Fe as catalyst, and the addn. of AcOH is not necessary. The product thus obtained shows the same regularity in analytical values as that obtained by atm. oxidation Purification of cephalin with HCl by the Frankel and Neubauer procedure (*C. A.* **5**, 715) leads to an ash-free material, but in only 50% yield. The main losses are due to an EtOH-sol. product which does not differ from the EtOH-insol. cephalin with respect to I and neutralization no. but gives quite different analytical values. By repptn. of purified cephalin a certain sepn. of the complex can be effected. When Et_2O-EtOH is used, the component with lower I and higher neutralization no. may be centrifuged out, leaving the other component in soln. Repptns. in the presence of H_2O lead invariably to products with lower neutralization and higher I no.

A. W. Dox

Phosphatides. II. The highly unsaturated fatty acids of the phosphatides from various organs. E. Klenk and O. v. Schoenebeck. *Z. physiol. Chem.* **194**, 191–2 (1931); cf. *C. A.* **25**, 120.—The highly unsatd. C_{22} acid recently found in the cephalin fraction of brain occurs also in the lecithin fraction of brain and in the phosphatides of beef liver. The sepn. of the highly unsatd. acids from the total fatty acids was accomplished by the Li salt-MeAc method of Tsujimoto (*C. A.* **15**, 1227). The fatty acids were converted into the Me esters and fractionated in a high vacuum. The highest-boiling fractions were in both cases the most unsatd. Hydrogenation and sapon. yielded behenic acid. Bromination of the unsatd. acids from liver phosphatides gave an Et_2O-insol. product, the analysis of which was in fair agreement with $C_{22}H_{32}Br_8O_2$. Removal of Br and subsequent hydrogenation, however, converted it into a mixt. contg. behenic acid, but no arachidonic acid could be identified. The highly unsatd. C_{22} acid appears to be of wide distribution in phosphatides of animal origin.

A. W. Dox

Chemistry of enzymes, hormones and vitamins. FELIX HAUROWITZ. *Pharm. Presse, Wiss.-prakt. Heft* **1930**, 161–5.—A review of the chief members of these 3 groups. W. O. E.

Amylase protecting substances. IV. Protective action of infusions of yeast, malt and barley. HIROICHI NAKAMURA. *J. Soc. Chem. Ind., Japan* **34**, Suppl. binding 16–7(1931); cf. *C. A.* **25**, 1270.—Yeast juice, prepd. by plasmolyzing yeast with PhMe, then autolyzing with H_2O 24 hrs. and filtering, was found to have very little protective action against the inactivation of takadiastase by heat at 50°. Infusions of malt and barley, prepd. cold, then boiled and filtered, had a marked protective action but no activating action. **V. Isolation of the protective substances from proteases.** *Ibid* 18–9.—Solns. of papain, papayotin and pepsin, which had been found to have a protective action, were made alk. to p_H 11.5 with NaOH and KH_2PO_4 and allowed to stand. The clear solns. were then found to have no protective action, but the pptd. material was 10–30 times as active as the original protease. **VI. Isolation of the protective substances from peptones and malt and yeast infusions.** *Ibid* 19–20.—Yeast, malt and peptone solns., treated as in part V, gave similar results, the pptd. material having a very powerful protective action. **VII. The identification of the chemically pure protective substances.** *Ibid* 21–2.—The ash from the ppts. obtained in V and VI was also found to have a most powerful protective action. Expts. showed the action is due entirely to the Ca content. Conclusion: Amylase is an org. Ca compd. and its decrease in amylolytic power when heated is due to loss of combined Ca. L. E. G.

A unit of expression for the hemolytic index. A. WEIL AND D. M. LIPCHÜTZ. *Arch. ges. Physiol.* (*Pflügers*) **226**, 239–42(1930).—Sapotoxin is suggested as a standard for expressing hemolytic activity. The hemolytic index is expressed as the no. of mg. of sapotoxin whose activity is equiv. to 100 cc. of the soln. in question. A. G.

The reversibility of coupled reactions in biological systems and the second law of thermodynamics. DEAN BURK. *J. Phys. Chem.* **35**, 432–55(1931).—The object of this paper is to indicate the extent to which the applicability of the second law of thermodynamics to like processes has so far received direct exptl. support. In general crit. data do not exist. Two types of free-energy efficiencies are distinguished, *viz*, "machine free-energy efficiency," in which the work done in a given reaction is compared to the total free energy dissipated by the organisms in all of their life processes, and "second-law free-energy efficiency," in which the work done in a reaction is compared to the free energy dissipated by that reaction alone. Obviously, the 2 may differ greatly and it is the object to det. if the latter may ever exceed 100%. The reversibility of autotrophic reduction of CO_2 by H_2 in the case of *B. pycnoticus* (Rühland, *Jahrbuch. wiss. Bot.* 63, 321 (1924)) is practically perfect, when the extraneous energy consumed in the metabolic processes of the organisms is taken into account. On the other hand, the second-law efficiencies calcd. from available data on autotrophic CH_4 oxidation and heterotrophic nitrate reduction are low. Second-law efficiency calcns. may be useful in detecting impossible, improbable or incomplete exptl. biological data. H. F. J.

The specificity of animal proteases. XX. Mechanism of enzymic dipeptide cleavage. ARNOLD K. BALLS AND FRANZ KÖHLER. *Ber.* **64B**, 34–45(1931); cf. *C. A.* **20**, 3702; **21**, 2910; **23**, 4235; **24**, 3522.—Erepsin (I) from the intestines can be sepd. into 2 components, a polypeptidase (II) and a dipeptidase (III), proving the presence in the ereptic enzyme-complex of an independent dipeptide-splitting enzyme. I may be used to det. the action of III in cases where the substrate is not attacked by II. The purpose of the expts. of B. and K. was to det. the reaction mechanism of the enzymic dipeptide cleavage by the study of a no. of "aniline peptides," many of which undergo cleavage by III. Because their constitution and properties may be varied by introducing different substituents, they are valuable for the study of the mechanism of peptide hydrolysis. The enzyme apparently attacks the peptide first at the NH_2 group, and then at the NH group. The prepn. of I, II, III and the substrates used is described by B. and K. in detail. The substrates used were the following glycyl derivs.: aniline (IV), *o*-toluidine, *p*-toluidine (V), *o*-aminobenzoic acid (VI), *m*-aminobenzoic acid, *p*-aminobenzoic acid (VII), *p*-nitroaniline (VIII), *p*-chloroaniline, and *p*-nitroaniline *o*-carboxylic acid (IX). Since VII, VIII and IX undergo cleavage by I, but IV, V and VI do not, B. and K. conclude that the substituent group (COOH or NH_2) affects the acid character of the peptide linkage and thus of the NH group. Interference with the action of III by such substances as chloroacetyltyrosine and aceturic acid supports the theory that the NH group is the 2nd point of attachment for the enzyme. The cause of the interference is the attachment of the enzyme to the NH group. The cleavage of ordinary di- and polypeptides by I, II and III was also studied. Cleavage of all of the higher glycine peptides was difficult. Apparently the presence of several

glycine residues forms an unfavorable configuration for the action of II. **XXI. The causes of steric selection by enzymes.** ERNST WALDSCHMIDT-LEITZ AND ARNOLD K. BALLS. *Ibid* 45–8.—Of the 3 isomeric chloroacetylaminobenzoic acids only the *m*-compd. undergoes cleavage by the carboxy-polypeptidase from hog-pancreas, indicating that only in the *m*-acid does the spatial arrangement of the substituents permit the reaction of the enzyme with COOH. LOUISE KELLEY

Experiments on denatured proteins. HENRY F. HOLDEN AND MAVIS FREEMAN. *Australian J. Exptl. Biol. Med. Sci.* 7, 13–26(1930).—Denaturization of proteins causes an increase in $[\alpha]$ which varies with the degree of change, the treatment producing the change and its subsequent history. Ox globin, ox euglobulin, horse globin, sheep euglobulin and hen egg albumin were studied, giving the following values, resp., for native and denatured proteins, $[\alpha]_{6780}$, —13° (water soln.) and —72° (NaOH soln.), —44.8° (NaCl) and —67.7 (NaOH), —18° (water) and —71 (NaOH), —46.6° (NaCl) and —88.8° (NaOH), —31.1 (water) and —51.4° (NaOH). The pptn. by Hg salts is slight in soln. not near the isoelec. point, on account of a low degree of ionization. The denatured proteins, including casein, show a higher $[\alpha]$ in acid soln. than in alkali, and when denatured by alc., a lower $[\alpha]$ than when denatured by HCl. C. G. KING

Action of dilute formaldehyde solution on proteins and protein derivatives. MAVIS FREEMAN. *Australian J. Exptl. Biol. Med. Sci.* 7, 117–24(1930).—Proteins and their hydrolytic products were partially (25–70%) pptd. by treatment with 0.5% HCHO at 37° for 10 days. Slight changes in $[\alpha]$ and in soly. were produced, the products being readily sol. in dil. acids and alkalies. C. G. KING

The toxicity of blood which has been frozen. WILLIAM ALEX. OSBORNE. *Australian J. Exptl. Biol. Med. Sci.* 7, 223–8(1930).—Defibrinated dog blood becomes toxic to the donor when frozen and thawed and injected intravenously. Toxicity is thought to be due to a denatured protein. C. G. KING

Rabbit-liver glycogen and its preparation. MELVILLE SAHYUN AND CARL L. ALSBERG. *J. Biol. Chem.* 89, 33–9(1930); cf. *C. A.* 23, 4273.—Glycogen can be readily obtained from liver by the use of 3% CCl_3CO_2H to remove the proteins. Thus prepd. it contained between 0.20 and 0.18% of ash; P_2O_5 and traces of Ca and Fe were present in the ash. By hydrolysis the purity of this glycogen was shown to be from 96.4 to 99.6%; and the P content calcd. as P_2O_5 was 0.032%. Glycogen is readily "denatured" by heating it to 105°; its soln. is considerably less opalescent; it acquires very strong adhesive properties even to smooth glass surfaces and the port-wine color with I changes to pink as it vanishes instead of gradually fading out. A. P. LOTHROP

Neutral-red reaction. V. KOEHRING. *J. Morphol. Physiol.* 49, 45–138(1930).—In living organisms neutral red combines with enzymes wherever they exist in digestive lumina. When cellular vacuolar systems are permeable, enzymes can usually be demonstrated upon the mitochondria. Neutral red serves as an indicator of hydrolysis and synthesis within the cell; it indicates that eggs developing in the ovary show hydrolysis in the early stages and synthesis later. Developing spermatozoa are poorly nourished. C. M. MCCAY

Enzymes. JORGE W. HOWARD. *Semana méd.* (Buenos Aires) 1930, II, 1028–42.—The physiol. and pathol. action of enzymes is discussed and the therapeutic value of organ exts. is emphasized. A. E. MEYER

Influence of alcohols on the heat coagulation of protein solutions buffered with acetate. TORSTEN THORELL. *Biochem. Z.* 229, 1–15(1930).—Heat coagulation of protein occurs only within the p_H range of 4.7 to 6.2 in the presence or absence of alc. Alcs. exert an increasing inhibitory effect on the heat coagulation in the order: MeOH < EtOH < PrOH in the presence of an acetate buffer. The inhibition increases with the concn. of the buffer. At an alc. concn. of less than 15–20% the coagulum becomes partially or completely dissolved on heating, to be repptd. on cooling. Pure serum albumin or native plasma from the horse or man is similarly affected by the alc.-acetate mixt., but the coagulation of the ovalbumin is not thus affected. It is pointed out that the use of alc. in tests for the Bence-Jones protein may cause erroneous conclusions. S. MORGULIS

The multiple nature of the enzyme carrier in polypeptide hydrolysis by yeast maceration juice. Preparation of protein-free eluates which act exclusively on polypeptides. A. FODOR AND L. FRANKENTHAL. *Biochem. Z.* 229, 16–27(1930).—The kaolin adsorbate of yeast maceration juice can be leached out with an absolutely neutral soln. of glycine which yields an enzyme prepn. practically free from protein; this prepn. exerts a hydrolytic action on peptone, polypeptides and dipeptides. S. M.

Hydrolysis of proline polypeptides by yeast and pancreas extracts, also by pancreatin preparations. A. FODOR, MAX FRANKEL AND S. KUK. *Biochem. Z.* 229, 28–

40(1930).—The water-insol. residue of pancreatin prepns. which has a specific hydrolytic effect on dipeptides also hydrolyzes prolylalanine. The water-sol. fraction which hydrolyzes dipeptides only after prolonged autolysis has no effect at first on the prolylalanine, but after 140 hrs. hydrolyzes 29%. Fresh pancreas maceration juice hydrolyzes prolylalanine, this action being increased by dialysis. The yeast maceration juice produces this hydrolysis very effectively. S. MORGULIS

The effect of proteases on urease preparations. JOSEPH ZAKOWSKI. *Biochem. Z.* **229**, 41–84(1930).—The destruction of the Jack bean urease by papain and trypsin at 30° and 40° and a definite p_H has been studied. At 40° with a ratio of proteases to urease 6:1 as much as 70–80% of the enzyme was destroyed in 7 hrs. Even with a papain-urease mixt. in the proportion of 1:6 a loss of 52% of activity was observed under the same conditions after 7 hrs. However, it is not concluded from these observations that this indicates simply a protein hydrolysis either of the urease itself or of its carrier. The expts. exclude the possibility that the inactivation of the urease is due to a liberation by the proteases of inhibiting substances. The fact that factors which activate papain and trypsin (HCN and enterokinase) also increase the destructive effect on the urease argues in favor of the enzymic nature of the inactivating process. Erepsin had no influence on the inactivation of the urease prepn. The inactivation by the various buffers employed in these expts. was practically a linear function of time during 7 hrs. S. MORGULIS

Effect of irradiation by means of the quartz lamps in vitro on the protein fractions of the blood plasma. LADISLAUS KOSTYÀL. *Biochem. Z.* **229**, 100–8(1930).—The different protein colloids of blood manifest different sensitivities toward irradiation by quartz lamps under different disease conditions, the effect being much greater on plasma with stable than on plasma with labile proteins. The influence of this irradiation is min. on the blood plasma from normal individuals. The accelerating effect on the rate of red cell sedimentation is produced only over a limited range, beyond which the rate tends to be retarded. S. MORGULIS

Some comments on the paper by Genesius on the metabolic effect of the Gurwich-rays. A. GURVITCH. *Biochem. Z.* **229**, 109–14(1930).—Some important bearings of Genesius' work (*C. A.* **24**, 5795) are emphasized. S. MORGULIS

Studies on glycogenolysis. H. K. BARRENSCHEEN, JOHANNES PANY AND ROBERT BERGER. *Biochem. Z.* **229**, 196–215(1930).—Postmortem glycogenolysis of the liver for the first 2–4 hrs. does not proceed in a linear but in a step-like fashion; the splitting off of H_3PO_4 takes place in the same way, the curves of both processes coinciding so as to suggest that the 2 reactions are coupled. As source of the new inorg. phosphate there is not only the pyrophosphate fraction which is easily hydrolyzable by acid, but also the difficultly hydrolyzable fraction of the acid-sol. org. phosphate. Neither the addn of insulin *in vitro* nor preliminary insulin intoxication affects the glycogenolysis or the hydrolysis of H_3PO_4. A hexosemonophosphate ester is formed during glycogenolysis evidently at the periods when the sugar formation and hydrolysis of phosphate show a diminution. The Ba salt of the hexosemonophosphate obtained during the glycogenolysis of rabbit or dog liver is the same and corresponds to the biological or artificial hexosemonophosphate esters in reducing power and optical activity. S. MORGULIS

A protein-ethereal sulfate from the gastric mucosa. HERMANN MATHIS. *Biochem Z.* **229**, 263–4(1930); cf. *C. A.* **24**, 4548.—Protein-ethereal sulfate compds. have recently been isolated from the anterior hypophysis, liver and gastric mucosa. The protein moiety of the hypophysis compd. is a globulin and of its 9 S atoms 7 are in the form of H_2SO_4 and none is present as cystine. The compd. prepd. from liver is an acid and has no globulin properties, and of its 3 S atoms 2 are in the form of H_2SO_4, but the third S atom is not in the form of cystine. Insulin, on the contrary, contains no H_2SO_4 but much cystine. The gastric mucosa prepn. has the following characteristics: It contains only 1.67–1.77% S (liver prepn. 7.49–7.68% S; anterior hypophysis prepn. 2.16–2.49% S) of which 1.56% is hydrolyzable by HCl, so that the S is entirely in the form of the protein-ethereal sulfate combination. S. MORGULIS

Enzymes and light. XVII. The influence of the visible and ultra-violet light on the succinodehydrogenase of horse muscle. LUDWIG PINCUSSEN AND WADIM ROMAN. *Biochem. Z.* **229**, 281–90(1930); cf. *C. A.* **24**, 1130.—The effect of succinodehydrogenase in the reduction-oxidation system: succinic acid–fumaric acid is greatest at p_H 6.9, with a second max. at p_H 7.7. The enzyme is more stable in an acid medium than in an alk. medium. Illuminating succinodehydrogenase for 15 min. with ultra violet light causes a strong injury to the enzyme within the range of p_H 6.0 to 8.0, but not so much on the acid side. The enzyme is also injured by illuminating for 1 hr. with ordinary light, and it is claimed that the injury is greatest at the p_H of max. ac-

tivity of the enzyme. Apparently exposure to the light only for 30 min. stimulates the enzyme's activity. S. MORGULIS

Equilibrium between egg albumin, calcium and potassium salts. M. GIUFFRÉ. *Biochem. Z.* **229**, 296–310(1930).—Egg albumin freed by electroultrafiltration of electrolytes binds increasing amts. of $CaCl_2$, $CaSO_4$, $Ca(CSN)_2$ and of KCl from solns. of increasing concn. No satn. is attained up to salt concns. of 0.05 *N* or 500 milliequivs. per 100 g. albumin. At higher concns. the behavior is irregular. Although the curves obtained for 2 different samples of similarly purified egg albumin are of the same type, the abs. values for the 2 are different. Albumin binds Ca from $CaCl_2$ solns. of weak or medium concn. more than K from KCl solns., but although in weak concn. the difference may be 100%, the 2 values tend to come close together as the concns. increase. In the presence of both $CaCl_2$ and KCl the 2 are bound. Ca from $CaSO_4$ is bound 10% more and from $Ca(CSN)_2$ 25% less than from $CaCl_2$. S. MORGULIS

The postmortem lactic acid formation in the liver. EGON FENZ AND HANS POPPER *Biochem. Z.* **229**, 397–426(1930).—The lactic acid formed and diffused from liver pulp upon standing 2 hrs. was detd. by the colorimetric method of Dische-Laszlo, with hydroquinone and H_2SO_4 as reagents. The lactic acid of the guinea pig liver increases in the first 7 hrs. up to 400 mg %, but later the increase is less marked. In the human liver macerated in Ringer-$NaHCO_3$ soln. and kept in an incubator preserved with $CHCl_3$ there was no further increase in lactic acid after 7 hrs. and therefore the livers obtained 8 hrs. after death already attained the max. lactic acid production. In some 60 cadavers the av. amt. of lactic acid was about 0.30% (0.136 to 0.574%), and since among these were persons with diabetes, cirrhosis, acute yellow atrophy and various endocrine disturbances there was thus no evidence of any dependence upon the total glucide content of the liver. Also in livers which 10–33 hrs. after death remained for many hrs. without $CHCl_3$ at 37° either in $NaHCO_3$ or in Na_2HPO_4, even with the addn. of glucose, there was no further increase in the lactic acid. Expts. on the livers from guinea pigs show that shortly after death the lactic acid formation is considerable, becoming somewhat less after 2 hrs. and very much less after 4 hrs., almost ceasing after 7 hrs. There was no difference whether $NaHCO_3$ or Na_2HPO_4 was used in the Ringer soln. Nor could the addn. of glucose, levulose or of glycogen cause any alteration, and only occasionally was there an irregular increase in the lactic acid upon the addn. of hexosediphosphate. Otherwise the max. value of 500 mg. % was never exceeded. In animals with a particularly low glycogen content of the liver the max. formation of lactic acid fell below this value. Similar results were obtained in studies on the kidneys. The results of the lactic acid formation in practically all organs of 2 human cadavers and of 2 guinea pigs are tabulated. S. MORGULIS

The cleavage of tyrosine and tryptophan from casein by papain activated by hydrocyanic acid. THEODOR LEIPERT AND IRMGARD HÄFNER. *Biochem. Z.* **229**, 427–32 (1930).—Only 47% of the total N of casein is hydrolyzed as amino N in 12 days' digestion by papain-HCN. Tyrosine is set free entirely in proportion to the total amino acid cleavage, and tryptophan is only more or less proportional to the total hydrolysis. Under the combined action of papain-HCN and trypsin for a week 71% of the total N is hydrolyzed as amino N, but the hydrolysis of tyrosine and tryptophan by the 2 enzymes together seems to be unaffected. S. MORGULIS

Studies on tobacco enzymes. CARL NEUBERG AND MARIA KOBEL. *Biochem. Z.* **229**, 455–63(1930).—In the present-day methods of prepn. roof-dried tobacco is passed through a flume with a gradually rising temp., for the purposes of removing the H_2O. In the zone of max. heat the temp. reaches 100°. The entire passage occupies 60 min. It was found that the tobacco enzymes do not lose their activity in this process. The following enzymes were studied: amylase, invertase, phosphatase, pectase, glycolase and ketonaldehydemutase. S. MORGULIS

A model for studying pectase. CARL NEUBERG AND CLARA OSTENDORF. *Biochem. Z.* **229**, 464–6(1930).—The action of pectase may be represented as follows: Under the influence of this hydrolyzing enzyme upon probably the acid Me ester of a complex polybasic glucidic acid (pectin), the MeOH is split off while the poorly sol. Ca and Mg salts of the pectic acid form a gelatinous ppt. For better investigation of the action of the pectase a substrate of definite chem. composition, namely, the Ca salt of methyl-*d*-tartaric acid, is substituted for the pectin whose compn. is highly variable. This substance under the influence of pectase gives MeOH and the sparingly sol. Ca tartrate. S. MORGULIS

Studies in comparative biochemistry. VII. Chemistry of the special saké yeast. JUN-ICHIRO SAGARA. *J. Biochem.* (Japan) **12**, 459–71(1930); cf. *C. A.* **20**, 3745.—In 2 strains of saké yeast there was a close chem. resemblance both in the inorg. and

org. compn. No lecithin was found but a phosphatide was bound, which because of its high N content must be either a tri- or diamino-monophosphatide. The presence of a pentose was proved, and a substance related to bioses was isolated in pure cryst. form. Arginine, histidine, lysine, phenylalanine, proline and valine were identified, the phenylalanine and proline being the predominant components of the protein. The nucleic acids of both strains are distinguished by their low N and P contents. Both types of yeast contain amylase, esterase, glycerophosphatase, pepsin and trypsin. Data are also recorded on the inorg. compn. S. MORGULIS

The properties of the biochemical constituents, the proteins in particular, in anhydrous solution. JEAN LOISELEUR. *Compt. rend.* **191**, 1477–9(1930).—In aliphatic solvents, biochemical substances form true, not colloidal, solns. They manifest certain chem. properties: (1) they are not frothy; their viscosity is less than aq. solns. of the same concn.; they are optically clear, not pptd. by a formic soln. of the ions Na, K, Mg, Fe, Cr or by tannin, MeOH, $CHCl_3$, pyridine or cyclohexanol. (2) Addn. of water to an aliphatic soln. of protein forms a colloidal dispersion which shows a Tyndall effect, the micellar state, adsorption, and flocculation. (3) Casein and keratin, in aceto-formic soln. and in presence of HCl and HNO_3, form a nitration deriv. having colloidal properties. N. M. NAYLOR

Growth factor in plants. HANS V. EULER, MARGARETA RYDBOM AND HARRY HELLSTRÖM. *Svensk. Kem. Tids.* **42**, 277–81(1930)(in German).—Petr. ether exts. of sprouts examd. spectrographically showed bands at 533, 497, 447 and 424. Distd. at 150° and 0.02 mm. Hg they gave bands at 256 and 325. A distillate from a carotenoid from swordfish liver had a band at 325 and Moore reports 328 for a rat liver fraction (*C. A.* **24**, 5343). A. R. ROSE

Membrane phenomena in living matter: equilibrium or steady state. A. V. HILL. *Trans. Faraday Soc.* **26**, 667–78(1930).—The difference in f. p. between the white and yolk of hen's eggs, observed by Straub (*C. A.* **23**, 3482), is confirmed. Since it persists in an atm. of H the oxidative mechanism at the membrane postulated by Straub for opposing the osmotic pressure cannot occur. The p. d. between inside and outside of muscle or nerve is also far greater than can be accounted for on the Donnan equil basis. The widespread occurrence of such steady states, maintained by the expenditure of energy, is held to indicate their biol. importance. K. V. THIMANN

The state of water in colloidal and living systems. ROSS AIKEN GORTNER. *Trans Faraday Soc.* **26**, 678–704(1930).—The work of Newton and Gortner (*C. A.* **18**, 2543 3205) and that of Robinson (*C. A.* **23**, 910, 1180) on winter hardiness are reviewed in relation to the general problem of "bound" water in the cell, and are compared to similar phenomena with inorg. gels and proteins. A discussion is also given. K. V. THIMANN

The p_H-stability regions of the proteins. T. SVEDBERG. *Trans. Faraday Soc* **26**, 740–4(1930); cf. *C. A.* **25**, 530.—Electrophoresis measurements show that the isoelec. pt. of proteins is not identical with the point of min acid- and alkali-binding, but is identical with the soly. min. The method can be used to sep. mixts. of proteins, since mutual neutralization does not occur. The isoelec. pts. detd. in 0.02 *N* NaOAc buffer are: ovalbumin 4.55, serum albumin 4.88, R-phycoerythrin 4.25, C-phycocyan 4.76, hemocyanin (*Helix*) 5.05, Bence-Jones protein 5.20. A summary of the results of sedimentation detns. is given. K. V. THIMANN

The solubility of proteins. E. W. J. MARDLES. *Trans. Faraday Soc.* **26**, 750–60 (1930).—The soly. in water of Coignet's gelatin varies with the amt. of the solid phase, and is greater when detd. by cooling sols than by soaking gelatin in cold water. It increases sharply at 26°, is diminished by washing, and is increased by the presence of HOAc, $HCONH_2$, urea and other org. compds. It is concluded that gelatin is heterogeneous (cf. Schryver and Thimann, *C. A.* **22**, 968); from the corresponding behavior of blood albumin a similar conclusion is drawn. K. V. THIMANN

Biological significance of the physical state of lyophilic colloids. F. F. NORD. *Trans. Faraday Soc.* **26**, 760–8(1930).—A summary of the work (cf. *C. A.* **22**, 4544, **23**, 5475) in which increase of zymase activity on treatment with C_2H_2 and C_2H_4 is correlated with increase of surface tension and decrease in viscosity of cell-free zymase solns. Corresponding surface tension and viscosity phenomena with solns. of albumin or Na oleate indicate surface adsorption of these gases, and also of N_2O, on colloids, leading to protective action and hence increase of enzymic activity. K. V. T.

Phase rule equilibria of horse serum globulin. JAMES W. MCBAIN AND ELOISE JAMESON. *Trans. Faraday Soc.* **26**, 768–9(1930).—The phase diagram for globulin prepd. by Svedberg's method, water and Am_2SO_4 at p_H 6.0 at 40° is given. "It appears that globulin solns., euglobulin and pseudoglobulin are but 3 phase of a system

of the same mother substance, dehydrated globulin—solns. of globulin being the ordinary isotropic soln., while euglobulin and pseudoglobulin are liquid cryst. phases, or a liquid and glass which are slightly doubly refracting." K. V. THIMANN

The structure, behavior and physiological characteristics of vertebrate cells cultivated in vitro. H. B. FELL AND E. N. WILLMER. *Trans. Faraday Soc.* **26**, 772–9 (1930).—A general lecture on the technic of tissue cultures and their physiol. behavior. K. V. THIMANN

Surface structure in the integration of cell activity. RUDOLPH A. PETERS. *Trans. Faraday Soc.* **26**, 797–807(1930).—The importance of interface reactions in detg. the activities of the cell is discussed. The interfacial tensions of palmitic, capric and erucic acids in benzene solns. against phosphate buffer show a sharp fall at about p_H 6 continuing to p_H 9.5. Adsorption of weak acids and bases on purified charcoal follows closely the dissocn. curves, the undissocd. mol. being the most adsorbed (Phelps and Peters, *C. A.* **23**, 5080). The pptn. of phosphotungstates of histamine and other bases is also a function of p_H, histamine being pptd. sharply at p_H 7.8 and on the acid side. The presence or absence of a single H ion is calcd. to be of considerable importance in detg. the reactions occurring in bacterial cells. A theory of mosaic cell structure, involving mobile chains of liquid crystals a few mols. thick, and orientating all substances in the cell, is developed. K. V. THIMANN

The isoelectric point of cells and tissues. HANS PFEIFFER. *Trans. Faraday Soc.* **26**, 822–36(1930); cf. *Protoplasma* **11**, 85(1930); *Biol. Reviews* **4**, 1–40(1929); and *C. A.* **23**, 3725. K. V. THIMANN

Decrease in the activity of β-glucosidase of emulsin of almonds in the course of successive syntheses of β-methylglucoside. M. BRIDEL AND N. JOANID. *J. pharm. chim.* [8], **12**, 337–9(1930).—A mixt. of 3 g. emulsin and 150 g. dextrose in 500 cc. of 70% MeOH was continuously rotated for 8 days, *i. e.*, until the optical rotation of the soln. became const. (42°40′). The emulsin was then collected, washed with 90% alc. and dried *in vacuo*. Only 2 g. was obtained. The process was repeated 6 times with the recovered quantity of emulsin and 50 times its wt. of dextrose in each case. The following wts. of emulsin were recovered: 1.2, 1.2, 1.0, 1.0, 1.0, 1.0 g. The 7th synthesis required 19 days to reach equil., and in each of the 7 cases, about 77% of the dextrose became combined. During equal periods of time in the 7 expts., the activity of β-glucosidase steadily diminished. Thus, measured by time, emulsin lost more than half of its activity. Nevertheless, having acted in these expts. for 3 months on 350 times its wt. of dextrose to cause 77% of it to form β-methylglucoside, it was still active enough to complete the last synthesis in 19 days. Mech. rotation shortened the time of these expts. materially. Also in *Bull. soc. chim. biol.* **12**, 931–3(1930). S. WALDBOTT

Hydrolysis by emulsin of 2 glucosides not considered hydrolyzable by this enzyme: asebotoside (asebotin) and phlorhizoside(phlorhizin). M. BRIDEL. *J. pharm. chim.* [8], **12**, 385–95(1930).—Contrary to the accepted belief, asebotoside (cf. Bourquelot and Fichtenholz, *C. A.* **6**, 1207) and phlorhizoside (cf. Johnson and Robertson, *C. A.* **24**, 1865), which are *l*-rotatory glucosides, are hydrolyzable by emulsin of almonds, yielding in each case *d*-glucose and a nonglucidic product insol. in water. Both glucosides therefore belong to the class of β-glucosides, *i. e.*, they are hydrolyzable by β-glucosidase. Twenty-five references are given. Also in *Bull. soc. chim. biol.* **12**, 921–30 (1930). S. WALDBOTT

The denaturation of albumin (BANCROFT, RUTZLER) **2**. The influence of the wave length of the exciting rays on the fluorescent spectrum of etioporphyrin (AHARONI, DHERE) **3**. Denaturing of protein of soy bean by alcoholic extraction (OKANO, *et al.*) **27**. The influence of light, CO and quinone on the methylene blue reaction (TAMIYA, *et al.*) **10**. The bile acids (WIELAND, *et al.*) **10**.

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B—METHODS AND APPARATUS

STANLEY R. BENEDICT

The antineuritic vitamin (preliminary communication). A. G. VAN VEEN. *Rec. trav. chim.* **49**, 1178–9(1930).—According to the method of Jansen and Donath (*Proc. Acad. Sci. Amsterdam* **29**, 1390(1926); cf. *C. A.* **20**, 2005) a product which contains about

20% of the vitamin may be easily obtained, the further purification being, however, very difficult and giving only 50–100 mg. of the pure vitamin from 100 kg. rice polishings after a few months' labor. Attempts have been made by Guha and Drummond (*C. A.* **24**, 1140) and by Williams, Waterman and Gurin (*C. A.* **24**, 4535) to obtain larger yields but without success; the technic of Jansen and Donath for the purification of the 20% product had to be modified profoundly in order to get higher yields. After having studied the products which accompany the vitamin in the 20% product, the author has now succeeded in getting 140 mg. of the cryst. vitamin from 75 kg. rice polishings; this product was, however, not pure, but could be purified by recrystn. The 20% product may be freed from several physiologically active compds. by treatment with acid chlorides or, even better, with sulfonyl chlorides, which leave the vitamin itself unchanged, and this may be purified further with the double salts of Pt or Cd chloride. It was found also that the Pauly reaction with diazotized sulfanilic acid is fainter the purer the vitamin. This fact was confirmed by Jansen (private communication). C. F. VAN DUIN

An improved design of the Van Slyke apparatus for the estimation of amino nitrogen. SIDNEY J. FOLLEY. *Biochem. J.* **24**, 961-4(1930). BENJAMIN HARROW

An apparatus for rotating serum-antigen mixtures in the Kline test for syphilis. PHILIP L. VARNEY. *Am. J. Pub. Health* **21**, 65–9(1931).—An electrically driven device is described, which mechanically mixes by rotation the serum-antigen mixt. As many as 6 slides (2″ × 3″) are accommodated at one time. The rotary speed of the app. has been arbitrarily set at 120 r. p. m. through an arc of ½″ radius. The app. may be connected to an elec. timing clock, thus relieving the technician of the necessity for timing the period of rotation, resulting in a greater uniformity of results and a saving in time necessary to perform the tests. J. A. KENNEDY

Colorimetric method for determining silicon. EARL J. KING. *Bull. soc. chim. biol.* **12**, 903–9(1930); cf. *C. A.* **23**, 405; **25**, 662.—The phosphate error in Isaacs' method (*C. A.* **18**, 3199) is pointed out and a modification proposed to avoid it. C. G. K.

The estimation of copper in organs. EMILE CHERBULIEZ AND STEFAN ANSBACHER. *Arch. Path. Anat.* (Virchow's) **278**, 365-71(1930). See *C. A.* **24**, 2402. E. R. L.

A new microcolorimeter. A. G. SHEFTEL. *J. Lab. Clin. Med.* **15**, 1016–8(1930). E. R. MAIN

A graduated test tube colorimeter. ARTHUR T. BRICE, JR. *J. Lab. Clin. Med.* **15**, 1018–22(1930). E. R. MAIN

Microdetermination of urea by Nicloux and Welter's method (GUILLEMET, GOLAZ) **7**. An improved pipet manipulator (DUFF) **1**. A new high-efficiency glass condenser (CRANDALL) **1**.

Handbuch der biologischen Arbeitsmethoden. Edited by EMIL ABDERHALDEN. Abt. 1. Chem. Methoden. Tl. 2. Allgemeine chem. Methoden. Hälfte 2. H. 6. (Lfg. 336). FRANZ BACHÉR: **Die Verseifung.** Pp. 2585 2878. Reviewed in *J. Am. Chem. Soc.* **53**, 818(1931). M. 16. H. 7 (Lfg. 339). HANS HORSTERS AND HELENE HORSTERS: **Neuere Synthesen biologisch wichtiger Pyridinkörper.** Pp. 2879 2970. M. 5. Abt. 3. Physikal.-chem. Methoden. Tl. A. Allg. u. spez. Methoden zur Untersuchung d. Verhaltens gelöster Stoffe. H. 10 (Lfg. 342). GÜNTHER RIENÄCKER: **Potentiometrische Mikrotitration.** FRANZ LEUTHARDT: **Pufferung und Puffersysteme.** ROBERT BRINKMAN: **Registrierung d. Wasserstoffionenkonzentration im strömenden Blut.** HANS FISCHER AND OTTO REBMANN: **Die Bestimmung von Gas- und Dampfdrucken.** Pp. 1913-2201. M. 17. Abt. 4. Angewandte chem. und physikal. Methoden. Tl. 14. Untersuchung d. Nahrungs- und Genussmittel. H. 3 (Lfg. 340). WILHELM PLÜCKER: **Allgemeine Methoden zur Untersuchung der Nahrungs- und Genussmittel.** Pp. 721-1034. M. 17. Cf. *C. A.* **24**, 5391. Berlin and Vienna: Urban & Schwarzenberg.

Polarimeter for testing urine. OPTISCH-MECHANISCHE FABRIK STEINDORFF & CO. Ger. 485,094, Jan. 21, 1928.

C—BACTERIOLOGY

CHARLES B. MORREY

Vital conditions of ferruginous bacteria. (MLLE.) I. TUROWSKA. *Bull. intern. acad. polonaise* **1929B I**, 255–82.—Fe bacteria are found in certain wells and other waters of Poland in which the Fe content is usually greater than 2 mg. per l. and the reaction is between p_H 5.88 and 7.60. Large concns. of salts appear to be unfavorable. The bacteria are able to withstand temps. down to 0°. B. C. A.

Disinfecting properties of chloropicrin. A. SMORODINTZEV. *Z. Desinfektion* **21**, 169–72(1929).—Chloropicrin has a high penetrating power for porous materials. Its disinfecting power at 38° is double that at 4°. Spore-forming bacteria are very resistant. B. C. A.

Studies on the Coccaceae. XVI. Genus Leuconostoc. G. J. HUCKER AND CARL S. PEDERSON. N. Y. Agr. Expt. Sta., *Tech. Bull.* **167**, 3–80(1930); cf. *C. A.* **23**, 629.—A biochem. study was made of 166 strains of low acid-producing types of streptococci (*Leuconostoc*) from slimy sugar solns., fermenting vegetables and from milk and milk products. All members of the genus *Leuconostoc* produce approx. 45% *l*-lactic acid from glucose, 20% CO_2 and 25% of volatile products, including AcOH and EtOH. In addn., the members of this group produce mannitol from fructose and a levulan or dextran from sucrose. In morphology, the genus *Leuconostoc* lies intermediate between the streptococci and the lactobacilli. Secondary characters used for recognition of species within the genus are the fermentations of pentoses and sucrose. Three species are well defined. *L. mesenteroides* ferments pentoses (arabinose or xylose) and sucrose, produces slime in sugar solns., and is generally found in fermenting vegetable material and in sugar solns. *L. dextranicus* ferments sucrose but not pentoses, produces a moderate amt. of slime in sugar solns. and may be assocd. with either vegetable or with dairy products. *L. citrovorous* fails to ferment either sucrose or the pentoses, produces no slime in sugar solns and is generally assocd. with milk or milk products. C. R. FELLERS

Staining bacterial flagella. R. P. LEOPOLD. *Sci. Agr.* **11**, 232–7(1930).—A modified Zettnow technic is preferred. C. R. FELLERS

The physiology of the acetic acid fermentation. I. The importance of cytochrome in the physiology of cell respiration. HIROSHI TAMIYA AND KIYOSHI TANAKA. *Acta Phytochim.* **5**, 167–211(1930).—The AcOH fermentation with *Acetobacter pasteurianus* was studied in a special app. It consists of 2 cylinders carefully ground into each other providing a piston-like air-tight closure. The outside cylinder is provided with an opening and a two-way stopcock. A series of 10 such cylinders is gently shaken on a machine. By this arrangement samples of both the gas and the fermentation mixt. can be taken. It was found that quinone can also be used as a H acceptor for the AcOH fermentation instead of O. The extent of the fermentation is largely independent of the amts. of O. CO does not influence the quinone fermentation while it hinders noticeably the O_2 fermentation. In the presence of light this effect is markedly ruled out The indophenol reaction of the AcOH bacterium is also hindered by CO more so in the dark than in the light. Toluene was found to retard strongly the O_2 fermentation even when the O_2 amts. were large; the quinone and methylene blue-fermentation, however, is not influenced. While the indophenol reaction of the AcOH bacterium as well as yeast is also retarded by toluene, *Lactarius* oxidase seems to be indifferent to its action. It furthermore was shown that the normal functioning of cytochrome is disturbed by the addn. of toluene and quinone, but is resistant toward methylene blue. The phenomena encountered are explained by assuming that cytochrome plays an important role in the O_2 fermentation of the AcOH bacterium and the normal O_2 respiration. Cytochrome is the "O_2 pressure regulator." The equation $Q' = R' C_A$ (Q' = extent of fermentation, R' = activity of the oxidizing enzyme system, C_A = concn. of the acceptor substance present on the surface of the enzyme) is given and the process discussed theoretically. The exptl. findings seem to agree with the theory of K. Shibata and H Tamiya (*C. A.* **24**, 3533). E. G.-F.

D—BOTANY

THOMAS G. PHILLIPS

Piceoside of black willow bark. M. BRIDEL AND J. RABATÉ. *Bull. soc. chim. biol.* **12**, 332–41(1930).—The extn. of the glucoside (see *C. A.* **24**, 4070) is described. B. C. A.

The action of radium on the germination of seeds. G. MEZZADROLI AND E. VARETON. *Atti accad. Lincei* **12**, 73–80(1930); cf. *C. A.* **24**, 5336.—A variety of seeds (cereals such as oats and corn; legumes such as peas, beans, soy) were exposed to the action of the same quantity of Ra at the same distance for 5 min., 30 min. and 3 hrs. The seeds were then planted and the relative growth was noted. Five min. is enough to stimulate growth somewhat; 30 min. has the max. effect, while with 3 hrs., growth is retarded. If ½ the amt. of Ra was used, 5 times the length of exposure was necessary. Therefore, Ra has a stimulating effect up to a certain period of exposure, beyond which the seeds are harmed. The stimulation is apparently permanent as seeds planted 2 months

after exposure showed the same accelerated growth as seeds freshly exposed for the same period of time. A. W. CONTIERI

Bibliography of Aspergillus, 1729 to 1928. HIROSHI TAMIYA AND SHINKICHI MORITA. *Botanical Mag.* (Tokyo) **43**, No. 506 to **44**, No. 524. pp. 204(1929–30); cf. *C. A.* **24**, 2496.—A chronological bibliography of 2424 papers dealing with the taxonomy, morphology, physiology and enzymic and chemical activities of *Aspergillus* species, with author index. A. W. DOX

Researches in ionic interchange between yeast cells and salt solutions. PAUL GENAUD. *Ann. physiol. physicochim. biol.* **6**, 240–330(1930); cf. *C. A.* **25**, 316.—When yeast cells are placed in solns. of dissociable salts, there is a rapid interchange of cations within a few min. between the cellular membrane and the surrounding fluid; the metal begins to penetrate the cell interior within about 10 min., complete equil. being reached in about 60 min. Vital staining by basic dyes is due to just such a cationic interchange between the membrane and the surrounding fluid. The *total* cation content is a fairly const. quantity, characteristic for a yeast cell under definite conditions of growth. Although the cationic interchange usually concerns equimol. quantities, with some metals (*e. g.*, Ag) there is an enormous absorption not conditioned by a simple interchange, but by other forces (*e. g.*, reduction of the Ag^+ to Ag). In cases of simple diffusion (K^+, NH_4^+, Pb^{++}) the vacuoles contain approx. half as much of the absorbed cation as the membrane. Dead yeast cells can take up 4 times as much Pb as living cells, probably because of the liberation of free acids. Corresponding to their slight Na^+ content, the cells are impermeable to Na^+, possibly on account of the fact that the hydrated ion cannot pass through the pores of the cell membrane. The enormous avidity of the cell for Ag^+ is conditioned by the fact that the latter is reduced by an as yet uncharacterized substance in the cell interior. There is an extensive bibliography. H. E.

Effect of spiral ringing on solute translocation and the structure of the regenerated tissues of the apple. L. H. MACDANIELS AND OTIS F. CURTIS. Cornell Agr. Expt Sta., *Mem.* **133**, 3–31(1931).—Trunks of young apple trees were ringed by removing narrow strips of tissue extending twice around the trunks spirally. In some cases the *phloem* and outer tissues only were removed, but in others the outer annual ring of *xylem* also was cut out. The effect of this ringing upon solute translocation was studied by making N analyses and catalase detn. on the leaves. The structure of the regenerated tissues was studied by sectioning and microscopic examn. Lateral transfer of solutes and of food substances is relatively slow, though it does occur when forced by spiral ringing. Foods from above and nutrient salts from below tend to move in straight lines parallel to the long axes of the conducting elements. When the trunk is spirally ringed and nitrate is added to the soil, N movement to branches immediately above the end of the spiral is greatly reduced as in a completely ringed trunk, whereas movement to those branches on the side not obstructed by this upper end of the spiral is normal as in the check trees. The phloem is the more important tissue involved in translocation, since the effect of cutting the phloem alone was the same as when both xylem and phloem were cut. There is a close correlation between high N content and high catalase activity of the leaf tissues of all trees examd. The conducting tissues formed by the cambium subsequent to the ringing changed their orientation so that the long axes of the elements were parallel to the spiral. After the new tissues were formed, the localized effects of the ringing upon solute transfer to the leaves on the tree top disappeared. Cambial growth is made in response to the coming together of the food from the leaves and the nutrients from the roots. The position of greatest thickening of the xylem is detd. more by the food supply than by the nutrient salts. The change in the orientation of the cambium is detd. by a change in the direction of the movement of foods and of nutrients, or possibly something of the nature of an elec. polarity may be a factor in the orientation. The general conception that lateral conduction of food and of nutrients is slow, that these substances move in straight lines parallel to the long axes of the vascular elements, and that cambial growth is a response to the coming together of the streams of food and nutrients is valuable in explaining plant response in practical problems of propagation, grafting and pruning. The possible bearing of this conception of greatest growth activity upon the practice of tapping trees for *oleoresin* is discussed. C. R. FELLERS

Growth behavior and maintenance of organic foods in Bahia grass. W. A. LEUKEL AND J. M. COLEMAN. Fla. Agr. Expt. Sta., *Tech. Bull.* **219**, 5–56(1930).—Except for the first year, frequent cuttings yielded more top growth and greater wt. than a single cutting at mature growth. The top growth from plants cut frequently retained more of a vegetative growth condition, more uniform % of N and a narrower carbohydrate-N ratio than plants grown to maturity. The latter gradually decreased

in % N, were less vegetative and gradually showed a wide carbohydrate-N relation assocd. with increased reproduction. Increased vegetative top growth production on plants was assocd. with a variation in % and quantity of org. foods in the stolons. During periods of slow growth such stolons again increased in wt. and quantity of reserve foods. Heavy seed production was assocd. with some decrease n org. foods in stolons but such foods again increased in quantity thereafter. The elaboration of org. foods by the more horizontal leaf area not removed by cutting appeared to be sufficient for the growing needs of the plant. C. R. FELLERS

Carbohydrate metabolism of Stipa pulchra. ARTHUR W. SAMPSON AND EDWARD C. MCCARTY. *Hilgardia* **5**, 61–100(1930).—The growth cycle of *Stipa pulchra* is an orderly process characterized by periodicity in that intervals of rapid growth alternate with intervals of depression in the growth rate. An inverse correlation existed between the annual march of carbohydrates and the growth rate. Accumulation of foods is related to low or to declining growth velocity, and is most active near the close of the annual growth cycle. Practically complete accumulation of carbohydrate foods occurred where 43 50% of the total annual herbage yield was produced prior to the peak in the growth rate Clipping or grazing had little effect on the total herbage yield and did not prevent the accumulation of max. amts. of carbohydrates in the latter part of the growth cycle. The herbage of *Stipa pulchra* on the range retains its succulency for 9 10 months. C. R. FELLERS

Experiments in forcing gladioli. F. F. WEINARD AND S W. DECKER. Ill. Agr. Expt. Sta., *Bull.* **357**, 345–61(1930).—The most desirable corms for forcing are those over 1½ in. in diam. Storage at 5 8° early in the season and at 20–1 for a short time previous to planting gave the best results. *Ethylene dichloride* and *ethylene chlorohydrin* forced the corms into early growth. The chem. treatment, however, is not yet well standardized and sometimes causes injury. C. R. FELLERS

Some effects of defoliation on fruit spur composition and fruit bud formation in the Oldenburg apple. G. F. POTTER, H. R. KRAYBILL, S. W. WENTWORTH, J. T. SULLIVAN AND P. T. BLOOD. N. H. Agr. Expt. Sta., *Tech. Bull.* **41**, 3–27(1930).—All the blossom buds were removed when in the "pink" stage from 3 heavily blooming Oldenburg apple trees. Every second spur on 2 similar trees was deblossomed so that along each branch deflorated spurs alternated with those blossoming and setting fruit. Four trees from which no blooms were removed served as controls. The wt. and the compn. of the developing fruits were detd. at 10 dates between the period of petal fall and harvest. The compn. and the fruit-bud formation of bearing spurs from the control trees and of deflorated spurs from the other 2 treatments were studied. The increase in dry wt. of the individual fruits followed the usual logarithmic curve of growth, the rate of increase reaching a max. in the second and third weeks in July. At this period each apple absorbed about 1 mg. of N daily and about 300 mg. of carbohydrate. Throughout June and July the N content of the bearing spurs was much higher than that of either of the other 2 types, and also was considerably higher on a % basis than the N content of the fruits. The starch content of bearing spurs and the adjacent 50% deflorated spurs was similar and lower throughout the season than in the 100% deflorated spurs on non-fruiting trees. The sugar-starch equil. of the fruit was independent of that in the spur to which it was attached, and sugars in the fruit reached a concn. several times that in the spur. The ash content of the bearing spurs was comparatively low; that of the 2 types of deflorated spurs was essentially similar. No difference large enough to be detd. existed among the 3 types of spurs in content of free reducing substances, sucrose, P, phlorhizin, acid hydrolyzable substances and total carbohydrates. The compn. and fruit-bud formation of adjoining spurs are materially altered by the presence of blossoming and fruiting spurs. No critical evidence is afforded, however, as to the fundamental nutritional causes underlying fruit-bud formation. C. R. FELLERS

Relation of hydrophilic colloids to hardiness in the apple as shown by the dye absorption test. STUART DUNN. N. H. Agr. Expt. Sta., *Tech. Bull.* **44**, 3–18(1930).—Results are compared both to general experience and opinion as to the ranking of varieties and to a freezing test by solid CO_2. Results of tests for 5 yrs. on 1-yr.-old twigs gathered each fall for 22 different varieties grown in Iowa and of direct freezing tests for 2 of these yrs. show a correlation of about 65% of the varieties compared to field experience, and 55% in 1 series and about 80% in the other on the basis of the parallel freezing test. The freezing tests agree with each other to a less extent. A marked consistency in the varieties not in agreement, as shown by a comparison of the various tests, and their variations in position in the different series, suggest that a lack of constancy in hardiness in any variety is assocd. with its failure to respond consistently or correctly

to any hardiness test. A similar conclusion is drawn from results on N. H. varieties. Similar tests on 12 N. H. varieties show a correlation between the dye test and either of the other standards of from 60 to over 90%. A large no. of freezing tests were made, distributed throughout the dormant season, which offered a wider basis of comparison. A marked trend toward a closer agreement was shown in the series gathered later in the season. Conclusion: The dye absorption test is not sufficiently consistent to be used in a quick, conclusive detn. of hardiness in the apple, but possibly in conjunction with other tests, such as the freezing test, will serve to differentiate between the hardiness of unknown varieties which are rather const. in that respect, if a sufficient no. of detns. is made. Some other factors besides the hydrophilic colloids are apparently partially responsible for hardiness, at least in ligneous plants like the apple. C. R. F.

Development and ripening of peaches as correlated with physical characteristics, chemical composition and histological structure of the fruit flesh. II. Histology and microchemistry. R. M. Addoms, G. T. Nightingalf and M. A. Blake. N. J. Agr. Expt Sta., *Bull.* **507**, 3–19(1930); cf. *C. A.* **24**, 5333.—Elberta and Shipper Cling varieties were used. Microchem. tests showed a gradual decrease in *protopectin*, *cellulose* and *hemicellulose* content as ripening proceeded. The change from hard-ripe to soft-ripe occurs within a very short time and is accompanied by profound changes in the cell walls, many of which completely break down and become disorganized. Comparisons made on fruits from a highly veget tive tree and a less vegetative tree, higher in carbohydrates, showed no chem. differences for the first 75 days after bloom. However, the latter contained more tannins and oxidases, but no histological differences were noted. Differences in microchem. and histological reactions in the Elberta and Shipper Cling varieties were evident only in the final stages of ripening. The non melting quality of ripe fruits of Shipper Cling variety is assocd. chiefly with the retention of a high content of insol. protopectin in the cell walls of the flesh. A bibliography is given. C. R. Fellers

Studies on tree root activities. III. G. H. Harris. *Sci. Agr.* **11**, 191–9(1930); cf. *C. A.* **24**, 5054.—The immediate influence of top pruning on root respiration is due to the injury caused. On the other hand, the immediate influence of injecting sugar in the top on root respiration is due to the injections stimulating bud activity. The buds in turn stimulate root respiration. In the nutrient solns. used, where all the nutrients were readily available, the amt. of CO_2 excreted by the root and absorption appeared to have little relation. Absorption seemed more closely related to the activity of the growing top. Cutting off the light from the growing tops reduced the amt. of root respiration. When transpiration is high, the CO_2 excreted by the roots is lower than if transpiration were low at this time. Some of the CO_2 produced during root respiration is apparently swept up to the tops during a time of high transpiration and consequently less is excreted by the root than if transpiration were low. C. R. F.

Sparassole in the roots of Rhododendron japonicum. Kono Kinoshita. *Acta Phytochim.* **5**, 157–65(1930).—Sparassole (I) is obtained from the alc. exts. of roots of *Rhododendron japonicum* collected in November. I is found in the cooled receiver upon distn. of the alc. It m. 67–68°. The yield is 0.36%. Hydrolysis yielded the monomethyl ether of orsellinic acid (II), m. 174–175° from 80% alc. The m. ps. given by previous authors are too low. II is converted to orcine by concd. HCl or HI. A mixed m. p. with a sample of I obtained from another source finally identified the substance as the monomethyl ether of orsellinic acid methyl ester. E. G. F.

The amount of sorbitol in rowan berries. G. Tanret. *Bull. soc. chim. biol.* **12**, 541–3(1930).—The sorbitol (isolated as the dibenzaldehyde deriv.) found on Aug. 15, Sept. 12 and Oct. 15 was 44.4, 66.5 and 68.9 g. per kg. whole berries of *Sorbus aucuparia*, corresponding to 147.8, 209.4 and 173.2 g. total sol. material. Acid and sugar analyses are also given. C. G. King

The penetration of 1-naphthol-2-sulfonic acid indophenol, *o*-chlorophenol indophenol and *o*-cresol indophenol into Valonia. Matilda Moldenhauer Brooks. *Proc. Nat. Acad. Sci.* **17**, No. 1, 1–3(1931).—B. (*C. A.* **23**, 4241) presents the continuation of the studies on oxidation-reduction indicators and their penetration into living plants on *Valonia*. Indicators lying further toward the pos. end of the scale are considered. 1-Naphthol-2-sulfonic acid indophenol does not penetrate into the sap within 24 hrs. at p_H values from 5.8 to 9. *o*-Cresol indophenol and *o*-chlorophenol indophenol penetrate into the sap in a colorless form and faster from an acid than alk. soln. Different equiv. concns. are established accordingly as a phosphate or borate buffer is used. Where reduction has changed the color of the dye, its identity was established spectrophotometrically. B. S. Levine

A source of error in the determination of amide nitrogen in plant extracts. Hubert

B. VICKERY AND GEO. W. PUCHER. *J. Biol. Chem.* 90, 179–88(1931).—HCl is an unsuitable reagent for the hydrolysis of amides in plant exts. and may lead to uncertain results if nitrates are also present, although the so-called Sachsse method in which *N* HCl is used and hydrolysis is continued for 4 hrs. actually gives quite accurate results if these definite conditions of hydrolysis are rigidly maintained. A compensation of errors occurs in which the oxidation of NH_3 by the mixt. of HNO_3 and HCl is counterbalanced by extra NH_3 formed by reduction of HNO_3 under the influence of an easily oxidized unknown substance present in tobacco leaf and other plant exts. Substitution of 2 *N* H_2SO_4 and a 6-hr. hydrolysis are recommended. When this is done accurate and reproducible results are secured with no interference from nitrates and considerable latitude is permissible both in acid concn. and in time of hydrolysis. A. P. L.

Biochemical transformation of acetic acid by molds and the chemistry of citric acid formation. T. CHRZASZCZ AND D. TIUKOW. *Biochem. Z.* 229, 343–57(1930).—In the metabolism of AcOH by the mold *Penicillium* succinic, fumaric, oxalic, *l*-malic and citric acids are formed and probably also other acids not yet identified. The finding of *l*-malic and citric acids is here reported for the first time. It is concluded that the citric acid formation in sugar cultures also proceeds over AcOH. The AcOH is changed to succinic acid and by dehydrogenation, and this in turn is dehydrogenated to fumaric acid. The fumaric acid is changed to *l*-malic acid by taking up a mol. of H_2O. It is assumed that at some moment both malic and acetic acid ions are present in the culture, citric acid being formed from these two by a dehydrogenation The transformation of the sugar to citric acid proceeds over the intermediate stages of pyruvic acid ⟶ acetaldehyde ⟶ AcOH, then as outlined before K and Na ions have a greater effect than Ca ions on the transformation of AcOH, and the formation of citric acid proceeds better; in fact, in the presence of Ca ions alone only succinic and *l*-malic acids have been found S. MORGULIS

Carbohydrate metabolism of higher plants. Formation of methylglyoxal by enzymes of germinating seeds. CARL NEUBERG AND MARIA KOBEL. *Biochem. Z.* 229, 433–42(1930).—Peas or beans were sterilized by submersion for 40 min. in 0.1% $HgCl_2$, then washed thoroughly with sterile H_2O and germinated in Petri dishes After 1–2 days the fresh sprouts were removed from the seed membranes and ground finely, and either extd. or made into dry prepns. with alc.-ether. Exts were made from the latter by 17–20 hrs. digestion with H_2O contg. 3% toluene. The methylglyoxal was produced from added hexose-phosphate ester, whereby the enzyme was completely removed from the fresh material or from the alc.-ether dry prepn., and could not be found in the residue. Obviously methylglyoxal is the intermediate product in the desmolytic changes in the sugar mol. both in plants and animals. S. MORGULIS

Microchemical study of hemicellulose in some plant cells, with special reference to its distribution in the protoplasm. R. C MALHOTRA. *J. Biochem.* (Japan) 12, 341–9 (1930).—Recent studies on hemicellulose seem to suggest that this substance is not merely present in the cell walls impregnated in cellulose, pectin or lignin, but actually is present as a reserve carbohydrate. Microscopic studies reveal that the hemicellulose is present not only in the cell wall but also as protoplasmic inclusions. Hemicellulose tests on tomato cells grown in warm and cold temp. seem to show that there is more hemicellulose in cells of plants grown in the cold than in the warm temp. S. MORGULIS

Glucides and glucidic compounds of the brown algae. H. COLIN AND P. RICARD. *Compt. rend.* 190, 1514–6(1930).—Many algae have been analyzed for mannitol, laminarine and algine. The figures are given. T. H. RIDER

The relationship between intracellular r_H and cytoplasmic sexualization of horsetail spores. PH. JOYET-LAVERGNE. *Compt. rend.* 191, 865–6(1930).—The spores of *Equisetum arvense*, *E. limosum* and *E. maximum* are divided into 2 groups. There is a relationship between the sexualization of the groups and their intracellular oxidation-reduction potentials. T. H. RIDER

The presence of tannoids in flowers. ST. IONESCO. *Compt. rend.* 191, 867–8 (1930).—Flowers or their parts are boiled in 96% alc. or in $(CH_3)_2CO$ until decolorized, then soaked in distd. H_2O until soft again, when the presence of tannoids can be demonstrated by the production of color by treatment with $Fe_2(SO_4)_3$, U acetate, $Cu(OAc)_2$ or K_2CrO_4. All parts of many flowers were found to contain tannoids. T. H. R.

The soluble enzymes secreted by Hymenomycetes. The quinones and the antioxidant function. L. LUTZ. *Compt. rend.* 191, 880–2(1930); cf. *C. A.* 24, 5796.—*Quinone* is shown to have an antioxidant effect, retarding the action of the soln. enzymes of *Hymenomycetes.* T. H. RIDER

Callusing of cotton stem cuttings. H. E. REA. *Plant Physiology* 5, 575–85 (1930); cf. *C. A.* 13, 139.—The treatment of cotton cuttings with 2.0, 1.0, 0.5 and

0.25% of aq. solns. of $KMnO_4$ for 30 min., prior to placing in propagators, reduced the percentage of callusing 37%. WALTER THOMAS

Preliminary study of elongation of roots of Georgia collards as affected by sodium luminal. T. W. PRATT. *Plant Physiology* **5**, 587–97(1930).—Pronounced retardation of root elongation by Georgia collards (*Brassica oleracea*) was produced by sodium luminal, used in concns. from 0.1 to 1.0%, within 1.5 hrs. after administration. The effect of the sodium luminal on the root elongation was immediate, the greatest retardation occurring during the first of the six 15-min. intervals of observation. Distd. water partially removed the depressing action of the sodium luminal. The stronger the concn. of the drug, the greater was the retardation of root growth. WALTER THOMAS

Effect of various methods of storage on the chlorophyll content of leaves. PHILIP A. HARRIMAN. *Plant Physiology* **5**, 599–606(1930).—*Soy bean* and *nasturtium* leaves dried at 98° suffered a considerable loss of chlorophyll (approx. 70%). Leaves dried at room temps. (18° to 24°) lost 20 to 30% of their chlorophyll. Even at the optimum temp. range for oven drying (45° to 60°) some chlorophyll may be lost. Low temps. are ineffective in preventing the loss of chlorophyll unless the leaves are actually frozen. Leaves frozen with "Dry Ice" retain all of their chlorophyll; also leaves desiccated at reduced pressure (7 cm. mercury) over concd. sulfuric acid at room temp. lost little or no chlorophyll. Leaves desiccated at reduced pressure in the absence of O and CO_2 lost more chlorophyll than leaves desiccated in air at the same pressure. *Conclusion.*—Freezing is the most satisfactory method of storing leaves for later detn. of chlorophyll. WALTER THOMAS

Production of kojic acid by Aspergillus flavus. O. F. MAY, A. J. MOYER, P. A WELLS AND H. T. HERRICK. *J. Am. Chem. Soc.* **53**, 774–82(1931).—With 20% dextrose soln., *Aspergillus flavus*, under favorable conditions, is capable of transforming more than 45% of the dextrose present and 55% of that consumed into kojic acid in 12 days from the time of inoculation from spores. $(NH_4)_2SO_4$ was unsatisfactory as nutrient N; NH_4NO_3 was most satisfactory; $NaNO_3$ was much less satisfactory. Better results were obtained with a KH_2PO_4 1 g. and $MgSO_4.7H_2O$ 2 g. per l. than with KCl 0.1, H_3PO_4 0.054 and $MgSO_4.7H_2O$ 0.5 g. per l. A range from 30° to 35° promoted rapid vegetative development with high yields of acid. In a range of sugar concns. from 15 to 35% growth and acid production were satisfactory, the highest yield occurring at a concn. of 20%. The max. quantities of acid were most economically produced in 12-day cultures when the ratio of the surface area of mycelium to the vol. of the soln. had a value of from 0.3 to 0.5. C. J. WEST

Chemical changes in infectious chlorosis in leaves of Abutilon. H. v. EULER, W. HERTZSCH, S. MYRBÄCK, D. RUNEHJELM AND A. FORSSBERG. *Arkiv Kemi Mineral. Geol.* **10B**, No. 13, 6 pp.(1930); cf. *C. A.* **24**, 5332; **25**, 131.—Those portions of the leaves affected with infectious chlorosis have much lower catalase activity, higher proportion of amino N, less chlorophyll, xanthophyll and carotene, and less tryptophan than the normal green portions. J. J. WILLAMAN

Studies on the ripening of rice grains. T. TADOKORO AND M. ABE. *J. Faculty Agr. Hokkaido Imp. Univ.* **27**, 349–87(1930); cf. *C. A.* **22**, 967, 3906.—Rice was harvested at 4 weekly intervals, the last sample being dead ripe. The ash and P decreased at first. The total N showed no definite tendency to change, but the ratio of protein to non-protein N increased constantly. Of the 4 groups of rice proteins detd., the water-sol. group gradually decreased, while the NaCl-sol. and alc.-sol. groups increased. The alkali-sol. group was inconstant in its changes. All of these changes are just the opposite of those during germination. While the non-protein N is decreasing, the amino N of the proteins is also decreasing, indicating a formation of higher proteins from lower. Oryzenin, the alkali-sol. protein, decreased in ash and P during ripening, but increased in N, S and amino N. Its isoelec. point changed toward the alk. side, and its $[\alpha]$ increased. The amt. of amino N liberated from oryzenin by ultra-violet light increased with ripeness. Arginine increased at first and then decreased, while histidine increased continuously. Lysine decreased at the later stage, while cystine decreased and then increased. Thus the authors think that oryzenin is at its highest degree of condensation sometime before dead ripening. The ash and P content of rice starch decreased gradually, while the sapon. value increased. The amt. of glucose formed by hydrolysis with HCl attained a max. before complete ripeness, and at this same period the $[\alpha]$ of the acetylated starch reached a max. and the content of acetyl its min. J. J. W.

A limnological significance of free H_2CO_3 (LINDEMANN) **14.**

E—NUTRITION

PHILIP B. HAWK

Urinary syndrome of metabolic disturbances caused by lack of vitamin B in the rat. J. ROCHE. *Bull. soc. chim. biol.* **12**, 342–56(1930); cf. *C. A.* **23**, 1166.—In rats receiving *ad libitum* the diet of Randoin and Simonnet, the C/N ratio of the urine and feces is practically const. for a normal animal on a given diet, although the actual value varies according to the age of the rat. On a diet deficient in vitamin B the ratio increases (more rapidly as the point of death is approached). Ingestion of yeast temporarily reduces the ratio. The consequences of lack of vitamin B are manifested sooner on a diet rich in carbohydrate. Death is not due to inanition, which would cause a fall in the C/N ratio. B. C. A.

Fractional dialysis of urine. A. BOIVIN. *Compt. rend. soc. biol.* **101**, 722–4(1929).—A vegetable diet increases the quantity of easily dialyzable substances in urine, while a meat, and particularly a milk, diet has the reverse effect. B. C. A.

The effect of irradiated ergosterol (vitamin D) on the calcium-phosphorus metabolism of the chicken. E. J. KING AND G. E. HALL. *Can. Chem. Met.* **15**, 22(1931).—One group of 4-month old chickens was fed an "adequate basal diet contg. all the essential elements for growth except vitamin D." Another received the same diet plus 2 drops of irradiated ergosterol soln. daily. Their growth was normal. Group No. 3 was fed excessive amounts of irradiated ergosterol equiv. to 250–1500 times that given the normal birds. These birds lost wt. rapidly, became strikingly anemic and weak-legged. In the rachitic birds there was an increased phosphatase content of the bones accompanied by a hypocalcemia of the serum and in the hypervitaminous birds a subnormal phosphatase content accompanied by a hypercalcemia. W. H. B.

Effect of acidic and basic diets in chronic nephritis. D. M. LYON, D. M. DUNLOP AND C. P. STEWART. *Edinburgh Med. J.* **38**, 87–108(1931).—High basic, high acid and high purine diets of similar protein content were investigated for their effect in chronic nephritis. The basic diet alone brought about clinical improvement as well as favorable variations in the blood and urine chemistry. RACHEL BROWN

The group of "water-soluble vitamins" and their relationship. III. The scurvy of rats. WERNER KOLLATH. *Arch. exptl. Path. Pharmakol.* **153**, 359–80(1930); cf. *C. A.* **25**, 132.—Rats can be given a disease histologically identical with guinea-pig scurvy by a proper diet. The addn. of alk. hematin to such a diet causes 75% of young rats to develop beriberi; their bones, however, show the same scorbutic changes. It is therefore suggested that the absence of a common factor underlies both beriberi and scurvy, other factors of age, species, or diet detg. which disease will appear. H. E.

Methylglyoxal as an intermediary product of carbohydrate catabolism. ERICH SCHNEIDER AND ERNST WIDMANN. *Klin Wochschr.* **9**, 1916–7(1930).—Previous workers have demonstrated that methylglyoxal is formed by liver, kidneys, muscle cells and red cells in the course of sugar metabolism. By removing the substance (as the 2,4-dinitrophenylhydrazone) S. and W. have shown that it is formed by human red cells, even after hemolysis, and also by white blood cells. As much as 70–75% of the total glucose added passes through the methylglyoxal stage. Diabetic blood cells show no abnormality in this respect. Material from abscesses did not form the substance, even though the bacteria involved were quite active, either in pure culture or when added to fresh leucocytes. H. EAGLE

Biological significance of milk peroxidase: Preliminary report concerning a relation between vitamin B and peroxidase. TAYURU ARAKAWA. *Tohoku J. Exptl. Med.* **16**, 118–22(1930).—Pregnant rabbits on a diet contg. no vitamin B secrete milk contg. no peroxidase. With the addn. of vitamin B (beriberol) to the diet, peroxidase appears in the milk. H. EAGLE

"Aperoxidatic" milk as a possibly early symptom of avitaminosis B. An experimental study. KAZUŔ SUZUKI AND TAYURU ARAKAWA. *Tohoku J. Exptl. Med.* **16**, 228–31(1930).—In rabbits secreting peroxidase-free milk on a diet contg. no vitamin B, the peroxidase reaction of the blood leucocytes remains as strong as normal. H. E.

Studies on the quantity of the glomerular filtrate. I. Glomerular filtrate in beriberi. FUSAKICHI NAKAZAWA AND HYOE KUSAKARI. *Tohoku J. Exptl. Med.* **16**, 321–8 (1930).—The glomerular filtrate of normal humans is 200–150 cc. per min., as estd. by creatinine output (if it is assumed to be a simple filtrate, with neither tubular secretion nor resorption). In beriberi it is much lower, and may fall to as little as 10 cc. per min. With the administration of vitamin B, this returns to its normal value. H. EAGLE

The toxicology of the irradiated products of ergosterol. WOLFGANG HEUBNER.

Nachr. Ges. Wiss. Göttingen Math.-physik. Klasse No. 2, 149–63(1930).—The irradiated products of ergosterol were prepd. according to the method of Windaus, some of the samples being irradiated in ether, some in benzene and others in alc. In most cases the light from Mg was employed. Expts. on rabbits which were fed with the ergosterol products showed various pathological effects centered chiefly in the aorta and arteries. Death, following a loss in wt., occurred in all cases. Calcification foci were found in the aorta upon postmortem exam'n. Data are presented in 13 tables. RUSSELL C. ERB

The feeding of milk goats with a ration consisting of oat straw and nutritive material but poor in vitamin A, and its supplement. A. SCHEUNERT AND K. BERTRAM. *Tierernähr.* 1, No. 1, 70–87(1929).—During a 400-day expt. 3 milk goats were fed on a ration of oat straw, dried scraps and nutritive matter, but lacking in hay or green food. To insure milk production it was necessary to add a salt mixt. of CaO, H_3PO_4 and NaCl. Before the addn. of this mixt. the milk yield dropped but rose to normal again upon the addn. Adding wheat germ, which contains a small amt. of vitamin A, produced a temporary increase in the milk yield. The effects of a lack of vitamin A were evident in 2 of the animals. One of these did not become pregnant and the other gave premature birth to 2 dead kids. The one goat that was given vitamin A daily in the form of 10 cc. of cod-liver oil went through an apparently normal pregnancy and gave birth to two dead kids and one living kid. The latter showed good development. After 3 months on the vitamin-A deficient diet, the milk showed a deficiency in vitamin A. A long time was required to bring the milk vitamin content back to normal. RUSSELL C. ERB

Nutritional study of the white school children in five representative counties of Florida. CHESTER F. AHMANN, OUIDA D. ABBOTT AND GEORGIA WESTOVER. Fla. Agr. Expt. Sta., *Bull.* 216, 5–50(1930).—A survey of defects in white school children as correlated with diet, wt., age, etc. C. R. FELLERS

Effect of the use of mineral oil upon the absorption of vitamin A. JENNIE I. ROWNTREE. *J. Nutrition* 3, 345–51(1931).—The effect of mineral oil on the absorption of vitamin A is dependent on the amt. of vitamin A in the diet. When the quantity of mineral oil given to rats is comparable to the human therapeutic dose and the vitamin A only enough to produce subnormal growth, the rats are unable to withstand the effects of the mineral oil. However, if the amt. of vitamin A is adequate, mineral oil can be given without noticeable effects. If sufficient vitamin is given the amt. of mineral oil could be increased 50% without producing a slackening of growth or preventing the cure of severe ophthalmia. If this laxative is employed, it should be accompanied by a generous amt. of fat-sol. vitamins. Bibliography. C. R. FELLERS

Preparation of a concentrated source of the heat-labile vitamin B, free from contamination with the heat-soluble factor G. HERBERT M. EVANS AND SAMUEL LEPKOVSKY. *J. Nutrition* 3, 353–74(1931).—25% EtOH is an efficient extractive of both the heat-labile and heat-stable, water-sol. vitamins; the heat-stable factor is in low concn. in the outer layers of the rice kernel and decreases further in abundance in the inner layers, whereas the heat-labile factor is in high concn. in the rice outer layers and decreases only slightly in the inner layers. Clay activated by the 25% ext. furnishes an excellent source of vitamin B free from the heat-stable factor. When the sirup resulting from concn. of a 25% ext. is treated with 95% alc. so that the resulting concn is 90%, most of the heat-stable factor is removed; nevertheless, large losses in the heat-labile factor are produced in this way. When the final concn. is 80% these losses are much reduced, though somewhat more heat-stable vitamin is present. In the case of the rice polish, so little of the heat-stable factor is initially present that fractionation with the 80% alc. yields an ext. almost free of the heat-stable factor and very rich in vitamin B. Finally, adsorption with clay is more selective for the heat-labile vitamin and thus the last traces of the heat-stable factor are left behind. Quant. removal of antineuritic B from clays by means of $Ba(OH)_2$ was not achieved, though feeding of these clays gave a high dosage of antineuritic B with assured absence of the heat-stable factor. Bibliography. C. R. FELLERS

Factors which determine renal weight. VII. Protein intake and age. EATON M. MACKAY AND LOIS LOCKARD MACKAY. *J. Nutrition* 3, 375–85(1931); cf. *C. A.* 23, 2744.—An extended study of the linear relationship between renal wt. and protein intake proved that it is not influenced by age. The empirical linear formula, *protein intake* = 0.0183 *renal wt.* − 2.75, expressed the relationship in normal male rats 70, 130, 220 and 400 days old when receiving adequate amts. of protein in the form of casein. **VIII. Protein intake and sex.** *Ibid* 387–94.—A linear relationship between renal wt. and protein intake was demonstrated for female rats at all ages. When receiving adequate amts. of protein in the form of casein it may be expressed: *protein intake* =

0.0183 *renal weight* − 2.2875. This is similar to the formula expressing the same relationship for male rats, except that at a zero protein intake it demands a theoretical renal wt. in relation to a unit of body surface (100 sq. cm.) of 125, instead of 150 mg.
C. R. FELLERS

Further experimental differentiation of vitamins B and G. H. C. SHERMAN AND M. R. SANDELS. *J. Nutrition* 3, 395–409(1931); cf. *C. A.* 23, 1160.—Dried bakers' yeast yielded a much larger proportion of its vitamin B (B_1) than of its vitamin G (B_2) to extn. with 80% EtOH. In 95% EtOH, no measurable amt. of the vitamin G of yeast was dissolved; in 80% EtOH the soly. was appreciable; in 60% EtOH the vitamin G was more sol. The soly. of vitamin G increases as the proportion of H_2O in the EtOH:H_2O solvent is increased. It was found best to judge the soly. of the vitamin from the feeding of the residue rather than of the ext. for a part of the extd. vitamin G disappeared and it is suggested that this may have been due to a partial destruction of vitamin G by oxidation. There was no corresponding loss of the extd. vitamin B. Rats lacking vitamin B showed a much more rapid decline of food consumption than those lacking vitamin G. It is evident that vitamin B (B_1) has a relation to the maintenance of appetite and the prevention of polyneuritis in rats; that growth in the rat requires both vitamins B and G and responds, within limits, according to the level of feeding of each; and that lack of vitamin G, under sufficiently controlled conditions, quite regularly produces in the rat the deficiency disease designated as pellagra-like by Goldberger and his associates and by Chick and Roscoe, though the particular type of skin lesion which this term suggests is not characteristic of the cases of most complete deprivation of vitamin G. Whether the observed variability of symptoms of the G-avitaminosis is connected with multiple nature of vitamin G is a question still under investigation. Bibliography.
C. R. FELLERS

Influence of bulk in the diet upon fecal calcium and phosphorus. LEAH ASCHAM. *J. Nutrition* 3, 411–20(1931).—Five dogs were kept in a neg. Ca balance at all times to better to interpret the results. The food unit consisted of a food mixt. contg. const. mixed amts of casein, sugar, lard and salt mixt. but of varying proportions of cellulose-flour and agar. The only diet changes made were in the kind and amt. of roughage. With but 1 exception excretions of both Ca and P were greatest during the periods of high roughage, the agar causing the higher excretions. If Ca has a physiol. action of importance in the intestines, the data do not show it, and it is impossible to assign a special function to Ca.
C. R. FELLERS

Autoxidation of fats with reference to their destructive effect on vitamin E. MARIAN J. CUMMINGS AND H. A. MATTILL. *J. Nutrition* 3, 421–32(1931).—Observations on the susceptibility to oxidation of several fats and oils were correlated with the reproductive behavior of rats reared on food mixts. contg. these same fats. The autoxidizability of the fats was measured by the induction period of O absorption and the length of this period increased in the following order: cod-liver oil, lard, butter fat, cottonseed oil, stearin, hydrogenated cottonseed oil. When mixed as in the diets, the fats mutually influenced the autoxidizability of the mixt. The reproductive behavior of animals, as indicated by the nos. of litters, the frequency of resorptions and the wts. of the testes, indicated that the mixt. of hydrogenated cottonseed oil and butter was most satisfactory, that of lard and cod-liver oil and that of stearin and butter were least successful. Intermediate were the mixts. of cottonseed oil with butter and with cod-liver oil, and the combination of hydrogenated cottonseed oil with cod-liver oil. The animal tests are in general agreement with the chem. tests and indicate that the knowledge of the distribution of vitamin E is relative rather than absolute. The efficiency of a given source of vitamin E depends, in part, upon the autoxidizable materials and antioxidants which are assocd. with it. The possible role of vitamin E as an antioxidant is discussed. Full bibliography.
C. R. FELLERS

Role of diet in the cause, prevention and cure of dental diseases. MILTON T. HANKE. *J. Nutrition* 3, 433–51(1931).—An extraordinarily complete editorial review with bibliography.
C. R. FELLERS

Antianemic potency of cane and beet molasses. W. E. KRAUSS. Ohio Agr. Expt. Sta., *Bimonthly Bull.* 147, 182–3(1930).—Rats fed upon an exclusive milk diet develop nutritional anemia and die as a result of a lack of Cu and Fe. Cane and beet molasses were fed rats as milk supplements. Both were also fed to anemic rats to test their curative properties. Cane molasses possessed excellent anemia-preventing and anemia-curative properties while beet molasses was very much inferior. A chem. examn. of the ash of cane and beet molasses showed the former to contain appreciable quantities of Cu and Fe while beet molasses ash was very deficient.
C. R. FELLERS

Lime in animal production. D. W. MAY. *Porto Rico Agr. Expt. Sta.* 1929. *Repl.*

4–5(1930).—Osteoporosis, a disease of horses where the bones, especially of the head, become porous and soft, was caused by diets deficient in Ca. The heavy clay soils of Central Porto Rico are definitely deficient in lime and the crops raised thereon are similarly deficient, thus giving rise to the disease in animals when the crops are used for fodder. The addn. of sea salt, bone meal and lime to the ration is recommended. C. R. FELLERS

Nutritional discoveries in relation to livestock feeding practices. G. BOHSTEDT. *Sci. Agr.* **11**, 65–73(1930).—General. C. R. FELLERS

Mineral feed problem with dairy cattle and swine. G. BOHSTEDT. *Sci. Agr.* **11**, 74–7(1930).—Tabular data are presented showing the most common mineral deficiency diseases in livestock and the remedy. C. R. FELLERS

Antiscorbutic power of fruit and flour. T. SCHLOSSBERG. *Compt. rend. soc. biol.* **102**, 1104(1930); *Physiol. Abstracts* **15**, 101.—Orange juice and lemon juice prevented the onset of scurvy in guinea pigs on a diet which otherwise caused it. Powd. milk and yeast added to flour had no preventive action. G. G.

Value of fats in the feed of dairy cows. ARNOLD BUSCHMANN. *Tierernähr.* **1**, 129–78(1930).—The effect of adding vegetable oils or oil-rich seed meals to the ration of dairy cows was studied. Up to a certain limit, varying from 0.4 to 1.0 kg. oil per day per 1000 kg. body wt., the fat content of the milk was not changed or was increased less than 0.1%. Feeding larger amts. slightly decreased the milk fat. The limit was lowest for rapeseed oil, highest for coconut, with sesame and linseed intermediate. The chem. and phys. constants of the milk fat were altered to the same extent as though approx. 18% of the particular oil in question had gone directly into the milk as so much butter fat. L. E. GILSON

Vitamin D efficacy of hog feeds. VALENTIN HORN. *Tierernähr.* **1**, 194–205 (1930).—Healthy hogs made greater gains in wt. in proportion to the amt. of food eaten when "Hemon," a com. irradiated phytosterol prepn., was added to the ration, but not sufficient to show a profit over the addnl. expense. L. E. GILSON

Does the addition of potassium iodide to the diet affect the composition of the intestinal and fecal flora? A. SCHEUNERT AND J. RODENKIRCHEN. *Tierernähr.* **1**, 206–18 (1930).—This question has been raised by the widespread adoption of table salt contg KI. Rats were given 0.20 mg. KI per day in their ration and compared with rats not given KI. There was no apparent difference in the counts of the various bacteria and fungi. Tables of bacterial counts are given. L. E. GILSON

Vitamin D preparations in hog feeds. VALENTIN HORN. *Tierernähr.* **1**, 295–305 (1930); cf. preceding abstr.—Vigantol-Merck and Hemon when fed in equiv. quantities were equally efficaceous in restoring to health and promoting the growth of groups of sick, coughing, rachitic young pigs. L. E. GILSON

Tryptophan and histidine as "anabolites." GEORGES FONTÈS AND LUCIEN THIVOLLE. *Compt. rend.* **192**, 63–5(1931); cf. *C. A.* **25**, 1575.—Simultaneous injection of tryptophan and histidine allows a living organism (dog) in equil. with an unchanging diet, to make very clear gains in wt., which are attained rapidly and maintained for a long time. These gains may be explained only by an improvement in the general assimilation processes, and especially those which have to do with N metabolism. The name "anabolite," as proposed for these amino acids, seems justified. L. K.

Metabolism of lipides. The role of the pancreas endocrine in the phenomena of pulmonary fat catabolism. I. I. NITZESCU AND GR. BENETATO. *Bull. soc. chim. biol.* **12**, 827–48, 849–72(1930); cf. *C. A.* **24**, 5811.—From the content and rate of catabolism of fats in lung tissue and blood, *in vivo* and *in vitro*, N. and B. conclude that the destruction of fats in the tissues is dependent on a localized thermolabile factor which is activated by insulin which functions as a coenzyme or kinase. The localized factor is also diastatic, controlling the catabolism of glycogen. C. G. KING

Resistance of chickens to parasitism affected by vitamin A. JAMES E. ACKERT, MARIAN FISHER MCILVAINE AND NAOMI ZIMMERMAN CRAWFORD. *Am. J. Hyg.* **13**, 320–36(1931).—The resistance of growing chickens to the intestinal round worm, *Ascaridia lineata*, was lowered when the fowls, 4–7 weeks of age, were kept on a diet deficient in vitamin A for a period of 5 weeks. The larger no. of worms remaining in the chickens is attributed to a weakened peristalsis. The source of the vitamin A in the control animals was cod-liver oil. The criteria for judging whether this vitamin affected the resistance of the chickens to the parasites were the no. and the lengths of the worms remaining in the chickens at the close of the expt. N. A. LANGE

Resistance of chicken to parasitism affected by vitamin B. JAMES E. ACKERT AND L. O. NOLF. *Am. J. Hyg.* **13**, 337–44(1931).—Preliminary tests were carried out to ascertain if the vitamin B complex is a factor in the resistance of chickens to the in-

testinal round worm, *Ascaridia lineata*. The source of vitamin B was baker's yeast. Groups of chickens given the same no. of embryonated eggs of the parasite had more worms when their diets lacked vitamin B than did similar groups fed adequate amts. of this vitamin. The larger no. of worms is attributed in part to partial paralysis of the intestine due to lack of vitamin, the greatly weakened peristalsis probably aiding the worms in remaining in their habitat. It is suggested that yeast may contain a factor which is favorable to the growth of worms since larger worms were found in those chickens whose diet contained yeast. N. A. LANGE

Variations in the chlorine content of the blood serum and urine of mice subjected to acute experimental scurvy. LUCIE RANDOIN AND ANDRÈE MICHAUX. *Compt. rend.* 191, 1378–80(1930); cf. *C. A.* 24, 4535. B. S. LEVINE

The effect of fluorine on the calcium metabolism of albino rats and the composition of the bones. F. J. MCCLURE AND H. H. MITCHELL. *J. Biol. Chem.* 90, 297–320 (1931).—Fluorine, especially when consumed in the more sol. form of NaF at levels of 0.0313 and 0.0623% of F, may cause the deposition of an apparently abnormal constituent in the bones or an abnormal deposition of a non-Ca constituent, possibly a fluoride of a mineral other than Ca, as evidenced by an increase (av. 1.3%) in the % of ash in the bones above the normal. There is also an interference with the deposition of Ca in the bones (av. decrease in Ca content 1.05%). The P content of the bone ash was not significantly affected by NaF feeding but the Ca:P ratio was depressed. When either CaF_2 or NaF was fed at the above levels, growth was inhibited entirely aside from any effect on food consumption; the higher level of NaF only lowered the food consumption also. The Ca balance was unaffected by either CaF_2 or NaF up to the level of 0.0313% F in the ration but at a level of 0.0623% the % of Ca that would otherwise have been retained by the exptl. rats was lowered. The peculiar effect of F on the development of the teeth was again demonstrated; the characteristic abnormalities appeared when either the sol. NaF or the insol. CaF_2 was fed. Bibliography of 37 references. A. P. LOTHROP

The physiological effects of diets rich in egg white. HELEN T. PARSONS. *J. Biol. Chem.* 90, 351–67(1931); cf. *C. A.* 24, 5802.—Diets rich in egg white speedily cause a nutritional disorder and death in young rats weaned from stock rations. As little as 5% of dried liver fed for 3 days before the beginning of the egg diet protects the rats from this disorder. The swiftness of onset of the first acute symptoms suggests that the effect is due to a direct injury from the egg white rather than to a nutritional deficiency in the usual sense of the term. In rats surviving the 1st few weeks on a ration contg. 66% of dried egg white, either raw Chinese, or from raw fresh eggs, symptoms developed which strikingly resemble pellagra even though the ration contained 20% of potent dried yeast. These symptoms were prevented or cured by 20% of dried beef liver (but not by 10%) no matter how far advanced the dermal or nerve involvement. Lard and raw linseed oil were ineffective as preventive or curative agents. The symptoms noted were loss of wt., lessened activity, an awkward gait in walking, a humped back, meteorism, increased shedding of hair, soiled fur, paws and tail, closed eyelids, bloody urine, and progressive spasticity. The results suggest caution in the use of as large quantities of egg white in invalid feeding as has been the common practice in many hospitals. The introduction of egg white into the somewhat restricted dietary of a child may also perhaps need to be safeguarded with protective foods in somewhat the same way as its introduction into the diets of the rats used in the expts. A. P. L.

Ketogenesis in relation to the food of swine. V. ZAGAMI. *Arch. intern. physiol.* 33, 159–72(1930).—Swine excrete considerable amts. of "ketone bodies" when fed carbohydrate diets. These are increased considerably upon fat or protein diets. Fats produce a greater increase than proteins. The NH_3 excretion does not parallel that of the ketones but bears a relation to the protein ingested as well as to the "ketone bodies" excreted. In this phase of intermediary metabolism swine contrast with the herbivora. C. M. MCCAY

The metabolism of nitrogen. VII. Comparative influence of carbohydrates and fats upon the utilization of nitrogen. G. PASQUALINO. *Arch. intern. physiol.* 33, 185–95(1930).—A series of diets was designed contg. casein, egg albumin and glutin. These proteins were fed with either starch or butter. The N balances were detd. P. supports his earlier thesis that 10–40% of the N intake cannot be accounted for by fecal N plus urine N plus body weight increase. He finds no influence of fats or carbohydrates upon the "lost" N. C. M. MCCAY

Experimental studies on the influence of diet on the formation of biliary and renacalculi. II. Feeding on a diet deficient in fat-soluble vitamins. 2. The quantitative change in potassium, sodium, calcium, magnesium, total cholesterols and total

fatty acids in the blood. KAZUMASA USUNI. *Japan J. Gastroenterology.* **2,** 226–30 (1930).—Normal values upon the sera of 82 young rabbits (50–120 days) were established as follows:

	Range (mg. %)	Mean (mg. %)
Ca	26.25— 17.56	22.37
K	17.56— 8.23	13.36
Mg	3.76— 2.40	3.24
Na	605.00 - 360.00	492.00
Total cholesterol	80.35— 47.56	60.5
Total fatty acids	254.12 -160.00	19.0

These same constituents were detd. upon 72 normal rabbits after they were placed upon a diet deficient in vitamin A. In cases that developed eye symptoms there was a marked increase in serum Ca. All the blood constituents increased in cases of calculi formation independently of the appearance of symptoms of avitaminosis. Ca and cholesterol increased the most. C. M. MCCAY

Vitamins. Physicochemical constants of serum and plasma of animals fed on autoclaved meat with or without yeast. FERDINANDO NEGRI. *Biochim. terap. sper.* **17,** 445–60(1930).—Dogs, fed exclusively on autoclaved meat, do not live longer than 2 months. The body temp. decreases especially in the last week of life. The p_H and the alkali reserve decrease; the refractive index of the serum decreases constantly. The sugar and N in the blood decrease; the latter increases in the urine; creatine in the blood and creatinine in the urine increase considerably. The addn. of yeast restores the animal almost to normal; only an innocent hyperglucemia was observed. A. E. M.

Changes in the central nervous system in some avitaminoses. SILVIO BRAMBILLA *Sperimentale* **84,** 537–52(1930).—Histological investigations of the central nervous system in scurvy of guinea pigs and in rickets of rats showed only slight degenerative changes, higher in scurvy than in rickets. No reason was found to suppose a unity of the neuropathol. picture in different avitaminoses. A. E. MEYER

Sauerkraut as a source of vitamin C. B. A. LAVROV AND NATALIE YARUSOVA *Biochem. Z.* **220,** 115–27(1930).—Hay and oats which have been autoclaved invariably produce typical scurvy in guinea pigs receiving this as their basic diet. Addn of sauerkraut to such a basic diet inhibits the development of the disease process, 30 cc. of the juice being required for a prophylactic dose. If it is assumed that the amt. of vitamin C present in the min. prophylactic dose of a definite product is a vitamin unit, 1 kg. sauerkraut juice contains only 33 units, 1 kg. sauerkraut 26 units while apple juice (cider) will contain 330 to 660 units per kg. S. MORGULIS

Hypervitaminosis in chickens. EARL J. KING AND G. EDWARD HALL. *Biochem. Z.* **229,** 315–22(1930).—Under the influence of overdosage with radiated ergosterol no calcareous deposits were observed in the organs of chickens; nevertheless the bones were weak and bent. There was a decreased phosphatase content in the bones and in the kidney. S. MORGULIS

Studies in experimental scurvy. X. Adrenaline content of the suprarenals and the amount of the adrenaline-like substance in the serum of guinea pigs fed on a vitamin-C-free diet. SHINSUKE OHATA. *J. Biochem.* (Japan) **12,** 419–27(1930). In the serum of scorbutic guinea pigs there is a definite diminution in the amt. of adrenaline-like substance as well as a decrease in the adrenaline content of the suprarenal glands. Although the adrenaline content of the gland decreases also during inanition, this decrease is not as great as during scurvy. The change in the adrenaline like substance of the serum is the same in inanition and scurvy. The effect on a vitamin-C free diet is, therefore, not purely an inanition effect. S. MORGULIS

The relation of carotene to vitamin A. BASHIR AHMAD. *J. Soc. Chem. Ind.* 50, 12–4T(1931); cf. *C. A.* **23,** 1941; **24,** 402, 5801. Colored palm oils from different sources were tested colorimetrically for carotene and biologically for vitamin A. Tests were also made upon oils in which the carotene had been partly or largely destroyed by hydrogenation. The results of these tests indicate that the yellow coloring matter in the vegetable oils is carotene and that this substance shows vitamin A activity. Certain charcoals adsorb carotene, during which process it is oxidized and so made biologically inactive. In fish-liver oils, the pigment can be adsorbed without destruction of vitamin A. N. M. NAYLOR

Lung calcification in healthy and tuberculous rabbits caused by massive doses of irradiated ergosterol. H. SIMONNET AND G. TANRET. *Compt. rend.* **190,** 1520–9 (1930); cf. *C. A.* **24,** 2409.—Irradiated ergosterol increases pulmonary calcification in

normal rabbits in a ratio of 1:20, while in tuberculous rabbits, the increase was as high as 1:80. In chronic tuberculosis the evolution of tubercules is checked. T. H. R.

Biochemical investigations on rubrene. M. JAVILLIER AND (MLLE.) L. EMERIQUE. *Compt. rend.* **191**, 882–4(1930).—*Rubrene* (I), $C_{42}H_{28}$, is a cryst., orange-red compd. rich in double bonds, and is decolorized by fixation of O_2. It is in many ways analogous to *carotene* (II), $C_{40}H_{56}$. Albino rats fed on a diet deficient in vitamin A were fed I without improvement in the vitamin-A-deficiency symptoms. 75% of I by mouth is eliminated in the feces. The remainder is probably altered in the body since I cannot be detected in the organs. I and II are therefore not physiologically similar.
T. H. RIDER

Further observations on the toxic effects of irradiated ergosterol. J. C. HOYLE. *J. Pharmacol.* **40**, 351-72(1930); cf. *C. A.* **25**, 134.—Bread or milk added to a synthetic diet did not protect rats against the toxic action of alc. irradiated ergosterol which contained a high concn. of vitamin D. A diet modified to contain protein, carbohydrate, fat and ash in the proportions found in a bread-and-milk diet conferred no protection. A diet contg. a smaller proportion of Ca and P had no protective action against irradiated ergosterol with either high or low concn. of vitamin D. A bread-and-milk diet had no protective action against amts. of irradiated ergosterol contg more than 70,000 antirachitic units.
R. RIEGEL

Further biochemical studies on the antineuritic vitamin. ATHERTON SEIDELL AND MAURICE I. SMITH. *U. S. Pub. Health Repts.* **45**, 3194–3200(1930).—The potency of a vitamin salt mixt. prepd. from brewer's yeast by the methods described by Smith (*C. A.* **24**, 1408–9) and Seidell (*C. A.* **23**, 4723) was compared with that of a sample of the crystals prepd. by Jansen (*C. A.* **21**, 2150). 0.05 mg S. and S. prepn. contg. 0.0062 mg. N_2 has the same curative value as 0.04 mg. J.'s crystals contg. 0.0069 mg. N_2. There is not sufficient evidence to conclude that the same compd. is involved in both prepns. S. and S. purified their prepn. by J.'s method, but no crystals were obtained. Rats were placed on a diet deficient in the antineuritic vitamin, until polyneuritis developed. The ration was then changed to one deficient in both vitamins, and the antineuritic concentrate administered intravenously (0.1 mg. per day). The rats recovered from paralysis but failed to grow. Death, due to nutritive failure, followed in 22–32 days.
W. GORDON ROSE

Catalytic vitaminic substances and their action in beriberi. ALESSANDRO SEPILLI. *Zymologica, Zym., Chim. Col. e Zucch.* **5**, 13–7(1930).—The expts. prove that besides having a strong action against putrefactive bacteria lactic ferments also cure polyneuritis in pigeons.
R. SANSONE

Further fractionation of yeast nutrilites and their relationship to vitamin B and Wildiers' "bios." ROGER J. WILLIAMS AND ELIZABETH M. BRADWAY. *J. Am. Chem. Soc.* **53**, 783–9(1931).—Expts. with Wildiers' original yeast culture show that his "bios" is not readily adsorbed by fuller's earth and appears to be the same as the nutrilite which stimulates the growth of Gebrüde Mayer yeast. No conclusive evidence of its multiple nature is available. The yeast nutrilites studied by Miller and his associates are shown to be distinct from the "bios" of Wildiers. The Toronto workers should be credited with the discovery of a new series of yeast nutrilites. Yeast No. 578 of the Am. Type Culture Collection and old process baker's yeast appear to have more complex requirements than Wildiers' yeast. Evidence is presented for the existence of a fourth distinct nutrilite concerned in the growth stimulation of yeast No. 578. It seems reasonable to suspect that several of the nutrilites for this yeast may be components of "vitamin B," since the antineuritic vitamin has previously been shown to affect its growth very strikingly.
C. J. WEST

Optical activity of cystine preparations used for animal experimentation. J. R. HAAG. *J. Am Chem. Soc.* **53**, 808–9(1931). Marston and Robertson (*C. A.* **23**, 4970) have criticized studies of the use of cystine because the optical activity of the prepns. was not detd. Of 7 prepns. examined, the value for α_D^{31} varied from —207.4° to —216.6°; one had the value —185.9°. This variation cannot be explained on the basis of S content but is partly due to the prolonged washing of certain samples with hot H_2O in order to remove the tyrosine present. It is highly probable that any one of the 7 samples is suitable for animal feeding unless it is assumed that inactive cystine is highly toxic.
C. J. WEST

Kalk-vizym (ESCHENBRENNER) **17.** Effect of nitrogenous fertilizers on pastures (NOLTE, *et al.*) **15.**

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Irradiation products from ergosterol. SOC. DES USINES CHIMIQUES RHÔNE-POULENC. Brit. 335,277, June 25, 1929. In order to obtain substances having intense antirachitic effect, unconverted ergosterol is sepd. from the product obtained by the irradiation of ergosterol, by crystg. from org. solvents in which the ergosterol is slightly sol. such as alc., acetone and EtOAc (the sepn. being continued until the sol. residue in alc. soln. shows a dextro-rotatory power greater than 25° for the yellow line of Hg). The active product may be obtained by distn. of the solvent or may be taken up in a vegetable oil. The irradiation may be effected in EtOH at a temp. of 75° while agitating the soln. with an inert gas, preferably with light having few or no rays below 2750 A. U. and is preferably stopped somewhat before the max. production of antirachitic vitamin is reached.

F—PHYSIOLOGY

E. K. MARSHALL, JR.

Skin. III. Sugar content of the skin under physiological and pathological conditions. E. URBACH AND G. SICHER. *Arch. Dermatol Syphiles* **157**, 160-82(1929); cf. *C. A.* **23**, 174, 893.—Values of the sugar content of the skin and blood, resp., are: man 47, 98; rabbit 117, 109; guinea pig 119, 117; rat 80, 83; dog 60, 92; mouse 53, 108 mg. per 100 g. (cc.). After administration of sugar the skin sugar increases like the blood sugar and returns to normal values. The skin sugar is diminished by insulin The effect of pathol. conditions of the skin is described. B. C. A.

Water and phosphorus compounds of the nerve on degeneration. R. M. MAY. *Compt. rend.* **190**, 1150-1(1930).—During the first month the water content of the degenerated sciatic nerve of the rabbit increases to 14% above the normal and thereafter falls to the normal value. The total P diminishes progressively during the first 2 months to a third of its normal value. The lipin P decreases after 100 days to a tenth of its normal value, when histological examn. shows complete reabsorption of the lipin products of the nerve. The alc.-sol. and the protein P after an initial rise diminish to a third of the initial values, while the water-sol. P shows a steady increase up to 35% above the normal value after 6 months. Also in *Bull. soc. chim. biol.* **12**, 934-53(1930). B. C. A.

Urea and ammonia in normal gastric juice. D. SIMICI, R. VLADESCO AND M POPESCO. *Compt. rend. soc. biol.* **101**, 199-202, 202-4(1929).—The gastric juice of fasting persons contains 0.014-0.042% of urea and 0.0048-0.0098% of NH_3, the values being scarcely affected by a test meal. Injection of urea (5-10 g. in 20 cc. of water) raised the values to 0.06 and at least 0.03%, resp. In pathol. conditions not affecting the kidneys these values are not markedly changed; in those affecting the kidneys they are increased to 0.3 and 0.11%, resp. B. C. A.

Dextrose in normal urine. H. ROTH. *Compt. rend. soc. biol.* **101**, 218-20(1929). The amt. of dextrose in normal urine varies between 0.02 and 0.30%, depending on the time of day. After fermentation with yeast there remains in the urine 0.01-0.02% of reducing non-sugar substances. B. C. A.

Non-dialyzable fraction of urine. A. BOIVIN. *Compt. rend. soc. biol.* **101**, 724-6 (1929).—The wt., C-N ratio, S content and P content of the non-dialyzable fraction of human urine depend on the technic of the dialysis. B. C. A.

Oxygen consumption of the heart in varying, approximately isotonic, work. L BAUER. *Z. Biol.* **89**, 513-22(1930).—By the method of Eismayer and Quincke (*C. A.* **23**, 2504), it is shown that the amt. of O used for each contraction of the heart does not increase proportionately with increase in pressure, and therefore in work done, but bears a linear relationship to the initial vol. before contraction. B. C. A.

The equilibrium between glycogen and lactic acid. WILDER D. BANCROFT AND GEORGE BANCROFT. *J. Phys. Chem.* **35**, 195-214(1931).—The rate of formation of

lactic acid during fatigue and the quantity of lactic acid found in fatigued muscle can be explained by assuming that enzymes catalyze its formation from glycogen. The reaction is revers ble, but glycogen may be stabilized by adsorption on protein. The formation of acid would be slow during anaerobic rest for this reason. The rapid action as a result of heat rigor or administering $CHCl_3$ is due to liberation of glycogen from the protein. Narcotics might act by freeing adsorbed glycogen from protein or by freeing enzymes from adsorption on the lipins or by a combination of the 2 reactions. The lactic acid found in the muscle is dextrorotary. One would expect inactive lactic acid to be formed by ordinary chem. processes. The adsorption of glycogen on protein could account for the conversion of lactic acid to glycogen during recovery of a muscle. Some failures to find glycogen adsorbed on protein or as a result of the action of enzymes on lactic acid are due to faulty methods of analysis. The *formation of lactic acid from glycogen in cancer* follows a path different from that followed in normal tissue. F. E. BROWN

Recent advances in the physiology of digestion. IV. The intestine. H. H. DUKES. *J. Am. Vet. Med. Assoc.* **31**, 235-9(1931); cf. *C. A.* **25**, 993.—A review. RACHEL BROWN

Studies in blood diastase. Factors which cause variation in the amount of diastase in the blood. CHARLES REID AND B. NARAYANA. *Quart. J. Exptl. Physiol.* **20**, 305–11 (1931).—The diastase in the blood was detd. by the method of Fyfe. Observations were made chiefly on dogs but also on humans, rabbits and cats. The blood diastase decreased after meals, injections of glucose, glycogen and insulin, but increased after anesthetics and injections of starch. Since pancreatectomy and ligature of the pancreatic duct caused little or no change in the amt. of circulating diastase, the pancreas is not the main source of blood diastase. Since definite variations can be induced by injections of insulin and glycogen, it appears likely that the circulating diastase is not entirely a waste product on its way to excretion. Evidence is adduced that variations in blood diastase are probably due to its being taken up or given out by the liver cells accord ng to the requirements of the body with respect to the glycogen-glucose equil. probably in assocn. with insulin. RACHEL BROWN

Placental hormones. J. B. COLLIP. *Can. Med. Assoc. J.* **23**, 631-3(1930); cf. *C. A.* **24**, 5812.—A brief résumé of work already reported, in which C. stresses his view that the human placenta contains at least 3 distinct active principles, one a sp. product of placental tissue functioning, and actively related to the condition of pregnancy. A. T. CAMERON

Notes on the clinical use of certain placental extracts. A. D. CAMPBELL AND J. B. COLLIP. *Can. Med. Assoc. J.* **23**, 633-6(1930); cf. *C. A.* **24**, 2781.—Observations on 135 cases of deranged ovarian function led to the following conclusions: Emmenin does not alter normal menstrual cycles. Its effect in dysmenorrhea has been particularly encouraging, and it appears to correct certain types of amenorrhea of recent origin. It definitely lengthens the cycles in polymenorrhea. It relieves the menopausal symptoms of recent origin, but not in castrates. An anterior-pituitary-like principle from the placenta arrests certain forms of metrorrhagia. A. T. CAMERON

The basal metabolism during harvesting. G. FARKAS, J. GELDRICH AND A. SZAKÁLL. *Arbeitsphysiol.* **3**, 468-76(1930); cf. *C. A.* **23**, 887; **24**, 5352.—The basal metabolism of 6 harvesters was detd. by the Douglas bag method during varying lengths of time, the longest for a period of over 7 weeks. The basal metabolism at the time of the most strenuous work varied from 1.20 to 1.36 cals. per kg. per hr. and was about 10% higher than the min. values obtained during the periods of idleness after harvesting and threshing were finished. T. M. CARPENTER

The protein catabolism at extraordinary altitudes. A contribution to the question of the limits of acclimatization at high altitudes. A. LOEWY. *Arbeitsphysiol.* **3**, 596-604(1930); cf. *C. A.* **25**, 988.—Ten urines obtained from 6 members of Dyhrenfurt's expedition to the Himalayas at altitudes between 5150 and 7300 m. and preserved in air-tight sterile bottles contg. powd. thymol were analyzed at Davos. Expressed in % of total N the constituents averaged: urea 75.4, ammonia 5.05, preformed creatinine 3.74, total creatinine 4.80, uric acid 2.22, amino acids 0.94 and undetd. N 12.5%. The urines were more nearly normal than those collected by Hopf (cf. *C. A.* **23**, 5223) in the second winter Olympic. This cannot be explained by the inhalation of O as only one sample was obtained under this condition and its compn. agreed well with that from the same person without previous inhalation of C. The approach to normality may be explained by the extensive acclimatization at the high altitudes. The acclimatization began at 2700 m. and the urines were collected 49 to 86 days later.

Meanwhile the subjects had successively gradually attained the high altitudes at which the urines were collected. T. M. CARPENTER

The growth and metabolism of mice. PH. L'HÉRITIER. *Ann. physiol. physicochim. biol.* **6**, 1–31(1930). H. EAGLE

The semi-permeable membrane of the cell. ROBERT CHAMBERS. *Ann. physiol. physicochim. biol.* **6**, 233–9(1930).—A brief summary of the evidence furnished by microdissection for the existence of a true cellular membrane. H. EAGLE

The demonstration of bile acids in the blood. M. JENKE AND FR. STEINBERG. *Arch. exptl. Path. Pharmakol.* **153**, 244–56(1930).—By use of the Pettenkofer reaction, bile acids are shown to be occasionally less than 0.025 mg. % in normal blood, disproving the theory that they regulate cardiac frequency. In jaundice, however, they may reach as high as 2–8 mg.%. H. EAGLE

Androkinin (male sex hormone) in male blood. S. LOEWE, F. ROTHSCHILD, W. RAUTENBUSCH AND H. E. VOSS. *Klin. Wochschr.* **9**, 1407(1930).—By extn. of sapond. ox blood with ether, the active principle can be demonstrated in small quantities (1–2 mouse units per l.), by injection into a castrated mouse, and histological examn. of the glands of the seminal vesicle. H. EAGLE

Oxygen consumption following bodily work. DIETRICH JAHN. *Klin. Wochschr.* **9**, 1757–9(1930). H. EAGLE

The significance of raw egg white for the deposition of glycogen in the liver. I. ABELIN. *Klin. Wochschr.* **9**, 1759–61(1930).—Egg albumin promotes the deposition of glycogen in the liver. H. EAGLE

Lactic acid metabolism in pregnancy and its relationship to hepatic and thyroid function. KARL JULIUS ANSELMINO AND FRIEDRICH HOFFMANN. *Klin. Wochschr.* **9**, 1768–70(1930); cf. *C. A.* **25**, 731.—In pregnancy there is an increased formation of lactic acid in muscles, both resting and active, due to increased thyroid function. Similarly increased lactic acid is observed in hyperthyroidism and in circulatory decompensation. H. EAGLE

The role of lactic acid in muscle fatigue. W. FLEISCHMANN AND F. SCHEMINSKY *Klin. Wochschr.* **9**, 1773(1930).—By reversing the direction of the elec. stimulus, a fatigued muscle can be made to contract, despite its lactic acid content, indicating that muscle fatigue does not depend upon this factor. H. EAGLE

The anterior pituitary hormone. W. FALTA AND F. HOGLER. *Klin. Wochschr.* **9**, 1807–12(1930). H. EAGLE

Investigations in the role of the liver in the intermediary metabolism. KARL PASCHKIS. *Klin. Wochschr.* **9**, 1917–9(1930).—In liver damage, as, *e. g.*, in toxic jaundice, there is an abnormal increase in blood amino acids following the peroral admnistration of amino acids, suggesting that deaminization is a function of the liver H. EAGLE

Effect of temperature upon the height of contraction and time of maximal contraction of skeletal muscles. I. Frog muscles. KISUO SUGAI. *Tôhoku J. Exptl. Med.* **16**, 1–24(1930).—The time required for maximal contraction decreases with increasing temp. (10–40°); the temp. coeff. is 2 between 10° and 25°, but only 1.2 between 25° and 40°. The degree of contraction is usually a min. at 22–27°; it increases at either higher or lower temps.; occasionally it remains quite const., and in a third group decreases uniformly with temp. **II. Muscles of white guinea pigs.** *Ibid* 54–76.—Contrary to the results obtained with the muscles of poikilothermic animals, the extent of contraction of guinea pig striated muscle decreases with temp. (10–40°). The latent period and the time required for maximal contraction both show a similar decrease with temp., the temp. coeff. being 1.2 between 40° and 25° and 1.8 between 25° and 10°. At the same temps., the contractility gradually decreases, but the max. contraction time remains unaffected. H. EAGLE

Effect of temperature upon the contraction curve with several peaks. KISUO SUGAI. *Tôhoku J. Exptl. Med.* **16**, 25–53(1930). H. EAGLE

Studies in the internal secretion of the pancreas. XV. TAIZO KUMAGAI AND SATORU UKAI. *Tôhoku J. Exptl. Med.* **16**, 157–68(1930).—Aq. exts. from various portions of pigeon pancreas were tested for their hypoglucemic effect upon rabbits. Those prepd. from regions relatively rich in alpha cells were found to be distinctly more active, contrary to the theory of beta-cell activity. H. EAGLE

Indispensability of the suprarenal glands in causing nicotine hyperglucemia in rabbits. TATSUSABIRO INABA AND KOGORO OIKAWA. *Tôhoku J. Exptl. Med.* **16**, 169–77(1930).—Double splanchnicotomy does not affect nicotine hyperglucemia in rabbits, but removal of the suprarenals prevents it completely. H. E.

The vascular effect of tissue fluids. SABURO FUKAMI. *Tôhoku J. Exptl. Med.* **16**,

184–8(1930).—Perfusion of Ringer fluid through surviving tissue (rabbit leg) endows the fluid with vasodilating properties, not observed if H_2O or NaCl soln. is used. The vasodilating activity is most marked $1^1/_2$ hrs. after the fluid is prepd., and gradually disappears in the course of 24 hrs. H. EAGLE

The resorption of parenterally introduced emulsified fats. SEINOSUKE HOTTA. *Tôhoku J. Exptl. Med.* **16**, 311–20(1930).—The number of very fine granules seen in blood plasma (fat droplets) is an accurate measure of parenteral fat absorption paralleling the results obtained on chem. analysis. Absorption from serous cavities is very rapid, and is conditioned by the circulation of the underlying tissues. H. E.

Biochemistry and biophysics of the developing hen egg. I. Influence of humidity. ALEXIS L. ROMANOFF. Cornell Univ. Agr. Expt. Sta., *Mem.* **132**, 3–27(1930).—From the exptl. data it is concluded that the extreme conditions in the incubator, 80 and 40% relative humidity, have both direct and indirect influence on the developing chick embryo, as follows: The growth of the embryo was rather irregular, being somewhat hastened at high and retarded at low humidity. The cycles in the growth of the embryo were decidedly disturbed. The Ca metabolism in certain stages of the embryonic development was much better at high than at low humidity. The mortality of the embryo was noticeably increased during the 2nd critical period, at the 19th day of incubation, particularly at high humidity. The physicochem. constitution of the yolk sac was slightly changed; this might have affected the embryonic metabolism, leading to the low vitality of the embryo and to its susceptibility to environment. The water content of the shell membranes and the contents of the allantoic sac corresponded to the humidity condition; this might have made an obstruction to hatching through the restriction of free movement of the embryo and through the hindrance to pulmonary embryonic respiration. Bibliography. C. R. FELLERS

Effect of the estrus-producing hormone on the growth of the mammary gland. C. W. TURNER AND A. H. FRANK. Mo. Agr. Expt. Sta., *Research Bull.* **145**, 5–56 (1930).—In the normal rabbit after continued estrus, the mammary glands show extreme extension of the duct systems resembling the naked branches of a tree. If pregnancy or even pseudo-pregnancy now ensues, the ducts develop lobules contg. large nos. of alveoli, resembling the budding of leaves from the smaller branches. The daily injection of 20 rat units of the estrus-producing hormone recovered from pregnant-cow urine, for 30 days in male castrate rabbits and in female rabbits castrated previous to puberty caused the growth of the duct system of the glands equal to that produced during continued estrus in the normal female. The results obtained seem to warrant the conclusion, that the estrus-producing hormone will cause the growth of the ducts equal to that produced during estrus, that the rate of development is not hastened by increasing the dosage and that there was present in none of the oils used a hormone or hormones which would produce the type of growth characteristic of pregnancy. C. R. FELLERS

Basal metabolism of young women. HUGHINA MCKAY. Ohio Agr. Expt. Sta., *Bull.* **465**, 3–37(1930).—The Benedict-Roth metabolism app. was used to study the basal metabolism on 91 girls aged from 14 to 18 yr. O consumption averaged 197 cc. per min.; basal heat production 1364 cal. and av. basal cal. production was 25.4 per kg. Heat production per kg. decreased fairly regularly as age increased. No significant differences among the age groups were noted on O consumption. When age was disregarded, heat production per kg. decreased decidedly with increased wt. The overwt. group averaged 9% less and the underwt. group, 12% more per kg. than the entire group. Predictions of basal metabolism on surface area are less liable to error than those based on height or wt. Basal metabolism of young college women is somewhat higher in the spring than in autumn or winter. C. R. FELLERS

The effect of manganese on the growth of rats. V. E. NELSON, J. M. EVVARD AND W. E. SEWELL. *Proc. Iowa Acad. Sci.* **36**, 267(1929).—Mn in small quantities stimulated the growth of rats. The basal diet employed consisted of casein 18, yeast 12, cod-liver oil 5, salts (mixt. no. 185) 3.7 and dextrin 61.3. $MnSO_4.4H_2O$ was fed at 2 levels, 100 and 600 p. p. m. of ration. In 56 days the control gained 1.78 g. daily and consumed 434 g. of feed per 100 of grain. On the smaller Mn allowance the gain was 2.06 g., and the feed requirement was 391.4 g. for 100 gain. On the larger Mn allowance the figures were 1.69 and 458.5. Apparently the 600 parts of $MnSO_4.4H_2O$ per million inhibited growth. W. G. GAESSLER

Hydrolysis of levorotatory substance in human milk. M. POLONOVSKI AND A. LESPAGNOL. *Compt. rend. soc. biol.* **101**, 64–5(1929); *Physiol. Abstracts* **14**, 373.—A levorotatory non-reducing lactoside, a glucoprotein, exists in human milk, which is converted to a reducing substance by hydrolysis. G. G.

Basal metabolism as a function of temperature. C. KARPER. *Compt. rend. soc. biol.* **101**, 708–10(1929); *Physiol. Abstracts* **14**, 653.—The influence of the surrounding temp. on the min. heat production of pigeons after a 26 hrs.' fast has been detd. By a simple mechanism of adaptation the exchanges in a pigeon may be diminished by 29.4%. The adaptation is slow, and may take several weeks for completion. In contrast with this slow mechanism is the rapid chem. regulation setting up increased heat production when the temp. is lowered. G. G.

Coagulation of blood and cholesterol content. L. BUGNARD. *Compt. rend. soc. biol.* **102**, 291–3(1929); *Physiol. Abstracts* **14**, 552.—The cholesterol of serum is greater than that of plasma. The coagulation of blood under oil or in air is accompanied by an increase of cholesterol in the fluid phase. G. G.

Mechanism of concentration of urinary indoxyl. G. LAROCHE, A. GRIGAUT AND P. DELILLE. *Compt. rend. soc. biol.* **102**, 532–4(1929); *Physiol. Abstracts* **15**, 38.—Parenteral injection of isotonic saline soln. in the dog leads to a lowering of urinary indoxyl. Ingestion of water by the mouth increases it because of the absorption of indole from the alimentary canal. Peptone shock causes an augmented output. Tissue disintegration with transformation of tryptophan to indole may account for some of the increase. This would imply the endogenous formation of indole, which cannot be demonstrated. G. G.

Cholesterol regulation in the lung. L. BUGNARD. *Compt. rend. soc. biol.* **102**, 550–1(1929); *Physiol. Abstracts* **15**, 18; cf. *C. A.* **24**, 647, 4816.—The distribution of cholesterol in the blood depends on the reaction. When the acidity is increased the amt. of cholesterol in the plasma rises, the effect being explained by a transference of cholesterol from the corpuscles. Diminution of CO_2 in the lung is accompanied by the reverse change in the cholesterol distribution. The distribution seems to be a factor in maintaining the physicochemical equil. and the p_H of the blood. G. G.

Oxidation-reduction potential of the vitreous humor. E. REDSLOB AND P. REISS. *Compt. rend. soc. biol.* **102**, 1060–2(1930); *Arch. phys. biol.* **7**, 221–5(1930); *Physiol. Abstracts* **15**, 145.—The oxidation-reduction potential of the vitreous humor in the rabbit was measured by the injection of indicators and by the insertion of a fine platino Ir point with an indifferent electrode on the skin for elec. measurement. The results of the 2 methods agreed well. A potential of +110 mv. was found, which corresponds with an r_H of 19.1 for a p_H of 7.6. Arrest of the circulation caused a fall of potential to +51 mv., corresponding to an r_H of 16.9. G. G.

Reactions of ovary to placental injections. M. KLEIN. *Compt. rend. soc. biol.* **102**, 1068–9(1930); *Physiol. Abstracts* **15**, 181.—Exts. of total placenta cause a great disturbance of the ovary in the rabbit. The changes resemble those obtained with hypophysin. The effects are produced with human placenta at all stages of pregnancy and at term. G. G.

Is the active placental substance a hypophyseal hormone? M. KLEIN. *Compt. rend. soc. biol.* **102**, 1070–1(1930); *Physiol. Abstracts* **15**, 181 2.—Hemorrhagic follicles and corpora lutea are found in the ovary after injection of the placental ext. These changes are supposed by some workers to be sp. tests of hypophysin. The increased thyroid activity described as resulting from injections of hypophysin did not occur as a result of placental injection. It is probable that the placenta contains a substance which acts on the ovary but which is not hypophysin. G. G.

Acidosis in pregnancy. E. L. SOLAI, J. DALSACE AND M. GIRARDOT. *Compt. rend. soc. biol.* **103**, 111–2(1930); *Physiol. Abstracts* **15**, 184.—Uncompensated acidosis has been demonstrated in albuminuric pregnancy. Now it is shown that acidosis exists to some extent toward the end of normal pregnancy. It is greatest in labor and disappears after parturition. There is a lowering of p_H and of the alk. reserve. In preeclamptic conditions the p_H and alk. reserve are lowest. G. G.

Oxytocic properties of woman's blood during parturition. J. FONTES. *Compt rend. soc. biol.* **103**, 349–50(1930); *Physiol. Abstracts* **15**, 119.—The oxytocic substance in woman's blood must be a fetal product or a product obtained from fetal accessory structures, as it disappears a few hrs. after parturition. The blood of the umbilical cord is not active, while that from the placental site of the uterus is. The placenta may be the seat of formation of the oxytocic substance. The oxytocic element is the detg. factor in setting up labor pains. G. G.

Secretory phenomena in the thyroid of birds. P. FLORENTIN AND M. WEIS *Compt. rend. soc. biol.* **103**, 601–3(1930); *Physiol. Abstracts* **15**, 179–80.—In certain birds massive degeneration of the parenchyma of the thyroid was observed. The débris is poured directly into the circulation, cellular emboli being seen in the small vessels. Amitotic multiplication is supposed to be the method of regeneration. The

analogy with mammalian thyroid processes is marked. The phenomenon seems to be connected with changes in the sexual organs. G. G.

Difference in cerebral effects of a new thyroid extract and thyroxine. G. FUCHS. *Compt. rend. soc. biol.* **103**, 603–5(1930); *Physiol. Abstracts* **15**, 180.—An ext. has been made from the thyroid of vagotonic animals which acts on psychomotor centers in lowering their chronaxie. It contains a hormone which is different from that affecting metabolism. Thyroxine does not lower the chronaxie of the nervous centers. G. G.

Substances extracted from the suprarenal glands by hydrogen peroxide. J. STEFL. *Compt. rend. soc. biol.* **103**, 650–2(1930); *Physiol. Abstracts* **15**, 180.—In extg. the cortical hormone of the suprarenal gland, adrenaline may be excluded by using H_2O_2. The ext. contains no lipoids, but choline is abundant. The alc. ext. contains lipoids and a crystallizable substance. The crystallizable substance is supposed to be identical with the oxidation product of adrenaline. Choline exists only in the peroxide ext., not in the alc. It probably arises from the decompn. of lecithin. G. G.

Remarks on the work of Mond and Netter "does the ionic permeability of muscle change during muscular activity?" E. ERNST. *Arch. ges. Physiol.* (*Pflügers*) **226**, 243(1930); cf. *C. A.* **24**, 5354.—Polemical. ARTHUR GROLLMAN

Hemin, bilirubin and porphyrins. HANS FISCHER. *Naturwissenschaften* **18**, 1026–37(1930); cf. *C. A.* **25**, 526.—An elaborate review of the present knowledge of the chemistry of blood pigment and related chem. compds.; numerous references are given. B. J. C. VAN DER HOEVEN

Morphology of the porphyrins. M. BORST. *Naturwissenschaften* **18**, 1038–41 (1930).—A review of recent work on morphological distribution of porphyrins and derivs. (cf. Borst and Königsdörffer, Untersuchungen über Porphyrine, Leipzig, 1929). B. J. C. VAN DER HOEVEN

Proteoclastic function of the thyroid. M. LOEPER, A. LEMAIRE AND J. TONNET. *Compt. rend. soc. biol.* **102**, 279–80(1929); *Physiol. Abstracts* **14**, 580.—The thyroid gland breaks up proteins. Nucleo-albumins (precipitable by AcOH) are less abundant in the venous than in the arterial blood. Serine is more abundant in the venous blood. The amino acids are less abundant in the efferent blood. Fresh thyroid ext. breaks up albumins *in vitro*. E. C. K.

Rest-nitrogen percentage of the blood of natives and of Europeans in the Tropics. W. RADSMA. *Mededeel. Dienst Volksgezondheid Nederland.-Indië* **19**, Pt. 2, 227–32 (1930).—A series of urea estns. with undernourished natives resulted in an av. of 23 mg. %; from 3 to 4 hrs. after the last meal at 10 or 11 A. M., the av. was 25.8 mg. %. The blood examd. was capillary blood from the fingertip. J. A. KENNEDY

Gasometric determination of the relative affinity constant of carbon monoxide and oxygen in whole blood at 38°. J. I. SENDROY, S. H. LIU AND D. D. VAN SLYKE. *Bull. soc. chim. biol.* **12**, 532(1930).—Three normal and 3 pathol. samples of human blood gave a value of 210 for the affinity const. K (p_{O_2}/p_{CO}) = ($HbCO/HbO_2$), and for 10 samples of beef blood K = 179. All values found were within 2.5% of the av. C. G. KING

Food balance and nutrition. LUCIE RANDOIN. *Bull. soc. chim. biol.* **12**, 815–26 (1930); cf. *C. A.* **24**, 5805.—Pigeons receiving 66% carbohydrate on a vitamin-B free diet died in 17–27 days, but when on a carbohydrate-free diet (54% protein) they survived 3 months. Similarly rats died in 30–60 days or survived 4 months. Expts. also indicate a needed balance of mineral salts and carbohydrate. Details concerning purification of the diets are not given. C. G. KING

Relationship between electrical differences of potential in the skin and normal basal metabolism. CHARLOTTE PURDY, A. FRANCES JOHNSON AND CHARLES SHEARD. *Science* **73**, 46–9(1931). W. D. LANGLEY

Regulation of cholesterolemia. L. BUGNARD AND C. SOULA. *Compt. rend.* **191**, 1382–4(1930).—The regulation of cholesterolemia is an automatic function of the blood tissue. It is accomplished by the globular cholesterol existing in this tissue although it is neither generated nor destroyed by it. The mechanism of such regulation is purely a physical one and depends upon the cholesterol circulating generally in the cellular constituents of the blood and in the plasma. B. S. LEVINE

The work of the kidney in the production of urine. HENRY BORSOOK AND HOWARD M. WINEGARDEN. *Proc. Nat. Acad. Sci.* **17**, 3–12(1931).—Summary: (1) The work of the kidney in the excretion of urine is analyzed by means of the second law of thermodynamics. (2) It is shown that the work performed by the normal kidney in man in the excretion of urine is of the order of magnitude of 0.7 g. cal. per cc. of urine, or 70 g. cal. per g. of N excreted. B. S. LEVINE

The energy cost of the excretion of urine. HENRY BORSOOK AND HOWARD M.

WINEGARDEN. *Proc. Nat. Acad. Sci.* **17**, 13–28(1931).—Summary: (1) The work of the kidney in the excretion of urine is analyzed by means of the second law of thermodynamics. It is shown that the production of either hyper- or hypo-tonic urine entails work on the part of the kidney. The excretion of a urine which is the same as the plasma in all details incurs no work by the kidney. (2) The energy consumed by the kidney in man in the production of urine was found to be 6–11 kg. cal. per g. of N excreted. (3) It is shown that the normal healthy kidney considered as a chem. machine possesses a great capacity for work, but performs its work with an "efficiency" probably not greater than 1–2%. (4) The effect of disease is to reduce markedly the capacity of the kidney for work. B. S. LEVINE

Gas tensions in the tissues. J. ARGYLL CAMPBELL. *Physiol. Rev.* **11**, 1–40 (1931).—General review covering diffusion, absorption, quant. measurement and other problems concerning gases in body tissues, cavities and secreted fluids. Extensive bibliography. E. R. LONG

Factor influence on oxidative and lytic systems. W. LOELE. *Virchow's Arch. Path. Anat.* **279**, 207–13(1930). In the oxidation system: OH + α-naphthol + NH_2-(COOH) + COH + Fe^{+++} a variety of amino acids may take the place of the glycocoll. This artificial oxidation system, in its susceptibility to heat, prolonged standing, $ZnCl_2$, etc., behaves much like the cell oxidase supposed to function in the granules of eosinophilic leucocytes. Amino acids function in tryptic systems *in vitro*, inhibiting the action of alkali. While *in vitro* the groups COH and NH_2(COOH) both inhibit the action of alkali, they are themselves antagonistic, the inhibiting action of COH being removed by NH_2. In the formation of blood cells peptic processes occur in the lymphocytes and tryptic processes in the granular leucocytes and red blood corpuscles. The formation of these cells may be modified by changing the OH concn. of tissue, and by treatment with aldehydes, amino acids or ferric salts. E. R. LONG

The equilibrium between cerebrospinal fluid and blood plasma. III. The distribution of calcium and phosphorus between cerebrospinal fluid and blood serum. H. HOUSTON MERRITT AND WALTER BAUER. *J. Biol. Chem.* **90**, 215–32(1931). Normal serum contains from 9.35 to 10.6 mg. of Ca per 100 cc. (av. 10.0 mg.) while the Ca content of cerebrospinal fluid is approx. ½ this amt. (4.5 to 5.23 mg., av. 5 mg.) The Ca content varies directly with the serum protein in such a way that there is no significant change in the ratio with changes in the serum protein. In meningitis there is a slight diminution in serum Ca and an increase in cerebrospinal fluid Ca which is accounted for by increased permeability of the meninges and the choroid plexus with a resulting increased protein content in the spinal fluid. There is a definite decrease in serum Ca at the end of pregnancy; the amniotic fluid Ca averages 6.59 mg. per 100 cc. In non-suppurative diseases of the central nervous system the Ca content of both serum and spinal fluid is normal; the spinal fluid P content varies between 31 and 45% of the serum P (av. 38%) in these diseases while in suppurative conditions the ratio varies between 35 and 123% (av. 40%). The serum and spinal fluid Ca content of cats is slightly higher than in humans, the spinal fluid Ca averaging 54% and the aqueous humor 60% of the serum Ca. **IV. The calcium content of serum, cerebrospinal fluid and aqueous humor at different levels of parathyroid activity.** *Ibid* 233–46. The cerebrospinal fluid Ca remains markedly constant in spite of a well-marked change in the serum Ca level, the striking lowering of serum Ca in parathyroid tetany and its sustained elevation following parathormone administration being without appreciable effect on the spinal fluid Ca level. Injection of parathyroid hormone causes only a slight increase also in the Ca content of the aqueous humor (0.6 mg.). If one accepts the cerebrospinal fluid as a dialyzate in osmotic and hydrostatic equil. with the blood plasma, the data would indicate that variations in serum Ca occurring during parathyroid tetany or following the administration of parathyroid gland ext. are chiefly and perhaps wholly limited to the non-diffusible Ca. Variations in serum Ca associated with different levels of serum protein involve both the diffusible and non-diffusible Ca. Bibliography of 55 references. A. P. LOTHROP

Studies in hyperthermia. II. The acid-base equilibrium in hyperthermia induced by short radio waves. FRITZ BISCHOFF, M. LOUISA LONG AND ELSIE HILL. *J. Biol. Chem.* **90**, 321–9(1931); cf. *C. A.* **24**, 2784.—"With the exception of a fall in blood vol., which is probably not a direct effect, no difference in effect was noted between raising the body temp. by placing the subject in the field of condenser plates in circuit with a short-wave radio transmitter and in raising the body temp. by means of diathermy, warmed air or hot water baths. Of fundamental importance was the loss of CO_2. The p_H of the blood became more alk., there was a shift of bases to the blood proteins and an increased oxygenation of the hemoglobin of venous blood. No signifi

cant change in the non-protein N constituents of the blood was noted. No evidence was obtained that the body was attempting to compensate for the condition of alkalosis through the urinary or perspiratory excretions." **III. The phosphorus equilibrium.** FRITZ BISCHOFF, L. C. MAXWELL AND ELSIE HILL. *Ibid* 331–9.—"No P is eliminated in the perspiration during a hyperthermia induced by radio waves. The decrease in the rate of urinary P excretion is accounted for by the decrease in P elimination with increase in metabolism and the conversion of inorg. to org. P in the blood with an alk. shift of blood p_H. The decreased rate of urinary N excretion is accounted for by the increased N elimination through the perspiration." A. P. LOTHROP

The action of general cold stimuli (sea bathing) on the resistance of erythrocytes. A. CHIATELLINO. *Arch. sci. biol.* (Italy) **15**, 346–55(1930); cf. *C. A.* **24**, 4824.—Cold stimuli such as sea bathing cause an increase in the no. of red blood corpuscles and a definite but slight decrease in the resistance of the corpuscles to hemolysis. P. M.

The place of origin of the biliary pigment. EMILIO BECCARI. *Arch. sci. biol.* (Italy) **15**, 356–95(1930).—A review. PETER MASUCCI

The reaction of articular tissues. BRUNO BORGHI. *Minerva med.* **1930**, II, 913–7.—The object was to see whether intensive work, immobility and the local action of heat and cold have the power to modify the p_H of articulations. One knee of the rat was used for the study, while the other was kept as a control. The p_H was detd. by means of phenol red which was injected intraperitoneally into the rats. The following results were obtained: Intense work changed the tissues of articulation toward the alk. side; immobility did likewise at first, but later the reaction of the tissues changed toward the acid side of the normal. The local application of heat increased the alky. Cold produced slight and inconst. changes toward the acid side which was revealed by the diminution of the buffer value of the tissues toward acids. The mechanism of these changes and their significance in the general pathology of articulation are discussed PETER MASUCCI

The curve of alveolar carbon dioxide tension during voluntary apnea. GIORGIO GIORGI *Arch. ital. biol.* **84**, 11–22(1930).—For the same individual there is an av. value for alveolar CO_2 tension beyond which it is impossible to maintain apnea. This max. alveolar CO_2 tension varies for different individuals, but for the same individual it is fairly const. S. MORGULIS

Influence of the liver on the function of the heart. A. RONCATO. *Arch. ital. physiol.* **84**, 23–31(1930).—Blood perfused through the liver produces a marked hemodynamic effect upon the isolated heart. The perfusion arrangement is such as to permit the inclusion or exclusion of the pancreas, and this shows that the pancreas does not contribute to the effect upon the heart of the blood circulating through the liver. No conclusion is drawn as regards the nature of the substance given off by the liver which may be a hormone, or some nutritive factor furnished by the liver to the heart. Finally, it is also considered that the liver may detoxicate the blood which passes through it before reaching the heart and thus increase its action upon the contraction of the heart. S. MORGULIS

Studies of carbohydrate metabolism of blood and organs with the aid of a new colorimetric method. I. The presence of different hexoses besides glucose in human blood and their formation in vitro. ZACHARIAS DISCHE. *Biochem. Z.* **229**, 169–95 (1930).—Two methods were employed for the detn. of the blood sugar. A part of the blood is deproteinized with 25%, and another part with 10% CCl_3CO_2H. After remaining overnight this is centrifuged. It has been definitely established that no free sugar is retained in the ppt., nor do any substances pass into the fluid which affect the color reactions utilized in the sugar detn. Added glucose has always been quantitatively recovered. The color reactions were produced with diphenylamine-HCl or with indole-H_2SO_4. The former reaction was so modified that it included all hexoses and not merely fructose. For this purpose to 1 part of the sugar soln. are added 2 parts of Rothenfusser's reagent (100 cc. concd. HCl, 80 cc. glacial AcOH, 20 cc. of 10% alc. diphenylamine); this is then heated in the boiling water bath 3, 10 or 30 min. The ketoses show a much stronger coloration than aldoses, the difference being greater the shorter the time of boiling. By the indole-H_2SO_4 reagent the relative color intensities for various sugars are as follows: glucose 100, fructose 125, Harden-Young ester 100, mannose 70 and galactose 75. The results by the former reaction are invariably higher (10–150%) than by the latter. In some instances the diphenylamine-HCl procedure gave variable results depending on whether the heating was for 10 or 30 min, which is regarded as an indication that blood contains 2 other hexoses besides glucose, an aldose and a ketose, which are designated as the "additional sugar." Following a large glucose dose the intensity of both the diphenylamine-HCl and indole-H_2SO_4 reaction gen-

erally increases to the same extent, so that only the glucose but not the "additional sugar" of the blood is raised under these circumstances, but occasionally there is an increase also in the "additional sugar." An hr. after the injection of 20–30 units of insulin both glucose and the "additional sugar" disappear, but the latter disappears more rapidly. Incubating blood at 37° for 2 hrs. causes practically all the "additional sugar" to disappear. From the behavior of fluoride or citrate blood kept for several hrs. at room temp. it is evident that a ketose sugar is formed, which disappears more quickly than glucose when the blood is kept in the incubator. Addn. of glucose to citrated blood causes the formation of a ketose as well as an aldose. The newly formed ketose is present only in the red cells whereas the preformed "additional sugar" is practically equally distributed between cells and plasma. The formation of the ketose in blood at room temp. is much increased through the addn. of Na_2HPO_4, and it is believed that this ketose is really a hexosephosphate ester. S. MORGULIS

Influence on the development of the female sex organs of hyper-interrenalization. CARL MÜLLER. *Endokrinologie* **8**, 5–14(1931).—Expts. were performed on female rats exactly 3 weeks old. Some of these young rats were thymectomized, and only about 15% of the operated animals were lost. A special ext. of the adrenal bodies was used to inject some of the intact and of the thymectomized rats. For this purpose very fresh beef suprarenal glands were freed from fat, etc., and the cortex, carefully sepd. from the medulla, was ground fine in a few cc. 0.9% NaCl. The thick, reddish pulp obtained from about 150 g. substance is boiled in an Erlenmeyer flask for 10 min. on the water bath to remove proteins. This is filtered through gauze, about 30 cc. soln. being obtained. Traces of adrenaline are removed by passing air through the ext. which is now neutralized with 0.05 *N* NaOH. Every 2–3 days 0.5 cc. of this was injected. These injections of the cortical ext. produced a typical strong inhibition of development of the external as well as internal female sex organs. In the ovary defective development of the ova was observed and absence of normal corpora lutea. S. MORGULIS

Inactivation by proteolytic enzymes of the anterior hypophysis hormone obtained from pregnant urine. M. REISS, A. SCHÄFFNER AND F. HAUROWITZ. *Endokrinologie* **8**, 22–4(1931).—Expts. were made with the following proteolytic enzymes: amino polypeptidase, carboxypolypeptidase, pepsin, inactive trypsin and activated trypsin. Only the activated trypsin brought about complete destruction of the hormone. S. MORGULIS

The significance of the bile acids in the carbohydrate metabolism. IX. The effect of bile acids on the sugar assimilation. SEI FUZITA. *J. Biochem.* (Japan) **12**, 383–91(1930).—The glycogen-forming capacity of the fasting rabbit liver from different monoglucides decreases in the following order: *d*-fructose, *d*-glucose, *d*-mannose and *d*-galactose. The glycogen forming capacity in this series can be raised on the av. 42–52% by the administration of cholic acid. Fructose yields the greatest glycogen production both with or without cholic acid; in point of extent of the glycogen formation with cholic acid this is followed by glucose, mannose and finally galactose. The lowering of the excretion threshold for these various sugars under the influence of cholic acid is therefore to be attributed to its stimulation of glycogen formation in the liver. S. MORGULIS

Studies on the nature of the prophyrin appearing in urine following ingestion of chlorophyll. YASUO NAKAMURA. *J. Biochem.* (Japan) **12**, 475–85(1930).—Spectroscopic studies as well as biol. tests show that urine porphyrin following the ingestion of chlorophyll is isomeric with blood porphyrin. The urobilin output after chlorophyll ingestion is always increased. S. MORGULIS

The site of ammonia production. A. FØLLING. *Skand. Arch. Physiol* **61**, 23–6 (1931).—F. experimented upon himself, on an ordinary diet, and in a condition of acidosis caused by NH_4Cl or alkalosis by $NaHCO_3$. The plasma NH_3 was detd. by the Parnas method, the rate of kidney filtration by Rehberg's method and the urinary NH_3 in hourly samples. So long as the urine is more acid than p_H 7.8 more NH_3 is found in the urine than is filtered through the kidney during the same time, so that the NH_3 must be formed by the kidney. The results of analysis also allow the calcn. of the concn. of undissocd. NH_4OH in plasma and urine, according to which the latter is 10 times as great as the former, thus precluding any possibility of a direct diffusion from plasma into urine. S. MORGULIS

Further observations on the depressor substance in brain tissue. RALPH H. MAJOR AND C. J. WEBER. *J. Pharmacol.* **40**, 247–52(1930); cf. *C. A.* **24**, 2199.—The depressor substance is adsorbed on Lloyd's reagent from a brain ext. and then freed by treatment with $Ba(OH)_2$. The soln. is further purified by pptn. with phosphotungstic

acid and $AgNO_3$. The final soln. produces a fall in blood pressure in dogs before or after atropinization. It gives a positive Sakaguchi, and a negative Pauly, reaction. The substance is not histamine, choline or acetylcholine. C. RIEGEL

G—PATHOLOGY

H. GIDEON WELLS

Chloride determinations in cases of intestinal obstruction. M. PAGET. *Bull. soc. chim. biol.* **12**, 409–10(1930).—Chloride detns. in cases of high or low obstruction of the intestine should be made on whole blood when the alk. reserve is increased and on the serum when it is normal. B. C. A.

Magnesium and calcium in the liver of hyperthyroidized animals. M. CAHANE. *Compt. rend. soc. biol.* **100**, 577–8(1929).—With guinea pigs the increase was 0.0021 and 0.0015%, resp. B. C. A.

Relation between changes in the alkali reserve and relative chlorine and sodium contents of the blood in experimental immobilization of the intestine and in histamine shock. F. D. ALSINA. *Compt. rend. soc. biol.* **100**, 1098–1101(1929).—The changes in the alkali reserve are accompanied by a relative increase in blood Na and decrease in blood Cl. B. C. A.

Dextrose and normohemolysins. I. DJURICIC. *Compt. rend. soc. biol.* **100**, 1224–5 (1929).—Dextrose has no influence on hemolysis by hemolysin; hence the mechanism is not that in hypertonia and is not accompanied by colloidal changes of the proteins of the surface layer. B. C. A.

Gaseous exchange in fever caused by naphthylamine-yellow or by β-tetrahydronaphthylamine. J. DADLEZ AND W. KOSKOWSKI. *Compt. rend. soc. biol.* **100**, 1234–6, 1238–40(1929). B. C. A.

Nature of the toxic product arising from closure of the intestine. A. BLANCHETIERE AND L. BINET. *Compt. rend. soc. biol.* **101**, 14–7(1929).—On occlusion of the intestine there is present a single-chain substance of proteose character, probably arising from the decarboxylation of leucine; it is possibly isoamylamine. B. C. A.

Action of formaldehyde, hydrogen peroxide and white phosphorus on tuberculin. J. F. HEYMANS AND C. HEYMANS. *Compt. rend. soc. biol.* **101**, 153–5(1929).—Tuberculin, which is not decomposed by the above reagents, is exceptional among proteins. B. C. A.

Affinity of hemoglobin for oxygen in anemia. G. LITARCZEK, H. AUBERT AND I. COSMULESCO. *Compt. rend. soc. biol.* **101**, 220–1, 222–3(1929).—The affinity of hemoglobin for O is reduced in anemia. The ratio of $1/k$ to $C_H \times 10^8$, where k is the dissocn. const. of the oxyhemoglobin, is abnormally high in anemia. B. C. A.

Bile protein in diabetes. J. GAVRILA AND A. MOGA. *Compt. rend. soc. biol.* **101**, 404–6(1929).—In diabetes the bile protein is increased. B. C. A.

Susceptibility and resistance to tar cancer, an experimental study. J. MAISIN. *Ann. Surgery* **93**, 180–9(1931).—Tar cancer is the result of a local irritation as well as of a general intoxication. Certain mineral salts (Mg, Cu) used in convenient doses are capable of delaying the appearance of cancer and of lowering the percentage of induced tumors. Other salts, *i. e.*, salts of radioactive metals, have the opposite effect. Diet can influence the appearance and evolution of tar cancer. The liver diet activates the development of cancer. It is probable that other diets would retard its appearance. Vitamin A adsorbed in addn. to a normal alimentation has no inhibitive effect on the appearance of cancer. Preceding closely the development of tar cancer and during its evolution, the metabolism of fats is deficient and the variations of the cholesterolemia are marked. The same variations are to be noticed after repeated ionium injections. RACHEL BROWN

Dehydration in intestinal obstruction. GAVIN MILLER. *Edinburgh Med. J.* **38**, 47–53(1931).—In high simple obstruction in dogs, death is caused by loss of intestinal secretion causing dehydration and loss of Na and Cl ions. Only the blood plasma and interstitial fluid are lost. The intracellular fluid is maintained by an ionic concn. consisting mainly of H_2PO_4 and K. These are not lost in the gastrointestinal secretion and so dehydration does not impair the intracellular fluid. RACHEL BROWN

Experiences with a high carbohydrate-low calorie diet for the treatment of diabetes mellitus. I. M. RABINOWITCH. *Can. Med. Assoc. J.* **23**, 489–98(1930).—A report from the clinical point of view is given of a diet such as the title indicates. Provided the fat content is kept very low and the cal. value is within the min. requirements, it is possible, in the majority of cases, to make the diet of the diabetic quite attractive without the use of insulin. Where insulin is necessary, the dosage and frequency of

administration are less than with diets ordinarily in use. Special articles of food are not necessary. Low plasma cholesterol and N retention in the early stages are characteristic metabolic features assocd. with the treatment. A. T. CAMERON

Chloropenia with excess of tissue chlorine in cirrhoses. H. THIERS. *Compt. rend. soc. biol.* **101**, 475–6(1929); *Physiol. Abstracts* **15**, 36; cf. *C. A.* **24**, 5370.—In alc. cirrhosis of the liver the following syndrome is described: (1) diminution of Cl in blood, (2) normal or raised alk. reserve, (3) urea and non-protein N diminution in blood, (4) excess of Cl in tissues. The hepatic lesion plays a part in this. It is not attributable to the same mechanism as in nephritis. H. L. D.

Superventilation tetany. FRIEDRICH HOLTZ. *Z. physiol. Chem.* **194**, 76–80(1931).—The tetany resulting from a prolonged period of voluntary forced breathing is accompanied by a lowering of the phosphate content of the serum. This may drop to a value as low as $^1/_3$ of the normal, while the Ca remains normal. A study was made of the effect on nervous excitability by measuring a low-voltage current in milliamperes required to produce tremors in the tibial nerve. No fundamental difference was observed between normal and epileptic subjects except that epileptics reached the excitable stage somewhat sooner. A. W. DOX

Disturbances in the carbohydrate metabolism in Basedow's disease. BERNHARD KUGELMANN. *Klin. Wochschr.* **9**, 1533–4(1930).—Thyreotoxic patients given 100 g. of levulose *per os* show an appreciably higher and more prolonged curve, presumably due to functional liver insufficiency. H. EAGLE

An experimental contribution to the serodiagnosis of carcinoma. I. The use of a scale-photometer in the albumin-A reaction of Kahn. W. BACHMANN. *Klin. Wochschr.* **9**, 1540–1(1930).—The demonstration of normal quantities of albumin A in the serum is strong presumptive evidence for the absence of carcinoma. **II. The comparison of the Kahn method of albumin-A determination by scale-photometric measurement with the modified Botelho reaction.** W. BACHMANN AND FR. SCHMIDT. *Ibid* 1541–3(1930). A Kahn estimate of albumin-A over 32 signifies the absence of cancer; readings of 32–30, with the Botelho M or Z tests negative, make carcinoma improbable. Kahn < 32, and positive Botelho M and Z tests are strong evidence for the existence of cancer; Kahn < 30, and Botelho tests negative or conflicting signify possible cancer. It is important to regulate the p_H in the Botelho tests. H. EAGLE

Eclampsia and ion economy. H. ROSSENBECK. *Klin. Wochschr.* **9**, 1545–7(1930).—In eclampsia Na leaves the blood and goes into the tissues, there is also a relative increase in muscle Ca and a decrease in K. In the liver there is an increase of Na and K and a decrease in Ca. There is a theoretical discussion as to the significance of these findings. H. EAGLE

The clinical significance of the porphyrins. HUGO KAMMERER *Klin. Wochschr.* **9**, 1658–63(1930).—A critical analysis of the literature. H. EAGLE

Causal relationship and metabolic effects in diseases of abdominal organs and kidneys. SIGURD FREY. *Klin. Wochschr.* **9**, 1678–81(1930). H. EAGLE

Organ-antibody formations in human beings. OEDRON FISCHER AND FELIX GEORGI. *Klin. Wochschr.* **9**, 1817–9(1930).—Spirochetes grown in a rabbit brain medium and injected into humans cause the appearance of antibodies which react with an alc. ext. of either spirochetes or human brain. Spirochetes grown on a rabbit-kidney medium, and injected into humans, cause the appearance of antibodies against an alc. ext. of beef kidney, against sheep red blood cells, and against spirochetes. Absorption of this latter serum with sheep red cells removes its reactivity for the sheep cells as well as for the kidney, but leaves undiminished its reactivity with the spirochetes. The greater reactivity of the kidney-spirochetes antisera for spirochetes grown on a kidney medium is not affected by this absorption. F. and G. conclude (1) that sheep red cells, rabbit kidney and beef kidney contain common receptors, which may or may not be identical with the Forssman receptor; (2) that organ-specific antibodies may be induced in humans (anti-brain, anti kidney), which are not species specific; (3) that the difference between spirochetes grown on kidney and brain media, manifested by their greater reactivity with the homologous antisera, are not dependent upon the organ antibodies present in these sera. It is highly significant that none of these anti-spirochetal sera is Wassermann-positive. H. EAGLE

Decrease of the urine chloride in acute fibrinous lung involvement. F. REICHL. *Klin. Wochschr.* **9**, 1860–2(1930). H. EAGLE

The significance of elastin in icterus. F. ROSENTHAL. *Klin. Wochschr.* **9**, 1909–13(1930).—In jaundice, there is not a uniform satn. of the body by the bile pigments, but a selective absorption detd. by the affinity of the various organs for bilirubin. Thus, in dogs with exptl. jaundice (toluenediamine), despite a very high blood bilirubin,

the bilirubin content of the spleen, heart, muscle, fat, brain, etc., is minimal; while the liver, kidney, skin conjunctive heart valves, vascular intima and lungs contain large quantities. The bilirubin content of the liver and kidney is probably due to their excretory function, while the great affinity of the other tissues is detd. chiefly by their high content of elastic fibers. *In vitro*, these fibers absorb bilirubin from soln. In jaundiced skin, conjunctival, nuchal ligament, etc., the pigment cannot be extd. by alc., acetone or $CHCl_3$ save in small quantities, while it is readily extd. from liver or kidney. Apparently, elastin enters into a firm combination with bilirubin. It should be emphasized that the foregoing holds only for acute exptl. jaundice. H. EAGLE

The iodine-deficiency theory of goiter. C. ALEXANDER HELLWIG. *Klin. Wochschr.* 9, 1914–6(1930).—See *C. A.* **24**, 3052. H. EAGLE

Icterus neonatorum gravis. H. KLEINSCHMIDT. *Klin. Wochschr.* 9, 1951–4 (1930).—The disease is characterized by a high degree of erythroblastosis. The large quantity of hematin in the blood and the pronounced siderosis both indicate toxic destruction of the blood. Early transfusion is suggested. H. EAGLE

Acid-base balance in gastric and duodenal ulcer. F. REICHE AND F. FRETWURST. *Klin. Wochschr.* 9, 1954–9(1930).—The authors cannot confirm the findings of Balint that there is acidosis in cases of duodenal ulcer. H. EAGLE

Testing the detoxicating function of the liver. MICH. SCHOUR AND CEL. ROSENGARTEN. *Klin. Wochschr.* 9, 1968(1930).—With increased putrefaction and a normally functioning liver, there may be indicanuria, but indole or urorosein does not appear. In cases of liver insufficiency, indican decreases, and the other 2 substances appear in the urine, the quantity depending upon the degree of intestinal putrefaction and of liver damage. H. EAGLE

Studies in the experimental autohemolysin of rabbits. SHUNYO SUNAMI. *Tôhoku J. Exptl. Med.* **16**, 277–97(1930).—A mixt. of lecithin and pig serum injected intravenously into rabbits causes the production of autohemolysin. A certain proportion of rabbits normally contain autohemolysin in the serum: and only a certain proportion contain the necessary receptor groups in the red cells which can combine with the antibody. H. EAGLE

The distribution of water in the animal body. I. Distribution of water in the rabbit with a functional impairment of the thyroid gland. HYOE KUSAKIRI AND KENJIRO TAKEDA. *Tôhoku J. Exptl. Med.* **16**, 329–40(1930).—In hyperthyroidism, the body as a whole loses water, particularly the skin; in hypothyroidism there is water retention, also chiefly in the skin Variations in the other organs are not const. H. EAGLE

Studies in the colloid-osmotic pressure of the blood in normal and pathological conditions. III. Colloid-osmotic pressure of the blood in hypotension and hypertension. FUSAKICHI NAKAZAWA AND JIRO IZUMI. *Tôhoku J. Exptl. Med.* **16**, 341–51(1930); cf. *C. A.* **24**, 2801.—In both hypotension and hypertension without kidney involvement there is no significant change in the colloid osmotic pressure of the blood or in the osmotic pressure per gram of serum protein. In hypertension with kidney damage, however, the total colloid osmotic pressure is very low, even though the serum protein may show no striking change. **IV. Colloid-osmotic pressure of the blood in experimental kidney damage.** KOTARO KIMURA AND FUSAKICHI NAKAZAWA. *Ibid* 352–60.—Following poisoning with cantharidin or U, the total colloid-osmotic pressure of dog serum is strikingly low, as is also the pressure per unit serum. In marked contrast following U poisoning, the colloid-osmotic pressure of the urine per unit protein is 3–5 times its normal value. Nephrectomy or bilateral obstruction of the ureters has qualitatively the same effect upon serum colloid-pressure as poisoning, although to a less degree. These results are ascribed to the presence in serum of larger protein-aggregates, due either (1) to an increased capillary permeability allowing the passage of small protein "molecules" into the tissues; (2) albuminuria, with passage of the smaller protein particles into the urine; (3) functional changes in the organs responsible for the regulation of blood protein. These results take on an added significance in the light of the recent work of Van Slyke. H. EAGLE

Metabolism of blood glucose in experimental trypanosomiasis. G. ZOTTA AND E. RADACOVICI. *Arch. roumaines path. exptl. microbiol.* **2**, 55(1929); *Rev. hyg. méd. prév.* **53**, 65(1931).—Exptl. studies with guinea pigs in Nagana showed no definite relation between hyperglucemia and the nos. of trypanosomes present in the blood. It is believed that the hyperglucemia in trypanosomiasis is due to a disturbance of the central gluco-regulating mechanism in the body. C. R. FELLERS

Cholesterol content, viscosity and p_H of blood after splenectomy. L. BUGNARD *Compt. rend. soc. biol.* **101**, 546–8(1929); *Physiol. Abstracts* **14**, 661; cf. *C. A.* **24**, 3556.—

The cholesterol content and the viscosity of the blood are increased after splenectomy. The changes begin at once. Temporary suppression of splenic function by clamping the pedicle was practised in dogs. When the clamp has been on for a few min. there is an appreciable increase of viscosity. After prolonged clamping there is no return to normal viscosity. G. G.

Sodium and chlorine of organs in uremia. L. Blum and P. Grabar. *Compt. rend. soc. biol.* **101**, 717–8(1929); *Physiol. Abstracts* **14**, 648.—In uremic conditions there are important modifications of the contents of Na and Cl. Na and Cl in some cases are much increased, especially Cl, as shown by lowering of the quotient Na/Cl. In other cases the diminution of the quotient is marked with a slight increase of Na. In still others the quotient is raised above the normal. The changes are not characteristic, or at least not characteristic of the various states grouped under the title uremia. G. G.

Sodium and chlorine in nephritis with scarcity of salt. L. Blum and P. Grabar. *Compt. rend. soc. biol.* **101**, 718–9(1929); *Physiol. Abstracts* **14**, 648.—In some fatal cases of Bright's disease the Na and Cl contents of different organs are greatly diminished but the quotient Na/Cl is greater than normal. In other cases the loss of Cl is less marked. This loss is pronounced in the myocardium. The least diminution is in the gray matter of the cerebrum. G. G.

Indoxylemia and indoxyluria in a pelvic tumor with compressed ureter. H. Thiers. *Compt. rend soc. biol.* **102**, 91–2(1930); *Physiol. Abstracts* **15**, 171.—In a pelvic tumor with compression of the ureters, progressive uremia, oliguria and alimentary intolerance, the indoxylemia varied with the indoxyluria, both declining as the uremia progressed. The reaction of Obermayer for blood indoxyl is pos. only when indoxyluria is present and in renal impermeability. It does not seem that any important value can be attached to retention of indoxyl in the condition of uremia. G. G.

Relation between alkali reserve and leucocyte index. S. Uchocha. *Compt. rend. soc. biol.* **102**, 354–5(1929); *Physiol. Abstracts* **14**, 551.—Acidosis was produced in dogs and rabbits by the administration of NH_4Cl. This causes, in rabbits, a lowering of the alkali reserve and a displacement to the left of the leucocyte index (Arneth). As the acidosis passes off, the leucocyte index returns to normal. Similar results were obtained in the dog, but with less influence on the alkali reserve. The same phenomena were observed in human beings with affections causing diminution of the alkali reserve. G. G.

Anisotonia in uranium nephritis. E. Pribyl. *Compt. rend. soc. biol.* **102**, 402–4 (1929); *Physiol. Abstracts* **14**, 573.—In 6 rabbits rendered nephritic by the use of U nitrate acidosis and non-protein N of the blood were increased in a parallel manner. In one instance in which a cure was effected, the non-protein N returned to normal but the acidosis persisted. The urinary Ca remained unchanged. The urinary NH_3 was greatly increased, which points to a regulatory function in acid-base equil. The NH_3 of the blood showed no increase. NH_3 is obviously formed in the kidney. G. G.

Permeability of the placenta to the serum antitoxin complex. L. W. Larrier and L. Richard. *Compt. rend. soc. biol.* **102**, 564–6(1929); *Physiol. Abstracts* **15**, 65.—Antitoxins pass through the placenta to the fetus, but heterologous normal serum does not. The antitoxic serum passes slowly, as is shown by complement deviation, but the quantity is appreciable. Anaphylactic sensitization of the fetus can be effected with antitoxic serum. G. G.

Alimentary anaphylaxis and desensitization per os. R. Jahiel. *Compt. rend. soc. biol.* **103**, 59–60(1930); *Physiol. Abstracts* **15**, 196.—In a woman of 21, certain phenomena of anaphylactic nature were observed, which in their course and treatment bring the case into line with lab. expts. on animals. It was found that the exact doses of milk necessary to cause pruritus, urticaria, etc., was more than 5 cc.; accordingly, 5 cc. of milk was administered regularly 1 hr. before giving a bowl of milk which was thus tolerated. Some days after the beginning of this treatment the anaphylactic state still existed, as the taking of a bowl of milk without the preliminary small dose caused urticaria, but ultimately the tolerance of milk was established. G. G.

Potassium in normal and pathological serum. A. Remond and E. Cantegrid. *Compt. rend. soc. biol.* **103**, 63–4(1930); *Physiol. Abstracts* **15**, 153.—Low blood K is found in Parkinson's disease and in diabetes. Markedly high blood K is observed in nephritis but not in proportion to the degree of azotemia. High blood K of less degree than in nephritis accompanies cancer but is independent of the seat and type of growth. The K is normal in amt. in numerous other conditions examd. G. G.

Zinc porphyrinuria. E. Derrien and P. Cristol. *Compt. rend. soc. biol.* **103**, 126–8(1930); *Physiol. Abstracts* **15**, 171.—In the "metallic spectrum" in porphyrinuria

Zn was demonstrated as the cause in certain cases. In the intervals between crises the Zn in the urine amounted to 1 mg. per 24 hrs., whereas during the attacks it was at least 3 times more abundant. The crisis is regarded as probably due to zincopenia, and an indication is provided for treatment with Zn. G. G.

Mode of action of manganese salts in immunization. A. LUMIÈRE AND R. H. GRANGE. *Compt. rend. soc. biol.* **103,** 261–3(1930); *Physiol. Abstracts* **15,** 132.—Injection of Mn salts in the dog caused a marked leucocytosis. It is probable that the increase of immunity produced by this method is due to this leucocytosis. Substances capable of stimulating the leucogenic function should be made use of for immunizing purposes. G. G.

Variations of affinity of hemoglobin for oxygen in hyperthyroidism. G. LITARCZEK, H. AUBERT AND J. COSMULESCO *Compt. rend. soc. biol.* **102,** 1110–1(1930); *Physiol. Abstracts* **15,** 89.—In hyperthyroidism an increase of the const. $1/K$, expressing the affinity of hemoglobin for O, was found. An increase of $1/K$ corresponds to a lower assocn. curve and to a more ample liberation of O to the tissues. The increase is not so accentuated as in anemic subjects. G. G.

The pathology of iron. F. PROESCHER. *J. Lab. Clin. Med.* **13,** 807–18(1928); *Physiol. Abstracts* **13,** 541.—A histological study of blood, of brain and of other tissues in cases of paresis, pernicious anemia and malignant growths was carried out with the Berlin-blue and methyl-green methods of staining. Many speculative suggestions are put forward to account for the distribution of Fe found by this method. G. G.

Ammoniacal output in alkalosis. M. POLONOVSKI, P. BOULANGER AND H. WAREMBOURG. *Compt. rend. soc biol.* **100,** 267–9(1929); *Physiol. Abstracts* **14,** 39; cf. *C. A.* **23,** 4970.—It has not been possible to confirm the views of Janney that increased NH_3 in the urine is anti-acid in function and that excess of $NaHCO_3$ by the mouth annuls the NH_3 eliminated. NH_3 seems to be taken from the blood by the kidney in obedience to a law similar to that governing the selection of urea. It is further confirmed that the NH_3 output does not follow that of total N, and exptl. alkalosis causes reduction of the ammoniacal coeff. which, according to the law of Hasselbalch, should remain const. E. C. K.

Blood creatinine and creatine in pathological states. J. GAVRILA, V. VOIR AND KAMNEANTZU. *Compt. rend. soc. biol.* **100,** 381–3(1929); *Physiol. Abstracts* **14,** 471.—In 15 cardiovascular cases the creatinine varied from 1.3 to 2.14 and creatine from 3.04 to 6.65 mg. %. In 13 cases of diabetes the creatinine varied from 1.33 to 2.5 and creatine from 4.05 to 7.5. mg %. In leucemia creatinine varied from 1.42 to 2.5 and creatine 3.6 to 6.72 mg. %. In 24 cases of chronic nephritis the creatinine varied from 1.33 to 10 and creatine from 3.93 to 17 mg. %. N showed parallel variations. In 7 cases of pulmonary tuberculosis the creatinine varied from 1.26 to 1.66 and creatine from 3.44 to 5.84 mg. %. In tuberculosis, pleurisy and bronchiectasis the normal limits were maintained. E. C. K.

Soap-venom complexes in immunization against cobra venom. M. RENAUD. *Compt. rend. soc. biol.* **103,** 143–4(1930); *Physiol. Abstracts* **15,** 197.—Venom of the cobra mixed with Na oleate or palmitate loses its toxicity. The immunizing power of this mixt. was tested by repeated injection into guinea pigs. In 30% of animals it was distinctly demonstrated. Soap behaves toward venom as it does toward toxin, notwithstanding the remarkable differences of chem. structure between venom and toxin. It annuls the toxic action while leaving the antigenic properties intact. E. C. K.

Pathological variations of protein osmotic pressure and the protein composition of blood serum. CH. ACHARD, A. GRIGAUT AND A. CODOUNIS. *Bull. soc. chim. biol.* **12,** 417–40(1930).—By using the osmometer of Grigaut and Boutroux, greater variations were found in the osmotic pressure of the serum proteins than in the ratio of albumin to globulin. From the study of 4 normal and 56 pathol. subjects very little correlation was found between the values and the condition of disease, except the low total protein in nephritis. The albumin-globulin ratio was found to be of little significance. C G. KING

The iodine content of the thyroid gland accompanying simple and exophthalmic goiter. P. SAINTON AND H. SIMONNET. *Bull. soc. chim. biol.* **12,** 773–6(1930).—The av. I contents from 13 cases of simple goiter and 11 cases of exophthalmic goiter were 0.095 (0.010–0.215) and 0.090 (0.010–0.267)% dry wt., resp. C. G. KING

The absence of tryptophan and histidine as the cause of pernicious anemia. Therapy of the anemias by supplementing the organism with hematogenic amino acids. GEORGE FONTÈS AND LUCIEN THIVOLLE. *Compt. rend.* **191,** 1395–7(1930).—F. and T. argue that the absence of tryptophan and histidine may be regarded as the cause of anemias. Experimentally the administration of the 2 amino acids in cases of leu-

cemic, secondary, splenomegalic and neoplastic anemias produced encouraging results. B. S. LEVINE

The "zoning" phenomenon in complement fixation with cholesterolized alcoholic beef heart extract. Its mechanism and significance. B. S. LEVINE. *J. Infectious Diseases* **48**, 189–202(1931).—L. presents theoretical considerations and exptl. evidence to explain the mechanism and significance of the "zoning" phenomenon occurring in complement fixation employed in the lab. diagnosis of syphilis in which the preliminary incubation is done in the ice box. By "zoning" L. means the occurrence of a stronger fixation of complement in a lesser amt. of suspected serum. He concludes that in the serum of most adults there are various types of immune substances either in the free state or in union with their respective homologous antigens. Upon the addn. of cholesterolized alc. beef heart suspension, the action of which L. proves to be non-specific, interfaces are created at the suspended particles of the colloid. The so-called immune complex concentrates at such interfaces in spherical and spheroid configurations. With the increase in the diln. of the serum, the dispersion of the suspended complexes increases, leading to an increase in the surface area of the sensitized spheres in accordance with the following formula: $S_2/S_1 = \sqrt[3]{n_2/n_1}$, where S_2 = surface area of the suspensoid in the more dil. serum; S_1 = surface areas of the sensitized spheres in the original diln. of the serum; n_2 = the no. of suspended spheres in the more dil. serum; and n_1 = the no. of spheres in the serum of the original diln. In a special case where $n_1 = 1$, the formula becomes $S_2/S_1 = \sqrt[3]{n_2}$. With a ration of the dispersion in the serum of the higher diln. to that of the lower exceeding 8:1 the consumption of the complement by vol., $v/2$, of full strength serum will be greater than the consumption of complement by vol., v, of full strength serum when both are dild. with the saline-antigen suspension to the same final volume. Hence, "zoning" will appear in all serums in which the consumption of complement by the so called "non-specific" antibodies in the first tube of the cold fixation procedure just exceeds, equals or nearly equals one "unit." The significance of the "zoning" phenomenon rests on the fact that it definitely proves the general immunologic rather than the specific leutic nature of complement fixation with cholesterolized alc. beef heart ext. L. concludes that to consider serum specimens manifesting "zoning" "positive for syphilis" is paramount to denoting positive for syphilis specimens showing hemolytic inhibition in a complement fixation procedure where 1.0 or 1.1 unit of complement is considered the "dose." B. S. LEVINE

Chemical investigations in Dercum's disease. IRVINE H. PAGE. *Virchow's Arch. Path. Anat.* **279**, 262–4(1930).—The depot fat of the abdominal cavity and that of the thigh were similar, and likewise normal, in a case of Dercum's disease. Chem findings do not explain why fat is laid down in Dercum's disease. E. R. LONG

Animal ochronosis and porphyry. R. FIKENTSCHER. *Virchow's Arch. Path. Anat.* **279**, 731–9(1931).—Beef kidneys, bone marrow and bone from a case of so-called "animal ochronosis" were examd. for the presence of porphyry. The results were negative in the kidneys and bone marrow and positive in the bone. In bone the substance was detected by direct chem. analysis and spectroscopic examn. of extd. pigment. F. concludes that the ochronosis, or better, osteohemochromatosis of cattle depends, in part at least, on porphyry. E. R. LONG

The glycogen content of the cadaver liver. HANS POPPER AND OSKAR WOZASEK. *Virchow's Arch. Path. Anat* **279**, 819–68(1931).—The total carbohydrate and glycogen content of the liver was detd. in 177 human bodies. Examn. was made as soon as possible after death. Usually the values obtained by chem. detn. of total carbohydrate and histol. estn. of glycogen corresponded. In sudden deaths, in persons previously in good health, the total carbohydrate content of the liver ranged from 1.56 to 6.17% of the moist wt., with considerable amounts of glycogen histologically visible. When death occurred after a wasting disease, the figure ranged from 0.24 to 1.53%, with little or no glycogen demonstrable in sections. In 22 cases of cirrhosis of the liver, where death came gradually, the value for total carbohydrate was 0.38–0.94%. Histologically demonstrable glycogen was relatively high. In 17 diabetics the total carbohydrate was 1.19–8.50%, *i. e.*, significantly higher than in other pathological conditions and equal to, or higher than, in the normal state. Glycogen could always be found, usually in considerable amount. In 11 liver tumor metastases total carbohydrate was 0.28–1.45%; glycogen was histologically not demonstrable. In 26 kidneys the total carbohydrate ranged from 0.28 to 1.64%, the higher values being found in cases of diabetes mellitus. E. R. LONG

A study of the blood urea clearances with relation to diuresis in normal and nephritic animals. ROBERT L. JOHNSTON. *J. Lab. Clin. Med.* **15**, 943–52(1930).—The ability

of the kidneys of the normal and nephritic, fasting animal to clear the blood of urea is correlated with the water-diuresis curve. A simple diuresis test is described for the detn. of the status of renal function. E. R. MAIN

The incidence of lipoids in urine. A report of the micropolariscopic examination of 1470 specimens. ARTHUR T. BRICE, JR. *J. Lab. Clin. Med.* **15**, 953–60(1930).—Lipoid substances were detected in 13.3% of the pathol. urines examd. A high incidence of urine lipoids assocd. with degenerative diseases of the kidneys suggests that pathol. conditions in the gall bladder may be an etiologic factor. E. R. MAIN

The Congo red test with special reference to excretion of the dye in the urine. NELSON W. BAKER AND ALBERT M. SNELL. *J. Lab. Clin. Med.* **16**, 262–70(1930).—The disappearance of more than 60% of intravenously injected Congo red from the blood stream in 1 hr appears to be a sp. test for amyloidosis. The dye is not excreted in the urine in the absence of albuminuria. It is excreted in relatively large amts. in chronic lipoid nephrosis and, in some instances, in nephrosclerosis with albuminuria and in renal amyloidosis. E. R. MAIN

Adrenaline glucemia in disturbances of the liver. G. NANNINI. *Minerva med.* **1930**, II, 874–7.—The glucemic curve was studied after the injection of adrenaline into 20 patients suffering from various hepatic lesions. The results indicate that the glucemic values are useful in the diagnosis of hepatic lesions and also for differentiating various types of icterus. PETER MASUCCI

The function of the liver in cardiopathic cases investigated by means of the amino acid curve. LUIGI ALZONA. *Minerva med.* **1930**, II, 917–23.—The hepatic function in patients with various forms of cardiac disturbances was studied by detg. the amt. o amino acids in the blood after the intravenous injection of glycocoll. A. concludes that the deaminizing action of the liver in cardiopathic cases varies according to the valvular lesion; the relation between compensation and the deaminizing power of the liver is not const.; in aortic lues, glycocoll disappears from the blood with more difficulty; as a general rule, the older the lesion, the more impaired is the hepatic function. PETER MASUCCI

The determining factors of the hypoglucemia in diabetic children. PEDRO B. LANDABURE. *Semana méd.* (Buenos Aires) **1931**, I, 160–4.—In 50% of diabetic children subjected to a diet and insulin treatment, hypoglucemic symptoms develop. This is due to a high variability of the glucemia in children. Even doses of 2 to 5 units may cause the syndrome which is not controlled by the sugar-forming substances in the diet. The symptoms appear at a blood sugar between 0.07 and 0.024%. A direct relation between the sugar level and the severity of the symptoms could not be established. A. E. MEYER

The passage of some normal antibodies from the mother to the fetus. ELISA MORELLI. *Sperimentale* **84**, 431–41(1930).—The bactericidal power against cholera vibrios in the blood of the pregnant guinea pig is not transmitted to the fetus. The hemolytic capacity of rabbit blood decreases during pregnancy and is not present in the new born. The lack of antibodies does not seem to be connected with changes of the complement in the blood. A. E. MEYER

The action of proteins in the growth of grafts of homologous neoplasms. GIOVANNI FAVILLI. *Sperimentale* **84**, 489–504(1930).—Mouse carcinoma and rat sarcoma were transplanted after a previous stimulation of the reticulo-histiocyte system by injection of protein. The growth was stimulated in this case; this is probably due to injuries in the spleen caused by the proteins. A. E. MEYER

Isolation of the toxin of Fraenkel's gas gangrene bacillus. II. ALFRED EBEL. *Biochem. Z.* **229**, 265–8(1930); cf. *C. A.* **24**, 5854.—Culture filtrates acid to litmus were evapd. *in vacuo* and completely pptd. by the addn. of 96% alc. The alc. soln. was then evapd. *in vacuo* to a very small vol. and again pptd. with alc. The alc. soln. of the poison was treated once more as above, until the condensed material dissolves completely in 96% alc. Upon the addn. of abs. alc., however, a thick, inactive ppt. is again produced. The soln. of the poison in the abs. alc. is now put through the same process of purification with abs. alc. until the concentrate completely dissolves in the abs. alc. and gives no ppt. even with an alc. soln. of $Pb(OAc)_2$. The soln. of the poison in abs. alc. is subjected to electrodialysis against distd. water, when only the cathode portion reveals strong activity and an alk. reaction. This portion was greatly concd. *in vacuo* and mixed with 4 vols. of 96% alc.; upon standing in the ice box inactive crystals sep. out. The alc. soln. is again concd. and purified by electrodialysis. The alk. dialyzate is pptd. with Pb acetate, the soln. freed from Pb and once more electrodialyzed. The dialyzate is concd. *in vacuo* and treated with alc. until the residue of the abs. alc. soln. is completely sol. in abs. alc. Pptd. now with ether, the

ether-alc. soln. retains the bulk of the poison. A further attempt is in progress to isolate the poison from this ether-alc. soln. S. MORGULIS

Studies on glucolysis of the blood. I. H. K. BARRENSCHEEN AND KARL HÜBNER. *Biochem. Z.* **229**, 329-42(1930).—An investigation of a number of glucolysis curves shows that the application of the equation of a first order reaction even with Fukushima's corrections for adsorption and diminished enzyme activity does not yield uniform reaction consts., more particularly during the initial stages of glucolysis. Studies on blood from normal fasting persons show that there is a 15–30 min. induction period which can be eliminated under the influence of SO_4 ions. The blood glucolysis is similarly stimulated by PO_4 and AsO_4 ions. The inorg. P during the first hrs. of glucolysis does generally diminish; this is attributed to a process of phosphorylization, the SO_4 ions stimulating this diminution in the P. It is interpreted that SO_4 ions activate the P-esterifying process Previous excessive ingestion of carbohydrate causes the disappearance of the induction time observed in the glucolysis of blood from the fasting subject, and the decrease in inorg. P occurs sooner and to a greater extent. Similarly the addn. of hexosediphosphate (but not of mono-phosphate esters) causes the disappearance of the induction time and accelerates the glucolysis. S. MORGULIS

Disturbances in the mineral regulation mechanism in diseases of cattle. A study of tetany. B. SJOLLEMA AND L. SEEKLES. *Biochem. Z.* **229**, 358-80(1930).—A study of blood serum of cattle suffering from delivery paresis and a "grass tetany" reveals some remarkable changes in the mineral metabolism, particularly in the Mg content, the concn. of Ca ions and of the inorg. P. In the former disease these quantities were on the av. 2.19, 0.44 and 2.16 mg. %; in the latter, 0.46, 1.18 and 4.33 mg. %, resp. The difference between these 2 pathol. states was also manifested in the total Ca content, namely, 4.35 and 6.65 mg. %, resp. In the normal cattle the concns. of Mg, P, Ca^{++} and Ca on the av. were 1.66, 4.57, 1.65 and 9.35 mg. %, resp. A graphic method has been developed for representing the total blood content of Mg, Ca and P in such a way that the normal and pathol. states are spatially sepd. In delivery paresis the ratio Ca/Mg = 2 approaches that (0.9) existing when narcosis is produced through the injection of a Mg salt. In "grass tetany" this ratio is Ca/Mg = 14.6, while in normal cattle it is 5.6, showing that there is actually a condition of excitation. In "grass tetany" the Mg content of the blood varies according to the time of the collection of the sample. If taken at the beginning of an attack of tetany the Mg is low and after the attack it is almost invariably high, possibly because of the strong muscle contraction during the convulsions. The tetany attacks in "grass tetany" occur even when the Ca/P is relatively high, namely 1.5, whereas in parathyroid tetany the attack does not take place unless this ratio is less than 1. In both pathol. conditions, however, the % of diffusible Ca undergoes wide variations Whereas in normal cattle the diffusible Ca constituted 48-66% of the total, it ranged from 25 to 100% during delivery paresis and from 40 to 100% during "grass tetany," but no connection was observed between the change in the % of diffusible Ca and the attacks. The inorg. P of the serum is completely diffusible under all conditions. The diffusible fraction of the Mg varied greatly in the normal and in the sick cattle. In delivery paresis no evidence was found of a relationship between the concns of the Ca^{++}, H^+, HCO_3^- and HPO_4^{--} of the serum. S. MORGULIS

Behavior of blood water during asphyxia. TAKESHI SASO. *J. Biochem.* (Japan) 12, 281-315(1930).—The plasma vol. in acute asphyxia decreases about 14.8%, this being practically independent of the dehydration of the blood. The sp. gr. of the serum is always raised by about 0.3% in acute asphyxia. The dehydration of both blood and serum during acute asphyxia is very small, being on the av. 0.6% for serum and only 0.3% for the whole blood. In prolonged asphyxia, on the contrary, the water content of the serum or blood always increases and there is never any dehydration. The dehydration occurring in acute asphyxia is not extensive enough to account for all the changes in the concn. of the various blood constituents, and the passage into the blood from the tissues must be the chief source from which these increases originate. Particularly in prolonged asphyxia, when there is actual hydremia, the increased concn of different blood constituents is obviously due to migration of substances from the tissues. S. MORGULIS

Comparative study of proteins in blood serum and pathological serosities. CH. ACHARD AND A. ARCAND. *Compt. rend.* **189**, 510-2(1929).—The authors question the fact that the proteins of exudates and transudates come only from blood plasma. Pointing out that the protein content of plasma varies notably in pathol. conditions they compare the protein content of blood serum with that of serous liquids. In 12 cases of pleurisy (10 inflammatory and 2 cardiac) about 50% of protein was found in

the serous liquids while 63–86% was found in the blood serum. The ratios between the proteins of blood plasma and serous liquids (serum/liquid) were 1.25 to 1.76 for the inflammatory cases, and 2 to 2.89 for the cardiac. The ratios for individual proteins were: albumin 1.16 to 2.24 (one exceptional value of 0.91); globulin, 1.14 to 2.23 (2 exceptional values of 0.96 and 4.13); *myxoprotein*, 1.07 to 1.79 in six cases, but 3.53, 5.66, 6.50 and 17.92 in four cases; in the two cardiac cases the values were raised for albumin and globulin, but were discordant for *myxoprotein* (1.07 to 5.66), in two cases exceeding the ratio for globulin in the blood serum but not in the serous liquid. In seven cases of dropsy the values of serum/liquid were 11.13 to 22.96 (one exceptional value of 1.60 in a case of serum rich in protein). The ratios for the individual proteins were: albumin, 3.61 to 46.47; globulin, 1.60 to 40.13; *myxoprotein*, 4.75 to 32.31. The ratios show that there was always much less albumin, globulin and *myxoprotein* in the serous liquids than in the blood serum, but the proportion was much more variable for *myxoprotein*. A. and A. conclude that most of the proteins of serous liquids come from blood plasma, but that this does not exclude the possibility of protein formation in the serous membranes. A. L. RAWLINS

Guanidine-like substances in the blood in experimental yellow fever. G. M. FINDLAY AND E. HINDLE. *Lancet* 1930, II, 678–9.—In exptl. yellow fever in monkeys there is an increase in the blood content of guanidine-like substances, similar to that assocd. with other conditions involving liver necrosis. This increase can be reduced by the administration of Ca lactate, which, however, does not prevent death but does tend to prevent hemorrhages. The method of Pfiffner and Myers was used for detg. the guanidine-like substances. F. B. SEIBERT

Manganese in foodstuffs and its possible relation to cirrhosis of the liver. A. E. BOYCOTT AND G. R. CAMERON. *Lancet* 1930, II, 959.—The method of Bradley (Lindow and Peterson *C. A.* 22, 125) was used for detg. the Mn. Various food products were analyzed and of them cloves, tea, pepper, ginger, coriander, winkles and scallops contained the most Mn. F. B. SEIBERT

Plasma-protein loss with edema but without proteinuria and its bearing on the concept of nephrosis. T. I. BENNETT, E. C. DODDS AND J. D. ROBERTSON. *Lancet* 1930, II, 1006–8.—Massive loss of protein may occur from the blood by routes other than the kidney and edema follows this loss. In such cases no pathol. changes are produced in the kidneys. F. B. SEIBERT

Urea content of the cerebrospinal fluid in status epilepticus. O. R. BINYON AND J. TYLOR FOX. *Lancet* 1930, II, 1233–4.—There was a high urea and glucose content of the cerebrospinal fluid. F. B. SEIBERT

Inflammation. V. The mechanism of fixation by the inflammatory reaction. VALY MENKIN. *J. Exptl. Med.* 53, 171–7(1931); cf. *C. A.* 24, 4833.—Microscopic studies show the presence of a network of fibrin within the tissues and numerous thrombosed lymphatics at the site of inflammation. Pptd. Fe compds., possibly coagulated horse serum or particulate matter caught in this fibrinous reticulum, will disseminate less readily than trypan blue from the site of inflammation. Trypan blue injected at the periphery of an inflamed area fails to enter the site of inflammation. Fixation of foreign substances by the inflammatory reaction is primarily due to mechanical obstruction caused by a network of fibrin and by thrombosed lymphatics at the site of the inflammation. **VI. Fixation of trypan blue in inflamed areas of frogs.** *Ibid* 179–83.—Trypan blue, injected into the circulating blood stream of frogs, accumulates rapidly in an inflamed area; injected directly into the area of inflammation, it is fixed *in situ* and fails to diffuse outward. If the dye is injected at the periphery of an inflamed area, it fails to enter the site of the inflammation. This failure of penetration is caused by the occlusion of lymphatic vessels and the presence of a network of fibrin in the inflamed area. C. J. WEST

Mineral content of pastures research (ASTON) 12. The detection of horse meat as an adulterant in sausage and other studies of the precipitin test (BOLIN) 12.

HOLMES, BARBARA: **Cancer and Scientific Research.** New York: The Macmillan Co. 160 pp.

H—PHARMACOLOGY

A. N. RICHARDS

Elimination of quinine in the bile. F. CAUJOLLE. *Bull. soc. chim. biol.* 12, 299–306 (1930).—The presence of quinine in the bile of dogs, after intravenous injection of an isotonic soln. of the neutral sulfate, is demonstrated by observing the fluorescence in

H_2SO_4 when exposed to light from a Hg vapor lamp after passage through a suitable filter. Elimination is more rapid in the urine than in the bile. B. C. A.

Intestinal elimination of iron in the dog. V. Henriquès and A. Roche. *Bull. soc. chim. biol.* **12**, 404–8(1930).—A daily oral administration of Fe (360–1675 mg.) as lactate does not affect elimination by the colon. The intestinal absorption of Fe (detd. by the $TiCl_3$ method) varies with the salt used, and the results do not support the theory of absorption in the small intestine and elimination by the large intestine. B. C. A.

Arrest of the internal secretion of the pancreas during decamethylenediguanidine hypoglucemia. E. Zunz and J. La Barre. *Compt. rend. soc. biol.* **101**, 141–3(1929); cf. *C. A.* **24**, 1149.—Synthalin hypoglucemia is accompanied by a diminution of the secretion of insulin. B. C. A.

Chemistry of overventilation. G. Popoviciu and H. Popescu. *Compt. rend. soc. biol.* **101**, 406–8(1929).—In convulsions caused by over-ventilation there is an increase in serum-Ca and a decrease in the serum-phosphate. The decrease in phosphate is reduced by ergotamine and increased by adrenaline and ephetonine. All these drugs tend to reduce the serum-Ca. B. C. A.

Effect of yohimbine on blood sugar. S. Hanson. *Compt. rend. soc. biol.* **101**, 601–3, 603–5, 605–7(1929).—Yohimbine causes a slight rise in blood sugar; in small doses it suppresses adrenaline hyperglucemia, although with larger doses a rise is observed The increase by yohimbine of the hypoglucemic action of insulin is discussed. B. C. A

Effect of adrenaline on the respiratory metabolism in exophthalmic goiter. I Schill. *Magyar Orvosi Arch.* **30**, 202–9(1929). B. C. A

Influence of electrolytes on the syneresis and clotting of blood. Satya Prakash and N. R. Dhar. *J. Phys. Chem.* **35**, 629–37(1931).—The electrolytes used were KCl, $CaCl_2$, $(NH_4)_2SO_4$, KF, $K_2C_2O_4$, AcONa, $Na_2C_4H_4O_6$, NaOH and Na citrate Each test sample contained 230 cc. of goat blood and was dild. to 250 cc. by the addn. of H_2O and salt soln. The smallest quantity of electrolyte used was 2 cc. of *N* soln. and the largest was 15 cc. of 3 *N* soln. In all cases syneresis decreases with increasing concn. of any one electrolyte. The concns. necessary to suppress syneresis in the clots formed were: KCl 0.12 *N*, $CaCl_2$ 0.0845 *N*, $(NH_4)_2SO_4$ 0.176 *N*, $K_2C_2O_4$ 0.016 *N*, Na citrate 0.016 *N*, KF 0.049 *N*, NaOH 0.039 *N*. If still higher concns. of electrolytes were added the blood was stabilized and no clotting occurred. Stabilizing of blood by fluorides, citrates and oxalates is due not to removal of Ca but to the influence of the anions. Clotting of blood and syneresis are affected by the same forces which affect formation and syneresis of both org. and inorg. gels F. E. Brown

Therapy of spontaneous mouse cancer. Failure of tuberculin, karkinolysin and some inorganic compounds therein. Burton T. Simpson and Millard C. Marsh *Ann. Surgery* **93**, 169–79(1931).—Fifty-six inorg. compds. contg. 33 chem. elements for which there is evidence indicating therapeutic value for transplantable cancer and 4 forms of tuberculin, and 1 ext. of thymus have been found to have no therapeutic action on spontaneous mouse cancer. Rachel Brown

Experimental and clinical studies on the treatment of cancer by dichloroethyl sulfide (mustard gas). Frank E. Adair and Halsey J. Bagg. *Ann. Surgery* **93**, 190–9(1931).—Mustard gas soln. is an effective agent against a localized cancer lesion Rachel Brown

Excretion urography: an experimental investigation of the properties of uroselectan. W. Arthur Mackey. *Glasgow Med. J.* **34**, 9–18(1931).—Uroselectan, the Na salt of 5-iodo-2-keto-1-pyridineacetic acid, is well tolerated by rabbits even when administered in amts. proportionately 10 times the human dose, provided the injection is made slowly Administered rapidly, doses smaller than the max. may be fatal. There is no evidence that the kidneys are injured during the excretion of the concd. soln. of uroselectan The urinary tract of the rabbit may be demonstrated by x-rays during the excretion period. R B

The results of the use of acriflavine hydrochloride in the treatment of undulant fever. D. S. Thurber. *Can. Med. Assoc. J.* **23**, 665–8(1930).—Results from a number of cases suggest the intravenous use of acriflavine materially shortens the course of undulant fever, and prevents the development of an incapacitating arthritis. A. T. Cameron

The danger of indiscriminate iodine prophylaxis. J. F. Reith. *Pharm. Weekblad* **68**, 77–82(1931).—A review of the arguments against the indiscriminate and unsupervised use of iodized salt. A. W. Dox

The silica content of human blood and its alteration by administration of silica.

HEINRICH KRAUT. *Z. physiol. Chem.* **194**, 81–97(1931).—The SiO_2 content of the blood of normal persons varies between 1 and 3% of the sulfate ash, but each individual maintains his SiO_2 value within much narrower limits. The blood of tuberculous subjects contains somewhat more SiO_2 than that of normal persons. Administration of easily absorbed SiO_2 increases the SiO_2 content of the blood by a multiple of the quantity administered. After discontinuing the treatment, several weeks elapse before the SiO_2 content sinks again to normal. Two methods of administration were employed: (1) oral administration of "silistren," a glycol ester of silicic acid, and (2) inhalation of a spray contg. a low mol. silicic acid obtained by hydrolysis of $SiCl_4$ or by treatment of silicates with acids at p_H 2–3. The 2nd method is much more efficient. The av. of 27 cases showed an increase of 1.65% over the normal, while in 1 case it rose to 4.5%. The inhalation expts. show that the increase does not correspond to the quantity administered, but that a mobilization of the SiO_2 of the organism occurs, so that the SiO_2 value of the blood remains altered for a considerable time. Eventually the original value returns. The far greater absorption by inhalation is explained by the fact that the orally administered silistren encounters an unfavorable p_H in the intestine and the bulk of it is there converted into an insol. and difficultly absorbed form. A. W. D.

The fate of ternary chains other than those with three atoms of carbon. V. ZAGAMI. *Ann. physiol. physicochim. biol.* **6**, 365–79(1930).—The subcutaneous administration of AcOH to rabbits causes an increased heat production equal to the energy produced by its complete oxidation. Pentose or ethylene glycol has no such effect. Z. concludes that the metabolism of proteins or of carbohydrates does not necessarily involve the formation of ternary C chains as an intermediate product of metabolism. H. E.

The significance of chemical configuration for the pharmacological effects of adrenaline-like substances. BUN-ICHI HASAMA. *Arch. exptl. Path. Pharmakol.* **153**, 161–86 (1930).—β-Phenethylamine, the basic substance of the adrenaline group, has only slight sympathomimetic action. The introduction of a phenolic OH group in the para position or of an alc. OH group in the β-C of the side chains increases its activity. Interchanging the NH_2 and the OH groups of the β-hydroxy-β-phenethylamine destroys its sympathomimetic action. Increasing the length of the side chains by a Me group decreases the activity by ½. The lability of the adrenaline groups is not necessarily detd by the OH groups of the benzene ring. Replacing a H in the α-C by a second phenyl group destroys the activity upon nerves, but endows the substance with strong muscle-stimulating properties. Oxidizing the secondary alc. to a ketone diminishes the activity. The toxicity of the various members of the group does not parallel the intensity of the sympathomimetic action. H. EAGLE

The kidney action of phlorhizin. Investigations upon frog kidneys. HANS HÄUSLER. *Arch. exptl. Path. Pharmakol.* **153**, 187–213(1930).—With a glucose-free perfusing fluid (Mines soln.) phlorhizin does not cause any change in urine secretion. Its glucuretic action is due (1) to an inhibition of the normal tubular resorption, and (2) to a change in the permeability of the vessel walls for glucose, which allows its passage through the walls of the tubules into the urine. H. EAGLE

Distribution of insulin in the organism following its injection. I. HANS HORSTERS. *Arch. exptl. Path. Pharmakol.* **153**, 214–30(1930). Following its intravenous injection into rabbits, insulin is stored primarily in the liver; within 60 min., however, it appears in the muscles, and gradually increases in quantity, 50% of the total injected being recovered after 3½ hrs. from the muscles. In marked contrast, following subcutaneous injection, the max. storage is reached in 60 min., and then only amounts to 30% of that injected. H. raises the question as to whether the injection of insulin stimulates an endogenous secretion. **II. Relationship between method of nutrition and blood sugar.** *Ibid* 231–43.—In both alimentary and adrenaline hyperglucemia the quantity of insulin which can be extd. from the organs is increased. Animals on a carbohydrate-rich diet also show increased insulin. In such animals, the administration of insulin causes a mobilization of endogenous insulin in the tissues which may exceed the quantity injected. Exogenous insulin is much easier to ext. than endogenous. H. suggests that there are 2 types of insulin: fixed tissue insulin, and free, loosely bound pancreatic insulin. In the diabetic the effective tissue-insulin would be decreased. H. E.

Pharmacological and physiological studies on the sweat centers. IV. The effect of inorganic cations upon the thermal and sweat center in the midbrain. BUN-ICHI HASAMA. *Arch. exptl. Path. Pharmakol.* **153**, 291–308(1930); cf. *C. A.* **24**, 2188.—K, Ba and Na ions injected subcranially into the tuber cinereum cause an increase in temp. and in sweat secretion; Mg and Ca ions are inhibitory. H. EAGLE

The mechanism of the lowering of blood pressure by histamine. MAX HOCHREIN AND ROLLF MEIER. *Arch. exptl. Path. Pharmakol.* **153**, 309–24(1930).—In cattle, dogs

and rabbits very small quantities of histamine cause capillary dilatation, acceleration of circulation, moderate increase of arterial pressure and occasionally also of venous pressure. All these effects can be explained by either a decrease in the total vessel vol., or an increased blood vol. Larger doses cause a transient hypertension, followed by hypotension. Both arteries and veins contract, particularly the latter, causing a diminished flow of blood through the dilated capillaries into the veins. The fall in arterial pressure is therefore due to imperfect filling. There is occasionally an increased liver vol., possibly because of the filling of the hepatic capillaries with blood. A temporary decrease in respiration is followed by an acceleration, possibly on account of the increased pressure in the right auricle. H. EAGLE

The effect of homatropine methonitrate upon gastric secretion. M. TENNENBAUM. *Arch. exptl. Path. Pharmakol.* **153**, 325–30(1930).—Homatropine methonitrate is only $^1/_{10}$ as inhibitory upon gastric secretion by dogs as is atropine. H. EAGLE

The effect of an extract of the posterior lobe of the hypophysis, morphine and caffeine upon the activity of the kidneys. B. SAGER. *Arch. exptl. Path. Pharmakol.* **153**, 331–46(1930). H. EAGLE

The reaction of snake hearts to certain cardiac poisons. OTTO GESSNER. *Arch. exptl. Path. Pharmakol.* **153**, 347–58(1930); cf. *C. A.* **24**, 5374.—The heart of *Tropidonotus natrix* or *Vipera berus* is only $^1/_{1000}$ as sensitive to strophanthin as the frog heart. A qualitatively similar resistance was observed against the whole digitalis group, possibly due to decreased absorption by the cardiac muscle. The symptoms of poisoning, and the effects of cations, particularly Ca and K, are the same as in frog hearts. The stimulating and conducting portions of the snake heart are comparatively more sensitive to digitalis than the contracting portions. Saponin and saponin-like toxins affect snake and frog hearts similarly. The blood of *Tropidonotus natrix* and that of *Vipera berus* are not toxic for the heart of these snakes. H. EAGLE

Treatment of morphinism by insulin and grape sugar. GÜNTHER ANTON AND JOSEF JACOBI. *Klin. Wochschr.* **9**, 1547(1930). H. EAGLE

The differentiation of the total blood sugar into glucose and galactose following the administration of galactose. H. PETOW, H. KOSTERLITZ AND H. N. NAUMANN. *Klin. Wochschr.* **9**, 1549–50(1930).—In normal patients, there is little change in the blood glucose following the administration of galactose The latter disappears from the blood within 2 hrs., reaching a max. of 0.02 0.07% within the first hr. In cases with hepatic damage, the blood galactose may rise as high as 0.145%, and is still demonstrable after 2 hrs. In diabetics, the galactose curve is normal, but there is a surprising increase of blood glucose, which may double its original value. H. E

Effect of insulin upon secretion. PETER F. MEYER. *Klin. Wochschr.* **9**, 1578–81 (1930).—Insulin increases the acidity and usually the quantity of gastric juice within 15–90 min. The blood sugar change is the inverse of this change, reaching min. values when the gastric secretion is at its max. Diabetics who do not become hypoglucemic following insulin show no gastric reaction. In achylia, insulin, like histamine, is ineffective. H EAGLE

The retention of uroselectan in the human body. W. TOURNÉ AND F. DAMM. *Klin. Wochschr.* **9**, 1581–3(1930).—With normal kidney function, there is no demonstrable uroselectan in the blood 4 hrs. after its administration; residual quantities of < 0.5 g. in the blood show partial impairment of kidney damage; > 0.5 g. after 4 hrs. indicates a high degree of kidney damage. H EAGLE

Effect of caffeine in hypoglucemia. LUDWIG POPPER AND SUSANNE JAHODA. *Klin. Wochschr.* **9**, 1585–6(1930).—The symptoms of insulin shock are not related to the hypoglucemia, and can be relieved by caffeine, which does not affect the blood sugar. H. EAGLE

The effect of the administration of bilirubin upon the blood. LUDWIG POPPER. *Klin. Wochschr.* **9**, 1770(1930).—The intravenous injection of 0.05 g. of bilirubin into humans causes a transitory (24 hrs.) increase in hemoglobin without affecting the red cell count. H. EAGLE

Clinical experiences in the treatment of post-encephalitic phenomena with harmine. HEINZ FRANK AND OTTO SCHLESINGER. *Klin. Wochschr.* **9**, 1864–6(1930).—Good results are reported, increased by the simultaneous administration of scopolamine. H. EAGLE

The vascular effect of minute iodine concentrations. GEORG BARKAN AND SALME PRIKK. *Klin. Wochschr.* **9**, 1872(1930).—No definite effect is produced by I_2 in concns. between 1:50,000 and 1:10,000 000 upon the caliber of rabbit ear veins. H. E.

Rhusinic acid, an active constituent of Rhus succedanea, L. KOJIRO TERAUCHI. *Tôhoku J. Exptl. Med.* **16**, 123–56(1930).—The chem. and pharmacol. properties of an

acid isolated from the fruit of *Rhus succedanea* are described in detail. It is primarily cardiotonic, is sympathomimetic and is very toxic for rabbits (lethal dose = 0.0067 g. per kg.). H. EAGLE

Effect of camphor upon the adrenaline output and the blood sugar content in non-anesthetized, non-fasted dogs. KOGORO OIKAWA AND TATSUSABURO INABA. *Tohoku J. Exptl. Med.* **16**, 298–310(1930).—Camphor-olive oil injected subcutaneously into dogs in quantities greater than 1.75 g. per kg. caused increased secretion of adrenaline, hyperglucemia, increased pulse rate and respiration, lasting for as long as 2 hours, with the max. effect in 30–60 min. H. EAGLE

The effect of certain narcotics (urethans) on permeability of living cells to water. BALDUIN LUCKÉ. *Biol. Bull.* **60**, 72–9(1931).—Narcotics in the presence of sea water do not decrease permeability to water beyond the value normally found in the fluid. There is a tendency to reduce permeability to water; narcotics of this type are less effective in this respect than are bivalent cations. This effect, too, depends on the chem. compn of the medium in which the narcotizing compd. is dissolved. F. G. G.

Action of ephedrine on the dog heart (electrocardiograph studies) I. E. COELHO. *Compt. rend. soc. biol.* **99**, 1525–7(1928); *Physiol. Abstracts* **14**, 524.—Synthetic ephedrine, ephetonine (Merck), produces certain modifications in the electrocardiogram of the dog. In small doses it causes bradycardia, sinoauricular and auriculo-ventricular block, ventricular extra systole and increase of the T-wave. In large doses it induces tachycardia and affects the whole conducting system, including Purkinje's fibers. Finally the heart fails in fibrillation. G. G.

Intra-ocular tension and physico-chemical properties of the vitreous humor. E. REDSLOB AND P. REISS. *Compt. rend. soc. biol.* **99**, 1586–8(1928); *Physiol. Abstracts* **14**, 521; cf. *C. A.* **22**, 3422.—Swelling of the vitreous humor depends upon its reaction. Isotonic solns. of HCl and H_3PO_4 were injected into the vitreous humor of rabbits. The tension fell in 30 min., and the normal condition was restored in 30 days. Alk. injections gave less characteristic results. Hypotension often follows the rise. Injection of gelatin causes a marked reduction lasting about 8 days. H_3PO_4 was injected in a case of glaucoma, and caused a marked lowering of tension with relief which lasted a month. The effect of gelatin is due to its action on the isoelec. point of the proteins of the vitreous humor. G. G.

Action of mercurial diuretics on hydremia, chloremia, azotemia and the urinary elimination. I. HATZIEGANU, I. GAVRILA AND BORBIL. *Compt. rend. soc. biol.* **99**, 1813–4 (1928); *Physiol. Abstracts* **14**, 258–9.—Neptal, solyrgan and novasurol given to man on a fixed diet cause identical variations in the blood and urine of subjects with different cardiac and renal affections. Hydremia is increased, reaching a max. 5 hrs. after injection. The Cl of blood is increased but not to the same extent in all cases. The N of the blood is practically unchanged. Intense diuresis occurs on the day of injection. The output of Cl on the day of injection is 2 to 7 times greater than on the day preceding. Urea is only slightly increased but not in all cases. G. G.

Action of insulin and thyroxine on endocrine glands. J. VATRIN AND P. FLORENTIN. *Compt. rend. soc. biol.* **100**, 111–3(1929); *Physiol. Abstracts* **14**, 581.—After injection of insulin the thyroid becomes congested, and colloid degeneration increases in the hypophysis. Thyroxine in increasing doses causes a marked reaction in the pancreas; the islets of Langerhans are multiplied, and new islets are being formed at the expense of exocrine acini. Insulin causes hyperplasic and thyroxine degenerative effects. G. G.

Ergotamine, yohimbine and post-hemorrhagic hyperglucemia. I. I. NITZESCU. *Compt. rend soc biol.* **100**, 386–8(1929); *Physiol Abstracts* **14**, 448.—Ergotamine and yohimbine inhibit the hyperglucemia produced by adrenaline. Hemorrhage causes hyperglucemia with increase of P and Ca. The latter form by hyperglucemia is also inhibited by the drugs mentioned, and it is therefore not due solely to increased glycogenolysis following increased output of adrenaline. G. G.

Action of camphor, hexetone and sodium salicylate on cestodes and Ankylostoma of the dog. S. F. GOMES DA COSTA. *Compt. rend. soc. biol.* **100**, 600–1(1929); *Physiol. Abstracts* **14**, 671.—*d*-Camphor in 3 *M*/1000 soln. is inactive on the *Tenia serrata* of the dog. *l*-Camphor has a stronger effect. Hexetone in 5 *M*/1000 has a strong effect, and causes paralysis in twice this concn. Part of this action is due to the salicylate in which hexetone is dissolved. The action of these reagents on cestodes is somewhat less than on *Ascaris*. On the whole, the action of the camphors on *Ankylostoma* is practically nil. Hexetone is less active on *Ankylostoma* than on *Tenic.* G. G.

Effect of sodium carbonate on polycythemia after muscular exercise. I. I. NITZESCU AND O. MIHALESCU. *Compt. rend. soc. biol.* **100**, 686–9(1929); *Physiol. Abstracts*

14, 456.—Among the metabolites of muscular exercise supposed to stimulate splenic contraction lactic acid occupies a prominent place. Na_2CO_3 injected intravenously opposes this action, which is therefore apparently due to the acid. Psychic excitation and lack of oxyhemoglobin are probably secondary agents. It is important to note that, while the alkali prevents splenic contraction and polycythemia, it does not prevent hyperpnea after exercise. G. G.

Action of chloroform on mammalian plasma and serum. P. BORDET. *Compt. rend. soc. biol.* **100**, 751–3(1929); *Physiol. Abstracts* **14**, 283–4; cf. *C. A.* **24**, 891. —If oxalated rabbit plasma is coagulated under the influence of $CHCl_3$ after several hrs. only traces of thrombin are found in it. $CHCl_3$ coagulation of ordinary plasma yields abundance of thrombin. $CHCl_3$ does not excite the formation of thrombin in the absence of Ca. A serum resulting from normal coagulation rapidly loses its thrombin whereas that arising in presence of $CHCl_3$ maintains activity over long periods. G. G.

Chlorine, bromine and iodine and cardiac excitability. L. DE BORGRAAF. *Compt. rend. soc. biol.* **101**, 167–8(1929); *Physiol. Abstracts* **14**, 359.—Br can completely replace Cl as an anion in the perfusing fluid of the frog heart without causing any important changes in the beat. The irritability, however, is diminished. Iodine used to replace Cl entirely causes distinct changes. The heart is slowed and the irritability diminished. G. G.

Action of sodium glycocholate and sodium taurocholate in Ringer-Locke solution on isolated frog heart. D. MANTE AND S. CIORAPCIU. *Compt. rend. soc. biol.* **101**, 225–6(1929); *Physiol. Abstracts* **14**, 375.—Bradycardia was never observed as a result of the action of a weak soln. of bile salts on the frog heart. Tachycardia was common, except in case of concd soln., which caused, besides bradycardia, intoxication of the myocardium and tendency to arrest the beat. G. G.

The pancreatic function in insulin hypoglucemia. B. A. HOUSSAY, J. T. LEWIS AND V. G. FOGLIA. *Compt. rend. soc. biol* **101**, 239–41(1929); *Physiol. Abstracts* **14**, 380.—After the injection of insulin into (*a*) normal dogs, (*b*) dogs without pancreas and (*c*) dogs with cervical grafted pancreas the glucemic fall is similar in all, but the restoration is slowest in the last-mentioned animals. This fact may be due to the suppression of the extrinsic nervous system, which influences the pancreatic endocrine function and which is stimulated by the hypoglucemia. G. G.

Effect of continued injections of insulin in depancreatized dogs. B. A. HOUSSAY, J. T. LEWIS AND V. G. FOGLIA. *Compt. rend. soc. biol.* **101**, 241–5(1929); *Physiol. Abstracts* **14**, 380.—There is a basal secretion of insulin which increases or diminishes according to the glucemic fluctuation. The amt. can be extd. by injections of insulin into depancreatized dogs. It is necessary in such cases to inject a regular dose of 0.01 unit per kg. per hr. G. G.

Injection of sodium nucleate in dementia precox. H. CLAUDE, P. SCHIFF AND A. DIMOLESCO. *Compt. rend. soc. biol.* **101**, 539(1929); *Physiol. Abstracts* **14**, 672.—A markedly irresponsive condition of the nervous system to injection of nucleate of soda and to other kinds of interference is generally recognized. Yet in cases which show no improvement a profound reaction of the organism is indicated by certain changes in the blood. Leucocytosis is an early occurrence, chiefly affecting mononuclears. It may be exhibited before any signs of fever set in; eosinophils are increased later. The discordance between phys and psychic reactions is very marked in dementia precox. G. G

Influence of the thyroid on reticulo-endothelial blocking. F. GOEBEL. *Compt. rend. soc. biol.* **101**, 596–7(1929); *Physiol. Abstracts* **14**, 658.—Injection of colloidal Ag which blocks the reticulo endothelial system and causes hyperglucemia in normal dogs does not cause hyperglucemia after removal of the thyroid. The hyperglucemia is a function of the glycogen reserve, and it may fail to occur when colloidal Ag is injected into a normal dog after thyroid feeding. Blocking of the reticulo-endothelial system causes no change in the cholesterol content of the blood in the dog after thyroidectomy. G. G.

Secretion and glucemia. E. ZUNZ. *Compt. rend. soc. biol.* **102**, 339–40(1929); *Physiol. Abstracts* **14**, 576; cf. *C. A.* **24**, 413.—Secretin free from hypotensive properties lowers glucemia in the dog, and the degree of this effect is in proportion to that on pancreatic activity. But prepns. of secretin have been found which produce the effect on the pancreatic juice without hypoglucemia. Thus, the two actions are not caused by the same chem. compd. G. G.

Histamine and alkalosis. R. RAFFLIN AND P. SARADJICHVILI. *Compt. rend. soc. biol.* **102**, 559(1929); *Physiol Abstracts* **15**, 39.—Subcutaneous injections of histamine

in epileptics and alcoholics produced a condition of alkalosis due to gastric and urinary secretion of Cl. A max. of alky. was reached 20 min. after the injection. The max. of Cl output by the kidney occurred in 10 min.; then there was a fall due to gastric secretion, followed by a 2nd max. 35 min. after the injection. G. G.

Antagonism of the base tropine (tropanol) and pilocarpine on the submaxillary gland. R. HAZARD. *Compt. rend. soc. biol.* **102**, 574–6(1929); *Physiol. Abstracts* **15**, 59; cf. *C. A.* **24**, 891.—Tropanol checks the secretion of saliva evoked by injection of pilocarpine, and pilocarpine increases the secretion when inhibited by tropanol. G. G.

Changes in toxicity of uranyl nitrate in the rabbit. M. GARNIER AND J. MAREK. *Compt. rend. soc. biol.* **102**, 978–81(1930); *Physiol. Abstracts* **15**, 171.—The authors formerly stated that $UO_2(NO_2)_2$ injected subcutaneously in the rabbit was always fatal in a dose of 0.003 g. per kg. From a series of expts. they show now that the fatal dose varies under certain circumstances between 0.001 and 0.004 g. per kg. A cause of this variation, apart from the breed, is the sex of the animal and the season. Females are more resistant than males, and rabbits injected in the summer are less resistant than in cooler weather. G. G.

Action of ephedrine on the spinal and venous pressures of the dog before and after yohimbinization. M. LOEPER, A. LEMAIRE AND J. PATEL. *Compt. rend. soc. biol.* **102**, 989–91(1930); *Physiol. Abstracts* **15**, 191–2.—In the cholalosed dog the intravenous injection of 5 mg. of chlorate of ephedrine causes a prolonged rise of blood pressure in the carotid artery. In the yohimbinized dog the carotid rise of pressure is suppressed. Ephedrine acts on the meningeal pressure independently of the arterial system. Its action is the opposite of that of adrenaline, which augments the meningeal pressure even after yohimbinization. G. G.

Cholagog action of neptal. E. CHABROL, R. CHARONNAT, M. MAXIMIN, J. PORIN AND BOCQUENTIN. *Compt. rend. soc. biol.* **102**, 991–2(1930); *Physiol. Abstracts* **15**, 169; cf. *C. A.* **25**, 352.—Increasing the mol. wt. of cholagog aromatic acids by substitution increases their effect on the flow of bile. The introduction of Hg into the formula of Na salicylate is effected in neptal. In doses of 2 to 4 cc. it doubles the amt. of bile; in 1 expt. the bile was quadrupled. The Hg *per se* does not affect the action. There is a certain parallelism between the cholagog and diuretic action of neptal. A diuretic like $CaCl_2$, on the other hand, has an inhibitory action on the secretion of bile. G. G.

Influence of the non-saponifiable substance of ox spleen on anemia of the rabbit. C. SOULA, J. TAPIE AND J. FAU. *Compt. rend. soc. biol.* **102**, 1022–3(1930); *Physiol. Abstracts* **15**, 154.—Bled rabbits require 10 to 20 days for the regeneration of the erythrocytes. A rabbit which receives 1 g. of cholesterol daily requires 14 days for this result. Given a daily dose of 1 g. of non-saponifiable substance (X), the rabbit needs but 7 days for the regeneration. G. G.

Study of *p*-aminobenzoate of *N*-diethylleucinol (panthesin). A. ROIG. *Compt. rend. soc. biol.* **102**, 1043–4(1930); *Physiol. Abstracts* **15**, 192.—The formula of panthesin has the same aromatic nucleus as novocaine, $NH_2COOCH_3CH_2N(C_2H_5)_2$. It may be sterilized by boiling. It does not inhibit the action of adrenaline on the rabbit ear. Anesthesia of the cornea with a 2 % soln. of panthesin lasts 58 min., as against 35 for cocaine. The relative toxicity of panthesin, *i. e.*, the ratio of toxicity to anesthetic power, is 2 or 3 times less than that of novocaine. The abs. toxicity of panthesin is greater. G. G.

Cholagog action of certain phenolic acids. M. MAXIMIN AND A. BOCQUENTIN. *Compt. rend. soc. biol.* **103**, 3–5(1930); *Physiol. Abstracts* **15**, 168–9.—Sodium benzoate is inactive toward biliary secretion in the dog in doses of 1 g. per 20 kg. The salicylate gives inconstant results. The *m*-hydroxybenzoate has a strong cholagog action. The diphenol acids, catechuic and caffeic, greatly increase the output of bile with increased wt. of solid ext. *p*-Hydrxoybenzoate is practically without effect. It seems that the position of the *m*-hydroxyl group favors the development of cholagog properties. Vanillic acid, in which the OH in the meta position is replaced by OCH_3, has a very marked cholagog action. Though the phenol function intervenes in the effectiveness of the compd., it is not in itself a sufficient factor. The role of the carboxyl group, as previously described, is further insisted on. G. G.

Action of insulin in tissue culture. E. FRIEDHEIM AND L. ROUKHELMAN. *Compt. rend. soc. biol.* **103**, 10–2(1930); *Physiol. Abstracts* **15**, 173.—Insulin acting directly on mesenchymatous cells in artificial culture is without influence on the formation of glycogen, and, far from increasing the consumption of sugar, it diminishes this consumption. The diminution runs parallel with a disturbing influence on growth *in vitro*. G. G.

Action of dinitro-α-naphthol on the pigeon. P. V. UYTVANCK. *Compt. rend. soc. biol.* **103**, 29–31(1930); *Physiol. Abstracts* **15**, 193.—The pigeon after injection of dinitro-α-naphthol exhibits polypnea; 12 min. later the rectal temp. rises and reaches 46.5° in 18 min. Peripheral vasodilatation, hyperglucemia and diminution of muscular and hepatic glycogen accompany the hyperthermia. The phosphates of blood and muscle are increased. The Ca content of blood does not change. The hyperthermic effects of dinitro-α-naphthol are not suppressed by exposure of the reagent to the rays of a Hg-vapor lamp. G. G.

Action of calcium and potassium on the isolated heart. R. KIRSCH AND H. FRÉDERICQ. *Compt. rend. soc. biol.* **103**, 34–6(1930); *Physiol. Abstracts* **15**, 157.—The chronaxie of the isolated heart of the tortoise is lengthened by an excess of Ca or a deficiency of K. It is diminished in the reverse conditions. If the perfusion with the modified Ringer soln. contg. excess Ca or deficient K be prolonged, then the chronaxie slowly returns to its original normal value. A fresh perfusion now with normal Ringer soln. causes a new variation of the chronaxie in the opposite direction to the first change. G. G.

Karyokinetic action of arsenious acid and alkalosis. M. ROCMANS. *Compt. rend. soc. biol.* **103**, 42–3(1930); *Physiol. Abstracts* **15**, 193–4.—In the guinea pig and dog increased multiplication of the cells in the lymphoid organs occasioned by H_3AsO_3 runs concurrently with a wave of alkalosis. The soly. of the Ca ion is diminished, and this effect is proportional to the dose of H_3AsO_3. The results obtained with H_3AsO_3 correspond with those obtained in peptone shock. The curves of cellular division and alkalosis run parallel. In the dog the normal p_H of 7.42 rises to 7.52, and that of the guinea pig rises from 7.29 to 7.42. The acid-base-regulating mechanism does not alter, for the variations of $NaHCO_3$ and H_2CO_3 are mutually balanced. G. G.

Arterial tension and leucocytes. Action of acetylcholine. L. JUNG AND P. COLLET. *Compt. rend. soc. biol.* **103**, 79–81(1930); *Physiol. Abstracts* **15**, 158.—The lowering of arterial pressure caused by injection of acetylcholine in dogs is accompanied by leucopenia. A return to a normal leucocyte count accompanies the restoration to the normal of arterial pressure, but it is slower than the rise of pressure. G. G.

Latent period of fluoride intoxication. H. CRISTIANI. *Compt. rend. soc. biol.* **103**, 292–4(1930); *Physiol. Abstracts* **15**, 126.—The bones of animals from districts where there are no factories emitting F contain very small quantities of this element in their compn., less than 0.05%. The bones of animals from the neighborhood of Al works contain 0.379%. Therefore, in regions where F is present, even in min. quantity, there is a condition of latent fluorosis in the cattle. G. G.

Strychnine-soap complexes. L. VELLUZ. *Compt. rend. soc. biol.* **103**, 302–3 (1930); *Physiol. Abstracts* **15**, 124.—Soaps tend to neutralize the toxicity of alkaloids but to a less extent than that of toxins. A mixture of oleate of Na and strychnine, boiled for 15 min. on a water bath, may be injected into a guinea pig in 4 times the fatal dose of strychnine without harmful effect. Increase of the amt. leads to the typical symptoms. Repeated injections of the complex during a period of 2 months did not produce any immunity either to pure strychnine or to the complex, and it is obvious that immunization against crystalloid poisons cannot be effected by conferring colloidal characters on them. G. G.

Suprarenal capsules in hyperglucemia produced by decamethylenediguanidine. X. CHAHOVITCH. *Compt. rend. soc. biol.* **103**, 328–30(1930); *Physiol. Abstracts* **15**, 117.—Synthalin produces hyperglucemia in the rabbit by its action on the suprarenal capsules. Bilateral extirpation of the capsules prevents the hyperglucemia following injection of synthalin; extirpation of both suprarenal glands does not *per se* cause variations in the amt. of free sugar in the blood. G. G.

Vascular effects of aconite. H. EKERFORS. *Compt. rend. soc. biol.* **103**, 443–5 (1930); *Physiol. Abstracts* **15**, 124.—Aconitine exerts a double action on blood vessels—constrictor in small doses and vasodilator in large doses. The latter is the more common effect, the first being sometimes doubtful. Atropine does not inhibit the action. Aconitine inhibits the constrictor action of $BaCl_2$, and therefore may be supposed to act on the muscle. G. G.

Alteration of the thyroid gland in fluoride intoxication. H. CRISTIANI. *Compt. rend. soc. biol.* **103**, 554–6(1930); *Physiol. Abstracts* **15**, 193.—Guinea pigs were given fluorides in small doses over long periods and their thyroid glands compared with those of controls. In the glands of the former, lesions were common and marked. The animals died after an av. duration of 53 days. G. G.

Macroscopic alterations of the hypophysis in fluoride intoxication. H. CRISTIANI. *Compt. rend. soc. biol.* **103**, 556–7(1930); *Physiol. Abstracts* **15**, 193.—Chronic poisoning

with fluorides causes diminution of vol. of the hypophysis, which becomes flat in appearance. The thickness in the guinea pig is reduced from about 2.25 to 1.7 mm. G. G.

Immediate hyperglucemia with use of insulin. F. RATHERY, R. KOURILSKY AND (MLLE.) Y. LAURENT. *Compt. rend. soc. biol.* **103**, 563–4(1930); *Physiol. Abstracts* **15**, 173.—Injection of insulin in the normal dog causes an immediate rise of the blood sugar, which is transient; it is followed quickly by a fall. This hyperglucemia is not const., but it is frequent. The phenomenon seems to be independent of the nature of the insulin employed, the dose and the path of injection. G. G.

Insulin hyperglucemia in different vascular regions. F. RATHERY, R. KOURILSKY AND (MLLE.) Y. LAURENT. *Compt. rend. soc. biol.* **103**, 565–6(1930); *Physiol. Abstracts* **15**, 173.—The hyperglucemia immediately following the injection of insulin in the normal dog is more marked in certain parts than in others. It is especially pronounced in the hepatic circulation. There is increased discharge of sugar into the hepatic vein and a notable increase of portal blood sugar. G. G.

Cardiovascular effects of choline derivatives administered by the digestive tract. M. VILLARET, L. JUSTIN-BESANÇON AND R. CACHERA. *Compt. rend. soc. biol.* **103**, 583–4(1930); *Physiol. Abstracts* **15**, 190.—Methylacetylcholine introduced directly into an exposed loop of intestine of the dog causes a fall of blood pressure which is maximal in 1 min. Absorption is extremely rapid. The arterial fall of pressure is very prolonged. The heart is scarcely affected, the fall being due to dilatation of the arterioles. Bromocholine used in the same way causes a fall of pressure which is less marked, but bradycardia sets in with respiratory trouble. The animal dies in 50 min. from a dose of 66 mg. per kg. G. G.

Utilization of pentoses by the animal organism. Action of intravenous injection of pentose on lactose secretion. I. I. NITZESCU AND M. BENETATO. *Compt. rend. soc. biol.* **103**, 1119–22(1930); *Physiol. Abstracts* **15**, 119–20.—After the intravenous injection of pentose the amt. of sugar in the milk is increased. Injection of sucrose causes no change in the output of lactose. The lactose-forming power of rhamnose is not as great as that of glucose, but it is equal to that of galactose. G. G.

Acute mercury poisoning, its treatment and alterations in chlorine, water, nitrogen and acid-base relations during its course. A. LANDAU, J. GLASS AND I. BEILES. *Wiener Arch. inn. Med* 20, 31[illegible]1930).—Acute Hg poisoning with Hg oxycyanate was treated by Bi thera[illegible]dministration, after the period of anuria had passed, of NaCl by mouth [illegible]nd subcutaneous injections of physiol. NaCl soln. A chem. study w[illegible]e blood and urine during the 5 definite stages of the poisoning. During [illegible]st period of anuria there was a retention of water without edema, a marked chloropenia of the plasma and blood corpuscles, a constantly increasing azotemia and a lowering of the alkali reserve, forming a complex which is typical for severe Hg poisoning. The chloropenia is probably due to loss of Cl in vomiting and diarrhea, as in mild cases without these symptoms the chloremia remains normal. The azotemia is very marked; it depends in part on the anuria and on a toxic breaking down of the cell proteins. There is a retention of urea, uric acid, creatinine and other N-contg. compds. The azotemia continued to increase for a time after the administration of NaCl had begun. Administration of NaCl at later stages did not increase the azotemia. Usually in acidosis the Cl index of the blood corpuscles rises from increase in Cl content in the corpuscles. Here, however, there is a marked decrease in alkali reserve without a shifting of the NaCl from plasma to blood corpuscles. In spite of a decreased alkali reserve the urine remained alk. Hyperventilation of the lung from toxic stimulation of the respiratory center by Hg or from toxic split products from cellular proteins, and the lowering of the CO_2 tension in the alveolar air bring about a decrease in alkali reserve of the plasma with excretion of basic substances by the kidneys. HARRIET F. HOLMES

Lymphadenoma produced by injection of coal tar. L. MERCIER. *Compt. rend. soc. biol.* **103**, 125–6(1930); *Physiol. Abstracts* **15**, 198.—Injection of coal tar in olive oil into the peritoneal cavity of the mouse caused generalized hypertrophy of the lymphatic glands, and splenic and pulmonary nodules. In some of the descendants of an animal thus treated lymphadenoma appeared spontaneously. Injection of coal tar into the progeny of sensitized animals caused a rapid appearance of lymphoid growths with an increase in the no. of pos. results. E. C. K.

Reaction of thyroid gland to hypophyseal extract. M. ARON. *Compt. rend. soc. biol.* **103**, 145–7(1930); *Physiol. Abstracts* **15**, 180.—Details are given of the histological changes which occur in the thyroid gland as a result of hypophyseal injection in the guinea pig. The vesicles become empty and the epithelial cells are enlarged. The

evidence of marked activity is more easily observed and less equivocal in the thyroid than in any other gland. E. C. K.

Blood-vessel wall changes produced by vigantol and their regression in animals. ALICE SCHIFF. *Arch. Path. Anat.* (Virchow's) **278,** 62–83(1930).—Feeding vigantol (com. irradiated ergosterol) to cats and rabbits in daily doses of 2–4 mg. for 1–3 months resulted in changes in the media of the arteries. The changes included degeneration, proliferation and calcification. Regression of the lesions could not be definitely established; on the other hand, there was some evidence of subsequent progression E. R. LONG

Initial stages of vigantol injury in rabbits. ERNST LAAS. *Arch. Path. Anat.* (Virchow's) **278,** 346–64(1930).—Single doses of 30 mg. vigantol per kg. animal weight produced in rabbits the following changes: calcification in the media of arteries, beginning in the elastic fibers without a recognizable pre-stage, and passing in the aorta from a localized nodular medial necrosis to a more diffuse degeneration; secondly, calcification in various organs, dependent in turn upon degeneration caused by injury to the vessels concerned in the local blood supply. E. R. LONG

Sectioning of the splanchnic nerve and the effect of cholic acid on the creatinine excretion. AIJIRO TAKU. *J. Biochem.* (Japan) **12,** 371 81(1930). —Subcutaneous injection of cholic acid causes a diminution in the creatinine excretion of the rabbit, but this effect disappears after sectioning of the splanchnic nerve. The hypoglucemic influence of cholic acid is likewise removed by sectioning of the splanchnic. All of this indicates that cholic acid exerts its action not peripherally but centrally. S. MORGULIS

Influence of hyperglucemia and of extirpation of the adrenal bodies on the amylolytic power of saliva and blood. TULLIO GAYDA. *Arch. ital. biol.* **84,** 55 66(1930). —See *C. A.* **25,** 328, 338. S. MORGULIS

Behavior and action of organic sulfur compounds in the organism of the dog. I. Action and fate of thiophene in the metabolism of the dog. ANAST. A. CHRISTOMANOS. *Biochem. Z.* **229,** 248 54(1930).—Thiophene is detd. colorimetrically as follows: To each of 2 test tubes are added 5 cc. concd H_2SO_4 and 2 drops of satd. $CuSO_4$ soln., then 0.05 cc. *N* lactic acid. This is thoroughly mixed and heated in boiling water exactly 3 min. After cooling to about 10° a known amt. of thiophene in alc. soln. is added to one and the unknown soln to the other test tube; this is mixed and left at room temp. for 10 min. when a color from rose to deep red develops, depending upon the concn. of the thiophene The colors should be matched quickly in a colorimeter, and the results calcd. by the formula $C = C_1 + S_1/S$, where C_1 = concn. of known soln., S_1 and S are the colorimeter readings of the known and unknown solns. As little as 0.013 mg. still gives a recognizable color. When fed to dogs 5.7- 12.2% of the thiophene are excreted in the urine as a conjugated product and part is assumed to change to CH_3-CH_2SH in the intermediate metabolism. Thiophene does not depress the total N metabolism Thiophene causes a characteristic ataxy reaction in the dog. S. M.

Influence of different foods on the amount of unsaturated fatty acids with four double bonds in the blood. N. BEREND. *Biochem. Z.* **229,** 323 8(1930).—The amt. of fatty acids with 4 double bonds in blood increases, after a preliminary drop, following the ingestion of fat. This preliminary decrease does not occur if carbohydrate is fed together with the fat. Carbohydrate or protein alone has no effect. S. M.

Assimilability and toxicity of racemic lactic acid. OTTO FÜRTH AND PAUL ENGEL. *Biochem. Z.* **229,** 381–96(1930).—The ingestion of fermentation lactic acid causes in man the loss of 20–30% in the urine. The lactic acid is detd. in human urine by pptg. the urine with phosphotungstic acid and removing from the filtrate the glucide-like substances by pptn. with $Ca(OH)_2$ and $CuSO_4$ In rabbit urine lactic acid cannot be so detd.; the long and difficult preliminary extn. with ether in a Lindt liquid extracter is necessary. For the rabbit lactic acid administered orally proved much more toxic than previously supposed. Although subcutaneously as much as 2.8–3.6 g. per kg. can be injected without any obvious harm, rabbits died when fed 1.6 g. and even as low as 0.6 g. lactic acid per kg., also when that quantity was given over a period of 3 days. For mice the lethal dose for subcutaneous injections of the Na lactate was 2–4 g. per kg. Rats, on the contrary, can withstand prolonged administration of 2 g. or more per kg. without any ill effects. The high toxicity of the ingested *l*-lactic acid for rabbits and its poor assimilability also in man throw doubt upon its value as a food substance. The use of small quantities of lactic acid in lemonades, fruit juices or confectionary is probably harmless. Alkalosis induced by $NaHCO_3$ did not alter the effect of lactic acid in rabbits and mice. Nor was the utilization of the lactic acid by the rabbit materially altered by adrenaline, phlorhizin or loading with sugar. Mild

P intoxication caused in rabbits a large loss of lactic acid, followed, however, by increased retention when the intoxication passed off. *In vitro* expts. on the catalytic oxidation of lactic acid on C surfaces fail to reveal any difference between the *d*- and *l*-acid, as is observed in physiol. expts. S. MORGULIS

Does adrenaline exert a direct action on the base of the mid-brain? R. H. KAHN AND E. RINDT. *Endokrinologie* **8**, 1–4(1931).—Following the application of a 1:1000 adrenaline soln. to the surface of the base of the mid-brain there is no evidence of a sympathetic stimulation of end organs or of any injury. This indicates that the direct application of adrenaline to nerve tissue is without effect On the contrary, a strong rise in blood pressure results promptly from the faradic stimulation of the base of the mid-brain. S. MORGULIS

Effect of alkaline extracts of the anterior lobe of the hypophysis on the genitalia of female rats. M. REISS, H. SELYE AND J. BÁLINT. *Endokrinologie* **8**, 15–22(1931).—Alk. exts. from the anterior hypophysis exert an inhibiting effect on the hormone prepd. from the urines of pregnant women. This inhibiting action was especially manifested on the epithelium of the uterus. The striking changes produced by the injection of the sex hormone were absent if this was accompanied by an injection of the alk. ext. The uterus hypertrophy does not occur in animals treated with both exts. and the great hypertrophy of the ovary likewise fails to develop. S. MORGULIS

Studies on relation of chemical constitution and biological action: amyostatic poisons. TAKAOKI SASAKI AND ICHIRO OTSUKA. *J. Biochem.* (Japan) **12**, 429–58 (1930).—Synthetic products made from aminophenylalanine with glycine anhydride possess very interesting biol. actions. These compds., which are the HCl salts of 3-aminohydrocarbostyrils (3-Astyl), act specifically upon the brain stem and cause, in rabbits given subcutaneous injections, disorganization of the myostatic and statokinetic responses resembling the decerebrate rigidity or the akinetic-rigidity syndrome observed in human pathology. The amyostatic action of local anesthetics like novocaine, tutocaine and acoine is similar to that of the 3-Astyl and its derivs., which also seem to have local anesthesia effects. The original must be consulted for a detailed account of the chem. prepn. of these various astyl compds. and their biol. effects. S. MORGULIS

The cause of the diminished effect of the vagus on the heart under insulin. C. E. RÄIHÄ AND P. MALM. *Skand. Arch. Physiol.* **61**, 64–70(1931).—The diminished chronotropic effect of vagus stimulation upon the heart under the influence of insulin is attributable to a lowered sensitivity of the heart. There is some evidence to show that the depressing effect of the insulin on the response to vagus stimulation is associated with an increased K content of the heart. S. MORGULIS

Copper studies. C. G. SANTESSON. *Skand. Arch. Physiol.* **61**, 79–112(1931).—Liver injury from Cu intoxication may arise in a variety of ways. In some instances of acute intoxication or intoxication for a long period with very large doses the blood is the seat of primary injury. Icterus with hematuria and hemoglobinuria, even hemorrhagic nephritis follow, and sometimes there is also evidence of methemoglobin formation. The disruption of red cells occasionally produces thrombosis of the liver blood capillaries which lead secondarily to necrosis of the parenchyma. However, the liver injury may also result from an altogether different cause. In the author's expts. with $CuSO_4$ the primary change in the liver was a strong capillary hyperemia with extensive bleeding which disrupted the liver parenchyma. The clotting of the blood takes place readily, leading to capillary thrombosis and thus to necrosis without primary blood alterations. The hyperemia is due to dilatation of the finest blood vessels and is common in all metal intoxication (Hg, Bi, Cu and especially As). The bleeding, at least in the case of As and P, results from injury of the vessel wall. S. never found icterus or cirrhosis of the liver, and thinks that possibly rabbits are not subject to icterus. A round cell infiltration was observed which might possibly have been an early stage of cirrhosis. The hyperemia from Cu intoxication extends also to the lung and frequently causes hemorrhage or pneumonia. Although intestinal changes have frequently been described, S. found little evidence in his expts. Likewise, the kidney was only slightly affected, although occasionally a little albumin appeared in the urine but never any bile pigment. Generally the intoxication with Cu or Bi has similar effects, but the former acts more upon the liver, whereas the latter acts on the large intestine and cecum and on the kidneys. S. MORGULIS

Toxic action of dictamnin. A. OGATA. *J. Pharm. Soc. Japan* **50**, 1124–33(1930).—Thoms (*C. A.* **17**, 2583) previously isolated dictamnin (I) from *Dictamnus albus* and studied its toxic action. O. repeated the study of the toxic action of I and found a slightly different toxic action. F. I. NAKAMURA

The action of formaldehyde on neuro-muscular excitability. D. BENNATI AND E.

HERZFELD. *Compt. rend.* 190, 1522–5(1930).—The injection of 0.1 cc. of 2% CH_2O in saline into the lymph sac of a 35 g. frog produced no important changes in the chronaxia or rheobase of the sciatic nerve-gastrocnemius. The injection of 0.5 cc. of the same soln. caused loss of excitability apart from an appreciable modification of the 2 characteristics of this excitability. Av. protocols are included. T. H. RIDER

Physiological action of aminomethyl-(3,4-dihydroxyphenyl)-carbinol. RAYMOND-HAMET. *Compt. rend.* 191, 869–71(1930); cf. Barger and Dale, *C. A.* 5, 109.—*Aminomethyl-(3,4-dihydroxyphenyl)-carbinol* (*artérénol*) (I) when injected prior to *d,l-adrenaline-HCl* (II) causes a greater hypertensive effect than the later injection of an equiv. dose of II. However, when II is injected it produces a greater hypertensive effect than a later injection of I. Loup (*C. A.* 7, 4016) has shown that the hypertensive effect diminishes with repeated equal doses of II or other like substances. The action of I proves a little greater than that of II; therefore, the mechanism of the action must be different. In a dog with a sufficient prior dose of *yohimbine* (III), to reverse the action of II, I still causes hypertension, accompanied, however, by renal dilation, whereas I administered without a prior dose of III causes renal constriction. The action of I is, therefore, similar to that of *ephedrine* (IV) (cf. R.-H. *C. A.* 22, 271). However, while strong doses of IV are hypotensive, fatal doses of I are still hypertensive. Similar to IV and contrary to II; the effects of I are not augmented by cocaine. T. H. R.

The chemistry of anesthesia. WILDER D. BANCROFT AND GEORGE H. RICHTER. *J. Phys. Chem.* 35, 215–68(1931).—All types of anesthesia are considered explained satisfactorily by the theories of Binz and of Claude Bernard, that the reversible coagulation of the colloids of the sensory nerves produces anesthesia. The material offered by this paper, however, is limited to a discussion of general anesthesia, local anesthesia not being specifically included. A cursory criticism of other theories is followed by the development of the Binz-Bernard theory, and a discussion of the 3 basic criticisms directed against it, namely: (*a*) The concns. at which narcotics are active are much less than that required to flocculate the cell colloids. (*b*) Coagulation of the cell colloids represents the toxic effect of a narcotic and is irreversible, whereas narcosis is a reversible phenomenon. (*c*) The cases in which the dispersion of the colloids is decreased by narcotics are explained as being only apparent. In answer to (*a*) B. and R. call attention to the fact that the presence of electrolytes makes possible the flocculation of protein sols with a low concn. of EtOH, and the assumption that the colloidal systems of the cell may be so sensitized in life that a small quantity of a narcotic will flocculate them. (*b*) and (*c*) are answered by the fact that with sensitized protein sols reversible flocculation with low concns. of narcotics was accomplished *in vitro*, and that reversible flocculation was demonstrated in yeast cells. Facts which cannot be explained by other theories but which can be explained by the Binz-Bernard theory are stressed. The stimulation of general protoplasmic irritability produced by low concns. of narcotics is explained as dependent upon the decreased stability of the colloids caused by these low concns. while narcosis is caused by higher concns. Attention is called to the fact that typical stimulants, such as caffeine and strychnine, behave as narcotics in high concn. The stimulating after-effect of narcotics is explained as due to the same colloidal state, passed through again in the process of peptization. Anesthesia caused by water, salts, heat, cold, or elec. or mech. means may also be explained as due to the effect on the colloidal state of protoplasm. The conclusion is reached that there is no relation between chem. structure and physiol. action on the grounds that structure merely dets. the phys. properties, which in turn, together with concn., govern the physiol. action. All drugs are assumed to stimulate in some low concn. and to depress in higher concns. Synergism is explained as follows: A small concn. of a drug is adsorbed entirely upon the principal substrate. The addn. of a synergistic drug which is adsorbed upon the same substrate displaces a certain amt. of its predecessor which then affects the secondary substrates in the same manner as would a higher original concn. Antagonism would occur when the colloids of a cell are reversibly coagulated and the agent that caused the flocculation is displaced by a substance of weaker flocculation capacity for the given concn., in which case the bio-colloids will again be peptized by the electrolytes. NaBr and antipyrine, which have a quieting effect on the nerves, produce a lowered irritability following upon increased dispersion of the colloids. Narcotizing agents are divided into 2 groups: direct narcotics, which coagulate the cell colloids by direct action (Et_2O, $CHCl_3$, EtOH) and indirect agents which interfere with some normal function of the cell, such as oxidation, and the coagulation is produced by the accumulated waste products (NO_2, C_2H_2, HCN). T. H. RIDER

Investigation into the distribution of lead in the organism on basis of a photographic (radiochemical) method. SVEND LOMHOLT. *J. Pharmacol.* 40, 235–45(1930).—A

soln. of $PbCl_2$ contg. a small amt. of radium D was injected into mice and subsequently sections of the various organs, or the entire animal, were prepd. and placed on photographic plates. When the plates were later developed the presence of the radioactive substance could be seen. Pictures showed that Pb is deposited in greatest amt. in the liver, in the cortex of the kidney, and in osseous tissue. Very little was found in the brain. C. RIEGEL

The electrocardiogram of non-anesthetized dogs as modified by the intravenous injection of pitressin, atropine sulfate and vagus section. CHARLES M. GRUBER AND WM. B. KOUNTZ. *J. Pharmacol.* **40**, 253–73(1930); cf. *C. A.* **25**, 745.—The following cardiac changes were noted: (1) a brief period of slowing, (2) a period of acceleration, (3) a prolonged period of slowing. During the latter phase the electrocardiogram showed shifting pacemaker, prolongation of auriculo-ventricular conduction time, sino-auricular block, partial auriculo-ventricular block, extra systoles, high T-waves, high branching T waves and bigeminal pulse. After atropine or vagus section, the same changes were noted. C. R.

A study of the effect of morphine upon the respiratory center. A. H. MALONEY AND A. L. TATUM. *J. Pharmacol.* **40**, 291–304(1930).—Depression of the respiratory mechanism is more marked after neonal, phenobarbital, or (to a less degree) amytal and ethyl-α-methylbutylbarbituric acid, than after urethan, chloral hydrate or avertine. From observations on stimulation of the central end of the cut sciatic nerve, stimulation of the intact skin and the effect of increased or decreased intrapulmonic pressure on respiration after morphine in rabbits it is concluded that morphine reduces the responsiveness of the center to acceleratory afferent nervous impulses and to CO_2, but increases the effectiveness of inhibitory vagal impulses. C. R.

Iodine prophylaxis and endemic goiter. A. T. CAMERON. *Can. Pub. Health J.* **21**, 495–506, 541–8(1930).—An extensive discussion and review of the literature on the distribution of I in nature and its correlation with thyroid diseases, particularly simple endemic goiter. A close relationship between deficiency of I in the diet and simple goiter is indicated. Other possible causes of endemic goiter are discussed. There is strong evidence that in certain regions a water-borne infection is a factor, but this probably acts through an effect on I metabolism. It is concluded that iodized salt is the best medium for I prophylaxis. The I content of Canadian iodized salt (1 part KI or NaI to 10,000) seems unnecessarily high, and is perhaps 10–20 times greater than required. The evidence that iodized salt is potentially dangerous for adult (non-toxic) goitrous individuals is frequently open to criticism, and gravely exaggerated. Further study of this aspect is desirable. A bibliography of 60 references is appended. R. E. THOMPSON

Influence of externally applied preparations to promote growth of hair. A. FORSTER. *Arch. exptl. Path. Pharm.* **144**, 363(1929); *Schweiz. Apoth. Ztg.* **68**, 545–7(1930).—Results of systematic expts. on cats with 6 classes of medicaments (19) do not support the belief that the normal growth of hair can be influenced by the external application of supposedly sp. substances promoting growth, *e. g.*, cholesterol, chem. degradation products of hair or "proteolytic enzymes." Aside from the effect of substances producing excessive stimulation of the skin, or of too high concns., treatment with each of the substances examd., even white vaseline, or 50% alc., although widely different in chem. and pharmacol. characters, may produce an increase in the growth of hair. This fact must be ascribed to the effect of mechanical stimulation, an increased flushing with blood, and perhaps also a cleansing of the skin. However, the mechanical effect may be increased by the use of locally acting chem. stimulants. S. WALDBOTT

Poisoning by seeds of the castor oil plant. P. LIPTÁK. *Ber. Ungar. pharm. Ges.* **1928**, No. 5; *Med. und pharm. Rundschau; Schweiz. Apoth. Ztg.* **68**, 280–1(1930); cf. *C. A.* **15**, 2936; **17**, 1844; **19**, 2533.—An account is given of 3 cases of poisoning by ricinus seed; 2 cases were fatal after, resp., 2½ and 5 seeds only had been eaten. S. WALDBOTT

A study of the treatment of Sydenham chorea. B. WASMER. *Thesis*, Lyon, 1929; *J. pharm. Alsace Lorraine* **57**, 255(1930).—Arsylen has been found an efficient and innocuous remedy (cf. *C. A.* **22**, 813). S. WALDBOTT

Distribution of hydrastine between the erythrocytes and the plasma. R. FABRE. *J. pharm. chim.* [8], **12**, 339–45(1930); cf. *C. A.* **24**, 4865.—Hydrastine-HCl was injected into a dog and 100-cc. samples of blood were taken after 1, 24, 48 and 72 hrs. Na citrate was added and plasma and erythrocytes were sepd. by centrifuging. From each sample the alkaloid was extd. by the Stas-Otto-Ogier method, converted into fluorescent hydrastinine sulfate with H_2SO_4 and H_2O_2, and equal vols. of the solns. were photographed in Wood's light. Again, the erythrocytes proved to have a fixing power for

the alkaloid superior to that of the plasma. Expts. *in vitro*, however, showed no difference. S. WALDBOTT

Bee and wasp poison. DE VASCONCELLES. *Rev. Terap.* **1930**, No. 9; *Therap. Ber.; Schweiz. Apoth.- Ztg.* **68**, 561–3(1930).—Present knowledge of this poison and the methods of combating its effects on man are reviewed; cf. Langer, **1896**; *C. A.* **13**, 2934; **14**, 78; **15**, 378, 2127; **17**, 2916, 3058; **18**, 1534; **23**, 906, etc. Effective antidotes are an injection of 0.1% adrenaline soln. (Samson), or of *racedrine* (racemic ephedrine) (Rubitschang) which prolongs the antidotal effect, or of *rephrine* which is a combination of both. S. WALDBOTT

The chemical examination of *Sida cordifolia*, Linn. (GHOSH, DUTT) **17**. Chloretone as a preservative (POLÁK) **17**.

WOLFF-EISNER, A.: **Handbuch der experimentellen Therapie, Serum- und Chemotherapie: Ein Handbuch für die ärztliche Praxis und Klinik.** Munich: J. F. Lehmanns. 236 pp. M. 18.

I—ZOÖLOGY

R. A. GORTNER

Insect oils and fats. J. TIMON-DAVID. *Bull. soc chim. biol* **12**, 395–403(1930); cf. *C. A.* **23**, 3513. The larvae of more than 2 dozen insects studied contain quantities of oil varying from 0.94 to 28.0%. The I values of the oils vary from about 1.2 in the case of some Aphidians (these oils have a high sapon. value) to 164.5 for *Saturnia pyri*, Sch. The non-drying oils are most largely represented. The isolation of hexabromostearic acid by bromination of the acids from *Colaspidema atra*, Ol. (m. p. 178.5°) confirms the presence of linolenic acid in the oil of this insect. Oleic acid is widely distributed in insect oils. The amt. of unsaponifiable matter varies from 0.75% in the oil of *Ergates faber*, L. to 12.5% in that of *Heliotaurus monticornis*, Reitt. The oils of tropical insects have a lower I value than those of insects inhabiting cold countries. Females generally are richer in fat than males. Related species yield oils of a similar type. B. C. A.

A study of the occurrence of trimethylamine in marine animals. A. STANLEY COOK. *Can. Chem. Met.* **15**, 22–3(1931).—Trimethylamine oxide was isolated from the muscle of various species of fish. A method is given for the quant. estn. of $(CH_3)_3NO$ in biol. materials, based on the reduction to $(CH_3)_3NH$ and micro steam distn. and titration of the liberated $(CH_3)_3NH$. W. H. BOYNTON

Occurrence of manganese in insects. II. A. P. VINOGRADOV AND M. V. NEUSTRUEVA. *Compt. rend. acad. sci. U. R. S. S.* **1930A**, No. 6, 127–32; cf. *Compt. rend. acad. Sci. U. R. S. S.* **1929A**, No. 10, 227.—Mn was detd. in a large no. of insect species The av. % of Mn based on live wt. was 10^{-4}, the extreme values being 2×10^{-4} and 5.2×10^{-2}. *Formica rufa* has the max. content. The amt. of Mn depends somewhat on the character of the food, is independent of sex and varies inversely with the atm of gaseous exchange in the insect, those always in motion having the smallest Mn content. With regard to distribution in the body, in *Formica rufa* the head contains an av. % of 2.8×10^{-2}, middle portion 9×10^{-2}, posterio portion 3×10^{-1} based on the dry wt. The latter part of the insect contains the major portion of the alimentary tract and also the gland furnishing the poisonous secretion. Its high Mn content is not due to food residues in the tract since the food of these insects contains less Mn and more Fe than the whole insect. As Mn plays a catalytic role in some fermentations, and as HCO_2H probably results from the action of an oxidative-enzyme upon carbohydrate, the high Mn of the posterior part may be related to HCO_2H production. LEWIS W. BUTZ

Occurrence of vanadium in marine organisms. A. P. VINOGRADOV. *Compt. rend. acad. sci. U. R. S. S.* **1930A**, No. 17, 465–7.—*Phalluris obliqua* and *Ciona intestinalis* contain V; *Molpadia affinis* and *Cucumaria frondosa* do not. It would seem that all Ascidiidae have a V-contg. blood pigment. *Phalluris obliqua* contains 0.0302% of the live wt. The quant. method follows: Fuse the ash with Na_2CO_3 and KNO_3, ppt. Pb vanadate from the aq. soln. of the melt, dissolve the ppt. and titrate the V, reduced by SO_2, with $KMnO_4$. LEWIS W. BUTZ

Molar concentration of snail blood; its factors and variations; influence of the state of activity of the animal. MARCEL DUVAL. *Ann. physiol. physicochim. biol.* **6**, 346–64(1930).—There is no definite relation between the state of activity of *Helix pomatia* and the molar concn. of its blood as tested by the depression of the f. p. NaCl constitutes 70–80% of the total. The molar concn. of the blood of the snail steadily

increases ($\Delta > -0.4°$) until rain or dew allows an imbibition of water. If this hydration does not occur, the animal dies when Δ reaches about $-0.6°$. The total blood CO_2 varies inversely with NaCl, is a max. during the state of activity and constitutes 20–30% of the total molar concn. NaCl and carbonates account for almost the entire molarity of snail blood. It contains only 2–3 mg. of mineral P per l. H. EAGLE

Goldfish susceptible to hydrocyanic acid gas. R. J. RYAN. Calif. Dept. Agr., *Monthly Bull.* **19**, 728(1930).—In 2 cases, orchard fumigation with liquid HCN caused the death of goldfish colonies in ponds located about 100 ft. from the nearest tree. Cf. *C. A.* **14**, 2953–4. C. R. FELLERS

Metabolism of the honey-bee colony during winter. C. L. CORKINS. Wyoming Agr. Expt. Sta., *Bull.* No. **175**, 3–54(1930). —As the external temps. decline below the clustering temp., the metabolic rate is not materially increased. C. R. FELLERS

Cholesterol of decapod crustaceans. A. LEULIER AND A. POLICARD. *Compt. rend. soc. biol.* **103**, 82–3(1930); *Physiol Abstracts* **15**, 142.—A method of extg. the cholesterol from certain crustaceans is described. The cholesterol is similar to that of higher animals, but its rotatory power is somewhat higher. G. G.

Influence of thyroxine on growth of embryos of the pond snail. O. V. HYKES. *Compt. rend. soc. biol.* **103**, 644–6(1930); *Physiol. Abstracts* **15**, 180.—Thyroxine has a depressing influence on the growth of the embryos of the pond snail (*Physa*). It alters the normal process of differentiation but has no direct influence on the duration of development. G. G.

Ion action. IV. The influence of various ions on the rate of the toad heart. SHUN HOMMA. *Japan J. Med. Sci.* **1**, No. 3, 109–47(1929).—Expts. were conducted on the isolated toad heart perfused with oxygenated Ringer soln. The NaCl in it was replaced by salts contg. NaBr, NaI, etc., in various concns. It was found that rubber tubing must not be used in the work. Br and I ions show a positive chronotropic action. In weaker concns. this is not evident. Weak concns. of NO_3 ions show a positive chronotropic effect, but strong concns. are markedly negatively chronotropic. SCN ions are practically the same as NO_3 ions. SO_4 ions are very weak and chiefly negative Anions in a given concn. are very different and the sensitivity of the heart beat for these anions shows a lyotropic series. Li shows a negative chronotropic action, and in concn. of 0.11 mols. the heart is quickly stopped. An antagonism exists between Li and K. **V. The influence of various ions on the excitability of heart strips of the frog.** *Ibid* 147–55.—Expts. on strips of heart muscle from *Rana nigromaculata* in a Ringer strip preparation in which various ions were interchanged showed certain changes in irritability when stimulated with direct current of const. duration Br, I and SCN ions in weak concns. increase the irritability. In high concn. the irritability is more or less decreased. SCN shows the greatest effect. SO_4 produces a diminution, while NO_3 ions cause an increase. The concn. of each anion for max. increase in irritability also shows a lyotropic series. The influence of anions on contractility is independent of the irritability. G H. W. LUCAS

Intracellular oxidation-reduction studies. III. Permeability of echinoderm ova to indicators. ROBERT CHAMBERS, BARNETT COHEN AND HERBERT POLLACK. *J. Expll. Biol.* **7**, 1–8(1931).—Ova of the sandollar (*Echinarachnius parma*) and starfish (*Asterias rubens*) were fertilized and freed from jelly and membranes before they were immersed in solns. of indicators. Eggs that were unstained were injected with 1% $K_3Fe(CN)_6$ as a test for reduced, colorless indicator Toxicity of the various stains was gaged by the subsequent development of the eggs. All indophenols studied penetrated the egg membranes except those with a sulfonate radical. Under aerobic conditions the indicators of the series studied down through methylene blue are reduced within the ova. Penetrating indicators are toxic. Except phenol blue sulfonate the indicators that failed to penetrate were non-toxic. Upon cytolysis or tearing, the indicator is washed from the ovum and the reducing substances pass into the surrounding fluid but retain their activity. C. M. MCCAY

The effect of hydrogen-ion concentration on protozoa, as demonstrated by the rate of food vacuole formation in Colpidium. SYLVIA M. MILLS. *J. Expll. Biol.* **7**, 17–29(1931).—Colpidium cultures (from hay infusion) were suspended in a series of buffer solns. and fed India ink suspensions. The rate of formation of food vacuoles indicates the feeding rate. This attains a max. at p_H 6.0. The max. rate of movement also occurs at this p_H. The mucus produced for food collection has a max. viscosity at a p_H of 8.0. This value lies in the zone of decreased food consumption and movement. C. M. MCCAY

The adaptation of Gunda ulvae to salinity. I. The environment. C. F. A. PANTIN. *J. Expll. Biol.* **7**, 63–72(1931).—*Gunda ulvae* occurs at the mouths of streams

flowing into the salt water of the ocean. It must withstand changes from fresh water to undiluted sea water. It may be exposed to either for periods of several hrs. **II. The water exchange.** *Ibid* 73–81.—These worms immersed in dil. sea water swell. At great dilns. the swelling is less than if they were covered with semi-permeable membranes. In waters contg. only small amts. of inorg. elements the worms swell and die. If these fresh waters are rich in $CaCO_3$ the swelling is much less. NaCl, $NaHCO_3$ or glycerol cannot be substituted for the $CaCO_3$. **III. The electrolyte exchange.** *Ibid* 82–94.—The loss of salts upon the transfer of the worms from sea water to fresh water was measured by elec. cond. Twenty-five % of the salts are lost as the worms imbibe water to double their vol. In waters contg. $CaCO_3$ in which the worms survive their internal salt concn. is reduced to 6–10% of that of sea water. Ca alone seems able to check this salt loss since it cannot be replaced by the other electrolytes studied and since salt loss is continuous in distd. water up to the stage of cytolysis. C. M. M.

Researches on the interior medium of the marine lamprey (Petromyzon marinus)—its variations as the exterior medium is changed. FONTAINE. *Compt. rend.* **191,** 880–2 (1930).—Lampreys were placed in fresh water which was progressively dild. with sea water. After 24 hours' immersion in water of a given concn. the Cl content and osmotic pressure of the blood were detd. The Cl concn. increased but the ratio of Cl to other ions in the blood decreased. Mucous retards the appearance of pathol. symptoms when the lamprey is placed in salt water. J. G. MCNALLY

A comparison of the action of magnesium chloride on the respiratory activity and on the contractility of the frog ventricle. J. LEIBOWITZ AND A. SCHWEITZER. *Biochem. Z.* **229,** 291–5(1930).—At the close of the seasonal hypersensitivity of the frog heart to $MgCl_2$ it is found that Mg salts exert an inhibitory effect upon tissue respiration which is parallel to the diminishing inhibition of the contractility. The inhibiting action of small doses of Mg on the oxidation can be shown during the summer in the heart but not in the liver. S. MORGULIS

Action at a distance and the development of the eggs of the sea urchin. New experiments. J. MAGROU AND MME. M. MAGROU. *Compt. rend.* **191,** 802–4(1930); cf. *Ibid.* **186,** 802(1921); **188,** 733(1929); **189,** 779(1929).—Eggs of the sea urchin (*Paracentrotus lividus*) are markedly affected at a distance by exposure to bacterial suspensions and chem. mixts., although sepd. therefrom by a quartz flask with a ground and hydraulically sealed stopper. These expts. were repeated with controls not exposed to the above agents, and slight irregularities of growth in the controls suggested that the larvae do not perfectly accommodate themselves to the sealed flask. A new set of expts. was therefore performed in which the active substances rather than the eggs were placed in the closed vessel. The results confirmed the action at a distance effected by *B. tumefaciens*, and glucose in an oxidizing medium. The open top of a tube contg. the active substance may be bent down and introduced into a control tube without effect on the development of the larvae, thus showing that the action at a distance is not due to a substance capable of traveling through this tube. T. H. RIDER

Actions at a distance on fertilized eggs, sperm and virgin eggs of the sea urchin (Paracentrotus lividus Lk.). J. MAGROU AND MME. M. MAGROU. *Compt. rend* **191,** 963–5(1930); cf. preceding abstr.—Sperm of *Paracentrotus lividus* Lk. exposed in quartz vessels to the same conditions as reported in the previous article, when used to fertilize normal virgin eggs, gave larvae which developed abnormally. Virgin eggs likewise treated before fertilization gave abnormal larvae. The exposure of eggs or sperm in the same manner to a soln. of uranium nitrate too weak to affect a photographic plate in 24 hrs. still produced abnormalities. T. H. RIDER

Chemical processes of cellular division. LOUIS RAPKINE. *Compt. rend.* **191,** 871–4(1930).—Accepting the hypothesis (Harris, *Proc. Roy. Soc.* (London) **B94,** 426 (1923)) that cellular division is preceded by a denaturation of proteins accompanying a splitting of the cellular lipoid-proteins, R. investigated the occurrence of the SH radical (I) during the stages before and after the division of eggs of *Paracentrotus lividus* Lk. Virgin eggs showed 35 mg. I per 100 g. eggs. Thirty min. after fertilization this figure dropped to 10 mg. I, and 10–15 min. before the first division increased to 46 mg. I. Eggs exposed to the action of 0.00001 *M* $HgCl_2$ 20 min. after fertilization for a period of 5 min. then transferred to sea water or sea water contg. $PhNH_2$ or cystine failed to develop. Transferred to a 0.001 *M* soln. of cysteine in sea water, however, 70–90% developed. Thus cellular division can be controlled by the removal or addn. of I. T. H. R.

Variation in the response to light in Ameba proteus with special reference to the effects of salts and hydrogen-ion concentration. S. O. MAST AND H. R. HULPIEU. *Protoplasma* **11,** 412–31(1930).—The rate of reaction is largely dependent upon age

size, etc., of the ameba. Under comparable conditions increase in HCl causes increase in reaction time. The reverse effect is obtained with CO_2. An increase in concn. of the chlorides of K, Mg and Ca causes a decrease in reaction time. In solns. of NaCl there is no consistent relation. M. H. SOULE

12—FOODS

F. C. BLANCK AND H. A. LEPPER

Amendment to the Federal food and drugs act of June 30, 1906. Food and Drug Administration, U. S. Dept. Agr., *Service and Regulatory Announcements, F. D.* No. **1**, Suppl. 1, 1930.—The text of the amendment of July 8, 1930, to Section 8 of the act is given. The Secretary of Agriculture is authorized to promulgate, from time to time, such standards of quality, condition and (or) fill of container for *canned foods*, as will in his judgment promote honesty and fair dealing with the consumer. Canned food coming within the jurisdiction of the act (except meat and meat food products subject to the Federal Meat Inspection Act, and canned milk) which fall below such standards is misbranded unless its package or label bears a plain and conspicuous form of statement promulgated by the Secretary, indicating that it falls below the standard. Canned food is defined as "all food which is in hermetically sealed containers and is sterilized by heat." It is provided that nothing in the amendment "shall be construed to authorize the manufacture, sale, shipment or transportation of adulterated or misbranded foods." H. A. LEPPER

Definitions and standards for food products. Food and Drug Administration, U. S. Dept. Agr., *Service and Regulatory Announcements, F. D.* No. **2**, Suppl. 2, August, 1930.—Definitions and standards are adopted for *fruit juice, grape juice, orange juice* and *whole-wheat flour*. The standard for *flour* has been revised. *Ibid* Suppl. 3, January, 1931.—In the definitions and standards for food products adopted as a guide for officials of the department in enforcing the Federal food and drugs act the term "sugar," with or without the parenthetical expression "sucrose," as used to designate the sweetening agent in manufactured food products, is to be interpreted to include dextrose (pure refined corn sugar). This is in keeping with the announcement of the Department permitting the use of pure refined corn sugar as an ingredient of food in which sugar (sucrose) is a recognized element without declaration on the label of the product. The restrictions on the adulteration or imitation of any natural product, such as honey, by the addition of any sugar are not affected by the ruling. H. A. LEPPER

Crude fiber determination with the aid of a filter of a new type. K. FEIST AND E. KUNTZ. *Z. Untersuch. Lebensm.* **59**, 480–3(1930).—An app. is described by which dependable results are obtained in min. time. C. R. FELLERS

Detection of hard wheat grits. E. BERLINER AND R. RÜTER. *Z. ges. Getreidew.* **16**, 212–3(1929).—A criticism of Kühl's test (*C. A.* **24**, 4557). B. C. A.

Detection of hard wheat grits. H. KÜHL. *Z. ges. Getreidew.* **16**, 213–6(1929); cf. *C. A.* **24**, 4557.—A reply to Berliner and Rüter (preceding abstract) and statement of exact conditions. B. C. A.

Effect of harvesting in different stages of ripening on the valuable constituents of cereals. F. BERKNER AND W. SCHLIMM. *Landw. Jahrb.* **72**, 269–91(1930).—Late harvested grain has greater weight per 1000 grains. There is a migration of the starch to the grain in the later stages of ripening and a rapid increase in the protein content between the "milky" stage and ripeness. GEORGE R. GREENBANK

Biometric analysis of cereal-chemical data. I. Variation. ALAN E. TRELOAR. *Cereal Chemistry* **8**, 69–88(1931).—T. explains the fundamentals of statistical analysis. He gives several formulas which are used by the biometrician. Histograms are given with fitted curves superimposed. The significance of statistical consts. is explained. L. H. BAILEY

Baking value of flour and possibility of determining it in the laboratory. A. TASMAN. *Chem. Weekblad* **27**, 138–43(1930).—An account is given of the attempts to correlate chem. and phys. consts., particularly viscosity and swelling power, with baking properties. Valuable information may be obtained by detns. of viscosity in the presence of regularly increasing quantities of acid, the differences in viscosity being plotted to form a curve. From the form of the curve for a given flour, rough estimates may be made of the ash content, gluten content and swelling power. B. C. A.

The stability of leavening in self-rising flour. PAUL LOGUE AND ELIZABETH MCKIM. *Cereal Chemistry* **8**, 24–9(1931).—The consumption of self-rising flour in

the U. S. is increasing more rapidly than the consumption of plain flour. The rate of premature decompn. of self-rising flour varies directly as the moisture content. Self-rising flours contg. less than 12.5% moisture are relatively stable. Self-rising flours contg. more than 12.5% moisture decompose more rapidly and result in alk. baked products, unless this premature decompn. is compensated for in increased acid leavening agent. An explanation of the increased alky. accompanying premature decompn. is offered in the mechanism of the reactions involved. L. H. BAILEY

Relation of peptization of wheat flour protein to loaf volume. R. H. HARRIS. *Cereal Chemistry* **8**, 47-63(1931).—A series of 11 experimentally milled flours was peptized by 3 methods and the percentage of total protein extd. was computed. The correlations between improver loaf vol. and percentage of total protein peptized were also computed. The quantity of protein removed increased quite rapidly at first, but no appreciable change was detected after the initial 30 min. Temp. did not appear to have any significant effect upon the quantity of protein extd. except in the water suspension, when a slight increase with rise in temp. was noticed. Forty-four flours of 75% extn., milled from 1929 crop Saskatchewan Marquis wheat of contract grade, were peptized by 0.5 *N* soln. of KBr and $MgSO_4$, and the protein extd. was calcd. as percentage of the total protein, also as peptized and non-peptized protein fractions of the flour. Correlations between the percentage of total protein peptized and improver loaf vol. were lower than those between total protein and improver loaf vol. and show less probability of forecasting loaf vol. The relationship between non peptized protein and improver loaf vol is not significantly different from that involving total protein and improver loaf vol., and is of equal value in predicting baking strength The corresponding correlations obtained with the basic loaf vol were not so large, and are relatively of less practical importance. Twelve flours milled in a similar manner from 1928 pure strain Marquis grown at various Saskatchewan points including grades from No. 1 Northern to No. 6 gave a higher neg. correlation between the percentage of total protein peptized and improver loaf vol than between the percentage of total protein peptized and basic loaf vol L. H. BAILEY

Predetermining flour soundness. D. A. COLEMAN. *American Miller* **58**, 434 (1930).—In an endeavor to find some method of detg. the soundness of flour without going through the time-consuming methods of milling and baking, it was observed that the acidity of the fat is much greater in unsound wheat than in normal wheat. It was also observed that the normal acidity of the different classes of wheats varies widely Thus the acidity of the fat of sound hard red winter wheat does not exceed 8.5; hard red spring wheat, 5.5; soft red winter wheat, 8.0; Durum wheat, 4.0; and white wheat, 5.5. The acidity of the fat of certain types of damaged wheat was found to be: dank and wet wheat, 8.6-16; musty wheat, 9-15; sour wheat, 9-22; skin-burned wheat, 21-38 and mahogany, bin-burned wheat, 35-44. The method of testing the acidity consists in removing the fat from the material with petroleum ether, recovering the fat from the ether to det. the quantity present and dissolving the fat in a suitable solvent so that the free fatty acid can be detd. The acidity of the free fatty acids present is expressed per g. of fat. L. H. BAILEY

Wheat and flour studies. XVII. Factors influencing the viscosity of flour-water suspensions. 4. The effect of extraction with solutions of potassium and sodium halides. ARNOLD H. JOHNSON. *Cereal Chemistry* **8**, 39-43(1931); cf. *C. A.* **24**, 3287.—The viscosity of flour-water suspensions extd. with 1.0 and 0.5 *N* solns. of the K and Na halides are higher than those of similar suspensions extd. with distd. water. The viscosities decrease according to the lyotropic series of the anions I > Br > Cl > F. Glutenin is not removed on extn. of a flour suspension with the halides of K and Na. L. H. BAILEY

The march of acidity in stored flour. II. M. C. MARKLEY AND C. H. BAILEY. *Cereal Chemistry* **8**, 29-38(1931); cf. *C. A.* **24**, 897.—A higher correlation of ash content with acidity as detd. by the A. O. A. C. method was found in freshly milled flours than the ash content with acidity detd. by the Greek method. The difference between Greek acidity and A. O. A. C. acidity in freshly milled flours was highly correlated with the ash content. Earlier assumptions that the A. O. A. C. tentative method for acidity indicated the relative rate of production of acid-reacting substances during the extn. with water received support from these recent studies. The rate of change in acidity of flours stored at 25° was highly correlated with ash content. It was estd. that flours contg. the percentages of ash included in the 4 grades or qualities described in the present Greek specifications will contain in excess of the max. limits of acidity after 43 to 52 days when stored at 25°. L. H. BAILEY

Recognition and determination of the polyfructoses. II. Determination of tri-

fructose anhydride for estimating the rye content of flour. C. I. KRUISHEER. *Rec. trav. chim.* **50,** 153–63(1931); cf. *C. A.* **24,** 4872.—Treat 12.5 g. of flour with 50 cc. of 70% alc. and shake vigorously for an hr. in a closed flask. Filter and transfer 25 cc. of filtrate to a centrifuge tube and treat with 5 cc. of *N* NaOH in 70% alc. Mix and allow to stand overnight. Centrifuge, pour off the liquid and wash the residue twice with 2 cc. portions of 70% alc. Dissolve the ppt. in 10 cc. of hot water and neutralize to methyl orange with 0.25 *N* H_2SO_4. Transfer the soln. together with 15 cc. more of water to a 50 cc. measuring flask, add 2.5 cc. of 9.5 *N* HCl and heat 10 min. at 68–70° to invert the sugar. After cooling, neutralizing and again cooling, the soln. is mixed and in 10 cc. of the soln.; the total reducing power (R_2) is detd. preferably by the method of Schoorl. To det. the fructose content (F_2), take 20 cc. of the inverted liquid and treat with hypoiodite. From the values R_2 and F_2 the content in trifructose anhydride (T) can be computed and also the saccharose obtained. Take the liquid poured off after the centrifugation described above, make neutral to methyl orange and evap. to a small vol. Transfer to a 50 cc. measuring flask, dil. to about 25 cc., add 2.5 cc. of 9.5 *N* HCl and invert 10 min. at 68–70°. Continue as described above to det. R_2 and F_2. The results in the analysis of about 40 samples are shown. In bolted rye meal 1.5–2% of a trifructose anhydride was obtained, but only 0.1–0.3% in wheat flour. On standing the content increases. On the basis of the above behavior, the rye content of flour can be estd. to within about 10%. The necessary calcns. are described. W. T. H.

Determination of butter fat. E. SCHWEITZER AND J. GROSSFELD. *Z. Untersuch. Lebensm.* **59,** 494–501(1930).—For 3 yrs. a large no. of samples of butter, mixts. of butter and margarine, and margarine were examd. for butyric acid and Reichert-Meissl values. The mean % deviations from the normal values of 20.0 and 27.0 were ±7.4 and ±10.0, resp., for normal butter. The mean of the Reichert-Meissl values for 37 samples was 28.7, which corresponds closely with the van Raalte value of 28.4. The ratio of the butyric acid value to the Reichert-Meissl value was in excess of 0.66 in all cases (av. 0.713). Other relations are discussed. C. R. FELLERS

Masking of the color reaction of margarine. B. HEPNER AND S. ZALC. *Przemysl Chem.* **14,** 412–5(1930).—Under some conditions the use of oil of sesame for distinguishing between butter and margarine is not satisfactory because of the difficulties encountered in the Baudouin reaction. It depends on the presence of sesamol in the oil of sesame which may be destroyed during refining either by acid reagents or high temp. (180°). Rancidity of the oil of sesame or of margarine produces under the influence of HCl an intensive coloration which masks the Baudouin reaction. This reaction was found unreliable in all cases of rancid margarine. KOH should be used for the removal of phenolic dyes used for coloring margarine when these mask the furfurol reaction. A. C. ZACHLIN

Determination of the milk proteins. II. GEORGE M. MOIR. *Analyst* **56,** 73–8 (1931); cf. *C. A.* **25,** 1004.—On the basis of the isoelec. point it is suggested that casein be defined as the material pptd. from cow milk at p_H 4.6 by AcOH buffered with NaOAc. By digesting with *N* NaOH and detg. the increase of the formol titration and by studying the rate of oxidation, it is shown that the casein pptd. under the above conditions is identical with that pptd. by AcOH alone at p_H 4.2. W. T. H.

Number and character of bacteria and their subsequent development in pure and in contaminated milks. HENRI L. BERARD. *Sci. Agr.* **11,** 369–77(1931).—Contamination of milk with manure or soil bacteria not only augments the initial nos. of organisms present, but these types develop in the milk during several days storage. Temp. increases during storage of contaminated milks cause great increases in soil and manure bacteria in milk. A contamination of approx. 0.1 g. of soil or manure per l. does not produce marked changes in the character of the milk flora if the temp. is held at about 60°F. If held below 50°F. there is a considerable increase in the no. of liquefiers and alkali producers; this is due principally to staphylococci. C. R. FELLERS

Modification of the methylene blue reduction test and its comparative value in estimating keeping quality of milk. C. K. JOHNS. *Sci. Agr.* **11,** 171–90(1930).—The suggested modifications to the standard test are: preliminary incubation at 12.8° for 18 hrs. and mixing of contents of tubes not decolorized in 6 hrs. when subsequently incubated at 37.5°. These modifications shorten the reduction time, and the mixing reduces the variations between duplicate tubes. The chief advantages are greater convenience, improved accuracy on high-grade milks, and closer correlation with keeping quality. In a study of 145 samples by the ordinary and the modified reduction tests, acidity increase, and plate and breed counts, the modified reduction test proved to be the method best suited to aid in ranking a series of samples according to keeping quality. C. R. FELLERS

Keeping quality of combined fat extraction, fixing and staining solution used in the direct microscopic technic for counting bacteria in milk. R. W. NEWMAN. Calif. Dept. Agr., *Monthly Bull.* 19, 667(1930).—No deteriorative changes were apparent after 3 yrs. use. The bottles were kept well stoppered. C. R. FELLERS

Investigation of the occurrence of B. abortus (Bang) in the milk of English herds (county of Somerset). D. R. WOOD AND E. T. ILLING. *Analyst* 56, 105(1931).—The deposit obtained by centrifuging 100 cc. of milk was injected subcutaneously into a guinea pig. After 4 weeks the pig was killed and cultures were made from the interior of the spleen on glucose, neutral red and vitamin agar in an atm. of 10% CO_2 and 90% air at 37°. The glucose and neutral red show at once whether any growth obtained is due to contamination with *B. coli*. *B. abortus* was identified by its failure to grow except under reduced O_2 tension and by agglutination with standard anti-serum. The expts. were carried out concurrently with the examn. of the milk for tubercle bacilli (*C. A.* 24, 5387). *B. abortus* was found in the milk of 4 out of 379 herds tested. W. T. H.

Effect of the electropure process of treating milk upon bacterial endospores. A. J. GELPI, JR. *Proc. Assoc. Southern Agr. Workers, 31st Ann. Convention* 162–7 (1930).—Although the cultures originally showed 80 to 90% sporulation no spore-formers were found after the samples were subjected to the electropure process. Further expts. indicated that purification of milk by the electropure process is brought about by the aid of another factor besides heat. K. D. JACOB

Retained milk. OTAKAR LAXA. *Ann. fals.* 23, 609–10(1930).—Four cows which had been unmilked for 3 days furnished on milking only about 100 cc. of thick, brownish-tinged, colostrum-like milk, having an odor of burnt milk and the following compn.: water 78.40, fat 10 15, casein 2.65, albumin and globulin 0, albumoses and peptones 2.92, amino acids 1.78, lactose 1.50, ash 1.10, undetd. 1.50%. The ash contained 23.2% CaO and 16.76% Cl. A. PAPINEAU-COUTURE

Investigation of artificial whole-milk powder. P. WEINSTEIN. *Z. Untersuch. Lebensm.* 59, 515–6(1930).—Microscopic examn. of a powder showed a relatively high proportion of large fat globules. Extn. of the fat with light petroleum ether gave a yield of 18.0%. The *n* and other consts. showed the oil to be largely olive oil which had been used for adulterating skim-milk powder. C. R. FELLERS

Studies concerning the daily yield and fat content of the milk of the half-wild yak in the Siberian Altai Mountains, together with a contribution to the investigation of milk and fat inheritance in primitive breeds. J. W. AMSCHLER. *Z. Tierzucht. Zuchtungsbiol. Tiernahr.* 20, 293–308(1931).—Studies are reported of the yield and fat percentage of the milk of 116 yaks and 6 yak crosses with Altai cattle living on sparse pasture in Siberia. The daily milk yield of the yak cows varied from 1.2 kg. to 4.1 kg. with a mean of 2.73 kg. The fat varied from 4.23 to 8.50% with a mean of 6.09%. The range of yield for the yak crosses was 2.4 to 4 kg. with a mean of 3.20. The fat varied from 4.59 to 6.21% with a mean of 5.45%. L. A. MAYNARD

Non-acid Babcock method for determining fat in ice cream. O. R. OVERMAN AND O. F. GARRETT. Ill. Agr. Expt. Sta., *Bull.* No. 360, 393–406(1930).—The method requires 2 reagents, *A* and *B*. *A* is made by mixing 75 cc. of c. p. NH_4OH, 35 cc. of BuOH and 15 cc. of 95% EtOH (denatured is satisfactory). Reagent *B* is made by dissolving with heat 200 g. of Na_3PO_4 and 150 g. of NaOAc in 1 l. of water. To make the test, weigh 9 g. of the well-mixed sample into a 8 or 10% milk test bottle (or a 20% ice cream test bottle), add exactly 2.5 cc. of *A* and mix thoroughly. Then add 9–10 cc. of *B* and thoroughly mix. Place the test bottle in a shallow water bath and heat to boiling, continuing the heating for several min. During the heating shake the bottles several times. The fat seps. after 15–30 min. and forms a clear yellow layer at the top of the liquid. After the fat sepn. is complete, place the test bottle in the centrifuge and whirl successively, as in the Babcock test, for 5, 2 and 1 min. Add hot water, as in the Babcock test, but do not acidify the water. Then place the bottle in the hot-water bath (130–40°F.) for 5 min In reading the results measure from the bottom of the fat column to the top of the upper meniscus. Comparisons were made with the Official Roese-Gottlieb method. Of the 54 samples tested, 64.82% came within ±0.1% of the R.-G. values, 24.07% fell within ±0.1–±0.2 and 11.11% between ±0.2 and ±0.3%. The av. difference for all samples was ±0.0675%. The method is fairly rapid, inexpensive and sufficiently accurate for com. use. A large no. of detns. can be made concurrently. Twenty-six references are cited. C. R. FELLERS

Standardization of milk with skim milk for the manufacture of Cheddar cheese. H. C. HANSEN AND D. R. THEOPHILUS. Idaho Agr. Expt. Sta., *Bull.* 174, 3–16(1930).—See *C. A.* 25, 360. C. R. FELLERS

The detection of horse meat as an adulterant in sausage and other studies of the precipitin test. F. M. BOLIN. *J. Am. Vet. Med. Assoc.* **31**, 163–70(1931).—A horse meat ext. antiserum was found better than horse serum antiserum for the detection of horse meat adulteration in sausage. Rabbits immunized to a cooked product had sp. precipitins for the uncooked sp. protein, and at the same time had nonsp. precipitins for cooked meats of different species. Meats heated at 15 lb. pressure for 10 min. were unsuitable as antigens for immunization purposes. Immature animals were unsatisfactory in the production of precipitins. Meats of closely related species were differentiated only by the length of time necessary for the reaction to occur.
RACHEL BROWN

"Adulterated" olive oil in sardines. H. WEWERS. *Z. angew. Chem.* **43**, 656 (1930).—High I values of the oil used in prepg. sardines, thought to be due to adulteration of the olive oil, were found to be assocd. with the extn. from the sardines of a fat of very high I value by the pure oil. B. C. A.

Increase in the p_H of the white and yolk of hen eggs. PAUL FRANCIS SHARP AND CHARLES KELLY POWELL. *Ind. Eng. Chem.* **23**, 196–9(1931); cf. *C. A.* **24**, 4558.—The p_H of eggs is an important factor in detg. their rate of deterioration. Eggs with a low p_H deteriorate less rapidly. The p_H of the white increases rapidly as the result of an escape of CO_2 gas. This may be delayed by storing at low temp. or by oil dipping. After 15–25 days' storage at high temp. the p_H decreases. The p_H changes of the yolk are smaller. In com. incubators the p_H of the white after 2 days is 9–9.2, which may affect the developing embryo. A higher CO_2 pressure would remedy this.
AMY LEVESCONTE

Preservation of fruits and vegetables by freezing storage. M. A. JOSLYN. Calif. Agr. Expt. Sta., *Circ.* **320**, 35 pp.(1930); cf. *C. A.* **23**, 3030.—At temps. of 10°F., molding, fermentation and bacterial spoilage do not occur and the normal ripening and respiration processes are effectively arrested. The com. methods are outlined. Deteriorative changes due to oxidative enzymes go on slowly at freezing storage temps. and cause surface discoloration in some fruits. The usual ratio of fruit to sugar is 2 or 3 to 1. A sirup pack is preferred to a mixt. of fruit and dry sugar, as surface discoloration is thus greatly reduced and better distribution of the sugar is secured. After thawing, cold-packed fruits keep from 3 to 7 days without actual spoilage. Vacuum packing of fruit for freezing possesses the advantage that nearly all the O is excluded from the container, thus decreasing oxidative changes in the frozen product. Fruit juices may be frozen without much injury to their flavor. Though most vegetables may be successfully stored in the frozen state, slight changes in flavor and the inability to keep for more than a few hours after thawing render frozen vegetables less suitable for com. exploitation than fruit. C. R. FELLERS

Storing canned fruits at high temperatures injures quality. E. F. KOHMAN. *Food. Ind.* **3**, 77(1931); cf. *C. A.* **24**, 1679.—The hydrolysis of the anthocyanin pigments in red fruits is greatly increased at high storage temps The color base separates from the glucoside base and is thrown out of soln. as a brown amorphous mass which no longer retains any of the original color. This mass causes some darkening of the fruit, but more important is the loss of bright natural color. Prompt and efficient cooling after the heat treatment, as well as subsequent cool storage, is strongly recommended as a means of better preserving the color of fruits. C. R. FELLERS

Research answers (food) packing and bottling problems. I. C. G. HICKS. *Glass Container* **10**, No. 4, 8–9, 22–30(1931).—Animal feeding tests for *vitamin C in tomato juices* prepd. in various ways showed that for max. retention of vitamin C, complete air removal is necessary. Tomato juice packed without treatment to remove air was entirely devoid of vitamin C. Vacuum sealing of the container was ineffective, but vacuum treatment of the juice before bottling combined with vacuum sealing, proved most effective in conserving the vitamin C in the final product. By decreasing the particle size by homogenization, sepn. of the pulp and juice was largely prevented. Eight-oz. bottles of tomato juice were effectively sterilized when subjected to a holding period of 15–20 min. in a water bath. C. R. FELLERS

Disinfecting power of bleaching powder with special reference to its application to the disinfection of vegetables. ENJI BANNAI AND HIDEKICHI HABU. *J. Pub. Health Assoc. Japan* **6**, No. 7, 3–6(1930); *U. S. Pub. Health Eng. Abstracts* **11**, Mi, 2(Jan. 31, 1931).—The disinfection with bleaching powder of such vegetables as greens, radishes, turnips, spinach, etc., could not be satisfactorily accomplished, irrespective of the concn. of the soln., length of exposure, no. of bacteria attacked, or time elapsed after contamination of the vegetables. C. R. FELLERS

Storage of potatoes. N. D. VYAS. *Agr. J. India* **25**, 408–16(1930).—Loss of

potatoes during storage for 32 weeks was reduced to 28–31% by wt. by storage in cinders or charcoal as compared with a loss of 40–90% by storage in coarse sand. Addn. of lime slightly lowered the preservative power of the storage media. The preservative action of cinders and charcoal seems to be due to their ability to absorb moisture and gases given off during rotting of the potatoes, thus preventing infection of sound potatoes. Rotting of potatoes was increased by treating them with 5% H_2SO_4 for 3 hrs. before storage. K. D. JACOB

Chemical studies on cannery peas. ANON. N. Y. Agr. Expt. Sta., *49th Annual Report*, 50 1(1930).—By means of a puncture tester the toughness of peas was found to increase regularly with size. Varieties varied considerably in toughness but the toughness of the fresh pea coincided with that of the processed (canned) pea as judged by experts. Chem. analyses were made for reducing sugars, sucrose, starch, sol. and insol. N, ash, Ca and alc-insol. residue on a large no. of samples. The following tentative phys. and chem. criteria are established for high-quality canning peas: The puncture value should not exceed 40 g. per sq mm. The starch-sugar ratio should not be over 1.0. The insol.-sol. N ratio should not exceed 3.0 and the CaO content of the fresh skins should not be over 0.06%. Sucrase, diastase and protease are very active in macerated peas and may cause some deterioration in quality. Toughness and Ca content are correlated. Effects of fertilizer treatment on quality are being studied. C. R. FELLERS

Microscopy and histochemistry of certain fruits. ANNELIESE NIETHAMMER. *Z. Untersuch. Lebensm.* **59**, 501–6(1930), cf. *C. A.* **24**, 4076, 5890.—The endocarp of oranges contains crystals of CaC_2O_4 which can be isolated and identified by treatment of the fruit with concd. H_3PO_4 followed by sublimation under reduced pressure. After storage for several weeks, slow resorption of the crystals occurs with concomitant formation of AcH. Lemons and mandarins exhibit identical phenomena. Pears contain characteristic inclusions, and in the ripe condition AcH, which is present in greatest abundance in over-ripe fruit. Upon sublimation, ripe pears give malic and citric acids, while over-ripe pears contain $H_2C_2O_4$ in addn. The AcH test is always pos. in plums, and CaC_2O_4 can be detected. From bananas in the ripening stage, malic acid can be sublimed, but after prolonged storage only traces of $H_2C_2O_4$ and tartaric acid can be detected. Unripe tomatoes contain considerable amts. of malic acid with traces of tartaric acid and $H_2C_2O_4$, while ripe samples contain malic, citric and tartaric acids. AcH is present only in ripe tomatoes. C. R. FELLERS

Papaya culture in Hawaii. W. T. POPE. Hawaii Agr. Expt. Sta., *Bull.* **61**, 40 pp. (1930). —The *chem. compn. of the ripe and immature fruits* was detd. Improved varieties gave the following av. results: total solids 13.39, ash 0.76, acid (as H_2SO_4) 0.132, protein 0.484, sucrose 10.14, total sugars 10.61, fat 0.105 and fiber 0.962. The green fruit contains practically no starch or sucrose and only a small amt. of reducing sugars. The latter increase rapidly with approaching maturity. *Papain*, a powerful digestive enzyme, is present in the milky juice. Meat rubbed with a slice of green juicy papaya becomes tender as a result of the action of the papain. Because of the size, wt. and delicate structure of the fruit great care is necessary in harvesting, packing and shipping. A bibliography is given. C. R. FELLERS

Isolation of quinic acid from fruits. E. F. KOHMAN AND N. H. SANBORN. *Ind. Eng. Chem.* **23**, 126(1931).—The BzOH content of prunes and cranberries is too low to explain their acid reaction after digestion. Quinic acid, which the authors have isolated from these fruits and have detected in grapes, is more probably the cause. AMY LEVESCONTE

Sampling of apples for arsenical spray residue determinations. J. R. NELLER. *Ind. Eng. Chem., Anal. Ed.* **2**, 382 4(1930). A statistical study of the sampling of apples that had been washed with dil. HCl showed that the av. probable error of single samples of 6 apples each was 8.2%, while that of duplicate samples was 5.36% of the total arsenic on the fruit. The av. probable error of analysis was 7.4%. The error of sampling is considerably reduced by using duplicate rather than single samples but the rate of reduction is much less for triplicates, quadruplicates, etc. J. R. NELLER

Artificial removal of astringency in kaki. KINZIRO KAKESITA. *Proc. Imp. Acad.* (Japan) **6**, 397–8(1930).—The expressed juice of Japanese astringent persimmons (kakishibu) is coagulated at room temp. by the addn. of AcH(HCHO or EtCHO may also be used). It is believed that this action is caused by the polymerization of tannic substances in the fruits with the formation of insol. tannin-colloid and that the astringency in kaki is thereby removed. C. J. WEST

Dehydration of grapes. P. F. NICHOLS AND A. W. CHRISTIE. **Calif. Agr. Expt. Sta., *Bull.* 500**, 3–31(1930).—A new type of raisin grape called the "Golden Bleached

Thompson" is the principal variety which is dehydrated, though wine and juice grapes can also be advantageously dehydrated. The grapes are dipped before dehydrating in a lye bath (0.5–1.0% NaOH) kept at 200–12°F. In sulfuring the dehydrated product, 2–4 lb. of S must be burned for each ton of fruit, giving a SO_2 concn. in the raisins of 200–1000 p. p. m. The finishing temp. should not exceed 165–70°F. with a relative humidity of 25%, or burning will result. Dehydration offers improvement in quality and yield by making it safe to defer picking until full maturity is reached. Special dips contg. olive oil, glycerol and mineral oil offer possibilities for improvement of color and keeping quality. Sulfuring did not adversely affect insect infestation. C. R. F.

Investigations on grape juice manufacture. ANON. N. Y. Agr. Expt. Sta., *49th Annual Report* 55(1930).—The colloidal material in Concord grape juice affects adversely the color and clarity of the juice and delays the settling out of tartrate crystals. By removal of the colloids, crystallization takes place in a much shorter time, thus allowing the juice to be bottled. The colloidal matter in grape juice contains about 8% protein and 7% pectin, the rest being polysaccharides of unknown nature.

C. R. FELLERS

The preservation of fruit juices, sweet must, etc. A. MEHLITZ. *Konserven Ind.* **1930,** 742–4, 756–8, cf. *C. A.* **25,** 153.—M. describes further work on the preservation of fruit juices by centrifuging the juices through a De Laval separator, clarifying by digestion with an enzymic ext. of *Aspergillus oryzae*, filtering through an asbestos prefilter and then through a Seitz E K germ filter. It was necessary to reduce the active acidity of the red currant juice from p_H 2.72 to 3.66, and of white currants from p_H 2.89 to 4.15 to obtain better enzyme action. In every instance the juice treated with *Aspergillus oryzae* filtered much more rapidly than the untreated juice. After 4 months standing the filtered juices were clear and of good color and taste. F. P. G.

Study of the factors affecting the jellation of fruit juices and pectin solutions. P. B. MYERS AND G. L. BAKER. Del. Agr. Expt. Sta., *Bull.* **167,** Ann. Rept. of the Director 22–4(1930).—With lemon albedo as raw material 4 series of pectins were prepd., 2 series each at temps. of 80° and 100°. The yield, jelly grade, jelly units, ash, methoxyl and p_H of the pectins in each series were detd. The yield of pectin increased with the temp. of the extn., other conditions remaining const. This condition existed only when the p_H of the extg. medium was at 1.50 or above. When below 1.50 the yield of pectin increased with the temp. of the extn. up to some temp. below 100° and then decreased as the temp. was increased to 100°. For instance, when the extn. was conducted at p_H 0.8, the yield of pectin increased from 20.5% at 40° to 30.8% at 85°, and then decreased to 28% at 100°. At some H-ion concn. between p_H 1.5 and 0.8 and below, the hydrolysis of pectin to some alc.-sol. compds. is faster than the hydrolysis of protopectin to pectin at temps. below 100°. The yield of pectin at any temp. could not be increased to the optimum yield obtained at a temp. above it by increasing the time of extn. The optimum jelly grade of pectins, extd. by heating 30 min. while varying the p_H of the extg. medium, decreased as the temp. of the extn. increased. Since the yield of pectin increased with the temp. of the extn. while the jelly grade decreased with increase in temp., the product of the 2 (jelly units) tends to remain const. so that the great variation in jelly units with the temp. of the extn. that was previously expected did not occur. C. R. FELLERS

Determination of sorbitol in jams. C. F. MUTTELET. *Ann. fals.* **23,** 602–5 (1930); cf. *C. A.* **24,** 3289.—Cherry juice was found to contain 0.290% sorbitol; red gooseberry and strawberry juices contained none. Home-made cherry jam contained 0.125%, while home-made gooseberry jam and strawberry jam contained none. Com. so-called "pure fruit" gooseberry jam and "pure fruit" stawberry jam contained 0.135% and 0.075% sorbitol, resp., indicating the presence of apple juice, which was confirmed by the presence of malic acid. Com. compd. cherry jam contained 0.025% sorbitol, indicating that there was but little cherry (really only cherry fragments in sugar sirup which was jellied by addn. of com. pectin). A. PAPINEAU-COUTURE

Determination of so-called crude fiber (cellulose) in cacao. K. KÜRSCHNER AND A. HANAK. *Z. Untersuch. Lebensm.* **59,** 484–94(1930).—The method previously devised (Kürschner and Hoffer, *Tech. Chem. Papier- Zellstoffabrikation* **26,** No. 8–9(1929)). for the detn. of cellulose in wood has been modified by the substitution of AcOH for EtOH in the mixt. used for decomposing the noncellulose elements. The sample of defatted cacao, approx. 0.3 g., is intimately mixed with 15 cc. of 80% AcOH and 1.5 cc. of HNO_3 (d. 1.4) in a flask fitted with a ground-in air condenser. The mixt. is gently boiled for 15–25 min. and then filtered through a large-pored porcelain or glass filter previously moistened with AcOH. The residue is washed successively with 7–10 cc. of the hot mixt. of HNO_3 and AcOH, hot water, a few drops of EtOH, 5–10 cc. of

Et_2O, 1–2 cc. of the acid mixt. and finally hot water, until all traces of AcOH have been removed, the flask and walls of the filter being washed at each stage. The residue is dried at 105–8° and weighed. By this method, which gives most consistent results, white undegraded cellulose was extd. from cacao and the detn. required less than 1 hr
C. R. FELLERS

Determination of sulfur dioxide in foods containing sulfur-bearing volatile oils. FRANK A. DIBELLO. *Am. J. Pharm.* **103**, 42–4(1931).—The following method was used for detg. the SO_2 content of prepd. horse-radish and prepd. mustard to which had been added 150 p. p. m. of SO_2: To 54 g. of the material in a 500-cc. flask add 200 cc. water, 5 cc. 10% H_3PO_4 and about 0.5 g. of tannin. Distil slowly in a current of CO_2 until 100 cc. is received in 20 cc. of soln. of H_2O_2. Det. sulfates with $BaCl_2$.
W. G. GAESSLER

Mineral content of pastures research. Some notes on the work in 1929–30. B. C. ASTON. *New Zealand J. Agr.* **41**, 10–7, 90–9(1930).—An extensive investigation of the mineral content of N. Z. pasture grasses is being made in order to det., if possible, whether there is any relation between mineral deficiencies and various animal diseases which occur in specific areas. "Dopiness" in sheep seems to be connected with Ca deficiency in the Mairoa district, and it seems to be definitely established that "bush sickness" in cattle and sheep is caused by a deficiency of Fe in the pasture grasses of certain pumice soil areas. Deficiencies of I and P have been established in several localities Numerous analyses of N. Z pasture grasses are tabulated. K. D. J.

Investigations into the intensive system of grassland management. I. The chemical composition of intensively treated pasture. A. W. GREENHILL. *J. Agr. Sci.* **20**, 573–86(1930).—The chem. compn. of the dry matter of herbage from pastures managed under the intensive system and representing 3–5 weeks' growth was closely comparable with that obtained by other workers from "pasture cuts" at 1- to 3-weekly intervals from unfertilized pastures. The dry matter is a concd feeding stuff of narrow nutritive ratio and low fiber content. The nutritive ratio is somewhat wider in a dry than in a wet season, but the av. fiber content is not markedly different. During the grazing season, drought or the early summer flush period produces some reduction in protein content and an increase in fiber content, with a recovery following cessation of the drought or the flush period These variations are a reflection of the productivity and habit of growth of the herbage. An abundant growth of young leafy herbage has a higher nutritive value, wt. for wt. of dry matter, than the more stemmy growth of early summer or drought conditions. The protein content of the dry matter of herbage from pasture intensively fertilized (including N) was higher than that from untreated pastures. The higher milk-producing power of the former pasture may be ascribed to improved compn., as well as to higher yield, of the herbage. P. R. DAWSON

Nutritive value of pasture. VI. The utilization by sheep of mineral-deficient herbage. H. E. WOODMAN AND R. E. EVANS. *J. Agr. Sci.* **20**, 587–617(1930); cf. *C. A.* **24**, 5893.—A detailed study was made of the utilization by sheep of a sample of herbage deficient in total ash, particularly in respect to Ca and P_2O_5. Na was also low, but the percentages of K, Mg and Cl were similar to those of "normal" herbage. The results lead to the belief that the failure of stock to thrive on mineral-deficient pasturage cannot be explained by assuming that the low mineral content is responsible for lack of palatability and a consequent depression of appetite. There is no evidence that the shortage of minerals causes the herbage to be digested any less efficiently than "normal" cultivated herbage of similar maturity and org. compn. Malnutrition on pasturage of subnormal mineral content is due directly to failure of the diet to supply the necessary inorg. materials for constructional purposes and for maintaining the normal balance of minerals in the blood and tissues P. R. DAWSON

Photography as a help in the examination of cattle foods. W. L. FIELDING AND S. T. PARKINSON. *J. South-Eastern Agr. Coll., Wye, Kent* No. **27**, 45–73(1930); cf. *C. A.* **24**, 3575.—Detailed directions are given for the microscopical identification of leguminous plants and oil seeds in cattle foods. K. D. JACOB

Determination of acids in silage by Wiegner's method. K. GREIST. *Tierernähr.* **1**, 65–9(1929).—A diagram permitting direct reading of the amts. of AcOH and butyric acid has been constructed. B. C. A.

Polarimetric determination of starch in potatoes and the relation between potato dry substance and starch content (VON SCHEELE) **28. Composition [for treating containers for food]** (Brit. pat. 335,559) **23. Emulsions of fatty substances [artificial cream]** (Fr. pat. 693,242) **13.**

Food products. ARMAND KREMPF. Fr. 692,918, June 27, 1929. Proteic substances (fish, seeds, vegetables) are autolyzed rapidly in the presence of volatile antiseptics which do not entirely prevent microbic or fermentative action, the antiseptic is removed and the autolyzate is seeded with one or more appropriate cultures and the cultures are allowed to develop. The product is stabilized with NaCl and used as a food.

Stabilization of nitrosylsulfuric acid for bleaching flour. N. V. MEELFABRIEKEN DER NEDERLANDSCHE BAKKERIJ and CHEMISCHE INDUSTRIE VAN HASSELT. Dutch 23,063, Nov. 15, 1930. The $ONOSO_3H$ is mixed with 1/4 part active silicic acid or kieselguhr. Cf. *C. A.* **24**, 4559.

Evaporating apparatus suitable for condensed milk production. ARNOLD W. BAUMANN. U. S. 1,791,262, Feb. 3. Structural features.

Plastic cream product. HERMAN D. WENDT (to Sharples Separator Co.). U. S. 1,791,068, Feb. 3. Cream is warmed to render the milk fat fluid without destroying the integrity of the fat particles and the original emulsion holding them in dispersed phase, and sufficient liquid is then removed by centrifuging so that the remainder on cooling forms a plastic mass of dispersed milk fat particles. U.S. 1,791,069 relates to the production of *butter* from a plastic cream product contg. not less than 65% of milk fat held in natural dispersed condition with other constituents of milk, by reversing the phase relation of the milk fat globules to the liquid vehicle by pressure applied directly to the plastic cream for transforming the latter into butter, removing a substantial portion of liquid vehicle from the mass as it is formed, and continuing the application of pressure to the butter until the desired texture is obtained.

Butter production. EDGAR PERKS. U. S. 1,791,000, Feb. 3. A stream of cream is subjected to repeated impact through vibratory motion imparted to the steam in a direction perpendicular to its surface. App. is described.

Preserving eggs and fruits by vacuum treatment and coating with petroleum oil or wax. L. BENOIT. Brit. 335,586, March 27, 1929. The coating material is applied in heated vaporous condition (as by steam distn.) to the materials treated while the latter are subjected to a partial vacuum. App. and various details of procedure are described.

Preserving fruit. KARL HESSEL. Ger. 515,160, May 5, 1926. In preserving fruit by drying in air at a low temp. and then comminuting and pressing, air is removed from within the comminuted fruit by suction.

13—GENERAL INDUSTRIAL CHEMISTRY

HARLAN S. MINER

The progress of chemical industry in France during 1930. JEAN DEBUIGNE. *Ind. Chemist* **7**, No. 73, 51–2(1931). E. H.

The chemical industry in Italy in 1930. MASSIMO TREVES. *Ind. Chemist* **7**, No. 73, 67–70(1931). E. H.

Chemical industries and the raw materials in Maryland. EDWARD B. MATHEWS. *J. Chem. Education* **8**, 485–9(1931). E. H.

Deciding on chemical plant location. FRED. D. HARTFORD. *Chem. Met. Eng.* **38**, 72–5(1931). E. H.

Wooden barrels in the chemical industry. LOUIS F. HORN. *Chem. Markets* **28**, 161–7(1931). E. H.

Power plant for the modern blast furnace. G. T. HOLLETT. *Blast Furnace Steel Plant* **19**, 281–3(1931). E. H.

More chemists in industry and conservation. Insulating materials, a field for the chemist. KURT GEISLER. *Chem. Fabrik* **1931**, 49–51.—The training for this work is discussed briefly and the Swiss, Austrian and German curricula are compared. J. H. MOORE

Correct clothing for the chemical worker. GEO. E. BURNS. *Chem. Markets* **28**, 169–73(1931) —Protective clothing is discussed. E. H.

Industrial silicosis. G. MALCOLM DYSON. *Ceramic Age* **16**, 220–1(1930).—The silicic ion is toxic. Milk is able to dissolve silica from new bottles. The danger is negligible in ingestion by mouth, but great in breathing silica dust or colloidal silica into the lungs. Silica, unlike other industrial dusts, cannot be removed from the lungs. The presence of other dusts modifies the toxic action of silica. Since silica is a normal constituent of tissue, the suggestion is made that the toxic action is most apparent in inorg. compds. M. A. EWER

Difficulties in the understanding of the occupational skin diseases. R. PROSSER-

WHITE. *J. State Med.* **37**, 559–70(1929); cf. *C. A.* **24**, 5842.—Evidence is given to show that most of the difficulties in the understanding of occupational skin diseases are due to the overemphasis of allergy and lack of knowledge of the common skin diseases. A. L. RAWLINS

Domestic mechanical refrigeration in relation to public health. ARNOLD H. KEGEL. *Illinois Med. J.* **58**, 424–7(1930); *U. S. Pub. Health Eng. Abstracts* **11**, PHA, 1(Feb. 7, 1931); cf. *C. A.* **24**, 4561.—In Chicago in less than 2 yrs. there occurred 62 cases of poisoning with 10 deaths from the refrigerant gas MeCl. The serious casualties were traced to the multiple-type refrigerator contg. 200 lb. of gas. The smaller household cabinets contain but 5 lb. of gas. Refrigerating systems using NH_3 or SO_2 furnish their own warning when gas is escaping, whereas MeCl, EtCl and similar gases are practically odorless and may cause unconsciousness. Suggestions for safe installations are made. C. R. FELLERS

The measurement and regulation of humidity in industrial processes. FR. LIENEWEG. *Siemens Z.* **11**, 26–32(1931).—A review of modern practice. C. G. F.

Temperature distribution in internally heated cylinders. ALBERT B. NEWMAN. *Ind. Eng. Chem.* **23**, 29–32(1931).—A presentation of math. theory of heat flow through walls of internally heated cylinders. Theory is applied to dissipation of heat generated by an elec. wire carrying a current and insulated by an external covering. M. C. R.

Gases used in warfare. TH. MOREUL. *J. pharm. Alsace Lorraine* **57**, 332–9 (1930).—A review of the effects and chemistry of these gases and modes of protection. S. WALDBOTT

A useful horizontal-tank chart. W. F. SCHAPHORST. *Ind. Eng. Chem.* **23**, 314–5 (1931).—A chart is included which gives the no. of gallons of liquid in any horizontal tank. G. G.

Woods for insulation. A. R. DUNTON. *Electrician* **106**, 237–9(1931).—The varieties used, methods of impregnation and breakdown voltages of treated woods are discussed. Typical phys. properties of the varieties of hard wood employed in insulation are tabulated, as are typical values of moisture content and elec. strength for various woods The woods are kiln-dried to a moisture content not exceeding 6%. Tables also show: some woods used for bakelized veneer-ply construction with typical tensile-strength values of products; compression-strength test results on these, and a comparison of elec. strengths of untreated and bakelized veneer-ply. The reliability of performance of all treated woods depends on their ability to withstand the penetration of moisture and it is therefore likely that thoroughly bakelized woods, impregnated in the form of thin veneers and built up into rods or boards, will prove popular. W. H. BOYNTON

The catalytic oxidation of CO (FRAZER) **2.**

Annuario per le industrie chimiche e farmaceutiche. Anno XI e XII. 1928–1929. Compiled by the Commissione per le industrie chimiche appointed by the Ministero delle Corporazione. 724 pp. Paper, L. 100. Reviewed in *Chem. Trade J.* **88**, 128 (1931).

CHAPLET, A.: **Dictionnaire des produits chimiques commerciaux et de la droguerie industrielle.** Paris: Dunod. 308 pp Paper, M. 54; bound, F. 63. Reviewed in *Ann. fals* **23**, 616(1930).

IZARD, J.: **Agenda Dunod, 1931. Physique industrielle.** 11th ed. Paris: Dunod. 532 pp. Bound, F. 20. Reviewed in *Chimie & industrie* **25**, 267(1931).

JAVET, E.: **Agenda Dunod, 1931. Chimie.** 50th ed. Paris: Dunod. 612 pp Bound, F. 20. Reviewed in *Chimie & industrie* **25**, 267(1931).

LAUNAY, L. DE: **La technique industrielle.** Paris: Dunod. 337 pp. Bound, F. 85. Reviewed in *Chimie & industrie* **25**, 267(1931).

PAGNIELLO, A.: **Disinfezione contro gli aggressivi chimici. Chimica di guerra.** Rome: Instituto Sacra Famiglia. 8 pp. Reviewed in *Chimie & industrie* **25**, 263 (1931).

STOLTZENBERG, HUGO: **Anleitung zur Herstellung von Ultragiften.** Hamburg: Norwi-Druck. 70 pp. M. 20.

STOLTZENBERG-BERGIUS, M.: **Was jeder vom Gaskampf und den chemischen Kampfstoffen wissen solte.** Hamburg: Chemische Fabrik Dr. Hugo Stoltzenberg. 30 pp. M. 1.

Adsorption of gases. SOC. CHIM. DE LA GRANDE PAROISSE (AZOTE ET PRODUITS CHIM.). Fr. 693,278, June 17, 1929. In a process for sepg. less volatile constituents

of a gas by solid adsorbent material, the gas is passed through the adsorbent under pressure and then expanded, and the expansion is used through a heat exchanger to cool the gases being treated.

Separating mixtures of gases or vapors. Soc. de recherches et d'exploitations pétrolifères. Ger. 515,296, June 8, 1926. Mixts. of gases or vapors are passed through active C or other adsorbent and the adsorbed constituents recovered by means of steam after preheating the charged adsorbent. The improvement consists in preheating the adsorbent convectively, *e. g.*, by locally heating the adsorption app. so as to effect a circulation of the gases therein. App. is shown.

Separating gases by liquefaction. Ges. für Linde's Eismaschinen A.-G., F. Pollitzer and H. Kahle. Brit. 335,599, June 26, 1929. Various details of app. and procedure are described, suitable for the sepn. of constituents of purified coke-oven gas. Cf. *C. A.* **24**, 2515.

Separating gas mixtures by liquefaction. Société l'air liquide (Soc. anon. pour l'étude et l'exploitation des Procédés Georges Claude). Ger. 513,682, Dec. 1, 1929. Addn. to 495,429. In the method of Ger. 495,429 (*C. A.* **24**, 3292), the cold unliquefied compressed residue is further cooled before it is caused to flow countercurrent to the mixt. Cooling may be effected by the expanded residue. The app is shown.

Purifying liquefied gases. N. V. Philips' Gloeilampenfabrieken. Fr. 692,621, Mar. 24, 1930. Liquefied gases such as O are purified by bringing them in contact with an absorbent material such as charcoal or SiO_2 gel.

Deoxygenating air, etc. Siemens-Schuckertwerke A.-G. Ger. 515,133, Dec. 23, 1924. A mixt. of a metal and an electrolyte is used such that the metal, under the action of O, is converted into an oxidizable salt. A mixt. of Cu and NH_4Cl is specified. Catalysts, *e. g.*, kieselguhr or active C, and diluents may be included in the mixt. The method is intended particularly for eliminating O above the oil level of oil-filled elec transformers, switches, etc

Separation of solutions from precipitates. H. Lawarrée. Belg. 371,194, July 31, 1930. An immiscible liquid, inert toward the reagents used or liberated, and having a different d. from that of the solns. involved, is used for the sepn. of solns. and ppts.; *e. g.*, CCl_4 is used for the sepn. of the solns. in the manuf. of $NaNO_3$ and NH_4Cl from NaCl.

The separation of chemical solutions and precipitates. H. Lawarrée. Belg. 371,586, Aug. 31, 1930. Solns. are sepd. from ppts. by means of a liquid which is inert toward the reagents used or liberated, immiscible with them and of different d. A fatty substance which can form a soap with the basic salts pptd. during the reactions is added to the liquid.

Aerating liquids. Eugen G. Stich. Ger. 507,294, Jan. 5, 1929. The air is delivered through perforated tubes encased in rubber, the latter having fine perforations which open only under the pressure of the air supplied.

Testing viscosity of liquid materials. Samuel T. Rodgers. U. S. 1,790,948, Feb. 3 A buoyant body is released at the bottom of a column of the liquid under test, permitted to rise through the liquid and the time required for its rise is noted. App. is described.

Obtaining pulverulent products from fused solids. Chem. Fab. von Heyden A.-G. (Ernst Krumbiegel, inventor). Ger. 514,419, Mar 2, 1928. The solid is heated and stirred in a pressure vessel with a liquid in which it is difficultly sol. to a temp. above the m. p. of the solid and above the b. p of the liquid. The mixt. is then discharged into a second vessel in which it is rapidly cooled by contact with a further amt. of liquid kept in rapid motion. Examples describing the treatment of β-naphthylamine and benzonaphthol are given.

Emulsions of fatty substances. Botulf Borthen. Fr. 693,242, April 3, 1930. Artificial cream and other emulsions rich in fatty substances are made by using concd. milk or other natural concd. soln. of phosphoprotein as protective colloid.

Electric insulators. Lodge-Cottrell, Ltd., and Metallges. A.-G. Brit. 335,503, Feb. 18, 1930. For preventing moisture condensation on insulators such as those of *elec. gas-cleaning app.*, the insulator is heated from a suitable source of heat by a reflector which may be revolved around the insulator (suitably with transmission of the heat through ordinary or quartz glass).

14—WATER, SEWAGE AND SANITATION

EDWARD BARTOW

Liège water service (1830–1930). E. THIRIAR. *Tech. sanit. munic.* **25**, 370–5 (1930).—An historical account. W. C. R. FELLERS

Kankakee (Ill.) served by new plant. GEO. HUSE. *Water Works Eng.* **83**, 498 (1930).—The new electrically equipped plant has a capacity of 6 million gals. daily while the present rate of consumption is 2 million gals. daily. River water is softened, clarified, carbonized, allowed to settle, filtered and made bacteriologically pure. Soda ash and lime reduce the hardness from an av. of 20 grains to about 4 or 5 grains per gal. The av. cost of chemicals will be about $2000 a month. C. H. BADGER

How North Carolina develops its water works plant operators. H. E. MILLER. *Water Works Eng.* **83**, 423–4, 446–9(1930).—The different acts and laws passed in N. C. pertaining to sanitation and water supplies are reviewed. Inexperienced but technically trained chemists and engineers are secured through the Bureau of Engineering for duty at small plants at a salary of $125 a month. Under the guidance of trained engineers these men are given thorough training in plant operation, serving a sort of internship for 2 yrs., until they can assume responsibility. In 1921 none of the 18 surface gravity supplies was chlorinated but in 1929, 19 out of 20 were. All filtered water supplies are now chlorinated. In 1921, 50 filter plants were deficient, 36 being obsolete, 10 requiring complete overhauling and 4 needing minor repairs. In 1929 all except 2 of the 78 filter plants were fully meeting modern practice. Only 1 plant was under technical supervision in 1921 while in 1929, 57 plants had complete chem. and bacteriol. control at the plant and 17 had simple lab. control of dosage. C. H. BADGER

A limnological significance of free carbonic acid. E. LINDEMANN. *Naturwissenschaften* **18**, 1113(1930).—Evidence is advanced for the importance of the CO_2 content of water for the growth of *Peridinia* provided the p_H is favorable. B. J. C. v. d. H.

Deciding type and layout for a small water system. G. B. LEONARD. *Water Works Eng.* **83**, 513(1930).—The water works and the sewerage system in Salisbury, Md., became inadequate in 1924. Investigations of surface and ground supplies showed that shallow wells on low ground produced the only supply worth developing. Six concrete wells have been constructed on the site selected and the Schumaker pond, nearby, can be used as an emergency supply. Aeration, to remove CO_2, is the only treatment necessary for this water. The water works system is based on an av. daily consumption of 100 gal. per capita. The general layout of the distribution is described. Two pumping operations were required, a low service from the wells to the aerators superimposed over the 500,000 gal. covered concrete storage reservoir, and the other from the reservoir to the mains and to the two 200,000 gal. elevated storage tanks situated in opposite ends of the town. Elec. power is used. C. H. BADGER

Utilizing marine gasoline engine as a water works (Oshawa, Canada) auxiliary unit. W. C. SMITH. *Water Works Eng.* **83**, 489–90, 522(1930).—A detailed description is given of a unique installation used as a standby unit on auxiliary standby plant for a water works system suppling 2 million gals. daily. C. H. BADGER

Building efficiency into an old purification plant. MARTIN E. FLENTJE AND CLARK CRAMER. *Water Works Eng.* **83**, 421–2, 450(1930).—The reservoir capacity at Lexington, Ky., is 1765 million gals. The water shed area is 12.7 sq. miles. There are 10 wooden tub filters and 2 concrete units with a total rated capacity of 6.325 million gals. daily. Eight addnl. 1 million gals. daily concrete units will be constructed. The reservoir water is fairly constant in chem. compn. and has an av. hardness of 110 p. p. m. The bacteria count is low because of long storage and absence of polluting sources. Microörganisms grow abundantly in the shallow reservoirs in the summer and $CuSO_4$ treatment is given at least once a week. The sand in the wooden tub filters became badly incrusted because of lack of proper washing facilities. Cleaning with NaOH, Na_2CO_3, Cl_2 and $CuSO_4$ solns. was not effective. Since lab. expts. showed that some form of abrasion is necessary for cleaning, the sand will be treated with 2% caustic soln. for 24–48 hrs.; it should be agitated every 2 hrs. with air piped into the underdrain system. Four samples thus far collected monthly show progressive darkening and lack of luster. The portion sol. in HCl and the loss on ignition have increased. Whether bad incrustation will be prevented remains to be seen. C. H. BADGER

Design and construction of additional filter units. HUGH R. CRAMER AND ARTHUR T. CLARK. *Water Works Eng.* **83**, 450–4(1930).—The new filter units mentioned (cf. preceding abstr.) are of the general type. Addnl. features are the combining of

the filter effluents, wash water, air wash and rewash through a special fitting. Their construction and operation are described in detail. C. H. BADGER

Building small purification plant at a minimum cost in restricted area. M. P. HATCHER. *Water Works Eng.* **83**, 487–8, 525(1930).—The water supply for Iola, Kan., is obtained from the Neosho River. This river carries much suspended matter and is subject to considerable pollution from a well-populated drainage area of 3600 sq. miles above Iola. About 50 to 75% of the hardness of 100–500 p. p. m. is due to $Ca(HCO_3)_2$. Chlorides are usually less than 400 p. p. m. but during low flow periods they run 500–700 p. p. m. because of oil field pollution. The present treatment includes only plain sedimentation and chlorination. In the new treatment plant, built on the same site, the raw water is to be pumped to a preliminary mixing chamber where lime will be added. The treated water, kept at a high velocity to prevent settling, will then pass to 2 similar reaction tanks for 30 min. agitation with a centrifugal pump and in turn passes to either or both of a 2.5 million gal. and a 3.5 million gal. settling basins for a max. retention period of 3 days. The water is then pumped to the aerator and carbonating chamber. Alum is dry fed to the suction of the auxiliary low service pumps. The reaction proceeds through the carbonating chamber and the alum reaction chamber but the major portion of the floc will be carried to the 3 filter beds, each with a capacity of 2/3 million gal. daily. The filtered water passes in turn through the storage reservoirs situated below the filters, the secondary basins and the pump room. Total storage capacity is 215,000 gal. Cl_2 is applied at the entrance of the last reservoir. C. H. BADGER

Controlling microscopic organisms in public water supplies. FRANK E. HALE. *Water Works Eng.* **83**, 353–4, 379–84(1930).—See *C. A.* **25**, 367. C. H. BADGER

Fluorescence of water in filtered ultra-violet light as an indicator of pollution. H. IVEKOVIC. *Z. Hyg. Infektionskrankh.* 112, 54–61(1931).—The fluorescence of drinking waters was examd. in the light from a quartz lamp passing through a black glass filter of NiO, and compared with gelatin standards. Many waters showed a bluish white fluorescence whose intensity was proportional to the consumption of MnO_4^-. The org. matter present is considered the cause of the fluorescence. R. B.

Unusual bacterial conditions encountered at the Williamson filtration plant. PAUL C. LAUX. *Proc. 5th Ann. Conference on Water Purification*, W. Va. Univ. Eng. Expt. Sta., *Tech. Bull.* No. 3, 40–8(1930); *U. S. Pub. Health Eng. Abstracts* **10**, W, 115(Oct. 25, 1930).—Bacterial tests on 5 ten-cc samples are made daily at the filtration plant. Of 5040 samples of filtered water, 85% gave neg. gas production after 48 hrs. Four types of gas-forming bacteria are described which produce gas but which are not fecal coli. They are thought to originate in the soil or in animal or human feces. Excess chlorination and preammoniation have but little effect on these gas-forming bacteria. C. R. FELLERS

Use of pre-ammoniation at the Springfield, Ill. plant. CHARLES H. SPAULDING. *Water Works Eng.* **83**, 514–8(1930).—The bacterial loads in the raw water have been excessively heavy. Tabulations of lab. expts. using added cultures of *B. coli* with river water show that sterilization with 1 hr contact was greater when NH_4OH was added just before chlorination but were less satisfactory even with a contact period up to 6 hrs. when lime was also added. After 8 hrs. contact chlorinated samples, with or without lime and NH_4OH, showed practically the same percentage reduction of *B. coli*. Lime by itself is slow in comparison. River water contg. 1.2 p. p. b phenol is sufficient to cause a chlorophenol taste but NH_4OH added in the portion of $^1/_2$ lb. NH_4OH to 1 lb. Cl_2 prevented chlorophenol tastes in boiled distd. water contg. 2 to 50 p. p. b. phenol and lime to a p_H of 9.6. The packing of the high-service pump showed *B. aerogenes* present; estd. at 20 billion per lb. NH_4OH is now added at the rate of 0.7 lb. per million gal. of water at the inlet of the raw water dosing well where the detention is about 30 sec. and Cl_2 is applied at the outlet of the dosing well. The residual Cl_2 as a rule drops by the time the water has passed the filters and about 1 lb. Cl_2 per million gal. of water is sufficient to bring the residual Cl_2 up to 0.2–0.3 p. p. m. Aqua NH_4OH and anhyd. NH_4OH were less expensive to use than NH_4OH salts. C. H. BADGER

Unusual uses of chlorine in a water works system. (Sterilization of new mains, new wells and flooded supplies.) R. W. KEHR. *Water Works Eng.* **83**, 458–61(1930).—K. cites the procedures for sterilization by Cl_2 of mains, etc., in New York, Chicago and Indianapolis. The sterilization of newly laid mains in Kansas has not received much attention. The av. time for 9 new supplies to become free from contamination was $6^1/_2$ months. Gravel used for gravel wells should be thoroughly treated with chlorinated lime water. All turbidity should be pumped from newly constructed wells. Residual Cl_2 was soon shown by the *o*-tolidine test when chlorinators fed several

p. p. m. Cl_2 to flooded supplies in Ottawa, Augusta and Eldorado. The following directions are given for sterilizing small quantities of water. Make a soln. of 1 teaspoonful of chlorinated lime in a pint of water, stir 1 tablespoonful of this stock soln. into 10 gal. of water and let stand 30 min. With very muddy waters double the dose. To clarify muddy waters add 1 teaspoonful alum to 5 gal. of water. After mixing and settling, the decanted water is sterilized. Boiling the drinking water was found to be impracticable during the Mississippi flood and Cl_2 sterilization was used almost entirely.
C. H. BADGER

Problems of slow chemical reaction in cold weather. C. T. HOUGH. *Water Works Eng.* **83**, 510(1930).—Lawrence, Kan. obtains its water supply from the Kaw River. The treatment includes plain settling, coagulation, softening, chlorination and filtration. Alky. varies from 125 p. p. m. in summer to 300 p. p. m. in winter and sulfate hardness likewise varies 60 to 125 p. p. m. The slow reaction of lime in cold water produced the same effect as a reduced retention period in the basins. Settling was not complete even when a dosage of 0.7 grain $Al_2(SO_4)_3$ per gal. was applied to the lime basin influent, necessitating a large amt. of wash water for the roughing filters. Attempts during low temp. to lower the alky. to 50 p. p. m. resulted in high carbonates and a heavy ppt. on the final filters, which showed on analysis nearly 50% $Al(OH)_3$ and the remainder $CaCO_3$ and $MgCO_3$. This ppt. is probably due to the retarded reaction of $Al_2(SO_4)_3$ with a highly lime-treated water. Reducing the lime treatment, thereby increasing the alky. to 70–80 p. p. m., eliminated a large amt of the ppt. and permitted satisfactory filter operation. In Dec., 1926 bacteriol. analyses, even with daily increased Cl_2 dosage, began to show pos. tests for the coli-aerogenes group in the first $1^1/_2$ miles of mains from the plant, but beyond this distance were neg. This indicated that the reaction of Cl_2 in water at 38–40°F. is slow and that there must be a sufficient contact period before distribution. After unsuccessful results of applying addnl. Cl_2 to the filter influent, $2^1/_2$ lb. per million gal. of water was then added to the lime basin influent and bacterial analyses showed neg. results. More recent attempts during low temps. to increase the lime dosage to give an alky. of 60–70 p. p. m. caused pos. bacterial results immediately. It is evident that increasing the p_H value of the treated water decreases the effectiveness of Cl_2.
C. H. BADGER

Use of permanganate at the Weirton, W. Va., city water works for the correction of chlorophenol tastes. L. L. LASHELL. *Proc. 5th Ann. Conference on Water Purification*, W. Va. Univ. Eng. Expt. Sta., *Tech. Bull.* No. **3**, 37–9(1930); *U. S. Pub. Health Eng. Abstracts* **10**, W, 116(Oct. 25, 1930) —$KMnO_4$, 1.45 p. p. m., applied between the sedimentation basin and filters, was entirely successful in removing the phenol tastes and odors and its bactericidal effect was great enough to warrant discontinuance of chlorination.
C. R. FELLERS

Operating results from well-arranged iron removal plant. C. C. FOUTZ. *Water Works Eng.* **83**, 557–8(1930); cf. *C. A.* **24**, 5902.
C. H. BADGER

Arsenic content of the Choussy well water, La Bourboule, and fixation of this arsenic in the organism. R. CLOGNE, (MLLE.) A. COURTOIS AND CAZALA. *Compt. rend.* **190**, 1133–4(1930).— Arsenic was detd. by a modification of the Cribier-Léonardon method, the stain on the $HgCl_2$ paper being fixed by immersion in a 10% soln. of KI and matched against standard stains prepd. under the same conditions. A slight excess of $KMnO_4$ was added to the sample to avoid evolution of H_2S or PH_3. Arsenic contents of 5.8–6.5 mg. per l. are recorded for the season 1928–29, and analyses of tadpoles kept in the water at the well for 8–10 days showed As contents of 3.25×10^{-3} mg. of As per g. (1.88×10^{-3} mg. per g. in ordinary water) Tadpoles in bottled Choussy water, or in synthetic water of similar compn., contained only 2.73 and 2.325×10^{-3} mg. per g., resp.
B. C. A.

Determination of silicic acid in water. W. STEFFENS. *Chem.-Ztg.* **54**, 996–7 (1930).—The colorimetric method depending on the formation of a yellow silicomolybdate is described again, preference being given to K_2CrO_4 solns. rather than picric acid solns. as standards of color.
W. T. H.

Determination of the "chlorinity" of ocean waters. THOMAS G. THOMPSON AND RICHARD VAN CLEVE. Intern. Fisheries Commission, Univ. Wash. (Seattle), *Report* No. **3**, 5–14(1930).—An outline is given of the literature dealing with factors that may produce possible variations between the calcd. and detd. densities. Modifications of Mohr's method, which differ as to type of volumetric app. used, size of sample and concn. of $AgNO_3$ soln. all give practically the same results. Errors in direct d. detns. were found to result from permitting an elapse of time between collection and analysis of the samples. The detn. of "chlorinity" gives the best method for the calcn. of the

most probably d. *in situ* at atm. pressure A table is given for converting "chlorinity" per l. to "chlorinity" per kg. at 20°. C. R. FELLERS

Determining protection of underground pipe through proper survey. P. J. RICHARDS. *Water Works Eng.* **83**, 491–2, 525(1930).—Chem. analyses of the soil and waters or aq. ext. of soil samples taken as required by means of an auger from the surface down to the bottom of the ditch will show the presence and the amt. of all chemicals known to be corrosive, non-corrosive, accelerators or inhibitors of corrosion. The phys. characteristics of the soil affect the rate of percolation of soil waters and will det. the character of the contact between the metal and surrounding materials. Heterogeneity of soils may lead to differences in potential within the soil itself and also between the soil and the buried material. Differences in potential will probably accelerate corrosion proportionate to the current flow. This knowledge will det. whether the pipe will serve without protection or whether an expensive coating is justified. Corrosion surveys have been made in Denver and Pueblo for the use of gas-distributing systems. Strong alkalies are usually destructive Chlorides and sulfates seem to be the most harmful. Sulfides are potentially dangerous and all soil acids must be considered corrosive. Limestone is not only non-corrosive but seems to be an inhibitor when corrosive chemicals are present Coatings must be thick enough to protect the metal and wrapped coatings must be used where there may be severe abrasion. It has been estd. that over half of the coatings that have been applied to pipe lines might have been saved if some knowledge of the corrosiveness of the locations had been obtained beforehand and that half of the remainder was either misapplied or underprotected. C. H. B.

The corrosion-checking calcium carbonate-protective layers in water tubes. GERHARD SCHIKORR. *Z. angew. Chem.* **44**, 40–1(1931).—The resistance of iron water tubes to rusting is very strongly increased through a $CaCO_3$-protective layer. For the formation of the layer, a definite quantity of O must be dissolved in the water. The water must contain a sufficient quantity of dissolved $CaCO_3$ but must not contain too great an excess of H_2CO_3. The action of the O may be traced to an electrochem. effect in contrast to the theory of Tillmans, Hirsen and Schilling (*C. A.* **23**, 1973). In order to show that the formation of the protective layer is not the result of the adsorption of H_2CO_3 by $Fe(OH)_3$ but is a cathode reaction, a noble metal was used in place of Fe. Expts. indicate that with suitable arrangements $CaCO_3$ can be pptd. from a $Ca(HCO_3)_2$ soln. on Pt with the aid of O. ALLEN S. SMITH

The continuous control of the salt content of boiler-feed water by means of a visual conductivity measurement. E. ROTHER AND G. JANDER. *Z. angew. Chem.* **43**, 952–4 (1930).—The chloride content of feed water is detd. by leading the water through a specially designed tube contg. Pt electrodes. The detns. are continuously recorded potentiometrically. RUSSELL C. ERB

Problems of a watershed sanitary inspector. S. F. GLASS. *Water Works Eng.* **83**, 376 (1930).—Rural sewage-disposal problems and the disposition of dead animals in the Denver, Col., watershed area are briefly discussed. C. H. BADGER

Performance of the Tenafly (N. J.) activated sludge plant. WILLEM RUDOLFS, H. HEUKELEKIAN, I. O. LACY AND C. N. HENDERSON. N. J. Agr. Expt. Sta., *Bull.* **502**, *Ann. Rept. Dept. Sewage Disposal* **1928–9**, 12–7(1930).—Chem. and bacteriol. examns. made on the Tenafly activated sludge plant and covering a period of 36 hours' sampling show that a high degree of purification and clarification was obtained. The av. biochem. O demand reduction was 93.5% and the *B. coli* reduction % was 99.99. C. R. FELLERS

Some operating results of the Plainfield (N. J.) disposal plant. WILLEM RUDOLFS AND I. O. LACY. N. J. Agr. Expt. Sta., *Bull.* **502**, *Ann. Rept. Dept. Sewage Disposal* **1928–9**, 9–12(1930).—In spite of the staleness of the sewage and the comparatively short detention time, the settling tanks removed 53% of the total suspended solids in addn. to 9–12% suspended solids removed by fine screens. The screened sewage averaged 737 p. p. m. total solids, 256 p. p. m. suspended solids and 190 p. p. m. biochem. O demand. Total reduction in biochem. O demand for the settling tanks and sprinkling filters was 56.2%, $^3/_4$ of which was taken care of in the sprinkling filters. C. R. FELLERS

Effect of certain chemicals on the vacuum filtration and gravity drying of ripe sludge. WM. H. BAUMGARTNER. N. J. Agr. Expt. Sta., *Bull.* **502**, *Ann. Rept. Dept. Sewage Disposal* **1928–9**, 17–25(1930).—$FeCl_3$ was the most effective treating chemical for ripe sludge. $FeCl_3$ has a 3-fold effect in sludge drying and filtration: (1) discharge of the dispersed material, coalescence being caused; (2) change of the H-ion concn., the isoelec. points where max. pptn. of the colloidal material takes place being thus approached; (3) liberation of CO_2, which makes the material porous and helps

in its flotation. There are peaks in the filtration of $FeCl_3$-treated sludge which correspond to definite p_H values. These peaks are at a concn. of 2 and 7 lb. to the cu. yd. of sludge, resp., $FeCl_3$ increases the amt. of drainage from sludge drying on beds and thus decreases the time for evapn. Treated sludge has a porous nature which allows more surface for evapn. Moisture is removed more rapidly by treating sludge with $FeCl_3$. C. R. FELLERS

Certain organic constituents of fresh and ripe sewage sludge. H. HEUKELEKIAN. N. J. Agr. Expt. Sta., *Bull.* 502, *Ann. Rept. Dept. Sewage Disposal* 1928–9, 31–6(1930).—The most abundant constituents of the org. matter of fresh solids are fats and crude proteins. Materials present in smaller percentages are water-sol. and alc.-sol. substances, hemicellulose, cellulose and lignin. Fats and cellulose show the greatest decrease in ripe sludge. Resistant substances like waxes and lignin are not decompd. readily and are therefore present in the ripe sludge in larger percentage than in fresh sludge. C. R. FELLERS

Notes on drying fresh sewage solids. ANTHONY J. FISCHER. N. J. Agr. Expt. Sta., *Bull.* 502, *Ann. Rept. Dept. Sewage Disposal* 1928–9, 29–31(1930).—Drying of fresh solids in the open is not feasible when treated with lime, alum, or a mixt. of lime and alum on account of poor drainage, objectionable odors, or both. C. R. FELLERS

Sludge drying. Relation between drainage and evaporation. WILLEM RUDOLFS AND I. O. LACY. N. J. Agr. Expt. Sta., *Bull.* 502, *Ann. Rept. Dept. Sewage Disposal* 1928–9, 26–9(1930).—Studies dealing with the relation between drainage and evapn. of drying sludge indicate that up to a temp. of 130°F., drainage is a more important factor than evapn. The percentage of total moisture removed, resp., by drainage and by evapn. at various temps. are: 43°F., 94 and 6; 74°, 86 and 14; 100°, 77 and 23; 113°, 60 and 40; and 131°, 47 and 53. The practice of covering sludge beds with greenhouses is beneficial because rain is thus kept off the beds. C. R. FELLERS

Notes on stabilization in a sprinkling filter. WILLEM RUDOLFS. N. J. Agr. Expt. Sta., *Bull.* 502, *Ann. Rept. Dept. Sewage Disposal* 1928–9, 37.—A summary of chem. results shows the amts. of suspended solids, O consumed, NH_3, NO_2, NO_3, suspended org. N, and sol. org. N present at different depths of the filter beds. In general, the removal of NH_3 nitrogen is well correlated with the reduction on O-consumed values. NO_2 and NO_3 values are the only ones which increase with depth. C. R. FELLERS

Determination of p_H in the estimation of the productivity of carp ponds. LOUIS ROULE. *Compt.-rend. acad. agr. France* 16, 1056–60(1930).—The p_H of the water should be between 6 and 8 and care must be taken to maintain the water within these values. Tests and adjustments of the water should always be made early in the morning and in the shade, as sunlight has a very marked effect on the chem. reactions taking place. J. R. ADAMS

Colorimetric determination of the sulfate ion in water (GUARNIERI) 7. Apparatus for extracting oils from sewage by solvents (U. S. pat. 1,791,398) 27.

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Water purification. H. GROECK (to Groeck Wasserveredlung Ges.). Brit. 335,687, Nov. 22, 1928. See Fr. 680,106 (*C. A.* 24, 3847).

Apparatus for deaerating water. GEORGE H. GIBSON (to Cochrane Corp.). U. S. 1,790,911, Feb. 3. Structural features.

Portable water filter. LLOYD E. RABJOHN and RALPH W. HOLLENBERG (to Cool Spring Filters, Inc.). U. S. 1,790,947, Feb. 3.

Apparatus for softening water by the lime and soda process. NECKAR WATERREINIGER MAATSCHAPPIJ. Fr. 693,007, Mar. 29, 1930.

Variable-rate chemical feed pump suitable for water-softening plants. ALBERT B. HODGES (to General Zeolite Co.). U. S. 1,790,708, Feb. 3.

Activated sludge treatment of sewage. JOHN C. DALLAS and MALCOLM WILSON. U. S. 1,790,975, Feb. 3. Various details of app. are described.

Deodorizing and producing fertilizer from sewage, etc. C. G. WIGLEY and C. POTTS. Brit. 335,682, Aug. 12, 1929. Sewage, sludge and the like are treated with a growth of the mycelium of fungi such as *Mucor* or *Rhizopus* developed under forced growth conditions, and under specified conditions of temp., moisture, limited access of air and under subdued light (in a described app.). A material suitable for sale as com. fertilizer may be obtained in 4 days.

Apparatus for clarifying waste waters, etc. DEUTSCHE ABWASSER-REINIGUNGS-GES. M. B. H., STÄDTEREINIGUNG. Fr. 693,040, Mar. 29, 1930.

15—SOILS, FERTILIZERS AND AGRICULTURAL POISONS

J. J. SKINNER AND M. S. ANDERSON

Soils of Connecticut. M. F. MORGAN. Conn. Agr. Expt. Sta., *Bull.* **320**, 829–911 (1930).—The ratio of N to org. matter (av. of 100 soils) is 1:20. No serious decline in N content has occurred in the cultivated soils of Conn. during the last 200 yrs. The av. N content of 21 forest soils is 0.205%, which is practically identical with the av. for agricultural soils. The av. percentage of P in the surface 8 in. of Conn. soils is 0.0919, an insufficient amt. for the profitable growing of most farm crops. The availability of the P in many of the soils is very low. K varies from 1.3 to 2.6% on cultivated land with an av. of 1.4%. Nearly all soils respond to potash fertilizers and lime. The av. p_H of the soils is 5.3 and the lime requirement per acre approx. 1.3 tons. Numerous greenhouse expts. were conducted to det. the fertilizer requirements of the soils. C. R. FELLERS

The red soils and Bienhoa of Indochina. M. V. AGAFONOFF. *Soil Research* (Supp. to *Proc. Intern. Soc. Soil Sci.*) **2**, No. 2, 184–96(1930); cf. *C. A.* **24**, 2822.—The results of chem. and mineralogical studies on samples of soil from Indochina are reported. The soils differ from the basalt from which they are derived in the almost complete removal of Mg, gradual loss of Na, Ca and K, oxidation of FeO to Fe_2O_3 and content of twice the amt. of Al and Ti as the basalt. The alteration and formation of secondary minerals in the decompn. of basalt are described. The similarities between Bienhoa and laterite are pointed out. The sterility of certain soils could not be accounted for by deficiency of N, P_2O_5 and K_2O. Soils low in bases in general had poor structure. Data are reported on studies of the absorbing complex of the soils by the method of Gedroiz and on the amt. of SiO_2 and Al_2O_3 sol. in 5% KOH. I. A. D.

Adsorbed bases and unsaturation of Polish sandy soils. W. BUTOWSKI. *Rept. Polish Agr. Expt. Sta.* **2**, 195(1928).—The proportion of adsorbed bases in the soils examd. varied with their mech. compn. and increased with the clay content. The plant covering of forest soils increased the adsorbed bases in the upper horizons. The amt. of adsorbed bases was less in the B-horizon than in the surface but increased at still greater depths approaching the parent rock. Variations in the degree of unsatn. were parallel with those of the base content and were greatest in the loams. The genesis of the soils is discussed. Podsolization is considered to take place in these soils. B. C. A.

Soils and soil treatments in Quebec. R. R. MCKIBBIN. *Sci. Agr.* **11**, 361–8 (1931).—It is the final balance existing in the soil after the addn. of soil treatments that is important, rather than the use of balanced fertilizers. Sweeping conclusions that similar results may be obtained from the use of similar treatments on all light soils or on all heavy soils, are unwarranted. Fundamental soil conditions must be known before effective fertilizer practice can be established. A survey of Quebec's soils is given. C. R. FELLERS

Soils of Anatolia and eastern Thrace. F. GIESECKE. *Chem. Erde* **4**, 551–97(1930).—A description is given of the various types of soils, with partial mech. and chem. analyses. A soil map of Anatolia is given. B. C. A.

Nitrate fluctuations in a South Australian soil. J. A. PRESCOTT AND G. R. PIPER. *J. Agr. Sci.* **20**, 517–31(1930).—An investigation was conducted to det. the nature and importance of the fluctuations in the nitrate content of the soil during the season under typical conditions of cropping and fallowing. The rate of nitrification is governed primarily by the soil moisture conditions. During the characteristic summer drouth there is little evidence of change in nitrate, the quantities accumulated during the preceding period of activity remaining unchanged. The quantity of nitrate ac-

cumulated during fallowing, as observed over a succession of seasons, appears to approach a const. value of about 20 p. p. m. of the 1st 18 in. of soil, and the greater portion of this remains in the 1st few in. of cultivated soil, sometimes attaining a remarkably high level. It is not washed down until the advent of autumn rains. There is generally no leaching down below the root zone of the cereal crops. At certain periods of the winter the soil moisture may be sufficiently high to result in disappearance of nitrate, when present in quantity, from the surface soil. This depletion is not due to leaching, but possibly to an intake of nitrate by microörganisms. Toward the end of the spring, the rapid nitrate accumulation in the cultivated layer may be due to a possible capillary redistribution caused by rise from the lower layer, or to particularly favorable moisture conditions immediately below the surface of the mulch or in the lower layers of the mulch itself. During the biol. active period of the year the rate of nitrification under fallow conditions is appreciably more rapid than under a crop. Lab. investigations showed that nitrate accumulation was favored by a rather broad range of temp. conditions between 11° and 34°, with no sharp optimum temp. There was, however, a definite optimum moisture content (17%, calcd. on the moist soil), with a rapid fall on the wetter side, leading to nitrate depletion at moisture contents above 19%. Nitrate accumulation occurred with relatively dry soil, although more slowly than under optimum conditions. P. R. Dawson

The development of the soil profile in North Wales as illustrated by the character of the clay fraction. G. W. Robinson. *J. Agr. Sci.* **20**, 618-39(1930).—A study was made of the variations in compn. of the clay fraction in different horizons of some typical North Welsh soil profiles. The changes in the mol. ratio of SiO_2 to sesquioxides ($SiO_2/(Al_2O_3 + Fe_2O_3)$) throughout a soil profile afford an indication of the nature of the eluviation which has affected the mineral portion of the soil The data for the soils studied indicate a general tendency to enrichment of the lower layers in sesquioxides, particularly Fe_2O_3, at the expense of the surface layers. The SiO_2-sesquioxide ratio of the clay fraction is an important aid to series definition. The soils of North Wales, particularly in the uplands, have probably been subjected to considerable erosion in the past The profiles are therefore considered to be more or less truncated. The soil profile appears to be of the brown-earth type, with podsol development in the uplands under heath vegetation The importance of the parent material is emphasized. North Welsh soils are generally of a loam character. The absence of light sandy soils in situations permitting profile development precludes the occurrence of typical podsols in the lowlands. The high content of org matter, resulting from artificial grassland conditions, results in affinities with prairie soils. P. R Dawson

The physical and chemical characteristics of certain American peat profiles. Irvin C. Feustel and Horace G Byers. U. S Dept Agr., *Tech Bull.* **214**, 1 26(1930) Based on the data obtained from 38 peat samples, an attempt has been made to distinguish between the various types of peat according to botanical origin of peat material, certain phys. and chem. tests, and response to liming and fertilization. Methods, which in many cases are modified standard methods, are given for detg. the apparent and true sp. gr., moisture relations, max shrinkage, reactions, fractional analysis of org. matter, elementary and proximate compn., mineral constituents of the ash and behavior of certain samples submerged under anaerobic conditions. The max. moisture holding capacity and moisture equiv. are the most useful of the phys properties for peat classification. The most important of the chem. detns. are of the ether and alc fractions, hemicelluloses and cellulose, lignin-humus complexes, sol. and insol. N and ash compn. Differences in profiles often handicap differentiation of the various types. Sphagnum peat from Maine is of quite a different compn. from the other varieties examd., as it consists of stems and leaves of mosses and is less decomposed The North Carolina peat is distinct in that it shows the highest alc. solv. and lowest hemicellulose content. The Washington peat seems to be in an intermediate stage of decompn. The Me. peats have a high Al_2O_3:Fe_2O_3 ratio and are rich in alkalies. The Florida peats have a high CaO content, while the N. C. peats are low in CaO. The peats from the northern regions of the U. S. show marked differences from those of the southern states. J. R. Adams

Nutrient contents of Rhineland soils. G. Hager. *Landw. Z. Rheinprovinz* No. 47(1929).—A survey of Rhineland soils is recorded. The productivity of soils is not governed by the nutrient content alone, but is dependent on many other factors, notably the proportions of clay and humus, tilth, soil depth and climatic conditions. With due consideration of these factors, the Neubauer test (cf. *C. A.* **24**, 1453) gives valuable information as to soil fertility. B. C. A.

The potassium, chlorine and sulfate contents of Kentucky tobacco as related to

grade. O. M. SHEDD. Ky. Agr. Expt. Sta., *Research Bull.* **308**, 447–71(1930).—The samples were selected from the crops of 1920, 1921 and 1924. Large variations in certain mineral constituents were found in the 2 kinds of tobacco. The extremes for the Burley were 0.79 to 7.36% K, 0.02 to 1.50 Cl and 0.09 to 0.81 sulfate S, while for the dark they were 0.76 to 4.72 K, 0.04 to 2.99 Cl and 0.11 to 0.82 sulfate S. Those samples which had an unusually high chloride or sulfate content did not generally have an abnormal amt. of K. In 78% of the comparisons of the Burley tobacco and in 62% of the dark tobacco, more K was found in the good grades than in the common. In 58% of the comparisons of the Burley tobacco and in 48% of the dark tobacco, more Cl was in the good than in the common. In 64% of the comparisons of the Burley tobacco and in 63% of the dark tobacco, more sulfate S was found in the good than in the common. The Cl was the same in several comparisons, and the sulfate S in a few. If the 3 Burley crops are combined, the averages of the good grades show 24% more K, 31% more Cl and 4% more sulfate S than the common. A comparison of the Burley and dark crops of tobacco shows that the Burley carries 42% more K than the dark, whereas the latter has 196% more Cl and 11% more sulfate S than the Burley. More K was present in the smoker grades of Burley tobacco than in the filler grades. The K content of the different grades of Burley usually varied in proportion to market quality and price. The same relation existed between the K content, quality and value of the dark tobacco. Org. K predominated in the better grades of Burley. Furthermore, the smoker grades had more org. K than the fillers. Diseased leaves disturbed the usual percentages of K, Cl and sulfate S present in the leaves. The results indicate that in expts. where fertilizers contg. K are used on tobacco, particularly of the smoking types, observations should be made of the effects of different amts. and combinations of this constituent on the quality as well as the yield of the crop. Bibliography.

C. R. FELLERS

Impoverishment of forest soils by use of the litter. A. NĚMEC. *Forstarch.* **1929**, 497–503.—Low proportions of nutrients in many forest soils are attributed to the annual removal of mineral matter in the forest litter. In this respect the available potash is least affected. B. C. A.

"Single value" soil properties: a study of the significance of certain soil constants. V. On the changes produced in a soil by oven drying. J. R. H. COUTTS. *J. Agr. Sci.* **20**, 541–8(1930); cf. *C. A.* **25**, 159.—Results for the loss in wt. of a soil on oven heating can be obtained to a very satisfactory degree of accuracy by an electrically controlled oven. The results obtained by heating soils (brought to equil. with atm. at 50% relative humidity) to temps. ranging from 50° to 250° give smooth curves connecting loss in wt. with rise in temp.; they lead to the conclusion that there is no sudden alteration in the structure of a soil when it is heated to 100°. The air-dry moisture of a soil, as detd. with sufficient accuracy by the usual methods, is a convenient empirical factor, but not a representation of any fundamental soil property. Expts. show that the losses in wt. on oven drying are greater than are the regains in wt. when the dried samples are brought to equil. with an atm. of 50% relative humidity. As the drying temp. is raised, the recoverable loss changes but slightly, while the total loss increases rapidly. Strength is lent the supposition that the recoverable loss is due to removal of free and interstitial water, while the irrecoverable loss is due partly to water bound adsorptively or chemically by soil colloids and partly by the destruction of org. colloids. At any given temp. of drying both classes of losses play a role. There is no justification for assuming that there is any sharp line dividing one class of water from the other or that in any process one of the classes of water will be removed while the others are unaffected. P. R. DAWSON

The decomposition of urea in soils. T. GIBSON. *J. Agr. Sci.* **20**, 549–58(1930); cf. *C. A.* **24**, 4882.—Investigation of the decompn of urea in 59 soil samples of extremely varied character showed that the compd. was decompd. readily in all, and very rapidly in most, of the cases. In mountain and heath soils decompn. was generally active, especially in soil tests. Strongly acid peat samples (p_H 3.1–3.3) decompd. from 0.44 to 0.86% of their own dry wts. of urea in 24 hrs. at 22–23°. In soln. and soil tests samples from permanent pastures produced a more rapid decompn. than those from cultivated land. In soil tests as high as 1% of the dry wt. of soil was converted to NH_3 in 24 hrs. at 22–23°. Fertile arable soils produced a relatively slow decompn. in soil tests. Forest soils were generally more active than cultivated soils. Strongly alk soils showed comparatively little activity in soil tests, but greater activity in soln. tests. Although urea is not absorbed by soils, its rapid conversion to NH_3 will generally prevent losses by leaching. P. R. DAWSON

Parent material as a factor in soil formation and as a criterion in soil classification.

B. POLYNOV. *Soil Research* (Supp. to *Proc. Intern. Soc. Soil Sci.*) 2, No. 2, 165–77 (1930).—The "climatic soil type" is a very broad and general concept. Soils must be further subdivided according to the properties and compn. of the rocks from which they are formed, since various rocks differ widely in their influence on soil formation. I. A. DENISON

A study of the pedogenic processes in an area of lower paleozoic shales. G. H. GETHIN JONES. *J. South-Eastern Agr. Coll., Wye, Kent* No. 27, 229–47(1930).—A full account is given of a podsol soil occurring in North Wales. There is a definite acid leaching of the sesquioxides from the eluvial horizon, followed by their subsequent deposition in the illuvial horizon of accumulation immediately below. The nature and extent of some of the pedogenic processes are shown by partial and complete profile chem. analyses of the sedentary soil, down to and including the parent rock. Welsh upland soils are in general very unsatd. with respect to lime because of excessive acid leaching in a humid climate. These soils and parent rock contain a relatively high proportion of MgO, usually about 1%. In the podsolized regions the ratio of exchangeable CaO to org. matter increases with depth, despite the poorer soil dispersion at the lower levels. This shows leaching from the upper layers, without evidence of a CaO horizon of accumulation. A profile study of p_H values showed a continuous rise toward neutrality as the relative amt. of unsatd. org. matter decreased with depth. Soil analyses by 48-hr. HCl extn. do not give reliable information as to the abs. chem. compn. of soils differing in their mech. and chem compn. K. D. JACOB

The importance of rare elements in the nutrition of plants. O. C. BRYAN. *Proc. Assoc. Southern Agr. Workers, 31st Ann. Convention* 1930, 239–42.—A general discussion with particular reference to the use of Cu and Mn salts on the Florida Everglades soils. K. D. JACOB

Correlations between the specific conductivities of soil extracts, nitric nitrogen and soluble calcium. C. H. WRIGHT. *8th Ann. Bull. Agr. Dept., Nigeria* 1929, 104–9; cf. *C. A.* 25, 761.—Periodical sampling and analysis of cropped soils show that the Ca and nitrate contents of 1 5 soil-water exts. are closely correlated with their sp. conductivities. Increased cond. is evidence of biol. activity in the soil. B. C. A.

Report of the committee on soil reaction measurements. SECOND COMMISSION, INTERNAT. SOC. SOIL SCI. *Soil Research* (Supp. to *Proc. Intern. Soc. Soil Sci.*) 2, No. 2, 141–52(1930).—The committee has already published (*Soil Research* 2, 77–139 (1930)) the methods and results of its coöperative investigation on detn. of the p_H value of soils. With few exceptions, p_H values obtained by 4 independent methods showed satisfactory agreement. Of a total of 28 soils examd., 8 gave erroneous results by the quinhydrone method. It is recommended, therefore, that a preliminary detn. be made to ascertain whether the quinhydrone method is suitable for a given soil. Where the increase in apparent p_H value from 10 to 60 sec. is less then 0.2, the method may be considered suitable. The final measurement is made by shaking the soil and water 1 min., adding the quinhydron, shaking again for 10 sec. and measuring the potential after 1 min. In the case of soils considered unsuitable for an exact detn. of p_H by this method, an approx. detn. can be made on a new sample after 10 sec. In the detn. of p_H by the H electrode a sintered glass crucible or funnel is recommended. The colorimetric method did not always agree with electrometric methods, although satisfactory agreement can be obtained with great care. I. A. DENISON

The relation between p_H value and state of saturation of soils. AMAR N. PURI. *Soil Research* (Supp. to *Proc. Intern. Soc. Soil Sci.*) 2, No. 2, 181–4(1930).—The state of satn. of the soil (V) is defined as the ratio of the amt. of absorbed bases in the soil (S) to the amt. of bases the soil is capable of absorbing (T), both values being expressed in equivs. Thus $V = 100S/T$. The value ($T - S$) is detd. by adding 100 cc. 0.2 N $Ba(OH)_2$ to 10 g soil and 2 g. $CaSO_4$ and titrating after several days against 0.1 N H_2SO_4 with phenolphthalein as indicator. T is detd. by removing all replaceable bases from 10 g. soil with 0.05 N HCl, washing with water and titrating back after adding an excess of $Ba(OH)_2$ as described above. From the values ($T - S$) and T, the S and V values are calcd. A general relation between degree of satn. and p_H was noted in the case of 36 soils. The difference in the nature of the colloids present in different soils is shown by fact that the T value per g. of clay varies from 0.252 to 1.516. I. A. DENISON

Growing onions on the muck soils of New York. J. E. KNOTT. Cornell Univ. Agr. Expt. Sta., *Bull.* 510, 3–34(1930).—On muck soils that have been under cultivation less than 10 years, increased quantities of N gave a neg. correlation with yield. P had little effect, but a fair response to K was apparent. On new, slightly acid mucks,

1000 lb. of 0–12–18 fertilizer is recommended, while for more acid mucks the formula is changed to 3–12–18. C. R. FELLERS

Lysimeter experiments. III. Records for tanks 3 to 12 during the years 1910 to 1924 inclusive. T. L. LYON, J. A. BIZZELL, B. D. WILSON AND E. W. LELAND. Cornell Univ. Agr. Expt. Sta., *Memoir* **134**, 5–72(1930); cf. *C. A.* **16**, 1123.—The lysimeters are square concrete tanks with funnel-shaped bottoms, each contg. 3½ tons of Dunkirk silty-clay loam soil. About ⅔ of the av. 32.5-in. rainfall percolated through the uncropped tanks; somewhat less than ½ percolated through the cropped soils. About 18% of the water was transpired by the plants on cropped tanks. Applications of lime had no appreciable effect on the proportion of rainfall that percolated through the soil. Liming did not increase the total quantity of N in the drainage water from the tanks in which only non-legumes were grown, nor did it have any effect on the quantity of N in the crops grown on these tanks. In the tanks with legumes, lime produced a decided increase in N, both in the drainage water and in the crops. Where legumes were grown in assocn. with non-legumes, the quantities of N contained in the latter were nearly as large as when the non-legumes were grown alone, in spite of the space occupied by the legumes and the nutrients they removed from the soil. There was less tendency for the N produced in the crops to decrease from year to year when the rotation contained legumes, than when it did not. In the tanks where no legumes were grown, the drainage water alone of the unplanted tanks contained more N than did the drainage water and plants combined from the planted tanks. This is attributed to N-synthesizing organisms which thrive better in the org. matter derived from the plant roots. Tanks in continuous grass lost less N than those planted to non-legume crops. The quantity of Ca in the drainage water from the unplanted soil was greater than that in the combined crops and drainage water from the planted tanks. Because of this, an annual conservation of 144 lb. of Ca per acre was effected by cropping the soil instead of leaving it bare. The larger removal of Ca in the drainage water from the unplanted soil than from the planted tanks was due chiefly to the much greater quantity of nitrates leached from the unplanted soil. Liming the soil was not accompanied by an increase in the quantity of Ca in the drainage water or in that of the crops produced. Its loss was decreased by cropping. To replace the yearly loss of Ca from an acre of cropped land requires approx 560 lb. of $CaCO_3$. To recoup the loss from bare soil would require about 900 lb. The quantity of Ca in drainage water was considerably greater where K_2SO_4 was applied, than where it was not. There was less Mg present than Ca in both the plants and in the drainage. Like Ca its loss was decreased by cropping. Application of lime resulted in a liberation of Mg as indicated by its greater removal in the drainage water. Crops removed more K than did the drainage water Liming did not increase the K in the drainage water or in the crops. Applications of K_2SO_4 did not result in a larger removal of K in the drainage water or in the crops. The removal of S was much larger by the drainage water than by the crops. Of the S added to the soil in the form of K_2SO_4, more than ½ was removed in the drainage water. Liming slightly increased the leaching of S in the drainage water. There was never more than a trace of P in any of the tanks. Liming slightly increased the P content of crops from the limed tanks. C. R. FELLERS

Microbiological analysis of soils. T. BAUMGÄRTEL AND H. BUTENSCHON. *Landw. Jahrb.* **72**, 256–68(1930).—The authors extend and confirm the results of their previous work (*C. A.* **24**, 5909). By the use of Biejerinck's medium cultures taken from soils contg. increasing amts. of K. fertilizers show increasing development of *Azotobacter chroöcoccum*, and where heavy dressings of potash have been used there were large nos. of protozoa. GEORGE R GREENBANK

The value of the simplified Kappen method for determining absorbed bases. D. V. DRUZHININ AND Z. I. STROGANOVA. *Udobrenie i Urozhai* (*Fertilizers and Crops*) **2**, 194–9(1930).—A series of tests was made on various soils comparing the Kappen and Bobko-Askinazi methods for detg. the absorbed bases The methods checked very well. The authors suggest a rapid, approx. method: To 1 part of soil (25, 40 or 50 g.) 2.5 parts of 0.1 *N* HCl is added, the mixt. is shaken for 1 min., allowed to stand 5 min., filtered and an aliquot taken and titrated with methyl orange as indicator. Tests with 16 different soils showed that the method checked very well with those of K. and of B.-A. Just as in the other methods the new method works best on soils free from lime and Ca phosphate and with a low content of absorbed bases. J. S. J.

The antimony electrode. M. S. DU TOIT. *South African J. Sci.* **27**, 227–35 (1930).—The Sb and H_2 electrodes were compared in a large no. of soils and found to agree closely. In the potentiometric titration of Fe and Al solns. the Sb electrode proved highly satisfactory. Its temp. coeff. was found to be 0.0013 v. per degree in

soils of varying p_H values. Franke and Willimans' conversion formula was confirmed. The use of the Sb electrode was advocated for soil surveys. C. E. P. JEFFREYS

An approximate method of mechanical analysis of soils for field purposes. P. KAMERMAN. *Soil Research* (Supp. to *Proc. Intern. Soc. Soil Sci.*) **2**, No. 2, 152–64 (1930). —A rapid method is described. The soil is dispersed by means of a mortar and rubber pestle after treatment with Na oxalate. In the case of certain soils the sample is pretreated with 0.2 *N* HCl or 6% H_2O_2. After a suitable period of settling, the clay fraction is estd. by detg. its sp. gr., and the sand fraction by decantation and measurement of its vol. I. A. DENISON

Neubauer analyses and field experiments. OBERDORFER. *Superphosphat* **6**, 83–5(1930). —In 28 field expts. on deep loam soils the crop responses to potash and phosphate fertilizers generally were in good agreement with the potash and phosphate deficiencies in the soils as indicated by Neubauer tests. K. D. JACOB

The methods of determining the phosphorus requirement of the soil. A. L. MASLOVA AND O. M. DOBROTVORSKAYA. *Udobrenie i Urozhai* (*Fertilizers and Crops*) **2**, 276–83(1930).—Soils from 27 field expts. were tested out in the lab. by the method of titration curves and soly. of P_2O_5. Into 100-cc. flasks 2, 4, 6, 9 and 12 cc. of 0.1 *N* HCl were introduced, 10 g. of soil was added and the whole made up to vol. After 24 hrs. the filtrates were analyzed for p_H and P_2O_5. It was found that for 2 different soils the soly. of P_2O_5 with HCl might be the same, but the p_H at which the same quantity of P_2O_5 is dissolved differs. Thus in chernozem soils the p_H value varies from 3.36 to 4.45, whereas in the dark gray loams it is 2.97. A comparison of the crop yields from the exptl. plots with the titration curves shows a certain correlation between the p_H and response to P fertilization. J. S. JOFFE

Testing soil for available phosphoric acid by the Winogradsky method. E. M. NORRIS. *Fertilizer Green Book* **12**, No. 2, 30–1(1931).—Directions are given for carrying out the *Azotobacter* test for phosphate deficiencies in soils. K. D. JACOB

Phosphoric acid and plant growth. M. E. MORTON. Calif. Dept. Agr., *Monthly Bull.* **19**, 766–8(1930).—A general discussion. Most Calif. soils are deficient in P. C. R. FELLERS

Phosphorus-fixing compound in the soil. A. H. MEYER. *Science* **71**, 461(1930).—An Fe compd. existing as concretions in southern soils and responsible for the fixation of P has been discovered. The P is present as a basic ferrous phosphate of very low soly. B. C. A.

Influence of phosphoric acid on the cropping power of seed potatoes. DENSCH. *Superphosphat* **6**, 120–3(1930).—Phosphate deficiency in soil not only reduces the crop yield of potatoes but lowers the seed value of the tubers, which in the subsequent season produce smaller crops of lower starch content. Moreover, the smaller crops in the 2nd season are not improved by phosphate fertilizing. B. C. A

Critical consideration of fertilizer practice and crop yields in German agriculture. ALLEMEYER. *Superphosphat* **6**, 115–20(1930). B. C. A.

Chemistry and the fertilization of Italian soil. N. PARRAVANO. *Industria chimica* **5**, 1339–46(1930).—A history of the development of the fertilizer industry in Italy. A. W. CONTIERI

Factors in the production of synthetic and natural nitrates. LEE VANDERLINDEN. *Fertilizer Green Book* **12**, No. 2, 15–6(1931). K. D. JACOB

Developments in the production and use of concentrated fertilizers. C. H. KUNSMAN. *Fertilizer Green Book* **12**, No. 2, 20–2(1931). K. D. JACOB

Modern methods in fertilizer manufacture. B. LESLIE EMSLIE. *Sci. Agr.* **11**, 305(1931).—A general discussion. C. R. FELLERS

New fertilizer mixer calculator. E. L. RAYNAULD. *Sci. Agr.* **11**, 159–61(1930).—A device is described. It is simple, inexpensive and fairly accurate. C. R. FELLERS

Development of knowledge of rational application of commercial fertilizers and new knowledge in this field. O. ENGELS. *Kunstdünger u. Leim* **27**, 331–6(1930).—An account of the chem. methods and vegetation tests employed for estg. the fertilizer needs of the soil. C. J. SCHOLLENBERGER

Possibilities of sulfur as a soil amendment. G. S. FRAPS. Tex. Agr. Expt. Sta., *Bull.* **414**, 3–56(1930).—Field and pot expts. were conducted over a 4-yr. period. Chem. analyses show that alfalfa, cabbage, cotton, onions and turnips take up much larger quantities of S than corn, rice, oats and wheat. Some Texas soils are low in S. S is brought down by rain and also is supplied by irrigation water and in most com. fertilizers. The amt. brought down by rain in Texas averages 4 to 12 lb. a year on each acre, varying with different sections. Pot expts. show that S alone gave very poor results, but when it was used to supplement a complete fertilizer in pots watered with distd. water which

contained no S, it increased the yield of crops (in some cases). Addns. of S did not increase the amts. of N or K taken up by crops in pot expts., although they increased the S taken up and slightly increased the P. There was a tendency for the S removed by crops to increase as the S content of the soil increased. Oxidation of S had practically no effect upon the active P or active K in the soils tested, but increased the permeability of some of the soils to water. S is not recommended as a fertilizer on soils in Texas, since a sufficient amt. of S is present in the soils, or is supplied by rain or irrigation water or by com. fertilizers. S or $CaSO_4$ may be recommended in special cases on soils which run together under irrigation, or which contain black alkali. It is possible that the use of concd. com. fertilizers contg. little or no S may cause a deficiency of S in soils in some sections of the country, especially for crops which require comparatively large amts. of S, such as alfalfa, cotton, cabbage and onions. C. R. FELLERS

The effect of the admixture of magnesium with lime applications. O. K. ZIKHMANKEDROV. *Udobrenie i Urozhai* (*Fertilizers and Crops*) **2**, 186-9(1930).—CaO, $CaCO_3$ (c. p.) and two kinds of limestone, one contg. 47% CaO and 23.3% MgO, the other 44.7% CaO and 25.2% MgO, were compared on podzol soils. The results showed that the Mg limestone was even slightly more effective than the pure $CaCO_3$. Another series of expts. was conducted with pure CaO, MgO, $CaCO_3$ and $MgCO_3$ alone or in combinations. Again the $MgCO_3$ showed no injurious effects, and in combination with $CaCO_3$ it stimulated the effectiveness of the latter. On some field plots the amt. of lime applied was almost equal to the hydrolytic acidity, and in every case the Mg-contg. limestones were very effective. It is concluded that limestones contg. CaO and MgO in the ratio of 2:1 or even 1:1 are not injurious; on the contrary it might be more beneficial than pure $CaCO_3$. J. S. JOFFE

The repressive effect of lime and magnesia upon soil and subsoil potash. W. H. MACINTIRE, W. M. SHAW AND J. B. YOUNG. *J. Agr. Sci.* **20**, 499-510(1930).—Data are presented from 5 lysimeter studies conducted over a 15-yr. period at the Univ. of Tenn. Agr. Expt. Sta. A 12-yr. expt. shows that economic addns. of CaO, MgO, limestone and dolomite, incorporated throughout the soil, depressed the soly. of native supplies of K. One-ton and 32-ton addns. of CaO and MgO produced the same repressive effect, even when supplemented by excessive quantities (added at once) of sulfates of Ca and Mg from $FeSO_4$ and progressive increments of the same salts from pyrite and S. A 15-yr. study with excessive quantities of 7 forms of Ca and Mg showed a decided decrease in the soly. of K in the surface soil and a marked decrease in the subsoil as a result of the influx of bicarbonate-impregnated percolates. A 4-yr. study with "light" and "heavy" forms of MgO and $MgCO_3$ and cryst. $MgCO_3.3H_2O$ showed the same consistent depression in K soly. Surface zone incorporations of $Ca(OH)_2$, limestone and dolomite produced neutral-salt-impregnated percolates that gave some indication of K liberation in an underlying unlimed zone of surface soil. Sub-surface zone incorporations produced the same repressive effect as the full depth incorporations. When K addns. were made by means of red clover hay along with $Ca(OH)_2$, limestone and dolomite, a decided decrease in the outgo of the K resulted. The results demonstrated that the liming of rock-derived soils under humid conditions will depress the hydrolytic disintegration of both the original K complex and that formed by fixation of added sol. K salts. It is further shown that the protective, or buffering, effect becomes more pronounced with increase in concn. of the bicarbonates of Ca and Mg. P. R. DAWSON

Plant-food value of mixed and fertilizing materials. BRUNO WAESER. *Metallbörse* **20**, 2021-2, 2077-8(1930).—A table shows ratios of N, P_2O_5 and K_2O contents of a number of common plants grown in Germany. The mean ratio for some 42 plants is $N:P_2O_5:K_2O = 1:0.47:1\ 42$. A similar table shows the same constituents in natural manures. The mean ratio here is 1:0.46:1.32. By combining these facts with the av. amts. of N, P_2O_5 and K_2O removed by various crops from the soil, a fair idea can be gained in regard to fertilizer requirements in Germany. The ratio of fertilizers actually used in Germany, in the case of 12 of the most important crops is $N:P_2O_5:K_2O$:lime = 1:0.449:1.256:0.66. Approx. the same ratio is found in artificial mixed fertilizers, such as KNO_3, $N:K_2O = 1:1.56$; Nitrophoska, $N:P_2O_5:K_2O = 1:0.825:1.413$; Am-Super, $N:P_2O_5 = 1:1.55$; Am-Sup-Ka, $N:P_2O_5:K_2O = 1:1.35:1.53$. A table shows the ratio of fertilizers applied to soil in some other European countries, also in Egypt and Japan. The av. ratio in these countries is $N:P_2O_5:K_2O = 1:2.11:0.81$. For the U. S., estimates are given for 3 ratio-types, $N:P_2O_5:K_2O = 1:3.33:1$; 1:5:1; 1:3:1. S. L. MADORSKY

Recent experiments on the preparation of organic manure. GILBERT J. FOWLER. *Agr. J. India* **25**, 363-85(1930).—Fermentation of org. matter in the prepn. of artificial

manure is facilitated by chopping the material into small pieces. The duration of fermentation is greatly diminished by the preliminary building up of a vigorously fermenting mass of material to serve as "activator," with which smaller quantities of less completely fermented materials are systematically mixed at suitable intervals. Insect larvae are practically eliminated by completing the fermentation anaerobically in pits. The necessary fermentation organisms may be obtained from either cow dung, cattle urine or night-soil, the latter always producing the most active fermentation. Fungi play an important part in the fermentation process, and materials contg. a high percentage of lignin cannot be rapidly fermented. There is some evidence that N fixation occurs during the process of fermentation. Data on the prepn. of artificial manure from *prickly pear, leaves, town refuse, mahua flowers, banana waste, leguminous plants* and *shrubs, sunn-hemp (Crotalaria juncea), weeds* and *green pea stalks* are tabulated.
K. D. JACOBS

Fermentation of compost and liquid manure. FRANZ SCHACHT. *Kunstdünger u. Leim* **27**, 306–8(1930).—Excessive fermentation induced by pumping liquid manure over solid stall manure can add nothing to the fertilizer value of the compost; the only advantage is in reduction of vol. by evapn., but this is accompanied by loss of N by volatilization as $(NH_4)_2CO_3$. Addn. of 18% superphosphate at the rate of 8–12 kg./cu. m. compost prevents loss by fixing NH_3 as nonvolatile phosphate. C. J. S.

Factors that influence nitrogen fixation in soils. THOMAS F. MANNS. Del. Agr. Expt. Sta., *Bull.* **167**, *Ann. Rept. Director* 44–52(1930).—Twenty years' expts. (with a rotation of wheat, mixed hay, corn and soy beans) are reported on N fixation in limed and unlimed plots receiving various fertilizer treatments. Conclusions: The use of lime, unless accompanied by K, resulted in less N gain in 20 years than shown by the unlimed plots, and lime was not a marked factor in N fixation. N losses from percolation in Del. probably reach 20% of that removed in the crops. K and P in combination were the most active factors in stimulating N fixation. K was the most active single element and the only mineral element that the crops removed in excess of that applied. C. R. FELLERS

The absorption of ammonium and nitrate nitrogen by various plants at different stages of growth. JAMES A. NAFTEL. *J. Am. Soc. Agron.* **23**, 142–58(1931).—Ammonium and nitrate N are absorbed by seedlings in appreciable amts. throughout all stages. $(NH_4)_2SO_4$ and $Ca(NO_3)_2 \cdot 4H_2O$ were used as sources of the N and similar results were obtained with all 3 plants (cotton, wheat and corn). The ammonium N is absorbed more rapidly in the early stages, after which the reverse is true. The best growth and earliest fruiting are obtained when there are both forms of N present. The easily sol. N of the seed and sap at the time of sprouting is present practically entirely in the ammonium form, and the N in this form is utilized much more rapidly than the nitrate N. The absorption of ammonium N increased as the acidity of the culture soln. decreased, while the absorption of the nitrate N was very slightly affected. The highest total N absorption usually occurred at p_H 6.0 and when both forms of N were present. A theoretical discussion of the observed phenomenon is included.
J. R. ADAMS

A comparison of various forms of nitrogen fertilizers. E. I. RATNER. *Udobrenie i Urozhai (Fertilizers and Crops)* **2**, 291–300(1930); cf. *C. A.* **24**, 1923.—The fertilizer values of $NaNO_3$, $(NH_4)_2SO_4$, $CO(NH_2)_2$, $CaCN_2$ and NH_4HCO_3 were tested in pot expts. on podsolized sandy loam, loam, degraded chernozem, deep chernozem, dark chestnut-brown, Turkestan loess and red soils (Roterde) with oats as the exptl. plant. None of the forms of N proved superior under all conditions. In the unsatd. soils cyanamide was superior to any form of N. On heavy loams $(NH_4)_2SO_4$ showed slightly higher effects. It is of interest to note that wherever $(NH_4)_2SO_4$ was not efficient the cyanamide was. It might be correlated with the different effects of these 2 forms of N on the reaction of the soil as shown in the tables presented. On some of the podsolized soils the tests were repeated, but to one series lime was added. The $(NH_4)_2SO_4$ was as good as the other forms of N on the limed soils. Cyanamide was superior to the others, even with lime, provided acid phosphate was used as the source of P. With pptd. phosphate the cyanamide was inferior. On freshly limed sandy loams (podsols) cyanamide was inferior, but on podsolized loams it was very efficient. Tests were also conducted with various moisture contents, but the results were of no significance. J. S. JOFFE

Effect of fertility on the carbohydrate-nitrogen relation in the soy bean. F. A. WELTON AND V. H. MORRIS. *Plant Physiology* **5**, 607–12(1930).—Soy beans grown in sand (3 parts of sand to 1 of Wooster silt loam) contained more dry matter and more total carbohydrates than did those grown in either soil (Wooster silt loam) or manure (3 parts of manure to 1 of Wooster silt loam). In general, the increase was due chiefly

to easily hydrolyzable carbohydrates, cellulose and lignin. The increase in carbohydrates in the plants grown in the sand was not accompanied by a simultaneous decrease in N as has been found with certain non-legumes (*C. A.* **14**, 1725–6). The high N content of these plants, however, was assocd. with the development of relatively large nos. of nodules on the roots of the plants. The stems of the plants grown in the sand were comparatively tough and rigid and not inclined to lodge. WALTER THOMAS

"Kalkammonsalpeter." O. NOLTE AND H. MÜNZBERG. *Mitt. deut. Landw. Ges.* **45**, 37(1930).—Comparison is made of the efficiency of "Kalkammonsalpeter," $(NH_4)_2SO_4$ and $NaNO_3$ in field trials. In dry seasons $NaNO_3$ was particularly effective, but in wet summers, when leaching losses were considerable, $(NH_4)_2SO_4$ proved the more profitable. "Kalkammonsalpeter" is preferable to either of the above for cereals and root crops. B. C. A.

The production of superphosphate from Khibinsk apatite. S. I. VOLFKOVICH, L. E. BERLIN AND L. B. GRINSHPAN. *Udobrenie i Urozhai* (*Fertilizers and Crops*) **2**, 300–12 (1930); cf. *C. A.* **25**, 763.—Enriched apatite obtained from nepheline apatite rock by fine grinding and sieving or flotation is used on a semifactory scale for the production of acid phosphate. The quantity of H_2SO_4 to be used was based on the following equation: $2Ca_4F(PO_4)_3 + 7H_2SO_4 + 17H_2O = 3CaH_4(PO_4)_2.H_2O + 7CaSO_4.2H_2O + 2HF$. It was found that by using 88% of the rock milled to less than 0.1 mm. a 40% P_2O_5 raw product was converted to acid phosphate of a good phys. condition with 18% sol. P_2O_5. With 83% milled to less than 0.1 mm. the raw product contained 38.9% P_2O_5 and the final acid phosphate 16.2% P_2O_5. When the quantity of particles less than 0.1 mm. fell below 28–34% P_2O_5 the phys. condition of the final product was poor. It was found possible to mix the high grade nepheline apatite with the Vyatka raw phosphate low in P_2O_5 (24.5% P_2O_5), half and half, and still obtain a good product. J. S. JOFFE

Fertilization trials with potassium ammonium superphosphate on root crop. DENSCH. *Superphosphat* **5**, 53(1929).—The efficiency of the N of "Kali-ammon-superphosphat" is similar to that of the simpler nitrogenous materials, and the fertilizer proved suitable for use on acid soils and for acid-sensitive plants. B. C. A.

Changes in soil reaction produced by ammonium, potash and potash ammonium superphosphate. GERLACH. *Superphosphat* **5**, 282(1929); cf. *C. A.* **25**, 164.—The increasing acidity of many German soils is more definitely attributable to the normal processes of cropping and leaching than to the use of physiologically acid fertilizers. Systematic liming or marling is preferable to the withholding of valuable, if slightly acid, fertilizers. B. C. A.

Composition of ammoniated superphosphate. K. D. JACOB. *Phosphorus Digest*, pp. 5–6(Nov., 1930); *Fertilizer Green Book* **12**, No. 2, 10–1(1931).—The citrate-insol. P_2O_5 formed when superphosphate is treated with relatively large quantities of NH_3 is present principally as $Ca_3(PO_4)_2$. The phys. and chem. properties of $Ca_3(PO_4)_2$ are quite different from those of the P compds. present in phosphate rock, which is composed principally of Ca fluophosphate having essentially the same constitution as fluorapatite, $3Ca_3(PO_4)_2.CaF_2$. Recent expts. indicate that $Ca_3(PO_4)_2$ has approx. 75 to 80% of the fertilizer value of mono- and di-Ca phosphates during the first growing season, while phosphate rock usually has a much lower value. K. D. JACOB

The use of superphosphate on acid soils. H. KAPPEN. *Superphosphat* **6**, 66–8(1930); cf. *C. A.* **24**, 4576.—The long-continued use of superphosphate on heavy clay and light sandy acid soils does not have a significant effect upon the p_H values of such soils. When used continuously on limed soils superphosphate tends to further increase the p_H values of the soils. Basic slag and Rhenania phosphate have approx. the same value in reducing soil acidity, and it seems that with the quantities ordinarily used in actual practice neither of these materials reduces soil acidity to a significant extent. K. D. JACOB

Soil fertilization for sugar beets. JAMES TYSON AND M. M. MCCOOL. Mich. Agr. Expt. Sta., *Special Bull.* **205**, 3–31(1930).—Field expts. conducted on 3 of the most important sugar-beet soils in Mich. show the best fertilizer ratios to be 1:4:1 or 1:4:2. From 400 to 600 lb. of 4-16-4 or 4-16-8 mixts. gave most profitable returns. $NaNO_3$ when applied all at one time to the prepd. soil before sowing the seed was fully as effective as when the same amt. was applied in instalments. C. R. FELLERS

Fertilization and crop quality in root crops. KLEEBERGER. *Superphosphat* **5**, 74–6 (1929).—The effect of unbalanced fertilization on the quality of sugar beet and potatoes is examd. In this respect nitrogenous fertilizers are of first importance. The use of phosphate fertilizers in amts. based on Neubauer trials may be unsatisfactory, since this method of examn. allows of no consideration of quality. There is no foundation for the opinion that phosphate fertilizers are of minor importance for potatoes. B. C. A.

Action of ammonium sulfate and of sodium nitrate on the yield and starch content of potatoes. O. ENGELS. *Fortschritte Landw.* **5**, 97(1930).—$(NH_4)_2SO_4$ produced higher crop increases and starch content of potatoes than did $NaNO_3$. With each fertilizer there was an economic return. B. C. A.

Sources of nitrogen for potato fertilizers in Aroostook County. B. E. BROWN, F. V. OWEN AND E. R. TOBEY. Maine Agr. Expt. Sta., *Bull.* **354**, 38 pp.(1930).—During 16 years' exptl. work $(NH_4)_2SO_4$ produced a higher av. yield than $NaNO_3$, but comparable results depend primarily upon seasonal conditions. The most important effects of seasonal variations are (1) leaching of $NaNO_3$ during periods of heavy rainfall and (2) unavailability of $(NH_4)_2SO_4$ during periods of drought, especially on very acid soils. Although there is very little difference in the yields of potatoes following the use of inorg. sources of N as compared with inorg. N supplemented with org. N, it is not recommended that the practice of adding some org. N be discontinued, though the amt. may be reduced. From 5–6% of NH_3 (4–5% N) in the potato fertilizer mixt. gave the best results on Caribou loam soil type. N in potato fertilizers is an absolute necessity for high yields. Leunasalpeter, NH_4NO_3, NH_4Cl, $(NH_4)_3PO_4$, $Ca(NO_3)_2$ and especially urea compared favorably with $(NH_4)_2SO_4$ and $NaNO_3$ as single sources of N. Good results were also obtained with $CaCN_2$ when the amt. did not exceed 60 lb. per ton of mixed fertilizer. The degree of acidity and alky. of the soil and its ability to hold moisture are important factors in detg. the effectiveness of various N materials.
C. R. FELLERS

Effect of nitrogenous fertilizers on pastures. O. NOLTE, H. MÜNZBERG AND H. KOCH. *Mitt. deut. Landw. Ges.* **44**, 385(1929).—Results of meat and milk trials on fertilized pastures are recorded. B. C. A.

Effect of various fertilizer treatments on the yield and chemical nature of permanent pasture sod in the Piedmont section. J. P. LAMASTER. *Proc. Assoc. Southern Agr. Workers, 31st Ann. Convention*, 148–58(1930).—Application of either a complete fertilizer or a N fertilizer alone greatly stimulated pasture growth for a period of 2 to 3 months following the application. A second and third application of a N fertilizer during the growing season greatly stimulated growth for a few weeks, the effect rapidly diminishing as the season advanced. Potash and phosphate fertilizers alone had very little effect in promoting growth of pasture, and little difference in the rate of growth was noted on the limed and unlimed plots. When superphosphate and lime were applied at the same time, reduced yields of green material and total P_2O_5 were obtained. On the basis of the whole season's growth, no significant differences in the percentages of N in the dry matter resulted from the various fertilizer treatments. The Ca content of the grass on all plots was very similar and followed the same trend through the season on all plots, the percentages being highest during the early season and lowest during the latter part of the season. The P content of the grass on all plots was also very similar. The percentages of P were high during the early growth period, low during midsummer and high again during the latter part of the growing period. K. D. J.

Fertilizer work with cabbage. L. M. WARE. Miss. Agr. Expt. Sta. *Circ.* **91**, 2–4 (1930).—Two yrs.' field expts. showed N was the only element which when added alone gave an increase in yield. The largest increase and net profit were obtained by the use of 532 lb. of $NaNO_3$, 1250 lb. of superphosphate and 160 lb. of KCl per acre.
C. R. FELLERS

Effects of certain soil conditions on the yield and quality of Burley tobacco. C. A. MOOERS. Tenn. Agr. Expt. Sta., *Circ.* **33**, 4 pp.(1930).—Tenn. tobacco fertilizers show an av. content of 2.5% N, 9% P_2O_5 and 4% K_2O Applications of from 500 to 1000 lb. per acre were more profitable and gave higher yields than light applications of from 100 to 450 lb. per acre. The use of manure also gave increased yields and profits.
C. R. FELLERS

Long-time fertilizer experiments (with peaches) in northeast Georgia. H. M. MCKAY. *Proc. Assoc. Southern Agr. Workers, 31st Ann. Convention*, 318–25(1930).—Over a period of 10 years N-K fertilizers gave the greatest total wt. of fruit and the greatest no. of fruits per tree. Applications of P fertilizers alone gave poorer results than those obtained on the check plots. K fertilizers increased the yield of fruit, but to a less extent than N fertilizers. For the period of the expt. the increase in the circumference of the trees was 33 to 50% greater when N was used in the fertilizer, and the terminal growth was also greater. P hastened the maturity of the fruit while N retarded maturity to a marked extent. K. D. JACOB

Cotton fertilizer experiments, 1930. Sources of nitrogen, supplements and time and method of application. G. A. HALE. Ga. Agr. Expt. Sta., *Circ.* **91**, 4 pp.(1930).—Field expts. showed that the P in superphosphate or treble superphosphate (43%

P_2O_5) was somewhat more efficient than that in $(NH_4)_2HPO_4$ or $NH_4H_2PO_4$. A small amt. of cottonseed meal used with $NaNO_3$ caused the production of more cotton than the $NaNO_3$ alone. The ordinary complete fertilizers contg. N, P and K were improved by the addn. of small amts. of Mg and Ca. C. R. FELLERS

Chemistry and plant protection. A. CHWALA. *Oesterr. Chem.-Ztg.* **32**, No. 6, 45–8 (1930).—C. reviews the chem. insecticide and fungicide materials, their classification, application and properties. He criticizes the crude methods used in chem. labs. for detg. the toxic effectiveness of these materials and points out the important influence of phys. factors, such as soly., dispersion, size of particles, surface tension, resistance to weather, wetability, etc., on the toxicity. S. L. MADORSKY

Ability of dry fungicides to adhere to seeds. A. SIMSKII. *Udobrenie i Urozhai (Fertilizers and Crops)* **2**, 206–12(1930).—Into glass-stoppered jars of 600 cc. capacity 200 g. of grain is introduced and placed in cups of a revolving drum. The fungicide is added and the drum kept at a definite speed for different time periods. The seeds are taken out, passed over a 100-mesh sieve (100 openings per square cm.) and washed, and the amount of dusting material absorbed is detd. Wheat, oats and barley were used. Ca arsenate, Paris green, $CuCO_3$ and $CuSO_4$ dusts were washed with a weak soln. of HCl. It was found that $CuCO_3$ and anhyd. $CuSO_4$ adhere best to wheat and Ca arsenate to oats. The longer the seeds are mixed with the dusts the more is absorbed. J. S. JOFFE

Review of research on the control of wireworms. C. A. THOMAS. Penn. Agr. Expt. Sta., *Tech. Bull.* **259**, 2–52(1930).—One of the most effective baits consists of 6 lb. of $Ca(CN)_2$ per 1000 ft. of crop row. The rows should previously be liberally baited with wheat, oats or corn so as to attract the wireworms. The use of CS_2 emulsions on limited areas as in greenhouses or gardens is also fairly effective. There are 12 pp. of bibliography, many of the references being briefly reviewed in the text. C. R. FELLERS

Possibility of a new insecticide for use on citrus. L. B. RIPLEY AND G. A. HEPBURN. *Farming in S. Africa* **5**, 200, 241(1930); cf. *C. A.* **24**, 3596.—Na_2SiF_6 has for the Natal fruit fly a killing power 16 times that of Pb arsenate. Preliminary expts. with strengths needed to kill the fly caused no damage to citrus foliage, but it is known that considerably higher concns. are capable of severe foliage burning, and the limit of concn. for safe spraying has not yet been detd. K. D. JACOB

The influence of antiseptics on the supply of nutrients in the soil. G. A. CHIGAREV AND N. B. MYAKIVA. *Udobrenie i Urozhai (Fertilizers and Crops)* **2**, 312–7(1930).—By using CS_2 or polychlorides (a mixt. of chlorinated hydrocarbons of the benzene series, b. 130–200°, consisting primarily of the isomers of dichlorobenzene with some mono- and poly-chloro derivs.) as soil disinfectants it was found that the nitrates are inhibited to a great extent by the CS_2, but are stimulated by the polychlorides. NH_3 is stimulated by both disinfectants. Very little effect was noted on the P regime in the soil. J. S. JOFFE

Mango hoppers and mildew and their control. P. V. WAGLE. *Poona Agr. Coll. Mag.* **21**, 170–3(1929).—Mildew on mangoes is effectively controlled by dusting with S alone or with a mixt. of 6 parts of S and 1 part of $Ca(CN)_2$. S checks the activities of the mango hopper, but better control is obtained by dusting with the S-cyanide mixt. K. D. JACOB

The economics of pyrethrum. JOHN GLASSFORD. *J. Econ. Entomol.* **23**, 874–7 (1930).—Japan now produces $^6/_7$ of the world's pyrethrum flowers. Imports into the U. S. increased from 3 million lb. in 1923 to 9 million lb. in 1929. Av. consular invoice values decreased from 47¢ per lb. in 1923 to 18¢ per lb. in 1929. A pyrethrum spray contg. 0.04% of pyrethrum oleoresin and activated with soap costs 2.2¢ per gallon compared with 0.3¢ for a 1% lubricating oil spray, 1.2¢ for a Pb arsenate spray, 1.75¢ for a lime-sulfur spray and 1.84¢ for a nicotine spray contg. 0.04% alkaloid. C. H. RICHARDSON

Experiments with insecticides against cattle grubs (Hypoderma spp.). F. C. BISHOPP, E. W. LAAKE, R. W. WELLS AND H. S. PETERS. *J. Econ. Entomol.* **23**, 852–63(1930).—Single and repeated applications of various insecticides were made against cattle grubs in the backs of cattle. Special attention was given to insecticides in dust form. Ground derris root and dust carriers contg. derris ext. gave excellent results under varying conditions. Tobacco powder and dust contg. free nicotine and nicotine sulfate also gave a high degree of control. C. H. RICHARDSON

A comparison of the toxicities of *p*-dichlorobenzene and naphthalene to the confused flour beetle (Tribolium confusum Duv.) (Coleoptera). RUSSELL S. LEHMAN. *J. Econ. Entomol.*, **23**, 958–66(1930).—Adults of *T. confusum* were exposed to a series

of concns. of *p*-dichlorobenzene and naphthalene at 30° and 60–65% relative humidity. Air satd. with *p*-dichlorobenzene is strongly anesthetic to this insect. Based upon the time required to kill 50% of the insects, naphthalene was 10–14 times more toxic than *p*-dichlorobenzene at the same concn. C. H. RICHARDSON

Arsenical sometimes injures peach trees. W. C. DUTTON. Mich. Agr. Expt. Sta., *Quart. Bull.* **13**, 55–6(1930).—Pb arsenate used alone or in combination with other materials in the form of a spray or dust during the growing season may cause severe injury to leaves, wood and bark, often resulting in defoliation. Light applications and dil. concns. of sprays and dusts, as well as mixing of the Pb arsenate with lime, are recommended as precautionary measures. C. R. FELLERS

A new fungicide for the control of both peach and apple diseases. L. A. NIVEN. *Proc. Assoc. Southern Agr. Workers, 31st Ann. Convention*, 308–10(1930).—With the exception of bitter rot, CaS sprays gave better control of peach and apple diseases than lime-S and Bordeaux sprays, and did not burn the fruit or foliage even under adverse weather conditions. K. D. JACOB

Influence of Bordeaux mixture on transpiration. W. H. MARTIN AND R. S. CLARK. New Jersey Agr. Expt. Sta., *Fiftieth Ann. Report*, 249–55(1929); *Rev. Applied Mycol.* **10**, 46.—An increase in transpiration rates in potatoes was noted after application of 5-5-50 Bordeaux mixture. Increased water loss occurred during the night following spraying of potatoes with Bordeaux mixture in soils previously adjusted to 15, 30 and 50% water content. The loss was particularly noticeable in the soils of high water content. Increased losses were observed in the 50 and 30 but not in the 15% moisture series during the day. O. E. SHEPPARD

Bunt of wheat in western Canada. W. F. HANNA AND W. POPP. *Sci. Agr.* **11**, 201–7(1930).—The CH_2O treatment of seed, even when badly infested with the *Tilletia* spores, gives satisfactory control of this disease. One lb. of com. CH_2O is used per bu. of seed. $CuSO_4$ and $CuCO_3$ are effective only when the seed is but slightly contaminated with spores. C. R. FELLERS

Sulfur dusting for the prevention of a bacterial disease of wheat called black chaff. F. J. GREANEY. *Sci. Agr.* **11**, 274–80(1931); cf. *C. A.* **24**, 5925.—The black chaff disease caused by *B. translucens* was largely prevented or controlled by frequent applications of S dust. The quality of the grain was also improved. C. R. FELLERS

The influence of sulfur dusting on rubber production. C. C. AMENT. *De Bergcultures* **4**, 823–5(1930); *Rev. Applied Mycol.* **10**, 55.—Dusting with S against mildew (*Oidium heveae*) on 2 out of 4 Hevea rubber estates in the Malang district of Java resulted in an increased yield of 22 and 14% over periods of 11 and 12 months, resp. The less productive parts of the estates were selected as controls in the expts.; so the results should be accepted with reservations. ODEN E. SHEPPARD

Sulfuring citrus trees. W. A. ROLFE. *J. Dept. Agr. Victoria* **28**, 732–3(1930).—Dusting citrus trees with powd. S at the rate of approx. 2 lb. per tree did not consistently increase the yield of fruit. K. D. JACOB

Defoliation of gooseberries by sulfur-containing sprays. HUBERT MARTIN. *J. South-Eastern Agr. Coll., Wye, Kent*, No. 27, 182–5(1930).—The Leveller variety of gooseberry is susceptible to defoliation when sprayed with either 1 in 60 lime-S, 3% dry-mix S-lime, or 0.4% colloidal S contg. 0.5% of soft soap. Addn. of $Al_2(SO_4)_3$ to the lime-S did not diminish the amt. of leaf fall. The expts. indicated that defoliation is caused by the action of elemental S and is not due to the presence of sol. sulfides. K. D. JACOB

Nicotine in paint for wooly aphis control. LEROY CHILDS. *J. Econ. Entomol.* **23**, 883(1930).—The woolly aphis attacks the callus tissue of pruning wounds, predisposing it to perennial canker infection. It was found that nicotine sulfate added to tanglefoot and tree paint which are applied to the wounds acted as a repellent to the aphids and as a contact poison to the young aphids when they attempted to establish themselves on the callus tissue. C. H. RICHARDSON

Neonicotine and certain other derivatives of the bipyridyls as insecticides. C. R. SMITH, C. H. RICHARDSON AND H. H. SHEPHARD. *J. Econ. Entomol.* **23**, 863–7(1930).—Twenty-five bipyridyl derivs. and related compds. not previously reported have been prepd. and examd. as contact insecticides. These include a no. of isomeric bipyridyls, bipiperidyls and pyridyl piperidines. Neonicotine (β-pyridyl-α-piperidine) was the most toxic of these compds., comparing closely with nicotine, to which it is chemically similar. α-Pyridyl-β-piperidine stands next in toxicity to neonicotine of the compds. investigated. In general, the compds. with the α,β and β,α groupings lead in toxicity over compds. with rings located in other positions. C. H. RICHARDSON

Results of airplane dusting in the control of cotton boll worm (Heliothis obsoleta

Fab.). FRANKLIN SHERMAN. *J. Econ. Entomol.* **23**, 810–3(1930).—**Large-scale airplane dusting operations with Ca arsenate in Texas showed that the cotton boll weevil might be controlled by the use of 5–6 lbs. Ca arsenate per acre. Cotton boll worms, however, were not controlled by this treatment, but increased in the dusted area during the season. Cotton boll worm damage was greater in treated than in untreated areas.** C. H. R.

Laboratory tests of miscellaneous chemicals against the codling moth. L. C. MCALLISTER AND E. R. VAN LEEUWEN. *J. Econ. Entomol.* **23**, 907–22(1930).—This is a study of the toxicity of a large no. of compds. to the newly hatched larvae of the codling moth (*Carpocapsa pomoneila*). Although no compd. superior in practice to Pb arsenate was found, about 50 were sufficiently toxic to be selected for further trial. Among these acetoacetanilide, diazoaminobenzene, dibromonaphthalene, 2,4-dinitrophenol, 3,5-dinitro-*o*-cresol, nitronaphthylamine, veratrine and nicotine were highly toxic to the larvae. C. H. RICHARDSON

Further results with trap baits for capturing the codling moth. M. A. YOTHERS. *J. Econ. Entomol.* **23**, 923–9(1930); cf. *C. A.* **24**, 4351.—Tests with trap baits to capture adults of *Carpocapsa pomonella* were made in a heavily infested apple orchard. The most promising baits were: malt sirup, cane molasses, beet molasses, brown sugar and geraniol. Variations in temp. affected the no. of moths captured more than did variations in dilu. of the bait. Geraniol increased the attractiveness of brown sugar and beet molasses baits. The capture of moths per trap increased with the no. of trees available from which to attract them, but not in direct ratio. C. H. RICHARDSON

Control of weeds by sodium and calcium chlorates. J. W. DEEM. *New Zealand J. Agr.* **41**, 1–3(1930).—$NaClO_3$ seems to give better control of weeds than $Ca(ClO_3)_2$, and it is cheaper and easier to handle. $Ca(ClO_3)_2$ readily absorbs moisture from the atm., but its fire risk is less than that of $NaClO_3$ Most soft weeds are killed by one application of either of these materials, while the harder weeds such as California thistle, blackberry, etc., are greatly weakened. K. D. JACOB

Eradicating perennial weeds with chlorates. A. C. ARNY, R. O. BRIDGFORD AND R. S. DUNHAM. Univ. Minn., Agr. Expt. Div., *Circ.* **32**, 4 pp.(1930); cf. *C. A.* **24**, 2538. C. R. FELLERS

Rotenone as a contact insecticide. W. M. DAVIDSON. *J. Econ. Entomol.* **23**, 868–74(1930).—Rotenone, the most toxic ingredient in *Derris* and some other plants, was tested in aq. suspension and in dust form (mixed with diatomaceous earth) against a no. of species of insects. The aq. suspensions were highly toxic to aphids, thrips, white fly larvae, leaf-hoppers, larvae of beetles, tent caterpillars, etc. Adult beetles, squash bugs, red spiders and mealy bugs were more resistant. The dusts were effective against chicken lice, roaches and cabbage worms, but the results obtained against soft-bodied sucking insects were not so good. C. H. RICHARDSON

The relative value as contact insecticides of some constituents of Derris. W. M. DAVIDSON. *J. Econ. Entomol.* **23**, 877–9(1930).—Aq. suspensions of the 4 principal toxic constituents of *Derris* root, *i. e.*, rotenone, deguelin, tephrosin and toxicarol, were tested as contact insecticides against aphids, thrips, white fly larvae and red spider mites. Their relative toxic values to *Aphis rumicis* stand with rotenone first in the approx. ratio of 400:40:10:1. Rotenone and deguelin are more toxic than nicotine to *A. rumicis*. This study indicates that the toxicity of *Derris* prepns. is due very largely to their rotenone content. C. H. RICHARDSON

Petroleum insecticides. C. W. WOODWORTH. *J. Econ. Entomol.* **23**, 848–51 (1930).—Kerosene emulsion has now been largely replaced by emulsions of the heavier petroleum oils. Heavy oils are selective in toxicity, systemic in their poisonous effects and are absorbed through the tracheae. Among the more than 100 com. brands of heavy oils now on the market, control labs. generally distinguish the following types: (1) *miscible oils* made with a cresol soap; (2) *soap emulsions* made with ordinary soaps; (3) the *nonsoap emulsions* commonly emulsified with alk. caseinate. Three types of oil are distinguished: (1) *the kerosenes*, about 40° Bé., constituting about 2% of the trade; (2) *summer oils*, about 30° Bé.; (3) *crude* and *winter oils*, about 20° Bé. The crude oils consist of a mixt. of oils varying widely in sp. gr. The winter oils are distillates from which the lighter and heavier fractions have been removed; some of them approach the summer oils in sp. gr. and refinement. Manufacturers often classify summer oils as heavy, medium and light, terms which are misnomers, as oils called heavy and light may have precisely the same sp. gr. The terms *thick* and *thin* are proposed for heavy and light. The following specifications for oils are given (the values denote, resp., sp. gr. in degrees Bé., Saybolt viscosity, percentage unsulfonatable residue, percentage distd. at 350° and 325°F. and, except in the first case, the percentage evapd. after 2 and 24 hrs.): ***winter oil***, **22° 110 sec., 68, 40, 15%; *thick oil*, 29° 110 sec., 97, 30, 10, 20,**

55%; *medium oil*, 30° 80 sec., 95, 50, 20, 30, 65%; *thin oil*, 30° 60 sec., 93, 75, 25, 40, 85%. It is conceivable that these phys. characteristics have no real significance in detg. the oils' efficiency as insecticides. The asphalt-base oils of California, which vary considerably in phys. characteristics, exhibit remarkable insecticidal efficiency. A tentative classification of the effect of oils on plants is outlined. Two new terms are proposed: *biolyte*, a general term for insecticides, fungicides, etc., and *biolysis*, the killing of pests. *Biolytology* is the science of economic poisons. C. H. RICHARDSON

Some physical properties of certain dormant oil emulsion-sulfur combinations. M. D. FARRAR AND M. A. SMITH. *J. Econ. Entomol.* **23**, 979-85(1930).—A petroleum oil emulsion for use in a dormant tree spray is described. This emulsion mixes readily with flotation S to give an effective combination spray for San José scale (*Aspidiotus perniciosus*) and peach leaf curl. The emulsion contains a vegetable gum emulsifier. When the emulsion and the S are mixed directly, the phys. properties are superior to the mixt. in which excessive water is added at time of mixing. Oils emulsified with a gum in combination with S were superior physically to those emulsions with K fish oil soap, K caseinate and petroleum soaps. Size of the S particles is a minor factor in these mixts. Flotation S contains small quantities of electrolytes which exert an important influence upon the oil emulsion mixt. The most desirable phys. properties of the mixt. were obtained when 4-6 lb. of flotation S was mixed with $1^1/_2$ gals. of the oil-gum emulsion and diluted in 50 gals. of water. C. H. RICHARDSON

A note on the relation between insecticidal action and the physical properties of soap solutions. P. A. VAN DER MEULEN. *J. Econ. Entomol.* **23**, 1011-2(1930).—This study is an effort to correlate certain phys. properties of soaps with their toxicity to insects. The adult Japanese beetle (*Popillia japonica*) was used as the test insect. As wetting and penetration are greatly influenced by the surface tension of the soln., this property was detd. with a Du Nouy surface-tension app. Surface tension was found to be very low and in all cases no definite relation existed between the surface tension of the soln. and its toxicity. The extent of penetration of a soap soln into the spiracles and tracheae of the beetle was not correlated with its toxicity. There was also no correlation between the viscosity of a soln. and its toxicity. When the soaps were allowed to evap. in the air on a glass surface, the surface became covered in most cases with a film of soap which differed greatly in strength with the different soaps. With the K soap made from palm oil, which was of relatively high toxicity, a very tough film remained upon the glass. The results show a relation between the toxicity to the insect and the tenacity of a film left after evapn. Soaps which form the toughest and most adherent films are most highly toxic, those which form less tenacious and weaker films are less toxic, while those which leave no film at all do not kill the insects. C. H. RICHARDSON

Densities of mixtures of air and various fumigants. R. C. ROARK AND O. A. NELSON. *J. Econ. Entomol.* **23**, 985-7(1930). The suitability of a compd. for use as a gaseous insecticide depends upon its toxicity, its vapor pressure and its vapor density. The vapor densities (in mass of 1000 cu. ft. of satd. mixt. of air and gas at 760 mm. Hg and 25°) and sp. gr. (air = 1) at 760 mm. and 25° of 29 compds., which have been used as fumigants for insects, are given in tabular form. Formulas for computing vapor density are also given. C. H. RICHARDSON

The calibration of flow meters for the measurement of insecticide gases. LYMAN C. CRAIG AND C. H. RICHARDSON. *J. Econ. Entomol.* **23**, 988-91(1930).—The calibration of resistance-tube flow meters for both large and small flows of air is described and the app. is illustrated. C. H. RICHARDSON

An additional statement concerning the tank-mixture method of using oil spray. RALPH H. SMITH. *J. Econ. Entomol.* **23**, 1009-11(1930).—Criticism of S.'s previous paper (*C. A.* **24**, 3594) has occasioned these remarks. The tank-mixt. method probably has an important place in the spraying of citrus trees in S. Calif.; whether it will be applicable to the spraying of deciduous fruit trees remains to be proved. Mech. mixts. of oil and water were used prior to 1910, but modern spray equipment and recent knowledge concerning the functioning of oil sprays indicate that a return to the original method is justified. The tank-mixt. method is based upon the use of an oil of given specification as to viscosity, distn. range and sulfonation. Insecticidal efficiency and injurious effect upon the plant depend entirely upon the amt. of oil deposited during spraying. The amt. deposited can be governed by placing the emulsifying material directly in the water in the spray tank, adding the oil and maintaining a uniform mixt. by means of agitators. The stability of the emulsion and size of oil globules, factors which heretofore have been the focus of oil-spray investigators, become relatively negligible. The dependability of the tank-mixt. hinges upon the proper agitation

and proper kind of emulsifier. The term "emulsifier" loses its significance when used in connection with the tank-mixt. method because an emulsion in the ordinary sense is not produced. The term "spreader" is perhaps more suitable. An investigation of spreaders for tank-mixt. sprays has shown that powd. blood albumin is one of the most promising substances for this purpose. C. H. RICHARDSON

The efficiency of the air-blast type of sprayer for applying insecticides. OLIVER I. SNAPP AND JAMES R. THOMSON. *J. Econ. Entomol.* 23, 884–5(1930).—The relative efficiency of com. air-blast sprayers and power sprayer outfits in applying lubricating oil emulsions and lime-sulfur soln. to deciduous fruit trees infested with San José scale (*Aspidiotus perniciosus*) was studied. No significant difference was found in the percent control with lubricating oil emulsion applied with the 2 types of sprayers. With lime-sulfur soln. the power sprayer gave greater efficiency than the air-blast type. C. H. RICHARDSON

Weathering of shell limestone and soil formation near Jena (HOPPE) **8.** Deodorizing reducing fertilizer from sewage, etc. (Brit. pat. 335,682) **14.** SeS_2 [fungicide or insecticide] (Fr. pat. 692,758) **18.**

Ergebnisse der Agrikulturchemie, Band II, 1930. Edited by F. HONCAMP. Berlin: Verlag Chemie, G. m. b. H. 196 pp. M. 13; bound, M. 14.

GÜNTHER, J.: **Die Chemie und das Praktikum für den Landwirt. Leitfaden für den Unterricht.** Würzburg: Bonitas-Bauer. 135 pp. Linen, M. 3.80.

Mededeelingen van de Landbouwhoogeschool te Wageningen. Dl.34. Verhandeling. 7. I. Vergleichende mikroskopische, physikalische und chemische Untersuchungen von einem Kalkstein- und einem Löss-Bodenprofil aus den Niederlanden. II. Vergleichendes Studium von einem Kalksteinbodenprofil aus Java. By A. TE WECHSEL, L. MÖSER AND C. VAN AGGELEN. Edited by J. van Baren. Wageningen: H. Veenman & Zonen. 105 pp. Fl. 4.

Fertilizers. I. G. FARBENIND. A.-G. Brit. 335,175, June 15, 1929. Various granular fertilizers are prevented from caking by coating the granules with mineral oil or other oil insol. in water and non-volatile or but lightly volatile. Materials which may be thus treated include: urea, KCl and NH_4NO_3 or their mixts. with NH_4 phosphate, NH_4 sulfate nitrate, mixts. of NH_4NO_3 with $CaCO_3$ and other mixed fertilizers contg. NH_4, K or Na nitrates.

Fertilizers. LOUIS LONGCHAMBON. Fr. 693,306, July 10, 1929. The fertilizing value of phosphorous slags is increased and the grinding thereof is facilitated by dropping the molten slag into water.

Fertilizers. GIUSEPPE LOTRIONTE. Fr. 693,528, April 8, 1930. A fertilizing, stimulating and parasiticidal mixt. to be applied to parts of plants above the ground is composed of Fe 25, Cu 5, $Mn(MnO_2)$ 2, $K(K_2O)$ 1, $Mg(MgO)$ 3, $Ca(CaO)$ 28, $P(P_2O_5)$ 1, S 8 and inert substances and water 27%.

Fertilizers. SOC. D'ÉTUDES POUR LA FABRICATION ET L'EMPLOI DES ENGRAIS CHIMIQUES (Georges Chaudron and Henri Herlemont, inventors) Fr. 693,319, July 12, 1929. Natural phosphates are made soluble by treatment with HCl or HNO_3 and sepd. from $CaCl_2$ and $Ca(NO_3)_2$ by conversion into insol. compds. such as phosphates of Cu, Sn or Fe. The insol. compds. are afterward converted into sol. phosphates for use as fertilizers. Cf. *C. A.* **24,** 3077.

Fertilizer. A. B. LAMB. Brit. 335,600, June 27, 1929. See Fr. 678,693 (*C. A.* **24,** 3599).

Fertilizer. EDWARD W. HARVEY (to The Barrett Co.). Can. 308,507, Feb. 10, 1931. A fertilizer is produced by treatment of $Ca(H_2PO_4)_2$ with atomized NH_4OH soln.

Fertilizers. J. VAN DER PLAES. Belg. 371,268, July 31, 1930. Raw manganiferous Ca phosphates are roasted in an oxidizing atm. Cf. *C. A.* **24,** 4888.

Basic phosphate slags. EISEN- UND STAHLWERK HOESCH A.-G. and FRIEDRICH HEINRICH. Fr. 692,510, Mar. 21, 1930. A compost of basic phosphates is made (1) by decanting Thomas flour or other basic phosphate slags in water, adding an acid or acid solns. and evapg., (2) by wet grinding in the presence of acids or acid salt solns., (3) by disaggregation with acids under high pressure or (4) by the action of finely pulverized acids or acid salt solns. on the slags. Fr. 692,511 describes the selective elimination of CaO from basic slags by treatment with acids or acid salt solns. so as to leave unmodified the constituent called silicocarnotite which is the soly. vehicle in citric acid.

Spray oils. WALLACE J. YATES (to Shell Development Co.). Can. 308,745, Feb. 17, 1931. A spraying liquid for insecticidal purposes consists of an emulsion in water of a petroleum spray oil, to which not over 1% of S has been added. Cf. *C. A.* 24, 5928.

Insecticide. STANDARD OIL DEVELOPMENT CO. Fr. 692,568, Mar. 22, 1930. An insecticide is composed of a naphtha or petroleum distillate having a b. p. above 205°, preferably between 205° and 280°, to which may be added exts. of pyrethrum, etc. Cf. *C. A.* 25, 1325.

Insecticide and fumigant containing ethylene oxide. RURIC C. ROARK and RICHARD T. COTTON (to the Government and People of the U. S. A.). U. S. 1,791,429, Feb. 3. A compn. suitable for fumigating foods, etc., comprises ethylene oxide as essential active agent.

Fungicide and bactericide. JOHN W. ROBERTS. U. S. 1,791,430, Feb. 3. A compn. suitable for combating fungi causing peach scab, etc., comprises a mixt. formed from $ZnSO_4$ 4 lbs., lime 3–4 lbs. and water 50 gals. Casein or alum may be added.

Fungicides for seeds. I. G. FARBENIND. A.-G. (Wilhelm Schepss, Wilhelm Bonrath and Carl Taube, inventors). Ger. 515,075, Sept. 23, 1927. Compds. in which Hg is linked to an aromatic hydrocarbon radical are used alone or with other fungicides, wetting agents or diluents. Among the compds. specified are PhHgOAc and $C_{10}H_7HgCl$. Cf. *C. A.* 24, 2539.

Fungicides for seeds. WILLI LENZ. Ger. 515,098, June 7, 1925. Water-insol. Cu compds. are mixed with alkali carbonates or bicarbonates and with hygroscopic compds. Adhesives, diluents, etc., may be included, but water-sol. fungicides should not be present. A suitable compn. contains $Cu(OH)_2$ 170, $CaCl_2$ 30, $NaHCO_3$ 50 and talc 50 parts.

Immunizing plants. Soc. D'ÉTUDES SCIENTIFIQUES. Fr. 693,723, July 18, 1929. Plants are immunized against the action of bacteria by the use of vaccines or artificial enzymes. Vegetable serums may be made by vaccinating plants and extg. and may be used in human and veterinary therapeutics.

Immunizing seed grain and preserving wood, glue, etc., from decay. I. G. FARBENIND. A.-G. Brit. 335,527, May 24, 1929. Fungicidal org. Hg compds. are used such as methoxyethylmercuric chloride or acetate, ethoxyethylmercuric chloride, methoxypropylmercuric acetate, phenoxyethylmercuric chloride, benzyloxyethylmercuric chloride, methoxyethylmercuric oxalate and methoxyethylmercuric hydroxide (details for the prepn. of some of which are given) and these compds. may be mixed with dry pulverulent diluents or with liquid vehicles. Cf. *C. A.* 24, 2828.

Mordants for seeds and for preserving and disinfecting grains, etc. I. G. FARBENIND. A.-G. Fr. 693,415, Apr. 5, 1930. Use is made of Hg compds. of the formula A. (A) XHgCRRCRROR′; (B) XHgCRRCRR–, in which X is a hydroxyl or any group forming with Hg a salt or a complex salt (acetate, lactate, oxalate, sulfate, chloride, thiocyanate, etc.). R is H, alkyl, aralkyl or aryl and may be the same or different in each position, and R′ is an alkyl, aryl or the group B.

Herbicides. I. G. FARBENIND. A.-G. Fr. 692,996, Mar. 28, 1930. Weeds, etc., are destroyed by solns. of salts such as chlorates to which are added a soln. of a wetting agent such as an aromatic sulfonic acid, the amt. of wetting agent added being small relative to the amt. of herbicide.

Weed killer. CHEM. FAB. LUDWIG MEYER. Ger. 515,414, Feb. 6, 1929. Addn. to 441,213 and 478,446 (*C. A.* 23, 4295). Solns. of heavy metal nitrates contg. free NO are used. Thus, 0.1–0.5% of NO in the form of HNO_2 or fuming HNO_3 may be added to a 1.5–7% soln. of $Cu(NO_3)_2$.

Destroying beet worms. CHEM. FAB. VON HEYDEN A.-G. (Walther Baunacke, inventor). Ger. 515,346 and 515,347, July 10, 1928. Formic acid is used, *e. g.*, by applying to the soil a mixt. of HCOONa 1 and $KHSO_4$ 2 parts (515,346). Picric acid may also be used and may be applied to the soil mixed with diluents, fertilizers, etc., or liberated in the soil by using mixts. of picrates with acid compds (515,347).

16—THE FERMENTATION INDUSTRIES

C. N. FREY

How much alcohol is produced by yeast? II. Checking of alcohol production. STAIGER AND GLAUBITZ. *Brennerei-Ztg.* 47, 127(1930); cf. *C. A.* 24, 4890.—Alc. was added to the original mash in various amts. (6, 8, 10 and 14%) and sugar was then added (75, 50, 25 and 0 g.). The alc. produced after 21 days was detd. The results were

10.6, 8.2, 6.0 and 2.2%, showing the alc.-producing ability of the yeast is checked when a certain concn. is attained. III. *Ibid* 146–7.—Various amts. (25, 30, 35 and 40 g.) of distillery, beer and wine yeast were used as seed. The results showed that the alc. production did not increase in spite of the increasing amts. of seed yeast, although the fermentation was completed sooner. S. Jozsa

Alcohol yields from corn and durra and from damaged raw material. Staiger. *Brennerei-Ztg.* **47**, 114–5(1930).—Ten corn samples, 2 durra samples and 12 miscellaneous grain samples were analyzed and the results of yield of alc. are given. S. J.

The balance in the fourth form of fermentation in the cell-free yeast fermentation. Maria Kobel and Max Scheuer. *Biochem. Z.* 229, 238–47(1930).—In expts. in which dild. yeast maceration juice acted upon hexosediphosphate pyruvic acid was isolated which was equiv. to 79% of the carbohydrate used and actually 100% of the sugar transformed. S. Morgulis

Further studies on the formation of methylglyoxal and pyruvic acid by yeast under the influence of various plasmolytic substances. Carl Neuberg and Maria Kobel. *Biochem. Z.* **229**, 255–62(1930); cf. *C. A.* **25**, 123.—The formation of $CH_3.CO.CHO$ from hexosediphosphate can be easily demonstrated in the presence of various plasmolytic agents (toluene, bromobenzene, various alcs., $CHCl_3$, CCl_4 and urethan) or of a high concn. of the diphosphate itself. The accumulation of $CH_3.CO.CO_2H$ can also be brought about by these means. S. Morgulis

Decomposition of non-phosphorated sugar by yeast with the formation of glycerol and pyruvic acid. Carl Neuberg and Maria Kobel. *Biochem. Z.* **229**, 446–54 (1930).—The fermentation of the Mg salt of fructose, diphosphate as substrate, yields 100% of the theoretical amt. of glycerol and pyruvic acid. Both these substances are recovered, though in smaller quantities, even when a 10% glucose soln. contg. 0.125–0.75% $Mg_3(PO_4)_2$ is fermented by fresh press yeast. The $Mg_3(PO_4)_2$ can be replaced by Na_2HPO_4. However, since MgO acts just as well, the presence of the phosphate ion is not essential, nor is the Mg ion indispensible because the Mg salt can be replaced by Na_2HPO_4. The glycerol and pyruvic acid appear in equiv. amts. under conditions where no cell multiplication takes place (yeast juice or suspension preserved with antiseptics), but the equivalence disappears when one works with living yeast cells. Cf. *C. A.* **24**, 1398, 3078. S. Morgulis

Formation and identification of acids produced by different strains of propionic acid bacteria. P. W. Wilson, E. B. Fred and W. H. Peterson. *Biochem. Z.* **229**, 271–80(1930).—Eleven strains of propionic acid bacteria were examd. from the standpoint of their ability to ferment glucose, lactose and maltose, from which volatile acids were produced. In pure cultures sugar was used up only partially but in the presence of *L. casei* all the sugar was used up and 25–75% converted to volatile acids. The most active strains were employed in the fermentation of meal from malted corn, molasses or hydrolyzed starch, only the latter 2 being quickly fermented. The activity of the different strains varied, of course, but those fermenting pure sugar most effectively did so also with the natural sources of sugar. Yeast water or the residue in the distn. of acetone-BuOH fermentation served well as the N sources. Acetic and propionic acids were isolated and identified as the volatile products, the latter constituting 65–70% of the total. S. Morgulis

Studies on slops. Staiger. *Brennerei-Ztg.* **47**, 142(1930).—The moisture, acidity and alc. content were detd. on 9 different samples of residual liquid from distn. of alc. liquors. The protein, fat, crude fiber, N-free ext. and ash were detd. on 3 rye slops. S. Jozsa

Slop and its significance in agriculture. K. G. Schulz. *Brennerei-Ztg.* **47**, 162 (1930). S. Jozsa

Removing wood taste from wine brandies. C. Luckow. *Brennerei-Ztg.* **47**, 138 (1930).—Two samples of wine distillate were stored in wooden barrels and had a strong oak-wood taste. By using 10 g. gelatin per 100 l. distillate, or 1% skim milk, the undesirable taste was practically removed. S. Jozsa

Formic acid, a constituent of the volatile acids of wine, and its determination. W. Seifert and Marie Ulbrich. Expt. Sta. Klosterneuburg, *Denkschrift*, 70th anniversary, 148–63(1930); cf. Kreps, *C. A.* **5**, 1305; Fincke, *C. A.* **5**, 1300, 3705; **6**, 1787; **7**, 2258.—The method of F. for detg. HCOOH is very exact, but laborious; the $KMnO_4$ method of Lieben (1893) was here adopted, and the results of the examn. of 24 samples of Austrian and Hungarian wines are tabulated. Conclusions: (1) The content of free HCOOH varies from 0.023 to 0.089 g. per l.; the quantity bound as ester is greater or smaller; no regularity is apparent. (2) The ratio of free HCOOH to volatile acids shows very wide limits: 3.4–21.6% in grape wines; 5.2–9.5% in raisin wines; and 7.1–

10.5% in fermented fruit juices. (3) The highest content of HCOOH is found in 1 of 2 Tokay wines examd.: 0.089 g. free, 0.214 g. total per l. K. records for Tokay wines 0.173–0.517 g. total HCOOH per l. These wines are usually left on the lees for about 1 year, then are stored in incompletely filled barrels in order that the characteristic "bread" taste may form. Yeast activity is thus renewed and volatile acids are formed. In the decompn. of leucine of yeast, HCOOH is split off (F. Ehrlich, 1905). (4) Two raisin wines prepd. by S. and U. contained only 0.108 and 0.091 g. per l. of total HCOOH, probably because 4 g. tartaric acid per l. had been added to exclude secondary fermentations. Khoudabachian (1883) found in a raisin wine 0.94 g. AcOH and 0.28 g. HCOOH per l., probably caused by the presence of bacteria. (5) The undild. juices of currants and raspberries fermented with pure yeast contained when examd. fresh only 0.052 and 0.062 g. total HCOOH, whereas K. had observed in stored raspberry wine 0.323–0.542 g. per l. The cause of this difference will be further studied. Fruit juices apparently keep best when they are fermented with pure yeast, withdrawn from the sediment early and filtered. S. Waldbott

Determination of glycerol in wines and fermented beverages. Lucien Semichon and Michel Flanzy. *Ann. fals.* **23**, 583-602(1930); cf. *C. A.* **24**, 2231.—S. and F. recommend the following technic, which is a modification of that of Ferré and Bourges (*C. A.* **22**, 4713): Place 20 cc. of wine in a 100-cc. volumetric flask, make up to 100 cc. with neutral 95% alc., add to 5 g. BaO and triturate in a mortar for 2–3 min., return to the volumetric flask, let stand 30 min. and filter (preferably through a Gooch crucible). Pass CO_2 for 2 min. through a 50-cc. aliquot in a 100-cc. Erlenmeyer flask, evap. to about 10 cc., add 20 cc. water, evap. to 15–20 cc., let cool, make up to 50 cc. and filter. Steam-distil 25 cc. (=5 cc. of original sample) under a partial vacuum of 30–40 cm. of Hg, absorbing the distillate in a mixt. of 10 cc. CrO_3 (63 g. per l.) and 20 cc. of 60° Bé. H_2SO_4. Immerse the tube contg. the sample to be distd. in a vaseline-oil bath heated to 115–120°, which also contains a coil for superheating the steam used for the distn.; place the absorbing soln. in a 500-cc. Durand washing flask immersed in a boiling-water bath. After distg. for 3 hrs., titrate the excess CrO_3 with $Fe(NH_4)_2(SO_4)_2$ soln. (149.13 g. per l.), using $K_3Fe(CN)_6$ as outside indicator; 69 mg. glycerol is completely oxidized by 350 mg. CrO_3. Details are given of the investigation of the method, and data are furnished justifying the various steps of the technic. A. Papineau-Couture

Experiments toward determination of sorbitol according to Werder and Zäch. Rudolf Haid and Franz Popberger. Expt. Sta. Klosterneuburg, *Denkschrift*, 70th anniversary, 90–3(1930); cf. Werder, Zäch and others, *C. A.* **23**, 928, 4296; **24**, 5105.—Heretofore, not much less than a 10% admixt. of fruit wine to grape wine could be detected by isolating dibenzalsorbitol (*A*). A 3% addn. contg. 7.5–39 mg. sorbitol per 100 cc. (cf. Fellenberg) should yield about 15–78 mg. of *A*, of which only 5–10 mg. is needed for the Tutin identification test. However, a 3% addn. yields only 3–5 mg. water-insol. *A*. To obtain a max. yield of *A*, the temp. must be kept at 0°, a min. concn. of 1:1 H_2SO_4 and a certain excess of BzH must be used; *e. g.*, 30 mg. sorbitol, 0.65 cc. H_2SO_4 (1:1) and 0.2 cc. BzH (6 drops) at 0° yielded 54 mg. of *A*. Slight deviations alter the yield considerably. S. Waldbott

Brewing as a branch of science. Arthur R. Ling. *Brewers J.* **66**, 302–6(1930).—The biochem. processes involved in the brewing of beer are outlined. P. J. F. W.

English barleys of 1929. H. M. Chubb. *J. Inst. Brewing* **36**, 221–4(1930).—In contradistinction to the heavy barley of the 1928 season, those of 1929 are light, the greater bulk reducing the malt house output by 5%. Germination on the floor was good and regular. Diastatic power and cold water exts. of the malts were below normal. Peter J. F. Weber

Foreign barleys of 1929. T. R. Sutcliffe. *J. Inst. Brewing* **36**, 225–6(1930).—California barley malted well and gave high to abnormally high exts., while Chile produced a barley of av. quality. The crops of other barley-growing countries were of inferior quality. Peter J. F. Weber

Some recent advances in the chemistry of enzymes. R. H. Hopkins. *J. Inst. Brewing* **36**, 189–94(1930).—See *C. A.* **24**, 2764 (the vol. no. given for *Chem. News* is an error for **140**). Peter J. F. Weber

Cleaning and disinfecting agents (in the brewery). P. Petit. *Brasserie & malterie* **20**, 337–42(1930).—A brief discussion of the proper method of cleaning and disinfecting piping and bottles. A. Papineau-Couture

Attenuation. J. de Clerck. *Bull. assoc. anciens eleves de Louvain*, March, **1930**; *Brewers J.* **66**, 293–4(1930).—The factors influencing attenuation of fermenting liquids are discussed. Peter J. F. Webber

The brewing value of hop tannin. A. A. D. Comrie. *J. Inst. Brewing* **36**, 307–11

(1930).—Research thus far indicates that boiling a malt wort renders part of the nitrogenous constituents insol. The tannin of the hops accelerates pptn. through the formation of tannin-nitrogen compds., which, however, only become quite insol. by conversion of the tannin into its deriv., phlobaphene. The tannin-nitrogen compds. sometimes pass into the beer and can produce haze of two kinds: reversible (when the soly. is reduced by chilling) or irreversible (when the tannin is converted into the insol. phlobaphene by heating, such as pasteurization). PETER J. F. WEBER

The solubility of maize proteins in mashing. II. R. H. HOPKINS. *J. Inst. Brewing* **36,** 297–304(1930); cf. *C. A.* **24,** 1929.—Lab. fermentations of malt and malt maize worts having similar ds. and contg. approx. 50 mg. of assimilable N per 100 cc. justified the conclusion that the N derived from maize is almost wholly left in the beer after a single fermentation. A second seeding of the fermented worts with yeast indicated that the maize N would be ultimately assimilable. PETER J. F. WEBER

Respiration and fermentation of top and bottom beer yeast. KURT TRAUTWEIN AND JOSEPH WASSERMANN. *Biochem. Z.* **229,** 128–53(1930).—The rate of respiration of top yeast is on the av. 77% higher than that of the bottom yeast. The top yeasts rise to the surface during fermentation where they can easily find O_2 and thus become acclimated to an aerobic existence. But here the increase in the respiration capacity is accompanied by a similar increase in the fermenting capacity so that the ratio between their rates remains const. Both types of yeast, however, use up 2–3% of the total sugar undergoing dissimilation in the respiration and 98–97% in the fermentation. If the energy value of both the respiratory and fermentative processes is calcd. the total metabolism of the top yeast is found to be 42% higher than that of the bottom yeast. In the top yeast 40% of the total metabolism is respiratory and 60% fermentative, while for the bottom yeast these values are 32 and 68%, resp. S. MORGULIS

Research work in the yeast field. L. H. LAMPITT. *J. Inst. Brewing* **36,** 250–60 (1930). -A review of results obtained, and of problems to be solved in the study of the life and activity of yeast. PETER J. F. WEBER

Alcohol losses in yeast manufacturing. F. WAGNER. *Brennerei-Ztg.* **47,** 162–3 (1930).—The losses on alc. due to aeration were studied on 3 different molasses mashes diluted 8, 16 and 20 times, resp. The amt. of air per cu. m. liquid was 25, 70 and 70 cu. m., resp. The alc. content of the air leaving the system was detd., and it was found that the losses of alc. increased with stronger aeration, and decreased with lower alc. content. S. JÓZSA

Losses of water-soluble phosphoric acid by the clarification of molasses under acid conditions and heat. O. HUMMER. *Brennerei-Ztg.* **47,** 142–3(1930).—The loss of water-sol. P_2O_5 increases rapidly with decreasing acidity. S. JÓZSA

Korean koji (a kind of the so-called Chinese yeast). HIROSUKE NAGANISHI. *Abstract from Rept. Central Lab. S. Manchuria Railway Co.* 1929, 41–2.—Thirty-seven mold fungi, 9 yeasts and 4 bacteria were found in this prepn. The diastatic powers of the molds are detd. V. F. HARRINGTON

Involution cultures of yeast 1. A. T. HENLEY. *J. Inst. Brewing* **36,** 304–7(1930).—To obtain surface growths of yeast which shall be characteristic and help in the differentiation of species, specially prepd. wort-carrigeen moss (*Chondrus chispus*) in Erlenmeyer flasks was inoculated with a wild yeast (*S. pastorianus*) and a culture yeast (Dublin No. 1). The growths thus obtained were distinctly different from each other, since the colonies were able to grow freely along any individual lines they may have possessed and yet could not sink into the body of the media. Under these conditions a high percentage of mycelial cells was formed and gave rise to the term *involution culture*. The gel produced by the addn. of carrigeen moss to wort was fragile, only a little agitation breaking it down. Details of the method of prepn. are given. P. J. F. W.

The use of microörganisms in certain commercial processes (HUBERT) **23.** The preservation of sweet must (MEHLITZ) **12.**

VENTRE, J.: **Traité de vinification pratique et rationnelle. Tome I. Le raisin et les vinifications.** Paris: Dunod. 490 pp. F. 50.

Fermentation products. ZELLSTOFFFABRIK WALDHOF and MAX GADE. Fr. 693,553, April 8, 1930. In the distn. of alc. from a fermented sulfite wort the first running contg. aldehyde is directed to a fresh wort about to be fermented.

Dehydrating alcohol. WM. H. ENGELS (to Merck & Co.). U. S. 1,790,907, Feb. 3. A hydrous alc. is mixed with comminuted CaO in relatively small excess as proportioned

to the amt. of water to be removed, the mixt. is heated and refluxed and the film of hydrated lime is continually removed as it forms upon the surface of the particles of oxide by the action of mech. agitation; this operation is continued to completion of the dehydration and the treated alc. is distd. off under continued agitation. A "com. pure" hydrated lime is obtained as a by-product.

Butanol and acetone. AUGUSTE FERNBACH. Fr. 693,744, July 23, 1929. In the production of butanol and acetone by the fermentation of materials contg. saccharose, inversion of the saccharose is obtained by the action of sucrase or invertase, yeast being used as the source of sucrase. The medium is kept at a p_H value of 4.3–4.5.

Lactic and acetic acids. WISCONSIN ALUMNI RESEARCH FOUNDATION. Brit. 335,596, June 20, 1929. Lactic and acetic acids are produced by fermentation of pentoses and hexoses (such as those from wood, sawdust, straw, corncobs or the like) by the action of a described microörganism obtained from fermenting plant material such as silage or sauerkraut. Various details of procedure are described.

Glycerol. VEREINIGTE CHEM. WERKE A.-G. Ger. 514,395, June 22, 1926. In the manuf. of glycerol by fermenting sugar in alk. soln. in the presence of Na_2SO_3 the volatile fermentation products are distd. off, and the residual mash contg. glycerol is fermented again after addn. of more sugar, these steps being repeated as required. The yeast should preferably be filtered off before removing the volatile products. Examples are given.

Yeast. KRAUSZ MOSKOVITS VEREINIGTE INDUSTRIE-ANLAGEN A.-G. Fr. 692,546, Mar. 21, 1930. Yeast of high enzymic activity is prepd. from yeast multiplied according to any known process, which is further developed in 2 working stages in such a manner that in the one stage, by assimilation, nitrogenous substances complete the plasma of the yeast cells with simultaneous inhibition of multiplication and in the other stage, by setting up a strong fermentation; the enzymes of the cells are caused to develop, the 2 stages being effected in either sequence.

Preparation of air yeast and other microbiological processes employing the passage of gas through the culture medium. HENDRIK C. JANSEN. Dutch 22,653, Sept. 15, 1930. Substances which are to be added to the nutrient medium are mixed in with the gas passed through the medium. Liquids or solids are sprayed into the gas.

17—PHARMACEUTICAL CHEMISTRY

W. O. EMERY

The chemical examination of Sida cordifolia, Linn. SUDHAMOY GHOSH AND ASHUTOSH DUTT. *J. Indian Chem. Soc.* **7**, 825–9(1930).—Berela (*S. cordifolia.* L.), regarded as a most valuable drug in the Ayurvedic system of medicine, and used as an aphrodisiac by the Mahomedan hakims, has not previously been examd. systematically. Assays of the entire plant by the U. S. P. method for belladonna showed the presence of 0.085% total alkaloids, the seeds contg. 4 times more alkaloid than the leaves, stems or roots. Extn. with petr. ether, Et_2O, abs. alc. and H_2O showed the presence of fatty oil, phytosterols, resins, resin acids, mucins, KNO_3 and alkaloids, but no tannin or glucoside. The alc. ext. contained the whole of the alkaloid content. From 100 kg. of the air-dried drug a crude alkaloid residue was extd., $^1/_5$ of which was $CHCl_3$-sol. The remainder gave a *cryst. HCl salt*, m. 215.5°, α_D^{22} —35.0, *chloroplatinate* m. 190.5°, mol. wt. 165, mixed m. p. with ephedrine-HCl from *Ephedra vulgaris* 215.5° (ephedrine-HCl, m. 215–6°, α_D —32.5; mol. wt. 167). The $CHCl_3$-sol. fraction was non-cryst. but appeared to contain alkaloids related to ephedrine. Ppts. with 11 alkaloidal reagents and the violet color of the biuret reaction confirmed the identity of the alkaloid from Berela with ephedrine. Pharmacologically, the alkaloid hydrochloride causes marked and persistent rise of blood pressure in the absence of ergotoxine, dilation of the bronchioles and inhibition of intestinal movements; these effects resemble those of sympathomimetic bases such as adrenaline or ephedrine. C. R. ADDINALL

The distillation of essential oils. V. I. VARENTZEV. *J. Chem. Ind.* (Moscow) **6**, 1602–4(1929).—The extn. of essential oils from their seeds by steam distn. can be expressed by the formula of an infinite decreasing geometrical progression: $S = a/(1 - r)$ and $l = ar^{n-1}$. Thus, by experimentally establishing a (the amt. of oil extd. in the first hr.) and r (the ratio of the amt. of oil extd. between 2 consecutive hrs.) the duration of the distn. of the oil content of the seeds can be easily calcd. The validity of this "distn. law" is shown by numerous examples taken at random from the literature.

E. BIELOUSS

The seeds and oil of Sinapis dissecta Lag. N. BELYAEV. *Masloboino Zhirovoe Delo* **1929**, No. 6, 25–6.—This plant, found abundantly in the Saratov region, is a variety of the common *Sinapis alba* L. The seeds contain moisture 8.80, oil 28.95, fiber 15.06, ash 4.48, total N 3.83, crude protein 23.90 and essential oil 0.09%. The oil has d. 0.9150, solidification point 15, n_D^{20} 71.9, sapon. no. 172.4, I no. (Hübl) 100.52, acid no. 1.64. The fatty acids have I no. 99.38, m. 21°, solidify 18°. The oil is thus similar to the oil of *Sinapis alba*. E. BIELOUSS

Investigation of the essential oil from different kinds of fennel cultivated in the Krasnodar district. N. SOBYANIN AND S. SAAKOV. *Masloboino Zhirovoe Delo* **1929**, No. 6, 34–6.—Fennel oils of different origins vary in yield from 1.21 to 5.3%, in optical rotation from +5 to +20.3, in *n* from 1.528 to 1.5405, in solidification point from 3° to 12°. E. BIELOUSS

Comparative value of metaphen in alcohol-acetone-aqueous solutions in the pre-operative disinfection of the skin. WINFIELD W. SCOTT AND KONRAD E. BIRKHANG. *Ann. Surgery* **93**, 587–97(1931).—A 0.5% alc.-acetone-aq. soln. of 4-nitro-5-hydroxy-mercuri-*o*-cresol is a satisfactory pre-operative skin disinfectant. RACHEL BROWN

Note on the biological assay of tincture digitalis. G. A. GRANT AND S. G. ALEXANDER. *Proc. Trans. Nova Scotian Inst. Sci.* **17**, 244–7(1930).—The strength of several samples of Tr. digitalis was detd. by the biol. assay outlined at the Geneva Conference. The results obtained indicate that for the tinctures examd. the max. deviation from the U. S. P. X standard is much less than that previously found and that the strength of the International powder is considerably above that of the present U. S. P. X standard. RACHEL BROWN

The germicidal action of ethereal oils. SIEGFRIED L. MALOWAN. *Z. Hyg. Infektionskrankh.* **112**, 93–4(1931).—The chem. compn. as well as the H_2O soly. affect the germicidal action of ethereal oils. Oils contg. aldehyde are most active and have a high soly.; oils contg. esters are less active than alcs. RACHEL BROWN

Bulgarian Otto of Rose. ERNEST S. GUENTHER AND ROBERT GARNIER. *Am. Perfumer* **25**, 417–20, 479–82, 547–50, 621–4(1930).—An exhaustive review is given of the natural rose oil industry as practiced in Bulgaria, with illustrations. W. O. E.

Leaf oil from Dacrydium franklini Hooker. A. R. PENFOLD AND J. L. SIMONSEN. *J. Proc. Roy. Soc. N. S. Wales* **63**, 95–101(1930).—A renewed study of the hydrocarbon portion of the oil would indicate that the alleged dacrydene previously reported by Baker and Smith is in all probability identical with Δ^4-carene, and should, therefore, be removed from the literature until evidence of its sep. existence is forthcoming. W. O. E.

Essential oil of Eucalyptus rariflora. A. R. PENFOLD, C. B. RADCLIFFE AND W. F. SHORT. *J. Proc. Roy. Soc. N. S. Wales* **64**, 101–14(1930).—Distn. of the leaves and terminal branchlets of this tree gave a reddish yellow to yellowish brown oil in 2.5% yield, possessing a pronounced phellandrene odor modified by the aromatic aldehydes present. The principal constituents so far identified are the terpenes Δ^4-carene, β-phellandrene, *l*-α-pinene, β-pinene, cymene, with cineole (about 10%), sesquiterpenes (principally aromadendrene), sesquiterpene alcs., with small quantities of the aromatic aldehydes (cuminal, phellandral, cryptal), alkali-sol. compds. (unidentified phenols and dehydroangustione (β-diketone)). The identification of Δ^4-carene is noteworthy in that it is the first record of its occurrence in *Eucalyptus* oils. W. O. E.

Oil of amber. T. TUSTING COCKING. *Perfumery Essential Oil Record* **21**, 477–8 (1930).—An exptl. study is reported of both the true and the com. oils, notably of the consts. obtained in the examn. of the various oil fractions. W. O. E.

Kalk-vizym. HERMANN ESCHENBRENNER. *Pharm. Presse, Wiss.-prakt. Heft*, **1930**, 145–6.—A new vitamin-contg. Ca phosphate prepn. is described, in connection with a review of certain chem. tests for the vitamins A, B and D alleged to be present in the above prepn.

Quinine. KARL DOPF. *Pharm. Presse, Wiss.-prakt. Heft.* **1930**, 167–8.—The history, production and importance of this alkaloid in medicine are discussed. W. O. E.

Examination of pine needle extracts by capillary analysis. H. ESCHENBRENNER. *Pharm. Presse, Wiss.-prakt. Heft* **1930**, 177–8.—A discussion is given of the contaminants not infrequently encountered in com. prepns. of pine needle exts. in connection with a review of the method specified by the Supplement to the D.A.-B.VI, as also that involving examn. of the capillary pictures obtained under the analytical quartz lamp. W. O. E.

Relation of structure to action of morphine and its derivatives. RUDOLF ZIFFERER. *Pharm. Presse, Wiss.-prakt. Heft* **1931**, 1–2.—Attention is directed (by illustration) to

important and valuable derivs. of morphine obtained by means of certain relatively simple changes in its mol. structure. W. O. E.

Sickness and intoxication through benzene and its derivatives. MAX GRÜNEWALD. *Pharm. Presse, Wiss.-prakt. Heft* **1931**, 2–5.—A discussion is given of the intoxication effects of C_6H_6 and derivs. on the animal economy, and of certain precautions to be observed in com. operations with these products. W. O. E.

Reaction of phenylum acetylo-salicylicum. H. SZANCER. *Pharm. Zentralhalle* **72**, 68–9(1931).—It is shown that this substance with $NaNO_2$ and concd. H_2SO_4 yields the same color changes as salol. W. O. E.

Detection of juglone. ROBERT FISCHER AND FRITZ STAUDER. *Pharm. Zentralhalle* **72**, 97–100(1931).—In the microsublimation of *Folia Juglandis* via the D.A.-B.VI. no yellow crystals result, in fact the official Ger. procedure for the microsublimation of either fresh or stored leaves, or of 8-day old, long shredded pericarps, fails to yield juglone. However, extn. with $CHCl_3$ of fresh or 3-day old leaves, followed by suitable treatment of the resulting residue, detects the presence of juglone. Similar results are obtained with 8-day old pericarps. Older leaves are free from juglone. α-Hydrojuglone could not be detected in fresh pericarps. It is shown that the yellowish needles reported by Tunmann as α-hydrojuglone were in reality juglone. β-Hydrojuglone could not be detected in any of the fruit available. W. O. E.

Estimation of *p*-chlorophenol as such and in pharmaceutical preparations. K. FRIST AND F. KLATT. *Pharm. Ztg.* **76**, 112–3(1931).—The method is based on the procedure of Koppeschaar, involving conversion of the *p*-chlorophenol into chlorodibromophenol (by KBr and 0.1 *N* $KBrO_3$ soln. + HCl) followed by treatment with KI, and final titration with 0.1 *N* $Na_2S_2O_3$. In mixts. of *p*-chlorophenol and camphor (or menthol) the former is isolated by treatment with NaOH soln. and then titrated as above. W. O. E.

Chemistry of neodorm. G. KUHLMANN. *Pharm. Ztg.* **76**, 113(1931).—This prepn. is α-bromo-α-isopropyl butyramide; it m. 50 1°, resembles menthol and is sol. in the usual org. solvents and in oil. It decomps. if sterilized in aq. soln., but not in oil. W. O. E.

Adulteration of oil of cloves with benzyl alcohol. S. KROLL. *Pharm. Ztg.* **76**, 128 (1931).—A sample of oil of cloves possessing apparently normal chem. and phys. properties, as stipulated in the Ger. Pharm., was found on examn. to contain considerable $PhCH_2OH$ as adulterant. The presence of this alc. was demonstrated by the method of Thoms (cf Ber. pharm. Ges. **1**, 278(1891)). W. O. E.

United States Pharmacopeial Commission. L. ROSENTHALER *Pharm. Ztg.* **76**, 143–4(1931).—An address indicating the salutary manner in which the Commission operates in marked distinction to the rather secretive activities of similar European bodies. W. O. E.

Manganous calcium hypochlorite. O. H. KÜRSCHNER. *Pharm. Ztg.* **76**, 184–6 (1931).—The reddish color noted from time to time in solns. of Ca hypochlorite is shown to result from conversion of traces of Mn into permanganate. W. O. E.

Production of benzonaphthol and *p*-acetamidophenyl salicylate. JULIUS SCHWYZER *Pharm. Ztg.* **76**, 186–8(1931).—Detailed procedures are reported for the production of benzonaphthol and salophen in large scale operations, in connection with illustrations of the app. needed. W. O. E.

New method for the preparation of isoeugenol from clove oil. R. PRIESTER. *Riechstoffind* **5**, 83–5, 108–9(1930).—Eugenol is converted to isoeugenol (1) by heating with KOH, (2) by the action of KOH dissolved in H_2O, MeOH, EtOH or AmOH under normal or increased pressure, (3) by the action of K or Na amylate in AmOH soln. under ordinary or increased pressure. KOH functions purely as a catalyst. According to the new method eugenol or oil of cloves 30 is heated for 35 min. to about 180° and maintained there 15 min. with H_2O 30, KOH 15, glycerol 5, the mass poured into H_2O, C_6H_6 added, the KOH almost neutralized with dil. H_2SO_4, AcOH added in slight excess, the C_6H_6 soln. withdrawn and washed to neutrality and finally fractionated *in vacuo*. Little or no resinification takes place under the above procedure. W. O. E.

Acetoeugenol and its presence in clove oil. J. HEROLD. *Riechstoffind.* **5**, 100–2 (1930).—The occurrence of acetoeugenol in oil of cloves, its probable fate during the process of distillation, in connection with the various methods for evaluation are discussed. W. O. E.

Composite or unitary perfumes. ERNST SCHIFTAN. *Riechstoffind.* **5**, 119–20 (1930).—The relative advantages of compns. as compared with unitary chem. substances or essential oils are discussed. The decision must be left largely to the expert knowledge of the perfumer. W. O. E.

Chemical and bomb gas baths. W. PEYER AND H. IFFINGER. *Süddeutsche Apoth.-Ztg.* **71**, 77–8(1931).—A general discussion of the essential differences in effect of O and CO_2 bath prepns. when developed from salts with suitable catalyzer directly in the water or indirectly from the capillaries of bombs. It is shown that the former method is the preferable one because of the phys. character of the developed gas. W. O. E.

Native drug plants in the light of modern chemistry and therapy. L. KROBBER. *Süddeutsche Apoth.-Ztg.* **71**, 93–5(1931); cf. *C. A.* **24**, 1934.—An address. W. O. E.

Problems of practical pharmacy. HERMANN THOMS. *Süddeutsche Apoth.-Ztg.* **71**, 110–3(1931); *Pharm. Ztg.* **76**, 195–9.—An address. W. O. E.

American medical plants of commercial importance. A. F. SIEVERS. U. S. Dept. Agr., *Misc. Publ.* **77**, 1–74(1930).—About 1580 plants of reputed medical value are described. C. R. FELLERS

Assay of digitalis. II. Comparison of Mansfeld's sinus method with the six-hour frog or cat method. A. STASIAK AND B. ZBORAY. *Magyar Gyógyszerésztud. Társaság Értesitöje* **5**, 400-6(1929); cf. *C. A.* **23**, 4770.—Further investigations were made by the method of Mansfeld-Horn on spring frogs with powders of digitalis leaves. An infusion made according to Mansfeld was used as standard. Parallel detns. on the same powder agreed well. The differences between the results of the sinus method and those of the 6-hr. frog or cat method are the same as those of the frog method and the cat method between each other. S. S. DE FINÁLY

Extractum filicis maris. Z. CSIPKE. *Magyar Gyógyszerésztud. Társaság Értesitöje* **5**, 425-38(1929); cf. *C. A.* **23**, 4769.—No correlation can be found between biol. losses of value and quantity of active matter found by chem. methods. Results of the so-called "pure filicic acid" detns. (Fromme, Kraft) are unreliable, since they do not show the presence of lower phloroglucides which also have anthelmintic power. A modification of the method of Kraft-Boechi-Fromme has been worked out. Shake out the ether soln. of the ext. twice with baryta water, and filter. Treat an aliquot part of this soln. with ammoniacal $AgNO_3$ soln Let stand for 6–10 hrs. in a dark place. Filter out the reduced metallic silver, wash, dissolve in 20% HNO_3, and titrate with 0.1 *N* NH_4SCN soln. One cc. of this soln. equals 0.00217 g. phloroglucinol or 0.0196 g. phlorobutyrophenone. S. S. DE FINÁLY

Biological evaluation of extracts of Filix mas. Z. CSIPKE. *Magyar Gyógyszerésztud. Társaság Értesitöje* **6**, 85-101(1930); cf. preceding abstract.—Chem. evaluation alone is not reliable. Biol. tests can be made satisfactorily with *Hirudo medicinalis* and *H. officinalis*. An emulsion of the drug with 1% $NaHCO_3$ was used. Exts. kept closed from the air remain undecompd. for years. For the test 4 g. of the ether ext. is shaken carefully at 40°, and mixed with powd. gum arabic and 1% aq. $NaHCO_3$ to an emulsion. This is dild. with 1% $NaHCO_3$ to 2000 cc. Of this dild soln. 500 cc. (equal to 1 g. ext.) is again dild. with $NaHCO_3$ soln. to 2000 cc. The soln. can be used after 2 hrs. M. l. d. is detd. with three series of expts. One series for orientation, the third for actual detn. M. l. d. found was 0.0028 in 100 cc The animals should be kept in motion under the detn. by mechanical or elec. means. S. S. DE FINÁLY

How to distinguish sulfonal from trional. L. EKKERT. *Magyar Gyógyszerésztud. Társaság Értesitöje* **6**, 385–6(1930).—The substance to be tested is heated with resorcinol and concd. H_2SO_4 until it shows a green color. The liquid is dild. and NH_3 added. Sulfonal shows bright rose color; trional becomes brownish yellow or reddish brown. S. S. DE FINÁLY

Biological test of adrenaline in draft mixtures, especially in the presence of local anesthetics. A. STASIAK AND L. RIGÓ. *Maygar Gyógyszerésztud. Társaság Értesitöje* **6**, 389–95(1930).—The presence of adrenaline can easily be proved in mixed draughts, even in presence of local anesthetics, by means of surviving mouse uterus. Adrenaline prevents the spontaneous contractions of the surviving uterus. These contractions, however, reappear very quickly after the uterus is washed out with Locke's soln. Thus the same uterus may be used for several detns. By this method adrenaline can be detected in the presence of novocaine, β-eucaine, holocaine, percaine, stovaine and tutocaine and in the presence of ext. of posterior lobe of the hypophysis. Novocaine increases the sensitiveness of surviving mouse uterus to adrenaline; β-eucaine and stovaine diminish it. Holocaine showed no influence on the sensitiveness. S. S. DE FINÁLY

Comparative studies on the tannic acid content of some drugs. I. TEMESVARY. *Magyar Gyógyszerésztud. Társaság Értesitöje* **6**, 396–402(1930).—Of the methods studied, (1) international hide-powder method, (2) Löwenthal method, (3) $SnCl_2$ method, (4) Wasicky method, (5) Schulte method and (6) tannoform method, (1) gives the most exact and reliable results. However, this gives high values for cinchona bark (part of

alkaloids is dissolved and pptd. by skin-powder) and for *Rheum* (where much slime is attached to the hide-powder). The tannoform method can usually be used when pyrocatechol-tannic acid is present. S. S. DE FINÁLY

Stability and attenuation of insulin. H. PUIGGARI. *Rev. soc. argentina biol.* **5**, 677–84(1929); *Physiol. Abstracts* **15**, 239.—Attenuation is avoided by the concn. of the alc.-acid exts. of pancreas *in vacuo* at 35–40°. Controls were made 200 days later, and no loss of pharmacol. activity was found. G. G.

New assay method and identification tests for mild and strong silver proteinate. I. H. INABINETTE. *Am. J. Pharm.* **103**, 42(1931).—Tanret's soln. produces a flocculent yellow ppt. when added to an equal quantity of 1% soln. of strong Ag proteinate. With the mild Ag proteinate a flocculent grayish black ppt. is given. Nessler's reagent is even more distinctive when used under the same conditions. A clear, golden brown soln. is produced with the strong Ag proteinate and bluish black soln. with the mild proteinate. Both of these solns. were satisfactory identifying agents for protargentum, protargol, Ag protein, Merck and P. W. R., argyrol, solargentum and argo nuclein (S. K. F. Co.). A new assay method, much more rapid than the present U. S. P. X, is as follows: Weigh 0.5 g. of the Ag compd., dissolve in 20 cc. H_2O, then add 20 cc. concd. HNO_3 and boil for 10 min. Cool, dil. to about 150 cc. and titrate with 0.1 *N* KCNS, using ferric alum as an indicator. This method produced results identical with those obtained by the U. S. P. X method. W. G. GAESSLER

Assay of solution of magnesium citrate. HERMAN W. HAUSSMANN. *Am. J. Pharm.* **103**, 44–5(1931).—The present method of the U. S. P. X for Mg requires evapn. and ignition, a time-consuming operation and one in which error may arise. The following modification of this gives slightly higher but more consistent results: The material after detn. of the free acid is evapd. and ashed as usual. The ash is then transferred to a porcelain dish with hot water and 50 cc. of 0.5 *N* H_2SO_4 added. It is then boiled, cooled and the excess of acid detd. by titration against 0.5 *N* NaOH with Me orange as indicator. W. G. GAESSLER

Assay method for ointments containing mercury or its salts. R. O. METZLER. *Am. J. Pharm* **103**, 45(1931).—For mercurical ointments the present method as outlined in the U. S. P. X gives satisfactory and consistent results. For calomel ointment weigh about 1 g. of the ointment directly on a dense filter paper. Fold and pass CCl_4 through until all fat is removed. Place the paper in a glass-stoppered flask, add 10 cc. CCl_4, 30 cc. 0.1 *N* I, 3 g. KI and 10 cc. H_2O. Shake well, allow to stand 12 hrs. and det. excess 0.1 *N* I with 0.1 *N* $Na_2S_2O_3$. Twelve detns. gave results varying from 30.09% to 30.5% calomel. For yellow HgO ointment the following methods were used: (1) Boil with HNO_3, add H_2O and titrate with 0.1 *N* KCNS. (2) The same as No. 1 except fat is filtered off before titration. (3) Treat as in No. 2 and ppt. Hg as sulfide. (4) Destroy fat with concd. H_2SO_4 and $KMnO_4$ and det Hg as sulfide. None of these methods gave results which were consistent or in agreement with the known compn. of the specially prepd. yellow HgO ointment. W. G. GAESSLER

Determination of boric acid in ointment of boric acid U. S. P. X. THEODORE BUDIN. *Am. J. Pharm.* **103**, 46(1931).—Place 25 cc. $CHCl_3$, 10 cc. glycerol and 1 cc. of phenolphthalein test soln. in a well-stoppered container. Shake, add 0.1 *N* alkali to faint pink color. Then introduce about 1 g. of boric acid ointment weighed on a wax paper, and add 25 cc. of 0.1 *N* NaOH. Shake well and det. excess of NaOH by titration with 0.1 *N* H_2SO_4. W. G. GAESSLER

Investigation of calcium hypochlorite (65 percent available chlorine). BERNARD MELKON. *Am. J. Pharm.* **103**, 46(1931).—Analysis of a com. supply of a product marketed under the trade title H. T. H. by the Mathiesen Alkali Works, Inc., gave insol. in H_2O 8.40, SiO_2 0.28, Fe_2O_3 0.38, Al_2O_3 1.76, CaO 32.17, available Cl 62.70%. W. G. GAESSLER

Assay of chloroform liniment. JOHN C. BRANTLEY, JR. *Am. J. Pharm.* **103**, 46–7(1931).—The method of Willgerodt (*C. A.* **20**, 92) was compared with a direct standard alkali sapon. and titration of residual alkali. Direct alkali sapon. does not give correct results. W. G. GAESSLER

Development of pharmaceutical chemistry in Maryland. A. G. DUMEZ. *J. Chem. Education* **8**, 471–84(1931). E. H.

The hydroxylamine method for the determination of ketones. Carvone in caraway and dill oils. C. T. BENNETT AND T. TUSTING COCKING. *Analyst* **56**, 79–82 (1931).—The method of Bennett and Salamon (*C. A.* **22**, 1825) applied to various oils contg. aldehydes and ketones does not give satisfactory results in all cases; the method must be modified according to the particular ketone present. The modified method of the Essential Oil Sub-Committee for the detn. of citral in oil of lemon (*C. A.* **24**, 1934) is

of almost universal application for testing oils contg. aldehydes, if a little benzene is added as solvent for the non-aldehydic portion of the oil; but this modified procedure was found to be quite unsuitable for the detn. of ketones. After considerable experimentation with dill oil, caraway oil, pennyroyal and piperitone, the following modification of the method was adopted for detg. carvone in oils of dill and caraway. Weigh 1.5 g. of oil into each of 2 stoppered tubes, add 10 cc. of approx. *N* NH_2OH·HCl reagent (6.95 g. dissolved in 95 cc. of 90% alc., 0.4 cc. of 0.2% dimethylyellow added and sufficient *N* KOH in alc. to bring the soln. to a full yellow), and heat in boiling water to about 75°. The color of the soln. changes from yellow to red, as a result of liberation of HCl. At 5-min. intervals remove each tube from the water bath and neutralize with *N* KOH in alc., using a sep. buret for each sample. Toward the end, the indicator becomes golden orange instead of red and it is hard to estimate the exact end point. When it is thought that the end of the reaction has been reached, add 0.5 cc. more of KOH to one of the tubes to overstep the end point and add to the other sufficient NaOH to match the color in the other tube. In the computation, 1 cc. of *N* KOH = 0.1513 g. of carvone. The advantages of this method over that of the neutral sulfite method are that very little oil is required and less time. The method has been applied to the detn. of ketones in other oils (menthone in oil of peppermint and pulegone in oil of pennyroyal) but the end point was hard to see. W. T. H.

Seventh report of the essential oil sub-committee on uniformity of analytical methods. Determination of solubilities. J. Allan *et al.* *Analyst* **55**, 386(1930).—The tests should be carried out at 15.5°, unless stated otherwise The concn. of alc. should be given in % by vol. and the following terms should be used as defined in the report: sol., sol. with opalescence, sol. with turbidity. Regarding the opalescence and turbidity, the adjectives *faintly, slightly* and *distinctly* should be used with reference to expts. under stated conditions with AgCl (for opalescence) and with $BaSO_4$ (for turbidity). W. T. H.

Testing of Admiralty disinfectant fluid. T. C. Patterson and Robert C. Frederick. *Analyst* **56**, 93–104(1931).—Two disinfectant fluids were divided into 2 series of identical samples and the phenol coeff. by the Rideal-Walker method was detd. in 13 different labs. The values obtained for one sample ranged from 6.0 to 11.5 and on the other from 6.0 to 17.4. To avoid such discrepancies, the Admiralty method is described in great detail. The method consists in prepg. a 1% diln. of the fluid with artificial sea water, allowing this to stand 24 hrs. and then comparing its action in the presence of org. matter against a particular strain of *B. typhosus* with similar expts. with pure phenol used as reference. A bibliography of 19 titles is appended. W. T. H.

Chloretone as a preservative. B. Polák. *Bratislav. Bekarske Listy* **9**, 281–4 (1929).—Chloretone (Cl_3CCMe_2OH), which is used as a preservative of org. substances, is injurious to the circulation by its paralyzing effect on the heart muscle and motor cardiac centers. William J. Husa

Distillation of essential oils. V. G. Patwardhan. *Poona Agr. Coll. Mag.* **21**, 31–3 (1929).—An app. for the small scale distn. of essential oils from grasses, etc., is described and illustrated. Two to 5 lb. of material, depending upon its nature, can be distd. at one time. K. D. Jacob

Merthiolate as a germicide. H. M. Powell and W. A. Jamieson. *Am. J. Hyg.* **13**, 296–310(1931).—*Merthiolate* (I) is *Na ethylmercurithiosalicylate*, $EtHgSC_6H_4CO_2Na$; a study was made of the general properties, germicidal and inhibition properties and toxicity for animal tissues. I is a white, orthorhombic cryst. compd., readily sol. in water and physiol. salt soln. Solns. of germicidal strength are stable under ordinary conditions of light and temp., are colorless and do not stain tissues or fabrics. The aq. solns. are miscible with soap and maintain their germicidal property. I does not amalgamate with metals. In soln. it is so slightly ionized that there is no immediate pptn. of Hg with either alk. hydroxides or $(NH_4)_2S$. Dry I or aq. I can be mixed in various proportions up to 25% with undild. serum without causing pptn.; I is pptd. by the salts of heavy metals and by acids. Many germicidal tests were made and are reported; from these tests it appears to be a very promising germicide with certain unusual properties which make it well adapted to tissue antisepsis. N. A. Lange

Estrogenic substances. II. Analysis of plant sources. Burnham S. Walker and James C. Janney. *Endocrinology* **14**, 389–92(1930); cf. *C. A.* **24**, 3809.—A relatively high concn. of estrogenic material occurs in plants associated with green pigmentation. Roots, tubers and fruits are neg. Estrogenic substances in yeast are an exception. Pos. extracts are obtained from plants while their growth is most rapid. Mary E. Lear

Chemical analysis of the cortex of Aspidosperma polyneuron Müell. Arg. Louis

FLORIANI. *Ann. Farm. Bioquim.* **1**, 135–9(1930).—F. made a modification of the procedure of Arata and with its aid found that the cortex of *Aspidosperma polyneuron* Müell. Arg. contained 2% of alkaloid. The nature of the alkaloid is under study.
B. S. LEVINE

Studies on the Vitali reaction for the detection of atropine. I. The extent of its applicability. SANTIAGO A. CELSI. *Ann. Farm. Bioquim.* **1**, 140–9(1930).—A study of the Vitali reaction as applied to atropine-HCl or sulfate, hyoscyamine, scopolamine, isatropylcocaine, homatropine and other alkaloids. The relation between the reaction and the chemical constitution of the reacting substances is discussed. The Vitali and Arnold reactions are compared.
B. S. LEVINE

Physiological styptics. OSKAR BEYER. *Chem.-Ztg.* **54**, 1007(1930).—A review of the various styptic agents is made. It is suggested that a rational means of stopping bleeding is to strengthen artificially by catalytic agents, the formation of thrombin. A prepn. of this type would be useful in hemophilia and in patients suffering from jaundice and liver damage. Such a prepn. is made from cow liver. Finely ground fresh cow liver, 300 g., is placed in a 2 l. flask; one l. of 96% alc. is added and the contents are extd. for 30 min. at about 60° on a water bath. The bright yellow liquid is rapidly filtered off on a porcelain suction filter. The filtrate treated with 4 portions of pure ether is allowed to stand 8–12 hrs. at room temp. The ether soln. is decanted, leaving a yellowish brown mass adhering to the walls of the vessel. The flask is heated to about 30° and the ether removed *in vacuo*. The residue, about 25 g., is taken up in 300 cc. sterile water, filtered, and 5 cc. put in sterile glass ampules. The ampules, after sealing, are sterilized in steam at about 95° for ½ hr. The soln. is assayed for clotting power. The substance contains N, peptones, amino acids, purine bases and carbohydrates.
G. H. W. LUCAS

Constitution of amino alcohols as local anesthetics. (Supplement.) S. KANAO AND K. SHINOZUKA. *J. Pharm. Soc. Japan* **50**, 1152–62(1930); German abstr. 148–52; cf. *C. A.* **24**, 3832.- In previous papers K. reported on the type I, $RCH(OH)CHR'(NR''R''')$. The present paper deals with the type II, $RR'C(OH)CH_2NH_2$. The local anesthetic action is neg. if R and R′ are both Me, Et or Pr; it is pos. if R and R′ are both Bu, $Me_2CHCH_2CH_2$, Ph or $PhCH_2$, or if R is Bu or cyclohexyl and R′ is Ph. The methods of prepn. of these amino alcohols are also given
F. I. NAKAMURA

Semen contra pills. J. MAHEU AND J. CHARTIER. *Ann. fals.* **23**, 613–4; *J. pharm. chim.* [8], **12**, 301–3(1930); cf. *C. A.* **21**, 2961.- Examn. of 4 samples for alkaloids, heavy metals, cyanogenetic glucosides and santonin gave neg. results, and the seed contained in each pill had all the morphological and anatomical characteristics of lucern
A. PAPINEAU COUTURE

Pyrethrum flowers from Kenya and Cyprus. ANON. *Bull. Imp. Inst.* **28**, 425–9 (1930). -Samples of pyrethrum grown in Kenya and in Cyprus were found to be of nearly as good quality as the best Dalmatian pyrethrum.
A. PAPINEAU-COUTURE

Tetrapone. H. BAGGESGAARD-RASMUSSEN. *Archiv Pharm. Chemi* **38**, 29–37 (1931). -Mixts. of alkaloid hydrochlorides have come into use in Danish hospitals. One contains morphine 50, narcotine 19.4, codeine 3.2, papaverine 4.5, thebaine 1.7 and narceine 0.8%. In another one thebaine and narceine are omitted and the narcotine is increased to 22%. The names "hexapone" and "tetrapone" are recommended for these as in line with Roche's "pantopone."
A. R. ROSE

Tinctura Quillajae and Liquor carbonis detergens. K. A. KARSMARK AND L. KOFLER. *Svensk Farm. Tids.* **34**, 706–14(1930)(in German).—The tincture made with 62% alc. contained 5 times more saponin than that made with 86%. Quillajae tincture with 42% alc. contained less sediment than the 62% prepn. The 62% alc. prepn. is to be preferred in making Liq. carbonis detergens. Percolation is better than trituration.
A. R. ROSE

Sublimated or synthetic benzoic acid in preparing mucilago gummi arabici and sebum salicylatum. HUGO WASTENSON. *Svensk Farm. Tids.* **34**, 714–5(1930).—The next edition of the pharmacopoeia should specify synthetic PhCOOH where it now specifies sublimated.
A. R. ROSE

The constitution and constants of sandal oil. R. CAJOLA. *Rivista ital. essenze profumi* **12**, XXI(1930).—This essence is obtained by distg. *Santalum album* wood. It is a yellow limpid liquid, with an agreeable persistent odor and an irritating acrid resin taste; it has sp. gr. 0.975–0.985 and boils and distils at 275–300°. The oil is sol. in all proportions in 90° alc., and has 90–98% of *a*- and *b*-santalol, with *a*- and *b*-santalene ($C_{15}H_{24}$), santene (C_9H_{14}), santenone ($C_9H_{14}O$), santenone alc. ($C_9H_{16}O$) and traces of santalic acid ($C_{15}H_{24}O_2$) and teresantalic acid ($C_{20}H_{14}O_2$) and a santal aldehyde ($C_{15}H_{24}O$). Sandal oil is used in medicine in mixt. with other sedative and antiseptic substances, and

constitutes the principal curing element in many pharmaceutical compds. It is used in doses of 1.5–2 g. per day for initiating the cure of blennorrhagia, when other antiseptics cannot be used in inoculations because of the irritation of the mucose. It is also useful in bronchial complications, as it is eliminated with the urine and during breathing. R. SANSONE

The composition and properties of sassafras and its essential oil. R. CAJOLA. *Rivista ital. essenze profumi* **12**, XXII(1930).—The wood of the sassafras plant contains the coloring principle sassafride and tannic acid. Its medicinal uses are listed. The roots contain balsamic resin, wax, sebaceous matter, tannic acid, coloring matter, gum, albumin, starch and 2.5% of a yellow essential oil. This oil is very little sol. in alc., it contains safrene ($C_{10}H_{16}$), an alc., safrole and a volatile phenol-like substance. R. SANSONE

The properties and composition of mustard seed. R. CAJOLA. *Rivista ital. essenze profumi* **12**, XXII-XXIII(1930).—Mustard seeds contain 20% of mucilage and 30% of a sweet fatty oil, the alkaloid sinapine, the enzyme myrosin, and sinigrin. Powd. mustard seeds, when beaten with lukewarm water, develop a chem. action between the myrosin and sinigrin, producing glucose, $KHSO_4$ and allyl isothiocyanate. With boiling water the reaction does not take place. The uses of mustard-seed oil are listed. R. SANSONE

A study of the treatment for insomnia. HENRI FAVIER. *Thesis*, Montpellier, 1929; *J. pharm. Alsace Lorraine* **57**, 200(1930).—A monograph on the hypnotic action of *sedormid* (cf. *C. A.* **22**, 3929). S. WALDBOTT

Pharmacy in Syria. C. LADAKIS. *Bull. Sud-Ouest et du Centre; J. pharm. Alsace Lorraine* **57**, 213–4(1930).—An account of present conditions under French administration. S. WALDBOTT

"Virtual adrenaline" in relation to inactivation of adrenaline by formol. MARCEL PAGET AND CHARLES P. LEBLOND. *J. pharm. chim.* [8], **12**, 531–6(1930); cf. *C. A.* **24**, 3323–4.—When the :NH function of adrenaline (*A*) is blocked by means of formol, the Denigès reaction becomes neg., but the reactions which are sp. for the pyrocatechol nucleus (Vulpian; Folin; P., cf. *C. A.* **25**, 532) remain pos. Blocking the :NH function diminishes considerably the mydriatic power of *A* without destroying it entirely. It sheds no light on the nature of "virtual *A*"; work on this subject is in prepn. S. W.

Oxidation of official castor oil by potassium permanganate. Study of triazelain. G. SCHUSTER. *J. pharm. chim.* [8], **13**, 5–12(1931).—The principle of the Hilditch method is applied (cf. *C. A.* **22**, 944, 2477, 3792, etc.). By $KMnO_4$ oxidation in acetone soln. of official castor oil, 63.58% triazelain (*A*) was formed. After sapon. of crude *A*, neither stearic nor dihydroxystearic acid was obtained. The results of Heiduschka and Kirsten (*C. A.* **24**, 1933) indicated these compds. were present. The same oil to which 3% of stearic acid was added yielded this quantity after oxidation; hence the sample examd. contained no glycerides of satd. acids. *A* was also synthesized by the action of epichlorohydrin of glycerol upon acid Na azelate ($CO_2H(CH_2)_7CO_2Na$) in sealed tubes at 135–140°. With a neutral 2% soln. of the Na salt of *A*, $AgNO_3$ forms a brick-red ppt. not altered by light; solns. of $BaCl_2$, $Bi(NO_3)_3$, $CdSO_4$ and $Sr(NO_3)_2$ give a chamois-yellow; $CuSO_4$ gives a green ppt.; $MgCl_2$ produces a chamois-yellow ppt. while Mg azelate is H_2O-sol. By means of this reaction, *A* was purified. S. WALDBOTT

Herba equiseti, a saponin-bearing drug. P. CASPARIS AND K. HAAS. *Pharm. Acta Helv.* **5**, 62–3(1930).—The presence of saponin in the herb was proved by foam no. expts. on a 10% chlorophyll-free decoction and a 10% aq. soln. of a purified MeOH dry ext., and also by the hemolytic effect of 1% of the latter soln. S. WALDBOTT

Senegin and its decomposition products. O. DAFERT AND E. KALMAN. *Pharm. Acta Helv.* **5**, 71–7(1930).—By extg. senega root repeatedly with 96% alc. and evapg. to a small bulk, crude neutral saponin (senegin) is pptd. (yield 10%). By repeated pptn. from soln. in 80, 90 and 96% alc., 3–4% pure H_2O-sol. senegin contg. C 52.29%, H 7.17% is obtained. It is hemolytic in dilu. of 1:66,000. Hydrolysis with 5% H_2SO_4 and then 5% alc. H_2SO_4 for 30 hrs. yielded a substance identical with that examd. by Wedekind and Krecke (*C. A.* **18**, 3362). Other products of hydrolysis are dextrose (41.09%), which seps. at first, then methylpentose (11.12%) and arabinose (11.06%) are split off (cf. Winterstein and Maxim, *C. A.* **13**, 1213). A list of 21 references is added. S. WALDBOTT

The evaluation of tribromophenol bismuth gauze. RUD. G. MAEDER. *Pharm. Acta Helv.* **5**, 112–6, 151(1930).—Weigh 4–5 g. of gauze exactly, add 20 cc. of 25% HCl, knead the gauze with a glass rod, add 50 cc. hot H_2O, knead again, transfer the soln. into a 200-cc. flask and repeat the extn. with 5 × 30 cc. hot H_2O. Cool, filter off the sepd. $C_6H_2(OH)Br_3$ and in the filtrate ppt. Bi with H_2S. Collect the Bi_2S_3 on a small filter,

wash with 2 × 10 cc. H_2O and dissolve the ppt. on the filter by adding, drop by drop, 15 cc. HNO_3 (d 1.4). Wash the filter with 3 × 10 cc. H_2O and warm on a steam bath to expel H_2S completely. Cool, then add in small portions 25 cc. NH_4OH (20–25%), collect the $Bi(OH)_3$ on an ash-free filter, wash well, dry at 103–105° and ash in a porcelain crucible. When cool, add a few drops of fuming HNO_3, evap. on a water bath, then heat slowly with a flame, finally to red heat, cool in a desiccator and weigh. Multiply the wt. of Bi_2O_3 bv 2 to obtain the wt. of *"xeroform"* in the gauze (com. xeroform yielded 49.6 and 55.2% Bi_2O_3; 50% is the standard adopted). In 5 com. samples of gauze, marked 20%, 10, 10, 5, 5%, the method showed 16.0%, 6.4, 6.9, 4.37 and 2.95%, resp. Deviations from statements on the label must not exceed ±10%. S. WALDBOTT

Pilulae ferratae Blaudii. J. B. LANG. *Pharm. Acta Helv.* **5**, 121–3(1930); cf. *C. A.* **24**, 5110.—The pharmacol. results of Starkenstein (*C. A.* **21**, 1494) confirm L 's contention that Blaud's pills should be as free as possible from ferric salt. The following modification of the previous test is given: Triturate 1 pill with 0.3 g. $BaCl_2$, mix with 20 cc. H_2O and filter. Divide the clear filtrate into 2 equal parts; to 1 add 5 drops of $K_3Fe(CN)_6$ soln.; a deep blue ppt. is formed at once. To the other add 5 drops of $K_4Fe(CN)_6$ soln.; at most a light blue coloration may appear. This test does not apply to pills consisting mostly of $FeCO_3$. S. WALDBOTT

Note on the Pharm. Ned. V. test for codeine in papaverine hydrochloride. E. ANNELER. *Pharm. Acta Helv.* **5**, 124(1930).—The following requirement of Pharm. Ned. V. is probably based on error: "The soln. of 10 mg. papaverine-HCl in 1 cc. H_2SO_4 shall be colorless or at most faintly yellowish; upon adding 1 drop of $FeCl_3$ soln. and warming on the water bath, no violet color must form (codeine)." The violet color which at first is pale green is produced with papaverine itself; this fact was proved with samples of known purity, and with papaverine prepd. synthetically. S. WALDBOTT

Determination of polysulfide and preparation of calcium sulfuratum solutum (Vlemingkx solution). J. BÜCHI. *Pharm. Acta Helv.* **5**, 124–32(1930).—The exact and rapid method of Schulek for the detn. of polysulfides (*C. A.* **19**, 1829) is adopted in the new Pharm. Helv. V. This method enables a much-needed control of the compn. of Vlemingkx soln. (*A*). When prepd. according to the directions of different pharmacopeias including Pharm. Helv. IV, *A* will contain very variable quantities of polysulfides. To prep. *A* of const. compn., the formula adopted by Pharm. Helv. V is recommended: Slake 1 part CaO with 5 parts H_2O, then add 2 parts of washed S and 10 parts H_2O. Boil the mixt. for 1 hr. under reflux (to exclude the air), cool, decant and pour through cotton. The sp. gr. of *A* thus prepd. is 1.12–1.14; the content of polysulfide S is 60–65 g. per l. A list of 8 references is added. S. WALDBOTT

The galenical preparations of Pharmacopeia Helvetica V. K. SIEGFRIED. *Pharm. Acta Helv.* **5**, 255–70(1930).—An address. Among novel requirements demanded by the Pharm. of Swiss pharmacies are a standardized thermometer, an app. for evapg. exts. under reduced pressure, special vessels to keep drugs and exts. over lime, a polariimeter and a polarization attachment to the microscope. Certain emulsions, *e. g.*, of P, must be prepd. with stabilized, *i. e.*, enzyme-free gum arabic. The new features of all galenical prepns., *e. g.*, the various exts., infusa, injectabilia, tinctures, ointments, etc., are discussed. S. WALDBOTT

The examination of alkaloids for purity in the Swiss pharmacopeia. R. EDER, E. BÜRGI AND H. T. LIEM. *Pharm. Acta Helv.* **5**, 276–85(1930); cf. *C. A.* **24**, 5424.—An address. The various pharmacopeias should agree on a uniform definition of alkaloids, *e. g.*, in quinine sulfate. The reaction of alkaloidal salt solns. should be measured by detg. the p_H value by means of colorimetric indicators. A list of 25 such salt solns. has been arranged into 6 groups of varying p_H values (2.8–7.0). S. WALDBOTT

The use of *p*-hydroxybenzoic esters in sterilization and disinfection. TH. SABALITSCHKA. *Pharm. Acta Helv.* **5**, 286–8(1930); cf. *C. A.* **22**, 2029; **23**, 2733; **24**, 160, 3285, 4834, 5886; **25**, 1031.—The antiseptic and sterilizing effect of 0.05% of ***nipasol*** (*A*), the Pr ester of *p*-$OHC_6H_4CO_2H$, exceeds that of a 0.25% PhOH soln. E. Leschke found 0.04% of *A* or 0.2% of the sol. Na compd. completely non-toxic and non-irritating in injections. The 0.2% soln. is recommended for sterilizing instruments, and to keep medicaments sterile for internal therapy. *A* and the similar esters may also be used for disinfecting powders, *e. g.*, $B(OH)_3$. talcum; warming with 1–3% Me ester, or 2–6% mixed esters to 70°, renders these powders germ-free for at least 2.5 yrs. Addn. of these esters enhances the antiseptic effect of $B(OH)_3$ materially. S. WALDBOTT

A comparison of certain suspending agents. F. R. C. BATESON. *Pharm. J.* **126**, 52–3(1931).—Shake a suspension of 2 g. prepd. chalk in 100 cc. water for 30 min. with (*a*) 12.5 cc. of mucilage of gum acacia (*Brit. Pharm.*), (*b*) 12.5 cc. of mucilage of tragacanth, (*c*) 2.22 g. of compd. powder of tragacanth, (*d*) 3.33 g. of the same, then pour off

50 cc. of the suspensions and det. $CaCO_3$ in each suspension and residue. It is found that the most efficient suspending agent for insol. powders is *compd. powder of tragacanth* (*Brit. Pharm.*). The (above) proportion of 10 grains is but slightly less effective than 15 grains per fluid ounce, but as in the latter case the mixt. is very viscous, the weaker proportion is preferable. The 2 mucilages (*a* and *b*) are not nearly so effective as suspending agents. S. WALDBOTT

The leaf oils of Washington conifers. Introduction. ARNOLD J. LEHMAN AND E. V. LYNN. *J. Am. Pharm. Assoc.* 19, 840–3(1930).—Botanists list 21 species of conifers in the state. The oils from 8 have been studied previously by others. The introduction contains a review of the literature and bibliography. L. E. WARREN

Physiological potency of commercial ergot preparations. W. T. MCCLOSKY, M. R. THOMPSON AND N. G. BARBELLA. *J. Am. Pharm. Assoc.* 19, 844–7(1930).—A survey was made of the market supply of fluidext. of ergot and other ergot prepns. The prepns. were tested by the cockscomb method but if the results were not concordant checks were run by the Brown-Clark method as modified by Pattee and Nelson. The fluidexts. assayed 0–400% of the U. S. P. requirements. The other prepns., many of which were in ampoule form, assayed from 0 to about 120% of the labeled amts. The assay methods used are capable of detg. the specific alkaloidal activity within ±20%. Therefore those prepns. assaying 80–120% of the U. S. P. X potency may be considered as satisfactory. Of 79 com. fluidexts. 35% were substandard, 20% were of U. S. P. potency and 45% were superstandard. Many of the substandard prepns. had been repackaged before final marketing. Probably some of the superstandard prepns. had been assayed by the U. S. P. method immediately after making and the non-specific amine interference had instituted an error in standardization. Such errors in standardization may be avoided by aging the prepns. in filled containers for several months before final standardization. Com. ergot prepns. should bear an expiration date. L. E. WARREN

Oleonaphtha as absorber of ethereal oils from distillation water. V. I. VARENTZEV. *J. Chem. Ind.* (Russia) 6, 966–7(1929).—Instead of following the usual procedure of returning the condensed distd. water holding droplets of ethereal oils back to the distg. app. the condensate collecting in the traps is made to pass through a layer of oleonaphtha, which retains the ethereal oils. A saving of 1.77% of the product was accomplished by this innovation. This method was also successfully applied to the recovery of *terpineol* from condensate, increasing the recovered product by 3.33%. A. C. Z.

Ambergris and how to recognize it (MORRISON) **27.** Analysis and preparation of medicated soaps (MATOLCSY) **27.** The economics of pyrethrum (GLASSFORD) **15.** Pyrazolone derivatives [intermediates for drugs] (Ger. pat. 514,421) **25.** Immunizing plants [vegetable serums for human and veterinary therapeutics] (Fr. pat. 693,723) **15.** Creams, etc. (Fr. pat. 692,454) **27.**

GILDEMEISTER, E., AND HOFFMANN, FR.: **Die ätherischen Öle. Band III.** 3rd ed., revised by E. GILDEMEISTER. Miltitz bei Leipzig: Verlag der Schimmel & Co. Akt. M. 36; half-leather, M. 40. Cf. *C. A.* **24,** 690.

TRUTTWIN, HANS: **Grundriss der kosmetischen Chemie.** Brunswick: Vieweg. 152 pp. M. 9.75.

Synthetic drugs. I. G. FARBENIND. A.-G. (Erich Bartholomäus, inventor). Ger. 514,418, Apr. 28, 1928. Anthelmintics of a basic character are prepd. by treating ketotetrahydronaphthalenes with CH_2O and a secondary amine. Thus, an alc. soln. of 1-ketotetrahydronaphthalene, paraformaldehyde and $Me_2NH.HCl$, boiled under reflux for 1 hr., yields *2-dimethylaminomethyl-1-ketotetrahydronaphthalene-HCl*, m. 158–9°. Other examples are given also.

Synthetic drugs. I. G. FARBENIND. A.-G. (Hans Schmidt, inventor). Ger. 515,206, Nov. 7, 1928. Sol. complex org. compds. of Sb are prepd. by the reaction of aromatic *o*-dihydroxy compds. contg. acid salt-forming substituents or their salts, with oxygenated compds. of quinquevalent Sb. Thus, an aq. soln. of K catecholdisulfonate may be treated with an excess of antimonic acid and the soln. filtered and neutralized; the product is pptd. by pouring into MeOH. Other examples are given also.

Synthetic drugs. I. G. FARBENIND. A.-G. (Karl Streitwolf, Alfred Fehrle and Hubert Oesterlin, inventors). Ger. 515,207, Aug. 28, 1929. Addn. to 510,451 (*C. A.* 25, 1036). The method of prepg. arsenobenzenes having aromatic hydroxyacylamino groups described in Brit. 318,491 (*C. A.* 24, 2241), is modified by condensing one component in the form of its arsine with the other component in the form of its arsine oxide

or the corresponding dichloroarsine. Thus, 4-glycolylaminobenzenearsine oxide in alc. HCl soln. may react with 3-amino-4-hydroxyphenylarsine. Other examples are given also.

Synthetic drugs. I. G. FARBENIND. A.-G. (Fritz Mietzsch and Heinrich Klös, inventors). Ger. 515,466, Jan. 30, 1929. New products effective against blood parasites are prepd. by acylating 4-(ω-aminoalkyl)aminobenzenearsonic acids, which may or may not be substituted in the 2-position. The initial materials may be prepd. as described in Ger. 501,088 (*C. A.* **24**, 4588-9). Examples are given.

Synthetic drugs. SCHERING-KAHLBAUM A.-G. (Adolf Feldt, Walter Schoeller and Erich Borgwardt, inventors). Ger. 513,799, May 6, 1926. Addn. to 511,303. The method of Ger. 511,303 (*C. A.* **25**, 1335) is extended to the conversion of aminometalmercaptosulfonic acids generally into the corresponding ω-sulfomethylamino compds. The initial materials in two of the examples given are Na β-amino-α-auromercaptoethanesulfonate and Na 3-amino-4-auromercaptobenzenesulfonate

Synthetic drugs. SCHERING-KAHLBAUM A.-G. (Walter Schoeller and Erich Borgwardt, inventors). Ger. 514,506, Feb. 12, 1926. Addn. to 506,443. The method of prepg. auromercapto acids described in Ger. 506,443 (*C. A.* **25**, 381) is modified by using acid or neutral sulfite in place of H_2SO_3. Examples are given.

Synthetic drugs. KARL LÜDECKE. Ger. 515,092, Sept. 11, 1928. Salts of choline with negatively substituted aromatic arsonic acids are prepd. by the customary salt-forming methods. The products are cryst. and non-hygroscopic. Examples are given describing the prepn. of the choline salts of, *inter alia*, 4 iodo-3-nitrobenzenearsonic acid, 3,5-dinitro-4-aminobenzenearsonic acid, and 4-carboxybenzenearsonic acid.

Extraction and concentration of vitamins. G. DUBOIS. Belg. 372,102, Aug. 31, 1930. Ground fish ovaries and livers are treated in strong alc. The oily liquid obtained on pressing is sapond. with an alc. alkali soln., and the soap is treated with Me_2CO and Et_2O to obtain vitamin A and with superheated steam to obtain vitamin F.

Medicinal silver preparation. PHYSIOLOGISCH-CHEMISCHES LABORATORIUM HUGO ROSENBERG. Ger. 515,061, Oct. 18, 1927. An ammoniacal soln. of Ag_2O is heated with an excess of starch until the oxide is wholly or partly reduced. An example is given.

Antiseptic solution. THE PEPSODENT CO. Fr. 693,083, Mar. 31, 1930. An antiseptic and disinfectant soln. contains, *e. g.*, chlorothymol 0.1, glycerol 7.5, EtOH 25, AcOH (of 36%) 1 and water 64.4%.

Creams, pomades, etc. COMPAGNIE FRANÇAISE POUR L'EXPLOITATION DES PROCÉDÉS THOMSON-HOUSTON. Fr. 692,757, Mar. 26, 1930. A protective pomade or cream contains soap 19, gum arabic 4, lanolin 2, glycerol 1 and water 74 parts. Gum arabic may be replaced by dextrin and lanolin by other oily substances.

Perfumes. J. D. RIEDEL-E. DE HAËN A.-G. Ger. 515,332, Dec. 8, 1926. Ethers of 3,4-dihydroxybenzyl alc are used as fixing agents or solvents for perfumes. The prepn. of the dimethyl, methyl ethyl and diethyl ethers is described

Essence d'Orient. JOSEPH JACOBSON. Fr. 693,735, July 22, 1929. Pure Essence d'Orient is obtained by emulsifying the org. materials mixed with it by peralcohol which permits a rapid decantation from the crystals.

18—ACIDS, ALKALIES, SALTS AND SUNDRIES

E. M. SYMMES

Causes of the intoxications produced in the cleaning of sulfuric acid tanks and tank cars. LEYMANN AND WEBER. *Zentr. Gewerbehyg. Unfallverhütung* **17**, 154-9 (1930); *Chimie & industrie* **24**, 832-3(1930).—From a study of a large no. of cases it is concluded that the intoxication is due to AsH_3. Against this were the suppositions that the action of H_2SO_4 on metallic Fe in the presence of reducible As compds. does not produce AsH_3, and that, as com. H_2SO_4 (except contact-process H_2SO_4) contains HNO_3, AsH_3 gas cannot form. Lab. expts. showed that when crude dil. H_2SO_4 acts on Fe in the presence of reducible As compds., AsH_3 can be evolved, even at atm. temp.; at higher temps., even when very dil., H_2SO_4 can still give rise to evolution of AsH_3 under similar conditions; finally, the small quantities of HNO_3 present in technical H_2SO_4 do not prevent the reaction. When cleaning out the tanks or cars, the H_2SO_4 which sats. the sludge heats up on being dild., attacks the Fe and ultimately causes evolution of AsH_3. To prevent the intoxications, cleaning outlets should be provided in the bottom of the tanks, or the washing should be carried out with a large amt. of water, which is continuously siphoned off.

A. PAPINEAU-COUTURE

Lime in 1929. A. T. COONS. Bur. Mines, *Mineral Resources of the U. S.* 1929, Pt. II, 267–98 (preprint No. 20 published January 14, 1931). E. H.

Density of sulfuric acid solutions of copper sulfate. G. CHAPAS, C. CHARMETANT AND A. RAME. *Chimie & industrie* **24**, 794–6(1930).—Control of the manuf. of $CuSO_4$.-$5H_2O$ requires frequent detns. of the compn. of the solns. to maintain the acidity within relatively narrow limits. As the detn. of acidity is relatively long to carry out, curves of the compns. of solns. at different ds. were detd. and plotted on triangular coördinates, the sides of the triangle representing CuO, SO_3 and H_2O, resp., and from them the crystn. curve was obtained. By anamorphosis the crystn. curve was transposed to rectangular coördinates. The diagrams permit obtaining the compn. of H_2SO_4-$CuSO_4$ solns. from the ds. and CuO contents. For the curves and method of using them, the original article should be consulted. A. PAPINEAU-COUTURE

The sulfates in industry—a review of the water-soluble products. IV. Magnesium sulfate. V. Iron sulfates. VI. Zinc sulfate. VII. Copper sulfate. CHAS. H. BUTCHER. *Chem. Trade J.* **88**, 125–6(1931); cf *C. A.* **25**, 1337. —An outline of characteristics required of these sulfates in the industries. W. H. BOYNTON

The problem of the drying of salt. B. LAGRANGE. *Chimie & industrie* **24**, 805–8(1930). —A brief discussion is given of various types of app. for drying salt from a moisture content of 5–8% down to 0.5%, together with approx. figures on the cost of the drying. A. PAPINEAU-COUTURE

Studies on fundamental synthesis of calcium aluminates and their hydration. VII. SHOICHIRO NAGAI AND RYUICHI NAITO. *J. Soc. Chem. Ind., Japan* **33**, Suppl. binding, 315–8(1930); cf. *C. A.* **24**, 4370.—Tests show that gehlenite ($2CaO.Al_2O_3.SiO_2$) can be obtained by heating appropriate mixts. of CaO, Al_2O_3 and SiO_2 above 1550° or for a longer time at 1450°. In eutectic mixts. between Ca aluminate and Ca silicate, the combination of CaO and Al_2O_3 or SiO_2 is completed instantly by heating at a little higher temp. than 1300°. Compression tests on the synthesized products of alite and gehlenite and of eutectic mixts. show that the alite has a small value at short curing times, but the strength increases gradually on longer curing in water. The gehlenite has no perceivable strength, but its strength increases remarkably when 5–10% of CaO is added. H. C. PARISH

Anhydrous aluminum chloride: its uses and manufacture. C. SIMON. *Chimie & industrie* **24**, 1317–24(1930).—A brief review is given of the more important uses of $AlCl_3$ with an outline of the chief processes of manuf., more particularly a comparison of the MacAfee and Hagglund processes A. PAPINEAU-COUTURE

Chile's attempt to modernize and make profitable the production of nitrate. L. NEUBERGER. *Kunstdünger u. Leim* **27**, 349(1930).—Statistics. C. J. S.

Annual review number. *Eng. Mining J.* **131**, 97–133(1931) **Gold.** ROBERT J. GRANT. *Ibid* 97(1931).—Increase in mining typifies the period of economic adversity. **Silver.** H. M. BRATTER. *Ibid* 98–9.—The by-product output of the metal makes its future uncertain. **Precious stones.** GEORGE F. KUNZ. *Ibid* 99. **Lead.** CLINTON H. CRANE. *Ibid* 100–1.—Abnormal refined metal stocks are on hand. **Asbestos.** NORMAN R. FISHER. *Ibid* 101–2.—Russian output has rapidly increased, while that of the U. S. A. and the Union of South Africa has fallen markedly. **Cobalt.** G. C. BATEMAN. *Ibid* 102.—The ceramic industry consumes about 40% of the output, but increased use in Co-alloys is noticed. **Aluminum.** C. L. MANTELL. *Ibid* 102.—The Al industry has held its own, with an outlook for further expansion in 1931. **Copper.** ARTHUR NOTMAN. *Ibid* 103–4.—"Opposition to law of supply and demand has again proved futile." **Graphite.** BENJAMIN L. MILLER. *Ibid* 104. **Zinc.** JULIAN D. CONOVER. *Ibid* 105–6. **Nickel.** THOMAS W. GIBSON. *Ibid* 106. **Iron.** EDWIN C. ECKEL. *Ibid* 107. **Tin.** E. BALIOL SCOTT. *Ibid* 108–9. **Sulfur and pyrites.** RAYMOND F. BACON. *Ibid* 109. **Quicksilver.** H. W. GOULD. *Ibid* 110. **Minor metals.** PAUL M. TYLER. *Ibid* 111–4.—Economic figures for Sb, chromite, bauxite, Mn, Mo, W, Ur, Ra, V and Ta are discussed. **Non-metallics.** OLIVER BOWLES. *Ibid* 115–8.—Sales of construction materials led the decline in the depression period. Barytes, felspar, fluorspar, gypsum, kaolin, magnesite, phosphate, mica, talc and soapstone and silica are discussed. **Platinum.** H. W. BOYNTON. *Ibid* 118.—The decline in price during 1930 was due more to increased production than to marked decrease in consumption. Increased consumption was evident in the essential industries. **Uncommon ores and metals.** H. C. MEYER. *Ibid* 119–20. Elements discussed are: Be, Cs, Ru, Ce, Se, Te, Th, Ti and Zr. **World potash industry prospers.** J. W. TURRENTINE. *Ibid* 120. **Mining in the United States.** S. D. STRAUSS. *Ibid* 121–4. **Canadian output of metal expands.** S. J. COOK. *Ibid* 125–6. **Mining in South Africa and Rhodesia.** OWEN LETCHER. *Ibid* 126–7. **Mining in Latin America in 1930.** S. D. STRAUSS.

Ibid 128–30. **Europe, Siberia, Far East and India.** DONALD J. FARQUHARSON. *Ibid* 131–2. **The mining industry of the U. S. S. R.** V. KARMASHOV. *Ibid* 132–3. **Mining in Australasia in 1930.** PETER G. TAIT. *Ibid* 133. **Japan.** HIRONAO NISHIHARA. *Ibid* 133. W. H. BOYNTON

A study on agar-agar. II. TETSUNOSUKE YANAGAWA AND Y. NISHIDA. *Repts. Imp. Ind. Research Inst., Osaka, Japan* 11, No. 14(1930); cf. *C. A.* 23, 4538.—Constituents of *Gelidium amansii* Lamx. and the phys. properties of agar-agar are given. F. I. NAKAMURA

Study of the conditions of cooking of gum tragacanth. A. F. LOMANOVITCH AND VENETZKAIA. *Izv. Tekstiln. Promychl.* 9, No. 3, 71–3(1930); *Chimie & industrie* 24, 947(1930).—From a study of the various factors involved, the following procedure is recommended: swell the finely divided gum in 30 parts of water at 50° for 12–15 hrs. with continuous stirring, heat for 2 hrs. in an open kettle and cool with stirring for 6–8 hrs., at which point max. viscosity is attained. A. PAPINEAU-COUTURE

The production of superphosphate from Khibinsk apatite (VOL'FKOVICH, *et al.*) 15.

British Plastics Year Book, 1931. London: The British Plastics Moulding Trade Assocn. 229 pp.

Hydrocyanic acid. IMPERIAL CHEMICAL INDUSTRIES, LTD., T. S. WHEELER, J. MCAULAY, W. B. FLETCHER and H. A. T. MILLS. Brit. 335,585, March 27, 1929. Fr. 692,542, March 21, 1930. Reaction between a hydrocarbon gas (such as CH_4, C_2H_6, and various natural and artificial industrial gases contg. hydrocarbons) and NH_3, to produce HCN and H is effected by passing a mixt. of the hydrocarbon material with more than one mol. proportion of NH_3 for each at. proportion of C, at a temp. of at least 1150°, rapidly through an unpacked reaction chamber. H or water vapor may be present, the gas mixt. may be preheated to 900° or higher, and the reaction chamber is preferably formed with smooth internal surfaces such as glazed silica or sillimanite. S compds. and CO_2 may be removed from the gases by passing them through aq. or liquid NH_3.

Hydrocyanic acid. IMPERIAL CHEMICAL INDUSTRIES, LTD. Fr. 692,543, March 21, 1930. HCN is produced as described in the preceding patent, but the NH_3 is not used in excess. Instead an appreciable amt. of a diluent such as H or N is used. The hydrocarbon may be coke-furnace gas, and it may be purified and at the same time mixed with NH_3 by bringing it into contact with liquid NH_3.

Phosphoric anhydride. ÉVENCE COPPÉE. Belg. 372,292, Aug. 31, 1930. Phosphates, to which may have been added a substance capable of reducing the reaction temp., *e. g.*, Al_2O_3, are heated in presence of SiO_2.

Phosphoric acid. H. LAWARRÉE. Belg. 370,074, June 30, 1930. Pb oxychloride or hydroxide is used in a closed cycle to isolate phosphoric acid as Pb phosphate in a salt soln. contg. phosphoric acid.

Phosphoric acid; hydrogen. BAYERISCHE STICKSTOFFWERKE A.-G. (Vladimir N. Ipat'ev, inventor). Ger. 514,173, Mar. 1, 1929. See Fr. 670,338 (*C. A.* 24, 1941).

Phosphoric acid and aluminum compounds. I. G. FARBENIND. A.-G. Fr. 693,818, Apr. 12, 1930. Al is pptd. as $AlCl_3$ by HCl gas from a hydrochloric acid soln. of substances contg. Al and H_3PO_4, and the H_3PO_4 is recovered after elimination of the Al. An example is given of the treatment of natural Al phosphate.

Silicic acid. RICHARD WILLSTÄTTER, KARL LOBINGER and HEINRICH KRAUT. Ger. 514,414, Nov. 3, 1928. Stable solns. contg. silicic acid as simple mols. are prepd. by decompg. an alkali silicate soln. with an acid, or by the reaction of a silicon halide with an aq. suspension of Ag_2O or other suitable base, and acidifying the soln. so obtained until the hydrion concn. lies between p_H 1.5 and 3.5. Examples are given.

Apparatus for effecting gas reactions such as catalytic production of sulfuric acid, ammonia or methanol. LUIGI CASALE. U. S. 1,790,853, Feb. 3. Various details are described of an app. with baffle plates and partitions arranged for heat-exchange between products of reaction and gases supplied for the reaction.

Removing arsenic from acids. METALLGES. A.-G. Fr. 692,595, Mar. 24, 1930. As is removed from a concd. acid such as H_2SO_4 of 60° Bé. by the addn. of the exact amt. of H_2S necessary to convert the As to sulfide.

Purifying acids or acid salts. PAUL BOESSNECK. Ger. 514,499, Sept. 26, 1929. Solns. of acids or acid salts obtained by treating solns. of Ca salts with H_2SO_4 are freed from dissolved $CaSO_4$ by addn. of HF.

Salts of cyanic acid. DEUTSCHE GOLD- UND SILBER-SCHEIDEANSTALT VORM. ROESSLER. Fr. 692,481, Mar. 21, 1930. Salts of cyanic acid are prepd. by heating, in the absence of solvents, urea with alk. earth compds. such as CaO, $Ca(OH)_2$, CaC_2 or alkali compds. such as Na_2CO_3 or K_2CO_3.

Synthesis of ammonia in presence of inert gases. AMMONIAQUE SYNTHÉTIQUE ET DÉRIVÉS, SOC. ANON. Belg. 372,057, Aug. 31, 1930. After having been freed from NH_3, the gases are partly returned to the same tower along with the gas from the preceding tower (or the fresh gas in the case of the 1st tower), and partly sent to the next tower (or the gas discharge in the case of the last tower).

Synthesis of ammonia. SOC. CHIM. DE LA GRANDE PAROISSE (AZOTE ET PRODUITS CHIM.). Fr. 693,712, July 9, 1929. Small quantities of CO_2 in the gases for the synthesis of NH_3 are removed by the action of the CO_2, NH_3 and steam to form $(NH_4)_2CO_3$, sufficient steam being left in the gas, so that during the final condensation it carries down the $(NH_4)_2CO_3$.

Gaseous syntheses. UNIVERSITÄTS-INSTITUT FÜR PHYSIKALISCHE GRUNDLAGEN DER MEDIZIN. Fr. 693,641, Feb. 28, 1930. In gaseous syntheses of surface reaction type by means of elec. discharges, the reaction chamber in which the elec. discharges are passed through the gas is heated to above the critical temp. of the gas to be prepd. Examples mentioned are the *prepn. of* NH_3 and C_2H_2.

Oxidation of ammonia. E. I. DU PONT DE NEMOURS & Co. Fr. 692,824, Mar. 27, 1930. NH_3 is oxidized to oxides of N by passing a mixt. contg. NH_3 and O in contact with a catalyst of the Pt group, the exposed surface of which per unit section of the gaseous current is more than 4 thicknesses of gauze of 23–63 mesh per linear cc., formed of threads of 127–25 thousandths of a mm. in diam

Oxidizing ammonia. E. I. DU PONT DE NEMOURS & Co. Fr. 693,559, April 8, 1930. NH_3 is oxidized to oxides of N by passing a mixt. of NH_3 and O over catalysts and rapidly cooling the reaction mixt. to below 500°. An app. is described.

Oxidizing ammonia with oxygen. FRANS G. LILJENROTH. Ger. 514,392, Sept. 9, 1926. See Swed. 65,260 (*C. A.* **24**, 1473).

Alkali ferrocyanides. HAMBURGER GASWERKE G. M. B. H. Fr. 692,868, Mar. 28, 1930. Alkali ferrocyanides are prepd. during the extn. of HCN from coal gas by washing, by means of bivalent compds. of Fe suspended in an alk. lye contg. an excess of alkali. The excess of alkali depends in amt. and concn. on the content of HCN in the coal gas, so that only sol. ferrocyanides are produced, and this excess after being transformed into carbonate or bicarbonate by the CO_2 in the gas is neutralized.

Alkali chromates. MUTUAL CHEMICAL CO. OF AMERICA. Fr. 692,614, March 24, 1930. See U. S. 1,752,863 (*C. A.* **24**, 2553).

Alkali or alkaline earth salts from the corresponding chlorides. H. LAWARRÉE. Belg. 370,808, July 31, 1930. The acid is brought into contact, in aq. medium, with the chloride in presence of an oxide, hydroxide or basic mercurous or mercuric salt which can combine with the Cl ion. The $HgCl_2$ or Hg_2Cl_2 produced is treated with a base to regenerate the oxide or other mercurous or mercuric salt. Cf. *C. A.* **25**, 779.

Chromium compounds. GINO PANEBIANCO and VIRGINIO A. DE LIBERA. Fr. 692,786, Mar. 26, 1930. Industrially pure Cr compds., particularly a mixt. of Cr_2O_3 and $H_2Cr_2O_4$ or its salts, are obtained from crude materials such as Cr ores or slags, by mixing the crude material with substances contg. pure or combined C and submitting the mixt. to the catalytic action of Cl in the presence of free or combined O.

Alkali metal phosphates. METALLGES. A.-G. Brit. 335,492, Oct. 17, 1929. Phosphates such as Na_3PO_4 and K_3PO_4 are produced by fusing (suitably at a temp. of about 1150–1250°) a mixt. of alkali metal sulfate and a metal-P alloy such as ferro-P, P-Cu or P-Mn (preferably in the form of powder or small lumps) in a elec. resistance furnace. Various details of procedure for avoiding atm. oxidation, etc., are described. The reaction product is leached with water, and metal sulfide is obtained as a by-product.

Phosphates. PHOSPHATE RECOVERY CORP. Fr. 692,731, Mar. 25, 1930. Phosphatic material contg. particles of phosphate and particles of gang is concd. by treatment with alkali and with oil and sepn. by a surface flotation. An app. is described. Cf. *C. A.* **24**, 1473.

Phosphates. SOC. D'ÉTUDES POUR LA FABRICATION ET L'EMPLOI DES ENGRAIS CHIMIQUES (Étienne T. de Boismilon, inventor). Fr. 693,736, July 22, 1929. A Ca phosphate having a content of citrate-sol. P_2O_5 of at least 36% of the dry product is obtained by adding the ground natural phosphate very slowly to the HCl soln. (contg. not more than 70 g. HCl per l.) at a temp. of about 30°.

Phosphotungstates. JOSHUA F. DARLING (to E. I. du Pont de Nemours & Co.).

U. S. 1,790,905, Feb. 3. For purifying phosphotungstates such as Na phosphotungstate in a mother liquor the crude tungstate liquor is acidified (suitably with HCl), an aromatic amine such as dimethylaniline is added, the repptd. phosphotungstate formed is removed, the ppt. is treated with an alk. substance such as NaOH and the amine is steam-distd. off.

Metal carbonyls. I. G. FARBENIND. A.-G. (Leo Schlecht and Emil Keunecke, inventors). Ger. 515,464, Aug. 19, 1928. See Fr. 679,542 (*C. A.* **24**, 3865).

Manufacture of ammonium sulfate from the spent gases of coke ovens and synthetic-ammonia plants. R. LEDENT. Belg. 370,942, July 31, 1930. $FeSO_4$ is used in the neutralizers, instead of H_2SO_4. The pptd. $Fe(OH)_2$ is air-dried and used as Fe ore. The concd. $(NH_4)_2SO_4$ soln. is crystd.

Utilizing dilute sulfuric acid for the manufacture of ammonium sulfate. SOC. GÉNÉRALE DE FOURS À COKE (SYSTÈMES LECOCQ). Fr. 692,789, Mar. 26, 1930. See Belg. 359,553 (*C. A.* **24**, 950).

Aluminum chloride. I. G. FARBENIND. A.-G. (Johannes Brode and Carl Wurster, inventors). Ger. 515,033, June 2, 1929. Anhyd. $AlCl_3$ free from Fe is prepd. by fusing the crude salt with a reducing agent, *e. g.*, Al, and sepg. Fe from the melt by electromagnetic means, *e. g.*, by suspending an electromagnet in the melt.

Magnesium chloride. ELISA LACELL NÉE VANDER-VORD. Fr. 693,232, April 3, 1930. Carnolite or $MgCl_2$ is dehydrated by adding gradually to a relatively large anhyd mass of $MgCl_2$ or $MgCl_2$ and KCl relatively small quantities of the salt to be dehydrated, to cause a rapid evapn. of the water and prevent the formation of oxides.

Potassium nitrate. KALI-FORSCHUNGS-ANSTALT G. M. B. H. Fr. 693,181, April 2, 1930. A mixt. of $Al(NO_3)_3$ and KCl is heated until no more nitrous gases or Cl sep., and the KNO_3 is dissolved in water or in KNO_3 solns. The Al_2O_3 is reconverted to $Al(NO_3)_3$ by HNO_3, the nitrous gases being used as well. Cf. *C. A.* **24**, 3091.

Potash and alumina. FELIX JOURDAN. Fr. 693,074, Mar. 31, 1930. KOH and Al_2O_3 are obtained from leucite by heating limestone with leucite and a suitable flux to the m. p., cooling, grinding and leaching with a soln. of K_2CO_3 to neutralize the CaO and ppt. it as $CaCO_3$.

Selenium sulfide. COMPAGNIE FRANÇAISE POUR L'EXPLOITATION DES PROCÉDÉS THOMSON-HOUSTON. Fr. 692,758, Mar. 26, 1930. Stable active SeS_2 of definite compn is made by satg. a soln. of $AlCl_3$ with H_2SO_4 and adding a soln. of H_2SeO_3 with continued addn. of H_2SO_4. A yellowish sol is first formed which is converted to a yellow flocculent ppt. A temporary and moderate excess of acid gives a sol The ppt. is washed and dried. $BaCl_2$ may be used instead of $AlCl_3$. Another method consists in mixing S and Se in the theoretical proportions and heating to 225°. The plastic product obtained slowly changes and becomes fragile and hard. The SeS_2 may be combined with a hydrophile medium such as bentonite by heating the 2° to 125–150°. The *product may be used for the vulcanization of rubber* or in aq. suspension as a *fungicide* or *insecticide*.

Sodium cyanide. S. COULIER. Belg. 372,147, Aug. 31, 1930. A mixt. of carbonaceous material, alkali salts and catalyst is treated with hot N, with addn. of a quantity of Na salts equiv. to the quantity of NaCN required. After sepn. of NaCN, the mass is treated with steam under pressure to produce formates and NH_3. Cf. *C. A.* **25**, 385.

Recovery of sodium carbonate from "tails salts." HARRY W. MORSE. U. S. 1,791,281, Feb. 3. "Tails salts" contg. Na_2CO_3, such as those produced from Searles Lake brine, are washed with water at a temp. of 30–40° in order to dissolve out Na_2CO_3.

Sodium chromate; alumina. I. G. FARBENIND. A.-G. (F. Wissing, inventor) Ger. 513,942, Feb. 5, 1930. Addn. to 505,318. In the method of Ger. 505,318 (*C. A.* **24**, 5949), the extn. of the sol. portion is effected by heating the melt with water under pressure to a temp. above 100°, *e. g.*, to 230°. The ext. thus obtained is relatively free from SiO_2.

Sodium fluoride. E. V. BRITZKE, W. I. BREMPELL and M. E. JAKUBOWITZ. Brit. 335,703, Aug. 29, 1929. NaF (neutral, acid or mixed) is obtained by the action of gaseous HF on solid calcined soda at an elevated temp. (suitably 70°), and the acid fluoride formed may be further neutralized with calcined soda. App. is described.

Acid disodium pyrophosphate. METALLGES. A.-G. Brit. 335,501, May 17, 1929. This compd. is obtained by evapg. *in vacuo* (suitably at 180–200°) a soln. contg. H_3PO_4 (which may be that obtained by decompg. crude phosphates with H_2SO_4) and a proper proportion of NaCl.

Bleaching powder. I. G. FARBENIND. A.-G. Ger. 514,390, May 24, 1928. Ground $Ca(OH)_2$ is suspended in an inert liquid, *e. g.*, CCl_4, and treated with Cl at a temp. above

40°, the mixt. being rapidly cooled below 20° when the reaction is completed. The product is dried *in vacuo* at a low temp.

Mixtures of hydrogen and carbon oxides. BRITISH CELANESE, LTD., W. BADER and E. E. STIMSON. Brit. 335,632, July 2, 1929. Mixts. of CO_2 and H such as those obtained by releasing the pressure upon wash waters used in treating industrial CO and H mixts., have their H content reduced or eliminated by treatment with chromite above 700° (preferably at 800–900°), which increases the CO content of the mixt. so that it may be used for CO production by drying and passing it over hot coke or charcoal.

Animal black. BAUGH & SONS CO. Fr. 693,239, April 3, 1930. See Ger. 512,484 (*C. A.* **25**, 1045).

Roasting sulfur ores. SAUREFABRIK SCHWEIZERHALL. Fr. 692,569, Mar. 22, 1930. S ores or other materials contg. S are roasted in mech. furnaces of several floors in countercurrent to air, the ore, etc., passing over intermediate floors to which only part of the air has access to prevent premature cooling by the air.

Condensation products. I. G. FARBENIND. A.-G. Fr. 693,750, April 11, 1930. Condensation products are obtained as a fine powder without odor, by the reaction of aliphatic aldehydes, or their mixts., with bases of the naphthalene series in the presence of acids in alcs. sol. in water, and treatment of the products with water. Examples are given.

Condensation products of urea and formaldehyde. MARTIN LUTHER and CLAUS HEUCK (to I. G. Farbenind. A.-G.). U. S. 1,791,062, Feb. 3. Condensation is effected with an aq. soln. of urea and CH_2O in which a p_H of 4 to 7 is maintained by addn. of buffer compds., and there is added to the condensation product, prior to hardening, a substance such as $MgCl_2$ or formamide which is capable of forming acid in the liquid condensation product during the heat treatment employed for the hardening.

Resitols. AUG. NOWACK A.-G. and RICHARD HESSEN. Fr. 693,004, Mar. 29, 1930. The initial sol. and fusible condensation products (resols) from phenols and CH_2O, if necessary with the addn. of accelerators or the polymers or homologs of, CH_2O, are heated in thin layers for a short time, preferably repeated, until the whole or a greater part of the volatile constituents are eliminated and the resitol formed contains the desired amt. of resol for the final treatment of the resulting resitol.

Cyanamide-formaldehyde condensation products. HANS SCHMIDT (to I. G. Farbenind. A.-G.). U. S. 1,791,433, Feb. 3. Formaldehyde is caused to act on cyanamide in aq. soln. contg. a "strong" inorg. acid such as dil. HCl, while heating (suitably at a temp. of the water bath) until the condensation product seps. in an amorphous condition. U. S. 1,791,434 also relates to effecting reaction between cyanamide and CH_2O, as by heating in dil. alk. aq. soln.

Plastic materials. COMPAGNIE FRANÇAISE D'ACCUMULATEURS ÉLECTRIQUES. Fr. 692,565, Mar. 22, 1930. A plastic material for molding hard elastic products, particularly suitable for molding accumulator vats, contains a mixt. of cotton-oil tar from the residues obtained in purifying cotton oils with H_2SO_4, petroleum tar, fibrous materials and a mineral charge. An example contains cotton-oil tar 40, petroleum tar 20, kieselguhr 30 and asbestos or jute 10%.

Molding casein. ADALBERT ZSIGMONDY. Ger. 515,376, Dec. 4, 1926. See Brit. 298,815 (*C. A.* **23**, 3061).

Composition for use in modeling, sculpture, pottery, etc. KARL F. HÖLLER and STEFAN SCHLESS. Ger. 515,442, Dec. 28, 1928. See Austrian 119,622 (*C. A.* **25**, 784).

Stabilization of dispersions of substances little soluble in water. N. V. BATAAFSCHE PETROLEUM MAATSCHAPPIJ and HYMAN LIMBURG. Dutch 23,111, Dec. 15, 1930. Aq. emulsions or suspensions of water-insol. substances, oils, tar, asphalt, rubber, etc., are stabilized by the addn. of small quantities of sulfonic acids. The latter are derived from petroleum products (lubricating-oil fractions) by repeated sulfonation with 10% oleum (20% SO_3) at 50°. The acid sludge from the 4th or 5th sulfonation is neutralized, and the sulfonic acids are dissolved in water. In a 5% alkali sulfonate soln. 160% of asphalt can be dispersed to a stable emulsion. The active sulfonic acids have a min. mol. wt. of 500, are insol. in xylene and CCl_4, and are not pptd. by $CaCl_2$. Cf. *C. A.* **24**, 444.

Adhesive for belts and the like. A. PLONSKIER. Belg. 369,970, June 30, 1930. The product is a mixt. of lanolin, wax (*e. g.*, paraffin) and fish oil (*e. g.*, cod-liver oil).

Adhesive. WILLIAM B. WESCOTT (to The Rubber Latex Research Corp.). Can. 308,567, Feb. 10, 1931. A plastic adhesive for laminated articles comprises heat-coagulated hemoglobin, rubber and a vulcanizing agent. It is used for securing rubber and rubber compns. to metal, bakelite, wood, etc. Cf. *C. A.* **24**, 2257.

Wetting, etc., agents. H. TH. BÖHME A.-G. Fr. 692,862, Mar. 28, 1930. Wetting

impregnating, dispersing or froth-forming agents contain the reaction products of org. bases on sulfonated higher aliphatic alcs. Thus pyridine or pyridinic bases react with sulfonated lauric or stearic alc.

Wetting, etc., agents. I. G. FARBENIND. A.-G. Fr. 693,620, April 10, 1930. Wetting, cleansing, dispersing and solvent agents are made by treating with H_2SO_4, SO_3 or $ClHSO_3$ carboxylic acids of the aliphatic, cycloaliphatic, aliphatic-aromatic or aromatic series or their NH_2 or substituted NH_2 derivs The reaction materials are so chosen that the products contain at least one double or triple bond or at least one hydroxyl group, and the products or amides of carboxylic acids prepd. in any manner contg. at least one double or triple bond or a hydroxyl group in the mol. Solvents or diluents such as $C_2H_3Cl_3$, CCl_4, ether or $PhNO_2$ may be used. Solvents or diluents such as org. or inorg. acids, anhydrides or chlorides capable of forming mixed anhydrides with sulfonating agents are only used with substances contg. hydroxyl groups which do not possess double or triple bonds. Several examples are given.

Wetting, etc., agents. I. G. FARBENIND. A.-G. Fr. 693,699, April 11, 1930. Wetting, cleansing, dispersing and solvent agents are prepd. by transforming aliphatic, aromatic or aliphatic-aromatic ketones or their derivs. or mixts., obtained during the prepn. of ketones, into true sulfonic acids. Examples are given of the sulfonation of oleone, palmitone, pentadecylnaphthyl ketone and others.

Artificial sponge. I. G. FARBENIND. A.-G. Ger. 512,748, Mar. 24, 1929. Artificial sponge is made from viscose, fibrous material and a filling material consisting wholly, or in part, of acid salts. The porosity of the sponge is obtained by removing the filling material. Thus, viscose is mixed with cotton, flax, etc., and NH_4HSO_4 or $NaHSO_4$, molded and the salt removed. Cf. *C. A.* **25**, 1048.

Kiln for preheating and clinkering of raw materials in powdered form such as lime or cement material. EDOUARD P. C. GIROUARD. U. S. 1,791,165, Feb. 3.

Friction material suitable for clutch and brake facings. I J. NOVAK. Brit. 335,549, May 21, 1929. See U. S. 1,766,932 (*C. A.* **24**, 4365).

Friction material suitable for brake lining, etc. ISADOR J. NOVAK (to Raybestos-Manhattan, Inc.). U. S. 1,790,944, Feb. 3. A potentially reactive but unreacted thin fluid mixt. is prepd. comprising $(CH_2)_6N_4$, cresylic acid and a modifier such as China wood oil. A fibrous base such as asbestos millboard is satd. with this mixt., and the satd. base is heated in a closed container, while preventing substantial loss of vapors, to initiate reaction and partial hardening; the heating is continued until the satd. base assumes marked plasticity, after which the material is cured at a higher temp. to convert the satd. compn. into an insol. infusible state. Cf. *C. A.* **24**, 4365.

Stencil sheet. SHINJIRO HORII. U. S. 1,790,987, Feb. 3. A stencil sheet adapted for stenciling by pressure consists of a base of fibrous material such as Japanese Yoshino paper having a coating comprising esters of polysaccharides such as cellulose nitrate or starch acetate together with dolphin oil, etc. Cf. *C. A.* **24**, 699, 4598; **25**, 567.

Magnetic material in fine dust form suitable for loading coils and other cores. JAMES E. HARRIS (to Bell Telephone Laboratories, Inc.). U. S. 1,790,704, Feb. 3. In order to increase the yield of fine dust from subdividing magnetic material such as Fe, Ni or Co and Mo alloys, the material is melted with a quantity (greater than an incidental impurity and which may amount to several per cent) of Sn, Bi or Pb. Cf. *C. A.* **25**, 786.

Gramophone records. R. H. CHESTER. Brit. 335,660, July 11, 1929. Flexible records such as those with a core of paper, linen or parchment, and covering layers of celluloid or like transparent material have designs or lettering, etc., applied reversely to the transparent material and the latter is then secured adhesively, with the printed surface down, to the core material. Cf. *C. A.* **24**, 5119.

Box-toe material. ALBERT L. CLAPP (to Beckwith Mfg. Co.). U. S. 1,790,796, Feb. 3. A felted material is formed comprising a fibrous pulp such as wood pulp and a relatively longer fibrous material such as long rope or flax fibers, and this is impregnated with a thermoplastic binder such as a rosin, gilsonite and Montan wax mixt. Cf. *C. A.* **24**, 4129.

Composition for filling teeth. C. A. WINTERBAUER and EWALD BREMER. Ger. 515,137, May 7, 1929. The compn. comprises powd. animal teeth, celluloid, and acetone. Powd. Au or Ag may be added.

19—GLASS, CLAY PRODUCTS, REFRACTORIES AND ENAMELED METALS

G. E. BARTON, C. H. KERR

Glass, its composition and properties. GEO. W. MOREY. *J. Chem. Education* **8**, 421–41(1931).—A review. E. H.

The theory of the composition of glass. E. ZSCHIMMER. *J. Soc. Glass Tech.* **14**, 229–49T(1930).—Graphic methods of representation of the compn. of glass as a quaternary system are discussed. H. F. K.

Effect of alumina and silica on some properties of glass. M. A. BESBORODOV. *Glashütte* **60**, 5–9(1930).—An increase in the Al_2O_3 and SiO_2 contents retarded the devitrification of a B–SiO_2–Al_2O_3–CaO–potash–soda glass, and increased the resistance toward water and Na_2CO_3. The resistance toward NaOH and H_2SO_4 rises with an increase in the SiO_2 content but falls with an increase in that of Al_2O_3. B. C. A.

The influence of manganese oxide on some properties of glass. A. A. CHILDS, VIOLET DIMBLEBY, F. WINKS AND W. E. S. TURNER *Ceramic Industry* **15**, 292(1930).—The replacement of Na_2O by MnO in 3 series of glass batches resulted in lowering the working temp. and the coeff. of thermal expansion; it raised the annealing temp. and improved the chem. stability. M. A. E.

Feldspar, its effect in glass. E. W. KOENIG. *Ceramic Age* **16**, 150–2(1930); *Glass Ind.* **11**, 264–6.—Feldspar in the glass batch is considered from the standpoint of the beneficial effects of alumina. Feldspar causes no mech. or chem. disturbance in the batch, is non-corrosive to tank blocks, and hinders surface sepn. of silica. It should be added at intervals in small quantities to avoid producing glasses of different compns. in the same tank. A bibliography of 19 titles is given. M. A. E.

Plea for uniformity of glass-making materials. R. L. FRINK. *Natl. Glass Budget* **46**, No. 26, 3, 13, 16, 20–1, 24(1930).—F. discusses at length the undesirable effects of variation of Fe content and moisture content, also of the presence of extraneous reducing agents in the raw materials of the batch, sometimes including not only tar and soot, but also catsup, sirups and fruit juices introduced with bottle cullet. Checks and seeds as well as unsatisfactory color, brittleness, and lack of homogeneity in glass may all be traced to such variations in materials. M. A. E.

Effect of various radiations on the coloring of glasses. P. GILARD AND AD. LECRENIER. *Chimie & industrie* **24**, 1035–51(1930); cf. *C. A.* **21**, 3434; **25**, 1049.—A large no. of glasses of known compn. were exposed for several weeks to the light of a Hg-vapor arc. The same and other glasses were exposed to the action of Ra rays for 29 days, and also samples of minerals and of a no. of pure chem. compds. The absorption spectra of the irradiated glasses were measured by the method of G. and Swings (*C. A.* **24**, 5235). From the results G. and L. are inclined to the belief, contrary to Przibram and coworkers, that the action of the Ra rays is like that of the ultra-violet rays in that it affects the mol. rather than the atom. A. PAPINEAU-COUTURE

Note on the influence of different radiations on the coloring of glass. AD. LECRENIER AND P. GILARD. *Rev. universelle mines* **4**, 349–62(1930); cf. *C. A.* **25**, 1049.—The ultra-violet ray has a marked influence on the intimate compn. of glass. It provokes reactions that may modify the aspect of the glass. The fact that certain glass seems unaltered does not mean, necessarily, a lack of internal reactions; the existence of these can be established only through sensible phenomena, such as colorations. In glass containing Cr or other elements existing in several states of oxidation, the action of the ultra-violet ray is clearly shown by displacement of color. The color obtained varies essentially with the compn. of the glass. Because of the lack of permeability of glass to ultra-violet rays, the color is at first superficial and only with time reaches the deep layers and the center of the mass. The color obtained disappears under the action of heat near the softening temp. of the glass. The heat causes reactions that are the reverse of those produced by the ultra-violet ray and destroys the mol. structure the latter has established. The ultra-violet ray acts only chemically and modifies only the mol. structures of bodies. The Ra ray causes deeper disintegrations and attacks the atoms; however, it is possible that under the action of Ra rays there is produced a modification in the relative positions of atoms in the mol. Tests with Ra rays have shown that all glass contg. K_2O gives yellowish green shades while that contg. Na gives shades of brown, the coloring varying with the compn. of the glass, often near the softening temp. Glasses contg. Cu and Fe scarcely seem to be affected by the Ra ray. Ni and Co glasses, on the contrary, are changed in a very perceptible manner. C. W. OWINGS

The making of mirrors by the deposition of metal on glass. ANON. *Bur. Standards Circ.* No. 389, 17 pp.(1931).—This publication supersedes Letter Circ. No. 32 and deals principally with the methods for producing mirrors by the chem. decompn. of Ag on glass. The Brashear, Rochelle salt, and formaldehyde formulas are given, also a detailed discussion of the precautions necessary to avoid danger, and the technic necessary to obtain the most satisfactory results. Reflecting films are produced on glass by the chem. decompn. of Cu, Pt or PbS, by cathode sputtering and by condensation of vaporized metals. W. H. BOYNTON

Preparation of mirrors by sputtering metals on to glass surfaces. A. C. G. BEACH. *J. Sci. Instruments* **7**, 193–5(1930).—Exptl. details are given for the prepn. of mirrors of Ag and Ni by sputtering. B. C. A.

Specifications for tank blocks. W. J. REES. *J. Soc. Glass Tech.* **14**, 124–30P (1930). See *C. A.* **25**, 1051. H. F. K

The corrosion of tank blocks by opal glasses. C. J. UHRMANN AND S. M. SLATER. *J. Am. Ceram. Soc.* **13**, 931–4(1930).—More opacifier must be used in batches for day tanks than for closed pots. The glass used was: SiO_2 65, B_2O_3 1.5, Al_2O_3 5.5, CaO 11.5, K_2O 6.5 and Na_2O 10.0%. During a tank failure a fluid of lower viscosity ran out before the glass came through. A similar vitreous substance was found between the glass and the bottom block. Apparently certain of the corrosive ingredients melt out first and percolate through the batch to the bottom. Cooling the blocks and filling in 3 sep. charges decreased block stones and increased tank life. C. H. KERR

Mechanical handling of raw and manufactured material under the conditions obtained in glass works. T. E. DIMBLEBY. *J Soc. Glass Tech.* **14**, 263-75T(1930). H. F. K.

Some experiments on the cascade method of melting glass. T. C. MOORSHEAD AND E. A. COAD-PRYOR. *J. Soc. Glass Tech.* **14**, 249–60T(1930). H. F. K.

Efficiency of tank furnaces for glass melting. Proposals for the standardization of its nomenclature and methods for its measurement. W. FRIEDMANN. *J Soc. Glass Tech.* **14**, 91–102P(1930). H. F. K

Notes on the effect of load on the fuel consumption of a glass tank furnace. E. A. COAD-PRYOR. *J. Soc Glass Tech.* **14**, 88–90P(1930).—For each 10% increase in the load over a range of 10–100% the increase in the fuel consumption was about 1.9%. H. F. K.

Effect of factory organization and size of pots on the production from pot furnaces. W. W. WARREN. *J. Soc. Glass Tech.* **14** 103–6P(1930). H. F. K.

Manufacture of working life of glasshouse pots. O. BARTSCH. *J. Soc. Glass Tech.* **14**, 107–18P(1930).—A comparison of pots contg the siliceous clays like the Grossalmerode clay and those of higher Al_2O_3 content like the Rakonitz clay showed the siliceous bodies to have higher expansion up to 800°, lower contraction after 1400°, less resistance to thermal shock at temps. below 600°, a higher softening temp. but a lower temp. of complete collapse, and a lower resistance to glass corrosion, though the glass produced was of better quality than that in the more aluminous pots. H. F. K.

Manufacture of glasshouse pots in England. G. V. EVERS. *J Soc. Glass Tech* **14**, 119–23P(1930).—Very good results are obtained with the Old Mine Stourbridge fireclay which contains up to 72% SiO_2 (ignited basis) and about 25% grog of the same material. H. F. K.

Contribution of technical education to ceramic progress. EDWARD ORTON, JR *Trans Ceram. Soc.* 29, 415–36(1930). H. F. K.

Color changes in pastes. G. MILANI *Corriere ceram.* **11**, 453–7(1930).—The color changes are generally due to Fe, Ti, and V. Under oxidizing conditions the color caused by the Fe may vary from yellow to brown, depending on the amount of Ca present. S in the fuel reduces the decoloring power of the Ca; the S combines with the Ca with the formation of white and yellowish colored spots. Sol. salts tend to conc. on the surface during drying, where they cause stains of insol. sulfates by taking up the S from the gases of combustion R. D. BUMBACHER

Shaft furnaces for calcining clays and silica. ALBERT HIRT. *Ceramique* **33**, 272–80(1930). A. J. MONACK

Thermal expansion of silica bricks. BERNARD LONG. *Ceramique* **33**, 268–72 (1930).—The results are expressed graphically. A. J. MONACK

The influence of atmosphere on the load-bearing capacities of fire bricks. S. C. H SWALLOW. *Refractories J.* 6, 85–94(1930).—Load tests were made on specimens from 5 types of fire bricks. All samples showed increased deformation rates in a reducing atm. The effect was greatest on samples with a high Fe content. A change from re-

ducing back to oxidizing conditions restored the original rate of deformation. The effect of steam was negligible. M. A. EDDY

Comparative effects of glass batch, cullet, soda and sulfate on fireclay bricks. P. P. BUDNIKOV. *Feuerfest* **5**, 181–3(1929).—Ten bricks of Russian manuf. of the type used for the bottom and sides of glass tanks were studied. The chem. compn., the refractoriness under load, and the porosity were detd.; the chem. resistance was studied on small cubes in which circular cavities had been bored. The cavities were filled with the reagents, and the specimens were then heated in an elec. furnace and held at 1430° for 2 hrs. The glass-batch mixt. was slightly more active than the cullet, but in neither case was corrosion very marked. The sulfate showed the most corrosive action, especially in the presence of C, since the Na_2S formed reacted vigorously with the refractory material. Soda also proved a powerful corrosive. In every case the degree of corrosion was dependent on the porosity of the material. B. C. A.

Progress in klinker (brick) construction in South Germany. A. LANG. *Ziegelwelt* **61**, 511–4(1930). H. F. K.

German klinker. W. ANGUS MCINTYRE. *Trans. Ceram. Soc.* **29**, 472–6(1930).—German plant processes in the manuf. of "Klinker" are described. The term covers a no. of hard-burned, all-clay bricks, with a variety of colors, produced by maintaining alternately oxidizing and reducing atms. in the kiln. H. F. K.

Factors in the manufacture of porcelain. MARC LARCHEVÊQUE. *Ceramique* **33**, 221–4(1930). A. J. MONACK

Manufacture of roof tile. MILDE. *Ziegelwelt* **61**, 545–8(1930). H. F. K.

Roof tile continuous drier with a horizontal alternating draft. E. GROSZKINSKY. *Ziegelwelt* **61**, 560–1(1930). H. F. K.

Artificial kaolin. JAROSLAV MILBAUER. *Chem Obzor* **5**, 236(1930).—From chem. analysis, checked by x-ray spectrographic tests, the so-called "artificial kaolin" was found to be a waste from the chem. treatment of bauxites by alk. process. It contains only 20% SiO_2 and is apparently an amorphous mixt. of $Al(OH)_3$ and SiO_2. J. K.

Influence of high temperature on Prosyanaya kaolin. V. V. YURGANOV AND M. V. ZUSMANOVICH. *Trans. Ceramic Research Inst.* (Moscow) **1929**, No. 21, 28–55(in German 56–7).—At a burning temp. of 880° reagents cause no changes in kaolin differing from those caused in similar materials. At this temp. kaolinic acid anhydride (metakaolin) apparently exists. At 980° kaolinite decomposes into free SiO_2 and the difficultly sol. form of clay and shows the first sign of formation of one or more Al silicates. At 1050–1100° there is little change except further combination of free SiO_2 and Al_2O_3. No sillimanite was found. At 1200° the difficultly sol. residue increases: it has the compn. $5Al_2O_3.4SiO_2$. At 1320° the ratio is $Al_2O_3:SiO_2 = 2.70:2$, or $4Al_2O_3.3SiO_2$. Kaolin burned at 1400° shows some crystals when examd. in thin layers, increasing at 1470°. At 1400° and above, $Al_2O_3:SiO_2 = 3:2$ (approx.). E. M. SYMMES

Ceramic investigations of Tshasoff-Jar clays. K. KÖHLER. *Trans. Ceramic Research Inst.* (Moscow) **1929**, No. 20, 88–150(in German 187–92).—Great care was taken to obtain a representative sample from agitated slime. Improper expulsion of free and combined water is discussed, and examples and tables are given. Plasticity is detd. by a method based on the Brongiart principle. Tensile strength is shown in tables. Bonding value is detd. by a special app. Clays are grouped according to rate of drying. Total shrinkage was detd. at 400–1410° and plotted in curves. Porosity was detd. on samples burned at the above temps. and shown in curves. The character of porosity was detd. by microstructure, sp. gr. and wt. *vs.* vol. Up to 900° the samples have the same porosity as before burning; above 900° secondary pores form, increasing in no. and size with temp. rise. At 900° there are mainly open pores, but above this temp. there is sintering. At 1200° the clay is completely sintered, the secondary pores closing. Above this temp. the gas trapped in the pores enlarges them. Refractoriness was detd. by comparison with Seger cones. A rational classification of clays is proposed. E. M. SYMMES

Use in the ceramic industry of the sandy Tshasoff-Jar clay called "Balyki." P. N. KAVOKIN. *Trans. Ceramic Research Inst.* (Moscow) **1929**, No. 20, 172–81(in German 194–5).—"Balyki" is a sandy clay, removed as overburden and discarded hitherto. Two samples fired at 1250° showed a total shrinkage of 7–10%, water absorption 1.12%, porosity up to 2.3%. Such clays can be used to make stoneware. About 60–65% of fireclay can be added to them, then fired at 1200° to make fire brick having 4% total shrinkage. Repeated firing causes no after-shrinkage. Resistance to abrupt temp. change is satisfactory. Water absorption is only 5%, and tensile strength 400–500 kg./sq. cm. A table shows deformation under load. Such bricks will not withstand furnace temp. above 1200°. E. M. SYMMES

Feldspar. I. J. FAIRCHILD, GEORGE K. BURGESS AND R. P. LAMONT. *Bur. Standards Commercial Standard C S* 23–30, 18 pp.(1930).—Classification is based on particle size and chem. compn. Chem. classification is in 3 groups: (1) includes ceramic grades based on percentage of SiO_2 and alkali ratio, and contg. less than 4% Na_2O; (2) includes spars used for glazing, based on percentage of Na_2O, and contg. 4% or more Na_2O; (3) includes spars used for glass making, based on SiO_2, Al_2O_3 and Fe contents. Tables are given with grades and specifications. Standard methods of phys. and chem. tests are given in detail. Chem. methods include analysis for SiO_2, "R_2O_3," Al_2O_3, Fe_2O_3, CaO, MgO, K_2O, Na_2O and ignition loss. Acceptors of this standard are listed. The effective date for production under this classification is Sept. 1, 1930.
ALICE W. EPPERSON

Ceramic bodies described according to their mineral compositions and as silicates. JOSEF WOLF. *Sprechsaal* 63, 929–31(1930).—A supplement to similar work by W. appearing in *C. A.* 22, 852. C. H. LORIG

Refractory materials for electric furnaces. I. The melting of lead and its alloys. ALFRED B. SEARLE. *Metal. Ind.* (London) 38, 3–4(1931).—The max. temp. attained in an elec. furnace when melting Pb or Pb alloys is about 1000°, and generally much lower. Elec. furnaces are the most suitable for melting this class of alloys. The properties of various refractory bricks are outlined. Magnesia brick is suitable for parts of a Pb furnace in contact with slag. For most induction furnaces dead-burned magnesia is best with pitch or colloidal MgO as binding material. A melted mixt. of PbO and clay applied as a paste affords protection to the refractories in high-frequency furnaces for these fusible alloys. Silica bricks are used in the roofs. Most refractory materials are good conductors of electricity at red heat; this often results in serious leakage of current and may cause a serious defect in the furnace. W. H. BOYNTON

The vitreous enameling of cast iron. J. H. D. BRADSHAW. *Foundry Trade J.* 44, 123–4, 129(1931); cf. *C. A.* 24, 2261.—A review. E. H.

The microscopic structure investigation in service in the enamel technic. FRITZ KRAZE AND VIKTOR LINDT. *Sprechsaal* 64, 1–4(1931).—Metallographic methods show defects appearing between the ground coat, cover coat and the iron. C. H. L.

Use of nepheline for enamels. A. I. ZHILIN. *Keram. i Steklo* 6, 485–8(1930).—Tests showed that nepheline from the Ural mountains can be used with success instead of feldspar in ground or white enamels. M. V. KONDOIDY

The effect of furnace gases on the quality of enamels for sheet steel. ANDREW I. ANDREWS AND EMANUEL A. HERTZELL. Univ. Ill. Eng. Expt. Sta., *Bull.* No. 214, 29 pp.(1930); cf. *C. A.* 24, 5957.—Small quantities of SO_2 such as are sometimes found in the atm. of industrial districts may be deleterious in enamel baking through its etching or pock-marking action. H. L. OLIN

Ashes and the remains of fuel found by the excavation of ruins of a seventeenth century glass factory near the Keizergracht at Amsterdam(KREULEN) 2.

Taschenbuch für Keramiker, 1931. Band I. Textband. FRITZ H. ZSCHACKE: **Glas.** H. J. KARMAUS: **Email.** 248 pp. **Band II. Alph. Führer durch der Keramik, Glas- und Emailindustrie mit Bezugsquellen.** 178 pp. Berlin: Verlag Keramische Rundschau. Linen, M. 4

Glass making. SOC. ANON. DES MANUFACTURES DES GLACES ET PRODUITS CHIM. DE SAINT-GOBAIN, CHAUNY & CIREY. Fr. 692,932, June 28, 1929. Means for controlling the temp. of app. used for rolling glass.

Apparatus for feeding mold charges of molten glass. EVERETT S. GREER (to Hazel-Atlas Glass Co.). U. S. 1,790,984, Feb. 3. Structural features.

Glass tank. KARL G. KUTCHKA. U. S. 1,790,820, Feb. 3.

Anchoring device for use in drawing sheet glass. ARTHUR E. SPINASSE. U. S 1,790,774, Feb. 3. Structural features.

Apparatus for making sheets of glass. MISSISSIPPI GLASS CO. Fr. 693,889, April 14, 1930.

Apparatus for rolling glass. CLAUDE LOCREILLE. Fr. 692,500, Mar. 21,1930.

Apparatus for annealing glass. SOC. ANON. DES MANUFACTURES DES GLACES ET PRODUITS CHIM. DE SAINT-GOBAIN, CHAUNY & CIREY. Fr. 692,971, July 5, 1929.

Treating frosted glass articles. ROWLAND D. SMITH (to Corning Glass Works). U. S. 1,791,066, Feb. 3. Articles such as lamp bulbs are washed in an aq. soln. of a simple Al salt of an aliphatic org. acid such as Al tartrate in order to prevent or lessen weakening. Cf. *C. A.* 24, 5124.

Wire glass production. GEORGE AURIEN (to Mississippi Glass Co.). U. S. 1,791,260, Feb. 3. Mech. features.

Apparatus for treating sheets of reënforced glass. DUPLATE CORP. Fr. 693,395, April 5, 1930.

Laminated glass. JAMES F. WALSH and JOHN H. STEVENS (to Celluloid Corp.). Can. 308,522, Feb. 10. 1931. Sheets of glass have interposed therein a pyroxylin sheet contg. cellulose nitrate having a N content of 10.5–11.5%, 35–50 parts of camphor to 100 parts of cellulose nitrate, urea, a residual solvent comprising volatile alc., and a coloring matter opposed to yellowness.

Safety glass. (MISS) M. SCHMIDT. Belg 371,936, Aug. 31, 1930. One or more sheets of cellulosic material are placed between two or more sheets of glass, without interposition of adhesive. The combined sheets are immersed into one or more baths which transform the surface of the cellulosic material into a film which can adhere to glass. The baths are composed of glycol monochlorohydrin, BuOAc, etc.

"Splinterless" glass sheets. JOHN JEFFRAY. Fr. 693,127, April 1, 1930. See Brit. 327,949(*C. A.* **24**, 5124).

Mixing clay and chamotte. W. LOTHES NACHFOLGER MAX STEPHAN. Ger. 515,171, Jan. 18, 1925. The chamotte is sprayed with water in a screw conveyor which delivers it to a wet mixer. The clay is fed to the mixer by another conveyor.

Bricks. ALFRED PAUL, JR. U. S. 1,791,372, Feb. 3. A highly porous light material such as volcanic ash is broken into small particles and 85–90% of this material is mixed with 15–10% of unslaked lime and water is added and the materials are agitated together in a closed space in which the steam generated is retained under pressure; the material is molded into bricks and the latter are subjected to the action of steam under pressure.

Piling brick for burning. ARTHUR J. THERRIEN (to National Brick Co). U. S 1,790,882, Feb. 3. Mech. and structural features.

Tile and similar products. DAVIS A. CABLE (to U. S. Quarry Tile Co.). U. S. 1,791,234, Feb. 3. A block of moist material is dried to beyond the plastic limit, trued and then burned. An arrangement of app. is described.

Ceramic vessels. MAX HAUSER. U. S. 1,790,918, Feb 3. Ceramic vessels of good toughness and heat cond. are made by shaping and firing a mixt. of a ceramic raw material and a Cr alloy such as ferro-Cr and Si.

Decorating ceramic objects. DEUTSCHE GOLD- UND SILBER-SCHEIDEANSTALT VORM. ROESSLER. Fr. 692,562, Mar. 22, 1930. Ceramic objects are decorated with Au, to which Ag, Cu or Bi may be added, the baking of the powder being effected in the presence of metals capable of increasing the resistance of the Au to the fire, such as Rh, Cr, U and like metals. Cf. *C. A.* **24**, 215.

Decorating pottery. DEUTSCHE GOLD- UND SILBER SCHEIDEANSTALT VORM. ROESSLER. Brit. 335,788, Nov. 9, 1928. The process of decorating described in Brit. 308,226 (*C. A.* **24**, 215) is modified by the use of ceramic enamel colors, and thus veins of a darker shade than the groundwork, or of variegated shades, can be produced. Various details and formulas of coloring compns. are given. Brit. 335,789 relates to the use of similar processes for coloring *metal* surfaces such as Al.

Apparatus for the continuous baking of ceramic products. FOURMENT ET LADURÉE (S. A. R. L.). Fr. 692,643, June 22, 1929.

Abrasive. BAKELITE CORP. Fr. 692,733, Mar. 25, 1930. An abrasive is made by mixing abrasive grains, a finely divided substance and a resinoid capable of being hardened. The mixt. is molded and heated until the resinoid hardens. Cf. *C. A.* **24**, 2569.

Abrasives. NORTON CO. Fr. 692,738, Mar. 25, 1930. An abrasive consists of a cryst. α-alumina free from non-aluminous impurities and β-alumina. Cf. *C. A.* **24**, 2854.

20—CEMENT AND OTHER BUILDING MATERIALS

J. C. WITT

Studies on calcium ferrites and iron cements. IV. SHOICHIRO NAGAI AND KATSUHIKO ASAOKA. *J. Soc. Chem. Ind., Japan* **33**, Suppl. binding, 256–7(1930); cf. *C. A.* **24**, 4605.—Analyses of mixts. of the 3-component system, SiO_2–Fe_2O_3–CaO, after heating at increasing temps. showed that Ca ferrite formed first, and later SiO_2 and CaO combined to $CaO \cdot SiO_2$ and then to $2CaO \cdot SiO_2$ and $3CaO \cdot SiO_2$. V. *Ibid* 312–5.—The combination in Fe cements is hardly completed at 1450–1500°, which is higher than the sintering temps. of ordinary portland cement mixts. and nearly 100–

150° higher than those of Kuehlzement raw mixt. Compression tests on the synthetic mixts. used in these expts. show somewhat smaller strengths than those of ordinary and special portland cements owing to the large contents of $2CaO \cdot Fe_2O_3$ and small contents of $3CaO \cdot SiO_2$. H. G. PARISH

Examination of road material with small samples. R. GRENGG. *Mikrochemie* [N. S.], **2**, 281–92(1930).—At the Technische Hochschule at Vienna it has sometimes been desirable to test small samples of materials used in road construction or of the pavement itself. In this paper some interesting information is given concerning grain size after pulverizing, and 2 instruments are shown: a ram for prepg. and testing small samples and a machine for testing small samples under pressure and under bending strain. W. T. H.

Report of Committee XVII on wood preservation. F. C. SHEPHERD, *et al.* *Proc Am. Ry. Eng. Assoc.* 1930, 659–770.—*Revision of manual.*—Tables prepd. by the Bureau of Standards for correcting the vol. and sp. gr. of creosote oils for different temps. are presented for adoption as standard. *Definitions* used in wood preservation: A final revision of the list of important terms in the industry is presented. *Service records.*—Data of completed service tests of ties, supplementing previous tables, are given; the annual table for tie renewals has been extended to include 27 railroads to 1928; reports on special test tracks on 7 large trunk lines are submitted. *Piling for marine construction.*—Progress reports of exposure tests of treated and untreated wood specimens for resistance against marine borers are submitted. *Creosote-petroleum treatments.*—Inspection of creosote-petroleum and zinc-petroleum ties on the Atchison, Topeka and Santa Fé R. R. is reported. *Termite destruction.*—An extensive report is given, with comprehensive bibliography, on termite injury to wood in railway structures and on methods of prevention. *Loss of preservative in treated ties due to oil-burning weed destroyers.*—Preliminary tests indicate very small loss from ordinary operation of such machines; no final conclusions are drawn. ALFRED L. KAMMERER

Report on work on protection of timber during the year 1929-30. GEORGE BARGER. Dept. Sci. Ind. Research, *11th (interim) Rept. Comm. Inst. Civil Eng.* Deterioration of Structures in Sea Water, 1930, 13–5; cf. *C. A.* **24**, 3876.—Several of the tests of treated timbers exposed to marine-borer attack at Colombo and Singapore have been completed, the remainder being still under observation. The conclusions to date are: Creosote to which D. M. (chlorodihydrophenarsazine) has been added shows no advantage over creosote alone; with the EtOH solns. of 4 arsenical compds. 2% (and in most cases 0.6%) of D. M. gives protection in the treated portions of the wood; with less active poisons and lower D. M. concns. there is serious attack; fuel oil as a vehicle yields unsatisfactory penetration; Pintsch gas tar gives excellent penetration and is suggested as a vehicle for toxics. ALFRED L. KAMMERER

Impregnation of the ninth series of timber test pieces for exposure at Kilindini and Mauritius and experiments on the impregnation of incised timber. S. M. DIXON. Dept. Sci. Ind. Research, *11th (interim) Rept. Comm. Inst. Civil Eng.* Deterioration of Structures in Sea Water, 1930, 16–8; cf. *C. A.* **24**, 3876.—Swedish fir blocks were treated with naphthalene alone and in various combinations with creosote by the Bethell process and exposed to borer attack at Kilindini and Mauritius. Tests with incising Oregon fir timbers to a depth of $^3/_4$ in. in staggered rows 1.5 in. apart center to center showed a very considerable increase in penetration of creosote with little reduction in strength. ALFRED L. KAMMERER

Termites and termite damage with preliminary recommendations for prevention and control. S. F. LIGHT, MERLE RANDALL AND FRANK G. WHITE. Calif Agr. Expt. Sta., *Circ.* **318**, 3–64(1930).—Coal-tar creosote or $ZnCl_2$ used thoroughly to impregnate wood will protect lumber, posts, ties, etc., effectively against termites. Cyanide fumigation is not a satisfactory control measure. *o*-Dichlorobenzene is fairly effective and does not constitute a fire hazard When a 10% soln. of Na_2HAsO_3 is liberally used on soil or in masonry foundations, termites are effectively controlled. A nontoxic ground treatment consists of a 10% soln. of $CuSO_4$ or $ZnCl_2$. C. R. FELLERS

Determination of Mg in portland cement (REDMOND, BRIGHT) **7.** Natural weathering and a comparison of chemical and natural weathering of building stones (KAISER) **8.** Improved asphalt extractor (STANTON) **22.** Kiln for preheating and clinkering of cement material (U S. pat. 1,791,165) **18.** Preserving wood, glue, etc. (Brit. pat. 335,527) **15.**

Cement and Concrete; A General Reference Book. Chicago: Portland Cement Assocn. 64 pp.

KNUCHEL, HERMANN: **Untersuchungen über den Einfluss der Fällzeit auf die Eigenschaften des Fichten- und Tannenholzes. Tl. I. Der Einfluss der Fällzeit auf einige physik. und gewerbl. Eigenschaften der Holzes.** Bern: Büchler. 127 pp. F. 5.

Cement. ARTHUR ANKER. Fr. 693,552, April 8, 1930. The crude materials used for making cement by heating to the commencement of fusion are stored for a certain time, with or without exposure to steam, in ripening silos heated or insulated from the cold.

Portland cement. THE ASSOCIATED PORTLAND CEMENT MANUFACTURERS, LTD. Fr. 693,206, Apr. 2, 1930. A white portland cement is obtained from colored raw materials by treating the cement during or immediately after the calcination and before the cement has cooled, with a reducing agent, after which the cement is rapidly cooled to a temp. preventing fresh oxidation. The reduction may be carried out by projecting finely divided coal on to the cement as it leaves the furnace or by emptying the red hot cement on to a surface covered with a film of paraffin.

Manufacture of artificial portland cement and similar products. R. POURBAIX. Belg. 371,579, Aug. 31, 1930. The paste or slurry to be burned is introduced at or near the top of the stack through which the gases from the kiln are discharged, so as to recover the heat of the gases and prep. the paste for the burning. Grates or perforated plates are provided in the stack to distribute the material uniformly.

High-alumina cement from phosphate rock and alunite. HERBERT H. MEYERS (to Armour Fertilizer Works). U. S. 1,791,103, Feb. 3. A mixt. of finely ground phosphate rock and finely ground alunite is calcined, and the calcined product is treated with NH_3, water and CO_2; the solid residue is sepd. from the soln., and the sepd. residue is burned to produce a cement of the high-alumina quick-hardening type. Cf. *C. A.* **24,** 5965.

Color composition for cementitious products. HERBERT E. BEDWELL. Can. 308,454, Feb. 10, 1931. A coloring compn. for cementitious material comprises 30 lb carbon black, 4 lb. Fe oxide and 100 lb. of water to form a paste capable of retaining the color suspended evenly throughout the mass. One lb. of oil of pine is preferably added.

Process for the regeneration of stones, marbles and concrete products. F. RICHIR. Belg. 371,673, Aug. 31, 1930. The material is impregnated with a metal fluosilicate contg. a slight excess of acid.

Apparatus for slaking the excess of lime in cement or clinker. ARTURO MALIGNANI and CAMILLO MALIGNANI. Ger. 514,474, April 3, 1928.

Rotary kiln for burning cement, ores, etc. LIONEL D. PARKER (to Vickers, Ltd.). U. S. 1,791,282, Feb. 3.

Concrete. VLADISLAV DYRYNK. Fr. 693,446, April 7, 1930. A silicate concrete is made by mixing a powd. basic silicate rock with a sol. glass and sand to make a mortar which is mixed with water and ground, and then broken stones or gravel are added.

Concrete grindstones for wood-pulp manufacture. F. RUHLEMANN. Brit. 335,521, June 21, 1929. The external temp. surrounding the stone is made equal to the internal temp. of the stone during its manuf. in order to avoid unequal stresses developing during the setting and hardening. Various details of manuf. are described.

Bituminous materials. ALUMINIUMERZ BERGBAU UND INDUSTRIE A.-G. Fr. 693,867, Apr. 14, 1930. Bituminous materials, particularly for roads, are made by incorporating finely divided bauxite with bitumen, etc. Other substances such as clay, schist, limestone or sand may also be added.

Road-surfacing material. SOUTH METROPOLITAN GAS CO., H. PICKARD and H. STANIER. Brit. 335,668, July 23, 1929. Coal, 1–10 lb., is dispersed in tar, 100 lb., (which may contain up to 10% of added pitch) at 250–300°, and 30–60% of dried and warm finely divided mineral matter is added and admixed.

Road-building aggregate. LESTER WITTENBERG (to Barrett Co.). U. S. 1,791,109, Feb. 3. Stone and bitumen are mixed while the bitumen is fluid and the stone has a temp. approx. equal to that at which the bitumen will set. An arrangement of app. is described.

Tar macadam. J. F. WAKE. Brit. 335,525, April 24, 1929. Aggregate is first coated with bituminous material and then with tar or a tar compn. comprising 20–75% of the total material in the 2 coatings, and a third coating of oil or low-viscosity tar also may be applied. The tar material used contains about 0.5% tar acids and 2% of naphthalene.

Roofing. G. F. JAULET and O. PARDOEN. Belg. 372,317, Aug. 31, 1930. Asbestos

is mixed and worked up with a vegetable oil together with a binder for the oxidizing substances, so that the asbestos fibers will be enveloped in completely hardened and oxidized oil.

Material suitable for shingles formed of cement and fibrous material. JOHN W. LEDEBOER (to Ambler Asbestos Shingle & Sheathing Co.). U. S. 1,790,822, Feb. 3. A material which may be formed mainly of cement and fibrous material is provided on its surface with a plurality of variably overlapping streaks comprising powdery coloring matter of different hues and cement irregularly distributed.

Drying stand for wood. OLOF ENGELBREKTSON. Ger. 515,459, Jan. 7, 1928.

21—FUELS, GAS, TAR AND COKE

A. C. FIELDNER AND ALDEN H. EMERY

Fuel utilization in 1930. Fuel Research Inst. *J. Fuel Soc. Japan* 10, 4–36(1931); English abstr. 1–6.—A review. F. I. NAKAMURA

The utilization of Brazilian fuel. FRÉDÉRIC W. FREISE. *Chaleur et ind.* 11, 320–6 (1930).—The utilization of coal, coal washing and briquetting, powdered coal, carbonization, manuf. of metallurgical coke, gas manuf., and low-temp. carbonization in Brazil are generally treated. Lignites, bituminous schists and peat in Brazil are briefly mentioned. Liquid and gaseous fuels are also briefly treated. A bibliography of 15 references is given. S. L. B. ETHERTON

Fuels and their combustion. ROGER MARTIN. *Chaleur et ind.* 10, 149, 206–12 (1929). S. L. B ETHERTON

Some factors affecting the problem of smoke prevention. W. E. GIBBS. *J. Inst. Fuel* 3, 361–8(1930).—A theoretical discussion of the formation of smoke and its elimination by (1) gravity sepn., (2) pptn. by centrifugal force, (3) washing and (4) electrostatic sepn. D. A. REYNOLDS

The relative merits of coal and oil in the mercantile marine. W. M. MEIJEN. *J. Inst. Fuel* 4, 54–8(1930).—A discussion. D. A. REYNOLDS

Fuel problems in the mercantile marine. STERRY B. FREEMAN. *J. Inst. Fuel* 4, 48–53(1930). D. A. REYNOLDS

Fuel problems in the mercantile marine. W. J. MULLER *J. Inst. Fuel* 4, 59–63 (1930). D. A. REYNOLDS

Diesel-engine developments. MAXIMILIAN GERCKE. *J. Inst. Fuel* 4, 16–20(1930). D. A. REYNOLDS

Two important physical properties of fuels pertaining to the formation of mixtures in carburetor engines. WAWRZINIOK. *Automobiltech. Z.* 33, 292–4, 317–8, 364–6, 408–10, 478–80(1930).—The suitability of fuel such as gasoline, benzene, alc., etc., and their mixts., for carburetor engines is detd. by the "evaporation no." which is obtained by exposing the fuel to a temp. of 45° and a pressure of 80 mm., adding the time (in min.) required to evap. 5, 10, 15, 20, 25–95% of fuel and dividing by the number of time readings, *i. e.*, by 19. An app. constructed for this detn. by the author is described in detail. A. A. BOEHTLINGK

The utilization of gas oil in motor trucks. A. GREBEL. *Chaleur et ind.* 11, 277–85, 333–43(1930).—G. gives an account of Chilowsky's app. for oil gas. This gas contains CO_2 4.8, CO 13.8, H_2 8.6, CH_4 9.1, C_2H_4 4.4 and N_2 59.3%, and the thermal yield is 70%. The gas is fed to a four-cylinder motor and its performance is analyzed. The prepn. of gas oil by "the chemical carburetor" is described with sketches and data, and a general summary is added. S. L. B. ETHERTON

Methane as motor fuel. J. BRONN. *Brennstoff-Chem.* 12, 27–9, 45–7(1931).—Uses for the large amts. of coke-oven gas which have been freed of H, etc., for various industrial purposes are discussed from practical and economic viewpoints. Direct use as fuel for internal-combustion engines is proposed; previous attempts thus to employ gaseous fuels are reviewed. The combustion of CH_4 and homologs is examd., and analytical data for the exhaust gases from fuel contg. 80% CH_4 are given. Several months' road test indicates that 0.85 cu. m. CH_4 = 1.0 l. C_6H_6, that the motor is not injured and that less lubricating oil is required. Cost data are given for the use of various types of steel cylinders and high-pressure piping from plants to population centers. F. W. JUNG

Recent experiments on the pyrolysis of methane. R. V. WHEELER AND W. L. WORD. *Fuel in Science & Practice* 9, 567–74(1930).—Addnl. exptl. work on the pyrolysis of CH_4 is described (cf. *C. A.* 24, 5715). Two types of expts. were made, (1) in which

CH_4 was heated in a quartz bulb of 60 cc. capacity at different temps., pressure changes being observed by manometer readings and (2) in which large vols. of CH_4 were passed through heated tubes of different materials, the products of decompn. being collected and analyzed. The rapid initial decompn. of CH_4 is chiefly a surface effect, but the decompn. does not proceed to an equil. state by surface reaction because of the formation of a protective layer of adsorbed H on the silica surface, which leads to a false state of equil. Fe has no effect on the decompn. of CH_4 but at higher temps. it has a marked catalytic effect on the pyrolysis. Tars and C_2H_4 are produced during CH_4 decompn.; hence the reaction is complex. When CH_4 is decompd. by prolonged heating, C and H are the principal products. As the duration of heating is decreased, more of the decompd. CH_4 is converted into higher hydrocarbons; for periods of heating of 0.3 sec. at 1050° in a silica tube, 84% of the decompd. CH_4 produced higher hydrocarbons. The shortest periods of heating favor the formation of mols. of 2 C atoms, whereas on increase in the duration of heating these diminish, and aromatic compds. are formed. C_3H_6 and C_3H_2 were not detected among the decompn. products. CH_4 flowing through an Fe tube was completely decompd. into its elements at comparatively low temps., yielding a C deposit quite different from that deposited in tubes of SiO_2 or chrome-Fe. D. A. REYNOLDS

Liquefaction of methane according to recent investigations. JOZEF DUBOIS. *Przemysl Chem.* 14, 302–9(1930).—This is a review dealing principally with liquefaction of methane and production of motor benzines. It contains numerous patent and periodical literature references. A. C. Z.

Purification of acetylene. S. KAKUTANI AND A. YAMADA. *Repts. Imp Ind. Research Inst., Osaka, Japan* 11, No. 11, 78 pp.(1930).—A review on the method of removing impurities such as PH_3, H_2S and NH_3 in acetylene and some exptl. data are given. F. I. NAKAMURA

Calculation of the heating value of solid fuels. F. SCHUSTER. *Glückauf* 67, 232–5 (1931).—Proposed formulas, based on proximate and ultimate analysis and on air required for combustion, are reviewed and tested on typical coals, the detd. heating values being known. Formulas based on air required and on the proximate analysis give only roughly approx. results. Vondracek's formula, $H_O = 81C + 342.5H + 22.5S - 36.6O$ Cal./kg., and that of S., $H_O = (254 + 0.355O)\ [C/3 + H - (O\text{-}S)/8]$ Cal./kg., gave results within 2% of the detd. value. The tests covered bituminous coals, brown coals, peat and wood. J. D. DAVIS

Softening of ash of solid fuel. H. A. J. PIETERS. *Chem. Weekblad* 27, 331–4 (1930).—A modified app. for detg. the softening point of ash is described, and a large no. of results are recorded. Three classes are distinguished, with softening temps., resp., below 1250°, and above 1250°, the 3rd class showing softening but not melting above 1250°. The relationship between softening temp. and chem. compn. is discussed. B. C. A.

Powdered fuel, with special reference to Lancashire boilers. H. J. HILL. *Trans. Inst. Mining Eng.* (London) 80, 158–79(1930–31).—The max. fineness possible is the aim in prepg. pulverized fuel; however, 75–85% through 200-mesh is the usual size used. Air-float anthracite dust burned more freely than dust from a pulverizer. A microscopic examn. showed that the dust from the pulverizer was rounded whereas the float dust was angular and hence exposed more surface during combustion. Present-day burners for boilers and furnaces are designed to obtain max. turbulence and in most cases the shortest possible length of flame. The operation of 2 Lancashire boilers has been entirely satisfactory. C. W. OWINGS

Pulverized fuel for the small unit-shell type boiler, metallurgical and chemical processes. H. W. HOLLANDS AND E. C. LOWNDES. *J. Inst. Fuel* 3, 225–30(1930).—Pulverized coal is compared to oil and gas as a fuel in cement plants, road-tar plants and for evapn. in the manuf. of NaOH. D. A. REYNOLDS

Tests of a Ljungström air preheater with a chain grate stoker. W. SCHULTES. *Glückauf* 66, 11–7(1930).—Comparative tests were made on a Babcock and Wilcox water tube boiler of 122 sq. m. heating surface with and without the air preheater (regenerative) which was located at the rear of the boiler in the flue-gas canal. The fuel used was low grade, being a 1:1 mixt. of fine coal and coal of a medium grade. The mixt. gave 14–27% ash, about 14% H_2O and 5400 to 5700 cal. Mech. imperfections of the preheater caused considerable trouble. The main advantages were increased capacity and easy kindling of the low-grade fuel. It did not enhance clinker trouble. The operation of the preheater was not interfered with by dust (ash) in the flue gas. Complete test data are given. J. D. DAVIS

Low-temperature carbonization and the production of electricity in Germany.

P. ROSIN. *J. Inst. Fuel* 3, 189–98(1930); cf. *C. A.* 24, 223.—A review is given of the present trend in Germany toward the coupling of carbonization plant, power station and gas works. D. A. REYNOLDS

The x-ray stereoscopic examination of coal. ARTHUR N. WILSON. *J. Inst. Fuel* 3, 433; 4, 64–5(1930); cf. *C. A.* 24, 5969 D. A. REYNOLDS

The history and present position of coal investigation by oxidation. W. FUCHS. *Fuel in Science & Practice* 9, 581–6(1930).—A review. D. A. REYNOLDS

Rational sampling of coal for chemical analysis. K. KLING AND J. PFANHAUSER. *Przemysl Chem.* 15, 12–6(1931).—Directions and care to be exercised in taking samples of coal from geologic deposits, cars, classifiers, storage, etc., are given, and the method of prepg. and cutting down the large sample is described in detail. A. C. ZACHLIN

Apparatus for sampling powdered coal. D. J. W. KREULEN. *Chem. Weekblad* 28, 66(1931).—Sampling of a carload of powd coal with a shovel is inaccurate. A sampler is described made up from a can. A small hole in the bottom makes it possible to see if the can is full. E. SCHOTTE

Constant factors for the calculation of the calorific value of Cape Breton coals from proximate analysis data. J. L BOWLBY. *Trans. Can. Inst. Mining Met.* 32, 469–90 (1929).—A comparison of various formulas. The expression preferred is $Vx + 145.5C + 40.5S$ = B. t. u per lb., where V is the volatile matter, C the fixed C and S the S percentage, and x is an arbitrary const. depending on the colliery. B. C. A.

Apparatus for determining the tendency of coal and other materials toward spontaneous combustion. D. J. W. KREULEN. *Chem. Weekblad* 27, 690–4(1930).—See *C. A.* 25, 394. E. SCHOTTE

Determination of the expansion pressure of coal. H. NEDELMANN. *Brennstoff-Chem.* 12, 42–3(1931).—The app. of Baum and Heuser (cf. *Glückauf* 66, 1497–1502, 1538–44(1930)) has been improved to include hydraulic pressure measurement and other simplifications in recording, etc. The importance of coal moisture content, particle size and uniformity in filling the apparatus is stressed. Data are given to show the duplicability of results in tests. F. W. JUNG

The washing of coal on the Hoyois washer. ARTHUR GROUNDS. *Fuel Economist* 5, 561–4, 665–9(1930).—The Hoyois washer is based on a combination of the trough washer and the upward-current classifier. LESLIE B. BRAGG

Incombustibles in coal and slag formation. REINHARD SCHULZE. *Die Warme* 54, 81–5(1931).—Results of expts. are presented which indicate that in spite of practically the same ash content and heating value of the fuel, the combustion characteristics and especially the slag formation in large measure depend on the mineral chem. compn of the incombustible matter and on the particle size, d. and reaction velocity as well as on the kind of atm. in the burning charge. Greater Fe_2O_3 and CaO contents lower the slag m. p. of the fuel with the simultaneous presence of a mixed atm. and lead to the formation of a vitreous pasty slag. Coke in coarse granules can be burned without difficulty with a high output, while in smaller granules the same coke is almost unserviceable. ALLEN S. SMITH

Calorimetric investigations of slag. A I. KORELIN. *Izvestiya Teplotekh. Inst* (*Trans. Thermo-Tech. Inst. Russia*) 1930, No. 1, 22–8.—Calorimetric investigations of slag can be carried out in a bomb; a minimum of 15% of combustible material is required for an accurate detn. The combustion should be effected with an admixt. of an air-dry material low in ash and sulfur. Such material may be hard coal, anthracite, coke or wood charcoal. The bomb should be charged up to 40 atm. with O, and the slag should be moistened with mineral oil, crude oil, fuel oil, etc. Combustion in the presence of a mixt. of benzoic and salicylic acids or sugar generally does not give satisfactory results. The presence of some inorg. compds., such as a high percentage of carbonates, may affect the combustion values considerably. When burning a mixt. of slag and coal in the calorimeter, an excessive rise in temp. should be avoided. This would require a large amount of charging material, while working with small amounts produces sufficiently accurate results. A. A. BOEHTLINGK

Petrographic investigation of bituminous coal briquets. H. BODE. *Brennstoff-Chem.* 11, 476–8(1930); 12, 7–9(1931).—The briquetting of fine coals is discussed from the viewpoint of constitution, *i. e.*, the durain, vitrain and fusain contents. Briquets were made (*a*) from equal mixts. of high-volatile and low-volatile coals of various particle sizes, and (*b*) from a mixt. of the high-volatile and a pressed, low-volatile coal; the same amount of pitch was used in each case. Abrasion tests, as detd. in a tumbler, gave 22.5% of < 3 mm. size for the first mixt. and 15.5% of > 5 mm. size for the second. The effect of fusain content upon the pitch required is discussed at length, a contrast being noted with its effect upon the briquetting of brown coal. Distinction in fusain

effect is made for particle size, < 0.12 mm. requiring an unnecessarily greater amount of binder pitch. Air cleaning does not satisfactorily reduce fusain content by removing undesired dust. For the various coal-particle sizes of > 5 mm. to 0.088 mm. for the three coals used, analytical screen data are tabulated for fusain, vitrain, durain and mineral matter to demonstrate the increasing contents of the first two with increasing fineness. Magnified sections show the distribution of the aggregate in the briquets made. F. W. JUNG

Studies in the development of Dakota lignite. IV. Critical oxidation temperature of lignite. W. C. EATON, G. A. BRADY, A. W. GAUGER, IRVIN LAVINE AND C. A. MANN. *Ind. Eng. Chem.* **23**, 87–93(1931).—The authors describe a method used in the detn. of the CO_2 index and "critical oxidation temp." (C. O. T.) of lignite. The results of the expts. indicate: (1) in a comparison of lignite with other coals, an increase in indexes and C. O. T. with the rank of the coal; (2) a decrease in index and C. O. T. with a decrease in the water content of lignite; (3) a decrease in C. O. T. and an increase in index with decrease in particle size; (4) an increase in C. O. T. and index as gases are changed from O_2 to air, to N_2 and to no gas; (5) a decrease in both index and C. O. T. with increase in gas flow; (6) 80° to 90° as the temp. at which, under the conditions used, dry lignite begins to self-heat sufficiently to burn spontaneously; (7) no greater change in index and C. O. T. after processing by the Fleissner method than would be expected. M. C. ROGERS

Carbonizing and briquetting Saskatchewan lignite. W. G HEPTINSTALL. *Trans. Can. Inst. Mining Met.* **32**, 395–404(1929).—A detailed description of the use of the Lurgi process for lignite contg. 30% of moisture. B. C. A.

Fusain. S. W. PARR, H C. HOPKINS AND D. R. MITCHELL *Ind Eng. Chem., Anal. Ed.* **3**, 64 5(1931).—The modes of occurrence of fusain in Illinois coals are described. In selected lumps of freshly mined Ill. coals 2 kinds of fusain, "hard" and "soft," were noted. Proximate analyses on moisture-free basis of 11 samples of fusain from 3 different beds of Ill. coal and of face samples of coal from the same mines, and calcd. values for "unit volatile matter" of the fusains are tabulated. The most striking feature noted was the fairly consistent character, especially in B. t. u. values, of the fusain from all parts of the state. The high porosity of fusain was shown by its air-drying to 0.5–2% moisture, while coals from the same beds retained 2–6% moisture. This porosity of fusain accounts for the large absorption of water by some bituminous coals even though they do not slack. The av. "unit volatile matter" for the fusain was 20.44, which would appear to refute completely the forest-fire theory of its formation. W. W. HODGE

X-ray study of vitrains. C. MAHADEVAN. *Indian J. Physics* **5**, 525–41(1930), *Fuel in Science & Practice* **9**, 574–80; cf. *C. A.* **24**, 5982.—Paleozoic and Tertiary vitrains of varying compn. were examd. by x-ray diffraction methods. The halo spacings for the former were 3.37 A. U. for the inner and 2.12 A. U. for the outer halo. For the latter, the values 3.50 A. U. and 2.21 A. U. were obtained. The intensity of general scattering between the direct spot and the halos depends somewhat on the moisture content and volatile matter of the vitrains. A calcn. of the size of the diffracting particles indicates that they are of colloidal dimensions and that the mineral matter present is in a colloidal state. MALCOLM DOLE

Natural gas in 1929. G. R. HOPKINS AND H. BACKUS. Bur. of Mines, *Mineral Resources of the U. S. 1929*, Pt. II, 319–40 (preprint No. 22, published February 3, 1931). E. H.

Progress in the gas industry in 1930. HAROLD E. COPP. *Gas Eng.* **48**, 79, 80 (1931). E. H.

The manufactured-gas industry: its trend and problems. R. B. LECKIE. *Gas Age-Record* **66**, 546–51(1930).—A review. LESLIE B. BRAGG

The trends of the natural gas industry. WRIGHT L. FELT. *Gas Age-Record* **66**, 549 51, 558, 562, 595(1930).—A review. LESLIE B. BRAGG

Proposed table of standards for technical fuel gases. J. KRZYZKIEWICZ. *Przemysl Chem.* **14**, 345–53(1930).—The 2 sheets of this table are reproduced and discussed. The first sheet shows the principle on which the gases are classified with respect to their origin, group, kinds and varieties, methods of prepn., brief descriptions of the varieties of the gases, and limits of their heat values. The second sheet covers addnl. technical names of industrial gases. A. C. ZACHLIN

The utilization of town gas as a fuel in heat-treatment furnaces. C. M. WALTER. *J. Inst. Fuel* **3**, 408–18(1930). D. A. REYNOLDS

Instruments aid in operating gas producers economically. JAY S. MCCLIMON. *Steel* **87**, 15, 54, 56, 58(1930) LESLIE B. BRAGG

Up-to-date methods for purifying illuminating gas before delivery to the consumers. A. V. Sivolobov. *Izvestiya Teplotekh. Inst. (Trans. Thermo-Tech. Inst. Russia) (Repts. of the 5th All-Russian Thermo-Tech. Congress)* 1930, No. 3, 73–100.—A general description of known methods. A. A. Boehtlingk

The Feld processes for the extraction of ammonia and hydrogen sulfide from coal gas. A. Parker. *Gas Eng.* 47, 694–5(1930).—P. discusses briefly Feld's processes for removing H_2S and NH_3 from city gas. The first process, consisting in the oxidation of H_2S by SO_2, was not successful because of the slow rate of the reaction. In the second process $ZnSO_3$ (from ZnO and SO_2) was used to oxidize the H_2S; the products (ZnS, S and water) could be treated with SO_2 to form ZnS_2O_3 and the mixt. again used to treat the gas. This process was unsatisfactory because of side reactions. The third process involved the removal of both H_2S and NH_3 by reaction with $FeSO_4$ to form $(NH_4)_2SO_4$, and further treatment producing Fe polythionates which decompose in the presence of water and NH_3. The difficulties with the above processes resulted in the development of a process using NH_4 polythionates for removing H_2S and NH_3 simultaneously. Also in *Inst. Gas Eng., Communication* No. 19, 4–8(1930). M. C. Rogers

Determination of carbon monoxide in illuminating gas. Jozef Dubois. *Przemysl Chem.* 14, 313–8(1930).—From a crit. examn. of the common methods of analysis D. finds those using Cu salts to be the best suited. The acid soln. of Cu_2Cl_2 absorbs CO rapidly but incompletely, while the ammoniacal soln. absorbs it completely though slowly. The best results are obtained by combining the 2 kinds of absorptions, allowing the acid soln. to take up 80% of the total CO content and removing the remainder in the ammoniacal soln. The method consists in first shaking the sample 2 min. with each of 2 successive 10 cc. quantities of the acid reagent, and then for 2 min. with each of 3 successive 5 cc. portions of the ammoniacal reagent. A complete absorption of CO takes place. The Damiens reagent was adopted for a complete and rapid absorption of CO over Hg. Three cc. of the reagent is introduced into the Hg pipet and shaken lightly for 9–10 min. Methods of prepg. the solns. are given. A. C. Z.

Atomizing and wick odorizers for natural gas. Philip E. Beckman. *Gas Age-Record* 66, 859–64, 886(1930).—A Venturi-type atomizer and a wick odorizer for odorizing natural gas are described in detail. Considerable exptl. work led to the choice of the present types of app. Leslie B. Bragg

New aspects of the gum problem. W. L. Shively. *Gas Age-Record* 66, 577–8, 584(1930).—Gum troubles have recently been noted with coal gas in pilot needle valves and thermostats. The gum is carried to the point of deposition as suspended particles of very small size. Preventive measures have been successfully applied but differ for individual situations. Leslie B. Bragg

Gum formation in town gas. L. H. Sensicle. *Gas Eng.* 47, 625–7(1930).—Gum forms in small droplets; continuous impacts against pipe walls and fittings assist these to deposit and form large drops. Volatilization of the lighter components causes the gum to become less fluid with increase in time. Gum deposits on valves in meters and deteriorates meter leathers. It stops up orifices in burners. Causes of gum formation and requirements of effective inhibitors are discussed. M. C. Rogers

Flue-gas testing. H. D. Brasch. *Die Wärme* 54, 57–9(1931).—A mech. Orsat type of continuous flue-gas analyzer is described. The percentages of CO_2 and combustible gases are indicated and are recorded on a strip chart. Details of the construction of the instrument and of its installation are given. Allen S. Smith

Combustion temperature and flue-gas composition; their determination with regard to dissociation. Roman Selikin. *Die Wärme* 54, 51–3(1931).—A method of detg. the flue-gas compn. and combustion temp. of any gas mixt. by means of the chem. equil. const. is discussed. When the gas contains no CH_4, the calcns. are simple. If CH_4 is present, the method is applicable if the fact is taken into consideration that CH_4 is not stable at high temps., but dissociates into its constituents which burn to CO_2 and H_2O. The combustion of an illuminating gas with $^3/_4$ the theoretically required air is used as an example. Allen S. Smith

Determination of viscosity on small samples of tar. F. M. Potter and J. S. Sach. *Roads* 8, 231–2(1930).—The app. described by Mallison (*C. A.* 15, 1231) is shown to provide a rapid means of checking the viscosities of tars, and the precautions necessary to obtain consistent results are discussed. B. C. A.

The thermal decomposition of the low-temperature tar of Fushun coal. I. Tadashi Mizoshita. *Abstracts from Rept. Central Lab. S. Manchuria Ry. Co.* 1929, 33–5.—A yield of 13.5% anti-knock gasoline is obtained by cracking at 430° and 25–30 atm. V. F. Harrington

The utilization of high-temperature coal-tar pitch. I. Preparation of creosote-oil substitute from pitch. MUNENARI TANAKA, KIYOSHI MORIKAWE AND ISAO MORIKAWA. *Abstracts from Rept. Central Lab. S. Manchuria Ry. Co.* 1929, 29–32.—Gasoline-solvent naphtha mixts. (1 : 1) dissolve 46% of the pitch. This ext. mixed with creosote oil is used as a creosote-oil substitute. **II. The preparation of active carbon from the extraction residue of high-temperature pitch.** SUSUMU WATANABE. *Ibid* 32–3. Calcining with K_2SO_4 gives a C more active than any commercial product. V. F. HARRINGTON

The desulfurization of brown coal tar oils with brown coal low-temperature coke. C. STAEMMLER. *Brennstoff-Chem.* 12, 43–5(1931).—Methods proposed and developed during the past year are reviewed. Attempts were made to desulfurize a generator light oil of 0.46% S, its distillate of 0.42% S, and a "yellow" oil of 0.72% S, by distn. over dried coke of 3–4 mm. size in an electrically heated tube furnace. While the H_2S from S compds. decomposed at the higher temps. was removed completely, the S removed was consistently small with a max. of less than 40% of the total S. Distn. in a stream of air or H had no effect. Pretreatment of the coke with HCl did not effect removal of the S, but it discolored the distillate with colloidal matter. Pptn. of $CaCO_3$ in the coke increased the S removal to 50% but is not believed practical. F. W. J.

The agglutination of coal and the activation of its surface during coke formation, considered as two complementary phenomena. W. SWIETOSLAWSKI. *Fuel in Science & Practice* 9, 564–6(1930).—The necessity of thorough impregnation of an inert material with caking material if the agglutinating ingredients of the latter are to be used effectively is stressed. The formation of structured surfaces on the stable products of dry distn. is held to be a converse process to that of the production of well-cemented coke. D. A. REYNOLDS

A comparison of methods for testing the caking properties of coal. L. SLATER. *Fuel in Science & Practice* 9, 586–91(1930).—See *C. A.* 24, 3625. D. A. REYNOLDS

Coking a banded bituminous coal: the part played by each band. C. P. FINN. *Trans. Inst. Mining Eng.* (London) 80, 283–302(1931).—Exptl. results show that different samples of clarain, which forms the largest percentage of the banded ingredients present in coking slack, may vary considerably in their coking properties but yield a comparatively poor coke that is much fissured and breaks easily. Evidence available indicates that vitrain is proportionately more valuable than clarain in a coking slack. Durain appears to exert little effect. Fusain, although itself non-coking, has been shown to be valuable when uniformly admixed with the remainder of the coking slack in amts. $< 5\%$. An increase in the amt of fusain middlings does not have any beneficial effect, and there is an indication from the tests that their complete removal may be advantageous. The presence of free dirt is deleterious to the quality of the coke obtained. C. W. OWINGS

Production of low-sulfur coke in the Ekaterinov ore area. V. M. STAKHOVSKII AND R. M. IL'EVA-RATNER. *J. Chem. Ind* (Moscow) 6, 734–5(1929).—Crushed coal from the Almaz vein graded on a 3-mm screen was found to show lower ash and S contents in the fines than in the coarse material. A. C. ZACHLIN

The dry cooling of coke. JENS RUDE. *Engineering* 130, 543–4(1930).—The thermal advantages of dry-cooling coke are outlined, and it is calcd. that the recoverable sensible heat is slightly less than 4% of the B. t. u. of the coke taken as 11,000 B. t. u. per lb. Section diagrams of the Sulzer dry coke-cooling plant are given. In this process inert combustion gases circulate through the hot coke and to a steam generator all in a closed system. Cooling time varies from 3.5 -4 hrs. for a large capacity plant to 1.5 hrs. for small gas works where the car of coke (1.5 tons) is wheeled directly into the cooling chamber. The essential features of the Collin dry-cooling plant are also outlined. The advantages of dry coke-cooling are: better quality coke, no water to evap. when the coke is burned, a smaller amt. of fines and breeze and recovery of the sensible heat of the coke. The chief objection is the high cost for a plant of the large dimensions required because of the comparatively low temp. gradients existing throughout the process. A set of curves is given showing the relative heat-transfer rates from coke to boiler water. Apparently a saving of approx. $^1/_3$ in the cost of the plant could be secured by cooling the coke to only 450–500°, but some 20% less steam would be produced than by cooling to about 300° as is now done. Two systems using steam (*C. A.* 24, 5466) in place of the inert gases are outlined and their relative advantages discussed. W. W. HODGE

Determination of volatile matter in coke. A. P. SHAKHNO AND M. D. ZHUKOVSKAYA. *Izvestiya Teplotekh. Inst.* (*Trans. Thermo-Tech. Inst. Russia*) 1930, No. 2, 17–26; cf. *C. A.* 24, 1721.—Results obtained by the use of alc., gas and elec. heating equipment are compared. A. A. BOEHTLINGK

The use of anhydrite (calcium sulfate) in the production of ammonium sulfate. P. PARRISH. *Gas Eng.* **47**, 695–6(1930); cf. *C. A.* **22**, 4768.—P. discusses the production of $(NH_4)_2SO_4$ by the action of $(NH_4)_2CO_3$ on $CaSO_4$. The carbonation and reaction with $CaSO_4$ must be carried out in sep. vessels. This increases the reaction rate and prevents side reactions. Four vessels in series are required. Also in *Inst. Gas Eng., Communication* No. 19, 9–24(1930). M. C. ROGERS

Rapid method for determination of benzene and phenol in ammoniacal and waste liquors. W. MÜNZ. *Brennstoff-Chem.* **12**, 3–4(1931).—To det. C_6H_6, pass upward through a vertical tube, 30 cm. long and 5 cm. in diam., contg. 100–150 g. activated charcoal, 10 l. of the liquor to be tested, in 1 hour's time. Drain the charcoal, recover the C_6H_6 by means of superheated steam by the method of Kattwinkel (cf. *C. A.* **24**, 1252) and det. to 200° by the usual procedure. This method is accurate only up to a charcoal absorption of 15% C_6H_6 by wt. To det. PhOH measure into a 250-cc. distn. flask 25 cc. of the filtered liquor. Add ammoniacal $CuSO_4$ soln. (prepd. by adding concd NH_4OH in excess to cold satd. $CuSO_4$ soln.) in excess of pptn. and then 5 cc. 40% NaOH soln. Boil over a free flame with shaking until NH_3 vapors are no longer evident, connect the flask to a condenser and pass CO_2 through the soln. at the rate of 2–3 bubbles per sec. The neutralization should be complete after some 5 min. Distil to dryness with a slow stream of CO_2. Rinse the condenser, adapter, etc., into the 250-cc. volumetric flask used as receiver and make up the distillate to vol. For titration, 25 or 50 cc of this is used in the case of NH_3 liquors, but with waste liquors the whole may be necessary. To this in a stoppered Erlenmeyer flask add 25 cc. of 0.1 *N* KBr-KBrO$_3$ soln. and then 15 cc. 15% H_2SO_4. After $^1/_2$ hr. add 10 cc. of 10% KI soln., let stand $^1/_4$ hr., and titrate the excess, using starch indicator, with 0.1 *N* $Na_2S_2O_3$ soln.

F. W. JUNG

The selection of coke for foundry purposes (HUPPERT) **9**. Ashes and the remains of fuel found by the excavation of ruins of a seventeenth century glass factory near the Keizergracht at Amsterdam (KREULEN) **2**. Colorimetric determination of the sulfate ion in coal (GUARNIERI) **7**. Geological aspects of the formation of coal (FOX) **8**. Development of Dakota lignite (HARRIS, *et al.*) **8**. Alkali ferrocyanides [preparation during extraction of HCN from coal gas by washing] (Fr. pat. 692,868) **18**. Separating gases by liquefaction (Brit. pat. 335,599) **13**.

RIEGER, FLORIAN: **Die Kohle, ihre Entstehung und ihre Verwertung.** Prachatice: Schramm. 15 pp. Kč. 3.

Fuel briquets. H. J. M. WASTEELS. Belg. 371,152, July 31, 1930. The coal is placed in iron or steel molds which are then placed in the distg. retorts. After distn. the balls, briquets or blocks of coke are demolded.

Fuel briquets. LUDWIG WEBER. U. S. 1,791,077, Feb. 3. Particles to be briquetted such as fuels, ores or flue dust are mixed with very finely divided clay of great plasticity, and this mixt., before briquetting, is moistened with sulfite waste liquor.

Production of agglomerates without the addition of pitch. H. HARDY. Belg. 370,410, June 30, 1930. Coal or lignite is prepd. in a globular state with a view to soln. in solvents acting successively; *e. g.*, the globular coal is treated with heavy oils, solvent naphtha and benzene, either in the above or reverse order; the coal can be carbonized at low temp., to obtain a powdered fuel, or it can be first pressed to agglomerate it and then carbonized for the production of semi-coke. Cf. *C. A.* **24**, 4615.

Plant for the manufacture of smokeless fuel. COMPAGNIE DES MINES DE VICOIGNE NOEUX ET DROCOURT. Fr. 693,273, May 30, 1929.

Fuel for internal-combustion engines. JOHANN W. MICHEEL. Ger. 515,076, Jan. 9, 1929. Soot from solid, liquid or gaseous fuels is compressed into briquets and then finely ground.

Motor fuel. I. G. FARBENIND. A.-G. Fr. 692,594, Mar. 24, 1930. When starting liquid fuel of high vapor tension is fed to explosion motors by mech. pressure on spongy material contg. the fuel.

Gasifying wet bituminous fuels. HERMANN HILLEBRAND. U. S. 1,791,411, Feb. 3. Alternately operated regenerative chambers are heated by burning a portion of recirculated gas; a mixt. of recirculated gas and steam is superheated in one of the heated regenerative chambers and thence passed upwardly into a gasification zone of a fuel bed to form water gas; a portion of the water gas and recirculated gas is passed through a superposed distn. zone of the fuel bed, effecting distn. of gases and vapors from the fuel; another portion of the water gas and recirculated gas is passed in heat exchange

with the wet fuel and to a collecting main, and the distn. gases and vapors are recirculated through the regenerative chamber. App. is described.

Low-temperature carbonization of bituminous carbonaceous materials. I. G. FARBENIND. A.-G. Brit. 335,740, Sept. 30, 1929. In a process such as described in Brit. 301,975 (*C. A.* **23**, 4329) in which hot gases are blown through fuel so that it is maintained in active motion on the grate, to effect carbonization without combustion or gasification, impact devices are arranged over the fuel bed to limit the upward movement of the fuel. Various details of app. are described. Cf. *C. A.* **24**, 489.

Low-temperature carbonization of powdered fuel. F. L. DUFFIELD. Brit. 335,643, July 5, 1929. In the use of a horizontal retort using steam as the carrying medium, the retort is locally heated to a high temp., and steam is admitted tangentially to the heated surface. Various details of structure of the app. and of its operation are described.

Process and oven for the distillation or low-temperature carbonization of coal and other carbonaceous materials. C. HONNAY. Belg. 370,266, June 30, 1930. Constructional features.

Vertical retort for low-temperature carbonization of fuel. CHARLES TURNER. Ger. 515,388, Mar. 20, 1928. See Brit. 295,461 (*C. A.* **23**, 2276).

Distilling solid fuels. FRANK E. HOBSON. Ger. 515,386 and 515,387, Feb. 3, 1927. See Brit. 277,214 and 277,215 (*C. A.* **22**, 2455).

Distilling solid carbonaceous materials in oil. IMPERIAL CHEMICAL INDUSTRIES, LTD. Ger. 515,389, Oct. 28, 1928. See Brit. 305,744 (*C. A.* **23**, 5032-3).

Furnace for the low-temperature distillation of carbonaceous materials. CHARLES HONNAY. Fr. 693,038, Mar. 29, 1930.

Rotatable retorts for the low-temperature distillation of coal. THE CARBOCITE CO. Fr. 692,881, Mar. 28, 1930.

Apparatus for distilling coal for the production of coke. BABCOCK & WILCOX, LTD. Fr. 692,529, Mar. 21, 1930.

Apparatus for carbonizing comminuted coal and for enriching water gas with distillation products. EDWARD A. DIETERLE. U. S. 1,790,745, Feb. 3. Structural features.

Destructive hydrogenation of coals, tars, etc. N.-V. DE BATAAFSCHE PETROLEUM MAATSCHAPPIJ. Brit. 335,543, June 24, 1929. Various carbonaceous materials, which may be mixed with phenolic substances or like O-contg. compds. are first treated with CO or gases contg. CO at elevated temps. and preferably under pressure to effect removal of most of the O present, and are then subjected to a treatment with H. Water present in the initial material may react with the CO to form H and effect partial hydrogenation. Various details of procedure, catalysts used, etc., are given. Cf. *C. A.* **25**, 1362.

Purifying gas. HUMPHREYS & GLASGOW, LTD. Fr. 693,106, April 1, 1930. Gases are freed from S by bringing the gases into contact with a heated catalyst formed of ZnO with or without an activating agent, whereby the org. S compds. are decomposed forming H_2S which is eliminated. The undecomposed org. S compds. are removed by H_2SO_4. Cf. *C. A.* **24**, 1726.

Desulfurizing gases. RICHARD BRANDT. Ger. 514,666, Dec. 15, 1927. Addn. to 503,118. In removing H_2S from gases by means of $K_3Fe(CN)_6$ soln. which is regenerated as described in Ger. 503,118 (*C. A.* **24**, 4994), the desulfurizing soln. is used in a continuous cycle without filtering off the free S liberated from the gases, the cycle including a settling vessel in which the agglomerated portion of the originally colloidal S is sepd.

Dehydrating fuel gas. FREDERICK W. SPERR, JR. (to Koppers Co.). U. S. 1,791,086, Feb. 3. Gas such as coke-oven or water gas is compressed, cooled by direct contact with water at substantially atm. temp. so that a portion of the moisture carried by the gas is removed, and the compressed and cooled gas is then treated with a hygroscopic material such as $CaCl_2$ or H_2SO_4 for further removal of moisture. An arrangement of app. is described.

Gases containing hydrogen. I. G. FARBENIND. A.-G. Brit. 335,524, April 24, 1929. In the conversion of carbonaceous materials such as CH_4, coal distn. gases, tars, mineral oils, etc., into gases consisting mainly of H and CO or of these gases and N, by treatment with air, O or CO_2 (with or without steam) in an elec. arc furnace, devices such as narrow exit openings produce eddies which cause all parts of the gas mixt. to attain a temp. of at least 1400°. Various details of app. and procedure are described.

Oil gas. CONSTANTIN CHILOWSKY. Ger. 514,487, Mar. 25, 1926. See Fr. 679,107 (*C. A.* **24**, 3888).

Mixed oil gas and water gas. H. G. TERZIAN (to Humphreys & Glasgow, Ltd.). Brit. 335,495, July 11, 1929. In a process in which oil gas is passed through an ignited fuel bed and the deposited C is consumed in the water-gas reaction, steam is generated in the tar washer by the passage of hot oil gas, and the steam thus formed is used in the generator to form water gas. Various details of app. and procedure are described. Cf. *C. A.* **25**, 1063.

Water gas. HUMPHREYS & GLASGOW, LTD. Fr. 693,105, April 1, 1930. Water gas is made by passing steam upwardly through a mass of incandescent fuel from a point situated sufficiently above the base of the mass to leave an annullar zone of incandescent fuel. A part of the gas produced is raised through a superposed layer of fresh fuel to eliminate hydrocarbons, another part is passed into a carburetor where it is mixed with a hydrocarbon, and the mixt. is introduced at the center of the lower part of fresh fuel.

Water gas. POWER GAS CORPORATION, LTD., and NIELS E. RAMBUSH. Fr. 693,514, Apr. 8, 1930. Means is described for superheating the steam, which is passed alternatively in an ascending and in a descending direction through the fuel. Cf. *C. A.* **24**, 3888.

Water gas. HENRY O. LOEBELL (to Henry L. Doherty). U. S. 1,790,824, Feb. 3. Fuel is passed downwardly in an unobstructed column of circular cross section through a gas-generating zone in which high temps. are maintained by periodically blasting air in a substantially radial direction through incandescent fuel in the zone. Steam is passed through incandescent fuel in the high temp. zone during periods following the air blasting, and hot water gas thus formed is passed through fuel above the blast zone. App. is described. Cf. *C. A.* **25**, 582.

Apparatus for manufacture of water gas. HENRY O. LOEBELL (to Henry L. Doherty). U. S. 1,790,823, Feb. 3. Structural features.

Water-gas producer. SOC. ANON. LA CARBONITE. Fr. 693,289, July 8, 1929.

Device permitting of the use of high-volatile or mixed high- and low-volatile coal fines in gas producers. E. DOHET. Belg. 370,238, June 30, 1930. A circular rotating plate is placed above the producer. The fuel is fed on to this plate and allowed to stay there sufficiently long to become agglomerated before it is fed into the producer. The gases given off from the coal while on the plate are mixed with the producer gas.

Apparatus for producing coal gas and water gas from coal dust. KARL MEITZLER. Ger. 514,486, Sept. 4, 1925.

Ovens for producing gas and coke. STETTINER CHAMOTTE-FABRIK A.-G. VORM. DIDIER. Ger. 515,385, Dec. 11, 1928. Constructional features are described.

"Waterless" gas holder. R. & J. DEMPSTER, LTD., J. W. SCOTT and WATERLESS GASHOLDER CO., LTD. Brit. 335,502, Feb. 15, 1930.

Purification and desulfurization of benzene. C. PETIT. Belg. 371,908, Aug. 31, 1930. The benzene vapors are bubbled through liquors such as H_2SO_4, NaOH or Na_2CO_3, which may be made to flow over the trays of a benzene-rectifying column or of a column placed after the rectifying column.

Storing acetylene. F. ROFFEY and IMPERIAL CHEMICAL INDUSTRIES, LTD. Brit. 335,820, Nov. 28, 1929. C_2H_2 is stored in cylinders or other containers contg. a solid absorbent material impregnated with an C_2H_2-solvent comprising a relatively non-volatile ether, ester or ether-ester of a polyhydric alc. such as glycol diethyl ether, glycerol triethyl ether, glycol diacetate, glycerol triacetate, β-ethoxyethyl acetate, β,γ-diethoxy-*n*-propyl acetate, glycol monoacetate, glycerol diacetate, glycol monoethyl ether and glycerol diethyl ether or mixts. of these. Before storing, the C_2H_2 is preferably dried, as by passing over $CaCl_2$ before and after compression. Some other suitable solvents are also mentioned.

Phenols. HUILES, GOUDRONS ET DÉRIVÉS and GEORGES SUPRIN. Fr. 693,734, July 22, 1929. Phenols obtained in phenolic oils and tars are extd. by solns. of alkali carbonates at a high temp. under pressure, means being provided to remove the CO_2 formed. This CO_2 is used for acidification of the phenolates obtained to reform carbonates.

Tar refining. JEAN H. BREGI (to Compagnie Technique des Petroles). U. S. 1,791,052, Feb. 3. See Fr. 689,294 (*C. A.* **25**, 1064).

Apparatus for distilling tar, oils, etc. COMPAGNIES RÉUNIES DE GAZ ET D'ÉLECTRICITÉ. Fr. 693,681, April 10, 1930.

Coking pitch. C. OTTO & Co. G. M. B. H. Ger. 514,478, Feb. 19, 1928. A finely

ground mixt. of pitch and pitch coke is coked in an oven of refractory material, the walls of which are coated with pitch coke to prevent penetration by the pitch.

Coke oven and door. CARL STILL. U. S. 1,790,775, Feb. 3. Structural features.

Method and plant for dry-cooling coke. WILHELM KLEISSER. Ger. 514,410, Nov. 18, 1925.

22—PETROLEUM, LUBRICANTS, ASPHALT AND WOOD PRODUCTS

W. F. FARAGHER

Municipal regulation of oil storage. ROBERT S. MOULTON. *Quart. Natl. Fire Protect. Assocn.* **24**, 255–76(1931).—A thorough review of the fire hazards of petroleum products and their control in cities, accompanied by a list of N. F. P. A. publications bearing on the subject. C. L. JONES

Catalytic reactions of sulfur compounds present in petroleum. I. High-sulfur naphthas in contact with nickel and iron catalysts. J. C. ELGIN, G. H. WILDER AND H. S. TAYLOR. *Ind. Eng. Chem.* **22**, 1284–90(1930).—Reduced Ni removed S from naphthas in both the liquid and the vapor states. The catalyst was most effective in its action upon the first of the naphtha vapor passed over it. Its activity then dropped off till a "steady state" was reached and its effect was almost const. for the remainder of the run. The S content of the naphthas was reduced still more if H_2 was passed with the naphtha vapor over the Ni. The action of reduced Fe was similar to that of Ni, but less pronounced. **II. Pure sulfur compounds in hydrocarbon materials in contact with nickel catalysts.** J. C. ELGIN. *Ibid* 1290–3.—Solns. of BuSH, iso-BuSH, Pr_2S, $(iso\text{-}Bu)_2S$ and thiophene in naphtha were passed in vapor form over reduced-Ni catalysts at 300°. The mercaptans readily decomposed, giving up S as H_2S. The sulfides reacted less readily. Thiophene was not affected after the catalyst had reached the steady state unless H_2 was passed with the naphtha vapor. Thiophene is formed in the thermal decompn. of mercaptans and sulfides; hence the removal of S from cracked naphthas is likely to be more difficult than from straight-run. EMMA E. CRANDAL

Refining of light petroleum distillates. H. P. RUE AND RALPH H. ESPACH. Bur. Mines, *Bull.* **333**, 111 pp.(1930).—Proper fractionation of the gasoline from a pressure distillate will decrease the amt. of chem. treatment necessary to make the gasoline meet trade requirements. To get the max. benefits of fractionation on the chem. treatment, a good degree of sepn. is necessary; there should be no overlaps in distn. range. In fractionation units, a reflux (closed-coil or open-spray) at the top of the bubble tower is necessary to control the top temp. When a closed-coil reflux is used, incoming charging stock may be preheated by pumping it through the coil. When an open-spray is used, the refluxing medium should be the material that is taken overhead as a vapor. The present methods of treating light distillates are described in detail. The influence of time, temp. and thoroughness of contact in treating with H_2SO_4 is considered. The effects of acid treatment on C deposits, distn. range, gravity and color are shown. The use of alkali is discussed. Studies with S and S compounds dissolved in gasoline are described. The effect of fractionation on color and gum formation is discussed. ALDEN H. EMERY

Refining cracked distillates. JACQUE C. MORRELL. *Natl. Petroleum News* **22**, No. 51, 61–6, No. 52, 49–54, No. 53, 46–8(1930); **23**, No. 1, 63–72, No. 2, 57–8, No. 3, 51, 54, 58, 60(1931).—The following are discussed: the desulfurization of cracked distillates by different methods; theory of gum formation; use of gum inhibitors for gasoline to be stored; H_2SO_4 treatment; split plumbite treatment; refining by sludge acid; recovery of spent chemicals at the refinery; acid and "doctor" soln.; rerunning acid-treated distillates; soap washes; vapor-phase treating; treatment of end point cracked distillates without rerunning; continuous treating plants; mixing devices; settling tanks and sepg. devices; gasoline treating plants; distn. equipment; operation of shell stills; operation of shell still rerun units; pipe still rerunning; operating precautions; chem. factors in distn.; future possibilities. R. W. KELLY

The occurrence of higher fatty acids in mineral oil distillates. E. HOLZMANN AND STANISLAUS VON PILAT. *Brennstoff-Chem.* **12**, 41–2(1931).—The cryst. material previously (cf. *C. A.* **25**, 584) sepd. from the phenol-free naphthenic-acid fraction of petroleum has been identified as higher fatty acids, although work by others indicated their absence in Polish oils. More of this material was prepd. from a Boryslav machine oil by dehydrating and distg. the acidified Na_2CO_3 washings to 235–40° at 12–15 mm. Hg in a

new Burstin-Winkler app., shown schematically, and sepg. the distillate into the acids, phenols and hydrocarbons. The first fraction yielded the fatty acids upon cooling. After removal by centrifuging, recrystn. from MeOH and then from acetone, white crystals were obtained. A mixed m. p. identified them as arachic acid. This characterization was confirmed by the neutralization no., the mol. wt. by m. p. depression and the elementary analysis. Additional fatty acids sepd. from the mother liquor as Li salts give a total of 0.0013% for the crude petroleum. They are being investigated further. F. W. JUNG

Present-day tendencies in oil-fuel burning. JOHN L. STREVENS. *Fuel Economist* 5, 569–72, 623–4(1930).—A review. LESLIE B. BRAGG

The value of ash determinations of mineral and fatty oils. W. SCHAEFER. *Seifensieder-Ztg.* 57, 878–9(1930).—The org. S in oils usually enters the ash on burning, indicating the presence of sulfates or sulfides in the oil. An extn. with H_2O or acid does not furnish evidence of the presence of these compds. P. ESCHER

Crystallization of paraffin wax. E. KATZ. *J. Inst. Petroleum Tech.* 16, 870–88 (1930).—The cryst. form of Polish and Asiatic wax crystd. from various solvents is shown by a microscopic study to be fundamentally a six-sided plate. Sixty-two photographs illustrate the variations of this form. L. W. T. CUMMINGS

Evaluation of anti-knock properties of fuels. L. AUER. *Automobiltech. Z.* 33, 538–9(1930).—A review. A. A. BOEHTLINGK

Velocity of propagation of flame and pressure wave: thermodynamic consideration of motors and the phenomenon of detonation. E. VARETON AND U. RE. *Ann. scuola ing. Padova* 4, 226–40(1928).—A review of the literature and of the work done, chiefly by American and English workers. S. L. B. ETHERTON

Experiments to determine velocities of flame propagation in a side-valve gasoline engine. H. S. GLYDE. *J. Inst. Petroleum Tech.* 16, 756–82(1930).—It is known that small head clearance in an explosion engine tends to reduce detonation and that differences of head clearance cause variations of turbulence. The possible relation of velocity of flame travel to head clearance and to turbulence forms the subject of this study. Measurements of the velocity of flame movement were taken in an engine with side-valve low-turbulence combustion chamber, and in 3 turbulent-type Ricardo engines with head clearances of 0.022, 0.084 and 0.272 in. Castings of the several combustion chambers used could be bolted down to a single cylinder block. Six sight holes in a straight line were made in the top of each combustion chamber and fitted with glass windows. A disk 16 in. in diam. revolved in a horizontal plane over the combustion chamber, on a vertical shaft connected with the ignition-timing shaft. Its radius was such that the line of holes cut in it from center to circumference would coincide with the line of openings into the combustion chamber. Its timing was adjustable by a screw. With the engine running, the usual readings of speed, torque, fuel consumption, ignition advance and jacket temps. were made at the same time as the observations through the stroboscopic disk. By the use of the adjusting screw, the time at which the flame passed each window could be known in terms of crankshaft degrees before or after the top dead center. Pressure-indicator diagrams were made. All runs were at 900 r. p. m. Max. velocity of the flame was reached in all cases within 7° and 10° after the top dead center. This was also the zone of max. rate of pressure rise. The smaller the head clearance, the more rapidly the velocity of the flame fell off after reaching it. This was attributed to the higher surface-vol. ratio, by which the flame was cooled and its travel impeded. The same cause raised the H. U. C. R. also. The mean velocities in the 4 heads were proportional to the rate of pressure rise, which is taken as the measure of turbulence. The max. velocities were nearly proportional, with the exception of that in Head No. 2. The velocity with which the flame spread from the spark to the first window was also proportional to the rate of pressure rise or turbulence. EMMA E. CRANDAL

Synthetic lubricating oils. A. W. NASH, H. M. STANLEY AND A. R. BOWEN. *J. Inst. Petroleum Tech.* 16, 830–69(1930).—Expts. are reported on the polymerization of C_2H_4 to light and heavy oils by heating in an autoclave at pressures up to 60 atm. Without a catalyst the polymerization occurred only above 325°. The temp. was lowered to 230–275° with $ZnCl_2$ as a catalyst and to 180° with $AlCl_3$, which was the principal catalyst studied. The product consisted of free oil (I) and hydrocarbon associated with the $AlCl_3$ (II). (I) contained from 10 to 45 C atoms and was of a satd. character, while (II) contained 10 to 50 C atoms per mol. and was unsatd. The products were distilled and some of the properties of the fractions reported: b. p., Br no., d., viscosity, and change of d. on oxidation. The heavier fractions had practically the

same characteristics as com. lubricants, except that they were more readily oxidizable. L. W. T. CUMMINGS

Recent examinations of friction and lubrication. J. E. SOUTHCOMBE. *Teknisk Ukeblad* **75**, 354–8(1928).—A review with subsequent discussion. C. A. ROBAK

About germ process oil. SVERRE LAUNY. *Teknisk Ukeblad* **75**, 388–9(1928).—A reply to Southcombe (see preceding abstract). Since the fatty acids which are used to make germ-process oil attack metals slightly with the formation of soaps, L. asks for more detailed information, particularly in regard to the variation of the coeff. of friction with time. C. A. ROBAK

The stability of germ-process oils. JAMES E. SOUTHCOMBE. *Teknisk Ukeblad* **75**, 507–8(1928).—A reply to Launy (cf. preceding abstr.). The fatty acids used for germ-process oil in amts. of about 0.7–1.0% are very pure, and accordingly have only a very small chem. activity. The standard test for germ oil is to heat 200 g. of oil to 80° for 36 hrs. in contact with steel plates. No change in color or wt. of the metal takes place. Comparative tests with germ oil and mineral oil carried out by heating both to 80° with Cu foil for 36 hrs., show that the wt. of the Cu foil is reduced a little more in germ oil than in pure mineral oil. The reduction is still higher in compound marine oil contg. rapeseed oil, which has been used extensively in ships for more than 25 years. C. A. ROBAK

The stability of germ oils. SVERRE LAUNY. *Teknisk Ukeblad* **76**, 10–1(1929).—A reply to Southcombe (cf. preceding abstr.). Even the tables given by Southcombe show that the addn. of "germ" to an oil always increases the corrosive action of the oil. The amt. of Cu dissolved was increased by 58 and 50% in 2 expts. C. A. R.

Dielectric losses of oils. A. GEMANT. *Z. tech. Physik* **11**, 544–5(1930).—By recent articles of G. (*Wiss. Veröffentlich. Siemens-Konzern*, in press) and of Ornstein and Willemse (*C. A.* **25**, 9), it is shown that the loss curves for transformers oils consist of 2 super-imposed parts (loss angle, ϑ, *versus* frequency). For high frequency the Debye losses are most important, but at low frequency the Wagner effect preponderates. B. J. C. VAN DER HOEVEN

Determination of the drop point by means of the Ubbelohde apparatus, especially for high-temperature lubricants. P. SCHWARZ. *Seifensieder-Ztg.* **57**, 877(1930).—The detn. of the drop point for greases and solid lubricants by means of the Ubbelohde app. may give values that differ by 25°, due to differences in the diam. or length of the glass tubing and to the depth to which the thermometer bulb is immersed. The rate of heating and moisture in the high-temp. lubricants also influences the results. P. ESCHER

Improved asphalt extractor. T. E. STANTON. *Eng. News-Record* **106**, 38(1931).—A new type of extractor is described in which the solvent is passed through an alundum filter stone 1 in. thick with the aid of 90-lb. air pressure. The max. variation between the asphalt content used and extd. from 11 prepd. samples contg. a high % of 200-mesh material and asphaltic cement was 0.2%, the av. variation being less than 0.03%. The solvent used is $CHCl_3$, approx. 85% of it being recovered. The cost of solvent per sample is about 13¢. The time of extn. with oil or asphaltic concrete mixts. is 15–30 min. R. E. THOMPSON

Filtration of asphaltic precipitates by suction, permitting rapid determinations. PAUL WOOG AND JEAN GIVAUDON. *Bull. soc. chim.* [4], **47**, 1419–20(1930).—Powd. glass that passes through a sieve of 0.058 mm. mesh is used in a crucible with sintered-glass bottom for filtering asphalt The process is rapid and gives const. results. G. M. MURPHY

A study of gum turpentines. (MISS) MARCELLE BARRAUD. *Bull. inst. pin* **1930**, 217–24.—The yield of spirit of turpentine from gum produced by pines of the same species or of species yielding spirit of turpentine having approx. the same compn. is fairly uniform, provided that the trees are situated in the most favorable conditions for growth. Spirit of turpentine consisting of pinene and nopinene can be obtained in yields exceeding 25%, but usually 22–23%. Spirit of turpentine contg other terpenes than pinene and nopinene is obtained in somewhat lower yields (20% or less). The first gatherings of gum contain more spirit of turpentine than the later ones. Trees of large diam. tend to give more gum contg. a higher proportion of spirit of turpentine than small trees. Analysis of 300 samples, each representing at least 1 tank-car of spirit of turpentine from Bordeaux pine, gave α_J —28.98° to —32°; spirit of turpentine from Austrian black pine had α_J —15.83° to —33.27°. α_J was for Austrian pine and maritine pine, resp., —17.50° to —37.14°, +10.12° to —38.86°. By fractionation of highly *l*-rotatory maritine-pine spirits of turpentine in a 2-m. Lebel column, pinene was sepd. having $[\alpha]$ —51.13°, while the highest values previously reported by Dupont

were +50.92° for pinene from Aleppo pine and —48.70° for pinene from maritine pine. A similar study of spirits of turpentine from Aleppo pine would probably yield a pinene having [α] higher than +50.92°. A. PAPINEAU-COUTURE

Two important physical properties of fuels, pertaining to the formation of mixtures in carburetor engines (WAWRZINIOK) **21.** Petroleum insecticides (WOODWORTH) **15.** Limestone oil reservoirs of the northeastern United States and of Ontario, Canada (MURRAY) **8.** Some properties of limestone as a reservoir rock (HOWARD, LOVE) **8.** Study of the black shale overlying the cap rock of the Cromwell sand in relation to the origin of the Cromwell oil dome, Oklahoma (GRAWE) **8.** Some chemical aspects of the origin of petroleum (LIND) 8. Hydrocarbons (Fr. pat. 693,054) **10.**

Treating cold petroleum oils with sulfuric acid. HORACE B. SETZLER and MERT C. MCDONALD (to National Refining Co.). U. S. 1,791,329, Feb. 3. The temp. of the oil is reduced to about 5° and the oil, during continued agitation, is subjected to the action of H_2SO_4, and clarified oil and sludge are sepd. App. is described.

Cracking petroleum oils. DAVID G. BRANDT (to Doherty Research Co.). U. S. 1,791,114, Feb. 3. In cracking oil under pressure, charging stock is passed in heat interchange relation to, but out of contact with, vapors in a dephlegmator so that a reflux condensate is produced; this condensate is passed through a heater under pressure to produce highly heated oil and vapors. The highly heated vapors and oil are sepd. in a sepg. zone, and the highly heated vapors are passed under pressure into a body of oil to crack the latter; residuum is withdrawn from the body of oil last mentioned and is distd. and the resulting distillate is independently heated under pressure to a high temp. and is passed into the sepg. zone. App. is described. Cf. *C. A.* **25,** 411.

Cracking crude petroleum. GENERAL TECHNICAL CO., LTD. Fr. 693,286, July 4, 1929. The asphaltic residues obtained in cracking crude petroleum are heated with a chem. reagent such as baryta and Fe perchloride to about 300°, under a pressure below 6 kg., and the products are returned to the cracking operation to be converted into gasoline.

Cracking and destructively hydrogenating hydrocarbons. I. G. FARBENIND. A.-G. Brit. 335,522, April 23, 1929. The process described in Brit. 296,700 (*C. A* **23,** 2555) is modified by subjecting the carbonaceous material to a mild cracking process in which extensive formation of benzine is avoided, followed by sepn. of any benzine formed and destructive hydrogenation of the remaining material. Catalysts may be employed in both these stages, if catalysts having a splitting action such as bauxite, silica gel, active charcoal or alumina are used for the initial stage. Numerous details and modifications of procedure are described, and an example of the process as applied to gas oil treatment is given.

Cracking hydrocarbons. JEAN F. A. BRUZAC. Fr. 693,281, June 22, 1929. Heavy hydrocarbons are converted to lighter hydrocarbons in 2 operations. (1) The hydrocarbons are distd. in contact with neutral metals such as Fe, Cu or Ni and condensed by cooling, the temp. never being above 500°. (2) The hydrocarbons from the first are submitted to the action of O or ozone to remove excess of C and S.

Cracking hydrocarbons. OWEN D. LUCAS. Fr. 692,549, Mar. 21, 1930. In converting heavy oils to light oils the temp. of the oil to be treated is raised to the final temp. required for cracking or conversion by communicating the necessary heat to the oil by indirect contact with biphenyl or phenyl ether in the liquid state in a heat exchanger, this compd. being contained in a closed-circuit app. to which the heat is furnished apart from the heat exchanger. Before entering the heat exchanger the oil is heated directly to a temp. below that at which appreciable cracking takes place.

Hydrocarbons of low molecular weight from those of high molecular weight. N. V. BATAAFSCHE PETROLEUM MAATSCHAPPIJ. Dutch 22,573, Sept. 15, 1930. The reaction is accelerated by metal carbides (Ca, U, Mo, Al). The temp. is between 300° and 700°; increased pressure may be used. No H_2, H_2O or H-contg. vapors are used.

Cleavage of hydrocarbons boiling up to 40°. N. V. DE BATAAFSCHE PETROLEUM MAATSCHAPPIJ. Dutch 22,574 Sept. 15, 1930. Low-boiling hydrocarbons, propane, butane, etc., are cracked in the presence of a small quantity of catalyzer (org. or inorg. halide, as HCl, CHI_3, CCl_4, $POCl_3$, etc.) with or without activator (Cu, Fe). Temps. of around 600° are used.

Distilling heavy hydrocarbon oils. ROGER D. HUNNEMAN, FRANCIS M. ROGERS and ROBERT E. WILSON (to Standard Oil Co. of Ind.). U. S. 1,791,209, Feb. 3. Oil such as residual oil is heated to about 355–405° and steam at a like temp. in the pro-

portion of 3–10 lb. per gal. of final oil distillate is supplied. Equilibrium is established between the oil and steam while maintaining an absolute pressure not over 75 mm., and the unvaporized oil and vapors are sepd. App. is described. Cf. *C. A.* **24**, 3353.

Gasoline by fractional condensation. DAVID G. BRANDT (to Doherty Research Co.). U. S. 1,791,113, Feb. 3. Hydrocarbon vapors contg. gasoline constituents, such as vapors produced by distg. and cracking petroleum, are passed under superatm. pressure through a series of condensing zones, the last of which is maintained at substantially the normal atm temp. while preceding zones are maintained at a higher temp., and condensates obtained in the preceding zones are individually cooled to substantially normal atm. temp. and a body of cooled condensate having a higher mean b. p. than that of the condensate obtained in the last condensing zone is maintained and mixed with the condensate from the last condensing zone. An arrangement of app. is described.

Gasoline from fuel oil. L. DE POTTER and F. RASQUIN. Belg. 370,471, June 30, 1930. Fuel oil is treated under pressure in a closed vessel with a compressed gas. The mixt. thus obtained is purified in filtering app. arranged in a closed circuit.

Apparatus for producing gas from gasoline. JAMES T. JONES (to Norman A. Way, Carley Zelmenovitz and Ashton Burford). U. S. 1,791,213, Feb. 3.

Filter for gasoline, etc. AMALGAMATED CARBURETTERS, LTD., and C. BROWN. Brit. 335,693, Aug. 26, 1929. Structural features.

Filter for gasoline, etc. WM. J. VILLAVASO. U. S. 1,791,333, Feb. 3. Structural features.

Filter for oil of internal-combustion engines. ERNEST J. SWEETLAND. U. S. 1,791,046, Feb. 3. Structural features.

Apparatus for dehydrating oil. LEONARD D. GRISBAUM (to Railway Service and Supply Corp.). Can. 308,563, Feb. 10, 1931.

Solutions of lower mercaptan compounds. GERALD L. WENDT (to Standard Oil Co. of Ind.). U. S. 1,791,179, Feb. 3. A soln. of lower mercaptan compds. which is suitable for removing S from gasoline, etc., is prepd. by washing petroleum naphtha with a NaOH soln. and adding to the resulting soln. a Ca compd., such as lime or Ca hydrosulfide, which reacts with the Na sulfide present to ppt. the sulfide radical.

Bituminous emulsions. BITUMULS KALTASPHALT A.-G. (C. A. Braun, inventor). Ger. 514,485, Mar. 22, 1925. Stable emulsions of asphalt and other bituminous materials and ceresin are prepd. by supplying the material to be emulsified, together with alk. water contg. less than 1% of alkali, to a mixing vessel contg. a pre-formed emulsion of the material. The amt. of emulsion that can be so prepd. from the batch of pre-formed emulsion is stated to be practically unlimited. Examples are given. Cf. *C. A.* **24**, 4627.

Reclaiming journal box lubricating oil from waste. LEONARD D. GRISBAUM (to Railway Service & Supply Corp.). U. S. 1,791,473, Feb. 3. Contaminated emulsified oil is treated with an alk. soln. such as NaOH of sufficient strength to break the emulsion and react with contaminations including lint, at a temp. above 75° (preferably about 100°), the mixt. is agitated with air, mixed with water, further agitated with air and the oil is sepd. App. is described. U. S. 1,791,474 describes app. and detail of procedure for treating the contaminated oil with NaOH soln. and projecting water on the surface of the oil after subsidence of the mixt., to travel downwardly. Cf. *C. A.* **24**, 6001.

23—CELLULOSE AND PAPER

CARLETON E. CURRAN

Determination of alpha cellulose. H. PINCASS. *Kunstseide* **12**, 282–3(1930).—Cellulose materials analyzed for alpha cellulose by 3 different methods gave different values. The differences in the results are due mainly to differences in the preliminary drying of the sample and to differences in the methods of washing out the alkali and drying the alpha cellulose. FREDERICK C. HAHN

Measuring the viscosity of cellulose and its application to the manufacture of plastics. L. LAISNEY AND H. RECLUS. *Rev. gén. mat. plastiques* **7**, 3–15(1931).—After a brief review of previous work on the viscosity of cellulose, a technic for its detn. is described in detail. The method is simple and easy to use in a com lab., and is sufficiently accurate for ordinary purposes. The cuprammonium soln. is prepd. via Joyner (*C. A.* **16**, 3543), but the NH_4OH is strengthened to about 250 g. NH_3 per l. before soln. of the Cu and again after soln. of the Cu is completed. The cellulose is dissolved in the

presence of H_2, and the soln. is forced by pressure of H_2 into a H_2-filled tube, where the viscosity is detd. by the falling-sphere method (a 3-mm. sphere falling 50 cm.). The concn. of the soln. should be such as to give a viscosity of 5–100 sec. The viscosity at various concns. was found to be: 0%, 2 sec.; 1%, 10 sec.; 2%, 140 sec.; 3%, 1000 sec. These values practically correspond to the equation $\log V = 1.01\ C + 0.035$.

A. PAPINEAU-COUTURE

Production of ammonium copper oxide cellulose solutions. E. SCHURZ. *Kunstseide* **12**, 283–5(1930); *Jentgen's Rayon Review* **2**, 248–9(1930).—A detailed discussion of the prepn. of cellulose cuprammonium solns. involving the following steps: pptn. of $Cu(OH)_2$, mixing of the $Cu(OH)_2$ with cellulose, extn. of the blue liquor, soln. of the $Cu(OH)_2$ cellulose mixt. in ammonia, filtration of the resulting soln., and removal of air bubbles therefrom. The mixing of dry cellulose with solid $Cu(OH)_2$ results in a much better control of the spinning soln.

FREDERICK C. HAIN

Nitrates of cellulose benzoate. M. SENDO AND J. KONDO. *Cellulose Ind.* (Tokyo) **6**, 150–5(1930).—Cellulose monobenzoate was treated at 18–20° with mixed acids of the following percentage compn., resp., H_2SO_4, HNO_3, HNO_2 and water: (1) 71.14, 20.81, 0.13, 7.92; (2) 65.6, 18.1, 0.15, 16.15; and (3) 59.58, 21.39, 0.23, 18.8. Cellulose dinitrate mononitrobenzoate $[C_6H_7O_2(NO_3)_2CO_2C_6H_4NO_2]$ was obtained by means of acids (1) and (2) and the mononitrate $[C_6H_8O_3(NO_3)CO_2C_6H_4NO_2]$ by acid (3). The explosive properties of these nitrates are similar to those of the normal cellulose nitrates, but, compared with equally nitrated normal cellulose, these mixed esters are more stable, less hygroscopic and less soluble in ether-alc. and burn at a slower rate.

B. C. A

Acid adsorption and stability of nitrocellulose. D. R. WIGGAM. *J. Phys. Chem.* **35**, 536–9(1931).—HNO_3 and H_2SO_4 are adsorbed by nitrocellulose of high N content, other acids are adsorbed somewhat less. The stability of the nitrocellulose is lowered to a degree depending upon the amt. of acid adsorbed.

MALCOLM DOLE

Phenomena of the lattice transformations of nitrocellulose. Their generality in cellulose compounds. J. J. TRILLAT. *Compt. rend.* **191**, 1441–3(1931).—Trogus, Hess and Katz (*C. A.* **24**, 2877) have shown that the x-ray interference pattern of ramie fibers, nitrated to a max., is changed if the fibers are swelled by certain liquids. The altered pattern reverts reversibly to that of the original fiber as the liquid evaporates from the fiber. Cotton, nitrated to 12.95% N (nearly trinitrocellulose), gave a cryst. diagram corresponding to trinitrocellulose. Some of this nitrated cotton was then completely dispersed, instead of merely being swelled, by dissolving it in acetone, and was then recovered in the form of a film by evapn. of the acetone. The films showed a cryst. structure having a new lattice spacing of 9.31 A. U. and differing slightly in other respects from that of the undispersed cotton. It is uncertain whether this modification of the structure of the lattice corresponds to a new cryst. form of trinitrocellulose, or arises from a combination of the trinitrocellulose with the solvent. The film retains about 1% of acetone very tenaciously. The new diagram appears to be a mixture of that of the original trinitrocellulose with that of a new product. If the degree of nitration of the cotton is less (10–12%), the fibers show a cryst. structure, although more feebly as the degree of nitration is less. The corresponding films, however, show only halos corresponding to an amorphous structure. This difference between the films from cotton nitrated to 12.95% and to 12% is quite sharp. It appears that only trinitrocellulose is a well-defined compd. capable of crystallizing in a second form as the result of passing through the disperse phase. The presence of an ill-defined compd. such as "dinitrocellulose" hinders the process and gives rise to an amorphous structure. Similarly, cellophane is cryst. and has a structure different from that of the initial cotton. In general, it follows that the compd. of cellulose and native cellulose both can assume different cryst. forms after being passed through a state of swelling, followed by dispersion.

R. H. LOMBARD

α,β-Lignin. PETER KLASON. *Svensk Kem. Tids.* **42**, 259–63(1930).—Reply to Hägglund's contention that there is only one lignin in wood (cf. *C. A.* **24**, 5152, 6007).

A. R. ROSE

Utilization of hardwoods for mechanical and chemical pulp. H. S. HILL. *J. Forestry* **28**, 1146–52(1930).—As spruce becomes more expensive, hardwoods become more important as pulp raw material. That the pulping qualities of hardwoods have already been investigated and found to be satisfactory for a variety of pulp products is evident from the literature reviewed by H. The future use of hardwoods for pulp is essentially a matter of economics.

ALFRED L. KAMMERER

Wood fibers. G. J. RITTER. , *J. Forestry* **28**, 533–41(1930); cf. *C. A.* **22**, 4149; **23**, 976, 1931.—The results of an investigation of the microstructure of the fibers of 16 species of wood are presented. Two types of lignin are distinguished. Fiber cell walls

are made up of layers, capable of being sepd. into fibrils by chem. and mech. means. Fibrils in turn can be chemically sepd. into fusiform bodies. Cellulose and lignin from wood can be distinguished by their optical properties in polarized light. A. L. K.

Composition of Cassia siamea, L. Y. SHINODA. *Cellulose Ind.* (Tokyo) **6**, 155–6 (1930).—The following percentage compn. has been found: moisture 11.2, ale.-benzene ext. 18.2, lignin (König) 37.3 (on the extd., dry product), ash 0.3, impure cellulose 40.3, hydrolysis value (Ost) 92.8 and pentosan content (Tollens-Krüger) 15.6%. Before chlorination the wood meal was steeped in 10% NaOH soln. for 48 hrs. and its cellulose content redetd., when the value 33.8%, of purity 100%, was found. Xylose and mannose were found in the hydrolysis liquor, but no galactose was present. B. C. A.

Bamboo. I. Fine structure of the bamboo fiber. K. SISIDO. *Cellulose Ind.* (Tokyo) **6**, 148–50(1930).—A theoretical discussion of the results of previous workers. B. C. A.

The use of microörganisms in certain commercial processes. E. E. HUBERT. *J. Forestry* **28**, 542–5(1930).—A résumé is given of making com. products with the aid of molds, bacteria, yeasts, etc., with bibliography. Expts. have shown that spruce and balsam fir attacked by the group of fungi causing white rots may produce relatively large yields of pulp by the sulfite process. This finding has possibilities in the future development of pulp manuf. H. is carrying out expts. on the action of a blue stain fungus on western yellow pine, the resulting by-product of which has com. possibilities. ALFRED L. KAMMERER

Removal of hemicelluloses from wood by use of sodium hydroxide. O. HORN. *Cellulosechemie* **11**, 151–2(1930).—Mineral acids and 5% NaOH have been used to remove hemicelluloses, undesirable impurities in wood investigations. In the presence of NaOH, lignin may be oxidized or its components may be split off, perhaps through sapon. and the balance may be altered. Beechwood sawdust, after extn. with benzene-ethanol, 1:1, was degummed with 5% NaOH by 4 treatments at room temp. for 36 and for 48 hrs., the ext. after each treatment being removed and new alkali used. The av. wt. loss for 4 detns. was 23%. If no lignin is removed, a lignin content of 24.1% before degumming must rise to 29.6%, whereas experimentally, it was found to be a little over 27%. Methoxyl content for the wood before degumming was 6.25%, equiv. to 7.7% for degummed wood, whereas experimentally only about 6.3% was found. Each alkali treatment was followed by washing with cold water, dil. AcOH and hot water until the filtrate was colorless, the results in all expts. being fundamentally the same. Conclusion: The method for degumming by use of 5% NaOH is a suitable one because, in addn. to hemicelluloses, a part of the lignin is also removed. C. A. BRAUTLECHT

Quality of technical caustic soda employed in the manufacture of viscose silk. V. I. SHARKOV. *J. Chem. Ind.* (Moscow) **6**, 1027–9(1929).—The purity of NaOH for use in viscose silk manuf. is of the utmost importance. Practical experience has shown that the presence of NaCl + Na_2CO_3 in NaOH in greater concns. than 3.5–4% is harmful, although very low concns. are not markedly bad. These 2 salts exert about an equal depressing effect on the swelling of the fiber of sulfite cellulose. A. C. ZACHLIN

Cellulose acetate rayon. KRÜGER. *Kunstseide* **12**, 262–7(1930).—A review of recent scientific works related to the prepn. of cellulose acetate, discussion of these results in the light of present practice in the manuf. of cellulose acetate rayon, and a comparison of this rayon with other types of rayon from various standpoints. FREDERICK C. HAHN

Dry spinning of acetate rayon. FRITZ OHL. *Kunstseide* **12**, 279–81(1930); *Jentgen's Rayon Review* **2**, 245–7(1930).—Numerous factors influencing the production and quality of acetate rayon are discussed. A cellulose acetate should be chosen with the smallest possible structure of the cellulose molecule; it should be sol. in proper solvents, free from impurities, of uniform viscosity and should not contain over 0.05% H_2SO_4. The spinning soln. must be prepd. under the strictest conditions. A cellulose acetate of fixed moisture content must be used; it should be uniformly dissolved with a min. period of stirring to avoid warming the mixt. and loss of solvent. A no. of filtrations are required and all bubbles must be removed from the soln. prior to spinning. Exptl. data are presented showing the importance of the foregoing factors. In the dry spinning process a careful control of the quantity and temp. of the air is important. F. C. HAHN

Strengthening of rayon. TATSUMI YAMADA. *Repts. Imp. Ind. Research Lab., Osaka, Japan* **11**, No. 10(1930).—Absorption of water by cellulose depends upon the presence of a free OH group and by replacing it with NO_2 or AcO groups it is possible to increase the resistivity toward water. A similar result is obtained by treating rayon with formalin. Y. found the following conditions necessary to treat rayon with formalin:

p_H 1.2–2.0, time of immersion 12 hrs., time of heating 5 hrs. at 50–70° and concn. of soln. 4–10%. F. I. NAKAMURA

Mechanical advances in the artificial silk industry. HANS SCHMIDT. *Chem. App.* 17, 205–7, 230–2(1930).—A review. M. C. ROGERS

Beating of [paper] pulp. XI. A characteristic of vegetable fibers as paper-making materials. M. NAKANO. *Cellulose Ind.* (Tokyo) 6, 144–7(1930); cf. *C. A.* 24, 5491.—Wool, silk, asbestos and vegetable fibers were beaten, and their paper-forming properties compared. Wool cannot be split longitudinally but is reduced to short lengths showing no fibrillation, from which it is impossible to form a sheet. Silk and asbestos split up into fibrils, but the sheets formed from the products are weak because of the slippage of the fibers. It follows, therefore, that fibrillation is not necessarily accompanied by the development of the adhesive properties which are essential for the production of satisfactory sheets. Only vegetable fibers have these characteristic properties, which are due to the colloidal state of the surface of the fibrils, and their felting capacity is of secondary importance. B. C. A.

Beating of [paper] pulp. XII. Improvement of absorbency of blotting paper. M. NAKANO. *Cellulose Ind.* (Tokyo) 6, 164–7; *Abstracts* 29(1930); cf. preceding abstract. —Blotting papers of high absorbency are obtained by the use of pulps treated with concd. NaOH solns., and the absorbing velocity of such products is, on the av., about 40% higher than that of paper made from untreated pulp. Hence pulps can be transformed into "freer" states than their natural ones, and this effect is the reverse of that obtained by beating. B. C. A.

The utilization of kaoliang stalk. III. Industrial experiments on the manufacture of soda pulp and paper. RYUJI YAMAMOTO. *Abstracts from Rept. Central Lab. S. Manchuria Railway Co.* 1929, 26–7.—70% kaoliang pulp is used to make white or Manila paper. V. F. HARRINGTON

The Spierer lens and what it reveals in cellulose (SEIFRIZ) **11A.** Constitution of cellulose xanthate (LIESER) **10.** Lignin and cellulose (FREUDENBERG, *et al.*) **10.** Methylated tri- and tetra-saccharides from cellulose and starch (FREUDENBERG, FRIEDRICH) **10.** Concrete grindstones for wood-pulp manufacture (Brit. pat. 335,521) **20.** Artificial threads, films, etc. (Fr. pat. 693,240) **25.** Treating cellulose material (Fr. pat. 692,796) **25.**

LEJEUNE-JUNG, PAUL: **Aus dem Werdegang der deutschen Zellstoff-Industrie 1880-1930.** Festschrift zum 50 jährigen Bestehen des Vereins deutscher Zellstoff-Fabrikanten e. V. Berlin: Selbstverlag d. Vereins. 112 pp. M. 10.

Cellulose. ERIK HÄGGLUND. Ger. 515,018, June 10, 1927. In the manuf. of cellulose by digesting wood with NaOH soln., a part of the black liquor by-product is returned to the digester, without causticizing, after its org. constituents have been destroyed by heating it to about 350° under 200 atm. pressure.

Cellulose. ERNST MEZEY. Ger. 514,466, Feb. 20, 1930. A pure, highly voluminous cellulose is prepd. by heating com. cellulose for 3–4 hrs. at 3–5 atm. pressure with a dihydric aliphatic alc. or a deriv. thereof, particularly a mono- or di-alkyl ether or an acetate or chloride. A small quantity of a weak alkali, *e. g.*, borax or soap, may also be present. Thus, washed sulfite cellulose may be heated as above with ethylene glycol monoethyl ether 2 and NH_3 0.5%, and the product washed and bleached.

Cellulose. HANS KAMMERL. Fr. 693,005, Mar. 29, 1930. A valuable cellulose is obtained from soiled plant fibers, particularly cotton waste such as linters, by treating the fibers mechanically to remove the greater part of the impurities in a centrifuge without a screen, after which the pectins, waxes and greases buried in the structure of the fiber are removed by leaching or light boiling.

Drying cellulose. GUSTAV NEUMANN. Fr. 693,014, Mar. 29, 1930. Cellulose is dried by means of liquid SO_2 which is then extd. by lowering the pressure. The dried cellulose is particularly suitable for acetylation or to be transformed into viscose.

Acidulation of cellulose. SOC. ANON. POUR L'IND. CHIM. À BÂLE. Fr. 693,800, Apr. 12, 1930. Cellulose is acidulated by treating it first with concd. solns. of neutral salts such as $CaCl_2$, $MgCl_2$, $ZnCl_2$ or thiocyanates of K, Ca, etc., and then with anhydrides of aliphatic acids. Cf. *C. A.* 24, 3112.

Nitrating cellulose, etc. I. G. FARBENIND. A.-G. (Franz Becker and Hans Zepter, inventors). Ger. 515,108, Oct. 30, 1927. A small addn. of urea is made to the nitrating mixt. in order to eliminate or reduce the amt. of N_2O_3. The process is particularly useful in nitrating cellulose with relatively dil. nitrating mixts.

Cellulose esters. I. G. FARBENIND. A.-G. (Max Hagedorn and Georg Hingst, inventors). Ger. 515,106, Jan. 7, 1927. Sol. cellulose esters of higher fatty acids are prepd. by treating unpretreated cellulose with chlorides of the acids in the presence of pyridine, quinoline or like base at a temp. above 100°, *e. g.*, 110–140°. Diluents may be present. An example is given.

Cellulose esters. I. G. FARBENIND. A.-G. (Max Hagedorn and Georg Hingst, inventors). Ger. 515,107, Jan. 28, 1927. Insol. or difficultly sol. cellulose esters of higher fatty acids are converted into sol. esters by treatment in a liquid medium at a raised temp. not exceeding 200° with an org. or inorg. acid, acid anhydrideor acid salt, or mixts. of these. Thus, insol. cellulose tristearate gives a clear soln. when heated in $C_2H_2Cl_4$ with Cl_3CCOOH to 145°, and the ester, isolated by pouring the soln. into EtOH, is sol in C_6H_6, $CHCl_3$ and AcOAm. Other examples are given also. Cf. *C. A.* 25, 1379.

Cellulose esters. SOC. KODAK-PATHÉ (SOC. ANON. FRANÇAISE). Fr. 693,189, Apr. 2, 1930. Cellulose esters of fatty acids are made by heating esterifiable cellulosic material in vapors of a fatty acid having more than one and less than 8C atoms, at a temp. above 100° but below 200° in the absence of O and catalysts producing a degradation of the cellulose, until the acyl group in the ester thus produced has reached at least 4%, the said vapors being the sole acylating agent. The ester may be esterified afresh with addnl. acyl groups.

Benzylcelluloses. JOSEPH BOUCHET. Fr. 693,318, July 12, 1929. Aralkylcelluloses, and particularly dibenzylcellulose, are obtained by treating alkali cellulose prepd. with a concd. NaOH lye with $C_6H_5CH_2Cl$ at 70–100° without pressure and with or without a diluent.

Cellulose acetate. OSWALD SILBERRAD and HARRY BLEASDALE. Fr. 693,568, Apr. 9, 1930. The AcOH is recovered from the acetylation mixt. by adding to this mixt. an amt. of water greater than that necessary to destroy all the anhydride remaining, *e. g.*, an addn. of 6–8% of water. The mixt. is allowed to stand at 30–35° until the cellulose acetate has become sol. in acetone, then transferred to a distg app. and finely ground AcONa is intimately mixed with it, and the AcOH distd. off. Fr. 693,569 describes the manuf. of cellulose acetate in which the cellulose acetate is pptd. from an acid product and collected as a porous opaque substance by dilg. the acid product with water in amt. almost sufficient to start the pptn. and afterward bringing the acid product thus treated into contact with water so that from the moment of contact the product is submerged in an excess of water.

Cellulose acetate. SOC. KODAK-PATHÉ (SOC. ANON. FRANÇAISE). Fr. 693,132, Apr. 1, 1930. Cellulose acetate is prepd. by treating a cellulosic material with Ac_2O and a catalyst in the presence of a mixt. which dissolves the cellulose acetate produced, the mixt. contg. an amt. of AcOH insufficient, by itself, to dissolve the acetate and an org. volatile liquid not miscible with water and inert with regard to Ac_2O, *e g.*, $C_2H_4Cl_2$. The cellulose acetate is pptd. in an aq. bath at a temp. above the b. p. of the volatile liquid, which is collected and condensed. Fr. 693,133 describes the recovery of cellulose acetate from soln. in AcOH by mixing the soln. with an aq. pptn. bath contg. at the beginning at least 20% by wt. of AcOH and capable of pptg. the acetate.

Cellulose acetate compositions. SOC. KODAK-PATHÉ (SOC. ANON. FRANÇAISE). Fr. 693,131, Apr. 1, 1930. A compn. suitable for making films is made by dissolving cellulose acetate sol. in acetone in a volatile solvent mixt. composed of AcOMe 50, AcOEt 10–40 and acetone 40–10 parts. This soln. contains about 30% of cellulose acetate.

Apparatus for circulating and storing colloidal solutions of cellulose. SOC. INDUSTRIELLE DE MOIJ. Fr. 692,647, June 24, 1929. The app. is constructed so that the cellulose is brought in a perfectly homogeneous state to the spinning nozzles for making *artificial silk*.

Saccharification of cellulose. MAURICE JUNIEN. Fr. 693,277, June 14, 1929. Cellulosic materials are heated under pressure to remove free O and then hydrolyzed with hot dil. H_2SO_4 in the presence of excess of water to obtain fermentable sugars. An app. is described with means for keeping the acid in rapid movement during the hydrolysis.

Carbohydrate esters. I. G. FARBENIND. A.-G. (Max Hagedorn, inventor). Ger. 515,109, Feb. 11, 1928. See Fr. 668,686 (*C. A.* **24**, 1650).

Nitrocellulose solutions, etc. JOSEPH G. DAVIDSON (to Carbide and Carbon Chemicals Corp.). U. S. 1,791,301, Feb. 3. Nitrocellulose or a like cellulose deriv. is used with a solvent comprising the acetate of the monoethyl ether of ethylene glycol or other solvent of the same type.

Felted cellulose fiber products. GEORGE L. SCHWARTZ (to E. I. du Pont de Nemours & Co.). U. S. 1,791,248, Feb. 3. In forming products such as those suitable for

manuf. of "artificial leather," shoe box toes, etc., continuous bands of cellulose fibers are gelatinized with caustic alkali, the gelatinized fibrous material is subjected to heat and pressure and washed. App. is described.

Plastic compositions comprising cellulose esters and polymerized vinyl compounds. CELLULOID CORP. Brit. 335,582, March 23, 1928. Cellulose acetate or other cellulose esters are used with polymerized vinyl compds. such as polymerized vinyl aceate, propionate, phthalate, phosphate, chloride or bromide, styrene or the products obtained by dehalogenating vinyl halides as by use of Zn, with or without various plasticizers or softening agents, fillers, pigments, gums, resins, etc., or anti-acid substances such as urea or Ca lactate or volatile solvents.

Plastic masses. I. G. FARBENIND. A.-G. Fr. 693,496, April 7, 1930. Plastic masses are composed of derivs. of cellulose such as acetylcellulose in combination with a gelatinizing or plastifying agent formed of one or more esters of phosphoric acid, the org constituent of which consists of monoalkyl or monoaryl glycolic ethers of the ethyleneglycol, propyleneglycol or butyleneglycol series, such as dimethylglycolbutylglycolphosphate or dipropylglycolbutylglycolphosphate. Several examples are given.

Pyroxylin sheets. THE FIBERLOID CORP. Fr. 693,186, April 2, 1930. Smooth sheets of pyroxylin are made by transforming a gel of pyroxylin into a sheet while still plastic, and modifying the phys. state of the surface of the sheet while drawing. The sheets may be extended and submitted to a tension while extending and a part at least of the solvent is removed by warm air.

Molding celluloid sheets and articles. H. DE HEN. Belg. 369,941, June 30, 1930. Previously heated and softened celluloid sheets are simultaneously pressed and subjected to the action of chemicals and of evapn. until they have acquired the desired shape and such a consistency that they can be removed from the press without being cooled.

Viscose. LEON LILIENFELD. U. S. 1,790,990, Feb. 3. Cellulosic material such as cotton or wood-cellulose is treated at least once with a caustic alkali soln. contg. not less than 15% caustic alkali (calcd. as NaOH), washed, converted into alkali cellulose, and the alkali cellulose is converted into viscose. Cf. *C. A.* **24**, 2292.

Nontransparent and glossy capsule of regenerated cellulose. KALLE & Co. A.-G. (Julius Voss and Otto Schnecko, inventors). Ger. 515,377, Nov. 7, 1925. See U. S. 1,778,096 (*C. A.* **24**, 6014).

Artificial silk from viscose. ZELLSTOFFFABRIK WALDHOF and A. BERNSTEIN. Brit. 335,605, June 27, 1929. In a noncontinuous process of the type in which the thread, after coagulation and fixing, is collected on spools, acid is removed by passing the threads immediately after coagulation through a hot water bath, and the threads are then spooled. The coagulating bath may be formed of water 70, Na_2SO_4 13, H_2SO_4 10 and glucose 7%, and formalin may be added to the hot water bath.

Artificial silk from viscose. I. G. FARBENIND. A.-G. Brit. 335,675, Nov. 8, 1928. Viscose made from unripened alkali cellulose and contg. excess of alkali as compared with its content of cellulose is spun into a soln. of an NH_4 salt such as $(NH_4)_2SO_4$ to which acid and other NH_4 salts such as the acetate or formate may also be added, as may also other neutral salts such as Na_2SO_4, NaCl, NaOAc or Na lactate, etc. For subsequent coagulation, the formed threads are passed through an acid bath of low concn. such as a 6% H_2SO_4 soln. and the freshly pptd. threads may be subjected to stretching. The viscose is made from unripened cellulose at temps. above 0°. Cf. *C. A.* **25**, 814.

Artificial silk. COMPTOIR DES TEXTILES ARTIFICIELS. Brit. 335,613, June 28, 1929. In forming filaments such as those from viscose spun into an acid-salt bath, the partly coagulated filaments after leaving the coagulation bath are stretched by passage through a narrow tube through which flows a current of liquid (which may be the same as, or different from, the coagulation bath) offering resistance to the forward movement of the filaments as they are drawn by rollers or other devices. App. is described.

Artificial silk. ZELLSTOFFFABRIK WALDHOF and A. BERNSTEIN. Brit. 335,606, June 27, 1929. While passing from a twisting spool to a reel, the material is allowed to fall into a liquid bath preferably contg. a material such as a wax-oil emulsion which forms a protective coating on the filament. The app. is described. Precipitants which do not crystallize out are preferably used in the spinning process.

Artificial silk. BENNO BORZYKOWSKI. Fr. 693,700, April 11, 1930. See Ger. 492,279 (*C. A.* **25**, 415).

Artificial silk. N. V. HOLLANDSCHE KUNSTZIJDE INDUSTRIE. Fr. 693,411, April 5, 1930. Artificial silk of a dull luster is made by introducing into the spinning soln. terpenes or terpenic alcs. or mixts. thereof. An emulsifying agent such as sulfonated castor oil is also added.

Artificial silk. NOVASETA A. G. ARBON. Fr. 691,749, Mar. 11, 1930. Artificial

silk on leaving the spinning nozzles is given a preliminary coagulation in a coagulating bath and then caused to pass in a direction not deviating much from the vertical through at least one subsequent vessel traversed by a pptg. liquid to obtain a final coagulation.

Apparatus for drawing artificial silk in the moist state. FRANZ J. GAHLERT. Fr. 693,574, April 9, 1930.

Twisting and collecting artificial silk, etc. WM. P. DREAPER. U. S. 1,790,979, Feb. 3. Mech. features.

Artificial threads. MICHEL J. DASSONVILLE. Fr. 692,665, June 26, 1929. Cellulose threads having a structure and qualities comparable to those of natural wool are obtained by varying the section of the thread from the spinning nozzle by a correspond ing variation of the flow or of the pressure of the cellulose soln. about to be spun.

Artificial filaments. ALGEMEENE KUNSTZIJDE UNIE N. V. Ger. 514,400, Aug. 24, 1927. Artificial filaments of dull luster are prepd. from solns. of cellulose acetate or other cellulose ester or ether by dry-spinning these in a spinning cell into which water or water vapor is introduced. The spinning soln. may be anhyd. or not. Examples are given.

Luminous artificial filaments. HENRY A. GARDNER. U. S. 1,791,199, Feb. 3 Artificial filaments such as those formed from cellulose acetate or viscose contain a compd. of Ti such as the oxide and a small proportion of a radioactive substance, such as $RaBr_2$.

Removal of hydrogen sulfide from air of viscose-silk factories. N. V. NEDERLANDSCHE KUNSTZIJDE FABRIEK. Dutch 23,233, Dec. 15, 1930. The surplus alk. liquor from the prepn. of cellulose is used, dild. to 4%, for absorption of H_2S from the foul air; catalyzers, such as Ni, Cr and Mn salts (1%), are added for oxidation of the H_2S Cf. *C. A.* **24**, 4633

Fiber from wood. GEORGE A. RICHTER and MILTON O. SCHUR (to Brown Co.). U. S. 1,790,838, Feb. 3. Chipped wood such as jack pine is digested under pressure and with heating, in a saponaceous alk. liquor such as a NaOH soln. contg. 0.3-0.4% of soap. Cf. *C. A.* **25**, 414.

Wood pulp. GUSTAF HAGLUND (to Patentaktiebolaget Grondal-Ramen). U. S. 1,791,476, Feb. 3. Wood chips, before cooking with a liquor such as a sulfite soln., are preliminarily soaked in a cooking liquor produced in the usual manner without any addn. of waste liquors from previous cooking operations, and, after removal of part of the cooking liquor, the chips are cooked with a cooking liquor mixed with waste liquor from a previous cooking operation or with such liquor from a cooking app. still in action.

Cellulose pulp web. GEORGE A. RICHTER (to Brown Co.). U. S. 1,790,839, Feb. 3 A web which is highly absorptive of impregnating substances comprises gelatinized cellulose and loosely felted, substantially uncompacted fibers in unbeaten condition.

Cooking cellulose. ALB. E. NIELSEN. Norw. 46,601, June 17, 1929. The cooking is carried out by indirect steam heating with circulation of the liquor through an app. outside the digester. During the cooking process the liquor is subjected to a successive evapn. in the circulation app. in order to increase the heat value of the waste liquor, reduce the consumption of fuel and raw material and increase the output of pulp.

Pulp beater ("pulping engine"). S. MILNE. Brit. 335,671, July 26, 1929.

Apparatus for continuous beating and brushing of paper-making stock. THOMAS J. MULLEN. U. S. 1,790,830, Feb. 3. Structural features.

Washing paper-making pulp. OTTO MANTIUS. U. S. 1,790,714, Feb. 3. App and various details of app. and operations are described.

Paper. FRIEDRICH K. WICKEL. Ger. 515,186, Mar. 27, 1928. Impervious transparent paper is prepd. from sulfite cellulose paper by impregnating this, as completely as possible, with anhyd. glycerol, and then coating it on both sides with an aq. soln. of albumin, preferably egg albumin, to which addns. such as hardening agents may be made. A soft and non-adhesive product is obtained after drying. Cf. *C. A.* **24**, 1741.

Unbleached paper, cardboard, etc. VALDEMAR W. D'OBRY. U. S. 1,791,092, Feb. 3. A grass is moistened and steamed under pressure while preventing escape of substantially all the constituents of the grass, and the material is then mech. disintegrated for making paper, cardboard or the like. Cf. *C. A.* **24**, 1981.

Paper-making apparatus. DEE L. SHEAFOR (to Black-Clawson Co.). U. S. 1,791,384, Feb. 3. Structural features.

Paper-making apparatus. NILS A. JACOBSEN. U. S. 1,791,412, Feb. 3. A device is provided, actuated by the wt. of torn off paper, for automatically dividing the paper web on the wire cloth in 2 or more parallel strips in case tearing of the paper web should be started because part of the paper is carried along with the wire cloth about the couch roller.

Suction box for paper-making apparatus. EARL E. BERRY (to Beloit Iron Works). U. S. 1,790,852, Feb. 3. Suction boxes are made of comparatively thin-wall material composed of a Cr alloy such as "stainless steel" having a high modulus of elasticity and resistant to corrosion by the liquids with which it comes into contact.

Waterproofing paper. WM. H. RICHARDSON (to Richardson Co.). U. S. 1,791,040, Feb. 3. In making waterproof cartons, a blank is printed and sprayed with paraffin on the printed side, and afterward is calendered with calender rolls. App. is described.

Composition for waterproofing paper, millboard, papier maché articles, etc. DUNLOP RUBBER CO., LTD., D. F. TWISS and G. GORHAM. Brit. 335,559, June 25, 1929. A material suitable for treating *containers for food* consists of an aq. emulsion or dispersion of rubber, gutta-percha, balata or the like, in admixt. with an aq. dispersion of a mineral or vegetable wax or mixt. of waxes, *e. g.*, paraffin, in which the wax content may amount to 20–95% of the "dry rubber-wax content." The compn. may also be used for sealing the lids of the containers.

Dyeing paper and paper pulp. SOC. ANON. POUR L'IND. CHIM. À BÂLE. Fr. 693,172, April 2, 1930. A unilaterally mono- or di-acylated diamine such as oleyldiethylethylenediamine is used as adjuvant in dyeing paper or paper pulp.

Recovery of paste from printed paper, and chiefly wood paste. LOUIS GRENAUDIER. U. S. 1,791,445, Feb. 3. Materials such as old newspapers are soaked in water and then treated with an alk. bath such as Na_2CO_3 to form an alk. soap with the fatty matter of the ink, and a substance such as NaCl is used which renders the soap insol. so that the ink-contg. soap rises to the top of the bath and does not mix with the paste in the bottom of the bath.

24—EXPLOSIVES AND EXPLOSIONS

CHARLES E. MUNROE AND C. G. STORM

Drying powder and explosive materials in vacuum. I. BODEWIG. *Chem. App.* **17**, 253–4, 279–80(1930).—B. reviews the difficulties encountered in drying powder and tells of improvements in the app. M. C. ROGERS

High brisance studies on explosive effect and chemical constitution. I. Tetranitromethane and its mixtures with toluene. ALFRED STETTBACHER. *Z. ges Schiess- Sprengstoffw.* **25**, 439–41(1930).—S. describes the prepn. of $C(NO_2)_4$ from $(CH_3CO)_2O$ and HNO_3 in lab. app. Because of the time required for the reaction (10–12 days) and poor yield (56%), the product has no industrial application. Its properties are described. When properly neutralized and dried, it is apparently quite stable. A mixt. of 100 parts $C(NO_2)_4$ and 15.66 parts $C_6H_5CH_3$ has a heat of explosion of 1701 Cal./kg. The sensitiveness of this mixt. is greater than that of nitroglycerin, and its brisance as indicated by Fe plate tests is even greater than that of gelatin-penthrinit (*C. A.* **24**, 6017; **25**, 818). C. G. STORM

High brisance studies. II. Mannitol hexanitrate (nitromannitol) and pentaerythritol tetranitrate (Penthrit). ALFRED STETTBACHER. *Z. ges. Schiess- Sprengstoffw.* **25**, 461–2(1930).—In comparative tests of nitromannitol and "Penthrit," alone and in mixts., S. again attributes the greater explosive strength of the "Penthrit" to its mol structure about a central C atom (*C. A.* **24**, 6017). Approx. 30 g. samples were detonated in heavy Fe crucibles on brass or Fe plates, these being preferred to Pb plates because of their greater hardness. Among other mixts. tested, one contg. nitromannitol 37.5%, nitroglycerin 56.2%, TNT 6.3% was compared with "Penthrit" 34%, nitroglycerin 51%, nitrocellulose 2.15%, NH_4NO_3 12.9%, both mixts. having an exact O-balance. The latter mixt. gave slightly superior results. A frozen mixt. of 60% "Penthrit" and 40% nitroglycerin (60/40 "Penthrinit") is claimed to have the highest rate of detonation of known explosives—9500 m./sec., as against 9000 m./sec. for frozen nitroglycerin. C. G. STORM

The preparation of nitrocellulose with maximum nitrogen content. F. LENZE AND E. RUBENS. *Z. ges. Schiess- Sprengstoffw.* **26**, 4(1931).—Nitrating expts. were made with cotton linters and mixts. of HNO_3 with H_2SO_4, SO_2 $(CH_3CO)_2O$, N_2O_5 and P_2O_5 in varying proportions. A max. N content of approx. 14% was obtained with a nitrating mixt. of HNO_3 and P_2O_5. The product was only slightly sol. in Et_2O-EtOH mixt. Further expts. are in progress. C. G. STORM

The properties of the nitroglycerin isomers. A. A. DSERSHKOVICH AND K. K. ANDREEV. *Z. ges. Schiess- Sprengstoffw.* **25**, 353–6, 400–3(1930).—The literature of the subject is reviewed. D. and A. compared liquid nitroglycerin (*A*) with the frozen labile

(*B*) and stable (*C*) forms, as regards brisance and rate of detonation. The Pb block test method of Hess showed (*C*) to have much greater brisance than either (*A*) or (*B*), and also to be more sensitive to detonation. The same relation was confirmed by the Kast method (compression of Cu cylinders), although this method gave discordant results. Rate of detonation tests were made by the Dautriche method in glass tubes 22 mm. inside diam. with 2 mm. walls; picric acid detonating fuse having a rate of 7000 m./sec. was used. (*C*) gave the remarkably high rate of 9150 m./sec. (av. of 3); (*A*) gave 1165 m./sec. (*B*) failed to detonate completely with No. 8 detonators, but gave a rate of 9100 m./sec. when a booster of 20 g. tetryl was used. Similarly, (*A*) gave a rate of 8750 m./sec. when a booster of 10–15 g. (*C*) was used. Contrary to the rate of detonation results (*B*) gave the highest Trauzl block test (560 cc.); (*A*), 518 cc.; (*C*), 390 cc. In this test the insensitiveness of (*B*) was probably overcome by the confinement afforded by the sand stemming. No appreciable difference was found as regards sensitiveness to impact. When properly protected from contamination, (*B*) remained unchanged for periods as long as 70 days. The linear conversion velocity and crystn. velocity of the isomers were detd. It is suggested that the loss of sensitiveness of gelatin dynamites during storage is the result of gradual conversion of (*A*) to (*B*).
C. G. STORM

Researches on coal-mining explosives at the Safety in Mines Research Station, Buxton. W. PAYMAN. *Trans. Inst. Mining Eng.* **80**, 11–23(1930–1931).—Tests are made to det. the safety of explosives in dusty and gassy coal mines. These tests include the number of cartridges in a shot-hole, the position of the detonator, the character of the stemming, the safety in the presence of coal dust and of methane. Ignitions of gas have been obtained with as little as 2 oz. of a permitted explosive with no stemming, but 1 in. of noncombustible stemming will prevent ignition of gas with 28 oz. of a similar explosive. The presence of an inhibitor to prevent ignition of gas by explosives has been considered but this method has not been found practical. Expts. on the effect of compression of gas have indicated that, up to at least 11 atm., as the pressure of the air and methane is increased the ignition point is lowered. When the pressure is reduced the ignition point of methane and air is reduced even more rapidly than under increased pressure. A max. temp. is reached in the case of methane under about $^1/_3$ of an atm. The greatest amt. of work is done when a detonator is placed in the cartridge next to the stemming and pointing inward.
C. W. OWINGS

Explosive limits of fire damp. E. KIRST. *Glückauf* **67**, 50–7(1931).—Results of recent investigations were discussed.
J. D. DAVIS

A review of some recent dust explosions. D. J. PRICE AND H. R. BROWN. *Quart. Natl. Fire Protect. Assoc.* **24**, 305–29(1930).—A comprehensive report is given on dust explosions at Western Maryland Grain Elevator, Hogan Mill Feed Co., E. F. Carlston Elevator Co., Tobacco Byproducts and Chem. Corp. and Staley Manufacturing Co. All these dust explosions occurred during August and September, 1930, resulting in a gross loss of approx. $500,000. Analysis of all that is known of the causes further emphasizes the necessity of cleanliness in industries producing flammable dusts, importance of controlling equipment design to minimize the likelihood of stirring up dusts or igniting them, and the value of inert gases as a method of preventing dust explosions in grinding equipment.
C. L. JONES

Nitrates of cellulose benzoate (SENDO, KONDO) **23.** Acid adsorption and stability of nitrocellulose (WIGGAM) **23.**

SACHSE, ERICH: **Die Bekämpfung der Schlagwetter- und Kohlenstaubgefahr.** Berlin: Phönix-Verlag C. Siwinna. 32 pp. M. 2.40.

Explosives. DYNAMIT A.-G. VORM. ALFRED NOBEL & Co. (Ph. Naoúm and H. Ulrich, inventors). Ger. 513,653, Mar. 28, 1930. Addn. to 500,407. The invention of Ger. 500,407 (*C. A.* **24**, 4397) is extended to cover the nitrates of homologs and of *N*-alkyl derivs. of monoethanolamine and diethanolamine. Cf. *C. A.* **25**, 1383.

Gunpowder blasting squibs for electrical ignition. IMPERIAL CHEMICAL INDUSTRIES, LTD., and W. MCGHIE. Brit. 335,607, June 27, 1929. Structural features.

25—DYES AND TEXTILE CHEMISTRY

L. A. OLNEY

Standard colors and fewer dyes would benefit textile industry. ALOIS MAERZ. *Textile World* **79**, 428-30(1931). RUBY K. WORNER

Color measuring and color standards. M. J. SCHOEN. *Chem. Weekblad* **28**, 105–6 (1931). G. G.

Photoelectric cell has definite place in color measurement. WALTER M. SCOTT. *Textile World* **79**, 886–9(1931).—A résumé is given of the accomplishments to date along the line of color measurements, together with a warning to textile manufacturers "that they must not look for an immediate millenium in this field." The applicability, limitations and future possibilities of the photoelec. cell for color measurement are discussed. The following color analyzers that use this device are briefly described: the T[illegible] C. B. Photocolorimeter, designed by Toussaint; the photoelec spectrophotometer developed by the American Photoelec. Corp. marketed by Eimer & Amend; the portable recording and indicating color analyzer developed by P. J. Mulder and J. Rasek, marketed by the Burgess-Parr Co.; the Colorscope, developed by H. H. Sheldon, New York Univ.; and the recording photoelec. color analyzer developed by A. C. Hardy, manufactured by General Elec. Co. The fallacies of the following claims are pointed out: that the photoelectric cell introduces a distinctly new method of color measurement; that it entirely eliminates the human eye and therefore greatly increases the accuracy of the measurement by doing away with the variable human factor; and that photoelec. instruments are so simple to operate that no previous specialized training is necessary. R. K. W.

Relation between structure and affinity of dyes for plant fibers. MIECZYSLAW DOMINIKIEWICZ. *Przemysl Chem.* **14**, 289–98(1930).—See *C. A.* **24**, 5501. A. C. Z.

The vat colors from a cotton piece dyers' point of view. GEO. H. HARRIS. *Dyer, Calico Printer* **64**, 643-4(1930).—A brief discussion based on practical experience is given of the difficulties involved in the use of vat colors. The selection of a suitable dyestuff, and the importance of such factors as the quality of the water, the temp of the dye bath, the method of handling the goods in running them through the dye bath, etc, are considered. RUBY K. WORNER

Pectographic studies of solutions of dyestuffs. PAUL BARY. *Rev. gén. colloïdes* **8**, 62–8(1930); cf. *C. A.* **24**, 3417. The similarly constituted compds. parafuchsin and fuchsin AB in aq. solns. give the same sort of pectographs in dil. and concd. soln., with crystn. being retarded in dil. soln. Methyl violet does not give crystals. Safranine T gives crystals at all concns., while safranine MN gives amorphous bands but yields crystals at 0.025% concn. Hence, in safranines, dilu aids crystn. and impedes it in the triphenylmethane derivs. The choice of solvent modifies completely the pectographs obtained in almost all cases. Picric acid in acetone gives clear unique crystals while in alc. it gives a gel impregnated with crystals. Safranine MN, which in water gives an unstable gel and crystals, in acetone yields fine lines as also do safranine T, methyl violet, parafuchsin, crystal violet and Induline scarlet. Ultramicroscopic examns. of these solns. show that all those which give a pectograph of fine parallel lines contain visible granules while those which give a gel deposit are optically void. F. W. L.

Action of nitrous acid on animal fibers, and reactions of the products formed with azo components. M. J. VAN TUSSENBROEK. *Chem. Weekblad* **28**, 62–5(1931).—The question is reviewed whether HNO_2 forms reactive diazonium compds. with amino acids of the fiber, or whether it is merely absorbed, leading, on development, to nitrosophenols and their dye derivs. Formation of $HOC_6H_4N_2NO_2$ from PhOH and N_2O_3 in excess (Morel and Sisley, *C. A.* **22**, 4515) was confirmed in this particular instance only. When N_2O_3 was conducted into an Et_2O soln. of *p*-cresol and tyrosine, $HO(O_2N)_2C_6H_2Me$ was formed, but no diazo compd. Light fastness of dyes developed on the fiber is very good, especially upon afterchroming. Shades are decidedly changed (deepened) and acid and alkali fastness improved by chroming. Diazotized fibers show light sensitivity. Photographs may be printed out on silk. K. H. ENGEL

Rapid identification of dyes on fibers. RAYMOND LEVÉ. *Tiba* **9**, 11–7(1931).—A scheme of analysis is presented for the rapid identification of the class of dye used on a given sample. The various tests (treatment with HClO, boiling with Na_2CO_3, reduction with $SnCl_2$ and with alk. hyposulfite) are carried out by adding the reagents to the dyed fibers in test tubes. A. PAPINEAU-COUTURE

The dyeing of cotton warp during sizing. A. POUZET. *Tiba* **8**, 1447–9(1930).—The dyeing of cotton warp in the sizing bath and before sizing is described and a no. of formulas for each process are given. A. PAPINEAU-COUTURE

Chemical finishing treatments of cotton. C. THIBAUD. *Tiba* **8**, 1457–63(1930); **9**, 35–41(1931).—The treatments, other than mercerization and bleaching, which effect a considerable modification in the phys. aspect of cotton are described. A. P.-C.

Dyeing and finishing cotton corduroys. L. MACKIRDY. *Textile Recorder* **48**, No. 575, 57–9(1931).—A detailed description is given of the processing of this type of fabric from the time it comes from the loom "in the grey" to the final folding and boxing of the finished article. RUBY K. WORNER

Continuous bleaching challenges the chemist. WINN W. CHASE. *Textile World* **79**, 636–7(1931).—The need of chem. developments to keep pace with the mech. improvements is stressed. RUBY K. WORNER

Practical suggestions for better handling of acetate yarns. STEWART H. GILSTON. *Textile World* **79**, 431–3(1931).—Suggestions are given for modifications and adjustments of the machinery used in winding, twisting and tinting cellulose acetate yarn. RUBY K. WORNER

Preparation of fabrics made of, or containing, acetate rayon, prior to dyeing. J. CALLADINE. *Russa* **5**, 1871, 1873(1930). A. PAPINEAU-COUTURE

Dyeing of acetate rayon. HERBERT BRANDENBURGER. *Kunstseide* **12**, 267–72 (1930); cf. *C. A.* **25**, 209.—Photochemical decomposition of the dyes. The fading of dyes on acetate-rayon fabrics is discussed in the light of oxidation, reduction and enzyme theories. Most of the cases discussed are explained on the basis of oxidation. According to this theory the dyestuff forms a peroxide which oxidizes the constituents of the dye. The dyeing of cellulose acetate is viewed as a soln. process and not as an adsorption process. The dye is present in a more finely divided state than on cotton textiles and therefore a greater surface of the dye is exposed to oxidation. On this basis is explained the poor fastness of basic dyes and acid (wool) dyes on acetate rayon. The fastness of various diazo colors and its relation to their constitution are discussed. *Ibid* 305–10.—A retrospect and an outlook in the future of acetate rayon developments with regard to the dyeing of this type of rayon and its mixts. with cotton, viscose rayon, wool and silk. FREDERICK C. HAHN

Dyeing acetate rayon black. JEAN PAUL SISLEY. *Tiba* **9**, 17–23(1931).—A review of the various dyes and processes which have been proposed. A. PAPINEAU-COUTURE

Practical viscose dyeing. HANS ENGEL. *Kunstseide* **12**, 290–2(1930); *Jentgen's Rayon Review* **2**, 255–6(1930).—Blotchily dyed viscose rayon is as a rule caused by unsuitable preliminary washing and improper handling during dyeing, and, less frequently, to the choice of dyestuff. Streakiness in the dyeing is due to abnormal viscose. The foregoing difficulty may be obviated by the use of dyes of the Rigan type, or mixts. thereof with other direct dyes which are known to equalize well. F. C. H.

The structure of rayon in relation to aniline-black dyeing. A. J. HALL. *Silk J.* **7**, No. 77, 37–8, No. 78, 33, 41(1930); cf. *C. A.* **24**, 6021.—Because of the greater absorbent properties of the regenerated rayons they give a better black than cotton. Acetate rayon shows a selective absorbency for basic compds., and will not absorb salts. Aniline and other amines are absorbed but the oxidant ($NaClO_3$) is not. It is suggested that acetate rayons might be treated with aniline first and then oxidized in a fresh bath. At present aniline black has not been satisfactorily dyed on acetate rayons. A. R. MACORMAC

Preparation, dyeing and finishing of rayon crepes. A. CRISPE. *Russa* **5**, 59–63 (1931). A. PAPINEAU-COUTURE

Printing of fast-color rayon crepes requires careful attention to details. HAROLD B. STURTEVANT. *Textile World* **79**, 338–4(1931). RUBY K. WORNER

Sizing and finishing of rayon. W. A. DYES. *Kunstseide* **12**, 313–5, 340–2(1930); cf. *C. A.* **24**, 1986.—A discussion of the prepn., testing and required properties of starch pastes for the sizing and finishing of rayon. FREDERICK C. HAHN

The coloration of silk stockings. S. R. TROTMAN. *Dyer, Calico Printer* **65**, 23–4 (1931); cf. *C. A.* **24**, 1985.—The various processes are described with particular emphasis on the difficulties involved. The water used, the preliminary soaking, the app. used for dyeing, the degumming process, the dyeing of pure silk and silk-cotton stockings, the selection of suitable dyestuffs for each type, etc., are discussed. RUBY K. WORNER

Hosiery redyeing made easier. HERBERT C. ROBERTS. *Textile World* **79**, 345 (1931).—Before stripping, a preliminary bath composed of 1–3% soda ash and $1^1/_2$–$1^3/_4$% sol. pine oil is recommended. The advantages of the use of the sol. pine oil are: It penetrates and opens up the fibers without injurying them. It removes part of the color, but does not start the resist colors in the picot edge or clock. It reduces the amt. of hyposulfite or sulfoxylate needed. It reduces the stripping time, thereby reducing also the danger of mech. injury to the goods. RUBY K. WORNER

The preparation of tussah silk and schappe silk prior to dyeing. J. BRACONNOT. *Russa* **5**, 1867–71, 2043–7(1930); **6**, 41–5(1931).—A review. A. P.-C.

The printing of wool and silk using the Neolan colors. VERNON D. FREEDLAND. *Dyer, Calico Printer* **64**, 646–7(1930).—The Neolan dyes used for printing are divided into those which require the addn. of Cr acetate to the printing paste and those which do not require it. Recipes are given for each type. A list of the solubilities of these dyestuffs in H_2O at 212°F. is also given. RUBY K. WORNER

Plate printing on silk. J. CLAROU. *Russa* **5**, 1705–9(1930).—Practical operating hints, with a no. of formulas. A. PAPINEAU-COUTURE

The dyeing and finishing of union wool-silk goods. L. BONNET. *Russa* **5**, 2047–57 (1930).—This is a general description, dealing more particularly with the various types of machines available for the handling of the goods. A. PAPINEAU-COUTURE

Dyeing wool with indigo in fermentation vats. E. DUTOIT. *Tiba* **8**, 1309–19 (1930).—The principles and technic of the process are described. A. P.-C.

The treatment of lace curtains. C. L. FISHWICK. *Tiba* **8**, 1435–41(1930).—Methods of bleaching, dyeing and finishing of lace curtains, at present in use in various European countries, are described. A. PAPINEAU-COUTURE

Dyeing and finishing curl cloths. DOUGLAS KERMODE. *Dyer, Calico Printer* **65**, 139–40(1931); cf. *C. A.* **24**, 6022.—Curl cloths consist of a worsted or worsted-mohair pile in loop form, knitted into a cotton backing. As a rule its manuf. is a work for specialists. Dyestuffs which have been found suitable for this type of fabric are listed and methods of applying them are described. RUBY K. WORNER

The dyeing of wool-felt and hair-felt hats. E. DUTOIT. *Tiba* **8**, 1441–7(1930).—Practical operating hints with a no. of formulas are given. A. PAPINEAU-COUTURE

Dyeing vegetable-ivory buttons. KARL HAHN. *Dyer, Calico Printer* **64**, 399–400 (1931).—See *C. A.* **24**, 5502. RUBY K. WORNER

Bleaching and dyeing leaves and grasses. F. GROVE-PALMER. *Dyer, Calico Printer* **64**, 707–8(1930); cf. *C. A.* **25**, 561.—The basic dyes are generally used for these materials because of their brightness, cheapness and high tinctorial power. Cellulose enamels in various colors may be sprayed on with an air pistol. Metal leaves can be obtained by spraying on bronze powder in a clear cellulose medium, or better still by electroplating with metals. RUBY K. WORNER

Kaoliang starch as a finishing material for textiles. JUSABURO KAWAMATA. *Abstract from Rept. Central Lab. S. Manchuria Railway Co.* **1929**, 27–9.—In respect to its value as a sizing material kaoliang starch occupies a position between wheat starch and corn starch. V. F. HARRINGTON

Noteworthy machinery development of recent years marches unretarded through 1930 into 1931. EDWIN D. FOWLE. *Textile World* **79**, 604–7(1931).—A review of new machinery developed for bleaching, dyeing and finishing. RUBY K. WORNER

A new use for textiles. GEO. RICE. *Dyer, Calico Printer* **65**, 28–9(1931).—Cotton stationery is described with particular reference to the processes used for stiffening, coating, weighting and glossing the fabric. The requirements of this material are that its stiffness shall be such that it can be written upon with a pen or printed upon with a typewriter; that the interstices shall be filled, and the finish smooth, so that the impression of the pen or the typewriter will be even; that the handle shall be satisfactory; that the writing shall be retained even when wet; and that the fabric must permit erasures. RUBY K. WORNER

Washing cotton and linen. YNGVE DALSTRÖM. *Svensk Kem. Tids.* **42**, 263–77 (1930).—A crit. review is given of the conflicting laundry technology literature. A. R. ROSE

Future textile-laboratory practice. GEO. B. HAVEN. *Am. Dyestuff Reptr.* **19**, 757–61(1930); *Textile World* **78**, 3028–30(1930); **79**, 42–4(1931); *Melliand* **2**, 1319–28 (1931).—New avenues are suggested for directing the future work of the Textiles Committee of the Am. Soc. for Testing Materials. Illustrated descriptions are given of app. for measuring yarn balance, corkscrew in yarns, crimp and yarn slippage, all of which are properties of the yarn, and for measuring porosity, absorbing power for liquids, bursting strength, precise thickness, abrasion, heat flow and resilience of fabrics. R. K. W.

Influence of laundering and exposure to light upon some washable silks. MARION GRIFFITH. Ohio Agr. Expt. Sta., *Bimonthly Bull.* **147**, 179–81(1930).—Only pure dye branded silks were used. All 12 samples showed a very decided fading upon exposure to light and during the laundering process. Blue and green colors faded most, while peach and yellow were least affected by light exposure. The highest-priced silk contained less than $^1/_3$ the amt. of finishing materials present in the least expensive silk. The breaking strength varied from 31–69% of the original when exposed 48 hrs. to light. The de

crease in strength resulting from 15 launderings varied from 15–17%. The silks lost 25–42% of their original elasticity as a result of exposure to light for 48 hrs.. The expts. are being continued along chem. lines. C. R. FELLERS

A cloth-wear testing machine. J. A. MATTHEW. *J. Textile Inst.* **21**, 546–60T (1930).—The design of machines for testing cloth wear is discussed and a new machine is described. Its principle is that a sample under a definite tension is rubbed with a Carborundum surface. The no. of rubs necessary to produce fracture is taken as a measure of the resistance of the cloth to wear. Results are given to show the effect of varying the rubbing conditions for a cloth and also to show the comparative resistance to wear of a no. of cloths under fixed rubbing conditions It is shown that wear tests and tensile strength tests bear little relation to each other. RUBY K. WORNER

Relation of cotton to synthetic fibers. C. E. MULLIN. *Jentgen's Rayon Review* **2**, 231–8(1930).—See *C. A.* **24**, 5483. FREDERICK C. HAHN

Fiber cross-section. H. L. BARTHELEMY. *Kunstseide* **12**, 316–7(1930).—An improved method of making rayon cross-sections is described. A slit is made lengthwise in a small cork to a depth $^2/_3$ of the diam. A single thread of rayon is placed in the slit parallel to the axis of the cork and then disks are cut therefrom with a razor. This method is an advantage over the Herzog method in that the individual filaments can be distinguished and counted FREDERICK C. HAHN

Fiber cross-section of acetate rayon. H. STADLINGER. *Jentgen's Rayon Review* **2**, 240–3(1930); *Kunstseide* **12**, 310–3(1930).—The two general types of acetate rayon cross-sections, "ribbon-like" (I) and "cloverleaf" (II) are discussed, and microphotographs are given of the cross-sections of various com. acetate rayons. Earlier acetate rayons were of the type I but present-day rayons are of type II. Type II are superior as regard to lower gloss and higher wet and dry strengths. FREDERICK C. HAHN

Physicochemical studies on the structure of wool hair after treatment with alkali, acids and chlorine. ERNST TANZER. *Wiss. Arch. Landw., Abt. B, Tierernähr. Tierzucht* **4**, 297–346(1930).—Wool from several breeds of sheep was treated with HCl, H_2SO_4, HNO_3, AcOH, Cl water and chloral hydrate; the wool was then investigated as to histological changes, change in wt., fineness, flattening, hygroscopic properties, tensile strength, elasticity, polarization, reaction with methylene blue, biuret test, reaction with Millon's reagent and Allwördens reaction. Many references are appended. W. GORDON ROSE

Rotenone as a moth-proofing agent. E. A. BACK, R. T. COTTON AND R. C. ROARK. *J. Econ. Entomol.* **23**, 1014(1930).—Rotenone, the insecticidal constituent of derris root, cubé root and some other tropical plants is effective as a moth-proofing agent. From 1 to 2% of rotenone is dissolved in acetone and the soln. is used to impregnate woolen goods. The impregnated goods appears to be highly resistant to attack of the clothes moth, *Tineola biselliella*, and of the beetles, *Anthrenus vorax* and *Attagenus piceus*. Acetone solns. contg. as low as 0.05% rotenone gave excellent protection from these insects. The rotenone treatment appears to be equal to that of other propietary moth-proofing solns. now on the market. Application for a public service patent has been filed. C. H. RICHARDSON

Note on a little-known fireproofing process. E. DUTOIT. *Tiba* **9**, 33(1931).—Perkin's method consists in impregnating flannel with a 26° Bé. Na stannate soln., draining, drying between heated Cu rolls, treating with a 10° Bé. $(NH_4)_2SO_4$ soln. to ppt. $Sn(OH)_4$, draining, drying, washing and drying again. The resultant fireproofing is permanent, as the SnO_2 is combined with the fiber; it increases the mech. strength of the fabric and its resistance to washing and ironing, and moreover it acts as mordant if it is to be dyed. A. PAPINEAU-COUTURE

Condensation products from aryldithioglycolic acids [dyes] (GEBAUER-FÜLNEGG JARSCH) **10.** Heteropolar C compounds. XII. New dyestuffs of the aniline blue series and perchlorates of several important triphenylmethane dyes (DILTHEY, DINKLAGE) **10.** β-Hydroxy-α-picoline azo dye (Brit. pat. 335,818) **10.** Leuco indigo (Fr. pat. 693,469) **10.** Triazine derivatives [intermediate] (Brit 335,783) **10.**

Dyes. COMPAGNIE NATIONALE DE MATIÈRES COLORANTES ET MANUFACTURES DE PRODUITS CHIM. DU NORD RÉUNIES (ÉTABLISSEMENTS KUHLMANN). Fr. 692,927, June 28, 1929. Anthraquinone derivs. which dye cellulose acetate silk are prepd. by the reaction of sulfonic acids of aminohydroxyanthraquinones such as diaminoanthrarufin and diaminochrysazine, their salts or reduction products, with either an aldehyde or its substitutes in the presence of hyposulfite, or hyposulfite compds. of aldehydes previ-

ously formed in the presence of an excess of hyposulfite or sulfoxylates of aldehydes. Thus, Na diaminoanthrarufin-2,6-disulfonate is dissolved in water and BzH and $Na_2S_2O_4$ are added and the mixt. is heated. The product dyes cellulose acetate blue. Several other examples are given.

Dyes. I. G. FARBENIND. A.-G. Fr. 693,474, April 7, 1930. Dyes of the anthraquinone series are made by the reaction of α-aminoanthrimidcarbazoles or their substitution products with anthraquinone-*o*-halocarboxylic acids or their derivs. or substitution products and transforming the reaction products into the corresponding acridones by the known methods. Thus, 4-amino-1,1′-anthrimidcarbazole (by sapon. of 4-benzylamino-1,1′-anthrimidcarbazole) is heated with anthraquinone-2-bromo-1-carboxylic acid in the presence of AcOK, MgO and $(AcO)_2Cu$. The product dyes cotton from the vat in olive-green shades. Other examples and formulas of the products obtained are given.

Dyes. I. G. FARBENIND. A.-G. Fr. 693,169, April 2, 1930. *N* condensation products which dye cotton from the vat are prepd. by condensing aminoanthraquinonecarboxylic acids, the COOH groups of which are so transformed that they do not form salts, with negatively substituted polynuclear org. compds. Thus, dibromo-3,4,8,9-dibenzopyrene-5,10-quinone is boiled in $C_{10}H_8$ with NaOAc, CuO and the Et ester of 1-aminoanthraquinone-2-carboxylic acid until practically all the Br is removed. The product dyes cotton in violet-red shades from the vat. Several other examples are given.

Dyes. I. G. FARBENIND. A.-G. (Paul Ochwat, inventor). Ger. 515,331, May 2, 1929. The dyes obtainable from anthrimides by acid or alk. condensation are halogenated, and the products are caused to react with N compds. contg. at least one exchangeable H atom. Products giving deeper shades than the initial dyes are so obtained. Thus, the dibromo deriv. of a dye prepd. as described in Ger. 507,340 (*C. A.* **25**, 599) may be boiled for 2 days in $C_{10}H_8$ with 1-aminoanthraquinone in the presence of Na_2CO_3, NaOAc and CuCl. Other examples are given also.

Dyes. I. G. FARBENIND. A.-G. (Paul Nawiasky, inventor). Ger. 515,096, July 17, 1928. Addn. to 498,292. The method of purifying *N*-dihydro-1,2,2′,1′-anthraquinonazine described in Ger. 498,292 (*C. A.* **24**, 3907), is now applied to the dye obtained by treating the above compd. with H_2SO_4 of low-water content, preferably in the presence of H_3BO_3. An example is given. Cf. *C. A.* **25**, 599.

Azo dyes. ERNEST F. GRETHER (to Dow Chemical Co.). U. S. 1,790,807, Feb. 3. Azo dyes which give various red shades are formed from the tetrazo deriv. of a diaminodiaryl ether such as diaminodiphenyl ether coupled with an arylide of 2,3-hydroxynaphthoic acid such as 2,3-hydroxynaphthanilide.

Azo dyes. GUILLAUME DE MONTMOLLIN (to Soc. anon. pour l'ind. chim. à Bâle). U. S. 1,791,444, Feb. 3. By coupling arylides of 2,3-hydroxynaphthoic acid such as the arylide derived from *o*-aminodiphenyl ether with diazo compds. such as those derived from 4-chloro-2-aminodiphenyl ether, *o*-aminodiphenyl ether, the corresponding cresylchlorophenyl or chlorocresyl ether or the benzyl ethers of *o*-aminophenols or *o*-aminocresols, fast red dyes are produced, which may be formed on a suitable substratum and employed for making *red varnishes*. Examples and details of procedure are given.

Azo dyes. MAX SCHMID and FRITZ STRAUB (to Soc. anon. pour l'ind. chim. à Bâle). U. S. 1,791,432, Feb. 3. Azo dyes suitable for conversion into metal derivs. such as those of Cr or of Cu are obtained by coupling a diazo-compd. contg. an OH group in *o*-position to the diazo group (such as the diazo deriv. of 4-chloro-2-aminophenol-6-sulfonic acid or 1-diazo-2-naphthol-4-sulfonic acid) with pyrazolone derivs. such as 5-pyrazolone-3-carboxylic acid or its Me or Et ester. Examples are given of dyes the Cr compds. of which produce violet or red dyeings.

Azo dyes. I. G. FARBENIND. A.-G. Brit. 335,555, June 21, 1929. Dyes insol. in water are formed in substance, on the fiber or on a substratum by coupling the diazo compd. of an amine of the general formula aryl-NH.R′.X.R″.NH_2 (in which R′ and R″ are aromatic nuclei which may be substituted or unsubstituted and X represents either a direct linkage or an —N:N— group, or in which —R′—X—R″—stands for a condensed aromatic system) with an arylide of 2,3-hydroxynaphthoic acid. By use of 2 mol. proportions of nitrite, nitrosodiazo compds. are obtained and the corresponding nitrosoazo dyes may be treated in substance or on the fiber with a reducing or saponifying agent to remove the nitroso group. Several examples are given. Cf. *C. A.* **25**, 1092.

Azo dyes. I. G. FARBENIND. A.-G. (Rudolf Heil, inventor). Ger. 515,230, Sept. 9, 1928. Brown azo dyes insol. in water are prepd. by coupling the diazo compds. from 2-amino-*N*-alkylpyrazoleanthrones, or 2-amino-*N*-aralkylpyrazoleanthrones, with arylides of 2,3-hydroxynaphthoic acid. An example is given.

Azo dyes. IMPERIAL CHEMICAL INDUSTRIES, LTD. Fr. 692,694, March 3, 1930. See Brit. 331,839 (*C. A.* **25**, 213).

Monoazo dyes and amines. BRITISH RESEARCH ASSOCIATION FOR THE WOOLEN & WORSTED INDUSTRIES and A. T. KING. Brit. 335,646, July 6, 1929. Monoazo dyes and amines are produced simultaneously by the reduction of disazo dyes of the type X.N:N.Y.N:N.$C_{10}H_6$(OH) in which X and Y represent aromatic residues such as those of benzene, naphthalene, diphenyl, diphenyl sulfide or other grouping, the reduction being effected with alkali metal bisulfite (with intermediate formation of disazosulfites). The disazosulfites may be treated with alkali metal hyposulfite to produce the amine or aminoazo compd. Several examples are given.

Disazo dyes. I. G. FARBENIND. A.-G. Brit. 335,705, Oct. 4, 1928. A disazo dye giving vivid greenish yellow dyeings on wool, fast to fulling and to light, is formed by coupling tetrazotized 4,4′-diamino-3,3′-dichloro-5,5′-dimethyltriphenylmethane with 1-(2′-chloro-5′-sulfo)phenyl-3-methyl-5-pyrazolone The 4,4′-diamino 3,3′-dichloro-5,5′-dimethyltriphenylmethane is made by condensing BzH with 3-chloro-2-toluidine Mention is also made of the production of some other similar dyes. Cf *C. A.* **24**, 2304

Disazo dyes. I. G. FARBENIND. A.-G. (Karl Dobmaier, inventor) Ger. 515,231, Aug. 21, 1927. Disazo dyes giving yellow shades on cotton are prepd by coupling the diazo compds. from nitrobenzoylated diamines or their derivs. with suitable components free from NH_2 groups, reducing the NO_2 group of the monoazo dyes so obtained, diazotizing, and coupling with pyrazolone derivs contg diazotizable NH_2 groups, or with compds. of the C_6H_6 or $C_{10}H_8$ series in which a diazotizable NH_2 group is present in a "heteronuclear" side chain. Suitable components for the first coupling are phenols and their ethers and carboxylic acids, acetoacetanilide, and phenyl methyl pyrazolone For the second coupling, *m*-aminobenzoyl-2,5,7-aminonaphtholsulfonic acid is specified, *inter alia*. The reduced monoazo dyes may be condensed with nitrobenzoyl chloride or its derivs., reduced again, and diazotized before finally coupling as above. Other modifications are described also. Examples are given

Disazo and trisazo dyes and their metal compounds. SOC. ANON. POUR L'IND. CHIM. À BÂLE, F. STRAUB and W. ANDERAU Brit 335,523, April 23, 1929. Disazo and trisazo dyes obtainable by coupling with the monoazo dye from 2-amino-5-naphthol-7-sulfonic acid (2 mols. coupled acid) either 1 mol proportion of an *o*-hydroxydiazo compd. or 2 mol. proportions of an *o*-carboxy diazo compd , or one mol proportion each of an *o*-hydroxydiazo compd. and a diazo compd contg no *o*-hydroxyazo group (excluding in this case *o*-hodroxycarboxy-group-contg. diazo compds) are treated (at any stage) with chroming or other metallizing compds. such as compds. of Mn, Fe, Co or Ni Various examples are given for producing dyes of different colors.

Trisazo dyes. IMPERIAL CHEMICAL INDUSTRIES, LTD. Fr. 693,585, April 9, 1930. Trisazo dyes, contg. at least 2 COOH or 2 SO_3H groups or one of each and suitable for dyeing regenerated cellulose, are obtained by coupling tetrazotized 3-aminobenzene-1′-azo-4′-aminonaphthalene or a substitution product thereof with one mol. proportion of a phenol naphthol or a carboxylic or sulfonic acid thereof and with one mol. proportion of the same or another component other than a naphtholarylketone or an arylide of 2,3-hydroxynaphthoic acid. The same products are obtainable by coupling diazotized 3-nitrobenzene-1′-azo-4′-aminonaphthalene or a substitution product thereof with a phenol, naphthol or a carboxylic or sulfonic acid thereof, reducing, diazotizing and coupling with a suitable component Several examples are given.

***o*-Carboxyazo dyes.** I. G. FARBENIND. A.-G. Fr. 693,024, Mar. 29, 1930. *o*-Carboxyazo dyes dyeing substantively and contg Cu are made by the reaction of agents liberating Cu on dyestuffs obtained by coupling tetrazotized 4,4′-diaminodiphenyl-3,3′-dicarboxylic acid with 2 identical or different mols. of arylamino- or aroylaminonaphtholsulfonic acids which contain in the aryl or aroyl group groups which render the compd. sol. in water. Several examples are given

Vat dyes. I. G. FARBENIND. A.-G. (Arthur Wolfram and Emil Hausdörfer, inventors). Ger. 514,432, Dec. 31, 1927. See Brit. 303,375 (*C. A.* **23**, 4579).

Vat dyes. I. G. FARBENIND. A.-G. (Paul Nawiasky and Alfred Ehrhardt, inventors). Ger. 514,433, July 20, 1929. Green vat dyes are prepd. by halogenating dimethoxydibenzanthrone in an inert org. solvent in the presence of a catalyst, *e. g.*, $FeCl_3$. Examples are given.

Vat dyes. I. G. FARBENIND. A.-G. (Max A. Kunz and Karl Köberle, inventors). Ger. 515,328, Mar. 31, 1929. Addn. to 499,169 (*C. A.* **24**, 4168) and 510,600 (*C. A.* **25**, 1094). Violet to green-blue vat dyes are prepd. by treating dibenzanthrone or isodibenzanthrone or their derivs. with Br or other brominating agent in an acid medium in the presence of a metal or a metal compd. as a catalyst. Hg, Mn and Sb are suitable

catalysts, and when using these the use of $HClSO_3$ as the acid medium does not give rise to products contg. Cl. The products are fast to light and atm. influences. Examples are given.

Vat dyes. I. G. FARBENIND. A.-G. (Robert Berliner, inventor). Ger. 515,329, July 5, 1928. See Brit. 314,899 (*C. A.* **24**, 1520).

Vat dyes. I. G. FARBENIND. A.-G. (Max A. Kunz and Karl Köberle, inventors). Ger. 515,330, Dec. 30, 1928. Addn. to 513,228 (*C. A.* **25**, 1396). New vat dyes giving varied shades are prepd. by condensing neg. substituted dibenzanthrones or isodibenzanthrones with amides or imides of mononuclear carboxylic acids. The condensation may be effected in a high-boiling solvent in the presence of a catalyst and an acid-binding substance. The products may be sapond. by the usual methods to yield mono- or polyamino compds of the dibenzanthrone or isodibenzanthrone series. Examples are given.

Vat dyes. I. G. FARBENIND. A.-G. Fr. 692,869, Mar. 28, 1930. Halogenated benzanthronepyrazoleanthrones, which dye textile fibers in valuable blue shades, are prepd. by treating benzanthronepyrazoleanthrone, its derivs. of isomers, preferably in the presence of catalysts, with halogens or substances capable of liberating halogens in the presence of diluents or solvents. Several examples are given.

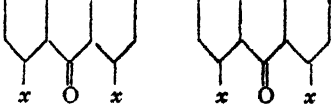
Vat dyes. I. G. FARBENIND. A.-G. Fr. 693,042, Mar. 29, 1930. Stable leuco vat dye prepns. forming by soln. in water a vat ready to be used for dyeing, are prepd. by mixing with a protective colloid, a wetting agent and a stabilizer, the leuco compds. of vat dyes of the anthraquinone and thioindigo series which are capable of dyeing from a "cold vat" of hyposulfite. The mixt. is dried and the dry powders ground with a caustic alkali and a reducing agent. Thus, the leuco compd. may be mixed with molasses, an alkylnaphthalenesulfonic acid, hydroquinone, caustic alkali and $Na_2S_2O_4$.

Vat dyes. I. G. FARBENIND. A.-G. Fr. 693,107, April 1, 1930. Vat dyes contg. one or more halogens are prepd. by treating isodibenzanthrone or its derivs., or derivs. of dibenzanthrone, with anhyd. metallic halides capable of yielding halogens. If necessary other halogenation agents, substances lowering the m. p., appropriate catalysts, solvents or diluent are added. The halides of Fe, Al, Sb and Hg are suitable for the chlorination, and alkali and alk. earth salts may be used for lowering the m. p.

Vat dyes. I. G. FARBENIND. A.-G. Fr. 693,410, April 5, 1930. Vat dyes are prepd. by heating 2-mercapto-1-methylanthraquinone or 3-mercapto-2-methylanthraquinone or their derivs. with S or by heating 2-halo-1-methylanthraquinone or 3-halo-2 methylanthraquinone or their derivs. with S and substances producing or facilitating the substitution of halogens by S. Several examples are given.

Vat dyes. I. G. FARBENIND. A.-G. Fr. 693,817, April 12, 1930. Vat dyes are obtained by treating the anthraquinonyl-4'-amino-1,2-benzanthraquinones with condensing agents. Thus, α-anthraquinonyl-4'-amino-1,2-benzanthraquinone when heated with moderately dil. H_2SO_4 or with a mixt. of NaCl and $AlCl_3$ gives a product which dyes pure yellow from the vat. The same initial material treated with $AlCl_3$ in the presence of a tertiary base such as pyridine gives a greenish blue from the vat. Several other examples are given.

Vat dyes (anthraquinonylcarbazoles). FRITZ BAUMANN (to General Aniline Works). U. S. 1,791,184, Feb. 3. Vat dyes of the general formula:

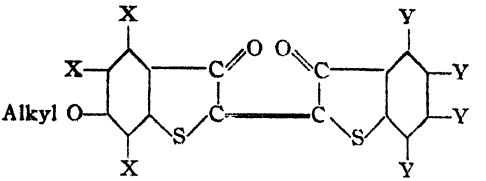


wherein at least one *x* stands for an anthraquinonylimino residue being attached to the nucleus by only one linkage in the position *x*, and the other *x*'s stand for substituents of the group consisting of H and any univalent substituent and wherein all nuclei may be further substituted, generally red to grayish powders, insol. in org. solvents, sol. in concd H_2SO_4 with a blue to reddish brown color and dyeing cotton from the vat red to grayish black shades of excellent fastness, are produced by the reaction of a 2,2'-dianthraquinonyl-1,1'-carbazole such as 5,5'-diamino-2,2'-dianthraquinonyl-1,1'-carbazole, with the corresponding 4,4'-diamino compd. or 5-amino-4'-benzoylamino-2,2'-anthraquinonyl-1,1'-carbazole, with a halogen anthraquinone compd. such as 1-*p*-tolylazimino-3-bromoanthraquinone, β-chloroanthraquinone or 1-benzoylamino-4-chloroanthraquinone, at an elevated temp. (suitably 180–250°) for 3–4 hrs. (suitably in a high-boiling solvent

such as naphthalene, trichlorobenzene or ethylcarbazole and in the presence of an acid-binding substance). Cf. *C. A.* **25**, 1396.

Vat dyes. KARL WILKE (to General Aniline Works). U. S. 1,790,780, Feb. 3. See *C. A.* **24**, 2305, 2611.

Substituted thioindigo vat dyes. KARL SCHIRMACHER, KARL ZAHN, ERWIN HOFFA and HANS HEYNA (to General Aniline Works). U. S. 1,790,843, Feb. 3. Dyes of the general formula:



wherein X and Y represent H or any substituent, at least one Y being a substituent (the constitution being such that the left-hand side of the formula is not identical with the right-hand side of the formula) are in a dry state red powders, insol. in water, alc. and ether, sol. in nitrobenzene with a red color, sol. in concd. H_2SO_4 with a green color, forming with an alk. hyposulfite yellow vats, from which animal and vegetable fibers are dyed red shades fast to light, Cl and washing, and are obtainable either by subjecting the 1-anils of such diketodihydrothionaphthenes as contain an alkoxy group in *m*-position to the S atom, and also their further substitution products substituted in the nucleus, to reaction with substituted ketothionaphthenes, the corresponding arylthioglycolic-carboxylic acids or with the acylketothionaphthenes obtainable from the said acids by condensation with acetic anhydride, or inversely by subjecting 5-alkylhydroxythionaphthenes, their substitution products substituted in the nucleus or the corresponding arylthioglycoliccarboxylic acids or acylketothionaphthenes obtainable from the said acids by condensation with acetic anhydride, to reaction with the 1-anils of substituted diketodihydrothionaphthenes. By introducing further substituents into one or the other nucleus it is possible to influence the shade toward blue or toward yellow. Numerous examples with details are given.

Stable water-soluble vat dye preparations. JAMES MORTON, JAMES I. M. JONES, BIRKETT WYLAM and JOHN E. G. HARRIS (to Scottish Dyes, Ltd.). U. S. 1,790,759, Feb. 3. Vat dyes (numerous examples of which are given in detailed examples of treatment) are treated with reagents such as chlorosulfonic acid, its salts, fuming H_2SO_4, SO_3 or salts of pyrosulfuric acid, in the presence of a tertiary org. base such as pyridine and of Cu or Zn (suitably with addn. also of a small proportion of $SnCl_2$). The treatment is applicable to dyes of the flavanthrone, indanthrone, dibenzanthrone, benzanthrone, anthraquinone, indigo and halogenated indigo groups, the products being suitable for dyeing cotton, wool or natural or artificial silk from aq. soln. with development of the color of the original dye on treatment with $FeCl_3$ soln., alkali metal hypochlorite or a perborate or permanganate soln.

Indigoid vat dyes. I. G. FARBENIND. A.-G. Fr. 693,903, April 14, 1930. 6-Methylhydroxythionaphthene is condensed with cyclic diketones of the isatinic series or their derivs. Thus, isatin is converted into the α-chloride by means of PCl_5 with the addn. of PhCl, 6-methylhydroxythionaphthene in PhCl is added at about 80° and the mixt. stirred. The product dyes cotton in intense bluish grey shades. Other examples are given.

Indigoid dyes. I. G. FARBENIND. A.-G. (Wilhelm Bauer, inventor). Ger. 513,230, June 13, 1928. Violet indigoid dyes are prepd. by coupling 5-halo-3-hydroxythionaphthenes with reactive α-derivs. of haloisatins, especially of 5,7-dichloro- or -dibromo-isatin. An example is given.

Indigoid dyes. I. G. FARBENIND. A.-G. (Karl Thiess, Theodor Meissner and Hans Heyna, inventors). Ger. 515,134, Feb. 8, 1928. 4,7,4',7'-Tetramethyl-5,5'-dihaloindigos are prepd. by the customary processes from 1,4-dimethyl-3-amino-6-halobenzenes, or from 1,4-dimethyl-3-amino-6-halobenzene-2-carboxylic acids. The same products may be obtained from 1,4-dimethyl-3-aminobenzene or 1,4-dimethyl-3-aminobenzene-2-carboxylic acid, by converting these into 4,7,4',7'-tetramethylindigo and then halogenating. Examples are given.

Indanthrone dyes. LYNNE H. ULICH (to Newport Chemical Corp.). U. S. 1,790,887, Feb. 3. See Brit. 314,803 (*C. A.* **24**, 1520).

Wool dyes. CHEMISCHE FABRIK VORM. SANDOZ. Ger. 515,055, July 13, 1929.

Reddish blue to reddish violet dyes for wool, etc., are prepd. by condensing anthraquinone derivs. contg. substituents exchangeable for an arylamino group, with aromatic amines having at least one halogen atom in the *m*-position to the NH_2 group. The condensation products may be sulfonated. Thus, 1-amino-2-methyl-4-bromoanthraquinone may be condensed with *m*-chloroaniline at 160°, and the product sulfonated. Other examples are given also.

Acid wool dyes. I. G. FARBENIND. A.-G. (Georg Kalischer and Ernst Honold, inventors). Ger. 514,434, Feb. 2, 1928. See Fr. 668,871 (*C. A.* **24**, 1747).

Carboxylic acids of *m*-hydroxyphenylarylamines. I. G. FARBENIND. A.-G. (Leopold Laska and Oskar Haller, inventors). Ger. 515,208, Dec. 2, 1928. Alkali salts of *m*-hydroxyphenylarylamines are heated with CO_2 under pressure. Thus, the K compd. of *m*-hydroxydiphenylamine, heated with CO_2 at 150–70° under 5–10 atm. pressure, yields a product m. 180–1° believed to be *3-hydroxydiphenylamine-4-carboxylic acid*. Numerous compds. derived from substituted *m*-hydroxydiphenylamines are described also. The products are stable and are useful as *intermediates for dyes*.

Dibromodibenzanthrone. MAX A. KUNZ and KARL KÖBERLE (to General Aniline Works). U. S. 1,791,215, Feb. 3. By a process involving brominating dibenzanthrone with Br in chlorosulfonic acid, with addition of Sb, there is obtained a substantially pure dibromobenzanthrone which dissolves in 96% H_2SO_4 to a pure violet soln., in $PhNO_2$ to a pure blue soln. with a pure red fluorescence and in $PhNH_2$ to a pure blue soln. without fluorescence, and which *dyes cotton* from a blue vat with a violet tinge strong marine blue shades which are faster to light than the dyeings obtained from the unhalogenated initial material.

Pyrazolone derivatives. I. G. FARBENIND. A.-G. (Hans Grotowsky, inventor). Ger. 514,421, July 17, 1926. Colored condensation *products useful as dyes or as intermediates for dyes or drugs* are prepd. by treating 1-phenyl-3-methyl-5-pyrazolone, or its derivs. substituted in the phenyl residue, with benzalaniline or other benzalbenzalimines. The reaction is effected in aq. acid soln. at atm. temp. The products are believed to be benzalpyrazolones. Examples are given

Dye intermediates. BRITISH RESEARCH ASSOCIATION FOR THE WOOLEN & WORSTED INDUSTRIES and A. T. KING. Brit. 335,645, July 6, 1929. Aromatic amino derivs. are prepd. by reduction of monoazo dyes other than those contg a β-naphthol component or which form azo-sulfites or which are reducible by SO_2, by the action of alkali bisulfite and sulfite approx. in the mol. ratio of $2NaHSO_3.Na_2SO_3$. Examples are given of the reduction of benzeneazosalicylic acid with an alc. soln. of the mixed reagent to form aniline and aminosalicylic acid and of the reduction of Na azosalicylic acid to aminosalicylic acid.

Intermediates for dyes. I. G. FARBENIND. A.-G. (Winfrid Hentrich, Josef Hilger and Rudolf Knoche, inventors). Ger. 515,468, Feb. 19, 1929. β-Naphthylamino phenoxy fatty acids are prepd. by the reaction of β-naphthol or β-naphthylamine or their substitution products with sulfites and 3- or 4-aminophenoxy fatty acids or their derivs., together or in turn. Thus, Na 2-hydroxynaphthalene-3-carboxylate, heated in aq. soln. with Na 4-aminophenoxyacetate and $NaHSO_3$, loses CO_2 and yields *4-β-naphthylaminophenoxyacetic acid*, m. 156°, after acidifying and cooling. Numerous other examples are given also.

Photochemically decolorizable dyes. I. G. FARBENIND. A.-G. Fr. 693,360, April 4, 1930. Layers for photochem. decoloration are prepd. by using dyes, the speeds of decoloration of which have been harmonized or regulated by hydrogenation or substitution in the aromatic groups joined directly or indirectly to the chromogen. Hydrogenation or the introduction of halogen or a cyano, thiocyano, NO_2, carboxyl or a carbalkoxy group increases the speed of decoloration, while the introduction of an alkyl, aryl, OH, aryloxy or alkoxy group decreases the speed of decoloration. Several examples are given.

Naphthalene derivatives. I. G. FARBENIND. A.-G. Fr. 692,716, Mar. 25, 1930. Derivs. of $C_{10}H_8$ are made by the reaction of carboxylic acid chlorides by the Friedel and Crafts reaction on 1-benzylnaphthalene or on 1-alkylnaphthalenes or their substitution products which are not substituted in the 4 position of the $C_{10}H_8$ nucleus, and treating, if necessary, the resulting products with oxidizing agents. The products are *intermediates for dyes*. Examples are given of the prepn. of 4-benzoyl-1-benzylnaphthalene, m. 110°, 1,4-dibenzoylnaphthalene, m. 106°, 4-benzoyl-1-(*p*-chlorobenzyl)naphthalene, m. 123°, 4'-chloro-1,4-dibenzoylnaphthalene, m. 118°, 1,4-di-*p*-chlorobenzoylnaphthalene, and 4-acetyl-1-benzylnaphthalene, m. 78°, also 4-methyl-1-naphthyl phenyl ketone, 4-benzoyl-1-naphthoic acid, 4-methyl-1-naphthyl methyl ketone and 4-acetyl-1-naphthoic acid, m. 184°.

Dyeing. I. G. FARBENIND. A.-G. Fr. 693,426, April 5, 1930. Very clear colored effects are obtained by printing on a support, previously impregnated with arylides of 2,3-hydroxynaphthoic acid and dried, with printing pastes composed of Na formaldehyde-hyposulfite and vat dyes, drying again, vaporizing rapidly, and finally coloring with a diazotized base. Examples are given.

Applying dyes to fabric. WILLIAM WHITEHEAD (to Camille Dreyfus). Can. 308,605, Feb. 10, 1931. Dyes are applied to a fabric contg. cellulose acetate by spraying with a material contg. a water-insol. dye and ethylene dichloride and a thickening agent.

Dyeing fibrous material. I. G. FARBENIND. A.-G. (Paul Rabe, Hermann Stötter, Berthold Wenk, and Wilhelm Schepss, inventors). Ger. 515,032, Dec. 23, 1925. In fixing dyes on fibrous materials by means of complex compds. of tungstic or molybdic acid, these compds. are treated on the fiber, before dyeing, with reducing agents, *e. g.*, $NaHSO_2$, $Na_2S_2O_4$ or CH_2O.

Dyeing cellulose esters and ethers. I. G. FARBENIND A.-G. (Hermann Wagner, Adolf Kuchenbecker, Richard Huss and C. Erich Müller, inventors). Ger. 511,205, Mar. 4, 1928. Addn. to 509,401 (*C. A.* **25**, 421). Fast blue dyeings are produced on cellulose esters and ethers by coupling with 2,3-hydroxynaphthoic acid or its arylides the diazo compds. from dialkyl, diaryl, or diaralkyl ethers of 2-amino-5-acylaminohydroquinones or their substitution products Coupling is effected on the material to be dyed. Examples are given.

Dyeing cellulose esters and ethers. I. G. FARBENIND. A.-G. (Wilhelm Eckert and Carl E. Müller, inventors) Ger. 515,029. Jan 26, 1928. Cellulose esters and ethers are dyed in yellow shades by means of 4-aminonaphthalimide or its derivs. in which an alkyl, aryl, or aralkyl group replaces H in the imino group. Examples are given.

Dyeing viscose products. I. G FARBENIND. A.-G. (Karl Bormann, inventor). Ger. 515,030, Feb. 18, 1928. Uniform dyeings are obtained with dyes prepd. (1) by coupling the tetrazo compds. of *m*- and *p*-azoxyaniline and their substitution products with suitable components, or (2) by coupling the diazo compds. from 3- and 4-nitroaniline or their substitution products with suitable components and reducing the products with alk. reducing agents. Numerous examples are given.

Dyeing artificial silk. IMPERIAL CHEMICAL INDUSTRIES, LTD. Fr. 693,179, April 2, 1930 Regenerated cellulose silk is dyed in relatively regular shades with dyes obtained by tetrazotizing a mono- or di-sulfonic acid of 4,4′-diaminodiphenylurea or one of its radical derivs. and coupling with 2 mol. proportions of a sulfonic acid or carboxylic acid deriv. of a phenol, naphthol, naphthylamine or *N*-substituted naphthylamine, or with one mol. proportion of a coupling constituent, as above mentioned, and one mol. proportion of an aminonaphtholsulfonic acid or one of its *N*-substituted products or one of its derivs. Examples and a list of components with the shades obtained are given.

Dyeing artificial silk. IMPERIAL CHEMICAL INDUSTRIES, LTD. Fr. 693,790, April 12, 1930. Silk made from regenerated cellulose is dyed by the products obtained by combining a diazotized amine of the C_6H_6 series, contg. no NO_2 group, with an aminonaphtholsulfonic acid in alk. soln , diazotizing again and coupling with another coupling component, all the aminonaphtholsulfonic acids used as final constituents being also coupled in alk. soln. An example and a table of components with the shades obtained on viscose silk are given.

Dyeing furs, hair, feathers, etc. I. G. FARBENIND. A.-G. (Paul Virck, inventor). Ger. 515,031, Sept. 15, 1926. The materials are treated with an aq. soln. of a salt of a naphthalene deriv contg. at least one 3-aminoarylamino group of the C_6H_6 series. They are then treated with an acidified nitrite soln Thus, fur is colored yellow by treatment, at atm. temp., in a bath contg. 2-(3′-aminophenylamino)naphthalene-HCl, followed by treatment with $NaNO_2$ soln. acidified with AcOH. Cf. *C. A.* **25**, 605.

Coloring textiles. HENRY DREYFUS. Fr. 692,734, Mar. 25, 1930. In producing discharge effects on textiles, the material is impregnated with a substance having an acid reaction such as an org. acid before applying the discharge agent The discharged materials may be colored with acylaminoanthraquinone dyes.

Printing with vat dyes. CHARLES J. SALA (to E. I. du Pont de Nemours & Co.). U. S. 1,790,950, Feb. 3. As dye assistants in calico printing pastes, etc., for aiding transfer of the dye to the fabric and producing improved results, there are added substances of the general formula $R_1R_2NAlkOH$ in which Alk represents an aliphatic radical as, for instance, the alkylene group C_2H_4; R_1 represents either H or a hydroxyaliphatic group, as CH_2CH_2OH and R_2, as R_1, represents H or a hydroxyaliphatic group. The use of meno-, di- and triethylolamines is particularly mentioned, also amines contg. ali-

phatic groups with more than one OH group such as a compd. with the group $CH_2CH(OH)CH_2OH$. An example with details of procedure is given.

Machine for dyeing and treating textiles. SMITH, DRUM & Co. Fr. 693,201, April 2, 1930.

Machine for dyeing hanks of thread. GAETANO S. RICCARDI. Fr. 693,037, Mar. 29, 1930.

Condensation products. I. G. FARBENIND. A.-G. Fr. 692,890, Mar. 28, 1930. New products which are of technical value, *e. g.*, *reserving agents* for wool or silk, are prepd. by condensing a halide of an aromatic carboxylic or sulfonic acid with an aromatic diamine to produce derivs. of the carboxylic or sulfonic acid amide sol. in water which contain no free NO_2, NH_2 or OH groups. At least one of the constituents of the reaction is substituted in the position *m*- to the halide or to one of the amino groups. The reaction takes place in water or an org. solvent in the presence of an agent fixing hydrogen halide. Thus, bis(2,4-dichlorobenzoyl)-1,3-phenylenediamine-4-sulfonic acid is prepd. by condensing 1,3-phenylenediamine-4-sulfonic acid with 2,4-dichlorobenzoyl chloride and bis(3,4-dimethylphenylsulfonyl)benzidine-*m,m'*-disulfonic acid from 3,4-dimethylbenzenesulfonic acid and benzidine-*m,m'*-disulfonic acid. Several other examples of compds. of this nature are given.

Reserve effects on textiles. I. G. FARBENIND. A.-G. Fr. 692,888, Mar. 28, 1930. Reserve effects are obtained on half-silk half-wool fabrics by adding to the dye bath contg. a substantive dye or to the mordanting bath, amides of sulfonic or carboxylic acids in which the H atoms of the amide groups are wholly or partly replaced by alkyl-aryl or aralkyl groups. Examples and a long list of substances which may be used are given, including bis(3,4-dichlorophenylsulfonyl)benzidine-*m,m'*-disulfonic acid (by condensing 3,4-dichlorobenzenesulfonyl chloride with benzidinedisulfonic acid in the presence of an acid neutralizing agent) and bis(3,4-dichlorophenylsulfonyl-3'-aminophenylsulfonyl-3''-aminophenylsulfonyl)benzidine-*m,m'*-disulfonic acid (by the reaction of *m*-nitrobenzenesulfonyl chloride with benzidinedisulfonic acid, reducing to the diamine, condensing with *m*-nitrobenzenesulfonyl chloride, reducing again and condensing the product with 3,4-dichlorobenzenesulfonyl chloride)

Textiles. HERMANN BOLLMANN and BRUNO REWALD. Fr. 693,887, April 14, 1930. Textiles are improved by adding to the baths used for treating fibers, threads or cloth a certain amt. of lecithin.

Waterproofing textiles. ALEXANDER NATHANSOHN. Fr. 693,803, April 12, 1930. Textiles are made waterproof by incorporating in them, by a gentle treatment with esterifying derivs. of higher fatty acids, the corresponding radicals of fatty acids in amts. which do not notably pass the content of the natural fibers in these radicals. Examples are given of the treatment of textiles with stearyl anhydride, stearyl chloride, etc., in benzine, C_6H_6, CCl_4, etc.

Sizing or softening agent for fibers. HERMANN BOLLMANN and BRUNO REWALD. Fr. 692,528, Mar. 21, 1930. A sizing, gumming or softening agent for fibers is composed of an emulsion of phosphatides of vegetable origin (particularly phosphatides from soy beans), fatty oils and (or) fatty acids in water. A small quantity of Turkey-red oil or mineral oil may be added to the emulsion.

Improving the qualities of fibrous materials. I. G. FARBENIND. A.-G. Fr. 693,019, Mar. 29, 1930. Fibrous materials such as artificial silk are improved by applying to their surface or incorporating with them aliphatic or cycloaliphatic compds. of high mol. wt., or mixed aliphatic- or cycloaliphatic-aromatic compds. which possess aliphatic or cycloaliphatic radicals of high mol. wt. or their salts.

Treatment of fabric. HERBERT PLATT and CYRIL M. CROFT (to Camille Dreyfus) Can. 308,437, Feb. 3, 1931. Fabric contg. cellulose acetate has the "sticking" point increased by treatment for 45 min. at 40° with a soln. contg. 10–50 g. of basic Al acetate per l., and about 50–100 cc. of AcOH per l.

Treating cellulose materials. HENRY DREYFUS. Fr. 692,796, Mar. 26, 1930. Materials of or contg. cellulose have their qualities improved by a treatment with organo-mineral acids or concd. aq. solns. thereof, *e. g.*, aliphatic or aromatic sulfonic acids. The threads may be spun directly from the spinning nozzles into the acids. Examples are given of the use of sulfoacetic acid.

Artificial threads, films, etc. HENRY DREYFUS. Fr. 693,240, April 3, 1930. Threads, films, ribbons, etc., made of or contg. cellulose derivs. are treated with organo-mineral acids such as sulfonic acids or concd. solns. thereof whereby the mech. resistance and elasticity are improved. Solns. of the cellulose derivs. may be extruded into the acids. Examples are given of the use of sulfoacetic acid, ethylenesulfonic acid and methylsulfonic acid. Cf. *C. A.* **25**, 1103.

Artificial silk. BRITISH CELANESE, LTD., and G. H. ELLIS. Brit. 335,583, March 16, 1929. Materials of cellulose acetate or other cellulose derivs. rendered insensitive to the delustering action of moist steam or other hot or boiling aq. media as described in Brit. 332,187 (*C. A.* 25, 205) and Brit. 332,231 (*C. A.* 25, 218) are used together with other cellulose ester or ether products sensitive to such delustering action, so that by use of a delustering material on the product design or pattern effects may be produced by its selective action. Numerous details and examples are given.

Artificial wool. MICHEL DASSONVILLE. Fr. 693,321, July 12, 1929. A machine is described for treating cellulosic filaments coming from the coagulating baths to give them the appearance of wool.

Oleaginous composition suitable for conditioning wool. AUGUSTUS H. GILL. U. S. 1,791,057, Feb. 3. In order to prevent spontaneous combustion of material to which oleaginous compns. are applied, about 1–2% of hydroquinone is added to the compn., *e. g.*, to "red oil" for lubricating wool.

Washing wool, textiles, etc. I. G. FARBENIND. A.-G. Fr. 692,834, Mar. 27, 1930. Aromatic sulfonic acids or their salts, possessing in the ring or in a substituent or both, one or more org. radicals with a chain of more than 5 C atoms, are used for washing wool, textiles, etc. Examples are given of the use of the Na salt of hexylnaphthalene-, octylnaphthalene-, cetylnaphthalene- and *N*-dihexylnaphthylaminesulfonic acid. Substances such as cyclohexanol, AmOH, cyclohexanone and CCl_4 may also be added. Cf. *C. A.* 24, 734.

Mothproofing wool, etc. I. G. FARBENIND. A.-G. Brit. 334,886, June 10, 1929. Materials such as woollen fabrics are treated with compds. obtained by condensing phenols with aralkyl compds. such as aralkyl halides, alcs., and ω-sulfonic acids, and then sulfonating, or by condensing sulfonated phenols with aralkyl compds. Various examples are given, one of which involves the use of the product obtained by condensing 2-sulfo-4-chlorophenol with tetrachlorobenzyl chloride.

Mothproofing fur, wool, etc. I. G. FARBENIND. A.-G. (Max Weiler, Berthold Wenk, and Karl Berres, inventors). Ger. 513,387, July 13, 1929, and 513,388, July 18, 1929. Addns. to 503,256 (*C. A.* 24, 5169). The materials are treated with asym. hydroxydi- or tri-arylmethane derivs. obtainable by condensing *p*-chloro- or *p*-bromophenol (or their substitution products having one *o*-position to the OH group unsubstituted) with aromatic hydroxy alcs. or hydroxyhydrols or their anhydrides or derivs., which are themselves obtainable by condensing an aldehyde with one of the phenols mentioned. A suitable reagent is pentachlorodihydroxytriphenylmethanesulfonic acid, prepd. by condensing 2,4-dichlorophenol with the hydrol anhydride obtainable from *o*-sulfobenzaldehyde and 2,4,5-trichlorophenol (513,387). Alternatively, the materials may be treated (1) with bis(hydroxybenzylated) aromatic hydroxy compds. having halogen in the *p*-position to the OH groups, but free from COOH or SO_3H groups, or (2) with nuclearly mono- or di-benzylated *p*-halophenols free from COOH or SO_3H groups and contg. no OH groups in the benzyl nucleus, or (3) with halogenation products of hydroxydi- or tri-arylmethanes not contg. COOH or SO_3H groups (513,388). Cf. *C. A.* 25, 422.

Hydroxyarylmethanes. I. G. FARBENIND. A.-G. Brit. 335,547, April 19, 1929. Mixts. of hydroxydi- and hydroxytri-arylmethanes, or mixed hydroxydi- and hydroxytri-arylmethanes, *suitable for mothproofing wool, furs, etc.*, are prepd. by condensing, in an acid medium, one mol. proportion of formaldehyde with 2 mol. proportions of a mixt. of phenols comprising a *p*-halogenated phenol or phenols with other phenols, or by similar condensation of 1 mol. proportion of an aromatic aldehyde such as mixed *o*- and *p*-chlorobenzaldehydes or *o*-sulfobenzaldehyde (but excluding aromatic hydroxy aldehydes and their sulfonic, carboxylic and sulfo-carboxylic derivs.) with 2 mol. proportions of a mixt. of phenols comprising *p*-alkylated phenols or their mixts. with other phenols, or a *p*-halogenated phenol mixed with other phenols (all the *p*-alkylated and *p*-halogenated phenols having free *o*-positions). Several examples are given and H_2SO_4, $AlCl_3$, $FeCl_3$ or a mixt. of H_2SO_4 and HOAc may be used as condensing agents. Cf. *C. A.* 24, 6036.

Rubberized cloth. E. I. DU PONT DE NEMOURS & CO. Fr. 693,890, April 14, 1930. Rubberized cloth is coated with a final layer of asphaltic varnish and heated to a temp. below the softening point of the asphalt. Cf. *C. A.* 24, 1524.

Apparatus for cleaning benzine used for degreasing and decoloring. MOÏSE DUVAL. Fr. 693,006, Mar. 29, 1930.

26—PAINTS, VARNISHES AND RESINS

A. H. SABIN

Studies in the painting of wood. I. Influence of wood structure on paint behavior. J. H. HASLAM AND S. WERTHAN. *Ind. Eng. Chem.* **23**, 226-33(1931).—In order better to understand the relationships between wood and paint films, H. and W. examd. microscopically the wood surface, the paint film and the interface of the 2. Differential staining of wood-paint sections made possible a study of the penetration of paint into soft woods of several species. The method is described in detail. Woods of apparent uniformity are revealed under the microscope as irregular. Differences in wood structure which have an important bearing on the behavior of the paint film include: (1) the sharpness of transition of spring wood to summer wood, (2) the distribution of pits on the fiber walls and their permeability, (3) the direction of the medullary rays with respect to the surface (flat- *vs.* edge-grained boards) and (4) the existence of resin ducts. A study of the shrinking and swelling of wood led to the discovery that the expansion of the summer wood is often greater than the over-all expansion of the wood. In such cases the swelling of summer wood is compensated for by compression of the spring wood. The expansion of the summer wood is less than the distensibility of a new paint film but exceeds many times the distensibility of a film 8 months old; hence the early loss of paint over summer wood. Penetration of paint liquids occurs through the pits and medullary rays. Penetration is uneven on flat-grained surfaces because of the existence of ray openings which occupy about 20% of the area. Uneven penetration results in nonuniformity of paint film and consequent early failure of paint film. Penetration of vehicles becomes more regular in the order: oil + turpentine, raw oil, bodied oil, varnish. H. K. SALZBERG

Effect of wood grain on paint durability. H. A. GARDNER. *Am. Paint & Varnish Mfrs.' Assoc. Circ.* No. 377, 128-30(1931).—A Pb-Zn house paint was applied over various primers to Ark. soft pine characterized by flat, angle and vertical grain. The primers were (I) the paint itself thinned according to directions, (II) Al-spar varnish, (III) $PbCrO_4$ in oil and (IV) a graphite paint. Superior results were obtained on vertical grain with (IV). G. G. SWARD

Why some wood surfaces hold paint longer than others. F. L. BROWNE. U. S. Dept. Agr., *Leaflet* **62**, 4 pp.(1930).—It is not necessary for painters to change the compn. of the priming coat for the different softwoods. Moisture gaining access to the backs of painted boards causes failure by blistering, peeling and discoloration The painting characteristics of a board depend on the amt. and distribution of the summer wood. The density of a softwood board measures roughly its ability to hold paint coatings. Cedars, cypress and redwood hold paint best and northern, western and sugar pines almost as well, whereas with southern pine and Douglas fir and western larch, serious flaking from the summer wood occurs sooner than with the former species Other conifers lie between. Wood of the same species varies greatly in texture and density and therefore in painting characteristics. Knots and pitch give trouble. Edge-grain boards hold paint better than flat-grain. Southern exposure is the hardest on paint. Repainting should be done before the old coating has flaked or the bare wood is exposed. ALFRED L. H. KAMMERER

Why wood painting research becomes a problem in forestry. F. L. BROWNE. *J. Forestry* **28**, 1136-45(1930); cf. *C. A.* **24**, 2313, 3913.—The variability in paint service on different woods is considerable. Density, ring-width and type of grain, all widely variable, have a great influence on the integrity of paint films. Progress in wood painting technology therefore concerns the forester. Results of tests described in previous papers are given. ALFRED L. H. KAMMERER

Commercial paints: substitutes for white lead and anti-corrosion paints. A. VILA. *Chimie & industrie* **24**, 1052-67(1930); cf. *C. A.* **22**, 3998.—The results obtained after 4 yrs.' exposure to the atm. are given, including photographs of the painted surfaces and of sections through them. Ti oxide and lithopone paints had the highest covering power, followed in order by ZnO, one of the white leads, mixed white pigments, Sb oxide and finally a white-lead paint. As regards resistance to weathering, the pure basic pigments (white lead, ZnO) which can combine with the acid radicals of the oil showed least loss to rubbing (light sponging with city or distd. water), while the dust thus removed from these paints had the highest content of org. matter; the Sb paint (Timonox) was already too badly deteriorated to make it worth while making these detns. Various accelerated aging tests for anti-rust paints were tried out, but apparently did not deteriorate the paint any more rapidly (in some cases less) than ex

posure to the atm. or to fresh or sea water. As the value of these paints depends essentially on their impermeability, the following test is suggested: Apply 2 coats of the sample to be tested over the whole of a small Al plate and allow to dry normally. Fill the hollow of the plate with a soln. of NaCl and $HgCl_2$ in distd. water and let stand at atm. temp.; if the coating is impermeable the soln. evaps. without producing any corrosion, but if it is not impermeable the $HgCl_2$ reacts vigorously with the Al as soon as the soln. has penetrated to the metal. The tests showed that at the present time a no. of com. French anti-corrosion paints contg. no Pb salts are fully equal to, or better than, the old minium paints. A. PAPINEAU-COUTURE

Technical analysis of titanium white. J. PFANHAUSER AND S. TOMASZEWSKI. *Przemysl Chem.* **14**, 353–5(1930).—The soln. contg. Ti is acidified with HCl with exclusion of air and then reduced with Zn for about 2 hrs. at 70–80°. High temp. causes the pptn. of insol. H_2TiO_3. The soln. is then either titrated with 0.1 *N* $KMnO_4$ at 60–70° under CO_2 with exclusion of air or is reduced with an excess of ferrous NH_4 sulfate, which is then titrated back without the need of excluding air. A. C. Z.

Thickening of red lead. W. VAN WÜLLEN-SCHOLTEN. *Farben-Ztg.* **36**, 644–5 (1931).—The consistencies of pastes prepd. with (I) highly dispersed and (II) normal red lead and varying amts. of linseed oil were detd. at intervals during several months and plotted. The curves for I passed through a min., the breadth of which varied directly with the amt. of oil, 20% being the least amt. of oil for which the breadth was very great. The consistencies of II increased continuously from the time of their prepn. The settled layers of I were softer than those of II. In order to det. which oxide, PbO or PbO_2, is responsible for the thickening properties of red lead, mixts. contg. varying amts. of these oxides were ground with linseed oil. The paste contg. 100% PbO_2 behaved like highly dispersed red lead and the mixts. with the highest percentages of PbO_2 had the softest settlings. In order to study the effect of the manner of prepg. the pastes, 84 parts red lead was ground with 9, 12 and 16 parts oil, resp. After different intervals, the oil content of all the pastes was brought up to 16%. The results showed that softer pastes are obtained if only a portion of the oil be used at first. G. G. SWARD

New methods of preparing chrome oxide green and hydrated chrome oxide green. A. C. HEINEMANN. *Farbe u. Lack* **1931**, 6.—A few of the recent German patents for prepg. the chrome oxide greens are briefly reviewed. G. G. SWARD

Survey of preparation of alkali chromates. ALFRED HEINEMANN. *Farbe u. Lack*, **1931**, 26. The author briefly reviews a few German and English patents on extn. of Cr from its ores. G. G. SWARD

The toxic action of varnish, paints and polishes. DELFÍN L. BARRIOS AND JOSÉ S. DEVOTO. *Semana méd.* (Buenos Aires) **1931**, I, 252–7. A review is given of poisoning by vapors of solvents (PhH, PhMe, AcOEt and $AcOC_5H_{11}$). A. E. MEYER

Spirit of turpentine in varnishes and paints. A. GÉRARD VAUDIN. *Bull. inst. pin* **1931**, 4. The merits of spirit of turpentine over white spirit are briefly discussed. A. PAPINEAU-COUTURE

Oiticica oil. G. G. SWARD. *Am. Paint & Varnish Mfrs.' Assoc. Circ.* No. **377**, 120–5(1931).—A white acetone-insol. material, which did not appear to be β-eleostearin, was obtained when oiticica oil was exposed in a thin layer to ultra-violet light. The yield was about 25%. A 25-gal. *ester-gum varnish* prepd. with oiticica oil compared favorably with one prepd. with tung oil. The literature of oiticica oil is briefly reviewed and a bibliography is given. G. G. SWARD

Scheiber oil. G. G. SWARD. *Am. Paint & Varnish Mfrs.' Assoc. Circ.* No. **377**, 126–7(1931).—Some of the phys. properties of a drying oil prepd. from castor oil were: $d_{15}^{15.5}$ 0.937, I no. (Wijs) 120.5, n^{25} 1.487, viscosity (G-H scale) G, and color (Hellige) 1L-1. When subjected to the Brown heat test, the oil did not gel in 2 hrs. The properties of a blown oil and of a stand oil prepd. from the raw oil are also given. G. G. SWARD

Oxidation products of drying oils. I. β-Eleostearin from tung oil. R. S. MORRELL AND S. MARKS. *J. Soc. Chem. Ind.* **50**, 27–36T(1931); cf. *C. A.* **24**, 2901.—In the oxidation of the β-eleostearic glyceride the first product is a diperoxide, followed by a change to a monoperoxide, $(CH_3(CH_2)_3\underset{\diagdown O_2 \diagup}{CH.CH.CH}:CHC(OH):C(OH)(CH_2)_7\text{-}COO)_3C_3H_5$. On methylation, Me esters, sol. and insol. in light petroleum, are formed. The max. number of methoxyl groupings which can be introduced is two. Attempts to methylate Me ricineolate were unsuccessful and resulted in the production of a methyl

ester of an acid isomeric with linoleic acid. The Me esters are oxidized by $KMnO_4$ to valeric acid and an intermediate C_{18} or C_{14} acid. Reduction by H_2 with Pd causes addition of two or four atoms of H. Treatment of the Me esters with HI or HBr causes reduction of the peroxide group and withdrawal of the methoxyl groups to form $CH_3(CH_2)_3CH.CHCH:CHCHCH(CH_2)_7CO_2H$. The evidence in favor of pos. and neg. polarity of the peroxide groups has been strengthened. The yellowing of drying films is due to rancidity, caused by disruption of the remote peroxide and the action of strong bases on the near peroxide to form colored salts. The inert character of the central double linking is very marked. There is a strong associating power of both peroxide groups. The peroxides are very stable in acid media. Polymerization of the oxidized esters is accompanied by a rise in refractive index. The loss in wt. of linoxyn films is connected with degradation beginning at the remote peroxide grouping. A scheme of orientation on the lines of Staudinger's representation of polymerides is suggested.

H. M. STARK

Notes on aircraft finishes. H. A. GARDNER. *Proc. Am. Soc. Testing Materials* 1930, Preprint No. 33, 37–45.—A discussion of various types of wing dopes. Acetate dope for priming coat evidenced lower tautness with good strength, while nitrate dope showed good tautness and satisfactory strength. Nitrate dopes properly applied and protected from light by Al-pigmented outer coats showed that the underlying coats of nitrate dope were not broken up by sunlight, the strength of the fabric was maintained and excellent tautness was effected. Two thin coats of clear spar varnish were applied over the Al-pigmented dopes to make it smooth. Properly compounded nitrocellulose lacquer coatings are now being applied to the top-side wing surfaces. The newly developed lacquer-varnish coatings usually contg. nitrocellulose properly compounded in soln. with phthalic anhydride-glycerol resins appear to offer the advantages of quick drying highly water-resistant surfaces and exceptional durability. W. H. B.

The preparation of low-viscosity cellulosic collodions. CH. STARK. *Rev. gén. mat plastiques* 6, 649–59(1930).—A brief review is given of the development of these collodions to meet the modern requirements of nitrocellulose lacquering and varnishing.

A. PAPINEAU-COUTURE

Nitrocellulose lacquers. HANS WOLFF AND B. ROSEN. *Farben-Ztg.* 36, 736–7 (1931).—Ordinary kauri copal, in either the natural or "run" states, tends to sep. as a gel in films of nitrocellulose lacquers contg. it. Solvent-extd. kauri, however, is not subject to this defect. In hardness, abrasion resistance, flexibility, tensile strength and elongation, films of nitrocellulose lacquers contg. extd. kauri compared favorably with those contg. ester gum. Films contg. Manila copal were inferior to those contg shellac and extd. kauri.

G. G. SWARD

Compatibility of resins with nitrocellulose solutions. HARRY E. HOFMANN *Ind. Eng. Chem.* 23, 127–30(1931).—Although nitrocellulose, ester gum and AcOBu or AcOAm are compatible in all proportions and give clear films, many other systems give cloudy films. Of 132 combinations prepd by mixing nitrocellulose with 11 resins and dissolving the mixt. in 1 of 12 solvents, 43 gave clear solns. and films; 15 required only the addn. of a plasticizer; 12 cleared up on the addn. of a plasticizer and diluent, and 3 cleared up on the addn. also of ester gum; 59 gave cloudy films in all tests. Some of the resins, notably vinyl acetate, rosin, dammar and Rezyl 12, are compatible with nitrocellulose in most of the solvents. Ester gum and Amberol H-9 could not be made compatible in systems contg. diacetone alc., Et lactate, Cellosolve or Cellosolve acetate. Kauri and pontianac could be made compatible only in systems contg. AcOEt, Cellosolve or Cellosolve acetate. Manila and shellac are incompatible in most systems and cumar could not be made compatible in any system. Incompatibility of resins with nitrocellulose in certain solvents is ascribed to lack of miscibility of resin and nitrocellulose rather than to pptn. of resin by solvent. Careful examn. of incompatible systems reveals the existence of 2 homogeneous phases but no ppt. Solvents and diluents belong to either an alc. or a hydrocarbon type and resins to either an alc.-sol. or a hydrocarbon-sol. type. In general, compatibility is most readily obtained by using solvents and resins of corresponding types, *e. g.*, an alc.-type solvent and an alc.-sol. resin. However, in those systems requiring the addn. of diluent or ester gum, it is found that the type of diluent or resin which produces compatibility is of the type opposite to that of the diluent or resin originally present. The ability of a plasticizer to clear up incompatible systems depends upon the nature of the plasticizer. A clear lacquer gives cloudy films when that type of solvent which makes for incompatibility is allowed to conc. in the film during drying.

H. K. SALZBERG

Cativa resin. L. P. HART. *Am. Paint & Varnish Mfrs. Assoc. Circ.* No. 377, 131–2(1931).—A balsam-type resin from the tree *Prioria copaifera*, Griseb, made into a tung-oil varnish gave a product whose films were somewhat softer than those of varnishes made from the common resins. G. G. SWARD

The importance of glycerol and glycol in industry. G. PETROV. *Masloboino Zhirovoe Delo* 1929, No. 7, 18–21.—The new developments in the application of glycerol and glycol in the prepn. of synthetic resins by condensation with polybasic acids are reviewed, and attempts to prep. "linoxyn films" from the ethyl esters of fatty acids of linseed oil are described. The results of these expts. were negative and P. concludes that glycerol cannot be replaced in the drying oils by lower alcs. E. BIELOUSS

New method of determining the acid number of copals. ZYGMUNT LEPPERT. *Przemysl Chem.* 15, 1–5(1931).—One g. finely powd. copal is boiled in 20 g. terpineol under a reflux until dissolved. Some difficultly sol. copals may take 1–3 hrs. The hot soln. is diluted with 20 cc. CH_3OH and on cooling is titrated with 0.1 *N* KOH. With difficultly sol. copals the hot terpineol soln. is treated with 20 cc. C_2H_5OH and 20 cc. alc. 0.5 *N* KOH, and heated for about 15 min. Since the soln. turns dark it is diluted with 200 cc. C_2H_5OH and after cooling titrated back with 0.5 *N* H_2SO_4 against phenolphthalein. Compared with the methods of Gardner, Dietrich, Marcusson and Winterfeld this method has the advantages in that it gives consistent results in a series of detns. on the same copal; it is general and does not require a different set of solvents for every kind of copal; the results obtained are very probable. The acidity values obtained by this method on various kinds of copals may be used for comparing their acidities. Tables of the acidity values of many kinds of copals are given. A. C. Z.

Production of oleoresin from Pinus halepensis of Spain. VICENTE CUTANDA AND MARIANO SEVILLA. *Servicio Forestal de Investigaciones y Experiencias* 2, No. 5, 29–42(1929).—The production of oleoresin from stands of *P. halepensis*, which are found along the Mediterranean coast, began during the World War. At present about 600,000 trees of this species are being turpentined. The oleoresin is being distd. at 7 different plants. The yields per tree per yr. vary from 1.05 to 4.30 kg., depending upon growing conditions. These yields compare favorably with those from the more commonly worked *P. pinaster* (maritime pine). The compn. of the oleoresin as given by Lacrue (*C. A.* 23, 5037) is discussed. The rosin is somewhat low in grade because of a greenish tinge. Cleaning the gum before distn., according to the usual Spanish practice, is especially advantageous on account of the presence of much tannin. Water is sepd. by decantation from the oleoresin before distg. by allowing the mixt. to stand in closed vessels for 10–12 hrs. The rosin is invariably sunned to improve its color. The turpentine must be distd. to remove its greenish color. A proposed alternative is filtration through $(CO_2H)_2$. H. K. SALZBERG

Azo dyes [for red varnishes] (U. S. pat. 1,791,444) 25.

Paint composition. RICHARD L. BRAGDON and DALE F. MCFARLAND. Can. 308,612, Feb. 17, 1931. Turpentine is added to paint and then there is added a soln. made up of water, shellac and $NaHCO_3$.

Weather-resisting paints. I. G. FARBENIND. A.-G. Brit. 335,626, May 2, 1929. There is incorporated with paints or other coating materials at least such a quantity of pptd. ZnO (dried by heating to a temp. not materially exceeding 500°) as is necessary to combine into soaps all free or combined fatty acids present in the binding agent such as linseed oil or China wood oil. Various details and examples are given.

Roof paint. JOSIAH D. WALSTON (to Black Diamond Paint Co.). U. S. 1,791,455, Feb. 3. A paint is formed from ingredients including coal tar, rosin, PbO, $ZnSO_4$, $CaSO_4$, gasoline and kerosene.

Paints, stains, etc., comprising colloidal dispersions. SAMUEL CABOT (to Samuel Cabot, Inc.). U. S. 1,791,119, Feb. 3. Pigment particles of colloidal fineness are carried in suspension in an org. dispersion medium such as linseed oil and turpentine or solvent naphtha together with a semi-plastic treated oil such as a linseed oil jelly.

Paint filter. RUDOLF SCHMID. Ger. 515,439, Sept. 28, 1929.

Indelible ink. MARCEL ROURE. Fr. 692,929, June 28, 1929. Indelible ink is made by dissolving salicylic acid 2, gum arabic 25, alum 100 and oxalic acid 50 g. in 1 l. of water, boiling and adding 100 cc. of ox gall and 100 cc. of alc. to make soln. A. Aniline dyes according to the color of ink desired are added to a boiling soln. of 20 cc. of HCl in 1 l. of water to form soln. B. Solns. A and B are mixed, allowed to stand and then filtered.

Ink for producing grained effects on wood. E. I. DU PONT DE NEMOURS & Co Ger. 515,232, April 18, 1929. See Brit. 315,214 (*C. A.* **24**, 1753).

Emulsions of oxidized drying oils, varnishes and lacquers. PAUL C. VAN DER WILLIGEN and N. V. NEDERLANDSCHE LINOLEUMFABRIEK. Dutch 22,635, Sept. 15, 1930. Stable emulsions of oxidized oils are obtained by keeping the p_H constantly above 7 during the oxidation by air. NaOH or NH_3 (not lime) is added during the reaction which is carried out between 30° and 70°. A buffer soln. may be employed for the same purpose. Cf. *C. A.* **24**, 2903.

Varnish. BAKELITE CORP. Fr. 693,899, April 14, 1930. A resin varnish contains a non-hardenable resin such as colophony or gum-lac and an infusible transformation product of a hardenable resin such as phenol-aldehyde resins dispersed colloidally in the non-hardenable resin.

Varnish, etc. BAKELITE CORP. Fr. 690,763, Feb. 27, 1930. A coating compn. is made by the reaction of a phenol, *e. g.*, cresol, and a fatty oil such as abrasion oil in the presence of $(CH_2)_6N_4$ at temps. of 190-200°. The reaction product may be heated anew in the presence of an agent contg. CH_2 such as paraformaldehyde.

Lacquers, varnishes, etc. SOC. LÉVY, SAMUEL & LÉVY. Fr. 692,912, July 3, 1929 Lacquers, varnishes and enamels which are insulators for heat and electricity and are resistant to chem. agents are prepd. by bringing into soln. or pseudo-soln. the product called "thiolite" (see Fr. 549,811) which is obtained by treating with S or S_2Cl_2 the condensation products of phenols with aliphatic aldehydes such as CH_2O. Solvents used are alcs., carbides, furfural, cyclohexanol, pyridine, molten or dissolved $C_{10}H_8$, etc.

Lacquers. I. G. FARBENIND. A.-G. Ger. 515,056, June 26, 1926. As solvents for lacquer materials, esters are used b. above 150° and derived from chlorinated monobasic fatty acids having not more than 12 C atoms in the mol., and mono- or polyhydric aliphatic, aromatic or hydroaromatic alcs. free from halogen. Lacquers contg. butyl chloroacetate and glycol monomethyl ether chloroacetate are described.

Nitrocellulose lacquers and plastics. I. G. FARBENIND. A.-G. Ger. 515,057, July 2, 1929. Nitrocellulose lacquers and plastics are colored blue with the dyes obtainable from hydrochlorides of dialkylnitrosoanilines and dialkyl-*m*-aminocresols. 2-Dimethylamino-2'-diethylamino-3'-methyloxazine chloride is a specified dye.

Lacquers from polymerized vinyl esters. CONSORTIUM FÜR ELEKTROCHEM. IND. G. M. B. H. (Wolfram Haehnel and Willy O. Herrmann, inventors). Ger. 514,435, May 16, 1926. The polymerization products are dissolved in EtOH and diluted with about 5% of water or other non-solvent for the products. Other resins, etc., may be added to the solns. Examples are given.

Composition for coating wire gauze or netting. E. HAVER. Brit. 335,775, Oct. 28, 1929. Wire gauze or netting is coated or filled with a soln. of a cellulose deriv., *e. g.*, cellulose acetate, contg. a small proportion (suitably about 1-2% of the amt. of the cellulose deriv.) of hydrocarbon material such as rubber, paraffin or paraffin oil, and the coating is preferably provided with a thin layer of a transparent air- and water-proof material having a high m. p. such as a wax, fat, paraffin, resin or varnish dissolved in a volatile solvent having a softening action on the underlying coating. Several examples and formulas of different mixts. are given.

Plastic materials. ANDRÉ SAMUEL. Fr. 693,739, July 22, 1929. A plastic material is made from a homogeneous soln. of ebonite and the sulfonation product of a phenol-CH_2O resin known by the name of "thiolite" (cf. Fr. 549,811). A mixt. of alc. and benzine may be used as solvent.

Purifying resins. MARIUS TOURNEL. Fr. 693,292, July 8, 1929. Resins such as colophony are purified by projecting the powd. resin into water contg. caustic lye, raising the temp. and adding an electrolytic soln. which ppts. the colloids formed. The top liquid contg. coloring substances, etc., is siphoned off, and the ppt. is suspended in water, treated with Na_2CO_3 and again pptd.

Synthetic resins. CANADIAN ELECTRO PRODUCTS CO., LTD. Fr. 692,718, Mar. 25, 1930. Resins are made by the reaction of partly or completely hydrolyzed polymerization products of vinyl esters with aldehydes. Several examples are given using vinyl acetate polymerization products and AcH or CH_2O.

Artificial resins. LOUIS C. F. PÉCHIN. Fr. 693,844, April 14, 1930. A phosphorescent artificial resin is made by incorporating sulfides in phenol-CH_2O resins during their manuf.

27—FATS, FATTY OILS, WAXES AND SOAPS

E. SCHERUBEL

Detection of vegetable and animal fats. L. AUERBACH. *Chem. Umschau Fette, Oele, Wachse u. Harze* **38,** 11–2(1931).—The digitonid method and the conversion of the digitonid into its acetate with a definite m. p. readily distinguish between wholly vegetable and animal oil, but at present no method is known which sharply detects animal fats in a vegetable fat or oil. For such detection A. places the greatest reliance upon the following methods: convert the digitonids into acetates, saponify, ext. the alcs. with petr. ether and det. the m. p. Exam. the crystals microscopically: in most mixts. A. found the crystals of cholesterol and of phytosterol side by side and in one case the peculiar cone-shaped mixed crystals described in the literature. P. ESCHER

Determination of the specific gravity of solid fats and other solid substances. W. NORMANN. *Chem. Umschau Fette, Oele, Wachse u. Harze* **38,** 22–3(1931).—Directions are given for the detn. of the sp. gr. by means of N.'s special dilatometer. P. E.

Fat from the grape waste products. LABORATORY OF ANALYSIS, DEPARTMENT OF OILS AND FATS. *Ind. olii minerali e grassi* **10,** 122–3(1930).—Grape wastes, after the extn of tartaric acid, contain 8–10% (on the dry product) of a dark-green fat, with high % of solid fatty acids having a high sapon. no. Some of the fat is combined with Ca. The wet waste contains 21–23% of fat and 24% of non-fatty extractive prepns., chlorophyll, mucilaginous matter and gum resins. From a dry grape waste sepd. from the kernels the oil yield is 2–5%; when it is disintegrated in a mill, the yield is 10%. The fat is best extd. after the recovery of the alc. and tartaric acid. It is principally in the seeds and skins, and in small quantity in the pulp and stalks. A sample of fat from black Puglia grape waste, without kernels, contained 6.30% of water. A portion was insol. in Et_2O, the sol. part with hot petroleum ether, gives a ppt. after 1 hr. By extg. with acetone, Et_2O and petroleum ether successively, there is obtained a semi-solid dark olive-green fat with much extraneous matter The part sol. in cold petroleum ether has 17.50 oleic acid acidity, 73.88 total fatty acids, 20.92 unsaponifiable matter, 1.51% oxidized acids and hydroxy acids The unsaponifiable matter obtained from grape fat forms a dark orange-yellow cryst. mass. The fatty acids have I no. 105.20, neutralization no 189.35, av. mol. wt. 296.30, I no. of liquid fatty acids 72.90, of solid acids 27.10. By crystn. of the K salts of the fatty acid from acetone there are obtained a fraction, m. 53–54°, contg. palmitic and stearic acids and a fraction, m. 71°, contg. an amorphous acid The liquid fatty acids give not more than 1% of hexabromide m. 178° (linolenic acid); they contain oleic and linoleic acids. The part insol. in petroleum ether is free from saponifiable substances and contains a small amount of Fe-Al ash, with little Ca and Mg. It contains mostly mucilaginous, non-fat extractive substances. R. S.

The oleic acid rancidity of fats. III. Catalytic influence in rancidity reactions. K. TÄUFEL AND J. MÜLLER. *Z. angew. Chem.* **43,** 1108–12(1930); cf. *C. A.* **25,** 426.—Rancidity expts. with oleic acid and oleic ethyl ester were made by exposing them in small dishes to atm. oxidation, with and without catalysts, and noting the intensity of the Kreis color reaction in one series and the wt. increase of the fats in another. The following substances were tried as catalysts: hydroquinone, phenol, β-naphthol, salicylic acid, KCN, Fe_2O_3, $FeCl_3$, Fe oleate, Cu oleate and Cu acetate. The results in the 2 series did not run parallel in all cases; β-naphthol prevented rancidity in the Kreis series and was indifferent in the wt. series. Oleic acid was, in most cases, influenced less than the ethyl ester; hydroquinone acted throughout as a strong neg. catalyst; $FeCl_3$ acted in the Kreis series as a strong positive catalyst; Fe oleate appeared to be a negative catalyst. P. ESCHER

Hardening unsaturated fatty acids containing triple bonds. A. STEGER AND H. VAN LAARHOVEN. *Chem. Umschau Fette, Oele, Wachse u. Harze* **38,** 23–4(1931).—By following the hydrogenation of stearolic Et ester with its triple bond by means of Kaufmann's thiocyanate method, the latter was found to be an equil. reaction which varies in results with the temp., time and concn. and excess of the thiocyanate. The hardening of stearolic Et ester occurs in steps, the triple bond being first reduced to a double bond before any stearic acid begins to form. Harris's ozonation method shows the absence of any shifting of the triple bond during hydrogenation. P. ESCHER

The fat and oil of Sapium sebiferum seeds. ANON. *Bull. Imp. Inst.* **28,** 429–31 (1930).—The seed consisted of 69.1% seed coats and 30.9% kernels. Extn. with petroleum ether yielded 33.9% oil (on the dry basis), having consts. agreeing fairly well with those published by Bolton for Chinese vegetable tallow, except the m. p. (37.8°) which was considerably lower but in good agreement with Nakamori (*C. A.* **14,** 1452).

The kernels yielded 61.7% oil (on the dry basis), which had consts. agreeing well with those recorded by Bolton for stillingia oil. A. PAPINEAU-COUTURE

Some developments in the oil palm industry. H. M. LANGTON. *Ind. Chemist* **7**, No. 73, 71–4(1931). E. H.

The lipase of olives and olive oil. E. PANTANELLI AND S. VERDESCA. *Rend. accad. sci. Napoli* [3], **36**, 76–83(1930).—The acidity which develops in olives after they are picked is due to a lipolytic enzyme which accelerates the hydrolysis of the glycerides into free fatty acids and glycerol with absorption of water. The activity of the lipase increases rapidly with the destruction of the cellular structure. The greater the initial acidity of the olives at the time of pressing, the more apt is the oil to be rich in lipase and develop more acidity. The acidity which develops in the oil is proportional to the water which remains emulsified during the process and also proportional to the glycerol already present. The glycerol, therefore, is the factor which governs the course and intensity of acid development, since it introduces water and lipase into the oil. PETER MASUCCI

Influence of bagging on the percentage of oil in castor beans. G. B. PATWARDHAN. *Poona Agr. Coll. Mag.* **22**, 13(1930).—Bagging castor bean flowers for seed propagation had no significant effect on the oil content of the seed. K. D. JACOB

The determination of the oil content of seeds in series. A. LEBEDYANTZEV AND N. DMITRIEV. *Masloboino Zhirovoe Delo* **1929**, No. 10, 3–10; No. 11, 3–9; No. 12, 9–17.—With the object of devising a method for serial detns. of oil in seeds L. and D. investigated the influence of various factors on the extn. of oils. After 4 hrs. of extn. 34.65% of the oil was obtained; after 18 hrs., 41.65%; and after 36 hrs., 41.76%. The usually specified time, 5–6 hrs. for extn. with a Soxhlet, is much too short; about 18 hrs. would be required for practical purposes. With 30 siphonings per hr. the extn. was complete in 16 hrs., as compared with 36 hrs. for 6 siphonings per hr. By pulverizing the material to a very fine state and with 30 siphonings per hr. the duration of the extn. can be reduced to 6 hrs. By previous maceration of the material with Et_2O for 18 hrs. the extn. time was reduced to 2 hrs. Up to 2 g. of a finely powd. material can be completely extd. within 6 hrs. at 30 siphonings per hr. Three g. of the material under the same conditions gave results which were lower by 1.1%. The Et_2O must be freed from alc. and dried over $CaCl_2$. To avoid the contamination of the Et_2O with H_2O the material should be dried at 100°. Drying oils should be dried in a N or a CO_2 atm. to avoid O absorption. Instead of drying, the material may be mixed with calcined $CaSO_4$. The best method for drying the extd. oil is to heat it in a N or a CO_2 atm. not over 60°. The oil content was detd. from the wts. of the extd. residues. The app., representing essentially an enlarged Soxhlet, was charged with 20 thimbles, each contg. 2 g. of material. The thimbles were allowed to soak for 24 hrs. in Et_2O and the extn. was carried out in 3 hrs. at 6 siphonings per hr. Uniform results were obtained agreeing within 0.16% with individual extns. in Teüge's app. The subsequent drying of the residues presents no difficulties, as it can be carried out by heating in the air at 100°. E. BIELOUSS

The relationship between acidity and titer of oils. I. STETZENKO AND I. PANTELEYEV. *Masloboino Zhirovoe Delo* **1929**, No. 10, 20–1.—Although the titer (*i. e.*, solidification point) of the fatty acids is higher than the titer of their glycerides, a high titer is no indication of a high acidity, as the neutral oil forms a eutectic mixt. with the free fatty acids. Thus a sunflower oil with an original acidity of 3.5% had a titer of 35.3° and 46.1° for the free acids. In admixts. up to 30% free acids the titer was below 35.3°. A hydrogenated sunflower oil with a titer of 56.4° and 61.6° for the free acids had a lower titer in admixts. up to 60% free acids. E. BIELOUSS

The splitting of oils and fats nearly to completion. G. PETROV AND A. PICHUGINA. *Masloboino Zhirovoe Delo* **1929**, No. 9, 53–6.—By the use of the naphthenic sulfonic acids oils and fats were hydrolyzed up to 97.87–99.6%. The hydrolysis was carried out in two steps by adding the sulfonic acids (0.9 to 1% of the oil) in two portions. E. BIELOUSS

Denaturing of protein of soy bean by alcoholic extraction. I. KOJI OKANO AND MANORU NINOMIYA. *Abstracts from Rept. Central Lab. S. Manchuria Railway Co* **1929**, 7–9.—Alc. extn. decreases the H_2O-sol. and NaCl-soln.-sol., and increases the NaOH-sol. protein. No difference in the amino acids of the original and extd. products was found. V. F. HARRINGTON

Extraction of soy-bean oil with alcohol. II. 1. Solubility of soy-bean oil in alcohol. MASANORI SATO AND HIROSHI SAKAI. *Abstracts from Rept. Central Lab. S. Manchuria Railway Co.* **1929**, 1–3.—The soly. of soy-bean oil in alc. of various concns.; in alc. dild. with C_6H_6, benzine or oleic acid; in MeOH; and in MeOH dild. with C_6H_6

has been detd. **2. Experiments on the extraction of soy-bean oil with alcohol.** MASANORI SATO AND MITSUO YOKOCHI. *Ibid* 3–6.—The optimum conditions are 2 extns. with alc. (96% by vol.) for 2 hrs. at 75° or above. The ext. cooled to 25° deposits the oil. Extn. above the b. p. gives better results. An app. is described. Yields are equal to those with benzine; the product is edible. **3. Separation and recovery of phosphatides and carbohydrates from the alcoholic extract.** MASANORI SATO AND IWAWO SETO. *Ibid* 6–7.—The residue from the alc. phase contains 27% carbohydrates, 1.27% N_2 and 1.07% P. Alc. dissolves the phosphatides. They can be coagulated by diln. of the alc. with H_2O and addn. of acid or salts. V. F. HARRINGTON

Determination of sandy matter in soy-bean cakes. SHUNICHI USAMI. *Abstracts from Rept. Central Lab. S. Manchuria Railway Co.* 1929. 23–4.—The cake is shaken with CCl_4 and the sand weighed or measured in a flask similar to an inverted Babcock flask. V. F. HARRINGTON

The soy-bean oil from Kuban. M. SERGEEV. *Masloboino Zhirovoe Delo* **1929**, No. 3, 47–51.—Fifty-five samples of the 1927 crop were analyzed. The n_D^{20}, and the acid and I nos. of the Kuban oil are somewhat lower than the corresponding consts. recorded for the oils of different origins. The yield of beans per hectare depends on the vegetation period; it reaches 2250 kg. for the late crops (149–163 days). The oil content varies from 19.6 to 25.3%. E. BIELOUSS

Examination of Japanese beeswax. I. General properties. H. IKUTA. *Chem. Umschau Fette, Oele, Wachse u. Harze.* **38**, 7–10(1931); cf. *C. A.* **25**, 613.—I. examd. 8 Japanese beeswaxes, 2 of which were produced by native Japanese bees and 6 by the European bees which rapidly are displacing the native bees. The various kinds of honey-flowers have no relation to the consts. of the wax produced; the differences in Japanese and European waxes are due to the breed of bees. The compn. is greatly influenced by the kind of artificial comb employed. Waxes from native Japanese bees have: d_4^{10} 0.8168–0.8232; m. p. 64.5–65.5°; n_{40} 1.4557–1.4560; acid no. 7.5–5.4; ester no 75.6–79.2; sapon. no. 83.1–84.6; I no. (Wijs) 11.3–14.0; acetyl no. 20.7–18.7; unsaponifiable constituents 58.3–56.5%. Only 2 of the other 6 samples were considered pure wax (European type of bees): d_4^{10} 0.8141–0.8132; m. p. 62.0–63.5°; n_{40} 1.4554; acid no. 19.8–19.4; ester no. 74.0–74.1; sapon. no. 93.8–93.5; I no. (Wijs) 8.5–7.2; acetyl no. 13.1–14.4; unsaponifiable constituents 49.5–48.6%. In addn. I tabulates the consts. of the saponifiable constituents of the waxes, their alcs and their hydrocarbons. P. ESCHER

Manganese soaps. HANS WAGNER AND G. HOFFMANN. *Farben-Ztg.* **36**, 689–93 (1931).—The reaction of umber with linseed oil fatty acids was studied by exposing mixts. of umber and fatty acids to ultra-violet light, daylight and darkness. The samples were exposed on microscope slides with and without cover glasses. In all cases where crystn. took place, ether-sol. Mn compds. were found, but the formation of Mn soaps was not definitely proved. Pronounced crystn. took place only in the presence of oxidizing or catalytic compds. Thus pyrolusite produced no crystals, but several ter- and quadrivalent Mn compds. did so as a result of the O_2 liberated in the reduction of the Mn to the bivalent form. G. G. SWARD

Analysis and preparation of medicated soaps. G. MATOLCSY. *Magyar Gyógyszerésztud. Társaság Értesitöje* **5**, 489–502(1929).—The flame reaction of soaps may show what alkalies have been used in their prepn. Color, odor and consistency should be observed. The water content can be measured on the basis of the resistance against cutting. The paste-cutting machine of Rejtö has been used for this detn. Fatty acids, content of alkalies, and org. and inorg. filling materials are detd. according to standard methods. A short description of the prepn. of medicated soaps is given. S. S. DE FINÁLY

Combinations of raw materials for toilet soap. BUNJI NAKAGAWA. *J. Soc. Chem. Ind., Japan* **34**, Suppl. binding 22–7, 28–31(1931).—Soaps of 8 different oils were mixed in proportions of 10–80% with a soap consisting of 80% Na tallow soap and 20% Na coconut-oil soap and the lathering no. (L. N.), lathering vol. (L. V.), lathering coeff. (L. coeff.) and rate of lather extinguishment detd. L. coeff. = L. N. × L. V., and the rate of lather extinguishment = {[(L. coeff. at 1 min. after shaking) − (L. coeff. at 5 min. after shaking)]/(L. coeff. at 1 min. after shaking)} × 100. Na palm-oil soap (I) has a good effect upon lathering. Hardened soy-bean oil soap (II) of 67.7 I no. has a better effect at 40° than at 20°, where it shows a reverse tendency. A Na lard soap (III) has a good effect on the L. coeff. at the start, but the rate of lather extinguishment rises with the increase in amt. of this soap. A 40% mixt. is the best for lathering power. Na hardened fish-oil soap (IV) decreases the L. coeff. The Na soap (V) of Chinese

vegetable tallow has not much effect on the L. coeff., but the rate of lather extinguishment is larger. At 20° the L. coeff. decreases. Na castor-oil soap (VI), Na peanut-oil soap (VII) and K tallow soap (VIII) all have a good effect upon the lathering, but VI is the most desirable. The soly of mixed soap was measured in an attrition app. composed of an endless rubber band rotating at 1086 cm. per min. and dipping into a water bath at 40° and 20°. A soap cake 2 × 3 × 2 cm. was fastened and weighted with 135 g. so that the rubber band could rub it. The duration of the operation was 10 min. at 40° and 20 min. at 20°, and by weighing back the soap the attrition was detd. The degree of attrition is designated "rubbing soly." and is calcd. by the formula: rubbing soly. = 100 × [soap by attrition (g.) ÷ rubbing surface (cm.²)]. The rubbing soly. of Na tallow soap mixed with 20% Na coconut-oil soap is smaller than that of the former alone but increases with increase of the latter. The mixt. with I or II does not increase the rubbing soly. In the mixt. of III the rubbing soly. increases with increase in amt. of this soap; in mixts. of IV it decreases with increase of this soap. In the case of V the rubbing soly. tends to decrease, and this effect is greater at 20° than at 40°. A 2.5% mixt. of VI increases the rubbing soly., as do also VII and VIII, 15% of VII being equal to 2.5% of VI. The relative hardness of the mixed soaps was detd. from the distances 2 5-cm. metal points 2 and 3 mm. in diam. (weighted to a total of 300 and 600 g., resp.) penetrated into the soaps, a homogeneous curd soap being the standard of comparison. The hardness of mixed Na tallow and Na coconut-oil soap increases with the increase in the amt. of the latter until, with 40% coconut-oil soap, the soap is unsuitable for toilet use. I and II (I no. 67) have a tendency to soften the mixed soap, I having a greater effect than II. IV (I no. 22.3) in lower percentages produces a slight softening in the mixt., but when 50% is used, it hardens the product V increases the hardness as its amt. is increased VII, VIII and VI (effective in this order) soften the mixt. according to the amts added. Conclusion: palm oil, hardened soy-bean oil and Chinese vegetable tallow can generally be used as substitutes for tallow, and the most desirable for the combination are castor oil, peanut oil and the K soap of tallow

E. Scherubel

The utilization of soap lyes. S. Liberman and A. Korelskii. *Maslobojno Zhirovoe Delo* **1929**, No. 6, 21–5.—The soap lyes, left after the salting out of the soap base, contain about 1.3% NaOH and 0.5% Na_2CO_3. L. and K. recommend their recovery by treatment with free fatty acids and rosin. E. Bielouss

Actual problems in the manufacture of washing compounds. J. Leimdörfer *Seifensieder Ztg.* **57**, 869–72(1930).—L. discusses the economic and mfg. phases of toilet, laundry and soft soaps. The brown spots on cottonseed-oil soaps may be prevented by hydrogenating the oil to lard consistency or by polymerizing it at 260–280° for 5–6 hrs. in a CO_2 atm. before sapon. P. Escher

Ambergris and how to recognize it. F. R. Morrison *Bull. Tech Museum Sydney* No. **15**, 9 pp.(1929).—The different varieties of ambergris are described, together with their values, uses and characteristics. All ambergris will float on sea water, and if the latter is slowly heated, the material will melt to a brown or black liquid before the water reaches its b. p. A piece of ambergris about the size of a pea is almost completely sol. in about $^1/_2$ oz. of warm alc., giving a fluorescent soln. A needle, previously heated in a candle flame for 10–20 sec., on being pressed into a sample of ambergris to a depth of $^1/_8$ in., forms a dark brown resinous liquid which, when touched by the finger, leaves pitch-like "strings" adhering to the skin. If the needle be withdrawn and placed in the flame, the ambergris burns; if the flame be extinguished the odor of the "smoke" is somewhat fatty or resinous and resembles that of burning rubber

B. C. A

Oiticica oil (Sward) **26**. Insect oils and fats (Timon-David) **11I**. Value of ash determinations of fatty oils (Schaeffer) **22**.

Apparatus for washing and mixing fats and waxes having the consistency of butter. Richard Bendlin and Ottokar Urbasch. Fr. 692,687, Jan. 6, 1930.

Coloring higher fatty acids such as stearic acid. Hermann Schladebach and Herbert Hähle (to General Aniline Works). U. S. 1,791,431, Feb. 3. A coloring substance such as a thioindigo and an amino compd. such as triethanolamine are added to fatty acids while the latter are in liquid state. Numerous examples of use of Cu salts, etc., also are given.

Extracting oils and fats. Sträuli & Cie. (Ernst Müller, inventor). Ger. 515,058, July 20, 1926. This relates to the extn. of oils and fats from oil seed press cakes, used bleaching earth and like residues. The material is ground and mixed with

a solid diluent, *e. g.*, sawdust, and the mixt. is lightly pressed into briquets which are then extd. with a solvent in known manner.

Apparatus for extracting oils from seeds, sewage or other materials by solvents. CLARENCE J. BLEIL. U. S. 1,791,398, Feb. 3. Various details are described of an app. comprising an endless filter made up of connected sections. Cf. *C. A.* **24**, 1257.

Recovering dry palm oil from its admixtures with water. JAMES H. HOLDEN and JOSHUA C. WHETZEL (to American Sheet and Tin Plate Co.). U. S. 1,790,748, Feb. 3. A water-in-palm oil mixt. sepd. from a palm oil-in-water emulsion formed by washing palm oil from tin plate, after it passes from the tinning pot, is heated until substantially all the water is vaporized; the mixt. of oil and vapor resulting from the heating is then delivered into a draft of air of sufficient velocity to carry away the vapor and of insufficient velocity to pick up the oil. App. is described. Cf. *C. A.* **24**, 3749.

Soap. PIERRE P. A. CHAPELLE. Fr. 693,580, April 9, 1930 A soap for domestic use or for mechanics contains tallow soap 50, fine white pumice 43, glycerol 5 and resin 2%

Soaps, creams, etc. SOC. D'ÉTUDES SCIENTIFIQUES ET INDUSTRIELLES. Fr. 692,454, June 19, 1929. Biol. products are used in soaps, creams, etc. Fr. 692,455 describes the use of exts. from fungi etc., in soaps, creams, etc.

28—SUGAR, STARCH AND GUMS

J. K. DALE

Electrical conductivity and ash content of sugar house products. K. ŠANDERA. *Bull. assoc. chim. sucr. dist.* **47**, 446–9(1930).—A new app. is described for the electrometric detn. of ash in which Pt-black electrodes are eliminated An optical method is used to det. the end point instead of a galvanometer. The app. is in principle a Wheatstone bridge. Two of the 4 resistances are lamps, the light of the lamps falling on the surface of a triangular prism. The bridge is balanced when the 2 lamps appear to be of equal brightness. The prism reflects the light from both lamps onto the field of vision, thereby facilitating comparison. The third resistance is a const. and the fourth is a variable resistance consisting of the sugar soln. with 2 electrodes. The distance between the electrodes is variable and is changed to balance the bridge. The distance apart may be calibrated to read ash content. F. CAMPS-CAMPINS

The action of nonsugars in sugars upon the caramelization test. J. PUCHERNA. *Listy Cukrovar.* **49**, 13–20(1930).—Thin-walled containers contg. 6.5 g. of a sugar mixt. were dried at 100° for 2 hrs. The containers were then submerged in an oil bath at 170° for 15 min., withdrawn and cooled in the air The residue was dissolved in 50 cc water, filtered and compared in an objective photometer. The remaining soln. was treated with 0.5 cc. 2 *N* NaOH, digested over a water bath for 10 min., cooled and compared in the photometer for additional coloration. The action of salts falls into 3 classes: (1) large primary and small secondary coloration, (2) small primary and large secondary coloration, (3) very little coloration. Salts falling into class (3) are NaCl, KCl, $BaCl_2$, K_2SO_4, Na_2CO_3, AcONa, $AcONH_4$, Na oxalate. All salts in this class except $AcONH_4$ are strongly electropositive and their solns. are neutral or alk. The small coloration in alkali formed by the chlorides and acetates indicates a decompn. of sucrose into glucose and fructose which readily give rise to colorations. Acetates form more primary coloration than chlorides. Sucrose in soln. and at high temps. behaves as an acid. At 170° AcOH is volatilized from AcONa by sucrose. The sucrose liberates an equiv. quantity of an acid from the salt of the acid. The action is most pronounced for weak acids; the resulting soln. is alk., which favors a decompn. of sucrose. For NaCl, KCl and $BaCl_2$, the liberated HCl is small, the medium is neutral and no decompn. due to increased alky. occurs. $AcONH_4$, as the salt of a weak acid and base, remains neutral in action. Na_2CO_3 leaves an alk. medium, and some coloration results. K_2SO_4 decomposes at 1050°; it cannot be attacked by the sucrose and remains neutral during the decompn. Na oxalate behaves more like NaCl than AcONa. $(COOH)_2$ is a stronger acid than AcOH and the decrease in coloration agrees with their dissocn. consts. Class (1) consists of salts or amides of amino acids. Metallic salts of amino acids have a greater effect than the corresponding amides because of the action of the alkali. Class (2) forms products which become colored in alkali. NH_4Cl, $Fe(NH_4)_2(SO_4)_2$, NH_4 oxalate and $(NH_4)_2SO_4$ cause a large primary coloration in addn. to the secondary; $CaCl_2$, betaine-HCl and glutamic acid-HCl give very little primary coloration; $Fe_2(SO_4)_3$ and $KHSO_4$ lie between these groupings.

Betaine-HCl decomposes at 228°; glutamic acid-HCl, at 208°; in the presence of sucrose the decompn. begins at a lower temp. The effect of sucrose upon salt is marked: HCl is liberated and attacks the sucrose, forming invert sugar. The additional coloration in an alk. medium is a linear function of the catalytic salt. Too much acid, 0.2%, causes a more thorough decompn. with the production of ulminic acid and caramelin. $CaCl_2$, although similar to $BaCl_2$, acts as a strong dehydrating agent and falls into class (2). The larger primary coloration with Na_2SO_4 and $Fe_2(SO_4)_3$ is due to the dehydrating and oxidizing action of H_2SO_4. The large primary coloration with NH_4Cl, $(NH_4)_2SO_4$, NH_4 oxalate and $FeSO_4.(NH_4)_2SO_4$ is due to the action of NH_4 on sucrose; with NH_4Cl, the action of NH_3 exceeds that of HCl. The class (2) catalysts form a fluid mixt. very soon after heating; larger addns. cause foaming with intense odors suggesting C_6H_5CHO. The solns. become acid. Sucrose may act as a solvent for salts capable of dissocn. Granules of salts are often surrounded by a low-melting mixt. which contains sucrose in a fluid state. The sucrose may exert its high dielec. properties as a solvent; the dissocn. of salts in this "sucrose solvent" is similar to dissocn. in water. A mixt. of salts in the form of molasses was also tried. The effect is complicated not only by the presence of mixed salts but also by the colored org. substances of molasses whose effects have not been studied. The primary coloration with molasses is large; the secondary is small; the effect is due primarily to substances of class (3). FRANK MARSH

Iodometric determination of sugar. M. S. FILOSOFOV. *Nauk. Zapiski Tzukrovoi Prom.* 9, 586–9(1930).—In certain cases the sucrose cannot be detd. polarimetrically. The following method may be used on molasses. The normal wt. of molasses is dissolved in water to 130 cc. Fifty cc. of soln. (10 g. of molasses) is transferred into a 100-cc. flask and 25 cc. of H_2O contg. 5 cc. of HCl (d. 1.19) is added The inversion is conducted according to the Herzfeld method. The soln is made up to the 100-cc. mark and thoroughly mixed. Twenty cc. of the inverted soln. is transferred to a 400-cc. flask, 20 cc. of Na_2CO_3 soln. (84 g. per l.), 1–2 cc. of lead acetate and the same amt. of $Al(OH)_3$ are added. The excess of lead acetate is eliminated with soda ash and the whole made up to the 400-cc. mark and filtered. Fifty cc. of filtrate is transferred into a 250-cc. Erlenmeyer flask. Four to five g. of pure sucrose, and 50 cc. of Fehling soln. are added. The mixt. is boiled for 2 min. and then cooled by addn. of 100 cc. of H_2O, transferred to a 250-cc. flask and made up to the mark. One hundred cc. is transferred to an Erlenmeyer flask, 5 cc. of a soln. contg. 0.65 g. KCNS + 0.1 g. KI in 5 cc. of water, is added and thoroughly mixed. Ten cc. of 6.5 *N* H_2SO_4 is added, mixed and titrated with 0.1387 *N* $Na_2S_2O_3.5H_2O$. Five cc. of 1% starch soln. is added as indicator. The Brunce table gives mg. of invert sugar and this multiplied by 0.9 gives the sucrose Cf. *C. A.* 24, 985. V. E. BAIKOW

A preliminary study of the glucose, sucrose and refractometer solids relationships of five sugar cane varieties grown under Laguna conditions. MANUEL L. HOLLERS. *Philippine Agr.* 19, 299–305(1930).—The sucrose content varies widely in different parts of the plant. The refractometer solids vary directly with the gravity purity. In all varieties the refractometer solids and gravity purity decrease and the glucose content increases from the bottom to the top of the plant. A. L. MEHRING

The relation between the ash content of raw sugar and the conductivity of sugar solutions of different concentrations as well as of acidified sugar solutions. O. SPENGLER AND F. TÖDT. *Z. Ver. deut. Zuckerind.* 80, 853–65(1930).—Expts. on some 60 samples of German raw sugars show that the elec. detn. of ash is more accurate at 5° Bx than at a higher Bx (*e. g.*, 25°Bx). The correction factor of Zerban for the decrease of the difference between the chem. and the elec. ash detn. was applied to 70 samples of German raw sugars. The results were inadequate. This shows that the non-sugars in the samples tested by Zerban are different from the non-sugars in the German samples. F. CAMPS-CAMPINS

The Kämpf viscometer. ERHARD LANDT. *Z. Ver. deut. Zuckerind.* 80, 949–55 (1930).—A description is given and the method of operation of the app. is reviewed. Tests were carried out on various sugar solns. Conclusion: It is sufficiently accurate for solns. of viscosities over 3 poises. (There is no turbulent flow above this value.) It is especially recommended for solns. of high viscosity. The instrument will work even where solid suspended particles are present. The viscosity in this case is, of course, not the same as the viscosity of the pure liquid (cf. *C. A.* 24, 1767). F. C.-C.

The determination of reducing sugars in the presence of sucrose by potassium ferricyanide. R. HAMY. *Bull. assoc. chim. sucr. dist.* 47, 385–7(1930).—The method of Jonescu and Vargolici (cf. *C. A.* 15, 3564) is reviewed. Comparative tests were made on sugar solns. with varying contents of sucrose. It is shown that $CuSO_4$-Rochelle salts methods give results which are too high, increasing with increasing amts. of sucrose

For the J. and V. method the true result is obtained as long as the sucrose content is below about 30%. The end point is quite sharp. F. CAMPS-CAMPINS

The continuous recording of the alkalinity of saturation beet juices by conductivity measurements. O. SPENGLER AND F. TÖDT. *Z. Ver. deut. Zuckerind.* **81**, 1–12 (1931).—The alky. tester of Reinhard Lindner which gives a continuous indication and record of the alky. by cond. measurement was tested in a factory. Such control seems feasible for continuous satn. A conclusive decision is possible only after further investigation, but a straight-line relationship is indicated. The influence of juice compn. on cond. needs to be studied. F. CAMPS-CAMPINS

The Šandera objective photocolorimeter. ALOIS DOLINEK. *Listy Cukrovar.* **49**, 203–5(1930).—Using various liquors available in a refinery, D. compared the Stammer and Šandera photocolorimeters. The av variation in readings with the Stammer was 3.5–5 times as great as with the Šandera colorimeter. The variation of eyes is insignificant with the Šandera colorimeter, but large with the Stammer. F. M.

Effect of certain non-nitrogenous substances on the polarimetric determination of sugar. E. PARISI. *Ind. saccarif. ital.* **23**, 217–9(1930); *Chimie & industrie* **24**, 1202 (1930).—P. shows that the polarimetric detn. of sugar can be vitiated by soln. of foreign substances derived directly or otherwise from pectin. Heating dried beet pulp with distd. water on the water bath gives a strong *d*-rotatory soln., because of the presence of arabinose (arabinose anhydride), which is partially pptd. by basic $Pb(OAc)_2$; if $Ca(OH)_2$ water is used instead of distd. water, the soln. is strongly *l*-rotatory on account of the presence of Ca or Mg salts of pectic acid; if a soln. of basic $Pb(OAc)_2$ is used, the soln. is much less *l*-rotatory. A. PAPINEAU-COUTURE

Determination of the amount of crystal in massecuites by the electrical conductivity method. K. ŠANDERA. *Z. Zuckerind. Cechoslovak. Rep.* **54**, 361–4(1930).—In place of calcns. based on formulas employing the dry substance or polarization of the massecuite, elec. cond. measurements afford a more reliable method for the calcn. of the amt. of crystal to be expected, and are besides considerably more expeditious. B. C. A.

Analysis of sugar cane. E. HADDON. *S. African Sugar J.* **14**, 675(1930).—Sucrose in cane is usually estd. by multiplying sucrose in juice by a factor which necessarily varies with the proportion of juice in cane. H. proposes to det. sucrose % cane directly by repeatedly extg. on a Buchner funnel 100 g. of finely disintegrated cane, neutralized by means of lime water, with hot water until a total vol. of 1000 cc. is obtained. The ext. is clarified, polarized in a 400-mm. tube, and the result multiplied by 1.3. To obtain juice % cane, a quantity of the pulp is pressed in a tincture press; the extd. juice is clarified and polarized, and its sp. gr. is detd. Then juice % cane = 100 sucrose % cane/sucrose % juice. The quantity (100 − juice % cane) is termed marc, which is the hydrated insol. part of the cane. The water % cane is detd. by drying the pulp. The fiber % cane is then found by subtracting from the marc the difference between water in cane and water in juice. Six typical analyses are given, showing that the fiber % cane detd. by lixiviation is considerably lower than that found by H.'s method. F. W. ZERBAN

Determination of fiber and sucrose in cane. M. BECHARD. *S. African Sugar J.* **14**, 743(1930); cf. preceding abstract.—Haddon's article is criticized. The inaccuracies inherent in cane sampling may lead to errors of 2 units in the % fiber. Even if a correct sample of pulp can be obtained the analysis should be made by pressing the pulp, analyzing the juice for Brix and sucrose, and the residue for water and sucrose. From these figures the sucrose and fiber % cane can be calcd. directly. H.'s methods are based on incorrect assumptions, and the results for fiber will be accurate only within −2.4 and +5.4 units. H.'s figures actually show errors of this magnitude, as the water held by the dry fiber varies in his results from 31.8 to 86.2%. The problem of fiber detn. in cane has not yet been solved satisfactorily. F. W. ZERBAN

A new spectral colorimeter. O. SPENGLER AND E. LANDT. *Z. Ver. deut. Zuckerind.* **81**, 13–24(1931).—A detailed description and method of use of the app. are given. In principle it is like a Duboscq colorimeter equipped with a monochromator. Readings are made at λ = 610, 560 and 480. Exptl. figures show the accuracy of the instrument when used as a Stammer-app. in the broader sense and also for the comparison of 2 colored solns. In the latter case $\alpha_1/\alpha_2 = c_2h_2/c_1h_1$, where α is the extinction coeff. at the given wave length, c the concn., and h the height of the liquid column. F. CAMPS-CAMPINS

Apparent disagreement in the analysis of molasses. J. J. WEISS. *Listy Cukrovar.* **49**, 213–4(1930).—The molasses of the present season have been very dark and have

led to discrepancies in analyses. All discrepancies have been due to improper sampling of molasses for analysis. Studies in sampling are in progress. FRANK MARESH

Materials for the study of sucrose crystallization. I. A. KUKHARENKO AND I. N. KAGANOV. *Nauk. Zapiski Tzukrovoi Prom.* **9**, 492–9(1930).—The rate of crystn. has the highest velocity during the seeding at the beginning of the process. The max. speed of crystn. does not exceed 10,000 mg. on 1 sq. m. of crystal surface per min. One hr. from the moment of the seeding is required to obtain crystals of 1 mm. length. For a sugar crystal of an ordinary kind the approx. size is: $P = 0.35\ L^3$ and $S = 2\ 1\ L^2$, where P is the wt. of the crystal in mg., S its surface in sq. mm., and L its length in mm. V. E. BAIKOW

Influence of bagasse analysis on the sucrose content of the cane. E. HADDON. *S. African Sugar J.* **14**, 741(1930).—Previous investigators have shown that prolonged boiling and greater diln. increase the polarization of the bagasse ext. This is probably due to the extn. of optically active non-sucrose substances derived from the hydrolysis of hemicelluloses. To prevent this, the extn. must be carried out in the presence of $Ba(OH)_2$, alky. to phenolphthalein being kept up until the end of the digestion. The baryta method applied to bagasse gave results 0.08 to 0.33% lower than the ordinary method. F. W. ZERBAN

The deterioration of Philippine sugars under varying degrees of humidity. QUERINO D. RENDON. *Philippine Agr.* **19**, 383–96(1930). -Increase of H_2O in cane sugar favors rapid growth of organisms, which causes the sugar to deteriorate and introduces an error in the polarimetric detn. of sucrose. The max. degree of humidity in which sugar will not deteriorate is 66.2%. In an atm. of 100% relative humidity 36% of the sugar was lost in 4 months. A. L. MEHRING

Adsorption from sugar solutions. III. Adsorption in the carbon layer with acetic acid. J. VÁCHA AND J. VAŠÁTKO. *Listy Cukrovar.* **49**, 171–5(1930). -Activated charcoal which has the slowest filtration time shows the greatest no. of small grains and possesses the greatest surface and internal condensation of water vapors. With 10 g. of charcoal in a 50-cc. filter, H_2O at 20°, $p_H = 7.2$, and a head of pressure of 208 g. per sq. cm., the increasing order of filtration is: Supra-norit 5x, Supra-norit 3x, Carboraffin, Radit, Supra-carboraffin, Polycarbon, standard norit. The rate of flow of H_2O through the charcoals varies exponentially with the pressure. Changes in temp. alter the viscosity of H_2O. At higher temps. (85°), a rapid flow occurs during the first stage of filtration; the process of wetting the surfaces and packing of layers proceeds slowly at higher temps. The rate of flow through charcoal decreases with increased viscosity of sugar solns.; the degree of coloring had no effect upon the rate of flow. Adsorption of CH_3COOH occurs very rapidly during the first addns. of CH_3COOH. Satn. was attained when 1 l. CH_3COOH (1 818 g. per 100 cc.) was used per g. of charcoal. FRANK MARESH

The results of sampling raw sugar. JIŘÍ VONDRÁK. *Listy Cukrovar* **49**, 175–80 (1930).—A survey of the result of using standard methods of prepg. representative samples during the seasons of 1927–30 is reported. FRANK MARESH

The treatment of the after-liquors. G. DIEHN. *Listy Cukrovar.* **49**, 181–2(1930). -The diln. water was computed on the basis of non-sugars present in raw sugar juices and added while the digested liquor was being released. During the outflow, an analysis was made, and the final diln. was made during the entrance into refrigerators. Samples of computations are given. FRANK MARESH

The course of the first saturation. III. Reproducibility of the saturation with lime and sugar solutions. J. DĚDEK. *Listy Cukrovar.* **49**, 183–90(1930).—App. used in previous expts. were not capable of maintaining identical conditions throughout the course of the whole expt.; the accuracy of the previous observations and conclusions is lowered. Further observation of the satn. process in plants showed that it is more complicated than lab. findings indicated. Using a highly refined app. with precise controls, D. ran over 100 expts. with pure sucrose and CaO from marble and observed total alky., alky. of the filtrate, absorption of CO_2 and elec. cond. Detailed curves are thoroughly discussed. Although the curves show great similarity, D. was not able to attain an abs. reproduction under the refined method used, especially in elec. cond. Curves of changes of alky. at 20°, 50°, 70°, 90° do not resemble those of elec. cond. at the same temp.; at higher temps. elec. cond. curves show 2 characteristic transformation maxima. In some instances the elec. cond. continued to diminish markedly even after abs. neutrality had been attained. This is due to a delayed hydration of CO_2 and changes accompanying the formation of sediment. The $CaCO_3$ comes out of soln. in a "firm form" more slowly than when it is formed by neutralizing CaO with CO_2 in satd. or supersatd. solns. **IV. The union of lime in sediments.** K. KOBLIHA AND

E. PALEČEK. *Ibid* 199–203.—The suspensions of $CaCO_3$ or CaC_2O_4 which form in a sucrose-CaO soln. retain some of the free CaO. The concn. of CaO in the sediment depends upon the alky. of the filtrate, *i. e.*, upon the actual concn. of CaO in soln. This dependence has the form of an adsorption isotherm. The removal of CaO from the sediment is very rapid during the first 0.25–0.5 hr.; the remainder is not released completely during the next 48 hrs. K. assumes that the CaO in suspensions is in 2 states: (1) CaO which is immediately sol.; (2) CaO which becomes sol. after the first is dissolved. When oxalates were suspended in a CaO-sucrose soln., CaO was removed from soln.
F. M.

How much non-sugar from the water used for diffusion passes into the juice [in beet-sugar factories]? V. STANĚK AND J. VONDRÁK. *Z. Zuckerind. cechoslovak. Rep.* **54**, 117–21(1929).—The water supplies of some beet-sugar factories are liable, at times, to contain abnormal amts. of dissolved solids. To ascertain what proportion of the dissolved solids in the water passes into the juice the authors carried out comparative diffusion expts. with a lab battery, using distilled water alone and distilled water contg. 0.1 and 0.5% of NaCl and urea. From the amts. of these substances found in the diffusion juices it is concluded that about 1/4 of the dissolved matter in the water passes into the juice. If this is not removed by carbonatation, it must lower the purity of the final juice and increase the amt of molasses obtained The extra molasses due to 0.1% of mineral salts or 0.1% of org non-sugar in the original water may amount to 0.25% of the wt. of beets in the former case or 0.12% in the latter. B. C. A.

The influence of invert sugar upon the removal of amino acids from sugar solutions during saturation. VÁCLAV KONN *Listy Cukrovar* **49**, 190–5(1930).—The presence of a mixt. of glucose and fructose decreased the amino N removed with the sediment. Controls made without the invert sugar but with increasing CaO content also increased the amino N in the sediment. Glutamic and aspartic acids, asparagine and leucine were studied The removal of the amino acids depends upon the presence of physically active CaO, *i. e.*, lime which forms $CaCO_3$ during satn. and carries the amino acids into the sediment by adsorption. FRANK MARESH

The balance of analysis of beet juices. FERDINAND KRYŽ. *Listy Cukrovar.* **49**, 195–8(1930).—Pressed juice from beet roots is not identical with the natural beet juice; the pressed juice contains natural beet juice secreted by the cells and admixts. of juices from cell walls and interstitial tissues FRANK MARESH

Scale from (sugar-house) evaporators. E. SAILLARD. *Circ. hebd. comité central fabr. sucre* **42**, 627(1930); *Chimie & industrie* **24**, 1205–6(1930).—Analyses were made of 93 samples of scale after a season's run All contained CaC_2O_4 in variable amts., also insol. SiO_2 and sometimes Ca silicate, the latter being probably produced in the lime kiln because of excessive heating. There is generally 1–2% $CaSO_4$ originating from the limestone or from sulfitation. The amt. of $CaCO_3$ varies according to the efficiency of the boilers in decompg. and pptg. bicarbonates. The Fe_2O_3 and Al_2O_3 content decreases from the 1st effect (40%) to the last effect (about 1%); they originate chiefly from the limestone and coke. The points to be watched in order to reduce scaling are: the compn. of the limestone, the alky. of the juices before boiling, the operation of the boilers and of the evaporators, the concn. of the wash liquors and the time of washing.
A. PAPINEAU-COUTURE

The importance of a preliminary purification of the diffusion juice (beet). I. B. MINTZ AND B. E. KRASIL'SHCHIKOV. *Nauk. Zapiski Tzukrovoi Prom.* **9**, 515–37(1930).—Russian kieselguhr was compared with the best American and German grades and was found very much alike except for the wt which is 3–4 times higher and the proportion of large particles is much greater. The filtration of diffusion juice through asbestos or fibrous material is advisable. The amt. of total N in carbonation juices, obtained from diffusion juices previously boiled or treated with 0.5–1.0% of kieselguhr, is 9–12% lower than that in ordinarily treated juices. The color of the juices at high alky. is the same; at lower alky. (0.02–0.01) the coloration of the preliminary treated juices is considerably lower than the color of juices treated in the usual way. Good clarification of the juice is obtained by preliminary sulfitation to a p_H of 4.0 at a temp. of 20–40° followed by neutralization to alky. of 0.1 with lime and increasing the temp. to 80°, then further filtration and carbonation to an alky. of 0.01–0.02. V. E. B.

Hyposulfites, redos, sulfoxylates and oxymethanesulfines. M. MESTRE. *Bull. assoc. chim. sucr. dist.* **47**, 388–93(1930).—Based on his experience with hyposulfites, M. concludes that the Teatini process is sound as is indicated by the ultramicroscopic study of the colloids. The chemistry and application of sulfoxylates and hyposulfites are briefly reviewed. Oxymethanesulfine is entirely different from the others and is not used in the sugar industry. F. CAMPS-CAMPINS

Return of greens and molasses into diffusion battery. I. B. Mintz, G. S. Benin, A. K. Kartashov and B. E. Krasil'shchikov. *Nauk. Zapiski Tzukrovoi Prom.* 9, 399–431(1930).—Expts. on returning greens and molasses to diffusion juice continuously or intermittently proved unsuccessful. The total losses increased from 2.61 to 3.31%. The yield of final molasses increased and more fuel was used. The purity of the juices and sirups decreased. The expts. were run in different beet-sugar factories with practically the same results. V. E. Baikow

The investigation of the incrustation from the juice heater. I. O. Trefil'ev and S. A. Kostro. *Nauk. Zapiski Tzukrovoi Prom.* 9, 432–49(1930). V. E. B.

Investigation of the conditions for increasing the velocity of crystallization in "sugar loaves." M. I. Nakhmanovich and I. F. Zelikman. *Nauk. Zapiski Tzukrovoi Prom.* 9, 450–92(1930).—A no. of expts. in different refineries in Russia showed that velocity of crystn. in sugar loaves greatly increases with a sharp decrease of the temp. The most convenient temp. in the cooling rooms is +5°–+10°. In summer the low temp. can be maintained with the aid of ventilating fans. The increased rate of the cooling does not affect the quality of the refined sugar. The hardness and the color of the latter remain practically the same as during the cooling of the sugar loaves at the higher temps. The bleaching of the sugar is normal. A no. of tables and diagrams are included. V. E. Baikow

Boiling of a refinery massecuite with low-pressure steam. I. F. Zelikman. *Nauk. Zapiski Tzukrovoi Prom.* 9, 506–14(1930).—The excess of low-pressure (1–2 atm.) steam was used for boiling refinery massecuite. The increase in the time of boiling caused a slight increase in reducing sugars and coloring matters. These difficulties can be overcome by using a vacuum pan with a larger heating surface. V. E. Baikow

The bleaching effect of washing the massecuite of the second skip. V. V. Cheshchevik. *Zhur. Sakharnoi Prom.* 4, 305-8(1930).—The following expts. were made to det. the increase in yield and quality of white sugars resulting from the second skip. The massecuite was washed (*A*) with greens of 30° Bé., (*B*) with hot final molasses, and (*C*) with a measured quantity of molasses at 90–95° (3.4–5.0% on the wt. of massecuite), followed by warm water (1.8–2.0% on the wt. of massecuite). In (*A*) the yield of yellow sugar decreased 9.5%, with purity increase of 0.9%, while color decreased 47.9% and the time of centrifuging decreased 19.2%. In (*B*) the yield of the yellow sugar decreased 1.5% with a purity increase of 0.9%, and the color decreased 23.1%. Purity of the molasses increased 0.5% and centrifugal time decreased 10%. In (*C*) the yield of the yellow sugar decreased 9.2%, while its purity increased 3.7%, color decreased 83.7% and the centrifugal time decreased 25%. Obviously method *C* is the most advantageous. V. E. Baikow

Cane sirup manufacture. J. O. Carrero. *Porto Agr. Expt. Sta.* **1929**, *Rept.* 13–4 (1930).—A light-colored sirup of full, agreeable flavor was manufd. from sugar cane. The juice was readily clarified with H_3PO_3 and CaO but considerable sediment was formed during storage. The use of CaO always darkened the sirup. By restoring the cane juice to its original acidity after clarification, a better color was obtained. C. R. Fellers

The beet crop in Czechoslovakia for 1930. Jaroslav Souček. *Listy Cukrovar.* 49, 207–12(1930).—The sugar crop was above normal; the sugar content was normal; the total yield is estimated at 62.7×10^6 q. of beets and 11.1×10^6 q. of sugar. Frank Maresh

A study of the biology of the beet-nematode, Heterodera Schachtii Schm. M. Sinitzkii. *Nauk. Zapiski Tzukrovoi Prom.* 9, 538–44(1930). V. E. B.

The physical and chemical properties of kaoliang starch. I. The adsorption of iodine and chlorine by kaoliang starch. Shoji Kiki. *Abstract from Rept. Central Lab. S. Manchuria Railway Co.* 1929, 24–6.—The absorption of I and Cl is represented by the Freundlich equation, $x = kc^n$, in which x is the quantity adsorbed and c is the concn. of the Cl or I soln. A break in the curve of log c *vs.* log x probably represents a change in surface tension due to swelling of the starch granule. V. F. Harrington

Polarimetric determination of starch in potatoes and the relation between potato-dry substance and starch content. Carl von Schéele. *Medd. Kgl. Lantbruksstyrelsen* 1930, No. 283, 5–14.—Behrend, Maercker and Morgen (*Landw. Vers. Sta.* 25, 1880) detd. the relation between the sp. gr. of potatoes and the starch content, and prepd. a table, which has not been used widely, and which contains errors. The relation between potato dry substance and starch content was found to be practically const. at 5.75. The accuracy of the starch detn. was ±2%, attributed to air spaces. For starch detn. 3 g. of air-dried, finely ground potato heated with 50 cc. of H_2O for

4 hrs. at 135–40°, cooled to 90°, filtered from undissolved residue, washed with boiling H_2O, the filtrate dild. to 200 cc., and digested with 20 cc. HCl for 3 hrs. on a water bath, cooled, almost neutralized with KOH, 7–8 cc. of $Pb(OAc)_2$ added and dild. to 500 cc., 200 cc. removed and 50 cc. of 1% H_2SO_4 added to ppt. Pb, and sugar detd. in the filtrate with Fehling's soln. Dry substance was detd. by the Holdefleiss method (Über die Werthbestimmung der Kartoffeln. Landwirtschaftliche Jahrbücher 1877, Supplementheft, 107). The dry substance of potatoes contains pectin, which hydrolyzes under pressure to arabinose and galactose, which are detd. as sugar, giving high values for starch. E. M. SYMMES

Soil fertilization for sugar beets (TYSON, MCCOOL) 15. Chemistry of starch. XXIV. New polyamyloses (PRINGSHEIM, *et al.*) 10. Lignin and cellulose. XIV. The hydrolysis of polysaccharides (FREUDENBERG, *et al.*) 10. Methylated tri- and tetrasaccharides from cellulose and starch (FREUDENBERG, FRIEDRICH) 10. A new spectral colorimeter (SPENGLER, LANDT) 1.

Purifying sugar-house and refinery juices. DARIO TEATINI. Fr. 693,437, April 5, 1930. See Belg. 367,847 (*C. A.* **25**, 838).

Plant for extracting sugar. ALOIS RAK. Ger. 515,007, May 6, 1927. See Brit. 286,125 (*C. A.* **23**, 302).

29—LEATHER AND GLUE

ALLEN ROGERS

Preservation of leather bookbindings. R. W. FREY AND F. P. VEITCH. U. S. Dept. Agr., *Leaflet* **69**, 8 pp.(1930).—Among the 7 dressings recommended, the following are examples: neat's-foot oil (pure, 20° cold test) 25 parts, anhyd. lanolin 17.5, pure Japan wax 10, powd. Na stearate 2.5 and distd. water 45. Another prepn. consists of pure petrolatum (petroleum jelly). These prepns. are well rubbed into the leather by hand or with a brush. A cellulose nitrate lacquer for the preservation of old powdery leather bindings consists of: cellulose nitrate (one-half sec., for lacquers, ready mixed with 30% by wt. of EtOH) 1 part, ethylene glycol or monoethyl ether 2, Et acetate 3, *n*-butyl alc. 1, toluene 5, xylene 2 and U. S. P. castor oil 0.5 part. The first 4 ingredients are put in a glass, tightly closed and allowed to stand with occasional shaking until a clear thick sirup is obtained. The last 3 ingredients, mixed together, are then added in a thin stream with const. stirring until a uniform mixt. results. The lacquer is best applied with a soft brush. C. R. FELLERS

Study of the action of yeast extracts on the constituents of hides. F. VAN WELDEN. *Bull. assoc. élèves inst. sup. fermentations Gand* **32**, 27–32, 39–41(1931).—The results of the expts. indicate that yeast exts. of p_H about 8, at 40° and at suitable concn., can be used for bating; by adding buffers such as phosphates and NH_4 salts the p_H of the hides is reduced. Active Cl (in the form of chlorohydrin) at a p_H of 9.3 is an excellent depilatory agent, which does not injure the texture of the hair. A. P.-C.

Use of calcium hydroxide prepared from marble in the leather industry. J. OETTINGER. *Chem.-Ztg.* **54**, 586(1930).—The product obtained by slaking marble lime sufficiently to yield a dry powder contains 96% $Ca(OH)_2$. By its use in liming, a large excess is unnecessary, stains and lime burns are avoided and the lime pits do not require to be emptied so frequently. This lime does not require to be slaked. It can be used for making lime paints or in liming glue pieces. B. C. A.

Composition of Burma cutch. ANON. *Bull. Imp. Inst.* **28**, 432–4(1930).—Analysis of: (1) 6 samples of com. Burma cutch, (2) 1 sample of Borneo cutch, (3) 1 sample of mangrove cutch and (4) 3 samples of "Krystal" cutch, gave the following results: water 13.0–15.9, 19.9, 20.0, 12.5–12.9; insol. matter 2.7–9.3, 3.8, 1.5, 3.6–4.2; extractive matter (nontannins) 17.5–26.3, 21.2, 21.0, 24.4–26.5; tannins (hide powder batch C_2) 54.7–60.4, 55.1, 57.5, 57.3–59.1; tannins (by cinchonine sulfate method) 45.4–48.0, 53.4, 57.4, 40.6–44.1; ash 1.9–4.2, 6.3, 5.5, 1.4–1.6; catechol 6.4–11.0, 0, 0, 14.2–17.2%. A. PAPINEAU-COUTURE

Complementary studies on mangrove barks from Madagascar. II. "Honkolahy" and its barks. F. HEIM DE BALSAC, A. JAMET AND H. HEIM DE BALSAC. *Bull. agence gén. colonies* **23**, 1176–94(1930); cf. *C. A.* **22**, 1055; **24**, 4652.—The botanical characteristics and the biology of Honkolahy (*Rizophora mucronata* Lam.) are described in detail. A sample of bark, about 1 mm. thick, from Sambirano, Madagascar, contained 30.3% tannin, as compared with 34.96% for older bark (5 mm. thick) from Ampasi-

marinu-Akbatorekitra (Majunga). Tanning tests carried out on demineralized calfskin were quite satisfactory, showing that the bark approaches quebracho for tanning purposes, except that it gives somewhat too bright a reddish brown tinge to the leather. The bark would be suitable for the local production of dry exts., or for exportation for the production of liquid exts. A. PAPINEAU-COUTURE

Tanning materials of New Zealand. P. WHITE. *Bull. Imp. Inst.* **28**, 450–3 (1930).– Tanekaha (*Phyllocladus trichomanoides*) bark was found to contain 17% tannins and 9.2% nontannins, as compared with 23–8% tannins reported by an earlier investigator, probably because the later sample was from younger trees. Kamahi (*Weinmannia racemosa*) bark from a 12-in. diam. tree, an 18-in. tree and a very old tree contained: tannins 14.5, 22.2, 30.0; nontannins 5.9, 5.9, 6.4%, resp. Tutu (*Coriaria ruscifolia*) has a very thin bark, which would not pay for stripping; the combined wood and bark of a 1-year old shrub and of a 10-year old shrub had: tannins 2.7, 3.1; nontannins 10.3, 8.3%. Samples of com. black wattle (*Acacia mollissima*) bark grown in New Zealand contained 37–40% tannins and 9–11% nontannins; silver wattle (*A. dealbata*) bark contained 12.2–22.1% tannins and 9.5–12.1% nontannins; bark of a hybrid between black and silver wattle, which is immune to frosts and fungus disease, contained 25.8% tannins and 11.3% nontannins. Bark from 7-, 16- and 26-year old trees of *A. decurrens* var. *normalis* contained: tannin 18.9, 28.4, 36.6; nontannins 13.1, 11.2, 10.8%, resp. Other species of acacia had the following tannin and nontannin contents: *A. melanoxylon* (Rotorua) 15.2, 9.9; *A. longifolia* 12.4, 8.0; *A. prominens* 23.4, 12.3, *A. Baileyana* 17.7, 10.1, *A. lunata* 22.4, 12.7, *A. decurrens* var. *Leichardii* (New Plymouth) 33.3, 7.3, *A. penninervis* (New Plymouth) 28.2, 7.3% Most of these samples were taken from comparatively old trees, *viz.*, 20 yrs. Two samples of fungus galls (1-year old and much older) contained: tannin 13.4, 28.3; nontannins 22.8, 9.2%, resp. The water ext. of the older galls was of a deep red color and had a p_H of 5.8; on adjusting the latter to 4.8 the color was reduced nearly to that of a normal black wattle soln. of similar strength. All results are given on a 10% water basis. A. PAPINEAU-COUTURE

Skin glues and bone glues. H. MAIER-BODE. *Kunstdünger- u. Leim-Ind.* **26**, 327–9, 339–41, 351–4(1929).– It is confirmed that the viscosity of fresh glue liquor is smaller than that of a sol of equal concn. prepd. from the solid material; it is considered that, on drying, reaggregation of the glutin takes place. Skin glues and bone glues are conveniently tested by detg. the viscosity of a 17.75 or 20% soln. at 30° and 40°. A modification of Ostwald and Köhler's (*C. A.* **22**, 2865) test differentiates skin glue from bone glue. B. C. A

The condensation of catechol tannin (BERGMANN, POJARLIEFF) **10.**

Bleaching leather, skins, furs, etc. ANDRÉ CORNILLOT. Fr. 692,981, July 6, 1929. Leather, skins, furs, etc., are bleached in a bath contg. peracetic acid prepd., *e. g.*, by the action of H_2O_2 on Ac_2O. Salts such as phosphates, borates, alkali salts of org. acids or a base such as NH_3 are preferably present.

Greasing leather. HERMANN BOLLMANN and BRUNO REWALD. Ger. 514,399, July 17, 1927. A mixt. of lecithin and fatty oil is used, *e. g.*, equal quantities of lecithin and train oil.

Leather substitutes. SOC. FLEURY ET LAVANANT. Fr. 692,988, July 8, 1929. A leather substitute is made by treating unsized paper with strong H_2SO_4 charged with HCl, applying the product to cloth and neutralizing, washing and drying.

Demineralization of bones. GÉLATINES HASSELT ET VILVORDE, SOC. ANON. Belg. 371,121, July 31, 1930. The bones are treated with aq. H_3PO_4. The acid liquor is regenerated by adding it to a bath contg. a sufficient quantity of H_2SO_4 so that there will be no excess of liquor until the whole of the $CaSO_4$ has been pptd.

30—RUBBER AND ALLIED SUBSTANCES

C. C. DAVIS

The rubber industry in the United States. L. P. MAX. *Rev. gén. caoutchouc* **7**, No. 65, 3–6; No. 66, 3–8(1930). C. C. DAVIS

A few facts on the study of rubber-bearing plants of the Russian Soviet Republic. SERGIUS IVANOV, T. S. CHELZOVA, S. B. RESNIKOVA, E. I. TROFIMOVA, E. M. DUHNE AND V. I. SVESHNIKOVA. *Kautschuk* **6**, 237–9, 256–8(1930).—The results of an in-

vestigation of over 150 plants are described, with analytical data tabulated in detail. The most promising raw material was the rubber of the *Chondrilla*, the "naphivi" of which with suitable improved methods yield considerable rubber. C. C. DAVIS

The significance of the primary valence chain theory in explaining the structure of rubber. EUGENIO LINDMAYER. *Kautschuk* **6**, 249–52(1930); cf. *C. A.* **24**, 750.—A review and discussion. C. C. DAVIS

The plasticizing of rubber. F. JACOBS. *Rev. gén. caoutchouc* **7**, No. 67, 19–26 (1930); cf. *C. A.* **25**, 1117.—Various wood resins, tars, pine tars and oils are described and discussed, with quant. data (already published). C. C. DAVIS

An aging test with kerbosch rubber. R. RIEBL. *Arch. Rubbercultuur* **14**, 411–20 (1930)(In briefer form in English 421 4).—Kerbosch rubber and latex-sprayed rubber were kept at av. temps of 27° and 18° (at places with different climates) to ascertain the influence of different climatic conditions on the aging of both types of whole latex rubber. The Kerbosch rubber deteriorated badly at sea level, but nowhere nearly so rapidly at 5000 ft. elevation (cf. de Vries, *C. A.* **18**, 2265). The latex-sprayed rubber aged much better than the Kerbosch rubber, and furthermore the aging of the former was not so disproportionately bad at sea level. The results in general show the important influence of climate on the aging of rubber of the Kerbosch type. C. C. D.

Manufactured rubber, its keeping qualities and reconditioning. P. BRUÈRE. *Arch. méd. pharm. militaires* **91**, 571(1929); *J. pharm. Alsace Lorraine* **57**, 219–28 (1930), cf *C. A.* **24**, 3397. S. WALDBOTT

The Kelly abrasion machine. A. F. HARDMAN, W. L. MACKINNON AND S. M JONES *Rubber Age* (N. Y.) **28**, 463 5(1931).—The new machine, which is described and illustrated, is designed to simulate the road wear of tires, with special attention to 3 factors: (1) increasing and diminishing pressure of contact of the rubber with the abrasive material, (2) application of only part of the surface to the abrasive material and (3) a side slip as the rubber leaves the abrasive surface. With this method, actual road wear can be foretold reliably. C C. DAVIS

Modern methods of cycle tire vulcanization. A. FRÖLICH. *Gummi-Ztg.* **45**, 543 (1930), *India Rubber J* **81**, 154 7(1931). - An illustrated description. C. C. DAVIS

The influence of S dusting on rubber production (AMENT) **15**. Rubberized cloth (Fr pat. 693,890) **25**. Rubberized conveyor belts (Brit. pat. 335,475) **1**. SeS_2 [for vulcanization] (Fr. pat. 692,758) **18**.

VAN HARPEN, N. H.: **The Electrometric Determination of the Hydrogen-Ion Concentration in the Latex of Hevea Brasiliensis and Its Applicability to Technical Problems.** Medan (Java). Varekamp en Co. 459 pp. Reviewed in *Chimie & industrie* **25**, 266(1931).

Rubber articles from latex. SOC. ITALIANA PIRELLI. Brit. 335,621, June 27, 1929. In a process generally similar to that described in Brit. 292,964 (*C. A.* **23**, 1527), in which latex with a small proportion of certain added coagulants is subjected to local heating to produce coagulation, normal latex is heated to a moderate temp. (suitably 40–60°) and cooled prior to the introduction of the coagulants. Various details of procedure are given.

Rubber. I. G. FARBENIND. A.-G. (Curt Meisenburg, inventor). Ger. 511,540, Nov. 13, 1925. Liquid polymerized substances are removed from rubber-like condensation products (*e. g.*, from butadiene) by treatment with powd. absorbents such as active C, active SiO_2, etc.

Rubber, etc., dispersions. THE DUNLOP RUBBER CO., LTD., and THE ANODE RUBBER CO., LTD. Fr. 692,532, Mar. 21, 1930. In the manuf. of articles from org. dispersions of rubber, gutta-percha, balata or like vegetable resins, the surface of the molds or formers is covered with a film of dehydrating and coagulating liquid before immersion in the dispersions. Thus, the molds may be inserted in a concd. soln. of $AcONH_4$, NaCl or NH_4Cl, to which an acid or a mixt. of acids may be added.

Rubber dispersions. NAUGATUCK CHEMICAL CO. Brit. 335,597, June 20, 1929. Rubber dispersions are prepd. as water-in-oil emulsions by emulsifying water in oil with suitable emulsifying agents and adding rubber before, after or during the emulsification, with subsequent mixing to effect dispersion. The products can be used in substantially the same manner as rubber-solvent doughs are used in making spread or coated fabrics. Numerous details and examples of procedure are given. Cf. *C. A.* **24**, 751.

Preservation of rubber. WALDO L. SEMON (to The B. F. Goodrich Co.). Can.

308,541, Feb. 10, 1931. Rubber is preserved by treating with the resinous condensation product of p-$C_6H_4(NHPh)_2$ with CH_2O. Cf. *C. A.* **24**, 2329.

Rubber treatment to increase resistance to deterioration from age. WM. S. CALCOTT and WM. A. DOUGLASS (to E. I. du Pont de Nemours & Co.). U. S. 1,790,794, Feb. 3. Rubber compns. are treated, before vulcanization, with (as anti-aging addns.) 3-hydroxy-3-methoxybenzylaniline (suitably 1-5%) or various other substances which may be obtained by the reaction of an aromatic primary amine with formaldehyde and a phenolic compd., as described in German patent 109,498. The resulting products are mixts. contg., in each instance as the major constituent, a hydroxybenzylaryl amine having the general formula R—NH—CH_2—R′—OH, in which R represents an aryl group which may or may not contain alkyl substituents and R′ represents an aryl group which may or may not contain alkyl and alkoxy substituents. Various examples and details of procedure are given.

Antioxidant for rubber. PAUL C. JONES (to The B. F. Goodrich Co.). Can. 308,542, Feb. 10, 1931. Rubber is preserved by incorporating with it tetraphenylhydrazine before vulcanization.

Rubber stock treatment. HENRY L. MORAN. U. S. 1,790,875, Feb. 3. Rubber stock is passed through a receptacle contg. water heated to about its b. p., to soften the rubber without cure or vulcanization. App. is described.

Apparatus for forming and calendering rubber or rubberized fabrics or strips. DUNLOP RUBBER CO., LTD., and H. WILLSHAW. Brit. 335,657, July 10, 1929. Mech. features and details of app. are described.

Sponge rubber. REGINALD J. NOAR. Ger. 515,340, May 26, 1928. See Brit. 284,938 (*C. A.* **22**, 4877).

Ornamenting rubber articles. LIVERPOOL RUBBER CO., LTD., and G. THORNE. Brit. 335,612, June 28, 1929. Articles produced directly on a former from aq. dispersions of rubber, gutta-percha, balata or the like, are ornamented by dipping them while still on the former into water on the surface of which are floated streams of suitable colored solns. such as rubber solns. contg. pigments such as CdS or vermillion.

Regenerating rubber. LOUIS BEAUDOIN. Fr. 692,982, July 6, 1929. Waste rubber of all kinds is regenerated by heating it rapidly to 250-280° until the mass becomes bright; this change corresponds to the max. devulcanization which it is possible to obtain. An app. is described

Substances resembling hard rubber. I. G. FARBENIND. A.-G. Fr. 692,606, Mar. 24, 1930. Substances resembling hard rubber are obtained by vulcanizing products obtained by the polymerization of erythrene. Examples are given.

Porous ebonite articles. MEYER WILDERMAN (to American Wilderman Porous Ebonite Co.). U. S. 1,791,437 Feb 3. In forming porous articles such as diaphragms, the surface portions are formed of initially uncured ebonite occupying such volume that adjacent particles are in contact but are not compacted into a nonporous solid mass, the coatings of the particles being united by vulcanization between themselves and with the enclosed ebonite particles.

Synthetic rubber. I. G. FARBENIND. A.-G. Fr. 691,662, Mar. 10, 1930. A product resembling rubber is obtained by polymerizing 1,3-butadiene, a small quantity of water being added during the reaction. The water added may be in the form of water of crystn. in salts, *e. g.*, $Na_2CO_3.10H_2O$ or $MgCl_2.6H_2O$. Cf. *C. A.* **24**, 6065

Synthetic rubber. I. G. FARBENIND. A.-G. Brit. 335,616, June 29, 1929. Mixed rubber-like masses are produced by partially polymerizing a diolefin as described in Brit. 307,308 (*C. A.* **23**, 5352), adding a different diolefin (such as 2,3-dimethylbutadiene if butadiene or isoprene is used as the initial material), and then further polymerizing. Various details and examples are given. Cf. *C. A.* **25**, 1120.

Synthetic rubber compositions for tires. I. G. FARBENIND. A.-G. Brit. 334,958, June 15, 1929. Butadiene polymers used for tire manuf. as described in Brit. 299,037 (*C. A.* **23**, 3376) are replaced by a mixt. of these polymers with a natural or artificial resin. Various details and examples are given.

Artificial rubber. I. G. FARBENIND. A.-G. (Helmuth Meis, Wilhelm Klein and Eduard Tschunker, inventors.) Ger. 515,143, July 21, 1927. Butadiene hydrocarbons, in aq. emulsion, are polymerized by addn. of a small quantity of a finely divided or colloidal heavy metal oxide which does not yield H_2O_2 when treated with acids. MnO_2 and PbO_2 are suitable oxides. Protective colloids may be included in the emulsions, and the oxide may be formed *in situ*. Examples are given.

Vulcanizing rubber. IMPERIAL CHEMICAL INDUSTRIES, LTD. Fr. 693,178, April 2, 1930. Rubber and like substances and vulcanizable oils are vulcanized in the presence of an *N,N*-dithio deriv. of a secondary amine such as *N,N*-dithiopiperidine.

CHEMICAL ABSTRACTS

Vol. 25. APRIL 20, 1931 No. 8

1—APPARATUS AND PLANT EQUIPMENT

W. L. BADGER

A device for determining work input to a laboratory ball mill. JOHN GROSS AND STUART R. ZIMMERLEY. Bur. Mines, *Rept. of Investigations* 3056, 3 pp.(1931). ALDEN H. EMERY

A satisfactory laboratory cement. V. T. JACKSON. *Chemist Analyst* 20, No. 2, 23 (1931).—Directions are given for making cements from asphalt, rosin, rubber and turpentine; such cements are used for *making gas-tight joints in apparatus.* W. T. H.

The shape of clamps. WILHELM VOLKMANN. *Chem. Fabrik* 1931, 62–3; cf. *C. A.* 23, 733.—The geometry of lab. clamps is discussed as a possible basis for standardization. J. H. MOORE

Modification of the Seitz 20-ml. filter. N. W. LARKUM. *Am. J. Pub. Health* 21, 193–4(1931); cf. *C. A.* 23, 3601.—Wider and thicker flanges make possible the application of much more pressure, which is necessary to assure an adequate seal in order to prevent air leakage with its consequent contamination of the filtrate. J. A. KENNEDY

Filters for the reproduction of sunlight and daylight and the determination of color temperature. RAYMOND DAVIS AND K. S. GIBSON. Bur. Standards, *Miscellaneous Pub.* No. 114, 165 pp.(1931). E. H.

Mechanical stirrer. IRWIN STONE. *Chemist Analyst* 20, No. 2, 18–9(1931).—Directions are given for making a stirrer; an old elec. motor or converted fan is used as power. W. T. H.

A generally applicable shaking apparatus. P. DICKENS. *Chem. Fabrik* 1931, 61–2; cf. *C. A.* 22, 3554; 23, 4905.—Two motor-driven shakers are described, one for use with ordinary glass app., the other for connected app. for carrying out reactions with air exclusion. J. H. MOORE

A flask, divided in the middle, for evaporating and drying in a vacuum, boiling with reflux, and extracting. ARNOLD LUBINSKI. *Chem. Fabrik* 1931, 78. J. H. MOORE

Improvised drying oven. GEO. W. CORRIE. *Chemist Analyst* 20, No. 2, 16 (1931).—For drying a no. of bulky objects at 50° it was found possible to make use of a small oven placed in the hood with a baffle plate in front of it. A cut of the arrangement is shown. W. T. H.

Water baths. LESTER MEYER. *Chemist Analyst* 20, No. 2, 16(1931).—An arrangement for keeping the level const. in the bath is shown. W. T. H.

Hot water as a means of attaining higher temperatures. BATTIGE. *Apparatebau* 42, 217–19(1930).—An air-heating system for use in drying rooms is described. Pipe bank "boiler" and heating coils. M. C. ROGERS

Method for preventing an exhaust tube from shutting off on a water-cooled condenser. RUSSELL P. EASTON. *Chemist Analyst* 20, No. 2, 21(1931).—By using a test-tube clamp on the upper outlet of a condenser mantle, collapse of the rubber tubing, which would impede the flow of the water, is prevented. W. T. H.

A practical viscometer. H. R. HAMMOND. *Chemist Analyst* 20, No. 2, 21–2 (1931).—An improvised viscometer is shown which can be made at low cost. W. T. H.

An adjustable picnometer float. FERDINAND AMBRUST. *Chemist Analyst* 20, No 2, 22–3(1931).—In detg. d. by the picnometer method it is necessary to support the app. in a const.-temp. bath so that it remains immersed to the proper depth. A floating support is shown which accomplishes this. W. T. H.

Paraffining reagent bottles for alkaline solutions. WALTER B. DYE. *Chemist Analyst* 20, No. 2, 18(1931).—Directions are given for lining a bottle with paraffin so that standard alkali soln. can be kept without deterioration as a result of action upon the glass. W. T. H.

A modified Victor Meyer apparatus for the determination of molecular weights EUGENE W. BLANK. *J. Chem. Education* 8, 546–7(1931).—An easily constructed app

stance and a vehicle or agglutinant, and is then passed through a die before the coating is baked. App. is described.

Photoelectric cell. S. RUBEN (to Arcturus Radio Tube Co.). Brit. 336,397, Jan. 11, 1929. An electrode surface of etched Cu_2O is prepd. by heating a Cu electrode in an oxidizing atm. at 1000° and immersing it in a soln. of NH_4Cl or $ZnCl_2$ to produce a rough cryst. surface. The electrode is embedded in beeswax and resin in a cell and exposed in an electrolyte such as NH_4Cl. Cf. *C. A.* **24**, 2336.

Photoelectric cell. AUGUST KAROLUS and FRITZ SCHRÖTER (to Ges. für Drahtlose Telegraphie m. b. H.). U. S. 1,791,928, Feb. 10. Ne or He may be used as a filling.

Photoelectric cell. Soc. DES USINES CHIMIQUES RHÔNE-POULENC. Brit. 336,574, July 12, 1929. Various details are described of a gas-filled cell which may have a cathode of a layer of K and an anode and auxiliary electrode in the form of straight parallel wires. The auxiliary electrode is near the anode and is maintained at a fixed potential much lower than that of the anode, so that it acts as a non-photoelec. cathode when the potential applied to the anode nearly reaches the luminous discharge potential. Cf. *C. A.* **25**, 238.

Electric discharge device. N.-V. PHILIPS' GLOEILAMPENFABRIEKEN. Brit. 336,563, July 8, 1929. App. for rectifying a. c. comprises a gas-discharge tube in which are located, in sep. chambers, an incandescent cathode (preferably an oxide cathode) and one or more anodes (such as graphite). Vaporized Hg may be condensed in the anode chamber. Various details of construction and operation are described. Cf. *C. A.* **25**, 851.

Electric discharge tubes for emitting ultra-violet rays, etc. N.-V. PHILIPS' GLOEILAMPENFABRIEKEN. Brit. 336,222, July 5, 1929. For preventing impairment of the transparency of the tube walls to the rays generated, when the discharge is carried wholly or partly by a substance such as Mg which is likely to cause obscuration of the tube, the part of the tube wall intended for the passage of rays is coated with a substance (suitably KCl or KF in the case of Mg) which either prevents deposition or renders the deposit formed transparent to the rays desired. CaF_2 may be used as a coating for the interior of a Hg vapor lamp. K fluoborate also is suitable for use with tubes contg. Mg. When the tube contains Na vapor, the wall may be coated with S or P. Various details are described.

Metallic-vapor luminous discharge tubes. PATENT-TREUHAND-GES. FÜR ELEKTRISCHE GLÜHLAMPEN (to General Elec. Co., Ltd.). Brit. 336,490, July 13, 1929. In a lamp with a filling comprising vapor of Na, K, Hg, Li, Cs or Zn, with a rare gas or a gas such as N to facilitate starting, condensation of vapor in the electrode chambers is prevented by encircling the part of the tube remote from the electrodes with laminated or ribbed metal rings to promote cooling. Oxide electrodes may be used, heated by a filament. Various details of construction are described.

Cathodes for electric discharge tubes. VEREINIGTE GLÜHLAMPEN- UND ELECTRIZITÄTS- A.-G. Austrian 120,121, June 15, 1930. Cathodes of elec. discharge tubes made wholly or partly of glass are oxidized *in situ* by electrolyzing the glass so as to liberate O within the tube. The glass is locally heated, and the low-pressure gas filling of the tube is rendered conductive by maintaining a discharge in the tube. The cathode for the electrolysis is electrically connected outside the tube to the heated part of the glass, and the anode or cathode of the tube serves as the electrolytic anode. By interchanging the electrolytic anode and cathode, alkali or alk. earth metals may also be introduced into the tube. Cf. *C. A.* **25**, 1125.

Catalytic hydrogenation apparatus. TECHNICAL RESEARCH WORKS, LTD., and E. J. LUSH. Brit. 336,569, July 11, 1929. In app. having a Ni catalyst in the form of wire, turnings, or the like, packed in cages, the catalytic elements are constructed so that their thickness does not exceed 6 in., so that anodic oxidation may be thoroughly effected; an internal and an external cathode are used during the anodic oxidation process. Various details of construction and treatment are described.

Filler material for absorption towers. C. H. BUTCHER. Brit. 335,889, June 28, 1929. Hollow cylinders are used which after manuf. have had their sharp rough edges removed as by grinding; or tubes are used which are die-pressed so that they are free from sharp edges.

"Molecular pump." E. R. GROTE. Brit. 336,001, July 9, 1929.

Mechanical-stage construction for microscopes. C. BECK and C. J. BECK. Brit. 336,064, Sept. 4, 1929.

Fine-focusing construction for microscopes. C. BECK and C. J. BECK. Brit. 336,063, Sept. 4, 1929.

Air-treatment, humidifying and dehumidifying apparatus. THOMAS CHESTER. U. S. 1,791,751, Feb. 10. Structural features.

Apparatus (with a perforated inclined plate) for pneumatic separation of solids of different densities. R. H. KIRKUP. Brit. 336,055, Aug. 29, 1929. Structural features.

Continuous process for sterilizing milk or other liquids under pressure. N. J. NIELSEN. Brit. 337,027, June 27, 1929. Various details of app. and procedure are described.

Vacuum tank and heated tube system for condensing milk or other liquid products. N. J. NIELSEN. Brit. 335,964, June 5, 1929. Structural features and details of operation are described.

Apparatus for pasteurizing milk or other liquids by the "Holding Process." RICHARD SELIGMAN (to Aluminium Plant & Vessel Co., Ltd.). U. S. 1,792,328, Feb. 10. Structural features.

Apparatus for pasteurizing liquids in closed vessels. WILLY RÜPRICH. Ger. 513,522, Nov. 11, 1927. Details are given.

Apparatus for producing a foam-like mass from slag suitable for casting porous articles. NORSKE AKTIESELSKAB FOR ELEKTROKEMISK INDUSTRI. Brit. 335,875, Feb. 27, 1929. Structural features of an app. with a horizontal or inclined container with stirrers, etc.

Apparatus and electrical system for magnetic tests of physical characteristics of iron or steel rods, etc. C. KINSLEY. Brit. 336,987, June 19, 1929.

Apparatus for continuous reactions between liquids under pressure. IMPERIAL CHEMICAL INDUSTRIES, LTD., and K. H. SAUNDERS. Brit. 336,136, Nov. 14, 1929. The app. for carrying out continuous reactions between liquids under pressure described in Brit 329,260 (*C. A.* 24, 5188) is constructed of corrosion-resisting material in the parts liable to be attacked by the reagents; *e. g.*, in an app. for the manuf. of *p*-nitroaniline from *p*-chloronitrobenzene and aq. NH_3 the outer tube may be protected by a mantle of "stainless steel," and the central tube may be formed of the same material. Various details of construction and operation of the app. are described.

Clarifying plant for liquids, particularly for coal and ore industries. PRÉPARATION INDUSTRIELLE DES COMBUSTIBLES. Ger. 516,454, Feb. 26, 1928.

Apparatus for determining specific gravity of solids or liquids. W. & T. AVERY, LTD., and W. A. BENTON. Brit. 336,043, Aug. 14, 1929. Numerous structural details are described.

Sterilizing apparatus for liquids, with heated filter. CARPULE G. M. B. H. and OSWALD PONTIUS. Ger. 516,007, Aug. 19, 1927.

Steam sterilizer. F. & M. LAUTENSCHLÄGER G. M. B. H. Ger. 516,008, May 23, 1928.

Mixing and emulsifying apparatus. VICTOR A. COLLINS. Ger. 516,443, Oct. 3, 1929. See Brit. 323,534 (*C. A.* 24, 2920).

Apparatus for extracting gases from liquids such as oils. SOCIETÀ ITALIANA PIRELLI. Fr. 693,985, April 15, 1930.

Apparatus for separating gaseous mixtures by liquefaction and rectification. SOCIÉTÉ L'AIR LIQUIDE (SOC. ANON. POUR L'ÉTUDE ET L'EXPLOITATION DES PROCÉDÉS GEORGES CLAUDE). Fr. 694,035, Apr. 16, 1930.

Apparatus for washing gases with atomized liquids. G. RAW. Brit. 336,221, July 4, 1929. Various details of construction and operation are described of apparatus suitable for removing dust from air or other gases.

Air liquefaction system. M. HAZARD-FLAMAND. Brit. 336,798, Oct. 18, 1928. Various details of app. and procedure are described.

Apparatus for storing liquefied gases. CHRISTIAN W. P. HEYLANDT. Fr. 694,010, April 16, 1930.

Gas washers. PNEUMATIC CONVEYANCE U. EXTRACTION (1929), LTD. Ger. 513,527, Nov. 15, 1928. Addn. to 508,571 (*C. A.* 25, 622). Further details of a partitioned air, etc., purifier are given.

Apparatus for drying gases with sulfuric acid. RENÉ HAYOT. Fr. 694,038, April 16, 1930.

Wet and dry bulb apparatus for determining humidity of gases. CAMBRIDGE INSTRUMENT CO., LTD., J. L. ORCHARD and H. T. GLOVER. Brit. 336,855, Dec. 2, 1929. Various details are described of app. employing elec. resistance thermometers.

Apparatus for effecting catalytic reactions between gases at raised temperature and pressure. MARIA CASALE-SACCHI. Austrian 120,393, July 15, 1930.

Apparatus for ammonia synthesis and like catalytic gas reactions. HANS HARTER. Ger. 516,249, Aug. 11, 1926. See Brit. 275,983 (*C. A.* 22, 2444).

Drying apparatus (spraying or atomizing type). PAUL KLAHR. Ger. 517,177, April 3, 1927.

Drying apparatus with conveyors and several compartments separately controlled as to drying conditions. B. J. OWEN and R. O. DAVIES. Brit. 336,009, July 10, 1929. Various structural features and details of supply of heated drying gas, etc., are described.

Apparatus for drying materials successively on superposed trays. L. N. LLOYD and PHILLIPS ENGINEERING CO., LTD. Brit. 336,602, May 9, 1929. Structural features.

Tunnel drier and associated rotary air filter. TOMLINSONS (ROCHDALE), LTD., and J. N. TOMLINSON. Brit. 336,049, Aug. 22, 1929.

Removing oil and fat from the hot chambers of drying apparatus. LOTHAR WOLF and KARL KUNZE. Ger. 514,074, Aug. 29, 1929. Addn. to 478,637 (*C. A.* **23**, 4803).

Evaporating apparatus. SOC. DES CONDENSEURS DELAS. Ger. 516,365, May 22, 1927. Means is described for preventing the carrying away of froth by the vapors.

Apparatus for evaporating and cooling solutions. PAUL H. MÜLLER. Ger. 513,789, Nov. 21, 1924.

Means for removing salts from evaporators operated at reduced pressure. PAUL H. MÜLLER. Ger. 516,381, June 3, 1927.

Apparatus for evaporating liquids or crystallizing salt solutions. E. M. S. INDUSTRIAL PROCESSES, LTD., RICHARD A. STOKES and EDWIN G. L. ROBERTS. Fr. 694,553, Apr. 25, 1930.

Apparatus for developing crystals. IMPERIAL CHEMICAL INDUSTRIES, LTD. Fr. 694,014, Apr. 16, 1930. The vessel consists of an annular partition and means for circulating the liquor from the top downward in the central part and from the bottom upward on the sides.

Surface condenser suitable for use with steam. PAUL A. BANCEL (to Ingersoll-Rand Co.). U. S. 1,792,060, Feb. 10.

Apparatus for cleaning steam. COCHRANE CORP. Ger. 516,158, Jan. 18, 1929.

Apparatus for drying sludge for fertilizer or other materials by the action of heated circulating drying medium such as air or combustion products. JOHN B. BERRIGAN and JOHN J. BERRIGAN (to The Press and Drier Co.). U. S. 1,792,064, Feb. 10. Structural features.

Apparatus for eliminating carbon monoxide from motor-vehicle exhaust gases. HAROLD E. STORY. U. S. 1,791,912, Feb. 10. Various structural details are described of a device adapted for elec. heating of the gas in the presence of water vapor.

Wet classifier for pulverulent materials. LEONARD ANDREWS. Ger. 516,146, July 30, 1927. See Brit. 280,121 (*C. A.* **22**, 3005).

Heat-resisting cementation pot. FRIED. KRUPP A.-G. Fr. 694,665, April 29, 1930.

Device for indicating the presence of coal gas, etc., in the air. RICHARD LEISER. Austrian 120,184, Feb. 15, 1929.

Horizontal chamber furnace. STETTINER CHAMOTTE-FABRIK A.-G. VORMALS DIDIER. Ger. 513,594, Mar. 1, 1928. Details of closure are given.

Door-lifting apparatus for chamber furnaces. EBERHARD GRASSHOFF. Ger. 513,571, April 1, 1927. Details are given.

Fusion furnaces. ITALSICE (SOCIETÀ ANONIMA). Fr. 694,186, April 18, 1930. Construction of burner for using powd. fuel is described.

Inclined grate furnace. L. and C. STEINMÜLLER. Ger. 513,476, May 13, 1928. Addn. to 511,566 (*C. A.* **25**, 1126). Details of charging the forward part of the furnace.

Counterflow furnace suitable for heating articles in boxes. VEIT A. HAIN (to George J. Hagan Co.). U. S. 1,792,423, Feb. 10.

Burner for liquid fuel. TOM K. A. NORDENSSON. Fr. 694,349, April 23, 1930.

Boiler plant fired with pulverulent fuel. INTERNATIONAL COMBUSTION ENGINEERING CORP. Ger. 516,449, Oct. 27, 1925.

Pulverulent fuel burner. ROBERT S. WALKER. Ger. 516,257, Aug. 9, 1921.

Apparatus for distributing pulverulent fuel and air from a main to a number of branches. GEORGE R. ALDEN and CHARLES SKENTELBERY. Ger. 516,137, Oct. 7, 1928. Corresponds to Brit. 312,474.

Rotary-drum grate for finely granular fuels. WERNER SCHLEGEL. Ger. 516,483, Feb. 12, 1928.

Heat exchanger. SEMJON W. STAKIN. Ger. 513,844, Mar. 25, 1928. A heat exchanger for pre-heating the fuel gas consists of a mass of tubes of eliptical cross section.

Tubular heat-exchange apparatus. J. HOWDEN & Co., LTD., and J. H. HUMB. Brit. 336,755, Sept. 21, 1929. Structural features of an app. with metal pieces having

concave surfaces placed between rows of tubes to direct heating gases or the like in sinuous paths between the tubes.

Tubular heat-exchange apparatus. C. A. HUBERT. Brit. 337,236, Nov. 22, 1929. Structural features.

Method of heating furnaces by the waste heat of spent gases. C. OTTO & Co. G. M. B. H. Ger. 513,595, April 27, 1930.

Apparatus for removing ash without admitting air to the furnace. JULIUS JOSEF KELBER. Ger. 513,792, July 17, 1928.

Gas burner. GASTON B. KILLAM. U. S. 1,791,565, Feb. 10.

Gas burner. CLARENCE H. MORROW (to Hotstream Heater Co.). U. S. 1,791,509, Feb. 10.

Gas burner for heating boilers, furnaces, etc. J. E. WEYMAN. Brit. 336,722, Aug. 23, 1929.

Safety valve for gas burners. CLARENCE H. MORROW (to Hotstream Heater Co.). U. S. 1,791,530, Feb. 10. Structural details are described of a valve which cuts off gas supply to a main burner when a pilot light is extinguished.

Bunsen-burner attachment for producing radial horizontal flames. LOUIS TARTAZ. U. S. 1,791,913, Feb. 10. Structural features.

Retort door for resisting pressure. NICHOLS PRODUCTS CORP. Brit. 335,946, July 3, 1929.

Rotary kiln. HURON INDUSTRIES, INC., and B. E. GREEN. Brit. 336,729, Aug. 28, 1929. A sealing ring between a rotary kiln and its fixed ends is mounted so that its wt. tends to maintain a tight joint.

Tunnel kiln construction and heating system. V. LASTOVICKA. Brit. 336,171, Dec. 23, 1929. Various structural details are described.

Electric water heater. L. F. THOMPSON. Brit. 336,011, July 11, 1929. Structural features.

Acetylene generator. AUTOGENWERK SIRIUS G. M. B. H., THEODOR GEIS and AUGUST H. GIES. Ger. 513,612, May 16, 1929. Details of app. for generating C_2H_2 from water and CaC_2 dust are given.

Acetylene generator and lamp. WM. F. HUNT and HERMANN C. STELLING (to Union Carbide Sales Co.). U. S. 1,791,595, Feb. 10.

Thermostat. N.-V. NEDERLANDSCHE TECHNISCHE HANDEL MAATSCHAPPIJ "GIRO." Ger. 513,550, Sept 22, 1929. The device is applicable to hot water systems, the expansion or contraction of a rod opening or closing a rubber, etc., tube.

Thermostatic electric switch. R. MACLAREN. Brit. 337,093, Aug. 10, 1929.

Thermostatic electric switch. FELTEN & GUILLEAUME CARLSWERK A.-G. Brit. 337,162, May 6, 1929.

Thermostatic device for electrically operated fire alarms. JAMES R. LONGWORTH and HERBERT HIRST (Longworth to Hirst). U. S. 1,791,598, Feb. 10. Structural features.

Thermostatic and electrical control system suitable for piezoelectric crystal control systems. ALFRED CROSSLEY (to Federal Telegraph Co.). U. S. 1,791,804, Feb. 10. Structural and elec. features.

Thermostatic cut-out device for electric circuits. ADONIRAM J. GREEN (to General Elec. Co.). U. S. 1,792,299, Feb. 10. Structural features.

Thermostatic control for heating systems. JOHN M. LARSON (to National Regulator Co.). U. S. 1,792,101, Feb. 10. Structural features of app. employing a plurality of thermostats.

Thermostat construction suitable for control of fluid heating media. R. CARLSTEDT. Brit. 336,481, Nov. 25, 1929.

Thermostatically controlled reducing valve construction suitable for steam-heating systems. CLAYTON A. DUNHAM (to C. A. Dunham Co.). U. S. 1,792,213, Feb. 10.

Thermostatically controlled combined hot-water supply and heating system. HOPE'S HEATING & LIGHTING, LTD., and J. H. HARPIN. Brit. 336,125, Oct. 31, 1929. Structural and elec. control features.

2—GENERAL AND PHYSICAL CHEMISTRY

FREDERICK L. BROWNE

Life and work of the late Professor A. C. Baer. R. B. BECKER. *Proc. Assoc. Southern Agr. Workers, 31st Ann. Convention*, 158–62(1930).—Baer's investigations on ice cream are discussed in particular. K. D. JACOB

Two pioneers in agricultural chemistry of particular interest to the Association of Official Agricultural Chemistry. E. M. BAILEY. *J. Assoc. Official Agr. Chem.* **14**, 18–28(1931).—An address on the careers of John Pitkin Norton and Samuel W. Johnson. A. PAPINEAU-COUTURE

Evgenii Vladislavovich Biron (E. W. Byron). B. N. MENSHUTKIN. *J. Russ. Phys.-Chem. Soc.* **62**, 1749–76(1930).—A biography with portrait. E. J. C.

Edward W. Morley, chemist, investigator, teacher. CHARLES F. THWING. *Science* **73**, 276–7(1931). E. H.

Nikolai Aleksandrovich Shilov. S. VOZNESENSKIĬ. *J. Russ. Phys.-Chem. Soc.* **62**, 2102–12(1930).—A biography with portrait. E. J. C.

The activity of Professor F. Wald in analytical chemistry. O. QUADRÁT. *Collection Czechoslov. Chem. Comm.* **3**, 49–52(1931). E. H.

F. Wald's theory of phases and of chemical stoichiometry. A. KŘIŽ. *Collection Czechoslov. Chem. Comm.* **3**, 9–31(1931). E. H.

Bibliography of scientific communications [of Francis Wald]. ANT. ŠIMEK. *Collection Czechoslov. Chem. Comm.* **3**, 5–8(1931). E. H.

The life of Professor Francis Wald. J. BABOROVSKÝ. *Collection Czechoslov. Chem. Comm.* **3**, 3–4(1931); cf. *C. A.* **25**, 1128. E. H.

Harvey Washington Wiley (1844–1930). *J. Assoc. Official Agr. Chem.* **14**, No. 1, ii–xxi(Feb. 15, 1931). **The teacher.** W. W. SKINNER. iv–vi. **The chemist.** C. A. BROWNE. vii–ix. **The leader.** W. G. CAMPBELL. ix–xi. **The pioneer.** A. S. MITCHELL. xi–xiii. **The public servant.** W. D. BIGELOW. xiv–xv. Cf. *C. A.* **24**, 5545. **The organizer.** H. A. HUSTON. xv–xvii. **The boss.** MARY T. READ. xviii–xix. **The man.** F. B. LINTON. xix–xxi. A. PAPINEAU-COUTURE

The relation of physics to chemistry. N. V. SIDGWICK. *Science* **73**, 269–76 (1931). E. H.

Rhodesian manganese mines of 7000 years ago. RAYMOND DENT. *Can. Mining J.* **52**, 150–1(1931).—The mines in the district east of Broken Hill, the primitive uses of minerals, the discovery of these mines and the uses of Mn in early civilizations are discussed. W. H. BOYNTON

The photoelectric measurement of luster. L. BLIN DESBLEDS. *Dyer, Calico Printer* **64**, 515–7, 583–5(1930); cf. *C. A.* **24**, 958. RUBY K. WORNER

Correlation of sieving analyses. H. HEYWOOD. *J. Inst. Fuel* **3**, 428–32(1930).—The variable factors entering into a sieving analysis are: personal factor, nature of powder, time, weight of powder, variation in sieve aperture. These are discussed. D. A. REYNOLDS

Hydrographic sections and calculated currents in the Gulf of Alaska. GEORGE F. MCEWEN, THOMAS G. THOMPSON AND RICHARD VAN CLEVE. *Rept. of the Intern. Fisheries Commission* No. **4**, 5–36(1930).—[Printed by Wrigley Printing Co., Vancouver, B. C., Can.]. The water was classified into 3 arbitrary types, *i. e.*, coastal water with a chlorinity less than 18 per mille and a value $\sigma_{s,t,o}$ less than 25.50, intermediate water underlying the coastal waters and having a chlorinity between 18 per mille and 18.50 per mille and a value of $\sigma_{s,t,o}$ between 25.50 and 26.40, and ocean water with a chlorinity greater than 18.50 per mille and a value of $\sigma_{s,t,o}$ greater than 26.40. $\sigma_{s,t,o} = (\text{d.} - 1)10^3$, where the d. is computed from the temp. and chlorinity but is not corrected for the pressure, p. In all 3 sections a cold surface layer lay over a deeper warmer stratum. The temp. and chlorinity data were treated hydrodynamically according to Bjerknes' theory (Publ. No. 88, Carnegie Inst. of Washington). C. R. FELLERS

Mixture formulas. K. K. JÄRVINEN. *Acta Chem. Fennica* **2**, 80–6(1929).—Formulas are given for prepg. certain solns. and similar formulas in the handbooks are discussed. All formulas are derived from the equation (1) $k_1p_1 + k_2p_2 = k_3p_3 = (k_1 + k_2)p_3$, where k means the wt. in kg. and p wts. percent. In the following l = vol. in l., v = vols. percent or g. in 100 cc. or normality, s = sp. gr., V = wt. *in vacuo* and A = wt. in air. By defining sp. gr. $s = k/l$ and substituting in formula (1): (2) $l_1s_1p_1 + l_2s_2p_2 = l_3s_3p_3 = \frac{l_1s_1 + l_2s_2}{\cdot}.p_3$. Since $p = vd/s$ and $k = ls$, where d = density of the dissolved substance, one gets from (1): (3) $l_1v_1 + l_2v_2 = l_3v_3 = \frac{l_1s_1 + l_2s_2}{\cdot}.v_3$ and for the contraction coeff. K: (3a) $K = \frac{l_3}{l_1 + l_2} = \frac{l_1s_1 + l_2s_2}{(l_1 + l_2)s_3}$. If one puts $p = vd/s$ in formula (1): (4) $\frac{k_1}{s_1}v_1 + \frac{k_2}{s_2}v_2 = \frac{k_3}{s_3}v_3 = \frac{(k_1 + k_2)}{\cdot}v_3$. These formulas are

theoretically exact only for vacuum, metric system and $st/4V$ at a certain temp., but are practically exact also in other circumstances. JOHN RYSELIN

The atomic number of elements. A study of the specific gravity of elements in liquid form. L. H. BORGSTRÖM. *Finska Kemistsamfundets Meddelanden* **36**, 76–81 (1927). J. RYSELIN

Was Mendelyeev's system known prior to 1869? G. ELSEN. *Chem. Weekblad* **27**, 378–9(1930).—A historical survey. The classification of the elements into 7 groups was proposed by Cooke in 1854. B. C. A.

Revision of the atomic weight of thallium. Analysis of thallous bromide. O. HÖNIGSCHMID AND H. STRIEBEL. *Z. anorg. allgem. Chem.* **194**, 293–8(1930).—The ratio TlBr/Ag was detd. by gravimetric titration. The mean of 6 detns. gave an at. wt. of 204.390 for Tl, with an av. individual deviation of 0.008, confirming the previous result 204.39 derived from analysis of TlCl (*C. A.* **18**, 1593). The wt. of AgBr formed by pptn. from TlBr came out high, which was ascribed to occlusion, and the resulting detns. of the ratio TlBr/AgBr were discarded. L. ONSAGER

An attempt to separate the isotopes of bromine. The atomic weight of bromine from the ratio of silver to silver bromide. P. HARTECK AND H. STRIEBEL. *Z. anorg. allgem. Chem.* **194**, 299–304(1930).—The mass differences of isotopes are expected to cause slight differences in the sp. heats and consequently in the vapor pressures at low temps.; on this basis a *reversible* sepn. is fundamentally possible. Fractional condensation of solid Br from the vapor in 3 stages (—18.5°, —25°, —36°) produced Br of at. wt. 79.916 ± .001 in the most volatile fraction from an initial material of pure ordinary Br, at. wt. 79.915 ± .001, both detd. from the ratio Ag/AgBr. The results confirm the value 79.916 (Ag = 107.880) found by Hönigschmid and Zintl (*C. A.* **18**, 771). L. ONSAGER

The interpretation of adsorption forces from atomic theory. F. LONDON AND M. POLANYI. *Naturwissenschaften* **18**, 1099–1100(1930).—Recently London (*C. A.* **24**, 5597) advanced a theory of mol. cohesion on the basis of the action of virtual oscillators as known in the theory of light refraction. This same theory is applicable to adsorption It is especially notable that this theory allows in first approximation simple superposition of the adsorption forces (cf. following abstract); this feature has not been included in other explanations of adsorption forces like the electrostatic theory or valence theory. The present theory is a good foundation for the potential theory of adsorption of Polanyi (*C. A.* **23**, 5079). The adsorption potential of a mol. at a distance d from the surface is $\phi = -(N\pi c/6)(1/d^3)$, N being the no. of surface atoms per cc., and c a const. The const. can be calcd. from the dispersion curve of adsorbent and adsorbate; it consists mainly of the product $\alpha\alpha'$ of the 2 mol. polarizations. Elec. dipole moment and higher moments are generally only of secondary influence. The adsorption forces become of the same nature as the van der Waals cohesion forces, expressed in his const. a. Further conclusions are: Adsorption forces are largely independent of temp., if the mols. are not too large or the dipoles too strong. The forces are independent of other substances present on the adsorbent. B. J. C. VAN DER HOEVEN

Properties and applications of molecular forces. F. LONDON. *Z. physik. Chem.*, Abt. B, **11**, 222–51(1930).—The intermol. forces can be calcd. approx. from purely optical data (*C. A.* **24**, 5597). In contradistinction to those observed electrostatically, forces so calcd. exhibit properties of a general cohesion, similar to the force of gravitation. The heat of sublimation, the heat of adsorption of adsorbed gases and the dissocn. energy are calcd. from the same data. Cf. *C. A.* **23**, 3399, 5094; **24**, 2651. C. L. W.

Curie points. L. F. BATES. *Proc. Phys. Soc. London*, **43**, Pt. I, 87–95(1931).—A description of the magnetic behavior of a ferromagnetic substance may require 3 temps., (1) the ferromagnetic crit. point, at which the rate of change of the square of the intrinsic magnetic moment per unit vol. with temp. is a max., (2) the ferromagnetic Curie point, at which the intrinsic magnetization may be considered zero and (3) the paramagnetic Curie point, given by θ in the Curie-Weiss law $\chi = C/(T - \theta)$. The significance of the ferromagnetic and paramagnetic Curie points is discussed in the light of the results of a no. of investigators on Fe, Ni, Co, the ferrocobalts, magnetite and manganese arsenide. The paramagnetic behavior of these substances can be accounted for by a slight extension of the idea that ferromagnetism is due to a magnetic particle consisting of a group of assocd. atoms. W. W. STIFLER

Magnetic susceptibility and chemical investigation. JAMES F. SPENCER. *J. Soc. Chem. Ind.* **50**, 37–41T(1931).—Possible applications of measurements of magnetic susceptibility in various types of chem. research are outlined. Since magnetic susceptibility in the rare earths is additive, it can be used in fractionation as an index of the

degree of sepn. of the constituents. For this purpose it is often more convenient and more sensitive than the "mean equiv." In the study of alloys, variation of susceptibility with compn. often reveals intermetallic compds. This application is illustrated by examples from the work of a no. of investigators on Pb-Sn, Bi-Sn, Pb-Ag, Pb-Au, and Al-Sn series of alloys. Evidence of O_4 mols. from susceptibility measurements is then discussed. Susceptibility detns. may be used to measure the velocities of chem. reactions and may also find application in studying assocn. and dissocn. in binary mixts. of org. liquids. Calcns. based on susceptibility measurements prove that Willgerodt's paramagnetic org. compd. cannot have the formula usually attributed to it. Formation of the compd. BiO is highly improbable. W. W. STIFLER

Effect of internal stresses on the magnetic susceptibility of metals. KOTARO HONDA AND YOSOMATSU SHIMIZU. *Nature* **126**, 990–1(1930).—The adaptability of Cu to cold working was measured by Weiss's electromagnetic method. The decrease in d. during cold working measures the internal stress. As the d. decreased from 8.921 to 8.87, the susceptibility changed linearly from $\chi = -0.083 \times 10^{-6}$ to $\chi = +0.063 \times 10^{-6}$, that is, the Cu changed from diamagnetic to paramagnetic. On heating slowly to 500° the original diamagnetism was restored between 230° and 330°, proving that cold working set up internal stress. During cold working of Ag the d. changed from 10.489 to 10.439 and the susceptibility from -0.200×10^{-6} to -0.140×10^{-6}. These results are in accord with H.'s theory of magnetism. W. W. STIFLER

Magnetic forces in a crystal of the type of rock salt. J. BOUMAN. *Arch. neerland. sci.* IIIA, 13, 1–28(1930).—A highly math. discussion in which it is shown that certain crystals similar in type to rock salt may be constructed in which the atoms have definite magnetic moments. The assumption that the moments of the 2 atoms are equal is not necessary, although when this assumption is made the formulas are less complicated than those developed without it. W. W. STIFLER

Change of the dielectric constant of nitrobenzene with temperature. J. MAZUR. *Nature* **126**, 993(1930); cf. *C. A.* **25**, 627.—The dielec. const. of carefully purified $PhNO_2$ was measured at a no. of temps. between +30° and −75° by a method based on the beat frequency between 2 high-frequency circuits. The temps. were measured to 0.005° and the method was sufficiently sensitive to show a change in the 5th decimal place of the dielec. const. The dielec. const. increases steadily from 35.4 at 30° to 38.18 at 9.6°, then drops abruptly to 11.82 at 7.713°, after which it diminishes gradually to 9.709 at −75°. W. W. STIFLER

The thermal resistivity of solid dielectrics. ANON. *J. Inst. Elec. Eng.* (London) **68**, 1313–55(1930).—The study is divided into four parts: (1) a study of the thermal resistivity of solid dielectrics when tested in sheet form, and of factors influencing the flow of heat through them; (2) a study of the thermal resistivity of solid dielectrics when applied to bars by the usual shop processes of wrapping; (3) a study of the thermal resistivity of sheet steel stampings transverse to the laminations and (4) a study of the thermal resistivity of air spaces. The appendix contains an estn. of the thermal conductivity of the insulation on a rectangular bar and a bibliography. The various forms of app. employed, as well as curves and results, are shown. W. H. BOYNTON

Specific heat of gases. H. LOURIÉ. *Chaleur et ind.* **11**, 423–35(1930); cf. *C. A.* **24**, 5555.—A discussion of methods for detg. the length of sound waves in gases. The The methods are classified as (1) dust methods, (2) methods of reënforcement of vibrations, (3) interference methods and (4) direct measurement. For the gases N_2, O_2, CO, air, CO_2 and H_2O at 0–2000° the following are tabulated: (*a*) velocity of sound in an unlimited gaseous atm., (*b*) C_p at 1 kg., (*c*) C_v at 1 kg., (*d*) av. C_p at 1 kg., (*e*) av. C_v at 1 kg., (*f*) C_p at 1 cu. m. (0/760), (*g*) C_v at 1 cu. m. (0/760), (*h*) the resp. av. values. Values of numerous experimenters for O_2, N_2, H_2, CO, CO_2, air are also tabulated. Curves are given for the mol. sp. heats of these gases. 82 references. S. L. B. ETHERTON

Calculation of gas equilibria from spectroscopic data. I. J. M. BIJVOET. *Chem. Weekblad* **28**, 26–37(1931).—A discussion of the calcn. of entropy consts. by statistical methods from spectral data. E. SCHOTTE

A measurement of molecular velocity and a test of the cosine law. P. CLAUSING. *Ann. Physik* [5], **7**, 569–78(1930).—Measurements of the time of passage $\bar{t}$ of A and Ne through a narrow cylindrical capillary at very low pressures, non-stationary flow being used, agreed within 1–3% with the formula: $\bar{t} = L^2/4ru$ (L = length, r = radius, $u = (8RT/\pi M)^{1/2}$ = mean mol. velocity). The derivation of this formula from kinetic theory assumes Maxwell's law for mol. velocities and the cosine law for the reflection (or reëvapn. after temporary adsorption) of mols. from the walls. The accurate con-

firmation of the given formula for $\bar{t}$ excludes material deviations from the cosine law, *e. g.*, an appreciable fraction of the mols. specularly reflected. L. ONSAGER

Reflection and period of adherence of metal atoms on oil surfaces. G. VESZI. *Z. physik. Chem.*, Abt. B, **11**, 211–21(1930).—Vapors of Cd, Zn, Tl, Pb and Bi were directed through a narrow opening against a moving (15 m. per sec.) olive oil surface and reflected back a distance of 0.2 cm. onto a wall cooled by liquid air. The distance on both sides of the opening in which the thickness of the deposited metal was uniform was used as a measure of the distribution curve. This method gave definite proof that Zn, Cd and Bi adhere to the reflecting surface. The period of adherence was 10^{-5} to 10^{-4} sec. Cf. Holst and Clausing (*C. A.* **20**, 1737). CURTIS L. WILSON

Vapor pressures of some hydrocarbons. ERNEST G. LINDER. *J. Phys. Chem.* **35**, 531–5(1931).—The vapor pressures at temps. in the neighborhood of 0° are given for toluene, tetrahydronaphthalene, *m*-xylene, *o*-xylene, *p*-xylene, dipentene, ethylbenzene, mesitylene, octane, durene, tetradecane, decane, butylbenzene, *sec.*-butylbenzene, *tert.*-butylbenzene, *p*-diethylbenzene, *m*-diethylbenzene, propylbenzene, isopropylbenzene, octylene, diisobutylene, 2,2,4-trimethylpentane, decane, hexamethylethane, *p*-menthane, *p*-cymene, styrene, 1-methylcyclohexene, methylcyclohexene, limonene, pinene, decahydronaphthalene, methylnaphthalene, cyclohexene, diphenylmethane, acenaphthene and *o*-diphenylbenzene. MALCOLM DOLE

Heat transfer in liquid ammonia. III. M. HIRSCH. *Z. ges. Kälte-Ind.* **38**, 5–8(1931). F. D. ROSSINI

Measurements with the aid of liquid helium. XI. The resistance of certain metals at low temperatures. W. MEISSNER AND B. VOIGT. *Ann. Physik* [5], **7**, 761–97(1930); cf. *C. A.* **25**, 243. —The resistances of metals of the first 2 periodic groups and of B, Al, In and Tl were measured from 273°K. down to the temp. of liquid He. The characteristic temps. for these metals were calcd., the Grüneisen formula being used. C. E. P. JEFFREYS

Determination of the coefficient of diffusion of metals in the solid state. SHINSUKE TANAKA AND CHUJIRO MATANO. *Proc. Phys.-Math. Soc. Japan* [3], **12**, 279–84(1930); cf. *C. A.* **25**, 1135.—The coeff. of diffusion was detd. at 500° for alternate layers of Au and Ag by measuring the change of elec. resistance with time. Fick's law was found valid. MALCOLM DOLE

The question of molecular or atomic solid solution of an intermetallic compound in a pure metal. G. WASSERMANN. *Z. Metallkunde* **22**, 158–60(1930).—Soln. of Mg in Al increases a_0 (the side of the unit face-centered cube of Al) from 4.0404 A. U. to 4.0535 A. U. in an alloy contg. 3 at. % Mg. Soln. of Zn decreases a_0 from 4.0404 to 4.0330 A. U. in an alloy contg. 10 at % Zn. When 1 at. % Mg and 2 at. % Zn($MgZn_2$) are added to Al, a_0 increases to 4.0420 A. U., which is only slightly lower than the change in a_0 calcd. additively from the effects of Mg and Zn taken separately. The vols. of 1 Mg atom plus 2 Zn atoms, and of 1 mol. of $MgZn_2$ are in the ratio of 1.08 to 0.98 on the basis of the vol. of 3 Al atoms (which they presumably replace in the solid soln.) = 1.00. Thus if $MgZn_2$ dissociates into atoms when dissolving in Al the Al lattice should expand, whereas if $MgZn_2$ dissolves as mols. the Al lattice should contract. The observed expansion of the Al lattice is taken an indicative of an at. solid soln. rather than a mol. ROBERT F. MEHL

The unipolarity of pressed lead sulfide. FR. TREY. *Naturwissenschaften* **18**, 1099(1930). —PbS crystals with detector qualities become inactive after pulverization and pressing; pptd. PbS after being pressed to a pastille is also inactive. However, after heating to 150° the prepns. assume rectifier properties (*C. A.* **20**, 1156). After repeated pressing these properties disappear again and reappear on heating. The resistance of the prepns. changes simultaneously with the rectification effect (Bridgman, *C. A.* **20**, 1542). Both properties depend on the structural qualities of the crystals. B. J. C. VAN DER HOEVEN

Röntgenographic investigation of the system cadmium–magnesium. U. DEHLINGER. *Z. anorg. allgem. Chem.* **194**, 223–38(1930).—In the system Cd–Mg there are 2 series of mixed crystals, α and β. Both are hexagonal. The α crystals exhibit the same axial ratio as pure Cd, namely $c/a = 1.89$, while β crystals, like pure Mg, exhibit the ratio $c/a = 1.62$. These ratios are independent of concn., and all lattices found belong to one of the types α and β. However, for crystals contg. 25–65 at. % of Mg, a transformation between the 2 may be effected by pressure (or mech. treatment), which favors β with approx. 2% smaller vol. Compds. with "hyperstructure" exist, the most important being $MgCd_3$ (α lattice) and $CdMg_3$ (β lattice); both were measured, the latter by the rotating-crystal method. A different type of hyperstructure was indicated by x-ray lines from alloys with about 50% Mg. L. ONSAGER

The ternary system potassium oxide, calcium oxide, silica. G. W. MOREY, F. C. KRACEK AND N. L. BOWEN. *J. Soc. Glass Tech.* **14**, 149–87T(1930); cf. *C. A.* **24**, 5448. —The phase relationships of these 3 rock-forming ingredients are described in detail. The quenching method developed so successfully by the Geophysics Lab. was used, great care being observed to insure homogeneity of the melts. More compds. are formed in the K_2O–CaO–SiO_2 system than in the Na_2O–CaO–SiO_2 system, and there is a greater tendency for these compds. to dissoc. on melting; the viscosity of the melts at the liquidus is greater over a large proportion of the diagram; and the crystn. and melting processes are more sluggish. The following new compds. were found and their equil. fields and properties detd.:

	Percent of K_2O	CaO	SiO_2	M. p. or Reaction $t°$	Crystal Habit
$K_2O.2CaO.9SiO_2$	12.61	15.01	72.38	1050 ± reaction	Prisms and plates
$4K_2O.CaO.10SiO_2$	36.46	5.43	58.12	946	Plates
$2K_2O.CaO.6SiO_2$	31.15	9.27	59.58	959	Plates
$K_2O.2CaO.6SiO_2$	16.62	19.79	63.59	1115 reaction	Prisms
$K_2O.3CaO.6SiO_2$	15.12	27.01	57.86	1020 reaction	Needles and plates
$2K_2O.CaO.3SiO_2$	44.36	13.20	42.43	1005 reaction	Octahedra
$K_2O.CaO.SiO_2$	44.78	26.66	28.56	1630	Hexagonal bipyramids

	2 V.	Optic Sign	Refractive Index γ	β	α	Crystal System
$K_2O.2CaO.9SiO_2$	Large	Neg.	1.525	...	1.515	Monoclinic or triclinic
$4K_2O.CaO.10SiO_2$	0	Neg.	1.551	...	1.539	Hexagonal
$2K_2O.CaO.6SiO_2$	60 ± 5 deg.	Neg.	1.543	1.541	1 535	Monoclinic or triclinic
$K_2O.2CaO.6SiO_2$	Large	Pos.	1.59	...	1.575	Orthorhombic
$K_2O.3CaO.6SiO_2$	..	Neg.	1.57	...	1.56	Orthorhombic
$2K_2O.CaO.3SiO_2$	...	...	1.572	1.572	1.572	Pseudo? cubic
$K_2O.CaO.SiO_2$	0	Pos.	1.605 ±	...	1.600	Hexagonal

H. F. K

ucture of cubic Carborundum. H. BRAEKKEN. *Z. Krist.* **75**, 572–3(1930).—Laue and rotation photographs on a small crystal of cubic SiC give results which agree with the powder photographs reported by Ott (*C. A.* **20**, 3106).

L. S. RAMSDELL

The crystal structure of iron silicide, FeSi. F. WEVER AND H. MÖLLER. *Z. Krist.* **75**, 362–5(1930).—A new detn. of the structure of FeSi (cf. *C. A.* **18**, 3033) gives $a = 4.467$ A. U. There are 4 mols. in the unit cube, and the Fe and Si atoms have the positions 4*f*, with $u_{Fe} = 0.1340$ and $u_{Si} = 0.8445$. The distance Fe — Fe is 2.74 A. U. and Si — Si is 2.76 A. U. Since each atom has a single atom of the opposite kind as its nearest neighbor, the structure can be considered as made up of FeSi mols.

L. S. RAMSDELL

Crystal structure of the compound Fe_2B. GUNNAR HÄGG. *Z. physik. Chem.*, Abt. B, **11**, 152–62(1930).—"A new structure is established for Fe_2B which, for spatial reasons, is more probable than the structure assumed by Wever and Müller (*C. A.* **25**, 20–1). It also offers a better explanation of the observed distribution of intensities" (on powder photograms). "The Fe atoms are located in the corners of tetrahedrons that form a highly uniform system. The B atoms are located in the largest intervals between these tetrahedrons." "Each B atom is surrounded, at equal distances of 2.176 A. U. by 8 Fe atoms. This structure indicates that the B atom has a radius of 0.97 A. U."

G. TOENNIES

The cubic high-temperature structure of some perchlorates. H. BRAEKKEN AND L. HARANG. *Z. Krist.* **75**, 538–49(1930).—The structure detns. by Herrmann and Ilge (*C. A.* **25**, 1420) for the alkali perchlorates are largely verified, although there are some minor disagreements. Parameters and interatomic distances are given.

L. S. RAMSDELL

The crystal structure of calcium chromate. J. H. CLOUSE. *Z. Krist.* **76**, 285–6 (1930)(in English).—X-ray data show definitely that $CaCrO_4$ is not orthorhombic and isomorphous with $CaSO_4$, but rather is tetragonal, and isomorphous with zircon, $ZrSiO_4$. The unit cell contains 4 mols., $a = 7.10$ A. U., $c = 6.19$ A. U.; the calcd. d. is 3.27; the space group is D_{4h}^{19}.

L. S. RAMSDELL

Large transparent cubic crystals of sodium chloride. TAKEMARO YAMAMOTO.

Bull. Inst. Phys. Chem. Research (Tokyo) **10**, 52–60(1931)(Abstracts 4–5 (in Esperanto) published with *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) **15**, Nos. 283–5).—Various cations have a catalytic effect on the crystn. by slow evapn. of a satd. NaCl soln. Mn^{++} gives large transparent crystals (the min. concn. is 0.01–0.001 g. ion per l.; hydrolysis of $MnCl_2$ gives enough acidity but the optimum concn. of H^+ is 0.001 *N*; the best temp. is 40–60°). Pb^{++} acts similarly but the angles may be truncated (by 111). Sn^{++} and Cd^{++} give somewhat smaller transparent crystals. Nontransparent crystals are given by the following cations, in the order of size of crystals: $Ni^{++} > Cu^{++}$, Fe^{++}, Cr^{+++}, Tl^+, $Rb^+ > Fe^{+++}$, $Hg^{++} > Al^{+++}$. AUSTIN M. PATTERSON

Habit variation in crystals of barium and lead nitrates HAROLD E. BUCKLEY. *Z. Krist.* **76**, 147–68(1930)(in English).—The erratic choice of habit when $Ba(NO_3)_2$ crystallizes from soln. at const. temp. is traced to the effect of humidity on the rate of evapn. and to traces of $BaCO_3$. For $Ba(NO_3)_2$, the cube planes are increased (relatively to 111) by addn. of carbonates of Ba, Na, Ca, Mg and Fe, by $FeCl_3$, methylene-blue, Ba or Na manganate, Ba, Na or K permanganate, urea and Congo red. Cube planes are decreased by HCl, Ba, Na or K chlorate and perchlorate, safranine and quinine. The 210 planes are increased by $K_3Fe(CN)_6$ and $K_4Fe(CN)_6$, K and Ba chromate and $K_2Cr_2O_7$. For $Pb(NO_3)_2$ the cube is increased by Congo red, safranine, methylene blue; the cube is decreased by Na and K chlorates. Various theories concerning crystal habit are discussed. Observations on a large no. of crystals lead to the conclusion that the true symmetry of these nitrates is tetartohedral rather than pyritohedral. L. S. R.

The refractive indexes of mixed crystals of magnesium sulfate and zinc sulfate. MARY W. PORTER. *Z. Krist.* **75**, 288–300(1930)(in English).—In a series of mixed crystals of $MgSO_4.7H_2O$ and $ZnSO_4.7H_2O$ the variations of the principal *n*s were found to be directly proportional to the compn., as expressed in vol. or mol. percentage, or in percentage by weight. L. S. RAMSDELL

The dependence of crystal spacing on crystal size. J. E. LENNARD-JONES. *Z. Krist.* **75**, 215–6(1930)(in English).—From the theoretical standpoint, an actual increase in lattice dimensions is to be expected for min. crystals of the non-ionic type. For a crystal of 500 atoms, the increase should be 5%; for one 5 layers thick each way, 7%; for one 3 layers thick, 14%. This is because the total attractive field decreases relatively to the total repulsive field when particle size is decreased. For ionic crystals the reverse is the case. L. S. RAMSDELL

Absorption of synthetic spinels colored by chromium and manganese. K. SCHLOSSMACHER. *Z. Krist.* **75**, 399–409(1930); cf. *C. A.* **24**, 4482.—Absorption measurements with a photoelec. cell were made in the range 400 to 600 mμ on synthetic spinels ($MgO:Al_2O_3$ = 1:1) colored by both Cr and Mn. With relatively high Mn content the Mn absorption was superimposed on that of Cr. In the region 540 to 570 mμ there was absolute agreement with results obtained from a $KMnO_4$ soln.; elsewhere there was only occasional agreement. L. S. RAMSDELL

A powder spectrometric study of urea. R. W. G. WYCKOFF. *Z. Krist.* **75**, 529–37(1930).—Powder reflections combined with the best available estimates of at. *F*-values give satisfactory results. It would appear that this method is useful for simple org. crystals, instead of single-crystal spectrometry. For urea a unit cell was found with a = 5.670 A. U. and c = 4.726 A. U. At. positions are u_N = 0.14; v_N = 0.32; w_O = 0.57–0.58; t_N = 0.17. At. positions can be fixed with as great accuracy as that provided by Laue and spectral photographic comparisons involving more complicated planes. L. S. RAMSDELL

A determination of the molecular weight of methylbixin by means of x-rays. J. HENGSTENBERG AND R. KUHN. *Z. Krist.* **76**, 174–6(1930).—The unit cell has the dimensions a = 10.50 A. U., b = 17.59 A. U., and c = 13.4 A. U. (±0.05 A. U.). With 4 mols. in this unit, the calcd. mol. wt. indicates the formula $C_{26}H_{32}O_4$ rather than $C_{24}H_{30}O_4$ as proposed by Karrer (*C. A.* **23**, 4480). L. S. RAMSDELL

The crystal structure of the diphenylpolyenes. J. HENGSTENBERG AND R. KUHN. *Z. Krist.* **75**, 301–10(1930).—The unit cells of the diphenylpolyenes are: (monoclinic series) diphenylbutadiene a = 7.71 A. U., b = 11.70 A. U., c = 13.41 A. U., Z = 4; diphenylhexatriene 6.33 A. U., 7.43 A. U., 14.43 A. U., 2; diphenyloctatetraene 6.25 A. U., 7.44 A. U., 16.03 A. U., 2; (orthorhombic series) diphenyldecapentaene 10.25 A. U., 7.66 A. U., 21.2 A. U., 4; diphenyldodecahexaene 10.20 A. U., 7.60 A. U., 23.58 A. U., 4; diphenyltetradecaheptaene 10.2 A. U., 7.57 A. U., 25.95 A. U., 4. In every case the mol. wt. calcd. from x-ray data agrees with that from the structural formula. In the hexatriene and octatetraene there are definite *trans-trans* bindings. The mols. have a plane oblong shape. L. S. RAMSDELL

The structure of quinoid compounds and of a molecular compound of the quin-

hydrone type. EDUARD HERTEL AND GEORG H. RÖMER. *Z. physik. Chem.*, Abt. B, 11, 90–6(1930).—"Anthraquinone of the rhombic system contains 8 mols. in an elementary structure of only 3.95 A. U. height. The ring planes in this structure are parallel but on different levels In 2,7-dinitroanthraquinone (I) of the quadratic system, however, an elementary structure of 38.4 A. U. height contains 4 mols., the ring planes of which must be arranged perpendicular to each other. The mol. compd. I-fluorene (1.1, triclinic) possesses an elementary structure the dimensions of which preclude a lattice structure according to the tridimensional alternation principle."
G. TOENNIES

Determination of the melting point of platinum. G. RIBAUD AND P. MOHR. *Compt. rend.* 192, 37–8(1931).—The method used was the tube method already described for Pd (*C. A.* 24, 1006), the technic being improved by the use of a thermoelec. pile. By optical extrapolation, the m. p. of Au being used, the m. p. of Pt was calcd. as 1762°. The error in this value is probably not more than 2°. LOUISE KELLEY

The extent of dissociation of salts in water. II. Uni-bivalent salts. EDWIN C. RIGHELLATO AND CECIL W. DAVIES. *Trans. Faraday Soc.* 26, 592–600(1930); cf. *C. A.* 21, 3793.—Dissocn. was calcd. from cond. data by using the Onsager theory and assuming an intermediate ion. The values of K for the ions used are: $CdCl^+$ 0.0101, $PbCl^+$ 0.0304, $CaNO_3^+$ 0.521, $SrNO_3^+$ 0.150, $BaNO_3^+$ 0.121, $CdNO_3^+$ 0.394, $PbNO_3^+$ 0.0647, $LiSO_4^-$ 0.229, $NaSO_4^-$ 0.198, KSO_4^- 0.151, $AgSO_4^-$ 0.05 and $TlSO_4^-$ 0.0472. The transport numbers calcd. from these consts. agree with the exptl. A. F.

Notes on the specific gravities of liquid and solid sulfuric acid. D. MCINTOSH. *Proc. Trans. Nova Scotian Inst. Sci.* 17, 259–61(1930). H_2SO_4 from 60° to 66° Bé. can be kept almost indefinitely in solid CO_2 without crystn. The sp. gr. was measured in calibrated bulbs with graduated stems of capillary tubing.

60° Bé.	Temp.	Sp. gr.	66° Bé.	Temp.	Sp. gr.
Liquid	+15°	1.695	Liquid	+20°	1.838
	−40°	1.756		−78.5°	1.951
	−78.5	1.801			
Solid	−43°	1.797	Solid	-78.5°	2.040
	−60°	1.811			
	−78.5	1.838			

RACHEL BROWN

The chemical constant of hydrogen vapor and the entropy of crystalline hydrogen. T. E. STERN. *Proc. Roy. Soc.* (London) A130, 367–79(1931). From the Einstein-Bose statistics, the vapor pressure of cryst. H at low temp. is calcd. The chem. consts. of H vapor at low and ordinary temps., resp., are −1.11 and −3.70. The effects upon equil. of differences between the moments of inertia of gaseous and cryst. H are investigated. The entropies of cryst. para-H, ortho H and ordinary H at zero abs. are, resp., 0, $R \log 9$ and $\frac{3}{4} R \log 3 + R \log 4$. G. M. MURPHY

The thermal properties of ammoniates and analogous compounds and their use in absorption refrigerating machines. R. PLANK AND L. VAHL. *Forsch. Gebiete Ingenieurw.*, Ausgabe A., 2, 11–8(1931). Heats of reaction, heats of vaporization, vapor pressures, ds., and refrigerating capacities are discussed for the systems: (1) $CaCl_2.8NH_3 = CaCl_2.2NH_3 + 6NH_3$; (2) $CaCl_2.6CH_3NH_2 = CaCl_2.2CH_3NH_2 + 4CH_3NH_2$; (3) $LiCl.3CH_3NH_2 = LiCl + 3CH_3NH_2$; (4) $LiCl.2CH_3NH_2 = LiCl + 2CH_3NH_2$ The following new data are given for CH_3NH_2: vapor pressure, −77° to 9°, $\log p_{mm} = -\frac{2068.6839}{T} - 8.66437 \log T + 0.004785\, T$; C_p, liquid, at 20° = 0.77 g.-cal. per g. F. D. ROSSINI

Problems of present-day colloid chemistry. VII. H. R. KRUYT. *Chem. Weekblad* 27, 176–9(1930).—The phenomenon of lyotropy is discussed in the light of the differences of size of similar ions due to varying degrees of hydration: the greater the hydration of the ions, the less water is available for forming the stabilizing hydration layer of the colloidal particles, the conditions obtaining thus resemble those in a soln. of an org. substance, the soly. of which is depressed by the addn. of electrolytes. The manner in which the water mols. are oriented around the colloidal particles is also of importance. **VIII.** *Ibid* 241–4.—A survey of certain outstanding problems, including adsorption, thixotropy, gelatinization and the relationship of emulsions to true colloidal solns. B. C. A.

Heats of adsorption and their bearing on the problem of adsorption. H. R. KRUYT AND JOHANNA G. MODDERMAN. *Chem. Reviews* 7, 259–346(1930).—A thorough review of the exptl data on heats of adsorption is given. An equation is deduced for calcn. of

the isothermal heats of adsorption. Calcd. and observed results agree fairly well. Complete agreement is not to be expected. The state of the adsorbed phase is discussed critically. Each of the equations now in use in connection with adsorption has a domain of usefulness but none of them expresses a complete isotherm at lower temps. Eight factors that influence adsorption are listed. One equation cannot include all of them. Many heats of adsorption are tabulated. Complete bibliography. L. H. R.

Adsorption of chromate ions by colloidal aluminum hydroxide. BEN H. PETERSON AND KEITH H. STORKS. *J. Phys. Chem.* 35, 649–52(1931); cf. *C. A.* 24, 1008.—The adsorption of K_2CrO_4 by colloidal Al_2O_3 was detd. at concns. above and below the pptn. value. Three types of adsorption curves result, representing (1) neutralization of the pos. charge on the suspended particle, (2) surface adsorption not elec. in type and (3) a combination of 1 and 2. It is not always permissible to extrapolate data to zero concn. of the adsorbed substance. HARRY B. WEISER

Adsorption of titanium hydroxide sol. L. S. BHATIA AND S. GHOSH. *J. Indian Chem. Soc.* 7, 687–97(1930).—$Ti(OH)_4$ sol was prepd. by dropping $TiCl_4$ slowly into water at 18°. The sol cannot be completely freed from HCl by dialysis. A sol contg. 15.2 g. TiO_2 per l. was found on prolonged dialysis to become more and more viscous and as soon as the acid concn. fell to p_H 4.1 the whole mass coagulated as a gelatinous ppt. The sol adsorbed appreciable amts. of anions from solns. of Na and K salts. The order of adsorption expressed as g.-mol. per g. of adsorbent was found to be $Fe(CN)_6^{---} > NO_3 > SO_4 > Cl > S_2O_3 > Cr_2O_7 > Br > Fe(CN)_6^{----} > IO_3 > CrO_4 > OH$. The coagulating power of the anions was found to be in the following decreasing order $Fe(CN)_6^{----} > Fe(CN)_6^{---} > OH > SO_4 > Cr_2O_7 > CrO_4 > IO_3 > S_2O_3 > NO_2 > Cl > Br$. Strong adsorption does not always indicate high coagulating power in this sol. The adsorption of OH ions by this Ti sol was small. The high coagulating power of OH ions was due to the removal of the stabilizing H ions. The sol adsorbed more anions than cations with the liberation of OH ions and a corresponding increase of p_H. $Ti(OH)_4$ is more basic than acidic. On aging, the sol prepd. at 18° became stable toward electrolytes and showed a decrease in sp. cond. and viscosity. A sol. prepd. at 55° did not change in stability on aging and the sp. cond. and viscosity increased very slightly. Adsorption of Ti^{++++} by the sol prepd. at 18° accounts for its stability. L. H. REYERSON

Studies on electrokinetic potentials. VII. The temperature coefficient of the ζ-potential. HENRY B. BULL AND ROSS AIKEN GORTNER. *J. Phys. Chem.* 35, 456–66(1931); cf. *C. A.* 25, 1138.—The temp. coeffs. of the ζ-potential for the interfaces water-cellulose, 1×10^{-4} *N* NaCl-cellulose, and EtOH-cellulose were measured between 20° and 51°. The latter interface potential has a pos. temp. coeff., while the other 2 show a slight max. in the neighborhood of 40°. MALCOLM DOLE

Structure of thin films formed from solutions of crystallizing and non-crystallizing substances. G. TAMMANN AND H. ELSNER VON GRONOW. *Z. anorg. allgem. Chem.* 194, 268 72(1930).—The surface films formed by evapn. of solns. contg. soaps or similar substances were studied by interference colors. Perrin (*C. A.* 24, 3411) found that the local thickness of a Na oleate film varies by steps of 4.2μμ. This observation was confirmed, and the same formation of flows with step-structure was observed for films of K undecylate and K myristate. Among a considerable no. of substances which were investigated, the phenomenon occurred only with Na and K salts of higher fatty acids. It is suggested that besides an elongated form of the mols., a film capable of swelling is required. L. ONSAGER

Experiments with precipitated and colloidal manganese dioxide. JNANENDRANATH MUKHERJEE, SATYAPRASAD ROY CHOUDHURY AND M. R. SUBBA RAO. *J. Indian Chem. Soc.* 7, 803-13(1930).—The results of adsorption, antagonism and coagulation expts. with both pos. and neg. MnO_2 sols and of adsorption expts. with negatively pptd. MnO_2 conflict in many respects with the findings of Dhar and his co-workers (*C. A.* 21, 3005; 22, 1075). Further study is needed to reveal the true chem. nature of the particles in these sols. OSCAR T. QUIMBY

A critical study of Kohlschütter's method of preparing silver hydrosol. M. RAMAN NAYAR AND P. S. MACMAHON. *J. Indian Chem. Soc.* 7, 699-707(1930).—The presence of alkali ions is not essential in the formation of a Kohlschütter sol as stated by Pauli, *C. A.* 18, 2629. The walls of the exptl. vessels det. the nature of the sol. Silvered vessels produce no sol. or only thin, pale, white, unstable sols. Silica or glass vessels invariably give rise to wine-red, stable sols. The contradiction between Pauli's results and those of N. and M. is traced to the neg. catalytic effect of the Ag vessels used by Pauli. Stable Kohlschütter sol was prepd. at 85°. Reduction of Ag_2O soln. near the b. p. produces a coarse suspension. L. H. REYERSON

Regarding the colloidal nature of cuprammonium solution. ALFRED J. STAMM.

J. Phys. Chem. **35**, 659–60(1931).—It was demonstrated by the aid of the ultracentrifuge that cuprammonium solns. contain colloidal material, probably $Cu(OH)_2$. The sol is polydisperse, contg. particles ranging in diam. from 6.5 mμ to more than 20.0 mμ for the concns. investigated. HARRY B. WEISER

Micelles and base exchange. MERLE RANDALL AND JESSIE Y. CANN. *Chem. Reviews* **7**, 369–406(1930).—Micelles are considered intermediate steps between ordinary ions and solid crystals. The soln. of micelles is taken to be a homogeneous phase and the thermodynamics of such a system is therefore that of a homogeneous phase rather than that of a heterogeneous system. The theory of the formation of micelles is extended to very large aggregates. The electrolytic nature of cryst. and near cryst. micelles is considered and the activity coeff. of such cryst. micellar masses is shown to be practically zero. All substances forming neg. micelles in soln. should possess differential base-exchange properties. Base exchange in zeolites, the compn. of zeolites and the methods of prepg. artificial zeolites are discussed. In zeolites the neg. ions of the aluminosilicate are considered to form large micelles. The rapid base or acid exchange properties of solid solns. and those of zeolites are explained by the electrolytic nature of the solids. Base exchange is considered in other systems as well as in zeolites. L. H. REYERSON

Mechanism of the mutual coagulation process. HARRY B. WEISER AND THOMAS S. CHAPMAN. *J. Phys. Chem.* **35**, 543–56(1931).—The zone of complete mutual coagulation of 2 sols of opposite sign may be very narrow or quite broad. When a given series of pos. sols, *e. g.*, is arranged in order of the optimum concn. for mutual coagulation on mixing with neg. sols, the order of the pos. sols may vary widely with different neg. sols. The reason for this behavior is that the mutual pptg. power is not detd. exclusively by the charge on the particles. Other factors are (*1*) mutual adsorption of colloidal particles that is independent of the charge, (*2*) the presence of pptg. ions as impurities and (*3*) interaction between stabilizing ions. The latter factor is not a general cause of mutual coagulation but it may be important in certain cases. The investigations were carried out with the following sols: (*a*) positively charged: Fe_2O_3, Cr_2O_3, CeO_2, $BaSO_4$, Night blue; (*b*) negatively charged: SnO_2, $Zn_2Fe(CN)_6$, $Cu_2Fe(CN)_6$, Congo red, As_2S_3. H. B. W.

A contribution to the theory of thixotropy. E. A. HAUSER. *J. Rheol.* **2**, 5–9 (1931).—The particles of a sol added to a bentonite dispersion do not come into close contact with the particles of the latter but rebound while at some distance away. The effect is due to the formation of solvated hulls around every particle. The view that each mech. disturbance disrupts certain solvatized hulls, thereby lessening the viscosity, is widely held but it is untenable, because there is no change in vol. On the other hand, thixotropy is characteristic of anisotropic particles; in extreme cases, of scale-like particles. The actual setting of the gel is an instantaneous effect of orientation and not a continuous change from liquid to solid. EUGENE C. BINGHAM

Lyophilic colloids. I. Hydration. S. M. LIPATOV AND L. N. KOROBOVA. *Z. anorg. allgem. Chem.* **194**, 369–76(1930).—The substance used in these expts. is "geraninic" acid, $C_{24}H_{17}N_3O_4S_2$. In dil. aq. solns. it is slightly ionized, as shown by a small elec. cond. The mol. wt. found from diffusion expts. is 506; the theoretical value is 497. The mol. wt. calcd. from cryoscopic measurements varies with the concn. and is lower than the theoretical value. The failure of geraninic acid to dialyze (nature of membrane not given) indicates hydration. The ability of "true" solns. of geraninic acid to gelatinize at low temp. is further evidence of its hydration. Osmotic pressure detns. on solns. contg. 2–25 g. per l. show that 1 g. geraninic acid holds 31 g. H_2O. Viscosity detns. on sols contg. 0.175 to 1.40% geraninic acid indicate a similar high hydration. Both the viscosity and the osmotic pressure of geraninic acid dispersions are greatly lowered by the addn. of small quantities (0.25–1.00%) of tannic acid. **II. Theory of macro- and micro-syneresis.** *Ibid* 377–82.—Geraninic acid gels show a much larger syneresis in 0.1 *N* NaCl than in H_2O alone. The time required for the complete syneresis decreases as the concn. of geraninic acid increases. The velocity of syneresis is a function of the distance between particles and depends upon the intensity of the attractive forces, which are the same in all directions. The velocity of syneresis follows the law of the first-order reaction. The concn. of geraninic acid in the liquid squeezed out is independent of the gel concn. When the vol. of the disperse phase is just equal to the total vol. of the system, no syneresis is observed; the addn. of more geraninic acid breaks up the structure of such a gel because of partial dehydration. The elec. charge is the only true stability factor of lyophilic systems. Hydration merely delays the changes. Also in *J. Russ. Phys. Chem. Soc.* **62**, 1895–1906(1930). OSCAR T. QUIMBY

Hysteresis in sol-gel transformations. S. N. BANERJI AND S. GHOSH. *Z. anorg.*

allgem. Chem. **194**, 305–15(1930).—By finding the time required at various temps. for (*1*) a sol to solidify completely and (*2*) the corresponding gel to become completely fluid, time-solidification and time-liquefaction curves were obtained. These curves tend to coincide, *i. e.*, the solidification and the liquefaction temp. approach each other more closely, the greater the time that is allowed. Such curves were obtained for: Na palmitate and Na stearate in H_2O, MeOH, EtOH, PrOH, BuOH; Na valerate, Na caproate and gelatin in H_2O. If the hysteresis is expressed as the temp. difference between the solidification and the liquefaction curves at 12 min., it was found that, in most cases, the hysteresis decreases abruptly to a min., rises again abruptly to a max. and then gradually decreases with increasing concn. of colloid. Addn. of NaOH to the Na palmitate or stearate systems decreases the hysteresis. Small concns. of alkali-metal chlorides peptize and larger concns. coagulate Na palmitate sols. Small concns. of both KCl and NaCl decrease the hysteresis. The hysteresis is also reduced by inoculation (of a cooling sol) with gel of the same concn. or by shaking the container. The partial analogy with crystn. from supersatd. soln. is pointed out. The hysteresis is probably due to the low orientation velocity of the micelles. OSCAR T. QUIMBY

Diffusion rings of silver dichromate and chromate in gelatin and agar-agar. F. PANNACH. *Chem. Erde* **4**, 598–631(1930).—A continuation of the work of Linck (*C. A.* **23**, 5380) on the rates of diffusion of $K_2Cr_2O_7$ or K_2CrO_4 and $AgNO_3$ in gelatin, etc., and on the form of the resulting ppts. B. C. A.

The distribution of ions in gels. E. J. BIGWOOD. *Trans. Faraday Soc.* **26**, 704–23 (1930); cf. *Compt. rend. soc. biol.* **104**, 815(1930).—The diffusion of OH ions from a const. concn. of NaOH into agar gels contg. phenol red was measured by the level at which the p_H was 7.5. The rate of diffusion increases slightly toward the bottom of the gel column, but in general the distance of penetration, d, in time $t = k\sqrt{t}$. With gelatin gels, however, the OH ion produces swelling which results in a concn. gradient of gelatin in the gel, and hence of the OH ion, the effect varying with concn. of the gel (Stiles, *C. A.* **17**, 2378). A steady state is reached only after some months, and the gradient equil. involved is that given by Donnan (*C. A.* **24**, 3416). When the concn. of OH ion above the gelatin is reduced, the p_H 7.5 level rises to a new equil. position. With 0.01 *N* $CaCl_2$ and 8% gelatin blocks, Ca migrates into the gel at $p_H > 4.7$, and Cl at $p_H < 4.7$, the Donnan equil. relationship for the whole block holding within 5%, although the electrolyte is unevenly distributed in the gel. K. V. THIMANN

Alkaloid precipitation reactions in gels. BENGT JONSSON. *Svensk Farm. Tids.* 35, 25–9, 45–9(1931).—Alkaloid solns. on gels in tubes contg. a neutral pptg. reagent give cryst. colonies characteristic as to cryst. form, aggregate and gel penetration. Gels from $Na_2Si_4O_9$ are easily made from material readily available pure, stable and chemically inert. Five cc. 20% $Na_2Si_4O_9$, 8 cc. *N* H_3PO_4 and 1 cc. neutral reagent (*e. g.*, trinitrophenol) form a gel in about 30 min. Two cc. alkaloid soln. is placed on the gel and the tube set aside for 1 or 2 days. Measurements must be made with care since slight variations make large differences. *E. g.*, 6.2 cc. *N* HCl to 5 cc. 20% silicate soln. made up to 13 cc. with water gels in 1 min. but 7 cc. acid to 4 cc. Si soln. requires many months; 6.5 cc. acid to 5.5 cc. silicate gives a gel in 20 min. A. R. ROSE

The behavior of proteins toward colloids and toward electrolytes. W. PAULI. *Trans. Faraday Soc.* **26**, 723–37(1930).—A summary is given of P.'s work on the coagulation of proteins and of Al_2O_3 sols by colloids and salts. In continuation of the work of Pauli and Weiss (*C. A.* **23**, 1551) it is shown that mutual flocculation of Congo blue and pure albumin sols occurs at approx. equal concns. of particles. With lower protein concns., the color change blue to red on heating becomes irreversible on cooling, because of the assocn. of the N atoms of the dye with COO groups of the protein, resulting in conversion of NH_3^+ to NH_2 and hence color change. There is also assocn. of the NH_3^+ groups of the zwitterionic protein with SO_3H groups of the dye. At still lower protein concns. flocculation is obtained by passing in CO_2, when 10 dye particles are assocd. with 1 serum-albumin particle. A flocculation diagram for NaCl, Congo blue sol, and albumin is given. Protective action, which does not occur with electrolyte-free sols, is attributed to inactivation of the charge on the dye by the salt soln. Sensitization is due to action of the salt at low concn. on the aggregates of protein and dye already formed. The protective action and the irreversible color change can be imitated with glycine instead of protein, since only zwitterionic structure is essential, but flocculation and sensitization, which involve large multivalent nuclei, are not obtained.
K. V. THIMANN

Preparation of cellulose membranes containing proteins. JEAN LOISELEUR AND LÉON VELLUZ. *Compt. rend.* **192**, 43–5(1931); cf. *C. A.* **25**, 1546.—Solns. of gelatin in

glacial AcOH, or of other proteins in anhyd. HCOOH, are miscible in all proportions and without flocculation with solns. of cellulose acetate (I) or nitrate in AcOH; these acid proteocellulose solns. remain stable during evapn. The membranes formed may be regarded as true solid solns., the structure of which depends on the ratio protein:cellulose. A 10% soln. of gelatin in cold glacial AcOH is first prepd. According to the percentage of gelatin desired in the membrane (the percentage may vary from 5 to 75), a suitable quantity of this soln. is mixed with a 10% soln. of I in AcOH. The mixt. is shaken energetically, and the membrane prepd. as usual. If the drying is complete, a resistant membrane is obtained, the permeability of which depends on the condition of evapn. of the original soln. Membranes with 5% gelatin are transparent; those with 25% are opalescent. The preceding method is applicable to the prepn. of membranes contg. other proteins, except that anhyd. HCOOH must be used to dissolve the protein. A perfectly dry membrane contg. 20 parts casein to 80 parts dry I is clear and does not give the Tyndall effect. Using the method described, a series of membranes contg. egg albumin, gliadin and the proteins of serum were prepd. LOUISE KELLEY

Solubility of thallous iodate in ethyl alcohol–water mixtures. VICTOR K. LA MER AND FREDERICK H. GOLDMAN. *J. Am. Chem. Soc.* 53, 473–6(1931).—The application of Born's equation for the electrostatic work of transfer of charged spheres of av. radius r was tested with $TlIO_3$-alc.-water mixts. The soly. of $TlIO_3$ was measured in EtOH-water mixts. contg. 0–47% EtOH. From the data, the av. radii were calcd. compared with the values of the parameter "a" computed from soly. data in dil. salt solns.

ALLEN S. SMITH

Liquid ammonia as a solvent and the ammonia system of compounds. VII. The nature of free radicals, their preparation and properties, as revealed by studies in liquid ammonia solutions. WARREN C. JOHNSON AND W. CONARD FERNELIUS. *J. Chem. Education* 7, 2600-8(1930); cf. *C. A.* 24, 3486.—Kraus classified free radicals on the basis of their affinity for the electron into strongly electropos., strongly electroneg. and amphoteric. The strongly electropos. radicals include the tetraalkylammoniums, which behave like typical alkali metals; *i. e.*, they give blue solns. in liquid NH_3 and form amalgams. The RHg radicals exhibit metallic properties. The strongly electroneg. radicals include $(CN)_2$, $(OCN)_2$, $(SCN)_2$ and $(SCSN_3)_2$. They do not exist in the monomol. state and they behave chemically like the halogens. Among the amphoteric radicals are Ph_3C, Me_3Sn and Me_2Sn. These substances combine with both the strongly electropos. and strongly electroneg. elements. Liquid NH_3 is a suitable solvent for the prepn. and study of the amphoteric free radicals because many of the substances from which the radicals are prepd. are sol. in liquid NH_3 and do not react with it. Typical reactions in liquid NH_3 are: $Me_3SnCl + 2Na \longrightarrow Me_3SnNa + NaCl$; $Me_3SnNa + Me_3SnCl \longrightarrow 2Me_3Sn + NaCl$; $Me_2SnBr_2 + 2Na \longrightarrow 2NaBr + Me_2Sn$.

W. C. FERNELIUS

The connection between ionic mobility and diffusion velocity in solid salts. CARL WAGNER. *Z. physik. Chem.*, Abt. B, 11, 139–51(1930).—For mixed crystals of solid salts of AgI + CuI or $PbCl_2$ + $PbBr_2$ a formula is derived to calc. the diffusion coeffs. of the ions from conductivities and transference nos. or from the migration velocities of the ions. From the conductivities of pure solid salts with exclusive cationic or anionic conductivities the self-diffusion const. of the more mobile ion can be derived. The formulas used by Hevesy (*C. A.* 15, 3243, 1440; 22, 1711; 23, 3395; 24, 1573) and by Tubandt, Reinhold and Jost (*C. A.* 22, 342; 23, 3612) are confirmed. It is assumed that the single ions move practically independently of each other (no common migration of cation and anion, no exchange of places between adjoining cations or anions). Approx. exptl. verification of the derived formula confirms this assumption. G. T.

The temperatures of maximum density and the surface tensions of aqueous solutions in relation to concentration. G. TAMMANN AND A. ROHMANN. *Z. anorg. allgem. Chem.* 194, 273–7(1930); cf. *C. A.* 23, 19.—The changes of the temp. of max. d. t_m and of the surface tension σ effected by addn. of different substances to water are discussed from the viewpoint of internal pressure. Solutes of high internal pressure cause a marked decrease of t_m, directly proportional to concn. Solutes of low internal pressure cause a smaller decrease of t_m, occasionally preceded by an increase at low concns., and the decrease is always smaller (particularly at low concns.) than the amt. calcd. by assuming the thermal expansion curves of water and solute additive. The difference is attributed to the internal soln. pressure's (K) being smaller than that of water, which affords a basis for the calcn. of K. It is pointed out that $\Delta\sigma/\Delta x$ (x = concn.) has the same sign as $\Delta K/\Delta x$. For substances of high K, $\Delta\sigma/\Delta K$ ranges between 13 and 72, while for substances of low K, $\Delta\sigma/\Delta K$ takes values in the range 5000–70,000. This contrast is connected with the well-known fact that substances lowering σ, which conc.

in the surface layer, effect a much greater abs. change than those that tend to keep away from the surface, raising σ. L. ONSAGER

Viscosity of electrolytes. W. E. JOY AND J. H. WOLFENDEN. *Nature* **126**, 904–5 (1930).—The viscosities of dil. aq. solns. of KCl were measured at 18° in both silica and glass viscometers. The results in glass indicate viscosities greater than that of pure water for concns. up to 0.025 *N*. When extrapolated to zero concn. the curve agrees with the predictions of the Dole-Falkenhagen equation. The results with the silica viscometers are less concordant but agree in general with those with glass. W. W. STIFLER

The measurement of electrolytic resistance by the barretter method. J. SCHIELE AND M. WIEN. *Ann. Physik* [5], **7**, 624–32(1930).—An oscillating circuit of 10,000–100,000 hertzes is connected to a barretter for measuring resistance of electrolytic solns. The barretter is a d. c. bridge that is shielded from the high-frequency circuit with choke coils and condensers. The effects of increase in the applied potential, of strong and of loose coupling, and of thin and of thick platinizing of the electrodes are shown. The limit of precision with the Kohlrausch method, using a telephone, is 30 sq. cm. ohm; by the barretter method, 1 sq. cm. ohm. G. M. MURPHY

The measurement of the conductance of electrolytes. III. The design of cells. GRINNELL JONES AND GILES M. BOLLINGER. *J. Am. Chem. Soc.* **53**, 411–51(1931); cf. *C. A.* **23**, 4613.—Data are given that confirm the observation of Parker (*C. A.* **17**, 2382, 3440) that the ratio of the resistance of 2 conductance cells when filled with a common soln. is not independent of the sp. conductance of the soln. used. In addn. to the error due to polarization, there is a capacitative shunt between parts of the cell of opposite polarity which makes the measured resistance too low. New cells are designed which give results reliable within 0.01%. JOHN R. HILL

Conductivity measurements and titrations. A contribution to their technic. FRIEDRICH L. HAHN. *Z. Elektrochem.* **36**, 989–91(1930).—A Cu–Cu_2O–Pb detector is used as a rectifier and a galvanometer as a null-instrument in cond. measurements. The method is fast and accurate and is especially adaptable to titrations. H. F. J.

Reduction potential of quadrivalent to tervalent iridium in hydrochloric acid solution. SHO-CHOW WOO. *J. Am. Chem. Soc.* **53**, 469–72(1931).—The reduction potential at 25° is 1.021 v. for the reaction $IrCl_6^{---} = IrCl_6^{--} + E^-$. The solns. were 0.1 *f* in HCl and the concns. of the 2 ions of the reaction between 0.002 and 0.008 *f*. The free energy decrease is —23,540 cal. and the temp. coeff. between 25° and 20° is +0.00098 v. per degree, which makes ΔH = —30,400 cal. JOHN R. HILL

The electrolytic reduction of acid solutions of vanadium. F. FOERSTER AND F. BÖTTCHER. *Z. physik. Chem.*, Abt. A, **151**, 321–400(1930).—The purpose of this investigation was to find out to what degree the reduction of V solns. is similar to solns. of Mo. E. m. f. measurements were made on equal mixts. of V solns. of different states of oxidation at various acid concns., with electrodes of Pt, Ir and Au. On platinized electrodes the first stage of reduction runs smoothly, but the second stage encounters considerable polarization so that H may be evolved. On bright Pt the first stage of reduction forms a diaphragm on the cathode, thereby producing polarization. As was the case with Mo this diaphragm consists of difficultly sol. products of hydrolysis. Au cathodes act similarly to Pt ones. MALCOLM DOLE

An effect of the breadth of junction on the electromotive force of a simple concentration cell. GEO. SCATCHARD AND T. F. BUEHRER. *J. Am. Chem. Soc.* **53**, 574–8 (1931).—The e. m. f. of HCl concn. cells increased a few hundredths of a mv when the liquid junction was made very thin. Flowing junction electrodes were used. This increase is greater than would be calcd. from the Debye-Hückel theory and is probably caused by the change in temp. in the boundary layer resulting from the heat of mixing of the 2 solns. JOHN R. HILL

The quinhydrone electrode. I J. LIVINGSTON R. MORGAN, OLIVE M. LAMMERT AND MARGARET A. CAMPBELL. *J. Am. Chem. Soc.* **53**, 454–69(1931).—A comprehensive study of the quinhydrone electrode was made to det. its reproducibility in 0.1 *N* HCl under different conditions. Flaws in metal electrodes were the sources of the greatest error. A method of making, cleansing and testing these which minimizes breakage is described. The effect of the size, compn., form, condition and age of the metal electrodes, with and without the use of Hg as a connecting medium, is reported. The purity and amt. of quinhydrone do not appreciably affect the results if the concn. is not too low. Stirring the solns. is recommended when feasible. II. OLIVE M. LAMMERT, J. LIVINGSTON R. MORGAN AND MARGARET A. CAMPBELL. *Ibid* 597–604.—The effect of N on the reproducibility of the quinhydrone electrode in 0.1 *N* HCl was detd. Better results

were obtained when N was passed through the solns. Equil. was attained more rapidly with electrodes prepd. with N than with air. F. W. MARSH

Effect of various manganese compounds on the quinhydrone electrode. S. OSUGI AND H. KASHIHARA. *J. Sci. Soil and Manure* 3, 4(1929); *Proc. Intern. Soc. Soil Sci.* 5, 104(1930). The presence of oxides of Mn (MnO_2 and Mn_3O_4) in small proportions (0.001 and 0.005%, resp.) caused inaccuracies in p_H measurements with the quinhydrone electrode. In soils known to contain Mn, however, no significant differences in p_H values as dtd. by H and quinhydrone electrodes were observed. B. C. A.

The potential of the cadmium electrode. FREDERICK H. GETMAN. *J. Phys. Chem.* 35, 588 95(1931).—Single crystals of Cd function as const. and reproducible electrodes, but give potential values that are uniformly greater than electrodes of the polycryst. form. A recalcn. of the normal electrode potential of Cd gives the value, $E_0 = 0.395$ v. MALCOLM DOLE

The potential of passive iron. A. TRAVERS AND J. AUBERT. *Compt. rend.* 192, 161–3(1931).—The e. m. f. of Fe in Na_2SO_4 solns. of different p_H values and in various oxidizing agents was dtd. The values vary considerably with the conditions and time, finally becoming const. There are degrees of passivity and the oxide-film theory is not generally applicable. V. F. HARRINGTON

The passivity of chromium. I. ERICH MÜLLER AND O. ESSIN. *Z. Elektrochem.* 36, 963–72(1930).—Electrolytic Cr is passive at 0° in *N* HCl, HF, HBr, H_2SO_4, $HClO_4$, H_3PO_4 and HNO_3. In the first 4 of these acids the metal becomes active when the acid is warmed, and each acid has a definite characteristic activation temp. that is proportional to the diam. of its anion. In $HClO_4$ and H_3PO_4 the metal is not active at 100°. Passive Cr is made more noble by removal of adsorbed H, but when placed in the inactive acids the potential gradually rises with time until it is greater than the reversible H potential, without the loss of its passivity by the Cr. When Cr is cathodically polarized in inactive acids (except H_3PO_4) it suddenly becomes active at a definite potential and the potential increases immediately to that of the Cr/Cr^{++} equil. The passivity of Cr is due to a layer of oxide, the pores of which are permeable to certain anions. H. F. JOHNSTONE

Atomic reactions that are affected by inertia. H. v. HARTEL AND M. POLANYI. *Z. physik. Chem.*, Abt. B, 11, 97 138(1930); cf. *C. A.* 22, 900. –The reaction of Na vapor with alkyl halides is accompanied by, at most, only a trace of luminescence. To show the dimensions of the Na alkyl halide flame a Na-A "resonance" lamp was used. N_2 or H_2 was used as the inert gas for the combustion. The diam. of the flame is inversely proportional to the square root of the pressure of alkyl halide and at controlled pressures serves to measure the speed of reaction. With MeI reaction is practically instantaneous. With MeF it is slow and could not be measured. Series were also obtained with Na in Br_2, the speed being greater than with MeI. The same relative order is obtained with PhCl, PhBr and PhI. Substitution of more halogens on a C increases the speed of reaction. Substitution of other groups for H increases the rate of reaction. The heats of activation of MeBr (3 cal.), MeCl (8 cal.), MeF(>20 cal.), can be correlated with London's theory, but that of $(CN)_2$ cannot. The reaction of Na vapor with ClCN tends to form NaCl instead of NaCN with increase of temp. The free CH_3 liberated in these reactions with alkyl halides reacts with H_2 at 300–500° to give CH_4 and H. FOSTER D. SNELL

The reaction mechanism of the formation of hydrogen molecules from atoms. H. SENFTLEBEN AND O. RIECHEMEIER. *Physik. Z.* 31, 960–1(1930); cf. *C. A.* 24, 2033, 4980.—If $a = c_1 n_a + c_2 + (c_3/n_a)$ (n_a = no. of atoms; c_1; c_2; c_3 = consts.) then a must be a linear function of n_a, if the surface reaction can be suppressed. This was found to be the case. The values of c_2 at 60, 30 and 15 mm. Hg were detd. and the conclusion was reached that space collisions between 2 atoms and 1 mol. preponderate. The at. collision diam. was found to be 3.5 times as great for tri-at. collisions as for collisions between 2 atoms and 1 mol. In the latter case, the collision diam. is only slightly larger than the gas-kinetic one. FRANK URBAN

Kinetics of the polymerization of ethylene at pressures above one atmosphere. ROBERT N. PEASE. *J. Am. Chem. Soc.* 53, 613–9(1931).—The rate of polymerization of C_2H_4 was measured at 2.5, 5 and 10 atm. from 350° to 500°. Fifty % of the C_2H_4 may be polymerized to gaseous and liquid monoolefins without formation of more than 2% of H_2 and satd. hydrocarbons. Butylene is concluded to be the primary reaction product. The reaction is of the second order and has an abnormally low temp. coeff. The mechanism of the assocn. reaction is discussed. S. LENHER

Polymerization and thermal decomposition of acetylene. P. SCHLÄPFER AND M. BRUNNER. *Helv. Chim. Acta* 13, 1125–51(1930).—Polymerization of C_2H_2 begins at

300°, but does not become rapid until 450°. Uncatalyzed spontaneous decompn. occurs only above 500°. Polymerization was carried out in glass tubes and the reaction velocity at various temps. was measured by the decrease in pressure that accompanies polymerization. At 420° the pressure decreased 110 mm. in 0.5 hr. and 590 mm. in 5 hrs., when gas analysis showed that 71.5% of the C_2H_2 had disappeared. Polymerization proceeds in the homogeneous phase and the reaction probably is bimol. Increased glass surface (10-100 times) has little effect on the reaction velocity, but catalysts such as Cu accelerate, while Fe powder or C (from C_2H_2) retards decrease in pressure. Polymerization products could not be isolated. The temps. and pressures at which explosive spontaneous decompn. of C_2H_2 takes place were detd. Below 530°, no deflagration occurs at pressures under 3 atms.; at higher temps. it takes place under much lower pressures (as 700° and 0.6 atms.). C, Fe and Fe oxide speed the relatively slow non-explosive decompn. but retard the explosive decompn. especially at higher temps. Although deflagration occurs as low as 590° at approx. 1000 mm. in the absence of C and Fe, in their presence it does not occur at 1960 and 2400 mm., resp. Impurities usually present in crude C_2H_2 have no appreciable effect on the spontaneous decompn., but the presence of small quantities of O causes deflagration at much lower temps. With increasing amts. of O, explosive decompn. occurs less readily and spontaneous combustion (oxidation) more readily. A. WIEBEN

The thermal decomposition of nitrogen pentoxide at low pressures. J. H. HODGES AND E. F. LINHORST. *Proc. Natl. Acad. Sci.* **17**, 28-32(1931).—Previous detns. of this rate gave conflicting results. The rate was detd. at 35° and at pressures from 0.12 to 0.001 mm. The reaction is unimol. above 0.06 mm. partial pressure of N_2O_5. Below this the rate decreases with the pressure, and below 0.004 mm. the reaction appears to be bimol. V. F. HARRINGTON

Equilibrium diagrams of the aluminum-manganese, copper-manganese and iron-manganese systems. TORAJIRO ISHIWARA. *Science Repts. Tôhoku Imp. Univ.* 19, 499-519(1930).—By thermal analysis, elec. resistance measurements, dilatometric and magnetic analyses, new and corrected equil. diagrams of the Al-Mn, Cu-Mn and Fe-Mn binary systems are set forth. Fifty-six photomicrographs are reproduced. CURTIS L. WILSON

The equilibrium iron-iron carbide-oxygen. P. PINGAULT. *Compt. rend.* **192**, 45-7(1931).—The Fe-C-O diagram is completed by detg. the curve representing the equil. between Fe and Fe_3C in mixts. of CO and CO_2. In the app. used the gas was passed continuously through a closed circuit. The 50-cc. samples were analyzed chemically with an accuracy of more than 0.5%. The Fe was used in the form of fine wire which made it possible with a small wt. of material to fill the whole tube and obtain a rather large reaction surface. The expts. were carried out at atm. pressure. To insure having no false equil. due to passive resistance, Fe was carburized in a mixt. rich in CO and decarburized in a mixt. rich in CO_2. Analysis showed that the 2 methods gave the same results at the same temp. When a mixt. of Fe and C was kept in a limited quantity of O the results varied with the temp.: above 740° Fe_3C was formed and CO_2 in the gaseous phase varied from 0 to 28%; between 740° and 700°, the proportion of CO_2 was 28-42%, and Fe_3C was oxidized to Fe and CO; below 700° the content of CO_2 became sufficient to oxidize Fe. The following calcns. were made: between 700° and 1000°, $CO_2 + Fe_3C \rightleftarrows 3Fe + 2CO - 14.5$ cals.; $3Fe + C \rightleftarrows Fe_3C - 27.5$ cals. L. K.

Notes on catalysis. A. BEYER. *Tiba* **8**, 1287-97(1930).—A general review of catalytic reactions, enumerated in chronological order, and of the various theories which have been proposed to explain catalysis. A. PAPINEAU-COUTURE

The heat capacities at low temperatures of manganese sulfide, ferrous sulfide and calcium sulfide. C. TRAVIS ANDERSON. *J. Am. Chem. Soc.* **53**, 476-83(1931).—Heat capacities were detd. for MnS, FeS and CaS between 60° and 300°K. The values obtained for entropy are compared with related thermal data found in the literature. R. H. LAMBERT

The heats of combustion of methane and carbon monoxide. FREDERICK D. ROSSINI. *Bur. Standards J. Research* **6**, 37-49(1931).—With the app. that was used in detg. the heat of formation of water, the heats of combustion of CH_4 and CO were measured. For 25° and a const. pressure of 1 atm., the values per mole are, resp., 890,160 ± 300 and 282,890 ± 120 international joules; 212,790 ± 70 and 67,623 ± 30 g. $cal._{18}$. F. D. ROSSINI

The heat of mixing in molten metals. MASUO KAWAKAMI. *Science Repts. Tôhoku Imp. Univ.* **19**, 521-49(1930).—A continuation of previous expts. (cf. *C.* **1**. **22**, 718). With similar or slightly modified app. 25 binary systems were investigated. The at. heats of mixing for 12 systems having intermetallic compds. existing up to the

liquidus were without exception pos. and reached a max. at the compn. of the compd. as given: Sn–Mg (at 800°), value of $Q_{max.}$ = +3420 cal. for 63.3 at. % Mg; Bi–Mg (800°), $Q_{max.}$ = +3050 cal., 55.4 at. % Mg; Pb–Mg (800°), $Q_{max.}$ = +2410 cal., 61.6 at. % Mg; Zn–Mg (800°), $Q_{max.}$ = +1520 cal., 39.5 at. % Mg; Cd–Sb (800°), $Q_{max.}$ = +829 cal., 46.7 at. % Sb; Mg–Al (800°), $Q_{max.}$ = +1130 cal., 47.8 at. % Al; Al–Ag (1050°), $Q_{max.}$ = +1242 cal., 74.1 at. % Ag; Mg–Ag (1050°), $Q_{max.}$ = +3050 cal., 46.1 at. % Ag; Sb–Ag (1050°), $Q_{max.}$ = +1192 cal., 71.6 at. % Ag; Sb–Cu (1200°), $Q_{max.}$ = +903 cal., 57.4 at. % Cu; Al–Cu (1200°), $Q_{max.}$ = +4880 cal., 62.2 at. % Cu; Sn–Cu (1200°), $Q_{max.}$ = +1077 cal., 71.4 at. % Cu. Because the heat for Sn–Cu was pos. and a max. at the concn. Cu_3Sn, it was thought that this compd. should persist up to the liquidus. Eight systems having no intermetallic compds. up to the liquidus showed neg. heat effects: Bi–Sb (800°), $Q_{max.}$ = —309 cal., 48.6 at. % Sb; Sn–Al (800°), $Q_{max.}$ = —1630 cal., 59.8 at. % Al; Zn–Al (800°), $Q_{max.}$ = —1215 cal., 48.6 at. % Al; Bi–Ag (1050°), $Q_{max.}$ = —1078 cal., 59.8 at. % Ag; Pb–Ag (1050°), $Q_{max.}$ = —1680 cal., 60.5 at. % Ag; Pb–Cu (1200°), $Q_{max.}$ = —2030 cal., 52.3 at. % Cu; Bi–Cu (1200°), $Q_{max.}$ = —1650 cal., 56.4 at. % Cu; Ag–Cu (1200°), $Q_{max.}$ = —1105 cal., 50.3 at. % Cu. Three exceptions were found, of which 2, Pb–Sb (800°), $Q_{max.}$ = +107 cal., 45.3 at. % Sb, and Sn–Sb (800°), $Q_{max.}$ = +1182 cal., 55.7 at. % Sb, were attributed to the presence of Sb, which, like Bi (see *C. A.* **22**, 718), has abnormal phys. properties. In the other exception, Sn–Ag (1050°), $Q_{max.}$ = +1260 cal., 67.9 at. % Ag, the reliability of the equil. diagram is questioned. The systems Cu–Au and Ag–Au showed very small heat changes and are offered as examples of ideal solns.

CURTIS L. WILSON

The relation of the viscosity of cellulose ester solutions and temperature (BERL, *et al.*) **23.** The motion of ions and colloid particles in an electric field (PAINE) **3.** Magnetic susceptibility of certain complex Mo compounds (RÂY) **3.**

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Measuring p_H values. SOLOMON F. ACREE. Fr. 694,936, May 1, 1930. A stable buffer standard of H-ion concn. is composed of an acid alkali metal salt of a dibasic org. acid the anion and cation of which have equal ionic mobility, *e. g.* acid Na phthalate mixed with very pure water. An alkali metal carbonate and an indicator, the latter being preferably regulated so as to be isohydric with the acid Na phthalate, are also present.

3—SUBATOMIC PHENOMENA AND RADIOCHEMISTRY

W. ALBERT NOYES, JR.

Radioactivity and the thermal history of the earth. ARTHUR HOLMES. *Naturwissenschaften* **19**, 73–9(1931).—A review with numerous references on the cooling process of the earth. B. J. C. VAN DER HOEVEN

Interaction of free electrons and radiation according to Dirac's theory of electrons and quantum-electrodynamics. I. TAMM. *Z. Physik* **62**, 545–68(1930).—Math. The Klein-Nishina formula is deduced. Transitions between neg. energy levels are essential to the scattering formula. A simple method for calcn. of the wave function of a free electron is given. B. C. A.

Proper energy of an electron on the quantum theory of scattering. I. WALLER. *Z. Physik* **62**, 673–6(1930); cf. *C. A.* **25**, 23.—Math. The difficulty of an infinite proper energy of a free electron in an electromagnetic field is discussed with the use of Dirac's relativity and non-relativity dynamics. B. C. A.

Mechanics of photons. V. FOCK. *Compt. rend.* **190**, 1399–1401(1930).—A math. development is given of the mechanics of a photon by treatment of Maxwell's equations in a manner corresponding with the wave motion of a photon (light quantum). An equation for a single photon is deduced and extended to a number of photons by application of Dirac's method of "posterior" quantification. The reasoning may be applied to the deduction of Einstein's law of energy fluctuation and to the laws of the interaction of matter and light. B. C. A.

Undulatory theory of quantum phenomena. L. DÉCOMBE. *Compt. rend.* **190**, 1385–7(1930).—The author's theory (*C. A.* **24**, 1575), when applied to band spectra, indicates that the Deslandres spectral term (*C. A.* **24**, 3950) is attributable to ionic oscillations about the center of gravity of the mol. With the assumption of a const. H for the proton, analogous to the electronic quantum const. (h), it is shown that there is resonance between the 2 rotatory frequencies of the spinning proton and electron. B. C. A.

Application of group theory to the quantum dynamics of monatomic systems. CARL ECKART. *Rev. Modern Physics* **2**, 305–80(1930).—The math. principles of finite group theory are discussed with special reference to quantum dynamics. The general theory includes discussion of invariant manifolds, Schur's lemmas, perturbation theory, multiplication of groups and orthogonality relations. The applications are concerned with complex at. spectra and include the method of sums, selection principles, alterna-

tion rule of multiplets, the permutation group and the Pauli principle. The influence of external fields is considered for the Zeeman and Stark effects. Mol. spectra, valence and electron conduction are not discussed. G. M. MURPHY

Magnetic susceptibility of certain complex molybdenum compounds. PRIYADA RANJAN RÂY. *J. Indian Chem. Soc.* **7**, 741–3(1930).—The mass susceptibilities of 5 complex coördination compds. of quinquevalent Mo were measured at 29°. The results ranged from $\chi_m = 2.435 \times 10^{-6}$ for $(C_5H_6N)_2MoOCl_5$ to $\chi_m = 1.140 \times 10^{-6}$ for $(C_5H_5N)_2MoOBr_3$. The corresponding Weiss magneton nos. are 8.093 and 7.257, and in every case the nearest Bohr magneton no. is one. These results do not agree with Bose's rule for the magneton no. and a table of possible electron arrangements to account for the anomaly is given. It is also suggested that the magnetic behavior of Mo may be masked by that of the org. radical. W. W. STIFLER

The motion of ions and colloid particles in an electric field. H. H. PAINE. *South African J. Sci.* **27**, 11–22(1930).—An address, in which the analogy between ions and colloid particles, as concerns their elec. structure, is discussed from the standpoint of the Debye-Hückel theory. C. E. P. JEFFREYS

The presence of hydrogen ions among the positive thermions as usually obtained. III. Catalytic hydrogenation. OTTO SCHMIDT. *Z. physik. Chem.*, Abt. A, **152**, 269–83(1931).—Theoretically it appears impossible to form H^+ by thermal emission. S. finds exptl. proof of this and so all theories of hydrogenation as an ionic reaction in the gas phase are invalid. This does not preclude the possibility of such reactions in the metal phase. The app. is described and data are given. V. F. HARRINGTON

Measurements on the Langmuir dark space. A. GÜNTHERSCHULZE. *Z. Physik* **62**, 619–23(1930).—The Langmuir dark space which surrounds an electrode maintained at a neg. potential, with respect to a region in which a discharge is maintained, is due to the relative inefficiency of pos. ions in producing new ions on collision and is accompanied by a pos. space charge. The dimensions of this dark space can be calcd., provided certain conditions are fulfilled, by the simple form of the space charge equation. Expts have been carried out in H, He, Ne and A in which the above-mentioned conditions are approx. fulfilled; a fairly satisfactory agreement exists between the observed and calcd. dimensions of the dark space. B. C. A.

Wave length of x-rays. T. H. LABY AND R. BINGHAM. *Nature* **126**, 915–6(1930).—By means of a plane glass grating of 10,800 lines to the inch, a vacuum spectrograph and x-ray tube with graphite target in the same vacuum, it was found that the carbon K line could be photographed from the 18th neg. to the 13th pos. order. With very small dispersion, the carbon K line was compared with Cu L_α and L_l in their 2nd and 4th orders, the wave lengths 44.7 and 44.8 A. U. being obtained for the C line relative to 13.32 for the Cu L_α line. Al $K_{\alpha_1\alpha_2} = 8.315$ A. U. relative to Cu $K_{\alpha_1\alpha_2} = 1.5392$ A. U. C. E. P. JEFFREYS

Electron emission by collision of positive ions at low gas pressures. A. GÜNTHERSCHULZE. *Z. Physik* **62**, 600–6(1930).—The efficiency of pos. ions for the liberation of electrons has been examd. at a Cu surface acting as a subsidiary electrode adjacent to a low-voltage arc in A, Ne and He, the pressure ranges being 0.0017–0.0036, 0.0126–0.0156 and 0.019–0.026 mm., resp. The efficiency is of the same order in all these gases and increases from about 10 to 30% as the potential of the subsidiary electrode is increased sevenfold. B. C. A.

The emission of positive electricity from palladium. FR. GULBIS. *Acta Univ. Latviensis, Mat. un Dabas Zinatnu Fakult.* Serija I, Fasc. 1. Burtnica, (in English 51–66)(in Lettish 67–8)(1931).—G. investigates the pos. (thermionic) emission of Pd in order to det. the decay of emission with time, and the effect of occluded gases and dirty surfaces. The app. used consisted of a loop of pure Pd wire surrounded by a cylinder of Pt foil, electrically connected to an electrometer. The 2 electrodes were enclosed in a pyrex bulb attached to a vacuum pump and an auxiliary spark gap for testing the reduced pressure. The Pd electrode was removable for cleaning. The values detd. for the decay of emission with time were not found to agree with the equation $i - i_0 = Ae^{-kt}$, but they more nearly agreed with the expression $it = K$. Attempts to revive the Pd by admission of dry air or H_2 for several hrs. were unsuccessful, but contact with H_2SO_4, HCl, H_2O, EtOH, Et_2O, grease and dust particles gave various increases in the emission. Immersion of the Pd wire in toluene or xylene caused no increase in emission. The theory is advanced that the pos. emission of metals is due to some "active matter" which is widely distributed and which can be transferred from one body to another. The ions of the "active matter" are thought to be bound in the metal in such a way that a definite energy is required for their liberation. The process of emission is unknown but is maintained by itself and decays with time. Temp. is only a promoter of it. H. W. L.

Oxygen films on tungsten. I. A study of stability by means of electron emission in presence of cesium vapor. I. LANGMUIR AND D. S. VILLARS. *J. Am. Chem. Soc.* 53, 486–97(1931); cf. *C. A.* 19, 931.—W filaments in the presence of Cs vapor emit more electrons than the pure W filament. Up to 640°K. at which emission is many billion-fold that of pure W the Richardson equation, $i = AT^{\frac{1}{2}}\epsilon^{-b/T}$, is valid in the presence of Cs vapor. If O is admitted to activate the filament by forming a W–O–Cs surface the emission is greatly increased and the Richardson equation is valid to much higher temps. A theoretical discussion of results and a description of exptl. methods are given with suggestions for their application to the study of the loss of O from films on W and its detection in a gas. A. LLOYD TAYLOR

γ-Rays in the power field. ROBERT F. MEHL AND CHARLES S. BARRETT. *Power* 73, 340–2(1931).—The penetrative limit of γ-rays through steel is about twice that of x-rays. The expense of radiographs taken with γ-rays may be less than of those taken with x-rays since Ra capsules may be rented and are easily portable. D. B. DILL

An attempt to demonstrate the existence of short-range α-particles from radium C. G. H. HENDERSON AND J. L. NICKERSON. *Proc. Trans. Nova Scotian Inst. Sci.* 17, 256–8(1930).—An attempt was made to detect short-range particles from Ra C by the Wilson chamber method, but no group of particles of definite range could be detected above the general background. RACHEL BROWN

The rate of flow of heat of some radioactive minerals. A. DORABIALSKA. *Bull. intern. acad. Polonaise* 1930A, 42–9(in French).—See *C. A.* 24, 1280. J. W.

Application of an adiabatic microcalorimeter for measurements of rates of flow of heat of uranium, thorium and radioactive minerals. A. DORABIALSKA. *Bull. intern. acad Polonaise* 1929A, 487–96(in French).—See *C. A.* 24, 2042. J. W.

Photographic effects of γ-rays. J. S. ROGERS. *Proc. Phys. Soc. London* 43, Pt. I, 59–67(1931).—γ-Rays from Ra and Rn in equil. with their short-lived products were collimated between Pb blocks and allowed to fall on Agfa duplitized film. Besides the direct beams, rays filtered through lead screens, varying in thickness from 0.19 to 4.03 cm., were used. The densities of the traces on the films were measured with a Moll microphotometer. Results are given for the variations of photographic density both with time and with intensity of radiation. The shape of the characteristic curves was found to be independent of filtering. Similar results were obtained for the Hurter–Driffield curves, except when no lead filter was used. The absorption coeff. of Pb was found to be 0.533 cm.$^{-1}$ for thicknesses from 1 to 7 cm. W. W. STIFLER

Ionium in dispersed masses of Tyuya-Muyun. Description of the method of preparation of a solution for its determination. I. D. KURBATOV, N. A. KARZHAVINA AND N. A. SAMOILO. *Compt. rend. acad. sci. U. R. S. S.* 1930A, 69–74.—In certain ores of Tyuya-Muyun, Ra is shown to be present in excess of the amt. in radioactive equil. with U. It is assumed that this is due to the presence and transformation of Io. As there is no direct method for detn. of Io an indirect method was devised to solve the problem whether Io is in excess of the equil. ratio of Io:U. The sample was fused with Na_2CO_3 and a Ba salt. Ra and Ba were sepd. as sulfates. The initial amt. of Ra and that resulting from transformation of Io were detd. with a Wulf electrometer. The results confirmed the assumption. Still another mineral deposit of Io and Ra probably exists in Tyuya–Muyun. J. G. TOLPIN

Proportions of active elements in dispersed masses of Tyuya-Muyun. I. D. KURBATOV. *Compt. rend. acad. sci. U. R. S. S.* 1930A, 452–8(1930).—Ra ore in Tyuya–Muyun consists of (*a*) active minerals contg. Ra, (*b*) minerals that contain no Ra but exert no influence upon the soly. of *a* in acids and (*c*) minerals contg. no Ra and lowering the soly. of Ra-contg minerals. Only minerals of class *a* are discussed here. Most important of them is tyuya–muyunite, $CaO.2UO_3.V_2O_5.xH_2O$, which is easily sol. in dil. acids. Another Ra-bearing mineral with entirely different chem. properties is brass-yellow radiobarite. From disturbed radioactive equil. it was concluded that other Ra-bearing minerals could be found in Tyuya–Muyun fields. For exptl. work active dispersed masses were chosen. Detn. of U and Ra showed an excess of Ra over the equil. amt. from 0.25×10^{-7} to 0.50×10^{-7} for each g. of U. The excess is explained as being due to sepn. of Ra and Io from the ore in quantities in excess of the equil. amt. or to disturbance of equil. on account of migration of the active element with the sepn. of a new mineral contg. Ra and Io formerly present in U mineral. In the second case the new mineral should be less sol. than tyuya–muyunite. Exptl. evidence tends to show the opposite. At least 3 minerals in which Ra is being concd. are present in Tyuya–Muyun; (1) tyuya–muyunite where Ra is stored (U ⟶ Io ⟶ Ra); (2) radiobarite (Io ⟶ Ra); (3) dispersed Fe_2O_3 in primary ores (Io ⟶ Ra). J. G. TOLPIN

Optics of x-ray reflection from crystals. V. Wide-angle diagrams. H. SEEMANN. *Ann. Physik* [5], 7, 633–49(1930); cf. *C. A.* 25, 870. C. E. P. JEFFREYS

Studies in x-ray diffraction. I. The structure of amorphous carbon. P. KRISHNAMURTI. *Indian J. Physics* 5, 473–86(1930).—X-ray powder diffraction patterns were measured for amorphous carbon prepd. from benzene, sugar, C_2Cl_6 and CCl_4, for active charcoal and for Acheson graphite. A strong scattering extending to an angle of 7° was observed for amorphous C which indicates that the C atoms are joined together in clusters of about 60 atoms of C per unit. **II. Some colloidal solutions and liquid mixtures.** *Ibid* 489–98.—Aq. solns. of starch, tannic acid and gum arabic show a strong scattering at small angles to the primary beams due to dissolved mols. or micelles. The mol. wts. calcd. from the extent of the corona were 6200, 3134 and 2810, resp. The small angle scattering from AcOH disappears immediately on diln. indicating a breaking up of mol. assocn. Mesitylene-cyclohexane, and ethyl phthalate-benzene systems were also investigated. **III. Aromatic hydrocarbons in the solid and liquid states.** *Ibid* 543–58.—Acenaphthene, naphthalene, fluorene and phenanthrene show 2 rings in the liquid state while biphenyl, bibenzyl and stilbene show only one. An explanation for this is given based on the assumption of impedance to free rotation or vibration for compds. having *o*- and *m*-substitution in the aromatic nucleus. The relation of the liquid diffraction patterns to crystal structure data is discussed. MALCOLM DOLE

X-ray diffraction in heated liquids and in solutions. V. I. VAIDYANATHAN. *Indian J. Physics* 5, 501–24(1930).—This work was done to test the applicability of the Einstein-Smoluchowski theory of optical scattering to small angles of scattering with x-rays. Since, according to this theory, the ratio of the intensity of the scattered to the incident beam must increase at high temps., the x-ray scattering of a no. of liquids was examd. at high temps. With benzene the ratio is greater than the ratio of scattering in the optical region. The abs. values of the ratio for water and benzene at room temp. were calcd. theoretically and shown to agree well with the observed values. The origin of the inner and outer rings is considered. Since the inner halo intensity did not diminish with rise of temp. with assocd. liquids like phenol, the conclusion is that the inner ring origin is not due to assocn. The theory of scattering by dissolved mols. is also discussed from a math. standpoint. MALCOLM DOLE

Part-absorption phenomena of x-rays. R. C. MAJUMDAR. *Nature* 127, 92 (1931).—Partly absorbed lines were observed with C, N and Al as the absorbing substances and the incident radiations from Fe $K\alpha_{1,2}$, Fe $K\beta_1$ and Ni $K\alpha_{1,2}$. Cf. Ray, *C. A.* 24, 5608. H. F. JOHNSTONE

Influence of the form and polarity of molecules on the Röntgen spectrum of liquids. III. The appearance of two amorphous rings in substances whose molecules are probably disk-shaped. J. R. KATZ AND J. SELMAN. *Z. Physik* 66, 834–57(1930); cf. *C. A.* 22, 2881.—The Rontgen spectra of many fluid org. compds. have been observed and are found to consist of 2 "amorphous" rings sepd. by a zone of more or less diffuse light. Measurement of the rings gives data from which the structure of the mol. groups is inferred. The mols. are regarded as disks arranged in parallel layers very similar to a stack of coins, the stacks forming a space grating. This arrangement is disturbed by thermal excitation whereby the axes of the groups assume a random distribution and individual mols. may wander from one group to another. This is betrayed by a loss in distinctness of the rings in the Röntgen diagram. C. C. KIESS

The intensity relations in the spectrum of a mixture of alkalies and the possibility of a quantitative spectrum analysis of these elements. HORST LUCAS. *Z. anorg. allgem. Chem.* 195, 321–37(1931); cf. *C. A.* 24, 5663.—The arc and spark spectra of salts of Na and K mixed in various proportions were photographed together with a source of white light of known intensity distribution to study the possibility of making quant. spectrochem. analyses. It was found that the relative intensities of the lines, as detd. from microphotometer measurements, depended on the region of the arc under investigation. In the middle zone of the arc where the temp. and elec. field are lowest the spectrum of K is emitted with greater strength than that of Na. Detns. of the relative concns. of Na and K from the line intensities were made with an accuracy of approx. 20%. As a by-product of the investigation it was found that the relative intensities of the principal and subordinate series are 1:100. C. C. KIESS

The dispersion of internal energy between the quartet and triplet terms $3s$P, $3p$P, and $3p$D of the spectra of carbon, nitrogen, oxygen and fluorine in different stages of ionization. J. GILLES. *Compt. rend.* 192, 350–2(1931).—From a study of the sepns. shown by the triplet and quartet *P* and *D* terms of C, N, O and F, coming from the electron configurations $1s^22s^22p3p$ and $1s^22s^22p^23p$, resp., it was found that (1) in passing from the 4th to the 6th column of the periodic table the triplet sepns. are very

nearly 80 × 2 and 80 × 4 wave no. units; (2) from the 5th to the 7th columns the quartet sepns. are very nearly 80 × 3 and 80 × 5 units. C. C. KIESS

Investigations of the anomalous dispersion of excited gases. V. Negative dispersion in excited neon. H. KOPFERMANN AND R. LADENBURG. *Z. Physik* **65**, 167–88(1930); cf. *C. A.* **22**, 2514.—The neg. dispersions of the Ne lines resulting from the $s_k - p_k$ combinations were measured by the method previously described (*C. A.* **22**, 4364). With increase in strength of the current in the discharge tube the anomalous dispersions of all the lines terminating in the s_k state increase in the same manner; but when the c. d. reaches 0.1 amp./sq. cm. the dispersions begin to decrease by amts. different for each line, depending on the atom density of each of the p_k states. The no. of atoms in each of the p_k states appears to reach a satn. value for a max. current of 0.7 amp., apparently because of the equil. between the atom densities of the various p_k states and the exciting and neutralizing electrons. The sp. temp. for the s and p states derived from the measurements for max. current is approx. 23,000°. **VI. Control experiments for demonstrating negative dispersion: absorption, anomalous dispersion, intensity distribution and intensity of different neon lines.** R. LADENBURG AND S. LEVY. *Ibid* 189–206.—Exptl. tests of the above interpretation of the anomalous dispersion of Ne lines is afforded by: (1) the anomalous dispersion and absorption shown by lines resulting from combination of a p_k state with a higher state; (2) the increase in intensity of the $s_i - p_k$ lines with increase in strength of the exciting current. Measurements of the anomalous dispersion and absorptions of the line at 7059 A. U. ($p_{10} - s_1''$) show that they increase markedly when the crit. current strength is reached; and investigations of the intensity distribution within the red line at 6304 A. U. by means of the Fabry–Perot interferometer show that it is caused solely by a Doppler effect. A formula is derived for the intensity of a spectrum line affected by absorption within a finite gaseous ayer. C. C. KIESS

Two remarks on the dispersion of mercury vapor. R. LADENBURG AND G. WOLFSOHN. *Z. Physik* **65**, 207–8(1930); cf. *C. A.* **24**, 5631.—(1) The new dispersion measurements in Hg vapor give a value of 1.14×10^{-7} sec. for the life of the $^1P_1$ state. (2) The frequency corresponding to the limit at 1190 A. U. of the principal series of Hg has assocd. with it a large f-value (2.59). This is attributed to the first simultaneous jump of both valence electrons. C. C. KIESS

The variations in intensity distribution in a resonance spectrum. LUDWIK NATANSON. *Z. Physik* **65**, 75–83(1930); cf. *C. A.* **24**, 5226.—The resonance spectra of Te and Se, excited by light from a Hg lamp, were observed at different pressures. The spectrograms, exposed also to the light of a W-filament lamp. were microphotometered to study the changes in intensity in the members of the resonance spectrum caused by the change in pressure. For Te intensity changes were noted which could not be attributed to absorption of the resonance rays by the vapor itself. For Se, in which the doublets of the resonance series were resolved by the spectrograph employed, the long wave length component of each doublet was strengthened relative to the short wave component with increase in pressure, the effect of absorption being eliminated. C. C. K.

Quantized rotation of the potassium atom. R. G. LOYARTE AND R. GRINFELD. *Univ. Nacl. La Plata, Estudio Cienc.*, No. 89, 103–8(1929); *Science Abstracts* **33A**, 645; cf. *C. A.* **24**, 2669.—Williamson has published curves which show the stimulation of K atoms by electron shocks. These curves show that it is probable that there is a quantized rotation of these atoms. The crit. potential, which corresponds to the leap from level $n = 0$ to level $n = 1$, must be 3.39 v., which corresponds to a $\Delta\nu = 27{,}441$ cm.$^{-1}$. On spectroscopic testing, 23 lines of the arc and spark spectra of K are found, obtainable by combination of a rotation-quantum leap with the electron leaps. Since the value $\Delta\nu = 27{,}441$ cm.$^{-1}$ is very large, it is not possible to find lines for which to subtract the rotation-quantum leaps from those of the electrons, for such lines would be in the deep infrared, where measurements have not been made. The no. of combination lines within the observed region is, therefore, small. G. G.

Anomalous Zeeman effect. P. DRUMAUX. *Bull. assoc. ing. élec. électrotech. Montefiore* **7**, 101–8, 142–56, 164–72(1929); *Science Abstracts* **33A**, 678.—This paper, in 3 serial portions, gives a summary of the theory of the anomalous Zeeman effect. The 1st portion deals with the classical theory, the 2nd with the classical quantum theory and the description of the effect in different multiplets and the final portion gives the quantum-mechanics treatment, with the use of wave mechanics and the matrix mechanics of Heisenberg and Dirac. G. G.

Elementary theory of the Zeeman effect. J. ZAHRADNÍČEK. *Z. Physik* **62**, 694–5(1930).—The Lorentz equations for the motion of a bound electron in a magnetic

field are best solved by the usual transformation of 2 real equations into one imaginary equation. B. C. A.

The Zeeman effect of quadripole lines. E. SEGRÈ. *Z. Physik* **66**, 827–9(1930).—The narrow doublet of K at 4642.17 and 4641.58 A. U. representing the transition $^2S - {}^2D$ results from quadripole radiation. The Zeeman effects of these lines have been observed in a field of 12,700 gausses and confirm not only the theory of Rubinowicz for the Zeeman effect of quadripole radiation but also the character of these lines as forbidden $S - D$ combinations. C. C. KIESS

The Stark effect of some helium lines in the visible part of the spectrum. KARL SJÖGREN. *Z. Physik* **66**, 377–88(1930).—The canal ray method of Stark was used to observe the displacements of visible He lines produced by elec. fields ranging from 175 to 550 kv./cm. Details of the measurements are given for the lines $2S - 3P$, $2S - 3D$, $2P - 4S$, $2P - 4D$, $2P - 4F$, $2P - 4B$, $2p - 4s$, $2p - 4d$, $2p - 4f$ and $2p - 4p$. C. C. KIESS

Lithium-like spectra of carbon, nitrogen and oxygen, C IV, N V and O VI. B. EDLÉN AND A. ERICSON. *Z. Physik* **64**, 64–74(1930).—The spectra of C, N and O have been examd. in the extreme ultra-violet, the vacuum spark method being used. The series of Li-like doublets was obtained. For the fundamental term $2^2S_{0.5}$, for the different elements, the following values were obtained: C IV, 520, 220; N V, 789, 591; O VI 1,114, 206. These correspond with ionization potentials of 64.19, 97.428 and 137.482 v., resp. The term values for the complete series for Li I, Be II, B III, C IV, N V and O VI are compared. B. C. A.

C IV lines in the visible and near ultra-violet regions of the spectrum. The term system of C IV. BENGT EDLÉN AND JOHN STENMAN. *Z. Physik* **66**, 328–38(1930).—With the terms of C IV previously described (preceding abstract) the lines which should appear in the near ultra-violet and visible regions of the spectrum have been calcd. These lines and others belonging to C IV have actually been observed in the spectrum emitted by a condensed spark discharge between graphite electrodes in vacuum. These new wave length observations together with those in the extreme ultra-violet have permitted a redetn. of all the terms up to those with principal quantum no. 6. The ^2P terms follow Landé's formula for the doublet sepns. very closely, giving a value 1.82 for the screening const. σ. C IV is now the best representative of a Li-like spectrum. C. C. KIESS

The nuclear moments of Li^6 and Li^7. HERMANN SCHÜLER. *Z. Physik* **66**, 431–5 (1930); cf. *C. A.* **25**, 249.—With a Perot–Fabry etalon and a Schüler lamp, the hyperfine structure of the Li-II triplets, $2^2P_{0,1,2} - 2^2S_1$ at 5485 A. U., was photographed. Several discrepancies in the earlier measurements have been removed. The results do not agree with the calcd. nuclear moments, $i = {}^1/_2$ or ${}^3/_2$ but the latter is slightly favored. No splitting of the lines for Li^6 was detected. In case it exists, it cannot be more than ${}^1/_8$ as great as that for Li^7. G. M. MURPHY

The para-ortho splitting and the mean value of the *S*-terms of helium for higher quantum numbers. EGIL A. HYLLERAAS. *Z. Physik* **66**, 453–70(1930); cf. *C. A.* **25**, 1156.—Math. By a perturbation method, the term values for the *S*-states of para- and ortho-He are calcd. for higher quantum nos. A similar calcn. is made including the influence of the polarization of the atom core. The results are $E(n,0) = -Rh/(n - a)^2$, where $a = 0.176 \pm 0.054$, 0.22 ± 0.07, 0.219 ± 0.079 for calcn. without and with polarization effect and exptl., resp. G. M. MURPHY

The calculation of the spectra of ions. ENRICO FERMI. *Mem. accad. Italia, Classe sci. fis. mat. nat.* **1**, No. 2, 10 pp.(1930).—F. first presents his general method of calcg. the statistical distribution of the electrons in an ion. The electrons surrounding the nucleus are treated as a cloud of electronic gas, the d. of which is detd. statistically as a function of the distance from the nucleus. Next is given the calcn. of the elec. potential in the interior of an ion as a function of the distance from the nucleus. This makes possible the numerical calcn. of the energy levels, which procedure is exemplified by the calcg. of the *S*-terms, or rather their Rydberg corrections, of the spectra of triply ionized atoms. Good agreement between calcd. and observed values is shown. R. H. LOMBARD

The magnetic moments of atomic nuclei. ENRICO FERMI. *Mem. accad. Italia, Classe sci. fis. mat. nat.* **1**, No. 1, 12 pp.(1930).—The hyperfine structure of spectra is due to the interaction between the motion of the electrons of the atom and the intrinsic magnetic moment of the nucleus. Methods are derived theoretically for calcg. this hyperfine structure of spectral lines. The magnetic moments of the nuclei of Na, Rb and Cs are deduced by applying these theoretical results to the experimentally detd. hyperfine structure of the spectra of these elements. R. H. LOMBARD

Nuclear spin and the third law of thermodynamics. The entropy of iodine. W. F. GIAUQUE. *J. Am. Chem. Soc.* **53**, 507–14(1931); cf. *C. A.* **25**, 867.—The value of $S_{298.1} = 27.9$ calorie/degree per mole of solid I obtained by extrapolation of existing data represents the abs. entropy less the nuclear spin entropy. For gaseous I the combined translational, rotational and vibrational entropies consists of the abs. entropy less the nuclear spin entropy and has a value as obtained from band spectra, $S_{298.1} = 62.29$ cal./degree/mole. The high temp. entropy effects due to nuclear spin in I are found to persist below 10°K., which is not the case for H. The *vapor pressure of solid I* is given by the equation, $\log_{10}P(\text{atm.}) = -(3512.3/T) - 2.013\log_{10}T + 13.374$.
A. LLOYD TAYLOR

Nuclear spin of nitrogen. W. R. VAN WIJK. *Arch. neerland. sci. IIIA*, **13**, 29–57 (1930).—In certain band spectra of mols in which the atoms are identical, alternate lines are very weak or even missing. This is ascribed to the symmetry of the mol. and to resonance in the at. nuclei. The theory of this method of investigating the nucleus, by photometric measurements of the intensities of the lines in the band spectrum, is outlined, with special reference to the N_2 mol. Exptl. details are given for work carried out on spectra emitted by the N_2^+ and the neutral N_2 mols. The ratio of the alternating intensities of the neg. bands at 3914, 3884, 4278 and 4237 A. U. was found to be 2:1. A Maxwell-Boltzmann distribution among the rotational levels was found. The ratio for the nuclear spin was confirmed by other measurements, including work on the resonance line of Th at 3776 A. U.
W. W. STIFLER

The experimental assignment of the H_2 bands to the singlet and triplet systems. W. FINKELNBURG. *Z. Physik* **66**, 345–9(1930).—A spectrogram of H_2 (obtained by Gehrcke and Lau) excited by streams of electrons of various velocities shows the same effect as that described for the singlet and triplet lines of Hg by Schaffernicht (*C. A.* **24**, 5621). The lines which extend entirely across the spectrogram with undiminished intensity as the excitation energy increases are those belonging to the A, B and analogous bands of the singlet system. Those lines extending only part way across the spectrogram, fading out with increasing energy of the cathode rays, belong to the α,β,γ and δ bands of the triplet system.
C. C. KIESS

Optical dissociation of diatomic molecules in gases and vapors. I. II. III. G. H. VISSER. *Chem. Weekblad* **27**, 237–41, 380–4, 390–3(1930). A survey of recent work.
B. C. A.

Analysis of the S_2 spectrum. R. ROMPE. *Z. Physik* **65**, 404–29(1930).—This analysis of the S_2 spectrum includes: (1) the bands classified by Rosen (*C. A.* **22**, 2717; **23**, 564) which are shown to represent a $^1\Sigma - {}^1\Pi$ transition; (2) the ultra-violet bands described by Gilles (*C. A.* **23**, 4406) which result from the term combinations $^1\Sigma - {}^3\Sigma$ (or $^1\Sigma$) and $^1\Sigma - {}^3\Pi$; (3) the resonance bands excited by the ultra-violet rays of Hg. Five resonance series have been observed. These have been arranged into band schemes for which the corresponding anti-Stokes members have also been observed. The intensity distribution within the resonance series resembles that noted by Rosen for the fluorescence spectrum and deviates markedly from that required by Condon's theory. The effect of the addn. of a foreign gas, N_2 or He, to the S_2 vapor is to bring out more or less completely the band systems assocd. with the resonance series.
C. C. KIESS

The emission bands of sulfur. R. K. ASUNDI. *Nature* **127**, 93–4(1931).—Spectrograms of the emission bands of S were obtained from discharge tubes contg. S vapor in the presence of high-pressure A. New bands toward the red indicate that A helps in some way to prevent the predissocn. of the S mols. A few new bands degraded toward the shorter wave lengths were also obtained in the extreme ultra-violet beginning from about λ2100 A. U.
H. F. JOHNSTONE

Raman spectra of some triatomic molecules. S. BHAGAVANTAM. *Nature* **126**, 995 (1930).—Photographs of the Raman spectrum of SO_2 gas show a line with a wave no. shift of 1154, which differs somewhat from the strong line having the shift 1146 which was previously found in the Raman spectrum of liquid SO_2. The 2 fainter lines found in the spectrum of the liquid do not appear in that of the gas. Photographs of the spectrum of liquid HCN show a triplet with shifts of 2076, 2097.2 and 2122, the middle component being much stronger than the others. The results of Krishnamurti on CS_2 were confirmed and 3 new, very feeble bands at 4438, 4605 and 4680 A. U. were found in the spectrum of CS_2 excited by the Hg line at 4358.3 A. U.
W. W. STIFLER

Raman effect and molecular structure. III. The basic frequencies of molecules of the type XY_4. Mixed halides. B. TRUMPY. *Z. Physik* **66**, 790–806(1930); cf. *C. A.* **25**, 250.—The Raman spectra of CCl_4, $SiCl_4$, $TiCl_4$, $SnCl_4$, $SnBr_4$ and of mixts. of $SnCl_4$ and $SnBr_4$ in the ratios 1:1, 3:1 and 1:3, were observed. The measurements show that the tetrachlorides and also the tetrabromide all exhibit 4 basic frequencies, those of

$SnBr_4$ being displaced to longer wave lengths compared with those of $SnCl_4$. These observed frequencies are in good agreement with those calcd. from a theoretical consideration of a mol. having its outer atoms at the vertices of a tetrahedron. Two of the frequencies represent active oscillations and 2 inactive oscillations of the mol. The infra-red absorption spectra of these compds., so far as known, correspond to the active oscillations and to combinations of them. The Raman spectra of the mixts. show new lines in addn. to those due to the constituent mols. The lines of the original mols. are weak compared to those of the new mols., which are probably of the form $SnCl_2Br_2$, $SnClBr_3$ and $SnCl_3Br$. C. C. KIESS

Apparatus for the demonstration of the Raman effect in liquids. N. B. REYNOLDS AND F. BENFORD. *Rev. Sci. Instruments* 1, 413–6(1930).—A hot-cathode He lamp (of cylindrical shape) is used in conjunction with a Ni oxide glass filter (cf. Wood, *C. A.* 23, 5419). The lamp is surrounded by a reflector of elliptical cross section, the cross section of the lamp being concentric with one of the foci of the ellipse. Concentric with the other focus is placed the tube contg. the liquid to be examd. A hot-cathode Hg lamp has been similarly used. B. C. A.

The Raman effect and the polymerization of water at various temperatures. O. SPECCHIA. *Nuovo cimento* [N. S.], VII, 10, 388–91(1930).—At room temp. the Raman spectrum of water excited by means of a Hg arc over the range 4108 to 5790 A. U. gives 3 bands of greatest intensity at 4176, 4693 and 5158 A. U., and 2 much weaker bands at 4258 and 4480 A. U. The bands at 4176 and 4693 A. U. are composed of 3 components each. The effect of increase of temp. in modifying the band at 4176 A. U. was particularly studied. Measurements were made between 17° and 91°. A marked diminution of intensity of the 3 components of this band was noted with increasing temp., as well as a displacement toward greater wave length. L. T. FAIRHALL

The photochemical union of hydrogen and chlorine. I. The effect of light intensity. ARTHUR J. ALLMAND AND EDWARD BEESLEY. *J. Chem. Soc.* 1930, 2693–708.—An extensive study to det. the relation between the reaction velocity and the intensity of light in the photochem. combination of H_2 and Cl_2. Thus, 405 mμ and 436 mμ monochromatic light over measured intensity ratios of about 180:1 and 440:1 resp., plane-polarized complex light over a measured intensity ratio of 4:1, and intermittent monochromatic light of wave lengths 313 + 303 mμ, 365 mμ, 405 mμ and 436 mμ are used. The light intensities are measured with a thermopile. They are varied in the expts. with the 405 mμ and the 436 mμ monochromatic light by 4 wedges of neutral tint and continuously varying density, with the polarized light by crossed Nicol prisms, and in the expts. using the intermittent monochromatic light by a rotating disk with 2 adjustable open sectors in opposite quadrants. The results show that the reaction velocity is proportional to the intensity of the incident light. The results of Baly and Barker (*C. A.* 24, 2385) are explained. J. BALOZIAN

The photochemical union of hydrogen and chlorine. II. The effect of wave length. Measurements with filtered light. ARTHUR J. ALLMAND AND EDWARD BEESLEY. *J. Chem. Soc.* 1930, 2709–21.—The dependency of the quantum efficiency (γ) on the wave length (260–546 mμ), the relative temp. coeffs. for the lines 436 mμ, 405 mμ, 365 mμ and 313 + 303 mμ (comparative velocity measurements being made at 19.7° and 25.0°), and the simultaneous effect of 2 monochromatic rays are investigated in the photochem. reaction between H and Cl. The app. and methods are similar to those used in expts. of the preceding abstract, extra light filters (260 mμ and 546 mμ) being also used. With decreasing wave length, γ at first increases to a max. and then decreases rapidly in the ultra-violet. The expts. show that between 313 mμ–436 mμ the temp. coeff. of γ increases with increasing wave length. In every case the simultaneous effect of 2 monochromatic rays is equal to the sum of their sep. effects. The threshold wave length for this reaction is found to be 546 mμ. J. BALOZIAN

The photo-reaction of hydrogen and iodine monochloride. D. P. MELLOR AND T. IREDALE. *Nature* 127, 93(1931); cf. Rollefson and Lindquist, *C. A.* 24, 4224.—H and ICl react rapidly in strong light if the H pressure is large compared with the pressure of ICl. This indicates that conditions favor the greater probability of the reaction, $H_2 + Cl \longrightarrow HCl + H$, and that excited Cl atoms may not be necessary for it to take place. In thin glass bulbs the reaction between H and ICl is very slow in artificial light, more rapid in diffuse daylight, and very rapid in direct sunlight, I_2 and HCl being the main products. H. F. JOHNSTONE

Photo-reaction between hydrogen and iodine monochloride. G. K. ROLLEFSON AND F. E. LINDQUIST. *J. Am. Chem. Soc.* 53, 1184–5(1931).—R. and L. point out that the results of Mellor and Iredale (preceding abstract) are not inconsistent with their

previous conclusions (*C. A.* **24**, 4224), since their exptl. conditions were considerably different. C. J. WEST

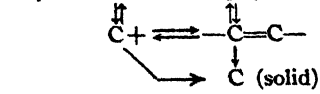
Photochemical interaction of ethylene and ammonia. HUGH S. TAYLOR AND HARRY J. EMELEUS. *J. Am. Chem. Soc.* **53**, 562–74(1931).—The photochem. decompn. of NH_3 in the presence of C_2H_4 and C_2H_4-H_2 mixts. induces a polymerization of C_2H_4 at room temp. to a liquid product. A formation of satd. hydrocarbons is subordinate to this process. The velocity of the reaction is independent of the C_2H_4 pressure over a wide range, and of NH_3 pressure when absorption is complete. Conclusions are reached as to the efficiency of methods for producing satd. hydrocarbons from C_2H_4 and at. H. C. E. P. JEFFREYS

Photochemical decomposition of hydrogen peroxide in aqeuous solution in presence of sodium nitroprusside. I. M. QURESHI. *J. Phys. Chem.* **35**, 656–8(1931).—An aq. soln. of H_2O_2 to which a few drops of Na nitroprusside soln. are added is sensitive to the visible light, the decompn. of the H_2O_2 continuing after the illumination ceases. It is probable that the illumination produces some colloidal Prussian blue which acts as a catalyst for the dark reaction. The course of the reaction was not followed quantitatively but this will be done later. HARRY B. WEISER

The transfer of energy between atoms at collision. OSCAR KNEFLER RICE. *Proc. Nat. Acad. Sci.* **17**, 34–9(1931).—Kallmann and London have considered the question of energy exchange between atoms and mols. at distances greater than those comparable with the at. or mol. radii. They neglected the relative translational energy of colliding atoms or mols. A modification of Born's method for solving collision problems is outlined which takes into account the mutual kinetic energy of the particles and meets the objection of K. and L. (*C. A.* **24**, 4696) to Frenkel's suggestion (*C. A.* **24**, 2052). V. F. HARRINGTON

The separation of two types of iodine molecule and the photochemical reaction of gaseous iodine with hexene. R. M. BADGER AND J. W. URMSTON. *Proc. Nat. Acad. Sci.* **16**, 808–11(1930).—Since one type of I mol. absorbs the Hg line 5461 and the other does not, an attempt at sepn. has been made by causing the activated type to react with hexene vapor. Indications, which are not conclusive, point to a partial sepn. J. B. AUSTIN

The mechanism of the action of electrical discharge upon methane. KURT PETERS AND O. H. WAGNER. *Brennstoff-Chem.* **12**, 67–8(1931); cf. *C. A.* **23**, 3861, 4326; **24**, 2955, 5715; **25**, 399, 645.—Spectrum analysis of the arc in the discharge tube before the color change observed upon increasing the elec. charge shows the bands of the —CH, N and —CN groups. This is taken to show the progression in radicals from $CH_3 \longrightarrow CH_2 \longrightarrow CH$. Polymerized satd. hydrocarbons are thus formed at low pressures and low charges while C_2H_4 and C_2H_2 are formed at high pressures. Following the change from pale blue to yellow, bands of the Balmer series, the Swann spectrum with exception of group I, and the —C≡C— and C+ groups were observed. Solid hydrocarbons result from the reaction of —C≡C— groups with reactive H. The mechanism is indicated as



The relation between elec. consumption, % in the final gas and the charge is shown graphically for C_2H_2 and C_2H_4. F. W. JUNG

The ammonia discharge tube. G. I. LAVIN AND J. R. BATES. *Proc. Nat. Acad. Sci.* **16**, 804–8(1930); cf. *C. A.* **24**, 3441.—The active gas reacts with ethylene to give cyanides and with O to give nitrides. Solid surfaces show sp. action. Cu and Fe_2O_3 extinguish the glow immediately. Sn, Ni, Fe, Pt, show an induction period. Mo and W produce little effect. J. B. AUSTIN

Disadvantages of the quartz lamp in fluorescence analysis. J. PLOTNIKOV. *Chem.-Ztg.* **54**, 582(1930).—The low light intensity, fragile nature, and monochromatic emission are mentioned; only those substances fluoresce under the lamp which can absorb radiation of wave length 366 mμ. B. C. A.

Transmission changes in ultra-violet glasses during high-temperature exposure to light. C. C. NITCHIE AND F. C. SCHMUTZ. *Science* **71**, 590(1930).—When kept in contact with the hot tube of the Hg-arc lamp (about 450°), certain glasses showed a marked increase in short-wave transmission. B. C. A.

The absorption of ultra-violet rays by liquids transparent to light. J. CLUZET

AND T. KOFMAN. *Compt. rend. soc. biol.* **103**, 783–5(1930).—A Cd photoelec. cell was used to measure the ultra-violet light (3000–2300 A. U.) absorbed by several liquids transparent to visible light. B. C. BRUNSTETTER

Quantitative investigations on the absorption spectra of organic dyes. J. AUŠKĀPS. *Acta Univ. Latviensis Kim. Fakultat. Serija* **1** (in German) 362–8(in Lettish) 279–361.—Absorption spectra of 79 org. dyes were measured with a Koenig-Martens spectrophotometer between 7200 and 4100 A. U. Values of the mol. absorption const. are given for each. The advantages of the quant. method are discussed. The Lambert-Beer law is valid for weak dye solns. in presence of small amt. of colorless inorg. compds. The results are discussed with regard to the relation between spectra and structure of the dye. The advantages of the color-triangle are also discussed. G. M. MURPHY

Effect of impurities on the phosphorescence of calcium sulfide. D. N. GOYLE AND N. SINGH. *J. chim. phys.* **27**, 433–51(1930).—The effect of adding up to 0.1% of eosin, fluorescein, quinine hydrochloride, methyl blue, $PbCl_2$, $Pb(NO_3)_2$, $CuCl_2$, $CuSO_4$, $Cd(NO_3)_2$, $CdSO_4$, $Ba(NO_3)_2$, $BaCl_2$, $Sr(NO_3)_2$ and $SrCl_2$ to CaS on the phosphorescence of the CaS was measured. The first 6 named gave a max. effect in concns. of about 0.003%, the highest value being obtained with quinine hydrochloride. Addns. of the other mineral salts gave minima in small concns., followed by maxima which were usually lower than the initial value. The intensity of the radiation decreased with age. The luminosity of CaS is explained by the equations: (1) $2CaS + 2H_2O \rightleftharpoons Ca(SH)_2 + Ca(OH)_2$; (2) $CO_2 + Ca(OH)_2 \longrightarrow CaCO_3 + H_2O$; (3) $H_2O + CO_2 + Ca(SH)_2 \longrightarrow CaCO_3 + 2H_2S$. H_2S was detected by odor and by test with lead acetate. GERALD M. PETTY

Thermoluminescence in glasses which contain two activators. BYRON E. COHN AND WM. D. HARKINS. *J. Am. Chem. Soc.* **52**, 5146–54(1930).—The thermoluminescence of a zinc borate glass, caused by Ce and Mg, alone and mixed in concns. up to 1% of each element, was measured from 2600 to 3350 A. U. The effect of mixts. was not additive. Intensity measurements of the thermoluminescence indicate that the energy for thermoluminescence is drawn from near the edge of the absorption bands. Relative thermoluminescent intensity varies with the source of excitation. The data are presented graphically. GERALD M. PETTY

Scattering of light by dielectrics of small particle size. G. F. A. STUTZ. *J. Franklin Inst.* **210**, 67–85(1930). The diffusion of light by a dielec. material, Zn oxide, was investigated in the range of particle sizes where, with increasing particle size, Rayleigh scattering rapidly diminishes and reflection and refraction effects increase in importance. The turbidity max. for Zn oxide dispersed in water, detd. for 3 wave lengths of light, occurs at 0.25μ for the wave length 5500 A. U. and at smaller particle sizes for shorter wave lengths; the particle size of max. turbidity was found to be proportional to the wave length of the light in the range 4800–6300 A. U. An app. for detg. the angular distribution of the light scattered by a suspension of fine particles is described. The total observed intensity has not the same distribution as calcd. by Blumer (cf. *Z. Physik* **38**, 304(1926)); the observed depolarization is in fair agreement with theory (cf. Lange, *C. A.* **22**, 2503–4). B. C. A.

The acceleration produced by light of the flocculation of colloidal solutions in fluorescent media. AUGUSTIN BOUTARIC AND JEAN BOUCHARD. *Compt. rend.* **192**, 95–7(1931).—The effect of visible and of ultra-violet light on the rate of flocculation of As_2S_3 and other sols by electrolytes in presence of fluorescein, eosin and erythrosin was studied. In all cases illumination decreased the time required for flocculation, the effect being greater in ultra-violet than in visible light freed from infra-red. K_2SO_4 and H_2SO_4, which inhibit the fluorescence of the dyes, also suppress the effect of light. Light has no effect in the absence of fluorescent compds., and the dyes do not affect the sols in the dark. K. V. THIMANN

Increased bactericidal effect of inorganic compounds in the presence of x-rays. ROBERT J. NORRIS. *Bull. Basic Sci. Research* **3**, 21–36(1931).—When bacteria are irradiated in solns. contg. NaBr, NaCl, NaI, $BaCl_2$, $HgCl_2$, $UO_2(NO_3)_2$, CsI or $Th(NO_3)_4$, the resulting lethal action is very much greater than that obtained by exposing the bacteria successively to x-rays and to the salts previously irradiated with x-rays, and is a true synergistic action. This action has previously been ascribed to ultra-violet fluorescence, or to emission of photoelectrons. Expts. are described which indicate that the synergistic action of the above salts is not due primarily to these factors. The expts. indicate that the synergistic action is independent of permanent chem. decompn. For Th salts, it has been shown that at the crit. voltage for the ejection of the *K* electrons the resulting action is greatest, while theoretically the speed of the emitted *K* electrons is at a min. at this voltage; and that at a higher voltage, at

which K electrons are emitted at much greater speed, the action is much less. A tentative explanation is based upon the theory that the toxicity of the ion is related to its ionic potential or state of ionization. J. A. KENNEDY

Röntgenographic investigation of the system Cd–Mg (DEHLINGER) **2.** An attempt to separate the isotopes of Br (HARTECK, STRIEBEL) **2.** A series of new tetramminecobaltic complexes (SARKAR, DAS-GUPTA) **6.** Photoelectric cells in science and technics (LANGE) **4.** Isotopes of K: their association with plant life (DRUCE) **11D.** Ultraviolet absorption spectra of the quinoline group (HICKS) **10.** Isotopes and living organisms (VERNADSKII) **11D.**

Ergebnisse der exakten Naturwissenschaften. Band VIII. J. ESTERMANN: **Elektrische Dipolmomente von Molekülen.** H. SACK: **Dipolmoment und Molekularstruktur.** Berlin: J. Springer. Reviewed in *Z. physik. Chem.* **152,** 318(1931).

HUMPHRIS, F. HOWARD: **Ultra Violet and Other Rays.** London: Macmillan. 128 pp.

Electron-emitting compositions. ANTON LEDERER. Austrian 120,212, Sept. 15, 1929. An electron-emitting compn. comprises more than 2% of Th incorporated into a metallic carrier consisting mainly of Os, with or without difficultly fusible metals or alloys such as W. The compn. may be coated on a wire or the like of W, or a paste contg. ThO_2, Os and a binder may be extruded to form a filament, which is then heated to a temp. above the m. p. of Th, suitably in an atm. of CO. Addnl. details are given.

Ionizing gases. ERIC DUTT. Fr. 695,016, Aug. 5, 1929. Gaseous currents are ionized to bring about chem. reactions at ordinary temps. in an elec. field produced by an alternating or pulsatory source of current the potential of which is not below 1500 v., so that the shocks of the ionized mols. between themselves liberate a sufficient amt. of energy to produce the reaction. The process may be used for the production of NO from N and O.

4—ELECTROCHEMISTRY

COLIN G. FINK

The direct-current arc furnace. SIEGMUND SCHEY. *Giesserei-Ztg.* **26,** 583–7 (1929).—The elec. accessories of an elec. steel furnace are described. C. L. W.

The high-frequency furnace in the steel mill. N. BROGLIO. *A. E. G. Mitt.* 1931, 37–42.—The "coreless" high-frequency furnace in which the charge (contained in the crucible) forms the core is described; it is used in an improved method of producing C and alloy steels. The layout of the instrument panel and elec. connections is given. A 300 kg. charge of cold high-speed steel was melted and poured in 82 min. with a requirement of 720 kw. hrs. per ton. C. J. B.

Use of electric furnace for the preparation of nonferrous alloys. K. OKIMOTO. *J. Fuel Soc. Japan* **10,** 48–58(1931).—The use of an elec. furnace in place of a coke-crucible furnace in prepn. of Cu alloys is recommended. F. I. NAKAMURA

Photoelectric cells in science and technics. B. LANGE. *Naturwissenschaften* 19, 103–7, 128–32(1931); cf. *C. A.* **25,** 1435.—A review with many references. B. J. C. VAN DER HOEVEN

Photoelectric control for soaking-pit covers. R. M. BOYLE. *Elec. World* **97,** 409(1931).—A Middle West plant has a soaking-pit control which makes use of a light-sensitive relay as the initiating source. The moving crane carries only a foot-operated push-button and a light box mounted on the end of the crane for each soaking pit spanned by the crane. The layout consists of 2 soaking-pit cranes operating on a common runway and each spanning 2 pits. Preparatory to opening a cover or during the operation the crane may be shifted 5 ft. on either side of the center line and the operating lamp-box will still be opposite the light relay for that cover. To open the cover a single short flash of the lamps in the box is all that is necessary. The circuit is self-maintaining. A simple transfer circuit permits the light ray to be alternately effective to open or close the pit cover. The light-sensitive cells respond only to concd. light above the room illumination, leaving no danger of false operation. W. H. BOYNTON

Temperature compensation in electrolytes. E. BLAMBERG AND K. MÜLLER. *Arch. Elektrotech.* **23,** 435–40(1930); *Science Abstracts* **33B,** 411.—The fact that the cond. of an electrolytic cell varies rapidly with temp. as well as with concn. may be a disadvantage in some processes of deposition. The authors show how to proportion a

combined shunt *manganin* resistance and a series Cu resistance to compensate substantially for the effect of temp. G. G.

Electrolytic cells for chlorine and caustic soda. C. L. MANTELL. *Chem. Met. Eng.* 38, 88–90(1931).—Ten electrolytic cells for Cl—the Castner, Sorensen, Townsend, Hargreaves–Bird, Nelson, Allen–Moore, Buck–McRae, Gibbs, Wheeler, Vorce—are briefly described as to their constructional details, and compared. A table of operating data on the various cells has been tabulated from information furnished by users of the equipment. Yields of from 0.62 to 0.76 lb. Cl and 0.69 to 0.86 lb. NaOH per kw. hr. are in the range of com. practice. C. L. MANTELL

Electrolytic iron. R. DUPUIS. *Metallbörse* 20, 1829(1930).—A lecture reviewing the qualities of electrolytic Fe and the technical methods of its production. L. P.

A note on the preparation of silver-free copper. BART PARK. *J. Am. Chem. Soc.* 52, 3165–6(1930).—The last spectrographic traces of Ag were removed from Cu by electrolyzing a soln. of 400 g. $CuSO_4$ made up to 2 l. with 5% HNO_3 between Pt electrodes with 0.05 amp. at 7 v. The Ag in the 7 fractions of deposits removed at intervals of 1–24 hrs. was estd. by Nitchie's spectrographic method (*C. A.* 23, 1587). J. D. S.

Electrolytic gold plating with high current densities. H. PAWECK AND R. WEINER. *Z. Elektrochem.* 36, 972–80(1930).—The compn. of the bath recommended for Au plating with high c. d. is 200 g. $K_4Fe(CN)_6$, 50 g. $HAuCl_4$, 50 g. anhyd. Na_2CO_3 and 1 l. of H_2O. The ppt. of basic Fe carbonate is filtered from the warm soln. and the clear filtrate serves as the electrolyte. The bath is used at 70° with rapid stirring. Gold anodes are used with the surface equal to or > that of the cathode. The cathodic c. d. is maintained at 4–6 amp./sq. dm., which corresponds to an e. m. f. of 1.2–1.5 v. when the electrodes are 4–6 cm. apart. A smooth Au plate is produced which does not require burnishing. At higher c. d. the plate is darkened. With the recommended conditions the cathodic current efficiency is equiv. to 150–190% and the anodic efficiency to 115–180%. A further study was made of the effect of varying the concn. of each of the components of the bath on the c. d.-anode potential curves. H. F. JOHNSTONE

Electrogalvanizing wires and strips at high current densities. A preliminary communication. D. V. STEPANOV, B. N. KABANOV AND N. T. KUDRYAVTZEV. *Tsvetnuie Met.* 1930, 1151–8.—Cold Zn plating has many advantages over the hot dip process, such as greater uniformity of the coating, steadiness of the bath, economy of Zn and easier control of the bath. The proposed methods of increasing the c. d. to hasten the process have serious drawbacks. The authors made about 300 expts. to find conditions essential for good results with high c. ds. Circulation of the bath permits higher c. ds. (200 to 400 amp./sq. dm.) than those used before. Different concns. of $ZnSO_4$, H_2SO_4, H_3BO_3 making up the bath were also studied, as well as the changes in the bath during the process and the suitable indicators. At 50 amp./sq. dm. it is necessary to add to a bath of 1000 l. 30 l. water, 1 kg. H_2SO_4 and 10 g. boric acid per hr. At 50 amp./sq. dm. the best temp. is 45°. At higher c. ds. the temp. should be higher. The problem of cooling the electrolyte which is heated by the current is solved by the application of air stirring; a formula is developed by which the equilibrium temp. suitable for the process can be calcd. Tables show the change of voltage with temp. and with the distance between the electrodes and a set of optimum conditions at c. ds. 50, 100 and 200 amp./sq. dm. J. G. TOLPIN

Electrodeposition of lead-thallium alloys. C. G. FINK AND C. K. CONARD, JR. *Metal Ind.* (N. Y.) 29, 116–7(1931).—See *C. A.* 24, 4989. G. G.

Polarographic studies with the dropping-mercury cathode. XVI. Electroreduction of acetaldehyde. I. SMOLEŘ. *Collection Czechoslov. Chem. Comm.* 2, 699–71 (1930); cf. *C. A.* 24, 5579.—The detection and estn. of aldehydes occurring in certain alc. beverages by their electroreduction potentials, with the dropping Hg cathode, have been previously described (Shikata and Tachi, *C. A.* 21, 1917; Shikata and Shoji, *C. A.* 22, 2895). The aim of the present work was the investigation of the mode of reduction of AcH in its pure solns., and its detn. in fermentation products. The reduction of the AcH was studied in solns. of Li salts or LiOH, since Li has the most neg. deposition potential of all cations at the dropping Hg cathode. AcH was found to be reduced at a cathode potential 0.50 v. more pos. than that at which Li is deposited from solns. of equal concn. as the AcH solns. Thus the reduction potential of AcH in a 1 M soln. is —1.60 v. The value of the reduction potential was uninfluenced by changes from a neutral to a weakly acid, or to a strongly alk., soln. Increasing acidity of the soln. hindered the electroreduction. A change in concn., c, of AcH produced a shift of the reduction potential, π, according to the formula $\pi = 0.060 \log c$ v. Math. analysis of the bend of the current-voltage curve showed that $\pi = -0.060 \log i$ (i = current), *i. e.*, $= -(RT/F)\log i$. The value of the diffusion current in 0.001 M AcH solns. was

the same as those given by 0.001 M solns. of Ba or Sr chlorides; it is, therefore, concluded that the electroreduction of 1 g. mol. of AcH requires the same amt. of electricity as is required to deposit 1 g. equiv. of Ba, *i. e.*, 1 Faraday. The probable reduction product is stated to be dimethylglycol. With this method it was found possible to est. the presence of 1 part AcH in 2 million to an accuracy of 10%. The results obtained were applied to the estn. of AcH in EtOH samples and in various vinegars. In fermented vinegars 0.001–0.002% AcH were estd. polarographically, while in synthetic or pyrolignic vinegars no traces of AcH were found. E. B. SANIGAR

Anodic oxidation of acetic acid in sulfuric acid solution. RUDOLPH SCHREINER. *Z. Elektrochem.* **36**, 953–63(1930).—In order to study the mechanism of the anodic oxidation of AcOH, solns. of oxalic, glyoxylic, glycolic, acetic and formic acids, HCHO and MeOH were electrolyzed, with a diaphragm, in 2 *N* H_2SO_4 at const. c. d. Oxidation potentials were detd., and the gaseous products were analyzed. The electrodes were Pt foil. In the AcOH series the main reactions are: $CH_3COOH \xrightarrow{+O} H_2COH{\cdot}COOH \xrightarrow{+O} HC(OH)_2{\cdot}COOH \xrightarrow{-2H} (COOH)_2 \xrightarrow{-2H} 2CO_2$, and the side reactions: $H_2COH{\cdot}COOH \xrightarrow{-2H} H_2CO + CO_2$ and $HC(OH)_2{\cdot}COOH \xrightarrow{-2H} HCOOH + CO_2$. In the MeOH series, the main reactions are: $CH_3OH \xrightarrow{-2H} H_2CO \xrightarrow{+O} HCOOH \xrightarrow{-2H} CO_2$, with $H_2CO \xrightarrow{-2H} CO$.

The data are interpreted as suggesting the following general rules for anodic oxidation of *org. compds.*: (*a*) an increase in potential favors addn. of O over the removal of 2H; (*b*) in general, the removal of 2 H atoms from the same C is easier than the addn. of O; (*c*) the difficulty of H removal increases in the order —OH,—CH,—COOH; (*d*) the simultaneous removal of 2 H mols. attached to different C atoms (in the present case 1 H was always a member of —COOH) is possible only when the H atoms are at the end of a 6-membered chain. H. F. JOHNSTONE

Electrodeposition of chromium. B. RASSOW AND L. WOLF. *Chem.-Ztg.* **55**, 73–6(1931).—An investigation of the com. prepn. "Chromprotekt," used as a protecting layer to prevent formation of chrome mists, is reported. Cf. *C. A.* **24**, 4993. C. L. W.

The acute effects of chromic acid mists. L. SCHWARTZ AND F. SEIKE. *Zentr. Gewerbehyg. Unfallverhütung* **17**, 232–4(1930).—Mists given off by Cr plating baths are the cause of ulcerations and other skin diseases among the employees. Of 233 persons examd., 42.6% had determititis, ulcers or scars and 52% showed nasal changes; of these 37 had perforation of the septum, and 79 showed ulceration or devitalization of the mucous membrane. Ulcerations of the mucous membrane were seen after 2 weeks, and perforation of the nasal septum from 6 months to 4 yrs. The authors recommend exhaust ventilation or covering the surface with petroleum or some of the less dangerous homologs of C_6H_6. Objections to these methods are liability to fire hazard and C_6H_6 poisoning. GEORGE R. GREENBANK

Modern metal cleaning. LESLIE WRIGHT AND F. TAYLOR. *J. Electroplaters' and Depositors' Tech. Soc.* **6**, 71-90(1931).—This paper is a survey of work which has been done by various experimenters upon the nature of soap solns. and the mechanism by which such solns. remove dirt. Various types of soaps, their alky., phys. properties and cleansing properties are reviewed. The evaluation of the alky. and of the detergent action of soaps is explained. The application of detergent materials to modern metal-cleaning practice is discussed. The authors are of the opinion that no one chem. cleaner is yet available which will satisfy all plating-shop requirements, so that scouring and mopping and subsequent acid dips to remove tarnish are likely to remain in general use. However, with large batches of material, which have passed through similar shop processes, a study of the grease and dirt accumulated during these processes makes it possible to devise a cleaning soln. best suited to the particular foreign materials to be removed. E. B. SANIGAR

High-voltage surge testing. F. D. FIELDER. *Elec. J.* **28**, 161–4(1931).—The cathode-ray oscillograph operation is outlined—the importance of the timing systems being emphasized. The 3-electrode gaps permit the operation of the Dufour type oscillograph for the cathode voltage within the one microsecond. The operation is simple and consistent when care is used in the circuit design and adjustment. In synchronizing circuits, the most complex system is the combination of the Dufour type oscillograph and single-sweep timing. The essential parts of the system are shown in a fig. W. H. BOYNTON

Developments in hydrogen-cooled condensers. C. J. FECHHEIMER. *Elec. J.*

28, 165–9(1931).—Success of the H_2-cooled condenser is largely due to the development of many devices for making the machine safe. Features of the machine include: (1) it has been made explosion-proof; (2) an inert gas is used for scavenging when changing from air to H_2, or the reverse; (3) the internal pressure is automatically maintained above atm. pressure to prevent air entering; (4) various alarm signals are provided to inform the operator that the internal pressure or % of H_2 is low, or that any part of the machine or auxiliaries is not performing properly; (5) suitable indicating devices are provided for the gas, water, bearings, etc., in addn. to the usual elec. instruments. Brief descriptions of these devices are given. Several illustrations and a good bibliography are included. W. H. BOYNTON

Some comments on the use of "getters." GEORGE D. O'NEILL. *Electronics* **2**, 510–11, 528(1931).—The application of the following materials as "getters" or "clean-up" agents in various types of radio tubes is considered: P, Mg, Al, Misch metal, Ba, Ca, Li, active charcoal and cerium. M. MCMAHON

Sensitizing the photoelectric cell. RICHARD FLEISCHER. *Electronics* **2**, 518–9, 530(1931).—Four requirements of photoelectric cells are instantaneous response, linear relation between light intensity and resulting electronic current, sensitivity in the visible spectrum, and constancy. Data are given showing that to increase the sensitivity of the K layer in the photoelectric cell, the K in vapor form must be brought into contact with the gas (H_2 or inert gas) present in the tube. The K is vaporized by ionic bombardment. M. MCMAHON

The cleaning of blast-furnace gas by electric precipitation; the Siemens-Schuckert system at the Falva Works of the Bismarckhütte. HERMANN BOSSE. *Stahl u. Eisen* **49**, 1153–61(1929).—By elec. pptn. in 5 filter units, the suspended matter is sepd. from 14,000 cu. m. of blast-furnace (cu. m. at 0°, 760 mm.) gas at a flow of 3.5 m./sec. The cleaned gas has a solid content of 0.01 to 0.02 g./cu. m. The d. c. at 65,000 v. is obtained by means of a transformer from an a. c. at 500 v. The moisture content of the gas is very important; if it is too low, the particles are not charged properly. The required moisture content of the gas depends also on the compn. of the gas; a high Zn and Pb content requires a higher moisture content. The gas temp. must be kept above the dew point, in order to prevent clogging of the equipment. There is a pre-cooler installed before the pptg. filters, where the gas is cooled by injection of water, followed by heating of the gas attained through combustion of part of the gas. The cost of the elec. pptn. is $^1/_6$ of that of the wet mech. pptn. at the Falva Works. J. A. SZILARD

Electro-melted cement as a new building material in the chemical industry (REDZICH) **20**. The mechanism of the action of electrical discharge upon CH_4 (PETERS, WAGNER) **3**. The hardness testing of electrodeposits (O'NEILL) **9**. Electric-furnace production of high-heat-duty refractories (SCHROEDER) **19**. Analysis of petroleum and its distillates for reducible substances and adsorbable matter by means of the polarographic method with the dropping-Hg cathode (GOSMAN, HEYROVSKY) **22**. Evaporation of electrolytic caustic soda (LEE) **18**. Values from ores by leaching and electrodeposition (Brit. pat. 336,584) **9**. Magnetic testing system for electric coils (U. S. pat. 1,792,249) **9**. Electrodeposition of rubber (Brit. pat. 336,659) **30**. Alloys for sealing to glass such as in vacuum tube and incandescent lamp manufacture (Brit. pat. 337,086) **9**. Recovery of Zn from ferrite compounds in the electrolytic Zn process (OLDRIGHT, NICONOFF) **9**.

MARTI, OTHMAR K., AND WINOGRAD, HAROLD: **Mercury Arc Power Rectifiers** New York: McGraw-Hill Book Co. 473 pp. $6. Reviewed in *J. Western Soc. Eng.* **36**, 63(1931).

Gas-exit for electric batteries. PRITCHETT & GOLD & E. P. S. CO., LTD., and H. M GENESE. Brit. 336,041, Aug. 9, 1929.

Manufacture of dollies for dry cell electric batteries. H. A. BUMKE GES. Brit. 337,001, April 8, 1929. Mech. features.

Manufacture of dollies for dry cell electric batteries. H. BLACHE. Brit. 337,164, April 2, 1929. Mech. features.

Batteries. OTTO BÖHM. Ger. 513,805, Jan. 17, 1930. Details are given of fastening the electric storage cells together.

Storage batteries. FRITZ HENTSCHEL. Ger. 513,807, Feb. 23, 1930. A continuous-process app. for filling dry battery cells with alk. electrolyte, comprising recessed wheels between which curved electrode strips and electrolyte are rolled, is described.

Storage batteries. Società Italiana Batterie Elettriche Cellino. Fr. 694,745, Apr. 29, 1930. Neg. electrodes are formed of sheets covered with a layer of Zn deposited electrolytically by means of an anode of Zn and in an electrolyte contg. alkali silicate.

Storage battery with sulfuric acid electrolyte. T. Standley. Brit. 336,113, Oct. 23, 1929. A H_2SO_4 electrolyte is gellified by adding 2 parts Na silicate to 5 parts of water, heating the mixt. and then adding it to 2 parts H_2SO_4 dild. with 5 parts of water.

Storage battery separators. W. R. Edwards and R. Edwards & Co., Ltd. Brit. 336,448, Oct. 30, 1929. Structural features.

Electrodes for accumulators. Fritz Hentschel. Ger. 513,806, Feb. 14, 1930. Details are given of forming electrodes for storage batteries, contg. alk. electrolytes, from blocked perforated sheets.

Metallic oxide electric rectifiers. Siemens-Schuckertwerke A.-G. Brit. 336,926, Feb. 27, 1929. The oxide layer is coated with graphite, and the latter and a lead to be attached are both smeared with a pasty soft solder compn. contg. an acid-free deoxidizing agent such as colophony to which NH_4Cl may be added; Zn is then sprayed onto the oxide layer to form a coating, melt the solder and unite the oxide layer and the lead.

Electric condensers. Hermsdorf-Schomburg-Isolatoren Ges. Brit. 336,990, July 18, 1929. Multi-part insulator-condensers are made so that the outer part forming the insulator is of a material of high mech. and thermal strength such as porcelain, steatite, stoneware or quartz glass, while the material such as glass of the inner condenser part has a high breakdown strength and the highest possible dielectric const. (even if this involves a lessened mech. or thermal strength).

Electrodeposition of copper. A. Mozer. Brit. 336,109, Oct. 29, 1928. In operations such as plating, manuf. of electrotypes and refining of black copper, an electrolyte contg. Cu_2I_2 is employed; *e. g.*, Cu_2I_2 60, KI 600 and water 1000 parts may be used with an addn. of 5–10 parts of a colloid such as glue or gelatin or of a substance having capillary activity such as phenol or tannin. A c. d. of 400 amps. per sq. meter at 0.3 v. is suitable.

Electroplating materials such as feed-mill screens with metals such as chromium. Richard Stresau (to Swifton Mfg. Co.). U. S. 1,792,197, Feb. 10. The electrolyte in which an anode is immersed is caused to circulate through the interstices of the material, which is connected as cathode, and at the same time elec. current is passed through the electrolyte to effect plating of the interstices of the material as well as of its exterior surface. App. is described.

Coating objects with chromium. Metals Protection Corporation. Ger. 513,742, July 3, 1927. See Fr. 640,913 (*C. A.* **23**, 1065) and Brit. 277,295 (*C. A.* **22**, 2331).

Nickel and chromium coatings on foundation metals such as iron or steel. Colin G. Fink and Li Chi Pan (to Chemical Treatment Co.). U. S. 1,792,082, Feb. 10. A heat-treated plate of Ni on the foundation metal is provided with an overlying plate of Cr.

Stripping off chromium plating. J. F. McCullough (to Ternstedt Mfg. Co.). Brit. 336,532, March 6, 1929. See Ger. 511,416 (*C. A.* **25**, 1167).

Plating aluminum. Louis Schulte. U. S. 1,791,642, Feb. 10. The surface of an Al article is "passivified" (suitably by treatment with HNO_3), and the prepd. surface is plated with an alloy of Ni and Fe by electrodeposition in a bath contg. sulfates of Ni and Fe and a cond. salt such as Na_2SO_4, and the coating thus formed is then further plated with a finishing metal such as Ag, Au, brass, Cu, bronze or Ni.

Electrolysis. Otto Lefnaer. Austrian 120,400, July 15, 1930. In pptg. metals from soln. by electrolysis, the cathodes used are made of Fe (or an Fe alloy) that has been converted superficially into the nitride. A nitrided Fe-Cr alloy is instanced. The electrolyte must not be too acid. The pptd. metals are readily removed.

Electrolytic cells. Joseph L. Woodbridge. Ger. 513,941, Nov. 29, 1927. An arrangement for insulating the electrodes is described.

Electrolytic cells such as those for producing oxygen and hydrogen. A. E. Knowles. Brit. 335,987, July 6, 1929. Liquid level in an electrolytic gas generator is maintained by flow from a tank, which is fed with electrolyte from gas-washing chambers, and delivery of fresh liquid to the washing chambers is controlled by a float in the tank. Various details of app. are described. Cf. *C. A.* **25**, 1167.

Electrolytic production of hydrogen peroxide or other compounds containing active oxygen. Erich Noack, Oswin Nitzschke and Georg Pfleiderer (to I. G. Farbenind. A.-G.). U. S. 1,792,389, Feb. 10. See Brit. 316,648 (*C. A.* **24**, 1805).

Acetylene. CONSORTIUM FÜR ELECTROCHEMISCHE INDUSTRIE G. M. B. H. Fr. 694,109, Apr. 17, 1930. C_2H_2 is made by submitting a current of CO or CO_2 or both mixed with H or hydrogenated compds. to the action of high tension elec. discharges, preferably under reduced pressure.

Formaldehyde. GUTEHOFFNUNGSHÜTTE OBERHAUSEN A.-G. Fr. 694,330, April 23, 1930. CH_2O is made by passing a mixt. of CH_4 and CO_2 or gases contg. these through an elec. field produced by an elec. current of high tension and frequency. Cf. *C. A.* **24**, 5241.

Decomposition of water. YUJI MORISHIMA. Fr. 694,346, April 23, 1930. An app. is described for decomposing water into H and O, in which water from a chamber can flow into a very narrow space between 2 of 3 coaxial tubes forming a chamber in which the water is vaporized by heat from an elec. heating element disposed in the central tube. The vapor thus produced is introduced into a decompn. chamber in which it is decomposed into its constituents by another heating element.

Electrolytic manufacture of salts. JEAN ALAS. Fr. 694,918, Jan. 15, 1930. Sol. salts of metals placed at the anode are made with the acid salt of alkali metals as electrolyte. The process may be used for making sol. sulfates of Cu, Fe, Al, Ni and Zn and also phosphates, chlorates, perchlorates and persulfates.

Alumina. GINO GALLO. Fr. 694,885, May 2, 1930. Leucite or other silicates contg Al and K or Na or natural or artificial salts of Al are treated to obtain SiO_2, Al_2O_3 and salts of K or Na in a very pure state, by making a soln. of a K- or Na-alum and submitting the soln. to electrolysis to obtain H_2SO_4 at the anode and $NaAlO_2$ or $KAlO_2$ at the cathode. An excess of alkali sulfate is used to facilitate the formation of the corresponding aluminate. The anode may be of Pb and the cathode of Fe.

Zinc. I. G. FARBENIND. A.-G. Fr. 694,234, April 19, 1930. Max. yields are obtained in the electrolysis of $ZnSO_4$ solns. by maintaining the circulating electrolyte at the most favorable compn. for the working conditions, each individual vat of the app. being charged directly from the circulating vessel.

Electric furnace. EMIL F. RUSS. Ger. 513,762, Aug. 5, 1927.

Electric furnaces. AKT.-GES. BROWN, BOVERI & CIE. Ger. 516,397, June 8, 1926. Means is described for insulating the electrodes against the electrode-moving device.

Electric furnaces. SIEMENS-PLANIAWERKE A.-G. FÜR KOHLEFABRIKATE. Fr. 694,428, April 25, 1930. Mounting of electrodes is described.

Electric induction furnaces. I. G. FARBENIND. A.-G. (Emil Fendt and Carl Schörg, inventors). Ger. 513,689, Dec. 29, 1928. The spools and rolls, etc., carrying the heating filaments are rendered sufficiently resistant to heat by making them of asbestos-insulated wire impregnated with a cement mass of fluosilicate.

Electric induction heating of apparatus such as that for treating oils or further oxidation of litharge. EDWIN F. NORTHRUP (to Ajax Electrothermic Corp.). U. S. 1,791,934, Feb. 10. Coils and elec. connections are arranged so as to provide sections for regulated differential heating.

Electric resistance furnace. W. J. MILLAR and ELECTRIC FURNACE CO., LTD. Brit. 336,097, Oct. 8, 1929.

Electric resistance furnace for carrying out exothermic reactions. ALLGEMEINE ELEKTRIZITÄTS-GES. (Viktor Paschkis, inventor). Ger. 513,542, Sept. 27, 1927.

Electric resistance furnace for annealing or other heat treatments. P. CARLBERG. Brit. 336,078, Sept. 23, 1929. Structural features. A cooling medium may be circulated through the resistance, tubular in form, when the heating is completed.

Electric resistance furnace for firing enameled gooda. C. L. IPSEN and J. L. MCFARLAND (to British Thomson-Houston Co., Ltd.). Brit. 336,168, Dec. 18, 1929. Structural features.

Electric furnace with resistance heaters under the hearth. ALLGEMEINE ELEKTRIZITÄTS-GES. Ger. 516,396, Mar. 1, 1929.

Apparatus for regulating the position of electrodes of tilting electric furnaces. HENNING G. FLODIN. U. S. 1,792,293, Feb. 10. Structural features.

Electric heating elements. C. B. BACKER. Brit. 336,949, June 22, 1929. Mg is applied to a wire in the form of 2 or more longitudinal strips bent in arcuate form so that the strips form a tube about the wire, and the Mg is converted into MgO by the action of steam, a resistance element embedded in the MgO and provided with an outer casing being formed.

Electric smelting oven. EMIL F. RUSS. Ger. 516,190, Mar. 5, 1929. Addn. to 504,419 (*C. A.* **24**, 5241).

Acetylene and hydrogen by electric arc treatment of saturated hydrocarbons.

I. G. FARBENIND. A.-G. Brit. 337,088, Aug. 7, 1929. See Fr. 674,459 (*C. A.* **24**, 2385). Gases such as CH_4, C_2H_6, natural gas, distn. gases from coal, shale or peat, cracking gases, oil or tar vapors, or gases contg. nebulized carbonaceous materials such as tar oils or coal dust (which may be assocd. with H or with small quantities of N, CO or CO_2) are passed through a series of arcs, the lengths of which are adapted to the changing compn. of the gas so that longer arcs are used as the concn. of hydrocarbons decreases. Various details and examples are given.

Thermal decomposition of methane, etc. I. G. FARBENIND. A.-G. Brit. 336,261, July 10, 1929. Gases such as CH_4 or natural gas are decompd. (for production of C_2H_2, carbon black and H) by passage through an elec. arc at a temp. of about 2500° or higher, so that the ratio of the quantity of gas (measured in cu. meters per hr.) to the power of the arc, in kilowatts, lies below 0.6.

Iron cores for electrical purposes. WEITVERKEHRSKABEL G. M. B. H. (Walther Ehlers, inventor). Ger. 513,761, Dec. 24, 1927. Fe powder, *e. g.*, obtained by electrolysis, is pressed at 20,000 to 30,000 atm.

Electrical gas purifiers. METALLGES. A.-G. Fr. 694,603 and 694,604, April 28, 1930. Electrodes and means for suspending them are described.

The purification of gases and the manufacture of fertilizers. SOCIÉTÉ BELGE D'ELECTRO-SYNTHÈSE "SOBELSYN." Belg. 371,622, Aug. 31, 1930. Solid fertilizer is obtained electrolytically. The electrolyte consists of a soln. of some basic salt, preferably liquors contg. CO_2 in some form and org. matter such as ammoniacal liquors from the gasification of coal, liquid manure, etc. A graphite or retort C anode is used. Cf. *C. A.* **25**, 1062.

Electrical purification of blast-furnace gas. SIEMENS-SCHUCKERTWERKE A.-G. Fr. 694,219, April 19, 1929.

Alloy armoring for electric cables. W. T. HENLEY'S TELEGRAPH WORKS CO., LTD., and P. ROSLING. Brit. 336,408, Oct. 3, 1929. For reducing armoring losses in single-core a. c. cables, the armoring is formed of an alloy of Al contg. also Mg 0.4–0.5, Si 0.5–0.6 and Fe about 0.3%.

Loading material for electric cables. STANDARD TELEPHONES & CABLES, LTD., and T. N. RILEY. Brit. 336,626, July 17, 1929. Dissimilar loading materials are used on different portions of a cable, the sections (such as the end sections) to be used at greater energy level being loaded with material of constant permeability over the normal working range (such as Ni 45, Fe 30 and Co 25%) and the intermediate portion being loaded with material of high resistivity (such as Ni 78.5, Mo 3% and the remainder Fe).

Temperature-indicating device for oil-immersed electrical apparatus such as transformers. GENERAL ELEC. CO. and BRITISH THOMSON-HOUSTON CO., LTD. Brit. 336,431, Oct. 14, 1929. Structural features.

Metallic-vapor lamps. N.-V. PHILIPS' GLOEILAMPEN FABRIEKEN. Brit. 336,208, July 5, 1929. Various structural details are described of elec. discharge tubes contg. an alloy or mixt. of metals such as a Cd amalgam, which preferably constitutes an electrode of the tube.

Electric neon lamps. CLAUDE NEON LIGHTS, INC. Brit. 336,956–7, July 18, 1929. Structural and elec. features.

Electric incandescent lamps. N.-V. PHILIPS' GLOEILAMPEN FABRIEKEN. Brit. 335,903, July 1, 1929. Various structural details are given of a lamp having a "concentrated" W filament assocd. with Hg or like material inert to W in a bulb allowing the Hg to circulate and which also may contain gases such as N or A. Cf. *C. A.* **25**, 1449.

5—PHOTOGRAPHY

E. P. WIGHTMAN

New processes of color photography. G. GROTE. *Phot. Korr.* **66**, 177–81(1930).—A review is given of the subject matter of all the patents issued in 1929 for additive (screen), subtractive or direct color processes. E. R. BULLOCK

Photography in the infra-red. W. DIETERLE. *Phot. Korr.* **66**, 309–15(1930).—After an historical account of progress in infra-red photography by means of filters and suitably sensitizing dyes, from the discovery of dicyanine to the present time, D. describes its applications to distance photography, to night-effect exposures (with Kodak or Agfa film), to spectrophotography and photomicrography in the infra-red and to the photography of substances at temps. below a visible red heat. Working prescriptions are given for the infra-red sensitizing of ordinary high-speed plates and films and for the

hypersensitizing of the purchaseable Kodak or Agfa infra-red sensitive plates. A suitable light filter, especially suitable for the purpose of the exposure, must be used, and development may be carried out by a feeble green light. E. R. BULLOCK

Filter solutions for fluorescence photography. K. WEBER. *Phot. Korr.* **66**, 317–9 (1930).—A 2% aq. soln. of $NaNO_2$ in a thickness of 1 cm. in a glass cell absorbs ultraviolet radiations of 366 mμ almost completely. W. gives comparative illustrations of fluorescence photography with a $NaNO_2$ filter and with "G. G." (Schott & Gen.) solid glass filters; the latter, though the most suitable of that kind available, do not absorb ultra-violet nearly as satisfactorily as does the former. E. R. BULLOCK

Photographic hardness and absorption measurements of x-rays. L. GREBE AND W. SCHMITZ. *Z. wiss. Phot.* (*Schaum Festschrift*) **29**, 129–33(1930).—By comparing x-ray exposures made through an Al step tablet with those made sensitometrically one may compute from the absorption law the effective wave length of a heterogeneous beam. The method is the same in principle as the ionization method. H. E. S.

The concentration speck or centripetal theory of light action. A. STEIGMANN. *Kolloid-Z.* **53**, 318–22(1930); cf. *C. A.* **24**, 30; **25**, 44.—The theory is applied to the mechanism of the action of light on photographic plates. ARTHUR FLEISCHER

Sensitiveness of photographic dry plates. M. MIYATA. *Mem. Coll. Eng., Kyoto Imp. Univ.* **6**, No. 2, 113–78(1930).—A possible addnl. cause of the sensitivity of the dry plate is presented. It is found that AgCl is always present with AgBr at its pptn. and it is presumed that the AgCl grains are the sensitive centers in the AgBr crystals. Further expts. show that AgBr and AgI in photographic emulsions act as both chem. acceptors and optical sensitizers for AgCl nuclei. Ripening of an emulsion is the result of the adhesion of AgCl and AgBr crystals sepd. at pptn. by gelatin. L. A. STAIF, JR.

The accumulation effect of photographic plates and its influence on the accuracy of photographic photometry. N. BARABASCHEFF AND B. SEMEJKIN. *Z. wiss. Phot.* **28**, 333–40(1930).—The accumulation of photographic density (growth of the latent image) is real and must be taken into account in photometry. It is advisable to develop plates at least 2 days after exposure; otherwise systematic errors which influence the results are introduced. Old plates show this accumulation effect to less extent than new plates. A P. H. TRIVELLI

Reproduction of negatives. P. HANNEKE. *Camera* (Luzern) **9**, 155–7(1930).—A AgBr plate or film is bathed in 4% $K_2Cr_2O_7$ soln., dried and exposed under the negative to be copied until a faint brown image is visible. The duplicate is then washed and finally developed by ordinary light, in a regular photographic developer. The unexposed portions develop, giving a duplicate negative. The contrast can be controlled by the length of exposure or by a subsequent flash exposure. M. W. SEYMOUR

Dyes unstable to light are sought. H. HERMSDORF. *Camera* (Luzern) **9**, 160–4 (1930).—The theory and history of color printing processes by means of bleach-out dyes are briefly described. The problems to be solved in the improvement of the bleach-out process are said to be increasing the sensitivity and working out a good means of fixation. A process useful practically requires plates or papers that will keep for at least 6 months to a year. M. W. SEYMOUR

Role of dyes in the progress of photography. A. SEYEWETZ. *Photo-Revue* **42**, 353(1930).—In the application of dyes to photography the following uses have been found: (1) chromatic sensitizing of photographic negative materials; (2) photographic reproduction of colors; (3) lighting of the darkrooms and the chromatic desensitizing of plates; (4) prepn. of antihalo plates; (5) tinting of plates and films for transparencies; (6) prepn. of colored motion pictures; and (7) production of photographic images with diazo compds. Most of the dyes which are used for the chromatic sensitizing of photographic materials belong to the following types: (1) diphenylmethane, (2) triphenylmethane, (3) acridine, (4) phenylacridine and (5) quinoline. A description including the spectral region which they sensitize is given for several dyes. *Ibid* 375(1930).—The cyanine dyes used as sensitizers for photographic materials are classified into 4 groups: (1) the cyanines, (2) the isocyanines, (3) the pinacyanols and (4) the dicyanines. A brief description is given for several dyes belonging to each class. The use of desensitizing dyes after exposure in order to permit inspection with a bright light during development was introduced by Lüppo-Cramer with the discovery of phenosafranine and has led to a study of the desensitizing properties of other dyes. Certain dyes which sensitize Ag chloride and bromide emulsions were found to desensitize Ag iodide emulsions. *Ibid* **43**, 5–7, 23–4(1931).—No direct relation exists between the constitution of a dye and its desensitizing properties. All of the safranines, however, which contain amino groups have desensitizing properties. The expts. of Lumière and Seyewetz have indicated that the desensitizing action of phenosafranine is

due to the formation of an adsorption complex between the AgBr and the dye which is not sensitive to light and is slowly destroyed by washing. Lüppo-Cramer considers that the desensitizing action is due to the oxidation by the dye. Dyes are used in the prepn. of films and plates for the suppression of photographic halation due to reflection. In this case the dye is incorporated in the subcoating between the sensitive emulsion and its support or is applied as a dyed gelatin backing. One of the most important uses of dyes has been in the photographic reproduction of color by the indirect method. A practical discussion with formulas is given for this process on the selection of the dye and the dyeing of the monochromes. H. D. RUSSELL

Acceleration of development by neutral salts and dyes. LÜPPO-CRAMER. *Phot. Korr.* 66, 253–6(1930).—L.-C. for the first time gives density curves to illustrate the phenomenon of acceleration of development by the addn. to the hydroquinone or other developer of large amts. of neutral salts or relatively very small quantities of certain basic dyes. Plates of very contrasty emulsion (not further described) were used, and the standard developer was hydroquinone with sulfite, K_2CO_3 and KBr. With these the effect of KNO_3 (10%) or of pinakryptol green (0.005%) is very conspicuous. As regards theory, L.-C. remarks that the action of the neutral salts and also, though there are some exceptions and contradictions in this case, that of basic dyes, recalls their coagulating action on such suspensions as colloid Ag. The exceptional difference between the action of pinakryptol green and pinachrome, the latter producing fog and a relatively flat gradation, is illustrated. E. R. BULLOCK

Fine grain developers and their application to spectrography. EMILIO VITERBI. *Nuovo cimento* [N. S.], 6, 36–9(1929); *Proc. 7th Intern. Congr. Phot.* 1928, 365–7. E. J. C.

The role of sulfite in photographic developers. J. RZYMKOWSKI. *Camera* (Luzern) 9, 128–32, 164–7(1930).—Evidence is adduced from the literature and from original exptl. work to show that the protective action of sulfite against the aerial oxidation of hydroquinone developers can be explained by the following series of reactions: (1) $C_6H_4(OH)_2 + O \longrightarrow O{:}C_6H_4{:}O[+ H_2O]$; (2) $3Na_2SO_3 + H_2O \longrightarrow 2Na_2SO_4 + S + 2NaOH$; (3) $S + Na_2SO_3 \rightleftharpoons Na_2S_2O_3$; (4) $O{:}C_6H_4{:}O + Na_2S_2O_3 + H_2O \longrightarrow (HO)_2C_6H_3SSO_3Na + NaOH$; (5) $(HO)_2C_6H_3SSO_3Na + NaOH \longrightarrow Na_2SO_3 + (HO)_2C_6H_3SOH$; (6) $(HO)_2C_6H_3SOH + O_2 + NaOH \longrightarrow (HO)_2C_6H_3SO_3H + H_2O$. The hydroquinone-sulfite complex previously assumed by Mees and Piper (*Brit. J. Phot.* 1912, 441–3) to explain the fogging action and minimal cond. of hydroquinone developers with a deficiency of sulfite is believed to be the hydroquinone monothiosulfonic acid formed in equation 4. The occurrence of hydroquinone disulfonic acid in oxidized hydroquinone developers is explained by assuming that the monosulfonic acid, formed in equation 6, undergoes the same series of reactions as the hydroquinone itself. M. W. SEYMOUR

A critical examination of the Hübl system of color sensitometry. E. HEISENBERG AND M. BILTZ. *Phot. Korr.* 66, 169–76, 198–203(1930).—H. and B. find that the color reproduction of materials calcd. according to the Hübl system agrees with the true color reproduction within an error of at most 20%. The variation of emulsion gradation (gamma) with the filter (wave-length range) needs to be taken into consideration; the unsharpness of cut of the filters, and the variation in color sensitivity of the emulsion within the limits of transmission of any one of the filters are, on the other hand, generally practically negligible. E. R. BULLOCK

Solarization. IV. Dependence of solarization upon the preparation of emulsions. H. ARENS. *Z. wiss. Phot.* 28, 341–7(1930); cf. *C. A.* 25, 651.—An emulsion freshly prepd. from a peptized Ag compd. solarizes a little or not at all. After some time the power to solarize increases. This increase is greater the less the concn. of Ag ions. If they are removed as far as possible by KBr, in a few seconds the emulsion acquires the power to solarize very strongly. This process is irreversible. A. P. H. TRIVELLI

Constancy of the amount of light in magnesium foil sensitometry. G. SCHWARZ AND F. URBACH. *Phot. Korr.* 66, 261–4(1930).—Using a micro-burner for igniting the Mg and a Rb and a K photoelectric cell for measuring the light, S. and U. conclude from the results of their expts. that Mg foil as prescribed by Eder (cf. *C. A.* 23, 4153) gives a practically const. source of light sufficient for this kind of sensitometry. It is necessary, however, by const. manipulation to diminish fluctuations in the light and also to take the mean of several measurements to bring the residual accidental error below that of the Eder-Hecht sensitometer. E. R. BULLOCK

Physics of the washing-out of hypo from prints. R. E. LIESEGANG. *Phot. Korr.* 66, 324–6(1930).—Expts. with ferrous NH_4 sulfate and with $CuCl_2$ suggest that, in consequence of the high osmotic pressure, hypo is removed in the washing process

from fixed prints more quickly than would be expected on the basis of simple diffusion.
E. R. BULLOCK

Displacement of silver in partly swollen gelatin layers. E. WAGNER AND K. SCHAUM. *Z. wiss. Phot.* 28, 325–7(1930).—A drop of water on a photographic plate or film causes a spot after development, in which the edges have higher densities than the center. This is due to a displacement of the gelatin contg. Ag halide grains to the edge of the wetted spot. The extent to which the real Ag density or addnl. light reflections cause the dark edge can be investigated by detg. the edge density after immersing the surface of the film or plate in glycerol. It is shown that even in that case the edges have a higher density, because of migration of Ag halide to the edge of the spot.
A. P. H. TRIVELLI

Hydrolyses occurring in washing of the gelatin-silver nitrate system. H. H. SCHMIDT AND F. PRETSCHNER. *Z. wiss. Phot.* 28, 328–32(1930).—Lüppo-Cramer had observed that in the gelatin system plus $AgNO_3$, hydrolysis takes place. The authors made a quant. investigation of this phenomenon as a support for their theory that during pptn. of Ag halides in gelatin, some Ag is formed by the action of $AgNO_3$ on gelatin. The hydrolysis of $AgNO_3$ in the presence of gelatin gives Ag_2O and HNO_3, which Ag_2O is retained by gelatin.
A. P. H. TRIVELLI

Stability of the latent image of a silver iodide emulsion toward dichromate-sulfuric acid. H. H. SCHMIDT. *Phot. Korr.* 66, 315–7(1930).—S. distinguishes 2 latent light images; one occurs in AgI-gelatin emulsion formed with excess of sol. iodide, the other in emulsions formed with excess of Ag salt. The former latent image is found to be very unstable and readily destroyed by solns. of oxidizing agents, while the latter is stable even toward dichromate-sulfuric acid. The latter is, moreover, not susceptible of intensification by nucleus denudation, but is, on the contrary, apparently somewhat diminished for phys. development, by the action of an intermediate bath of KI.
E. R. BULLOCK

Photographic effects of γ-rays (ROGERS) 3. Manufacture of photographic lenses (GUILFORD) 19. Photographic sound records (Brit. pat. 336,559) 18.

Color photographs. LOUIS DUFAY (to Old Jewry Trust, Ltd.). U. S. 1,792,418, Feb. 10. In a process for the reproduction of color photographs on a transparent film bearing only one sensitive layer on each of its faces, the sensitive layers are impregnated with tartrazine, corresponding neg. plates are simultaneously applied on each of the sensitive layers, and the film and neg. plates are exposed to light, and the film is subsequently washed to eliminate the tartrazine and the layers are differently colored.

Color photography. J. N. GOLDSMITH, T. T. BAKER and SPICERS, LTD. Brit. 337,073, July 30, 1929. A film of material such as celluloid, viscose or the like, to which a multicolor screen is to be applied by dyeing, applying a resist pattern, bleaching and redyeing the parts unprotected by the resist, is preliminarily coated with an isolating layer of substantially waterpoof character, such as a synthetic resin or cellulose acetate varnish, and a surface layer of material such as collodion or cellulose prepd. from viscose which is receptive to dyes.

Color photography. T. T. BAKER, A. B. KLEIN and COLOUR SNAPSHOTS (1928), LTD. Brit. 337,057, July 27, 1929. A "tripack" is formed with a green-sensitive front layer, a blue-violet-sensitive intermediate layer, a red-sensitive rear layer and (in order to protect the rear layer from green and blue-violet light) filters preferably comprising a green-absorbing filter between the front and intermediate layers and a blue-violet-absorbing filter between the intermediate and rear layers. Various details of manuf. are described.

Color photography. T. T. BAKER. Brit. 337,040, July 25, 1929. In a process of obtaining prints in natural colors in which a light-sensitive layer coated over a multicolor screen on a transparent support is printed through the support from a negative assocd. with a multicolor screen (the image and screen being subsequently transferred to an opaque support with the screen uppermost), the screen is printed on a celluloid, cellulose acetate, regenerated cellulose, collodion or gelatin layer attached by an adhesive such as gum dammar to a translucent stripping support such as celluloid or parchmentized paper. The final support may be paper, a cellulose acetate film contg. baryta or material such as is described in Brit. 282,980 (*C. A.* 22, 3848) which is coated with an adhesive such as gum arabic. Brit. 337,041 describes a process in which, to avoid the moiré effect in copying by projection from a master cinematograph film, a sheet of plane glass scored or indented with lines is placed in front of, or behind, the

projection lens. The lines may be formed as concentric circles about 0.125 in. apart. Cf. *C. A.* **24**, 5245.

Color photography. I. G. FARBENIND. A.-G. Fr. 694,031, April 16, 1930. Color images are obtained on films with microscopic lenticular gratings by producing, during the taking of the view, all the images of the colored screen in the layer of emulsion so that they coincide with the central axis of the corresponding lenticular elements.

Photographic layers. PHILIPPE FRANGIALLI and GEORGES H. A. FREYSS. Fr. 695,006, Aug. 2, 1929. Layers sensitive to light are made on suitable supports by using as sensitive material diazonium salts of aromatic amines which contain the imidazole group, simple or substituted, mixed with an azo compd. of phenolic or aminophenolic properties and adding, according to the case, an acid which does not deteriorate the support. Thus, Schaeffer acid and oxalic acid are added to a soln. of diazotized *N*-methyl-*C*-methylaminobenzimidazole and the mixt. is used for coating supports which are then dried. Other examples are given.

Photographic surfaces. JOS-PB FARBENPHOTO G. M. B. H. (Gustav Koppmann, inventor). Ger. 513,277, Feb. 17, 1929. See Brit. 327,283 (*C. A.* **24**, 4996).

Photographic films from mixed cellulose esters. C. S. WEBBER and C. J. STAUD (to Kodak, Ltd.). Brit. 336,353. Mixed esters are employed which contain an acyl radical and a radical of an acid contg. a hydroxy group in the α-position or a ketonic group in the α- or γ-position and which are sol. in acetone or its homologs or in 50–75% aq. alc. soln. and these esters are dissolved in a mixt. of ethylene chloride and a monohydroxy aliphatic alc. contg. 5 C atoms or less.

Combined cinematograph and sound record films. T. T. BAKER. Brit. 335,899, July 1, 1929. Before application of the resean to the surface of the film, the narrow marginal strip which is to serve as the sound track is protected from the dyes in the resean by application of a layer of protecting varnish such as a soln. of bitumen in C_6H_6. The resean is then applied to the whole surface of the film, followed by treatment with a varnish-removing solvent, so that a strip of clear uncolored film is provided to receive the sensitive emulsion upon which the sound record can be photographed in black and white.

Fire-resistant motion picture films. ARTHUR ARENT (to Arthur Arent Laboratories, Inc.). U. S. 1,792,457, Feb. 10. Films are treated with a soln. prepd. from urea and $SbCl_3$ or from other suitable acid-binding org. compd. which does not promote inflammability and a suitable acid-yielding fire-retardant metal salt, applied in a substantially non-aq. solvent such as EtOAc.

Photographic developers. I. G. FARBENIND. A.-G. (Gustav Reddelien and Werner Müller, inventors). Ger. 516,030, Jan. 8, 1930. Addn. to 454,839. *N*-Monohydroxypropyl and *N*-monohydroxybutyl derivs. of *o*- and *p*-aminophenol and their nuclear substitution products not contg. NO_2 groups are used as the active constituents of developing solns. for Ag halide layers. A suitable soln. comprises *p*-(hydroxypropylamino)phenol-HCl 1, Na_2SO_3 9 and K_2CO_3 8 g. in H_2O 200 cc. Cf. Ger. 467,818 (*C. A.* **23**, 572).

Transforming photographic silver images. F. LIERG. Brit. 335,930, July 2, 1929. The opaque substances such as AgBr or Ag are converted into transparent complex compds. having strong mordanting properties by treatment with a reagent such as an iodide, urea, thiocyanate or thiocarbamide and other substances such as bisulfites may also be added which react with the complex-forming reagent. Various details and examples are given.

6—INORGANIC CHEMISTRY

A. R. MIDDLETON

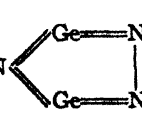
The isomerism of radicals. CLEMENT DUVAL AND MME. CLEMENT DUVAL *Compt. rend.* **191**, 843–5(1930); cf. *C. A.* **24**, 563.—A special study was made of the isomeric ions $[CoSO_4(NH_3)_5]^-$ and $[CoSO_4(NH_3)_5]^{--}$. Persulfatepentammine sulfate has a d. of 2.1 and a mol. susceptibility of -588×10^{-6}. Sulfatepentammine sulfate is red, has a d. of 1.7 and a mol. susceptibility of -212×10^{-6}, measured at 15°. Both give the same product on hydrolysis in dil. soln. GERALD M. PETTY

The coördination value of multivalent negative radicals. PAUL PFEIFFER. *Z. anorg. allgem. Chem.* **192**, 366–8(1930).—If it is assumed that Co has a const. coördination no. of 6, certain bivalent radicals sometimes have a coördination value of 1 and sometimes of 2, as follows: $[(H_3N)_5Co(CO_3)]X$ and $[(H_3N)_4Co(CO_3)]X$. These can be satisfactorily explained by the following distribution of charges on dissocn.: $^{++}[(H_3$-

N)$_5$Co—O—CO—O$^-$] + X$^-$, $\left[(H_3N)_4Co\begin{smallmatrix}O\\O\end{smallmatrix}>CO\right]^+$ + X$^-$. The following general statement can be made: bivalent acid radicals take 2 coördination positions in the uncharged condition and only 1 coördination position when carrying a single neg. charge. If 2 neg. charges are carried, then the coördination no. of the radical is zero. H. STOERTZ

The mechanism of precipitation changes. I. The reaction between lead chloride and ammonium chromate. Z. KARAOGLANOV AND B. SAGORTSCHEV. *Z. anorg. allgem. Chem.* **194**, 151–8(1931).—$PbCrO_4$ pptd. in the presence of HCl contains Cl, whose quantity varies with the concn. of Cl^-, the time required for complete pptn. and the temp. The Cl held by the ppt. does not appear to be volatile at high temps. When HNO_3 is present no nitrate could be detected in the ppt. No dichromate was found in either case. The Cl is believed to be held as $Pb_2Cl_2CrO_4$ (cf. *C. A.* **24**, 4690). The results are reproducible only with carefully controlled conditions. **II. The reaction between sulfuric acid and lead bromide.** *Ibid* **195**, 105–12.—Pptn. of $PbCrO_4$ with $PbBr_2$ gives the same results as with $PbCl_2$. The reproducibility of the results depends on the length of time the ppt. stands in the soln. The longer the time the less the Br in the ppt. **III. Further investigations of the reaction between sulfuric acid and lead bromide.** *Ibid* 113–20.—The decrease in Br content of the ppt. which occurs when the ppt. is not immediately filtered has been studied. There appears to be a metastable Br-contg. product which is not a mixed crystal, solid soln. or abs. compd. but rather a complex of the type $(PbBr)_2SO_4$ which decomposes on standing in soln. to give $PbSO_4$ and $PbBr_2$. J. B. AUSTIN

Investigations on cerium. LEON LORTIE. *Ann. chim.* [10], **14**, 407–60(1930).—Ceric salts (valence 4) dissolve in alkali carbonates to form complex salts. The ceric carbonate of Na, $[Ce(CO_3)_5.(H_2O)_2]Na_6.10H_2O$, has been sepd. as yellow crystals and analyzed. It decomposes in H_2O to cerihydroxy carbonate, $CeCO_3(OH)_2$. Although K, NH_4, Li and Tl form similar compds., they could not be crystd The Na salt is isomorphous with the Na thoricarbonate, $[Th(CO_3)_5(H_2O)_2]Na_6.10H_2O$. Tl, Zr and Ti salts show similar reactions. Cerous tartrate (valence 3), $Ce_2(C_4H_4O_6)_3$ 6-H_2O or $Ce_2(C_4H_4O_6)_3.4^1/_2H_2O$, dissolves in halogen acids to form complex acids as cerous chlorotartrate, $Ce_2(C_4H_4O_6)_3.3HCl.14H_2O$, and cerous bromotartrate, $Ce_2(C_4H_4O_6)_3.3HBr.14H_2O$. With tartaric acid it forms cerotartaric acid, $Ce(C_4H_4O_6)_2H.2H_2O$, which is able to form the Na cerotartrate, $Ce(C_4H_4O_6)_2Na.8H_2O$. In alk. tartrates it forms ceric compds., which are subsequently reduced by the tartrate to cerous compds. With excess O unstable perceric compds. (valence 6) form. Cerous tartrate dissolves in alkalies to form salts as K ceritartrate, $2CeO(C_4H_2O_6)K_2.C_4H_4O_6K_2.11H_2O$. These are red crystals sol. in water, bases and acids. With Na salicylate cerous salts give perceric salicylate, $Ce_2O_3(C_6H_4.CO_2.O)_3.6H_2O$. A. LE V.

Germanium. VIII. The action of ammonia on germanium tetrachloride: germanium imide. JOHN S. THOMAS AND WM. PUGH. *J. Chem. Soc.* **1931**, 60–71; cf. *C. A.* **24**, 2391.—The principal object of this investigation is to det. whether $GeCl_4$ 6-NH_3 is a pure compd. or whether it is a mixt. of $Ge(NH)_2$ and NH_4Cl. Since $Ge(NH)_2$ is readily hydrolyzed when exposed to traces of H_2O vapor, an all-glass app. is described in which $GeCl_4.6NH_3$ can be prepd., washed with liquid NH_3, dried and weighed, without opening at any stage. Thus, $Ge(NH)_2$ of 97.2% purity was prepd. By means of liquid NH_3, $GeCl_4.6NH_3$ was broken up into 1 mol. $Ge(NH)_2$ and 4 mols. NH_4Cl; thus it is a mixt. rather than a mol. compd. of $GeCl_4$ and NH_3. The existence of $Ge(NH)_2$ as an intermediate product of the action of NH_3 on $GeCl_4$ above −20° could not be confirmed. When HCl is passed over $Ge(NH)_2$ the addn. compd. $Ge(NH)_2$ 2-HCl is first formed; this then combines with 4 mols. of HCl to form $GeCl_4$ and NH_4Cl The action of heat (up to 300°) on mixts. of $GeCl_4$ and NH_4Cl was studied. The results are explained on the assumption that HN  is formed. J. BALOZIAN

The chemistry of germanium. ROBERT SCHWARZ, P. W. SCHENK AND H. GIESE. *Ber.* **64B**, 362–8(1931); cf. *C. A.* **24**, 3189.—From vapor pressure and x-ray measurements hydrated GeO_2 is found not to exist. GeO_2 m. 1115 ± 3°. The prepn. of GeO_2 from $Ge(OEt)_2$, of Ge_2OCl_6 and of $Ge(SO_4)_2GeO_2$ is described. V. F. H.

Nitrogen compounds of germanium. I. The preparation and properties of ger-

manic nitride. WARREN C. JOHNSON. *J. Am. Chem. Soc.* **52**, 5160–5(1930).—Ge was heated in NH_3 at 650° to 700°, yielding Ge_3N_4, a light brown powder. The Ge_3N_4 is reduced by H_2 at 700°, reacts with O_2 at 850° and with Cl_2 at 600° to 700°; decomposes at 900° to 1000° and resembles the corresponding compd. of Si in its high stability. GERALD M. PETTY

Studies on heteropoly acids of germanium. I. Germanomolybdic acid. CHARLES G. GROSSCUP. *J. Am. Chem. Soc.* **52**, 5154–60(1930).—A heteropoly acid of Ge and Mo having the formula $H_8[Ge(Mo_7O_7)_6]aq.$ was prepd. The coeff. for "aq." has an apparent max. of 26. The use of MoO_3 for the colorimetric detn. of Ge is suggested. GERALD M. PETTY

Chlorogermanites of alkaloids and chlorogermanites of cesium. ARAKEL TCHAKIRIAN. *Compt. rend.* **192**, 233–4(1931).—$GeCl_2$ forms with alkaloids, as quinine and pilocarpine, salts of 2 types: $GeCl_2$, A.2HCl (dibasic alkaloid) and $GeCl_2$, A.HCl (monobasic alkaloid) in which A represents the mol. of the alkaloid. The method for the prepn. of the salts and their properties are described. If to a soln. of $GeCl_2$ strongly acidified with HCl, a soln. of CsCl is added, a sparsely sol. white microcryst. ppt. is obtained. Its formula is $GeCl_2$ CsCl. An analog is obtained with RbCl, but not with LiCl, NaCl or KCl. At 100° in an atm. of dry HCl the Cs salt liberates the $GeCl_2$. The stability of the new compd. is such that at the temp. of fusion in an atm. of dry HCl $GeCl_2$ is not liberated, but $GeHCl_3$ is formed instead. It is possible, therefore, that the Ge exerts its tri-coördinated valence and that the formula of the compd. is $[GeCl_3]Cs$ B. S. LEVINE

Sulfides of the rare earths. W. KLEMM, K. MEISEL AND H. U. v. VOGEL. *Z. anorg. allgem. Chem.* **190**, 123–44(1930).—The disulfides of La and Ce, and the sesquisulfides of Sc, Yt, La, Ce, Pr, Nd, Sm, Gd, Dy, Er and Yb were prepd. by treating the anhyd. sulfates or chlorides in a stream of dry H_2S at elevated temps. The ds., colors, magnetic susceptibilities and x-ray cryst. structures were studied. On the basis of the color and x-ray detns. the sesquisulfides may be divided into 2 series, the first of which (La-Dy) shows a regular variation in the mol. vol., while the second (Dy-Yb, Yt, Sc) has an irregular variation. The magnetic properties indicate that the sesquisulfides are salts. The disulfides were proved to be of a polysulfide nature. L. L. QUILL

The sulfates of zirconium and hafnium. GEORG v. HEVESY AND ERIKA CREMER. *Z. anorg. allgem. Chem.* **195**, 339–44(1931).—$Zr(SO_4)_2$ and $Hf(SO_4)_2$, prepd. from the tetrahalides or the oxides, always contain an excess of H_2SO_4. This is the reason why the at. wts. of Zr and Hf, as detd. by the sulfate method, are too small. The last traces of H_2SO_4 are removed only at temps. at which the sulfates decomp. noticeably. The relation between the decompn. pressure of the sulfates and the temp. was detd. between 550° and 650°. $Zr(SO_4)_2$ has the higher decompn. pressure. L. K.

Properties of cuprous oxide. O. v. AUWERS. *Naturwissenschaften* **19**, 133–4(1931).—The sp. resistance of artificial Cu_2O depends on various factors, such as the pressure of the surrounding gas: a decrease in air or H_2 pressure gives a decreasing resistance, a decrease in O_2 pressure causes an increase in resistance, while N_2 or Ne has no effect. The resistance is increased several hundred % by increased gas removal from the substance in high vacuum. Cu_2O has a reversible transition point at 56°, above which the previously transparent substance becomes opaque. This transition point is less distinct after removal of gas; O_2 addn. causes a reappearance of it. The thermal expansion coeff. of Cu_2O depends likewise on the condition of the Cu_2O lattice. Fresh Cu_2O has practically no expansion up to 56° (α = 0.00000005), while above 56° it contracts. On cooling it contracts more until 56° is reached, the length changing irreversibly. If previously the gas has been extd. *in vacuo* the coeff. is 0.000001, changing little at 56°. It is concluded that the phys. properties of Cu_2O depend largely on substances dissolved in (O_2) or adsorbed on (H_2) the lattice. For the change in transparency, formation of CuO + Cu is believed to be responsible, although the reversibility remains unexplained. The photo effect of Cu_2O can also be related to the gases moving about in the lattice by the theory of phosphoric centers. Other oxides, as those of Ni, Sn and Zn (Skaupy, *C. A.* **14**, 2111), seem to have similar qualities. B. J. C. VAN DER HOEVEN

Structure of silicates. W. L. BRAGG. *J. Soc. Glass Tech.* **14**, 295–305(1930).—See *C. A.* **24**, 5553. H. F. KRIEGE

Structural principles of compounds of boron and hydrogen. E. WIBERG. *Z. anorg. allgem. Chem.* **187**, 362–8(1930); cf. *C. A.* **23**, 2897.—Polemical against Hellriegel (*C. A.* **24**, 2649). The conception of a special "B linking" to explain the existence of the different B hydrides is unnecessary. From its position in the periodic table it is reasonable to regard B as quinquevalent toward H. As proof that Grimm's hydride

law may be applied to B the similarity between the properties of diborane, B_2H_6, and C_2H_4 is pointed out. This indicates that B is quinquevalent in this compd., the 2 B atoms being joined by a double linking. B. C. A.

Preparation of anhydrous stannous chloride. HENRY STEPHEN. *J. Chem. Soc.* 1930, 2786–7. $SnCl_2$ (long needles) may be more simply prepd. than as previously described (*C. A.* 19, 3261) by treating $SnCl_2.2H_2O$ (1 mol.) with Ac_2O (2 mols.), washing the anhyd. salt, sepg. with dry Et_2O until free from AcOH, and crystg. from AcOH contg. a little Ac_2O. J. BALOZIAN

Preparation and purification of the triiodides of antimony and arsenic for use in immersion media of high refractive index. H. G. FISK. *Am. Mineral.* 15, 263–66 (1930). SbI_3 and AsI_3 were synthesized by gently heating a mixt. of the metals with I in a large test tube. The crude iodides were purified by recrystn. from CS_2. In this step a small excess of the metals was necessary for combination with free I in the soln. A second recrystn. was made further to purify the compds. In prepg. melts from the iodides and piperine it was found essential to avoid heating the mixts. above 135° to prevent decompn. A. M. BRANT

Nitrogen triiodide. HERBERT W. CREMER AND DONALD R. DUNCAN. *J. Chem. Soc.* 1930, 2750–4.—It has been found that NI_3 is formed by the action of NH_3 on the less stable alkali dibromoiodides (*i. e.*, those with high dissocn. pressures). With the K salt as typical, the reaction is: $3KIBr_2 + 4NH_3 = 3KBr + 3NH_4Br + NI_3$, the mechanism of which most probably is: $3KIBr_2 \rightleftharpoons 3KBr + 3IBr$; $3IBr + NH_3 = 3HBr + NI_3$; $3HBr + 3NH_3 = 3NH_4Br$. As found by Dobbin and Masson (*Ibid* 49, 848(1886); *J. prakt. Chem.* 31, 37(1885)), the more stable dibromoiodides such as the tetramethylammonium and trimethylsulfonium salts (having very low dissocn. pressures) do not react with NH_3 to form NI_3, but form additive compds. with 2 mols. of NH_3. J. BALOZIAN

A comparison of the action of halogen salts of iron on phenyl magnesium bromide and phenyl zinc chloride. G. CHAMPETIER. *Bull. soc. chim.* [4], 47, 1131–7(1930).—Anhyd. halogen salts of Fe did not give stable organometallic compds. on reacting with PhMgBr. The 3 reactions obtained were: (1) $6C_6H_5MgBr + 2FeCl_3 \longrightarrow 3(C_6H_5)_2 + 2Fe + 3MgBr_2 + 3MgCl_2$. (2) $2C_6H_5MgBr + 2FeCl_3 \longrightarrow (C_6H_5)_2 + 2FeCl_2 + MgBr_2 + MgCl_2$. (3) $2C_6H_5MgBr + FeCl_3 \longrightarrow (C_6H_5)_2 + Fe + MgBr_2 + MgCl_2$. *PhFeI*, a new organometallic compd., was prepd. according to the reaction $2C_6H_5ZnCl + 2FeI_2 \longrightarrow 2C_6H_5FeI + ZnCl_2 + ZnI_2$. On hydrolysis, the reaction was $2C_6H_5FeI + 2H_2O \longrightarrow 2C_6H_6 + Fe(OH)_2 + FeI_2$. GERALD M. PETTY

The action of halogens on ethyldiiodostibine. Antimony bromodiiodide. ROBERT E. D. CLARK. *J. Chem. Soc.* 1930, 2737–9.—The action of I, Br and Cl on ethyliodostibine (I) is studied. SbI_3 (1.2 g., red needles, m. 168–170.5°) may be prepd. by adding a soln. of I (1.2 g.) in $CHCl_3$ (10 cc.) by drops to I (0.75 g.) in a min. of $CHCl_3$, refluxing for a few min. and cooling, the SbI_3 sepg. out. *Antimony bromodiiodide*, $SbBrI_2$ (long yellow needles (2.9 g.), m. 88°) is formed when Br (1.6 cc. dissolved in $CHCl_3$ (5 cc.)) is added in drops to a soln. of I (12.0 g.) in a min. of $CHCl_3$ (about 15 cc.), cooled in a freezing mixt., refluxed for a few min., cooled to 0°, the $CHCl_3$ decanted off, the mixt. treated with xylene until free from I, and the residue recrystd from $CHCl_3$ or light petroleum (b. p. 80–100°). As typical of the reaction between Cl and I, into a soln. of I (10.0 g.) in warm $CHCl_3$ (10–15 cc.), Cl_2 (530 cc. in all; calcd. 600 cc.) is passed at the max. rate (in this case 35 cc. per min.), at which absorption is complete for the temp. employed (25–30°); the mixt. is boiled, filtered and cooled. red SbI_3 and its yellow metastable modification alone being produced. J. BALOZIAN

Chloramine, its preparations, properties and uses. W. HIRSCHKIND. *Western Construction News* 5, 531–2(1930); *U. S. Pub. Health Eng. Abstracts* 11, W, 21(Feb. 21, 1931).—The chemistry, properties and application to water sterilization of the chloramines (NH_2Cl, $NHCl_2$ and NCl_3) are discussed. C. R. FELLERS

A note on the preparation of hydriodic acid. T. H. WHITEHEAD. *J. Chem. Education* 8, 541–2(1931).—In the prepn. of HI from H_2S and I_2 it has been found that the formation of I_2 on distg. the HI soln. can be prevented if the mixt. is dialyzed through a collodion membrane for 48 hrs. This removes the colloidal S which seems to cause oxidation of the HI. R. H. CARTER

The action of bases on non-metals. A. LAURENCE CURL. *J. Chem. Education* 8, 490–7(1931).—Most of the non-metallic elements with the exception of N and the rare gases react with the alkali hydroxides. In general the reactions take place in accordance with the type $Cl_2 + 2NaOH \longrightarrow NaCl + NaClO + H_2O$. The exact mechanism of this type of reaction is not known or discussed. Similar reactions are obtained with the alkali amides which are analogous to the hydroxides in the NH_3

system of compds. In NH_3 the polysulfides, polyphosphides, etc., are more stable than in water, but the ammono salts are less stable than the corresponding aquo salts.
R. H. CARTER

Course of the reactions between graphite and oxides as well as between heavy metal carbides and oxides. OSKAR MEYER. *Arch. Eisenhüttenw.* **4**, 193–8(1930).—These reactions were studied by detg. the course of vapor pressure-temp. curves. In the case of SiO_2 and graphite, the partial pressure of CO (p_{CO}) reaches 20 mm. at 1400°. MnO is reduced by graphite at lower temps., p_{CO} having attained about 130 mm. at 1200°. Curves and similar data are given for argillaceous earth and graphite and reactions between the carbides of Si, Mo, W and Cr and the oxides of Mn, Fe, Cr and Si.
H. STOERTZ

The interaction between iodine pentoxide and nitric oxide. MADHAVLAL SUKHLAL SHAH AND TRAMBAKLAL MOHANLAL OZA. *J. Chem. Soc.* 1931, 32–6.—The course of the reaction at 120° between I_2O_5 and NO was followed by measuring (*a*) the vol. of NO used, (*b*) the amt. of I_2 produced, and (*c*) the amt. of nitrate formed. The reaction may take place according to either (I) $10NO + 2I_2O_5 = 2I_2 + 5N_2O_4$, and subsequently $5N_2O_4 + I_2O_5 = I_2 + 5N_2O_5$, or (II) $10NO + 3I_2O_5 = 3I_2 + 5N_2O_5$. No decisive evidence could be obtained to indicate that it occurred according to I. The assumption that first II takes place with the formation of N_2O_5, and subsequently N_2O_4 is formed according to $5N_2O_5 + 5NO = 7.5N_2O_4$ is equally possible. J. B.

Action of mercuric oxide on solutions of cupric chloride. H. PÉLABON AND MLLE. DELWAULLE. *Bull. soc. chim.* [4], **47**, 556–9(1930); cf. *C. A.* **19**, 1105; **24**, 3454.—The reaction between HgO and $CuCl_2$ is shown to take place according to $3HgO + 4CuCl_2 = 3HgCl_2 + 3CuO.CuCl_2$. The action of CuO on, as well as the soly. of $HgCl_2$ in, solns. of $CuCl_2$ was studied separately.
G. TOENNIES

Formation of a ferromagnetic iron sesquioxide by decomposition of the hydrate of van Bemmelen's sesquioxide. G. CHAUDRON AND A. GIRARD. *Compt. rend.* **192**, 97–9(1931).—The cryst. Fe_2O_3 H_2O prepd. from $Fe_2O_3.Na_2O$ by the method of van Bemmelen (*J. prakt Chem.* **46**, 520(1892)) loses water slowly at 100° and rapidly at 140° to form a strongly magnetic sesquioxide which at 675° is converted into the ordinary sesquioxide. Both the monohydrate and the oxide are hexagonal, while the magnetic oxide obtained by slow oxidation of magnetite (Malaguti's oxide) is cubical (cf. Welo and Baudisch, *C. A.* **19**, 3182).
K. V. THIMANN

Decomposition of magnesium salts by calcium carbonate at elevated temperatures. E. SAUER AND J. HUTER. *Z. anorg. allgem. Chem.* **195**, 241–6(1931).—$MgCl_2$, $MgSO_4$ and $Ca(HCO_3)_2$ in aq. soln. were autoclaved for long periods (as high as 9 hrs.); the courses of the decompns. were followed. Mixts. of the Mg salts with $Ca(HCO_3)_2$ were also studied; pptn. of $Mg(OH)_2$ occurs. Solid $CaCO_3$ was also present in some expts. Data and curves are given.
WILLIAM E. VAUGHAN

The double decomposition between aqueous sodium formate and ammonium sulfate. G. BREDIG AND F. LOTZ. *Chem.-Ztg.* **55**, 4(1931).—Isotherms are given for the reciprocal salt pair at 13.5°, 24.6° and 60°. There are several difficulties in the way of prepg. HCO_2NH_4 by double decompn.
T. H. CHILTON

Thoryl nitrate. ED. CHAUVENET AND MME. SOUTEYRAND-FRANCK. *Bull. soc. chim.* [4], **47**, 1128–31(1930).—$Th(NO_3)_4.5H_2O$ was obtained by slow evapn. of a soln. in air at 15°. Above 80° the trihydrate was obtained; above 110° the dihydrate; from 125° to 150° decompn. of the salt yielded $ThO(NO_3)_2.1/2H_2O$; from 150° to 360° decompn. was continuous, yielding pure ThO_2. The dihydrate was not affected by reduced pressure. Anhyd. $Th(NO_3)_4$ could not be obtained. $Th(NO_3)_4.5H_2O$ reacted in soln. with 2 mols. NaOH, yielding $ThO(NO_3)_2.H_2O$. No other product of hydrolysis was obtained. The hydrolysis is similar to that of $ZrCl_4$ (cf. *C. A.* **24**, 5654).
GERALD M. PETTY

The complex cuprothiosulfates of ammonium, potassium and sodium. III. G. SPACU AND I. G. MURGULESCU. *Bul. soc. stiinte Cluj* **5**, 344–70(1930); cf. *C. A.* **24**, 4230.—Potentiometric titrations of $Cu(NO_3)_2$ by $Na_2S_2O_3$ in the presence of regulated amts. of EtOH show flexures corresponding to the following Na cuprothiosulfates: $Na_3Cu_7(S_2O_3)_6.8H_2O$, $NaCuS_2O_3.1\,1/2H_2O$, $Na_4Cu_2(S_2O_3)_3.xH_2O$, $Na_5Cu(S_2O_3)_3.xH_2O$, $Na_3Cu(S_2O_3)_2.2NaNO_3$. $Na_3Cu_7(S_2O_3)_6.8H_2O$ is formed as a yellow cryst. ppt. when 7 vols. of 0.5 *M* $Cu(NO_3)_2$ and 13 vols. of 0.5 *M* $Na_2S_2O_3$ are mixed in the presence of 3 1/2 vols. of EtOH. $NaCuS_2O_3.1\,1/2H_2O$ is obtained as a white amorphous ppt. when 5 vols. of 0.2 *M* $Cu(NO_3)_2$ are mixed with 4 vols. of 0.5 *M* $Na_2S_2O_3$ in the presence of 16–20 vols. of EtOH. When 2 moles of $NaCuS_2O_3.1\,1/2H_2O$ are titrated with 1 mole of $Na_2S_2O_3$, $Na_4Cu_2(S_2O_3)_3$ seems to be produced in the form of a brown oily soln. This salt could not be further isolated, for upon evapn. the soln. changed to a glassy homo-

geneous mass. It was attempted to prep. $Na_3Cu(S_2O_3)_2$ from a soln. contg. theoretical amts. of $Na_2S_2O_3$ and $NaCuS_2O_3$. A mass of iridescent crystals was obtained, too hygroscopic for further purification. The double salt $Na_3Cu(S_2O_3)_2.2NaNO_3$ is prepd. by treating a mixt. of $NaCuS_2O_3$ and $NaNO_3$ with 3 *M* $Na_2S_2O_3$. Upon recrystn. it appeared as colorless needles. The following table contrasts the hydration of the cuprothiosulfates of NH_4, K and Na:

		$Na_6Cu_7(S_2O_3)_6.8H_2O$
$NH_4CuS_2O_3.{}^1/_2H_2O$	$KCuS_2O_3.H_2O$	$NaCuS_2O_3.1{}^1/_2H_2O$
$(NH_4)_4Cu_2(S_2O_3)_3.2H_2O$	$K_4Cu_2(S_2O_3)_3.2H_2O$	$Na_4Cu_2(S_2O_3)_3.xH_2O$
	$K_4Cu_2(S_2O_3)_3.H_2O$	?
$(NH_4)_6Cu(S_2O_3)_3.4H_2O$	$K_6Cu(S_2O_3)_3.3H_2O$	$Na_6Cu(S_2O_3)_3.xH_2O$

J. H. REEDY

A series of new tetrammine-cobaltic complexes. PULIN BIHARI SARKAR AND TUHINANGSU DAS-GUPTA. *J. Indian Chem. Soc.* 7, 835–7(1930).—$\left[Co^{Cl}_{(NH_3)_5}\right]S_2O_3$ at 35–40° for 4 weeks changes completely to the more stable $\left[Co^{S_2O_3}_{(NH_3)_5}\right]Cl$ without appreciable change in wt. Thiosulfato-pentammine compds. possess a characteristic ultra-violet absorption spectrum by which they can be easily distinguished from their ionic isomers. Their conductivities are half that of the corresponding chloro compd. $\left[Co^{(1,6)Cl_2}_{(NH_3)_4}\right]Cl$ or $\left[\begin{matrix}(1)Cl\\ Co(2)H_2O\\ (NH_3)_4\end{matrix}\right]Cl_2$ in aq. soln. with $Na_2S_2O_3$ below 0° gives *trans-thiosulfato-aquo-tetrammine-cobaltic thiosulfate* $\left[\begin{matrix}(1)S_2O_3Co(NH_3)_4\\ (6)H_2O\end{matrix}\right]_2S_2O_3$ (I) by double decompn. The free S_2O_3 group of I is replaced to give the corresponding Cl, Br, NO_3, SCN, CrO_4, SO_4 and S_2O_6 compds. Their ultra-violet absorption spectra in aq. solns. are identical. At higher temps. the soln. by hydrolysis gives, $\left[\begin{matrix}(1)S_2O_3Co(NH_3)_4\\ (6)OH\end{matrix}\right]$. Further hydrolysis permits the formation of H_2SO_3, which partially reduces the Co^{+++} compds. to the Co^{++} - Co^{+++} complex, $\left[\begin{matrix}(H_2O)_2\\ Co''(OH)_2[Co'''(NH_3)_4]_2\end{matrix}\right](S_2O_3)_2$, isolated by alc. FOSTER DEE SNELL

A new class of ammines. The double selenocyanammines. G. SPACU AND V ARMEANU. *Bul. soc. stiinte Cluj* 5, 294–318(1930).—Solns. of $K_2Hg(SeCN)_4$ and $KAg(SeCN)_2$ were formed by the action of KSeCN on $HgCl_2$ and AgCl, resp. By causing these solns. to react with various metallic salts of ethylenediammine, the following double selenocyanammines were pptd.: $Cu(en)_2[Hg(SeCN)_4]$, $Ni(en)_2[Hg(SeCN)_4]$, $Cd(en)_2[Hg(SeCN)_4]$, $Zn(en)_2[Hg(SeCN)_4]$, $Co(en)_2[Hg(SeCN)_3]_2(SeCN)$, $Cu(en)_2[Ag(SeCN)_2]_2$, $Ni(en)_2[Ag(SeCN)_2]_2$, $Cd(en)_2[Ag(SeCN)_2]_2$, $Zn(en)_2[Ag(SeCN)_2]_2$, $Co(en)_3[Ag(SeCN)_2]_3$. These double selenocyanammines, as a class, are cryst. solids, stable toward light and dry air. They are insol. in EtOH, Et_2O, C_6H_6, $CHCl_3$, etc., and slightly sol. in H_2O, Me_2CO, etc. They are decompd. by the feeblest acids and bases. J. H. REEDY

The salts of hexafluophosphoric acid. WILLI LANGE AND EMIL MÜLLER. *Ber.* 63B, 1058–70(1930).—The reaction of dil. HF with P_2O_5 gives three types of acids H_2PO_2F, HPO_2F_2 and HPF_6. HPO_2F_2 and HPF_6 ppt. with nitron. Keeping the soln overnight results in complete hydrolysis of HPO_2F_2 and the soln. yields with nitron a ppt. of pure nitron-HPF_6. This ppt. shaken with chloroform and ammonia gives the well-crystallizing NH_4PF_6 in the water soln. The hexafluophosphates strikingly resemble the perchlorates in soly. They differ completely, however, in crystal form All the inorg., especially the complex, PF_6 compds. have refractive indexes similar to that of water, which gives them a gel-like appearance in water suspension. Aryl diazonium-PF_6 compds. are less sol. than the perchlorates; they do not decompose when dry, and are not sensitive to shock or blows. Heating results in decompn. according to: $ArN_2PF_6 = ArF + PF_5 + N_2$. HPF_6 is stable in cold soln. but is hydrolyzed in hot soln. PF_6 compds. on boiling with strong acids are hydrolyzed. Mol vols. of PF_6 and ClO_4 compds. are compared. Prepn. and properties are described for KPF_6, NH_4PF_6, $NaPF_6.H_2O$, $RbPF_6$, $CsPF_6$, $Cu(PF_6)_2.5NH_3.H_2O$, $Cu(PF_6)_2.4NH_3$, $Cu(PF_6)_2$ $2C_2H_4(NH_2)_2.2H_2O$, $Cu(PF_6)_2$ $5C_5H_5N.NH_3.H_2O$, $Co(PF_6)_2.6NH_3$, $Ni(PF_6)_2$ $6NH_3$, Me_4NPF_6, Et_4NPF_6, PhN_2PF_6, *o*-$MeC_6H_4N_2PF_6$, *p,p'*-$F_6PN:NC_6H_4C_6H_4N:NPF_6$, $C_5H_5N.HPF_6$, strychnine-HPF_6, brucine-HPF_6, morphine-HPF_6, cocaine-HPF_6, nitron-HPF_6, nitron-$HAsF_6.H_2O$, nitron-$HSbF_6.2H_2O$ and nitron-$HSbF_6$. R. W. S.

Bis-*p*-phenetyl telluride and its derivatives. GILBERT T. MORGAN AND FRANCIS H. BURSTALL. *J. Chem. Soc.* **1930**, 2599–601.—Bis-*p*-phenetyl telluride and some of its derivs. are prepd., the view of Burstall and Sugden (*C. A.* **24**, 2652) that bis-*p*-phenetyl telluridichloride is a nuclear-substituted telluride being confirmed. *Bis-p-phenetyl telluride*, $(EtO.C_6H_4)_2Te$, (white plates, m. 64°) is prepd. by adding 63 g. *p*-bromophenetole (by the Sandmeyer reaction from *p*-phenetidine) to Mg (7.2 g.) suspended in dry Et_2O, warming until nearly all the Mg is in soln., decanting, adding the soln. slowly to a $TeBr_2$ (43 g.) suspension in dry Et_2O, refluxing for several hrs., cooling, treating with ice, adding HBr, filtering, drying the Et_2O layer over $CaCl_2$, evapg. to dryness, extg. the residue of gum with petroleum ether (b. 40–60°), evapg. and repeatedly recrystg. the solid sepg. out from alc. *Bis-p-phenetyl telluridichloride*, $(EtO.C_6H_3Cl)_2Te$, m. 108°, is prepd. (1) by adding Cl_2 to a soln. of the preceding telluride in CCl_4, (2) by heating *p*-phenetyl telluritrichloride with an excess of phenetole at 180–190° and (3) by heating $TeCl_4$ (1 mol.) with phenetole (4 mols.) at 180–190°.

Bis-p-phentyl tellurioxychloride, $(EtO.C_6H_4)_2Te\langle{}^{O}_{Cl\ Cl}\rangle Te(C_6H_4\ OEt)_2$ (fluffy white crystals, decompg. at 193°) is prepd. by boiling an aq. suspension of the dichloride. *Bis-p-phenetyl telluridibromide*, $(EtO.C_6H_3Br)_2Te$, (lemon-yellow crystals, m. 127°) and *bis-p-phenetyl telluridiiodide*, $(EtO.C_6H_3I)_2Te$, (orange-red needles, m. 144°) are prepd. from mixts. of their generators in soln. *Bis-p-phenetyl telluroxide*, $(EtO.C_6H_4)_2TeO$, (white microcrystals, decompg. at 181°) is prepd. by boiling the dichloride or the dibromide with aq. 2 *N* NaOH soln. *p-Anisyl-p-phenetyl telluridichloride* (white needles, m. 165–6°) is prepd. by heating the trichloride (1 mol.) at 160° with anisole (4 mols.) for 6 hrs., cooling, treating with petroleum ether (b. 40–60°) and recrystg. the residue repeatedly from alc. *p-Anisyl p-phenetyl telluride* (white needles, melting to a clear liquid at 45°) is prepd. by heating the dichloride for an hr. in glacial AcOH with Zn dust in excess, filtering, pouring the filtrate into H_2O and crystg. the ppt. from alc.

J. BALOZIAN

Researches on residual affinity and coördination. XXXII. Complex salts of bivalent silver. GILBERT T. MORGAN AND FRANCIS H. BURSTALL. *J. Chem. Soc.* **1930**, 2594–8; cf. *C. A.* **23**, 1877.—As with Cu salts and a diamine (*C. A.* **20**, 3400, 3401; **21**, 3166), it has been found that the chelate group in α,α'-dipyridyl is sufficiently powerful to stabilize a bivalent argentic complex. Thus, by starting with α,α'-dipyridyl (as prepd. by Hein and Retter (*C. A.* **23**, 143)), a series of Ag salts is prepd. in which the bivalent Ag has coördination nos. of both 4 and 6. *Bis-α,α'-dipyridylargentous nitrate* $[Ag2dipy]NO_3$, (felted masses of yellow needles, decompg. at 155°) is prepd. from hot alc. solns. of $AgNO_3$ (16.9 g.) and α,α'-dipyridyl (31.2 g.), and recrystd. from hot dil. alc. *Bis-α,α'-dipyridylargentic persulfate*, $[Ag2dipy]^{II}S_2O_8$, (deep reddish brown microcrystals, decompg. rapidly at 137°) is prepd. by stirring the preceding nitrate into a cold satd. soln. contg. an excess of $K_2S_2O_8$. *Pentakis-α,α'-dipyridyldiargentic persulfate*, $[Ag_25dipy](S_2O_8)_2$, (small reddish purple needles, decompg. rapidly at 159°) is prepd. by triturating the preceding persulfate with cold dil. HNO_3 (60% HNO_3 (d = 1.4) and 40% H_2O) and pptg. with H_2O (4 vols.). *Tris-α,α'-dipyridylargentic nitrate*, $[Ag3dipy]^{II}(NO_3)_2$, (small dark brown needles, decompg. at 176°) is obtained by draining the residue from the persulfate trituration, extg. with warm H_2O, adding an excess of aq. NH_4NO_3 and cooling in ice. *Tris-α,α'-dipyridylargentic chlorate*, $[Ag3dipy]^{II}(ClO_3)_2$, (dark purple plates or needles, decompg. quietly at 171°) is prepd. by adding aq. $NaClO_3$ to the preceding nitrate and recrystg. the product from H_2O by the addn. of $NaClO_3$. *Tris-α,α'-dipyridylargentic perchlorate*, $[Ag3dipy]^{II}(ClO_4)_2$, (orange-brown microcrystals, detonating violently on heating) is prepd. by adding $NaClO_4$ to a soln. of either the preceding chlorate or nitrate. *Bis-α,α'-dipyridylargentic hydrogen sulfate*, $[Ag2dipy]^{II}(HSO_4)_2$, (brown cryst. powder, decompg. at 157°) is prepd. by treating the persulfate with cold 40% H_2SO_4 or by adding Na_2SO_4 and H_2SO_4 to solns. of the preceding chlorate or nitrate.

J. BALOZIAN

7—ANALYTICAL CHEMISTRY

W. T. HALL

Reply to the remarks of L. Moser and L. v. Zombory concerning my paper on "New ways in analytical chemistry." J. DICK. *Z. anal. Chem.* **83**, 105–7(1931); cf. *C. A.* **25**, 891; M. and Z., *C. A.* **24**, 4725.—The method of washing the ppt. with alc. and ether with vacuum drying at room temp. is defended. W. T. H.

Collecting average samples from storage tanks. H. O. BERNSTROM. *Chemist Analyst* **20**, No. 2, 10–1(1931).—The taking of a sample from tank cars by means of a circular "thief" is described. W. T. H.

Standardizing silver nitrate solutions. ALVIN MAYHAN. *Chemist Analyst* **20**, No. 2, 14 5(1931).—One soln. of $AgNO_3$ can be standardized against another of the same kind by making an approx. 0.24 *N* HCl soln. and titrating one portion with the old and another portion with the new soln. by Mohr's method. W. T. H.

Sodium sulfite for analysis. HOLZVERKOHLUNGS-IND. A.-G. *Chem.-Ztg.* **54**, 502(1930).—Contrary to earlier statements, pure Na_2SO_3 does not yield alk. solns., and the faint blue color with thymolphthalein is destroyed by one drop of 0.1 *N* HCl. In the use of Na_2SO_3 for the detn. of CH_2O, the grade "pro analysi" is not essential, because reasonable proportions of neutral saline impurities, such as Na_2SO_4, do not affect the titration; Na_2CO_3 must, however, be absent. B. C. A.

"Direct green B." A new reagent very sensitive to copper. P. SISLEY AND DAVID. *Bull. soc. chim.* [4], **47**, 1188-92(1930).—When Cu salts are added at 90° to a soln. of "direct green B," the color changes from blue-green to violet-pink. soln. should have a p_H value between 6 and 9. The ratio dye/Cu should be 10, but results are satisfactory between 6 and 50. The reaction is sensitive to 0.1 mg. Cu per l. Anions had no effect on the color. No other metal gave a violet-pink col Neutral salts retarded the reaction and reduced the intensity of the color, K_2SO_4 having the greatest effect. Colloids masked the reaction. Cu was found in distd. water used for diluting serums and medicines. GERALD M. PETTY

Correct methods of analyzing for carbon in rustless steels. C. M. JOHNSON. *Iron Age* **127**, 549–51(1931).—In some cases it is necessary to have the results on C detns. accurate to 0.01% of the wt. of the sample. Low results may be caused by incomplete combustion because of failure to cover the sample with Pb_3O_4, and high results may be caused by the S content. Directions are given for carrying out the combustion in an elec. furnace, and an absorption train is shown in which danger due to SO_2 or SO_3 fumes is overcome by passing the gas through 50 ml. of 5% $KMnO_4$ soln., through the usual Zn tower, through P_2O_5 and finally into the Stetser and Norton ascarite bulb. W. T. H.

Determination of total sulfur by the sodium peroxide method. M. R. BERCOVITCH. *Chemist Analyst* **20**, No. 2, 8(1931).—In neutralizing the aq. ext. of the melt, loss by effervescence can be avoided by introducing the acid at the bottom of the soln. by means of a pipet or funnel drawn out to a fine point. W. T. H.

Wet oxidation method for the determination of total sulfur in slags, ores, cinders, etc. FRANK W. SCOTT. *Chemist Analyst* **20**, No. 2, 8(1931).—The sample is dissolved in concd. HNO_3 which has been satd. with $KClO_3$, and the resulting SO_4^{--} is detd. as in the well-known Lunge method. W. T. H.

Detection of minute quantities of phosphorus in oil. CONRAD STICH. *Pharm. Ztg.* **76**, 112(1931).—A commentary on S.'s previously published method (*C. A.* **21**, 3856) with suggestions for its more precise application. W. O. E.

Spectrophotometric determination of phosphorus. TORSTEN TEORELL. *Biochem. Z.* **230**, 1-9(1931).—Fiske-Subbarow's procedure for the colorimetric detn. of P is modified to be used for a photospectrometric analysis of quantities ranging from 0.01 to 0.05 mg. P. The method dispenses entirely with the standard soln., and detns. can be made with an accuracy of ±2%. S. MORGULIS

Colorimetric estimation of nitrogen by direct nesslerization, with a note on a modified Nessler-Folin reagent. LANCE S. WALTERS. *Australian J. Exptl. Biol. Med. Sci.* **7**, 113–6(1931).—By using a gum ghatti soln. for protective colloid and replacing NaOH by LiOH in the Nessler-Folin soln., it was possible to nesslerize 100 cc. of soln. contg. 2 cc. concd. H_2SO_4 and up to 1 mg. N. The nesslerized soln. remained clear for weeks. The usual Kjeldahl digest contg. 20 cc. of H_2SO_4 is diluted to 100 cc. and an aliquot taken which contains 0.5 to 1.0 mg. N. This is diluted to about 60 cc., 3 cc. colloid soln. is added, followed by nesslerization and making up to 100 cc. for matching a standard. The protective colloid soln. contains 2% of alc.-pptd. and dried gum in thymol-satd. water. C. G. KING

Determination of nitrogen by a "micro-Kjeldahl" method. A. C. ANDERSEN AND B. NORMAN JENSEN. *Z. anal. Chem.* **83**, 114–20(1931).—The method previously described by A. and J. (*C. A.* **19**, 1461) can be used equally well for 0.5–1 mg. of N if the app. is built on a smaller scale. Such a modification is shown and exact dimensions are given. The app. was tested with 5 org. nitrogenous compds. and excellent results were obtained. W. T. H.

Determination of some gases by means of the spectrograph. BOUCHETAL DE LA

ROCHE. *Bull. soc. chim.* [4], **47**, 1326–31(1930); cf. *C. A.* **24**, 1252, 1580, 5667.—Further description of the method is given. Spectrographic analyses of mixts. of Si and B fluorides and Cl with dry air are in close agreement with the results by the chem. method. Br and I are less sensitive and therefore difficult to det. by this method. O gives certain lines by which it can be detd., but the intensity is independent of the quantity of O introduced; this is probably due to the oxidation of the electrodes. N diluted with H or CO_2 is detd. by the line 5008 or 3437, resp., and the results agree well with those of volumetric analysis. H. W. WALKER

Bromoiodometric investigations. V. Determination of bromine in bromides. J. H. VAN DER MEULEN. *Chem. Weekblad* **28**, 82-6(1931); cf. *C. A.* **25**, 1182.—To 20 cc. KBr soln. (contg. about 0.1 g.) add 10 cc. *N* KOCl in 0.1 *N* KOH and 25 cc. satd. NaCl soln. Heat the mixt. on the water bath to about 85° and add 10 cc. of a satd. H_3BO_3 soln. Continue the heating for about 5 min. after discoloration takes place. Decompose the excess KOCl with 10 cc. *N* H_2O_2 and boil off the excess H_2O_2. After cooling add KI and HCl and titrate the mixt. A blank titration is necessary. E. SCHOTTE

Spectroscopic detection of fluorine. JACOB PAPISH, L. E. HOAG AND W. E. SNEE. *Ind. Eng. Chem., Anal. Ed.* **2**, 263–4(1930).—A mixt. of a substance contg. F with a salt of Ca is placed on a graphite electrode and the arc or spark spectrum photographed. A band at 5291 A. U. is intense enough to detect 0.02 mg. F. The method is applied to complex F compds., F minerals, bones and teeth of animals. In the latter case and when the quantity of F is very small, the sample is concd. by distg. with H_2SO_4 and the HF is collected in $Ca(OH)_2$ soln. The dried CaF_2 is then applied to the electrodes. G. M. MURPHY

Qualitative microanalysis. Detection of traces of copper by capillary separation. F. FEIGL AND H. J. KAPULITZAS. *Mikrochemie* [N. S.], **2**, 239–44(1930).—Traces of Cu may be detected in the presence of large amts. of Ni by placing one drop of the AcOH soln. of the elements on a filter paper which has been dipped into an alc. soln. of dithioöxamide and dried. If Cu is present, the middle of the drop immediately develops an olive-green to black ring; the Ni diffuses further before it reacts with the amide, so that a white ring surrounds the Cu ring and is itself surrounded by a dirty violet to violet-blue ring. The reaction will detect 0.05γ of Cu in the presence of 20,000 times as much Ni or 2000 times as much Co, which forms a yellowish brown ring outside the Cu ring. B. C. A.

Effect of the presence of other elements on some microscopical tests for the metals. W. F. WHITMORE AND F. SCHNEIDER. *Mikrochemie* [N. S.], **2**, 293–304(1930).—The formation of triple nitrates with K and Pb is a test for Cu or Ni in the absence of the other, the former giving black or dark brown cubes and the latter light yellow cubes; when both elements are present the color may vary from light yellow to black. The oxalate test for Mn, Cd, Pb and bivalent Sn is sp. only when each element is present alone; when 2 or more are present in the test soln the crystals formed usually have a different habit from the normal, or the crystals due to one element may fail to appear. Similarly, the $Hg(CNS)_2$ test for Cu, Co, Zn and Cd does not distinguish the elements from one another when in admixt., the crystal habit and color varying considerably with the nature and relative proportions of the metals present. Fe cannot be detected by the ferrocyanide test when more than 10 times as much Cu is present, and Pb and Hg cannot be detected by the iodide test when 50 times as much Hg or Pb is present in the same soln. (cf. *C. A.* **24**, 2964). B. C. A.

Analysis of white metals and solder. H. L. MATTHIJSEN. *Chem. Weekblad* **27**, 284–7(1930).—Slight modifications in standard methods, and particularly in simultaneous electrolytic detn. of Pb and Cu, are described. B. C. A.

Spot tests for the detection of the precious metals. H. HOLZER. *Mikrochemie* [N. S.], **2**, 271–6(1930).—For the detection of Au in a soln. contg. Pt a drop of the liquid is placed on a filter paper and allowed to dry; on addn. of a min. drop of acid $SnCl_2$ soln. to the middle of the spot it becomes yellowish brown, and a purple ring gradually forms around the outside if Au is present. Feigl's test for Ag with *p*-dimethylaminobenzylidenerhodanine (*C. A.* **22**, 4080) is interfered with by Au, Pt and Pd, which produce colored flocculent ppts. with the reagent. The Pd ppt. is dark violet in color and its formation serves as a sp. test for Pd. B. C. A.

Inorganic gravimetric microanalysis. I. Determination of minute amounts of gold in the presence of much iron, lead and copper. J. DONAU. *Mikrochemie* [N. S.], **2**, 257–63(1930).—To the boiling, slightly acid soln. (0.2–0.3 cc.) of the Au is added a small piece of Japanese silk previously washed in HCl, then in water and dried. The Au deposits rapidly on the silk, coloring it dark purple; a 2nd piece of silk may be added

to make sure that pptn. is complete. The silk is collected on a glass microfilter, washed with hot water, dried in a small Pt-foil dish and ignited over a small flame. Further heating causes the Au residue to alloy with the Pt, which is then weighed on the microbalance. Fe, Cu and Pb do not interfere in the test. B. C. A.

Determination of cadmium with potassium ferrocyanide. ALFRED KUNDERT. *Chemist Analyst* **20**, No. 2, 5–6(1931).—It is shown that the $K_4Fe(CN)_6$ titration gives results that are comparable to those obtained gravimetrically. W. T. H.

Specific reaction for the detection of cadmium. F. PAVELKA AND E. KOLMER. *Mikrochemie* [N. S.], **2**, 277–80(1930).—Cd salts in AcOH soln. yield a characteristic yellowish white cryst. ppt. with nitrophenolarsinic acid; under the microscope the crystals appear as long narrow rectangular prisms often clustered in prickly spherical aggregates. The reaction will detect 1 part of Cd in 200,000 parts of soln. and is not affected by the presence of any metal which forms a sol. acetate. B. C. A.

Detection of zinc by means of resorcinol. K. FABICH. *Verhandl. Geol. Bundesanst. Wien* **1929**.—The addn. of a 10% soln. of resorcinol in alc. to a dil. soln. of a Zn salt gives on shaking in the cold a yellow color, which on heating changes to olive-green or blue, the color depending on the concn. Other metals, such as Cd, Ni, Co, Cu and Mn, give similar colors with resorcinol. B. C. A.

Analysis of the coating of galvanized sheet steel. FRANK W. SCOTT. *Chemist Analyst* **20**, No. 2, 4–5(1931).—Cut 3 test pieces, 2.25 in. sq., of the metal, clean with gasoline or benzene, dry, mark one of them and weigh. Place the 3 pieces in a 400-cc. beaker with their bottom edges resting on pieces of pure Zn and with the sheets sepd. by glass rods. Cover the squares of metal with 3.3 *N* H_2SO_4 and put a watch glass over the beaker. Move the pieces from time to time but keep them in close contact with the pure Zn. When the evolution of gas is very slow, showing that the coating has been dissolved, transfer the acid to another beaker and at once cover the undissolved metal with water. Using a policeman and a jet from the washer bottle, scrub off the sheets and pieces of pure Zn, adding the black residue and water to the acid soln. Dry the marked sheet and again weigh; the loss in wt. in g. is equal to the wt. of coating in oz. on a piece a foot sq. This wt. multiplied by 3 gives the wt. of sample analyzed. Titrate the Fe^{++} in the soln. with $KMnO_4$. Add HNO_3, evap. with concd. H_2SO_4 and det. the Pb as $PbSO_4$. Dil. the filtrate from the $PbSO_4$ to 450 cc. and, while introducing H_2S, reduce the acidity so that some Zn together with all the Cd is pptd. as sulfide. Filter, dissolve in acid and repeat this pptn. twice more until finally pure CdS is obtained and weighed. To det. Sn, treat 3 more pieces in the same way, from the resulting soln. ppt. sulfides of Sn and Pb with H_2S, dissolve the ppt. in aqua regia, boil off Cl_2, dil., nearly neutralize with NH_4OH, add an excess of NH_4OAc, make neutral to methyl orange and allow to stand in a warm place to ppt. $Sn(OH)_2$. Filter, ignite and weigh as SnO_2. Call the remainder of the coating Zn. W. T. H.

Determination of the iron contained in the coating of galvanized steel. BENJAMIN E. COHN. *Chemist Analyst* **20**, No. 2, 4(1931).—The method of obtaining the sample is similar to that described by Scott (see preceding abstr.) but $HgCl_2$ is added to the soln. before titrating with $KMnO_4$. W. T. H.

The determination of iron in aluminum. GIULIO AGAMENNONE. *Giorn. chim. ind. applicata* **12**, 486–7(1930).—Fe occuring in Al is usually detd. volumetrically as Fe^{II}, leading to some losses due to carbides not completely decompd. because of the danger of oxidizing to Fe^{III} again, and to some Fe remaining as Fe^{III}. To avoid these losses, Fe is detd. as Fe^{III} by dissolving the Al in dil. HCl, boiling the soln., adding H_2O_2 and again boiling. The soln. is then cooled and the Fe^{+++} detd. iodometrically. A. W. CONTIERI

New test for tin. IRWIN STONE. *Chemist Analyst* **20**, No. 2, 6–7(1931).—Meissner's Bunsen flame test is described in which a blue coloration is obtained. W. T. H.

Lead-antimony-tin alloys. MAX HALE. *Chemist-Analyst* **20**, No. 2, 10(1931).—The sp. gr. of the sample gives a fair idea of the Sb content of Pb-Sb alloys. The treatment of the alloy with acid, sepn. of Sb and Sn from Pb by NaSH soln., detn. of Pb as $PbSO_4$ in the ppt., electrodeposition of the Sb from the alk. soln. to which KCN is added and the pptn. of Sn in the electrolyzed soln. are described. W. T. H.

Electrolytic determination of copper in steel. LAWRENCE ANDERSON. *Chemist Analyst* **20**, No. 2, 7–8(1931).—Dissolve 5 g. of metal in 100 ml. of 3 *N* H_2SO_4, filter off the Cu and any insol. carbide, treat the residue with hot dil. HNO_3, filter and electrolyze. W. T. H.

Analytical applications of a reaction of copper salts. MANUEL LORA Y TAMAYO. *Rev. acad. ciencias Madrid* [2], **25**, 267–98(1930).—The reaction between Cu^{++} and

tartrate in alk. soln. serves to indicate 15.9–16.7 mg. of Cu^{++} per 100 cc. of aq. soln. or 6.4 mg. of Cu^{++} if sufficient alc. is added. By measuring the vol. of KCN used to decolorize the soln. a fairly satisfactory detn. of Cu^{++} can be made. A bibliography of methods for detg. Cu and of studies of the action of various cations on alk. tartrate is given. JOHN B. ENTRIKIN

Study of Spacu's reaction. Methods for the volumetric determination of copper based on this test. J. GOLSE. *Bull. soc. chim.* **49**, 84–100(1931).—Salts of Cu give ppts. of $[Cu(C_5H_5N)_2](SCN)_2$ when placed in contact with pyridine and an alk. thiocyanate. The ppt. is easily dissolved by $CHCl_3$ giving an emerald-green soln., and by evapn. of this soln. a residue is obtained which can be weighed as such or ignited to CuO. Quantities of Cu varying from 5 to 60 mg. can be detd. volumetrically by using 1 cc. of pyridine and 25 cc. of 0.1 *N* KCNS in a total vol. of 100 cc., filtering off the ppt., adding a known quantity of $AgNO_3$ and titrating the excess Ag^+ with 0.05 *N* NH_4CNS, using ferric alum as indicator. Cl^-, Br^-, Zn, Cd, Ni and Co must be absent and proper allowance must be made for a blank run in the absence of Cu. Another method, suitable for even smaller quantities of Cu, consists in pptg. the Cu similarly, filtering the soln. and detg. the excess CNS by the following method: Take 20 cc. of filtrate, add 0.5 cc. of NaOH (d. 1.32–1.36) and expel excess pyridine by a current of steam, using glass connections without any contact with rubber and keeping the vol. at 20 cc. Cool and dil. to 30 cc. Add 20 cc. NaBrO soln. (5 cc. Br_2, 50 cc of NaOH (d. 1.32–1.36) and water to make 500 cc.) to oxidize the excess CNS^- to SO_4^{--} and CNO^- with reduction of BrO^- to Br^-. After 15 min. add 10 cc. of 20% KI and 20 cc. of 2 *N* HCl. Titrate the liberated I_2 with 0.1 *N* $Na_2S_2O_3$. Run a blank without any Cu soln. W. T. H.

Separation of nickel from cobalt metal or ferro-cobalt. H. A. KAR. *Chemist Analyst* **20**, No 2, 15(1931). Treat the HNO_3 soln. with NH_4OH and $(NH_4)_2S_2O_8$, filter, add considerable NH_4Cl and treat with dimethylglyoxime. Dissolve the ppt. in acid and repeat the above treatment; the final Ni ppt. will be free from Co. W. T. H.

Estimation of copper and nickel in steel. W. L. KNOYLE. *Paper before Swansea Tech Coll. Met. Soc.*, 18 pp.(Feb. 22, 1930); *Metals & Alloys* **1**, 738.—If small amts. of Cu are assocd. with large amts of Fe, the sepn. is best effected by the pptn. of the Cu as a sulfide by means of ZnS in place of the usual NH_4 sulfocarbonate. No new method is offered for the estn. of the Ni. G. G.

New volumetric method for the estimation of sodium. A. BLENKINSOP. *J. Agr. Sci.* **20**, 511–6(1930). Certain disadvantages of the gravimetric $NaZn(UO_2)_3Ac_9$ method (*C. A.* **22**, 2898; **23**, 462; **24**, 5912), due to manipulative details, are overcome by a proposed method in which the U is detd. by reduction to U^{++++} by means of standard $TiCl_3$ soln. Ppt the Na as $(UO_2)_3ZnNaAc_9\ 6H_2O$, as in the gravimetric method, filter through a Jena glass filtering funnel (porosity G4), remove as much of the reagent as possible by suction and wash 2 or 3 times with 2-cc. portions of a satd. soln. of the ppt. in 95% alc. Dissolve the ppt in dil. HCl, transfer to a 500-cc. conical flask, add about 10 cc of strong HCl and displace the air in the flask by a stream of CO_2. Reduce the U to the uranous state by addn. of an excess of 0.02 *N* $TiCl_3$ soln. Maintaining the CO_2 atm., shake the mixt and allow to stand for 2 or 3 min. or heat to 40–50° to insure complete reduction. Add 20–25 cc. of 2% HF to stabilize, or even ppt., the U. After addn. of about 10 cc. of 10% KSCN, est. the excess of $TiCl_3$ by back titration with 0.02 *N* Fe alum soln. to a permanent red color. P. R. DAWSON

Determination of water in glycerols. L. F. HOYT AND P. C. CLARK. *Soap* **7**, No. 2, 25–27; *Oil & Fat Ind.* **8**, No. 2, 59–61(1931).—Water in concd. glycerols may be detd. directly by the Bidwell-Sterling distn. method using toluene as the boiling liquid. A variable but small amt. of glycerol (never exceeding 0.1 mg.) is carried over with the water, and the correction of the apparent percentage did not exceed 0.15% in any of the glycerols contg. up to 10% of water. The use of xylene b. above 100° is not advisable, as more glycerol is carried over and the time of distn. is not markedly shortened. An analysis of a 25 g. sample of dynamite glycerol to which 2.8 g. of water was added giving 10.37% water, gave a recovery, corrected for 0.036 g. of glycerol carried over, of 10.39% water. E. SCHERUBEL

Determination of phosphoric acid as ammonium phosphomolybdate or as phosphomolybdic anhydride. A. VON ENDRÉDY. *Z. anorg. allgem. Chem.* **194**, 239–57(1930).—For pptg. 0.0003–0.035 P_2O_5, it is recommended to add 8 g. NH_4NO_3, 20 cc. 4 *N* HNO_3 and 20 cc. of reagent (100 g. tartaric acid, 150 g. $(NH_4)_6Mo_7O_{24}\ 4H_2O$, 10–12 drops HNO_3 per l.). Dil. to 100 cc., shake vigorously and filter after the ppt. has settled. Wash the ppt. with 5% NH_4NO_3 which is 0.6 *N* in HNO_3, dry with acetone and weigh

or ignite. The dried ppt. contains 3.55% P_2O_5; after ignition it contains 3.92% P_2O_5. The tartaric acid is added to stabilize the soln. B. A. SOULE

Analysis of gases and vapors which affect oxidation of phosphorus. J. TAUSZ AND H. GÖRLACHER. *Z. anal. Chem.* **83**, 81–92(1931).—A method is given for the analysis of substances like hydrocarbons and $Fe(CO)_5$ which tend to prevent oxidation of P in mixts. with O_2 and air. As indication of the beginning of its oxidation, the luminescence shown by the P can be taken. The pressure of the gas at which this takes place is sharply defined and reproducible so that it can be called the "luminescence pressure." It serves to detect low concns. of impurities which would be difficult to detect in other ways. The literature on this subject of oxidation hindrance from 1797 to the present time is reviewed. The luminescence pressures of mixts. of O_2 and air with the following substances were detd.: benzene, cyclohexane, acetylene, methylcyclohexane, ethylene, propylene, cyclohexene, isoprene and $Fe(CO)_5$. On the basis of these data it is possible to analyze binary gas mixts. of these substances with either O_2 or air. The results quoted were accurate within about 0.05%. W. T. H.

Absorption spectrum of sulfohemoglobin. JEAN PRÉVOT. *J. usines gaz.* 576–80(1930).—H_2S leaves the 2 characteristic bands of hemoglobin unchanged, but adds a new one at 0.610–20μ, the red blood color being changed to olive-green. In analyzing suspected gas mixts. for H_2S the gas was washed with 200 cc. blood soln. in a gas-absorption app. A paraffin oil was used as the replacement fluid, instead of water. A min. of 30 cc. H_2S (room temp. and pressure) produced the characteristic band. CO_2 and O_2 did not interfere. K. H. ENGEL

Notes on the detection of carbon disulfide. F. FEIGL AND K. WEISSELBERG. *Z. anal. Chem.* **83**, 93–104(1931).—The sensitiveness of tests for CS_2 was studied and of 12 methods, the formation of a difficultly sol. Ni salt with "Hector's base," $C_{14}H_{12}N_4S$, proved the most sensitive test. In a small test tube of Jena glass, which is provided with a well-fitting rubber stopper, put a little of the soln. to be tested, a few crystals of $Ni(OAc)_2$ and some of the org. reagent. If the $Ni(OAc)_2$ is insol. in the liquid, add 5–10 drops of water. Stopper the tube, heat a few min. in a water bath, then remove and allow to cool. A pink color will appear if 0.0005 mg. of CS_2 is present in 1 cc. of soln. tested and a red ppt. if much more is present. The ppt. can be weighed and used as the basis of a gravimetric detn. Of the other methods tested, the next-best results were obtained by the reactions with NaN_3 and I_2, in which the CS_2 acts as catalyzer, and with HCHO and Na_2PbO_2; these reactions served to detect 0.002 mg. of CS_2 in 1 cc. of liquid. W. T. H.

A new reaction to differentiate between kaolin and talcum. E. TSCHIRCH. *Seifensieder Ztg.* **57**, 909–10(1930).—Boil about 1 g. of the substance with 10 cc. of 2 *N* HCl, filter, neutralize with AcOH and add 1 cc. of a freshly prepd. 1% alc. soln. of hematoxylin (ext. of "Blue-Wood"); a rose-violet color turning blue-violet (test for Al) indicates kaolin; a yellowish color indicates talcum. P. ESCHER

The chemical analysis of bastnasite. I. P. ALIMARIN. *Trans. Inst. Econ. Mineral.* (Moscow) No **44**, 55–6(1930).—F is sepd. from the decompd. mineral according to Berzelius and detd. by the Merwin colorimetric method. Rare earths and sesquioxides are pptd. with NH_4OH and then sepd. by Peter's oxalate method. Th is sepd. from the Ce and Y groups with H_2O_2 and Ce from the remaining rare earths by Br. Water is detd. by an improved Penfield method. Other common elements are detd. by the usual methods. H. C. PARISH

The determination of sulfate ions in chrome-plating baths. O. MACCHIA. *Industria chimica* **5**, 1346–51(1930).—After a lengthy review of the numerous methods which have been proposed for the detn. of SO_4 ions in chrome-plating solns., including an extensive bibliography, the following method is developed. To 20 cc. of soln. add 20 cc. of glacial AcOH and reduce Cr(6) with NH_2OH or C_6H_5NHOH, adding the reagent until there is no further evolution of gas. Add 150 cc. of water, boil and ppt. with 8 cc. of 10% $BaCl_2$. It is claimed that this method will give results within 5% of the truth. A. W. CONTIERI

Analysis by distillation. HANS WOLFF AND J. RABINOWICZ. *Chem. Fabrik* **1931**, 37–8.—Directions are given for constructing the simple app. and performing distns. by which the characteristics and boiling relations of solvents, single or mixed, may be detd. when only 2–4 cc. of substance is available. Charts show comparative results by this method and the Engler method for benzine, a mixt. of benzine and acetone, and for a mixt. b. 60–200°, but the nature of this mixt. is not stated. J. H. M.

Determination of the constituents of a mixture of volatile liquids. M. LEMARCHANDS. *Bull. soc. chim.* **49**, 80–4(1931).—The method, which can be used for the detn. of alc. and ether in pastes of Poudre B, depends upon the complete vaporiza-

tion of the alc. and ether in a vacuum, the detn. of the quantity of heat absorbed by this vaporization and the wt. of the substances vaporized. The app. consists of a silvered Dewar tube fitted with a stopper carrying a thermometer graduated in tenths of a degree and an Al tube which is provided with an exit tube to be connected with the vacuum pump. The sample is weighed in the Al tube which is placed in the heated Dewar tube which is filled with hot water. The tube is evacuated and the rate of cooling observed. The results obtained were better than those obtained by the usual methods. W. T. H.

Effect of light on the determination of ethylene. J. Louis Oberseider and J. H. Boyd, Jr. *Ind. Eng. Chem., Anal. Ed.* **3**, 123(1931).—By painting the Williams pipet black, except for a narrow vertical strip, the detn. can be made more accurate when made in sunlight, which probably increases the activity of Br upon heavy hydrocarbons so that the C_2H_4 results obtained by absorption in Br aq. are otherwise high when made in sunlight. W. T. H.

Volumetric determination of citric acid in calcium citrate. G. Romeo. *Rivista ital. essenze profumi* **11**, xxiii-xxvi(1929); cf. *C. A* **24**, 2963.—The Ca citrate is converted into the K salt and treated with an excess of standard $AgNO_3$ soln., the excess being titrated with thiocyanate. Oxalic acid, tartaric acid, HCl and H_3PO_4, but not $CaSO_4$ nor pectic substances, interfere. B. C. A.

Color reaction of glycerol with alkali thiosulfates. D. Ganassini. *Arch. ist. biochim. ital.* **2**, 239–42(1930).—Most of the color reactions of glycerol are due to its products of oxidation or dehydration. Of these, acraldehyde, which is formed by heating with $KHSO_4$ (or B_2O_3 or P_2O_5) either glycerol or its derivs., may be identified by spontaneous conversion of its phenylhydrazone into phenylpyrazoline, this giving an intense violet coloration in the presence of oxidizing agents in acid soln. Powd. $Na_2S_2O_8$ dissolves in very concd. glycerol soln., with slight heating, to a colorless soln., which becomes sky-blue and then deep indigo when heated to boiling. This reaction is not given by carbohydrates in general, but a much less intense coloration is obtained with the polyhydric alcs. To sep. glycerol from org. liquids and tissues, the material is mixed with water and filtered, the filtrate being treated with a slight excess of basic Pb acetate and filtered. After removal of the Pb as sulfide, the liquid is evapd. to dryness with milk of lime, the residue being extd. with a mixt. of 95% alc. (2 parts) and Et_2O (1 part) and the soln. evapd. to a sirup, to which the above test is applied. To ext. glycerol present as glycerides, glycerophosphate or lecithin, the material must first be hydrolyzed with NaOH. The coloration given with thiosulfate appears to be due to the transitory formation of the unstable blue modification of S. The test may be used also for the detection of thiosulfate. B. C. A.

New analytical applications of the reaction of ammonia on resorcinol in the presence of cations. Ligor Bey. *Bull. soc. chim.* [4], **47**, 1192–3(1930); cf. *C. A.* **23**, 4909, **24**, 2397.—NH_3 was added to a 5% soln. of resorcinol in ether, just to the point of re-solution. A soln. contg. 0.0011% $CdCl_2$ $2H_2O$, added carefully, gave a blue ring at the junction of the 2 layers in 26 min. It persisted 5–10 min. Lower concns. gave a noncharacteristic violet. In the analysis for Sn, stannic Sn gave the best results. The Sn was oxidized with Br until the soln. was a light yellow. Two or 3 cc. was shaken with 5 cc. NH_3 (d. = 0.925) for several min.; 2 or 3 cc. of 5% aq. resorcinol was added, giving a white ppt. of $Sn(OH)_4$, which turns blue in 2–20 min. This test is sensitive to 0.0015% $SnCl_2$ $2H_2O$. Lower concns. gave a noncharacteristic gray. The result is not affected by less than 400 times as much Sb as Sn. G. M. P.

Detection and estimation of hydroxyl groups in organic compounds. Huppmann. *Pharm. Ztg.* **76**, 113–4(1931).—This is a commentary on the usual methods (by the aid of AcCl, Ac_2O and BzCl) in connection with expts. on resorcinol, orcinol, Me salicylate and 2,7-hydroxytetralol, in which the procedure of Verley and Bölsing was used. W. O. E.

Iodoxybenzoate as a test reagent for free phenolic hydroxyl groups in organic compounds. Chauncey D. Leake. *Proc. Soc. Exptl. Biol. Med.* **28**, 148–50(1930).—Morphine salts treated with an aq. soln. of NH_4 iodoxybenzoate give a straw to garnet color reaction. No other opium alkaloid, except apomorphine, gives a color with this reagent. The reagent does not decompose the compds. with which it comes in contact; it reveals by an oxidizing color reaction the presence of a "free" phenolic hydroxyl group. The test should be useful in detecting and differentiating morphine and apomorphine from other opium alkaloids, adrenaline from ephedrine, acetarsone from other quinquevalent arsenicals. It detects phenol and cresol as preservatives in org. fluids. The test substance need not be miscible with the reagent; thorough shaking is sufficient. The pharmacol. effect of substances treated with this reagent does not

seem to be altered. Substances such as codeine, in which the H of the phenolic hydroxyl group is replaced, have much less toxicity and general pharmacol. action than the parent substances. C. B. BAILEY

Detection of hydrogen in volatile organic compounds. IRWIN STONE. *Chemist Analyst* **20**, No. 2, 7(1931).—By passing the vapors through a small opening so that they strike against hot CuO in a test tube, water is formed and condenses on the upper walls of the tube. W. T. H.

Note on the Ter Meulen-Heslinga methods for the estimation of nitrogen, carbon and hydrogen in organic material. E. P. GRIFFING AND C. L. ALSBERG. *J. Am. Chem. Soc.* **53**, 1037–9(1931).—This is a discussion and suggestion of modifications of the methods for N, C and H developed by Meulen and Heslinga (cf. *C. A.* **19**, 226, 2465). C. J. WEST

A method for the (mercurometric) determination of formaldehyde and hexamethylenetetramine. ENRIQUE E. REBAGLIATI. *Ann. Farm. Bioquim.* **1**, 150–8(1930).—The substances are reduced with the aid of Knapp's reagent, modified, and the final detn is accomplished by titration with 0.1 *N* $AgNO_3$ according to the method of Denigès. R. claims that the method is rapid and exact. B. S. LEVINE

New method for the estimation of halogens in organic substances. JUAN A. SANCHEZ. *Ann. farm. bioquim.* **1**, 121–34(1930).—Heat the org. substance in a closed tube together with solid K_2MnO_4, ext with water and destroy the excess of the reagent with H_2O_2. Det. the halogen titrimetrically. The method can be applied to quantities of org. matter as low as 0.02 g. It is applicable with a high degree of precision to aliphatic and cyclic derivs. and to substances rich in C and poor in halogen, and *vice versa* The detn. of halogens in substances such as C_6Cl_6 and the halogen derivs. of phenyl is accomplished with greater ease than by the method of Carius. B. S. LEVINE

The activity of Professor F. Wald in analytical chemistry (QUADRÁT) **2.** Conductivity measurements and titrations (HAHN) **2.** Oxidation of heterocyclic As compounds by I (RAZUVAEV, MALINOVSKII) **10.**

Fälschungen. Edited by SIEGFRIED TÜRKEL. Graz: Ulr. Moser. 93 pp. M 12. Reviewed in *Analyst* **56**, 141(1931).

SCHUFTAN, P.: **Gasanalyse in der Technik.** Leipzig: S. Hirzel. 80 pp. M. 5.50.

8—MINERALOGICAL AND GEOLOGICAL CHEMISTRY

EDGAR T. WHERRY AND J. F. SCHAIRER

Gallium. IV. Occurrences of gallium in zinc minerals. JACOB PAPISH AND CHESTER B. STILSON. *Am. Mineral.* **15**, 521–7(1930).—The arc spectrographic method, with graphite and also Ag electrodes, was used in a study of a no. of Zn minerals for the detection of Ga. The relative intensity of the Ga lines is listed. Sphalerite, gahnite, hopeite, parahopeite and adamite were found to be galliferous. Ga was not detected in calamine, smithsonite, zincite, hydrozincite, goslarite, hodgkinsonite, hardystonite and clinohedrite. A. M. BRANT

Tellurium and tellurium minerals of Hungary. S. KOCH. *Bányás. Kohás Lapok* **62**, 425–9, 449–52(1929).—Te is the one element discovered by a Hungarian scientist, Pál Kitaibel. Eleven Te minerals are found in Hungary, ten of which were first described there. The genetic relations of these are summarized. Native Te of Facebánya contained 0.15–2.78% Au. Tetradymite, hessite, wehrlite, petzite, muthmannite, krennerite, sylvanite, nagyágite, tellurite and stützite are described. The mines which once yielded such Au-contg. tellurides belong now to Roumania, and most of them are not being worked. S. S. DE FINÁLY

Notes on rickardite, a new occurrence. WM. P. CRAWFORD. *Am. Mineral.* **15**, 272–3(1930).—Rickardite, Cu_4Te_3, has been found in the sulfide ores of the Brigg's mine, Warren, Ariz. A. M. BRANT

Crystallography of stibnite and orpiment from Manhattan, Nevada. CHARLES PALACHE AND DAVID MODELL. *Am. Mineral.* **15**, 365–74(1930).—The crystallographic features are given in detail. The data on orpiment give addnl. proof that the mineral is monoclinic. A. M. BRANT

Crystal habit of zinc blende. G. KALB AND L. KOCH. *Centr. Mineral. Geol* **1929A**, 353–7.—Zn blende is referred to the octahedral isoharmonic crystal type; 2 forms, resp., black and reddish brown to reddish yellow, are distinguished. B. C. A.

Arsenoferrite from Jachymov, Czechoslovakia. Wm. F. Foshag and M. N. Short. *Am. Mineral.* 15, 428–9(1930).—This mineral, $FeAs_2$, is the arsenide member of the pyrite group. It is isotropic in character, differing from löllingite which is anisotropic. It can be distinguished from smaltite only by chem. tests. The color is dull medium gray. The phys. properties are: metallic luster, no cleavage, hardness 5.5, sp. gr. 6.42. Jachymov arsenoferrite occurs as fine-grained irregular masses in a carbonate gang. Chem. analysis of material contg. some gang gave: Fe 24.88, Cu 1.34, Pb 0.05, $CaCO_3$ 34.00, $MgCO_3$ 1.57, As 66.84, S 1.08, sum 99.76%; Co and Ni were not detected. The blowpipe characteristics are the same as those for löllingite. A. M. Brant

The crystal structure of cryolithionite. G. Menzer. *Z. Krist.* 75, 265–87(1930).—A detailed report of the structure of $Li_3Na_2Al_2F_{12}$ (cf. *C. A.* 22, 2340). The side of the unit cube is 12.097 ± 0.004 A. U. and the calcd. d. is 2.791. Coördinates for the F atoms are 0.035, 0.04 and 0.64 (all ±0.01). Although the structure is analogous to that of garnet, the diffraction effects are quite different, for in garnet the O atoms are almost negligible, while in cryolithionite the corresponding F atoms are the most important. L. S. Ramsdell

Boleite, pseudoboleite and cumengeite. B. Gossner. *Z. Krist.* 75, 365–7 (1930).—A criticism of the structure detn. of Friedel and Hocart (*C. A.* 24, 4734). G. maintains that the x-ray data show boleite to be cubic and not tetragonal. L. S. Ramsdell

Origin, weathering and artificial coloring of agate. H. Heinz. *Chem. Erde* 4, 501–25(1930).—The different layers in agates were examd. chemically, optically and by x-rays. Analyses are given of the white weathered crust and of the fresh agates; *e. g.*, flint from the English chalk gave I for the inner black portion and II for the white chalk-like crust.

	SiO_2	$(Fe,Al)_2O_3$	(Mg,Mn)O	CaO	Ign.	D.
I	97.93	0.27	0.20	0.59	1.25	2.596
II	96.72	0.28	0.09	1.71	1.68	2.501

The portion sol. in 10% KOH soln., taken to represent admixed opal, varies in different bands from 5.02 to 30.69%, with a corresponding range in d. from 2.620 to 2.601. Artificial coloring, by soaking in sugar soln. for 14 days and then in concd. H_2SO_4, was effected in the finer-grained layers contg. more opal, rather than in porous weathered layers. Banded and tubular structures, similar to those seen in agates, were obtained experimentally by the interaction of silicic acid sols and salt solns. B. C. A.

Agate. G. Linck and H. Heinz. *Chem. Erde* 4, 526–8(1930).—A discussion of the preceding abstr. The banding of agate is attributed to the alternating action of solns. of silicic acid and of salts, the former during the dry season and the latter during the wet season of the year. B. C. A.

The relations of magnetite and ilmenite in the magnetite deposits of the Duluth gabbro. G. M. Schwartz. *Am. Mineral.* 15, 243–52(1930).—Polished surfaces of the titaniferous magnetite ores and gabbro were examd. in reflected light. The Ti was found to occur only in the form of ilmenite, as grains and as intergrowths along the parting planes of magnetite. The intergrowths are estd. to amount to 15% of the ore. Their texture is attributed to the breaking down of a solid soln. A. M. Brant

Four stages in the alteration of the Villeneuve uraninite. H. V. Ellsworth. *Am. Mineral.* 15, 455–60(1930).—The specimen, found in 1886, shows well-marked zones of material due to progressive alteration. The central zone A has a steely blue-black color, hardness 6, sp. gr. 9.144; zone B has a pitch-black color, hardness 4.5, sp gr. 7.779; zone C has a bright "flame-scarlet" color, hardness 3.5, sp. gr. 5.273, waxy luster; zone D is a very thin irregular layer with hardness 3 and has a buff to apricot-yellow color and waxy luster. The chem. analysis of the first 3 are tabulated. The results indicate that when analyzing altered uraninites for age detns., all red and yellow alteration products should be excluded. This is due to the abnormal increase in the Pb-Ur ratio in these products. A. M. Brant

Uraninite from Placer de Guadalupe, Chihuahua. Roger C. Wells. *Am. Mineral.* 15, 470–3(1930).—The mineral occurs in a calcite vein about 2 ft. thick between porphyry and shale. It is intimately assocd. with Au. The nodules range from small specks to the size of a walnut. Above the water level the pitchblende is leached out leaving wires of Au and small quantities of uranophane and a dark green U mineral. The mean of 2 analyses is: UO_3 70.09, UO_2 22.69, ThO_2 0.20, CeO_2 0.71, La_2O_3 etc., 1.02, Y_2O_3 etc., 3.41, Fe_2O_3 0.10, As_2O_3 0.06, PbO 0.40, CaO 0.30, TiO_2 0.06, Al_2O_3 0.25, H_2O (0.41), sum 99.70%. The age of the veins calcd. from the Pb-Ur ratio

is 36 million years. The sp. gr., 10.63, detd. by pycnometer, is the highest so far reported for uraninite. A. M. BRANT

Euhedral magnesite crystals from Winkler County, Texas. JOHN T. LONSDALE. *Am. Mineral.* 15, 238–9(1930).—Magnesite crystals 1–5 mm. long were obtained from drill cores at 2690 feet. The matrix is dolomite limestone contg. flint nodules. Many of the crystals are stained with petroleum or asphalt. A. M. BRANT

The occurrence of magnesite and of iron ores at Tarrekaisse, Sweden. ALVAR HÖGBOM. *Geol. Fören. Förh.* 52, 417–30(1930).—The magnesite is usually accompanied by chlorite, asbestos and magnetite. The probable formation of the ores is discussed. WILHELM SEGERBLOM

Feldspars in the Adirondack anorthosite. HAROLD L. ALLING. *Am. Mineral.* 15, 267–71(1930).—A discussion of an article by Barth (*C. A.* 24, 5258). A. concludes that (1) the plagioclase of the Adirondack anorthosites consists of labradorite grading into andesine with an appreciable though small percentage of K-feldspar in solid soln., and (2) late-stage interstitial feldspars are Na-rich anorthoclases and K-bearing oligoclases. The latter may be untwinned. A. M. BRANT

A chromium-bearing pyroxene from Jagersfontein, S. Africa. H. O'DANIEL. *Z. Krist.* 75, 575(1930).— This dark-green mineral occurred as a nodule in the blue-ground. The angle between the 110 and $1\bar{1}0$ cleavages was 92°49′; between 110 and 001, 79°7′. Analysis gave: SiO_2 53.53, Al_2O_3 1.30, Cr_2O_3 1.96, FeO 2.10, CaO 22.96 and MgO 17.88, sum 99.73%; n_D: α 1.6722, β 1.6847, γ 1.7015. L. S. RAMSDELL

A titaniferous augite from Chaudrawati, Sirohi State, Rajputana. A. L. COULSON. *Records Geol. Survey India* 63, 448–50(1930).—The mineral occurs in a contact metamorphic product at the junction of olivine gabbro with calcic rock. Its assocd. minerals are calcite, wollastonite, pectolite, quartz, microcline, orthoclase, plagioclase and magnetite. Optical data are given. ALDEN H. EMERY

Iron-rhodonite from Tuna Hästberg. N. SUNDIUS. *Geol. Foren. Forh.* 52, 401–6 (1930).—An ore found at Tuna Hastberg was a very Mg-poor olivine holding 27.9% MnO and 40% FeO, small grains of garnet and a pyroxene-like mineral which made up 4 to 5% by vol. of the ore. The last-named mineral was found to be an Fe-rich rhodonite with the compn.: SiO_2 47.78, Al_2O_3 0.08, Fe_2O_3 0.11, FeO 14.51, MnO 29.20, MgO 1.93, CaO 6.55, H_2O 0.09, sum 100.25%. The mineral is colorless or slightly pink and has 2 excellent cleavages nearly at right angles to each other. Discussion of the work of Weibull and of Palmgren and Sobral on similar minerals leads S. to conclude that the name iron-rhodonite should be reserved for members of the series which contain considerable amts. of FeO. WILHELM SEGERBLOM

The structure of anthophyllite, $H_2Mg_7(SiO_3)_8$. B. E. WARREN AND D. I. MODELL. *Z. Krist.* 75, 161–78(1930)(in English).—Anthophyllite is the simplest orthorhombic amphibole. X-ray data lead to the formula $H_2Mg_7(SiO_3)_8$ rather than $MgSiO_3$. Rotation photographs give a = 18.5, b = 17.9 and c = 5.27 A. U. The unit contains 4 mols. and the space group is V_h^{61}. Compared with enstatite (*C. A.* 25, 1420) the values for a and c are identical, but b for anthophyllite is twice that for enstatite. A block of enstatite is multiplied by the action of symmetry planes to form the anthophyllite cell, except for $^1/_8$ of the Mg atoms, which fall in unlikely positions and drop out. Each Si is surrounded by 4O atoms tetrahedrally arranged. Sharing of tetrahedra corners gives rise to the characteristic amphibole double Si-O chains. One-twelfth of the (O, OH) positions are not bound to Si, but to only 3Mg. These are only singly charged and must be OH. The general relations between amphiboles and pyroxenes are discussed. L. S. RAMSDELL

Soda-rich anthophyllite asbestos from Trinity County, California. J. D. LAUDERMILK AND A. O. WOODFORD. *Am. Mineral.* 15, 259–62(1930).—The country rock is serpentine contg. minute branching veins of chrysotile and much thicker veins (up to 5 cm.) of amphibole asbestos. They are short branching and lie in the crushed slickensided rock in roughly parallel positions. The fibers are usually perpendicular to the walls. The material was found to be anthophyllite with α = 1.606, β = 1.613, γ = 1.623. Z, parallel to elongation, was pale yellow green, in the other directions colorless. Analysis gave: SiO_2 57.70, Al_2O_3 2.00, Fe_2O_3 trace, FeO 5.32, MgO 21.12, CaO 5.10, Na_2O 7.40, K_2O absent, MnO trace, H_2O^+ 1.80, H_2O^- 0.30, sum 100.74%. A. M. B.

An association of anthophyllite and enstatite. F. COLES PHILLIPS. *Geol. Mag.* 67, 513–6(1930).—These minerals were observed in thin-sections of rocks from the Shetland Islands. The anthophyllite shows a variable degree of alteration to talc. The enstatite is of later formation than the anthophyllite, but there is little evidence that the pyroxene formed at the expense of the amphibole. A. M. BRANT

Hypersthenization and its explanation. D. GUIMARAES. *Ann. acad. brasil. sci.* **2**, 1–11(1930).—The formation of hypersthene from diopside by way of clinoenstatite is discussed from the crystallographic point of view, and a general theory is put forward to account for the chem. transformations which have occurred for silicate minerals. It is supposed that at high temps. and pressures the small quantity of water present acts as an electrolyte, and interaction of silicates, or of silicates and SiO_2, and the transformation of one mineral into another is possible in directions controlled by the H-ion concn. B. C. A.

Tremolite from near Jasidih, Bihar. A. L. COULSON. *Records Geol. Survey India* **63**, 444–6(1930). ALDEN H. EMERY

Changes in hornblende at about 800°. VIRGIL E. BARNES. *Am. Mineral.* **15**, 393–417(1930).—A set of 14 samples of hornblende including edenite and pargasite and 6 of the tremolite-actinolite series were studied optically before and after heating in air. The samples were later heated to 850° in a stream of H and the optical properties again studied The results are given in tabular and graph form. It was found that green hornblende when heated in air changes to brown hornblende, with the optical properties of basaltic hornblende. The Fe-poor hornblendes do not change on heating. Tremolite behaves like the Fe-poor hornblendes and actinolite like the iron-rich ones. The changes observed in heating the latter are: an increase in d., *ns*, birefringence and dispersion; a decrease in extinction angle; a change in optic angle to about 65°; a change in pleochroism from greens to browns. The birefringence of brown hornblende in violet is greater than that for red, and the opposite is in general true for common hornblende. The wt.-% loss on heating is only a fraction of the H_2O obtained by analysis; there is marked conversion of Fe^{++} to Fe^{+++}. Heated hornblendes in general show a more complete change in Fe^{++} than basaltic hornblendes. Dehydration has little effect on the optical properties, but they change almost in proportion to the change in the total Fe oxides, with Fe^{+++} being especially influential. Brown hornblende when heated in H changes back to green hornblende. Inversion does not take place. In dehydration, H and not H_2O (except that which is not a constituent part of the space lattice) is given off. The O remains in the mineral, either oxidizing Fe^{++} to Fe^{+++}, or in the absence of Fe^{++} remaining free because of its size. A. M. BRANT

Notes on some Franklin minerals. L. H. BAUER AND HARRY BERMAN. *Am. Mineral.* **15**, 340–8(1930).—*Cummingtonite* (Zn, Mn-bearing) was found embedded in rhodonite or garnet. The green prismatic crystals have a cleavage angle of 54°28′. The chem. compn. is: SiO_2 49.74, Al_2O_3 1.72, FeO 12.80, MgO 8.31, ZnO 10.46, MnO 13.79, CaO 0.49, Na_2O 0.22, H_2O^+ 2.16; sum 99.69%. The optical properties are: biaxial −, 2V = 75°, ZAc = 15°, Y = b, α = 1.657, β = 1.674, γ = 1.685. *Apophyllite* found as pale-pink radiating crystals in limestone has the compn. SiO_2 50.90, CaO 24.74, K_2O 3.70, Na_2O 0.42, MnO 0.47, ZnO 1.79, H_2O 17.71%. The derived formula is (Ca, K, Na, Mn, Zn)$_2$ $Si_8O_8.3^1/_2H_2O$. *Barysilite* occurs as thin films and veinlets assocd. with garnet, axinite, hardystonite. The chem. compn. is: SiO_2 16.84, PbO 77.35, MnO 3.33, FeO 0.23, Al_2O_3 0.59, CaO 0.21, MgO 0.78, ZnO 0.30, H_2O 0.07, sum 99.70%; the formula is $3PbO.2SiO_2$. The optical properties are: uniaxial−; ω = 2.033, ϵ = 2.015. *Celestite* is reported from Sterling Hill. It occurs in cavities in franklinite ore as good crystals tabular parallel to *a*(100). *Chlorophoenicite* (previously described as clinozoisite) is compared with that mineral. *Datolite* has been found in crystals tabular to *b*(010). *Ferroschallerite*, in which the Mn of schallerite is partially replaced by Fe, has the compn.: SiO_2 31.12, MnO 29.22, FeO 17.12, MgO 0.12, ZnO 3.63, As_2O_3 12.46, H_2O 6.42, sum 100.09%. A single specimen of *manganbrucite* was found. This had a Mg to Mn ratio of 5:1. The chem. analysis of *svabite* is: insol. 0.29, H_2O 1.32, F 1.41, CO_2 trace, CaO 45.89, ZnO 1.54, MnO 1.23, MgO 0.84, PbO 0.51, As_2O_5 35.24, P_2O_5 12.54, sum, corrected for O = F_2, 100.22%; sp. gr. is 3.542 and ω = 1.684. The relations of the members of the apatite-svabite series are discussed. A. M. BRANT

The structure of hardystonite, $Ca_2ZnSi_2O_7$. B. E. WARREN AND O. R. TRAUTZ. *Z. Krist.* **75**, 525–8(1930)(in English).—From rotation and oscillation photographs it is shown that the unit cell and space group of hardystonite are the same as those found for melilite (*C. A.* **24**, 4736). The dimensions are a = 7.83, c = 4.99 A. U., c/a = 0.637. The at. arrangement is the same as in melilite, except that the (Mg, Al) is replaced by Zn. L. S. RAMSDELL

Crystal lattice of eulytite, $Bi_4Si_3O_{12}$. G. MENZER. *Centr. Mineral. Geol.* **1928A**, 420–1.—Powder photographs show a cubic, space-centered lattice, a_0 10.25 ± 0.02 A. U.; d. 6.32 ± 0.21. If a mol. wt. of 1109 is assumed, there are 3.7 mols. in the unit cell. B. C. A.

The structure of danburite, $CaB_2Si_2O_8$. C. DUNBAR AND F. MACHATSCHKI. *Z. Krist.* **76**, 133–46(1930)(in English).—The orthorhombic unit cell has the dimensions $a = 8.75$, $b = 8.01$ and $c = 7.72$ A. U. If the symmetry is holohedral, the space group is V_h^{16}. There are 4 mols. in the cell. The unit of structure is not an SiO_4 group, but rather Si_2O_7, 2 tetrahedral groups being linked by a common O atom. The eighth O atom forms a tetrahedron with O atoms from $3Si_2O_7$ groups. The B atoms are at the centers of these tetrahedra. Although the presence of B makes the detn. of structure difficult, parameters are derived for all positions. L. S. RAMSDELL

Zoisite and its native rock from the high mountains of Västerbotten. ERLAND GRIP. *Bull. Geol. Inst. Univ. Upsala* **22**, 289–98(1930).—Three samples of amphibolite from different localities were examd. The rock is dark grayish green, somewhat slate-like, with porphyritic injections of zoisite in a granular base of hornblende, plagioclase and quartz. The long, flat, striated zoisite needles are white with a tinge of green, and are, in general, oriented with respect to the cleavage plane (100). The optical orientation is $\alpha = c$, $\beta = b$, $\gamma = a$. The sp. gr. is 3.368, it is optically + and $2V = 30–56°$; $\alpha = 1.7011$, $\beta = 1.7020$, $\gamma = 1.7073$. Analysis gave: SiO_2 39.37, Al_2O_3 32.06, Fe_2O_3 1.47, FeO 0.15, MnO 0.02, CaO 24.32, MgO none, TiO_2 0.36 and H_2O 1.89%. Descriptions and analyses of the other mineral constituents are included. The composite material from Spängfjället, sp. gr. 3.090, contained hornblende 70.7, zoisite 10.3, quartz 7.7, plagioclase 3.5, garnet 5.7 and titanite 2.1% by wt. W. L. HILL

Sapphirine in the Vizagapatam district. H. CROOKSHANK. *Records Geol. Survey India* **63**, 446–8(1930)—The material occurs as a thin rim around grains of hercynite Optical data are given. ALDEN H. EMERY

Formulization of silicates. W. KUNITZ. *Chem. Erde* **4**, 549–50(1930).—A further discussion of the chem. formula of tourmaline, with comparison of the views of K. (*C. A.* **25**, 1461) and of Machatschki (*C. A.* **23**, 5132 and *C. A.* **25**, 1461). To conform with the detn. that the unit cell contains 3 mols., the empirical formula may be multiplied by 3/2 or 9/4. B. C. A.

The space lattice of natrolite. FRANZ HALLA AND ERNST MEHL. *Z. Krist.* **75**, 421–9(1930).—The orthorhombic unit cell of natrolite has the dimensions $a = 18.384 \pm 0.004$, $b = 18.715 \pm 0.027$ and $c = 6.632 \pm 0.008$ A. U. It contains 8 mols. of $Na_2Al_2Si_3O_{10}.2H_2O$. If holohedral symmetry is assumed, the space group is V_h^{23}; otherwise it is C_{2v}^{18} or V^7. L. S. RAMSDELL

The crystal structure of muscovite. W. W. JACKSON AND J. WEST. *Z. Krist.* **76**, 211–27(1930)(in English).—The structure for muscovite proposed by Pauling (*C. A.* **24**, 2694) has been confirmed, and the details of the structure are discussed. Four mols. of $KAl_2(AlSi_3)O_{10}(OH)_2$ are in the monoclinic unit, with $a = 19.96$, $b = 9.02$, $c = 5.18$ A. U. and $\beta = 95°30'$. The close relations between diopside, tremolite and muscovite are discussed. L. S. RAMSDELL

The structure of chrysotile, $H_4Mg_3Si_2O_9$. B. E. WARREN AND W. L. BRAGG. *Z. Krist.* **76**, 201–10(1930)(in English).—Chrysotile (variety of serpentine) occurs only in bundles of parallel fibers, with random orientation about the fiber axis (= c axis) It is not possible to obtain rotation photographs about any other axes, and exptl. data are consequently meager. This proposed structure is believed, however, to be correct in its main features. The unit cell is monoclinic, with $a = 14.66$, $b = 18.5$, $c = 5.33$ A. U. and $\beta = 93°16'$. The space group is probably C_{2h}^3. The unit contains 4 mols. of $(OH)_6Mg_6Si_4O_{11}.H_2O$. Each Si atom is surrounded by a tetrahedron of O atoms. Sharing of O atoms by adjacent tetrahedra gives rise to double Si-O chains, just as in the amphiboles. These have the compn. Si_4O_{11}, and between them lie sections of Mg and OH arranged as in brucite ($Mg(OH)_2$). Although the formula calls for $4H_2O$, these are not H_2O mols, as each H is shared by 2O atoms. The lateral binding between the chains is very weak, the perfect fibrous character of chrysotile being thus accounted for. L. S. RAMSDELL

Aluminum silicate from Allchar, S. Serbia. F. TUCAN. *Bull. soc. franç. minéral.* **52**, 42–7(1929).—The product, having a compn. corresponding with the formula $Al_2O_3.3SiO_2.7H_2O$, has d_{22} 1.9818; when heated it evolves water (completely at 650°) having an acid reaction. The dehydration curve ($CaCl_2$, H_2SO_4 or P_2O_5 being used) is continuous. B. C. A.

The chemical composition of lessingite and cerite from the Kyshtym district. YU. N. KNIPOVICH. *Trans. Inst. Econ. Mineral. and Met.* (Moscow) No. **44**, 46(1930).—The formula for the new mineral lessingite may closely approach $H_3Ca_2Ce_4Si_3O_{16}$. On the assumption of the presence of an admixt. of bastnäsite, the compn. of the cerite is

$4Ce_2O_3.6SiO_2.H_2O$ which closely approaches Swedish cerite but contains less H_2O.
H. C. PARISH

Cenosite from North Burgess Township, Lanark County, Ontario. R. P. D. GRAHAM AND H. V. ELLSWORTH. *Am. Mineral.* **15**, 205–19(1930).—The mineral occurs as minute pink or pale rose colored crystals on calcite and quartz in soln. cavities in a coarse granular limestone. Chalcopyrite and celestite are also present. It is orthorhombic in crystn., prismatic in habit. The mineral is optically −, with 2 V about 39°45′, $\alpha = 1.644$, $\beta = 1.689$, $\gamma = 1.691$. Orientation $a = \alpha$, $b = \beta$, $c = \gamma$. Other phys. properties are: hardness 5–6, sp. gr. 3.612, vitreous to pearly luster, no cleavage. Chem. analysis gave: SiO_2 34.66, $(Ce, La, Di)_2O_3$ 3.22, $(Yt, Er)_2O_3$ 35.46, CaO 16.72, SrO 0.31, Al_2O_3, Fe_2O_3, BeO 0.22, MnO 0.02, Na_2O 0.27, K_2O trace, MgO 0.19, CO_2 6.58, SO_3 0.04, H_2O 2.54, H_2O (110–130°) 0.04, sum 100.23%; formula deduced, $2CaO.(Ce, Yt)_2O_3.CO_2.4SiO_2.H_2O$.
A. M. BRANT

Allodelphite, a new silicoarsenite from Långban. P. QUENSEL AND H. VON ECKERMANN. *Geol. Fören. Förh.* **52**, 639–46(1930).—The mineral which Flink labelled "undescribed mineral no. 325" in his catalog of new minerals from Långban (cf. *C. A.* **19**, 2623; **20**, 1778) is now named *allodelphite* to show its relation to synadelphite. Allodelphite occurs as thin crusts of small well-defined elongated tabular crystals of a dark red-brown color, but deep wine red in transmitted light. The luster is submetallic, fracture conchoidal and streak chocolate brown. It is optically −; sp. gr. = 3.573. The compn. is: SiO_2 6.23, As_2O_5 21.91, As_2O_3 0.62, Sb_2O_5 0.15, Al_2O_3 1.50, Fe_2O_3 0.98, PbO 0.39, MnO 50.30, CaO 1.10, MgO 6.22, K_2O 0.74, Na_2O 0.53, H_2O 8.82, sum 99.49%. Allodelphite is evidently a new representative of the small group of silicoarsenates or silicoarsenites. Two general formulas are suggested: $9RO.As_2O_5.SiO_2.5H_2O$ and $5RO.2R_2O_3.As_2O_5.SiO_2.5H_2O$. Q. and E. discuss these in the light of a new analysis of the related mineral synadelphite and conclude that, pending further investigation, the formula of allodelphite may be assumed to be $MnO.(Mn_2, As_2, MnSi)O_3.H_2O$. W. S.

The hiddenite deposit in Alexander County, North Carolina. CHARLES PALACHE, S. C. DAVIDSON AND E. A. GORANSON. *Am. Mineral.* **15**, 280–302(1930).—The genetic history of this deposit was traced, 3 stages of mineralization being distinguished, as follows: (1) the *lit-par-lit* pegmatite stage, (2) the hiddenite pegmatite stage, (3) the hiddenite cavity stage. The minerals of the latter stage are described in some detail. The optical properties of *hotmquisitite* are $\alpha = 1.625$, $\beta = 1.645$, $\gamma = 1.654$; pleochroism X = light yellow, Y = violet, Z = purplish violet; Z nearly parallel to *c*; dispersion weak $\rho > v$; 2V = 51°. The mineral is compared as to chem. compn. with the find at Utö, Sweden.
A. M. BRANT

Paragenesis of the Newry pegmatite, Maine. H. J. FRASER. *Am. Mineral.* **15**, 349–64(1930). Structural and textural data indicate 3 periods during the formation of the pegmatite, and that the process was essentially continuous. In the first period mainly silicates were deposited. During the second period these changed to Li silicates and phosphates. The third period was one of deposition of Mn, Fe, Al and Be phosphates.
A. M. BRANT

Pegmatite minerals of Poland, Maine. HARRY BERMAN AND F. A. GONYER. *Am. Mineral.* **15**, 375–87(1930). The minerals found in pockets in microcline comprised: *amblygonite*, as a compact rim around the pockets; *lithiophilite*, partially replaced by reddingite. The chem. compn. is: FeO 10.96, MnO 31.90, Na_2O 0.30, Li_2O 9.55, H_2O + 0.40, P_2O_5 46.35, insol. 0.16, sum 99.62%. The optical properties of the analyzed material were: biaxial +, 2V = 60°; α and γ parallel to cleavages. $\alpha = 1.675$, β 1.679, γ 1.688. *Rhodochrosite* occurs as an irregular layer over the amblygonite contg. cavities with small protruding crystals of the mineral, strongly etched. *Quartz* occurs as min. doubly terminated crystals in veinlets in the rhodochrosite. *Eosphorite* (cf. Drugman *C. A.* **10**, 31) occurs as well-formed crystals embedded in rhodochrosite. *Reddingite* replaces rhodochrosite as granular masses and as veinlets in lithiophilite. The color varies from colorless to deep brownish red, depending on the degree of alteration to landesite. The chem. compn. is: Fe_2O_3 0.95, FeO 12.68, MnO 38.36, CaO 0.15, $Na_2O.K_2O$ trace, H_2O + 13.16, P_2O_5 34.52, insol. 0.45, sum 100.27%; formula $3(MnFe)O.P_2O_5.3H_2O$, with Mn:Fe = 3:1; optically biaxial + with 2V = 65°; $\alpha = 1.655$, β 1.662, γ 1.683. *Dickinsonite* occurs as small, tabular, highly etched crystals assocd. with fairfieldite. The color is brownish to yellowish green. The chem. compn. is: FeO 12.33, MnO 31.83, MgO 1.67, CuO 2.01, Na_2O 7.41, K_2O 1.73, Li_2O 0.20, H_2O 1.82, P_2O_5 40.78, insol. 1.00, sum 100.78%; formula $7(MnFe)O.2(Na_2K_2Ca)O.3P_2O_5.H_2O$; optically biaxial + with 2V near 90°; $n\alpha = 1.648$, $\beta = 1.655$, $\gamma = 1.662$. *Fairfieldite* occurs as white foliated plates in rhodochrosite and on dickinsonite. Its compn. is: FeO 4.74, MnO 14.82, CaO 30.85, Na_2O 0.41, K_2O none, H_2O 9.70, P_2O_5 39.55, insol.

0.50, sum 100.58%; formula $(MnFe)O.2CaO.P_2O_5.2H_2O$, with Mn:Fe::3:1; optically biaxial + with 2V = 86°; α = 1.640, β = 1.650, γ = 1.660. *Apatite* occurs as small "nailhead" crystals resting on the other crystals. *Landesite*, a new mineral, is a brown alteration product of reddingite. The crystals are rough and of a form suggesting the unit pyramid of the latter. Two cleavages are shown. The chem. compn. is: Fe_2O_3 + FeO 13.91, Mn_2O_3 2.69, MnO 33.65, MgO 3.07, CaO 1.39, H_2O 13.60, P_2O_5 31.94, insol. 0.13, sum 100.38%. This analysis yields the formula $3Fe_2O_3$.-$20MnO.8P_2O_5.27H_2O$. The mineral is related to salmonsite in compn. and to sicklerite in optical properties. These are: biaxial −, 2V large; Z perpendicular to best, and X to an inferior cleavage; pleochroism X = dark brown, Y = light brown, Z = yellow; α 1.720, β 1.728, γ 1.735. *Cassiterite* is contemporaneous with rhodochrosite. It is identified optically by the following: uniaxial+; ω = 2.01 = light green, ϵ = brown. The pleochroism is worthy of note. A *beryl* crystal from this locality has on the base an excellent etch figure of the forms $(10\bar{1}1)$ and $(11\bar{2}1)$. Its ω = 1.585, indicating high alkali content and probably Cs. This crystal was not a part of the phosphate suite of minerals and is probably of an earlier period. The solns. leading to the formation of the foregoing minerals were essentially of Mn phosphate with carbonate and water, Li-rich in the earlier phase and Ca-rich toward the end. A. M. BRANT

Pegmatite minerals of Ontario and Quebec. HUGH S. SPENCE. *Am. Mineral.* 15, 430–50, 474–96(1930).—The minerals occurring in (1) the normal granite pegmatites of Ontario and Quebec and (2) the syenite pegmatites of the Wilberforce district, Ontario, are reviewed and the pegmatites described. The minerals are listed for those of more restricted regional development: (1) the Sn-bearing pegmatites of New Ross, Nova Scotia, (2) mica-apatite-pyroxenite pegmatites of Ontario and Quebec, (3) Li-pegmatites of southeastern Manitoba and (4) granite pegmatites of British Columbia. A. M. BRANT

A remarkable occurrence of thucolite and oil in a pegmatite dike, Parry Sound district, Ontario. HUGH S. SPENCE. *Am. Mineral.* 15, 499–520(1930); cf. *C. A.* 23, 796.—The location is the Besner mine in Henvy township. The pegmatite is a light-pink perthite. The mineral occurred near the dike walls, at or near the surface. It was closely assocd. with radiated groups of a highly altered mineral now chlorite, thought to have originally been pyrorthite. The mineral thucolite occurred in part as well-defined cubic crystals, apparently pseudomorphic after uraninite. Massive material is jet black with a conchoidal fracture and a sooty brownish black streak. Its hardness = 4 and sp. gr. 1.57. The cubes have a dull earthy appearance. Analysis gave:

	Thucolite Crystals	Massive Thucolite
Moisture, 110°.	2.00	1.60
Volatile hydrocarbons	20.19	19.96
Fixed C	50.82	61.56
Ash	26.86	16.63
	99.87%	99 75%

The ash from both samples was strongly radioactive. Minerals found closely assocd. with the thucolite were allanite, beryl, biotite, cyrtolite, garnet, martite, pyrorthite (?), titanite, uraninite. An oily substance was found in 2 parallel fracture zones across the dike. The occurrence of the thucolite indicates that it is not a primary constituent of the pegmatite, and S. suggests that its origin may have been from oil introduced in a later stage. A. M. BRANT

A note on the occurrence of monazite in western Arizona. ROBERT E. S. HERNEMAN. *Am. Mineral.* 15, 536–7(1930).—Scattered pebbles were found in the stream gravels in Mohave county. Some were good crystals, elongated on the b-axis. The sp. gr. of a group of 8 crystals was 5.04. A. M. BRANT

The structure of apatite. I. MARTIN MEHMEL. *Z. Krist.* 75, 323–31(1930).—The dimensions of the hexagonal unit of apatite are: a = 9.36 and c = 6.85 A. U. (±0.02). The space group is C_{6h}^2, and there are 2 mols. of $Ca_5F(PO_4)_3$ in the cell. General positions for all atoms are given, but no parameters. ST. NARAY-SZABO. *Ibid* 387–98(1930)(in English).—A complete detn. has been made by means of abs. intensity measurements. Parameters are given for all at. positions. There are 6 (PO_4) groups in the unit cell; 4Ca ions are on trigonal axes, surrounded prismatically by 6O ions; 6Ca ions are surrounded by an irregular polyhedron of 1F and 5O. F ions are at the corners of the reflection planes, touching 3Ca ions each. L. S. R.

Lazulite from Chittenden, Vermont. CHARLES PALACHE AND F. A. GONYER. *Am.*

Mineral. **15**, 338–9(1930).—The specimen, deep blue in color, is backed by quartzite containing sericite, rutile needles and hematite grains. Soln. of sample for analysis gave 1.49% insol., contg. SiO_2 and probably TiO_2. The sol. material had the compn.: Al_2O_3 33.11, FeO 2.59, MgO 12.38, H_2O^+ 6.24, P_2O_5 46.17, sum 100.49%; formula $(Mg,Fe)O.Al_2O_3.P_2O_5.H_2O$, with Mg:Fe = 8:1. The sp. gr. is 3.08. The optical properties are: biaxial- with 2V = 70°, α = 1.612 colorless, β = 1.634 light blue, γ = 1.643 blue. A. M. Brant

Two phosphates from Dehrn, dehrnite and crandallite. Esper S. Larsen and Earl V. Shannon. *Am. Mineral.* **15**, 303–6(1930).—The 2 minerals were found on a specimen of brecciated phosphorite. *Dehrnite* formed grayish or greenish white crusts of fibrous to bladed crystals. Its phys. properties are: hardness 5, sp. gr. 3.04, fusibility 2, with formation of a white opaque bead, basal cleavage, hexagonal outline. Optically it is uniaxial-, ω = 1.622, ϵ = 1.614. The compn. is: insol. 0.12, CuO 50.88, P_2O_5 37.12, K_2O 1.20, Na_2O 7.11, H_2O^+ 1.52, H_2O^- 0.16, CO_2 1.49, sum 99.60%; probable formula $7CaO.Na_2O.2P_2O_5.H_2O$. *Crandallite* occurs in creamy-white radiating prismatic fibers attached to dehrnite. It is optically +, has a moderate optical angle and has α = 1.59, γ = 1.60. X is parallel to elongation and Z perpendicular to the cleavage (100). It is probably orthorhombic. The compn. is: SiO_2 4.92, Al_2O_3 37.52, P_2O_5 25.24, CaO 11.04, MgO 0.24, H_2O^+ 17.90, H_2O^- 1.00, CO_2 2.54, sum 100.40%; formula $CaO.2Al_2O_3.P_2O_5.6H_2O$. This mineral has previously been called "kalkwavellit." A. M. Brant

The minerals of the phosphate nodules from near Fairfield, Utah. Esper S. Larsen and Earl V. Shannon. *Am. Mineral.* **15**, 307–37(1930).—The nodules were found embedded in a matrix of quartz and calcite. They have an ellipsoidal or discoidal shape and vary in size up to 8 in. The methods used in the study and analysis of the minerals are described. Most of the nodules consisted of a no. of minerals arranged in concentric layers or in part lining or filling cavities. Calcite, variscite, pseudowavellite and wardite were present in most of the nodules. Dehrnite (cf. preceding abstr.) was observed in cavities of the pseudowavellite. Seven new minerals were segregated and studied optically and physically and analyzed. The results are tabulated. Wardite was found to be identical with soumanite. Pseudowavellite is the most abundant mineral in the nodules. The new minerals are *deltaite*, $8CaO.5Al_2O_3.4P_2O_5.14H_2O$; *dennisonite*, $6CaO.Al_2O_3.2P_2O_5.5H_2O$; *lewistonite*, $15CaO.(K,Na)_2O.4P_2O_5.8H_2O$; *englishite*, $4CaO.K_2O.4Al_2O_3.4P_2O_5.14H_2O$; *millisite*, $2CaO.Na_2O.6Al_2O_3.4P_2O_5.17H_2O$; *lehiite*, $5CaO.(Na,K)_2O.4Al_2O_3.4P_2O_5.12H_2O$; *gordonite*, $MgO.Al_2O_3.P_2O_5.9H_2O$. A. M. B.

Scorodite from Gold Hill, Tooele Co., Utah. Wm. F. Foshag, Harry Berman and Ruth A. Doggett. *Am. Mineral.* **15**, 390–1(1930).—The color of the crystals is pea-green. The mineral is optically-; by the Merwin dispersion method the *n*s for D are: α = 1.784, β = 1.796, γ = 1.814; dispersion F-C = 0.3 ± .005. 2V = 54° ± 5°. The mineral is a normal scorodite and at Gold Hill forms bodies of considerable magnitude as an alteration product of arsenopyrite. A. M. Brant

Psittacinite from the Higgins mine, Bisbee, Arizona. Stephen Taber and Waldemar T. Schaller. *Am. Mineral.* **15**, 575–9(1930).—The mineral occurs in coarsely granular masses of anhedral crystals up to 2 cm. diam. with well-defined cleavage in one direction. It is intimately assocd. with higginsite and platy white barite. The compn. is: V_2O_5 21.11, As_2O_5 trace, PbO 50.13, CuO 19.10, ZnO none, ignition loss (H_2O) 4.79, insol. 3.06 (MnO_2), sum 98.19%, approximating the formula $2PbO.2CuO.V_2O_5.2H_2O$ ascribed to psittacinite. The color is dark olive-green, streak yellow. The cleavages show parallel extinction, and the mineral is probably orthorhombic. Approx. values for *n* are α = 2.22, γ = 2.33. The dispersion is strong, $\rho > V$. Thick fragments show distinct pleochroism from yellow to olive-green. The analysis of the mineral from the Higgins mine is compared to that from the Shattuck mine nearby, and the relation to descloizite is discussed. A. M. Brant

Seamanite, a new manganese phosphoborate from Iron County, Michigan. E. H. Kraus, W. A. Seaman and C. B. Slawson. *Am. Mineral.* **15**, 220–5(1930).—The mineral occurs in the Chicagon mine near Iron River, Mich., as small acicular crystals in crevices in a highly ferruginous siliceous rock. A fibrous asbestos-like mineral is assocd. with it. The crystals are transparent, pale yellow, unit prisms terminated by pyramids, with distinct basal cleavage; orthorhombic—bipyramidal, with $a:b:c$ = 0.5195:1:0.4508; hardness 4, sp. gr. 3.128. It is optically + with α = 1.640, β = 1.663, γ = 1.665; X = *a*, Y = *b*, Z = *c* and 2V about 40°. Analysis gave: MnO 56.22, (Mg,Ca)O 1.61, FeO 0.13, B_2O_3 9.95, P_2O_5 16.65, H_2O 14.57%. The mineral is regarded as a double salt of $3MnO.B_2O_3.3H_2O$ and $3MnO.P_2O_5.3H_2O$ in equal proportions. A. M. Brant

Crocoite, lautarite and dietzeite and their crystallographic relationships. B. GOSSNER AND F. MUSSGNUG. *Z. Krist.* **75**, 410–20(1930).—Lattice constants were detd. as follows: crocoite, $a = 6.82$, $b = 7.48$, $c = 7.16$ A. U., $\beta = 102° 33'$, C_{2h}^5, 4 mols. $PbCrO_4$ in cell; lautarite, $a = 7.18$, $b = 11.38$, $c = 7.42$ A. U., $\beta = 106° 22'$, C_{2h}^5, 4 mols. CaI_2O_6; dietzeite, $a = 10.16$, $b = 7.30$, $c = 14.03$ A. U., $\beta = 106° 32'$, 4 mols. The compn. is considered as $CaI_2O_6.CaCrO_4$ rather than $7(CaI_2O_6).8(CaCrO_4)$ as usually stated. The structural and crystallographic relations of these minerals are discussed.
L. S. RAMSDELL

Transparency of gypsum and mica in the ultra-violet. W. HAUSMANN AND O. KRUMPEL. *Strahlentherap.* **35**, 387–90(1930).—Gypsum is highly transparent for ultra-violet rays, which are largely absorbed by mica. B. C. A.

The chemical composition and genesis of the natural iron sulfates. XIV. RUDOLPH SCHARIZER. *Z. Krist.* **75**, 67–87(1930); cf. *C. A.* **22**, 47.—A detailed discussion of the genesis of *römerite*. If free H_2SO_4 is present in an aq. soln. of rhomboclase, hydrolysis is prevented and the acid $H_4Fe(OH)_2(SO_4)_4(H_2O)_6$ is stable. This reacts with $(HO)Fe(H_2O)_6$ to form römerite. A series of analyses of natural and artificial voltaite shows it to be a mixt. of the K Fe^{++} salts of $H_{12}Fe_6(SO_4)_{12}$ + 13Aq and $H_{12}Fe_4(SO_4)_{12}$+18Aq.
L. S. RAMSDELL

Replacement of wolframite by scheelite, with observations on the fluorescence of certain tungsten minerals. FRANK R. VAN HORN. *Am. Mineral.* **15**, 461–9(1930).—A specimen from the East Pool mine, Camborne, Cornwall, England, contains wolframite which is partly or wholly altered or replaced by pinkish scheelite. The alteration seems to have taken place at right angles to the cleavage planes. The scheelite shows a bright blue fluorescence under ultra-violet rays, of a darker shade of blue than other specimens examd. The results of tests made on a series of W minerals are tabulated. It is suggested that the fluorescence of some wolframites and hübnerites is caused by a slight alteration to scheelite. A. M. BRANT

A new iron meteorite from Carbo, Mexico. CHARLES PALACHE AND F. A. GONYER. *Am. Mineral.* **15**, 388–9(1930).—The meteorite, found in 1923, weighed about 1000 lb. The surface is covered with the usual rounded depressions, and in addn. there are a no. of cylindrical holes which are thought to have contained troilite. An etched section shows well-marked octahedral structure. There are numerous nodules of troilite. The bands of kamacite are regular and from 0.5 to 1 mm. thick. The meteorite is classed as a medium octahedrite; its compn. is given. A. M. BRANT

Statistical review of Ontario's mineral industry in 1929. W. R. ROGERS AND A. C. YOUNG. *Ann. Rept. Ont. Dept. Mines* **39**, Pt. I, 1–68(1930). A. H. E.

Quinquennial review of the mineral production of India for the years 1924 to 1928. E. H. PASCOE. *Records Geol. Survey India* **64**, 89–92, 254–7, 318–20, 322–4, 380–3, 384, 385–92, 400–3(1930); cf. *C. A.* **24**, 4245. A. H. E.

The copper shale of Mansfeld. J. W. GREGORY. *Bull. Inst. Mining and Met.* No. **316**, 1–22(1931); cf. *C. A.* **25**, 898.—Discussion. ALDEN H. EMERY

Origin of Copper Mountain (British Columbia) ores. V. DOLMAGE. *Trans. Can. Inst. Mining Met.* **32**, 151–62.—An analysis is given of the ore, which consists of basaltic and andesitic breccia very little altered by mineralization. Possible modes of origin of the ore are discussed; it was probably formed before the magma had solidified to any great extent. B. C. A.

Copper on the Coppermine River, N. W. T. GEOFFREY GILBERT. *Econ. Geol.* **26**, 96–108(1931).—This region in the past has been very inaccessible, but the airplane has revolutionized these conditions. Native Cu, although of widespread occurrence, gives little promise of economic importance, and the chief Cu mineral is the sulfide, chalcocite. Mineralization is apparently confined strictly to the fissures. Resemblances to the deposits of Michigan are obvious, the main difference being in the angle of dip of the flows, which may have a definite bearing on the question of ore deposition. There appears no reason to suppose that the Cu mineralization will be co-extensive with the basalts on the one hand or strictly limited to them on the other. In this district, as in any other, the main requisite is an adequate supply of Cu-bearing solns. Without these, the basalts are no more likely to contain important ore than any other rock; given these, the deposits may occur in other formations as well as in the basalts.
ALICE W. EPPERSON

A quantitative and qualitative determination of the ores of Cobalt, Ontario. JACOB W. YOUNG. *Econ. Geol.* **26**, 112–8(1931).—Y. discusses the recent paper by Ellis Thomson (*C. A.* **25**, 1466). T.s' conclusions as to the pptn. of Ag in the veins at Cobalt, and also for the time of the deposition of the calcite composing the veins in relation to the

metallic arsenides and sulfarsenides, are at variance with previously formulated views which have much to support them. Y. gives data to support these contentions.
ALICE W EPPERSON

Determination of carbon content in carbonaceous pyrite. V. P. ZEMLYANITZUIN. *J. Chem. Ind.* (Russia) **6**, 889–90(1929).—Detns. by 3 different methods were made on a closely bound mixt. of coal and pyrite. All gave practically the same figure of 26.3% C.
A. C. ZACHLIN

Origin of the Manchurian magnesite deposit. HIRONAO NISHIHARA. *Econ. Geol.* **26**, 118–21(1931).—N. discusses a statement made by T. Kato (*Econ. Geol.* **24**, 90–3) as to the origin of the Manchurian magnesite deposit. The conclusion as to whether this deposit is a product of replacement of calcareous rock by Mg of magmatic origin, as Niinomy and Kato conclude, or of sedimentary origin, as N. believes, may have an important economic bearing on future exploration for similar magnesite deposits elsewhere.
ALICE W. EPPERSON

The witherite deposit of the Settlingstones mine, Northumberland. G. TRESTRAIL. *Bull. Inst. Mining and Met.* No. **316**, 23–6(1931); cf. *C. A.* **25**, 899.—Discussion.
ALDEN H. EMERY

A gold and diamond field in Brazil. ANON. *Mining J.* **170**, 744–5(1930).
ALDEN H. EMERY

Diatomite. PAUL HATMAKER. *Bur. Mines Information Circ.* **6391**, 20 pp.(1931).—H. discusses diatomite under the headings: varieties, occurrence, distribution, properties, uses, mining, prepn., marketing, producers, production, economic condition of the industry and a bibliography of 35 references.
ALDEN H. EMERY

Gypsum. P. P. BUDNIKOV. *Bull. acad. sci. U. R. S. S.* **1930**, No. 77, 1–180.—A collection of the papers published on the above subject by B. and co-workers from 1922 to 1928.
B. C. A.

Salt and gypsum in Alberta. J. A. ALLAN. *Trans. Can. Inst. Mining Met.* **32**, 232–54(1929).—An account is given of the distribution of salt and gypsum in Alberta. They are mostly of Devonian or Silurian age. Interbedding of salt, anhydrite and dolomite in the McMurray deposits shows that they have been deposited at the edge of a sea of varying concn. The anhydrite is of primary origin, but much of the gypsum, occurring as selenite, is secondary.
B. C. A.

The microbiological aspect of peat formation. A. C. THAYSEN. *Fuel in Science & Practice* **9**, 560–3(1930).—Analysis of the behavior of all known types of cellulose-decomposing microörganisms is given as proof that their activity is limited to the very surface layers of peat, that it decreases in intensity under an excess of moisture and that in acid peats it ceases long before the cellulose has been eliminated.
D. A. R.

The present nature of coals resulting from their history. LEON DUBRUL. *Rev. univ. mines* **5**, 10–5, 40–7, 65–77(1931). It is difficult to draw clear-cut conclusions as to the effect of the history of coals on their nature. The single conclusion is that the causes of differentiation are many. The evolution of the coal beds is as follows: The peat formed had a variable chem. compn. depending on the nature of the plants and especially on their manner of decompn. and consequently on the rate at which the peat bogs sank. According to the wt. of the overlying material the mass underwent an anthracitization, the modality of which depended upon the initial state; this mass, then under equal pressure and time, showed what is termed the "original differentiation," consisting in a localization of varieties richer in volatile matter in the zone where the subsidence was quickest. But if the overburden varied in thickness, it could have modified the differentiation and at times might have had the reverse effect (Gard). At the same time, under the influence of the variable load there was produced a vertical change by a decrease in volume, relatively greater for lower beds (Hilt's law). At the time of folding the influence of static pressure became negligible as compared with dynamic pressure. Orogenic forces were the cause of a new lateral differentiation, because the quantity of energy transformed into heat depended upon the resistance to the lateral thrusts. It was thus that the regions displaced did not become thinner, the rubbing having been solely a source of heat (Serang); the masses that had been crushed against a resistant block for the most part lost energy, from folding, in heat and underwent an intense devolatilization (Herstal). The depth of the bed had only a min. influence on the coals already formed. Four differentiations are: (1) original; (2) by wt. before folding; (3) through orogenic forces; and (4) by wt. after folding. The first and third are generally the most important; the second is found occasionally, and the last relatively seldom.
C. W. OWINGS

Igneous intrusions and ore deposits of the zone of flowage. E. C. ANDREWS. *Econ. Geol.* **26**, 1–23(1931).—The igneous rocks of the Willyma or Broken Hill "older-

mass" belong to 2 periods of intrusion: that of marked folding, and that of relative stability. The ore deposits are phases of igneous intrusions belonging to the closing stages of the "bedded" form. All the ore deposits examined appear to end vertically as well as laterally, either against or between bedding planes. No sign of feeding source has been detected for the igneous rocks. A. infers that the Broken Hill region during the earlier portion of pre-Cambrian time was affected by a movement of strong folding, in which there was a strong reaction toward the surface of the earth. Field study suggests that the igneous rocks and the ore deposits may not contain the same mineral assemblages which they possessed during their passage to the "pressure-slacks." The latest stages of igneous intrusions appear to have been attended with increased mobility of the igneous material, resulting in injection and replacement, both of sediments and the earlier orthogneisses, by aplite, pegmatite and ore deposits. A. W. E.

Structural geology of the Conception Bay region and of the Wabana iron ore deposits of Newfoundland. ALBERT O. HAYES. *Econ. Geol.* **26**, 44–64(1931).—A table of formations is given, and stratigraphy and structural geology of the region is discussed. The limits of the Fe ore are fixed by faults, and the northern limits of the ore are thought to be along a fault line from Colliers Bay to the middle of Conception Bay. The Fe ore reserves are discussed, and it is estd. that mining operations may continue on a scale limited only by the amt. the market will absorb and the engineering difficulties of submarine operations. ALICE W. EPPERSON

Southern contact of the Riesen Mountain granite and the adjacent slate region. ADOLPH WATZNAUER. *Lotus* **78**, No. 2, 112–64(1930).—A petrographical study. W. L. HILL

Differentiation in the Cape Spencer flow. RICHARD J. LUND. *Am. Mineral.* **15**, 539–65(1930).—This is the thickest and lowest of a series of 5 Triassic lava flows found on Cape d' Or, Nova Scotia. The optical study was made on material from a drill core. The variations in mineral content, in the FeO:MgO ratio, and in the optical properties of the pyroxene and plagioclase series are given in the form of tables and graphs. Differentiation of the type known as fractionation took place during the crystn. of the flow. This was brought about by the fractional crystn. of the plagioclase and pyroxene series together with the relative movement of these minerals with respect to the liquid. A. M. BRANT

Differentiation in the Dartmoor granite. A. BRAMMALL. *Nature* **126**, 132(1930).—Graded and significant variations in the chem. compn. of granites from East Dartmoor are discussed. B. C. A.

Eruptive rocks of the Oberwiesenthal, Erzgebirge. R. HERRE. *Chem. Erde* **4**, 632–65(1930).—Petrographical descriptions with chem. analyses are given of phonolites and basalts from this locality in Saxony. B. C. A.

Geology of the south coast of New South Wales. III. The monzonitic complex of the Mount Dromedary district. IDA A. BROWN. *Proc. Linnean Soc. N. S. Wales* **55**, 637–98(1930).—Tables of complete chem. analyses of many specimens of the rocks are given. The igneous complex is intrusive into metamorphosed sediments of early Paleozoic age, the main intrusion being an outcrop over an oval area of about 25 sq. mi., probably in laccolithic form. The igneous complex consists of plutonic and hypabyssal types. A study of the field occurrence and assocns. of these igneous rocks and of their mineralogical and chemical compns. shows that probably they are all comagmatic, but that the degrees of consanguinity of the different groups vary. B. considers that the main monzonitic series composing the laccolith has been produced as a result of the differentiation of a monzonitic magma in place, by means of fractional crystn. and the sinking of crystals. The origin of the garnet-bearing series is more obscure; it may be due to secondary differentiation of a basic phase of the magma, or the result of assimilation of limestone by the monzonitic magma, with subsequent differentiation. Direct evidence of the age of the intrusion is scanty, but the chem. similarity of the series as a whole to the monzonitic rocks of Milton and the latitic flows of the Illawarra District indicates a probable Permo-Carboniferous age. ALICE W. EPPERSON

The iron-rich norite at Akkavare (Sjaunja). PER GEIJER. *Geol. Fören. Förh.* **52**, 391–7(1930).—Varieties of norite rich in Fe have been discovered at Akkavare, Sjaunja. The rock is generally massive, dark and with the size of the grain averaging 1 to 2 mm. for the main constituents. Five specimens are described in detail. The magnetite and ilmenite content varies from 10.7 to 28.8% by vol. in the different specimens. WILHELM SEGERBLOM

Lamprophyrite of the petrographical province of Predazzo. SILVIO VARDABASSO. *Ann. scuola ing. Padova* **4**, 195–216(1928).—In the eruptive territory of Predazzo and

Monzone, the stratigraphical series and the volcanic rocks are crossed by numerous dark veins. These may be put into 2 classes: (*a*) non-differentiated veins related to porphyrite and melaphyre traversing all sedimentary rocks remaining in the district (Triassic period), tuffs and lava but not the intrusive masses, (*b*) veins differentiated by the continuation of intrusive masses (monzonite, etc.); these are the most recent of all rocks in this part of the Dolomites. The latter basic series, or lamprophyrites, contain in turn many types considered as representing an alk.-calcareous magma (pacific) and others an alk. magma. This is one of the most salient characteristics of this petrographical province. V. gives 4 figures illustrating the compn. of camptonite, 3 for monchiquite, 4 for rizzonite, with a table of compn., and 2 for lamprophyrite with 3 analyses. There is a bibliography of 34 references. S. L. B. ETHERTON

Water content and degree of compactness of argillaceous rocks. W. PETRASCHEK AND B. WILSER. *Berg. Hüttenm. Jahrb.* **74**, 57–65(1926).—The water content, other than that evolved at a red heat, diminishes with increasing metamorphism. B. C. A.

The mineralogy of some deposits of kaolinized volcanic ash from the slate belt of North Carolina. JASPER L. STUCKEY. *Am. Mineral.* **15**, 253–8(1930).—The deposits described lie in areas of acid volcanic rocks. Quartz, altered feldspar, sericite, kaolinite, epidote, rutile, titanite, hydromica, and halloysite were identified by microscopic means, while much fine-grained material could not be identified. Screen tests and chem. analyses of the material are given. The origin of the deposits was fine-grained tuff or volcanic ash. In the northern part they have been changed by severe metamorphism to sericite schist, and in the south have weathered to impure kaolin. A M. B.

Mechanical analyses of sediments by centrifuge. PARKER D. TRASK. *Econ. Geol.* **25**, 581–99(1930).—An application of the centrifuge to the procedure of mech. analyses of sediments on the basis of Stokes' law is described. The method consists in decanting the sand and detg. the rate of increase in wt. of finer particles settling out, with time. This is done by sepg. the suspension contg. these finer constituents into a no. of aliquots and detg. wt. of material that settles from each aliquot after centrifuging for definite times and at specified speeds. Curves representing the rate of fall are constructed by plotting the wt. of sediment that settled from the aliquots against the proper values for the time. From these curves, both the size distribution of the constituents and the percentile diams. are readily obtained. Chief advantages of the method are: it is rapid and does not involve complicated app.; it permits of presentation of the results as percentile diams.; and it gives the complete size distribution of the constituents down to any desired dimension, no matter how small. A. W. E.

Sedimentation in the Channel Islands region, California. PARKER D. TRASK. *Econ. Geol.* **26**, 24–43(1931).—The mech. compn. of the deposits of this region varies with the configuration of the ocean bottom. Finer sediments accumulate in the basins and coarser on the divides, topography influencing sediments more than depth of water or distance from shore. Finer deposits of the Pacific Coast region are more coarse-grained than corresponding sediments forming off master streams, such as Orinoco, Mississippi or McKenzie. The $CaCO_3$ content of sediments is variable, but in general less in shallow water than in depressions, where it reaches a max. of 16%. The org. content varies with bottom configuration and ranges from less than 1 to 7% in deposits in the bottom of Santa Cruz basin. Ignition loss is a rough index of the amt. of org. matter. The C-N ratio of recent deposits does not vary greatly from 8.4. Consequently, the org. content of sediments may be estd. by multiplying the percentage of N by 14. Sediments of past geologic age contain about half as much N with respect to C as do recent deposits. ALICE W. EPPERSON

Subterranean water conditions in the coastal regions of the Netherlands. J. VERSLUYS. *Econ. Geol.* **26**, 65–95(1931).—Geologic history of the area is given, and the character of the deposits and their influence on ground water are described. Chem. action in the subsoil of the dunes is discussed. Formation of water with excess of alkalies is explained by assuming that the sea-water has ceded alkalies to the soil, and that these, when the sea-water was displaced by calcareous fresh water, have in turn been exchanged for Ca. ALICE W. EPPERSON

Iron and manganese hydroxide sols in relation to the black coating on rocks and the formation of laterite. W. KNAUST. *Chem. Erde* **4**, 529–48(1930).—Sols of the hydroxides were prepd. with H_3PO_4 as a peptizing agent, and various expts. were made to det. the conditions for their coagulation. The bearing of these expts. on the deposition of Fe and Mn oxides as a coating on rocks and on the formation of laterite is discussed. B. C. A.

Soils derived from the glacial boulder-marl in the Hamburg district. E. SCHMIDT. *Chem. Erde* **4**, 475–500(1930).—Detns. of the amt. of $CaCO_3$, of the size of particles,

and of the heavy minerals present in the boulder clay and the overlying soils are recorded. B. C. A.

Annual review of Swedish geological literature for 1929. R. SANDEGREN AND M. MAGNUSSON. *Geol. Fören. Förh.* **52**, 689–754(1930).—Continuation with 190 titles of the résumés described in *C. A.* **23**, 1598; **24**, 1605. WILHELM SEGERBLOM

The unipolarity of pressed PbS (TREY) **2**. Quinquennial review of the mineral production of India for the years 1924 to 1928 (PASCOE) **9**. The evolution of coal (BRIGGS) **21**. Method and cost of recovering quicksilver from low-grade ore at the reduction plant of the Sulphur Bank Syndicate, Clearlake, Calif. (BRADLEY) **9**. Radioactivity and the thermal history of the earth (HOLMES) **3**. Preparation and purification of the tri-iodides of Sb and As for use in immersion media of high refractive index (FISK) **6**. Structure of silicates (BRAGG) **6**. Relation between the contents of coal in volatile matter and in ash (LE GRAYE) **21**.

9—METALLURGY AND METALLOGRAPHY

D. J. DEMOREST, H. W. GILLETT AND RICHARD RIMBACH

What the Bureau of Standards does for metallurgy. RICHARD RIMBACH. *Metals and Alloys* **2**, 65–70(1931). A. J. MONACK

Principal metallurgical products utilized in aeronautical construction. G. R. HAMEL. *Aciers spéc.* **5**, 550–8(1930). A. J. MONACK

Progress of metallurgy at Broken Hill, N. S. W. M. R. MCKEOWN. *Chem. Eng. Mining Rev.* **23**, 93–100(1930).—The equipment, operation and reagents used are described. Slow-speed crushers and vibrating screens are preferred. An all-flotation treatment with an alk. current of 0.005% Na_2CO_3 is used. This process yields higher-grade Pb and Zn concentrates, low time factor for flotation and lower costs. A. N. H.

Quinquennial review of the mineral production of India for the years 1924 to 1928. E. H. PASCOE *Records Geol. Survey India* **64** (1930).—**Introduction.** *Ibid* 1–3. **Summary of progress.** *Ibid* 4–25.—Detailed production figures for Indian minerals from 1924 to 1928 are given. **Antimony.** *Ibid* 26–8.—Stibnite lodes in gneissose granite occur in Punjab. They carry 6 dwts. of Au per ton. Stibnite with cervantite occurs in the Northern Shan states. The tetrahedrite in the Sleemanabad Cu lodes is highly antimonial. About 1000 tons per yr. of antimonial Pb, analyzing Pb 77, Sb 21% and Ag 6–8 oz. per ton, is produced in Burma. **Copper.** *Ibid* 78–88.—In Singhbhum, Cu lodes occur in muscovite and chlorite-quartz-schists. At the surface they consist of quartz with malachite, chrysocolla and red oxides of Fe contg. small quantities of Cu, possibly as red oxide, with sometimes small incrustations of liebethenite In depth the ore is entirely chalcopyrite. There is a small chalcocite zone not far below the surface. In the Darjelling area, chalcopyrite occurs disseminated through slates and schists. Recent work has shown lodes in Sikkim in which Cu is assocd with Bi, Sb and Te. Tetradymite and linnaeite are found. Typical minerals are chalcopyrite, pyrite, pyrrhotite, sphalerite and galena. Several occurrences are described. Bawdwin (Burma) ore analyzed Pb 13, Zn 8, Cu 7% and Ag 18 oz. per ton **Arsenic.** *Ibid* 320–2.—The chief Indian source of As is the orpiment mines of Chitral, where realgar, orpiment and fluorspar occur. **Bismuth.** *Ibid* 344.—Native Ni and bismuthinite occur in wolfram and cassiterite-bearing veins of lower Burma. **Cobalt.** *Ibid* 379–80.—Cobaltite and danaite have been found disseminated among certain slates. The Ni speiss of the Burma Corp. contains 3–4% Co. **Nickel.** *Ibid* 412–3.—Nickeliferous pyrrhotite, chalcopyrite and pyrite occur in various parts of India. It is a by-product in the smelting operations of the Burma Corp. ALDEN H. EMERY

Quinquennial review of the mineral production of India for the years 1924 to 1928. Iron. H. CECIL JONES. *Records Geol. Survey India* **64**, 111–46(1930).—Bihar and Orissa are the only parts of India where Fe ore is mined for the production of Fe and steel. In Burma limonite and hematite are produced for use as a flux in Pb smelting The main plants are described and analyses given of their raw materials and finished products. Ore occurrences are also described in detail. ALDEN H. EMERY

The concentration of ores by flotation. H. L. SULMAN. *Bull. Inst. Mining and Met.* No. **316**, 31–6(1931); cf. *C. A.* **24**, 2699, 5006, 5263; **25**, 901.—Discussion. ALDEN H. EMERY

Water concentration tests. BERNARD W. HOLMAN. *Bull. Inst. Mining and Met.* No. **316**, 29(1931); cf. *C. A.* **24**, 2699; **25**, 901.—Discussion. ALDEN H. EMERY

Reduction of iron oxide ores in molten state by means of hydrogen and other gases. SAMUEL L. MADORSKY. *Ind. Eng. Chem.* **23**, 99–103(1931).—Thirteen expts. were undertaken to reduce molten Fe oxide with H_2, water gas and CO. For each kg. of Fe 1.19 cu. m. of H_2, 45% of the theoretical, was required. An Fe product is obtained at a cost comparable to that of other steel-making processes. C. H. LORIG

Leaching copper ores: advantages of wet-charging. JOHN D. SULLIVAN AND ALFRED P. TOWNE. Bur. Mines, *Rept. of Investigations* 3050, 26 pp.(1931); cf. *C. A.* **25**, 478.—Charging the ore into the leaching vat in the wet condition increases the extn. of Cu. Virtually identical extn. was obtained by upward and downward percolation when the solns. were not continuously circulated. In the latter case, extn. was greater on downward percolation. Virtually identical extn. resulted from flood and trickle leaching when the ore was wet charged. With dry-charged ore, extn. was greater from +100-mesh ore than from unsized material contg. fines; there was no difference when the ore was wet charged. ALDEN H. EMERY

Cyanidation of a copper-gold ore. E. H. SMITH. *Can. Chem. Met.* **15**, 45–6 (1931).—The function of lime in cyanidation of Au ores is attracting much attention. Lime and alky. have no solvent action on the precious metals, but enter into numerous reactions occurring in the process. A pyritic ore ground in lime soln. yields CaS and CaS_2O_3, and gang constituents consume a certain amt. of lime. Each mineral in an ore removes lime from the mill soln. in an amt. dependent on the lime present, and this amt. is sp. for each mineral. Lime decomposes the $Zn(CN)_2$ or double cyanide formed in the pptn. processes. W. H. BOYNTON

Method and cost of recovering quicksilver from low-grade ore at the reduction plant of the Sulphur Bank Syndicate, Clearlake, Calif. WORTHEN BRADLEY. Bur. Mines, *Information Circ.* **6429**, 17 pp.(1931).—The ore deposit consists of grains of cinnabar finely disseminated throughout a gang composed principally of altered basalt with subordinate amts. of elemental S (1–15%, av. 2%) and opal. Recovery is as follows: (1) screening (cinnabar mostly in fines) and sorting the low-grade ore to obtain a furnace feed contg. 8–10 lb. Hg per ton, (2) treatment in a rotary kiln, (3) pptn. of dust from gas stream, (4) condensing Hg from gas, (5) flotation of low-grade condenser mud and (6) retorting high-grade condenser mud and high-grade flotation concentrates. Costs per ton of ore treated for April, 1930, are: screening and sorting $0.835, furnace treatment $1.709, flotation $0.387, retorting $0.177, assaying $0.107, condensing $0.534, miscellaneous $0.359 and total $4.108. ALDEN H. EMERY

Milling methods and costs at the Homestake Mine, Lead, S. D. ALLEN J. CLARK. Bur. Mines, *Information Circ.* **6408**, 25 pp.(1931).—The ore bodies occur in altered dolomitic limestone contg. cummingtonite and chlorite with pyrite, arsenopyrite and pyrrhotite. The Au content is about $5.00 per ton of ore. Amalgamation recovers 62.8% of the Au (chiefly coarse), cyanidation of sand 20.6%, and cyanidation of slime 9.6% more, a total of 93% recovery. Cost of crushing in mine and at hoists in 1929 was 3.8 cents per ton, milling 27.6 cents and cyanidizing 18.9 cents, a total of 50.3 cents per ton of ore milled. Detailed metallurgical data and costs are given. A. H. E.

The Roan Antelope mill and smelter. A. G. MCGREGOR. *S. African Mining and Eng. J.* **41**, pt. 11, 373–4(1930). ALDEN H. EMERY

Lead smelting in shaft furnace with zinc-rich slags. KARL PRIOR. *Metall u. Erz* **28**, 25–33(1931).—High Zn content is unfavorable for operation of the shaft furnace. The constitution of shaft-furnace slags in general is discussed, as well as the forms in which Zn is found in the slag. Among these are the oxide, silicates, Zn spinel, Zn ferrites, zincates and sulfides. Operating conditions in the presence of high Zn content are discussed. H. STOERTZ

Copper and zinc in cyanidation sulfide-acid precipitation. EDMUND S. LEAVER AND JESSE A. WOOLF. Bur. Mines, *Tech. Paper* **494**, 63 pp.(1931).—All of the common Cu minerals except chrysocolla and chalcopyrite are sufficiently sol. in cyanide soln. to cause excessive reagent loss (2–3 lb. NaCN per lb. Cu) unless the cyanide combined with the Cu is regenerated. The Na_2S-H_2SO_4 method regenerates an av. of > 80% of the cyanide from solns. used to treat precious-metal ores contg. up to 0.5% cyanide-sol. Cu. Solns. used to treat cuprite or metallic Cu give large regeneration. The more complex the Cu mineral treated, the less cyanide will be regenerated from the resulting soln. The more nearly all the cyanide is combined with Cu and the less the cyanide is uncombined (free) the greater will be the regeneration. The amt. of Na_2S used varies with the amt. of metals pptd. The acid consumption varies with the strength of the original soln. in both cyanide and lime. The Ag may be pptd. separately from the Cu before the soln. is acidified. The CuS must be removed from the acid soln.,

as it redissolves in alk. cyanide soln. Only a small quantity of Au is pptd. by the Na_2S-H_2SO_4; most must be removed by Zn as usual. Cu in cyanide soln. up to 10 lb. per ton does not diminish the activity of the soln. as a solvent for Au and Ag if the requisite free cyanide is present. The double Na-Cu cyanide soln., in the absence of free cyanide, is only a weak solvent for the precious metals and is more effective for Au than for Ag. Smithsonite, hydrozincite, zincite and calamine are sol. enough under the usual conditions of cyanidation to cause rapid accumulation of Zn in the soln. unless special precautions are taken to remove it. Willemite, sphalerite and franklinite are dissolved more slowly. From 1.5 to 4.0 lb. NaCN is needed per lb. Zn dissolved. The various Zn cyanide compds. are only weak solvents for the precious metals, even if $AgNO_3$ titration shows free cyanide. Addn. of excess CaO or caustic soda improves extn. by liberating free cyanide from the double salt. If most of the cyanide present in a soln. is combined with Zn, more free cyanide must be added to this soln. than to a fresh soln. for the 2 to have = activity as solvents. Na_2S-H_2SO_4 treatment will remove Zn and regenerate cyanide. When ores contg. sol. Zn minerals are treated, the soln. must contain free cyanide, or the soln. of Zn will decrease Ag extn. The Welch method was thoroughly tried and seems to apply only to Au ores or to Au-Ag ores contg. not over 0.1% of cyanide-sol. Cu and in which Ag occurs as a haloid mineral. A. H. E.

Recovery of zinc from ferrite compounds in the electrolytic zinc process. G. L. Oldright and D. P. Niconoff. Dept. Mining and Met. Research, Univ. of Utah, *Tech. Paper* **6**, 45 pp.(1929).—Zn ferrite formation increased with increasing time, temp. and fineness. Fe in Zn ferrite was more readily sol. than when present in Fe_2O_3. Replacement of ZnO in ferrite by other bases such as CaO and MgO is possible but not practical. Zn ferrite was readily decompd. by treatment with reducing agents at elevated temps.; Zn was then sol. in NH_3 or H_2SO_4. High concns. of reducing gases make the Fe sol. in H_2SO_4. C will reduce ferrites at 800°. Pure CO should not be used below 600°, as CO_2 is needed at low temps. to prevent its decompn. to CO_2 and C. The best procedure was treatment for 2 hrs. at 550° with CO_2 contg. 35–50% CO. This makes 80% of the Zn and 39% of the Fe sol. in H_2SO_4. To make more Zn sol., higher proportions of Fe were dissolved. The rate of decompn. of ferrite with reducing agents, as well as its rate of soln. in H_2SO_4, HCl and HNO_3, depends upon the temp. and time of prepn. of the ferrite. By giving refractory ferrite a preliminary low-temp. roast, the subsequent rate of reduction can be increased. Alden H. Emery

Purifying zinc by dry method. D. M. Chizhikov. *Mineralnoe Suir'e i Tzvetnuie Met.* **4**, 1211–8(1929).—The processes of purifying Zn are described briefly. M. A. J.

Memorandum on calcination of zinc carbonate ores in particular in a continuous-charged furnace (Jalabert method). Gustave Piron. *Rev. ind. minérale* No. **241**, 9–14(1931).—By eliminating the moisture and CO_2, the wt. is decreased 25–32%, according to the ore. The beneficiation of the ore increases its salability. However, calcined ore has to be kept covered in transportation and in storage. Lean calamines are calcined either in an ordinary reverberatory furnace or in an Oxland or Spirek furnace. Best results from calcining are obtained in a shaft furnace, but lean ores cannot be treated in this furnace. The Jalabert furnace, designed to treat this class of ores with the advantages of the shaft furnace, is constructed of brick; ordinary bricks are used as high as the inlet air holes, and the upper part is made of a shell of refractory brick. Ventilation is induced by a blower. In calcining, the lean calamines are mixed first with a combustible in a proportion detd. by lab. tests. At Gustar, wood-charcoal dust is used in the proportion of 9% by wt. of the raw ore. The yield of calcined material varies from 68 to 73%. Calcination of Zn carbonate in the Jalabert furnace takes place under relatively the same conditions as in a shaft furnace and has the following advantages: (1) good utilization of inferior quality combustible that consequently reduces costs; (2) inexpensive construction and installation; (3) reduced labor, (4) continuous operation; and (5) perfect calcination. C. W. Owings

A consideration of some of the problems of the chloride volatilization process. Robert H. Bradford and Carrol Max Macfarlane. Dept. Mining and Met. Research, Univ. of Utah, *Tech. Paper* **3**, 21 pp.(1928).—$CaCO_3$ was increasingly deleterious to chloride volatilization as its content in the gang of an ore increased above 20%. Water vapor was beneficial when treating ores with a high calcareous gang. HCl was a more active chloridizer than $CaCl_2$ or NaCl. HCl was prepd. by spraying a soln. of $CaCl_2$ or NaCl into the roasting furnace, SiO_2 being necessary with NaCl. An oxidizing atm. contg. 4–11% O_2 was best when chloridizing a Cu ore. A. H. E.

Recovery of noble metals from waste. A. Ievinš. *Acta Univ. Latviensis, Kim. Fakult. Serija* **1**, No. 1, *Burtnica*. 1–11(in German **12**)(1929).—Smelting gives better results than the Cl or CN processes for 1–3% content of noble metal, the efficiency

increasing with the richer charges. The yield is increased by adding $CaCO_3$ and $MgCO_3$ and holding for sufficient time at 1350–1400°. ANN NICHOLSON HIRD

Platinum. PAUL M. TYLER AND R. M. SANTMYERS. Bur. Mines, *Information* 6389, 69 pp.(1931).—The following subjects are discussed for Pt: properties, uses, alloys, substitutes, history, ores and minerals, occurrence (U. S. and foreign, by states and countries), assaying, mining, concg., refining, production, marketing and prices. *Osmiridium* is briefly discussed. ALDEN H. EMERY

Fluxes for brass melting. E. T. RICHARDS. *Giesserei-Ztg.* 27, 433–5(1930).—Fluxes used in brass melting serve 3 purposes: they accelerate the melting process; they protect the metal from oxidation; and they remove impurities. Glass and sand mixts. are the common com. fluxes, used often with covers of charcoal, coke and NaCl. In crucible melting, borax is used to dissolve SiO_2, Al_2O_3., CaO, etc., and to lessen the Zn loss. Mixts. of boric acid, borax and the alk. carbonates are strongly desulfurizing. Boric acid is gradually displacing borax as a flux, in spite of its higher cost. Potash and soda are used to remove S and As. $KHSO_4$ is valuable for removing Al, but it introduces a little S into the brass. For the removal of Fe, the brass is treated with a mixt. of 75% calcined soda, 18% KCN and 7% powd. glass. For Pb-rich alloys, mixts. of talc and quartz are recommended. CURTIS L. WILSON

Manufacture of wire bars from secondary copper. P. SIEBE. *Giesserei-Ztg.* 27, 505–9(1930); cf. *C. A.* 23, 4915. CURTIS L. WILSON

The production of high-test cast iron. II. RICHARD MOLDENKE. *Iron & Steel Can.* 14, 27–8, 41–2(1931); cf. *C. A.* 25, 1192. E. H.

Processing 3-ton wrought-iron balls. A new departure. J. D. KNOX. *Steel* 87, No. 20, 43–6(1930).—The Aston process for making wrought iron and the new plant of the A. M. Byers Co. near Pittsburgh, Pa., are described. LESLIE B. BRAGG

The reductivity of over-crusted coke and the production of a carbon-poor forgeable channel iron in the foundry shaft furnace. E. PIWOWARSKY. *Die Giesserei* 17, 1149–52 (1930).—Expts. to det. the effect of impregnating coke with milk of lime on its reactivity. Thus, a current of CO_2 is allowed to react with coke at 900° and 1100°, and the amt. of CO formed is detd. These expts. show that when coke is satd. with milk of lime CO is formed in greater amt., the reductivity of the coke being actually favored by the impregnation. Claims in the patent of June 2, 1919 (class 18a, Gr. 3, C. 38 289) are disproved. Low-C Fe (1.6% C and less) has successfully been prepd. by P. in the cupola furnace. J. BALOZIAN

Agglomeration of blast-furnace dust and treatment of iron carbonate minerals by the Greenawalt process. ROBERT CORDONNIER. *Rev. Metal.* 27, 467–78(1930).—A description of plant operations and the process for sintering blast-furnace dust and Fe carbonate ores are given. C. H. LORIG

Deoxidation of steel with silicon. C. H. HERTY, JR., G. R. FITTERER AND C. F. CHRISTOPHER. Bur. Mines, *Tech. Paper* 492, 42 pp.(1931).—The liquidus of the system FeO–SiO_2 has been studied over the range 45–100% FeO. The m. ps. of synthetic Fe^{++} silicates were detd. with the micropyrometer. Fayalite ($2FeO.SiO_2$) melted at 1335°. Two eutectics, at 65 and 78% FeO, were found; their m. ps. were 1260° and 1240°, resp. The deoxidation const. for the reaction $2FeO + Si \rightleftharpoons SiO_2 + 2Fe$ was detd. to be $K_D = (Si)(FeO)^2 = 1.65 \times 10^{-4}$ when all concns. are expressed as wt. %. Fluxing of SiO_2 by dissolved FeO was shown to be an important factor in the deoxidation of low-C steel. Steels high in SiO_2 are red-short in forging, while steels contg. Fe^{++} silicates high in FeO forged without cracking. The use of Si as a deoxidizer in steel-making processes always results in the formation of SiO_2 or silicates, depending on the amt. of Si used and the concurrent use of other deoxidizers. If Si is used alone, the SiO_2 formed is extremely hard to eliminate. The oxidation of the metal in the basic open-hearth process increases as the C content decreases. The time required to eliminate silicates, resulting from deoxidation with Si, from the steel bath was proportional to the depth of the bath and inversely proportional to the size of the particles formed on deoxidation. Agitation of the bath assisted in cleaning it. High residual Mn had only a slight cleaning effect. Segregation of silicates in ingots from 20 lb. to 3 tons in wt. was studied. In top-poured steels the max. segregation was in the center of the ingot about 15% from the bottom. An annular zone of high-silicate segregation was found in the upper portion of these ingots and is due to crystn. phenomena. In bottom-poured ingots segregation is more irregular and is complicated by erosion of runner brick. ALDEN H. EMERY

Operation and metallurgy of a 200-ton tilting furnace for the Talbot process [of steel making]. W. ALBERTS. *Stahl u. Eisen* 51, 117–28(1931).—In continental practice, open-hearth furnaces for steel making are considered economical up to 75–100 tons

capacity. For larger sizes tilting furnaces are more economical because of the easy removal of the slag by tilting the furnace. The construction and the operation of a 200-ton tilting furnace, which can be used for either the scrap iron or the pig iron-ore (Talbot) process, is described in detail. In using the scrap iron process best results were obtained by tapping off $^3/_8$ of the content of the furnace at the end of the melt, while in using the Talbot process the most economical operation was attained by tapping off only 65–75 tons. The chem. reactions during the melting process were followed by taking samples from the melt from various depths. About 3 hrs. was required to obtain the steel of the desired compn. For deoxidation Fe-Mn gave better results when added as a liquid rather than as a solid. The mech. tests carried out on a great no. of melts showed that the steel obtained by the Talbot process was of a very good quality. Many references are given. J. A. SZILARD

Graphical calculation of cupola furnace mixtures with special regard to pearlite castings. BÉLA SZÖKE. *Die Giesserei* **17**, 1013–7(1930).—A theoretical paper in which is described a method using parallel coördinates for detg. the wt. of each constituent to be charged into a cupola furnace to obtain a given content of a given element (*e. g.*, Ni) in the Fe drawn-off. The charged mixt is prepd. from 2 or 3 kinds of Fe, with known Si content. Three examples showing the application of the method to various charges (2 pearlitic castings) are given. J. BALOZIAN

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thickness provided they are not much harder than about 400 Brinell. In both the micro-Brinell and scratch tests, loads up to 1 kg. were used. In the indentation tests the results are expressed as "ball numbers" in kg. per sq. mm., obtained by dividing the load by the projected area of the indentation (πr^2) instead of the spherical area (as required for the Brinell no.). The use of this "ball no." is recommended as being a more scientific value than the Brinell no. and being considerably easier to calculate than the Brinell no. while not differing greatly from it. A similar "cone no." is used in recording the results of micro-indentation tests using a 120° diamond cone. The scratch hardness no. is given by $P_s = (8L/\pi w^2)$ kg. per sq. mm. (L = total load on diamond, w = width of scratch made by hemispherical diamond). The scratch hardness no., under the conditions used, does not vary greatly with the testing load. An empirical conversion curve for obtaining *approximate* Brinell nos. from scratch hardness nos. is given. Tables showing the results of applying both the above tests to various metals, and the scratch test to Cd deposits of various thicknesses, to electrodeposits of various metals 0.02 mm. thick, and to Ni deposits (on steel) from baths of different compns., are given. It is suggested that a 0.5 mm. hemispherical diamond indented on a machine of the above general type would be of still greater utility, as harder deposits could then be tested. EDWARD B. SANIGAR

New method of making ball hardness tests of metals, and a plotting table for the simplification of Meyer (hardness) analysis. HUGH O'NEILL. *Iron and Steel Inst.* (London), *Carnegie Scholarship Mem.* **19**, 19–38(1930).—A crit. discussion of existing hardness-testing machines is followed by a description of a new diamond hardness test which uses an "unrecovered" indentation, dispenses with a measuring microscope, gives comparable hardness nos., has a const. rate of application of load and can be used for standard Brinell testing. The instrument is suitable for Meyer's hardness analysis. For hard materials a 1-mm. indenter is employed, while for soft metals and alloys a 10-mm. indenter is recommended. H. S. v. K.

Testing chromium plate for resistance to abrasion. HARRY C. WOLFE. *Metals and Alloys* **2**, 60–1(1931). A. J. MONACK

Materials of construction in aircraft engines. R. R. MOORE. *Proc. Am. Soc. Testing Materials* **1930** (preprint) No. 33, 46–56.—A discussion of the various *steels, bronzes, brasses and light alloys* most commonly used in aircraft engine construction. Phys. properties and chem. analyses of the alloys are tabulated and the applications of each alloy and the reasons for its specific uses explained in detail. W. H. BOYNTON

Ferrous metals used in airplane construction. J. B. JOHNSON. *Proc. Am. Soc. Testing Materials* **1930** (preprint) No. 33, 3–9.—Cast Fe and cast steel have but a limited application in aircraft construction. Standards on the chem. compns. as adopted by the Society of Automotive Engineers, in some cases with slight modifications, are applied in the airplane industry in the cases of rods, bars and billets. Rolled sheets and strips, tubes and wire are used in the industry. W. H. BOYNTON

Some notes on teeming speeds of ingots. A. JACKSON. *Iron Steel Ind. and British Foundryman* **4**, 167–70(1931).—A summary of the effects of teeming rates on 6-ton ingots. Rapid teeming rates tend to cause cracking. C. H. LORIG

Multi-component systems involving iron. III. The system: iron-phosphorus-silicon. W. HUMMITZSCH AND F. SAUERWALD. *Z. anorg. allgem. Chem.* **194**, 113–38 (1930); cf. *C. A.* **24**, 1049.—The system contg. an excess of Fe was examd. chemically, thermally and metallographically. Fe_2P–FeSi is quasi-binary. Fe–Fe_2Si–FeSi is an independent 3-component system. Fe_3P–FeSi is not quasi-binary. A ternary eutectic at 1018° consisted of 6.35% Si, 7.45% P, 86.20% Fe. At 1110° there is an equil. of the form: Liquidus k + Fe_2P = Fe_3P + FeSi. The liquidus is 13.55% Si, 6.00% P, 80.45% Fe. Eleven diagrams are given and discussed, also a no. of photomicrographs. B. A. SOULE

The expansion of iron. W. SCHRECK. *Giesserei-Ztg.* **27**, 1–3(1930).—Motor cylinders are cooled by water or air, but the pistons come in direct contact with hot gases and expand. On subsequent cooling the Fe does not contract to its original vol.; thereby it suffers a loss of strength. The modern light construction demands stringent specifications. High Si causes pptn. of the C as graphite, with accompanying expansion. Mn, and especially Cr, hinder the pptn. In order to regulate the compn. accurately, the Fe should be melted in an elec. furnace. CURTIS L. WILSON

The coefficient of expansion of cast iron. F. ROLL. *Giesserei-Ztg.* **27**, 4–7(1930).—A review of the effects of temp. and alloying elements upon the coeff. of thermal expansion of cast Fe. CURTIS L. WILSON

Shrinkage in cast iron in relation to the production of some special castings. R. T. ROLFE AND J. LAING. *Iron Steel Ind. Brit. Foundryman* **3**, 263–7, 284(1930). E. J. C.

Factors influencing the hardness of cast iron. AL. L. NORBURY. *Metallbörse* **20**, 1939–40(1930).—The influence of various factors upon the pptn. of fine graphite particles in the molten Fe is discussed. The addn. of graphitizing substances probably causes the pptn. of a large no. of finely divided graphite particles which are dissolved easier and quicker than the big flakes. Gray castings made with the addn. of such graphitizing substances show better strength values. Fe-Si, Ca-Si or Ni addns. have this effect. Mn and S by themselves favor the tendency toward hardening. Since they are always present at the same time, however, they neutralize each other through the formation of MnS. In order to neutralize the effect of S, an excess of 0.3% Mn over the quantity theoretically required for the formation of MnS is necessary. P seems to diminish the tendency toward hardening of thin pieces cast in sand molds. The tendency toward hardening is diminished by Al, Ni, Cu and Co, while it is increased by V, Cr, Se, Mo, Sn, Sb and W. LEOPOLD PESSEL

Effects on cast iron of prolonged heating at 800–1100°F. R. S. MACPHERRAN AND REXFORD H. KRUEGER. *Trans. & Bull. Am. Foundrymen's Assoc.* **2**, 826–64(1931).—See *C. A.* **25**, 60. C. H. LORIG

Chromium in cast-iron mixtures. T. F. JENNINGS. *Trans. & Bull. Am. Foundrymen's Assoc.* **2**, 801–9(1931).—See *C. A.* **24**, 4743. C. H. LORIG

Effect of nickel and silicon on the properties of whiteheart malleable cast iron (with special reference to thin-walled malleable). I. S. J. E. DANGERFIELD, F. JOHNSON AND E. R. TAYLOR. *Iron and Steel Inst.* (London), *Carnegie Scholarship Mem.* **19**, 1–18(1930).—The effect of Ni on cupola-melted white cast iron used for thin-walled malleable castings was investigated. The test bars, $^3/_{16}$ in. thick, contained C 3.4, Si 0.65, S 0.2, P 0.05 and Mn 0.08%. The content of Ni varied from 0 to 3.66%. Ni improves the fluidity of the molten alloy. The tensile strength increases to a max. of 22.7 tons/sq. in. at 2.5% Ni and falls to 6.4 tons/sq. in. at 3.66% Ni. Bend tests give the best results at 0.7% Ni. The machinability is not impaired by the presence of Ni. In the annealed bars Ni causes a diminution in the size of the C nodules, and up to 2.8% a retardation in the rate of C migration, thus retaining more combined C in the form of an intercryst. network. This is attributed to a widening of the temp. interval of the Ar_1 range due to the Ni content. Above 2.5% Ni there is a rapid decrease in the percentage of combined and total C left in the annealed bars. With 3.6% Ni only 0.085% C is left and a severely burned material results. H. S. v. K.

The influence of phosphorus, sulfur, nickel and chromium on the growth of cast iron. O. BAUER AND K. SIPP. *Die Giesserei* **17**, 989–95(1930).—Investigations to det. the influence of P, S, Ni and Cr on the primary growth (by annealing tests), and the carbide decompn. or the graphite sepn. from the solid soln. (metallographically) of cast Fe are described. The growth is promoted by Si, P and Ni and is retarded by Cr, Mn and S (in large amts.), while S in small quantities and C have no influence. Below the pearlite point P promotes the carbide decompn., and at high temps. the C sepn. from the solid soln. Cr and Mn tend to retard both these, while S in small quantities does not influence the carbide decompn. In large amts. S tends to act strongly against both this decompn. and the C sepn. Micrographs (18) are given. J. BALOZIAN

Effects of alloys in cast iron. R. C. GOOD. *Trans. & Bull. Am. Foundrymen's Assoc.* **1**, No. 8, 15–28(1930).—A review is given of the effects of alloying constituents. The influence of C, Si, P, S, Mu, Cr, Ni, Co, V, Ti, Al, Cu, Mo, W and Zr is discussed. LEOPOLD PESSEL

Some notes on cast-iron plating tools. ROGER POWELL. *Iron Steel Ind. and British Foundryman* **4**, 161–2(1931).—From service records the essential of a good plating tool appears to be a good chill $1^1/_2$ to 3 in. deep. C. H. LORIG

Microstructure of pig and cast iron. H. PINAL. *Giesserei-Ztg.* **27**, 436–47(1930).—A series of 133 photomicrographs showing the various structures of P, graphite, combined C and slag in pig Fe and cast Fe. CURTIS L. WILSON

The properties of pig irons from various sources. A. WAGNER. *Giesserei-Ztg.* **27**, 403–12(1930).—Chem. analysis is not an exclusive criterion of the value of pig Fe, as many varieties of the same compn. exhibit different properties. The behavior of 17 types of pig Fe, such as English hematite, foundry and Swedish charcoal Fe was investigated by melting and remelting several times in crucibles, under as const. melting conditions as possible, and examg. specimens for tensile and bending strength, hardness and microstructure. The first melting resulted in materials of low tensile strength, 8.5–12 kg., and low bending strength, 18–19 kg. Repeated remelting improved the phys. properties: after the 4th melting, the tensile strength increased 100% without any appreciable change in compn. Numerous photomicrographs are reproduced. CURTIS L. WILSON

The causes of blisters and pinholes in wet-process cast-iron enamel. WALTER KERSTAN. *Die Giesserei* **17**, 965–72(1930).—Plant and lab. expts. were carried out to det. the causes of blisters and pinholes in cast-Fe enamels produced by the wet process. These defects are shown to be due to the simultaneous action of various causes, principal among which are: (1) incorrect compn. of the frit, (2) phys. defects in the cast Fe, (3) insufficient cleaning of the casting surface, and (4) various changes in the Fe structure during the baking of the enamel. Cast Fe in which the graphite is finely divided is the most stable during baking and shows the least change in structure during the enameling process. J. BALOZIAN

Etching figures appearing in iron and steel. V.-N. SVECHNIKOV. *Rev. métal.* **27**, 512(1930). C. H. LORIG

The study of special steels—constitutional diagram of the 18 per cent Cr alloys with variable composition of nickel and carbon. V. N. KRIVOBOK. *Mining Met. Investigations U. S. Bur. Mines, Carnegie Inst. Tech., Mining Met. Advisory Boards, 4th Open Meeting of the Met. Board*, Oct. 17, 1930, 4 pp.—An outline is given of problems begun or to be carried out on 18% Cr-Fe alloys contg. variable percentages of Ni and C. C. H. LORIG

Mechanical properties of copper steels with special reference to the effect of heat treatment. F. NEHL. *Stahl u. Eisen* **50**, 678–86(1930).—The addn. of more than 0.6% Cu to mild steel increases the yield point appreciably but tends to make the metal brittle, a tendency which is overcome by the addn. of 0.4% Cr. This alloy has a much higher tensile strength and yield point at high temps. than Si steel and is more resistant to corrosion. Quenching from above 800° and tempering at 450–550° increases the tensile strength of steels with more than 0.6% Cu without seriously reducing the ductility and resistance to shock. Tables and graphs are given showing the effect of various heat treatments on the mech. properties of several Cu steels after varying mech treatment. B. C. A.

Vibratory strength of nitrided steel. O. HENGSTENBERG AND R. MAILÄNDER. *Krupp. Monatsh.* **11**, 252–4(1930).—A considerably higher vibratory strength is shown by the nitrided specimens as compared with the same steels not nitrided. This depends on the relative depth of nitrided layer and core as well as upon the type of steel. The first breakdown always occurs at a point on the border of the nitrided layer, although this layer shows very little plastic deformation. Small surface defects are without effect upon the vibratory strength of nitrided samples. H. STOERTZ

Practical importance of the influence of different cooling conditions on the structure of steel ingots. F. LEITNER. *Stahl. u. Eisen* **50**, 1081–6(1930).—The effect of varying wall thicknesses of the mold on the structure of plain C and Ni-Cr steels has been examd The results show that a more fine-grained and homogeneous macrostructure is obtained by retarded cooling, and hence thin-walled molds are to be preferred. Even better structures are produced by retarding the radiation of heat from the mold by covering it with a heat-insulating material or by using a double-walled mold with an annular air space between the walls. B. C. A.

Drawing of rapidly quenched steel. ANDRÉ MICHEL AND PIERRE BENAZET. *Compt. rend.* **192**, 163–6(1931).—A study is made of the influence of drawing time and temp. on the transformation of austenite to martensite in a high-speed steel contg C 0.72, Si 0.33, Mn 0.26, Cr 5.20, W 18.33, V 1.02 and Co 11.09%. Co in steel increases the effect of secondary tempering. C. H. LORIG

Drawing of special rapidly quenched steels. ANDRÉ MICHEL AND PIERRE BENAZET. *Rev. métal.* **27**, 501–8(1930).—Dilation characteristics of 16 alloy steels were detd to study the γ-α transformation. C. H. LORIG

The annealing of steel. P. CHEVENARD. *Metallbörse* **20**, 1828(1930).—The hardening of steel was investigated by means of photomicrographic, magnetic and dilatometric methods. Dilatometric curves were detd. for the thermic cycles of growth with gradually increasing temps. and also for the phenomena of isothermic growth under exact detn. of the change of length as a function of the time. A special dilatometer with movable photographic plates was used. Constant temp. was insured by special construction. The investigations were made on austenite, the only constituent that can be obtained in a pure state. It was investigated in the state of complete superhardening. A mixt. of austenite-martensite was investigated in a partially superhardened condition and the greatest hardness obtainable was detd. in a quenched steel contg. the max. amt. of martensite. The phenomena can be explained by the equil. diagram but they are complicated by the simultaneous occurrence of the various reactions. C. could eliminate the influence of the simultaneous reactions which had caused the variations of results before. Austenite can lead to the formation of cementite,

a reaction which causes contraction, or a mixt. of α-Fe and cementite may be formed under expansion. The formation of martensite, which follows that of austenite, is connected with a contraction that grows with the temp. In quenched steels there is always a simultaneousness of these 2 phenomena, causing in certain sections of the expansion curve either an arrest in the contraction, a rise or a slowing down. A direct transition of austenite into martensite during heating could never be observed. This secondary reaction in hardening always occurs in the second period of cooling. This simultaneousness of the phenomena in martensite and austenite can also be observed by means of the elec. cond. LEOPOLD PESSEL

Solution of scale in pickling steel. E. L. CHAPPELL AND PAUL C. ELY. *Ind. Eng. Chem.* **22**, 1200-1(1930).—In pickling welded pipe 95% or more of the scale goes into soln., the undissolved part consisting mainly of Fe silicates. The rate of scale soln. is about equal to the rate of metal soln. in the absence of an inhibitor. The rate of scale soln., is about the same with or without an inhibitor. Scale on pipe is more quickly and completely dissolved than scale in acid without metal. L. P.

Pickling solution for stainless and nickel steel. W. E. WARNER. *Machinery* **36**, 626–7(1930); *Metals and Alloys* **1**, 737.—Proportions given are: 9 parts water, 1 part H_2SO_4, 1 part HCl and 1 part HNO_3. G. G.

Economic pickling of thin metallic sheets. E. DWORZAK. *Przemysl Chem.* **14**, 361–73(1930).—The rate of soln. of thin sheets of Fe and Zn in 1–25% H_2SO_4 at 30–50° was studied with and without the addn. of certain inhibitors. This rate for Fe was followed by measuring the vol. of evolved H. In H_2SO_4 alone the rate of soln. of Fe increases rapidly with temp. At 30° this rate is markedly greater in 35% than in 5% acid, but is nearly the same for all concns. at 50°, when 1 cc. H is evolved per 1 cm.^{2} of the surface per 20 min. The addn. of 1–15% naphthalenesulfonic acid (I) or "Passiv" to 15% H_2SO_4 reduces the rate of evolution of H markedly and causes the rates for various concns. of acid to remain different even at the higher temps. The effect of the addn. of 0.1–2% "Vogel's compd.," or "compd. K" (author's prepn.) is to repress the rate of H evolution still further, although the former ceases to function at 50° after 30–40 min. while the latter continues to maintain its inhibiting property. The advantage of speeding up the pickling of Fe by increasing the temp. or concn. of the acid is only apparent, because the increased rate of H evolution is not only a sign of an increased rate of consumption of Fe and acid but is also harmful to the metal. The pickling process is speeded up appreciably by the addn. of inhibitors. Their concn. seems to have little effect on the rate of H evolution at the higher temps. H_2SO_4 alone removes the oxide scale on Fe sheet in small chunks. In the presence of I these chunks are larger. In the presence of "Vogel's compd." or "compd. K" there is no H_2 observed at all until after several min. the whole surface of the oxides suddenly peels off. A study of the rate of soln. of Fe oxide scale in H_2SO_4 in the presence of the above inhibitors leads D. to conclude that evidently the negative catalytic effect of the inhibitors pertains to the soln. of metals in acids, and of those reactions which are accompanied by evolution of H, and not to the metal oxides. Tests show that the inhibitors increase the rate of soln. of the scale, although in com. practice only a negligible amt. of scale is dissolved. In pickling, the scale is forced away from the metal by H which is produced by the action of the acid on the metal. A study of the efficiency of the utilization of acid showed that 40 kg. 60° Bé. H_2SO_4 is needed for pickling 1 T iron sheet, 1 sq. m. surface and 1 mm. thick in 15% acid, whereupon 2.3% metallic Fe is dissolved. The addn. of 3% "Passiv" reduces this to 1.06%. The corresponding figure for "Vogel's compd." is 0.78%, and for "compd. K" 0.53%. A. C. ZACHLIN

Pickling of pipe using commercial inhibitors. E. L. CHAPPELL AND PAUL C. ELY. *Ind. Eng. Chem.* **22**, 1201-3(1930).—The use, lab. control and practical evaluation of inhibitors are discussed. LEOPOLD PESSEL

General principles underlying the use of alloy steel. R. WHITFIELD. *Iron and Steel Ind. and British Foundryman* **3**, 347-50(1930).—A review. LEOPOLD PESSEL

The constitution of alloys. The application of physical methods. ALFRED SCHULZE. *Giesserei Ztg.* **27**, 86-97(1930).—Of all the properties used to study the constitution of alloys, the elec. cond. is the easiest to comprehend and the most sensitive toward slight changes in constitution. The change in elec. cond. for binary systems which show complete insoly. in the solid state, when plotted against the vol. concn., is not quite linear; it is not the arithmetic mean, but the geometric mean, of the elec. conds. (and elec. resistivities). For complete miscibility in the solid state, the curve of elec. cond. decreases rapidly and has in the middle a flat min. The resistance resulting from solid solns. is independent of the temp. When a system shows partial soly. in the solid state, the elec. cond. curve decreases rapidly within the limits of soly. and then changes almost

along a straight line. When a chem. compd. is formed, a distinct break in the elec. cond. curve is noted at the concn. of the compd. The relation between concn., temp., and elec. cond. is shown on space models. CURTIS L. WILSON

The thermal properties of various alloy groups. ALFRED SCHULZE. *Giesserei-Ztg.* 27, 177–84(1930); cf. preceding abstr.—Next to the elec. cond., the thermal expansion of alloys throws the most light upon their constitution. The tube method of dilatometric analysis is both sensitive and exact. For systems completely insol. in the solid state, the coeff. of thermal expansion is a linear function of the vol. concn. For complete soly. in the solid state, the curve of the coeff. of expansion is convex toward the concn. axis. This deviation from a straight line is explained as due to the fact that an atom of the one component displacing an atom of the other disturbs the space lattice so that the av. distance between the atoms is not proportional to the concn. For partial soly. systems, the coeff. curve is similar to that of solid solns. within the soly. limits, outside of which it is a straight line. The thermal cond. is similar to the elec. cond. with respect to its relation to the constitution of alloys. Magnetic and x-ray analyses are also discussed. CURTIS L. WILSON

Structural and engineering light alloys for aircraft. R. L. TEMPLIN, F. V. HARTMAN AND E. C. HARTMANN. *Proc. Am. Soc. Testing Materials* 1930 (preprint) No. 33, 10–6.—The wrought and cast alloys of Al and Mg best suited to aircraft work and their respective advantages are discussed. The designation of the various alloys available is indicated and the forms in which they are produced commercially given. Data on nominal compn., heat treatment and mech. properties are tabulated. W. H. B.

Alloys for drilling purposes. N. PRAVDYUK AND V. NEGREEV. *Azerbaĭdzhanskoe Neftyanoe Khozyaĭstvo* 1930, No. 12, 99–112; cf. *C. A.* 24, 2406.—Analyses and descriptions are given of various alloys which were tested for hardness and resistance to wear. Expts. indicate that alloys contg. W can be successfully applied to drilling. V. K.

Alloyed castings. E. KOTHNY. *Giesserei-Ztg.* 27, 291–300, 323–7(1930).—A review of the effects of Ni, Cr, Ni-Cr, Ti, Al, B, Ce, Co, Cu, W, Mo, V and Zr upon the constitution and the phys. and chem properties of gray, chilled and malleable Fe castings. A bibliography is appended. CURTIS L. WILSON

Processes involved in age-hardening. G. TAMMANN. *Z. Metallkunde* 22, 365–8 (1930).—The theory of age-hardening is discussed generally. It is concluded that the increase in hardness and strength observed in age-hardening alloys cannot be explained by the blocking of slip-planes by ppt. alone, but that the chief effect must be a pre-pptn. assocn. of the pptg. mols. in the supersatd. solid soln The importance of the form of the ppt. (Widmanstatten figure) and of the process of coagulation is discussed. R. F. MEHL.

Age-hardening of alloys. W. GUERTLER. *Z. Metallkunde* 22, 78–84(1930).—A review, chiefly of the theoretical aspects. ROBERT F. MEHL

The age-hardening of Constructal. G. WASSERMANN. *Z. Metallkunde* 22, 160–2 (1930).—The changes in lattice parameter during aging of the alloy Constructal (Al with 5.88% Zn, 1.40% Mg, 1.35% Mn, 0.28% Fe, 0.20% Si) was studied. It was found that the lattice const., a_0 (the side of the unit face-centered cube of the Al solid soln.) decreased by 0.0015 A. U. upon room temp. aging for one day or artificial aging at 80° for $^1/_2$ hr. Annealed wire showed the presence on the x-ray spectrogram of $MgZn_2$. The strongest line of $MgZn_2$ may be found on the spectrogram after only $^1/_2$ hour's aging at 80°. It was not possible to prove the presence of $MgZn_2$ ppt. in alloys aged only at room temp. ROBERT F. MEHL

Brinell hardness, elastic limit, and ultimate tensile strength of age-hardening aluminum alloys. P. MELCHIOR. *Z. Metallkunde* 22, 175–6(1930).—The equations suggested by Bohner (*C. A.* 24, 1067) to express empirical relationship between these quantities are discussed and simpler and more accurate equations proposed. ROBERT F. MEHL

The hardening problem in copper-silver, beryllium-copper and zinc-copper alloys. M. HAAS AND D. UNO. *Z. Metallkunde* 22, 154–8(1930).—*Cu-Ag.*—Earlier work on the solid soly. of Cu in Ag is summarized. A new solid soly. curve is established by measurements of thermal expansion (dilatometric) and of elec. resistance, and by microscopic studies on quenched and annealed alloys. The maximums upon the dilatometric curve and the elec. resistance curve correspond to the max. upon the hardness curve *Be-Cu.*—Dilatometric curves on the Cu-rich solid soln. are given. Hardness measurements are in good agreement with the dilatometric. *Zn-Cu.*—A few dilatometric curves are given for alloys cooled from the β field. Throughout this work an attempt is made to trace the course of pptn. by means of changes in volume and to correlate these changes

and therefore the various stages in the pptn. process with the changes in hardness observed. ROBERT F. MEHL

The alloys of aluminum. L. POTIN. *Rev. gén. sci.* **41**, 474–7(1930).—A review. LEOPOLD PESSEL

Cast aluminum bronzes. III. Shrinkage phenomena. W. CLAUS AND F. GOEDERITZ. *Die Giesserei* **17**, 1017–23(1930); cf. *C. A.* **24**, 4497.—In studying the macrostructure of cast Al bronzes, castings of 4.5, 7 and 10% Al, and a Si-Al bronze are made in dry and moist sand and in chill molds, pouring at 1250°. Shrinkage pipe is present in the core of the 7 and 10% Al bronzes when cast in either the dry or the moist molds. The 4.5% Al bronze shows small defects in the bottom of the casting, but no shrinkage pipe in the head. This bronze when cast in a chill mold gives a dense casting. Shrinkage pipes are shown by the 4.5, 7 and 10% bronzes when cast in chill molds. The Si-Al bronze shows slag defects in the foot when cast in the sand molds, and a central porosity when cast in the chill mold. Lower pouring temps. (1050°) do not affect the shrinkage pipe in the 10% Al bronze when cast in the dry sand mold. J. BALOZIAN

Ternary alloys of aluminum, silicon and copper. G. G. URAZOV, S. A. POGODIN AND G. M. ZAMORUEV. *Mineralnoe Suir'e i Tzvetnuie Met.* **4**, 160–95(1929).—A study, by thermal analysis, of the Al triangle up to 24% Si and 40% Cu is given. The alloys in this range consist of mech. mixts. of Si, $CuAl_2$ and a solid soln. of Si and Cu in Al. The soly. of Cu is increased by Si in the interval 450–350°. The hardness of the ternary solid solns. was detd. Aging of the alloys at the ordinary temp. diminishes with increasing content of Si. The technical application of the results is considered. B. C. A.

Bismuth alloys. J. G. THOMPSON. *Metals and Alloys* **2**, 92–4(1931).—See *C. A.* **25**, 670. A. J. MONACK

Crystal structure of the alloys of iron and manganese. JAMES B. FRIAUF AND MAXWELL GENSAMER. *Mining Met. Investigations U. S. Bur. Mines, Carnegie Inst. Tech., Mining Met. Advisory Boards, 4th Open Meeting of the Met. Board*, Oct. 17, 1930, 6 pp.—X-ray analyses show α-Fe is present in Fe-Mn alloys up to at least 16% Mn. γ-Fe makes its appearance at room temp. in the forged alloys with 13% Mn. Another phase, the hexagonal close-packed arrangement, was found in forged alloys contg. 10 to 26% Mn. C. H. LORIG

Constitutional diagram of iron-manganese alloys. V. N. KRIVOBOK. *Mining Met. Investigations U. S. Bur. Mines, Carnegie Inst. Tech., Mining Met. Advisory Boards, 4th Open Meeting of the Met. Board*, Oct. 17, 1930, 3 pp.—A tentative constitutional diagram was constructed from data supplied by thermal analysis, metallographic studies and x-ray patterns. It is believed there are at least 6 different phases: α-Fe, γ-Fe, ε-Fe, α-Mn, β-Mn and γ-Mn. C. H. LORIG

Heat treatment and metallography of the alloys of iron and manganese. V. N. KRIVOBOK AND CYRIL WELLS. *Mining Met. Investigations U. S. Bur. Mines, Carnegie Inst. Tech., Mining Met. Advisory Boards, 4th Open Meeting of the Met. Board*, Oct. 17, 1930, 4 pp.—Dividing the Fe-Mn alloys into 6 groups, K. and W. discuss the microstructure of each group individually but briefly. C. H. LORIG

Thermal analysis of iron-manganese alloys. F. M. WALTERS, JR., AND CYRIL WELLS. *Mining Met. Investigations U. S. Bur. Mines, Carnegie Inst. Tech., Mining Met. Advisory Boards, 4th Open Meeting of the Met. Board*, Oct. 17, 1930, 6 pp.—Thermal analyses were made in a gradient furnace on Fe-Mn alloys contg. 1.7, 4.4, 7.2, 10.2, 13.1 and 16% Mn with an av. of 0.02% C. A sudden change in thermal disturbance was observed in alloys contg. 13 and 16% Mn. C. H. LORIG

Ternary alloys of lead. S. J. NIGHTINGALE. *Brit. Non-Ferrous Metals Research Assoc. Develop. Rept.* **D3**, 12 pp.(1929).—The properties of Pb alloys contg. (*a*) 0.25% Cd and 0.5% Sb and (*b*) 0.25% Cd and 1.5% Sn are compared with those of pure Pb as regards their utility for the manuf. of pipe. The tensile strength of the alloys is 1.62 tons/sq. in. compared with 0.9 ton/sq. in. for pure Pb, the ductility 52–55% against 80% and the fatigue limit 0.74–0.57 ton/sq. in. against 0.18. The alloys are on the whole more resistant to corrosion than is Pb and withstand a considerably higher bursting pressure, so that a lighter pipe can be used for the same service than is the case with Pb. The working and soldering properties of the alloys are equally as good as those of lead and, taking into account their superior properties, are relatively less costly than Pb; they do not undergo intercrystalline corrosion or fatigue. B. C. A.

Silicon-zinc-copper alloy. E. VADERS. *Metal. Ind.* (N. Y.) **29**, 108–10(1931).—See *C. A.* **25**, 63. G. G.

Useful titanium alloys. W. KROLL. *Metallwirtschaft* **9**, 1043–5(1930).—Fe-Ti

alloys can be rolled and may be used as alloy steels. With high Ti content they are susceptible to aging. Their grain structure is very coarse. Ni reduces grain size and increases the age-hardening effects. The alloys are compared to those of Fe-Be. C. H. LORIG

Directional properties in cold-rolled and annealed copper. ARTHUR PHILLIPS AND E. S. BUNN. *Am. Inst. Mining and Met. Eng. Tech. Pub.* No. **413**, 18 pp.(1931).—The paper deals with the directional differences in the tensile properties of 2 kinds of sheet Cu: tough pitch Cu contg. 0.0295% Ag and electrolytic Cu deoxidized with P (residual P 0.0089%). The first series of tests was on the cold-rolled Cu, reduced 10–90% Tensile tests were made on strip cut (1) in the direction of rolling, (2) at 90 degrees and (3) at 45 degrees to the direction of rolling. In the second series the 3 kinds of strips cut from the rolled sheets were annealed over a temp. range extending from 300° to 800°. The results seem to indicate that rather pronounced directional differences, particularly in elongation values, are produced by the combined effects of heavy reductions and high temps. of anneal. C. L. MANTELL

Duplexing. K. R. BINKS. *Iron and Steel Ind. and Brit. Foundryman* **4**, 194, 198 (1931).—Processes are described. C. H. LORIG

Parkerizing. E. LIEBREICH. *Z. angew. Chem.* **43**, 769–71(1930).—The reactions underlying this process and the qualities of the coatings obtained are discussed. LEOPOLD PESSEL

An inquiry into lead poisoning during coating with lead on metal. E. AGASSE-LAFONT. *Med. Travail* **1**, 277–9(1930); *Bull. Hyg.* **5**, 923–4.—Metals are coated by plunging the red-hot metal into the metal powder or by sprinkling the powder on the hot metal and returning the metal to a hot furnace where it melts and spreads. The powder may contain 66% of Pb_3O_4. The air is so laden with the powder that 6.6 g. (contg about 4 g. of Pb) were collected on each sq. m. of surface per hr. Basophile granulated red cells were found in the blood of 90% and 80% showed the blue line. They suffered from colic. Symptoms of plumbism were present after a few days' employment. GEORGE R. GREENBANK

Risks in new methods of spraying. W. ROSENTHAL, D. ROSENTHAL AND ERIKA. *Deut. Med. Wochschr.* **56**, 1444–67, 1487–9(1930); *Bull. Hyg.* **5**, 926.—The authors describe "metallization" in which molten metal is blown onto a surface by compressed air. Cellulose spraying is described in which turpentine, C_6H_6 and its much less dangerous homologs PhMe and $C_6H_4Me_2$ are used. Particular stress is laid on the dangers of MeOH as likely to produce optic nerve neuritis. Among the poisonous coloring matters discussed Pb and Si are the most dangerous. The value of periodic medical examn. is stressed, and the symptoms which if present should result in suspension of the worker are indicated. Symptoms of poisoning by C_6H_6, Pb and Si are described GEORGE R GREENBANK

Protecting iron from rust. DIECKMANN. *Farbe u. Lack* **1931**, 87–8.—An address G. G. SWARD

Corrosion-resisting cast iron. W. ACKERMANN. *Giesserei-Ztg.* **27**, 263–6(1930).—As corrosion is regarded as an electrochem. process the homogeneous structure of solid solns. is most favorable to resistance. Graphite accelerates corrosion. Si causes the pptn. of graphite, but a cast Fe with 0.84% Si corrodes more rapidly than one with 2.25% Si. The resistance of the higher Si casting is attributed not to the graphite but to the Si which is in solid soln. P up to 0.5% increases resistance, but more than 0.07% S is detrimental. From 14 to 22% Si creates an acid-resisting material, which is not recommended for alk. solns. Ni, Cu and Cr reduce the rate of corrosion under certain conditions. The addn. of Monel metal to cast Fe produces an austenitic structure and a resistance to corrosion almost equal to that of bronze. C. L. W.

Corrosion-prevention methods as applied in aircraft construction. H. S. RAWDON. *Proc. Am. Soc. Testing Materials* **1930** (preprint) No. 33, 30–6.—A résumé of present com. practice on corrosion-prevention. Steel structural parts are plated either with Cd or Zn, followed by an iron-oxide primer and a lacquer or enamel. The inside of closed tubular members is coated with the primer. In Navy practice duralumin is treated by the anodic-oxidation process prior to the application of a priming coat, followed by the finishing coat. Army practice is to have a careful preliminary chem. surface cleaning followed by a priming coat and finishing coats. Special precautions against "crevice" corrosion involve the use of rubberized balloon tape, bitumastic paint or similar product between metal parts and wood, leather, etc., and the use of "dope-proof" paint or Al foil on top of the protective coating already applied. Duralumin and steel parts before assembly by riveting or bolting are coated with primer or Navy gray enamel on the contact surfaces. Bare Al surfaces are cleaned by the use of a

mild etching soln., such as a dil. soln. of H_3PO_4. Another soln. is a caustic "dip" followed by neutralization with weak acid. Mild abrasives may be used, even sand blasting for heavier parts, each followed by chem. cleaning. W. H. BOYNTON

Corrosion exfoliations on aluminum sheet. LEOPOLD PESSEL. *Metal Ind.* (N. Y.) 29, 72–3(1931).—The phenomenon of corrosion exfoliations, which is quite different from the commonly observed forms of corrosion of Al, can be observed on Al sheet exposed to continuous salt spray. This phenomenon is explained on the basis of the O concn. cell theory, under the assumption that min. crevices, formed as a consequence of the rolling process, are made the anodic areas because of the exclusion of O. The formation of a large vol. of Al hydroxide takes place in these sections, causing the blister-like raising of the adjoining metal. It was shown by expt. that Al sheet, sand-blasted and sprayed with molten Al by the metal spraying process, will not show this type of corrosion. LEOPOLD PESSEL

The corrosion of copper and high-copper alloys by salt solutions with special consideration of conditions existing in the potash industry. A. RAUCH AND H. KOLB. *Korrosion Metallschutz* 6, 151–6, 174–8, 193–200(1930); cf. *C. A.* 24, 4750.—Corrosion-time curves obtained by the corrosion of Cu in 1.35 *N* KCl and 1.35 *N* $MgCl_2$ solns., while of a linear nature, show a kink after approx. 1 hr., coinciding with the time when a deposit of basic Cu chloride could be observed. Solns. of Na_2SO_4 and $MgSO_4$ were much less active toward Cu than the chlorides. The curves obtained show considerable "spreads," making it difficult to draw a definite conclusion. A comparison between electrolytic Cu and 4% Al bronze showed that the linear relation between time and corrosion is found with Cu alloys, also. While the corrosion was greater with chlorides than with sulfates, there was also found a distinct relation between the nature of the anion and corrosion. In different salts having the same anion, the corrosion was the same at equal concns. of this anion. With increasing velocity of the liquids a slow increase of corrosion could be ascertained. The curve apparently approached a max. An app. is described in which the corrosion of Cu was accomplished in the absence of O. As was to be expected, the corrosion in solns. free of O was found to be only a fraction of that observed in the presence of air. In the absence of O the corrosion is practically not influenced by changes in concn., temp. and time of exposure. It is also equally intensive with chlorides and sulfates. In the absence of air, pure Cu and Cu alloys show the same behavior. Here too, no essential influence of concn., time and temp. could be found. Technical salt solns. were found to give practically the same result. The small difference in the corrosion values found in the presence and absence of air can be explained by the low O content of the solns. and by the tenacious retention of O in these concd. solns. For the *detn. of O in salt solns.* Winkler's Mn hydroxide method was modified for solns. contg. Mg salts by using NH_3 contg. NH_4I and NH_4Cl in place of NaOH. This method gave good results. The concn. of O in salt solns. was found to decrease with increasing concn. The influence of the temp. upon the O concn. was detd by modifying the app. The soly. of O decreases with increasing temp., the relation being expressed by a linear curve, apparently up to the b. p. of the solns. No quant. relation could be found between O soly. and corrosion. The corrosion reaches a max. at 20% KCl. From there on influences favoring and counteracting corrosion are apparently active at the same time. Leaching solns. attack Cu much less than KCl solns. of moderate concn.; this is explained by the lower soly. of O in the former. The temp. coeff. of corrosion in leaching solns. is also smaller. An experiment made to ascertain the attack by carried-over solid salts indicated the negligible degree of this factor. Solid $MgCl_2$, however, can, if in contact with Cu at increased temp., induce corrosion by splitting off HCl. The extent of corrosion of various Cu-bearing alloys was investigated. Al bronze was generally found superior to smelters Cu, electrolytic Cu, tin bronze and brass. While the latter showed greater resistance in one expt. with flowing KCl solns., the danger of severe local dezincification exists and suggests Al bronze as the more advisable material. Smelters Cu was found to be least resistant; electrolytic Cu came next, except in higher KCl concns., where Sn bronze showed greater attack. In an investigation of etched and copper-plated Cu sheets the influence of the surface condition upon corrosion was found to be negligible. Cold-worked Cu and Cu alloys were found to be more attacked than the soft annealed material. *Potential measurements* were made on electrolytic Cu, Al bronze and Sn bronze along with detns. of the corrodibility. No connection was found between the latter and the electro-chem. behavior. Electrolytic Cu, which showed the greatest corrosion, always had the noblest potential. In comparing the potentials of "soft" and "hard" electrolytic Cu with the corrodibility, it was found that the hardened metal, although of a lower potential, was less attacked. A soft and a hard Al bronze showed

the same amount of corrosion and yet a distinct difference in the potential. In comparing normal and cold-worked metal sheets, the latter always showed a more neg. potential and also greater corrosion. By direct measurement of electrolytic Cu and Al bronze electrodes, the latter were always found to be anodic. The conclusion is that the potentials cannot be considered a general indication of the corrosion resistance of the material. Electrolytic Cu became more anodic with increasing concn. of KCl. Expts. were made to determine whether Toedt's methods of measuring corrodibility by residual currents could be applied in the case of electrolytic Cu and Al bronze. The combination Pt-Al bronze gives a current 2–3 times as strong as the combination Pt-electrolytic Cu, which stands in contradiction to the repeatedly detd. greater corrosion resistance of Al bronze. In other expts. the quantity of residual current and the corrodibility were detd. at the same time. The latter was found to be 2–8 times as great as the values calcd. from the quantity of current. In other expts. the quantity of current was found to be the smaller the greater the loss of weight due to corrosion. No definite regularity can as yet be found in the relation between residual current and corrosion. Corrosion expts. were made with a larger exptl. installation. An app. recirculating 150 l. of leaching soln. is described. Al bronze was found to have the greatest resistance against corrosion, being about 7 times better than electrolytic Cu. In the expts. on a smaller scale this proportion had been found to be less pronounced. Sn bronze of 1.5% Sn showed a corrodibility similar to Cu. LEOPOLD PESSEL

Welding aluminum. FRED GROVE-PALMER. *Metal Ind.* (London) **33**, 509–10, 533–4, 546(1928). E. J. C.

Soldering and welding aluminum and its alloys. ERNST WEBER. *Giesserei-Ztg.* **27**, 72–6(1930).—Al and its alloys are difficult to solder because (1) the thin skin of thermally resistant and chemically inert oxide hinders a firm alloying of the metal and solder; (2) the high sp. heat and thermal cond. of Al cause in spots a "quenching" of the liquid solder and (3) the strong electropos. nature of the metal sets up reactions in the presence of liquids or moist air. Most modern Al solders consist principally of Sn with some Al and Zn. Many contain also Sb, Bi, Cd, Cu, Pb, Ni, Ag and other metals. Soldered joints are tested in steam, boiling salt soln. or boiling water for several days. The tensile strength is 5 kg./sq. mm., which is lower than that of Al. In order to meet chem. and mech. specifications, autogenous welding is recommended. Al is one of the most weldable of metals, if the following characteristics are kept in mind: (1) low resistance against oxidation, (2) high coeff. of expansion, (3) high thermal cond., (4) low m. p., (5) low tensile strength at high temps., (6) tendency to warp. Modern fluxes consist of alk. chlorides, fluorides, bisulfates, etc. A slightly reducing oxyacetylene flame gives good results. Welded joints should be guarded against too rapid cooling. CURTIS L. WILSON

Reaction between metal receptacles and foodstuffs (BLEYER, SCHWAIBOLD) **12**. Röntgenographic investigation of the system Cd-Mg (DEHLINGER) **2**. Effect of internal stresses on the magnetic susceptibility of metals (HONDA, SHIMIZU) **2**. The reactivity of metallurgical coke (DUFRAINE) **21**. Present position of the metallurgical coke industry in Central Europe (BERTHELOT) **21**. A device for determining work input to a laboratory ball mill (GROSS, ZIMMERLEY) **1**. Magnetic susceptibility and chemical investigation (SPENCER) **2**. Surface protection of the light metals (LEIB, KOLKE) **26**. Blast-furnace-slag portland cement (TOMARCHIO) **20**. A recording dust concentration meter and its application to the blast furnace (SIMON, *et al.*) **1**. Equilibrium diagrams of the Al–Mn, Cu–Mn and Fe–Mn systems (ISHIWARA) **2**. The equilibrium Fe-Fe_3C-O (PINGAULT) **2**. The heat of mixture in molten metals (KAWAKAMI) **2**. Cr oxide [for metallurgical purposes] (Brit. pat. 336,671) **18**. Washer for ores (Ger. pat. 516,145) **21**. Clarifying plant for ore industry (Ger. pat. 516,454) **1**. Alloy armouring for electric cables (Brit. pat. 336,408) **4**.

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Froth-flotation concentration of ores. PERCY C. WRIGHT (to The Minerals Separation North American Corp.). Can. 309,071, Mar. 3, 1931. Ore in the form of a non-acid pulp is subjected to a froth flotation operation in the presence of dixanthogen.

Mat (including a perforated sheet of rubber) for distributing air through liquids in ore flotation or other processes. WALTER H. CURRY and HENRY F. DIETZ (to Hewitt-Gutta Percha Rubber Corp.). U. S. 1,792,285–6, Feb. 10. Structural features.

Grading ores by weight for air blast hearths. REMBRANDT PEALE, WM. S. DAVIES and WM. S. WALLACE. Ger. 513,787, Aug. 18, 1923. Details of the app. are given.

Values from ores by leaching and electrodeposition. R. SANZ CARRERAS. Brit. 336,584, July 10, 1929. Ores contg. Cu, Ni and Co are leached with a dil. H_2SO_4 soln. contg. NaCl (suitably about 5%). Any insol. portion of the ore, which may contain arsenides and sulfocyanides, is oxidized in a furnace and again leached, and the solns. obtained may be further treated together or separately. The liquid, about 13–15°Bé., is electrolyzed for Cu recovery (various details of app. and procedure being given) and the electrolyte is then evapd. to 28°Bé. and cooled to ppt. alk. earth metal and Mg salts. It is further concd. to 38°Bé and cooled to crystallize Co sulfate, which may then be dissolved and subjected to a special electrolytic treatment to deposit Co in scales. Ni is recovered from the remaining electrolyte.

Apparatus for separating ore constituents by air currents. ALANSON O. TAYLOR. U. S. 1,792,404, Feb. 10. Various structural details are described.

Treating ores of metals. MEYER MINERAL SEPARATION CO. Brit. 336,770, Sept. 30, 1929. Metalliferous material is heated in the presence of a so-called "reagent metal" (defined as a metal capable of existing in 2 or more states of oxidation, such as Fe, Cu, Ni or Mn) to an elevated temp. somewhat below the decompn. temp. of the sulfate of the "reagent metal" and treated alternately with an oxidizing gas such as air and with an atm. contg. SO_2 and air. The process is applicable to oxidized or sulfide ores contg. Au, Ag, Pb, Ni, Mn, Cu, Co, Bi, Zn, Cd, Fe and similar heavy metals (which may themselves contain sufficient of the "reagent metal" or may be mixed with pyrites to supply the latter). If the ore is not amenable to sulfating, a halide such as NaCl may be gradually added to form chlorides. Various details and examples are given.

Treating sulfidic ores. E. J. KOHLMEYER. Brit. 336,670, July 19, 1929. Sulfidic ores of metals such as Zn, Sn, Pb, Bi, Cd, As and Sb are blast-smelted in a rotary furnace of such (described) construction that the flame is compelled to enter and leave by the same side, and air is blown on or into the melt until oxidation of the Fe present commences. In treating ore contg. pyrites and ZnS, the oxidation to ZnO supplies sufficient heat that no further external heating is required. A small proportion of lime may be added to form Ca ferrite with any Fe oxide produced and prevent stiffening of the melt, and a small proportion of coal may be added to prevent the Ca ferrite from taking up ZnO. When Fe and Cu are present, a slag contg. Cu-Ca ferrite is formed; the Cu may be sepd. as a mat from the slag by treatment with added S-bearing material such as pyrites.

Treating chromium ores. I. G. FARBENIND. A.-G. Brit. 336,970, July 22, 1929. Cr ores, such as those which are to be worked up with an alkali carbonate in the presence of lime, dolomite or bauxite, are preliminarily heated in an oxidizing atm. to above 800°, with or without adding a small proportion of an oxidizing agent such as $NaNO_3$ or KNO_3.

Treating titanium ores. MONTAN- UND INDUSTRIALWERKE VORM. JOH. D. STARCK. (Willy Glaser, inventor). Austrian 120,673, Oct. 15, 1929. Ilmenite, rutile and like ores are heated in an autoclave under pressure with an excess of H_2SO_4. The reaction product is allowed to settle, and the liquid, comprising the excess of acid with some dissolved Ti and Fe, is sepd. and used in treating a fresh batch of ore. The solid resi-

due, comprising metatitanic acid and ferro-ferric sulfate, is sepd. into its components by extn. with water or mother liquor from a previous operation.

Treatment of zinc-bearing material. WILLIAM C. HOOBY (to The New Jersey Zinc Co.). Can. 308,892, Feb. 24, 1931. ZnS concentrates contg. insol. compds. of Mg and Ca are roasted to convert the Mg and Ca into sulfates and the ZnS into ZnO, and the product is leached to remove the sulfates of Mg and Ca.

Treatment of zinc-bearing material. WILLIAM C. HOOBY (to The New Jersey Zinc Co.). Can. 308,893, Feb. 24, 1931. A pulp of Zn concentrates contaminated with insol. compds. of Mg and Ca in objectionable amts. is treated with H_2SO_4 in amt. sufficient to convert the compds. of Mg and Ca to Mg and Ca sulfates while inhibiting the formation of $ZnSO_4$; the mixt. is leached to remove such sulfates as have been rendered water-sol., and the sludge is subjected to a "hydrosepn. action" to remove undissolved $CaSO_4$ particles held in suspension.

Roasting sulfide ores such as zinc blende. METALLGES. A.-G. Brit. 335,852, June 4, 1929. See Ger. 502,586 (*C. A.* **25**, 479).

Agglomerating pulverulent hematites. BROR CHRISTIANSEN. U. S. 1,792,413, Feb. 10. The pulverulent ore is crushed to such fineness that the main portion of the mass has a grain size of 0.04 mm. or less but not a colloidal or slimy consistency, and the material thus prepd. is heated.

Coked agglomerates. EARL H. BUNCE (to The New Jersey Zinc Co.). Can. 308,891, Feb. 24, 1931. An intimate mixt. of zinciferous material and carbonaceous material with a moisture content of 6–12% of the dry wt. is initially heated by direct contact with a gaseous heated medium passed therethrough of sufficient vol. and high temp. to form promptly a shell of coke on each agglomerate, and the heating is continued until coking is completed.

Coked agglomerates. GEORGE T. MAHLER and ERWIN C. HANDWERK (to The New Jersey Zinc Co.). Can. 308,894, Feb. 24, 1931. A mixt. of zinciferous material and carbonaceous material is subjected to an initial temp. not exceeding 550° and the continued application of heat for 2–4 hrs. at temps. gradually increasing to the coking temp., whereby the agglomerates first undergo a drying stage without softening and next become plastic and finally become coked throughout. The agglomerates possess satisfactory residue strength for vertical retort smelting.

Casting metals under pressure. P. HAESSLER. Brit. 336,129, Nov. 7, 1929. App. and details of operation are described.

Continuous casting of metals between rolls, etc. H. HARRIS. Brit. 336,727, Aug. 27, 1929. Mech. features.

Casting metals with sheathings of other metals. I. SUGIMURA, K. MAGARISAWA and M. YASUMOTO. Brit. 337,286, Jan. 8, 1930. In casting a metal sheathing on a core metal having a higher m. p., lower sp. gr. and greater surface tension than the sheath metal, when the 2 metals are non-alloying with each other (as in the case of cast iron or iron alloys with Cu, Cu alloys, Pb or Sn or of Zn or Al with Pb), the melted metals are mixed in a vessel in which they assume such a configuration that when poured into a mold the core metal is suitably covered by the sheath metal. Various details of use of reducing agents, fluxes, etc., are described.

Trough for centrifugal casting machines with horizontal rotary molds. AURELIO POSSENTI and CARLO SCORZA. Ger. 516,009, July 28, 1929.

Apparatus for centrifugal casting of articles such as metal pipe. FRANK G. CARRINGTON (to Ferric Engineering Co.). U. S. 1,792,069, Feb. 10. Structural features.

Centrifugal casting of metal pipes, etc. FERRIC ENGINEERING CO. Brit. 337,105, Aug. 22, 1929. App. and various details of operation are described.

Casting metal pipes in centrifugal molds. L. A. CAMEROTA. Brit. 336,857, Dec. 5, 1929. Mech. features.

Mold for casting hollow metal bodies. MANNESMANNRÖHREN-WERKE. Ger. 513,994, Nov. 5, 1927. Details are given.

Water-cooled molds. ANTON MOHR. Ger. 513,930, Oct. 27, 1927. The molds are for casting roller plates, axles, rods and tubes.

Casting aluminum and its alloys. VEREINIGTE ALUMINIUM-WERKE A.-G. (Hans Bohner, inventor). Ger. 516,139, Sept. 7, 1929. Local variations in the compn. of the cast metal are compensated, and castings of more uniform compn. are obtained by feeding the casting with an alloy differing in compn. from the casting. Thus, an ingot may be cast from an Al alloy contg. 5.95% of Cu, and the casting fed with an alloy contg. 7.26% of Cu.

Furnace for reheating ingots. OFENBAU-GES. M. B. H. Fr. 694,653, April 28, 1930.

Furnace suitable for the heat treatment of sheet steel, etc. RALF S. COCHRAN (to Surface Combustion Co.). U. S. 1,792,074, Feb. 10.

Metallurgical furnace suitable for steel treatment and decarbonization. FRED H. LOFTUS. U. S. 1,792,021, Feb. 10.

Continuous-process furnace suitable for carburizing metal articles such as those of steel. CHARLES T. WILLARD and RICHARD KAIER (to Singer Mfg. Co.). U. S. 1,792,456, Feb. 10.

Tube or muffle furnace for heat treatment of wire. H. B. BLYTHE. Brit. 336,947, June 22, 1929.

Heat-treating furnace for enamelled articles. JOHN C. CROMWELL (to Steel Sanitary Co.). U. S. 1,792,284, Feb. 10.

Gas-heated doorless hardening furnace for tools. ERICH REIMANN. Ger. 513,601, June 15, 1928.

Apparatus for removing the products from the bottoms of blast furnaces. KOHLENSCHEIDUNGS-G. M. B. H. Ger. 513,611, June 28, 1927.

Apparatus for charging Scotch-hearth furnaces such as those used for smelting ores. HUGH R. MACMICHAEL (to American Smelting and Refining Co.). U. S. 1,791,677, Feb. 10. Structural features.

Bessemerization of mats. THE INTERNATIONAL NICKEL CO. Fr. 694,092, April 17, 1930. Mats of Ni or alloys contg. Ni such as Monel metal are bessemerized to remove S and reduce the mats by melting the mat in a convertor and introducing a mixt. of air and superheated steam. The mat is blown at a temp. of 1100–1500°, then carried to a temp. of 1500–1600° while continuing the blowing, the blowing mixt. being then almost completely free from air or O.

Reducing metallic compounds. GUSTAF N. KIRSEBOM. Fr. 694,283, April 22, 1930. Metallic compds. are reduced by the reaction of As on a molten alkali metal compd. such as NaOH, in the presence of the metallic compds. to be reduced. Pb, Cd, Sb and Bi may be obtained in this way from their oxides.

Extrusion manufacture of metal tubes, etc. P. MULTHAUPT. Brit. 336,688, July 26, 1929. In effecting the extrusion of liquid or plastic iron, steel or other metal, the matrix, mandrel, dies, etc., are formed of W or of an Fe-free alloy of W with C, Si, Zr and "metals analogous to W." Scale is removed by heated or high-pressure gases.

Apparatus for cutting metals by fusion. L. J. HANCOCK. Brit. 336,433, Oct. 15, 1929. Structural features.

Apparatus for washing thin metal sheets. FRITZ GRAH. Ger. 516,208, Jan. 11, 1929.

Finely divided metals from carbonyls. I. G FARBENIND. A.-G. Brit. 336,007, July 10, 1929. See Fr. 690,991 (*C. A.* **25**, 1211).

Metal acetylides. DEUTSCHE GOLD-UND SILBER-SCHEIDEANSTALT VORM. ROESSLER. Brit. 336,516, Feb. 7, 1929. Acetylides such as those of the alkali metals or their alloys with each other are made by continuously exposing fresh surfaces of the molten metals or alloys to the action of C_2H_2 (suitably in a rotating tube from which the air has initially been displaced by N). For making mono-Na acetylide, 60 hrs. are required at a temp. of about 170 80°; for di-Na acetylide, a temp. of 210-20° is used.

Aluminum salts. E. HERZFELD and H. WALKER (to Colloid-chemische Forschungs A.-G.). Brit. 336,181, Jan. 7, 1929. Fe-free Al salts such as the sulfate are obtained from Fe-bearing solns. by pptn. with alc. The soln. and pptn. may be repeated.

Dezincing lead. JESSE O. BETTERTON (to American Smelting and Refining Co.). U. S. 1,792,210, Feb. 10. Precooled Cl gas is confined in a reaction tank, and molten lead to be dezinced is continuously recirculated through the Cl while maintaining the lower end of the tank sealed by the metal of the bath outside the tank to prevent escape of the Cl. App. is described.

Tin. WALTER POETSCH and ROMAN VON ZELEWSKI. Ger. 513,697, Aug. 15, 1928. Sn is obtained from raw material by heating it to 250° with NaSH. Aq. tech. NaSH soln. may be employed. In the example, zinc blende contg. about 10% Sn is heated with a 25% soln. of NaSH.

Tungsten. A. PACZ. Brit. 337,160, Oct. 3, 1929. In forming W ingots by compacting W powder and sintering, freedom from residual O is insured by mixing the powder with a more volatile metal such as Ag, compacting, sintering and volatilizing the added metal such as Ag to form a pure unworked W ingot suitable for use in the manuf. of filaments, spark points, elec. contacts, etc. Various methods are described involving admixt. of W and Ag compds., with or without a Th compd., followed by reduction and by volatilization of the Ag. Cf. *C. A.* **24**, 5280.

Finely divided metals such as combined zinc and copper. WM. C. WILSON. U. S.

1,792,262, Feb. 10. A metal such as Cu is reduced from one of its salts such as $CuSO_4$ by effecting intimate contact of the salt in a dispersed state with a precipitant metal (such as Zn in the case of $CuSO_4$), and the particle size of the liberated metal is controlled by the degree of comminution (less than 40 mμ) of the precipitant metal.

Magnetic testing system for testing materials such as sheet iron or steel, electric coils, etc. JAMES T. SERDUKE (to General Elec. Co.). U. S. 1,792,249, Feb. 10.

Rolling sheet, hoop or band iron. FRANZ JORDAN. U. S. 1,792,377, Feb. 10. Various mech. details are described for rolling an iron core between covering sheets of Al so thin that under the high roll pressures employed the Al is driven substantially completely into the pores of the iron core and forms substantially no exterior plating on the iron.

Iron and steel. H. HAGEMANN. Brit. 336,954, July 18, 1929. In producing a non-siliconized iron or steel which can be easily welded, the C content of the bath is reduced (suitably to about 0.02%), and there is afterward added, in the furnace or ladle, an Al-Si alloy of such compn. that it readily slags off. Mn low in C may be added to facilitate working of the product, and the latter may contain C 0.02, Mn 0.5, Cu 0.09, P 0.02 and S 0.003%. The Al-Si alloy added may contain Al 30, Si 50, Fe 19 and C 0.25%, or an alloy may be used contg. Al 18–22 and Si 40–50%. Cf. *C. A.* **24**, 2102.

Steel. POLDIHÜTTE. Austrian 120,668, May 15, 1927. Steel resistant to corrosion and capable of being forged contains C 0.2–1, Ni 20–25, Cr 12–20, Mn less than 0.5 and Si less than 0.5%, specifically C 0.5, Ni 22, Cr 15, Mn 0.4 and Si 0.3%.

Steel. ANDRÉ P. MAHOUX. Fr. 695,045, Aug. 8, 1929. Steels are hardened superficially by creating an oscillating field between the metallic piece and the piece to be treated, the dielectric being composed of a carbureted or N atm.

"Stainless steel," etc. W. E. MARTIN and J. A. BERLYN. Brit. 336,024, July 22, 1929. "Stainless steel" and similar Fe alloys contg. high proportions of Cr or Ni (or mixts. of metals adapted to form such alloys) are melted in a crucible in a furnace, the temp. of which is increased gradually and substantially uniformly to the casting temp. (especially at the temp. range between 900° and the casting temp., which may be 1800–2400°). The heating may be at the rate of 100–400° per 15 min. Deoxidants such as Al may be added, together with other materials such as Cr hydrate if desired, just before casting, and the metal may be cast into molds made of 2 parts molding sand and 1 part sea sand bonded with molasses, the cores being formed of molding sand 1 and sea sand 2 parts.

Manganese steels. TAYLOR-WHARTON IRON & STEEL CO. Brit. 336,091, Oct. 4, 1929. Steels contg. Mn 10–15% and C 0.3–0.85% also contain up to 4% Ni and less than 0.4% Si, with or without 8% or less of Cr, and may be toughened by heating to 800–1150° and cooling in air.

Case-nitridation of steel. AUGUSTUS B. KINZEL (to The Electro Metallurgical Co. of Can., Ltd.). Can. 309,049, Mar. 3, 1931. An article of ferrous material is heated to 700° for 2 hrs. in the presence of H, then heated in the presence of V to 900° for 2 hrs., and then heated in the presence of NH_3 to 500–580° for a time sufficient to make a hard surface layer on the article.

Case-hardening by nitridation. AUGUSTUS B. KINZEL (to The Electro Metallurgical Co. of Can., Ltd.). Can. 309,047, Mar. 3, 1931. Ferrous material is heated with Al to about 550° to form an aluminized coating and then subjected to a temp. of about 510° in the presence of NH_3.

Case-hardening by nitridation. AUGUSTUS B. KINZEL (to The Electro Metallurgical Co. of Can., Ltd.). Can. 309,048, Mar. 3, 1931. Fe and steel articles (contg. alloying elements as Mn, Si, Cr and particularly V and Al) are case-hardened by heating in a molten nitriding bath contg. one or more metal cyanides (as mixts. of NaCN and KCN, of NaCN and $Zn(CN)_2$, or of KCN and $Mg(CN)_2$) at a temp. below 580°.

Alloys. W. C. HERAEUS G. M. B. H. Ger. 516,490, May 20, 1930. Addn. to 437,173. Ger. 437,173 describes alloys for making pen nibs comprising Ru 40–60, Os 35–50 and Pt 5–15%. There are now used alloys contg. Ru 60–80, Os 10–35 and another metal of the Pt group 5–25%.

Alloys. THEODOR KITTL. Austrian 120,383, July 15, 1930. In fractionally crystg. fused alloys so as to obtain alloys of different compn., the melt is slowly circulated during the crystn., with the result that larger crystals are obtained. Circulation may be effected by elec. induction heating.

Alloys. WALTHER MATHESIUS and MARTIN W. NEUFELD. Ger. 513,623, April 27, 1926. Addn. to 441,071. Pb is hardened by adding alkali or alk. earth metal, Mg or Al and 0.1% Bi, Cu or Sn. The Pb alloy may contain 0.6 to 0.65% Na, 0.75

to 0.1% Ca, 0.2 to 0.25% Mg and 0.10% Al, the ratio Ca:Mg:Al being kept at the value 8:2:1.

Alloys. KARL SCHMIDT G. M. B. H. Ger. 516,200, Aug. 27, 1926. Al alloys for making pistons contain Si 20–35 and Cu up to 5, with or without Mg and (or) Mo up to 5%. Cf. *C. A.* **24**, 3982.

Alloys. GEORG WECK. Ger. 513,513, Sept. 7, 1929. Objects resistant to HCl and H_2SO_4 are made from alloys contg. NiSb 0.5 to 70, Ni 0 to 30 and W or Mo 69.5 to 0%. The NiSb may be replaced wholly or partly by W.

Alloys. THE INTERNATIONAL NICKEL CO., INC. Fr. 694,929, April 12, 1930. Alloys which are resistant to corrosion contain Fe 20–80, Ni 12–79, C 0.01–2 and Cu 1–32%. An example contains Cu 6, Ni 34, Fe 60 and C 0.2%. Fr. 694,930 describes an alloy contg. Cu 1–20, Ni 12–30, C 0.01–2% and Fe the rest An example contains Ni 25.5, Cu 4.5, Mn 0.6, C 0.1% and Fe the rest. Cf. *C. A.* **25**, 677.

Alloys. SOC. DES TORPILLES DE ST. TROPEZ. Fr. 695,050, Aug. 9, 1929. An alloy for protecting Fe, etc., against corrosion contains Cd and Sn, Cu and Pb or Sb being optional addns. An example contains Cd 10, Cu 10, Sn 60 and Pb 20%.

Alloy for bearing surfaces. H. C. HALL. Brit. 336,881, Dec. 30, 1929. "Commercial Zn" is alloyed with Al 8–18, Cu and Ni up to 1% each and preferably only traces of other metals. The Zn is added after melting the other metals together.

Alloy for jewelry. VICTOR WYLDES. Can. 308,834, Feb. 24, 1931. To 5 lbs. 10 oz. of melted Cu are successively added 3 oz. fuller's earth, 7 oz. $Na_2B_4O_7$, 3 oz. ammoniated mercury, 12 oz. Sn, 3 oz. MgO and 1 oz. alc., and the mixt. is agitated and boiled. The resultant alloy simulates Au and is malleable, ductile, immune from tarnishing and suited for jewelry.

Alloys for sealing to glass such as in vacuum tube and incandescent lamp manufacture. N.-V PHILIPS' GLOEILAMPENFABRIEKEN. Brit. 337,086, Aug. 6, 1929. Ring- or disk-shaped members of metal to be sealed to material such as glass are formed of an alloy contg. Ni (preferably over 50%) together with other metals such as W, Mo, Ta, V, Nb, Co or Si, the coeff. of expansion of the alloy being at least approx. equal to that of the insulating material with which the alloy is to be sealed. One or more substances such as Cr, Al or Mg which facilitate the formation of a coherent film of oxide may be added to the alloy in proportion preferably less than 5%.

Magnetic alloys. W. S. SMITH, H. J. GARNETT and W. F. RANDALL. Brit. 336,948, June 22, 1929. Alloys substantially free from C and composed mainly of Fe and Ni are given a high and const. permeability by heating to 900° or over until completely annealed, cooling and further heating to not over 700° but to at least 50° above the magnetic change point of the alloy (and in the case of alloys contg. not more than 50% Ni preferably at least 100° above the change point). The alloy is preferably subjected to mech. straining between the 2 heat treatments, and the sp. resistance of the alloy may be increased by the addn. of up to 10% of one or more of the elements: Mn, Cr, Cu, Mo, W, V, Al or Si. Various details and examples are given. Cf. *C. A.* **24**, 1074.

Aluminum alloys. H. T. TILLQUIST and J. HARDEN. Brit. 337,099, Aug. 17, 1929. See Fr. 680,959(*C. A.* **24**, 3983)

Alloys of copper. P. M. G. METAL TRUST, LTD Fr. 690,875, July 26, 1929. Cu alloys are made by adding to Cu or a Cu alloy a hardening alloy contg. Fe, Si and Cu. The Fe constituent of the hardening alloy may be obtained by alloying steel and cast Fe, and the steel may include one or more of the metals Ni, Cr, Mo, W and V. The hardening alloy may also contain Mn or P or both. Examples are given. Cf. *C. A.* **24**, 5712.

Copper alloys. VICKERS-ARMSTRONGS, LTD., W. MACHIN and W. B. O'B. GOUDIELOCK. Brit. 335,950, April 4, 1929. Alloys such as those of high Cu content are made by adding to Cu or a Cu alloy a hardening alloy comprising Fe, Si and Cu (which may be prepd. in part from steel contg. also Si, Cr, Mo, W or V), and Mn and P also may be present in the hardening alloy. Various details are given, and a final alloy may comprise Cu 88, Zn 2 and hardening alloy 10%. The alloys may be heated to over 800° and quickly cooled in water or oil, in some cases being reheated to not over 450°.

Copper alloys containing tin and zinc. MICHAEL G. CORSON (15% to George H. Corey). U. S. 1,792,146, Feb. 10. Alloys of Cu contg. also Sn 4–18 and Zn 10–35% are treated, to improve their properties as lubricated wearing surfaces, by heating for a proper time and at a suitable temp. to bring about a uniform β-state of the alloy constituents, then quickly cooling to produce a hard acicular structure, reheating to a temp. above the eutectoidal transformation point for the alloy to produce a structure characterized by the presence of β-crystals uniformly distributed throughout a matrix of α-crystals, and then cooling to effect stabilization.

Magnesium alloys. I. G. FARBENIND. A.-G. Brit. 336,019, April 25, 1929. Products such as high-percentage Mg alloy castings are improved by heating at a temp. range in which the soly. of the alloying component or components is increased and then subjecting them to cooling which is considerably retarded artificially especially in the range 300–100°. Details are given of the treatment of Mg-Al alloys contg. 7.5% or more Al, Mg-Zn alloys contg. 1.8% or more Zn, and Mg-Pb alloys contg. 18% or more Pb. An alloy contg. 8.2% Al may be heated to 410° for 72 hrs., then transferred to an annealing furnace and cooled down to 100° in 24 hrs. (the cooling from 300° to 100° taking 18 hrs.).

Magnesium and its alloys. I. G. FARBENIND. A.-G. Brit. 336,498, Jan. 2, 1929. Mg and Mg alloys are refined by treating the molten metal with a material such as Mn, Cr, Mo or Si which on cooling combines with impurities such as Fe for sepn. from the remaining melt. A small proportion of the added reagent such as Mn may remain in the product. Cf. *C. A.* **25**, 678.

Preventing corrosion of aluminum. G. ADOLPH. Brit. 336,854, Nov. 29, 1929. To prevent attack of Al by alk. solns., such as alk. bleaching liquors, the latter are admixed with an alkali silicate, H_2O_2, compds. such as Na perborate or percarbonate, or mixts. of these.

Rust prevention. KARL DAEVES. Fr. 693,905, April 14, 1930. The formation of white rust on galvanized objects or other metallic surfaces is prevented by exposing the surfaces to the action of free air or the gases produced by the combustion of S before storing in closed spaces.

Rustproofing iron. W. BÖHMER. Brit. 335,868, Jan. 27, 1930. The cleaned surfaces are treated either with (1) a mixt. of Pb_3O_4, PbO, glycerol and waterglass, or (2) a mixt. of zinc white and waterglass, or (3) a $ZnCl_2$ soln. Specific formulas are given.

Rustproofing iron and steel by coating with phosphates. VAN M. DARSEY (to Parker Rust-Proof Co.). U. S. 1,791,715, Feb. 10. An iron or steel surface carrying a phosphate coating contg. a metal such as Cu having a potential different from that of iron or steel is treated with a soln. of a material contg. the chromic acid radical such as K chromate

Welding aluminum-steel. H. J. SCHIFFLER. Brit. 336,195, March 25,1929. Scale-resisting steels contg. Al (and which may also contain other components such as Cr and Mo) are welded by electrodes or rods of scale-resisting steel alloys not contg. Al (but which may contain Cr, Ni and Mo) in order to produce a scale-resisting weld. Various formulas of alloys used are given.

Welding bronze. L. J. TIBBENHAM. Brit. 336,402, Oct. 1, 1929. A welding rod for use in welding bronze by the blow-pipe flame is formed of bronze with a coating such as H_3BO_3 49, Na borate 9, metal oxides such as those of Fe and Cu 30 and Na silicate 12 parts.

Welding magnesium and its alloys. I. G. FARBENIND. A.-G. Fr. 694,137, April 18, 1930. See Ger. 508,352 (*C. A.* **25**, 680).

Electrodes for spot-welding copper. F. KRUPP A.-G. Brit. 335,876, March 26, 1929. Electrodes are used contg. one or more carbides of W or similar high m. p. metal, and they may also contain a small quantity of metals such as Fe, Co or Ni of lower m. p., *e. g.*, 6% of Co. The material sold under the name "Widia" is suitable.

Weld iron. ARTURO DOSSMANN. Ger. 513,732, April 27, 1928. Small iron waste is used as starting material and is prevented from oxidation by a coating of colophony or molasses before mixing with the wood charcoal or soot and limestone.

10—ORGANIC CHEMISTRY

CHAS. A. ROUILLER AND CLARENCE J. WEST

Catalytic addition of gaseous hydrochloric acid to unsaturated hydrocarbons. W. J. PIOTROWSKI AND J. WINKLER. *Przemysl Chem.* **15**, 25–36(1931).—The 20–40° fraction of cracked benzine was used as the starting point for this synthesis. It was characterized by n_4^{15} 0.632, amylene content 31% by wt. Its complete distn. curve at 1° intervals is given. Two hundred-cc. portions of this pentane-amylene fraction with slight excess of HCl were passed over catalysts through a glass app. for 4 hrs. The yield was figured on the basis of change in d_4^{15} and distn. fractionation. It was found advantageous to pass the raw materials over the catalysts held in 2 tubes, the 1st of which was kept at 70° and the 2nd at 150°, in which case a predominance of secondary chlorides was ob-

tained. If the sequence of these temps. was reversed a mixt. of all possible chlorides resulted. The presence of moisture interfered with the formation of secondary chlorides, and its absence never had any detrimental effects. The catalysts here studied were the chlorides of bivalent, tervalent and quadrivalent metals mounted on activated charcoal and dried at 150° for several hrs. to const. wt. The catalysts themselves caused no polymerization in the benzine in the absence of HCl. The reaction between HCl and the hydrocarbons was vanishingly small without the catalysts; it was marked in the presence of activated charcoal. The catalysts are classified in 3 groups: (1) $CrCl_3$ and $FeCl_3$, which are inactive; (2) $HgCl_2$, $CuCl_2$, $CdCl_2$, $MnCl_2$, $BiCl_3$, $AlCl_3$ and $SbCl_3$, which are slightly active; (3) $ZnCl_2$ and $SnCl_4$, both of which are strongly active, $SnCl_4$ having given a practically quant. formation of amylene monochlorides. The catalysts are subject to poisoning by S compds. which should be removed by activated charcoal previously partially poisoned. Sharp fractionation of the product showed it to be composed of Me_2CClEt, $Me_2CHCHClMe$, MeCHClPr and $Me_3CCHClMe$. A. C. Z.

Transformation of propylene into liquid hydrocarbons. A. Mailhe and Renaudie. *J. usines gaz* **54**, 568–9; *Compt. rend.* **191**, 851–4(1930); cf. *C. A.* **24**, 5283.—C_3H_6, heated over SiO_2 gel at 650°, furnishes a considerable proportion of liquid hydrocarbons, unsatd. and aromatic; C_6H_6 and PhMe predominate. Solid hydrocarbons, $C_{10}H_8$, $C_{14}H_{10}$, etc., were absent, their formation beginning at 700–20°. Traces of Fe led to excessive formation of C and inactivation of the catalyst. K. H. Engel

Synthesis of squalene. P. Karrer and A. Helfenstein. *Helv. Chim. Acta* **14**, 78–85(1931).—In a recent paper Karrer (*C. A.* **25**, 519) suggests the sym. formula $(Me_2C{:}CHCH_2CH_2CMe{:}CHCH_2CH_2CMe{:}CHCH_2)_2$ (I) for squalene rather than those proposed by Heilbron (*C. A.* **23**, 3702). Such a structure may be considered as made up of isoprene residues and in this way looks plausible in the light of the Karrer proposed structure for lycopin and carotene. On the assumption of the above structure K. and H. synthesized I by treating farnesyl bromide, $Me_2C{:}CHCH_2CH_2CMe{:}CHCH_2CH_2CMe{:}CHCH_2Br$ (II) with K or Mg, whereby 2 mols. of II were joined through the elimination of Br from each. The synthetic I forms a mixt. of 2 isomeric hexahydrochlorides with HCl as does I from natural sources. These hydrochlorides may be sepd. by hot acetone into a hexahydrochloride m. 143–5° (0.25–0.20 part) and one m. 108–10°, exactly as may be done when they are prepd. from natural I. Crystals of the hexahydrochloride m. 143–5° from synthetic source were compared with those from a natural source and in both cases rhombic forms, chiefly $m(110)$ and $c(001)$ and seldom $b(010)$, were observed. The angle (110):(110) is about 59° so that $a:b = 0.56:1$ in both. Optical orientation $n_\alpha \| b$, $n_\beta \| a$, $n_\gamma \| c$; optical character, neg. X-ray absorption of the powder of both prepns. gave 11 lines with Fe-K radiation which agree in position and intensity. The yields of I were poor (about 5%) because K. and H. could not prep. pure II. Probably the difficulty is due to the known tendency of halogen in similar compds. to migrate to a tertiary C atom or the reverse: $-MeC{:}CHCH_2Br \rightleftharpoons -MeCBrCH{:}CH_2$. In agreement with this assumption it was possible to prep. from nerolidol, $Me_2C{:}CHCH_2CH_2CMe{:}CHCH_2CH_2CMe(OH)CH{:}CH_2$ (III), a mixt. of Br compds. which yielded I on treatment with K or Mg. K. and H. regard I as a possible mother substance of cholesterol (cf. André and Canal, *C. A.* **23**, 3364). Ten g. of farnesol (IV) or III (3 mol.) was added dropwise to a mixt. of 1 g. dry pyridine ($^2/_3$ mol.) and 5 g. PBr_3 (1.2 mols.) at —5° and allowed to stand overnight at room temp., washed with ice-cold $NaHCO_3$ soln. and extd. with ether. The ether soln. was washed successively with dil. H_2SO_4, $NaHCO_3$ and water, then dried and distd. A fraction $b_{0.7}$ 110–20° with 8.1% Br and one $b_{0.6}$ 125–300° (about 9 g.), with 17.3% Br were collected. Redistn. caused decompn. and lowering of the Br content This impure bromide (V) was used although the theoretical percentage of Br is 28.07. Other methods of bromination or chlorination of III or IV gave poorer yields of less pure material. Into 9 g. crude V at 100° was dropped 3 g. K and the temp. raised to 135° for 0.5 hr.; the cold product was treated with abs. ether and excess K removed by filtration through glass wool. The soln. was washed with dil. H_2SO_4 and then with water, dried and distd. The fractions sepd were one of 3.5 g., b_1 100–20°, the squalene fraction of 2 g., b_1 210–40° and a residue of 1.5 g. which yielded no squalene hexahydrochloride (VI) with HCl. The 2-g. squalene fraction yielded 0.05–0.15 g. of VI on treatment with HCl. Impure V (15 g.) was treated with 1.7 g. Mg and yielded 3 g. impure I, which on conversion to VI gave 0.55 g. Impure V (28 g.) treated with 2.7 g. Mg yielded 6.8 g. I and this gave 1.3 g. VI. One g. squalene, from natural sources gave 0.5 g. VI; if the Br content of V is taken as a basis of its purity the yield of I from pure V is about 20%. Oden E. Sheppard

Catalysis of polymerization by ozonides. Ray C. Houtz and Homer Adkins. *J. Am. Chem. Soc.* **53**, 1058–63(1931).—A mixt. of the ozonides of 2 octylenes has

been found to catalyze the polymerization of styrene, indene, $(CH_2:CMe)_2$, a methylpentadiene and furfuryl alc. It has been found to be inactive as a polymerization catalyst toward stilbene, *o*-$HOC_6H_4CH_2OH$, $Me_2C:CHMe$ and the mixt. of octylenes from which it is made. The catalyst was active at room temp. and 100° and in a soln. in PhMe. The ozonide underwent a change on standing, especially during the first 2 days after its prepn., and lost a large part of its catalytic power. C. J. WEST

The halogenation of the paraffin hydrocarbons. GUSTAV EGLOFF, R. E. SCHAAD AND C. D. LOWRY, JR. *Chem. Reviews* **8**, 1–80(1931).—A summary of the work which has been done on the halogenation, particularly the chlorination and bromination, of paraffin hydrocarbons. An extensive bibliography is given. Problems for research are suggested. LOUISE KELLEY

Preparation of alkyl iodides. HAROLD S. KING. *Proc. Trans. Nova Scotian Inst. Sci.* **17**, 242–3(1930).—In the prepn. of alkyl iodides by a modification of Adam's method the use of anhyd. alc. is not necessary (*Proc. Trans. Nova Scotian Inst. Sci.* **16**, 87–91(1924). The addn. of 10% by wt. of water to MeOH did not reduce the yield of MeI. A MeOH soln. of I is slowly run into the reaction flask contg. P and more MeOH and heated at 70–5°. The refluxing liquid passes over I on its return to the flask. RACHEL BROWN

Preparation of anhydrous alcohol, and the detection and determination of water in alcohol. F. ADICKES (WITH W. BRUNNERT AND O. LÜCKER). *Ber.* **63B**, 2753–60 (1930).—When HCO_2Et is added to alc. NaOEt it is almost instantly sapond. in the cold by the slightest traces of water in the alc. according to the equation $HCO_2Et + NaOEt + H_2O = 2HOEt + HCO_2Na$, with pptn. of the very difficultly sol. HCO_2Na. As HCO_2Na can be detd. easily and accurately the reaction can be used for the 3 purposes indicated in the title. After this work had been started, it was found that Smith had made use of the same principle, employing $(CH_2CO_2Et)_2$ instead of HCO_2Et (*C. A.* **21**, 3328). $(CH_2CO_2Et)_2$ is much more difficult to saponify than HCO_2Et and the anhyd. alc. he prepd. by its means contained 0.04 g. of the ester per l. With HCO_2Et, the equil. in the catalytic decompn. of HCO_2Et by alc. NaOEt (HCO_2Et = CO + HOEt) lies practically completely on the CO side at the b. p. of the alc., and by using an excess of NaOEt, refluxing until equil. is established and distg. away a first fraction, an alc. can be obtained whose ester content is at least 10 times less than that of the alc. obtained with $(CH_2CO_2Et)_2$. When neutral HCO_2Na is boiled a long time with alc. and the alc. is then slowly distd. off, the residue becomes slightly alk. because of loss of HCO_2H as HCO_2Et; the alky. corresponds to 0.0037% ester in the alc. distd. off, or a water content of only 0.0009%. The process for prepg. anhyd. alc. consists simply in dissolving Na in the alc., adding HCO_2Et, heating under a reflux until no more CO is evolved and then adjusting the cooling water in the reflux so that the alc. distils off. The alc. so obtained contains 0.03% water and 0.00015% HCO_2Et. The soly. of HCO_2Na in alc. in the presence of NaOEt is so small at 0° (0.05 in 100 g. alc.) that by addn. of NaOEt soln. and HCO_2Et as little as 0.013% water in alc. can be detected qualitatively by the turbidity produced. For quant. detns., the HCO_2Na can simply be filtered off when the quantity of water is large (2.5–3%); with smaller quantities of water the alc. and undecompd. ester must be distd. off (finally *in vacuo*); with very small quantities of water (0.1%) there must be applied a correction factor for the water or acid content of the HCO_2Et, detd. by running parallel detns. with different quantities of HCO_2Et. The HCO_2H was detd. by weighing the HgCl pptd. from $HgCl_2$; the detn. cannot be carried out in alc. since the latter also reduces $HgCl_2$, although but slowly. With the larger quantities of water the detn. can be made volumetrically by filtering off the HCO_2Na and titrating it with an oxidizing agent. The detn. can also be made by using a known quantity of HCO_2Et and measuring the CO evolved by decompn. of the excess; in this case allowance must be made for the ester vapors carried along by the CO and for the water and acid content of the HCO_2Et, and the method is accurate enough only for water contents of 1% or more. C. A. R.

Preparation of absolute ethyl alcohol. E. GORDON YOUNG. *Proc. Trans. Nova Scotian Inst. Sci.* **17**, 248–55(1930).—A comparative study has been made, with reference to % yield and cost per l. of product, of 3 methods of prepg. abs. alc. for ordinary chem. procedures. By the carbide method (1) 100 g. 95% alc. was refluxed 2 hrs. with 25 g. CaC_2 and 1 hr. further with 1 g. $CuSO_4$. A 2nd treatment with $CuSO_4$ was necessary to remove odors. The yield was 95% of 99.7% alc. By the C_6H_6 method (2) 2000 cc. alc. and 1500 cc. C_6H_6 were distd. in a fractionating column with 22 bulbs; 300 cc. abs. alc. was obtained. By the CaO method (3) alc. was refluxed with varying amts. of CaO for varying periods of time. The time required was found to vary inversely with the amt. of CaO used. 1 l. 95% alc. refluxed with 300 g. fresh CaO for 4 hrs. gave an

80% yield. Conclusion: method 1 gives the best yield at a cost slightly higher than 3; method 2 is impracticable on a lab. scale; method 3 is the cheapest. R. B.

Organic compounds of thallium. R. C. MENZIES. *Chem. News* **141**, 305–6 (1930).—The Tl′ atom replaces the H of many OH compds., including simple and polyhydric alcs. of the aliphatic series, with the formation of stable compds. which are generally less sol. than those of the alkali metals. In many cases all the H of the OH of the polyhydric alcs. and the H of the OH and the CO_2H of the HO acids can be replaced, but well-defined Tl salts of the reducing sugars have not yet been prepd. because of the oxidation of the sugars with the reduction of the metal. However, with compds. in which the reducing groups are protected, well-defined Tl derivs. are obtained, although with α- and β-Me glucosides 1 of the 4 available H escapes replacement and with sucrose only 4 of the 8 available H are replaced. An explanation of these observations has not yet been found. C. J. PEDERSEN

Catalytic hydrogenation of esters to alcohols. HOMER ADKINS AND KARL FOLKERS. *J. Am. Chem. Soc.* **53**, 1095–7(1931).—Et laurate, myristate, valerate, cinnamate, trimethylacetate and succinate have been hydrogenated over a Cu chromite catalyst with the formation of the corresponding alcs. in yields of 80–98%. The CO_2Et group in $HOCH_2CMe_2CO_2Et$ was hydrogenated to a CH_2OH group, and in addn. the mol. underwent cleavage between the 2 and 3 C atoms. The H pressure during the hydrogenation approximated 220 atm. and the temp. was 250°. C. J. WEST

Esters of sulfurous acid. I. WALTER VOSS AND ERICH BLANKE. *Ann.* **485**, 258–83(1931); cf. *C. A.* **25**, 69.—Dropping 1 mol. MeOH into 1 mol. $SOCl_2$ cooled in ice and salt and simultaneously passing through a rapid stream of CO_2 to stir the mixt. and remove HCl as formed, gives 50% of *Me chlorosulfinate*, MeOSOCl, b_{60} 35°, d_4^{18} 1.4186, slowly decomposing at room temp. into MeCl and SO_2 and immediately decomposed by water. *Et ester*, b_{16} 32°, b_{24} 41–2°, d_4^{17} 1.2826 (68% yield); *iso-Pr ester*, $b_{24.5}$ 34°, d_4^{16} 1.2005 (47% yield). $SOCl_2$ and 2.2 mols. MeOH with cooling give 70–5% $(MeO)_2SO$, b_{760} 126°, d_4^{24} 1.2073; di-Et ester, b_{760} 158° (85% yield); Pr ester, b_{760} 192–2.5°, b_{15} 89° (90% yield); boiling 24 hrs. causes little change; iso-Pr ester, b_{20} 78°, b_{765} 169.5–70.5° (33% yield); *Bu ester*, b_{15} 114–5°, d_4^{22} 0.9944, $n^{19.8}$ 1.430511, 1.43808, 1.44268 for α, β and γ, n_D^{11} 1.43244 (94% yield); *iso-Am deriv.*, b_{15} 127–8°, $d_4^{16.2}$ 0.97293, $n^{12.4}$ 1.43547, 1.44315, 144820, 1.43757 for α, β, γ and D (72% yield); *cyclohexyl ester*, b_{19} 182°, $d_4^{17.8}$ 1.0974, $n^{18.7}$ 1.48396, 1.49571, 1.4865 for α, β and D (54% yield); *di-Ph ester*, $b_{0.7}$ 143°, $b_{1.8}$ 152°, $d_4^{19.2}$ 1.2404, $n^{18.4}$ 1.56899, 1.58833, 1.57441 for α, β and D (34% yield). EtOSOCl and the calcd. amt. of MeOH and C_5H_5N give *Me Et sulfite*, b_{20} 53°, b_{769} 141.5°, d_4^{18} 1.1364, $n^{19.8}$ 1.41417, 1.42159, 1.42628, 1.41669 for α, β, γ and D. If C_5H_5N is not used, a mixt. of Me_2SO_3, Et_2SO_3 and $MeEtSO_3$ results. Me_2SO_3 (0.2 mol.) and EtOH (1 mol.) with 0.1 cc. 12% EtOH-HCl as a catalyst, give 44% of Et_2SO_3. Similarly Et_2SO_3 and MeOH give Me_2SO_3. $MeOS(O_2)Me$ results in 67% yield from $MeSO_3H$ and MeI at 100°; b_{25} 101–2°, b_{751} 202–3°, d_4^{21} 1.2975, $n^{17.6}$ 1.41384, 1.42027, 1.41576 for α, β and D. The kinetics of the hydrolysis of $MeOSO_2Me$ and Me_2SO_3 by water, acid and alkali are discussed. The following values were obtained for pure water ($H^+ = 1$) and ($OH^- = 1$): $MeOSO_2Me$, 2.98×10^{-4}, 0, $2.81 \times 1\ 0^{-2}$; Me_2SO_3, 0, 1.30×10^{-2}, 13.37; Et_2SO_4, 1.55×10^{-3}, 0, 9.5×10^{-3}; Me_2CO_3, 0, 0, 5.4. The Na derivs. of PhOH, *o*-$O_2NC_6H_4OH$ and β-$C_{10}H_7OH$ with 1.1 mols. dialkyl sulfite give: 80% PhOMe, 88% β-$C_{10}H_7OMe$, 85% *o*-$O_2NC_6H_4OMe$, 88% PhOPr, 55% iso-AmOPh. With 3 mols. Me_2SO_3 the *o*-, *m*- and *p*-$C_6H_4(OH)_2$ give 89, 76 and 80% of the di-Me ethers, resp. PhOH and Me_2SO_3 with a few drops concd. H_2SO_4 or EtOH-HCl give 9.3% PhOMe; β-$C_{10}H_7OH$ gives 37% Me ether and 63% Et ether. One mol. $PhNH_2$ with the dialkyl sulfites gives the following yields of alkyl derivs.: 96% $PhNMe_2$; 52% $PhNEt_2$, 31% PhNHEt; 38% $PhNPr_2$, 44% PhNHPr; 15% $PhN(iso\text{-}Am)_2$, 74% PhNH(iso-Am). *Benzenesulfonethylanilide*, $b_{1.5}$ 188.5°, d_4^{21} 1.1943, $n_D^{16.3}$ 1.57537; *p-toluenesulfonisoamylanilide*, m. 76–7°. $PhNMe_2$ and Me_2SO_3, heated at 135–40°, give 99% of *trimethylphenylammonium methanesulfonate* (I), $(PhNMe_3)OS(O_2)Me$, m. 188–9°; this also results from $PhNMe_2$ and $MeOSO_2Me$ at room temp.; on warming 24 hrs. with 12% KOH 53% of $PhNMe_2$ are split off; 5% MeONa splits off 96.5% in 5 hrs. $PhNMe_2$ and Me_2SO_3 on standing at room temp. for several weeks deposited 10% of a yellow, very hygroscopic product, m. 120–1°, which may be $(PhNMe_3)OSO\text{-}OMe$; this could not be changed into I by heating at 135°. *N-Methylpyridinium methanesulfonate*, red, very hygroscopic, m. 117–8°; C_5H_5N and Me_2SO_3 at room temp. give the compd., $C_7H_{11}NO_3S$, m. 104–7°. The following yields of esters were obtained with

1.1 mols. dialkyl sulfite and a drop of concd. H_2SO_4 on warming 1–2 hrs.: BzOEt 96; BzOBu 86; *p*-$BrC_6H_4CO_2Et$ 95; $PhCH:CHCO_2Et$ 86; $MeCH:CHCO_2Me$ 82; $(CH_2CO_2Et)_2$ 90; $CH_2(CH_2CO_2Et)_2$ 81; salol, 65; di-Et carbonates do not give esters under these conditions. **II. Preparation of acetals and glucosides.** W. Voss. *Ibid* 283–98.—Cyclohexanone (I) and Me_2SO_3 in MeOH, with MeOH-HCl as a catalyst, gave 79% of the *di-Me acetal*, $b_{22.5}$ 64°. In the same way PrCHO gave 87% of the di-Me and 72% of the di-Et acetals; BzH gave 81% di-Me and 78% di-Et acetals; *p*-$MeOC_6H_4CHO$ gave 84% di-Me acetal and I gave 63% of the di-Et acetal. These new acetals will be described later. Ph_2CO and Me_2SO_3 gave 95% of di-Me acetal, m. 106–7°. BzH (10.5 g.), 12 g. Me_2SO_3 and 27 g. BuOH (with MeOH-HCl) gave 80% of *benzaldehyde di-Bu acetal*, b_{14} 149–50°, d_4^{14} 0.9289, n_D^{19} 1.4790. The di-iso-Am acetal was obtained in 76% yield. The following yields of $Ph_2C(OMe)_2$ were obtained from 4.6 g. Ph_2CO with 0.1 mol. reagent in MeOH with HCl as catalyst: Et_2SO_3 1.9 g.; $HC(OEt)_3$ 2.9 g.; $HSi(OEt)_3$ 3.9 g.; $Me_2C(OMe)_2$ 1.9 g.; $Me_2C(OEt)_2$ 1.4 g. No acetal resulted with Me_2SO_4 in C_6H_6, Et_2O, etc., with HCl as a catalyst or in MeOH with AcOH or picric acid as catalyst. *d*-Glucose (36 g.) with 25 g. Me_2SO_3 and 100 cc. 3% MeOH-HCl, warmed about 2 hrs., gave 19 g. α-Me and 2.8 g. β-Me *d*-glucoside. Starch (250 g.) gave 96% of α-Me glucoside. *d*-Galactose (36 g.) formed 28.3 g. of α-Me galactoside and only 0.1 g. of the β-Me deriv. *d*-Mannose gave only the α-Me deriv. Details are given for the prepn. of Me rhamnoside, α-Me and α-Et *l*-arabinoside and α-Et *d*-galactoside.

C. J. West

Reaction between multivalent alcohols or phenols and arsenic compounds, especially arsonoacetic acid. III. Bertil Englund. *J. prakt. Chem.* **129**, 1–23(1931); cf. *C. A.* **24**, 1841.—By use of the previously described method the following values for L_S have been detd. for the reactions of arsonoacetic acid (I) with $HO(CH_2)_nOH$ in AcOH at 25° (values of *n* and L_S given): 2, 0.205; 3, 0.060; 4, 0.052; 5, 0.0060; 6, 0.068; 7, 0.047; 8, 0.057; 9, 0.043; 10, 0.045. With As_2O_3 in BuOH contg. 5% H_2O values of *L* were detd. as follows: $MeCH(OH)CH_2OH$, 0.128; $HO(CH_2)_3OH$, 0.012; *meso*-$(MeCH(OH))_2$, 0.288; *dl*-deriv., 0.246; pinacol, 0.340; $HO(CH_2)_6OH$, 0.013; $HO(CH_2)_7OH$, 0; $HO(CH_2)_8OH$, 0.11. With I in AcOH the alicyclic diols gave the following values for L_S, the 2 figures being for the *cis*- and *trans*-forms: $C_6H_8(OH)_2$, 0.375, 0.034; $C_6H_{10}(OH)_2$, 0.420, 0.087; hydrindene-1,2-diol, 0.485, 0.050; tetrahydronaphthalene-1,2-diol, 0.475, 0.022. The diglycol esters of As_2O_3 are relatively weak acids; with excess of glycol there result complex triglycol derivs.; thus $HAs(C_2H_4O_2)_2$ has been isolated as salts of the acid. While the glycol deriv. of As_2O_3 and I show a double mol. wt. in $CHBr_3$, they are monomol. in Me_2CO. The pinacol deriv. (II) of I titrates as a monobasic acid in alc., using phenolphthalein as indicator; the other derivs. studied ($HOAsG_2$, $HO_2CCH_2AsG_2$ and $HOAsPn_2$, where G and Pn represent glycol and pinacol) are unstable and decomp. in EtOH. Data are given for the hydrolysis of II by H_2O; this is complete in about 1 hr. and in about half that time on the addn. of a small amt. of HCl; it is fairly resistant to alkali. The elec. cond. is also reported for 3 concns., 2 at 25° and 1 at 0°. The final value agrees well with that for As_2O_3. E. also discusses tensionless hetero rings.

C. J. West

Characterization of alkyl halides and organomagnesium halides. A. M. Schwartz and John R. Johnson. *J. Am. Chem. Soc.* **53**, 1063–8(1931).—The yields of RMgX from a series of alkyl halides are reported; these RMgX are characterized by transformation into the anilides of the corresponding acids with PhNCO; the cor. m. ps. for these anilides are given. The application of this method to certain branched-chain alcs. is limited by the fact that intramol. rearrangements may lead to anilides that do not correspond in structure to the original alc. Thus, 3-methylbutan-2-ol and 2,2-dimethylpropanol both give the anilide of dimethylethylacetic acid; allyl alc. gives the anilide of crotonic acid. An optically active halide, *d*-2-bromoöctane (in which the halogen is directly attached to the asym. C atom), led to a completely inactive anilide.

C. J. West

Partly abnormal reaction of β-substituted allyl bromides on organomagnesium bromides. Charles Prévost and Jean Daujat. *Bull. soc. chim.* [4], **47**, 588–94 (1930).—While with organomagnesium bromides the simple allyl bromide reacts thus: $RMgBr + CH_2:CHCH_2Br = MgBr_2 + RCH_2CH:CH_2$ (Kirrmann, *C. A.* **20**, 3443), β-substituted allyl bromides give rise to a desmotropism in this reaction: $RCH:CHCH_2Br + R'MgBr = MgBr_2 + RCH:CHCH_2R'$ or $MgBr_2 + RR'CHCH:CH_2$ (Prévost, *Ann. chim.* [10], **10**, 121). The 3 reactions (1) $EtMgBr + EtCH:CHCH_2Br$, (2) $PhMgBr + EtCH:CHCH_2Br$ and (3) $EtMgBr + PhCH:CHCH_2Br$ were studied in detail and the 5 theoretically expected *hydrocarbons*, $EtCH:CHCH_2Et$ (I), $Et_2CHCH:CH_2$ (II), $EtCH:CHCH_2Ph$ (III) $PhCH:CHCH_2Et$ (IV) and $PhEtCHCH:CH_2$ (V),

were isolated. For the prepn. of the β-substituted allyl bromides (Bouis, *C. A.* **22**, 213) the vinylcarbinols (Delaby, *Thesis*, 1923) were used. To the Mg reagent the allyl bromide in Et_2O is slowly added and the reaction is completed by several hrs. of refluxing. By using a slight excess of the Mg reagent immediately after decanting it from excess Mg, formation of brominated products as well as doubling of the allyl bromide is avoided. Although compds. I–V are not new, the consts. of II, IV and V were found to differ substantially from the literature. Reaction (1): I and II are sepd. by 4 distns. The total yield is above 80% and 3–4 times as much II as I is formed. II b. 85°, n_{22} 1.3966, d_{22} 0.6948, mol. refraction 33.94. Bromination yields the *dibromide* $Et_2CHCHBrCH_2Br$, b_{15} 93.5°, n_{24} 1.5006, d_{24} 1.5251, mol. refraction 49.81. KOEt forms *isoamylacetylene*, b. 87°, n_{22} 1.4023, d_{22} 0.7272, mol. refraction 32.24 (cf. Lespieau, *C. A.* **24**, 334). The *Ag salt* $Et_2CHC:CAg$ is very sol. in EtOH. Reaction (2): III and V are sepd. by 7 vacuum distns.; 2–3 times as much III is formed as V, and the total yield is excellent. V b_{12} 71°, b_{760} 191.5° (cor.), n_{21} 1.5030, d_{21} 0.8818, mol. refraction 48.95. Reaction (3): IV and V are sepd. by 3 vacuum distns. In a total yield of 75–85% about twice as much IV is present as V. IV b_9 87.5°, b_{14} 94°, b_{760} 217° (cor.), n_{17} 1.5318, n_{21} 1.5337, d_{17} 0.8924, d_{21} 0.8886, mol. refraction 50.7, 51.0. Some *bicinnamyl* was identified as a by-product. Data on I and III are also given. G. Toennies

Highly polymerized compounds. XLVII. Morphology of highly molecular substances. II. Polyoxymethylene precipitates from solutions. Hans W. Kohlschütter. *Ann.* **484**, 155–78(1930); cf. *C. A.* **25**, 15.—K. ppts. aq. $(CH_2O)x$ solns. (d_4^{19} 1.086) with H_2SO_4 and obtains 24 ppts., using various conditions of temp., amounts of H_2SO_4 and concns. of $(CH_2O)x$. Also, the effects of added substances (*e. g.*, MeOH) and of the substitution of HCl and H_3PO_4 for the H_2SO_4 were studied. The significance of the ppts. is discussed. C. J. West

Relation of the structure of ketones to their reactivity and affinity in acetal formation. II. Geo. J. Pfeiffer and Homer Adkins. *J. Am. Chem. Soc.* **53**, 1043–8 (1931); cf. *C. A.* **22**, 383.—HCO_2Et and Na react as follows: $3HCO_2Et + 4Na = 2CO + MeONa + 3EtONa$ (to be discussed in a later paper). The ratio of CO to HCO_2Et is independent of the amt. of $H(OEt)_3$ or of ketone acetal present in the mixt. subject to analysis; however, the ratio is dependent upon the amt. of EtOH and the amt. and kind of ketone present. A table is given showing the CO from HCO_2Et in the presence of various amts. of EtOH and ketones. The reaction of the various ketones with $HC(OEt)_3$ was carried out by mixing 0.1 mol. of ketone and 0.1 mol. $HC(OEt)_3$ in EtOH to give a total vol. of 49 ml., then adding 1 ml. of EtOH contg. 0.0136 g. HCl; after 50–60 hrs. 5 ml. aliquots were removed and decompd. with Na and EtONa; from the data the % acetal calcd. and equil. const., $K_E \times 10^2$, were detd. Me_2CO, 94.8, 334; MeCOEt, 90.1, 0.83; $MeCOCH_2CH_2Ph$, 89.1, 0.66; MeCOPh, 86.2, 0.39; Me neopentyl ketone, 84, 0.28; $(iso\text{-}Pr)_2CO$, 65.4, 0.034; *tert*-BuCOMe, 50.1, 0.0101; *tert*-BuCOEt, 36.2, 0.0033; Ph_2CO, 33.7, 0.0026; *tert*-$BuCOCHMe_2$, 25.8, 0.0012; $(tert\text{-}Bu)_2CO$, 17.2, 0.0004. These results show that any substitution in the Me groups of Me_2CO results in a lowering of the extent of the reaction. The extent of conversion is decreased only slightly by the substitution of a $PhCH_2$ group for 1 of the H of Me_2CO. The effect of the replacement of a Me by Ph is marked, while 2 Ph groups reduce the % conversion to acetal to about 33% of the value for Me_2CO. The b. p. and d. for the various compds. are given. C. J. West

Preparation of anhydrous pinacol. Harold S. King and W. W. Stewart. *Proc Trans. Nova Scotian Inst. Sci.* **17**, 262–7(1930).—The dehydration of pinacol hydrate was carried out by 3 methods: (1) To 118 g. pinacol, 108 g. water, and 700 cc. Et_2O cooled and shaken, 250 g. coarsely powd. CaC_2 was added. After standing, the mixt. was filtered and the filtrate distd. with a 3-ft. fractionating column. The fraction b. 170–4° weighed 106 g. and was pure anhyd. pinacol. In all, 90% of the hydrate was recovered. (2) Pure pinacol hydrate distd. on an oil bath under the same conditions gave only 75–80% of anhyd. pinacol. (3) Pinacol (118 g.), 108 g. water, and 200 cc C_6H_6 were distd. at 68° until all the water was removed through a condenser connected with an automatic separator from which the C_6H_6 siphoned back to the distg. flask. The C_6H_6 soln. was then heated on a metal bath to 170°. Anhyd. pinacol in 96% yield remained in the flask. The C_6H_6 dehydration method was used for the analysis of pinacol hydrate. It was found to contain 4.9% uncombined water when dried in the air for 24 hrs. Rachel Brown

Identification of fatty acids. I. Reinhard Seka and Robert H. Müller. *Monatsh.* **57**, 97–105(1931).—The reaction with $o\text{-}C_6H_4(NH_2)_2$ is proposed as a method of identifying fatty acids; the method seems to be applicable to acids up to C_{16}; the possible use with unsatd. acids is being studied. $o\text{-}C_6H_4(NH_2)_2$ and $PrCO_2H$, heated at 140–50°

for 8 hrs., give *2-propylbenzimidazole*, b_{15} 220°, m. 152–3°; *pentyl deriv.*, b_{15} 250°, m. 155–6°; *heptyl deriv.*, b_{15} 280°, m. 139–40; *nonyl deriv.*, b_{15} 280°, m. 114–5°; *hendecyl deriv.*, b_{15} 300°, m. 101–3°; *pentadecyl deriv.*, b_{15} 300°, m. 91–2°; *heptadecyl deriv.*, b_{15} 310°, m. 90–1°; *iso-Pr deriv.*, b_{15} 180°, m. 223–5°; *methylpentyl deriv.*, b_{15} 230°, m. 158–9°. C. J. West

Selective hydrogenation of unsaturated acids and their constitution. II. Isolinolinic acid of silk worm pupa. Yoshiyuki Inoue and Bunsuke Suzuki. *Proc. Imp. Acad.* (Japan) 7, 15–8(1931); cf. *C. A.* 24, 5283.—Oxidation of Me isolinolate with $KMnO_4$ in Me_2CO contg. $NaHCO_3$ gives $(CO_2H)_2$, caproic and azelaic acids, while the partially reduced acid gives pelargonic and azelaic acids. These results are the same as those obtained for linolic acid and so isolinolic acid is assigned the structure of octadeca-$\Delta^{9,10,12,13}$-dienoic acid; however, the 2 acids are not identical, for the Br deriv. of linolic acid m. 114°, while that of isolinolic acid is a liquid. Oxidation of the partially hydrogenated isolinolic acid in alk. soln. gives 2 dihydroxystearic acids, m. 130° and 100°, elaidic and stearic acids. Thus the 2 acids may be represented by the following:

$$\begin{array}{l} Me(CH_2)_4CH{:}CHCH_2CH \\ \qquad\qquad \| \\ HO_2C(CH_2)_7CH \end{array}$$
Linolic acid

$$\begin{array}{l} Me(CH_2)_4CH{:}CHCH_2CH \\ \qquad\qquad \| \\ HC(CH_2)_7CO_2H \end{array}$$
Isolinolic acid

These results are confirmed by measuring the velocity of hydrogenation; this runs in 2 stages and in both linolic acid is hydrogenated more rapidly. C. J. West

Partial hydrogenation of linolenic acid and its esters. T. P. Hilditch. *Chem. Umschau Fette, Oele, Wachse Harze* 37, 354–6(1930).—An answer to the Bauer and Ermann paper (*C. A.* 24, 5721) in which they state that no proof for a change in the ethylene bond during hydrogenation of linolenic acid was found and that the presence of suberic acid among the oxidation products by $KMnO_4$ may be due to secondary oxidation of the primary products. In answer it should be noted: (1) The oxidation by $KMnO_4$ in acetone causes no secondary oxidation of the di-CO_2H degradation products which are probably immediately pptd. and thus removed from the reaction; and oxidation of Me oleate, palmitoöleate, etc., produces only one di-CO_2H acid, azelaic acid. (2) Partially hydrogenated Me oleate yielded not only azelaic and suberic acids, but also sebacic acid, $C_8H_{16}(CO_2H)_2$, whose presence would be difficult of explanation when a secondary destructive oxidation is assumed. (3) While aq. $KMnO_4$ oxidation of oleic acid may produce azelaic, suberic, nonylic, octylic and oxalic acids, Lapworth and Mottram (*C. A.* 19, 2930) have shown that the aq. alk. $KMnO_4$ oxidation of the Na salt of 9,10-dihydroxystearic acid, the primary oxidation product of Na $\Delta^{9,10}$-oleate yields almost equal amts. of suberic, *n*-octylic and oxalic acids, the splitting taking place at the 8,9- and 10,11- and not at the 9,10-position. When oxidizing with $KMnO_4$ in acetone the primary formation of satd. di-HO acids does not occur and splitting is restricted to the 9,10-position. The observed differences are doubtless due to differences in the conditions under which hydrogenation occurred: B. and E. hydrogenated mainly at 20–120°, using 1.1–4.3% Ni for 12–30 hrs. while Hilditch and Vidyarthi hydrogenated mostly at 180–200°, using 0.3–0.6% Ni for 30-90 min.; they also observed that there is less change in the ethylene bond at 100–5° than at 180–200° and probably still less at B. and E.'s temp. of 20°. **Reply.** K. H. Bauer. *Ibid* 356.—Different hydrogenation conditions produce different results. The acetone $KMnO_4$ oxidation is more advantageous in this case than the O_3 oxidation. P. Escher

The parachor of some aliphatic acids of high molecular weight. G. B. Semeria and G. Ribotti-Lissone. *Gazz. chim. ital.* 60, 862–6(1930).—It is already known that with the Me esters of fumaric and maleic acids, of citraconic and mesaconic acids, of cinnamic and *allo*-cinnamic acids, etc., the parachor of the *cis*-form is smaller than that of the *trans*-form. In expts. with the free acids, it was found that the same fact is true of each pair of ethylenic acids with 18 and 22 C atoms, so that following the concept of Sugden and Whittaker (cf. *C. A.* 19, 3263), ordinary oleic acid (I) should have a *cis*-configuration and elaidic acid (II) and brassidic acid (III) *trans*-configurations. In the present paper, as with the results of Sugden (*loc. cit.*), the measurements of the parachors confirm the conclusions which can be deduced from other phys. consts. Thus, Mascarelli and Toschi (*C. A.* 10, 597), found by f.-p. measurements a *cis*-configuration for erucic acid (IV), a *trans*-configuration for III, and Keffler (cf. *C. A.* 24, 3702–3), from heats of combustion, considered I a *cis*-form and II a *trans*-acid. In view of this, the parachors of stearic acid (V) and of behenic acid (VI) were detd. to ascertain whether there is a relation between the parachors of these satd. acids and those of the corresponding ethylenic acids. The results show that the surface tension γ of the satd.

acids with 18 and 22 C atoms is nearly the same as that of the corresponding *trans*-ethylenic acids, while it is smaller than that of the *cis*-ethylenic acids. Moreover, the parachors of the satd. acids are greater than those of the corresponding unsatd. acids, while the parachors of the latter are the greater in the *cis*-forms. To complete the investigation the parachor of 2,3-oleic acid (VII) was detd., and since it was practically equal to that of II, the former has the *trans*-configuration as indicated by earlier expts. (cf. S., *C. A.* **19**, 1245). The differences in the parachors of each pair of ethylene isomers are small, but since these differences are systematic in both series and for different temps., they are not exptl. errors. Surface tensions γ were detd. by the method of max. boiling pressure with the Sugden app. (cf. *C.A.* **16**, 2627; **18**, 1771), and the parachors were calcd. by the formula $P = M\gamma^{1/4}/(D - d)$ of Sugden. The following data give d., γ and the parachor of the acids at 90° and at 95°, resp.: **I**, 0.84804, 0.84404, 27.94, 27.52, 765.07, 766.93; **II**, 0.84370, 0.83670, 26.56, 26.31, 760.44, 764.93; **VII**, 0.84843, 0.84039, 27.00, 26.89, 759.31, 763.70; **V**, 0.83602, 0.83102, 26.99, 26.42, 777.79, 778.87 (cf. 778 of Hunten and Maass, *C. A.* **23**, 1549); **IV**, 0.8357, 0.8327, 28.56, 27.77, 932.40, 938.91; **III**, 0.8324, 0.8294, 27.40, 27.28, 929.20, 934.36; **VI**, 0.8223, 0.8219, 27.77, 37.61, 950.07, 951.36. The exptl. values of the parachors are not compared with those calcd. theoretically, because the theoretical parachors are always different from the exptl. values when the no. of C atoms comprising the chain is very high. The results show that I and IV have *cis*-configurations, and II, VII and III have the *trans*-configurations.

C. C. DAVIS

Separation of glycerides. XVI–XVIII. BUNSUKE SUZUKI. *Proc. Imp. Acad.* (Japan) **7**, 9–11(1931); cf. *C. A.* **23**, 4928.—**XVI.** WITH YUTAKA MASUDA.—By use of the principle of fractional pptn. with $CaCl_2$ from EtOH and extn. of the petr. ether-insol. portion with various solvents the brominated oil from the bones of the common finbock (*Balaenoptera physalus*), the following bromides were isolated (only m. p. given): dilinoleno-zoömarin, 65°; clupanodono-linoleno-zoömarin, 132°; clupanodono-arachidono-olein, 95°; $C_{22}H_{42}O$-clupanodono-linolenin, 123°; arachidono-linoleno-olein, 145°; triarachidonin, 218°; the following are oils: linoleno-dizoömarin, stearo-linoleno-zoömarin, stearo-oleo-zoömarin, stearo-linoleno-zoömarin, oleo-dizoömarin, linoleo-diolein. **XVII.** WITH SHUZO OE AND UZO NISHIMOTO.—The skin of the finbock gave the following bromides: $C_{18}H_{37}O$-linoleno-stearidonin, 122°; $(C_{18}H_{37}O)_2$-stearidonin, 148°; cetoleo-linoleo-stearidonin, 172°; distearidono-zoömarin, 168° (decompn.); tristearidonin, 192° (decompn.); triolein and dieruco(?)-linolein. **XVIII.** WITH RYOZO YONEDA AND UZO NISHIMOTO.—The internal organs of the finbock gave the following bromides: clupanodono-$C_{22}H_{36}O$-linolenin, 105°; $C_{22}H_{38}O$(?)-linolenin, 98°; clupanodono-stearidono-zoömarin, 193°; diarachidono-gadolein, 220° (decompn.); linoleo-dizoömarin, oil.

C. J. WEST

The structure of synthetic mixed triglycerides. RAMKANTA BHATTACHARYA AND THOMAS PERCY HILDITCH. *Proc. Roy. Soc.* (London) **129A**, 468–76(1930).—Synthetic triglycerides were prepd. from various combinations of lauric, palmitic, and stearic acids with unsatd. acids (85% oleic and 15% linoleic). The curve of the molar percentage of the fully satd. glycerides plotted against the molar percentage of satd. acids in the synthetic mixt. gave corresponding values for a no. of natural animal fats (including butter and tallow) and for some vegetable pericarp fats, while vegetable fats have somewhat less fully satd. glycerides than the synthetic fats for a given ratio of satd. to unsatd. acids. Vegetable seed fats are almost invariably assembled on different principles, the glyceride structure being detd. by a tendency to even distribution. In this case, fully satd. glycerides rarely appear in appreciable quantity until the molar proportion of satd. acids in the mixed fatty acids reaches 60%.

H. J. DEUEL, JR.

Origin of stereochemistry. EMANUELE PATERNÒ. *Gazz. chim. ital.* **60**, 910–1 (1930).—Certain misstatements in a recent book by Oddo ("Trattato di chimica organica") are discussed.

C. C. DAVIS

Stereochemistry of organic compounds. II. Spatial rearrangement of the a oms in the pentaerythritol molecule. LUDWIG ORTHNER AND GERTRUD FREYSS. *Ann.* **484**, 131–54(1930); cf. *C. A.* **22**, 81.—Details are given for the prepn. of the mono-(I) and diacetone (II) derivs. of pentaerythritol (III) (cf. *C. A.* **22**, 1327). I and Na in $C_6H_4Me_2$, heated 3 hrs., then treated with MeI and again heated 2 hrs., give 43% of the *mono-Me deriv.* (IV), b_{12} 129–30°; Ag_2O and MeI with I give 70% of III; *p*-nitrobenzoate, m. 90°. IV with NaOH in 70% MeOH gives 60% of the Me deriv. of III, m. 72°. I in Me_2SO_4 and 5% KOH give a mixt. of the *di-Me deriv.* (V) of III, b_{12} 139°, m. 32° (*dibenzoate*, m. 70°), and the *tri-Me deriv.*, b_{12} 103–4° (*p*-nitrobenzoate, m. 53–4°). I and BzCl in C_5H_5N give the *di-Bz deriv.*, m. 110°, hydrolyzed by HCl in Me_2CO to the di-Bz deriv. (VI) of III, m. 75°; further action of BzCl gives the tetra-Bz deriv. of

III, m. 94°, identical with that obtained from III and BzCl. I, Ac_2O and AcONa in $CHCl_3$, heated 1 hr., give 90% of the *di-Ac deriv.*, m. 48–9°; hydrolysis at room temp. gives 25% of the *di-Ac deriv.* of III, $b_{0.3}$ 159°; on standing, the tetra-Ac deriv. (VII) and III sep. Cond. measurements are reported for I, V and VI in H_2O and H_3BO_3. Dipole detns. are given for VII and II; μ was found to be 2.18 ± 0.03 and 2.26 ± 0.07, each × 10^{-18} c. g. s. The spatial structure of III is discussed and illustrated by diagrams. C. J. WEST

Preparation of 1,3,9- and 3,7,9-trimethyluric acid. HEINRICH BILTZ AND HEINZ PARDON. *Ber.* **63B**, 2876–80(1930).—*8-Methoxytheobromine* (I), from the 8-Cl compd. with Na in MeOH, m. 282°, at once resolidifying (probably rearranging into 3,7,9-trimethyluric acid (II)) and then m. 370–80°. Heated 0.5 hr. at 290° (not higher), 10 g. I gives 5 g. II, m. 373–5° (decompn.), readily methylated by alk. Me_2SO_4 to tetramethyluric acid, m. 228°. 1,3,9-Trimethyluric acid (III) is prepd. by heating K 1,3-dimethylurate with *p*-$MeC_6H_4SO_3Me$ in *o*-$C_6H_4Cl_2$ at 150°; the crude product is purified by removing the more strongly acid 1,3-di-Me compd. by boiling up in dil. NH_4OH or by just dissolving in 23% KOH and pptg. the III with CO_2; yield, 3.2 g. from 10 g. of the di-Me acid. The III decomps. 340°, as does that prepd. from 9-methyl-*ps*-uric acid (Strufe gives 347°). An attempt was made to prep. III from 8-chlorotheophylline (obtained in 8 g. yield in needles, m. 304° (decompn.), from 10 g. theophylline with $KClO_4$ in HCl), but the Cl compd. was unchanged by KOH or NaOH in boiling MeOH or by KOMe or NaOMe at 140° in sealed tubes. C. A. R.

Preparation and properties of crystallized alkali salts of *l*-cystine. GERRIT TOENNIES AND THEODORE F. LAVINE. *J. Biol. Chem.* **90**, 203–13(1931).—The Li, Na and K salts of *l*-cystine have been prepd. by pptn. of alc. alk. cystine solns. with MeCN. A method of recrystn. was not found and repptn. under the conditions of prepn. did not improve the purity or cryst. form. However, analysis indicated that the original prepns. were fairly pure. The salts are very sol. in water and the aq. solns. are practically stable for several days, a noteworthy fact in view of the known instability of cystine solns. when boiled with excess alkali. $[\alpha]_D$, calcd. for cystine at 29°, for the Li, Na and K salts, resp., in water is: —94.4°, —90.9° and —91.1°. A. P. LOTHROP

Condensation between aliphatic esters and ketones. S. G. POWELL AND KEITH M. SEYMOUR. *J. Am. Chem. Soc.* **53**, 1049–51(1931).—With the Claisen condensation, AcOEt and MeCOEt or $EtCO_2Et$ and Me_2CO give 11 and 15%, resp., of $(MeCOCH_2)_2$. $EtCO_2Et$ and MeCOPr or $PrCO_2Et$ and MeCOEt give 9 and — % of $(EtCOCH_2)_2$. AcOEt and $MeCOCHMe_2$ or iso-$PrCO_2Et$ and Me_2CO give 14 and 6%, resp., of 2-methyl-3,5-hexanedione. Modifications of proportions and conditions did not change the course of the reaction in the cases studied. C. J. WEST

Sugar oxidation and destruction. X. Formation of methylglyoxal from sugars and from related substances under the influence of hydrogen peroxide. K. BERNHAUER AND H. TSCHINKEL. *Biochem. Z.* **230**, 484–92(1931); cf. *C. A.* **24**, 4268.—Under the influence of H_2O_2 in the presence of $FeSO_4$ in acid soln., MeCOCHO is formed from various sugars and especially from γ-Me glucoside. In the absence of $FeSO_4$, however, acids, particularly HCO_2H, are produced instead. **XI. Formation of phenol-like compounds in the decomposition of sugar.** K. BERNHAUER AND J. NEPP. *Ibid* 493–500.—Phenol-like substances are formed in very minute amts. and only under special conditions from carbohydrates. KCO_2H when used in making the phenol fusion mixt. leads to the formation of *o*- and particularly of *m*-$HOC_6H_4CO_2H$ from phenol. **XII. The formation of higher fatty acids in the destruction of sugar.** *Ibid* 501–4.—There is no evidence found that higher fatty acids result when sugars are acted upon by concd. alkalies. S. MORGULIS

Glucuronic acid fermentation. II. TEIZO TAKAHASHI AND TOSHINOBU ASAI. *Proc. Imp. Acad.* (Japan) **7**, 5–8(1931).—See *C. A.* **24**, 4319. C. J. WEST

Course of addition of sodium enol alkylmalonic and sodium enol alkylcyanoacetic esters to unsaturated esters. ARTHUR MICHAEL AND JOHN ROSS. *J. Am. Chem. Soc.* **53**, 1150–72(1931); cf. *C. A.* **25**, 82.—The course of the addn. of a deriv. of the Na enol malonic ester type to an α,β-unsatd. ester proceeds according to the law of chem. neutralization. That addn. product is therefore formed in which the positive energy of the Na atom is best neutralized, since the max. energy degradation is thus realized. In the addn. of Na enol alkylmalonic esters to fumaric ester, the alkyl group migrates so that the addendum parts are alkyl and $-C(CO_2Et):C(ONa)OEt$; in the addn. of Na enol alkylcyanoacetic esters to crotonic ester, the addendum parts are similarly alkyl and $-C(CN):C(ONa)OEt$. In the addn. to crotonic ester, the yield of addn. product was greater in the case of Na enol methylcyanoacetic ester (50%) than with Na enol ethylcyanoacetic ester (33%). However, the yield of addn. product is detd.

by several complex factors so that it is not possible from these expts. to make any statement regarding the relative ease of migration of the Me and Et groups in these addn. reactions. The max. chem. neutralization of the Na is realized by the Na remaining attached to the carbonyl O atom in the malonic or cyanoacetic groups. The Na atom, however, becomes better neutralized than it was in the addendum by the spatial negative influence of the acquired CO_2Et group. Esters of the type $CHX(CO_2Et)CHY\text{-}CZ(CO_2Et)_2$ (where X = R or H, Y = R, H or CO_2Et and Z = R or H, also R is an alkyl or aryl radical), apparently form enolic Na derivs. contg. the group -CH:C(ONa)OEt, but these immediately decomp. to form ethylenic α,β-esters and Na alkylmalonic esters. The retrogression of the free ester (A) by Na is probably due to the formation of such an enolic Na deriv. It would follow from this relationship that the Na atom involved in the addn. reactions specified above cannot migrate during the addn. process. However, if the single CO_2Et group of (A) can form an enolate, an amt. of Na corresponding to the relative acidity of the 2 enolic forms of ester (A) (Z = H), would migrate to the single CO_2Et group according to the partition principle, and spontaneous retrogression would lead to the reformation of a further quantity of the Na enol deriv. Thus, by this process, in agreement with the partition principle, an apparent balanced state would be achieved between the 2 possible stable Na derivs. It has not been found possible to obtain addn. to the γ-C atom of a β,γ-unsatd. ethylenic ester or nitrile. Addn. occurs in the case of allyl cyanide and styrylacetic ester at the α- and β-C atoms with migration of an α-H atom. $CH_2(CO_2Et)_2$ and $(CHCO_2Et)_2$ with a little EtONa give 90% of the Et ester, b_5 187°, of *propane-α,β,γ,γ-tetracarboxylic acid*, m. 153°. The ester (22 g.) in an Et_2O suspension of anhyd. EtONa, methylated with 10 g. MeI, gives 21 g. of the *Et ester*, b_3 180°, of *butane-α,β,γ,γ-tetracarboxylic acid*, m. 170°. *Pentane-β,γ,δ,δ-tetracarboxylic acid*, m. 166°, results from the sapon. of the ester obtained from the butane deriv. and MeI with EtONa at 0°. The propane deriv. and EtI with EtONa give the *Et deriv.*, b_3 180°, of *pentane-α,β,γ,γ-tetracarboxylic acid*, m. 177°. *Pentane-α,α,β,γ-tetracarboxylic acid* m. 179° (decompn.). *Hexane-β,β,γ,δ-tetracarboxylic acid*, m. 170°, is formed from the Et ester of the last-named acid, MeI and EtONa at 0°. Addn. of MeC(CN):C(ONa)OEt to $MeCH{:}CHCO_2Et$ gives 50% of the *Et ester*, b_3 145-8°, of *α,β-dimethyl-γ-cyanoglutaric acid*, which could not be crystd.; the corresponding *γ-carboxy deriv.* m. 142° and is not identical with the acid obtained from tiglic acid. β,γ-Dimethyl-γ-cyanoglutaric acid m. 152°. EtC(CN):C(ONa)OEt and $MeCH{:}CHCO_2Et$ give 33% of the *Et ester*, b_3 153°, of *γ-cyano-α-ethyl-β-methylglutaric acid*, m. 147°; this gives with HCl a mixt. of *α-ethyl-β-methylglutarimides*, m. 92° and 102°; hydrolysis of the imide, m. 92°, gives *cis-α-ethyl-β-methyglutaric acid*, m. 88°. Complete hydrolysis of the above ester gives *α-ethyl-β-methyl-γ-carboxyglutaric acid*, m. 147°. $MeC{:}CEtCO_2H$ and NCCH:C(ONa)OEt give 60% of the *Et ester*, b_4 152°, of *α-ethyl-β-methyl-γ-cyanoglutaric acid*, m. 132°; complete hydrolysis gives the *γ-carboxy deriv.*, m. 141°. Ethylation of γ-cyano-β-methylglutaric ester gives the *Et ester*, b_4 152°, of *γ-ethyl-β-methyl-γ-cyanoglutaric acid*, m. 139°; γ-ethyl-β-methyl-γ-carboxyglutaric acid could not be crystd. $CH_2{:}CHCH_2CN$ and NCCH:C(ONa)OEt give 90% of *β-methyl-γ-carbethoxyglutaronitrile*, b_3 160°; MeC(CN):C(ONa)OEt gives *α,β-dimethyl-γ-carbethoxyglutaronitrile*, b_3 152°. $PhCH{:}CHCH_2CO_2Et$ and $CNCH_2\text{-}CO_2Et$ with EtONa give *Et β-benzyl-γ-cyanoglutarate*, b_3 193°; hydrolysis gives β-benzyl-γ-carboxyglutaric acid, m. 158°; the Na deriv. of the ester and MeI give *Et γ-methyl-β-benzyl-γ-cyanoglutarate*, b_3 194°; alk. hydrolysis gives *γ-methyl-β-benzyl-γ-carboxyglutaric acid*, m. 177° (decompn.), giving *α-methyl-β-benzylglutaric acid*, m. 139°. $PhCH{:}CHCH_2CO_2Et$ and $MeCH(CO_2Et)_2$ with EtONa give the *Et ester*, b_3 197°, of *α-methyl-β-benzyl-γ-carboxyglutaric acid*, which exists in 2 forms, m. 197° and 118°; heating above their m. p. gives 2 α-methyl-β-benzylglutaric acids, m. 139° (cf. above) and 97°. PhMeCHCHO and $CH_2(CO_2H)_2$ in EtOH give a mixt. of the *Et esters*, b_{10} 156° and b_{10} 175–82°, of *γ-methyl-γ-phenylbutenoic acid* (I), did not crystallize, and γ-methyl-γ-phenyl-α-carboxybutenoic acid, m. 151°. I and $NCCH_2CO_2Et$ with EtONa give *Et γ-methyl-γ-phenyl-α-cyano-β-aceticbutyrate*, b_3 198°; alk. hydrolysis gives *γ-methyl-γ-phenyl-α-carboxy-β-aceticbutyric acid*, m. 162° (decompn.), giving *γ-methyl-γ-phenyl-β-aceticbutyric acid*, m. 88°. C. J. WEST

α,β,γ-Trimethylglutaric acids. F. E. RAY. *J. Am. Chem. Soc.* **53**, 1174–5(1931); cf. *C. A.* **22**, 945.—Polemical with Michael and Ross (*C. A.* **25**, 82) regarding the identity of α,β,γ-trimethylglutaric acid. C. J. WEST

α,β,γ-Trimethylglutaric acids. ARTHUR MICHAEL AND JOHN ROSS. *J. Am. Chem. Soc.* **53**, 1175–6(1931).—Reply to Ray (cf. preceding abstr.). C. J. WEST

A supposed asymmetry of *meso*-tartaric acid. K. SCHERINGA. *Pharm. Weekblad* **68**, 143–5(1931).—A theoretical discussion of the spatial configuration of *meso*-tartaric

acid and a possible asymmetry due to a mutual repulsion of the 2 carboxyls.

A. W. Dox

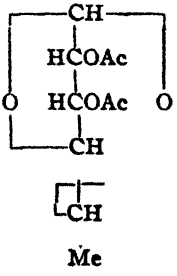
Iron nitrosyls and their behavior on oxidation. HANS REIHLEN, E. ELBEN AND J. EVERET. *Ann.* **485**, 43–52(1931).—$(NO)_2Fe(S_2COEt)_2$ (I) (Manchot and Davidson, *C. A.* **23**, 4417) results in 91% yield (on the basis of the Fe) or 95% yield (on the basis of NO) from 10 g. $FeSO_4$ in 70 cc. H_2O and 12–14 g. K xanthate in 30 cc. H_2O to which are added 50 cc. CS_2 or $CHCl_3$ and the whole satd. with NO (av. absorption, 1500 ± 50 cc.); expts. at 0–40°, addn. of KOH or AcONa, or variation of the ratio of K xanthate to Fe from 0.5 to 4, always gave the same result. With EtOCOSK there results 35% of *dinitroso ferrous Et thiocarbonate* (II), $(ON)_2FeSCO_2Et$, brown-black, much less stable than I and reacts much more quickly with acids and alkalies. I, on heating at 60–80°, gives a N-free sublimate, *S,O-di-Et thiocarbonate*, b_{10} 76°, n_D^{19} 1.5375. The behavior of I and II on autoxidation is shown in curves. I in C_6H_6, on shaking with 1 atom of O, gives a compd. contg. about 30% of $(NO)O:NOFe(S_2COEt)_2$.

C. J. WEST

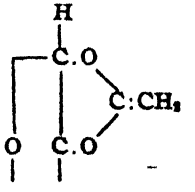
Carbohydrates. X. Further 1,2-derivatives of glucose. PERCY BRIGL AND RICHARD SCHINLE. *Ber.* **63B**, 2884–7(1930); cf. *C. A.* **24**, 4509.—An entirely different and materially smoother method of prepg. 2-methylglucose (I) (*C. A.* **24**, 74) is described. Tetrabenzoylglucose di-Et mercaptal reacts with extraordinary ease with MeI and Ag_2O, yielding half its wt. of *tetrabenzoyl-2-methylglucose di-Et mercaptal*, 88–9°, $[\alpha]_D^{18}$ 64.33–64.57° (Me_2CO), sapond. by NaOEt to 2-methylglucose di-Et mercaptal, m. 178°, identical with that obtained from glucose mercaptal with MeI and yielding with aq. $HgCl_2$ I, m. 158°, shows slight mutarotation in H_2O, $[\alpha]_D$ changing from 56.6–59.2° in 0.5° hr. to 64.9–65.6° in 48 hrs.; phenylhydrazone, m. 177°, $[\alpha]_D^{19}$ —13.3° (C_5H_5N) (heating with more $PhNHNH_2$ gives the Me-free glucosazone, m. 205°).

C. A. R.

Sugar anhydrides. II. Action of trimethylamine on acetobromo-*l*-rhamnose. FRITZ MICHEEL AND HERTHA MICHEEL. *Ber.* **63B**, 2862–6(1930); cf. *C. A.* **23**, 3669.—It was shown recently (*C. A.* **24**, 2727) that acetohalogenosugars whose substituents on the 1- and 2-C atoms are in the *cis*-position can form quaternary NH_4 salts with NMe_3 while the *trans*-derivs. do not. The acetohalogen derivs. of *d*-mannose and *l*-rhamnose form no quaternary derivs., but while the mannose compd. can be recovered almost unchanged even after long-continued action, acetobromorhamnose undergoes another reaction. In abs. alc. after a sufficiently long time almost all the Br is split off and seps. as $NMe_3.HBr$. Tetraacetylethylrhamnoside is not formed, however; there are obtained chiefly a diacetylrhamnose anhydride (I), 2,3,4-triacetyl-β-rhamnose (II) and an unsatd. non-cryst. compd. The yields of these products vary considerably and it has not yet been possible to establish the conditions necessary for obtaining I, especially, in reproducible yields. I, to which the accompanying structure is assigned provisionally, is probably formed by splitting off of Br with the Ac group on C atom 4 as AcBr which reacts with the alc. to form AcOEt and HBr, the latter sepg. as $NMe_3.HBr$. By using C_6H_6 instead of EtOH as solvent, it is possible to isolate the very unstable $AcBr.NMe_3$. I reduces Fehling soln. only very little after sapon. of the Ac groups but powerfully after boiling with acids, and it is stable toward Br in AcOH and



(I)



(III)

$KMnO_4$ in Me_2CO. It has not been possible to obtain the corresponding carbohydrate in pure form, however. Cautious alk. sapon. gives sirups which after long standing in the air reduce Fehling soln. and deposit small quantities of *l*-rhamnose hydrate, while a dil. soln. of HCl in MeOH produces a change in rotation from —24.1° to —9.8° but yields no cryst. rhamnoside acetate. The simultaneous formation of II renders the isolation of I difficult. The mother liquors from I and II give a sirup which reacts

strongly with Br and $KMnO_4$; it may be a compd. of the glucal type or a ketene-acetal-like product (III) derived from the tautomeric form of acetobromorhamnose. The easy elimination of AcBr from acetobromorhamnose indicates that the mobile 6-membered pyran ring is fixed in a position in which the Br atom is close in space to an Ac group; if no Walden inversion occurs at C atom 1 in the ring closure, this can result only in the formation of *(α1,4)(β1,5)-rhamnosan 2,3-diacetate* (I), since the Br is in the *trans*-position to the Ac groups on C atoms 2 and 3. The acetohalogenomannoses, which under the same conditions are stable toward NMe_3, have an $AcOCH_2$ group instead of the end Me group of the rhamnose. This end $AcOCH_2$ group probably favors a form of the pyran ring in which the Br and Ac groups are not close to each other. I (0.9 g. from 2 g. acetobromo-*l*-rhamnose), m. 124–5°, $[\alpha]_D^{20}$ —21° ($CHCl_3$). C. A. R.

Nitrogen-containing sugars. II. Synthesis of peptide-like compounds from amino sugars and amino acids. I. Glucosamine as the component. Alfred Bertho, Fritz Hölder, Werner Meiser and Franz Hüther. *Ann.* **485**, 127–51(1931); cf. *C. A.* **24**, 3761.—Glucosamine-HCl (8.64 g.) in 400 cc. 0.2 *N* NaOH, treated during 20 min. with 4.52 g. $ClCH_2COCl$ with cooling, give about 5% of *chloroacetyl-N-glucosamine*, m. 168–9°, $[\alpha]_D^{24}$ 24.8° (MeOH); Fehling soln. is easily reduced. The α-bromopropionyl deriv. (I) m. 200–1°, $[\alpha]_D^{20}$ 52.5° (H_2O) after 17 min., changing to a const. value of 35.2° in 18 hrs.; crystn. of this prepn. tends to increase the component with the higher rotation, since the const. value for the product crystd. once is 23.78°. The α-bromoisocaproyl deriv. (II), m. 178° (decompn.), also shows mutarotation, the value of $[\alpha]_D^{22}$ changing from 39.67° (H_2O) after 30 min. to 24.70° after 24 hrs. I and MeOH-NH_3, on standing 3 months at 0°, give a mixt. of dehydroalanyl-*N*-glucosamine anhydride (III), m. 272° (decompn.), and *alanyl-N-anhydroglucosamine anhydride* (IV), m. 199°. Concd. NH_4OH at 0° gives principally III but a small amt. of IV. MeOH-NH_3 at 100° gives almost completely IV. III reduces Fehling soln. only after long heating; it does not liberate N in the Van Slyke app.; $[\alpha]_D^{23}$ —38.0° (H_2O); it is unchanged after heating with MeOH-NH_3 3 hrs. at 70–5° and 3 hrs. at 100°. IV likewise reduces Fehling soln. only after long heating and in the Van Slyke app. liberates 42% of its N after shaking 7 hrs. The *tetra-Bz deriv.* of I m. 189°, $[\alpha]_D^{18}$ 86.7° ($CHCl_3$), does not reduce Fehling soln.; a small amt. of *tetrabenzoyl-(α-hydroxypropionyl)-N-glucosamine* is also formed, m. 238°, $[\alpha]_D^{25}$ 15.87° ($CHCl_3$). II also yields a *tetra-Bz deriv.*, m. 189°, $[\alpha]_D^{18}$ 103.1° ($CHCl_3$). *Hippuryl-N-glucosamine*, m. 200° (decompn.); it reduces Fehling soln. but does not react with MeI; $[\alpha]_D^{21}$ 43.47° (C_5H_5N). *p*-Bromohippurazide gives the *compd.* $C_{24}H_{25}O_9N_5Br_2$, m. 214°. Benzoylalanine azide gives *benzoylalanyl-N-glucosamine*, m. 222° (decompn.), $[\alpha]_D^{22}$ 59° (H_2O). C. J. West

Acetylmonoses. VI. The ring structure of the mannose pentaacetates. P. A. Levene and R. Stuart Tipson. *J. Biol. Chem.* **90**, 89–98(1931); cf. *C. A.* **18**, 76, 1274; **21**, 1969, 3184.—Hudson (*C. A.* **24**, 2726) has recently attributed different ring structures to *α-d-* and *β-d*-mannose, and if this assumption is correct the α- and β-pentaacetates should also possess different ring structures. L. and T. find on examg. the 2 forms that this is not the case. Fifty g. of β-mannose pentaacetate treated with AcOH and HBr gave 32 g. of 1-bromotetraacetyl-*d*-mannose (I), m. 53–4°, $[\alpha]_D^{26}$ 123.2° (in $CHCl_3$), Treatment of I (25 g.) with Zn dust and AcOH gave 12 g. triacetylglucal, m. 54–5°, $[\alpha]_D^{25}$ —16.3° (in abs. EtOH). The action of AgOAc on 17 g. of I gave 15 g. of a compd. m. 74, $[\alpha]_D^{26}$ +56.6° (in $CHCl_3$), which was found to be identical with *α-d*-mannose pentaacetate. Dry NaOMe acted on I to give the peculiar tetraacetylmethylmannoside of Freudenberg (*C. A.* **24**, 4509), m. 104–5°, $[\alpha]_D^{27}$ —22.6° (in $CHCl_3$), while treatment with Ag_2CO_3 gave 2,3,4,6-tetraacetylmannose (II), m. 93°, $[\alpha]_D^{27}$ +26.3° (in $CHCl_3$). II strongly reduced hot Fehling soln., and on acetylation gave β-mannose pentaacetate, m. 117°, $[\alpha]_D^{21}$ —24.1° (in $CHCl_3$). It thus appears that the 2 pentaacetates are the α- and β-forms of the same ring isomer. H. W. Leahy

The preparation and melting point of anhydrous β-maltose. J. Gillis. *Natuurw. Tijdschr.* **12**, 193–9(1930).—β-Maltose hydrate is dehydrated *in vacuo* below 100°, contrary to the results of deBruyn and van Leent (*Rec. trav. chim.* **13**, 218(1894)). The m.-p. curves show that the anhyd. substance m. 108°, while the hydrated form m. 102–3°. The product obtained by deBruyn was probably a supercooled mixt. of about 56% of β- and 46% of α-maltose. R. C. Hockett

Autohydrolysis of diastatic dextrins. Jean Effront. *Compt. rend.* **192**, 198–201 (1931).—Reducing dextrins are formed during one of the primary phases of the process

of starch saccharification. The maltose encountered in the course of the dextrin disappearance results from the breaking down of these reducing dextrins. In the process of purification by solvents or dialysis autohydrolysis plays a dominant part, while the phenomenon of polymerization also occurs. The final products are, therefore, always impure, a condition similar to the one encountered in the study of the decompn. of starch. B. S. LEVINE

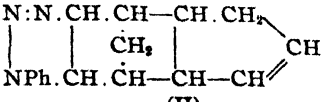
The supposed depolymerization of glycogen. ENDRE BERNER. *Ber.* **63B**, 2760–4 (1930).—B. showed recently (*C. A.* **24**, 5730) that the supposed depolymerization of inulin described by Vogel and Pictet and by Pringsheim, Reilly and Donovan is explained by the fact that inulin eagerly adsorbs such substances as alc., glycerol, glycol and $AcNH_2$ and thereby becomes easily sol. in H_2O; analysis of the supposed depolymerizates showed that the adsorbed substances, together with the pure inulin, corresponded quantitatively to the relatively large observed f.-p. depressions. B. now shows that this is also true of Reilly, Pringsheim and Donovan's glycogen prepns. (*C. A.* **24**, 3996). When well-dried glycogen is dissolved in anhyd. solvents, like fused $AcNH_2$, $HCONH_2$ or glycol and pptd. with abs. alc., it adsorbs large quantities of these substances, the adsorption being greatest when the H_2O is removed as completely as possible, *e. g.*, if the glycogen soln. is heated some time *in vacuo* before the pptn. The quantity of $AcNH_2$ adsorbed also decreases with increasing quantities of alc. used for pptn. The ppts. give up their alc. only slowly *in vacuo* over $CaCl_2$ but in the air they lose it more rapidly because the hygroscopic substances take up H_2O and the adsorption of alc. is thereby diminished. This explains why the H_2O must be removed before good adsorption will take place. A prepn. obtained by dissolving glycogen in $HCONH_2$ at room temp., pptg. and washing with abs. alc. and drying 2 days *in vacuo* over $CaCl_2$ gave an apparent mol. wt. of 342 in H_2O but contained 9.16% alc. and 0.25% $HCONH_2$; after standing several hrs. in the air the apparent mol. wt. was 610 and a couple of hrs. later 960; the prepn. now contained only 2% alc. A prepn. similarly obtained from a soln. of glycogen in $HCONH_2$ which had been heated 1 hr. *in vacuo* at 90–5° gave an apparent mol. wt. of 255 increasing, after 2 days in the air, to 317; it contained 4.13% alc. and 6.27% $HCONH_2$, and an aq. soln. of the same quantities of glycogen, alc. and $HCONH_2$ gave an apparent mol. wt. of 364. A prepn. similarly obtained from glycol gave in H_2O the same opalescence as true glycogen solns. and was colored by I in the same way. The glycogen was prepd. from calves' livers and after careful purification (finally by electro-dialysis) formed a friable powder of the compn. $C_6H_{10}O_5$ (ash less than 0.02%), $[\alpha]_D^{20}$ 194.5° in H_2O. The better it was dried, the less did it depress the f. p. of H_2O, pointing to the presence of alc., which, like H_2O, is removed with great difficulty; only heating at 100–10° *in vacuo* gives a product of the compn. $C_6H_{10}O_5$, which may account for the large depressions found by R., P. and D., who dried their glycogen only at 80°. C. A. R.

Cyclopropene series. I. Diphenylcyclopropenedicarboxylic acid. S. F. DARLING AND E. W. SPANAGEL. *J. Am. Chem. Soc.* **53**, 1117–20(1931).—*Di-Me α-bromo-β,γ-diphenyl-γ-nitroethylmalonate*, m. 117–8°, with AcOK in MeOH gives *di-Me 1,2-diphenyl-2-nitro-3,3-cyclopropanedicarboxylate*, m. 129°; refluxing with MeONa splits off $NaNO_2$, giving the *di-Me ester*, m. 140–2°, of *1,2-diphenyl-3,3-cyclopropenedicarboxylic acid*, m. 190° (evolution of CO_2); oxidation with $KMnO_4$ gives CH_2Bz_2; Br and the ester give *di-Me 1,2-dibromo-1,2-diphenyl-3,3-cyclopropanedicarboxylate*, m. 194–5°. Melting the acid gives the *lactone*, $C_{16}H_{12}O_2$, m. 149–51°, hydrolyzed to *1,2-diphenyl-2-hydroxy-3-cyclopropanecarboxylic acid*, m. 146–8°; this is not oxidized by O_2. C. J. WEST

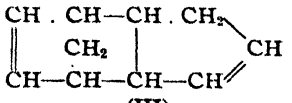
Polymerization and pyrogenic decomposition of phenylacetic anhydride. I. Cyclobutane-α-dione. P. KALNINS. *Acta Univ. Latviensis Kim. Fakultat. Serija* **1**, No. 13–7, 455–67, 468(1930)(in German).—In the prepn and fractionation of $(PhCH_2CO)_2O$ there is formed by decompn., a red substance, probably diphenylcyclobutane-α-dione, while $PhCH_2CO_2H$ distils over. This results by the unsym. polymerization of the anhydride, with the splitting off of 2 mols. $PhCH_2CO_2H$. The intermediate product of the polymerization is colorless and easily changed into the red diketone. The latter with EtONa undergoes a mol. rearrangement, similar to the benzilic acid rearrangement, the product being $PhCH_2CHPhCOCO_2H$. This is 1 of the few examples of unsym. polymerization, most of the polymerizations yielding sym. compds. The study is being extended to other anhydrides. C. J. WEST

Polymerization of cyclic hydrocarbons. I. Polymeric forms of cyclopentadiene. KURT ALDER AND GERHARD STEIN (WITH HUGO FINZENHAGEN). *Ann.* **485**, 223–46 (1931).—Dicyclopentadiene (I) and PhN_3 give the *addn. compd.* (II), m. 130–1°, decompd. by mineral acids with liberation of N. The dihydro deriv. of I, m. 50–1°, does

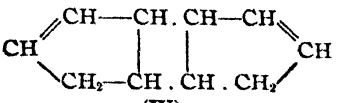
not react with PhN_3, thus indicating structure III as opposed to IV. Oxidation of the dihydro deriv. of I with $KMnO_4$ in Me_2CO gives 3,6-endomethylenehexahydrohomophthalic acid, m. 137°, and cyclopentane-1,3-dicarboxylic acid, isolated as the anhydride, m. 163°. Decompn. of the bisnitrosochloride of I gives the unsatd. ketone (V), m. 216°; dihydro deriv., m. 109–10° (*semicarbazone*, m. 229° (decompn.)); oxidation yields *cis-pentalan-1,3-dicarboxylic acid* (VI), m. 230°. Excess BzO_2H and I give the dioxide, m. 189°; the action of 1 mol. BzO_2H upon I in $CHCl_3$ at —12° gives a mixt. of *monoxides* (VII and VIII); while these cannot be sepd. by crystn., VII adds PhN_3, giving a *triazole* (IX), m. 149°. From the petr. ether mother liquor VIII, b_{15} 100–10°, m. 79–80°, is isolated; catalytic reduction of VIII gives a *dihydro deriv.*, m. 118–9°. Tricyclopentadiene adds PhN_3, giving the compd. $C_{21}H_{23}N_3$, m. 199–200° (decompn.).



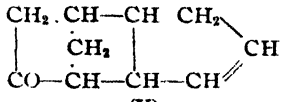
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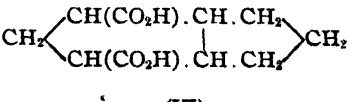
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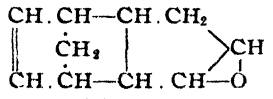
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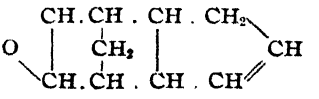
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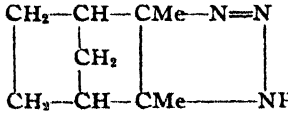
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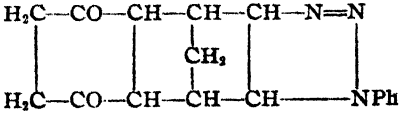
(VIII)

C. J. West

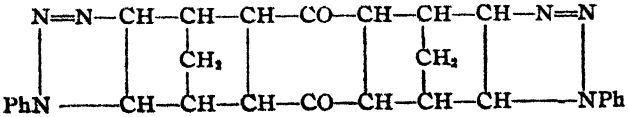
Graduated addition capacity of unsaturated ring systems. Kurt Alder and Gerhard Stein. *Ann.* **485**, 211–22(1931).—The peculiar behavior of dicyclopentadiene toward PhN_3 lead to the study of other compds. of this type. Santene and PhN_3 give an *addn. compd.* (I), m. 86°. Δ^4-3,6-Endomethylenetetrahydro-*o*-phthalic anhydride gives the *compd.* $C_{15}H_{13}O_3N_3$, decomps. 225°. Dihydromonocyclopentadienequinone and PhN_3 give the *compd.* II, m. 194°; $PhCH_2N_3$ gives the *compd.* $C_{18}H_{19}O_2N_3$, m. 141°; N_2CHCO_2Et gives the *compd.* $C_{16}H_{18}O_4N_2$, m. 177°. Dihydromonocyclohexadiene- and -butadienequinone do not react with PhN_3. Biscyclopentadienequinone and PhN_3 give the *compd.* III, darkens above 200° and decomps. 258°; the corresponding hexadiene and butadiene derivs. did not react. 3,6-Endoxo-Δ^4-tetrahydro-*o*-phthalic anhydride and PhN_3 give the compd. $C_{14}H_{11}O_4N_3$, decomps. 200°. *N,N'*-Dicarbethoxy-3,6-endomethylenetetrahydropyridazine and PhN_3 give the compd. $C_{17}H_{21}O_4N_5$, m. 126°.



(I)



(II)



(III)

C. J. West

Induction of the reaction between chlorine and benzene and ethylene. T. D. STEWART AND M. H. HANSON. *J. Am. Chem. Soc.* **53**, 1121–8(1931); cf. *C. A.* **24**, 3984.—$C_6H_6Cl_6$, together with substitution products, is formed when C_2H_4 is passed into a C_6H_6 soln. of Cl in the dark. A mixt. of the various stereoisomers is obtained, with the α-form (m. 157°) predominating. The molar ratio of total Cl reacting to C_2H_4 reacting varies from 2 to 11 in the present expts. and is greater the lower the partial pressure of C_2H_4. This is explained on the basis of chain mechanisms for both the C_2H_4-Cl and C_6H_6-Cl reactions, the latter being induced by and acting as an inhibitor of the former. In homogeneous soln. the above ratio, with Cl in large excess, is approx. 2. A higher proportion of the Cl is used in substitution than in the heterogeneous reactions. No evidence of a Friedel-Crafts type of reaction between the $C_2H_4Cl_2$ and C_6H_6 could be found. In a mixt. of C_6H_6, BzCl and Cl no BzPh was formed with introduction of C_2H_4. C. J. WEST

***cis-trans*-Isomerism and steric hindrance. XII. *o*-Butylcyclohexanols.** G. VAVON AND A. GUEDON. *Bull. soc. chim.* **47**, 901–10(1930); cf. *C. A.* **24**, 1355.—A study of the *cis*- and *trans*-*o*-butylcyclohexanols (I) and their ethers was undertaken for comparison of their reaction velocities. *o-Butylcyclohexanone* (II) was prepd. by catalytic hydrogenation of *o*-BuC_6H_4OH (III) followed by oxidation with CrO_3. The catalytic hydrogenation of III with Pt black yielded butylcyclohexane and 60% of I. The semicarbazone of II m. 143–4°, from which was regenerated II, b. 90–1°, d_4^4 0.914, n_D^4 1.4603. Catalytic hydrogenation of the semicarbazone in aq. alc. contg. HCl yielded the semicarbazide, m. 96–7°; oxime of II m. 43–4°. II also was obtained by condensation of butanal with cyclohexanone (IV) and subsequent catalytic hydrogenation of the butylidenecyclohexanone in the presence of 5% NaOH according to the process of Grignard and Dubien (*C. A.* **19**, 1247). The fraction b_{16} 130–45° was not purified but directly dehydrated by distn. in the presence of 2% $(CO_2H)_2$ at 30–40 mm. The fraction now b_{20} below 100° gave with semicarbazide-HCl a compd. m. 166° which is the semicarbazone of IV. The main fraction b_{20} 105–20° was directly hydrogenated and yielded II. A 3rd way of obtaining II is by the action of Mg and BuBr on *o*-chlorocyclohexanone. Bu cyclopentyl ketone (V), b_{25} 104–6°, d_4^{23} 0.893, n_D^{23} 1.4479, is obtained as a by-product. The structure of V is proved by its synthesis from cyclopentanealdehyde and BuMgBr and subsequent oxidation of the secondary alc. obtained. The formation of a 5-C ring from the 6-C system is emphasized. *cis*-I was prepd. by Pt black hydrogenation of II in AcOH-HCl. After hydrolysis of the acetate formed it b_{9-10} 101–2°; dinitrobenzoate, m. 76°; acid phthalate, m. 58–9°; phenylurethan, m. 64–5°. *trans*-I, obtained in 87% yield by treating II with Na and alc., b_{16} 111–2°, d_4^{17} 0.9046, n_D^{17} 1.4654; dinitrobenzoate 72–3°; acid phthalate, m. 71°; phenylurethan, m. 68°. The esterification of the *cis*-form is slower than that of the *trans*-isomer; hydrolysis with 0.1 *N* NaOH of the 2 acid phthalates at 39° gives K_{trans}/K_{cis} = 3.6 in H_2O, 2.5 in 75% alc. E. G.-F.

Oscillating, puckered, centroid model for the benzene ring. MAURICE L. HUGGINS. *J. Am. Chem. Soc.* **53**, 1182–3(1931).—Brief discussion. C. J. WEST

Directing influence of certain groups in the benzene nucleus. G. BARGELLINI. *Mem. accad. Italia* (*Classe sci. fis mat. E nat.*) **1**, Chem. No. 3, 15 pp.(1930).—In a preceding paper (*C. A.* **23**, 3910) the influence of OH, *O*-alkyl, NH_2 and acylamino groups in directing halogens entering the C_6H_6 nucleus were studied. In the present paper the effect of NH_2 groups when para to each other and blocked by alkyl or acyl groups is studied. Previous work has shown that when an OH group is blocked by an alkyl, and at the *p*-position an NH_2 is blocked by an acyl group, then the first halogen enters a position ortho to the alkoxy, but a 2nd halogen enters ortho to the acylamino group. *E. g.*, $MeOC_6H_4NHAc$ forms successively, acetyl-2-bromo- and then *acetyl-2,5-dibromoanisidine*, m. 195°. Its constitution was proved by oxidation which gives 2,5-dibromoquinone. The rule is then that *when a deriv. of p-aminophenol is halogenated, which has an O-alkyl group as well as NHAc, the first halogen enters ortho to the O-alkyl group and the second ortho to the NHAc group.* A. W. CONTIERI

Catalytic hydrogenation of organic compounds over copper chromite. HOMER ADKINS AND RALPH CONNOR. *J. Am. Chem. Soc.* **53**, 1091–5(1931).—Details are given for decomposing $CuNH_4$ chromate for the prepn. of Cu chromite, which is shown to be quite superior in many respects to any catalyst hitherto used. Numerous aldehydes and ketones may be quantitatively and rapidly hydrogenated to the corresponding alcs.; this holds true not only for aliphatic CO compds. but also for aromatic ones and for keto esters and a keto alc. A carbinol group adjacent to a benzenoid ring may be completely reduced. NO_2 groups may be quantitatively reduced to primary amines without the simultaneous formation of secondary amines. An alkene linkage in a

hydrocarbon as well as in an acid or ketone may be hydrogenated without otherwise modifying the org. compd. Pyridinoid rings and C to N double bonds, as in anils, may be readily hydrogenated. The furanoid ring in furyl alc. may be readily broken with the formation of 1,2- and 1,5-pentanediols in good yields. The new catalyst is not active toward cyanides or toward benzenoid nuclei. It is not nearly so sensitive as Ni to S- or halogen-contg. impurities in the compd. to be hydrogenated. Its lesser sensitivity toward deactivation probably accounts for the fact that it is much more active after it has begun to act than is Ni, despite the fact that Ni is active at lower temps. No special app. such as a reduction furnace is needed and the catalyst need not be freshly prepd. before use. The catalyst ready for use does not change on standing in contact with air or moisture. It is not rapidly deactivated during use. The rate of hydrogenation of Me_2CO over Cu chromite is very much more rapid at higher pressures. With an av. pressure of 35 atms. the hydrogenation of 1.73 mols. with 1 g. of catalyst has proceeded to the extent of only 17% in 30 min., while at a pressure of 148 atms. 60% of the Me_2CO was reduced and at 212 atms. the reaction was 95% complete in 30 min. At the end of 1 hr. the percentage of hydrogenation was 22, 92 and 100 for the 3 pressures given above. Zn chromite has also been used as a catalyst but it is much less active than the Cu compd. and has been found to catalyze condensation. C. J. WEST

Organic syntheses facilitated by pressure. GILBERT T. MORGAN. *Chemistry and Industry* **50**, 104–9(1931).—A review with many references to the patent literature of important syntheses facilitated by pressure was presented by the Herter Memorial Lecturer in which the following were discussed: aromatic amines from phenols and NH_3; alkylanilines from anilines and alcs.; alkali fusions of substituted naphthalenesulfonic acids; formation of hydrocarbons, alcs., aldehydes, ketones, etc., by pressure reactions in the gas phase from CO and H_2 with various catalysts; dehydration of alcs. to form ethers; gaseous polymerization of C_2H_4; hydrogenation in general; oxidation in general; CO_2 and phenols as in the Kolbe synthesis for salicylates; CO_2 and aromatic hydrocarbons in the presence of $AlCl_3$ to give benzoic acid, toluic acid, etc.; anilines and CO_2 to form CO_2H acids, ketones and urea derivs. In autoclaves pressures from 50 to 300 atms. may be developed without personal risk, providing the temps. are not excessive; above 360° care must be taken. It is best to assume that with every autoclave in const. use there will come a time when failure is to be expected. It is believed that a systematic study of high-pressure reactions will in many cases lead to discoveries whereby the use of pressure will be partially or entirely avoided as in the amination of naphthols where a more efficient catalyst has led to a reduction from 50 to 5 atms. Under conditions of high temp. and pressure the oxides of C may be hydrogenated catalytically to yield a complex mixt. of alcs., aldehydes, acids and esters; these results are somewhat comparable with the transformations of photosynthesis. The more complex products of vital activity are missing from high-pressure syntheses probably because at the high temp. also involved, these substances are incapable of existence; more efficaceous catalysts by causing a lowering in the temp. might make the synthesis of such natural products possible. N. A. LANGE

Transformation of aldehydes into higher molecular amines. A. SKITA AND G. PFEIL. *Ann.* **485**, 152–73(1931); cf. *C. A.* **21**, 2876.—Previous work has shown that $EtCH{:}NC_6H_{11}$(I) on reduction with Pt and H gives $PrCHMeCH_2NHC_6H_{11}$(II). The present study is an extension of this observation. Catalytic reduction of $MeCH{:}NC_6H_{11}$ at room temp. and with a pressure of 3 atm. of H is complete in 0.5 hr., giving 8% of the Et deriv. (*picrate*, m. 231°), and 38.7% of *N-butylcyclohexylamine*, b. 202–4° (HCl salt, m. 290°); the latter also results in 51.5% yield by reducing *N-(2-buten-1-al)cyclohexylamine*, b_{18} 90–1°. Reduction of I gives 49% of II; II also results from *N-(2-methyl-2-penten-1-al)cyclohexylamine*, b_{15} 118–9.5°, in 49% yields; using an equiv. amt. of EtCHO with I increases the yield of II to 76.4%; II *HCl salt*, m. 139°; *phenylurea*, m. 99°. *Butyralcyclohexylamine*, b_{16} 85–7°, is reduced in 5 hrs., giving 75% of *N-(2-ethylhexyl)cyclohexylamine*, b_{14} 140–4°; this also results in 56% yield by reducing *N-2-ethyl-2-hexen-1-al)cyclohexylamine*, b_{12} 139–43°; *HCl salt*, m. 95°, *picrolonate*, m. 225–6° (decompn.). Reduction of isovaleralcyclohexylamine gives 50% of the *N*-iso-Am deriv., b_{11} 89–93° (*HCl salt*, m. 279–80°) and 15% of *N-(2-isopropyl-5-methylhexyl)cyclohexylamine*, b_{11} 143–5° (*HCl salt*, m. 105°; *acid oxalate*, m. 193.5–4.5°); *N-(2-isopropyl-5-methyl-2-hexen-1-al)cyclohexylamine*, b_{16} 146–52°, gives 61.5% of the same amine. Isovaleralethylamine is reduced in 3 hrs., giving 20% of the iso-Am deriv., and 16.4% of *N-(2-isopropyl-5-methylhexyl)ethylamine*, b. 213–20° (*picrolonate*, m. 221–2° (decompn.)). *N-Heptylcyclohexylamine*, b_{16} 132–5° (*HCl salt*, m. 211–2°); *N-(2-amylnonyl)cyclohexylamine*, b_{17} 208–10° (42.3% yield); *HCl salt*, m. 90°; *acid oxalate*, m. 153°; *N-(2-amyl-2-nonen-1-al)cyclohexylamine*, b_{11} 208–11°; reduction gives 25.8% of the

amine. Reduction of hydrocinnamalcyclohexylamine gives 15% of the 3-phenylpropyl deriv. and about 16% of *N-(2-benzyl-5-phenylamyl)cyclohexylamine*, whose *HCl salt* m. 169–70° and *acid oxalate* m. 172°; this also results in 69% yield by reducing *N-(2-benzyl-5-phenyl-2-penten-1-al)cyclohexylamine*, b_{16} 265–70° (partial decompn.). Catalytic reduction of a mixt. of I and AcH in AcOH gives, in addn. to $C_6H_{11}NH_2$, its Et, Bu and 2-methylamyl derivs., 29.5% of *N-(2-methylbutyl)cyclohexylamine*, b_{14} 96–101° (*HCl salt*, m. 234°; *phenylurea*, m. 118°); this also results in 61% yield by reducing *N-(2-methyl-2-buten-1-al)cyclohexylamine*, b_{15} 100–5°. I and BzH give 11% of *N-(2-methyl-3-phenylpropyl)cyclohexylamine*, b_{14} 165–72° (*HCl salt*, m. 184°; *phenylurea*, m. 116°); this also results in 60.5% yield from *N-(2-methyl-3-phenyl-2-propen-1-al)-cyclohexylamine*, b_{14} 168–76°. I and furfural give 8 7% of *N-(2-methyl-3-furylpropenyl)-cyclohexylamine*, b_{15} 167–75° (*HCl salt*, m. 180°); 0.7% of its *dihydro deriv.*, b_{12} 156–61°; and 8% of the *tetrahydro deriv.*, b_{18} 143–50° (*acid oxalate*, m. 165°). The same compds. are obtained on reducing *N-(2-methyl-3-furyl-2-propen-1-al)cyclohexylamine*, b_{12} 158–62°, in 7.3, 1.8 and 10.75% yield, resp. *Furfuralcyclohexylamine*, b_{18} 131.5–5.5°; reduction gives the *N-furomethyl deriv.*, b_{16} 123–4°; *phenylurea*, m. 113°. Isobutyralcyclohexylamine and HCHO give 64.8% of *N-(2,2-dimethyl-3-hydroxypropyl)cyclohexylamine*, b_{12} 123–5°, m. 38°; *HCl salt*, m. 224°; *phenylurea*, m. 150°; *di-Ac deriv.*, b_{16} 198–9°. This also results in 37.8% yield by reducing *N-(2,2-dimethyl-3-propanol-1-al)cyclohexylamine*, b_{12} 108–10°. These results indicate that the reaction proceeds through the hydrolysis of the amine to the aldehyde, which then forms a Schiff's base with the amine and as such is reduced. Only in the case of I is practically complete hydrolysis observed. The reaction does not occur with aromatic aldehydes of the type of BzH but does with the fatty-aromatic aldehydes, such as $PhCH_2CH_2CO_2H$.

C. J. West

The manufacture of acetaldehyde. A. Ullrich. *Metallbörse* **21**, 315–6, 363–4, 413(1931).—A review of patents. E. H.

Removal of hydrogen halides from organic halides. C. R. Noller and R. Dinsmore. *J. Am. Chem. Soc.* **53**, 1185–6(1931).—N. and D. report that they have been investigating the reaction of org. halides with tert. amines (cf. Semb and McElvain, *C. A.* **25**, 1252, who report the action on sec. amines). The main reaction other than quaternary salt formation appears to be the removal of halogen acid, although rearrangement of the salt to alkylpyridine hydrohalides has not been excluded.

C. J. West

Fluosilicates of organic bases. II. C. A. Jacobson. *J. Am. Chem. Soc.* **53**, 1011–5(1931); cf. *C. A.* **23**, 117.—The *fluosilicates* of the following compds. were prepd. and the crystals photographed. *o-Tolidine*, m. 268–9°; *di-α-naphthylamine*, m. 218° (decompn.); *di-β-naphthylamine*, m. 236.3°; *di-m-nitroaniline*, m. 200°, *diphenylamine*, m. 169°; *m-phenylenediamine*, m. 243–4°; *p-phenylenediamine*, decomps. on heating; *diethylaniline*, m. 165.3°; *dinitrosodiphenylamine*, m. 124.5° (decompn.); *di-p-aminoazobenzene*, m. 220° (decompn.); *di-p-aminobenzoic acid*, m. 240 5°. The soly. in EtOH at 25° is given. C. J. West

Mechanism of chemical reactions. II. Mechanism of the synthesis of secondary and tertiary amines by reduction. Karl Kindler, W. Peschke and W. Dehn. *Ann.* **485**, 113–26(1931); cf. *C. A.* **17**, 2278.—$PhCH_2NH_2$ gives almost quant. $(PhCH_2)_2NH$ on reduction with Pd and H in 96% EtOH for 3 hrs. $PhCH_2CH_2NH_2$ (I), similarly treated, gives only 10% of the sec. amine. This reaction is assumed to proceed as follows: $RCH_2NH_2 \longrightarrow RCH{:}NH \longrightarrow RCH_2N{:}CHR \longrightarrow (RCH_2)_2NH$. A mixt. of I and $PhCH_2OH$ in $C_6H_4Me_2$, reduced as above for 3 hrs., gives a mixt. of 6% $(PhCH_2CH_2)_2NH$ but principally $PhCH_2CH_2NHCH_2Ph$ (II). Here it is assumed that the $PhCH_2OH$ is reduced to BzH, which then reacts to give $PhCH{:}NCH_2CH_2Ph$ (III), and this is reduced to II. III, prepd. from BzH and I, is nearly quant. reduced to III in 5 min. $PhCSNH_2$ (IV), on reduction with Al-Hg in moist Et_2O, gives 85% of $PhCH_2NH_2$ and 8% $(PhCH_2)_2NH$, while $PhCH_2CSNH_2$ (V) gives 26% of I and 66% $(PhCH_2CH_2)_2NH$. In 55, 90 and 145 min., resp., 84, 94 and 99% of IV and 35, 41 and 31% of V, resp., were reduced at 20° in moist Et_2O. Both primary and sec. amines result on reduction of $PhCH_2CH(OH)NH_2$ and $PhCH_2CH{:}NH$. Reduction of $PhCH_2CH(OH)NMe_2$ with Al-Hg gives $PhCH_2CH_2NMe_2$, b. 204–6°. In the reduction of $PhCH_2CN$ in AcOH-$AcONH_4$ with Pd and H, the Schiff base is an intermediate product and the final product contains about 60% of $(PhCH_2CH_2)_2NH$. The amt. of sec. amine formed is much larger in a neutral or alk. medium than in an acid medium. PhCN in AcOH is catalytically reduced at 35° and 2.5 atm. H in 20 min., giving 99% of primary amine (VI); in 96% EtOH, 70% is reduced after 180 min., giving 96% VI and 4% sec. amine; $PhCH_2CN$ is 95% reduced in AcOH after 420 min., giving 50% primary and 40% sec.

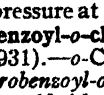
amine; in EtOH, 50% is reduced in 180 min., giving 17% primary and 68% of sec. amine. $PhCH_2CN$ and Pr_2NH, catalytically reduced in EtOH, give a mixt. of 24% of $(PhCH_2CH_2)_2NH$ and 60% of $Pr_2NCH_2CH_2Ph$. C. J. WEST

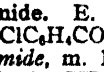
Derivatives of anesthesin. L. CONIGLIO. *Rend. accad. sci. Napoli* [3], **36**, 56–60 (1930).—New derivs. were prepd. by condensing anesthesin, p-$H_2NC_6H_4CO_2Et$ (I), with $Me_2CHCHBrCOCl$ (II), BzCl (III), phthalyl chloride (IV) and AcCl (V). The aim was to study the pharmacol. action of the derivs. in relation to the new radicals introduced into the mol. *N-α-Bromoisovaleryl deriv.* was prepd. from 0.60 g. I and 7.96 g. II; mixed in a separatory funnel with about 50 cc. of a 2% soln. of equal parts NaOH and KOH; the caseous white mass was filtered, washed repeatedly with H_2O and dried. The product was sol. in all org. solvents; a pure material, m. 115°, was obtained by dissolving in acetone and pptg. with petroleum ether. *N-Bz deriv.* from 6.60 g. I and 5.62 g. III, according to the Schotten-Baumann method, washed with H_2O and dried *in vacuo* over H_2SO_4, it crystallizes in white needles from alc., sol. in acetone, $CHCl_3$, AcOH and Et_2O, insol. in H_2O, m. 15°. *N-Phthalyl deriv.*, $C_6H_4(CO)_2NC_6H_4CO_2Et$, from 6.60 g. I and 7.12 g. IV in benzene and cooled; the white mass filtered, washed with H_2O and dried *in vacuo* over H_2SO_4, long needles from alc. crystallize out, sol. in warm AcOH and acetone, very sol. in cold $CHCl_3$, insol. in Et_2O and in H_2O, m. 152°. *N-Ac deriv.* from 6.60 g. I in 20 cc. benzene and 3.12 g. V warmed on the water bath and cooled, filtered, washed repeatedly with Et_2O and dried over $CaCl_2$, sol. in alc. from which it is pptd. with Et_2O, sol. in H_2O, acetone, AcOH, slightly sol. in $CHCl_3$, insol. in Et_2O and MeOH, m. 181°. The pharmacol. properties are being investigated. P. M.

***p*-Bromoanilides of isobutyric and isovaleric acids.** MARGUERITE KUEHN AND S. M. MCELVAIN. *J. Am. Chem. Soc.* **53**, 1173–4(1931).—The derivs. were prepd. from the acid chloride and p-$BrC_6H_4NH_2$; *p-bromoisobutyranilide*, m. 150–1°; *p-bromoisovaleranilide*, m. 128–9°. C. J. WEST

The organic sulfonic and sulfinic acids. JULIUS V. BRAUN AND KARL WEISSBACH. *Ber.* **63B**, 2836–47(1930).—In contrast to the large amount of work which has been done on the imidocarboxylyl chlorides, no attempts had ever been made to prep. the imidosulfinyl chlorides, RSCl:NR′, and the only expt. in the field of the SO_3H acids recorded in the literature indicated that the relations are materially different from those in the CO_2H acid series; PCl_5 reacts with $PhSO_2NHPh$ only after long heating and the $-SO_2NH-$ group is not attacked, only chlorination of the Ph nucleus taking place. $PhSO_2NHEt$ also reacts only at 100° and very slowly, forming (probably as the result of chlorination outside of the $-SO_2NH-$ group) a very difficultly separable oily mixt. boiling in a high vacuum within wide limits (100–70°). The hope that in the absence of aromatic residues the results would be more clear-cut was completely fulfilled. Expts. on monoalkylamides of $BuSO_3H$, iso-$AmSO_3H$ and cyclohexylsulfonic acid gave the following results: PCl_5 reacts with compds. like $BuSO_2NHEt$ considerably more sluggishly than with the amides of non-aromatic CO_2H acids but, without recourse to extreme conditions, gives compds. having the expected compn. $BuS(:O)Cl:NEt$ and whose properties were, at first, surprising; the compds. are stable to heat and can therefore be distd.; their Cl is strikingly unreactive; with H_2O and alc. they react only very slowly, with amines almost not at all. The action of an excess of PCl_5 results in a very slow chlorination of the C atom adjacent to the $-S(:O)Cl<$ group, but with still more Cl under more vigorous conditions the grouping $>C.S(:O)Cl:N-$ is finally converted into $>C.SCl_3:N-$, in which the 2 new Cl atoms (but only these) are as reactive as the Cl in the imidocarboxylyl chlorides; even cold H_2O converts the compds. back into the $>C.S(:O)Cl:N-$ derivs. It is believed that these properties are due to the "imidosulfonyl chlorides" really having a 3-membered ring structure (I) or, from the standpoint of the modern theory of semi-polar union, the structure II. It had been hoped that this might be confirmed by a detn. of the parachor, but the usual parachor consts. do not hold for this type of compds. and the values obtained differed widely from those calcd. If the peculiar behavior of the "imidosulfonyl chlorides" is due to the presence of O, the SO_2H derivs. should show no such anomaly, and as a matter of fact compds. like BuSONHEt react readily with PCl_5 to give HCl, $POCl_3$ and liquid chlorinated products reacting violently with H_2O and which cannot be distd. without decompn. even in a high vacuum. The prepn. of a no. of amides of non-aromatic sulfinic acids was used to study a question in this field which hitherto had been tested experimentally only with $PhSO_2H$, *viz.*, the dismutation of these acids ($2\,RSO_2H = RSO_2SR + RSO_3H + H_2O$). The distn. without decompn. of the $BuSO_3H$, iso-$AmSO_3H$ and cyclohexylsulfonic acid made it possible to follow the reaction quantitatively. While the mol. of RSO_2H which is oxidized at the expense of the other 2 mols. cannot be replaced by o- or p-$C_6H_4(OH)_2$ as O acceptor, it can be replaced by mercap-

tans: $2RSO_2H + HSR' = RSO_2SR + 2H_2O + R'_2S_2$. Sulfinic esters and sulfinyl chlorides, unlike the free acids, are relatively very stable but the conversion of the chlorides into thiosulfonic acids can be readily effected with Na mercaptides or, even more conveniently, with dithiocarbamates as O acceptors: $2R_2NCS_2H.NHR_2 + 2ClSOR = [R_2NC(:S)S]_2 + 2ClH.NHR_2 + R'SO_2SR'$. Sulfenyl chlorides react according to the equation $2R_2NCS_2H.NHR_2 + 2ClSR' = [R_2NC(:S)S]_2 + 2ClH.NHR_2 + R'_2S_2$. The $AlkSO_2H$ derivs. were prepd. by treating the alkyl bromides in Et_2O with Mg and SO_2 and converting the resulting acids into the chlorides with $SOCl_2$, the $AlkSO_3H$ derivs. by oxidizing the crude $(AlkSO_2)_2Mg$ with $KMnO_4$ and converting the $AlkSO_3H$ into the chlorides with PCl_5. The liquid $BuSO_2H$ no longer dissolves clear in H_2O after standing a short time at room temp.; at 100° (in N) the disproportionation is complete in about 1 hr. and the H_2O-insol. part $b_{0.2}$ 126–8° and has the compn. of *Bu butylthiosulfonate*, while the strongly acid, H_2O-sol. part is *butylsulfonic acid*, $b_{0.2}$ 145°. *Butylsulfinyl chloride*, light yellow, $b_{0.1}$ 38°, b_{12} 78°, fumes in moist air, is energetically hydrolyzed by H_2O, is stable in the absence of O, even on heating, but in dry air slowly changes into $BuSO_2Cl$. The *Et ester*, b_{12} 85°, and *ethylamide*, b_{10} 108–10°, show the same oxidizability and non-dismutation. *iso-Am isoamylthiosulfonate*, b_{12} 176–80°. *Isoamylsulfonic acid*, $b_{0.2}$ 176–8°. Isoamylsulfinyl chloride, $b_{0.1}$ 60–2°, b_{12} 91–2°. *iso-Am ester*, b_{12} 98°, remains unchanged at 100° in N. *Ethylamide*, b. 120° in a high vacuum. *Cyclohexylsulfinic acid*, yellowish oil solidifying on strong cooling to crystals, m. 33–5°, and having approx. the compn. of a *monohydrate*. *Cyclohexyl cyclohexylthiosulfonate*, faintly yellow, $b_{0.1}$ 184–6°. Cyclohexylsulfonic acid, $b_{0.1}$ 178–80°, readily absorbs H_2O to form a monohydrate, m. 92°, the m. p. given by Borsche and Lange for the acid. *Butylsulfonethylamide*, $b_{0.1}$ 120–2°. *Ethylimidobutylsulfonyl chloride*, $b_{0.2}$ 124–6°. *Isoamylsulfonethylamide*, faintly yellow oil; *imido chloride*, $b_{0.2}$ 128–30° (with 2 mols. PCl_5 is obtained a *di-Cl compd.*, $b_{0.5}$ 128–30°, which is as resistant to hydrolysis as the mono-Cl compd. and probably has the structure $C_4H_9CHClSCl.O.NEt$). *Cyclohexylsulfonethylamide*, b_{18} 183–5°, m. 72°; *imido chloride*, $b_{0.7}$ 131–2°, m. 73–4°. With 4 mols. PCl_5 is obtained a brownish oily *compd.* $C_8H_{15}NCl_4S$, b_1 140–50°, quickly converted by cold H_2O into a *compd* $C_8H_{15}ONCl_2S$, m. 156°, in which both Cl atoms are very firmly held. *Cyclohexylsulfonpropylamide*, m. 78°, reacts so slowly with PCl_5 that even after 2.5 hrs. at 100° with 2 mols. PCl_5 it gives only 60% of a mono-Cl compd. $b_{0.1}$ 145–60°; the *heptylamide*, $C_8H_{11}SO_2NHC_7H_{15}$, m. 72°, behaves in the same way. *p*-$O_2NC_6H_4SCl$, $b_{0.1}$ 125°, with piperidine piperidyldithiocarbamate in Et_2O yields 1 mol. piperidine-HCl and a mixt. of $(p\text{-}O_2NC_6H_4)_2S_2$ and piperidylthiuram disulfide which could not be sepd. anywhere nearly quantitatively but distn. in a high vacuum gave a product sepd. by crystn. from alc. into the $(O_2NC_6H_4)_2S_2$ and dipiperidylthiourea.


(I)


(II)

C. A. R.

Separation and synthetic preparation of phenol. TADASHI MIZOSHITA. *Abstracts from Rept. Central Lab. S. Manchuria Railway Co.* 1929, 36.—High-temp. coal tar yields only 0.1897% PhOH and 0.569% cresols. 1 PhCl + $2Na_2CO_3$ gives 84% PhOH by heating under pressure at 320° for 2 hrs. with Cu as the catalyst. V. F. HARRINGTON

***N*-*o*-Chlorobenzoyl-*o*-chlorobenzenesulfonamide.** E. WERTHEIM. *J. Am. Chem. Soc.* **53**, 1172–3(1931).—*o*-$ClC_6H_4SO_2NH_2$ and *o*-ClC_6H_4COCl, heated at 180–90° for 1 hr., give *N-o-chlorobenzoyl-o-chlorobenzenesulfonamide*, m. 154–5°. Attempts to prep. from this diphenic sulfinide failed; Cu and NaI in AmOH gave an impure compd., m. 255–8°, with 8.67% S, which had a bitter taste. C. J. WEST

Methylation of alcoholic hydroxyl from the standpoint of the electron theory. JULIUS V. BRAUN, ERNST ANTON AND KARL WEISSBACH. *Ber.* **63B**, 2847–61(1930).—The old valence doctrine does not serve to explain why the proximity of a Ph nucleus or a double bond to the HO group in such compds. as $PhCH_2OH$, $PhCH{:}CHCH_2OH$, dioxindoles, morphine, codeine and the 2 methylmorphimethins makes the HO group so easy to methylate, as compared with the alcs., with Me_2SO_4 and alkali, but the electron theory offers a plausible explanation. The pair of electrons in a homeopolar combination XY is shifted nearer to the one or the other of the partners in the union, depending on the chem. nature of X and Y and on the near and, to some extent also, the more distant surroundings. The Ph nucleus and the double bond, which

exert an attraction on electrons, must produce in a compd. Ph.C....C.O.H or —CH:CH.C....C.O.H a shifting of the electrons toward the left, imparting to the end H atom a weak positive charge and making it more reactive. If this basic assumption is correct, it follows that (1) the inductive or attractive influence of a Ph nucleus or a double bond must diminish greatly with the distance from the HO group; (2) an influence as strong as, or stronger than, that of a Ph nucleus or C:C bond must be exerted by every dipole with its + side turned toward the HO group (*e. g.*, the groups $\bar{O}{=}\overset{+}{C}<$, $\bar{N}{:}\overset{+}{C}-$, etc.); (3) the effect must be most pronounced when in the chain contg. the HO group there is an element having the character of a positively charged ion (*e. g.*, $\bar{A}c.\overset{+}{N}\,C.....C.O.H$). The behavior of the morphine alkaloids mentioned above suggested that it is not the aromatic nuclei or the double bonds which activate the H of the HO group but that under the influence of the Me_2SO_4 the N is converted into a quaternary form and it is the NH_4 ion which acts on the HO group. To test these views a long series of comparative expts was made; the values given below represent the % yield of Me ether obtained from the different HO compds. under identical conditions: $PhCH_2OH$ (I), 64; $PhCH_2CH_2OH$ (II), 19; $Ph(CH_2)_3OH$ (III), 5; $Ph(CH_2)_5OH$ (IV), 0; $PhCMe_2OH$ (V), 0; $PhCH{:}CHCH_2OH$ (VI), 53; O.CH:CH.CH:C-CH_2OH (VII), 70; $CH_2{:}CHCH_2OH$ (VIII), >20; PrOH (IX), 0; AmOH (X), 0; $C_7H_{15}OH$ (XI), 0; $C_5H_{10}N(CH_2)_2OH$ (XII), 100; $Me_2N(CH_2)_3OH$ (XIII), 100; $PhNMe(CH_2)_3OH$ (XIV), almost 100; $C_5H_{10}N(CH_2)_4OH$ (XV), about 50; $C_5H_{10}N(CH_2)_5OH$ (XVI), 0; $Me_2N(CH_2)_5OH$ (XVII), 0; 2-dimethylamino-3-hydroxytetralin (XVIII), 100; 2-β-hydroxyethylpiperidine (XIX), 100; dihydrocodeine (XX), almost 100; 5,2-$Me(Me_2N)C_6H_2CH_2OH$ (XXI), 60; tropine (XXII), 0; $Me_2NCMe_2CH(OH)Me$ (XXIII), 0; $PhSO_2NMe(CH_2)_3OH$ (XXIV), 0; $NC(CH_2)_2OH$ (XXV), >50; $EtSO_2CH_2CH_2OH$ (XXVI), 100; $Me_2SiCH_2CH_2OH$ (XXVII), 50; $Me_2SiCH_2CH_2CH_2OH$ (XXVIII), ?; $MeCH(OH)CO_2H$ (XXIX), 15?; $PhCH(OH)CO_2H$ (XXX), 70; $PhCH(CH_2OH)CO_2H$ (XXXI), 40; phthalide (XXXII), 40; phenylparaconic acid (XXXIII), 40. Comparison of compds. I–IV shows how rapidly the influence of the Ph on the HO group decreases with the distance between them. This is also true of the 2 unsatd. alcs. tested (VI, VIII). Satd. aliphatic alcs. are resistant toward Me_2SO_4 and alkali (IX, X and XI). The furan ring is similar to the C_6H_6 ring (VII). CN and the more strongly dipolar SO_2 have as great or a greater effect than the aromatic nucleus of the C:C bond (XXV, XXVI). In compds. with basic N together with HO, the effect is greater than in aliphatic-aromatic alcs. (XII compared with II, XIII and XIV with III). The influence of N is still strong on a δ-HO (XV) but is no longer shown on ε-HO groups (XVI, XVII). That the influence of the N is due to its forming a quaternary salt is indicated by the behavior of XXI and XXIV; its greater influence, as compared with that of the Ph nucleus or C:C bond, is shown by the fact that XX is methylated to about the same extent as codeine. The non-methylation of XXII is thought to be due to the branching of the chain between the N and the HO; the base XXIII and the carbinol V behave similarly. That it is not the secondary nature of the HO or the position of the N in the ring that prevents the methylation of XXII is shown by the behavior of the alkamines XVIII and XIX. The electron attraction should be weakened by increasing the vol. of the ionized atom $X.\overset{+}{C}....C.O.H$; to test this point, the sulfonium compds. XXVII and XXVIII were studied but no clear picture of the methylation of XXVIII could be obtained; XXVII, however, acted as had been expected. Of the simple aliphatic HO acids, only XXIX gave results which were at all definite; they indicated that the influence of the C.O is not inordinately great, as also indicated by comparison of XXX with I and of XXXI with II. In the reaction between Me_2SO_4 and an activated HO group it may be assumed that as the result of an attraction of the positively charged S by the weakly negatively charged O in the OH group there is formed an intermediate addn. product $\begin{matrix}R\\H\end{matrix}\!\!>\!O....SO_2(OMe)_2$ which then in some way undergoes further reaction. The extraordinary ease with which alkamines and HO acids are methylated is of practical interest for purposes of prepn. and in questions of structure. The HO bases prepd. from compds. of the type ArCH:CH— by addn. of Br, boiling with H_2O and treatment with amines are formed through an oxide

ArCH.CH.O which may give either ArCH(NHR)CH(OH)— or ArCH(OH)CH(NHR)–.

No means of distinguishing between these two possibilities was hitherto available, but methylation will give an ether which must be identical with or different from the compd. ArCH(OMe)CH(NMe$_2$I)— obtained by treating ArCHBrCHBr— with MeOH, then with NH$_2$Me and methylating exhaustively. By this means it was found that the hydroxymethylamino *base* (**XXXIV**) obtained by Mannich from isosafrole really has the structure $CH_2O_2C_6H_3CH(NHMe)CH(OH)Me$ which he assigned to it without any real proof. The methylations were carried out under as nearly identical conditions as possible; the substance dissolved or suspended in 10 parts H_2O at 5° was treated with 6 mols. Me_2SO_4 and 14 mols. 10% NaOH, shaken 5 min. and allowed to stand (the temp. rose to 50–5°) 15 min. The methiodide of **XII** forms a red *chloroplatinate*, m. 228°, and a *chloroaurate*, m. 243°; the methiodide of the Me ether gives an orange *chloroplatinate*, m. 234° (decompn.), and a *chloroaurate*, m. 108°. *Methiodide* of the Me ether of **XIII**, m. 221°; *chloroplatinate*, decomps. 235°. *Methiodide* of **XIV**, m. 132°; *Me ether*, m. 119–21°. *Methiodide* of **XV** Me ether, semi-oily. **XVIII**, m. 31°; *Me ether methiodide*, m. 223°; *methochloride*, m. 230°; *chloroplatinate*, light orange, m. 229°. **XXIX** with Me_2SO_4 forms a quaternary salt which cannot be pptd. out; the compn. of the *chloroplatinate*, $C_{20}H_{44}O_2N_2Cl_6Pt$, m. 212°, shows that both the HO and NH groups are methylated; with MeI is obtained a *methiodide*, decomps. 235°, the compn. of whose *chloroplatinate*, $C_{18}H_{40}O_2N_2Cl_6Pt$, yellow, m. 204°, shows that the HO group has remained intact. *Me ether* of **XXI**, b_{12} 120–5°; *picrate*, m. 155°; *chloroplatinate*, m. 172°; *methiodide*, m. 115° (effervescence) (the corresponding derivs. of **XXI** m. 157°, 180°, 147°, resp.). *Methiodide* of **XXIII**, m. 172° (foaming). **XXIV**, from $PhSO_2NNaMe$ and $Cl(CH_2)_3OH$ on the H_2O bath, $b_{1.5}$ 194°, $b_{0.3}$ 167°. Ephedrine with Me_2SO_4 readily yields the quaternary salt of the *Me ether;* the corresponding *iodide*, $C_{13}H_{22}ONI$, m. 190°, smoothly loses MeI when heated *in vacuo*, yielding the *Me ether*, b_{16} 116°; *picrate*, m. 166–8°. α-Methoxy-β-bromodihydrosafrole (**XXXV**), obtained from isosafrole dibromide (**XXXVI**) with MeOH, and which certainly has the MeO group on the α-C atom, gives with Me_2SO_4 and then KI an unusually hygroscopic quaternary *iodide* (**XXXVII**), yielding a *chloroplatinate*, m. 216°, while the hydroxybromoisosafrole from **XXXVI** and H_2O yields, together with a little **XXXVII**, chiefly the non-hygroscopic *methiodide*, m. 190°, of **XXXIV**; *chloroplatinate*, m. 198°. *β-Hydroxydiethyl sulfone* (**XXVI**), from $EtSO_2Na$ and $ClCH_2CH_2OH$ in alc. on the H_2O bath, b_{12} 193–5°, m. 46°; *Me ether*, b_{12} 142–4°. *Dimethyl-β-hydroxyethylsulfonium iodide* (**XXVII**), from $MeSCH_2CH_2OH$ and MeI, m. 60–2°, absorbs moisture from the air (*chloroplatinate*, red-brown, m. 80–1°). *γ-Hydroxypropyl homolog* (**XXVIII**), m. 52–5° (*chloroplatinate*, orange, m. 115°). **XXIX** with Me_2SO_4 gave a small quantity (1.5 g. from 10 g. **XXIX**) of a compd., b_{12} 95–6°, having the compn. of the *Me ether* of **XXIX**. The Me ether of **XXX**, m. 71°, $b_{0.4}$ 121–2°. *Me ether* of **XXXI**, $b_{0.3}$ 134–6°, m. 62°; *chloride*, $b_{0.5}$ 88°, reacts readily with C_6H_6 and $AlCl_3$ to give the *ketone* $PhCH(CH_2OMe)COPh$, yellowish, $b_{0.2}$ 139–41°, converted by concd. HCl into the *ketone* $PhCH(CH_2Cl)COPh$, light yellow, $b_{0.5}$ 139–40° with some loss of HCl. **XXXII** gives the *acid* $o\text{-}HO_2CC_6H_4CH_2OMe$, m. 93–4°, $b_{0.5}$ 121–5°, does not form a chloride with $SOCl_2$ but loses MeCl with regeneration of **XXXII**. **XXXIII** gives a *compd.* $b_{0.5}$ about 155°, m. 95–6°, having the compn. of (*α-methoxybenzyl*)-*succinic anhydride*, and giving the *acid* m. 140°, when pptd. from Na_2CO_3 with acids.

C. A. R.

Derivatives of chloroacetylated phenols and phenol-alcohols. A. LAKNER. *Magyar Chem. Folyoirat* **35**, 151–5(1929).—ICH_2CO derivs. of di-HO derivs. of C_6H_6, like $ClCH_2CO$ derivs., are hydrolyzed by NH_3. With $AgNO_2$ halogenoacetylphenols react vigorously at 96°, affording dinitro derivs. and Ag halogenoacetate; AgCN behaves analogously. The following are described: *chloroacetates* of *pyrocatechol*, m. 56°, b_{10} 185–6°; *resorcinol*, m. 76°, b_5 191–2°; *quinol*, m. 126°; *iodoacetates*, m. 48–9°, 59–60°, 112–3°, resp. Quinol chloroacetate forms with $PhNMe_2$ an equimol. *compd.*, m. 152–3°, decomp. 156–7°. *Phenylethyl aminoacetate*, m. 115°; *phenylpropyl aminoacetate*, m. 105°.

B. C. A.

Propargyl ethers of phenol. CHARLES D. HURD AND FRANK L. COHEN. *J. Am Chem. Soc.* **53**, 1068–77(1931).—PhC:CBz (I) was obtained from PhC:CCOCl and EtOH, giving the Et ester and reacting this with PhMgBr. The yield of the ester is 65% and of the ketone 85%; the ketone b_{15} 200–2° and m. 53–5°. $PhC:CCPh_2OH$ results in 65–70% yield from BzPh and PhC:CNa. MeC:CH and EtMgBr give a Grignard reagent which reacts with Me_2CO to give 47% of *2-methyl-3-pentin-2-ol* (*trimethyl propargyl alc.*) (II), b_{16} 75–7°, n^{20}_D 1.4193; a by-product is *2-methyl-1-penten-3-ine*,

CH_2:CMeC:CMe (III), b. 75–7°, n_D^{20} 1.4002. 1-Phenylethinylcyclohexan-1-ol, b_1 166–9°, m. 58–60°. PhC:CNa and *p*-$Me_2NC_6H_4Bz$ give 50% of *α,γ-diphenyl-α-p-dimethylaminophenylpropargyl alc.*, m. 144–5°. II gives a *chloride*, light yellow, b_{47} 57–61°, n_D^{20} 1.4143 (33% yield). *γ-Methylpropargyl chloride* (*1-chloro-2-butine*), light yellow, b. 81–4° (44% yield). *Triphenylpropargyl Ph ether* (IV), from the chloride and PhONa in 70% yield, m. 90–90.5°; *trimethylpropargyl Ph ether* (V), viscous yellow oil, n_D^{20} 1.3408; *γ-methylpropargyl Ph ether* (VI), b_{25} 123–6°, n_D^{20} 1.3894 (57% yield). IV, heated slowly and uniformly to 310°, gives PhOH and *9-phenylethinylfluorene*, yellow, m. 98–100°; this was also prepd. from 9-chlorofluorene and PhC:CNa. Both V and II decomp. on heating into PhOH and III. When refluxed, VI changed primarily into a tar, the apparent mol. wt. of which was 400. No simple allenes were found although they may have been the precursors of the tars. C. J. West

Bromine derivatives of certain mixed ethers and some of their reactions. L. Chas. Raiford and Louis H. Howland. *J. Am. Chem. Soc.* 53, 1051–7(1931).—*Pentabromophenyl alkyl ethers: iso-Pr*, m. 86° (nearly quant. yield); *Bu*, m. 79–80° (quant. yield); *iso-Bu*, m. 92–3° (45% yield); *sec-Bu*, m. 57–8° (25% yield); *iso-Am*, m. 64–5° (quant. yield); no reaction was obtained with *tert*-Bu or *α*-Am halides. Four methods were studied for splitting the ethers: (1) glacial AcOH soln. of ether and PBr_3 to which the calcd. amt. of H_2O was gradually added was heated under a reflux; (2) the mixt. in (1) was heated in a sealed tube at 135–50° for 12–15 hrs.; (3) Br was dropped into a C_6H_6 soln. of the ether contg. I as a catalyst; (4) the ether, excess Br and about 1% Al as $AlBr_3$ reacted at room temp. for 2 days. Of the tri-Br derivs. of the Ph alkyl ethers, only iso-Pr and *sec*-Bu were completely split by (1); these were also split by (3) (others not studied); Me, Et, Pr, iso-Bu and iso-Am were completely split by (2) but showed no reaction with (1). Of the penta-Br derivs., iso-Pr and *sec*-Bu were completely split by (1); Me, Et, Pr, Bu, iso-Bu and iso-Am were completely split by (2); Me, Et and iso-Pr showed no reaction with (3); the following % of Br_5COH were obtained in (4): Me 80; Et 40; Pr 40; iso-Pr 60; Bu 30; iso-Bu 20; *sec*-Bu 70; iso-Am 30. *2,4-Dichlorophenyl allyl ether* (I), b_{25} 144–5°; *3,5-di-Br deriv.* (II), b_{10} 145°; *2,6-di-Br deriv.* (III), b_{10} 132–3°; *penta-Br deriv.* (IV), m. 167–8°. I and Br in $CHCl_3$ at 0° give the *β,γ-di-Br deriv.*, b_{10} 188° (95% yield); II gives the *2,3,4,5-tetra-Br β,γ-di-Br deriv.*, m. 123–4° (97%); III gives the *β,γ-di-Br deriv.*, m 48–9°, as does IV, m. 122–3° (96 and 94%, resp.). Alc. KOH transforms these into derivs. of *Ph propargyl ethers: 2,4-di-Cl*, liquid, decomps. on distn. *in vacuo*; *2,4-di-Br*, m. 65°; *2,6-di-Br*, m. 58–60°; *2,4,6-tri-Br*, m. 136–7°; the yields are 97–9%. The *Ag salts* (with 1 mol. $AgNO_3$) of these ethers were prepd., as well as the *Cu* and *Hg salts* of the 2,4-di-Br and 2,4,6-tri-Br derivs. The HBr evolved in the bromination of Ph alkyl ethers may split them unless AcONa is present. The splitting is most complete when the alkyl group is connected through a sec. or tert. C atom. Ph allyl ethers contg. 2 or more Br atoms in the nucleus could not be rearranged by heat. C. J. West

Effect of substituents on certain physical properties of benzene picrate. O. L. Baril and E. S. Hauber. *J. Am. Chem. Soc.* 53, 1087–91(1931).—The addn. of HO groups to benzene picrate (I) lowers the m. p. and deepens the color of the picrate formed; the addn. of Me groups to I raises the m. p. of the product and deepens the color of the picrate less than the HO group. The addn. of Me groups to a side chain of I gradually increases the m. p. and deepens the color of the picrate; this increase is more rapid than when a corresponding no. of Me groups are substituted in the ring. The sym. tri-HO and tri-Me derivs. of I are the darkest and the color of the picrates become lighter as we approach the 1,2,3-derivs. The same deepening of color was obtained with the Me derivs. of $C_{10}H_8$. Unsatn. in the side chain yields a very unstable picrate. In the following list of *picrates* the color and m. p. are given: C_6H_6, 83.9°; PhMe, light yellow, 88.2°; PhEt, light yellow, 96.6°; PhPr, yellow, 103.5°; *o-*, *m-*, and *p*-$C_6H_4Me_2$, lemon-yellow, 88.5, 90–1.5° and 90.5, resp.; 1,2,3-$C_6H_3Me_3$, yellow, 89.5°; 1,2,4-$C_6H_3Me_3$, yellow, 96–7°; 1,3,5-$C_6H_3Me_3$, bright yellow, 96.6°; 1,2,3,4-$C_6H_2Me_4$, golden yellow, 92–5°; C_6HMe_5, golden yellow, 131°; C_6Me_6, orange-yellow, 170°; all except the last 3 of these are unstable, decompg. in the air. PhOH, yellow, m. 83.1°; *o-*, *m-* and *p*-$C_6H_4(OH)_2$, orange-yellow (*o-* and *m-*) and light yellow, m. 122°, 89–90° and 115–7°, resp.; 1,2,3-$C_6H_3(OH)_3$, lemon-yellow, 128–9°; 1,2,4-$C_6H_3(OH)_3$, orange-red, 96°; 1,3,5-$C_6H_3(OH)_3$, brown, 101–3°; *o-*, *m-* and *p*-MeC_6H_4OH, orange-yellow, yellow and bright red, m. 88°, 61.6° and 64–5°, resp.; orcinol, orange-yellow, 92°; 1,2,4-, 1,3,2- and 1,4,2-$Me_2C_6H_3OH$, chrome-yellow, orange-yellow and orange, m. 83.8°, 50–3° and 81–2°, resp. $C_{10}H_8$, yellow, 149°; *α-* and *β-*Me derivs., lemon-yellow, 140–1° and 115–6°, resp.; *α-* and *β-*Et derivs., lemon-yellow and yellow, m. 97.4 and 69–70°, resp.; *α-* and

β-Pr derivs., yellow, m. 140–1° and 89–90°, resp.; α- and β-Bu derivs., orange-yellow, m. 104–5° and 71–3°, resp.; 1,4- and 2,6-di-Me derivs., orange-yellow, m. 139–40° and 141–2°, resp.; 1,2,6-tri-Me deriv., orange-yellow, m. 121–2°; α- and β-$C_{10}H_7OH$, orange-yellow, m. 188.5° and 155.5°, resp.; anthracene, ruby-red, m. 138°; hexa-Me deriv., dark brown, m. 203°; phenanthrene, orange-yellow, m. 132.8°; acenaphthene, orange-red, m. 160.5°; stilbene, red, m. 90–1°; fluorene, red-brown, m. 77°; pyrene, red, m. 220°. C. J. West

Phenyl ethers. Manfred Oesterlin. *Monatsh.* **57**, 31–44(1931).—PhONa and *p*-BrC_6H_4OMe with Cu at 200–10° for 4 hrs. give *p-methoxydiphenyl ether*, b_{14} 163–5°; $AlCl_3$ in C_6H_6 splits off the Me group, giving the *p-HO deriv.* (I), m. 84°; bromination (KBr and $KBrO_3$ with concd. H_2SO_4 in CS_2) gives 82% of the *p'-Br deriv.* (II), m. 85°. I in KOH and *p*-BrC_6H_4OMe with Cu at 210° for 4 hrs. give *p-methoxy-p'-phenoxydiphenyl ether*, m. 82°; $AlCl_3$ gives the *p-HO deriv.*, m. 87°. *p*-$MeOC_6H_4OH$ and *p*-BrC_6H_4-OMe with Cu and 80% KOH give 65% of *p,p'-dimethoxydiphenyl ether*, m. 102°; the *di-HO deriv.*, m. 160°. *p*-$MeOC_6H_4OH$ and *p*-$C_6H_4Br_2$ with KOH and Cu at 200–10° for 5 hrs. give *di(p-methoxyphenyl) hydroquinone ether* (*p*-$MeOC_6H_4O)_2C_6H_4$; this also results from II and *p*-$MeOC_6H_4OH$ with Cu and KOH at 210° for 4 hrs. The *di-p-HO deriv.*, m. 188°. *p*-$MeOC_6H_4OH$ and (*p* $BrC_6H_4)_2O$ give *p-di(methoxyphenyl)dioxydiphenyl ether*, $(MeOC_6H_4OC_6H_4)_2O$, m. 164°. *p*-$O_2NC_6H_4OPh$, m. 61°; NH_2 deriv., m. 84°; Ac deriv., m. 131°; nitration gives *p-acetylamino-m-nitrodiphenyl ether*, yellow, m. 104°; reduction gives the *m-NH_2 deriv.*, m. 124°; di-NH_2 deriv., m. 66°. *p-Amino-m-nitrodiphenyl ether*, red-orange, m. 47–8°, then solidifies and m. 81°; the reduction product is the di-NH_2 deriv., m. 66°; HCl salt, m. 216°; 3,3-dinitrobenzil gives *?,?-di-(p-nitrophenyl)-6-phenoxyquinoxaline*, light yellow, m. 195–6°. *p*-$ClC_6H_4NO_2$ and *p*-HOC_6H_4OPh with Cu and KOH at 150° for 5 hrs. give *p-phenoxy-p'-nitrodiphenyl ether*, yellow, m. 94°; *p-NH_2 deriv.*, m. 84°; *Ac deriv.*, m. 148°; nitration gives *p-phenoxy p'-acetamido-m'-nitrodiphenyl ether*, m. 124°; sapon. and reduction give *p-phenoxy m',p'-diaminodiphenyl ether*, m. 95°. *p*-$MeOC_6H_4OH$ and *p*-$ClC_6H_4NO_2$ give *p-methoxy-p'-nitrophenyl ether*, yellow, m. 111–2°; *p'-NH_2 deriv.*, m. 81–2°; *HCl salt*, m. 212°; *sulfate*, m. 220°; *Ac deriv.*, m. 131°; nitration gives the *m'-nitro deriv.*, m. 106°; *p-methoxy-m'-nitro-p'-aminodiphenyl ether*, m. 76–7°; *m',p'-di-NH_2 deriv.*, m. 105°. *p-Di-(nitrophenyl)dioxydiphenyl ether*, m. 136°; *di-NH_2 deriv.*, m. 109°; *di-Ac deriv.*, m. 265–6°. C. J. West

Diphenyl ether series. II. Preparation and structure of some sulfonic acids and related derivatives. C. M. Suter. *J. Am. Chem. Soc.* **53**, 1112–6(1931); cf *C. A.* **23**, 4460.—Bromination of Ba phenoxybenzene-4,4'-disulfonate and treatment of the ppt. with Na_2CO_3 soln. gives 57% of the *Na 4-bromophenoxybenzene-4'-sulfonate, p-toluidine salt*, m. 245–7°. Further bromination of the Na salt gives 84% of (4-$BrC_6H_4)_2O$. Ph_2O and Ac_2O, shaken with 95% H_2SO_4 and heated 1 hr. on the H_2O bath, give 93% of the mono-SO_3H acid (cf. Quilico, *C. A.* **22**, 1765); *p-toluidine salt*, m. 221–2°; bromination of the Na salt gives (4-$BrC_6H_4)_2O$; fusion of the Na salt with NaOH gives little or no 4-HOC_6H_4OPh. With PCl_5, heating 10 hrs. at 170–80° gives 54% of *4-phenoxybenzenesulfonyl chloride*, b_{12} 205.7°, m. 45.6°; amide, m. 128.9°; *anilide*, m. 86–8°. 4-BrC_6H_4OPh and 95% H_2SO_4 give a mono-sulfonate; $ClSO_3H$ gives *4-bromophenoxybenzene-4'-sulfonyl chloride*, m. 81.2°, also obtained in 91% yield by bromination of 4-$PhOC_6H_4SO_2Cl$; *amide*, m. 131.2°; *anilide*, m. 108–9°. *Phenoxybenzene-4,4'-disulfonyl chloride*, m. 128–9°; *diamide*, m. 158.6°. Reduction of the sulfonyl chloride with Na_2SO_3 and Na_2CO_3 gives *4-phenoxybenzenesulfinic acid*, m. 100.1°, which drops to 91–3° in 48 hrs. Reduction of the chloride with Zn and H_2SO_4 gives 60% of *4-thioldiphenyl ether*, b_{20} 178–80°, m. 21–2°; oxidation of the Na salt with air or with I in EtOH gives the disulfide, m. 47–8°. C. J. West

3,5-Dimethoxyaniline. Reinhard Seka and Walter Fuchs. *Monatsh.* **57**, 63–70(1931).—3,5-$(MeO)_2C_6H_3CO_2Me$ (I), m. 43°, and liquid NH_3 in a bomb tube at room temp. for 4 weeks give 92% of the *amide*, m. 148–9°, which may also be prepd from the acid chloride and NH_3; the Hoffmann degradation gives about 52% of *3,5-dimethoxyaniline*, b_{12} 177°, m. 46°; *HCl salt*, m. 210°; *chloroplatinate*, golden yellow, decomps. 223°; *picrate*, yellow, decomps. 167–70°; *Bz deriv.*, m. 139°; *anisoyl deriv.*, m. 119–20°. I and $N_2H_4 \cdot H_2O$, boiled 8 hrs., give 50% of the *hydrazide*, m. 168.5° (*HCl salt*, m., 210°); the azide, m. 50–1°, decomps. about 70° and with H_2SO_4 gives $(MeO)_2$-$C_6H_3CO_2H$; *urethan*, m. 43.5°. C. J. West

The behavior of *p*-acetophenetide toward chlorine and bromine. E. Burěš and J. Kovařovičová. *Časopis Českoslov. Lékárnictva* **10**, 197–202, 233–9(1930).—Chlorination of *p*-acetophenetide (I) in glacial AcOH at ordinary temp. and pressure gave 2,3,5,6-tetrachloro-*p*-acetophenetide (II), m. 226°, while bromination of I resulted in 3,5-di

bromo-*p*-acetophenetide (III), m. 175°. The entrance of the halogens caused an increase in stability, and a decrease in basicity and in ease of replacement of NH_2. Sapon. of II gave 2,3,5,6-tetrachloro-*p*-phenetide, m. 96°, from which the following *ethoxybenzenes* were prepd.: 2,3,5,6-tetrachloro, m. 56°; 2,3,4,5,6-penta-Cl, m. 75°; 2,3,5,6-tetrachloro-4-bromo, m. 81°; 2,3,5,6-tetrachloro-4-iodo, m. 79°; and 2,3,5,6-tetrachloro-*p*-quinone. Sapon. of III yielded 3,5-dibromo-*p*-phenetide (IV), m. 54°, the constitution of which was detd. by conversion to 3,5-dibromophenetole (V), b. 267°. Attempts to replace the NH_2 group in IV by OH or CN were unsuccessful, but the following *3,5-dibromoethoxybenzenes* were prepd.: Me_2N, m. 84°; BzNH, m. 159°; EtNH, m. 91°; Ac_2N, m. 108°; 4-Br m. 72°; 4-I, m. 99°; 4-Cl, m. 42–4°; and the picrate of IV, m. 145°. Nitration of III yielded 3-bromo-5-nitro-*p*-phenetide, m. 108°. Nitration of V gave 3,5-dibromo-1-ethoxy-4-nitrobenzene, m. 128°, which on reduction yielded IV. 3,4,5-Tribromo-1-ethoxy-2-nitrobenzene, m. 52–3°, was prepd. WILLIAM J. HUSA

Dehydration with potassium hydroxide of the ethylol group adjoining the benzene nucleus. III. Dehydration of the α,α′-alkylarylethanols. SEBASTIEN SABETAY. *Bull. soc. chim.* [4], **47**, 614–20(1930); cf. *C. A.* **24**, 1099.—In the distn. of alcs. of the phenylethyl alc. type over anhyd. KOH the secondary and tertiary alcs. are much more stable than the primary ones that easily form the corresponding unsatd. hydrocarbon. S. shows that of *hydratropic alc.*, $PhCHMeCH_2OH$ (I), and *methylbenzylcarbinol*, $PhCH_2CHMeOH$ (II), only I is dehydrated, to *α-methylstyrene*, $PhCMe:CH_2$ (III), by anhyd. KOH while *dehydration with "porosite"* (Ramart-Lucas and Amagat, *C. A.* **22**, 1582, and Fourneau, *C. A.* **16**, 2495) forms a mixt. of III and PhCH:CHMe. By heating 10 g. of I over 5–7 g. anhyd. KOH 2 layers form, the upper one of which is distd. off, extd. with Et_2O, dried and rectified, finally over Na. III b_{744} 159–60°, n_D^{22} 1.5350, d_{22}^{22} 0.9065, mol. refraction 40.56. It tends less to polymerization than styrene and forms a liquid *dibromide*. The identity of III was established by comparing it with III prepd. from $PhMe_2COH$ according to Staudinger and Breusch (*C. A.* **23**, 3213) as well as with "porosite" (cf. references above). *α-Ethylstyrene*, $PhEtC:CH_2$ (IV), was similarly prepd. by the action of anhyd. KOH on $PhEtCHCH_2OH$. IV b_{748} 177–80°, n_D^{22} 1.5262. Its *dibromide* seems to be liquid. Dehydration of II under the same conditions yields only traces of PhCH:CHMe. G. TOENNIES

New method of synthesis of phenylpropargyl alcohol and its homologs substituted in the ring. L. BERT. *Compt. rend.* **191**, 493–5(1930).—Instead of condensing PhC≡CH with HCHO, which will give very poor yields, B. prepd. PhC≡CCH$_2$OH in the following way (the figures under the arrows indicate the % yield obtained):

$$PhBr \xrightarrow[94]{Mg + (C_2H_5)_2O} PhMgBr \xrightarrow[100]{CH_2ClCH.CHCl} PhCH_2CH.CHCl \xrightarrow[84]{KOH\text{-}BuOH}$$

$$PhCH:CHCH_2OBu \xrightarrow[83]{HCl} PhCH:CHCH_2Cl \xrightarrow[60]{AcONa} PhCH\,CHCH_2Ac \xrightarrow[100]{Br} PhCH\text{-}$$

$$BrCHBrCH_2OAc \xrightarrow[66]{KOH} PhC:CCH_2OH.$$

The com. cinnamyl acetate, which is employed in perfumery, can be used as a starting material. F. R. GREENBAUM

Reduction of Schiff bases. L. ZECHMEISTER AND J. TRUKA. *Ber.* **63B**, 2883-4 (1930).—Mg in MeOH can be used advantageously for the reduction of the -CH:N- group in Schiff bases to $-CH_2NH-$. The reaction takes place in a neutral soln. and even when the product is decompd. with H_2O there is no marked alky. The base is dissolved in almost anhyd. MeOH, an at least 5 fold excess of Mg ribbon is added (the reaction being regulated by cooling or heating, as needed), then the MeOH is distd. off, the residue decompd. with ice H_2O and the $Mg(OH)_2$ dissolved out with 30–50% AcOH. The following amines were obtained in 70–90% yield in this way: $PhCH_2NHPh$, m. 37–8°; *p*-$MeOC_6H_4CH_2NHPh$, m. 64.5°; *o*-$HOC_6H_4CH_2NHPh$, m. 108°; $PhCH_2CH_2CH_2NHPh$, m. 193–5°; 3,4-$CH_2O_2C_6H_3CH_2NHPh$, m. 78°; *p*-$Me_2NC_6H_4CH_2NHPh$, m. 62°; *p*-$MeC_6H_4NHCH_2Ph$, m. 318–20°; α-$C_{10}H_7NHCH_2Ph$, m. 67°; α-$C_{10}H_7NHCH_2C_6H_4OMe(p)$, m. 80°; β-$C_{10}H_7NHCH_2Ph$, m. 68°; β-$C_{10}H_7NHCH_2C_6H_4OMe(p)$, m. 104.5°. C. A. R.

Acyl derivatives of *o*-aminophenol. VI. C. B. POLLARD AND R. E. NELSON. *J. Am. Chem. Soc.* **53**, 996–1001(1931); cf. *C. A.* **23**, 4940.—A study of the diacyl derivs. of *o*-$H_2NC_6H_4OH$, when 1 of the acyl groups was always the $PhCH_2CO$ radical,

is reported. When both acylating agents were of the type ClCOR, isomeric diacyls were obtained depending on the order of the introduction of the acyl groups. In 5 cases out of 8 complete rearrangement occurred during sapon., 1 case showed partial rearrangement and in 2 cases rearrangement did not occur. Apparently relative acidity and wt. are not the controlling factors in this type of rearrangement. When 1 of the acylating agents was an alkyl chlorocarbonate, the same diacyl deriv. was obtained regardless of the order of introduction of the groups. *o-Phenylacetylaminophenol* (I), m. 149–50° (60% yield); *o-butyrylamino deriv.*, m. 80–1° (58% yield); *o-(m-bromobenzoylamino) deriv.*, m. 180° (60% yield); *m-Cl isomer*, m. 156–8° (52% yield). I and AcCl with a drop of H_2SO_4 give 60% of the *acetate*, m. 101–2°; *o*-$AcNHC_6H_4OH$ and $PhCH_2COCl$ give 45% of *o-acetylaminophenyl phenylacetate*, m. 99–100°; sapon. of either gives $PhCH_2CONHC_6H_4OH$, showing that rearrangement occurred in the second case. *o-Phenylacetylaminophenyl propionate* (II), from I and EtCOCl, m. 98–9° (40% yield); *butyrate* (III), m. 91–2° (40% yield); *valerate* (IV), m. 80–2° (50% yield); *isovalerate* (V), m. 87–8° (50% yield); *chloroacetate* (VI), m. 106–7° (50% yield); *benzoate* (VII), m. 110–1° (60% yield); *m-chlorobenzoate* (VIII), m. 146–8° (65% yield). *o-Propionylaminophenyl phenylacetate*, m. 71–2° (35% yield); sapon. of this or of II gives $PhCH_2CONHC_6H_4OH$ (IX); the *o-butyrylamino deriv.*, m. 46–8° (40% yield), gives $PrCONHC_6H_4OH$ on sapon., while the isomeric III gives IX; the *o-valerylamino deriv.*, m. 71–2° (40% yield), gives $BuCONHC_6H_4OH$ (X) on sapon., while the isomeric IV gives 65% IX and 35% X; *o-isovalerylamino deriv.*, m. 56–7° (55% yield), gives iso-$BuCONHC_6H_4OH$, as does V, on sapon.; *o-chloroacetylamino deriv.*, m. 113–4° (55% yield), or VI yields IX on saponification; *o-benzoylamino deriv.*, m. 108–9° (75% yield), yields $BzNHC_6H_4OH$ on hydrolysis, while the isomeric VII gives IX; *o-(m-chlorobenzoylamino) deriv.*, m. 150–2° (55% yield), or VIII give on hydrolysis $ClC_6H_4CONHC_6H_4OH$; *o-(m-bromobenzoylamino) deriv.*, m. 157–9° (55% yield), gives the corresponding Br deriv. on hydrolysis. The *phenylacetate of Me o-hydroxycarbanilate*, m. 105–6° (60% yield), yields on hydrolysis 50% each of IX and $MeOOCNHC_6H_4OH$; the *Et deriv.*, m. 62–3° (40% yield), gives $EtOOCNHC_6H_4OH$; the *iso-Bu deriv.*, m. 72–3° (53% yield), gives the iso-Bu deriv. C. J. West

Reduction potentials of some higher benzologs of the quinones. Louis F. Fieser and Emma M. Dietz. *J. Am. Chem. Soc.* **53**, 1128–33(1931).—A potentiometric study of the benzologs of anthraquinone and phenanthrenequinone leads to the following conclusions: The potentials of the benz- and dibenzanthraquinones lend support to the *o*-quinonoid theory of the structure of anthracene. Hydroxychrysenequinone constitutes an exception to the rule that when a quinone can exist in 2 forms, the 1 of lower potential will predominate. The following values for the reduction potential at 25° (E_0 (av.) in v.) are reported: 1,2-benzanthraquinone, 0.228; 1,2,7,8-dibenzanthraquinone, 0.264; 1,2,5,6-dibenzanthraquinone, 0.268; (1,2)*Bz*-3-metho-1,2,5,6-dibenzanthraquinone, 0.257; 5,6-chrysenequinone, 0.465; 6,12-chrysenequinone, 0.392; 12-hydroxy-5,6-chrysenequinone, 0.391; 12-EtO deriv., 0.418; 1,2-benz-3,5-anthraquinone, 0.430; picenequinone, 0.474. C. J. West

Configurational relationships of phenylated carbinols. III. P. A. Levene and A. Walti. *J. Biol. Chem.* **90**, 81–8(1931); cf. *C. A.* **24**, 4008.—A direct chem. method is found for the correlation of the configuration of $Me(PhCH_2)CHOH$ with *sec*-aliphatic alcs. The method is based on the condensation of optically active ethylenic oxides with aliphatic or aromatic radicals by the Grignard reaction. Condensation of *d*-$MeCH.CH_2.O$ (I) with C_5H_7MgBr gave *l*-$MeCH(OH)C_6H_9$, $[\alpha]_D^{25}$ —1.75° (without solvent), and its *α-naphthylurethan* gave $[\alpha]_D^{25}$ —4.28° (in abs. alc.). PhMgBr and I gave *l*-$Me(PhCH_2)CHOH$, $[\alpha]_D^{25}$ —19.8° (without solvent); *α-naphthylurethan*, $[\alpha]_D^{25}$ —31.6°. The latter carbinol was oxidized to the corresponding ketone which was then identified by the *semicarbazone*, m. 188°. L. and W. conclude that the direction of rotation is detd. by the position of the heavier group, provided the Ph group is not less than 1 C atom from the asym. C atom. H. W. Leahy

Beckmann rearrangement. IV. Unsaturated ketoximes. Karl v. Auwers and Maria Seyfried. *Ann.* **484**, 178–211(1930); cf. *C. A.* **19**, 1405; **23**, 4701.—PhCH:CHBz (I) with NH_2OH in alk. soln. gives 3,5-diphenylisoxazoline, m. 75°, and a mixt. of alkali-sol. hydroxyaminoöximes. The oxime (II) of I, m. 115–6°, was prepd. by the use of $NH_2OH.HCl$; this was unchanged by boiling with 2 *N* NaOH for 10 hrs. The Beckmann rearrangement gives PhCH:CHCONHPh (cf. Henrich, *C. A.* **1**, 1411). II yields a dibromide, m. 156°, which splits off HBr when heated above its m. p., giving 3,5-diphenylisoxazole (III). Beckmann rearrangement gives a *dibromohydrocinnamic*

anilide, m. 179°. PhCHBrCHBrBz could not be transformed into the oxime. PhCH:CBrBz yields an oxime, m. 151° (*C. A.* **23**, 4701), which gives **III** with EtOH-KOH. The Beckmann rearrangement product, probably PhCH:CBrCONHPh, was obtained only as a brown smeary product. *p*-$MeOC_6H_4COCH$:CHPh (**IV**) and $PhNHNH_2$ in AcOH give *1,5-diphenyl-3-p-anisylpyrazoline*, m. 140.5–1.5°; the concd. H_2SO_4 soln. becomes blue-violet on addn. of $FeCl_3$; NH_2OH in alk. soln. gives *3-p-anisyl-5-phenylisoxazoline*, m. 104.5–5.5°, oxidized by CrO_3 in AcOH to the isoxazole (**V**), m. 121°; this is also obtained from *p*-$MeOC_6H_4COC$: CPh and $NH_2OH.HCl$, while free NH_2OH gives 3-phenyl-5-anisoylisoxazole, m. 127–8°. **IV** and $NH_2OH.HCl$ in EtOH give *benzal-p-methoxyacetophenone oxime*, m. 140–2°; *Ac deriv.*, m. 134–5°; Beckmann rearrangement gives *cinnamic p-anisidide*, m. 152–3°. *p*-$MeOC_6H_4COCBr$·CHPh, b_{13} 250–3°, with NH_2OH in NaOH gives **V**; NH_2OH HCl gives the *oxime*, m. 153°. The relative rates of decompn. of the ketone and oxime by EtOH-KOH are: 10 min., 17, 86%; 20 min., 50, 95%; 30 min., 66, 95%; 15 hrs., 100, 95%. Beckmann rearrangement gives a brown smear, from which *p*-$MeOC_6H_4CO_2H$ was isolated after hydrolysis. *β-Bromobenzal-p-methoxyacetophenone*, from PhC : $CCOC_6H_4OMe$, yellow, m. 65–6°; NH_2OH and alkali give **V**; $NH_2OH.HCl$ gives 50% of the oxime (**VI**), m. 115–6°. The relative rates of decompn. of the ketone and oxime by alkali are: 10 min., 10, 11%; 20 min., 95, 51%; 30 min., —, 68%; 15 hrs., 95, 85%. The relative rates of decompn. of the α- and β-bromo oximes with 2% NaOH are: 2 min., 10, 11%; 7 min., 45, 14%; 12 min., 70, 16.5%; 17 min., 95, 16.5%. The Beckmann rearrangement of **VI** gives *β-bromocinnamic p-anisidide*, m. 144°. *Benzal-p-ethoxyacetophenone dibromide*, m. 151–2°. **V. Substituted cinnamaldoximes and cinnamonitriles.** *Ibid* 212–35.—*cis*-PhCH:CBrCHO (**I**) is oxidized to *trans*-PhCH:$CBrCO_2H$ by alk. Ag_2O or by O_2 in $CHCl_3$. The oxime (**II**) of **I**, m. 144°, results in acid, alk. or neutral medium; warming with EtOH-H_2O-KOH gives PhC : CCH:NOH, m. 108°; Ac deriv. of **II**, m. 81–2°; heating **II** with Ac_2O gives *cis*-PhCH:CBrCN (**III**), b_9 138–40°, $d_4^{19.1}$ 1.4624, $n^{19.1}$ 1.61984, 1.62983, 1.65669 for α, He and β; this also results from the acid amide and $POCl_3$ at 70–2°. *Dibromocinnamonitrile*, m. 92–3°, also gives **III** with EtOH-KOH. **II** and PCl_5 in dry Et_2O, allowed to stand 10–24 hrs., give the *trans-isomer* (**IV**), b_{12} 148–50°, m. 33–5°, $d_4^{58.5}$ 1.4263, $n^{58.5}$ 1.60386, 1.61348, 1.63904 for α, He and β; **IV** was also obtained from the *trans*-acid amide, m. 120–1°, and $POCl_3$ at 70–2°. Attempts to change **III** to **IV** or **IV** to **III** failed. The relative rates of reaction of **III** and **IV** with EtOH-KOH are: 2 min., 42.3, 78% decompose; 10 min., 99.6, 42.6%. **III** or **IV** and 10% EtOH-KOH give *β-ethoxycinnamonitrile*, b_{10} 146–8°, $d_4^{18.4}$ 1.0601, $n^{18.4}$ 1.55988, 1.56718, 1.58641, 1.60482 for α, He, β and γ. Addn. of EtOH to PhC : CCN gives an *isomeric nitrile*, b_{11} 163–5°, d_4^{17} 1.0543, 1.54569, 1.55169, 1.56756 for α, He and β. Both forms give $BzCH_2CN$ with dil. H_2SO_4 and show little difference in their reaction with Br in CS_2. PhC : CCHO and HBr in AcOH give *β-bromocinnamaldehyde*, b_{12} 144–6°, d_4^{20} 1.492, $d_4^{18.85}$ 1.4937, $n^{18.85}$ 1.62865, 1.63884, 1.66649 for α, He and β; it slowly decomposes in the air, giving off HBr. Heating with 1.1 mols. AcOK in abs. EtOH for 7 hrs. splits off 24.4% of the Br; *oxime*, m. 81°, sepd. by means of the Na salt into 2 isomers, m. 63–6° and 103° (*Ac deriv.*, m. 68–9°). The relative rates of decompn. of the aldehyde and oxime by 5% EtOH-KOH are: 5 min., 30.5, 2.2%; 10 min., 77.2, 4.4%. C. J. WEST

Reduction of the mixture of aldehyde or ketone with nitrite. II. A. OGATA AND S. HIRANO. *J. Pharm. Soc. Japan* **50**, 1141–52 (1930); German abstr. 147–8; cf. *C. A.* **24**, 4758.—Reduction of the mixt. of equiv. quantities of BzH and $NaNO_2$ in alc. AcOH or HCO_2H with excess Zn dust gave $PhCH_2NH_2$, $(PhCH_2)_2NH$, *α,β-diphenyl-α-hydroxy-β-benzylaminoethane* (**I**) and NH_3 as end-product. **I**, $C_{21}H_{21}ON$, m. 151°, sol. in hot alc., but insol. in H_2O. HCl salt, m. 226–8°, *Bz deriv.*, m. 135–6°. The formation of *benzylamine* is due to the formation of an intermediate compd., *benzaldoxime*, followed by reduction, while *dibenzylamine* is due to the reaction between $PhCH_2NH_2$ and unreacted BzH, followed by reduction. F. I. NAKAMURA

Isomerization of the hydroxy aldehydes. IV. Transformation of benzylbromoacetaldehyde and benzylglycolaldehyde. S. DANILOV AND E. VENUS-DANILOVA. *Ber.* **63B**, 2765–75; *J. Russ. Phys.-Chem. Soc.* **62**, 1697–1711(1930); cf. *C. A.* **24**, 1093.—*Benzylbromoacetaldehyde* (**I**), from $PhCH_2CH_2CHO$ and Br in CS_2, is an unstable oil readily resinifying and polymerizing on standing, but it yields a cryst. *monohydrate*, m. 87.5–8°, which permitted of studying the conversion of **I** into *benzylglycolaldehyde* (**II**) and the acid (**III**). Heated with H_2O and freshly pptd. $BaCO_3$ **I** gives **II** in quite good yields, together with 4% $PhCH_2CH_2CO_2H$ (**IV**). With Ag_2O are obtained 20% **II**, 9.4% **III**, 5.6% of a condensation product (**V**) of **I** and 31% **IV**. PbO_2 yields chiefly halogen-contg. condensation products of **I** and 22.6% **IV**. The structure of **II** is es-

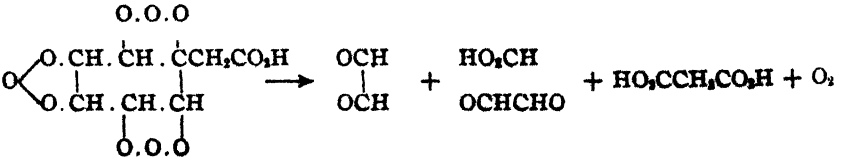
tablished by its prepn., its derivs. and its oxidation products; $KMnO_4$ in aq. C_5H_5N gives $PhCH_2CHO$, BzOH and III. Its isomerization into the HO ketone is accompanied by the formation of a diketone: $PhCH_2CH(OH)CHO$ (II) ⟶ $PhCH(OH)COMe$ (VI) + PhCOCOMe (VII). II, b_4 120–1°, m. 51.5–2°, reacts with NH_3-$AgNO_3$, fuchsin-SO_2 and Fehling soln., mol. wt. in freezing C_6H_6 143.7; *oxime*, m. 123°; *semicarbazone*, m. 136.5°; *phenylosazone*, yellow, m. 137°; *benzoate*, m. 70°, mol. wt. in freezing C_6H_6 252.6. III, m. 97.5°, mol. wt. in freezing C_6H_6 150. VII, b_{13} 113–5°; dioxime, m. 238–9°. VI, b_{13} 130–2°, mol. wt. in freezing C_6H_6 155–61; semicarbazone, m. 194°. With $PhMgBr$ VI yields $PhMeC(OH)CH(OH)Ph$, m. 103°, gives with concd. H_2SO_4 a deep red color destroyed by H_2O and is oxidized by CrO_3-AcOH to PhCOMe and BzOH. C. A. R.

New *p*-bromophenacyl esters. S. G. Powell. *J. Am. Chem. Soc.* **53**, 1172 (1931).—The following *p-bromophenacyl esters* were prepd.: *trimethylacetate*, m. 76.5°; *isocaproate*, m. 77.3°; *enanthate*, m. 69.2°; *isoheptylate*, m. 75.5°; *pelargonate*, m. 63.5°. C. J. West

Oximes of α,β-unsaturated ketones and the Beckmann rearrangement. A. H. Blatt. *J. Am. Chem. Soc.* **53**, 1133–41(1931).—Certain α,β-unsatd. ketones, when treated with $NH_2OH.HCl$, yield oximes of the general configuration $RCH{:}CHCR'{:}NOH$. These oximes undergo a *trans*-shift in the Beckmann rearrangement and when dissolved in concd. H_2SO_4 rearrange in a different manner to yield the isomeric isoxazolines $RCH.CH_2.CR'{:}NO$. The so-called stable oximes of these α,β-unsatd. ketones are in reality isoxazolines and are formed through a process which does not involve either the true oxime as an intermediate or the simple 1,4-addn. of NH_2OH to the ketone. *Benzal-o-chloroacetophenone oxime* m. 110–24° when heated at the rate of 2° per min., even though the oxime was pure; PCl_5 in excess in abs. Et_2O gives *cinnamic o-chloroanilide*, m. 136–7°, also obtained from the acid and *o*-$ClC_6H_4NH_2$. Boiling the oxime with MeOH-KOH for 5.5 hrs. removes only 2.3% of the Cl. *Benzal-p-bromoacetophenone oxime* m. 138–50°; there was no evidence of isoxazoline formation with EtOH-KOH or NH_2OH; PCl_5 gives the *p-bromoanilide of cinnamic acid*, m. 191°; bromination of the oxime gives a *di-Br deriv.*, m. 155° (decompn.); with EtOH-KOH it eliminates HBr, giving *3-p-bromophenyl-5-phenylisoxazole*, m. 178–9°; this also results in 50% yield by heating the oxime at 150° or by heating in glacial AcOH; it was also obtained from $PhCHBrCHBrCOC_6H_4Br$ and $NH_2OH.HCl$; the *isoxazoline*, m. 138–9°, results from the oxime and concd. H_2SO_4 or from the ketone, $NH_2OH.HCl$ and KOH. C. J. West

Methods of manufacturing vanillin. J. Schwyzer. *Chem.-Ztg.* **54**, 817–8, 839–40(1930).—Explicit details of the 4 practical methods for the manuf. of vanillin are given. The methods are (*a*) chlorination of PhOH, treatment with $Ba(OH)_2$ to form *o*-$C_6H_4(OH)_2$, treatment of this with *m*-$O_2NC_6H_4SO_3Na$, CH_2O and Fe filings to give 3,4-$(HO)_2C_6H_3CHO$, followed by methylation; (*b*) treatment of piperonal with PCl_5 and hydrolysis of the product to 3,4-$(HO)_2C_6H_3CHO$, followed by methylation. (*c*) sulfonation of $PhNO_2$, reduction by electrolysis or by Zn and HCl, and treatment with guaiacol, $FeSO_4$ and CH_2O, or treatment of guaiacol with MeOH, $Me_2NC_6H_4NO$ and CH_2O, or guaiacol is treated with alloxan prepd. by the action of Cl_2 on uric acid, sapon. with NaOH, treatment with SO_2, then with *p*-$Me_2NC_6H_4NH_2$, and finally with NaOH; (*d*) formation from clove oil. C. H. Peet

The action of ozone on benzoic acid and phenyl aliphatic acids. H. Rupe and H. Hirschmann. *Helv. Chim. Acta* **14**, 49–56(1931).—BzOH and phenyl aliphatic acids add on a mol. of O_3 at each of the double bonds of the benzene nucleus to form triozonides. These compds. are white camphor-like substances at low temps. and oils at room temps. They are not very stable and tend to decomp. with explosive violence at room temp. They decomp. with water to form, probably, 1 mol. O_2, 2 mols. glyoxal, 1 mol. HCO_2H and 1 mol. of a dibasic acid. The yields of these hydrolysis products are poor. The yields of the ozonides are also poor as apparently much of the phenyl aliphatic acids are completely oxidized. The triozonide of $PhCH_2CO_2H$ (I) probably decomps. with water as follows:



Ten g. of I was dissolved in 100 cc. CCl_4 and at 0–15° treated with 10–12% O_3 for 24 hrs. The white ozonide was filtered and washed with ice-cold abs. ether and decompd. with water on the water bath. The clear soln. gave 1.1 g. of $(CH{:}NNHCO\text{-}NH_2)_2$ (IV), decomps. 300°. HCO_2H was identified by its odor and the sepn. of about 0.5 g. which reduced $HgCl_2$ and HgO. $CH_2(CO_2H)_2$ was identified by formation of $PhCH.CHCH{:}C(CO_2H)_2$, m. 202–3° instead of 208° as given by Rupe (*Ber.* **37**, 3123) and by the solid acid isolated in about 0.1 g. yield, giving off CO_2 when melted. I (1.7 g.) was recovered unchanged. In 1 expt. 10 g. of $PhCH_2CH_2CO_2H$ (II) in 100 cc. CCl_4 was treated at 0–15° with 10–12% O_3 for 24 hrs. The white ozonide after decompn. with water yielded 4.2 g. of IV, 0.8 g. $(CH_2CO_2H)_2$ and only 0.1 g. of II was recovered unchanged. Ten g. of BzOH (III) in 80 cc. $CHCl_3$ and 20 cc. CCl_4 was treated at 0–15° with 10–12% O_3 for 20 hrs. III gave the best yields of ozonide but this ozonide was the least stable. One sample of 3.5 g. exploded in the desiccator. The ozonide from the above sample on decompn. with water yielded 0.62 g. IV and 0.5 g. $(CO_2H)_2$ and 5.5 g. III was recovered unchanged. III is more resistant to the action of O_3 than either I or II. ODEN E. SHEPPARD

Condensation products of phenylacetic hydrazide. REINHARD SEKA AND ST. PETER HEILPERIN. *Monatsh.* **57**, 45–51(1931).—$AcCO_2H$ and $PhCH_2CONHNH_2$ (I) in H_2O give 76.6% of the *hydrazone*, $PhCH_2CONHN{:}CMeCO_2H$, m. 168°; the mother liquor contains *diphenylacetic hydrazide* (II), $(PhCH_2CONH)_2$, m. 236–7°. With $AcCH_2CO_2Et$ and I only II is formed. Levulinic acid gives the *phenylacetic hydrazone*, m. 119°; the mother liquor contains II. Galactose likewise gives a *hydrazone*, m. 192–3° (58% yield). Ac_2 and I give a *monophenylacetic hydrazone*, m. 138°, sol. in H_2O, and a *diphenylacetic hydrazone*, $C_{20}H_{22}O_2N_4$, decomps. 254°. Benzil gives a *diphenylacetic hydrazone*, $C_{30}H_{26}O_2N_4$, m. 198–9°. C. J. WEST

Several new 4′-sulfo-*o*-benzoylbenzoic acid derivatives and the corresponding anthraquinone compounds. IVAN GUBELMANN, H. J. WEILAND AND O. STALLMANN. *J. Am. Chem. Soc.* **53**, 1033–6(1931).—2-$HO_2CC_6H_4COC_6H_4SO_3Na$-*p*, nitrated with a mixed acid (100 g. mixed acid contg. 70% HNO_3, 22% H_2SO_4 and 8% H_2O with 480 parts of 25% oleum) in 100% H_2SO_4, the acid being added over 6–8 hrs. at 15–20° and the reaction then heated at 35° for 3 hrs., gives the *5′-NO_2 deriv.*; 100 g. of the free acid, heated with 25% oleum at 150°, give 80 g. of *2-nitroanthraquinone-7-sulfonic acid*; with $NaClO_3$ in dil. HCl there results quant. the *7-Cl deriv.*, light yellow, m. 251–2°; reduction gives nearly quantitatively the *2-NH_2 deriv.*, light orange, m. 302–3°. 5,2-$H_2N(p\text{-}HO_3SC_6H_4CO)C_6H_3CO_2H$, by reduction of the above NO_2 deriv., gives with oleum 2,7-$H_2NC_6H_3(CO)_2C_6H_3SO_3H$, which may be transformed into the 2,7-di-NH_2 deriv. by NH_4OH and As_2O_3 at 180°. Further proof is offered by the m. p. of the corresponding di-HO deriv. and its di-Ac deriv. C. J. WEST

Some new water-soluble organomercury compounds. JOHN H. WALDO. *J. Am. Chem. Soc.* **53**, 992–6(1931).—MeHgI and *o*-$HSC_6H_4CO_2H$ in EtOH-NaOH give 80–5% of *methylmercurithiosalicylic acid*, m. 174° (all m. ps. cor.); *Et deriv.*, m. 111°; *iso-Am deriv.*, m. 78°; *p-ethylmercurimercaptobenzoic acid* does not m. 250°; the *sulfonic acid* was also prepd. The following compds. were prepd. but analyzed only for Hg: *phenylmercurithiosalicylic acid*, m. 228.5° (decompn.); *benzyl deriv.*, m. 144.5° (decompn.); *α-ethylmercurimercaptobutyric acid*, m. 76°; *p-ethylmercurimercaptophenylacetic acid*, m. 116.7°; *p-ethylmercurimercaptobenzenesulfonic acid*, m. above 300°. These compds. are sol. in $NaHCO_3$ and form with the alkali metals sol. salts whose solns. are in general stable and do not give an immediate ppt. of HgS with $(NH_4)_2S$. Therapeutic data are given: the alkaryl derivs. are less toxic than the aryl; the salts of CO_2H derivs. are less toxic than the SO_3H derivs.; some decrease in the therapeutic index is produced by a change from the *o*- to the *p*-position on the C_6H_6 ring and by alkyl instead of alkaryl derivs. The aryl compds. are decidedly less stable, either in soln. or dry, than the alkaryl compds. C. J. WEST

Pyromellitic acid. Benzodiketohydrindene and benzodipyridazine derivatives. REINHARD SEKA, HANS SEDLATSCHEK AND HEINRICH PREISSECKER. *Monatsh.* **57**, 86–96(1931).—$O(CO)_2C_6H_2(CO)_2O$ (I) and quinaldine, heated at 250° until the mass is solid, give the *condensation product* (II), $C_{30}H_{16}O_4N_2$, dark reddish brown, decomps. 265°, insol. in EtOH, and the yellow-brown, EtOH-sol. *compd.*, $C_{20}H_{11}O_4N$, decomps. about 125°. Sulfonation of II with 50% oleum at 170° gives a product similar to quinoline yellow, which dyes wool and silk a pure yellow. I and α-$C_{10}H_7NH_2$ give *pyromellitic dinaphthylimide*, m. 431°. $N_2H_4.H_2O$ (4 mols.) gives the *dihydrazide*, light yellow, decomps. about 450°; its *tetra-Ac deriv.* m. 235–8°. 1,4,2,5-$Bz_2C_6H_2$-$(CO_2H)_2$ and 10 mols. $N_2H_4.H_2O$ in abs. EtOH, heated 24 hrs. at 120°, give 90% of *1,6-diphenyl-4,9-dihydroxybenzodipyridazine*, carbonizes at 445°; 1,5,2,4-$Bz_2C_6H_2$-

$(CO_2H)_2$ and 6 mols. $N_2H_4.H_2O$ give the *1,9-diphenyl-4,6-dihydroxy deriv.*, decomps. 430°. $(MeC_6H_4CO)_2C_6H_2(CO_2H)_2$ and $N_2H_4.H_2O$ give the *1,9-dixylyl-4,6-dihydroxy deriv.*, carbonizes at a high temp. 2-Benzoylanthraquinone-3-carboxylic acid and 3.8 mols. $N_2H_4.H_2O$ in abs. EtOH, heated 9 hrs. at 120°, give the *hydrazide*, light yellow, decomps. 374°. 1,2,4,5-$C_6H_2(COCl)_4$ and MeONa in C_6H_6 give 88% of *tetra-Me pyromellitate*, m. 138°; the *tetra-Ph ester*, m. 179.5°, results in 24% yields.

C. J. WEST

The influence of impurities on some physical and crystallographic properties of hemimellitic acid. V. AGAFONOV. *Compt. rend.* **192**, 99–101(1931); cf. *Compt. rend.* **124**, 855(1897).—After 2 recrystns. of hemimellitic acid, $C_6H_3(CO_2H)_3$ (I), there can still be isolated small quantities of Ca hemimellitate (II) and another compd. (III), both of which are monoclinic and have smaller birefringence than I. The refractive indices for the D line are: I, n_p 1.4316, n_m 1.6358, n_g (calcd.) 1.6744; II, n_p 1.52, n_g 1.68; III, n_p 1.515, n_g 1.63. The pure I is triclinic and the axial ratios are 1.705:1:0.6185. The ds. and solubilities at 20° of the 3 compds., and a full description of the crystals of I, are given. Microscopic observation of the process of crystn. shows that small quantities of II and III are included within the crystals of I and are probably the cause of its polychroism in the ultra-violet, since according to A., polychroism is always due to the presence of impurities or polymers in regular orientation.

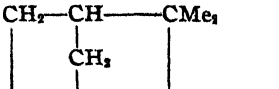
K. V. THIN

Sclareol and its derivatives. MAURICE-MARIE JANOT. *Compt. rend.* **191**, (1930).—Sclareol (I) obtained from the essential oil of *Salvia sclarea* L. appea be $C_{17}H_{30}O_2$. It b_3 188–9° and b_{19} 218–22° to give by condensation a solid pro which is transformed slowly at room temp. and instantaneously at 45° into crystals, m. 104–5°. I is not sapond. by alc. KOH or by KOH in $PhCH_2OH$. Heated to near its m. p. it loses 45% of its wt. in 72 hrs. It gives no test for MeO, is acetylated with difficulty, giving only a 50% yield, and is benzoylated in the presence of pyridine with difficulty. It gives CO_2 and $CO(NHPh)_2$ when heated to 150° with OCNPh. Alc. I gives a violet color with saccharose and furfural, and a garnet-red color with PhCH:CHCHO, vanillin and piperonal. (Ekkert, *C. A.* **22**, 2384). In CS_2 contg. Ag_2CO_3 I adds Br to give 3 compds.: (1) a cryst. deriv., m. 122–4°, contg. 35.33% Br, and (2) and (3), hexagonal crystals m. 134–5° and 140–3°, resp. I adds H in alc. in the presence of colloidal Pd to give 98% of a cryst. deriv. m. 114–5°, mol. wt. 270. Oxidation with $KMnO_4$ in HOAc gives sclareolic acid besides other compds. and oxidation with H_2CrO_4 gives a non-acidic compd. m. 124–5°. Alc. I shows no absorption in the ultra-violet. The sp. rotatory data of the various compds. are given.

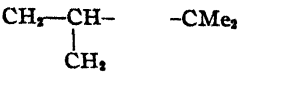
C. J. PEDERSEN

Camphor and terpenes. VI. So-called camphor cyanohydrins. J. HOUBEN AND E. PFANKUCH. *Ann.* **483**, 271–304(1930); cf. *C. A.* **21**, 1808.—H. previously showed that camphorimine easily adds HCN, giving a camphor cyanohydrin; Passerini (*C. A.* **20**, 595) claims to have isolated the same compd. from pernitrosocamphor and KCN. A re-examn. of P.'s compd. (I) shows that it is camphene-1-carboxamide. From I is prepd. a Ag salt and a Me ester, $C_{12}H_{21}NO_3$, m. 102°. The *dl*-, *d*- and *l*-forms of I may be obtained by starting with the proper camphor; thus, the *d*-form prepd. from the pernitrosocamphor from *d*-camphor, HCN and Et_3N in Et_2O has $[\alpha]_D$ 78.5°. Sapon. of I with alkali gives camphene-1-carboxylic acid; the *d*-form has $[\alpha]_D^{19}$ 95.5°. When the *d*- and *l*-forms are mixed in petroleum ether, the *dl*-form seps., showing that the 2 acids differ only in optical properties. O_3 oxidizes the acid to camphenilon-carboxylic acid (II) and camphenonic acid (III), m. 133–4°. II gives an *oxime*, m. 171–2°. The action of O_3 on I gives the amide of III. III with aq. alkali gives camphenecamphoric acid, the *dl*-form m. 133–4° and the *d*-form m. 142–3°. Reduction of the acid gives *dihydrocamphene-1-carboxylic acid*, m. 174–5°, $[\alpha]_D^{20}$ —16.7°. Reduction of I gives the corresponding amide, m. 189°. I and Ac_2O, boiled 2 hrs., give *d-camphene-1-carboxylic nitrile* (IV), b_{18} 108–10°, m. 38–40°, $[\alpha]_D^{18}$ 40.5°. The acid with $SOCl_2$ and NH_4OH gives I, m. 208°. The camphor cyanohydrin of H. and P. (V) is not sapond. by concd. HCl or 48% HBr; with HNO_3 it gives IV and a blue-green oil, which gives with MeOH-KOH *d*-camphene-1-carboxylic acid and a small quantity of the amide; there also results an oxynitrile, which is dehydrated by Ac_2O to IV and with EtOH-H_2O-KOH gives *3-(α,α-dimethylacetonyl)pentamethylenecarboxylic acid* (VI), b_{19} 186–8°, $[\alpha]_D^{18}$ —2.6°; *semicarbazone*, m. 200–2°. Further degradation with NaOBr gives camphenecamphoric acid (VII), m. 134–5°, identical with that obtained from III. The oxynitrile is a *camphene hydrate-1-carboxylic nitrile*. *d*-Camphene-1-carboxylic acid and HBr in AcOH give the *dl-Br hydrate*, m. 118–20° (decompn.), $[\alpha]_D^{19}$

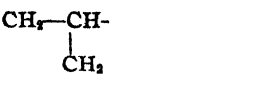
—16.5°; dil. alkali or K_2CO_3 gives the *camphene hydrate-1-carboxylic acid*, m. 142–3°, $[\alpha]_D^{17}$ —17°; the H_2O is split off by boiling with 0.1 *N* H_2SO_4 for 15 min.; the *Me ester*, m. 59–60°, $[\alpha]_D^{19}$ —19.5°; MeOH-KOH gives VI. *d*-Camphene-2-carboxylic acid and HBr in AcOH give the *Br hydrate*, m. 165–6°; the corresponding *hydrate* m. 221°; *Me ester*, m. 61–2°, $[\alpha]_D^{18}$ 24.5°. *dl-Camphene-bromohydrate-1-carboxylic nitrile* m. 150–1°; attempts to prep. the hydrate gave only the unsatd. compd.



(V)



(IV)



(VI)

C. J. West

π-Camphor derivatives. II. Identity of dihydroteresantalic acid with 7-π-apocamphanecarboxylic acid. Torsten Hasselström. *J. Am. Chem. Soc.* **53**, 1097–103(1931); cf. *Ann. Acad. Fenn.* **30**, 12(1929).—The lactone of 2-hydroxy-7-π-apocamphanecarboxylic acid, with alk. $KMnO_4$, gives *ketodihydroteresantalic acid* (*2-keto-7-π-apocamphanecarboxylic acid*), m. 269–70°, $[\alpha]_D^{28}$ —55° (10% EtOH); *semicarbazone*, m. 204–5° (decompn.); heating the latter with EtONa at 170–80° for 15 hrs. gives a good yield of 7-π-apocamphanecarboxylic acid (dihydroteresantalic acid), m. 228–9° (cor.), nearly optically inactive; this is identical with the compd. obtained by complete synthesis in part I. The crude mixt. of Me chlorodihydroteresantalate, reduced with Al-Hg in moist Et_2O at room temp., and finally with Na and EtOH, gives dihydroteresantalol (π-borneol), m. 171°; oxidation with $K_2Cr_2O_7$ and H_2SO_4 gives dihydroteresantalal, whose semicarbazone m. 212–3° (decompn.); further oxidation with $KMnO_4$ in NaOH gives dihydroteresantalic acid, m. 229–30°, identical with the acid prepd. as above. The addn. of HCl to teresantalol, m. 114°, gives a liquid and a solid form of chlorodihydroteresantalol; the solid part (2-chloro-7-π-borneol) m. 125–6° (decompn.) and on reduction with Na and EtOH gives π-borneol. C. J. West

Optically active α-pinenes. F. H. Thurber and R. C. Thielke. *J. Am. Chem. Soc.* **53**, 1030–2(1931).—Details are given for the prepn. of pinene nitrosochlorides; the 3 forms, *dl*-, *d*- and *l*-, m. 115°, 89.5° and 90°, resp., and have $[\alpha]_D^{20}$ (C_6H_6) 0°, 396.2° and 366.8°; they decompose at room temp. to a brown oily mass in about 3 weeks, but are stable for a much longer time at —20°; the regenerated α-pinenes show the following properties: b_{760} 155–6°, d_{20} 0.8591, n_D^{20} 1.4663, $[\alpha]_D^{20}$ 51.14° and —51.28°. The HCl compds. m. 132° (cor.) and the active forms have $[\alpha]_D^{20}$ (1% EtOH soln.) 33.52° and —33.24°. Contrary to previous reports the *dl*-pinene yields an inactive HCl deriv. and the active pinenes yield active HCl derivs. whose rotations are equal and opposite in sign. C. J. West

Stereochemistry of derivatives of biphenyl and analogs. Francis Lions. *J. Am. Chem. Soc.* **53**, 1176–9(1931).—L. outlines certain researches in the 2- and 4-phenylpyridine and 2-phenylquinoline series, phenylpyrroles, phenylindoles and biphenyl derivs. Failure to obtain these substances in enantiomorphous forms has prevented publication; this note is offered because of the work of Adams (*C. A.* **25**, 105) in the field of phenylpyridines. C. J. West

Bistibyls. I. Tetraphenylbistibyl. Attempts to obtain tetraphenylbibismuthyl. F. F. Blicke, U. O. Oakdale and F. D. Smith. *J. Am. Chem. Soc.* **53**, 1025–9(1931).—*Diphenylstibyl iodide*, m. 68–70°, results from the chloride and NaI in Me_2CO; a PhBr soln. does not absorb O, although a mixt. with Ph_3CBr does. The iodide reacts with Cu in PhBr, giving the bistibyl but this apparently undergoes decompn. or is rendered inactive toward O by the Cu halide or by combination with unchanged Ph_2SbI. The iodide in abs. EtOH with NaH_2PO_2 gives *tetraphenylbistibyl*, m. 121–2°, which reacts instantly with I, giving Ph_2SbI; it also absorbs the calcd. amt. of O to give $(Ph_2Sb)_2O_3$. Ph_2BiI in PhBr, shaken with Ag, Hg, Zn and Cu bronze, did not give solns. which absorbed O. NaH_2PO_2 did not appear to react with an EtOH soln. at room temp., and on heating gave a black product. $(Ph_2Bi)_2$ could not be obtained. C. J. West

Action of phenol on benzoyldiphenylmethyl bromide. C. Frederick Koelsch. *J. Am. Chem. Soc.* **53**, 1147–50(1931); cf. Schuster, *C. A.* **25**, 943.—S. reported that Ph_2CBrBz and PhOH give $Ph_2C(OPh)Bz$ (I), which reacted with PhMgBr to give $Ph_2C(OPh)C(OH)Ph_2$ (II). Repetition of the reaction shows that the reaction really gives *p*-BrC_6H_4OH and Ph_2CHBz (S.'s I). Ph_2CHBz and KOH give Ph_2CH_2 and BzOK,

while Ac_2O and H_2SO_4 give $Ph_2C:C(OAc)Ph$. Ph_2CHBz and Ph[illegible] give Ph_2CHCPh_2OH, m. 232-3° (S.'s II), which decomposes with KOH to [illegible] and BzPh.

C. J. WEST

Constitution of colorless and colored triphenylmethane derivatives. T. LIPSCHITZ. *Ber.* **64B**, 161–82(1931); cf. *C. A.* **24**, 100, 1368, 4020.—In an earlier paper (Lifschitz and Girbes, *C. A.* **22**, 3855) L. has formulated his theory as to the constitution of derivs. of Ph_3CH. In the present paper he answers criticism of his theory by Hantzsch, Dilthey and others, criticizes H.'s theory as to the nature of halochromes, shows the untenability of certain of D.'s views, and develops his own theory further, adding special proofs for certain phases of it. H. has shown that the substances $Ar_3C.X$ belong to 2 optically different series, between which there is no optical transition. H. considers these series isomeric; if they are, the colorless and colored Ph_3C derivs. should have the same mol. wts. Since there is no proof of this, L. states that the assumption of isomerism has no foundation. Another defect of H.'s theory is that it cannot explain the most characteristic property of halochrome salts—their peculiar light absorption. In most of the compds. $Ar_3C.X$, the C X bond is heteropolar, Ar_3C^+X'. This may give the electrolyte $[Ar_2C...R]X'$, whose free ions may be stable or may undergo further change. Anion X′ may be solvated, or may form complex ions with suitable mols., such as metal halides. The cations may form

$$Ar_2C=\begin{matrix}R_1\\ \\ R\end{matrix}\Big]X' \text{ (I)},$$

the real mother substance of the halochrome carbonium

Because of their quinoid nature these can form deeply colored mol. compds., such as

$$\left[\begin{matrix}Ar_2C\\ :\\ R_2\end{matrix}\right]\begin{matrix}R^-\\ \downarrow\end{matrix}$$

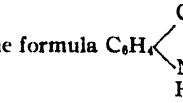
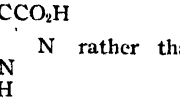
which are analogous in structure to meriquinoid compds. Structure I belongs to various so-called halochrome compds. with dye-like absorption. L's theory is thus shown to explain the facts satisfactorily. Retaining a coördination no. of 4 for C, as assumed by Werner, and without using the forced deductions of H, it is possible to explain the influence of the solvent on the color of Ph_3CH derivs. The first step in the formation of the colored forms is substitution; the final step is addn. with the formation of mol. compds. of quinoid ions. Where the latter is not possible and complex formation with the compd. itself enters in, the reason lies in the nature of the medium. In the substances mentioned the chromophor which shows the visible color is the quinone C atom in the ring. Solns. of halochrome derivs. of the same triphenylcarbinol contain not the same complex, as H. thought, but different complexes with the same chromophor. With the exception of neutral perchlorates all the isolated halochromes are mol. compds, and it can easily be shown that complex formation produces the color. L.'s theory also explains satisfactorily the electrolytic behavior of Ph_3CH derivs., and is further strengthened by the results obtained in detns of the mol. wts. of such derivs.

LOUISE KELLEY

The synthesis of *N*-methylhydroxynaphthindolequinone and *N*-methylnaphthisatinquinone. ZENJIRO KITASATO AND CHUZABURO SONE. *Bull. Chem. Soc. Japan* **5**, 348–54(1930); cf. *C. A.* **22**, 1779.—To study the origin and properties of such indigoid substances as nandazurin, 1-methylhydroxynaphthazolequinone (**VIII**) has been synthesized as follows: 2,3-dibromo-α-naphthoquinone and $NaCH(CO_2Et)_2$ give bromo-α-naphthoquinonemalonic ester (**I**), 5 g. of which suspended in 15 cc. abs. alc. and treated with 5 g. 33% alc. $MeNH_2$ gives crystals. H_2O dissolves a yellow substance, 1-methyl 3-carbethoxy-α-naphthazolequinone (**II**), decomps. about 220°, and leaves a red substance, 2-bromo-3-methylacetamido-1,4-naphthoquinone, m. 165°. Two g. of **II** with 120 cc. 7% NaOH gives **VIII**, m. over 300°, 1 g. of which with 10 cc. concd. H_2SO_4 and 6 cc. 10 *N* HNO_2 give 1-methyl-2,3-ββ-naphthazoledione-4,9-quinone, m. 268°. To elucidate the mechanism of the above reactions the following reactions were conducted: 6,3,4-$Br(MeO)_2C_6H_2CH:CHCO_2Et$ and 2-bromo-3-carbethoxy-1,4-naphthoquinone both give an amide with $MeNH_2$, m. 183° and 164–5°, resp.

V. F. HARRINGTON

Tervalent nitrogen. I. The constitution of indazolecarboxylic acid. TARO HAYASHI. *Bull. Inst. Phys. Chem. Research* (Tokyo) **9**, 911–5(1930) (*Abstracts* 88 (in English), published with *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) **14**, Nos. 275–6).—Crude *indazolecarboxylic acid* (**I**) (Auwers, *C. A.* **14**, 65) gives, by treating it with 0.5 *N* KOH, 0.5 *N* H_2SO_4, hot AcOEt and PhMe, white crystals, m. 266–6.5°, whose EtOH soln. is optically inactive. *Brucine salt* m. 236–6.5°, $[\alpha]_D^{15}$ —102°; crystals from a mixt. of pyridine and EtOH (*a*) and H_2O (*b*) show following specific rotations:

(*a*) $[\alpha]_D^{15.5}$ —104° (*b*) $[\alpha]_D^{15.6}$ —86°, $[\alpha]^{15.6}$ —90° *Cinchonine salt*, m. 233.5–4°, $[\alpha]^{17}$ 18.1°, $[\alpha]^{17}$ 47.7°. *Quinine salt*, m. 245–6°, $[\alpha]^{18.5}$ 200°. The Me ester of I, methylated with MeI, followed by sapon. and recrystn. from 30% EtOH (K. v. Auwers, *loc. cit.*) gives *1-methylindazolecarboxylic acid* (II), m. 213–4°. Similarly, on methylation with $(MeO)_2SO_2$ and purification with MeOH, there results *2-methylindazolecarboxylic acid* (III), m. 225–6°. I, II and III show similar absorption curves but the absorption band of I is displaced to the side of shorter wave lengths. From these results I would seem to have the formula  rather than  , which contains an asym. C atom.

K. KONDA

Condensation of aldehydes and phenols. V. *m*-Chlorobenzaldi-β-naphthol. OTTO DISCHENDORFER AND HEINRICH MANZANO *Monatsh.* **57**, 20–30(1931); cf. *C. A.* **25**, 290.—β-$C_{10}H_7OH$ (10.2 g.) and 5 g. *m*-ClC_6H_4CHO in AcOH-concd. HCl, after standing 24 hrs., give *3-chlorobenzaldi-β-naphthol* (I), crystg. with 1 mol. AcOH, m. 178–9°; *Na salt*, needles; *di-Ac deriv.*, m. 216–7°; *di-Bz deriv.*, m. 164°; Me_2SO_4 gives a *mono-Me ether*, m. 168°. I in EtOH and 10% NaOH, treated with Br as long as a yellow ppt. forms, gives *dehydro-3-chlorobenzaldi-β-naphthol*, $C_{27}H_{17}ClO_2$, light yellow, m. 199°. I, AcOH and concd. H_2SO_4, warmed 1 hr. on the H_2O bath, give *ms-(3-chlorophenyl)dinaphthopyran* or *9-(3-chlorophenyl)-1,2,7,8-dibenzoxanthene* (II), m. 191–2°, sol. in warm concd. H_2SO_4 with a golden yellow color and a green fluorescence; II also results in 78% yield by warming the mixt. of $C_{10}H_7OH$ and ClC_6H_4CHO in AcOH-HCl 1 hr. on the H_2O bath. II in AcOH-HCl, oxidized with MnO_2 and treated with solid $FeCl_3$, gives *ms-3-chlorophenyldinaphthopyrylium chloride ferrichloride*, red needles, m. 225–6°; *mercurichloride*, red needles with green metallic luster, m. 272°; *perbromide*, red needles, m. 205–6° (decompn.), *perchlorate*, bright red needles with green luster. The $FeCl_3$ salt in Me_2CO contg. a little H_2O gives *ms-3-chlorophenyldinaphthopyranol*, m. 254–5°, sol. in cold concd H_2SO_4 with an orange red color. *Et ether*, m. 215–6°; *Me ether*, m. 217–8°, the ethers result from the $FeCl_3$ salt and the corresponding alc.

C. J. WEST

The structure of organic molecular compounds with principles of two- and three-dimensional variation. EDUARD HERTEL AND GEORG H. ROMER. *Z. physik. Chem.*, Abt. B., **11**, 77–89(1930).—X-ray investigation of org. mol. compds. shows that not all can be built up on the principle of 3-dimensional variation. A 2-dimensional variation explains anthracene-1,3,5-$C_6H_3(NO_2)_3$. A 1-dimensional variation explains [fluorene]$_3$[1,3,5-$C_6H_3(NO_2)_3$]$_4$. The crystal structures of 1,3,5-$C_6H_3(NO_2)_3$ and 2,4,6-$MeC_6H_2(NO_2)_3$ are discussed.

FOSTER D. SNELL

Structure of nitrofuran and the mechanism of nitration in the furan series. B. T. FREURE AND JOHN R. JOHNSON. *J. Am. Chem. Soc.* **53**, 1142–7(1931).—2-Nitrofuran, prepd. by the decarboxylation of 5-nitrofuroic acid, is identical with the compd. obtained from furan by nitration; the latter had been incorrectly formulated by Marquis (*Ann. chim. phys.* **4**, 216(1905)) to be 3-nitrofuran. Evidence is presented to support the view that the intermediate nitroacetates, produced in the nitration of various furan derivs. in Ac_2O soln., are ring structures rather than open-chain enols. The mechanism of the nitration process is suggested tentatively to be a 1,4-addn. to the furan ring, without scission of the O bridge. Me furoate yields a *nitroacetate*, $C_8H_9NO_7$, m. 96.3° (cor.); on catalytic hydrogenation 2.5 mols. H are absorbed, water decomposes the compd.; warming with C_5H_5N gives Me 5-nitrofuroate, m. 81.6° (cor.)

C. J. WEST

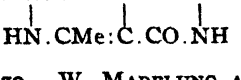
Local anesthetics in the pyrrole series. II. F. F. BLICKE AND E. S. BLAKE. *J. Am. Chem. Soc.* **53**, 1015–25(1931); cf. *C. A.* **24**, 1183.—In certain types of compds. at least, the following substitutions may be made in local anesthetics without loss, in a qual. sense, of anesthetic activity: the substitution of 2-pyrryl or Bz and 4-aminobenzoyl and the replacement of the NMe_2 and NEt_2 by the 1-pyrryl or the 1-pyrrolidyl nucleus. β-(1-Pyrryl)ethyl alc. (I), b_{12} 110–3° and K in C_6H_6, heated until the metal disappeared and then treated with BzCl, gave 78% of the *Bz deriv.*, $BzOCH_2CH_2NC_4H_4$, m. 53–5°. The K deriv. of I and *p*-$O_2NC_6H_4COCl$ in Et_2O-C_6H_6 give the *4-nitrobenzoate*, slightly yellow, m. 92–4°; catalytic reduction with Pt oxide in abs. EtOH gives the *4-aminobenzoate*, m. 87–8°. The *2-pyrroyl deriv.* m. 73–4°. *p*-$H_2NC_6H_4CO_2CH_2CH_2Cl$ and pyrrolidine, heated for 8 hrs. at 115–20°, give β-(*1-pyrrolidyl*)*ethyl 4-aminobenzoate*, m. 98–100°. γ-(1-Pyrryl)propyl alc., b_{748} 229–31°, gives a *Bz deriv.*, b_6 165–70°; the *4-nitrobenzoyl deriv.* m. 68–70°; the *4-aminobenzoyl deriv.*

m. 114–6°; the *2-pyrroyl deriv.* m. 69–70°. *γ-(1-Pyrrolidyl)propyl 4-aminobenzoate*, m. 84–5°. The K deriv. of MeEt(Me_2NCH_3)COH (II) and BzCl give stovaine. *Methylethyl(1-pyrrolidyl)methylcarbinyl benzoate*, from the carbinol, BzCl and C_6H_6 on heating 3 hrs. on the water bath. The *2-pyrroyl deriv.* of II m. 194–5°. *Dimethyl-1-pyrrylmethylcarbinol*, b_{2-3} 86–8°, gives oily Bz and 2-pyrroyl derivs. *Diethyl-1-pyrrylmethylcarbinol*, b_1 108–10°; the Bz deriv. was oily. The corresponding Et deriv. b_{4-5} 125–8°; the Bz deriv. was oily. The *4-(2-pyrroyl)-1-methyl derivs.* of the stable and labile forms of 2,2,6-trimethyl-4-hydroxypiperidine were prepd. from the 2 forms of 1-methylvinyldiacetone alkamine (K deriv.) and pyrroyl chloride; both m. 106–7° but a mixed m. p. was 80–3°. Notes are given on the prepn. of pyrrolidine. C. J. West

The preparation of hydroxyproline. Harriette K. Klabunde. *J. Biol. Chem.* **90**, 293–5(1931).—Hydroxyproline is readily obtained as a by-product during the isolation of proline from the products of the hydrolysis of gelatin by 33% H_2SO_4. In Town's procedure (*C. A.* **23**, 162) for the sepn. of the hydrolysis products proline and hydroxyproline occur in fraction 3, the Cu salts are sol. in both H_2O and MeOH. It is sepd. from proline by its insoly. in abs. alc. and can be isolated as the picrate from the alc.-insol. residue. Yields of 18–20 g. can be obtained from 1 kg. of gelatin

A. P. Lothrop

Heterocyclic ring systems. III. Ring closure reactions of heterocyclic *o*-dicarboxylic acids. Reinhard Seka and Heinrich Preissecker. *Monatsh.* **57**, 71–80 (1931); cf. *C. A.* **20**, 386.—Di-Et 2,5-diphenylfuran-3,4-dicarboxylate (1 mol.) and 7 mols. $N_2H_4.H_2O$, heated in EtOH 24 hrs. at 100–20°, give 76% of the *cyclohydrazide*, $C_{18}H_{12}O_3N_2$; the corresponding 2,5-di-Me ester reacts with the destruction of the ester Di-Et 2,5-dimethylpyrrole-3,4-dicarboxylate and 4.8 mols. $N_2H_4.H_2O$, heated 12 hrs. at 140–50°, give 80% of the *cyclohydrazide*, begins to carbonize at 295°, decomps. 359°; crystals from H_2O with 1 mol. solvent; the corresponding *2,5-di-Ph deriv.* m 324° (82% yield). *Pyrazolinedicarboxylic dihydrazide*, decomps. 170°, carbonizes 280° (86% yield); *dibenzohydrazone*, m. 218°; the ring system is very labile and could not be isolated. *2-N-Phenyl-1,2,3-triazole-4,5-dicarboxylic dihydrazide*, m. 225° (60% yield); *dibenzohydrazone*, m. 240°; heating *in vacuo* for 2 hrs. gives the *cyclohydrazide*, m. 317°. Imidazole-4,5-dicarboxylic acid does not give an anhydride or a cyclic hydrazide. **IV. Splitting of the furan ring systems with hydrazine hydrate.** *Ibid* 81–5.—Di-Et 2,5-dimethylfuran-3,4-dicarboxylate and 2.4 mols. $N_2H_4.H_2O$ in abs. EtOH, heated 24 hrs. at 100–20°, give the *compd.* $C_8H_{10}O_2N_4$, begins to carbonize at 315–20°; *tetra-Ac deriv.*, m. 140°; *tetra-Bz deriv.*, m. 190°. The same compd. is obtained by the action of $N_2H_4.H_2O$ upon $(EtO_2CCHAc)_2$. The compd. is believed to be 3,6-dimethyldihydropyridazine-4,5-dicarboxylic cyclohydrazide,



C. J. West

Bis(5-phenyl-2-pyrrole)indigo. W. Madelung and L. Obermann. *Ber.* **63B**, 2870–6(1930).—Posner (*C. A.* **21**, 87) considers the indigoid dyes to be intramol. quinhydrones (I), the secondary valences coming into play between the carbonyl O and the aromatic nucleus and the NH serving only to make the aromatic nucleus capable of entering into such a secondary valence union. It might be pointed out, however, that Friedländer and Kielbasinski's bis(5-phenyl-2-thiophene)indigo (*C. A.* **7**, 2193), in which the conditions demanded by P.s' theory are not fulfilled, is nevertheless very similar in color and properties to the normal thionaphtheneindigo. It seemed of interest to study more closely the relationship of a pyrroleindigo to the normal indole indigo, and *bis(5-phenyl-2-pyrrole)indigo* (II) was accordingly synthesized. It seemed that the logical starting material would be a phenylated deriv. of 3-hydroxypyrrole (designated as *pyrroxyl* by analogy with indoxyl) which should readily be converted by appropriate oxidizing agents into the corresponding indigo. K phenylglycidate, $NH_2CH_2CO_2H$ and KOH on the water bath yield 80% of the *di-K salt*, needles with $6H_2O$ from MeOH, m. 96°, crystals with $4H_2O$, m. 86°, from H_2O, of *α-hydroxy-β (carboxymethylamino)hydrocinnamic acid* (III), m. 235°. Attempts to apply the Heumann reaction to this acid were only partially successful in that the product of the KOH fusion yielded a very small quantity of an acid (not isolated) which on heating with water gave an oil which must have been the desired pyrroxyl, for treatment with $FeCl_3$ and water gave a small quantity of the corresponding II. KOH fusion is not practicable as a method of prepn., however, for by far the greater part of the III is completely destroyed. Attempts to bring about the ring closure by thermal decompn.

of the Ca or Th salt of III were likewise only partially successful. Ac_2O with the K salt of III, however, yielded 33% of *phenylacetylpyrroxylic acid (5-phenyl-1-acetyl-3-hydroxypyrrole-2-carboxylic acid)* (IV), m. 150°, decarboxylated by boiling 4 hrs. in water in a CO_2 atm. to the *pyrrole* (38% yield), m. 88°, gradually becoming reddish in the air. This with Ac_2O and a drop of concd. H_2SO_4 gave 33% of *5-phenyl-1,3-diacetoxypyrrole*, pale red, m. 181°, also obtained in small yield by heating III with Ac_2O. With $FeCl_3$ and HCl IV gave 80% II, brown-violet needles from C_5H_5N, m. somewhat above 300° with evolution of a red vapor, also insol. in most org. solvents in the cold, somewhat in hot C_6H_6 and AcOH, easily in hot C_5H_5N; the intensely red soln. in AcOH is turned pure blue by mineral acids; the H_2SO_4 soln. is orange-yellow. A 10^{-5} *M* soln. in C_5H_5N shows extinction below 560$\mu\mu$, lightening at 480–500$\mu\mu$, a 4×10^{-5} soln. in 50% H_2SO_4 lightening at 580–620$\mu\mu$, a 2×10^{-5} soln. of the acetate lightening at 540–560$\mu\mu$. With complex-forming metallic chlorides it forms complexes of different colors (blue with $SnCl_4$ in C_6H_6, brown-yellow with $TiCl_4$) which remain in soln., while dry HCl ppts. a blue HCl salt. The alk. $Na_2S_2O_4$ vat has only a slight affinity for cotton and imparts a very weak violet-red color. *Bis(5-Ac) deriv.*, brown-red, m. 220°, sol. in AcOH and C_6H_6 with intense red color, no longer has any basic properties or the ability to form metal compds. The properties of II show conclusively that P.s' theory as to the structure of indigo is incorrect. C. A. R.

Reaction of aliphatic imido ethers with hydrazine. WILFRID OBERHUMMER. *Monatsh.* 57, 106-11(1931).—HN:CHOEt and anhyd. N_2H_4 in abs. Et_2O give 25–30% of 1-amino-1,3,4-triazole, besides NH_4Cl and $N_2H_4.HCl$; with salts of N_2H_4 in abs. EtOH, only about 3% of the triazole was isolated. C. J. WEST

2-*N*-Phenyl-5-*C*-phenyl-1,2,3-triazolecarboxylic acids. MARIO GALLOTTI WITH G. BARRO AND L. SALTO. *Gazz. chim. ital.* 60, 866–72(1930).—In an analogous way to the transformation of phenanthrene to diphenic acid (I), the oxidation of 2-*N*-phenyl-1,2-naphtho-1,2,3-triazole leads to 2-*N*-phenyl-2,3-triazolylphenyl-*o*,4-dicarboxylic acid (II) (cf. Charrier and Gallotti, *C. A.* 19, 2205, 2954), but *2-N-phenyl-5-C-phenyl-1,2,3-triazole-4-carboxylic acid*, $PhC(:N.NPh.N:C)CO_2H$ (III) (see later) cannot be prepd. in this way because when II is heated alone or with soda lime or with NaOH it does not simply eliminate a CO_2H group or both CO_2H groups (as with I) with formation of III or *o*-$HO_2CC_6H_4C(:N.NPh.N:CH)$ (IV). The reaction is much more complicated, with formation of an anhydride deriv., whose constitution is not yet explained. It was of interest, therefore, in explaining the genetic relations between II and III and IV, and their possible transformation into 2-*N*-phenyl-5-*C*-phenyl-1,2,3-triazole (V), to attempt to prep. II, III and IV by some other method. The present paper describes the synthesis of III and unsuccessful attempts to prep. II. EtPhCO, treated with *iso*-$AmNO_2$ in the presence of a little anhyd. HCl, extd. with dil. NaOH, the ext. washed with Et_2O, AcOH added to the aq. residue and the ppt. recrystd. from dil. EtOH, yields 55–60% of BzC(:NOH)Me (VI). The latter and $PhNHNH_2$ yield, after recrystn. of the product from EtOH, almost 100% of *phenylhydrazone oxime* PhC(:NNHPh)C(:NOH)Me (VII), lustrous, m. 210°. VII (24 g.), added to Ac_2O (70 g.) at 50–5°, after several min. (when clear brown) made ice-cold and when solidified cold water (12 vols.) added, agitated for some time, the ppt. washed with cold water and recrystd. from 95% EtOH, yields the *Ac deriv.*, PhC(:NNHPh)C(:NOBz)Me (VIII), lemon-yellow, m. 137°. VIII (30 g.) and aq. Na_2CO_3 (14 g. in 650 cc.), heated 40 hrs. on a boiling water bath, cooled, satd. aq. $KMnO_4$ added until permanently red, excess $KMnO_4$ destroyed by aq. $NaHSO_3$ and dil. H_2SO_4, extd. with Et_2O, and the ext. evapd., yields 50% of crude 2-*N*-phenyl-4-*C*-methyl-5-*C*-phenyl-1,2,3-triazole (IX). IX (15 g.) and alk. $KMnO_4$ (26 g. and 66 cc. of 10% NaOH in 330 cc. water), refluxed for 100 hrs. (until homogeneous), decolorized with EtOH, filtered, the residue washed with boiling water, the combined filtrates concd., aq. HCl added, the ppt. recrystd. from boiling water, BzOH eliminated by subliming at 180° and the residue recrystd. repeatedly from water, yield III, m. 208–9°, stable above its m. p., but at 230° decomps. to an orange-yellow *substance* which sublimes at a still higher temp. This decompn. is more extensive than merely the elimination of CO_2, for in this case V would have been formed. III is a strong acid, turns blue litmus red, decomps. carbonates (with lively effervescence) and forms alk. salts extremely sol. in water and difficult to obtain in a cryst. state. Prepd. like VI, a 45–50% yield of *o*-$MeC_6H_4COC(:NOH)Me$ is obtained, and this with $PhNHNH_2$ yields almost 100% of the *phenylhydrazone oxime*, *o*-$MeC_6H_4C(:NNHPh)C(:NOH)Me$ (X), m. 175–7°. Following the same procedure as with VII, X (18 g.) and Ac_2O (55 g.) yield almost 100% of the *Ac*

deriv. of **X**, *o*-$MeC_6H_4C(:NNHPh)C(:NOAc)Me$ (**XI**), light yellow, m. 140°. **XI** (50 g.) and aq. Na_2CO_3 (30 g. in 1200 cc.), heated 40 hrs. on a water bath, and treated as before with $KMnO_4$, yields about 50% of crude *2-N-phenyl-4-C-methyl-5-C-tolyl-1,2,3-triazole.* C. C. DAVIS

A new synthesis of substituted thioxanthydrols. J. REILLY, P. J. DRUMM AND B. DALY. *Proc. Roy. Irish Acad.* **39B**, 515–22(1930); cf. *C. A.* **21**, 1253, 2885; **22**, 766.—$(p\text{-}MeC_6H_4)_2O$ (I) reacts with $C_6H_4(CO)_2O$ (II) or BzCl (III) and $AlCl_3$ to give only monosubstituted derivs. H_2SO_4 does not act upon the substituted *o*-benzoylbenzoic acid formed with II to yield a substituted anthraquinone but gives 2,7-dimethylfluoran (IV) instead. The product from the reaction of I with III is 9-phenyl-2,7-dimethylxanthydrol instead of the expected ketone so the formation of IV probably proceeds through a xanthydrol. Exactly similar results are obtained with $(p\text{-}MeC_6H_4)_2S$ (V) instead of I save that the condensation of V with III proceeds less smoothly. V, b_{16} 186°, m. 57.3°, was obtained in 70% yield by diazotizing $p\text{-}MeC_6H_4NH_2$, destroying the excess HNO_2 with $CO(NH_2)_2$ and slowly adding the diazonium chloride with vigorous stirring to $p\text{-}MeC_6H_4SH$ (VI) (1 mol.) in dil. NaOH (1 mol.) at 60–70°, keeping the mixt. at this temp. for 1 hr. after addn. is complete. (Explosive diazo thioethers result at lower temps.) $(p\text{-}MeC_6H_4)_2S_2$ (VII), m. 45.6°, was prepd. by adding 3.3 g. Br_2 to 5 g. VI in 100 cc. Et_2O at 0°. It dissolves in concd. H_2SO_4 to give violet to blue colors, whereas V gives only a faint green; hence it is probable that the violet color obtained by Dilthey and others (*C. A.* **24**, 91, 1855) with V was really due to VII. 2-*o*-Carboxybenzoyldi-*p*-tolyl sulfide (VIII) was prepd. by the Friedel and Craft reaction and by heating $p\text{-}MeC_6H_4SK$ with $o\text{-}(2,5\text{-}ClMeC_6H_3CO)C_6H_4CO_2K$ in the presence of a trace of Cu powder. The Ag salts were sparingly sol. in H_2O but sol. in dil. NH_4OH and the m. ps. and the mixed m. ps. were the same, 207°. VIII gave an oxime, m. 129°, and warmed with concd. H_2SO_4 gave 2,7-dimethylthiofluoran, m. 222°. 9-Phenyl-2,7-dimethylthioxanthydrol (**IX**) (from V and III), m 207°. It dissolves in AcOH with a pink color which becomes reddish orange on heating. It dissolves in H_2SO_4 to a reddish orange soln. with a brownish yellow fluorescence and the color is not destroyed nor is there pptn. on dilu with H_2O. Addn. of anhyd. $FeCl_3$ to an HCl satd. soln. of **IX** in AcOH forms a carmine-red ferrichloride, m. 202°. Satn. of a soln. of **IX** in anhyd. Et_2O with HCl gives deep red prisms of the chloride-HCl of **IX** which is readily sol. in $CHCl_3$ and in $PhNO_2$ but insol in Et_2O and in PhH. This compd. probably has a quinonoid rather than a sulfonium structure (cf. *Ber.* **37**, 2937; *C. A.* **4**, 1172). **IX** is slowly reduced by boiling in alc. HCl to the corresponding thioxanthene, m. 157°, but reduction by Zn in 80% AcOH is much more rapid. $PhNEt_2$ reacts with **IX** to give 4′-diethylamino-9,9-diphenyl-2,7-dimethylthioxanthene, colorless needles, m. 211°. C. H. PEET

Purely aliphatic *strepto*-pentamethin dyes. W. KÖNIG AND W. REGNER. *Ber.* **63B**, 2823–7(1930).—That compds. of the type $Alk_2N.(CH)_{2n-1}:NAlk_2X$ or, rather, $[Alk_2N^{+}\!\!-\!\!CH\!\!-\!\!CH\!\!-\!\!CH\!\!-\!\!CH\ldots\ldots CH\!\!-\!\!\!-\!\!NAlk_2]X^{-}$ are not only colored but have sufficient color strength and fiber affinity for practical dyeing purposes had not as yet been definitely proved, although indications of this had been obtained with the pentamethinium salts (n = 3). Zincke, at the beginning of his classical work on the cleavage of pyridine, had attempted to prep. the salts $[R_2N.CH.CH.CH.CH.CH.NR_2]X$ (I, R_2N = Me_2N and $CH_2.CH_2.CH_2.CH_2.CH_2.N$) but obtained them only in the form of very difficultly sol. $HgCl_2$ addn. compds., and he distinctly expressed the opinion that the salts themselves are so unstable that they cannot be isolated as such, and as the yellow color of the $HgCl_2$ compds. might to a certain degree be produced by the $HgCl_2$ the question whether these salts are real dyes remained unanswered. The desired evidence has now been supplied by the synthesis of the well-crystd. *perchlorates* (I, X = ClO_4). By the BrCN-C_5H_5N method they are formed only to a minor extent, together with many other products, which renders their purification difficult; they can also be obtained from $NHMe_2$ or piperidine with various di-*N*-arylaminopentamethinium salts, but these methods are far inferior to that depending on the treatment of the Zincke aldehydes, $ArAlkNCH:CHCH:CHCHO$, with $NHMe_2$ or piperidine in the presence of 1 equiv. of $HClO_4$. The 2 perchlorates are, in solid form, yellow with beautiful blue surface luster; they are relatively stable, easily dissolve in H_2O and alc. with green-yellow color and dye tannated cotton similarly to the auramines as regards tone and depth of color. The absorption curves of the 2 salts are almost identical; the NMe_2 compd. shows a single main band with a max. at 412$\mu\mu$ which is materially more persistent and narrower than the corresponding

band complex of auramine perchlorate; at around 300μμ the dye is extraordinarily transparent. Colorimetric comparison of alc. solns. of the Me_2N compd. and com. auramine G showed relative strengths of about 85:100. The fastness to light of the color on tannated wool was at least equal to that of auramine and the fastness to acids and alkalies was greater. A further striking property of the new salts is their strong luminescence under the Hanauer quartz lamp (intense green and orange-yellow for the Me_2N and piperidine compds., resp.); this fluorescence is shown only by the solids, not their solns., and is limited to the perchlorates. The *1,5-bisdimethylaminopentamethinium perchlorate* m. 165°; the *1,5-bis-N-piperidino salt* m. 111°. C. A. R.

Linear pentacene series. XX. Optical absorption of pentacene compounds. GUIDO MACHEK. *Monatsh.* **57**, 201–24(1931); cf. *C. A.* **24**, 5019.—Details are given, in tables and as curves, of the absorption of pentacene-6,13-monoquinone, pentacene-5,7,12,14-diquinone, 1,8-dihydroxypentacene-5,7,12,14-diquinone, the 6,13-di-HO deriv., the 1,8-di-Br deriv., the 6,13-di-Br deriv. and the 1,11-di-NO_2 deriv. in C_5H_5 and C_5H_5N and of the 1,11-di-Br deriv., the 2,9-di-Br deriv., the 1,8- and 1,11-diamino derivs., and the 1,8-di-NO_2 deriv. in C_5H_5N. The influence of the solvent and of the substituents of the absorption spectra is discussed. C. J. WEST

Alkali-organic compounds. VIII. Reactions between lithium alkyls, pyridines and condensed pyridine systems. K. ZIEGLER AND H. ZEISER. *Ann.* **485**, 174–92 (1931); cf. *C. A.* **24**, 5752.—Quinoline and a 1.32 *N* BuLi soln. in C_5H_5 give an addn. product (I) which, on decompn. with H_2O, gives 90% of *2-butyl-1,2-dihydroquinoline* (II), $b_{0.06}$ 128°, b_{14} 160–2°, d_4^{20} 0.997, n_α^{20} 1.5699, n_{He}^{20} 1.5772; *picrate*, deep red, m. 140–60°. Thermal decompn. of I gives 50–60% of *2-butylquinoline* (III), b_{14} 153° after purification through the *picrate*, m. 162–3°; the crude III also yields a *picrate*, m. 145°, probably that of the 4-Bu deriv. III has d_4^{20} 1.003, n_α^{20} 1.5699, n_{He}^{20} 1.5766. Heating II in 5 parts $PhNO_2$ gives 70–80% III. PhLi gives principally 2-phenylquinoline and a little 4-Ph deriv. Isoquinoline and BuLi give an unstable dihydro-1-butylisoquinoline, which $b_{0.4}$ about 135° and on dehydration by boiling in $PhNO_2$ gives 70% of *1-butylisoquinoline*, b_{14} 154–7°, b. 283–4°; *picrate*, m. 185.5°. PhLi gives the 1-Ph deriv. Acridine and BuLi give 9-butyl-9,10-dihydroacridine. 2-Butylpyridine and BuLi give *dibutylpyridine*, b. 243–4°; *chloroplatinate*, yellow, m. 192.5–3°. Quinaldine gives a Li deriv., which yields with PrBr III; $PhCH_2Cl$ gives 2-(β-phenylethyl)quinoline, m. 28°. Allyl chloride gives *2-(3-butenyl)quinoline*, b_{14} 152.5–4°, d_4^{20} 1.023, n_α^{20} 1.5853, n_{He}^{20} 1.5920; *picrate*, yellow, m. 143°. Ph_2CO gives *1,1-diphenyl-2-(2-quinolyl)ethanol*, m. 165°; H_2SO_4 in AcOH splits off H_2O and gives *2-(β,β-diphenylvinyl)quinoline*, m. 103–3.5°. The Li compd. of picoline and $PhCH_2Cl$ give 2-(β-phenylethyl)pyridine. C. J. WEST

Ultra-violet absorption spectra of the quinoline group. C. STANTON HICKS. *Australian J. Exptl. Biol. Med. Sci.* **7**, 171–81(1930).—Cinchonine, quinine, cinchotoxine, hydrocupreine, quinoline, cupreine, methylquinine, ethylquinine, ethylhydrocupreine, eucupine, yohimbine and euquinine were studied. The quinoline nucleus is the detg. factor in the absorption characteristics of the group. The absorption curves of stereoisomers were practically identical. Substitution in the quinoline HO group, reduction of the vinyl group, esterification, or opening of the quinuclidine nucleus, exert little or no effect upon the curves. The absorption curve of yohimbine is similar to that of indole and quinoline. C. G. KING

The alkyl-*py*-quinolines. (Generalization of the Skraup's reaction applied to α-alkylglycerols.) RAYMOND DELABY AND MLLE. JEANNE HIRON. *Compt. rend.* **191**, 845–7; *Bull. soc. chim.* [4], **47**, 1395–400(1930).—The alkyl-*py*-quinolines were obtained in low yields by means of the Skraup's reaction modified by the authors. They are clear yellow liquids possessing a strong odor, and were found to be mixts. of α- and γ-isomers, the former being present in greater quantities. The phys. properties of the following quinolines and their derivs. are: α-ethyl-, α-propyl and α-butylquinoline, resp., b_{18} 128-31°, 142–5°, 150–5°; d_{17} 1.050, 1.038, 1.020 (at 18°); n_D^{23} 1.5979, 1.5886, 1.5799; picrate, m. 148°, 159°, 143°; chloroplatinate, m. 188°, oily, 163.5°; chloromercurate, m. 118°, 112°, —; iodomercurate, m. 135°, —, —; iodobismuthate, m. 205° (decompn.), 186°, 163°. C. J. PEDERSEN

Methoxylated phenylquinolines or 2-phenyl-4-hydroxyquinoline. REINHARD SEKA AND WALTER FUCHS. *Monatsh.* **57**, 52–62(1931).—These compds. were prepd. as a preliminary step to the synthesis of certain flavones. PhNHBz gives 68.5% of a chloroimide, b_{20} 200–10°, m. 40°, which condenses with $CHNa(CO_2Et)_2$ in Et_2O, by heating 16 hrs. at 130–50°, giving 27.6% of the Et ester, m. 261–2°, of 2-phenyl-4-ketoquinoline-

carboxylic acid, which reacts with PCl_5 and NH_3 to give the *amide*, m. 208°, and with $N_2H_4.H_2O$ to give a *pyrazolone compd.*, $C_{16}H_{11}ON_3$, m. 317°. *p*-$MeOC_6H_4NHBz$, m. 156.5°, gives a chloroimide, b_{20} 220°, m. 63–4°; $CHNa(CO_2Et)_2$ gives 26.5% of the *Et ester*, m. 245°, of *2-phenyl-4-keto-6-methoxyquinoline-3-carboxylic acid*, m. 235°; sublimation at 12 mm. splits off CO_2, giving *2-phenyl-4-keto-6-methoxyquinoline*, m. 287°. *p*-$MeOC_6H_4NHCOC_6H_4OMe$-*p*, m. 202°, yields a *chloroimide*, b_{20} 215–25°, m. 109°; condensation with $CHNa(CO_2Et)_2$ gives the *Et ester*, m. 265–6°, of *2-p-methoxyphenyl-4-keto-6-methoxyquinoline-3-carboxylic acid*, m. 252°; the AcOH soln. shows a pale bluish yellow fluorescence. Sublimation in a high vacuum gives 70% of *2-p-methoxyphenyl-4-keto-6-methoxyquinoline*, crystg. with 1 mol. H_2O, m. 295°.

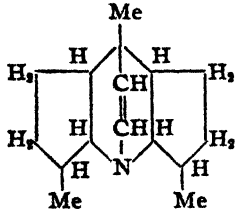
C. J. West

Pyrimidines. CXX. Action of ozone on uracil. Treat B. Johnson and Robert B. Flint. *J. Am. Chem. Soc.* **53**, 1077–81(1931); cf. *C. A.* **24**, 2462.—Uracil is not readily attacked by O_3 in glacial AcOH or 85% HCO_2H at room temp.; if, however, the pyrimidine is suspended in either solvent and washed O_3 is bubbled into such a suspension for several hrs., the uracil is finally completely destroyed; the 2 major products are oxaluric acid and *formylglyoxalurea*, $C_4H_4O_4N_2$, m. 162°, which does not yield a phenylhydrazone; the *Ag salt* crystallizes with 1 mol. H_2O; it reduces Fehling soln. and Tollens reagent; dil. H_2SO_4 gives HCHO and $CO(NH_2)_2$. Part of the uracil mol. is completely broken down with the formation of $CO(NH_2)_2$, $(CO_2H)_2$ and HCO_2H. **CXXI. Action of ozone on some derivatives of uracil.** *Ibid* 1082–7.—4-Methyluracil and O_3 give 67% of *acetylglyoxylurea*, m. 150°, $CO(NH_2)_2$ and $(CO_2H)_2$. 4-Phenyluracil gives benzoylglyoxylurea. Thymine gives 40% of $H_2NCONHCHO$; $AcCO_2H$ was not detected. 5-Bromouracil gives parabanic acid. 5-Nitrouracil reacts slowly (28 hrs.), giving parabanic and oxaluric acids. 1,3-Dimethyl-5-bromouracil gives *dimethyloxaluric acid*, m. 124–5°. These results show that the pyrimidine ring is destroyed with the formation of characteristic ureide constructions and simple oxidation products. In no case is the urea configuration of the respective pyrimidines destroyed by the O_3 treatment. The application of ozonization makes possible an improved technic for detg. the structure of uracil compds. The advantages gained exptly. become apparent when one is called upon to sep. and identify the products of oxidation.

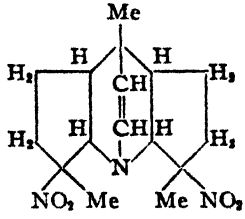
C. J. West

Nitrogen compounds in petroleum distillates. III. Structure of a hydroaromatic base of the formula $C_{16}H_{25}N$. W. C. Thompson and J. R. Bailey. *J. Am. Chem. Soc.* **53**, 1002–11(1931); cf. *C. A.* **24**, 1864.—The base (I), after purification through the picrate, b_{746} 278.2°, d_4^{20} 0.9391, n_D^{20} 1.5129, optically inactive; *picrate*, yellow, m. 151°; *acid sulfate*, m. 196°; *HCl salt*, m. 251°; *nitrate*, crystals with 1 mol. H_2O,

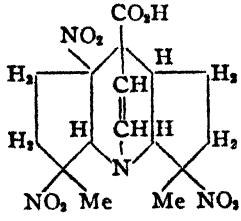
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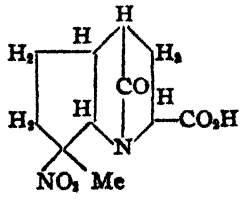
II



III



IV

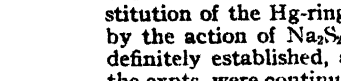


m. 79°, is dehydrated at 110° and then m. 141°, soly. in H_2O at 30° 1:20; *chloroplatinate*, decomps. 240°; *zinc chloride salt*, m. 171°; *mercurichloride*, softens at 250° and then decomps. without melting. I does not contain a *N*-alkyl group and cannot be dehydrogenated by $Hg(OAc)_2$ in 50% AcOH or by other methods; Br gives only a

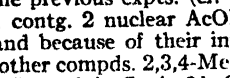
loose Br addn. product. Oxidation with $KMnO_4$ gives only $(CO_2H)_2$. I is not reduced by Na and abs. EtOH, Sn and HCl or HI and red P. I is regarded as *decahydro-3,5,8-trimethyl-4,8-ethenopyrindacine*. Nitration of I gives a mixt. of 4 products when heated at 170° for 3 hrs.; *3,5-di-NO₂ deriv.* (II), m. 116.5° (*picrate*, m. 231°); *decahydro-3,5-dimethyl-3,5,7a-trinitro-4,8-ethenopyrindacine-8-carboxylic acid* (III), yellow, m. 347° (decompn.); *octahydro-7-methyl-7-nitro-1,4-carbonylpyrindine-3-carboxylic acid* (IV), m. 189–90° (decompn.), readily oxidized with alk. $KMnO_4$; berberonic acid, m. 240–1° (decompn.). C. J. WEST

Oxidation of heterocyclic arsenic compounds by iodine. G. A. RAZUVAEV AND V. S. MALINOVSKII. *Ber.* **64B**, 120–30(1931); cf. *C. A.* **24**, 2132.—A new method for the *detn. of As* in alkyl and aryl derivs. of 9,10-dihydrophenarsazine (I), in 10-chloro-9,10-dihydrophenarsazine (II), in 9,10-dihydrophenarsazine oxide (III) and in phenoxarsine oxide (IV). A soln. of the sample in 15–20 cc. EtOH was dild. with H_2O until cloudy, and titrated with alc. I (0.1 *N* for 0.3–0.5 g. samples, 0.02 *N* for 0.1 g. sample) to a bright yellow color. During titration H_2O was added 2 or 3 times, so that the total vol. was 60–100 cc. The color appearing on the addn. of the 1st portions of I disappeared at once on shaking. Toward the end of the titration, 10–30 sec. was required for disappearance of the color. Finally 1–2 drops of I soln. gave a bright yellow color which lasted 24–48 hrs. This method is good for all derivs. of I which are not colored or contaminated with colored substances. The oxidation products must also be colorless or nearly so. The method is not good for I, since a brown color developed and obscured the end point. With IV, which is insol. in EtOH, the method was modified With both IV and II, the addn. of $NaHCO_3$ during the titration was advantageous. The results obtained by this new method were within the permissible limits of error. Before the oxidation products could be studied it was necessary to remove the HI also formed. This was done (1) by neutralization with NaOH, or (2) by pptn. with an excess of freshly pptd. Ag_2O and removal of the ppt. of AgI and Ag_2O by filtration. The products were obtained on concn. of the soln. and with a nearly theoretical yield in each case. Method 1 gave mainly the di-OH derivs. of the 10-R derivs. of I; method 2 gave the corresponding oxides. The products usually contained some H_2O of crystn. or hygroscopic moisture, which was removed by drying *in vacuo* (5–10 mm.) over P_2O_5. The di-OH derivs. dried *in vacuo* at 70–150° gave the oxides. The following oxidation products were isolated: di-OH deriv. of 10-Me deriv. of I, m. 210–15° (80% yield); the corresponding oxide (also obtained by drying the di-OH deriv. over P_2O_5) decomps. without melting at 256–7°; the di-OH deriv. of the 10-Et deriv. of I m. 141–3° when contg. H_2O; it m. 141–183° when H_2O-free; the corresponding oxide m. 239°; the di-OH deriv. of the 10-Pr deriv. of I m. 93°; the corresponding oxide m. 111–2°; the di-OH deriv. of 10-iso-Am deriv. of I m. 95–6°; the corresponding oxide m. 101–2°, hygroscopic; the 10-Ph deriv. of I was not obtained, the product being always the oxide, m. 280–300° (decompn.). Oxidation of III gave phenarsazinic acid (V); of II gave V; of IV gave phenoxarsinic acid, m. 221–2°; of $AsPh_3$ gave triphenylarsine dihydroxide, m. 112–4°. These oxidation products gave dark-red or cherry-red solns. in concd. H_2SO_4. The following derivs. of I were prepd.: 10-Pr deriv., from MgPrI and II, m. 81–2°; 10-iso-Am deriv., from iso-AmMgBr and II, m. 76–8°; 10-Ph deriv., from PhMgBr and II, m. 148–9°. LOUISE KELLEY

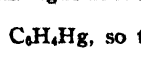
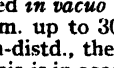
The formation of a closed heterocyclic ring of mercury atoms. II. L. VECCHIOTTI AND M. PANCIERA. *Gazz. chim. ital.* **60**, 904–9(1930); cf. *C. A.* **25**, 957.—The constitution of the Hg-ring compds. prepd. in the previous expts. (cf. V., *C. A.* **23**, 3447) by the action of $Na_2S_2O_3$ on $PhNH_2$ derivs. contg. 2 nuclear AcOHg groups was not definitely established, and in view of this and because of their interesting character, the expts. were continued with the prepn. of other compds. 2,3,4-$Me(AcOHg)_2C_6H_2NH_2$. 3,4-Diacetomercurio-*o*-toluidine (cf. V. and Copertini, *C. A.* **24**, 348) (6 g.) and aq $Na_2S_2O_3$ (10 g. in 10 cc.), let stand 1 month in darkness, filtered, the residue washed with water and dried over H_2SO_4 yield *3,4-bimercuri-bi-o-toluidine* (I), m. 200°, could not be obtained pure enough to det. the mol. wt. Its constitution is either



or



Because of this doubt, a quite different method was tried to obtain a compd., the identity of which could be more easily established. *o*-$C_6H_4Br_2$ (50 g.), 2% Hg-Na (500 g.), dry gasoline (50 g.) and AcOEt (5 g.), refluxed 5 hrs. at 120°, filtered hot, the gray product in the residue sepd. mechanically from the Hg, dried in air, washed with boiling water, dried, recrystd. from boiling cumene (because of the insoly. in all ordinary solvents) and washed with EtOH and then with Et_2O, and dried *in vacuo* over H_2SO_4, yields *1,2-bi-*

mercuribiphenyl (II), turns light brown when heated, but does not m. up to 300°. Its analysis corresponds to C_6H_4Hg, so that it is either  or $C_6H_4{:}Hg$. To decide between these 2 formulas, its decompn. was studied. II and glacial AcOH, refluxed for a long time, filtered hot, the filtrate cooled, and fractionally crystd. and the product dried *in vacuo* over H_2SO_4, yield a *bis(acetomercuri)benzene*, $(AcOHg)_2C_6H_4$ (III), does not m. up to 300°. The mother liquor from this crystn., neutralized with KOH and steam-distd., the distillate extd. with Et_2O and the Et_2O evapd. from the ext. yields C_6H_6. This is in accordance with the 1st formula of II given above, and with the reaction  + 2AcOH ⟶ III + C_6H_6. III (6 g.) and I (7.68 g.) in aq. KI (6 g. in 60 cc.), intimately mixed, let stand 24 hrs. at room temp., steam-distd., the distillate extd. with Et_2O, the ext. evapd., the residue cooled with ice, the solidified product dissolved in a min. of boiling EtOH, the soln. made ice-cold and the ppt. dried *in vacuo* over H_2SO_4, yields *o*-$C_6H_4I_2$, m. 27° (cf. Körner and Wender, *Gazz. chim. ital.* **17**, 491). This proves conclusively that II has the 1st formula given above.

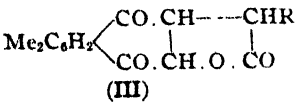
C. C. Davis

Attempted synthesis of a tricyclic system present in morphine. Richard H. Manske. *J. Am. Chem. Soc.* **53**, 1104–11(1931).—An attempt, thus far unsuccessful, to effect the synthesis of a portion of the morphine nucleus, is reported. Details are given of the prepn. of phenylsuccinic and β-phenylglutaric acids. Reduction of $EtO_2C{-}CHPhCH_2CO_2Et$ with Na and EtOH gives *2-phenylbutane-1,4-diol*, b_4 165°, sets to a solid glass at −10°; *bisphenylurethan*, m. 113°; dry HBr in Ac_2O gives the *dibromide*, b_{16} 173–5°, loses HBr readily and in several days turns turbid and dark; NaCN, followed by hydrolysis, gives *β-phenyladipic acid*, m. 146°; with PCl_5 and then $AlCl_3$ in CS_2, there results *1-keto-1,2,3,4-tetrahydronaphthalene-4-acetic acid*, but the yield was so small that it was not obtained in a state of purity; there also resulted a small quantity of *4,9-diketo-1,2,3,4-tetrahydroacenaphthene*, m. 149°. *3-Phenylpentane-1,5-diol*, b_4 174°; *bisphenylurethan*, m. 112-3°; the *dibromide*, b_{16} 177-82°, loses HBr readily and with EtOH-PhONa gives *3-phenyl-1,5-diphenoxypentane*, m. 72°. *γ-Phenylpimelic acid*, m. 84°; PCl_5, followed by $AlCl_3$, gives 53% of *1-keto-1,2,3,4-tetrahydronaphthalene-4-propionic acid*, m. 108-9°; the *Me ester* is a viscous oil; there also results in this condensation *hexahydrobenzonaphthene-α,α'-dione*, m. 111°; *dioxime*, m. 253-4°. β-Phenylglutaric acid, PCl_5 and $AlCl_3$ give *hydrind-1-one-3-acetic acid*, m. 155°; *Me ester*, b_{18} 175-80°, m. 54°. In the reduction of esters with Na, the use of EtOH is as satisfactory as the toluene method; in the case of the ester contg $PhO(CH_2)_3CN$, there results *α-phenoxybutyr-δ-phenoxybutylamide*, m. 94-5°. $PhO(CH_2)_5OH$ is obtained in 75% yield with the Na-EtOH reduction; $HO(CH_2)_{10}OH$ is obtained in 77% yield.

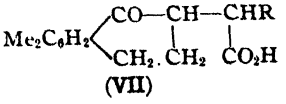
C. J. West

Syntheses in the field of the santonin derivatives. A. E. Chichibabin and M. N Shchukina. *Ber.* **63B**, 2793–806(1930).—This paper is published because of the appearance of the communications of Clemo, Haworth and Walton (*C. A.* **24**, 4046) and of Berg (*C. A.* **24**, 4300). The method chosen for the synthesis of santonin and related substances is closely analogous to that used for the synthesis of pilopic acid (*C. A.* **24**, 3015). Succinic esters and their homologs are condensed with oxalic esters to oxalosuccinic esters, $R'O_2CCHRCH(CO_2R')COCO_2R'$, which are reduced to the HO esters, $R'O_2CCHRCH(CO_2R')CH(OH)CO_2R'$, and these on heating yield the lactonic acid esters, O CO CHR CH(CO_2R') $CHCO_2R'$ which contain 3 asym. C atoms and may therefore exist in 4 optically inactive stereoisomeric forms. By condensation of the anhydrides or chloroanhydrides of these lactonic acids with aromatic compds. (especially *p*-xylene and $2,5\text{-}Me_2C_6H_3OMe$) it was planned to prep. the products of incomplete condensation, $2,5\text{-}Me_2C_6H_2COR''$ (I) and $2,5,4\text{-}Me_2(MeO)C_6H_2COR''$ (II) (R'' = —CH.O.CO.CHR.$CHCO_2H$), and those of complete condensation (III and IV) (IV = III with $Me_2(MeO)C_6H$ instead of $Me_2C_6H_2$). I and II on reduction should yield the dibasic acids $Me_2C_6H_2CH_2CH_2CH(CO_2H)CHRCO_2H$ (V) and $Me_2(MeO)C_6H_2CH_2CH_2CH(CO_2H)CHRCO_2H$ (VI) which by ring closure should give the tetrahydronaphthalene derivs. VII and VIII. Reduction of the ketone C:O group in VII and VIII and subsequent lactone formation should give compds. with structures (IX and X) which, when R = Me, have been shown by the work of C., H. and W. to be the structures of hyposantonin and desmotroposantonin Me ether. IX and X

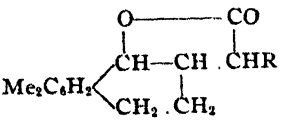
are also obtained by the method successfully used by C., H. and W., *viz.*, ring closure of **VII** and **VIII** to the unsatd. lactones, **XI** and **XII**, and reduction. Reduction of the two ketone C:O groups in **III** and **IV** should give compds. (**XIII** and **XIV**) having the structures which recently have usually been assigned to hyposantonin and desmotroposantonin Me ether. Sapon. of the MeO group in **X** and **XIV** would give the compds. (**XV** and **XVI**) having the 2 structures which have been given to desmotroposantonin. **XIII** and **XIV** can also be obtained in a more round-about way: reduction of **I** and **II** to $Me_2C_6H_3CH_2R''$ (**XVII**) and $Me_2(MeO)C_6H_2CH_2R''$ (**XVIII**) (R in R'' (see above) = Me), ring closure to the tetrahydronaphthalene derivs. (**XIX** and **XX**) and the reduction of the C:O groups to CH_2. All these syntheses might be rendered difficult by the presence of the 3 asym. C atoms but it was hoped that the intermediate products corresponding to the stable hyposantonin and desmotroposantonin might also be stable and therefore the most easily formed modifications. The work has not yet been completed and the results so far obtained are published now to reserve the right of further investigation along this new broad road to the synthesis of santonin-like lactones. From $EtO_2CCHMeCH_2CO_2Et$, $(CO_2Et)_2$ and NaOEt was obtained 80–90% EtO_2C-$CHMeCH(CO_2Et)COCO_2Et$ (probably a mixt. of stereoisomers), converted by reduction with amalgamated Al in moist Et_2O into 85% of a mixt. of esters of 3 stereoisomeric HO acids. On distn. *in vacuo* elimination of EtOH and lactone formation occurred and 200 g. of the reduction product after 15 fractionations yielded 88 g. liquid ester b_{13} 182–3°, d_{20} 1.1717, n_D 1.4498, 18 g. b_{13} 186–7°, d_{20} 1.1747, n_D^{20} 1.4507 and 13 g. solid ester, b_{13} 200–4°, m. 70°. Of these *di-Et 3-methylbutanolide-1,2-dicarboxylates*, the first yielded with boiling HCl a free *acid* m. 179–82°, which with AcCl gave, along with dimethylmaleic anhydride, the *anhydride*, m. 162°; *anilide*, from the anhydride and boiling $PhNH_2$, m. 212–4°. The ester b_{13} 186–7° gave an *acid* m. 186°, which strongly depressed the m. p. of the preceding acid and was for the most part unchanged by boiling AcCl, the small quantity which did react giving the above anhydride. The 2 acids are apparently *cis-trans* isomers. The solid ester gave an *acid* m. 185°, forming with AcCl an *anhydride* m. 201° which partly isomerizes into the 162° anhydride on distn. *in vacuo* and yields the same anilide with $PhNH_2$. The 162° anhydride with *p*-xylene and $AlCl_3$ gave the *acid* **I**, m. 171–3°, converted by heating 5 min. in concd. H_2SO_4 on the H_2O bath into an *isomer* m. 150°, which is obtained directly from the chloroanhydride of the 181–2° acid with *p*-xylene and $AlCl_3$. **I** and its isomer with amalgamated Zn and concd. HCl gave the *compd.* **V**, m. 161–3°, but with amalgamated Zn and AcOH they yielded a *compd* $2,5\text{-}Me_2C_6H_3COCH_2CH(CO_2H)CHMeCO_2H$, m. 169–72°, which is reduced to **V** by the Clemmensen method. The *chloroanhydride*, m. 182° (decompn.), of **I**, heated at 160–85°, yields the *diketone* **III**, light yellow, m. 137–9°, reacts neutral to litmus, sol. in boiling 10% but only difficultly in 0.1 *N* NaOH. The 162° anhydride with $2,5\text{-}Me_2C_6H_3OMe$ gives the *ketolactonic acid* **II**, m. 207–8° (together with a small quantity of a substance m. 156°), which is reduced by the Clemmensen method to the compd. **VI**, m. 131°, converted by demethylation with HI into the cryst. product from which was obtained, by the method of C., H. and W., their unsatd. lactone m. 250–2°.



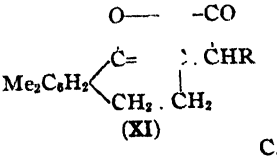
(III)



(VII)



(IX)



(XI)

C. A. R.

Sulfur sugars and their derivatives. XV. Nature of the sugar of mustard oil glucosides. Wilhelm Schneider, Hellmuth Fischer and Walter Specht. *Ber.* **63B**, 2787–98(1930); cf. *C. A.* **23**, 4932.—It has been established that the natural mustard oil glucosides are *S*-glucosides of the type $RN{:}C(OSO_3M)SC_6H_{11}O_5$ (M = K, an org. base, etc.) and it only remained to det. whether they are α- or β-glucosides. From their negative rotation and the fact that all plant glucosides hitherto investigated have been found to be derivs. of β-glucose, it was to be expected that these *S*-glucosides would also belong to the β-series, although Wrede had reported that the thio-

sugar obtained from sinigrin is not identical with the thioglucose synthesized by Schneider and collaborators which, from its method of prepn. and reactions, seemed to be beyond doubt a β-compd. The subsequent prepn. in pure cryst. form of the Na salts of the 2 mutameric thioglucoses and the exact characterization of the optical behavior of the free thiosugar undermined the ground on which Wrede based his conclusion that the thiosugar from sinigrin is the α-form and again left open the question of its configuration. Since the 2 typical glucosidases, emulsin and yeast maltase, cannot be used, the mustard oil glucosides being hydrolyzed only by myrosinase, which is sp. for them alone, and since the synthesis of these glucosides has not yet been effected, their configuration could be settled only by detg. that of the glucose set free by their cleavage. Preliminary expts. along these lines on sinigrin have already been described (S. and Becker, *C. A.* **24**, 2466). Contrary to this preliminary announcement, however, the initial rotation of the glucose liberated by myrosinase is not unequivocal. It was found that it is impossible to prep. an optically inactive myrosinase soln. and its rotation is so affected by NH_3 as to render it impossible to recognize with certainty any mutarotation effect of the sugar split off. The expts. described in the present paper, however, confirm the results given in the preliminary note and lead to the same conclusion on a firmer exptl. basis. The mustard oil glucosides are smoothly and rapidly decompd. by aq. $AgNO_3$, with pptn. of allyl mustard oil-$AgSO_4$ in the case of sinigrin and a mixt. of the mustard oil and sinapic acid Ag compds. in that of sinalbin, and if the HNO_3 set free is at once neutralized by carrying out the reaction in the presence of Ba or Ag carbonate, the reaction is practically complete in 0.5 hr. and the mutarotation of the liberated glucose is not unduly accelerated by the acid. Hg″ salts can also be used, although not so satisfactorily, for the decompn. From sinigrin, m. 127–9°, $[\alpha]_D^{18}$ —16.4° (H_2O, *c* 2.622), with 3 mols. $AgNO_3$ was obtained a glucose soln. with $[\alpha]_D^{20}$ changing from 81.0° 40 min. after adding the $AgNO_3$ to 64.7° after 120 min. and 53.7° for $t = \infty$ (20–30 hrs.). Sinalbin, m. 84–5°, $[\alpha]_D^{20}$ —8.76° (H_2O, *c* 0.2967), gave a glucose soln. with $[\alpha]_D^{20}$ 93.7°, 52.4° (const.) after 40 and 120 min., resp. With $Hg(OAc)_2$ the decompn. is so slow that at the end of 1 hr. the rotation is still rising because of the increasing concn. of sugar with high rotation, and only after 2 hrs. does the mutarotation begin to manifest itself by a decrease in the rotation. These results show plainly that the sugar split off is the α-form, and would seem to confirm Wrede's conclusion that sinigrin and sinapin are α-glucosides. The synthetic Na β-glucothiosate should then give with $AgNO_3$ β-glucose with a low initial rotation, but as a matter of fact there was obtained a glucose soln. with $[\alpha]_D^{20}$ changing from 68.5° after 45 min. to a const. value of 48.5° (that the final value is somewhat lower than the equil. value, 52.5°, for glucose is due to the fact that the colloidal glucothiose-Ag compd. is adsorbed on the $BaCO_3$-Ag_2S; if the decompn. is carried out in the absence of $BaCO_3$ the mutarotation is considerably accelerated but leads to const. values very close to 52.5°). In the desulfurization of β-glucothiose by $AgNO_3$, the glucose is therefore split off as α-glucose, and as the reaction is entirely analogous to that with the mustard oil glucosides the latter are certainly β-glucosides. This is confirmed by the formation of β,β-diglucosyl disulfide octaacetate, m. 140°, $[\alpha]_D^{21}$ —158.7° in $(CHCl_2)_2$, from sinigrin heated on the H_2O bath with about 2.2 mols. of 0.1 *N* NaOH, cooled to room temp., neutralized, immediately treated with 0.1 *N* I as long as it is used up, evapd. *in vacuo* and treated with Ac_2O in cold C_5H_5N. C. A. R.

Digitalinum verum. H. Kiliani. *Ber.* **63B**, 2866–9(1930).—For the hydrolysis of *Digitalinum verum* (I) K. had previously always used a dil. HCl contg. alc. and then treated the sugar soln., after removal of the digitaligenin, with Br to sep. the oxidation product of the digitalose as digitalonolactone (II) from the *d*-gluconic acid formed at the same time, but the yield of II was very small (never more than 10%). It therefore seemed desirable to devise another cleavage method for such glucosides, especially since the use of HCl contg. alc. leads to the formation of considerable quantities of ethylsugars, which greatly interfere with the sepn. and identification of the individual sugars. K. had left, from his earlier work, several kg. of digitalis by-alkaloids which, he found, still contained considerable quantities of I. This he extd. by a method similar to that used before but differing in the relative proportions of substance and solvents employed; he will publish the details of this method after he has tested it on a com. by-product to be soon supplied to him. The 90 g. of crude I he obtained by his new method was purified by the method previously described but for its hydrolysis he used an acid contg. AcOH instead of alc. (35 cc. glacial AcOH, 55 cc. H_2O and 10 cc. concd. HCl); the solvent action of the AcOH on both the glucoside and the genin is

about the same as that of the alc., no ethylsugars are formed and, because of the dilu. and the presence of HCl, the danger of acetylation is exceedingly small. Details of the hydrolysis and of the working up of the sugar soln. for II are given. The yield of II is regularly around 40%. Attention is called to an error in Haworth's book, *The Constitution of Sugars*. C. A. R.

Strophanthin. XIX. The dehydrogenation of strophanthidin and gitoxigenin WALTER A. JACOBS AND ELMER E. FLECK. *Science* **73**, 133–4(1931); cf. *C. A.* **24**, 5773.—The Se method of dehydrogenating is used and gives promising results pointing toward the structure of the hydrocarbon upon which these aglucones are built. Four fractions were obtained from strophanthidin and 2 from gitoxigenin. The hydrocarbon obtained from fraction II from gitoxigenin resembles the $C_{23}H_{18}$ hydrocarbon obtained from fraction 4 from strophanthidin. W. H. TIFFANY

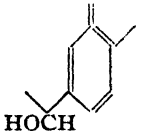
Unedoside, a new glucoside hydrolyzable by emulsin, from the fresh leaves and branches of Arbutus unedo L. M. BRIDEL AND (MLLE.) C. BOURDOUIL. *J. pharm. chim.* [8], **12**, 241–53; *Bull. soc. chim. biol.* **12**, 910–20(1930). cf. Bourquelot and Fichtenholz, *C. A.* **4**, 2948.—Unedoside (I), obtained with a yield of only 0.1 g. per kg. of fresh leaves or branches, is sol. in water (3% at ordinary temp.) and 95% alc. and insol. in Et_2O, crystallizes from Me_2CO contg. 7% water in long prisms, m. 225.5°; loses only 0.35% of its wt. *in vacuo* at 50°, $[\alpha]_D$ −112.43°, $[\alpha]_{5461}$ −133.92°, reducing power, 0.853 that of dextrose, similar to that of verbenaloside (verbenalin; Bourdier, *C. A.* **2**, 661, 1595); the latter differs, however, by a higher m. p. and lower $[\alpha]$. Upon hydrolysis with H_2SO_4 I gives a black ppt. caused by the decompn. of the nonglucidic product *unedol;* the rotation becomes pos., but the reducing power diminishes by more than 20%. Following hydrolysis of I with emulsin, unedol does not form a black ppt. as with H_2SO_4, but the soln. turns red-brown, unedol ppts. and the reducing power of the soln. diminishes; hence I is the only glucoside whose hydrolysis is characterized by a *loss* of reducing power. Unedol has been crystd ; it also possesses reducing properties. A bibliography of 8 references is added. S. WALDBOTT

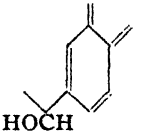
Chlorophyll. XV. Phyllo- and pseudophylloerythrins. H. FISCHER, OTTO MOLDENHAUER AND OSKAR SÜS. *Ann.* **485**, 1–25(1931); cf. *C. A.* **25**, 961.—Phylloerythrin (I) gives with MeOH-KOH a quant. yield of the *K salt*, $C_{33}H_{33}N_4O_3K$, sol. in H_2O but insol. in all org. solvents; 12% HCl gives I. Heating I with *m*-$C_6H_4(OH)_2$ gives a porphyrin spectroscopically identical with pyrroporphyrin I in AcOH-concd. HCl, treated with H_2O_2, gives a Cl deriv , probably a mixt. of $C_{32}H_{32}N_4O_3Cl_2$ and $C_{33}H_{33}N_4O_3Cl$. I and $H_2NCONHNH_2$ in C_5H_5N yield the *semicarbazone*, small needles, $C_{34}H_{37}N_7O_3$, for which the spectrum in C_5H_5N is given; the max. is at 631.2; the *Me ester*, $C_{36}H_{39}N_7O_3$, forms deep red prismatic needles. $N_2H_4 \cdot H_2O$ and I give a *hydrazone*, prismatic needles with a red-violet surface luster; the spectrum is shifted to the violet; after short exposure to light the spectrum of I is again seen I also yields an *oxime*, $C_{33}H_{35}N_6O_3$, prismatic needles; the *Me ester*, m. 270° (decompn.), forms deep red needles. Reduction of I by heating with EtONa and $N_2H_4 \cdot H_2O$ 6 hrs. at 165–70° gives *desoxophylloerythrin* (II), $C_{33}H_{36}N_4O_2$, prisms or prismatic needles with blue-violet surface luster; HCl no. about 1.5; the spectrum is given in pyridine-ether and HCl; *Me ester*, m. 264° (cor.); *Fe complex*, $C_{34}H_{36}N_4O_2FeCl$, prismatic needles; *Cu salt*, tablets from $CHCl_3$-MeOH. Reduction of the semicarbazone of I with EtONa at 168° gives a porphyrin spectroscopically identical with isopheoporphyrin a_3. Pseudophylloerythrin (III) with ice-cold oleum for 15 min. gives I; while 2 mols. I crystallizes with 1 mol. $CHCl_3$, III does not do so, even after heating with HCO_2H 24 hrs., showing that III is unchanged by this treatment. Oxidation of III with H_2O_2 gives rhodoporphyrin and a 2nd product, probably isochloroporphyrin e_4. III gives an *oxime* (*Me ester*) and a *semicarbazone*. The di-Me ester of diacetyldeuteroporphyrin yields a *dioxime*, needles, and a *semicarbazone*, for which the spectra are given. Reduction of this ester gives a mixt. of hemo- and mesoporphyrins. II does not react with EtONa and N_2H_4 at 170°. 3,4′-Dimethyl-4,3′-diethyl-5-bromo-5′-bromomethylpyrromethene-HBr and 3,3′,4′,5′-tetramethyl-4-propionic acid-pyrromethene-HBr, on fusion with $(CH_2CO_2H)_2$ at 210° give *1,3,5,6,7-pentamethyl-2,4-diethyl-8-propionic acid-porphin*, whose *Me ester*, $C_{38}H_{48}O_2N_4$, m. 242° (cor.); its spectrum is entirely different from that of II. The Fe and Zn salts of III are reported. C. J. WEST

The enzymic hydrolysis of gelatin in its relation to the formation of diacipiperazines. A. BLANCHETIÈRE. *Compt. rend.* **191**, 1479–81(1930); cf. *C. A.* **23**, 1619, 2698, **4219**.—A relation has been pointed out between the N of the diacipiperazines formed in fermentative hydrolysis of proteins and the N content of certain amino acids known to be resistant to hydrolysis. Gelatin differs much in chem. behavior from ovalbumin and gliadin. In peptic digestion, the ratio of diacipiperazine N in

gelatin as compared with that in ovalbumin is 0.64 while the corresponding ratio of amino acid to ovalbumin is 0.97. In comparative expts., the ratio of diacipiperazine N in gelatin to that in gliadin is 0.295 while the corresponding ratio of amino acid to gliadin is 0.471. This is interpreted to indicate that the diacipiperazine N is less in gelatin than in certain resistant anhydrides of amino acids, and also that gelatin has less N linked by cyclopeptidic structure than has ovalbumin or gliadin. N. M. N.

Ergosterol and some of its derivatives. Z. DE BOE. *Bull. acad. roy. méd. Belg.* **10**, 336–75(1930); cf. Castille, *C. A.* **24**, 5320.—A critical review, with 34 references, of the literature on the *isomerization, reduction* and *oxidation derivs.* of *ergosterol A* (I) and a study of certain isomerizations and reductions of I. *"Iso-ergosterol"* was prepd. according to Reindel (cf. *C. A.* **21**, 1464) and, confirming Heilbron (*C. A.* **24**, 1388), shown to consist of a mixt. of *isoergosterol B* (II) and *ergosterol B* (III), both of which possess a secondary alc. group and 3 double bonds and correspond to $C_{27}H_{42}O$. II, crystd. from MeOH-EtOAc (4:1) or EtOH, m. 135–6°, has α —66° and forms an *acetate* (IV), m. 112°. III m. 145–6° and turns on standing into II. Sapon. of its *acetate* (V), m. 139°, yields mainly II. The ultra-violet absorption spectra of II–V in C_6H_{14} and EtOH-Et_2O are described. A mixt. of II and III was also obtained by the action on I of dry HBr at 0°, while by boiling I with H_2SO_4 in EtOH only II was formed. From a soln. of I in dry pyridine and BzCl kept at 0°, *ergosterol benzoate*, m. 164–5° after recrystns. from MeOH and Et_2O, was isolated. Its absorption spectrum in EtOH and C_6H_{14} is described. By heating I with BzCl to 150–70°, *isoergosterol benzoate*, m. 125–6° after recrystn. from MeOH-EtOAc, is formed. Sapon. with KOEt yields a mixt. of II and III. From the absorption spectra the conclusion is drawn that the isomerization of I into II and III consists of a shifting of double bonds such as



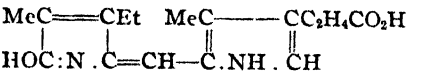


By refluxing I in AmOH in presence of Na and avoiding air oxidation, *dihydroergosterol A*, $C_{27}H_{44}O$ (VI), free of I and m. 208–9° after crystn. from dry MeOH-EtOAc or dry Et_2O, was obtained, while crystn. from ordinary EtOH gave the *dihydrate* of VI, m. 205° and retaining 2 H_2O even after 6 hrs. at 120° over H_2SO_4. From the MeOH-EtOAc filtrates *isodihydroergosterol A*, $C_{27}H_{44}O$ (VII), m. 173–4°, was isolated. Sapon. of the *acetate* of VI, m. 181°, gave VII. These relations are confirmed by a study of the absorption spectra. A similar reduction of III could not be realized, but when III was refluxed in AmOH in presence of Na, *α-isoergosterol B*, m. 188–90°, possessing 3 double bonds and 1 secondary alc. group, could be isolated. Sapon. of its *acetate* m. 112° gave II. The corresponding absorption spectra are reported. It is shown that Heilbron's observations on the alleged isomerization of VI (*C. A.* **24**, 623) by HCl gas are merely due to a m.-p. depression caused by transformation of I, present in impure prepns. of VI, into III; no isomerization being observed with pure VI. An attempt to reduce I by HI and red P at 230° led to a non-cryst. material free of alc. groups, evidently contg. only 1 double bond and possibly consisting of a mixt. of *ergostane*, $C_{27}H_{48}$, and *ergostene*, $C_{27}H_{46}$. The same mixt. seems to be formed by the same reduction of II. G. TOENNIES

Soy-bean lecithin. II. Lecithins of the α-series. YOSHIKUNI YOKOYAMA AND BUNSUKE SUZUKI. *Proc. Imp. Acad.* (Japan) **7**, 12–4(1931); cf. *C. A.* **25**, 530.—The α-lecithins obtained as double salts with $CdCl_2$ were brominated and fractionated by means of petr. ether, Et_2O and $CHCl_3$; 4 bromides were isolated, the first 3 being oils: *palmito-linoleo-α-lecithin, oleo-linoleo-α-lecithin, dioleo-α-lecithin* and *dilinoleo-α-lecithin*, m. 113–4°; these structures were established by hydrolysis and identification of the fatty acids. C. J. WEST

Neo-, xantho-neobilirubic acid and partial synthesis of mesobilirubin and mesobilirubinogen (urobilinogen). H. FISCHER AND RICHARD HESS. *Z. physiol. Chem.* **194**, 193–228(1931).—Bilirubin, the biol. degradation product of the blood pigment, contains 33 C; its cleavage product, bilirubic acid, obtained by energetic reduction, contains 17 C and represents, therefore, only 0.5 of the bilirubin mol. The other half has hitherto escaped identification. This unknown half of the bilirubin mol., *neobilirubic acid* (I), has now been isolated and identified. The method employed for the cleavage of bilirubin was the resorcinol fusion used by Schumm (*C. A.* **23**, 153)

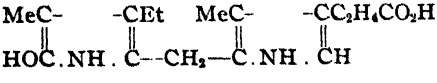
for breaking off the unsatd. side chains of hemin. Bilirubin itself did not give satisfactory results under this treatment, but its hydrogenation product, mesobilirubin, yielded a yellow cryst. product *neoxanthobilirubic acid* (II). The relationship between II and I is that of pigment and leuco compd. The synthesis of mesobilirubin was effected by condensing 2 mols. of II with 1 CH_2O. This supplies the additional C atom of the bilirubic acid half of the mol., the other half being neobilirubic acid itself. *Neoxanthobilirubic acid* (II), m. 229° (*Me ester* m. 190°), was prepd. by adding mesobilirubin to boiling resorcinol, pouring the molten mass into H_2O, extg. the ppt. with $CHCl_3$ and recrystg. from MeOH. It contains a free CH since it yields a cryst. *monoazo dye*, m. 193° (decompn.), with PhN_2Cl. Bromination converts it into a *mono-Br deriv.*, darkens 171° but does not m. below 350°, in which the Br is substituted on a pyrrole nucleus. With $C_6H_4(CO)_2O$ at 180-90° it forms an orange-yellow *phthalide*, m. 298°. On reduction with Na-Hg it yields the leuco compd. I, which gives an intense Ehrlich reaction and on treatment with MeOH at 190° reverts to II. On oxidation it yields methylethylmaleic imide, m. 67°. It contains 1 CH_2 less than xanthobilirubin. The probable formula of II is



While bilirubic acid breaks down into cryptopyrrole and cryptopyrrolecarboxylic acid, a substance of the above structure should yield cryptopyrrole and hemopyrrolecarboxylic acid. Both of these products were actually obtained and identified. The pyrrole ring contains a reactive CH which condenses with aldehydes, 2:1. With BzH the product is *bis(neoxanthobilirubic acid)phenylmethane*, m. 257°, represented by the formula

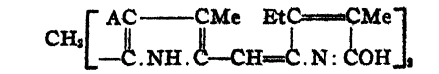


In the Gmelin reaction this product gives a sequence of colors similar to that of bilirubin. It is the first synthetic product to give this characteristic reaction. When reduced with HI-AcOH it yields *benzylneobilirubic acid*, m. 187°. The other product should be I, but it has not yet been identified. Other aldehydes give similar condensation products with II; *o*-$O_2NC_6H_4CHO$ ⟶ *bis*(II)-*o-nitrophenylmethane*, m. 259°, *p*-$Me_2NC_6H_4CHO$ ⟶ *bis*(II)-*p-dimethylaminophenylmethane*, m. 239°, 4-methyl-3,5-dicarbethoxy-2-formylpyrrole ⟶ *condensation product*, m. 239°, AcH ⟶ *bis*(II)*methylmethane*, m. 267°, CH_2O ⟶ *bis*(II)*methane*, m. 310°. This last product coincides with *mesobilirubin* in cryst. form, m. p., mixed m. p. and Gmelin reaction. It gives the same *Me ester*, m. 190°, which forms the same red *HCl salt*. Both mesobilirubin and the synthetic product are reduced by Na–Hg to the leuco deriv., *mesobilirubinogen*, both give an intense diazo reaction, and with $Zn(OAc)_2$ yield *urobilin*, m. 192°, with its characteristic fluorescence. The crystallographic identity is complete. All of the above aldehyde condensation products are yellow and well crystd. Condensation products were also obtained with MeAc and with camphor. Reduction of II by HI-AcOH or by Na-Hg gives the leuco compd. *neobilirubic acid* (I), m. 185°. This gives a sharp m.-p. depression with bilirubic acid which m. 187°. Like II it contains a free CH and condenses with aldehydes. The condensation product with BzH, m. 248°, is identical with that obtained from mesobilirubin and BzH (Me ester m. 212°). The PhCH deriv. is reduced by HI-AcOH to *benzylneobilirubic acid*, m. 189°. The latter cannot be brominated, but with Br-AcOH it undergoes oxidation to *benzylideneneobilirubic acid*, m. 248°. These 2 substances represent pigment and leuco compd. Bilirubic acid, on the other hand, does not condense with BzH since the pyrrole rings are completely satd. The formula for I is

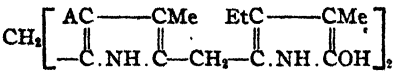


Reduction of mesobilirubin by HI-AcOH gives both halves, I and bilirubic acid, in 50% yield. They may be sepd. by $CHCl_3$ in which the former is difficultly and the latter easily sol. The condensation products of I and II with aldehydes represent 2 distinct types, similar to those obtained with simple pyrroles, *viz.*, the tripyrrylmethanes and the dipyrrylmethenes. MeAc condenses first to mesityl oxide and

this with II to *bis*(II)*isobutylenemethylmethane*, m. 246°. Mesobilirubin is



and its leuco compd., *urobilirubinogen*,



The main difficulty in explaining the urobilin reaction is the fact that dehydrogenation does not give mesobilirubin. Air oxidation gives, instead, urobilin. Perhaps the formation of urobilin consists in dehydrogenation to a trimethin pigment in which numerous possibilities of isomerism exist. Such a structure would be extremely unstable and inclined to formation of resins. All this confirms the supposition that hemin consists of 4 pyrrole rings which are linked by 4 methin bridges. Hemin contains 34, bilirubin 33 C atoms. A connecting CH group thus steps out and is replaced by 2OH in the opened porphin ring, and the new bis(hydroxypyrro)methin pigment, the hypothetical structure of urobilin but with C_2H_3 in place of Et groups, would then occur as intermediate product in the formation of bile pigment. There still remains, however, the possibility of a more complete breakdown of the blood pigment and a resynthesis to bilirubin from the resulting fragments. A. W. Dox

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The structure of quinoid compounds and of a molecular compound of the quinhydrone type (Hertel, Römer) **2.** The crystal structure of the diphenylpolyenes (Hengstenberg, Kuhn) **2.** A determination of the molecular weight of methylbixin by means of x-rays (Hengstenberg, Kuhn) **2.** A powder spectrometric study of urea (Wyckoff) **2.** Vapor pressures of some hydrocarbons (Linder) **2.** Studies in x-ray diffraction. III. Aromatic hydrocarbons in the solid and liquid states (Krishnamurti) **3.** The primary oxidation of bituminous coal (Fuchs, Horn) **21.** Anodic oxidation of AcOH in H_2SO_4 solution (Schreiner) **4.** Polymerization and thermal decomposition of C_2H_2 (Schläpfer, Brunner) **2.** The dehydrating action of coal ash (Tanaka) **18.** Frangularoside (Bridel, Charaux) **11D.** Composition and properties of certain red and yellow plant pigments (Bilger) **11D.**

Bodroux, Fernand: **Cours de chimie organique à l'usage des candidats aux certificats d'études physiques, chimiques et naturelles.** Paris: Vuibert. 242 pp.

Wertheim, Edgar: **Essentials of Organic and Biological Chemistry.** Easton, Pa.: The Chemical Pub. Co., Inc. 175 pp.

Condensing hydrocarbons. Imperial Chemical Industries, Ltd. Fr. 694,350, Apr. 23, 1930. Aromatic or unsatd. hydrocarbons are prepd. by passing hydrocarbons contg. at least 2 atoms of C per mol. through a heated space at a temp. of at least 1000° or 1100°, preferably 1200°, and at a volumetric speed of 50 or 100, preferably more. The treatment may be carried out in several steps with removal of aromatic hydrocarbons between the steps, the temp. and speed increasing from step to step. The walls of the reaction chamber may be made of agglomerated SiC or graphite or an alloy resistant to heat. If it is desired to favor the production of $C_{10}H_8$ the walls may be made of sillimanite.

Synthetic hydrocarbons. Henry C. Wade. Fr. 694,924, Mar. 29, 1930. Liquid synthetic hydrocarbon products are prepd. by vaporizing crude petroleum or portions thereof having relatively high b. ps. or liquefied coal or like materials, and during this treatment leading the vapor through a spiral path with speed and without pressure, and through a zone contg. a metallic catalyst at a moment when the hydrocarbon reaches the atomic state and along with steam to produce nascent H and free C which combine. The vapors are condensed or fixed in the state of gas by a suitable heat treatment. An app. is described.

Hydrogenating aromatic hydrocarbons and their derivatives. I. G. Farbenind. A.-G. Brit. 336,583, July 10, 1929. Compds. such as C_6H_6, naphthalene or their hydroxy or amino derivs. are hydrogenated at temps. below 350° in the presence of mixed catalysts immune from poisoning from S and the like and which comprise oxides or hydroxides or sulfides of metals of group 6 of the periodic system in admixt. with

metals of group 8 or heavy metals of group 1 (as such or in the form of their compds.) deposited on carriers of large surface. Examples are given of the use of sulfides of Pt and of W deposited on active silica, oxides of Ni and Mo and $CaCO_3$ deposited on active charcoal, and sulfides of Co and Mo deposited on Florida earth.

Hydrocarbon derivatives. I. G. FARBENIND. A.-G. Fr. 695,095, May 5, 1930. Hydrocarbon derivs. contg. in the mol. more than one halomethyl group are prepd. by the reaction on polynuclear hydrocarbons, of an aq. soln. of CH_2O satd. with hydracids. Examples are given of the prepn. of di(ω-chloromethyl)naphthalene, m. 130–140°; chloromethyl derivs. of $C_{14}H_{10}$ and a product corresponding to $C_{10}H_{10}(CH_2Cl)_2$, m. 117.5°.

Halogenation of paraffin hydrocarbon series. N. V. BATAAFSCHE PETROLEUM MAATSCHAPPIJ. Dutch 23,383, Jan. 15, 1931. For the halogenation of satd. aliphatic hydrocarbons an enameled reaction vessel is used; this prevents both corrosion and C liberation.

Halogenated isocyclic compounds. I. G. FARBENIND. A.-G. Brit. 335,948, April 3, 1929. Isocyclic compds. substituted in the nucleus by Cl or Br or both are prepd. by reaction on isocyclic compds. with HCl or HBr or both in oleum or chlorosulfonic acid or their mixts. in the presence of halogen carriers such as S, I, Sb, As, Bi, Hg or their compds. Temp. conditions may be chosen to avoid or favor side-reactions such as prepn. of halogenated sulfonic acids or halogenated quinones. Among the starting materials which may be treated are benzene, naphthalene, anthracene, pyrene, perylene and their nitro, amino and halogen derivs., benzanthrones, dibenzanthrones, *ms*-benzodianthrones, *ms*-naphthodianthrones, *allo-ms*-naphthodianthrones, *ms*-anthradianthrones, anthanthrones, dibenzopyrenequinones or isomeric compds.

Converting olefins into higher olefins and aromatic hydrocarbons, etc. I. G. FARBENIND. A.-G. Brit. 336,234, May 4, 1929. Starting materials such as C_2H_4, C_3H_6, C_4H_8 or gas mixts. contg. them such as casing head gases or gases produced in cracking mineral or tar oils are brought into contact with elementary Si or a Si-contg. material such as ferro-Si contg. a large proportion of Si, in the form of small pieces or bricks (suitably at 350–800° and under pressures which may be up to 1000 atm. or more). App. is preferably used which resists H_2S and which does not cause deposition of C, such as "V2A" steel or steels contg. Mo and W. Various details and examples are given.

Separating olefins. N. V. BATAAFSCHE PETROLEUM MAATSCHAPPIJ. Fr. 694,323, Apr. 23, 1930. The concn. of one constituent of a fluid mixt. is increased by effecting the fractionated distn. of the mixt. in the presence of a solvent having a selective attraction toward one of the constituents. Thus, to sep. a mixt. of olefin hydrocarbons and paraffins NH_3 is added. An example is given of the sepn. of butylene and butane.

Oxidation products from hydrocarbons, waxes, etc. I. G. FARBENIND. A.-G. Brit. 337,130, Sept. 12, 1929. An app. is described for producing oxidation products from solid or liquid hydrocarbons, waxes and the like by the action of oxidizing gases, in which cooling liquid is sprayed on the outer surface of the reaction vessel which is surrounded by a pressure-tight cooling jacket.

Oxygenated organic compounds from carbon oxides and hydrogen by catalytic reactions. H. DREYFUS. Brit. 337,014, July 24, 1929. Compds. such as EtOH, HOAc, acetaldehyde, MeOAc and higher homologs are made by use of catalysts comprising ferrites, ferrates, cobaltites or cobaltates such as those of alkali or alk. earth metals or of Al, preferably at temps. of 200–600° (suitably 250–350°) under 50–500 atm. or higher pressure. There may be used coke-oven gases, producer gas or water gas which may be preliminarily treated if desired to effect formation of synthetic products such as MeOH or EtOH in the presence of a catalyst such as ZnO or a basic chromate. The catalysts may be used in connection with Zn, Mg, Ca, Al, Cr, Mo, V, W or U or their oxides or other compds. Cu may be present, and the app. used may be of Cu or steel lined with Cu or of steel contg. Mo, W, Co or Ni.

Organic bases. I. G. FARBENIND. A.-M. (Otto Nicodemus and Walter Schmidt, inventors). Ger. 516,765, Sept. 27, 1928. Addn. to 479,351 (*C. A.* **23**, 4709). Org. bases, generally of the pyridine series, are prepd. by passing C_2H_2 and the vapor of an aliphatic primary or secondary amine at 250–400° over a catalyst comprising an inorg. or org. salt capable of combining with NH_3, or a metal oxide such as Fe_2O_3, ZnO or Al_2O_3. Examples are given.

Organic isocolloids. LASZLÓ AUER and LAJOS SUSZTEK. Fr. 694,339, Apr. 23, 1930. The phys. properties of org. isocolloids composed of unsatd. org. acids of high mol. wt. or contg. such acids, are modified by incorporating therein, by soln. or dispersion, soaps of alkali or alk. earth metals, Zn, Mg, etc., and heating to a relatively

low temp. The treated products may be vulcanized. Examples are given in which linseed oil, K or Na soap and linseed oil acids are heated to about 200°. An after treatment with S gives products which are useful *in varnish and rubber manuf.* Cf. *C. A.* **25**, 618.

Organic isocolloids. LASZLÖ AUER. Fr. 694,340, Apr. 23, 1930. The soly. of modified or unmodified org. isocolloid substances is altered by dissolving or dispersing in such substances, agents favoring soln., *i. e.*, agents which are themselves sol. in the solvent in which it is desired to render the isocolloid sol. or more sol. Thus, castor oil is heated with NH_4I *in vacuo* for 5 hrs. at 260° to give a dark colored soft paste which is sol. in acetone. Other examples are given.

Organoarsenic compounds. I. G. FARBENIND. A.-G. Brit. 337,299, Feb. 11, 1929. *N*-Alkyl-, -aralkyl-, or -alkylene-3,4-benzimidazolonearsonic acids are prepd. by treating *o*-aminoalkylamino-, *o*-aminoaralkylamino- or *o*-aminoalkyleneamino-benzenearsonic acids with a chloroformic acid ester and decompg. the product with an acid (preferably with heating). Details are given of the production of 1-methyl-, 1-propyl- and 1-allyl-2,3-dihydro-2-ketobenzimidazole-5-arsonic acids by interaction with Et chloroformate of 4-methylamino-, 4-propylamino- and 4-allylamino-3-amino-benzenearsonic acids, resp.

Separating organic liquids. GENERAL TECHNICAL CO., LTD. Fr. 695,005, Aug. 2, 1929. The constituents of mixts. of org. liquids of different b. ps. are sepd. by passing the mixts. through a tube or tubes, preferably filled with contact material, a counter-current of vapors, of a non-miscible liquid being circulated, the temp. of treatment being slightly higher than the b. p. of the non-miscible liquid. An example is given of the sepn. of a mixt. of hydrocarbons using a counter-current of steam.

Catalysts for reducing or dehydrogenating organic compounds. I. G. FARBENIND. A.-G. (Hellmut Langheinrich, inventor). Ger. 516,251, May 7, 1926. Oxygenated compds. of Mo or W are treated with NH_3 (or gases contg. NH_3) at 450–600° and at atm. or raised pressure. The compds. obtained from molybdates or tungstates of Cu, Ag, Fe and Ni are particularly suitable. Examples are given.

Alcohols. I. G. FARBENIND. A.-G. Fr. 694,424, Apr. 25, 1930. Alcs. are prepd. by treating sugars with H in the presence of catalysts other than Pt and in the presence of OH ions. Examples are given of the prepn. of sorbitol and mannitol from glucose in the presence of activated Ni and CaO, etc.

Alcoholates. CHRISTIAAN VAN LOON. Ger. 513,677, July 22, 1926. Alkali metal alcoholates of polyhydric alcs. are prepd. by evapg. aq. solns. of the alc. and an alkali hydroxide at high temp. and reduced pressure. The reaction is preferably carried out in a current of indifferent gas. Thus, a soln. contg. 1 mol. glycol and 1 mol. concd. NaOH is evapd. in a water bath *in vacuo*. The product contains 26.2% Na. Other examples are given.

Phenolic aldehydes. SCHIMMEL & CO. A.-G. Ger. 513,678, Oct. 18, 1925. The ozonides of the corresponding propenyl compds. are reduced by hyposulfite. Thus, isoeugenol in $CHCl_3$ is satd. with O_3, and the resulting ozonide treated with $Na_2S_2O_4$ to give an 84% yield of vanillin. Other examples are given.

Esters. I. G. FARBENIND. A.-G. (Erwin Schwabe, inventor). Ger. 516,135, Aug. 6, 1925. In the manuf. of esters from acids that are relatively non-volatile and alcs. that are insol. or difficultly sol. in water, a reaction mixt. is used contg. only a small excess, if any, of acid or alc. and also contg. a water-insol. solvent for the alc., preferably a solvent b. near 100°. The distillate obtained from the mixt. seps. into 2 layers, the aq. layer being removed and the layer of solvent and unreacted alc. being returned to the reaction vessel. The prepn. of isobutyl phthalate with the use of toluene as the solvent is described in an example. Cf. *C. A.* **24**, 2141.

Esters of carbonic acid. I. G. FARBENIND. A.-G. (Gerhard Steimmig and Max Wittwer, inventors). Ger. 516,281, Nov. 15, 1928. Carbonic esters of glycols are prepd. by treating α, β- chlorohydrins with alkali carbonates or bicarbonates. Thus, glycol carbonate, $CH_2OC(O)OCH_2$, may be prepd. by warming ethylenechlorohydrin 1 mol. with $NaHCO_3$ 1 mol. for a few hrs. while stirring. Other examples are given also.

Esters such as fatty acid glycerides. I. G. FARBENIND. A.-G. Brit. 336,276, July 4, 1929. In the production of esters of polyhydric alcs. such as glycerol with acids such as those of linseed or olive oil, the component of lower b. p. is led in vapor or mist form (and suitably with a carrier gas such as H, for simultaneous hydrogenation, N or H_2O vapor) at reduced pressure into the liquid higher-boiling component at a temp. above the b. p. of the lower-boiling component, and catalysts may be used such as Mg oleate, H_3PO_4 or $ZnCl_2$. Cf. *C. A.* **25**, 115.

Vinyl ethers. I. G. FARBENIND. A.-G. (Otto Ernst and Walter Berndt, inventors). Ger. 513,679, May 24, 1927. Vinyl ethers of aromatic hydroxy compds. of a phenolic character, without substituents with OH groups linked to aliphatic residues, are obtained by treating the aromatic compds. with vinyl halides, especially the chloride, in the presence of bases and, optionally, catalysts. Thus, PhOH, NaOH, water and vinyl chloride are fused together at 180–200° to give an 80% yield of vinyl phenyl ether of sp. gr. 0.977 (20°) and b. 155-6°. Other examples are given. Cf. *C. A.* **25**, 302.

Ethers of α-naphthylmethyl alcohol. I. G. FARBENIND. A.-G. (Gustav Reddelien and Hans Lange, inventors). Ger. 516,280, Apr. 3, 1929. α-(Chloromethyl)naphthalene is treated with aliphatic or aromatic alcs. in the presence of an acid-binding agent. Examples are given of the prepn. of *methyl α-naphthylmethyl ether*, b_{11} 134°, *ethyl α-naphthylmethyl ether*, b_{11} 144.5°, *butyl α-naphthylmethyl ether*, b_{11} 167°, and *benzyl α-naphthylmethyl ether*, b_{11} 220°. Cf. Ger. 508,890 (*C. A.* **25**, 716).

Hydrogenating phenols. I. G. FARBENIND. A.-G. Brit. 336,616, April 17, 1929. Hydroaromatic hydrocarbons are prepd. from phenols by hydrogenation at temps. of 250-400° under pressures above 50 atm. with catalysts comprising oxides or sulfides of metals of the second to seventh periodic groups (preferably those of the sixth group) in admixt. with Cu, Ag, Au or metals of the eighth group or their oxides or sulfides. Numerous details and examples are given.

Dioxanes. I. G. FARBENIND. A.-G. Ger. 516,844, Dec. 28, 1927. Addn. to 500,223 (*C. A.* **24**, 4307). Single or mixed homologs of dioxane or mixts. of dioxane therewith are prepd. as described in Ger. 500,223, using as initial materials the mixts. of glycols obtainable from cracking gases, the by-products obtained in etherifying such mixts., or the single higher glycols isolated from the mixts. Examples are given. Cf. *C. A.* **25**, 524.

Indanones. I. G. FARBENIND. A.-G. (Fritz Mayer, inventor). Ger. 515,110, June 11, 1927. Addn. to 513,204 (*C. A.* **25**, 1260). Indanones are prepd. from xylenes, halotoluenes or dihalobenzenes by condensing these with a halide of β-chloropropionic acid, and treating the resulting ketone as described in Ger. 513,204. Thus, *7-methyl-6-chloro-3-indanone*, b_{14} 188°, is obtained from *o*-chlorotoluene. Other examples are given also.

Naphthenates of alkaline earth and heavy metals. I. G. FARBENIND. A.-G. Brit. 335,863, Feb. 22, 1929. In the prepn. of naphthenates such as those of Co, Pb, Mn, Zn, Ca, Pb-Mn or Co-Zn, naphthenic acid is saponified with KOH and the resulting soln. is treated with a suitable alk. earth or heavy metal salt (all operations being carried out at boiling temp.) and the ppt. thus formed may then be dried at 130° in the same vessel.

Dialkyl sulfates. ÉTABLISSEMENTS LAMBIOTTE FRÈRES. Brit. 336,681, June 25, 1929. For making dialkyl sulfates, the corresponding ether (derived from the alc. such as MeOH or PrOH and H_2SO_4) is caused to react with oleum, preferably in theoretical proportions and at temps. below 50° (suitably 30°). Various details of procedure are given.

Sulfonamides. IMPERIAL CHEMICAL INDUSTRIES, LTD., N. BENNETT, H. DODD and W. C. SPRENT. Brit. 336,512, Jan. 17, 1930. Monoalkylxylenesulfonamides are made by direct alkylation of xylenesulfonamide with MeCl or EtCl under pressure in the presence of caustic alkali. Various details of procedure are given.

Alkali salts of aromatic sulfohaloamides. CHEM. FAB. VON HEYDEN A.-G. (Curt Philipp, inventor). Ger. 515,465, June 20, 1928. Addn. to 514,094 (*C. A.* **25**, 1261). The reagents necessary for the method of Ger. 514,094 are mixed in the dry state, and made into tablets if desired. The reaction is effected by dissolving the mixt. in water. One mol. of the alkali may be dispensed with by using the sulfonamide in the form of its monosodium salt.

Aluminum gluconates. CHEMISCHE FABRIK VORM. SANDOZ. Brit. 336,922, Feb. 15, 1929. Sol. Al compds. forming stable solns. are obtained by reaction of Al compds. such as the sulfate with gluconic acid or its salts such as alk. earth metal gluconates (preferably in the presence of alk. earth metal hydroxides). The product may be evapd. to dryness or pptd. with alc. and the acid salts obtained may be neutralized with NH_3 or other alkali, or a neutral salt may be obtained directly by reaction of an alkali aluminate soln. with gluconic acid. Cf. *C. A.* **24**, 5437.

Lead alkyl compounds. STANDARD OIL CO. OF ILL. Ger. 505,688, Aug. 27, 1926. A Pb-Na alloy is heated with the desired dialkyl sulfate with free halogen or a metal halide as a catalyzer. Thus a Pb-Na alloy contg. 10% Na is heated with $(Et)_2SO_4$ in toluene with KI in water as the catalyst, to give $Pb(Et)_4$ on distn.

Metal carbamates. I. G. FARBENIND. A.-G. Brit. 336,749, Sept. 19, 1929. Reaction is effected between NH_4 carbamate and finely divided (preferably dry) metal oxides such as those of Zn, Mg or alk. earth metals, in the absence of solvents, at temps. not usually substantially above 100° (suitably about 60–80° in most cases), and if desired in the presence of a stream of an inert gas such as NH_3, air or N. The alk. earth metal carbamates thus produced may be converted into cyanamides by heating to about 700° and treating with a stream of NH_3.

Pyrazolone derivatives. I. G. FARBENIND. A.-G. (Hans Grotowsky, inventor). Ger. 515,782, Apr. 5, 1927. Addn. to 514,421 (*C. A.* 25, 1684). The method of Ger. 514,421 is modified by using, instead of a prepd. benzylidene imine or a stoichiometric mixt. of the corresponding aldehyde and amine, a mixt. contg. a substantially lower proportion of the amine. Examples are given.

Triazine derivatives. I. G. FARBENIND. A.-G. Fr. 694,756, Apr. 30, 1930. See Brit. 334,887 (*C. A.* 25, 1266).

Hexahydrodiphenylamine compounds. I. G. FARBENIND. A.-G. Brit. 337,103. Aug. 21, 1929. Two- or three-nuclear condensation products, obtained as described in Brit. 313,421 (*C. A.* 24, 1123) from cyclohexanone or its alkyl derivs. and aromatic amines or their products of acylation, are subjected to catalytic hydrogenation under pressure (with a base metal catalyst such as Ni and preferably in the presence of a diluent such as decahydronaphthalene). Details are given of the production of 4-aminohexahydrobiphenyl from 4-aminotetrahydrobiphenyl, 4-amino-3-methylhexahydrobiphenyl from 4-amino-3-methyltetrahydrobiphenyl and of similar reactions, and catalysts are described contg. Ni, Co, Ce, Bi and Cu in various mixts. which may be carried on pumice or silica gel.

Condensation products. I. G. FARBENIND. A.-G. (Arthur Lüttringhaus, Heinrick Neresheimer and Wilhelm Schneider, inventors). Ger. 513,530, Feb. 23, 1926. Addn. to 487,870 (*C. A.* 24, 1867). Condensation products are obtained by converting benzanthrone, or derivs. with a free or halogenated *Bz*-1-position, or derivs. with S- or O-contg. substituents into the corresponding ketohalides and then condensing these with other benzanthrone ketohalides, benzanthrone or derivs. Thus, benzanthrone in $PhNO_2$ is treated with PCl_5 and concd. H_2SO_4. The benzanthrone ketochloride obtained is then condensed with benzanthrone in $C_6H_3Cl_3$. Other examples are given. Cf. *C. A.* 25, 1263.

Condensation products. HENKEL & CIE. G. M. B. H. Ger. 513,797, Oct. 14, 1927. In condensing polyhydric alcs. and their ketonic derivs. with aliphatic, aromatic, mixed or hydroaromatic ketones, by heating to a high temp., the reaction is carried out without addn. of solvents, and in the presence of a small quantity of aq. or gaseous mineral acid or acid salt. Examples describe the condensation of glycerol with cyclohexanone and methylcyclohexanone. Cf. *C. A.* 24, 5044.

Halogenated fatty acids. I. G. FARBENIND. A.-G. Brit. 336,623, July 15, 1929. Satd. or unsatd. fatty acids contg. more than 8 C atoms per mol. and which may contain OH groups are treated with halogens or with a mixt. of a chlorate and HCl to introduce at least 3 halogen atoms per mol. one at least of which replaces a H atom by substitution. Examples are given of the production of trichlorinated, tetrabrominated and hexachlorinated ricinoleic acid, trichlorinated oleic acid, pentachlorodihydroxy stearic acid, heptachlorinated ricinoleic acid, tetrachlorinated oleic acid and hexa chlorinated stearic acid, etc. The products are oils, usually having adhesive properties, or plastic or resinous materials. Cf. *C. A.* 24, 3517.

Aromatic dicarboxylic acids. RÜTGERSWERKE A.-G. (Johannes Sielisch and Ernst Guttman, inventors). Ger. 516,282, May 5, 1929. The oxidation of aromatic *o*-diketones to dicarboxylic acids, *e. g.*, the oxidation of phenanthraquinone to diphenic acid, is effected in aq. alk. suspension with H_2O_2, or in aq. suspension with Na_2O_2 or like metal peroxide. An addn. of MeOH or EtOH accelerates the reaction. Examples are given.

Sulfonic acids of the fatty series. H. TH. BÖHME A.-G. Fr. 694,692, Apr. 30, 1930. Sulfonic compds. of higher fatty acids and their alkali salts are prepd. by treating the corresponding α-bromo fatty acids with an alkali sulfite. Thus brominated lauric acid is dissolved in aq. NH_3 and the soln. is boiled under reflux with a concd. aq. soln. of $(NH_4)_2SO_3$, giving the NH_4 salt of the α-sulfolauric acid. The products are wetting, purifying, emulsifying and foaming agents.

Sulfonic acids, naphthenic acids, etc. N.-V. DE BATAAFSCHE PETROLEUM MAATSCHAPPIJ. Fr. 694,578, Apr. 26, 1930. Purified sulfonic, naphthenic and like acids are prepd. by dissolving the initial material in water and treating with an amt. of tar oil, etc., sufficient to permit the substances to be purified, to sep. with the tar oil, after

which the aq. soln. is decanted and the tar oil is removed from the purified products by distn. Cf. *C. A.* **24**, 629.

Aliphatic acids and esters such as acetic acid and methyl acetate. BRITISH CELANESE, LTD., and W. BADER. Brit. 337,053, July 27, 1929. MeOH or other liquid aliphatic alc. is mixed with one or more acid catalysts such as H_3PO_4 and the mixt. is subjected to the action of CO at 200–450° and at pressures up to 300 atm. Esters in the reaction products may be saponified with H_2O in the presence of H_2SO_4 (or, preferably, H_3PO_4) at 150–300° to produce an acid and an ether. App. and various details of procedure are described.

Concentrating acetic acid. MARTIN MUGDAN and JOSEF WIMMER (to Consortium Elektrochemische Industrie, G. m. b. H.). U. S. 1,792,113, Feb. 10. See Fr. 671,283 (*C. A.* **24**, 2143).

Concentrating aqueous solutions of formic and acetic acids. JAMES NELSON, LTD. Ger. 513,574, July 13, 1927. See Brit. 281,827 (*C. A.* **22**, 3669).

Acetic and formic acid. IMPERIAL CHEMICAL INDUSTRIES, LTD. Fr. 694,016, Apr. 16, 1930. Aq. solns. of AcOH or HCOOH are concd. by passing the vapors thereof over active C at a temp. of 120–130°, whereby the acid is absorbed in preference. The absorbed acid is sepd. from the C by raising the temp. and reducing the pressure.

Carboxylic acid chlorides. FRANZ HENLE (to I. G. Farbenind. A.-G.). U. S. 1,792,163, Feb. 10. In prepg. carboxylic acid chlorides such as acetyl chloride, chloroacetyl chloride, propionyl chloride or butyryl chloride by reaction of the corresponding free acids with sulfochloride compds. such as Na chlorosulfonate or *p*-toluenesulfochloride, the reaction is rendered more efficient and almost quant. yields are obtained by adding to the reaction mixt. a "solid extender" such as NaCl, and other substances may be added such as a neutral sulfate, a pyrosulfate, kaolin or sand. Several examples with details of procedure are given.

Acetic anhydride and other aliphatic anhydrides. H. DREYFUS. Brit. 336,960, July 22, 1929. For producing the anhydride, the vapor of the corresponding acid is contacted with an oxide or acid of As or Sb or a salt of such an acid such as arsenates or antimonates of Na or K or Mg arsenate, which may be placed in tubes on a carrier. Various details and modifications of procedure are described.

Ethylene from acetylene. I. G. FARBENIND. A.-G. Brit. 336,999, May 24, 1929. Te or a compact form of Ni is used as catalyst in forming C_2H_4 by hydrogenation of C_2H_2. The Te may be used either in compact form or distributed on a carrier. Cf. *C. A.* **24**, 4523.

Absorbing ethylene in sulfuric acid. N.-V. DE BATAAFSCHE PETROLEUM MAATSCHAPPIJ. Brit. 336,603, June 4, 1929. Various compds. of Os, Ir, Pt, Ru, Rh, Pd, Cu, Fe, Co or Ni are used in the H_2SO_4 as catalysts in absorbing C_2H_4 or treating crude gases contg. C_2H_4 such as natural gas or cracking gases, to obtain a soln. which may be hydrolyzed, distd. or otherwise treated for the production of esters, alcs., ethers, etc. Various compds. of the catalytic metals may be added to the soln. and then converted into sol. complex compds. by passing CO or nitric oxide through the soln. Solvents such as EtOH, HOAc, $PhNO_2$ or ether may be added to the H_2SO_4 and froth-forming or emulsifying agents also may be added. Brit. 336,604 relates to a process of generally similar character for the absorption of olefins contg. more than 2 C atoms such as propylene or diallyl or crude gases contg. these or similar compds. Various details and modifications of procedure and examples are given.

Absorbing ethylene in sulfuric acid. N.-V. DE BATAAFSCHE PETROLEUM MAATSCHAPPIJ. Brit. 336,633, June 4, 1929. The absorption is catalyzed by the presence of one or more of the metals Pt, Pd, Os, Ir, Ru or Rh or their compds., in finely divided form and preferably on a carrier such as carbon black, silica gel or decolorizing clay (suitably in the form of a colloidal ppt.).

Dichloroethylene. CONSORTIUM FÜR ELEKTROCHEMISCHE INDUSTRIE G. M. B. H. Fr. 694,054, Apr. 16, 1930. Dichloroethylene is prepd. by passing trichloroethane over heated catalysts composed of salts of heavy metals such as Fe or Cu, or alk. earth compds. such as $BaCl_2$.

Oxidizing propylene. IMPERIAL CHEMICAL INDUSTRIES, LTD. Fr. 694,726, Apr. 29, 1930. Isopropyl alc. and isopropyl acetate are obtained by absorbing propylene in a mixt. of concd. H_2SO_4 and glacial AcOH and hydrolyzing the sulfuric esters formed.

Methanol. H. DREYFUS. Brit. 335,962, June 5, 1929. In synthesizing MeOH from CO and H, the reaction gases are passed first over one or more masses of ZnO with or without Cr oxide and then over one or more MeOH catalysts which are sensitive to S poisoning such as catalysts contg. Cu or Mn or their compds. Various details of procedure are described and water gas may be used as an initial material.

Methanol synthesis. ALWIN MITTASCH, MATHIAS PIER and CARL MÜLLER (to I. G. Farbenind. A.-G.). U. S. 1,791,568, Feb. 10. In synthesis of MeOH from H and C oxides in the presence of a catalyst such as potash-lime or potash-alumina more than 2 vols. of H for each vol. of CO and more than 3 vols. of H for each vol. of CO_2 are employed. Several examples are given. Cf. *C. A.* **25**, 715.

Butanol and higher alcohols. N.-V. DE BATAAFSCHE PETROLEUM MAATSCHAPPIJ. Brit. 336,811, Feb. 17, 1930. For producing BuOH and higher alcs., EtOH vapor under pressure (preferably 130–300 atm.) is heated to not over 400° (preferably not much over 325°) in the presence of a catalytic mass contg. MgO together with a smaller quantity of Cu oxide.

Tetrahydrofurfuryl alcohol. E. I. DU PONT DE NEMOURS & CO. and IMPERIAL CHEMICAL INDUSTRIES, LTD. Brit. 337,296, Jan. 25, 1930. Furfural is heated under pressure in the presence of H, a Ni catalyst and water (suitably at 50–150° and under 100 lbs. per sq. in. pressure). The catalyst is preferably prepd. by pptg. a soln. of Ni nitrate with $(NH_4)_2Cr_2O_7$ and NH_3 and partially reducing the ppt. with H at 500–550°.

Formaldehyde. BAKELITE CORP. Brit. 336,282, July 10, 1929. In the catalytic oxidation of MeOH, formation of by-products is restricted by adding a basic agent such as NH_3, to the reaction mixt. at any stage of the process prior to the distn. of the crude product obtained by absorbing or condensing the mixt. leaving the catalyzers, so that the distillate is rendered substantially neutral. Brit. 336,283 relates to the inhibiting of by-product formation in similar processes by rapidly cooling the hot gaseous product leaving the catalyzers by bringing it into contact with an aq. liquid (preferably so proportioned that the temp. of the liquid does not exceed 50°) and the concn. of the formaldehyde is kept substantially below 30%. Various details of procedure are described. Cf. *C. A.* **24**, 866.

Acetaldehyde. GUTEHOFFNUNGSHÜTTE OBERHAUSEN A.-G. Fr. 694,382, Apr. 24, 1930. AcH is prepd. by passing CH_4 and CO_2 through an elec. field produced by elec. currents of high frequency and tension. Contact substances may be placed in the field.

Urea. A. B. LAMB. Brit. 335,913, June 27, 1929. In a cyclic process, liquid NH_3 and liquid CO_2 are continuously and separately introduced into a heated autoclave maintained under pressure, and the melt contg. urea is continuously withdrawn from the autoclave, unconverted NH_3 and CO_2 are sepd. from the melt by distn. and are sepd. from each other, and after being dried, compressed and liquefied they are reintroduced in liquid form into the autoclave. Various details of app. and procedure are described and producer gas (with conversion of its CO into CO_2) may be used as a starting material (the NH_3 being produced by catalytic synthesis from N and H). Cf. *C. A.* **25**, 305.

Thiourea. I. G. FARBENIND. A.-G. Brit. 336, 111, Oct. 19, 1929. Ca cyanamide is treated with H_2S in the absence of liquids or in the presence of small quantities of liquids sufficient to form a paste (such as water or MeOH, EtOH, aniline, alkyl amines, EtOAc or other esters, pyridine or hydrocarbons such as C_6H_6 or their halogen derivs.) and in some cases alk. substances such as NH_3 and gaseous amines are added. The materials may be subjected to high pressures and to stirring and the temp. usually should not exceed 100°. The thiourea is extd. from the reaction mixt. by a selective solvent such as acetone, pyridine or its homologs, mixts. of alcs. and ethers or of alc. and C_6H_6 or of alcs. and $CHCl_3$, CCl_4 or C_6H_6, or in some cases by aq. mixts. such as aq. alcs. Various details of procedure are described. Cf. *C. A.* **24**, 4524.

5-Halo-2-amino-1-alkoxy- and -1-aralkyloxybenzenes and intermediates. WILHELM FITZKY (to General Aniline Works). U. S. 1,792,156, Feb. 10. By the gradual addn. of halogenating agents such as SO_2Cl_2 or Br, sufficient for the introduction of 2 halogen atoms, to suspensions (suitably in $C_2H_2Cl_4$ or $PhNO_2$) of *o,o'*-dialkoxy- and *o,o'*-diaralkyloxydiphenylureas (obtainable by causing the corresponding amino compds. to react with phosgene in the presence of an acid-binding agent) there are formed dihalogen compds. of the general formula 4,2-X(RO)C_6H_3NHCONHC_6H_3(OR)X-2,4 wherein R stands for alkyl or aralkyl and X stands for halogen. These compds., when split up by means of a caustic alkali or NH_4OH are converted into 5-halo-2-amino-1-alkoxy- and -1-aralkyloxybenzenes such as 5-chloro-2-amino-1-methoxybenzene, m. about 52°, 5-bromo-2-amino-1-methoxybenzene, m. 60–1°, 5-chloro-2-amino-1-ethoxybenzene, m. 32°, 5-chloro-2-amino-1-butoxybenzene, b_{12} 160°, and 5-chloro-2-amino-1-benzyloxybenzene, m. 46–7°. Details of procedure for making all these compds. are given.

1-Phenyl-2-methylamino-1-propanol (ephedrine). KNOLL A.-G. CHEMISCHE FABRIKEN and W. KLAVEHN. Brit. 336,412, July 30, 1929. 1-Phenyl-1,2-propane-

dione (acetylbenzoyl) is treated with a reducing agent (suitably activated Al in the presence of water) in the presence of methylamine.

Flavanthrone, etc. W. SMITH, L. J. HOOLEY, J. THOMAS and SCOTTISH DYES, LTD. Brit. 336,983, April 16, 1929. 1,1′-Dianthraquinonyls contg. Cl, Br or sulfonic groups in the 2,2′-positions are condensed with substances contg. reactive H atoms such as NH_3, monomethylamine, aniline, aminoanthraquinones, phenols, mercaptans or Na phenate or similar compds. When NH_3 is used condensation is followed by ring closure of the 2,2′-diamino-1,1′-dianthraquinonyl to form flavanthrone. Various examples are given.

4,10-Diaminoperylene. F. BENSA. Brit. 336,144, Dec. 22, 1928. See Fr. 686,233 (*C. A.* **25**, 525).

Isatin and its derivatives. GEORG KRÄNZLEIN, ARTHUR WOLFRAM and EMIL HAUSDÖRFER (to General Aniline Works). U. S. 1,792,170, Feb. 10. Cyanoformarylides of the general formula RNHCOCN in which R stands for a substituted or unsubstituted aromatic residue having at least one free *o*-position to the imino group are transformed into isatins by ring closure with a condensing metal chloride such as $AlCl_3$ or $ZnCl_2$. Examples are given of the treatment of cyanoformanilide; cyanoform(2-methyl-3-chloroanilide) (yielding 6-chloro-7-methylisatin); cyanoform(3,5-dichloroanilide) (yielding the 4,6-dichloroisatin); *N*-cyanoformyl(β-naphthylamine) (yielding a 2,1-naphthisatin, m. 248°); cyanoform(3,5-dimethylanilide) (yielding 4,6-dimethylisatin); and *N*-cyanoformyl(1-chloro-2-naphthylamine) (yielding 1-chloro-2,3-naphthisatin, m. 262°).

Benzyl chloride. IMPERIAL CHEMICAL INDUSTRIES, LTD. Fr. 694,429, Apr. 25, 1930. $C_6H_5CH_2Cl$ is obtained by treating the crude liquids from the manuf. of benzyl cellulose with HCl. The liquids are given a preliminary treatment with an alk. substance such as Na_2CO_3 to remove Fe or other metals. After removal of $C_6H_5CH_2Cl$ the residue is treated with Cl to give a mixt. of $C_6H_5CH_2Cl$ and BzH.

Vinyl chloride. I. G. FARBENIND. A.-G. Fr. 694,575, Apr. 26, 1930. Vinyl chloride is prepd. by treating ethylene chloride with KOH dissolved in MeOH.

11—BIOLOGICAL CHEMISTRY

PAUL E. HOWE

A—GENERAL

FRANK P. UNDERHILL

Studies in the physical chemistry of muscle globulin. II. Some physico-chemical properties of muscle globulin [myosin]. JOHN T. EDSALL. *J Biol. Chem.* **89**, 289 313(1930); cf. *C. A.* **22**, 2174.—The muscle globulin is prepd. by extg. fresh, finely ground muscle with an excess of a 1.2 *M* KCl soln. buffered with K_2HPO_4 and KH_2PO_4. The soln. should have an ionic strength of 1.2 to 1.5 and p_H 5.1 to 5.5. The protein is collected and purified by changing the ionic strength of the ext. several times, thus causing either a redissolving or repptn. When pptd., muscle globulin settles out as micellar particles which conc. to a thick jelly-like mass on centrifugation. The pptd. protein has its isoelec. point at p_H 5.1 to 5.5 and between p_H 6.2 and 6.6 is the zone of minimal acid- and base-binding capacity. Myosin is almost completely insol. in the absence of salts or even in the presence of salts at low ionic strengths. As the phosphate soln. approaches p_H 7.4 there is a sudden rise in soly. between ionic strength 0.25 and 0.30. Myosin can be sepd. from serum globulin by pptn. in dil. salt solns. Myosin requires greater concns. of neutral salts to ppt. it than pptd. fibrinogen but somewhat less than is needed by euglobulin. At p_H 7 and 0° it is completely pptd. by 4.4 to 4.6 *M* NaCl. Increasing the temp. decreases the soly. of myosin in concd. salt solns. In the absence of salts myosin is insol. from p_H 4.5 to 8 and at all salt concns. it is insol. from p_H 5 to 6. In moderate salt concns. it is sol. if the p_H is alk. to 6.0 and as the acidity becomes greater than p_H 5 the protein dissolves without the presence of a neutral salt. Alk. to p_H 10, it is also sol. in the absence of salt. The viscosity of myosin is of a higher order of magnitude than that of the blood proteins of myogen. Even concd. ppts. of proteins contain 98 to 99% H_2O and this H_2O can not be removed unless the protein is denatured in the process. In the nearly complete absence of salt, and in the presence of small quantities of alkali, gels of the protein of a peculiar character are formed. Finally myosin is compared to the proteins studied by other investigators. J. R. ADAMS

Studies in the physical chemistry of muscle globulin. III. The anisotropy of myosin and the angle of isocline. ALEXANDER L. VON MURALT AND JOHN T. EDSALL. *J. Biol. Chem.* 89, 315–50(1930); cf. *C. A.* 22, 2174 and preceding abstract.—Highly anisotropic protein in myosin produces double refraction of flow. This is brought about through the orientation and elastic deformation of these particles. The app. for the detn. of the angle of isocline and the double refraction is described. The age of the myosin has no effect on the angle of isocline. For intermediate and high concns. at low temp. it is between 77.5° and 78.5° and approaches 45° as a lower limit with increasing diln. For const. temp. and varying concn. or const. concn. and varying temp. characteristic curves are obtained for the relation between the angle of isocline and angular velocity. Myosin soln. possesses rigidity which is not affected by age. The gel formed from myosin is a thixotropic gel and gives two different crosses of isocline, one with an angle of 45° and the other 61° to 63°. The measurements of angle of isocline have been interpreted as an indication that the myosin particles are of uniform shape and size. **IV. The anisotropy of myosin and double refraction of flow.** *Ibid* 351–86.—A description is given of the app. used to prove that myosin solns. contain anisotropic particles and that anisotropy is connected with the chem. structure of the protein. Double refraction and angular velocity are found to be related by characteristic curves, which vary with protein concn., are reproducible for any given prepn. over a period of time and there appears to be no aging effect. The general form of these curves is the same for all prepns. examd. Denaturing agents produce rapid and complete destruction of the double refraction of flow. Double refraction is ascribed primarily to the orientation of anisotropic protein particles, due to the shearing stresses which arise during flow. Three tentative hypotheses are suggested to explain the observed facts. The Gans effect also indicates that the protein particle is anisotropic. The evidence also indicates that the anisotropic protein particles are of uniform size and shape. The properties of myosin solns. suggest that they may contain rod-shaped particles. The double refraction of myosin would indicate its probable location in the anisotropic disk of the cross-striated muscle fiber, and its general physicochem. properties suggest that it may play a part in the functional activity of the muscle. J. R. A.

Light and catalase. H. KOEPPE. *Strahlentherap.* 34, 598–604(1929).—Blood catalase is regarded as storing radiant energy. B. C. A.

Micellar modifications of human serum by weak electrolytes. P. PONTHUS *Compt. rend. soc. biol.* 103, 1140–2(1930); cf. *C. A.* 24, 4813.—The effect of weak electrolytes on human serum is analogous to that obtained by strong electrolytes, acids or neutral salts. As the acidity increases, micellar vol., as measured by the viscosity of the serum, increases to a max. value and then diminishes. With an increased content of bile salts in serum, the micellar vol. as shown by decreased viscosity constantly decreases. The cond. of the serum increases constantly with increased acidity, but remains const. when the concn. of the bile salts in the serum varies. B. C. B.

The mechanism of the acidification of tissue culture medium. M. MAGATH *Compt. rend. soc. biol.* 103, 1180–1(1930).—The decrease in p_H in tissue culture media from approx. p_H 8.0 to p_H 7.0 is explained by glucolysis. CO_2 accumulates as a result of the action of lactic acid on bicarbonates. Carrel's method for regulating the p_H of tissue culture by controlling the CO_2 content of the air around the tissues works satisfactorily. B. C. BRUNSTETTER

Nucleic acid. I. Enzymes which split nucleic acid. YUTAKA JONO. *Acta Schol. Med. Univ. Imp. Kioto* 13, 162–75(1930).—The leaves and roots of green vegetables and seeds, in general are richer in nuclease than are the fruits. A study of the P:N ratio shows that the base-sugar compds. are more difficultly broken down than are the phosphoric acid-sugar compds. Nucleic acid is rapidly attacked by plant nucleases, the hydrolysis reaching a max. in 3 to 4 days and continuing at an almost const. rate Plant nucleases split yeast nucleic acid about 3 to 5 times as readily as they do thymus nucleic acid. The optimal p_H for the reaction is 6.2 while a rapid decline in decompn occurs in weakly alk. medium. The relationship between the setting free of purine bases and of phosphoric acid remains const. at different p_H values. The nucleases are stable in acid or alk. medium and are more or less completely adsorbed by fuller's earth or kaolin. The reaction does not influence the completeness of this process. Animal nucleases were shown to be present in almost every organ but especially in the liver, pancreas, spleen, kidneys and small intestine while they occurred only in traces in the blood, muscles and the brain. **II. The decomposition of nucleic acid through B. proteus.** *Ibid* 176–81.—*Proteus vulgaris*, grown on agar media, was transferred to a sterile medium contg. nucleic acid and allowed to incubate for 7 days. The following

compds. were proved to be present in the bacterial digest of yeast nucleic acid either by m. p., elementary analyses or both: succinic acid, hypoxanthine, xanthine and uracil; cytosine was not found. With thymus nucleic acid the same products were obtained and also thymine. No cytosine was isolated from the animal nucleic acid. **III. The partial hydrolysis of nucleic acid through plant nuclease.** *Ibid* 182–6.—On the digestion of yeast nucleic acid with an ext. of soy-bean powder, guanosine, adenosine and cytidine were isolated but no uridine. These mols. were proved to contain pentoses. On digestion with an ext. of spinach, adenosine was also proved to be present. When thymus nucleic acid was treated with soy-bean nuclease, guanine hexoside was formed. H. J. Deuel, Jr.

Denaturation of proteins by urea. W. Ramsden. *Nature* 126, 685(1930).—The rate of denaturation of approx. isoelectric egg albumin by urea has a neg. temp. coeff. H. J. Deuel, Jr.

The structure of the hemocyanins. I. The isolation of "hemocuprin," the copper component of hemocyanin. (Octopus vulgaris). Adolf Schmitz. *Z. physiol. Chem.* 194, 232–47(1931); cf. *C. A.* 24, 5771.—Hemocyanin, the blue pigment in the blood of molluscs and crustacea, may be coagulated without loss of respiratory function, and in this respect differs from hemoglobin. The moist coagulum retains the property of binding and again releasing O, as shown by alternate coloration and decolorization, but when completely dried it undergoes an alteration by which this property is destroyed. The Cu complex, however, is not split out unless the substance is treated with alkali. The linkage between metal component and protein is therefore more stable and of a different nature than that existing in hemoglobin. It is very resistant to acids, in fact more resistant than that of the metal itself, since the latter appears as ion before the entire complex is liberated. In the prepn. of the Cu component the finely powd. denatured hemocyanin is treated with *N* NaOH. The substance swells and soon takes on a reddish violet color. The color then gradually disappears but the soln. finally becomes dark and a green ppt. forms. The reaction is complete after 24 hrs. at 37°. After removal of the mother liquor which contains the protein component, the pptd. *hemocuprin*, as Na salt, is dissolved in hot H_2O or hot dil. EtOH to a dark wine-red soln. and repptd. by weak acids as a difficultly sol. green substance. Analysis gave the following values: C 45.04, H 6.99, N 12.58 and Cu 6.27%. P and S were absent. The substance has not yet been crystd.; hence the calcn. of an empirical formula was not attempted. The behavior of the substance toward solvents, the high H content which excludes an aromatic ring structure, and finally the spectroscopic behavior of the Na salt and the pyridine soln. of the acid show that a porphyrin structure is not present. Neither in structure nor in mode of linkage to protein does it resemble hematin. On the assumption that 1 mol. of hemocuprin contains 1 atom of Cu, the electrometric titration curve shows it to be a tetrabasic acid. It dissociates in 2 stages with dissocn. consts. of approx. 4×10^{-7} and 8×10^{-10}, resp. Titration of hemocuprin explains the color changes which occur also with hemocyanin itself. The alk. soln., *i. e.*, the quadrivalent ion of the dissocd. Na salt, is wine red. At p_H 8.5 a development of blue color begins and increases up to p_H 7.4, at which point the 2 weak acid groups have been neutralized, and the color is now pure blue. This represents the acid Na salt, *i. e.*, the bivalent dissocd. ion. Further titration changes the color to green until finally the green undissocd. acid seps. out The change of color to green, frequently observed with hemocyanin, has nothing to do with the formation of a hypothetical "methemocyanin"; it is a property of the undissocd. substance. Hemocuprin dissolves in concd. NH_4OH with a green color which changes to red when the soln. is dild. It contains no free NH_2, but when hydrolyzed by 8 hrs.' boiling with concd. HCl practically all of the N becomes NH_2. Similar treatment with concd. NaOH converts only 24% of the N to NH_2. This behavior is the reverse of that usually observed with polypeptides. The Cu is evidently not linked to NH_2 groups. A. W. Dox

Carbohydrate redoxase. Hans v. Euler and Ragnar Nilsson. *Z. physiol. Chem.* 194, 260–8(1931).—The hexosephosphate-dehydrogenase present in the seeds of jute (*Corchorus capsularis*) requires cozymase for its activity. If the cozymase of the seed ext. is removed by dialysis the enzyme action vanishes but can be restored by addn. of cozymase. The instability of enzyme action in the ext. is not due to lability of the enzyme but to destruction of the cozymase. Methylene blue reduction with fresh muscle and muscle ext. is activated by addn. of creatine. Washed muscle and dry prepns., on the other hand, are not activated by creatine. Both types of muscle prepn. are activated by creatinephosphoric acid. It is possible, however, that the activation may be due to a small impurity in the creatine and creatinephosphoric acid prepns. which exert a donor action. A. W. Dox

Use of radium emanation and method of its administration. J. STRASBURGER. *Klin. Wochschr.* **10**, 29–31(1931). H. EAGLE

Optical specificity of human liver esterase. P. RONA, R. AMMON, AND H. FISCHGOLD. *Klin. Wochschr.* **10**, 72(1931); cf. *C. A.* **25**, 976.—The results of Bamann and Laeverenz regarding the effect of strychnine upon the optical selectivity of human liver esterase in the hydrolysis of the racemic Et ester of mandelic acid have been confirmed. It has a similar effect upon the splitting of the *dl*-methyl ester, facilitating the splitting of the *l*-ester. The greater velocity of the *l*-hydrolysis is due to the fact that strychnine accelerates the splitting of the formed enzyme-*l*-ester combination by about 50%. H. EAGLE

The decomposition of the guanine nucleus by the enzymes of rabbit liver. GERHARD SCHMIDT. *Klin. Wochschr.* **10**, 165–7(1931).—A preliminary report. Details of the expts. and results will appear in *Z. physiol. Chem.* H. EAGLE

Physiological chemistry as an independent profession. D. ACKERMANN. *Klin. Wochschr.* **10**, 175–6(1931). H. EAGLE

Proteolytic enzymes of human white blood cells and blood serum. H. A. OBERKERS AND H. FISCHGOLD. *Klin. Wochschr.* **10**, 205–7(1931).—Human white cells obtained by centrifugation from a blood specimen hemolyzed by acetic and tartaric acids contain erepsin, trypsin and cathepsin. Blood serum contains only erepsin. H. EAGLE

Biological-chemical methods in the investigation of phylogenetic problems. ROBERT JARETZKY. *Arch. Pharm.* **269**, 50–62(1931).—An address. W. O. E.

Studies on pectin. V. The hydrolysis of pectin. ARTHUR G. NORMAN AND JOHN T. MARTIN. *Biochem. J.* **24**, 649–60(1930); cf. *C. A.* **25**, 1266.—The yields of Ca pectate, furaldehyde and CO_2 were estd. at intervals in the course of pectin hydrolysis carried out at 100°, with 0.5% and 0.2% alkali. The rupture of the pectin ring proceeds more rapidly than the destruction of the furaldehyde-yielding groups. A polyuronide deriv. of pectin was prepd. by alk. hydrolysis of pectin. BENJAMIN HARROW

Quantum problems in radiation biology. R. GLOCKER. *Naturwissenschaften* **19**, 20(1931).—From the recent results of Wyckoff (*C. A.* **24**, 5789; **25**, 129) on the influence of radiation on *B. coli*, conclusions can be drawn on the basis of G.'s theory as to the effect of electron impulses in a cell. The dying of the bacteria follows an exponential curve for waves between 0.5 and 4 A. U., the exponent consisting of the radiation dose factor and a probability factor. From the latter is derived the "apparent vol." V of the cell which is sensitive for radiation. W. found that V changes with λ; previous work of Lacassagne and Holweck on *B. pyocyaneus* with λ = 4–8 A. U. (*C. A.* **23**, 1928) gave a const. V. The mean path of an electron for λ = 0.56–2.3 A. U. is smaller than its range of action; hence the orbits of electrons originating outside V have to be included in the probability calcns. In accounting for this effect it is found that the true V is const. in all cases and that calcd. V values agree with the results of W. In the case of L. and H. the range of the electrons is far larger than their mean path and therefore does not affect V. For the calcn. the mean path inside the entire cell is to be used, not that inside the sensitive parts only ($^1/_{16}$ to $^1/_{100}$ of the total vol.). Apparently this indicates that several small sensitive spots are distributed all over the cell, a conclusion which is in agreement with the biol. conceptions of cells without nuclei. The change of V with λ and its const. value after correction for electron range is a direct proof for the quantum character of the influence of radiation on cells. B. J. C. VAN DER HOEVEN

The proteolytic action of papain and cathepsin. H. A. KREBS. *Naturwissenschaften* **19**, 133(1931).—Recently Waldschmidt-Leitz (*Ibid* **18**, 952(1930)) denied an increase in proteolytic activity of papain and cathepsin by removal of heavy metal from their solns. and attributed the increase obtained by K. (*C. A.* **24**, 3804) to the presence of HCN in the solns. freed from metal. In a further study it was found that at p_H 5 HCN up to concns. of 0.2 mole has no effect at all. The action of complex-forming substances (like HCN) depends on the nature of the metal impurity. If the metal is Zn as was proved formerly for this case, HCN has little effect; therefore removal of the metal is far more effective. If Au is present as inhibitor, HCN has considerable effect by changing the Au ions into complex ions (cf. also Grassmann in "Handbuch. d. Biochem." of Oppenheimer, p. 184(1930)). B. J. C. VAN DER HOEVEN

Specificity of animal proteases. XXII. Mode of action of peptidases. ARNOLD K. BALLS AND FRANZ KÖHLER. *Ber.* **64B**, 294–301(1931); cf. *C. A.* **25**, 1542.—In order to det. the mechanism of the reaction of aminopolypeptidase (I) of the intestine, the inhibitory effect of various substances on the action of I and of dipeptidase (II) was studied. The substances used were: benzoylglycine (III), benzoyldiglycine, benzoyltriglycine, bromoisocaproylglycine (IV), bromoisocaproyldiglycine (V), bromo-

isocaproyltriglycine (VI), *p*-nitrobenzoylglycine (VII), aceturic acid (VIII), phthalimide (IX), sarcosine (X), allantoin (XI), creatinine (XII), glycine anhydride (XIII), benzoylglycine with changing concn. of substrate, benzoylglycine with changing concn. of enzyme, benzoylsarcosine and some amino acids (glycocoll, α-alanine, *l*-leucine, *d*-glutaminic acid). From the results obtained certain conclusions may be drawn. That the inhibitory action of the NH group depends on its acid character is shown by the fact that III, IV, VII, VIII, IX and X inhibit the action of I; XI, XII and XIII do not. That only the peptide linkage adjacent to the acid residue has an inhibitory effect is shown by the fact that equiv. quantities of IV, V and VI show the same inhibition of the action. Bromoisocaproyltriglycyltyrosine shows an increased inhibitory action, since it has more than one NH group to react with the enzyme. The cleavage of natural peptides may perhaps be explained thus—that the COOH activates the NH group for reaction with the enzyme. This view is strengthened by the fact that X, which has no free NH_2 group but an NH group, inhibits the action of I. Yet for other reasons it seems that the activation of the NH group is caused by the enzyme, *i. e.*, that the union of the enzyme with the NH_2 group of the peptides first renders the NH group capable of functioning as the second point of attachment. The results support the theory that the NH group functions as a point of attachment for all peptidases. This is the first common principle found for the action of peptidases. LOUISE KELLEY

A new proteolytic action of extracts of intestinal mucous membrane. ARNOLD K. BALLS AND FRANZ KÖHLER. *Ber.* **64B**, 383-7(1931); cf preceding abstract and *C. A.* **25**, 1542.—Although dipeptidase and aminopolypeptidase from intestinal mucous membrane attack the NH_2 and NH groups of peptides, glycerol exts. of the membrane show a hydrolytic action of peptide-like substances which contain no NH_2 or COOH groups, *e. g.*, chloroacetyl-*o*-nitraniline. The enzyme action described here belongs to a new type of peptidases which apparently react only with the NH group. The enzyme seems either to be present in very small quantities or to lose its activity easily as a result of inhibitory substances, for in the expts. the increase in acidity was very slight. Expts. with chloroacetyl-*p*-nitroaniline and benzoyltriglycine showed the optimum p_H for cleavage to be about 8. LOUISE KELLEY

The crystallization, denaturation and flocculation of proteins with special reference to albumin and hemoglobin, together with an appendix on the physicochemical behavior of glycine. W. C. M. LEWIS. *Chem. Reviews* **8**, 81–165(1931).—Certain aspects of the behavior of denaturable proteins in respect to crystn., denaturation and flocculation are reviewed. A no. of closely related problems are also considered, among them the physicochem. behavior of glycine in soln. LOUISE KELLEY

Action of sulfhydryl, iron and cyanide compounds on the oxygen consumption of living cells. SANFORD M. ROSENTHAL. *U. S. Pub. Health Repts.* **46**, 521–39(1931).—Glutathione, either in the oxidized or reduced form, when added to various tissues or to yeast cells, does not accelerate the rate of O consumption. Under the conditions of these expts., rat liver, brain, testicle, Jensen sarcoma and chicken erythrocytes are able to keep SH glutathione in the reduced state. The addn. of considerable quantities of cysteine and Fe to these tissues does not overcome this property. Cysteine is also kept reduced by these tissues, even in the presence of added Fe. Rat kidney permits the slow oxidation of glutathione and cysteine. Blood serum causes a marked acceleration in the rate of oxidation of glutathione. Hemin, Na Fe tartrate or $FeSO_4.(NH_4)_2SO_4\ 6H_2O$ causes no acceleration of the O consumption of rat tissues or yeast cells. Methemoglobin, Na Fe tartrate and $FeSO_4\ (NH_4)_2SO_4\ 6H_2O$ can prevent part of the inhibition of O uptake caused by NaCN. Oxyhemoglobin is less effective, while hemin shows no effect. Neither oxidized nor reduced glutathione influences the inhibition of respiration by cyanide. However, a slight antagonism can be demonstrated if S-S glutathione and cyanide are allowed to react for a considerable time before they are added to the tissue. KCN and α-amino-β-sulfopropionic acid do no inhibit the O consumption of rat testes. KCNS causes a slight increase in the rate of O consumption of rat testes. The significance of these results with respect to the mechanism of the action of cyanide upon living cells is discussed. J. A. KENNEDY

Kinetics of esterase activity in comparison with acid catalysis. ERNST A. SYM. *Biochem. Z.* **230**, 19–50(1931).—To avoid inactivation of esterase by the substrate and to provide a suitable solvent for the various org. acids, alcs. and esters, an acetone medium was found most favorable. In studying the inactivation of the esterase in the presence of 0.2 mol AcOH per l. it was found that this becomes less as the mol. wt of the alc. increases (up to butyl alc.) and this is also true for the homologous fatty acids of the aliphatic series. The inactivation of the esterase by H_2O in an acetone medium becomes considerable at a concn. of 6–8 mols. per l. Comparative expts.

with esterase and with HCl catalysis at different concns. of butyl alc. showed that the reaction velocity const. is subject to large variations. Water activates esterase and inhibits HCl catalysis. The esterase activity increases with a rise in the butyric acid concn., very rapidly up to a concn. of 0.6 mol. per l.; then it remains const. or even diminishes. The velocity of the esterification reaction of different alcs. of the homologous series, with esterase or HCl, or under the influence of heat is practically the same. However, the influence of homologous acids on the kinetics of esterification is entirely different for esterase than for the HCl catalysis or for the thermal reaction. The hypothesis is developed of the ester formation by a process of contact catalysis.

S. MORGULIS

Characterization of proteins through the determination of their affinities. G. ETTISCH, H. SACHSSE AND W. BECK. *Biochem. Z.* 230, 68–92(1931).—The affinity of the proteins for Cu is measured by the e. m. f. of the compd., and this is offered as a means of identifying the different proteins. The reaction between alk. protein solns. and $CuSO_4$ (biuret reaction) has been studied quantitatively, the e. m. f. being detd. in relation to the protein, Cu, alk. concns. and temp. in the following chain: Cu|protein + NaOH|KCl|$CuSO_4$|Cu. The influence of the alkali at the end of 24 hrs. reaches a definite point which could be detd. not only by studying the e. m. f. but also changes in depolarization, viscosity and light absorption. Electrochem. differences become apparent especially in high protein concns., when the e. m. f. with rising NaOH concn. is found to increase much more with albumin than with globulin. On the contrary, with increasing Cu concn. the e. m. f. of the albumin diminishes more rapidly than that of the globulin. These facts are interpreted as showing that in albumin the Cu-binding groups have a greater affinity for the Cu than in globulin, but that their no. is smaller in albumin than in globulin. Certain theoretical and methodical points are discussed in connection with this study. S. MORGULIS

Depolarization and light absorption of alkaline protein solutions. G. ETTISCH, H. SACHSSE AND B. LANGE. *Biochem. Z.* 230, 93–114(1931).—The depolarization of alk. protein solns. varies with time and with the alkali concn. These alterations are due to the swelling as well as breaking up of the protein particles, which only occur in the presence of sufficiently large alkali concns. Globulin is more easily broken up than albumin. S. MORGULIS

Viscosity of alkaline protein solutions. G. ETTISCH AND H. SACHSSE. *Biochem. Z.* 230, 115–28(1931).—The flow elasticity of albumin or globulin solns. shows no measurable alteration within a wide reaction range, but there is an indication of a form elasticity as soon as a few cc. of $CuSO_4$ soln. is added to a highly concd. alk. soln. of albumin or globulin. In fact under some conditions the solns. may become solidified on the addn. of the $CuSO_4$. The viscosity increases with increased alkali addn. after a certain concn. (satn. concn.) has been exceeded which causes far-reaching alterations in the protein mol. The ability to split up is greater in globulin than in albumin, and this is considered to be responsible for the fact that the globulin is more hydrophile. S. MORGULIS

The chemical independence of the serum proteins. G. ETTISCH AND H. SACHSSE. *Biochem. Z.* 230, 129–35(1931).—The euglobulin fraction obtained by 1/3 satn. with $(NH_4)_2SO_4$ corresponds to the globulin fraction by electrodialysis. The paraglobulin obtained by half satn. with $(NH_4)_2SO_4$ is an independent chem. substance, which occupies a definite position between the globulin and albumin. The transformation of one into another is not very probable. S. MORGULIS

Influence of lecithin on the stability of the serum proteins. ISTVÁN WENT AND FERENC FARAGÓ. *Biochem. Z.* 230, 238–44(1931).—On mixing an aq. lecithin emulsion with serum a definite reciprocal relationship is manifested in the alteration in the amts. of euglobulin and pseudoglobulin I on the one hand, and between pseudoglobulin II and albumin, on the other. Conclusion: Euglobulin is a colloidal complex of pseudoglobulin and lecithin, and the same may also be true for the pseudoglobulin II (pptd. by 21.5% Na_2SO_4) and albumin. Between the 2 main types of serum protein there seem to be less definable dispersoids whose precipitability by neutral salts varies greatly according to the amt. of lecithin. S. MORGULIS

The specificity of phosphatase. KURT P. JACOBSOHN AND JOAO TAPADINHAS. *Biochem. Z.* 230, 304–11(1931).—Mono- and di-menthyl phosphate and di-menthyl pyrophosphate esters could not be hydrolyzed by phosphatase. S. MORGULIS

The destruction of cystine and of cysteine through illumination. FRITZ LIEBEN AND ERICH MOLNAR. *Biochem. Z.* 230, 347–52(1931).—Both cystine and cysteine

undergo decompn. under the influence of light from the quartz-Hg lamp or diffuse daylight, but this proceeds at a much slower rate than with aromatic amino acids. In diffuse daylight the destruction of cystine goes on only in an alk. medium, while that of cysteine must be followed in an acid medium since it oxidizes spontaneously in an alk. medium. Hematoporphyrin must be used as a sensitizer with the cysteine. Under the influence of the illumination with the quartz-Hg lamp no sensitizer is necessary, but the rate of the reaction without it is markedly slower. The products of radiation of cystine when added to tryptophan or to tyrosine diminish their color reactions. The reduction of methylene blue in diffuse daylight by cysteine as compared to that in the dark shows that with an increase in the acidity the difference in time required for the fading of the color becomes constantly greater while at the same time the rate of fading sharply decreases. S. MORGULIS

Refractometric studies on serum protein. III. The specific refraction for the total protein and for the non-protein substances of horse serum. D. VON DESEÖ. *Biochem. Z.* **230**, 373–82(1931); cf. *C. A.* **24**, 1874.—The refractive index and sp. gr. were detd. at 17.5°, also the total protein gravimetrically, in 30 horse serums, both normal and immune. A study of the data leads to the following formulation: The refractive index of the serum, R. I. − 1.33320 = 0.00209 + 0.00187 × protein content, with an av. error of ±0.00002. Or, specific gravity of the serum, S. G. − 1.0 = 0.00752 + 0.00268 × protein content, with an av. error of ±0.00005. The R. I. and S. G. of the non-protein materials of the serum are 0.00209 and 0.00268, resp. The increase in the specific refraction of serum protein is 0.00187 and that of the specific wt. 0.00268 per unit of protein. **IV. Increase in the specific refraction of the protein fractions in horse serum.** *Ibid* 383–94.—Three groups of serum proteins were studied from the point of view of their *ns*. The first group was represented by the proteins pptd. by satn. with a definite amt. of $(NH_4)_2SO_4$ and the second by those remaining in soln. in the serum. The former comprised all the globulins with an av. *n* of 0.00195 ± 0.00001 and a corresponding sp. gr. of 0.00298 ± 0.00005. Corrected on the basis of sp. gr. data, the *n* should be 0.00187, which is the same as that for the albumin. The third group was represented by mixts. of both albumins and globulins. Here the *n* was 0.00185 ± 0.00002 and the sp. gr. 0.00272 ± 0.00005. It has been further substantiated that for 1% serum protein the variations in *n* and sp. gr. are, resp.: 0.00187 ± 0.00001 and 0.00268 ± 0.00005. S. MORGULIS

Hydrotropic solution of calcium, with reference to the solution of calcium in blood serum. A. VON KUTHY AND H. BANGA. *Biochem. Z.* **230**, 458–65(1931).—Ca dissolved hydrotropically in a Na salicylate soln. behaves like a serum Ca in that part of it is ionized, is negatively charged and part is in a non-diffusible condition. It is therefore suggested that serum Ca is hydrotropically dissolved. S. MORGULIS

Comment on the paper of Schreiber and Friedrich: "Demonstration and intensity of mitogenetic radiations." A. GURWITSCH. *Biochem. Z.* **230**, 505(1931).—Discussing the neg. findings of these authors (*C. A.* **25**, 529) G. points out that agar yeast cultures do not radiate in the dark but can still be used as detectors. S. MORGULIS

Investigations on the source of oxidase granules. GÜNTER WOLBACH. *Folia Hematol.* **43**, 121–31(1931).—The subcutaneous injection of horse-radish or beet ext. produces oxidase granulation in white mice. JOHN T. MYERS

The dependence of oxidizing fermentations upon the oxidation reduction potential of the external medium. S. I. KUZNETZOV. *Zentr. Bakt. Parasitenk.*, 2 Abt., **83**, 37–52(1931). JOHN T. MYERS

The enzymic hydrolysis of gelatin in its relation to the formation of diacipiperazines (BLANCHETIÈRE) **10.** Neo-, xantho-neobilirubic acid and partial synthesis of mesobilirubin and mesobilirubinogen (FISCHER, HESS) **10.**

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B—METHODS AND APPARATUS

STANLEY R. BENEDICT

Determination of p_H of [biological] media. M. LEMOIGNE AND R. CHAMINADE. *Compt. rend. soc. biol.* **102**, 922-3(1929).—When the colorimetric method is inapplicable and the electrometric method troublesome, the medium may be brought into electrometric equil. with a phosphate mixt. of colorimetrically detd. p_H. B. C. A.

Detection of necrosis of pancreatic tissue by determination of urinary diastase. J. WOHLGEMUTH. *Klin. Wochschr.* **8**, 1253-4(1929).—W.'s method for the detn. of urinary diastase in presence of a phosphate mixt. of p_H 7.2 is described. B. C. A

Microdetermination of proteins. R. WINTERNITZ AND Z. STARY. *Mikrochemie* [N. S.], **2**, 252-6(1930).—A quantity of the soln. contg. not more than 1.5 mg. of protein is centrifuged for 15 min. with 2 cc. of 20% trichloroacetic acid, the liquid decanted, and the pptd. washed with 4% trichloroacetic acid, and heated with a mixt. of H_2SO_4 and H_3PO_4 to destroy org. matter. The mixt. is dild. to 17.5 cc., 7.5 cc. of Nessler soln. is added, and the color developed is compared with a series of standards. B. C. A.

A critique of present methods for the study of gastric acidity. MILTON J. MATZNER AND IRVING GRAY. *Arch. Internal Med.* **47**, 58-63(1931).—The methods of gastric analysis are discussed. Histamine should be used as a gastric stimulant if the routine test gives no free HCl. A definite alk. tide was found in 50% of the cases showing free HCl after injection of histamine. J. B. BROWN

The detection and estimation of lactose in urine. C. P. STEWART AND R. M. GRAY. *Edinburgh Med. J.* **38**, 109-12(1931).—The total sugar (A) in the urine is detd. by Cole's method and calcd. as glucose. The total sugar (B) in urine hydrolyzed with HCl is calcd. in the same way. The amt. of glucose (y) and the amt. of lactose (x) can be calcd. from the equations: $y + x/2 = A$, $y + x = B$. The method is suitable for the examn. of urine during pregnancy and lactation. R. B.

The technic of tissue culture in hanging drops. ALEXIS CARREL. *Compt. rend. soc. biol.* **102**, 742-4(1929).—The p_H of tissue cultures is regulated by flooding a culture chamber with expiratory breaths until an indicator drop (phenol red in a drop of medium) shows that the desired p_H has been reached. The chamber is formed by a metal ring, 5 cm. in internal diam. and 1 cm. high; at each end of the ring is a ledge, 0.25 cm. deep. A mica sheet is affixed to each end by paraffin. At one end of the ring there are 2 openings in opposite walls; provision is made for the insertion of a metal cannula, to which rubber tubing may be attached, to flood the chamber with expired air. Four tissue cultures may be observed simultaneously. B. C. BRUNSTETTER

A diazo method for detecting bilirubin in urine. GEORGE HUNTER. *Can. Med. Assoc. J.* **23**, 823-4(1930).—The possibilities of detecting bilirubin in icteric urine have been reinvestigated, and a satisfactory qual. test, which might form the basis of a quant. method, is as follows: To 5 cc. of urine in a 15-cc. centrifuge tube add 2 cc. of 10% $BaCl_2$, mix and centrifuge. Pour off the supernatant fluid, wash the ppt. with a few cc. water, centrifuge again and pour off the liquid. Add 0.5 cc diazo reagent, stir the ppt. with a glass rod, and add 2 cc. of 96% alc., and, as buffer, 0.3 cc. of 6% $Na_2HPO_4.12\ H_2O$. If bilirubin is present the same color results as with the diazo reagent and icteric serum. If the urine is alk. add AcOH initially till weakly acid. If it is highly pigmented, after the Ba ppt. is obtained stir with 2 cc. of 96% alc. to which has been added 1 drop of 10% H_3PO_4, centrifuge and transfer the supernatant fluid to a second tube along with 4 cc. water. Add 2 drops 10% $(NH_4)_2SO_4$ and 2 cc. $BaCl_2$, repptg. the bilirubin, and proceed as above. A. T. CAMERON

The colorimetric determination of nonprotein residual nitrogen in blood. G. A BROSSA. *Atti accad. sci. Torino* (Classe di sci. fis., mat., e nat.) **65**, 272-4(1930) Methods of analysis which may be applied readily without very elaborate app. or technic are being developed in biochemistry as an aid in diagnosis (*i. e.*, tests for sugar, uric acid, etc.). A method is described for detg. *nonprotein N* without the necessity of any distn. De-albuminize 1.2 cc. of blood serum in 8.8 cc. distd. water by adding 4 cc. of 10% sulfosalicylic acid soln. After 30-60 min. filter the soln., and, after adding 1 cc. of H_2SO_4 and a crystal of K_2SO_4, evap. it to dryness. Redissolve the residue with water to exactly 12 cc. Use 2 cc. to det. the amt. of 30% NaOH necessary to make the soln. alk. to litmus. Then add the calcd. amt. to the 10 cc. left and add 2 cc. 10% PhOH soln. and 0.6 cc. of freshly prepd. NaOCl soln. Heat this mixt. as well as a standard soln. for comparison in boiling water for 10 min., cool and compare the colors with the help of a colorimeter. A. W. CONTIERI

The calculation of the color index of blood. FRANZISKA STENGEL. *Wiener*

klin. Wochschr. **44**, 194–7(1931).—An alignment chart shows color index, in terms of *erythrocyte count* and quantity of *hemoglobin*. The latter is detd. by the Hellige or the Sahli method. D. B. DILL

Determination of small quantities of zinc in the presence of lead salts. M. W. STAS. *Pharm. Weekblad* **68**, 93–7(1931).—Zn may be detd. by pptn. with *o*-hydroxyquinoline in solns. contg. 1% AcOH and 4% NaOAc in the presence of Pb, provided the concn. of Pb does not exceed 100 mg. per 50 cc. The pptd. Zn salt of *o*-hydroxyquinoline is detd. volumetrically by bromination with $KBrO_3$ + KBr and titrating the excess Br with $Na_2S_2O_3$ as recommended by Berg (*C. A.* **21**, 2630). A. W. DOX

Titrating organic acids in the urine. WILHELM WERTZ. *Klin. Wochschr.* **9**, 1632(1930).—Occasionally the tint of the urine precludes or makes difficult the use of tropeolin OO as indicator in the titration of urine org. acids by the Van Slyke-Palmer technic. In such cases H. recommends the use of β-dinitrophenol. H. EAGLE

New reactions of bilirubin in blood serum. GABRIEL MONASTERIO. *Klin. Wochschr.* **9**, 1772–3(1930).—If one adds 1 drop of H_2O_2 and 1 drop of glacial acetic acid to 5–6 drops of serum, a green color develops in the presence of bilirubin, which is intensified by heat. By heating serum with the diazo reagent of van den Bergh, sera which would otherwise give an indirect reaction give a direct reaction. Alc. is a similar "catalyst." H. EAGLE

Microestimation of the nitrogenous constituents of urine. LUDWIG PINCUSSEN. *Klin. Wochschr.* **9**, 1966–7(1930).—A reply to the criticism of Jacoby (*C. A.* **24**, 5775). Pincussen believes 15 min. distn. quite adequate. H. EAGLE

Estimation of blood volume in congenital heart defect. KARL HITZENBERGER AND FRITZ TUCHFELD. *Klin. Wochschr.* **9**, 2159–60(1930). H. EAGLE

Hormonal reaction for pregnancy with the urine of humans and animals. BERNHARD ZONDEK. *Klin. Wochschr.* **9**, 2285–9(1930).—The hypophyseal hormone has been demonstrated in the urine of pregnant women, apes and horses, but could not be found in cows, pigs, elephants or Rodentia. The urine of pregnant mares contains about 10 times as much folliculin per unit vol. as that of pregnant women, but, unlike the latter, is in a form not sol. in org. solvents. From such urine it is possible to prep. large quantities of cryst. hormone, contg. 8000 units per g. The folliculin content of blood is only $^1/_{100}$ that of the urine. In marked contrast, the blood of pregnant horses contains large quantities of hypophyseal anterior lobe hormone, as shown by the ovarian hyperplasia and the formation of corpora lutea induced by its injection into infantile rats; but the urine contains only minimal quantities. The longer the pregnancy, the less of the hypophyseal hormone circulates in the blood. Z. distinguishes 2 types of the hypophyseal hormone: (1) HVH-A, which causes ripening of follicles, and (2) HVH-B, which causes luteinization. No explanation is offered for the massive excretion of folliculin by the pregnant horse, and the retention of the HVH, particularly HVH-B. It is important to note that in the diagnosis of pregnancy in women, the essential criterion is the presence of HVH-B in the urine, which induces luteinization and the formation of blood spots on the ovary of the test animal; both folliculin and HVH-A may appear in the urine during other conditions, such as at the menopause, in amenorhea, etc. In the horse, however, the best criterion is the induction of rut in the infantile rat, as shown by the appearance of cells in the vaginal smear. This is a test for the enormous increase in the urine folliculin and is more accurate if the urine to be tested is first acidified, filtered and extd. with ether to remove an uncharacterized inhibiting factor. In 9 virginal mares, this test was uniformly neg.; in 54 pregnant, it was positive in 53; and in 17 mares which had been mounted but had not become pregnant, the test was pos. only once: a total error of only $2^1/_2$%. H. EAGLE

A new method for the estimation of glucuronic acid in the urine. JOACHIM SAUER. *Klin. Wochschr.* **9**, 2350–1(1930).—The ether ext. of the acidified urine is evapd. to dryness, heated with 12% HCl, and the glucuronic acid estd. by the usual Lefèvre app. The av. daily excretion is 0.22–0.29 g. H. EAGLE

A method for the determination of organic iodine (uroselectan) in the urine. K. HILLGRUBER. *Klin. Wochschr.* **9**, 2353–4(1930).—The urine is oxidized with hot H_2SO_4 and H_2O_2; the I, now free from its org. radical, is then oxidized with Cl water in alk. soln. to HIO_3, and this is titrated in acid reaction with KI and $Na_2S_2O_3$. H. EAGLE

The peroxidase reaction. XXVIII. An exceedingly sensitive peroxidase reagent for human milk. TAYURU ARAKAWA. *Tôhoku J. Exptl. Med.* **16**, 83–9(1930).—Reagent *A* consists of guaiac resin 0.3–1 g., As_2O_3 0.02 g., glacial AcOH 0.6 g., AcONa 1.30 g. and 99% EtOH to make 100 cc. Reagent *C* consists of pharmacopeial tincture with 0.1% peroxide (cf. *C. A.* **25**, 1330) 1, and guaiacol 2 parts, and acetone to make

100 cc. A mixt. of *A* and *C* is used for qual. tests. For quant. tests reagent *B* (benzidine 1 g., AcONa 1.36 g., and 99% alc. to 100 cc.) and reagent *D* (described in part XXX, below) are used. Despite the fact that the qual. test is 64 times as sensitive as those currently used, it fails to react with blood and can, therefore, be used for testing pus, spinal fluid and milk which are contaminated with blood. **XXIX. Determination of human milk peroxidase. 1. Dilution method.** *Ibid* 90–96.—A diln. method in which are used reagents *A* and *C* (part XXVIII, above) is described. **XXX. Determination of human milk peroxidase. 2. Colorimetric method.** *Ibid* 97–106.—The reagents used are (1) reagent *B* (part XXVIII, above), (2) reagent *D* (a 3% soln. of H_2O_2 0.1, and guaiacol 2 parts and 99% EtOH to make 100 cc.), (3) Walpole's acetate mixt. at p_H 3.6 dild. 1:10 with 0.9% NaCl, (4) $CHCl_3$, (5) 0.1 *M* AcONa in 96% alc., (6) a standard soln. consisting of a $CHCl_3$ ext. of $Cu(OAc)_2$. Equal vols. of (1) and (2) are added to one vol. of milk (whole, or dild. with (3)), and the mixt. is extd. with $CHCl_3$. The ext. is made up to 5 cc. with 96% alc., and compared colorimetrically with the standard. **XXXI. An approximate estimation of milk peroxidase.** *Ibid* 107–11.—To 1 cc. of milk are added 3 cc. of *M* 15 phosphate buffer at p_H 7.8, 1 cc. of reagent *A* (above) and 1 cc. of reagent *C* (above). In a milk contg. large quantities of peroxidase, a deep-blue color develops immediately. **XXXV. A rapid micro method for peroxide by the use of milk peroxidase; preservation of milk peroxidase.** *Ibid* 232–5.—To 0.5 cc. of reagent *A* are added decreasing quantities of the substance to be tested, and 0.25 cc. of standard peroxidase; the color which develops is compared with that formed by a known peroxide soln. (3% H_2O_2 dild. 1:100). Milk peroxidase may be preserved indefinitely by the following technic: 100 cc. of milk is shaken with 10 cc. $CHCl_3$, 10 cc. 95% EtOH and 1 cc. guaiacol; 0.5 cc. glacial AcOH is added and the mixt. filtered 24 hrs. later. The filtrate keeps indefinitely. H. EAGLE

Sulfosalicylic acid as protein reagent. HUGO KÜHL. *Süddeutsche Apoth.-Ztg.* **70**, 665–6(1930).—Sulfosalicylic acid is a useful reagent in physiol. chemistry, notably in the detection of albumin in urine. In the present study expts. have been carried out to characterize the various ppts. obtained by treating certain sol. proteins with 1 cc. of the reagent. The protein solns. examd. contained 0.5% albumin. Among the proteins examd. were albumin Merck and Sanguin, natural albumin of duck eggs, meat albumin, plant albumin, gelatin, peptone, keratin, etc. On addn. of the reagent the soln. is heated to boiling, and observations are made on the time required to produce a ppt. (if any), the character of this ppt., being noted. The value of sulfosalicylic acid as a precipitant lies in the fact that the nature of the ppt. often enables one to det. what protein is involved. W. O. E.

Chemical detection of blood according to Segeloff. PAUL SCHUGT. *Pharm. Presse, Wiss.-prakt. Heft* **1930**, 166–7.—This test, applicable to the detection of blood in the urine or feces, in conjunction with spectroscopic and microscopic tests, involves the following procedure: While the urine may be tested directly, the feces require a preliminary treatment, as trituration of a 30-g. sample in a mortar with a like amt. of 0.5% AcOH, followed by filtration through a wet (if necessary, double) filter. To 5 cc. 5% pyramidone soln. in abs. EtOH, add 8 drops 3% H_2O_2 soln., 8 drops 50% AcOH and 10 drops of the urine or feces filtrate. The presence of the minutest traces of blood in either sample is shown by a violet to light-blue coloration. This test is about 10 times more delicate than that of Almen and about 3 times more sensitive than the Adler test. An improvement on the Segeloff procedure consists in treating 1 cc. of the sample in a test tube with 8 drops AcOH and 8 drops H_2O_2, and then, with the tube in an oblique position, adding, drop by drop, the pyramidone reagent. The first 10 or 15 drops mix with the soln. mixt., whereas further addn. of the reagent develops a layer superimposed on the lower, the zone of contact showing a light-blue to amethyst-violet coloration. W. O. EMERY

Selective staining of basophilic granules. EUGENE BUJARD. *Bull. histol. appl.* **7**, 264–9; *Stain Tech.* **6**, 31(1931).—The technic is described. C. R. FELLERS

Histochemical detection of hemoglobin. L. LISON. *Rev. hyg. méd. prév.* **52**, 894–6; *Compt. rend. soc. biol.* **103**, 36–8(1930).—Hemoglobin in blood is transformed to hematin by treatment with the following mixt.: Pb acetate 2–5 g., CH_2O 10 cc. and distd. water 100 g. Peroxidases in the hemoglobin are uninjured by the treatment and give a characteristic benzidine-H_2O_2 reaction (blue color). The reaction is sp. for hemoglobin. C. R. FELLERS

Colorimetric determination of phenols in feces. DEBERGH AND R. GOIFFON. *Rev. hyg. méd. prév.* **53**, 78–80(1931).—Dil. 10 g. of feces to 100 cc. and treat 5 cc. of this soln. with 5 cc. of 10% Na tungstate and 5 cc. of 0.66 *N* soln. of HCl. In a few min. stir the soln. and filter. To 6 cc. of the filtrate, corresponding to 2 cc. of the 1:10 diln.

of feces, add 5 cc. of an aq. soln. of 2.5% $ZnCl_2$ and 5 cc. of 20% Na_2CO_3 soln. Agitate the mixt. and filter. Place 8 cc. of the clear filtrate in a 30-cc. cylinder together with the phenol reagent and make up to 25 cc. with distd. water. Finally add 5 cc. of a 20% soln. of Na_2CO_3, shake the mixt. and set aside for observation at the end of 1 hr. The development of a blue color indicates the presence of phenols. The amt. may be estd. by colorimetric comparison with a standard made up by adding 0.091 g. of resorcinol per l., and treating 1 cc. of this soln. by the method just described. This amt. of resorcinol gives the same intensity of color as 0.1 g. of phenol per l. The method is considerably more accurate than the original Folin and Denis technic. C. R. F.

New rapid method for tissue diagnosis. CHARLES F. GESCHICKTER, EDWARD P. WALKER, A. M. HJORT AND CARL H. MOULTON. *Stain Tech.* **6**, 3–12(1931).—A new staining procedure applicable to both fresh and CH_2O-fixed frozen sections is described. A pre-staining bath consisting of KH_2PO_4 6.75 g., *N* NaOH 30 cc., distd. water 570 cc., glycerol 200 cc. and 95% EtOH 200 cc. is used to collect the sections as they come from the microtome. The sections are then passed into the following staining soln. for 20–30 sec.: thionine eosinate 0.75 g., Ba eosinate 0.25 g. and azure A 0.25 g. dissolved in 100 cc. of a mixt. of 4 parts of $(CH_2OH)_2$ and 1 part of EtOH 95% plus 0.2% glacial AcOH. The stain is washed off in 2 successive changes of 95% EtOH contg. 200 cc. of glycerol to each 80 cc. of EtOH. The tissue is left in the first bath about 10 sec. and in the second bath 3 sec. Sections are dehydrated by floating for 10–15 sec. in a soln. of diethylene glycol monobutyl ether and cleared in butyl phthalate by floating in this soln. for 20 sec. The section is finally floated on a glass slide, blotted dry with photographic lintless blotting paper and covered with an inverted cover slip upon which 1–2 drops of dammar gum has been placed. C. R. F.

Dissection, staining and mounting of styles in the study of pollen-tube distribution. JOHN BUCHHOLZ. *Stain Tech.* **6**, 13–24(1931).—Details of the method are given. C. R. FELLERS

Method of staining pollen tubes within the pistil. CLYDE CHANDLER. *Stain Tech.* **6**, 25–6(1931).—A very satisfactory killing soln. consists of 6–7 cc. of com. CH_2O in 70% EtOH. The method of dissection and staining with acetocarmine is outlined. C. R. FELLERS

Lacmoid-Martius—yellow for staining pollen tubes in the style. B. R. NEBEL. *Stain Tech.* **6**, 27–9(1931).—The staining technic is described. The callose stain permits of interpreting the physiol. condition of the tube more readily than a stain of the plasmatic content alone. The method is particularly valuable with fleshy styles such as are found in pomaceous plants, cherries, plums and grapes. C. R. FELLERS

Method for detecting mineral particles in tissues, particularly in lung tissue. A. POLICARD. *Bull. hist. appl. physiol. et path.* **7**, 129–31(1930); *Physiol. Abstracts* **15**, 203; cf. *C. A.* **24**, 3579.—A method is described for detecting such particles in lung tissue, but it is applicable to other investigations. Concd. $HClO_4$ is used to dissolve or render transparent the org. particles. The paraffin section is treated with xylene, then alc., and dried; it is covered with a drop of strong $HClO_4$ and heated on a boiling water bath until it becomes transparent; it is immediately cooled and examd. The method is of value in studying the mineral deposits found in the lungs in certain miners' diseases. G. G.

Ultrafiltration in vivo. L. BRULL. *Compt. rend. soc. biol.* **99**, 1605–7(1928); *Physiol. Abstracts* **14**, 482.—The principle of the ultrafilter of Giemsa is adapted to an app. to receive the blood from the carotid of a dog after the injection of heparin to prevent coagulation. The ultrafiltrate from the plasma is obtained in sufficient quantity to permit physicochem. study. G. G.

Action of ox bile in filtration. D. COMPRESEO AND A. DAMBOVICEANU. *Compt. rend. soc. biol.* **103**, 182–4(1930); *Physiol. Abstracts* **15**, 80.—Ox bile was used to facilitate the passage of substances in emulsion through filters, Chamberland bougies and collodion sacs. Victoria blue and Congo red do not pass in ordinary conditions, but the latter in 1 per 2,000 soln. passes through the bougie to a slight extent. Addn. of bile (1 *in* 10 to 1 *in* 100) facilitates the passage of both. *Bacillus pyocyaneus* also passes through the bougie after the use of bile. G. G.

Colorimetric estimation of phenols in feces. MME. TONCKHEERE-DEBERGH AND R. GOIFFON. *Compt. rend. soc. biol.* **103**, 485–7(1930); *Physiol. Abstracts* **15**, 207.—Errors occur in the filtration of tungsto-molybdic ppts. in the method of Folin and Denis. These are obviated in the method employed by the authors for detg. phenols in feces. In this process the tungstic filtrate is treated with $ZnCl_2$ and Na_2CO_3. The $ZnCO_3$ retains the S, which is capable of acting on the colorimetric agent, and the resulting color is easily compared with the standard resorcinol color. G. G.

Importance of protein precipitation in amino acid determination in blood. P. M. Re and D. Potick. *Rev. soc. argentina biol.* 5, 725–44(1929).—Folin's method gives values below the real ones, and the error increases with the concn. in amino acids. The tungstate-H_2SO_4 mixt. used to ppt. the proteins diminishes the values obtained up to 50%. Trichloroacetic acid gives a much smaller error. Phosphotungstic acid gives intermediate values. G. G.

Methods for the study of the physiology and pharmacology of the artificially perfused mammalian intestine. H. F. Roese. *Arch. ges. Physiol.* (*Pflügers*) **226**, 171–83(1930).—Various methods are described for perfusing mammalian intestine. Arthur Grollman

Microchemical examination of very small quantities of skin for phenolic substances. Hans Schmalfuss and Helene Barthmeyer. *Mikrochemie* [N. S.], 2, 245–52(1930).—*Melanogen* is a provisional name given to any substance which turns an enzyme strip of the flour beetle, *Tenebrio molitor* L., brown, gray or black. In studies concerning inheritance and development, it was desirable to test for the distribution of melanogens, *e. g.*, *o*-dihydroxybenzenes, in organisms, particularly in the colored skins of insects. By means of simple methods, most of them already known, it was found possible to do this with very small quantities of material. To ext. the color, $1–6 \times 10^{-3}$ cm. of material was pulverized, a suspension made with 0.008–0.25 cc. of water, the suspension was transferred to a small test tube and heated for 2 min. in boiling water to destroy injurious enzymes. The soln. was then filtered and tested with enzyme test strips. Tests were also made with $FeCl_3$–Na_2CO_3 for dihydroxybenzenes and for phenols by Gibb's reagent and with Millon's reagent. The work is described in detail and will be interesting to those who desire to make similar tests. W. T. H.

A modification of MacCallum's hematoxylin method for iron. R. R. Dieterle. *Arch. Path.* 10, 740–1(1930).—In the original method of MacCallum for the staining of unmasked Fe a freshly prepd. 0.5% aq. soln. of hematoxylin was used. The modification consists in the addn. of 1 cc. neutral CH_2O soln. to 100 cc. of the hematoxylin soln. The CH_2O acts as a reducing agent and prevents the natural oxidation of the hematoxylin soln. Such a CH_2O-hematoxylin soln. has been used for 3 months without losing its ability to combine with the Fe. Harriet F. Holmes

The state of acidity of the stomach contents and its clinical estimation. F. Erben. *Wiener Arch. inn. Med.* 20, 353–74(1930); cf. *C. A.* 24, 3527.—By the use of the phloroglucinol-vanillin test of Günzberg, the free HCl can be detd. in the stomach contents. This is no test for H-ion content as with the same p_H value, solns. of HCl, tartaric acid and citric acid react positively and solns. of normal fatty acids and lactic acids negatively. The HCl bound to proteins cannot be detd. by any direct titration method. Its estn. follows the detn. of free HCl and of the total HCl after the methods of Sjoqvist or Lüttke-Martius. By use of these methods it is possible to distinguish in the stomach contents between HCl as the normal acid of the stomach and the accidental acids of the food or pathologic org. acids. The detn. of the actual acidity directly or indirectly (titration of the indicator according to Sahli) is not superfluous or to be ignored but is supplemented. As the taste of the acids is not due to the H-ion concns. alone, but to the equiv. concn., the equiv. concn. must be considered as well as the actual acidity. In order that results may be compared in writing on the acidity of the stomach contents the nature of the test meal should be given and the methods used such as: total acidity (α-naphthaolphthalein) or total acidity (phenolphthalein), free HCl (dimethyl yellow), actual acidity (Sahli). Harriet F. Holmes

A new simple method for preserving microscopical stained films. M. van Riemsdyk. *Nederland. Tijdschr. Hyg., Microbiol. en Serol.* 5, 119–24(1931).—An aq. soln. of transparent gum arabic can be applied with success as a film cover to all microscopical stained smears, perhaps even to histological and anatomical films. The gum recommended is the Gee Wee gum. Take 1 part of gum and 1.5–2 parts of H_2O, make slightly alk. with *N* NaOH to litmus and sterilize. The soln. can be kept a long time but the reaction must always be alk. The film must be entirely dry. J. C. Jurrjens

A simplified method for the determination of blood cholesterol. Emily M. Day and Adolph Bolliger. *Australian J. Exptl. Biol. Med. Sci.* 7, 41–4(1930).—The method requires less time and app. than others and gives a correlation of ±5% with that of Myers and Wardell, with 0.2 to 1.0 cc. of blood. Blood or plasma is dried at room temp. on two 7 cm. filter papers, folded, placed in 6 in. test tube and covered with $CHCl_3$. The tube is then gently boiled for 15 min. in a beaker of CCl_4 and the $CHCl_3$ decanted and made up to 15 cc. with washings, from which 5 cc. aliquots are taken for analysis as in Myers' method, with 2 cc. Ac_2O and 0.1 cc. concd. H_2SO_4. With 0.2 cc. of blood the drying may be omitted. C. G. King

Rapid determination of blood serum protein. FERNAND KAYSER. *Bull. soc. chim. biol.* **12**, 533–5(1930).—To a mixt. of 25 cc. 95% alc. and 25 cc. acetone, add [illegible] g. MgSO$_4$ in 50 cc. distd. water, let stand 1 hr. and make up to 125 cc. Filter and to an aliquot of the filtrate add 1 cc. formal and 15 drops of 10% AcOH. Bring to boiling and filter, washing the ppt. with small portions of dil. AcOH until free from sulfate. Dry and weigh the ppt. and report globulin by difference.
C. G. KING

The determination of lactic acid in blood. J. LOISELEUR AND R. MOREL. *Bull. soc. chim. biol.* **12**, 538–40(1930).—The method is based upon the procedures of Sakowsky and Clausen (*C. A.* **16**, 2342). To 3 cc. fluoride plasma add 21 cc. distd. water and 2 g. CaO, let stand a few min., add 6 cc. satd. $CuSO_4$, let stand 1 hr. with occasional shaking, and centrifuge. Det. lactic acid in the supernatant liquid by the Clausen method. Control expts. show that lactic acid can be recovered, that glucose does not interfere, and that the results compare closely with Clausen's when applied to different types of blood.
C. G. KING

Utilization of the Soja hispida seed freed from uricase in the detection and determination of allantoin. R. FOSSE, A. BRUNEL, P. DE GRAEVE, P. E. THOMAS AND J. SARAZIN. *Compt. rend.* **191**, 1388–90(1930).—Under exptl. conditions the uricase of the soy bean was destroyed by heat and also by KCN without affecting the active properties of the allantoinase and urease. The uricase-free substance was then studied for possible utilization in the detn. of allantoin in blood serum and in dog serum. The presence of allantoin in a diln. of $^1/_{100,000}$ can thus be unmistakably detected.
B. S. LEVINE

The use of uroselectan in urography. R. S. E. MORRAY. *U. S. Vet. Bur. Med. Bull.* **7**, 111–6(1931).—A brief review of the developments leading to the evolution of Na 5-iodo-2-keto-1-pyridineacetate. Indications for its use and methods of administration and 3 case reports are given.
B. S. LEVINE

The alkaline decomposition of serine. FLOYD S. DAFT AND ROBERT D. COGHILL. *J. Biol. Chem.* **90**, 341–50(1931).—Serine is decomposed when heated in a strongly alk. soln., among the products formed being NH_3, glycine, alanine, $(COOH)_2$ and lactic acid. An intermediate decompn. product is pyruvic acid. Serine must be absent from solns. in which arginine is being estd. by alk. decompn., but this condition is secured by the pptn. of arginine with phosphotungstic acid. The methods commonly employed for the removal of NH_3 from protein hydrolyzates do not cause any significant decompn. of serine.
A. P. LOTHROP

A reduction in the amount of blood required for the Folin micro method for blood sugar. HAROLD J. JEGHERS AND VICTOR C. MEYERS. *J. Lab. Clin. Med.* **15**, 982–4(1930).—A modification is described of the Folin micro method (*C. A.* **22**, 2762) for the detn. of blood sugar. The quantity of blood required is reduced to 0.025 cc., which may be measured by means of a capillary pipet.
E. R. MAIN

A routine blood chemistry unit. E. G. SCHMIDT. *J. Lab. Clin. Med.* **15**, 1013–6 (1930).—A mech. unit is described for the routine detn. of blood chemistries in the hospital lab.
E. R. MAIN

The preparation of some brominated oils and brominated esters. HELEN L. WILKOFF. *J. Lab. Clin. Med.* **16**, 36–8(1930).—Methods are described for the prepn. of brominated oils and brominated esters suitable for use in röntgenologic work. Sesame oil contg. 40% Br appears to be the most suitable of the brominated oils. The brominated Me esters of the acids prepd. from cottonseed oil, which contain 42% Br, appear to be the most suitable of the esters. The latter have a low viscosity, are pale amber in color and more limpid than the corresponding oils or Et esters.
E. R. M.

Determination of copper in biologic material. J. M. INOUYE AND F. B. FLINN. *J. Lab. Clin. Med.* **16**, 49–51(1930).—An electrolytic method is described for the detn. of Cu in biologic material.
E. R. MAIN

Simultaneous determination of inorganic phosphate, sugar and lactic acid in blood. SERGIUS MORGULIS AND SHERMAN PINTO. *J. Lab. Clin. Med.* **16**, 60–4(1930).—Procedures are described for the detn. of inorg. phosphate, sugar and lactic acid in the trichloroacetic acid filtrate obtained from 3 cc. of blood. The inorg. phosphate is detd. by the method of Kuttner and Cohen (*C. A.* **22**, 606); the sugar, by a modification of the Hagedorn-Jensen method and the lactic acid, by the method of Friedemann (*C. A.* **23**, 3245).
E. R. MAIN

Phosphorus metabolism. I. A system of blood phosphorus analysis. GUY E. YOUNGBURG AND MAMIE V. YOUNGBURG. *J. Lab. Clin. Med.* **16**, 158–66(1930).—

Detailed directions are given for the use of a colorimetric method for the detn. of P, in which the phosphomolybdate formed is reduced with $SnCl_2$. The method is adapted to the detn. of total P, inorg. phosphate P, total acid-sol. P and lipide P in whole blood, corpuscles and plasma. E. R. MAIN

The determination of nonprotein nitrogen in 0.1 cc. of blood. ARTHUR K. ANDERSON AND STACEY F. HOWELL. *J. Lab. Clin. Med.* **16**, 183–6(1930).—A modification is described of the Folin-Wu method for the detn. of nonprotein N which requires but 0.1 cc. of blood. The pptg. agent is a mixt. of Na_2WO_4 and H_2SO_4. The digestion is carried out in tubes graduated at 5 cc. E. R. MAIN

A proposed chemical test for pyrogen in distilled water for intravenous injections. EDGAR B. CARTER. *J. Lab. Clin. Med.* **16**, 289–90(1930).—One hundred cc. of the distd. water is heated to boiling in a clean pyrex beaker and treated with 10 cc. of 10% H_2SO_4 and 0.1 cc. of 0.05 *N* $KMnO_4$. The color of the soln. should not be destroyed by boiling for 10 min. if pyrogens (fever-producing org. substances of bacterial origin) are absent. E. R. MAIN

Acetone as a yardstick for ketosis. ARTHUR T. BRICE. *J. Lab. Clin. Med.* **16**, 291–3(1930).—A method is described by which the Legal test for acetone may be used as a quant. method for the estn. of acetone in the urine. E. R. MAIN

Application of the quinhydrone method for the determination of the p_H of solid medium. WM. STEENKEN, JR. *J. Lab. Clin. Med.* **16**, 316–7(1930).—The quinhydrone method may be used for the detn. of the p_H of agar or other solid media. Small portions (5 × 5 mm.) are ground with 0.2 g. of powd. quinhydrone and the p_H is detd. by use of the Cullen and Biilmann electrode (*C. A.* **19**, 3101). E. R. MAIN

A simple method of estimating "osmic acid," with some applications to cytological technic. R. PALMER. *J. Roy. Microscopical Soc.* **50**, 221–6(1930).—Analysis of solns. of osmic acid is desirable, as indicative of deterioration and also of the amt. taken up by the tissue under treatment. Qual. tests for OsO_4 are available, of which Chugaev's is best. A soln. of OsO_4 or a chlorosmate is heated with thiourea in excess, acidified with HCl. A red color is observable in concns. greater than about 1:1,000,000. The reaction is applied to colorimetric estn., by prepg. a series of standards, which are in sealed tubes. 0.2 cc. of 2% OsO_4, 32 cc. H_2O, 4 cc. of 5% thiourea and 4 cc. of HCl (1/5 concn.) give 40 cc. of a soln. contg. 0.01% OsO_4, from which other standards may be prepd. by dilution. For estn. of an unknown, 0.05 cc. is measured by a capillary pipet, mixed with 8 cc. H_2O, 1 cc. 5% thiourea and 1 cc. of HCl (1/5 concn.), heated to boiling and cooled. The reaction is unaffected by $HgCl_2$ but gives a black ppt. if chromate-fixing agents have been used in the tissue. Data are given for the absorption of OsO_4 during the impregnation of frog kidney. Solns. of OsO_4 keep best in tightly stoppered bottles, so evapn. loss is minimized. C. W. MASON

Hyrax, a new mounting medium for diatoms. G. D. HANNA. *J. Roy. Microscopical Soc.* **50**, 424–6(1931).—Resinous mixts. of aniline, S and HCHO may be prepd., but these are rather deeply colored and do not harden readily. "Hyrax" is "a derivative of naphthalene" (no formula or recipe given) of pale straw color and resinous character, n = 1.82, sol. in benzene or xylene, but not in H_2O or EtOH. It hardens by evapn. of solvent; it may be heated gently and is rendered fluid thereby, without discoloration. Prepd. slides and stained specimens have been permanent for several years, with only slight darkening if exposed to sunlight. Hyrax is very transparent to blue and violet. C. W. MASON

A method for the histochemical detection of iodine. U. HINTZELMANN. *Z. wiss. Mikroskop.* **46**, 486–7(1930).—The tissue is fixed in dil. HCHO and treated with 1% TlOAc. Yellow TlI is formed. Sections are best prepd. by the freezing method, and care should be taken not to dissolve out the TlI by subsequent staining treatments. The yellow color is seen best by reflected light against a dark background. TlOAc is better than Pb salts because no ppt. of chlorides or carbonates interferes, and is much cheaper than Pd salts. C. W. MASON

The fate of fructose in the animal organism. I. Determination of fructose by the diphenylamine method. W. W. OPPEL. *Biochem. Z.* **229**, 85–99(1930).—From a detailed study of the method the following procedure for the detn. of fructose has been worked out: Place a mixt. of 1 cc. of the fructose soln., 0.1 cc. 20% alc. soln. of diphenylamine, and 1 cc. 25% HCl in a test tube for 20 min. in a vigorously boiling water bath. Cool the tube quickly in running water, ext. the color with 2–2.5 cc. isoamyl alc. and after sepn. remove the isoamyl alc. layer and dil. with 30 cc. alc., compare the color with that of a standard fructose soln. treated similarly. Quantities between 0.438 and 0.085 mg. can thus be detd. S. MORGULIS

Determination of the acid elimination in the urine. FRITZ MAINZER AND MARGA

BRUHN. *Biochem. Z.* **229**, 216–32(1930).—Urine was collected under paraffin oil and analyzed immediately. The CO_2 content was detd. in the Haldane app. after 15 cc. urine was equilibrated in a tonometer at 38° with a gas mixt. of known CO_2 content. The total CO_2 was detd. in the Van Slyke app.; the H-ion concn. was detd. with the quinone electrode, while the titratable acidity was detd. by titrating under oil to p_H 7.45 with phenol red as an indicator. Not only the H-ion concn. but the titratable acidity as well depends upon the CO_2 tension of the urine. At acid p_H the error in detg. the urinary acidity is small, but at $p_H > 8.0$ it may become 90–100% of the titration. With the aid of CO_2 tension and total CO_2 values satisfactory corrections may be obtained. On the other hand, the total acid excretion (acid + NH_3 − HCO_3) is largely independent of the abs. value of the CO_2 tension, provided the total CO_2 and acid are detd. under the same CO_2 tension. S. MORGULIS

Analytical studies. XII. LUDWIG PINCUSSEN. *Biochem. Z.* **229**, 233-7(1930); cf. *C. A.* **24**, 4801.—A small extn. app. is described for extg. fat from liquids. A method is discussed for detg. Br in urine. Evap. to dryness 5–10 cc. of urine treated with 6–12 drops NaOH, then incinerate in a Ni crucible over an open flame. Filter the ash soln. into a special distn. app., acidify strongly with H_2SO_4 and mix with 20 cc. 10% $KHSO_4$. Add a 2% soln. $KMnO_4$, drop by drop, from a funnel until a permanent pink color remains and suck cold air through the app. for 1.5 hrs., passing it through 2 wash bottles with about 20 cc. 2% KI soln. At the close of the aeration titrate the KI solns. with 0.01 *N* $Na_2S_2O_3$, 1 cc. of which = 0.799 mg. Br. Another method described deals with the microdetn. of NH_3 and urea by the urease procedure. The removal of NH_3 by aeration is facilitated by adding NaCl, which diminishes its soly. To 2 cc. urine add 1.5 g. NaCl, phenolphthalein and paraffin oil, then 2 cc. 33% Na_2CO_3. Distil at 45° for 20 min. when theoretical results are obtained. In the detn. of urea the addn. of the NaCl does not have any significance. S. MORGULIS

The manometric carbon dioxide determination according to Van Slyke. FRITZ MAINZER. *Biochem. Z.* **229**, 311–4; *Klin. Wochschr.* **9**, 2401(1930).—A 50-cc. pipet is described so constructed that the gas vol. can be read at 0.5, 2.0, 4.0 and 6.0 cc. in the Van Slyke manometric CO_2 app. This is very useful in CO_2 detns. of urine, which often cannot be made in the ordinary app. calibrated only at 0.5 and 2.0 cc. S. MORGULIS

Microdetermination of calcium and phosphorus in blood and tissues. G. WIDMARK AND B. VAHLQUIST. *Biochem. Z.* **230**, 245-52(1931).—Blood, plasma or tissue fragments contg. 0.1–0.2 mg. Ca or 0.05–0.2 mg. P are digested with 0.5–0.75 cc. H_2SO_4 in a small Kjeldahl flask, and when the material is completely charred a few drops of concd. HNO_3 is added and the heating continued until a clear, colorless soln. results. The strongly acid soln. is transferred to a Pt dish, washed with H_2O and the soln. evapd. and then ignited to drive off all H_2SO_4. The residue is taken up in H_2O, transferred to a beaker and warmed on a water bath. One cc. of satd. $(NH_4)_2C_2O_4$ and a drop of methyl red are added, and the reaction is adjusted to p_H 5 with NH_4OH and AcOH. The pptn. is allowed to proceed at least 1 hr. and the material is filtered through a special porcelain rod with suction. The ppt. is washed twice with H_2O. The ppt. is dissolved in 0.5 cc. HCl, heated to 60° and titrated with 0.01 *N* $KMnO_4$. The Ca can be detd. in 2 cc. plasma with an accuracy of 2–3% by this method. For the P detn. the digested material is diluted with 15 cc. H_2O and boiled for 3 min. To this are added 5 cc. 50% NH_4NO_3 and, after renewed boiling, 1 cc. 10% $(NH_4)_2MoO_4$. The mixt. is kept for 2 min. at 80°, and the ppt. is allowed to settle out for an hr. It is filtered again by means of the special porcelain rod, and washed 3 times with ice-cold water. An excess of 0.04 *N* NaOH is now added and titrated with 0.04 *N* H_2SO_4 against phenolphthalein. S. MORGULIS

Microchemical demonstration of lead and mercury in the organism. H. BÜLL. *Biochem. Z.* **230**, 299–303(1931).—The Pb is detd. as $K_2CuPb(NO_2)_6$ which forms a beautiful cryst. ppt. The reaction is sensitive to 0.05 mg. Pb and can be carried out even in the presence of Cd or Hg in a concn. 300 times as great as that of the Pb. Blood, urine or feces is charred at a very low temp., and the charred mass is rubbed up with about 4 times its wt. of a mixt. of equal parts of $KNaCO_3$ and of KNO_3. This is now fused in a porcelain crucible, dissolved in 2 *N* HNO_3 and filtered, if necessary. The soln. is evapd. and the nitrate is decompd. by evapg. several times with 2 *N* HCl. Finally, the residue is taken up in 10 cc. 0.1 *N* HCl, warmed to 60° and H_2S is bubbled through it for 30 min. Then following neutralization with 10 cc. 0.1 *N* NaOH the H_2S is passed for 15 min. longer. After standing for 24 hrs. the ppt. is filtered off, washed with 1% NH_4NO_3 satd. with H_2S, and dissolved in hot dil. HNO_3. After evapn. to dryness the residue is taken up in 3 drops of hot 0.1 *N* HCl, transferred to a microscope

slide, evapd. over an open flame, and treated with a drop of 2% Cu acetate soln. Upon evapn. the residue is treated with a drop of a mixt. consisting of equal amts. of AcOH, satd. NH_4OAc and H_2O to which an equal vol. of satd. KNO_3 has been added. In the presence of Pb small brown or large black crystals appear. Pb is always found in feces where Pb had been ingested, and is never present in the blood unless it has been found in the urine or feces. Hg was demonstrated in the vomitus of poisoned persons by first heating this with concd. HCl and $KClO_3$ until a yellow color developed, when a 3 mm. piece of Cu wire is inserted for 24 hrs. The wire is washed, dried and sealed into a capillary tube. The Hg is distd. off by heating the tube and the droplets of Hg are examd. under the microscope. For urine, this must first be heated with concd. HCl and $KClO_3$, satd. with H_2S and the filtered off ppt. is dissolved in HCl and a crystal of $KClO_3$. This is placed on a microscope slide, carefully evapd. and treated with a droplet of a reagent consisting of $Co(OAc)_2$ and satd. NH_4SCN. Instead of this a small crystal of a mixt. can be added obtained by evapg. an aq. soln. of 2 parts $Co(OAc)_2$ and 5 parts of NH_4SCN. Blue crystals of mercuri-cobalti thiocyanate are formed in the presence of Hg. S. MORGULIS

Microdetermination of the reduced and total glutathione in the liver. JOACHIM KÜHNAU. *Biochem. Z.* **230**, 353–72(1931).—Weigh quickly on a torsion balance about 0.5 g. of fresh liver (or liver kept on ice for not over 1 hr.), cut into several pieces and rub up with a little ignited quartz sand to a fine suspension with 9 cc. 10% CCl_3CO_2H. After leaving this for 5 min. filter the material through a double thickness of Schleicher and Schüll No. 595 in a Büchner funnel. Rinse the mortar with 4 cc. of the CCl_3CO_2H and pour this also through the filter, repeating the washing once more. Pour the fluid into a 100 cc. Erlenmeyer flask. To this add 1 cc. 25% KI and 2 cc. 0.005 *N* I_2 soln. and after 2 min. titrate with 0.002 *N* $Na_2S_2O_3$, using 2 drops of a 1% starch soln. as indicator, make a blank titration, using 19 cc. CCl_3CO_2H, the difference multiplied by 0.62 giving the GSH (reduced glulathione) content in mg. With this procedure the error is ±4%. S. MORGULIS

The degree of oxidation within the animal body under the influence of different conditions. HITOSHI KIMURA. *J. Biochem.* (Japan) **12**, 351–69(1930).—Müller's method (*C. A.* **24**, 393) for detg. the "Vakat O_2" has been used with certain modifications. This method gives a measure of the amt. of O_2 needed to oxidize completely the org. substances excreted through the urine. It consists in oxidizing the urine with H_2SO_4 and KIO_3 at a high temp. and detg. in an aliquot the I_2 set free with KI. In another aliquot the N is detd. by the usual procedure. Also a correction for Cl must be made: 1 mg. Cl is equiv. to 1.207 mg. KIO_3. K. points out that it is necessary first to heat the contents of the flask for 2 hrs. at 180°. The use of 0.5 g. KIO_3 for each 10 cc. urine is recommended, but of herbivorous urine only 5 cc. is taken. Human urine should best be dild. 2–3 times with water. Removal of the thyroid gland causes a diminution in the O_2 consumption, but the degree of oxidation is not altered. Feeding thyroid gland increases the amt. of oxidation, while the degree of oxidation is decreased far below normal. Adrenalectomy diminishes both the N and the total metabolism, but the degree of oxidation is not materially affected. S. MORGULIS

A new microdetermination of bile acids in the bile. SATOSU NAGAKAWA AND HOSABURO FUJIKAWA. *J. Biochem.* (Japan) **12**, 399–410(1930).—When 0.5 cc. of an aq. soln. of bile salts is heated for exactly 2 min. in a vigorously boiling water bath with 2 cc. concd. H_3PO_4 and 2 drops of a 0.6% furfural soln. in abs. alc. a beautiful red color develops suitable for colorimetric study. Prep. a standard from 2 solns., one of which contains 0.01 g. scarlet and 1 g. $HgCl_2$ in 100 cc. and the other 1 g. $K_2Cr_2O_7$ in 100 cc. Mix 5 cc. of the first and 1.5 cc. of the second soln. and dil. with water to 30 cc.; this results in a soln. with a very permanent red color. The color is proportional to the concn. of the bile salts within the range of 5–20 mg. %. This red coloration is probably due to cholic acid, the other bile acids reacting very feebly or not at all. Fats, lecithin, cholesterol and alc.-ether exts. of the brain give neg. results. S. MORGULIS

Methods for the determination of total fixed base, sodium and potassium in urine. A. FØLLING. *Skand. Arch. Physiol.* **61**, 27–31(1931).—For the total base detn. place 2 cc. of urine in a silica dish 7 cm. in diam. and, after the addn. of 4–5 drops 50% H_2SO_4, evap. on a water bath and ash at 600°. After cooling, mix this with 1 g. of wet stannic acid and 3 cc. 35% HNO_3 (make the stannic acid by treating 20 g. Sn shavings with 300 cc. 35% HNO_3 and washing the residue several times with water by decantation, keep the metastannic acid wet in a glass-stoppered jar), stir the mixt. and evap. to dryness. When cool, treat it with 10 cc. of a soln. of 2 cc. HNO_3 in 100 cc. water, to 10 cc. of which add 1 cc. EtOH just before using. Stir the mixt. well and filter through ashless paper. Evap. 5 cc. of the filtrate with a drop of 50% H_2SO_4 in a Pt dish, heating

cautiously at first, then all over to a bright red heat for about 10 min. Dissolve the ash in 15 cc. neutralized water (add 0.02 *N* NaOH to distd. water until a persistent red color to phenol red results). If not all the H_2SO_4 was driven off the color turns yellow and can be brought back to red by the addn. of 0.02 *N* NaOH which is then subtracted from the results. Det. the sulfate by the benzidine micromethod as usual. Det. Na and K separately by removing the Ca and Mg as phosphates through the addn. of NH_4OH. To 10 cc. urine add 10 cc. dil. NH_4OH and, after 4 hrs., filter the mixt. Evap. 4 cc. of the filtrate in a silica dish to drive off NH_4OH, then add 5 drops of 50% H_2SO_4 and carry out the detn. as before for the total base. To another 10 cc. filtrate obtained from urine treated with dil. NH_4OH to remove Ca and Mg add 10 cc. 1% $CeCl_3$. Mix well, filter after 15 min. and use a 4-cc. aliquot to det. the total base. Det. the Na alone as the complex uranyl-Zn-Na acetate salt. To 5 cc. urine add 5 cc. of a $UO_2(OAc)_2$ soln. contg. 27 g. of this salt and 3 cc glacial AcOH in 1 l. of water. Filter off the phosphates after 15 min. To 2 cc. of the filtrate in an 18 × 150-mm. test tube add 4 cc. of reagent made by dissolving 20 g. $UO_2(OAc)_2$, 40 g. crystd. $ZnSO_4$ and 7 cc. glacial AcOH in 180 cc. water and filtering after 2 days. This soln. should not give a ppt. when mixed with an equal vol. of alc. To the mixt. in the test tube add 6 cc. 96% alc. with const. stirring and, after 20 min., filter through a Jena Gerate-glass filter. Wash the tube and the filter 4 times with 3 cc. alc. Now dissolve the ppt. and wash back quantitatively into the test tube with hot water. Transfer to a small Erlenmeyer flask and titrate to a definite red with 0.1 *N* NaOH, using 5 drops 1% phenolphthalein. The cc. 0.1 *N* NaOH/8.77 = 0.1 milli-equivs. Na in 1 cc. urine. Det. the K by difference from the K + Na detn. S. MORGULIS

Determination of ammonia in urine by extraction. GRETA HAMMARSTEN. *Skand. Arch. Physiol.* **61**, 49–63(1931).—The Widmark rocking extractor is used. The NH_3 is liberated from 15–25 cc. urine by 5–10 cc. *N* NaOH and the liberated NH_3 is absorbed in a measured amt. of 0.1 *N* H_2SO_4. The solns. in the 2 communicating chambers are covered with layers of acid-free ether. Half of the NH_3 is absorbed in 340 min. so the shaking is carried out for that period of time and the standard acid is titrated with bromocresol purple as indicator. S. MORGULIS

Colorimetric determination of glucuronic acid in urine of man and rabbits. II. A. OGATA AND T. YAMANOUCHI. *J. Pharm. Soc. Japan* **50**, 1059–75(1930); German abstr. 135–8.—The method of detg. glucuronic acid in aq. soln. (cf. *C. A.* **23**, 4718) was applied to the detn. of glucuronic acid in urine of man and rabbits. F. I. N.

The association of biochemical constituents and of certain cellulosic esters. JEAN LOISELEUR AND LEON VELLUZ. *Compt. rend.* **192**, 159–61(1931).—A method is described for the prepn. of a clear, solid membrane made from proteins, glucides or lipins. It is accomplished by using a carefully selected ratio of certain solvents. *E. g.*, in the prepn. of a casein membrane, 9 g. of dry acetate of cellulose is dissolved in a mixt. of 10 parts (47.6 g.) of acetone and 7 parts (33.4 g.) of abs. MeOH; 1 g. casein is dissolved in 9 g. of formic acid. The 2 solns. are mixed with rapid stirring, then poured on a plate till the solvents evap., when a clear membrane is obtained. By this method, membranes may be made from gelatin, casein, glycogen, gums, glycerides and other biochem. constituents. N. M. NAYLOR

Biological reactions applied to the medico-legal identification of muscles. C. SIMONIN. *Ann. méd. légale criminol. police sci.* **11**, 32–7(1931).—Pptg. serums can be used for the identification of fresh muscle only if they possess a very high activity, and only pos. reactions are conclusive. Expts. with 80 guinea pigs are described and showed that: (1) raw muscle behaves in the same way as blood in regard to anaphylactic reactions; (2) on boiling the muscle loses part of its sensitizing properties. A. P.-C.

The quantitative assay for the testicular hormone by the comb growth reaction. T. F. GALLAGHER AND FRED C. KOCH. *J. Pharmacol.* **40**, 327–39(1930).—Individual variations in response of Brown Leghorn capons to the injection of testis hormone were observed; they were not due to variations in age or wt. of the birds or original size of the comb. The best quant. results were obtained by using a min. daily dose required to produce an increase in growth of 3–7 mm. in 5 days. It is suggested that the strength of the hormone prepn. be expressed in bird units; a unit is defined as the amt. of hormone which, when injected in daily doses for 5 days, yields an av. increase of 5 mm. in length and height of the combs in at least 5 birds. C. RIEGEL

The specificity of the phenol reagent for the selective determination of tyrosine in proteins. VINTILA CIOCALTÉU. *Compt. rend. soc. biol.* **101**, 198–9(1929); cf. *C. A.* **21**, 3210.—The Folin-Denis phenol reagent provides a method for the estn. of tryptophan and tyrosine. An objection to this method for tyrosine has been that the reaction is not sp. In approaching this question from the point of view of the speed

of the reaction, C. first studied the possible interference of the $HgSO_4$. Conclusions: The mercuric tyrosine compd. (I) causes the limits of proportionality to vary greatly, and the $HgSO_4$ diminishes the intensity of the reaction. If the solns. which contain (I) are boiled for ½ hr. with HCl, the proportionality becomes perfect again, but the intensity of the coloration remains feeble. The use of H_2S gives the same excellent results as with tryptophan, but for a complete sepn. of tyrosine the flasks satd. with H_2S should stand stoppered for at least 12 hrs. before filtering; 5 cc. of filtrate is boiled in a 100-cc. graduated flask for 30 min. on the water bath, cooled and treated with the reagent. One mg. tyrosine, without $HgSO_4$, serves as the reference standard. The proportionality is perfect. It is thus possible to det. 0.5–4 mg. tyrosine. J. D. S.

A new clinical method for the estimation of protein in urine. PHYLLIS M. TOOKEY KERRIDGE. *Lancet* **1931**, I, 21–2.—The urine is mixed with a C suspension and C and protein are simultaneously pptd. with trichloroacetic acid. The grayness of the ppt. depends on the amt. of protein, when the amt. of C is const. The tone is compared with standards. The error is 0.025–0.05 g. protein N%. F. B. SEIBERT

Triketohydrindene hydrate as a reagent for albumin, peptone and amino acids. HERMANN GARDNER. *Lancet* **1930**, II, 525–6.—The color reaction with ninhydrin is due to the presence of traces of free NH_3 or of NH_3 ions and is masked by NH_4OH or alkali in excess, and is, therefore, not a reliable reagent for detecting the products of hydrolysis of protein. Water contg. 0.00865% NH_3, or in 1 cc. 0.77 mg. NH_3 N, gives a blue coloration. F. B. SEIBERT

Optimum use of material in biological assays. WARREN W. NICHOLAS. *Bur. Standards J. Research* **6**, 77–87(1931).—If a "characteristic curve" (cf. Trevan, *C. A.* **21**, 2913) representing the effect of increasing amts. of an agent on an organism is known approx., it may be used to det. the actual points on the curve accurately and efficiently Such a curve is obtained by plotting the quantity or concn. of an agent, such as x-rays, ultra-violet light, toxins, inorg. drugs, hormones, vitamins, specific sera, etc., against the percentage of cases in which a given effect such as mortality is produced. The practice of using the same no. of animals to det. each point on the curve is inefficient, as the various points are then detd. with different degrees of accuracy. The point which will be detd. with least accuracy is that at which 0.5 the no. of animals show the given effect. To det. all points with the same degree of accuracy it is necessary to use a max. no. of animals for this point, and a decreasing no. for the points departing from this in either direction. A min. no. of animals will be used where all or none produces the given effect. To det. any 1 point independently, an expt. may be conducted with a small group of animals. From the result it is possible to calc. the value for the given point with the aid of an approx. curve, as well as the probable error of this value. The expt. may be repeated until the probable error lies within the desired limits.
CORNELIA T. SNELL

The study of undetermined carbon and glucidic carbon in normal urines. PAUL FLEURY AND PIERRE AMBERT. *J. pharm. chim.* [8], **12**, 350–64(1930).—The main object was to find a relation between the quantity of glucidic C and undetd. C. Glucidic substances are considered those which not only are pptd. by the Cu-Ba reagent (*C. A.* **24**, 1625) but also are reducers of Hg salts (F. and Marque, *C. A.* **24**, 591, 639). From a sample of urine 3 liquids were prepd. at near 0° for examn.: (1) the urine defecated with Hg salts; (2) the Cu-Ba pptn. filtrate of (1) and (3) the H_2SO_4 soln. of the ppt In each of the 3 liquids were detd. (*a*) total C (Nicloux, *C. A.* **23**, 628), (*b*) total N, (*c*) urea, (*d*) Hg reduction, (*e*) Cu reduction (F. and Boutot, *C. A.* **16**, 4222) before and after hydrolysis. Conclusions: C and N contained in the defecate were completely recovered in solns. (2) and (3), while Hg reduction showed a loss of 40%, Cu reduction 20.9% before and 25.3% after hydrolysis. Therefore the losses of reducing power must be due not to removal by pptn., but to instability of the reducing substance As the Cu-Ba ppt. carried down only 20% C in the form of truly glucidic C (0.710 g. per l. = 1.78 g. dextrose per l.) while the defecate by Cu reduction after hydrolysis showed only 0.717 g. dextrose, *i. e.*, about half as much, the heretofore undetd. quantity of "nonreducing glucide" must be of about the same order as the reducing quantity In addnl. expts., starting from the Cu-Ba ppts., the liquids showed no appreciable rotatory power. They contained Cu-reducing substances, exclusively aldoses (no ketoses), and with $PhNHNH_2$ gave crystals seemingly identical with the glucurosazone of Grimbert and Bernier (*C. A.* **4**, 1497); however, they differ greatly in m. p.
S. WALDBOTT

Determination of biliary salts in bile. I. Gasometric determination in one process. II. Volumetric determination by formol titration. III. Evaluation of biliary sulfur. L. CUNY. *J. pharm. chim.* [8], **12**, 485–98(1930); cf. *C. A.* **21**, 2914,

3211; **22**, 2589, 4559.—**I.** To avoid preliminary gasometric detn. of N in the free amino acids, urea and NH_4OH present, remove these by NaBrO, which liberates their N without affecting the mols. of glycine and taurine cholates. Defecate the bile with hot 95% alc., treat an aliquot of the filtrate with NaBrO, remove excess of this with H_2O_2, hydrolyze the bile salts with NaOH, neutralize with HNO_2 and det. the vol. of N as usual in a ureometer by means of $NaNO_2$ and dil. HNO_2. Calc. the results in terms of g. of N per l. of bile. Make a blank test on the reagents used without bile, deducting any gas vol. formed. **II.** Treat the bile as before with 95% alc., NaBrO and NaOH; then eliminate cholalic acid and carbonates by dil. HCl, filter, neutralize with NaOH (phenolphthalein as indicator), add $BaCl_2$, filter again and acidify slightly. Compare a definite aliquot corresponding to 3 cc. of bile (in tube *B*) with an equal vol. of a blank detn. (tube *T*) prepd. exactly as *B* except that bile is omitted. To both *B* and *T* add 6 drops of phenolphthalein and $Ba(OH)_2$ soln. of exactly known strength ($C \times 0.1\ N$) to pale pink and 10 cc. of neutralized CH_2O. Now add to *T* 0.5 cc. of $Ba(OH)_2$ soln. to bring the soln. to dark red, then det. in *B* the vol. (*n* cc.) of $Ba(OH)_2$ soln. necessary to produce the same tint as in *T*. The content of N (g. per l. of bile) is then $N = (n - 0.5) \times C \times 0.0014 \times 1000/3$. **III.** An adaptation of the *benzidine sulfate method* (*C. A.* **21**, 2145; **22**, 4140) is used. After defecation with alc. and evapn., destroy the org. matter by treatment with HNO_3 and then H_2O_2. Hydrolyze the filtered-off benzidine sulfate (obtained by pptn. in an acetone medium) with boiling water and while hot titrate the free H_2SO_4 with 0.02 *N* NaOH in a bromothymol blue soln. as indicator until a permanently *green* tint is formed, to which the indicator soln. was previously adjusted. Each cc. of 0.02 *N* NaOH indicates 0.00032 g. S. C. prefers the above method I although the capacity of the instrument limits the size of the sample used for analysis. Method II requires experience to read the end points; and double filtration is a disadvantage. Finally, C. quotes the results of Eisenfarb (*Polskiego Archiwum Medycyny Wewnetrznej* **6**, 4(1928)) on comparative detns. of biliary acids in org. liquids by colorimetry (Herzfeld and Haemmerli, *C. A.* **19**, 2965), fluorescence (Raue, *C. A.* **21**, 2710) and gasometry (Chiray and C., *C. A.* **21**, 3211).

S. WALDBOTT

Determination of cholesterol in blood. E. CANALS. *Bull. pharm. Sud-Est; Schweiz. Apoth.-Ztg.* **68**, 49-50(1930).—The av. normal content of blood serum and plasma in cholesterol is 1.5 g. per l. The colorimetric method of detn. by Grigaut (cf. *C. A.* **4**, 2513, 2514; **6**, 497, 1447; **8**, 147) is only approx. accurate. The wt. method by Grigaut for total cholesterol, or better still the technic of Windaus for free and combined cholesterol, is recommended. Details are given for all methods. S. W.

Clinical determination of the albumin-globulin ratio in spinal fluid. WM. G. EXTON AND ANTON R. ROSE *J. Am. Med. Assoc.* **96**, 36-7(1931).—For the detn. of *total protein* equal vols. (1 cc.) of spinal fluid and Exton's protein reagent are mixed and the resulting turbidity is measured in the scopometer For the detn. of *globulin*, equal vols. (2 cc.) of spinal fluid and a satd. soln. of $(NH_4)_2SO_4$ are mixed and let stand a few min. for the globulin to salt out. The mixt. is filtered and the filtrate passed through the same filter until clear, care being taken to drain the test tube thoroughly. The filtrate is an albumin soln. and may be used later if it is desired to ppt. and measure the albumin separately. The salted out globulin on the filter paper is placed in a clean test tube, 2 cc. distd. H_2O poured on the filter paper to bring the globulin into soln. and this is passed thrice through the same filter paper to insure a perfect homogeneous globulin soln. After the funnel has been thoroughly drained, 0.2 cc. distd. H_2O is added in the tip of the filter cone to wash down the globulin that adheres to the tip of the cone. One cc. $(NH_4)_2SO_4$ soln. is added to the globulin soln and mixed. The globulin is pptd. by adding 2 cc. of a satd. aq. soln. of phenol and mixed by gently inverting the tube once. The globulin-phenol ppt. is allowed to stand at least 15 min. and then the turbidity is read in the scopometer sometime between 15 and 30 min. after pptn. Mg. globulin per 100 cc. of spinal fluid is obtained by dividing the junior scopometer scale reading by 4. *Albumin* is detd. by subtracting the globulin from the total protein. If a sep. pptn. of albumin is desired, 1 cc. distd. H_2O is mixed with 2 cc. of the original $(NH_4)_2SO_4$ filtrate and pptd. with phenol as for globulin. The no. of mg. of albumin per 100 cc. of spinal fluid is then obtained by dividing the junior scopometer scale reading by 2.

R. C. WILLSON

TAILLANDIER, M.: **Spectrophotométrie et photométrie appliquées a l'analyse biologique.** Paris: N. Maloine. 256 pp. F. 40.

C—BACTERIOLOGY

CHARLES B. MORREY

The effect of iodine on microbes. J. JADIN. *Compt. rend. soc. biol.* **105**, 461–2 (1930).—Suspensions of *E. typhi* (I), *paratyphosus* B (II) and *paratyphosus* C (Hirsfeld's bacillus) (III) were heated on the steam bath at 56° for 30 min. The suspensions were iodized at 50° for 2–3 hrs. by adding first several drops of Na_2CO_3 soln., then I-iodide soln. until free I_2 was present. The excess I_2 was removed by centrifugation, and the iodized microbes were injected into rabbits to get immune sera. The antigen from the injection of iodized I agglutinated both normal and iodized I (1:4000) but not II or III. Similar specificity was shown by II and III. Iodized microbes, unlike serum proteins, preserve with their antigenic properties all their specificities. B. C. BRUNSTETTER

The action of lipoid solutions upon the growth of acid-fast bacilli. TEOFILIP NYREN. *Beitr. Klin. Tuberk.* **73**, 238–50(1929).—Lecithin from 5 different sources (human, cow, pig, plant and egg) was used in disperse soln.; it favored the growth of tubercle bacilli. Cholesterol had no stimulating influence. Human lecithin retarded the growth of saprophytes. There was no inhibition from lecithin upon cold-blood tubercle bacilli and saprophytes. A no. of the acid-fast bacilli grew upon the lecithin nutrient medium with marked granulations. H. J. CORPER

Biological chemical observations on the tubercle bacillus. V. A. VASSILIOU. *Z. Tuberk.* **54**, 219–26(1929).—Tubercle bacilli were extd. with chloroform and a wax-like dark fraction was obtained in addn. to a second fat-like fraction. Various substances were tested to det. the soly. of these fats. The chem. investigation revealed that the m. p. could not be detd. because carbonization occurred at 280°. Extn. of the substances with ether revealed an absence of fat and the constituents of fat such as glycerol, elain, steatin, etc., were absent. Conclusion: The so-called fat and waxy substances of the tubercle bacillus are not related to fat or wax. The watery ext. of the chloroform emulsion disclosed an aldopentose, however. H. J. CORPER

The chemistry of disinfection. WILDER D. BANCROFT AND G. HOLMES RICHTER. *J. Phys. Chem.* **35**, 511–30(1931).—Disinfection is explained on the basis of the colloidal nature of cells. The first stage of decreasing stability of the cell colloid is assocd. with the phenomena of stimulation; the next stage of reversible coagulation inhibits the activity of the organism (antisepsis), and the final stage of irreversible coagulation brings death to the bacteria (disinfection). These colloidal changes of yeast cells and of certain bacteria were observed experimentally with the ultramicroscope. The chem. concept of disinfection is shown to be unsound because of the inapplicability of the mass action law, the lack of stoichiometrical relations and the abnormal temp. coeffs. Conclusion: Disinfection consists first, of an adsorption of the drug and, secondly, of the coagulation of the cell colloids. MALCOLM DOLE

The reaction of purines to protein in microörganisms. ÉMILE F. TERROINE AND FR. SZUCS. *Ann. physiol. physicochim. biol.* **6**, 129–49(1930).—The content of total N cannot be taken as a measure of protein in micoörganisms. It is, however, true that a given species of bacterium always contains the same purine/protein N ratio. H. EAGLE

Influence of starvation (complete starvation and nitrogen starvation) on the proportion of proteins and of purines in microörganisms. ÉMILE F. TERROINE AND FR. SZUCS. *Ann. physiol. physicochim. biol.* **6**, 157–77(1930).—Either complete or N starvation causes a decrease in the total protein of yeast and of *St. nigra*. Purine and protein N fall concomitantly at first; in later stages, the decrease in protein N is proportionately larger. H. EAGLE

The viability of B. pestis. I. S. TINKER AND G. P. RUDNEW. *Arch. Schiffs-Tropen-Hyg.* **34**, 554–9(1930).—*B. pestis* is not affected by Hayem's soln. or by Giemsa stain 1:10. It is, however, killed by a modified Turk's soln., or by fixation of the smear with EtOH for 5 min.–2 hrs., followed by Giemsa stain. The reagent used for hemoglobin detn. kills it in 45 min. Dried and stained, the organism remains viable for 2 hrs. H. EAGLE

The vibriocidal powers of the water of certain rivers of India. SARANJAM KHAN *Indian J. Med. Research* **18**, 361–5(1930).—Water of the Ganges and Jumna rivers has vibriocidal properties which are completely destroyed by heating at 55° for $^1/_2$ hr. H. EAGLE

The bacteriological diagnosis of tuberculosis. J. MOURIZ. *Klin. Wochschr.* **9**, 2249–51(1930).—Hohn's method was found to be the best for isolating tubercle bacilli from mixed culture. No more than 4–5% H_2SO_4 should be used; a potato-egg medium

was found to be the best. A special tube was devised to keep the medium moist.
H. EAGLE

Formation of hydrogen peroxide by lactic acid bacteria. ALFRED BERTHO AND HANS GLÜCK. *Naturwissenschaften* 19, 88(1931).—H_2O_2 is formed in oxidative metabolism by the facultative, anaerobic, catalase-free lactic acid producers *Bact. delbrücki*, *B. iugurt* and *B. acidophilus*. The O consumption was followed in Barcroft manometers with glucose as "donor." HCN, 0.0005 mol., was without influence. The H_2O_2 was detected with Ti sulfate and detd. as Ce peroxide (Wieland and Rosenfeld, *C. A.* **24**, 2155) or by direct titration. Generally the theoretical amt. from $2H + O_2 = H_2O_2$ was found. Catalase addn. reduced the amt. of H_2O_2 to half. If the H_2O_2 was not bound during the reaction, its increasing concn. damaged the cells and resulted in decreased total production. The conditions were about as follows: 3 cc. bacterial suspension of 10 mg. dry substance, 3 cc. 0.1 *M* glucose, 3 cc. 0.2 *M* borate buffer of p_H between 8 and 9, 1 or 2 cc. 0.002 *M* cerous sulfate were added together to give an initial p_H of 8.2 to 8.3. For *Streptococcus casei*, which also respires unhampered by HCN, no H_2O_2 formation was found. B. J. C. VAN DER HOEVEN

The use of small additions of acid for increasing the germicidal action of E. C. on bacterial spores. C. S. RAM AYYAR. *Agr. J. India* **25**, 213–9(1930); cf. *C. A.* **24**, 5328.—Spores of refractory bacteria, such as *B. subtilis*, *B. albolactus* and *B. mesentericus*, were practically completely destroyed after 30 min. contact with a soln. contg. 0.2% of E. C. (a special hypochlorite soln. contg. 2% of available Cl) and 0.05% of a N soln. of citric acid. With a 0.2% soln. of E. C. alone the spores were not destroyed even after 60 min. contact, although the no. was reduced to a considerable extent. K. D. J.

Remarks on the composition of peanut meal peptone and its use for the culture of pathogenic bacteria. ALBERT BERTELOT, G. AMOUREUX AND DENIS PETIT. *Bull. soc. chim. biol.* 12, 1029–30(1930).—Analysis is given of a pepsin (I) and a pancreatic peptone (II), illustrating differences depending upon the method of prepn. I gave good toxin production and II did not, although both gave good growth with *B. tetanus*.
C. G. KING

Physical difference among bacteriophages. F. M. BURNET. *Australian J. Exptl. Biol. Med. Sci.* **7**, 27–35(1930).—Bacteriophages from *Salmonella*-dysentery groups of bacilli fell within 2 groups with regard to the difference in heat stability and ascension of filter paper. C. G. KING

Balanced salt action as manifested in bacteriophage phenomena. F. M. BURNET AND MARGOT MCKIE. *Australian J. Exptl. Biol. Med. Sci.* **7**, 183–98(1930); cf. *C. A.* **24**, 5787.—Bacteriophage (I) dild. in a soln. of Na, K and NH_4 salts were inactivated by heating 1 hr. at 60°, but the presence of Ca, Ba or Sr salts partially or completely prevented such action In the absence but not in the presence of bivalent cations or broth, Janus green, toluidine blue and methylene blue inactivated a dil. soln. of I. Different types of I show characteristic individual differences in sensitivity toward inactivating and protecting substances. The effects related to the Na:Ca balance are like those of living protoplasmic structure. Electrophoretic expts. indicate a decrease in effective size of I in the presence of excess Ca ion. C. G. KING

The electrical behavior of bacteriophages. F. M. BURNET AND MARGOT MCKIE. *Australian J. Exptl. Biol. Med. Sci.* **7**, 199–209(1930).—In electrophoretic expts. 20 types (salmonella, dysentery and staphylococcus) of bacteriophage all showed a neg. elec. charge. The migration rate and adsorption of proteins (globin and gelatin) varied greatly. In one case cathodic concn. was obtained for a type which acted only on rough strains and was not sensitive to methylene blue, toludine blue or Janus green.
C. G. KING

Oligodynamic dilutions. JULIUS MEYER. *Chem.-Ztg.* 55, 85–6(1931).—The term "oligodynamic" as used in biology and medicine is a misnomer. It was used originally to designate germicidal telekinesis of metals such as Ag or Cu plates placed in aquaria or flower vases. At present under this term is included such germicidal action as is manifested by extremely high dilns. of metallic salts, despite the fact that the phenomenon of telekinesis is entirely absent. The dilns. with which the biol. and medical investigators are experimenting often are extremely high from the point of view of the analytical and phys. chemist. For example, K. König (cf. *C. A.* **22**, 4177) worked with dilns. of $AgNO_3$ and $Pb(NO_3)_2$ varying from 10^{-2} to 10^{-29}. For $Pb(NO_3)_2$ in a 10^{-29} diln. 55,000 l. of the soln. contains 1 mol. of the reagent and for $AgNO_3$ 28,000 l. contains 1 mol. of the reagent. Results obtained from work with such dilns. are scientifically valueless since such dilns. cannot be distinguished from water of the highest purity.
B. S. LEVINE

Experiments on bacteriophage adsorption by vulnerable bacteria. CLAUDE P.

BROWN AND FRANK GEMAR. *U. S. Vet. Bur. Med. Bull.* 7, 224–9(1930).—The expts. show that it is possible to adsorb bacteriophage obtained from sewage by using a vulnerable organism (*E. coli*) against which it is actively lytic. Temp. control is necessary in order to bring about the adsorption of bacteriophage when the organism against which it is actively lytic is used for this purpose. A temp. as low as 25° still permits lysis, while 16° or lower prevents lysis. B. S. LEVINE

Disinfection. II. The manner of death of certain bacteria and yeasts when subjected to mild chemical and physical agents. GEORGES KNAYSI AND MORRIS GORDON. *J. Infectious Diseases* 47, 303–17(1930).—The order of death of *E. coli* and of *Schizosaccharomyces pombe* when produced either by chem. or by phys. agencies is detd. by the distribution of resistance among the cells. That this distribution is not uniform among a culture of microorganisms is shown by the structure of the death curves The similarity in results obtained with *E. coli* and *S. pombe* does not justify the theory advocating a difference in the order of death between small and large cells. **III. The taking up of iodine by yeast cells.** *Ibid* 318–21.—The cells of *Saccharomyces cerevisiae* take up I from its aq. solns. according to the adsorption isothermal. These results are in agreement with microscopic observations which show that the colloidal structures of the cells, and especially the membrane, take up I to a great extent and give up much of it on dilu. When $HgCl_2$ is used instead of I, the adsorbed salt may be pptd. as HgS. The membrane, with its high adsorptive power, becomes black, while the rest of the protoplasm becomes gray only after more prolonged standing. This suggests that the mechanism of disinfection is closely related to that of dyeing and tanning. JULIAN H. LEWIS

The use of acid fuchsin in Russell's triple sugar medium. G. D. CUMMINGS. *J. Infectious Diseases* 47, 359–66(1930).—Undecolorized acid fuchsin is recommended for use in the Russell medium because of its chem. stability, ease of prepn., ability to give clear-cut reactions and lack of inhibitory effect. The use of undecolorized acid fuchsin would eliminate the variety of methods for the prepn. of Andrade indicator now to be found in the literature. JULIAN H. LEWIS

The growth and toxin production of Corynebacterium diphtheriae in synthetic media. MARY E. MAYER. *J. Infectious Diseases* 47, 384–98(1930).—Diphtheria bacilli can be adapted to grow and produce potent toxin in a modified Braun and Hofmeier synthetic medium. The chief modification was of the N-bearing constituents The cystine content was increased fourfold, asparagine or NH_4 succinate replaced the Na aspartate, and glycine was added. It appears that the medium must provide not only nutrients for rapid growth and pellicle formation, but these nutrients should also favor the appearance or maintenance of the toxigenic variants that occur in consequence of a dissociative process. JULIAN H. LEWIS

Hexylresorcinol in experimental tetanus. GEORGE E. COLEMAN. *J. Infectious Diseases* 47, 410–5(1930).—Hexylresorcinol S. T. 37, when mixed with tetanus toxin in 16.6% soln., is capable of neutralizing 10 and less than 100 minimal lethal doses. It is bactericidal for the vegetating forms of tetanus bacilli within 0.5 hr. *in vitro*, but does not kill resistant spores in 12 hrs. When injected into the devitalized or necrosed tissue of guinea pigs infected with tetanus spores, it is without action in modifying the course of the disease. JULIAN H. LEWIS

Decomposition of urea by Proteus. ALEXANDER A. KAY, WM. M. GIBBS, ARTHUR W. WALKER AND RUTH E. JUNG. *J. Infectious Diseases* 47, 490–502(1930).—The destruction of urea by *Proteus* in various media was studied. Urea does not meet the N requirement of the organisms and the inference is warranted that the action on urea is only incidental to the metabolism of the bacteria and is not concerned with its vital needs. The enzyme responsible for urea destruction is of endocellular nature since $CHCl_3$-killed, washed and dried organisms are active. JULIAN H. LEWIS

The antagonistic substances formed during bacterial fermentation. B. KLEIN. *Z. Immunitäts.* 66, 530–42(1930).—In culture media contg. carbohydrates bacteria form antagonistic substances that behave like antibodies in that they produce agglutination and bacteriolysis of whole bacteria and give precipitin and complement-fixation reactions with bacterial exts. These reactions are, however, not sp. The agglutination is due to acids formed during fermentation. The antagonistic substances are formed not only in lab. media but also in natural and com. processes involving fermentation such as the curdling of milk and the manuf. of beer, wine and cheese. J. H. L.

The antiseptic properties of uroselectan. RUGGERO ASCOLI. *Minerva med.* 1930, II, 415–7.—Uroselectan, the Na salt of 5-iodo-2-keto-1-pyridineacetic acid, in concns. of 10–20% retards the growth of *E. coli* and *Staphylococcus* in urine. The inhibition is

more marked at a concn. of 30%, but even a concn. of 40% fails to kill the organisms. The substance, therefore, has bacteriostatic but no antiseptic power. P. M.

Peroxidase in relation to bacterial growth with special reference to the influenza bacillus. LUCILE R. ANDERSON. *J. Bact.* **20**, 371–9(1930).—*B. influenzae*, hemolytic and non-hemolytic, and *B. hemoglobinophilus-canis* do not produce peroxidase. *B. parainfluenzae* produces it under both aerobic and anaerobic conditions. Not one of 13 anaerobes tested produced it according to the benzidine reaction. Of 44 aerobes tested all but 4, two of which were streptococci, gave a positive reaction. Banana reacts positively to the benzidine test. The "X-factor" of Fildes seems to be associated with peroxidase. JOHN T. MYERS

Micrococcus niger, a new pigment-forming anaerobic coccus recovered from urine in a case of general arteriosclerosis. IVAN C. HALL. *J. Bact.* **20**, 407–15(1930). JOHN T. MYERS

The effect of the oxidation-reduction character of the medium on the growth of an aerobic form of bacteria. W. P. ALLYN AND I. L. BALDWIN. *J. Bact.* **20**, 417–40 (1930).—This factor exerts an important influence on the growth and behavior toward atmospheric O of certain aerobic bacteria (*Rhizobium*). In agar shake cultures these organisms establish thin zones of growth, the level of which depends on the oxidation-reduction character of the substrate. This also dets. in part the ability to initiate growth. By reducing with appropriate concns. of cystine a medium which is slightly too oxidized for these organisms, it is possible greatly to increase the no. of sources which develop into colonies in Petri dish cultures. Hence this is important in making plate counts. The organisms are able to make slight adjustments if the media are too oxidized. The introduction of sand, finely divided filter paper, etc., into a liquid medium which was too oxidized to permit growth overcame the condition, probably because of the trapping of small vols. of medium where the organism could make the necessary adjustments, as suggested by a lag period interpreted as time required for this adjustment. The bacteriostatic effect of certain oxidizing and reducing substances seems due in part to the poising of the medium at an unfavorable potential. Their toxicity depends largely on concn. in relation to the oxidation-reduction potential of the system. Similar concns. were inhibitory under one set of conditions and stimulatory under another. J. T. M.

A marine denitrifying organism. BLODWEN LLOYD. *J. Bact.* **21**, 89–96(1931).—A denitrifying organism was isolated from sea water off the Scottish coast, and denitrification curves were constructed. JOHN T. MYERS

The effect of temperature upon the production of hydrogen sulfide by Salmonella pullorum. RALPH P. TITTSLER. *J. Bact.* **21**, 111–8(1931).—An incubation temp. of 30° is optimum, and temps. above 37° inhibit H_2S formation by *S. pullorum*. Slight quant. differences were noted between aerogenic strains at 30°. The ability to produce H_2S parallels the ability to produce gas from carbohydrates. Difco Pb agar is satisfactory for demonstrating H_2S formation. JOHN T. MYERS

A modified Loeffler's blood serum medium useful in the routine health department examination for diphtheria and streptococcus infections. LEON S. MEDALIA, KARL R. BAILEY AND CATHERINE ATWOOD. *J. Bact.* **21**, 118–37(1931).—Loeffler's medium is modified by the addn. of 4.5% of *N* NaOH, yielding a final p_H of 7.6; bromothymol blue is used as an indicator. JOHN T. MYERS

An instance of pigment formation by B. pestis. A. BESSONOVA AND M. LOCHOV. *Zentr. Bakt. Parasitenk.*, I Abt., **119**, 35–8(1930). JOHN T. MYERS

A polysaccharide-building streptococcus. J. OERSKOV. *Zentr. Bakt. Parasitenk.*, I Abt., **119**, 88–93(1930).—A substance analogous to the polysaccharides of the pneumococcus was found. JOHN T. MYERS

Bacteria which destroy blood pigment. (Studies with the help of bacteria which form hydrogen peroxide on heated blood plates. K. BINGOLD. *Zentr. Bakt. Parasitenk.* I Abt., **119**, 97–100(1930).—Pneumococci, *Streptococcus mucosus*, *S. viridans* and to a lesser degree *S. pyogenes* can split oxyhemoglobin, methemoglobin or hematin to substances of simpler constituents. This seems to be due to H_2O_2 formation. This can occur only in the absence or the presence of minute amts. of catalase. JOHN T. MYERS

Changes in virulence and hemolytic power produced in hemolytic streptococci by growth in hematin agar. K. BINGOLD AND K. BACH. *Zentr. Bakt. Parasitenk.*, I Abt., **119**, 100–3(1930).—Growth in hematin agar decreases virulence and hemolytic power. JOHN T. MYERS

The pigments of timothy grass bacilli. ERWIN CHARGAFF. *Zentr. Bakt. Parasitenk.*, I Abt., **119**, 121–3(1930). JOHN T. MYERS

The phenomenon of hemolysis through the action of bacteriophage. ELISABETH BECHTEL. *Zentr. Bakt. Parasitenk.*, I Abt., **119**, 340–9(1931). JOHN T. MYERS

Cytological observations on the dissociation process in B. pestis. M. POKROVSKAYA. *Zentr. Bakt. Parasitenk.*, I Abt., 119, 353–61(1931).—A nucleus of chem. structure analogous to that in higher forms is demonstrable in certain phases of bacterial development. JOHN T. MYERS

The disinfecting action of simple organic mercury compounds. GERTRUD MEISSNER. *Zentr. Bakt. Parasitenk.*, I Abt., 119, 375–9(1931).—There are halogen Hg alkyl compds. which have a higher killing power for staphylococci and anthrax bacilli than does $HgCl_2$. The growth-inhibiting power of Me, Et, Pr, Bu and Am Hg compds. is about 25–1000 times higher than that of $HgCl_2$. The action of the higher members of the series is weak or nil. Cl and Br salts are about equal in action, but I salts are weaker. The killing action is also better than that of $HgCl_2$. The hydroxides have a much weaker action than the halogen salts. Anthrax spores were more susceptible than staphylococci. JOHN T. MYERS

The influence of alkaloids on the metabolism of Bac. pyocyaneus. T. H. AMAKO. *Zentr. Bakt. Parasitenk.*, I Abt., 119, 464–72(1931).—Cocaine, nicotine, physostigmine, pilocarpine and strychnine inhibit methylene blue reduction in proportion to their concn. Atropine and morphine inhibit only at moderate concns. (0.1 to 1.0%), not above or below. JOHN T. MYERS

The influence of plant growth on the activity of root bacteria. GERTRUDE GRÄF. *Zentr. Bakt. Parasitenk.*, II Abt., 82, 44–69(1930).—The greatest activity of the N-fixing root bacteria is concurrent with greatest plant growth. NH_3 production in soil is also greater during plant activity. JOHN T. MYERS

The fermentation of pentoses by certain propionic acid bacteria. MARIAN FOOTE, E. B. FRED AND W. H. PETERSON. *Zentr. Bakt. Parasitenk.*, II Abt., 82, 379–89(1930).—In common with the majority of organisms, the propionic acid bacteria do not ferment the pentoses as readily as the hexoses. Out of 20 cultures tested, 13 fermented arabinose and only one fermented xylose. The fermentation of pentoses as compared with glucose is marked by a decrease in the percentage of volatile acids and an increase in non-volatile acids. The ratio of propionic acid to acetic acid is decreased. The non-volatile acids consist of lactic and succinic. The latter was identified by its m. p. and the Ba content of its salt. The succinic acid is probably derived from the carbohydrate rather than from the yeast water. JOHN T. MYERS

The influence of high dilutions of quinine on the bacterial flora in hay infusion. M. FEILER. *Zentr. Bakt. Parasitenk.*, II Abt., 83, 63–8(1931).—Quinine at a concn. of about 10^{-10} *M* favors the growth of *B. proteus*. *Paramecium* is stimulated at a concn. of about 10^{-18}. JOHN T. MYERS

The lactic mannitic fermentation of sucrose. BOLCATO VIRGILIO. *L'ind. saccarif. ital.* 22, 427–32(1929).—Partial anaerobiosis is a needed condition for the activity of mannitic enzymes. A smaller amt. of mannitol with aerobic fermentation is compensated for by more lactic and acetic acids. Fermented juices defecated with basic Pb acetate gave, with Bertrand's liquid after 1 day, polarization of 7.60 and 0.528% invert sugar; after 2 days, polarization of 3.70 and 4.000% invert sugar; after 3 days, polarization of 2.20 and 3.040% invert sugar; after 4 days, polarization of 2.70 and 1.630% invert sugar. A variation in the quantity of invert sugar influences the saccharimetric value, rendering it unsuitable for a control of the fermentation process. This is best conducted by considering the principal products: lactic acid (45% of the sucrose), AcOH (12–5%), mannitol (30–5%). AcOH is detd. by adding H_2SO_4 and distg. in a current of steam; lactic acid is detd. by subtracting AcOH from total acid. For detg. total acid the fermented liquid is neutralized with $CaCO_3$; in 1 cc. of the clear liquid Ca is pptd. with NH_4 oxalate and the oxalic acid titrated with 0.1 *N* $KMnO_4$. From this the Ca and lactic acid are detd. Mannitol is best detd. by Gayon and Dubourg's method of crystn. from alc. at 85° and weighing. The estn. is preceded by an alc. fermentation for eliminating the remaining sugars. The yeast has only a slight action on the mannitol. If samples are taken regularly from the beginning of fermentation it is noted that, while the lactic acid is formed continuously with a regular speed, the mannitol is all formed within the first 4–5 days. In the same time nearly all the AcOH is formed. The same juices with the sucrose inverted by warm H_2SO_4, filtered and submitted to fermentation, in 2 days show a change in the polarization from neg. to pos., denoting a more rapid consumption of levulose than glucose. The destruction of levulose is very rapid, as is the production of mannitol and AcOH, and continues until all the mannitol is formed. Despite the consumption of glucose (shown by the increase in lactic acid) the pos. polarization continues to rise and reaches its max. with the total disappearance of levulose and arrest in the production of mannitol. After this the pos. polarization is gradually reduced by the transformation of glucose into lactic acid. This is caused by

the high neg. value of the sp. rotary power of levulose, $[\alpha]_D = -92°$, in comparison with the pos. value of glucose, $[\alpha]_D = +52°,5'$, and the lower fermentation speed of glucose with regard to levulose. R. SANSONE

The indole titer of Gersbach. E. L. KRUGERS DAGNEAUX. *Chem. Weekblad* **28**, 66–7(1931).—The fact that the colon bacilli do not give the indole reaction after some time is not a disadvantage as it shows that the pollution occurred long ago and that there is no danger of typhoid contagion. E. SCHOTTE

The action of alkylresorcinols on phytopathogenic bacteria. C. STAPP. *Angew. Bot.* **12**, 275–289(1930); *Rev. Applied Mycol.* **10**, 46.—The effect of varying concns. of phenylethylresorcinol and of hexylresorcinol on phytopathogenic bacteria depends so greatly on the media in which the bacteria are grown that no conclusion as to the toxic action of these substances on phytopathogenic bacteria within the host can be drawn by their effect on the same organisms on artificial media. Where potato tubers were used as the media for *B. phytophthorus* concns. of 0.2% of hexylresorcinol and 0.3% of phenylethylresorcinol were necessary to inhibit the growth of the organism, whereas lab. tests showed that concns. of 0.08% of either killed the bacteria when free of media. Seven media and 7 bacteria were studied. ODEN E. SHEPPARD

Gas-metal electrode potentials in sterile culture media for bacteria. ELDON M. BOYD AND GUILFORD B. REED. *Can. J. Research* **4**, 54–68(1931); cf. *C. A.* **23**, 3411.—The work of French and Kahlenberg on gas-metal electrode potentials suggested that the potentials obtained at inert metal electrodes immersed in growing cultures of bacteria, and generally regarded as an oxidation-reduction phenomenon, might be of a similar type. This was tested by passing air, H, N and CO_2 through sterile beef broth and observing the potentials developed at Pt, Au and Hg electrodes. It is shown that air causes a rise in potential at all 3 electrodes; H_2 causes a marked fall in potential at the Pt and a slight change at the Au and Hg electrodes; N and CO_2 cause little or no change in the potential at the 3 electrodes. These changes are in agreement with French and Kahlenberg's results except with the Hg electrode which is shown to react chemically with the broth. J. W. SHIPLEY

The mechanism of bacterial action. J. H. QUASTEL. *Trans. Faraday Soc.* **26**, 853–64(1930).—A summary of the work on the dehydrogenases of resting bacteria. The theory previously developed (*C. A.* **22**, 249, 4137), of the localization of dehydrogenation reactions on sp. areas of cell surface, is outlined. K. V. THIMANN

Increased bactericidal effect of inorganic compounds in the presence of x-rays (NORRIS) **7**. Red colorations on salted hides and a comparison of the growth and survival of halophilic or salt-loving organisms and some ordinary organisms of dirt and putrefaction on media of varying salt concentrations (ROBERTSON) **29**. The microbiological aspect of peat formation (THAYSEN) **8**.

Handbuch der pathogenen Mikroörganismen. 3rd ed., edited by WILHELM KOLLE, RUDOLF KRAUS AND PAUL UHLENHUTH. Band. VII, Tl. 2. Jena: G. Fischer. Berlin and Vienna: Urban & Schwarzenberg. Pp. 753–1752. M. 108. Cf. *C. A.* **25**, 983.

MACKIE, T. J., AND MCCARTNEY, J. E.: **An Introduction to Practical Bacteriology:** A Guide to Bacteriological Laboratory Work. 3rd ed., enlarged. New York: Wm. Wood & Co. 421 pp. $3.50.

D—BOTANY

THOMAS G. PHILLIPS

Phototoxic substance from Hypericum crispum. Z. MÉLAS IOANNIDÈS. *Arch. Inst. Pasteur Hellén.* **2**, 161–165(1928).—In an attempt to isolate the phototoxic substance from *Hypericum crispum*, 0.16 g. of a red, amorphous substance, slightly sol. in water and giving a characteristic spectrum, was obtained from 100 g. of the dried plant. B. C. A.

The phototoxic pigment of Hypericum crispum. ZOÉ MÉLAS IOANNIDÈS. *Compt. rend. soc. biol.* **105**, 349–51(1930); cf. preceding abstract.—The isolated pigment of *Hypericum crispum* when inoculated into white rats photosensitized the animals in the same way that ingestion of the fresh plant does. The pigment was obtained in cryst. form by extg. the dried plants with 0.3% Na_2HPO_4, and treating the filtrate with AcOEt. The 2 phases were sepd. by satg. the aq. layer with Na_2CO_3. The AcOEt soln. of the pigment was purified by washing 3–4 times with satd. Na_2CO_3 soln., then with H_2O; the filtered soln. was concd. by distn. to 60 cc., and treated with 240 cc. of ether. The pigment was extd. by shaking with 0.3% Na_2HPO_4. The pigment seps. in amorphous

form on acidification with KH_2PO_4 soln. Slow acidification, obtained by diffusion without agitation from KH_2PO_4 crystals, resulted in 0.05 g. of brick-red crystals. These are insol. in $CHCl_3$, CS_2 and C_6H_6, very slightly sol. in ether, fairly sol. in MeOH, EtOH and AcOEt and extremely sol. in acetone and pyridine. All the solns. are strongly fluorescent, and are bright red in color. The pigment is pptd. in a brick-red colloidal form by the addn. of Na_2CO_3, or as a grayish green ppt. on the addn. of NaOH. It is also pptd. by dil. acids which seem easily to alter it. The following absorption spectra data were obtained on a soln. of 0.1 g. of pigment in 5000 cc of alc.: 4-mm. layer, band 1,599–588–586, band 2,553–545; 20-mm. layer, band 1,605–587–575, band 2,558–547–545, band 3,513–548; 10-mm. layer, band 1,612–573–570, band 2,562–530–528, band 3,515–505 (progressive absorption at the extreme violet of the spectrum, 485).

B. C. BRUNSTETTER

Wood-pentosan. I. K. NISHIDA AND T. TAKAGI. *Cellulose Ind.* (Tokyo) **6**, 170–3(1930); *Abstracts*, 32–3.—Woodmeals from a no. of different coniferous and deciduous trees were extd. with 5% NaOH soln., the ext. was treated with Fehling soln. in order to sep. pentosan as the Cu compd., the latter was decomposed with HCl, and the yield and compn. of the pentosan were detd. The pentosan content (from the Cu compd.) of the deciduous woods examd. is found to be characteristic, while coniferous woods contain much smaller quantities of pentosan. Frequently the wood pentosan was converted into 2 different modifications; deciduous woods contain both the α- and β-varieties, while only the α-type is present in coniferous wood. The compn. of the β-pentosan (% xylan, etc.) from the deciduous woods examd. is given; that of the α-variety will be given in part II. B. C. A.

Micro-incineration of diatoms without carapace. E. BACHRACH AND MME. PILLET. *Compt. rend.* **190**, 1442–3(1930).—No SiO_2 was detected in the hyaline body of the diatom *Novicula* without carapace. The ash contained Ca. B. C. A.

Differentiation between good and poor germinative capacity of seeds by chemical means. H. O. PAECH. *Diss. Agr.-Chem. Inst. Univ. Breslau* 1929.—The germinative activity of seeds is closely related to their dehydrogenase activity. Of numerous colorimetric methods for the detn of the latter, the most satisfactory is that using *m*-dinitrobenzene. Comparative tests should be made on the same day with freshly ground material. B. C. A.

Action of a sudden withdrawal of nutrient salt solution from corn seedlings. G BERTHOLD. *Z. Botan.* **23**, 94–131(1930).—Corn seedlings, grown for a time in nutrient salt solns., were transferred to distd. water, and progressive anatomical and physiol. changes were observed. R. C. BURRELL

The nature of chemodinetical stimulation and the differences in swelling produced by *l*-asparagine. HANS FITTING. *Z. Botan.* **23**, 328–60(1930).—Plasma streaming in leaf sections was studied and the stimulating effect of dil. solns. of asparagine noted. These dil. asparagine solns. readily become inactivated as the result of bacterial action. R. C. BURRELL

Chlorophyll changes in barley. HARALD NILSSON. *Arkiv. Kemi, Mineral. Geol.* **10A**, No. 12, 34 pp.(1930).—No essential differences in activity were shown between the normal green chlorophyll in homo- or heterozygotes or the chlorophyll-deficient white homozygotes in barley seeds. The O_2 utilization of the intact green embryo and of certain organs as the leaves, roots and endosperm is greater than that of the white parts. No difference between the homo- and heterozygotes could be detd. in this respect. The earlier results which showed no relationship between O_2 utilization and catalase activity are confirmed. Higher O_2 consumption occurred in all cases with chlorophyll-contg. leaves than with chlorophyll-deficient ones. The presence of KNO_3 was without effect on the O_2 utilization. Only slightly lower ash content was found in the chlorophyll-deficient leaves than in the green ones. H. J. DEUEL, JR.

Plant proteases. XVI. The activation of animal and plant proteases by glutathione. W. GRASSMANN, O. V. SCHOENEBECK AND H. EIBELER. *Z. physiol. Chem.* **194**, 124–36(1931); cf. *C. A.* **24**, 868.—Zoökinase, the natural activator of animal proteases, has recently been shown by Waldschmidt-Leitz (*C. A.* **24**, 5316) to be identical with glutathione. A similar identification of the phytokinase of yeast is now reported. The activator of yeast proteinase is rapidly liberated by autolysis in the presence of a cell poison, the greater part passing into soln. during the first hr. The liberation of proteolytic enzyme, on the other hand, is hardly appreciable during the 1st hr. and requires 24 hrs. for completion. The sepn. of enzyme and activator is therefore a comparatively simple matter. The 1st fraction, which has no enzymic activity, contains the glutathione of the yeast and has the property of activating the inactive enzyme to the full activity attainable by treatment with HCN. Boiled yeast ext. shows the

same behavior. Fractionation of the crude activator soln., according to the procedure for purification of glutathione, yields fractions in which the activating capacity and the glutathione content are strictly parallel. The activity of the crude activator soln. is therefore due to its glutathione content. Since cysteine and glutathione must be in their reduced form to activate papain and cathepsin, it would appear that the natural SH system effects an intimate connection between respiration and proteolysis. Hydrolytic processes are commonly assocd. with anaerobic conditions, while synthetic processes are performed by the cell during active respiration. In the functioning cell, which is abundantly supplied with O, the glutathione would be present in its disulfide form, and hence the cathepsin for the most part would be in its inactive form. The cell would thus be protected from autolysis. However, there is reason to believe that the activation phenomena cannot be attributed exclusively to glutathione, since yeast proteinase undergoes self-activation under conditions which preclude the intervention of glutathione. A. W. Dox

Plant microchemistry. L. Rosenthaler. *Pharm. Zentralhalle* **72**, 81–5(1931).—An address. W. O. E.

Growth and absorption by oats in relation to varying concentrations of calcium and sodium in the nutrient solution. C. Philipson. *Svensk Bot. Tid.* **24**, 155–262 (1930); *Physiol. Abstracts* **15**, 263.—The relation of dry wt. of culture to compn. of the nutrient soln. is shown graphically for 2 periods of growth: (*a*) 1–3 weeks, involving 6 harvestings; (*b*) 2 months and for mature plants and seeds. The dry-wt.-time curves for the first 3 weeks follow V. H. Blackman's formula. N content and ash content follow the same course as the dry wt.; Ca content increases more rapidly. Changes in Ca utilization are involved in the antagonism between Ca and Na; it is probable that these changes are due partly to alteration in permeability of cell membranes. G. G.

The proteins and vitamins in the embryo of the soy bean. Sajiro Ohtomo. *Abstracts from Rept. Central Lab. S. Manchuria Railway Co.* 1929, 15–7.—The embryo constitutes 2.09% of the soy bean. It contains moisture 4.47, crude protein 42.24, protein 35.75, crude fiber 2.96, ash 3.45, crude fat 9.46, non-nitrogenous ext. 37.42 and pentose 5.7%. Of the total N, 78.8% is sol. in H_2O, 8.61% in NaCl soln. and 5.22% in NaOH soln.; 78.68% of the N is present as globulin, 6.64% as albumin, 9.12% as proteose and 5.56% as nonprotein. On the basis of dry matter N is distributed as follows: total N 7.08, sol. in 20% HCl 6.90, amide 0.69, humin 0.21, arginine 1.32, histidine 0.23, lysine 0.55, cystine 0.09, amino 4.86%. The embryo is richer in vitamins *A* and *B* than is the endosperm. V. F. Harrington

Absorption and utilization of potassium by plants. R. P. Bartholomew and George Janssen. *Proc. Assoc. Southern Agr. Workers, 31st Ann. Convention*, 242–5 (1930).—The min. amt. of K which it is necessary to maintain in soln. to produce optimum growth varies with different plants. Alfalfa and Hubam clover required a min. K concn. approximating 0.5 p. p. m., cow peas, oats, soy beans and cotton 2.0 p. p. m., and Sudan grass 3.0 p. p. m. In all expts. good growth was made from a concn. of only 0.5 p. p. m. Plants have the ability of absorbing relatively large amts. of K very rapidly, and the amt. absorbed depends upon the amt. in soln. and not upon the needs of the plant, large amts. being taken up when no visible growth is being made. The plant quickly adjusts itself to changes in the concn. of K. Although plants absorb K very rapidly symptoms of K starvation in the later stages of growth are infrequent because the plant is able to transfer the K from the older to the embryonic regions and re-utilize it for growth processes. K. D. Jacob

Isotopes of potassium: their association with plant life. J. G. F. Druce. *Chem. News* **142**, 33–5(1931); cf. *C. A.* **24**, 1885.—Addnl. exptl. work confirms D.'s earlier statement that KCl from the ashes of potato stalks contains more K^{41} than is present in ordinary KCl. In non-living plant tissue there is no accumulation of the higher isotope. Louise Kelley

Spike disease of Dodonaea viscosa. B. N. Sastri and N. Narayana. *J. Indian Inst. Sci.* **13A**, 147–52(1930); cf. *C. A.* **25**, 315.—Diseased tissues of *Dodonaea viscosa*, as compared with healthy tissues, showed a higher nitrate, nitrite, NH_3 and amide content, a tendency toward accumulation of sugar and starch, a higher diastatic activity and a deficiency in Ca. *Zyzyphus oenoplia*, which suffers from a similar disease, also shows Ca deficiency. Louise Kelley

Proteins of Indian foodstuffs. III. Globulins of Bengal gram (Cicer arietinum, Linn.) and horse gram (Dolichos biflorus). Nuggihalli Narayana. *J. Indian Inst. Sci.* **13A**, 153–8(1930); cf. *C. A.* **23**, 211.—A knowledge of the compn. of Bengal gram and horse gram is important because of the relation of these pulses to human and animal nutrition, resp. The globulins in these grams were isolated and were found to

contain sufficient quantities of arginine, tyrosine and lysine, but to be deficient in cystine and tryptophan. The arginine content of the Bengal gram was much higher than that usually found in globulins of other Indian pulses. LOUISE KELLEY

Physiological studies on Drosera. II. The effect of quinine and atoxyl on pepsin. KUNIO OKAHARA. *Science Repts. Tôhoku Imp. Univ.* [4], 5, 739–55(1930); cf. *C. A.* 25, 983.—In the course of studies made by O. to det. whether *Drosera* enzyme and pepsin are identical, he detd. the effect of quinine-HCl and atoxyl on pepsin. Digestion expts. were carried out at 39°, and the extent of digestion was detd. by the nephelometric method; a 40% soln. of sulfosalicylic acid was used to cause turbidity. Variations in the method of mixing the solns. and in the concn. of the solns. of poison used caused the digestion to be accelerated, repressed or unchanged. LOUISE KELLEY

Composition and properties of certain red and yellow plant pigments. LEONORA N. BILGER. *Bull. Basic Sci. Research* 3, 37–46(1931).—The pigment (I) extd. from Japan red peppers is shown to differ in chem. compn. from *lycopin* and the pigment from paprika. Ultimate analyses for I gave C 74.69 and 74.69%, H 9.95 and 10.26%, O (by difference) 15.36 and 15.05%. The crystals were deep red, m. p. 167–9° (when taken immediately after purification), 120–1° (after slight fading) and 50–60° (after complete fading); they were moderately sol. in EtOH and MeOH, sol. in C_6H_6 and ether, easily sol. in $CHCl_3$ and CS_2, nearly insol. in petroleum ether and insol. in water. They were purified by pptn. from ether by adding petroleum ether and chilling and by recrystn. from CS_2. I shows no rotation. The dry crystals of *lycopin*, *carotene* (II), *capsanthin* and I are readily bleached when exposed to air and light. Alc. solns. of I and II may be kept in stoppered glass test tubes (air present) for weeks in daylight at room temp. without noticeable fading and for months in a refrigerator. Alc. and $CHCl_3$ solns. of I and II were exposed in water-cooled quartz tubes to ultra-violet light and in cellophane cover cells to soft x-rays with and without air present. In general, alc. and $CHCl_3$ solns. faded much more rapidly than CS_2 solns. In the presence of air, alc. and $CHCl_3$ solns. completely lost their colors after 3 hrs.' exposures to ultra-violet light. CS_2 solns. required 9 hrs. for complete fading or 26 hrs., when air was excluded. In all cases of exposure to ultra-violet light, a very small amt. of a brown resinous material formed on the walls of the tubes. When the filtered solns. were evapd. to small vols. and cooled, sparkling colorless crystals sepd. Fading of the pigment was also brought about with soft x-rays but in a much shorter time than with ultra-violet light. After irradiation with ultra-violet light neither I nor II showed bands in the visible region; I but not II showed bands in the ultra-violet. Twenty-five photographs of absorption spectra of these pigments are appended. J. A. KENNEDY

Preliminary study upon the nucleo-cytoplasmic ratio in plant tissues. F. E. HEULIN. *Australian J. Expll. Biol. Med. Sci.* 6, 59–64(1929).—The ratio: nucleic acid N/(coagulable protein N-nucleic acid N) found for wheat plants 29, 46 and 57 days old was 0.0341, 0.0124 and 0.0040, resp. C. G. KING

Variability of rice varieties in resistance to toxic action of potassium chlorate and its practical significance. MORIMASA YAMASAKI. *J. Imp. Agr. Expt. Sta.* (Japan) 1, 1–22(1929).—Rice seedlings grown in tubes of $KClO_3$ soln. (0.005–2.0%) were found to vary in susceptibility to toxic action. Upland rice was more resistant than lowland varieties, and among strains of upland rice, a direct correlation between drouth resistance and resistance to toxicity was shown. In all varieties there was a similar relation between length of growing season and resistance. Injury from $KClO_3$ was shown by a dark-brown discoloration of the leaf veins. Conditions of growth previous to placing seedlings in $KClO_3$ soln. also affected resistance; those grown under upland conditions and exposed to the sun were less resistant than those previously grown in a watered nursery and shaded. Resistance to toxicity decreased with the age of the seedlings. Differences in resistance to toxicity are attributed to varietal differences in permeability of root cells, not to differences in osmotic pressure of cell sap. K. KITSUTA

Variation and correlation among varieties of wheat and barley in regard to resistance to the toxic action of potassium chlorate. MORIMASA YAMASAKI. *J. Imp. Agr. Expt. Sta.* 2, 139–62(1929).—See *C. A.* 24, 4576. K. KITSUTA

Variations in the unsaponifiable lipides and in the lipide phosphorus of Sterigmatocystis nigra as a function of the mineral composition of the liquid culture medium. CHARLES PONTILLON. *Compt. rend.* 191, 1367–9(1930).—The mineral compn. of the nutritive medium has a considerable influence upon the lipide metabolism of *Sterigmatocystis nigra*. B. S. LEVINE

Frangularoside, a new rhamnoside of the freshly dried bark of black alder. M. BRIDEL AND C. CHARAUX. *Compt. rend.* 191, 1374–6(1930); cf. *C. A.* 25, 984.—A

method for the prepn. and purification of the rhamnoside is given and its properties are described. The use of freshly dried bark is essential. B. S. LEVINE

The distribution of nitrogen in plant extracts that contain a high proportion of nitrate nitrogen. ALBERT C. CHIBNALL AND E. J. MILLER. *J. Biol. Chem.* 90, 189–96 (1931).—Exts. of plant products which contain a high percentage of nitrate N show certain abnormalities in the distribution of N, and it has been necessary to revise the methods employed for the partition of the N into the now commonly accepted groupings. Reduction of nitrate was found to occur during HCl hydrolysis (cf. Vickery and Pucher, *C. A.* 25, 1552–3); this reduction was promoted by the presence in the ext. of an easily oxidizable substance which apparently was nitrogenous in character. A particular sample of rye grass (*Lolium perenne*) was found to contain 12.7% of its total N as nitrate N, an amt. equal to 4.4% of the dry wt. of the leaf. Only the tobacco leaf has previously been shown to contain such a relatively enormous amt. of nitrate.
A. P. LOTHROP

The fermentable principle of the tubers of the asphodel. II. C. NEYRON. *Bull. sci. pharmacol.* 38, 38–51(1931); cf. *C. A.* 25, 1274.—The rhizomes and tubers contain the glucoside *asphodeloholoside* which was obtained as a $Ba(OH)_2$ compd. sol. in water and pptd. by dil. EtOH. It is partly decomposed by CO_2. The glucoside itself cannot be crystd.; it is extremely sol. in water and EtOH. The mol. wt. is about 700; the rotatory value is between —18° and —19°. After hydrolysis, the rotation is —67°; the sugars formed are levulose and an aldose, probably glucose. It is easily fermented, especially by *Aspergillus niger*, and only partly by sucrase. A. E. MEYER

Presence of methyl mercaptan in the leaves of Lasianthus laevigatus Bl., L. lucidus Bl., L. purpureus Bl., L. stercorarius Bl., and L. bracteolatus Miq. D. R. KOOLHAAS. *Biochem. Z.* 230, 446–50(1931).—A method is discussed for the detn. of MeSH in the steam distillate from leaves. S. MORGULIS

Chemistry of citric acid formation by molds. IV. Transformation of saccharic acid. K. BERNHAUER, H. SIEBENÄUGER AND H. TSCHINKEL. *Biochem. Z.* 230, 466–74(1931); cf. *C. A.* 23, 1151.—Expts. with 26 strains of mold fail to give any evidence for the formation of saccharic acid from glucose or gluconic acid, or for the formation of citric acid from saccharic acid or its salts. There is thus no evidence that saccharic acid is an intermediate product in citric acid formation. A no. of the molds transformed saccharic acid to oxalic acid. S. MORGULIS

Characterization of Aspergillus niger strains. III. Further propagation experiments and comparison of different mold strains. K. BERNHAUER, F. DUDA AND H. SIEBENÄUGER. *Biochem. Z.* 230, 475–83(1931); cf. *C. A.* 23, 2741.—The different strains are differentiated by their ability to produce citric acid and to form gluconic acid.
S. MORGULIS

Isotopes and living organisms. V. I. VERNADSKII. *Compt. rend.* 192, 131–3 (1931).—The work of Loring and Druce (*C. A.* 24, 1885) indicates that K extd. from the potato has an at. wt. of 40.4–40.59 and is more radioactive than the lower isotope of K. These results are contested by Lowry (*C. A.* 25, 314) who extd. the K of cotton and of wheat and obtained an at. wt. of 39.09–39.31. V. prepd. compds. of K, Fe, Mg, Zn, Ca, Si and S from living organisms with a view to det. the at. wt. of each element. These data would throw some light on the hypothesis that living organisms sep. the isotopes of elements. This hypothesis is supported by the fact that N, C, H and other elements occur in living organisms in isotopic mixts., and that certain elements (such as Ca, K, Fe and Mg) present in the vital cycle tend to remain there. N. M. NAYLOR

The liberation of iodine from the gland cells of Bonnemaisonia asparagoides by the action of ultra-violet light. ROBERT LAMI. *Compt. rend.* 191, 863–5(1930).—Irradiation of *Bonnemaisonia asparagoides* with ultra-violet light causes the liberation of I_2. It is possible that the algae are killed, and that the liberation of acids from the diffuse vacuoles causes this effect, but it is probable that it is a direct effect of the radiation which ionizes the free I_2 present in the gland cells. T. H. RIDER

Studies on the nature of rust resistance in wheat. V. Physiology of the host. W. F. HANNA. *Can. J. Research* 4, 134–47(1931).—Detns. were made of catalase, diastase and oxidase activity; rate of respiration; and content o fchlorophyll, xanthophyll and carotene in the leaves of 8 wheat varieties. With respect to their reactions to stem rust, these wheats vary from almost complete susceptibility in certain varieties to a high degree of resistance in others. Catalase activity increased as the plants approached maturity, whereas diastatic activity decreased with increasing age. No significant differences were found in the oxidase activity or respiratory rate of the varieties. Little Club and the varieties of the vulgare group proved to be relatively rich in chlorophyll and the carotenoids. It is suggested that photosynthetic processes may

take place more rapidly in the cells of the varieties having a high content of these pigments, and thus furnish conditions suitable for the growth of the rust mycelium.

J. W. SHIPLEY

The mechanism of growth in the cotton hair. F. T. PEIRCE. *Trans. Faraday Soc.* **26**, 809–13(1930); cf. *C. A.* **23**, 5381.—The deposition of sol. carbohydrate as cellulose involves linkages in 3 directions, each one corresponding to a stage in the physiology of the plant. The theory of orientation of glucose residues in the cell wall is developed. K. V. THIMANN

Useful device for evaporating alcohol from plant extracts. F. E. GARDNER. *Plant Physiology* **5**, 617–9(1930).—The device is attached to a Soxhlet extn. battery. It consists of an air pump driven by a $^1/_6$ h.-p. motor and connected to a piece of 0.75-in. iron water pipe 8 ft. long into which are fitted, at the proper intervals, 12 curved pieces of $^3/_{16}$-in. Cu tubing about 7 in. long, which lead into the necks of the flasks. The time necessary for the evapn. of 100 cc. 95% alc. is 15–20 min. and for 80% alc. considerably less than 1 hr. A diagram of the app. is given. WALTER THOMAS

Some organic acids of wheat plants. E. K. NELSON AND HEINRICH HASSELBRING. *J. Am. Chem. Soc.* **53**, 1040–3(1931).—In an investigation of the org. acids in growing wheat plants the aq. ext. was found to contain (% calcd. on the basis of green plants): malonic, by fractionation of esters, 0.005; aconitic, by Et_2O extn. of acids, 0.040; malic, by fractionation of esters, 0.056, by polarization, 0.064; citric, by fractionation of esters, 0.016, by pentabromoacetone, 0.019; oxalic, trace. The residue after water extn. contained 0.02% oxalic acid (0.11% on dry basis). C. J. WEST

Influence of neutral red on yeast respiration. MAX GEIGER-HUBER. *Proc. Acad. Sci. Amsterdam* **33**, 1059–68(1930).—Manometric measurements of the O_2 consumption at 20° showed that the respiration of bakers' yeast is independent of the p_H between 5 and 8.1. When neutral red is added 1:10,000, respiration in acid medium quickly rises 20–30% and aften an hour falls to 80% of the original. In alk. media it falls immediately. The older the cells, the more pronounced are these changes.

J. J. WILLAMAN

Changes occurring in stored alcohol plant extracts. JAMES E. WEBSTER. *Science* **73**, 77–8(1931).—Plant samples preserved in 80% EtOH + excess $CaCO_3$ were found to have p_H values of 4.6–6.0 and titers of 3–8. Celery exts. in 80% EtOH for 9 months doubled their NH_3 content at p_H 4.2 and quadrupled it at p_H 8+. There was always increase in NH_3 in exts. of grapes, celery, lettuce and spinach. W. urges that this method of preservation be studied by other investigations. J. J. WILLAMAN

Changes in the composition of oranges during ripening. P. R. v. d. R. COPEMAN. *Trans. Roy. Soc. S. Africa* **19**, 107–67(1931).—The growth and compn. of oranges were followed for 104 days; fruits from both unsprayed trees and from those sprayed with Pb arsenate were used. Most of the factors studied fitted rather well this modified form of equation for autocatalytic reactions: $\log (x - c)/(a - x) = K(t - t_1)$, where c is the value of the factor at the beginning, a is the final value, $K = k(a - c)$ (k is the velocity constant of the change) and t_1 is the time at which x has a value of $a + c/2$. The factors studied were wt. of fruit, skin and pulp, alc.-insol. residue, sol. solids, acidity, sucrose, glucose, fructose, ash, N, P, K, Ca, Mg, Fe. The proportion of P, both in the juice and in the ash, decreased during the period of ripening, and storage of P must occur in the early stages of formation of the fruit. The K content of the juice and of the ash increased during ripening, and the relatively large proportion of K in the mineral constituents of the juice indicates clearly the importance of this factor in the development of the fruit. The results indicate that the growth of the fruit is dependent upon a continual supply of K. It would appear that K is closely connected with the formation of carbohydrates in the plant, and it is believed that this factor is also assocd. with the transference of the carbohydrates. The K content of the juice of the sprayed oranges is greater than that of the unsprayed oranges, and the proportion of sugar in the total solids was also higher in this case. The Ca and Fe contents of the juice decreased during ripening, while there was no significant rate of change in the content of Mg and no significant increase in N or in ash contents in the juice. Ca appears to resemble P in that it must be stored in the early stages of development of the fruit. P–N ratios in the case of both sprayed and unsprayed oranges are similar and show no significant difference, the mean values being 0.352 and 0.351, resp. The value of the ratio decreased in both series during ripening. On the other hand, the K–N ratio was slightly higher in the case of the sprayed oranges, the mean values for the 2 series being 1.83 and 1.67, resp. The value of this ratio remained more or less const. during ripening. During this period the wt. of the orange increased, and this was accompanied by an increase in the wt. of pulp, in the amt. of sol. solids and sugars in the juice and in the amts. of these constituents per fruit.

At the same time the proportion of cell-wall material in the pulp and of the acid in the juice decreased. During the final stages of growth transpiration became dominant, with the result that the fruit lost wt. because of loss of water. At the same time there was a corresponding increase in the concn. of sol. solids in the juice. The acidity of the sprayed oranges was less than in the unsprayed oranges, while there was a greater content of cell-wall material in the sprayed oranges. At the same time there was a slightly higher content of sugars in the juice of the sprayed oranges, and this appears to be due to the fact that the amt. of sucrose was increased. The rates of change of the various factors were not affected by the spraying, and it was concluded that the arsenate spray exerts an internal physiol. action on the trees, with the result that there is a selective oxidation of the respiratory materials in the fruit. As a consequence of this action the acid in the sprayed oranges forms a more important source of respiratory material than the cell-wall material. The action must be caused by the absorption of arsenical compounds through the leaves of the trees. The solution of the problem depends upon the use of sprays other than arsenical. A bibliography is included. J. J. WILLAMAN

E—NUTRITION

PHILIP B. HAWK

Changes in the composition of blood in rabbits fed on raw and cooked soy beans. ERNEST TSO AND S. M. LING. *Proc. Soc. Exptl. Biol. Med.* **28**, 219–20(1930).—The feeding of raw or cooked soy beans or a diet of millet and cabbage had no effect on the concns. of uric acid, urea N and inorg. P in the blood of the rabbit. The blood cholesterol value was slightly higher on the soy-bean diets. Uric acid was detd. by the Folin improved method (cf. *C. A.* **24**, 2771). Twice the vol. of blood filtrate was used and the standard was reduced to 2 cc. C. V. BAILEY

Effects of a hyperprotein and hyperpurine diet (pancreas) on the rat. P. RONDONI. *Arch. ist. biochim. ital.* **2**, 243–68(1930).—On a diet of pancreas, either alone or mixed with flour, rats lose wt., especially in the former case, while the kidney wt. increases both absolutely and relatively. Other effects of such diet include: slight tendency to leucocytosis; diffuse phenomena of swelling in the parenchymal organs; more marked vital colorability with trypan blue; an acidotic condition; increased thermal reactivity compared with that caused by subcutaneous injection of peptone or suspension of uric acid; increased disposition to inflammation. B. C. A.

Ergosterol and antirachitic vitamin. M. COMEL. *Arch. ist. biochim. ital.* **2**, 281-306(1930).—When administered in excessive doses, irradiated ergosterol maintains its efficacy as a Ca-fixing and antirachitic remedy but gives rise to toxic phenomena. The toxicity is displayed mainly by pptn. of lime in the viscera and by a characteristic atrophy of their cellular elements, and is probably due to the ergosterol itself rather than to admixed substances. This toxicity throws doubt on the identity of irradiated ergosterol with the lime-fixing vitamin, but the irradiated ergosterol may represent the active constituent of the vitamin, the latter being formed by union of the ergosterol with a protective lipin. B. C. A.

Effect of x-rays on ergosterol. M. SUMI. *Bull. Inst. Phys. Chem. Research* (Tokyo) **8**, 640–4(1929).—Vitamin D, formed by irradiation of ergosterol with ultraviolet light, is destroyed by 4 hrs.' exposure to x-rays. The spectrum of ergosterol and activated ergosterol extends further into the ultra-violet region after irradiation with x-rays. B. C. A.

Biological investigations with milk changed by the removal of fats and the addition of carbohydrates. L. RANDOIN AND R. LECOQ. *Compt. rend. soc. biol.* **102**, 528–31 (1929); cf. *C. A.* **25**, 729.—Pigeons were fed daily with a mixt. prepd. from 8 g. of agar agar, 2 g. of filter paper and 90 g. of dried milk or dried milk from which fats had been removed. The animals fed on the fat-free diet died in 30–50 days. In another series, the diet consisted of 50 g. of dried milk (fat-free or normal), 40 g. of carbohydrate and 10 g. of roughage. With the fat-free diet, the animals fed with lactose, sucrose, maltose, dextrose and dextrin died in 15–25, 50–70, 70–100 days, 3–4 months and not less than 5 months, resp. With the normal milk diet, only the animals fed with lactose died (50–80 days). B. C. A.

Dependence of the sugar curves of the blood on acid and alkaline diets with subcutaneous injection of pilocarpine. E. T. MINKIR-BOGDANOVA. *Russian J. Physiol.* **13**, 151–6(1930).—An acid or an alk. diet influences the sugar of the blood but little, the sugar content and its max. and min. values being approx. the same in the 2 cases. With either diet, subcutaneous injection of pilocarpine produces neither a definite increase nor

a definite lowering of the sugar content of the blood, but the divergences from the mean value are more marked than those of most of the control expts. B. C. A.

Variations of the catalase curve of blood after introduction of pilocarpine on an acid or alkaline diet. S. A. POVORINSKAYA. *Russ. J. Physiol.* **13**, 188–92(1930).—The curves representing the catalase content of the blood at various times after subcutaneous injection of pilocarpine are of a uniform type for children receiving an alk. but not an acidic diet; where a mixed diet is taken, the curves are of a mixed type. The catalase-time curves for children on an alk. diet not receiving pilocarpine are not of a uniform type. The catalase curves vary irregularly for the same individual according to the day and hour at which the blood is taken. No parallelism is found between blood catalase and hemoglobin contents. B. C. A.

Variations in the chloride and water contents of striated muscle, liver and kidney during acute experimental scurvy. LUCIE RANDOIN AND ANDRÉE MICHAUX. *Compt. rend.* **192**, 108–10(1931); cf. *C. A.* **24**, 4535; **25**, 1559.—In guinea pigs deprived of the antiscorbutic vitamin the Cl and water contents of the liver and kidney increase only slightly above normal, but the Cl content of the muscle increases considerably. This is not dependent upon the Cl content of the diet, as the same effect was noted in guinea pigs receiving diets contg. no NaCl, 0.5% NaCl and 1.5% NaCl. RACHEL BROWN

Observations and measurements on vitamin A. P. KARRER, B. EULER, H. VON EULER, H. HELLSTRÖM AND M. RYDBOM. *Arkiv. Kemi, Mineral. Geol.* **10B**, No. 12, 6 pp.—A study is made of the metabolic variations of carotene and its relationship to vitamin A. Carotene was found to be concd. in the blood plasma or serum. Almost none was present in the red blood cells even in those bloods which contained large amts. of this pigment. In 50 samples of normal human blood sera the av. was 0.8 Lovibond units per 10 cc., although one value was 4.5 units. With herbivorous animals, much higher values were obtained. With ox serum the content was 17 units and with cow sera taken in Sept. the av. was 14 Lovibond units (11–16). A seasonal variation occurred in these animals, the highest concns. being obtained in the fall after a summer of fresh pasturage while much lower amts. were obtained after the usual winter feed. While it is admitted that carotene is not the growth-promoting factor identical with vitamin A, it is suggested that this latter factor may be a hydrogenated carotene which has been formed in the liver through the action of carotenase. A spectrometric study of these pigments in biostearin and in the distillates of cod-liver oil and shark-liver oil definitely proves that a growth-promoting factor independent from carotene exists. A very rapid deterioration of these substances occurs, as indicated by the rapid disappearance of the absorption bands. Ether-sol. substances having a different spectometric picture were obtained from germinating barley and *Fucus vesiculosis*. H. J. D., JR.

The ether-soluble substances of polished rice. YOSHIKAZU SAHASHI. *Bull. Inst. Phys. Chem. Research* (Tokyo) **9**, 882–90 (Abstracts 84–5 (in English) published with *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) **14**, No. 271–3(1930)).—A further substantiation of earlier expts. (*C. A.* **23**, 1937; **24**, 3264) in which it was demonstrated that polyneuritis in birds is not to be traced to toxic compds. in the alc.-sol. fraction of polished rice as claimed by Teru-Uchi (*C. A.* **24**, 1146). The ether-sol. portion consists of palmitic, oleic and linoleic acids, phytosterol and other oily nonsaponifiable matter. The injection of this ext. was not followed by any toxic symptoms in pigeons or in mice, nor was any difference noted in the effect of feeding alc.-extd. polished rice or that washed only with water. In either case the diet must be supplemented with vitamin B to prevent the onset of polyneuritis. H. J. DEUEL, JR.

The vitamin content of marine plankton. J. C. DRUMMOND AND E. R. GUNTHER. *Nature* **126**, 398(1930).—Phytoplankton gave a pos. test for vitamin A in 20 mg. doses and the $SbCl_3$ and absorption spectrum tests were likewise pos. These were neg. for zoöplankton. The line test for vitamin D was only doubtfully pos. with phytoplankton but unmistakably pos. with zoöplankton, while the x-ray gave neg. results with both species. H. J. DEUEL, JR

The relation of vitamins to carcinogenesis. WARO NAKAHARA. *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) **15**, 32–6(1930); *Chem. News* **142**, 86–7(1931).—In opposition to Fujimaki, Kimura, Wada and Shimada (cf. *C. A.* **21**, 1836), N. finds no direct relationship between vitamin-A deficiency and cancer in rats. Overdosage with vitamin D was likewise ineffective in producing this condition. H. J. DEUEL, JR.

Problems of nomenclature and dosage in experiments with Vigantol. M. SCHMIDTMANN. *Klin. Wochschr.* **9**, 1629–30(1930). H. EAGLE

The use of an acid diet in the treatment of bronchial asthma. KURT TEIFENSEE *Klin. Wochschr.* **9**, 1675–8(1930); cf. *C. A.* **24**, 2798.—Untreated cases of bronchial asthma show a decreased excretion of acid and NH_3 during an attack. An acid diet,

with addn. of NH_4Cl, $NH_4H_2PO_4$ and "Silicalcium," leads to a significant improvement in the asthmatic condition. Asthmatics kept in a secluded room show an increased excretion of acid and a decreased no. of attacks. Definite improvement, however, was obtained only when an acid diet was given. Alkalosis is therefore an important symptom in bronchial asthma, the correction of which affects the whole clinical picture. H. EAGLE

A new principle in the biological demonstration of irradiated ergosterol. JOSEF WARKANY. *Klin. Wochschr.* 9, 2152–3(1930).—Rabbits which usually excrete no phosphate, and are given 30–100 mg. of irradiated ergosterol in their food, show large quantities of phosphate in the urine in 48 hrs. A normal phosphate excretion can be prevented by daily $CaCO_3$ in the food. H. EAGLE

The fate of oxidizing enzymes in foods in the human digestive canal. I. BOAS. *Klin. Wochschr.* 9, 2295–6(1930).—Using bananas (which are particularly rich in catalase, oxidase and peroxidase) as a test meal, B. finds that all 3 are inactivated if the stomach is acid (to Congo red), but that this inactivation is reversible, the enzymes being reactivated by the neutralization of the mixt. Oxidase is the most sensitive to acid. As shown by the passage of a duodenal sound, as well as by expts. on a dog with fistula of the ileum, the enzymes are reactivated when the food reaches the intestines. Normal feces contain no oxidase. If pus is present, oxidase may appear; if blood is present, peroxidase may appear. Catalase is normally present. Normal urine contains no peroxidase or catalase, but they may appear in pathol. conditions. Oxidase may be present, but it is thermostable and is probably a metallic catalyst. H. EAGLE

The active principle of liver in pernicious anemia. KURT G. STERN. *Klin. Wochschr.* 10, 172–5(1931).—A summary of the recent work. H. EAGLE

The chemical nature of vitamin D. ETSUO TAKAMIYA. *J. Dept. Agr. Kyushu Imp. Univ.* 3, 1–27(1930).—A repetition and extension of studies previously reported (cf. *C. A.* 24, 3523; 25, 123, 536). New work includes a comparison between the action of O_3 and of ultra-violet light upon cholesterol and olive oil with respect to photoactivity, color reactions, and m. p. of the cholesterol. The behavior of the ozonized materials was similar to that of those exposed to ultra-violet light. Ozonized ergosterol was found to be antirachitic when fed to rats made rachitic on McCollum's diet 3143, the potency rising to a max. and then falling off with increasing time of exposure to O_3. The relationship of these exptl. results to the chem. nature of vitamin D is discussed, and it is tentatively concluded that the antirachitic portion of the ionized ergosterol is ergosterol monoozonide Δ_1, which is possibly identical with vitamin D. S. B. FOSTER

Influence of radium emanation on the transformation of ergosterol to vitamin D. J. MAISIN, W. MUND, Y. POURBAIX AND A. CASTILLE. *Compt. rend. soc. biol.* 103, 534–6(1930); *Physiol. Abstracts* 15, 258.—Ergosterol in soln. in paraffin irradiated by Ra rays in a closed receptacle undergoes a definite chem. transformation. The product obtained is endowed with antirachitic properties. G. G.

Reducing power of tissues in animals with low cystine diet. N. C. LACLAU AND A. D. MARENZI. *Rev. soc. argentina biol.* 5, 768–73(1929); *Physiol. Abstracts* 15, 233.—The reducing power is less than in the controls. Differences are greater in liver than in muscle. There is a certain relation between reducing power and glutathione content of tissues. G. G.

Experimental production of bladder stones. S. PERLMANN AND W. WEBER. *Münch. med. Wochschr.* 77, 680–1(1930); *Bull. Hyg.* 5, 699.—Twenty-three % of the rats fed on a vitamin A-deficient diet had phosphatic stones in the bladder. Of 100 rats fed on an unsuitable but not deficient diet, half died in 3 months; of the remaining 50, 7 showed gravel at the end of 80 days. The small stones consisted of urates and resembled those of human beings. All normally fed rats were free from stones. Vitamin-A deficiency is not the only factor, but it is an important one. Europeans have a predominance of urate stones, while oxalate stones predominate among the Japanese. In the case of children, stones are probably due to improper feeding, but in adults anatomical factors, infection and disordered metabolism are the probable causes. GEORGE R. GREENBANK

The nutritive value of soy-bean cake and purified soy-bean cake. SAJIRO OHTOMO. *Abstracts from Rept. Central Lab. S. Manchuria Railway Co.* 1929, 10–2.—Feeding and artificial digestion expts. show that the alc.-extd. cake is less nutritive. V. F. H.

The occurrence of vitamins A and B in soy-bean oil and cake. SAJIRO OHTOMO. *Abstracts from Rept. Central Lab. S. Manchuria Railway Co.* 1929, 13–5.—Rat and pigeon feeding expts. indicate that soy-bean cake and oil contain some vitamin A. This is contrary to McCollum, *et al.* (*C. A.* 10, 2902). V. F. HARRINGTON

Studies on experimental rickets. III. The isolation of ergosterol from brewer's

yeast and the activation of ergosterol by ultra-violet light. SEIICHI IZUME, YOSHINORI YOSHIMARU AND ISAO KONATSUBARA. *Abstract from Rept. Central Lab. S. Manchuria Railway Co.* 1929, 18–21.—The ergosterol, m. 160–1° and having $[\alpha]_D^{25} = -122°$ in $CHCl_3$, after irradiation cured rickets in doses of 0.001 mg. per day. Rays of 311–260 $\mu\mu$ are most effective in imparting antirachitic power. Too long exposure destroys this power. V. F. HARRINGTON

Recent developments in vitamin research. W. D. SALMON. *Proc. Assoc. Southern Agr. Workers, 31st Ann. Convention*, 288–92(1930).—In general, diets in the South are rather low in vitamins A and C and dangerously low in what for the present may be called the vitamin-G fraction, including the pellagra-preventive factor. They are also deficient in Ca and in vitamin D. There is little doubt that an abundance of sunlight is the only thing that prevents rickets from being more prevalent in this region. K. D. JACOB

Dietary standards for pregnancy. CALLIE COONS. *Proc. Assoc. Southern Agr. Workers, 31st Ann. Convention*, 293–5(1930).—A study was made of the retention of N, Ca and P by 9 pregnant women at different stages of fetal development. There was a distinct tendency for N retention to increase with an increase in intake and *vice versa*, and N was stored much in excess of the probable fetal demand. Storage of Ca was highest in late pregnancy, as was also the curve of probable fetal demand for Ca. Only 3 of the 9 women were storing as much Ca as the probable fetal demand, and many were storing much less. Assocd. with low Ca retention were instances of maternal tooth destruction and of poor bone formation as shown by x-ray examn. of the 8-day old baby. Retention of P was even more const. than intakes, the same woman storing as much in the middle months as in late pregnancy. Also the rate of storage was well above the fetal demand in the middle months. K. D. JACOB

Antirachitic activation of ergosterol by soft x-rays. ELIZABETH SHELOW AND JOHN R. LOOFBOUROW. *Bull. Basic Sci. Research* 3, 47–64(1931).—Theoretical considerations show that any radiation of shorter wave length than about 3000 or 3100 A. U. should be capable of activating ergosterol. This applies to radiations throughout the x-ray and γ-ray regions. The extent of activation should not be appreciable, however, except in portions of the spectrum in which the absorption is of consequence. Calcns. show that the greatest x-ray absorption of ergosterol lies in the extreme soft x-ray region and that appreciable activation should be expected in or near this region. Irradiation expts. with soft x-rays are described, and absorption spectra and animal expts. indicative of the activation of ergosterol by soft x-rays are recorded. The effect of x-rays on the solvent might be more pronounced than on ergosterol or cholesterol with solvents contg. elements of higher at. wt. than H, C or O; and consideration must be given to the possibility of glass containers giving fluorescent ultra-violet radiations in the presence of x-rays. The effect of soft x-rays in activating ergosterol may be a primary or secondary one. The literature is reviewed and photographs and x-ray pictures are given. J. A. KENNEDY

Modern problems of nutrition. AUGUSTIN D. MARENZI. *Ann. farm. bioquim. Suplemento* 2, 1–35(1931).—A comprehensive review of the subject along the following lines: I. Complete diets. Factors of importance: equilibria (*a*) caloric, (*b*) N, (*c*) mineral, (*d*) vitamin. II. The importance of the nitrogenous substances: (*a*) protein minimum, (*b*) practical protein minimum, (*c*) high- *vs.* low-protein diets. III. The nutritive value of proteins. Supplemental value. Its relation to the amino acid content. (*a*) Methods for the detn. of nutritive values of a substance, (*b*) the nutritive value of proteins from the viewpoint of maintenance and (*c*) of growth, (*d*) supplemental value of proteins, (*e*) the relation between biol. value of proteins and their chem. constitution. IV. The relation between amino acids and maintenance, and the growth of animals. Methods of study. General results. Conclusions. There is no bibliography. B. S. LEVINE

Antioxidants and the autoxidation of fats. H. A. MATILL. *J. Biol. Chem.* 90, 141–51(1931).—To secure information on the chem. nature of the antioxygenic substances that are found in natural oils and that prevent autoxidative destruction of fat-sol. vitamins, a series of hydroxy aromatic compds. was tested for their capacity, when used in a quantity of 0.02%, to prolong the thermal oxidation induction period of a standard mixt. of lard and cod-liver oil. The antioxygenic capacity of phenols resides in 2 OH groups in the *o*- or *p*-configuration; when these are in the *m*- position the compd. is inactive. The OH groups are ineffective unless attached directly to the ring; fully hydroxylated inositol is ineffective. In the naphthols 1 OH group is sufficient, and, in keeping with its accepted behavior, α-naphthol has the character of an *o*-compd. and is

much more effective, as an antioxidant, than β-naphthol; quinone is effective and β-naphthoquinone is even more so, but the α-form is entirely inactive. A no. of sterols of animal origin and sitosterol from wheat, corn and lettuce were all inactive. The existence of pro- and anti-oxygenic substances among the unsaponifiable constituents of natural fats and oils suggests that some of these may be concerned with the physiol. action of the fat-sol. vitamins and methods for their segregation from the sterols are under investigation. It is suggested that in the prepn. and manipulation of easily autoxidizable substances, the presence of traces of antioxidant will prevent undesirable oxidative changes. A bibliography of 42 references is given. A. P. LOTHROP

The effect of nitrous acid upon the components of the vitamin-B complex. H. C. SHERMAN AND M. L. WHITSITT. *J. Biol. Chem.* 90, 153–60(1931).—The "protein-free" milk prepn. of Osborne and Mendel was used as a suitable material contg. both vitamins B (B_1) and G (B_2). The solns. were treated with HNO_2 in 2 ways: in one the gas was drawn by aspiration into the vitamin soln. and in the other the HNO_2 was generated directly in the vitamin soln. by adding $NaNO_2$ to it and dropping in an equiv. amt. of 1:1 HCl. After 14 hrs. in each case the dissolved gases were removed under reduced pressure and the liquid was then neutralized with 0.2 *M* NaOH. Treatment by the aspiration method had little, if any, influence upon vitamin B but a large diminution of potency occurred when the HNO_2 was generated in the soln. These results suggest that vitamin B may be a nitrogenous base but of such a structure as to be more resistant to HNO_2 than are typical primary amines. No destruction of vitamin G was brought about by aspiration of HNO_2 through the soln., but partial destruction by the 2nd method was indicated by feeding tests when the data were taken for an 8-week but not for a 4-week exptl. period. It seems probable from these expts. and other unpublished observations that vitamin G_1 (B_2) is stable toward HNO_2 but that there is more or less destruction of one of the newer and not yet clearly defined factors making up the vitamin-G complex and that the reaction involved is likely one of oxidation rather than deaminization. A. P. LOTHROP

Studies on alimentation and nutrition. IV. Means and measures of food economy. C. FOA. *Arch. sci. biol.* (Italy) 15, 445–94(1930).—This is a review and is part of a series of investigations promoted by the Italian National Research Council. The subjects discussed are bread, distribution of food resources between man and domestic animals, utilization of leaves, utilization of waste and residues from slaughter houses, refrigeration and food preservation, utilization of refuse as fertilizer, savings in kitchen and table practice and methods for evaluating the food requirements of man. PETER MASUCCI

The chemistry of nutrition. FILIPPO BOTTAZZI. *Atti III congresso naz. chim. pura applicata* 1930, 51–64.—The latest developments in the biochemistry of carbohydrates, proteins, enzymes and vitamins are reviewed and discussed. The study of metabolism by thermodynamic methods alone is considered insufficient. A detailed knowledge concerning the chemistry of nutritive substances is essential, in addn. to knowing their energy content, before the biol. value of the substances can be ascertained. PETER MASUCCI

The phosphate esterification and the phosphatase action in B-avitaminosis. J. BODNÁR AND ANTON KARELL. *Biochem Z.* 230, 233–7(1931).—The muscles and livers of pigeons suffering from vitamin B deficiency esterify H_3PO_4 77 and 146%, resp., more than the organs from healthy birds. No difference was found between the normal and vitamin B deficient pigeons so far as the phosphatase activity of the muscles and livers is concerned. S. MORGULIS

Intermediate carbohydrate metabolism. VI. Sugar assimilation, phosphorus and water metabolism during prolonged intravenous injections of glucose, fructose and galactose. M. WIERZUCHOWSKI, W. PIESKOW AND E. OWSIANY. *Biochem. Z.* 230, 146–72(1931); cf. *C. A.* 22, 3232.—The total reduction of deproteinized blood from 3 well-nourished dogs, in fasting condition, ranged between 91 and 104 mg. %, of which 54–67 mg. % was due to glucose and 34–40 mg. % was due to residual reduction. In the continuous intravenous injection of glucose for 3 hrs. at the rate of 2 g. per hr. the blood sugar during the first hr. rose on the av. of 300 mg. % but fell during the next 2 hrs. This diphasic reaction was not observed in the other hexoses. Two hrs. after the injection the blood sugar was lowered below the initial level. During the expt. 10.5% of the injected glucose was eliminated in the urine, the glucosuria curve like the glucemia curve being also diphasic. The rest of the injected sugar was utilized. Two hrs. after the injection there was no more glucosuria. When fructose was injected, the fructose concn. of the blood rose gradually but was on the av. lower than the glucose concn. in parallel expts. However, of the total amt. of injected fructose 10.5% was lost in the

urine, the rest having been assimilated. Two hrs. after the injection the fructose disappeared from the blood, and only traces were found in the urine. With galactose injections the blood galactose concn. increased very rapidly, becoming 800 mg. % in the middle of the third hr., and not until 9 hrs. after the injection did the galactose disappear from the blood and urine. Only about 30% of the galactose was utilized, the rest being excreted in the urine. Under the influence of insulin the diphasic nature of the reaction after the injection of glucose disappeared, since the glucemia in the first hr. was much diminished and the assimilation definitely increased. The insulin had practically no effect on the fructosemia or on the utilization of fructose, but it did greatly stimulate the rate of removal of galactose from the blood and improved its assimilation to such an extent that only 42% was excreted in the urine. The injection of fructose or galactose of itself does not affect the glucose concn. of the blood, but under the influence of insulin the glucose concn. diminishes while the concn. of the fructose or galactose actually rises. The "residual reduction" remains unchanged when either glucose or fructose was injected. In these expts. no relation was found between the blood and urine P values. With a const. hexose injection the blood became most dild. with galactose and least dild. with fructose. The quantity of urine corresponded to the amt. of excreted hexose. **VII. Lactic acid production under the influence of prolonged intravenous injection of glucose, fructose and galactose.** M. Wierzuchowski and M. Laniewski. *Ibid* 173–86.—The lactic acid concn. of the blood of fasting dogs varied from 7 to 25 mg. %, the hourly excretion in the urine ranging from 1.4 to 5.1 mg. In expts. with a continuous intravenous injection for 3 hrs. at the rate of 2 g. per hr. the blood lactic acid curve for each hexose presented rather definite characteristics. The lactic acid excretion ran parallel to the changes in the blood concn. Most lactic acid was formed from fructose and occasionally from galactose, and least from glucose. After glucose injections about 0.1 g. lactic acid was excreted, after galactose injections 0.1–0.3 g. and after fructose injections 0.3–0.9 g. more than before the injections. With insulin the lactic acid excretion was increased with all 3 sugars. The lactic acid formation is responsible for the acidosis during the sugar injection, the rise in lactic acid concn. of the blood being more or less correlated with the increase in concn. of the hexose **VIII. Respiratory metabolism of intravenously injected glucose, fructose and galactose.** M. Wierzuchowski. *Ibid* 187–224.—During the expts. with continuous intravenous hexose injections the av. increase in the nonprotein R. Q. was for glucose 0.23 without insulin and 0.26 with insulin, for fructose 0.24 and 0.30, and for galactose 0.13 and 0.18, resp. The sp. dynamic action of the glucose was 9.7%, of fructose 13.8% and of galactose 17.3% of the caloric content of the assimilated part of the hexose. The greatest rise in heat occurred between the second and third hrs. and was 51% for glucose, 63% for fructose and 32% for galactose. In the expts. with insulin 2 periods were distinguished: hyperglucemic, while sugar and insulin were being injected, and hypoglucemic when nothing was being injected. In the first period the increase in heat production was for glucose 21%, fructose 38% and galactose 23% greater than in corresponding expts. without insulin. The greatest increase in heat was 57% for glucose, 85% for fructose and 32% for galactose. During the hypoglucemic period, 4–5 hrs. after the injection, the heat production was increased 36%. The largest amt. of sugar which the dogs were able to oxidize was 0.5 g. per kg., and of the total assimilated sugar 34% of the glucose, 41% of fructose and 56% of the galactose underwent oxidation. During the hyperglucemic period under the influence of insulin the oxidation was increased 15% for glucose, 24% for fructose and 87% for galactose. On the av. 36.7% of the cal. of the different hexoses was utilized in the sp. dynamic increase of heat production, and when 1 mol. sugar was oxidized 235 cal. were liberated. Control expts. in which physiol. NaCl soln. was injected showed only an insignificant rise in heat production. During the 2nd and 3rd hrs. of the injection when the transformation of the hexose was at a max. the heat production and the increase in R. Q. were inversely proportional to the concn. of the injected hexose in the blood. Although a parallelism is not always observed between the blood lactic acid curve and the heat production curve, the extent of lactic acid formation from 1 g. of assimilated hexose seems to be correlated with the sp. dynamic action and oxidation in that these are greater for the sugar from which the organism produces more lactic acid. S. M

The iodine content of the bile and thyroid gland in cattle under the influence of the seasonal changes in feeding. G. Pfeiffer. *Biochem. Z.* **230**, 290–8(1931).—An increase in the av. wt. of the thyroid glands of cattle of various ages was observed from the winter months to the summer months. It has not yet been detd. whether there is also a decline in wt. from the summer to the winter months. The I content rises both with age and with the gland wt. and reaches a max. value in cattle 5–6 years old. The change from the I-poor winter fodder to the I-rich summer fodder has no

recognizable influence upon the I of the thyroid glands. The bile secretion was found to increase with age. The I excretion in the bile during the summer is 120% higher than in winter, which shows that the I of vegetable matter is well absorbed by the animals. The I content of the feces cannot serve as an accurate guide to a study of I absorption.
S. MORGULIS

Determination of value of vitamin D preparations. II. MARTIN SCHIEBLICH. *Biochem. Z.* 230, 312–9(1931); cf. *C. A.* 23, 4971.—In testing the potency of vitamin D prepns. the healing dose does not correspond generally to the preventive dose, the former always being higher and the difference between the 2 being very variable. Detn. of the healing dose gave practically the same results either by the line test or by the x-ray examn. In such tests there is no evidence that there is any danger of error due to eating of feces, but there is apparently danger from animals licking each other. S. M.

The excretion of creatinic bodies a function of the amount of the endogenous nitrogen discharged. EMILE F. TERROINE, R. BONNET, P. DANMANVILLE AND G. MOUROT. *Compt. rend.* 191, 1473–5(1930).—This series of expts. was carried out to det. whether the behavior of creatinic bodies in metabolism can be attributed to the N of exogenous or of endogenous origin. The diet contained glucides for the energy requirement and was adequate in mineral salts and vitamins but contained no protein. Inanition expts. were carried out with pigs of 15–20 kg. and upon rats; intoxication expts. after complete inanition were carried out with pigs for the addn. of BzOH and of phlorhizin to the diet, and with rabbits for the addn. of H_3PO_4. The results of the expts. indicate that (1) the excretion of creatinine remains const. though that of endogenous N varies greatly; (2) the excretion of creatine follows that of total N; it rises with a rise of excretion of endogenous N as influenced by the diet. The creatinic bodies behave in endogenous N metabolism exactly as in exogenous metabolism. N. M. NAYLOR

Irradiated helisterol and its antirachitic power. G. MOURIQUAND AND A. LEULIER. *Presse méd.* 37, 1261–2(1929); *Bull. soc. hyg. aliment.* 18, 290(1930).—Irradiated purified cholesterol extd. from snails was found to possess practically no antirachitic power. On the other hand, cholesterol contg. the cholesteric lipoids of snails (helisterol) was found to be exceptionally active, but only after irradiation One to two drops of a 0.1% helisterol soln. was found sufficient to prevent rickets in rats and to facilitate fixation of Ca in the case of an animal fed exclusively on Pappenheimer's diet No. 85.
A. PAPINEAU-COUTURE

Clinical investigations on the antirachitic action of irradiated helisterol. G. MOURIQUAND AND A. LEULIER. *Paris méd.* 19, 409(1930); *Bull. soc. hyg. aliment.* 18, 294; cf. preceding abstract.—Clinical observations showed that irradiated helisterol has an antirachitic power comparable to that of ergosterol. This power reveals itself in the various forms of human rickets, particularly in cases of so-called "florid" rickets and in those in which the decalcification lesions do not extend to the whole diaphysis.
A. PAPINEAU-COUTURE

Vitamin A in serum and liver. BETH V. EULER. *Svensk Kem. Tids.* 42, 302–4 (1930)(in German).—There is no vitamin A in the subcutaneous fat of rabbits. There is probably no vitamin A in the serum of rabbits and sheep. The $SbCl_3$ color reaction is indefinite and is probably due to something other than carotene. A. R. ROSE

The digestion of keratin, especially the horny material of birds feathers, by fowls and mammals. ERNST MANGOLD AND JOSEF DUBISKI. *Wiss. Arch. Landw., Abt. B., Tierernähr. Tierzucht* 4, 200–21(1930).—The secondary quills of white goose feathers were fed to owls, cats, dogs and rats. Examn. of the feces showed some mech. disintegration in the case of the cat and owl, but balance expts. failed to show digestion in any of the expts. Rats on a diet deficient in cystine showed no growth that could be attributed to cystine furnished by the feathers ingested. W. GORDON ROSE

An investigation of the vitamin A content of liver meal. ANTON SOHNER. *Wiss. Arch. Landw., Abt. B., Tierernähr. Tierzucht* 4, 281–96(1930).—The vitamin A potency of liver meal was investigated to det. whether it is a suitable source of vitamin A for milk cows and young animals during the winter months. Rats were fed a diet prepd. as directed by v. Euler and v. Euler, *Zur Methodik der Vitaminprüfung* vol. 5, which was deficient only in vitamin A. Liver meal was added to the diet when noticeable loss in wt occurred. Xerophthalmia was cured and normal growth effected by 0.1 g. per day. This was equiv. to 5–10 mg. cod-liver oil. Since several of the rats lost wt. without showing any indications of xerophthalmia, other criteria, such as loss in wt., are necessary in vitamin A studies. W. GORDON ROSE

The biological values of wheat, barley and rye. ISTVÁN WEISER AND ARTHUR ZAITSCHEK. *Wiss. Arch. Landw., Abt. B., Tierernähr. Tierzucht* 4, 461–6(1930).—Goats were fed diets of hay plus wheat, hay plus barley and hay plus rye, and weighed at

intervals. The expt. showed no essential difference in the biol. values of the 3 grains.
W. GORDON ROSE

Antirachitic vitamin D. Announcement of a standard by the medical research council. ANON. *Lancet* **1930**, II, 503–4.—A quantity of ergosterol from yeast, purified and dried by methods carefully recorded, was subjected, in an accurately made alc. soln., to irradiation with the rays from a Hg arc, the phys. details of the procedure being measured and recorded with the greatest practicable accuracy. The irradiation products were carefully freed from alc., dissolved in pure, unadulterated olive oil and the vol. was adjusted to a known concn., in terms of ergosterol used. Such solns. retain their activity unchanged for 2 years if maintained at or below 0°. F. B. SEIBERT

Effect of added iron on the hematopoietic properties of dried milk. A. L. BACHARACH. *Lancet* **1930**, II, 957–8.—The recognized low hematopoietic properties of milk solids can be materially enhanced by drying appropriate quantities of an Fe salt in the milk. F. B. SEIBERT

The toxicity of vitamin D. J. B. DUGUID. *Lancet* **1930**, II, 983–5; cf. *C. A.* **24**, 5058.—The pathol. effects in animals of overdosage of vitamin D are: a tendency to increased serum Ca and blood inorg. P; a very greatly increased excretion of Ca and P, especially by way of the kidneys, involving a reduction of Ca and P retention in the body; an accumulation of Ca salts in the tissues and loss in body wt. In estg. the dosage and toxicity a large no. of factors must be taken into account. Standardization is urged. F. B. SEIBERT

The constitution of irradiated ergosterol. A. CASTILLE. *Bull. acad. roy. méd. Belg.* **10**, 319–25(1930).—A study of the absorption spectra of aliphatic geometrical isomers shows a remarkable similarity between the *cis-* and *trans-* compds. Since the same similarity is found between the spectra of ergosterol B and isoergosterol B as well as between those of dihydroergosterol A and dihydroisoergosterol A, a simple *cis-trans* isomerism due to the mobility of the secondary alc. groups is assumed. Comparison of the absorption spectra of *ergosterol A* (I) and of its irradiation product (*"vitamin D"*) points to the fact that the biol. activation is due to the gradual formation of a geometrical isomer *isoergosterol A* (II) that is identical with the active principle of vitamin D. Prolonged irradiation leads to further rearrangement into another biologically inactive modification; this transformation begins before all of I has been converted into II.
G. TOENNIES

The quantitative estimation of the glutathione content in normal and pathological tissues. III. Relationship between the development and the glutathione content in chick embryos. TOKUO KAMIYA. *Nagoya J. Med. Sci.* **5**, 1–5(1930); cf. *C. A.* **24**, 4057.—Expts. made on chick embryos show that the glutathione content increases gradually during the first half of development, reaches a max. in 12–14 days, and then gradually decreases. The liver, brain, heart, muscle and eye contain the largest percentage of the glutathione of the body and are richest in the order named. **IV. The glutathione content in various organs of pigeons fed on polished [rice] and subjected to starvation, and also of starved rabbits.** *Ibid* 6–17.—Pigeons fed on polished rice showed a decreased glutathione content in liver, heart and muscle proportional to the no. of days of the expt. The adrenal glands, spleen and blood showed an increase. Starvation produced the same result, but to a greater degree. Symptoms of polyneuritis appeared after 15–18 days in pigeons fed on polished rice and later in those fed on half-polished rice. **V. Relationship between glutathione content and neurotomy in muscles of pigeons fed on polished and unpolished rice.** *Ibid* 18–23.—Pigeons were subjected to neurotomy of the sciatic nerve of the right leg, the left serving as control. The wt. of the right leg did not increase as rapidly as that of the left and the glutathione content of the muscle subjected to neurotomy showed an increase proportional to the no. of days elapsed since the operation. This was true for pigeons fed on polished rice as well as unpolished rice; but in the control muscles, the glutathione content decreased more rapidly in the former case. A. WIEBEN

Ergosterol and some of its derivatives (DE BOER) **10.**

DRUMMOND, J. C., AND HILDITCH, T. P.: **The Relative Values of Cod Liver Oils from Various Sources.** London: H. M. Stationery Office. 135 pp. 1s. Reviewed in *Chemistry & Industry* **50**, 160(1931).

F—PHYSIOLOGY

E. K. MARSHALL, JR.

Excitant substance in the central nervous system. L. HABERLANDT. *Arch. ges. Physiol. (Pflügers)* **223**, 171–9(1929).—The excitant action of emulsions of the cerebrum

or midbrain when injected into frogs is due to a substance which is sol. in water, but not in alc. or Et_2O; it is dialyzable, and is decomposed when heated. B. C. A.

Existence, origin and significance of the so-called lutein colloid. A. ALBANESE. *Arch. ist. biochim. ital.* 2, 269–80(1930).—Discussion of previous work, together with new exptl. results, indicates that the ruby-red test is not sp. for the lutein colloidal substances, that the presence of this colloid is not sufficient for the diagnosis of a gravid lutein body, and that the so-called colloid encountered in either the menstrual or gravid lutein body is merely a metamorphic blood deriv., which is accompanied by involutive, atrophic phenomena of the lutein body itself. B. C. A.

Amylase content of the milk of various animals. R. SCHENK. *Arch. wiss. prakt. Tierheilk.* 58, 375–84(1928).—Human milk contains a considerable quantity of amylase; colostrum-free milk of the cow, horse, dog, cat and guinea pig contains only traces, while neither milk nor colostrum of the goat contains amylase. The markedly higher amylase content of the colostrum of the other animals, falling with the progress of lactation, indicates that the enzyme originates in the colostrum. B. C. A.

Glutathione content of human placenta and denervated gastrocnemius of the toad. J. DI LEO LIRA. *Compt. rend. soc. biol.* 102, 469–70(1929).—The former contains 0.029–0.038%, the latter 0.014–0.018% (normal), 0.012–0.017% (denervated) of glutathione. B. C. A.

Lipogenic and antilipogenic action of hormones as cause of obesity and leanness. A. LUBLIN. *Klin. Wochschr.* 8, 2276–8(1929).—Hyperfunction of lipogenic hormones (*e. g.*, insulin) causes obesity and of antilipogenic hormones (*e. g.*, adrenaline, thyroxine, pituitary hormone) causes leanness. Intravenous injection of thyroxine (1 mg.) causes a transient rise in blood sugar (*e. g.*, 0.110–0.130 g. per 100 cc.). B. C. A.

Hydremia in alimentary hyperglucemia. M. N. KALLINIKOVA. *Russ. J. Physiol.* 13, 193–7(1930).—Detn. of hemoglobin and water in the blood of children, taken at various times after ingestion of sugar, show that hydremia is not assocd. with hyperglucemia. B. C. A.

Cholesterolemia in alimentary hyperglucemia. M. N. KALLINIKOVA AND G. D. OBRAZTZOV. *Russ. J. Physiol.* 13, 198–203(1930).—In children alimentary hyperglucemia is assocd. with cholesterolemia, which attains its max. value 15–30 min. after ingestion of sugar. No general parallelism is found between the blood-cholesterol-time curves and the dextrose-time curves. B. C. A.

Blood lipase in alimentary hyperglucemia. E. T. MINKER-BOGDANOVA AND G. D. OBRAZTZOV. *Russ. J. Physiol.* 13, 204–9(1930).—Max. variations of the lipase-time curves of blood following the ingestion by children of large quantities of sugar coincide with the maxima of the dextrose and fat content-time curves. The types of lipase-time curves found for different individuals correspond either with the dextrose-time curves or with their mirror images. B. C. A.

Absorption of water, 0.2% hydrochloric acid, gastric juice, ethyl alcohol and various chlorides by the dog's isolated stomach. R. O. FAITELBERG. *Russ. J. Physiol.* 13, 224–36(1930).—From 22 to 31% of water introduced into the isolated small stomach of the dog is absorbed within 60 min. Addn. of HCl to 0.2% or of NaCl to 0.9% reduces the percentage absorption to about 17%. Natural gastric juice in some cases undergoes resorption, assocd. with diminution in acidity. The abs. but not the relative amt. of chlorides resorbed from hypertonic solns. increases with concn. Absorption of alc. from 10 and 20% solns. is complete within 60 min., and amounts to 90% in the case of 40% alc. solns. The velocity of absorption of chlorides and of alc. is greatest during the 30 min. following introduction. B. C. A.

The variations of the specific gravity of the plasma and the means available for altering it. NORMAN S. MOORE AND HAROLD J. STEWART. *J. Clin. Investigation* 9, 423–39(1930); cf. *C. A.* 24, 3828.—For comparable results the same anticoagulant must be used, heparin being employed in these expts. Normal specimens of blood show a remarkable constancy of the sp. gr. of plasma and of plasma proteins, provided the samples are taken at the same time each day. In patients suffering from heart disease who were in water balance the max. daily variation in sp. gr. was 0.0004. In 2 normal individuals the variations over a period of 14 months were 0.0015 and 0.0011. Arterial blood showed lower values than venous. Intravenous injection of normal saline soln. into dogs lowered the plasma sp. gr. and protein. Administration of 1 l. of water by mouth to human beings had slight effect. After hemorrhage a decline in these values was followed by a return to normal after 4 days. The injection of gum acacia in glucose soln. slightly increased the sp. gr., but lowered the proteins by diln. J. B. BROWN

Carbon dioxide and oxygen tensions of the mixed venous blood of man at rest. DICKINSON W. RICHARDS, JR., AND MARJORIE L. STRAUSS. *J. Clin. Investigation* 9,

475–532(1930).—Certain aspects of the process of equilibration of lung gases with incoming venous blood are discussed. Equil. can be regularly established for CO_2 with certain high O mixts. and for both CO_2 and O with certain low O mixts. J. B. B.

Studies on the Arneth count. XVII. The effect of alterations of the serum-calcium level on the count. DAVID R. CLIMENKO. *Quart. J. Exptl. Physiol.* **20**, 369–77(1930); cf. *C. A.* **24**, 5351.—Irradiated milk taken by humans, colloidal Ca orally administered to rabbits, and physiol. saline soln. intravenously injected into rabbits produced no change in the Arneth count or the serum-Ca level. Colloidal Ca injected intramuscularly into rabbits and $CaCl_2$ intravenously raised the serum-Ca level and produced a regenerative deflection of the count. Intravenous injections of hypotonic solns. produced no effect on the serum-Ca level but caused a regenerative deflection of the count. RACHEL BROWN

The reformation of muscle glycogen destroyed by work. G. DEBOIS. *Compt. rend. soc. biol.* **103**, 546–8(1930).—Contraction of the paw muscles of cats (anesthetized or decerebrated) was effected by elec. stimulation of the sciatic nerves. The integrity of the vagi nerves is essential for the reformation of muscle glycogen after work; the left vagus alone is sufficient. The glycogen lost after section of the cervical medulla, vagotomy or pancreatectomy is fully restored by the injection of 30 units of insulin. B. C. BRUNSTETTER

The effect of the injection of synthetic thyroxine on the carbon and nitrogen in urine. GEORGES FONTÈS AND LUCIEN THIVOLLE. *Compt. rend. soc. biol.* **105**, 558–9(1930).—Two adult male dogs of the same wt. and age were kept on a const. diet throughout the expt.: after a month, the vol. of the urine, as well as its C and N contents, was recorded daily for 3 weeks (I); the same detns. were made over a period of 2 weeks in which 1 mg. of thyroxine was injected daily (II), over a period of 2 weeks in which 2 mg. of thyroxine was injected daily (III) and lastly, over a period of 2 weeks in which no injections were made (IV). Variations of wt. over each period were recorded. The av. amts. of C and N per day in g. were: I, 3.60, 5.04; II, 4.12, 5.66; III, 4.15, 5.72; and IV, 3.62, 4.90. The C/N ratios for the 4 periods were 0.71, 0.72, 0.71 and 0.73. The vol. of urine was not altered by thyroxine treatment. The av. wt. changes were: I, +150; II, −450; III, −400; and IV, +250. B. C. BRUNSTETTER

The effect of thyroidectomy with and without injections of thyroxine on the carbon and nitrogen in urine. GEORGES FONTÈS AND LUCIEN THIVOLLE. *Compt. rend. soc. biol.* **105**, 559–61(1930); cf. preceding abstr.—The same diet and technic were used in this expt. A 15-kg. dog was used. The data obtained support the conclusion that thyroidectomy alters the C/N ratio of the urine, but that injections of thyroxine do not. The thyroid gland exerts functions other than the elaboration of thyroxine. B. C. BRUNSTETTER

The effect of delivery on the protein equilibrium of the serum. CH. ACHARD, M. BARIÉTY AND A. CODOUNIS. *Compt. rend. soc. biol.* **103**, 1064–6(1930).—The total protein, the albumin and the globulin of the sera of 9 women at the time of delivery and 10 days after delivery were detd. The total protein and albumin are slightly less than normal and can be accounted for by the hydremia of pregnancy. In 6 of the cases, the total protein was decreased 10 days after delivery; in 5 cases the albumin was decreased, while in 5 cases the globulin was increased. B. C. BRUNSTETTER

The organic bases and amino acids in normal human urine. SAKISABURO WADA *Acta. Schol. Med. Univ. Imp. Kioto* **13**, 187–99(1930).—From 300 l. of normal human urine, the following compds. were isolated: leucine, alanine, *l*-proline, *d,l*-proline, isoleucine, valine, phenylalanine, aspartic acid (?), glutamic acid, hippuric acid, creatine, creatinine, histidine, methylguanidine, betaine (?), choline, methyl pyridylammonium hydroxide, lysine, xanthine, *l*-methylxanthine (?), adenine, hypoxanthine, heteroxanthine and *p*-xanthine. H. J. DEUEL, JR.

Cortin, the vital hormone of the adrenal cortex. FRANK A. HARTMAN. *Endocrinology* **14**, 229–32(1930).—The injection of cortin (an ext. prepd. from the adrenal cortex) not only prevented the development of the usual symptoms following double adrenalectomy but allowed the animals (cats) to survive indefinitely (170 days in the longest expt.) as well as to increase in wt. Its potency was also demonstrated in bringing about the recovery of 2 animals in acute adrenal insufficiency. The blood urea is lowered from the high level occurring in adrenal deficiency. A relationship was shown to exist between the rate of growth of adrenalectomized rats and cortin injection. H. J. DEUEL, JR.

The effects of growth-promoting and gonad-stimulating principles of the anterior lobe of the pituitary on basal gaseous metabolism in the rat. MILTON O. LEE AND JULES GAGNON. *Endocrinology* **14**, 233–42(1930).—The subcutaneous administration

of the gonad-stimulating principle of the anterior lobe of the pituitary daily for periods of 8 to 24 days caused no significant change in the basal metabolism in rats. Identical results were obtained on exts. of the fresh gland and on that isolated from the urine of pregnant women. On the other hand, the intraperitoneal injection of these prepns. was effective in reducing the metabolic rate of 10 of the 18 animals used after several daily injections. The lowered metabolism continued 6 to 14 days after the treatment had stopped. H. J. DEUEL, JR.

The metabolism of the isolated frog heart. A. J. CLARK, C. P. STEWART AND R. GADDIE. *Proc. Roy. Soc. Edinburgh* **50**, 297–303(1930).—Expts. were made on isolated frog heart perfused with Ringer's soln. either with or without glucose. Even in the presence of serum, glucose and insulin the carbohydrate metabolism represents only a fraction of the total metabolism. The protein catabolism can account for somewhat over 50% of the total O consumption. There is no evidence that this organ uses fat as detd. by the amt. present. The heart does not synthesize glycogen from protein. It is possible that an unknown factor essential for carbohydrate metabolism is absent in these artificial expts. although the ease with which the heart utilizes non-carbohydrates sources of energy suggests that the metabolism of this foodstuff is not a primary process which produces muscle contraction. These results are at variance with those obtained earlier on dog heart. H. J. DEUEL, JR.

Physiological chemistry of the blood in the tropics. W. BORCHARDT. *Arch. Schiffs-Tropen-Hyg.* **34**, 608–12(1930). H. EAGLE

The iodine content of the normal thyroid of albino rats. G. SANKARAN. *Indian J. Med. Research* **18**, 563–70(1930).—Thyroids average an I content of 0.018%, independent of sex and age. Thyroid weight is proportional to body weight. H. E.

The significance of the parathyroid hormone for the regulation of the calcium economy. CHRISTIAN BOMSKOV. *Klin. Wochschr.* **9**, 2065–6(1930).—A preliminary report. H. EAGLE

The water-binding relationships of child blood plasma. J. JOCHIMS. *Klin. Wochschr.* **9**, 2115(1930).—Viscosity is a reliable index of the water-binding power of the plasma colloids. In child plasma it varies between 0.095 and 0.108. During hydremia in the child there is a parallel fall in plasma viscosity and protein: the sp. viscosity remains const., indicating that the excess water in the plasma is free and not bound by plasma colloids. H. EAGLE

Choline and choline esters in the blood. H. BOHN. *Klin. Wochschr.* **9**, 2147–8 (1930).—A protein-free ext. of human blood contg. choline, when injected into rabbits or cats, causes a very pronounced fall in blood pressure. Choline esters are known to be many thousand times as active in this respect as choline, and B suggests that the choline in the blood (1.5–2 mg. %) is, in part at least, in the form of an ester with, *e. g.*, AcOH. In essential hypertension there is a low blood choline. H. EAGLE

Glucolysis and increase in acidity in tissue cultures, and analogous phenomena in the organism. A. A. KRONTOVSKII AND M. A. MAGATH. *Klin. Wochschr.* **9**, 2165–8 (1930).—The oxidation of glucose to lactic acid is the most important source of energy in tissue cultures. This type of metabolism may be characteristic of active regenerative processes even in the organism. The CO_2 formed results both from respiration and from the action of the lactic acid upon the $NaHCO_3$ of the medium. Changes in tissue cultures are analogous to changes observed in ischemia, inflammation, wound healing, regeneration, etc. H. EAGLE

Milk secretion and menformone. S. E. DE JONGH AND ERNST LAQUEUR. *Klin. Wochschr.* **9**, 2344–6(1930).—The administration of menformone to male guinea pigs causes lactation. It is interesting to note that large quantities, 50 units twice daily for 4 weeks, cause a preliminary mammary hypertrophy; if this dose is then suddenly decreased, lactation begins within 2–3 days and continues for as long as 40 days if constantly decreasing quantities of menformone are injected. The authors point out the complete analogy to conditions in the pregnant woman. H. EAGLE

The protein content of the urine of patients with normal kidney function. BRUNO MINZ. *Klin. Wochschr.* **9**, 2352–3(1930).—Using sulfosalicylic acid as a pptg. agent and solns. of casein as a nephelometric standard, M. finds that the urine of normal subjects invariably contains some protein, ranging from 0.14 to as high as 13 mg. %. The Esbach method can detect only 25 mg. %. H. EAGLE

The theory of diuresis (urine excretion). HELLMUT MARX. *Klin. Wochschr.* **9**, 2384–8(1930).—The blood of a fasting dog contains a substance which inhibits the diuresis caused by water. The significance of this finding is discussed, particularly in the light of the fact that a pituitary ext. has a qualitatively similar effect. H. EAGLE

Substances in human urine and diagnoses of pregnancy. M. ARON AND M. KLEIN.

Compt. rend. soc. biol. 103, 702–4(1930); *Physiol. Abstracts* 15, 248–9.—The action of human urine on the thyroid glands of guinea pigs and rabbits demonstrates that the substance in the urine producing this effect is the hypophyseal hormone. This sp. reaction is obtained with all urines, whether from men or women, but the urine of pregnancy only can affect the genital organs. This latter effect is due, not to the hypophyseal, but to a placental substance. G. G.

Pulmonary chemical sensibility studied by means of the isolated head. A. Pi Suñer and J. Puche. *Compt. rend. soc. biol.* 103, 735–6(1930); *Physiol. Abstracts* 15, 226. G. G.

Secretion of cerebrospinal fluid. T. Falkiewicz. *Compt. rend. soc. biol.* 103, 821–3(1930); *Physiol. Abstracts* 15, 253.—The secretion of the cerebrospinal fluid is stimulated by hypophyseal ext., pilocarpine and atropine; it is not increased by adrenaline, thyroxine, caffeine, $AmNO_3$, theobromine, salicylate of Na, Br, I, luminal and hypertonic or hypotonic solns. of NaCl. The hypophysis is the biol. regulator of this secretion. The neg. results are opposed to the theory of transudation and confirm that of sp. secretion. G. G.

The storage of iodine in living tissues. W. Weber. *Schweiz. med. Wochschr.* 15, 237–9(1930); *Bull. Hyg.* 5, 942.—The thyroid is known to store appreciable amts. of I; other glands such as the ovary and suprarenal store the element but in considerably smaller quantities. W. fed rabbits KI and injected solns. of the salt in the blood to det. whether the I content of the tissues was raised. Tissues such as the liver, heart, lungs and spleen were so low in I that the amt. might be attributed to exptl. error. The value for the kidneys was higher, but this might be attributed to the urine on the tubules. The urine contained considerable amts. of I. After 24 hrs. 50–60% of the I consumed had been excreted. George R. Greenbank

The content of glutathione of the blood in high altitudes and on exposure to natural Alpine sun. J. von Deschwander. *Strahlentherapie* 39, 278–82(1931).—D. found that the glutathione content of the blood and that of the red blood cells are considerably increased at altitudes of 1300–500 m. above sea level. After one hour's irradiation with natural Alpine sun, the glutathione content of the blood and the quotient glutathione: erythrocytes decrease. This means that the glutathione content of the red blood cells decreases. Conclusion: The sp. respiration function of the blood and that of the red blood cells are increased at these altitudes, while by irradiation with natural Alpine sun this function is decreased. Frederick R. Greenbaum

The minute volume and gaseous metabolism of the artificially perfused mammalian intestine. H. F. Roese. *Arch. ges. Physiol.* (*Pflügers*) 226, 184–9(1930).—The O_2 consumption of denervated mammalian intestine is 4.5 cc. per kg. per min., but varies considerably with time. The R. Q. is greater than unity. Arthur Grollman

Ammonia formation and sugar utilization in artificially perfused mammalian intestines. H. F. Roese. *Arch. ges. Physiol.* (*Pflügers*) 226, 190–7(1930).—Intestines perfused by a Starling heart-lung prepn. form appreciable quantities of NH_3 presumably as a result of bacterial decompn. Glycocoll is resorbed by the intestine but is deaminized neither by the intestinal wall nor by the lung of the heart-lung prepn Urea, although retained by the intestinal wall, is not converted to NH_3. The sugar utilization of the intestine is 1.75–1.94 g. per kg. per hr., only 20% of which is oxidized. Arthur Grollman

Effect of sleep, abstention from sleep, and physical work on the blood chemistry. M. Hochrein, J. Michelsen and H. Becker. *Arch. ges. Physiol.* (*Pflügers*) 226, 244–54(1930).—Abstention from sleep for a night resulted in an increase in the NaCl, total base, total CO_2 and PO_4^{---} of the blood. Physical exercise produced greater changes in the blood chemistry of subjects deprived of sleep, during the preceding night, than in normal rested subjects. Arthur Grollman

The temperature coefficient of oxygen utilization by surviving organs. E. Schmutzler. *Arch. ges. Physiol.* (*Pflügers*) 226, 294–304(1930).—The O_2 consumption of isolated perfused limbs of the dog remained const. for 3–4 hrs. Cooling and subsequent rewarming did not affect this O_2 consumption. The temp. coeff. for the O_2 consumption was const. and equal to 3% of the value at 35°, for each degree change in temp. A similar linear relationship also occurred in goose blood over the temp. range of 17–39°, the coeff. being 4% of the value at 35°. Arthur Grollman

The effect of reduced air pressure on animals. III. The effect of varying degrees of reduced air pressure. W. Linzel and T. Radeff. *Arch. ges. Physiol.* (*Pflügers*) 226, 307–18(1930); cf. *C. A.* 24, 4544.—White rats were kept for 3 weeks under reduced air pressures of varying degrees. The blood corpuscles increased at air tensions corresponding to 2000 and 4000 m. altitude, but little at higher altitudes. The total hemo-

globin and blood vols. increased in inverse proportion to the air pressure. The heart wts. did not increase except at pressures corresponding to altitudes of 6000 meters or more. ARTHUR GROLLMAN

A chemical investigation in Victoria (Australia) of the blood of cattle and sheep. JOAN H. NORRIS. *Australian J. Exptl. Biol. Med. Sci.* **7**, 3–4(1930); cf. *C. A.* **24**, 5809.—The mean values found for inorg. P (mg./100 cc.), total P and Fe, resp., were: 4.44, 10.13 and 60.54 for 26 steers, and 6.63, 12.59 and 57.92 for 22 cows. C. G. KING

A chemical study of the liver during inanition. L. VAUDIN, M. JAVILLIER, H. ALLAIRE AND MAD. SCHIRMER. *Bull. soc. chim. biol.* **12**, 894–902(1930).—A dog receiving water only until its weight had dropped from 7 to 5.1 kg. showed the following % loss (dry wt.) in liver constituents compared to a control kept on a normal diet: glycogen and glucose 74.8, ash 33.7, insol. ash 48.1, ether ext. 31.8, cholesterol 24.4, unsaponifiable matter 10.5, glycerides 45.7, lecithin P 25.1, nucleoprotein P 16.5, N 18.3, total loss in dry wt. 27.2%. C. G. KING

The pituitary posterior hormone in fat metabolism. W. RAAB. *Endocrinology* **14**, 385–8(1930).—Pituitrin promotes the absorption and destruction of circulating fat by the liver through a nervous pathway starting in the tuber cinereum and running through the cervical spinal cord and the abdominal splanchic to the liver. Any disturbance of the pituitary-mesencephalic system leads to obesity. Arterio-venous fat detns. suggest that pituitrin does not affect the fat deposit directly. There seems to be a relation between the pituitrin-nervous mechanism and chem. heat regulation. MARY E. LEAR

Crystalline cholesterol in the post-retinal fluid. ALBERTO J. SCHIVO AND LUIS N. PIZZORNO. *Ann. farm. bioquim.* **1**, 160–6(1930). B. S. LEVINE

Protein sugar in the blood plasma of the horse. H. BIERRY. *Compt. rend.* **192**, 240 1(1931); cf. *C. A.* **25**, 1270.—The protein sugar content of the blood plasma varies with the species and within the species with the individual. Furthermore, it is possible to provoke in the same individual important variations in the protein sugar content through the injection of adrenaline and insulin. In the blood plasma of the horse glucidic complexes combined with protein (protein sugar) constitute about $^2/_3$ of the total sugar. The latter oscillates around 2 g. per l. of plasma. Marked individual variations occur. B. S. LEVINE

Combining the values of optic density and viscosity of a suspension for the determination of the number and volume of the dispersed elements. G. ACHARD. *Compt. rend* **192**, 242–4(1931).—A. made a study of the relation between viscosity and no. of red blood cells on the one hand, and optic d. and no. of red blood cells on the other. An attempt was made by combining the viscosity and optic d. value to derive an empirical formula which would make possible the detn. of the vol. and the no. of the dispersed elements. B. S. LEVINE

A metabolic study of desiccated suprarenal medication in man. R. G. HOSKINS AND F. H. SLEEPER. *Endocrinology* **14**, 109–11(1930).—Before the medication was begun records were made of a series of clinical lab. detns. The suprarenal substance was administered by mouth in dosages varying from 18 to 90 gr. daily for 54 to 108 days. The results are recorded in a table. From the viewpoint of lab. findings they are neg. Likewise no significant mental changes are observable. The general deviations observed were such as are usual in any medically selected group B. S. LEVINE

Purification of the male hormone by high-vacuum distillation. E. DINGEMANSE, J. FREUD, S. KOBER, E. LAQUEUR AND A. P. W. MÜNCH. *Proc. Acad. Sci. Amsterdam* **33**, 1206–9(1930).—The method of fractionation is described and a schematic outline of the fractions obtained is presented. It is concluded that the male hormone can be brought to a high degree of purity through high-vacuum distn. At 90° with pressure of 0.001 mm. the hormone is found in the distillate, and at 80° in the residue. Fractional distn. offers the possibility for the sepn. of the male from the female hormone. Also in *Naturwissenschaften* **19**, 166(1931). B. S. LEVINE

The quantitative knowledge of cerebral lipoids. (A dissertation.) ERICK BACKLIN. *Upsala Läkareförenings Förhandl., N. F.* **35**, 105–83(1930).—The object was to det. the changes occurring in the cerebral lipoids in the psychoses. The chemistry of the lipoids of the brain and methods for the quant. study of cerebral lipoids are reviewed. A new method is described which requires only 30–50 mg. of the brain substance for the detn. of (*a*) cholesterol, (*b*) the fraction contg. unsatd. phosphatides in greater part, (*c*) the satd. phosphatides and (*d* and *e*) cerebrosides with satd. and unsatd. fatty acid radicals. Results obtained by this method indicated that it is reliable. The water content of the brain substance was detd. In the autolysis taking place in the cerebral

lipoids during the first 24 hrs. postmortem, demonstrable changes actually occur.
B. S. LEVINE

Effect of composition of air on the growth and mortality of the chick embryo. A. L. ROMANOFF. *J. Morphol. Physiol.* **50**, 517(1930); cf. *C. A.* **24**, 4087.—Studies were made upon fertilized hen eggs. Continuous exposure to 0.4% of CO_2 in the air stimulated growth during the first part of the embryonic period. A high CO_2 and a diminished O_2 content decreased the size and increased the mortality of the embryos. Temporary exposures to high CO_2 concn. of 24- or 48-hr. periods decreased the size of the embryos with no apparent injuries. C. M. MCCAY

The phosphorus partition in normal whole blood. BURNHAM S. WALKER AND MILDRED E. HUNTSINGER. *J. Lab. Clin. Med.* **16**, 247–52(1930).—The total P content of normal whole blood is 39.2 mg. per 100 cc. The inorg. phosphate P appears to be 9.7% of the total P; the acid-sol. P 68.1%; the acid-sol. org. P (ester P) 58.3% and the lipin or lecithin P 36.0%. The P detns. were made by the method of Fiske and Subbarow (*C. A.* **20**, 1092). E. R. MAIN

The effect of splenectomy on changes in the blood at high altitudes. ANTONIO CHIATELLINO AND STEFANO GOLDBERGER. *Arch. sci. biol.* (Italy) **15**, 407–32(1930).—The studies were made on 3 normal and 3 splenectomized dogs which had been kept on Colle d'Olen for 6 weeks. The percentage increase in red blood corpuscles for the normals was 5.0, 8.9 and 0.6; for the splenectomized animals 50.0, 22.3 and 33.3. The percentage increase in hemoglobin was, resp., 14.3, 19.5, 11.8 and 31.8, 58.0, 11.7. There was also an increase in leucocytes which appeared rather late, but there was no marked difference between the 2 groups. Blood smears from the splenectomized animals showed numerous Jolly bodies and a few normoblasts; the controls also presented a similar picture but with much less frequency. The resistance of the corpuscles was greater in the splenectomized than in the normal animals. On returning to lower altitudes, there was a marked diminution of all values which approached the initial values; the resistance of the corpuscles, however, remained higher than the initial value.
PETER MASUCCI

Gaseous exchange of the testicle. A. CHIATELLINO. *Arch. sci. biol.* (Italy) **15**, 433–44(1930).—The respiratory exchange of the testicles of normal decerebrated, narcotized and curarized dogs was detd. In the first 2 groups, the blood flow in the organ was noticeably less than in the curarized group. In those narcotized the R. Q was on an av. 45.7 cc. per min. per 100 g. of organ. The O_2 consumption was on an av. 3.47 cc. per 100 g. of organ; the CO_2 production was on an av. 3.00 cc. per min. per 100 g. of organ. The respiratory exchange in the left and right organs of the same animal corresponded perfectly. There were marked differences, however, between individual animals; in general with an increase in blood flow, there was a decrease in the respiratory exchange. PETER MASUCCI

Variations in the nonprotein nitrogen of the blood during fatigue. UGO RONDELLI AND S. CHIABRERA. *Minerva med.* **1930**, I, 65–70.—The purpose of this investigation was to det. the relation between muscular fatigue, hyperthermy and protein metabolism. From the results obtained on 6 subjects, the conclusion is drawn that the increase in nonprotein N of the blood which accompanies muscular fatigue (running) is independent of the energy spent and of the hyperthermy from fatigue. The increase in the nonprotein N is attributed to a change in equil. between the tissues and blood plasma. PETER MASUCCI

Choline and adrenals. GAETANO VIALE AND TEODORO COMBES. *Arch. fisiol.* **28**, 25–32(1930).—Injections of adrenaline cause the passage of choline from the adrenals into the circulation. The sopradiaphragmatic section of the vagus has no influence on the choline content of the adrenals. A. E. MEYER

Experimental determination of sex and the sterility by hormone action. B. PANIZZA. *Arch. fisiol.* **28**, 51–68(1930).—See *C. A.* **25**, 329 A. E. MEYER

The metabolism of alcohol by man at high altitudes. A. BORNSTEIN AND A. LOEWY. *Biochem. Z.* **230**, 51–67(1931).—The alc. content of the blood rises more rapidly and to a higher level at high altitudes than in the plains, but after the max. concn. has been reached the loss of the alc. from the blood proceeds at the same rate at high or low altitudes. The min. vol. as well as the frequency of the respiration is little affected under both conditions. The R. Q. was found to be regularly lower in the mountains than in the plains, and after the consumption of alc. it fell much more so that in the mountains the R. Q. often became that of pure alc. oxidation. Under neither condition did alc. exert any sp. dynamic action, except when sugar was given together with the alc.
S. MORGULIS

Phosphoration, lactic acid formation and phosphatase activity in muscle pulp and

in muscle powder. J. Bodnár and Béla Tankó. *Biochem. Z.* **230**, 228–32(1931).—The lactic acid formation of muscle pulp decreases during preservation in direct ratio to its loss of ability to esterify H_3PO_4. The H_3PO_4-esterifying substance is completely retained in the powder prepd. from muscle pulp with alc. ether, or with acetone ether. The inability of the muscle powder to form lactic acid is attributed to the diminished content of phosphatase, since the loss of phosphatase activity is parallel to the diminution in lactic acid formation. S. Morgulis

Fate of fructose in the animal organisms. II. Do the digestive juices cause a change of fructose to glucose? W. W. Oppel. *Biochem. Z.* **230**, 269–84(1931); cf. *C. A.* **25**, 1858.—When a fructose soln. is preserved under toluene in a thermostat with a mixt. of digestive juices (gastric, pancreatic and intestinal) at different p_H values there is no formation of aldoses even after 20 hrs. Shorter preservation of similar mixts. but without toluene likewise fails to bring about any transformation of fructose to an aldose, although the intestinal sucrase causes considerable hydrolysis of sucrose in the same period of time. S. Morgulis

Studies on blood glucolysis. II. The pyrophosphate fraction and glucolysis. H. K. Barrenscheen and Béla Vásárhelyi. *Biochem. Z.* **230**, 330–46(1931); cf. *C. A.* **25**, 1544.—The pyrophosphate content of different bloods shows considerable variation, increasing in the following order: horse<cow<dog<rabbit<guinea pig<man<pig. In man the pyrophosphate fraction constitutes relatively the highest portion of the acid-sol. org. P. Except for the blood of the pig, with its very large pyrophosphate content but no glucolytic power, the glucolytic ability of the various bloods seems to be correlated with their pyrophosphate content. During glucolysis there is an increase in the pyrophosphate which is entirely accounted for by the decrease in inorg. P, but when the glucolysis is accelerated by the addn. of SO_4 ions the pyrophosphate diminishes instead. Neither the feeding of large amts. of glucose nor the preliminary injection of insulin has any effect upon the pyrophosphate fraction of the blood P. The pyrophosphate is present only in the erythrocytes, apparently in some org. combination because it cannot be easily isolated. The blood and cells contain a pyrophosphatase which sets free P from pyrophosphate, the enzyme being inhibited in its action by F. S. Morgulis

The solubility, dissociation and tension of carbon dioxide in urine. Fritz Mainzer and Marga Bruhn. *Biochem. Z.* **230**, 395–410(1931).—Detns. made on 20 urines gave the following results: the soly. $\alpha_{(CO_2,\ 38°)} = 0.441 - 0.514$; $p_{KI} = 5.81 - 6.30$; and $P_{(CO_2,\ 38°)} = 13.3 - 242.4$ mg. Hg. From this it seems that the CO_2 tension of the urine could not have the physiol. significance as representing the tension in the tissues. S. Morgulis

The cholesterols in structural combinations in protoplasm. V. Studies on adrenals from cattle. G. Pfeiffer. *Biochem. Z.* **230**, 438–45(1931); cf. *C. A.* **24**, 4826.—A special procedure is described for the hydrolysis of the adrenals with 2% NaOH. In 100 g. of fresh substance was found 0.2753 g. total cholesterol, of which 56.6% were cholesterol and oxycholesterol (the latter alone representing 17.5%) and 43.2% cholesterol esters. Cholesteryl palmitate was 2.3% and the oleate 9.1%; oxycholesteryl oleate was 31.9%. The high cholesterol content of the adrenals is thought to be due to the destruction of erythrocytes for the building up of the adrenal hormon. The endogenous synthesis of cholesterol in the adrenals is considered as improbable. S. Morgulis

The significance of the conjugated bile acids in fat resorption. IV. F. Verzar and A. von Kuthy. *Biochem. Z.* **230**, 451–7(1931); cf. *C. A.* **23**, 4957.—The objection to the hypothesis that fat is absorbed in the intestinal tract as the water-sol. combination of fatty acids with bile acids could be based upon the fact that there is never enough bile acid present to convert all fatty acids into a diffusible state. Expts. made on isolated and washed out segment of intestines of living animals show that a given amt. of bile acid promotes the absorption of much more fatty acid than could be made diffusible in tests *in vitro*. It is therefore assumed that the bile acids become adsorbed on the epithelial cells of the mucous membrane where the fatty acids become converted into diffusible forms. This is corroborated by the finding that even hrs. after the administration of bile acids these can be demonstrated in the mucous membrane though not in the lumen of the intestine. The adsorbed bile acid-fatty acid combination is presumed to undergo hydrolysis, the bile acids being then ready to take up more fatty acids. S. Morgulis

The role of the pyloric sphincter in the control of gastric acidity. Robert Elmen and A. P. Rowlette. *Arch. Surg.* **22**, 426–37(1931). John T. Myers

The zinc content of the liver of the rat in relation to growth. Gabriel Bertrand

AND MME. Y. BRANDT-BEAUZEMONT. *Compt. rend.* **191**, 1410–1(1930); cf. *C. A.* **24**, 5358.—With the same methods of technic and analysis as previously described, expts. were made to det. the Zn content of the livers of rats at various stages of growth: at birth, at 15 days (near weaning), at 30 days and at 7 months. It was shown that the quantity of Zn per 100 g. of liver decreased with age, there being about 3½ times more of metal at the time of birth than in the adult rat. Because of this storage of Zn at birth, it seems that the role of Zn in nutrition is more important in the adult than in the new-born. N. M. NAYLOR

The mucin of the articular fluids. CH. ACHARD AND M. PIETTRE. *Compt. rend.* **191**, 1412–4(1930).—In the expts. described, synovial mucin is purified by repeated pptns. from a water soln. with acetone. It is first obtained as a thick, viscous mass, but with further purification, as a dry powder. Synovial mucin averages 0.7% S, while the mean content of S in blood serum averages 1.4%. The sp. viscosity of synovial mucin is 5.389; that of blood serum is 1.090. The synovial mucin described compares favorably with true mucin (1) by its soly. in excess HCl and its slight soly. in excess AcOH and (2) by the fact that its content of sulfur is similar to that obtained for saliva mucus (Hammarsten) and for tendon mucus (Loebisch). N. M. NAYLOR

Threshold relationships of testis hormone indicators in mammals: the rat unit. CARL R. MOORE AND T. F. GALLAGHER. *J. Pharmacol.* **40**, 341–49(1930); cf. *C. A.* **24**, 3547.—The order of sensitivity in the rate of testis hormone indicators was: (1) spermatozoön motility test; (2) prostate cytology test; (3) seminal vesicle, Cowper's gland and vas deferens tests; (4) elec. ejaculation test. The rat unit is defined as the minimal daily amt. required to maintain 50% of castrated animals in a normal condition, the indices being a normal prostate gland and seminal vesicle. One rat unit is approx. equal to 6 bird units. C. RIEGEL

The chemistry of muscular contraction. OTTO MEYERHOF. *Lancet* **1930**, II, 1415–22.—The hydrolysis of creatinephosphoric acid in muscle is of the utmost importance in muscle contraction. The lactic acid-forming system is analyzed and a "hexokinase" discussed. Similarities between the glucolytic function of muscle and the fermentative function of yeast are pointed out. The importance of phosphoric esters, pyrophosphate and adenylic acid in muscle or enzyme exts. is stressed. All vertebrates are found to contain creatinephosphoric acid in their striated muscles, and all classes of invertebrates utilize argininephosphoric acid. F. B. SEIBERT

The regulation of oxygen consumption in animals with variable alveolar gaseous tension. H. J. JORDAN. *Arch. néerland. physiol.* **15**, 198–212(1930).—Diving birds, amphibia, molluscs and insects are considered. The O content of the lungs may vary more than 10% with only a slight difference in consumption. B. A. SOULE

Iron in normal and pathological tissues and its biological significance. I. Iron content of the organs of various classes of animals. KENZUI KOJIMA. *Nagoya J. Med. Sci.* **5**, 34–48(1930).—In mammals and fishes, the Fe content of the spleen is always greater than that of the liver, but in birds, reptiles and amphibians the opposite is true. On the other hand, the glutathione content is greater in the liver of mammals and fishes than in the spleen and vice versa for birds, reptiles and amphibians. The amt. of both Fe and glutathione in the lungs of birds is relatively higher than in the other organs. **II. Relationship of the iron content of the organs and the growth of animals.** *Ibid* 49–61. The fluctuations in the Fe content of growing honeybees and silk worms parallel the cytochrome content, gradually becoming greater during the larva stage, decreasing during the pupa stage and increasing again in the imago stage. The amt. of Fe in growing chick embryos reaches its max. somewhat later than the glutathione and cytochrome content. The Fe content per g. dry substance in the organs of normal chickens was found to be: liver 0.1806, heart 0.1317, leg muscle 0.0879, brain 0.1444, kidney 0.4920, lung 0.0525 and blood 0.1468 mg. Egg yolk contained 0.0314 mg. Fe/g. dry substance, but no Fe was found in egg white. The water content of the organs of chick embryos decreased with growth. **III. Effect of the time of year upon the iron content of animals that hibernate [toad] (Bufo vulgaris japonicus).** *Ibid* 62–70.—In general, the Fe content of the various organs of the toad is greatest in winter and least during the spawning time. The glycogen content parallels that of Fe, but the glutathione content is just the reverse. The liver always contains more than twice as much Fe as the spleen. A. WIEBEN

The carbon dioxide content of the blood in the new born. HOWARD F. KANE AND JOSEPH KREISELMAN. *Am. J. Obstet. & Gynec.* **20**, 826–7(1930).—A study of 47 specimens indicates that the CO_2 of the blood in the new born is consistently high and increases with the degree of asphyxia. R. C. WILLSON

Alkali reserve in blood during gestation. S. PASCALI. *Clinica Ostetrica* **32**, 537–55

(1930); *J. Am. Med. Assoc.* **96**, 76.—From studies of 45 cases in various months of gestation, it is concluded that in the first 3 months of pregnancy the alkali reserve is lowered, but not markedly. The normal limits of alkali reserve are maintained between the fourth and eighth months. In the ninth month the reserve is about normal but tends to fall in the beginning of labor. R. C. WILLSON

Cholesterol and bilirubin contents of blood of mother and child. H. HINGLAIS AND J. GOVAERTS. *Gynéc. et Obstét.* **22**, 137(1930); *J. Am. Med. Assoc.* **95**, 1870.—Hypercholesterolemia in the mother is frequent at term but it is by no means observed constantly. The cholesterol content of infants at birth is distinctly low. During the first few days after birth the blood cholesterol of the infant increases markedly. No relation was found to exist between the excess blood bilirubin at birth and the low cholesterol value. Bilirubinemia decreased in the first few days after birth. R. C. WILLSON

Organic and inorganic phosphorus content of blood in children. P. FEDOROV. *Vrachebnoe Delo* **13**, 505–10(1930); *J. Am. Med. Assoc.* **95**, 1789.—The results given are from examns. of 1000 samples of blood from 254 healthy children aged from 7 to 15 yrs. The av. inorg. P in blood of boys and girls was about the same, 3.97 mg. per 100 cc. Org. P was 6.02 mg. per 100 cc. No seasonal changes in org. P were observed. R. C. W.

Oxygen and carbon dioxide inhalations and their effect on circulation. C. KROETZ. *Z. Kreislaufforsch.* **22**, 641(1930); *J. Am. Med. Assoc.* **96**, 80.—In man O inhalations do not increase the catabolic processes in the organism; there is, however, a high elimination of N. The latter reaches, or nearly so, the increase in the amt. of O intake. In healthy subjects the arterial blood O remains unchanged but the amt. of O in venous blood is usually greatly increased. There is a definite increase in the min. vol. of the circulation. O inhalations in cardiacs produce an increase in the O tension of the tissue, a normalization of the O content of the arterial blood and an elevation of the low min. vol. and beat vol. in decompensation. CO_2 inhalations increase the O content of the arterial blood and increase the venous reflux and with it the min. vol. and the beat vol. R. C. WILLSON

G—PATHOLOGY

H. GIDEON WELLS

Anaphylaxis with water-soluble specific substance from yeast-like fungi. T. J. KUROTCHKIN AND C. E. LIM. *Proc. Soc. Exptl. Biol. Med.* **28**, 223–5(1930).—The sensitizing power of the mycelial growth is distinctly higher than that of the budding cell growth of the same fungus. *Monilia pinoyi* had a higher sensitizing capacity than *M. psilosis;* culturally, the former fungus differed from the latter in that its growth was accompanied by a rapid and rich formation of the mycelium. The guinea pig was used. C. V. BAILEY

Zinc and cancer. A. ZLATAROFF. *Bull. soc. chim. biol.* **12**, 44(1930).—It is suggested that accumulation of Zn is one defense of the organism against the abnormal metabolism of the cancer cell, the Zn tending to inhibit the enhanced activity of proteolytic enzymes and catalase, to stimulate the decreased activity of peroxidase and to oppose the increased colloidal activity of the cancer cell, thus tending to reëstablish normal cellular respiration. B. C. A.

Use of precipitated diphtheria toxin in the preparation of anti-diphtheria serum. P. SÉDALLIAN AND MME. CLAVEL. *Compt. rend.* **190**, 1525–6(1930).—The ppt. obtained when diphtheria toxin is adjusted to p_H 4.7 (cf. *Compt. rend. soc. biol.* **97**, 1543–5(1927); *C. A.* **22**, 810; **23**, 3509) is dissolved in a neutral peptone broth (Martin), and then injected (in increasing amts. during 3 months) into horses. The serum obtained is of the same value (as an antigen) as that resulting from injection of the original toxin. B. C. A.

Potassium content of pleural discharges. DIMITRESCU-MANTE. *Compt. rend. soc. biol.* **102**, 971–2(1929).—Av. values are 25–35 mg. per 100 cc. B. C. A.

Effect of various salts on the stability of diphtheria toxin. S. SCHMIDT. *Compt. rend. soc. biol.* **103**, 95–8, 98–100, 104–6(1930); cf. *C. A.* **24**, 5855. B. C. A.

Role of the electrolyte in the diphtheria toxin-antitoxin reaction. Coagulation of the purified toxin in presence of various salts. S. SCHMIDT. *Compt. rend. soc. biol.* **103**, 101–3, 106–8(1930); cf. *C. A.* **24**, 5855. B. C. A.

The influence of different salts on the stability of toxin and antitoxin. S. SCHMIDT. *Z. Immunität.* **66**, 506–18(1930); cf. preceding abstract.—Diphtheria antitoxin is much more stable to the destructive action of salts than is toxin. The flocculating function of both substances is less stable than the antigenic or antitoxic properties.

Salts of acids which have strong oxidizing or reducing actions quickly destroy toxin and antitoxin. This is also true for salts of certain aromatic acids, as salicylic and cinnamic acids. JULIAN H. LEWIS

Occurrence of xanthine calculi in New Zealand sheep. T. H. EASTERFIELD AND J. A. BRUCE. *New Zealand J. Sci. Tech.* 11, 357–61(1930).—Calculi found in the kidneys of certain sheep consist of xanthine. The probable cause is a deficiency of minerals in the pasturage. B. C. A.

Hypochromic anemia with achlorhydria. THEODORE R. WAUGH. *Arch. Internal Med.* 47, 71–81(1931).—Mostly clinical. J. B. BROWN

The cholesterol partition of the blood plasma in parenchymatous diseases of the liver. EMANUEL Z. EPSTEIN. *Arch. Internal Med.* 47, 82–93(1931).—The cholesterol ester values of the blood plasma in acute parenchymatous damage of the liver are diminished or reduced to zero in proportion to the severity of the disease process. The cholesterol partition is normal in atrophic cirrhosis. J. B. BROWN

Chemistry and metabolism in experimental yellow fever in Macacus rhesus monkeys. III. Blood sugar and liver glycogen. A. MAURICE WAKEMAN AND CLARE A. MORRELL. *Arch. Internal Med.* 47, 104–15(1931); cf. *C. A.* 24, 5835.—Monkeys with yellow fever showed hypoglucemia 24 hrs. before death. Hypoglucemic convulsions during fasting could not be produced even with blood sugar as low as 45 mg. %. In yellow fever, monkeys with hypoglucemia showed low liver glycogen. Adrenaline produced no hyperglucemic symptoms. J. B. BROWN

The potassium content of the hearts of persons dying from edematous and nonedematous conditions. L. C. SCOTT. *Arch. Internal Med.* 47, 116–21(1931).—There is no appreciable av. difference in the content of water, Na and K in the hearts of edematous and nonedematous persons. There is considerable individual variation. The Na content may be greater or less than K. J. B. BROWN

The blood lipoids in nephrosis and chronic nephritis with edema. L. LICHTENSTEIN AND EMANUEL Z. EPSTEIN. *Arch. Internal Med.* 47, 122–7(1931).—Increased cholesterol, both total and ester, and phosphatides were found in the blood plasma of patients with various nephroses. The lipoidemia was accompanied usually by diminution of serum proteins, especially albumin. Similar results were obtained on 7 cases of chronic glomerulonephritis. J. B. BROWN

Terminal hypoglucemia. E. G. SCHMIDT AND T. NELSON CAREY. *Arch. Internal Med.* 47, 128–34(1931).—Detn. of blood sugar in 33 nondiabetic patients dying in the hospital showed low terminal blood sugars (28–75 mg. %) in 36% of the cases. Urea usually rose just prior to death. J. B. BROWN

The optical activity of cerebrospinal fluid in suppurative meningitis, and its lactic acid, sugar and chloride content. SYDNEY L. WRIGHT, JR., ELIZABITH F. HERR AND JOHN R. PAUL. *J. Clin. Investigation* 9, 443–61(1930).—The lactic acid concn. in the cerebrospinal fluid in suppurative meningitis is decidedly abnormal and usually related to the severity of the clinical symptoms. The ultrafiltrate of this fluid is usually *l*-rotatory. The lactic acid may be present as *l*-rotatory *d*-lactates. The ratio of concn of Cl^- in the blood and spinal fluid is not altered. The sugar and lactic acid ratios are greatly altered, there being less sugar and more lactic acid. An extended bibliography is given. J. B. BROWN

The proportion of certain important inorganic constituents in the dying heart muscle. L. C. SCOTT. *J. Clin. Investigation* 9, 463–74(1930).—As a result of a large series of analyses of heart muscle from persons dying from a variety of diseases, there does not seem to be any relation between the water content, the content of ash, Ca, Mg, K and Na and disease. With the exception of Mg, the inorg. constituents are quite variable. Hearts from individuals dying from arteriosclerotic changes do not show high Ca content. A reversed ratio of K to Na may indicate an affected cardiac contractility. J. B. BROWN

The humoral origin of the paresis consecutive to the destruction of the suprarenals J. E. ABELOUS AND H. LASSALLE. *Compt. rend. soc. biol.* 103, 475–7(1930).—The injection of blood from a frog paralyzed as a result of destruction of its suprarenals into a frog whose suprarenals have been extirpated results in paralysis and death, if injection is made into a normal frog, the same disturbances result after a very short delay. They are, however, transient, the poisons being gradually destroyed or neutralized by adrenaline. The considerable increase of muscular chronaxy in relation to that of the nerve implies a curarizing action of the poisons which accumulate in the organism when its suprarenal function is suppressed. B. C. BRUNSTETTER

The protein equilibrium of blood serum in cerebral tumors. CH. ACHARD, M. BARRÉTY AND A. CODOUNIS. *Compt. rend. soc. biol.* 105, 346–7(1930).—A study of

10 cases of cerebral tumor showed that the protein equilibria of the blood sera were practically undisturbed. The range of values for total protein was 76.30–89.74 g. per 1000; for albumin, 39.10–58.84 and for globulin, 25.36–41.07 g. per 1000. The albumin–globulin ratio ranged from 0.95 to 2.12. B. C. BRUNSTETTER

Oxalaturia and increased oxalic acid secretion in urine in tuberculosis. JOSEF A. LANGER AND TH. LITTIG. *Beitr. klin. Tuberk.* 72, 492–6(1929).—Among 150 tuberculous individuals examd. there were 29.2% with a pos. oxalaturia, 48.2% with variable findings and 22.6% persistently neg. Of the latter there were about 61.7% with severe processes. Among children and youths under 16 years oxalate crystals were found less frequently. No effect of a febrile reaction was noted and a diet rich in oxalic acid was without effect. H. J. CORPER

Experimental studies on artificial immunization against tuberculosis. Hemolysin tests. P. KALLOS AND E. BAJZA. *Beitr. klin. Tuberk.* 73, 323–4(1930).—In earlier expts. on artificial tuberculosis immunization in which tuberculous tissues were placed subcutaneously in sacs impervious to bacteria (*Beitr. klin. Tuberk.* 71, 604(1929)) it was recommended that this method be used for immunizing purposes. In order to det. whether these sacs are suitable for the production of antibodies, sheep erythrocytes were placed in the sacs subcutaneously in rabbits and it was shown that the serum of these animals after a short time contained a fair titer of hemolysins. H. J. C.

Bilirubin determination in the blood serum in chronic pulmonary tuberculosis. F. WARNECKE. *Z. Tuberk.* 54, 321–7(1929).—As the result of an examn. of 134 patients with severe bilateral pulmonary tuberculosis there was found a diminution of bilirubin in the blood serum 0.002 mg. as compared to normal 0.005 mg. Toxic destruction of the liver parenchyma, of the reticulo-endothelium, insufficient supply of hemoglobin or O unsatn. of hemoglobin are looked upon as possible causes. The detns. were made by means of direct and indirect diazo reactions and with the Autenreith colorimeter. H. J. CORPER

Blood sedimentation and white blood picture in the prognosis of pulmonary tuberculosis. HERMAN VOS. *Z. Tuberk.* 55, 431–7(1930).—Study of the blood picture and sedimentation revealed a disagreement between the 2 in 22% of 369 cases examd. In the cases where disagreement occurred the majority showed a parallelism of the clinical course and the leucocyte formula while the smaller proportion revealed an agreement of the sedimentation rate and the clinical course. Conclusion: The hemogram more rapidly reacts to the immuno-biologic condition of the body than the sedimentation rate. H. J. CORPER

Studies on the tuberculin reaction. G. PLATONOV AND S. SHAVROVA. *Beitr klin. Tuberk.* 73, 435–41(1930).—In elaboration of observations made by others that certain substances possess the property of inhibiting or neutralizing the local tuberculin reaction, the authors used solns. of Na morrhuate and Na gynocardate, as well as solns. of Ca and Mn salts. After the amt. of tuberculin producing a reaction in the patient had been detd. these various reagents were added in different concns. Na morrhuate and Na gynocardate caused a definite diminution in the reaction while $MnCl_2$ increased it and $CaCl_2$ gave indefinite results. It is believed that the action of Na morrhuate and Na gynocardate is to be explained on the basis of the antitryptic properties of the unsatd. lipoids, while with $CaCl_2$ the possibility of the action through the nervous system cannot be excluded. On the basis of a parallelism between the local and general sensitiveness, it is reasoned that these expts. may point to a way of desensitizing lung tissue for therapeutic purposes. J. H. CORPER

Further observations on the serum calcium and plasma cholesterol in health and disease and on the blood chemistry in osteomalacia. T. A. HUGHES, D. L. SHRIVASTAVA, P. N. SAHAI AND K. S. MALIK. *Indian J. Med. Research* 18, 517–26(1930).—The serum Ca of residents in the Punjab is higher than that of normal inhabitants of temperate climates. The oral administration of vitamin D (Vigantol or Radiostol) or vitamin A (Radiostoleum) caused a rise of serum Ca in 4 cases of osteomalacia, but indefinite changes in serum P or plasma cholesterol. H. EAGLE

Chemical composition of urinary calculi in rats. S. RANGANATHAN. *Indian J. Med. Research.* 18, 599–613(1930).—The compn. of the urinary calculi of albino rats varies with the diet. Ca-rich stones develop on a Ca-rich diet; they contain it as $CaCO_3$, $Ca(OH)_2$ or both, are poor in P and N and contain no uric acid. $CaCO_3$ stones contain little H_2O; $Ca(OH)_2$ stones may contain as high as 49% H_2O. Mg-NH_4PO_4 stones develop on diets contg. no added lime. H. EAGLE

Chemical composition of the "nucleus" of urinary calculi. S. RANGANATHAN. *Indian J. Med. Research* 18, 613–7(1930).—The nuclei of vesical calculi are not homo-

geneous. They contain uric acid, urates and only traces of phosphates; their compns. usually, but not necessarily, parallel the compn. of the surrounding stone. H. E.

Renal diabetes and ketonuria. WILHELM BERG. *Klin. Wochschr.* **9**, 1621–3 (1930).—A description is given of an unusual case of renal diabetes, with development of ketonuria during pneumonia. H. EAGLE

Functional disturbances of the kidneys in diabetic coma. A. Wl. ELMER AND M. SCHEPS. *Klin. Wochschr.* **9**, 1631(1931).—Contrary to the conclusions of Gottschalk and Müller, ketonemia and acidosis may play a very significant part in causing kidney insufficiency in diabetic coma. Ketonuria, decreased alkali reserve and ketonemia do not necessarily run parallel. A very severe ketonemia (> 300 mg. %) is quite compatible with negligible ketonuria and a plasma CO_2 of 40%. H. EAGLE

Calcium gout and calcinosis universalis. HERMANN STEINITZ. *Klin. Wochschr.* **9**, 1632–4(1930). H. EAGLE

The metabolism of progressive muscular dystrophy. GERTRUD MOSBERG. *Klin. Wochschr.* **9**, 2051–2(1930).—In 3 cases of infantile muscular atrophy which presented no clinical signs of endocrine disturbances there was (1) an increase in blood Ca, cholesterol and lactic acid, (2) abnormal blood glucose and NaCl curves following their ingestion and (3) a normal insulin curve. H. EAGLE

Alimentary lipemia. A. HIRSCH. *Klin. Wochschr.* **9**, 2062–4(1930).—Alimentary lipemia is not observed in cases of portal obstruction (atrophic cirrhosis, ascites) or in disturbances of fat absorption of the most diverse kind (fever, cachexia, bile duct obstruction). Alimentary lipemia is therefore not a functional test of a cirrhotic liver, but of enteral fat resorption. Its absence is, however, one of the regular and early symptoms of atrophic cirrhosis. H. EAGLE

Specific skin reactions in patients with gonorrhea by means of specific protein-free substances derived from gonococci. WOLFGANG CASPER. *Klin. Wochschr* **9**, 2154–8(1930).—A protein-free, type-specific deriv. of Type I gonococcus, carbohydrate in nature, gave specific skin reactions in gonorrheic subjects, apparently allergic in nature. Type II derivs. gave no reaction with these patients; conversely, the Type I substance gave no reaction in a patient who was sensitive to Type II. H. EAGLE

Uremia in scarlatinal nephritis. A. ALTMANN. *Klin. Wochschr.* **9**, 2252–4 (1930).—The usual premonitory signs may be completely absent in cases of uremia following scarlatinal nephritis. The non-protein N may be normal; blood pressure may not be high; and there may be no oliguria, hematuria or albuminuria. A. suggests the possibility that the convulsive uremia of scarlatinal nephritis may differ in essential respects from the "quiet" uremia of chronic nephritis. H. EAGLE

Hyperinsulinismus with a hypoglucemic symptom complex. F. KRAUSE. *Klin Wochschr.* **9**, 2346–9(1930). H. EAGLE

Nephrosis and glucosuria. H. STRAUSS. *Klin. Wochschr.* **9**, 2388–9(1930) Previous communications have shown that there is a low threshold value for blood sugar in nephrosis following the peroral intake of glucose. The results of Fell, which indicate an abnormally high kidney threshold, were obtained by the intravenous injection of glucose. H. EAGLE

Percutaneous immunization with the Löwenstein diphtheria protective salve. HEINRICH BAAR AND HANS BENEDICT. *Wochschr.* **9**, 2395–6(1930).—Eighty % of 106 children became Schick neg. following percutaneous immunization. Inducing an erythema by means of a mustard plaster previous to the application of the toxoid-salve increases the absorption. H. EAGLE

Experimental basis for the serological demonstration of a specific cancer antigen. H LEHMANN-FACIUS. *Klin. Wochschr.* **9**, 2430–3(1930).—A lipoid which reacts specifically with a rabbit anti-carcinoma serum can be obtained in the acetone-insol., petr.-ether-sol. fraction of the original carcinoma tissue. This fraction does not react with Wassermann-pos. sera, and does not react with a group-specific antiserum. H. EAGLE

Humoral changes in a case of trypanosomiasis (a contribution to the question of auto-antibodies). ÖDÖN FISCHER. *Klin. Wochschr.* **9**, 2436–8(1930).—The serum of a patient with trypanosomiasis contained agglutinins at 0° for human blood cells of all groups, including his own cells, and complement-fixing antibodies against an alc ext. of human red cells. F. interprets these as antibodies to the hosts' own red cells, due to changes induced by the infection. H. EAGLE

Observations on the sugar metabolism in a case of spontaneous levulosuria. P. A. HEERES AND HERMAN VOS. *Klin. Wochschr.* **9**, 2440–1(1930). H. EAGLE

Influence of the benzene nucleus on the specificity of azoproteins. M. ADANT. *Compt. rend. soc. biol.* **103**, 539–40(1930); *Physiol. Abstracts* **15**, 260.—In the azoproteins

obtained by coupling diazotized aniline with serum protein, the protein fragment has lost its specificity. An active precipitin corresponding to the serum employed in production is quite free from activity toward the azoprotein. Replacement of the aniline mol. by a benzidine or naphthylamine mol. causes no modification of the specificity of the antibody. G. G.

Antigenic properties of gelatin. R. Bruynoghe and P. Vassiliadis. *Compt. rend. soc. biol.* **103**, 543–4(1930); *Physiol. Abstracts* **15**, 260.—Gelatin and gelatin aniline were injected into animals with the view of ascertaining whether they caused the production of deviating substances. Neither serum gave the slightest trace of deviation of alexin on gelatin coupled with aniline, but both fixed the alexin on gelatin by itself. The inactivity of the gelatin aniline serum toward the antigen cannot be attributed to a want of sensitizing substances; it is rather due to the nature of the antigen. G. G.

Antigenic properties of collagen and their modification under the influence of radium emanation. J. Loiseleur and Ach. Urbain. *Compt. rend. soc. biol.* **103**, 776–8(1930); *Physiol. Abstracts* **15**, 258–9.—The flocculation of collagen under the action of Ra is preceded by diminution of viscosity and lowering of the antigenic properties. G. G.

Experimental production of chicken sarcoma with arsenic trioxide. N. C. Laclau and C. Pillado Matheu. *Rev. soc. argentina biol.* **5**, 744–67(1929); *Physiol. Abstracts* **15**, 262.—Carrel's results could not be repeated. Injections of As_2O_3 and embryonic pulp did not produce sarcoma. Cholesterol injections did not modify these results. No results were obtained by modifying the time of contact of arsenic and embryonic pulp, varying the p_H and adding $ZnSO_4$ or ext. of rat sarcoma. Substitution of embryonic by spleen pulp also gave neg. results. Granuloma were produced by injecting clay. Subsequent injections of arsenic did not produce cancer. G. G.

Factors affecting the deposition of dental calculus. Geoffrey H. Smith. *Australian J. Exptl. Biol. Med. Sci.* **7**, 45–77(1930).—Loss of CO_2, changes in p_H value and phosphate content of the saliva are not important factors in the deposition of dental calculi. A salivary phosphatase from desquamated epithelial cells which forms inorg. phosphate from org. esters is the chief factor. The optimum p_H of the enzyme is 5.5. C. G. King

Rapid precipitation tests for syphilis and blood transfusion. B. S. Levine. *Am. J. Syphilis* **15**, 81–9(1931).—Antigen pptn. is merely the first step of the complement-fixation procedure made visible. The recent pptn. procedures used in the lab. diagnosis of syphilis are relatively not greater as improvements over the early pptn. procedures than the cold incubation complement-fixation procedures (Kolmer and similar tests) are over the early Wassermann tests. The improved pptn. procedures are not intrinsically specific for syphilis. They are empirical tests exactly as are the improved complement-fixation tests. None of the antigen pptn. procedures is any more sensitive in reaction at any stage of the syphilitic disease than are the properly standardized cold incubation complement-fixation procedures. Antigen pptn. procedures, similar to those of complement fixation, yield pos. reactions, mostly of the weaker intensity, with serum of individuals affected with certain chronic low-grade conditions other than syphilis. Antigen pptn. tests for syphilis have their zones of nonreactivity similar to the complement-fixation procedures. The colloidal conditions prevailing in some sera at times may favor complement fixation and not antigen pptn. and *vice versa*. The serum conditions which lead to nonreaction either with the pptn. or complement-fixation procedures or both are intermittent in the majority of instances. The proper precautions to be taken in testing blood sera before deciding upon their suitability for transfusion are given. B. S. Levine

Electrodialysis of antitoxin serums. Fernando Modern. *Rev. inst. bacteriol.* **5**, 695–702(1930).—An exptl. review and also original study in the electrodialysis of serum-antitoxin with a view to its possible application on a large scale to the concn. of immune serums. B. S. Levine

Purification of antidiphtheric serum by thermal coagulation in the presence of salts. Raúl Wernicke and Fernando Modern. *Rev. inst. bacteriol.* **5**, 713–7 (1930).—Heating antidiphtheric serum for 10 min. at 70° in the presence of salts destroys its antitoxic properties. Such destruction increases with the duration of the heating and with the salt concn. The liquid fraction of the serum thus obtained generally is poorer in total protein in comparison with the proteins carrying the antitoxin than is the original serum. Therefore the ratio antitoxin units:1 g. protein is between 2 and 3 times as great in this liquid fraction as in the original serum, but it never exceeds 3 times its value. The yield in the antitoxin varies and generally reaches

60%, though it may be as high as 92–95%. More of the antitoxin is recovered in the presence of $(NH_4)_2SO_4$ and Na_2SO_4 than in the presence of NaCl. B. S. LEVINE

A contribution to the study of the precipitation of diphtheria toxin-antitoxin. FERNANDO MODERN AND RAÚL WERNICKE. *Rev. inst. bacteriol.* 5, 705–12(T. A.) (1930).—Pptd. toxin-antitoxin requires a min. reaction of $p_H = 3.6$ to dissolve completely. In acid medium the pptd. T. A. liberates the antitoxin, the optimum reaction being $p_H = 3.2$ to 3.6. Temp. has an influence upon this reaction, the optimum being at 10–15°. The antitoxin unit content increases in the course of time from the instant the pptd. T. A. has gone into soln. The yield in the antitoxin units recovered from the T. A. in acid soln. increases with the diln. B. S. LEVINE

Plurality of the antigen contained in B. anthracis. A. SORDELLI AND V. DEULOFEU. *Rev. inst. bacteriol.* 5, 778–85(1930).—With the aid of water or physiol. salt soln., preferably warm, it is possible to ext. from *B. anthracis*, cultivated on serum agar, a complex possessing complement-fixing properties in the presence of that fraction of anticarbuncle serum which is sol. in H_2O and CO_2. In this ext. there is also a substance (hydrocarbon) which possesses the properties of a precipitinogenic antigen. Both substances are relatively thermostable in neutral and alk. reaction. The complement-fixing complex is destroyed by heat in acid medium. Both complexes are pptd. by alc. and acetone. The precipitinogenic substance is not thereby altered with regard to its antigenic properties, whereas the complement-fixing fraction completely loses its antigenic properties. B. S. LEVINE

Studies in allergy. I. The specific activity of pollen oil. EDGAR L. MILFORD. *J. Allergy* 1, 331–3(1930).—Oil extd. from dry ragweed pollen with the usual fat solvents produced skin reactions in only $^2/_3$ of the patients who reacted to aq. exts. of the pollen. Passively sensitized areas of the skin of normal people reacted to the aq. exts. when these sites had been exhausted by the oil ext. JULIAN H. LEWIS

Allergy considered as a special type of alkalosis. HARRY BECKMAN. *J. Allergy* 1, 496–500(1930).—Because clinical conditions assocd. with acidosis either relieve or prevent allergy B. believes that a "potential alkalosis" is an important causative factor in allergy. He emphasizes the use of nitrohydrochloric acid in the treatment of hay fever. JULIAN H. LEWIS

Studies on pollen and pollen extracts. IV. The allergically active constituent in pollen oil. MARJORIE B. MOORE, HOBART W. CROMWELL AND EDMOND E. MOORE. *J. Allergy* 2, 6–10(1931).—The non-dialyzable H_2O-free EtOH-sol. fractions of pollens have a skin-reacting activity. From the results of local passive sensitization and desensitization tests it is believed that the active constituent in pollen oil is identical with one or more of the antigens extd. by aq. solvents. Chem. tests of the active non-dialyzable constituent of pollen oil indicates that it may be glucosidic in nature. JULIAN H. LEWIS

Further studies on the precipitation test for syphilis. EMIL WEISS. *J. Infectious Diseases* 47, 355–8(1930).—The comparative study of Kahn's antigens with regard to the temp., time and ratio of tissue to solvent employed in their prepn. led to the prepn. of an improved antigen. Dry beef heart is extd. with EtOH in the ratio of 1:13 for 40 min. in the icebox. The ext. is discarded and the tissue dried. To the dried tissue 95% alc. is added in the ratio of 1:5. The alc. extn. is carried out at 37° for 3 days. This ext. is then filtered and left overnight at room temp. The ext. is refiltered and 0.6% cholesterol is added. This antigen is simpler to prep., has a wider sp. zone and does not require addnl. sensitizing or correcting. JULIAN H. LEWIS

Serologic studies on the proteins found in casein. D. C. CARPENTER AND G. J. HUCKER. *J. Infectious Diseases* 47, 435–42(1930).—By extn. with acid 70% alc. and by fractionation with K oxalate 3 proteins having mol. wts., resp., of 98,000, 188,000 and 375,000 were sepd. from crude casein. These proteins were clearly distinguishable from one another by serologic reactions. It was also found that the alc.-sol. protein of Osborne and Wakeman is not the same as the acid-alc.-sol. protein having a mol. wt. of 375,000. JULIAN H. LEWIS

Precipitation with cerebrospinal fluids. A. M. MALLOY, R. L. KAHN AND LUCY WESTALL. *J. Infectious Diseases* 48, 203–11(1931).—As is true with the Kahn reaction, the colloidal Au and mastic reactions depend on the globulin fraction of the spinal fluid, the albumin fraction giving neg. results. The globulin fraction gives results somewhat more sensitive than the unfractionated fluid, undoubtedly because of the removal of the protective action of the albumin. After a Kahn test has been performed with a soln. of globulin obtained from the spinal fluid and after removal of the ppt. by centrifugation, the supernatant soln. continues to give colloidal Au and mastic reactions, indicating that the pptn. substances in the globulin soln. (or the

conditions of this soln.) responsible for the Kahn reaction are not the same as those responsible for the colloidal Au and mastic reactions. Heating the globulin fraction at 56° up to 2 hrs. exerts little effect on the 3 reactions. When heating is prolonged to 24 hrs., there is a tendency toward reduction in sensitivity, especially in that of the Kahn reaction. Heating the globulin exerts comparatively little reduction in the sensitiveness of the colloidal Au and mastic reactions and considerable reduction in that of the Kahn reaction. After heating at 70° for 30 min., there is reduction in the sensitiveness of the 1st 2 reactions and marked reduction in that of the Kahn reaction. These heating expts. also indicate that the conditions governing the Kahn reaction are not identical with those governing the colloidal Au and mastic reactions. J. H. L.

Detoxifying and disinfecting properties of sodium salicylate. Its action on diphtheria and tetanus toxins and on streptococcal "toxic" filtrates. KONRAD BIRKHAUG. *J. Infectious Diseases* **48**, 212-25(1931).—A satd. soln. of Na salicylate has the power of neutralizing diphtheria and tetanus toxins *in vitro* without destroying their antitoxinogenic capacity. Neutralization proceeds in direct proportion to the concn. of Na salicylate, the duration of contact and the degree of temp. Simultaneous injection of pure toxin and the required amt. of Na salicylate that produces a neutral mixt. *in vitro* fails to avert death from diphtherial toxemia, although the period of survival is slightly prolonged. No neutralizing effect is exercised by the satd. soln. of Na salicylate on the toxic filtrates of hemolytic or nonhemolytic streptococci, a feature that seps. these "toxins" from the true bacterial exotoxins of *C. diphtheriae* and *Cl. tetani*. The bactericidal action of Na salicylate on commonly encountered pathogenic microorganisms is about $^1/_{10}$ that of phenol. The precise mode of action of Na salicylate *in vivo* remains obscure. Its dual capacity to exercise antitoxic and antiseptic action *in vitro* suggests the hypothetic possibility that its therapeutic success in certain infectious diseases is effected by weakening the pathogenic microörganisms and their capacity to secrete the deleterious exotoxins. JULIAN H. LEWIS

Titration of the antigenic properties of diphtheria toxin in vitro. E. HOEN AND L. TSCHERTKOW. *Z. Immunitäts.* **66**, 389–93(1930).—Flocculation tests are not adapted to the titration of antitoxin-binding values of diphtheria toxin and its derivs. but the ring pptn. test gives const. and accurate results. JULIAN H. LEWIS

The action of phenol-alcohol on serological reactions. G. SOLLAZZO. *Z. Immunitäts.* **66**, 424-42(1930).—Phenol and alc. added to lipoid antigens (sp. lipoids, Wassermann and Forssman antigens) make them more reactive in immune reactions. Phenol alone is more active than alc., but a mixt. of the 2 is most active. J. H. L.

The identity of heterogenetic antigens. K. A. FRIDEDE AND L. A. SCHWARZMANN. *Z. Immunitäts.* **66**, 454–64(1930).—Although 9 different heterogenetic antigens have been described the authors believe they are all the same antigen. Proof of this opinion is given in adsorption expts. JULIAN H. LEWIS

The presence of Forssman heterogenetic antigen in the blood corpuscles of the guinea pig. G. SOLLAZZO. *Z. Immunitäts.* **66**, 465–84(1930).- Heterogenetic antiserum and antiserum obtained by immunizing with sheep blood react specifically with alc. exts. of guinea pig red blood cells. The hemolytic amboceptor for guinea pig red cells in these sera is difficult to activate with guinea pig serum but can be activated readily with rabbit serum. Guinea pig red cells adsorb antibodies from heterogenetic antisera slowly. Repeated exposures of red cells to the antiserum must be used. These expts. prove that guinea red cells contain Forssman antigen. JULIAN H. LEWIS

The antagonistic influence of glucose in anaphylactic shock. K. M. DVOLAITZSKA-BARISHEVA AND M. S. GOLDBERG. *Z. Immunitäts.* **66**, 485–90(1930).—By perfusion expts. it is found that glucose in 5% concn. has the property of inhibiting the sp. action of antigen on the vessels of a sensitized guinea pig. This action of glucose is ascribed to the fact that glucose has the ability to prevent the change in the grade of dispersity of the colloids in muscle cells that result from the combination of antigen with antibody within the territory of the cell. JULIAN H. LEWIS

The occurrence of the Thomsen antigen in human organs. M. N. SINYUSHINA *Z. Immunitäts.* **66**, 491–5(1930).—The receptor which is developed by human erythrocytes exposed to the growth product of certain bacteria and which makes them agglutinable by all sp. agglutinating sera is not developed under the same conditions by cells of human organs. JULIAN H. LEWIS

The appearance of organ specific brain substances in ontogenesis. E. WITEBSKY AND G. SOLLAZO. *Z. Immunitäts.* **67**, 1–8(1930).—The brains of guinea pig embryos 4–6 cm. in length and of human fetuses of the 3rd to 4th months react with sp. antibrain sera. In earlier stages the brains do not react. The sp. antigen of embryonal brains is heat stable and alc. sol. which indicates it is lipoidal in nature. J. H. L.

med. scand. 71, 558–97(1929); cf. *C. A.* 24, 651.—For normal men and women the total cholesterol and total fatty acids were 0.1444 and 0.1524%, and 0.2466 and 0.3050%, resp. Both in the manic and melancholic phases of the manic-depressive psychosis there are notable changes in total cholesterol and total fatty acid of the blood, the values falling back to normal after recovery. S. MORGULIS

The brown pigment of hemochromatosis. MARTIN JACOBY. *Biochem. Z.* 230, 225–7(1931).—The liver obtained at autopsy of a case of hemochromatosis was finely cut to ext. the pigment. This was insol. in alc., ether, $(C_2H_3)_2CO$ or $CHCl_3$. Glacial acetic acid became strongly colored and the soln. was difficult to filter, but if the mixt. was boiled a colorless filtrate was obtained. Neither did the pigment pass into benzene, phenol, toluene or CCl_4. The pigment is very sol. in 0.85% NaCl. If the liver pulp previously treated with NaCl soln. is extd. with H_2O, it is possible to ppt. a brown substance by complete satn. with $(NH_4)_2SO_4$. This was washed with satd. $(NH_4)_2SO_4$, suspended in H_2O and dialyzed until the Nessler reaction became neg. The substance is then dissolved by the addn. of NaCl and on filtration a clear brown soln. is obtained. Of the 691 mg. dry residue in 100 cc. soln. 154 mg. was ash; 94 mg. N and 66 mg Fe. The relation between N and Fe is thus 4:1. S. MORGULIS

Urinary creatinine as a test of renal efficiency. A. MUIR CRAWFORD. *Lancet* 1930, II, 1177–79.—In a great variety of cases of nephritis, which are tested and described, the creatinine excretion for a 24-hr. period was detd. and would seem to be a reliable prognostic guide. F. B. SEIBERT

Nature of the chill-producing principle in antipneumococcus serum. ALBERT B. SABIN AND G. B. WALLACE. *J. Exptl. Med.* 53, 339–62(1931).—The chill principle appears to be formed only in blood which has been allowed to stand. The expts. reported do not show that the reaction is dependent on formed elements, fibrinogen or lipoids. Anticoagulants, filtration, dialysis and moderate heating are without effect in removing the principle from the soln. contg. it. By changes in the NaCl and H-ion concn. in antibody solns. an acid globulin and an alk. globulin fraction may be obtained The acid globulin fraction, whether or not phospholipin is present, contains the greater part of the chill principle and a small part of the antibody substance; the alk. globulin fraction contains the greater part of the antibody substance and a smaller part of the chill principle. The acid globulin fraction is not itself the chill principle but serves as a carrier of this, probably through an adsorptive process. C. J. WEST

Immunization with mixtures of poliomyelitis virus and aluminum hydroxide. C. P. RHOADS. *J. Exptl. Med.* 53, 399–404(1931).—See *C. A.* 25, 738. C. J. W.

Iron and copper in various tissues in acute myeloid leucemia. KENZUI KOJIMA AND SHINZO KOSAKA. *Nagoya J. Med. Sci.* 5, 71–4(1930).—K. and K. tabulate results obtained in analyzing liver, spleen, heart muscle, kidney, cerebrum and blood in myeloid leucemia. The spleen was richest in Fe and the cortex of the kidney and brain contained more Fe than the marrow. However, the liver was richest in Cu and the cerebrum cortex contained nearly 3 times as much Cu as the marrow. A. W.

Normal urine sugar in cystoscopic examinations. RUSSELL RICHARDSON. *Am. J. Med. Sci.* 180, 171–7(1930).—Normal urine sugars in specimens obtained by ureteral catheterization usually show approx. equal amts. of sugar from the 2 kidneys in the absence of any disease which damages kidney efficiency. The sugar from a badly damaged kidney is very much decreased as compared with that from a normal kidney. R. C. WILLSON

The hydrogen-ion concentration of the blood in eclampsia. H. J. STANDER AND N. J. EASTMAN. *Am. J. Obstet. & Gynec.* 20, 822–5(1930); cf. *C. A.* 24, 884.—Immediately following an eclamptic convulsion the blood p_H usually increases, often to a true acidosis. R. C. WILLSON

Studies in epilepsy. XI. The calcium content of the blood and of the spinal fluid. WM. G. LENNOX AND MARGARET B. ALLEN. *Arch. Neurol. Psychiatry* 24, 1199–1205 (1930); cf. *C. A.* 24, 5372.—Detns. were made in 77 epileptics. Av. concns. and av. spinal fluid-serum ratios were within normal limits, although there was an abnormally wide distribution of values, with a tendency toward low spinal fluid measurements In $^1/_8$ of the patients the ratio of spinal fluid to serum Ca was less than 45%. R. C. WILLSON

Acetone bodies in normal pregnancy and in the toxemias of pregnancy. H. J. STANDER AND J. F. CADDEN. *Bull. Johns Hopkins Hosp.* 47, 382–90(1930).—The total acetone bodies (free acetone, acetoacetic acid and β-hydroxybutyric acid) in the blood of normal nonpregnant women varied between 11 and 18 mg. acetone per l. blood, after correction for lactic acid, the av. being 15.8 mg. In normal pregnant women

corrected acetone bodies varied between 11 and 24 mg., with an av. of 16.6 mg. Corrected values in pregnancy with nephritis were 8.6 to 48.8 mg., and in eclampsia they averaged 50.2 mg. R. C. WILLSON

Alkalinity of the blood in eczema. B. S. BIKKENIN AND N. N. YASNITSKY. *Kazansky Meditsinsky Jurnal* 26, 703–8(1930); *J. Am. Med. Assoc.* 95, 1546.—Urine p_H was normal but that of the blood was found to be from 0.1 to 0.5 above the av. R. C. WILLSON

Acid-base equilibrium in diseases of the heart and kidneys. I. M. LIPETS AND M. M. PISMAREV. *Kazansky Meditsinsky Jurnal* 26, 778–86(1930); *J. Am. Med. Assoc.* 95, 1629.—A decrease in the alkali reserve and a parallel decrease in the alveolar CO_2 were observed during the decompensation period in both heart and kidney diseases, usually more pronounced in the latter and in proportion to the severity of the condition. The Cl content of the urine remained unchanged. The blood urea was increased in almost all patients with kidney diseases, but in only a few patients with cardiac complaints. R. C. WILLSON

Peculiarities of glucemic reaction in early infancy. V. L. STYRIKOVICH. *Okhrany Materinstva i Detstva* 1, 28–42(1929); *J. Am. Med. Assoc.* 95, 1789(1930).—S. studied the various phases of the glucemic reaction and recognized the following main types and subtypes, according to the curves they give: (1) with a single rise, encountered in only 37% of cases; (*a*) to a considerable height with a more or less rapid descent to normal; (*b*) to a moderate height, remaining there for a time (1 hr. or longer), with sometimes a wave-like fluctuation, and thereupon dropping—in some cases with a tardy hypoglucemia; (*c*) to a modest height with subsequent drop to a lower level on an empty stomach; (2) with 2 rises: (*a*) with the second rise lower than the first; and the second wave of smaller vol. than the first; (*b*) with the second rise attaining or surpassing the level of the first, and the second wave equal to or exceeding the first; (*c*) with the second rise rapid, returning to normal after a short time; (3) with 3 rises—a rare form. R. C. WILLSON

Absorption of calcium and phosphorus in experimental rickets. F. PEOLA AND G. GUASSARDO. *Riv. clin. pediatrica* 28, 583(1930); *J. Am. Med. Assoc.* 95, 1541.—Normally the absorption of Ca is from 50 to 60% of the amt. taken in and that of P from 70 to 80%. In exptl. rickets that of Ca remains normal while that of P falls to 60%. This decrease appears later in the disease, however. R. C. WILLSON

Benzene derivatives of intestinal purtefaction in the etiology of cancer. E. GRANDJEAN. *Schweiz. med. Wochschr.* 60, 823–8(1930); *J. Am. Med. Assoc.* 95, 1540.—Benzene derivs. of intestinal putrefaction resulting from diets rich in animal proteins exert a continuous growth stimulation on the healthy cells, and gradually the constantly irritated tissues develop into malignant tumors. Benzene derivs. are also formed wherever in suppurative processes disintegration of protein by anaerobic bacteria takes place, as in the lungs, female genitalia, abscesses of the teeth and ulcers The theory that benzene derivs. are significant in the etiology of cancer is supported by the fact that occupational cancers are most frequent in workers who come into contact with benzene and coal-tar products. R. C. WILLSON

Cardiac insufficiency; chemical changes in the blood. E. BECHER. *Z. Kreislaufforsch.* 22, 638–40(1930); *J. Am. Med. Assoc.* 96, 80.—The amino-N content of the blood in cardiac insufficiency is almost constant and varies only slightly from the normal. Occasionally the creatinine content is increased. The blood serum does not contain an increased amt. of urochrome or urochromogen. The uric acid, urea and residual N are frequently increased but not so much as in renal insufficiency. There is no increase in the aromatic substances. Phenol, cresol and its derivs. and indican are not increased. R. C. WILLSON

H—PHARMACOLOGY

A. N. RICHARDS

Effect of some imidazoles on gastric secretion. J. P. BURGERS AND A. C. IVY. *Proc. Soc. Exptl. Biol. Med.* 28, 115–6(1930).—Imidazole, imidazolepropionic acid, imidazolealdehyde, 1-imidazolelactic acid and imidazoleacrylic acid in doses of 1 mg. to 5 mg. have no effect on gastric secretion or on blood pressure in the dog. C. V. BAILEY

Effect of calcium chloride injections on blood sugar of normal and jaundiced dogs. ALLAN G. REWBRIDGE AND EDMUND ANDREWS. *Proc. Soc. Exptl. Biol. Med.* 28, 126–7(1930).—The intravenous injection of a 10% soln. of $CaCl_2$ caused a rise in blood sugar nearly as marked as that following the injection of sugar itself and tended to last

longer. Sugar and Ca seem to have a reciprocal influence on each other and one cannot say which is of greater importance in the control of blood coagulability. C. V. B.

Rate of urinary arsenic excretion after giving acetarsone ("stovarsol") and "carbarsone" by mouth. MEI-YU CHEN, H. H. ANDERSON AND C. D. LEAKE. *Proc. Soc. Exptl. Biol. Med.* **28**, 145–8(1930).—Acetarsone (3-acetylamino-4-hydroxyphenylarsonic acid) and carbarsone (4-carbaminophenylarsonic acid) are slowly excreted in the urine after oral administration. A normal man give 0.5 g. of acetarsone excreted 20% of the ingested As in 72 hrs.; given a similar dose of carbarsone he excreted 8% in 52 hrs. Another subject excreted 7% of the As in 24 hrs. following 0.5 g. of acetarsone and 13% in 42 hrs. following the ingestion of 0.5 g. of carbarsone. C. V. B.

The pharmacology of inflammation. I. Technic. LOUIS HIRSCHHORN AND M. G. MULINOS. *Proc. Soc. Exptl. Biol. Med.* **28**, 168–70(1930).—One drop of a 15% soln. of essential oil of mustard in mineral oil, instilled into the conjunctival sac of the rabbit, induces blepharospasm for 1 hr., lacrimation for 0.25 hr., immediate injection of the conjunctival blood vessels lasting for 48 hrs., pin point miosis which passes off in 1 hr. and edema which is max. in 0.5 hr. Complete recovery usually occurs in 7–14 days. The method lends itself to studies of the inhibitory and curative effects of drugs on inflammatory processes. C. V. BAILEY

Further investigations concerning the stimulating effect of anterior pituitary gland preparations on the thyroid gland. LEO LOEB, R. B. BASSETT AND HILDA FRIEDMAN. *Proc. Soc. Exptl. Biol. Med.* **28**, 209–13(1930).—Guinea pigs were injected daily with 1 cc. of an acid ext. of anterior pituitary gland for 5 consecutive days. On the 6th day the thyroid gland was markedly hypertrophied, the cells were mitotic and the colloid had largely disappeared Retrogression progressed regularly and the gland had a normal appearance at the end of 31 days. The administration of thyroid substance diminished but did not prevent this hypertrophy. The injection of anterior pituitary ext. is more potent in producing hypertrophy of the thyroid gland than is the removal of a great part of the gland or the administration of stimulating doses of KI. C. V BAILEY

Comparison of physiological action of aspidospermine and quebrachine. RAYMOND-HAMET. *Compt. rend.* **191**, 157–9(1930).—The hydrochlorides of these alkaloids isolated from the bark of *Aspidosperma quebracho blanco*, contrary to reported expts., act differently on the sympathetic or vagus nervous systems. B. C. A.

Secretion of dextrose under the influence of phosphates and sulfates. J. VAN DE VELDE. *Compt. rend. soc. biol.* **102**, 596–9(1929).—Injection of a soln. of NaH_2PO_4 into a dog after injection of dextrose accelerates the secretion of sugar in the urine, the blood corpuscles giving up more sugar than the plasma. Na_2HPO_4 has practically no effect on the p_H of the blood, but, as in the former case, the sugar is quickly secreted Na_3PO_4 produces such rapid secretion that the sugar content of the corpuscles falls temporarily below the normal. Na_2SO_4 causes marked alky. but leaves the secretion of sugar practically unchanged. B. C. A.

Sugar metabolism and water regulation. II. Treatment of cardiac diabetes with insulin and dextrose. H. TATERKA. *Klin Wochschr.* **8**, 1763–4(1929); cf. *C. A.* **24**, 4808. The action of injected insulin is retarded but more marked; dextrose causes a less rapid and less marked rise in blood sugar. Non-cardiac diabetics with insulin edema behave similarly. B. C. A.

Action of substances of the pilocarpine group (pilocarpine, arecoline, physostigmine) on the gas content of the blood. A. M. PREOBRAZHENSKII. *Russian J. Physiol.* **13**, 19–32(1930).—Expts. on dogs show that all substances of the pilocarpine group diminish greatly the O content of venous blood and leave unchanged or increase slightly that of arterial blood; decrease of the latter is, however, caused by large doses of physostigmine. If the decrease of the amt. of O in venous, with normal content in arterial, blood is the result of increased O absorption by the tissues, and diminution of the O content of arterial blood the result of insufficient arterialization of the blood in the lungs, the increased consumption of O must be a characteristic common to all substances of the group. The arterialization of the blood in the lungs thus compensates for the O consumed, except that, in most of the cases in which physostigmine and all in which toxic doses of the other substances were administered, the O content of the arterial blood falls. B. C. A.

The comparative changes in gastric acidity and urinary reaction after the injection of histamine. MILTON J. MATZNER AND IRVING GRAY. *Arch. Internal Med.* **47**, 202–5(1931).—In tests combining gastric analysis with histamine as a stimulant and estn. of urinary acidity, not over 50% of the cases showing gastric-free HCl gave a definite alk. tide. The use of histamine is discouraged. J. B. BROWN

Liver extract, liver ash and iron in the treatment of anemia. CHESTER S. KEEFER, K. K. HUANG AND C. S. YANG. *J. Clin. Investigation* 9, 533–54(1930); cf. *C. A.* **24**, 3038.—With liver ext. increased hemoglobin regeneration was shown in the nutritional anemia of childhood and in the anemias of dysentery, hookworm and pregnancy. In some cases the effect of the ext. was increased by Fe. Liver ash, equiv. to 300 g. of liver per day, was of little effect. Fe in the form of $FeCO_3$ was quite effective, usually in proportion to the size of the dose. Often the effect of Fe was greater than that of liver ext. or ash. J. B. BROWN

Cardiac antagonism of pilocarpine and tropine. RAYMOND-HAMET. *Compt. rend.* **192**, 111–3(1931).—Ordinarily the injection of tropine in a dog subjected to the action of a large dose of pilocarpine suppresses the cardiac inhibition. Since the same phenomenon is observed if sparteine replaces the tropine, it is not due to the atropine action of tropine. RACHEL BROWN

Influence of hydrogen-ion concentration on the fixation, by adsorption, of cocaine hydrochloride on the nerve fibers. JEAN RÉGNIER AND GUILLAUME VALETTE. *Compt. rend.* **192**, 114–6(1931); cf. *C. A.* **25**, 143.—The adsorption of cocaine-HCl on animal charcoal increases from p_H 3 to p_H 7.5 by 1.5 times, the increase being very marked above p_H 6. With nerve fibers the increase from p_H 3 to p_H 7.6 is 5 times. Therefore an alk. medium favors the fixation of the anesthetic on the nerve itself. R. B.

Regulation of respiration. NATHAN B. EDDY. *Quart. J. Exptl. Physiol.* **20**, 313–31(1930); cf. *C. A.* **23**, 4251.—The *effect upon salivary secretion of the intravenous administration of $NaHCO_3$, NaOH, NaCl and Na_2SO_4.* In the dog, salivary secretion elicited by continuous administration of pilocarpine is decreased by intravenous injection of $NaHCO_3$, Na_2CO_3 or NaOH. The effect produced by $NaHCO_3$ is proportional to the size of the dose, whether in isotonic or hypertonic soln. NaOH has a greater action than Na_2CO_3. $NaHCO_3$ prevents almost completely the augmenting effect upon salivary secretion of a 10-min. period of rebreathing. These alk. agents also increase submaxillary blood-vol. flow. Their effect may be due to changes in acid-base equil. in which the H-ion concn. of the interior of the cell may be a major factor. In isotonic soln. NaCl or Na_2SO_4 increases submaxillary secretion and blood-vol. flow. In hypertonic soln. they decrease the former but increase more markedly the latter. The effect of these salts seems to be due to the increase in blood-vol. flow and to the withdrawal of water from the tissues. *The effect upon salivary secretion of the intravenous administration of lactic acid, sodium lactate and HCl.* The secretion of the submaxillary gland is increased by the intravenous administration of lactic acid and HCl. The increase due to HCl is frequently followed by a decrease below normal. The effect of HCl is the same whether the sympathetic supply to the gland is intact or not. Lactic acid and HCl increase the submaxillary blood-vol. flow. The increase in secretion produced by lactic acid is greater if the vago-sympathetic has been cut. Na lactate decreases salivary secretion if the vago-sympathetic is intact, but increases it if the nerve is cut. It increases submaxillary blood-vol. flow. The lactate ion appears to be inhibitory to the central and augmentory to the peripheral mechanism of secretion. Changes in the acid-base equil. of the tissues and blood are an important factor in the effect of lactic acid, HCl and Na lactate upon secretion. Coincident changes in blood-vol. flow probably affect the results, and some additional effect of the lactate ions, such as their use as food material supplying energy for secretion, may be involved. *Effect upon salivary secretion of the intravenous administration of NH_4Cl and $(NH_4)_2CO_3$.* The administration of NH_4Cl and $(NH_4)_2CO_3$ produces an initial increase and subsequent decrease in the rate of salivary secretion and in the submaxillary blood-vol. flow. One cc. per kg. of *M*/6 NH_4Cl or $(NH_4)_2CO_3$ produces transient fall in blood pressure and brief increase in pulmonary ventilation. Five cc. per kg. of $(NH_4)_2CO_3$ lowers the blood pressure and depresses pulmonary ventilation. The effects of NH_4Cl and $(NH_4)_2CO_3$ on the salivary secretion are probably due to changes in the acid-base equil. and to changes in blood-vol. flow. RACHEL BROWN

The therapy and the prevention of carbon disulfide poisoning. G. B. AUDO-GIANOTTI. *Industria chimica* **5**, 1375–80(1930).—A summary of the symptoms, therapy and prevention of industrial poisoning by CS_2. A. W. CONTIERI

Experimental studies in the neutralizing action of sodium thiosulfate in atoxyl intoxication. N. KURODA. *Acta dermat.* **13**, 289–99. See *C. A.* **24**, 1431. E. J. C.

Sensitization of the skin of guinea pigs to phenylhydrazine. W. JADASSOHN. *Klin. Wochschr.* **9**, 551(1930). E. J. C.

The effect of insulin upon the rate of dialysis of diabetic blood sugar. ISREAL S. KLEINER, HAROLD BIRNKRANT AND THEODORE ROTHMAN. *Endocrinology* **14**, 226–8 (1930).—The addn. of dry potent insulin to hirudinized blood of a diabetic dog did not

alter the rate of dialysis of sugar from it. This indicates that the pancreatic hormone does not exert its effect by producing a more readily diffusible form of glucose.
H. J. Deuel, Jr.

Antagonism between sulfur and adrenaline. Dòmenico Campanacci. *Wiener klin. Wochschr.* 44, 79–81(1931).—The antagonistic effect on blood pressure is produced when 30 mg. of colloidal S and 1 mg. of adrenaline are injected. D. B. Dill

Assimilation of intravenously injected hexoses; phosphorus and water metabolism. E. Owsiany and M. Wierzuchowski. *Compt. rend. sac. biol.* 103, 416–8(1930); *Physiol. Abstracts* 15, 240–1.—The sugar assimilated is estd. as the difference between the amt. injected and the amt. eliminated by the kidney. Of 4 dogs, 2 assimilated glucose best and 2 fructose, 90% of the total in each case. Insulin causes an insignificant increase in glucose assimilation and has no effect on that of fructose. The amt. of inorg. P in blood and urine is lowered during the active assimilation period. The curve of P reduction is not affected by the rate of assimilation. The P curve is raised again after cessation of injection, and the rise is not prevented by insulin. G. G.

Liver and muscle glycogen and blood sugar in starved and phlorhizinized dogs. F. Rathery, R. Kourilsky and Mlle. Y. Laurent. *Compt. rend. soc. biol.* 103, 472–4(1930); *Physiol. Abstracts* 15, 240.—Starvation alone, even when prolonged, causes only a slight diminution of hepatic and muscular glycogen. Injection of phlorhizin after a period of starvation causes a diminution of hepatic and muscular glycogen. In spite of the almost complete absence of hepatic and muscular glycogen, the glucemic level may remain normal, although accompanied by a marked glucosuria. The glycogen of the liver or muscles does not seem to be essential for the maintenance of this normal level. G. G.

Influence of insulin on early variations of hepatic and muscular glycogen in the normal and phlorhizinized dog. F. Rathery, R. Kourilsky and Mlle. S. Gibert. *Compt. rend. soc. biol.* 103, 474–5(1930); *Physiol. Abstracts* 15, 240.—Phlorhizin in the fasting dog causes marked diminution of hepatic and muscular glycogen. Injection of insulin now causes rapid restoration of the glycogen of the liver, while that of muscle is still further diminished. The loss of hepatic glycogen is great, and not proportional to the muscular loss. G. G.

Chemical modifications of blood after injection of ionium nitrate. Y. Pourbaix. *Compt. rend. soc. biol.* 103, 536–8(1930); *Physiol. Abstracts* 15, 257.—Ionium injected in small doses, which are well tolerated over long periods, causes a disturbance of glucose and cholesterol metabolism manifested by instability of these substances in the blood. Later anemia sets in and is accompanied by a considerable diminution of plasma globulin and an increase of the albumin/globulin quotient. G. G.

Action of choline and its derivatives on respiration. M. Villaret. *Compt. rend. soc. biol.* 103, 675–7(1930); *Physiol. Abstracts* 15, 226.—Choline, acetylcholine and formylcholine, which have similar cardiovascular actions, also produce the same effect on the respiratory rhythm. Bromocholine causes more sustained apnea than the others, because it persists longer in the circulation. The effect is due to the choline group. G. G.

Choline apnea and artificial respiration. M. Villaret. *Compt. rend. soc. biol.* 103, 677–9(1930); *Physiol. Abstracts* 15, 226.—Choline and its derivs. cause apnea in large doses, polypnea in small doses. The effect is independent of vagus influence. The duration of the apnea is proportional to the dose. Artificial respiration saves the lives of animals treated by otherwise fatal doses. It must be continued much longer with bromocholine than with other derivs. The fatal action of the poisons is effected, not directly on the heart, but on the respiratory center. G. G.

Adrenaline, atropine and lobeline in choline apnea. M. Villaret. *Compt. rend. soc. biol.* 103, 771–2(1930); *Physiol. Abstracts* 15, 226–7.—When apnea is set up by the action of choline, it is not modified by doses of adrenaline, atropine or lobeline, which are capable of counteracting the cardiac influence of choline and its derivs. G. G.

Derivatives of choline mechanism of polypnea caused by intravenous injection of choline and its derivatives. M. Villaret. *Compt. rend. soc. biol.* 103, 772–3 (1930); *Physiol. Abstracts* 15, 227.—The polypnea elicited by the injection of choline and its derivs. into the circulation is enhanced by a discharge of adrenaline. The results correspond with the observation that in reflux or central polypnea injection of adrenaline causes, not apnea, but hyperpolypnea. G. G.

Fatty bodies in cells of the liver, lung, kidney, suprarenal and testicle in the normal dog and in the dog poisoned by tolylenediamine. J. Slotwinski. *Compt. rend soc. biol.* 103, 811–5(1930); *Physiol. Abstracts* 15, 244.—In the normal dog there is a

subpleural chain of cellular elements contg. large amts. of cholesterol esters. This reserve seems to be of great importance in defence against intoxication. Intoxication with tolylenediamine leads to infiltration of the liver cells with fat. After poisoning, the disappearance of the subpleural cells and the diminution of fatty bodies in the suprarenal cortex and in the interstitial cells of the testis indicate a defensive process and a neutralization of the toxic substances. G. G.

Histochemical and biological studies of electric ionotherapy. F. RASZEJA. *Compt. rend. soc. biol.* **103**, 799–803(1930); *Physiol. Abstracts* **15**, 213–4.—Normally in the skin of the rabbit Ca is distributed in the subcutaneous tissue and K in the epidermis. When $CaCl_2$ is ionized on a pad with the passage of an elec. current through it to the skin, the K is pushed into the deeper regions and the Ca ions occupy the surface. Rabbits treated in this way are much less susceptible than controls to the decalcifying effects of Ca-free diet. The cond. of the serum is markedly increased after introduction of Li in the above manner, and this when the urine becomes free from Li. The elimination of this element lasts longer than is revealed by the urine. G. G.

The role of the reticulo-endothelial system in the metabolism of fat in the normal dog and in the dog poisoned by tolylenediamine. J. SLOTWINSKI. *Compt. rend. soc. biol.* **103**, 816–8(1930); *Physiol. Abstracts* **15**, 244.—The reticulo-endothelial system in the tonsils, liver and bone marrow plays a most important part in the metabolism of fat. It is still more important in pathol. conditions like tolylenediamine intoxication. The fatty inclusions in the cells of the system are formed of lipoids and cholesterol esters. The elements contg. these particles in the tonsil are situated deeply in the lymphatic nodules. They are rare under the epithelium. G. G.

Pathology of aniline poisoning. G. AIELLO. *Med. Travail* **1**, 294–6(1930).—*Bull. Hyg.* **5**, 929.—A. describes the symptoms of acute and chronic poisoning by aniline dyes. Venesection and inhalation of ammonia relieved these symptoms. In most cases of dye poisoning the dye can be detected in the urine, particularly if aniline blue or black is the cause. GEORGE R. GREENBANK

Injury to the digestive tract by copying pencils. I. ILKOFF. *Deut. med. Wochschr.* **56**, 1132–3(1930); *Bull. Hyg.* **5**, 929.—The injury is due to tissue necrosis by gradual soln of the aniline violet. In a test case a man ate meat contg. a 3-cm. piece of the pencil; ulcers formed in the pylorus. Food contg. crushed pieces of the pencil was given to dogs. All the dogs showed gastric or duodenal inflammation and ulcers formed in a few days. This is due to the fact that the aniline deriv. has an alk. reaction which dissolves the albumin and thus causes destructive penetration whereas acid dyes cause coagulation and hinder penetration. GEORGE R. GREENBANK

Insulin and glycogen. I. Study in the normal dog. F. RATHERY AND R. KOURILSKY. *Ann. physiol. physiochim. biol.* **6**, 32–72(1930).—In the dog the hepatic vein contains the most glucose, the portal vein least and peripheral vessels have intermediate quantities. Following the administration of insulin, the relative order does not change, but the difference between the hepatic and peripheral veins increases. The liver therefore continues to discharge glucose into the circulation; nor can one postulate an increased avidity of the tissues for glucose, as the difference between the arterial and venous blood sugar does not increase. Immediately following the injection of insulin, the blood sugar shows a transitory increase, particularly in the hepatic vein; the liver glycogen decreases, while the muscle glycogen is not appreciably changed. Conclusions are given in the following paper. **II. Study in the dog following pancreatectomy, starvation or phlorhizin. General conclusions concerning the role of glycogen.** *Ibid* 73–128.—Following pancreatectomy, all the sugar values rise, but their order changes. The sugar of the hepatic vein falls below that of the peripheral veins; however, it remains higher than the portal blood sugar. Liver glycogen falls precipitously, while the muscle glycogen is only slightly affected. Qualitatively, the effects of insulin are exactly the same as in the normal animal, except for the fact that it induces an increase in liver glycogen. Moreover, insulin has the same effect upon starved dogs as upon normal dogs. Phlorhizin administered to fasting dogs causes an almost complete disappearance of liver glycogen, but the blood sugar remains normal. Conclusion: Liver glycogen plays no role in the maintenance of blood sugar; there is some intermediate product of metabolism in the liver. Insulin does not mobilize glycogen or activate the muscle metabolism of sugar. The effect of insulin upon glycogen, whether hepatic or muscular, is of only secondary importance in insulin hypoglucemia. Glycogen is not indispensable either for the proper functioning of the liver and muscles or for sugar metabolism. H. EAGLE

Behavior of soaps in the animal organism. IRVINE H. PAGE AND E. V. ALLEN. *Arch. Exptl. Path. Pharmakol.* **152**, 1–27(1930).—Most soaps, particularly those of

hydroxy and unsatd. acids, are highly toxic. Injected intraperitoneally into rats and mice, they cause marked histological changes, chiefly perivascular infiltration and focal degeneration in the liver and proliferative changes and adhesions in the peritoneal cavity. The total fat content of the liver decreases, but the I no. increases. On intravenous injection of soap, the blood pressure falls and respiration increases. Diethanolamine ricinoleate increases the permeability of the blood-spinal fluid barrier for circulating dyes. H. EAGLE

The action of a sympathomimetic alkaloid in Sida cordifolia (Brela). R. N. CHOPRA AND PREMANKUR DE. *Indian J. Med. Research* **18**, 467–75(1930).—The active principle of *Sida cordifolia* (Brela) is a sympathomimetic alkaloid resembling ephedrine in its pharmacol. properties. H. EAGLE

The conditions of "basic narcosis" in combined narcosis experiments. L. LENDLE. *Klin. Wochschr.* **9**, 1609–15(1930). H. EAGLE

Secondary ultra-violet radiation and its biological effect. MONA SPIEGEL-ADOLF. *Klin. Wochschr.* **9**, 1615–8(1930).—Only a small portion of the radiation-energy emmitted by Ra or x-rays is absorbed by proteins in soln., while ultra-violet light is comparatively much better utilized. The fluorescent light emitted by salt crystals following exposure to radium or x-rays is much more effective in causing the coagulation of protein, the hemolysis of red cells and the death of paramecia than the original radiation energy used to induce this fluorescence. H. EAGLE

The effect of thyroxine. O. EICHLER AND R. SANDERS. *Klin. Wochschr.* **9**, 1618(1930).—The intravenous injection of thyroxine (1.8 mg. per kg.) into rabbits causes a significant increase of the blood lactic acid and O_2 consumption. H. E.

The antagonism between adrenaline and insulin. Experiments in adrenalectomized dogs. R. CARIO. *Klin. Wochschr.* **9**, 1623–4(1930).—The injection of concd. glucose solns. into the pancreatico-duodenal artery of dogs does not cause an elevation of blood sugar, even after the adrenals have been removed. Injected into any other artery, it causes a transient hyperglucemia. This is further evidence that the blood sugar as such is an adequate hormone for the regulation of insulin secretion. Adrenaline and insulin may be antagonists in the regulation of blood sugar. H. EAGLE

Animal and clinical studies on the question of synthalin-B. HERBERT HIRSCH-KAUFMANN. *Klin. Wochschr.* **9**, 1631–2(1930). H. EAGLE

Oral desensitization of dermatoses due to alimentary idiosyncrasies by the use of species-specific peptones. ERICH URBACH. *Klin. Wochschr.* **9**, 2046–9(1930). H. EAGLE

The opposing effects of liver and spleen. A contribution to the spleen treatment of erythremia. F. HÖGLER. *Klin. Wochschr.* **9**, 2052–8(1930).—Ra irradiation of the long bones has a beneficial effect in erythremia, in which it is often followed by an excretion of aldehyde in the urine; but no beneficial effect could be discerned upon pernicious anemia. In 2 cases of erythremia a striking improvement in the blood picture was effected by the daily ingestion of large quantities of spleen over a period of months. In one case of pernicious anemia, splenectomy followed by liver therapy caused a typical erythremia, which was controlled by the subsequent administration of spleen. The liver and spleen therefore have antagonistic effects upon the erythrocytes. H. EAGLE

The separation of mixtures of dyes by normal and poisoned kidneys. RUDOLF HÖBER. *Klin. Wochschr.* **9**, 2065(1930); cf. *C. A.* **24**, 4543.—Most dyes are excreted slowly through the glomeruli (*e. g.*, cyanol) but some, like phenol red, are rapidly excreted by the tubules in a concd. form. If a mixt. is injected into frogs or rabbits, the tubular dye predominates at first; after it has been almost completely excreted, the urine contains only the glomerular dye. If the tubules are injured, as by uranium nitrate, the quick tubular excretion of a concd. dye is not observed, and one obtains only the glomerular excretion of the two in approx. the same concn. This fact suggests a method for testing tubular function in man. H. EAGLE

A highly active liver extract which can be injected. M. GÄNSSLEN. *Klin Wochschr.* 9 2099–103(1930).—Excellent results were obtained in the treatment of pernicious anemia by the intragluteal injection of protein-free liver ext. Improvement is usually obtained in 6–8 weeks. H. EAGLE

Clinical observations on the treatment of anemias with stomach preparations. FERDINAND BERTRAM. *Klin. Wochschr.* **9**, 2103–6(1930).—Using the proprietary prepn. Stomopson, B. found improvement in 10 of 11 cases of Biermer's (pernicious) anemia. In the unsuccessful case liver therapy was effective. H. EAGLE

Experimental studies on the effect of the inspiration of small quantities of benzine and benzene upon the respiratory organs and the entire body. M. SCHMIDTMANN.

Klin. Wochschr. 9, 2106–8(1930).—The inhalation by rabbits, guinea pigs, mice and rats, of small quantities of benzine or benzene-gasoline vapor over long periods of time eventually causes emphysema, chronic bronchitis, and atalectatic pneumonia. An initial leucocytosis is followed in the later stages by a marked leucopenia, and a fall in both the red cell count and hemoglobin. In the spleen, an initial myeloid infiltration of the pulp is followed by a gradual decrease in cells, pronounced phagocytosis of red cells, and, in some cases, hyalinization. These results are exactly the same as the acute changes induced by the subcutaneous injection of benzine, differing only in the long time required for their evolution (months). Heart and liver both show focal necrosis in the center of small areas of infiltration. The cumulative toxic effect of these repeated small inhalations are highly significant in the light of the continuous exposure of an urban population to the exhaust of automobile engines. H. EAGLE

The effect of beef adrenal extract upon the uterus. ERICH ENGELHART. *Klin. Wochschr.* 9, 2114–5(1930).—The subcutaneous injection of beef adrenal ext. into virginal female rabbits causes proliferative changes in both the mucosa and musculature. H. EAGLE

The decrease of oxidation processes during ether anesthesia. H. FUSS AND E. DERRA. *Klin. Wochschr.* 9, 2115–6(1930).—In dogs ether drop anesthesia causes a definite arterial O_2-unsatn., which is less pronounced with ether-air anesthesia, and not observed if an ether-O_2 mixt. is used. The increase in blood lactic acid during anesthesia bears some relation to the degree of arterial O_2-unsatn. and is possibly due to an inhibition of resynthesis. H. EAGLE

Copper treatment of anemia in nurslings. E. SCHIFF, H. ELIASBERG AND N. JOFFE. *Klin. Wochschr.* 9, 2144–5(1930).—The authors believe that the daily administration of 20 drops of 1% $CuSO_4$ $5H_2O$ is of benefit in anemia. H. EAGLE

The treatment of pernicious anemia with preparations of gastric mucosa. N. HENNING AND G. STIEGER. *Klin. Wochschr.* 9, 2145–7(1930).—A dried prepn. of pig mucosa was found to be highly effective. Acid alc. exts. were not effective. Both the antrum and fundus contain the active principle, which is not pepsin. H. EAGLE

A case of hydrazoic acid poisoning. ZD. KÖCHER. *Klin. Wochschr.* 9, 2160–1 (1930). H. EAGLE

The effect of intracutaneous injection upon the basal metabolism. WILFRIED LOWENSTEIN. *Klin. Wochschr.* 9, 2255–6(1930).—The intracutaneous injection of solns. of protein, or even H_2O, causes a marked fall in the basal metabolic rate, amounting to as much as 50%, and beginning within 10–15 min. L. suggests that it is due either to a reflex in the vegetative nervous system, or to the release of histamine from cells at the site of injection. H. EAGLE

The significance of ammonium chloride medication in the treatment of diuresis. PAUL SAXL AND OTTO ERLSBACHER. *Klin. Wochschr.* 9, 2302–3(1930).—NH_4Cl causes a lowered alkali reserve and decreased circulatory blood vol., while Salyrgan causes an increased blood vol. Despite their antagonistic action upon the vol. of circulating blood, a combination therapy with these 2 drugs causes a much more rapid removal of transudates due to cardiac failure, hepatic cirrhosis, nephritis, etc., and even of exudates, as in articular arthritis. H. EAGLE

The dependence of gas exchange and the action of iodine upon the hydrogen-ion concentration. L. WISLICKI. *Klin. Wochschr.* 9, 2354–5(1930).—Increased [$NaHCO_3$] or decreased CO_2 tension causes an increased O_2 consumption by rat muscle *in vitro*, and an increased respiratory quotient. An acid reaction has the opposite effect. NaI, in small concn., neutralizes either change; in higher concn., it causes an increased formation of lactic acid without any further effect upon O_2 consumption. It is interesting to note that it has no constant effect at serum reaction (p_H 7.46). Thyroxine has no effect, probably due to its insolubility at this H-ion concn. H. EAGLE

Excretion and storage of neodorm. ANNELIESE ROTHMAN. *Klin. Wochschr.* 9, 2398–9(1930).—Weeks after the ingestion of neodorm (bromoisopropylbutyramide) Br_2 can be demonstrated in the tissues, the brain in particular, in a water-sol. form. The Br_2 is gradually excreted, chiefly in the urine and bile. H. EAGLE

Pharmacological study of the effect of caffeine-adenine mixtures. DAVID I. MACHT AND HERMANN SCHROEDER. *Klin. Wochschr.* 9, 2429–30(1930). H. EAGLE

Treatment of insulin lipodystrophy. REINHOLD BOLLER. *Klin. Wochschr.* 9, 2433–5(1930).—The addn. of cocaine or novocaine in insulin has a preventive and therapeutic effect in diabetics who tend to develop lipodystrophy as a complication of the insulin treatment. H. EAGLE

The effect of digitalis upon the final wave of the electrocardiogram. ERNST BLUMENFELDT AND SPENCER G. STRAUSS. *Klin. Wochschr.* 9, 2439(1930).—The

reversal of the T-wave in the electrocardiogram is only an exceptional occurrence in patients receiving digitalis and cannot be taken as a criterion of digitalis effect. H. EAGLE

The effect of vasopressin and oxytocin upon the blood sugar in human beings. A. WL. ELMER AND M. SCHEPS. *Klin. Wochschr.* 9, 2439–40(1930).—Vasopressin, injected subcutaneously, usually causes an elevation in blood sugar. The effect of pituitrin is much less frequent and less marked. Oxytocin is ineffective. H. EAGLE

Local anesthetics. Derivatives of amino alcohols having the function of primary alcohols. E. FOURNEAU, G. BENOIT AND ROGER FIRMENICH. *Bull. soc. chim.* 47, 858–85(1930).—The prepn. and properties of a series of di-primary glycols are described, also the aldehydes from which they are derived, several of which are new. Similar tables are given of a series of acetobromohydrins, and a series of amino alcs. with their benzoyl derivs. Some of these derivs. which formed colorless crystals of definite m. p. were tested as local anesthetics. They are very sol. in H_2O and alc., sol. in acetone, insol. in Et_2O and taste bitter. They have a strong anesthetic reaction which takes effect slowly. ANN NICHOLSON HIRD

Carbon monoxide poisoning and a new treatment by irradiation. F. KOZA. *Bratislav. Lekárske Listy* 9, 16–33(1929).—Ultra-violet light causes dissocn. of CO hemoglobin *in vitro* and *in vivo*. Animals and humans poisoned with CO showed marked improvement when irradiated with ultra-violet light at a distance of 60 cm. for 40 min. WILLIAM J. HUSA

Influence of arsenicals and crystalline glutathione on the oxygen consumption of tissues. CARL VOEGTLIN, SANFORD M. ROSENTHAL AND J. M. JOHNSON. *U. S. Pub. Health Repts.* 46, 339–54(1931).—The addn. of cryst. SH-glutathione to kidney, liver, testis, the Jensen rat sarcoma, and baker's yeast does not increase the rate of O_2 consumption beyond the extra amt. of O_2 required to oxidize the S of the added glutathione. Oxidized glutathione has no accelerating influence on the O_2 consumption of kidney and testis. Arsenious oxides (R.As.O.) in relatively low concn. cause a pronounced reduction in the rate of O_2 consumption. The pentavalent arsenicals ($R.AsO_3H_2$), including tryparsamide, in the same concn. are devoid of any influence on the O_2 consumption. Of the arsenobenzene derivs. ($R.As=As.R$) sulfarsphenamine is ineffective, whereas neoarsphenamine due to its rapid oxidation reduces the O_2 consumption, but less markedly than arsenoxide. These results are in harmony with observations concerning the pharmacol. and chemotherapeutic properties of these compds. which distinguish the 3 groups, $R.AsO$, $R.AsO_3H_2$ and $R.As=As.R$. SH-glutathione when added to tissues in the ratio of 10 moles to 1 mole of arsenoxide prevents the reduction in O_2 consumption caused by arsenoxide alone. S-S-glutathione is ineffective, showing that the action of SH-glutathione is due to its SH group. $FeSO_4(NH)_2SO_4 \cdot 6H_2O$ is ineffective in overcoming the reduction in O_2 consumption produced by arsenoxide. These observations add further evidence in favor of the theory that the pharmacol. action of these arsenicals is essentially due to a chem. reaction with SH-glutathione and possibly other SH compds. of protoplasm. From the physiol. viewpoint the results appear to indicate that glutathione in some as yet unexplained manner is concerned in the O_2 consumption of tissues *in vitro*. J. A. KENNEDY

Observations on the venom of a large Australian snake, Pseudechis australis. C. H. KELLAWAY AND DONALD F. THOMSON. *Australian J. Exptl. Biol. Med. Sci.* 7, 134–50(1930); cf. *C. A.* 24, 650.—Weekly "milkings" through rubber yielded 0.1 to 0.31 g. dry venom. It exerted a marked effect upon heart muscle, blood pressure and respiration, and is strongly hemolytic and anticoagulant. The lethal dose for lab. animals varied from 0.6 to 5 mg. per kg. C. G. KING

The action on mammalian circulation of the skin secretion of Hyla aurea. WM. A. OSBORNE. *Australian J. Exptl. Biol. Med. Sci.* 7, 226–8(1930).—The secretion exerts an effect like that of digitalis on the heart and like that of ephedrine on the arterioles. C. G. KING

Standardization of the trypanocidal activity of some aryl derivatives of arsenic acid. L. LAUNOY AND (MISS) ENGLER. *Bull. soc. chim. biol.* 12, 886–93(1930).—A new standard index is proposed, based upon "trivalent curative dose" (I) and "tolerance dose" (II), in which I is the av. quantity required to destroy a virulent blood stream infection of *Tr. brucei*, *Tr. evansi* and *Tr. equiperdum* in mice (held 30 days) and II is the intravenous dose tolerated by 50 to 60% of the animals. Rabbits may also be used. The index so obtained for atoxyl is taken as one and other compds. are given proportionate values, tryparsamide = 2.03 and Forneau 270 = 5.95. C. G. KING

Iodine reaction in exophthalmic goiter. WILLARD O. THOMPSON AND PHEBE K. THOMPSON. *Endocrinology* 14, 393–9(1930); cf. *C. A.* 24, 3559.—In Boston the small-

est quantity of I that produces any reduction in basal metabolism in exophthalmic goiter is greater than 0.75 mg. in $^2/_3$ of the cases. The min. amt. to produce max. reduction is 6 mg. Between these limits, the relation between the percentage approach of the basal metabolism toward the normal level and the size of the dose is roughly linear. The effective dose has not been detd. in Chicago but 6 mg. causes a marked reduction in basal metabolism. MARY E. LEAR

The role of iodine in the treatment of exophthalmic goiter. M. L. GREENSTEIN. *U. S. Vet. Bur. Med. Bull.* 7, 167–9(1931).—G. describes the beneficial effects of Lugol's soln. in a specific case. B. S. LEVINE

Experimental rabies in white mice and attempted chemotherapy. A. HOYT AND C. W. JUNGEBLUT. *J. Infectious Diseases* 47, 418–24(1930).—Prophylactic administration of various drugs (particularly arsenicals and quinine derivs.) failed to protect white mice infected intracerebrally by single or multiple minimal lethal doses. The period of incubation of the disease consistently showed a very slight prolongation following injection of Ag-arsphenamine. JULIAN H. LEWIS

The effect of barium sulfate upon the incidence of human intestinal protozoa. JUSTIN ANDREWS AND MOSES PAULSON. *J. Lab. Clin. Med.* 16, 39–42(1930).—The no. of intestinal protozoa per unit vol. of stool appears to be greatly reduced following the ingestion of $BaSO_4$. The intestinal amebas are affected more noticeably than the flagellates. The effect is transitory and is not prolonged by extension of the period of administration of $BaSO_4$. E. R. MAIN

Pharmacology of brominated oils. CLAYTON S. SMITH AND HELEN L. WIKOFF. *J. Lab. Clin. Med.* 16, 43–6(1930).—The brominated esters of cottonseed oil appear to be well adapted for use in the röntgenologic demonstration of lesions. They are eliminated from the site of injection in rabbits within a week and produce no deleterious effects in repeated doses. E. R. MAIN

Antimony in medicine. C. N. MYERS AND BINFORD THRONE. *J. Lab. Clin. Med.* 16, 239–46(1930).—A compd. (M 303) is described which contains both Sb and As in the tervalent condition. It appears to be a valuable therapeutic agent in syphilis, leprosy and diseases in which protozoal organisms are involved. An historical discussion of the use of Sb in medicine is included. E. R. MAIN

The elimination of water and sodium chloride through the kidneys after intravenous injection of isotonic sodium chloride solution. IGNAZIO SIMONE. *Biochim. terap. sper.* 17, 469–77(1930).—A soln. of 0.974% NaCl was slowly injected into rabbits. In proportion to the vol. injected a higher percentage of Cl and H_2O is eliminated; the ratio of H_2O:Cl is always the same. A. E. MEYER

A new digitalis, "Digitalis lanata" Ehrh. EM. PERROT, P. BOURCET AND RAYMOND-HAMET. *Bull. sci. pharmacol.* 38, 7–16(1931).—The plant, whose botanical description is given, contains a cryst. glucoside, dilanin, of digitalis action, but of higher potency than the cryst. digitalin of *Digitalis purpurea*. The toxicity is the same in oral administration as in intravenous injection. In contrast to *D. purpurea*, the *D. lanata* keeps up an almost const. pharmacol. activity when cultivated. The drug is not only more uniform, but also of higher content of the glucoside. A. E. MEYER

Quinidine in paroxysmal tachycardia. C. BONORINO UDAONDO. *Semana méd.* (Buenos Aires) 1930, II, 1402–7.—Quinidine sulfate (0.5 g.) dissolved in physiol. saline was given intravenously. Two cases were successfully treated. A. E. MEYER

Sinusitis treatment with lipiodol. RICARDO BRACHT. *Semana méd.* (Buenos Aires) 1931, I, 102–4.—Iodized oil, lipiodol, was injected into the sinus cavity for radiography. It is an excellent remedy. A. E. MEYER

Local inflammations treated with concentrated solution of magnesium sulfate. S. JOUAN. *Semana méd.* (Buenos Aires) 1931, I, 259–62.—A satd. soln. of $MgSO_4$ was applied in a permanent bandage on the inflamed area. Forty cases were successfully treated. A. E. MEYER

Influence of insulin on the glycogen content of the perfused rabbit liver. NIELS A. NIELSEN. *Biochem. Z.* 230, 259–68(1931).—On perfusing the rabbit liver with defibrinated blood without insulin there is a gradual decrease in the sugar content of the blood and a corresponding increase in the liver glycogen. The deposition of the glycogen in the liver is not uniform. Addn. of $^1/_3$ to 20 units of insulin to the blood causes a rise in the blood-sugar concn. and a loss of glycogen in the liver. No effect was observed with amts. smaller than $^1/_3$ insulin units. S. MORGULIS

Influence of fermentation poisons upon experimental tumors. I. L. KARCZAG. *Biochem. Z.* 230, 411–9(1931).—Enzyme and protoplasm poisons have been differentiated upon the basis of their effect in inhibiting the fermentation of (1) both yeast and zymin (protoplasm and enzyme poison), (2) zymin alone (enzyme poison), or (3)

yeast alone (protoplasm poison). By this method it was possible to discover substances which injured the glucolytic enzyme without producing any poisoning effect upon the protoplasm. The N of the biologically active mol. plays a paramount role, especially the NO_2 and the CN groups, and not in the nucleus but in the side chains of the compd. By the same method substances were discovered which are protoplasmic poisons. It was then attempted to select substances such as isoquinoline red, Magdal red, ethyl red, Martius yellow, Mikado yellow, bromothymol blue, propionaldehyde, cyanohydrin, nitrobenzaldehyde, *o*-nitrobenzonitrile, which, because of their relative nontoxicity could be employed in animal expts. to treat tumors. No consistent results were obtained, although with isoquinoline red, Magdal red and ethyl red a definite influence was noted. II. L. KARCZAG AND C. SELLEI. *Ibid* 420–34.—Ethyl red, chrysoidine, Magdal red, isoquinoline red and Martius yellow, which are inhibitors of the yeast fermentation process, were found to exert an inhibiting action on the glucolysis of tumor cells which diminishes in the order given above. These substances also cause a diminution of the respiration in the same order so that Martius yellow either had no influence upon the respiration of the tumor cells or actually stimulated it. These enzyme poisons act upon several enzymes so that both the fermentation and the respiration enzyme are simultaneously inhibited, and in this respect they differ from the KCN which injures the respiratory enzyme much more than the glucolytic enzyme. Furthermore, whereas the action of KCN on glucolysis is reversible, the effect of the above substances is irreversible. *In vitro* the effect of these enzyme poisons can be superimposed upon the action of KCN, but when used subcutaneously in animals the KCN effect predominates. The substances which were found to be toxic for the fermentative activity of both tumor and yeast cells were also toxic for the fermentation by *B. coli*. It is usually easier to influence glucolysis than respiration, and it is therefore concluded that the therapeutic efforts, so far as the metabolism of the tumor is concerned, must be directed toward the respiratory function. It is suggested that results could only be expected by definitely and permanently inhibiting their respiration while leaving the glucolytic ability unchanged or slightly lowered. III. L. KARCZAG. *Ibid* 435–8.—The sugar content of Ringer soln. mixed with sarcoma powder increases. Fermentation of the glucose proceeds slowly and continuously in such a mixt., though the controls show no fermentation in the same time. Conclusion: Rous sarcoma can ferment glucose with liberation of gas and this process can be studied also *in vitro*.
S. MORGULIS

The action of certain autonomic drugs upon the pigmentary responses of Fundulus. DIETRICH C. SMITH. *J. Exptl. Zool.* 58, 423–53(1931).—Certain sympathetic and parasympathetic stimulants (cocaine, ergot, pilocarpine, physostigmine, atropine) were injected into the body cavity of the fish, *Fundulus heteroclitus*, and the effects upon the dermal melanophores were studied. Cocaine in sublethal doses produces a contraction, in lethal doses an expansion of the melanophores. Ergot produces a stellate condition of the melanophores which then respond to temp. changes like denervated melanophores. Pilocarpine and physostigmine retard the normal responses of the melanophores. High concns. produce permanent expansion. Atropine produces a stellate condition but unlike pilocarpine the melanophores still respond to background shade. Lethal doses produce complete expansion but the melanophores respond to temp. changes like innervated melanophores. In appropriate dosage atropine antagonizes the action of pilocarpine but not of cocaine. The melanophores of fishes possess a double rather than a single innervation. C. H. RICHARDSON

Adsorption and narcotic action. H. H. KING, J. LOWE HALL, A. C. ANDREWS AND H. L. COLE. *J. Pharmacol.* 40, 275–89(1930).—The authors detd. the free surface tensions of drugs in aq. solns., the interfacial tensions of aq. solns. against pure liquid paraffin and against a liquid paraffin soln. of lecithin, and calcd. the adsorption at various concns. The drugs used were: trional, butyl chloral hydrate, sulfonal, bromal hydrate, triacetin, diacetin, chloral hydrate, Et carbamate, monoacetin, Me carbamate, Et Me carbamate. A comparison of the compds. in homologous series showed that the free surface tension and the adsorption in each series decreased as the liminal values (as detd. by Meyer) increased. The calcd. adsorption values increased as the liminal values decreased in the series with pure paraffin. For the paraffin-lecithin series the results were not so regular. C. RIEGEL

Chloroform content in various tissues during anesthesia and its relationship to the theories of narcosis. JAMES L. MCCOLLUM. *J. Pharmacol.* 40, 305–25(1930).—Dogs were anesthetized with $CHCl_3$ and the blood and tissues analyzed for $CHCl_3$ content. The corpuscles contained more $CHCl_3$ than the plasma and more than their lipoid content would indicate. The $CHCl_3$ content of the brain and tissues increased grad-

ually, but at the point of highest concn. (for the brain) there was less $CHCl_3$ than the lipoid content would indicate was possible. C. RIEGEL

Number of open glomeruli in acute mercuric chloride nephrosis. ROBERT A. MOORE AND LOUIS M. HELLMAN. *J. Exptl. Med.* 53, 303–6(1931).—Acute Hg nephrosis in the rabbit is not assocd. with a decrease of glomerular circulation. C. J. W.

Effects of the intravenous injection of colloidal silver upon the hematopoietic system in dogs. SAMUEL S. SHOUSE AND GEORGE M. WHIPPLE. *J. Exptl. Med.* 53, 413–20 (1931).—Colloidal Ag has no sp. action on the bone marrow in dogs but is a systemic poison which may cause anorexia, weakness, loss of wt., anemia and death. Hemolysis can be demonstrated after large doses of colloidal Ag and the anemia presumably is due in part at least to a destruction of red blood cells in the peripheral circulation. The colloidal Ag, injected intravenously, is deposited as granules almost exclusively in the cells of the reticul-endothelial system after the manner of particulate substances. Repeated injections of non-lethal amts. of this substance are invariably followed by hyperplasia of the bone marrow. Large single doses cause rapid death in 12 hrs. or less, characterized by pulmonary edema and congestion. C. J. WEST

Aplasia of marrow and fatal intoxication in dogs produced by Röntgen radiation of all bones. SAMUEL S. SHOUSE, STAFFORD L. WARREN AND GEORGE H. WHIPPLE. *J. Exptl. Med.* 53, 421–35(1931). C. J. WEST

The combined effects of colloidal silver and highly filtered Röntgen radiation upon the hematopoietic system in dogs. SAMUEL S. SHOUSE AND STAFFORD L. WARREN. *J. Exptl. Med.* 53, 437–45(1931).—The individual destructive effects of colloidal Ag and heavily filtered radiation are still evident when the 2 are used together; the combined effects are cumulative in that small doses are more destructive than when either is used alone. The leucocytosis resulting from the injection of the colloidal Ag affords no protection against the terminal leucopenia following the radiation. C. J. W.

The effect of amyl nitrite on the size of the heart and the width of the aortic shadow as determined röntgenologically. WM. A. BRAMS AND HERMAN A. STRAUSS. *Am. J. Med. Sci.* 180, 618–20(1930).—Six normal and 15 arteriosclerotic persons were studied röntgenologically before and after administration of $AmNO_2$. The transverse diam. of the heart shadow was reduced in 18 of the subjects; the presence or absence of arteriosclerosis seemed to play a minor role in these changes. The width of the aortic shadow was increased in 13 of the 21 patients after $AmNO_2$ administration. This result was independent of the condition of the peripheral vessels or the degree of blood pressure. R. C. WILLSON

The action of thymophysin on the human pregnant uterus in situ. M. PIERCE RUCKER. *Am. J. Obstet. & Gynec.* 20, 791–7(1930).—After an intramuscular injection of 0.5 cc. of thymophysin in a case at term there was apparently no change in the type of uterine contractions or in the tone of the uterus. A dose of 1 cc. in a case in the fifth month of pregnancy showed an increased frequency, a decreased force of contractions and an increase in the tone of the uterus between contractions. The same dose produced similar but more marked changes in cases at term. R. C. WILLSON

A study of the effect of acriflavine given intravenously on experimental uterine infection in the dog. JOSEPH L. MEYERS. *Am. J. Obstet. & Gynec.* 20, 760–74(1930).—An appropriate dose of acriflavine given intravenously has a definite beneficial effect on the course of the experimentally infected uterus of the dog. The earlier the dye is injected the greater is the effect. In some instances sterile cultures of the inoculated or infected uterine horn are obtained after acriflavine therapy. R. C. WILSON

Cerebral blood flow. I. The effect of intravenous administration of hypertonic and hypotonic solutions on the volume flow of blood through the brain. COBB PILCHER. *Arch. Neurol. & Psychiatry* 24, 899–906(1930).—The O content of arterial blood and blood from the occipitovertebral sinuses in the dog was studied before and after the intravenous injection of 50% dextrose or 30% NaCl and of distd. water. The O content varied immediately after the injections but became stable within 30 min. and remained so for several hrs. The O content from the occipitovertebral sinus was invariably diminished markedly after the injection of both hypotonic and hypertonic solns. The arterio-venous difference (utilization of O) increased after injection of both types of solns. **II. The effect of intravenous injection of hypertonic and hypotonic solutions on the cardiac output and blood pressure.** *Ibid* 907–12.—The cardiac output was usually diminished after injection of both types of solns. The O consumption and O utilization were usually increased by both types. The mean blood pressure varied during the injection but thereafter was increased slightly in all expts. R. C. WILLSON

The effect of potassium iodide on the pulse rates of normal individuals. DONALD

McEachern. *Bull. Johns Hopkins Hosp.* **47**, 299–303(1930).—In the absence of thyroid disease or other interfering circumstances, KI produced significant increases in pulse rate in 12 subjects while 5 showed a slight decrease. The changes came on gradually about the third to seventh day and reached the max. at about the tenth day. Normal rate was restored within a week or so after the drug was discontinued.
R. C. Willson

The effect of the ingestion of potassium iodide on the electrocardiogram of normal individuals. Donald McEachern and B. M. Baker. *Bull. Johns Hopkins Hosp.* **47**, 304–7(1930).—KI in therapeutic doses has no significant effect. R. C. Willson

The effect of lead on the isolated uterus. M. D. Devlet-Kildeeva and B. A. Raikhstein. *Kazansky Meditsinsky Jurnal* **26**, 690–4(1930); *J. Am. Med. Assoc.* **95**, 1545.—After a graphic record had been made of the normal muscular contractions of a part of the uterine cornu in cats placed in Ringer's or Locke's soln. kept at 38° with a const. stream of O flowing through the soln., Pb acetate was added gradually to the soln. The uterine contractions changed with the concn. of the Pb acetate. When this reached 1:200 the uterus reacted by a complete tetanus and the muscular contractions could not be made to reappear even after all traces of the Pb acetate had been washed out. The introduction of Pb acetate into the blood stream of cats also produced a hypertonic condition of the uterus. R. C. Willson

Antagonism between adrenaline and ergotamine, and the respiratory quotient. R. Capo. *Riforma Medica* **46**, 1347–53(1930); *J. Am. Med. Assoc.* **95**, 1703.—Ergotamine does not modify the greater consumption of O induced by adrenaline, but when administered during fasting it causes a notable lowering of the elimination of CO_2 and a reduction of the R. Q. Adrenaline causes a mobilization of hepatic glycogen and thus increases almost constantly the elimination of CO_2 and rises the R. Q. Ergotamine inhibits the hyperglucemia that is induced by adrenaline without modifying the increased intra-org. combustion caused by the latter. R. C. Willson

Iodoxybenzoate as a test reagent for free phenolic hydroxyl groups in organic compounds (Leake) **7**. Trypsin preparations suitable for the prevention of adhesions (Walton) **17**. Derivatives of anesthesin (Coniglio) **10**.

Anschütz, W., Specht, K. and Tiemann, Fr.: **Die Avertinnarkose in der Chirurgie.** Berlin: J. Springer. 200 pp. Reviewed in *J. Am. Med. Assoc.* **96**, 715(1931)

I—ZOOLOGY

R. A. Gortner

Amylase in the extracts of the salivary glands of the silk-worm larva (Bombyx). S. Matsumura. *Bull. Sericulture and Silk Ind.* (Japan) **2**, 4–5(1930).—Aq. glycerol exts. of the salivary glands of the silkworm hydrolyze sol. starch to dextrin and sugar and glycogen to dextrose with optimum activity at p_H 6.6–7.1. In the absence of NaCl the enzyme is almost inactive. Exts. made from European varieties of silkworm are less active than similar prepns. from the Chinese and Japanese varieties.
B. C. A.

Cardiac hormone in the tortoise. A. de Carvalho. *Compt. rend. soc. biol.* **102**, 535–37(1929).—Elec. irritation, and the action of pilocarpine, atropine, ephedrine and ergotamine on the heart of a tortoise failed to detect a cardiac hormone. B. C. A.

Action of hypophyseal extract on egg production of batrachians. R. Kehl. *Compt. rend. soc. biol.* **103**, 744–5(1930); *Physiol. Abstracts* **15**, 248.—The alk. aq. ext. of the anterior lobe of the hypophysis of mammals, when injected into *Discoglossus*, rapidly elicits the free laying of eggs in the females captured in Dec. and Jan. Controls which are kept in the same conditions of fasting, etc., do not lay their eggs. G. G.

Cause of ammoniacal odor of flesh of the shark. O. Martin. *Z. Fleisch Milch-Hyg.* **40**, 48–9(1929).—The NH_3 arises from urea (up to 2.5% of the flesh), the origin of which is not pathol.; it serves to maintain the internal osmotic pressure against that of the water. B. C. A.

Amino acids of tissues. IV. The diamino acid content of muscle tissue of different classes of animals. John L. Rosedale and Joseph P. Morris. *Biochem. J.* **24**, 1294–6(1930); cf. *C. A.* **24**, 164.—An increase in the amt. of histidine N and a decrease in lysine N are found in the lower organisms (tissue of crocodile, cockroach, mosquito larvae, oysters and sponge). **V. Monoamino acids of the horse mackerel (Caranx rottleri).** *Ibid* **24**, 1297–1300.—The monoamino acids are extd. with BuOH Better results are obtained by first removing some of the amino acids from soln.
Benjamin Harrow

The hydrolytic products of the protein from the egg capsule of the gastropod, Hemifusus tuba Gmel. JUN-ICHIRO SAGARA. *J. Biochem.* (Japan) **12**, 473–4(1930).—The protein of the egg capsule of *Hemifusus* seems to belong to the albumoids, being in some respects similar to keratin and in other respects to elastin. It contains no glycine, tyrosine or histidine, but much leucine and glutamic acid, these 2 amino acids making up 30% of the protein. S. MORGULIS

A qualitative analysis of the digestive secretions of the larva of the Japanese beetle (Popillia japonica Newn). MILLARD C. SWINGLE. *J. Econ. Entomol.* **23**, 956–8 (1930).—A qual. chem. examn. of the digestive secretions of this larva showed the presence of ions of Al, Fe^{++}, Ca, Mg, K, Na, NH_4, CO_3, Cl, NO_3 and PO_4. C. H. R.

Investigations on the rapid coloration of the cilia of ciliates. HÉLÈNE ANSELMIER. *Pharm. Acta Helv.* **5**, 33–41, 64–71, 88–94(1930).—Detailed directions are given for the differential staining of the cilia of ciliates, thus making it possible rapidly to diagnose ciliates in mixed cultures of infusoria. Photomicrographs of certain protozoa of various origins, and a bibliography of 10 references accompany this highly specialized study. S. WALDBOTT

12—FOODS

F. C. BLANCK AND H. A. LEPPER

Amendment of July 8, 1930, to the Federal food and drugs act and requirements thereunder. ANON. Food and Drug Administration, U. S. Dept. Agr., *Service and Regulatory Announcements* F. D. No. 4(1931).—The forms of statements required on *canned foods* of substandard quality and substandard fill, together with standards for fill of container of all canned foods and of quality and condition for *peas, peaches* and *pears*, are given. H. A. LEPPER

Color and flavoring problems in the food industries. T. H. FAIRBROTHER. *Food Manuf.* **6**, 72–5(1931). E. H.

Possibility of use in foods of coloring materials made in Italy. C. MANUELLI AND R. MAGGIORA. *Atti III congresso naz. chim. pura applicata* 1930, 627–35.—The characteristics of coloring materials allowable in foods are reviewed. E. M. SYMMES

Reaction between metal receptacles and foodstuffs. I. Relation of metals to fluids (drinks): corrosion. B. BLEYER AND J. SCHWAIBOLD. *Biochem. Z.* **230**, 136–45 (1931).—The corrosion of various metals (Al, Zn, Fe, Ni, Sn, Pb, Cu, Ag, brass) by water, tea and coffee has been studied and the extensive findings are recorded in tables and curves. S. MORGULIS

Determining the swelling rate in canned foods. W. S. STURGES, E. T. DRAKE AND L. B. PARSONS. *Food Ind.* **3**, 105(1931).—A quant. method for the measurement of swelling rate of Sn cans is given. The principle of the method consists in weighing the can under H_2O and also in air. $S = 100\ W/V$, where W is the decrement in wt. in H_2O, V = wt. in air − wt. in H_2O, and S is the % swell. C. R. FELLERS

The p_H values of New Zealand wheats and flours. J. K. DIXON. *New Zealand J. Sci. Tech.* **12**, 146–53(1930).—The p_H and buffer-effect values of ground whole-wheat flour prepd. in the lab. and com. flour were detd. Exts. prepd. by the Kent-Jones method were used in a quinhydrone cell coupled with a calomel half-cell. One hr. was required to get a correct reading. The Pt electrodes poisoned readily. The results showed that the quality of a com. flour as detd. by the baking test cannot be predicted from the p_H or buffer-effect value of its wheat or flour prepd. in the lab. The p_H and buffer-effect values of flours are governed by the treatment each wheat receives at the mill and bear no relation to the values found for samples prepd. in the lab., although the lab. values may be of some assistance to the miller in choosing the method of treatment to be adopted for each lot of wheat. L. E. GILSON

Utilization of the soy bean. IV. Electrolytic oxidation of the hydrolyzate of proteins. I. YOSHITARO TAKAYAMA. *J. Soc. Chem. Ind., Japan* **34**, Suppl. binding, 31–2(1931); cf. *C. A.* **24**, 2810.—Crude soy-bean protein was hydrolyzed with H_2SO_4. The hydrolyzate was filtered from humin and electrolyzed with a peroxidized Pb anode and a Pb cathode in an undivided cell (anodic c. d. 2 amp./sq. dm.); the soln. was then steam-distd. The distillate was neutralized with NaOH and redistd. The volatile acids remaining as Na salts were 9.6% of the crude protein. A mixt. of free acids was obtained from the salts by addn. of phosphoric acid and fractionated at 95–195°, sepg. formic and isovaleric acids and AcOH, with small quantities of propionic and butyric acids. The residual soln. of the steam distn. was distd. over CaO under reduced pressure into HCl. The volatile base obtained was pure NH_4Cl. The relation between NH_4N

produced and elec. quantity consumed was detd. In the same way, formic and isovaleric acids and AcOH were obtained from gluten hydrolyzate. E. M. SYMMES

"Vaingan" rice cultivation in south Konkan. R. M. HEGDEKATTI. *Poona Agr. Coll. Mag.* **22**, 146–59(1930).—The term "vaingan" is given to rice grown by means of lift irrigation during the hot summer weather. As compared with rainy season rice, "vaingan" rice kernels and bran are richer in albuminoids and digestible carbohydrates and poorer in woody fiber and ash, particularly siliceous ash. "Vaingan" rice straw contains more digestible carbohydrates and albuminoids than rice straw from a rainy season. K. D. JACOB

The determination of starch in cereal products. C. W. HERD AND D. W. KENT-JONES. *J. Soc. Chem. Ind.* **50**, 15–22T(1931).—Methods for detg. starch are broadly classified as: (I) hydrolytic methods, (*a*) acid hydrolysis, (*b*) enzymic hydrolysis; and (II) non-hydrolytic methods. The "by-difference" method and the method of direct washing out from dough are in the latter category. Some of these methods are discussed in detail and the relative results obtained by the application of them to different mill stocks are considered. These stocks included: (1) com. starches, (2) com. flours and mill stocks, (3) wheat offals, and (4) whole wheats. Conclusions: By "starch" different observers mean different things. The modified Rask method is suggested as of the greatest utility, while hydrolytic methods are open to grave suspicion. The modified method is: Place 1 g. of material and 1 g. acid-washed sand in a centrifuge tube, mix and cover with washed Et_2O, stir, centrifuge and pour off the liquid. Make 2 addnl. washings and to the residue add 25 cc. of water and 0.25 cc. *N* NaOH, mix and after 15 min. add 5 cc. pure MeOH and mix again. Mix in 5 cc. dil. MeOH (2:1 water), centrifuge this mixt. and remove the alc. layer. Wash the residue twice with 10 cc. of dil. MeOH and finally thrice with water. Stir the residual mass into a thick paste with a few cc. of water, add a total of 20 cc. of water to transfer to a 100-cc. flask, add 20 cc. concd. HCl and make up the vol. to 100 cc. with Rask's acid. Filter the contents of the flask by suction through a Gooch crucible contg. asbestos and a layer of acid-washed sand into a small dry suction flask. Transfer 50 cc. to a 200-cc. beaker contg. 110–5 cc. 96% alc., and immediately after pipet drainage, stir the resulting mixt. 1 min. or until the ppt. becomes flocculent. When it has settled, transfer the contents of the beaker to a centrifuge tube, centrifuge 10 min. and remove the supernatant liquid. Wash the residue with 70% (by vol.) alc. and twice with 96% alc. Wash the ppt. with Et_2O, dry the crucible at 40° for 10–15 min. and then at 130° to const. wt. W. H. BOYNTON

The determination of starch in flour by diastase-acid hydrolysis. B. G. HARTMANN AND F. HILLIG. *J. Assoc. Official Agr. Chem.* **14**, 112–6(1931).—A detailed description is given of a modification of the technic of the official A. O. A. C. method for the detn. of starch by diastase-acid hydrolysis. The time required for starch conversion by diastase is reduced from 2 hrs. to 20 min. by introducing a preliminary pepsin digestion (cf. *C. A.* **21**, 287), but the total working time required for the peptic-diastatic digestion is about 3 hrs. The peptic digestion increases the starch yield appreciably; this is shown to be due to the fact that the starch is rendered more accessible to diastatic hydrolysis and not to any reduction by the pepsin or the products of its action. In the pepsin digestion an acidity adjustment corresponding to 5 cc. *N* HCl per 100 cc. of substrate is made; after the digestion the acidity is carefully neutralized, the mixt. is slightly acidified with HCl, and finally treated with $CaCO_3$ to assure a practically neutral condition for the diastatic inversion. The official method was also modified in regard to the removal from the flour of the sugars and free fat; the procedure proposed, though time-consuming, is easy to carry out and gives satisfactory results with ordinary care, even in the hands of analysts inexperienced with it. A. PAPINEAU-COUTURE

Starch explosion hazards reduced by safety measures. D. J. PRICE AND H. R. BROWN. *Food Ind.* **3**, 106–7(1931).—Explosions of dry starch are relatively frequent and are usually caused by sparks from machines, motors, etc., or by static electricity. A serious explosion at Decatur, Ill. is described. Safety measures are outlined. C. R. FELLERS

Estimation of the age of flour. W. HARTMANN. *Z. Untersuch. Lebensm.* **59**, 364–79(1930).—Samples of flour and bread (33.3 g.) were extd. for 6 hrs. with boiling petr. ether or $CHCl_3$, and the n at 40° and the acid value of the ext. detd. Flours recently mill-ground had acid values of 54 to 76 and 46 to 64 when contg. 60% of rye and wheat flour, resp., while the corresponding figures for flours of the same compn., ground in the lab. and left for 24 hrs., were 44 and 39. Bleached flours were not included. Extns., after various intervals, showed that the acid value increases with time of storage, rapidly at first, to about 240 after 15 months. Gluten N, lecithin phosphate contents and

n decrease on storage at a rapid rate, particularly in the initial stages. The acid value and *n* of the unground grain, however, showed little alteration on storage. Reductions in *n* were observed for bread baked from rye and wheat flours, while the acid value was increased in the latter case only. The lecithin phosphate fell from 6 to 1.3 mg. per 100 g. of flour in both cases. The bacterial contents were also detd. on samples 5 to 15 months old; in the presence of growths of *Oidia*, small quantities of an unsaponifiable wax-like substance were obtained. In view of statements that flour is no longer suitable for baking purposes after 6 months' storage, it is suggested that the max. permissible acid values in such cases should normally be 120 to 150 for 60% rye flours, and 90 to 100 for 60% wheat flours. C. R. FELLERS

Direct determination of available carbon dioxide in baking powder. MAYNE R. COE. *J. Assoc. Official Agr. Chem.* **14**, 99–101(1931).—In the gasometric method adopted by the A. O. A. C. for the detn. of CO_2, 2 detns. must be carried out to obtain available CO_2, which is the difference between the total and residual CO_2. The following new method is proposed; the same app. is used and only 1 detn. is required. Run 25 cc. of 5% $(NH_4)_2SO_4$ soln. into the 250-cc. decompn. flask contg. 1.7 g. of baking powder, heat at boiling temp. till all gas is evolved, cool to room temp.; when equil. is established (generally in about 15 min.) read the amt. of available CO_2 on the graduated tube and make the necessary temp. and pressure corrections. Total CO_2 also can be detd. in a few min. with the same sample, without detaching the flask from the app., as follows: Fill the buret contg. a few cc. of $(NH_4)_2SO_4$ with H_2SO_4 (1 + 5), run 25 cc. into the flask, heat almost to boiling, let cool as before, take the reading, subtract a no. corresponding to the no. of cc. of acid used from the no. of cc. found, and correct for temp. and pressure. $(NH_4)_2SO_4$ is used as reagent because (1) a satisfactory evolution of CO_2 is obtained from all varieties of baking powder; (2) it acts as a protein coagulant for powders contg. egg albumin, thus serving as a foam destroyer; (3) if distd. water is used with phosphate powders and those contg. egg albumin, low results are obtained, but with 5% $(NH_4)_2SO_4$ soln. the same results are obtained as with the gasometric method; (4) if the total CO_2 value is desired the acid reagent may be used to evolve the residual CO_2 remaining in an $(NH_4)_2SO_4$ soln. The technic of the method is described in detail. It gives results checking with those of the gasometric method as closely as would duplicates by the latter method. A. PAPINEAU-COUTURE

The function of emulsions of oil and water in breadmaking, with special reference to gluten formation and modification. J. C. VAN DYK. *J. Soc. Chem. Ind.* **49**, 421–2T (1930).—Glutens obtained from doughs which had been made up with emulsions are softer and more elastic. When the gluten is dried in a hot-air oven at 105°, the color of the baked gluten is superior to that obtained by drying off the glutens from a dough of flour and tap water. It is very difficult to wash out doughs made from flour and emulsions, and in order to prevent dispersion the starch must be filtered through fine muslin. Emulsions of oil and water increase the amt. of gluten in the flour to a very small extent. This contradicts Bennion (*C. A.* **21**, 613). There seems to be no definite relation between the fact that emulsions of oil and water keep bread moist for a long period, and the increase of gluten. As the washing free from starch is very difficult, it seems that the increase of gluten reported by B. was caused by some const. error connected with the washing out of the gluten. ALBERT L. HENNE

Phosphatide content of different breads. B. REWALD. *Z. Untersuch. Lebensm.* **60**, 315–8(1930).—The phosphatide contents were detd. by R.'s method (*C. A.* **23**, 3940), the sample being extd. in succession with a large excess of acetone and a mixt. of C_6H_6 and EtOH. The exts. were evapd. separately, the residues extd. with dry Et_2O, and the P was detd. in each case in the residue after evapn. of the Et_2O. The sum of these 2 figures was taken as the total phosphatide content, the following percentage of the dry samples being found: Rye bread crumb or crust 0.174, crumb and crust of white bread 0.287, crumb and crust of pumpernickel 0.073, black bread crumb 0.183 and crust 0.194, graham bread crumb 0.267 and crust 0.302. The respective P contents of the residues after extn. were 0.20, 0.24, 0.32, 0.34, 0.35, 0.30 and 0.29%. With the exception of pumpernickel, the different breads examd. contained approx. the same amts. of phosphatide. Similarly, the P contents of the residues were approx. equal in all cases. Temp. is without influence on the phosphatide content because both crust and crumb had the same amts. Yeast fermentation was also without effect on the phosphatide of bread. C. R. FELLERS

The extinction coefficient of milk. A. SCHNECK AND H. MENGEBIER. *Milchwirtschaft. Forsch.* **11**, 1–29(1930).—The light transmission is proportional to concn. under strictly controlled conditions. The Lambert-Beersche rule may be employed. The fat phase has little effect. In dilns. of 1–100 the results satisfy the Lambert-Beersche rule. Many

samples tested show the extinction to be depressed 4% by skimming. Milks from different cows have different extinction coeffs. It is shown that the extinction coeff. due to fat varies with the av. size of the fat particle. GEORGE R. GREENBANK

The residual nitrogen of cow milk. F. KIEFERLE AND J. GLOETZL. *Milchwirtschaft. Forsch.* 11, 62–117(1930).—The authors consider the residual N of milks as analogous to that of blood and urine. They ppt. the coagulable protein by heat and 10% AcOH. The N remaining in the filtrate is called total residual N. The total residual N for an individual milk is 84.8 mg. % per 100 cc. when the total N is 531.7 mg. %; for herd milk it is 66.3 mg. % for a total N of 533.1 mg. %. If the hexone bases are removed by Na tungstate and trichloroacetic acid the residual N for an individual milk is 28.4 mg. %. The values for the total residual N in mg. % of the constituents for individual and herd milk are, resp., albumoses 30.7, 27.2; peptone 24.2, 18.7; amino acids 3.9, 4.6; NH_3 1.3, 1.1; urea 13.4, 10.1; creatinine 2.3, 1.7; creatine 3.1, 2.2; uric acid 2.1, 1.5. The total residual N increase in pasteurization is 10.4% and in boiling 18.6%. GEORGE R. GREENBANK

Proteolysis of milk. H. HARTWIGK. *Milchwirtschaft. Forsch.* 9, 339–54(1930).—The detn. of caseolytic organisms in milk is described; the detn. of NH_3 by distn. in a vacuum and the detection of peptone are also of value. Tryptophan was not detected. The catalase value is not always parallel with the no. of proteolytes. B. C. A.

Has "chromiform," the new milk preservative, proven its value? FONZES DIACON. *Ann. fals.* 24, 22–5(1931); cf. *C. A.* 23, 913.—The previous investigation established the value of "chromiform" when added to fresh milk. Evidence is now presented showing that, when added to milk several hrs. old, "chromiform" is a much better preservative than either $K_2Cr_2O_7$ or $(CH_2O)_3$ alone. A. PAPINEAU-COUTURE

Influence of formaldehyde on the precipitation of milk protein material. MARCEL MASCRÉ AND EMILE BOUCHARA. *Bull. soc. chim. biol.* 12, 994–1000(1930); cf. *C. A.* 24, 5052.—Addn. of up to 20% formol to milk caused more AcOH to be required for pptn. of casein, but less N was left in soln. after pptn. was complete, and there was less re-soln. upon adding an excess of acid. A similar effect was exerted upon the pptn of total milk proteins by CCl_3COOH. C. G. KING

Souring of milk. I. W. GRIMMER AND W. PAAPE. II. W. GRIMMER AND C. ARLART. *Milchwirtschaft. Forsch.* 9, 88–99, 100–20(1929); cf. *C. A.* 23, 3990; 24, 3025.—Rennin coagulum and the residue of milk on porous plates differ in that the N, Ca and P contents of the latter are the smaller. Possibly in coagulation by rennin dissolved Ca and P are co-pptd., or combination of $Ca_3(PO_4)_2$ with caseinogen or casein occurs. With progressive souring the Ca content of the coagulum diminishes fairly regularly. If $\sqrt{kS}$ is the H-ion concn. of lactic acid of acidity x, c is a factor and S is the H-ion concn. of the milk, $y = cx^3\sqrt{kS}$. The value of c was 3.03–5.42 (av. 4.3) $\times 10^{-6}$. B. C. A.

The foaming problem. W. MOHR AND C. BROCKMAN. *Milchwirtschaft. Forsch.* 11, 48–61(1930).—Milk with the greatest surface tension and viscosity produces the most stable foam. The foaming properties are greatly changed by the addn. of Na citrate. The solidity and stability of the foam are greatly diminished by the salt. There is a relation between the foaming and the surface viscosity. The tendency to foam depends on the ability to form a surface. Solidification of the wall gives a measure of the surface viscosity but not of the stability. It requires an optimum surface viscosity for a stable foam. With increasing fat foam formation and stability decrease. Foam formation is greater when the fat is liquid than when solid. Homogenization of skim milk reduces foaming; with whole milk it is increased. The influence of temp. varies with different milks. The optimum is from 30° to 60°. Repeated foaming does not decrease the capacity. Churning reduces the capacity of the skim milk. G. R. G.

Detection of heated milk. K. EBLE AND H. PFEIFFER. *Z. Untersuch. Lebensm.* 60, 311–4(1930).—Of the several variations of the *benzidine test* for the detection of heated milk, the following method gave the most satisfactory results: shake 5 cc. of milk with 0.5 cc. of a 4% soln. of benzidine in 96% EtOH, add 1 drop of a 1% soln. of H_2O_2 after 1 min., and shake the mixt. again. Raw milk gives a stable blue-green color, milk heated for 30 min. at 63° gives a transient blue-green color, while strongly heated milk is colorless. After 1 min. add 10 cc. of a satd. soln. of $MgSO_4$ and shake the mixt.; raw milk becomes gray-green gradually turning to blue-green in about 10 min.; heated milk is gray-green and gradually becomes grayish blue. After 10 min. more dark blue curds sep. from the slightly heated milk, while in the strongly heated milk the curds are white. If $MgSO_4$ is replaced by Na_2SO_4, the respective colors are chocolate

to violet-brown and green-brown. Heated milk having an abnormally high leucocyte content or lactic acid acidity, or milk heated for a short time below 63°, tends to give the color reactions of raw milks, and it is desirable before making the test to add 0.25 *N* KOH soln. to reduce the acidity to 0.06% lactic acid. These exceptions are due to the peroxidase assocd. with the proteins or leucocytes of the milk, which normally passes into soln. when the milk is heated and hence loses its activity, but may be activated by lactic acid and inactivated by the addn. of AmOH. In doubtful cases a mixt. of 10 cc. of milk, 10 cc. of a satd. soln. of $MgSO_4$ and 1 cc. of a 20% soln. of AcOH is shaken and centrifuged for 6 min. at 120 r. p. m. Slightly heated milk gives a clear serum, raw milk a definitely opalescent serum, and mixed milk contg. 20% or more of raw milk, a faint turbidity. C. R. FELLERS

Pseudomonas as a cause of bitter milk. R. W. NEWMAN. Calif. Dept. Agr., *Monthly Bull.* 19, 640(1930). C. R. FELLERS

Anaerobic spore test as an index of contamination in milk. M. H. KNUTSEN AND E. C. HOLST. Penn. Agr. Expt. Sta., *43rd Ann. Rept. of the Director in Bull.* 258, 29(1930).—The addn. of reduced Fe increased the efficiency of the test, but even this improved technic failed to show any decided degree of accuracy in differentiating milks as to the amt. of manurial contamination. One of the principal reasons the test is invalid is because anaerobic spores germinate after varying periods of time depending upon the temp. of incubation and other factors. C. R. FELLERS

The physicochemical constitution of spray-dried milk powder. L. H. LAMPITT AND J. H. BUSHILL. *J. Soc. Chem. Ind.* 50, 45–54T(1931).—It is shown that the figures obtained for fat content (Soxhlet) are not comparable to the "free" fat as detd. by the standard method as described. The normal moisture content of com. milk powders has no effect on the amt. of "free" fat. The "free" fat content of 8 com. spray-process powders is given, showing that the percentage calcd. on the total fat may vary between 3.33 and 14.22; for roller-process powder it is between 91.6 and 95.8. Increasing the surface of the particles of spray-process powder by grinding 3 hrs. increases the "free" fat up to 83% of the total, but in the roller-process powder practically all of it is free. The differences in the systems of drying which may influence the constitution of the particles are pointed out. Attempts to simulate the Soxhlet mechanism by a repetition series of standing extns. has thrown some light on the differences observed. It is shown that when milk powder absorbs moisture certain well-defined changes take place and that a first "clammy" stage is succeeded by the development of a dry, hard and powdery texture. This change is accompanied by a freeing of the fat. It is proved that there is a definite range of moisture content at which the fat is freed; this is called the "critical moisture content" by the authors. Microscopical examn. proves this change to be accompanied by the crystn. of the lactose, and this crystn. is also produced by treatment with 96% alc. Spray-process lactose is amorphous but crystallizes under the effect of exposure to moist air or to treatment by 96% alc. Time is a factor in the freeing action of absorbed moisture; powder freshly made reacts more slowly than an older one. The fat-freeing action of moisture is irreversible. The crit. moisture range is independent of the fat content and proportional to the amt. of solids-not-fat in the powder. It is not possible to put forward a definite theory concerning the structure of the milk-powder particle. The lactose in its amorphous state has an important effect on the availability of the fat to solvents, and any means so far tested by which the lactose is caused to crystallize results in the freeing of the fat. J. C. JURRJENS

Butter-fat test in condensed and evaporated milk. W. D. SWOPE, C. D. DAHLE AND F. J. DOAN. Penn. Agr. Expt. Sta., *43rd Ann. Rept. of the Director in Bull.* 258, 26(1930).—The method for sweetened condensed milk is that previously given (*C. A.* 24, 4869). In testing evapd. milk, excellent results were obtained by using 3 cc. of NH_4OH, 4 cc. of BuOH and 17.5 cc. of 1:1 H_2SO_4, added to 9 g. of evapd. milk. The fat column was measured, as for condensed milk, from the bottom of the lower to the bottom of the upper meniscus. This method also yields accurate results when used on *ice cream* and ice cream mixes. C. R. FELLERS

Sterilization of glass-lined tanks. F. M. SCALES AND HARRIET E. RUSSELL. *Food Ind.* 3, 120–1(1931).—Results indicate that glass-lined tanks which have been properly cleaned and rinsed and then sprayed with a Cl soln. contg. 225–250 p. p. m. of available Cl in an alk. NaOCl soln. will be sterile or nearly so 30 min. after being sprayed. Bacterial cultures obtained from non-sterile milk bottles were used in carrying on the expts. C. R. FELLERS

Advances in processing aid domestic casein. F. L. CHAPPELL. *Food Ind.* 3, 102–4 (1931).—Approx. 60,000,000 lb. of casein, 80% of which is consumed by the paper

trades, is annually consumed in the U. S. A casein low in both ash and acidity is required. A continuous process of manuf. from skim milk is described. Briefly, the casein is pptd. by HCl, the concn. being approx. 0.5%, at a temp. of 43°. The curd is broken up, washed, pressed and dried to 10–15% moisture content within a very few min. The quality of the domestic product is constantly being improved. C. R. FELLERS

Bacterial flora of some ice cream ingredients. R. W. NEWMAN AND A. E. REYNOLDS. Calif. Dept. Agr., *Monthly Bull.* 19, 677–83(1930).—Data are given for frozen egg yolks, fresh eggs, powd. eggs, powd. skim milk, gelatin, sugar, powd. cocoa, cold pack (frozen) strawberries and ice cream colors. C. R. FELLERS

Gelatin percentage can be reduced. E. O. ANDERSON, T. A. LYONS AND R. L. PIERCE. *Ice Cream Trade J.* 26, No. 11, 81–3(1930).—Ice cream of good body was secured with the grade of gelatin used when the precentage of gelatin was about 0.10% and the homogenizing pressure was 3000 lb. Apparently satisfactory ice cream contg. no gelatin was also obtained when the homogenizing pressure was 3500 and 4000 lb. By taking advantage of these data com. ice cream is now being prepd. in which the gelatin has been reduced to 0.10%. A. H. JOHNSON

Gelatin will not be replaced. B. E. HORRALL. *Ice Cream Trade J.* 26, No. 11, 80–1(1930).—Expts. were conducted in which it was attempted to replace gelatin in the ice cream mix by using high homogenization pressures. The results indicated that the lots with higher gelatin contents and lower homogenizing pressures were not so coarse or icy as lots with lower gelatin contents and higher homogenizing pressures. The smoothness in texture of the ice cream increased with the quantity of gelatin used. Water showed a tendency to drain out of mixes contg. the smaller quantities of gelatin. The lower the gelatin content of the mix the shorter was the time required to reach the desired overrun. In general, the work indicated that high homogenizing pressure would not entirely replace gelatin. A. H. JOHNSON

Consistency of Swedish butter. E. HAGLUND, G. WODE AND T. OLSSON. *Kgl. Landtbruks-Akad. Handl. Tid.* 69, 1147–72(1930).—The consistency of Swedish butter at different times of the year and from various districts, and factors causing these differences, were detd. The no. of samples was 413. Butter hardness was detd. by the Perkins method (*C. A.* 8, 1313) at 15°, av. of 6 impressions, expressed as the wt. in g. which the falling body must have for the rod to displace 1 cc. of butter. The I value of the butter was detd. also. Butter hardness varies considerably with the time of year, and that from different districts at the same time of year is different. These variations are caused by variations in I value of the fat and hence are due to feeding. Hardness decreases as I value increases. Fat with a given I value can give butter with varying degrees of hardness. Churning tests showed that permanent variations in butter hardness can be produced by manuf. methods. Long cooling of cream before churning increases butter hardness, as does long cooling of butter granules before working. Differences in degrees of butter hardness caused by methods of prepn. are as great as variations in hardness of collected samples of identical I value. E. M. SYMMES

A new relation for the determination of vegetable oils in butter. OSCAR DE SOUZA VIEIRA. *Rev. brasil. chim.* 2, 237–46(1930).—Taking into consideration the increasing use of babassú oil and other palmaceous oils in the adulteration of butter and paying particular attention to the relative meanings of the various indexes, S. V. studies the methods actually used for the discovery of such fraudulent mixts. Bromometry is not yet suited to the study of small quantities of vegetable oils. A valuable relation results from the great differences between the consts. of the insol. fatty acids (Polenske) and butyric and caproic acids (xylene) in various kinds of vegetable oils, principally palmaceous oils. Thus the relation (Polenske/xylene) × 100 is found to be 10 for the various kinds of butters and possibly 1529 for babassú oil. JOHN M. LADINO

Effect of method of preparation on the calcium content and consistency of cheese. GUNNAR WODE. *Kgl. Landtbruks-Akad. Handl. Tid.* 69, 1032–43; *Medd. Centralanstalt. försöksväsendet jordbruks., Mejeriförsök* No. 40, 14 pp.(1930).—There is a close relation between Ca content and body of cheese; the higher the Ca content the weaker the body, and vice versa. During cheese making the vat whey dissolves Ca from the curd. A loss of Ca is caused also by the whey removed during the pressing. The quantity of Ca dissolved from the curd by the vat whey increases, parallel to the acidity of the milk before setting. If the vat whey is sepd. quickly from the curd it dissolves less Ca. The quantity of Ca dissolved from cheese by press whey increases with increasing vol. and acidity of press whey. The total Ca dissolved by vat whey is considerably greater than that dissolved by the press whey. E. M. SYMMES

Bleaching, muddy discoloration and black-spot development in colored cheese.

G. F. V. MORGAN. *New Zealand J. Agr.* **42**, 35–6(1931); cf. *C. A.* **25**, 748.—Bleaching of annatto-colored cheese was traced to the reducing action of certain organisms, including *B. subtilis* and *B. fluorescens liquefaciens*, on the dye in the absence of an adequate supply of atm. O. Upon longer keeping the bleached areas acquired a muddy discoloration. Black discoloration was traced to the action of bacteria in reducing Pb salts present in the annatto coloring material. K. D. JACOB

Physicochemical investigations of vegetable juice. E. CANALS, J. CANAYE AND E. CABANES. *Bull. soc. chim. biol.* **12**, 1022–4(1930).—P, Ca, Mg, Na and K were detd. in the expressed juice and in the dialyzate from turnips, carrots, radishes, spinach, asparagus, peas, beets and 6 fruits. Practically all of the Na and K and over 90% of the P and Mg were removed by dialysis. Of the Ca 30–94% (av. 70) was removed. C. G. King

Maraschino cherries, their preparation and manufacture. E. H. WIEGAND AND D. E. BULLIS. *Glass Packer* **4**, 125–7, 134(1931); cf. *C. A.* **24**, 439.—For bleaching the raw unstemmed cherries (white sweet varieties) a soln. of 1.5% of SO_2 and 1.5% soln. of $Ca(OH)_2$ is used. The process is usually carried out in bbls. Excessive lime causes spoilage to occur from gas-forming and liquefying bacteria. Daily agitation of the bbls. is necessary to prevent the lime from settling out. The cherries keep practically indefinitely in this soln. The cherries are leached in cold water for about 20 hrs. to remove SO_2 and lime, stemmed and pitted, and finally dyed with erythrosin or mixts. of erythrosin and Ponceau in a slightly alk. soln. $NaHCO_3$ added at the rate of 7 oz. per bbl. is used to give proper reaction for dyeing. About 1 oz. of erythrosin per 100 lb. of liquid is used. The dye is set by acidifying with citric acid added at the rate of 1 lb. per 100 lb. of liquid. The cherries are now ready for the candying process, which consists of the gradual building up of a sirup concn. of 50–65% of sucrose. Oil of bitter almonds or BzH is universally used for flavoring purposes. Sterilization of the bottled product is carried out at a temp. of 180° for 25–30 min. C. R. FELLERS

Determination of formic acid in fruit juices. A. HANAK AND K. KÜRSCHNER. *Z. Untersuch. Lebensm.* **60**, 278–90(1930); cf. *C. A.* **24**, 4098.—Steam-distil with 0.3 g. of tartaric acid for 45 min. 10 cc. of the juice or 10 g. of the fruit sirup dild. to 20 cc.; the increase in the vol. in the distn. flask should not exceed 20 cc. Avoid overheating by the use of an asbestos shield and collect 400 cc. of distillate in just enough distd. water to cover the end of the adapter. Dil. the distillate to 500 cc., titrate 200 cc. of it and calc. the total free volatile acids. To 100 or 200 cc. of the distillate, according to the amt. of HCO_2H present, add the calcd. amt. of 0.5 *N* NaOH soln. required to neutralize the acidity, followed by 0.5–1.0 cc. in excess. Warm the mixt. for 10 min. to saponify any formic esters and then evap. with 0.2 g. of Na_2CO_3, without boiling, until 30 cc. remains. Add sufficient 0.2 *N* $KMnO_4$ (usually 3–5 cc.) so that an excess of 1–1.5 cc. is present. Oxidation is complete after 45–60 min.; then add 1 cc. of 10% $ZnSO_4$ soln. to flocculate any suspended matter, and dil. the soln. to 50 cc. and filter. Det. the excess of $KMnO_4$ colorimetrically by matching the color of 25 cc. of filtrate against that of a 0.2 *N* soln. of $KMnO_4$ in a colorimeter. The colorimetric method is sensitive to 0.1 cc. (equiv. to ±2.76 mg. of HCO_2H). The method gave accurate results on a variety of fruit juices. C. R. FELLERS

The manufacture of lime juice and its economic value. V. H. KULKARNI. *Poona Agr. Coll. Mag.* **22**, 88–92(1930).—The manuf. and preservation of lime juice in India are described. The yield of clear juice is about 40% of the wt. of the fruit. West Indian bottled lime juice contains about 5.6% citric acid while the av. Kagdi lime juice contains approx. 7.5%. K. D. JACOB

New method of enzymic clarification of unfermented apple juice. ZOLTAN I. KERTESZ. N. Y. State Agr. Expt., *Bull.* **589**, 3–10(1930).—A very active pectin-decompg. enzyme obtained from *Penicillium glaucum* is proposed as an agent for assisting in the clarification of apple cider. The enzyme can be prepd. from the mold in either solid or liquid form. The method of extn. is not given. Starches or proteins are not attacked by the enzyme prepn. in concns. of 0.5% acting at 55° for 10 hrs. The insol. matter which is formed by the decompn. of the pectin and is largely responsible for the cloudiness in cider is readily removed by filtration or centrifugation. The clear filtrate may be bottled and pasteurized for 20 min. at 76° without showing any change in flavor. In 1 test about 30% of the pectin was removed from cider by enzyme clarification. The method may have com. applications. C. R. FELLERS

Removal of spray residues from apples; a wax-solvent method. J. R. NELLER. *Ind. Eng. Chem.* **23**, 323–5(1931).—Winesap apples were dipped in various solvents to remove the exuded wax and the oil that had been added in the spray mixts. MeOH proved to be a desirable solvent and enabled the HCl wash effectively to remove arseni-

cal spray residues that could not be removed with HCl alone even when heated. The storage quality of the fruit was not impaired. Practical considerations of the method are discussed. J. R. NELLER

Composition of tomatoes and tomato products and the determination of water in these products. A. LEONHARD. *Z. Untersuch. Lebensm.* **60**, 185–95(1930).—The compn. of 34 samples of German and Italian tomato products is tabulated. After comparing the various methods of detg. dry solids in tomato products, L. prefers to det. the water directly by distn. with xylene. Place 5–10 g. of the well-mixed sample in an Al boat and dist. with 150 cc. of xylene in a 300-cc. Erlenmeyer flask on a sand bath. A delivery tube 350 mm. long, bent at an angle of 45°, leads into a vertical 150-cc. graduated receiver completely immersed in running water and closed except for a glass tube drawn out at 1 end to 2 mm. in diam. and inserted through a rubber stopper. The bottom of the receiver contains 1 cc. of 1:1 KOH soln., and 150 cc. should distil over in about 20 min. Remove any condensate from the delivery tube by application of a small flame, shake the contents of the receiver gently and read the vol. of the sepd. aq. layer after 2 hrs., deducting the 1 cc. of alkali originally present. Volatile oils are retained in the xylene. The results for dry matter were compared with those obtained by calcn. from the sp. gr. of the filtered aq. ext. In general, the dry solids obtained by the direct distn. method were 0.0–4.7% less than by the sp. gr. method; *i. e.*, the moisture results were probably a little high, especially for samples of the more liquid products. C. R. FELLERS

Converting wastes into profits. A study of what can be done with tomato pomace. EARL D. STEWART. *Food Ind.* **3**, 112–4(1931).—Tomato seeds contain approx. 18–20% of high-quality edible oil resembling cottonseed oil, solidifying pt. −9°. It contains about 45% olein and 34.2% linolein. Tomato pomace may be readily dried in a rotary air drier. The yield is 15 lb. per ton of tomatoes. The compn. is crude protein 21.0, crude fat 18.0, fiber 27.3, N-free ext. 24.9 and moisture 5.0%. The product is ground in a hammer mill. Although the taste is bitter, the product is suitable for *cattle feed*. Other products are considered briefly. C. R. FELLERS

Insect control in dried fruits. H. M. REED. *Food Ind.* **3**, 117–9(1931).—The use of cold storage, vacuum fumigation with CS_2 and CO_2, HCN, ethylene oxide and ethylene oxide-CCl_4 mixts. are advocated for preventing or destroying insect infestation in various dried fruits under varying conditions. C. R. FELLERS

Some properties of honey colloids and the removal of colloids from honey with bentonite. R. E. LOTHROP AND H. S. PAINE. *Ind. Eng. Chem.* **23**, 328–32(1931).—Honey samples contain 0.1–1% colloids, which exert a considerable influence on the properties of the honey. The particles have an isoelec. point at p_H 4.3, at which max. flocculation by diatomaceous earth and min. cataphoresis occur. Addn. of bentonite flocculates the colloids completely. K. V. THIMANN

Some organic acids in honey. E. K. NELSON AND H. H. MOTTERN. *Ind. Eng. Chem.* **23**, 335–6(1931).—The non-volatile acids were detd. by Hartmann and Hillig's method (*C. A.* **24**, 2208), the pptn. with $Pb(OAc)_4$ being checked with known mixts. of malic and citric acids in the presence of sucrose. Succinic acid is present in the more acid specimens. Volatile acids, mostly HOAc and HCO_2H, range from 0.01 to 0.05%, malic and citric up to 0.05 and 0.008%, resp. K. V. THIMANN

Ultra-violet absorption of honeys. J. STITZ AND J. KOCZKÁS. *Z. Untersuch. Lebensm.* **60**, 420–5(1930).—The Bunsen-Roscoe absorption extinction coeff. e is given in terms of the intensities of incident light I_o and transmitted light I, the concn. c, and the thickness of the layer of soln. examd. x by $(1/cx)\log(I_o/I)$. By means of the Judd-Lewis sector photometer and Hilger quartz spectrograph e was detd. for wave lengths λ of 5500 to 2350 A. U. from the measured values of $\log(I_o/I)$ with a relative error of ± 2.2%. A layer 1–4 cm. thick was used, the source of illumination being a W-Fe arc with electrodes 3 mm. apart in front of a 0.02-mm. slit. Absorption curves in which e is plotted as ordinate against λ, are shown for 6 varieties of genuine honey, a characteristic curve always being obtained with a sharp max. at 2700 A. U. corresponding with e = 0.13 to 0.145 for a 1-cm. layer of a 4.5–6.5% soln. Glucose, fructose and sucrose give higher absorption maxima than water but all are relatively low. For com. sucrose, e is slightly higher than in the pure product. Dextrin has a very high absorption at 2700–800 A. U. Addn. to honey of 22% of sucrose lowered e by 0.3. The total absorption of honey cannot be detd. from the individual absorptions of its sugar constituents alone, since the nature and concn. of the ash, coloring matter and proteins exert a considerable influence. C. R. FELLERS

Mushrooms should be packed in glass. C. G. HICKS. *Glass Container* **10**, No. 1, 8–9, 22(1930).—Darkening or oxidation of canned mushrooms is due solely to the

presence of O and not to the action of light. A weak citric acid brine is used in the prepn. to prevent darkening during the heat treatment, which varies from 30 to 45 min. at 240° F. C. R. FELLERS

Stem marrow kale fodder, its cultivation and yield. H. EDIN AND G. SUNDELIN. *Kgl. Landtbruks-Akad. Handl. Tid.* 69, 972–1013(1930).—Stem marrow kale has been used widely recently, but data on feed value, cultivation and yield are scarce and inadequate. The dry substance of fresh stem marrow kale is 11.5–15%. Leaves contain twice as much protein as the stalk, and considerable fat. The org. substance was crude protein 16.4, fat 3.1, fiber 18.5, N-free ext. 62.0 and true protein 10.9%. The org. substance was about 86% of the dry substance. Digestibility coeffs. of late harvested kale were crude protein 75, fat 66, fiber 48, N-free ext. 88, carbohydrates 81, org. matter 78 and true protein 67. Fresh stem marrow kale contains about 95 feed units per 100 kg. of org. matter, 7.5 kg. of digestible protein, and 68 starch equivs., whereas dried kale has 66 feed units. The numerical value is 87–91 for fresh kale and 76 for dried kale. For cattle feeding, grinding or cutting is unnecessary, but the milk may have the taste of kale. Sheep eat stem marrow kale, but coarse stalks must be crushed. Pigs eat leaves without grinding, then eat stalks later. For 50 kg. body wt., 5 kg. of kale per day may be fed pigs, but this fodder is not a fattener. Poultry will eat cut kale, as a supplementary, rich vitamin food. Detailed instructions for cultivation of stem marrow kale are given. E. M. SYMMES

The camelthorn (Acacia giraffae, Burch). J. S. HENKEL. *Rhodesia Agr. J.* 28, 71–3(1931).—The pods of camelthorn are eagerly eaten by elephants, giraffes and other wild animals in Africa. Their compn. is: H_2O 9.4, acid-sol. ash 3.3, ether ext. 1.6, fiber 31.0, crude protein 11.4, CaO 0.9, P_2O_5 0.24 and K_2O 1.3%. A. L. MEHRING

Experiments in spray residue removal (STREETER, *et al.*) 15. A study of arsenical residue on apples in Pennsylvania (HODGKISS, *et al.*) 15. Importance of microbiology [in study of milk and its products] (CAZI) 15. Life and work [on ice cream] of the late Professor A. C. Baer (BECKER) 2. Proteins of Indian foodstuffs (NARAYANA) 11D. Influence of neutral red on respiration [of bakers' yeast] (GEIGER-HUBER) 11D. Rust resistance in wheat (HANNA) 11D. The antagonistic substances formed during bacterial fermentation (KLEIN) 11C. Apparatus for pasteurizing milk or other liquids by "holding process" (U. S. pat. 1,792,328) 1. Vacuum tank and heated tube system for condensing milk or other liquid products (Brit. pat. 335,964) 1. Continuous process for sterilizing milk or other liquids under pressure (Brit. pat. 337,027) 1.

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"Cerco"—Proceedings of the First International Conference on Flour and Bread Manufacture, in Prague, September 22, 1927. Edited by FRANCIS HRUŠKA. Prague: "Cerco." 578 pp. Reviewed in *Cereal Chem.* 7, 193(1930).

Index to the Literature of Food Investigation. Vol. II, No. 2. Compiled by AGNES E. GLENNIE. London: H. M. Stationery Office. 89 pp. 2s. Reviewed in *Food Manuf.* 6, 84(1931).

LABBÉ, HENRI: **Le cacao et le chocolat au point de vue alimentaire et hygiénique** Brussels (19, Rue des Chartreux): Secrétariat général du Congrès international des fabricants de chocolat et de cacao. 24 pp.

OLIVAN, NICASIO: **Industrias de la leche.** Barcelona: Cervantes. 204 pp.

Preserving food. FRITZ WALTER RAUTH and WILHELM SCHEFFER. Fr. 694,527, April 25, 1930. Packing materials for food are coated with a mixt. of glycerol, a colloid such as agar-agar and water.

Preserving foods. ERICH FREUND. Fr. 695,096, May 5, 1930. Foods are preserved by heating them in a soln. of agents, such as salts of open-chain hydroxy acids, which facilitate the swelling of the dried products. Examples are given of the use of Na lactate and gluconate.

Conserving foodstuffs. RICHARD WILLSTÄTTER. Ger. 513, 656, Jan. 22, 1929. Animal and vegetable foodstuff is conserved by addn. of not less than 0.004% vol. of HCN in closed vessels. Thus, meat is kept fresh for 6 weeks at 20° with 120 to 300 mg. HCN to 5 kg. of meat in a 100 l. vessel.

Vitamin food. LAURENT M. RAYBAUD. Fr. 694,443, July 24, 1929. The vitamins in germinated seeds, whole or ground, are preserved by a coating of sugar chocolate, etc.

Hydrolyzed protein products. CHARLES N. FREY (to Standard Brands, Inc.). Can. 308,910, Feb. 24, 1931. Hydrolyzed protein substances high in assimilable N are made by hydrolyzing a protein-contg. substance with H_2SO_4, neutralizing a portion of the H_2SO_4 with CaO, sepg. the ppt. and neutralizing a further portion of the acid with aq. NH_3.

Flour. METALLGES. A.-G. Fr. 694,666, April 29, 1930. Flour for cooking purposes is improved by adding to the flour or to the cereal before grinding, perphosphates up to 2.5% or more of the wt. of the flour, so that besides O for the bleaching, there remains in the phosphate an amt. of O sufficient to have a raising action on the flour during baking.

Dough-bleaching agents comprising bean flour, etc. D. VERON. Brit. 335,943, July 3, 1929. A dough-bleaching agent is prepd. by treating fresh untreated legumes contg. carotin-removing enzymes with a green malt infusion, drying the treated material at a low temp. and grinding. NH_4 or Ca phosphates (3%) may be added to the infusion before use or similar mineral salts may be added to the bean flour in larger proportion, to form a composite yeast food and bread improver. Cf. *C. A.* **24**, 1676.

Bread. OTTO GRAUL. Ger. 516,268, July 27, 1928. In the manuf. of bread of relatively low carbohydrate content by baking a mixt. of rye bran or groats with fresh wheat gluten, sterilized white of egg is added to the leaven.

Yeast product. CHARLES N. FREY, ELMER B. BROWN and COLGATE CRAIG (to Standard Brands, Inc.). Can. 308,908. Feb. 24, 1931. A food product is prepd. by heating a mixt. of 4 lbs. of yeast, 35 cc. of HCl (d. 1.19), 10 cc. of lactic acid (85%) and 2.5 cc. of phosphoric acid (85%), hydrolyzing the mass, sepg. the residue and evapg. the ext., neutralizing the excess of acid and admixing flavoring ingredients prior to the completion of the evapn.

Yeast product. CHARLES N. FREY, ELMER B. BROWN and COLGATE CRAIG (to Standard Brands, Inc.). Can. 308,909, Feb. 24, 1931. A food product is prepd. by heating a mixt. of 4 lbs. of yeast, 35 cc. of HCl (d. 1.19) and 23 cc. of lactic acid (85%), hydrolyzing the mass, sepg. the residue and evapg. the ext., the excess of the acids being neutralized prior to the completion of the evapn.

Yeast product. CHARLES N. FREY, ELMER B. BROWN and COLGATE CRAIG (to Standard Brands, Inc.). Can. 308,911, Feb. 24, 1931. A food product is prepd. by hydrolyzing 4 lbs. of compressed yeast with 40 cc. of HCl (d. 1.19) and 10 cc. of H_3PO_4 (85%) in an autoclave at 15–20 lb. pressure for 3 hrs. The ext. is sepd. and the residue evapd. to a pasty consistency of d. 1.4. The acidity may be neutralized with soda; a favorable final reaction is approx. neutrality to litmus.

Baking powder. WILLIAM E. STOKES and REGINALD A. WRIGHT (to Royal Baking Powder Co.). Can. 308,902, Feb. 24, 1931. A baking powder comprises $NaHCO_3$ 300, $Ca(H_2PO_4)_2$ 33, Na H pyrophosphate 405 and starch 262 parts.

Testing milk. N. GERBER'S CO., G. M. B. H. Ger. 516,423, April 15, 1928. To det. whether udder disease is affecting the compn. of the milk, samples from each of the four quarters of the udder are treated with an indicator, preferably bromothymol blue, and then compared one with another.

Ozonized acetone. CHEM. FAB. VON HEYDEN A.-G. (Georg Schroeter, inventor). Ger. 495,021, Nov. 18, 1927. A product contg. active O is prepd. by treating acetone with ozonized O or ozonized air until an acid reaction has developed. The product is useful as a *reagent for distinguishing boiled from unboiled milk*, since a drop of the product added to milk that has been treated with ext. of guaiacum wood or resin gives a blue color with raw milk but no color with boiled milk.

Apparatus for pasteurizing milk in bulk. CHARLES E. NORTH (to Creamery Package Mfg. Co.). U. S. 1,791,511, Feb. 10. Structural features.

Emulsifying apparatus suitable for use with milk and butter. L. S. RICHARDS, E. M. RICHARDS and CREMAC MARKETING CO., LTD. Brit. 335,949, April 4, 1929. Mech. features.

Apparatus and system of operation for continuous freezing of food materials such as ice cream. CLARENCE W. VOGT (to Vogt Instant Freezers, Inc.). U. S. 1,791,772–3–4, Feb. 10. Mech. features.

Butter and margarine. UNILEVER N. V. Fr. 694,770, April 30, 1930. Butter and margarine of good keeping qualities are made by bringing the H-ion concn. of the aq. constituent to above 5.

Margarine. J. D. RIEDEL-E. DE HAËN A.-G. Ger. 516,119, July 28, 1926. The incorporation of lecithin and other phosphatides into margarine is effected by dissolving

the phosphatides in oxidized or polymerized oils, and incorporating the soln. with the margarine. Thus, lecithin 1 part and an oxidized unsatd. oil 4 parts may be dissolved in ether, the soln. evapd. and the product incorporated into margarine.

Cheese. SWIFT & Co. Ger. 513,666, Jan. 6, 1925. Emulsified cheese is produced by treating the pulverized cheese with an emulsifying agent, sterilizing and finally emulsifying without heating.

Conserving meat, etc. OTTO SINDL. Ger. 513,716, Oct. 27, 1927. The meat, etc., is treated with the condensed products passing over from a wood distn. at about 400°, the tar oil, MeOH and acid having been removed.

Cake, pastry, etc. POMOSIN-WERKE G. M. B. H. Ger. 516,363, Nov. 2, 1929. The deterioration of cake, pastry, etc., into a dry and stale condition is retarded by thoroughly incorporating pectin into the cake, etc., mixt. Examples are given.

Jams, marmalade, etc. A. W. BEACH. Brit. 336,321, July 22, 1929. In making jams, marmalade, conserves, confectionery, etc., the sugar is added in the form of an aq. soln. (preferably contg. 40% or more sugar) obtained by lixiviation or diffusion treatment of the sugar beet, followed by concn. and purification and decolorization.

Tea extracts, etc. O. STROBACH and P. A. WICKMANN. Brit. 335,901, July 1, 1929. Tea leaves are treated with an org. solvent (such as petroleum ether, pentane, $CHCl_3$ or ether), the solvent is removed to leave a dark green paste, and from the latter the chlorophyll, fat and wax-like components are removed by treatment first with 70–80% alc. and then with a solvent such as petroleum ether, and a tea-aroma residue is obtained by distg. off the last-mentioned solvent. A fat, oil or wax may also be used as a solvent by allowing the tea leaves to stand with it for a sufficiently long time. The tea paste may be dild. with sugar to deposit the tea aroma on the latter, and caffeine and tannic acid exts. may be added, prepd. from tea leaves remaining in the extn. app. Tablets may be prepd. from the product and it may be mixed with candy, chewing gum, milk or other edible substances.

Apparatus for drying tea. J. A. MAIN. Brit. 336,619, June 14, 1929. Structural features.

Alimentary salt. P. WOOG. Brit. 336,279, Feb. 18, 1929. Solns. contg. Mg salts are added to solid NaCl to give proportions similar to those of salts from sea water and the wet mixt. is dehydrated as described in Brit. 319,203 (*C. A.* **24**, 2513). Org. Mg salts may be used and some of the Mg may be in the form of insol. salts or finely divided or colloidal material.

Food for animals. R. A. LEGRENDRE. Brit. 336,014, Nov. 3, 1928. Preservation of feeds such as straw, bran or oats mixed with molasses is facilitated by adjusting the p_H of the contained moisture to a value between 6 and 11 by the addn. of various substances effective for this purpose.

Preserving green fodder. GUSTAV FINGERLING. Ger. 513,557, Nov. 20, 1925. Green fodder is treated with a Cl-evolving electrolyte, *e. g.*, NaCl soln. and subjected to electrolysis. The cathode is surrounded by a diaphragm. App. is described.

13—GENERAL INDUSTRIAL CHEMISTRY

HARLAN S. MINER

European laboratories for the testing of materials. FRANKLIN L. EVERETT. *Mech. Eng.* **53**, 201–4(1931). E. H.

Drying the output of the chemical plant. RALPH BECKER. *Chem. Met. Eng.* **38**, 34–6(1931).—A survey of commercial drying equipment and applications. L. W. T. CUMMINGS

The heating and drying of granular materials by convection. W. GILBERT. *Engineer* **150**, 500–2, 530–2, 574–5, 617–9, 640–2(1930).—A study of the rate of heat transfer from hot gases to granular lumps of *coal, cement, clay*, etc., under varying conditions of lump size, gas velocity and gas temp. Graphs and formulas are given from which the rate of drying over a wide range of conditions can be calcd. D. B. DILL

The economy of hot-air drying with regard to the highest permissible temperature of the product to be dried. ÖDÖN VAJDA. *Chem. Fabrik* **1930**, 25–7; cf. *C. A.* **24**, 3066.—The results of calcns. of the heat consumption and power requirements for air circulation in parallel and counter-current driers and the lowering of the vapor pressure of hygroscopic materials as a function of the water content are shown on 4 charts. J. H. MOORE

Hydrogen in modern industry. RENE DUBRISAY. *Science ind.* 1929; 323–4. E. J. C.

Dust and air filtration. R. C. ROWE. *Can. Mining J.* **52**, 192–6(1931).—The advisability of filtering air for various machines is emphasized. Types of dusts and advantages gained by filtration are pointed out. The amount of filter surface is important. W. H. BOYNTON

The theory of rectification in packed columns. E. KIRSCHBAUM. *Chem. Fabrik* 1931, 38–40, 51–3, 63–5; cf. *C. A.* **24**, 4194.—A math. method is developed for calcg. the height and diam. of packed towers, which takes into account the phys. properties of the mixt. and quantities rectified. It has the advantages that in most cases the results may be obtained graphically, and a chart shows curves for detg. the height of intermittent and continuous towers. J. H. MOORE

Moisture in technical gases. II. Application of moisture calculations. FRIEDRICH LÜTH. *Arch. Eisenhüttenw.* **4**, 185–92(1930); cf. *C. A.* **24**, 2814.—After a discussion of the practical application of moisture calcns., various methods for measuring the moisture content of gases are described, among them the wet and dry bulb method, the pressure-temp. method, direct weight method and Haar hygrometer. H. STOERTZ

Chemical warfare. MICHELE GIUA. *Rivista chim. sci. ind.* **1**, 170–8, 193–201, 240–51, 266–72, 289–306, 321–60(1930).—Chem. and phys. properties, toxicity, uses and manuf. of poison gases used in the World War are described. E. M. SYMMES

Apparatus for defense against toxic gases. R. MARCILLE. *Compt. rend.* **192**, 382–4(1931).—The principle of the app. is as follows: respiration takes place in a closed bell; the expired air is passed into a soda soln. which absorbs the CO_2, the diminished vol. of air being supplemented by pure O from a small tank of compressed gas. Such an app. weighing 10 kg. maintains comfortable respiration for one person for 2 to 3 hrs. The app. is inexpensive and light in wt. and may also be made of sufficient size to protect several people at the same time. ALBERT L. RAWLINS

Chemical reactions in the oxygen isolation mask. ALBERT HLOCH. *Z. ges. Schiess-u. Sprengstoffw.* **25**, 379–81, 422–5(1930).—A discussion of the chem. reactions involved and the chem. problems to be solved in the design of a practical isolation-type gas mask. As fillers the alkali superoxides do not furnish sufficient O, and hence a small auxiliary O container is necessary. Other principal objections to this type of filler are: (1) the high temp. of the air entering the lungs and (2) the high breathing resistance of the canister. The alkali superoxides discussed are Na_2O_2, K_2O_4 and a mixt of the two, or $KNaO_3$. A newer type of filler contains alkali chlorates (cf. *C. A.* **24**, 5086). The reaction which furnishes O is started by a type of ignition which results in an initial burst of O which then continues at a rate sufficient for the needs of respiration. This filler is free from the objections cited against the alkali superoxide fillers. A. L. KIBLER

Burning accident from sodium chlorate. J. W. DEEM. *New Zealand J. Agr.* **42**, 55(1931).—Clothing worn during spraying with $NaClO_3$ for weed eradication should be washed free of all traces of the salt before being exposed to an open fire. In one case, failure to observe this precaution resulted in severe burns on the lower limbs. K. D. JACOB

Insulation for high temperatures. E. F. ZEINER. *Power* **73**, 104–6(1931).—Thermal conductivities of furnace-insulating materials and of insulating cements are compared. D. B. DILL

The thermal properties of ammoniates and analogous compounds and their use in absorption refrigerating machines (PLANK, VAHL) **2.** Heat transfer in liquid NH_3 (HIRSCH) **2.** Determination of the local strength of fabrics, felts, paper, etc. (SCHUBERT) **1.** Solid CO_2 from Mexico (MARTIN) **18.** Porous material for heat insulation, etc. (Brit. pat. 336,318) **18.**

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Gran enciclopedia de Química industrial. Química de Muspratt. Suplemento II. Barcelona: Francisco Seix. 332 pp. Ptas. 21.50; bound, Ptas. 30.50. Cf. *C. A.* 24, 2514.

KIEFER, PAUL J., AND STUART, MILTON C.: **Principles of Engineering Thermodynamics.** New York: John Wiley & Sons. 545 pp. $4.50. Reviewed in *Mech. Eng.* 53, 243(1931).

Separation of gas mixtures. GES. FÜR LINDE'S EISMASCHINEN A.-G. ABT. GASVERFLUSSIGUNG. Ger. 513,683, Apr. 20, 1929. Addn. to 490,878 (*C. A.* 24, 2214) Gas mixts., such as air, are resolved into components by liquefaction and fractional evapn. in an app. such as described in 490,878, but in which the heat-exchangers and storers are modified. Cf. *C. A.* 24, 5117.

Gas reactions or purifications. COMPAGNIE INTERNATIONALE POUR LE FABRICATION DES ESSENCES ET PETROLES. Fr. 694,997, Aug. 2, 1929. In treating gases or vapors with catalytic or purifying agents a cylindrical or annular chamber closed at both ends is used, in which the catalyst or purifying agent is placed between 2 perforated partitions which allow a free space at each end for the gas. Perforated tubes for the admission of a reactivating agent and perforated tubes for the exit of the gases formed during the reactivation run through the mass parallel to the axis of the chamber.

Separation of dust from gases. WOODALL-DUCKHAM (1920), LTD., and A. M. DUCKHAM. Brit. 336,201, June 6, 1929. Sepn. of suspended matter from a gas, such as that resulting from the passage of air through a bed of coal and shale for stratification and removal of impurities, is facilitated by adding a gas or vapor such as steam or a liquid spray and so altering the relative ds. of the gas and dust and in some cases causing cohesion of the dust by wetting. Various details of procedure and control of the treatment are described, including an automatic control for the admission of the steam or other treating agent.

Separating fatty or waxy substances from solutions. DEUTSCHE GASOLIN A.-G. (Johann K. Pfaff, Kurt Böttger and Adolf Sieweke, inventors). Ger. 516,401, May 17, 1927. See Fr. 677,385 (*C. A.* 24, 3110).

Emulsions. DEUTSCHE HYDRIERWERKE A.-G. Ger. 513,813, Jan. 17, 1929. Addn. to 512,979 (*C. A.* 25, 1303). In emulsifying substances insol. or only slightly sol. in water, the emulsifying agent of 512,979 is replaced by the reaction products of the esters of monobasic org. acids and alcs. of high mol. wt., with polybasic org. acids. Thus, olein alc. is esterified with AcOH in the presence of H_3BO_3 and the product treated with adipic acid. The product is used to emulsify peanut oil or other neutral oils in the presence of a small quantity of NaOH. Another example is given.

Moistening pulverulent materials. OTTOKAR URBASCH. Austrian 120,160, June 15, 1930. A uniform and still pulverulent product is obtained by treating the materials with the vapor or spray of the moistening liquid in a rotary drum having loosed or fixed subdividing means. The treatment of stone dust, foundry sand, flue dust, fine ores and cement is referred to.

Separating lump materials according to their behavior toward rays of short wave length, including Röntgen, cathode or ultra-violet rays. FRIED. KRUPP GRUSONWERK A.-G. Ger. 516,130, July 27, 1927.

Sterilizing closed vessels. ARTHUR VONDRAN. Ger. 513,632, Mar. 27, 1928. A reversible air or gas current moistens and carries around the disinfecting agent.

Canister construction for breathing apparatus. R. H. DAVIS. Brit. 336,674, July 19, 1929.

Use of sodium peroxide and similar compounds in cartridges of respiration apparatus. DEUTSCHE GASGLÜHLICHT-AUER GES. and HANSEATISCHE APPARATEBAU GES. VORM. L. VON BREMEN & CO. Brit. 337,170, Nov. 7, 1928. In app. of this character, of closed-circuit type, evolution of O is effected at the commencement of breathing by the introduction into the app. of a gaseous acid such as CO_2 or HCl (which may be generated from an effervescent powder or supplied in suitable flasks). Various details of app. are described.

Refrigerating agents. K. BERGL. Brit. 336,557, June 11, 1929. In a refrigerat-

ing system employing in open circuit an aq. NH_3 soln., the NH_3 vapors are absorbed on exhaustion in a liquid such as H_2SO_4 which converts them into a non-volatile form. Various details of app. and operation are described.

Absorbent for use with ammonia in refrigerating apparatus. HARRY F. SMITH (to Frigidaire Corp.). U. S. 1,791,515, Feb. 10. A mixt. of $SrCl_2$ and $LiNO_3$ is used as an NH_3 absorbent.

Insulators. I. G. FARBENIND. A.-G. Fr. 694,151, April 18, 1930. Elec. conducting wires are insulated by filaments obtained by the hardening of polymerization, condensation or transformation products of butadiene hydrocarbons no longer elastic or extensible.

Insulators. I. G. FARBENIND. A.-G. Fr. 694,425, April 25, 1930. The condensation products obtained from ethers or thioethers of dicarboxylic acids and polyhydric alcs. described in Fr. 685,565 (*C. A.* **24**, 6041) are used as insulators in elec. machines and app.

Insulating material. GUSTAV OEDER. Fr. 694,644, April 28, 1930. A sound- and shock-insulating material is composed of a vulcanized oil mixed with MgO, cumar, etc.

Heat-insulating material. I. G. FARBENIND. A.-G. Brit. 336,163, March 11, 1929. See Fr. 691,068 (*C. A.* **25**, 1304).

Waterproofing materials and manufacture of electrical insulation. R. C. NEVILLE. Brit. 336,731, Aug. 29, 1929. Articles such as those of asbestos, asbestos cement, clay or the like are impregnated with coal tar, tar oil, pitch or similar material, dried and immersed in a soln. of CH_2O and phenol, and finally heated to 230° for 3–12 hrs. Various details and modifications of procedure are described.

Heat- and sound-insulation. M. CASES. Brit. 336,440, Oct. 24, 1928. The residue of the combustion of rice chaff is used (suitably in the proportion of 50% or more) with other materials such as asbestos, "silicate wool" and a small proportion of binding substances such as starch or fused silicates, or with clay and granulated cork, etc. Cf. *C. A.* **24**, 5087.

14—WATER, SEWAGE AND SANITATION

EDWARD BARTOW

Potable and industrial water 1924–1929. Advances, processes, literature. H. BACH. *Chem.-Ztg.* **55**, No. 17, *Fortschrittsber.* No. 1, 1–29(1931). E. H.

Water supply conditions at Sweetwater, Texas. H. N. ROBERTS. *Proc. 12th Texas Water-Works Short School* 27–30; *U. S. Pub. Health Eng. Abstracts* **11**, W, 15(Jan. 31, 1931).—The new Bitter Creek supply of $2^1/_2$ million gals. per day plus a ground supply of 2 million gals. furnishes water of good quality for 11,000 people. Rapid filtration is used. C. R. FELLERS

Water works of the City of Mexico. EDUARDO MELINA, ANTONIO CORNEJO AND ALFONSO V. ACOSTA. *Southwest Water-Works J.* June, **1930**, 11–7; *U. S. Pub. Health Eng. Abstracts* **11**, W, 7(Jan. 24, 1931).—The source of the water is at Xochimilco Springs, about 20 miles south of the city. Because of previous occasional contamination, a dosage of 0.1 p. p. m. of Cl is now added. The present supply is to be enlarged to a capacity of 100 million gals. per day. C. R. FELLERS

Development of ground water supplies. R. O. JOSLYN. *5th Ann. Rept. Missouri Water and Sewerage Conf.*, 64–71; *U. S. Pub. Health Abstracts* **11**, W, 15(Jan. 31, 1931).—Of 200 water supplies in Missouri, 66% use ground water as a source. Drilled wells are more economical and less likely to become contaminated than dug wells. Complete sealing out of water from contaminated or otherwise unfavorable strata is essential. C. R. FELLERS

Analysis of the water and deposits from the springs of the "baths of Basna" (district of Tarnava-Mica). J. DICK. *Bul. soc. stiinte Cluj* **5**, 330–43(1930).—Analytical data are given. J. H. REEDY

The nitrogenous compounds in sea water—methods for their study. J. GIRAL. *Rev. acad. ciencias Madrid* [2], **25**, No. 10, 203–19(1930).—Attention is called to the wide variety of types of nitrogeneous compds. present in sea water. A review is given of the existing methods which might be applied to the study of the following classes of N compds.: free N, NH_3, nitrites, nitrates, albumins, total N and org. N compds. other than those mentioned. No exptl. data are given and no new methods are suggested. JOHN B. ENTRIKIN

The Hardershof water-purification plant at Königsberg. G. SATTLER AND R.

BRUCHE. *Gas u. Wasserfach* **74**, 73–6, 101–4, 128–32(1931).—A new water-purification system was constructed at the Hardershof waterworks of Königsberg in 1929 and 1930, and details of the system and its operation are given, with numerous illustrations. The yellow raw water is softened with lime water and clarified and decolorized by adding 30–60 mg. alum per l., followed by rapid filtration through a quartz-sand filter after a settling period. The older slow sand filtration plant is still in use. Daily detns. of color, hardness, free CO_2, p_H and permanganate requirement are made before, during and after treatment. Bacterial tests also are made. A clear and almost colorless water is obtained from the badly colored ground water. R. W. RYAN

An interesting water-purification change. OTTO REGEL AND ALBERT WICKLEIN. *Chem. App.* **17**, 207–8(1930).—A summary of changes made in a soda-lime water-softening system and the results obtained are given, including costs. M. C. ROGERS

Sterilization of water by metals. F. DIENERT AND P. ETRILLARD. *Compt. rend.* **192**, 185–7(1931); cf. *Compt. rend.* **136**, 707(1903); Lakhovsky, **188**, 1069(1929).—Previous work has shown the efficiency of Ag, Zn and Mg in destroying the microorganisms in water. The expts. here reported show that water is freed from *B. coli*, pathogenic organisms, and liquefying bacteria by passing it over a prepn. called silver sand or by agitating it with the silver sand. The organisms disappear more rapidly from water at 37° than at a lower temp. The presence of NaCl in the water retards the process of bacterial destruction. It is shown that water thus treated contains less than 0.003 mg. of Ag per l. N. M. NAYLOR

Experience with the lime-baryta process. A. FREDERKING. *Die Wärme* **53**, 943–9(1930).—The results of a no. of investigations on water-purification installations are presented. The effect of the addn. of lime and baryta, and the limit of softening are detd. ALLEN S. SMITH

Boiler-water conditioning. A Pittsburgh development. J. N. WELSH AND H. A. JACKSON. *Proc. Eng. Soc. West. Penn.* **46**, 327–42(1930); cf. *C. A.* **21**, 3407.—Success in boiler operation at high pressures depends upon the timely and correct analysis of the constantly changing boiler H_2O. Fundamental requirements of boiler H_2O conditioning establishes that a sufficient amt. of dissolved material (carbonate or phosphate) must be maintained to give chem. equilibria; all org. or saponifiable material must be eliminated and a min. concn. of solids in feed H_2O be maintained. Numerous specific examples, from the Pittsburgh area, of such conditioning are cited. EDWARD S. HOPKINS

Determining the quality of boiler-feed water by the electrical method. YU. M. KOSTRIKIN. *Izvestiya Teplotekh. Inst.* (*Trans. Thermo-Tech. Inst., Russia*) **1930**, No. 2, 27–32.—The performance of the Leeds-Northrup instrument of Philadelphia is described. A. A. BOEHTLINGK

Purification of sea water for boilers. I. SHIK AND G. TOROSYAN. *Azerbaidzhanskoe Neftyanoe Khozyaĭstvo* **1930**, No. 10, 104–8.—Prevention of $CaSO_4$ formation is of primary importance. Ninety-five % of the Ca is pptd. by treating 100 cc. of water with 0.317 g. Na_2CO_3. Fair results are obtained even with 0.075% Na_2CO_3. V. KALICHEVSKY

The study of the fouling of steam turbine paddles. JULES ERNOULD. *Chaleur et Ind.* **11**, 178–80(1930).—Two 4500-kw. turbines running on steam at 14–15 kg. at 320° suddenly gave trouble after some years of satisfactory performance, by blade fouling in 2 weeks so that the rotor was quite out of balance. Two analyses of the deposits are given, the major constituents being CO_2, CaO, Fe_2O_3 and SiO_2. It was concluded that the trouble was due to the boiler feed waters. Finally this was held at 40–45° of alky., *i. e.*, about 2 g. per l. Some discussion is given as to how the deposits arose and also a description of the kind of corrosion seen in the steel tubes of water reheaters. S. L. B. ETHERTON

Practical operation of sewage works. C. E. KEEFER, *et al. Civil Eng.* **1**, 91–4 (1930).—This is a committee report and subsequent discussion before the Sanitary Eng. Div. Amer. Soc. Civil Eng. The report is a general review of sewage-plant operation and outlines principles for proper procedure. The detailed tests for control purpose are given together with suggestions as to the reporting of cost data, etc. The discussion, showing wide variance in personal opinion, was based upon the value of the various detns. and their relationship to the problems in question. EDWARD S. HOPKINS

The simple facts about sewage treatment. GEO. G. NASMITH. *Can. Pub. Health J.* **22**, 70–6(1931).—A discussion of sewage treatment, with particular reference to the North Toronto activated-sludge plant, which treats a normal dry-weather flow of about 4 million gallons per day from a residential district of 56,000 people. The plant consists of a storm-water tank, bar screens, primary settling tanks, aeration tanks in which rising air bubbles give the sewage a spiral motion, final settling tanks, sludge-digestion

tanks and glass-covered drying beds. The effluent is non-putrescible and contains 15–20 p. p. m. suspended matter, its quality being better than that of the Don River, into which it flows. The primary and activated sludges are continuously digested together, the 30,000 cu. ft. of gas collected being employed for heating the incoming sludge and for lab. purposes. Digestion is complete in a month. The digested sludge contains 50% org. matter and approx. 3% N_2, and is odorless. R. E. THOMPSON

Sewage-reclamation plant for Los Angeles. R. F. GOUDEY. *West. Construction News* **5**, 519–25(1930); *U. S. Pub. Health Eng. Abstracts* **11**, S, 10(Jan. 17, 1931).—In order to study sewage reclamation, the City of Los Angeles placed in operation in May, 1930, an exptl. sewage plant of 200,000-gal.-per-day capacity. The problems to be studied are outlined. C. R. FELLERS

Modified form of Imhoff tank used in four Oklahoma towns. FRANK B. KING. *Eng. News-Record* **106**, 112(1931).—General practice of allowing 15–20% of top area for gas vents is probably satisfactory where there is daily supervision or mech. means is employed to break up the scum, but experience has indicated that a greater area must be allowed for gas vents in installations where little attention is paid to operation. In modified type of tank employed in 4 towns in Oklahoma, 60% of the top is left for scum accumulation, the sludge bed being placed nearby to allow the scum to be thrown from the tank with a fork when excessive amts. interfere with escape of the gas. R. E. T.

Thermophilic digestion of sewage solids. IV. Fresh solids and activated sludge. WILLEM RUDOLFS AND H. HEUKELEKIAN. *Ind. Eng. Chem.* **23**, 67–9(1931); cf. *C. A.* **25**, 157.—Digestion of lab. samples of daily addns. of fresh and activated sewage solids was accomplished at 50° in the short period of 2.1 days, seeding materials produced under similar thermophilic conditions having been used. These expts. indicate that a daily charge of 50% volatile matter as fresh sludge can be assimilated. The sludge so obtained had all of the characteristics of well-digested material. Additional work is to be conducted on a semi-plant scale. EDWARD S. HOPKINS

Dewatering sewage sludge on glass-covered sand beds. G. C. HOUSER. *Munic. Sanit.* **2**, 69–70(1931).—Glass-covered beds afford means of at least partially controlling odors from drying sludge. By protecting the sludge from rain the area can be reduced as much as 50%. G. L. KELSO

Separate sludge-digestion plant at Toledo mechanically operated throughout. HARVEY P. JONES. *Eng. News-Record* **106**, 389–92(1931).—A description is given of what is stated to be the world's largest mechanically operated sep. sludge-digestion plant, now under construction at Toledo, Ohio. Treatment will include prechlorination, coarse screening, grit removal, sedimentation, sep. sludge digestion and sludge drying Mech. equipment will provide for automatic cleaning of coarse screens, continuous cleaning of grit chambers, continuous sludge removal from sedimentation tanks, skimming of scum and oil from the latter, and agitation of sludge during digestion. The plant, which is the final step in a 14-year program for cleaning up the Maumee River, is designed to serve the 1950 population of 600,000, contributing a mean daily flow of 80 million gallons. Prechlorination will be employed to eliminate odors and reduce the bacterial load, the chlorination plant being designed for an ultimate capacity of 18,000 lb. of Cl_2 per day, equiv. to a dosage of 15 p. p. m. based on the max. dry-weather flow of 140 million gallons per day anticipated in 1950. The screenings will be destroyed at the municipal incineration plant. Digestion tank capacity equiv. to 2.23 cu. ft. per capita will be provided, including 6 months' sludge storage during the winter. The gas formed will be collected in domes and utilized for maintaining the optimum digestion temp. Provision is also being made for maintaining the p_H value of the sludge at the optimum for digestion. The drying beds will be glass-covered, the space provided being equiv. to 0.25 sq. ft. per capita. The dried sludge will be used for reclaiming low-lying ground. The cost of the plant was estd. at $1,971,000 and the actual bids were approx. 5% lower. R. E. THOMPSON

The influence of chlorine on an activated-sludge process. H. D. BELL. *The Surveyor* **79**, 217–8(1931); cf. *C. A.* **24**, 1450.—Since bleaching powder is cheaper than liquid Cl for small plants, it was used to reduce the load on the bio-aeration unit. Twenty % increase in plant capacity resulted from chlorination. The final effluent showed an av. of 2.0 p. p. m. of nitrate N, thus showing that putrefaction was decreased by Cl treatment. A. L. ELDER

Filtering materials for trickling filters. WM. E. STANLEY. *Civil Eng.* **1**, 113–6 (1930); cf. *C. A.* **25**, 368.—A general review of the materials used in sewage filter beds. EDWARD S. HOPKINS

Selecting the materials to prevent clogging. FRANK W. JONES. *Civil Eng.* **1**, 118–20(1930).—The size and durability of filter-bed material must be such as to insure

an abundant air supply through the entire mass. Surface growths seal the beds, diminish the air supply and cause "ponding." This is also caused by application of improperly treated sewage. Disintegration of the beds may cause clogging in the depths, decreasing the voids. This may also be caused by the rough surfaces of the aggregates retaining the solids. Uniform particles of clean material should be used, regardless of size. They must be as durable as possible to retard disintegration by weathering. EDWARD S. HOPKINS

Operating filters to remove organic growths. CHAS. C. HOMMON. *Civil Eng.* **1**, 116–8(1930).—Study of about 60 sewage trickling-filter beds in this country shows that while reasonably clean filters are obtained naturally it is doubtful if the process is satisfactory. The uncertain natural removal of clogged material by sloughing, entirely beyond the control of plant operators, is a disquieting feature of plant control. Control of sloughing and killing of surface algae was accomplished by drying the beds for 24 hrs. every 7 days. This eliminated "ponding" and cleaned the top 12 in. of material of adhering particles by action of the sewage flow when re-admitted to them. The results of this practice in the Canton, O., plant were in accordance with expectation and prevented the more or less periodic "ponding" of the beds. EDWARD S. HOPKINS

Experiments on the destruction of the filter fly (Psychoda). W. D. SCOULLER AND H. H. GOLDTHORPE. *The Surveyor* 79, 219–20(1931).—Expts. were made on 2 filters with cresote-oil emulsion and *o*-dichlorobenzene. Expts. in l. cylinders showed that vapors from *o*-dichlorobenzene killed the flies in 10 min. Treatment on filters at the rate of 1 gallon per day per 437 sq. yds. of filter surface inhibited breeding of *Psychoda* after 10 days' treatment and gave immunity for a month. It was twice as effective as the creosote emulsion in paraffin oil. One gallon of creosote emulsion per day was needed per 220 sq. yds. of filter surface. Flies gradually returned when the treatment was stopped. A. L. ELDER

Notes on the determination of biochemical oxygen demand. W. D. HATFIELD AND K. MORKERT. *Sewage Works J.* **2**, 521–8(1930).—The diln. method was found to be accurate to 5% if the bottles were carefully cleaned with cleaning soln., rinsed and dried, and if the org. matter in the diln. water was well stabilized and the water itself not toxic to the normal bacterial flora. Distd. water for diln. gave low results, 500 p. p. m., bicarbonate water higher results, and natural well water still higher results. Adoption is recommended of a standard diln. water contg. Ca, Mg, Na, HCO_3, SO_4 and Cl ions. Data are given which show that rubber stoppers have an O demand and should never be substituted for glass stoppers in the incubation bottles. W. D. HATFIELD

Effect of sunlight and green organisms on reaeration of streams. WILLEM RUDOLFS AND H. HEUKELEKIAN. *Ind. Eng. Chem.* **23**, 75–8(1931); cf. *C. A.* **23**, 4760.—This lab. study is based upon the dissolved O, biochem. O demand and *B. coli* tests of samples collected from the Delaware River for 24-hr. periods. Results, presented in chart form, indicate that the dissolved O increased rapidly during the forenoon, reaching a max. between noon and 4 P. M. During the night a decrease was noted until the lowest point was reached at 3 A. M., with a subsequent increase again after daylight. This occurred in spite of temp. decrease during the night hrs. Many expts. confirm the belief that this O is given off by blue-green algae growths in vigorous activity. These data have important bearing on stream-pollution surveys, particularly in summer seasons and discredits afternoon sampling if these specimens of algae are present. EDWARD S. HOPKINS

Technic of stream-pollution investigations. F. W. MOHLMAN, T. L. HERRICK AND H. GLADYS SWOPE. *Ind. Eng. Chem.* **23**, 209–13(1931).—Special considerations are to be noted in the sampling of a polluted river. A carefully chosen sampling program is to be followed and the most representative points in the stream used for the testing stations. Bottom samples should be carefully collected to assure the elimination of sludge deposits. Composite samples are a necessity for correct data. Interesting diagrams locating proper sampling stations are given. EDWARD S. HOPKINS

Experimental studies of natural purification in polluted waters. IV. Influence of he plankton in the biochemical oxidation of organic matter. C. T. BUTTERFIELD, W. C. PURDY AND E. J. THERIAULT. *U. S. Pub. Health Repts.* **46**, 393–426(1931); cf. *C. A.* **24**, 2220.—A dil. dextrose-peptone soln. (I), which could be readily and accurately reproduced, was used in a series of expts. designed to show the functions of the bacteria and the plankton and the probable interrelationships of the 2 groups of organisms in the biochem. oxidation process. The results obtained in these expts. indicated that: Dil. I preserved free from biol. activity did not absorb any dissolved O under the conditions of these tests. (2) When inoculated with bacteria in pure culture, dil. I favored their growth, and they increased rapidly in no., reaching a limiting population on the second day of incubation. This limiting no. was maintained for long periods of

time. (3) While bacteria were actively multiplying, O was depleted at a rapid rate. After the limiting no. had been reached, this depletion of dissolved O practically ceased, although the living bacterial population remained high. (4) The results observed with mixed cultures of bacteria, free from plankton, were the same as with pure cultures, except that the extent of oxidation was somewhat greater. (5) The protozoön *Colpidium* grew well in the presence of bacteria in dil. I but was not able to grow in it in the absence of bacteria. When the concn. of food in the medium was increased 100–1000 fold, *Colpidium* grew well in the absence of bacteria. The conclusion was reached that in the dil. medium the bacteria act as "collectors" or "concentrators" of the *Colpidium* food. (6) *Colpidium* growing in pure culture used up the O. The amt. of O used, however, was comparatively small. (7) When bacteria and plankton were grown together in dil. I, the results obtained during the first 2 days of incubation were approx. the same as when bacteria only were present. After the first 2 days, however, the bacterial nos. were not maintained but were reduced rapidly, the reduction being accompanied by a plankton increase. Moreover, the oxidation process did not cease but continued as in natural polluted waters. (8) In general the extent of oxidation observed in dil. I varied directly with the complexity of the biol. factors present—that is, the greater the variety of organisms acting in the medium, the more extensive the O depletion observed. Based on the results obtained, the theory is advanced that the chief function of certain plankton in the biochem. oxidation process is to keep the bacterial population reduced below the satn. point and thus to provide conditions suitable for continuous bacterial multiplication, this in turn resulting in more complete oxidation. Support is given to this theory by the results obtained in expts in which the limiting nos. of bacteria were reduced by phys. and chem. means. Such reductions in bacterial nos. were invariably followed by renewed bacterial multiplication and oxidation. J. A. KENNEDY

Some inter-relationships of plankton and bacteria in natural purification of polluted water. C. T. BUTTERFIELD AND W. C. PURDY. *Ind. Eng. Chem.* **23**, 213–8 (1931); cf. *C. A.* **22**, 2223.—Normal polluted H_2O contains many bacteria and plankton, if these are removed or killed oxidation ceases. Studies with *B. aerogenes* and bacteria free *Colpidium* in pure culture were undertaken to show the relationship between them. Active multiplication of bacteria caused rapid adsorption of O by the H_2O until a limiting concn. was reached. Use of the pure plankton culture gave moderate O depletion, admixt. of the cultures gave rapid O adsorption during periods of bacterial multiplication and also after the limiting value of *Colpidium* had been reached. This indicates that the function of plankton in polluted streams is to maintain the bacterial population below their limiting value and to provide suitable conditions for their multiplication, thereby giving more complete oxidation. EDWARD S. HOPKINS

A routine method for direct determination of B. coli in large quantities of water on a solid medium. F. DIENERT AND P. ETRILLARD. *Ann. services Tech. hyg. Ville de Paris* **1930**.—In France the common test for *B. coli* is by the use of 0.1% phenol broth. The medium described is a type of eosin methylene blue agar. It contains: 1000 ml. distd. water; 10 g. peptone (Difco); 2 g. dipotassium phosphate; 10 g. lactose; 15 g. agar. The reaction is adjusted to p_H 7.5. When ready to use the following is added to 25 ml. of the agar: eosin yellow 2%, 0.5 ml.; methylene blue 0.5%, 0.5 ml.; phenol 5%, 0.25 ml. Highly contaminated waters are plated directly in small quantities. In waters less densely polluted the bacteria must be concd. *B. coli* colonies are round, and 3–4 mm. in diam. By transmitted light the center of the colony is a dark violet-blue, this color covering at least ¾ of their area. The periphery is bright gray blue, sometimes metallic in appearance. By reflected light the center of the colony appears slightly elevated. The colonies beneath the surface are in the form of small, dark-blue lentils. *B. aerogenes* colonies are 4–6 mm. in diam. with deep-brown centers when viewed by transmitted light. By reflected light they do not show the metallic sheen. In case of doubt colonies are picked and inoculated to peptone broth. G. L. KELSO

Epidemic of intestinal disorders in Charleston, W. Va., occurring simultaneously with unprecedented water-supply conditions. E. S. TISDALE. *Am. J. Pub. Health* **21**, 198–200(1931).—Throughout the entire drought period of 4 mos. (Aug. to Dec., 1930), in which acute and offensive taste and odor conditions existed in the water supply and a high pollution continued as a result of pollution of the Elk River by water from the Kanawha River, the filtration-plant operation was above reproach, and daily independent bacteriol. tests by 3 different water-testing labs. showed that the U. S. Treasury Standards had been met. The illness caused by these unprecedented circumstances is described. J. A. KENNEDY

Water-borne typhoid fever still a menace. ABEL WOLMAN AND ARTHUR E. GORMAN. *Am. J. Pub. Health* **21**, 115–29(1931).—W. and G. give a detailed analysis of water-

borne outbreaks of typhoid fever and *dysentery* covering the decade 1920–1929 for both the United States (47 states) and Canada (6 provinces). These outbreaks are classified as to population groups affected, as to points of pollution in waterworks system, as to causes and as to relative magnitude. Data are given concerning the largest outbreaks. The 5 cities in the U. S. with repeat outbreaks from the same cause and the 4 cities with repeat outbreaks from a different cause are further considered in tabular form.

J. A. KENNEDY

Use of chloramine in treatment of pool water. J. F. T. BERLINER. *Beach and Pool Mag.* **5**, 9–10(1931).—Chloramine, unlike chlorine, is not destroyed by org. matter or actinic rays, nor removed by aeration. Less chlorine is required, a reduction as high as 80% being accomplished. Complaints of tastes, odor, and irritating effects, as well as algae and slime growths are reduced. The ammonia is added before the chlorine. Before applying the *o*-tolidine test, nitrites, if present, must be destroyed by oxidation with H_2O_2.

G. L. KELSO

Chloramine, its preparation, properties and use (HIRSCHKIND) **6**. Importance of microbiology [in study of sewage and water] (CAZI) **15**. Apparatus for drying sludge for fertilizer (U. S. pat 1,792,064) **1**. Recovering fibers from the waste waters of the paper, cellulose, etc., industries (Austrian pat. 120,610) **23**. Apparatus for eliminating CO from motor-vehicle exhaust gases (U. S. pat. 1,791,912) **1**. Purifying light oils recovered from coal gas, etc. [with production of solutions for softening water] (Brit. pat. 336,636) **22**.

Regenerating zeolites used in water softening. WALTER H. GREEN (to Permutit Co.). U. S. 1,792,220, Feb. 10. A moving stream of the zeolite is first subjected to the action of a relatively weak regenerating soln and then to the action of a stronger regenerating soln. App. is described.

Tubular heat-exchange apparatus suitable for heating boiler feed water, etc. FOSTER WHEELER CORP. Brit. 336,899, Jan. 23, 1930 Structural features.

Dechlorinating water. JOSEF MUCHKA. Austrian 120,119, June 15, 1930. In removing excess of Cl from chlorinated water by passing the water through active C or the like, the dechlorinating mass is kept sterile by continuously exposing a fresh surface to the chlorinated water. Suitably, the water is supplied through an injector to the top of a container for the active C, and the water-supply pipe is connected to the bottom of the container in such a way that C is sucked up by the injector and carried by the water to the top of the C mass.

Rotary sewage distributor. E. HARTLEY. Brit. 336,384, Sept. 23, 1929. Structural features.

Purifying waste waters from gas manufacture. HEINRICH BRUNS. Ger. 516,527, July 25, 1929. Addn. to 504,337 (*C. A.* **24**, 5404). The washing oils required for the method of Ger. 504,337 are used in a cycle and are dephenolized, *e. g.*, by washing with NaOH soln., immediately before or after treating the waters therewith.

15—SOILS, FERTILIZERS AND AGRICULTURAL POISONS

J. J. SKINNER AND M. S. ANDERSON

The formation of a board of specialists to study the interesting scientific problems of agriculture in the hot countries and the organization of scientific service for the Colonies. AUG. CHEVALIER. *Bull agr. Congo Belge* **21**, 365–73(1930).—The formation of a board to study the agricultural and forestry possibilities of the hot countries and to furnish scientific information is discussed. A no. of the important problems facing such a comm. are given.

J. R. ADAMS

Importance of microbiology as a subject of study and research in agricultural colleges. A. K. B. CAZI. *Poona Agr. Coll. Mag.* **22**, 172–9(1930).—The importance of microbiology in the study of *soils, manure, sewage, water* and, particularly, *milk and its products* is discussed.

K. D. JACOB

A few impressions of agricultural chemistry in foreign countries. C. A. BROWNE. *J. Assoc. Official Agr. Chem.* **14**, 101–12(1931).—An address dealing briefly with modern trends in European countries, as observed in the course of 16 months' sojourn in various European countries.

A. PAPINEAU-COUTURE

The restoration of the fertility of tropical soils. ALBERT BRUNO. *Bull. agr. Congo Belge* **21**, 574–80(1930).—A no. of the plantations in the French colonies have

lost much of their fertility because of lack of fertilization. Conclusions are drawn from work carried out in other countries as to the proper fertilizer for the various tropical crops on these plantations. J. R. ADAMS

Titanium in some New Zealand soils and pastures. H. O. ASKEW. *New Zealand J. Sci. Tech.* **12**, 173–9(1930).—Soils of various types from different regions were examd. The Ti content varied from 0.25 to 1.5%, calcd. as Ti, but in a large proportion of the samples it fell between 0.3 and 0.7%. "Bush-sick" soils, both of granitic and volcanic origin, were low in Ti. Heavy loam and clay were highest. The variation in Ti content of the pasture grasses and clovers is considerable. From 1 to 8.5 mg. TiO_2 per 100 g. dry matter was found. This amt. is believed to be too small to affect detrimentally the assimilation of phosphates in the animal body by pptn. of an insol. phosphate. There appears to be a correlation between the Fe and Ti contents of the pasture vegetation; both tend to increase at the same time. No correlation exists between Ti and Mn. L. E. GILSON

Chemical composition of the soils of McHenry County. T. H. HOPPER AND H. L. WALSTER. N. Dak. Agr. Expt. Sta., *Bull.* **240**, 3–46(1930).—The soils are carefully classified as to type, depth and chem. compn. The following composite % compn. of surface soils is representative: N 0.247, P 0.060, K 1.35, Ca 1.66, Mg 0.55, S 0.91, Si 35.22, org. C 2.72, carbonate C 0.24. With the exception of the gravelly and sandy soils, sufficient Ca, S, N, P and K were present for normal crop needs. C. R. F.

Chemical analyses of Congo soils. F. CLAUS. *Bull. agr. Congo Belge* **21**, 560–1 (1930).—A short note is given on the history of the analyses of Congo soils with the titles of a few of the publications on this subject. J. R. ADAMS

Chemical analyses of Congo soils at the Zambi Laboratory. G. BATZ. *Bull. agr Congo Belge* **21**, 562–6(1931).—Both the mech. and chem. analyses of 30 representative soil samples of the colonies are tabulated. The soils of the central basin are very mediocre in nutritive values while in the rest of the colony these values are variable and depend on the origin of the soils. J. R. ADAMS

Response of Illinois soils to systems of soil treatment. F. C. BAUER. Ill. Agr. Expt. Sta., *Bull.* **362**, 437–514(1930).—This bulletin brings together in summarized form, certain results obtained from 28 exptl. fields that are located on representative types of Ill. soils and have been under investigation for 15–26 years. The immature, dark soils of Ill. are much more productive than the mature lighter soils. Farm manure with or without lime was an effective fertilizer on all soil types. The proper use of lime is fundamental to the management of most Ill. farm lands, and nearly always gives very profitable returns. In general, soils deficient in available P respond generously to applications of superphosphate or very finely ground raw rock phosphate. Little difference was found as to the effectiveness of these 2 carriers of P. The light-colored soils and the less-productive dark-colored soils respond strikingly to applications of K. C. R. FELLERS

Microbiological studies of some typical Iowa soil profiles. P. E. BROWN AND T. H. BENTON. Iowa Agr. Expt. Sta., *Research Bull.*, No. **132**, 363–420(1930).—The nos. of bacteria, actinomycetes and molds in various horizons of typical profiles of some Iowa soils were detd. during 2 seasons, and the results are compared with careful descriptions of the soil profiles by horizons. C. R. FELLERS

Studies in soil colloids. I. Base exchange and soil acidity. AMAR N. PURI *Mem. Dept. Agr. India, Chem. Ser.* **11**, 1–38(1930); cf. *C. A.* **25**, 159.—The exptl. evidence obtained in this investigation lends support to the view that soil acidity is due to insol. colloidal acids or "acidoids," which are assocd. with surface-active H ions and characteristic reactions. A no. of reactions characteristic of sol. acids were studied in fully unsatd. soils obtained by exhaustive treatment with 0.05 *N* HCl. The results showed that acidoids, though insol., give reactions similar to those of sol. acids, the reactions taking place, however, in 3 distinct stages in which 1, 2 or 3 equivs. of H can take part. The exptl. facts can be best interpreted by supposing that the acidoid in a fully unsatd. soil is a tribasic acid. Results of liming expts. showed that toxicity of acid soils is confined to the primary H ion of the acidoid. **II. Factors influencing the dispersion of soil colloids in water.** *Ibid* 39–51.—Dispersion coeff. (D. C.) is defined as the % of the total clay (0.002 mm.) that can pass into suspension by "auto-subdivision" on being left in contact with water for 24 hrs. Expts. with air-dried clayic acid (obtained by prolonged treatment of clay with 0.05 *N* HCl) and metallic clayates (obtained by exhaustive treatment of clay with neutral salts) showed that Na clayates go almost completely into suspension after air-drying by simply keeping them in contact with water, while K, Ca and Ba clayates have a D. C. of approx. 10 or less. The D. C. for clayic acid and Al clayate is very low. Na and Li clayates contain the largest pro-

portion of particles that show no sign of settling to a depth below 5 cm. after 19 days. If a soil suspension at max. dispersion is converted, however, into any clayate (with the possible exception of the clayates of Al and Fe) the dispersion remains at its max., provided the soil is not allowed to become dry. Alkali soils rich in exchangeable Na show a high D. C. and a very low rate of percolation. Successive treatments of alkali soils with gypsum increase the permeability and lowers the D. C. Highly acid soils give a very low D. C. and a very high rate of percolation. Irrigated soils give a comparatively higher D. C. than unirrigated ones. **III. Flocculation of soil colloids.** *Ibid* 101–18.—Almost equiv. quantities of Ca, Ba and Sr hydroxides are required to flocculate a soil. The higher the valency of the exchangeable ion, the smaller the ionization and stability of the suspension and consequently the smaller the flocculation value (F. V.) for a given electrolyte. NaCl is an efficient flocculating agent when the exchangeable ions are principally Fe and Al, but is quite inefficient in the case of soils contg. principally exchangeable Na. In general, Na ions are the weakest flocculating agents, and they show a great difference between F. V. for partial and complete flocculation. Where the amt. of exchangeable Na is large, it is not possible to locate accurately the latter value because the whole mass gelatinizes. Flocculation values for Al ions are not greatly different from those for Ca and Ba ions. This is probably due to the formation of Na aluminates at higher p_H values, which behave like other Na salts as regards their flocculating power, or it may be due to pptn. of a part of the Al as $Al(OH)_3$. Mg ions are less powerful flocculating agents than Ba and Ca ions. The concn. of gypsum needed for flocculating a deflocculated soil contg. only bivalent exchangeable ions is 1.574 mg. of Ca per 100 cc. This shows that lime cannot function as a permanent cure for the deflocculated condition of a soil because the lime must be converted eventually into $CaCO_3$, a satd. soln. of which contains only 0.72 mg. of Ca per 100 cc. **IV. Methods of estimating soil colloids.** *Ibid* 119–31.—Methods of detg. soil colloids are briefly reviewed. Heat of wetting, dye adsorption and NH_3 absorption methods are affected by the nature of the exchangeable base in the soil and are not reliable measures of the colloid content. Mech. analysis and water-absorption methods seem to be the most accurate. It is suggested that the hygroscopicity of a soil should be measured by bringing it into equil. with an atm. of 70% humidity; and soil in equil. with an atm. of 10% humidity should be considered as dry basis for referring to hygroscopic moisture. In order to define completely the colloidal behavior of a soil it is necessary to know its clay content, hygroscopicity and base-exchange capacity. **V. Methods of determining saturation capacity and degree of saturation of soils.** *Ibid* 133–41.—The following method is proposed for detg. the state of satn. of soils with respect to bases: To 10 g. of the soil add 100 cc. of water and shake for 2 hrs. with 2 g. of $CaSO_4$. Next add 100 cc. of 0.2 *N* $Ba(OH)_2$ and shake at intervals for 6 hrs. during 2 days. After addn. of 10 drops of phenolphthalein soln. the color of the supernatant liquid is discharged with 0.1 *N* H_2SO_4 and the acid is then added gradually with vigorous shaking after each addn. The titration is complete when the supernatant liquid remains absolutely colorless for 2 hrs. The titration is completed in 2 to 3 days. The total $Ba(OH)_2$ minus the total acid gives the amt. of base retained by the soil and is equal to $T - S$, where T is the amt. of base the soil is capable of binding and S is the amt. of absorptively bound base originally present in the soil. T is detd. by washing another 10 g. of soil with 0.05 *N* HCl till all the replaceable bases are removed, as detd. by the absence of Ca ions in the filtrate, followed by washing with water till the free acid is removed. The soil is then transferred to a bottle and titrated with H_2SO_4 after addn. of an excess of $Ba(OH)_2$ exactly as described above. The method is simple and rapid, inasmuch as detns. can be made on 20 soils at one time.

K. D. Jacob

The adsorption of the anions of acid dyes by soil colloids. J. G. Smith and P. L. Gile. *J. Agr. Research* **41**, 401–13(1930).—Several soils contg. colloids with widely different silica-sesquioxide ratios were shaken with either H_2O or weakly acid solns. of the acid dyes, Na carminate, orange II and ponceau with negligible adsorption of the anions. The soils removed large quantities of ponceau from a 0.05 *N* acid soln. but this is evidently a pptn. of the dye.

J. R. Adams

A simplified method of determining "sticky point" of soils. Amar Nath Puri. *Agr. J. India* **25**, 206–9(1930).—The method of Keen and Coutts (*C. A.* **23**, 5261) for detg. the "sticky point" of soils is simplified as follows: 50 g. of air-dry soil is spread on a stout glass plate and water is added gradually from a buret. After each small addn. of water the soil is well mixed and worked into a paste, first with an Fe spatula and then with the hand, exactly as in the standard method. The sticky point generally can be located within 2–3 drops of water, corresponding to about 0.4 to 0.6% moisture content. The amt. of water in cc. multiplied by 2 gives the sticky point. On 48 samples of soil

from different parts of India, the results obtained by the simplified method were almost identical with those obtained by the method of Keen and Coutts if allowance was made for the air-dry moisture content in very hygroscopic soils. K. D. JACOB

Soil humus. S. OSUGI AND Y. SANO. *J. Sci. Soil and Manure; Proc. Intern. Soc. Soil Sci.* **5**, 112–3(1930).—Soil humus was fractionated by Waksman's method. The sol. portion is too small to be significant. The C, N and ash contents of the α- and β-fractions were examd. No particular relationships between the α-fractions of rich humus soils or the β-fractions in mineral soils were observed. Schollenberger's chromic acid method for detg. humus (*C. A.* **22**, 291) is satisfactory if samples of suitable size are used, *e. g.*, 0.01 g. sample of soil with 30% humus, 0.02 g. with 15.20% and 0.1 g. with 5%. B. C. A.

Potasssium thiocyanate method for determining soil acidity. Y. KAMOSITA. *J. Imp. Agr. Expt. Sta., Tokyo; Proc. Intern. Soc. Soil Sci.* **5**, 103–4(1930).—The color intensity in the Comber test for soil acidity was standardized by titrating the alc. ext. with KOH soln. Values so obtained for a no. of soils were compared with p_H values, exchange acidity and exchangeable base content. Soils exhibiting exchange acidity have $p_H < 5.5$. Soils with $p_H < 6.88$ give, with Comber's test, red colorations which increase in intensity with increasing exchange acidity. In soils showing exchange acidity the proportions of exchangeable Ca and Mg are smaller than those of Fe and Al. The reverse is the case where no exchange acidity exists. It is suggested that the red coloration in Comber's test is due to the exchange of ferric ions for K ions in the thio cyanate and that exchange acidity is partly the result of the presence of exchangeable Fe B. C. A.

The effect of lime on the texture of soils. WALTER REIMER. *Wiss. Arch. Landw.*, Abt. A., *Pflanze* **4**, 251–70(1930).—The heat of wetting of loam, clay or humus soils remains unchanged by addn. of CaO or $CaCO_3$. These substances increase the bacterial decompn. of org. matter in the soil, thereby changing the texture. This effect is negligible, however, for the quantities of CaO or $CaCO_3$ used in practice. W. G. R.

Lime additions to friable clay. W. BRENNER. *Bull. Agrogeol. Inst. Finland* No **29**, 13 pp.(1929); *Proc. Internat. Soc. Soil Sci.* **5**, 129–30(1930).—Addn. to soil of lime in quantities predetd. from titration curves to produce p_H changes up to 5.6 effected the calcd. changes. To bring about p_H 6 in the field, 1.6 times the quantity of lime calcd. from lab. tests was required. It was impossible in the field to bring the p_H value to 7.0. The most heavily limed areas of this soil rapidly developed further acidity. B. C. A.

The effect of plowing-under cane trash upon the available nitrogen of the soil. WM. L. OWEN AND W. P. DENSON. *Zentr. Bakt. Parasitenk.*, 2 Abt., **82**, 174–99(1930). The addn. of fresh cane trash to soils contg. nitrates causes a very rapid transformation of the N into org. forms. This depressing effect on soil nitrates decreases at a fairly const. rate when the crop residue is in contact with the soil, and under ordinary conditions it has perhaps lost most of its pernicious effects at the time the fertilizer is applied to cane fields. The addn. of fresh trash retards appreciably the rate of growth of corn plants but when it has been partially buried for several months, it increases the initial rate of growth and the yield. The addn. of cane trash to soil increases its water-holding capacity and retards drying. Cane trash in soil causes appreciable gains in total N, indicating stimulation of the N-fixing bacteria by the products arising from decompn of the org. matter. Field tests over a period of several years show no decrease in crop yields, indicating that the practice is consistent with conserving available N in the soil Whether the continued practice of incorporating such large quantities of org. matter with a C:N ration of approx. 1:40 would tend so to increase the accumulation of the more resistant constituent, lignin, as to affect unfavorably the compn. and productiveness of a soil needs further study. JOHN T. MYERS

Cellulose-decomposing soil-fungus of an unusual character. H. L. JENSEN *Proc. Linnean Soc., N. S. Wales* **55**, 699–707(1930).—A fungus, probably belonging to the genus *Botryosporium*, was isolated from an English field soil with addn. of manure. This organism proved very sensitive to acid reaction, p_H 4.5 being very near the limit of acidity at which growth could be induced; a good growth would only take place at p_H values above 6.0, and an optimum zone seemed to stretch from p_H 6.6 to p_H 7.4 and possibly higher. In neutral or alk. soln. the fungus exerted a very strong cellulose-decompg. activity; in unbuffered physiologically acid soln. it exerted almost no activity. Its sensitiveness to acidity is greater than that of any fungus hitherto studied. ALICE W. EPPERSON

Agreement between the Azotobacter and seedling plant methods (for determining the phosphoric acid requirements of soils). H. NIKLAS, H. POSCHENRIEDER AND F.

CZIBULKA. *Das Superphosphat* **6**, 111–5(1930); cf. *C. A.* **24**, 5410.—In 2000 comparative expts. with the *Azotobacter* and the Neubauer seedling plant methods for detg. the available P_2O_5 content of soils, the agreement between the 2 methods was very good, good and poor in 74.7, 14.1 and 11.2% of the trials, resp. K. D. JACOB

The evaluation of the results of soil analyses, with respect to the need of phosphate fertilization. ANTONIN NEMEC. *Wiss. Arch. Landw.*, Abt. A, *Pflanze* **4**, 228–46 (1930); cf. *C. A.* **24**, 5917.—Addn. of superphosphate to soils contg. but little phosphate sol. in 1% citric acid soln failed to increase the yield of sugar beets in some cases, whereas other cases were observed where increased yields were obtained from soils rich in phosphate sol. in 1% citric acid soln., when similarly fertilized. This anamolous behavior was found to be due to the Fe content of the soil. Soils contg. more than 45–50 mg. sol. Fe per 100 g. soil failed to show increased yields when fertilized with superphosphate, regardless of the phosphate content of the soil. Other expts. showed that the same effect is observed if the SiO_2 content of the soil is greater than 12 mg. per kg. soil. Similar results were found for several grains and vegetables. W. G. R.

Determination of easily soluble phosphoric acid and potash in soils by extraction with water and with carbonic acid-bicarbonate solutions. B. DIRKS AND F. SCHEFFER. *Das Superphosphat* **6**, 75–80(1930); cf. *C. A.* **25**, 1019.—It is proposed to det. easily sol. P_2O_5 and K_2O in acid soils by extn. with distd. water, and in neutral and alk. soils by extn. with a H_2CO_3 soln. of $Ca(HCO_3)_2$. Thirty g. of the soil is shaken with 75 cc. of water, or the soil is mixed with 1 g. of $CaCO_3$ and shaken with 75 cc. of soln. contg. CO_2 equiv. to 80 cc. of 0.1 *N* NaOH per 100 cc., for 1 hr. continuously in a 100-cc. flask. P_2O_5 in the filtrate is detd. by the Mo blue method, and K_2O is detd. by the cobaltinitrite method. The method gives results which usually parallel those obtained by the Neubauer seedling method, although the actual numerical values obtained by the 2 methods may be quite different. Results obtained with the method on soils receiving the same fertilizer treatment over a period of years are tabulated, and the use or non-use of P_2O_5 and K_2O fertilizers is definitely indicated by the data. K. D. JACOB

Increased root-solubility of potash contained in the soil as a result of phosphoric acid fertilization. C. DREYSPRING AND F. HEINRICH. *Superphosphate* **4**, 1–10, 46–59 (1931).—As a result of expts. with the Neubauer method for root-sol. K_2O and P_2O_5 on 85 soils of different types and origin, it was found that the root-soly. of the soil K_2O was increased 1 to 14 mg. per 100 g. of oven-dry soil by the addn. of P_2O_5 fertilizers. Readily sol. phosphates were more effective in increasing the root soly. of soil K_2O than were the less sol. phosphates. Superphosphate caused an av. increase of 8.8 mg. of root-sol. K_2O and basic slag an av. of 4.2 mg. per 100 g. of oven-dry soil. The percentage increase in the assimilation of K_2O, caused by either of the 2 phosphates, systematically diminished as the root-sol. K_2O content of the soil increased. The abs. assimilation by the plants, on the other hand, became slightly higher. The increase in the assimilation of K_2O was also dependent on the root-sol. P_2O_5 contained in the soil; the abs. figures became slightly, and the percentage figures considerably, smaller with increasing P_2O_5 content of the soil. D. and H. consider that the potash-activating power of superphosphate is due principally to its content of free H_3PO_4 and $CaH_4(PO_4)_2$. The Ca sulfate in superphosphate may also have some effect. K. D. JACOB

History of the ammonium citrate method for determining insoluble phosphoric acid. W. CATESBY JONES. *Am. Fertilizer* **73**, No. 11, 36, 38, 60(1930).—A review. W. H. ROSS

The fertility of the fundamental soil zones of the Union and their fertilizer requirements. A. N. LEBEDYANTZEV. *Udobrenie i Urozhai* (*Fertilizers and Crops*) **2**, 351–63 (1930).—The soils were analyzed chemically for the properties which indicate to some degree the fertility of the soil, such as exchange capacity, exchange acidity, hydrolytic acidity, hygroscopic moisture, N, P, K and org. matter. The results are presented graphically and in tabular form on the podsols, gray forest soils, degraded chernozem, deep chernozem, ordinary chernozem, southern chernozem, chestnut and gray arid soils. The control pots of the vegetation expts., conducted by the Mitscherlich method, show that the natural fertility of the soil zones follows from a low point in the podsol zone to the highest point on the deep and ordinary chernozem and to a lower point on the southern chernozems and chestnut soils and still lower on the gray soils. The yields follow the properties of soil fertility enumerated above, which in themselves increase and decrease in the order of the soil zones as enumerated. The field expts., as well as some of the vegetation expts., indicate that all zones show deficiencies decreasing in the order N, P, K. The podsols have the least K. They also respond most effectively to fertilizers in general. The same is true for desert soils when water is supplied. Next in order of effective response are the northern chernozems. The lowest response is obtained on the

southern portion of the chernozem zone. Some specific crops require specific fertilizers irrespective of the soil zones. J. S. JOFFE

Survey of the fertilizer industry. P. E. HOWARD. U. S. Dept. of Agr., *Circ.* **129**, 1-22(1931).—A statistical review of the world consumption of N, P_2O_5 and K_2O; the world production of inorg. N compds., basic slag, superphosphate and other fertilizer materials; the quantity and value of fertilizer imports and exports for the U. S.; and the U. S. supply of N, P_2O_5 and K_2O. W. H. ROSS

Fertilizer trials at Rothamsted. Rothamsted Expt. Sta., *Rept.* **1929**, 125 pp.—Efficiency of phosphate fertilizers on grass land is in the order superphosphate > high-soly. basic slag > low-soly. basic slag > mineral phosphate. The high-soly. fertilizers increased the proportion of phosphate in the herbage. Superphosphate increased the potato crop provided no N was given, but decreased it in the presence of N and potash. In cooking tests the color of potatoes which had received potash fertilizers was superior. In this respect the chloride gave best results, followed, in order, by the sulfate and potash fertilizer salts. In flavor only the best of the potatoes fertilized with potash equaled that of the unfertilized; all others were inferior. Complete fertilizers gave best results with sugar beet, and these were still further improved by dressings of salt. With barley, H_2CN_2 and NH_4Cl again gave as good results as $(NH_4)_2SO_4$, though still inferior to $NaNO_3$. Potash reduced the attack of *Fusarium culmorum*. In pot culture chlorides delayed the ripening of barley straw and gave a lower dry-wt. yield than sulfates. The highest-quality barley was obtained with NH_4Cl and urea. No harm resulted from sowing up to 2 cwt. of H_2CN_2 per acre with the seed, but 4 cwt. per acre was distinctly injurious. B. C. A.

Nitrogen fertilizers. BRUNO WAESER. *Metallbörse* **20**, 1853(1930); cf. *C. A.* **25**, 1617.—A review of various pyrolytic and acid processes for making mixed fertilizers from phosphate rock and K Al silicates; from phosphate rock, HNO_3 and NH_3; and from KCl, H_3PO_4 and NH_3. S. L. MADORSKY

Results of experiments with nitrogen fertilizers on cotton. V. N. MANDRUGIN. *Udobreni i Urozhai* (*Fertilizers and Crops*) **2**, 363-9(1930).—The addn. of nitrogenous fertilizers from various sources at the time of planting shows that the best results during the year of application were from $(NH_4)_2SO_4$ followed by KNO_3, $CaCN_2$, NH_4NO_3 and $CO(NH_2)_2$. The best after-effects were shown by NH_4NO_3, followed by $(NH_4)_2SO_4$, KNO_3, $CO(NH_2)_2$ and $CaCN_2$. The highest total increase in yield for the 2 years came from $(NH_4)_2SO_4$ followed by NH_4NO_3, KNO_3, $CaCN_2$ and $CO(NH_2)_2$. When the same fertilizers were added during the process of boll formation the $CaCN_2$ was the most effective during the first and second years. In general, the increase in yield was higher when the fertilizers were added later in the process of growth. This is in accordance with the results of physiol. expts. which show that cotton takes up more N in the later stages of growth than during the early part. J. S. JOFFE

Nitrate fertilization and nitrogen fixation by the legumes. ERWIN WEBER. *Zentr. Bakt. Parasitenk.*, 2 Abt., **82**, 353-79(1930).—Nitrate fertilization decreases N fixation. JOHN T. MYERS

Potash fertilizers at the "Belle Etoile" distillery. DUBOSC. *Bull. agr. Congo Belge* **21**, 581-3(1930).—The addn. of a large quantity of K_2O causes a richer and purer juice in the sugar cane and favors the maturity of the cane. This in turn favors a greater production of rum to the acre of cane. J. R. A.

Tests with phosphate fertilizers. G. TOMMASI AND S. DOJMI. *Atti III congresso naz. chim. pura applicata* **1930**, 561-3.—In some cases the use of finely ground mineral phosphate is advantageous, but much less effective than sol. phosphate fertilizers. E. M. SYMMES

The use and action of phosphates on chernozem. M. A. EGOROV. *Pochvovedenie* (Russian) **23**, No. 3-4, 5-28(1928); cf. *C. A.* **24**, 2534.—In an attempt to establish the conditions for the reversion of phosphates in chernozem soils, E. conducted a series of expts. assuming beforehand that the Ca humates in the soil undergo double decompn. with sol. phosphates. By using the *mono-*, di- or tri-Na phosphate on soils the corresponding Ca phosphates ought to be obtained. Ten g. of soil was mixed with 50 cc. of 0.25 *N* solns. of various phosphates, shaken for 3 min. and filtered. With KH_2PO_4 the ext. was almost colorless; with NaH_2PO_4 the ext. was light yellowish brown; with $(NH_4)_2HPO_4$, K_2HPO_4 and Na_2HPO_4 it was the same; with K_3PO_4 it was dark brown; with Na_3PO_4 it was intense dark brown. Thus the color depends on the nature of the cation (Na being more active) and the anion ($H_2PO_4^-$ and HPO_4^{--} giving a slight coloring and PO_4^{---} producing an intense coloration). The intensity of the color increased with the increase in concn. and an increase in the time of shaking. The humus substances can be released by washing with a salt soln. and then with water. Exts.

obtained by the use of NaH_2PO_4, Na_2HPO_4 or KH_2PO_4 together with $CaCO_3$ are darker than those obtained with the phosphate alone. $CaCO_3$ alone when mixed with soil and water gives no humus in the ext. Five-g. samples of soil were treated with 25 cc. 1.0 *N* NaH_2PO_4, KH_2PO_4 and Na_2HPO_4, shaken for 3 min., placed in collodion bags and dialyzed. After a few days a brownish liquid began to rise from the surface of the settled soil in the bag with the NaH_2PO_4 and diffuse through the supernatant liquid. It finally turned the entire bag into a dark-colored mass; some org. matter started to go through the dialyzer. This action was slower with the Na_2HPO_4. With the KH_2PO_4 the liquid after 3 months was just a weak brownish yellow. The behavior of the NaH_2PO_4 and Na_2HPO_4 is explained on the basis of formation of the more sol. $Ca(H_2PO_4)_2$ and the less sol. $CaHPO_4$. Addns. of $FeSO_4$ or $FeCl_3$ to exts. of Na_2HPO_4 had no effect on the mobility of the humus. Addns. of $FeCO_3$ gave the same results as addns of $CaCO_3$. The reactions in all cases resolve themselves into the formation either of a sol. or an insol. phosphate. By successive extns. with Na_3PO_4 and decanting it was found possible to obtain in soln. most of the org. fraction of the absorbing complex, about $^1/_3$ to $^1/_2$ of the total org. matter is contained in this fraction. J. S. JOFFE

Fertilizing action of bone meal. E. TRUNINGER AND F. KELLER. *Landw. Jahrb. Schweiz.* **43**, 931–45(1929).—Bone meal, with preference for the defatted, is recommended to give good results when used on acid soil. One application of raw bone meal gave 0.33 the increase of superphosphate; on doubling the application the increase was 0.50. There is a relationship between the particle size and the activity. N from bone meal is estd. to be 50% as valuable as nitrate N. GEORGE R. GREENBANK

Ammonia liquor as a fertilizer. BIMSCHAS. *Gas u. Wasserfach* **74**, 13–6; *Gas Journal* **193**, 324(1931).—Pot tests carried out at the Mitscherlich Expt. Sta at Marienburg on the effect of NH_3 liquor on oats and mustard plants in light, medium and heavy soils indicate that good results may be obtained on the better or heavier soils Phosphate and potash were added in each case. In spite of the alk. nature of the NH_3 better results were obtained when phosphate was added as Thomas meal instead of superphosphate. This was first noted at a period about half-way in the growth of the plants and became more noticeable as the expt progressed Poor results were obtained on a pure sand soil, even though potash and phosphate were added. R. W. RYAN

Composition of lime for fertilizer. YOSHIZO HAYASHI. *J. Imp. Agr. Expt. Sta.* **1**, 57–72(1929).—The CaO content of 43 representative liming materials in Japan varied from 55.94 to 95.92%, av. 71.82%. The finer the particles of lime, the lower was the CaO content. K. KITSUTA

Production of citric-soluble fertilizers by the decomposition of phosphorite with silica at high temperatures. JAAK KUUSK. *Acta Commentationes Univ. Tartuensis* (Dorpatensis) **AXX**, 1, 1 79(1930)(in German).—A study was made of the optimum conditions for the formation of citric-sol phosphate (sol. in 2% citric acid soln.) by heating natural phosphates with SiO_2. With Esthonian phosphorite and Florida phosphate, both of which have the fluorapatite structure, active decompn. began at about 1370° and, in general, the percentage of citric-sol. P_2O_5 increased with further increase in temp. With finely ground phosphate, passing a sieve having 5000 meshes/sq. cm., the amt. of citric-sol. P_2O_5 formed depended upon the quantity of SiO_2 used, up to about 42% of the wt. of the furnace charge, and better decompn. was obtained with finely ground SiO_2, passing a sieve having 5000 meshes/sq. cm., than with the same wt. of coarse SiO_2. Approx. 90 to 98% of the total P_2O_5 was converted into the citric-sol. form when mixts. contg. 30 to 40% SiO_2 were heated rapidly in an internally fired gas furnace to 1380° and then heated to 1440–1460° at the rate of 2°/min. Lower results were obtained when the mixts. were heated in an elec. furnace under the same conditions. Phosphates contg. excessive amts. of lime were successfully decompd. by proportionately increasing the amt. of SiO_2 in the charge. The presence of more than about 10% of Fe_2O_3 and Al_2O_3 depressed the citric soly. of the P_2O_5. K. thinks that the citric-sol. P_2O_5 is present as a *silicophosphate*, $3Ca_3(PO_4)_2.CaSiO_3$, which results from the replacement by SiO_2 of the F in the fluorapatite compd., the F being volatilized as SiF_4. With phosphates of the carbonato-apatite type decompn. began at about 1100°, and above this temp. the percentage conversion in a given time increased rapidly. K. D. JACOB

Industrial value of marine flora. VICTOR DE BUEN. *Rev. ing. ind.* **1**, No. 6, 5–12; No. 8, 12–6(1930).—A brief review is given of methods of prepn. of fertilizers, I, alginic acid, cellulose, food products and other org. prepns. from various marine algae and phanerogams. L. E. GILSON

Field results indicate value of ammoniated superphosphate for cotton. ANON. *Phosphorus Digest*, Feb., **1931**, 2–6.—Complete mixts prepd. from KCl and highly

ammoniated superphosphate plus $(NH_4)_2SO_4$ (when additional N was required) were compared with mixts. of similar analysis prepd. from KCl, ordinary superphosphate and $(NH_4)_2SO_4$ as fertilizers for cotton in field tests carried out in S. C., Ga. and Ala. In 17 tests the ammoniated superphosphate mixts. gave an av. yield of seed cotton 6.4% greater than that obtained with the ordinary superphosphate mixts. The av. yield of cotton obtained at the first picking was also higher from the plots fertilized with the ammoniated superphosphate mixts. The ammoniated superphosphate used in these expts. was prepd. by treating ordinary superphosphate with approx. 6% of anhyd. NH_3.
K. D. JACOB

Effect of fertilizers on the phosphorus content of plants. J. H. MITCHELL. *Phosphorus Digest* March, 1931, 6–7.—Expts. by the S. C. Expt. Sta. over a no. of years showed that application of complete fertilizers contg. 10 12% P_2O_5 gave av. increases of 27, 42 and 47% in the P_2O_5 content of oats, soy beans and grass hay, resp.
K. D. JACOB

The present and the improved methods of making farmyard manure in Kanara. R. M. HEGDEKATTI. *Poona Agr. Coll. Mag.* **21**, 222–40(1930).—Large quantities of farmyard manure are prepd. in India by the fermentation in pits of org. materials in the presence of approx. 30% by wt. of cattle dung and urine. The principal org. materials used are the green and dry leaves and young shoots of forest plants. The leaves of a no. of varieties of plants used for this purpose contain approx. 1.10 to 2.10% N and 0.5 to 20% tannin as well as astringent resins and volatile oils which act as deterrents to injurious insects in the soil. Fermentation of the material in the pits is hastened by keeping it moist and turning it occasionally. Fermentation is also hastened by the addn. of 0.1% N in the form of $(NH_4)_2SO_4$ and 5% of lime or lime alone. A better grade of manure is produced in covered pits than in uncovered pits. In 7 expts. the loss of org. matter during fermentation ranged from 29.5 to 64%. Analyses of various org. materials and of manures prepd. from them are tabulated.
K. D. JACOB

Barnyard manure nitrification in cultivated fields. CHR. BARTHEL AND N. BLENGTSSON. *Kgl. Landtbruks-Akad. Handl. Tid.* **69**, 1014–31(1930). Expts. with pure bacterial, yeast and mold substance and different amino acids, show that N which is included as a constituent in the cell substance of different microorganisms, and which forms the main portion of the org. N in barnyard manure, is nitrified readily in the soil when it is present in the form of pure prepns. However, org. N in barnyard manure does not mineralize in tilled soil until a very long time has elapsed, and has no fertilizing effect during the first months or years after introduction. Either the microbial cells in the manure are protected from decompn. by colloidal substances in which they are imbedded, or the decompn. depends upon the C–N ratio (cf. Jensen, *C. A.* **23**, 5263). Data are insufficient to decide upon either theory.
E. M. SAMMIS

The conservation of ammonia in fertilizing with liquid manure. S. TOVBERG-JENSEN. *Wiss. Arch. Landw.*, Abt. A, *Pflanze* **3**, 161–80(1930). The rate of escape of NH_3 from solns. of $(NH_4)_2SO_4$ plus NaOH and NH_4HCO_3 was detd. by drawing air through the solns. maintained at const. temp. Lab. expts. were conducted on the rate of escape of NH_3 from liquid manure spread on various soils. The effect of added salts was detd. by adding $CaCl_2$, KNO_3, gypsum and superphosphates to the liquid manure, and detg. the NH_3 lost when the solns. were allowed to dry on filter papers. The lab. expts. show that the liquid manure is best spread on the soil when it is porous, in cool weather, and that addn. of the salts mentioned prevents 90% of the loss of N_2 ordinarily suffered. Field expts. were also conducted by fertilizing with (1) liquid manure, (2) KNO_3, $CaCl_2$ and superphosphate dissolved in liquid manure and (3) liquid manure and each of these salts added separately, the best results were obtained by dissolving the salts in the manure. The following *rapid volumetric method for the detn. of* NH_3 is described: The liquid manure is added to an alk. NaOBr soln. and the N_2 evolved is collected and measured in a gas buret. 100% of the N_2 in NH_3 is obtained by this method, but only 95% of the N_2 is liberated from urea.
W. GORDON ROSE

The use of preservatives to prevent loss of nitrogen from cow excreta during the day of collection. ROWLAND B. FRENCH. *J. Agr. Research* **41**, 503–6(1930).—Thorough mixing of the feces and urine greatly increases the speed of the action by which N is lost. When unmixed this loss is from 1 to 2.6% of the total N in 18 hrs. at 70° F. and when these excreta are thoroughly mixed it varies from 6 to 30%. $CuSO_4$, $ZnSO_4$ and formaldehyde in small concns. gave complete protection against loss of N when added to homogeneous mixts. of feces and urine but the $CuSO_4$ was very ineffective with unmixed excreta. At higher concns. boric acid, $FeSO_4$, phenol, salicylic acid and toluene also showed some preservative action.
J. R. ADAMS

The chemical composition of grass from plots fertilized and grazed intensively in

1929. J. G. ARCHIBALD. *J. Agr. Research* **41**, 491–501(1930).—The dry matter of the grass from the fertilized plots was higher in N, ether ext., Ca and P, and lower in crude fiber than the dry matter of the grass from the unfertilized plot. Acre production of all constituents detd., crude fiber excepted, was markedly higher on the fertilized than on the check plots. The seasonal variations in the compn. of the grass confirm the conclusions of a previous paper (cf. *C. A.* **23**, 4008). The amt. of rainfall is one of the most important factors which influence the chem. compn. of the grass. J. R. ADAMS

Club-root in cruciferous crops. J. G. GIBBS. *New Zealand J. Agr.* **42**, 1–17 (1931).—Fertilization of cruciferous plants with basic slag and K_2SO_4 seemed to reduce the intensity of club-root infection. Satisfactory control of the disease was obtained by applying burnt lime at the rate of 2 to 3 tons per acre about 3 months before sowing the crop. K. D. JACOB

Calcium relationships of forage crops. L. I. PUGSLEY AND R. R. MCKIBBIN. *Can. J. Research* **4**, 39–51(1931).—Samples of soil, timothy and red clover were secured from the Chateauguay River basin, Quebec, and analyzed to det. the cause of the variation in Ca content of clover and timothy previously observed. The Ca content of timothy and red clover increased directly with the total Ca content of the underlying soil and decreased as the "lime requirement" of the soils increased. No proportionate increase of protein or of P as the Ca content of the hays increased was observed. The timothy hays from the area investigated were extremely low in Ca content but otherwise normal. The ratios $\frac{CaO}{P_2O_5}$ and $\frac{\text{protein}}{CaO}$ for these hays are, resp., abnormally low and abnormally high. In the red-clover hays these values were normal. J. W. SHIPLEY

Nature and course of the nutrient intake of various vegetables. T. REMY AND F. WEISKE. *Landw. Jahrb.* **71**, 315–31(1930).—The rate of intake of a no of vegetables is studied by cultural trials. The significance of the cultural intake and growing period is considered in studying the proper fertilizer treatment and the appropriate fertilizer. GEORGE R. GREENBANK

Fertilization of cucumbers and strawberries with carbon dioxide gas. H. LUNDEGÅRDH. *Kgl. Landtbruks-Akad. Handl. Tid.* **69**, 1044–56(1930).—The theoretical basis of CO_2 fertilization has been investigated (Sveriges Tradgårdsodling Årsbok 1923), and practical tests with CO_2 fertilization on various hot-house plants have been made (Der Kreislauf der Kohlensaure in der Natur, Jena, 1924; Centralanst. f. försoksvas. på jordbruksomr., Medd. no. 331(1928)). Tests were repeated in hot houses, with alc. burned as the source of CO_2. A l of 95% alc. gives 6000 cal on burning and induces air currents for distribution. CO_2 fertilization increases the fruit no. and wt. of cucumbers 28.5–45%, with a CO_2 atm. 3–4 times normal. Lamps were filled every morning, lighted, and burned about 20 hrs. until extinguished spontaneously, then the dil. alc. residue was removed to avoid evapn. of denaturant. With strawberries, ripening was earlier, the fruit no. increased 12%, the wt. of fruit higher, and the leaf growth greater. A profit is shown by comparison of the alc. purchased *vs.* increased return from sale of cucumbers. E. M. SYMMES

Potato scab and fertilizers. EICHINGER. *Das Superphosphat* **7**, 8–14(1931).—Superphosphate and $(NH_4)_2SO_4$ have a decided effect in reducing scab on potatoes. Sulfate of potash-magnesia (a mixt. of K_2SO_4 and $MgSO_4$) and probably K_2SO_4 tend to reduce the occurrence of scab. KCl has no protective action, but seems to favor scab formation to a slight extent. Because of its alk. nature basic slag favors scab formation. Scab formation is promoted to a marked extent by $NaNO_3$ and to a less extent by $Ca(NO_3)_2$. K. D. JACOB

Preparations containing rotenone for use as insecticides. I. Aqueous suspensions. HOWARD A. JONES AND WILLIAM M. DAVIDSON. *J. Econ. Entomol.* **24**, 244–57 (1931).—Aq. suspensions of rotenone were prepd. by two methods: (1) Rotenone solns. in water-miscible solvents were added to water, and powdered prepns. were mixed with water. (2) Permanent suspensions contg. 0.05–0.5 g. rotenone per l. with the rotenone in highly dispersed condition were prepd. by the addn. to water of pyridine solns. and acetone solns. contg. tannic acid. Mixts. of certain dry products with pptd. rotenone also gave satisfactory suspensions. Permanent suspensions of rotenone were more easily obtained under slightly alk. conditions, but they were difficult to obtain in hard water. Toxicity expts. on various species of insects indicated that aq. suspensions of rotenone are of definite value in the control of certain types of insects. Rotenone decomposes rapidly in pyridine, less rapidly in acetone contg. tannic acid and very slowly in pure acetone soln. This decompn. is accompanied by a corresponding loss in toxicity (cf. following abstract). Pure dry rotenone shows no change in toxicity on standing. C. H. RICHARDSON

The toxicity of rotenone in solution and suspension. W. M. DAVIDSON AND HOWARD A. JONES. *J. Econ. Entomol.* **24**, 257–62(1931).—The loss in toxicity to insects of rotenone in pyridine solns. and acetone solns. contg. tannic acid is described. The pure acetone and alc. solns. of rotenone did not lose toxic activity upon standing. The yellow decompn. material obtained in a pyridine soln. of rotenone was much less toxic to insects and fish than pure rotenone. Aq. suspensions of rotenone made from fresh acetone and alc. stock solns. decreased in toxicity to insects upon standing. It is recommended that stock solns. of rotenone in pyridine and acetone be used immediately after prepn. Solns. in acetone and alc. may be allowed to stand a limited time without loss in toxicity. C. H. RICHARDSON

Some comparative tests with rotenone, nicotine and pyrethrum. MERRILL M. DARLEY. *J. Econ. Entomol.* **24**, 111–5(1931).—A soln. of rotenone (concn. 1:100,000) contg. a com. petroleum prepn. (concn. 1:200) compared favorably as a contact poison with nicotine at 1:10,000 and pyrethrum at 1:74,800 concn. the tests being made upon 2 species of aphids. Pyrethrins at 1:37,400 were effective against the spotted cucumber beetle (*Diabrotica duodecimpunctata*) and the Mexican bean beetle (*Epilachna corrupta*), but nicotine at 1:5000 and rotenone at 1:50,000 were ineffective. A com. petroleum prepn. at 1:100 was used in each spray. Tests indicated that the toxicity of rotenone for the common red spider (*Tetranychus telarius*) was appreciably greater than that of nicotine and pyrethrins. The relative toxicity of rotenone was greater for this animal than for the aphids. C. H. RICHARDSON

Genuine derris root may contain no rotenone. R. C. ROARK. *J. Econ. Entomol.* **24**, 328–30(1931).—Expts. have shown that rotenone is far superior in insecticidal value to deguelin, tephrosin and toxicarol, the other insecticidal constituents of derris. Therefore all the matter extd. with ether from derris root may not be equal to rotenone in toxicity. Numerous samples of root sold as derris root have recently been found to contain no rotenone. The rotenone content of derris root varies from 0 to 5.5%, whereas the total ether ext. ranges from 5 to 23%, there is no consistent relation between the two. The compn. of the ext. from derris root, *i. e.*, the ratio of one constituent to the other, also may vary considerably. A sample found to be rich in toxicarol entirely lacked rotenone. This lack of uniformity in proprietary derris prepns. accounts for many of the inconsistent results reported by entomologists. The common derris root now on the market may be expected to contain about 2% rotenone. Cubé root (*Lonchocarpus nicou*) from South America contains as much as 7.6% rotenone. An ext. of cubé root prepd. in Peru or Brazil may soon be placed on the American market. C. H. RICHARDSON

An insecticidal method for the estimation of kerosene extracts of pyrethrum. H. H. RICHARDSON. *J. Econ. Entomol.* **24**, 97–105(1931).—The speed with which pyrethrum exts. paralyze house flies (*Musca domestica*) varies directly with the concn. The speed of paralytic action is variable, but the variation falls within the limits of error due to random sampling. This was not true of the mortality after 24 hrs. Differences in speed of paralytic action between a 0.75 lb. (per gal.) and 1 lb. kerosene ext. of a fairly powerful grade of pyrethrum powder (0.26% pyrethrin I) were easily distinguishable and statistically significant. Differences in percentage mortality, analyzed similarly, were not significant. C. H. RICHARDSON

Problems in the manufacture of liquid household insecticides of the petroleum extract of pyrethrum type. ALFRED WEED. *J. Econ. Entomol.* **24**, 95–7(1931).—The problems which confront the manufacturer of pyrethrum products are: (1) the concn. of the toxic constituents to be used; (2) the use of pyrethrum powder or concd. exts. in prepg. the products; (3) the selection of satisfactory petroleum fractions and perfumes. C. H. RICHARDSON

The effect of soap on the toxicity of a pyrethrum product known as "Red Arrow." A. E. BADERTSCHER. *J. Econ. Entomol.* **24**, 268–77(1931).—This is a study of a com. mixt. contg. pyrethrum ext. with the addn. of K coconut fatty acid soap in various proportions. The green spiraea aphis (*Aphis spiraecola*) was used as the test insect. "Red Arrow" dild. with tap water does not give max. efficiency probably because the surface tension of the aq. carrier is too high to permit sufficient penetration into the trachea of the insect. The toxicity of this product is increased about 4 times when dild. with 0.4% soap, the surface tension of the aq. carrier then being nearly 30 dynes. "Red Arrow" loses little if any of its toxicity upon standing. C. H. RICHARDSON

Experiments with white oil-pyrethrum for the control of the oriental peach moth. BYRLEY F. DRIGGERS. *J. Econ. Entomol.* **24**, 319–25(1931); cf. *C. A.* **24**, 3313.—The newly hatched larvae of *Laspeyresia molesta* are killed more easily when crawling over sprayed new growth than when crawling over sprayed old growth, because of the great

absorptive power of the old growth for the oil. Reduction of fruit infestation amounted to 30–70%. The effects of parasites and their relation to spraying operations are discussed. C. H. RICHARDSON

Tests with nicotine activators. E. P. FELT AND S. W. BROMLEY. *J. Econ. Entomol.* **24**, 105–11(1931).—Field tests were carried out with nicotine solns. contg. various petroleum oil emulsions, Na oleate, K oleate, com. soap flakes and Ca caseinate prepns. The results indicate the influence of a complex of factors on the toxicity of the various mixts. C. H. RICHARDSON

Nicotine in the control of ectoparasites of poultry. F. C. BISHOPP AND R. D. WAGNER. *J. Econ. Entomol.* **24**, 56–62(1931).—The feather mite (*Liponyssus silviarum*) is controlled by treating roosts and spraying the houses with nicotine sulfate soln. The common chicken mite (*Dermanyssus gallinae*), the fowl tick (*Argas miniatus*) and the sticktight flea (*Echidnophaga gallinae*) are controlled by spraying poultry houses with strong solns. of nicotine sulfate. Fowls are treated for the various species of chicken lice by making a light application of nicotine sulfate (40%) to the upper surface of the perches ½ hr. before the fowls go to roost. With proper ventilation of poultry houses and correct dosage this method will not injure fowls. Disadvantages of the method are discussed. C. H. RICHARDSON

Comparative performance of nicotine tannate and lead arsenate against the codling moth. ROBERT S. FILMER. *J. Econ. Entomol.* **24**, 277–83(1931).—If a sufficient quantity is maintained upon the foliage during the period of codling moth activity nicotine tannate controls this insect as well as Pb arsenate. Nicotine tannate in appropriate concns. injures neither fruit nor foliage. In its present form nicotine tannate disappears rapidly from the foliage, 60–70% loss occurring in 10 days after application. Before it can be used as an efficient substitute for arsenicals its adhesive qualities must be improved. C. H. RICHARDSON

Report of committee to formulate plans for investigation of the codling moth from biologic and control standpoints. A. L. QUAINTANCE, LEROY CHILDS, G. A. DEAN, B. A. PORTER, P. J. PARROTT AND W. A. ROSS. *J. Econ. Entomol.* **24**, 18–23(1931).—Results of lab. and field tests from 25 Federal and State entomological labs. are given. The following insecticides are considered: Mn arsenate, Na_2SiF_6, $BaSiF_6$, K fluoaluminate, petroleum oil-nicotine mixt., petroleum oil-pyrethrum mixt., petroleum oil-Pb arsenate mixt., petroleum oil derris mixt., highly refined (white) petroleum oil emulsion, nicotine tannate and rotenone. Removal of As spray residue also is considered. Mech. control methods (banding, chemically treated bands, bait traps, soil treatment), use of parasites and biol. data are reported. C. H. RICHARDSON

The effect of hydrogen-ion concentration on the toxicity of nicotine, pyridine and methylpyrrolidine to mosquito larvae. CHARLES H. RICHARDSON AND HAROLD H. SHEPARD. *J. Agr. Research* **41**, 337–48(1930).—The toxicity of 0.03 *M* nicotine solns. to mosquitos increased with increasing p_H value, reaching a max. at p_H 9.7 (the free base). Similar results were obtained when either HCl or H_2SO_4 was used to adjust the p_H of the soln. At each nicotine concn. the free base was about 5 to 7 times more toxic than was nicotine sulfate soln. at p_H 5.0. The addn. of an inorg. hydroxide had no apparent effect upon the toxicity of a nicotine soln. Pyridine solns. of 0.03 *M* and 0.12 *M* were about twice as toxic as solns. of the same molar concn. titrated to p_H 5.0 and 4.9, resp., with H_2SO_4. Methylpyrrolidine soln. was about 19 times as toxic as methylpyrrolidine-HCl soln. of p_H 3.0. The toxicity of these materials in aq. soln. is directly related to the concn. of the undissocd. mols. The toxicity of nicotine solns. is largely dependent on the dissocn. of the pyrrolidine N. J. R. ADAMS

Trapping for the Japanese beetle (Popillia japonica Newman) during the seasons of 1929 and 1930. O. K. COURTNEY. *J. Econ. Entomol.* **24**, 219–26(1931).—The operation of traps with a bait mixt. contg. geraniol and eugenol is described. C. H RICHARDSON

The tolerance of beans to sprays and dusts for the Mexican bean beetle. H. C. HUCKETT. *J. Econ. Entomol.* **24**, 200–4(1931).—Further studies with com. brands of arsenicals, $BaSiF_6$ and cryolite in spray and dust mixts. against *Epilachna corrupta* indicate that certain forms of arsenicals cannot always be used with safety upon bean plants. Mg arsenate, $BaSiF_6$ and cryolite are the safest to use at recommended concns. C. H. RICHARDSON

Hints at new spraying procedures. P. J. PARROTT, F. Z. HARTZELL, HUGH GLASGOW AND S. W. HARMAN. *J. Econ. Entomol.* **24**, 297–302(1931); cf. *C. A.* **24**, 3312.—This investigation was conducted to find materials or practices that would amplify present control measures for the rosy aphis (*Anuraphis roseus*), and the eye-spotted bud moth (*Spilonota ocellana*) on apple trees. $NaNO_3$, one lb. per gal., made the trees unattractive

to rosy aphis without apparent injury to the trees. Fall applications of nicotine or ground tobacco to apple trees reduced the number of aphids. Tar distillate sprays were very effective against apple aphid eggs and nymphs of the spruce gall aphid (*Adalges abietis*) but were ineffective against eggs of the leaf roller. These tar distillate sprays appeared safe to use on the trees. American creosote oil emulsified with sulfonated castor oil and alkali killed eggs of the rosy aphis and caused no serious injury to the trees. Sulfonated fish oils apparently may be used in place of the sulfonated castor oil to reduce the cost of this spray. These methods may offer a marked advantage over spring spraying for control of the rosy aphis. C. H. RICHARDSON

A study of arsenical residue on apples in Pennsylvania with respect to efficient spraying practice. H. E. HODGKISS AND D. E. HALEY. *J. Econ. Entomol.* **24**, 83–8 (1931).—In Pa. protection of apples from second-brood larvae of the codling moth (*Carpocapsa pomonella*) requires a definite spray procedure ending early in June. In this way it is possible to control the insect with Pb arsenate and to keep the As residue within the export tolerance of 0.1 grain per lb. of apples. Analyses of fruit are given. C. H. RICHARDSON

What summer oil sprays may do to apple trees. JOSEPH M. GINSBURG. *J. Econ. Entomol.* **24**, 283–90(1931).—Refined (white) petroleum oils, viscosity 80–320° Saybolt at 100°F., and sperm oil were sprayed on apple and peach trees during the spring and summer months. The oils were emulsified with soap or powdered skim milk, and the emulsions dild. to contain 0.5 3% actual oil. Some trees were sprayed during two successive seasons and accumulative effects on the fruit and foliage were studied. Peach trees are less susceptible to petroleum oil injury than apple trees. Continuous oil spraying of apple trees during the growing season produced physiol. changes in growth processes and fruit production. Oil injury is more pronounced and more severe from early than from late spraying. Sperm oil was less injurious to peach and apple foliage than any of the other animal or vegetable oils tested. C. H. RICHARDSON

Experiments in spray residue removal. L. R. STREETER, P. J. CHAPMAN AND G. W. PEARCE. *J. Econ. Entomol.* **24**, 240–4(1931). —The standard washing machine using HCl as a solvent entirely and satisfactorily removes As residue. Methods successful in the Pacific Northwest are not entirely adaptable to the needs of the Northeast In the Northeast a machine is required which combines the washing and wiping principle. No single machine now available entirely meets these requirements. Results of chem. analysis of sprayed fruit are given. C. H. RICHARDSON

Investigations aimed to reduce the cost of pear psylla control. F. Z. HARTZELL. *J. Econ. Entomol.* **24**, 71–7(1931).—Economy can be obtained in part by modifying the environment of the orchard, by using lubricating oil emulsions, and by decreasing the concn. of nicotine in the sprays. Care must be exercised in the use of petroleum oil sprays on weak trees. C. H. RICHARDSON

The compatibility of lime with fluosilicates. R. H. CARTER. *J. Econ. Entomol.* **24**, 263–8(1931); cf. *C. A.* **24**, 455. —The compn. and chem. properties of fluosilicates in relation to insecticidal use and injury to foliage are described. The addn. of small quantities of $Ca(OH)_2$ to Na_2SiF_6, K_2SiF_6 and $BaSiF_6$ materially decreased the solv., probably because of the introduction of a common ion from the reactions. Strong alk. solns. were formed when an excess of lime was present as the result of further chem reactions. C. H. RICHARDSON

Mercury salts as disinfectants of seeds. VITTORIO CASABURI. *Industria chimica* **5**, 1362–8(1930); cf. *C. A.* **25**, 553.—By using an emulsion of 1,4-$Cl_2C_6H_4$ in petroleum taken up with talc in conjunction with Hg salts, a powerful disinfecting action is obtained, with a smaller quantity of Hg salts. A. W. CONTIERI

Tests with *p*-dichlorobenzene-oil emulsion against the San José scale. OLIVER I. SNAPP AND J. R. THOMSON. *J. Econ. Entomol.* **24**, 328(1931). – A petroleum oil of 168 sec. viscosity (Saybolt) and a volatility of 0.60% was used in these expts. *p*-$C_6H_4Cl_2$ was dissolved in it in the proportion of 2 lb. per gal. The oil was emulsified with K fish oil soap and the spray contained 0.25–1.5% actual oil. The addn. of *p*-$C_6H_4Cl_2$ to an oil does not increase its effectiveness for the control of San José scale. C. H. R.

The influence of plant growth on the activity of root bacteria (GRÄF) **11C.** Removal of spray residues from apples (NELLER) **12.** Burning accident from $NaClO_3$ (DEEM) **13.** Effect of various Mn compounds on the quinhydrone electrode (OSUGI, KASHIHARA) **2.** "Lime-nitrogen" (Brit. pat. 336,677) **18.** Apparatus for making lime-nitrogen (Ger. pat. 516,445) **18.** Dicalcium phosphate and KNO_3 (Brit. pat. 336,692) **18.** Purification of gases and the manufacture of fertilizers (Belg. pat. 371,622) **4.**

Fertilizer. C. VILAIN. Brit. 336,651, July 15, 1929. Natural dolomite is treated with H_3PO_4 and the product may be treated with NH_3.

Fertilizers. SOC. D'ÉTUDES POUR LA FABRICATION ET L'EMPLOI DES ENGRAIS CHIM. Fr. 694,455, July 27, 1929. A compd. fertilizer is prepd. by treating natural chlorides with a strong mineral acid such as H_2SO_4, HNO_3 or H_3PO_4, isolating the K salt formed and using the liberated HCl to attack natural phosphates and mixing the sol. phosphate with the K salt. Cf. *C. A.* **25**, 1625.

Fertilizers. SOC. D'ÉTUDES SCIENTIFIQUES ET D'ENTREPRISES INDUSTRIELLES. Fr. 694,628, April 28, 1930. A fertilizer is composed of a mixt. of natural phosphates and blast-furnace or P-furnace slags.

Fertilizers. G. OBER & SONS CO. Fr. 694,113, April 17, 1930. Phosphatic fertilizers are made by sending a current of hot acid through a restricted receiving zone, mixing this current with a current of finely divided phosphatic material and sending the mixed current through the restricted receiving zone. The phosphatic powder may be aerated to render it more fluid. An app. is described. Fr. 694,114, describes the prepn. of a fertilizer by submitting a phosphatic material to the action of an acid in a closed vessel and afterward introducing NH_3 into the vessel. Fr. 694,115, describes the prepn. of a fertilizer by forming currents of acid and finely divided phosphatic material, mixing the currents, introducing the mixed current into a vessel and regulating the concn. of the acid current and the duration of the charging to reduce to a min. the losses of volatile substances during the transport.

Powdered deodorizer for accelerating the ripening of organic fertilizers. KAZUYOSHI YAMAJI. U. S. 1,791,918, Feb. 10. A cereal powder contg. a large quantity of enzymic material such as barley, wheat or beans is mixed with bran, water is added and the mixt. is heaped for fermentation, after which it is dried and powdered and mixed with dried and powdered germinated seeds of cereal such as barley, wheat or beans high in enzymic content and tri-Ca phosphate also is added to the mixt., which, as thus prepd., is suitable for treating org. fertilizer or use as a deodorant.

Insecticides. MAURICE BOURDERIONNET. Fr. 694,139, April 18, 1930. An insecticide and rat-killer is composed of a mixt. of HCN with 3–6% of oxalic acid and 2–5% of CNBr.

Insectifuges. DEUTSCHE GOLD- UND SILBER-SCHEIDEANSTALT VORM. ROESSLER. Ger. 516,373, Apr. 20, 1923. Pulverulent compns. for combating flea-beetles, etc., comprise a solid absorbent, *e. g.*, kieselguhr, mixed with nitrobenzene and a substance which repels the insects by its odor, *e. g.*, "oleum animale," phenol or cresol. Substances improving the adhesion, *e. g.*, talc, may be included.

Destroying insects and other animal pests. I. G. FARBENIND. A.-G. (Carl Taube and Hans Kukenthal, inventors). Ger. 516,496, Oct. 10, 1929. Esters of H_2SO_3 are used, alone or mixed with diluents, other insecticides, inflammability-reducing substances, etc.

Bactericides; fungicides. I. G. FARBENIND. A.-G. (Rudolf Lehmann and Richard Michel, inventors). Ger. 516,485, Nov. 23, 1928. Mixts. of halophenols (or their derivs.) with esters of substituted aromatic carboxylic acids are used, with or without other disinfectants, etc. A mixt. of trichlorophenol acetate 1 and methyl *p*-hydroxybenzoate 3 parts is specified.

Plant-protecting agents. I. G. FARBENIND. A.-G. Ger. 513,775, Dec. 6, 1927. The agent consists of hydrocarbons of the diaryl type, combined with other fungicides or insecticides and optionally mixed with solvent, adhesive or spreading agents. The examples mention biphenyl, 4,4'-dichlorobiphenyl, 2,2'-diaminobiphenyl and dinitrobiphenyl.

Mordants for seeds. I. G. FARBENIND. A.-G. Fr. 694,994, May 5, 1930. Mordants for seeds are composed of thio derivs. of alkylarsenious acids such as methylarsine sulfide, or the condensation product of methylarsine and β-thionaphthol, arsenomethane and dithioglycolic acid or methylarsine oxide and thiosalicylic acid. Cf. *C. A.* **25**, 1626.

Herbicide. GUSTAV LITSCHE. Fr. 694,663, April 29, 1930. A herbicide is composed of $CuSO_4$ and about 3 times the amt. of H_2SO_4 of 60° Bé.

Weed killers. CHEM. FAB. OKER & BRAUNSCHWEIG A.-G. Ger. 516,141, Dec. 5, 1928. The corrosive action on metal tanks, sprayers etc., of weed killers comprising heavy metal salts, is reduced by addn. of a nitrate, sulfate or thiosulfate of an alkali, alk. earth, or earth metal. The addn. must not give an insol. ppt. with the heavy metal salt. Thus, 1% of $NaNO_3$ may be added to a 2% soln. of $CuCl_2$.

16—THE FERMENTATION INDUSTRIES

C. N. FREY

Constitution of fusel oil obtained from fruits. G. VEGEZZI AND P. HALLER. *Mitt. Lebensm. Hyg.* **21**, 321–5(1930)(in Italian).—The constitution of fusel oil depends upon the source. An av. sample is a limpid, yellow-brown liquid, d_{15}^{4} 0.8205–0.8300, acid trace, esters 1.3% by vol. calcd. as EtOAc, furfural 0.01, aldehydes 0.3, fusel oil and EtOH 99.4. Fusel oil from fruit is the best, because its value is detd. by the AmOH content. Fusel oil from fruit contains BuOH. A considerable no. of samples analyzed contained abnormal products, such as SO_2, formaldehyde, fatty acids and amines. Fusel oil from fruit contains an appreciable amt. of compds. boiling higher than AmOH, in 1 case 13.4%. E. M. SYMMES

Production of alcohol from spent mohwra (Bassia latifolia) flowers. D. L. SAHASRABUDDHE AND V. G. PATWARDHAN. *Poona Agr. Coll. Mag.* **22**, 45–9(1930).—The spent mohwra flowers resulting from distillery operations are a nuisance in certain Indian localities. Approx. 11% of total sugar may be obtained from the carbohydrates in the spent flowers by heating the flowers with 0.05 *N* H_2SO_4 for 4 hrs. under 3 atm. pressure. By diluting the ext. from the original flowers with that from the spent flowers the addnl. sugar ferments completely, giving a proportionately higher total yield of alc. from a given wt. of flowers. Under these conditions neutralization of the H_2SO_4 before fermentation is unnecessary. K. D JACOB

The composition and determination of the barley proteins. III. Fourth report on barley proteins. The proteins of barley during development and storage and in the mature grain. L. R. BISHOP. *J. Inst. Brewing* **36**, 336–49(1930); cf. *C. A.* **24**, 1929.—Analytical data and graphical presentation are given of the proteins of varieties of English barleys, in various stages of maturation, and in mature grain before and after storage. After allowance is made for the various standard errors of the detns. it is possible to deduce that: The relationship between the quantities of the individual proteins and the total N is characteristic of the variety. Within each sep. variety, the weights of the individual proteins are simple regular functions of the total N content per thousand corns. Immature grain, if given sufficient time, reaches the natural equil. and the proportion of the various proteins will be the same as in mature grain of the same total N content per thousand corns. It is suggested that in pure grain the protein proportions may be represented in amts. per thousand corns as follows: $S = aN - bN^2$, $H = pN + qN^2$ and $G = xN$, where S = salt-sol. N, H = hordein N; G = glutelin N and N is total N per thousand corns. The values of the factors (a, b, p, q and x) are regarded as characteristic of the variety. PIETER J. F. WEBER

Institute of brewing research scheme. H. LLOYD HIND. *J. Inst. Brewing* **36**, 265–8(1930).—A report is made by the research organizer covering the autumn and winter months of 1929–1930. PETER J. F. WEBER

Preliminary note on barley proteins. The influence of the method of grinding on the estimation of barley proteins. G. HOFMAN-BANG. *J. Inst. Brewing* **36**, 381–8 (1930).—Before making estns. of different proteins in Danish barleys, the reliability of Bishop's method (cf. *C. A.* **22**, 3729; **24**, 1929) was investigated. The proteins were detd. on barleys ground to varying degrees of fineness as ascertained by shaking in a screen grader. To obtain consistent results and reach a const. value for the various proteins, the barley had to be ground in a ball mill so that 95% passed a sieve with meshes of 0.253 mm. PETER J. F. WEBER

Algerian musts of the 1930 vintage. I. G. FILAUDEAU AND A. BONIS. *Ann. fals.* **24**, 5–8(1931); cf. *C. A.* **24**, 2231.—A discussion of the results (not given in detail) found on examn. of 128 representative samples from the Department of Oran, 271 from the Department of Alger and 90 from the Department of Constantine, from which it is concluded that the quality of Algerian wines of the 1930-vintage is, on the whole, satisfactory, and even slightly better than that of the 1929 wines. **II.** POUGET, SABATIÉ AND WALLAERT. *Ibid* 8–11.—A brief discussion of the quality of the 1930 vintage in Algeria, based on the analysis of 253 samples, from which it is concluded that the constitution of the wines should be fairly well balanced, and the alc. content higher than in 1929. A. PAPINEAU-COUTURE

New apparatus for the rapid determination of the volatile acidity of wine. MARCEL MARTIN. *Ann. fals.* **24**, 36–7(1931).—The simplest method for detg. the volatile acidity of wine consists in subtracting non-volatile from total acidity; but in order to obtain consistent results it is essential that the evapn. of the volatile acids be always carried

out under strictly identical conditions. The app. described consists of an electrically heated water bath, the steam from which is passed through the sample while the latter is being heated on the bath. The construction is such that the quantity of steam passed through the sample is always the same. A. PAPINEAU-COUTURE

Dry, unpressed wine and natural wine. J. WERDER AND C. ZÄCH. *Wein u. Rebe* **11**, 272–6(1929).—Dry, unpressed wine, but not natural wine, after decolorization by animal charcoal, shows a blue luminescence in filtered ultra-violet light. B. C. A.

Rum fermentation. MARTIN FICKER AND STEFAN SZÜCS. *Zentr. Bakt. Parasitenk.*, 2 Abt., **82**, 199–211(1930).—The aroma produced during the fermentation of rum is due to the action of acetic, butyric and lactic acid bacteria. JOHN T. MYERS

Alcohol production for motors in Brazil (FREISE) **21**. Polarographic studies with dropping-mercury cathode. XVI. Electroreduction of AcH (SMOLER) **4**. The antagonostic substances formed during bacterial fermentation (KLEIN) **11C**.

Rectifying alcohol. HEINRICH PROSKE. Ger. 515,195, Dec. 21, 1928. Operative details are described. The principal features are the maintenance of an excess pressure of about 0.06 atm. in the still, and the use of a thermometer with a movable scale, which is adjusted in steam before the distn.

Acetyl methyl carbinol. T. H. VERHAVE. Brit. 337,025, June 26, 1929. A mash, such as a saccharified potato mash contg suitable N compds., a phosphate such as superphosphate and a carbonate such as $CaCO_3$, is fermented with bacteria such as *Aerobacter aerogenes* which under normal conditions produce 2,3-butylene glycol, and the mash is subjected to aeration insufficiently strong to prevent the formation of butylene glycol and the aeration is continued after the main fermentation period until at least most of the butylene glycol formed has been converted into acetyl methyl carbinol. Volatile fermentation products may be recovered by suitable washing devices, and the acetyl methyl carbinol produced may be converted into diacetyl by the action of oxidizing agents such as $FeCl_3$.

Acetic, butyric and propionic acids by fermentation. DISTILLERS CO., LTD., and H. B. HUTCHINSON. Brit. 337,153, Sept. 30, 1929. A dild. molasses soln. or other suitable sugar soln. of low concn. (various examples of which are given) is fermented with thermophilic organisms (which may be procured from animal excrement or from decompg. cellulosic material) and stronger sugar soln. is added under regulated conditions such that the concn. remains sufficiently low to prevent the formation of non-volatile fatty acids. Numerous details of procedure are described. Cf. *C. A.* **24**, 2543.

Fermentation. OLGA K. SAUER NÉE BUCHHOLZ. Ger. 513,511, Dec. 20, 1927. Yeast and bacteria prepns. are rendered stable and capable of germination by mixing to a paste or emulsion with fats at temps. not injurious to the organisms, without subsequent drying. Petrolatum, liquid petrolatum and cacao butter are mentioned as suitable fats.

Promoting fermentation reactions with activated carbon. DARCO SALES CORP. Brit. 336,207, April 2, 1929. The yield and speed of fermentation reactions (as in the production of alc., fusel oils and vinegar) are improved by adding to the fermenting mass (which may comprise a sugar or molasses soln. and suitable microörganisms) an active adsorbent agent such as activated "vegetable char" together with org. nitrogenous food substances such as a protein material. The use of "Darco" (produced from lignite) is particularly mentioned. Brit. 335,972 relates to similar processes in which the microörganisms and active charcoal are first added (preferably intimately assocd) to a soln. of medium d. of the material to be fermented and, after the d. has been reduced by the fermentation, it is increased above the initial d. by the addn. of a soln. of high d. of the material to be fermented. An example is given of the fermentation of a molasses soln. by yeast.

Fermenting sacchariferous liquids. EUGEN STICH. U. S. 1,792,450, Feb. 10. In processes such as alc. and yeast production, an app. is employed in which aeration is effected through porous diaphragms of a special degree of porosity (suitably arranged in 2 layers of material, the upper of which, in contact with the liquid, has pores of a diam. of 0.16 to 6μ while the lower layer has pores of larger diam.). Diaphragms of this particular character are stated to be suitable for producing better yields with a reduced air supply.

Pasteurizing apparatus for beer, etc. OSKAR KARY. Ger. 516,458, June 5, 1928.

17—PHARMACEUTICAL CHEMISTRY

W. O. EMERY

Contribution of the pharmacist to the progress of chemistry and other sciences. GODOY TAVARIS. *Bol. assoc. brasil. pharm.* **11**, No. 11, 13-22(1930).—Historical review. CARLOS A. ABELEDO

Corrosive sublimate tablets. CARLOS H. LIBERALLI. *Bol. assoc. brasil. pharm.* **11**, No. 11, 31-7(1930).—The addn. of NaCl to increase the soly. of $HgCl_2$ as recommended by many pharmacopeias is not advisable. Complex formation decreases the antiseptic action which is proportional to the concn. of Hg^{++} ions. L. recommends the addn of tartaric acid which does not interfere with the dissocn. of the mercuric salt. C. A. A.

A new medicine for the treatment of piroplasmosis. L. TOBBACK. *Bull. agr. Congo Belge* **21**, 484-8(1930).—A new medicine called "Piroblue" has been recommended as a cure for cattle piroplasmosis. It is a mixt. of trypan blue and Na cholate, one of the acid constituents of bile. This medicine may be used up to concns. of 4% and in quantities from 50 to 100 cc. A complete sterilization of the blood is not obtained but this is desirable as the presence of parasites in the blood aid resistance to infection. J. R. ADAMS

Beauty creams. FRED WINTER. *Am. Perfumer* **24**, 232, 234(1929).—A review. E. J. C.

The measurement of the adsorption capacity of medicinal charcoals. HEDWIG LANGECKER. *Klin. Wochschr.* **9**, 2298-3000(1930). Animal charcoals are, in general, better adsorbents than plant charcoals. In comparing the adsorbing power of a large series of charcoals, with methylene blue, morphine and $HgCl_2$ as test adsorbates, a fairly good correlation was obtained, particularly between the last 2. Occasional discrepancies do occur, *e. g.*, a strong adsorption of methylene blue, with weak adsorption of the other 2 by the same charcoal. H. EAGLE

Components of the drug "Salpamisri." C. GRIEBEL AND G. STEINHOFF. *Arch. Pharm.* **269**, 37-49(1931).—The East Indian drug "Salpamisri" (probably derived from *Allium macleanii*) contains H_2O 9.25, ash 3.75, free acid (as malic) 1.00, fructose 2.04, polysaccharide (calcd. as fructose) 69.63, saponin (in the alc. ext. as calcd. from the difference) 3.97, Et_2O ext. 0.60, insol. 11.00%. Hydrolysis of the saponin ($C_{44}H_{80}O_{40}$) yields in addn. to sapogenin ($C_{27}H_{44}O_6$), galactose, arabinose, methylpentose and galacturonic acid. The hemolytic index is 6700, the fish index 13,300. The polysaccharide gives on hydrolysis mainly fructose and is, therefore, to be regarded as trifructosan $(C_6H_{10}O_5)_3$. W. O. EMERY

Liquor plumbi subacetatis fortis—its preparation and assay. PHILIP A. BERRY. *Chem. Eng. Mining Rev.* **22**, 421-3(1930).—Liq. plumbi subacet. fort owes its virtue to the fact that it is a highly basic Pb soln. No standards requiring a high degree of basicity have been previously suggested, neither has any method of estn. been put forward to ensure this. The following method is proposed for estg. both the Pb and Ac radicals: To a known wt. of sample add a known excess of standard $H_2C_2O_4$ soln., make up to a definite vol., filter and in an aliquot portion of the filtrate det. the excess of oxalic acid by titration with $KMnO_4$. In another aliquot portion det. total acidity by titration with 0.1 N NaOH. The difference gives AcOH. The detn. is not affected by impurities present to an extent exceeding 50% of that permitted by the B. P. To prep. the liquor triturate 320 g. powd. PbO to a smooth paste with 100 ml. distd. H_2O, transfer to a bottle, wash in the rest of the PbO with 650 ml. H_2O, shake well, add 240 g. AcOH, shake vigorously for several min. and again at intervals for 24 hrs., filter and pass through the filter water to make up to 1 l. An excess of PbO results in the sepn. of a highly basic Pb acetate from the soln., with a resultant loss of both Pb and Ac radical. The white deposit formed in making this soln. is composed of basic Pb carbonate together with basic acetate of the compn. $Pb(CH_3CO_2)_2.2PbO.4H_2O$. The d. of the official liquor is at present too definite, a range of 1.275-1.300 is suggested. The method of assay proposed is equally suited for Pb acetate. W. O. E.

History of Austrian Pharmacopeias. OTTO ZEKERT. *Pharm. Monatsh.* **12**, 2-4, 22-5(1931).—An address describing in word and picture certain of the earlier Austrian pharmacopeial documents and apothecaries. W. O. E.

Arbutin content of certain known Ericaceae. L. ZECHNER. *Pharm. Monatsh* **12**, 4-6(1931); cf. *C. A.* **24**, 685.—Some 15 ericaceous plants were exaud. with respect not only to their arbutin but also their hydroquinone content. The greatest amt. of arbutin occurs in *Arctostaphylos*. W. O. E.

Electrometric studies of complex formation. I. The citrates of bismuth. C.

MORTON. *Quart. J. Pharm. Pharmacol.* **3**, 561–74(1930).—From the results of an electrometric study in which the glass electrode was employed, it is concluded that: The view that Bi citrate is a complex "bismuthyl citric acid" is incorrect. As ordinarily prepd., the normal citrate is obtained. In the presence of alkali citrates or bicarbonates, as in the Cowley process, sparingly sol. basic complexes are formed, the compn. of the complex cation being a function of the p_H. The process of "neutralization" by alkalies consists in the reversible formation of a series of complex cations, the final product being the neutral, sol. and stable 4:1 complex, $3Bi(OH)_3.BiC_6H_5O_7$. "Bismuth and ammonium citrate" is a mixt. of this basic salt and of NH_4 citrate in the mol. proportions 1:3. The methods given in the B. P. (1914) and the Brit. Pharmaceutical Codex (1923) for the prepn. of solns. of "bismuth and ammonium citrate" are unsatisfactory, and suggestions are offered for the prepn. of non-precipitable neutral solns. of definite compn. W. O. E.

Calcium phosphate B. P. NOEL L. ALLPORT AND T. TUSTING COCKING. *Quart. J. Pharm. Pharmacol.* **3**, 578–83(1930).—Analyses of several com. samples of Ca phosphate showing the variable proportions of CaO and P_2O_5 are given. The reaction of $Ca_3(PO_4)_2$ is p_H 9.2, and that of $Ca(H_2PO_4)_2$ is p_H 4.5. Previous workers have shown that $Ca_3(PO_4)_2$ is slowly decompd. by H_2O to form $3Ca_3(PO_4)_2\,Ca(OH)_2$. Evidence is here adduced which suggests that, under certain conditions, a salt is formed with a still higher Ca content, and having the approx. compn. $2Ca_3(PO_4)_2.Ca(OH)_2$. Expts. have been made which indicate that it is impracticable to manuf $Ca_3(PO_4)_2$ by a process of pptn. in the presence of H_2O. W. O. E.

Critical observations on the directions for glass testing of the German Pharmacopeia, sixth edition. L. KROEBER. *Sprechsaal* **20**, 356(1927); *J. Soc. Glass Tech.* **13**, Abstracts 173–4; cf. *C. A.* **21**, 2047.—The German Pharmacopeia directs that medical glasses be ¾ filled with an aq. soln. contg. 1 cc. of 0.1 *N* HCl per l. and 5 drops of Me red soln. and heated for ½ hr. in a boiling water bath. After this time the red color of the soln. should not have completely disappeared. For ampoule glasses for solns. of alkaloid salts, 5 g. of the coarsely crushed glass is heated for ½ hr. in a boiling water bath with 100 cc. of water, 0.3 cc. of 0.01 *N* HCl and 1 drop of Me red soln. in a Jena glass flask previously rinsed out with boiling distd. water. After this time the red color of the soln. should not have completely disappeared. Tests for pipets, dropping glasses, wide-neck glasses and app. glass should be given. Variable results can be obtained by heating the glasses in the steam or in the boiling water, by loosely closing the necks with cotton wool or by securely sealing with cork stoppers, and by having the vessels standing or floating in the water. Preliminary cleansing of the vessels with distd. water at the ordinary temp., to remove dust and grease particles is necessary and ought to be precisely expressed. For pipets, dropping bottles and app. requiring after-working in the blowlamp an intermediate or semi hard glass is suggested. The test for ampoule glass should be more precisely defined, particularly with reference to the size of the crushed glass particles, which should be sieved to a definite uniform size and freed from dust by washing with abs. alc. The narcotine-HCl test is superior to any other durability test, because of the extreme sensitiveness of the reagent and the fact that an estn. can be made in the course of an hr. without the necessity of applying heat. G. G.

Rapid volumetric determination of nicotine by means of silicotungstic acid. B. KASANSKY. *Z. anal. Chem.* **83**, 107–14(1931).—Nicotine forms a difficultly sol. salt with silicotungstic acid of the formula $2C_{10}H_{14}N_2.2H_2O.12WO_3.SiO_2.5H_2O$ in faintly acidic solns. If, after filtering off the salt, it is decompd. with caustic alkali and the freed nicotine distd. with steam, the distillate can be titrated with acid. The ppt. can also be weighed. The modification of the method now proposed consists in first distg. off the nicotine with steam and titrating the distillate with silicotungstic acid, stopping at the point where no further clouding is produced by adding the reagent. A 12% soln. of the reagent was used in the expts. described. To carry out the detn. in a sample of tobacco, weigh out 8–20 g. of the material into a 500 cc. round-bottomed flask, add 150 cc. of water and 50 g. NaCl. Mix well to a paste and add a suspension of 5 g. MgO in a little water. Distil with steam into a 500 cc. measuring flask contg. a little concd. HCl. After distg. for 1.5–2 hrs. the distillate should show a neg. test for nicotine when tested with silicotungstic acid. Fill the flask up to the mark, mix well and transfer, with a pipet, 100 cc. into a 200–250 cc. flask. Add 2 g. of solid NH_4Cl and titrate. Standardize the reagent by means of pure nicotine soln. which has been subjected to the same treatment. The analysis of 11 samples of tobacco and nicotine exts. indicates that the method gives satisfactory results. W. T. HALL

A note on three oil-bearing grasses from Burma. D. RHIND. *Agr. J. India* **25**,

327–9(1930).—A yield of oil amounting to 0.26% of the dry matter was obtained by the steam distn. of fresh *Cymbopogon clandestinus*, a grass which grows abundantly in dry rocky open spaces on hillsides in central Burma. The oil was of a light straw-color and had a pleasant odor somewhat resembling that of ginger-grass oil. The oil tends to form an emulsion with water and a redistn. is necessary to effect complete sepn. A new species of annual *Cymbopogon*, smaller than *C. clandestinus* and differing from it in having glabrous pedicelled spikelets, yielded upon steam distn. 0.72% of the dry matter as a pale straw-colored oil, which tended to emulsify in water. Steam distn. of *C. virgatus*, an undescribed perennial species of *Cymbopogon*, yielded 0.55% of an oil having a rather unpleasant odor somewhat resembling that of Botha-grass oil. The oil had the following properties: d_{15} 0.9556, $\alpha^{100} - 28°53'$, n_{20} 1.49107, acid value 1.9, ester value 6.5, ester value after acetylation 72.8, and alc. content calcd. as $C_{10}H_{17}OH$ 21–22%. K. D. JACOB

Studies of chemical sterilization and bacteriostasis. I. Standard inhibition control for germicidal tests. JUSTINA H. HILL. *Am. J. Pub. Health* 21, 192–3(1931).—The following method of making inhibition controls is proposed by which valid germicidal tests may be made by any accepted method: Let *D* represent the no. of cc. of drug employed in the test, B the amt. of inoculum employed, *S* the amt. of the mixt. of *D* + *B* used for sub-culture and *T* the no. of cc. of broth used for sub-culture. The inhibition control then consists of the following steps: (1) Mix 1 *D* and an amt. of sterile broth equal to 1 *B*. (2) Transfer the equiv. of 1 *S* of this mixt. to 1 *T*. (3) Mix the equiv. in sterile H_2O of 1 *D* with 1 *B*. (4) Transfer the equiv. of 1 *S* of this mixt. to the 1 *T* previously used in step (2). Such inhibition controls should be made with every diln. of drug employed and with every type of organism used. It is wise to run such controls in triplicate to allow for unavoidable exptl. variation. J. A. K.

Pyrethrum. II. Culture, yield and economic future. J. CHEVALIER. *Bull. sci. pharmacol.* 37, 235–9(1930). **III. Industrial and pharmaceutical preparations. The estimation of the activity.** *Ibid* 422–31; cf. *C. A.* 24, 2804.—The pyrethrins I and II are esters of pyrethrolone, a ketonic alc., and of chrysanthemummonocarboxylic acid and chrysanthemummethyldicarboxylic acid. The flowers of pyrethrum contain at an av. 2.5–3 g. pyrethrin per kg. at a max. 5 g. Stems contain 1/6 to 1/8 as much. The industrial exts. are solns. in hydrocarbons or H_2O-sol. emulsions. The pyrethrins can be isolated as semicarbazones, but this method is not suitable for analysis. The extn. with EtOH or MeOH destroys the active substance. Chlorinated org. solvents are not satisfactory. Pyrethrin I is more efficacious than II. In the practical test on insects, different preparations show a large variation of activity. The species of the animal and the temp. have much influence. C. recommends the test on the frog. About 0.2 mg. pyrethrin injected into the lymphatic sac will kill the animal within 3 hrs. The test is unreliable at low temp. The method used for the extn. of male fern by detn. of the effect on fish showed pyrethrin active in dilutions 1:100,000. This is too sensitive for practical purposes. Com. prepns. should be tested on the class of animals they are sold for. A. E. MEYER

The culture of valerian and burdock. G. HINARD AND MLLE. PRADES. *Bull. sci pharmacol.* 37, 469–77(1930).—The compn. and growth of the plants is considered in relation to the compn. of the soils in different parts of France and Belgium. A. E. M.

Essential oil of Asarum sieboldi var. seoulensis Nakai. I. T. KAKU AND T. KONDO. *J. Pharm. Soc. Japan* 51, 8–17(1931); German abstr. 3–7.—K. and K. isolated from *Asarum sieboldi var. seoulensis* Nakai an essential oil (yield 2.21%) (I). I has the following properties: d_4^{15} 0.9988, n_D^{20} 1.5141, acid no. 1.85, sapon. no. 28.4, sapon. no. after acetylation 56.1, α_D −0.75 and MeO 21.4%. I contains palmitic acid (II), a substituted phenol (III) with mol. formula of $C_6H_3(OH)(OC_3H_5)(O_2CH_3)$. III is under further investigation. I, after removal of II and III, was fractionated under reduced pressure. The constituents isolated are: *l-pinene*, a ketone b_{10} 80–110° (*semicarbazone*, m. 185°, which, on treating with HCl, gave a free ketone, b. 200–20°, d^{19} 0.9562, n_D^{20} 1.5095, not purified further, which resembled *eucarvone*); *safrole*, which on oxidation gave piperonylic acid; and *methyleugenol*, $C_{11}H_{14}O_2$, b_{11} 127–9°, d_4^{15} 1.0443, n_D^{20} 1.5340, which on oxidation gave veratric acid, m. 180°. F. I. NAKAMURA

Common diabetic drug. IV. Constituents of the bark of Aralia chinensis L. var. grabrescens (3). S. KUWATA. *J. Pharm. Soc. Japan* 51, 17–31(1931); German abstr. 7–9; *C. A.* 24, 656.—From the alc. ext. of the bark of *Aralia chinensis L. var. grabrescens* K. isolated *α-taralin* (I) and *β-taralin* (II). I is sol. in alc., but insol. in H_2O and Et_2O; it contains a large amt. of ash (chiefly Mg, Ca and Na). It decomp. at 202–4° after electrodialysis. Analysis indicates the mol. formula of $C_{50}H_{72}O_{18}$. Hydrolysis takes

place according to the equation: $C_{50}H_{72}O_{19} + 3H_2O = C_{32}H_{46}O_4 + 2C_6H_{12}O_6 + C_6H_8O_6$. *Octaacetyl-α-taralin* decomps. 143°. Catalytic reduction of I gave glucose (decompn. 229°) which shows strong acid and Liebermann's reaction. The hemolytic action of I is similar to that of saponin of Kahlbaum and senegin of Merk. The action is weakest in a neutral soln. F. I. NAKAMURA

Digitalin of Nativelle and digitoxin. V. HASENFRATZ. *Compt. rend.* **192**, 366–8 (1931). —H. attempts to prove that the digitalin of Nativelle and the digitoxin of Schmiedeberg are the same definite chem. substances by expts. showing that these compds. have identical products of hydrolysis. The reaction of Windaus and Stein (*C. A.* **23**, 1646) representing the hydrolysis of digitoxin into digitoxose and digitoxigenin ($C_{41}H_{64}O_{13} + 3H_2O \longrightarrow C_{23}H_{34}O_4 + 3C_6H_{12}O_4$) also represents, according to H., the hydrolysis of digitalin of N. It is pointed out that digitalin of N. and digitoxin have the same toxicity (cf. Raymond-Hamet, *C. A.* **23**, 2757). ALBERT L. RAWLINS

Experimental studies on heart tonics. IV. The main factors of digitalis standardization with a new assay method. WILLIAM NYIRI AND LOUIS DUBOIS. *J. Pharmacol.* **40**, 373–401 (1930); cf. *C. A.* **24**, 5381.—Rabbits are anesthetized by intravenous injection of barbital derivatives, and the drug to be tested injected into the jugular vein. Blood pressure tracings are made (in some instances using ouabain to supplement the prepn.) until the pressure drops to zero. The prepn. tested may subsequently be used without the further complication of inaccuracy by diln. C. RIEGEL

Trypsin preparations suitable for the prevention of adhesions. ROBERT P. WALTON. *J. Pharmacol.* **40**, 403–11 (1930).—Bacteria-free enzyme prepns. could be obtained by pressure filtration of water-glycerol solns. of trypsin, and from this, by pptn. with alc. and ether, a dry sterile powder. These prepns. were found to be effective in preventing peritoneal adhesions in dogs. C. RIEGEL

Analysis of disinfectants. LESLIE HART. *Soap* **5**, 111–5 (1930).—The methods of the Food and Drug Administration St. Louis station are given for the following detns., water, alkalies, phenols, neutral oils and fatty or rosin acids, mineral oils, mineral oil in creosote oil, Liquor Cresolis Compositus, unsapond. material and fatty acids, total alkali, glycerol, sapond. cresols, water in pine oil emulsions, pine oil and fatty and rosin acids. E. SCHERUBEL

Hypophosphites. F. H. ALCOCK. *Chemist and Druggist* **113**, 613–4 (1930).—Detailed criticisms are given on the monographs of the various hypophosphites of the new Brit. Pharm. S. WALDBOTT

Glycerinum acidi borici, Brit. Pharm. J. F. BOYLE. *Pharm. J.* **125**, 453 (1930).—The present Brit. Pharm. requires a soln. of 300 g. $B(OH)_3$ in 450 g. glycerol to be evapd. to 500 g. at a max. temp. of 150°. On a large scale a higher temp. is needed for evapn., which causes darkening of the product. A simplification of the proportions instead of an increase as proposed for the new Pharm. is suggested. S. WALDBOTT

Unguentum hydrargyri compositum. J. H. RIDGWAY. *Pharm. J.* **125**, 453 (1930).—The formula ung. hydragr. Brit. Pharm. 400, cera alba, Brit. Pharm. 50, camphora 100, adeps benzoatus 450 is recommended in the place of the Brit. Pharm. formula in which the yellow beeswax imparts to the prepn. an unsightly greenish color. S. WALDBOTT

Comments and criticisms, British Pharmacopeia revision. ANON. *Pharm. J.* **125**, 453, 483, 511, 536, 561, 647–8; *Chemist and Druggist* **113**, 553–4, 587–8, 613–4, 644–5, 685–6, 746, 770–1 (1930); cf. *C. A.* **25**, 772.—More or less detailed comments were made thus far by 31 pharmacists. S. WALDBOTT

Acidum carbolicum liquefactum. Infusions. B. G. W. HOARE. *Pharm. J.* **125**, 483 (1930).—The acidum carbolicum liquefactum proposed for the new Brit. Pharm. is said to contain 50 grains in a fluid drachm. A sample made according to the new formula had a sp. gr. of 1.062; hence it contains a little below 46.5 grains per fluid drachm. Fresh infusions are superior in aroma and in efficacy in certain cases, to concd. infusions; to introduce these would be a backward step. Infusions of ergot, broom, chiretta and rhatany might be deleted. S. WALDBOTT

Syrupus ferri phosphatis compositus. F. GOLDBY. *Pharm. J.* **125**, 561 (1930).—A decoction of cudbear instead of cochineal is recommended as a permanent, bright coloring agent. Possibly a sol. powd. ext. of cudbear may be used. S. WALDBOTT

Note on linimentum camphorum. J. F. DUCKWORTH. *Pharm. J.* **125**, 647 (1930).—Peanut and ordinary cottonseed oil are not suitable for the prepn. of a satisfactory camphor liniment since the latter prepd. with these oils become solid or opaque at 0°. The *non-freezing cottonseed oil* is suitable and should be adopted in the new Brit. Pharm. S. WALDBOTT

Liquor carmini, Brit. Pharm. Codex. J. F. BOYLE AND J. H. FRANKLIN. *Pharm.*

J. **125**, 648(1930).—Evapn. of the NH_4OH soln. of carmine to near neutrality, as directed by the Codex, causes much pptn. of the coloring matter. It is suggested that after evapn. until the NH_3 is expelled, just enough soln. of NH_4OH be added to redissolve all of the pptd. carmine; or dissolve the carmine in NH_4OH and preserve the soln. with glycerol. S. WALDBOTT

A qualitative comparison of various digitalis substances. HARRY GOLD, WM. HITZIG, BEN GELFAND AND HERMAN GLASSMAN. *Am. Heart J.* **6**, 237–54(1930).—The substances used were tincture digitalis of an American-grown leaf, the same of a German grown leaf, the chloroform fraction of digitalis, tincture of adonis, ouabain and digitoxin. All have the same qual. cardiac actions, but there are extraordinary individual differences in response to the same prepn. R. C. WILLSON

Standardization of the trypanocidal activity of some aryl derivatives of arsenic acid (LAUNOY, ENGLER) **11H.** Chlorogermanites of alkaloids (TCHAKIRIAN) **6.** Explosions occurring during the use of C_2H_4 (JOHNSON, CABOT) **24.** Gases from crude oil cracked in the vapor phase [for use in preparing perfumes] (MARKOVICH, PIGULEVSKII) **22.**

CHIRIS, A.: **Contribution à l'étude des huiles essentielles.** Grasse: Antoine Chiris. 55 pp. Reviewed in *Chimie & industrie* **24**, 1507(1930).

Synthetic drugs. I. G. FARBENIND. A.-G. Brit. 337,136, Oct. 8, 1928. Acetates of 9-aminoacridine or its substitution products, which are readily water-sol. and suitable for therapeutic use, are obtained by treating the base with HOAc and isolating the product. Examples are given of the prepn. of acetates of 7-ethoxy-3,9-diaminoacridine, 9-aminoacridine, 7-methyl-9-aminoacridine and 3,9-diaminoacridine. 7-Methyl-9-aminoacridine is prepd. from *o*-chlorobenzoic acid and *p*-toluidine by a process similar to that described in Brit. 176,038.

Synthetic drugs. I. G. FARBENIND. A.-G. (Hubert Oesterlin, Karl Streitwolf and Alfred Fehrle, inventors). Ger. 517,002, Apr. 8, 1928. *o*-Phenolglycinamidearsonic acids and their substitution products are prepd. from *o*-aminophenolarsonic acids and their substitution products by the customary methods. Thus, 3-amino-4-hydroxybenzenearsonic acid may be treated with CH_2O and KCN to yield the nitrile of 4-hydroxybenzene-1-arsonic-3-aminoacetic acid, from which the acid and its amide are obtained in turn. Other examples are given also.

Therapeutic preparations. SALO BERGEL. Ger 513,694, April 24, 1929. Anti-syphilis-spirochetes prepns. are obtained by the intrapleural, intraperitoneal or intravenous injection of animals with lipoid or lipoid-albuminous substances, nucleoproteins, or albumin, inoculating them with weakened and then with fully virulent syphilis-spirochetes in the breast or abdomen and ear vein, and working up the exudations from the breast and abdomen with the ext. from the lymphatic glands, milk, ovaries, etc., and with the blood serum.

Medicinal aqueous-oil emulsions. CLAUSS B. STRAUCH. U. S. 1,791,878, Feb 10. An emulsion suitable for injection into the tissues is prepd. by dissolving a cholesterol (such as metacholesterol) and beeswax in olive oil, and adding a water-sol. drug such as insulin. Myricin may be added as a stabilizing ingredient.

Complex iron compounds of aliphatic hydroxycarboxylic acids. I. G. FARBENIND. A.-G. Brit. 335,965, June 5, 1929. Acids such as hexanetetrolic acid, gluconic acid, trihydroxyglutaric acids, glucuronic acid, saccharic and mucic acids and their isomers or salts are treated with Fe or an Fe compd. and the reaction mixt is simultaneously or subsequently neutralized with a basic substance such as alkalies or NH_3 or org bases. Water-sol. *therapeutic compds.* are obtained, and details are given of the production of Na ferrous and ferric gluconates, K-Na ferrous and ferric saccharates, quinine K ferrous saccharate and Na Fe mucate.

Anesthetics. I. G. FARBENIND. A.-G. (Max Bockmühl and Leonhard Stein, inventors). Ger. 516,285, Jan. 16, 1929. Alkamine esters of halophenyl carbonic acids are prepd. by condensing halides of halophenyl carbonic acids, or their substitution products free from N, with aliphatic amino alcs. having a tertiary N atom. Thus, *p*-chlorophenyl carbonic acid chloride (prepd. from *p*-chlorophenol and $COCl_2$) may be caused to react with $Et_2NC_2H_4OH$, yielding $ClC_6H_4OC(O)OCH_2CH_2NEt_2.HCl$, m. 132°. Other examples are given also.

Extracting organic substances. I. G. FARBENIND. A.-G. Fr. 694,602, April 28, 1930. Org. substances are extd. from animal or vegetable materials, *e. g.*, alkaloids from roasted coffee or tobacco, or sugar from beet roots, by means of liquid NH_3.

Hormones. SCHERING-KAHLBAUM A.-G. Brit. 336,470, Dec. 6, 1928. For purification of crude hormone prepns. such as those derived from animal liquids or organs, yeast or maize shoots, impurities of an ester-like character are saponified by Twitchell reagent, Dartring saponifier, lipase of castor seed, pancreas lipase or other catalytically acting agent. The saponified material may be extd. with MeOH, the ext. neutralized with alc. $Ba(OH)_2$, the filtrate concd. and then taken up in water with ether, and the hormone obtained by evapg. the ethereal soln.

Hormones. SCHERING-KAHLBAUM A.-G. Brit. 336,471, Dec. 1, 1928. Liquids contg. hormones such as urine of pregnant mammals or an aq. ext of the anterior lobe of the hypophysis are mixed with a water-sol. org. liquid such as alc. in quantity insufficient to ppt. the hormone but sufficient to ppt. impurities The hormone is subsequently pptd. as by addn. of ether, $CHCl_3$ or ethylene chlorohydrin.

Tuberculosis vaccine. CARL OTTO. Ger. 516,403, Dec 7, 1926. Pus from a dead tubercular cow is injected into a healthy cow and the latter, at the end of the incubation period, is inoculated subcutaneously with croton oil. The pus produced at the point of inoculation is removed, coagulated, and filtered. The residue is mixed with ground periosteal substance and the mixt. finally sludged with the filtered pus serum.

Alkaloids. SOC. A. S. FARMAKON. Fr. 694,055, April 16, 1930 Opium is treated with a solvent for fatty materials, preferably petroleum ether, then the soln. is agitated with acidulated water, preferably contg. HCl. The acid soln is neutralized to ppt. the alkaloids

Digitalis glucosides. WELLCOME FOUNDATION, LTD., and S. SMITH. Brit. 337,091, Aug. 8, 1929 A new glucoside is obtained by stirring the total glucosides of the leaf of *digitalis lanata* with acetone or methyl ethyl ketone, filtering, fractionally pptg. the filtrate by adding water, removing the sepd solid, adding salt to the clear liquid, drying the ppt. thus formed, and extg. it with MeOH or EtOH, on adding water to the soln. and standing, crystals of the new glucoside are obtained. Various details of purification and auxiliary treatment are given.

18—ACIDS, ALKALIES, SALTS AND SUNDRIES

E. M. SYMMES

Purification of caustic soda obtained by the lime process. ALFONS KRAUSE AND WACLAW KLUKA. *Przemysl Chem* **15**, 6-12(1931). Caustic soda obtained by the CaO process contains Na_2CO_3, NaCl, Na_2SO_4, Na_2SiO_3 and traces of Al_2O_3 and Fe_2O_3 as impurities derived from the raw materials. Their removal by the chem. method is impossible, but it can be accomplished by concn. and cooling. Studies on the solubilities of the above salts in NaOH solns of varying concn. and at various temps. show that the concn of the NaOH should be increased up to 72 .5% at least, higher concn. not to exceed 100% being preferable. Cooling decreases the solv. of all the impurities. For the removal of Na_2SO_4 to a very low figure cooling of the NaOH to about 50° is necessary. The degree of cooling required for the removal of other impurities depends on the concn. It is well to conc. the NaOH in the presence of a definite amt. of $CaCO_3$, which forms insol. compds. with Na_2CO_3 and Na_2SO_4 and thus causes their removal from the soln. Among the impurities in the purified soda Na_2CO_3 takes first place and NaCl second. There is relatively little Na_2SO_4, and only traces of Al_2O_3 and Fe_2O_3. A. C ZACHLIN

Evaporation of electrolytic caustic soda. J. A. LEE. *Chem. Met. Eng.* **37**, 404-8 (1930).—An account is given of the continuous evapn and salt recovery system at the South Charleston plant of the Westvaco Chlorine Products, Inc The original soln. contains about 8% NaOH and 17.5% NaCl, and the final products from the steam evapn. plant are: 53 short tons of NaOH per 24 hrs. in soln. (d. 1.53) contg. also about 0.9% NaCl in soln. and none in suspension, and NaCl brine for return to the electrolytic cells. The water evapd. is about 1 million lb. per day, and the steam used, at 10 lb./sq. in. gage, about ¾ million lb. Evapn. is in 3 stages, a double effect followed by a single; then follows a continuous crystallizer and Laughlin centrifugal filter, which delivers the final caustic liquor. Swenson evaporators, Dorr thickeners and rake classifiers are employed. The materials of construction used are Ni cast Fe, Ni tubes and Monel metal. B. C. A.

Causticizing soda by Lewig's method and the use of various iron ores for this purpose. V. S. YATLOV. *J. Chem. Ind.* (Russia) **6**, 1020-7(1929).—The reaction between

soda and several Fe ores was found to be very sensitive to such factors as time, temp., subdivision of the materials, and make-up of the mix. A change in any one of them requires great readjustment in the others to bring about the same degree of reaction or the same velocity. The surface area of the reacting substances is the most important factor of all. Under the usual factory conditions the currents of hot air often carry away the finest particles of the ore, and heat sometimes produces a fusion of the reactants, with resulting diminution of the surface area. In studying the factory phase of this reaction it appears that further work should be concerned with the use of more finely subdivided ore and the use of lower temps. Special lab. analyses were worked out to obtain more accurate results than those of routine analysis. A. C. ZACHLIN

Causticizing ammonium chloride with magnesium oxide. KOJI NISHIDA AND SOEMAN NAKAMURA. *Abstracts from Rept. Central Lab. S. Manchuria Ry. Co.* 1929, 37–9.—The NH_4Cl soln. must be dild. to 2.34 *N* for perfect recovery of NH_3. This soln. uses 3 times as much fuel for distn. V. F. HARRINGTON

Dicalcium phosphate or "precipitate," and its commercial production. RUD. WEBERS. *Metallbörse* 20, 2659–60, 2755–6(1930).—A review of methods of manuf. of $CaHPO_4$ from superphosphate and bones. E. M. SYMMES

Preparation of zinc oxide by the wet method. TATSUO IRIYE. *Repts. Imp. Ind. Research Inst., Osaka, Japan* 11, No. 16, 56 pp.(1930).—The powd. Zn ore is roasted and treated with H_2SO_4. The $ZnSO_4$ thus obtained is treated with NaOH soln. under pressure. The crude Na_2ZnO_2 is freed from other metallic impurities and treated with CO_2. Pure $Zn(OH)_2$ is oxidized to ZnO by heating. F. I. NAKAMURA

Catalytic reduction of carbon monoxide under ordinary pressure. VII. Effect of alkalies on iron-copper catalysts. S. KODAMA AND K. FUJIMURA. *J. Soc. Chem. Ind., Japan* 34, Suppl. binding 14–6(1931)(in German); cf. *C. A.* 25, 1039.—With a Cu-Fe catalyst prepd. from the nitrates, 3.0 cc. of oil contg. a small quantity of a substance like vaseline was obtained at 270° from 141 l. of water gas. Addn. of 0.0005–0.05 mol. of Na_2CO_3 to the above catalyst increased its initial activity and favored formation of higher hydrocarbons. With catalysts contg. alkalies there is a high gas contraction at first, the activity diminishing gradually. The catalyst may become coated with the higher hydrocarbon. No diminution of activity occurs with alkali free catalysts. The best catalyst contains Fe 1 atom, Cu 1 atom, Na_2CO_3 0.005 mol. E. M. S.

Solid carbon dioxide from Mexico. J. W. MARTIN. *Ind. Eng. Chem.* 23, 256–8 (1931).—Oil-well gas, contg. 95% CO_2 and 5% combustible gas, issues from oil wells in the Quebrache field, Mexico, at 100°F. and a pressure of about 1000 lb. per sq. in. After purification, the gas is cooled to the liquid state and then expanded to form solid CO_2, which is shipped by rail to the Gulf Coast and by boat to New York. The plant cost is 1/4, and the transportation expense, including duty, 2/3 of the total cost. F. D. ROSSINI

Carbon dioxide in its new field of usefulness. J. C. GOOSMANN. *Ice and Refrigeration* 80, 45–9(1931).—A review of the origin, liquefaction and solidification of CO_2. Various methods now in use for the solidification of CO_2, together with the thermodynamics of each and a tabulation of the power required per ton of solid CO_2 manufd., were described previously (August, 1930). The chronology of CO_2 discovery is given, with a brief history of patent literature. Early methods of producing and compressing CO_2 snow to "dry ice" are described, and the development of the present methods of production is discussed. ALICE W. EPPERSON

Regaining iodine from phosphates. HANS JORDT. *Chem.-Ztg.* 55, 86(1931). From the analysis of the crude I_2 it is concluded that this by-product is obtained by the Dansk Svovlsyre und Superphosphatfabrik of Kopenhagen electrolytically, and the procedure is condemned as non lucrative. J. is of the opinion that by treating the gases evolved from superphosphate manuf. with CS_2, active C, H_2O_2 and O_2, the I_2 can be brought by filtration to a sufficient state of concn. to render further purification profitable economically. B. S. LEVINE

Evaporation of natural salt brines. V. P. IL'INSKII AND V. M. FILPPEO. *J. Chem. Ind.* (Russia) 6, 1163–8(1929).—The phase diagrams of Na and Mg chlorides and sulfates were studied in relation to sea water and lake brines. The processes of evapn. of natural brines with crystn. of NaCl were classified according to the types of Glauber salt, astrachanite, epsomite, hexahydrate and biphosphate. A new type of evapn. was established, based on Caspian Sea brine, accompanied by a labile system. NaCl deposits in the astrachanite sector, as a result of which NaCl deposits out in a pure state to the amt. of 30–40%. The labile equil. in the epsomite sector is disturbed by fluctuations of temp., which cause a deposition of epsomite (on the av. found for stable equil.) depending upon areas of crystn. as worked out in the lab. The amt. of

NaCl depends on the relative NaCl content of the dry residue, and to an even greater degree on the coeff. of metamorphosis. The yield of salt declines sharply with increase in the coeff. of metamorphosis. On the basis of industrial observations and data in literature concns. were established at which crystn. of NaCl begins in the various reservoirs under normal conditions and at an av. temp. of 25°. A. C. ZACHLIN

Salt and its production in history. HANNS FREYDANK. *Kali* **23**, 145–51, 161–8, 177–81(1929). E. J. C.

The utilization of bittern. I. The recovery of Glauber's salt. TORARO KATO. *Abstract from Rept. Central Lab. S. Manchuria Ry. Co.* **1929**, 40–1.—One hundred parts bittern and 40 parts NaCl are dild. with water until d. = 24° Bé. Cooling to —10° gives 45% of the Na_2SO_4 in the bittern and cooling to —19°, 70%. V. F. H.

Quinquennial review of the mineral production of India for the years 1924 to 1928. Salt. W. A. K. CHRISTIE. *Records Geol. Survey India* **64**, 276–87(1930).—About $^2/_3$ of Indian salt production is from sea water, $^1/_3$ from rock salt and the rest from areas of internal drainage. The salt works are described. **Borax.** E. H. PASCOE. *Ibid* 345–7.—Borax is not known to occur in India, although the country exports borax obtained from hot spring deposits in Kashmir and salt lakes in Tibet. **Sodium compounds (other than salt).** W. A. K. CHRISTIE. *Ibid* 432–6.—Na_2CO_3 (usually) and Na_2SO_4 deposits (occasionally) occur. Soda is evapd. from lake waters A. H. E.

The dehydrating action of coal ash. MUNENARI TANAKA. *Abstracts from Rept. Central Lab. S. Manchuria Ry. Co.* **1929**, 36–7.—Fuchun coal ash and Japanese acid clay at 260° have action only slightly inferior to $AlCl_3$ in the formation of anthraquinone derivs. from phthalic anhydride and phenols. V. F. HARRINGTON

Driers in soda factories. V. G. BAKHUROV. *J. Chem. Ind.* (Russia) **6**, 694–8 (1929).—One of the main points of weakness of the usual soda process is the low efficiency of the driers which show a heat utilization for evapn. purposes of only 45–50%. The performance of the drier can be improved by replacing by a centrifuge the continuous filter which feeds the $NaHCO_3$ into the drier, and shortening the rotary drier itself. A complete heat and material balance is calcd. for an av. plant. A. C. ZACHLIN

Performance of the Kessler apparatus. V. N. SCHULTZ, V. M. VOLCHENKO, I. V. IOSELOVSKII AND L. V. SUPONITZKII. *J. Chem. Ind.* (Russia) **6**, 928–40(1929).—A careful study was made of material and heat balance in the Kessler app. in the Degoonin H_2SO_4 chamber-process plant. The exceptionally high heat efficiency of this particular app. depends in part on the high temp. of gases entering the saturator. Utilization of heat in the Kessler app. was distributed as follows: concn. of H_2SO_4 77.9%; outgoing gases 13.2%; loss to surrounding medium 8.9%. A. C. ZACHLIN

Revivification of foam solutions for fire protection with carbon dioxide. C. B. WHITE. *Chem. & Met. Eng.* **37**, 379–80(1930).—By a few simple addns. to the fire-protection pump the soln. of $NaHCO_3$ is circulated from the bottom of the storage tank, through a small tower, and back to the upper part of the tank; it is recarbonated in the tower by gas from a cylinder. The method is preferable to adding addnl. $NaHCO_3$, because if that is done, the $Al_2(SO_4)_3$ or other acid soln. which must also be added has to be increased *pro rata*, and eventually both will have to be scrapped. B. C. A.

Potash salt recovery in cement burning (KUUSK) **20**. Apparatus for NH_3 synthesis and like catalytic gas reactions (Ger. pat. 516,249) **1**. Sulfonic acids of the fatty series (Fr. pat. 694,692) **10**. Manufacture of liquid household insecticides (Weed) **15**.

KRCZIL, FRANZ: **Untersuchung und Bewertung technischer Adsorptionsstoffe.** Leipzig: Akad. Verlag. 504 pp. M. 28; bound, M. 30.

Hydrocyanic acid. IMPERIAL CHEMICAL INDUSTRIES, LTD., T. S. WHEELER, H. A. T. MILLS, J. MCAULAY and W. B. FLETCHER. Brit. 335,947, March 27, 1929. In prepg. HCN by reaction between hydrocarbon gas and NH_3 as described in Brit. 335,585 (*C. A.* **25**, 1642), the reaction mixt. may contain one mol. proportion of NH_3 to one atomic proportion of C, or less, if the mixt. also contains H.

Hydrocyanic acid stabilization. HANS LEHRECKE (to Deutsche Gold & Silber-Scheideanstalt vorm. Roessler). U. S. 1,792,103, Feb. 10. As a stabilizing agent there is added to liquid HCN a small proportion of an ester of a halogen-substituted org. acid such as Et bromoacetate.

Nitric acid. E. I. DU PONT DE NEMOURS & Co. Brit. 336,638, April 17, 1929. Absorption in water or HNO_3 soln. of gases contg. N oxides (such as those produced by the arc process or by the catalytic oxidation of NH_3) is effected under pressures

of 50–150 lb. per sq. in. in a specially constructed tower (details of which are described) comprising 10 to 20 sections for gas and liquid contact. The gases are alternately scrubbed with liquid in each section and further oxidized on their passage to the next higher section. Cf. *C. A.* **24**, 2840.

Nitric acid production by catalytic oxidation of ammonia. E. I. DU PONT DE NEMOURS & Co. Brit. 336,233, March 27, 1929. In a process involving oxidation of NH_3 to nitric oxide, further oxidation of the nitric oxide to NO_2, and absorption in water condensed from the oxidized mixt., the oxidation and absorption are effected under pressure (suitably 4–10 atm. or higher), and the oxidized mixt. is cooled quickly to effect sepn. of water before oxidation of the nitric oxide takes place. An arrangement of app. and various details of procedure are described.

Recovery of nitric acid. MAHLON G. MILLIKEN (to the Hercules Powder Co.). Can. 308,879, Feb. 24, 1931. Waste gases from nitrating operations are treated for the recovery of HNO_3 by mechanically removing H_2SO_4 mist, introducing NH_3, and sepg. out substantially pure NH_4NO_3 formed by combination of the NH_3 with HNO_3 vapor of the waste gases

Sulfuric acid. HENRI N. M CORBILLÉ. Fr. 694,080, April 17, 1930. The residual gases from the Pb chambers are practically perfectly denitrated, and the loss in S is suppressed by submitting the gases to the action of H_2SO_4 only after they have reached a degree of oxidation corresponding to the presence of NO and NO_2 in equimol. proportions, the treatment with H_2SO_4 being then reduced to about 5–10 sec. The gases are given a final washing with alkali carbonate or bicarbonate.

Sulfuric acid. I. G. FARBENIND. A.-G. Fr. 695,098, May 5, 1930. Constituents of HNO_3 are eliminated from impure H_2SO_4 contg. more than 60% of H_2SO_4 by adding SO_2 dissolved in an appropriate solvent to the H_2SO_4 to be purified and treating the mixt. with a current of gas at a high temp.

Cooler for sulfuric acid. A.-G GEORG EGESTORFF'S SALZWERKE UND CHEM. FAB. Ger. 516,366, July 22, 1928.

Residue of sulfonic acids from oil refining. STANISLAW PILAT and JAROSLAW SEREDA. Fr. 694,236, Apr. 19, 1930. The residue of sulfonic acids obtained in the refining of oils with H_2SO_4 is neutralized with alk. earth hydroxides and treated with an alkali carbonate to obtain alkali sulfonates, which may be treated with mineral acids to obtain the free acids. The products are used as *wetting*, *emulsifying* and *fat splitting* agents.

Oxidation of ammonia. I. G. FARBENIND. A.-G. Fr. 694,790, May 1, 1930 NH_3 is oxidized with catalysts of the Pt group, covered with Rh alone or with a mixt of Rh with other metals of the Pt group. The Rh is heated to redness to make it adhere better before use as a catalyst

Apparatus for the catalytic oxidation of ammonia. SOC. ANON. D'OUGRÉE MARIHAYE. Ger. 516,444, April 17, 1928.

Mono- or di-alkali cyanamides. JEAN MARGOLES. Fr 694,093, April 17, 1930 $CaCN_2$ is caused to react with an alkali phosphate in dil or concd. soln. and at any temp.

Alkali phosphates. METALLGES. A.-G Fr. 694,667, April 29, 1930. Alkali phosphates, particularly Na_3PO_4, are prepd. by heating NaCl or other alkali chloride in a cyclic operation with FeS in the presence of O and steam, the Na_2SO_4 formed is heated with Fe-P to obtain Na_3PO_4 and FeS which is used again.

Alkali phosphates. METALLGES. A.-G. (Freiherr Conway von Girsewald, Hans Weidmann and Gerhard Roesner, inventors). Ger. 516,382, June 1, 1929 See Brit. 335,492 (*C. A.* **25**, 1643).

Pyrophosphates. METALLGES. A.-G. Fr. 693,913, April 15, 1930 Acid di-Na pyrophosphate ($Na_2H_2P_2O_7$) is made by evapg. under vacuum solns. of phosphoric acid contg. the corresponding amt of NaCl. Temps. which would cause the formation of insol metaphosphates are avoided.

Phosphorus compounds. VICTOR CHEMICAL WORKS. Fr. 694,278, April 22, 1930. An app. is described for the manuf. of P compds., consisting of a combustion chamber and means for leading in gases contg. P.

Anhydrous chlorides. I. G. FARBENIND. A.-G. (Max Jaeger, Robert Suchy and Wilhelm Moschel, inventors). Ger. 513,529, May 30, 1926. Addn. to 502,646. Anhyd. chlorides of Li, Ca, Zn and Ce are obtained by the method used in 502,646 (*C. A.* **25**, 564) for anhyd. $MgCl_2$, *i. e.*, by heating a mixt. of metal chlorides and oxides of Li, Ca, Zn or Ce. In one example, a mixt. of $CaCl_2$ and CaO are heated electrically in a current of Cl_2 and CO or HCl. In another, NaCl and KCl are heated with CeO_2.

Alumina. MAX BUCHNER. U. S. 1,792,410, Feb. 10. Aluminiferous material such as clay is treated with HNO_3 insufficient to combine with all the alumina in the material, and the Al nitrate soln. is sepd. and decompd. by heat. Cf. *C. A.* **24**, 5947.

Alumina. WM. GUERTLER. Ger. 516,278, June 11, 1929. In the manuf. of Al_2O_3 by heating Al silicates with $CaCl_2$ or like chloride at 650–1000°, the HCl evolved is caused to act again on the reaction mixt. when the latter has cooled to below 400°. Ca silicate is thus decompd. and $CaCl_2$ is recovered. The reaction product is worked up by extg. $CaCl_2$ with water, and extg. $Al(OH)_3$ from the residue with HCl, the $AlCl_3$ soln. being then worked up in known manner. Details are given.

Ammonium carbamate. I. G. FARBENIND. A.-G. Brit. 336,206, July 1, 1929. Reaction under pressure is effected with excess of liquid or gaseous NH_3 and NH_4HCO_3, $(NH_4)_2CO_3$ or bicarbonates of alkali metals or of Mg (in which latter cases carbonates of the alkali metals or Mg are also formed). Mixts. of salts produced may be sepd. by treatment with water, aq. or liquid NH_3, MeOH, etc., and the reactions may be carried out in the presence of water.

Diammonium phosphate. I. G. FARBENIND. A.-G. Brit. 336,008, July 10, 1929. Di-NH_4 phosphate soln. is mixed with the dry salt to obtain a moist product which can be dried at a temp. of about 60–80° without loss of NH_3. The soln. used is preferably made from H_3PO_4 still contg. some of the H_2SO_4 used to decompose the crude phosphates, evapd. to a sp. gr. of 1.4–1.5 and cooled. The contained Ca is thus pptd. as sulfate and is removed, the soln. being then neutralized. The pptd. Fe and Al may be left in the soln.

Calcium carbonate. LOUIS PERIN. Fr. 694,507, Aug. 1, 1929. Chemically pure $CaCO_3$ is obtained by converting the natural carbonate into chloride and treating the chloride with $(NH_4)_2CO_3$ which ppts. pure $CaCO_3$. The $(NH_4)_2CO_3$ is recovered by treating the residual soln. with CaO and carbonating with CO_2, the $CaCl_2$ being then treated as indicated.

Dicalcium phosphate and potassium nitrate. A. HOLZ and T. VAN D. BERDELL. Brit. 336,692, July 30, 1929. Material contg. tri-Ca phosphate is treated with a mixt. of H_2SO_4 and HNO_3 (preferably in the ratio of 1 to 4 mols.), $CaSO_4$ is removed from the soln. of H_3PO_4 and $Ca(NO_3)_2$ formed, and the latter is then treated with KOH or K_2CO_3. Di-K phosphate formed is immediately converted into di-Ca phosphate, and the latter is removed and dried; the remaining KNO_3 soln. may be evapd. to dryness, the salt may be mixed with di-Ca phosphate contg. some $CaSO_4$, and the latter may be converted into $(NH_4)_2SO_4$. Cf. *C. A.* **25**, 1324.

Carbon monoxide. HENRY DREYFUS. Fr. 694,223, April 19, 1930. Mixts. of CO_2 and H, particularly those resulting from the washing waters of industrial mixts. of these gases, are passed over chromite heated to 800–900°, and the resulting gases are passed over hot C (coke, coal, wood, etc.) in any manner used for making CO from CO_2.

Carbon dioxide. I. G. FARBENIND. A.-G. Fr. 694,871, May 2, 1930. Liquid CO_2 is prepd. by the catalytic dissocn. under pressure of CO or gases contg. it, and condensing under pressure the CO_2 formed. Examples are given using Ni as a catalyst.

Solid carbon dioxide. KARL FEHRMANN. Ger. 513,514, Nov. 4, 1928. A method and app. are described for regulating the evapn. of solid CO_2 by using the gas pressure developed.

Solid carbon dioxide. GES. FÜR LINDE'S EISMASCHINEN A.-G. Ger. 513,528, Apr. 17, 1929. Addn. to 463,125. Solid CO_2 is obtained by sepn. of its vapor from a solidified mixt. and resolidification. App. is described.

Chromium oxide. I. G. FARBENIND. A.-G. Brit. 336,671, July 19, 1929. A *product suitable for use as a pigment, polishing agent* or *for metallurgical purposes* is obtained by igniting (suitably at about 900°) Cr hydroxide obtained by reducing an alkali chromate or dichromate (free from coloring impurities such as Fe) with S in soln. or partial soln. and suspension. Alkalies and polysulfides, etc., may be used as initial materials for the reduction, and the color of the ignited product varies from yellow to blue as the temp. of reduction is increased (reduction temps. of 105–120° being suitable). $Na_2S_2O_3$ may be crystd. from the spent liquor and the latter then reused, or part of the S may be recovered by treatment of the liquor with H_2SO_4.

Phosphorus oxychloride. J. S. DUNN, F. BRIERS and IMPERIAL CHEMICAL INDUSTRIES, LTD. Brit. 336,065, Sept. 6, 1929. Ca phosphates such as rock phosphate or double superphosphate are reacted on by phosgene under such conditions as constantly to expose fresh surfaces to the reacting gases (as by agitation with admixed pebbles in a rotary kiln), and the $CaCl_2$ (formed from $CaCO_3$ in the raw material) is prevented from forming a protective covering. The mass may be washed with water at inter-

vals and reused after drying, and inert solids such as coke or washed residues from a previous operation may be added. Alternatively, the phosphate may be mixed with C activated by treatment with Cl at 1000°, and Cl alone or mixed with CO may be used instead of phosgene. The temp. may be raised during the reaction from about 350° to 600° (or higher if Cl alone is used).

Phosphorus oxychloride. J. S. DUNN, F. BRIERS and IMPERIAL CHEMICAL INDUSTRIES, LTD. Brit. 337,123, Sept. 6, 1929. $POCl_3$ is produced by reaction of $COCl_2$, or its equivs. such as CO and Cl, upon natural Ca phosphate such as phosphate rock, which has been subjected to a preliminary treatment to remove other reactive Ca compds. such as $CaCO_3$ (suitably by conversion of the latter into sol. compds. and washing out these). In a modified procedure, Cl may be passed over a mixt. of the phosphate with active C. Various details of treatment are described.

Sodium sulfide. I. G. FARBENIND. A.-G. Brit. 336,251, June 10, 1929. Anhyd. Na sulfide is made by reducing Na_2SO_4 in the mass with H or other suitable gaseous reducing agent at such a temp. (suitably 500–600°) that the mass is maintained in the solid state throughout the reaction. The reaction may be accelerated by the addn. of a small proportion of Na sulfide or the crude melt obtained in its manuf., NaOH, S, Fe or Ni or mixts. or compds. of these. Cf. *C. A.* **24**, 2253.

Zinc hydrosulfite. HANS PICK. Austrian 120,389, July 15, 1930 In the manuf. of ZnS_2O_4 by treating Zn suspended in EtOH with SO_2, better yields are obtained by effecting the reaction in the presence of a small quantity of a metal less electropos. than Zn, *e. g.*, Sn or Ag. The addnl. metal may be pptd. in the presence of the Zn, or an inert carrier on which the metal has been pptd. may be used. An example is given.

Zinc oxide. COMPAGNIE FRANÇAISE DE TRANSFORMATION MÉTALLURGIQUE. (René H. L. Aubert, inventor). Fr. 693,947, Apr. 15, 1930. In the manuf. of ZnO the greater part of the heat necessary for the distn. of the metal is obtained from the radiant heat of the combustion flame of the Zn vapors. A suitable app. is described.

Enriching natural phosphates. AKTIEBOLAGET KEMISKA PATENTER. Fr 694,946, May 3, 1930. Natural phosphates are enriched by heating them with H_3PO_4 so as to form tribasic phosphates of alk. earth metals.

Reactivating carbon, silica gel, etc. JOSEF MUCHKA. Austrian 120,098 and 120,101, June 15, 1930. The materials are entrained in a current of a reactivating liquid or gas, in a manner analogous to that employed in cleaning filter sand. App. is shown (120,098). Austrian 120,101 describes modified app. for the same purpose

Hydrogen and carbon monoxide from methane, etc. I. G. FARBENIND. A.-G Brit. 336,635, April 8, 1929. Gaseous hydrocarbons such as CH_4 or gas mixts. contg. it (other than coke-oven gases or other gases contg. liquid hydrocarbons) are passed, with water vapor (and if desired with further addn. of air or O), through a water-gas producer in which coke or other carbonaceous fuel is undergoing gasification which is carried out without addn. of CO_2 (the coke having a temp. of at least 800–1000°). As starting material there may be used a natural gas or waste gases from NH_3 synthesis, hydrogenation of coal, cracking, etc. Various details and modifications of procedure are described. Cf. *C. A.* **25**, 783.

Hydrogen and carbon monoxide from methane, etc. I. G. FARBENIND. A.-G. Brit. 336,944, April 8, 1929. Various details are described of a process generally similar to that of Brit. 336,635 (preceding abstract).

Hydrogen and oxyacids of phosphorus. I. G. FARBENIND. A.-G. Brit. 337,109, Aug. 24, 1929. P or P acids of lower stage of oxidation than H_3PO_4 are heated under pressure with anhyd. H_3PO_4; *e. g.*, yellow P 10 parts is heated for 3 hrs. with H_3PO_4 85 parts at 300° under 83 atm. pressure, by which an acid contg. 80% P_2O_5 is obtained.

Metallic sodium and potassium. JOSÉ YLLA-CONTE. Fr. 694,587, April 26, 1930. An app. is described for the production of K and Na by reduction of the carbonate or hydroxide with C under reduced pressure produced by pumps drawing off the gases formed. Cooling means is placed between the reaction chamber and the pumps.

Catalysts. I. G. FARBENIND. A.-G. Fr. 694,076, April 17, 1930. Very active catalysts are prepd. by disseminating catalytic substances in an extremely fine state of division, preferably in the atomic state, in particularly refractive stabilizers not modified under the conditions of the process and bringing the substance into the state of catalytic activity without using high temps. If oxides or salts are used, they are reduced with active H in the stabilizer.

Polymerization products. I. G. FARBENIND. A.-G. Fr. 693,920, April 15, 1930. Polymerization products of good mech. properties are made by heating diolefins, such

as butadiene, while adding alkali metals or their alloys or org. compds. of alkali metals in portions during the polymerization.

Urea-formaldehyde condensation products. I. G. FARBENIND. A.-G. (Johannes Kuchenbuch and Karl Eisenmann, inventors). Ger. 516,995, Apr. 13, 1929. Addn. to 490,012 (*C. A.* **24**, 2256) and 495,790 (*C. A.* **24**, 3615). Products of reduced inflammability are obtained by effecting the processes of the prior patents in the presence of halogenated aromatic alcs. or of di- or polyhydric alcs. partly etherified or esterified with one or more halogenated aromatic radicals. Suitable condensation media are *o*-chlorobenzyl alc., glycol monobromophenyl ether and glycol bromosalicylate. Examples are given.

Plastic masses. DEUTSCHE HYDRIERWERKE A.-G. Ger. 513,771, Jan. 24, 1926. A softening and gelatinizing agent for such plastic masses as cellulose esters, lac, etc., consists of esters of hydroaromatic carboxylic acids which have a wholly or partly hydrated nucleus. These may be combined with other softening agents. Preferably, the agent is an ester of dicarboxylic acids obtained by the oxidation of partly hydrated naphthalene with a wholly hydrated ring, or of hydronaphthols.

Artificial materials. I. G. FARBENIND. A.-G. Fr. 694,944, May 3, 1930. Artificial materials are made of fibrous materials agglutinated with condensation products of dicarboxylic acids of ethers or thioethers and polyhydric alcs. or their solns. The product is submitted to a hardening under pressure. Examples are given of the use of the condensation products of diglucolic acid with glycerol in acetone; thiodihydracrylic acid with glycerol in a mixt. of dioxane and acetone, etc.

Composite articles of materials such as rubber and bakelite. B. O. WARWICK and M. WARWICK (trading as Warwick's Time Stamp Co.). Brit. 336,292, July 12, 1929. Materials such as uncured rubber and bakelite powder are united by molding together under heat and pressure to form a hardened mass.

Pectins and mucilages. HENRI OLIVIER. Fr. 694,460, July 27, 1929. Pectins and mucilages contained in plantain seeds are extd. with water in a closed vessel at a temp. above 100°.

Casein. CHARLES C. T. PORCHER and JEANNE BRIGANDO. Fr. 694,032, April 16, 1930. Casein contg. little ash is prepd. by pptn. with lactic acid, AcOH, HCOOH, HCl or H_2SO_4 at the isoelectric pt. of a p_H value of 4.7. The casein is afterward heated in its serum to 60–65°, the serum decanted and the casein washed in acidulated water. Paracasein and Ca paracaseinate are prepd. from com. lactic casein.

Dialyzing membrane. FILTRES PHILIPPE. Fr. 695,007, Aug. 2, 1929. A membrane for dialyzing org. products in the presence of solvents is made by dipping a support, *e. g.*, of cloth into a bath of rubber and drying. Fr. 695,008 describes the application of the membranes for the *purification of mineral oils.*

Porous material for heat insulation, filters, etc. I. G. FARBENIND. A.-G. Brit. 336,318, July 19, 1929. Siliceous material, such as that obtained in the manuf. of alumina by treating burnt clay with HCl, is heated with alkali such as a 20% NaOH soln. and then further heated (suitably to 300–500°) to effect swelling and production of a porous product suitable for heat, sound or elec. insulation, filters, diaphragms, absorbents, fillers of rubber, lacquer, paper, etc. Numerous examples of siliceous materials and alk. reagents which may be used are given. MgO and $MgCl_2$ may be employed to strengthen the product, and org. fillers may be burnt out to increase the porosity of the product if desired.

Bearing material. CHARLES F. NOFTZGER. U. S. 1,791,834, Feb. 10. Bearings are formed of ground sericite schist and an insol. condensation product of a phenolic compd. and CH_2O.

Use of diethyl phthalate as a cooling fluid in heat-exchange systems such as engine-cooling systems. DAN J. KILLEN (to Waldemar C. Wehe). U. S. 1,791,818, Feb. 10. Diethyl phthalate is used alone undild.

Apparatus for calcining seaweed. J. C. MORRISON. Brit. 336,500, Dec. 16, 1929. Structural features.

By-product whiting. JOHN W. CHURCH and HARVEY G. ELLEDGE (to The Pure Calcium Products Co.). Can. 309,082, Mar. 3, 1931. Whiting is produced by the reaction of $Ca(OH)_2$ and Na_2CO_3, sepn. of the major portion of the NaOH formed, formation of a slurry of the impure $CaCO_3$, treatment of the slurry with CO_2 to convert the remaining NaOH into a carbonate, further treatment of the slurry with $CaCl_2$ to form NaCl and the washing out of the NaCl.

Applying hood caps to bottles. CARLETON ELLIS (to Ellis-Foster Co.). U. S. 1,792,006, Feb. 10. Binder-carrying caps such as those of heavy paper treated with a mixt. of carnauba wax 80, rosin 18 and S 2% are applied to a container such as a

bottle while maintaining the temp. sufficiently high to render the binder of the cap plastic, but low enough not to cause undesirable adhesion between the cap and container.

Use of aqueous oil emulsions to take up shocks in shock-absorbing devices. NOEL B. NEWTON. U. S. 1,791,832, Feb. 10. Emulsions may be used such as those prepd. from water 10 gals., lard oil 2½ gal., Na_2CO_3 7 lb. and soft soap 2 lb. or from olein 3–5, MeOH 1, mineral oil of 0.885 sp. gr. 19, glycerol 1, KOH 1 and water 75 parts.

Treated receptacle for preventing tarnishing of silverware. GEORGE E. HERRING. U. S. 1,791,594, Feb. 10. Tarnishing is inhibited by treating the inner surfaces of a silverware case with a substance such as Pb acetate which arrests the tarnishing action of H_2S and SO_2.

Wetting, etc., agents. DEUTSCHE HYDRIERWERKE A.-G. Fr. 694,250, April 22, 1930. Piperidine and its homologs, either alone or with org. acids are used as washing, cleaning, wetting or emulsifying agents. Cf. *C. A.* **25**, 1048.

"Lime-nitrogen." ELEKTROCHEMISCHE GES. and H. GROHMANN. Brit. 336,677, July 20, 1929. Ca carbide is heated in N which is supplied through channels uniformly throughout the mass (as through cardboard tubes in the mass). The mass is heated to 800° or higher, and it fuses but remains sufficiently viscous that the channels are not closed.

Apparatus for making lime-nitrogen. GUSTAV HILGER. Ger. 516,445, Sept. 20, 1929.

Device for blowing combustion air into shaft kilns for lime, etc. MASCHINENBAU-ANSTALT HUMBOLDT. Ger. 516,087, Feb. 22, 1929.

Rotating furnace for dehydrating gypsum. ÉTABLISSEMENTS POLIET ET CHAUSSON Fr. 695,029, Aug. 6, 1929.

Protecting leather, wallpaper, wood and other materials from fungi. I. G. FARBENIND. A.-G. Brit. 336,244, May 1, 1929. The materials (including textile materials other than those of wool) are protected against mildew or other fungi by treatment with a hydroxydiarylmethane or hydroxytriarylmethane contg. one or more univalent halogen phenol residues, *e. g.*, ox hide is treated with a caustic alkali soln. of the condensation product from formaldehyde and 2 mol. proportions of *p*-chlorophenol (dil. H_2SO_4 being added to neutralize the alkali). Various other examples are given.

Pencil compositions. EAGLE PENCIL CO. Ger. 516,229, July 16, 1929. Addn. to 505,144 (*C. A.* **24**, 5951). The compn. described in Ger. 505,144 is modified by using other sulfonated oils, *e. g.*, sulfonated olive oil, in place of Turkey-red oil.

Stencil sheet. SHINJIRO HORII. U. S. 1,792,095, Feb. 10. Sheet material such as Japanese yoshino paper is coated with a compn. comprising a mixt. of esters of polysaccharides such as cellulose acetate, cellulose nitrate, starch acetate, starch palmitate or mannan acetate with naphthenic acid glycerides and a heavy hydrocarbon oil. Cf. *C. A.* **25**, 1646.

Materials for electrodynamic microphones. CLINTON R. HANNA (to Westinghouse Elec. & Mfg. Co.). U. S. 1,792,300, Feb. 10. A conical diaphragm has a coil support at its smaller end formed of material such as celluloid to which a coil is united by a cementing material such as a cellulose acetate compn. which when applied contains an ingredient having a solvent action on the material of the support.

Photographic sound records. F. K. CROWTHER and BRITISH TALKING PICTURES, LTD. Brit. 336,559, July 4, 1929. Various mech. details of manuf. are described.

Dental amalgams. DEUTSCHE GOLD- UND SILBER-SCHEIDEANSTALT VORMALS ROESSLER (Fritz Ungerer, inventor). Ger. 513,957, May 9, 1928. The amalgams are formed by shaking the constituents in a closed vessel in the presence of a small quantity of dil. NaOH.

Apparatus suitable for heating thermoplastic dental materials, etc. DANIEL S. LOCKWOOD. U. S. 1,792,434, Feb. 10. Structural features.

Dental cement. JORGEN E. THOMSEN. U. S. 1,792,200, Feb. 10. A dry powder suitable for use as a dental cement on addn. of water alone consists of approx. 145 parts by wt. of a silicate cement and 40–60 parts by wt. of pure H_3PO_4 or its equiv. in the P_2O_5 radical, the ingredients being mixed together at a temp. sufficiently low (suitably at room temp.) to retain the mixt. in an unstable condition capable of reacting with the added water to form a plastic mass capable of hardening.

"Frost-preventive" or thawing agents for use on railway switches, etc. G. ERDBRÜGGER. Brit. 336,739, Sept. 9, 1929. Ground raw carnallite is used in mixture with liquid bitumen or crude mineral oil.

"Artificial ice" skating rinks. H. REESER. Brit. 336,218, June 4, 1929. A suitable foundation is covered with a layer which may be formed from Na hyposulfite 70

and borax 30 parts with a small quantity of alum, and the surface may be covered with a soap and stearin compn.

Mixed felt for use as a box toe material. HENRY P. SHOPNECK (to Arden Box Toe Co.). U. S. 1,791,537-8, Feb. 10. A short-fibered material such as wood pulp 60, is used with leather fibers or wool and cotton fibers 30 and asbestos fibers 10%, felted and impregnated with a thermoplastic material. Cf. *C. A.* **24**, 1478.

Filter for use in tobacco pipes. Z. BRAZAY. Brit. 337,200, Dec. 5, 1928. Filter wads are formed of material such as cotton or filter paper which has been treated with dil. H_2SO_4, heated sufficiently to carbonize the fibers on their outer surface, and then impregnated with $FeCl_3$ or other material such as citric, tartaric or tannic acid adapted to fix the nicotine. The H_2SO_4 still present after the carbonization is neutralized with NH_3.

Apparatus for supplying fire-extinguishing foam to oil tanks, etc. MINIMAX A.-G. and PYRENE CO., LTD. Brit. 337,221, Nov. 14, 1929. Structural features.

Co nposition for fireproofing fibrous materials. S. A. I. G. (SOC. ANON. INVENZIONI GUADAGNIN). Brit. 336,863, Dec. 10, 1929. Articles are immersed or treated under pressure with a soln. formed of NH_4Cl or $(NH_4)_2CO_3$ 12, H_3BO_3 8, NH_3 8 and water 70 parts.

Fire-extinguishing compositions. MINIMAX A.-G. Ger. 516,426, July 28, 1927. Compns. comprising CCl_4 and NH_3 (or a compd. thereof) are rendered stable to storage by means of a phys. or chem. drying agent, which may be added to the compn. or located in the container therefor. Suitable drying agents are soda-lime, anhyd. Na_2SO_4, P_2O_5, and silica gel. Cf. *C. A.* **25**, 1348.

19—GLASS, CLAY PRODUCTS, REFRACTORIES AND ENAMELED METALS

G. E. BARTON, C. H. KERR

Quinquennial review of the mineral production of India for the years 1924 to 1928. Glass-making materials. G. V. HOBSON. *Records Geol. Survey India* **64**, 392–9 (1930).—Chem. analyses of Indian glass sands are given (SiO_2 96.00, 98.95, 99.39, 98.10 and 99.80). ALDEN H. EMERY

Dependence of the properties of glass on its thermal history. E. BERGER. *J. Soc. Glass Tech.* **14**, 280–94(1930). The properties of glass depend upon the state of aggregation within the mass. Annealing produces an inner state of equil. and hence a change in double refraction, density, etc. H. F. KRIEGE

The decomposition of refractory silicates by fused ammonium fluoride and its application to the determination of silica in glass sands. A. C. SNEAD AND G. FREDERICK SMITH. *J. Am. Chem. Soc.* **53**, 483-6(1931). The use of an NH_4F fusion for decompn. of glass sands is rapid and quite satisfactory for routine analyses. M. A. EDDY

Manufacture of photographic lenses. ROBERT S. GUILFORD. *Glass Ind.* **12**, 23–7 (1931).—The methods employed at the Hawkeye Works of the Eastman Kodak Company are described. H. F. KRIEGE

Destruction of glass by superheated steam. F. H. ZSCHACKE. *Chem.-Ztg.* **55**, 41 (1931); cf. *C. A.* **24**, 4130.—No glasses are completely immune to the attack of water vapor, but a typical compn. and list of sources are given for glass which is satisfactorily resistant. T. H. CHILTON

Term "pounds of glass per pound of coal" is misleading. JOHN W. ROMIG. *Glass Ind.* **12**, 28 9(1931).—The factors requiring consideration in a discussion of melting efficiency are furnace construction, regenerative capacity, temp. in the tank, quality of fuel and pull on the tank. H. F. KRIEGE

A little-known action of animal glue and other adhesives on glass. GUSTAV GÜNTHER. *Chem.-Ztg.* **55**, 37-8(1931).—A sign was affixed to a store window with dextrin and the glass underneath was "ruined," and damages were sought. It was demonstrated that any adhesive might, when removed after drying, cause an irregular frosting effect, if the glass was old and had been frequently polished. A flexible paste is recommended for such cases. T. H. CHILTON

Notes on clay and burned clay products. G. S. STAIRS. *Eng. J.* **13**, 688–93 (1930).—Some of the properties of clay as a material and the methods of manuf. of such clays which are of importance to structural engineers are indicated. The manuf. of brick and the manuf. of structural tile are outlined. Advantages and disadvantages

of the car *tunnel* and the down-draft *kilns* are listed. A flowsheet of mfg. processes in the clay product industry and a brief discussion are included. W. H. BOYNTON

Behavior of soluble salts during the burning of clays—the problem of efflorescence. IV. Conditions for the formation of sulfate efflorescences in ceramic materials. A. SIMON AND K. SCHMIDER. *Z. angew. Chem.* **43**, 380–2(1930); cf. *C. A.* **24**, 1949.—Clay material contg. quartz, or quartz material was admixed with varying quantities of lime (contg. MgO) and heated at 1000° for 3 hrs. and then maintained at this temp. for 5 hrs. in air contg. 0.5 or 2% SO_2. For the same lime content the amt. of sulfate formed rises with increasing SO_2 concn., the amt. of SO_2 absorbed being directly proportional to its concn. Similarly, for the same SO_2 concn. the quantity of this gas absorbed and of sulfate formed increases with the rise in lime content, but at a much lower rate than the latter. The temp. interval 300–600° is most favorable for the absorption of SO_2, max. absorption probably occurring between 400° and 500°. In the firing of ceramic materials, therefore, the interval 300–600° should be passed as quickly as possible in order to avoid absorption of the SO_2 produced by the combustion of the S of the coal. No absorption occurs at 750° and above, the sulfate detected in the expts. carried out at 1000° is formed during the heating up to this temp., and although the dissocn. pressure of $CaSO_4$ in the presence of SiO_2 is already exceeded at 750°, greater energies than are present are necessary before decompn. occurs. The drying and preheating of ceramic material, therefore, should be completed as far as possible in the absence of SO_2, while for sharp firing, coal contg. S may be used without adverse effect. B. C. A.

Technical analysis of clays with the aid of the microscope. H. MÖHL. *Sprechsaal* **62**, 731–4(1929).—The methods employed are described, together with the microscopical characteristics of various clays B. C. A.

Manufacture of light-weight units of clay and combustible admixtures. AUG. E. BUCH. *Ziegelwelt* **62**, 31–2(1931).—A fat clay is essential as binder while a variety of admixtures such as sawdust may be used. H. F. K.

Effect of temperature on the cracking of plastic clay; with some notes on Temperature gradients inside the clay during steady heating in a saturated atmosphere and on drying at 100°. S. R. HIND AND F. WHEELER. *Trans. Ceram. Soc.* (Eng.) **29**, 314–25 (1930); cf. *C. A.* **24**, 5955.—It was shown that clay cracks vigorously when heated in a satd. atm. Hence the failure during drying cannot be due to unequal contractions of different parts of the ware nor to the bursting force developed by entrapped water vapor. A definite relationship exists between the crit. temp. and the water content of the clay in a satd. atm. The actual range over which cracking occurs is a property of the clay. With 4" cubes of clay heated at a regular rate the thermal diffusivity increases as the water decreases from 30.7 to 17.4%, after which it decreases. Clay must be air-dried to a certain water content beyond which the drying process may take place at higher temps. without serious results. H. F. K.

Influence of atmosphere on the load-bearing capacities of fire bricks. H. T. S. SWALLOW. *Trans. Ceram. Soc.* (Eng.) **29**, 339–53(1930).—By use of the Mellor and Moore load-test furnace as modified by Dale, several types of bricks were tested in oxidizing, reducing and steam atms. It is suggested that the influence of a reducing atm. at high temps. is apparent more in an increase in the amt. of contraction than in a reduction in refractoriness or load-bearing capacity. At the temps of these tests (1200–1280°) the action of steam appeared to be negligible as a reducing atm. The Fe content of the brick must be considered when tests are made under oxidizing conditions. It is suggested that the term "oxidizing atmosphere" be defined as that in which FeO cannot exist in stable equil. but is raised to at least Fe_3O_4. H. F. K.

Effect of repeated burning on the structure and properties of lime-bonded silica bricks. II. Determination of the proportions of quartz, cristobalite and tridymite. W. HUGILL AND W. J. REES. *Trans. Ceram. Soc.* (Eng.) **29**, 381–4(1930); cf. *C. A.* **23**, 5289.—Using the optical method of reading the linear intercepts for each constituent in 2 directions at right angles, H. and R. detd. the amts. of the 3 forms of SiO_2 and of glass present after repeated burnings. The amt. of unchanged quartz decreases rapidly in the first 2 burnings and thereafter much more slowly. By extrapolation, it is estd. that at least 20 burnings under these conditions would be necessary to invert the whole of the quartz. Tridymite increases and cristobalite decreases more in the first 6 burnings than later. The quantity of glass remains const. **III. Determination of the reversible thermal expansion.** *Ibid* 384–7.—**Test pieces were burned up to 12 times in a com. kiln at cone 17, the temp. of the specimens being raised 2.5° per min. The linear expansions for the intervals 15–240° and 15–1000° were, resp.: 1 burn 0.73%, 1.172%; 3 burns 0.74%, 1.130%; 6 burns 0.75%, 1.104%; 12 burns 0.49%, 840%.** H. F. K.

Some effects of firing temperature, kind of grog and grading on the properties of fire-brick material. A. J. DALE. *Trans. Ceram. Soc.* (Eng.) **29**, 326–38(1930).—A clay giving a refractory test result of cone 26 was used as a bond clay with several highly refractory materials. Addns. of over 60% of fused Al_2O_3 or precalcined diaspore gave good results. Greater rigidity of such materials below 1500° can be obtained by increasing the severity of the kiln treatment and decreasing the grain size of the grog. Crude zirconia gave a very dense vitrified product which, however, squatted under load at relatively low temps. Silica glass and quartzitic grog were about equal; the greater the grain size the greater the after-expansion. Vitrified grog should be of finer gradation than the porous grog. When the amt. of clay is not excessive, the value of the clay-bonded refractory is governed by the nature of the grog more than by the clay. H. F. K.

Thermal expansion of refractory materials. R. V. WIDEMANN, A. JOURDAIN AND H. CASSAN. *Ceramique* **33**, 239–56(1930).—Various *types of app.* are described. *Thermal expansion curves* are given for silico-aluminous refractories, French, English and German silica refractories, bauxite and magnesite. A. J. MONACK

The refractory lining of cupolas. JOSEPH ROBITSCHEK. *Feuerfest* **6**, 113–8 (1930).—Lab. tests of refractory brick and examn. under actual working conditions indicate that the major factors in the destruction of a cupola lining are chem. and mech. action of the slag. In some cases the life of a lining depends upon resistance to temp. changes. This factor becomes of greater importance the larger the brick. B. A. SOULE

Electric-furnace production of high-heat-duty refractories. FRED W. SCHROEDER. *Ind. Eng. Chem.* **23**, 124–6(1931).—The operation of the Corhart Refractories Co. is described. Diaspores and kaolins are carefully blended, melted in an elec. furnace of the dipping-electrode resistance type and poured into sand molds, after which the blocks are annealed for 6–10 days. The resulting product is vitreous, non-porous and refractory up to cone 37, has about 0.5 the linear coeff. of expansion of first-class fire brick and is very resistant to the corrosion of glass. H. F. K.

Gas permeability of refractory material, especially at high temperatures. H. IMMKE AND W. MIEHR. *Sprechsaal* **64**, 85–7, 107–9(1931).—Two methods for detg. gas permeability of refractories at high temps. are described. The permeability of 6 pyrometer tubes toward 12 gases detd. at high temps. shows that the gas permeability is directly proportional to the pressure and depends on the temp. At very high temps the gas permeability decreases with increased temp. It is also a function of the viscosity of the gas. C. H. LORIG

The scorification of refractories. V. The relation of flux content and porosity to the scorification of fire brick. HERMANN SALMANG AND OTTO HEBESTREIT. *Feuerfest* **7**, 1–8(1931).—A mixt. of very pure Al_2O_3 and SiO_2 (1:2) was prepd. Portions were treated with a flux (2% of Fe_2O_3, CaO, TiO_2 or Na_2O), molded into cupels and fired at 1410°. Six different synthetic slags were made from mixts. of high-grade FeO, Fe_2O_3, SiO_2, Al_2O_3, CaO and Na_2O. The action of each slag on each sort of cupel for 1 hr. at 1410° showed that, regardless of the flux, the depth of slag penetration was about the same. The max. was 13–14 mm. for the slag 3.46 $CaO.1Al_2O_3.3.53\ SiO_2$. The influence of the flux was nullified by the high porosity (53–54 vol. %). Crucibles made from a 70:30 mixt. of burnt and unburnt kaolin contg. either 0, 2 or 4% flux had a porosity of ±24 vol. %. FeO, as a slag, strongly attacked each type of crucible at 1500°. The action was greatest in the presence of 4% Na_2O or TiO_2. The slag $FeO.SiO_2$ perforated many crucibles. Refractories with 2 or 4% flux were attacked by the various slags only slightly more than those contg. none. Tests on com. brick showed that the action of blast-furnace or open hearth slag is not directly dependent on porosity. Brick of the same chem. compn. and porosity is attacked to the same extent only when the microstructure is the same. B. A. SOULE

Graphical calculation of the composition of ceramic varnishes (CASTIGLIONI) **26.** Firing with powdered coal in German tempering foundries (STOTZ) **9.** Structure of silicates (BRAGG) **6.** Critical observations on the directions for glass testing of the German Pharmacopeia, Sixth Edition (KROBBER) **17.** Transmission changes in ultra-violet glasses during high-temperature exposure to light (NITCHIE, SCHMUTZ) **3.** Heat-treating furnace for enameled articles (U. S. pat. 1,792,284) **9.** Alloys for sealing to glass (Brit. pat. 337,086) **9.** The ternary system: K_2O–CaO–SiO_2 (MORBY, *et al.*) **2.**

Tonindustrie-Kalender, 1931. 2 vols. Berlin: Tonind-Ztg. M. 4. **Reviewed in** *Ceram. Abstracts* **10**, 236(1931).

WIDEMANN, R. V., JOURDAIN, A., AND CASSAN, H.: **L'étude de la dilatation des materiaux refractaires.** Paris: La Céramique. 20 pp. Reviewed in *Ceram. Abstracts* **10,** 236(1931).

Paddle mechanism for circulating molten glass. ALEXANDER F. MCNISH (one-half to John Moncrieff, Ltd.). U. S. 1,792,386, Feb. 10. Structural features.

Apparatus for supplying molten glass to a suction-gathering machine. J. MONCRIEFF, LTD., and A. F. MCNISH. Brit. 336,883, Aug. 9, 1929. Structural features.

Device for gathering molten glass and similar materials. EGYESÜLT IZZOLAMPA ES VILLAMOSSAGI RESZVENYTARSASAG and J. LEVAI. Brit. 335,931, July 2, 1929. Mech. features.

Apparatus and method for circulating and feeding mold charges of molten glass. KARL E. PEILER (to Hartford Empire Co.). U. S. 1,791,634-5-6, Feb. 10. Mech. features.

Forming tubes or rods of glass. P. A. FAVRE. Brit. 336,460, Nov. 14, 1928. App. is described.

Apparatus for glass bottle manufacture. CHARLES BADGER (to Lynch Glass Machine Co.). U. S. 1,792,267, Feb. 10. Structural features.

Coloring glass. DEUTSCHI GASGLÜHLICHT-AUER-GES. M. B. H. Fr. 694,828, May 1, 1930. Glasses are shaded in red with oxides of rare earth metals while preserving the dichroism by adding small quantities of colloidal colors known to color glass red, Au, Cu_2O or Se. Cf. *C. A.* **24,** 5451.

Tempering glass. SOC. ANON. DES MANUFS. DES GLACES ET PRODUITS CHIM. DE SAINT-GOBAIN, CHAUNY ET CIREY. Fr. 695,055, Aug. 7, 1929. An arrangement is described for blowing air on to the heated glass. Fr. 695,040, Aug. 8, 1929. An app. is described for tempering glass. It consists of 2 hollow plates through which cooling liquid flows and between which the sheets of glass are mounted. Cf. *C. A.* **25,** 571, 2, 790.

Glass sheet. Y. BRANCART. Brit. 336,921, Feb. 14, 1929. Mech. features relating to the formation of the sheets (or their immediate treatment after formation) with a rotating rough roller run at such a speed that the glass is driven backward slightly toward the beginning of the plate. The impressions formed disappear at once. Brit. 336,924 relates to a generally similar process including rolling with smooth rollers. Cf. *C. A.* **25,** 571.

Table for receiving or casting glass plates or sheets. C. LOCKFELLER. Brit. 336,550, April 9, 1929. Casting tables are made of a sandless concrete composed of fragments of porphyry and of a cement formed of a ground mixt. of burned lime, silica and alumina (the porphyry fragments being distributed in several layers through the thickness of the table in graded sizes with pulverized porphyry in the top layer).

Apparatus for making sheets of glass. MISSISSIPPI GLASS CO. Fr. 693,940, April 15, 1930.

Apparatus for rolling sheets of glass. N. V. MAATSCHAPPIJ TOT BEHEER EN EXPLOITATIE VAN OCTROOIEN. Fr. 693,973, Apr. 4, 1930.

Rolling and fire-polishing glass sheets. A. BRANCART. Brit. 336,533, Feb. 25, 1929. App. and various details of procedure are described.

Plate glass rolling machine. N. V. MAATSCHAPPIJ TOT BEHEER EN EXPLOITATIE VAN OCTROOIEN. Ger. 513,879, Nov. 29, 1929.

Sole plate for glass-annealing furnaces, etc. YVON BRANCART. U. S. 1,791,656, Feb. 10.

Furnace for annealing glassware. W. A. MORTON. Brit. 336,596, April 15, 1929.

Apparatus for making glass reënforced with wire. MISSISSIPPI GLASS CO. Fr. 694,215, April 19, 1930.

Safety glass. JOHN NEWTON. Fr. 693,919, April 15, 1930. Safety glass is made by incorporating 2 or more sheets of celluloid or cellulose acetate, etc., between 2 sheets of glass.

"Unsplinterable glass" sheets. T. W. HOLT and J. F. W. STUART. Brit. 336,037, Aug. 1, 1929. Various details of app. and procedure are described for uniting the component sheets with use of fluid pressure in an autoclave.

Uniting glass sheets with non-brittle material. LIBBEY-OWENS GLASS CO. Brit. 336,732, Aug. 30, 1929. In uniting glass sheets with cellulose derivs. or synthetic resins or with a combination of the two, the latter is sprayed with a bonding medium such as a mixt. of di-Bu phthalate and a polyglycol deriv. such as the monoethyl ether of diethylene glycol, and the sheets are united by heat and pressure. The glass may be sprayed with a cellulose deriv. compn. or synthetic resin compn. in a low b. p. solvent

mixed with higher b. p. solvent or plasticizing substances. Various details of procedure and compns. are given.

Uniting glass sheets with sheets of cellulose derivatives. S. BARRATT. Brit. 335,890, June 29, 1929. For removal of knife marks and the like, a cellulose deriv. sheet is softened and pressed with a hard surface (which may be a gelatin-coated glass sheet with which it is to be united). Various details of heating and pressing the sheets together are described.

Joining glass sheets with an intervening sheet of celluloid or similar materials. T. W. HOLT and J. F. W. STUART. Brit. 337,158, Oct. 2, 1929. Various mech. details for uniting the sheets are described.

Composite sheets of glass and cellulose derivatives. BRITISH CELANESE, LTD. Brit. 335,878, March 13, 1929. Two glass sheets are united by an intermediate sheet formed of a cellulose deriv. and an org. tartrate such as di-Bu or di-Et tartrate and dyes, synthetic resins and stabilizers such as urea also may be added. The cellulose deriv. sheet may be united to the glass by an adhesive such as gelatin or vinyl acetate resin or a suitable mixt. of a cellulose deriv. and synthetic resin.

Fused silica sheets suitable for window panes. J. H. SULLIVAN (to British Thomson Houston Co., Ltd.). Brit. 336,923, Feb. 14, 1929. Fragments of cryst. SiO_2 are fused *in vacuo*, the material while plastic is allowed to assume, by gravity, the form of a flat sheet, and is caused to harden under gaseous pressure, as by admitting air or by use of N under pressure (suitably 200 lb. per sq. in.). App. and various details of procedure are described.

Purifying clay. WM. FELDENHEIMER. U. S. 1,791,959, Feb. 10. A liquid suspension of the material is deflocculated, impurities are sepd. (as by sedimentation) and the slip is flocculated and thickened with reagents such as lime and HCl in quantities which render the clay non acidic, and the clay is sepd. from the liquid.

Refining kaolin and clay. ERICH MÜLLER. Ger. 516,144, Dec. 30, 1926. Water and water glass in const. proportions are continuously fed to a mixing vessel to which kaolin or clay is also fed at such a rate that a suspension having a sp. gr. between 1.08 and 1.09 is produced. It is stated that a streaky appearance develops on the surface of the suspension when the sp. gr. lies between the limits mentioned. The suspension flowing from the mixing vessel is passed upwardly through a funnel-shaped vessel to remove fine impurities, and then neutralized with HCl and worked up in known manner. Cf. *C. A.* **25**, 783, 790.

Porous bricks. T. KOIDL and F. GORLICH. Brit. 337,231, Nov. 20, 1928. An extrusion press is provided with means for injecting compressed air into the plastic material for forming the bricks before the material is fed to the extrusion nozzle.

Heat-insulating bricks, etc. SIEBCHAMOTWERKE G. M. B. H. Ger. 516,377, June 8, 1926. Porous bricks, etc., are evacuated and then coated with a material impermeable to gas, *e. g.*, rubber. The coating may be partly applied before evacuation.

Rotary ceramic furnace. GEORG VON HERITZKA. Ger. 513,583, May 12, 1929. The bearing stones are partly of high Al_2O_3 content, and partly of chamotte stone.

Ceramic kiln. JEGOR I. BROWN. Ger. 513,581, July 28, 1926. An electrically heated tunnel kiln for firing ceramic ware at high temps. and with pre-heating, firing and cooling zones is described.

Burning ceramic sludge. LEOPOL, INTERNATIONALE PATENTVERWERTUNGS G. M. B. H. and N. V. "SOLOPOL" INGENIEURSBUREAU TOT EXPLOITATIE VAN HET, SYSTEM POLYSIUS. Ger. 513,584, Sept. 7, 1927. Ceramic sludge, especially crude cement sludge, is wholly or partly dried, heated in a rotary furnace until granulated, calcined and finally sintered.

Molding fused quartz. DEUTSCH-ENGLISCHE QUARZSCHMELZE GES. Brit. 336,493, Dec. 12, 1928. In forming articles such as insulators or tubes with ribs or flanges, a hollow blank of the material is expanded in a mold by compressed air and then further shaped by application of pressure mechanically.

Apparatus and hydraulic classification system for grading abrasives such as those used in continuous glass-grinding apparatus. PILKINGTON BROS., LTD., F. B. WALDRON and J. H. GRIFFIN. Brit. 336,587-8, July 12, 1929.

Abrasive wheel. JOHN R. GAMMETER (to George W. Perks Co.). U. S. 1,792,083, Feb. 10. An abrasive wheel body is formed with spiral grooves in its opposite faces, and wire convolutions are wound while hot in the grooves and permitted to shrink in them, and over these a bonding layer of material such as a rubber or synthetic resin compn. is cured under pressure to secure the wire convolutions to the face of the wheel.

Compositions for grinding-wheels. CARBORUNDUM CO. Brit. 336,631, July 17,

1929. A cement formed of S 95 and ground coke 5% is used in building up wheels of segmental abrasive blocks (various structural details of which are given).

Refractory earth. FELLNER & ZIEGLER A.-G. Fr. 694,818, May 1, 1930. Refractory earth is baked in a rotating tubular furnace at temps. of 1100–1300° and the furnace is preferably enlarged in the 800–1000° zone.

"Semi-porcelain" composition. J. E. TAMS. Brit. 336,172, Dec. 27, 1929. Asbestos powder 50, ball clay 40 and either ground stone 20 or feldspar 20 (or of each 10) parts are blunged with water into a slip or plastic mass for treatment in the usual way.

Enamels. W. E. DOUGHERTY. Brit. 336,797, Oct. 17, 1929. TiO_2 is used as an opacifier in enamels which do not contain F, and $CaCO_3$ or other suitable salt of Ca, Ba, Sr or Mg is preferably added to the batch to intensify the opacity produced by the Ti. Small quantities of Zr or Sn oxides may be added to counteract any tendency to yellowish color. Various details are given.

Coloring enamel, glass, etc. DEUTSCHE GASGLÜHLICHT-AUER-GES. M. B. H. Fr. 694,888. May 2, 1930. To obtain red colored enamel, glass or glazes with Se, use is made of enamel, etc., which has a high content of rare earths. Cf. *C. A.* 24, 5451.

20—CEMENT AND OTHER BUILDING MATERIALS

J. C. WITT

Quinquennial review of the mineral production of India for the years 1924 to 1928. Cement. A. M. HERON. *Records Geol. Survey India* **64**, 359-70(1930).—The Indian cement industry has increased materially each yr. Several companies use a limestone which naturally contains the correct proportions of clay. **Building materials.** E. H. PASCOE. *Ibid* 347–59. **Marble.** *Ibid* 406-9.—Marbles of all colors are plentiful in India. **Slate.** E. L. G. CLEGG. *Ibid* 429–31 ALDEN H. EMERY

Electro-melted cement as a new building material in the chemical industry. CONSTANTIN REDZICH. *Apparatebau* **42**, 277-8(1930).—The manuf. of a cement from bauxite and burned lime in an elec. furnace is described. The product has the following approx. compn.: Al_2O_3 35–50, CaO 35–45, Fe_2O_3 5–15, SiO_2 5–10%. It is compared to portland cement and may supplant it. M. C. ROGERS

Blast-furnace-slag portland cement. GIUSEPPE TOMARCHIO. *Atti III congresso nas. chim. pura applicata* **1930**, 557–60.—Compn. and properties of various slag cements are reviewed. E. M. SYMMES

Potash salt recovery in cement burning, with special reference to Esthonian potash ores. JAAK KUUSK. *Acta Commentationes Univ. Tartuensis (Dorpatensis)* **AXX**, No 4, 1–36(1930)(in German).—Esthonia contains relatively large amts. of K ores capable of being burned to cement. In burning, K compds. are volatilized in part and can be pptd. electrostatically. Since the K compds. in different cement plants volatilize quite differently, and since the factors affecting the volatility are not known accurately volatilization of K compds. was investigated in the lab. In a mixt. of K silicate with $CaCO_3$, in the ratio $2CaO \cdot SiO_2$, decompn. of K silicate and volatilization of K began simultaneously at about 1150°. With increasing temp. and duration of heating the amt. of K volatilized increased per unit of time. If less $CaCO_3$ were added to the K silicate than corresponds to Ca metasilicate, volatilization of K stops almost wholly even at very high temp. Starting from these mixts., the volatility of K increases rapidly with increase in amt. of $CaCO_3$ added. Addn. of Fe_2O_3 affects K volatility very favorably because it increases the velocity of K silicate decompn. at low temp. The Fe_2O_3 added remains almost unattacked. Addn. of Al_2O_3 is unfavorable to K volatility because most of the CaO present changes to aluminate. Addn. of $CaSO_4$ is just as effective as addn. of $CaCO_3$. In K volatilization from synthetic K aluminate the same general results were obtained. The amt. of K volatilized at 1440° was low if only sufficient $CaCO_3$ were added to the aluminate to form only Ca meta-aluminate. (Ca or K_2)SiO_3 and (Ca or K_2)$2AlO_2$ are unstable at the roasting temp. in question, while (Ca_2 or K_4)SiO_4 and (Ca_2 or K_4)$2AlO_2$ are unstable and lose K_2O. E. M. SYMMES

Hydrated lime as used in engineering. R. J. HOLDEN. *Eng. News-Record* 106, 148–9(1931).—Curves are given showing the total annual production of CaO and $Ca(OH)_2$ during the period 1906–1928 and the amts. used for building during this period, together with a brief discussion of the properties of CaO and $Ca(OH)_2$, with particular reference to deterioration on storage. There has been no increase in the production of CaO since 1906, but the production of $Ca(OH)_2$ has markedly and steadily increased. R. E. THOMPSON

A study of methods of curing concrete pavements. Report of field investigation in Tennessee. F. H. JACKSON AND E. W. BAUMAN. *Public Roads* **11**, 209–35(1931).—The method of cure involving the application of wet burlap for periods varying from 24 to 96 hrs. without further curing compares favorably with the standard method. The application of Sisalkraft paper for periods of 24 to 48 hrs. without further curing is a reasonably satisfactory method of cure as compared with the standard method. In the poor earth cure it is not necessary to keep the earth satd. with water for the entire 10-day curing period. The sodium silicate method of cure gives results somewhat less satisfactory than those given by the standard method. Surface application of $CaCl_2$ appears to give results nearly as satisfactory as the standard method. Curing with bituminous materials, as used in these tests, was unsatisfactory; there was marked evidence of increased transverse cracking. Nothing is gained by the use of tar paper on the subgrade.
L. B. MILLER

Revision of "Directions for testing (D I N 1995) and delivery (D I N 1996) of road and construction materials containing asphalt and tar." ANON. *Asphalt u. Teer* **30**, 1253–62(1930).
K. H. ENGEL

Testing limestone for road building. J. JACHZEL. *Asphalt u. Teer* **30**, 1041–2 (1930).—Soly. in CO_2-contg. water (indicative of grain size) and mech. hardness should be detd. The presence of $Ca(HCO_3)_2$ is a proof of harmful weathering. K. H. E.

American road tars. HUGO LAEGER. *Brennstoff-Chem.* **12**, 89–90(1931).—Comparison of grades, consumptions and prices with corresponding German products.
F. W. JUNG

German patent development in bitumen emulsions for road construction. A. VON SKOPNIK. *Teer u. Bitumen* **28**, 581–5(1930).
K. H. ENGEL

Road asphalt and mechanical methods for testing it. W. BIERHALTER. *Asphalt u. Teer* **30**, 931–46(1930).
K. H. ENGEL

Preparation of a new road binder. C. F. BROADHEAD. Inst. Gas Eng., *Communication* No. **3**, 23 pp.(1930).—See *C. A.* **24**, 4372.
G. G.

Determination of wool content in roofing felts by chemical methods. R. KORN AND B. SCHULZE. *Teer u. Bitumen* **29**, 34–6(1931).—Admixed wood flour is insufficiently dissolved during treatment of the felt with 80% H_2SO_4. Shaking during the digestion reduces the residue to 6%. A felt sample equiv. to 10 g. dry, ash-free material is boiled in H_2O and macerated. The fibers, isolated and washed with alc., are shaken with 300 cc H_2SO_4 (80%) for 3 hrs. The acid is removed with H_2O and dil. NH_3 and the residue dried at 100–5°. Ash and, if warranted, 6% of the wood flour content are deducted from the wool residue. The wood flour of the felt should be estd. microscopically in ranges of 10%.
K. H. ENGEL

New methods of wood utilization and wood research. HANS WISLICENUS. *Z. Ver. deut. Ing.* **74**, 1469–78(1930).—A short outline of wood chemistry is followed by details of kiln drying, impregnation, wood decompn. processes, surface charring to enhance the grain effect, liquid infusion of living trees, turpentine recovery, wood cellulose, saccharification, artificial silk and metallized wood.
E. M. SYMMES

Protecting wood from fungi (Brit. pat. 336,244) **18.**

Cement. EMIL REUBKE (to I. G. Farbenind. A.-G.). U. S. 1,791,684, Feb. 10. See Fr. 662,145 (*C. A.* **24**, 482).

Cement. TREVOR M. CAVEN (to Frederick B. Hazard). U. S. 1,791,591, Feb. 10. A cement in dry powd. form suitable for monolithic linings or walls comprises about 5% silica in colloidal form, about 10% silica in diatomaceous form and about 85% silica in relatively coarse form, all these forms of silica being of approx. the same compn.

Dolomite cement. GUSTAV MATSCHAK. Ger. 500,138, Mar. 25, 1928. $MgSO_4$ is added to the product in order to react with any CaO formed during the firing and at the same time to raise the Mg content.

Portland cement. JAMES H. COLTON (to Pacific Portland Cement Co.). U. S. 1,791,800, Feb. 10. A portland cement mixt. is burned to form a clinker, the clinker is ground, the ground clinker is added to a raw cement mix to form a granular mixt. and this mixt. is burned to form a clinker.

Waterproof cement. S. A. I. G. (Soc. ANON. INVENZIONI GUADAGNIN). Brit. 336,860, Dec. 9, 1929. See Fr. 686,193 (*C. A.* **25**, 566).

Composition for waterproofing cement. SAM C. BENNETT. U. S. 1,791,704, Feb. 10. A mixt. formed from Na_2CO_3 9, $Al_2(SO_4)_3$ 1, $KMnO_4$ 0.03 and water about 20 parts is used together with pure cement in sufficient quantity to leave the compn. fluid so that

it may be applied as a liquid coating to waterproof and "rejuvenate" worn and discolored cement.

Rotary kiln for the preparation of fusible cement. ARNO ANDREAS. Ger. 513,582, Feb. 7, 1929.

Apparatus for granulating crude material and burning to produce cement. OTTO LELLEP. Ger. 515,172, Feb. 10, 1929. Addn. to 466,298 (*C. A.* **23**, 497).

Hydraulic product. KARL BIEHL. Fr. 695,079, May 5, 1930. A hydraulic product for addn. to lime, cement, etc., is made by heating all sorts of clay, marl products of volcanic eruption, etc., and fine grinding.

Concrete. LUDWIG HEYNEMANN. Fr. 695,099, May 5, 1930. A concrete which is resistant to sea-water is made by adding to ordinary or superior cements or mixts. of these with sand, etc., finely divided cinders from the combustion of powd. coal.

Concrete composition. CARLTON E. MILLER. U. S. 1,791,630, Feb. 10. A concrete which sets quickly to a high strength is formed from an admixt. of portland cement with a preformed mixt. comprising $CaCl_2$ 2 and diatomaceous earth 3 parts (suitably 5% as much of this mixt. as of portland cement).

Cellular concrete. TORKRET-GES. M. B. H. Fr. 694,287, April 22, 1930. A liquid absorbing substance such as kieselguhr is added to cellular concrete so that the mass is plastic without losing its swelling power.

Cellular or porous concrete. EMRIK I. LINDMAN (to Aerocrete Corp. of America). U. S. 1,791,820, Feb. 10. Cement and water are mixed with a metal powder which is adapted to cause generation of gas and with slag so divided as to present fine hydraulizing particles and larger particles of a size and in sufficient quantity to prevent formation of cracks during setting (the slag not exceeding 80% of the wt. of the total dry ingredients of the concrete, and at least 10% having a grain size less than three-eighths of an in.).

Casting concrete pipes. ABRAHAM RUTENBERG. Ger. 516,437, May 17, 1929. See Brit. 318,285 (*C. A.* **24**, 2266).

Dust-laying agent for roads, etc. FRITZ LYDTIN. Ger. 513,846, May 15, 1925. Low-temp. tar (*e. g.*, generator tar, crude mineral tar, etc.) from brown or stone coal is used, alone or mixed with other residues or distn. products.

Asphalt or tar compositions. I. G. FARBENIND A.-G. Fr. 694,789, May 1, 1930. Asphalt, tar or bitumen compns. for roads, paint, etc., contain appropriate polymerization products of diolefins.

Colored mineral granules suitable for decorating roofing shingles. RALPH L. ATKINSON (to Arthur D. Little, Inc.). U. S. 1,792,058, Feb. 10. Material such as compacted raw clay or shale is reduced to granules of the desired size, these are separated from material of finer size or dust, treated with water or a coloring agent such as Fe, Cu, Mn, Co or Cr compds. if required, and heated to a hardening temp. without fusion.

Artificial stone, etc. ÖSTERREICHISCH-AMERIKANISCHE MAGNESIT A.-G. and KONRAD ERDMANN. Austrian 120,418, July 15, 1930. Addn. to 108,151. In the manuf. of shaped articles from fibrous materials and a Sorel cement, the compn. is bound and hardened in the mold by means of a gas heated to a temp. between 220° and 450°. Open, closed or perforated molds may be used, and the gaseous atm. may contain CO_2. Cf. *C. A.* **24**, 4913.

Mold for casting plates from a mixture of magnesite, magnesium chloride solution and powdered stone or quartz. MICHAEL GUTTENBERGER. Ger. 516,066, Aug. 23, 1927.

Molded material resembling wood, etc. A. HAWERLANDER (to Halizite Corp.). Brit. 336,754, March 13, 1929. Fibrous material such as sawdust is first treated with a small quantity of a volatile liquid such as "petrol," is then incorporated with sufficient phenol-CH_2O resin condensation product to cover its surface and is molded under heat and pressure so as to permit venting of the volatile liquid before the binding agent hardens. The material may be molded in contact with surface veneers of wood. Various details of procedure are described.

Preservative for wood. HOLZINDUSTRIE-WERKE JOSEF BENZ A.-G. Ger. 516,407, Dec. 14, 1929. Asphalt-rubber melts are dissolved in a mixt. of acetone oil with homologs of benzene and (or) with hydronaphthalenes.

Preserving wood. LEO PATRICK CURTIN. Ger. 516,075, Mar. 12, 1927. See Brit. 291,857 (*C. A.* **23**, 1241).

Impregnating wood. IMPREVA HOLZIMPRÄGNIERUNG UND HOLZVERWERTUNG A.-G. Ger. 513,848, Jan. 16, 1925. The bottoms of masts are treated with a soln. of bitumen, pitch, etc., in CCl_4.

Apparatus for impregnating wood with creosote and for compressed air or steam treatment. C. GOODALL. Brit. 337,133, Sept. 18, 1929. Structural features.

Apparatus for the partial impregnation of wooden masts or poles. ERNST REICH and LUDWIG TRAMER. Austrian 120,412, July 15, 1930.

21—FUELS, GAS, TAR AND COKE

A. C. FIELDNER AND ALDEN H. EMERY

Quinquennial review of the mineral production of India for the years 1924 to 1928. Coal. CYRIL S. FOX. *Records Geol. Survey India* **64**, 31–78(1930).—Complete statistical data for production and handling of Indian coal from 1919 to 1928 are given. Typical coal analyses are given. Coal reserves are estd. ALDEN H. EMERY

The evolution of coal. HENRY BRIGGS. *Chemistry and Industry* **50**, 127–33 (1931).—Coal of all varieties has undergone and is still undergoing a species of slow spontaneous change involving the discharge of CH_4 and H_2O. B. calls this autometamorphism. It may proceed entirely independently of outside influences, although heat (mild) and pressure accelerate, and certain influences, such as a large quantity of mineral matter, retard the action. The continued evolution of CH_4 from coal is confirmatory proof of this reaction. Analyses of coal of all ranks, ash-, S- and N-free, are plotted on a C-H-O trilinear diagram. The gaseous evolution necessary to move from one rank of coal to another is calcd. ALDEN H. EMERY

Bibliography of United States Bureau of Mines investigations on coal and its products, 1910–1930. A. C FIELDNER AND M. W VON BERNEWITZ. Bur. Mines, *Tech. Paper* **493**, 56 pp.(1931).—Over 750 references to articles on coal and coal products by members of the staff of the U. S. Bureau of Mines are classified and cross-indexed. The subjects covered include origin, constitution, analyses and classification of coal; chem. and phys. properties of coal and coke; absorption and evolution of gases in coal; corrosion and mine water; coal-dust inflammation; methods of sampling, analyzing and testing; mining; coal prepn.; storage and spontaneous heating; processing, including briquetting, high-temp. and low-temp carbonization; utilization, including combustion in power boilers, domestic furnaces, locomotives, marine boilers, kilns and oil stills; smoke abatement; lignite; and economics and statistics ALDEN H. EMERY

The primary oxidation of bituminous coal. W. FUCHS AND O. HORN. *Brennstoff-Chem.* **12**, 65–7(1931); cf. *C. A.* **23**, 1403; **24**, 4767; **25**, 396.—For conversion into humic acids, the humins of bituminous coals have been readily oxidized in a short treatment with HNO_3 (sp. gr. 1.40). The products possess the characteristics of hydroxy carboxylic acids, form permutite like K salts and ether-esters. They are partly sol., especially when damp, in org. solvents, as pyridine, acetone, "methylglycol," but are not always peptizable in alkalies. The peptized acids are identical with the original except for a difference in soly. (also produced by a H_2O-pyridine treatment) and a 20% greater K content in their K salts. The humin content of striped (bituminous) but not anthracite or boghead coal may be made water-sol. in this way. F. W. JUNG

The present status of low-temperature carbonization technic. CH. BERTHELOT. *Rev. métal.* **27**, 672–9(1930).—From the standpoint of its present development in England and Central Europe low-temp. carbonization is faced with 3 major difficulties: (1) high cost of production, which in some cases is 3 times that of high-temp. coke; (2) little profitable disposal of the primary tars in other than the fuel markets; and (3) the competition following new methods of utilizing high-temp carbonization gas. Hydrogenation and cracking methods are promising for increasing the value of the tars H. L. OLIN

Preparation of fiber coal (fusain) through artificial carbonization. TH. LANGE AND P. ERASMUS. *Braunkohle* **29**, 463–9(1930).—Samples of silicified lignite with well-preserved cell structure (trunk and roots) were carbonized by heating under water at 340° for 2 hrs. SiO_2 was leached out with H_2F_2. Microscopic slides showed that the org. material had been carbonized to *fusain*. Isolated cellular aggregates, filled with bituminous material, had changed to *vitrain*. Conclusion: Cell walls filled with humic acids were gradually resorbed and changed to vitrain. Wood which was filled with gases, SiO_2, etc., or which had lost its permeability to humic acids through drying, retained its structure and was carbonized to fusain. K. H. ENGEL

Relation between the contents of coal in volatile matter and in ash (supplementary note). M. LEGRAYE. *Ann. soc. geol. Belg.* **53**, B55–7(1930).—Replying to a criticism of Denoel of a previous paper (*C. A.* **24**, 710), L. gives more curves and discussion. He finally concludes that there is no relation between ash content and content in volatile matter, and that no conclusions can be drawn regarding the comparative origin of bituminous and anthracite coals. R. H. EWELL

The relation between gross and net heating values and volatile matter of coal. WILHELM GUMZ. *Feuerungstech.* **19**, 1–3(1931).—From 100 analyses in the literature G. derives the formulas: $Q = 8150 + 6543V - 17{,}308V^2$ and $H = 8150 + 4489V - 13{,}864V^2$ for the gross and net heating values, resp., of the dry ash-free coal, V being the fraction of this which is volatile. ERNEST W. THIELE

Diffusion as a factor in burning pulverized coal. DOUGLAS HENDERSON. *Power* **73**, 288–9(1931).—While the mixing of air with a gaseous fuel is in part by diffusion, macroscopic fuel particles must be mixed mechanically with air. D. B. DILL

Testing coking coals. WOLFGANG MELZER. *Arch. Eisenhüttenw.* **4**, 169–75 (1930).—A no. of tests are outlined for Westphalian coking coals. For works labs., extn. methods are too time-consuming, and sufficient information as to the coking qualities can be obtained by detn. of the softening point. H. STOERTZ

Asturian coals. III. Rejuvenation of a gas coal. BENITO A. BUYLLA. *Anales soc. españ. fís. quím.* **28**, 959–66(1930); cf. *C. A.* **24**, 2860.—In "berginizing" a coal having volatil ematter 32% (yielding highly swelled coke 66.38 and primary tar 5.8%), 22.2% oils and 64% solid residue were obtained. The residue contained volatile matter 28.94% and produced hard, coherent coke 59.54 and primary tar 9.41%. This indicates the possibility of rejuvenating coal by hydrogenation. E. M. SYMMES

Coal as a raw material. E. F. ARMSTRONG. *Chem. Markets* **28**, 158–60(1931).—A plea is made for the most efficient means of utilizing coal, coke, oil, etc. Hydrogenation after carbonization of the coal under conditions assuring a max. yield of oil and a char which may be used in the manuf. of water gas and H_2 appears economically best. W. H. BOYNTON

Humic acids from brown coal. Preliminary communication. HANS STACH. *Z. angew. Chem.* **44**, 118–20(1931).—Not only humic acid but also brown coal from which the bitumen has been extd. can be methylated. The ability to react with diazomethane proves the acid character of the extd. coal. A distinction is made between ortho- and meta-humic acids, the latter not being sol. in cold KOH. E. SCHOTTE

Recent developments in by-products from bituminous coal. A. C. FIELDNER. Bur. Mines, *Rept. of Investigations* 3079, 13 pp.(1931).—There has been steady gain in value and yield of by-products from coal during the last 15 yrs.; the design of ovens and by-product recovery equipment has also shown const. improvement. The by-product oven has recently supplied much base-load gas for city use. Natural gas and refinery gas are increasingly important competitors. Cheap synthetic NH_3 has made the profitable recovery of by-product NH_3 a problem. The Tern and C. A. S. processes for the conjoint recovery of S, NH_3 and cyanogen, European developments and the recovery of by-product S peculiarly adapted to fungicidal and agricultural purposes as practiced in America are described. The solution of the phenol recovery problem and the reduction of light-oil losses by improvements in refining are discussed. ALDEN H. EMERY

Concretions in coal. X. STAINIER. *Ann. soc. sci. Bruxelles* **50**, Ser. B, 247–55 (1930).—The formations known as "coal apples" found in English pit-coals and in certain anthracite coals of the U. S., nodules found in Australia, ball coal in pit-coal of Hindustan and certain concretions found in Belgium are described. S. states that no decisive proof of the origin of these structures is available from these studies. The phenomenon is probably more complex than one thinks and may be due to a combination of causes. Even the term concretions is used for want of a better word. They are not true nodules, produced by concn. at a given point, of substances at first scattered through a rock. Various possible theories are discussed. ALICE W. EPPERSON

Coal-cleaning problems. L. W. NEEDHAM. *Iron Coal Trades Rev.* **121**, 525–7 (1930).—A review. LESLIE B. BRAGG

The hydrogenation of solid fuels. CARL ZERBE. *Chem.-Ztg.* **55**, 4, 18–9, 38–40, 94–6, 114–7, 136–7, 152–3(1931).—A review of the present status of the process, with particular reference to recent patents, and extensive bibliography. T. H. CHILTON

Fusion points of the ash constituents of the Sonnenschein seam. H. WINTER AND H. MÖNNIG. *Glückauf* **67**, 156–60(1931).—Fusion points of ash from different structural parts of the Sonnenschein seam detd. by the methods of Bunte and Baum (*C. A.* **22**, 1457) and of Dolch and Pochmuller were: fusain 1060 1150°, vitrain 1125–1200° and durain 1530°. In every case as the compn. of the ash approached that of pure clay, $Al_2O_3.2SiO_2.2H_2O$, the m. p. was raised. H. L. OLIN

New researches on ash fusion points. C. STAEMMLER. *Chem.-Ztg.* **55**, 59–60 (1931).—Various Ca, Fe and Si salts were combined into mixts. and the fusion points detd. by thermocouples after the method of Bunte and Baum (*C. A.* **22**, 1457). Sulfates always raised the fusion points of the mixts., probably because of some interaction between S and the oxides. C. R. FELLERS

Furnace heating by means of pulverized fuel. G. E. K. BLYTHE. *Metal Ind.* (London) **34**, 177–9, 231–2(1929). E. J. C.

At what temperature should purification masses be dried? DE VOOGD. *Het Gas* **50**, 501–5(1930).—Expts. on drying of $Fe(OH)_3$ were conducted to det. the correct drying temp. for purification masses. Even at 110° not all water is removed after drying for a long time because of the colloidal character of the hydroxide and the lack of a definite hydrate. This holds for Lux mass as well as for the weathered limonite which is used as a natural product. Every drying temp. is arbitrary. The method outlined is as follows: Weigh at least 1 kg. of substance in a flat dish and place in a drying furnace at 60–70°. After 2–8 hrs. take out the dish and expose to air for 15–16 hrs. (overnight). Repeat the cycle of heating, aeration and weighing (usually thrice) until const. wt. (within 1%) is obtained. The analyses for Fe of the mass should be related to the original wt. and not calcd. on dry wt. This is also true for the absorption capacity detn. for H_2S (generally 74% by wt. of the Fe present, 16% of the mass itself). B. J. C. VAN DER HOEVEN

Alcohol as motor fuel. Report on practical large-scale tests. P. W. UHLMANN. *Chem.-Ztg.* **54**, 818–9(1930).—A suitable substitute for gasoline used in Brazil in 1916 consisted of a mixt. of abs. EtOH, Et_2O and petroleum in the wt. proportions 75:15:10. R. E. SCHAAD

Alcohol production for motors in Brazil. FREDERICO W. FREISE. *Intern. Sugar J.* **32**, 404(1930).—In recent years much work has been done on the utilization of molasses for the manuf. of motor spirits. One plant with a capacity of 100 tons of motor alc. is operating at its full capacity. In a test of "Azulina," a national motor spirit containing 57% ether, on a motor car fitted with 2 T. A. G. motors of 100 h. p. each, av. fuel consumption was 1.4 l. "Azulina" per km., while the gasoline consumption in parallel tests was 1 l. per km. The price of "Azulina" is half that of gasoline. W. L. OWEN

Suitability of fuels for Diesel engines. LOUIS R. FORD. *Power* **73**, 361–3(1931).—Since the factors which control the behavior of fuel in the engine cylinder are not well understood, performance tests must be relied upon in selecting suitable fuels. D. B. DILL

Hydrogenation at high pressures. GIORGIO ROBERTI. *Mem. accad. Italia* (*Classe sci. fis. mat. e nat.*) **1**, Chim. No. 2, 15 pp.(1930).—As part of the general problem of utilizing national sources of fuels, the hydrogenation of the phenolic distillate from lignite was studied. Co_2S_3 was found to be a satisfactory catalyst, as it induces the formation of satd. cyclohexane at 100 atms. at temps. of 350–400°, and, at the same time, is much less sensitive to poisoning than other commonly employed catalysts. A. W. C.

The possibilities of a South African oil industry. O. FELDMANN. *S. African Mining and Eng. J.* **41**, Pt. II, 281–2(1930).—F. discusses the low-temp. carbonization of S. African lignite followed by hydrogenation of the tar produced. A. H. E.

The history of gas. C. L. VAN BALEN. *Het Gas* **51**, 40–6(1931). B. J. C. v. d. H

Natural gas problems. ALEXANDER FORWARD. *Gas Age-Record* **66**, 823–6 (1930).—A discussion. LESLIE B. BRAGG

Statistics of the British manufactured gas industry. DAVID BROWNLIE. *Gas Age-Record* **66**, 975–7(1930).—A review. LESLIE B. BRAGG

The Linz gas works—its development and its future position. LUDWIG STOLL. *Z. österr. Ver. Gas Wasserfach.* **71**, 30–40(1931). E. H.

Nomography in gas analysis. W. J. G. DAVEY. *Gas World* **92**, 694–5(1930).—The graphical method is used for the detn. of H_2 and CH_4 in a gas after the other constituents and the calorific value have been detd. The other constituents usually detd. are CO_2, O_2, unsatd. hydrocarbons, CO and N_2. Examples are given showing the application of the method to carbureted water gas and vertical retort gas. F. H. B.

Institution gas research fellowship report 1929–30; influence of the inorganic constituents in the carbonization and gasification of coal; liberation of ammonia. A. H. EASTWOOD AND JOHN W. COBB. Inst. Gas Eng., *Communication* No. **23**, 24 pp.(1930).—See *C. A.* **25**, 1057. G. G.

Heat transmission: modern methods of expressing convection data. M. FISHENDEN. *Gas World* **92**, 632–7(1930).—The principles of heat transfer are reviewed and expressed in math. form. Many heat transfer problems connected with the gas and carbonization industries are too complex to be expressed in simple generalized rules. In some individual cases it is possible to correlate and apply available data. The math. presentation is supplemented with graphs for the solution of heat-transfer problems, particularly those in which convection is taken into account. F. H. BERGEIM

Gas meter calibration with the Mariotte bottle. L. ZIPPERER. *Gas Wasserfach* **74**, 27–8(1931).—An insulated Mariotte bottle is a convenient means for calibrating

gas meters. An illustration of such use and the method of calcg. exact gas vols. are given with examples. R. W. RYAN

The new (large) Brandl-Marischka gas meter. PITTSBURGH EQUITABLE METER CO. *Gas u. Wasserfach* **74**, 67(1931); cf. *C. A.* **24**, 5135.—The principle of the Brandl-Marischka meter is old and has long been used by the Pittsburgh Equitable Meter Co. **Reply.** BRANDL AND MARISCHKA. *Ibid* 67–70.—Patents granted in various countries are listed. R. W. RYAN

Coal-grinding and -mixing equipment for gas works. Otto HUPPERT. *Gas u. Wasserfach* **74**, 49–56(1931).—When gas works are large enough there is a definite advantage in grinding and blending coal, as cheaper coal and waste coal and coke can be used and a good coke still obtained. Operating and test data are given in support of this claim and a typical German installation is illustrated and discussed. Attempts to use low-temp. brown-coal coke in such blends were unsuccessful. Recent work of Damm, Fischer and others on the mechanism of coking is reviewed R. W. RYAN

The physical basis and the manner of operation of the Progas-Union gas governor. C. BARCKMANN. *Gas u. Wasserfach* **74**, 110–2(1931); cf. *C. A.* **25**, 190.—Addns. and correction to previous math. derivations are given R. W. RYAN

Experiences with a waterless gas holder. FRANK PRENTICE. Inst. Gas Eng., *Communication* No. **7**, 8 pp.(1930).—See *C. A.* **24**, 4918. G. G.

Gas dehydration. E. W. SMITH. Inst. Gas Eng., *Communication* No. **5**, 37 pp. (1930).—See *C. A.* **24**, 4917. G. G.

Effect of sodium carbonate upon gasification of carbon and production of producer gas. DAVID FOX AND ALFRED H. WHITE. *Ind. Eng. Chem.* **23**, 259–66(1931).—Na_2CO_3 reacts in appreciable measure with C at temps. above 800° and the rate becomes rapid above 900°. The reactions are $Na_2CO_3 + 2C = 3CO + 2Na$, $Na + CO = NaO + CO$; $NaO + CO_2 = NaCO_3$. The net effect is to increase the vapor pressure of C to 10^{15} times its actual value. The mechanism of the reaction is discussed. The use of coke impregnated with Na_2CO_3 in the gas producer gives gases higher in CO than would otherwise be obtained. In a water-gas machine the gases are much richer in CO and H_2, but the increased reactivity of the fuel bed would be disadvantageous during blasting and offset any gains during steaming ALDEN H. EMERY

The new Omeco flue-gas tester. ILLIES. *Feuerungstech.* **18**, 242–3(1930).—The recorder dets. O_2 instead of CO_2. An automatic device takes in predetd vol. of the sample and of H_2 and passes them through a combustion furnace. The contraction is recorded. ERNEST W. THIELE

A new method of phenol recovery from gas liquors. C. SCHÖNBURG. *Brennstoff-Chem.* **12**, 69–71(1931); cf. *Glückauf* **64**, 836(1928).—The disadvantages of dephenolizing with C_6H_6 are discussed. *Tricresyl phosphate* has been found to absorb 10–20 times more phenols and also has the advantages of non volatility, insolv. in, and greater sp. gr. than, the liquors. Partition coeffs. for both are shown diagrammatically for phenol and cresol solns. and gas liquor. The phenols, after absorption, are driven off from the high-boiling tricresyl phosphate by heat or steam distn. under vacuum. Practice shows that only 4–5 parts of tricresyl phosphate are needed to dephenolize 100 parts of liquor contg. 3 g. phenol per l. and that a 6–8% phenol concn. so obtained in the phosphate requires only 5–6 parts steam per part phenol for complete recovery. Use for several months shows a selectivity for phenols and the non-soln. of tar. App., shown schematically, is described. F. W. JESSEN

Tests on a Birmingham (town gas-fired oven) furnace installation. C. M. WATER. *Gas J.* **190**, 576–7(1930).—Tests were carried out on a battery of 4 town gas fired oven furnaces to det. how far working efficiencies could be affected by the employment of special insulating material, improved recuperator elements, and in particular the precise control of primary and secondary air, and reduction of losses by leakage through doors and dampers. For a given operation of carburizing in the older type of furnace a fuel consumption of 16,000 cu. ft. of 500 B. t. u. gas was required. The improved installation used 6230 cu. ft. of gas of slightly lower calorific value. F. H. B.

A new commercial application of the Walter Feld polythionate process. FRITZ OVERDICK. *Z. angew. Chem.* **43**, 1048–51(1930).—To remove NH_3 and S from coal gas the following reactions have been used: $(NH_4)_2S_4O_6 + 2NH_3 + H_2S \longrightarrow 2(NH_4)_2SO + S$; $(NH_4)_2S_4O_6 + 2NH_3 + H_2O \longrightarrow (NH_4)_2S_2O_3 + (NH_4)_2SO_4 + S$, $(NH_4)_2S_4O_6 + 3H_2S \longrightarrow (NH_4)_2S_2O_3 + 5S + 3H_2O$; $(NH_4)_2S_4O_6$ (hot) $\longrightarrow (NH_4)_2SO_4 + SO_2 + 2S$, or $(NH_4)_2S_4O_6 + 2(NH_4)_2S_2O_3 \longrightarrow 3(NH_4)_2SO_4 + 5S$. The S is burned to SO_2 for re-use. Funke (*Gas u. Wasserfach.* **68**, 388(1925)) and Raschig (*C. A.* **15**, 940) have investigated the process. A modification at Leverkusen makes possible complete

removal of NH_3 and H_2S without addn. of foreign NH_3 if excess H_2S is present, by gas washing in several stages. H_2S alone reacts very slowly with $(NH_4)_2S_4O_6$, but rapidly when NH_3 is also present. Absorption of excess H_2S (without NH_3) is done in the first stage, where H_2S is concd., while in later stages the more difficult absorption of dil. H_2S is accomplished by the aid of NH_3 by the first reaction given. E. M. SYMMES

A new modification of the Feld polythionate process. D. SIAVORINUS. *Het Gas* **51**, 19–20(1931).—A short review of a new modification of the Feld process as developed by the I. G. and used at the mine Auguste Viktoria (cf. Overdick, preceding abstract). It consists of cooling the crude gas from the ovens to 25°, thus removing tar and part of the NH_3, and then removing both H_2S and NH_3 in 4 scrubbers by polythionate liquor circulating in the same direction as the gas. In the first scrubber H_2S is taken out to an extent of more than the equiv. of NH_3 present; in the second scrubber no NH_3 is present, but thionate and H_2S react to give free S. Furthermore, the regenerated liquor (treated with SO_2) contg. some free SO_2 is circulated over this scrubber. In the third scrubber is used a mixt. of thionate liquor with the NH_3 distd. off the primary cooler condensate; the gas is thereby freed of its last traces of H_2S. A final washing for removal of the remaining NH_3 is carried out in the fourth scrubber run on NH_3-free thionate liquor, which is subsequently used in the first scrubber. The spent liquor is worked up in the customary way: S is filtered off and the liquor decomposed at 120–30° to give a strong $(NH_4)_2SO_4$ soln., which is freed of thiocyanate by fractional crystn. The present process is an improvement over the former ones in that H_2S comes in contact with liquors of high NH_3 content. This has been found necessary for complete H_2S absorption. The thiosulfate formed from the tetrathionate of the active soln. during the reaction with NH_3 and H_2S is regenerated by the action of SO_2-contg. gases in a separate little scrubber. B. J. C. VAN DER HOEVEN

The storage of carbon monoxide. OTTO HEINRICH WAGNER. *Brennstoff-Chem.* **12**, 87–9(1931). In view of the possible use of CO as a motor fuel, three methods of storage have been investigated: using (1) liquid absorbent, (2) solid absorbent and (3) a reversible chem. combination. Ether-pentane mixts. were the best of the liquids (absorption increasing with decreasing b. p.), but liquid CO_2 and NH_3 showed no absorptive properties. Of the solids, activated C when packed in cylinders showed only 40% capacity increase over an unpacked cylinder at 40 atm., and less at higher pressures. Silica gel and chabasite showed a decrease in capacity at pressures under 100 atm. Solns. of ammoniacal and acid cuprous salts involved heating to deliver the absorbed CO and were corrosive. With solid cuprous halides, addn. compds. of the type $Cu_2X_2.2CO$ were formed very slowly during the first absorption but rapidly after a single removal of the absorbed CO. The addn. is quant., reversible and traces of H_2O greatly increase its speed. Purification as well as storage is thus feasible. The vapor pressures of the $COCl_2$ and $COBr_2$ showed 235 mm. Hg for the former at 20° and 1.67 atm. for the latter. A 40-l. cylinder holding 7 kg. CO at 150 atm. will contain 28 kg. when filled with 100 kg. solid Cu_2Cl_2. Warming to 50° then releases the CO for use, the vapor pressure of the addn. compd. being 5 atm. at this temp. Because of the cost of Cu_2Cl_2 the halides and ammoniates of Fe, Ni and Co as well as ZnO and CaO are being studied. F. W. J.

Ammonia synthesis by the low-pressure Mont Cenis process. W. F. SCHOLVIEN. *Chem. Met. Eng.* **38**, 82–6(1931).—The Scholven, Germany, plant is described. Coke-oven gas is the source of H. CO is removed from the gas by washing with liquid N. Conversion is effected at 400° and 100 atm. Economic data and advantages of the process are given. L. W. T. CUMMINGS

Development and inventions in tar distillation. ERNST WEISE. *Asphalt u. Teer* **30**, 1124–7, 1147–9, 1169–70, 1232–5, 1287–92, 1312–5(1930); cf. *C. A.* **24**, 3886.—This is a detailed digest of 106 recent patents. K. H. ENGEL

Specifications for coal tar in Holland. F. J. NELLENSTEIJN. *Asphalt u. Teer* **30**, 952–3(1930). K. H. ENGEL

Analysis of coal-tar-asphalt mixtures. H. MALLISON. *Asphalt u. Teer* **30**, 183–4 (1930). Sepn. of the components by sulfonation methods is not entirely trustworthy. The asphalt is converted into sol. and insol. sulfonic acids. Certain asphalts, sulfonated by themselves, showed slight increases in wt. When sulfonated in mixts. with 85% tar, they were changed, almost quantitatively, into sol. products. K. H. ENGEL

Thermal decomposition of coal-tar constituents. VII. Reaction products of the thermal decomposition of *m*-cresol. YOSABURO KOSAKA. *J. Soc. Chem. Ind., Japan* **34**, Suppl. binding No. 1, 10–2(1931); cf. *C. A.* **24**, 1958.—Pure *m* cresol was decompd. at 700°, 800° and 900°, as was done with C_6H_6 (*J. Soc. Chem. Ind., Japan* **31A**, 507; **31B**, 126(1928)) except that at 900° no packing material was used because of C deposits formed. Fractions of the distillate up to 120° were mainly C_6H_6 and PhMe. Fractions

above 120° were treated with NaOH soln. to sep. acid constituents; the remainder was sepd. into picrate-forming and non-picrate-forming substances. The former were mostly naphthalene, anthracene, phenanthrene and derivs., the latter mostly Ph_2, Ph_2O and derivs. Differences in packing material have little effect. The yield of C_6H_6, PhMe and PhOH is a max. at about 800°; the yield of naphthalene and anthracene varies little with temp., but the Ph_2 yield increases with decompn. temp. **VIII. Reaction products of thermal decomposition of *o*-cresol and *p*-cresol.** *Ibid* 12–3.—Pure *o*-cresol and *p*-cresol were decompd. at 800° and the products compared with those from *m*-cresol treated similarly. The main products were C_6H_6, PhMe, PhOH, naphthalene, anthracene, phenanthrene, Ph_2, Ph_2O and their derivs. Nearly 24% of *m*-cresol, 12% of *o*-cresol and 8% of *p*-cresol remain undecompd. The PhOH yield is 19% with *o*-cresol and *p*-cresol, but 4.6% with *m*-cresol. *m*-Cresol gives the most C_6H_6 and PhMe while *o*-cresol gives the most naphthalene and anthracene. **IX. Qualitative consideration of the reaction mechanism of the thermal decomposition of cresols.** *Ibid* 13–4.—The thermal activity of cresols has been considered previously (Fischer, *Abh. d. Kohle* 6, 172(1923); Hagemann, *Braunkohle* 28, 1095(1929)). A series of reactions based on exptl. data is proposed. The difference in nature of decompn. of the 3 cresols seems to be due to the relative stability of OH and CH_3 groups, CH_3 being more stable than OH in *m*-cresol, and vice versa in *o*- and *p*-cresol. E. M. Symmes

Light oil from water-gas tar. N. A. Orlov. *Zhur. Prikladnoi Khim.* 3, 585–7 (1930).—Light oil obtained in the manuf. of water gas which had a brownish color and d_0^{10} 0.9240 was distd. and the 141–50° fraction was taken to sep. styrene. This fraction, which had d_0^{20} 0.8794 and n_0^{20} 1.5121, on being treated with Br in chloroform soln, indicated the presence of about 30% of styrene. The bromination was carried out at 0° and the remaining hydrocarbons were distd. off with steam; the dibromide was twice recrystd. from alc. and m. 71 1.5°. In a vacuum distn. at 26 mm pressure the whole of the dibromide distd over at 150 2° and required only one recrystn. The light oil contains about 1.5 2% styrene. This method, however, is not recommended because other products present are also brominated. The pure styrene was obtained from the dibromide by the action of Mg. Attempts to obtain styrene without the use of Br by heating the fraction in an autoclave for 5 hrs. at 200° failed. Indene was easily sepd from the 176–85° fraction by the Weissgerber method (cf. *C. A.* 3, 1152) with a yield of 42 or 4.7% corresponding to that from the original light oil. The indene content is probably higher because the liquid becomes very hot during the reaction and polymerization can be noticed. A. A. Borhtlingk

Tar dehydration. Ehlert. *Gas u. Wasserfach* 74, 40(1931).—The longest possible tar well is desirable. Heating coils were so placed as to minimize mixing by convection. A week before tar was to be loaded, it was heated in about 24 hrs. to 50° and then allowed to stand without further heating for 5 days before loading. R. W. Ryan

Functions of coke ovens. Edward G. Stewart. Inst. Gas Eng., *Communication* No. 6, 30 pp.(1930).—See *C. A.* 24, 5136. G. G

Production, properties and use of coke. D. Aufhäuser. *Montan. Rundschau* 22, 521–4(1930).—Some statistics are given on the production of gas, coke and coal tar products in Germany. For gas making the C content of the coke should be high and the H content low. The size of lumps recommended is 2–9 cm diam. (0.75–3.5 in.), depending on the size retort used. Channing Wilson

Present position of the metallurgical coke industry in Central Europe. Cu Berthelot. *Rev. métal.* 27, 486–500(1930).—The present tendency in the Central European metallurgical coke industry is to improve furnace design and furnace equipment, and to analyze more intensively factors entering into the net cost of coke manuf. C. H. Lorig

The reactivity of metallurgical coke. Dufraine. *Rev. métal.* 27, 509–11(1930); cf. *C. A.* 24, 5980.—The surface of coke was modified by applying solns. of CaO and flux. The reactivity of 3 cokes to which 3 solns. were applied was detd. for 800°, 900°, 1000° and 1100°. Lime solns. decrease the reactivity of coke, thereby raising the CO_2 content of the combustion gases. C. H. Lorig

The determination of coke strength. Fritz G. Hoffmann. *Brennstoff-Chem.* 12, 61–5(1931); cf. *C. A.* 24, 5981.—The effects of fissuring, cooling or quenching strain and coke hardness upon the accuracy of the results obtained in tumbler, compression and shatter tests are discussed in detail. Causes of fissures in coke from various types of ovens, as well as in the carbonizing of briquetted coal, are studied. The use of an automatic screening, weighing and recording device is suggested for continuous detns. on a small part of the oven output. The tumbler with attached double screen is recom-

mended as the best-suited hardness test. The importance of testing carefully screened coke and the preferability of hand- to fork-picked samples is stressed. F. W. JUNG

Low-temperature pressed coke. E. ROSER. *Brennstoff-Chem.* **12**, 86–7(1931).—By using thin-walled, slightly tapered alloy steel cylinders of 300 mm. mid-diameter and 2800 mm. height, fitting in pairs into 400-mm. Otto ovens, a series of carbonizations at oven temps. of 750° has been made. A strongly swelling slack of 18% volatile carbonaceous matter (V. C. M.) and 5.4% ash was coked 4 hrs. A coking slack of 22.1% V. C. M. and 5.1% ash, and a 1:1 mixt. by vol. of this slack and an anthracite fine of 10.5% V. C. M. and 7% ash were coked 5 hrs. In each case a hard, large-sized and uniform coke resulted. Gas and tar yields were not detd. Analytical data are given for the coke obtained. Consumption and production data for light oil products in Germany are given in support of a low-temperature process. F. W. JUNG

Dry quenching of coke. WM. O. RENKIN. *Fuels and Steam Power* (*A. E. S. M. Trans.*) **53**, 65–85(1931).—See *C. A.* **25**, 1059. G. G.

The reductivity of over-crusted coke (PIWOWARSKY) **9.** Ammonia liquor as a fertilizer (BIMCHAS) **15.** The microbiological aspect of peat formation (THAYSEN) **8.** The present nature of coals resulting from their history (DUBRUL) **8.** The dehydrating action of coal ash (TANAKA) **18.** Separation and synthetic preparation of phenol (MIZOSHITA) **10.** Apparatus for eliminating CO from motor-vehicle exhaust gases (U. S. 1,791,912) **1.** Separation of tars, tar oils, etc. (Brit. pat. 336,945) **22.** Purifying light oils recovered from coal gas, etc. (Brit. pat. 336,636) **22.** Clarifying plant for coal industry (Ger. pat. 516,454) **1.** H and CO from CH_4, etc. (Brit. pat. 336,635) **18.** Separation of dust from gases (Brit. pat. 336,201) **13.** Purifying light hydrocarbons produced by destructive hydrogenation of coal (Brit. pat. 335,885) **22.** Purification of gases, etc. (Belg. pat. 371,622) **4.**

Fuel. WILHELM CLEMENS. Ger. 513,512, July 1, 1926. Dried pressed peat is pulverized, kneaded into a plastic condition with added substances and finally pressed into molds. The pulverized mass may be coked. App. is described.

Fuel briquets. SOC. ANON. LA CARBONITE. Ger. 513,731, May 6, 1924. Briquets of high calorific value, suitable for driving gas producers, etc., are obtained by distg. wood, peat or lignite below 500°, mixing the residue with oxidized tar below 500° and pressing. Cf. *C. A.* **24**, 1960.

Fuel for motors. N. V. DE BATAAFSCHE PETROLEUM MAATSCHAPPIJ. Fr. 694,053, Apr. 16, 1930. Fuel suitable for motors is obtained by heating carbonaceous materials such as petroleum, asphalts, etc., in the presence of a compd. of Mo acting as a catalyst and in the presence of H under pressure, the conditions being chosen so that no splitting of the mols. of the treated materials takes place with formation of gaseous or low b. p. products. Examples are given.

Fuel for internal-combustion engines. JOHANN W. MICHEEL. Ger. 515,816, Nov. 26, 1929. Addn. to 515,076 (*C. A.* **25**, 1660). Soot is mixed with powd. fuels giving a relatively large amt. of ash, *e. g.*, lignite, wood charcoal or cellulose.

Vaporizing heavy fuels for internal-combustion engines. RECTOR GASIFIER CO. Brit. 336,243, July 9, 1929. The fuel is heated, sprayed radially to a common center from several orifices and an inert gas is passed at right angles through the sheet of spray thus formed.

Catalytic heating device for fuel of internal-combustion engines. OSCAR H. WALLIN. U. S. 1,792,337, Feb. 10. Various structural details are described.

Removing carbon deposits from internal-combustion engine cylinders. THOMAS & HOCHWALT LABORATORIES, INC. Brit. 335,963, June 5, 1929. A C-loosening compn. is used contg. a halogenated aromatic hydrocarbon (such as chloronaphthalenes, chlorobenzenes, bromobenzenes, halogenated toluenes or xylenes, benzal chloride or benzyl chloride, which may be dissolved in alcs., ether, acetone, EtOAc, kerosene, gasoline, C_6H_6 or the like) which is introduced into the hot cylinders. Examples with proportions are given.

Acetylene. CHARLES DE LA ROCHETTE. Ger. 513,692, Mar. 6, 1929. Details are given of a plant for producing an C_2H_2-air mixt. for motors and other combustion machines.

Solid acetylene. I. G. FARBENIND. A.-G. Fr. 694,001, April 15, 1930. C_2H_2 is stored and transported by cooling the gas to just below its m. p. and compressing the snow thus formed into cakes.

Wagon for the low-temperature distillation of bituminous fuels in tunnel ovens. N. V. MACHINERIEËN EN APPARATEN-FABRIEKEN. Ger. 516,153, Oct. 18, 1927.

Destructive hydrogenation. IMPERIAL CHEMICAL INDUSTRIES, LTD., R. HOLROYD and C. COCKRAM. Brit. 337,028, July 18, 1929. At the beginning of a multi-stage process for the destructive hydrogenation of bituminous coal, the coal is heated either *in vacuo* or in an inert gas or with H, with or without oil or catalysts, to a temp. at or just above that of initial thermal decompn. at which the ulmic constituents disintegrate. Preferably H is used under pressure in the presence of high-temp. tar or oils derived from a later stage of the process and in the presence of catalysts, and sufficient H is used to deoxygenate the coal and yield a fusible product. The material is then further hydrogenated and liquid products are fractionated from the resulting substances. Various details and examples are given.

Destructive hydrogenation. C. F. R. HARRISON and IMPERIAL CHEMICAL INDUSTRIES, LTD. Brit. 336,991, July 19, 1929. Destructive hydrogenation under pressure is effected in a vertical tower in the presence of a massive metallic catalyst of large surface area such as plates, wire, ribbon or gauze. Various details of app. are described. Cf. *C. A.* **25**, 192.

Destructive hydrogenation of pastes of coal and oil. C. F. R. HARRISON, E. D. KAMM and IMPERIAL CHEMICAL INDUSTRIES, LTD. Brit. 336,610, July 16, 1929. Various details of app. and procedure are described for a process in which all the products from the reaction vessel pass through a common exit to a catch pot which is kept at such a temp. (suitably about 350°) that heavy oils are condensed while the vapors of middle and light oils are led away, and the heavy oils are returned to the reaction vessel.

Furnace and retort for drying, roasting or distilling solid materials such as coal. F. K. WOODROFFE. Brit. 336,657, July 18, 1929.

Coal. MAURICE DÉNOS. Fr. 694,979, May 5, 1930. The combustion properties of coal are improved by sprinkling it with water contg. soda, S, red ocher and CaC_2.

Apparatus for cleaning coal by air separation. ALWYN G. OPPY and GRANGER B. SADLER. U. S. 1,792,440, Feb. 10. Structural features.

Apparatus for cleaning and purifying coal. HARRY L. MCLEAN (one-third each to George W. Wilmot and Francis H. Blatch). U. S. 1,792,179, Feb. 10. Structural features.

Washer for coal, ores, etc. ANTOINE FRANCE. Ger. 516,145, Nov 21, 1926.

Liquid products from coal, etc. N. V. DE BATAAFSCHE PETROLEUM MAATSCHAPPIJ Fr. 694,192, Apr. 18, 1930. Valuable liquid products are prepd. by treating coal, tar, petroleum products or residues, lignite or cellulose by heating under pressure in the presence of H and a catalyst composed of Mo compds. intimately mixed with finely divided absorbent substances such as absorptive charcoal.

Apparatus for determining the humidity of brown coal, etc. HANS TRAUTHWEIN Ger. 513,701, April 6, 1928. The water is evapd. in a closed chamber in a rotary drum app. and the condensate is measured.

Lignite cooling plant. MASCHINENFABRIK BUCKAU R. WOLF A.-G. Ger. 513,860, Jan. 26, 1929. Addn. to 460,570. Cooling plates are arranged after the manner of venetian blinds.

Drying peat. WILHELM CLEMENS. Ger. 513,572, Jan. 25, 1927. To crude peat pressed peat is added, and the whole is further pressed and then treated with drying agents.

Montan wax. I. G. FARBENIND. A.-G. Brit. 335,929, July 1, 1929. Purification of montan wax is effected by extn. under pressure and at an elevated temp. (suitably 135° or 150°) with org. solvents of the wax acids and esters (but not of the coloring substances) such as aliphatic alcs., esters, ketones and ethers, open chain or cyclo-aliphatic liquid hydrocarbons or chlorinated hydrocarbons, alone or mixed or with a smaller quantity of aromatic hydrocarbons. Examples with details of procedure are given.

Removing phenols from ammonia liquor. GEWERKSCHAFT MATHIAS STINNES Ger. 517,001, Apr. 30, 1929. In removing phenols from ammonia liquor by means of a circulating org. solvent, the latter is desulfurized, before freeing it from phenols, by treatment with a suitable liquid or gas. Thus, the solvent may be washed with water, which may then be passed to the ammonia washer, or acrated to render it fit for use again. Alternatively, the solvent may be treated with coke-oven gases, which may traverse a cycle in which the H_2S taken up by the gases is removed by a solid purifying material or by an alk. wash. Cf. *C. A.* **25**, 801.

Gas purification. F. BÖNNEMANN. Brit. 336,425, Oct. 12, 1929. See Fr. 682,838 (*C. A.* **24**, 4616).

Gas purification. DAVID L. JACOBSON (to Koppers Co.). U. S. 1,792,097, Feb. 10 Gas is washed with an alk. suspension of a compd. of a metal of the Fe sub-group of the 8th group of the periodic system, such as Fe oxide, contg. in soln. a hydroxy deriv. of

an org. non-paraffin compd., such as 2% or less of a phenol, which retards formation of thio compds. Cf. *C. A.* **25**, 802.

Purifying gases. I. G. Farbenind. A.-G. Brit. 336,319, July 20, 1929. Coke-oven gases, low-temp. distn. gases, cracking gases and gases other than those mentioned in Brit. 329,688 (*C. A.* **24**, 5983) such as gases intended for the manuf. of synthetic NH_3, MeOH, etc., are freed from volatile S compds. such as H_2S and largely from CO_2 if present in appreciable proportion, by washing with high b. p. hydrocarbons or phenols or their mixts. under 10 atm. or higher pressure at such a temp. that the concn. of H_2S amounts to less than 0.3% by volume of the gas. The pressure is preferably released in stages. Various details and examples are given.

Purifying gases. Heinrich Koppers A.-G. and Christian J. Hansen. Ger. 513,953, Nov. 1, 1927. NH_3 and H_2S are removed from gases in the proportion of 2 : 1 by a washing liquid causing the formation of Fe, Mn or Zn thionate, and the excess of H_2S is removed by a second washing causing the formation of polythionates. H_2SO_3 is added to the second washing fluid. Cf. *C. A.* **24**, 1726.

Gases rich in olefins. I. G. Farbenind. A.-G. (Fritz Winkler, Paul Feiler and Carl Messerknecht, inventors). Ger. 513,845, Nov. 11, 1926. Gases rich in olefins are obtained by rapidly heating powd. bituminous coal to dull red heat and rapidly cooling the gas evolved. Superheated steam may be admitted to the glowing fuel. The examples describe the production of gas contg. 19 to 24% C_nH_{2n} from lignite by this method.

Heating and illuminating gas. Albert F. Kunberger (to United Gas Improvement Co.) U. S. 1,792,172, Feb. 10. A mass of coal is heated to incandescence with an admixt. of finely divided iron or Fe oxide in a chamber, and a mixt. of H and superheated steam is introduced into the heated mass, simultaneously addnl. coal is introduced into the chamber together with an admixt of a small proportion of finely divided Fe oxide, and the gases within the chamber are subjected for a time to steam pressure of 30–300 lbs. per sq. in. to cause the H to combine with the C to form hydrocarbon gases. App. is described.

Coal gas. Ges. für Linde's Eismaschinen A.-G. (Paul Schuftan, inventor). Ger. 513,815, Aug. 7, 1928. The small quantities of reactive gas remaining in coke-oven gas are removed, before splitting the gas by cooling to low temps., by passing it over an absorptive agent such as active C impregnated with metal or metallic salts, or over active SiO_2-gel. This removes the NO and traces of hydrocarbons remaining after the removal of the hydrocarbons, H_2S and water by the usual methods.

Washing coal gas. H. Koppers A.-G. Brit. 336,484, Sept. 27, 1929. In final water-cooling of coal distn. gases, the water, before re cooling, is washed or treated with tar to remove deposited naphthalene. App. is described.

Expansion machines for separating benzene from coal gas. Ges. für Linde's Eismaschinen A.-G (Paul Schuftan, inventor). Ger. 513,764, Sept 14, 1926. Addn. to 511,567 (*C. A.* **25**, 1265). Details are given for lubricating the machine by oil to which homologs of C_6H_6 or hydrated naphthalene are added to lower the congealing point. Glycol, ketones or monohydric alcs. may be added to the water-ice soln. to prevent excessive loss by evapn at low-vapor pressures.

Mixed oil gas and water gas. J. A. Perry (to Humphreys & Glasgow, Ltd.). Brit. 336,525, March 2, 1929. In the operation of a carbureted water-gas set, oil gas is obtained by passing sep. streams of a hydrocarbon fluid through the generator and through the carbureter, the hydrocarbon material being cracked by passage through the fuel bed, and the gas is withdrawn separately from that formed in the carbureter and superheater. Various details of app. and operation are described. Cf. *C. A.* **25**, 1063, 1662.

Water gas. Metallges. A.-G. and C. Mueller. Brit. 336,821, Nov. 4, 1929. Powd. and granular fuels are gasified by O in admixt. with steam, and part of the gas produced is reintroduced into the producer together with the gasifying medium, in which it is burned with a part of the O before the gasifying medium reacts with the fuel to be gasified.

Non-poisonous gas from blue water gas. W. H. Fulweiler (to Humphreys & Glasgow, Ltd.). Brit. 335,869, May 2, 1929. One portion of blue water gas is passed over a heated catalyst such as Ni and another portion is passed with steam over a heated catalyst such as activated Fe oxide to form chiefly H; the 2 gases are mixed, with removal of CO_2 and water vapor either before or after admixture. Some CO may remain.

Continuous water-gas production. J. Pintsch A.-G. Brit 336,965, July 22, 1929. In the continuous production of water gas by passing steam and water gas together with the fuel through a tube surrounded by a heating app. for the reacting

gases (as described in Brit. 295,717 (*C. A.* **23**, 2278)), the mixt. of previously produced water gas and steam is admitted progressively and cumulatively to the reaction tube at a number of points along the tube as well as through a space at the top of the tube. Details of app. are described.

Water-gas generator. W. B. CHAPMAN, C. W. ANDREWS and H. B. YOUNG (to H. A. Brassert & Co. and Western Gas Construction Co.). Brit. 335,203, Nov. 27, 1928. A generator is described having means for continuous ash removal, in the operation of which the air-steam ratio is such as to maintain a zone in which the ash is liquefied and a cooler zone below this in which the ash tends to solidify for removal by a mech. device.

Water-gas generator. H. G. TERZIAN (to Humphreys & Glasgow, Ltd.). Brit. 336,902, April 20, 1929. A generator using bituminous fuel has a perforated tubular gas off-take in the axis of the upper part of the generator and openings communicating with an annular chamber surrounding the carbonizing zone, and both blast and run gases pass through this annular chamber. Various auxiliary structural details also are described.

Combined water-gas and steam generator. CARL MARISCHKA. U. S. 1,792,178, Feb. 10. Structural features of an app. with a boiler chamber surrounding a generator shaft, a heating jacket surrounding the boiler chamber, and tubes disposed entirely within the heating chamber and connected at their ends with the boiler chamber.

Gas producer. J. A. MACDONALD. Brit. 336,932, July 29, 1929.

Gas producers. POETTER G. M. B. H. Fr. 694,116, April 17, 1930. See Ger. 503,750 (*C. A.* **24**, 5985).

Vertical gas producer. C. H. LANDER and T. F. HURLEY. Brit. 336,022, July 19, 1929.

Grateless gas-producer for the continuous gasification of coal dust or granules. JANOS KALICZKY. Austrian 120,427, July 15, 1930.

Gas producer and associated furnace and boiler. BABCOCK & WILCOX, LTD. Brit. 336,356, Aug. 22, 1929.

Charging apparatus for gas producers. A. L. GALUSHA. Brit. 337,005, July 23, 1929. Structural features.

Degasifying chamber for gas producer. CARL BLEYER. Ger. 510,351, Feb. 8, 1927.

Prevention of gummy deposits in gas mains, etc. W. H. FULWEILER (to Humphreys & Glasgow, Ltd.). Brit. 336,456, Dec. 17, 1928. Gum-forming constituents such as indene and styrene are left in the gas and the latter is treated with mono- or poly hydric derivs. of C_6H_6 or its homologs, as by spraying.

Tar distillation. GEORGE T. GAMBRILL, JR. (to The Barrett Co.). Can. 309,014, Mar. 3, 1931. A method and an app. for distg. tar are specified. The tar is heated without sepn. of the vapor; then the vapor is released and simultaneously the tar is blown with an inert gas preheated to a temp. approx. that of the tar; the vapor and inert gas are withdrawn, the mixt. is cooled to sep. condensible constituents, and the inert gas is heated and returned for further contact with addnl. portions of the tar. Cf. *C. A.* **25**, 803.

Coking coal. A. POTT. Brit. 335,910, April 27, 1929. A coking coal is first dried and heated externally to a temp. just below its decompn. temp. and is then transferred to another app. in which it is externally heated to effect distn. at a temp. not exceeding 550° (the second app. being preheated to about the temp. of the coal before introduction of the latter into it).

Wet or dry cooling plant for coke. C. OTTO & CO. G. M. B. H. Ger. 516,442, Aug. 3, 1926.

Coke ovens. RUDOLF WILHELM. Fr. 694,019, April 16, 1930. Construction of door is described.

Coke ovens with heat regeneration. ROBERT J. A. DE STORDEUR. Fr. 693,954, Dec. 14, 1929.

Coke oven for making semi-coke. SOC. GÉNÉRALE DE FOURS À COKE SYSTÈME LECOCQ. Brit. 336,809, Oct. 27, 1928. Structural features of app. with a vertical or inclined chamber oven lined with metal plates or partitions supported at a distance from the heated refractory walls and heated by radiation only (each metal chamber being enclosed on all its faces by the heating walls).

Multiple regenerative coke oven. C. OTTO & CO. G. M. B. H. Ger. 513,593, May 30, 1928. Details of arrangement.

Coke-oven construction and operation. K. BEUTHNER. Brit. 337,278, Jan. 3, 1929. Distillates are withdrawn from the bottom of the charge into a lower compartment forming part of a divided fuel support, whence they pass to an outlet pipe. Steam may be introduced for production of water gas. Cf. *C. A.* **24**, 2868.

22—PETROLEUM, LUBRICANTS, ASPHALT AND WOOD PRODUCTS

W. F. FARAGHER

Artificial aging of mineral oils. III. F. EVERS AND R. SCHMIDT. *Wiss. Veröffentlich. Siemens-Konzern* **9**, No. 1, 357–68(1930); cf. *C. A.* **23**, 3565; **25**, 404.—The catalyst and procedure previously recommended for aging tests on mineral oils are used to show that the aging curve may be expressed by the equation $y = 2.3 \log x. C + K$, where $C = 10.1$ and $K = -11.3$. From the aging const. of a mineral oil, the sapon. value, acid value and tendency to polymerization during various stages in aging can be calcd., and a close approximation made of the av. life of the oil under elec. conditions. B. C. A.

Heat calculation for flash distillation [of petroleum hydrocarbons]. G. H. FANCHER. *Chem. Met. Eng.* **37**, 307–8(1930).—In calcg. the heat added during vaporization of hydrocarbons by means of Turner and Harrell's equation (*C. A.* **24**, 2280), more reliable results can be obtained by taking into consideration the av. sp. gr. and the temp. rather than the mol. wt. of the vapor formed. The value of the latent heat used in this calcn. should be obtained from the relation $l = (1/d)(110.9 - 0.09\,t)$, where l is the latent heat of vaporization in B. t. u. per lb., d the sp. gr. (at 60°F. compared to water at 60°F.) of the liquid vaporized and t is the temp. in °F.; this value is more accurate than that obtained from Hildebrand's or Trouton's rules. B. C. A.

Determination of carbon residue in petroleum products —Conradson carbon. B. ROSENBAUM. *Chem.-Ztg.* **55**, 106(1931).—Corrections are given for several Conradson C detns. previously reported (*C. A.* **25**, 804), with the explanation that the quality of these products has changed in the meantime. The possibility of a definite relation between Conradson C and viscosity is pointed out. D. F. BROWN

Ultrafiltration of petroleum. A. ZAHARIA AND E. LUCATU. *Bul. soc. chim. România* **12**, 90–4(1930).—In an attempt to settle the question as to whether paraffin, resins and asphalt are present in petroleum in colloidal or in true soln., petroleums of different types from 5 localities were subjected to ultrafiltration. Vulcanized rubber membranes of 0.04 mm. thickness and a vulcanization coeff. of 1.7 were used in the Brukner app. under a pressure of 150 atm. Two membranes were used that gave an effective filtration surface of 25 sq. cm. The resins of petroleum which are separable by 70% EtOH were found to be ultrafilterable All the paraffin in the petroleums used was ultrafilterable but the asphalt, both hard and soft, was removed quantitatively by ultrafiltration. This behavior indicates that the asphalt is colloidal but that the resins and paraffins are not. The asphalt retained by the ultrafilter was dissolved in C_6H_6 and cyclohexane and was again retained by the filter Several passages of an oil through the same filter removed the resins and left the pure dry asphalt, which dissolved readily in that portion of the petroleum that was ultrafiltered. This expt. shows that the asphalt exists in petroleum as a lyophile colloid. ODEN E. SHEPPARD

Contact filtration of bright stocks. V. MATUSEVICH. *Azerbaidzhanskoe Neftyanoe Khozyaĭstvo* **1930**, No. 12, 64–75. A mixt. of long residuum from Dossor (85) and Makat (15) crude oil was treated with acid and in 2 stages with clay. Substitution of a NaOH wash for the 1st-stage clay treatment resulted in the formation of emulsions and in high ash content of the finished oil. Lab and plant results showed that long residuum requires 7–10% and cylinder stock 8–12% of 96–98% H_2SO_4, which is applied as a fine shower, with air agitation. Long residuum is best treated at 30–35° and cylinder stock at 45–55°, since at higher temps. the sludge discolors the oil. The time of contact is detd. by testing the oil on a glass plate and discontinuing agitation when large lumps of sludge begin to form (usually 20–45 min.). The main body of sludge is sepd. from the oil at once and the remainder is allowed to settle for 15–48 hrs. in settling tanks at not over 50–55° (heating even with steam coils is detrimental). Coagulation of the sludge with water, NaOH soln., clay, water glass, etc., fails to give good results. Operations are controlled by color tests (2% naphtha soln. of oil in a Dubosc colorimeter). Clay should be applied to acid oil but the oil should be free from sludge. With long residuum a mixt. of clay (10% by wt. of oil), pretreated with acid and water (1:3), is mixed with the oil and circulated through a Foster-Wheeler pipe still (construction and operating details are specified) and a mixing tank where the temp. should reach 165° (max. permissible temp. in pipe still is 170°). When the temp. reaches 90–100°, 5–10% more clay is added (total 15–25%). If all of the clay is added at the beginning, foaming is excessive. This clay treatment requires 6–8 hrs. but lab. results show that 40 min. contact gives the best color. The use of superheated steam shortens the time of treating

but the product is impaired. Loss of oil to clay is about 1:1 by wt. Similar results are obtained with cylinder stocks but more clay is required. Clay is sepd. from the oil on a filter press of the frame type; this is unsatisfactory because of loss of time. The following results were obtained in treating long residuum:

98% H_2SO_4, % by wt.	—	6	9	12	15
Color of acid oil, mm.	—	41	55	70	80
Sp. gr.	0.9182	0.9055	0.9046	0.9022	0.8997
Flash point		Practically unchanged			
Conradson C, %,	3.70	1.68	1.48	1.16	1.07
Color after clay treatment, mm.	9.5	50	68	87	91

V. KALICHEVSKY

Dielectric constants of petroleum and its products. V. ZHUZE. *Azerbaĭdzhanskoe Neftyanoe Khozyaĭstvo* **1930**, No. 12, 88-98.—The dielec. consts. of petroleum and its products increase with the increase in sp. gr., b. p. and mol. wt. of oils. The same relation holds for paraffins, contrary to the conclusions of Pécheux (*C. A.* **21**, 169). The dielec. const. is very closely equal to $(n_D)^2$. For paraffins, the const. increases with the increase in m. p. The temp. coeff. of the const. is neg. for petroleum products. In abs. value it increases with the d. except for the paraffins, for which it shows a decrease. The temp. coeff. of paraffins is 2-3 times smaller than that of liquid mineral oils. The dielec. const. of naphthenic acids increases with increase in sp. gr., b. p., surface tension, index of refraction and mol. wt. V. KALICHEVSKY

Absolute viscosities of petroleum products from Groznui fields. L. SELSKIĬ AND E. SHCHEGLOVA. *Azerbaĭdzhanskoe Neftyanoe Khozyaĭstvo* **1930**, No. 12, 130-1. V. KALICHEVSKY

Cold settling of surakhanui crude oil. A. VELIKOVSKIĬ AND S. NIFONTOVA. *Azerbaĭdzhanskoe Neftyanoe Khozyaĭstvo* **1930**, No. 10, 109-11.—Satisfactory lab. results were obtained. V. KALICHEVSKY

Ligroin and gasoline content of straight-run and cracked distillates from Groznui crude oils. L. SELSKIĬ. *Azerbaĭdzhanskoe Neftyanoe Khozyaĭstvo* **1930**, No. 12, 124-9. V. KALICHEVSKY

Many products from Burman crude oils. G. EGLOFF. *Oil and Gas J.* **29**, No. 30, 46, 133(1930).—The situation and production of the fields are discussed and the products obtained are described. J. R. STRONG

Analysis of petroleum and its distillates for reducible substances and adsorbable matter by means of the polarographic method with the dropping mercury cathode. B. GOSMAN AND J. HEYROVSKY. *Trans. Electrochem. Soc.* **59** (preprint) 23 pp.(1931), cf. *C. A.* **24**, 3419.—The electroanalytic method with the dropping Hg cathode and automatic polarographic recording of the current-voltage curves has been applied to the estn. of (1) electrolytically reducible substances and (2) adsorbable (surface-active) matter in petroleum and its distillates. The analysis of electroreducible substances is carried out by shaking the petroleum with a soln. of NH_4Cl and submitting the aq. ext. to polarographic examn. after the atm. O_2 has been expelled by H_2 or by the addn. of a sulfite. About 0.005% of reducible substances may be detected in this way. Many sorts of petroleum were found to contain acidic substances, probably *naphthenic acids*, which may be extd. by aq. alk. solns. and which possess a prominent anticatalytic action in the reaction between O_2 and sulfite. These anticatalysts suppress maxima occurring on current-voltage curves at pos. potentials, thus indicating their neg. charge and strong adsorbability. The content of adsorbable substances is detd. by adding the petroleum or its soln. in MeOH from a microburet to an acidified MeOH soln. of $CuSO_4$. The max. on the current-voltage curve, due to the latter soln., is hereby depressed and the diln. at which a half-suppression is reached is taken as characteristic for the adsorbability in the petroleum cut. *Naphtha* from different sources has been found to contain the least adsorbable substances (diln. no., 10-400), then gasoline (400-2000) and lubricating oil (3000-13,000). Crude oil is most adsorbable with diln. nos. up to 41,000. C. G. F.

Knocking and effect of antiknock compounds. J. LORENTZEN. *Z. angew. Chem.* **44**, 130-6(1931).—The causes of knocking were investigated in combustion expts. made in a cylindrical chamber with mixts. of air with pentane and hexane. Variations in the proportions of the mixts. showed that the reactions are different when knocking occurs and when it does not. Change of position of the spark in the chamber proved that knocking sets in when an incomplete combustion is propagated through the chamber and a pressure wave is reflected from the wall, causing an explosion of the partly oxidized products. The flame is propagated about twice as fast under knocking conditions as

otherwise. Turbulence increases the combustion velocity. In the exptl. arrangement used, knocking occurred in a turbulent gas mixt. only at pressures above 8 atms. The addn. to the fuel of antiknock compds., lead tetraethyl and iron carbonyl, had no effect. When the combustion products of the same antiknock agents were introduced into the combustion chamber previous to the ignition of the fuel, it was impossible to produce knocking below 5 atm. pressure, and when turbulence was produced at the same time, no knocking was observed, although the initial pressure was raised to 9 atm.

D. F. BROWN

Benzene and the evolution of ideas on motor fuels. BRUNSCHWIG. *J. usines gaz* **54**, 569-76(1930). Current theories on the causes and prevention of motor knock, the methods of refining fuel benzene, gum formation and the action of inhibitors, and methods of testing for gum-forming tendency are discussed. K. H. ENGEL

Knock rating of motor fuels. Note on experiments carried out in 1930. ANON. *J. Inst. Petroleum Tech.* **17**, 69-71(1931). From the results of a 2nd series of knock-rating tests participated in by the research labs. of the Anglo-American Oil Co., the Anglo-Persian Oil Co. and the Asiatic Petroleum Co., it was agreed that the bouncing pin was the best means of measuring knock intensity if the engine was small enough for it to function properly. The Sub-Comm. of the I. P. T. agreed upon the octane no. for expressing knock ratings in the future The results from the older types of testing engines can be compared with those from the Horning engine only by working out the correlation for each type of fuel separately. EMMA E. CRANDAL

Gases from crude oil cracked in the vapor phase. M. B. MARKOVICH AND V. V. PIGULEVSKII *Neftyanoe Khozyaĭstvo* **18**, 425-44(1930), cf *C. A.* **25**, 405.—Fuel oil was cracked in the vapor phase and the gas produced was sepd into 3 fractions, (*a*) permanent gas, (*b*) Blau gas, *i. e.*, liquid at 15° under 100 atm pressure and (*c*) light gasoline. These fractions contained, resp., in % by wt., H 2.4, 0.2, 0.0; satd. hydrocarbons 49.0, 29.6, 3.0, C_2H_4 25.2, 17.1, 0.0; C_3H_6 12, 24.3, 4.0; butylene 2.9, 9.0, 35.0, bivinyl 2.0, 6.6, 18.0; vapors of higher unsatd hydrocarbons 0.0, 2.5, 0.0; N_2, CO_2, O_2, etc., 3.0, 0.4, 0.0. The work was undertaken to det the possibility of using cracked gas in the manuf. of synthetic chem. compds. to replace natural fats, for prepg glycols, perfumes, etc. A. A. BOEHTLINGK

The vapor-pressure curves of motor spirits. P. MEYER. *J. Inst. Petroleum Tech.* **17**, 42-68(1931).—The Ramsay-Young boiling-point law, deduced from the Clausius-Clapeyron equation, may be expressed in the form: $\log P = K_1 - K_2(t/T)$. Vapor pressures of a large no. of air free motor spirits were detd., in Andrew's app., and by the methods of Rhodes and McConnell, Beistle and Prather, Tizard and Marshall and Bridgeman, Aldrich and White. All the results fell approx. upon the graph represented by B., A. and W.'s equation, in which the consts. of the Ramsay-Young equation are evaluated: $\log P = 6.76 - 3.88(t/T)$ Two methods were developed for calcg. the true hydrocarbon vapor pressure from the apparent vapor pressure to avoid the exptl. difficulty of removing dissolved air from a mixt. of volatile hydrocarbons. By the first method, the apparent vapor-pressure curve is regarded as made up of the true vapor-pressure curve plus an air-pressure curve. The 2nd method utilizes the apparent molal heat of vaporization for calcg. EMMA E. CRANDAL

Vapor-phase treatment of cracked gasolines in the Vickers cracking unit. B. P. FRADKIN AND D. A. STROM. *Neftyanoe Khozyaistvo* **18**, 445-8(1930).—Gasoline obtained in the Vickers cracking unit is evapd again and passed in the vapor phase through fuller's earth filters. The yield of the final gasoline amounts to 91.1%, while 0.2% of fuller's earth is consumed, based on 11 regenerations During this process the fuller's earth is continuously heated by flue gas, the temp. being kept at 230–5°. The untreated gasoline has a Stammer color of 3.2, gum 0.5%, no corrosive action, unsatisfactory doctor test, and a sp. gr. of 0.734. The treated gasoline has a color of 2.1, 0.3% of gum, satisfactory corrosion and doctor tests, and a sp. gr. of 0.737 A. A. BOEHTLINGK

Destructive hydrogenation in bomb-polymerization in cracking. S. A. KISS. *Ind. Eng. Chem.* **23**, 315-8(1931). The initial retardation of the decompn. in destructive hydrogenation, carried out in a closed bomb, is explained by the Poynting effect which abstracts the "activated molecules" from the liquid phase and transforms them into "non-activated molecules." Formulas are developed for the kerosene yield and the gas and gas-plus-gasoline yield, also for the amt. of polymerization. D. F. BROWN

Cracking unit of Jenkins. B. CHIRKIN. *Azerbaĭdzhanskoe Neftyanoe Khozyaĭstvo* **1930**, No. 10, 67-92.—A complete description is given of the units bought from the Graver Co., including detailed drawings, dimensions, guarantees, etc. V. K.

Design of liquid phase cracking equipment. P. RYABUIKH. *Azerbaĭdzhanskoe Neftyanoe Khozyaĭstvo* **1930**, No. 12, 76-82.—If the cracking rate doubles for every 10

the av. cracking rate (C_{av}) for the temp. interval $T_1 - T_2$ is $C_{av} = 14.5C_1/(T_2 - T_1)\cdot(1.074^{T_2-T_1} - 1)$, where C_1 = cracking rate at T_1. The length of the heating coil (L) is the sum of the length required to heat the oil (L_1) and the length necessary to supply the heat for cracking (L_2), calcd. as follows: $L_2 = L_1^2 q_b/q_a n\theta - L_1 q_b$, where q_a = cal. used in heating 1 g. of oil to the cracking temp.; q_b = cal. absorbed in cracking 1 g. of oil; n = the velocity of the oil in pipes in m./sec.; θ = heating time in sec. At temps. below 450°, L_2 is not over 2% and may be neglected but at 480° it may reach 25% of the total length. The temp. drop in the reaction chamber under adiabatic conditions is $T_2 - T_3 = q_b(1 - \alpha) + q_k/(1 + \beta)S$, where qk = heat lost to the surroundings; α = the fraction cracked before the oil reaches the chamber; β = the fraction recycled; S = the av. sp. heat of the oil between T_2 and T_3. For *isothermic* conditions $t_1 = T + QZ/GS_g(Z - 1)$; $t_2 = T + Q/GS_g(Z - 1)$, where t_1 = the temp. of the gases entering the heating coil; t_2 = the temp. of the gases leaving the heating coil; Q = the heat absorbed in the reaction chamber; G = the wt. of gases used per hr.; S_g = the sp. heat of gases; $Z = eQ/GS_g\delta_m$, where e = the base of the natural log. and δ_m = the temp. difference satisfying the relationship $\delta_m = Q/KH$, where K is the coeff. of heat transfer between hot gases and the oil, and H = the surface of heating coils. Sample calcns. are given. V. KALICHEVSKY

Heat balance in cracking reactions. V. KHOKHLOV AND P. MARKOSOV. *Azerbaĭdzhanskoe Neftyanoe Khozyaĭstvo* **1930**, No. 12, 83-7.—The work of Ryabuikh (preceding abstr.) is criticized and a method recommended for calcg. cracking reactions is outlined. V. KALICHEVSKY

Present methods for investigating gasolines. N. KALANTAR. *Azerbaĭdzhanskoe Neftyanoe Khozyaĭstvo* **1930**, No. 12, 55-63.—Various analytical methods are described V. KALICHEVSKY

Refining of cracked gasolines with clays from Surakhanui. E. GINZBURG AND A. MARKARYANTZ. *Azerbaĭdzhanskoe Neftyanoe Khozyaĭstvo* **1930**, No. 10, 93-8.—Clay alone gives unsatisfactory results but might be of value in combination with acid or hypochlorite. V. KALICHEVSKY

Perfect flexible method for treating [gasolines and naphthas]. C. O. WILLSON. *Oil and Gas J* **29**, No. 31, 38(1930).—A method has been perfected by the Union Oil Co of Calif. for economically treating all grades of gasoline and naphtha by a continuous acid treatment followed by contact with clay. This company also uses the heat from the recycle stock of their Cross stills to rerun the treated pressure distillate. J. R. STRONG

Determining gum contents of gasoline. OSCAR C. BRIDGEMAN AND ELIZABETH W ALDRICH. *Oil and Gas J.* **29**, No. 37, 42, 199, 200, 201(1931).—The Cu-dish method gave on the av. much higher results than either the use of a glass, silica or porcelain dish in an atmosphere of steam, or the air jet method with glass dish and air blowing on the surface of the liquid at the rate of 300 ml. per sec. On high-gum gasolines the glass-dish method gave higher figures than the air-jet, but for low-gum gasolines they are about the same. The values decreased rapidly from zero air flow to 300 ml. per sec and from there on did not change. Inert gases (CO_2 and N_2) gave somewhat higher results than those obtained with an atm. of air The methods thus far proposed have not been correlated with gum deposit in an engine. It is felt that a lab.-flow method can be devised that will simulate engine-manifold conditions and that can be used as a preliminary criterion for the choice of a method to be employed in the detn. of gum content This all seems to hinge on the true gum content; hence a method must be found to det the true gum content. J. R. STRONG

Determination of the gum content of cracked spirits. W. LITTLEJOHN, W. H THOMAS, AND H. B. THOMPSON. *J. Inst. Petroleum Tech.* **16**, No. 84, 684-95(1930).—This method of detg. gum, decided upon for tentative use in the laboratories of the Anglo-Persian Oil Co., is the outcome of a series of expts. in which the effects of varying many factors were tested. A 25-cc. sample of gasoline is evapd. in a hemispherical glass dish 7 cm. in diam., on a steam bath, with the aid of a jet of air at 0.5 in. pressure If the residue in the dish is not dry at the end of 1 hr. it is allowed to remain on the bath 15 min. after it is visually dry. Drying is continued in an oven at 150° for 1.5 hrs. If the gum exceeds 11 mg. in wt., a new detn. is made upon a sample just small enough to bring the quantity of gum under the 11-mg. limit. Results for vapor-phase cracked gasolines are more affected by the change from the old method of drying at 100° for 1 hr. than are those of gasolines formed by liquid-phase cracking. EMMA R. CRANDAL

Action of inorganic refining reagents on alkyl sulfides in naphtha. P. BORGSTROM AND J. C. MCINTIRE. *Ind. Eng. Chem.* **23**, 321-3(1931).—Expts. were run on the removal of alkyl sulfides dissolved in various samples of naphtha. The sulfides used were

ethyl, propyl, isopropyl, alkyl, butyl, isobutyl and sec-butyl sulfide. The reagents used were silica gel, mercuric acetate, mercuric chloride, solid mercurous nitrate, Zn sulfide, cupric sulfide, ferrous oxide, ferric oxide, cupric oxide, cobaltic oxide, Ni oxide, yellow mercuric oxide, Pb oxide, Al oxide, Zn oxide, chromic oxide, basic Cu carbonate, ferric nitrate, stannous chloride, Zn chloride and cupric chloride. The results show that the lower sulfides are more readily removed by mercuric acetate than the higher ones. The removal of the isobutyl and isoamyl sulfides was about the same as that of the normal compds. More sec-propyl and sec-butyl sulfides were removed than the corresponding normal compds. The action of mercuric chloride varied greatly. An appreciable difference was noted with mercurous nitrate according to the naphtha used. This reagent appears, however, to be the best available for the removal of alkyl sulfides.
D. F. BROWN

Influence of water and steam in the rectification process. K. KOSTRIN. *Azerbaĭdzhanskoe Neftyanoe Khozyaĭstvo* **1930,** No. 10, 99–103; cf. *C. A.* **21,** 1178.—Condensation of steam in the rectifying columns and not the steam itself has a harmful effect on rectification.
V. KALICHEVSKY

Origin and refining of sulfur oils. W. FRIEDMANN. *Oil and Gas J.* **29,** No. 31, 32, 106, 107(1930); cf. *C. A.* **24,** 5989.
J. R STRONG

Practical aspects of modern dehydration. M. E. GARRISON. *Petroleum World and Oil Age* **27,** No. 12, 67, 71, 72, 75, 77, 79(1930).
EMMA E. CRANDAL

Determining the congealing point of fuel oil. N. I. CHERNOZHUKOV AND A. M. GUTZAIT. *Izvestiya Teplotekh. Inst. (Trans. Thermo-Tech. Inst. Russia)* **1930,** No. 3, 33–5.—Put the fuel oil into a 200-cc. flask (about half full) provided with a thermometer, stir the oil at a rate of 80–100 revolutions per min. on a water bath which is 3–5° cooler than the congealing temp. of the fuel oil. When the oil reaches the bath temp. transfer it to a test tube provided with a thermometer which has been brought to the bath temp. Insert the test tube in a second tube, and place the assembly in a cooling bath, the temp. of which is kept 5° below that of the fuel oil. The congealing point is found by tilting the test tube at an angle of 45° at each degree.
A. A. BOEHTLINGK

Sapropelites from the river Barsas (Siberia). N. M. KARAVAYEV AND J. B. RAPOPORT. *Izvestiya Teplotekh. Inst. (Trans. Thermo-Tech. Inst. Russia)* **1930,** No. 3, 59–69.—Three types of deposits were found near the river Barsas: (1) dark-yellow, very dense, in layers, very difficult to grind; (2) dark gray, in layers, the layers becoming more distinct after drying; they can easily be sepd. and disintegrate into scales on grinding; (3) a piece of wood root with bark on it. These sapropelites contained moisture 1.2–3.5%, ash 16–29.8%, S 0.6–1.0% and volatile matter 60.5–80.6%. The elementary analysis of the combustible part gave: C 76–79.6%, H 7.3–9.6% and N 0.28–0.72%. The calorific value was 8150–9100 kg. cal. A low-temp. carbonization in a Fischer retort yielded 38.27–57.24% semicoke, 33.81–50.90% tar; water and the gas and loss amounted to 7.83–10.83%. The coke so obtained was dense and was good only as a low-grade com. fuel. The tar contained 2.35–3.84% phenols, 2.35–3.00% acids, 0.51–1.2% bases and 87.9–93.5% neutral components of 0.8437–0.8972 sp. gr. The tar distn. produced 16.7–25.4% b. below 200°, 35.9–43.6% b. below 275° and 56.4–64.1% residue b. above 275°. The gasoline fraction had a sp. gr. of 0.7608–0.7756 and an I no. of 136.7–142.3. It had an unstable color which, after treatment with H_2SO_4 of 1.84 sp. gr., washing with caustic soda and water and redistn., was stabilized, the loss through treatment amounting to 21.65%. The original gasoline fraction contained 21.50–24.3% of unsatd. compds. and 9.3–15.9% of aromatic compds. Its sp. gr. after treatment and redistn. was 0.7679. The kerosene fraction was also unstable in color. It contained 13–14.11% phenols, traces of bases, 85.89–87% of neutral components and had a sp. gr. of 0.817–0.8636. The gas-oil distillate was semi-solid (b. 280–350°) and contained up to 0.68% of paraffin, calcd. on the tar. In a destructive hydrogenation of 70 g. of the gas oil and 10 cc. of gasoline, with 2 g. of Al_2O_3 as catalyst, 67.5% of liquid product was obtained. The heating was continued for 4 hrs. at 415–25°. The original H pressure was 70 atm.; the final and max. pressures were 65–75 atm. and 200 atm., resp. An insignificant amt. of C and gas was formed. The liquid had 33.15% b. below 170°, 16.31% b. 170–230°, 14.29% b. 230–80° and 5.28% b. 280–350°; the residue was 18.06% and the loss 5.89%. Expts. carried out with Al_2O_3 and Al_2O_3 + CuO by heating the mixt. for 2–3.5 hrs. produced similar results. A destructive hydrogenation of the residue b. above 280° in the presence of Al_2O_3 and CuO yielded 33% b. below 175°, 13.25% b. 175–260°, 11.45% b. 260–80°, 14.37% b. 280–340° and 27.93% of residue (including loss). All fractions were unstable in color. Cracking of the 280–350° fraction at 405–50° for 1.5 to 2.25 hrs. at a pressure of 18–62 atm. yielded 51.85–77.7% of a product b. up to 280° and 22.3–32.45% of residue. The I value varied between

62.38 and 35.94. The gasoline and kerosene fractions, although off color, are suitable for com. purposes because they contain some aromatic compds. and unsatd. compds.
A. A. BOEHTLINGK

Oil-field waters of Alberta and Saskatchewan. W. P. CAMPBELL. *Trans. Can. Inst. Mining Met.* **32**, 316–32(1929).—The water problem in oil borings is discussed. A high chloride content generally indicates deep water; absence of chlorides and presence of sulfates and H carbonates indicate surface water. B. C. A.

The making of low pour point oils. E. R. LEDERER AND E. W. ZUBLIN. *Oil & Gas J.* **29**, No. 32, 64, 101(1930); cf. *C. A.* **25**, 1367.—There are 5 important methods for making an oil with low pour point: (1) solvent processes; (2) cold pressing; (3) cold settling; (4) centrifuging; and (5) Weir process. Solvent processes have attained little importance as yet because of the possible loss of solvent. These processes make an oil equal to the best com. products. Cold pressing is applicable to overhead oils only, and depends entirely upon crystn. of the wax into needles rather than plates. By careful control of the distn. and pressing in 2 stages it is possible to make an oil whose pour point is 0°. Cold settling consists in diluting the stock with about 70% of light naphtha, chilling and settling. The wax must be amorphous, not cryst. The viscosity of the oil must be sufficiently low to permit the wax to settle out. The oil must have a low sp. gr. for the highest possible gravity differential between soln and wax. Before centrifuging, the oil is slowly chilled, in soln. with 70% of light naphtha, at a rate of 5° per hr. to about —60°F. Truly cryst. wax cannot be sepd. by centrifuging. The Weir process consists in filtering cold with the aid of Hyflo-Super Cel One lb per gal. is added to the diluted oil, and the cooled mixt. is forced through a filter. The Hyflo Super Cel is abrasive and cannot be handled with pumps J. R. STRONG

Gasoline and lubricants by hydrogenation. R. T. HASLAM AND W. C. BAUER. *Oil and Gas J.* **29**, No. 37, 34, 165, 166(1931). —Hydrogenated oils are, in general, equal or superior to all others in the relationships that are the usual indications of quality. In the White motor, oil consumption was least for the hydrogenated oil and with the exception of one other oil the C deposit was lower. Tests in the Mack motor were more severe, but results were still favorable to the hydrogenated oil. The hydrogenated gasolines are very sensitive to addn. of tetraethyl lead, have low S and gum, and are equal to C_6H_6 for blending purposes. Hydrogenated gasolines are unlike most cracked gasolines in that the heavier fractions have the best antiknock qualities. J. R STRONG

Turbine oils. ANON. 5th All-Russian Thermo-Tech. Congress. *Izvestiya Teplotekh. Inst.* (*Trans. Thermo-Tech. Inst Russia*) 1930, No 1, 66 9.—Emba turbine oil distillate from the Konstantinovskii refinery after being used for 6 months in a turbine caused the bearing temp to rise up to 70°, a great amt. of sludge composed mostly of carbenes and asphaltenes being pptd. The same oil when overrefined became too viscous and the amt. of acid formed which was able to cause corrosion was quite appreciable. The same over-refined oil with water being admitted during the test run in a steam turbine produced, after 4 months' use, a great excess of sludge. Oil of the above type but slightly acidic and contg. an insignificant amt. of sludge changed very little in the presence of water, although it did not stand up in the de-emulsification test, the latter fact being explained by the formation of Cu and Fe soaps, while the same oil under normal conditions worked quite satisfactorily. A sample of Baku turbine oil was satisfactory under normal working conditions. To regenerate used turbine oils they may be centrifuged to sep. out water and sludge, while oils high in acid require refining. The lubricating system of the steam turbine should be blown out with steam to remove impurities. Considerable data concerning turbine oils before and after use are given
A. A. BOEHTLINGK

Make asphalt by vacuum reduction. D. H. BANCROFT. *Oil and Gas J.* **29**, No 36, 30(1931). —Asphalts of improved quality are being made in the El Dorado, Ark., plant of the Lion Oil Refining Co. by reducing the bottoms in a high vacuum. Heavy Smackover crude oil is processed through a combination dehydrator, topping unit and vacuum reducing tower. In addn., this unit makes a lubricating distillate, gas oil and gasoline. Asphalt can also be made from low-gravity Smackover fuel oil. The lower the abs. pressure the lower will be the ductility and the penetration. J. R. STRONG

Improving crude-oil asphalts. A. I. VORONOV AND N. I. LOGVINOV. *Neftyanoe Khozyaistvo* **18**, 449–60(1930).—Road asphalts meeting the various standard specifications were prepd. from paraffin-base, mixed-base and asphalt-base fuel oils by distg. the oils under high vacuum or with steam or refinery gas, followed by blowing with air. The oil sepd. in distn. was suitable for prepg. lubricating oils and cylinder stocks or it could be used for cracking. Careful distn. was required to avoid the conversion of tars

into asphaltenes, which increase the brittleness of asphalt. An extensive bibliography on asphalts is appended. A. A. BOEHTLINGK

Solubility of asphalts and pitches in various, less common, organic solvents. EMIL J. FISCHER. *Asphalt u. Teer* **30**, 1332-4(1930). - See *C. A.* **24**, 2589. K. H. ENGEL

The chemical nature of bitumen from Petchora. N. D. ZELINSKII. *Compt. rend. acad. sci. U. R. S. S.* **1930A**, No. 14, 351-2. The bitumen is a black, viscous mass mixed with vegetable residues and possesses a rather sharp, characteristic odor. A sample was extd. with benzene. After the benzene was distd. off, the residue was distd. under vacuum (11 mm.). The distillate was a yellowish oily liquid which distd. under ordinary pressure without decompn. between 190° and 305°, and had the following compn.: C — 86.48% and H — 13.34%; d_{23} = 0.8590. The rather high d. indicates the predominance of heavy hydrocarbons of cyclic nature. The residue from the first distn. was distd. under high vacuum and the remaining mass was a hard tar of the following compn.: C — 85.00% and H — 10.64% This tar constitutes the main part of the Petchora bitumen. L. JACOVLEFF

Carbonization (of wood) in modern portable furnaces. ANTONIO BERNAD. *Instituto Forestal de Investigaciones y Experiencias* **2**, No. 5, 68-80(1929). - The disadvantages of the old method of wood carbonization (slowly burning open piles of wood) are such as to cause the gradual disappearance of this method. The use of portable metal furnaces improves the quality and yield of charcoal, eliminates the necessity of const. attention to the burning, prolongs the working season, prevents interruption by adverse weather conditions and supplies a source of power for running machinery. The details of construction and operating expenses are given. The Spanish woods used for the manuf. of charcoal are *Pinus sylvestris*, *P. halepensis* and *Eucalyptus globulus*. H. K. S

Solid CO_2 [from oil-well gas] (MARTIN) **18.** Residue of sulfonic acids from oil-refining (Fr. pat. 694,236) **18.** Temperature-indicating devices for oil-cracking apparatus (U. S. pat. 1,792,086) **1.** Destructive hydrogenation of pastes of coal and oil (Brit. pat. 336,610) **21.** Liquid products from coal, etc. (Fr. pat. 694,192) **21.** Apparatus for extracting gases from oils (Fr. pat. 693,985) **1.** Apparatus for supplying fire-extinguishing foam to oil tanks (Brit. pat. 337,221) **18.** Dialyzing membrane [for purification of mineral oils] (Fr. pat. 695,007) **18.**

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Purifying petroleum oils. KARL T. STEIK (to Standard Oil Development Co.). U. S. 1,791,941, Feb. 10. Oil is treated with a liquid mixt. of SO_2 and SO_3.

System for treating petroleum oils with reagents such as acid and adsorbent earths. SAMUEL J. DICKEY and ERNEST W. ROTH (to General Petroleum Corp. of Calif.). U. S. 1,792,003, Feb. 10. The oil under treatment is repeatedly and successively mixed with a mixt. of finally purified liquid and reagent sludge, the sludge is drawn from the mixts. formed, and successive treatments are effected with mixts. contg. successively higher percentages of unexhausted reagent. An arrangement of app. is described.

Desulfurizing petroleum oils. FRANCIS M. ROGERS (to The Standard Oil Co.). Can. 309,099, Mar. 3, 1931. Straight-run, low boiling petroleum distillates are desulfurized by passing the vapors through adsorbent clay maintained at a temp. around 650°F., whereby a substantial part of the combined S is disengaged as H_2S.

Distillation apparatus with entrainment separators for vacuum distillation of petroleum oils. ALEXANDER C. SPENCER (to Standard Oil Development Co.). U. S. 1,791,940, Feb. 10. The vapor stream from a vacuum still is cooled without substantial condensation. The direction of flow of the stream is then suddenly changed, its linear velocity decreased and the vapors are passed to a condensing zone. Various details of app., including an entrainment separator, are described.

Hydrocarbons. MELANIT A.-G. Fr. 694,682, April 29, 1930. Carbonaceous or hydrocarbon materials are converted to liquids of lower b. p. by prepg. a mixt. of the substance to be treated with a colloidal soln. of a metal such as colloidal Zn, and treating

the mixt. under pressure and heat, *e. g.*, by injecting it in the atomized state with the aid of H or gases contg. H into appropriate reaction vessels.

Purifying hydrocarbons. GENERAL TECHNICAL CO., LTD. Fr. 695,004, Aug. 2, 1929. Fractions of various hydrocarbons (petroleum, tars, etc.), particularly fractions of low b. p. (benzene, gasoline), are distd. by adding to the fraction a non-miscible liquid or a mixt. of non-miscible liquids, the b. p. of which is lower than that of the lightest sulfured compd. in the mixt. The mixt. is afterward distd. at the boiling temp. of the non-miscible liquid introduced so that the sulfured impurities are sepd. from the hydrocarbons and a distillate is obtained free from S. Water, alc., certain higher alcs. and ketones or halogen derivs. of hydrocarbons, alcs., aldehydes or ketones may be used.

Decolorizing and stabilizing hydrocarbon mixtures. I. G. FARBENIND. A.-G. (Walter Rosinsky and Karl Smeykal, inventors). Ger. 516,279, Aug. 17, 1928. The mixts. are treated with a small proportion of an aldehyde- or ketone-sulfoxylate at atm. or raised temp. An alc. may be added during the treatment, and afterward distd. off. Thus, crude lubricating oil may be treated with an equal amt. of MeOH and 1% of Na formaldehyde sulfoxylate and the alc. then removed.

Removal of naphthenic acids from hydrocarbon oils. FRANCIS M. ROGERS (to The Standard Oil Co.). Can. 309,100, Mar. 3, 1931. Naphthenic acids are removed from hydrocarbon oil by vaporizing the oil and passing the vapors upward through a tower, maintaining molten NaOH in the lower part of the tower and producing a small amt of reflux in the upper part of the tower to prevent entrainment of Na compds.

Hydrocarbon oil conversion. GUSTAV EGLOFF and JACQUE C. MORRELL (to Universal Oil Products Co.). U. S. 1,791,618, Feb. 10. After heating oil to a cracking temp. in a heating zone such as a coil of pipe in a furnace, vapors thus formed are subjected to dephlegmation and the dephlegmated vapors are subjected to catalytic treatment such as with Ni on pumice and the treated vapors are condensed and the distillate and uncondensed gases are collected, the uncondensed gases are scrubbed, passed through a desulfurizer and then admitted to a flowing stream of dephlegmated vapors prior to the subjection of the latter to the catalytic treatment. App. is described.

Hydrocarbon oil conversion. WM. R. HOWARD (to Universal Oil Products Co.). U. S. 1,791,622, Feb. 10. A body of oil is maintained at a cracking temp. under superatm. pressure in a zone of vapor evolution, vapors are taken off and subjected to a primary reflux condensation and the reflux condensate is returned to the zone of vapor evolution and there heated to the prevailing temp. but out of direct contact with the other material in such a zone (suitably by a reflux still within the main still) and vapors are evolved from the reflux condensate and these vapors are combined with the uncondensed vapors from the reflux condensation, and the combined vapors are subjected to secondary dephlegmation and condensation. App. is described.

Converting heavy hydrocarbon oils into lighter products. LESTER KIRSCHBRAUN (to Universal Oil Products Co.). U. S. 1,791,566, Feb. 10. A stream of oil is heated to a cracking temp. (suitably in a pipe coil in a furnace) and then transferred to a reaction zone, and the temp. imparted to the oil stream is controlled in accord with variations in the thermal condition of the oil stream as it is transferred to the enlarged reaction zone, to maintain it at a substantially uniform predetd. temp. App. is described.

Purifying light hydrocarbons produced by destructive hydrogenation of oil, coal, etc. R. SCOTT and IMPERIAL CHEMICAL INDUSTRIES, LTD. Brit. 335,885, May 31, 1929. Purification is effected by passing the material, while still in the vapor state and under a pressure of at least 10 atm., through a solid purifying agent such as bauxite or fuller's earth. App. and various details of procedure are described. Regeneration of the purifying material may be effected by treatment with air at 400–500°.

Purifying light oils recovered from coal gas, etc. J. A. SHAW (to Koppers Co.). Brit. 336,636, Nov. 6, 1928. Materials such as light oils recovered from coal gas and distillates from tar and petroleum are purified by washing with acid and then with an alk. soln. of Na phenolate in 2 stages, first in such quantity that most or just all of the acid present is neutralized and practically all the phenols liberated from the phenate dissolve in the oil, and second to effect neutralization and remove the phenols and any remaining acid. H_2SO_4 is usually employed. There are thus obtained from the first alkali washing solns. contg. practically no phenols, and from the second solns. of Na phenolates practically free from sulfates, sulfonates, etc., and these latter, with or without sepn. and recovery of the phenols, may be used for *purifying gas* or for *softening water*, etc.

Light hydrocarbon oil distillation and purification. D. A. HOWES, R. SCOTT and IMPERIAL CHEMICAL INDUSTRIES, LTD. Brit. 336,515, July 22, 1929. Kerosene and light hydrocarbons produced by destructive hydrogenation, cracking or straight distn.

are distd. at a suitable temp. below 300° in the presence of gaseous NH_3 and in the absence of inorg. acids, to improve color and restrict tendency to gum formation. Various examples are given.

Apparatus with superposed drums and heating flues for distilling hydrocarbon oils. JACKSON R. SCHONBERG (to Standard Oil Development Co.). U. S. 1,791,937, Feb. 10.

Cracking hydrocarbons. PAUL VEROLA. Fr. 694,495, July 31, 1929. In cracking hydrocarbons by heat treatment, the gases produced in the process are reintroduced partially or wholly into the liquids before, during or after the cracking thereof has taken place, whereby the properties of the residual oil are improved.

Cracking hydrocarbons. SOC. D'ÉTUDES ET RÉALISATION "ERÉAL" (SOC. ANON.). Fr. 694,744, Apr. 29, 1930. Gaseous products rich in hydrocarbons are decomposed to obtain valuable by-products by passing them through an incandescent mass. The speed of the current or the height of the layer traversed or both are regulated so that at the exit of the mass temps. are obtained which do not exceed that necessary for a product of good quality. The temp. of the mass is about 1000-1200° and of the exit gas 600–700°.

Cracking hydrocarbon oils. FRITZ HOFMANN and CARL WULFF. U. S. 1,791,562, Feb. 10. See Brit. 301,395 (*C. A.* **23**, 4059).

Cracking oils. I. G. FARBENIND. A.-G. Brit. 337,046, July 26, 1929. Metal compds. of 1,3-diketones sol. in hydrocarbon oils, such as the W, Mo, Cr, V, Mn, U, Nb, Zr, Ce, Sn, Ti, Al, Cu, Zn, Co or Ni compds. of acetyl-, propionyl-, and butyryl acetonates, are used, singly or in various mixts. with each other or with other suitable substances, as catalysts in converting into lower b. p. compds. materials such as mineral oils, tar oils or oils obtained by the destructive hydrogenation of carbonaceous materials. Various details and examples are given, and the process may be carried out at 300–600° with or without high pressure or use of H.

Cracking oils. A. P. SACHS (to Petroleum Conversion Corp.). Brit. 336,380, Oct. 6, 1928. In a cracking process in which the heat for the conversion is supplied by a heated carrier circulated cyclically, the H_2S which accumulates in the gas is washed from it by spraying the gas with water after it has been cooled to condense the vapors produced (and preferably after it has passed through the circulating blower). Various details of app. and procedure are described

Cracking mineral oils. S. SEELIG. Brit. 336,822, Nov. 7, 1928. See Fr. 684,456 (*C. A.* **24**, 5477).

Apparatus for cracking oil. GUSTAV EGLOFF and HARRY P. BENNER (to Universal Oil Products Co.). U. S. 1,791,617, Feb. 10. Oil is passed in a single passage through a pipe coil in which it is heated to a cracking temp., and a valve-controlled connection is provided for passing heated oil in liquid phase from the coil into either of the opposite extremities of an enlarged horizontal vapor chamber sepd. from the coil, and means, such as pipes of restricted diam., is provided for increasing the velocity of the oil as it reaches points near the entrances to the vapor chamber. The vapor chamber communicates with a condenser, and the app. is arranged for conducting the oil treatment under superatm. pressure. Cf. *C. A.* **24**, 4385.

Apparatus for distilling and cracking hydrocarbons. NIKOLAUS MAYER. Austrian 120,428, July 15, 1930. Addn. to 118,255 (*C. A.* **24**, 4927).

Oils. I. G. FARBENIND. A.-G. (Carl Wulff, inventor). Ger. 513,814, April 23, 1927. Aryl carbonates, formed by treating the phenols with $COCl_2$, are used as transformer and switch oils.

Refining mineral oils. RICHFIELD OIL CO. OF CALIFORNIA. Fr. 695,077, May 5, 1930. See U. S. 1,790,622 (*C. A.* **25**, 1374). Fr 695,078 describes a process for refining hydrocarbons by vaporizing them and bringing them into contact with a soln. of at least one metallic salt, *e. g.*, a salt of Zn.

Refining oils and waxes. COMPAGNIE PROVENÇALE DE RAFFINAGE DE CORPS GRAS MINÉRAUX. Fr. 694,469, July 27, 1929. Mineral oils and waxes are refined by dissolving them in naphthalene decahydride and treating with H_2SO_4 in the usual manner. The decahydride is afterward recovered by distn.

Atomizing heavy oils. KARL MODL. Austrian 120,725, Aug. 15, 1930. The atomization of heavy oils in a gas stream is facilitated by introducing a readily vaporized fuel into the gas stream. The method may be applied in connection with internal-combustion engines.

Fractional condensation of oil vapors. HARALD NIELSEN and BRYAN LAING. Ger. 513,613, Oct. 30, 1928. The vapors are passed through a rotary washer under which various fractions condense as the temp. falls. App. is described.

Condensing and separating apparatus suitable for use in steam distillation of

mineral oils. WM. W. HOLLAND (to Standard Oil Co. of Ind.). U. S. 1,792,164, Feb. 10. Structural features of a baffle and gravity sepn. app.

Decolorizing oils such as vapor-cracked gasoline or other mineral oil or distillate. N.-V. MIJN-BOUW-EN CULTUURMAATSCHAPPIJ BOETON. Brit. 335,952, Nov. 3, 1928. Decolorization is effected by solns. of alkali metal hydroxides in substantially water-free org. solvents miscible with the oil such as MeOH, EtOH, BuOH, glycerol or acetone, and small quantities of reducing agents such as Zn, Al, aldehydes or polyhydric phenols may be present. The alkali may be recovered by dissolving the still residue in water and calcining. Cf. *C. A.* **25**, 1374.

Refining gasoline. AUGUST P. BJERREGAARD. U. S. 1,791,521, Feb. 10. After removing water from gasoline, the dry gasoline is mixed with a high-test alc. and this mixt. is treated with dry caustic alkali.

Refining cracked benzine. OTTO ZECHETMAYR. Ger. 513,870, June 20, 1928. The benzine is led through layers of porous material contg. hydroxides of alkali or alk. earth metals. The layout is described

Use of mercury cyanide as an "antidetonant" with motor fuels. A. J. DUCAMP Brit. 335,828, Dec. 4, 1928. Several mixts. are described.

Separating paraffin from oil. ROBERT E. MANLEY (to Texas Co.). U. S. 1,792,234, Feb. 10. A wax-bearing lubricating oil stock is mixed with an added more volatile carrier oil such as a light asphalt-base lubricating oil which is less volatile than kerosene, and the carrier oil is then distd. off together with the paraffin wax under less than atm. pressure. An arrangement of app. is described.

White petrolatum. HUGH F. GALLAGHER (to Standard Oil Development Co.) U. S. 1,791,926, Feb. 10. A petrolatum-yielding material is treated with fuming H_2SO_4 in the presence of a heavy, normally liquid hydrocarbon material such as lubricating oil distillate to obtain a liquid product contg. suspended sludge, a readily-settling sludge such as asphaltic bottoms is added to this product so that the suspended sludge is pptd., and petrolatum is obtained from the residual reaction mixt. App. is described. Cf. *C. A.* **24**, 495.

Fractionating tars, oils, etc. J. KÁRPÁTI Brit. 336,945, June 18, 1929. See Fr. 691,360 (*C. A.* **25**, 1063).

Tank and distributing nozzle system, etc., for treating bottom settlings or cut oils with water, steam and soda ash. WM. YANTIS. U. S. 1,791,695, Feb. 10. Structural features.

Distilling bituminous materials. WERSCHEN-WEISSENFELSER BRAUNKOHLEN A.-G. Ger. 513,596, Oct. 6, 1928. Details are given of a vertical retort with an endless band or chain for circulating the bituminous material.

Treating bituminous sands, etc. KARL A. CLARK (to Governors of the University of Alberta). U. S. 1,791,797, Feb. 10. In sepg. bitumen from bituminous sand, silt or clay, the material is mixed with a reagent such as Na silicate giving an alk. reaction on hydrolysis, and the mixt. is introduced into a body of hot water to effect sepn. of the bitumen from the sand, silt or clay; a water-sol. inorg. compd. of a multivalent metal such as $CaCl_2$ is introduced into the hot water to coagulate the reagent and the silt or clay, and the bitumen is recovered from the surface of the water. App. is described

Continuous production of dispersions of thermoplastic material such as bitumens, gums and waxes. GEORGE A. BROWN (to Bennett, Inc.). U. S. 1,792,067, Feb. 10 Various details of app. and operation are described

Lubricating and insulating oils. I. G FARBENIND A.-G. (Mathias Pier and Ernst Hochschwender, inventors). Ger. 516,316, June 1, 1927 See Fr. 668,102 (*C. A.* **24**, 1499).

Lubricants. STANDARD OIL DEVELOPMENT CO. Fr. 694,225, April 19, 1930 Lubricants are obtained from a heavy hydrocarbon oil contg. impurities of a gummy or resinous nature by eliminating all the non-crystn. impurities from the oil, *e. g.*, by distn. and subsequent treatment with H_2SO_4, and treating the purified oil with a gas rich in H under pressure and at a temp. at which decompn. is relatively slow, *e. g.*, 371 426°

Reconditioning lubricants such as crank-case oil from internal-combustion engines. M. CZARNY and F. C. FROLANDER. Brit. 336,202, June 6, 1929. The lighter fluid impurities are absorbed by a wick and are evapd. from the wick in an app. which is described and which may be arranged to operate continuously in connection with an engine.

Apparatus for cleaning used oil by heating and filtering. FIRMA HERMANN BENSMANN. Ger. 516,183, Feb. 22, 1927.

Composition for removing carbon deposits and rust from internal-combustion engine cylinders or other surfaces. GEORGE R. WAGNER (one-half to Wm. L. Smith

U. S. 1,792,052, Feb. 10. Kerosene 1 gal., lubricating oil 1 qt., "lubricating graphite" 1.0–1.5 oz., ether 3 oz. and spirits of camphor 3 oz.

Turpentine oil, pine oil and rosin from coniferous woods. FRANCESCO C. PALAZZO. U. S. 1,792,392, Feb. 10. See Fr. 676,859 (*C. A.* **24**, 3110).

Turpentine. JEAN B. H. FONGA. Fr. 36,835, April 18, 1929. Addn. to 668,493 (*C. A.* **24**, 1737). Turpentine from maritime pine is treated with a solvent, the distn. temp. of which is below that of the turpentine, and the resinic acid normally present is pptd. by adding lime or other alk. earth base. The solvent is recovered and a turpentine of reduced acidity and absolute purity is obtained

23—CELLULOSE AND PAPER

CARLETON E. CURRAN

Construction of the crystalline part of cellulose. II. H. MARK AND K. H. MEYER. *Cellulosechemie* **11**, 91–100(1930); cf. *C. A.* **23**, 5077; **24**, 1500.—Cellulose interference to x-rays can be explained by a monoclinic structure; it leads to an atomic arrangement which is illustrated, and to micelles with a length of about 500 and width of about 50 A. U. The micelle surface reactions and the "permutoid" reaction are taken into account. According to the Hudon rule, the principal valence chain model makes possible the estn. of the rotatory power of various cellulose derivs. which is in agreement with practical knowledge. A method for x-ray comparison of cellulose prepns. is given and minor structural differences are discussed. C. A. BRAUTLECHT

Cellulose in the light of the x-rays. WM. BRAGG. *Cellulose* **1**, 80–3, 110–3 (1930).—See *C. A.* **24**, 2287, 5151. C. A. BRAUTLECHT

Structure of ramie cellulose as deduced from x-rays. O. L. SPONSLER AND W. H. DORE. *Cellulosechemie* **11**, 186–97(1930). On the basis of new exptl. evidence with x rays, S. and D. deduce a structural formula which appears to agree with known chem. and phys. characteristics. Three-dimension models, employed for comparison with location of atoms in the space lattice, showed the following characteristics: (1) The structure-forming units are arranged parallel and lengthwise in continuous chains. (2) The individual chains are arranged in rectangular order of dimensions 6.10 × 5.40 A. U. (3) Individual units in each chain repeat every 10.25 A. U. (4) One can assume individual cells to have the dimensions 6.10 × 5.40 × 10.25 A. U. (5) In the individual cell in every chain there are 2 C_6 units. (6) In the elementary cell the atoms are so arranged that a no. of planes appear whose space intervals have a simple numerical relationship to 10.25, namely, there are planes present which lie in intervals of 5.15, 3.40, 2.58, etc. It is concluded that the proposed mol. structure agrees with the x-ray analysis and apparently with all phys. and chem. characteristics; the cellulose structure is built up of glucose units; the amylene oxide ring formula agrees best with the x-ray findings; the glucose units are built up into endless chains through glucosidic condensation; combination between units is of a 1:1 and 4:4 type bridge; the 1:4 bridges which are characteristic of cellobiose do not exist in the structure of ramie cellulose; the chains are rectangular 6.10 × 5.40 A. U. separately arranged with the greatest length along the diagonal direction; a group of 8 glucose units is the simplest unit which the cellulose structure can represent, agreeing with the crystallographic unit with axes: a = 10.80, b = 12.20, c = 10.25 A. U.; the ramie fiber is a hollow cylinder in whose walls the crystallographic units are so arranged that the diagonal of the 6.10 × 5.40 space always takes a tangential position; the cellulose structure is stabilized, in length by primary valence forces which hold together the glucose units, transversely by the secondary valence forces of O atoms; the suggested structure permits the elasticity of the fiber in the direction of its length, explains in length and breadth, various coeffs. of elasticity and allows for computation of swelling phenomena; the structure indicates, in conformity with Irvine's methylation results, that the OH groups attached to the 2nd, 3rd and 6th C atoms are open for substitution. It is shown that ester formation is possible, without change of the fiber structure, only by spreading apart the longitudinal chains; the fiber structure can thus be weakened, and, if the introduced groups are large, the secondary valence forces can be sufficiently weakened so as to lose the ability to retain the fiber-like arrangement; since ramie cellulose is like other cellulose fibers it is probable that similar celluloses have a similar structure; the presence of xylose units in several celluloses can be carried through to the accepted belief that oxidation of glucose units leads to gluconic acid, which on subsequent decarboxylization yields xylose; and, that these changes would not appreciably change the suggested arrangement of the original fiber structure. C. A. BRAUTLECHT

Acetolysis of bamboo cellulose. S. OGURI AND M. NARA. *Chem. News* **142**, 184–5 (1931).—See *C. A.* **25**, 1072. G. G.

Bamboo. II. Bamboo lignin. K. SISIDO. *Cellulose Ind.* (Tokyo) **6**, 167–70 (1930); *Abstracts* 29–32 (in German); cf. *C. A.* **25**, 1669.—Bamboo is especially suitable for a study of lignin formation in vegetable material, because the shoots grow extraordinarily quickly. Shoots 5.8 m. long were divided into 3 parts, each part being then dried and pulverized, and the dry powder extd. exhaustively with alc.-C_6H_6 and dried *in vacuo*. Lignin was removed with 72% H_2SO_4, and its methoxyl no. detd. by the Zeisel method. The methoxyl nos. for the samples were also calcd. on the assumption that this no. represents lignin. Both calcd. and observed values show a decrease from the base to the tip of the shoots, but good agreement is not found. It is considered probable that in the samples more remote from the base of the shoot the whole of the methoxyl is not fixed to lignin, and it is concluded that the lignin is methylated gradually according to the growth of the bamboo, or combines with the residue which contains Me in order to give the higher values detd. Some properties of bamboo lignin have been compared with those of wood lignin, and it is found that they behave similarly. Thus C, H, ash and methoxyl contents are similar in amt. to those from spruce wood lignin. Also both spruce-wood and bamboo chips give a green coloration on immersion in concd. HCl, while, on sepn., the lignin gives a grayish violet coloration before, and a salmon-pink after washing with boiling water. This suggests that bamboo lignin also has a heterocyclic structure. The distribution of O in the lignin as hydroxyl, methoxyl, etc., is discussed. B. C. A.

Integral relationship of cellulose to difficultly soluble xylan in the structural substance of red beech (Fagus silvatica). I. E. SCHMIDT, K. MEINEL, K. NEVROS AND W. JANDEBEUR. *Cellulosechemie* **11**, 49–68 (1930).—Previous observations by Schmidt *et al.*, have shown that (*a*) dil. aq. ClO_2 affects lignin markedly and can be used to identify lignin or its fragments; (*b*) lignin does not undergo change with the carbohydrate part of the cell wall; (*c*) oxidation products of lignin which are insol. in water can be removed through salt formation with alkalin. salts such as Na_2CO_3, or action with H_2SO_3 in form of $NaHSO_3$, phenols or pyridine; (*d*) the unsatd. part of the cell wall (lignin) can be removed quantitatively; (*e*) the polysaccharides of the cell membranes are converted into water-sol. forms, especially *d*-galactose and carbohydrates which behave as derivs. of *d*-galactose such as *l*-arabinose, which differ from the carbohydrates of cell membranes that are built up from *d*-glucose and its conversion products such as *d*-mannose. Investigation of the skeleton substance of the wooded cell walls of cryptogams and phanerogams showed that COOH-contg. polysaccharides always participated in the building up of skeleton substance, a synthesis best explained by the ester theory. The above evidence led S., *et al.*, to investigate the quant. relationships of single polyose units of the skeleton substance and the manner of their combination. In red beech it was shown that the skeleton substance treated with 0.04 to 0.2% NaOH quant. to an easily sol. xylan, while ester-like combinations of acetyl groups are split off. The residue from the treatment with 0.04 to 0.2% NaOH is entirely acid-free and consists of cellulose and xylan. The skeleton substance contains two xylans, an easily sol. (I) and a difficultly or less sol. one (II). II can be sepd. from the acid-free mixt. of cellulose and I by soln. in 5% NaOH at ordinary temp. On the assumption that cleavage products of cellulose, such as result by 5% NaOH action, are dissolved simultaneously with xylan, there is a stoichiometrical relationship of one part xylose anhydride ($C_5H_8O_4$) in II to 3 glucose anhydride ($C_6H_{10}O_5$) in the cellulose. This observed regularity of skeleton substance in red beech is dependent upon the kind of after-treatment during the breaking up of the wood with ClO_2 when an excess of OH ions is prevented (which can be the cause of specific side reactions), also on age, standing, time of cutting, etc. It was found that the proportion of cellulose to II was 3 : 1 for red beech independent of age or geographical origin. Thus for the first time a marked mass-weight association is shown between two colloids. This leads to a view of the compn. of wood which apparently contradicts the incorporation theory based on a mixt. of cell membrane cellulose, pentosans, hexosans and lignin. Part I is devoted to the method of hydrolysis with ClO_2 and Na_2SO_3 with reference to improvements of the method. With p_H limits of 6.8–7.5, after ClO_2 treatment, lignin can be removed quant. by Na_2SO_3. Part II is devoted to the action of NaOH of different concns. (up to 17%) on the skeleton substance of red beech. With concd. alkali solns. the work was carried out under N. The carboxyl-contg. part of the skeleton substance is removed completely by 0.2% (0.05 *N*) NaOH. Polymeric carboxylic acid and polymeric xylose anhydride is extd., simultaneously with the hydrolysis of acetyl groups. The easily sol. I is sol. in 0.2% NaOH; the difficultly sol. II is attacked completely only by

5% NaOH. When 3% or 1% NaCl soln. is added to the alkali the plotted curve for % wt. loss against concn. of alkali takes a different course, being the same, however, for the 3 as for the 1% NaCl. Salts, other than NaCl, also affected the wt. loss. The const. wt. loss with 5–7% NaOH contg. NaCl, implies that concns. of 3% NaOH and upward cause soln. of II and part of the cellulose. Five % NaOH in presence of 3% NaCl seps. xylan quant. from cellulose. Thus from a mixt. of cellulose and (II), 5% NaOH contg. NaCl dissolves 21.39% xylan and leaves 78.61% cellulose, and upon dividing the % quantities by the equiv. wts., 132 for xylan and 162 for cellulose, the quotients 1:3 are obtained. C. A. BRAUTLECHT

Integral relationship of cellulose to difficultly soluble xylan in the structural substance of red beech [Fagus silvatica]. II. E SCHMIDT, W. JANDEBEUR AND K. MEINEL. *Cellulosechemie* **11**, 73–9(1930); cf. preceding abstract.—Red beech-wood meal treated with 0.25% ClO_2 in water oxidizes lignin, yielding products which can be removed by treatment with salt solns. having a p_H of 6.8. Na_2SO_3 serves to dissolve lignin (1) by yielding Na ions to form salt like sol. lignin derivs. and (2) by H_2SO_3 from Na_2SO_3 to form sol. products. At a p_H value of 6.8 (a higher p_H affects the polysaccharides) salts other than Na_2SO_3, such as Na_2CO_3, Na_3PO_4, or K xanthate can be employed under the same conditions of temp. (50–60°) leading to the same stoichiometrical relationship between cellulose and less sol. of the two xylans present. Repeated alternate treatments of SO_2, in form of 4% $NaHSO_3$ soln., and water-sol. phenols such as resorcinol, with ClO_2 completely removes lignin from the cell constituents. Polysaccharides are not attacked by this treatment and even after 400 hrs.' treatment with ClO_2, the ratio for delignified material of 3 mols. cellulose to 1 mol. less soluble xylan remains the same. C. A. BRAUTLECHT

The relation of the viscosity of cellulose ester solutions and temperature. III. E. BERL, H. UMSTÄTTER AND F. KARRER. *Z. physik. Chem.*, Abt. A, **152**, 284–94(1931); cf. *C. A.* **24**, 5151.—The previous equation is found to hold for nitrates or acetates of cellulose. The viscosity does not change after heating and cooling if no acid is present. The Berl-Büttler equation holds with sufficient accuracy for such viscose materials. An *improved app.* is described. V. F. HARRINGTON

Some remarks on acetylcellulose. FRITZ OHL. *Farbe u. Lack* **1931**, 51, 64.—A review. To test for the presence of cellulose sulfoacetate O. dyes the sample with a 1% aq. soln. of methylene blue. Particles contg. sulfoacetate are dyed a darker blue than acetate particles. G. G. SWARD

Changes in the viscosity of cellulose acetate-acetone solutions. C. G. RITTENHOUSE AND C. J. STAUD. *Paint, Oil & Chem. Rev.* **91**, No. 9, 9–10(1931).—The viscosity of cellulose acetate-acetone solns. increased faster than the concn., an indication of a colloidal system. G. G. SWARD

Chemistry of pectin and its relation to the formation of incrustations of cellulose. I. F. EHRLICH. *Cellulosechemie* **11**, 140–51(1930); cf. *C. A.* **24**, 65.—A summary of the chemistry of pectin, its general and com. phases and its discovery by Braconnot in 1825 to the present being considered. Much attention is devoted to pectic acids isolated from the com. pectins sepd. from beet-sugar waste and cull citrus fruits. Attention is also given to galacturonic acids, their isolation, relationships and characteristics. II. *Ibid* 161–70.—Enzymic transformations of pectin and possible formation of lignin from pectin are discussed. Cyclic tetragalacturonic acids *a* and *c* can be opened by pectin ferments, especially by *Pencillium glaucum* and Perisporiaceae; the latter are easily obtained from sugar-beet pulp. Taka-diastase acts on a partly neutralized soln. of galacturonic acids *a* or *c* at a p_H of 4–6 in the course of a day to yield tetragalacturonic acid *b*. The new Perisporiaceae enzyme named "pectolase" by E. is obtained in especially active form from exts. of old cultures of isolated Perisporiaceae molds, in dry form. With 5% pectolase, galacturonic acids *a* and *c* could be converted into galacturonic acid *b* in a few min. and this could be totally converted into cryst. *d*-galacturonic acid in 2 or 3 days. The behavior of enzymes on tetragalacturonic acids leads E. to regard them as original components of pectin. The enzymes from molds which have the most intense action on the middle lamellae also act most intensely in the hydrolysis of tetragalacturonic acids. E. suggests that the tetragalacturonic acids which have been previously obtained only by acid hydrolysis of pectin are also intermediate products of the original pectin mol. which have been degraded by enzymic action. The mechanism of the action of pectolase on pectin involves, under specific conditions, (1) the splitting off of MeOH, (2) the reaction of the liberated pectic acids with Ca salts to form an insol. Ca salt of galacturonic acid *a*, which seps. as a gelatinous coagulum. In studying metabolic changes in highly lignified plant parts, E. examd. flax in the same manner as sugar beets. In old flax pectin, because of a hydration, the tetragalacturonic

acid ring is opened so that the galacturonic acid mols. in the pectic acid are held together as members of an open chain. Very marked differences are shown by flax pectin as compared with other pectins, with regard to the alc. components of its hydratopectins. Whereas hydratopectins from beets, oranges, etc., yield 20–25% of araban contg. only arabinose, the fraction of flax hydratopectin sol. in 55–70% ethanol is a complicated hexopentosan mixt. of arabinose, xylose, galactose and fructose. On evapn. of the alc. soln. of this crude hexopentosan, 25% of a resinous substance resembling lignin is obtained. After washing with cold water, and repeated soln. in NaOH and pptn. with HCl, a dark-brown powder results which is insol. in water and acids but sol. in alkalies and NH_4OH and shows no trace of carbohydrate. Its reactions and analysis show that furan nuclei are an integral part of it. E. concludes that the original substances of lignin in plants are really pectins and that the substances isolated from partly lignified flax straw represent intermediate products in the change from pectin to lignin. This resin and the hexopentosan from sugar-free flax straw were firmly held to the parent substance, because prolonged extn. with 70% ethanol did not remove them. In comparing the lignin (resinous product above) with other lignin prepns. E. states that (*a*) wood contains practically no pectin, (*b*) the larger part of the lignin is found in the middle lamella of wood, analogous to the pectin of the new nourishing tissues of young plants, (*c*) it appears that the methoxyl and acetyl content is derived from pectin, (*d*) all kinds of pectins, in addn. to galactose, are characterized by a high content of pentoses or pentose-like groups such as arabinose, xylose and tetragalacturonic acids (which can be regarded as carboxyl pentosans) and (*e*) it is very probable that a conversion of pectin into lignin is caused by chem. and enzymic processes during growth and aging. The change can be represented by the equation: $C_{66}H_{88}O_{40} \longrightarrow C_{48}H_{48}O_{16} + CO_2 + 10H_2O + 6O_2$ C. A. Brautlecht

Viscose. XXXIV. Effect of chlorination on the properties of cellulose. S. Masuda and J. Murakami. *Cellulose Ind.* (Tokyo) **6**, 173–4(1930); *Abstracts* 33–4.—Previous work by the authors has shown that the properties of sulfite pulp are improved by chlorination of the material at 15°, and similar results are now found for cotton. The Cu no. of the purified cotton cellulose used was reduced from 5 to 4 as a result of chlorination for 15 min. at 24° and washing with water, under standard conditions, and to 3 by similar chlorination for 30 min. B. C. A.

Recent developments in the preparation of viscose and viscose silk. Hanns Schmidt. *Chem. Fabrik* **1931**, 73–7, 85–90, 97–100. A review of improved methods and machinery with suggestions of possible simplifications. German and foreign patents are cited and 52 literature references are given. J. H. Moore

The enzymes of barley malt. VI. Fermentative decomposition of viscose silks. H. Pringsheim and E. Thilo. *Cellulosechemie* **11**, 100–2(1930); cf. Otto, *C. A.* **23**, 4955.—On fermentation certain small specific hydrolytic differences were observed; also that there does not appear the slight hydrolysis of viscoses pptd. in the presence of strong salt concn. in comparison to viscoses coagulated with H_2SO_4 alone. Viscose silks pptd. with $(NH_4)_2SO_4$ and then fixed with dil. H_2SO_4 are least decompd. and differences in behavior with other enzymes are probably due to differences in absorptive properties of the surface layers of the viscose filaments. C. A. Brautlecht

Silk fibroin as raw material for artificial-silk preparation. Hanns Schmidt. *Angew. Chem.* **44**, 83–4(1931).—A review. H. H. Moshier

Factors during spinning which influence the physical properties of rayon. H. Philip C. Scherer, Jr., and Robert E. Hussey. *Ind. Eng. Chem.* **23**, 297–300(1931); cf. *C. A.* **24**, 3359.—For specific conditions in which only temp. was varied, elongation and tensile strength show definite min. and max. Foster Dee Snell

New bark [and sap] of wood of spruce, pine and red beech. C. G. Schwalbe and K. E. Neumann. *Cellulosechemie* **11**, 113–28(1930).—Extns. of sugar-like substances, hydrolyses, detns. of pentosans, extn. of bark with $Ca(OH)_2$ and $Ba(OH)_2$, acid hydrolysis after swelling with NaOH soln. and detns. of resin-fat wax content were made. Wood forming saps were investigated. Bark can be easily removed in the spring because the cambium cells are very tender. In fall and winter, these cell walls are heavily incrusted and the bond between bark and wood is a strong one. Dil. acids dissolve the incrusted substances in spruce and pine. Similar treatment has no action on the beech. Hot-water extn. showed only negligible quantities of sugar in the bark of all 3 trees, indicating that sugars played no important part in the formation of the incrustation. Results of hydrolyses with dil. acids were different between the coniferous and deciduous barks. The conifers yielded more sugar from the inner bark than from sap wood, indicating the presence of easily hydrolyzable hemicelluloses in the barks of these trees. All representatives of hexosans, commonly found on wood hydrolysis

(except glucose), could be shown to be present, but no pentosans. The pentosans were therefore not attacked by the dil. acid. The bark contains more pentosans than the sap wood but the ratio is less than that of the hexosans. Since the bark-incrusting material is mostly hexosans, in coniferous woods, dil. acids effect a partial soln. of incrusting material and therefore a weakening of the bond between bark and sap wood. The supposed mother substances of the hemicelluloses, carbohydrates and pectin substances were detd., also the ether-sol. and substance volatile with steam, also ash and adsorbable tannins. In addn., the presence of important org. groups such as acids, alcs., aldehydes, phenols, etc., was tested for by pptn. and color tests. The total residues of all saps were small. The ash in residues was high because of the presence of appreciable quantities of org. salts. From the ash analysis of autumn wood and bark, especially from the Ca content, S. concludes that the mineral salts in the saps are stored in the bark, after the growing period. Substances adsorbed by hide powder were very high in pine and lowest in beech and yielded pos. tannin tests. Reducing sugar content of the saps was appreciable, being highest in the beech. These included hexoses, which were preformed in the sap. The content of total fermentable carbohydrates after hydrolysis was greatest in the beech. The pentose content of all the saps was remarkably small, but greatest in beech, although still small in ratio to hexoses. This suggests that the pentoses are derived from hexoses and that they are transformed in the same measure as produced. The ether exts. were chiefly resins. The fat and wax accumulation in the cambium layer of the beech in the autumn was not observed in the sap. Substances volatile with steam (ethereal oils, terpenes, etc.) were found only in small quantity in the saps, chiefly in pine. Oxalic, succinic and citric acids could be sepd. and identified in beech as well as in pine sap. Lactic acid could be found only in beech. Tartaric, malic and acetic acids could not be found. Oxalic, succinic and citric acids could have been formed by simultaneous oxidation and splitting of carbohydrates in the growing process. Lactic acid is probably due to fermentation of the sap subsequent to extn. The acids exist free, in part, and yield an acid reaction in the sap. Neither EtOH nor MeOH could be detected. Coniferyl alc. was found in pine sap. Vanillin was found in the 3 saps, and it is assumed that coniferyl alc. is converted, in part, by oxidases or enzymes, into vanillin. Aliphatic aldehydes were absent. Guaiacol was present in very small quantity. The aromatic substances, which were found, all belong to the protocatechuic group and may be intermediate products in formation of lignin, although the quantity is less than that of lignin in the finished wood, especially in the conifers. This is addnl. support for the view that lignin is derived from the hexoses present in excess over the intermediate products (pectin, pentoses, pyrocatechol derivs.). Proteins are present only in traces and are probably derived from the protoplasm of the living cambium cells. C. A. BRAUTLECHT

Apparent destruction of coniferous wood by larva of common beetle [Hylotrupes bajalus, L.]. R. FALCK. *Cellulosechemie* **11**, 89–91(1930).—In studies to det. the changes in wood substance caused by insects inhabiting wood, F. examd. fir wood attacked solely by this larva, dividing it into (1) the fine powder from the bore-hole and (2) the adjacent wood. The air-dry wood contained 9.6% water, the borings 9.4%. The borings which had passed through the food tube of the larva were of the same color and in other phys. characteristics was similar to the pulverized wood, except as to degree of pulverization. Ash, cellulose, lignin, fat, wax, resin, pentosans and hemicellulose were detd. in both the larva borings and sound wood powder. The lignin and resin contents were the same; total pentosan was practically the same; the larva borings contained 12.27% less cellulose. The hemicellulose from the larva borings contained 2.96% less glucose (equiv. to 2.67% less hexosan), 1.09% more pentosan in soln. and 0.76% less pentosan in the residue. H_2SO_4 (69%) at 10–12°, in a shaking machine for 2 days, removed 12.29% more cellulose and hemicellulose from sound wood powder than from larva borings. Conclusion: The larva of the common beetle removes about 21% cellulose and hemicellulose from the wood without changing the remainder. F. suggests that the lignocellulose complex, pre-existent in the original wood, is unaffected. C. A. BRAUTLECHT

Apparent destruction of wood by larva of Annobium [common wood worm]. R. FALCK. *Cellulosechemie* **11**, 128–9(1930); cf. preceding abstract.—Analysis of sound pine wood meal and of the finely disintegrated wood after digestion in *Annobium striatum* showed practically no difference between the 2 products as to fats and resins, alkali-sol. material, pentosans and lignin. The insect apparently consumes about 9% cellulose, and, since the lignin content is the same, it is probable that the cellulose consumed is loosely, or not at all, combined with lignin in the original wood. Of the hemicelluloses, a slight difference exists in the hexosan part, being 2.62% less in the worm

product (= 19% of the total hexosan fraction); the pentosans in the soln. are 0.53% higher, and in the residue 1.5% less. These results compared with those having to do with the common beetle are the same as to kind but differ in quantity. The analytical data lead to the conclusion that insects living in wood which do not yield a different colored residue utilize only a certain cellulose fraction, which is not combined with lignin or is only slightly combined. C. A. BRAUTLECHT

The visible digestion of wood for pulp. H. R. HAMMOND. *Chemist Analyst* **20**, No. 2, 17–8(1931).—A glass cylinder digester capable of withstanding 150 lbs. pressure is shown. W. T. H.

Some observations on digesting sulfate pulp. DAVID JOHANSSON. *Svensk Pappers Tid.* **33**, 916–28(1930).—Digesting in autoclave and testing the resulting pulp gave the following results: (1) The strength of the ground pulp increases with the increasing Roe Cl no., being max. at Cl no. 7. Ease of grinding decreases with increasing Cl no. (2) The max. removal of lignin occurs with a 25% Na_2S content. A lower Na_2S content raises the lignin content. The strength no. is lowest for soda pulp and highest for Na_2S pulp. (3) In spite of careful treatment and low final temp. during digesting it was impossible to make soda kraft pulp of the same strength as sulfate kraft pulp. Addn. of bleach liquor does not increase the strength. The lignin content is higher for soda pulp than for sulfate pulp for corresponding yields and appearance. (4) Shortening the chips down to 10 mm. does not affect the strength of the pulp. (5) Sulfate pulp from douglas fir, goblolly pine and southern yellow pine from the U. S. compared with sulfate pulp from Swedish pine and spruce showed that the Swedish pulp, in spite of its shorter fiber, gave a stronger paper. WILHELM SEGERBLOM

Determination of the bleaching of sulfite pulp by potassium permanganate. H. J. *Svensk Pappers Tid.* **33**, 928,31(1930).—In detg. the bleaching of sulfite pulp in the lab. by the Bjorkman no. method it was found that dry undefibered pulp gave varying results. It is necessary to defiber indirectly digested pulp before treating with $KMnO_4$. An improved method is described, involving dry pulp, defibering in H_2SO_4 soln., successive treatments with $KMnO_4$, $Fe(NH_4)_2(SO_4)_2.6H_2O$, H_2SO_4 and $KMnO_4$, and calcg. in percent of $CaOCl_2$ by a special curve. Exact data as to quantities, times and temp. are given. WILHELM SEGERBLOM

Uses of paper in electrical apparatus. W. H. ANDERSON. *Elec. J.* **28**, 99–103 (1931).—See *C. A.* **25**, 1080. W. H. BOYNTON

Protecting wallpaper from fungi (Brit. pat. 336,244) **18.**

Cellulose. HEINRICH KÖRBER. Austrian 120,351, Jan. 15, 1930. Cellulosic materials such as sulfite or soda cellulose are refined by treatment with hydrocarbons. The treatment may be effected in the hollander and the hydrocarbons may be used in the form of an aq. emulsion. Thus, unbleached cellulose in 15–20 times its wt. of water may be treated at 80° for 1 day with 10% of its wt. of hydrogenated naphthalene.

Cellulose. I. G. FARBENIND. A.-G. (Emil Hubert and Karl Weisbrod, inventors) Ger. 513,693, Oct. 11, 1927. Stable solns. of cellulose in $CuO\text{-}NH_3$ are obtained by adding catalyzers, especially CN compds., before or during the dissolving process to prevent deterioration of the soln. by the action of atm. O. The amt. of CN compd. added does not exceed 5%. Examples of CN compds. mentioned are $K_4FeC_6N_6$, KCN, HgC_2N_2 and $K_3FeC_6N_6$.

Bleached cellulose from materials such as wood. ERIK HAGGLUND. U. S. 1,792,009, Feb. 10. Raw material such as beech wood is partly decompd. by boiling with alkali and the partly decomposed material is then treated in aq. suspension with Cl for a time sufficient to impart a uniformly brown color to the material, and after this, decompn. is completed by addn. of hypochlorite, by which intermediary lower Cl-contg. acids are formed which change the color from brown to yellowish white; the material is then washed and subsequently further bleached with $Ca(OCl)_2$.

Saccharifying cellulose. COMMERCIAL ALCOHOL CO., LTD., J. S. ARTHUR and R. GOGARTEN. Brit. 337,017, April 20, 1929. Cellulosic material which has a low water content or which is dried down to about 10% moisture content or less is treated with steam until it has a moisture content of about 20–40%, treated with HCl gas under cooling until decompn. is effected, and then, without removing the HCl, further treated with steam or a mixt. of steam and inert gas to saccharify the decompn. products (the vessel preferably being heated to 60–70° during the saccharification). Various auxiliary treatments are described.

Cellulose saccharification. COMMERCIAL ALCOHOL CO., LTD., J. S. ARTHUR and R. GOGARTEN. Brit. 336,934, April 20, 1929. In the treatment of sawdust or other

cellulosic or closely related materials, the material is dried (suitably to a moisture content of about 10% or less) and is treated with steam and a volatile acid gas such as HCl or HF uniformly to distribute the acid and water throughout the material, and decompn. is then effected with the same acid under such conditions of low temp. (suitably —10° to —15°) that no substantial formation of sugar occurs. Saccharification is then effected without removing the acid by direct steam heating or by indirect heating to 50–100°, followed by de-acidification and conversion of the sugars to monoses by treatment with steam under pressure or by boiling with acidified water. Brit. 336,935 relates to a generally similar procedure in which, however, the starting material may contain up to 50% of moisture.

Treating cellulose. CAMILLE DREYFUS. Fr. 694,879, May 2, 1930. The properties of cellulosic materials are improved by treating them with alk. liquids at a temp. below atm., *e. g.*, a 10% NaOH soln. may be used at —10°. The product may be activated subsequently with AcOH or HCOOH with a view to esterification.

Molded products from cellulosic material. FREDERIC H. SMYSER (to General Elec. Co.). U. S. 1,792,254, Feb. 10. A cellulosic material such as sawdust, bagasse or cornstalks having natural substances capable of yielding resinous compds. is digested with NaOH, and H_2SO_4 is added to the digested mass to ppt. the dissolved resinous constituents, the material is filtered and the mass is washed until neutral, dried at about 80° and there is added to the dried mass about 5–40% of hydrated lime, the material is powdered and is molded under heat and pressure.

Cellulose derivative. SOC. LYONNAISE DE SOIE ARTIFICIELLE and PIERRE CHEVALET. Ger. 516,462, Dec. 23, 1926. A formylacetylcellulose is prepd. by treating cellulose at a low temp. with HCOOH in the presence of a small proportion of H_2SO_4, then kneading the mass with AcOH contg. more H_2SO_4, and finally pptg. the product with water or EtOH. An example is given.

Cellulose derivatives. LEON LILIENFELD. Ger. 516,461, May 20, 1924. See Brit. 231,809 (*C. A.* 19, 3592).

Cellulose derivatives. HENRY DREYFUS. Fr. 694,881, May 2, 1930. Weighted or mordanted materials of, or contg., cellulose esters or ethers are prepd. by incorporating a weighting or mordanting metallic radical, or an agent capable of pptg. this radical, with the spinning soln. used for making the materials. The metallic radical may be used in the form of a thiocyanate. Examples are given of the use of compds. of Sn and Fe.

Nitrocellulose. IMPERIAL CHEMICAL INDUSTRIES, LTD. Fr. 694,623, April 28, 1930. Nitrocellulose is prepd. by making, without disaggregation, a uniform cellulose having a high apparent d. and giving limpid solns., by systematic subdivision of pulp in the form of plates or sheets to obtain pieces or tablets practically uniform, and nitrating these uniform tablets with a mixt. of H_2SO_4 and HNO_3.

Alkali cellulose press. HANS HASELMANN. Ger. 513,863, May 8, 1927. Details of construction are given.

Cellulose esters. JOHANNES ALLES. Ger. 513,541, Mar. 29, 1928. Solns. and plastic masses of cellulose esters are prepd. by using esters of copal-resin acids with mono- or di-hydric alcs. as solvents or softening agents. In an example, nitrocellulose, Congo copal benzyl ester and a solvent of the acetone, AcOAc or AcOAm type are mixed, and the product is diluted with spirits, C_6H_6, etc. Other examples are given.

Cellulose esters. I. G. FARBENIND. A.-G. (Albert Gundlach and Theodor Becker, inventors). Ger. 516,250, Feb. 24, 1927. Esters of cellulose with higher homologs of AcOH are prepd. by treating cellulose or its conversion products with chloroacetic anhydride and higher homologs of AcOH in the presence of a catalyst, *e. g.*, H_2SO_4 or $ClCH_2COOH$. The soly. properties of the products can be improved by after-hydrolysis. Examples are given. Cf. *C. A.* 25, 1671.

Cellulose aliphatic acid esters. K. WERNER. Brit. 336,349, Aug. 15, 1929. In the production of cellulose aliphatic esters with preliminary removal of water from air-dried cellulose, before esterification, by treatment at temps. up to 50° with sufficient aliphatic acid and anhydride (such as acetic, propionic or butyric acids and anhydrides) to complete the esterification reaction, the removal of water is facilitated by the presence of a small quantity of catalyst insufficient to promote esterification such as H_2SO_4 0.02–0.05% or SO_2Cl_2 0.05% (calcd. on the wt. of the cellulose) and a milling process is preferably used for the pretreatment. Various details and examples of procedure are described.

Apparatus for cellulose acetate production. JEAN ALTWEGG (to E. I. du Pont de Nemours & Co.). U. S. 1,792,059, Feb. 10. An app. is described comprising a column having an inlet adjacent to one end and an outlet adjacent to the opposite end, and pro-

vided in its interior with rotatable stirring devices of varying form, which increase in size from inlet to outlet "according to the texture of the material to be treated" by these devices.

Apparatus for production of cellulose xanthate. M. DASSONVILLE. Brit. 337,149, July 1, 1929. Numerous structural details are described of a rotatable app. through the journals of which CS_2 may be fed to the reaction chamber and heating or cooling agents similarly fed to a jacket around the reaction chamber. Cf. *C. A.* **24**, 3646.

Hydroxyalkylcellulose xanthates in manufacture of artificial threads, films, etc. L. LILIENFELD. Brit. 335,993, March 25, 1929. Hydroxyalkylcellulose xanthates such as those described in Brit. 335,994 (following abstract) may be worked up into threads alone or with other materials such as cellulose xanthate or alkali-sol. derivs. of cellulose, gelatin, or softening or plasticizing agents, etc. (various examples of which are given). Numerous details of procedure are described for making products such as artificial threads and films, staple fiber, plastic masses, adhesives and cements, coatings and fabric dressings, artificial leather, transparent sheets, etc.

Xanthated hydroxyalkyl derivatives of cellulose. L. LILIENFELD. Brit. 335,994, March 25, 1929. Products of this type are produced by xanthating hydroxyalkyl derivs. of cellulose obtained either by the action of a hydroxyalkylating agent on cellulose in the presence of an alk. agent such as caustic alkali or by hydroxyalkylating alkali cellulose. Various halohydrins may be used as reagents and numerous examples, details and modifications of procedure are given. The final products may be isolated from the reaction masses or solns. (suitably after neutralizing with a weak acid such as HOAc) by pptn. with MeOH or EtOH, Al salts, NH_4Cl or $(NH_4)_2SO_4$, NaCl, Na_2SO_3, $NaHSO_3$, CO_2, SO_2, H_2SO_4 or HCl, or by dialysis. Catalysts such as salts of Cu, Ni, Ag, Zn or Fe may be added to the alkali cellulose or to the reactive mixt., and instead of NaOH or KOH there may be employed sulfonium hydroxides such as trimethylsulfonium hydroxide. "Near conversion products" of cellulose such as cellulose hydrate, hydrocellulose or oxycellulose may be used in the process.

Transparent celluloid stable to light. SCHERING-KAHLBAUM A. G. Brit. 336,980, Oct. 5, 1928. Celluloid of otherwise usual compn. contains a small proportion of added ingredients capable of combining with O compds. of N to form colorless non-injurious compds., such as urea or urethane.

Apparatus for treating viscose silk with liquids after spinning. ACME RAYON CORP. Fr. 694,971, May 3, 1930.

Tantalum spinneret. MINER M. AUSTIN (to Fansteel Products Co.). U. S. 1,791,785, Feb. 10. A Ta spinneret is provided with a hard resistant oxide film formed directly thereon to protect the spinneret against corrosion and wear.

Artificial fibers. I. G. FARBENIND. A.-G. (Harry Meyer, inventor.) Ger. 513,663, Nov. 15, 1928. Mat viscose fibers are produced from viscose to which the water-insol. liquid residues from the catalytic production of alc. have been added.

Device for connecting artificial threads to winding apparatus in the dry spinning process. J. E. PEDDER and COURTAULDS, LTD. Brit. 336,718, Aug. 21, 1929. Structural features.

Cellulose acetate yarn. CAMILLE DREYFUS and WILLIAM WHITEHEAD (to Camille Dreyfus). Can. 309,131, Mar. 3, 1931. Artificial textile products are produced by spinning a soln. of an acetone-sol. cellulose acetate in a solvent mixt. contg. 95.8% of acetone b. 56° and 5.2% of MeOH b. 64.5°.

Cellulose acetate yarns. CAMILLE DREYFUS and WILLIAM WHITEHEAD (to Camille Dreyfus). Can. 309,130, Mar. 3, 1931. Artificial textile materials are produced by spinning solns. of acetone-sol. cellulose acetate contg. less than 1% of moisture in a solvent mixt. of approx. 65% acetone and 35% denatured alc. contg. substantially 95% of EtOH.

Artificial silk. J. P. BEMBERG A.-G. Ger. 517,018, Nov. 8, 1927. In the manuf. of artificial silk from ammoniacal copper solns. of cellulose by stretch-spinning, the aq. pptg. bath contains a readily sol. gas, preferably a gas having a reducing action *e. g.*, SO_2 or H_2S. The bath may be preliminarily deaerated wholly or in part. Cf. *C. A.* **24**, 3901.

Artificial silk. I. G. FARBENIND. A.-G. (Hermann Schmidt and Emil Hubert, inventors). Ger. 516,370, June 12, 1926. Cuprammonium cellulose solns. are spun into pptg. baths contg. free CO_2 but no other dissolved gas.

Artificial silk. WM. P. DREAPER. Fr. 693,928, April 15, 1930. See Brit. 328,627 (*C. A.* **24**, 5496).

Artificial silk. RISUKE FURUSHO, YASUZO UTSUMI and ASAYUEMON TODA. Fr. 694,285, Apr. 22, 1930. The thread of artificial silk after desulfurizing, etc., is brought

into a coloring or bleaching soln. while still wet, then submitted to a tension to reduce its section while being drawn through a sizing soln., dried and wound on a reel.

Artificial silk. BARMER MASCHINENFABRIK A.-G. Fr. 694,309, April 23, 1930. The spinning cakes of artificial silk are given an interior conical shape of any thickness and the cakes are afterward placed on conical bobbins of the same slope for subsequent treatment.

Artificial silk. PIERRE L. É. V. BOURGEOIS. Fr. 694,531, April 25, 1930. In the prepn. of viscose for artificial silk, the wt. of fixed cellulose is increased by the addn. of flour or starch, etc., during the mixing of the xanthate with NaOH and water.

Artificial silk, films, etc. HENRY DREYFUS. Fr. 694,048, April 16, 1930. Finely divided SiO_2 is incorporated in the solns. of cellulose or its derivs. used for making threads, films, etc. Instead of SiO_2 an org. or inorg. silicate may be used which is afterward treated with HCl to produce SiO_2.

Artificial silk, films, etc. HENRY DREYFUS Fr. 694,119, April 17, 1930. In the manuf. of artificial silk, films, etc., a finely divided insol. substance such as $BaSO_4$, ZnO, $CaCO_3$ or insol. silicates is incorporated in the spinning soln. The dispersion of the insol. substance may be aided by protective colloids or oils such as Turkey-red oil.

Artificial silk, films, etc. I. G. FARBENIND. A.-G. Brit. 336,250, June 4, 1929. A true sulfonic acid (or a salt or other water-sol. deriv of such an acid) prepd. from a deriv. of an aliphatic or cycloaliphatic hydrocarbon contg. at least 8 C atoms, such as the sulfonic acid product derived from "tall oil" is added to cellulose or cellulose ester or ether or viscose solns. to improve the uniformity, softness and dyeing properties of the products formed.

Artificial silk, etc. H. DREYFUS. Brit. 335,894, May 31, 1929. Products such as filaments, films, ribbons or the like (suitably those from viscose, nitrocellulose or cuprammonium cellulose) are stated to be improved in strength and elasticity and modified as to luster, by subjecting them to the action of sulfo-carboxylic or other carboxy-organo-mineral acids contg. at least one free OH group and with one or more OH groups replaced by alkyl, aryl or aralkyl or other org. radicals one at least of which contains a carboxyl group (preferably of 30–50% concn.). Sulfoacetic, sulfosalicylic, sulfophthalic, sulfosuccinic or propane-β-carboxy-α-phosphinic acid may be used and some other acids also are mentioned. Other substances such as glucose, glycerol, Na_2SO_4, alcs. or sulfonated oils may be added to the treating baths.

Artificial silk, etc. L. LILIENFELD. Brit. 335,906, March 25, 1929. Artificial silk and other products are made by incorporating substances capable of providing one or more substituted or non-substituted alkyl, or hydroxyalkyl radicals (such as halogen derivs. of di- or polyhydroxy alcs.) with a cellulose deriv. contg. one or more CSS groups such as viscose, following this by a suitable shaping and treatment with an agent having a coagulating and plasticizing effect (or by successive treatment with agents having these effects separately). A cellulose-xantho-fatty acid or cellulose dixanthate may be used instead of viscose, and the plasticizing agent is preferably H_2SO_4 of at least 35% strength which may be mixed with HCl, HNO_3, H_3PO_4, H_3BO_3, HOAc, formic, lactic or oxalic acids, bisulfites, sulfites, and nitrites or aniline salts, glycerol, sugar or glucose. Numerous details, examples and modifications of procedure are described.

Improving the properties of artificial silk and similar products. H. DREYFUS. Brit. 336,217, March 28, 1929. Tensile strength, extensibility and elasticity of filaments, threads, fabrics or films, etc., comprising cellulose acetate or other cellulose esters or cellulose ethers are improved by treatment with neutral org. solvents in relatively high concn. so that a superficial filming or plasticizing of the material may occur. Among the solvents which may be used are acetone, diacetone alc., mono- or di-ethers of olefin glycols or polyolefin glycols, diethyl tartrate, ethyl lactate, phenols and mono- and di-acetins. The solvent is preferably assocd. with water, benzene or other non-solvent. Numerous details and examples are given.

Mordanting and weighting artificial silk. H. DREYFUS. Brit. 336,621, July 9, 1929. In mordanting and weighting materials such as cellulose acetate or other cellulose org. esters or ethers, one of the reagents for the mordanting or weighting is incorporated in the spinning soln. and the formed filaments are treated during or after their production with a reagent which will fix the desired metal compd. in the material. Compds. of metals such as Al, Cr, Fe, Sn, Zn, W and Bi may be used and if a pptg. agent such as tannic acid is added to the spinning soln. a compd. of the metal is preferably applied to the finished material or continuously with its production under such

conditions that swelling of the cellulose deriv. takes place. Various details and examples are given.

Esterification of wood. I. G. FARBENIND. A.-G. Brit. 336,969, July 22, 1929. Acylation of wood such as beech, aspen, fir or pine is effected with an anhydride of an org. acid such as acetic, butyric or benzoic anhydride, in the absence of inorg. catalysts. The wood may be used in dry disintegrated form or in the form of sheets which may be superficially acylated, and may be initially deresinified and dewaxed with solvents and treated with steam.

Treating bagasse fibers. ERNEST C. H. VALET (to Cellulosa Hemmer Valet, S. A.). U. S. 1,792,202, Feb. 10. In order to render bagasse fibers suitable for paper manuf., etc., they are treated with a clear satd. soln. of lime and there is subsequently added a soln. contg. a sulfite such as Na_2SO_3 and the fibers are then treated in a soln. of KOH, NaOH and a sulfite and are subsequently washed in a soap soln.

Sieve cylinder apparatus for dewatering cellulose pulp. J. STRINDLUND Brit. 336,879, June 11, 1929. Structural features.

Feltable bituminous pulps. CHARLES L. KELLER (to Richardson Co.). U. S. 1,792,098, Feb. 10. Fibrous material is subjected to a "pre-beating" to form a half stock and the latter is concd. to bring it to an easily handled plastic stage, transferred to a mixer, "premixed" with added bituminous material and the "premixed" stock is transferred to a beater and subjected to heating to prepare the fibers for felting, and production of a product in sheet form.

Nitrocellulose from wood-pulp board. N. PICTON and IMPERIAL CHEMICAL INDUSTRIES, LTD. Brit. 336,235, May 27, 1929. Wood-pulp board is cut into substantially uniform pieces (suitably about one-eighth of an in. square) by a cutter which does not affect the agglomeration of the fibers and the pieces are nitrated with acid contg. not less than 40% HNO_3 to produce a nitrocellulose of high d. and uniform compn. suitable for the *manuf. of propellent explosives, blasting explosives, varnishes, celluloid,* etc. Various details of procedure are described.

Tanks and associated agitating apparatus for treating paper pulp. JOSEPH E BOND. U. S. 1,791,705-6, Feb. 10.

Dewatering paper pulp, etc. RICHARD KASTNER and HERBERT SCHMOLKA. Austrian 120,690, Aug. 15, 1930. Addn. to 115,901 (*C. A.* **24**, 2295). In the method of Austrian 115,901, the heating of the materials in the press is effected by passing an elec. current through the materials, the metallic sieves acting as electrodes

Dirt trap for paper pulp, etc. FRANZ HASSMANN. Ger. 516,212, June 3, 1928

Paper. I. G. FARBENIND. A.-G. (Rudolf Richter, inventor). Ger. 516,029, Aug. 12, 1928. Ornamental or effect paper is prepd by addn. of finely comminuted leather, colored or uncolored, to the paper stuff.

Paper stock. HARRY P. BASSETT. U. S. 1,792,351, Feb. 10. Cotton linters or similar material is subjected to a combined slight beating and acid treatment with a weak acid soln. such as a 0.05–1.0% soln. of H_2SO_4 at a temp. between 20° and 100° to effect partial hydrolysis of the material, and the latter is then treated with a weak alkali soln.

Recovering fibers from the waste waters of the paper, cellulose, etc., industries GEORG WATZINGER. Austrian 120,610, Jan. 15, 1930. A gas under pressure is dissolved or emulsified in the waste waters, and the pressure is then released so as to liberate bubbles of gas within the liquid. These carry the suspended fibers to the top of the liquid, whence they are removed. App. is described.

Paper-making machine [Fourdrinier type]. BELOIT IRON WORKS. Ger. 516,121, June 3, 1926. See Brit. 268,180 (*C. A.* **22**, 1238).

Suction box for paper-making apparatus, etc. GEORGE PEEBLES (to Selbec, Inc U. S. 1,791,535, Feb. 10.

Doctor blade mounting for paper machines. L. S. JOHNSON and F. W. VICKERY Brit. 336,554, May 14, 1929. Structural features.

Apparatus for reënforcing paper or other fabrics with unspun fibers. G. E. GIBBS (to American Reënforced Paper Co.). Brit. 336,830, Nov. 8, 1928. Structural features

Printing and waxing paper webs in a single operation. HARRY C. COLE. U. S. 1,792,414, Feb. 10. Various details of app. and operation are described.

Preparation for coating paper. SOC. I. F. LAUCKS, INC. Fr. 694,224, April 19, 1930. The prepn. is made by incorporating a mineral substance with a protein in the liquid state derived from oleaginous seeds. The seeds are freed from oil and extd with a feebly alk. salt such as Na_2SO_3 and the protein is pptd. with lime.

Apparatus for coating paper with wax. A. GREEN. Brit. 335,968, July 2, 1929. Structural features.

Sizing for paper. ARTHUR W. BURWELL (to Alox Chemical Corp.). U. S. 1,791,860, Feb. 10. A material for use in sizing paper consists essentially of water-sol. alkali metal salts of normally liquid water-insol., petroleum-insol., relatively high mol. wt. aliphatic and hydroxy-carboxylic acids such as those formed by oxidizing a paraffin-base fuel oil distillate and is capable of being retained in a paper in quantity up to 50% by wt. App. is described, suitable for oxidation of the oil.

Paper sizing. B. WIEGER (to Becker & Co. (1924), Ltd.). Brit. 335,902, July 1, 1929. Paper or pulp is sized with an emulsion prepd. by adding to the molten sizing material, while rapidly agitated, 1–3% of an aq. dispersion of a protective colloid (preferably alkali casein) and colophony is preferably employed as the sizing material, although there may be used other natural or artificial resins, solid or semi-solid hydrocarbons, waxes, fats, higher fatty acids or their mixts., with or without drying oils. Various details and examples are given.

Automatic device for regulating the drying of paper, etc., sheets. JOSEF MUCHKA. Austrian 120,248, July 15, 1930.

Drying cardboard, etc., by pressing. RICHARD PRÜCKNER. Austrian 120,700, Aug. 15, 1930. The press is housed in a casing having means for adjusting the temp. and pressure of the air in the casing. Operative features are described.

Water-resistant paper product. WM. C. LODGE (to Oswego Falls Corp.). U. S. 1,792,382, Feb. 10. There is added to the pulp sizing in the proportion of 3 parts rosin or rosin substitute and approx. 1 part wax or wax substitute, and a fixing or pptn. treatment is employed for the production of a final paper product contg. about 1% wax and not more than 3% rosin, which is suitable for bottle hood caps, etc.

24—EXPLOSIVES AND EXPLOSIONS

CHARLES E. MUNROE AND C. G. STORM

Report of Chief Inspector, Bureau for the Safe Transportation of Explosives and Other Dangerous Articles, for 1930. B. W. DUNN. *B. E. Report* No. 24, 83 pp. (March 3, 1931); cf. *C. A.* 24, 2296.—Only 15 minor accidents involving 2 injuries to persons and a total property loss of only $71 resulted during the transportation of *explosives* in the U. S. during 1930. None of these accidents was with com. blasting or military explosives, but involved toy torpedoes, fireworks, etc. In comparison, *inflammable liquids* caused 602 accidents with 9 deaths, 4 injuries and loss of $380,847, while *acids and corrosive liquids* caused 356 accidents, with 15 injuries and loss of $21,057. Defective tank cars carrying H_2SO_4 and faulty packing of HNO_3 were the causes of most accidents with acids. The report gives statistical details and contains much information of interest to manufacturers, dealers and consumers of explosives.

C. G. STORM

Static charges in smokeless powder. H. E. NASH. *Army Ordnance* 11, 293–6 (1931).—To est. the danger of ignition from static electricity in a smokeless powder dryhouse, expts. were conducted in a special unit of one tray, 36″ × 48″ × 6″, holding 100 lb. of powder, under varying conditions of moisture content of powder, and humidity, temp. and velocity of air current. Conclusion: (1) A moisture content of less than 1% is necessary for the existence of a measurable static charge. (2) A negligible amt. of static electricity exists on powder being dried in a heated air current. (3) Agitation of the powder causes larger static charges, but the max. charge is lower than that capable of causing ignition. With E. C. powder, the static found was less than $^1/_{10}$ that required to cause ignition. C. G. STORM

Variation of $\int p\,dt$ with loading density for different types of powders. H. MURAOUR AND G. AUNIS. *Compt. rend.* 192, 90-2(1931); cf. *C. A.* 25, 818.—The types of powder were a 20% centralite with a mixt. of nitrocotton 66, nitroglycerin 25, a 9% centralite powder made from the same mixt., a powder without centralite made from a mixt. of nitroglycerin 50, nitrocotton 50 and flake nitrocellulose powder. Various sizes of grains were used. Percent variation of $\int p\,dt$ is independent of grain size except for very low d. of loading with 50% nitroglycerin powder. A graph is given, with abscissas the inverse of max. pressure, ordinates the inverse of $\int p\,dt$, which shows that between 2500 and 3000 kg. max. pressure the inverse of $\int p\,dt$ is practically a linear function of max. pressure. E. M. SYMMES

Limits of inflammability of gases and vapors. H. F. COWARD AND G. W. JONES. Bur. Mines, *Bull.* 279, 114 pp.(1931); cf. *C. A.* 22, 2058.—This is a thoroughly revised and enlarged edition of this *Bull.* ALDEN H. EMERY

The ignition limits of hydrogen-air mixtures in the explosion bomb. Fr. Dieterlen. *Tech. Mech. u. Thermodynamik* 1, 429–34(1930).—Values of ignition limits of H-air mixts. given in the literature vary from 0.041 to 0.10 and from 0.60 to 0.80 parts H_2 by vol. for the lower and upper limits, resp.; this is mainly due to widely different app. used. In the tests made photography was used to det. the pressure-time diagram, and the movement of the flame front was recorded by spark photography with the Lindner app. (*Forschungsarb. Gebiete Ingenieurwesens* No. 326 (1930)). It was found that in addn. to the lower limit there was a combustion limit which is explained by the influence of convection. The proof thereof was obtained by variation of test conditions and Schlieren photographs. The characteristic reactions at the upper limit vary widely from those at the lower limit. An explanation is attempted by the use of the Schlieren photographs. E. M. Symmes

Nitration of diethylene glycol. Wm. H. Rinkenbach and H. A. Aaronson. *Ind. Eng. Chem.* 23, 160–3(1931).—Com. diethylene glycol contains usually about 5% ethylene glycol. The latter was removed by fractional distn. and freezing. Pure diethylene glycol has a f. p. of —11.5°, instead of —11.3° given in the literature. There were investigated the effects of the ratio of HNO_3 to H_2SO_4 in the mixed acid, the % H_2O in the mixed acid, the ratio of HNO_3 to diethylene glycol in nitration, the soly. of the dinitrate in spent acid, the effect of temp. in nitration, oxidation loss in nitration and purification losses. Diethylene glycol dinitrate is unstable in the presence of acid, is easily decomposed by heat and empirical heat tests are no more applicable than with nitroglycerin. Diethylene glycol dinitrate remained stable for 1 yr. at ambient temp. It is toxic, like nitroglycerin. E. M. Symmes

High brisance studies. III. Dynamite and Penthrinit in plastic and frozen states. Alfred Stettbacher. *Z. ges. Schiess-Sprengstoffw* 26, 8–10(1931); cf. *C. A.* 25, 1674.—Nitroglycerin, nitroglycol or gelatin Penthrinits frozen at a temp. as low as —40° are more brisant than when in liquid or plastic form, as shown by tests on 7 mm. Fe plates. At —75° to —80° glycol dinitrate merely deflagrates, blasting gelatin explodes with greatly reduced brisance, pure nitroglycerin explodes with unaltered effect, while Penthrinit exhibits increased brisance. S. believes that these differences in behavior cannot be satisfactorily explained by differences in chem. or phys. properties. The tests made serve to emphasize the high brisance of the Penthrinits under all conditions. C. G. Storm

Firedamp, its characteristics and detection. Colin McLuckie. *Iron Coal Trades Rev.* 121, 800–1(1930). The amt. and rate of emission of gas from coal were detd. They vary widely in different seams, varying from a trace to 8.8 cu. ft. per ton of coal in 48 hrs. in the samples reported. Sampling of the gas by means of rubber pump and balloon is described. Leslie B. Bragg

The testing of blasting caps. A. Haid and H. Koenen. *Z. ges. Schiess Sprengstoffw.* 25, 393–8, 433–9, 463–8(1930). The general principle proposed by Esop and developed by Wöhler (*C. A.* 21, 3744) of testing blasting caps against desensitized nitro compds. gives satisfactory results, provided test conditions are uniform. TNT of standard purity is screened through 0.5-mm. mesh with a duster screen of 0.15 mm. mesh. Talc was selected as the most desirable desensitizing agent, with specifications for screen test and settling test. The TNT and talc are intimately mixed in varying proportions, the talc content varying by 5% increments, and the mixts. are pressed at 1250 kg./cm.² in blocks 25 mm. in diam. and 41–2 mm. high, with a cavity for insertion of the blasting cap. These blocks do not become insensitive on storage as do mixts. contg. oils. The blocks are detonated on Pb plates 3 cm. thick, and the diam. of the depression is measured after filing the rough edges. This diam. decreases with increasing talc content until it is only the diam. of the block when the latter fails to detonate. The initiating effect of a blasting cap is measured by the percentage to which the talc may be increased before failure results. Straight $Hg(ONC)_2$ caps failed at 25% talc, compound TNT caps at 50% and tetryl caps at 65%. A series of tests was also made by the Cu cylinder method of Kast and the Trauzl Pb block test, which compare the effects of TNT charges desensitized with 30% talc when initiated with caps loaded to equal height with (*A*) $Hg(ONC)_2$ and $KClO_3$, 90/10; (*B*) $Hg(ONC)_2$; (*C*) TNT; (*D*) tetryl; (*E*) pentaerythritol tetranitrate. In *C*, *D* and *E*, priming charges of a mixt. of Pb trinitroresorcinate and PbN_6 were used. The order of brisance was found to increase from *A* to *E*. In every case, increased d. of charge in the caps gave higher brisance. The latter was shown to vary with the rate of detonation of the cap charge. Brisance is calcd. as $\Delta \times$ rate of detonation $\times (T/273) \times V_0$. General confirmation of the above relations was also obtained in tests of the caps alone on 7-mm. Pb plates. Variations in the form of the base of the cap (flat or concave) do not affect the initiating

effect of the cap as they do the results of the Pb plate test. Both Cu and Al caps gave substantially the same results. In studying the effect of variations in granulation of the TNT used in the desensitized charges, it was found that granulations from 0.15 to 0.50-mm. mesh showed equal sensitiveness (desensitization limit 40% talc); the same TNT pulverized to dust in a ball mill was more sensitive (50% talc); when it was fused and pulverized, its sensitiveness decreased (30–35% talc). Variations in pressures used in blocking the TNT-talc mixts. had a negligible effect on the results; with pressures from 750 to 2000 kg./cm.^{2} the desensitization limit was the same (40% talc). Lower pressures gave a decrease in sensitiveness. An app. is described and illustrated for cutting open blasting caps in order to remove the charge intact for examn. and analysis. C. G. STORM

Explosions occurring during the use of ethylene. FRANKLIN D. JOHNSON AND HUGH CABOT. *Arch. Surgery* **22**, 195–224(1931). JOHN T. MYERS

Under-water explosions—"torpedo" effect. M. TONEGUTTI. *Z. ges. Schiess-Sprengstoffw.* **25**, 446–7(1930).—Tests conducted by T. lead to conclusions exactly opposite to those of Stettbacher (*C. A.* **24**, 6018). Charges of 14 g. TNT (d. 1.4) and of 17 g. Penthrit 80/20 (d. 1.6) in cylindrical metal cartridges 21 mm. in diam. were detonated on 6.5-mm. Fe plates resting on an Fe cylinder enclosing a sealed air chamber. Tests were made in air and also with the entire app. under 0.5 m. of water. Photographs of the Fe plates show that with both explosives the under-water effect was appreciably greater than that obtained in air. C. G. STORM

Explosion in an acid-mixing plant. S. H. NEWMAN AND H. E. WATTS. *British Home Office Report* **1931**, 18 pp.—The explosion occurred in an acid-mixing tank in the plant of Hickson and Partners, Ltd., Castleford, Yorkshire, Eng., on July 4, 1930. HNO_3 (97–8%) was being added to 2–3 tons of H_2SO_4 (approx 80%) recovered from spent acid from the manuf. of mono- and di-nitro compds. of C_6H_6 and PhMe. Violent evolution of fumes was followed by flame and an explosion which caused much damage to the plant and the loss of 13 lives. Investigation showed that the storage tank from which the H_2SO_4 was drawn contained large quantities of a mixt of nitro compds. resulting from long accumulation. When HNO_3 was added to samples of these nitro compds. mixed with H_2SO_4, a marked rise in temp. occurred with a strong evolution of fumes. A mixt. of the nitro compds. (2 vols.) with HNO_3 (3 vols.) was highly combustible. Of this mixt. 376 g. was loaded in an 18-pounder steel artillery shell, provided with a booster of 50 g. tetryl, in which a no. 8 detonator was placed. On firing the latter, the charge detonated, causing fragmentation equal to that produced by picric acid. It was concluded that the reaction of the HNO_3 with the nitro compds. in the H_2SO_4 caused the explosion of the mixing tank. C. G. STORM

Nitro and amino compounds. Safe practices in production of explosives materials (AINSWORTH) **25.** Starch explosion hazards reduced by safety measures (PRICE, BROWN) **12.** Nitrocellulose from wood-pulp board (Brit. pat. 336,235) **23.** Recovery of HNO_3 (Can. pat. 308,879) **18.**

Explosives. CHARLES V. A. E. BARON. Fr. 694,466, July 29, 1929. Explosives are coated with coal or vegetable tar, petroleum, etc., by dissolving the coating substance in a suitable solvent such as CCl_4 or mineral oils, mixing with the explosive and heating, with stirring, in an autoclave. The solvent is afterward recovered by distn. under vacuum.

Explosives. WALTER FRIEDERICH. Fr. 694,057, April 16, 1930. Cyclic ketone-alcs. or cyclic alcs. such as tetramethylolcyclohexanone, tetramethylolcyclopentanone or octomethylolcyclohexanediol are converted into nitrates. The nitrates may be used alone or mixed with other explosives.

Explosives. OSKAR MATTER. Ger. 513,933, May 27, 1926. Pure, readily explosive Pb azide is prepd. by treating Na azide with alk. earth soln. (*e. g.*, $(AcO)_2Ba$) and then with $PbCO_3$.

Explosives. LEOPOLDO PARODI-DELFINO. Ger. 513,567, Oct. 30, 1925. Nitro powders, with or without a nitroglycerol content, are gelatined and stabilized by addn. of phthalide or homologs. Thus, artillery explosive may consist of nitrocellulose, nitroglycerol and phthalide.

Nitroglycerin. A. SCHMID and J. MEISSNER. Brit. 336,253, July 5, 1929. Sepn. of nitroglycerin from residuary acid is effected by passing the crude liquid through a vessel having an inclined longitudinal axis so that the particles move generally parallel to this axis, the acid downwardly and the nitroglycerin upward. Various details of app. and operation are described.

"Gas" cartridge. BYRON C. GOSS (to Lake Erie Chem. Co.). U. S. 1,792,010, Feb. 10. A compn. contg. gelatin and glycerol is used as the container material of cartridges such as those contg. an asphyxiating or disabling chemical to be fired from a pistol.

Fire-producing compositions. FERDINAND RINGER. Austrian 120,172, June 15, 1930. A fire-producing compn. cast in stick or rod form comprises a combustible base giving only a little ash, *e. g.*, cellulose nitrate or acetate, together with oxidizing agents and readily combustible substances, *e. g.*, $KClO_3$ and S, with, if desired, addns. for regulating the rate of combustion, *e.g.*, $(NH_4)_2C_2O_4$. The proportions of the ingredients are selected so that the stick or rod can be ignited by friction, blown out and ignited again as required. Glass powder, Carborundum or the like may be included to increase the sensitiveness to friction. A suitable compn. is cellulose nitrate 60–75, camphor 6–14, $KClO_3$ 11–20, $K_2Cr_2O_7$ 2.5, $(NH_4)_2C_2O_4$ 2.5, S 2.5, glass meal 5–15 and ZnO 3–10%.

25—DYES AND TEXTILE CHEMISTRY

L. A. OLNEY

The chemistry of turkey-red dyeing. LYTLE R. PARKS. *J. Phys. Chem.* **35**, 488–510(1931).—The history of turkey-red dyeing is reviewed and the chemistry of the various operations studied. A new short process is proposed which gives a color just as bright and fast as any produced by the older methods. H. W. LEAHY

Nitro and amino compounds. Safe practices in production of dyestuffs and explosives materials. CYRIL AINSWORTH. *Am. Dyestuff Reptr.* **20**, 126–7(1931).—Prevention methods and remedies for poisoning by various nitro and amino compds. are given. ROBERT HOUGHTON

Formic acid in the textile industry. K. L. SCHANBACHER. *Proc. Am. Assoc. Textile Chem. Colorists* **1931**, 76–9; *Am. Dyestuff Reptr.* **20**, 144–7(1931).—The use of HCOOH in the dye bath as a swelling agent, in cross dyeing and as an exhausting agent is discussed. MILTON HARRIS

Use and misuse of chlorine in textile bleaching. W. L. SAVELL AND J. W. IVEY. *Am. Dyestuff Reptr.* **20**, 97–100(1931).—Cl bleaches may be used from atmospheric temps. (cold) to 130°F. in the form of strongly alk. to slightly acid hypochlorites Bleaches are prepd. by dissolving Cl in caustic soda soln. $NaHCO_3$ is unsuitable and unnecessary as a constituent of bleach liquors. Stock solns. are generally made at a concn. of approx. 30 g. per l. of available Cl. MILTON HARRIS

Bleaching with liquid chlorine or hydrogen peroxide 100 volume for hosiery. G. H. DUBOIS. *Proc. Am. Assoc. Textile Chem. Colorists* **1931**, 83–4; *Am. Dyestuff Reptr.* **20**, 151–2(1931).—A discussion of formulas and their sp. application in bleaching. MILTON HARRIS

The chemical analysis of sized cloth. G. SMITH. *Am. Dyestuff Reptr.* **20**, 118–22 (1931).—See *C. A.* **24**, 3115. MILTON HARRIS

Change of some properties of sericin particles on the surface of the (silk) cocoon on drying. H. KANEKO, T. HAYASHI, S. CHINO AND M. MIYASAKA. *Bull. Sericult Silk Ind.* (Japan) **2**, 2–3(1930).—During the drying of the cocoon the sericin particles on the surface undergo dehydration and their phys. properties change in such a way that the amt. of dyestuff absorbed is decreased and the surface tension, viscosity, n and turbidity and colloidal properties of the sericin soln. in water are altered. B. C. A.

Boiling-resistance tests of acetate silk. WALTER FERMAZIN. *Chem.-Ztg.* **55**, 93–4 (1931).—Methods are described for testing the resistance to boiling of acetate silk yarn Skeins are washed in ether, then tested by boiling for 1 hr. in distd. water and dried for 2 days at room temp. For testing breaking strength, elongation and elasticity, the boiled skeins are kept for 48 hrs. in 60% humidity, and 100 threads are then tested in the Schopper app. Elasticity values obtained by loading a weighted thread with an added weight equal to 50% of the breaking strength, and measuring the contraction on unloading, agree with the results of the other test. The depth of dyeing of skeins with standard dyes is compared with that of standard boiled skeins of varying resistance. The loss of gloss is detd. by Kempf's app., in which light is reflected from the threads onto a photographic film and the resultant brightening of the film is measured photometrically. I. H. ODELL

Determination of p_H of cotton cloth and study of its relation to tensile strength. S. I. KOLSKY AND B. M. JONES. *Am. Dyestuff Reptr.* **20**, 133–8, 157–9(1931).—Slight

decreases in p_H tender the cloth while increases tend to make it stronger. Ordinary bleached cloth was strengthened by treatment with dil. alkali. MILTON HARRIS

The effect of cleansing agents on linen and cotton. EMIL J. SIMOLA. *Acta Chem. Fennica* **3**, 89–94(1930).—One g. per l. of $MeCH_2SO_2NClNa \cdot 3H_2O$ has a little less weakening action on linen and cotton than has 0.5 g. per l. of perborate bleaching agent because of the greater stability of the former on boiling. A mixt. of 5 g. of soap with 3 g. per l. of soda weakened cotton 15% in 25 washings and 22% in 50 washings. For linen the values were 25 and 52%, resp. For soda alone (6 g. per l.) the values were 6 and 12%, resp., for cotton and 6 and 3%, resp., for linen. Ten g. per l. of Marseilles soap, with a water content of 26%, weakened cotton 16% in 25 washings and 28% in 50 washings, with values of 26 and 46%, resp., for linen. Soaps prepd. from linseed oils, soy-bean oils, Na and K stearates, oleates and palmitates showed that in water of 4 degrees hardness the greatest weakening of cloth occurred with soaps contg. acids of high I no. or high degree of unsatn. The cloth wt. increased in all washings, being greatest when water of a high degree of hardness was used. The weakening of cloth when distd. water, water of 4 degrees hardness and water of 25.4 degrees hardness were used were, resp., 5–15, 8–19 and 24–39%. For water of 4 degrees hardness the greatest weakening occurred with soaps contg. Na salts of acids of high I no. or high unsatn. as in soy-bean oil and linseed oil, being about 25% for cotton and 35% for linen in 25 washings. When soaps contg. Na salts of satd. acids as in coconut oil and tallow were used the weakening effect on cotton was 10% and on linen 15% in 25 washings. The drying of the cloth also greatly affects its strength, the weakening varying directly with the time necessary to dry. The cloth weakening was directly proportional to the amt. of Ca and Mg salts of unsatd. acid pptd. on the cloth fibers. These salts have some effect on the air oxidation of the cloth, and catalyze its autoxidation during drying; hence it is imperative that the cloth be dried as rapidly as possible. Ca and Mg salts must be prevented from forming, or, if this is not possible, they must be prevented from oxidation during drying of the cloth. Satd. acids will cause a pptn. on the cloth fibers, but the salts are not oxidized, and have less weakening action on the cloth. Satd. acids prepd. from unsatd. acids were difficult to purify, and discolored the cloth on long standing. Substances may be added which keep Ca and Mg salts in emulsion form and prevent pptn. on the cloth fibers. One cu. m. of water of 12 degrees hardness requires 2 kg. of Na soap to soften, and results in a pptn. of Ca and Mg salts, so the most effective method of preventing their formation is to soften the water preliminary to its use. Perborate solns. have about the same effect on cloth weakening as soaps contg. a high percentage of unsatd. acids. S. A. K.

Newer preparation for emulsifying, wetting out and washing. A. SALMONY-KARSTEN. *Z. ges. Textil-Ind.* **33**, 677(1930).—"Flerhenol M Superior" is described as a dyeing oil for rayon and rayon mixts. with silk and wool; "Flerhenol B T Special" is an anhydrous concd. product for degreasing vegetable fibers; "Appret-Flerhenol," a finishing oil stable with $MgSO_4$; "Neo Flerhenol," a wetting-out agent with unusual brightening and softening properties, "Visco-Flerhenol F" and "Visco-Flerhenol A" are for brightening and dyeing cotton and rayons; "Enfullon H" and "Enfullon Extra" for fulling and washing of woolens. All of these products are stable to hard water, easily sol., rinse well and are inexpensive. H. F. LEUPOLD

The photoelectric measurement of luster (DESBLEDS) **2**. Experiments with N fertilizers on cotton (MANDRUIGIN) **15**. Textile soap (HALBERSTADT) **27**. Purely aliphatic strepto-pentamethin dyes (KÖNIG, REGNER) **10**. Constitution of colorless and colored triphenylmethane derivatives (LIFSCHITZ) **10**. Protecting [textile materials] from fungi (Brit. pat. 336,244) **18**.

Annuaire des soies et des soies artificielles, 1930. Paris: L'Édition textile. 757 pp. F. 55. Reviewed in *Chimie & Industrie* **24**, 1287(1930).

HEGEL, K. T.: **Textilchemische Erfindungen. Lfg. 6.** Wittenberg: A. Ziemsen Verlag. Paper, M. 10. Reviewed in *J. Soc. Dyers Colourists* **47**, 40(1931). Cf. *C. A.* **24**, 3377.

Dyes. SCOTTISH DYES, LTD. Ger. 512,821, May 12, 1927. See Brit. 278,039 (*C. A.* **22**, 2667).

Dyes. I. G. FARBENIND. A.-G. (Wilhelm Eckert, inventor). Ger. 513,690, Oct. 23, 1928. N-contg. dyes are produced by nitrating naphthoylenediarylimidazole and

reducing the product. Thus, 1,4,5,8-naphthoylenedibenzimidazole (obtained by condensing 1,4,5,8-naphthalenetetracarboxylic acid with *o*-phenylenediamine as described in Ger. 430,632) is nitrated with HNO_3 and reduced with $Na_2S_2O_4$ to give a dye which colors cotton scarlet in a green vat. Other examples are given.

Dyes. I. G. FARBENIND. A.-G. Brit. 337,021, June 21, 1929. Anthraquinone dyes for wool are made by condensing the Cu compd. of a 1-hydroxy-4-haloanthraquinonesulfonic acid with an alkyl-, aryl-, cycloalkyl-, aralkyl- or acylamino compd., the amino residue entering the 4-position. Suitable starting materials include acetyl-*p*-phenylenediamine, *m*-phenylenediamine and acetyl-*m*-tolylenediamine.

Vat dyes. L. CASSELLA & Co., GES. Brit. 336,495, Dec. 10, 1928. See Ger. 507,558 (*C. A.* **25**, 823).

Dyes. SOC. ANON. POUR L'IND. CHIM. Á BÂLE. Brit. 336,775, Oct. 3, 1929. Isodibenzanthrone is chlorinated (1) with $SbCl_5$ in $PhNO_2$ to form a blue-violet dye, (2) with sulfuryl chloride and I in $PhNO_2$ or (3) with Cl and I in $PhNO_2$, to form a similar dye, or (4) with $FeCl_3$ in trichlorobenzene, also forming a similar dye.

Dyes (dibenzanthrone derivatives). I. B. ANDERSON, R. F. THOMSON, J. THOMAS and SCOTTISH DYES, LTD. Brit. 336,268, May 9, 1929. By the alkali fusion of *Bz* 1,*Bz*-1′-dibenzanthronyls substituted by phenoxy, nitro or simple amino groups (but having the 2-position free) dyes are obtained producing reddish blue, greenish black or greenish gray shades on cotton. Several examples are given.

Azo dyes. I. G. FARBENIND. A.-G. Brit. 336,938, July 10, 1929. Dyes are formed in substance or on the fiber (which may be regenerated cellulose or cellulose esters or ethers) by coupling a diazo, tetrazo or diazoazo compd. free from sulfonic, hydroxy and carboxy groups with a 2′,3′-hydroxynaphthoyl-4-amino-1-alkoxymethylbenzene. Numerous examples of coupling components are given.

Azo dyes. I. G. FARBENIND. A.-G. Brit. 335,893, April 30, 1929. A diamine of the general formula NH_2—R—R′—R—NH_2 in which R is an aromatic and R′ a hydroaromatic residue (all of which may be substituted or not) is tetrazotized and coupled with 2 mol. proportions of the same or different coupling components one of which may be a diazo compd. or may be diazotized and coupled with another component. Numerous examples are given of dyes of different colors for dyeing wool, silk, etc.

Azo dyes. SOC. ANON. POUR L'IND. CHIM. Á BÂLE. Brit. 335,896, June 25, 1929. Cotton is dyed olive green in the presence of Cr salts by the dye produced by coupling 2-sulfo-4-oxy-α,β-naphthophenazine with diazotized 4-nitro-2-amino-1-phenol 6-sulfonic acid, and instead of the latter compd. there may be employed *o*-anisidine, *p*-nitroaniline, sulfanilic acid or *p*-nitroaniline-*o*-sulfonic acid. Various other dyes also are described derived from components of similar type, and methods are given for producing azo compds. used as intermediates.

Azo dyes. IMPERIAL CHEMICAL INDUSTRIES, LTD., and R. BRIGHTMAN. Brit. 336,350, Aug. 15, 1929. Azo dyes for wool are formed by coupling tetrazotized *m*-tolidine with one mol. proportion of salicylic acid and one mol. proportion of 2-naphthol-3-a 2-naphtholmonosulfonic acid, 2-naphthylamine-6-sulfonic acid or 2-methylamino-naphthalene-7-sulfonic acid. Cf. *C. A.* **25**, 599.

Azo dyes. IMPERIAL CHEMICAL INDUSTRIES, LTD. Fr. 694,730, April 29, 1930. New azo dyes are prepd. by diazotizing a *p*-nitroamine or a *p*-acetamidoamine of the C_6H_6 series contg. at least one alkoxy group in the mol., combining with a naphthol, naphtholsulfonic acid or a *N*-substituted 2,8-aminonaphtholsulfonic acid, reducing or hydrolyzing the product obtained, diazotizing again and coupling with a 1,8- or a 2,8-aminonaphtholmono- or di-sulfonic acid. Thus, 5-nitro 2 anisidine is diazotized and coupled with 2-phenylamino-8-naphthol-6-sulfonic acid. The product is reduced, diazotized and coupled with 1,8-aminonaphthol-2,4-disulfonic acid, giving a product which dyes viscose silk a deep blue. Other examples with a list of components and the colors obtained are given.

Azo dyes. IMPERIAL CHEMICAL INDUSTRIES, LTD. Fr. 694,559, April 26, 1930. Azo dyes are prepd. by coupling with coupling components a tetrazotized diamine of the general formula $NH_2C_6H_4NHXNHC_6H_4NH_2$ in which X is a chain of 2 or more CH_2 groups or a chain of CH_2 and CO groups, or by combining a diazotized amine of the general formula $YC_6H_4NHXNHC_6H_4NH_2$, in which X has the same significance and Y is a NO_2 or acylamino group, with a constituent which contains no NH_2 group, reducing the NO_2 group or hydrolyzing the arylamino group, diazotizing and coupling with another constituent. The dyes give regular colors on regenerated cellulose silk.

Copper compounds of azo dyes. I. G. FARBENIND. A.-G. Brit. 336,971, July 22, 1929. Substantive *o*-carboxyazo dyes contg. Cu are formed by the action of a copperiz-

ing agent such as $CuSO_4$ on dyes obtained by coupling tetrazotized 4,4′-diaminodiphenyl-3,3′-dicarboxylic acid with 2 similar or dissimilar mol. proportions of an aminonaphtholdisulfonic acid or a nuclearly substitution product of such an acid (other than acids substituted in the amino group). The dye may also be prepd. in the presence of a suitable coppering agent. The dyes thus formed produce mainly blue and gray shades on cotton and viscose. Several examples are given.

Monoazo dyes. I. G. FARBENIND. A.-G. Brit. 336,580, June 14, 1929. Monoazo dyes which dye wool from an acid bath bright yellow to red to violet to brownish shades fast to washing and to milling are formed by combining with a usual coupling component contg. at least one sulfonic group a diazotized aniline deriv. contg. a hydrogenated benzene nucleus in *p*-position to the NH_2 group and which may also contain a halogen atom or an alkyl or alkoxy group in *o*-position to the NH_2 group. Numerous examples are given.

Disazo dyes. E. I. DU PONT DE NEMOURS & Co. Brit. 336,646, July 12, 1929. Disazo dyes for cotton are made by coupling diazo compds. free from sulfo and carboxy groups with a *N*-aminobenzoylaminobenzoyl-J-acid, diazotizing the monoazo product and coupling it with a sulfo- or carboxy-indole. Numerous examples are given.

Disazo dyes. J. R. GEIGY A.-G. Brit. 337,224, Nov. 15, 1928. See Fr. 684,551 (*C. A.* **24**, 5507).

Disazo dyes. MELCHIOR BOENIGER (to Chemische Fabrik vorm. Sandoz). U. S. 1,792,355, Feb. 10. By coupling one mol. of a tetrazodiaryl with two mols. of 3′-amino-4′-methyl-5′-sulfo-1-phenyl-5-pyrazolones or by combination of the intermediate products of one mol. of a tetrazodiaryl and one mol. of an aryl-*o*-hydroxycarboxylic acid with one mol. of a 3′-amino-4′-methyl-5′-sulfo-1-phenyl-5-pyrazolone or by coupling the intermediate product of one mol. of a tetrazodiaryl and one mol. of a 3′-amino-4′-methyl-5′-sulfo-1-phenyl-5-pyrazolone with one mol. of an azo component substantive azo dyes are obtained, which when diazotized on the fiber can be developed with unsulfonated azo components (for instance β-naphthol, *m*-diamines, phenylmethylpyrazolone) to shades varying from orange to red, heliotrope and dark brown, which are fast to washing and can be discharged with formaldehyde-hyposulfite to pure white effects. The direct dyeings can also be fixed with formaldehyde or by an after treatment with *p*-nitrodiazobenzene. The same diazotizable azo dyes can be obtained by substituting, for the 3′-amino-4′-methyl-5′-sulfo-1-phenyl-5-pyrazolones, the corresponding 3′-nitro-4′-methyl-5′-sulfo-1-phenyl-5-pyrazolones, and by reducing in the nitro dyes thus obtained the nitro group to the amino group by treatment with NaS. Several examples with details of procedure are given.

Diazo dyes for acetylcellulose. BRITISH DYESTUFFS CORP., LTD., JAMES BADDILEY and JAMES HILL. Ger. 513,763, Nov. 9, 1926. See Brit. 270,428 (*C. A.* **22**, 1692).

Vat dyes. I. G. FARBENIND. A.-G. (Max A. Kunz, Karl Köberle and Erich Berthold, inventors). Ger. 516,313, Apr. 28, 1929. Green-blue vat dyes contg. halogen are prepd. by treating benzanthronepyrazoleanthrone or its derivs. with $HClSO_3$ in the presence of a catalyst, *e. g.*, Hg or I, and in the presence or absence of Br or other brominating agent. The products give greener shades than the dyes described in Ger. 492,274 (*C. A.* **24**, 2611). Examples are given.

Vat dyes. I. G. FARBENIND. A.-G. (Heinrich Neresheimer, inventor). Ger. 516,784, Aug. 18, 1929. Addn. to 513,046 (*C. A.* **25**, 1396). Blue to green vat dyes similar to some of those obtainable as described in Ger. 513,046, are prepd. by the action of acid condensing agents on α-anthraquinonyl-3-amino-1,2-benzanthraquinones contg. at least one acylamino group, which may be split off or substituted after the condensation. Thus, the condensation product from 3-chloro-1,2-benzanthraquinone and 1-amino-5-benzoylaminoanthraquinone may be treated with $HClSO_3$. Examples are given.

Vat dyes. I. G. FARBENIND. A.-G. Fr. 694,152, April 18, 1930. The 4 H atoms of the C_6H_6 ring in anthraquinone-2,1-acridone are substituted by halogen atoms. The dyes are prepd. after the process of Ger. 267,211, *e. g.*, by condensing the benzylic ester of 1-chloroanthraquinone-2-carboxylic acid with 2,3,4,5-tetrahaloaniline and a final joining of the acridone ring, or by introducing other halogen atoms into anthraquinoneacridones, the C_6H_6 ring of which is substituted by less than 4 halogen atoms, or by substituting with H the halogen contained (in addn. to 4 atoms of halogen of the C_6H_6 ring) in another part of the mol. of the haloanthraquinoneacridones. Examples are given.

Vat dyes. I. G. FARBENIND. A.-G. Fr. 693,997, April 15, 1930. The mixts. of isomeric 1,4,5,8-naphthoylenediarylimidazoles obtained by the process of Fr. 600,843

and its addns. are sepd. into their 2 constituents. The sepn. is effected by treatment with concd. H_2SO_4 or by transforming them in the presence of an appropriate diluent into their salts and sepg. these. Examples and formulas of the products obtained are given.

Vat dyes. I. G. FARBENIND. A.-G. Fr. 693,949, June 14, 1929. The condensation products obtained from *N*-dihydro-1,2′,2,1′-anthraquinonazines by means of CH_2O or substances yielding CH_2O (cf. Fr. 346,398) are submitted to an oxidation or dehydrogenation. Examples are given.

Vat dyes of the thioindigo series. KARL THIESS, THEODOR MEISSNER and HANS HEYNA (to General Aniline Works). U. S. 1,792,130, Feb. 10. 4,7,4′,7′-Tetramethyl-5,5′-dibromoindigo and other similar halogen compds. dye cotton blue from an olive-green vat and are made by transforming amino compds. of the general formula



$CX:CMe.CY:C(NH_2).CMe:CH$ wherein X stands for halogen and Y stands for H or the COOH group, into indigo dyes according to the process generally used for the prepn. of indigo dyes from aromatic amino compds. with a free *o*-position, or from *o*-aminocarboxylic acids. Several examples with details of procedure are given.

Vat dyes or intermediates. I. G. FARBENIND. A.-G. (Walter Mieg and Robert Berliner, inventors). Ger. 516,398, Dec. 9, 1928. Dianthraquinonylamine derivs. contg. a thioxanthone ring and either one acylamino group or an acridone ring is treated with H_2SO_4 at a low temp. Oxidation of the products may be necessary. Thus, the condensation product from 4-aminoanthraquinonethioxanthone and 1 benzoylamino-5-chloroanthraquinone may be treated with H_2SO_4 at 20° and the product poured into water contg. a little $NaNO_2$. Other examples are given also. The products are carbazole derivs. Cf. *C. A.* **25**, 824.

Dyes and intermediates. W. SMITH, J. THOMAS and SCOTTISH DYES, LTD. Brit. 336,982, April 16, 1929. 1,1′-Dianthraquinonyl derivs. contg. Cl, Br or sulfonic acid groups in the 2,2′-positions are prepd. by condensing anthraquinone derivs. contg. similar groups in the 2-position and a halogen atom or diazo group in the 1-position in the presence of Cu. There may be employed as starting materials compds. such as 1,2-dichloroanthraquinone, 1-amino-2-bromoanthraquinone or 1-amino-2-sulfoanthraquinone. The 2,2′-substituents in the products are easily replaceable by other substituents, *e. g.*, treatment with NH_3 forms 2,2′-diamino-1,1′-dianthraquinonyl which is converted to flavanthrone.

Dyes and intermediates. I. G. FARBENIND. A.-G. (Max A. Kunz, Karl Köberle and Gert Kochendorfer, inventors). Ger. 516,399, Feb. 16, 1929. See Fr. 689,908 (*C. A.* **25**, 1100).

Dyes and intermediates. I. G. FARBENIND. A.-G. Fr. 694,853, May 2, 1930. Condensation products, some of which are dyes and intermediates, are prepd. by treating with condensing agents the products resulting from the reaction of aromatic *o*-aminocarboxylic acids, their derivs. or substitution products with negatively substituted heterocyclic compds. or with negatively substituted isocyclic compds. contg. at least 4 rings, or the corresponding products resulting from the reaction of heterocyclic or isocyclic *N* compds. contg. at least 4 rings and having at least one atom of H capable of being substituted fixed to the N, with aromatic carboxylic acids, negatively substituted in the *o*-position to the COOH group, or their derivs. or substitution products. Thus, the condensation product of dibromo-3,4,8,9-dibenzopyrene-5,10-quinone with 2 mols. of the Et ester of 1-aminoanthraquinone-2-carboxylic acid is dissolved in concd. H_2SO_4 and heated to 110–120° for some time, the oxonium salt of the product being pptd. by water. On hydrolysis a product is obtained which dyes cotton in brown red shades from the vat. Other examples are given.

Dye intermediates. I. G. FARBENIND. A.-G. Brit. 336,394, Sept. 27, 1929. *p*-Arylaminophenolcarboxylic acids are made by treating a dry alkali salt of a *p*-arylaminophenol contg. a free *o*-position to the OH group and no sulfonic acid groups with CO_2 with use of heat and pressure. There may be used as starting materials: 4-hydroxydiphenylamine, 4-hydroxy-2′-methyldiphenylamine, 4-hydroxy-3′-methyldiphenylamine, 4-hydroxy-4′-methyldiphenylamine, 4-hydroxy-3-methyldiphenylamine (obtained from toluhydroquinone and aniline), 4-hydroxy-3,4′-dimethyldiphenylamine (obtained from toluhydroquinone and *p*-toluidine), and 4-hydroxy-3′-methoxydiphenylamine.

Dye intermediates. I. G. FARBENIND. A.-G. Brit. 336,428, Oct. 14, 1929. Arylides of *m*-arylaminophenolcarboxylic acids such as those obtained according to the process of Brit. 333,783 (*C. A.* **25**, 603) are made by reaction of the carboxylic group

(with or without previous acylating of the N atom) with an arylamine in the presence of an acid-condensing agent such as PCl_5 and a diluent such as xylene, toluene, PhCl or dimethylaniline; or, the carboxylic acid may be first converted to the acid chloride by a reagent such as thionyl chloride and then condensed with an arylamine in the presence of a diluent. Numerous examples are given.

Dye intermediates. I. G. FARBENIND. A.-G. Brit. 336,800, Oct. 18, 1929. Dihydroxyanilides of naphthalenedicarboxylic acids, capable of being coupled with a diazo compd., are made by condensing a naphthalenedicarboxylic acid (other than a *peri* or an *ortho* acid) in the presence of PCl_5 (or by using a naphthalenedicarboxylic acid chloride directly) with a hydroxyarylamine which has a free *o*- or *p*-position relative to the OH group such as 3- or 4-aminophenol, 1-methyl-2-amino-4-hydroxybenzene, 1-methyl-2-amino-5-hydroxybenzene or the like. The alkali salts of the products are sol. in water and have an affinity for vegetable fibers. Naphthalene-1,4- and 1,5-dicarboxylic acid chlorides (which may be used as initial materials) are made by treating the corresponding acids with PCl_5.

Dye intermediates. I. G. FARBENIND. A.-G. Brit. 337,047, July 26, 1929. Aminohydroxyanthraquinones and their substitution products are obtained by condensing an acyl- or aroylaminophenol, or a homolog or substitution product, with phthalic anhydride, or a substitution product, in the presence of a substance such as $AlCl_3$, saponifying, and ring closing when necessary in the usual manner. Examples are given of the production of 2,3-aminohydroxyanthraquinone from 2,2'-dimethoxydiphenylurea, 1-amino-4-hydroxyanthraquinone from 1-benzoylamino-4-phenol and of several other similar reactions.

Dye intermediate (1-chloromethylnaphthalene). I. G. FARBENIND. A.-G. Brit. 337,289, Jan. 12, 1929. Cryst. naphthalene in aq. suspension is treated with nonpolymerized formaldehyde and concd. HCl (suitably with gentle heating).

Intermediates for azo dyes. I. G. FARBENIND. A.-G. Ger. 516,156, Feb. 8, 1929. Nitroaryl arylides of the formula $HORNHCOR'NO_2$, in which R and R' are the same or different aryl radicals of the C_6H_6 series, and in which the NO_2 group is in the *m*- or *p*-position to the CO group, while the *o*- or *p*-position to the OH group is unsubstituted, are converted by treatment with alk. reducing agents into new compds. having a great affinity for cotton. The products are believed to be azoxy or azo compds. Examples are given.

Dyes of the anthraquinone series. FRANZ ACKERMANN and CARL APOTHEKER (to Soc. anon. pour l'ind. chim. à Bâle). U. S. 1,792,348, Feb. 10. Reaction products such as those formed by heating, at 150–160°, aromatic amines such as $PhNH_2$ or *p*-anisidine with compds. such as (1,5- or 1,8)-diamino-(4,8- or 4,5)-dinitroanthraquinone, are subjected to careful reduction (suitably with Na sulfide or hydrosulfide), and there are thus obtained dyes sol. in various org. solvents and which are suitable for dyeing cellulose esters and ethers or products such as nitrocellulose lacquers blue to blue-green shades. Several examples with details of procedure are given.

Fuchsin dyes. HEIDELBERGER GELATINE-FABRIK STOESS & Co. (Albert Steigmann, inventor). Ger. 513,610, Dec. 14, 1928. Fuchsin dyes are produced by oxidizing and nitrating fuchsin in the presence of sulfurizing agents and optionally reducing the product. Thus, fuchsin is mixed with $Na_2S_2O_3$ or $Na_2S_2O_4$ and treated with HNO_3 and H_2SO_4. The Na and NH_4 salts of the dye color wool yellow in a weak AcOH bath. Another example is given. Cf. *C. A.* **24**, 4639.

Sulfur dyes. I. G. FARBENIND. A.-G. Brit. 336,061, Sept. 2, 1929. Sulfur dyes are made by sulfurizing a 2-(4'-hydroxyarylamino)-6-arylaminonaphthalene (suitably with a polysulfide of high S content and in the presence of an inert org. solvent such as an aliphatic alc. of high b. p., a cyclic alc. or glycerol). The dyes produce bluish to green shades on cotton from a Na sulfide bath or hyposulfite vat, and greener shades are obtained by sulfurizing in the presence of a Cu salt such as the sulfide or cyanide. Several examples are given.

Sulfuretted dyes. I. G. FARBENIND. A.-G. Brit. 337,061, July 27, 1929. The S dyes obtainable, as described in Brit. 325,519 (*C. A.* **24**, 4169), by heating halogenated dinaphthylene dioxides with S, with or without a high boiling diluent, or by submitting them to polysulfide fusion, are treated either in substance or on the fiber with alkylating or aralkylating agents as described in Brit. 317,776 (*C. A.* **24**, 2306). Several examples are given.

Wool dyes. I. G. FARBENIND. A.-G. Fr. 694,088, April 17, 1930. One mol. of a secondary amine of the C_6H_6 series contg. 2 primary NH_2 groups in position *o*- with respect to the secondary amine group and at least one SO_3H group is heated with one

mol. of the C_6H_6 series contg. 2 NO_2 groups in *o*-position and a NO_2 group in *p*-position with respect to an exchangeable atom or atomic group. Thus, 2,6-diaminodiphenylamine-4-sulfonic acid is dissolved in water and the neutralized soln. is condensed at 70–80° with 2,4,6-trinitroanisole in the presence of Na_2CO_3. The product is pptd. by NaCl and dyes wool in yellowish brown shades. Other examples are given.

Anthanthrone derivatives. I. G. FARBENIND. A.-G. (Max A. Kunz, Karl Köberle and Erich Berthold, inventors). Ger. 516,312, Aug. 10, 1928. See Fr. 678,055, (*C. A.* **24**, 3248).

Dibenzopyrenequinones. GEORG KRÄNZLEIN and HEINRICH VOLLMANN (to General Aniline Works). U. S. 1,792,169, Feb. 10. Vat dyes are formed by the reaction (with introduction of O into the reaction mixt.) at temps. of 110–50° of α-benzoylnaphthalene or other suitable α-aroylnaphthalenes with benzoyl chloride or other suitable compd. of the general formula: aryl—CO—X (in which X stands for a halogen atom or for the group —O—CO—aryl, as in aromatic carboxylic acid chlorides or carboxylic anhydrides), in the presence of $AlCl_3$. The reaction may require 20–60 hrs. Examples and details of procedure are given.

Diphthaloylnaphthalene. I. G. FARBENIND. A.-G. Fr. 694,890, May 2, 1930. 1,2,5,6-Diphthaloylnaphthalene, m. 410°, and its substitution products are prepd. by treating 2′,2″-dicyano-1,5-dibenzoylnaphthalene with an acid-condensing agent. If desired the cyano groups may first be changed to COOH groups. With sufficiently moderate conditions 2′-carboxybenzoylnaphthanthraquinone may be obtained as an intermediate product. The prepn. of 1,2,5,6-(2′2″-dichlorodiphthaloylnaphthalene), m. above 400°, is also described. The products are *intermediates for dyes.*

Dyeing with vat dyes. I. G. FARBENIND. A.-G. (Ludwig Löchner, inventor). Ger. 513,526, Sept. 12, 1928. Polychromatic effects are produced by using ester salts of vat dyes. The goods are impregnated with an alk. soln. of 2,3 hydroxynaphthoic acid arylides, and printed out successively with aromatic diazo compds. of vat dyes, with addn. of $NaNO_2$. The vat dye is developed in the dried goods by acid and the rolled goods are then scoured and treated with a hot dil. alk. soln. A small quantity of reducing agent such as CH_2O, glucose, etc., may be added to the vat dye printing paste. In an example, the goods are soaked in a soln. contg. 2,3-hydroxynaphthoyl-*o*-toluidine, Turkey-red oil and NaOH, and dried. For red shades, the goods are printed out with a paste contg. the diazo soln. from 4-chloro-2-toluidine-HCl, water, $NaNO_2$, AcONa and starch. For blue shades the material is printed out with a soln. contg. ester salts of tetrabromoindigo, $NaNO_2$, water and starch. Several other examples are given.

Dyeing or treating threads. HENRY DREYFUS. Fr. 694,880, May 2, 1930. Liquids such as size or dyes are applied to threads while they pass below the edge of an annular or cylindrical member serving to guide the thread to a bobbin or cake of thread.

Dyeing cotton. ORANIENBURGER CHEMISCHE FABRIK A.-G. (Kurt Lindner, Rudolf Kuhn and Max Trapke, inventors). Ger. 513,843, Jan. 11, 1924. Dyes, especially naphthol dyes, are applied directly to cotton, the process being carried out in the presence of hydrogenated phenols and nonsulfonated soap in the proportions 1 or less:4. Thus, the azo dye from dianisidine and 1-amino-8-naphthol-4-sulfonic acid (Chicago blue B) is used directly to color cotton blue in the presence of coconut oil, oleic acid and cresol. Other examples are given.

Dyeing wool yarn. FIRMA H. KRANZ. Ger. 513,662, April 24, 1927. Details are given of app. for receiving the spools and supplying the dye liquor.

Dyeing artificial silk. IMPERIAL CHEMICAL INDUSTRIES, LTD. Fr. 694,856, May 2, 1930. Textiles of regenerated cellulose are dyed regular blue shades by applying to the textile a diazo dye obtained by coupling a diazotized aminoazo compd. with a 1,8- or 2,8-aminonaphthol-mono- or -di-sulfonic acid, the aminoazo compd. being obtained by coupling with a naphthol or naphtholsulfonic acid or with a *N*-substituted deriv. of 2,8-aminonaphtholsulfonic acid, either diazotized *p*-nitroaniline (or a substituted deriv. excepting alkoxy derivs.) or diazotized *p*-aminoacetanilide (or a substituted deriv. excepting alkoxy derivs.), the coupling being followed by reduction of the NO_2 group in one case or hydrolysis of the acetylamino group in the other. Examples and a list of components with the colors obtained are given. Fr. 694,857 describes a process for obtaining regular dyes on textiles of regenerated cellulose by applying to the textile a monoazo dye obtained by diazotizing an oxamic acid of the benzidine series and coupling with a naphtholsulfonic acid, a sulfonic acid of naphthylamine, 1,8-aminonaphtholsulfonic acid, 1,8-dihydroxynaphthalenesulfonic acid, *m*-dihydroxybenzene deriv., *m*-diaminobenzene deriv. or *m*-aminohydroxybenzene deriv. Examples and a list of components with the colors obtained are given. Cf. *C. A.* **25**, 1685

Dyeing cellulose esters or ethers. I. G. FARBENIND. A.-G. (Wilhelm Eckert, Carl E. Müller and Walter Gmelin, inventors). Ger. 516,982, Feb. 2, 1929. Addn. to 515,029 (*C. A.* **25**, 1685). The method of Ger. 515,029 is modified by using naphthalimide-4-sulfamic acid or the corresponding derivs. or their salts instead of 4-aminonaphthalimide or the derivs. mentioned. Examples are given.

Dyeing skins, furs, feathers, etc. I. G. FARBENIND. A.-G. (Karl Marx and Karl Bittner, inventors). Ger. 513,525, Apr. 14, 1927. Use is made of a soln. contg. an oxidizing agent and a salt of the base *p*-$RC_6H_4NHC_6H_4NH$-alkylene-OH-*p'*, where R = H, CH_3, OCH_3 or halogen. The material may be mordanted. In the example, skins are treated with an aq. soln. of H_2O_2 and 4-hydroxyethylaminodiphenylamine-HCl to produce a yellowish tint when mordanted with Fe alum. A blue-violet color is given by 4-hydroxyethylamino-4'-methoxydiphenylamine-HCl.

Skein-dyeing apparatus. J. SCHUMPF. Brit. 336,174, Dec. 27, 1928. Structural features.

Apparatus for dyeing width fabrics. O. OBERMEYER. Brit. 336,724, Aug. 26, 1929. Structural features.

Apparatus for dyeing cloth webs. WM. E. CAFFRAY (to Nashua Mfg. Co.). U. S. 1,791,954, Feb. 10. Various structural details are described.

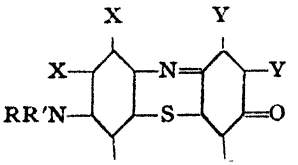
Apparatus for dyeing ribbons, etc. H. A. BLUNDELL and BLUNDELL BROS. (LUTON), LTD. Brit. 336,686, July 23, 1929. Structural features.

Extracting dyes from dyed artificial materials. WM. WHITEHEAD (to Celanese Corp. of America). U. S. 1,791,990, Feb. 10. Dyed materials formed from artificial org. cellulose derivs. such as cellulose acetate are treated with a soln. such as C_2HCl_3 together with about 2% of acetone, which acts as a swelling agent for the cellulose deriv. material and a solvent for dyes present.

Reduction products of dyes. I. G. FARBENIND. A.-G. Fr. 693,904, April 14, 1930. Stable reduction compds. which are difficultly sol. in aq. alkalies are prepd. by submitting to an alk. reduction the symmetrical or asymmetrical dyes of the thioindigo series which are substituted in their mol., at least once, by a halogen, alkyl or alkoxy group, the alkali being present in amt. less than that used practically for the prepn. of the vat dyes in question. Several examples are given.

Printing textiles. I. G. FARBENIND. A.-G. Fr. 693,996, April 15, 1930. Textiles are printed with stable reduction products of thioindigo dyes prepd. by the process described in Fr. 693,904 (preceding abstr.) and then treated in the usual manner. Examples are given. Cf. *C. A.* **25**, 1391.

Textile printing. I. G. FARBENIND. A.-G. Fr. 694,643, April 28, 1930. Fast printings are obtained on vegetable fibers by direct printing in the usual way with dyes of the formula:



in which R' is an aryl ring which may be substituted, R is H or an alkyl or aralkyl group, X is H or a univalent substituent, Y is H or a univalent substituent, particularly a halogen. These dyes are described in Ger. 445,270.

Printing. I. G. FARBENIND. A.-G. (Albrecht Schmidt and Ernst Pfeffer, inventors). Ger. 515,305, Jan. 5, 1929. Prints obtained from vat dyes with the aid of methyl cellulose are fixed, without steaming, by means of a salt bath contg. alkali and a reducing agent, *e. g.*, hyposulfite. Examples are given.

Coloring textiles. HENRY DREYFUS. Fr. 694,750, April 29, 1930. The solidity of dyes on textiles, etc., particularly anthraquinone derivs. contg. NH_2, alkylamino or arylamino groups, is improved by incorporating in the textiles before, after or during their dyeing, one or more urea bases such as diisoamylthiourea or tetramethylthiourea. A dispersion agent and a protective colloid may also be added. Fr. 694,751 describes a similar process in which one or more alkylated diarylamino bases such as tetraalkyldiaminodiphenylmethane (or ethane) are used. Cf. *C. A.* **25**, 1685.

Colored reserves in textile printing. I. G. FARBENIND. A.-G. Brit. 336,968, July 22, 1929. Colored reserves are obtained by incorporating with the reserve, com-

prising essentially one or more metallic salts, a previously prepd. mixt. of an aryl nitrosamine compd. of an arylide of 2,3-hydroxynaphthoic acid or of acetoacetic acid ("Rapid Fast Colors"), the dye formation being completed by steaming or hanging, followed by dyeing of the material with a vat dye, and finishing in the usual manner. Details of materials used are given.

Colored patterns on cellulose acetate materials. GEORGE H. ELLIS and ERNEST GREENHALGH (to Celanese Corp. of America). U. S. 1,792,152, Feb. 10. The material is locally treated with a compn. comprising a swelling agent for the acetyl cellulose and a substance such as a printing color compn. capable of effecting a desired color change. Various details and examples are given.

Impregnating fibers. LOUIS C. F. PECHIN. Fr. 694,690, April 30, 1930. Fibers or ligneous materials are impregnated with resins using only a vacuum during impregnation and then polymerizing or hardening the resins by direct treatment in a suitably heated oil bath.

Impregnating textile fibers. GERHARD SCHMITT. Ger. 513,592, April 27, 1927. The fibers are impregnated with a colloidal soln. of powd. montan wax, resin and calcined soda obtained by using hot water or steam. Other oils, fats, waxes, asphalt, pitch, etc., may be added.

Mercerizing vegetable fibrous materials. EMIL GMINDER. Ger. 516,069, Dec. 1, 1925. The materials, after treatment with acid or alkali, are simultaneously cooled and stretched. App. is described.

Machine for stripping tissue from vegetable fibers. I. G. FARBENIND. A.-G. (Ernst Wiss and Karl Erb, inventors). Ger. 513,816, Sept. 18, 1927.

Improving the color of jute fibers. JOSEPH BERLINERBLAU. Ger. 513,374, Nov. 23, 1928. See Fr. 684,964 (*C. A.* **24**, 5511).

Apparatus for treating textile materials with circulating liquids. C. F. HAMMOND and W. SHACKLETON. Brit. 336,963, July 22, 1929. Structural features.

Combined singeing and warping apparatus for treating yarns. STANDARD-COOSA THATCHER CO. Brit. 335,916, June 29, 1929. Various structural details are described of an app., the burners of which are automatically turned off when the app. stops or when a stop-motion is operated by breakage of the yarn or by passage of a measured length.

Pile fabrics. COLLINS & AIKMAN CORP. Brit. 336,553, April 9, 1929. Pile fabrics are woven with less than the customary number of threads in the backing and the latter is impregnated with materials such as rubber, viscose or pyroxylin solns. which are solidified as by coagulation, vulcanization or heating. Various features of decoration, etc., are mentioned. Cf. *C. A.* **25**, 606.

Silk-faced fabric. A. DELUBAC. Brit. 336,067, Sept. 7, 1929. Silk cocoons are opened out and flattened and are sewed or otherwise attached to a backing fabric such as calico, silk or linen, and the material is then subjected to the action of a bath which dissolves the sericin without attacking the fibroin such as a boiling soln. contg. soda 140 g. in water 100 l., followed by washing in hot water, drying and brushing, combing or beating to raise the fibers.

Artificial silk. GLANZSTOFF-COURTAULDS G. M. B. H. Fr. 694,516, April 25, 1930. The liquid for treating cakes of artificial silk is introduced at the interior of the cake which rests on a fixed support and the overflowing of the liquid over the edge of the cake causes a loosening of the layers of thread.

Artificial silk and wool. I. G. FARBENIND. A.-G. Fr. 693,921, April 15, 1930. Artificial silk and wool are made from the polymerization, condensation and transformation products of butadiene hydrocarbons obtained in the presence of solvent agents.

Apparatus (with perforated drums) and suction system for drying cotton or wool slivers. J. E. FLEISSNER and E. FLEISSNER (trading as C. Fleissner & Sohn). Brit. 336,540, Feb. 23, 1929.

Removing cotton linters, etc., from closed kiers. J. P. BEMBERG A.-G. Ger. 516,068, Dec. 16, 1928. The treating liquid is run off, and the cotton is agitated with water by blowing in air at atm. pressure until a uniform pulp is obtained. The pulp is then forced out through an ascension tube by means of compressed air.

Horsehair substitute. EGON ELÖD. Fr. 694,683, April 29, 1930. Hard vegetable fibers, such as coconut fibers are heated with dil. lyes, *e. g.*, 7–8% NaOH in a closed vessel to 120–135°, and then treating with oily or hygroscopic substances.

Apparatus for reclaiming used petroleum products such as "dry cleaning" solvents by chemical treatment. CLARENCE V. FUQUA. U. S. 1,791,809, Feb. 10. Structural features.

26—PAINTS, VARNISHES AND RESINS

A. H. SABIN

Desirable properties in paints for toys. W. ADLER. *Farbe u. Lack* **1931**, 65, 76–7.—Suitable pigments of a wide range of colors for use in aq. and non-aq. media are discussed. G. G. SWARD

Adhesion in the painting and in the gluing of wood. F. L. BROWNE. *Ind. Eng. Chem.* **23**, 290–4(1931).—To improve materially, the durability of house paints on wood means must be discovered for making coatings adhere permanently so that they will wear away instead of falling off in pieces (cf. *C. A.* **24**, 2313). Scientific approach to the problem requires a study of the nature of the adhesion between coatings and wood. There are essential similarities between coatings clinging to wood surfaces and layers of glue joining surfaces in glued wood joints. Knowledge already gained about the adhesion between glue and wood (*C. A.* **21**, 3485; **23**, 1304) may therefore serve as a useful guide in the study of adhesion between coatings and wood. F. L. BROWNE

Notes on lead tungate. H. A. GARDNER. *Am. Paint & Varnish Mfrs.' Assoc., Circ.* No. **377**, 133–4(1931).—Pb tungate as a vehicle for quick-drying paints may be prepd. by adding 30 parts litharge or 35 parts basic Pb carbonate to 100 parts of tung oil fatty acids at 300° F. The paste so prepd. is thinned while hot, preferably with solvent naphtha. Pb tungate so prepd. is sol. in a no. of common solvents while hot but gradually ppts. from these solns. on standing after cooling. Apparently its pptn. does not preclude its use in paints. G. G. SWARD

Protection of surfaces with paint and varnish. ASSER. *Farbe u. Lack* **1931**, 78.—An address. G. G. SWARD

Criticism of accelerated weathering tests. PAUL NETTMANN. *Farbe u. Lack* 1931, 77.—The usual accelerated weathering test is conducted without proper consideration of the various destructive forces. Until these forces are evaluated, success in accelerated weathering tests will not be attained. G. G. SWARD

Quinquennial review of the mineral production of India for the years 1924 to 1928. Barytes. A. M. HERON. *Records Geol. Survey India* **64**, 324–8(1930). **Mineral paints.** E. H. PASCOE. *Ibid* 409–11.—Red and yellow ocher are the only important mineral pigments in India. ALDEN H. EMERY

Bodied pilchard oils. STANLEY A. LEVY. *Am. Paint & Varnish Mfrs.' Assoc., Circ.* No. **377**, 139(1931).—Some phys. constants of pilchard oil thickened to various degrees are given. G. G. SWARD

Glass color standards for varnish. STANLEY A. LEVY. *Am Paint & Varnish Mfrs.' Assoc., Circ.* No. **377**, 140(1931); cf. *C. A.* **24**, 4408.—The $K_2Cr_2O_7$ and $NiSO_4$-I_2 values for addnl. intermediate glass color standards are given. G. G. SWARD

Lacquer diluents of the petroleum type. JEFFREY R. STEWART. *Am. Paint & Varnish Mfrs.' Assoc., Circ.* No. **378**, 143–53(1931).—The kauri-butanol no., the diln. ratio, the soly. in Me_2SO_4 and the aniline point (crit. soln. temp. in aniline) of 27 different lacquer diluents were detd. In most cases the last-named test may be carried out as follows: Warm approx. equal quantities (*viz.*, 3 cc. aniline and 2.5 cc. diluent) in a 6-in. test tube until miscible. Allow the contents of the test tube to cool in a water bath and note the temp. at which the soln. becomes cloudy. Repeat the process twice with 0.3 cc. addns. of diluent each time. The max. temp. at which cloudiness appears is the aniline point. The aniline point is inversely proportional to the other 3 properties. G. G. SWARD

Alcohols for cutting shellac. STANLEY A. LEVY. *Am. Paint & Varnish Mfrs.' Assoc., Circ.* No. **377**, 137–8(1931).—No differences were noted in the working properties of shellac cut with formula No. 1 and with formula No. 5 alc. contg. alcotate and aldehol. G. G. SWARD

Graphical calculation of the composition of ceramic varnishes. ANGELO CASTIGLIONI. *Industria chimica* **5**, 1351–5(1930).—The quantities of the various constituents in a varnish are represented by the sides of polygons having as many axes as there are constituents, and whose length is proportional to the amts. present. Thus when mixts. of varnishes of known compn. are mixed with those of unknown compn., the compn. of the resulting mix being known, the unknown quantities can be scaled off on the diagram by proportion. A. W. CONTIERI

Yellowing phenomenon in coating compositions. I. Oil vehicles. EDWARD F. MALONEY. **II. Water vehicles.** F. C. ATWOOD. *Am. Paint & Varnish Mfrs.' Assoc., Circ.* No. **370**, 461–73; *Am. Paint J.* **14**, No. 52D, 25; *Paint, Oil & Chem. Rev.* **90**,

No. 17, 80–3; *Oil, Paint & Drug. Rep.* **118**, No. 19, 54–5(1930).—The theories of yellowing of oil paints are briefly reviewed, 17 references being given. While a slightly elevated temp. accelerates the yellowing of oil vehicles, temps. below 225–50° do not affect water vehicles. Data are given for the hiding power of 15 common pigments in a casein vehicle (compn. not given). Max. hiding power in sq. ft. per gal. of paint was obtained with lithopone which gave 305 sq. ft./gallon. Some of the other values were Titanox-B, 245; Eng. whiting, 163; barytes, 112. The detns. were made on black and white checkered linoleum (cf. *C. A.* **24**, 2312). G. G. SWARD

Surface protection of the light metals. TH. LEIB AND FR. KOLKE. *Korrosion Metallschutz* **7**, 3–11(1931).—This is mostly a discussion of the problems encountered. The use of the Jirotka–Bengough process and of combinations of oil-base and nitrocellulose-base coatings is recommended. Data are given showing the resistance of such coatings against accelerated tests and outdoor exposure. The use of oil-base coatings, applied in 3 thin successive coatings, is recommended. Among the pigments, zinc chromate and iron oxide were found to be the best. Good results were also obtained with zinc white. Expts. were made with the application of oven-drying coatings on untempered lautal, in such a manner that the drying and tempering took place simultaneously. The advantage is that parts treated in this manner can be stored for a longer period of time without danger of corrosion. If such parts are to be exposed to sea water, addnl. protective coatings must be applied. LEOPOLD PESSEL

"Improved" linoleum brush-out test for hiding power. STANLEY A. LEVY. *Am. Paint & Varnish Mfrs.' Assoc., Circ.* No. 377, 135–6(1931).—Results of expts. with a brush-out board (cf. *C. A.* **24**, 2312) whose squares conform in brightness to the specifications of the A. S. T. M. are satisfactory. G. G. SWARD

The nature of the resins in jack pine [*Pinus banksiana*]. HAROLD HIBBERT AND JOHN B. PHILLIPS. *Can. J. Research* **4**, 1–34(1931).—Green and seasoned jack pines have an av. crude resin content of 4.58% and an ether-sol. content of 3.52%. The value of "total acids" present in the resin was the same in each case, but the proportion of "fatty" acids was greater in green wood, while the unsaponifiable matter was considerably less. The seasoned wood contained a lower percentage of fats than the green wood and a correspondingly higher percentage of resin acids. The amt. of unsaponifiable, polymerized terpenic substances was also higher. There was a marked decrease in the amts. of phytosterol and "resene" in the seasoned wood. The isolated resin acids obtained by distn. or esterification contained a high percentage of abietic acid formed by transformation of the original acids. The percentage of natural (pimaric) acids was, however, quite high in the resin acids isolated by petr. ether and recrystd. only twice. A higher percentage of cryst. acids was found in the resin acids from green wood than from seasoned wood, presumably because of the change into amorphous products during storage. The fatty constituents were chiefly members of the unsatd. series, present both as free acids, glycerides, or other esters. The seasoned wood contained much less linolic acid in the glycerides than green wood. Oleic acid was present in about the same proportion in both cases; linolenic was present in only very small quantity. The free fatty acids had practically the same percentage compn. in both green and seasoned wood. The amt. of the total unsatd. fatty acids was higher in the glycerides and free acids from green wood than from seasoned wood. The latter contained a high percentage (30.2%) of oxidized acidic material in the fatty glycerides, indicating that extensive polymerization, or decompn. of some kind, had taken place in the fats present in the green wood during the time of seasoning. The quantities of essential oil obtained from the resins of each kind of wood were very small, amounting to 1.5 to 4.3% of the total crude resins. The products showed no difference in properties, or variation in amt., with time of storage of the wood. Because of the small quantity available for investigation, only α-pinene could be identified. The percentages of phytosterol and resene were extremely small, and were appreciably less in the seasoned wood than in the green wood. The amt. of polymerized terpenic material found in the unsaponifiable matter was much higher in the seasoned wood. This was probably due to extensive polymerization of the essential oil having taken place during the storage of the wood. J. W. SHIPLEY

Preparation of synthetic resins from alkali lignin. MAX PHILLIPS AND HERMAN D. WEIHE. *Ind. Eng. Chem.* **23**, 286–7(1931).—The condensation of lignin with various aromatic amines and with furfural yields sol., dark, fusible resins. Possible uses for the products are suggested. W. A. LA LANDE, JR.

Cr oxide [for use as a pigment] (Brit. pat. 336,671) 18. Asphalt or tar compositions

[for paint] (Fr. pat. 694,789) **20.** Nitrocellulose from wood-pulp board [for varnishes] (Brit. pat. 336,235) **23.** Organic isocolloids [for varnish] (Fr. pat. 694,339) **10.**

Paints. N. V. DE BATAAFSCHE PETROLEUM MAATSCHAPPIJ. Fr. 694,640, April 28, 1930. The agglomerating agent for colors contg. metals is used in the form of an aq. dispersion. An example is given of the mixt. of Al powder in white spirit which is poured into an aq. dispersion of asphalt and the whole is stirred.

Bituminous paint. CRAIGBANK CHEMICAL CO., LTD., and J. H. TAYLOR. Brit. 336,117, Oct. 26, 1929. A paint comprising bitumen or pitch, a volatile solvent such as turpentine, a pigment or mineral filler such as PbO and a vegetable drying oil such as boiled oil is stated to be improved by the addn. of 5–15% of tannic acid.

"Weather-resistant" paints. I. G. FARBENIND. A.-G. Brit. 336,198, May 2, 1929. Paints such as those formed with the usual drying oils, have incorporated with them such a quantity of a basic pigment such as white lead and minium, as is necessary to combine into soaps all free and combined fatty acids present in the binding agent. Other inert constituents such as colcothar, titanium white, lithopone or blanc fixe may also be added. Examples with details are given. Cf. *C. A.* **25**, 1691.

Anti-rust paint. ADOLF SCHNEIDER. Fr. 694,833, May 1, 1930. Fe or its oxides are heated in the presence of O to 750–1100° for a sufficient length of time to produce the gray highly oxidized compd., which is used in a finely divided state with suitable carriers or binders.

Pigments. TITANIUM PIGMENT CO., INC. Ger. 516,314, Nov. 11, 1926. See Brit. 281,459 (*C. A.* **22**, 3543).

Zinc colors. COMPAGNIE DES MINES, FORGES ET ACIÉRIES DE VITKOVICE and ADOLF ANDZIOL. Fr. 694,290, Apr. 22, 1930. An app. is described for treating pyrites with gases contg. H, for the production of H_2S, which is used for the manuf. of Zn colors from Zn lyes.

Lithopone. SACHTLEBEN A.-G. FÜR BERGBAU UND CHEMISCHE INDUSTRIE. Brit. 336,839, Dec. 5, 1928. For rendering lithopone weather-resisting, it is quenched, after calcination, in water contg. water-sol. sulfates such as $MgSO_4$ or Na_2SO_4, and if the lithopone does not naturally contain some sol. Ba salts a small proportion of a salt such as $BaCl_2$ or Ba sulfide may be added to it before the calcination, so that the sulfate treatment may form $BaSO_4$ around the particles of lithopone. Cf. *C. A.* **25**, 222.

Printing inks and pastes. I. G. FARBENIND. A.-G. Brit. 337,199, Oct. 31, 1929. The process for prepg. printing inks and pastes described in Brit. 307,877 (*C. A.* **24**, 252) is modified by substituting, for the resinous products used, unhardened sol. products produced by the condensation of "polybasic" org. acids with polyhydric alcs. and one or more "monobasic" carboxylic acids contg. at least 7 C atoms, such as the product which may be prepd. by heating together glycerol, linseed oil, phthalic anhydride and colophony dissolved in toluene, which may be ground with Lithol Fast Scarlet R. Various other materials may be added such as sol. cellulose derivs., solvents, plasticizers, driers, etc.

Treating drying oils. GUSTAV RUTH AKT.-GES. and ERICH ASSER. Fr. 694,074, Apr. 17, 1930. Useful products are obtained by heating drying oils, particularly linseed oil or a mixt. of linseed oil and china wood oil, to about 270–280° until polymerization commences. Air is then bubbled through and the heating continued to 310° or more. Cellulose esters or ethers may be added.

Nitrocellulose varnish. KAZUO TAKEMURA (50% to Kazue Oiwa). U. S. 1,791,879, Feb. 10. A coating compn which is especially suitable for use on ironwork comprises nitrocellulose together with mixed solvents and about 3% of $K_4FeC_6N_6$ and pulverized bamboo (suitably about 5%).

Nitrocellulose lacquers, etc. W. J. JENKINS and IMPERIAL CHEMICAL INDUSTRIES, LTD. Brit. 336,615, April 11, 1929. Compns. for the prepn. of enamels or lacquers are made by dissolving water-wet nitrocellulose in a solvent which evaporates in air at normal temps. and has a b. p. not less than about 120° (such as ethylene glycol monoethyl ether or BuOAc) with the addn. of a water-miscible or partly miscible volatile solvent such as industrial alc. or EtOAc in sufficient quantity to keep the water in soln. A solvent of higher b. p. than the main solvent also may be added such as methylcyclohexanone, and water-wet or moist pigments may be added also, as may ingredients such as dammar gum, tricresyl phosphate and the like.

Coloring nitrocellulose lacquers and plastics. I. G. FARBENIND. A.-G. Ger. 516,315, Aug. 29, 1929. Addn. to 515,057 (*C. A.* **25**, 1692). The dyes obtainable from hydrochlorides of dialkylated nitrosoanilines and monoalkylated *m*-aminophenols are used, instead of the dyes specified in Ger. 515,057.

Lacs and varnishes. JOHANNES SCHEIBER. Ger. 513,540, Feb. 21, 1928. Linoleic

acid isomers (octadecadien-9,11-acid-1) obtained from ricinoleic acid are esterified with multivalent alcs., especially glycerol, and the product is used for the manuf. of lacs and varnishes. Resin may be added. Thus, technical ricinoleic acid is heated to 200° and distd. *in vacuo*. The product going over at 260–270° is heated to 200° with glycerol to give a bright oil. Other examples are given. Cf. *C. A.* 25, 1400.

Coating composition. VICTOR H. TURKINGTON (to Bakelite Corp.). Can. 308,848, Feb. 24, 1931. Resinous compns. are prepd. by reaction of 100 parts of cresol, 200 parts of tung oil and 25 parts of $(CH_2)_6N_4$ at a temp. of 190–200°. Cf. *C. A.* 25, 834.

Coating compositions containing *m*-styrene and softeners. WALTER E. LAWSON (to E. I. du Pont de Nemours & Co.). U. S. 1,792,102, Feb. 10. Compns. suitable for coating metals, glass, wood, etc., comprise *m*-styrene and tricresyl phosphate, dibutyl phthalate, dixylyl ethane, glyceryl dibenzyl ether, butyl stearate or homologs of these compds. Cf. *C. A.* 24, 980.

Coating metals with synthetic resins. HEROLD A.-G. Brit. 337,192, April 30, 1929. Solns. of phenol-aldehyde artificial resins are applied to metal surfaces while the latter are at a temp. above the b. p. of the solvent (which may be "spirit") to evap. the solvent and the coatings are hardened by heating. The rate of hardening may be restricted by the use of incomplete condensation products or by dilg. the coating soln. with cresols, glycerol, glycol or high b. p. polyglycols, or addn. of solids such as feldspar, zirconia or kieselguhr.

Purifying and decolorizing rosins. ROBERT C. PALMER and CLYDE O. HENKE (to Newport Co.). U. S. 1,791,633, Feb. 10. Rosin dissolved in a volatile hydrocarbon material such as petroleum naphtha is treated with resorcinol at a temp. (suitably about 90–110°) at which the resorcinol is in liquid form and below the b. p. of the hydrocarbon material, and, after agitation, the materials are allowed to stand and the liquid resorcinol layer contg. the impurities is removed. Cf. *C. A.* 25, 424.

Rosin decolorization and purification. DURAIN C. BUTTS (to Hercules Powder Co.). U. S. 1,791,658, Feb. 10. Rosin is heated in an inert atm. such as CO_2 to a temp substantially within the range of 280° to 350° while avoiding substantial decompn. or distn.

Inlaid linoleum. W. O. L'ESTRANGE. Brit. 336,277, July 8, 1929. Mech features.

Condensation products from vinyl esters. I. G. FARBENIND. A.-G. Brit. 336,237, Nov. 16, 1928. In the production of polymerization products such as those of vinyl acetate, chloroacetate, chloride and benzoate and of lacquers from the resinous derivs thus obtained, there is added (before, during or after the polymerization) a small proportion of a basic substance sol. in org. solvents such as guanidine or its derivs., hydrazine or its derivs., ethylamine, formaldehyde or phenylhydrazones, and N compds. having plasticizing properties (such as a condensation product of urea and formaldehyde) also may be added. Benzoyl peroxide also is added in polymerizing vinyl benzoate. The production of *lacquers* is described. Cf. *C. A.* 25, 389.

Molded articles from synthetic resin compositions. BAKELITE CORP. Brit. 336,265, July 10, 1929. Articles with a raised surface design are made by applying a colored mixt. (such as a plastic phenol resin and bronze or other pigment) to a phenol resin compn. in a partially cured state and then completing the curing. Various details of procedure are described.

Colored molding mixture containing a synthetic resin. BAKELITE CORP. Brit. 336,264, July 10, 1929. A mixt. comprising a potentially reactive resin, a filler such as wood flour and a pigment is subjected to extrusion whereby the colored particles are distributed along definite flow lines.

Molding articles of artificial resin. HEROLD A.-G. Brit. 337,184, Oct. 24, 1928. Articles of artificial resin such as balls, tubes or dishes are cast by the use of a cast mold of Pb or other easily fusible metal within an outer mold which may be made by either casting or dipping. Various structural details are described.

Modifying resins, waxes and fatty oils. HERBERT HÖNEL. Austrian 120,679, May 15, 1930. Resins, waxes and fatty oils are heated with a subordinate amt. of a primary condensation product obtained under alk. conditions from CH_2O and a phenol having a hydrocarbon substituent in the *p*-position to the OH group. In this way, the resins and waxes are rendered harder and of higher m. p., and fatty oils are made more viscous. Thus, an oily condensation product from *p*-amylphenol and CH_2O may be introduced into 5 times its wt. of a fused coumarone resin m. 50–55°, the temp. being gradually raised to 200°; a clear resin m. 70–75° is obtained. Other examples and addnl. details are given.

Synthetic resins. IMPERIAL CHEMICAL INDUSTRIES, LTD., and R. HILL. Brit.

336,698, Aug. 3, 1929. Blending of monohydroxylated fatty oils such as drying oils with resins such as those formed from glycerol and phthalic anhydride or similar components is facilitated by replacing some or all of the polyhydric alc. by a reaction product of a polyhydric alc. with a lower aliphatic aldehyde such as CH_2O; *e. g.*, glycerol and polymerized CH_2O are condensed together, then phthalic anhydride and tung oil or linseed oil, or phthalic anhydride, tung oil, colophony and glycerol are added and the mixt. is heated until a homogeneous resin is produced. Varnishes prepd. from such products dry rapidly in the air or when heated and their drying may be facilitated by adding substances such as Co linoleate.

Synthetic resins. BAKELITE CORP. Fr. 694,047, April 16, 1930. White masses of compns. having a basis of phenol resinoid are made by the reaction of phenol about 100 with CH_2O about 200 and di-Et phthalate 70 parts in the presence of oxalic acid acting as catalyst. Water is removed from the reaction mass, a volatile solvent is added and the whole mixed with "albalith." The liquid mixt. thus obtained is applied to a filling material. The app. used must not contain Fe or Cu. Cf. *C. A.* **25**, 1400.

Synthetic resins. EDGARD ISRAEL. Fr. 695,036, Aug. 7, 1929. Urea and CH_2O are condensed with glucose or lactose as condensing agent, in the presence of a metallic oxide, preferably ZnO, and polymerized at 80°.

Artificial resins of the glycerol phthalic anhydride type. BAKELITE CORP. Brit. 336,645, July 10, 1929. A "polybasic" acid such as phthalic anhydride or succinic acid and a polyhydric alc. such as glycerol are heated together until "slag formation" begins and the reaction is then arrested by rapidly cooling the mass throughout so that transformation to a "slag condition" is prevented (as by casting in thin layers). The product may subsequently be baked for hardening or may be broken up, remelted and cast. Dyes may be added and various details of temps. employed, etc., are given.

Artificial resins. COMPAGNIE FRANÇAISE POUR L'EXPLOITATION DES PROCÉDÉS THOMSON-HOUSTON. Fr. 694,669, Apr. 29, 1930. Artificial resins are prepd. by the reaction of amines such as $PhNH_2$ with insufficient aldehyde, then adding more aldehyde and heating under pressure to cause the resin to pass to the infusible state.

Artificial resins. IMPERIAL CHEMICAL INDUSTRIES, LTD. Fr. 694,181, April 18, 1930. Rapidly hardening resins are made by the union of a polybasic acid-polyhydric alc. resin with a condensation product of CH_2O and urea or thiourea or with substances capable of giving a product of this kind, this union being effected in an alc. solvent and with the aid of heat. As solvents ethylene chlorohydrin, BuOH or hexahydrophenol may be used. Cf. *C. A.* **24**, 740.

Artificial resins. LOUIS C. F. PÉCHIN. Fr. 694,978, May 5, 1930. Artificial phenol-aldehyde resins are hardened by heating them under vacuum to 95–105° in vessels placed in an oil of low d., and then to 140–180° under atm. pressure still in the oil. Cf. *C. A.* **25**, 1692.

27—FATS, FATTY OILS, WAXES AND SOAPS

E. SCHERUBEL

Determination of the fat content of oil seeds. M. MONHAUPT. *Chem.-Ztg.* **55**, 70(1931).—M. modifies Dopfer's method for the detn. of fat in oil seeds as follows: place 4 g. of the ground seed in a round-bottom, heavy glass bottle together with 40 cc. of gasoline b. 40–60°, 10–12 g. of sand and 5 or 6 steel balls of 10–12 mm. diam. and grind in a shaking machine for 1–2 hrs. or until apparently "dust-free"; allow to settle, evap. 20 cc. of the gasoline ext., weigh and calc. the % of fat according to the formula: $x = (100 \times 40 \times f)/4(20-1.0753f)$, in which f is the wt. of the oil residue from 20 cc. gasoline soln., and 1.0753 is the sp. gr. factor for oil (1.00/0.93). P. ESCHER

The determination of unsaturation of fats and acids. III. Wijs iodine number. J. VAN LOON. *Chem. Umschau Fette, Oele, Wachse u. Harze* **37**, 257–62(1930); cf. *C. A.* **24**, 3663.—The Wijs method for detn. of I no. shows the theoretically true unsatn. value when correct exptl. conditions are selected, except with triple bonds which become only ½ satd. by halogens. There is no substitution by I even in prolonged action of the reagent. For official analyses the I no. of the acids (after removal of the unsapon. matter) should be detd. in addn. to that of the oil, because their I no. is more const. than that of the oil. If the total acids show an I no. which increases on continued action of the reagent, a polymerized product or some unknown acid may be present. The Wijs method satisfies all scientific requirements and is applicable to general fat chemistry. P. ESCHER

Some physical constants of fatty acids. (Specific heat, viscosity, absorption of

ultra-violet light.) E. L. LEDERER. *Allgem. Öl- u. Fettztg.* **27**, 237–41(1930).—The sp. heats of stearic, lauric and oleic acids were measured at several temps. and calcd. for others. A new formula for calcn. of viscosity, based on thermodynamic principles, is derived: $\log n = (q°/4.571\ T) - 2.75 \log T + ET + C$, where n = coeff. of viscosity (in poises), T = temp., $q°$ = heat of assocn. at 0° (cal. per mol.), E = const., C = const. The values of $q°$, E and C for the following substances are, resp., butyric acid 1960, 0.001770, 2.9952; valeric acid 2330, 0.001663, 2.9050; caproic acid 2740, 0.001401, 2.8200; heptylic acid 3210, 0.001470, 2.5791; caprylic acid 3475, 0.001576, 2.4883; nonylic acid 3655, 0.001696, 2.4160; capric acid 3700, 0.001992, 2.3865; myristic acid 5030, 0.001670, 2.0221; stearic acid 5490, 0.001907, 1.7920; pentane 724, 0.002097, 3.0077; water 5825, 0.008222, —1.9613. The values of n for butyric acid at 8 temps. between 0° and 160° were calcd. and found to agree within 2.2% with the values given in the tables of Landolt-Börnstein. Measurements of the absorption of ultra-violet light were made on the satd. fatty acids in the liquid state, rather than in soln. In making the measurements a photoelec. Na cell was used instead of a photographic plate. In this way it was possible to make more accurate measurements than heretofore. It was found that all the fatty acids observed showed sp. absorptions of the wave lengths between 270 and 280 mμ. This sp. absorption was observed in synthetically prepd., as well as in naturally occurring, fatty acids but not in triglycerides. It was further observed that the sp. absorption for the shorter chain acids was for the shorter wave lengths. Thus the sp. absorption range was between 270 mμ for propionic acid, and 280 mμ for stearic acid. The cause for this sp. absorption has not yet been definitely established. W. F. BOLLENS

Method for estimation of total unsaturated fatty acids of higher unsaturation than oleic acid in fats and oils. N. BASKIN. *Allgem. Öl- u. Fettztg.* **27**, 243–4(1930).—The method is based on the conversion of unsatd. fatty acids of high mol. wt. into ether acids (cf. *C. A.* **24**, 2142). The sapond. fat carrying excess alkali of 0.1% is polymerized in an atm. of H_2 for 2–3 hrs. at a temp. of 290°. This procedure reduces the unsatn. of those fatty acids contg. more than 1 double bond to that of oleic acid. The difference in I nos. of the sepd. fatty acids before and after polymerization is called the "Mutit" no. and is a measure of the fatty acids contg. more than 1 double bond. The "Mutit" no. of several oils is given: olein (tech.) 1.2, peanut oil 23, cottonseed oil 50, soy-bean oil 50, sunflower-seed oil 46, linseed oil 90, herring oil 54, cod-liver oil 74.1. W. F. BOLLENS

Characteristic fatty acids of vegetable and animal fats with reference to the biological families in which they occur. T. P. HILDITCH. *Allgem. Öl- Fettztg.* **27**, 219–22, 255–8 (1930); cf. *C. A.* **24**, 4176.—A compilation is made of the percentage fatty acid compn. of a large no. of fats and oils arranged according to the biological families in which they occur. W. F. BOLLENS

Manipulation and evaluation of the Mackey test. KEHREN. *Seifensieder-Ztg.* **58**, 29–32(1931).—K. summarizes former exptl. results as follows: The real cause of the temp. increase in the Mackey test is the rapid oxidation of the linolic or linolenic acid when present in the olein to be tested. This temp. increase is accelerated by iron soaps or other pos. catalysts and is inhibited by neg. catalysts like β-naphthol. The presence of soaps should be confirmed by an ash detn. (upper limit less than 0.07%) and by a qual. test for Fe. When present, the temp. test should be repeated after removing the Fe soap from the sample by extn. with dil. HCl. The I no. and Kaufmann's thiocyanate no. should be detd. to detect any presence of linolic acid if a neg. catalyst is suspected. The presence of much unsaponifiable matter also reduces or retards the temp. increase. The standard limit of 100° or 150° after 1 hr. should be modified, since oleins which contain acids with more than 1 double bond show a rapid temp. increase after ¾ hr., the cotton being more or less carbonized. Directions for making the test are given in much detail. P. ESCHER

Further notes on the Mackey test. H. WOLF AND R. HEILINGÖTTER. *Chem. Umschau Fette, Oele, Wachse u. Harze* **38**, 24–5(1931); cf. *C. A.* **25**, 429.—The selection of the material for the cotton-bearing cylinder may well be left to the (German) Olein Commission. The samples of olein should be tested in the same condition as received; it would be illogical to attribute the temp. rise due to the presence of any soap to the presence of "unsatd. fatty acids" in an otherwise unobjectionable sample. The soaps cause a temp. rise only after prolonged (1.5 hrs.) heating at 100°, while unsatd. acids usually show a temp. rise at a low temp. after ¾ hr. An olein becomes a fire hazard through the presence of unsatd. acids, not by the presence of soaps. The present tendency is to reduce the time of heating to 1 hr. rather than to increase it to 3 hrs. The moment the thermometer in the cotton registers 70° should be considered the start-

ing time of heating. It is not necessary to pass a stream of air through the app., since the natural ventilation through the tubes is sufficient. P. ESCHER

The pyrolysis of vegetable oils of high acetyl value. RAYMOND DELABY AND RAYMOND CHARONNAT. *Bull. sci. pharmacol.* **38**, 17–23(1931). A. E. MEYER

Yield differences in the oil mill. E. I. BETTER. *Chem. Umschau Fette, Oele, Wachse u. Harze* **38**, 33–4(1931).—B. calls attention to unaccounted for differences (about 1%) in the oil mill between the calcd. yield based on lab. analysis and the actual yield in the factory. It is suggested that this difference is due to phosphatides or lipoids showing different solubilities under lab. and factory conditions. P. ESCHER

Analysis of refined (olive) oils. GAETANO MAROGNA. *Atti III congresso naz. chim. pura applicata* **1930**, 564–8.—From chem. and phys. tests of a great many samples of olive oil it is concluded that refined oil from the first extn. acts like a true olive oil as regards chem. and phys. consts. and various analytical tests; the exceptions are the Wood light test and the Bellier test. Oils from the second extn. show a reduction in av. quality and chem. and phys. tests. The characteristics of edible olive oil should be standardized strictly. Oils which have a n above 62 8, a thermal index above 47, unsaponifiable content above 1.5%, and which do not correspond to the Bellier, Blarez and Fachini-Morawsky tests should be excluded. Addn. of refined, first-extn. olive oil should be limited, so as not to vary these tests. E. M. SYMMES

Correlation of oil content to presence of color in the stem of castor (Ricinus communis). G. B. PATVARDHAN. *Poona Agr. Coll. Mag.* **22**, 16–8(1930).—In 32 samples of beans from red-stemmed castor plants the oil content ranged from 40.45 to 54.97% with an av. of 45.94%, while in 24 samples from green-stemmed plants the oil content ranged from 35.75 to 54.24% with an av. of 51.22%. The analyses were made on seed of parents which had proved true to stem color in the succeeding generations. K. D. JACOB

Detection of castor oil and peanut oil in abrasin oil. HANS WOLFF AND J. RABINOWICZ. *Farben-Ztg.* **36**, 596–7(1930).—Castor oil can be detected by the formation of octyl alc. on fusion with KOH. The amt. can be calcd. from the acetyl values of the sample and of an EtOH (80–85%) ext. Peanut oil can be detected by the formation of arachidic acid and detd. by means of its n, which is 1.468–72; that of abrasin oil is 1.517. G. G. SWARD

Suggestions for the proposed unified methods of analysis of Turkey-red oil and similar products. WIZÖFF. *Chem. Umschau Fette, Oele, Wachse u. Harze* **38**, 34–7 (1931).—This is the text for the proposed standard methods of analysis as worked out by the German Commission for Fat Analysis jointly with the Intern. Soc. of Leather Chemists, the National Comm. of Trade Specifications and the Union of Turkish Red Oil Mfrs. The methods are based on extensive analytical investigations and on control checks by public analysts, but cover only sulfonated oils whose SO_3 can be completely split off by boiling HCl. P. ESCHER

Constituents of the leaves of pine (Pinus Thumbergii). I. JENJIRO SAKURAI. *J. Pharm. Soc. Japan* **51**, 34–9(1931).—S. isolated from the petr. ether ext. of the leaves of pine a wax-like substance (I) which had the following phys. properties: d^{17} 0.9201, m. 78–80°, acid no. 29.84, sapon. no. 218.90, ester no. 189.06, sapon. no. after acetylation 219.18, and I no. 7.55. Sapon. of I (100 g.) gave mixed solid fatty acids (II) (85 g.). II was esterified and fractionated into the following constituents: lauric, palmitic, stearic, hydroxypalmitic acids. F I. NAKAMURA

Textile soap. G. T. HALBERSTADT. *Proc. Am. Assoc. Textile Chem. Colorists* **1931**, 67–70; *Am. Dyestuff Reptr.* **20**, 109–12(1931).—A review. M. H.

Lime-proof soaps. W. SCHRAUTH. *Seifensieder-Ztg.* **58**, 61–3(1931).—The usual lime-proof soaps are the Na salts of sulfonated fatty acids which keep the Ca soaps, formed by hard water, in such a finely divided state that they are not deposited upon the fabric of the washed goods. S. describes a new type of soap-like salts made by reducing the higher fatty acids to their alcs., sulfonating them and converting the sulfonates into their Na salts of the general formula RCH_2SO_3Na. These salts have the properties of soaps, excelling in emulsifying power; lauric Na sulfate shows with Traube's surface tension pipet 29 drops in spindle oil against 17 drops for regular coconut-oil soap. They are not easily hydrolyzed and are very stable toward Ca and Mg salts. P. ESCHER

Rancidity of soaps and its relation to the properties of fats. F. WITTKA. *Seifensieder-Ztg.* **58**, 3–5(1931); cf. *C. A.* **25**, 613.—W. prepd. soaps from various fats and examd. their keeping quality toward oxidation in the presence and absence of catalysts and light. Of the hardened fish oils whale oil resists oxidation most, herring oil is equiv. to edible tallow, sardine oil turns brown on exposure to light or to catalysts; the latter

2 oils on standing take on an intense odor of hardened oil; peanut, sesame and palm-oil are sensitive to air and light. Coconut oil and its soap keep longest; soaps from palm-kernel oil and Babassu fat do not keep quite as well. Soaps from corn, grape-kernel and linseed oil soon turn rancid even without catalysts. Soaps with 15% or less of WW or FG rosin show little change, but larger quantities make them unstable and sticky.
P. ESCHER

Moisture determination in soaps and fats by distillation. E. SCHLENKER. *Seifensieder-Ztg.* **58**, 96–7(1931).—From lab. expts. S. concludes that H_2O detns. in soaps by the distn. method with petr. benzine yield low results, unless a sufficient amt. of olein (20 g. per 30 g. soap flakes) has been added before distn.; addn. of dry sand is superfluous. Butter needs no olein addn., and correct results are obtained by direct distn. with petr. benzine. S. prefers xylene in place of petr. benzine, since the latter holds some of the distd. H_2O in min. suspension. P. ESCHER

Indirect estimation of potassium and sodium in filled potassium-sodium soaps. G. KNIGGE. *Allgem. Öl- u. Fettztg.* **27**, 223–5(1930).—The indirect method of Davidsohn (*C. A.* **24**, 3669) is proved with a soap of known compn. Ground pumice is used as the filler. The results check very well with known compn. and also with results obtained by the perchlorate method. W. F. BOLLENS

Surface tension of alkaline soap solution. SUTEZO OGURI. *J. Soc. Chem. Ind., Japan* **33**, Suppl. binding 471–4(1930).—A modified Millard's app. was used to det. surface tension by the drop-wt. method. All measurements were made at 40°, and the tip of the pipet had a radius of 3.23 mm. The surface tension was calcd. from Tate's law $2\pi r\gamma = mg$, in which $2\pi r$ = the circumference of the tip, γ = surface tension, m = effective mass of the drop, and g the acceleration due to gravity. One table and 3 graphs are given. E. SCHERUBEL

The effect of cleansing agents on linen and cotton (SIMOLA) **25.** Determination of vegetable oils in butter (DE SOUZA VIEIRA) **12.** Structure of synthetic mixed triglycerides (BHATTACHARYA, HILDITCH) **10.** Apparatus for extracting gases from oils (Fr. pat. 693,985) **1.** Fractional condensation of oil vapors (Ger. pat. 513,613) **22.** Residue of sulfonic acids from oil-refining [fat-splitting agents] (Fr. pat. 694,236) **18.** Modifying waxes and fatty oils (Austrian pat. 120,679) **26.** Continuous production of dispersions of waxes (U. S. pat. 1,792,067) **22.**

Extracting oils and fats. C. SCHLOTTERHOSE and H. BRANDT (trading as Schlotterhose & Co.). Brit. 337,079, March 28, 1929. The extn. process described in Brit. 316,881 (*C. A.* **24**, 2002) is modified by subjecting the material to be extd. to a treatment with the vapor of the solvent, in direct or countercurrent, in addn. to or instead of treatment with liquid solvent. Various details of app. and procedure are described.

Extraction of oil, etc., from soy beans. M. SATO and C. ITO. Brit. 336,273, June 10, 1929. Extn. with a solvent such as EtOH is effected at a temp. above the b. p. of the solvent but below 120° (suitably at about 85°), and the soln. of fatty oil is drawn off and cooled to below 50° to sep. oil and obtain a liquid residue contg. coloring matter, sugar and lecithin. Brit. 336,274 (M. Sato and Y. Ishida) describes the extn. of soy beans and the like with a solvent such as alc. admixed with benzine or benzene of such concn. and quantity that the water in the resulting liquor is less than 10%. Extn. is effected above 65° and oil is sepd. by cooling. An arrangement of app. is described.

Extracting oleaginous materials with solvents such as in degreasing bones. JOSEPH SAVAGE. U. S. 1,791,906, Feb. 10. A volatile hydrocarbon solvent is circulated in a closed circuit through an extn. chamber, passing through the chamber as vapor, under superatm. pressure; the vapors are condensed, extd. water is automatically sepd., and hot sepd. solvent is returned to the circuit at a temp. near the b. p. of the solvent at the pressure existing in the circuit. App. is described.

Glycerol distillation. I. G. FARBENIND. A.-G. Brit. 336,608, July 12, 1929. Crude glycerol is treated, at its b. p. under the reduced pressure employed (suitably 20 mm. or 30 mm.) with finely divided liquids (such as wet steam or a mist of CCl_4 or benzine assocd. with air or CO_2) inert to glycerol and having a b. p. not exceeding that of water and assocd. with gaseous or vaporous carriers (the operation being continuous). Various details and examples are given.

Stabilizing fatty substances and soaps. R. T. VANDERBILT CO., INC. Fr. 694,286, Apr. 22, 1930. Fatty substances and soaps are stabilized by the addn. of a phenolate prepd. by the reaction of a phenylphenol such as 2- or 4-hydroxybiphenyl with a base which is itself a stabilizer such as diphenylguanidine, triethanolamine or an alkylene-

diaryldiamine. If the fatty substance or soap is animal or vegetable a *p*-phenylphenol is used, if mineral an *o*-phenylphenol is used. Cf. *C. A.* **25**, 430.

Soaps. A. IMHAUSEN. Brit. 335,954, May 6, 1929. Soaps of high lathering power comprise grain soap and coconut oil or palm-kernel oil paste soap contg. little salting-out agent. Various details of manuf. are given.

Soap. ALBERT A. BESNARD. Fr. 695,028, Aug. 6, 1929. A soap which cleans the hands without water contains agar-agar 2, psillium 3, glycerol 50, Na_2CO_3 50, black soap in pulp 50, "NH_3" 25, Javel water 5 and distd. water 815 parts.

Soap. CARLOS CONEN. Fr. 694,220, April 19, 1930. A soap is made by adding naphtha benzine or refined petroleum to a fatty acid and adding an alk. substance such as Na_2CO_3 in the dry state.

28—SUGAR, STARCH AND GUMS

J. K. DALE

Defecation of cane sugar juices. NATHAN LEVY W. *Bull. assoc. chim. sucr. dist.* **47**, 502–3(1930); cf. *C. A.* **4**, 3310.—The author reviews his method for detg. the right amt. of lime for defecation of cane juices. F. CAMPS-CAMPINS

The use of lime and sulfurous acid in the defecation of sugar juices. NATHAN LEVY W. *Bull. assoc. chim. sucr. dist.* **47**, 500–2(1930).—The harmful effects of too much or too little lime in the defecation of cane sugar juices are reviewed. If excess lime is added and then followed by SO_2 to neutrality, all the evil effects of excess lime are produced and the subsequent SO_2 does not destroy them. The author advocates sulfitation before, instead of after, liming. A slight excess of SO_2 is not harmful; the right amt. of lime, as detd. on raw juice, is then added. There will be no deleterious result even though the resultant juice is slightly acid. F. CAMPS-CAMPINS

Advances in beet-sugar manufacture in 1930. EDMUND O. VON LIPPMANN. *Chem.-Ztg.* **55**, No. 17, *Fortschrittsber.* No. 1, 33–6(1931). E. H.

The "Werkspoor" rapid crystallizer. R. BONATH. *Intern. Sugar J.* **32**, 306–9 (1930).—The earlier method of operating crystallizers was in series, utilizing the surrounding air for cooling. Further developments were made with cooling jackets, and later fixed internal tube systems were adopted. A more successful type was developed by Lafeuille, who introduced a fixed tubular system, around which the hermetically closed cylinder contg. the massecuite rotated. The requirements of a crystallizer are (1) shortening the period of fermentation, (2) avoidance of formation of false grain, (3) simple and substantial design. The "Werkspoor" crystallizer consists of a trough which may be either U- or bottle-shaped. The revolving water-cooled stirring system consists of a hollow drum, of large section, riveted to which are a number of semicircular hollow cooling pockets coupled by suitable pipe connections inside the central drum. The transport of the massecuite from one end to the other of the crystallizer is effected by a screw-shaped element placed outside and independent of the cooling pockets. W. L. OWEN

Starches and the constitution of starch. ST. V. NÁRAY-SZABÓ. *Z. physik. Chem.*, Abt. A, **151**, 420–4(1930); cf. *C. A.* **25**, 16.—A discussion of recent work. W. L. HILL

The effect of plowing-under cane trash upon the available N of the soil (OWEN, DENSON) **15**. Potash fertilizers at the "Belle Etoile" distillery (DUBOSC) **15**. An inexpensive crystal or molasses separator (KING) **1**. Sugar anhydrides (MICHEEL, MICHEEL) **10**. N-containing sugars (BERTHO, *et al.*) **10**. Continuous production of dispersions of gums (U. S. pat. 1,792,067) **22**. Extracting [sugar from beet roots] (Fr. pat. 694,602) **17**.

Device for cleaning sugar canes. RALPH S. FALKINER. Ger. 513,928, Mar. 2, 1929.

Apparatus for storing sugar beet in water without loss of sugar. FIRMA R. FÖLSCHE. Ger. 513,927, Dec. 10, 1929.

Apparatus for mixing liquids with solids, particularly for liming sugar juices. GILCHRIST CO. Ger. 516,359, July 19, 1925. Brit. 247,541 (*C. A.* **21**, 668).

Refining sugar. RAFFINERIE TIRLEMONTOISE, SOC. ANON. Ger. 516,360, Oct. 1, 1926. See Brit. 278,302 (*C. A.* **22**, 2680).

Carbohydrate derivatives. I. G. FARBENIND. A.-G. Fr. 694,696, April 30, 1930. Carbohydrate derivs. which are sol. in water and org. solvents and which are useful

for the prepn. of films, lacquers, artificial silk, plastic substances, swelling and impregnating agents, etc., are made by treating a carbohydrate or one of its derivs. with an alkylene oxide or one of its homologs or analogs in the presence of an aq. alkali. Examples are given of the treatment of potato starch, dextrin or cotton with ethylene oxide, propylene oxide, etc.

Dextrose. CORN PRODUCTS REFINING CO. Ger. 513,570, July 22, 1923. Anhyd. dextrose is prepd. from converted starch solns. by crystn. at 57–49°. The crystals are sepd. from the mother sap by centrifuge. Cf. *C. A.* **24**, 4652.

Soluble starch. ROBERT HAAKE and WALTER HAAKE. U. S. 1,792,088, Feb. 10. A highly concd. oxidizing liquid such as NaOCl soln. is added in small quantities to the starch to be disintegrated and mixed with it while maintaining the starch in its powdery condition, thus elevating the heat of reaction to such an extent that the chem. transformation is performed without any residue and a sufficient evapn. is effected of the slight surplus of moisture contained in the treating soln. added.

Starch products. INTERNATIONAL PATENTS DEVELOPMENT CO. Ger. 516,361, July 3, 1928. See Brit. 294,979 (*C. A.* **23**, 2065).

29—LEATHER AND GLUE

ALLEN ROGERS

Tannery effluent. I. Effect of various gases on the nitrogen distribution. EDWIN R. THEIS AND PHILIP KRATZ. *Ind. Eng. Chem.* **23**, 69–71(1931).—The effect of p_H value on evolution of gases from soak waters contg. $NaNO_3$ was that gases were evolved at p_H values 1 to 5, and absorbed at higher p_H values. Bubbling O_2 through soak water promotes formation of NH_3, indicating deaminization; it causes the effluent to become very colloidal in character and retards the formation of volatile sulfides. H_2 furthers the formation of H_2S, causes deaminization with subsequent reduction, and finally causes the formation of volatile acids. H. B. MERRILL

Fat-liquoring of chrome leather. Effect of hydrogen-ion concentrations on oil adsorption. EDWIN R. THEIS AND FRANK S. HUNT. *Ind. Eng. Chem.* **23**, 50–3(1931).—The amt. of oil taken up by chrome leather is studied for numerous mixts. of sulfonated and raw oils and com. fat liquors, as a function of the p_H value of both the skin and the fat liquor. Characteristic curves are obtained for each oil mixt. employed. Relation of the strength of the leather to the kind of fat liquor and to the amt. of oil adsorbed is shown. The adsorption of oil is shown as "oilation" by means of the dilatometer. H. B. MERRILL

A note on the cause of certain red colorations on salted hides and a comparison of the growth and survival of halophilic or salt-loving organisms and some ordinary organisms of dirt and putrefaction on media of varying salt concentrations. MADGE E. ROBERTSON. *J. Hyg.* **31**, 84–95(1931).—Certain brick-red stains on salted hides are produced by the growth of halophilic organisms which come from marine salt used in curing the hides. There are many varieties of these organisms which flourish best in high concns. of salt and fail to grow below 6%. The organisms of dirt and putrefaction, though certain of them survived as high a concn. as 30% for a considerable time, failed to multiply above 8%. The non-halophilic cocci survived at high salt concns. much longer than the non-halophilic bacilli. JOHN T. MYERS

Glue making from chrome-leather scrap by the chromic hydroxide process. C. STIEPEL. *Chem.-Ztg.* **54**, 894 5(1930).—In this process the chrome complex in the leather is changed to a stable, non-tanning hydroxide by "intensive liming." The process is similar to the magnesia process, but the yields obtained with the latter are inferior. The process is far superior to the various acid processes, is economical as regards time, labor and equipment, and yields a glue of good quality. H. B. M.

Protecting leather from fungi (Brit. pat. 336,244) **18.**

Treating hides with liquids for tanning, etc. CHARLES WESLEY NANCE. Ger. 513,929, Dec. 31, 1927. See Brit. 310,823 (*C. A.* **24**, 748).

Treatment of skins before tanning. DAVID L. LEVY. Fr. 694,407, April 24, 1930. Skins are treated with a soln. of mineral or org. acids and alkali, alk. earth or metallic salts before the usual tanning operation. Cf. *C. A.* **24**, 1247.

Tanning agents. I. G. FARBENIND. A.-G. Fr. 694,257, April 22, 1930. Condensation products which are sol. in water and have very pronounced tanning and charg-

ing properties are prepd. by the reaction of urea, its homologs or substitution products and aliphatic aldehydes on di- or poly-hydric phenols of the C_6H_6 series, their homologs or substitution products, preferably in the presence of acid condensing agents. Part of the phenols may be replaced by tanning substances of vegetable origin. Several examples are given. Cf. *C. A.* **25**, 1116.

Tanning compositions. W. SAILER. Brit. 336,984, April 18, 1929. Sulfite cellulose lye, phenols, cresols and natural tanning substances such as a bark ext. are caused to react with enzymes such as phenolases, peroxyidases or dehidrases and with substances yielding O such as H_2O_2 or perborates. The products may be further treated with halogens and are suitable for use preliminary to chrome tanning

Greasing leather. HERMANN BOLLMANN and BRUNO REWALD. Ger. 516,187, Sept. 7, 1927, 516,188, Oct. 25, 1927, and 516,189, Dec. 25, 1927. Addns. to 514,399 (*C. A.* 1704). There is used (1) a mixt. of lecithin and train oil emulsified in a relatively large amt. of water (516,187), or (2) an aq. soln. of lecithin (516,188) or (3) a mixt. or emulsion of lecithin and fatty oil with a small quantity of soap or sulfonated oil, with or without a small quantity of mineral oil (516,189).

Dyeing leather. I. G. FARBENIND. A.-G. (Bartholomäus Vossen, inventor). Ger. 513,842, Feb. 4, 1925. Leather is dyed by acid azo dyes built up by the process amine ⟶ 1-amino-8-hydroxynaphthalene-3,6-disulfonic acid ⟶ resorcinol ⟶ *p*-nitraniline, the amine indicating sulfanilic, picramic or naphthionic acids. The example describes the dyeing of deacidified chrome leather by the dye built up from picramic acid.

Machine for mordanting hides. VEREINIGTE HUTSTOFFWERKE BLOCH & HIRSCH, C. F. DONNER G. M. B. H. Ger. 513,698, Mar. 23, 1929.

Coated fabric [imitation leather]. ARTHUR W. BURWELL (to Alox Chemical Corp.). U. S 1,791,711, Feb. 10. A coating compn. suitable for use in the manuf of "artificial leather" comprises nitrocellulose and a softening agent consisting essentially of the water-insol., satd. aliphatic, high mol. wt., carboxylic acid product obtainable by contacting a free-O-contg. gas such as air with a petroleum hydrocarbon mixt. consisting of a 48 43° Bé. petroleum distillate in the liquid state, in the presence of an "oxidation exciter" such as Mn oleate at a reactive temp. not above about 155° (suitably about 140°) and at a superatm. pressure but not greater than about 350 lb. per sq. in., to the point of incipient formation of petroleum-insol. compds. in the mixt. An app. is described suitable for oxidation of the petroleum distillate.

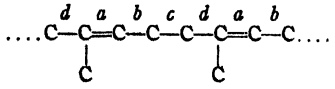
30—RUBBER AND ALLIED SUBSTANCES

C. C. DAVIS

The oil and the lipase-like enzyme in Para rubber seed. YOSHITORA IWAMOTO. *J. Soc. Chem. Ind., Japan* **33**, Suppl. binding 409–11(1930).—Fallen seeds from Malaya were used in the expts. The following data give the kind of seed, the grade of oil from each kind, the color of the oil, its taste and its acid no., resp.: fresh with yellow-white kernel, 1st, faint yellow, sweet, 7.21; older with dirty yellow kernel, 2nd, yellow, bitter, 24.71; partly putrefied, 3rd, brownish yellow, bitter, 77.10; badly putrefied with dark gray kernel, 4th, brown, very bitter, 110.86. The results show that fresh seeds are suitable for practical oil extn. Oil obtained by cold-pressing is superior to oil by hot-pressing, as shown by a higher yield, a lighter color, a sweeter taste and a much lower acid no. (19.70 *vs.* 45.22). A bitter taste is best removed by NaOH. Oil extd. with petr. ether from fresh seeds showed d_4^{15} 0.9234, n_{20} 1.4757, acid no. 7.12, I no. 138.8, solidifying point 2°, sapon. no. 189.20, Reichert-Meissel no. 2.28, acetyl no. 2.41, unsapoñiable matter 1.62, insol. hexabromide (fatty acids) 15.48. By the Pb salt-Et_2O method, the fatty acids yielded 79.99% of yellow liquid acids and 17.81% of white solid acids. The former when oxidized with alk. $KMnO_4$ by the Hazura method gave dihydroxystearic, sativic and linusic acids. This shows that the liquid acids contain considerable oleic, linolic and linolenic acids. After recrystn. from 95% EtOH at —20°, the solid acids yielded a white cryst. powder which m. 62° and had a neutralization no. 204.62, which was probably a mixt. of 70% stearic acid and 30% palmitic acid. The high acid no. of the oil from decayed seeds suggested the presence of lipase. The following data give the acid nos. of the oils extd. with Et_2O from 4 samples before and after 92 days at room temp., resp.: (1) seeds with husks, 5.41, 15.72; (2) crushed kernel with husk removed, 6.30, 48.82; (3) crushed kernel with oil removed and then ground with rapeseed oil, 1.20, 93.37; (4) same as (3) but

with kernel previously heated 5 hrs. at 105° before adding rapeseed oil, 1.20, 8.24. In tests of the lipolytic properties of kernels, pos. results were always obtained. It is suggested that the oil from fresh seeds might be used in food products, but it is more suitable for low grades of soap, for oil hardening and in conjunction with other oils in paint. C. C. DAVIS

Natural and synthetic rubber. VI. The pyrolysis of natural rubber in the presence of metallic oxides. THOMAS MIDGLEY, JR., AND ALBERT L. HENNE. *J. Am. Chem. Soc.* 53, 203–4(1931); cf. *C. A.* 24, 3129.—Pale crepe rubber pyrolyzed in the presence of ZnO or MgO gives the same decompn. products as in the absence of these oxides, but in different proportions. If the rubber mol. is represented by a long open-chain formula, the various bonds being designated by the letters, *a*, *b*, *c*, *d*, the relative ruptures during pyrolysis of straight rubber are represented by the values:



$a = 0$, $b = 0.6$, $c = 100$, $d = 0.7$; in the presence of MgO the values are $a = 0$, $b = 12.7$, $c = 100$, $d = 12.1$. This modification is attributed to an action of the oxides upon the double bonds of the rubber mol. C. J. WEST

Report on the effect on the plasticity of crepe of adding sodium bisulfite to latex. G. MARTIN AND L. E. ELLIOTT. *Trop. Agr.* (Ceylon) 75, 213–5(1930).—Samples of crepe contg. variable proportions of $NaHSO_3$ were tested for hardness and plasticity. Hardness is proportional to the $NaHSO_3$ added. The normal quantity of $NaHSO_3$ increases the mastication no. about 15% over that without it. The temp. of storage has little effect on the hardness or plasticity. Addns. of $NaHSO_3$ do not appear to increase the total mineral matter in the rubber but do make it more hygroscopic. The increased hardness cannot be due to the extra H_2O, since moist rubber does not harden as much as dry rubber on keeping. A. L. MEHRING

Composite articles of rubber and bakelite (Brit. pat. 336,292) **18.** Artificial silk [rubberized] (Fr. pat. 693,928) **23.** Organic isocolloids [for rubber] (Fr. pat. 694,339) **10.**

Rubber. IMPERIAL CHEMICAL INDUSTRIES, LTD. Fr. 693,975, April 7, 1930. The deterioration of rubber and like compds. is retarded by mixing with the unvulcanized rubber an org. N. compd. capable of sepg. into free radicals contg. bivalent N such as tetraphenylhydrazine or *N*-triphenylmethyldiphenylamine and afterward vulcanizing.

Creaming rubber latex. K. D. P., LTD. Brit. 337,269, Jan. 24, 1929. Concn. of latex is effected by adding to it materials such as mucilages of Carragheen moss, Iceland moss or diagum adapted to combine with water without previous hydrolysis and heating to above 60° to cause creaming.

Electrodeposition of rubber. DUNLOP RUBBER CO., LTD., D. F. TWISS, A. A. ROUND and E. W. MADGE. Brit. 336,659, July 18, 1929. Rubber or other org. material is deposited from an aq. dispersion by use of a. c. connected to rectifying electrodes, one of which is preferably Al or Ta while the other may be of Zn or C. The liquid in contact with the rectifying electrode preferably contains an electrolyte such as an alkali metal phosphate or borate which may be held in a gypsum or unglazed earthenware vessel surrounding the electrode.

Rubber compositions. I. G. FARBENIND. A.-G. Brit. 337,095, Aug. 12, 1929. A rubber compn. of good mech. strength is obtained by compounding with polymerization products such as those of butadiene or isoprene the solid substance obtained by removing the low b. p. constituents from the product of the careful low-temp. carbonization of bituminous material such as brown coal. The low b. p. constituents may be removed from the added material by distn. under reduced pressure or by extn. with acetone and the resulting material may be treated with vapors contg. O or S compds. or with S, phthalic anhydride, ZnO or other substances having a condensing action. Cf. *C. A.* 24, 4186, 5535.

Purifying gutta percha and like materials. W. S. SMITH, H. J. GARNETT and J. N. DEAN. Brit. 335,966, June 6, 1929. Crude gutta percha, balata or the like is subjected to selective extn. with a solvent acting selectively on the resins at a suitable temp. to remove the fluavil and like resins and leave behind resins of the Albane type.

Gutta percha may be treated with EtOH at 21° or with acetone at 3° in prepg. an elec. insulating product.

Rubber mixtures. RUDOLF DITMAR. Austrian 120,423, July 15, 1930. Esters of adipic acid and its derivs. are used as plasticizers for rubber. Cyclohexyl and methylcyclohexyl adipates and methylcyclohexyl methyladipate are specified.

Method of determining the plasticity and adhesion of rubber, etc., by extrusion under heat and pressure. HYDRAULIK G. M. B. H. and FRIEDRICH W. KOERVER. Ger. 516,203, Dec. 9, 1928.

Coloring rubber. I. G. FARBENIND. A.-G. and J. Y. JOHNSON. Brit. 336,446, Oct. 29, 1929. There is rolled into solid rubber such as crepe rubber one of the water-sol. components of a practically water-insol. dye, *e. g.*, 2,3-hydroxynaphthoic acid *o*-anisidide, and the dye is then pptd. within the material, *e. g.*, by use of the diazo compd. of 5-nitro-2-toluidine. Various details of procedure are described.

Coloring rubber and rubber substitutes. I. G. FARBENIND. A.-G. Brit. 335,912, May 29, 1929. Rubber substitutes made from fatty oils such as vulcanized rape-seed oil or mixed factice and linseed oil are mixed, in the form of an emulsion or suspension, with aq. pastes of org. or inorg. water-insol. coloring materials, or with dry pigments, lakes, water-insol. metal salts of org. dyes or their mixts., or with leuco compds. of vat dyes, or with reagents forming a color lake or the like *in situ* and the colored material is simultaneously or subsequently coagulated, and may be further used for coloring rubber or other plastic materials. Wetting agents such as alkyl-naphthalene-sulfonic acids or their salts may be used to facilitate the process. Cf. *C. A.* **24**, 4185, 6064.

Colored rubberized fabrics. JAMES J. CLIFFORD (to Steadfast Rubber Co.). U. S. 1,792,277, Feb. 10. For durably uniting coloring pigment to a rubber-compd.-coated fibrous fabric there is applied a non-oleaginous pigment mixt. such as Au, Ag or bronze powder together with nitrocellulose and a solvent including AmOAc and a blending ingredient such as benzene or high-test naphtha.

Coating metals or other materials with rubber. H. BECKMANN. Brit. 337,222, Nov. 14, 1929. Materials such as metals, stone, wood or cement are provided with a thin layer of rubber having exceedingly fine pores, several alternative processes for producing which are described.

Rubber product resistant to aging. WINFIELD SCOTT (to Rubber Service Laboratories Co.). U. S. 1,792,042, Feb. 10. Prior to vulcanization, there is incorporated with the rubber compn. a S deriv. of a reaction product of a ketone and a naphthylamine such as that of acetone and α-naphthylamine.

Rubber articles. DUNLOP RUBBER CO., LTD., and THE ANODE RUBBER CO., LTD. Fr. 694,676, Apr. 29, 1930. Articles are made of rubber or like material having a spongy or cellular structure, by starting with aq. emulsions or dispersions, particularly those which may be converted to a gel by heating or those to which substances have been added which will form a gel after a definite time in the cold, and transforming them into a froth or foam by a gas or by energetic stirring.

Rubber articles. DUNLOP RUBBER CO., LTD., and THE ANODE RUBBER CO., LTD. Fr. 694,768, April 30, 1930. Articles are made of rubber or the like of a spongy or cellular texture from aq. emulsions or dispersions in the state of foam contg. a gas (the emulsions or dispersions being still in the reversible state) and solidifying the foam to form a permanent mass of solid and stable material.

Hollow rubber articles. SOCIETÀ ITALIANA PIRELLI. Fr. 694,993, May 5, 1930. A core for hollow rubber articles is made of colloidal materials such as foundry earths, chalks, clay and kaolins, molded with the amt. of water strictly necessary and baked.

Inflated rubber articles such as balls. MURRELL J. DE FRANCE (to Pennsylvania Rubber Co.). U. S. 1,792,362, Feb. 10. A hollow blank is formed of incompletely vulcanized rubber, coated interiorly with successive layers of gelatin and of rubber, water and reactive gas-generating substances such as $NaNO_2$ and NH_4Cl are inclosed within the blank, and the latter is subjected to a vulcanizing temp. in a mold.

Rubber rollers. R. WHEATLEY and VICTORIA RUBBER CO., LTD. Brit. 337,250, May 30, 1930. The under layers of rubber-covered rollers are formed of sponge rubber of the isolated gas-filled pore kind.

Rubber footwear. CHARLES M. RICHARDSON and ARTHUR J. HOWE (to B. F. Goodrich Co.). U. S. 1,792,322, Feb. 10. Mech. features and an arrangement of app. are described.

Rubber boot manufacture. HOOD RUBBER CO. Brit. 336,226, July 8, 1929. A layer of relatively non-flowing material such as a mixt. of rubber with fibrous material is placed next to the lining to prevent the rubber or the like of the boot leg from filling

the spaces between the threads of the lining, to reduce the stiffness of the boot and to prevent adhesion to the last. Various details of manuf. are described.

Use of forms in making balloons, gloves, cots or other dipped rubber goods from aqueous dispersions of rubber. ISAAC W. ROBERTSON (to Thermo Process Co.). U. S. 1,792,187, Feb. 10. Various details of procedure are described.

Puncture-sealing mixture for tires. P. G. MASTERS. Brit. 335,980, July 5, 1929. A mixt. for placement in inner tire tubes is formed of castor oil 0.5 pint, talc 1.5 oz., cellulose 1.5 oz., such as wood dust, water 0.5 pint, gum acacia 1 oz. or less, with or without a small addn. of benzene, "petrol" or rubber soln.

Rubber insulating material. WM. BRYAN WIEGAND. Fr. 694,333, April 23, 1930. Insulating materials contg. rubber have added thereto C black retaining its adsorbent power in amt. up to 10% of the wt. of rubber or 3% of the total mass. An example of such a material contains rubber 984.6, ZnO 30, C black 29, monosulfide of tetramethylthiouran 3.5 and S 40 parts. Other examples are given.

Mercaptothiazole derivatives. WM. P. TER HORST (to Rubber Service Laboratories Co.). U. S. 1,792,096, Feb. 10. In producing products such as various rubber vulcanization accelerators, reaction is effected between an amine such as piperidine or diphenylguanidine and the product obtained by the reaction a salt of mercaptobenzothiazole with a Cl deriv. of CS_2. Cf. *C. A.* **24**, 2470.

Elastic material. OCTAVE PIRARD. Fr. 694,998, Aug. 2, 1929. A light elastic material is made, *e. g.*, of wood charcoal 35, bark fiber 10 and pure rubber 55%.

Transparent sheets comprising synthetic rubber. I. G. FARBENIND. A.-G. Brit. 336,075, Sept. 20, 1929. Reënforced sheets are made by applying a soft coating of a polymerization product of butadiene or its homologs to an open-meshed fabric (such as tinned iron wire mesh or a vegetable fiber material) and hardening the coating (as by the action of O or by heating). Condensation products such as those derived from oxylene or other aromatic hydrocarbons with butadiene in the presence of a condensing agent such as $AlCl_3$ also may be used.

Synthetic rubber. I. G. FARBENIND. A.-G. Brit. 336,339, Aug. 2, 1929. Removal of polymerization products of diolefins from the reaction vessel is facilitated by lining the vessel with readily removable materials such as paper, cardboard, textile fabrics, leather, or films of sheet metal or cellulose derivs. or polymers of diolefins or of rubber (which latter may be vulcanized or otherwise suitably treated), or waxes, readily fusible alloys or bitumen. Various examples and details of app. and procedure are given.

Synthetic rubber. I. G. FARBENIND. A.-G. Brit. 337,019, May 25, 1929. In polymerizing diolefins such as butadiene by the action of alkali or alk. earth metals or their mixts. or alloys, in the presence of org. solvents such as ether, the solns. of the polymerization products are continuously removed from the catalyst as soon as the polymerization is effected, as by a flowing stream of solvent or soln. The products may be unsuitable for the production of soft rubber, but are suitable for the manuf. of various hard materials.

Vulcanizing synthetic rubber. I. G. FARBENIND. A.-G. Brit. 335,970, July 2, 1929. Polymerization products such as those of butadiene or its homologs or analogs are vulcanized in the presence of an accelerator previously dissolved in a solvent or admixed with a liquefying agent, which gives a product of improved stretch and breaking strength. Solvents of various kinds may be used such as water, alc., hydrocarbons, chlorinated hydrocarbons, ethers, weak acids and liquid bases. Stearic acid may be used as a softening agent. Cf. *C. A.* **24**, 3400.

Rubber vulcanization accelerator. WINFIELD SCOTT (to Rubber Service Laboratories Co.). U. S. 1,792,041, Feb. 10. The reaction product of formaldehyde with crotonaldehyde dianilide is used as an accelerator. Cf. *C. A.* **25**, 618.

Rubber vulcanization. ALBERT A. SOMERVILLE (to R. T. Vanderbilt Co.). U. S. 1,791,876, Feb. 10. In effecting vulcanization with the aid of an active accelerator such as mercaptobenzothiazole a small quantity of a peroxide such as BaO_2, PbO_2, CaO_2 or SrO_2 is added to inhibit or prevent scorching or prevulcanization. Various examples are given.

Apparatus for vulcanizing rubber coatings on hollow metal articles such as press-rollers of paper-making apparatus. CHRISTIAN H. GRAY. U. S. 1,792,298, Feb. 10. Structural features.

Forming vulcanized joints in rubber articles such as air-tubes, rubber balls or other hollow products. DUNLOP RUBBER CO., LTD., and G. R. MEAD. Brit. 336,076, Sept. 21, 1929. Mech. features.

CHEMICAL ABSTRACTS

Vol. 25. MAY 10, 1931 No. 9

1—APPARATUS AND PLANT EQUIPMENT

W. L. BADGER

Filtering disks of sintered Pyrex glass. W. F. BRUCE AND H. E. BENT. *J. Am. Chem. Soc.* **53**, 990–2(1931).—A layer of powd. glass (60-, 80- or 100-mesh), 1.5–2 mm. thick, is sintered in a Ni tube of suitable diam. About 2 min. at a bright red heat is required. The disk obtained may be sealed to a Pyrex tube. B. A. SOULE

Further applications of the centrifugal filtration tube. EVALD L. SKAU AND LOUIS F. ROWE. *Ind. Eng. Chem., Anal. Ed.* **3**, 147–8(1931); cf. *C. A.* **23**, 5355.—This device can be used to det. the approx. amt. of solid and liquid in a mixt. at any definite temp. Hence binary f.-p. diagrams may be constructed or a eutectic compn. detd. B. A. SOULE

Portable electric stirrers in the chemical industry. HANS WOLLENBERG. *Chem.-Ztg.* **54**, 804(1930).—A small, compact, well-protected elec. stirrer which can be clamped on any vessel is described. A. L. HENNE

A modified slow-combustion pipet. KENNETH A. NOBE. *Ind. Eng. Chem., Anal. Ed.* **3**, 159 (1931).—A modified Stalcie pipet for slow-combustion analysis is described, and the advantages of this method over the explosion method are pointed out. D. F. BROWN

Wash bottle for organic, poisonous or corroding fluids. WALTER FERMAZIN. *Chem.-Ztg.* **54**, 804(1930).—To the conventional wash bottle a vent tube is added. The vent is closed with a finger, while the liquid is being forced out of the bottle. To interrupt the liquid stream the finger is lifted before blowing is stopped. This prevents disagreeable fumes from backing into the operator's mouth. A. L. HENNE

Comparative efficiencies of gas-washing bottles. F. H. RHODES AND D. R. RAKESTRAW. *Ind. Eng. Chem., Anal. Ed.* **3**, 143–4(1931).—Each bottle was filled to the normal working height with NaOH (32.7 g./l.). Then air contg. 13.4% CO_2 was passed through at increasing rates of flow until that rate was found at which some CO_2 escaped absorption. The order of decreasing efficiency is: Friedrichs spiral, Schott & Gen. No. 101, No. 83c, No. 83, Muencke, Habermann. The order is approx. the same when 5.1% CO_2 is used. B. A. SOULE

Direct-reading volume-meter. M. T. CARLISLE AND RHEBA USHER. *J. Chem. Education* **7**, 1562(1930).—This vol.-meter for irregular solids consists of a cylinder 4.8 cm. in diam. and 12 cm. long, the bottom of which is drawn out into a tube 10 cm long contg. a bulb of 10 cc. capacity. A glass stopper with a finely graduated outlet tube, 30 cm. long and 5 mm. in diam., is inserted in the top of the cylinder. A leveling bulb of Hg is attached to the bottom tube. The cylinder and bottom tube are filled with water, after which the leveling bulb is brought up to a mark on the botrom tube. The level of the column of water forced up into the upper outlet is then read and the leveling bulb lowered again. After the test specimen is dropped into the cylinder, the operation is repeated and the difference in water levels noted. ANN NICHOLSON HIRD

Potentiometer for the determination of p_H. N. N. KAVTZEVICH. *Ann. Weissruth. Staatl. Akad. Landw. Gory-Gorki* **9**, 245–60(1929).—Potentiometric measurement of the e. m. f. is discussed, and a simplified potentiometer which gives readings with an accuracy of 0.01 p_H is described. The novel feature of the potentiometer is the introduction of a telephone in place of the galvanometer. J. S. JOFFE

Colloid mills. AUGUST CHWALA. *Kolloid-Z.* **54**, 243–51(1931); cf. *C. A.* **25**, 1122.—A review of German patents. ARTHUR FLEISCHER

An automatic constant-level device for liquid air. R. B. SCOTT AND F. G. BRICKWEDDE *Rev. Sci. Instruments* **2**, 171–2(1931). E. H.

Apparatus for the continuous extraction of large quantities of material at high temperatures. FRITZ WREDE. *Biochem. Z.* **231**, 173–4(1931).—An app. capable of extg. 5 kg. or more of material has an outer vessel that contains a heating liquid (liquids of various b. ps. can be used for extn. at diff. temps.) and an inner container for the ma-

terial and the solvent. The solvent is boiled in a flask outside the container, so connected that the solvent circulates through the material and then returns to the flask.
S. MORGULIS

Extraction apparatus. R. C. BAKER. *J. Soc. Chem. Ind.* **50**, 54T(1931).—A drawing showing a modified Soxhlet extractor is given, and the advantages possessed by the app. over the usual type are presented. N. A. LANGE

Note on centrifugal dust extractors. M. SEILLAN. *Chaleur et ind.* **10**, 289–93 (1929); cf. *C. A.* **24**, 992.—S. discusses the trajectory of an element of gas emerging from the rotor of a centrifugal pump and draws the parallelogram of velocities at the exit of a ventilator. This is followed by a discussion of cyclone extractors.
S. L. B. ETHERTON

An apparatus for determination of true vapor pressure. E. J. SQUIRE. *Petroleum World* **28**, No. 1, 66–79, 101–9(1931).—An app. for detg. true vapor pressure should be designed so that the sample may be introduced as it exists at the point of sampling, so that vapor pressures may be detd. at different temps., and so as to be speedy enough in operation for routine testing. The app. here described can be said to meet these conditions and is suitable for liquids that do not attack Fe, Hg or glass, are not too viscous to be properly agitated, do not have an abs. vapor pressure over 2000 mm. of Hg, and do not contain emulsion. R. W. KELLY

Apparatus for purifying gases. Z. VERESS. *Magyar Chem. Folyoirat* **35**, 155–7 (1929).—The current of gas drives the solvent into an absorption tower, whence it returns dropwise into the original container. B. C. A.

The technic of gas analysis. A. J. ANTHONY. *Z. Biol.* **90**, 633–6(1930).—An *app.* equipped with shaking attachment is described. The specific difficulties for nitrous oxide analysis are discussed. FRANCES KRASNOW

Automatic analyzers of gas mixtures based upon thermal conductivity of gases and their industrial use. DE FROBERVILLE. *Chaleur et ind.* **11**, 469–71(1930).—A discussion of an article by Jarrier (cf. *C. A.* **25**, 1413), in which F. meets the weaknesses of app. described by J. PAUL JARRIER. *Ibid* 471–2.—J. replies and gives more detail.
S. L. B. ETHERTON

A new titration colorimeter. K. MAYER. *Biochem. Z.* **231**, 314–6(1931).
S. MORGULIS

Helical pumps and their use in industry. ERNST BLAU. *Chem.-Ztg.* **54**, 801–2 (1930).—Descriptive. A. L. HENNE

Improvements in the construction and use of the Berthelot-Mahler calorimeter. RICCARDO DE BENEDETTI. *Rivista tec. ferrovie ital.* **38**, 56–60(1930).—Several details of the mech. parts of the app. are modified, and methods of calibrating and operating are suggested for serial work and for the detns. with liquid combustibles. G. A. B.

Generator for the production of carbon dioxide of high purity. EDGAR J. POTH. *Ind. Eng. Chem., Anal. Ed.* **3**, 202–3(1931).—The construction of a generator for CO_2 or other gases is described, for which the following advantages are claimed: (1) It is compact and is constructed entirely of glass without ground-glass joints. (2) It can be warmed and pumped free of occluded gases. (3) It has a novel automatic feeding arrangement. (4) Reagents are completely used, and none of the gas produced is wasted. CHANNING WILSON

Flow divider for fractionation under diminished pressure. A. M. SCHWARTZ AND M. T. BUSH. *Ind. Eng. Chem., Anal. Ed.* **3**, 138–9(1931).—In vacuum distn. total condensation and return of part of the condensate as reflux permit complete and easy control of the reflux ratio. A stillhead with a Hg check valve has been found suitable for this purpose. Constructional details are given. B. A. SOULE

Glass temperature and float regulators. D. F. OTHMER. *Ind. Eng. Chem., Anal. Ed.* **3**, 139–43(1931).—Constructional and operating details are given for a controller of pressure or temp. when a flowing liquid causes the change of conditions. The sensitive element is a vapor-pressure bulb that operates a "flow diverter." A temp., never over 0.2° high, may be maintained for weeks. The device is recommended for lab. or semi-works operations. Several float valves are also described. B. A. S.

Glass electrode and vacuum-tube potentiometer. DONALD H. CAMERON. *J. Am. Leather Chem. Assoc.* **26**, 7–23(1931).—Advantages and limitations of the electrode are discussed. In tannery analyses, the chief advantage is freedom from poisoning and disturbance by oxidation-reduction reactions; the chief disadvantage, aside from the rather laborious standardizations required, is the failure to function at p_H values higher than 9. Different forms of electrode are described: MacInnes' form, using the Ag-AgCl electrode, is preferred. A vacuum-tube potentiometer circuit, on the Wheatstone bridge principle, is described in detail. H. B. MERRILL

A vacuum-tube method of temperature control. FRANCIS O. SCHMITT AND OTTO H. A. SCHMITT. *Science* **73**, 289–90(1931).—The app. is essentially a type FG-27 thyratron regulator tube with a toluene-Hg regulator inserted in the grid circuit. A large un-insulated metal water bath has been held for days to within 0.005°; well insulated baths may be held within 0.001°. J. H. MOORE

Something new in vacuum drying chambers. HOLLAND-MERTEN. *Chem.-Ztg.* **55**, 153–4(1931).—A rectangular chamber, built by Vacuumtrockner, Erfurt, is described. It is made up of independent heating elements, any no. of which may be used, the sides of the elements forming the walls of the chamber. Internal dead space is eliminated; internal condensation and steam leakage are minimized; and less wt. and floor space are required for a given capacity. J. H. MOORE

The determination of the heat of wetting. WALTER REIMER. *Wiss. Arch. Landw.*, Abt. A., *Pflanze.* **4**, 383–91(1930).—A new *calorimeter* for detg. the heat of wetting is described. The heat tone is measured by the expansion of toluene, which surrounds the inner wall of the calorimeter and connects with a graduated capillary tube. A sensitivity of 0.25 cal. is possible. Details of the construction and use of the calorimeter are given. W. GORDON ROSE

Chemical engineering memoranda. XIII. Further notes on heaters, including air heating by steam. CHARLES H. BUTCHER. *Ind. Chemist* **7**, 95–6(1931); cf. *C. A.* **25**, 364. E. H.

A very sensitive, self-registering heat-flow meter. GEORG HOFBAUER. *Arch. Wärmewirt.* **10**, 398–402(1929).—The instrument, which is intended primarily for measuring heat flows through the walls of buildings, consists of 5 multiple couples, each contg. 100 Fe-constantan elements, with junctions on opposite sides of a rubber sheet 0.3 cm. thick, which is protected by thin outer rubber sheets and surrounded by a protecting ring. Good accuracy can be attained with flows as low as 1.5 cal. per sq. cm. per hr. ERNEST W. THIELE

The energy problem of electric heating. F. MERKEL. *Arch. Wärmewirt.* **10**, 407–8(1929).—A general discussion of *heat pumps* with special reference to their use in *distn.* ERNEST W. THIELE

Packed heat from a new type of electric steam generator. HOWARD BIDWELL AND LINUS H. JONES. *Ind. Eng. Chem.* **23**, 298–300(1931).—The problem of obtaining large quantities of high pressure steam for short periods for sterilization work has been solved by the construction of an elec. steam generator of original design. The boiler of the generator is offset at an angle, almost the entire vol. of water in the generator and reservoir being made available for steam. Immersion heating elements are used, the size and energy consumption depending on the pressure and quantity of steam required. The design incorporates the safety features of small diams. Sterilizing pressure may be obtained within 30 sec. from the time of closing the autoclave. A. S. S.

A practical hot stage for the microscope. EDWARD H. WALLACE AND MARY L. WILLARD. *J. Chem. Education* **8**, 706–11(1931). E. H.

Modern electrically heated aluminum-fusing furnaces. KIRCHRATH. *Metallbörse* **20**, 2731–2, 2779–80(1930).—Furnaces, especially those built by Gautschi and Brandt, with Ni-Cr heating elements, are described. The elements are either bands or spirals placed in recesses in the roof so that heat is radiated down on the charge. J. H MOORE

Determination of the local strength of fabrics, felts, paper, rubber, film, wood, leather, metal, etc. II. FRIEDRICH SCHUBERT. *Chem.-Ztg.* **55**, 134–5(1931); cf. *C. A.* **25**, 1708.—The *app.* referred to in *C. A.* **23**, 1187, 4103, has demonstrated its value. It is described, its use and the results are discussed and a sample calcn. is given. J. H. MOORE

Early steps in the development of the Columbia soil rod. BUELL B. LEGG. *Gas Age-Record* **67**, 111–8(1931).—Work is being done on the development of a soil rod which will enable the determination of the galvanic action of the soil, the specific resistance, the tendency to polarization and the potential difference between adjacent soils. Preliminary work indicates a close relationship between results obtained with such a rod and corrosion of test samples. The rods at present have a copper electrode and a steel electrode suitably insulated. The bottom, steel electrode is tapered to provide a driving tip. LESLIE B. BRAGG

Modification of Ostwald's electric thermoregulator. E. BUTTERWORTH AND D. A. DERRETT-SMITH. *J. Sci. Instruments* **7**, 233(1930).—Change in calibration due to allowing the instrument to cool is avoided by omitting the 2 side tubes of the standard form, sufficiently fine adjustment being obtainable by means of the screw in the terminal

head. It is advisable to distil the toluene over Hg to insure complete removal of S. B. C. A.

A laboratory thermostat for continuous operation. P. W. SCHENK. *Ber.* **64B**, 368–70(1931).—A thermostat is described which will operate without special attention for a long period of time with an accuracy of 0.02°. A Dewar tube is surrounded by a wooden box which contains the stirring motor, battery, relay, condenser and Hg switch. A particular feature of the thermostat assembly is the inclosed Hg switch operated by a relay and making and breaking the current to two cylindrical heating bulbs in the thermostat. The relay is actuated by a Hg-in-glass thermoregulator. A condenser of 1–2 mf. is used across the regulator. For temps. below room temp. a const. stream of water is passed through a Cu U-tube in the thermostat, and the same heating system is used to maintain the lower temp. ALLEN S. SMITH

Simple universal thermostat for laboratory fermentations, refractometry and pycnometry. H. FINK. *Wochschr. Brau.* **47**, 461–4(1930).—This app. consists of a eudiometer with capillaries and containers for fermentation, a thermostat with heating elements, thermoregulator and stirrer, and an electrically driven shaking device and fillings to accommodate 20 pycnometers and 12 capsules mounted for reading by an immersion refractometer. Six or 12 fermentation flasks can be used at once, These are provided with gas-measuring fittings. The bath remains const. within 0.2° and is used within the range 15° to 40°. S. JÓZSA

Oven-temperature control and design of a bi-metal thermostat. W. E. BENTON. *Gas World* **94**, 35–7(1931).—A math. treatment of the fundamental principles of bi-metal thermostat design. F. H. BERGEIM

A cooling unit for low-temperature thermostats. T. J. B. STIER. *Science* **73**, 288–9(1931).—A Cu funnel is fed with cracked ice from an insulated hopper, with means for drawing off water as the ice melts. The funnel is immersed in the thermostat to the proper level, found by trial, and will hold the app. const. to ±0.01° at room temps. It costs about $1.00. Details are given. J. H. MOORE

Ag and its application to chemical plant (MCDONALD) **9**. Colorimeters, spectrophotometers and nephelometers (DIGAUD) **7**.

Colorimeter. JOHN C. BAKER and CHARLES F. WALLACE (to Wallace & Tiernan Products, Inc.). U. S. 1,794,134, Feb. 24.

Immersion pyrometer for fused metals. RUDOLF HASE. Ger. 514,682, May 11, 1929. Details of construction are described.

Optical absorption-pyrometer. KAISER-WILHELM INSTITUT FÜR EISENFORSCHUNG E. V. (Gerhard Naeser, inventor). Ger. 517,023, July 9, 1929.

Thermometer. MAX E. MOELLER (to Moeller Instrument Co.). U. S. 1,793,950, Feb. 24.

Thermometer connected with an indicator at a distance. HERMAN SCHLAICH. U. S. 1,794,324, Feb. 24. Structural features.

Distance signalling thermometer suitable for use in stacks. D. G. ZEITLIN. Brit. 338,267, Sept. 14, 1929. Structural features.

Thermometer or like device containing a gallium alloy. SYLVESTER BOYER (to General Elec. Co.). U. S. 1,793,303, Feb. 17. Ga or alloy which may contain Ga, Sn and In is placed in a tube of material such as fused SiO_2 to which the alloy does not adhere.

Viscometer. HARRY W. KLINGER (to Hercules Powder Co.). U. S. 1,793,807, Feb. 24. X-rays are utilized for observing the passage of a ball or the like through opaque liquids. Cf. *C. A.* **25**, 3.

Air filter. LOUIS KLAFF (to American Air Filter Co.). U. S. 1,794,115, Feb. 24.

Air filter. ALBERT BENTELI-HÜSSY. Swiss 142,423, Oct. 4, 1929. A labyrinthine passage for the air causes deposition of foreign bodies.

Air filter for liquid-storage vessels. KAREL PRILLINGER and FRANTISEK PRILLINGER. Swiss 142,109, Sept. 11, 1929.

Fabric air filter. C. G. VOKES. Brit. 337,966, Nov. 1, 1929. Structural features.

Oil filter. CHARLES W. MCKINLEY (to A C Spark Plug Co.). U. S. 1,792,854, Feb. 17.

Unactivated "prefiltering medium" suitable for treating oils, sugar solutions, etc. JOHN J. NAUGLE. U. S. 1,794,862, March 3. A material of low decolorizing and deodorizing value, but which has a highly porous structure permitting a high rate of filtration, comprises carbonized lignin residues substantially free from all alk. residues.

Filter cloths. VICTOR ROEDER. Ger. 517,260, Jan. 18, 1929. Peripheral reenforcing means for perforations in the cloth is described.

Apparatus for filtering liquids under pressure. J. HOFFMANN and T. KRIEBERNIGG. Brit. 337,848, Aug. 14, 1929. Structural features.

Rotary, impeller agitating device and filter for treating liquids such as sugar solutions or oils. JOHN J. NAUGLE. U. S. 1,794,916, March 3. Structural features.

Magnetic separator. MITSUO KOIZUMI. Ger. 517,259, Apr. 8, 1925. Corresponds to Brit. 254,030.

Means for separating pneumatically conveyed materials from the conveying medium. WILHELM KNOLLE. Ger. 517,050, Jan. 17, 1928.

Separator for oil and water, etc. IGNAZ MÜLLER. Ger. 517,425, Apr. 20, 1929. See Austrian 115,650 (*C. A.* **24**, 2286) and 117,500 (*C. A.* **24**, 3403).

Apparatus for separating oil from compressed air. MARTIN J. BINKLEY (to Caloroil Burner Corp.). U. S. 1,793,460, Feb. 24. Structural features.

Settling apparatus suitable for the separation of solids from liquids and gases. WALTON C. GRAHAM, HORACE S. RUMSEY and ASHUR U. WETHERBEE (to Gilchrist & Co.). U. S. 1,794,374, March 3. Structural features.

Spray-system washer for separating dust from gases. DAVID S. JACOBUS (to Babcock & Wilcox Co.). U. S. 1,793,620, Feb. 24. Structural features.

Röntgen-ray tubes. W. D. COOLIDGE (to British Thomson-Houston Co., Ltd.). Brit. 338,430, Jan. 16, 1929. Structural details of tubes which may have a Mo plate of sufficient thickness to assume a uniform temp. and a surrounding focusing member of Ni or Mo.

Quartz rod (with a cone-shaped depression in its end) for use with ultra-violet lamps. CLEON W. SYMONDS. U. S. 1,794,557, March 3.

Thermionic cathode. SANDOR JUST (to General Elec. Co.). U. S. 1,794,298, Feb. 24. A cathode is formed of a metal such as Mo having a m. p. above 1000° and an electron-emissive material comprising a mixt. of oxides including an alk. earth oxide and a rare earth metal oxide, in which the latter is present to only about 0.1% the quantity of the former.

Electron-discharge apparatus. DUDLEY A. MULLANEY (to General Elec. Co.). U. S. 1,794,315, Feb. 24. A control electrode for a space current device has its surface mechanically roughened to decrease emission of secondary electrons from it.

Electron-discharge devices. ÉTABLISSEMENTS INDUSTRIELS DE E. C. GRAMMONT ET DE A. GRAMMONT. Brit 337,971, Dec. 10, 1928. Electron-emitting filaments (which may be formed of pure or oxidized W or of W coated with oxidized metal such as Fe, Ni or Cu and may if desired be wound with fine taping to retain the coating) are coated with alk. earth metal oxide by depositing on the filament a single or double cyanide of the alk. earth metal and decompg. the cyanide to form the oxide after the filament is mounted in the electron, discharge device. Various details of procedure are described.

Electron-discharge devices. H. C. RENTSCHLER (to Westinghouse Lamp Co.). Brit. 337,704, Feb. 16, 1929. Oxidation of the surface of the anode may be effected by cooling in air after baking in H, and selective reduction of the oxides of Ni and Fe may then be effected by H at 800–1000°. A small proportion of H_2O vapor in the H prevents the formation of nitride or carbide of Cr due to the presence of any N or satd. hydrocarbons in the gas used. For further details see U. S. 1,760,525 (*C. A.* **24**, 3405).

Discharge device for compressed gases such as carbon dioxide. RENEE M. LEMOINE. U. S. 1,794,185, Feb. 24. Plugs of porous material such as tow impregnated with a liquid of low f. p. such as alc. are placed in expansion devices at the points which are most exposed to freezing. U. S. 1,794,186 relates to an app. for atomizing paints, insecticides, etc., with CO_2.

Gas-analysis apparatus. J. G. DALOZ. Brit. 338,410, June 20, 1929. Various structural details are described of an app. suitable for detn. of fire damp. The app. may be attached to a *miner's lamp*.

Automatic gas-analysis apparatus. C. A. HARTUNG. Brit. 337,862, Aug. 21, 1929. Various details are described of app. in which the gas to be tested, such as flue gas, is treated with another gas such as H and reaction effected as for the purpose of detg. residual O in flue gases.

Apparatus for determining and registering the density of gases and liquids. SIEMENS & HALSKE A.-G. (Josef Krönert and Heinz Grüss, inventors). Ger. 517,364, Mar. 11, 1928. The detn. depends on the velocity at which the gas or liquid flows through a narrow orifice.

Apparatus for carrying out catalytic reactions between gases under high tempera-

ture and pressure. MARIA CASALE-SACCHI. Swiss 142,144, Apr. 5, 1929. Details are given.

Apparatus for the catalysis of gas. SOC. ANON. D'OUGRÉE-MARIHAYE. Swiss 141,303, Mar. 4, 1929. The app. is used for such catalytic reactions as the *oxidation of* NH_3 into oxides of N.

Apparatus for maintaining a desired relation between the pressures of gas and air, etc. A. C. IONIDES. Brit. 337,955, Oct. 28, 1929. Various structural details are described.

Device for regulating the quantity and composition of gas mixtures such as those used for anesthesia. ANTON GRAMBERG (to I. G. Farbenind. A.-G.). U. S. 1,793,608, Feb. 24. A device is described for operating needle valves controlling the supply of the gases.

Apparatus for treating gases with liquid sprays for washing, saturating, cooling or other purposes. J. A. REAVELL. Brit. 337,507, Aug. 22, 1929. Structural features.

Gas washer, with rotary perforated washing drum. ZSCHOCKE-WERKE KAISERSLAUTERN A.-G. (Ernst Heilmann, inventor). Ger. 517,352, Oct. 26, 1929.

Device for mixing liquids with added substances, for chemical reactions. EUGEN STEUER. Ger. 514,937, June 9, 1929.

Centrifugal atomizer for liquids. AKTIESELSKABET NIRO. Ger. 514,714, July 18, 1926. The app. comprises a rapidly rotating plate and is used for atomizing liquids preparatory to their reaction with gases.

Centrifugal drum apparatus for clarifying liquids. H. LIST. Brit. 337,628, Nov. 22, 1929. Structural features.

Apparatus for clarifying aqueous liquids, etc., by gravity separation. FRITZ MIEDER. U. S. 1,792,919, Feb. 17. Structural features.

Apparatus for extractions with liquid solvents. LE ROY C. TRESCOTT (to Contact Filtration Co.). U. S. 1,794,874, March 3. Various details of construction are described of an app. for extn. on the Soxhlet principle, such as extn. of clay used in filtering oil. An agitating device is mounted in the extn. chamber.

Valve for regulating the flow of liquids or liquefiable solids such as sulfur, wax, fat, pitch, etc. ARTHUR T. PRENTICE (to Imperial Chemical Industries, Ltd.). U. S. 1,793,747, Feb. 24. Structural features.

Noncorrodible container for liquids. WILHELM BESCHIETZNICK. Ger. 514,588, Nov. 27, 1929. The container is built up of sections coated with Pb, Cu, Al or other noncorrodible plates.

Evaporator with steam-heated tubes suitable for concentrating liquids. FRANZ HOFMEISTER and HANS MELHARDT (to Chemische Fabriken J. Bellak). U. S. 1,793,174, Feb. 17. Structural features.

Evaporating apparatus. KARL FRIED. Ger. 517,176, Jan. 8, 1928. The app. combines evapn. in thin layers with multiple-effect vacuum evapn.

Hollow-plate heating apparatus for evaporating liquids, etc. SOC. ANON. POUR L'IND. CHIM. À BÂLE. Brit. 338,097, April 29, 1929. Structural features.

Multistage steam drier. SCHMIDT'SCHE HEISSDAMPF-G. M. B. H. (Otto H. Hartmann, inventor). Ger. 514, 883, Dec. 17, 1920.

Centrifugal drier with a filter drum. I. G. FARBENIND. A.-G. and FRITZ SANDER. Ger. 514,568, July 23, 1927. Addn. to 401,162.

Apparatus for drying steam. CHRISTIAN HÜLSMEYER. Ger. 517,402, May 10, 1928.

Apparatus for drying sheet materials. COE MFG. CO. Brit. 337,432, May 29, 1929. Structural features.

Apparatus for drying materials by circulating air which is alternately heated and cooled. JOHAN G. OLSSON and FRANS I. E. STENFORS. U. S. 1,795,094, March 3. Structural features.

Apparatus and procedure for spray desiccation of materials such as blood, milk or soap. FRED F. PEASE (to F. F. Pease, Inc.). U. S. 1,794,978, March 3. Structural and mech. details.

Sealing ring for rotating cylinder apparatus such as kilns and driers. BUKNETT E. GREEN (to Huron Industries, Inc.). U. S. 1,794,454, March 3.

Rotary cooling drum (for cooling material discharged from rotary furnaces or kilns). H. STEHMANN (to F. Krupp Grusonwerk A.-G.). Brit. 338,069, Jan. 18, 1929.

Atmospheric water spray cooling tower. CARL F. BRAUN (to C. F. Braun & Co.). U. S. 1,794,394, March 3.

Vapor-liquid contact column suitable for distillation, dephlegmation, absorption,

etc. CLAUDE B. SCHNEIBLE (to trustees of Joseph Schneible Trust). U. S. 1,794,986, March 3.

Column-and-superposed-tray apparatus for removing carbon by washing from bubble towers used for oil distillation. GUY B. BOGART (to Texas Co.). U. S. 1,792,887, Feb. 17. Structural features.

Surface condenser suitable for use with steam. PAUL A. BANCEL (to Ingersoll-Rand Co.). U. S. 1,794,135, Feb. 24. Structural features.

Apparatus for aerating water with carbon dioxide. H. ZWICKY. Swiss 141,040, Sept. 24, 1929.

Apparatus for proportionate mixing of chemicals with water or other fluids supplied through pipes. JAMES W. PARKER, SABIN CROCKER and JAMES H. WALKER. U. S. 1,792,757, Feb. 17. Structural features.

Condensing apparatus suitable for use with steam engines or turbines. RAYMOND P. MOORE (to Ingersoll-Rand Co.). U. S. 1,793,119, Feb. 17. Structural features.

Tiltable pan for receiving ammonium salts from saturators. FIRMA CARL STILL. Ger. 517,476, July 7, 1928.

Lip-tilting crucible furnace. J. H. LUDLOW and ASSOCIATED ELECTRICAL INDUSTRIES, LTD. Brit. 338,013, Nov. 25, 1929.

Muffle furnace. ZAHN & CO. G. M. B. H. Ger. 514,502, May 31, 1927. A muffle furnace with a heat-resisting hearth for the production of sulfate from NaCl and H_2SO_4 or bisulfate, is described.

Horizontal or muffle furnace suitable for treating sand to remove its iron content. V. A. COLLINS. Brit. 337,845, Aug. 13, 1929. Structural features.

Annealing furnace. VEREINIGTE DRAHTWERKE A.-G. (TRÉFILERIES RÉUNIES S. A.). Swiss 138,657, May 10, 1929. Details of preheating and cooling are given.

Chamber furnace with regenerative chamber for preheating air and gas. C. OTTO & CO. G. M. B. H. Ger. 507,912, Feb. 28, 1929.

Twin chamber furnace. C. OTTO & CO. G. M. B. H. Ger. 517,175, Mar. 5, 1927. Addn. to 511,515 (*C. A.* **25**, 1127).

Regulator for inclined-grate furnace. FIRMA M. STREICHER. Ger. 514,665, July 6, 1928.

Traveling-grate furnace with compressed air admittance below the grate. L. & C. STEINMÜLLER. Ger. 514,843, July 19, 1929.

Oil-fired furnace. ERNST FELDHOFF (Erich W. Becker, inventor). Ger. 514,521, Dec. 7, 1928.

Gas-fired boiler with plate-like members. STREBELWERK G. M. B. H. Ger. 514,873, Apr. 19, 1929.

Gas-fired annular chamber kilns. LUDWIG RIEDHAMMER. Ger. 517,334, Mar. 1, 1929. A method is described of attaining uniform temps. in the upper and lower parts of the combustion chambers.

Gas burner. CHARLES J. SCHIFFERLE (to Harry R. Struthers). U. S. 1,794,868-9, March 3.

Gas burner. J. W. BAKHUIZEN. Brit. 338,345, Nov. 5, 1928.

Safety pilot-jet system for gas burners. A. C. BECKER. Brit. 338,122, April 13, 1929. Two pilot jets and a main burner and assocd. devices are so arranged that in the event of one of the pilot jets being extinguished it is reignited from the other. Brit. 338,124 and Brit. 338,128 also relate to similar devices.

Furnace wall with parallel tubes for cooling. OSCAR NYGAARD. U. S. 1,793,004, Feb. 17.

Means for heating or intensively cooling hollow rolls or drums for working rubber, etc. PAUL TROESTER, MASCHINENFABRIK. Ger. 517,361, July 9, 1930.

Heat-exchange apparatus suitable for use as a condenser. GEORGE T. JACOCKS (to Alco Products, Inc.). U. S. 1,794,336, Feb. 24. Structural features.

Heat-exchange apparatus suitable for heating air for combustion by hot gases. JEAN B. E. E. ARNOULT (to Établissements Ernest Arnoult). U. S. 1,794,573, March 3. Structural features

Apparatus for electric heating of liquids in receptacles by immersed electric resistance devices. W. WINSHIP. Brit. 337,762, May 3, 1929. Structural features.

Heating and cooking vessels. "SFINX" SPOJENÉ SMALTOVNY A TOVÁRNY NA KOVOVÉ ZBOŽÍ AKC. SPOL. Brit. 337,313, Dec. 24, 1929. An inner vessel such as one of rustless steel is fitted within an outer sheath or jacket of metal of higher heat cond. such as Al or Cu. Various structural details are described.

Apparatus suitable for heating chemicals in large kettles, etc. SIDNEY E. MEYERS (to National Aniline & Chemical Co.). U. S. 1,792,918, Feb. 17. Various details are

described of a heating system by which a large kettle or the like is heated by hot fluids such as combustion gases supplied from an adjacent furnace.

Apparatus for dispelling fog and mist with heated air. EDWARD C. READER. U. S. 1,793,719, Feb. 24. App. is described suitable for use at aircraft landings, etc., which comprises an externally heated conduit through which air is forced which is then discharged as a forceful, voluminous blast into the fog or mist.

Apparatus suitable for mixing measured portions of opaque substances with röntgenologists' solutions. GEORGE W. HOPKINS. U. S. 1,794,769, March 3. Structural features.

Apparatus for "neutralizing" poisonous gases such as those from gasoline engines. DANIEL A. MACKINNON. U. S. 1,793,813, Feb. 24. Structural details are described of an app. suitable for treatment of the gases with catalytic material such as oxidized Cu.

Apparatus for electrical conductivity tests on water in bore holes (to determine character of surrounding rocks). SOC. DE PROSPECTION ELECTRIQUE (PROCEDES SCHLUMBERGER). Brit. 337,489, Oct. 26, 1928. Structural and elec. features.

Mercury-vapor boiler. WALTER E. TRENT (to Trent Process Corp.). U. S. 1,792,784, Feb. 17. The interior of the boiler is surfaced with a material such as Ag which is wetted by Hg.

Apparatus for testing wearing of gears, etc., in various atmospheres. M. FINK. Brit. 337,511, Aug. 24, 1929. Wear is stated to be greater in gases contg. O than in inert gas such as CO_2.

Apparatus (with superposed mixing chambers and agitating devices) for dissolving xanthates. RICHARD THURM and EUGENE SCHMIERER (to Baker Perkins Co.). U. S. 1,794,214, Feb. 24. Structural features.

Apparatus for making amalgams, particularly for dental use. DEUTSCHE GOLD- UND SILBER-SCHEIDEANSTALT VORM. ROESSLER. Ger. 517,202, Mar. 27, 1928.

Apparatus for estimating the humidity of foundry sand, etc., by determining the electrical resistance. FRITZ TÖDT. Ger. 517,212, Dec. 23, 1928.

Valve for operation under high temperatures and pressures. W. PFEIFFER and K. REISS. Brit. 337,838, April 18, 1929.

Acetylene generators. PAUL WIDERKEHR. Swiss 142,961, July 22, 1929. App. for producing C_2H_2 from water and CaC_2, having a hollow vessel for regulating the C_2H_2 pressure, is described.

Transport drum for carbide, etc. GUSTAV HILGER. Ger. 517,281, Nov. 10, 1929. Addn. to 489,305 (*C. A.* **24**, 2017).

Gas-cock control device. FREDERICK A. GERCICH and WALTER M. BERRY (to Hammer-Bray Co.). U. S. 1,792,488, Feb. 17. Structural features.

Automatic gas shut-off valve. LUTHER D. LOVEKIN (to Kitson Co.). U. S. 1,794,191, Feb. 24. Structural details of a device which shuts off gas flow when water in a tank reaches a certain temp. Cf. *C. A.* **24**, 2335.

Thermostatic valve. EDWARD S. HALSEY. U. S. 1,794,610, March 3. U. S. 1,794,611–12 also relate to valves of the same general type.

Thermostatic device suitable for control of electric circuits. JOSEPH W. MYERS. U. S. 1,793,954, Feb. 24. Structural features.

Thermostatic device for gas ranges. ARTHUR STOCKSTROM and ISAAC V. BRUMBAUGH (to American Stove Co.). U. S. 1,794,329, Feb. 24.

Thermostatic device suitable for humidity indicators, etc. ARTHUR E. KRICK (to National Dry Kiln Co.). U. S. 1,793,809, Feb. 24. Structural features.

Thermostatic valve for hot-water systems, etc. WALTER B. CLIFFORD. U. S. 1,792,891, Feb. 17.

Thermostatic control device for burners such as those of water heaters. HOWARD I. PIATT (to Motor Wheel Corp.). U. S. 1,793,451, Feb. 17. Structural features.

Thermostatic control device for hot water and oil heat-storage systems. C. F. HAMMOND and W. SHACKLETON. Brit. 337,425, July 31, 1929. Structural features.

2—GENERAL AND PHYSICAL CHEMISTRY

FREDERICK L. BROWNE

Adolf Cluss. W. KLUGER. *Brauer- und Hopfenzeitung-Gambrinus* **58**, 6–8 (1931); cf. *C. A.* **25**, 1128.—Obituary. S. LAUFER

Arthur Amos Noyes. MILES S. SHERRILL. *Ind. Eng. Chem.* **23**, 443–5(1931).—Biography with portrait. G. G.

Hermann Reisenegger. H. LAUBMANN. *Chem.-Ztg.* **55**, 181(1931); *Z. angew. Chem.* **44**, 213–5.—Obituary. E. H.

To the memory of Karl Schirmacher. BRYK AND ZAHN. *Z. angew. Chem.* **44**, 179–80(1931).—Obituary with portrait. E. H.

Alfred Stavenhagen. H. WÖLBLING. *Z. angew. Chem.* **44**, 178(1931).—Obituary with portrait. E. H.

Edward William Voelcker. BERNARD DYER. *Analyst* **56**, 144–6(1931).—Obituary with portrait. W. T. H.

Nichols Medal award [to John Arthur Wilson]. The life of the medalist. CLARKE E. DAVIS. *Ind. Eng. Chem.* **23**, 435(1931). **Scientific accomplishments of the medalist.** ARTHUR W. THOMAS. *Ibid* 435–6. G. G.

The history of The Department of Chemistry of The Ohio State University. WM. MCPHERSON. *J. Chem. Education* **8**, 640–51(1931). E. H.

Chemistry in the vocational high schools of the middle west. MABLE SPENCER. *J. Chem. Education* **8**, 712–6(1931). E. H.

The analytical distillation of gasoline. HAROLD J. TORMEY. *J. Chem. Education* **8**, 679–705(1931).—A lab. exercise for students is described. E. H.

The technic of micromanipulations. E. A. HAUSER. *Rev. gén. colloïdes* **8**, 358–61 (1930); cf. *C. A.* **22**, 1495, 4876; **25**, 1409.—A lecture. A. F.

Reflections on statistical thermodynamics. J. H. COBLYN. *Chaleur et ind.* **9**, 465–76, 527–34(1928); **10**, 194–9(1929); **11**, 31–8, 141–6, 197–205(1930); cf. *C. A.* **23**, 2350; **24**, 2664, 4984. S. L. B. ETHERTON

Simple reduction experiments. E. H. J. MAGER. *Z. physik. chem. Unterricht* **44**, 25–6(1931).—M. describes several demonstration expts.: the reduction of boiling water with Zn dust, the reduction of CuO with (*a*) Fe dust, (*b*) wood charcoal in a porcelain crucible and (*c*) in a gas flame. $CuCl_2$ can be reduced to CuCl by the following treatment: Dissolve a small quantity of $CuCl_2$ in 3–4 cc. concd. HCl and place a wad of Cu wool in the soln. Boil the whole vigorously until the soln. becomes colorless. Pour a portion into water and a white ppt. of CuCl forms; cool the rest and shining crystals of CuCl appear. E. R. SCHIERZ

Gas-volumetric experiments in student exercises. JOSEF KLIMA. *Z. physik. chem. Unterricht* **43**, 265–7(1930).—K. describes a simple and inexpensive app. for collecting gases which resembles the gas-collection part of the Victor Meyer mol.-wt. app. Two burets, one to serve as a leveling tube, are connected at their lower ends with rubber tubing. The one in which the gas is to be collected is fitted with a rubber stopper carrying a T-tube. One arm of the T-tube is connected with a test tube or side-neck test tube which serves as a reaction chamber, the other arm is closed with a pinch clamp. This app. with slight modifications to suit individual cases can be used to det. the H equiv. of metals, the amt. of O in HgO, and for the quant. reduction of oxides (HgO, CuO) or the oxidation of Cu. Diagrams and directions are given. E. R. S.

Evolution of hydrogen sulfide in the Bay of Krasnovodsk. D. ZABRIEV. *Azerbaĭdzhanskoe Neftyanoe Khozyaĭstvo* **1930**, No. **10**, 58–63. The role of microörganisms is described. V. KALICHEVSKY

Preparation of pure mercury. H. VON STEINWEHR AND A. SCHULZE. *Z. Instrumentenk.* **49**, 566–7(1929).—Hg for use in phys. app. is repeatedly shaken with dil. HNO_3 and then with water; fat is removed by means of petroleum or alc. The Hg is then filtered through a thin leather, previously freed from fat with petroleum, or a Haldenwanger filter tube. It is then distd. in a current of air in a water-pump vacuum in an app. without taps, and preserved in evacuated glass vessels. B. C. A.

Final report of I. M. M. representatives on the Sieves and Screen Committee of the British Engineering Standards Association. S. J. TRUSCOTT AND H. L. SULMAN. *Bull. Inst. Mining Met.* **311**, 9 pp.(1930).—The proposed fine testing sieves are based on a ratio of the fourth root of 2 between linear aperture measurements of consecutive sieves. The American and proposed British sieves will be essentially identical as to aperture but not as to mesh because of the difference in American and British wire gage. ALDEN H. EMERY

A note on gravity separation. R. C. EMMONS. *Am. Mineral.* **15**, 536(1930).—The unsatisfactory nature of gravity sepn. by means of heavy solns. on material in a fine state of division is best accounted for by adhesion, both of grain to grain and grains to air bubbles. This can be eliminated by strong evacuation of the sepg. vessel. A few min. is sufficient. A rapid stratification results when the liquid is allowed to stand, not necessarily under vacuum. A. M. BRANT

The technical preparation of dvi-manganese. J. G. F. DRUCE. *Ind. Chemist* **7**, 75, 79(1931); cf. *C. A.* **24**, 2352.—The history of dvi-Mn (Re), at. no. 75, since its dis-

covery in 1925, its properties and the methods used to sep. it from molybdenite (Brit. Pat. 317,035, *C. A.* **24**, 1943) are given. $KReO_4$ (corresponding to $KMnO_4$) is now being manufactured at a cost of approx. $2.50 per g. A list of references is included.
E. G. R. ARDAGH

The chemistry and the geochemistry of the titanium group. GEORGE VON HEVESY. *J. Chem. Soc.* **1931**, 1–16.—The amts. of these elements in the total mass of the earth are calcd. as follows:

	Ti	Th	Zr
(1) from analyses of terrestrial rocks		14×10^{-7} g./g.	2×10^{-5} g./g.
(*a*) assuming the earth to have an eclogite shell	0.0016 g./g.		
(*b*) assuming a periodotite shell	0.0019 g./g.		
(2) from analyses of meteorites alone	0.0015 g./g.	14×10^{-7} g./g.	3×10^{-5} g./g.
(3) heat equil. considerations		1.3×10^{-7} g./g.	

The geochem. behavior of HfF is similar to that of Zr. When present as a mineral most of the earth's Ti is shown to occur as ilmenite ($FeTiO_3$). J. BALOZIAN

The natural classification of chemical compounds. F. M. SHEMYAKIN. *Z. physik. Chem.*, Abt. A., **152**, 235–44(1931).—Grimm's classification is elaborated. By plotting mol. no. (the sum of the electrons in the atoms of the mol.), sometimes including H and sometimes not, against any property, regularities are revealed. This is true for both org. and inorg. compds. V. F. HARRINGTON

A revision of the atomic weight of calcium. The atomic weight of calcium from sylvite. O. HÖNIGSCHMID AND KÄTE KEMPTER. *Z. anorg. allgem. Chem.* **195**, 1–14 (1931).—If the K_{41} isotope is the radioactive one (cf. *C. A.* **22**, 4356) the disintegration product should be Ca_{41}. The authors attempt to show the existence of Ca_{41} in an old K-bearing mineral (sylvite) by a detn. of the at. wt. of the Ca present. They found 40.195 and 40.226 for Ca in 2 different prepns.; this agrees with a previous report (cf. *C. A.* **24**, 2043) but these high values were due to the presence of Sr. When a correction was made for this they obtained 40.091, in good agreement with 40.085 ± 0.006 found in a redetn. of the at. wt. of Ca in a pure prepn. No indication of Ca_{41} was obtained. J. B. AUSTIN

Behavior of water with change of temperature and with addition of electrolytes as studied by the Raman effect. I. RAMAKRISHNA RAO. *Proc. Roy. Soc.* (London) **A130**, 489–99(1931); cf. *C. A.* **24**, 3436.—Data are presented for ultra-violet and visible Raman bands of pure water at different temps. and of solns. contg. varying concns. of $NaClO_3$, $NaNO_3$ and HNO_3. Increasing temp. shifts the water bands toward the short-wave side; increasing concn. of electrolytes sharpens the water bands. The results are discussed in the light of the assumption that water consists of single, double and triple mols., the relative proportions of each depending on the phys. state of the water. E. J. ROSENBAUM

Electric moment and molecular structure. I. The ethyl esters of mono- and dicarboxylic acids. C. P. SMYTH AND W. S. WALLS. *J. Am. Chem. Soc.* **53**, 527–39 (1931); cf. *C. A.* **24**, 1554.—The dielec. consts. and ds. of the Et esters of a no. of mono- and dicarboxylic acids were measured in C_6H_6 soln. These measurements together with the n_D^{20} for the pure substances were used to calc. the elec. moments of the mols In the moments of the Et esters of the monobasic fatty acids there is a slight decrease with increase in the size of the mol., analogous to the decrease in ionization const. The relative positions of the —COOEt group in the mol. do not affect the moment greatly, because of rotation around the bonds. There is no difference in moment between the long- and short-chain esters, because the long-chain mols. have extended structures, which do not bend in small external elec. fields. **II. Tertiary butyl and triphenylmethyl chlorides and alcohols.** C. P. SMYTH AND R. W. DORNTE. *Ibid* 545–55.—The dielec. consts. and ds. of solns. of *tert*-Bu and Ph_3C chlorides and alcs. in C_7H_{16} or C_6H_6 were detd. over varying ranges of temp. The data were used to calc. the polarizations and elec. moments of the mols. The polarizations show that the branched C chain of the *tert*-Bu group has no greater screening effect than the straight chain of the *n*-Bu group, but the Ph_3C group has a greater effect. The results are explained by a theory of induced moments. The moments increase from the *n*- to the *sec*- to the *tert*-compd. because of the increase in the no. of C atoms subjected to the inductive influence of

the principal dipole. The moment of the *iso*-compd. is the same as that of the normal if the branch in the chain is at least 2 C atoms away from the halogen, because only these 2 C atoms are affected by the principal dipole. H. W. LEAHY

Superstructure and magnetic susceptibility in the system: copper–gold. H. J. SEEMANN AND E. VOGT. *Ann. Physik* [5], **2**, 976–90(1929); cf. *C. A.* **24**, 5196.—The variation of diamagnetic susceptibility with concn. was measured for the Au-Cu mixed-crystal series. Alloys of the compns. Cu_3Au and CuAu in certain circumstances exhibit superimposed structure lines consistent with a regular arrangement of the constituent atoms; *e. g.*, the corners of the elementary cube may be occupied by Au atoms and the face centers by Cu atoms. The relation between susceptibility and the appearance of superstructure was detd. for alloys of the compns. Cu_3Au and CuAu. For the former an increase and for the latter a decrease in diamagnetic susceptibility accompany the production of regular at. distribution in the lattice. Control expts. on alloys differing in compn. from the whole-no. ratios indicated no difference in susceptibility for quenched and slowly cooled specimens. No explanation is available for the difference in sign of the effect with Cu_3Au and CuAu. B. C. A.

Magnetic measurements on rhenium. W. H. ALBRECHT AND E. WEDEKIND. *Naturwissenschaften* **19**, 20–1(1931).—Samples of Re and of K perrhenate having less than 0.01% impurity in the form of Ca and U were measured. Re gave at 18° a sp. susceptibility $\chi = +0.046 \times 10^{-6}$ (± 0.02); the perrhenate is diamagnetic: $\chi = 0.13$ (± 0.05). The Re value does not lie between those of the neighboring elements Os ($+0.074 \times 10^{-6}$) and W ($+0.33 \times 10^{-6}$). B. J. C. VAN DER HOEVEN

Relationships between the dielectric constant and the optical properties of substances having the sodium chloride lattice. J. ERRERA. *Z. Elektrochem.* **36**, 818–23 (1930).—The total polarization of the alkali metal halides increases with increase of at. wt. of the anion and the cation. By using Spangenberg's values for the electronic polarization, the at. polarization was calcd. The proportion of the total dielec. const. due to at. vibrations is decreased as the at. no. of the anion is increased, and in the case of the bromides and iodides with increase of at. no. of the cation. There is an irregular variation in the chlorides and fluorides. The factor p of the infra-red term of the dispersion formula can be detd. by comparing the characteristic infra-red frequencies calcd. by the dispersion formula from the observed values of the dielec. const. with those calcd. by Born by the theory of electrostatic cohesion. The infra-red branch of the dispersion curve can also be calcd. L. L. QUILL

Action of nitric acid on benzoic acid in magnetic and in electrostatic fields. R. H. CLARK AND R. M. ARCHIBALD. *Trans. Roy. Soc. Can.* [3], **24**, Sect. 3, 121–4(1930); cf. following abstr.—The action of HNO_3 on benzoic acid was carried out at 20° in a magnetic field of 23,000 gausses per $\pi/4$ sq. cm. The products of the reaction did not vary appreciably from those obtained outside the magnetic field. J. W. SHIPLEY

Addition of hydrogen bromide to allyl bromide in a magnetic and an electrostatic field. R. H. CLARK AND K. R. GRAY. *Trans. Roy. Soc. Can.* [3], **24**, Sect. 3, 111–4 (1930).—The effect of a magnetic field on the reaction of HBr and allyl bromide in glacial AcOH decreases the yield of trimethylene bromide. For propylene bromide $n_D^{20} = 1.51904$ and for trimethylene bromide $n_D^{20} = 1.52292$. J. W. SHIPLEY

Further investigation of the two electromers of 2-pentene. R. H. CLARK AND E. G. HALLONQUIST. *Trans. Roy. Soc. Can.* [3], **24**, Sect. 3, 115–9(1930); cf. preceding abstr.—The 2 electromers of 2-pentene were synthesized and some of their phys. properties detd. Neither a magnetic nor an electrostatic field had any effect upon the addn. products obtained with HBr on the metastable 2-pentene. Stable 2-pentene has the following consts.: b. p. 35.8° (755 mm.), n_D^{20} 1.37845, f. p. —149°; metastable 2-pentene has b. p. 36.5°, n_D^{20} 1.37960, f. p. —144°. J. W. SHIPLEY

Sound propagation in gas mixtures. D. G. BOURGIN. *Phys. Rev.* [2], **34**, 521–6 (1929).—Mainly math. Previous results on a single gas and a mixt. of 2 gases (cf. *Phil. Mag.* [VII], **7**, 821–41(1929)) are simplified and extended to a mixt. of any no. of gases. B. C. A.

Calculations on the velocity of sound in nitrogen tetroxide. FRANK VERHOEK AND FARRINGTON DANIELS. *J. Am. Chem. Soc.* **53**, 1186–7(1931).—By using dissocn. data of N_2O_4 detd. by V. and D., the velocity of sound was calcd. and compared with the velocities detd. experimentally by Kistiakowsky and Richards (*C. A.* **25**, 864). The agreement is not much better than with the data of Bodenstein, used by K. and R., but the deviation is nearly const. and the calcd. value is always less than the observed velocity; this may indicate a const. error, either in theory or expt. C. J. WEST

The formation of beams in molecular streaming. P. CLAUSING. *Z. Physik* **66**,

471–6(1930); cf. *C. A.* **24**, 3409.—Formulas are given for the distribution of mols. that stream through a short tube at const. pressure into an evacuated space. The mean free path of the mols. is great compared with the size of the tube and diffuse scattering from the walls of the tube is assumed. In the case in which the length of the tube equals the diam., large deviations from the cosine law occur. G. M. M.

Viscosity, heat conduction and diffusion in gas mixtures. XI. The viscosities of H_2, N_2, CO, C_2H_4, O_2 and their binary mixtures. MAX TRAUTZ AND ALBERT MELSTER. *Ann. Physik* [5], **7**, 409–26(1930); cf. *C. A.* **25**, 10.—The viscosities of H_2, N_2, CO, C_2H_4, O_2 and their binary mixts. were detd. over the temp. range 20° to 280° by measuring the rate of flow through a capillary tube. The results were well represented by the Sutherland formula, $\eta_1/\eta_2 = (T_1/T_2)^{1/2} \times [1 + (C/T_2)]/[1 + (C/T_1)]$, by using the following values for the const. *C:* H_2 84.4, N_2 103.9, CO 101.2, O_2 126.6, C_2H_4 241.4. The isotherms of N_2–CO, N_2–O_2 and CO–O_2 mixts. were practically straight lines. The relation between viscosity and mol. diam. in mixts. is discussed. **XII. Viscosity of gases at high temperatures.** MAX TRAUTZ AND ROBERT ZINK. *Ibid* 427–52.—The viscosities of air, N_2, H_2, O_2, CO_2, SO_2, CH_4, A, Ne and He were measured over the temp. range 20° to 830°. The viscosities of air, N_2, A, O_2, CH_4, SO_2 and CO_2, as well as of HCl and Br_2, are accurately represented by the Sutherland formula. The values of *C* for the different gases are given. This formula fails for H_2, He and Ne below the crit. temps, but the viscosities of these gases are given by the formula $\eta = kT^n/[1 + (C/T)]$ where *n* and *C* have the following values: H_2, $n = 2/3$, $C = 0$; He, $n = 2/3$, $C = 2.5$; Ne, $n = 0.6$, $C = 20$. P. T. NEWSOME

Calculating viscosity and flash point in compounded oils. E. KADMER. *Seifensieder-Ztg.* **58**, 22–3(1931).—See *C. A.* **25**, 805. P. ESCHER

Note on the equation of state explicit in the volume. GEORGE SCATCHARD. *Proc Natl. Acad. Sci.* **16**, 811–3(1930).—The Beattie-Bridgeman equation (*C. A.* **21**, 3146) may be expressed in the form $V/n = (RT/p) + (\beta/RT) + [\gamma/(RT)^2 - \beta^2/(RT)^3]p + [\delta/(RT)^3 - 3\beta\gamma/(RT)^4 + 2\beta^3/(RT)^5]p^2$, in which *n* is the no. of moles and the coeffs. β, γ, δ are functions of the temp. This equation reproduces the exptl. results for less perfect gases less satisfactorily than Beattie's original equation (*C. A.* **24**, 1775). The equation is not accurate at high pressures. J. B. AUSTIN

The specific heat of liquid biphenyl. ROY F. NEWTON, B. D. KAURA AND THOMAS DE VRIES. *Ind. Eng. Chem.* **23**, 35–7(1931).—The sp. heat of liquid Ph_2 up to 300° was detd. by 2 elec. heating methods and by a method of mixts. The 3 methods gave consistent results with an av. value for the sp. heat of $(0.388 + 0.00057t°)$ ±1%. F. H. RATHMANN

The specific heat of biphenyl. H. O. FORREST, E. W. BRUGMANN AND L. W. T. CUMMINGS. *Ind. Eng. Chem.* **23**, 37–9(1931).—The sp. heat of Ph_2 in small temp. intervals from 72° to 203° was detd. by the batch-calorimeter method and from 147.7° to 347° by the flow calorimeter. The sp. heat varies from 0.408 ± 2% at 77.6° to 0.672 ± 2% at 347°. The results differ from those of N., K. and De V. by from −5 to +12% (cf preceding abstr.). F. H. RATHMANN

The necessity of adopting a standard substance for boiling-point and vapor-tension measurements. W. SWIETOSLAWSKI. *J. chim. phys.* **27**, 496–502(1930); cf. following abstr.—After a discussion of work done by others in this field, it is recommended by the Comm. on Physical-Chemical Standards of the International Union of Chemistry that b. p. and vapor tension be detd. simultaneously with the b. p. and vapor tension of water, that a few other liquids be standardized and that dp/dt be detd. G. M. P.

A comparative study of boiling points and vapor tensions of eight standard organic substances. AL. ZMACZYNSKI. *J. chim. phys.* **27**, 503–17(1930).—B. ps. and vapor pressures of 8 compds. were measured between 380 and 2000 mm. pressure. The b. ps. of the substances studied were compared with the b. p. of water by the formula $t_{subs.} = A + Bt_{H_2O} + Ct^2_{H_2O}$, and the coeffs. *A*, *B* and *C* were calcd. dp/dt was calcd. The b. ps. detd. at 760 mm. were: EtBr, 38.386°; CS_2, 46.262°; Me_2CO, 56.131°; $CHCl_3$, 61.152°; C_6H_6, 80.122°; PhMe, 110.606°; PhCl, 131.687°; PhBr, 155.908°. GERALD M. PETTY

The vapor pressure of pyridine. P. A. VAN DER MEULEN AND RUSSELL F. MANN *J. Am. Chem. Soc.* **53**, 451–3(1931).—The vapor pressure of pyridine was detd. by the isoteniscope method. Between −20° and +120° the pressure is given by the formula $\log p = 6.8827 - \frac{1281.3}{t + 205}$ where *p* is expressed in mm. of Hg and *t* in degrees C. P. T. NEWSOME

Systems of four immiscible liquid layers. E. LESTER SMITH. *Nature* **127**, 91 (1931).—An example of the rarely observed phenomenon of 4 immiscible liquid

layers can be produced by using hexane 12 cc., $PhNH_2$ 7 cc., oleic acid 0.5 cc., alc. 1.5 cc. and 0.8 *N* NaOH 10 cc. The alc. is not essential to the system but reduces the time required for sepn. of the layers. An increase of temp. or of electrolyte renders miscible the hexane and $PhNH_2$ layers (first and third from the top), which then form the top layer. H. F. JOHNSTONE

Relation of the liquid to the crystalline state. KEDARESWAR BANERJEE. *Nature* **127**, 92–3(1931).—The origin of elastic heat waves in liquids is elec. and akin to that of lattice oscillations in crystals. From theory and from observations on x-ray diffraction, it is seen that there is a max. in the mol. arrangements in liquids corresponding to the structure of the substance in the crystal state. In a crystal the natural frequencies of a mol. that are responsible for the Raman effect are modified because of the surrounding mols., but on account of the regular arrangement all the mols. are affected in the same manner and the Raman lines are sharp. In a liquid, however, the regularity of arrangement is broken, and there is a broadening of the natural frequencies of the mols. H. F. JOHNSTONE

Loading of metals with gas at high pressure. HANS JELLINEK. *Z. Physik* **66**, 543–57(1930).—After activation, Fe, Pd and Ag take up H_2 and N_2 under high pressures. The phenomenon is studied by means of measurements of the elec. cond. When the gas is taken up by the metal, the resistance increases and falls again when the pressure is removed and the gas is liberated. The resistance for Fe and H_2 increases 8.9% between 0 and 35 atm., but for Fe and N_2 it decreases 4.5% up to 15 atm. and then increases 13.3% from 15 to 30 atm. The increase in resistance and pressure range for other cases are: Pd-H_2, 4.4%, 0-20 atm.; Pd-N_2, 3.8%, 0–25 atm.; Ag-H_2, 13.1%, 0-35 atm. G. M. MURPHY

Measurements with the help of liquid helium. XII. Plasticity of metal crystals at low temperatures. W. MEISSNER, M. POLANYI AND E. SCHMID. *Z. Physik* **66**, 477–89 (1930); cf. *C. A.* **24**, 3687.—The plastic deformation of Zn and Cd crystals on stretching was investigated over the temp. range 1.2 20° abs. The plasticity remains nearly const. A method for transporting and handling liquid He is described. G. M. M.

Dependence of the dissociation temperature of solids on the size of crystal grains. J. KRUSTINSONS. *Acta Univ. Latviensis Kim. Fakultat.* **1**, 273–7(in German 278) (1929); cf. *C. A.* **25**, 447.—Red HgO was sepd. into 4 fractions by sieves and it is shown that the dissocn. temps. of the smallest and largest sizes differ by 6°. If the Thomson formula is assumed to hold, the calcd. surface tension at the gas-solid interface is 1146 dynes/cm. G. M. MURPHY

The conductivity of thin metal foils. LADISLAUS TISZA. *Naturwissenschaften* **19**, 86–7(1931).—The limiting thickness of thin metal foils (by cathodic dispersion) at which their resistance rises sharply (cf. Bartlett, *C. A.* **22**, 2879, Perucca *Ann. Physik* **4**, 252(1930), Braunbek, *C. A.* **24**, 1557) can be derived from the free path of the cond. electrons as indicated by J. J. Thomson. It is assumed that the electrons are diffusely reflected by the surface and thereby lose their forward impulse. The resulting free path is $\lambda' = \lambda d/(d + \alpha)$, in which λ is the free path in compact metal, d the thickness of the film, α a const. of about $1/2$. The crit. limiting thickness is d_o = about $\alpha\lambda$, which agrees with exptl. values ($16\mu\mu$ for Ag at room temp., $\lambda = 50\mu\mu$, Sommerfeld). At low temps. with d_o many times larger (λ longer) the results should be more pronounced and characteristic. The present theory, however, does not account for Braunbek's result on Hg: its d_o value of 200–300μ at —183° is too high. B. J. C. v. D. H

Polar properties of single crystals of ice. J. M. ADAMS. *Proc. Roy. Soc.* (London) **A128**, 588–91(1930).—Photographs are reproduced of single microscopic ice crystals grown under controlled conditions. A short right hexagonal prism, with the height nearly equal to the diam. of the base, is a frequently occurring shape for these small crystals. A no. of specimens give evidence of crystallographic polarity by the appearance of a jut at one end only of the *c* axis when the crystal is brought into an atm. favorable to evapn. Two other types of disintegration, characterized resp by juts at each end and in the middle of the *c* axis, are observed in crystals of the same external form. These 2 types are explained as being due to the 2 possible modes of twinning of a polar crystal on the basal plane. The conclusion that the *c* axis in ice is a polar axis does not necessarily contradict the conclusion reached by Barnes that the (0001) plane must be a plane of symmetry so far as the arrangement of O ions in the lattice is concerned (*C. A.* **24**, 765). It is possible that the asymmetric location of H ions in a non-polar O lattice confers the necessary polarity on the structure as a whole. B. C. A.

Crystal structure of molybdenum trioxide. NORA WOOSTER. *Nature* **127**, 93 (1931).—Laue photographs of crystals of MoO_3 show orthorhombic symmetry. The cell size is $a = 3.93 \pm 0.02$ A. U., $b = 13.91 \pm 0.05$ A. U., $c = 3.57 \pm 0.02$ A. U. There

are 4 mols. of MoO_3 per cell. The space group is O_h^{16}. The crystals were thin plates parallel to (010). H. F. JOHNSTONE

The grating constant of quartz. O. BERGQVIST. *Z. Physik* **66**, 494–8(1930).—The grating const. of a rock crystal was measured in the 1st and 2nd orders with Cu $K_{\alpha 1}$ and Fe $K_{\alpha 1}$. The distance from slit to plate was 622.11 mm.; the slit width, 0.02 mm. The x-ray tube operated at 35 kv. and 5 milliamperes; the exposure time was from 20 min. to 2 hrs. No measurable plates were obtained in the 3rd order in 3 hrs. From the values in the 1st order, the higher-order results were calcd. A correction curve to the wave-length calcns. is given for the anomalous dispersion of quartz. The results are d = 4246.02 X. U., log $2d$ = 3.9290120. G. M. MURPHY

Crystal structure of nickel oxides. O. G. BENNETT, R. W. CAIRNS AND EMIL OTT. *J. Am. Chem. Soc.* **53**, 1179–80(1931).—NiO, prepd. by oxidation of $Ni(OH)_2$ with Cl in alk. soln. and heated at 285°, corresponds to the previously reported structure for NiO, as it is face-centered cubic. If the NiO is not heated above 110°, the compd. is cubic but the edge of the unit cube is 4.64 A. U.; the d. is 4.8, as compared to 6.69 for ordinary NiO, the no. of mols. in the unit cell is calcd. as 4; consideration of the intensities of reflection excludes the face-centered cubic type. There is evidence of further modifications. C. J. WEST

The physical properties of rhenium. C. AGTE, H. ALTHERTUM, K. BECKER, G. HEYNE AND K. MOERS. *Naturwissenschaften* **19**, 108–9(1931).—Several properties of Re were detd. The crystal structure is hexagonal in close packing; consts. a = 2.765 A. U., c = 4.470 A. U., c/a = 1.616, smallest distance 2.765 A. U., atomic radius 1.382 A. U. The m. p. is 3440° abs. (measured in drilled hole), the linear thermal expansion (x-ray method) is 12.45×10^{-6} along the hexagonal axis, 4.67×10^{-6} perpendicular to it (8% accurate). The d. of a highly annealed rod is 20.9 (calcd. 21.4 for at. wt. 186.31 ± 0.02). The fracture strength of a Re wire grown in gas phase, 0.25 mm. diam., 0.03 mm. W core is 50.6 kg. per sq. mm., elongation 24%. The sp. elec. resistance at room temp. is $\rho = 0.21 \times 10^{-4}$ ohm cm. (15% accurate), its temp. coeff. between 0° and 100° is 3.11×10^{-3}; between 0° and 2710°, 1.98×10^{-3}. The ratio of ρ_{2710} is ρ_0 is 6.34. The electron emission between 1900° and 2700° abs. gives for the Richardson equation A = 200 amp. per sq. cm. and degree squared, b = 59,500, corresponding to an exit energy of 5.1 v. B. J. C. VAN DER HOEVEN

Condition magnitudes for water in the range from 10° to 500° and from saturation pressure to 300 atmospheres. M. TRAUTZ AND H. STEYER. *Forschung Gebiete Ingenieurw.* **2**, 45–51(1931).—A high pressure vessel (vol. 1410 cc. at 15° and 1 atm.) was fitted with a heating device, thermoelements and manometer, and placed in a container packed with insulating material. An air space sepd. this container from the outer jacket. The sp. vol. of water was measured in the range 10° to 370° and 150 to 300 atm. Below the crit. temp. the estd. accuracy was about ±0.2–0.4%, and at the crit. temp., ±2–4%. The change in heat content between 10° and 500°, over the range 150 to 300 atm., was measured with an estd. accuracy of ±3%. From the present PVT data, together with values interpolated between 150 atm. and satn. pressure by utilizing the International Skeleton Steam Tables, a series of values were calcd. for (*1*) αC_p, the product of the Joule-Thomson effect and the sp. heat; (*2*) J, the heat content; and (*3*) C_p, the sp. heat at const. pressure. F. D. ROSSINI

Thermal properties of compressed liquid water. JOSEPH H. KEENAN. *Mech. Eng.* **53**, 127–31(1931).—Recent data of Keyes and Smith on compressed liquid sp. vol. measurements and of Osborne, Stimson and Fiock on satd. vapor measurements, have made possible a much more accurate calcn. of the feed-pump work in power plant operation in the higher temp. and pressure ranges. Calcns. are based on the more accurate const.-entropy measurements as compared with the older and less accurate const.-vol. method. Temp.-entropy diagrams are given for ranges up to 700°F. A diagram is given showing a comparison between const.-entropy feed-pump work and const.-vol. feed-pump work for abs. pressures from 0 to 400 kg./cm.^{2}. The differences are small, usually within 2% of the compression work. A. L. KIBLER

Some final values for the properties of saturated and superheated water. FREDERICK G. KEYES AND LEIGHTON B. SMITH. *Mech. Eng.* **53**, 132–5(1931).—Tabulations are given of all available data of the Mass. Inst. of Technology pertaining to the properties of water. The tabulations include the following: vapor pressures between 100° and 374°; dp/dt at satn. between 0° and 370°; sp. vols. of satd. steam between 100° and 370°; sp. vols. of water at satn. pressure between 100° and 374°; d. of water between 100° and 360°; vols. of liquid water under pressure and at different temps.; isometrics of superheated steam between 200° and 400°. The use of an alloy of 18Cr–8% Ni steel increased the accuracy of high-temp. measurements. A. L. KIBLER

Some additional volume data for superheated steam. L. B. SMITH AND F. G. KEYES. *Mech. Eng.* **53**, 135–7(1931).—The temps. at which steam has been measured are extended to 460° by the use of a stainless-steel bomb. Results are given in tables and diagrams. A. L. KIBLER

The vapor pressure of chlorine monoxide. CHARLES F. GOODEVE. *J. Chem. Soc.* **1930**, 2733–7.—The vapor pressures (from 288° abs to 173° abs.), the m. p. and the b. p. of ClO are detd. The plot of log vapor pressures (mm.) against $1/T_{abs.}$ is the straight line: $\log_{10}p = -1373/T + 7.87$. From the vapor pressures the b. p. of ClO is 2.0°/760 mm., which is a better value than that of Goldschmidt (*C. A.* **14**, 29). From the slope of the line the latent heat of evapn. (L_e) is 6200 cals./g.-mol. The m. p. of ClO is detd. from cooling curves as −116 ± 1°. The value of Trouton's coeff. indicates that little or no assocn. of ClO takes place in the liquid state. J. BALOZIAN

The electrical conductivity of amorphous quartz. WALTER GNANN. *Z. Physik* **66**, 436–52(1930); cf. *C. A.* **24**, 5197.—The surface cond. of amorphous quartz cylinders of 1 cm. diam. and 1.2 cm. length is measured as a function of humidity of the air, tension and time. The cond. is strongly dependent on humidity. Up to 20% relative humidity, quartz is a better insulator than amber, but its cond. increases more rapidly with humidity. Immediately after tension is applied, the current is relatively large but drops after a few hrs. to a const. value. The vol. resistance is greater than 6×10^{19} ohm cm. Similar measurements made on Bakelite C show that it is strongly hygroscopic. G. M. MURPHY

Blanc's alumina. N. PARRAVANO. *Mem. accad. Italia, Classe sci. fis. mat. e nat.* **I**, *Chim.* No. 1, 1–27(1930); cf *C. A.* **24**, 4681.—Further study of Blanc's Al_2O_3 reveals powerful adsorbing properties: at 25° it retains 32.5% CCl_4, 18.7% C_6H_6, 18.2% CS_2 and 17.9% Mc_2CO. It is anisotropic; a diffraction spectrum appears only after mol. rearrangement, which occurs at 180° to 670°, depending on exptl. conditions. This change is accompanied by a crowding of the atoms in the space lattice, which is probably the source of the heat developed in the process. X-ray analysis also shows that this second form passes into a third, corundum, above 950°; this reaction is also an exothermic one accompanied by further crowding of atoms in the lattice. This opinion is strengthened by the fact that the corundum form, is not a catalyst because it will not dehydrate EtOH, while the other forms, whose atoms are further apart, have strong catalytic powers. A summary of the previous work on this substance is included. A. W. CONTIERI

Gradual transition in crystalline sodium nitrate. F. C. KRACEK AND E. POSNJAK. *J. Am. Chem. Soc.* **53**, 1183–4(1931).—$NaNO_3$ exhibits a gradual transition which ends at approx. 275°; the properties of the crystals alter reproducibly over a range of temps. rather than suddenly at a definite transition pt. The coeff. of expansion is nearly const. to about 150°, then it gradually increases to a peak value near 275°, followed by a rapid decrease to a normal value beyond 280°. The heat absorption on heating likewise gradually increases to a max. at 275.5°, while on cooling the heat evolution begins at about 275°. Other changes are noted. C. J. WEST

Calorimetric determinations of heats of adsorption. Adsorption of sulfur dioxide by wood charcoal. A. MAGNUS, H. GIEBENHAIN AND H. VELDE. *Z. physik. Chem.*, Abt. A, **150**, 285–94(1930).—The integral heats of adsorption of SO_2 by coconut charcoal were measured over a wide range of concn. (0.05–68 mg. of SO_2 per g. of charcoal). With increase in the amt. adsorbed there is a slow, regular fall of molar heat of adsorption. Differential heats of adsorption were measured by allowing about 0.12 mg. of gas per g. of adsorbent to be adsorbed on the already more or less charged charcoal. A marked discrepancy appears between the curves for integral and differential heats of adsorption, and this is explained by the slow establishment of equil. in the crevices on the surface of the adsorbent. B. C. A.

Adsorption influence, activity and solvation in salt solutions. P. P. KOSAKEVICH AND N. A. ISMAILOV. *Z. physik. Chem.*, Abt. A, **150**, 295–309(1930).—The adsorption by charcoal of PhOH in aq. soln. and of BzOH in MeOH or EtOH soln. is increased by the presence of the chlorides or bromides of Li, Na or K. In aq. soln. the relative effects of the cations are in the order Na > Li > K and those of the anions Cl > Br. In MeOH the same order is observed for the anions, but this order is reversed in EtOH. The salts raise the activity of the substance adsorbed, providing a means of calcg. the relative activities of the latter from adsorption measurements. On the assumption that the neutral salt effect is due to solvation, values are obtained from adsorption measurements in good agreement with those calcd. from the influence on soly. B. C. A.

The work of the International Bureau of Physical-Chemical Standards. IV. Study of the physical constants of twenty organic compounds. J. TIMMERMANS AND MME. HENNAULT-ROLAND. *J. chim. phys.* 27, 401–42(1930); cf. *C. A.* 22, 4024.—A continuation of work previously reported, carried out with the same precision. The following results were obtained:

	B. p.	M. p.	$d_0°$	$d_{15}°$	$d_{20}°$	$n_{He\ yellow}^{18}$	$\eta_{18}°$
m-Xylene	139.30	− 47.4	0.88113	0.86835	0.85551	1.49989	650 × 10^6
n-Propylbenzene	159.45	− 99.2	0.87864	0.86629	0.85380	1.49436	917
Tetrachloroethylene	121.20	− 22.35	1.65582	1.63109	.....	1.50759	932
n-Propyl chloride	46.60	−122.8	0.91686	0.89846	0.87994	1.39142	372
n-Butyl chloride	78.50	−123 1	0.90838	0.89197	0.87549	1.40499	469
o-Chlorotoluene	159.15	− 36.5	1.10180	1 08729	1.07279	1.52827	1037
Methanol	64.65	− 97.0	0.81005	0.79609	0.78208	1.33066	623
Ethylal	88.0	− 66.5	0.85021	0.83465	0.81896	37546	442
n-Propyl ether	90.1	−122.0	0.76611	0.75178	0.73737	38296	448
n-Butyl ether	142.4	− 98	0.78536	0.77254	0 75976	39906	741
Acetic anhydride	140.0	− 73.1	1.10526	1.08712	1.06911	39229	971
Formic acid	100.7	8.40	. ...	1.22647	1.20775	37348	1966
Acetic acid	118 2	16.55	.....	....	1.03802	37392	1314
Propionic acid	141.35	− 20 8	1.01503	0.99874	0 98260	1 38879	1175
Methyl formate	31.50	− 99.0	1 00317	0.98149	0.95973	1.34648	360
Ethyl acetate	77.15	− 83.6	0.92453	0 90657	0.88851	1.37510	473
Ethyl propionate	99.10	− 73.9	0.91251	0 89574	0 87903	1 38643	564
Ethyl carbonate	126.8	− 43.0	0.99707	0.98043	0 96393	1 38654	868
Ethyl oxalate	185.4	− 40 6	1.10169	1.08426	1.06687	1 41239	2311
Methyl cyanide	81 60	− 44 9	0 80345	0.78746	0 77141	1 34638	375

	$\eta_{20}°$	γ_{15}	γ_{20}	γ_{40}	Mol. Refraction He yellow	Mol. refraction Hα
m-Xylene	547 × 10^6	30.11	29.55	28.44	35.92	35.64
n-Propylbenzene	746	29.52	29 01	28.02	.	40.09
Tetrachloroethylene	798	32.86	32.32	31.27	...	27.90
n-Propyl chloride	318	22 45	21.78	20 48	20.92	20.82
n-Butyl chloride	405	24.40	23.90	22.88	25.43	25 30
o-Chlorotoluene	887	33.99	33.44	32.33	35 79	35.52
Methanol	510	22.99	22.55	21.69	...	8 18
Ethylal	344	21.71	21.18	20.13		28.45
n-Propyl ether	376	21.12	20.53	19.35	31.68	31 53
n-Butyl ether	602	23.40	22.93	21.99	40.75	40 56
Acetic anhydride	783	33.37	32.65	31.22	22 37	22 25
Formic acid	1443	38 13	37.58	36 48	8.54	8 50
Acetic acid	1040	28.26	27.79	26.87	12.99	12 92
Propionic acid	958	27.21	26.70	25 71	17.57	17.48
Methyl formate	3281	...	..	.	..	12 98
Ethyl acetate	400	24.36	23.75	22.55		22 13
Ethyl propionate	473	24.83	24 27	23.16		26 67
Ethyl carbonate	698	26.94	26.44	25.47	28 32	28 19
Ethyl oxalate	1618	32.83	32.22	31.03	33.55	33.38
Methyl cyanide	325	29.76	29 10	27 80	..	11 05

[1] $t = 25°$

For most compds. *n* is also given for He red, green, and violet, and for Hα, Hβ and Hγ; values for mol. refraction are also given for Hβ and Hγ. Extensive summaries are given of values obtained by previous workers. GERALD M. PETTY

Density of glycine. R. C. HOUCK. *J. Am. Chem. Soc.* 52, 2420(1930).—Contrary to previous statements, glycine has d_4^{50} 1.575. B. C. A.

The adsorption time and its measurement by means of diffusion experiments. P. CLAUSING. *Ann. Physik* [5], 7, 489–520(1930).—Previous work on the av. life of the mol. on the adsorbing surface is reviewed. The work of Langmuir, Holst and Becker is considered. In the theoretical discussion the following problem is treated as one of diffusion. *Ibid* 521–68.—The app. used for measuring the adsorption time (av. life on the surface) involved the measurement of the time of flow of a gas through a capillary

tube at low pressure and low temp. Pressure changes were followed with an ionization manometer. For A on glass, the av. life was 75×10^{-6} sec. at 78°K. and 3.1×10^{-5} sec. at 90°K. The adsorption time of N_2 on glass was of the same order of magnitude as that of A. For Ne on glass between 78° and 90°K., the adsorption time was 2×10^{-7} sec. P. T. NEWSOME

The adsorption of gas mixtures by silica. E. C. MARKHAM AND ARTHUR F. BENTON. *J. Am. Chem. Soc.* 53, 497–507(1931).—The adsorption of each gas in binary mixts. of CO and O_2 was measured at 1 atm. and temps. of 0° and 100°, and in mixts. of CO_2 with CO and with O_2 at 100°; the isotherms of the sep. gases were detd. at the same temps. Adsorption values calcd. for the mixts. on the basis of a simple extension of Langmuir's theory of adsorption agree fairly well with observed values for mixts.of CO and O_2. In mixts. contg. CO_2, however, the observed values are not only larger than the calcd. but often exceed the adsorptions found in the absence of the second gas; this is tentatively explained as due to some kind of mutual interaction between the 2 kinds of adsorbed mols. P. H. EMMETT

Adsorption and base exchange. P. G. NUTTING. *J. Wash. Acad. Sci.* 21, 33–6 (1931).—A qual. discussion of adsorption from solns. and of some naturally occurring adsorbates. P. H. EMMETT

Phenomena of adsorption and protection in complex colloidal media. CHARLES MARIE AND N. MARINESCO. *Compt. rend.* 192, 92–4(1931).—The dielec. consts. of aq. solns. of gelatin, glycine and *l*-leucine are higher than that of water; this indicates high elec. moment. Aq. suspensions of C also give higher values than water, which are attributed to induced polarity. When suspensions of C are mixed with solns. of the above compds., however, the dielec. const. becomes lower than that of water, partly because of the removal of free dipoles from the system by adsorption and partly because of the effect of the adsorbate in reducing the field-induced moment of the C particles, *i. e.*, protection of the C. The addn. of gelatin to amino acid solns. also reduces the dielec. const.; this effect is attributed to mol. assocn. or to condensation of dipoles by the gelatin, not to adsorption. Thus the type and amt. of protective colloid required may be detd. by studying the dielec. const. K. V. THIMANN

Rigidity of adsorption layers. D. TALMUD, S. SUCHOVOLSKAYA AND N. LUBMAN. *Z. physik. Chem.*, Abt. A, 151, 401–12(1930).—Measurements of the rigidity of the layer at the air-soln. boundary of solns. of org. acids, in both water and dil. HCl, were made by the method of Rohde (*Ann. Physik* [4], 19, 935 (1906)). The results are presented in support of T.'s theory according to which the rigidity of the layer reaches a max. before it becomes satd. W. L. HILL

Monomolecular films on water and on mercury. I. Superficial films on water. L. FAHIR. *J. chim. phys.* 27, 471–95(1930).—An app. is described for making films on the surface of water. The surface tensions of superficial solns. and of monomol. films of oleic acid, myristic acid, and cetyl alc. were measured at various temps. and time intervals. The data are presented in graphical and tabular form, and the values are approximated by math. formulas. Calcd. mol. dimensions agree well with results obtained by spectrography and with x-rays. The change from surface soln. to surface film depends on the temp. **II. Superficial films on mercury.** *Ibid* 587–603.—An app for studying films on Hg is described. The surface tensions of films of oleic, lauric, myristic, palmitic and stearic acids, cetyl alc., triolein and benzyl benzoate on Hg were measured. Films of oleic acid have twice as high a satn. pressure on Hg as on water. The mol. dimensions were calcd. and values developed for the energy of a dipole in the elec. field of water and of Hg, and for the total energy of the film. GERALD M. PETTY

Formation of streamers in sedimentation. C. E. MARSHALL. *Nature* 126, 94 (1930).—The centrifugal method previously described (*C. A.* 24, 2356) for detg. particle size is not invalidated by the formation of streamers. B. C. A.

Technic of extracting liquids that form emulsions. WALTER WEINBERGER. *Am. J. Pharm.* 102, 594–5(1930).—One of the following methods usually succeeds in breaking emulsions that may form in extg. a solute from a liquid solvent by means of a second solvent immiscible with the first: (1) addn. of excess of the solvent in the dispersed phase, (2) addn. of a third solvent miscible with each of the other 2, (3) destruction of the emulsifying agent, (4) salting out, (5) filtration, (6) heating, freezing or electrolyzing, (7) centrifuging. If the emulsion is present only as a broad layer at the interface between the two phases it is best to draw off the emulsion separately and break it. Examples: (1) If the emulsion is one between ether and water, take a small sample in a test tube and add successive portions of water; if unsuccessful, take a second sample and add ether. (2) A small addn. of alc. often breaks an emulsion between ether and water. (3) An emulsion stabilized by soap may be broken by adding acid.

HCHO breaks emulsions stabilized by proteins. (4) Anhyd. Na_2SO_4, $(NH_4)_2SO_4$, or $CaCl_2$ often salts out emulsifying agents. (5) Filtration breaks emulsions stabilized by flocculent ppts. W. G. GAESSLER

The dielectric constants of complex colloidal systems. Adsorption by micelles in solution. Dielectric origin of the adsorptive forces. CHARLES MARIE AND NÉDA MARINESCO. *J. chim. phys.* **27**, 455–70(1930); cf. *C. A.* **21**, 3806; **22**, 4385.—Tables and graphs are given which show the variation of dielec. const. with concn. of suspensions of C in water and in gelatin, of isoelec. gelatin, of *l*-leucine and C, and of glycine, gelatin and C. The phenomenon of protection was sepd. from the phenomenon of assocn. in complex mixts. Dielec. analysis permits the arbitrary choice of a protective colloid, and a detn. of the quantity necessary to protect an unstable colloid. GERALD M. PETTY

Formation of spirals by chemical precipitation. R. E. LIESEGANG. *Naturwissenschaften* **18**, 645–6(1930).—The spiral structures found by Schikorr (*Ibid* **18**, 376(1930)) are simply varieties of the ordinary Liesegang rings. A photograph showing the occurrence of these spirals in Ag_2CrO_4 pptd. in gelatin is reproduced. B. C. A.

Study of E. Fischer's polypeptides with x-rays. FRITZ V. LENEL. *Naturwissenschaften* **19**, 19(1931).—X-ray photographs were made of 4 Fischer prepns: I *dl*-leucyltetraglycylglycine, II *l*-leucyloctaglycylglycine, III *l*-leucyltriglycyl-*l*-leucyloctaglycylglycine and IV *l*-leucyltriglycyl-*l*-leucyltriglycyl-*l*-leucyloctaglycylglycine. "Mark" tubes of 0.8 mm. diam., 10 to 20μ wall were used to contain the substances in a Debye-Scherrer camera of 117.7 mm. diam., Cu *K* rays, 10 hrs. exposure, 10 to 12 amps., 35 kv. Rings at various angles were found. In the last 3 prepns. a recurring ring at $\vartheta = 10°36'$ indicates a crystallographic distance of 4.07 A. U. between polypeptide chains (4.65 and 5.20 for silk). For I a distance of 3.15 A. U. is found that is probably unrelated to the 3.5 A. U. of the av. of glycylalanyl (K. H. Meyer *C. A.* **23**, 3721). A pos. result of the study is that the polypeptides are cryst. B. J. C. VAN DER HOEVEN

Solubility of salts in ethylene glycol and in its mixtures with water. H. M. TRIMBLE. *Ind. Eng. Chem.* **23**, 165–7(1931).—Tabular and graphical data are presented for the soly. at 30° of KI, KBr, $CuSO_4.5$ aq, K_2SO_4, NaCl and KCl in ethylene glycol, in water and in mixts. of the 2 solvents. The relative order of solubilities is much the same. Metathetical reactions, and reactions in which one metal displaces another, took place readily in ethylene glycol solns. GERALD M. PETTY

Influences acting upon solubility. VII. The couples: thiourea-antipyrine and caffeine-antipyrine. E. OLIVERI-MANDALÀ AND L. IRRERA. *Gazz. chim. ital.* **60**, 872–7(1930); cf. O.-M., *C. A.* **21**, 1395.—The cryoscopic measurements were carried out by the method of Bargellini (*C. A.* **14**, 488). The expts. show that (1) the solubilities of thiourea (I) and of caffeine (II) in water increase greatly with addn. of antipyrine (III); (2) the temp. coeffs. of soly. and the thermal effect, *q*, calcd. by the isochore formula of van't Hoff are not reliable criteria of the presence of mol. complexes in water; and (3) the cryoscopic method and that based on soly. coeffs. at different temps. often give different results. The following data give the soly. (mols. per l.) in water of I and of II at the temps. shown: **I**; 10°, 1.1176; 15°, 1.383; 20°, 1.544; 25°, 1.759; **II**, 15°, 0.058; 25°, 0.100; 35°, 0.167. The soly. values and soly. coeffs. of the I-III and II-III solns. are given in more extensive tables, which should be consulted for details. C. C. DAVIS

Critical solution temperatures of systems of sulfur dioxide and normal paraffins. W. F. SEYER AND E. TODD. *Ind. Eng. Chem.* **23**, 325–7(1931).—It was found in study of the systems of SO_2 and butane, hexane, octane, decane, dotriacontane, duodecane and tetradecane that the crit. soln. temp. is a function of the mol. wt. of the hydrocarbon. The amt. of hydrocarbon sol. in SO_2 at its b. p. is comparatively small. D. F. BROWN

Temperature of maximum density of aqueous solutions. Deviations from the law of Despretz. NORA GREGG-WILSON AND ROBERT WRIGHT. *J. Phys. Chem.* **35**, 624–8 (1931); cf. *C. A.* **13**, 923.—Previous expts. with dil. solns. supported the law of Despretz, but on investigating more concd. solns. deviations were found which seem to depend upon 3 factors, *viz.*, lowering of the f. p., increase in the coeff. of expansion and the d. of the soln. In general with more concd. solns. the temp. of max. d. is lower than the f. p. The law of Despretz holds only for dil. solns. H. W. LEAHY

The role of chemical impurities in the fluctuation of heats of solution of monotropic salts. K. P. MISHCHENKO. *Z. Elektrochem.* **36**, 777–82(1930).—In order to det. the source of the variations in the heat of soln. of KCl (of the order of ±1 percent) very accurate measurements were made with an adiabatic calorimeter (cf. *C. A.* **24**, 4694) devised by L. and M. Other solid modifications of KCl were considered as a possible

source of the variations and for this reason certified samples of KCl from two sources were used after drying at 300°; after fusing; and with no previous treatment. Excellent agreement at 25° of 6 detns., with the high —4200 cal. and the low —4194 cal., gave an av. value of —4196 cal. as the integral heat of soln. of KCl to KCl.200 H_2O and indicated that other modifications were not the source of error. A sample of KCl of analytical grade gave consistently low results—about —4175 cal. but after one recrystn. it gave —4184 cal. This indicated the source of error and when addn. of small amts. of $CaSO_4$ to the certified samples gave correspondingly low results the proof seems conclusive ODEN E. SHEPPARD

Heats of dilution of uni- and multivalent strong electrolytes at great dilution. E. LANGE AND J. MONHEIM. *Z. Elektrochem.* **36,** 772–7(1930).—The exptl. integral heats of diln. recently made available by Lange and collaborators (cf. *C. A.* **22,** 346; **24,** 4694; **23,** 1562, etc.) for 14 1-1 type, 2 2-2 type and 4 2-1 type salts are collected, plotted, and discussed in a more extended fashion (cf. Lange and Meixner *C. A.* **24,** 1018). With 1-1 type salts with same cations the initial exptl slopes, *A*, which correspond to "*a*" values (apparent ionic diameters) are larger the smaller the radius of the opposite ion. This relation is valid for the 2-1 type salts investigated. $A_{MgCl_2} > A_{CaCl_2} > A_{SrCl_2} > A_{BaCl_2}$. However, the measurements available indicate the reverse condition in regard to the 2-2 type salts as far as is indicated by $CaSO_4$ and $MgSO_4$. Possibly this is due to the fact that Mg ion has a greater parameter due to the extent of hydration. Possibly in all cases the temp. change of the parameter is a factor individual for each ion. This may also play a part in the explanation of neg. slopes in heats-of-diln. curves. ODEN E. SHEPPARD

Rotation dispersion of optically active substances. E. KEESER. *Strahlentherap.* **34,** 574–7(1929).—The circular dichroism and optical activity of various proteins were studied; the curve of the anomalous rotation dispersion of a 5% egg-albumin soln. in presence of Cu sulfate is reproduced. B. C. A.

The theories of the Soret effect. G. S. HARTLEY *Trans Faraday Soc.* **27,** Pt. I, 1–10(1931).—H. reviews the kinetic theories of the Soret effect advanced by van't Hoff, Wereide, Porter and Chapman and points out the error common to all of them, *viz.:* attributing to the solvent only the role of vehicle and carrier of the solute. He obtains independent support for Eastman's theory by basing a treatment on the assumption that a gradient of osmotic pressure produces the same velocity of ion transfer as an elec. field which gives rise to the same force per ion. E. R. SCHIERZ

Note on the use of acetamide as a solvent in cryoscopy. E. CHERBULIEZ AND G. DE MANDROT. *Helv. Chim. Acta* **14,** 183–6(1931); cf. *C. A.* **25,** 2159.—Acetamide (I) was the only suitable solvent found for detg. the mol. wt. of certain disintegration products of casein. Previously detd. (cf. Bruni and A. Manuelli, *Gazz. chim. ital.* **35,** 1448(1905)) values of the cryoscopic *K* for I (3630 with urethan, 3330 with naphthalene and 3740 with biphenyl) disagreed so widely that new values were detd. with acetanilide, where *K* = 4861 at 0.897% concn., 4223 at 1.877% and 4177 at 2.520%; hippuric acid, where *K* = 4543 at 1.346% concn., 4240 at 2.418%; and diketopiperazine, where *K* = 4885 at 0.507% concn. and 4790 at 0.866%. The values of *K* decrease with increase in concn. but at the same mol. concn. of each solute the values check within 5%. The detns. were made with pure, dry I in Beckmann tubes in a paraffin bath (to avoid water vapor) placed in a const.-temp. enclosure at 78° maintained by boiling AcOEt. I kept in a desiccator does not melt at a const. temp. and in a week the m. p. drops several degrees, indicating 2 modifications of I. Despite these facts results agree well when values of *K* are used depending on the concn., and the results are considered valuable in the work under consideration. ODEN E. SHEPPARD

Solvents. T. H. DURRANS. *J. Oil & Colour Chem. Assoc.* **14,** 65–80(1931).—The phys. chemistry of solns. with particular reference to *lacquer solvents* is discussed. G. G. SWARD

Studies on the porous-disk method of measuring osmotic pressure. F. T. MARTIN AND L. H. SCHULTZ. *J. Phys. Chem.* **35,** 638–48(1931).—The porous-disk method of Frazer and Patrick (cf. Townend, *C. A.* **23,** 752) for directly measuring osmotic pressure was modified and applied to dil. solns. of KCl with sufficient success to justify further work on it. Errors in the results were traceable to unequal temps. within the app. and therefore suggest refinements in construction. Distn. was obtained at will in either direction with relation to the disk, which had not been possible in previous work. H. W. LEAHY

Fractional precipitation. V. The influence of foreign substances in the crystal lattice. OTTO RUFF. *Z. anorg. allgem. Chem.* **195,** 60(1931).—Additional literature reference for a previous article (cf. *C. A.* **24,** 2030). J. B. AUSTIN

Free energy of formation of thallium amalgams. CHARLES EDWIN TEETER, JR. *J. Am. Chem. Soc.* **53**, 1180–1(1931). C. J. WEST

The deposition series of metals in fused salts. GIOVANNI DEVOTO. *Atti III congresso naz. chim. pura applicata* **1930**, 322–30.—From existing data, the free energy of formation at 700° and at the m. p. was calcd. for *halides* of the *alkali* metals, *alk. earth* metals and a few other metals such as *Mn, Cu, Co* and *Tl*. The potential relative to H at 700° was calcd. for a number of metals. J. B. AUSTIN

The diffusion of salt ions into aluminum. J. CICHOCKI. *Compt. rend.* **191**, 841–2 (1930); cf. *C. A.* **23**, 5099.—An Al tube, 2 mm. inside diam., and 4 mm. outside diam. was filled with $NiCl_2$, and drawn to 0.83 mm. outside diam. It was placed concentrically with a tube of Al in a larger glass tube, and the system was evacuated. At 600° and 80 v., a thermionic current was obtained, which rose to a max. of about 2.3×10^{-7} amp. in 60 min., followed by a rapid decrease. No neg. emission was obtained. The thermionic current was due to an absorption of the salt by the metal. G. M. P.

The apparent dissociation constants of phenylalanine and of dihydroxyphenylalanine and the apparent free-energy and entropy change of certain amino acids due to ionization. SADAICHI MIYAMOTO AND CARL L. A. SCHMIDT. *J. Biol. Chem.* **90**, 165–78 (1931).—The apparent dissocn. consts. for *dl*-phenylalanine and *dl*-3,4-dihydroxyphenylalanine were detd. Values for the apparent standard free-energy change for the ionization of those naturally occurring amino acids for which apparent dissocn. consts. are available were calcd. Values for ΔS, the apparent change in entropy of the system due to ionization, were calcd. for alanine, glycine, arginine, histidine, lysine, aspartic and glutamic acids and diiodotyrosine. Calcns. were made which show that no appreciable error results when concn is used instead of activity in calcg. the primary dissocn. const. of aspartic acid and of glutamic acid. P. H. EMMETT

Electrolytic water as acid. R. SAXON. *Chem. News* **142**, 49–50(1931).—A method of prepg. H is described. H is liberated rapidly from pure water at a Cu anode with a potential of 200 v. Since the cathode becomes plated with Cu a Cu cathode is desirable also. No gas appears at the cathode. White CuOH is formed first; this turns through a light-blue to a green hydroxide. Electrolytic reactions cannot be represented accurately by chem. equations. The reaction in question is explained by a rotation of the charged element H within H_2O groups from the position OHH^+ to the position ^+HOH under the influence of the charges on the electrodes. The stage of the white hydroxide is formulated as $H)OHH^+OHH^+ \ldots OHH^+$ (OHCu and the stage of green hydroxide as $HH)OHH^+OHH^+ \ldots OHH^+$(OHOH Cu, in which) represents the pos. and (the neg. electrode. ALLEN S. SMITH

Buffer solutions from secondary sodium phosphate and citric acid. K. H. SLOTTA AND W. FRANKE. *Ber.* **64B**, 452–4(1931).—Buffer solns. prepd. from these 2 salts have a range of p_H 2.2 to 7.4. The values given for the various proportions differ considerably from previous reports. V. F. HARRINGTON

The "drop method" apparatus of Todt for the colorimetric determination of p_H values. I. M. KOLTHOFF. *Chem. Weekblad* **5**, 78–9(1931).—The several shortcomings of this method are pointed out. Buffer solns. are recommended in order to minimize the chances for making errors. J. C. JURRJENS

The use of indicators with two color ranges for the photometric determination of the hydrogen-ion concentration. HANS LINSER. *Biochem. Z.* **230**, 285–9(1931).—The use of an indicator with a single color range is preferable to that with 2 color changes in detg. the p_H by means of the step photometer. S. MORGULIS

The potential of the iridi-iridochloride electrode. HENRY TERREY AND HERBERT C. BAKER. *J. Chem. Soc.* **1930**, 2583–6.—The potential of the iridi-iridochloride electrode was measured, the cell arrangement being: $\overline{Hg} \mid Hg_2Cl_2 + NaCl \mid NaCl + Na_2IrCl_6 + Na_3IrCl_6 \mid Ir$. The electrodes were of (*a*) iridized Ir-foil welded to Pt-Ir wire, or (*b*) iridized glass, the Na_3IrCl_6 concns. being held const. at 0.984×10^{-3} *N* and the Na_2IrCl_6 concns. being varied from 0.874 to 18.482×10^{-3} *N*. The e. m. f. values vary according to: $E = E_o + RT/F \cdot \log_e i/o$, where, i and o are the concns. of Na_2IrCl_6 and Na_3IrCl_6, resp. The heat of oxidation of the iridochloride was calcd. as 5600 cal./mol. It is found that the irido-iridichlorides are correctly represented as being of the "ferro-ferri" type. J. BALOZIAN

The reduction potential of thymoquinhydrone. EINAR BIILMANN AND JYTTE MUUS. *Ber.* **64B**, 310–4(1931).—The prepn. of pure thymoquinhydrone is described. Its potential was measured against quinhydrone. The values were not very const., increasing with time and temp. The e. m. f. against H_2 is at 18° 0.5927 ± 0.0005 v. and at 25°, 0.5866 ± 0.0005 v. V. F. HARRINGTON

The behavior of the modifications and varieties of silica in a stream of chlorine in the presence of carbon. E. GRUNER AND J. ELÖD. *Z. anorg. allgem. Chem.* **195**, 269–87(1931).—The sequence of reactions is shown to be $SiO_2 + 2Cl_2 \longrightarrow SiCl_4 + O_2$; $2C + O_2 \longrightarrow 2CO$ and not the more commonly accepted $SiO_2 + C \longrightarrow Si + 2CO$; $Si + 2Cl_2 \longrightarrow SiCl_4$. The temps. of formation of $SiCl_4$ from SiO_2, Cl and C are 740° from amorphous SiO_2, 1060° from tridymite, 1060° from cristobalite and 1220° from quartz. For various naturally occurring varieties of SiO_2 the necessary temp. is 800–1100°, depending on the degree of aging. The temp. of formation of $SiCl_4$ can be used in the analysis of SiO_2 to det. the amts. of the various modifications present. A. P. SACHS

The influence of the silent discharge on sulfur vapor. ROBERT SCHWARZ AND PAUL ROYEN. *Z. anorg. allgem. Chem.* **196**, 1–10(1931).—The behavior of S vapor at a temp. of 460° in a silent elec. discharge was studied by a dilatometric method. A relative contraction was observed. This is explained by postulating the formation of S_3 (thiozone) mols. E. J. ROSENBAUM

The existence of hyzone. ROBERT SCHWARZ AND PAUL ROYEN. *Z. anorg. allgem. Chem.* **196**, 11–25(1931).—A silent elec. discharge was passed through H at a pressure of 4 cm. Hg and liquid air temp. The decrease in pressure was measured at frequent time intervals. From the amt. of contraction observed and a calcn. of the wall-adsorption of H atoms, it is concluded that the effect is due only to the adsorption of H atoms and that there is no evidence of H_3. E. J. ROSENBAUM

The hydrolysis of acetamide. THOMAS W. J. TAYLOR. *J. Chem. Soc.* **1930**, 2741–50.—The effect of acids (3, 4, 5 *N* HCl, and 4, 5 *N* HBr and H_2SO_4) and bases (*N* NaOH and KOH) on the velocity of hydrolysis of acetamide (in 0.05 *N* soln.) at 25° is measured, together with the effect of 4 *N* and 5 *N* HCl at 40° and 41°, resp. The salt effects are detd. at 25° with 4 *N* HCl for *N* alkali (Li, Na, K) chloride, 4 *N* HBr for *N* alkali bromide solns, *N* NaOH for 2, 2.5 *N* NaCl, 2, 3 *N* NaBr, and with *N* KOH for 2 *N* KCl, KBr and KI. Curves of the acid normality against the velocity coeffs. at 25° and 50° indicate that for HCl the velocity coeff. is max. when the acid concn. is 3 *N*. A similar max. is shown by HBr, but is not present with H_2SO_4. To explain these max. it is assumed that with acetamide HCl and HBr form complexes ($2CH_3{\cdot}CO{\cdot}NH_2$, HCl and $2CH_3{\cdot}CO{\cdot}NH_2$, HBr, resp.), which do not hydrolyze, while H_2SO_4 does not form such a complex. It is found that with 4 *N* HCl as catalyst, NaCl and KCl accelerate the hydrolysis, while LiCl fails to do so; with HBr, KBr accelerates the reaction, NaBr has no apparent effect, while LiBr represses it. To explain this behavior of salts, the assumption is made that acetamide forms stable complexes with certain salts, which complexes do not hydrolyze. The effect of any salt is the same in bases as in acids. J BALOZIAN

Vapor-phase equilibrium of the simplest cis-trans isomers (dichloroethylene). L. EBERT AND R. BÜLL. *Z. physik. Chem.*, Abt. A, **152**, 451–2(1931).—The *b. ps. of cis- and trans-*$C_2H_2Cl_2$ are 60.14 ± 0.04° and 47.48 ± 0.04°, resp. (purity checked by dielec. precision measurements). An exact *b. p. curve of mixts. of the 2 isomers* was detd. Condensation of the vapor in equil. at 300° yielded 63% of *cis*-$C_2H_2Cl_2$, the thermodynamically more stable form. FRANK URBAN

The melting point in the tungsten–rhenium system. KARL BECKER AND KURT MOERS. *Metallwirtschaft* **9**, 1063–6(1930).—The solidus line for the W Re system was detd. An intermetallic compd., W_2Re_3, m. 3005° and with 2 eutectics one with 50 atomic % Re and m. 2892°, the other with 67 atomic % Re and m. 2822°, were found. C. H. LORIG

The modifications of silver iodide. R. BLOCH AND H. MÖLLER. *Z. physik. Chem.*, Abt. A, **152**, 245–68(1931).—By röntgenographic and microscopic examn. of AgI prepd. by various methods the phase diagram was constructed. There are 3 modifications; cubic (< 135°), hexagonal (135–46°) and "hot" cubic (> 146°). Methods of prepg. both cold forms are given. V. F. HARRINGTON

Phase equilibrium in binary systems with continuous mixed crystals. E. KORDES. *Z. physik. Chem.*, Abt. A, **152**, 161–96(1931).—A simple empirical equation is given for the phase equil. between crystals and liquid, between crystal modifications within continuous crystals and between the anisotropic liquid state and the isotropic. Previous data are used to prove the general applicability of the equation. The value of this equation in geochemistry (the zone formation in plagioclase, the difference between isopolymorphism and boundary miscibility, etc.), is suggested. V. F. H.

Phase-rule studies on metallic thiocyanates. I. The systems $Ba(CNS)_2$–NaCNS–H_2O and $Ba(CNS)_2$–KCNS–H_2O at 25°. VINCENT J. OCCLESHAW. *J. Chem. Soc.* **1931**, 55–60.—The systems $Ba(CNS)_2$–$Na(CNS)$–H_2O (I) and $Ba(CNS)_2$–KCNS–H_2O

(II) are investigated, and the solubilities of NaCNS, KCNS and $Ba(CNS)_2$ in H_2O are detd. at 25°. The ternary diagram of system I shows that no double salt exists at 25° $NaCNS.2H_2O$ is the stable solid phase at this temp. when NaCNS is in equil. with its satd. solns., its transition temp. being 30.3–04° (detd. dilatometrically and thermometrically). In system II $3KCNS.2Ba(CNS)_2.5H_2O$ exists over a wide area. It is prepd. by allowing a soln. contg. the correct proportions of the constituent salts to cryst. at 25°, freeing from mother liquor as much as possible by suction, and drying in air in cold weather. At 25° the soly. in g./100 g. is detd. as 58.78 for NaCNS, 70.89 for KCNS and 62.61 for $Ba(CNS)_2$. J. Balozian

Physical constants of the system methane-hydrogen. F. A. Freeth and T. H. Verschoyle. *Proc. Roy. Soc.* (London) **A130**, 453–63(1931), cf. *C. A.* **25**, 1422. —The pressure range of CH_4 isotherms was extended to 215 atm. The m.-p. curve was detd. The triple point was observed to be −182.46° at a pressure of 8.737 cm. The three-phase curve and one isotherm at −182.5° of the system CH_4–H_2 were detd. E. J. Rosenbaum

Kinetics of chlorine bleaches and hypochlorite solutions. Joseph J. Weiss. *Z. Elektrochem.* **37**, 20–5(1931); cf. *C. A.* **24**, 5589. — The velocity of spontaneous decompn. of alk. hypochlorite solns. by the general reactions $3ClO^- \longrightarrow ClO^-_3 + 2Cl^-$; $2ClO^- \longrightarrow 2Cl^- + 2O$, at const. H-ion concn. is given by $\frac{d[ClO^-]}{dt} = \left\{k_2\frac{f_2^1}{f_2} + k_2'' f_{HOCl}^2 [H^+]\right\}\left\{[OCl^-]_0^2 \left(\frac{1}{[ClO^-]_t} - \frac{1}{[ClO^-]_0}\right)\right\} = k_2\frac{f_2^2}{f_2} + k_2'' f_{HOCl}^2 [H^+] \quad k_{bi}$ Consideration of the F. Foerster tests (*Z. Elektrochem.* **23**, 137(1917); cf. *C. A.* **11**, 2865) and use of the Debye-Hückel theory gives $k_{bim}^F = 1.97 \times 10^{-4} \times 10^{0.704\sqrt{2}[OH^-]} \sqrt{2[OCl^-]} + 1.2 \times 10^{-4}\frac{f_{HOCl}^2}{[OH^-]}$ at 25°, time in days and concn. in mol./l. Consideration of the Kauffmann tests (*C. A.* **19**, 561) gives $k_{bim}^K = (5.1 \times 10^{-4} f_{HOCl}^2/[OH^-])$ in the same units. General kinetics of Cl bleaches, if HOCl or Cl_2O is assumed as the bleaching principle, are set up, and the oxidation mechanism is discussed; with p_H = const. $\frac{d[ClO^-]}{dt} = \{f(F) + k_2'\{f_{HOCl}^2 f_{HOCl}[H^+][ClO^-]^2; \frac{1}{t}\left(\frac{1}{[ClO^-]_t} - \frac{1}{[ClO^-]_0}\right) = \{f(F) + k_2'\} f_{HOCl}^2 k'_{HOCl}[H^+] = k'_{bim}$ For homogeneous reactions $f(F)$ = const. $[R] + k_2'$ (R is the reducing agent). This is compared with the Kauffmann phenolphthalein tests and confirmed. For heterogeneous reactions a form $f(F) = a_1[H^+]^n + a_2$ is discussed, which in general leads to a H-ion concn. for extreme reaction velocity. There is discussed n, a reaction velocity and swelling being assumed for the special case of cellulose bleaching or oxidation, where $k'_{bim.} = f_{HOCl}^2\{b_1\sqrt{[H^+]} + b_k[H^+]\}$. The Clibbens and Ridge tests (cf. *C. A.* **21**, 2192) and theory are discussed for the cases $b_1 = 3.92 \times 10^4$, $b_k = -4.0 \times 10^7$, $[H^+]^{a)}_{max.} = 2.5 \times 10^{-7}$; and $b_1 = 10.4 \times 10^4$, $b_k = -2.2 \times 10^8$, $[H^+]^{b)}_{max.} = 0.6 \times 10^{-7}$ as H-ion concns. of greatest fiber attack. A notable fact for useful application of practical bleaching of cellulose and textiles is that, from the general difference of the n of the fiber and the n of the color to be discharged, a H-ion concn. or interval can be calcd. at which the color to be discharged is attacked rapidly, while the textile or fiber is practically unattacked, which is advantageous as regards bleach loss and textile strength. E. M. Symmes

Influence of the triazo ion in the catalytic action of colloidal platinum on hydrogen peroxide. E. Oliveri-Mandalà. *Gazz. chim. ital.* **60**, 878–82(1930); cf. *C. A.* **24**, 1017.—Colloidal Pt was prepd. by the method of Bredig. Decompn. of H_2O_2 was followed by N detns. with an app. used previously for the catalytic decompn. of HN_3 (cf. *C. A.* **11**, 1608). The molar concns. per l. of the H_2O_2, NH_3 and colloidal Pt were 0.0839, 0.012 and 0.00019, resp. The velocity of decompn. of H_2O_2 is reduced greatly by adding small quantities of NH_3; even traces of NH_3 reduce the velocity about 0.5. The velocity const., K, is not a linear function of the concn. of NH_3. The presence of HN_3 decreases K about 25%. The temp. coeff., K_{t+10}/K_t, is 1.66 to 2. Conclusion: the catalytic decompn. of aq. H_2O_2 follows the logarithmic law: $x = A(1-e^{-kt})$, and the temp. coeff. per 10 degrees is approx. 2, whether NH_3 is present or not. C. C. Davis

Autoxidation of cyclohexene by oxygen. N. D. Zelinskii and P. P. Borisov. *Ber.* **63B**, 2362–5; *J. Russ. Phys.-Chem. Soc.* **62**, 2051–4(1930).—The Lewis-Langmuir

theory predicts the addn. of O to an ethylenic linkage to yield a peroxide without the use of a catalyst. Z. and B. allowed 20 g. of cyclohexene to absorb O. The rate of absorption increased, decreased and became zero after 151 days. 3200 cc. of O, corresponding to *one atom per molecule*, was absorbed. The unchanged cyclohexene was removed by standing in a vacuum desiccator over H_2SO_4 for 3 months, when a tough, resinous, reddish yellow mass remained, which gave the peroxide test with guaiacol resin and ferrous salts, and analyzed for cyclohexene peroxide, $C_6H_{10}O_2$. F. H. RATHMANN

Oxidation of seemingly autoxidizable leuco bases by molecular oxygen. ALBERT REID *Ber.* **63B**, 1920-2(1930). Thionine was reduced by phenylhydrazine to leucothionine and carefully purified by washing with alc., drying and subliming at 190–220° under 0.05 mm M. p. 185°. 2.0 mg. leucothionine in 2 cc. of a molar buffer soln. of NH_4OAc and HOAc, purified in quartz vessels (p_H = 4.5), was shaken in a quartz vessel immersed in a thermostat at 20°, and the rate of absorption of O, noted. From 0.0001 to 0.001 mg. of Cu greatly increased the rate. Replacement of the N of the air by CO greatly reduced the rate both with and without the presence of Cu. Leuco methylene blue gave similar results. It is concluded that the oxidation of these leuco bases is not autoxidation but is catalyzed by traces of such metal ions as Cu, occurring as impurity in even the purest of lab. reagents. F. H. RATHMANN

The catalysis of the reactions between solids. II. The mechanism of the reaction of catalytic stannate formation. SETSURÔ TAMARU AND NOBORU ANDÔ. *Z. anorg. allgem Chem* **195**, 309-20(1931), cf. *C. A.* **24**, 774. If SnO_2 is previously heated to 1150° the stannate formed from the mixt. of SnO_2 and 7CaO without a catalyst at 900° is always small in amt and is independent of the method of prepn. of the SnO_2. The reduction of SnO_2 by H_2 occurs in 2 stages and the further reduction of SnO is repressed by the presence of CaO A new method of *decompose cassiterite for analysis* is proposed, based on the formation of stannate by heating with lime in the absence of air. A. P. SACHS

The decomposition of carbon monoxide in the presence of iron and iron oxides. P. RISCHBIETH. *Z. physik. chem Unterricht* **44**, 22-4(1931). R. describes 2 lecture expts to study the reaction (*a*) $CO \longrightarrow C + CO_2$ and the equil. (*b*) $CO_2 + C \rightleftharpoons CO$ in the presence of Fe and its oxides The gases are passed over heated Fe_2O_3 in a glass tube Even after reduction of the oxide the content of CO_2 in the escaping gases (*a*) remains about const. (50%), indicating the decompn. of the CO in contact with Fe. At 400-500° the equil (*b*) is about 50% CO_2. This catalytic reduction of CO may account for the occurrence of the finely divided C so often met with in the upper regions of the blast furnace. E. R SCHIERZ

The mechanism of iron catalysts in certain oxidations. C. V. SMYTHE. *J. Biol. Chem.* **90**, 251-65(1931).—Ferrous iron present as the unionized pyrophosphate or metaphosphate is shown to oxidize rapidly with O_2 of the air regardless of the acidity of the soln , whereas $FeSO_4$ in similar slightly acid solns. showed no appreciable oxidation. This behavior, as well as the catalytic effect of ferrous and ferric iron in certain org. oxidations, is explained in terms of the electronic structure of the compds. P. H. E.

New methods of organic thermochemistry. M. REBEK. *Arhiv. Hem. Farm.* **4**, 212-21(221 German)(1930).—A report on preliminary expts. to det. the energy content of org compds. J. KUČERA

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3—SUBATOMIC PHENOMENA AND RADIOCHEMISTRY

W. ALBERT NOYES, JR.

Masses of the electron, the proton and the universe. A. S. EDDINGTON. *Proc. Cambridge Phil. Soc.* **27,** 15–9(1931); cf. *C. A.* **24,** 1277.—E's "Theory of 137" is developed further. The calcn. of the ratio of mass of the proton to the mass of the electron is given as 1849.6. The "packing fraction" is checked. The no. of protons in the universe is given as 7×10^{78} or 14×10^{78}, depending on whether space is taken as elliptical or spherical. WILLIAM E. VAUGHAN

The quantum theory of zero-point temperature. G. BECK, H. BETHE AND W. RIEZLER. *Naturwissenschaften* **19,** 39(1931).—At 0 abs. all internal motion of a crystal lattice has stopped. All degrees of freedom are "frozen" with the exception of 1 per electron for the Bohr orbits of the electrons. Every electron has (Eddington) $1/\alpha$ degrees of freedom if α is the Sommerfeld fine structure const. Likewise $1/\alpha$ degrees for every proton are present. Hence in order to reach abs. 0 $(2/\alpha)$ —1 degrees of freedom have to be subtracted from a substance per neutron present. If this is equated to 273°, a value of 137 is found for $1/\alpha$ which is considered to agree with a value obtained in a different way. B. J. C. VAN DER HOEVEN

Quantum mechanics of electrons in crystal lattices. R. DEL. KRONIG AND W. G. PENNEY. *Proc. Roy. Soc.* (London) **A130,** 499–513(1931).—Math. The mechanics of electrons in periodic fields of potential are calcd. for an integrable case. The results agree qualitatively with exptl. facts. E. J. ROSENBAUM

Diamagnetism of the free electron. C. G. DARWIN. *Proc. Cambridge Phil. Soc.* **27,** 86–90(1931).—Math. D. shows that the susceptibility of a free electron gas is $2\mu_B^2/3kT$ per electron, where μ_B is the Bohr magneton. WILLIAM E. VAUGHAN

X- and γ-radiation measurement and the new international *r* unit. J. G. STEPHENS *J Cancer Research Comm. Univ. of Sydney* **1,** 222–31(1930).—Radiation is specified clinically by detg. (*a*) the wave length, (*b*) the amt. of energy in the radiation and (*c*) the degree of polarization. The *r* unit, which measures the total ionic charge under certain conditions, is used to express energy in the radiation in terms of the ionization in air. It is suggested that the ionization in liquids such as hexane or light petroleum would be of advantage by reducing the size of app. and giving larger ionization currents B. C. A.

Direct measurement of intensity distribution in molecular beams. J. B. TAYLOR *Z. Physik* **57,** 242–8(1929).—When an alkali metal atom strikes a glowing W wire, it parts with an electron and is reëmitted as a pos. ion. By measuring the no. of pos ions emitted from such a wire in various positions in the path of a mol. beam the no of alkali metal atoms striking the wire per sec. can be detd., and hence the energy distribution in different parts of the beam deduced, with an accuracy of 1 in 10^3. B. C. A.

The production of an intense beam of hydrogen positive ions. LOUIS R. MAXWELL *Rev. Sci. Instruments* **2,** 129–40(1931).—A method was designed for obtaining an intense beam of H_2^+ ions by diminishing the loss of the ions to the walls of the discharge chamber which occurs in the usual method. This is accomplished by placing the discharge chamber in a strong magnetic field in which the direction of the magnetic field is parallel to the direction of motion of the pos. ions. The app. is described. It is capable of producing a pos.-H-ion beam corresponding to currents ranging up to 3 ma. in a region of pressure of 3.3×10^{-3} mm. of Hg. ALLEN S. SMITH

Photographic detection of the asymmetrical angular distribution of twice-reflected electrons. E. RUPP. *Naturwissenschaften* **19,** 109(1931).—Photographs were made of twice-reflected electrons. An electron beam passed through a 0.3-mm. hole and was reflected at 45° on a Au surface. The reflected ray (also at 45°) passed through a 0.1-mm. hole (50 mm. from the point of reflection) with a thin Au foil behind it. The scattered ray is photographed on a plate 450 mm. from the foil. For electrons of 220 kv., diffraction rings were obtained with distinct asymmetry, the rings being weakest on the side away from the original direction of incidence of the electron beam. The asymmetry is not due to the structure of the Au. An Al reflector and foil do not give the same result. B. J. C. VAN DER HOEVEN

Angular scattering of electrons in gases. F. L. ARNOT. *Proc. Cambridge Phil. Soc.* **27,** 73–6(1931); cf. *C. A.* **24,** 1572.—A discussion is given of the error introduced

into expts. on the angular scattering of electrons in gases by a potential at right angles to the electron beam. Calcn. shows that in the previously reported paper the error in all cases was less than 0°17′, which is less than the exptl. error in the detn. of the angles.
WILLIAM E. VAUGHAN

Optical determination of the sphere of action of atoms for electrons. L. S. ORNSTEIN AND A. M. VAN DOMMELEN. *Proc. Acad. Sci. Amsterdam* **33**, 683–9(1930); cf. *C. A.* **24**, 1793, 2668.—The optical method previously described for the detn. of the sphere of action of He atoms is limited to electronic energies above the excitation potential. It is shown that it is possible to extend the measurements below that value with a mixt. of He and Hg. Further it is possible to simplify the method so that intensity measurement is not necessary and the density detn. is sufficient for obtaining the value of the sphere of action.
MARIE FARNSWORTH

The cathode radiation of the sun. H. RUDOLPH. *Naturwissenschaften* **19**, 66 (1931).—From a theory on the daily variation of the earth's magnetism (*Gerl. Beitr. z. Geophysik* **27**, 378(1930)) it is concluded that the N "dust shell" around the earth is negatively charged. This necessitates a strongly neg. corpuscular radiation from the sun and a potential of some 10^{14} v. for this shell. Several conclusions and results are discussed.
B. J. C. VAN DER HOEVEN

Direct photography of ionization in insulating substances. A. GEMANT. *Naturwissenschaften* **19**, 109(1931).—Light-sensitive films in an elec. field are blackened on reaching certain limits of potential. This effect is attributed to ionization; it occurs in gases as well as in liquids and solids. By using photographic paper (semiconductor) as an extension of the plate electrode the structure of insulating substances can be examd. when present between the electrodes. Blackening below the breakdown potential indicates porous structure of the material; ionization and consequent luminescence by either d. c. or a. c. can thus be studied directly. It was found that for a no. of substances only a. c. gives the glow to which the blackening is due.
B. J. C. VAN DER HOEVEN

Photoelectric effect with lead and mercury at low temperatures. J. C. MCLENNAN, R. G. HUNTER AND J. H. MCLEOD. *Trans. Roy. Soc. Can.* [3], **24**, Sect. 3, 3–23(1930).—Measurements of the photoelec. current produced by films of Pb and of Hg when irradiated with ultra-violet light below 3000 A. U. were made down to temps. below the transition point for supercond. The object was to det. whether the emission of electrons from a metal when suitably irradiated undergoes any abrupt modification if the temp. of the metal irradiated is progressively lowered from a point a few degrees above its supercond. transition point to one a few degrees below it. The photoelec. current from Pb and Hg in highly evacuated cells was measured at temps. down to that of liquid H_2. At the temp. of liquid air Pb showed a decrease in the current of about 2% from that of the satn. value of the current at room temp. and a decrease of about 16% at the temp. of liquid H_2. Hg at liquid-air temps. showed large variation with the thickness of the Hg film. Inability to reproduce films of exactly the same thickness made it impossible to draw any conclusions concerning the change in the photoelec. current from Hg at the temps. of liquid air and liquid H_2. The photoelec. current from lead films at the temp. of liquid He and in the superconducting state was slightly less than it was at a few degrees above its transition temp., 7.2°K. No abrupt change took place in the photoelec. emission of electrons from Pb as it was cooled down through its characteristic transition temp.
J. W. SHIPLEY

The action of adsorbed gas films on the photoelectric effect of salts (remark on "The action of Geiger counting chambers"). J. KLAPHECKE. *Naturwissenschaften* **19**, 87(1931).—Water vapor promotes electron emission in a manner similar to that found in Geiger counters by Bosch and Klumb (*C. A.* **25**, 1434) in an investigation of the photoelectric effect of salts. Salts heated *in vacuo* show no photoelectric effect (Werner, *C. A.* **23**, 1295). Salts sublimed in air give a photoelectric current, which increases 10-fold after a short treatment with water vapor. They do not exhibit the same activity as do the same salts with occluded water prepd. from solns. Results on gases other than H_2O are inconclusive.
B. J. C. VAN DER HOEVEN

Cathode sputtering at very low gas pressures. A. GÜNTHERSCHULZE AND K. MEYER. *Z. Physik* **62**, 607–18(1930).—The sputtering of Ag and Cu cathodes in He, Ne, A, H and N has been investigated at pressures so low (generally less than 0.01 mm., in the app. described) that the sputtering is not dependent on the gas pressure. The sputtering electrode, changes in the wt. of which were noted by observing the motion of a spiral spring by which it was supported, was placed near a low-voltage arc consuming 3–5 amp. at 50 v.; it was maintained at a p. d. of 300–1200 v. neg. with respect to the anode of the arc. The amt. of sputtered metal increases with the p. d. applied

to the cathode, and the amt. per unit ion current reaching the cathode increases in the order H, Ne, N, A, at any given cathode potential. No sputtering was observed in He up to the highest p. d. applied, 800 v. The efficiency of the sputtering calcd. as the ratio of heat of vaporization of the metal sputtered to the energy delivered by the ion current ranges from 0.3% in H to 1.3% in A. Data have also been compiled relating to the amt. of gas adsorbed per g. of metal sputtered under various conditions of gas pressure and sputtering electrode potential; the values obtained are in the neighborhood of 0.4 mg. in A, 1.0 mg. in Ne, 0.7 mg. in H and 1–6 mg. in N. B. C. A.

Observation of a particulate emission from the cooled metallic cathode of an electric arc. Georges Laudet. *Compt. rend.* **192**, 202–3(1931). M. McMahon

The dielectric constant and the conductivity of ionized gases. Th. V. Jonescu and C. Mihul. *Compt. rend.* **192**, 343–5(1931).—The values of the cond. and the dielec. const. of electronic gas as detd. previously (*C. A.* **25**, 1440) were about 30 times greater than the calcd. values. The present study indicates that this was due to the assocn. of electrons with mols. to a degree depending on the elec. conditions present in the tube used for the measurements. The results suggest that the long transmission range of short elec. waves of between 10 and 40 m. wave length might be due to a similar assocn. of electrons with mols. in the upper atm. The reflecting power of such an ionized layer would be great for wave lengths between 10 and 40 m. R. H. Lombard

Method of measuring the number of ions in the free atmosphere. Yo Itiwara *Physik. Z.* **32**, 97–106(1931).- The usual type of ion-counting tube does not measure the total no. of ions in the air as some are deflected away from the entrance by the elec. field. Measurements were made of the contour surfaces of equal potential around the end of the counting tube by means of a flame probe. I. discusses and proposes corrections to apply to the data of Hess (*Sitzb. Akad. Wiss. Wien*, Abt. IIa, **138**, 169 (1929)). **Reply.** V. F. Hess. *Ibid* 106. -H. disagrees with I. on several points. T. H. Chilton

Experiments on the entanglement of atoms in a magnetocathodic or cathodic stream. E. Henriot, O. Goche and (Mlle.) F. Dony-Hénault. *J. phys. radium* [7], **2**, 1–11(1931).—Atoms of various substances (W, C, Pt, Na and S) may be entangled in a magnetocathodic or cathodic stream, probably as ions. Once entangled in the electron stream they appear to form an integral part of it in that they are deformed by an elec. or magnetic field in the same way and yield deposits of the particular element used of the same shape as the electronic stream alone. They resist various attempts to sep. them from the electronic stream. However, they may be disengaged from the electronic stream at points of strong curvature of the latter and are obtained as pos. ions. This is brought about by applying an opposite and larger voltage between the plates than that of the electron flow. The electron stream is then bent back to the plate through which it came after reaching a point of great electron density where the curvature of the stream reaches a max., whereas the atoms continue and are deposited on the opposite plate. No satisfactory explanation of the attraction of the electron stream for the atoms is advanced but is thought possible that it is of an electrostatic character. Oden E. Sheppard

The anomalous scattering of α-particles by light nuclei. Eugen Guth and Theodor Sexl. *Z. Physik* **66**, 577–80(1930).—The theory and formulas for the exact calcn of anomalous scattering of α-particles in a Gamov-Gurney-Condon potential field are described. M. McMahon

A new method for the radioactive investigation of pulverized substances. W Sebesta. *Z. Physik* **66**, 598–612(1930).—Because of its great sensitivity the α-ray method is suited to quant. measurement of radioactivity. In the method described a small quantity of pulverized normal material was mixed with the pulverized material to be investigated and the resulting change of gas cond. produced in an α ray counter was measured. Ionization took place in a semi-spherical condenser with circular opening before which the brass dish holding the pulverized material was placed; a quadrant electrometer was used as measuring instrument. The standard material used was Ra Ba sulfate. M. McMahon

An investigation for accomplishing the decomposition of lead atoms. III. A Smits and H. S. Vening Meinesz. *Proc. Acad. Sci. Amsterdam* **33**, 737–48(1930); cf. *C. A.* **19**, 3210; **21**, 855. Marie Farnsworth

Artificial disintegration by α-particles. J. Chadwick, J. E. R. Constable and E. C. Pollard. *Proc. Roy. Soc.* (London) **A130**, 463–89(1931).—Atoms of B, N, Al, F, Na and P were bombarded by α-particles from Po. The protons emitted were recorded by an elec. method, with vacuum-tube amplification. It is assumed that the

protons and α-particles are in definite energy levels within the nucleus. Mass defects have been calcd. and checked against Aston's data (*C. A.* **21**, 3543). E. J. R.

Photoelectric absorption of γ-rays. L. H. GRAY. *Proc. Cambridge Phil. Soc.* **27**, 103–12(1931).—Consideration of the exptl. data has lead G. to the following equation for the photoelec. absorption coeff. per electron (τ) of x-rays and γ-rays: $\log_{10}\tau = \bar{3}.6505 + 1.0\log_{10}\lambda + 0.480(\log_{10}\lambda)^2$. The curve is given. WILLIAM E. VAUGHAN

Capture of electrons by α-particles. H. C. WEBSTER. *Proc. Cambridge Phil. Soc.* **27**, 116–30(1931); cf. *C. A.* **24**, 5617.—The study of the capture by α-particles from Po of electrons emitted from a heated oxide-covered filament was attempted. The ions were recorded with a modified Geiger counter. The exptl. set-up is described in detail. Wholly neg. results were obtained. The disagreement with the work of Davis and Barnes (*C. A.* **24**, 1029) is discussed; no reconciliation is made. W. E. V.

Study of the velocity of disintegration of polonium in various places. L. BOGOYAVLENSKII. *J. phys. radium* [7], **2**, 12–9(1931); cf. *C. A.* **24**, 3143; **24**, 3427.—Three series of expts. on the detn. of the half period were made: in the southern part of U. S. S. R. (42 places), in the region of Leningrad (18 places) and at Dietskoie Selo (3 places). The results vary from 135.5 to 141.1 days. The time seems to depend on the place where the detn. was made. L. D. ROBERTS

The nature of the absorbable radiation accompanying the rays from polonium. IRÈNE CURIE AND FREDERIC JOLIOT. *J. phys. radium* [7], **2**, 20–8(1931).—A more detailed account is given of the work described in *C. A.* **24**, 1792. O. E. S.

Theory of the scattering of short x-rays by molecular hydrogen. H. S. W. MASSEY. *Proc. Cambridge Phil. Soc* **27**, 77–85(1931); cf. *C. A.* **25**, 869.—Theoretical, on the basis of wave mechanics. M. develops a theory which leads to the conclusion that the scattering of short x-rays by mol. H is similar to that for at. H, although the ratio varies with the angle of scattering. There is no agreement with the one set of exptl. values available (cf. Barrett, *C. A.* **22**, 1275, 3581). WILLIAM E. VAUGHAN

Moseley diagram of the ionization voltages of the light atoms and ions. W. BRAUNBEK. *Z. Physik* **63**, 20–9(1930).—The sq. roots of the ionization voltages for the elements and ions of the 1st 3 short periods (to K) are plotted against the at. no. of the element as abscissa, and it is shown that each isoelectronic series (*e. g.*, Li, Be^+, B^{++}, C^{+++} . . .) gives points lying on a straight line, the gradient of these lines being const. in each period. The only point deviating appreciably is that corresponding with Cl^+, and for this ion the ionization voltage of 22.2 v. is predicted instead of the provisionally accepted value of 18.32 v. It is shown that this means that a linear relation exists between the screening nos. and the atomic no. Z in an isoelectronic series, although in the 1st period (H and He) the screening no is independent of the nuclear charge. It is shown that s decreases with increase in Z in an isoelectric series, contrasted with the x-ray terms, in which s increases with increase in Z. A slight concavity in the lines of the Moseley diagram points to a decrease of s with Z which is not exactly linear, the concavity being greatest in the 2nd period and not observable in the 1st period. On this basis values for the ionization potential of the ions Li^+, Be^{+2}, B^{+3}, C^{+4} are extrapolated from the known value of s for He, complete linearity being assumed. These values agree to within 1% with the values calcd. by Hylleraas (*C. A.* **24**, 1285) by means of wave mechanics, which agree very exactly with the unpublished measurements of Edlén and Ericson (cf. *C. A.* **24**, 1575). The equation of Hylleraas is shown to predict a slight decrease of s with increase in the above-mentioned series. B. C. A.

Satellites of the $K\beta_1$ line of elements from iron to zinc. SUEKICHI KAWATA. *Mem. Coll. Sci. Kyoto Imp Univ.*, Ser. A, **13**, 383–7(1930).—In the course of expts. to det. the relative position of the absorption edge and the $K\beta_2$ line for the elements from Fe to Zn several new satellites have been found on the short side of $K\beta_1$ and $K\beta_2$, which seem to correspond to β'' and β''' observed by Druyvesteyn for elements of lesser at. no. than that of Fe. Wave-length tables are presented. The application of the theories of Druyvesteyn and Beuthe as to the origin of these lines is discussed but no definite conclusion is reached. C. J. HUMPHREYS

X-rays in the service of chemistry and industry in 1931. GEORGE L. CLARK. *J. Chem. Education* **8**, 625–39(1931). E. H.

Experimental study of the absorption formula of x-rays. II. MATAKICHI ISHINO AND SUEKICHI KAWATA. *Mem. Coll. Sci. Kyoto Imp. Univ.*, Ser. A, **13**, 375–81(1930); cf. *ibid* **10**, 311(1927).—The relation of the true g.-atomic absorption coeff., $\tau/\rho A$, to the at. no., Z and to the wave length has been studied for a no. of elements by the method described in the previous paper (*C. A.* **22**, 3096). From a study of the data thus obtained it seems right to conclude that the fluorescent absorption of x-rays as a function

of λ and Z does not obey such a simple law as given by $\tau/\rho A = c\lambda^p Z^q$, in which c, p and q remain const., but that it must be connected by a more complex relation. Also, if it is to be expressed by the above formula, the constancy of p and q should hold only in a restricted region, and, in the general case, they should depend somewhat on λ and Z. C. J. HUMPHREYS

A new x-ray spectrograph for wave-length determinations in air. S. ZEIDENFELD. *Rev. Sci. Instruments* **2**, 153–63(1931). E. H.

The accuracy of interference measurements in the molecule with Röntgen and cathode rays. L. BEWILOGUA. *Physik. Z.* **32**, 114–7(1931).—From a consideration of the theoretical "form factor" curves for Röntgen rays and for electrons, it is shown that, in general, the former must give more exact values for the distance between atoms in a single mol. T. H. CHILTON

Interferometer measurements in the infra-red region of xenon and iron. J. C. MCLENNAN AND FLORENCE M. QUINLAN. *Trans. Roy. Soc. Can.* [3], **24**, Sect. 3, 47–52 (1930).—An examn. of the infra-red region of the spectra of Xe and Fe was made to det. whether suitable lines might be found as secondary standards of wave length. Difficulty was found in reproducing the Xe spectrum because of a change of the pressure of the gas as the discharge tube became older. This makes the gas unsuitable as a source of accurate standard wave lengths. A table contg. the wave lengths of the arc spectrum of Fe from λ6677.994 to 8688.637 A. U. is given. J. W. SHIPLEY

Interpretation possibilities of the mercury hyperfine structures. H. SCHÜLER. *Naturwissenschaften* **18**, 895(1930).—The Hg lines, in general, appear to consist of one strong component and several weaker components so grouped that their center of gravity coincides roughly with that of the main one. The ratio of the intensity sum of the weaker components to the total intensity has been measured for Hg arc lines 4047, 4078, 4916, 5461, 5769, 5791 A. U. and for Hg spark lines 6150 and 7944 A. U. With 2 exceptions the ratio is between 0.25 and 0.32. According to Aston the odd-numbered isotopes constitute about 30% of the total so that the large hyperfine structure splitting of Hg lines may be ascribed principally to the odd-numbered isotopes, Hg_{199}, Hg_{201}. W. F. MEGGERS

Photoelectric intensity measurements in the mercury spectrum. II. L. S ORNSTEIN AND J. F. CUSTERS. *Proc. Acad. Sci. Amsterdam* **33**, 809–13(1930).—In the first paper (cf. *C. A.* **24**, 4458) it was stated that a characteristic relation of the line intensity I as a function of the current i exists at const. pressure, p, provided that the current is small and the pressure lies within a certain range. Further measurements show that I/i increases with decreasing i at all pressures, provided the current becomes sufficiently small. W. F. MEGGERS

Intensity measurements for the multiplet $z^5G - e^5F$. W. A. M. DEKKERS AND A. A KRUITHOF. *Z. Physik* **66**, 491–3(1930).—Intensity measurements of 9 lines in the Ni spectrum forming the multiplet $z^5G - e^5F$ (4592.532 to 4900.97 A. U.) were made under a variety of conditions; they confirm the deviations from the sum rule reported by Ornstein and Bouma (*C. A.* **24**, 5620). W. F. MEGGERS

Note on a phenomenon connected with the aurora. A. C. BURTON. *Can. J. Research* **4**, 52–3(1931).—A description with photographs is given of a brilliant white beam of light stretching across the sky from east to west on the night of Aug. 21, 1930. Microscopic examn. of the photograph showed a fine structure not observed visually. J. W. SHIPLEY

Excitation functions in the neon spectrum. W. HANLE. *Z. Physik* **65**, 512–6 (1930).—The intensities of various Ne lines as a function of the applied potentials which excite them are measured in the yellow and red, the potentials ranging from 20 to 100 v. Lines involving the same initial term are found to have the same excitation function. The marked dependence of intensity distribution in the spectrum upon gas pressure is ascribed to an effect of collisions. W. F. MEGGERS

Remark on our work "Intensity measurements in the copper arc." L. S. ORNSTEIN AND D. VERMEULEN. *Z. Physik* **66**, 490(1930).—In the work referred to (*C. A.* **25**, 249) the intensity ratio of the Cu doublet $1^2S - 2^2P$ was reported to deviate from the sum rule. Further measurements made with C electrodes contg. a trace of Cu so that the lines in question could be photographed with a long exposure led to the true value of the intensity ratio, *viz.*, 1:2. W. F. MEGGERS

Absorption spectra of dissolved mercury. H. REICHARDT AND K. F. BONHOEFFER. *Z. Elektrochem.* **36**, 753(1930).—The soly. of Hg in water at temps. below 130° is too small for the absorption spectrum of the metal to be detected, but at about 140° 2 absorption bands of about 20–30 A. U. width, due to the Hg atom, occur at 2600 and 2520 A. U. They are not derived by broadening and displacement of the normal lines

at 2650 and 2537 A. U., since in the solvents MeOH and C_6H_{12}, both of which contain dipoles, the bands occur at 2575 and 2530 A. U. and 2575 and 2545 A. U., resp.; they may result from division of the line at 2537 A. U. by the action of the elec. fields surrounding the solvent mols. B. C. A.

Interpretation of band spectra I, IIa, IIb. ROBERT S. MULLIKEN. *Rev. Modern Physics* **2**, 506–8(1930); cf. *C. A.* **24**, 2049. W. F. MEGGERS

Interpretation of band spectra. IIc. Empirical band types. ROBERT S. MULLIKEN. *Rev. Modern Physics* **3**, 89–155(1931). E. H.

Some bands of the carbon molecule. G. H. DIEKE AND W. LOCKTE-HOLTGREVEN. *Z. Physik* **62**, 767–94(1930).—Details are given for new bands resembling the Swan bands of C_2 (cf. *C. A.* **24**, 2050). W. F. MEGGERS

Radiation and characteristics of molecules. R. D. KLEEMAN. *Z. anorg. allgem. Chem.* **195**, 164–72(1931).—A general discussion. WILLIAM E. VAUGHAN

Structure and spectra of the molecules of hydrogen and helium. W. WEIZEL. *Z. Elektrochem.* **36**, 599–603(1930); cf. *C. A.* **24**, 3169.—A description is given of the manner whereby the band spectra of the H_2 and He_2 mols. may be developed by consideration of the arrangement of the electrons and protons, and the phys. significance and method of detg. the quantum nos. of the individual electrons are indicated. The origins of the ortho- and para-H spectra by sym. and asymmetric rotations are described. B. C. A.

Energy levels of molecular oxygen. J. C. MCLENNAN, H. D. SMITH AND J. O. WILHELM. *Trans. Roy. Soc. Can.* [3], **24**, Sect. 3, 65–79(1930).—The absorption spectrum of O_2 was studied in the gaseous, liquid and solid phases to det. the origin and relation of the bands observed in its spectrum. Particular attention was paid to the bands in the spectrum of liquid O_2. Wave-length tables and mol.-configuration diagrams are given. J. W. SHIPLEY

The band spectrum of silver hydride. ERNST BENGTSSON. *Nature* **127**, 14 (1931). –An improved source has greatly extended the range of the known spectrum. This source is an elec. arc operating in H at reduced pressure and having a pos. electrode made of a Ag-Al alloy. Greatly increased intensity has been attained as well as the elimination of the N_2 spectrum. The rotational structures of 14 bands belonging to the $^1\Sigma \longrightarrow {}^1\Sigma$ system have been analyzed and arranged in a vibrational scheme. The vibrational levels of the lower electronic state appear to be represented by the formula: $F''(v) = 1723.5v'' - 33.5v''^2 - 0.0094v''^3$. The excited electronic state shows irregularities of spacing in its rotational and vibrational levels which may be due to a perturbing electronic level. An approx. calcn. of the dissocn. energy in both states gives: $D' \sim 6300$ cm.$^{-1}$, $D'' \sim 19{,}000$ cm.$^{-1}$. The isotope effect is clearly shown with high dispersion. C. J. HUMPHREYS

Fluorescence of mercury vapor under atomic and molecular absorption. RAYLEIGH. *Nature* **127**, 10(1931).—The excitation of Hg vapor by radiation near the resonance line is due to both at. and mol. absorption. The at. absorption gives a type of fluorescence known as the core effect, since the radiation capable of this kind of absorption is limited to about 0.05 A. U. on either side of the resonance line. The intensity of this effect falls off very rapidly with penetration. The weaker fluorescence due to outlying radiation is called the wing effect, and is caused by mol. absorption. It is extinguished much less rapidly as the beam traverses the vessel. The reality of both effects has been confirmed by showing that a suitable addn. of H suppresses the core effect. C. J. HUMPHREYS

The vibrational levels of the iodine chloride molecule. W. E. CURTIS AND O. DARBYSHIRE. *Trans. Faraday Soc.* **27**, 77–87(1931); cf. *C. A.* **24**, 1026.—Const.-pressure measurements of the spectrum were made at 17° and 207° to compare the intensities. All of the vibrational progressions increased appreciably, invalidating the method for the detn. of vibrational levels. Some evidence indicated that the 2nd progression might remain const. and be identified with $v' = 1$. ARTHUR FLEISCHER

Raman effects with liquid and gaseous nitrous oxide. J. C. MCLENNAN, H. D. SMITH AND J. O. WILHELM. *Trans. Roy. Soc. Can.* [3], **24**, Sect. 3, 197–205(1930).—The Raman effect was studied for liquid N_2O as an example of a triat. mol. and the results were compared with those obtained by others. Tables and a discussion of the results are included. J. W. SHIPLEY

Infra-red spectroscopy. M. CZERNY. *Z. Elektrochem.* **36**, 615–8(1930).—A historical survey of the development of modern methods of infra-red spectroscopy, with some exptl. details. B. C. A.

Raman effect and its significance for the spectroscopic study of molecular structure. A. SMEKAL. *Z. Elektrochem.* **36**, 618–31(1930).—A survey of recent work. B. C. A.

Raman effect and chemical bonds in certain organic liquids. LESLIE E. HOWLETT. *Can. J. Research* **4**, 79–91(1931).—Spectrograms were taken of ethylene glycol and 5 of its derivs., 4 nitriles and benzyl alc. on a specially constructed spectrograph designed to study the Raman effect. By assuming the simple harmonic oscillator theory an attempt was made to assoc. certain frequencies with definite bonds and structures. The theory was applied through an expression derived for the frequencies characteristic of the elastically bound masses vibrating in a straight line. The value of the stretching force of all single bonds is assumed to be the same. Double and triple bonds are taken as having a stretching force 2 and 3 times, resp., that of the single bond. Frequencies in the neighborhood of 300 mm.$^{-1}$ are attributed to longitudinal vibrations between C and H. Lines near 160 mm.$^{-1}$ indicate a double-bonded C atom in the chain or ring. Lines near 225 mm.$^{-1}$ are due to the C≡N triple bond. Lines between 50 mm.$^{-1}$ and 150 mm.$^{-1}$ are due to the longitudinal vibrating chain. Frequencies less than 50 mm.$^{-1}$ are probably due to transverse vibrations of the chain, while some lines near 140 mm.$^{-1}$ may be due to transverse vibrations of H. In the ethylene glycol compds. lines near 86 mm.$^{-1}$ are assigned to the presence of O at the end of the chain. Lines near 72 mm.$^{-1}$ and 65 mm.$^{-1}$ are attributed to the longitudinal vibrations of Cl and lines near 42 mm.$^{-1}$ and 30 mm.$^{-1}$ are attributed to transverse vibrations of Cl. J. W. SHIPLEY

The influence of absorption of light on the rate of photochemical reactions. A. K. BHATTACHARYA AND N. R. DHAR. *Z. anorg. allgem. Chem.* **196**, 26–32(1931); cf. *C. A* **24**, 553.—The relationship between absorption of light and reaction rate was obtained for the following photochem. reactions: $K_2C_2O_4$ with I, $FeSO_4$ with I and citric acid with H_2CrO_4. The exponent in the equation relating absorption of radiation to reaction rate can vary from a proper fraction to 2, it is independent of the relationship between the light and dark reaction. Tabulated data are given. E. J. ROSENBAUM

Photochemical dissociation of triatomic molecules. II. Potassium cyanide. DONALD S. VILLARS. *J. Am. Chem. Soc.* **53**, 405–11(1931); cf. *C. A.* **24**, 1034.—KCN vapor at 875° was found to absorb in 2 regions, the long wave-length limits of which are approx. 2175 (5.7 v.) and 2900 (4.3 v.) A. U. The former region is interpreted as corresponding to the dissocn. into a normal atom and an excited one (K excitation 1.6 v.; CN excitation, 1.8 v.); the latter corresponds to dissocn. into 2 normal atoms or radicals. This agrees with theoretical considerations. WILLIAM E. VAUGHAN

Photochemical studies. XII. Photochemical reaction between nitric oxide and mercury vapor. W. ALBERT NOYES, JR. *J. Am. Chem. Soc.* **53**, 514–26(1931).—The reaction between NO and Hg in the full radiation of a quartz-Hg lamp immersed in water has been studied from pressure decrease in the system. The reaction seems to lead to the formation of NO_2, which may react with Hg to give N_2. Both quartz and Corex glass cells were used; the pressure of the NO was initially approx. 0.1 mm. The rate in all cases was computable on the basis of a monomol. reaction rate equation. Initial pressures were varied over the range 0.1128 to 0.00338 mm. and the monomol. rate still applied. The value of k_1 decreases with high pressures of the order of 24 mm Removal of Hg vapor practically stopped the reaction. Some studies on the quenching of the fluorescence of Hg by NO were made; 72% quenching at 2 mm. and 85% at 6 mm. A detailed theoretical discussion is given; various mechanisms are discussed. It is thought that a NO mol. in a high vibration state of the normal electron level is produced by collisions of the 2nd kind. WILLIAM E. VAUGHAN

The photosensitized decomposition of nitrogen trichloride and the induction period of the hydrogen-chlorine reaction. J. G. A. GRIFFITHS AND R. G. W. NORRISH. *Nature* **127**, 14(1931).—The inhibiting effect of the addn. of small measured quantities of NH_3 on the induction period of the photochem. H-Cl reaction is due to the formation of NCl_3, which undergoes photosensitized decompn. in the presence of excess Cl. Quantum-efficiency measurements indicate that the decompn. of NCl_3 proceeds by way of reaction chains of short length, the quantum efficiency falling to a lower limiting value of about 2 as the Cl pressure is increased. Gases such as He, A, N and O, when added to mixts. of NCl_3 and Cl_2, have sp. retarding effects on the decompn.; and, as the pressures are increased, depress the quantum efficiency toward the above limiting value. C. J. HUMPHREYS

The absorption of aqueous tartaric acid solutions. RENE LUCAS AND MARCEL SCHWOB. *Compt. rend.* **192**, 225–7(1931).—The relative results of ultra-violet absorbing powers of aq. tartaric acid solns. were detd. with the help of photoelec. cells, the photoelec. cell arrangement of Halban and Siedentopf (*C. A.* **16**, 2078) being used. Contrary to previous observations, Beer's law was not verified. The variations are

particularly marked for 2536 A. U., the sp. absorption varying more than 200%. Dil. solns. having greater absorbing power than concd. solns. M. McMAHON

Absorption spectrum of lignin derivatives in the ultra-violet. ERIK HÄGGLUND AND F. W. KLINGSTEDT. *Z. physik. Chem.*, Abt. A, **152**, 295–312(1931); cf. *C. A.* **24**, 1578.—The absorption spectra of the alkyllignins, the ligninsulfonic acids and the alkali lignins have been measured by the method of Victor Henri by means of the small Hilger quartz spectrograph. The general similarity of the spectra of the different substances points to the fact that they have a common residue; there is, however, a distinct difference between the spectra of derivs. of lignin from conifers and from deciduous trees. Selective absorption is relatively strong, which indicates the existence of at least 1 aromatic ring in the fundamental substance of lignin. W. WEST

Potassium chromate and potassium dichromate as light filters and the constitution of chromic acid from absorption measurements. W. V. BHAGWAT AND N. R. DHAR. *J. Indian Chem. Soc.* **7**, 913–21(1930).—Detn. of extinction coeffs. shows that: wave lengths shorter than 5150, 4950, 4950, 4600, 4300 and 4000 A. U. are completely absorbed by 1 cm. of 5.5 (satd.), 2, 1, 0.1, 0.01, and 0.001 *N* K_2CrO_4 solns., resp.; wave lengths shorter than 5600, 5200, 4600 and 4000 A. U. are completely absorbed by 1 cm. of 1.17 (satd.), 0.1, 0.01 and 0.001 *N* $K_2Cr_2O_7$ solns., resp. The % transmission in the range 5600–6700 A. U. is greater with satd. K_2CrO_4 than with satd. $K_2Cr_2O_7$ soln. In 0.001 *N* solns. K_2CrO_4 transmits light of wave lengths 5400–6700 A. U. better than K_2CrO_4. Neither K_2CrO_4 nor $K_2Cr_2O_7$ solns. obey Beer's law. In dil. solns. the absorption-concn. curves for K_2CrO_4 and $K_2Cr_2O_7$ are strikingly similar. Although concd. solns. of dichromate contain $Cr_2O_7^{--}$ and $HCr_2O_7^-$ ions, the dil. solns. contain mainly CrO_4^{--} and $HCrO_4^-$ ions. OSCAR T. QUIMBY

The law of paramagnetic rotation of xenotime and its experimental verification. JEAN BECQUEREL, W. J. DE HAAS AND H. A. KRAMERS. *Compt. rend.* **191**, 839–41 (1930); cf. *C. A.* **24**, 2047. GERALD M. PETTY

Quantum theory of chemical kinetics. Unimolecular reactions. S. ROGINSKII AND L. ROSENKEVICH. *Z. physik. Chem.*, Abt. B, **10**, 47–85(1930).—A unimol. decompn. or rearrangement can be viewed either as originating in an internal force field within the complicated mol., which causes the expulsion of a part of the mol. in a manner analogous to the mechanism of γ-ray disintegration as pictured by Gramow and by Gurney and Condon, or as a rearrangement of its parts whereby new chem. linkages are formed and simultaneously a part of the old linkages is disrupted with the consequent emission of part of the original mol. This latter process has its analog in the Auger effect, as *e. g.*, in the excitation and simultaneous spontaneous ionization of a He atom. Both schemes lead to the correct expontential form of relation between velocity const. and temp.; but it is argued that there is no exptl. evidence for the kind of interaction between the mol. and the emitted particle necessary in the first scheme. The Auger process gives $k = e^{-A/kT} \cdot e^{\beta(Q-A)/\sqrt{A}}$, where A is the energy of activation, Q the heat of the reaction, and β a factor depending only slightly on the nature of the mol. This requires an exponential relation between the consts. A and B of the Arrhenius equation $k = Be^{A/kT}$, which is shown to be experimentally satisfied. The order of a reaction is detd. by the relative values of Q and A; the conclusions are applied to known cases and used in predictions concerning reactions for which data are still wanting. W. WEST

Chemical combination and the line emission of solid bodies. R. TOMASCHEK. *Z. Elektrochem.* **36**, 737–43(1930).—A survey of work on the spectrum of Sm in phosphors. Cf. *C. A.* **18**, 3546; **19**, 935; **22**, 915. B. C. A.

The ionization of air during the oxidation of phosphorus. J. TAUSZ AND H. GÖRLACHER. *Physik. Z.* **32**, 91–7(1931).—Ionization measurements were carried out incidental to work on the oxidation of P in air and O_2, both pure and in the presence of poisons for the reaction (*C. A.* **24**, 4476). When P was oxidized by air, the ionization increased with air velocity, temp., and P surface. Pure O_2, when wet, showed no increase in ionization over air, but showed a progressive increase during drying. Strongly poisoning substances such as isoprene and cyclohexane mixed in air caused considerable decreases in ionization depending on the concn. T. H. CHILTON

Physical and chemical action of ultra-violet rays on sublimed S (FONZES-DIACON) **15.** Behavior of water with change of temperature and with addition of electrolytes as studied by the Raman effect (RAO) **2.** Determining Hg vapor in air (Ger. pat. 517,480) **7.**

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4—ELECTROCHEMISTRY

COLIN G. FINK

Recent progress in the use of the electric furnace in the steel industry. ALBERT LEVASSEUR. *Arts & métiers* **1931**, 54–60; cf. *C. A.* **24**, 5236.—An address. A. P.-C.

A modern electric steel plant. K. VON KERPELY. *Giesserei-Ztg.* **27**, 101–2(1930).—A description of the new elec. steel plant (wire, cable, etc.), at Campia Turzii, Roumania. CURTIS L. WILSON

Artificial atmospheres for electric furnaces and their application. A. N. OTIS. *Iron Age* **126**, 767–70, 844–8(1930).—Results of Cu-brazing of steel parts, of annealing sheet steel, strip and lamination punchings for elec. generators and transformers indicate that there is a wider field of application. A simple app. has been developed for producing, from readily available materials, suitable gases rich in H at a fraction of the cost of H_2 produced by the usual methods. N may be used as a diluent of H. Where there is a demand for atomic H for welding, NH_3 may be dissociated by heat into a gas consisting of 75% H and 25% N. The production of *electrolene* is described. The H content prevents oxidation and the small CH_4 content prevents decarburization. The content of the gas is controlled by the operating temp. of the dissociator. Several diagrams, tables and illustrations of different types of furnaces are included. W. H. BOYNTON

Production of alloy steels in coreless induction furnaces. O. DÖRRENBERG AND N. BROGLIO. *Stahl u. Eisen* **50**, 617–26(1930).—After a review of the development of the high-frequency induction furnace and a discussion of the elec. principles on which it is constructed, an account is given of the installation and performance of one of these furnaces in a German steelworks. The transformer efficiency is about 78–80%, and the current consumption for a 300-kg. charge starting in the cold is 600 kw. hr./ton to effect complete fusion and 730–790 kw. hr./ton until casting is complete; the av duration of melting is 90–100 min. Curves showing the elec. conditions during the melting of several charges are given, and the operation of the furnace is compared with that of a gas-fired crucible furnace. B. C. A.

Tonnage melting by coreless induction. E. F. NORTHRUP. *Iron Age* **127**, 228–33 (1931).—The first of a series of articles on the theory, operation and uses of the high-frequency induction furnaces. For power requirements of 50 kw. or less, the Hg gap type of oscillator is best in present practice. For greater power, the motor or turbine driven generator giving frequency well within design and economic limits will best meet requirements. Mechanically considered, the steel housing is lined everywhere on its inner surface with high-cond. sheet Cu about 1/4 in. thick. This lining prevents eddy currents from being induced in the steel housing. The best results are obtained when using a "graded" coil without vacant spaces between turns. G. T. M.

Valve-operated coreless induction furnace for high-temperature research. FRANK ADCOCK. *Trans. Faraday Soc.* **26**, 544–60(1930).—A detailed description of the app. and circuit used is given, particular attention being paid to special features in design, safety appliances and the application of the furnace to metallurgical researches at high temps. Two air-cooled silica valves, each capable of dissipating 2.5–3.0 kw. at the anode, are employed on the "push-pull" or "back-to-back" principle. The valve filaments are rated at 40 amps. and 17.2 v. and are supplied with a. c. by means of a transformer with a center-tapped secondary. A combination of grid leak and condenser in conjunction with an accumulator bank maintaining a neg. potential of 36 v. is used to apply the correct grid bias to the oscillating valves. Accurate regulation of the power supply is obtained by means of a condenser potential divider by means of which a definite fraction of the full oscillatory voltage in the furnace circuit is rectified and passed through a milliammeter used as an indicator. Frequencies of 50,000 and 1,000,000 cycles per sec. are used, special furnace construction (from the viewpoint of insulation between the turns of the inductor coil) being devised for the higher frequency. Owing to the high frequencies employed the furnace is capable of heating efficiently

charges consisting of small metallic fragments. "Bridging" (*i. e.*, the formation of a liquid pool by the lower portion of the charge while the upper portion remains as a relatively cool "bridge") of the charge on melting is not very pronounced at the 1 million cycles per sec. frequency. Detailed descriptions (with drawings and photographs) of the component parts of the furnace set-up are given. Observations on technic and applications of the furnace to the obtaining of high-temp. thermal curves, and to magnetic and resistivity investigations are also included. EDWARD B. SANIGAR

Refining of ferrochrôme in coreless induction furnaces. C. TAMA. *Arch. Eisenhüttenw.* **4**, 55–61(1930).—Production of Fe-Cr, decarbonization in coreless induction furnaces, suitable refractories for lining, and refining are considered. The systems Fe–Cr, Fe–Cr–C, and Cr–C are discussed in the light of the recent investigations. A charge of 300 kg. of Fe–Cr is usually melted in 70–100 min. in a 50-cycle furnace or in 60–80 min. in a 500-cycle furnace, and a charge of 30 kg. takes only 40 min. in a 10,000-cycle furnace. The power consumed varies from 750 to 1850 kw. according to the type of the furnace. G. T. MOTOK

Chromium-plating of paper-mill rolls. R. E. CLEVELAND. *Paper Mill* **54**, No. 4, 14-5(1931).—A brief discussion of the advantages of Cr-plating paper-mill rolls to increase their life by its hardness and resistance to corrosion. A. PAPINEAU-COUTURE

Cathodic protection of metals in neutral solutions. U. R. EVANS. *Metals and Alloys* **2**, 62–4(1931).—A table gives values for c. d. below which production fails for several steels and irons. A. J. MONACK

Buffer action in nickel-plating solutions. K. PITSCHNER. *Metal Ind.* (N. Y.) **29**, 119–20(1931).—The resistance to change in p_H exhibited by a soln. when it is subjected to gain or loss of acid or alkali varies greatly at different p_H values. Certain reagents, which are now common constituents in Ni-plating solns., have the property of depressing the tendency toward large changes in p_H. The buffer effects of boric acid and of NH_4Cl on Ni content were studied. The extent of buffer action is evaluated by the Van Slyke method. It is the differential ratio of the increment in g. equivs. of strong acid or base added per l. of the soln. to the resultant increment or change of p_H. The buffer effect is highest at the upper end of the p_H range and least in the vicinity of p_H 4.0 only 1/20–1/100 of the value at p_H 6. In the usual plating range of p_H 6–5, the buffer effect is more noticeable when alkali is added, while in the range around p_H 2.5, the reverse is the case. The NH_4Cl content of Ni solns. is kept high enough so that the anode corrosion will keep the trend of p_H toward the upper limit of the range. Addns. of acid only are necessary. A brief discussion is included. Exptl. results are tabulated. W. H. BOYNTON

Studies in the electrodeposition of nickel. II. The effect of current density and temperature. J. B. O'SULLIVAN. *Trans. Faraday Soc.* **26**, 533–9(1930); cf. *C. A.* **24**, 1801.—The influence of cathode c. d. and temp. on the appearance, structure and deposition potential of Ni deposited from buffered $NiSO_4$ solns. having various p_H values has been studied. The solns. used and the prepn. of the deposits were as reported in Part I of this work (*C. A.* **24**, 1801). Deposits were obtained at 17° and 35° at c. ds. of 2, 5, 10 and 15 ma./sq. cm. Deposition potentials were measured against a satd. calomel half-cell, a capillary electrode tip in contact with the cathode surface being used. Tables showing the appearance of the deposits and tables of deposition potentials are given, as well as graphs of the deposition potentials against the logs of the c. ds. (giving straight lines). Tables of the deposition potentials at unit c. d. (obtained by extrapolation of the above graphs) and of the slopes of the above graphs are also given. The varied surface structure of the Ni deposits is explained as due to variations in the throwing power (mainly dependent on the slope of the deposition potential-c. d. curve) of the solns. The slope of the deposition potential-log c. d. curve and the deposition potential at unit c. d. were found to vary from one soln. to another. From this it is deduced that the constants of the Freundlich adsorption isotherm are functions of the p_H of the soln. and of the nature of the buffering agent employed. **III. Effect of small quantities of iron and aluminum.** *Ibid* 540–3.—In Part I of this work it was shown that the structure of a Ni deposit varies according to the p_H of the plating bath and the nature of the buffering agent employed, and it was suggested that this was due to the formation of some colloidal $Ni(OH)_2$ or basic salt in the cathode film and its co-pptn. with the metallic Ni. The investigation has been extended by examg. the effect of adding to the plating bath small quantities of inorg. salts which would be likely to yield colloidal hydroxides at a lower p_H than is required for $Ni(OH)_2$, *i. e.*, at a p_H where $Ni(OH)_2$ would be exerting little influence. Fe (added as $FeSO_4$ or $FeCl_3$ soln.) and Al (as potash alum) were used for this purpose. Expts. were performed with solns. contg. 24 g. $NiSO_4.7H_2O$ and 1.56 g. NaCl per 100 cc., with a Fe ',

Fe$^{\cdots}$ or Al to Ni ratio of 1:1000 or 1:200 at p_H's from 3.9 to 4.7, deposition being continued for 30 min. at a c. d. of 10 ma./sq. cm. It was found that small amts. of Fe salts had no appreciable effect on the electrodeposition of Ni, and it is suggested that this is due to the preferential deposition of Fe, whereby this metal is removed from the cathode film before it can form any colloidal compds. Al can accumulate in the cathode film until colloidal compds. are formed, and if this process proceeds far enough the structure of the deposit is altered; it becomes black or "burnt." The black deposits were found to contain appreciable amts. of Al (0.0006 g. in 0.65 g. deposit) whereas none could be detected in the white deposits (which were somewhat finer-grained than those from solns. contg. no Al) so that it is suggested that the change is due to the co-pptn. of colloidal $Al(OH)_3$ with the Ni. A discussion is given of the possible ways in which colloidal hydroxide—either as a film at the cathode or, with an amphoteric colloid, as a film some little distance from the cathode—could cause finer-grained deposits. EDWARD B. SANIGAR

Electrodeposition of zinc on aluminum from sulfate solutions. H. C. COCKS. *Trans. Faraday Soc.* **26**, 517–26(1930); cf. *C. A.* **24**, 2058.—Measurements were made of the deposition potential of Zn from *N* $ZnSO_4$ solns. with first c. d. and secondly p_H of the soln. as the only variable. Some static potentials were also detd. and observations made upon character of deposits, gas evolution and adhesion of bubbles. Expts. were done with buffered and with unbuffered solns. at c. ds. of 4.5, 9, 18 and 36 amp./sq. ft. at a temp. of 20°. Com. Al sheet (contg. 0.14% Si and 0.58% Fe), prepd. by sandblasting at 5–10 lb. pressure, was used as cathode. Potentials were measured by the capillary tip method. Tables are given for both buffered and unbuffered solns. showing the effect on the deposition potential and on the deposits, of various addition agents and of p_H. Graphs of the cathode potential against c. d. are also given. The potential measurements indicate that the addn. agents should increase the throwing power of an unbuffered $ZnSO_4$ soln. somewhat when its p_H is 3–4. The order of merit of the addn. agents in giving smooth, fine-grained deposits was found to be gum arabic plus β-naphthol, gum arabic, β-naphthol, glucose, while a parallelism was found between the order of efficiency of the addn. agents in improving the deposits, increasing the change of deposition potential with c. d. and increasing the actual value of the polarization. The static potentials of Zn deposits and of sandblasted Zn sheet in both buffered and unbuffered solns. were found to vary with time and with p_H. For a given soln. the deposition potential became more neg. with decrease of p_H at a fixed c. d., and more neg. with an increase of c. d. at a fixed p_H. These changes were barely detectable in the absence of addn. agents. Suggestions are given to explain these results. The deposits from the buffered and the unbuffered solns. were mostly dull white. The deposits improved with decrease of p_H and increase of c. d. The addn. agents had marked effects on the deposits. Change of p_H had a less marked effect on deposits from buffered than on those from unbuffered solns. Gas pits on the deposits usually increased with decrease of p_H and increase of c. d. From agitated solns. there were generally no gas pits from solns. of p_H 6 and only rarely from solns. of p_H 5. A comparison of the p_H values of the solns. employed obtained by the quinhydrone and by the colorimetric methods is given. Within the range of p_H 3.0–6.0 the quinhydrone values were the lower (extreme deviations, 0.2 and 0.8 p_H). A soln. contg. *N* $ZnSO_4$, 0.25 *N* NaOAc and 1 g./l. of gum arabic, with or without 0.1 g./l. of β-naphthol, is suggested as likely to prove most suitable for Zn deposition on Al and its alloys. E. B. S.

Electrolytic zinc. CHARLES W. CUNO. *Chem. Markets* **28**, 253–6(1931).—The advantages of the electrolytic over the smelter process are described. E. H.

Adhesion of electroplated coatings. W. BLUM. *Metals and Alloys* **2**, 57–9(1931).—A review. A. J. MONACK

Electrodeposition of platinum, palladium and rhodium. W. KEITEL AND H. E. ZSCHIEGNER. *Trans. Electrochem. Soc.* 59 (preprint) 4 pp.(1931).—The chloride plating bath for Pt metals is not satisfactory because of its short life. A new bath was accordingly developed in which the Pt is present as the diamminonitrite. Good, bright adherent deposits are obtained. The throwing power is very good. A similar bath for Pd was likewise developed and has given very satisfactory results. C. G. F.

The limiting current density in the electrodeposition of noble metals. S. GLASSTONE. *Trans. Electrochem. Soc.* 59 (preprint) 8 pp.(1931).—The literature of electrochemistry does not appear to contain a simple equation permitting the calcn. of the max., or limiting, c. d. at which a metal can be deposited with 100% current efficiency. Such an equation is now developed on the assumption that the max. rate of deposition is equal to the max. rate at which the ions contg. the metal to be deposited can diffuse up to the cathode. The values calcd. in this manner are shown to be in good agreement

with those observed, although discrepancies may arise when there is a possibility of H_2 evolution. C. G. F.

Isothermal metallic cells. O. SCARPA. *Mem. accad. Italia, Classe sci. fis. mat. e nat.* **1**, *Chim.* No. 5, 28 pages(1930).—This study deals with the degree of freedom of ions in solid and liquid metals. The motion of ions in metals diffusion in solid metals, also the e. m. f. of contact of metals and thermodynamical calcn. are considered in the first part of the paper. This cell may consist of the following:

Cu	Hg	Zn	Cu
Cu	Hg	Cd	Cu
Cu	Hg	Zn amalgam	Cu
Cu	Hg	Cd amalgam	Cu

With Zn amalgam a satn. point of 0.75×10^{-6} v. is reached at 19° with a concn. of 5.5 atomic per cent of Zn. G. T. MOTOK

Theory of electrolytic diaphragm cell. FRANCESCO GIORDANI. *Mem. accad. Italia Classe sci. fis. mat. e nat.* **1**, *Chim.* No. 6, 75 pages(1930).—A mathematical study of electrolysis based on the expts. carried out in a new type of electrolytic diaphragm cell for the production of caustic alkalies (developed by Giordani and Pomilio). This cell is set vertically with the graphite electrode in the center and the diaphragms on both sides of the electrode. The formula for instantaneous discharge in the electrolytic diaphragm cell can be written: (*A*) $R = 1 - \{n/[1 + (x_1/x_2)]\}$ and the ratio x_1/x_2 can be expressed as a function of the concn. C_1 and C_2 of the chloride and the hydroxide dissociated at the cathode: (*B*) $x_1/x_2 = Am(C_1/C_2)$ and (*C*) $C_1 = C_o - BC_2$. *A* and *B* are functions of the initial concn. C_o and temp. By substituting (*B*) and (*C*) in (*A*), there is obtained (*D*) $R = (1 + MC_2)/(1 + NC_2)$, where *M* and *N* are also functions of C_o and temp. For higher values *M* is eliminated and (*E*) $R = 1/(1 + NC_2)$ results, the formula which was obtained by Guye. G. T. MOTOK

The electrochemical oxidation of ketones. I. A preliminary paper. W. E. BRADT AND CARL J. OPP. *Trans. Electrochem. Soc.* **59** (preprint) 8 pp.(1931).—Acetone was oxidized at a Pt wire gauze anode at low anodic c. ds. The course of the oxidation was followed by the collection and the analysis of consecutive portions of the gaseous oxidation products. The effect of variation of the c. d. on the compn. of the anode gas was investigated. The anode gas from the oxidation of acetone normally contained CO_2, CO, O_2, unsatd. hydrocarbons, CH_4 and C_2H_6. Analyses of the anode soln were made. In every case, aldehydes, MeOH and pyruvic acid were absent. The anode soln. normally contained formic acid, acetic acid, *mesityl oxide*, unchanged acetone and a tar. At higher c. ds. phorone was identified. Efforts were made to show the disposition of all the acetone originally placed in the cell. C. G. F.

The alleged electrochemical sulfonation of an aromatic hydrocarbon. FR. FICHTER, H. E. SUENDERHAUF AND A. GOLDACH. *Helv. Chim. Acta.* **14**, 249–53(1931).—An emulsion of PhMe, EtOH and concd. H_2SO_4 was electrolyzed with an anode c. d. of 0.19 amp./cm.^{2} The acidic portion of the product was converted into Ba salts. $Ba(OAc)_2$ and $(EtOSO_3)_2Ba.2H_2O$ (I) were the only products isolated. No $C_6H_4(SO_3Ba)CO_2$ was found, contrary to reports in the literature (Puls, *Chem.-Ztg.* **25**, 263(1901)). The electrolysis of a mixt. of EtOH and H_2SO_4 yielded the same products free from resins produced by the oxidation of the PhMe. On the other hand, a like operation on PhMe and H_2SO_4 yielded no acid. **The electrochem. oxidation of acetophenone.** H. E. SUENDERHAUF. *Ibid* **14**, 253.—The electrolysis of PhAc emulsified with H_2SO_4 led to the formation of small yields of *maleic* and *fumaric acids*. Some phenolic compds. were also present among the products. I. M. LEVINE

Electrolytic reduction of 4-keto-3-phenyl-3,4-dihydroquinazoline. H. ITOML. *Mem. Coll. Sci. Kyoto Imp. Univ.* **13A**, 311–3(1930).—Electrolytic reduction of 4-keto-3-phenyl-3,4-dihydroquinazoline with a lead cathode and aq.-alc. Na_2CO_3 as the cathode soln. at 25° gives *4-hydroxy-3-phenyl-1,2,3,4-tetrahydroquinazoline*, m. 170–1°, in 40% of the theoretical yield. Both the above quinazolines are reduced to *3-phenyl-1,2,3,4-tetrahydroquinazoline*, m. 118–9°, when the cathode consists of Cu coated with Pt black and reduction is carried out at 50–60°. B. C. A.

Electrolytic Peltier heats and their measurement by isothermal, adiabatic, differential calorimetry. E. LANGE AND J. MONHEIM. *Z. physik. Chem.*, Abt. A, **150**, 177–202 (1930).—The electrolytic Peltier heats at reversible electrodes are discussed in relation to other thermodynamical quantities characteristic of the electrolytic cell. Earlier measurements are reviewed, and an isothermal, adiabatic, differential calorimetric method is described and has been applied to the Hg | Hg_2^{++} electrode, using a Hg elec-

trode in $HgNO_3$ soln. and the normal HgCl electrode. The tabulated values show an increase in the pos. direction with increasing metal-ion concn., in agreement with theoretical prediction. B. C. A.

Method of mapping equipotential lines and its application to electrical precipitator problems. A. W. SIMON AND L. C. KRON. *Rev. Sci. Instruments* **1**, 527–36(1930). B. C. A.

Construction, operation and characteristics of photoelectric tubes. LEWIS R. KOLLER. *J. West Soc. Eng.* **36**, 15–25(1931).—A discussion of the characteristics of the different types of photoelec. tubes showing what kind of tubes should be collected, with their operating limits for the different services. Metals of the alkali group are used in these tubes. Compds. of these metals change the sensitivities markedly. One of the most useful characteristics of the photoelec. cells is the relation between current and illumination. This is strictly linear over a wide range. The photoelec. tube is sometimes called the "electric eye." Alone it is less sensitive than the human eye, but with the aid of an amplifier it is 20 times as sensitive. Several types of amplifier are discussed. Where a great constancy in operation is required, vacuum tubes should be used. Outstanding applications of the tubes are: television, talking pictures, smoke detectors, counters, bean sorters, light recorders, color analyzers, phys. photometers and innumerable control devices. W. H. BOYNTON

Hydrogen-cooling for turbine-generators. M. D. ROSS. *Elec. Eng.* **50**, 211–4 (1931).—Actual operating experiences with a 7500-kv.-amp. unit are outlined. Five advantages of H_2 as a cooling medium for rotating elec. machinery are: (1) Windage losses are reduced to about 18% of their value in air. (2) For a given amt. of active material the rating of a generator with H_2 cooling is 25% greater. (3) Corona has little effect on insulation in H_2 atm., increasing the life of the insulation. (4) Fires in the generator are impossible, on account of absence of O_2. (5) Smaller gas coolers and less cooling water are required than with air cooling. W. H. BOYNTON

The relative merits of gas, oil and electricity for industrial purposes (HOPKINSON) **13**. Special refractories for electric-furnace linings (KUKLA) **19**. Some new facts of a chemical nature in the field of corrosion investigations and in the protection of metallurgical products against corrosion (COURNOT) **9**. Corrosion of steel water pipes by stray electric currents (ROTHE) **9**. Electrochemical oxidation of paraffin (ATANASIU) **22**. Au and Ag solutions (Brit. pat. 338,383) **18**. Heat treatment of loaded electrical conductors (Brit. pat. 338,169) **9**. Rubber battery boxes (Brit. pat. 338,114) **30**.

BILLITER, JEAN: **Électrométallurgie des solutions aqueuses.** Translated from 2nd German ed. by J. Salauze and S. Salauze. Paris: Dunod. 324 pp. F. 84.

Dry batteries. SOC. ANON. LE CARBONE. Ger. 514,966, Feb. 16, 1924. The Zn and C electrodes are embedded in an electrolyte mixed with pectinizable colloid and powd. C. The example mentions a mixt. of NH_4Cl, arrowroot starch and powd. wood charcoal.

Dry cell electric battery. H. A. BUMKE GES. Brit. 337,869, Aug. 27, 1929. Mech. features.

Storage battery. SOC. ANON. DES ACCUMULATEURS MONOPLAQUE. Brit. 337,375, Feb. 5, 1929. Between each pair of neg. plates there are placed two pos. plates each having half the thickness of the neg. plates, the pos. plates being joined together and enclosing electrolyte which tends to remain at max. concn. The electrolyte passes through the pos. plates under the influence of hydrostatic and electro-osmotic pressures. Alternatively, a single hollow pos. plate contg. an inert packing may be used

Galvanic batteries. KARL KUPKA. Ger. 514,967, May 23, 1928. Details of arrangement of the electrodes in multicell batteries are given.

Selenium cells. FIRMA CARL ZEISS. Ger. 514,911, Jan. 8, 1929. Se cells contg. two Pt electrodes mounted on glass or quartz and a channel contg. Se are described

Selenium cell of the condenser type. "SELENOPHON" LICHT- UND TONBILDGESELLSCHAFT M. B. H. Ger. 514,972, Feb. 4, 1930. Details of arrangements are given.

Light-sensitive selenium cells. TELEFUNKEN GES. FÜR DRAHTLOSE TELEGRAPHIE Brit. 337,691, Feb. 13, 1929. A cell formed on polished glass comprises electrodes formed by graphite deposited from a colloidal suspension on portions previously etched the suspending medium being driven off by heating and the interstices coated with Se or Se and Te together.

Electrodeposition of metals on rotating cathodes. S. O. COWPER-COLES. Brit.

338,173, May 16, 1929. In the deposition of metals such as Cu, Zn, Ni or Ag, a slowly rotating cathode is used which is supported on rollers above an arc-shaped anode and driven by rollers. The anodes may either be formed of the metal to be deposited or of inert material such as Pb, C or ferro-Si and the electrolyte may contain the compd. of the metal to be deposited either in soln. or in suspension. Deposition may be effected directly from ore. App. is described.

Forming acoustic diaphragms of thin metal such as nickel by electrodeposition. ALBERTIS HEWITT (to Victor Talking Machine Co.). U. S. 1,793,483, Feb. 24. Various details of app. and procedure are described.

Nickel-coated articles. FRANK V. KNAUSS (to Madsenell Corp.). U. S. 1,793,936, Feb. 24. A Ni-surfaced article such as a spring steel bar is treated as anode in a H_2SO_4 bath and a fresh Ni coating is then electrodeposited on the treated Ni surface. A firmly adherent coating is formed which takes a good polish.

Electroplating ferrous metal articles with zinc. SIDNEY H. DAVIS, CARL O. ANDERSON, RUDOLPH J. STENGL, WM. N. SMITH and HERBERT R. HANLEY (to Century Zinc Co.). U. S. 1,795,081, March 3. Articles are first provided with a thin coating of Zn by electrodeposition from a $ZnSO_4$ soln. of suitable acidity with a current of suitable d.; the articles are then transferred to a second bath of $ZnSO_4$ soln. of relatively higher acidity and the plating is continued with a current of higher d.; and the c. d. is finally lowered and the plating further continued to produce a coating of the desired thickness.

Electroplating zinc on iron or steel. SIDNEY H. DAVIS, CARL O. ANDERSON, WM. N. SMITH and HERBERT R. HANLEY (to Century Zinc Co.). U. S. 1,795,079, March 3. A thin initial coating is formed on an article by current from an insol. anode in a bath comprising a $ZnSO_4$ soln. of relatively low acidity by using a d. c. of relatively high c. d., and further plating is effected with a current of lower d. in a bath of higher acidity with further use of an insol. anode. U. S. 1,795,080 relates to plating with Zn after preliminary deposit of a thin coating of spongy Pb from an alk. Pb-bearing soln. by current of low d. from an insol. anode and brushing to remove some of the Pb and cause penetration of the ferrous metal by the remaining Pb.

Electroplating apparatus suitable for continuous operation. CHRISTIAN H. JORDING (to John W. Brown Mfg. Co.). U. S. 1,793,551, Feb. 24. Structural features.

Anode container for electroplating apparatus. THOMAS G. MELISH. U. S. 1,792,998, Feb. 17. Structural features.

Apparatus for electroplating successive portions of a large area such as the interior of oil stills, etc. KEVIE W. SCHWARTZ (to United Chromium, Inc.). U. S. 1,794,487, March 3. Various structural details are described including means for moving the anode to different positions for use.

Apparatus for electroplating articles such as in the manufacture of "copper-clad" roofing. CHARLES E. YATES (to Anaconda Sales Co.). U. S. 1,794,748, March 3. Structural features.

Plating interior surfaces of metallic vessels. EDWARD O. DUNKLEY (to Standard Oil Co. of Calif.). U. S. 1,793,069, Feb. 17. Various details of app. and procedure are described for operations such as plating the interior of large metal vessels with Cr.

Continuous process for chromium-plating metal wires or strips. BYRON V. MCBRIDE (to Westinghouse Elec. & Mfg. Co.). U. S. 1,794,973, March 3. The wire or strip is drawn downward through a Cr-plating soln. in such a manner that all portions are substantially equidistant from the anode and exposed directly to the voltaic action of the bath, and then drawn upward through the soln. in such a manner that all portions are again substantially equidistant from the anode and exposed directly to the voltaic action of the bath. App. is described.

Selectively chromium-plating portions of surfaces such as those of reflectors. VICTOR L. SODERBERG. U. S. 1,794,929, March 3. Portions of the surface which are to remain unplated are covered with nitrocellulose lacquer preliminarily to the plating operation.

Electrolytic cell. I. G. FARBENIND. A.-G. (Georg Pfleiderer, inventor). Ger. 514,741, Nov. 2, 1926. Addn. to 471,925 (*C. A.* **23**, 2376). In a bipolar cell, especially for the decompn. of water (as described in 471,925), a portion of the electrolyte is passed continuously through an outside circulatory system to regulate the temp. and concn. The app. is described.

Electrolytic cell. SOCIÉTÉ D'ÉTUDES POUR LA FABRICATION ET L'EMPLOI DES ENGRAIS CHIMIQUES. Ger. 514,501, Oct. 25, 1928. The cell has a middle partition and porous containers between the partition and the electrodes, the containers being raised from the bottom of the cell to permit free flow of the electrolyte.

Construction for maintaining a constant electrolyte level in electrolytic cells. CARL ROTH (to I. G. Farbenind. A.-G.). U. S. 1,793,136, Feb. 17.

Electrolytic production of compounds containing active oxygen. JOHANNES ECKELL (to I. G. Farbenind. A.-G.). U. S. 1,792,633, Feb. 17. See Brit. 313,124 (*C. A.* **24**, 792).

Metal hydroxides by electrolysis. R. S. CARRERAS. Brit. 338,178, July 9, 1929. Hydroxides of Zn, Cu, Sb and other metals (other than Bi hydroxide and white lead) are obtained by use of an anode of the metal the hydroxide of which is to be formed, in a dil. soln. of an electrolyte such as $NaClO_3$ or $KClO_3$ satd. with CO_2 (the electrolyte being continuously withdrawn from the cell without removal of the pptd. hydroxide and returned after resatn. with CO_2). Various details of app. and procedure are described.

Apparatus for electrolyzing fused alkali metal halides. DEUTSCHE GOLD- UND SILBER-SCHEIDEANSTALT VORM. ROESSLER. Ger. 517,256, May 15, 1924.

Apparatus for preparation of light metals by electrolysis of their fused halogen salts. SOC. ANON. POUR L'IND. CHIM. À BÂLE. Swiss 142,518, Aug. 23, 1929.

Formation of gang by the decomposition of electrolytic solutions within the rock layers. SIEMENS-BAUUNION G. M. B. H., KOMM.-GES. (Michael Müller, inventor). Ger. 514,818, Jan. 17, 1929. Rocks not contg. a natural electrolyte are impregnated with Na_2SiO_3 so that SiO_2 is freed on electrolysis. The process can be used for petrifaction.

Aluminum production. COMPAGNIE DE PRODUITS CHIMIQUES ET ELECTROMÉTALLURGIQUES ALAIS, FROGES ET CAMARGUE. Brit. 338,084, March 15, 1929. A mixt. of AlF_3 and Na or K carbonate or hydroxide is used instead of cryolite as a flux in the electrolytic reduction of alumina. Various details, proportions, etc., are given.

Protective layers of lead peroxide. SIEMENS & HALSKE A.-G. (Walter Birett and Johannes Fischer, inventors). Ger. 514,621, Oct. 23, 1927. Anode conductors are given a protective coating of PbO_2 by electrolysis in an alk. soln. of a Pb compd. contg. also such O-contg. org. compds. as aldehydes, ketones, ales or their derivs. Examples mention baths contg. NaOH, hydroquinone and PbO, or NaOH, acetone, AcH and PbO, or NaOH, fruit sugar and PbO.

Bleaching shellac. OLGA MYLO NÉE ROSENHAGEN. Ger. 517,096, May 12, 1929. A soln. of shellac is treated with a soln. of a suitable salt, *e. g.*, NaCl, and the mixt. is electrolyzed with stirring and cooling. Preferably, the electrolysis is begun with a weak current, which is afterward strengthened. An automatically operating app. is described.

Treating hydrocarbons in an electric arc. I. G. FARBENIND. A. G. (Otto Eisenhut, inventor). Ger. 514,592, Dec. 15, 1925. App. for subjecting satd. hydrocarbons, *e. g.*, CH_4, to the elec. arc to produce unsatd. hydrocarbons, *e. g.*, C_2H_2, is described. Cf. *C. A.* **24**, 1586.

Acetylene and hydrogen production in the electric arc. OTTO EISENHUT (to I. G. Farbenind. A.-G.). U. S. 1,794,004, Feb. 24. See Fr. 674,459 (*C. A.* **24**, 2385).

Electric furnace. DET NORSKE AKTIESELSKAB FOR ELEKTROKEMISK INDUSTRIE. Ger. 514, 575, May 7, 1926. Details of the electrodes are given.

Electric induction furnace. EDWIN F. NORTHRUP (to Ajax Electrothermic Corp.) U. S. 1,795,136, March 3. Elec. features.

Electric induction furnaces. SIEMENS-SCHUCKERTWERKE A.-G. (Rudolf G. Berthold, inventor). Ger. 517,348, July 17, 1926. Details of the current feed are described.

Electric resistance furnace. HERBERT J. MCCAULEY. U. S. 1,794,310, Feb. 24. Structural features.

Electric arc furnace for alloying or refining metals. EMILIEN BORNAND and HANS A. SCHLAEPFER. Ger. 517,285, Mar. 1, 1928.

Electric annealing furnace. AKT.-GES. BROWN, BOVERI & CIE. Swiss 142,004, Sept. 17, 1929.

Electric furnace for smelting metals. EMIL F. RUSS. U. S. 1,793,137, Feb. 17. Structural features.

Electric-furnace reduction of alumina. VEREINIGTE ALUMINIUMWERKE A.-G. Brit. 337,995, Nov. 27, 1928. A furnace is continuously charged automatically in accord with the quantity of alumina which is reduced to metal in the bath, the charging hopper being mounted on a hollow anode and discharge from it being controlled by a current-indicating device.

Closed tiltable electric furnace suitable for iron and steel production. EMIL G. T. GUSTAFSSON and BENGT I. NOREN (to Hampus G. E. Cornelius). U. S 1,794,455, March 3. Structural features.

Melting finely divided dry materials such as iron oxide in an electric induction furnace. EDWIN F. NORTHRUP (to Ajax Electrothermic Corp.). U. S. 1,794,863, March 3. Lumps of cond. material such as pure iron which are large enough to be separately heated by induction in passing an a. c. about the charge are mixed with the charge.

Producing carbide-forming metals such as titanium, vanadium, chromium, iron or manganese. TURE R. HAGLUND. U. S. 1,794,401, March 3. Ores such as oxides of the metals named are fused in an elec. furnace together with added reducing agent including lumps of material contg. bauxite, a basic refractory oxide of lower m. p. than the ore, such as CaO, and carbonaceous reducing material. A cement may be produced as a by-product.

Electric furnace with carbide resistances. R. C. BENNER and G. J. EASTER (to Carborundum Co. and C. E. Hawke). Brit. 338,131, Dec. 7, 1928. Various structural details are described of furnaces which may have resistances of Si carbide or B carbide surrounded by a body of granular carbon such as crushed petroleum coke.

Electromagnetic stirring device for furnaces for the electrolysis of fused aluminum salts. HANS THOMA. Ger. 514,919, Dec. 4, 1928.

Device for electrically heating and for spraying molten metals for coating surfaces. WM. S. RICE and CHARLES M. SAEGER, JR. U. S. 1,792,551, Feb. 17. Structural features.

Electrode mounting for electric furnaces or electrolytic cells. A. FRANCHINI (to P. Girod). Brit. 338,371, Aug. 27, 1929. Structural features

Lattice cathodes. RAGUHN-ANHALTER METALLOCHEREI M. B. H. Ger. 514,716, June 24, 1926. Lattice cathodes for the electrolysis of alkali chlorides are described.

Coating cathodes with alkaline earth metal oxides. FRITZ TÖDT. Ger. 514,606, Apr. 8, 1928. The glowing cathode is coated with alk. earth metal oxides, especially BaO, by electrolysis in an aq. bath of alk. earth metal salt contg. CO_3 ions and heating the carbonate deposit so formed to glowing.

Cathode for rotary flame arcs. GEORGES GAUTIER, LEON LE BOZEC and RAYMOND DUBOIS. U. S. 1,793,605, Feb. 24. A cathode comprises a hollow annular ring in which a cooling fluid flows continuously and a winding immersed in the fluid which is supplied with elec. current and has its axis the same as that of the ring.

Glowing cathodes. SIGNUM A.-G. Swiss 142,281, Aug. 6, 1929. Glowing cathodes are made with a core of non-readily fusible metals. This is heated with one or more alkali metals in the absence of O to form a surface alloy, which is then oxidized to complete the cathode.

Incandescent cathode for electric discharge tubes. ANTON E VAN ARKEL and JOHANNES BRUIJNES (to N.-V. Philips' Gloeilampenfabrieken). U. S. 1,794,810, March 3. Cathodes are formed with a metallic core such as Ni, W, Mo or Pt and a surface consisting of a nitride of at least one of the elements Ti, Zr and Hf.

Luminous electrical discharge tube and associated cooling device. JACQUES RISLER (to Risler Corp. of America). U. S 1,793,720, Feb. 24. Structural features.

Electric gas-cleaners. METALLGES. A.-G. (Heinrich B. Rüder, inventor). Ger. 517,261, July 18, 1929. Means is described for keeping the high-tension insulators dry by supplying radiant heat.

Electric gas-cleaners. METALLGES. A.-G. (Kurt von Eberhard, inventor). Ger. 517,262, Oct. 5, 1929. Details of the discharge electrode and its mountings are described.

Electric gas-cleaning apparatus with parallel-plate precipitating electrodes. METALLGES. A.-G. (Jakobus R. Gies, inventor). Ger. 517,067, June 8, 1928.

Hammer device for gas-cleaning electrode. SIEMENS-SCHUCKERTWERKE A.-G. (Alexander Kaufmann, inventor). Ger. 517,263, June 26, 1928.

Electric gas-purification plant. METALLGESELLSCHAFT A.-G. Ger. 514,587, Dec. 9, 1928. Addn. to 511,643 (*C. A.* **25**, 1169). Details of cleaning the electrodes by shaking.

Electric gas-purification plant. SIEMENS-SCHUCKERTWERKE A.-G. (Richard Heinrich, inventor). Ger. 514,650, July 31, 1927. Details of the pptg electrodes are given.

Chamber for the electric purification of gas. SIEMENS-SCHUCKERTWERKE A.-G. (Richard Heinrich, inventor). Ger. 514,820, Mar. 10, 1926. The pptg. surfaces are formed of tin plates.

Apparatus for electrical precipitation. CARL W. J. HEDBERG and HARRY A. WINTERMUTE (to Research Corp.). U. S. 1,794,074, Feb. 24. Structural features.

Apparatus for electrical precipitation of suspended particles from gases. LODGE-COTTRELL, LTD., and L. LODGE. Brit. 337,642, Nov. 29, 1929. Structural features.

Apparatus for electrical precipitation of suspended particles from gases. ME-

TALLGES. A.-G. and LODGE-COTTRELL, LTD. Brit. 337,318, Feb. 15, 1930. Various details are given of an app. in which the gas travels in circular or spiral paths.

Apparatus for electrical precipitation of suspended particles from gases. WILHELM HOSS (to International Precipitation Co.). U. S. 1,794,615–16, March 3. Structural and electrical features.

Apparatus for electrical precipitation of suspended particles from gases. EVALD ANDERSON (to International Precipitation Co.). U. S. 1,793,664–5, Feb. 24. Structural features of electrodes are described.

Apparatus for electrical precipitation of suspended particles from gases. INTERNATIONAL PRECIPITATION CO. and LODGE-COTTRELL, LTD. Brit. 337,685, Jan. 14, 1930. Structural features.

Apparatus for electrostatic precipitation of suspended particles from gases. NATIONAL CARBON CO. Brit. 337,389, Nov. 14, 1928. A collecting electrode is formed (preferably in the shape of a tubular chamber) from coke flour and tar extruded and baked at 900–1400° or machined from solid or perforated blocks of C.

Electrical resistance units. LINWOOD T. RICHARDSON and EDGAR M. SCHMIEL (to Cutler-Hammer, Inc.). U. S. 1,793,829, Feb. 24. Resistance units are formed by surrounding a resistor such as a helical wire with an enclosure such as tubular casing spaced from the resistor, filling the space between the resistance and enclosure with loose granular MgO, hydrating the latter by the action of water and heating the unit to expel H_2O. U. S. 1,793,830 relates to a similar process in which the MgO is hydrated and heated subsequently to reform MgO.

Flexible electric conductors. W. W. RICHARDSON. Brit. 338,215, Jan. 9, 1930. Insulated wires or bare wires laid in spiral paths of different diams. are embedded in rubber and the composite assembly is vulcanized. Various details of manuf. are described.

Apparatus for electrical tests to identify various materials. MARTIN E. SIMON and JOHN A. O'CONNOR (O'Connor to Simon). U. S. 1,793,970, Feb. 24. It is stated that different chem. elements, org. or inorg. compds. and biol. organisms may be identified and distinguished by a described arrangement of elec. app. including a response circuit assocd. with a control circuit with the system critically adjusted so that a characteristic response is produced when a particular substance is brought in active relationship with the control circuit. For example, a known substance, which is the substance it is desired to distinguish in the unknown matter, is placed in electrostatic relation with the control circuit and the response circuit is adjusted to a balanced condition, that is, on the point of oscillation. The normal oscillations may then be suppressed so that there is no sound heard in the loud speaker or telephones, and this condition is disturbed whenever an element for which the circuit is tuned is placed in electrostatic relation with said circuit. In this manner, the particular element may be detected by an audible signal in the loud speaker.

Electric system for temperature control. ANDRE CHAGNAUD (to Établissements Poulenc Frères). U. S. 1,795,008, March 3. Structural and elec. features.

Supplying artificially ionized oxygen for ventilation or other purposes. FRANK E HARTMAN (one-third each to Fred H. Montgomery and W. Ray Montgomery). U. S 1,793,799, Feb. 24. An elec. app. is described for producing ionized O and O_3, with the former in relatively large ratio to the latter.

Incandescent electric lamps. D. K. WRIGHT (to British Thomson-Houston Co., Ltd.). Brit. 337,782, Feb. 18, 1929. Finely divided W is inserted into the bulb of a device such as a lamp, before its sealing, to enable deposits to be rubbed off its inner surface. Various details of manuf. of a projection lamp are described. Cf. *C. A* **24**, 795.

5—PHOTOGRAPHY

E. P. WIGHTMAN

Role of dyes in the progress of photography. A. SEYEWETZ. *Photo-Revue* **43**, 33–4, 53–4(1931); cf. *C. A.* **25**, 1746.—The methods used to fix dyes to the Ag image include (1) those in which the Ag is converted into a chem. compd. capable of acting as a mordant and also capable of fixing the dyes proportionally to the opacity of the Ag deposit; (2) those in which there is formed with the Ag a compd. that will produce a dye by reacting with certain org. compds. In the first method the Ag image is converted into (*a*) simple and double halide salts, (*b*) simple and double Ag ferrocyanides.

(*c*) compds. of Ag with Cr, (*d*) the thiocyanates of Ag and of Cu or (*e*) compds. of Ag formed with quinone in the presence of an alkali metal bromide. H. D. RUSSELL

An abnormal phenomenon of photographic plates. F. E. ROSS. *Astrophys. J.* **73**, 54(1931).—The reversal of low densities on astronomical plates is noted. This phenomenon has a direct bearing on astronomical photography and photometric measurements. H. R. BRIGHAM

Study of some photographic reducers. G. ROBIN. *Sci. ind. phot.* [2], **2**, 24–6(1931). —A systematic study of a number of photographic reducers has been made. All are found to decrease contrast. Permanganate with acid is very close to a proportional reducer; $(NH_4)_2S_2O_8$ attacks more strongly the high densities. L. A. STAIB, JR.

Utilization of film scrap. KURT BRATRING. *Nitrocellulose* **2**, 25–9(1931).—A description of com. processes of regeneration for photographic purposes, recovery of Ag and celluloid, removal of the galatin layer, recovery of gelatin, soln. of celluloid backing alone, treatment of film having protective coatings over the gelatin and utilization of colored, opaque and safety film. E. M. SYMMES

Additive or subtractive effects of two successive exposures. R. LANDAU. *Sci. ind. phot.* [2], **2**, 1–4(1931).—When panchromatic film used for sound recording was given a second exposure under a step wedge subsequent to the exposure received in the sound-recording app., anomalous results were obtained. Subsequent investigation disclosed the following: (1) A very short preliminary exposure (10^{-4} sec.) diminishes sensitivity. (2) Panchromatic film shows the effect. (3) The short exposure must precede the longer one. (4) Polarized light is not essential to the effect noted. (5) The first exposure may produce densities as high as 0.6. L. A. STAIB, JR.

Diminution of the time of exposure and improvement of the detail of radiographs by application of a special after-exposure process. E. HAEGER. *Fortschr. Gebiete Röntgenstrahlen* **42**, 233–52(1930).—A process is described in which the latent images of x-ray films are intensified by application of the Becquerel effect (after-exposure in yellow and green light) after desensitizing the material in a soln. of pinakryptol green (1:5000) for 2 min. As a result, further decrease of the exposure times to radiation is possible. In consequence of the great intensification, the detail of a poorly exposed film is improved. The combination of the intensification and developmental processes is of considerable advantage since, by this procedure, variations of exposure can be compensated for to a considerable degree. Tray development must be employed for this process. E. LINCKE

Second reversal and the Herschel effect with solarized images. W. LESZYNSKI. *Phot. Ind* **28**, 1412–6(1930).—The literature contains evidence of the presence and the absence of the second reversal in different types of emulsions. It is easy to show that the second reversal may or may not occur in the same emulsion. An ordinary emulsion exposed behind a gray wedge shows no second reversal, but the same emulsion previously exposed to solarization in different light and then further exposed under the gray wedge shows a second reversal. Reference is made to the work of Luppo-Cramer, and the second reversal is discussed in relation to uniformity of intensity of exposure, intermediate exposure, the use of red filters for studying the Herschel effect and the necessity for their purity or lack of fogging power. C. E. MEULENDYKE

Peculiar phenomena obtained with mercuric chloride-treated plates. A. REVCHLER. *Bull. soc. chim. Belg.* **39**, 374–8(1930).—Photographic plates treated for a short time in 0.002% $HgCl_2$ soln., touched with the finger tips and given a light exposure show a black mark after development where the pressure was applied. A plate treated with the $HgCl_2$ soln., exposed to light, then touched with the finger tips and developed shows little or no image where the fingers touched. The effects of varying the sequence of $HgCl_2$ treatment, pressure marking and light exposure are discussed. A method of chemically obtaining photographic impressions on money, printed matter, etc., is described. The piece of money or page of printed matter to be reproduced is kept in intimate contact for 2 to 3 hrs. with a sheet of paper which was previously impregnated with $HgCl_2$ and dried. The metal object or printed page, slightly mercurized by the vapor, is removed from the paper and placed in contact with sensitive film or paper for a period of 20 hrs. The film or paper is then given an exposure to light, wetted with water and developed. A negative image of the metallic relief or the printing is thus obtained. L. E. MUEHLER

A photochemical polarizer. FRITZ WEIGERT AND FRITZ STIEBEL. *Naturwissenschaften* **19**, 108(1931).—By irradiation of a photographic transparent gas-light plate with red polarized light the effect of negative induced photodichroism is obtained on direct development. However, by treating the undeveloped plate with CrO_3 (Albert, Luppo-Cramer method) and irradiating subsequently with diffuse natural red light,

positive induced dichroism is obtained on development. The polarized initial exposure with the CrO_3 treatment had changed the sensitive film to a photochem. polarizer. The effect is a support for the micelle theory of latent image and was predictable from it. It is expected that the same Albert reversal could also be obtained with highly sensitive, coarse-grained emulsions. B. J. C. VAN DER HOEVEN

Determination of the general and color sensitivity of negative materials. C. EMMERMANN. *Schweiz. Photo-Ztg.* **32**, 220–2, 224–9(1930).—The principles and the application of the methods of Scheiner, of Eder-Hecht and of Hurter and Driffield are discussd for the detn. of the general and color sensitivity of neg. materials. H. D. RUSSELL

Optical sensitizing of silver halide by colloidal silver. S. E. SHEPPARD. *J. Franklin Inst.* **210**, 587–607(1930).—Various theories on the optical sensitizing of Ag halides are discussed. It is suggested that optical sensitizing by colloidal Ag (Becquerel effect) is primarily due to sensitized photoelec. emission by Ag amicrons and ultramicrons. Sensitized photoelec. emission of composite metal films is considered as due to minute Volta condenser fields. Self-fields as origins of sensitized photoelec. effects are considered in relation to the Becquerel and Weigert effects with Ag halides. E. P. WIGHTMAN

Alteration of orthochromatism by pinakryptol. K. HAIDRICH. *Photofreund* **11**, 50–2(1931).—Sensitometric tests were made on a series of plates. The same exposure was given each plate. One plate was desensitized with a normal pinakryptol bath before development. A rodinal developer (1:20) was used. The normal plate was developed for 5 min. and the desensitized plate for 6 min. in total darkness. With the Gevaert SSS plate a loss of 5° Scheiner resulted; with Gevaert Super-Press 8° Scheiner; with Agfa Isochrome 9° Scheiner and with Agfa Allocyanine plates 15° Scheiner. It was also found that desensitizing affected the color sensitiveness of an emulsion as follows:

Agfa Isochrome plates

Blue	green	yellow
3° S.	3° S.	3° S. loss in speed

Gevaert Super-Press plate

Blue	green	yellow
6° S.	8° S.	8° S. loss in speed

Gevaert SSS plate

Blue	green	yellow
1° S.	4° S.	3° S. loss in speed

Allocyanine plate

Blue	green	yellow	red
14° S.	11° S.	16° S.	16° S.
loss in speed		increase in speed	

A. K. WITTMER

Desensitizing. NEUGEBAUER. *Photofreund* **10**, 360–3(1930).—Sensitometric tests were made to det. loss of speed by the use of a desensitizer (pinakryptol green as a preliminary bath). A desensitized plate compared with untreated plate showed a loss of speed when both were given equal development. If the developing time is doubled, an increase of speed is obtained which approaches but does not usually equal that of the untreated. If a desensitizer is used two to three times the normal exposure should be given. A. K. WITTMER

Desensitizing. H. DÜRR. *Photofreund* **10**, 441–3(1930); cf. Neugebauer (preceding abstract).—D. directs attention to several publications by O. Mente, A. Hübl, K. Jacobsohn, M. L. Dundon, J. I. Crabtree and B. H. Carroll on desensitizing. All authors claim no loss of speed if a plate or film is developed a little longer than an ordinary plate which is not given a desensitizing treatment. A. K. WITTMER

Desensitizing. LÜPPO-CRAMER. *Photofreund* **11**, 7–9(1931).—Exception is taken to the view of Neugebauer (2nd preceding abstract) that the use of desensitizers results in a loss of speed. L.-C. cites some of his own papers in support of his statements. A. K. WITTMER

Desensitizing. NEUGEBAUER. *Photofreund* **11**, 27(1931).—In reply to Lüppo-Cramer (preceding abstract) N. states that the newer emulsions may act differently with a desensitizer from emulsions made in 1920–1925. A. K. WITTMER

Chromium and sulfur intensification of negatives and prints. H. D. POWER. *Camera Craft* **38**, 73(1931).—The method consists in bleaching the negatives or prints in a soln. of 2% $K_2Cr_2O_7$ plus 1.5% strong HCl and substituting a freshly prepd. 2% soln. of Na_2S for the developer. The use of a bisulfite soln. is mentioned to discharge the color of the dichromate to give satisfactory results. G. W. WILHELM

Some properties of fine-grain developers for motion picture films. H. C. CARLTON AND J. I. CRABTREE. *Trans. Soc. Motion Picture Eng.* **13**, 406–44(1929).—Graininess can be lessened by (1) increasing the sulfite, (2) decreasing the rate of development and (3) increasing the degree of development. Borax developers do not give aerial fog, but also do not produce images with less graininess. Tables showing the effect of compn., agitation, aging and exhaustion and time-fog curves are given. A. N. H.

Borax developer characteristics. H. MOYSE AND D. R. WHITE. *Trans. Soc. Motion Picture Eng.* **13**, 445–52(1929).—A sulfite concn of 75 g. per l. gives grain-free images with high speed. The effect of borax is due to its alky. Metol rather than hydroquinone does the developing. Hydroquinone tends to increase fog. Renewing a borax developing bath brings back the development rate but not the detail-giving power which has been lost through bromide accumulation. ANN NICHOLSON HIRD

Neutral and acid amidol developer. C. EMMERMANN. *Phot. Chronik* **37**, 138–40 (1930).—Acid amidol is a somewhat slower developer than neutral amidol. Emulsion speed is not affected. Acid amidol also produces more fog. Halation is more noticeable with the acid amidol. A. M ROBINSON

Warm tone developing, selenium and sulfur toning. C. EMMERMANN. *Phot. Chronik* **38**, 10, 15–7(1931).—The use of pyrocatechol, glycine, hydroquinone and eikonogen without sulfite as warm tone developers is briefly discussed Se and S toning are also briefly described. A. M. ROBINSON

"Uvatypie" and its paper prints in natural colors. K. WOLTER. *Camera (Luzern)* **9**, 185–90(1931). Three-color sepn. negatives are made in a repeating back camera. A print is made from each of these on dichromated gelatin film by exposure through the support. A wash-off relief is then produced on each film. The reliefs are dyed in the three complementary colors and a three-color imbibition print is made upon gelatin-coated paper. This imbibition process remedies the poor shadow quality and variation in successive prints characteristic of other imbibition processes. This end is achieved by rinsing the dyed reliefs in distd. water before making the prints and by employing dye solns. of the correct degree of dispersity. Diffusion of the dye in the printing paper is prevented by incorporating casein into the gelatin. M. W. S.

Positive material for motion pictures in color. R. LANDAU. *Kinotechnik* **13**, 12–(1931). A hypothetical color-printing process is described in which 3 fine-grained photographic emulsions are to be made, each of a uniform grain size differing from the other two When developed in the same developer, each emulsion is to give a colloidal Ag deposit of one of the 3 complementary printing colors. The emulsions are to be coated in superposition upon a common film support. The top and bottom emulsions are not to be color-sensitized, while the middle one is to be orthochromatic or panchromatic. All are to be impregnated with a yellow screening dye. The lowest is to give a red Ag deposit, the middle one a yellow deposit and the top one a blue deposit. The film is exposed 3 times, each time through one of the three-color sepn. negatives: to the green filter neg., through the support, with blue light; to the red filter neg., from the emulsion side, with blue light; to the blue filter neg., with yellow light The film is then to be developed to obtain a pos. in 3 colors. Instead of making the emulsions of 3 grain sizes, they may be of one grain size, and the developer, preferably contg. a Ag halide solvent, may be altered in compn. as it penetrates the successive emulsions. M. W. SEYMOUR

Photographic detection of the asymmetrical angular distribution of twice reflected electrons (RUPP) **3.** Direct photography of ionization in insulating substances (GEMANT) **3.** Method for preparing photographs of Petri dish cultures by direct contact printing on photographic paper (BUCHHOLZ, LEWIS) **11C.**

NEWENS, FRANK R.: **The Technique of Colour Photography.** London: Blackie and Son, Ltd. 101 pp. 4s. 6d., net.

Photographic emulsions. S. E. SHEPPARD and E. P. WIGHTMAN (to Kodak, Ltd.). Brit. 337,323, Feb. 25, 1929. Stability of emulsions is improved and any tendency to fog is corrected by adding small proportions of compds. such as saccharin, diacetamide, phthalimide, pyrrole derivs. such as succinimide and ring compds. such as those contg. the pyrazolone, pyrazole, pyrazolidone or *v*-triazole ring. Cf. *C. A.* **24**, 3720.

Photosensitive material. H. D. MURRAY, D. A. SPENCER and COLOUR PHOTOGRAPHS (BRITISH & FOREIGN), LTD. Brit. 337,868, Aug. 24, 1929. A water-impermeable cellulose ester such as a nitrocellulose or cellulose acetate compn., or fibrous

material such as paper or fabric coated or impregnated with such an ester, has its surface rendered water-permeable by superficial de-esterification and is then impregnated with a light-sensitive salt such as a compd. of Ag, Cr or Fe or a diazo compd. Various details of treatment are described.

Apparatus for developing photographic materials such as sensitive paper by a developing gas such as ammonia. ADOLPH LANGSNER (to Eugene Dietzgen Co.). U. S. 1,794,909, March 3. Structural features.

Bromide printing. OTTO TREICHEL. Ger. 495,920, Sept. 26, 1928. Bromide prints without spots or wrinkles are produced by having at most 1.8% alkali and at least 1.8% Na_2SO_3 in the $KHSO_3$ and citric acid developer. A suitable developer contains metol, hydroquinone, Na_2SO_3, Na_2CO_3, $KHSO_3$, citric acid and KBr.

Blue prints. KALLE & Co. A.-G. (Maximilian P. Schmidt and Rudolf Zahn, inventors). Ger. 517,159, July 24, 1926. A compd. (other than a dye) showing strong absorption in the ultra-violet, *e. g.*, Na 6-phenyl-2-aminopseudoaziminobenzene-3,4′-disulfonate, is added to inks or crayons for making drawings from which blue prints are to be prepd. Clearer reproduction results.

Screen for use in photoengraving. JOHN W. IPPERS (one-half to Joseph Deutsch). U. S. 1,794,693, March 3. In forming a patterned, irregularly reticulated, hardened colloid screen for photoengraving, a dichromated colloid layer is exposed to actinic rays at predetd. areas and again exposed to light in its entirety, and swelling is then effected by development with suitable colloid-swelling liquids, followed by washing and drying.

Photomechanical printing surfaces. EUSTACE B. ELDRIDGE (one-half to John A. Haeseler). U. S. 1,793,070, Feb. 17. For producing a substantially grainless printing surface from a latent Ag image in a colloidal material, capable of being printed from as in collotype printing, the exposed plate or film carrying the latent image is developed with a developer such as a dil. amidol soln. which reacts upon all the light-affected Ag salt in the colloid proportionately to the amount of light to which the Ag salt has been exposed, but the action of which is so feeble as to produce an extremely faint and tenuous image lacking d. and depth which will be composed of very minute quantities of reduced Ag held in suspension in the colloid, and the colloid is chem. hardened in the presence of the Ag (suitably by the action of an aq. soln. formed from $CuSO_4$, KBr, $K_2Cr_2O_7$ and chromic acid).

6—INORGANIC CHEMISTRY

A. R. MIDDLETON

The atomic weight of iodine. The analysis of iodine pentoxide. GREGORY P. BAXTER AND ALBERT Q. BUTLER. *J. Am. Chem. Soc.* **53**, 968–77(1931).—I_2O_5 produced by dehydration of HIO_3 contains less I (and more O) than corresponds to the theoretical formula. I_2O_5 of normal compn. is difficult, if not impossible, to prep. Conclusions based upon its actual compn. are not sufficiently reliable for work of high precision, as attested by the at. wt. obtained, 126.905. B. A. SOULE

Principles of the structure of boron-hydrogen compounds. Addendum. E. WIBERG. *Z. anorg. allgem. Chem.* **195**, 288(1931).—Because of an abbreviation of ms. (cf. *C. A.* **25**, 1751) omission was made from the table of properties of B_2H_6 and C_2H_4 that the statement regarding addn. of Na to the ethylenic bond relates to derivs. of ethylene and that the assumption of addn. of hydrogen halides, halogens and compds. of the type HOX to B_2H_6 relates to a previous hypothesis on boron hydride substitutions elaborated by W. A. P. SACHS

The chemistry and metallurgy of beryllium. G. MALCOLM DYSON. *Chem. Age* (London) **24**, 228–30(1931).—A review. E. H.

The separation of beryllium and aluminum oxides. A. TRAVERS AND SCHNOUTKA. *Compt. rend.* **192**, 285–7(1931).—Methods available are based on these facts: (1) BeO dissolves in a soln. of NH_4HCO_3 while Al_2O_3 does not. (2) Solubilities in alk. solns. are different. (3) Solubilities in a boiling soln. of $NaHCO_3$ are different. (4) A basic acetate of Be is sol. in $CHCl_3$. (5) Al is pptd. by 8-hydroxyquinoline. T. and S. offer the following methods: (1) The bisulfites are evapd. to dryness on a steam bath and extd. Al forms an insol. oxide but Be does not. (2) $Be(HSO_3)_2$ ppts. in boiling soln. in the presence of traces of H_2SO_4 but redissolves on cooling, while $Al(HSO_3)_3$ does not. (3) Be forms a complex with $NaHSO_3$ which is completely decomposed by boiling and Be does not form compds. with Al at p_H 4. An extensive bibliography is given. A. L. T.

Polytherms of ternary systems which in addition to water contain an alkaline sul-

fate and manganous sulfate. III. A. BENRATH. *Z. anorg. allgem. Chem.* **195**, 247–54 (1931); cf. *C. A.* **24**, 3159.—The polytherms are detd. for the systems $MnSO_4$–Tl_2SO_4–H_2O, $MnSO_4$–$(NH_4)_2SO_4$–H_2O, $MnSO_4$–Rb_2SO_4–H_2O. The solid phases present are $MnSO_4.Tl_2SO_4.6$ aq., $2MnSO_4.Tl_2SO_4$, Tl_2SO_4 and corresponding salts of NH_4 and Rb, in addn. to the mono-, penta- and heptahydrate of $MnSO_4$ in each system. The temp. range was 0–100°. K does not form the double salt $MnSO_4.K_2SO_4.6$ aq., while with Cs the salt $2MnSO_4.Cs_2SO_4$ is lacking. H. STOERTZ

Ternary systems. IX. Sodium iodate, sodium nitrate and water. ARTHUR E. HILL AND JOHN E. DONOVAN. *J. Am. Chem. Soc.* **53**, 934–41(1931); cf. *C. A.* **23**, 4616.—The soly. of $NaIO_3$ in water is given for temps. from 5° to 50°. Isotherms in the ternary system $NaIO_3$–$NaNO_3$–H_2O are given at 5°, 25° and 50°. The stable hydrates are $NaIO_3.5H_2O$ below 20° and $NaIO_3.H_2O$ above this temp. In the ternary system, the double salt, $2NaIO_3.3NaNO_3.15H_2O$, appears below 9.8°. **X. Magnesium iodate, magnesium nitrate and water.** ARTHUR E. HILL AND SAMUEL MOSKOWITZ. *Ibid* 941–6. –The soly. of $MgIO_3$ in water is given from the eutectic (−0.36°) to +90°. In addn. to the deca- and tetrahydrates, previously known, the anhydrous form is shown to exist in contact with water above 57.5°. Isotherms in the ternary system $Mg(IO_3)_2$–$Mg(NO_3)_2$–H_2O are given at 5°, 25° and 50°. No double salts are found in this temp. range. B. E. TIFFANY

Behavior of sodium sulfate crystals toward cold ethyl alcohol and methanol. M. A. RAKUZIN. *Z. Krist.* **73**, 115–6(1930).—Treatment with 95% EtOH affords a powder consisting of thenardite; with MeOH dehydration, but not powder formation, occurs. B. C. A.

The chlorides of sulfur. T. M. LOWRY. *Z. Electrochem.* **36**, 733–4(1930); cf. *C. A.* **24**, 4441.—Dielec. consts. for mixts. of S_2Cl_2 and Cl_2 in the solid state show the presence of SCl_4. F.-p. curves indicate the sepn. of solid S_3Cl_4, SCl_2 and SCl_4. Surface tension, d., light absorption and parachors show the liquid mixts. behave as a ternary system: S_2Cl_2–SCl_2–Cl_2. O. M. SMITH

Sulfur fluoride. KĀRLIS ŠTRENKS. *Acta. Univ. Latviensis Kim. Fakultat. Serija* **1**, 233–60 (in German 261 2)(1930).—The interaction of AgF and S yields Ag_2S and S_2F_2, a colorless gas with an odor similar to that of SO_2 or S_2Cl_2; it fumes in air and is very toxic to the organism; it is decomposed by water, yielding S, H_2SO_3 and HF, it attacks glass, even at low temps., and yields S, SiF_4, SOF_2 and SO_2; its formula has been proved by analysis and density detn. It attacks quartz, and consequently the physical constants reported by Fischer and Jaeneckner (*C. A.* **23**, 5014) are incorrect, it does not corrode Sn, steel, Fe or Pt. A. L. HENNE

The decomposition of hypobromous acid. FRIEDRICH POLLAK AND ETELKA DOKTOR. *Z. anorg. allgem. Chem.* **196**, 89–112(1931).—HBrO is best prepd by treating concd. $AgNO_3$ soln. with pure Br_2, followed by vacuum distn. A concn. greater than 0.3 *M* will be unattainable because of the decompn. of HBrO. Prepns. of HBrO always contain its decompn. products, $HBrO_3$ and Br_2, which fact has not always been considered in previous work. If HBrO is prepd. from $AgNO_3$ it contains HNO_3 which comes over during the distn. This HNO_3 can be detd. analytically only by the nitrometer method. The nitrometer method of Klemenc and Hayek (*C. A.* **21**, 3285), which is especially suitable for a small quantity, was modified for use in the presence of the Br compd. present in the prepn. Inexplicable irregularities in the distn. and the decompn. of HBrO make it almost impossible to prep. a soln. of definite concn. This decompn. is greatest during the first part of the distn. The decompn. of HBrO proceeds by 2 simultaneous, independent reactions: (I) $5HBrO \longrightarrow HBrO_3 + 2H_2O + 2Br_2$ and (II) $4HBrO \longrightarrow O_2 + 2H_2O + 2Br_2$. In the dark, at 15°, reaction (I) predominates. H ions were not observed to influence it. Bubbling of N_2 through the soln. did not affect it. $HBrO_2$ may be involved transiently in the decompn., but it did not appear in measurable concn. R. H. LOMBARD

Composition of the deposit forming on zinc immersed in copper sulfate solution. I. A. GALECKI AND J. TOMASZEWSKI. *Roczniki Chem.* **10**, 437–68(in German 468–71) (1930); cf. following abstr.—The coherence of the deposit forming on zinc rods immersed in $CuSO_4$ soln. increases with stirring and with the concn. and decreases with the acidity of the solns.; at the same time the color of the deposit becomes lighter. The deposit contains two constituents: (a) a metallic, flexible, red, yellow or white coating, possessing either a dull or a polished surface; and (b) a dark brown to black powdery or flocculent ppt. The former consists of metallic Cu and Zn in various proportions, probably both as a mixt. and as alloys, while the latter contains oxides of the two metals, as well as basic sulfates and the free metals. B. C. A.

Composition of the deposit forming on zinc immersed in copper sulfate solution. II.

A. GALECKI AND J. TOMASZEWSKI. *Roczniki Chem.* **10**, 601–27(in German 628–9)(1930); cf. preceding abstr.—With the increase of temp. the content of Cu in the ppt. decreases and the content of Zn increases. The neg. balance of the reaction is greater the higher the temp. Temps. at which the expt. was performed (18–50°) had no noticeable influence on the appearance and color of the ppt. The addn. of $ZnSO_4$ to the reaction system lowers the percentage of Zn in the ppt. by an amt. proportional to a certain extent to the amt. of $ZnSO_4$ added. The neg. balance of the reaction increases with added $ZnSO_4$. In a quiet electrolyte the addn. of $ZnSO_4$ has in general no noticeable influence on the external form and consistency of the ppts.; in a stirred soln. addn. of $ZnSO_4$ causes the formation of more fragile ppts. A considerable portion of Zn is most probably in the form of basic compds. which dissolve in NaOH. In general, the ppt. varies greatly in form and compn. with varying conditions. J. KUČERA

The non-existence of the subiodides of bismuth, BiI_2 and BiI. V. CAGLIOTI. *Gazz. chim. ital.* **60**, 933–5(1930).—For a long time there has been evidence both for and against the existence of Bi iodides lower than BiI_3 (cf. *Pogg. Ann.* **107**, 601(1859); Guthmann and Herz, *Z. anal. Chem.* **56**, 422(1908); Marino and Becarelli, *C. A.* **7**, 1457), and it was therefore of interest to exam. BiI_3 and the reputed compds., BiI_2 and BiI, by x-rays BiI_2 and BiI were prepd. with the app. used by Marino and Becarelli (*loc. cit.*) for studying the system Bi–I. The powder method was used in the x-ray examn., and the rontgenographs are reproduced. No evidence of the existence of any compd. other than BiI_3 was obtained. A mixt. of BiI_3 and Bi in proportions corresponding to BiI_2 showed no interference lines of Bi, so that the substance which was supposed to be BiI_2 is probably a mixt. of BiI_3 and Bi. A mixt. of BiI_3 and Bi in proportions corresponding to BiI showed the lines of BiI_3 and Bi. This obscuring of the lines of one substance in a mixt. is being studied further, and it has already been found that Cu contg. 7% of Co_2Si does not show the interference lines of the Co_2Si. C. C. DAVIS

Silicic acids. II. W. DILTHEY AND W. NAGEL. *J. prakt. Chem.* **129**, 178–88 (1931); cf. *C. A.* **23**, 1585.—The earlier expts. were repeated with various solvents and at lower temps. The H_2O content of the silicic acids obtained depends on the temp. and is not much influenced by the proportion of the Ph_3COH in the reaction. At −18° to −20° and with 4.5 mols. of Ph_3COH a product with a H_2O content of 27% is obtained when using $CHCl_3$ as a solvent. This compares with the product obtained with Et_2O at 35°. The 27% is too high to assume the presence of the meta acid. With CCl_4 at −15° to −18° a product with 20% H_2O is obtained This value is too low for the meta acid No ortho acid could be obtained. The soly. of the silicic acids, detd by dialysis, was not over 6% and decreased with age. The splitting off of H_2O is probably not intra- but inter mol. E. SCHOTTE

The existence of violet tungsten oxide, W_4O_{11}. E. TARJAN. *Naturwissenschaften* **19**, 166–7(1931). Expts in H_2-H_2O mixts. between 700° and 1000° on W oxides did not confirm the existence of W_2O_5 (blue), in agreement with the results of Reinders and Vervloet (*C. A.* **18**, 349). Inside the range of existence of this compd. (Chaudron, *C. A.* **14**, 2451) a violet product was obtained of compn W_4O_{11} (oxidation value 1.76 to 1.84%), *i. e.*, between WO_3 and W_2O_5. Above W_4O_{11} blue reduction products are formed at low H_2 concns. with oxidation values of a few tenths of a percent; below W_4O_{11} no blue products could be obtained, further reduction gave WO_2 and W. W_4O_{11} can be prepd. from WO_2 as well as from WO_3 at 15 to 30% H_2 at 900°. In CO-CO_2 mixts W_4O_{11} can be made inside the alleged W_2O_5 limits from either side (900°, 25% CO_2) (cf. van Liempt, *C. A.* **16**, 1530). W_4O_{11} crystallizes in red-violet needles with a metallic luster; it has a triclinic lattice different from that of WO_3 and WO_2. Ignition of a pressed mixt. of $3WO_3 + 1WO_2$ in an inert atm. gives the violet oxide in a manner similar to the prepn. method of W bronzes. The relationship with these bronzes is furthermore evident from the chem. resistivity and the metallic cond. ($\rho = 2 \cdot 10^{-4}$ ohm cm. for a pressed sample, sintered at 1200°). Leiser (*C. A.* **2**, 760) has described the electrolytic prepn. of W_4O_{11}; earlier erroneous data on the W oxides are partly due to retarded reduction processes and hence apparent equilibria. B. J. C. v. D. H.

The preparation of complex bromine derivatives of quinquevalent tungsten. H. PAULSSEN-v. BECK. *Z. anorg. allgem. Chem.* **196**, 85–8(1931); cf. Collenberg, *C. A.* **12**, 2501.—The following complex bromotungstites were prepd. by methods which in principle consisted in treating the complex K, NH_4 or Na oxalotungstites with concd. HBr, sepg excess oxalate and bromide and treating with a soln of the bromide of the metal or base in HBr: *Dirubidium pentabromotungstite*, $Rb_2(WOBr_5)$, bright, olive-brown crystals; *dicesium pentabromotungstite*, $Cs_2(WOBr_5)$, greenish-yellow powder of microscopic octahedra; *monopyridine tetrabromotungstite* $(C_5H_5NH)(WOBr_4)$, brownish-green

powder of square platelets; *diammonium pentabromotungstite*, $(NH_4)_2(WOBr_5)$, olive-green octahedra, decompd. on drying; *monotetraethylammonium aquotetrabromotungstite*, $[(C_2H_5)_4N](WOBr_4.H_2O)$, bright green powder of cryst. scales. The 3 series of salts, $Me^I_2(WOBr_5)$, $Me^I(WOBr_4.H_2O)$ and $Me^I(WOBr_4)$, are analogous to the previously known chlorotungstites and have the same cryst. form as the latter, although their color is more toward brownish yellow. The bromotungstites are less sol. in concd. HBr than are the corresponding chlorotungstites in concd. HCl. The color of the bromotungstite soln. is green; that of the chlorotungstite soln. is blue. Treatment of Na oxalotungstite with concd. HF gives a violet-colored soln. The bromotungstites are more susceptible to hydrolytic decompn. than are the chlorotungstites, but they may be preserved in dry CO_2. R. H. LOMBARD

Sulfur derivatives of perrhenic acid. WILH. FEIT. *Z. angew. Chem.* **44**, 65–6 (1931).—H_2S is passed into a satd. soln. of $KReO_4$. The soln. becomes yellow in color at first, but after a day's flow of gas becomes deep brown, almost opaque. When no further change is observed the H_2S is removed by boiling, and the soln. is carefully concd. by evapn. at 35°. When only about $^1/_5$ the original volume remains, small brown crystals sep. which appear to be $KReO_4$ contg. a small quantity of thio salt. On further concn. the crystals sepg. become even darker and are accompanied also by a dark brown ppt. which is probably a sulfide of Re. The soln. is finally dried without further sepn. of crystals to a dark brown mass which is easily sol. in H_2O and contains 14–15% S. It is a mixt. of $KReO_3S$, $KReO_2S_2$, $KReOS_3$, $KReS_4$. A soln. of this residue is treated with N/20 Tl_2SO_4 and the dark brown ppt. is filtered, washed and dried at 35°. Analysis gave the compn. $TlReS_4$. The filtrate from this still contained Re and S, and on further treatment with Tl_2SO_4 yielded a bright yellow cryst. ppt. of $TlReO_3S$. A soln. of this salt on treatment with HCl gave a fugitive red color followed by sepn. of S, showing that free $HReO_3S$ is unstable. H. STOERTZ

The hypophosphites of cesium and rubidium. L. HACKSPILL AND J. WEISS. *Compt. rend.* **192**, 425–6(1931) The hypophosphites of Cs and Rb (PO_2H_2M) are similar to those of the other alkalies. Their density and their affinity for H_2O increase with their at. wt. and their decompn. with heat is similar. AMY LEVESCONTE

Study of the absorption spectra of various series of rare earth double nitrates. DENIS W. PEARCE AND J. ALLEN HARRIS *Trans Roy. Soc. Can* [3], **24**, Sect. 3, 145–51(1930). A study was made of the various double nitrates of the rare earth elements to ascertain if it was possible that some might be more efficient than others in effecting a sepn. of these elements, particularly of Il from Nd and Sa. From a study of the relative intensities of the most characteristic absorption band of each element it would appear that: (1) The double NH_4 nitrates afford the most efficient sepn. of La and Pr from Nd. (2) The double Mg and double Co nitrates are of the same efficiency in their relative sepns., no definite sepn being possible by these salts. The ease of crystn. renders them useful for preliminary sepn. of the more basic members. (3) The double Mn nitrates are to be recommended as a means for sepg Sa and Nd. (4) The double Cu nitrates appear to effect a reversal of soly from the usual serial order of the double nitrates, *i. e.*, according to at. wts. (5) Pb appears to produce little effect on the sepn. of the more basic members of the Ce group. Indications are afforded that $Pb(NO_3)_2$ may be helpful in the sepn. of Il. J. W. SHIPLEY

Observations on the complex cyanides of nickel, copper and chromium. W. GLUUD AND W. RIESE. *Ber. ges. Kohlentechnik* **3**, 452–9(1931) In strongly ammoniacal solns., $K_4Fe(CN)_6$ decomposes as follows under the influence of $AgNO_3$. First one mol of NH_3 is taken up: $K_4Fe(CN)_6 + NH_3 \longrightarrow KCN + K_3[Fe(CN)_5NH_3]$. The $AgNO_3$ removes the cyanide and takes the reaction to the right in steps as follows: $K_3[Fe(CN)_5NH_3] + NH_3 \longrightarrow KCN + K_2[Fe(CN)_4(NH_3)_2]$; $K[Fe(CN)_3(NH_3)_3]$, $[Fe(CN)_6(NH_3)_4]$ and finally $Fe(CN)_2$ are formed. Similar reactions occur with Ni salts, $K_2[Ni(CN)_4]$ being converted into $K[Ni(CN)_3NH_3]$, $[Ni(CN)_2(NH_3)_2]$ and finally also into $[Ni(NH_3)_3CN](CN)$ and $[Ni(NH_3)_4](CN)_2$. Similar results are obtained with Cu and Cr compds. With $(NH_4)_2S_x$, these complex cyanides lead to the formation of thiocyanates, the Ni salts furnishing typical reactions. If the formation of $[Ni(NH_3)_4](CN)_2$ is assumed, this reacts with $(NH_4)_2S_x$ to form NiS and NH_4CNS. The corresponding Cu and Cr salts are formed somewhat less readily. The presence of concd. NH_4OH suppresses any considerable thiocyanate formation. Varied reactions are given with $FeSO_4$, the Ni salts giving a ppt. of $Fe[Ni(CN)_4]$, no Fe whatever replacing Ni in the anion. With Cu salts, however, ferrocyanides are produced and also the following compd., $KFe[Cu(CN)_4]$. With the complex Cr cyanide the reaction is as follows in alkaline soln.: $K_3[Cr(CN)_6] + 3KOH \longrightarrow Cr(OH)_3 + 6KCN$. The excess of KCN then forms a ferrocyanide with the ferrous salt. H. STOERTZ

Phase-rule studies on metallic thiocyanates (OCCLESHAW) 2.

LÖWENSTEIN, ELSE: **Über Subhaloide der Homologen des Quecksilbers.** Freiburg i. B.: Speyer und Kaerner. 32 pp. M. 1.50.

7—ANALYTICAL CHEMISTRY

W. T. HALL

Quantitative emission spectrum analysis in any percentage without calibration curve. G. SCHEIBE AND O. SCHNETTLER. *Naturwissenschaften* **19**, 134(1931).—Certain phases of a method previously described (*C. A.* **24**, 5622) have been checked by the use of a Pt absorption wedge. The results are briefly discussed. B. J. C. v. D. H.

Physical methods in the chemical laboratory. XVII. A method for increasing the accuracy in quantitative emission spectral analysis and its testing. G. SCHEIBE, C. F. LINSTRÖM AND O. SCHNETTLER. *Z. angew. Chem.* **44**, 145–51(1931); cf. *C. A.* **25**, 1440.—The photographic plate, with respect to its applicability for spectrographic analyses, was studied, with particular attention to the dependence upon the wave lengths. With the aid of a thermoelec. photometer, which is suitable for technical purposes, the behavior of the intensity of the lines was carefully studied, and as a result of this study a procedure was developed which will serve for the spectrographic detn. of varying quantities of substances with an accuracy of about 3%. W. T. H.

Colorimeters, spectrophotometers and nephelometers. C. DIGAUD. *Ann. chim. anal. chim. appl.* **13**, 1–5, 33–54, 65–72(1931).—This is an account of the marked advances that have been made in the field of analytical chemistry, particularly with respect to applying the principles of modern phys. chemistry. A discussion of the theory underlying all processes ending with visual observation begins with an explanation of the anatomy of the eye, then turns to photoelec. cells, thermoelec. couples, thermoelec piles and photographic plates and finally compares the sensitiveness of the eye with that of the photoelec. cell and of the photographic plate. The app. and its use are described in detail. W. T. H.

Nephelometric titrations. II. Standard-solution end-point. CLYDE R. JOHNSON. *J. Phys. Chem.* **35**, 830–5(1931).—It has been pointed out (*C. A.* **25**, 1178) that there is a possible error in the equal-opalescence end point in nephelometric detns. To avoid this possible error it is proposed to work to a different end point called the "standard-soln. end-point." For this 2 sets of standard solns. are necessary In the titration of Cl^- with $AgNO_3$, *e. g.*, the necessary quantity of $AgNO_3$, to within a few tenths of a mg., is added, and then both Cl^- and Ag are detd. nephelometrically in the supernatant soln. by use of solns. satd. with AgCl ppt. as standards. W. T. H.

The stability of standard arsenious acid solutions. IV. TANANAEV. *Ukrainskii Khem. Zhurnal* **5**, Sci. Pt., 217–26(1930).—(1) Standardized arsenious acid loses the strength of its titer through oxidation to arsenic acid. The oxidation rate is directly proportional to the alky. of the soln. A 0.1 *N* soln. of As_2O_3 in 1 *N* NaOH suffers a daily loss in titer equaling approx. 0.176% of As_2O_3. (2) Weakly alk. solns. (p_H = 7–9) remain unchanged for 1.5 years. (3) $NaHCO_3$ free from Na_2CO_3 is most suitable and can be prepd. by passing CO_2 through the soln. (4) Solns. of As_2O_3 prepd. from the pure chem. remain sterile and do not form AsH_3. B. S. LEVINE

Systematic qualitative analysis with small quantities of cations. A. SCHEINKMANN. *Z. anal. Chem.* **83**, 176–88(1931).—Instead of starting with 1 g. or more of material, only 0.1–0.15 g. of sample is taken, and the reagents are added in drops, an unnecessary excess being avoided. The first group of AgCl, $PbCl_2$ and Hg_2Cl_2 is treated with a little 5% KNO_3 soln., in which $PbCl_2$ is more sol. than in water, but is otherwise analyzed in the conventional manner. For pptg. the second group, a satd. soln. of H_2S is used, which is prepd. daily but which is much more convenient to use than the gas itself. The sulfide ppt. is treated with KOH soln. to dissolve the sulfides of As, Sb, Sn and Hg. From this soln. HgS is pptd. by NH_4Cl, and the sulfides of As, Sb and Sn by AcOH, after which this subgroup is analyzed conventionally. The sulfides of Group II which are insol. in KOH soln. are dissolved in HCl and H_2O_2 and treated with NH_4OH, after which the procedure is normal. In Group III, the NiS and CoS left undissolved by dil. HCl are dissolved by treatment with AcOH and H_2O_2, which is decidedly advantageous. In testing for Al, both the morin and alizarin tests are used For Zn the resorcinol and ferrocyanide tests are used, and for Mn the green fusion test and the treatment with PbO_2 and HNO_3 are prescribed. The filtrate from this

Fe-Al group is evapd. to dryness after making acid with HCl and ignited with oxalic acid, whereby insol. $BaCO_3$, $SrCO_3$, $CaCO_3$ and MgO are formed together with water-sol. alkali carbonates. In this way the baneful effects of excess NH_4 salts are overcome. These are the principal ways in which the procedure differs from that ordinarily used. Several lab. devices are shown which will be found useful. W. T. H.

Mercurimetric studies. O. TOMÍČEK AND O. PROČKE. *Collection Czechoslov. Chem. Comm.* **3**, 116–25(1931).—Votoček found that $Na_2Fe(CN)_5(NO).2H_2O$ could be used as indicator in titrating Cl^- and Br^- but not I^- with $Hg(NO_3)_2$. With respect to the soly. of the Hg nitroprussiate and the extent of its ionization, but little data are available. It would seem probable that the molar soly. is not greater than 2×10^{-5} and that its soly. product is below 10^{-9}. The physicochem. studies here described lead to the same conclusion that the molar soly. is below 5×10^{-5}. Other observations made will be given a practical application in a subsequent paper. W. T. H.

Dimethyl-*p*-phenylenediamine hydrochloride for the determination of small quantities of chlorine. KNUT ALFTHAN. *Finska Kemistsamfundets Medd.* **36**, 109–12 (1927).—The reagent gives with Cl the same shade of red color as methyl red (dimethylaminoazobenzene-*o*-carboxylic acid) shows in acid soln. The water to be tested is treated with the reagent, and the resulting color is compared with those of known solns. of methyl red. In testing drinking water, 0.01 mg. Cl can be detd. J. RYSELIN

Indirect estimation of silicon in 48 to 52 percent ferrosilicons. G. T. DOUGHERTY. *Ind. Eng. Chem., Anal. Ed.* **3**, 158–9(1931).—The direct detn. of Si in Fe-Si requires 1.5–2 days. To avoid car demurrage, an indirect method has been worked out requiring but 0.5 day and which depends upon carefully treating the sample with HF and H_2SO_4 in a Pt or palau crucible and weighing the residue after evapn. and ignition. W. T. H.

Lithium chloroplatinate and the separation of potassium from sodium and lithium by the unmodified, original, Fresenius method. G. FREDERICK SMITH AND A. C. SHEAD. *J. Am. Chem. Soc.* **53**, 947–57(1931).—$Li_2PtCl_6.6H_2O$, prepd. from Li_2CO_3 and H_2PtCl_6, and twice recrystd., can be used to advantage for pptg. K_2PtCl_6. The ppt. then has the normal concn., which is not true when H_2PtCl_6 is used as precipitant. Moreover, the ppt. is stable at 200–260°, whereas the ppt. produced with H_2PtCl_6 decomposes above 160°. For washing the K_2PtCl_6 ppt., 80% EtOH is recommended. The errors due to the use of H_2PtCl_6 are due to decompn. of the reagent, which does not take place when recrystd. Li_2PtCl_6 is used. W. T. H.

Quantitative determination of calcium, magnesium and phosphorus in feedstuffs and cattle excreta. Improved technic. H. P. MORRIS, J. W. NELSON AND L. S. PALMER. *Ind. Eng. Chem., Anal. Ed.* **3**, 164–7(1931).—Detailed directions are given for fusing the ash with soda, extg. the melt with HCl and water and detg. Ca, Mg and P in the soln. To avoid the necessity of removing all SiO_2, the CaC_2O_4 ppt. is titrated rather than weighed. The value of the method is shown by exptl. data. W. T. H.

The selenious acid method for the determination of zirconium. STEPHEN G. SIMPSON AND WALTER C. SCHUMB. *J. Am. Chem. Soc.* **53**, 921–33(1931).—For decompg. Zr minerals, the Muehlberg method of fusing with Na_2O_2 and C is recommended, the fusion being made a second time with any residue which is insol. in acid. After the fusion, ext. the melt with water and reject the soln. of sol. Na salts. Dissolve the residue in HCl, filter if necessary and evap. the soln. to fumes with 25 cc. of 18 *N* H_2SO_4. Cool, dil. and filter off SiO_2. Make the filtrate ammoniacal, filter and wash slightly. Promptly dissolve the ppt., which contains ZrO_2, in 15 cc. of 12 *N* HCl, add 20 cc. of EtOH, heat nearly to boiling, dil. to 500 cc., again boil and add 20 cc. of 10% H_2SeO_3 soln. When the liquid is clear, filter off the ppt. of $4ZrO_2.3SeO_2.18H_2O$, and after very slight washing, dissolve it in 15 cc. of 12 *N* HCl. Add 20 cc. of 3% H_2O_2 to reduce any quadrivalent Ce, dil. to 500 cc. and again ppt. with H_2SeO_4. Digest the 2 filters used for the Zr ppts. with 40 cc. of hot 10% oxalic acid and add the soln. to the main ppt. contg. Zr. Dil. to 200 cc., heat to boiling and add 12 cc. of 6 *N* HCl. After it has stood at least 10 hrs., filter and wash the ppt. with 2.5% oxalic acid dissolved in 0.24 *N* HCl. To the filtrate contg. the Zr add 30 cc. of 18 *N* H_2SO_4 and evap. till all the $C_2O_4^{--}$ has been destroyed, as shown by no more evolution of CO and CO_2. Filter off any Se ppt. and make the filtrate ammoniacal. Filter off the $Zr(OH)_4$ ppt., and after a little washing dissolve it in 15 cc. of 12 *N* HCl, add 20 cc. of 3% H_2O_2, dil. to 500 cc., add 20 cc. of 10% H_2SeO_3 soln., filter, ignite the basic Zr selenite over the blast lamp and weigh as ZrO_2. W. T. H.

Separation of calcium and magnesium by the molybdate method. R. C. WILEY

Ind. Eng. Chem., Anal. Ed. **3**, 127–9(1931).—$CaMoO_4$ is insol. in water, whereas $MgMoO_4$ is quite sol. Quantities of Ca ranging from 20 to 50 mg. can be sepd. from 12–70 mg. of Mg by treating the soln. (0.05 *N* in Ca, 0.075 *N* in Mg, or less) at the boiling temp. with a slightly ammoniacal soln. of NH_4 molydate (about 0.4 *N*), added dropwise. The pptn. of the Ca is complete if boiling is continued till the supernatant liquid is clear. The ppt. can be weighed as $CaMoO_4$ after drying at 130° for 30 min. The Mg can be detd. as $MgNH_4PO_4$ in the filtrate. W. T. H.

Potentiometric determination of iridium. Sho-Chow Woo and Don M. Yost. *J. Am. Chem. Soc.* **53**, 884–8(1931); cf. *C. A.* **25**, 1725.—The iodometric method, in which quadravalent Ir is reduced to the bivalent Ir by means of I^- in 0.1–0.2 *N* HCl and the liberated I_2 is titrated with $Na_2S_2O_3$, gives good results if benzene is used to show the end point. Good results are also obtained by direct titration with $TiCl_3$. The potentiometric end point is clear in 50 cc. of 0.1 0.2 *N* HCl if 2–3 g. of NaCl is added and the $TiCl_3$ is added slowly toward the last. Directions are given for prepg. chloroiridic and chloroiridous acids. W. T. H.

Method for the separation and gravimetric determination of osmium. Raleigh Gilchrist. *Bur. Standards J. Research* **6**, 421–48(1931).—Os, when present as chloride or bromide, can be pptd. completely as hydrated OsO_2 from boiling solns. of p_H 1.5–6.3. The presence of alkali chloride or sulfate does no harm. The marked tendency to spatter when the oxide is heated can be overcome by impregnating the ppt. with NH_4Cl. Os, when reduced in H_2 and cooled to room temp. in CO_2, remains unattacked by air for a long time. Os, when present as bromosmate or alkali osmate, can be volatilized completely as OsO_4 by boiling in 10% HNO_3. When present as chlorosmate, it cannot be eliminated easily in this way, but from concd. H_2SO_4 near its b. p. the OsO_4 can be distd. off from the latter compd. but less readily from the former compds. By a mixt. of H_2SO_4 and HNO_3 it is possible to effect complete volatilization from either type of compd. No RuO_4 is volatilized from 40% HNO_3 or from concd. H_2SO_4 alone, but from concd. H_2SO_4 contg. HNO_3 or from concd. HNO_3 alone RuO_4 is gradually volatilized A soln. of 6 *N* HCl satd. with SO_2 is a suitable reagent for receiving the distd. OsO_4. It is necessary, however, to evap. repeatedly with concd. HCl to decompose the Os sulfite compd. completely. The thiourea test for the detection of Os can be made sensitive to 0.02 mg. of Os in 100 ml. of soln. In the app recommended for the detn. of Os, all connections are of ground glass. The 700 ml. distg. flask carries a tap funnel in the neck, a glass tube extending to the bottom of the flask for the entrance of the gas, and a gas exit tube leading to a conical flask, contg. 150 ml. of 6 *N* HCl which has been satd. with SO_2. In this first receiver practically all of the OsO_4 is condensed, but for the sake of safety there are 2 other flasks provided, each contg. 50 ml. of the SO_2-HCl soln. Between the first and second flasks, a small tap funnel is fused into the gas line, through which addnl. HCl-SO_2 can be introduced if necessary. It was found necessary to keep the stopcock of this funnel greased, but otherwise no lubricant is advisable. To the soln. in the distg. flask, dild. if necessary with 100 ml. of water, add 40 ml. of 7.5 *N* HNO_3 and flush out the funnel with 10 ml. of water. Pass a slow current of air through the app. and heat the soln. to boiling. Distil for 1 hr. This should be sufficient to remove Os from alkali osmate or bromosmate, but 7–8 hrs. are necessary if chlorosmate is present. In this case it is better to distil from concd. H_2SO_4, or if Ru is absent, from concd. H_2SO_4 to which a little concd. HNO_3 has been added Unite the several portions of HCl-SO_2 and evap. on the water bath in an unetched beaker. Digest the residue with 10 ml. of concd. HCl for 15 min. and evap. a second time. Repeat the digestion and evapn. 3 times more. Take up the final residue in 150 ml. of water and heat to boiling. Add $NaHCO_3$ soln. until a ppt. appears and suddenly coagulates. Add bromophenol blue indicator and enough more $NaHCO_3$ soln. to impart a faint, bluish color to the soln. Boil 5–6 min., filter through a Munroe crucible and wash the ppt. with hot 1% NH_4Cl. Cover the washed ppt. with solid NH_4Cl, add a few drops of the wash liquid, and apply suction to get the NH_4Cl into the ppt. Wipe off the coating of NH_4Cl that comes through the crucible, cover with a Rose crucible lid of quartz and heat in H_2. At the end heat strongly for 10 min. and allow to cool in H_2, finally replacing with CO_2. Weigh as metallic Os. W. T. H.

New method for reduction of tin and antimony prior to titration. B. S. Evans *Analyst* **56**, 171–7(1931).—A soln. of 5 g. $NaH_2PO_2.H_2O$ in 6 *N* HCl, added to about 100 ml. of 6 *N* HCl contg. 0.002–0.05 g. of Sn and 1 cc. of satd. $HgCl_2$ as catalyst, will reduce all Sn^{++++} to Sn^{++} if boiled 15 min. in an atm. of CO_2. Then, by dilg. with 2.5 times as much of a boiled and cooled soln. of 10 g. citric acid, 0.4 g. KI and some starch, the Sn can be detd. by titration with standard I_2. Particular pains were taken to avoid all contact with air. The reduction of Sb to the tervalent condition takes

place with 5 min. boiling and without the use of any catalyst. Fe, Cu and As must be removed. The results obtained were excellent. W. T. H.

Determination of lead as chromate in presence of perchloric acid. D. J. Brown, Joseph A. Moss and John B. Williams. *Ind. Eng. Chem., Anal. Ed.* **3**, 134–5(1931).—$PbCrO_4$ is less sol. in dil. $HClO_4$ solns. than it is in dil. HCl or dil. HNO_3. Directions are given for carrying out the gravimetric and volumetric detn. of Pb as $PbCrO_4$, after first removing HCl and HNO_3 by evapn. with $HClO_4$, and 24 results obtained with a 0.5 g. sample of a certain ore contg. 82.04% Pb showed 81.55–82.04%. W. T. H.

Photoelectric microanalysis. Mototarō Matsui and Tōkiti Noda. *J. Soc. Chem. Ind., Japan* **33**, Suppl. binding 517–8(1930).—Cu in Cu-NH_3 soln. can be detd. by measuring with a photoelec. cell the amt. of light transmitted through such a soln. The light source was an incandescent lamp. The thickness of the Cu-NH_3 soln. was 12 cm. If I is the current from the photo-elec. cell when the Cu-NH_3 soln. is in the light path, and I_0 the current when H_2O is substituted for Cu-NH_3 soln., a quant relation exists between I_0-I or $log(I_0/I)$. The photoelec. current was reduced 73.5% when a 0.00063 N Cu-NH_3 soln. was substituted in the cell by H_2O. An accuracy of about 5% was possible. The photoelec. cell used was of the A-filled Cs type. The tension was 80 v. in series with a 5 megohm protector. E. M. Symmes

Detection of cadmium. J. Stanton Pierce and W. T. Forsee. *Ind. Eng. Chem., Anal. Ed.* **3**, 188–9(1931).—Instead of using KCN or Fe powder before testing for Cd in the usual qual. scheme, it is recommended to boil the neutral or slightly acid soln. for 3–5 min. with 1–5 g. of fine Ni powder which serves to reduce the Cu. Then, after filtering, a soln. is obtained which can be tested for Cd by adding AcOH and H_2S. W. T H.

Detection of zinc and cadmium by the cyanide method. N. A. Tananarv and N. S. Fedulov. *Ukrainskii Khem. Zhurnal* **5**, Sci. Pt., 213–6(1930).—To a soln. of the substance add a considerable excess of NH_4OH, heat and filter. If Mn is present add H_2O_2 and filter. To the filtrate add a soln. of KCN until the colors due to Ni, Co and Cu disappear. Add Na_2S and heat. Wash the ppt. 3 or 4 times with water. A white ppt. which completely dissolves in an excess of KCN indicates the presence of ZnS_2 alone. If the ppt is yellow, CdS is present alone or in conjunction with ZnS. To establish this fact add an excess of KCN and acidify the soln. with AcOH. A white ppt. or turbidity indicates the presence of ZnS. There is some incomplete exptl. evidence to show that the method works in the presence of Pb and Sb when the NH_4OH added is not too strong. B. S. Levine

Qualitative tests for zinc, copper and silver. A. Sergeev. *Ukrainskii Khem. Zhurnal* **5**, Sci. Pt., 227–9(German abstract 230)(1930).– Add a few drops of concd. NaOH and some pulverized Al to the soln., and stir with a glass rod. A change in color and a swelling of the Al particles indicate the presence of Zn. To a neutral or slightly ammoniated soln. of the substance add some Hg. Formation of gray or silvery needle-like crystals indicates the presence of Ag. Heat the end of a narrow glass test tube and apply to a drop of the soln. to be tested. Heat the end of the tube for about 2 min. in the lower part of a Bunsen flame. A copper-orange filament is formed if Cu is present. B. S. Levine

Pyrognostic assaying of platinum and palladium. Herculano Calmon. *Rev. brasil. chim.* **1**, 84–5(1929).—C. describes his method for the detection of Pd and Pt, which is based on the incandescence that is observed in the ashes of the filter paper or in asbestos threads that have been impregnated with the salt to be investigated, heated to a red heat and put in the flame of illuminating gas, alc. vapors or a mixt. of EtOH and sulfuric ether. Working on a metallic web is recommended. The reaction is very sensitive. John M. Ladino

New method for the titration of iron according to J. Knopp. Otto Rothe and Aggêo Pio Sobrinho. *Rev. brasil. chim.* **1**, 129–49(1929).—For detg. Fe^{++}, the following conclusions are drawn: The use of diphenylamine indicator with dichromate is superior to the use of permanganate. The metals of the second group must be removed with H_2S, especially As and Sb. Min. quantities of Cu cause no error. Colloidal silica or other metals such as Hg and Sn need not be removed. Colloidal Pt caused by fusion of the oxide in a Pt crucible is harmful, making the use of permanganate necessary. A Ag crucible is to be preferred. Care must be taken not to reduce any AgCl, the reduction of which takes place quite readily. John M. Ladino

Determination of aluminum oxide in aluminum and its alloys. A. M. Shandorov. *Tzvetnuie Metallui* **1930**, 672–9; *Chimie & industrie* **25**, 37(1931).—S. verified the accuracy of the Cl-gas method, using a gas-heated, transparent quartz tube so as to follow the reaction, which is strongly exothermic and requires careful regulation of the

heating and Cl feed. It is essential that the Cl be free from O_2 and water. After the chlorination, the boat is ignited at 1000° to burn the C. The analysis requires about 1 hr. S. found 0.07–0.10% Al_2O_3 in com. Al and 0.07–0.21% in duralumin.
A. PAPINEAU-COUTURE

Analysis of metal containing copper. I. Analysis of copper. H. ARAI, C. UYETSUKI AND S. TACHIBANA. *Repts. Imp. Ind. Research Inst., Osaka, Japan* **11**, No. 15 (1930).—The procedure for the electrolytic detn. of Cu is given. F. I. NAKAMURA

Supplement to the new iodometric method for determining vanadium in alloy steels and in ferro-vanadium. W. WERZ. *Z. anal. Chem.* **83**, 161–4(1931); cf. *C. A.* **25**, 51.—For the decompn. of excess $(NH_4)_2S_2O_8$, 15 min. is inadequate, but 30–35 min. should suffice. The reaction between Fe^{+++} and I is so slow in the presence of H_3PO_4 that as much as 3 g. Fe liberates I_2 corresponding to not more than 0.2 cc. of 0.05 *N* $Na_2S_2O_3$ when 0.2–0.3 g. of KI is added; with 1–2 g. of KI about twice as much I_2 is liberated. When oxalic acid is present, more I_2 is set free. With highly alloyed steels, this effect is less, and by keeping the concn. of the H_3PO_4 soln. low, the interference of Mn is lessened and the addn. of oxalic acid is unnecessary. There is, on the other hand, no danger of any Cr being oxidized by the persulfate when Ag ions are absent. When the Cr is high in an alloy steel, the Cr carbide should not be removed until after the oxidation with HNO_3. If this carbide is not removed, it will tend to reduce vanadate later in the analysis. The persulfate should not be added until the nitrous fumes have all been boiled off from the soln. The procedure as modified is as follows: Dissolve 1–3 g. of steel in a 500-cc. Erlenmeyer flask in 25 cc. of H_3PO_4 (*d.* 1.70) and 200 cc. of water (10–15 min.). Oxidize with concd. HNO_3 and add 5 cc. in excess. Boil a few min. to remove nitrous fumes. Filter off any undissolved carbide. Add 10 cc. of 5% $(NH_4)_2S_2O_8$ soln. and boil 35 min. Add 25 cc. more of H_3PO_4, cool to room temp., add 2–10 cc. of 0.2 *N* KI soln., shake well and after 5 min. titrate with 0.05 *N* $Na_2S_2O_3$ in a vol. of about 200 cc. W. T. H.

Use of microanalysis in the streak test [for precious-metal alloys]. R. STREBINGER AND H. HOLZER. *Mikrochemie* [N. S.], **2**, 264–70(1930).—The streak test is made on a roughened depression in a microscope slide. When the alloy is chiefly Ag, the streak is dissolved in HNO_3 on the slide, and the Ag is pptd. as chloride and removed by centrifuging. The filtrate is evapd to dryness, the residue dissolved in water, and 1 drop of K mercurithiocyanate soln. is added; green crystals indicate the presence of Cu and brown crystals the presence of Cd. For the examn. of a Au streak it is dissolved in aqua regia, the metals are pptd. as sulphides by passing H_2S through the soln. from a capillary tube, and the ppt. is collected in a microcentrifuge, washed, digested with $(NH_4)_2S$ to remove the Au, and dissolved in HNO_3. Min. drops of the soln. are tested for Pb by addn. of AcOK and KNO_2 (triple K Pb Cu nitrite pptd.) for Bi with K sulfate (double sulfate pptd.), for Pd with dimethylglyoxime in AcOH, for Ni with the same reagent and NH_3, for Co, Zn and Fe with NH_4 mercurithiocyanate, and for Al with alizarinsulfonic acid. Pt streaks may be similarly tested for the presence of Cu, Pd and Ag; Au is detected by the purple of the Cassius test. B. C. A

Titrimetric determination of small quantities of ammonia, with particular attention to water analysis. S. KÜHNEL HAGEN. *Z. anal. Chem.* **83**, 164–75(1931).—An app. is shown which is suitable for the detn. of free NH_3 in water. One of the principal advantages lies in the avoidance of rubber stoppers and rubber connectors and in the use of a quartz condenser tube. The NH_3 is caught in a measured vol. of $^1/_{140}$ *N* HCl and the excess titrated with NaOH of the same concn. against an indicator of a 0.01% soln. of methyl red and 0.04% soln. of bromothymol blue in 96% alc. For the detn. of albuminoid NH_3, it is recommended to heat with H_2SO_4 0.1 g. graphite, 0.75 g $HgSO_4$, 1.00 g. $CuSO_4.5H_2O$ and some K_2SO_4, and finally to add Na_2S and NaOH and distil. By the app. and method described, 0.1–0.3 mg. of NH_3 can be detd. with an accuracy of about 5%. W. T. H.

Indirect determination of magnesium carbonate in the presence of calcium carbonate. G. A. PANCHENKO. *Ukrainskii Khem. Zhurnal* **5**, Sci. Pt., 187–95(1930).—Dissolve a weighed sample in an excess of standard acid and titrate the excess. Now add an excess of standard oxalic acid and titrate the excess of the oxalic acid with $KMnO_4$. B. S. LEVINE

The estimation of sodium carbonate in sodium bicarbonate. A. K. BABKO. *Ukrainskii Khem. Zhurnal* **5**, Sci. Pt., 197–206(1930).—When the % of soda in the bicarbonate exceeds 3–4%, it can be detd. by titration against phenolphthalein, if a pure soln. of $NaHCO_3$ and an equal amt. of the indicator are used as a control, or by the method of Simpson with a mixt. of 6 parts of bromophenol blue and 1 part of cresol red

as indicator. If the Na_2CO_3 content is below 3%, a colorimetric detn. is better.
B. S. LEVINE

The oxalate method for the analysis of potassium thiocyanate using the borax titer. N. A. TANANAEV AND N. A. LAZARKEVICH. *Ukrainskii Khem. Zhurnal* **5**, Sci. Pt., 209-12(1930).—By means of the oxalate method, convert KCNS into K_2CO_3 and titrate the latter with acid soln. standardized against borax. B. S. LEVINE

Determination of phosgene. J. C. OLSEN, GEORGE E. FERGUSON, VICTOR J. SABETTA AND LEOPOLD SCHEFLAN. *Ind. Eng. Chem., Anal. Ed.* **3**, 189-91(1931).—Four methods for detg. $COCl_2$ have been studied: (1) absorption in alc. soln. of NaOH and subsequent titration of chloride or of excess NaOH, (2) absorption in ammoniacal $AgNO_3$ soln. and weighing of the AgCl formed after neutralizing with HNO_3, or titration of excess Ag, (3) absorption in a satd. soln of aniline and weighing of the resulting diphenylurea, (4) passing of the $COCl_2$ through a 2% soln. of NaI in acetone and titration of the liberated I_2. Methods (3) and (4) were found reliable in studying decompn. products of CCl_4 mixts. and in samples of $COCl_2$ contg. other Cl compds.
W. T. H.

The separation of phosphoric acid as bismuth phosphate in quantitative analysis. A. KEŠĀNS. *Acta Univ. Latviensis Kim. Fakult. Serija* **1**, No. 4 5, Fasc. 2 Burtnica (in German 121-6)(in Lettish 65-121(1929)).—At room temp., a satd. soln. of $BiPO_4$ in 0.25 *N* HNO_3 contained 0 6 mg. of P_2O_5 in 100 cc. A 0.5 *N* HNO_3 soln. under the same conditions dissolves 2.4 mg. of P_2O_5. In the presence of the halogen or sulfate ions, the soly. increases, because a portion of the $BiPO_4$ becomes basic BiOX or $Bi_2O(OH)_2 \cdot SO_4$. This difficulty can be overcome by using solid $BiONO_3$ as the precipitant. The sepn. is so complete that only 0.1 mg. of P_2O_5 in 100 cc. of the soln. remains. The main pptn. is carried out in a 2 *N* or 5 *N* HNO_3 (either hot or cold) by adding the solid $BiONO_3$ and diluting to a strength of 0.5 *N*. The mixt is warmed for 6-8 hrs. on a water bath and allowed to cool until the next day. This insures greater pptn. The cations Ca and Sr should not be present in amts. greater than 70 mg /100 cc of diluted soln., and the other cations, Na, K, Mg, Ba, Zn, Mn, Co, Ni and Fe, in concn. greater than 100 mg./100 cc. of soln RUSSELL C. ERB

A new method for the optical determination of atmospheric ozone. ANDRE I. DUNINOWSKI. *Compt. rend.* **191**, 859 61(1930).—By use of a galvanometer sensitive to 10^{-9} amp., with photographic registration, the distribution curve of solar energy was recorded between 4860 and 12,000 A. U. on several days from August to December, 1929. In interpreting the results it is necessary to consider at some definite wave length the intensity, *I*, the mass of air traversed, *M*, and the atm. d , Δ: colog I = colog $I_0 + m\Delta$. The ozone is detd. in 4 min , and 10 15 detns. should be made at one time, as atm. changes during a series of measurements were the principal source of error. The work was done at Montpelier. The value of *e* varied from 0.20 to 0.36 cm.
GERALD M. PETTY

New method for determining carbon monoxide by combustion with oxygen in the presence of a new catalyzer of two substances. ALBERT SCHMIDT. *Z. angew. Chem.* **44**, 152-5(1931).—I_2O_5 is commonly used for the oxidation of CO but is not very stable at the necessary temp.; it tends to retain the liberated I_2, and but 1 mol. of I_2 is formed by the action of 5CO. Combustion of CO to CO_2, by passing the dry gas over CuO at 300–400°, is always more or less incomplete without a catalyst, but if 1 2 mm. quartz grains are moistened with $Cu(NO_3)_2$ and then ignited, a layer of fine CuO on SiO_2 is obtained which converts CO to CO_2 very efficiently. The SiO_2 tends to adsorb CO, the CuO adsorbs O_2 and the catalyzer does not retain the CO_2 formed, which can be absorbed in $Ba(OH)_2$ soln. An app. is shown which is suitable for detg CO and in which the reaction tube is heated electrically. At the end of the process the excess $Ba(OH)_2$ is titrated. W. T. H.

Determination of hydrochloric acid in the presence of hydrobromic and hydriodic acids. G. G. LONGINESCU AND TH. I. PIRTEA. *Bul. chim. soc. română stiinte* **31**, No. 4/6, 77 87(1930); cf. *C. A.* **25**, 894.—The method described depends upon first pptg. with $AgNO_3$ in dil. HNO_3 and weighing the ppt. This gives the wt. of AgCl together with AgBr and AgI. In a second portion of the same size, the ppt. is kept as far as possible in the beaker and washed by decantation to remove all excess Ag. The ppt. is then heated with 50 cc. of 7-8% NH_3 soln. and treated with a soln. of KBr or HBr, whereby any chloride of Ag is converted into AgBr. This ppt. is also weighed. Finally, when all 3 halides are present, a similar treatment is given to the ppt. except that KI is added after the treatment with NH_3 soln. In this case, the total halide content is detd. as AgI. The purpose of the NH_3 treatment is to dissolve all the AgCl

and part of the AgBr, whereby the KBr or KI soln. becomes more effective in accomplishing the desired conversion. W. T. H.

Microdetermination of the calcium ion. MOUSSERON. *Bull. soc. chim. biol.* **12,** 1014(1930); cf. *C. A.* **25,** 1458.—Ca is pptd. as the salt $K_2CaNi(NO_2)_6$ from which N is reduced to NH_3 and detd. by titration. The amt. of Ca can then be calcd. Fe, Mg, Al, etc., cause less interference in this method than in the tungstate method. From 0.3 to 1.0 mg. Ca can be detd. C. G. KING

A new reagent for fluorides. CAMILLO PERTUSI. *Atti III congresso naz. chim. pura applicata* **1930,** 573-5.—The reagent consists of a soln. of benzidine acetate prepd. from 1.84 g. benzidine, a little concd. HOAc and distd. H_2O to make up to 500 cc., and a 0.02 *N* Hg succinimide soln., mixed in equal parts. The reaction is quite evident with a drop of 0.05 *N* alkali fluoride or 0.00004 g. of HF. The compn. of the ppt. in a complex mol. of 2 mols. of $HFH_2NC_6H_4C_6H_4NH_2HF$ and 1 mol. of HgF_2. E. M. S.

Detection of bromides by the drop method. A. V. PAVLINOVA. *Ukrainskii Khem. Zhurnal* **5,** Sci. Pt., 231(German abstract 232)(1930).—The method is based on the fact that pernitric acid, formed by the interaction of H_2O_2 and HNO_2, liberates Br from bromides. The Br gives a pink color with eosin or fluorescein. The reaction is sensitive to 1:12,500. Chlorides do not interfere with the reaction. Iodides do, but they can be removed with $Na_2S_2O_3$. B. S. LEVINE

Conductometric titration of sulfate and barium. I. M. KOLTHOFF AND TOHRU KAMEDA. *Ind. Eng. Chem., Anal. Ed.* **3,** 129-33(1931).—In the conductometric titration of $ZnSO_4$ with $BaCl_2$ the end point is very poor unless about 30% of alc. is added. In all cases, however, the titration curve bends before the equivalence point is reached. Similar results were obtained in titrating sulfates of K, Na and Li with $BaCl_2$ as well in the reverse titration of $BaCl_2$ with alkali sulfate solns. The end points are reproducible, however, to within about 1% of the Ba or SO_4 content, so that the conductometric method will be useful in the analysis of very dil. solns. The errors are smallest with Li_2SO_4. The cond. of the soln. in the presence of $BaSO_4$ ppt. is greater than when the ppt. is removed, possibly because of the charge residing on the $BaSO_4$ in suspension and because of its influence on the cell const. W. T. H.

Determination of nitrite and sulfite in the presence of one another in salt mixtures and in meat products. E. SZABÓ. *Z. Untersuch. Lebensm.* **60,** 389-95(1930).—The salt is dissolved in a little H_2O, Na_2CO_3 is added and the sulfite pptd. by a cold soln. of $Pb(OAc)_2$. The mixt. is dild. to a known vol., filtered, and an aq. portion taken for the colorimetric detn. of the nitrite by means of *m*-phenylenediamine. The ppt. is washed with cold H_2O, suspended in cold boiled H_2O and the SO_2 detd. by acidification and distn. in a stream of CO_2. Or, the sample may be dissolved in a dil. soln. of $NaHCO_3$ and the SO_2 detd. by the addn. of a slight excess of 0.1 *N* I soln. with back titration with $Na_2S_2O_3$. The air is then removed by a stream of CO_2 and the soln acidified with 1 cc. of 0.1 *N* H_2SO_4, and after 1 min. without disturbance, the free I is titrated with $Na_2S_2O_3$. The stream of CO_2 serves to mix the 2 solns. KI should be added in the second titration only if the amt. of nitrite is in great excess. A max error of approx. ±1 mg. for both detns. was found in solns. of mixts. contg. 65-100 mg. of Na_2SO_3 and 25-100 mg. of $NaNO_2$. Meat samples are extd. with $NaHCO_3$, and the ext. should be free from substances which may interfere with the iodometric titration. C. R. FELLERS

The determination of the sulfite ion in the presence of the thiosulfate ion with the aid of fuchsin. V. E. MALINOVSKII. *Ukrainskii Khem. Zhurnal* **5,** Sci. Pt., 181-6 (1930).—Dissolve 0.34 g. fuchsin in 1 l. of water contg. 1 g. of H_2SO_4 and heat slightly on a water bath. Make a satd. aq. soln. of the substance and dil. 16 times; add 1 drop of 1% phenolphthalein indicator and, if the soln. is alk., carefully neutralize with 0.1 *N* AcOH. To 10-15 cc. of the neutralized soln add a few drops of the fuchsin reagent. Decolorization within the first few min. is a certain indication of the presence of the SO_3^{--} ion. Under the conditions outlined the presence in the soln. of the $S_2O_3^{--}$ ion does not interfere with the reaction. B. S. LEVINE

Determination of ammonium salts by the formaldehyde method. ERMENEGILDO SORRENTINO. *Atti III congresso naz. chim. pura applicata* 552-6(1930).—Five cc. of neutral 40% CH_2O and a few drops of phenolphthalein are added to 20-5 cc. of the NH_4 salt soln., and the mixt. is titrated with 0.2 *N* $Ba(OH)_2$ until a color persists. Results agree well with the theory. Urea, dicyandiamide and guanidine do not interfere. E. M. SYMMES

The simultaneous test for thiocyanate and ferrocyanide anions by the drop method. A. V. PAVLINOVA AND T. N. BAKH. *Ukrainskii Khem. Zhurnal* **5,** Sci. Pt., 233(German abstract 234)(1930).—Place a drop of $FeCl_3$ on a piece of filter paper, follow by a drop

of H_2SO_4 and finally by a drop of the soln. to be tested. In the presence of both anions a central blue spot of Prussian-blue is formed surrounded by a red ring formed by the $Fe(CNS)_3$. B. S. LEVINE

The effect of the nature of the paper upon the sensitiveness of the drop method. A. V. PAVLINOVA AND T. N. BAKH. *Ukrainskii Khem. Zhurnal* **5**, Sci. Pt. 235(German abstract 236)(1930).—Ash-free paper enables one to detect the presence of $K_4Fe(CN)_6$ in $N/8445$ soln., while on ordinary paper the test is sensitive only to $N/5000$ soln. B. S. LEVINE

Poisoning by mercury oxycyanide. A. SARTORI. *Chem.-Ztg.* **54**, 813–4(1930).—An analysis of the viscera, performed 3 months after death, failed to detect the presence of HCN, but showed Hg. A. L. HENNE

Absolute determination of nitrogen in organic compounds. Pregl's micro-method. OTTO R. TRAUTZ AND JOSEPH B. NIEDERL. *Ind. Eng. Chem., Anal. Ed.* **3**, 151–2(1931).—The accuracy of the micro-Dumas method for dctg. N can be increased by using measured vols. of CO_2 and of CuO, applying empirical corrections for air and absorption errors, allowing for adhesion to the walls and taking into consideration the vapor pressure of the KOH soln. over which the N_2 is measured. Detailed directions are given for carrying out an analysis with a few mg. of sample. Thus in one analysis of toluamide the value 10.33% N was obtained, which is correct within 4 parts in 1000 although the observed vol. of N_2 obtained was only 0.321 cc. and the calcd. corrections were 0.012 cc. W. T. H.

A micro-method for the determination of carboxyl groups in organic acids. SHUNJI TSURUMI AND YASABURO SASAKI. *Science Repts. Tôkohu Imp. Univ.*, 1st. Ser., **19**, 681–8(1930).—The carboxyl group in org. acids is detd. within an error of 1% on 2–5-mg. samples by a procedure based on that described by Hunter and Edwards (*C. A.* **7**, 2189). The app. consists of a train, a decompn. vessel, an air chamber and a micro-buret (Flaschentrager, *C. A.* **19**, 3230) in series. The train contains the usual elements for producing pure H_2S. The decompn. vessel (55 mm. × 14 mm. diam.) has an inlet tube reaching the bottom, an outlet tube at the top and a side arm. A curved spatula, which may be rotated, is introduced through a stopper in the side arm. The air chamber is water-jacketed and has 2 2.5-cc. bulbs and a 5-cc. bulb in series. Capillary tubing and stopcocks are used throughout. Charge the decompn. vessel with 1 cc. of carbonate-free NaOH and weigh the sample on a 7-mm. watch glass and support it on the spatula. Sat the NaOH with H_2S from the train and shake to remove excess. Bring the system to atm. pressure and connect it to the buret. Spill the sample by turning the spatula, shake the decompn. vessel till no more gas is evolved and measure the displaced air over water in the buret. A. F. SHEPARD

Analysis of mixtures of hydrogen, methane and ethane. OSWALD J. WALKER AND SOORYA NARAYAN SHUKLA. *J. Chem. Soc.* **1931**, 368–70.—A Töpler pump is connected by means of a 3-way cock to a U-tube which can be cooled by immersion in a bath of liquid air for the removal of the C_2H_6; it is also connected to bulbs contg. "oxidized" Pd sponge for the removal of H_2. The procedure consists, therefore, in condensing the C_2H_6 and measuring the contraction, adsorbing the H_2 by Pd and detg. the CH_4 by difference or by explosion. W. T. H.

Detection of glycerol. M. TRONCOSO SERANTES. *Rev. centro estudiantes farm. bioquim.* **18**, 221–3(1929).—Denigès' method (*C. A.* **22**, 136) and Sanchez' procedure are modified by the use of BaO_2 instead of PbO_2 or MnO_2, as oxidizing agent. B. C. A.

Reactions of glycerol and calcium glycerophosphate. LAD. EKKERT. *Pharm. Zentralhalle* **72**, 85–6(1931).—Various color tests are discussed in connection with the detection of glycerol, notably that involving the use of codeine and concd. H_2SO_4. It appears unnecessary first to oxidize the glycerol to glyceraldehyde or dihydroxyacetone, since by simply putting a layer of concd. H_2SO_4 beneath an aq. soln. of glycerol and codeine a blue or violet color develops. An aq. soln. of Ca glycerophosphate shows like behavior. W. O. E.

Detection of isopropyl alcohol in brandy, spirits, tinctures, cosmetics and liniments by means of piperonal. G. REIF. *Z. Untersuch. Lebensm.* **60**, 243–54(1930); cf. *C. A.* **23**, 5542.—Twenty-five brandies, 40 cosmetics, 124 liniments and various samples of spirits, tinctures, etc., were examd. by the following improved technic: Ten cc. of the sample is distd. on the water bath into a small cylinder immersed in ice water until no more alc. is evolved, 0.3 cc. of the distillate is shaken with 0.7 cc. of a mixt. of 80 cc. of abs. alc. and 20 cc. of H_2O, and a soln. of 0.1 g. of $NH_2OH.HCl$ in 3 cc. of water is added. The mixt. is shaken for 3 min. at room temp., 0.4 g. of absorbent charcoal is added and the mixt. is shaken and filtered through a small dry paper into a 100-cc. round-bottomed flask. Five cc. of a freshly prepd. soln. of 0.5 g. of piperonal in 100 cc. of abs. alc. is added,

followed by the slow addn. of 20 cc. of H_2SO_4, sp. gr. 1.84. The mixt. is shaken and placed on the water bath for 5 min. in a large test tube; a red color indicates the presence of isopropyl alc., and a green-brown color its absence. If 30 cc. of 30% AcOH is added, a stable rose-red color is a pos. reaction; a brown color indicates the presence of a small quantity of the alc.; a colorless soln. or weak red tinge stable for a min. and turning yellow-gray or colorless shows a definite reaction. The sensitiveness of the reaction is 1–2% for most substances but is delicate to 0.1% with liniments. In the latter, CH_2O, if present, must be removed before distn. by heating the sample with 5 cc. of NaOH soln., sp. gr. 1.125, under a reflux condenser for 1 hr. Concns. of acetone less than 20% have no harmful effect on the reaction. C. R. FELLERS

Colorimetric determination of the tyrosine and tryptophan contents of various crude protein concentrates. WM. D. MCFARLANE AND HUGH L. FULMER. *Biochem. J.* **24**, 1601–10(1930).—The detns. were based on the method developed by Folin and Ciocalteu (*C. A.* **21**, 3210). The tyrosine (ty.) and tryptophan (tr.) contents in one series of expts. were as follows:

	Ty.%	Tr.%
Caseinogen	7.59	1.54
Buttermilk powder	6.36	1.25
Meat meal	3.02	0.95
Tankage	2.42	0.88
Cod-liver meal	..	0.77
Fish meal	2.92	1.38

BENJAMIN HARROW

The separation of Be and Al oxides (TRAVERS, SCHNOUTKA) **6.** Technic of extracting liquids that form emulsions (WEINBERGER) **2.** Apparatus for electrical tests to identify various materials (U. S. pat. 1,793,970) **4.**

JOUNIAUX, ALCIDE. **Leçons de chimie analytique.** Paris: Hermann et Cie. 350 pp. F. 60

MERCK, E.: **Prüfung der chemischen Reagentien auf Reinheit.** 4th ed. Darmstadt: Merck. 401 pp.

Determining monatomic substances in gases, particularly mercury vapor in air. SIEMENS & HALSKE A.-G. (Otto Krenzien, inventor). Ger. 517,480, Sept. 13, 1928. The method depends on the detn. of the intensity of the resonance effect produced when a beam of light, the spectrum of which includes a "resonance line" of the spectrum of the element to be estimated, is directed through the gas in which the element is to be detd. and then into a vessel also contg. the vapor of the element.

8—MINERALOGICAL AND GEOLOGICAL CHEMISTRY

EDGAR T. WHERRY AND J. F. SCHAIRER

The formation of calcite crystals by slow precipitation of calcium salts in water by ammonia. J. HENRION. *Ann. soc. geol. Belg.* **53**, B40–1(1929).—A flask of tap water connected by an overhead glass tube to a flask of concd. NH_3 pptd. calcite, identified petrographically, on 4 months' standing. R. H. EWELL

The precipitation of calcium carbonate in dilute solutions. F. CORIN. *Ann. soc. geol. Belg.* **53**, B64–6(1930).—Referring to Henrion's paper (preceding abstr.), C states the present status of the subject, and cites the work of several earlier investigators. R. H. EWELL

The deposit of cerite in Kystym district. V. ZILBERMINTZ. *Trans. Inst. Econ. Mineral* (Moscow) No. **44**, 41–2; cf. *C. A.* **24**, 4243.—Assocd. with parisite there has been found another mineral, differing in all its properties but closely connected genetically. It contains about 19% SiO_2, 11% CaO and 64% Ce, La and "Di" oxides. It approaches cerite in optical properties and compn. but is purer than Swedish cerite. H. C. PARISH

Radioactive mineral found in Japan. SATOYASU IIMORI, JUN YOSHIMURA AND SHIN HATA. *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) **15**, No. 285, 83–8(1931). A radioactive mineral has been found in the Bijozan Range, in black prismatic crystals about 6–7 mm. long, with a resinous luster and a hardness of 5.5. The powder and the streak are brown. It is easily decomposed by HCl, leaving a white flocculent residue

It is a new species belonging to the epidote group, and the name *nagatelite* is suggested. Its radioactivity is thought to be due to a small quantity of Th. An intensively radioactive mineral was found in a biotite crystal. It gave a qual. test for U. Laterite and lateric clays were also found. Analyses of some of the minerals are given.
L. D. ROBERTS

A variety of uranotile from Chinkolobwe (Katanga). J. THOREAU. *Ann. soc. geol. Belg.* **53,** B60–4(1930).—A sample of pitchblende was encrusted with a thin layer of yellow radiating needles with black opaque inclusions, weakly dichroic, with parallel extinction, + elongation, $n_g = 1.703$, $n_p = 1.632$. The d. is greater than 3.3. Analysis gave: volatile matter (H_2O) 15.4, insol. matter (SiO_2) 6.8, UO_3 73.1, CaO 7.4%. This corresponds roughly to $SiO_2 \cdot 2UO_3 \cdot CaO \cdot 6H_2O$. The mineral dissolves in cold concd. HCl with evolution of a gas, and if heated the black inclusions also dissolve. The black mineral may be uraninite. There is also another yellow, fibrous mineral on the pitchblende with somewhat different properties (n_g less than 1.676), which may be another variety of uranotile.
R. H. EWELL

Sorption of gas by minerals. II. Laumontite. JITSUSABURO SAMESHIMA. *Bull. Chem. Soc. Japan* **5,** 303–10(1930).—Laumontite ($CaAl_2Si_4O_{12}\ 4H_2O$) sorbs NH_3, but not CO_2. The sorption data are tabulated and presented in curves. The dryness of the mineral has an important influence. NH_3 combines chemically with the dehydrated mineral.
ALBERT L. HENNE

The presence of apatite in the Upper Cambrian rocks of Neuville. Note on the optical study of weakly birefringent minerals. F. CORIN. *Ann. soc. geol. Belg.* **53,** B66–8(1930).—After considerable difficulty, C identified apatite as an accessory constituent of these rocks. The birefringence is only 0.0015.
R. H. EWELL

Contribution to the mineralogy of the coal fields. M. BELLIERE. *Ann. soc. geol. Belg.* **53,** B125–39(1930).—The mode of occurrence in various coal-mining regions of Belgium is described for the following minerals: S, sal-ammonite, ankerite, quartz, pholerite, pyrite, chalcopyrite, sphalerite, galena, calcite, dolomite, gypsum and aragonite. Crystallographic data and chem. analyses are given.
R. H. EWELL

Petrographical description of the Sadon mine. E. A. KUZNETZOV. *Trans. Inst. Econ. Mineral* (Moscow) No. **46,** 3–53(1930). The aplite veins are adapted to a transverse system of cracks, which are parallel to a more recent thrust. The same direction was followed by keratophyres at a later period. After a long period of rest accompanied by the destruction of granite and deposition upon it of sedimentary rocks, new movements produced new cleavages, along which flowed the overlying keratophyres. Then, after another period of relative rest, a new fracture occurred in the same region, where granite, porphyry and sedimentary formations were caught by the movement and ground up. Simultaneously ore-bearing solns. rose from their original depth reservoir. The granite was crystd. under the influence of its own gas phase. Apparently the hydrothermal solns. were rather hot at first. Later they cooled and the main manifestation of their force is to be seen in silication, sericitization, chloritization and carbonatization of adjacent rocks.
H. C. PARISH

Mineralogy of the Sadon ore vein. E. E. ZAKHAROV. *Trans. Inst. Econ. Mineral* (Moscow) No. **46,** 54–152(in English) 153–4(1930).—The Sadon deposit of Pb-Zn ore showed galena, sphalerite, pyrite, chalcopyrite, pyrrhotite, arsenopyrite and molybdenite, of the gang minerals quartz, carbonates, chlorite, muscovite and a mineral of the gummite series. A series of the minerals smithsonite, cerussite, malachite, azurite, gypsum and Pb oxide has also been discovered. Z. notes: breccia structures, imbricated and banded structures, a thick network of ore-bearing veinlets, a thick ore-inclusion and structureless formations.
H. C. PARISH

Magnesite: its application in assaying. R. J. B KETHEL. *J. Chem. Met. Mining Soc. S. Africa* **31,** 172–5(1931); cf. *C. A.* **24,** 5256.—Discussion.
ALDEN H. EMERY

Asbestos deposits in the Union. A. L. HALL. *S. African Mining Eng. J.* **41,** II. 423–4(1930), 487–8(1931).—The Union of South Africa contains asbestos deposits of very considerable extent. It is the leading crocidolite producer. The following fiber varieties occur in the Union: amosite, crocidolite, chrysotile, anthophyllite, tremolite. The occurrences of each are described.
ALDEN H. EMERY

Petrology of chrysotile asbestos deposits of the Krasno-Uralsky asbestos mine in the Ural Mountains. V. V. ARSHINOV AND B. YA. MERENKOV. *Trans. Inst. Econ. Mineral* (Moscow) No. **45,** 1–83(1930).—The asbestos is graded according to fiber length as follows: grade I about 16 mm.; grade II, 12 mm.; III, 8.5 mm.; IV, 4 to 2 mm.; VI, 2 to 0.5 mm. It is believed that the serpentines of this region have been derived from saxonites under the simple influence of water. Other basic rocks encountered in small quantities are schlieren of pyroxenite, a mono-mineral rock formed by diopside.

The serpentinization of saxonites is developed along the fissures as ribbons of serpentine. As this process goes on, the grain size diminishes until the whole rock is altered into serpentine. The characteristic types of asbestos ribboning are represented by the following varieties: (1) bordered asbestos, (2) fine asbestos veinlets branching, (3) fine asbestos parallel sets. A. believes all of these rocks to be products of the differentiation of diorite intrusive bodies. The absence of granite pegmatite dikes is characteristic for the asbestos deposits of the Krasno-Uralsky mine. H. C. PARISH

A new deposit of plastic clay. L. NYS. *Ann. soc. geol. Belg.* **53,** B77–8(1930).—The deposit is at Grosses Pierres. Analysis gives: SiO_2 73.08, Al_2O_3 19.97, Fe_2O_3 1.78, CaO 0.10, MgO 0.06, loss on heating 4.30%. There are inclusions of yellow sand and small amts. of andalusite, zircon, magnetite and tourmaline. R. H. EWELL

Studies on the moisture adsorbed by the Kanbara clay. HAJIME ISOBE. *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) **14,** 229–74(1930)(in English).—In certain deposits of Kanbara clay the upper layers are acid, the middle layer is neutral and the lower alk. Neutral clay can be prepd. from either the acid or the alk. clay by washing with distd. water. Acid and alk. clays show different vapor-pressure curves, but the curves of the natural neutral clay, clay artificially neutralized with acids or alkalies and clay made neutral by washing with distd. water, have practically the same characteristics at the same temp. The water adsorbed by special capillary action ranges from 20 to 35%, while that due to true adsorption of the surface of the clay is about 2 to 18%. On the basis of x-ray studies the formula $[Al(SiO_4SiO_2)_3]MgH_2O$ is advanced for the clay. K. D. JACOB

The translucent and opaque diamonds of the Bushmaie deposits. EDMOND POLINARD. *Ann. soc. geol. Belg.; Publ. rel. au Congo Belge* **52,** C179–218(1929); **The transparent diamonds of the Bushmaie deposits.** *Ibid* **53,** C1–45(1930).—Complete and detailed crystallographic data are given. R. H. EWELL

The igneous rocks of the Helle (Haute Fagnes). PAUL RONCHESNE. *Ann. soc. geol. Belg.* **54,** B35–43(1930).—Petrographic analysis shows these rocks, formerly classed as granites, to be quartziferous diorites, because they contain about 30% of anorthite in the plagioclase and a small amount of orthoclase. Analysis gives: SiO_2 70.06, Al_2O_3 14.86, Fe_2O_3 1.64, FeO 0.63, FeS_2 1.28, MnO 0.06, CaO 3.45, MgO 1.02, K_2O 2.06, Na_2O 4.83%. Accessory minerals include biotite, chlorite, magnetite, epidote, apatite, zircon, sericite, kaolinite and sulfides. R. H. EWELL

The plagioclases of the igneous rocks of the Helle. P. MICHOT. *Ann. soc. geol Belg.* **54,** B44–8(1930); cf. preceding abstr.—M. discusses the mutual soly. of orthoclase, albite and anorthite to explain the absence of separate crystals of orthoclase, when its presence is shown by chem. analysis. The zoning of the plagioclases is explained by the effect of irregularly varying pressures on the temp.-compn. diagram of the system. R. H. EWELL

The pegmatites of the sodalitic syenite of the Island Rouma (archipelago of Los, French Guinea). Description of a new mineral (serandite) found there. A. LACROIX *Compt. rend.* **192,** 189–94(1931).—The island is very rich in feldspathoid syenite. Mineral constituents of the pegmatites are described, and mineralogical characteristics of normal syenite are compared with those of the pegmatites. The new mineral called serandite is described in detail, and chemical analysis given: SiO_2 48.72, Al_2O_3 0.29, Fe_2O_3 0.03, FeO 1.33, MnO 28.99, MgO 0.06, CaO 10.42, Na_2O 7.38, K_2O 0.26, H_2O+ 2.67, H_2O- 0.11%, corresponding to SiO_2 $(MnO_2.CaO).(Na_2O.K_2O).H_2O$. A somewhat similar manganese-bearing pectolite from Magnet Cove, Ark., is discussed, but the Mn is in smaller quantities, and d. and optical properties are different from those of the new mineral. ALICE W. EPPERSON

The alkaline rocks of the southern part of Kystym district, Ural. E. A. KUZNETZOV. *Trans. Inst. Econ. Mineral* (Moscow) No. **48,** 1–89(1930).—This area is formed of granite-gneisses, syenites and miascites. In the granite-gneisses are bands of amphibolites, quartzites and garnet-mica gneisses. Analyses of the miascites are given. On the mountain Sobachy all the miascite bands are edged by alk. syenites forming the reaction zones of miascite and granite-gneisses. The western dikes of miascites are more or less sharply sepd. from the country rocks, the latter being altered into syenite-gneisses with aegirite-augite and biotite. As against the Eastern band the miascites become fine grained in contact and at some places contain considerable porphyritic inclusions and albite or elaeolite up to 5 cm. In other respects all miascites are similar. H. C. PARISH

Mariupolite and its related rocks. J. MOROZEWICZ. *Prace Polsk. Inst. Geol.* **2,**

217–350(1929); *Tschermak's Mineral. Petrog. Mitt.* **40**, 335–436(1930).—Mariupolite, from Ukraine, is an extreme member of the nepheline-syenite series. It consists of albite, nepheline and aegirine, with sometimes lepidomelane, sodalite or cancrinite, and accessory magnetite, beckelite and pyrochlore. The order of intrusion of this and the assocd. rocks was that of increasing bacisity:

	Mean d.	Mean SiO_2 (mol.-%).
1. Upper biotite-granite	2.632	80.0
2. Diallage- and amphibole- granite	2 678	74.4
3. Alkali-syenites	2 699	70 5
4. Mariupolites	2.712	63.9
5. Foyaites	2.718	60.6
6. Wehrlite	3 359	46.2

Many chem. analyses are given of these rocks and their constituent minerals, and the relations are discussed in detail. B. C. A.

Origin of certain Pre-Cambrian amphibolites in Agder (Southern Norway). TOM F. W. BARTH. *Norsk Geol. Tids.* **11**, 219–31(1930).—Pre-Cambrian amphibolites found in Agder have the same 3 modes of origin as those found by Adams (*Compt. rend. Congr. Géol. Int. Stockholm* **1910**, 536–72) for amphibolites from Haliburton and Bancroft areas (*Memoir* **6**, *Can. Geol. Survey*, **1910**). Comparative compns. are shown. A para-amphibolite formed by metamorphic action of granitic magma or "ichor" on impure calcareous sediment embedded in the magma is described. A map of a small area of Pre-Cambrian rocks in which amphibolites originated by alteration of limestones by the action of granitic "ichor" is shown. The same mechanism produced an amphibolite which formed a basic schlieren in the anorthosite on the eastern slope of Mt. Pokamoonshine in the Adirondacks. Detailed data on different amphibolites are presented. Actinolitic hornblende occurs in Norwegian amphibolites formed by alteration of pure limestones; other types contain common hornblende. A theory of formation is discussed. E. M. SYMMES

Structure and form of fresh-water limestones. E. ROZENŠTEINS. *Acta Univ. Latviensis Kim. Fakultat. Serija* **1**, Fas. 1 Burtnica; (in German 13–24) (in Lettish 25–7(1929)).—The compact limestones consist of microcryst. (0.01–0.2 mm.) or mesocryst. (0.25–0.07 mm.) calcite aggregates in rosette or druse forms. The medium compact limestones are of crypto- and pelitomorphous aggregates (0.003–0.005 mm.) and often the interspaces are filled with secondary crystals. Around thin plant fibers there forms a strong crust which tends to form in layers. The gypsum content may range from 1.24 to 4.12% and may be found in limestones deposited from gypsum-free water, on account of the oxidation of pyrite. Silica was as high as 13.92%. A. N. H.

Structure of weather-resisting rocks. A. L. W. E. VAN DER VEEN. *1st Communications New Intern. Assoc. for Testing of Materials B*, 10–2(1930).—Fossilization (cementation) of a sediment is made by solns. circulating in its interstices. The microscope reveals the mineralogical compn. of the sediment and the nature of its cement. The chem. analysis of a weather-resisting rock may suggest that something is wrong within, whereas the microscope reveals that the dangerous atoms are locked up in most resisting minerals. The relation between genesis and weather resistance of some sandstones and marbles is described. E. J. C.

Mineralogical study of the soil of the Vercelli district. E. REPOSSI. *Atti accad. sci. Torino Classe sci. fiz., mat. e naturali* **64**, 335–58(1929). B. C. A.

The ceramic industry of Ontario (MONTGOMERY) **19**. Au—its geographic distribution and geological occurrence (BELL) **9**. Phase equilibrium in binary systems with continuous mixed crystals (KORDES) **2**. Gravity separation (EMMONS) **2**. The geochemistry of the Ti group (VON HEVESY) **2**.

9—METALLURGY AND METALLOGRAPHY

D. J. DEMOREST, H. W. GILLETT AND RICHARD RIMBACH

Present status of the dressing of bituminous copper ores. A. GÖTTE. *Metall u. Erz* **28**, 73–5(1931).—The most notable deposits of bituminous Cu ores in Germany are at Niedermansberg and Mansfeld. A discussion of dressing methods used for these ores is given. The bituminous content in no way interferes with the flotation processes. H. STOERTZ

Investigation of ore dressing machines with the help of yield calculations. W. LUYKEN AND L. KRAEBER. *Metall u. Erz* **28**, 49–55(1931).—A study of operating conditions at the "Ant" mine in Siegerland by comparison of the yields obtained from a dust settling machine and a Hercules hearth. The particle range is 22–2.5 mm. for the first machine and 2.5–0 for the second. H. STOERTZ

Effect of particle size on flotation. A. M. GAUDIN, JOHN O. GROH AND H. B. HENDERSON. *Am. Inst. Mining Met. Eng., Tech. Pub.* No. **414**, 3–23(1931).—A study is made to det. what effect particle size has on floatability. One method of study was on the samples of the final products of several mills and in the other mixts. of pure minerals were ground to different degrees of fineness and floated. In both cases the products were sized and analyzed. Conclusions: The results obtained by the 2 methods are in agreement. The usual notion about the relative ease of flotation of very fine particles does not agree with the facts. There is a time sequence of flotation with regard to size, the medium coarse particles floating first. No successful method of floating extremely fine pulps has been found. Recovery is optimum in a well-defined size range. Selection is optimum in another well-defined range. The bulk of the pulp is in the range of 100–800 mesh. Thirteen figures and 5 tables are shown. Data from lab. and practice agree closely. W. H. BOYNTON

Experimental flotation of oxidized silver ores. H. S. GIESER. *Am. Inst. Mining Met. Eng., Tech. Pub.* No. **401**, 9 pp.(1931).—Because of the other uses the no. of org. S compds. available for flotation is limited. Benzyl mercaptan and benzyl sulfide and disulfide show interesting results. Thioureas leave high tailings. When the diethylphenyl- and di-*o*-tolyl-thioureas are used the froth is white and barren. Mercaptobenzothiazole is of some value with a number of oxidized precious-metal ores. Thioacetanilide gives fair results, while thiobenzanilide is better. Reagent soly. is an important factor in flotation. H. C. PARISH

Flotation of minor gold in large-scale copper concentrators. E. S. LEAVER AND J. A. WOOLF. *Am. Inst. Mining Met. Eng., Tech. Pub.* No. **410**, 32 pp.(1931).—CaO is an active depressant for free Au during flotation if the alky. of the soln. circuit is $p_H = 10$ or above. A reaction of p_H 7.5 to 10 is best. In the flotation of base-metal ores contg Au as a by-product careful regulation of CaO, avoiding excess, will increase Au recovery. If pyrite in the ore is crushed fine enough to free the Au, most of the pyrite may be depressed by low CaO alky. in the flotation circuit and a high percentage of the Au floated with the Cu sulfides. Ores with a low ratio of pyrite to CuS and contg. under $1 in free Au per ton gave, by control of the flotation circuit assuring low alky., 25% Cu concentrates contg. more than 90% of the Cu and more than 80% of the Au. Ores high in pyrite and lean in Cu sulfides and Au as a nominal by-product, offer low-grade concentrates unless the percentage of Au recovery is sacrificed. In the flotation of oxidized base-metal ores in which a sulfidizing reagent is used, Na_2S gives a much higher Au recovery than CaS or Ca polysulfide; Ca salts depress Au. H. C. PARISH

Investigation on the influence of the iron content of zinc blendes on their floatability. LUDWIG KRAEBER. *Mitt. Kaiser-Wilhelm Inst. Eisenforsch. Düsseldorf* **12**, 343–52 (1930).—Flotation tests were made on blendes in a mechanically agitated cell and in a pneumatic cell. It was found that each sample of blende gave a definite p_H to the water regardless of whether the water was originally slightly alk. or acid, the value being lower for blendes of high Fe content. The max. recovery was obtained with a p_H between 6 and 7, and it appeared that the optimum p_H was lower for high Fe content. Very small quantities of CuS speeded up the rate of recovery. The quantities of KCN and $ZnSO_4$ necessary to hold down the Fe differed widely for different ores but bore no simple relation to the Fe content. Conclusion: The presence of foreign materials as well as the pretreatment is of more significance than the Fe content in affecting flotability. H. C. DUUS

Quinquennial review of the mineral production of India for the years 1924 to 1928. *Records Geol. Survey India* **64**(1930).—**Gold.** G. DEP. COTTER. *Ibid* 92–106.—Indian Au occurs both in veins and as alluvial deposits. Individual deposits are described Production has fallen steadily since 1915. **Lead.** G. VERNON HOBSON. *Ibid* 154–66.—Near Bawdwin ore-bearing solns. have ascended through crushed rhyolitic tuffs, flows and breccias metasomatically replacing materials in the tuff and leaving sulfides. The ore is an intimate mixt. of Ag-bearing galena and sphalerite and in many places also chalcopyrite. Production for 1924–28 averaged about 60,000 tons of Pb and 5¾ million oz. Ag. **Manganese.** L. L. FERNOR. *Ibid* 172–233.—Indian Mn occurs chiefly in metamorphosed manganiferous sediments contg. spessartite and rhodonite. Typical ores contain braunite and psilomelane. Ores are also found in assocn. with cryst. limestone contg. piedmontite. Other minerals found are holland-

ite, vredenbrugite, sitaparite and rarely pyrolusite. The high-grade ores contain Mn 48–54, Fe 4–8 and SiO_2 6–9%. World production, analyses of ores, manuf. of ferromanganese in India, various economic considerations, etc., are discussed. India is the world's leading producer. **Silver.** G. VERNON HOBSON. *Ibid* 293–8.—No ores are mined primarily for Ag in India. Over 99% of the production is a by-product from Pb, the remainder from Au. The government Ag refinery is described in detail. **Tin.** J. COGGIN BROWN. *Ibid* 298–305.—Almost all India's Sn production comes from Burma cassiterite, the occurrence of which is described in the section on tungsten. **Tungsten.** J. COGGIN BROWN. *Ibid* 305–10.—Wolfram and cassiterite occur in quartz veins closely assocd. with a biotite boss-granite intruded into a series of slates, shales, argillites and agglomerates with greatly subordinate quartzites, limestones and conglomerates. The veins fill fissures. The mineral associates of wolfram are not the same in different deposits. The various assocd. minerals are beryl, tourmaline, mica, fluorite, molybdenite, pyrrhotite, galena, sphalerite, arsenopyrite, Bi, bismuthinite and topaz. The vein formation appears to be a direct sequence of processes of differentiation influenced by local conditions. **Zinc.** G. VERNON HOBSON. *Ibid* 310–2.—Sphalerite occurs with galena at the Bawdwin mine. The industry is growing.

ALDEN H. EMERY

The composition of Finnish ores. GUST. A. AARTOVAARA. *Ylipainos Tekn. Aikakauslehti* (Reprint) **10**, 1–9(1927).—Analyses are given of sulfide and oxide ores.

J. RYSELIN

The use of Greek nickel ores in Germany. E. REITLER. *Metallbörse* **20**, 2273–4 (1930).—Before the war the German nickel works used New Caledonian ore and some American oxide. Attempts have been made to use Greek nickel ores from the Laurion Mountains. The compn. of these ores is, on the dry ore: NiO 6.62, CoO 0.15, Fe_2O_3 40.01, SiO_2 28.86, Al_2O_3 14.64, As_2O_3 0.04% and minor quantities of CuO, CaO, MgO and Cr_2O_3. The smelting of these ores is complicated by the presence of so much alumina, which give very viscous slags. It is very doubtful if these ores can be successfully used.

R. S. DEAN

Iron ore on Canyon Creek, Fort Apache Indian Reservation, Arizona. ERNEST F BURCHARD. U. S. Geol. Survey, *Bull.* **821-C**, 51–75(1931). E. H.

Rationalization of the fusion of lead minerals. N. C. KYRIACOU. *Génie Civil* **98**, 184–9(1931).—Insufficient prepn. of the mixing bed and imperfect combustion raise the consumption of coke. The metal should be dense, free of S, in the form of the silicate, perfectly clinkerized and free of dust. The most suitable size of granule is 20 mm. in diam. A rotary furnace for preliminary roasting feeds its charge directly to the shaft furnace. The use of a water jacket and of a forehearth reduces Pb losses.

ANN NICHOLSON HIRD

Treatment of low-grade gold ores at West Rand (South Africa). JEAN FULOP. *Génie Civil* **98**, 153–8(1931).—Modern equipment has raised the Au recovered by the cyanide process from 49.78 to 61.93%. The Au in the tailings is lowered from 0.316 to 0.256 pennyweight per ton.

ANN NICHOLSON HIRD

Origin of flour gold in black sands. A. E. KELLOGG. *Mining J.* (Arizona) **14**, 3 4, 49–50(1931).—Flour Au may float over riffles, adhere to black sand or magnetic Fe or refuse to amalgamate. Flour Au may have been originally minutely dispersed through rocks, run into soln. with quartz in vein fissures, wrapped up within or chemically combined with other Au ores or may have been formed by attrition by waves. An example of such grinding is in the very ancient Siskiyou Island. No reliable means of recovering flour Au is known.

E. M SYMMES

Gold—its geographical distribution and geological occurrence. J. MACKINTOSH BELL. *Canadian Mining J.* **52**, 246–51(1931).—An address is given which covers the world's gold fields. It seems probable that the annual production of Au will decrease 20–25% during the next decade.

W. H. BOYNTON

Mining and mill in the Vermont copper district. C. S. ANDERSON. *Eng. Mining J.* **131**, 208–10(1931).—Mining of the cupriferous pyrrhotite deposits of Vermont is outlined. The Cu content varies between 0.5 and 20% with an av. of about 3%. A flowsheet is shown for the Elizabeth-Foster-Cleveland mill of the National Copper Corp.

W. H. BOYNTON

Milling methods and costs at the Spring Hill concentrator of the Montana Mines Corporation, Helena, Montana. L. A. GRANT. Bur. Mines, *Information Circ.* **6411**, 8 pp.(1931).—The ore, Au (10–15% native) assocd. with pyrite, arsenopyrite and Bi, occurs disseminated through diorite along a limestone contact. Barren pyrrhotite, the most plentiful sulfide, floats with the Au-bearing sulfides. Costs per ton of ore concd. for 1929–30 were crushing and conveying $0.162, grinding $0.290, flotation

$0.258, tailings disposal $0.052, H_2O $0.012, repairs $0.233 and total $1.007.
ALDEN H. EMERY

Milling methods and costs at the lead-zinc concentrator of the Treadwell Yukon Company, Limited, at Tybo, Nevada. W. H. BLACKBURN. Bur. Mines, *Information Circ.* 6430, 14 pp.(1931).—The ores are complex and contain Pb, Zn, Fe, Ag and Au. Most of the Ag is assocd. with galena. Sphalerite and pyrite are also argentiferous. Pb concentrates average 90.43 oz. Ag per ton, 62.75% Pb and 3.50% Zn. Zn concentrates average 13.65 oz. Ag per ton, 2.71% Pb and 46.57% Zn. Costs for March, 1930, were in cents per ton of ore treated: sorting 1.8, crushing 7.9, grinding and classification 44.5, flotation 50.2, filtering 2.1, general 21.7 and total $1.282. Pb recovery is 74%, Zn 79%, Ag 75%. Detailed metallurgical data are given. ALDEN H. EMERY

The absorption of gold in tube mills. H. A. WHITE. *J. Chem. Met. Mining Soc. S. Africa* 31, 161–71(1930).—Though concn. upon the surfaces of pebbles and tube linings is a real effect, it does not account for more than a minor portion of the total Au locked up in the tube. The remainder is held in the numerous joints in the linings, between the lining and the shell and in other crevices. ALDEN H. EMERY

Amalgamation practice at Porcupine United Gold Mines, Ltd., Timmins, Ontario. RONALD A. VARY. Bur. Mines, *Information Circ.* 6433, 5 pp.(1931).—The ore consists of quartz with fine stringers of mineralized basaltic schist, or of banded quartz schist, or of stringers of quartz in schist, accompanied by pyrite and often contg. visible Au. It is amalgamated in a 25-ton pilot mill. Costs per ton of ore treated are crushing $0.384, grinding $0.771, classifying, screening, conveying and refining $0.626, miscellaneous $0.070 and total $1.851. ALDEN H. EMERY

Historical evolution of Lower Harz smelting methods. ROSENHAINER. *Metall u. Erz* 28, 75–85(1931). H. STOERTZ

The rationalization of zinc smelting in horizontal retorts. H. BEERMANN. *Metall börse* 20, 2385–6, 2441–2(1930).—The slowness of the reaction is due to the inability to carry it on at a very high temp. since the reaction zone proceeds inward concentrically from the retort walls and consequently the Zn reduction reaction is going on at a gradually decreasing temp. and hence rate. From these considerations B. concludes that a small quantity of some gas which would not interfere with condensation could be profitably introduced into the retort to equalize the temp. somewhat. No test has been made of the idea. R. S. DEAN

The reaction between magnetite and ferrous sulfide. II. F. S. WARTMAN AND G. L. OLDRIGHT. Bur. Mines, *Rept. of Investigations* 3072, 10 pp.(1931); cf. *C. A* 23, 1374.—SiO_2 and MgO accelerate, whereas CaO, Al_2O_3 and Cu_2S hinder, the reduction of magnetite by FeS. Orthoclase, anorthite, albite and kaolin also accelerate the reaction. ALDEN H. EMERY

Nickel slagging in copper refining with the formation of ferrites. W. STAHL. *Metall u. Erz* 28, 55–6(1931).—In the presence of Fe it is comparatively easy to remove Ni from Cu by slagging it out as ferrites ($NiFe_2O_4$ and $NiFeO_4$). The residual Cu still has a Ni content of 0.10–0.15%, which cannot be removed in this manner. H. S.

Suggested improvements in fire refining of copper. H. H. ALEXANDER. *Eng. Mining J.* 131, 226–9(1931).—An outline is given of methods incorporated in U. S. Patents 1,687,277(*C. A.* 22, 4450), 1,756,967 (*C. A.* 24, 3207) and 1,776,826 (*C. A* 24, 5711). Means of removing impurities by oxidation, the deoxidation of Cu and improved melting practice as tried out in the lab. and in furnaces of com. size are pointed out. Melting and refining simultaneously result in: low initial cost of equipment, lower slag production, few repairs, low operating cost and a better product.
W. H. BOYNTON

The zinc industry in Belgium. V. FIRKET. *Bull. soc. belg. ing. ind.* 10, 799–844 (1930). E. H.

Photoelectric control for soaking-pit covers. R. M. BAYLE. *Elec. World* 97, 409 (1931). C. G. F.

Fluorspar in the open-hearth slag. H. L. GEIGER. *Blast Furnace Steel Plant* 19, 412–4(1931).—A survey of the work of prominent metallurgists to help to make clear the much discussed function of fluorspar in the thinning of slag. Basic open-hearth tapping slags do not contain F. F is probably lost as volatile SiF_4, and a little as a volatile F-S compd. (In the basic elec. process very little F is lost; however, very little SiO_2 is present.) The action of fluorspar is probably to decrease the SiO_2 in the slag by the formation and loss of SiF_4. In order to establish equil. FeO and Fe_2O_3 from the bath replace the lost SiO_2. It is generally agreed that these metallic oxides increase fluidity. If this analysis is correct, then Fe oxide is the actual thinning agent.
A. W. HOLMES

The economic situation of non-ferrous metallurgy. LÉON GUILLET. *Génie Civil* **98**, 81–5(1931).—International statistics are given on the production, export and import of Cu, Pb, Zn, Sn, Sb, Ni, Al, Hg, Ag, Pt and Au from 1870 to 1928. A. N. H.

X-rays in the foundry trade. R. BERTHOLD. *Giesserei-Ztg.* **26**, 642–4(1929).—The economic value of the use of x-rays in the foundry is discussed with particular reference to light metal castings. MALCOLM DOLE

X-ray technic in the foundry. WALTER B. BARTELS. *Giesserei-Ztg.* **26**, 632–4 (1929).—A discussion of the technic, costs and profits of the use of x-rays in the foundry. MALCOLM DOLE

Rosin in core oil. WERNER G. SMITH. *Proc. Am. Soc. Testing Materials* **30**, Pt. II, 839–41(1930).—The compn. of core oils and their use in the foundry are discussed. During baking of the core much of the core oil is lost by volatilization, leaving a porous but strong material which is free from gas-producing substances. Rosin imparts tensile strength to the oil film and prevents excessive absorption of the oil by sands contg. loam. The medium grades of rosin are commonly used for this purpose. S. suggests improvements in the packaging and shipping of rosin. H. K. SALZBERG

The influence of colloidal ferric hydroxide upon the properties of molding sand. ETUJI TAKAHASI. *Kinzoku-No-Kenkyu (J. for Study of Metals)* **7**, 552–62(1930).—A difficulty connected with synthetic molding sands consists in the lack of durability: that is, fine clayey substance is liable to sep. from the sand. In a study of the action of electrolytes and $Fe(OH)_3$ sol upon clay substance in molding sand, T. found that the addn. of colloidal $Fe(OH)_3$ increases either the plasticity or the gas permeability according to ramming conditions. The increase in gas permeability seems to be due to the coagulation of clayey particles. It prevents the separation of bonding substance from the sand. Various applications of colloidal $Fe(OH)_3$ for making synthetic sands were also studied. M. KURODA

Influence of siliceous matters upon the reduction of magnetic sands. KEIZO IWASE AND MASAJI FUKUSHIMA. *Kinzoku-No-Kenkyu (J. for Study of Metals)* **7**, 524–34(1930).—The influence of siliceous matter such as tailings, sea sand, pptd. silica and alumina upon the rate of reduction of magnetic sands has been detd. at temps. between 900° and 1150°. At lower temps. their influence is small because no sintering occurs but at higher temps. the semi-reduced product FeO from the hematite in the tailings and other substances combine with silica forming semi-fused substances and retard considerably the rate of reduction. M. KURODA

The manufacture and properties of malleable castings. J. K. SMITHSON. *Foundry Trade J.* **44**, 110–12(1931).—A description. H. C. PARISH

New methods of producing quality gray cast iron, hard cast iron and tempered cast iron in cupola furnaces. LAMLA. *Giesserei-Ztg.* **27**, 621–3(1930).—A general discussion. H. C. DUUS

Low-carbon, malleable cast iron from cupola furnaces. W. VALENTIN. *Giesserei-Ztg.* **27**, 617–22(1930).—A general discussion. H. C. DUUS

Advantages of fine-grained iron over coarse-grained iron for the production of high-grade castings. R. SCHMITT. *Z. ges. Giessereipraxis* **51**, 25–8(1930); *Chimie & industrie* **25**, 81(1931).—By the use of fine-grained iron instead of hematite iron, castings with identical C, Si, Mn, P and S contents but of finer grain were obtained; the tensile strength increased from 23 to 26 kg. per sq. mm., the Brinel hardness was unchanged, and the mech. properties of the castings were improved in spite of an increase in the graphitic C content. The effects of the size of the grains were evaluated quantitatively, and variations in the mech. properties resulting from the metallographic tests confirmed the following mechanism: When fine-grained iron is used, the small graphite lamellas are completely dissolved in the iron; this results in a state of high dispersion of the graphite in the castings, which in turn produces a fine-grained structure on cooling. If coarse-grained iron is used, the graphite lamellas are not uniformly distributed; this leads to irregularities in structure on cooling. A. PAPINEAU-COUTURE

Sulfur in cast iron. H. H. EBERT. *Zentral Europ. Giesserei-Ztg.* **3**, 3–4(1930).—Methods of desulfurization are discussed. B. C. A.

Cast chromium steels in wider use. H. D. PHILLIPS. *Steel* **88**, No. 2, 39–43 (1931).—A discussion of production processes, properties and uses of chromium steels. LESLIE B. BRAGG

Overcoming certain operating troubles in making open-hearth steel. T. N. ARMSTRONG. *Iron Age* **127**, 864–7(1931).—The advantages incident to the use of burnt lime instead of raw limestone in basic open-hearth steel charges are discussed, as well as the methods of overcoming a no. of common troubles encountered in open-hearth

operation, particularly those connected with the use of Southern grades of pig Fe. DOWNS SCHAAF

The system: iron-carbon. EUGÈNE L. DUPUY. *Rev. métal.* **27**, 686–92(1930).—A review. H. S. v. KLOOSTER

Manufacture of ferro-silicon. ROY P. HUDSON. *Blast Furnace Steel Plant* **19**, 399–401(1931).—The chief district for producing ferro-Si is Jackson County, Ohio. Originally, lean ores of the district were used, but these have been supplanted by Lake Superior ores. The blast furnace can produce metal contg. 18% Si, but most grades average 6–15% Si. Ferro-Si is notably low in S on account of the high temp. of formation and large vol. of slag produced. Bituminous coal is used in admixt. with coke to decrease the fuel cost. Because of the high temp. required to reduce a large quantity of silica to Si, the heat should be concd. in a small area; therefore, the boshes and hearths are always smaller. In the manuf. of high-Si iron the evidence indicates that when alumina is lower than 17% it acts as an acid and above this it acts as a base. But as it rarely exceeds that amt., alumina is always considered an acid. A. W. HOLMES

Open-hearth combustion. W. P. CHANDLER, JR. *Proc. Eng. Soc. West. Penn.* **46**, 241–63(1930).—See *C. A.* **24**, 5265. H. C. DUUS

Gas and stock flow in the blast furnace. S. P. KINNEY. *Blast Furnace Steel Plant* **19**, 407–11(1931).—See *C. A.* **24**, 808. A. W. HOLMES

Recent advances in metallography. I. L. HAUGHTON. *1st Communications New Intern. Assoc. for Testing of Materials A*, 316–9(1930).—A review of the advances in the methods of thermal and microscopic analysis of alloys, and in the use of phys. property measurements as an aid to the study of constitution. Attention is also directed to some of the other principal problems such as age-hardening, modification and the problems raised by allotropic modification, intermetallic compds., etc. E. J. C.

Bearing of present-day knowledge of plastic deformation on the testing of metals. G. SACHS. *1st Communications New Intern. Assoc. for Testing of Materials A*, 309–15 (1930).—In the testing of metals and other cryst. materials it will in the future be necessary to bear in mind the results of modern investigations on the following points (1) The properties of a material may be different in different directions. (2) The values of the elastic consts. may be seriously affected by previous treatment and by the methods of measurement. (3) The elastic limit and the yield point are easily affected by previous cold-working. (4) The previous history of a material can subsequently be detd. from the distribution of internal stresses within it. (5) In the calcn. of structural parts it is necessary to take account of the new knowledge concerning the liability to deformation under normal and shear stresses. (6) The behavior of materials when subjected to technological processes can be calcd. on the basis of their properties as detd. by testing methods and can be checked by specially designed methods of testing. A bibliography is included. E. J. C.

Materials at high temperatures. General properties, limiting creep stress and limit of proportionality. R. G. BATSON. *1st Communications New Intern. Assoc. for Testing of Materials A*, 74–9(1930).—The general behavior of steels at high temps. under short-time tensile tests and the effect of prolonged loading in producing creep or flow and intercryst. failure are discussed. Limiting creep stresses are described and the values obtained for them are compared with results from limit of proportionality detns. and time yield tests as defined by Hatfield (*C. A.* **23**, 4429). The safe stresses to be used for design purposes are stated. E. J. C.

Materials at high temperatures. A. POMP. *1st Communications New Intern. Assoc. for Testing of Materials A*, 80–4(1930).—Tensile strength at high temps. is materially affected by the rate of testing. The time effect, however, is materially less in the detn. of the yield point or the 0.2% limit. Published results generally indicate that the yield point at high temps., for particular classes of material, bears a definite ratio to the tensile strength at room temp. In place of the lengthy tests under prolonged loading, Pomp and Dahmen propose an abridged method of testing which in the course of 1 or 2 working days permits of an approx. detn. of the so-called limiting creep stress. This is regarded as being attained when the rate of extension in the 3rd and 6th hrs. after applying the load does not exceed 0.001%. A bibliography is given. E. J. C.

Behavior of metals at high temperatures. H. STÄGER. *1st Communications New Intern. Assoc. for Testing of Materials A*, 89–96(1930).—Tests to det. the limiting creep stress were made at 400°, 500° and 600° on steel castings of widely varying compns. and on a no. of alloy steels. Rapid high-temp. tests afforded no indication of the value of the limiting creep stress. For the design and construction of machine parts intended to work at high temps. only the actual creep stress can be employed. An exact defi

nition of this stress can only be arrived at as the result of further investigation. It was found that it is not the steels contg. large amts. of alloying elements which give the best strength results at high temps., but rather those in which the alloying elements have been added in the most suitable amts. for the purpose of strengthening the material lying in the crystal boundaries. E. J. C.

Materials at high temperatures. Special alloys of iron, nickel and chromium. ROBERT HADFIELD. *1st Communications New Intern. Assoc. for Testing of Materials A*, 104–10(1930).—A review of the development of heat-resisting alloys and their use in the improvement of furnace efficiencies as metallic recuperators, conveyors for the mech. operation of furnaces, exhaust valves for internal-combustion engines, steam turbine blading and steam fittings. Of these alloys, the Fe-Ni-Cr type are probably the most useful and important. Most of the practical alloys of this type fall into 3 groups, 1 contg. from, say, 18–25% of Cr, with 7–10% of Ni, the Fe content amounting to 65–70%. The second range is higher in Ni, its percentage being in this case from 20 to 40, the Cr amounting to 10–15% and Fe 50 60%. The third group includes alloys contg. about 65% of Ni, 12% of Cr and 25% of Fe. Other elements in smaller percentages are added in many instances. E. J. C.

The micromechanical study of metals. P. A. WELIKOV, N. P. SHCHAPOV AND W. F. LORENZ. *1st Communications New Intern. Assoc. for Testing of Materials A*, 328–38(1930) — The micromech. method used by the Inst Sci. Exptl. des Transports, Moscow, for studying the mechanism of plastic deformations occurring in the materials employed in means of transport, comprises a combination of the micrographic investigation of the deformations with mech. tests on specimens of small dimensions, the 2 being carried out simultaneously on the same test piece. Tests were carried out on compressive and tensile strength, and in the latter case test specimens both with and without a notch were used. The following materials were investigated: mild steel used in bridge construction; steel for rails; fine-grained Cr and Ni steels. The rept. describes the development of permanent deformations observed. E. J. C

Nonmetallic inclusions in metals. G. F. COMSTOCK. *1st Communications New Intern. Assoc. for Testing of Materials A*, 348–54(1930).—The causes, effects, identification and elimination of nonmetallic inclusions in steel and nonferrous alloys are discussed briefly. Illustrations of the most common type of inclusions are presented, as well as Wohrman's scheme for their identification by metallographic means. Proper polishing of specimens is important. The various types should be considered separately, since the causes of their existence in metals, and the means for their elimination, are different for the different types The effects of their presence are usually, but not always, undesirable, and the prevention of segregation is of more general importance than the elimination of inclusions. E. J. C.

Physical and chemical properties of the light metals. Prescription for the mechanical testing of aluminum alloys. A. VON ZEERLEDER. *1st Communications New Intern. Assoc. for Testing of Materials A*, 257 72(1930). - The phys. consts. of Al and Mg are given and their alloys described. The standard specifications for tests on casting and forging Al alloys are stated, as they are recommended by the Swiss section of the New Intern. Assoc. for the Testing of Materials and by the European Al producers They concern the detn. of tensile strength, elongation, limit of elasticity, upper yield point, modulus of elasticity, Brinell hardness, resilience, bending capability, casting property and contraction for casting alloys and construction for forging alloys. E. J. C.

Notched-bar impact test—standard test piece. M. MOSER. *1st Communications New Intern. Assoc. for Testing of Materials A*, 222-4(1930).—The Charpy test piece is not altogether satisfactory. Both producers and users of materials are looking for a new test piece on the following lines: (1) The specimen must be small so as to enable each part to be tested without unreasonable expense. (2) The shape must be such that the various mech. conditions of the material are widely differentiated at room temp. (3) The range of application must be as wide as possible so that auxiliary test pieces are only necessary in exceptional cases. (4) It must be easy to make; the tools commonly available in a workshop are used. Various proposals are illustrated. The German standard notched-bar test specimen, the principal features of which are already fixed, corresponds closely to the test specimens used in other countries. E. J. C.

Notched-bar impact tests—standard test piece. R. PAWLISKA AND M. SCHMIDT. *1st Communications New Intern. Assoc. for Testing of Materials A*, 217 21(1930).—No simple proportionality exists between notched-bar test specimens of various forms, and the test results are influenced by the temp., shape of the specimen and by the speed of the test. For plain and alloy steels, distinction must be made between high and low values for the impact toughness; the development of these, with reference to the

above-mentioned influences, is described in detail. Since the values obtained for impact toughness are not only dependent on the material and its treatment, it appears advisable to introduce a standard test specimen, for which Mesnager's specimen with a sharp-angled V-notch is proposed. E. J. C.

Meaning of the notched-bar impact test for investigation and for acceptance test purposes. R. H. GREAVES. *1st Communications New Intern. Assoc. for Testing of Materials A*, 225–30(1930); cf. *C. A.* **23**, 5137.—The essential feature of the test is concn. of stress by the notch. Fracture may occur (*a*) by shear accompanied by considerable deformation, (*b*) by 3-dimensional tensile stress accompanied by little deformation. The transition from 1 type to the other may be brought about by relatively small changes in dimensions of the test piece or form of notch, or of speed or temp. of deformation. The result of a single test may be misleading on account of the existence of this transition zone, which, however, is more remote from standard conditions of testing for alloy steels than for C steels. A poor impact figure indicates a decided liability to fail prematurely under localized stress, but the demand for a good impact figure tends to eliminate the class of material in which failures due to adventitious causes are liable to occur. E. J. C.

Tensile and impact tests at low temperatures. P. SCHOENMAKER. *1st Communications New Intern. Assoc. for Testing of Materials A*, 237–50(1930).—The different behaviors of metals having the face-centered cubic lattice structure and those having the body-centered structure under plastic deformation, which makes itself evident in the phenomena of flow in a tensile test and in the occurrence of slip bands and twin crystals in the structure, is explained by the difference in the slipping capacity of these metals. The phenomena indicate that the resistance to slip is smaller in the face-centered structure than in the body-centered. Since the resistance to slip depends on the mobility of the atoms, the temp. must also be taken into account. Rise of temp. increases the mobility of the atoms, the possibilities of slip increase, and, as the expts. of Bach have shown, the yield point falls. Conversely, a fall of temp. raises the yield point (Körber, Mailänder). It is demonstrated with Cu and brass that it is possible to diminish the mobility of the atoms in the face-centered lattice by lowering the temp to such an extent that they behave like the atoms in a body-centered lattice. Impact tests, also, taken at a low temp. confirm the view that temp. has an effect on the phenomena of plastic deformation. E. J. C.

A simple method of studying the stress-strain relation in the notched-bar impact test. TADASHI KAWAI. *Science Repts. Tôhoku Imp. Univ.*, 1st Ser., **19**, 727–43 (1930).—By the ordinary method of applying the notched-bar impact test, the value of the impact energy required which is just sufficient to break the test piece is found, but not the stress-strain relation. Though the impact value is a measure of the toughness of metals, it does not give any information as to the behavior of the metals under load, as is obtained by the statical test. Hence K. has devised a simple method for detg. the energy-strain and stress-strain relation in notched-bar impact test, by using an ordinary Charpy machine. R. RIMBACH

The elastic limit in shock tests. N. DAVIDENKOV AND K. YUR'EV. *1st Communications New Intern. Assoc. for Testing of Materials A*, 231–6(1930).—An attempt was made to det. the relative increase of the elastic limit under shock, first in relation to the tensile strength (max. load) and then to the tearing strength (fracture). For this purpose polished test pieces coated with shellac were used, the change in diam. at the ends being conical so as to allow the yield point to be readily recognized. The mean relative increase for a series of C steels was found to be 25% with respect to the tensile strength (max. load), and 70% with respect to the tearing strength (fracture). As a sequel to this phenomenon, an elongation at the elastic limit under shock equal to about 4 times that obtained with a static tensile test was ascertained. E. J. C

Determination of the creep limit according to the short time test. A. POMP AND W ENDERS. *Stahl u. Eisen* **51**, 157–62(1931); *Mitt. Kaiser Wilhelm Inst. Eisenforschung* **12**, No. 10, 1930, Report 152, 127–47.—In continuation of previous investigations by Pomp and Dahmen (*C. A.* **21**, 1959; *Stahl u. Eisen* **47**, 414–5(1927)), on the detn. of the creep limit by an abbreviated method, the present investigation studied the suitability of this method which has been improved in the meantime. In this method the extension is optically measured and recorded while the specimens are subjected to a load. The accuracy of these extension measurements could be essentially increased. Four straight-C steels (C: 0.06–0.61) were tested at 300°, 400° and 500°; 3 types of cast steel contg. Cu and Ni and a 13.44% Cr steel were tested both at 400° and 500°. The results of the tests which in part have been extended over 240 hrs. indicate that a higher velocity of extension than 0.0003%/hr. can be applied between

the 3rd and 6th hr. In alteration of Pomp and Dahmen's previous suggestions the creep limit of straight-C steels is defined as that max. load at which the velocity of extension does not exceed 0.0003% between the 5th and 10th hr. G. G. NEUENDORFF

Prospects hopeful on metals for 1000–1500°F. H. W. SPRING. *Elec. World* **97,** 459–61(1931).—Greater demands are being made for steel to withstand high temps. under high-pressure conditions. Above the strain-hardening or so-called equi-cohesion temp. there is no such thing as "creep limit," creep constantly going on, but more rapidly with higher temps. and increased stresses. Large grain-sized material has greater resistance to creep than the same material with reduced grain size. Fatigue of over-stressed metal is much more important at lower temps. than at high operating temps. Boiler shells, headers, piping, etc., have a certain flexibility, but valve seats require new and more serviceable materials than the common C steels. Brass, Monel metal, Ni and Ni alloys, stainless steels and some harder alloys are used, depending upon the service desired. A proper valve seat should be noncorrosive, have a proper coeff. of expansion, have forging or casting quality, machinability, density and smooth texture, proper strength and ductility, hardness to withstand scratching, nongalling or seizing quality and be reasonable in cost. "*Nitralloy*" is being used for the purpose.
W. H. BOYNTON

Advances in microscopy. F. F. LUCAS. *1st Communications New Intern. Assoc. for Testing of Materials A,* 363–5(1930); cf. *C. A.* **23,** 73.—Specifications are given for new metallographic equipment expected to yield satisfactory results at very high magnifications (5000–7500 diams.). Developments in progress in the field of ultra-violet metallography are discussed. New optical glasses of ultra-violet-transmitting characteristics are needed and the possibilities are reviewed briefly. The advances to be expected in metallography, especially with respect to the phenomena involved in the hardening of steel and the nature of the constituents, martensite and troostite, are discussed.
E. J. C.

Progress of microscopy. H. WRIGHTON. *1st Communications New Intern. Assoc. for Testing of Materials A,* 366–8(1930).—Progress in metallurgical microscopy in Great Britain since 1920 is described. An outline is given of the work of the Roy. Microscopical Soc. in the interests of technical microscopy, of new developments in app. and of advances in microscopical and photomicrographic technic. Reference is made to the work in progress at the Imp. Coll. of Sci., where the technic of ultra-violet light microscopy is being developed.
E. J. C.

Strengthening by reversals of stress. W. SCHWINNING AND E. STROBEL. *Z. Metallkunde* **22,** 402–4(1930).—Conclusion of a previously published article (*C. A.* **25,** 1197). This article gives an account of the changes in structure (slip lines, grain boundaries, etc.) and the effect of heating (recrystn.) upon the structural changes observed.
ROBERT F. MEHL

Theory of solution of metals. II. M. STRAUMANIS. *Z. physik. Chem.,* **Abt. A, 153,** 107–11(1931); cf. *C. A.* **24,** 4688.—Polemical with Thiel (*C. A.* **25,** 673).
OSCAR T. QUIMBY

Note on the preceding contribution [on theory of solution of metals]. A. THIEL. *Z. physik. Chem.,* Abt. A, **153,** 112(1931).—Polemical with Straumanis (cf. preceding abstr.).
OSCAR T. QUIMBY

Thermal analysis and dilatometry. H. SCOTT. *1st Communications New Intern. Assoc. for Testing of Materials A,* 339–44(1930).—The salient features of methods for revealing physicochem. changes in metals at high temps. have been critically examd.; thermal analysis, dilatometry, resistance testing and magnetic testing alone are considered. Thermal analysis alone is well adapted to the detection of solid to liquid phase changes. Its chief shortcomings are inability to follow changes at a const. temp. and to measure quantitatively a sp. phys. property. The other test methods are complementary to thermal analysis in these respects. Dilatometry has the distinction of revealing under favorable conditions all types of discontinuous changes in solid metals. Elec. resistance measurements are particularly adapted to the detn. of changes in solid soly. Magnetization tests are superior for the detn. of phase relations in certain steels and permit the identification of sp. magnetic compds. in steel. There are several types of equipment available for each test method. Of those for thermal analysis, the Rosenhain furnace with the inverse rate method is the most flexible one. An autographic device for plotting such curves has been developed. The fully automatic dilatometer of Chevenard is very convenient for detecting physicochem. changes and furnishes fair values of expansivity as well. Elec. resistance and magnetization tests have unique applications, but require further development to become generally acceptable lab. tools.
E. J. C.

Heat treatment of aircraft parts. HORACE C. KNERR. *Proc. Am. Soc. Testing Materials* **30**, Pt. II, 154-70(1930).—A general discussion. The properties of various SAE steels under different heat treatments are tabulated. For Cr Mo aircraft steel 4130X, Knerr advocates 1575–1625°F. for normalizing or quenching, and 1275–1375°F. air or 1375–1425°F. furnace, for annealing. On oil quenching, and tempering at 680–1100°F. yield points from 180,000 to 110,000 lb./sq. in. are obtained. Types of furnace equipment for various heat treatment operations are discussed. H. W. G.

Heat treatment of carburized parts. H. M. MCQUAID. *Iron and Steel of Canada* **14**, 22–4(1931).—A considerable amt. of steel, which at the present time is being given the costly double treatment subsequent to carburizing, might quite sucessfully be quenched directly from the carburizing box. The 3 methods of single-quenching carburized work are discussed, and the types of steel suitable for use when these methods are employed are described. A statement is given of the proper procedure to follow in establishing the proper heat treatment of a carburized part based on the assumption that the analysis selected has been chosen as the result of a careful study of the stresses and service to be met with in use. O. W. ELLISS

Heat treating pipe-line couplings. C. B. PHILLIPS. *Steel* **87**, No. 26, 43–5(1930).—The plant of the Dresser Mfg. Co. at Bradford, Pa., is described. LESLIE B. BRAGG

Red shortness. FRANZ HATLANEK. *Arch. Eisenhüttenw.* **4**, 207–14(1930).—In addn. to red shortness due to oxides, brittleness is also due to other causes at high temps., among them the action of gases and the presence of Mn. Brittleness produced by O at relatively low temps. can be prevented by the presence of C, Mn, Si and Al. Blue shortness is caused by oxidic inclusions, is produced earlier than red shortness, and is more difficult to overcome. H. STOERTZ

The measurement of the true specific heat of solid and liquid metals at high temperatures. H. SEEKAMP. *Z. anorg. allgem. Chem.* **195**, 345 65(1931).—S. describes a process for the measurement of the true sp. heat in which a W spiral is employed as the source of energy. Complete details of the method of supporting the spiral within the sample of metal to be investigated are given. Four diagrams are given which describe the app. used and the elec. equipment employed in connection with the expts. Particulars are given of the results of expts. on Cu, Al and Mg, the true sp. heats of which were measured in the solid state. Curves are given, showing the relationship between S.'s results and those of previous workers in this field. The application of this method to the investigation of liquid metals is described. In this case, the W spiral is protected by means of a porcelain sleeve. Measurements of the true sp. heats of solid and of liquid Tl were made from the range 18° to 500°. It is shown that Tl undergoes a transformation at the point of 226.7°, the heat of transformation amounting to 98 cal./g.-atom. O. W. ELLIS

Standardization of methods for testing the fatigue resistance of metals. K. LAUTE *1st Communications New Intern. Assoc. for Testing of Materials A*, 111–8(1930). The alternating stress resistance of a material is detd. by the endurance limit under a standardized system of dynamic loading. Its value is dependent on the 2 factors of fatigue and work-hardening. Abridged methods of testing fail because work-hardening is not completed even after a million reversals of loading. The various methods of stressing, either by steadily changing loading or by alternating impact, and the various types of stress, such as bending, torsion or alternating tension and compression cannot be regarded as interchangeable. The fatigue range varies with the chem. compn. of the material. It is diminished by occasional over-loading and depends very much on the smoothness of the surface of the test piece. Much less important are the effects of mech. or thermal treatment prior to testing, while the variations of temp. during the test itself and the frequency of alternation have no effect. The influence of the actual dimensions of the test piece is probably negligible. The great importance of the character of the surface in itself constitutes a very serious obstacle to standardization of the test. Further, the difficulty of ascertaining and keeping to a definite max. of loading in practical use makes the application of the fatigue limit for practical purposes somewhat illusory. E. J. C.

Fatigue of single crystals of pure metals. H. J. GOUGH. *1st Communications New Intern. Assoc. for Testing of Materials A*, 133–44(1930); cf. *C. A.* **23**, 2402.—The characteristics of deformation, under fatigue stresses, of single crystals conforming to each of 3 crystallographic forms, *i.e.*, face-centered cubic (Al), body-centered cubic (α-Fe) and close-packed hexagonal (Zn), are summarized. It is shown that the criterion of plastic deformation is, in every case, the max. value (max. resolved shear stress) of the shear stress component on the slip plane along one of the slip directions contained by the slip plane. The direction of slip is always parallel to the "principle line" of

atoms (that having a greater no. of atoms per unit distance than any other line of atoms in the lattice). In the face-centered and close-packed hexagonal systems, the slip plane is the plane of max. at. d. α-Fe deforms by a process of duplex slip on planes of high at. d. Fatigue cracks are initiated in the region of max. resolved shear stress, not affected, apparently, by normal stress considerations. The propagation of the crack is, however, largely assisted by tensile normal stress: the direction of propagation is often detd. by max., not max. resolved, shear stress. Reference is also made to certain theoretical deductions arising from the expts. A bibliography is included. E. J. C.

The effect of surface condition on fatigue test results. C. H. M. JENKINS. *1st Communications New Intern. Assoc. for Testing of Materials A*, 145–8(1930).—An attempt has been made to translate fatigue tests to the service conditions of such machine parts as springs, shafts with keyways, etc. The effects on the test results of such factors as the form of section, the surface finish and abnormalities in compn. and micro-structure are discussed. The accelerating influence of chem. corrosion is marked, and perhaps phys. abrasion of the surface may also weaken the material. Although the general tendency of imperfect surface conditions is to reduce the value of the fatigue strength, there appears to be a slightly increased resistance to fatigue in the case of certain surface-hardened materials. A bibliography is given. E. J. C.

Fatigue. I. Relation of the fatigue limit to the elastic limit and other mechanical properties. II. Effect of surface condition on fatigue test results. P. LUDWIK. *1st Communications New Intern. Assoc. for Testing of Materials A*, 119–32(1930). E. J. C.

Fatigue studies of telephone cable sheath alloys. J. R. TOWNSEND AND C. H. GREENALL. *Proc. Am. Soc. Testing Materials* **30**, Pt. II, 395–405(1930).—In the study of fatigue properties of cable sheath alloys, a preliminary survey is made by use of a const. deflection method on a flat cantilever specimen at a single deflection, under which pure Pb fails in 0.3 to 1.3 million cycles and a 1% Sb alloy in 1.8 to 2.6. Alloys of refined Pb with 0.04% Ca ran for 13 million as a min. up to 169 million unbroken Very small quantities of Sn or Sb injure the Ca-Pb alloy on the test and it is stated that it will detect the effect of 0.001% As, which is not shown by tensile test. Actual endurance tests are made on a cantilever type rotating beam machine. Refined Pb, unalloyed, shows a 50 million cycle endurance limit at 215 lb./sq. in. The same with 1% Sb shows 45 and with 0.04% Ca 850 lb./sq. in. S-N curves are given. Static flow tests show an elongation in 3000 hrs. at 920 lb./sq. in. of 0.02" in 2" for the Ca alloy and 0.10" for the 1% Sb alloy. For metallographic and other data on these alloys, see Schumacher and Bouton (*C. A.* **24**, 2409). H. W. GILLETT

Constancy of the work done to cause fracture as an explanation of fracture by fatigue and other loads. K. LJUNGBERG. *1st Communications New Intern. Assoc. for Testing of Materials A*, 149–54(1930). E. J. C.

Relations between the changes in physical properties by cold working and mixed crystal formation. CURT AGTE AND KARL BECKER. *Physik. Z.* **32**, 65–80(1931).—Cold working and the introduction of impurities cause similar changes in many of the phys. properties of metals. A review is given of data on W showing these changes. Bibliography includes 75 references. T. H. CHILTON

The theory of recrystallization. J. A. M. VAN LIEMPT. *Z. anorg. allgem. Chem.* **195**, 366–86(1931).—Having assumed (1) that in the solid state only those atoms can change places, which possess an energy equal to, or greater than, a given value $E = ar_0^2$, where r_0 is the min. amplitude required to cause a change of place, and (2) that amplitudes in excess of r_0 are impossible, and having accepted Lindemann's assumption that at the m. p. of a solid the amplitude of vibration of the atoms is approx equal to the mean distance of the atoms apart, van L. develops a general diffusion formula applicable to single crystals, from which, if the distance between the atoms of the metal in which diffusion occurs, the characteristic vibration frequency, and the m. p. of the diffusing metal, and the temp. at which diffusion occurs are known, a value for the diffusion const. at the above temp. can be obtained. Hence, the relationship between the diffusion const. and the temp. of the metals can be calcd. A relationship between the diffusion consts. of deformed and undeformed metals is then evolved, and the fact that the rate of diffusion of a deformed metal in an undeformed metal is greater than that of the undeformed metal is explained. Modifications necessary to apply the theory to polycryst. materials are discussed. van L. then derives general formulas for the relationships between temps. of annealing and the times required to effect complete softening at these temps., and between the m. ps. and the temps. of recrystn. of the metals. Tables showing the relationship between observed and calcd. values are given.

The phenomena of recrystn. in solid solns. and of recrystn. in general are discussed. O. W. ELLIS

The aeration theory of Evans. E. HERZOG AND G. CHAUDRON. *Korrosion Metallschutz* **7**, 1(1931).—A reply is made to objections by Maass and Liebreich (*C. A.* **24**, 3744, 5705) against conclusions drawn from "drop" expts. Details of these expts. are given, which uphold the conclusions of the authors and the aeration theory by Evans. E. MAAS AND E. LIEBREICH. *Ibid* 2–3.—The unetched spot in the center of a drop, observed by Herzog and Chaudron (above) after adding to this drop a NaCl soln. contg. 1% H_2O_2, is assumed by the authors not to be due to a different aeration, but to be due to disturbances of convection currents caused by the introduction of the capillary pipet. It is important whether the pipet only touches the surface of the drop, or whether it penetrates beneath it. In the first case, the soln. introduced will not go down to the center of the drop, as assumed, but will, provided its d. is approx. the same as that of the drop, diffuse slowly throughout the drop. In the second case, a disturbance of the convection currents takes place, which will cause the appearance of an unetched or only slightly etched spot in the center, regardless of whether the soln. contains H_2O_2 or not. A similar unetched spot can also be obtained if, in place of a pipet, a thin glass rod with a plane polished end is immersed for only 5 or 10 min. into the drop. This cathodic spot formed in the center remains unetched even after the removal of the glass rod. LEOPOLD PESSEL

Investigation on the behavior of metal toward cleaning and disinfecting materials. M. E. SCHULZ. *Molkerei-Ztg.* (*Hildesheim*) **44**, 1439–41, 1461–3, 1495–1501, 1515–6, 1557–60(1930).—Metal sheets of 100 sq. cm. surface are immersed for 24 to 48 hrs at 45° to 50° in a soln. of the material. Change in the metal, loss in wt., tempering color, surface and pore corrosion are detd. The results are placed in a table so that the proper material can be detd. for each metal. There are no cleaning solns. which do not attack metal, but some are worse than others. The protection given by the addn of water glass and chromate is studied. The addn. of chromate to the soln. is limited by the cost. The amt. of water glass to add to solns. of a no. of com. cleansers is given. GEORGE R. GREENBANK

Metallurgy of the modern die set. JOHN H. HRUSKA. *Iron Age* **127**, 702–5 (1931).—Castings for die sets are made almost exclusively from semi-steel or a special grade of gray cast Fe. The heat treatment of die set castings is described. Increased temp. decreases hardness; prolonged heating enlarges graphite flakes of matrix and decreases transverse strength. Leader pins and bushings are made of pearlitic Mn steels. Box carburizing is desirable in long leader pins and bushings. The rotary furnace has certain outstanding features so far as quick production and low cost are concerned. Drawing may be done in rotary furnaces, salt pots or oil tanks with accurate temp. regulation. Results of analyses are tabulated. V. S. POLANSKY

Atomic hydrogen occluded in iron nitride. SHUN-ICHI SATOH. *Bull. Chem. Soc. Japan* **5**, 291–303(1930).—The presence of at. H in Fe nitride is confirmed. The evidences are: the liberation of H when Fe nitride is heated above 430° and decomposes slowly; the measurement of the single potential of Fe nitride in the normal $FeSO_4$ soln.; the oxidation of at. H by O in the water in which Fe nitride is immersed; the transformation of K ferricyanide. Nitriding changes compact Fe into porous Fe. Light does not produce any marked photochem. effect upon the single potential of Fe nitride. ALBERT L. HENNE

Nickel in aviation. GENERAL GRARD. *Aciers speciaux* **5**, 566–73(1930).—The properties of many steels are given. A. J. MONACK

Discontinuous changes in length accompanying the Barkhausen effect in nickel. C. W. HEAPS AND A. B. BRYAN. *Phys. Rev.* **36**, 326–32(1930). BERNARD LEWIS

Silver and its application to chemical plant. DONALD MCDONALD. *Soc. Chem. Ind.*, Chem. Eng. Group Feb. 13, 1931, 12 pp.; *Chemistry & Industry* **50**, 168–78 (1931).—The properties of Ag are reviewed with regard to its use in the construction of chem. equipment. The economic history, occurrence and metallurgy of Ag are discussed at length. The phys. and chem. properties reported in the literature are critically reviewed with some addnl. observations. The power of absorbing O by Ag in the molten state has been studied in detail. The more important alloys of Ag and their applications are mentioned. The properties of Ag which make it attractive for the chem. plant are: its freedom from oxidation, resistance to acids, high thermal and elec. conductivities, and excellent mech. characteristics. Various uses in the industries are mentioned. The high salvage value of Ag app. makes its use as a construction material more attractive. ALLEN S. SMITH

The resistance of chromium-plated plug gages to wear. HARRY K. HERSCHMAN. *Bur. Standards J. Research* **6**, 295–304(1931). R. RIMBACH

The structure and the mechanical properties of pearlite. N. T. BELYAEV. *Rev. métal.* **27**, 680–5(1930).—B. indicates the possibility of using the interlamellar distance in pearlite as a measure for the mech. properties of eutectoid steels (cf. *C. A.* **23**, 5454). H. S. v. KLOOSTER

The effect of certain elements upon the segregation of cementite and its relation to the modification process. J. H. ANDREW. *Roy. Tech. Coll. Met. Club J.* (Glasgow) 1929–30, No. 7, 16–7.—Speculation upon the relation between the effect of 0.25% Mo in a 3% Ni steel, or of 0.60% Mn in a 0.22% C steel, in which the Mo or Mn is said to hinder free movement of carbides, preventing them from coalescing, and thus producing a fine sorbite, and that of Na in the modification of Al-Si alloys. H. W. G.

Thermochemical data on iron. W. A. ROTH, H. UMBACH AND P. CHALL. *Arch. Eisenhüttenw.* **4**, 87–93(1930); cf. *C. A.* **24**, 2039.—The authors used azeotropic 20% HCl soln. at temps. in the neighborhood of 100° as a solvent for various Fe compds. and detd. the following heat effects, calcd. at 19°: $Fe + 0.5O = FeO + 64.2$ Cal., $FeO + Fe_2O_3 = Fe_3O_4 + 7.0$ Cal, $2FeO + SiO_2$ (quartz) $= Fe_2SiO_4 + 8.1$ Cal. and $Fe_2O_3 + 3Cl_2 = 2FeCl_3$ (cryst.) $+ 1.5O_2 + 7.4$ Cal. H. S. v. KLOOSTER

Alterations in the properties of hematite pig iron cast from the first melting. E. PIWOWARSKY. *Stahl u. Eisen* **50**, 966–8(1930).—The alterations which take place in the mech. properties of pig Fe during tapping from the blast furnace into an acid mixer from which finished castings are poured have been detd The compn. and properties of samples cast in sand and in chill molds directly from the blast furance during the charging of the mixer and during the emptying of the mixer are tabulated, the variations over a period of 7 days being shown. Sand castings have the better properties when taken directly from the blast furnace, but chill castings are superior to sand castings poured from the mixer. In both cases an appreciable improvement in properties takes place during the passage of the metal through the mixer. B. C. A.

Cast iron. E. PIWOWARSKY. *1st Communications New Intern. Assoc. for Testing of Materials A*, 5–9(1930).—The special properties of cast Fe (lack of quasi-isotropy and influence of graphite inclusions) have for a long time made it difficult to introduce standardized methods of testing. The absence of reliable inter-relationships between the mech. and phys. properties necessitates furthermore a large number of sep. investigations to det. the quality. The following measurements are now made: (1) *The static properties.*—(a) Tensile strength. Tensile tests are provided for. The fact that cast Fe is scarcely ever subjected to pure tension in practice makes this test of little value, but it is easy to carry out and to evaluate; (b) bending strength. The deflections must be given for as many loads as possible, in any case for the max load at fracture; (c) the Brinell hardness; (d) compression strength, with simultaneous recording of the stress-strain diagram and the load at which cracks begin to appear; (e) shearing strength. The test for shearing strength does not give any simple relation between shearing and tensile strength. (2) *The dynamic properties.*—The detn. of the fatigue limits will continue to be of value until smaller foundries are able to procure rotating type fatigue-testing machines. (3) *The elec. and magnetic properties.*—Experiences in testing Fe and steel may be applied. (4) *The machinability.*—The hardness boring test of Keep, Loewe or Kessner is widely used. Nevertheless the test on turning time to det. the cutting speed seems to be the only suitable one. The Brinell hardness for cast Fe bears no fixed relation either to the machinability or to the resistance to wear. (5) *The volumetric stability.*—This test still lacks any degree of uniformity. (6) *The sp. vol.*—This test is best carried out with the method of buoyancy. Measurement of the perviousness to gases appears to be of less importance. (7) *The ability to fill molds.*—Rapid and practically useful results are given only by pouring tests. The tendency to porosity and to the formation of blow-holes is shown by Cook's K-test. E. J. C.

Cast iron—methods of testing. E. DUBI. *1st Communications New Intern. Assoc. for Testing of Materials A*, 10–24(1930).—A separately cast test piece of 50 mm. diam. gives results which agree very closely with those obtained from test pieces of 30 and 50 mm. diam. machined from the main casting. Small test pieces taken according to the French specification from the main casting give valuable criteria of the nature and uniformity of the internal structure of the casting itself. As regards the strength of the material, however, these small test pieces do not give any more accurate indications than specially cast test pieces having a diam. corresponding as nearly as possible to the thickness of the wall of the casting under investigation. The strength properties of casting apparently can only be detd. conclusively from tests on the casting itself. E. J. C.

High-duty cast iron. GEBRÜDER SULZER. *1st Communications New Intern. Assoc. for Testing of Materials A*, 49–63(1930).—The methods of producing high-grade cast Fe are discussed with particular reference to the effect of a considerable reduction of C content on the properties of the Fe. As the C content diminishes, bending strength, tensile strength and resistance to impact increase, while in general the deflection remains unchanged. The shrinkage and the tendency to form cavities, however, increase, as do the general difficulties of foundry technic. The pearlitic ground mass of high-grade cast Fe has, in the cast condition, a tensile strength of approx. 70 kg. per sq. mm. By means of alloying addns., so long as the structure remains pearlitic, the Brinell hardness of cast Fe is increased while the other strength properties are not materially changed. Carbide-forming elements such as Cr, W, Mo and V increase the resistance to abrasion and to thermal effects, but reduce the machinability. E. J. C.

The results of investigations on the growth of cast iron. FRANZ ROLL. *Die Giesserei* **17**, 995–8(1930).—The views of various investigators on the influence of the compn and other factors on the growth of cast Fe are tabulated J. BALOZIAN

Cast-iron testing in Great Britain. J. G. PEARCE. *1st Communications New Intern. Assoc. for Testing of Materials A*, 1–4(1930).—A specification which has the approval of the founding industry was issued in 1928 by the Brit. Eng. Standards Assoc. While it covers only 2 qualities of Fe for general engineering castings, the testing procedure is applicable to all types and qualities. The features of this specification are as follows: The size of the test bar varies with the thickness of the casting, 3 sizes being used at present. The test bars are cylindrical and may be cast away from the casting. Both tensile and transverse tests are covered and no chem. analysis is demanded. The majority of engineering castings will be covered by the intermediate size of bar 1.2″ in diam which is virtually the standard bar used on the Continent and in America. The adoption of this basis for testing has stimulated a considerable amt. of investigation on the relations between mech. properties, but it is believed that at the present stage of development no other mech. tests can be usefully employed in general specifications. E. J. C

Heat- and acid-resisting cast irons with high chromium and carbon contents. EMANUEL VALENTA. *Iron and Steel Inst. (London) Carnegie Scholarship Mem* 19, 79–165(1930).—Three series of Cr-Fe-C alloys were studied: (I) without added elements, (II) with addns. of Si and (III) with addns of Al. (I) In this series the C content varied from 0.15 to 3.6%, while the amt. of Cr was between 4.7 and 36.9%. The Si content was 0.4% for low Cr and 0.8% for high Cr percentages. It was found that above 16% Cr the resistance to scaling is perfect. Beyond 35% Cr the heat resistance does not increase further. The proportion of primary double carbides increases with the C content. These carbides form long, heat-resistant needles which destroy the homogeneity and strength of the castings. Hence the hypereutectic alloys are of no technical importance. Below 0.5% C the alloys are more expensive and must be produced in an elec. furnace. Test bars, both prismatic and cylindrical, were prepd. for chem., metallographic, dilatometric, thermal and mech. examn. Brinell hardness detns. were made after casting, annealing and air cooling for various thicknesses and different rates of cooling. Graphs are presented showing lines of equal hardness depending on the Cr and C contents. For machinability, if a hardness of 350 is assumed to be the limit, it is necessary to keep the C content below 1.6 or 2% in alloys contg. 25 or 35% Cr, resp., in annealed specimens. For high resistance to wear and abrasion a Cr/C ratio of 10/1 may be used with advantage. The useful alloys in the Fe–Cr–C system are those contg. 1.8–2% C which may be divided in 3 zones: (*a*) alloys in which the pure δ-crystal predominates, strongly corrosion-resistant, suitable for forging and without hardening ability, (*b*) alloys showing both γ- and δ-crystals with reduced corrosion resistance and lower malleability and (*c*) alloys of pure γ-crystals with materially reduced resistance to corrosion, recommended for service at high temps. (II) The examn. of alloys contg. Si in amts. varying from 0.5 to 4.3% with Cr ranging from 20 to 35% showed that the eutectic valley is displaced to lower C percentages. Hence the range of useful hypoeutectic alloys is much lower. Addn. of 1% Si displaces the eutectic line to lower C content by about 0.3% C. The corrosion resistance is greater than for those alloys contg. no Si. With constant Cr content the effect of varying amts. of Si (0.5–2.3%) is to raise the temp. of entrance into the γ phase. For 1% Si the rise is about 80°. The effect is less for lower C content where the eutectoid temp. rises rapidly. Hence the lower the C and the higher the Cr percentage, the smaller is the amt. of Si required to suppress the hardening of alloys cooled from 1000°. For high C alloys as much as 4% Si might be required to prevent air hardening, but the product would be brittle and unmachinable. (III) Alloys with Al as addn.

element contained 1.1–2.9% C, 19.3–29.8% Cr and 0.6–2.4% Al. Even a low percentage (0.5%) of Al was in most cases sufficient to suppress entirely the self-hardening properties. The effect of Al on the raising of the critical points and upon the structure was about twice that of Si. Air cooling gave alloys with low hardness shock-resistance and good malleability. The location of the eutectic line was not materially altered by adding 1–1.5% Al; hence the range of useful high-C alloys is greater than that for Si alloys. The alloys studied are classified on the basis of the dilatometric curves obtained. Numerous tables, charts and photomicrographs are given. A suitable reagent for etching these alloys consisted of a cold alc. soln. of 5% picric acid, 2 5% HCl and 2% $FeCl_3$. H. S. v. KLOOSTER

Nickel-vanadium and nickel-molybdenum cast irons. II. JEAN CHALLANSONNET. *Rev. Métal.* **27**, 654–71(1930); cf. *C. A.* **25**, 1197.—The dilatometric and microscopic study of a synthetic cast iron contg. 3.7% C showed that the presence of 0.25 and 0.5% Mo either alone or with 1 and 2% Ni, resp., does not affect the Curie point of Fe_3C. Addns. of 0.25 and 0.5% Mo raise the Ac point 25° to 725° and in alloys with 1 and 2% Ni the added Mo raises the Ac point from 660° and 665° to 725°. On cooling the Ar point is lowered and the effect is cumulative when both Mo and Ni are present Reheating of the cast alloys brings about graphitization in the specimens contg. 1% Ni and 0.25% Mo (at 1000°), 2% Ni and 0.25% Mo (at 1050°) and 2% Ni + 0.5% Mo (at 1070°). The microstructure of all 6 alloys when fast cooled showed no graphite. Mo refines the pearlitic constituent and produces small bright spots, possibly complex Fe-Mo carbides which diminish in size in the presence of Ni. The com. cast irons were the same as those used previously for prepg. Ni-V cast irons and distinguished as A, B and C, resp. In each group 6 alloys were studied contg. approx. 1% Ni + 0.25% Mo, 1% Ni + 0.5% Mo, 2% Ni + 0.25% Mo, 2% Ni + 0.5% Mo, 0.25% Mo and 0.5% Mo. All alloys as obtained after casting contained both graphite and cementite. Mo favors somewhat the cementite formation at low C contents (2.5%) but the graphitizing effect of Ni is only slightly changed by Mo. Dilatometric curves show sudden expansions on heating at temps. below the Ar point for all alloys contg. Ni. This expansion, due to graphitization, is absent in alloys contg. only Mo addns. when heated to 1000°. A study of the effect of the rate of cooling on the microstructure indicated that no complex carbides were produced in the com. cast irons but that Mo, like Ni, increases the hardness of the pearlitic matrix. With a C content as high as 3.5% C, Mo does not noticeably increase the percentage of combined C. Contrary to the effect of V on rapidly cooled cast irons contg. Ni, Mo does not prevent a martensitic quench. Tables, graphs and photomicrographs accompany the article. No definite conclusions could be derived from the data obtained. H. S VAN KLOOSTER

Non-metallic inclusions in iron and steel. A. BAIKOV. *1st Communications New Intern. Assoc. for Testing of Materials A*, 355–62(1930).—The non-metallic inclusions in cast metal are generally present in only very small proportions (tenths or hundredths of 1%), and usually consist of S and O compds. The sulfurous inclusions are solid solns., and the O compds. are fused matter resembling a slag. If this view of the nature of inclusions is correct, then the way in which they are distributed is detd. by the circumstance that the complete constitutional diagram of the system: cast metal + material of the nonmetallic inclusions exhibits the phenomena of limited soly in the liquid state and forms 2 liquid layers. Nonmetallic inclusions with a m. p. lower than that of the metal are of a totally different character. In this case the inclusions are in the form of drops and retain their spherical shape while surrounded by the solidified metal. The third type of nonmetallic inclusions is observed in metals with low Mn content, considerable quantities of S and low C content. In this case practically the whole of the S forms Fe sulfide. With excess metal, the nonmetallic inclusions solidify at the end of the crystg. process, forming a skin of eutectic alloy around the grains of the segregated metal. E. J. C.

Report of research committee on yield point of structural steel. W. O. M. WITHEY, *et al. Proc. Am. Soc. Testing Materials* **30**, Pt. I, 133–58(1930).—In a coöperative study, the yield point of specimens cut from structural shapes of 16 different sizes and shapes, ranging from $^3/_8$" plate to 26" girder beam and made from steel of 0.14 to 0.29% C, 0.37 to 0.73% Mn, was found to range from 29,000 to 39,000 lb./sq. in. depending on variations in rolling and cooling conditions, on finishing temp., on size of section and position of the specimen in the section. The ratio of yield point by drop of beam to tensile strength ranged from 0.50 to 0.65; hence it cannot be estd. with sufficient accuracy from the tensile values. There was considerable discrepancy between mill tests and the more carefully conducted coöperative tests. A single specimen will not adequately represent the av. properties of heavy girder beams and H-column shapes

and 3 specimens from intermediate flange, root and web should be taken. If only one is taken, it should come from the intermediate flange. The most representative single specimen is from an intermediate location in plates and angles and from the center of the web in channels and I-beams. H. W. GILLETT

Mechanical properties of British steels. W. E. DALBY. *Proc. Inst. Civil Eng.* (London) **227**, 25–61(1928).—Slipping stresses are calcd. from (1) the non-load-to-break diagram, (2) the elastic diagram, (3) the push-pull diagram, and (4) the torque-twist diagram to indicate the stress at which slip begins for Bessemer acid steel, open-hearth basic, open-hearth acid (0.52% C), open-hearth acid (0.63% C) and Ni-Cr steels. Elastic twist changes gradually to plastic twist, the change being more marked in Bessemer steel. The elastic diagrams are similar but limits of proportionality vary greatly. ANN NICHOLSON HIRD

The macroexamination of steel. Metallographic methods used at the Watertown Arsenal. M. G. YATSEVITCH. *Army Ordnance* **11**, 297–305(1931).—Prepn. methods are discussed and objects of tests, etc., are considered. Examples are given. Three tables on quantity of reagents, etching times, etc., are given. The interpretation of the picture revealed on the surface of the metal is discussed. M. F. BEHAR

Selection and heat treatment of ball- and roller-bearing steels. ERNEST F. DAVIS. *Fuels & Furnaces* **9**, 153–62(1931).—Ball steels contain 1% C and 0.75–1.65% Cr, depending upon ball diam. Smaller sizes have lower Cr contents. Failures of balls in service result from surface defects, surface decarburization, excessive carbide segregation, and the commoner defects such as inclusions and center segregation. Steels for races are the high-C-Cr steel and the carburized grades such as the Ni-Mo, and the 3.5% Ni. Most widely used steel for carburized races is SAE 4615. Roll steels are the high-C-Cr steel, spring steel of modified SAE 4150 analysis and the carburized grades. Analyses are given of the various steels and methods of heat treatment are outlined. R. RIMBACH

The strength of steels at high temperatures. H. A. DICKIE. *Roy. Tech. Coll. Met. Club J.* (Glasgow) **1929-30**, No. 7, 32–7.—A brief general discussion. H. W. G.

Effect of rate of cooling on the structure and constitution of steel. J. M. ROBERTSON. *Safety in Mines Research Board Paper* No. 59, 57 pp.(1930).—The effect of variation in the rate of cooling steel cannot be accounted for by the supposition that an increased cooling rate produces in turn sorbite, troostite and martensite, as many other different forms of structure are evident between these states. It is suggested that the constitution of steel should always be considered in terms of the quantity of α-solid soln., γ-solid soln. and cementite present and their relation with one another. Four series of structures may be obtained by different methods of cooling. The first includes all structures consisting of ferrite and pearlite or the latter alone. Again, continuous rapid cooling which suppresses the Ar1 and lowers the Ar2 point produces the series of quenched steels, the structure of which may be varied considerably. When cooled so that the Ar1 point is suppressed and the rate then retarded so that the Ar2 change takes place at const. temp., a 3rd series results, and a 4th is similar except that the steel is withdrawn before the change is complete, the final change being effected by atm. cooling. The general arrangement of all ferrite-pearlite structures is detd. by the manner in which ferrite develops from austenite, but the structure of the grains of pearlite is detd. by simultaneously formed ferrite and cementite. The only structures which temper in a different manner are those which contain a considerable quantity of α-solid soln., since, during reheating, decompn. of this α-phase occurs by the gradual sepn. of C as the temp. is raised and not by a sudden pptn. of fine C with subsequent coalescence to form larger globules. B. C. A.

Effect of the state of the cementite on the heat sensitivity, the tendency to core-hardening and formation of hardness fractures in carbon steels. S. STEINBERG. *Stahl u. Eisen* **50**, 1164–6(1930).—The effect of various heat treatments on the microstructure and mech. properties of steels with 0.8 and 1.3% C has been investigated. The hypoeutectoidal steel after annealing at 950° and slow cooling becomes hard and tough after hardening at 735° and quenching; hardening at 750–800° produces a more coarsely crystalline structure, and the metal becomes brittle with a tendency to develop hair-cracks. The hypereutectoidal steel requires very slow cooling after annealing at 950° and a hardening temp. of 800–50° to produce a tough structure. Lamellar cementite causes brittleness and hair-cracks to develop on hardening, whereas granular cementite or troostite imparts a high degree of toughness to steel. B. C. A.

Temper hardening of steel containing copper. H. BUCHHOLTZ AND W. KÖSTER. *Stahl u. Eisen* **50**, 687–95(1930).—The solid soly. of Cu in α-Fe is 0.4% at 0–600° and then increases according to the equation, $\log x = -4125/T + 4.32$, to 3.4% at the

eutectoid temp., 810°. On cooling a Cu steel from the γ-solid soln. range, supersatd. solid solns. of Cu in α-Fe, having a structure resembling that of martensite, may be obtained; these supersatd. solns., as well as those contg. 0.6–3.4% Cu quenched at 600–800°, undergo age hardening on tempering at 450–600°, but the sepn. of the excess Cu in a highly dispersed condition and the subsequent coagulation of the particles take place very slowly. When the steel contains both Cu and C in supersatd. solid solns., both elements sep. in a disperse form on aging at high temps., the 2 reactions taking place independently of one another. Thus on tempering a quenched steel with 0.05% C and 2% Cu at gradually increasing temps., the hardness rises sharply from 160 to 210 at 20° during 3 days, then to 220 at 100° because of sepn. of excess C; the hardness then falls rapidly to 150 at 300°, because of coagulation of the cementite, and rises again to 205 at 500–550° because of pptn. of the Cu. The properties of temper-hardened forgings of steel with 0.8% Cu and 0.4% Cr resemble those of a Cr-Ni steel with a tensile strength of 70 kg./sq. mm.; both steels are characterized by the regularity of their mech. properties throughout large cross-sections and by their stability on prolonged storage after tempering. B. C. A.

The malleability of rolled soft steel and a new method for its improvement. JOSEPH VIETÓRISZ. *Iron and Steel Inst. (London) Carnegie Scholarship Mem.* **19**, 167–213 (1930).—Tensile tests and microscopical investigations were performed on a com. open-hearth mild steel contg.: C 0.05, Mn 0.29, P 0.02 and S 0.035%. Specimens obtained from the same billet (heated to 1350° and rolled in 8 passes at 1200°) were rolled at temps. ranging from 1280° down to 20°. Test pieces were then taken both in the direction of rolling and across. The following quantities were detd. for various degrees of deformation: yield point, traction hardness, uniform and total elongation, tenacity, stress in contracted section of fracture, malleability, reduction in area, tensile strength and no. of grains in a given field of vision. The changes in properties were recorded in graphs as a function of the rolling temp. The main results are summarized as follows: Between 700° and 850° all mech. properties have very low values; this range may be taken as the dividing line between hot- and cold-rolling. Uniform and total elongation are at their max. value on rolling at 900° and reach a min. at 300°. Rolling between 200° and 400° gives a fairly const. max. value for yield point, traction hardness and tensile strength. At const. temp. these quantities, as a rule, increase when the degree of deformation increases. The tenacity curve shows a rise at 850°, falls rapidly between 850° and 750°, then rises again at 700° and drops to its lowest value at 300°. The grain no. increases rapidly with decrease in rolling temp. to 850°, but below 700° no appreciable change in grain no. is found. After rolling between 200° and 550° a special etching method with the aid of Fry's reagent brings out characteristic slip figures at angles of 45° to the direction of compression parallel to the direction of rolling and in the form of horizontal lines across the direction of rolling. Rolling at room temp. produces merely slipbands, serrated crystal boundaries and broken crystals. It is suggested that recrystn. of specimens rolled between 200° and 400° will produce the finest structures and the best mech. properties. This tentative conclusion is contrary to the customary practice of recrystallizing material rolled at room temp.
H. S. v. KLOOSTER

Carburization and decarburization of carbon steels. TAKEJIRO MURAKAMI AND HARUJIRO SEKIGUCHI. *Tetsu-to-Hagané (J. Iron and Steel Inst. Japan)* **16**, 1015–40(1930).—C steels with 0.29, 0.70, 1.02 and 1.29% C were treated at 800°, 900° and 1000° with different kinds of carburizing agents. With pure C powder, decarburization was already noticed at 800° in steels whose C content was higher than 0.3, especially when the packing was insufficient. Carbonate salts prevent this effect, though slight decarburization was found at initial stages. Carburizing speeds can be accelerated by the addn. of $BaCO_3$ till the amt. of the salt reaches 40%; the addn. of $NaCO_3$ to this mixt. promotes the tendency. When the carburizing temp. exceeds 900° fine particles of C adhere to the steel surface. It is easy to carburize up to the Acm point, but the carburizing speed drops suddenly above this. Small quantities of moisture in C are preferable for carburization, and the size of C powder has no effect on the speed. M. KURODA

The effect of carbon on the transformation points and hardness of 12% chromium steels. TAKEJIRO MURAKAMI AND YOSHIRO FUJII. *Kinzoku-No-Kenkyu (J. for Study of Metals)* **7**, 505–23(1930).—By measurements of the thermal dilatation and the magnetization of 8 specimens contg. about 12% Cr with const. and varying C contents of less than 2.04% during heating and cooling under different conditions, the change of transformation points of these specimens was studied. The effect of C on the A_1, A_2 and A_3 points in slow heating and cooling from 900° and 1100° with different ve-

locities was carefully observed, and the results were shown in curves. The Brinell hardness of specimens cooled under the same varying conditions as above, or quenched in oil from 900°, 1000°, 1100° and 1200°, or quenched and tempered at several temps. was measured. From the results, the change of hardness with the C content and with the several heat treatments was plotted in several curves and discussed in detail. The microstructure of these specimens and its change under several heat treatments were also described. M. KURODA

Manganese steel. HEINRICH KREUTZ VON SCHEELE. *Giesserei-Ztg.* **27**, 98–100 (1930).—A review of the prepn. of high Mn-steel castings. CURTIS L. WILSON

List of alloys. WM. CAMPBELL. *Proc. Am. Soc. Testing Materials* **30**, Pt. I, 336–97(1930).—Campbell's list of non-ferrous alloys, which has been so useful for reference, has been brought up to date, and greatly enlarged. There are about 8000 compns. listed. The phys. properties of the standard and widely used alloys are given from the Am. Soc. for Testing Materials specifications and other sources. H. W. GILLETT

Comparison tests on light metal piston alloys. M. v. SCHWARZ. *Z. Metallkunde* **22**, 417–9(1930).—An app. is described for detg. the performance of a piston in service. Data obtained with it are used to compare Al alloys and cast Fe used in piston manuf. ROBERT F. MEHL

Measurements on the superconductivity of alloys. J. C. MCLENNAN, J. F. ALLEN AND J. O. WILHELM. *Trans. Roy. Soc. Can.* [3], **24**, Sect. 3, 53–64(1930); cf. McLennan and Quinlan, *C. A.* **25**, 2050.—The supercond. transition points of a no. of alloys contg. Sb, As and Sb were measured to compare the effect produced with that of metals from other groups. Most metals when alloyed with superconductors do not affect the supercond. appreciably. Au apparently lowers the supercond. transition point of some metals while with one exception the metals of the Bi group elevate the transition temp. of the metal with which they are alloyed. Tables giving the transition temp. for the alloys examd. are included. J. W. SHIPLEY

Methods of mechanical testing of light aluminum alloys used in automobile and aircraft construction. S. S. NEKRYTI. *1st Communications New Intern. Assoc. for Testing of Materials A*, 277–92(1930).—Investigations were carried out to det. the methods of testing which best show the influence of the following factors: heat treatment, the addition of other metals (Mg, Fe) to the alloy, and methods of casting. Tensile strength, compression strength, elongation and the results of a bending test with a single blow are not affected by these factors. On the other hand, the following tests are sufficiently sensitive to enable the mech. properties to be estd. and to det. the influence of the factors under investigation: bending strength, limit of proportionality under compression, limit of endurance (fatigue test), rupture under repeated blows, alternating tensile and compressive stresses by repeated blows and shortening under compression. A definite relation exists between the results of these tests and the elements of construction. The best method for detg. the resistance to corrosion is the soly. test for 15 min. in a 10% soln. of HCl. There is a relation between the results of this test and those of the fatigue tests. No difference is observable between the mech properties of specimens cut from the main casting and those of specimens cast separately. Al alloys can be hardened even if they contain no Mg. The addn. of Mg up to 0.6% and of Fe up to 1.0% increases considerably the hardness and the strength after hardening. Like all other metals, Al alloys have a safe limit of fatigue stress. E. J. C.

The notch toughness of a few aluminum alloys especially at low temperatures. W. A. GÜLDNER. *Z. Metallkunde* **22**, 412–6(1930).—Conclusion of a previously published article (cf. *C. A.* **24**, 5009). The influence of velocity of test, of the width of the test piece, and of the depth of the notch, all at —190° were studied. The relations between these conditions is expressed mathematically and graphically, and discussed at length with comparison to Fe alloys. ROBERT F. MEHL

Aluminum alloys containing nickel. W. C. DEVEREUX. *Brass World* **27**, 31–5 (1931).—The manuf. and applications of "Y" and "RR" alloys are outlined. "Y" metal contains 4% Cu, 2% Ni, 1.5% Mg, balance Al; "RR" contains 1.3–2.25% Cu, 1.3% Ni, 0.1–1.6% Mg, 0.1–0.8% Ti, 0.5–2.2% Si, balance Al. The manuf. of Cu hardener, Ni hardener and Cu-Ni hardener is also outlined. Applications of "Y" and "RR" alloys include aero and automobile engineering, cylinder heads and pistons, connecting rods, propellers, crank cases, bus frames, etc. W. H. BOYNTON

The advantages of titanium additions to aluminum. H. RÖHRIG. *Metallwirtschaft* **10**, No. 6, 105–11(1931).—It is difficult to alloy Ti with Al on account of the high m. p. of Ti. The best method is to add TiO_2 to the Al ore and reduce the 2 together electrolytically. Ti added to Al in small quantities forms either $TiAl_4$ or $TiAl_3$, a

brittle compd. Pure Al has a very coarse-grained structure. By alloying with small quantities of Ti, 0.01 to 0.03%, the grain size is reduced considerably. This is illustrated by macrographs. Sheet Al, 1 mm. thick, contg. 0.01-0.19% Ti, was annealed at 500°, stretched cold 2, 5 and 10% and then annealed at 600°. The samples were etched in HCl-HF to show the recrystn. structure. With the higher Ti contents the grain size was smaller, but the difference was less noticeable with the 10% cold-worked samples. With Ti-free Al recrystn. begins at 300°, with 0.19% Ti at 350°. The influence of these small quantities of Ti on the tensile strength and ductility is slight. The tensile strength of the samples contg. Ti which were hard rolled, and those which were annealed at 350°, was slightly higher and the ductility lower. For those annealed at 450° and 500° the reverse was the case. Corrosion tests were made by immersing samples for 1 hr. at 20° in 4 parts HNO_3, 4 parts H_2O and 1 part HCl. The loss in weight increased in the following order: annealed at 500° (least), annealed at 450°, at 400°, at 350°, hard rolled (most). Samples contg Ti lost less weight than those without Ti. Those which were annealed during the hard rolling process lost more weight than those not annealed. C. E. MACFARLANE

Study of iron–aluminum–carbon alloys. O. v. KEIL AND O. JUNGWIRTH. *Arch. Eisenhüttenw.* **4**, 221–4(1930).—The most suitable melting methods for the production of Fe-Al-C alloys are detd. Up to 14% Al, the eutectic temp. rises from 1145° to 1300° and then slowly falls again. With 1% Al, the eutectic point is reduced by about 0.16% C. The greatest formation of graphite lies between 3 and 20% Al; between 12 and 18% Al the melt when chilled is white. With increasing Al content 2 new constituents are formed: Phase I, which is low in C, microscopically homogeneous but easily sol. in acid; and Phase II, probably an Al-Fe carbide with great stability against acid attack. H. STOERTZ

Electrical conductivity of some bismuth alloys at low temperatures. J. C. MCLENNAN, J. F. ALLEN AND J. O. WILHELM. *Trans. Roy. Soc. Can.* [3], **24**, Sect. 3, 25–35(1930).—A no. of alloys contg. Bi were prepd. and their super-conducting transition temps detd. with an accuracy of about 0.1°K. The transition temps. found were 58% Bi and 42% Pb 8.8°K., Rose's metal (Bi_2SnPb) 8.5°K., Newton's metal (Bi 50, Sn 19, Pb 31%) 8.5°K., Wood's metal (Sn 12.5, Cd 12.5, Pb 25, Bi 50%) 8.2°K., Bi_5Tl_3 6.4°K., Pb 83 and 17% Sb 6.6°K. The presence of Bi in an alloy tends to raise the superconducting temp. while the presence of Sb sometimes raises and sometimes lowers the superconducting point. The Pb-Bi alloy has a superconducting point 1.6°K. higher than any other previously obtained. Attention is drawn to the inadequacy of all the theories of elec. cond. in metals in that they do not account for the phenomenon of superconductivity. A suggestion is made that superconductivity may be due in part, at least, to the directive action of magnetic forces within the atom. J. W. SHIPLEY

Constitution of the cadmium-rich alloys of the system cadmium–silver. P. J. DURRANT. *J. Inst. Metals*, Advance Copy, No. **549**, 15 pp.(1931).—Alloys contg. up to 40% Ag were studied microscopically and by means of heating and cooling curves. There are 3 peritectic lines, and 3 solid solns. in this area. The solid soly. of Ag in Cd is 6.0% at 343°, and 5.2% at 250°. The second solid soln. includes 18–33.5% Ag, the third more than 36% Ag. Also in *Metal Ind.* (London) **38**, 403–6, 415(1931). J. L. GREGG

Copper alloy systems with an α-phase having variable limits and their use for the hardening of copper. M. G. CORSON. *Rev. mét.* **27**, 83–101, 133–53, 194–213, 265–81 (1930).—An account is given of the investigations leading up to the development of the so-called "Corson alloys" which have been the subject of numerous patents in recent years. The alloys consist of Cu with small percentages of Cr, Co, Si, or silicides of Ni, Co, Fe or Cr, all of which constituents have a higher solid soly. at high temps. than at the ordinary temp. Between 20° and 1000° the solid soly. of Cr in Cu varies from 0.05 to 0.8%, of Co from 0.35 to 3.4%, of Co_2Si from 0.3 to 3.3%, of Ni_2Si from 0.7 to 8.2%, of Fe from 0.2 to 3.8% and of Si from 2.8 to 7.5%. Alloys contg. silicides are best hardened by quenching from 800° to 1000° and aging at 250–450°; these alloys should contain a slight excess of the 2nd metal over that required to form its silicide so as to insure max. hardening on aging without the serious fall in elec. cond., which is produced by the retention of Si in solid soln. Photomicrographs of numerous alloys of this type are reproduced, and the effect of heat treatment on the mech. and elec. properties and on the structure is illustrated by graphs and photographs. B. C. A.

X-ray investigation of copper-arsenic alloys. NOBUYUKI KATOH. *Z. Krist.* **76**, 228–34(1930)(in English).—See *C. A.* **25**, 272. L. S. RAMSDELL

Investigation of the effects of impurities on copper. VII. The effect of antimony

on copper. VIII. The combined effect of antimony and arsenic on copper. S. L. ARCHBUTT AND W. E. PRYTHERCH. *J. Inst. Metals*, Advance copy, No. 546, 33 pp.(1931); cf. *C. A.* **24**, 2705.—Alloys contg. less than 0.02% O were investigated. Those contg. up to 0.47% Sb rolled hot, while one with 0.85% Sb was hot short. Annealed ingots contg. up to 0.85% Sb could be cold rolled. All alloys contg. 0.47% or less Sb could be rolled into thin sheet. Sb increases the strength without appreciably affecting the ductility. The endurance limit of the annealed 0.47 Sb alloy was 7.8 tons/sq. in. as compared with 5 or 6 tons/sq. in. for pure Cu. The softening temp. is raised by Sb, its effect being greater than that of As. The limit of soly. of Sb in solid Cu was detd. microscopically as approx. 10%. The addn. of As to alloys contg. Sb had only a slight effect on the properties. All of the alloys had high impact strengths. J. L. G.

The equilibrium diagram of copper-tin alloys. MATSUJIRO HAMASUMI AND SEIJI NISHIGORI. *Kinzoku-No-Kenkyu (J. for Study of Metals)* **7**, 535–51(1930).—There are many structures of Cu-Sn alloys (especially those contg 10–40% Sn) that are hardly explainable by any of the existing diagrams. The latest diagram is probably that of Raper. H. and N. prepd. bar specimens of 15 cm. length and 5 mm. diam. in spite of their glass-like brittleness and measured the change of elec. resistance and the thermal dilatation on heating. Thermal analyses and microscopical examns. on the quenched specimens were made, and the equil of the system in the solid state was detd. There are 2 intermetallic compds., namely, δ and η, in this region, corresponding to the chem. formulas Cu_3, Sn_8 and Cu_3Sn. The compd. δ, formerly considered to have the formula Cu_4Sn, is proved to be Cu_3Sn_8, as pointed out by Westgren. The compound η undergoes a transformation at 675° to the solid soln. γ. This transformation accompanies an expansion of 0.56% of its linear dimension, which is twice as great as that of γ-iron to α-iron. There are 3 eutectoid transformations at 510°, 570° and 630°, corresponding to the equil. $\alpha + \delta \rightleftarrows \beta$, $\delta + \eta \rightleftarrows \epsilon$ and $\beta + \eta \rightleftarrows \gamma$, and 2 peritectic transformations at 580° and 625°, corresponding to the equil. $\delta \rightleftarrows \beta + \epsilon$ and $\epsilon \rightleftarrows \beta + \eta$. The transformation of δ and η into ϵ accompanies a linear expansion of 0.25%, which is nearly equal to the expansion of γ-iron into α-iron. The typical dilatation-temp. and resistance-temp. curves of the samples are shown. The change of the direction of the curves on heating exactly coincides with the equil. diagram given. The existence of the new phase ϵ is also clearly proved by the microscopic examn. of the quenched specimens. M. KURODA

X-ray examination of the lattice structure of the ϵ phase of the copper-tin system. J. O. LINDE. *Ann. Physik* [5], **8**, 124–8(1931).—An alloy with exactly 25 at. % Sn was prepd. from pure materials, melted in a H atm. and carefully homogenized. After powdering in an agate mortar it was heated in an evacuated glass tube for 40 hrs. at 400° and then subjected to the x-ray examn. with an angle range of 25–75°. Extra lines, not formerly observed, were found, which could not be identified as lines of the hexagonal lattice with only 2 atoms in the elementary range. These lines were found to be surprisingly strong by choosing an 0.2 mm. camera opening and an exposure of 17 hrs. Being dissolved into their α doubles, they could be measured very well. The indices of all the lines observed could be detd. These extra lines found indicate a regular distribution of the 2 kinds of atoms in the lattice, which is in agreement with the low elec. resistance of Cu_3Sn. It was not possible to find a simple at. arrangement, with hexagonal symmetry, which would explain all the lines observed. The lattice appears to be very complicated. LEOPOLD PESSEL

Alloys of iron, nickel and chromium. M. A. GROSSMAN. *1st Communications New Intern. Assoc. for Testing of Materials A*, 97–103(1930).—A review of the properties and uses of these alloys. Fe-Ni alloys are used with various proportions of Ni to give high elec. resistance, low thermal expansion, high permeability and to form permalloy (78% Ni). Fe-Cr alloys are used for their stainless properties and stiffness at high temps. Ni-Cr alloys (80–90% Ni, 20–10% Cr) give high elec. resistance combined with resistance to oxidation and are therefore used for elec. heating elements. Fe-Cr-Ni alloys are rustless, readily worked and have a high creep stress. Alloy steels may contain from 0.5 to 4% Cr, giving great hardness, or from 0.5 to 5% Ni to give toughness. Ni and Cr may also be combined with other alloying elements. E. J. C.

Tensile properties of alloy steels at elevated temperatures as determined by the "short-time" method. WILLIAM KAHLBAUM, R. L. DOWDELL AND W. A. TUCKER. *Bur. Standards J. Research* **6**, 199–218(1931).—The materials tested were a plain carbon steel and commercial alloys of Cr, V and Fe with and without addns. of W, Si or Al; also Cr-W, Ni-Mo and several austenitic steels with and without W. Metallographic study revealed very little intercryst. weakness and no marked or significant change in structure resulting from the high-temp. tests. The addn. of W increases the "structural

stability" of the austenitic alloys. Hardness was detd. as a further indication of tempering which might have occurred during the heating. A comparison of "short-time" test and "flow test" for pearlitic and austenitic steel is included. R. R.

Mechanical and physical properties of magnesium alloys. S. L. ARCHBUTT. *1st Communications New Intern. Assoc. for Testing of Materials A*, 251–6(1930)—A review of the results of the investigations carried out during recent years on Mg and its alloys. Important progress has been made in regard to purity of the metal and foundry technic, but intensive research is necessary regarding heat treatment and modification processes. Al, Zn and Cu are the chief alloying elements at present in com. use, and curves are given showing the tensile strength and ductility of binary alloys of Mg with these metals as well as with Ni. Four tables are also included showing the results of numerous tests carried out by various bodies on Mg alloys. E. J. C.

Compression diagrams and temperature-hardness curves of some lead-tin-antimony alloys. EDUARD HERTEL AND ARTHUR DEMMER. *Metallwirtschaft* **10**, No. 7, 125-6(1931) –Compression stress-strain diagrams were prepd. for 12 Pb-Sn-Sb alloys, with samples 20 mm. diam. and 25 mm. high; the load was applied at the rate of 0.01 mm. per sec. These results and Brinell hardness tests are shown in the tabulation. In 10 x-ray examns., the existence of a tetragonal Sn rich, a trigonal Sb-rich and a cubic constituent was found and the absence of any definite Sn-Sb compds. was proved.

No.	Compn. Sn	Pb	Sb	Cu	Ni	Mg	P	Load, kg /sq. mm. at Compression 0.2%	0.4%	0.9%	1 8%	3.6%	Brinell hardness at 20°	100°	Ratio 0.4%/0.2%
	100							2 51	2 94	3 40	3.7	4 03	12 8	5	1.17
		100						2 07	2 58	3.08	3 39	3.69	6 1	3.8	1.24
			100					5 31	8 64	12.54	Broke	....	49.0	34.5	1.06
				100				....	....	....	....	....	63.0	57.0	....
I	50	50						2 57	4 09	4.77	5 20	5 49	14.5	6.8	1.59
II	48	48	4					3.42	4 59	5.56	5.81	5 86	18.6	8.0	1.34
III	44	44	12					4 26	....	7.00	7.47	7 77	24.9	9 5	....
IV	42	42	16					4.36	6 04	7.95	8 51	8 84	28.4	13.0	1 36
V	40	40	20					4.87	6 53	8 86	9.75	10.19	30 0	13.5	1.33
VI	40	40	15	5				5.11	7.33	9 89	10 45	10.87	43.0	22.8	1 43
VII	40	45	10	5				4.44	6.87	9 39	9 98	10 23	30 4	12 4	1 54
VIII	40	40	15	3	2			4.78	7 10	9 89	10 40	10 67	29.7	15.9	1 48
IX	40	40	12	3	5			2 55	3.10	5 17	6.71	6 87	31.2	17.2	1 21
X	40	40	9	3	8			....	....	....	....	....	34.5	17.8	....
XI	40	40	15	3		2		4.97	6 20	8 12	8.86	9.30	....	....	1.24
XII	42	42	10	2		2	2	4.40	6.16	7 21	8.01	8.62	....	....	1.40

C. E. MACFARLANE

Silver-cadmium alloys. E. R. THEWS. *Deut. Goldschmicde-Ztg.* **33**, 56–8(1930). B. C. A.

Alloys of zinc and manganese. N. PARRAVANO AND V. MONTORO. *Mem. accad. Italia, Classe sci. fis. mat. e nat.* **1**, Chim. No. 4, 19 pp.—A study of the binary alloy Zn-Mn by the x-ray method. Alloys studied contained up to 23.3% Mn. In these alloys 3 different phases were detd.: (1) a solid soln. of Mn in Zn, the η phase, with hexagonal lattice that is similar to that of Zn, having up to 0.98% Mn; (2) an ϵ phase with hexagonal lattice different from that of Zn. This corresponds to the compd. $MnZn_7$, which contains 16 atoms ($2MnZn_7$); (3) a γ phase, with body-centered cubic lattice, corresponding to the compd. $MnZn_3$ and having 48 atoms ($12MnZn_3$) per unit lattice. G. T. MOTOK

The influence of third metals upon the constitution of the brasses. III. The effect of tin. O. BAUER AND M. HANSEN. *Z. Metallkunde* **22**, 405–11(1930).—Continuation of previously published articles (cf. *C. A.* **25**, 1202). The exptl. methods are described and the results expressed in diagrams representing sections of the ternary system. The results are summarized in a partial ternary three-dimensional diagram. ROBERT F. MEHL

Influence of the degree of rolling on the properties of α-brass. N. DAVIDENKOV AND V. BUGAKOV. *Metallwirtschaft* **10**, 1–6(1931).—α-Brass (62.95% Cu, 37.03% Zn) was rolled to thicknesses corresponding to reductions varying from 0 to 80%. The tensile strength, elastic limit, elongation, Brinell hardness, the soly in HNO_3 and the micro- and x-ray structure in the rolled condition were investigated. Between 20 and 30% reduction there is a crit. region where all curves of properties plotted against % reduction show discontinuities. On annealing at 200° the change in proper-

ties becomes continuous, showing that the discontinuities are caused by internal stresses. C. H. LORIG

Deep-etch test of brass. W. F. GRAHAM AND L. A. MEISSE. *Trans. & Bull. Am. Foundrymen's Assoc.* **2**, 810–25(1931).—Deep etching of brass with a soln. of HNO_3 (1.42 sp. gr.) and 10% by vol. of HCl (1.18 sp. gr.) clearly brings out areas of discontinuity of the structure caused by sonims, crystal boundaries or dendrites. C. H. L.

Some properties of silicon "Al-bronzes." L. J. BRICE. *J. Inst. Metals*, Advance copy, No. **547**, 18 pp.(1931).—The effect of Si on the mech. properties of Cu base alloys contg. 5, 7¼ and 10% Al was detd. The alloys were tested as cast, as cast and annealed by heating to 800° followed by air cooling, as quenched in oil from 800° or 600° and a few as forged. Si contents were as high as 4.5%. With 5% Al the addn. of up to 2% Si improves the properties. Further increase of Si increases the strength but lowers the ductility rapidly. An annealed 5% Al, 3.5% Si alloy has the properties of a 10% Al alloy. The addn. of up to 4% Si to the 7¼% Si alloy progressively increases the strength and decreases ductility. With more than 3% Si the ductility is so low as to render the alloy useless. The addn. of even 1% Si to the 10% Al alloy produces a very low ductility. A microscopic study of the alloys is included. Also in *Engineering* **131**, 498–500(1931). J. L. GREGG

Repairing pewter. A. EYLES. *Brass World* **27**, 27–8(1931).—The handling of pewter in the old days is outlined and practical notes are given for the reconditioning of old pewter vessels. In repairing old pewter vessels, dents must be removed and all surfaces must be perfectly clean. A good solder consists of Bi 50, Sn 25 and Pb 25%. Fluxes are rosin, Gallipoli oil, olive oil and a mixt. of rosin and olive oil. W. H. B.

A sand-cast test bar for specification purposes for aluminum alloy castings. S. L. ARCHBUTT. *1st Communications New Intern. Assoc. for Testing of Materials A*, 273–6 (1930).—Investigation into the use of a sand-cast bar prepd. in sand molds of special and simple type, with Y-alloy of widely varying gas content, is described. Density, machining and tensile tests on bars so prepd. are compared with corresponding values obtained from chill-cast bars of similar dimensions. The presence or absence of gas is clearly indicated in the results from the sand-cast bars, while relatively little effect is seen in the tests on chill-cast bars. E. J. C.

Magnesium alloy castings. E. PLAYER. *Metal Ind.* (London) **38**, 7–10, 31–2 (1931).—A review is given of the properties and foundry practice. The application of a special flux, Elrasal, which is to prevent the contamination of the metal is described, as well as the use of powd. S in the core material, to obtain clean castings. L. P.

The mechanical work of cutting and dressing rough castings. M. KURREIN *Z. Metallkunde* **22**, 382–6(1930).—A discussion is given of the evaluation of the mech. work performed, and its relation to design, by chisels, milling cutters, saws, grinding wheels and sand blast. The article is too detailed to permit adequate abstracting ROBERT F. MEHL

Some notes on a "burned-on" casting. L. W. BOLTON. *Bull. Brit. Cast Iron Research Assoc.* **1931**, No. 31, 342–3.—Bureau Report No. 68 describes physical and microscopic tests of a gray-iron casting 1.5 in. thick, which had an almost circular hole about 3 in. in diam. filled in by burning on new metal. R. RIMBACH

Some new facts of a chemical nature in the field of corrosion investigations and in the protection of metallurgical products against corrosion. JEAN COURNOT. *Bull. soc. chim.* **47**, 802–25(1930).—A review is given. Among the protective processes mentioned, the electroplating of Ni, Cd, Cr and parkerizing are discussed in greater detail LEPOLD PESSEL

Two years' progress in corrosion resistance. JOHN A. MATHEWS. *Paper Trade J.* **92**, No. 10, 57–8(1931).—A brief review is given of some of the causes of failures of 18–8 alloys, particularly in the sulfite industry. The latest metallurgical theories are given relative to C pptn., and the need for proper heat treatment of metals is stressed, as well as the chem. compn. of the alloys. Means of preventing metal embrittlement is indicated. A. PAPINEAU-COUTURE

The resistance of electrodeposits to corrosion, with special reference to cadmium and zinc. W. S. PATTERSON. *Metal Ind.* (London) **36**, 527–9, 579–82, 632(1930).—Of the 3 different types of corrosion of electrodeposits only the 1st is discussed: the corrosion of the coating metal considered as a continuous envelope sealing completely the metal it is protecting. The effects of impurities and of porosity of deposits upon corrosion were studied under a variety of conditions. Electrodeposited and hot-galvanized Zn are compared. Cd is regarded as an excellent coating for indoor work or for mild conditions of exposure, but for outdoor work where rain and atm. pollution

play an important part Cd fails and Zn is the more satisfactory and durable.
W. H. BOYNTON

Corrosion resistance of light alloys. H. SUTTON. *1st Communications New Intern. Assoc. for Testing of Materials A*, 304–8(1930).—A review of the more important work of British investigators. E. J. C.

The corrosion of aluminum casting alloys. R. STERNER-RAINER. *Z. Metallkunde* **22**, 357–61(1930).—The sensitivity of Al casting alloys toward corrosion is dependent upon the compn. and upon the corrosive agent. Contrary to the usual opinion that the corrosion of Al alloys cannot be improved by addns, it has been shown that all those substances which are effective in scpg. Fe and Si are effective in improving the corrosion resistance. It is not certain that a protective coating forms on Al alloys inhibiting further action, though the effect of small addns. of Sb and Bi furnish some support for such a belief. Other addns. decrease the corrosion resistance, especially Cu. The application of special alloys to special conditions is discussed. R. F. M.

Corrosion resistance of aluminum and its alloys. M. BOSSHARD. *1st Communications New Intern. Assoc. for Testing of Materials A*, 293–303(1930). —The great resistance which Al offers to the action of air, water and aq. salt solns. is due to the formation of a skin of oxide. Corrosion must be divided into 2 classes according to the way in which it occurs: (1) general corrosion, soly.; (2) local corrosion, formation of holes. General corrosion occurs only under the action of corrosive agents which dissolve the oxide. On the other hand, corrosive agents causing local corrosion have at first no oxide-dissolving qualities. The ability to dissolve the inert surface layer locally is a secondary effect of electrochem. action. The effect of impurities (Fe, Si, Cu, Mg, Zn and Mn) on the corrosion of Al is also discussed. E. J. C.

Studies of corrosion in aluminum and aluminum alloys under the microscope. H. RÖHRIG. *Z. Metallkunde* **22**, 362–4(1930); cf. *C. A.* **24**, 1835. —From microscopic studies reported R. concludes: (1) that deliberate or accidental inclusions are more noble to corrosive attack than the Al matrix; (2) that pores or voids offer assistance to the progress of corrosion; (3) that according to the nature of the attacking substance corrosion may proceed intergranularly or along strings of inclusions, or it may proceed concentrically from the starting point without regard for structure—the first is typified by the attack of sea water or sea water accelerated by H_2O_2, the second by boiling phenol or dil H_2SO_4. The purer the Al the fewer are the inclusions from which attack might start. Corrosion resistance may also be improved by heat treatment.
ROBERT F. MEHL

Corrosion of early Chinese bronzes. WM. F. COLLINS. *J. Inst. Metals*, Advance copy, No. **548**, 25 pp.(1931).— The probable mechanism of the formation of patina on early Chinese bronze is discussed in light of the corrosion studies made in England and the mechanism of mineral formation. S was probably not a factor in the corrosion of the Chinese bronzes. The ancient Chinese bronzes are unique in contg. appreciable quantities of Pb. The analyses of a large no. of these bronzes are given. The data also include the probable period of origin. J. L. GREGG

Corrosion of steel water pipes by stray electric currents. OTTO ROTHE. *Rev. brasil. chim.* **2**, 249–54(1930).—After a period of 1–2 years, pipes showed holes which from appearances and the presence of $FeCl_3$ at places not yet perforated made the deduction reasonable that the damage was caused by continuous elec. current. R. tested pipes at various points of the city and found that they were positively charged in relation to the soil around them; the p. d. from the voltage of the trolley car power lines had a max. of 10 v. It was possible to reproduce in the lab. funnel-shaped holes full of $FeCl_3$, similar to the ones in the city water pipes. The perforations occur where the asphalt protection is damaged and the elec. current is permitted to pass. A diagram is given. JOHN M. LADINO

Experiments with coal-fired pot-annealing furnaces. H. STÄBLER. *Stahl u. Eisen* 50, 381–91(1930).—An attempt has been made to elucidate some questions regarding annealing time, fuel consumption, choice of pot, etc., arising from an analysis of the details of operation of annealing furnaces in a no. of works. The max. and min. temps. within the heating stock, in a semi-gas-fired furnace capable of accommodating 5 pots, have been detd. as a function of the time. The annealing time, *i. e.*, the time required for the min. temp. within the material to reach the arbitrarily chosen value of 700°, is a linear function of the wt. of the charge (W) and is given by the equation $T = T_0 + KW$, where T_0 is the time required for the inner wall of the empty pot to reach 700°. The temp. difference, $t_{max.} - t_{min.}$, when $t_{min.} = 700°$, increases linearly with the wt. of the charge until the latter reaches about 1500 kg., when it passes through a max. and thereafter decreases. By suitably regulating the heating conditions, the char-

acteristic temp. curves ($t_{max.}$ and $t_{min.}$ as functions of the time) can be varied to correspond with any desired heat treatment of the material. The calcn. of the efficiency of the plant from the annealing time is discussed and illustrated by 1 or 2 examples.
B. C. A.

Press welding of iron. HANS ESSER. *Arch. Eisenhüttenw.* **4**, 199–206(1930).—E. dets. the relationship between the press weldability of pure Fe or Fe-C alloys and temp welding pressure, surface properties and grain size. Three dimensional diagrams are given, in which tensile strength is plotted against temp. and C content of press-welded Fe-C alloys. With pure Fe, the strength of the welded surface increases with temp. The smaller the grain size the more suitable is the material for welding, and at higher temps. the welding ability increases markedly with welding pressure. With increasing C content in pure Fe-C alloys, the temp. range suitable for press welding becomes lower
H. STOERTZ

The chemistry and metallurgy of Be (DYSON) **6**. Sidelights on Cu as applied to brewing (STEWARDSON) **16**. The melting point in the W–Re system (BECKER, MOERS) **2**. Superstructure and magnetic susceptibility in the system: Cu–Au (SEEMANN, VOGT) **2**. Au and Ag solutions (Brit. pat. 338,383) **18**. Clarifying suspensions [of ores] (Ger. pat. 517,055) **13**. Apparatus for estimating the humidity of foundry sand (Ger. pat. 517,212) **1**. Crystals of metals (U. S. pat. 1,793,672) **18**.

FRENCH, HERBERT J.: **The Quenching of Steels.** Cleveland: Am. Soc. for Steel Treating. 177 pp.

MÜNZER, GEORG: **Das Platin: Gewinnung, Handel, Verwendung.** Leipzig: W Diebener G. m. b. H. 136 pp. M. 6.75.

SUHR, JEAN: **L'almélec.** Paris: Revue de l'aluminum et de ses applications. 11 pp.

Recovering ore values on an adhesive surface. ROYER LUCKENBACH. U. S 1,792,544, Feb. 17. Candle tar with an oil thinner such as crude petroleum is used in sepg. ore constituents such as Au, Ag, Pt or other metals. Na silicate may be added to assist in sepn. of gang.

Apparatus for amalgamation of metal constituents in ores. EDGAR W. MYERS. U. S. 1,794,090, Feb. 24. Structural features.

Reducing iron from iron oxide ores. WM. W. PERCY. U. S. 1,792,507, Feb. 17. Preheated ore is charged into a reducing chamber and subjected to the reducing action of gases comprising CO and H, and after the gases have passed from the reducing chamber a portion of them is withdrawn. The temp. of the remaining gases is maintained, and they are caused to pass downward through a bed of incandescent C in a bottom-blown gas regenerator exterior to the reducing chamber and thence return into the bottom of the reduction zone at a temp. at which complete reduction of the Fe oxide will take place. App. is described.

Working up lead ores and waste. METALLGESELLSCHAFT A.-G. Ger. 514,679, April 29, 1927. Pb ores and waste contg. Pb, such as flue dust, are worked up in a completely rotatable cylinder furnace in which metals such as Zn, Cd and As are volatilized as oxides. The Pb is obtained, without the addn. of C, by the thermal reduction of $PbSO_4$ and PbS with production of SO_2 and SO_3. App. is described.

Working up ores containing zinc, lead and copper. ALBERT F. MEYERHOFER. Ger. 514,537, Dec. 24, 1924. A wet process for working up these ores consists in sepg. the Zn and Pb as sol. fluosilicates, leaving the Cu. The Zn and Pb fluosilicates are sepd. by fractional crystn. and worked up to obtain the metal with regeneration of HF. The Cu remains mostly as CuS and is worked up in the usual way. The detailed steps of the sepn. of the $ZnSiF_6$ and $PbSiF_6$ are given.

Treating zinciferous ores. A. FOLLIET and N. SAINDERICHIN. Brit. 337,636, Oct 19, 1929. Volatile metals in Zn-bearing ores contg. S are extd. by blowing air in 2 stages onto a thin traveling layer of the ore, first onto ore alone for desulfurization and then onto the hot roasted product together with reducing C. App. is described. Cf. *C. A.* **24**, 4499.

Tin from ores, etc. SOC. D'ÉLECTRO-CHIMIE, D'ÉLECTRO-MÉTALLURGIE ET DES ACIÉRIES ÉLECTRIQUES D'UGINE. Brit. 338,149, June 22, 1929. See Fr. 692,640 (*C. A.* **25**, 1481).

Separating and refining metals. HIRSCH, KUPFER- UND MESSINGWERKE, A.-G. (Cyrano Tama, inventor). Ger. 514,612, Aug. 31, 1928. Metals and metallic compds.

of differing m. p. are sepd. by placing them near the perforated bend of a tube and heating to the various fusing temps. of the metals or compds. by elec. induction.

Metal granules from molten metal. HARTSTOFF-METALL A.-G. Ger. 514,623, Dec. 6, 1928. Details of app. for atomizing the molten metal are described.

Floating metal powders. JOHN R. CAIN (to Richardson Co.). U. S. 1,794,585, March 3. A dry powd. metal such as Fe is treated with a volatile oily liquid such as benzene, and after the liquid is evapd. the powder is deposited on an aq. soln. of a metal salt such as a Cu salt soln., the metal of which will be replaced by the metal of the powder, and the resulting powder is consolidated into a foil on the surface of the soln. The product thus formed is suitable for integrating into foils by the action of an elec. current.

Treating impure lead containing copper and arsenic. JOHN B. SCHUETTENHELM (to Bunker Hill & Sullivan Mining & Concentrating Co.). U. S. 1,794,647, March 3. For recovering Cu and As in the form of dross from hot impure lead to purify the lead, the initial dross is skimmed off from a molten mass of the material and the material of the molten mass is caused to continuously circulate (as by the action of a propeller submerged in the bath, in a described app.) downwardly from and then upwardly to the surface of the bath. A charge of NH_4Cl is introduced into the circulating molten mass to sep. the Cu and As from the Pb so that the first two will rise by upward currents and gravity to the surface. The dross is skimmed off to recover the Cu and As from it while the mass is quiescent, the treatment with NH_4Cl and circulation of the material is repeated, and the temp. of the mass is gradually reduced as the process proceeds to freeze the Cu and As and facilitate their isolation by reason of their relatively higher m. ps. as compared with Pb, so that the dross will gradually become drier as the process proceeds.

Separation of gases such as sulfur dioxide from smelter fumes by adsorption under pressure. RUDOLPH L. HASCHE and WM. H. DARGAN (to American Smelting & Refining Co.). U. S. 1,794,377, March 3. An adsorbent material such as silica gel may be used and during "desorbing" sufficient heat is supplied to the material to balance the latent heat of vaporization of the gas and to maintain the temp. of the material substantially constant, so that the process is carried out substantially isothermally.

Ladle for melting metals (suitable for use in dental work). K. BRUDER. Brit. 338,063, Jan. 14, 1929. Structural features of a double-walled ladle the jacket of which may be filled with glycerol or other suitable liquid.

Molding sand mixture for use in casting iron, steel, brass, etc. ROY CROSS (to Silica Products Co.). U. S. 1,795,011, March 3. Inert material such as sand and clay is mixed with about 2.5-5% of bentonite treated to increase its jelling power (suitably by conjoint use of MgO, Ca aluminate, Ca silicate, portland cement or blast-furnace slag)

Binder for mold materials such as sand. MONROE S. CLAWSON. U. S. 1,794,588, March 3. Sawdust, resin and paraffin oil are used together.

Coating molds such as those for casting automobile engine pistons, etc. NELSON J. QUINN (to Metal Castings Holding Corp.). U. S. 1,794,536, March 3. Various mech. details are described for applying a liquid contg refractory material such as MgO to matrix surfaces from a nozzle first placed close to the surface to build up a relatively thick coating rapidly and then held at a greater distance from the surface to produce a surface coating which has the desired degree of porosity.

Ingot mold. EDWARD R. WILLIAMS (to Vulcan Mold and Iron Co.). U. S. 1,795,065, March 3. Ingot molds are made of cupola cast iron which contains less than 0.05% S and has a high resistance to cracking through sudden expansion.

Hot top for ingot molds. WM. H. RAMAGE (to Valley Mould & Iron Corp.). U. S. 1,792,868, Feb. 17.

Hot top for ingot molds. NIKLAS F. EGLER (to Insulated Top Co.). U. S 1,794,840, March 3.

Composite ingots. W. ALBERTS and F. STEIN. Brit. 338,092, Aug. 28, 1929. In casting ingots suitable for rolling into "Vignoles" rails, etc., the partition for sepg. the molten metals forming the ingot is made of practically pure iron and may be perforated or woven.

Ingots for producing non-porous articles such as rock drill pistons, etc. LOUIS G. FIRTH (to Firth-Sterling Steel Co.). U. S. 1,792,581, Feb. 17. Metal such as steel is cast into an ingot having a body portion and flanges extending from the latter, the flanges are longitudinally sepd. from the body portion, and products such as pistons, valve seats or valves are formed from the flanges.

Apparatus for die-casting metal articles. FRANZ F. MANTEI (to Friedrich J. Haas). U. S. 1,793,110, Feb. 17. Structural features.

Casting metals. HARRY ALBERT SCHWARTZ. Ger. 514,875, Mar. 4, 1924. App. for casting metals with cooling by a circulating liquid is described.

Casting slab ingots from deoxidized steel. EMIL GATHMANN. U. S. 1,793,314, Feb. 17. App. and various details for controlling solidification are described.

Casting blooms of aluminum. ELMER P. MCCLURE (to Aluminum Products Co.). U. S. 1,792,545, Feb. 17. Mech. features.

Casting aluminum alloy pistons, etc. FRITZ FEHRENBACH. U. S. 1,792,580, Feb. 17. Al is melted and Si is added in an amt. about 18% or somewhat more of the metal mixt., and to this mixt. are added particles of hard material such as Ag, Cu, B, Be, Zr, Mg, Ti, V, Mn, Mo or Cr to approx. 5% of the ultimate metal mixt. The molten mass is poured into a vertical mold and chilled, so that the hard metal particles are distributed over the surface of the casting.

Aluminum castings. THEODOR LAIBLE. Swiss 143,081, May 11, 1929. In making Al castings, NaCl, KCl, K_2SO_4, wood-charcoal dust, $Na_2B_4O_7.10H_2O$ and cryolite are added to the molten metal. These addns. prevent oxidation of the Al, adsorption of N, H or CO_2 and remove Fe, Si, etc., as scum.

Casting copper alloys. ARTHUR KIRCHHOF. Ger. 513,738, April 16, 1924. Thick castings of Cu alloys are produced by adding CuO to the molten metal just before casting in the proportions of 1 to 2 parts CuO to 50 parts of metal.

Casting "stainless steel" or similar alloys. W. E. MARTIN and J. A. BERLYN. Brit. 337,413, July 29, 1929. Structural details are described of sand molds which may be combined with chills and wire reënforcing in their walls.

Alloys of tungsten or molybdenum carbides. FRIED. KRUPP A.-G. (Hermann Voigtländer and Otto Kaufels, inventors). Ger. 514,728, May 3, 1928. See Brit. 310,876 (*C. A.* **24**, 584).

Ore-roasting muffled-retort furnace. HOWARD S. BAILEY and RAY A. BENNETT (Bailey to Bennett). U. S. 1,792,476, Feb 17.

Calcine-dust seal for ore-roasting furnaces. BENJAMIN G. CALL (to American Smelting and Refining Co.). U. S. 1,793,274, Feb. 17. Structural features.

Blast-furnace tuyère. E. POHL, A. WAGNER and GUTEHOFFNUNGSHÜTTE OBERHAUSEN A.-G. Brit. 338,130, May 10, 1929.

Tuyère for blast furnaces. HOLMES B. GRONINGER. U. S. 1,793,849, Feb. 24.

Drying air for furnace blasts. G. MALYOTH. Brit. 338,244, Aug. 28, 1929. See Ger. 515,216 (*C. A.* **25**, 1480).

Multi-trough hearth furnace for distilling metals such as zinc, mercury and cadmium. E. M. S. INDUSTRIAL PROCESSES, LTD., R. A. STOKES and E. G. L. ROBERTS. Brit. 337,471, Aug. 3, 1929. Structural features.

Metallurgical furnace suitable for annealing, etc. JOSEPH HARRINGTON (to Joseph Harrington Co.). U. S. 1,792,638, Feb. 17. Structural features.

Furnace suitable for continuous heating of metal sheet bars, slabs, billets, etc. FRANK J. WINDER (to Allegheny Steel Co.). U. S. 1,793,037, Feb. 17.

Furnace for heating metal billets and sheets. A. SMALLWOOD and J. FALLON. Brit. 337,362, June 25, 1929. Structural features.

Furnace for heat treatment of small articles in baskets or other containers. FRANK T. COPE (to Electric Furnace Co.). U. S. 1,794,151, Feb. 24.

Heating salt baths for heat treatment of metals. ARTHUR E. BELLIS. U. S 1,792,674, Feb. 17. A low-voltage a. c. is continuously passed directly through the bath material between an electrode immersed in the bath and the metal wall of the pot or container.

Heat treatment and quenching procedure for differential tempering of car wheels. JAMES C. DAVIS. U S. 1,794,445, March 3.

Heat treatment of loaded electrical conductors. V. E. LEGG (to Electrical Research Products, Inc.). Brit. 338,169, Nov. 24, 1928. In making Cu conductors loaded with magnetic material, with heat treatment, the Cu is first heated to about 1000° in the presence of a reducing agent such as charcoal (in a closed vessel in a resistance furnace) and afterward the loading material is applied, followed by further heat treatment and annealing. App. is described.

Apparatus for conveying materials such as metal bars or sheets through heat-treating furnaces. LEONARD LARSON (to Republic Steel Corp.). U. S. 1,793,940, Feb 24. Structural features.

Apparatus for annealing arched metal sheets. WM. E. WATKINS (to Copper Plate Sheet & Tube Co.). U. S. 1,794,659, March 3. Structural features.

Iron. WALTER G. CLARK. U. S. 1,792,967, Feb. 17. For producing a substantially C-free metal, iron is melted and heated air is blown through it until about 75% of the Fe is converted into oxide, the residual air is displaced with N and heated H is then blown through the mass until the oxide is reduced to metal and until the C content of the metal is reduced to the desired limit.

Cast iron. EDWARD R. WILLIAMS (to Vulcan Mold and Iron Co.). U. S. 1,793,268, Feb. 17. For making cast iron with a pearlitic structure, a charge of low Si and C contents is melted, the S content is reduced to below 0.05%, the molten metal is poured into a mold which is at room temp. and the casting is cooled normally without application of external heat.

Cast iron. MEEHANITE METAL CORP. Brit. 337,844, Aug. 13, 1929. Iron which has been produced by methods such as are described in Brit. 210,118 (*C. A.* **18**, 1640), Brit. 292,164 (*C. A.* **23**, 1382) and Brit. 312,126 (*C. A.* **24**, 819) is heat-treated by maintaining the casting at a temp. above the Ac_1 point (about 800°) for over 12 hrs. and then cooling (the first stage of cooling—as from about 900° to about 540°—being at a rate not exceeding about 10° per hr.).

Iron and iron alloys. T. D. YENSEN and N. A. ZIEGLER (to Associated Electrical Industries, Ltd.). Brit. 338,409, Jan. 18, 1929. For obtaining iron or alloys of Fe with Ni or Si, substantially free from C and O, there is added to the material such a quantity of either C or O that these elements are present in substantially equal atomic proportions and the material is melted while simultaneously removing the products of combustion as they are formed (as by evacuation or passing an inert gas through the furnace). C may be added as such and O may be added as free O, air or an Fe oxide or oxide of an alloying ingredient. The product may be allowed to solidify in a vacuum and cooled slowly from 900–1200° to normal temp. (with previous hot working if desired).

Heat treatment of iron and steel sheets. HERBERT M. COX and CARY M. SMITH (to Republic Steel Corp.). U. S. 1,792,573, Feb. 17. The sheets are heated to a temp. near the lower crit. point of the metal and maintained at this temp. for a time varying from $\frac{1}{2}$–6 min., then heated to a temp. above the upper crit. point of the metal, maintained at such temp. for 2–6 min., then cooled rapidly to a temp. below the lower crit. point of the metal, maintained at such temp. for 2 min. or less, reheated to a temp. near the lower crit. point of the metal, maintained at this temp. for 2–8 min. and then permitted to cool to atm. temp. This treatment gives the metal good drawing and stamping properties.

Protecting iron and steel from corrosion. A. FOLLIET and N. SAINDERICHIN. Brit. 337,562, Oct. 10, 1929. Articles of iron or steel are heated to 850–1050° in a mixt. comprising finely granulated Al free from Cu or Zn (the Al_2O_3 present as impurity not exceeding 6%), an inert material of high thermal cond. such as SiC free from graphite (this material constituting 40–60% of the volume of the mixt.), and 2–5% of one or more chlorides of non-ferrous metals alloyable with Fe, such as Cr, Ni or Mn. Double chlorides may be used and NH_4Cl 1.0–2.5% may also be added. A layer of an alloy of Fe, Al and the metal of the chloride used is formed on the articles.

Protecting iron and steel from corrosion. A. FOLLIET and N. SAINDERICHIN. Brit. 337,635, Nov. 28, 1929 A protective surface alloy is formed on iron or steel articles by embedding them in a mixt. of Al or Al-Mg alloy, oxides or oxidized ores of metals to be alloyed with the iron or steel (such as ilmenite, calcined pyrolusite, calcined garnierite or roasted nickeliferous pyrites, chrome Fe ore or wolframite), and 2–10% of one or more chlorides of the same metals. By heating in mixts. of this kind surface alloys are formed such as chrome-Ni steel, Ti-Mn steel or the like. Cf. *C. A.* **24**, 4254.

Open-hearth steel. ALEXANDER L. FEILD (to Republic Steel Corp.). U. S. 1,794,068, Feb. 24. A melted charge is refined in the presence of a slag in which a substantially constant percentage of Fe oxide is maintained by necessary tests and adjustments.

Open-hearth steel. GLENN E. HILLIARD. U. S. 1,793,442, Feb. 17. A molten bath of carbonized metal in the furnace is maintained in mobile condition and a strongly oxidizing flame is passed over the bath to effect oxidation of impurities. Finely divided scrap is introduced at such a rate of speed and in such volume that it is heated "nearly to molten condition" while approaching the surface of the bath but is not excessively oxidized by the flame.

Hardening steel by nitridation. F. KRUPP A.-G. Brit. 337,404, May 25, 1928. Nitridized articles of high resistance to stresses produced by high pressure or impact are made from steel free from Al and contg. Cr 1–20, C 0.25–3.0, W 0.5–3.0% and up to a total of 3% of Si, Mn, V and Mo (not more than 1% of any one of these). A

temp. of about 500° and a time of about 70 hrs. is suitable for the nitridation. Cf. *C. A.* **24**, 818.

Treating steel scrap in open-hearth furnaces. GLENN E. HILLIARD. U. S. 1,793,441, Feb. 17. Fine metal scrap is introduced into open-hearth furnaces in the form of a free-falling stream of such volume and at such rate that the occluded air will be consumed by the furnace gases while the scrap is moving into charged position.

Stainless steel. POLDIHÜTTE A.-G. Ger. 514,944, Sept. 2, 1923. An acid- and rust-proof steel contains Ni 20–25, C 0.2–0.8, Cr 9–27 and not more than 0.5% Mn or Si. Cf. *C. A.* **25**, 1792.

Alloys resistant to corrosion at high temperatures. R. A. HADFIELD. Brit. 337,893, Sept. 11, 1929. An alloy suitable for elec. furnace resistors contains Fe together with Cr 24–35, W 3–5, and Al 3–7%, the proportions of C, Mn and Si being low (suitably about 0.6, 0.3 and 0.6%, resp.).

Aluminum alloys. ALUMINIUM-INDUSTRIE A.-G. Brit. 337,922, Oct. 12, 1928. Elongation and bending and rolling capability of sheets, bands, wires, etc., of Al alloys of high tensile strength is improved by plating them with an Al alloy of lower tensile strength but of high elongation and good bending and rolling capability such as one contg. Mn 1–4, Mg 0.5–6% and up to 1% Sb, or one contg. Mn 0.5–2, Mg 0.3–1 and Si 0.5–2%, or up to 2% of Pb. Various details of manuf. are given.

Aluminum alloys. BIRMINGHAM ALUMINIUM CASTING (1903) CO., LTD., and P. PRITCHARD. Brit. 337,558, Oct. 9, 1929. Alloys comprising Al 94.5–96, Mg 3.5–5.0 and Mn 0.5% are made by melting Al and Mg and adding a melted Al-Mn alloy.

Aluminum alloys. ALUMINIUM-INDUSTRIE-A.-G. Swiss 142,629, Sept. 23, 1929. An alloy suitable for vehicle buffers contains Al, with Mg 0.3–1, Si 0.5–2, Mn 0.5–2 and Cu 3.5–5%.

Copper alloys. HANS KANZ. Swiss 141,610, Feb. 1, 1929. An alloy for grinding contains Zn 15–50%, up to 8% Sn, and Cu, with addn. of any of the metals Al, Fe, Mn, Ni, Sb, Pb or Si. The example mentions an alloy contg. Cu 62, Sn 4, Zn 30, Pb 2.5 and Ni 1.5%. Cf. *C. A.* **25**, 908.

Copper alloys containing also silicon, nickel, iron and zinc. EUGEN VADERS U. S. 1,792,944, Feb. 17. Casting alloys suitable for tools are formed mainly of Cu together with Si 1–4, Ni 1–5, Fe 4–6 and Zn 8–20%. Cf. *C. A.* **24**, 4503.

Iron alloys. WILLOUGHBY S. SMITH, HENRY J. GARNETT and JOHN A. HOLDEN Ger. 512,727, April 29, 1928. An alloy of high permeability for use in elec. circuits contains 4–10% Cr, 1–4% Al, 0.05% C and the rest Fe.

Iron alloys. VEREINIGTE STAHLWERKE A.-G. Brit. 338,071, Jan. 30, 1929. In the manuf. of Fe alloys, the rusting tendency of the alloy is detd. rapidly by first testing in the normal way the power of the material to withstand vibration stresses, and then ascertaining the power of the material to withstand vibration stresses while exposed to the corrosive action of water or moist air during the vibration test (the method being based on the fact that the rusting of steel proceeds in the same proportion as the resistance to fatigue stresses is reduced in the corrosion-fatigue test).

"Rustless" iron alloys. FREDERICK M. BECKET and JAMES H. CRITCHETT (to Electro Metallurgical Co.). U. S. 1,793,153, Feb. 17. In prepg. a low-C alloy of Fe and Cr of "rustless" character, the metal bath is side-blown with a blast contg. 50% or more free O to effect oxidation of constituents of the bath including C and a minor proportion only of the Cr and the temp. of the bath is raised to and maintained above 1600° solely by the exothermic reactions induced by the blowing operation, and the blowing is continued until the C content of the bath is reduced to 0.2% or less.

Iron-chromium alloys. SKODA WORKS, PLZEN. Brit. 337,767, April 18, 1929. Fe-Cr alloys contg. Cr 20–40 and C 0.2–3% contain also Ti 1–15 (preferably 1–5) and up to 15% of Al (preferably 5% or less).

Spongy metals. HENNING G. FLODIN. U. S. 1,792,532, Feb. 17. See Fr. 662,960 (*C. A.* **24**, 330).

Steel alloys containing chromium. F. KRUPP A.-G. Brit. 337,349, June 26, 1929. Austenitic Cr steel or Cr-Ni steel alloys contain also such a proportion of V or Ti or both as to enter into stable combination with the C dissolved by the austenitic basic mass and retain the alloy in austenitic form even when it is heated to 500–800°. The quantity of Ti or V is preferably at least twice that of the C.

Alloy steels. W. MATHESIUS and H. MATHESIUS. Brit. 337,715, March 16, 1929. In making Ti steel, previously decarburized and deoxidized liquid steel is passed from a ladle through a discharge brick in the bottom into a second ladle contg. pulverized or briquetted Ti thermic mixt.

Alloy steels. R. SERGESON. Brit. 338,315, Oct. 18, 1929. Alloy steel articles

which have been nitrided at about 460–560° for about 5–100 hrs. are reheated to between 590° and the lower crit. point of the core material (preferably about 650°) to decrease the brittleness and increase the toughness of the case. An example is given of the treatment as applied to a steel contg. C 0.32, Mn 0.56, Si 0.18, Cr 1.43, Mo 0.18 and Al 1.3%.

Alloy steels. J. T. Whiteley (to I. W. Heyman and S. L. Zavon, trading as Multi-Steel Co.). Brit. 337,919, Jan. 24, 1929. Alloys are formed contg. C 0.2–0.5% together with Mo 0.4–0.75, Cr 0.1–0.3, Si 0.2–0.5, Mn 0.5–1.0, Zr 0.5–1.5, Ti 0.1–0.3, Cu 0.5–0.9 and Ni 0.1–0.35%, and may be hardened by heating to about 925–950° and quenching.

Magnesium alloys. I. G. Farbenind. A.-G (Adolf Beck and Hugo Dibelka, inventors). Ger. 517,162, July 26, 1928 Addn. to 493,827 (*C. A.* **24**, 2713). The method for rendering the surface of Mg alloys non corrosive, described in 493,827, is modified by moistening the surface with dichromate soln. and drying, before carrying out the dichromate and HNO_3 treatment

Magnesium alloy suitable for pistons of internal-combustion engines. Walther Schmidt (to I. G. Farbenind A.-G.). U. S. 1,793,023, Feb. 17. Mg is alloyed with other metals such as Cu 15, Al 2 and Si 3%.

Strengthening magnesium and its alloys. I. G. Farbenind. A.-G. Brit. 337,706, March 11, 1929. The strength, especially the compression yield point, of Mg and its alloys is improved by hot working (suitably at 200–500°).

Silver alloys. Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler. Ger. 514,772, Apr. 7, 1926. Alloys of Ag-Cu and Ag-Cu-Cd are improved by heating to glowing to a temp. just below that at which fusion commences and quenching. The process may be repeated with cold mech. working between the processes. In an example, a Cu-Ag alloy is heated to 730° and cooled in water.

Tungsten-carbide alloys. Joseph T. Terry. U. S. 1,792,943, Feb. 17. For controlling the C content of a W carbide alloy to prevent the formation of graphitic carbon, CaO is added to W and the mixt. is fused in a carbon crucible.

Steam and vacuum treatment system for drying spools of water-quenched wire. Charles B. Carr (to Western Elec. Co.). U. S. 1,793,275, Feb. 17. App. and various details of steam and vacuum treatments are described.

Pickling metals with acid solutions. Vanderveer Voorhees (to Standard Oil Oil Co. of Ind.). U. S. 1,793,146, Feb. 17. An acid soln. such as a 5–10% soln. of H_2SO_4, for use in pickling metals such as iron or steel, is prepd. with an addn. of org. substances recovered from sludge derived from a cracked petroleum distillate sol. in dil. H_2SO_4 but free from sludge substances sol. only in strong H_2SO_4. These substances serve to inhibit corrosion of the metal.

Pickling bath for steel plates, wire, etc. Edwin C. Wright (to National Tube Co.). U. S. 1,792,958, Feb. 17. A 5% H_2SO_4 soln. is used with an addn. of about 0.05% of a sulfonated product of coal-tar distillates b. 270–350° (other than anthracene oil), which serves as an inhibitor.

Purifying acid waste liquors such as those from pickling steel. John T. Travers (to Ohio Sanitary Engineering Corp.). U. S. 1,793,342, Feb. 17. Acid waste liquors contg. Fe salts are treated with a mixt. of lime and a solid waste product recovered from an alkali plant, the latter being in a quantity about 4 times that of the lime.

Case-hardening (nitriding) metal articles. John J. Egan (to Electro Metallurgical Co.). U. S. 1,793,309, Feb. 17. Articles such as iron alloys are heated in the presence of a nitriding agent such as NH_3 and at least one of the N oxides.

Local case-hardening of metals. Aubert & Duval Freres. Ger. 517,077, Nov. 18, 1927. The parts to be protected from nitridation are coated with a salt or a salt mixt., or with a glaze, enamel or the like, *e. g.*, with KCl or with a mixt. of $BaCl_2$ 2, KCl 1.5, $CaCl_2$ 1 and NaCl 1.25 parts, or with a mixt. of PbO 7, sand 2 and borax 1 part. The parts to be protected may be painted with water glass and the powd. salt, etc., then applied.

Sealing metals to insulating materials such as glass. N.-V. Philips' Gloeilampenfabrieken. Brit. 337,491, Aug. 12, 1929. In forming vacuum tubes, etc., comprising metal members such as rings or disks sealed to glass or the like, the metal at the point of union consists of an alloy preferably contg. 50–90% Fe together with one or more of the elements W, Mo, Ta, Cb, Co or Si, the coeff. of expansion of the metal being about the same as that of the insulating material with which it is to be united. Substances such as Cr, Al or Mg (preferably less than 5%) which form a coherent oxide film also may be added. Various structural details of manuf., etc., are described.

Apparatus for spraying metallic materials. Theo E. Bridger. Swiss 141,331,

Mar. 21, 1929. The metal is finely divided, centrifuged and subjected to an intermittent elec. current in an atm. of indifferent gas. Cf. *C. A.* **24**, 51.

Coating articles with vaporized or atomized metals, etc. KURT RICHTER. Ger. 517,419, Dec. 8, 1928. Low-pressure vaporization or cathodic atomization of the coating materials is effected in a flattened vessel having a relatively small vapor space through which a gas stream is led at a high velocity. Back-diffusion of the coating material is thus diminished.

Protective coatings on metals. A. ARENT. Brit. 338,221, Aug. 20, 1929. Metals such as iron or steel are provided with a protective coating or surface layer by treatment with a soln. of a chloride of As, Sb or Bi in a substantially non-aq. solvent such as C_6H_6, kerosene, acetone, AmOAc, EtOAc or their mixts. or with the vapor of such a soln. if a volatile chloride is used. The material may be preliminarily coated with Zn if desired, and a surface thus prepd. is suitable for further coating with paint, etc.

Coating and coloring aluminum alloys. A. PACZ. Brit. 338,204, Aug. 16, 1929. A colored protective coating is formed by treatment with a soln. contg. chromates or dichromates or both in quantity not exceeding 0.17% by wt. calcd. as CrO_3 and a comparatively large quantity of an alk. substance such as not less than 1.5% of Na_2CO_3. Various colors are produced depending on the compn. of the Al alloys, which may contain Si, Zn, Mn, Sb, Mo, Cu, Ag, Sn or W; small quantities of metal salts may be added to modify the coloring.

Coating iron or steel sheets, etc., with metals such as zinc-aluminum alloy. AMERICAN ROLLING MILL CO. Brit. 337,399, July 29, 1929. The metal to be coated is passed successively through a flux, a bath of molten Pb and a bath of molten Zn-Al alloy contg. 3–20% Al. App. and various details of operation are described. Cf. *C. A.* **25**, 909.

Apparatus (with squeezing rolls) for coating metal sheets with materials such as tin. EDMUND W. SHINN and ROBERT H. SCOTT. U. S. 1,794,093, Feb. 24. Structural features.

Determining the thickness of metal coatings such as tin and chromium. WESLEY A. RICHARDS and PAUL H. KRAMER. U. S. 1,792,606, Feb. 17. The coating is liberated by a stripping acid such as 37% HCl so that the salt of the coating will be in reduced condition. The reduced salt is measured by means of I soln. and starch as an indicator in the reaction reagent.

Cement mixture suitable for uniting metals. WM. R. CHAPIN. U. S. 1,793,156, Feb. 17. Silico-Mn 65 and powd. borax glass 1–10 are used with fine steel filings to make up about 100 parts total. U. S. 1,793,157 specifies silico-Mn 40, powd. Cu 25 powd. borax glass 1–10 and fine steel filings to make a total of about 100 parts. Cf. *C. A.* **24**, 5281.

Uniting iron with other materials such as tin or nickel. WM. H. SMITH. U. S. 1,793,757, Feb. 24. In forming alloys of Fe, finely divided iron such as "sponge iron" is assocd. with the other alloy elements such as Sn or Ni while still comparatively cold, and the assocd. materials are pressed into the general desired form so that they hold together by adhesion. They are then heated to a temp. somewhat below the m. p. of the iron to partly fuse the mass, heated up to alloying temp., and then subjected to pressure to effect final alloying and shaping.

Hard metal composition for cutting tools and dies. FLOYD C. KELLEY (to General Elec. Co.). U. S. 1,794,300, Feb. 24. A powd. mixt. consisting largely of W but contg. appreciable quantities of C and Co is treated with a small percentage of an alkyd resin and moistened with a solvent such as acetone. The material is pressed, heated sufficiently to vaporize the solvent and resin, further heated to sintering temp. and subjected to pressing while highly heated.

Use of tungsten carbide for making hard tough metal products. SAMUEL L. HOYT (to General Elec. Co.). U. S. 1,794,229, Feb. 24. Powd. W carbide is mixed with a cementing metal such as Co and the mixt. is pressed into the desired form to make tool bits or other articles, sintered into a hard mass and then subjected to pressure while subjected to a sintering temp. Cf. *C. A.* **24**, 5016.

Apparatus for flexing metal wire or strips such as iron or steel while immersed in a liquid such as sulfuric acid to remove surface impurities. FRANK M. DORSEY (to Madsenell Corp.). U. S. 1,793,914, Feb. 24.

Filaments of material such as metals. GEORGE F. TAYLOR (to Baker & Co.). U. S. 1,793,529, Feb. 24. Material such as a metal of low or high m. p. sheathed with borax, glass or quartz is drawn into a cored filament while heated to render it sufficiently fluent and the cored filament is solidified close enough to the heated substance so that the substance will flow to the point of soldifying. App. is described.

Indented metal foil. ALUMINIUMWERKE A.-G., RORSCHACH. Brit. 337,716, May 24, 1929. Metal foils with deep indentations are formed by passing smooth foil through goffering rollers together with paper which is subsequently burned away in an annealing process (suitably at 300–550°).

Metal bearings. HENRY L. BARTON (to General Motors Research Corp.). U. S. 1,792,565, Feb. 17. Powd. bearing metal such as finely comminuted Babbitt alloy is placed in a bearing back and subjected to pressure to cause it to unite with the back in good heat-conducting relation.

Magnetic material comprising nickel, chromium, cobalt and iron. GUSTAF W. ELMEN (to Bell Telephone Laboratories, Inc.). U. S. 1,792,483, Feb. 17. A material comprising Ni 10–80 and Co 5–80, Fe between 9 and 50% of the entire Ni-Fe-Co content and Cr up to 12% is heat-treated to give it good magnetic properties with small magnetizing forces, and is suitable for use in making loading coils of signaling systems, etc. Cf. *C. A.* **25**, 678.

Metal for use in spark-plug manufacture. A. A. POSTNIKOFF and E. P. ZEREKIDZE. Brit. 337,889, Sept. 7, 1929. The metal surfaces exposed to the combustion gases are coated with Cr or a Cr alloy to a thickness of 0.0001–0.00025 in.

Cutting elements for paper-making engines. CLARENCE W. NOBLE (to Noble and Wood Machine Co.). U. S. 1,792,546, Feb. 17. The side portions of cutting edges are formed of relatively hard metal such as Cr and the central portions of softer metal such as steel.

Welding electrode. JOHN G. RITTER (to Westinghouse Elec. & Mfg. Co.). U. S. 1,794,983, March 3. Welding electrodes formed of an alloy of Fe 65–45%, minor impurities and Ni 35–55% produce welded joints substantially free from residual stresses by deposition at a temp. near or below its low annealing temp. Various details of temps. for working with varying compns. of alloy are described.

Arc electrodes for welding. J. H. AITCHISON, H. BULL and L. JOHNSON. Brit. 337,589, Oct. 25, 1929. Billets are formed of one or more metals of an alloy to be welded (such as Cr steel for welding "stainless steel") and are provided with one or more longitudinal cores or coverings of the other metal or metals of the alloy to be welded (such as Ni), and the composite billet is worked into composite electrodes by rolling, forging or drawing. Various details and modifications of manuf. and compns. for electrodes are given.

Electrode for metal deposition by the electric arc process. ARTHUR P. STROHMENGER (to Quasi-Arc, Inc.). U. S. 1,794,042, Feb. 24. An electrode is formed with a flux-forming covering and a ferrous core contg. a quantity of Mn dependent on its diam. and varying inversely as the diam. from 2.25% to 4.0% for cross sections of electrode cores from 0.042 to 0.005 sq. in. This proportion of Mn avoids a brittle zone in the deposit. Cf. *C. A.* **24**, 52.

10—ORGANIC CHEMISTRY

CHAS. A. ROUILLER AND CLARENCE J. WEST

The determination of the empirical formula of a hydrocarbon. EDWARD W. WASHBURN. *Bur. Standards J. Research* **5**, 867–90(1930).—The precision aspects are discussed of the problem of detg. the mol. wts. and H content of a hydrocarbon, and of combining the results so as to obtain the empirical formula. "A detn. of the Br (or other) addn. no. may, in some instances, be substituted for the mol.-wt. detn. or for the combustion analysis, or may be utilized to decrease the accuracy which would otherwise be required in either or both of these detns." By following the lab. procedure outlined it should be possible to det. the empirical formula of any pure hydrocarbon contg. not more than 100 C atoms. R. E. SCHAAD

Formation of carbon tetrachloride from the elements. ALFRED STOCK, HERMANN LUX AND WERNER WUSTROW. *Z. anorg. allgem. Chem.* **195**, 149–57(1931).—Specially prepd. C made from filter paper and well outgassed was used. This prepn. was placed in a quartz tube in a furnace at either 400° or 500° (only 2 temps. were studied) and measured amts. of Cl_2 were admitted; the contents of the tube were analyzed at various periods. CCl_4, HCl and traces of CO_2 were found. Heating periods were for as long as 90 hrs. Activation of the C was attempted. The effect of HCl on the reaction vessel was also studied; in 70 hrs. 3.7 cc. HCl was quantitatively converted into H_2O. Cl_2 had practically no effect on the glass. WILLIAM E. VAUGHAN

Pentane. C. R. NOLLER. *Org. Syntheses* **XI**, 84–6(1931).—Details are given for

the prepn. of C_6H_{12} from $Me(CH_2)_2CHBrMe$ through the Grignard reaction; yield, 50–3%. C. J. West

Carotene. III. Hydrogenation and optical properties of carotene and its hydrogenated derivatives. James H. C. Smith. *J. Biol. Chem.* **90**, 597–605(1931); cf. *C. A.* **24**, 3794.—By reduction of carotene (I) in Et_2O with Al-Hg, filtering and drying *in vacuo*, *dihydrocarotene*, $C_{40}H_{58}$, was obtained as a noncrystallizable orange compd., $[\alpha]_D^{18}$ 41.9° (Et_2O), 38.0° (EtOH). I had $[\alpha]_D^{18}$ −63° ± 17% (CS_2). The degree of hydrogenation by Adams' catalyst varied with the amt. of catalyst. With 5.2 g. I in cyclohexane and 0.126 g. catalyst, 9 mols. H_2 was absorbed to give a colorless oil, $C_{40}H_{74}$, *octadecahydrocarotene* (II), $[\alpha]_D^{14}$ 7.56° (CS_2), $d_4^{29.2}$ 0.8828, d_4^{80} 0.8524, $n^t{}_D$ 1.4962 − 0.000367 *t*, M_D 180.3 (calcd. for straight chain 178.2). With 0.85 g. I and 1.84 g. catalyst, 10.23 mols. H_2 was absorbed to give a clear viscous oil, $C_{40}H_{76}$, *eicosahydrocarotene* (III), $b_{0.0001}$ 206°, $[\alpha]_D^{20}$ 0.337°, $n_D^{24.2}$ 1.4821, $d_4^{24.2}$ 0.8748, M_D 181.42 (calcd. for straight chain 180.32). From the low mol. exaltations of II and III the presence of the cyclopropane rings is deduced. The steady decrease in rotation on hydrogenation shows that the 2 linkages hardest to sat. are those producing asymmetry. The 2 bonds reducible by Al-Hg are probably attached to rings (Kuhn and Winterstein, *C. A.* **23**, 4682). A structure of 9 conjugated double bonds, conjugated further with 2 cyclopropane rings, is assigned to I; this agrees with the formula of Karrer, *et al.* (*C. A.* **25**, 519). K. V. Thimann

A method for the preparation of substituted acetylenic hydrocarbons. René Truchet. *Compt. rend.* **191**, 854–6(1930).—Methylacetylenes are satisfactorily prepd. by treating a Na acetylide with Me_2SO_4, $PhSO_3Me$ or *p*-$MeC_6H_4SO_3Me$. The reaction with aromatic SO_3H acids appears to be perfectly general, 45–60% yields resulting from treating RC : CNa with various sulfonic esters for 3 hrs. at 80°, decompg. with H_2O, extg. with Et_2O, drying over $CaCl_2$, distg. *in vacuo* and redistg. at atm. pressure. C_6H_{11}-C : CNa (I) plus *p*-$MeC_6H_4SO_3Et$ (II) gave 45% of *3-nonine*, b. 155–7°, d_{20} 0.763, n_{20} 1.429, M. R. 41.9 (calcd. 41.77). $C_6H_{11}C$: CNa with II gave *3-decine* (47% yield), b. 175–6°, d_{21} 0.765, n_{21} 1.433, M. R. 46.6 (calcd. 46.4). I with *p*-$MeC_6H_4SO_3Bu$ gave *5 hendecine* (60% yield), b. 195–6°, d_{20} 0.785, n_{20} 1.437, M. R. 52.0 (calcd. 51.1). I with $PhSO_3C_7H_7$ gave *amylallylacetylene*, b_{12} 74.5–5.5°, d_{20} 0.788, n_{20} 1.445, M.R. 46.2 (calcd. 46). By-products of these reactions may be ethers produced by heating the sulfonic esters, alcs. from sapon. of the esters or 1-chloroacetylenic hydrocarbons resulting from the presence of small quantities of sulfonyl chloride. These chloroacetylenes are especially hard to remove so care should be taken to use esters contg. none of the chloride. C. H. P.

Preparation of chlorinated acetylene derivatives. Stephan Langguth. *Chimie & industrie* **25**, 22–5(1931).— Directions are given for the prepn. of $SbCl_5$, $SbCl_6$, $C_2H_2Cl_4$, $C_2H_2Cl_2$, CCl_2:CHCl and $(PhNH)_2C$:CHNHPh. A. Papineau-Couture

The higher alcohols of the paraffin series and their technical significance. Schrauth *Chem.-Ztg.* **55**, 3, 17–8(1931).—The higher alcs. are now available, made by reduction of the corresponding acids. Various uses are indicated, chiefly as the sulfuric and sulfonic acid derivs. in *medicine* and as *emulsifying agents;* as esters in *perfumery* and as *waxes.* T. H. Chilton

Some α,α-dichloro and α,α-diethoxy tertiary alcohols and the hydroxy aldehydes derived from them. A. Avy. *Bull. soc. chim.* [4], **49**, 12–8(1931).—The general problem of prepg. α-HO aldehydes of the type $R_2C(OH)CHO$ (I) from $R_2C(OH)CHCl_2$ (II) and $R_2C(OH)CH(OEt)_2$ (III) was investigated. Type II compds. were prepd. by treating Cl_2CHCO_2Et (IV) with the suitable organomagnesium bromide since the bromides gave better yields than the iodides used heretofore. IV was obtained in 90% yield by boiling for 6 hrs. 100 g. Cl_2CHCO_2H with 300 g. abs. alc. in the presence of 3 cc H_2SO_4. $Me_2C(OH)CHCl_2$, obtained in 74% yield, m. 8°, b_5 38°, b_{10} 52°, d_4^0 1.2507, d_4^{19} 1.2363, n_D^{19} 1.4598. $Et_2C(OH)CHCl_2$ (V), obtained in 70% yield, b_{14} 76°, d_4^0 1.1999, d_4^{21} 1.1750, n_D^{21} 1.47102. $EtCOCHCl_2$ is obtained in the proportion of 12 g. to 100 g V, in the prepn. of V. $Pr_2C(OH)CHCl_2$ and $Bu_2C(OH)CHCl_2$ were obtained by this method in very poor yield (15%) and in an impure state. $Ph_2C(OH)CHCl_2$ (VI), obtained as chief product along with Ph_2 and an unidentified very slightly sol. compd., b_5 200°, crystals from a mixt. of Et_2O and petr. ether, m. 95–6°. $PhCH_2MgBr$ acted on IV to form dibenzyl as the only isolated product. Type III compds. were prepd. more

Type III compds. are more sensitive to the action of mineral acids than type [illegible] $Me_2C(OH)CH(OEt)_2$ (VII), obtained in 70% yield, b_{19} 75°, d_4^0 0.9478, d_4^{24} 0.9277, n_D^{24} 1.41109. $Et_2C(OH)CH(OEt)_2$ (VIII), obtained in 83% yield, b_{18} 95°, d_4^0 0.9409, d_4^{21}

0.9230, n_D^{21} 1.4255. $Pr_2C(OH)CH(OEt)_2$ (**IX**), obtained in 70% yield, b_6 98°, d_4^0 0.9261, d_4^{22} 0.9073, n_D^{22} 1.4258. $Bu_2C(OH)CH(OEt)_2$ (**X**), obtained in 70% yield, b_3 101°, b_7 122°, d_4^0 0.9167, d_4^{20} 0.9001, n_D^{20} 1.4315. $Ph_2C(OH)CH(OEt)_2$ (**XI**), obtained in 55% yield, b_4 170°, m. 125°. Attempts to prep. type I compds. by heating type II compds. with $CaCO_3$ suspended in water, Na_2CO_3, PbO and water for various periods at various temps. never resulted in the isolation of type I compds. though small amounts of impure $Et_2C(OH)CHO$ (**XII**) were obtained by refluxing 72 g. V for 36 hrs. with 300 cc. water and 50 g. $CaCO_3$, extg. with ether, drying and fractionating, when 15 g. of a yellow oil b_{15} 55–7° was obtained which gave a semicarbazone (**XIII**) of **XII**, m. 204–5°. Hydrolysis of **XIII** with aq. $(CO_2H)_2$ gave a liquid b_{13} 28°; semicarbazone m. 210°; oxime m. 62°. Analysis indicates these compds. are derived from **XII** after elimination of 1 mol. of water. Hydrolysis of type III compds. with warm dil. HCl yielded type I compds., but with cold concd. HCl intermediate compds. of type **XIV** apparently resulted according to the scheme: $2R_2C(OH)CH(OEt)_2 \longrightarrow R_2C(OH)CH(OH)OEt + R_2C(OH)CHO \longrightarrow O.CR_2.CH(OEt).O.CHC(OH)R_2$ (**XIV**) + H_2O. Type **XIV** compds. on further hydrolysis yield type I compds. When 10 g. of **VII**, 2.5 g. water and 3.5 g. concd. HCl stood 24 hrs. in a flask and were then extd. with ether there was obtained 5 g. of a sirupy liquid, b_{12} 105°, whose properties and analysis correspond to those predicted for the corresponding type **XIV** compd. Warm dil. HCl on **VII** gave a high-boiling material not identified. Hydrolysis of 9 g. **VIII** with cold dil. HCl gave 5 g. liquid, b_6 114–5°, which did not give a semicarbazone and has strong reducing properties and is probably a polymer of $Et_2C(OH)CHO$ (**XV**). Warm dil. HCl on **VIII** gives 65% of impure **XV**, characterized by its semicarbazone as a type II compd. Hydrolysis of 7 g. **IX** with cold HCl gave 3 g. of an apparently type **XIV** compd., crystals from ether, m. 87°. Hydrolysis of **X** with cold HCl apparently produces (from analysis and mol.-wt. detn.) a type **XIV** compd. (**XVI**), m. 90–1°. **XVI** (0.9 g.), distd. with 20 cc. water and 2 cc. HCl, produces 0.7 g. oil, b_6 94–7°, d_0 0.920, d_{22} 0.9040, n_D^{22} 1.4379, whose mol wt., analysis and analysis of its semicarbazone, m. 141–2°, prove it to be pure $Bu_2C(OH)CHO$.

ODEN E. SHEPPARD

The use of calcium chloride in the dehydration of alcohol. K. B. EDWARDS AND R. LACEY. *J. Soc. Chem. Ind.* **49**, 422T(1930).—Alc. residues are concd. to 80% by distn. Then 20 g. of fused $CaCl_2$ per 100 cc. alc. is added. Distn. yields 78% of 95.5% alc. and 8% of "tails." The alc. remaining with $CaCl_2$ in the still is recovered by adding water and distg. Simple tests for the concn. of the alc. have been worked out; they depend on the miscibility of one drop of alc. in 5 cc. of various solvents. Kerosene, miscible when the concn. is 99.35%; white spirit, 98.3%; com. xylene, 97.4%; permanent cloudiness with 3 drops of 97.2%. The tests are to be carried out between 15° and 18°.

ALBERT L. HENNE

Triethylcarbinol. W. W. MOYER AND C. S. MARVEL. *Org. Syntheses* **XI**, 98–100 (1931).—Detailed directions are given for the prepn. of Et_3COH from EtMgBr and $(EtO)_2CO$; the yield is 82–8%. The following were prepd. by the use of the proper Grignard reagent and $(EtO)_2CO$: Pr_3COH 75, Bu_3COH 84, Am_3COH 75 and $(C_7H_{15})_3COH$ 72%.

C. J. WEST

Aliphatic ethers. HERBERT HENSTOCK. *J. Chem. Soc.* **1931**, 371–2.—PrI and iso-BuONa, shaken 12 hrs. at 10° and then heated 1 hr. at 100°, give 67.2% of *Pr iso-Bu ether*, b_{720} 106°, d^{15} 0.7549, $n_{5461}^{24.9}$ 1.3852. *iso-Pr Bu ether*, b_{738} 108°, d^{15} 0.7594, $n_{5461}^{24.9}$ 1.3889 (72.4% yield). iso-BuOPr, BuOPr, iso-PrOPr, EtOPr, MeOPr, iso-BuOBu, iso-PrOBu, EtOBu, MeOBu, iso-PrOEt, iso-PrOMe, iso-BuOEt and iso-BuOMe, heated with Na-K in N at 190–200° for 24–100 hrs., are unchanged; it thus appears that in ethers the bonds between the simple alkyl radicals and the O atom are stronger than the corresponding bonds holding heavier radicals contg. highly branched chains.

C. J. WEST

Syntheses with β,β′-dichlorodiethyl ether. II. Heterocyclic compounds containing two members of the oxygen group in the ring. 1,4-Selenoxane and its derivatives. CHARLES S. GIBSON AND JOHN D. A. JOHNSON. *J. Chem. Soc.* 1930, 266–72; *Chemistry & Industry* **49**, 896(1930); cf. *C. A.* **25**, 681.—$(ClCH_2CH_2)_2O$ or $(ICH_2CH_2)_2O$ and Na_2Se in water, heated 4.5 hrs. while H is passed through the mixt. give *1,4-selenoxane* (**I**), purified through the dibromide which is obtained in 33–40% yields; 164 g. dibromide gives 60 g pure **I**; I b_{22} 66°, b_{26} 69.5°, b_{768} 167.5–8.5°, m. —21.5°, n_D^{20} 1.5480, d_4^{16} 1.575, $d_4^t = 1.597 - 0.00135t$; γ^{17} 42.08, $\gamma^{28.5}$ 40.80, $\gamma^{35.5}$ 39.75, γ^{44} 38.67 dynes/cm.; I is a colorless liquid with penetrating but not unpleasant odor; it is volatile in CCl_4 vapors;

$SnCl_4$ gives a cryst. compd. decompd. by atm. moisture; I and HNO_3 (d. 1.42) give a deep red soln. from which the *hydroxynitrate* sepd. on cooling; it decomps. 140–1° and detonates on heating in a sealed tube over a small flame; its aq. soln. gives the dibromide with HBr in the cold. I and Cl in CCl_4 give the *dichloride*, m. 127–9° (decompn.); Br in CCl_4 gives the *dibromide*, yellow, m. 132° (decompn.); the aq. soln. gives no ppt on cooling but HBr ppts. the dibromide; *diiodide*, violet, m. 106–7°. I and MeI in abs. EtOH for 5 hrs. or I and MeI for 2 hrs. give the *methiodide*, m. 171°. I and $HgCl_2$ in EtOH give the *mercurichloride*, m. 179°; *chloroaurate*, golden yellow, decomps. 142–4°; *chloroplatinate*, orange-yellow, m. 149° (decompn.). The dibromide and moist Ag_2O give a highly hygroscopic oil, which gives the hydroxynitrate with HNO_3. The dibromide and dry NH_3 in C_6H_6 give the *compd.* $C_4H_{14}ON_2Br_2Se$, begins to decomp. 93° and turns brownish yellow 130°; it is decompd. by water; similar compds. were formed with pyridine, piperidine and $PhNH_2$. The coördination compd. of the dibromide with $C_2H_4(NH_2)_2$ yielded $C_2H_4(NH_2)_2.2HBr$ on treatment with aq. EtOH. The parachor, 245.2, confirms the value of 62.5 for the at. parachor of Se. C. J. West

Formation of sulfonium chlorides and of unsaturated substances by the action of water and of aqueous alcoholic potash on β,β′-dichlorodiethyl sulfide. John S. H Davies and Albert E. Oxford. *J. Chem. Soc.* **1931**, 224–36.—The hydrolysis of $S(C_2H_4Cl)_2$ (I) is generally assumed to occur in 2 stages: $I + H_2O \longrightarrow ClC_2H_4SC_2H_4OH$ (II) + HCl; $II + H_2O \longrightarrow S(C_2H_4OH)_2$ (III) + HCl. It is probable that II has not been isolated; attempts to prep. II from HOC_2H_4SH and ClC_2H_4Cl or from ClC_2H_4SH and $(CH_2)_2O$ failed. II, evapd. in the min. quantity of water at a low temp. under diminished pressure gives a sirup, insol. in $CHCl_3$ and Me_2CO and hence not II or III, but readily sol. in cold H_2O to give a soln. contg. much Cl ion. I yields a *diphenylurea*, m **128.5–9.5°**; the methiodide is a viscous red oil; the *p-toluenesulfilimine* formed from chloramine-T, m. 86–7°. III and HOC_2H_4Cl, heated on the water bath for 13 hrs., give *tri-β-hydroxyethylsulfonium chloride* $(HOC_2H_4)_3SCl$, m. 125–6°; the yield is largest with 3 mols. ClC_2H_4OH; it develops no acidity when dissolved in water and the Cl content can be estd. volumetrically; it is sol. in concd. HCl but no I is formed on prolonged boiling. III and I, heated 6 hrs. at 65–75°, give *sulfidobis-β-hydroxydiethyl sulfide 1,3-di-β-hydroxyethochloride*, $Cl(HOC_2H_4)_2SC_2H_4SC_2H_4S(C_2H_4OH)_2Cl$, m. 101.5–3°; with HCl at 100° only I is formed; the *chloroplatinate*, yellow, amorphous, m. 133–4°. This explains why II has not been isolated by the hydrolysis of I, for, even if it were formed momentarily, it might unite with itself and most certainly would combine with III to form sulfonium chlorides. $HOC_2H_4SC_2H_4SC_2H_4OH$ and ClC_2H_4OH, heated at 100° for 14 hrs., give 2 sulfonium chlorides, probably IV and *sulfidobis-β-hydroxydiethyl sulfide 1,2-di-β-hydroxyethochloride*, m. 120–1.5°. $HOC_2H_4SC_2H_4SC_2H_4OH$ and HOC_2H_4Cl heated on the water bath for 8 hrs., or HOC_2H_4Cl and 1,4-dithiane, heated at 100° for 28 hrs., give *1,4-dithiane 1-β-hydroxyethochloride* (IV), m. 175°; *mercurichloride*, m. 95–6°. Passing dry HCl into III at 100–6° gives 56% I and 44% of *oxidobis-β-chloroethyl sulfide*, b_1 152°; the latter and PhOH with EtONa give the *phenoxy deriv.*, m. 55–7°. Hydrolysis of I with 2.25 vols. water gives IV, but this was not found when 6 vols. water was used. The sirup obtained with 4 mols. water, heated with concd HCl 40 min. at 100°, gives I and a small quantity of $C_2H_4(SC_2H_4Cl)_2$. If 10 vols. HCl is used, I is the sole product. III and 2 mols. HCl in 2.5 vols. water, heated 5 hrs., give IV and other sulfonium chlorides. Hydrolysis of 1 mol. I with 4 mols. 20% EtOH-KOH (EtOH:H_2O = 4:1) gives a mixt. of divinyl sulfide, b. 85° (*sulfilimine*, m. 91–3°), *β-ethoxyethyl vinyl sulfide*, b_8 65°, d_4^{20} 0.9532, camphor-like odor (*mercurichloride*, m. 152–3°), $S(C_2H_4OEt)_2$, b_4 101–2° and some $EtOC_2H_4SC_2H_4OH$, b_4 117.5°. With 1 mol EtOH-KOH, there was isolated *β-chloroethyl vinyl sulfide*, b_{80} 71–2° (*sulfilimine*, m. 101.5–3°; mercurichloride, amorphous, decomps. about 150°); with HCl this yields *α,β′-dichlorodiethyl sulfide*, b_9 68–9°. C. J. West

Heptylamine. W. H. Lycan, S. V. Puntambeker and C. S. Marvel. *Org. Syntheses* **XI**, 58–60(1931).—Reduction of $Me(CH_2)_5CH:NOH$ with EtOH and Na gives 60–73% of $Me(CH_2)_6NH_2$, b. 152–7°. By use of the same method the following may be obtained: $BuNH_2$, in 50–60% yields, *sec*-$BuNH_2$ and cyclohexylamine. C. J. West

Acrolein acetal. E. J. Witzemann, Wm. Lloyd Evans, Henry Hass and E. F. Schroeder. *Org. Syntheses* **XI**, 1–2(1931).—$ClCH_2CH_2CH(OEt)_2$ (167 g.) and 340 g powd. KOH, heated at 210–20°, give 75% of $CH_2:CHCH(OEt)_2$, b. 122–6°. Fe retorts should be used when many runs are to be made. C. J. West

β-Chloropropionaldehyde acetal. E. J. Witzemann, Wm. Lloyd Evans, Henry Hass and E. F. Schroeder. *Org. Syntheses* **XI**, 26–7(1931).—EtOH-HCl, satd. at 0°

and treated with CH_2:CHCHO at about 0°, gives 34% of $ClCH_2CH_2CH(OEt)_2$, b_8 58–62°. C. J. WEST

Heptaldoxime. E. W. BOUSQUET. *Org. Syntheses* XI, 54–6(1931).—$Me(CH_2)_5CHO$, $NH_2OH.HCl$ and Na_2CO_3 give 81–93% of $Me(CH_2)_5CH$:NOH. Cyclohexanone oxime is obtained in the same manner. C. J. WEST

Fatty acid distillation. A comparison of intermittent and continuous operation. OTTO KREBS. *Teer u. Bitumen* **28**, 421–4, 440–3(1930).—Batch distn. with superheated steam and continuous distn. under reduced pressure (60 mm.) are described with some detail and the economics of the 2 methods compared. Vacuum distn. permits an easy sepn. of $C_{15}H_{31}CO_2H$, b_{60} 255°. $C_{17}H_{33}CO_2H$ boils only slightly lower than $C_{17}H_{35}CO_2H$; their sepn., therefore, requires a very efficient fractionation column. K. H. ENGEL

Addition of alkali alcoholates to acid esters. IV. Addition of sodium ethylate to formic ester. F. ADICKES (WITH A. WÄCHTEROWITZ, H. DU MONT AND O. LÜCKER). *Ber.* **63B**, 3012–27(1930); cf. *C. A.* **21**, 1628; Scheibler, *C. A.* **20**, 2824; **21**, 1795.—S. says in his 1st paper that NaOCOEt (I) is obtained quantitatively according to the equation $HCO_2Et + NaOEt = HC(ONa)(OEt)_2$ (II) = I + EtOH by letting NaOEt and 1 mol. HCO_2Et stand in Et_2O 16 hrs., evapg. *in vacuo*, adding another 0.5 mol. HCO_2Et, letting stand again and once more evapg. off the excess of HCO_2Et, along with the EtOH formed, *in vacuo*. A. showed that the product was not I (*C. A.* **21**, 1628) but the conclusion drawn from analyses of the apparently homogeneous substance that it was quite pure II has now been found to have been incorrect. Contrary to S.'s statement, a great part of the HCO_2Et used is decompd. into CO and EtOH and a part of the EtONa is not added at all, so that the product consists in great part of NaOEt with more or less EtOH of crystn. (around 30%) and some HCO_2Na (8%) and can, therefore, contain only about 10–20% II. With such a product, the Zeisel EtO detn. can be carried out only with certain precautions in a modified app.; the far too low results obtained in the usual Meyer app. had led to an erroneous interpretation, and, moreover, the apparent absorption of 1 mol. HCO_2Et by the NaOEt (calcd. from the amt. of HCO_2Et used and that recovered from the Et_2O and EtOH vapors drawn off) was merely due to the aforesaid decompn. of the HCO_2Et. According to S.'s 2nd paper, I is prepd. by splitting EtOH off from the (assumedly almost pure) II at 40° and completing the reaction by repeated treatment with HCO_2Et and splitting off of EtOH. No proof (by detn. of the CO) is given of the decompn. $I + H_2O = NaOH + CO + EtOH$ which S. describes as characteristic but which A. has never observed. The apparent success of the new method of prepn. is due to the fact that the temp. is raised by the "vigorous reaction" which takes place; the decompn. of the HCO_2Et, which is slow at room temp., is now very rapid and the product is not I but NaOEt, more or less free of EtOH of crystn., depending on the length of the last heating *in vacuo*. In both methods of prepn. the HCO_2H present in the product (as the acid and as HCO_2Et) can be detd. by reduction of $HgCl_2$ or by back titration after sapon. with excess of hot alkali. The HCO_2H is present partly as HCO_2Na because ordinary abs. alc. and HCO_2Et not dried over P_2O_5 are used in the process. This is also shown by analysis of the salt mixt. obtained by passing CO_2 into the Et_2O suspension of the supposed I; the HCO_2Na remains unchanged, the NaOEt is converted into $EtOCO_2Na$ and a part of the total HCO_2H is recovered as HCO_2Et, presumably from II, for I could not regenerate HCO_2Et with CO_2. A time-consuming method, based on the analytical detn. of the total Na, total HCO_2H, the HCO_2Na (by CO_2 decompn.), total EtO (modified Zeisel method) and EtOH of crystn. (Zerevitinov), was worked out to decide whether the product contained I or II (later it was found that light could be shed on this question by other means); the results showed that the product prepd. by either of S.'s 2 methods cannot be anywheres nearly pure I; that prepd. by the 1st method may contain up to about 25% II and that prepd. by the 2nd method none at all, and neither can possibly contain a I with the properties given by S. With none of the many prepns. was an evolution of CO on decompn. with H_2O observed. That the ester still held bound in the reaction product is almost certainly present as II was shown by prepg. II in pure form; when it is heated *in vacuo* at 40° according to S.'s 2nd method for prepg. his supposed I, soon only the formate-HCO_2H remains and the end product is a mixt. of EtOH-free NaOEt + HCO_2Na. When EtOH-free NaOEt in Et_2O suspension is allowed to react at 0° with HCO_2Et, the HCO_2Et does not decomp. into CO, and 1 mol. (not more) is bound; the addn. product, which is almost insol. in Et_2O, is an exceedingly hygroscopic microcryst. powder which decomps. into CO at room temp. Attempts to obtain from it derivs. of $HC(OEt)_3$ with $ClCO_2Et$ or $PhCH_2Br$ failed so that it could not be proved directly that it has the structure II. The method previously used to det. the structure of ester-alcoholate addn. products (cleavage of

equiv. amts. of MeOH and EtOH with H_2O or of NaOMe and EtONa with CO_2 from the mixed Et ester-methylate or Me ester-ethylate) does not have the significance then ascribed to it, for, contrary to expectation, the esters may undergo an exchange of the alkyl (*Umesterung*) in Et_2O under the influence of the insol. alcoholate. The addn. product dissolves when treated in Et_2O suspension with $(CO_2Et)_2$ and HCO_2Et is set free; correspondingly, the $(CO_2Et)_2$ addn. product does not react with HCO_2Et. C. A. R.

3-Methylpentanoic acid. E. B. Vliet, C. S. Marvel and C. M. Hsueh. *Org. Syntheses* **XI**, 76–8(1931).—$EtCHMeCH(CO_2Et)_2$, sapond. with KOH and the acid liberated with H_2SO_4 and refluxed 3 hrs., gives 62–5% of $EtMeCHCH_2CO_2H$, b_{743} 193–6°. Caproic acid was obtained in 75% yield by this method. C. J. West

The amides of α-methylbutenoic acids. P. Bruylants, L. Ernould and M. Dekoker. *Bull. sci. acad. roy. Belg.* [5], **16**, 721–40(1930); (cf. *Me m. acad. roy. Belg.* **9**, 16(1927) and *C. A.* **22**, 2366).—The amides, acids and nitriles of α-methylbutenoic acids were prepd. and certain phys. properties observed. The configuration of the angelic and tiglic nitriles were detd. by comparison with crotonic and isocrotonic nitriles and with 3,4- and 2,6-$Me_2C_6H_3CN$. The butenoic nitriles, amides and acids were prepd. by the dehydration of the cyanohydrins with P_2O_5 or $SOCl_2$, preferably the latter. The methylnitriles were converted into methylchlorobutanonitriles by addn. of HCl Treatment with quinoline gave the isomeric butenonitriles. The following compds. were prepd.: (I) α-methyl-β-chlorobutanonitrile, b_{14} 64–5°; (II) α-ethyl-β-chloropropionitrile, b_{14} 73–4°. I on treatment with quinoline gave 2 isomers of α-methyl crotonitrile, b_{12} 121–2° and 137–8°. The high-boiling isomer (III) has been previously described. The low-boiling isomer (IV) gave d_4^{20} 0.81968, n_α^{20} 1.42004, n_D^{20} 1.42303, n_β^{20} 1.43087, $E\Sigma_\alpha$ 0.66. The $ClCH_2CHEtCN$ on treatment with quinoline gave α-ethylacrylonitrile (V), b_{752} 115.0–115.4, d_4^{20} 0.81389, n_α^{20} 1.41440, n_D^{20} 1.41752, n_β^{20} 1.42456, $E\Sigma_\alpha$ 0.51. The amide obtained from III m. 75–6°, that from IV m. 127–8°, and that from V m. 87.7–7.8°. The first 2 amides both yield tiglic acid on hydrolysis or treatment with HNO_2. Also in *Bull. soc. chim. Belg.* **39**, 379–94(1930). Wallace R. Brode

The preparation of ellagic acid. Fritz Zetzsche and Marguerite Graef. *Helv. Chim. Acta* **14**, 240 2(1931).—Ellagic acid (I) was obtained in 4% yield by acidifying the hydrolysis product of Turkish tannin with an equal wt. of Na_2SO_3 crystals. It forms an *addn. compd.* with 2 mols. of pyridine. Acetylation of I or its pyridine compd. with Ac_2O yields *tetraacetylellagic acid*, m. 317–9°. The hydrolytic products also contained 3.3% of 1,2,3-$C_6H_3(OH)_3$. The residue from the aq. ext. of the tannin contained 24% of cellulose. Other tannins also yield I. I. M. Levine

α-Bromoisovaleric acid. C. S. Marvel and V. du Vigneaud. *Org. Syntheses* XI, 20–2(1931).—$Me_2CHCH(CO_2Et)_2$ is sapond., the free acid liberated by HCl, brominated and then heated at 125 30° until evolution of CO_2 ceases; the yield of $Me_2CHCHBrCO_2H$ is 55–66%. C. J. West

Action of ethylmagnesium halides on ethyl diethylcyanoacetate. A. Mavrodin. *Compt. rend.* **192**, 363–5(1931).—EtMgBr or EtMgI reacts with $NCCEt_2CO_2Et$ (I) either at the CN or CO_2Et group but not with both groups in the same mol. The mixt. of products contains Et_2CO, $Et_2CHCOCEt_2CO_2Et$ and Et_2CHCO_2Et; these compds. were also found when PhMgBr was used. Besides these compds. *3-cyano-4-hydroxy-3,4-diethylhexane* (I), b_{20} 132–3°, Et_2CHCN and Et_3COH were also produced. The last was isolated as the *allophanate* (reaction product with HCNO), m. 182–3°. I was transformed into *Δ²-3,4-diethyl-4-cyanohexene*, b_{16} 105°, by reaction with $SOCl_2$. The work confirms the hypothesis that the ester group in I undergoes enolization under the influence of the Grignard reagent; furthermore, the great complexity of the reaction is considered by M. to be due to the inertia and fragility imparted to the mol. by the tetrasubstituted C atom. I. M. Levine

Action of ethylmagnesium bromide on *N*-diethylchloroacetamide. Sou Phou Ti. *Compt. rend.* **191**, 943–5(1930).—The principal product of the action of 3 mols. of EtMgBr on 1 mol. of $CH_2ClCONEt_2$ was neither a chloroamine nor a chloroketone as might have been expected but *2-diethylamino-2-ethyl-1-butanol*, $Et_2C(NEt_2)CH_2OH$ (I) (20% yield), b_{18} 90°; picrate, m. 99°; chloroplatinate, m. 140–1°. Heating I for 3 hrs on a steam bath with excess Ac_2O gave its acetate, b_{13} 97–8°; picrate, m. 130–1°. Other products of the reaction were considerable Et_2NH; about 1% of an ethylenic base, $C_{10}H_{21}N$, with a picrate, m. 74° and a chloroplatinate m. 142–3°; $Et_2NCH_2CONEt_2$, b_{20} 125–6°, with a picrate, m. 121° (Hahn and Loos report 133°, *C. A.* **13**, 725) and a chloroplatinate, m. 164–5°; and the major product was a sirupy, yellowish, basic oil, $C_{14}H_{34}N_2O_2$, b_{14} 160–2°, which did not react with Ac_2O, was not sapond. by 48% HBr, gave no cryst. derivs. and could not be identified. C. H. Peet

Chemistry of thiocholine halides (trimethylthioethylammonium halides). II. Thiocholine chloride and its derivatives. TAICHI HARADA. *Bull. Chem. Soc. Japan* **6**, 25–8(1931); cf. *C. A.* **24**, 2428.—Forty g. of $(CH_2Cl)_2$ was condensed with NMe_3, the chlorocholine chloride (I), $Me_3NClCH_2CH_2Cl$, formed being washed with Et_2O and dried over $CaCl_2$. The 40 g. of crude product, recrystd. from 95% alc. melted about 242°, with decompn. above 163°. Six g. of I was heated with 5 g. of 2-thiouracil together with 25 cc. of H_2O in a bomb tube at 150° for 2 hrs. After filtration from the uracil, the filtrate was neutralized with NH_4OH and on concn. more uracil was removed. Fractional crystn. from a cold mixt. of BzOH and EtOH gave 0.5 g. thiocholine chloride (II), $Me_3NClCH_2CH_2SH$, m. 238° with decompn. above 200°. II reacts with AgCl to form $Me_3NClCH_2CH_2SAg.AgCl$, sol. in H_2O to the extent of 1.215 g. per l. at 37°. It decomps. above 70°, m. 228°. C. R. ADDINALL

α-Aminoisobutyric acid. H. T. CLARKE AND H. J. BEAN. *Org. Syntheses* **XI**, 4–6 (1931).—Details are given for the prepn. of $Me_2C(NH_2)CO_2H$ from Me_2CO, NaCN and NH_4Cl, giving $Me_2C(OH)CN$; with NH_3 this yields $Me_2C(NH_2)CN$, hydrolyzed by HBr to the acid HBr salt, from which the free acid is obtained in 30–3% yield by C_5H_5N. C. J. WEST

The action of formaldehyde on amino acids with special reference to the formation of amines. LAWRENCE ZELENY AND ROSS A. GORTNER. *J. Biol. Chem.* **90**, 427–41 (1931).—On boiling casein, alanine, cystine, glutamic acid or tyrosine with HCHO in 20% HCl, 12–40% of the total N is converted first into primary, then into secondary and tertiary, amines, which were estd. by Weber and Wilson's method (*C. A.* **12**, 1977). NH_4Cl behaves similarly. The end product, which was reached more rapidly by autoclaving with HCHO at 180° in 5% HOAc, was in all cases NMe_3, identified by the compd. with Reinecke's salt or by the chloroplatinate. The action of HCHO is therefore one of deamination followed by methylation as suggested by Werner (*C. A.* **11**, 3243), but occurring through some intermediate non-volatile, non-amino compd. This compd., which may be a CH_2 deriv., was not isolated, but after the amino-acid N has reached a const. value, the amt. of volatile N continues to increase on boiling. K. V. THIMANN

***N*-Alkylation of β-amino esters.** J. DÉCOMBE. *Compt. rend.* **191**, 945–7(1930).—Alkylation of β-amino esters by treatment with alkyl iodides proceeds unsatisfactorily because it is impossible to fractionate the resulting mixt. by distn. and because there is decompn. of the parent amine through splitting out of NH_3 with resultant formation of an unsatd. ester. However, 70% yields of alkylamino esters may be obtained by the catalytic hydrogenation in EtOH of equimol. mixts. of the β-amino ester and the appropriate aldehyde, with PtO_2 (Adams) as a catalyst. The reaction doubtless proceeds through a condensation of the amine with the aldehyde and reduction is accompanied by the formation of a certain amt. of resin. The following compds. were prepd. by condensing the proper β-amino ester with AcH: $MeCH(NHEt)CH_2CO_2Et$ (I), b_{12} 74–5° (HCl salt, m. 125°); $MeCH(NHEt)CH_2CO_2H$, m. 169 70°; $PrCH(NHEt)CH_2CO_2Et$, b_{20} 110–1° (HCl salt, m. 79°); $C_5H_{11}CH(NHEt)CH_2CO_2Et$, b_{20} 130–2° (HCl salt, hygroscopic, m. about 60°); $C_5H_{11}CH(NHEt)CH_2CO_2H$, m. 140–1°. The method is not so satisfactory for the introduction of 2 alkyl groups. With aldehydes of low mol. wt., a mixt. of amino esters is obtained which cannot be fractionated. Aldehydes of higher mol. wt. yield a small quantity of the dialkyl deriv. $MeCH(NEtBu)CH_2CO_2Et$, from PrCHO and I, b_{15} 118–9° and forms a viscous HCl salt but a microcryst. chloroplatinate. Prepn. of dialkyl derivs. by treatment of the monoalkyl compds. with RI is also unsatisfactory. (The b. p. at 17 mm. of $MeCH(NH_2)CH_2CO_2Et$, incorrectly given in *C. A.* **24**, 2110, is 68–9°.) C. H. PEET

***N*-Acyl derivatives of alanine. Resolution of externally compensated *m*-nitrobenzoylalanine.** WM. M. COLLES AND CHARLES S. GIBSON. *J. Chem. Soc.* **1931**, 279–85.—The *N*-acyl derivs. of alanine (I) were studied not only as a means of isolating and identifying it but also because the nitroacyl derivs. may serve as convenient starting materials for prepg. arsonic acids for the study of the relative chemotherapeutic activities of *dl*- and active isomers. *dl-m-Nitrobenzoyl deriv.* (II) of I, m. 163–4°; at 20° 0.38 g. dissolve in 100 cc. H_2O, 0.37 g. in 100 cc. Et_2O and 0.43 g. in 100 cc. $CHCl_3$; *Ag salt*, needles; *Et ester*, m. 89°; *Me ester*, m. 110–1°; NH_4OH gives the *amide*, m. 189–90°. Reduction of II gives the *NH_2 deriv.*, whose *HCl salt* m. 150–2° (decompn.). *dl-o-Nitrobenzoyl deriv.* (III) of I, m. 165–6°, slightly less sol. in H_2O and Et_2O than II; *o-NH_2 deriv.*, does not m. 270°. *dl-p-Toluyl deriv.* (IV), m. 188–9° (95% yield). *dl-m-Nitrobenzenesulfonylalanine* (V), from I in *N* KOH and *m*-$O_2NC_6H_4SO_2Cl$ in C_6H_6 added at regular intervals, yellow, m. 158.5–9° (89% yield). *dl-4-Nitrotoluene-2-sulfonylalanine* (VI), crystg. with 1 mol. H_2O, m. 91–7°; anhyd., it m. 125.5–6.5°. *dl-Cin-*

namoylalanine (VII), m. 196–7° (30% yield); in alk. soln. it rapidly decolorizes $KMnO_4$, giving BzH. I (15 g.) in 32.4 cc. 0.976 *N* NaOH and 1000 cc. H_2O, treated with 11.92 g. quinine and then with 10 cc. EtOH, gives 17 g. of the *quinine salt* of *l*-I, converted to a glass-like mass at 125°, crystals with 2 mols. H_2O, $[\alpha]_{5461}$ —137.1°; the mother liquor was freed of alkaloid and then treated with brucine, giving 58.2 g. of the *brucine salt* of *d*-I, crystg. with 3.5 mols. H_2O, $[\alpha]_{5461}$ —9.1° (EtOH, *c* 0.5511). *l*-I, m. 158° $[\alpha]^{20}_{5461}$ —44.7° (NH_4 salt in H_2O, *c* 1.342), 5.87° (EtOH, *c* 1.361); *Et ester*, m. 104–5 $[\alpha]^{20}_{5461}$ 6.91° (EtOH, *c* 1.465); in EtOH-KOH (0.0882 g. KOH in 50 cc. EtOH) α_{5461} changes from 0.17 to —1.05° in 26 hrs. *d*-I, m. 158° $[\alpha]^{20}_{5461}$ 44.7° (NH_4 salt in H_2O, *c* 1.358), —5.62° (EtOH *c* 1.335); *Me ester*, m. 126°, $[\alpha]^{20}_{5461}$ —12.7° (EtOH, *c* 1.429); *amide*, m. 193–4°, $[\alpha]^{20}_{5461}$, 24.2° (EtOH, *c* 0.238). The relative rates of hydrolysis of the *dl*-*N*-acyl derivs. were detd. by gently heating 3 hrs. with const.-boiling HCl, neutralizing the hydrolysis mixt. to p_H 8 and titrating the liberated I by Sørensen's method to p_H 10. The % hydrolysis is given: Bz, 96; IV, 95; VII, 92; phthalyl, 76; III, 47, II, 91; *p*-$O_2NC_6H_4CO$ deriv., 97; $PhSO_2$ deriv., 14; α-$C_{10}H_7SO_2$ deriv., 66; β-isomer, 18 (45% after 9.5 hrs.); *p*-$MeC_6H_4SO_2$ deriv., 17; V, 21; VI, 2 in 4 hrs. C. J. WEST

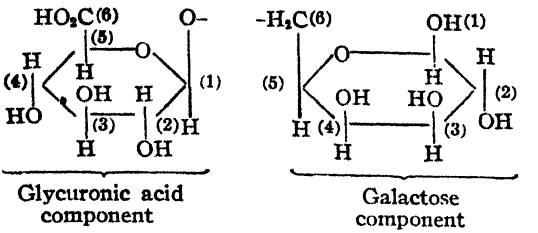
dl-**Glyceraldehyde.** E. J. WITZEMANN, WM. LLOYD EVANS, HENRY HASS AND E. F. SCHROEDER. *Org. Syntheses* XI, 50–1(1931).—Hydrolysis of 50 g. $HOCH_2CH(OH)CH(OEt)_2$ with 500 cc. 0.1 *N* H_2SO_4 at 20° for about 1 week gives 80% of $HOCH_2CH(OH)CHO$, m. 137–9°. C. J. WEST

dl-**Glyceraldehyde acetal.** E. J. WITZEMANN, WM. LLOYD EVANS, HENRY HASS AND E. F. SCHROEDER. *Org. Syntheses* XI, 52–3(1931).—$CH_2:CHCH(OEt)_2$ and $KMnO_4$ in H_2O at 5° give 67% of $HOCH_2CH(OH)CH(OEt)_2$, b_8 120–1°. C. J. W.

The two forms, *cis* and *trans*, of isobutylideneacetone and the isomeric unsaturated β,γ-ketone. R. HEILMANN. *Bull. soc. chim.* [4], 49, 75–80(1931).—Eccott and Linstead have shown (*C. A.* 24, 3991) that the condensation of Me_2CHCHO with Me_2CO gives the *trans*-modification of $Me_2CHCH:CHCOMe$ (I) which on boiling with 20% H_2SO_4 is isomerized into $Me_2C:CHCH_2COMe$ (II). In prepg. $Me_2CHCH(NH_2)N:CMeCH_2$ (III) by the action of $(NH_2)_2.H_2O$ on I, H. obtained a fraction which on hydrolysis with 20% H_2SO_4 gave II. Although II might result from the hydrolysis of the azine produced by the spontaneous oxidation of III (*C. A.* 24, 851), thus regenerating the 2 stereoisomeric forms of I, and by the consequent isomerization of the *trans*-modification, there does not seem to be abs. identity between the residues from the prepn. of III and the products obtained by controlled oxidation of the pyrazoline. In the 1st case the oil obtained consists almost entirely of III whereas in the 2nd case the principal product is I. H. is still of the opinion that I and II are formed simultaneously in the condensation of Me_2CHCHO with Me_2CO and proposes to return to this matter at a later date. C. R. ADDINALL

Compound uronic acids. Structure of the aldobionic acid from gum arabic. SYDNEY WM. CHALLINOR, WALTER N. HAWORTH AND EDMUND L. HIRST. *J. Chem. Soc.* 1931, 258–65.—Aldobionic acid from gum arabic, with $[\alpha]^{20}_D$ 2.0° (Ca salt), on methylation with Me_2SO_4 and 30% NaOH and finally with Ag_2O and MeI, gives a mixt. of α and β-forms of *Me heptamethylaldobionate* (*Me ester of hexamethyl-6-glycuronosido-β methylgalactoside*), $b_{0.02}$ 185°, n^{20}_D 1.4715, $[\alpha]^{20}_D$ —3.5° (H_2O, *c* 1.55), —24° ($CHCl_3$, *c* 2.0), which is non-reducing; after 14 days at 50–60° about 20% of the mixt. seps. as the cryst. β-deriv., m. 86°, $[\alpha]^{20}_D$ —21° (H_2O, *c* 0.67), —43° ($CHCl_3$, *c* 0.65). Hydrolysis of the liquid ester was effected by heating 3.5 hrs. at 100° in 7% HCl, $[\alpha]^{20}_D$ changing from —1° to 63.5° in that time. The 2 hydrolysis products were isolated in 87–8% yields. *2,3,4-Trimethylgalactose*, pale yellow sirup, n^{18}_D 1.4727, $[\alpha]^{20}_D$ 83° (H_2O, *c* 0.6); further methylation gives 2,3,4,6-tetramethyl-β-methylgalactoside. Br-H_2O at 35° for 24 hrs gives *2,3,4-trimethyl-δ-galactonolactone* (after heating 2 hrs. at 100° and 12 mm.), which was characterized as the *phenylhydrazide*, m. 165–7°; the rate of hydrolysis of the lactone is given, becoming const. in 8 hrs. Oxidation of the lactone gives *2,3,4-trimethyl mucic acid*, whose *di-Me ester* m. 98°, $[\alpha]^{20}_D$ 35° (H_2O, *c* 0.6). The other hydrolytic product is *2,3,4-trimethylglycuronic acid*, pale yellow, viscid sirup, n^{16}_D 1.4709, $[\alpha]^{18}_D$ 58° (equil. value in H_2O, *c* 0.63) (this value is for a product that has not been distd.); further methylation gives a mixt. of the α- and β-forms of *2,3,4-trimethylmethylglycuronide*, the β-form m. 133°, $[\alpha]^{23}_D$ —38° (H_2O, *c* 0.4), $[\alpha]^{21}_D$ —63° ($CHCl_3$, *c* 0.6). This was also obtained from glycuronic acid with Me_2SO_4 and alkali. In *N* HCl at 100° the velocity of hydrolysis of the glycuronide was almost identical with that of β-Me glucoside under

similar conditions. Thus, the structure of the aldobionic acid from gum arabic appears to be:



It is not certain whether α- or β-glycuronic acid is involved in the biose linking, although preliminary evidence favors the β-linking. C. J. WEST

Ethyl ethylenetetracarboxylate. B. B. CORSON AND W. L. BENSON. *Org. Syntheses* **XI**, 36–8(1931).—$BrCH(CO_2Et)_2$ (1.25 mols.) and 1.9 mols. anhyd. Na_2CO_3, heated 3 hrs. at 150–60°, give 75–80% of $[:C(CO_2Et)_2]_2$, b_8 197°, b_{13} 203°, b_{22} 210°, b_{33} 221°, b_{48} 234°, m. 52.5–3.5°. The soly. in 95% EtOH is reported for 0 to 36.5°. C. J. WEST

Condensations giving diethyl dicyanoglutaconate. YOSHIYUKI URUSHIBARA. *Bull. Chem. Soc. Japan* **6**, 29–31(1931).—The compd. termed di-Et dicyanoglutaconate, $C_{11}H_{12}O_4N_2$ (I) (*C. A.* **21**, 3889), is now considered to be the semihydrate $(C_{11}H_{12}O_4N_2)_2.H_2O$ (II). The acidification of di-Et sodiodicyanoglutaconate gives II and so attempts were made to form I by direct condensation rather than by proceeding through this intermediate Na compd. Two such condensation processes were carried out in which the formation of I was proved by the pptn. of II on acidifying the alkali ext. of the crude products, *e. g.*, the condensation of $HOCH:C(CN)CO_2Et$ with $CNCH_2CO_2Et$ by the action of Ac_2O and the condensation of $ClCH:C(CN)CO_2Et$ with $ClCH(CN)CO_2Et$ by the use of metallic Cu. C. R. ADDINALL

Mesaconic acid. R. L. SHRINER, S. G. FORD AND L. J. ROLL. *Org. Syntheses* **XI**, 74–5(1931).—Citraconic anhydride (100 g.), 100 cc. H_2O and 150 cc. dil. HNO_3, evapd. to red fumes, give 43–52% of mesaconic acid, m. 203–5°. C. J. WEST

Ethyl pimelate. ADOLF MÜLLER AND ERICH RÖLZ. *Org. Syntheses* **XI**, 42–5 (1931).—Details are given of the reduction of o-$HOC_6H_4CO_2H$ with iso-AmOH and Na and the esterification of the acid; yield of ester, b_{24} 153–6°, 35–8%. C. J. WEST

Citraconic anhydride and citraconic acid. R. L. SHRINER, S. G. FORD AND L. J. ROLL. *Org. Syntheses* **XI**, 28–9(1931).—Itaconic anhydride, distd. rapidly at atm. pressure, gives 68–72% of citraconic anhydride; soln. in slightly more than the necessary amt of H_2O gives 94% of the acid. C. J. WEST

Fumaric acid. NICHOLAS A. MILAS. *Org. Syntheses* **XI**, 46–8(1931).—Oxidation of furfural with $NaClO_3$ (V_2O_5 as catalyst) gives 50–8% of fumaric acid. C. J. WEST

Cyanogen bromide. W. W. HARTMAN AND E. E. DREGER. *Org. Syntheses* **XI**, 30–1(1931).—Details are given of the reaction of NaCN and Br, giving 73–85% of BrCN. C. J. WEST

Isopropyl thiocyanate. R. L. SHRINER. *Org. Syntheses* **XI**, 92–3(1931).—Directions are given for the prepn. of Me_2CHSCN from iso-PrBr and NaSCN in 76–9% yields. C. J. WEST

Oxidation. IV. Action of ferric chloride and hydrogen peroxide on *S*-alkylthiosemicarbazones. Formation of triazoles. SATISH CHANDRA DE AND TARANI KANTA CHAKRAVORTY. *J. Indian Chem. Soc.* **7**, 875–8(1930); cf. *C. A.* **24**, 4781.—By oxidation of *S*-alkylthiosemicarbazones of aldehydes thiodiazole formation is excluded and triazoles formed. Yields with $FeCl_3$ were poor but with H_2O_2 the reaction proceeds smoothly. *5-Phenyl-3-methylthiol-1,2,4-triazole*, m. 164°, was obtained by condensing $NH_2C(SMe):NNH_2$ and BzH in alc. followed by H_2O_2 oxidation without isolation of the intermediate compd. *5-Phenyl-3-ethylthiol-1,2,4-triazole*, m. 166°. *Benzylidene-S-methyl-4-phenylthiosemicarbazone*, m. 66–7°; *HI salt*, m. 153°. *4,5-Diphenyl-3-methylthiol 1,2,4-triazole*, m. 165–6°. *Benzylidene-S-ethyl-4-phenylthiosemicarbazone*, m. 78°; *HI salt*, m. 118°; *HCl salt*, m. 178° (decompn.). *4,5-Diphenyl-3-ethylthiol-1,2,4-triazole*, m. 148°. *Benzylidene-S-methyl-4-o-tolylthiosemicarbazone*, m. 62°; *HI salt*, m. 189° (decompn.); *HCl salt*, m. 194° (decompn.). *4-o-Tolyl-5-phenyl-3-methylthiol-1,2,4-triazole*, m. 130°. *Benzylidene-S-ethyl-4-o-tolylthiosemicarbazone; HI salt*, m. 123°; *HCl salt*, m. 167°. *4-o-Tolyl-5-phenyl-3-ethylthiol-1,2,4-triazole*, m. 107°. *Benzylidene-S-methyl-4-p-tolylthiosemicarbazone*, m. 71°; *HI salt*, m. 180° (decompn.); *HCl salt*,

m. 130° (decompn.). *4-p-Tolyl-5-phenyl-3-methylthiol-1,2,4-triazole*, m. 176°. *Benzylidene-S-ethyl-4-p-tolylthiosemicarbazone; HI salt*, m. 165°; *HCl salt*, m. 158°. *4-p-Tolyl-5-phenyl-3-ethylthiol-1,2,4-triazole*, m. 148°. FOSTER DEE SNELL

Carbamidosulfonic acids. PAUL BAUMGARTEN AND ILSE MARGGRAFF. *Ber.* **64B**, 301–9(1931).—*N*-Pyridiniumsulfonic acid and urea give $NH_2CONHSO_3(C_5H_5N,H)$ (I) or $CO(NHSO_3)_2(C_5H_5N,H)_2$ (II) depending on the mol. proportions. The free acids are unstable. Both form stable metal salts. The salts of I in acid soln. decomp. into urea and H_2SO_4; in neutral or acid soln. (*i. e.*, the mono- or disalts) decomp. into NH_3, CO_2 and H_2NSO_3Na. The salts of II in acid or neutral soln. decomp. into urea and H_2SO_4 and also into CO_2 and NH_2SO_3H. The neutral disalts decomp. in dil. soln. into CO_2 and H_2NSO_3Na and in solns. over 2% into urea and $NaHSO_4$. The tetrasalts are very stable. These reactions are analogous to those of nitrourea. V. F. HARRINGTON

Preparation of xanthates and other organic thiocarbonates. LAURENCE S. FOSTER. Dept. Mining and Met. Research, Univ. of Utah, *Tech. Paper* **2**, 8 pp.(1928).—The history of the xanthates is reviewed and methods are described for the prepn. of iso-Am, hexyl, heptyl, octyl, nonyl, lauryl and other xanthates, and K alkyl monothiocarbonate, Na Bu and K iso-Am trithiocarbonates. ALDEN H. EMERY

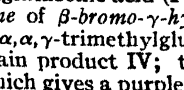
A catalyst for the autoxidation of uric acid. M. FRÈREJACQUE. *Compt. rend.* **191**, 949–51(1930).—Autoxidation of uric acid (I) in KOH can be reduced from 15 hrs. to 10 min. by the addn. of 5% of active C, thus eliminating side reactions. Active C also catalyzes the alk. oxidation of 1-methyl-, 1,3-dimethyl-, hydroxymethylene- and 7-methyl- (II) uric acids although total oxidation of II in the absence of the catalyst appears impracticable. Autoxidation of allantoin (III) by active C in alk. soln. is slow and gives 30% of K oxonate (IV). In the absence of the catalyst, this step cannot be observed on account of the preponderant hydrolysis of III to allantoic acid. There is no autoxidation of the other purines (xanthine (V), hypoxanthine, caffeine, theobromine, etc.) even in the presence of C; hence, pure V is easily obtained by agitating the crude product from the reduction of I with O and C. Autoxidation of I fixes between 1 and 2 atoms of O per mol. of I—most at low temps., least at high. Acidification after oxidation at ordinary temps. gives a mixt. of III and IV, the amt. of IV increasing as the amt. of O absorbed increases. When I is oxidized at 0° in the presence of 1% of C, there is no evolution of NH_3 and acidification after filtering out the C ppts. oxonamide (VI). Perhaps the oxidation proceeds as follows: a peroxide of I (RO_2) is formed; this can decomp. into RO and O (C catalyzes this decompn.), the reagents present decomp. the RO_2 and RO into III and VI. C. H. PETER

Acetone compounds of the sugars and their derivatives. XVII. Conversion of monoacetoneglucose into a new amino- and anhydroglucose. Also a contribution to acyl migration. HEINZ OHLE AND RUDOLF LICHTENSTEIN. *Ber.* **63B**, 2905–12(1930); cf. *C. A.* **24**, 1351.—In connection with the tautomerism problem of the sugars it was of interest to prep. the still unknown glucosyl-5-amine. 5-*p*-Toluenesulfonyl-6-benzoylacetoneglucofuranose seemed to be a suitable starting material for this purpose, and after all attempts partially to hydrolyze it to the toluenesulfonylacetoneglucofuranose (I) had failed (the $MeC_6H_4SO_2$ group was split off along with the Bz group), it was treated directly with NH_3 in MeOH. The reaction might conceivably proceed in various directions. Presumably, the Bz group is first split off and the intermediate I might then (1) yield acetoneglucosyl-5-amine (II) by simple exchange of the $MeC_6H_4SO_2$ group for NH_2, or (2) lose $MeC_6H_4SO_3H$ to form 5,6-anhydroacetoneglucose (III) and add NH_3 to give acetoneglucosyl-6-amine (IV). Moreover, a Walden inversion at the 5-C atom might occur in either (1) or (2), giving (3) acetoneidosyl-5-amine (V) or (4) acetoneidosyl-6-amine (VI) through the corresponding ethylene oxide. As a matter of fact, the reaction is more complicated and has not yet been entirely cleared up but the results thus far obtained are published now because of the appearance of Josephson's paper (*C. A.* **24**, 5285) in which he announces that he is going to attempt to prep. acetoneglucose-5-phosphoric acid. The reaction with NH_3 in MeOH proceeds only slowly at room temp. and the rotation of the mixt. does not become const. even after 3 weeks. If the reaction is interrupted after 14 days, there can be isolated the *p-toluenesulfonate* (VII) of an acetonehexosamine (VIII) and a sirupy, N-free, neutral substance (IX). VII is different from the toluenesulfonate of V. HNO_2 gives an acetoneanhydrohexose (X) different from either III or the 3,6-compd., nor, from its mol. wt. and low m. p., can it be a dimer of either of these compds. It does not add NH_3 even at 100°. Nor is the ring opened by acids, not even by *N* H_2SO_4 at 100°; there is merely obtained the free anhydrosugar (XI) which, like 3,6-anhydroglucose, is sweet and shows no mutarotation. This stability toward hot dil. mineral acids makes it very improbable that the O bridge is between C atoms 3 and 5. It is therefore assumed that XI is *3,6-anhydroidose* and

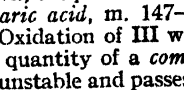
VIII is *acetoneidosyl-6-amine*. Of the 4 possible reactions mentioned above, apparently only (4) takes place. Some other reaction also takes place at the same time, however, as indicated by the formation of IX which on acetylation gives an *acetyldi-p-toluenesulfonylacetonehexose* (XII) different from the 3,5,6-compd. and characterized by a surprising resistance to dil. mineral acids. Whatever the structure and configuration of IX may be, its formation is an entirely new phenomenon in the chemistry of the sugars; since the starting material contained only one $MeC_6H_4SO_2$ group, one part of it must have been toluenesulfonated, under the influence of the NH_3-MeOH, at the expense of another part; the 5-position of the $MeC_6H_4SO_2$ group is thought to stand in some causal relationship with this reaction. VII (15 g. from 44 g. of the toluenesulfonylbenzoylacetoneglucose), m. 173–4° (decompn.), $[\alpha]_D^{20}$ —23.49° (H_2O, *c* 3.150) (the salt of V decomps. 176–7°, $[\alpha]_D^{20}$ —7.02° (H_2O, *c* 5.01)). XII, m. 112°, does not reduce Fehling soln. until after treatment with concd. H_2SO_4 or heating with NH_3-MeOH at 100°, $[\alpha]_D^{20}$ 2.87° ($CHCl_3$, *c* 2.436) (the 3,5,6-compd. m. 92°, $[\alpha]_D^{19}$ —28.76° ($CHCl_3$, *c* 4.347)). H_2SO_4 (0.05 *N*) completely splits off the Me_2CO from VIII only after 8 days at 37°, $[\alpha]_D$ in a 1-dcm. tube (*c* 10) falling from —1.0° to —0.25°. Direct treatment of the hydrolyzate (after distg. off the Me_2CO split off and neutralizing the H_2SO_4 with KOAc) gives with $PhNHNH_2$ *phenylhydrazine p-toluenesulfonate*, $C_{13}H_{16}O_5SN_2.H_2O$, m. 183–4° (decompn.), identical with Ohle and v. Vargha's supposed toluenesulfonate of the phenylhydrazone of glucosyl-6-amine. *p-Nitrophenylosazone* of XI, dark red-brown, m around 227°. *Tri-Bz deriv.* of VIII, m. 192°, $[\alpha]_D^{20}$ —19.30° ($CHCl_3$, *c* 2.280); one of the Bz groups is held very loosely and the compd. is partially alcoholyzed when crystd. from alc. *Tri-Ac deriv.* of IV, m. 86°, $[\alpha]_D^{18}$ 18.35° ($CHCl_3$, *c* 2.452); *tri-Bz deriv.*, m. 198–9°, $[\alpha]_D^{20}$ —76.43° ($CHCl_3$, *c* 2.682), is not appreciably alcoholyzed; *di-p-toluenesulfonyl deriv.*, m. 172° (decompn.), $[\alpha]_D^{19}$ —2.54° ($CHCl_3$, *c* 3.145). *Hexabenzoylglucosyl-6-amine*, needles with 1 mol. PhMe, reduces Fehling soln., $[\alpha]_D^{20}$ 22.89° ($CHCl_3$, *c* 0.830). *Acetone-3,6-anhydroidose* (X) (yield, 80%), m. 105°, $b_{0.8}$ 147–8° (bath temp.), $[\alpha]_D^{20}$ 24.94° (H_2O, *c* 2.566), mol. wt. in H_2O 202.1 (*c* 1.022) (3,6-anhydroacetoneglucose, m. 56–7°, $[\alpha]_D^{20}$ 29.33° (H_2O)); III, m. 133.5°, $[\alpha]_D^{20}$ —26.5° (H_2O). XI, m. 105–6°, is markedly hygroscopic, strongly reduces hot Fehling soln., $[\alpha]_D^{20}$ 25.36° (H_2O, *c* 3.510) (3,6-anhydroglucose, m. 118°, $[\alpha]_D^{20}$ 55.39° (H_2O, *c* 2.888)). C. A. R.

Report (No. 93) of the most important work in the field of pure sugar chemistry published during the first half of the year 1930. E. O. v. LIPPMANN. *Deut. Zuckerind.* 55, 1104, 1131–3, 1178–9, 1204(1930).—A comprehensive review. J. L. LEETE

Essential oil of Backhousia angustifolia. III. Constitutions of angustione and dehydroangustione. ROBERT S. CAHN, CHARLES S. GIBSON, ARTHUR R. PENFOLD AND JOHN L. SIMONSEN. *J. Chem. Soc.* **1931**, 286–94; cf. *C. A.* **24**, 3998.—The constitution ascribed to angustione (I) is further confirmed by the action of HBr, which gives 1,1,3-trimethylcyclohexane-4,6-dione, m. 130–1°, and by its oxidation with KOBr to $HO_2CCHMeCH_2CMe_2CO_2H$, m. 91.2°, $[\alpha]_{5461}$ —12° (H_2O, *c* 1.546); oxidation with $KMnO_4$ gives a ketonic acid, further oxidized to the above acid with KOBr. Dehydroangustione (II), *p*-$MeC_6H_4NH_2$ and $ZnCl_2$, heated 2 hrs. at 140–50°, give the *p-toluidino deriv.*, m. 63.5°. Heating II with HBr on the H_2O bath for 4 hrs. gives 1,1,3-trimethyl-Δ^2-cyclohexene-4,6-dione (III), m. 156–7°. Reduction of II gives *dl*-angustione, b_{14} 127°, d_{20}^{20} 1.083, n_D^{20} 1.5087 (identical with the natural ketone, except for the value of *n*; the previous sample was contaminated with II); the *amino deriv.*, m. 139–40°, is formed by adding NH_4OH to the EtOH soln.; the *4*(or *6*)-*oxime*, m. 57–8°. Oxidation of II with NaOBr gives a mixt. of a compd. m. 88.5°, identified as the anhydride of *cis*-α,β,γ-



(I)



(II)

trimethylglutaconic acid (IV), m. 125° (on bromination, the product evolves HBr, giving the *lactone* of *β-bromo-γ-hydroxy-α,α,γ-trimethylglutaric acid*, m. 147–8°) and *trans*-β-hydroxy-α,α,γ-trimethylglutaric acid, m. 156–7°. Oxidation of III with NaOBr gives as the main product IV; there also results a small quantity of a *compd.*, $C_8H_{12}O_3$, m. 85–6°, which gives a purple color with $FeCl_3$; this is unstable and passes into a red oil on standing; it may be $OC.CHMe.CH_2.CMe_2.CO$ or $HOC:C(OH).CMe:CH.CMe_2$.

Note on the parachors of angustione and dehydroangustione. OWEN J. EVANS AND

FREDERICK G. SOPER. *Ibid* 289–90.—*dl*-I, m. 151–2°, γ_{20} 34.9, *P* 442 (calcd., 462.1); II gave γ_{20} 36.7, *P* 435 (calcd., 439.5); the d^{20} were 1.083 and 1.103, resp. The temp. coeff. of the surface tension for I is —0.072 dyne/cm. per degree, d^{40} 1.074, Ramsay-Shields const. 2.05; this indicates that I is a normal liquid, so that the neg. anomaly cannot be attributed to assocn. The reason for this is discussed. C. J. WEST

Model experiments for the theory of alcoholic fermentation. III. Degradation of α-diacetonefructosesulfuric acid. HEINZ OHLE AND GEORG COUTSICOS. *Ber.* **63B**, 2912–27(1930); cf. *C. A.* **24**, 1350.—It was shown in Paper I that β-diacetonefructose-1-sulfuric acid (I) with aq. neutral $KMnO_4$ gives the tri-K salt of 2,3-acetone-β-*l*-furtondiacid-1-sulfuric acid (II) (the mother substance, $HOCH_2C(OH)_2CH(OH)CH(CO_2H)_2$, being designated as furtondiacid). The prepn. of this salt has since been materially improved and simplified and it is now quite readily available. A weak point in the proof of its constitution was the detection and quant. estn. of the $HOCH_2CO_2H$ formed in its hydrolysis but this gap has now been filled in. On the basis of the fact that $HOCH_2CO_2H$ forms a difficultly sol. basic Pb salt a quant. method for detg. this acid, sufficiently accurate for the present purpose, was devised and it was found that the above tri-K salt does in fact give 1 mol. $HOCH_2CO_2H$, as previously assumed. That the yield of MeCOCHO does not exceed 80% is probably due to a small part of it undergoing a Cannizzaro reaction, with formation of $AcCO_2H$ and $AcCH_2OH$; the latter, though not isolated, was shown to be present by its characteristic odor. The reaction was next applied to α-diacetonefructose-3-sulfuric acid (III). Whereas with I the formation of II and the point where it is present in greatest concn. can be readily recognized by following the oxidation polarimetrically to the max. in the rotation curve, the curve for III shows no such max. With 12 atoms O the III is completely broken down into optically inactive products, as is demanded by theory if the Me_2CO split off is not attacked. If each mol. of III were at once broken down into the final products (Me_2CO, H_2O, CO_2, H_2SO_4) before the next mol. underwent the same change, the rotation curve should be a straight line, but, as was to be expected, it is not. To obtain further light on the course of the reaction, the splitting off of the H_2SO_4 was also followed and here again the curve obtained by plotting the no. of mols. H_2SO_4 split off against the no. of atoms of O used was not a straight line. In both cases the max. deviation from a straight line was at a point corresponding to about 6 atoms O, and at this point it was possible to isolate an almost optically inactive product (IV) having the same compn. as II, *viz.*, the tri-K salt of *1,2-acetone-α-l-furtondiacid-3-sulfuric acid*, and yielding the same hydrolysis products. Attempts to isolate intermediate products in the formation of II and IV in order to det. at what point of the fructose mol. (C atom 5 or 6) oxidation first begins were unsuccessful, and the study of α acetonefructose-3-sulfuric acid (V) was therefore undertaken. Since here the 4- and 5-HO groups are free, the V should be more readily attacked by $KMnO_4$ and the first oxidation phase should use up more $KMnO_4$ than with III and less $KMnO_4$ would be left for the further oxidation so that there would be an increased accumulation of the intermediate oxidation product. The max. deviation of the exptl. rotation curve from a straight line appeared at the point corresponding to 5 atoms O, and at this point there were obtained large quantities of IV but also, although in small quantity, the di-K salt of *1,2-acetonefructuronic-3-sulfuric acid* (VI), showing that, in part, at least, it is the 6-C atom which is first attacked. Whether VI is an intermediate or a by-product in the formation of IV could not be detd. for lack of material. VI, the first deriv. of the hitherto unknown fructuronic acid, the analog in the ketose series of glucuronic acid, is decompd. by boiling dil. HCl into Me_2CO, H_2SO_4 and CO_2, but the latter is evolved much more slowly than from II or IV. MeCOCHO and furfural were not formed. To det. how the OSO_3H residue influences the course of the oxidation of α- (VII) and β-diacetone- (VIII) and α-acetonefructose (IX), the oxidation curves of these compds. were also detd. With VIII the rotation curve also changes from − to +, with a max. at the point corresponding to about 6 atoms O, so that 2,2-acetone-2,2,3-trihydroxyglutar-4-carboxylic acid is probably formed, but the curve does not pass through α_D 0° at the point corresponding to 12 atoms O. The same is true of the curve for VII. The only possible explanation for this is that a part of the Me_2CO split off is also oxidized, probably after it has reacted with another cleavage product of the sugar mol. The curve for VII also shows a dispersion of the exptl. values which is not due to exptl. error, as the individual values can be reproduced with great exactitude. It is, therefore, assumed that a whole series of intermediate products is formed through different reactions, one of which, through the furtondiacid, is extraordinarily favored by the introduction of an OSO_3H residue. The curve for IX is parallel to the theoretical (straight line) curve from the points corresponding to 2 up to 9 atoms O, indicating that most of the IX is oxidized directly to Me_2CO, CO_2 and H_2O without the accumulation in

appreciable amount of any intermediate product. If, however, **IX** is not a pyroid fructose but a fructofuranose, the curve might be interpreted on the assumption that with 2 atoms O there is an almost quant. formation of acetonefructuronic acid, but an expt. on a large scale under these conditions yielded only large quantities of unchanged **IX**. **IX** and its 3-sulfate (V) show most strikingly the selective action of the OSO_3H group which evidently depends on its adjacent position to the masked C:O group, the strongly electronegative OSO_3H residue stabilizing the hydrate form of the C:O group and therefore exerting the same influence as the Cl in $CCl_3CHO.H_2O$. By the stabilization of the hydrate form the union of the Me_2CO is also strengthened and the upper end of the mol. is protected from attack by the oxidizing agent. Other electronegative groups must exert the same influence, and, furthermore, oxidation through derivs. of the furtondiacid type in the glucose series is at most possible only in those glucose derivs. having strongly acid residues on the 2-HO group. It is believed, therefore, that a degradation of glucose in the sense of the Neuberg fermentation scheme is possible only by way of fructose. *K salt* of **III**, from **VII** and $ClSO_3H$ in C_5H_5N, needles with $^1/_2$ mol. H_2O, decomps. about 165°, $[\alpha]_D^{20}$ —124.3° (H_2O, *c* 1.094), is practically insol. in abs. alc., swells in ordinary alc. and dissolves on heating, the satd. cooled soln. contg. about 0.7% of the salt; more concd. solns. solidify to a more or less stiff jelly. The alc. in these jellies can be for the most part squeezed out by gentle pressure. The higher alcs. behave like EtOH but with MeOH the property of gelatinizing is less marked. *Na salt*, needles with $1H_2O$, decomps. about 170°, $[\alpha]_D^{20}$ - 128.3° (H_2O, *c* 2.144). The salts are stable toward boiling dil. alkalies but split off Me_2CO and H_2SO_4 with very dil. acids at room temp. *Tri-K salt* of **IV** (20 g. from 100 g. of the K salt of III with 2 *N* $KMnO_4$ (6 atoms O) on the H_2O bath), prisms with $3H_2O$ from MeOH-Me_2CO-EtOH, $[\alpha]_D^{20}$ —1.78°, needles with 4.5 H_2O from MeOH, $[\alpha]_D^{20}$ —2.72°. *K salt* of **V**, obtained by partial hydrolysis of the K salt of **III** with *N* H_2SO_4 at room temp., decomps. about 150°, $[\alpha]_D^{20}$ —112° (H_2O, *c* 1.847). *Na salt*, decomps. 140°, $[\alpha]_D^{20}$ -- 118.6° (H_2O, *c* 2.426). *Di-K salt* of **VI** (5 g. from 100 g. of the K salt of V with 2 *N* $KMnO_4$ (5 atoms O) at 100°), prisms with 4 mols. H_2O (0.5 mol. is firmly held even at 135°), $[\alpha]_D^{20}$ —45.68° (H_2O, *c* 1.345). **IX**, from 50 g. **VII** allowed to stand 3 hrs. at 37° in 250 cc. of 70% AcOH, m 120.5°, $[\alpha]_D^{20}$ —159.3° (H_2O, *c* 1.639). Tri-K salt of II (164 g. from 756 g. of the K salt of I heated 10 hrs. at 100° with 1264 g. $KMnO_4$ in 20 l. H_2O), $[\alpha]_D^{20}$ 29.35° (H_2O, *c* 3.314),

C. A. R.

Lignin, humic acid and humin. W. Fuchs. *Z. angew. Chem.* **44**, 111–8(1931); cf. *C. A.* **25**, 761.—Investigations by F. and co-workers are summarized. E. Schotte

Lignin and related compounds. V. Action of halogens on lignin and wood. Harold Hibbert and Charles A. Sankey. *Can. J. Research* **4**, 110–8(1931); cf. *C. A.* **24**, 5151, 5152.—Spruce meal and a variety of lignin products were treated with Br dissolved in a variety of solvents. The addn. of Br was found to be a function of time, concn., solvent used and the acidity of the reacting medium, and quite unsatisfactory for the detn. of unsatn. **VI. The mechanism of aqueous halogenation.** K. Austin Taylor, O. Maass and Harold Hibbert. *Ibid* 119–33.—The rates of addn. of HClO and HBrO to several unsatd. compds., under the influence of various catalysts, have been studied. The addn. of HClO to allyl alc. and dipropenylglycol is catalyzed by both $\overset{+}{H}$ and $\overset{-}{Cl}$, the catalytic effects of these ions, mole for mole, being equal. The effect of $\overset{+}{H}$ and $\overset{-}{Cl}$, when added together as HCl, is not the sum of their sep. effects but is proportional to their product, indicating undissocd. HCl as the real catalyst. The catalytic effect of varying amts. of added HCl is approx. proportional to the square of the amt. added, again indicating undissocd. HCl as the real catalyst. The addn. of HBrO to allyl alc. is catalyzed by HCl and HBr to about the same degree. This catalysis of HBrO addn. by HCl provides further support for the hypothesis of undissocd. HCl as the real catalyst in the addn. of HClO. This catalytic effect of undissocd. halogen acid on the addn. of hypohalous acids is given as an explanation of the greater rates of addn. of HClO and HBrO from Cl and Br water as compared with solns. of HClO and HBrO. The addn. of HBrO to fumaric acid is not catalyzed by HBr but, on the other hand, is considerably decreased. It is catalyzed, however, by HCl, although not nearly to the same degree as the addn. to allyl alc. This difference in behavior between fumaric acid and allyl alc. shows the necessity for studying the effect of HCl and HBr on the rate of addn. of HBrO to a wide variety of unsatd. compds., before any general theory of aq. halogenation applicable to all types of unsatd. compds. can be put forward. The

possible influence of conjugation has, however, been pointed out. An attempt has been made to apply the theory of hypohalous acid addn. catalyzed by undissocd. halogen acid to the aq. halogenation of phenols. The reaction between HBrO and *m*-nitrophenol has been shown to be catalyzed by HCl although not to the same extent as by HBr. This indicates HBrO addn., catalyzed by undissocd. HBr, as one of the mechanisms involved in the aq. bromination of phenols. A similar mechanism cannot be the fastest one in the aq. chlorination of phenols, since it is in disagreement with kinetic data of Soper and Smith (*C. A.* **20**, 2840), showing Cl to react faster than HClO with phenols. Resorcinol and phloroglucinol do not fall under the general classification proposed by Soper and Smith for phenols. Even here, however, the main reaction between Cl water and the phenol seems to involve Cl rather than HClO. Several parallel mechanisms may be involved in the aq. halogenation of phenols and the necessity for further work in this field has been emphasized. J. W. SHIPLEY

The enolization of ketones. V. GRIGNARD AND H. BLANCHON. *Bull. soc. chim.* [4], **49**, 23–42(1931).—The Grignard reagent has an enolizing reaction on ketones (*C. A.* **21**, 731), and it is possible to esterify the mixt. of enol so produced and the accompanying tertiary alc. from the normal reaction by means of acid chlorides or anhydrides. After sepn. of the esters by distn., the enolic ester can be hydrolyzed with H_2O. With certain precautions the enol-keto mixt. can be isolated by the decompn. of the Mg complex by NH_4Cl (*C. A.* **20**, 751). A systematic study was undertaken to establish a relation between the constitution of the ketone, its aptitude for enolization and the stability of the enol, the present paper dealing with the enolization of ketones (*C. A.* **24**, 1342), and the prepn. of the enols. To obtain the max. amount of enolate iso-PrMgBr was selected as being the most readily prepd. reagent. In general, the ketone was dissolved in an equal vol. of Et_2O and gradually introduced into the reagent. After refluxing for 30 min. and then cooling to —5°, the theoretical amt. of AcCl in 5 vols. of Et_2O was added dropwise with stirring and the resulting yellow mass was dropped into iced water contg. $NaHCO_3$. The washed and dried Et_2O exts., freed from Et_2O, were distd. under reduced pressure, giving 3 fractions, the keto-enol mixt., the enol acetate and the acetate of the tertiary alc. *Cyclohexanone-enol.*—100 g. of cyclohexanone gave 5 g. of keto-enol mixt. contg. 30% enol, 25 g. of the enol ester and 60 g. of isopropylcyclohexanol, b_{12} 125°. The ester was hydrolyzed with 10% $(CO_2H)_2$, yielding a 70% enol, n_D^{12} 1.4601. The tautomerization to cyclohexanone was complete in 10 hrs., the transformation being retarded by $(CO_2H)_2$, but not by $C_6H_4O_2$ or *o*-$C_6H_4(CO_2)O$, and accelerated by mineral acids, alkalies and Br. *Thujone-enol.*—Thujone formed mainly isopropylthujol acetate, b_{12} 125°, on treatment with iso-PrMgBr, and also some thujone-enol mixt. contg. 89.5% enol, n_D^{15} 1.4540, which reverts to the ketone in 15 hrs. The ketonization is completed in 2 hrs. with $NaHCO_3$ and instantaneously with Br, demonstrating the difficulty of obtaining the pure enol and the inapplicability of the Kurt Meyer method. *Carvone-enol.*—200 g. of carvone, enolized by EtMgBr, gave ethylcarveol, b_{12} 142°, and 15 g. of 96.5% carvone-enol, b_{12} 114–5°, d_{15}^4 0.957, n_D^{15} 1.5151, R. M. 47.2, calcd. 46.3. After 25 hrs. the mixt. contains 1.5% enol, tautomerization being accelerated by light, acids and alkalies. With Br the ketonization is complete in 1 hr. at 15° and in 15 mins. at 40°. The Kurt Meyer method applied at 0° would give results 10% below those furnished by the detn. according to Job and Reich. *Enol of mesityl oxide.*—Enolization of 100 g. of $Me_2C{:}CH{-}COMe$ with iso-PrMgBr yielded in addn. to 31 g. of 2,3,5-trimethyl-4-hexen-3-ol, b. 172°, and 10 g. of enol acetate, 21 g. of a 70% enol, b. 134°, d_{12}^4 0.8610, n_D^{12} 1.4500, R. M. 30.8, calcd., 30.18, which ketonized in 5 hrs. to 6.4% enol. Enols can be formed through the chlorohydrins. These are transformed into the acetic ester by AcOK and then treated as above. From pulegone was obtained 50% yield of a 98.2% enol, b_3 79–81°, n_D^{12} 1.48115, d_{12}^4 0.9130, R. M. 47.38, calcd. 46.76. The 75% enol derived from MeBz through the chlorohydrin was a very unstable liquid, b. 205°. Tautomerization was complete in 10 hrs. in the dark, 5 hrs. in light and was instantaneous in the presence of acids and alkalies. The ketonization was accelerated with Br. The enol did not give a color reaction with $FeCl_3$ nor did it form an ammoniacal enolate. C. R. A.

Bromomesitylene. LEE I. SMITH. *Org. Syntheses* **II**, 24–5(1931).—Details are given of the bromination of $C_6H_3Me_3$ in CCl_4 at 10–5°, the yield of $C_6H_2Me_3Br$ being 79–82%; traces of side-chain derivs. are removed by treatment with EtONa. The Br deriv. b_{62} 132°, b_{70} 139°, b_{78} 146°, b_{100} 157°. C. J. WEST

Process for the preparation of mesitylene. V. IPAT'EV, B. DOLGOV AND I. VOLNOV. *Ber.* **63B**, 3072–8(1930).—Ipat'ev, Jr., in connection with his work on the displacement of metals of the 5th group from their chlorides ($SbCl_3$, $BiCl_3$) by H in Me_2CO under pressure, noticed an extensive condensation of the solvent, irrespective of the salt used,

which occurred even when the solns. were dild. with H_2O. This made it seem probable that the condensation to mesitylene (I) and higher condensation products depends not only on the dehydrating action of the HCl but also on a catalytic action exerted by it. The present authors were chiefly interested in the mechanism of the condensation to I, and since the use of H_2SO_4 under the same conditions resulted in a very deep-seated condensation with formation of S-contg. products, they discarded this acid and used HCl. By choosing the mildest possible conditions and studying the effect of varying them they were able to det. the optimum conditions for the prepn. of I. Using the Ipat'ev high-pressure app., they found that the yield of I after 24 hrs. at 175° (initial pressure 100 atm.) rapidly increases with increasing concn. of HCl up to 5 vol. % of d. 1.19 acid and then slowly falls as the HCl concn. is increased to 50 vol. %, where higher, terpene-like condensation products appear. This explains the poor yields of I from Me_2CO satd. with HCl. Keeping the concn. of HCl const. (5 vol. %) and varying the temp. gave a very rapid increase in yield (based on the Me_2CO not recovered) with increasing temp. up to 140°; the yield based on the total amt. of Me_2CO charged into the app. reached its max. at 170°; from 175° to 190° the 2 curves coincided, pointing to a complete utilization of the Me_2CO charge. A very significant fact is the decrease in lower, O-contg. condensation products (mesityl oxide) with increasing temp. Under optimal conditions (5 vol. % and 145°), the yield of I no longer increases after 24 hrs.; up to this point the yield increases very regularly. Under these conditions 3–4.5% mesityl oxide could be isolated as the primary condensation product. The absence of phorone in the condensation products indicates that either it is not formed at all under these conditions or quantitatively undergoes further condensation. Under the above optimal conditions, com. Me_2CO gives 43% I, based on the Me_2CO not recovered; up to 50% of the Me_2CO charged does not react but it can be put through the process again. At 175–80° practically all the Me_2CO is used up, giving 36% I, as against only 17.5% previously obtained. C. A. R.

Isodurene (1,2,3,5-tetramethylbenzene). Lee I. Smith. *Org. Syntheses* **XI**, 66–9 (1931); cf. *C. A.* **24**, 1850.—2,4,6-$Me_3C_6H_2Br$ gives a Grignard reagent which yields 53–61% of 1,2,3,5-$C_6H_2Me_4$ with Me_2SO_4. C. J. West

The forced reaction between tetraphenylethylene and some organomagnesium derivatives. Henry Gilman and Stanton A. Harris. *Bull. soc. chim.* [4], **49**, 10–12 (1931).—The formation of *o*-phenylbenzohydrylaniline by the action of PhMgBr on $Ph_2C{:}NPh$ (*C. A.* **23**, 3909), in which an addn. is made to a benzene ring in a compd. contg. several closely situated Ph groups, suggested the corresponding reaction with $(Ph_2C{:})_2$ (I). Fifteen g. of I (0.045 mol.) in 150 cc of PhMe was heated with 0.174 mol. of PhMgBr at 60° for 20 hrs. and then at 90–100° for 6 hrs., the mixt. being guarded from the atm. Eighty-six % of I was recovered and on addn. of CO_2 to the reaction mixt. before hydrolysis only BzOH was formed. Similarly, after a forced reaction with $PhCH_2MgCl$, 85.5% of I was recovered and carbonation with CO_2 gave $PhCH_2CO_2H$ uniquely. Neither expt. showed any evidence of any reaction of the type expected in spite of the forced conditions and the highly phenylated nature of I. C. R. A.

2,4-Diaminotoluene. S. A. Mahood and P. V. L. Schaffner. *Org. Syntheses* **XI**, 32–5(1931).—Details are given of the reduction of 2,4-$(O_2N)_2C_6H_3Me$ with Fe and HCl, the di-NH_2 deriv. being obtained in 74% yield. C. J. West

***p*-Iodoaniline.** R. Q. Brewster. *Org. Syntheses* **XI**, 62–4(1931).—$PhNH_2$ in $NaHCO_3$, treated with 1 mol. powd. I_2, gives 75–84% of *p*-$IC_6H_4NH_2$, m. 62–3°. C. J. West

The action of ethyl nitrate on phenylhydrazine in the presence of sodium ethylate. Eugen Bamberger and Otto Billeter. *Helv. Chim. Acta* **14**, 219–32(1931).—The method used for the prepn. of $PhN{:}NO_2H$ from $PhNH_2$, $EtONO_2$ and NaOEt (*C. A.* **15**, 1516) was applied to $PhNHNH_2$ with the hope of obtaining $PhN(:NO_2H){:}NH$ but the attempt failed. $NaNO_2$, C_6H_6, $PhNH_2$, PhNHNHAc, PhN_3, $(PhN{:})_2$, HOAc, N_2 and $MeC(N{:}NPh){:}NNHPh$ (I) were isolated from the reaction mass. Mechanisms for the formation of these compds. are suggested and evidence in their support is offered. I was prepd. in 94% yield from $PhNHN{:}CHMe$ (II) and $PhN(:N)Cl$. In the same manner *nitromethalformamol* [illegible]

I. M. Levine

Condensation of ethyl acetoacetate with aromatic amines. I. G. V. Jadhav. *J. Indian Chem. Soc.* **7**, 669–76(1930).—$AcCH_2CO_2Et$ (I) and aromatic amines give $MeC(NHR){:}CHCONHR$ and either $MeCOCH_2CONHR$ (II) or $MeC(NHR){:}CHCO_2Et$ (III); the effect of substituent groups in the aromatic nucleus was studied. Compds. of

type II were isolated in only a few cases and heating the reaction mixt. was shown to convert them to compds. of type III, except in the case of Et *β-p*-nitroanilinocrotonate. The following compds. were prepd. by refluxing equal wts. of I and the proper amine unless otherwise indicated: *acetoacet-m-nitroanilide* (IV), pale yellow, m. 120–1°; *β-m-nitroanilinocroton-m-nitroanilide* (V), yellow, m. 152–3°; *Et β-p-nitroanilinocrotonate*, yellow, m. 122–3°; *β-p-nitroanilinocroton-p-nitroanilide* (VI), orange, m. above 250°; *acetoacet-p-anisidide* (VII), m. 117–8°; *β-p-anisidinocroton-p-anisidide*, m. 235–6°; *Et p-phenetidinocrotonate*, m. 60–1° (from a cold mixt. on standing 48 hrs.); *β-p-phenetidinocroton-p-phenetidide*, m. 230–1°; *β-m-(1,4,5)-xylidinocroton-m-(1,4,5)-xylidide*, m. above 275°, *β-m-(1,3,4)-xylidinocroton-m-(1,3,4)-xylidide*, m. above 275°; *acetoacet-m-chloroanilide*, m. 105–6°; *β-m-chloroanilinocroton m-chloroanilide*, m. 240–1°; *acetoacet-p-chloroanilide* (VIII), m. 132–3°; *Et β-p-chloroanilinocrotonate*, m. 55° (from a cold mixt. on standing 72 hrs.); *β-p-chloroanilinocroton-p-chloroanilide*, m. above 275°; *acetoacet-o-chloroanilide* (IX), m. 107–8°; and *β-o-chloroanilinocroton-o-chloroanilide*, m. 236°. V and VI with HCl give IV and *acetoacet-p-nitroanilide* (X), m. 122–3°, resp. IV, X, VIII, IX and VII with NH_4OH give the following *anilides* of *β-aminocrotonic acid: m-*NO_2, orange-red, m. 129–30°; *p-*NO_2, yellow, m. 189–90°; *p-MeO*, m. 109–10°; *p-Cl*, m. 110°, and *o-Cl*, m. 96–7°. A. F. Shepard

Azoxybenzene. H. E Bigelow and Albert Palmer. *Org. Syntheses* **XI**, 16–8 (1931).—Details are given of the action of As_2O_3 and NaOH upon $PhNO_2$; PhN:N(:O)Ph results in 85% yields; the compd. is easily volatile with steam at 140–50°. C. J. West

Remarks concerning the most recent work of A. Angeli. Eugen Bamberger *Helv. Chim. Acta.* **14**, 242-9(1931).—A mechanism offered by B. for the reaction by which azohydroxyamides, RN(OH)N:NR, are obtained from the interaction between PhNO (I) and $PhNHNH_2$ (II) or their derivs involves an aldol condensation of the reactants followed by a loss of H_2. This mechanism is in contrast to that given by Angeli who supposed that II is first reduced to PhN:NH which then adds I. Several instances of reactions easily explained by means of the aldol condensation are given. Besides the simple compds., *p*-BrC_6H_4NO (III), $PhMeNNH_2$ (IV) and Ph_2NNH_2 (V) undergo the same type of reaction. From IV and I, *phenylazomethylanilidoxide*, PhMeNN:N(:O)Ph (VI), m. 72°, PhMeNN:NPh (VII) and PhNHMe (VIII) were obtained. By reduction of VI with Zn, VII, VIII, $PhNH_2$ and NH_3 were produced. Condensation of V and I yields *phenylazodiphenylamidoxide*, $Ph_2NN:N(:O)Ph$, m. 128.5–9°, Ph_2NH and PhNHOH. From III and IV *p-bromophenylazomethylanilidoxide*, $BrC_6H_4N(:O)$ NNMePh (IX), m. 77–8°, $BrC_6H_4N:N(:O)C_6H_4Br$ (X), and possibly $BrC_6H_4N:NNMePh$ were isolated. Reduction of IX yielded $(BrC_6H_4N)_2$ (XI) and VIII. III and V interact to give *p-bromophenylazodiphenylamidoxide*, $BrC_6H_4N(:O):NNPh_2$ (XII), m. 119–20°, X and BrC_6H_4NHOH. The reduction products of XII consisted of X, (BrC_6H_4NH), XI, Ph_2NH, $BrC_6H_4NH_2$ and Ph_2NNHAc. I. M Levine

***N*-Diethylamino-*N'*-phenylurea.** R. Stollé and W. Brandt. *J. prakt. Chem* **129**, 206(1931).—Hurd and Spence (*C. A.* **21**, 570) state that Et_2NNH_2 and PhNCO give the compd. PhN:C:NNEt$_2$; S. and B. state the compd. analyzes for $C_{11}H_{17}ON_3$ and is thus a semicarbazide deriv. C. J. West

***p*-Methoxybenzylmagnesium bromide.** Henry Gilman and E. A. Zoellner *Bull. soc. chim.* [4], **49**, 7–9(1931).—The extraordinary activity of the halogen in the halides of the type *p*-$MeOC_6H_4CH_2X$ renders these compds. so unstable that various workers have reported that *p*-$MeOC_6H_4CH_2Cl$ does not form a Grignard reagent (*C. A.* **18**, 237; **23**, 823). By a modification of the usual procedure (*C. A.* **23**, 2934) *p*-$MeOC_6H_4CH_2MgBr$ has been prepd. in satisfactory yields. To 1.82 g. (0.075 atom) of Mg, 30–80 mesh, covered with 11.5 cc. Et_2O, were added 10 drops of freshly distd. *p*-$MeOC_6H_4CH_2Br$ (b_{12} 129°, d_{20} 1.41), and then 0.05 g. of I. After boiling for 10 mins. without stirring, 4.35 g. (0.0216 mol.) of the bromide mixed with 23.5 cc. of Et_2O, was added uniformly over a period of 30 mins. with stirring and refluxing. After the addn. this treatment was continued for 10 mins. The resulting soln. gave a positive reaction for organometallic reagent (*C. A.* **19**, 2473) and titrated for 54% *p*-$MeOC_6H_4CH_2MgBr$ (*C. A.* **17**, 530). Treatment with CO_2 gave *p*-$MeOC_6H_4CH_2CO_2H$, m. 84–5°, and some $(p\text{-}MeOC_6H_4CH_2)_2$. The yield could be raised to 75% by using 10–20 atoms of Mg and about 30 mols. of Et_2O per mol. of bromide; an even better yield should be obtained of the corresponding organomagnesium chloride. C. R. Addinall

Sulfur derivatives of 2-methoxytoluene. G. B. Kolhatkar and K. V. Bokil *J. Indian Chem. Soc.* **7**, 843–50(1930).—3,4-$Me(MeO)C_6H_3SO_2Cl$ (I) and 2-$MeOC_6H_4Me$ in CS_2 with $AlCl_3$ give *3,3'-dimethyl-4,4'-dimethoxydiphenyl sulfone* (II), m. 138°. Alk. $KMnO_4$ oxidizes II to *3,3'-dicarboxy-4,4'-dimethoxydiphenyl sulfone* (III), sinters 245°,

m. 250° (decompn.). Distn. of III with CaO-NaOH gives *4,4'-dimethoxydiphenyl sulfone*, m. 129°. With HI, II gives *3,3'-dimethyl-4,4'-dihydroxydiphenyl sulfone*, m. 263°, and III gives *3,3'-dicarboxy-4,4'-dihydroxydiphenyl sulfone*, m. 306–7° (decompn.). Either $PhSO_2Cl$ with 2-$MeOC_6H_4Me$ or I with C_6H_6 give *3-methyl-4-methoxydiphenyl sulfone*, m. 112–2.5°. *3-Methyl-4-hydroxydiphenyl sulfone*, m. 226°. *3-Carboxy-4-methoxydiphenyl sulfone*, m. 176°. *3-Carboxy-4-hydroxydiphenyl* [illegible] *4,4'-dimethoxydiphenyl sulfone*, m. 186–7°. *3'-Methyl-2',4-dimethoxydiphenyl sulfone*, m. 145°. A soln. of $AlCl_3$ in 2-$MeOC_6H_4Me$ satd. with SO_2 gives *3,3'-dimethyl-4,4'-dimethoxydiphenyl sulfoxide* (V), m. 87–87.5°, by ether extn. and 2 isomers of *tri-o-cresylsulfonium chloride*, m. 140–1° and 69–70°, by $CHCl_3$ extn. Reduction of V with AcOH and Zn dust gives *3,3'-dimethyl-4,4'-dimethoxydiphenyl sulfide*, m. 37.5–38°. Reduction of I with Na_2SO_3 and NaOH gives VII (see below) and *2-methoxytoluene-5-sulfinic acid* (VI). The Na salt of VI with I in abs. alc. gives *3,3'-dimethyl-4,4'-dimethoxydiphenyl disulfone* (VII), m. 206.5° (decompn.). *2-Methoxy-5-thioltoluene*, m. 42–3°, b. 236–7°, oxidized in NaOH by I_2-KI gives *3,3'-dimethyl-4,4'-dimethoxydiphenyl disulfide* (VIII), m. 44.5°. Oxidation of VIII in AcOH with H_2O_2 gives *3,3'-dimethyl-4,4'-dimethoxydiphenyl disulfoxide*, m. 118°, identical with that obtained by spontaneous decompn. of VI.

FOSTER DEE SNELL

Relative directive powers of groups of the forms RO and RR'N in aromatic substitution. IX. The nitration of *p*-cetyloxyanisole and *p*-benzyloxyanisole. JOHN C. SMITH. *J. Chem. Soc.* **1931**, 251–8; cf. *C. A.* **22**, 404.—In continuation of earlier work the relative directive powers of the cetyloxy and benzyloxy groups in the quinol series have been measured. The values of the relative directive powers obtained to date are: MeO 100, EtO 164, PrO 180, BuO 186, $C_{16}H_{33}O$ 212, $PhCH_2O$ 107, *p*-$NO_2C_6H_4CH_2O$ 38. *p*-HOC_6H_4OMe and cetyl iodide with MeONa give 80% of *4-cetyloxyanisole* (I), m. 68.5°; 3,4-$O_2N(MeO)C_6H_3OH$ gives 80% of *2-nitro-4-cetyloxyanisole* (II), crystg. as prisms, m. 62.5°, and needles, m. 63.9°. *3-NO_2 deriv.* (III), m. 49.5° (63% yield). At 230° a mixt. of II and III was unattacked by 10% KOH after 4 hrs.; addn. of PrOH and reheating at 140° for 4 hrs. caused slow hydrolysis. Data are given on the f. ps. and m. ps. of mixts. of II and III, contg. from 69.85% to 46.7% III. Nitration of I at 25° gives 97% of a mixt. contg. 67.8% III; at 0° the yield is 98% of a mixt. contg. 67.9% III; details of the nitrations are given. *4-Benzyloxyanisole* (IV) seps. from EtOH as plates, m. 69.7°, which are unstable and change to needles, m. 71.5° (95% yield); *2-NO_2 deriv.* (V), light yellow, m. 59.8° (80% yield); *3-NO_2 deriv.* (VI), yellow, m. 61.3° (50% yield); the m.-p. curve for mixts. of V and VI is given; the mixts. were viscous and reproducible f. ps. were not obtainable. Nitrations of IV at 28° gives 97% of a mixt. contg. 51% VI; at 14°, 97% of a mixt. contg. 51.4% VI. Details of the nitrations are given. C. J. W.

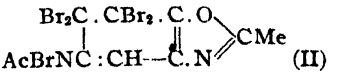
Heteropolar carbon compounds. XIII. Action of the nitro group on the salt color of positive ions. W. DILTHEY, C. BLANKENBURG, W. BRANDT, W. BRAUN, R. DINKLAGE, W. HUTHWELKER AND W. SCHOMMER. *J. prakt. Chem.* **129**, 189–205(1931); cf. *C. A.* **25**, 1513.—Tables are given showing the color of many compds. in concd. H_2SO_4 and in many cases in AcOH + H_2SO_4 and in Ac_2O + $HClO_4$. The general rule is that a NO_2 group in a Ph residue adjacent to the CO group of a ketone has a bathochromic effect on the salt color. *4'-Nitrophenyl 4-biphenyl ketone*, from Ph_2, 4-$O_2NC_6H_4COCl$, $AlCl_3$ and CS_2, m. 164°; H_2SO_4 gives a yellow-orange color. *p*-$O_2NC_6H_4SPh$ and AcBr with $AlCl_3$ in $PhNO_2$ give *4-(4-nitrophenylthiol)acetophenone*, $AcC_6H_4SC_6H_4NO_2$, pale yellow, m. 119°; concd. H_2SO_4 gives an orange-red color; with BzH and MeONa there results *4'-(4-nitrophenylthiol)chalcone*, S-yellow, m. 142°; concd. H_2SO_4 gives a red-orange color; the *4-MeO deriv.*, yellow, m. 154°; concd. H_2SO_4 gives a red color; the *3,4-methylenedioxy deriv.*, yellow, m. 174°; concd. H_2SO_4 gives a red-violet color. The reaction between *p*-$ClC_6H_4NO_2$ and PhSNa in iso-BuOH gives *azodiphenyl sulfide*, orange-yellow, m. 121–2°; the concd. H_2SO_4 soln. is violet. Ph_2O and *p*-$O_2NC_6H_4COCl$ with $AlCl_3$ give *4-(4-nitrobenzoyl)diphenyl ether*, m. 121–2°, sol. in concd. H_2SO_4 with a brown-red color, gradually changing to orange; the *3-NO_2* isomer, m. 87–8° and gives a yellow color in H_2SO_4; *3-NH_2 deriv.*, analyzed as the *HCl salt*, m. 200–6° (decompn.), sol. in concd. H_2SO_4 with a yellow color (*Bz deriv.*, pale yellow, m. 127°; the *azo dye* from β-$C_{10}H_7OH$, orange-red, gives a red color in H_2SO_4). Two mols. *p*-$O_2NC_6H_4COCl$ give *4,4'-di(4-nitrobenzoyl)diphenyl ether*, m. 226°, sol. in concd. H_2SO_4 with a red-orange color; *di-4-NH_2 deriv.*, light yellow, m. 177–8°; concd. H_2SO_4 gives an orange-yellow color; *HCl salt*, colorless; *azo dye* from β-$C_{10}H_7OH$, red-orange, sol. in H_2SO_4 with a

dark red color. *4,4'-(3-Nitrobenzoyl)diphenyl ether*, m. 175°, sol. in concd. H_2SO_4 with a yellow color; *di-3-NH₂ deriv.*, greenish yellow, m. 150–1°; H_2SO_4 soln., red-orange; *azo dye* from β-$C_{10}H_7OH$, orange, sol. in H_2SO_4 with a red color. *3-(3-Nitrobenzoyl)-diphenyl sulfide*, m. 128–9°, sol. in concd. H_2SO_4 with an orange-red color; the *di-4,4'-(3-nitrobenzoyl) deriv.*, m. 229–30° and gives an orange-red color in H_2SO_4. *Di-4,4'-(4-nitrobenzoyl) deriv.*, m. 278°; H_2SO_4 gives an orange-red color. *Di-4,4'-(3-nitrobenzoyl)-diphenyl selenide*, greenish yellow, m. 221–2°, sol. in H_2SO_4 with an orange-red color; the *di-4,4'-(4-nitrobenzoyl) deriv.*, yellow, m. 267–8° and gives a deep red soln. in H_2SO_4. *4-Benzoyl-4'-nitrodiphenyl sulfide*, m. 145°; concd. H_2SO_4 soln., orange. C. J. West

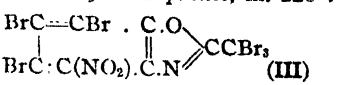
Aromatic disulfides and Sugden's parachors. S. S. Bhatnagar and Balwant Singh. *J. Indian Chem. Soc.* 7, 663–8(1930).—The parachor values for several aromatic disulfides indicate that the conventional structure with 2 bivalent S atoms is correct. The following disulfides were studied and data for each were detd. at 3 or 4 different temps.: diphenyl, m. 66.5°, $d_4^{118.0}$ 1.110, γ 35.08, parachor (mean) 477.9; 4,4'-dichlorodiphenyl, m. 71.5°, $d_4^{102.3}$ 1.304, γ 39.38, parachor (mean) 550.6; 4,4'-dibromodiphenyl, m. 93.8°, $d_4^{115.0}$ 1.647, γ 40.33, parachor (mean) 575.9; 4,4'-dimethyldiphenyl, m. 46.0°, $d_4^{111.0}$ 1.068, γ 33.13, parachor (mean) 552.9; 4,4'-dimethoxydiphenyl (I), m. 73.5°, $d_4^{100.5}$ 1.139, γ 37.84, parachor (mean) 666.1; β,β'-dinaphthyl, m. 139.0°, $d_4^{144.0}$ 1.144, γ 37.20, parachor (mean) 689.6; dibenzyl, m. 71.0°, $d_4^{100.2}$ 1.085, γ 36.42, parachor (mean) 557.1; 2,2'-dinitrodibenzyl, m. 112.0°, $d_4^{15.0}$ 1.308, γ 44.81, parachor (mean) 665.7. The parachor value of I is 6.3 units lower than that calcd. for bivalent S; presumably this is due to assocn. A. F. Shepard

Action of bromine on phenols. Gustav Heller, Werner Dietrich, Theodor Hemmer, Horst Kätzel, Erhard Rottsahl and P. G. Zambalos. *J. prakt. Chem.* **129**, 211–56(1931).—The action of Br upon phenols may be divided into several categories. (*1*) *Br does not react.*—This is the case where the phenol group is protected as in 4,6,3-$Br_2(AcNH)C_6H_2OAc$; 2,4,6,3,5-$Br_3(AcNH)(O_2N)C_6HOH$ is also unchanged on heating with Br-AcOH. (*2*) *Br enters only in the nucleus.*—4,6,3-$(O_2N)_2(AcNH)C_6H_2OH$ and Br in AcOH, heated 8 hrs. on the H_2O bath, give *4,6-dinitro-3-amino-2-bromophenol*, yellow, m. 207°; *di-Ac deriv.*, m. 222°; partial hydrolysis with dil. NaOH gives the *3-AcNH deriv.*, m. 223.5°. Warming on the H_2O bath with concd. HNO_3 gives *4,6-dinitro-2-bromo-1,3-dihydroxybenzene*, golden yellow, m. 192.5–3°; 8% NaOH gives a carmine-red salt; this also results by diazotizing in concd. H_2SO_4. 2-Acetamido-4-nitroresorcinol and Br-AcOH, shaken until soln. results and allowed to stand 24 hrs., give the *6-Br deriv.*, pale yellow, m. 173–4°. 6,3-$O_2N(AcNH)C_6H_2OH$ and Br-AcOH, warmed on the H_2O bath, give *2,4-dibromo-6-nitro-3-aminophenol*, yellow, m. 199–200°; the alkali salt is orange-yellow; and *2-bromo-6-nitro-3-aminophenol*, yellow-brown, m. 230°; the structure of these compds. was established by removal of the NH_2 group. 3,5,4-$(O_2N)_2(AcNH)C_6H_2OH$ and Br-AcOH give the *2,6-di-Br deriv.*, decomps. 274.5°, the free *NH_2 compd.*, brown, m. 138°. (*3*) *In addn. to substitution some of the groups are replaced by Br.*—4,3,5-$H_2N(O_2N)_2C_6H_2OH$ and Br-AcOH, warmed 2 hrs. on the H_2O bath, give bromoanil. Energetic bromination of 4,3-$O_2N(AcNH)C_6H_3OH$ gives 2,3,4,6-Br_4C_6HOH; with 1 mol. Br in AcOH there results the *6-Br deriv.*, yellow, m. 295° (decompn.); EtOH-KOH gives *6-bromo-4-nitro-3-aminophenol*, red-brown, m. 244° (decompn.), whose structure was established by converting it into 6,4-$Br(O_2N)C_6H_3OH$, m. 113°. With more than 1 mol. Br, there also results the *2,6-Br_2 deriv.*, yellow-orange, m. 205°; *2,6-dibromo-4-nitro-3-aminophenol*, egg-yellow, m. 162.5°. 2,4-Dinitroresorcinol and a slight excess of Br in AcOH give the *6-Br deriv.*, m. 89°, a small quantity of the 5-Br deriv. and tetra-Br deriv. 4-Acetamido-6-nitroresorcinol and Br give the *2-Br deriv.*, m. 226° (decompn.). 3- and 4-Nitropyrocatechols, on energetic bromination, give the tetra-Br deriv. and tetrabromo-*o*-quinone. (*4*) *The bromination is complete and leads to Br_5C_6OH.*—This is true of 3,4-$O_2N(AcNH)C_6H_3OH$; 3,4-$O_2N(H_2N)C_6H_3OH$, on the other hand, gives bromoanil. (*5*) *Besides complete bromination there follows addn. of Br and entrance of a halogen atom in the AcNH group.*—2,4-$(AcNH)_2C_6H_3OH$ and 1 mol. Br in AcOH give the *6-Br deriv.*, m. 215°; with HNO_3 (d. 1.4) and H_2O (1:4) on the water bath, there results *2-acetamido-6-bromoquinone*, orange, m. 183°; SO_2 in EtOH gives the hydroquinone, m. 154°; excess Br gives tetrabromodiketo-R-pentene (I), m. 143–4°. Two mols. Br gives *2,4-diacetamido-5,6-dibromophenol*, crystg. with 2 mols. H_2O, m. 188.5°, anhyd., it m. 208°; HNO_3 gives *2-acetamido-5,6-dibromoquinone*, orange, m. 213°; the hydroquinone m. 188°. Four mols. Br gives *2-acetamido-3,5,6-tribromoquinone*, golden yellow, m. 198°. Excess Br gives *4-(N-bromoacetamido)-5,6-tetrabromo-2,1-ethenylaminophenol* (II), light orange, m. gradually above 210°, and I;

with 2 *N* NaOH there results *4-acetamido-5,6-dibromo-2,1-ethenylaminophenol*, m. 245°; fuming HCl gives 5,6,2,4-$Br_2(AcNH)_2C_6HOH$, m. 188.5°. 2,6-$(AcNH)_2C_6H_3OH$ and Br in AcOH give the *3,5(?)-Br₂ deriv.*, m. 208°; a *mono-Br deriv.*, m. 215° (decompn.), Excess Br gives an orange-yellow addn. product, amorphous, m. 161–3° (decompn.). which gives with AcONa *6-acetylamino-3,4,5-tribromo-2,1-ethenylaminophenol*, m. 226°.



(II)



(III)

Oxidation of 2,6-$(AcNH)_2C_6H_3OH$ with HNO_3 gives *2,6-diacetamidoquinone*, orange, m. 270° (decompn.); $PhNH_2$ gives an anilide, blue-black, m. 202°; the same quinone results from 2,4,6-$(AcNH)_3C_6H_2OH$. (6) *A quinone is formed with the retention of the AcNH group.*—2,4-$(AcNH)_2C_6H_3OH$, $NaNO_2$ and dil. H_2SO_4 give *2,4-diacetamido-6-nitrophenol*, orange, m. 215°; Br in AcOH gives 2-acetamido-3,5,6-tribromoquinone. (7) *In the case of quinone formation, there generally follows complete bromination with the removal of substituents and formation of bromoanil.*—3,2,4-$H_2N(O_2N)_2C_6H_2OH$ and Br in AcOH, warmed 4 hrs. on the water bath, give the *6-Br deriv.*, yellow, m. 148° (*di-Ac deriv.*, m. 161°; *mono-Ac deriv.*, pale yellow, decomps. 221°); excess Br gives bromoanil. Through the diazo reaction in concd H_2SO_4 there results *2,4-dinitro-6-bromoresorcinol*, m. 89°. HNO_3 (d. 1.42) gives styphnic acid. 4,2,6-$AcNH(O_2N)_2C_6H_2OH$ and excess of Br give bromoanil 2,5-Dinitrohydroquinone gives the same product. (8) *Special behavior of 4,2,3,5-$H_2N(O_2N)_3C_6HOH$.*—Br in AcOH gives *5-bromo-2-nitro-1,4-quinone azide*, yellow-brown, m. 186° (decompn.); the Ac deriv. gives bromoanil. *2-Acetamido-3,5,6-trinitrophenol*, light yellow, m. 151°; Br gives a compd., m. 218° (decompn.); the free NH_2 compd. with Br gives yellow needles, exploding at 180°. (9) *In several cases the Br opens the C_6H_6 ring with the formation of tetrabromodiketo-R-pentenes.*—*4-Nitro-2-acetamidophenol*, decomps. 267°, and Br in AcOH give the *6-Br deriv.*, m. 206°; thus also results by brominating 2,4-$(O_2N)_2C_6H_3OH$, reducing and acetylating. Excess of Br in AcOH gives I and *3,5,6-tribromo-2-amino-1-quinone 4 dibromide(?)*, m. 216° (*Ac deriv.*, m. 208°). Heating 2,4,6-$AcNH(O_2N)_2C_6H_2OH$ with excess Br several hrs. also gives I. *2-Acetamido-5-nitrophenol*, m. 258–9°. 2,3,5,6-$H_2N(O_2N)_3C_6HOH$ and HNO_2 give *3,5,6-trinitro-1,2-quinone azide*, yellow, sepg. with C_6H_6 of crystn. and is very explosive; the alk. soln. gives a deep violet-red color with β-$C_{10}H_7OH$; cooking with 4–5 parts EtOH gives 2,3,5-$(O_2N)_3C_6H_2OH$; a shorter period of heating gives *3(?)-ethoxy-5,6-dinitro-1,2-quinone azide*, yellow, m. 166° (decompn.); alk. β-$C_{10}H_7OH$ gives a deep brick red dye. 2,5-Acetamidonitrohydroquinone and Br-AcOH give *2-acetamido-5,6-dibromoquinone*, orange-yellow, m. 213°, identical with that obtained on oxidation of 5,6,2,4-$Br_2(AcNH)_2C_6HOH$; an intermediate product is *2-acetamidotribromoquinone*, yellow, m. 189–90° (decompn.). *Hexaacetyl-2,5-diaminophentetrol*, $(AcNH)_2C_6(OAc)_4$, m. 216° (decompn.); 5 mols. Br give *2,5-diacetamidodihydroxyquinone*, red-brown, does not m. 280°. 3,4-$(AcNH)_2C_6H_3OH$ and Br-AcOH give the *6-Br deriv.*, decomps. 258° and the *2,6-Br₂ deriv.*, m. 223°; excess Br gives *2-methyl-5,7-dibromo-6-hydroxybenzimidazole*, greenish flakes which do not crystallize. *2,6-Diacetamidohydroquinone*, m. 240° (decompn.); Br gives *3-bromo-2,6-diacetamidoquinone*, red-brown, m. 225°; SO_2 in AcOH at 40 50° gives *3-bromo-2,6-diacetamidohydroquinone*, m. 198° (decompn.). With 5 mols. Br there results *3,5-dibromo-2,6-diacetamidoquinone*, red-brown, m. 201°; the mother liquor contains a small quantity of $(CBr_3)_2CO$; I could not be detected. (10) *Formation of hexabromoacetone:* Excess of Br-AcOH with 2,6-diacetamidoquinone gives $(CBr_3)_2CO$; this also results from nitroaminophentetrol, in addn. to $Br_2C_6(OH)_4$; a *compd.* $C_6H_3O_4NBr_2$ was obtained in some expts. *Pentaacetylnitroaminophentetrol*, m. 194°, is formed with Ac_2O and AcONa; in the presence of H_2O there results the *di-Ac deriv.*, light yellow, explodes at 214°. 2,3-$O_2N(H_2N)C_6H_2OH$ and 1 mol. Br in AcOH give the *6-Br deriv.*, m. 233°; excess Br gives the *4,6-di-Br deriv.*, yellow, m. 182°; warming with 6 mols. Br for 16 hrs. gives a mixt. of *2-dibromomethyl-4-nitro-5,6,7-tribromobenzoxazole*, m. 233°, and the *2-tribromomethyl deriv.* (III), m. 172°. Tetrabromodiketopentene and $PhNH_2$ in EtOH give *4,5-dibromo-2-dianilino-3-anil-1-ketopentamethylene*, m. 261°.

C. J. WEST

Quinone formation from nitroacetamidohydroquinone. GUSTAV HELLER AND THEODOR HEMMER. *J. prakt. Chem.* **129**, 207–10(1931).—Dinitrohydroquinone is reduced by $SnCl_2$ and HCl in AcOH to *2,5-nitroacetamidohydroquinone* (I), brick-red, decomps. 226°; the *tri-Ac deriv.* m. 183–4°. *2,5-Nitroaminohydroquinone*, red, carbonizes 154°; heating with dil. alkali gives a color change from blue through green to yellow; no characteristic substance was obtained through diazotizing. I and fuming HNO_3 in AcOH give *2-nitro-5-acetamido-3,6-dihydroxyquinone*, orange-yellow, m. 164°

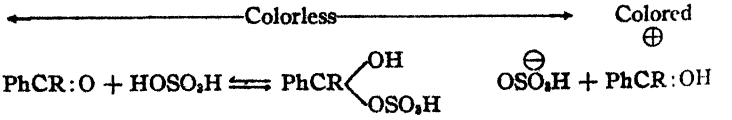
(decompn.), crystals with 0.5 mol. H_2O; with $PhNH_2$ there results *3,6-dianilino-2-acetamido-5-nitroquinone* (II), steel-blue needles, gradually decomps. at 260°. Careful oxidation of I with CrO_3 in AcOH gives apparently a *monohydroxynitroacetamidoquinone*, gradually darkens above 140°; $PhNH_2$ gives II. C. J. WEST

Halogenation of optically active phenylmethylcarbinol in the presence and in the absence of pyridine by thionyl chloride and the chlorides and oxychloride of phosphorus. JOSEPH KENYON, HENRY PHILLIPS AND FRANK M. H. TAYLOR. *J. Chem. Soc.* 1931, 382–9.—The halogenation of *l*-PhMeCHOH by $SOCl_2$, PCl_3, PCl_5 and $POCl_3$ in the presence and absence of C_5H_5N is studied. It is found that the presence of either pyridine or quinoline causes a reversal in the sign of rotation of the PhMeCHCl when $SOCl_2$ is used. When PCl_3, PCl_5 or $POCl_3$ are used in the presence of C_5H_5N, the signs of rotation of the PhMeCHCl obtained are the same as in its absence but the magnitudes of the rotations are greater. The presence of K_2CO_3 is without influence on the magnitude of the rotatory power of the PhMeCHCl obtained by the interaction of the *l*-alc. with PCl_3. It is probable that the HCl produced in the initial stage of this interaction plays no further part in the reaction and that the PhMeCHCl produced arises through the decompn. of the intermediate compd., $PhMeC(OPCl_2)H$. In the absence of C_5H_5N, which causes the inversion reaction to predominate, the decompn of the intermediate compd. appears to follow an indefinite course in which all the methods of decompn. may occur, since *d*-PhMeCHCl with $[\alpha]_{5461}$ 10.1° is obtained in place of the probably optically pure chloride with $[\alpha]_{5461}$ 64.1° which is obtained when the decompn. occurs in the presence of C_5H_5N. It would appear that, in the absence of C_5H_5N, the decompn. of the intermediate compd. PhMeC(OPOCl)H is initiated by the sepn. of a phenylmethylcarbonium cation without the simultaneous production of a Cl anion. The results of the various expts. may be tabulated as follows:

Halogenating agent		Tert. base	$[\alpha]_{5461}$ of *l*-alc.	$[\alpha]_{5461}$ of PhMeCHCl
$SOCl_2$	2 5 mols.	None	—51.7°	—63.5°
$SOCl_2$	2 0 mols.	C_5H_5N 1 mol.	49.8	17.3
$SOCl_2$	2 0 mols.	C_5H_5N 2 mols.	49.8	36.3
$SOCl_2$	2.0 mols.	Quinoline 2 mols.	43.7	16.1
PCl_3	3.5 mols.	None	51.7	10 1
PCl_3	2.0 mols.	K_2CO_3	51.7	10.0
PCl_3	2.0 mols.	C_5H_5N 1 mol.	49.8	64.1
$POCl_3$	2.5 mols.	None	28.0	0.5
$POCl_3$	2.0 mols.	C_5H_5N 1 mol.	52.1	12 6
PCl_5	2.0 mols.	None	43.7	4.5
PCl_5	2.0 mols.	C_5H_5N 1 mol.	49.8	10.4

The b. p. and *n* are given for many of the products. C. J. WEST

Salt-forming characteristics of doubly- and singly-linked elements of the oxygen groups. I. The carbonyl group in benzaldehyde and acetophenone. JOHN WM. BAKER. *J. Chem. Soc.* 1931, 307–14.—The investigation of the salt-forming characteristics of the carbonyl O in derivs. of the type ArCOR has been carried out along 2 lines The first involves investigations of the condition of such groups in H_2SO_4 soln. by the purely phys. methods of partition, colorimetry, absorption spectra, etc. Secondly, the conversion of a pseudo-basic system, directly attached to a C_6H_5 nucleus, into the "onium" salt will affect the directive action of the group causing enhanced tendency toward *m*-substitution. Pure BzH was distributed, under comparable conditions, between H_2SO_4 (of various concns.) and ligroin, both with and without the addn of $(NH_4)_2SO_4$ to the acid layer. The following results were obtained ($100[H_2SO_4]/([H_2SO_4] + [H_2O]$) and proportion of BzH in ligroin layer (%) with and without $(NH_4)_2SO_4$ are given): 7.3% free SO_2, 0.5, 1.4; 100, 0.81, 1.03; 90, 0.83, 8.7; 80, 1.77, 30.8. The equil. conditions in H_2SO_4 may be represented by the scheme:

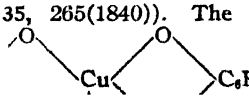


Sol. ← —Insol. in ligroin–

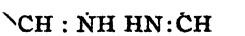
In the absence of $(NH_4)_2SO_4$ these equil. are displaced largely toward the right, the BzH being retained almost completely in the acid layer, even in 80% H_2SO_4. Addn.

of $(NH_4)_2SO_4$ causes a repression of the ionic dissocn. which is followed in turn by a further decompn. of the pseudo-salt into free BzH and H_2SO_4 with the result that a larger proportion of the BzH is found in the ligroin layer. Color values of BzH in 100% H_2SO_4 at room temp. are given; in agreement with the theoretical deductions, the product *cl* is not const. as required by Beer's law, the intensity of the color decreasing with increasing diln. more slowly than this law requires. The effect of the diln. of the H_2SO_4 was investigated by detn. of the relative color intensities of solns. of BzH in 100, 90, 80 and 70% H_2SO_4 in which the mol. ratio, BzH/H_2SO_4, was kept const. If, as has been assumed, the intensity of the color is a measure of the amt. of the salt form present, then the figures show that, of the amt. of oxonium salt present in 100% H_2SO_4, 15, 55 and 79%, resp., suffers hydrolysis in presence of the same mol. quantity of H_2SO_4 but in 90, 80 and 70% diln., resp. A similar expt. with BzMe shows that hydrolysis of the onium salt occurs even more readily, the diminution in color as the strength of the acid is diminished being too rapid to admit of accurate colorimetric measurement. **II. Nitration of benzaldehyde and acetophenone in sulfuric acid solution.** J. W. Baker and Wm. G. Moffitt. *Ibid* 314–8.—Using HNO_3 of d. 1.53 at 5° the following yields of *m*-NO_2 deriv. of BzH were obtained with varying concns. of H_2SO_4: 7.3% free SO_2 90.8; 5% free SO_2 89.0; 2.7% free SO_2 89.8; 90% 86.5; 80% 83.9; 0% 72.1. With BzMe: 7.3% free SO_2 90; 80% 83.1; 0% 69.8. This establishes the anticipated increase in *m*-substitution when nitration is effected in the presence of a large excess of H_2SO_4. Proof that these compds. are nitrated mainly through the cations of the salt is afforded by the observation that the addn. of $(NH_4)_2SO_4$ depresses the *m*-substitution; Rb_2SO_4 behaves similarly. C. J. West

Inner complex salts from hydroxyaldimines and hydroxyketimines. Paul Pfeiffer, E. Buchholz and O. Bauer. *J. prakt. Chem.* **129**, 163–77(1931).—*o*-HOC_6H_4CHO and $CaCl_2$ in dil. NH_4OH give the *compd.* $(C_7H_5O_2)_2Ca\ 2H_2O$, yellow, which loses the H_2O over $CaCl_2$; the *Mg complex* also contains $2H_2O$ and is yellow. $Zn(OAc)_2$, however, gives a *complex* of *salicylaldimine*, $(C_7H_6ON)_2Zn.H_2O$, yellow; crystn. from C_5H_5N gives a compd. with 1.5 mols. C_5H_5N, which loses 1 mol on standing; the *Ni complex*, $(C_7H_6ON)_2Ni.H_2O$, red needles with golden luster, which crystallizes from C_5H_5N without solvent of crystn. The Cu complex was first prepd. by Ettling (*Ann.* 35, 265(1840)). The properties of these compds. indicate the structure



C_6H_4 Cu C_6H_4.



o-Vanillin gives a *Mg complex*, $(C_8H_7O_3)_2Mg$, yellow; a Mg salt of the imine could not be prepd. Zn gives the *complex*, $(C_8H_7O_3)_2Zn.2H_2O$, yellow; in NH_4OH there results the *complex* $(C_8H_8O_2N)(C_8H_7O_3)Zn$, which crystallizes with 0.5 mol. H_2O. Ni gives the *complex* $(C_8H_8O_2N)_2Ni$, glistening red-brown needles. *o*-HOC_6H_4Ac and $Ni(OAc)_2$ in NH_4OH, shaken 3 hrs., and the products crystd. from C_5H_5N, give the *compd.* $(C_8H_7O_2)_2Ni.2C_5H_5N$, yellowish green leaflets; when $NiSO_4$ in 25% NH_4OH is boiled 1.5 hrs., there results the *compd.* $(C_8H_8ON)_2Ni$, orange-red or dark red from C_5H_5N; from hot $PhNH_2$ it crystallizes in dark red prisms with 1 mol. $PhNH_2$. Peonol and $Cu(OAc)_2$ in EtOH give the *complex* $(C_9H_9O_3)_2Cu$, dark gray-green, which seps. with 2 mols. C_5H_5N in glistening green crystals and from $PhNH_2$ with 1.5 mols. $PhNH_2$, green. The *Ni complex* $(C_9H_9O_3)_2Ni$, green, seps. in green crystals with 2 mols. C_5H_5N and with $2PhNH_2$; this salt does not absorb NH_3. In concd. NH_4OH there results the *salt* $(C_9H_{10}O_2N)_2Ni$, brick-red, crystg. from C_5H_5N or $PhNH_2$ without solvent of crystn. in red-orange needles. Benzalpeonol and $NiSO_4$ in EtOH-NH_4OH give the *compd.* $(C_{16}H_{14}O_2N)_2Ni$, orange-red, crystg. from C_5H_5N in rust-brown needles. $AcOC_6H_4OMe$ and $NiSO_4$ in 25% NH_4OH, heated 0.5 hr., give *acetohydroquinone Me ether imine Ni* $(C_9H_{10}O_2N)_2Ni$, red prisms; it seps. with 1 mol. $PhNH_2$, in dark red crystals. C. J. West

Behavior of ketone hydrazones towards diazonium salts. M. Busch and Konrad Schmidt. *J. prakt. Chem.* **129**, 151–62(1931).—PhMeC:NNHPh (4.2 g.) in 130 cc. EtOH at −5° and 2.8 g. PhN_2Cl in 50 cc. EtOH give 4 g. of *acetophenone benzeneazophenylhydrazone* (I), orange-golden yellow, m. 161°; this is more easily formed from the phenylhydrazone in C_5H_5N, cooled to 0° and treated with concd. alc. PhN_2Cl; the *HCl salt* is a dark, brown-violet, glistening powder; reduction gives *p*-$C_6H_4(NH_2)_2$, $PhNH_2$ and BzMe. PhMeC:NNHC$_6$H$_4$Br-*p* gives *acetophenone 1-benzeneazo-4-bromophenylhydrazone*, golden yellow, m. 183°. Acetophenone *asym-m*-xylylhydrazone (II) and 2 mols. PhN_2Cl give I. *Acetophenone benzylphenylhydrazone* (III), pale yellow, m. about 58°; PhN_2Cl gives *acetophenone benzeneazobenzylphenylhydrazone*, red-yellow

oil, whose *HCl salt* is bright red. PhMeC:NNHPh and *p*-$O_2NC_6H_4N_2Cl$ in EtOH give *acetophenone p-nitrophenylhydrazone*, brown, m. 184°. *p*-$BrC_6H_4NHN:CPhMe$ and PhN_2Cl give the same product. II and *p*-$O_2NC_6H_4N_2Cl$ give *acetophenone 2-p-nitrobenzeneazo-4-nitrophenylhydrazone*, Cu-bronze, m. 300°. III and *p*-$O_2NC_6H_4N_2Cl$ give the *p-nitrophenylazophenylbenzylhydrazone* $PhMeC:NN(CH_2Ph)C_6H_4N:NC_6H_4NO_2$-*p*, brown-red, m. 130°. PhMeC:NNHPh and *m*-$(O_2N)_2C_6H_3N_2Cl$ in AcOH give *acetophenone m-dinitrophenylhydrazone*, dark brown, m. 234°. $Ph_2C:NNHPh$ and PhN_2Cl do not react; *p*-$O_2NC_6H_4N_2Cl$ gives 30% of the *p-nitrobenzeneazophenylhydrazone*, $Ph_2C:N-NHC_6H_4N:NC_6H_4NO_2$-*p*, bluish red with violet metallic luster, m. 194–6°. $Ph(PhCH_2)C:NNHPh$ and PhN_2Cl give the *compd.* $Ph(PhCH_2)C:NNHC_6H_4N:NPh$, golden yellow, m. 138° (poor yield); *desoxybenzoin p-nitrophenylhydrazone*, red with bluish violet surface luster, m. 160°, results from $Ph(PhCH_2)C:NNHPh$ and *p*-$O_2NC_6H_4N_2Cl$ or from $Ph(PhCH_2)CO$ and *p*-$O_2NC_6H_4NHNH_2$. C. J. West

The condensation of phenolic aldehydes and their ethers with methyl propyl or butyl ketones. Kenji Iwamoto and Taro Kato. *Science Repts. Tokohu Imp. Univ.*, 1st Ser., **19**, 689–93 (1930); cf. *C. A.* **22**, 575. Aromatic aldehydes with an OH or OMe group in the *p*-position condense with MeCOPr or MeCOBu to give substituted styryl Me ketones, while *m*-substituted aldehydes yield substituted distyryl ketones. *p*-HOC_6H_4CHO (2.4 g.), MeCOPr (1.8 g.) and dry HCl give 2.9 g. of *α-ethyl-p hyd* ... *styryl Me ketone* (I), faint yellow, m. 120–1°. The following styryl Me ketones were prepd. similarly: *α-propyl p hydroxy*, pale yellow, m. 100° (*oxime*, m. 110–21.5°); *α-ethyl p-methoxy* (II), faint yellow, b_{12} 171.2° (*oxime*, m. 93–4.5°); *α-propyl-p-methoxy* (III), pale yellow, b_{14} 183.4 (*oxime*, m. 191.2°). I, II and III give the CHI_3 reaction. The distyryl ketones which follow were prepd. in the same way except that coned. HCl was used in forming IV and V: *α-ethyl-m,m'-dihydroxy* (IV), brick-red, *α propyl m,m'-dihydroxy* (V), brick red, *α ethyl m,m'-dimethoxy*, dark yellow, and *α-propyl m,m'-dimethoxy*, dark yellow. A. F. Shepard

Behavior of stereoisomeric oximes of α,β-unsaturated ketones on hydrogenation. K. W. Merz. *Ber.* **63B**, 2951–3 (1930). Isovanillalacetone and $NH_2OH·HCl$ in a little MeOH give 75% (as the *HCl salt*, needles, m. 174° (decompn.)) of the *syn oxime* (*1-(3'-hydroxy-4'-methoxyphenyl) 1-buten 3-one oxime*), m. 168° which, heated 1 hr. in 12 parts AcOH on the H_2O bath, changes into the *anti form*, m. 142–3°. Both forms give by the Schotten Baumann method the same *di Bz deriv.*, m. 148–9°, hydrolyzed by boiling alc. NaOH to the *anti* oxime. The latter is not hydrogenated in alc. contg. a little AcOH by H and Pd charcoal, but the *syn* oxime (6 g.) yields a mixt. of 1.8 g. $HO(MeO)C_6H_3CH:CH_2CH_2COMe$, 1.5 g. of its oxime and 1 g. of $HO(MeO)C_6H_3CH-CH_2CH(NH_2)Me$. The same difference in the behavior of the *syn* and *anti forms* on catalytic hydrogenation was noted with PhCH:CHC(:NOH)Ph and dypnone oxime, only the *syn* forms being hydrogenated and yielding the corresponding satd. amine. It is thus shown in 2 cases that it is possible by hydrogenation to det. to which series the oximes of α,β unsatd. ketones belong. C. A. R.

Some reactions of phenyl propenyl ketone with semicarbazides and thiosemicarbazides. Alexander Y. Livingstone and Forsyth J. Wilson. *J. Chem. Soc.* **1931**, 335–7. PhCOCH:CHMe yields a *β phenylsemicarbazone*, m. 212°, even with excess of reagent; the *β phenylthiosemicarbazone*, m. 110°, becomes yellow in light without change in m. p. $NH_2NHCSNH_2$ and the ketone in HOAc–EtOH give *thiosemicarbazidopropyl Ph ketone*, m. 140°; excess of reagent gives the same product. NH_2OH gives the *oxime*, $C_{11}H_{14}ON_2S$, m. 165°. *p*-$MeOC_6H_4COCH:CHMe$ gives a *β phenylsemicarbazone*, m. 249°. C. J. West

Some synthetic bases similar to ephedrine. L. Chiriulio, Fr. Neumeier and H. Lozeron. *Helv. Chim. Acta* **14**, 186–200 (1931). ω-Hydroxy and alkoxy derivs. of ephedrine (I) were prepd. to test their vasoconstrictor action in comparison with that of I. The method of prepn. consisted of (*a*) the treatment of $PhCH:CHCH_2OH$ (II) and its Ac (III) and Bz (IV) derivs. and alkyl ethers, with I_2 and HgO, in Et_2O and (*b*) subjection of the resulting iodohydrin (without sepn.) to the action of $MeNH_2$ under pressure, at 100°. The first step is favored by light. II, III and IV (the last 2 prepd. in 70 and 60% yields, resp., by simple acylation of II) gave *di ω-hydroxyephedrine*, $PhCH(OH)CH(NHMe)CH_2OH$ (V), m. 110° (*HCl salt*, m. 159.5°). Thus step (*b*) involved a hydrolysis. In the prepn. of the alkoxy derivs. it was important to sep. the cinnamyl ethers from unchanged II; this was accomplished by benzoylation of the crude product, followed by fractionation. The intermediary compds., *cinnamyl Pr ether*, b_{12} 131.2°, *cinnamyl Bu ether*, b_{12} 138°, and *cinnamyl allyl ether*, b_{12} 138°, were prepd. by the action of the alkyl iodide on the Na deriv. of II (from II and $NaNH_2$ in C_6H_6) in 35–40%, 30–35% and 50–60% yields, resp.; the Me and Et derivs. (Et, bu

125–6°) were best obtained by means of the corresponding alkyl sulfates. The alkoxy derivs. of I obtained were *methoxyephedrine* (VI), PhCH(OH)CH(NHMe)CH_2OMe, b_{12} 148° (yield 38%) (*HCl*, m. 151–3°), *ethoxyephedrine*, b_{10} 148°, *ephedryl Pr ether*, b_{12} 151–3°, *ephedryl Bu ether*, b_{12} 155–7°, and *ephedryl allyl ether*, b_{12} 155–7°, all probably mixts. of racemates. When the reaction was conducted in MeOH instead of Et_2O, II yielded 31% of *3,3-phenylmethoxy-2-methylaminopropyl alc.*, PhCH(OMe)CH(NHMe)CH_2OH (VII), b_{11} 143°. VI was transformed into PhCH(OMe)CH(NHMe)CH_2OMe by interaction with MeI. Of the derivs. VI was the most active physiologically but it was much less active than I; in concns. of 30 mg. or more, per kg. (for a cat), its action was reversed; it lowered the blood pressure to an extent increasing with increase in concn. V had a very light constrictor action while VII produced a reversal.

I. M. Levine

β-Phenylethylamines. I. Mescaline and mescaline-like substances. K. H. Slotta and H. Heller. *Ber.* **63B**, 3029–44(1930). — In addn to the sympathomimetic action which is a general property of β-aryl-ethylamines and -ethanolamines, mescaline, 3,4,5-$(MeO)_3C_6H_2CH_2CH_2NH_2$ (I), possesses a peculiar narcotic action. For a pharmacol. and clinical investigation of I and a study of its relationships to other sympathomimetic drugs it was necessary to find a way by which it would be possible to prep. several hundred g. of I. The only method by which it had hitherto been synthesized ($RCHO$ (+ $MeNO_2$) ⟶ $RCH{:}CHNO_2$ (+ H_2) ⟶ $RCH_2CH{:}NOH$ (+ H_2) ⟶ $RCH_2CH_2NH_2$) serves to establish its structure rather than to prep. the compd. The new method should also make it possible to prep. more easily the isomers of I, as well as mono- and dimethoxyphenylethylamines, in order to det. the influence of the position and no. of the MeO groups on the physiol. action of the alkoxyphenylethylamines. An examn. of 4 other possible methods of prepn. indicated that the only feasible one was that based on the scheme $RCHO$ (+ $CH_2(CO_2H)_2$) ⟶ $RCH{:}CHCO_2H$ (+ H_2) ⟶ $RCH_2CH_2CO_2H$ (+ $SOCl_2$) ⟶ RCH_2CH_2COCl (+ NH_3) ⟶ $RCH_2CH_2CONH_2$ (+ KOBr) ⟶ $RCH_2CH_2NH_2$. The *m*- and *p*-mono- and the 2,3-, 3,4- and 3,5-di-MeO compds. have already been prepd. by this method but in all attempts to prep. I it had hitherto been impossible to carry out the last step. S. and H. have now found, however, that under certain conditions not only I but also its isomers can readily be obtained in very satisfactory yield by using concd NaOBr for the Hofmann degradation. The condensation of the aldehydes with $CH_2(CO_2H)_2$ was effected in 2–3 parts C_5H_5N (distd. over KOH) and 1–5 cc. piperidine per mol. of aldehyde; com. $CH_2(CO_2H)_2$ can be used directly and a 20% excess is quite sufficient. The splitting off of CO_2 from the primary di-CO_2H acid is almost quant. on the H_2O bath and only in a few cases was it necessary to boil the C_5H_5N soln. a short while. The yield of $RCH{:}CHCO_2H$ was in general above 80%. The reduction of the unsatd. acid was in all cases easily carried out with an excess of Na Hg, usually on the H_2O bath, a higher temp. was required only when the unsatd. acid was difficultly sol. in NaOH, and a toning down of the alky. with AcOH was necessary only with 3,4,5-$(MeO)_3C_6H_2CH{:}CHCO_2H$. The chlorides RCH_2CH_2COCl were obtained by heating the acids in $CHCl_3$ 4–5 hrs. on the H_2O bath with twice the calcd. amt. of $SOCl_2$; they were not isolated but the reaction mixts. were concd. to about 0.5 vol. *in vacuo* and added, with cooling, to concd. NH_4OH contg. about 10% NaOH (only 2,4-$(MeO)_2C_6H_3CH_2CH_2CONH_2$ could not be obtained in this way). For the successful degradation of the amides to the amines, it is necessary to have a very pure amide. The statement in the literature that NaOCl gives better yields than NaOBr was confirmed for only some of the amides (the best results were obtained with a soln. prepd. by passing 5.5 g. Cl into 40 g. NaOH in 100 cc. H_2O). The behavior of the amides in the Hofmann degradation depends greatly on the position and nature of the nucleus substituents. The products are best worked up by distn. *in vacuo*. The physiol. action of the amines prepd. will be described later by Hesse and Lange. *o*-$MeOC_6H_4CH{:}CHCO_2H$, m. 183° (80% from *o*-$MeOC_6H_4CHO$), gave 99% $MeOC_6H_4CH_2CO_2H$, m. 92° (literature, 85–6°); the *amide*, m. 111° (80.3% yield), gave with NaOCl 35.2% *o*-$MeOC_6H_4CH_2CH_2NH_2$, b. 115–20° in the vacuum of a H_2O pump (*HCl salt*, m. 143°, *sulfate*, m. 230°). *m*-HOC_6H_4CHO, m. 106° (60% by diazotization of *m*-$H_2NC_6H_4CHO$, prepd. from the NO_2 compd. with $FeSO_4$), yielded 80% of the $MeOC_6H_4CHO$ which gave 69% $MeOC_6H_4CH{:}CHCO_2H$, m. 177°; the satd. acid, m. 50° (80% yield) gave 27.5% of the amide, b_{12} 222–5°, m. 56°, which yielded with NaOBr 61% (with NaOCl 19%) of *m*-$MeOC_6H_4CH_2CH_2NH_2$, b_{12} 128°. *p*-$MeOC_6H_4CH_2CH_2NH_2$.HCl, m. 210°, was obtained in 43% yield with NaOCl from the amide which itself was obtained in 75% yield through the $MeOC_6H_4CH{:}CHCO_2H$ (82.5%) and the satd. acid (81%). *p*-iso-$PrC_6H_4CH{:}CHCO_2H$, m. 165° (64%); satd. acid, m. 73° (98%); *amide*, m. 142°

(81.5%), boils explosively with NaOCl at 80° and at 65° gives only a little *β-(p-isopropylphenyl)ethylamine*, b. 150° in the vacuum of a H_2O pump (*HCl salt*, m. 270°). Vanillin Et ether, m. 63° (85% from vanillin and alk. Et_2SO_4), gave 89% *3-methoxy-4-ethoxycinnamic acid*, m. 205°; *propionic acid*, m. 130° (79%); *amide*, m. 124° (33.9%), gave with NaOCl the ethylamine, b_{14-8} 165° (*HCl salt*, m. 120°). *m*-$C_6H_4(OMe)_2$, b_{12} 117–8° (90% from *m*-$C_6H_4(OH)_2$ with alk. Me_2SO_4), gave in Et_2O with HCN, HCl and $ZnCl_2$ 76% of 2,4-$(MeO)_2C_6H_3CHO$; 2,4-$(MeO)_2C_6H_3CH:CHCO_2H$, m. 138° (99%); propionic acid, m. 105° (94%); attempts to prep. the amide through the chloride gave a red-brown oil which decompd. on distn., *in vacuo*. 3,4-$CH_2O_2C_6H_3CH:CHCO_2H$, m. 232° (94%); propionic acid (92%); amide (83.5%), gave with NaOCl 37% of the ethylamine-HCl, m. 206°. 1,2,3-$C_6H_3(OMe)_3$, b_{12} 140° (65% with alk. Me_2SO_4), gives with HCN and $AlCl_3$ in C_6H_6 53% 2,3,4-$(MeO)_3C_6H_2CHO$, b_{12} 170°. *2,3,4-Trimethoxycinnamic acid*, m. 172° (94%); propionic acid, m. 76° (65%); *amide*, m. 171° (63.5%), gives with NaOBr 71.5% *β-(2,3,4-trimethoxyphenyl)-ethylamine*, b_{12} 167°, quickly forms the carbonate in the air. 3,4,5-$(MeO)_3C_6H_2CO_2H$ (86% from $(HO)_3C_6H_2CO_2H$ with alk. Me_2SO_4); chloride (86% with PCl_5) in boiling xylene (distd. from Na) with Pd-$BaSO_4$ and H gave in 30 hrs. 80% 3,4,5-$(MeO)_3C_6H_2CHO$, m. 74°; cinnamic acid, m. 124° (80%); *β-(3,4,5-trimethoxyphenyl)propionic acid*, m. 98° (88% yield); *amide*, m. 106° (60%), gave with NaOBr (52 g. Br and 150 g. NaOH in 375 cc. H_2O) 66% I, b_{12} 180° (HCl salt, m. 181°). *p*-BrC_6H_4OMe, b_{12} 120° (82.9% from PhOMe in AcOH with Br vapors) gave in Et_2O with Mg (activated with I) and ethylene oxide and subsequent decompn. with HCl 31.1% of *p*-$MeOC_6H_4CH_2CH_2OH$, b. 145–60° in the vacuum of the H_2O pump, and this with boiling 47.5% HBr yielded 45% of the bromide, b_{12-8} 140–50°, from which, when refluxed with a mixt. of $C_6H_4(CO)_2NH$ and 0.5 mol. K_2CO_3 until no liquid condensed in the condenser tube, then treated in alc. with $N_2H_4 \cdot H_2O$ and finally with HCl gas, was obtained 11.8% *p*-$MeOC_6H_4CH_2CH_2NH_2$ HCl, m. 211°. 4-Bromoveratrole, *p*-BrC_6H_4OH, *p*-BrC_6H_4OAc, *o*- and *p*-$BrC_6H_4NO_2$ and *o*-$C_6H_4Cl_2$ could not be made to react with Mg in either Et_2O, $(iso\text{-}Am)_2O$ or otherwise. C. A. R.

o-Toluic acid. H. T. Clarke and E. R. Taylor. *Org. Syntheses* **XI**, 96–7 (1931). Sapon. of *o*-MeC_6H_4CN with 75% H_2SO_4 gives 80–9% of *o*-$MeC_6H_4CO_2H$, m. 102–3°. *p*-$MeC_6H_4CO_2H$ is obtained in the same yield by the same method. C. J. West

Preparation of aromatic acid amides. C. H. Kao and Shao-Yuan Ma. *J. Chem. Soc.* **1931**, 443–4. cf. *C. A.* **25**, 1230.—If 100 g. aromatic acid and 150 cc. 90% AcOH are used with 90 g. $(NH_4)_2CO_3$ the following yields of amides are obtained. *p*-$O_2NC_6H_4CO_2H$, 60 g.; *m*-NO_2 deriv., 58 g.; *o*-NO_2 deriv., 15 g.; *p*-Cl deriv., 79 g.; benzilic acid, 77.5 g. (71 g. with 60 g. $(NH_4)_2CO_3$). $C_6H_4(CO)_2O$ (60 g.), 90 g. imide; *o*-$HOC_6H_4CO_2H$, 0; $PhCH_2CO_2H$ and $PhCH_2CH_2CO_2H$ give the amides quantitatively, which are in part dehydrated to the nitriles; $PhCH:CHCO_2H$ (100 g.) gives 20 g. amide. $(CH_2CO_2H)_2$ (100 g.) gives 71 g. of the imide. C. J. West

Nitration of 6-methoxy-*m*-toluic acid. A correction. John L. Simonsen. *J. Chem. Soc.* **1931**, 444.—Nitration of 3,6-$Me(MeO)C_6H_3CO_2H$ gives the 5-NO_2 deriv and 5-nitro-*o*-tolyl Me ether, m. 69–70°, and not the 6-NO_2 deriv., as reported in *C. A.* **13**, 127. C. J. West

A method for the preparation of phenyl-, *o*-chlorophenyl- and *p*-chlorophenylmalonic acids. D. Ivanoff and A. Spassoff. *Bull. soc. chim.* [4], **49**, 19–23 (1931). Grignard syntheses designed to produce ketones frequently give hydrocarbons and a complex (I) instead. I. and S. made use of I in synthesizing phenyl- (II), *o*-chlorophenyl- (III), and *p*-chlorophenyl-malonic acids (IV) according to the scheme: $PhCH_2CO_2MgX + RMgX \longrightarrow PhCH(MgX)CO_2MgX$ (I) + RH; I + $CO_2 \longrightarrow PhCH(CO_2MgX)_2$, which on hydrolysis yields II. I. and S. found that all aliphatic, aryl aliphatic and hydroaromatic, but only certain aromatic organomagnesium compds reacted in the above manner, and they have studied the reaction quantitatively to find out which gives the best yields. With $PhCH_2CO_2MgCl$ the yields of mixed acids (in g.) and of II (in %) from the following Grignard reagents were, resp.: EtMgBr, 15.25, 62.5; PrMgCl, 11.90, 45; iso-PrMgCl, 14.10, 65.6; iso-PrMgBr, 10.90, 48.9; BuMgBr, 11.00, 42.2; $C_5H_{11}MgBr$, 9.8, 40; *o*-MeC_6H_4MgBr, 11.80, 50.6; α-$C_{10}H_7MgBr$, 13.00, 53.3; $PhCH_2MgCl$, 12.40, 3.1. MeMgI gave a little gas evolution but hardly a trace of II. The procedure in all cases was to treat 0.1 g. mol. of the Grignard reagent (*e. g.*, $PhCH_2CO_2MgCl$) in 100 cc. ether at 0° with dry CO_2 in excess in a closed system, expel the excess CO_2 by evapg. half the ether, add 0.16 g. mol. of the 2nd Grignard reagent (*e. g.*, EtMgBr), reflux on the water bath, treat again with dry CO_2 in excess at 0°, hydrolyze, ext. the org. acids with ether, ext. the org. acids from the ether with dil. alkali, acidify, ext. again with ether, dry and weigh. This product contains

the corresponding phenylmalonic acid phenylacetic acid and the acid from the 2nd Grignard reagent. A weighed sample heated to 150–60° in a flask gave CO_2 and the corresponding phenylacetic acid. The wt. of CO_2 collected gave the % of the corresponding phenylmalonic acid. Only the phenylmalonic acids are sol. in benzene and can be sepd. easily in the pure state by extn. with benzene. With *o*-$ClC_6H_4CH_2CO_2MgCl$, iso-PrMgCl gave 10.5 g. mixed acids and 46.2% III; PhMgBr gave 10.5 (?) g. mixed acids and 52.8% of III. III m. 139° (decompn.); heating quantitatively produces CO_2 and *o*-$ClC_6H_4CH_2CO_2H$. With *p*-$ClC_6H_4CH_2CO_2MgCl$ iso-PrMgCl gave 13.5 g. mixed acids and 56.4% of IV; *o*-MeC_6H_4MgBr gave 13.0 g. mixed acids and 48.3 g. IV. IV m. 163° (decompn.) and on heating yields quantitatively CO_2 and *p*-$ClC_6H_4CH_2CO_2H$. The hydrocarbons evolved in the prepn. of I by the use of EtMgBr, PrMgBr, and iso-PrMgBr were collected, washed free of ether with concd. H_2SO_4 and burned with excess O for quant. detn. The amts. found checked very well with those calcd.

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Dibenzylsuccinic acids. P. CORDIER. *Compt. rend.* 192, 361–3(1931).—Stobbé (*Ber.* 27, 2406(1894); 37, 2241, 2666(1904); *C. A* 3, 438, 651) prepd. dibenzylsuccinic acid, $[CH(CH_2Ph)CO_2H]_2$, and reported obtaining 2 isomeric acids: the one (m. 203°) (I) he considered inactive by internal compensation and the other (m. 204°) racemic. Further, S. indicated that the inactive compd. gave an anhydride m. 104° (II) which under the action of heat yielded an anhydride m. 128° (III); while the *dl*-compd gave an anhydride m. 155° which under the action of heat yielded an anhydride m. 140°. Following the same procedure, C obtained I, which gave 2 anhydrides, the first (II) being obtained by moderate treatment with Ac_2O, and the second (m. 125°) (IV) by more vigorous treatment of II. His 2nd anhydride (IV) seemed to correspond to the III of S. However, it did not give the original dibenzylsuccinic acid on hydration but a new isomeric acid (m. 172°) (V) which could easily be converted back to IV. C. found that I was inactive and could not be resolved into active components by strychnine sulfate; V was also inactive but it gave, by the same treatment, 2 active components, the one with α_d −29.5°, the other, less pure, with α_d 22.8°. These last 2 acids are much more sol. in water than V, and the m. ps. are much lower (about 130°).

ALBERT L. RAWLINS

Esters of orthophenylacetic acid. PETER P. T. SAH, SHAO YUAN MA AND CHUNG HSI KAO. *J. Chem. Soc.* 1931, 305–7. —$PhCH_2CN$ and abs. MeOH (EtOH) in an equal vol. of abs. Et_2O with 1.25 mols. HCl at 0° give 85% of $PhCH_2C(OMe):NH.HCl$ (or the Et deriv.), with 2 mols. abs. alc at room temp. for 2 weeks, there results 40–5% of $PhCH_2C(OMe)(OR)_2$ (I) or $PhCH_2C(OEt)(OR)_2$ (II); they are colorless liquids with a pleasant odor. Derivs. of I (R =) (b. p. at atm. pressure, d_4^{20} and n_D^{20} are given): *Me*, 216–8°, 1.0651, 1.5075; Et, 224–6°, 1.0356, 1.5000, *Pr*, 239–42°, 1.0109, 1.4950; *iso-Pr*, 227–9°, 1.0079, 1.4913, *Bu*, 254–7°, 0.9953, 1.4911; *iso-Bu*, 245–8°, 0.9929, 1.4898; *iso-Am*, 260–5°, 0.9880, 1.4900. Derivs. of II: *Me*, 217–9°, 1.0640, 1.5080; *Et*, 225–7°, 1.0308, 1.4997; *Pr*, 238–41°, 1.0094, 1.4967; *iso-Pr*, 228–30°, 1.0050, 1.4908; *Bu*, 254–7°, 0.9974, 1.4916; *iso Bu*, 248–51°, 0.9867, 1.4883; *iso-Am*, 260–5°, 0.9867, 1.4887.

C. J. WEST

Ethyl phenylcyanopyruvate. ROGER ADAMS AND H. O. CALVERY. *Org. Syntheses* XI, 40–1(1931).—$PhCH_2CN$, $(CO_2Et)_2$ and EtONa, followed by acidification, give 60–75% of $PhCH(CN)COCO_2Et$, m. 130°.

C. J. WEST

New method for the preparation of δ-ketonic esters. (MLLE.) S. GRATEAU. *Compt. rend.* 191, 947–9(1930).—The acid chloride obtained by treating $EtOCO(CH_2)_4CO_2H$ with $SOCl_2$ reacts with PhH in the presence of $AlCl_3$ to give $PhCO(CH_2)_4CO_2Et$ (I) in 80% yield. I, b_3 164°, is sapond. to give $PhCO(CH_2)_4CO_2H$, m. 71°, which forms a semicarbazone m. 183°. I treated with EtONa gives $CH_3(CH_2)_2CO.CH(COPh)_2$, b_3 137° (semicarbazone, m. 223°, Maquenne block). Reduction of I by the Clemmensen method gives $Ph(CH_2)_4CO_2Et$ (II), b_{11} 162–4°. Sapon. of II gives $Ph(CH_2)_4CO_2H$, b_{11} 186–8°, m. 11°; anilide, m. 80°; *p*-toluide, m. 78°.

C. H. PEET

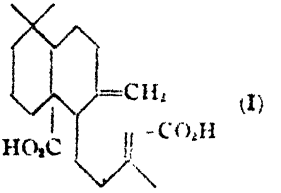
Lichen substances. VI. Gyrophoric acid. YASUHIKO ASAHINA AND MASATOSI WATANABE. *Ber.* 63B, 3044–8(1930); cf. *C. A.* 23, 4477. —The conclusion that gyro-

...oaria pulmonaria Hoffm.) ... hitherto generally been given as the m. p.). Titration of the $I.H_2O$ in Me_2CO with bromothymol blue as indicator gave a mol. wt. of 477.5–7.8 (a parallel titration with hexanoic acid gave 340.1). *Tetra-Ac deriv.* of I, from I, Ac_2O and a drop of concd. H_2SO_4, m. 228°, gives no color in alc. with $FeCl_3$ or bleaching powder soln., mol. wt.

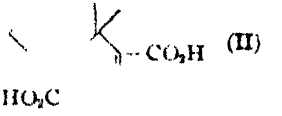
(by titration) 626.6–641.1, in camphor (Rast) 617–32. ***Tetra(chloroacetyl) deriv.,*** from I in C_5H_5N and $ClCH_2CO_2H$ treated alternately with C_5H_5N and $ClCH_2COCl$, cryst. powder with 2 H_2O, m. 163–4°, gives no color in aq. Me_2CO with $FeCl_3$ or bleaching powder, mol. wt. (anhyd.) in boiling Me_2CO 704–815. ***Quinine salt*** of I, faintly yellowish cryst. powder with 1 H_2O, m. 162°, mol. wt. (anhyd.) in boiling Me_2CO 766.2–789.7. Me tetramethylgyrophorate (0.6 g. from 1 g. I in Et_2O with CH_2N_2), m. 196–7° (previously given as 187°), insol. in Na_2CO_3, gives no color in alc. with $FeCl_3$ or bleaching powder, mol. wt. in freezing PhOH 510.4. Since, according to Hesse, umbilicaric acid, $C_{24}H_{19}O_9(OMe)$ (II), which is also found with I in many *Gyrophorae*, is decompd. by $Ba(OH)_2$ into CO_2, orcinol and umbilicarinic acid, isomeric with evernic acid, the relation of I to II seems to be the same as that of lecanoric acid to evernic acid, *viz.*, $^{3}Me(HO)(XO)C_6H_2{}^{1}{}^{4}CO.OC_6H_3{}^{2}Me(OH)^{1}{}^{4}CO\ OC_6H_2{}^{2}{}^{6}Me(OH)^{1}CO_2H$, where X = H for I and Me for II. Also in *J. Pharm. Soc. Japan* **51**, 104–9(1931). C. A. R.

Symmetrical and unsymmetrical *o*-phthalyl chlorides. ERWIN OTT. *Org. Syntheses* **XI**, 88–91(1931). *o*-$C_6H_4(COCl)_2$ results from $C_6H_4(CO_2)O$ and PCl_5 in 92% yield. $AlCl_3$ gives 72% of the unsym. chloride. C. J. WEST

Higher terpene compounds. XLIII. The Bouveault reduction of the esters of agathic- and isoagathicdicarboxylic acids. Transformation of the latter into a new methylpimanthrene. L. RUZICKA AND J. R. HOSKING. *Helv. Chim. Acta.* **14**, 203–19 (1931); cf. *C. A.* **25**, 1232.—R. and H. suggest I and II as the skeleton formulas for agathic- (**III**) and isoagathicdicarboxylic acids (IV). The facts upon which these formulas are based are as follows: (*a*) I yields 1,5,6-$C_{16}H_4Me_3$ (V) and 1,7-dimethylphenanthrene (VI) upon reduction with Se. II also yields VI but no V. (*b*) The 2 CO_2H groups in III are different; one of the CO_2Me groups in the di-Me ester of III is easily hydrolyzed, while the other resists hydrolysis. The esters of IV, noragathic acid (VII), and isonoragathic acid also resist hydrolysis. (*c*) Upon reduction of III with Na in alc. at 115–20° a mixt. was obtained of which 30% was neutral and 70% acidic. Of the neutral portion 28% consisted of *mono-Me hydroxydihydroagathate*, $C_{18}H_{30}(CO_2Me)CH_2OH$, $b_{0.5}$ 193.5°, d_4^{16} 1.026, n_D^{15} 1.5076, M_D 97.57, (calcd 97.47). The remaining 2% contained *dihydroxydihydroagathene*, $C_{18}H_{30}(CH_2OH)_2$, m. 112.5°, which absorbed 1 mol. of H_2 in the presence of PtO to give the satd. compd. *dihydroxytetrahydroagathene*, $C_{18}H_{32}(CH_2OH)_2$, m. 107.8°. The acidic portion was distd. *in vacuo* and yielded the Me ester of VII; upon repeated redistn. of the acidic portion of the distillate *mono-Me dihydroagathicdicarboxylate*, $C_{18}H_{30}(CO_2Me)CO_2H$, $b_{0.1}$ 210.2° was obtained. The stability of this compd. in comparison to that of its precursor, $C_{18}H_{28}(CO_2Me)CO_2H$ (VIII), illustrates the effect of the double bond in close proximity to the CO_2H group. VIII contains a double bond which is easily reduced, close to a CO_2Me group which is also easily reduced and hydrolyzed. This indicates that the C atoms on either side of the double bond are unsubstituted. Reduction of the di-Me ester of IV with Na and alc. yields *Me hydroxyisoagathate*, $C_{18}H_{28}(CO_2Me)CH_2OH$ (IX), m. 125.6°, and *dihydroxyisoagathene*, m. 172.3°, in almost equal amts. A small quantity of a dehydro deriv. of IX, $C_{21}H_{30}O_3$, $b_{0.4}$ 186–90°, was also isolated. Treatment of IX with 4 vols. of 99% HCO_2H yields a mixt. ($b_{0.4}$ 155.8°) of the esters $C_{19}H_{31}(CO_2Me)Me$ and $C_{18}H_{28}(CO_2Me)Me$. This mixt. when reduced with Se yielded $C_{19}H_{14}$ (X), m. 142–3° (*picrate* m. 161.3°). Oxidation of X with CrO_3 gave the *quinone*, m. 194°, from which the *quinoxaline compd.*, m. 131.2°, was obtained. It is believed that X is a homolog of VI. **XLIV. The constitution of pimanthrene.** L. RUZICKA, G. B. R. DE GRAAFF AND J. R. HOSKING. *Ibid* 233–9.—Pimanthrene (**XI**) and retene (**XII**) were each oxidized in parallel expts. with $K_3Fe(CN)_6$ and KOH, and the mixt. of resulting acids, sepd. by means of cold MeOH, was esterified with CH_2N_2. In both cases *tri-Me 1,2,1',3'-biphenyltetracarboxylate* (**XIII**), m. 153–4°, and *1,7-phenanthrenedicarboxylic acid*, m. 151–2°, were formed. Likewise the *o*-quinones of XI and XII were oxidized with $KMnO_4$. The XII quinone yielded *3'-hydroxyisopropyl-1,2,1'-*



(I)



(II)

biphenyltricarboylic acid (XIV), m. 188° (Bucher, *C. A.* **4**, 1465, obtained the same compd. in a similar fashion but he gave no m. p.), and an amorphous substance which gave upon further oxidation with HNO_3 (d. 1.5) and esterification of the product, 1,2,3- (XV) and 1,2,4-$C_6H_3(CO_2Me)_3$. The XI quinone and XIV upon oxidation yielded XIII and XV. From these facts it is concluded that XI is 1,7-dimethylphenanthrene.
I. M. Levine

Catalytic influences in three-carbon tautomerism. II. The action of acid catalysts on ketones. George A. R. Kon. *J. Chem. Soc.* **1931**, 248–51; cf. *C. A.* **23**, 4454.—The action of H_2SO_4, HCl and $(CO_2H)_2$ on cyclohexylidene- (I) and cyclohexenylacetone and on isopulegone is reported. The acids are less rapid in their action than the catalysts previously employed; *e. g.*, *N* aq. EtOH-H_2SO_4 at 25° produces only 22% change in I in 4 hrs., which is equiv. to about 4-min. treatment with *N* EtONa. Longer treatment gives rise to extensive side reactions (addn.); at 100°, however, isomerization proceeds smoothly and side reactions are negligible in the time required to reach equil. Heating for 0.5 hr. is sufficient to produce the same equil from either ketone by means of *N* H_2O-EtOH-H_2SO_4. With HCl the same equil. p. is reached but side reactions occur more readily and a Cl-contg. high-boiling fraction is obtained. $(CO_2H)_2$ is much slower in action. The new value for the equil. p. is 23% of α,β-ketone. Isopulegone is rapidly isomerized to pulegone by hot alc. H_2SO_4, the equil. p. being coincident, within exptl. error, with pure pulegone. Although pulegone is readily isolated from the equil. mixt. as the semicarbazone, its phys. properties differ somewhat from those of pure pulegone and it may be that the equil. of isopulegone is a less simple process than hitherto supposed. Results of 18 expts are given in tabular form. C. J. W.

The energy value of the ozonide linkage determined from the ozonide of α-terpineol. E. Briner, M. Mottier and H. Paillard. *Helv. Chim. Acta* **13**, 1030–5 (1930).—Comparison of the heats of combustion of a compd. and its ozonide would give the energy equiv. of the ozonide linkage. The heat of formation would appear to be strongly exothermic since the ozonization of C_2H_4, etc., is accompanied by a considerable rise in temp. but this rise may be due to decompn. of the ozonides as well as to the heat of formation of the ozonide. For the detn., the ozonide of α-terpineol I) was chosen because it is stable and a solid I was ozonized in specially dried hexane (II), the II was then decanted off and the I ozonide was placed in a vacuum desiccator to remove the residual II. Small quantities of an unidentified gas were continuously given off and it was found that the heat of combustion decreased as the age of the ozonide increased. The av. heat of combustion of freshly prepd. I ozonide was 1445 cal. per g mol and that of I was 1501 cal., from which the heat of ozonization of I was found to be 90 cal. This value is probably significant though not rigorously exact. Since it indicates a lower energy content than that of the components which enter into the ozonides, there would appear to be no advantage in the suggested employment of ozonides as explosives unless ozonization alters the mol. to make disuption of its linkages easier. C. H. Peet

Oil of Eucalyptus dives. K. Stephan and Marg. Ducker. *J. prakt. Chem.* **129**, 147–50(1931).—The oil from *Eucalyptus dives* contains 55% of piperitone; the oil also contains about 4.5% of terpinen-4-ol and also an *acid*, $C_{11}H_{16}O_3$, m. 109–12°. Oxidation of piperitone with $FeCl_3$ gives 90% of thymol, oxidation with neutral $KMnO_4$ gives dosphenol, but the yield is too small to make this a technical method of prepn. C. J. West

Thiobenzophenone. H. Staudinger and H. Freudenberger. *Org. Syntheses* **XI**, 94–5(1931). Ph_2CCl_2 and NaSH in EtOH give 42.9% of Ph_2CS, m. 53–4°; if the chloride is added to the NaSH a 70% yield of the disulfide is obtained. C. J. West

4-Nitro-4'-methoxystilbene. A correction. J. T. Hewitt and Wm. Lewcock. *J. Chem. Soc.* **1931**, 444 –4-Nitro-4'-methoxystilbene m. 132°, not 162° as reported in *C. A.* **6**, 3264. C. J. West

α-Chloronaphthalene. V. The chlorination of naphthalene in solution. P. Ferrero and J. Corbaz. *Helv. Chim. Acta* **13**, 1009–25(1930); cf. *C. A.* **22**, 2938; **23**, 4944; **24**, 100, 1652.—The study of the chlorination of $C_{10}H_8$ (I) was continued in a variety of solvents to establish, if possible, a series which would either be protected by the chlorination product or which would prevent the chlorination of I. In every case, 2 mols. of I was dissolved in 500 g. of solvent and Cl_2 passed in at the rate of 35 g. per hr. When a catalyst was used, a wt. was taken equal to 0.5% of the I present. Below the limits at which partial oxidation occurs, higher temps. favor monohalogenation. I_2 always favors monohalogenation while $FeCl_3$ favors polyhalogenation. The concn. mentioned above was about the optimum, less solvent approaching the condition of no solvent with consequent polyhalogenation and more solvent resulting in gradual

chlorination of the solvent and polyhalogenation of I. The theoretical amt. of Cl_2 should be added but the rate of addn. is immaterial so long as the Cl_2 is thoroughly dispersed throughout the reaction mixt. *The chem. nature of the solvent is more important than the amt. present or the phys. properties of the soln.* Solvents which cannot be acted upon by Cl_2 (*e. g.*, CCl_4) favor a considerable formation of poly-Cl derivs. and are less desirable than no solvent. Solvents which might be chlorinated (*a*) (*e. g.*, PhH or PhCl) may be protected from chlorination by the I even in the presence of I_2 and are the most satisfactory solvents for use in chlorination or (*b*) (*e. g.*, PhMe or $C_{10}H_{18}$) they may protect the I against chlorination and hence be entirely unsatisfactory solvents. PhH, PhCl and AcOH are the most satisfactory solvents investigated. PhMe, *o*-$C_6H_4Cl_2$, $PhNO_2$, $C_2H_2Cl_4$, C_2HCl_3, EtOH, AcOEt and Et_2O are all unsatisfactory for reasons mentioned above. C. H. Peet

Naphthalene series. III. Preparation of 3-amino-2-naphthyl methyl ether. Gev Bamanshaw Jambuserwalla, Sidney Holt and Frederick A. Mason. *J. Chem. Soc.* 1931, 373–7; cf. *C. A.* 19, 497.—2,3-$HOC_{10}H_6CO_2H$ (48 g.) in 100 cc. 20% NaOH with 64 g. Me_2SO_4 at 15° gives 49.6 g. of *2-methoxy-3-naphthoic acid*, pale yellow, m. 133–5°; the use of too great excess of alkali decreases the yield; the chloride is a transparent yellow gum, m. about 59° (decompn.), which gives with $(NH_4)_2CO_3$ in C_6H_6 77% of *2-methoxy-3-naphthamide*, m. 172–3°; 15 g. of the amide in EtOH, treated with KOBr, gives not over 3 g. of 3,2-$H_2NC_{10}H_6OMe$, m. 109–10°. The diazo compd. with CuCl gives 82% of *3-chloro-2-naphthyl Me ether*, m. 78.5°; HI gives *3-chloro-2-naphthol*, m. 63–4.5°, gives a green color with $FeCl_3$. 2,3-$MeOC_{10}H_6CO_2Et$, b_{18} 198°, gives 98% of *2-methoxy-3-naphthhydrazide* (I), m. 121–4°; it melted slowly when heated on the H_2O bath and then m. 137–8°; with 2,3-$MeOC_{10}H_6COCl$ there result 80% of *di (2-methoxy-3-naphth)hydrazide*, m. 248–50°. I and BzH give the *benzylidene deriv.*, m. 222.5° (cor.); *m-nitrobenzylidene deriv.*, canary-yellow, m. 223–4° (cor.); *o-isomer*, canary-yellow, m. 185–6° (cor.); I and vanillin give *4'-hydroxy-3,2'-dimethoxybenzylidene-3-naphthhydrazide*, m. 211–2° (cor.). I in EtOH-HCl with EtNO$_2$ gives 72% of *Et 2-methoxy-3-naphthylcarbamate*, m. 104–5° (cor.); hydrolysis with concd. HCl at 120° for 3 hrs. gives quant. 3,2-$H_2NC_{10}H_6OH$; 10% H_2SO_4 gives the naphthol and some Me ether; heating with slaked lime for 3 hrs. at 200° gives 85% of the Me ether; 40% NaOH on refluxing 1 hr. gives 92.5% of the Me ether. IV. **Preparation and properties of 2-naphthol-3-sulfonic acid.** S. Holt and F. A. Mason. *Ibid.* 377–81.—3,2-$H_2NC_{10}H_6OMe$ (14 g.) was diazotized in a mixt. of 48 cc. concd. H_2SO_4 and 160 cc. H_2O at 0° with 2 *N* $NaNO_2$; SO_2 was passed into the diazo soln. until frothing became noticeable and 10 cc. liquid SO_2 were then run in; chem. prepd. Cu powder (30 g.) was then added, a slow stream of SO_2 being maintained; the ppt. was then extd. with 30% K_2CO_3 and the ext. acidified with concd. HCl, giving nearly quant. *2-methoxynaphthalene-3-sulfinic acid* (I), m. 133–4°. Oxidation with $KMnO_4$ in Me_2CO gives nearly quant. the *K salt* (II) of the SO_3H acid; oxidation in H_2O gives 75% of a less pure product. The alk. soln. of the salt gives no color with 2,4-$(O_2N)_2C_6H_3N_2Cl$. *2-Methoxynaphthalene-3-sulfonyl chloride* m. 137–8°; the amide m. 113°; the *anilide* m. 173–4°. I and 2,4-$(O_2N)_2C_6H_3Cl$ in EtOH-AcONa give *2,4-dinitrophenyl 2-methoxy-3-naphthyl sulfone*, m. 213–4°. II and HCl (1:1), refluxed 1 hr., give 93 of *2-naphthol-3-sulfonic acid* (III), which sepa. with 1 mol. H_2O; the *Na salt* also sepa. with 1 mol. H_2O; the chloride is amorphous; the $PhNH_2$ salt m. 241–2°; the α-$C_{10}H_7NH_2$ salt m. 247–8°; the sulfonamide, yellow, m. 110°; 2-naphthol 3-sulfonanilide, buff, m. 112° (decompn.). *1-Nitroso-2-naphthol-3-sulfonic acid*, yellow, decomps. 268°; $FeCl_3$ gives a deep brown color; it dyes Fe-mordanted cotton a tobacco-brown. III yields azo dyes as follows: *$PhNH_2$*, red needles with blue reflex; *p-$O_2NC_6H_4NH_2$*, red needles; *m-xylidine*, red powder; *α-$C_{10}H_7NH_2$*; *dianisidine*. Dyeings with these on wool were deeper in all cases than the corresponding shades obtained from Schaffer acid. The peaks of the absorption curves of these dyes are given. C. J. West

Alkamines and ether bases of the tetralin and hydrindene series. Julius v. Braun and Karl Weissbach. *Ber.* 63B, 3052–9(1930).—It was recently shown (*C. A.* 25, 1812) with $CH_2O_2C_6H_3CH(OH)CHBrMe$ (I) that it is possible to det., by methylation with Me_2SO_4, whether in the alkamines formed (through the α-oxide) by treating I with an amine RNH_2 the RNH is in the β-position originally occupied by the Br and the OH in the α-position, as in the I, or whether, when the intermediate α-oxide ring is opened, the NHR group goes to the α-position and the HO to the β position. This method has now been used to answer the long unanswered question as to the structure of the alkamines (II) obtained from α,β-dibromotetralin through the bromohydroxy compd. with various amines. Methylation of the alkamine obtained

with $NHMe_2$ and treatment with KI gives a *quaternary iodide* (III) different from that (IV) obtained by replacing the Br in α-methoxy-β-bromotetralin by NMe_3 and adding MeI. While IV decomps. into a tertiary base and MeI on heating, III gives NMe_2·HI and the *Me ether* (V), C_6H_4·CH:C(OMe)·CH_2·CH_2, of the enol form of the tetralone; V readily takes up 2 atoms H and on dehydrogenation with Br yields β-$C_{10}H_7OMe$, showing that in the II the HO occupies the β-position. Analogous expts. in the indene series showed that, contrary to the hitherto generally accepted view, the alkamines (VI) obtained from α-hydroxy-β-bromohydrindene have the HO group in the β-position. Partly to confirm these results by a different method, and partly to obtain the α-HO isomers of the I and VI for pharmacol. comparison with the I, attempts were made to prep. these α-HO isomers by demethylation of the corresponding α-MeO compds. These attempts were successful only with α-methoxy-β-methylaminotetralin, the resulting alkamine (VII) being different from the II from α-hydroxy-β-bromotetralin with $MeNH_2$. When the basic substituent of the α-MeO compds. is NMe_2 or NC_5H_{10}, the only definite products of demethylation in the tetralin series are the unsatd. bases C_6H_4·CH:C(NR_2)·CH_2·CH_2 (VIII), and the analogous unsatd. bases are the chief products in the indene series even where the basic substituent is NHMe. VII, which may be considered as a cyclic ephedrine, acts pharmacologically like ephedrine, although not as powerfully. III, m. 168°. V, b_{14} 136°, d_4^{27} 1.0674, turns yellow and thickens on standing several weeks, gives the same blue color as β-tetralone when shaken in alk. soln. in the air, gives the tetralone, m. 132–3°, when shaken several hrs. with 2 *N* HCl, is reduced by H and Pd to *ac-β-tetralyl Me ether*, b_{14} 123–4°. *α-Methoxy-β-dimethylaminotetralin*, from the β-Br compd. and $NHMe_2$ in C_6H_6 at 100°, yellow, b_{13} 147–9° (30% yield); *HCl salt*, m. 184°; *picrate*, m. 192°; *methiodide* (IV), m. 210°, depresses the m. p. of III to 135–48°. *α-Methoxy-β-methylaminotetralin* (50% yield), b_{14} 144–6°; *HCl salt*, m. 228°; *picrate*, m. 150°. Exhaustive methylation of the base gives IV. *α-Methoxy-β-piperidinotetralin*, b_{14} 191–3°; *HCl salt*, m. 230°; *picrate*, m. 153°. *α-Hydroxy-β-methylaminotetralin* (VII) (60% from the α-MeO compd. with 66% HBr at 55–60°), m. 77–9° (*HCl salt*, m. 206°); if the heating with HBr is carried out at 100°, the product is the *unsatd. base*, b_{12} 162–4°, of the type VIII; it forms a hygroscopic *HCl salt*, m. 148–50°, and a yellow *picrate* m. 149°. The unsatd. *dimethylamino base* (VIII), $b_{0.4}$ 102–4°, is obtained even when the temp. in the heating with HBr is not raised above 40–5°, it darkens and thickens in the air and forms an oily HCl salt and a *picrate* m. 148°. The *piperidino analog*, $b_{0.4}$ 168–70°, m. 40°, is likewise formed at 40–5°; *picrate*, yellow, m. 149°. *β-Hydroxy-α-methylaminohydrindene* (VI), m. 130°; *HCl salt*, m. 175°; *picrate*, m. 153°. Methylation with Me_2SO_4 and treatment with KI gives a quaternary *iodide*, m. 187°, which splits off NMe_2·HI only slowly and incompletely above its m. p., and gives a light yellow oil, b_{14} 114–6°, having approx. the compn. of *β-hydrindone enol Me ether* and giving β-hydrindone when shaken with H_2O. A more complete decompn. can be effected by distn. *in vacuo*, which gives β-hydrindone and a base $C_{13}H_{17}ON$, regenerating the iodide with MeI and different from IX (below); it is therefore probably *α-dimethylamino-β-methoxyhydrindene*. It b_{14} 132°; *picrate*, m. 159°. The *β,α-isomer* (IX), from *β-bromo-α-methoxyhydrindene* (b_{11} 134°, obtained in 90% yield from the di-Br compd. with boiling MeOH) with Me_2NH in C_6H_6 (yield, 20%), b_{14} 128–9°, rapidly reddens, forms a *methiodide* m. 176°, which quantitatively regenerates IX and MeI on dry distn. *Methylamino analog* of IX (35%), b_{14} 127–8°, darkens even more rapidly than IX; *picrate*, m. 118°; *HCl salt*, m. 173°. Demethylation of the MeO is much more difficult than in the tetralin series; heating with concd. HBr at 100° for even only 1 hr. gives a thick non-distillable basic oil, apparently a polymerization product of the unsatd. amine, for by heating 1 hr. at 50°, treating with NaOH-K_2CO_3, extg. with Et_2O and treating in petr. ether with HCl in Et_2O there is obtained a *salt* m. 165–6° having very nearly the compn. $C_{13}H_{18}NCl_3$ of the HCl addn. product of the unsatd. amine. The *α-hydroxy-β-methylaminohydrindene*, m. 77–9°, was finally obtained in small yield by allowing the MeO compd. to stand 40 hrs. with fuming HBr at room temp. and then heating 15 min. at 45–50°; its yellow *picrate* m. 171°. IX on short heating with HBr gave a basic oil which soon began to thicken and could not be distd. C. A. R.

1-Amino-2-naphthol hydrochloride. J. B. Conant and B. B. Corson. *Org. Syntheses* XI, 8–11(1931).—1,2-$C_{10}H_6(NO)ONa$, reduced with $Na_2S_2O_4$ at 60–5°, gives 66–74% 1,2-$C_{10}H_6(NH_2)OH$. C. J. West

1-Amino-2-naphthol-4-sulfonic acid. Louis F. Fieser. *Org. Syntheses* XI, 12–4

(1931).—1,2-$C_{10}H_6(NO)OH$ in $NaHSO_3$ and *N* NaOH, treated with concd. H_2SO_4, gives 82–4% of 1,2,4-$H_2N(HO)C_{10}H_5SO_3H$. C. J. West

2-Iodo-3-naphthoic acid. Henri Goldstein and Ernest Cornamusaz. *Helv. Chim. Acta* **14**, 200–3(1931).—Diazotization of 2,3-$C_{10}H_6(NH_2)CO_2H$ and treatment of the product with KI gives 70% of *2-iodo-3-naphthoic acid* (I), m. 214°; *Me ester* (85% yield), m. 55°; *Et ester* (87% yield), m. 78°; *amide* (from the action of concd. NH_4OH on the impure *chloride* prepd. by treatment of I with PCl_5), m. 241° (yield 90%); anilide, m. 205° (yield 80%). I. M. Levine

Syntheses of antiseptic derivatives of indan-1,3-dione. I. Interaction of malonyl chloride and of alkylmalonyl chlorides with the methyl ethers of resorcinol and β-naphthol. Raphael Black, Herbert Shaw and Thomas K. Walker. *J. Chem. Soc.* **1931**, 272–9.—$CH_2(COCl)_2$, obtained in 36% yield from the acid and PCl_5, with *m*-$C_6H_4(OMe)_2$ and $AlCl_3$ in $PhNO_2$ gives 30% of *7-hydroxy-5-methoxyindan-1,3-dione*, lemon-yellow, m. 217°. $MeCH(COCl)_2$, b_{22} 45–50°, gives the *2-Me deriv.*, m. 225–6°; *2-Et deriv.*, pale fawn-colored, m. 192.5°; *2-Pr deriv.*, pale fawn, m. 190.5°; the Bu deriv. could not be obtained cryst. β-$C_{10}H_7OMe$ and $CH_2(COCl)_2$ with $AlCl_3$ in $PhNO_2$ give 31% of *5-hydroxyperinaphthindan-1,3-dione*, dull yellow, m. 276–80°; *2-Et deriv.*, golden brown, m. 215° (20% yield); *2-Pr deriv.*, bright canary-yellow, m. 181°; *2-Bu deriv.*, yellow, m. 185°. These compds. exert no action on *B. coli communis* when tested by the Rideal-Walker technic and they were also without effect on the proliferation of organisms of the *B. pyocyaneus* group; very definite inhibition of growth was observed with *S. pyogenes* and a no. of Gram-positive bacilli. These compds. are to be regarded as possessing selective antiseptic properties distinct from the general disinfectant properties of the phenols from which they are derived. Detailed results are given with *Bacterium C.* The introduction of an alkyl substituent into the 2-position of the dione ring in the parent resorcinol derivs. results in a lowering of the antiseptic power, but this depressing effect is counterbalanced to an increasing degree as the length of the substituent alkyl chain is increased. Such lowering effect is absent in the alkylated indandiones derived from β-$C_{10}H_7OH$. C. J. West

Anthracene derivatives. II. Edward de Barry Barnett and Norman P. Goodway. *Ber.* **63B**, 3048–51(1930); cf. *C. A.* **24**, 5036. – In order to obtain further data on the influence of substituents in the side ring on the reactions of atoms and groups in the *ms*-position, attempts were made to reduce 1,5-dimethoxyanthraquinone (I) to the corresponding anthrone, but in spite of numerous trials in both acid and alk. soln neither the anthrone nor the anthracene could be obtained. The now commercially prepd. and hence readily available 1,5-diphenoxyanthraquinone (II) also did not yield the *anthrone* (III) by either the usual Sn-HCl or the Al powder-concd. H_2SO_4 method. III was obtained in satisfactory yield, however, with $SnCl_2$ and HCl in AcOH. It was unchanged by MeMgI and $PhCH_2MgCl$; the copious evolution of gas with MeMgI pointed to the anthranol rather than the anthrone structure. Attempts to obtain a mono- or di-benzylanthrone by boiling with $PhCH_2Cl$ and NaOH gave only resinous products and unchanged III. III is readily brominated and the *10-Br deriv.* (IV) resembles 1,5-dichlorobromoanthrone more than bromoanthrone itself. It readily yields 10-RO and 10-NHR derivs. This seems to support the theory of *peri*-coördination, but in view of the contradictory results recently obtained, a theoretical discussion is reserved for a later date. With the object of detg. the influence of a β-PhO group, $C_6H_4(CO)_2O$ was condensed with Ph_2O but the resulting *4'-phenoxybenzophenone-1-carboxylic acid* (V) could not be converted into the anthraquinone. It was, however, easily reduced to *4'-phenoxydiphenylmethane-1-carboxylic acid* (VI); attempts to convert this into the anthrone have thus far failed. The I, pale yellow, m. 241°, was obtained in about 30 g. yield from 1,5-$NaO_3SC_6H_3(CO)_2C_6H_3SO_3Na$ and 1.5 parts NaOH boiled 40 hrs. with continuous stirring in MeOH. III, yellow, m. 166°, gives with C_5H_5N-Ac_2O on the H_2O bath *1,5-diphenoxyanthranyl acetate*, yellow, m. 165°. IV, yellow, m. 180–3° (gas evolution). *10-EtO deriv.*, from IV refluxed in alc. with $CaCO_3$, m. 148°, quickly turns light pink on the surface; *anthranyl acetate*, yellow, m. 238°. *10-Piperidino deriv.*, m. 136°. *10-Anilino deriv.*, yellow, m. 159° (decompn.). *10-N-Methylanilino deriv.*, yellow, m. 159°. *10-p-Dimethylaminophenyl deriv.*, faintly yellow, m. 205°. V, m. 162°. VI, from V with Zn dust and aq. NH_4OH on the H_2O bath, m. 128°. C. A. R.

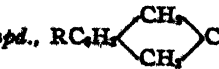
Oxalic acid as a condensing agent. I. Condensation of phthalic anhydride and phenol. S. Nakanishi. *J. Pharm. Soc. Japan* **51**, 31–4(1931); German abstr. 10–11.—$C_6H_4(CO)_2O$ (I) (10 g.), when treated with hydroquinone (5 g.) and $(CO_2H)_2$ (20 g.) at 120–40° for 2 hrs., gave *quinizarin*, $C_{14}H_8O_4$, m. 194°. I (5 g.), α-naphthol (5 g.) and

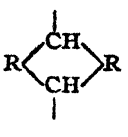
$(CO_2H)_2$ (20 g.), when treated as above, gave *α-naphthofluoran*, $C_{28}H_{16}O_3$, m. 300° (yield 3 g.). F. I. NAKAMURA

Constitution of the aloins. E. LEGER. *Bull. soc. chim.* [4], **49**, 70–2(1931).—A polemic. Cf. Gibson and Simonsen, *C. A.* **24**, 2752. ODEN E. SHEPPARD

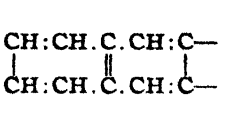
Anthraquinhydrone. OSCAR BALLY. *Ber.* **63B**, 2938(1930); cf. Scholl and Böttger, *C. A.* **25**, 695.—In 1905 (Ger. pat. 194,252), in applying alc. KOH fusion to the prepn. of isoviolanthrone, B. observed with anthraquinone itself an intense bottle-green color. Scholl, apprised of this observation, ascribed the color to the formation of K anthraquinhydrone. C. A. R.

Polynuclear aromatic hydrocarbons and their derivatives. VII. A new class of deeply colored radical hydrocarbons and the supposed pentacene of E. Philippi; also a reply to remarks of Roland Scholl and Oskar Böttger. E. CLAR AND FR. JOHN. *Ber.* **63B**, 2967–77(1930); cf. *C. A.* **24**, 2457.—*lin*-Dibenzo-9,10-dihydroanthracene (I), when dehydrogenated by passing over heated Cu *in vacuo* or by boiling in $PhNO_2$ with phenanthrenequinone or in xylene with chloranil, gives a deep violet-blue hydrocarbon, $C_{22}H_{14}$, to which (see below) is assigned the structure of a *2,3,6,7-dibenzanthracene-9,10-diyl* (II, R = III). The homologs of I yield corresponding violet-blue hydrocarbons. These deeply colored, very difficultly sol. and high-melting hydrocarbons differ from the hitherto known condensed aromatic hydrocarbons of the same mol. magnitude not only in their deep color but also in their interesting reactions. The red xylene soln. of II is unchanged by dry O but moist O or air changes it to yellow, with green fluorescence, and ppts. an insol. colorless *peroxide* (IV), and the mother liquor on concn. yields yellow-brown needles, $C_{22}H_{14}O_2$ (V). IV has the compn. $C_{44}H_{28}O_2$ and regenerates II when heated to its m. p. or in high-boiling solvents ($PhNO_2$), properties agreeing well with the peroxide structure given. IV is then apparently formed by the addn. of H_2O_2, not of O_2. Unfortunately mol.-wt. detns. could not be made because of the insoly. of the IV. The *endocyclic peroxide* V is accompanied by varying amts. of the monoquinone $R(CO)_2R$ (VI), apparently formed by further oxidation of V. In 1 case where the di-mol. IV was not formed, the monomeric V was readily isolated in pure form. It does not dissolve in NaOH and on fusion shows the decompn. characteristic of peroxides. Light greatly accelerates the oxidation. CrO_3 and AcOH, as already reported, give VI exclusively. In xylene suspension, II is immediately decolorized by benzoquinone with the formation of a faintly yellow cryst. product to which is assigned the structure VII; on heating it does not break down into its components but melts to a dark mass, with evolution of gas. With chloranil in xylene the reaction is somewhat slower and there are obtained a yellow (VIII) and a brown-red product (IX). VIII, from its compn., is the analog of VII but on heating alone or in high-boiling solvents breaks down into its components. IX contains 1 mol. more of H_2O and does not split up into its components when heated; it is provisionally assigned the structure shown. Dil. NaOH converts it into a colorless, difficultly sol. compd., while VIII dissolves only in alc. KOH, with brown-red color. Crystn. of IX from AcOH changes it into a light-red *substance* (X) of much higher m. p. which is no longer altered by dil. NaOH. With phenanthrenequinone, II does not react; it reacts at once with halogens, including I, and readily with boiling $PhNH_2$ contg. a little $PhNH_2.HCl$. Among the reaction products with halogens are halogen-contg. diradicals of great stability. If II, which sublimes undecompd. below 300° in CO_2, is sublimed above this temp., it gives, depending on the temp., small quantities of I, m. 270°, and the residue, which retains the cryst. structure of the II, has a glittering, graphite-like appearance. It is probably formed by a graphite-like linking together of many hydrocarbon mols., while the H thereby set free reduces a part of the II to I. The properties of II indicate that it has the structure shown. Röntgen ray studies by Debye's method have established the uniplanar position of the C_6H_5 rings and leave hardly any doubt as to the correctness of the structure II. The supposed 2,3,6,7-dibenzoanthracene, which Philippi, with Scholl, Houben and de Diesbach, calls *lin*-pentacene (*C. A.* **24**, 356), is really the dihydro deriv. (I). Using their own method of prepn. (*C. A.* **24**, 1634), C. and J. obtained a hydrocarbon with the same properties as P.'s but with the compn. $C_{22}H_{16}$, not $C_{22}H_{14}$, and yielding II on dehydrogenation, and VI exclusively on oxidation. On standing some months, the m. p. of the I rises to 300–10° and the substance (XI) now agrees in all its properties with that first described by Mills and Mills; on oxidation it gives the diquinone, $C_6H_4(CO)_2C_6H_2(CO)_2C_6H_4$, although with $FeCl_3$ it gives only VI; this is readily explained by an intermediate dehydrogenation to II by the $FeCl_3$. XI, which is apparently more stable at room temp. than I, is probably formed from I by a change in position of two H atoms and is the *1,4-dihydro*

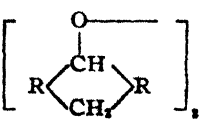
compd.,  The reverse rearrangement has been effected by heating XI for some time above its m. p. under CO_2; the resulting product with CrO_3 now gives VI along with traces of the diquinone. There is no change in compn., as P. believes, in the rearrangement. Both forms give red melts. A brief reply is made to the criticisms of Scholl and Böttger (*C. A.* **25**, 696). IV decomps. 335–60°, imparts a faint green color to concd. H_2SO_4. V, m. 320–30° (decompn.), sol. in H_2SO_4 with green color. *2,3,6,7-Dibenzanthracene-9,10-diyl hydroquinone ether* (VII), decomps. 262° with gas evolution (m. 355° with carbonization if heated very slowly). *Tetrachlorohydroquinone ether* (VIII), m. 263° (gas evolution), sol. in H_2SO_4 with dirty green color; *mono-ether* (IX), m. 267–8° (gas evolution), also sol. with dirty green color in H_2SO_4. X, apparently formed from IX by loss of 2 mols. HCl and 1 mol. H_2O, darkens 300°, m. 370° (decompn.), sol. in H_2SO_4 with violet-red color.



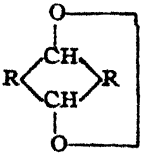
(II)



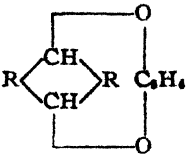
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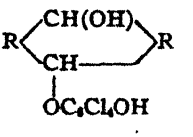
(IV)



(V)



(VII)



(IX)

C. A. R.

Unsaturated compounds. XII. Action of hydroxylamine on furfurhippuric acid and its esters, as also on furfuracrylic esters. Theodor Posner and Irmengard Sichert, née Modrow. *Ber.* **63B**, 3078–88(1930); cf. *C. A.* **18**, 3367.—The addn. at conjugated double bonds has hitherto been studied chiefly on variously substituted cinnamic acids. The present work deals with the influence on the additive power of the replacement of the C_6H_4 nucleus by the furan ring and the relation to the strength of the acid. *Acid addn. products.*—The furan ring increases the dissocn. of the acid and quite materially increases the difficulty of addn.; furfuracrylic acid (I) adds more difficultly than hippuric acid (II), furfurhippuric acid (III) more difficultly than benzalhippuric acid (IV) and III more difficultly than I; the increase in the yield of NH_2OH addn. products of the acids of the furan series agrees well with the decrease in the dissocn. of the acids, insofar as these consts. have been detd. On short heating the formation of hydroxamino acids, $RCH(NHOH)CH_2CO_2H$, increases with decrease in dissocn., and on longer heating the oxamino acids are more and more oxidized to the ketones. The formation of the other oxidation product, the isoxazolone, N:CR.CH_2.CO.O, and of the reduction product, $RCH(NH_2)CH_2CO_2H$, is irregular. *Ester addn. products.*—The esters add much more easily than the corresponding acids, the Et ester generally somewhat easily than the Me ester; they generally react quite well with NH_2OH in the cold, whereas the acids only form the NH_2OH salts. Unlike the acids, which add only 1 mol. NH_2OH when heated, the esters react in the cold with 2 and 3 mols. NH_2OH and the ability to add 1–3 mols. increases from the ester of the strongest to that of the weakest acid (the Me ester of III adds 1, the Et ester of IV 2, $PhCH:CHCO_2Et$ 3 mols.) Most of the cinnamic esters with HO and MeO substituents on the nucleus are exceptions; they in general do not add at all in the cold. The yield of oxime and isoxazolone increases inversely proportionally to the dissocn. consts. of the corresponding acids; only *o*-$O_2NC_6H_4CH:CHCO_2Et$ is an exception. The amino acids also are generally formed in smaller amounts the weaker the corresponding acids are (except with the esters of III, *o*-$O_2NC_6H_4CH:CHCO_2H$ and *trans*-*o*-$MeOC_6H_4CH:CHCO_2H$). The ester of III forms oxidation and reduction products even in the cold, and in spite of the slow addn. even when boiled, it yields a relatively large amount of amino acid. In the expts. at the boiling temp., esters of III, contrary to the cinnamates, form small

amounts of the free acid, and likewise some ester is formed from the free acid. III is obtained in 35 g. yield by refluxing 100 g. $BzNHCO_2H$ with fural and treating 50 g. of the resulting azlactone (obtained in 92 g. yield) in NaOH with HCl. The II, m. 187–8.5°, is obtained in 90% yield from $ClCH_2CO_2H$ and NH_4OH, followed by evapn. and treatment with BzCl in NaOH. Me ester of III, m. 141° (78 g. from 94.0 g. of the azlactone with Na in MeOH contg. a little H_2O). In the prepn. of the II there is also obtained *N-benzoyldiglycolamidic acid*, $BzN(CH_2CO_2H)_2$, m. 68°, sol. slowly in NaOH, quite difficultly sol. in HCl. Dissocn. consts., detd. by the gas-chain method: III 1.51×10^{-4}; I 3.83×10^{-4}; freshly crystd. $PhCH:CHCO_2H$ 3.98×10^{-5}. The addn. expts. in almost every case were carried out by boiling the acid 4, 10 and 240 hrs. or letting the ester stand 10 days at room temp. with 4 mols. NH_2OH. Tables are given showing the amount of unchanged material and yield of hydroxamino acid, oxime, isoxazolone and amino acid with I, III, IV, $PhCH:CHCO_2H$, α-, β- *o*-, *m*- and *p*-methyl-, *o*-nitro-, α- and β-phenylcinnamic acid and *o*-$HO_2CC_6H_4CH:CHCO_2H$ and their Me or Et esters and the esters of $CH_2:CHCO_2H$, *o*-, *m*- and *p*-hydroxy-, *cis*- and *trans*-*o*-methoxy-, *m*- and *p*-methoxy- and *m*- and *p*-nitrocinnamic acid. $C_4H_3OCH(NH_2)CH_2CO_2H$, m. 206°. *Acetylfuran oxime*, m. 102°. *γ-α'-Furfurylisoxazolone*, decomps. 147°, sol. in alkalies, insol. in HCl. *β-Amino-β-α'-furfurylpropionyl chloride-HCl* is obtained in 86.7% yield from the acid in AcCl with PCl_5. *Anilide*, m. 92°, easily sol. in HCl, difficultly in NaOH. *α-Benzoylamino-β-amino-β-α'-furfurylpropionic acid*, m. 173.5°, easily sol. in NaOH and HCl. *γ-α'-Furfuryl-β-benzoylaminoisoxazolone*, decomps. 181.5°, becomes yellow in the air, easily sol. in NaOH or Na_2CO_3. *Methylated α-benzoylamino-p-hydroxylamino-β-α'-furfurylpropionic acid*, probably $C_4H_3OCH(NHOMe)CH(NHBz)CO_2H$, since it is sol. in NaOH and Na_2CO_3 and reduces Fehling soln. only after some time, m. 203°, easily sol. in AcOH and HCl. *ω-Benzoylamino-α-acetylfuran oxime*, m. 157°, easily sol. in NaOH, difficultly in HCl. *α-Benzoylamino-β-ureido-β-α'-furfurylpropionic acid* (0.8 g. from 1 g. of the amino acid with KCNO in boiling H_2O), m. 196°. C. A. R.

Condensations of benzilic and anisilic acids and xanthydrol with thiophene and thionaphthene. J. Ancizar-Sordo and A. Bistrzycki. *Helv. Chim. Acta* **14**, 141–53 (1931).—Diphenyl-2-thienylacetic acid (I), $Ph_2C(C_4H_3S)CO_2H$, obtained in 80% yield by dissolving 2.3 g. benzilic acid (II) and 1.7 g. thiophene (III) in 20 cc. AcOH and adding 20 cc. of an equal wt. mixt. of H_2SO_4 and AcOH and letting stand 2 days, adding cold water and crystg. the residue from MeOH, m. 217–8°, dissolves in concd. H_2SO_4 with brownish red color; a dil. NH_4OH soln. treated with $AgNO_3$ yields a white, light-sensitive Ag salt; 1.5 g. heated 2 hrs. in a sealed tube at 100° with 0.5 g. KOH, 10 cc. MeOH and 3.2 g. MeI yielded 85% I Me ester, m. 149–50°. Diphenyl-3,5(?)-dibromo-2-thienylacetic acid (IV), $Ph_2C(C_4HBr_2S)CO_2H$, obtained is almost quant. yield by heating 1.5 g. I in 25 cc. AcOH after adding 1.6 g. Br, m. 213–4° (decompn. and green coloring). Diphenyl-2-thienylcarbinol (V), obtained in 30% yield by heating 1 g. I to 35° with 10 cc. of a mixt. of 10 vols. abs. H_2SO_4 and 2 vols. AcOH, pouring into water, yellow crystals from petr. ether, m. 129–30°. CO splitting from I as usual with H_2SO_4 (cf. Bistrzycki and Siemiradzki, *C. A.* **2**, 2379) gives even poorer yields. The yellow color of V is unexpected (cf. Thomas, *C. A.* **4**, 191). A.-S. and B. think it more likely that 4-valent S according to the following isomerism scheme explains the color of the solid V. $Ph_2(HO)CC:CH.CH:CH.S \rightleftharpoons Ph_2C:C.CH:CH.CH:SOH.$

Diphenyl-2-thienylmethane (VI), obtained in 85% yield by heating 1 g. I with 1.5 g. KOH and 7 cc. water in a tube at 180°, m. 63–4° dissolves in concd. H_2SO_4 with pale greenish-yellow color remarkably different from Ph_3CH. The structure of VI, previously in question from Levi's work (cf. *Ber.* **19**, 1623; also Minnis, *C. A.* **24**, 850), is settled by the above method of prepn. Levi failed to obtain HO, nitro or amino derivs. of VI and A.-S. and B. failed to prep. a HO deriv. by condensing II with III (later planning to split out CO). A reaction occurred but no product was isolated. 9-(2'-Thienyl)xanthene (VII), $O:(C_6H_4)_2CHC_4H_3S$, obtained in 75% yield by warming to 35° a mixt. of 2 g. xanthydrol (VIII) with 1.7 g. III after adding 3 g. P_2O_5 and a few cc. ether and then letting stand for 2 days, pale yellow, m. 150–1°, dissolves in concd H_2SO_4 with yellow color and intense green fluorescence. Diphenyl-2(?)-thionaphthylacetic acid (IX), $Ph_2C(C_8H_5S)CO_2H$, obtained in 95% yield by letting stand 3 days 2.3 g. II and 1.7 g. thionaphthene (X) in 20 cc. AcOH to which 20 cc. of an equal wt. mixt. of H_2SO_4 and AcOH was added, m. 244–5° (gas evolution and darkening); Na salt, difficultly sol. in water; 1.7 g. heated with 0.5 g. KOH, 10 cc. MeOH, and 3.2 g. MeI for 2 hrs. at 100° gave the Me ester of IX in 85% yield, m. 151–2°. Diphenyl-2(?)-thionaphthylcarbinol (XI), $Ph_2C(OH)C_8H_5S$, obtained in 35–40% yield by treating

1 g. IX with 8 cc. concd. H_2SO_4 and 2 cc. AcOH, m. 125–6°. The lack of color is unexpected if the suggested formula is correct (cf. Weissgerber and Kruber, *C. A.* **15**, 88, who point out that the Na compd. of X is not yet explained). Diphenyl-2(?)-thionaphthylmethane (XII), $Ph_2CHC_8H_5S$, obtained in 90% yield by splitting out CO_2 from IX as VI was obtained from I, m. 104–5°, dissolves in concd. H_2SO_4 with intense greenish orange color. Diphenyl-3(?)-bromothionaphthylacetic acid (XIII), $Ph_2C(C_8H_4BrS)CO_2H$, obtained in almost quant. yield by treating 1.7 g. IX with 1.6 g. Br, m. 223–4° (decompn.); dissolves in concd. H_2SO_4 with violet-red color. Diphenyl-3(?)-bromothionaphthylcarbinol (XIV), $Ph_2C(OH)C_8H_4BrS$, obtained in 75% yield by the method of prepg. XII from IX, m. 166–7°, dissolves in concd. H_2SO_4 with violet-red color. 4,4'-Dimethoxydiphenyl-(?)-thionaphthylacetic acid (XV), $(MeOC_6H_4)_2C(C_8H_5S)CO_2H$, obtained in 90% yield by treating a soln. of 2.9 g. of anisilic acid and 1.7 g. X in 20 cc. AcOH with 20 cc. of a mixt. of equal wts. H_2SO_4 and AcOH, letting stand 2 days, m. 245–6° (decompn.); the Ba salt is almost insol. in water; Me ester, in 90% yield prepd. as the Me ester of IX, m. 166–7°. CO evolution resulted when XV was treated with H_2SO_4 or H_2SO_4 and AcOH but no product was isolated. 9-(2(?)Thionaphthyl)xanthene, $O:(C_6H_4)_2CHC_8H_5S$, obtained in 50% yield by refluxing 2 hrs. 2 g. VIII, 1.7 g. X, 3 g. P_2O_5 and 5 cc. ether, and letting stand 2 days, m. 172–3°, dissolves in H_2SO_4 with yellow color and intense blue-green fluorescence. O. E. S.

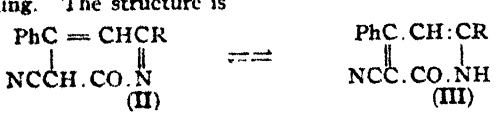
New methods of formation of coumarone and of diphenylene oxide. N. A. Orlov and V. V. Tishchenko. *Ber.* **63B**, 2948–51(1930); cf. *C. A.* **24**, 110.—Coumarin (350 g.), passed at the rate of 50 g. per hr. through a 2 cm. tinned Fe tube, 60 c. long, at 860° gave a gas consisting of 4.0% CO_2, 71.6% CO, 19.2% H and 4.8% C_nH_{2n}, and 297 g. of a thick brown product sepd. by distn. into 56 g. b. 80–200° (I), 16 g. b. 200–88°, 75 g. b. 288–305° and 146 g. residue. The 3rd fraction and a considerable portion of the 2nd fraction consisted of unchanged coumarin and the residue, which was very similar in all its properties to coumarone resin, gave on dry distn. 78.6 g. oil (II), which was combined with I, and 56 g. of a porous coke. The combined I and II, freed of acid products (phenols) with NaOH, was sepd. by careful fractionation into 8 g. b. 80–172° (chiefly C_6H_6 hydrocarbons), 122 g. practically pure coumarone, b. 172–4°, and 8 g. residue (mainly coumarin). Under pressures greater than atm. the decompn. of coumarin follows another course; heated 4 hrs. at 420° in an autoclave the coumarin gave only gases and coke. Coumarin may be considered as an α-benzopyrone, and xanthone (dibenzo-γ-pyrone) (100 g.), treated like the coumarin at 880°, gave a gas consisting of 94% CO, 1.76% CH_4 and 2.1% H, and a black cryst. mass giving on distn. 15 g. of a product b. 285–300° which, through the picrate, gave 9.5 g. diphenylene oxide, m. 85°. Dimethylpyrone was similarly treated, but because of lack of material the best conditions for a smooth degradation into CO and dimethylfuran could not be worked out. The formation of a volatile compd. with pronounced furan properties and the evolution of large quantities of gas rich in CO was observed, however C. A. R.

The hydrolysis of acetylindoxylic acid and the acetylindoxyls. Geoffrey Spencer. *J. Soc. Chem. Ind.* **50**, 63–4T(1931).—*N-Acetylindoxylic acid*, AcN.C_8H_4.$CO.CHCO_2H$ (I). A melt of 10 g. of *o*-$HO_2CC_6H_4NHCH_2CO_2H$ and 45 g. of 80% KOH, fused at 260° for 10 min., was ground up, mixed with 50 g. of ice and partly neutralized with 35 cc. of AcOH at 0° in a CO_2 atm. Ten cc. of Ac_2O was added and after 30 min. the ppt. of *O*-acetylindoxyl was filtered off. Acidification of the filtrate with HCl gave I, m. 179° (decompn.). I was also obtained by acetylating acid indoxylic acid solns. Hydrolysis of I was expected to give indoxylic acid, indoxyl and then indigo but on the contrary a marked tendency to ring cleavage was shown. Hydrolysis with Na_2CO_3, alk. H_2O_2 and NaOH gave 50% of $NH_2C_6H_4CO_2H$ and some indigo, whereas treatment with HCl or acid $FeCl_3$ yielded $NH_2C_6H_4CO_2H$ solely. *N-Acetylindoxyl* (II) was prepd. by the method of Vorländer and Pfeiffer (*C. A.* **13**, 2356), after attempts to decarboxylate indoxylic acid by boiling had failed. On boiling II in the presence of air with dil. Na_2CO_3, indigo, diacetylindigo and isatin were obtained in 55, 8 and 12% yields, resp. Dil. NaOH gave mainly indigo (74%) together with isatin, while acid $FeCl_3$ gave only isatin. *O-Acetylindoxyl* (III). An indoxylic acid melt was partly neutralized, boiled for 10 min., cooled, and acetylated with Ac_2O. After standing for 30 min., III was filtered off, washed free from acetylindoxylic acid and crystd. from H_2O. After drying *in vacuo*, 15% yield of III, m. 127.5°, was obtained. Hydrolysis with Na_2CO_3 yielded 95% indigo and 3–4% isatin; treatment with alk. H_2O_2 gave mainly isatin, 18% indigo and some $NH_2C_6H_4CO_2H$. Acid $FeCl_3$ gave indirubin (18%) and isatin. C. R. Addinall

3,5-Diketopyrazolidine derivatives. I. TOKUICHI TSUMAKI. *Bull. Chem. Soc. Japan* **6**, 1–9(1931).—*1,2-Diphenyl-3,5-diketopyrazolidine* (I). $(PhNH)_2$ (18.5 g.) in 300 cc. of Et_2O was added from a dropping funnel to a soln. of 10 g. of $CH_2(COCl)_2$. The white ppt., washed with Et_2O in the absence of moist air, was extd. with petroleum ether and recrystd. from EtOH; yield 6 g., m. 178°. The ether filtrate was washed with water and shaken with 1% Na_2CO_3. On acidification with HCl the alk. soln. gave a ppt. which when dissolved in $CHCl_3$ and treated with EtOH yielded crystals of *1,2-diphenyl-3,4-dihydroxy-5-pyrazolidone* (II), m. 160–2°. This compd. was also obtained by dissolving I in a mixt. of $CHCl_3$ and EtOH, and allowing the soln., acidified with a trace of HCl, to stand for a few days. I and II were obtained by the action of C_4O_2 on $(PhNH)_2$, the poor yields being accounted for by polymerization of the main part of the C_4O_2 during the reaction. I forms an NH_4 salt, m. 138–9°, and an isonitroso deriv., m. 163–4°. It condenses readily with aldehydes and ketones, giving products easily decompd. by hot alkali. From BzH, O.CH:CH.CH:CCHO, PhCH:CHCHO, Me_2CO, MeBz and PhBz the following 1,2-diphenyl-3,5-diketopyrazolidine derivs. were formed: 4-benzylidene, m. 164–5°; 4-furfurylidene, m. 157–8°; 4-cinnamylidene, m. 190–2°; 4-isopropylidene, m. 113°; 4-(α-phenylethylidene), m. 148–9°, and 4-(diphenylmethylene), m. 269°. C. R. ADDINALL

Equilibrium and "intermediate stage." F. ARNDT. *Ber.* **63B**, 2963–6(1930).—In agreement with v. Auwers *et al.*, who, in their work on the *N*-alkyl-γ-pyridones (*C. A.* **25**, 295), misunderstood the attempted explanation, in footnote 2 to the paper by A. and Kalischek (*C. A.* **24**, 3239), on an electronic theoretical basis, of A.'s conception of the difference between equil. and "intermediate stage," A. explains more fully this conception, which is dealt with in detail by his pupil Lorenz (*Diss. Breslau*, **1927**) but is referred to only incidentally here and there in A.'s own papers. C. A. R.

Reactivity of conjugated systems. II. Condensation of acetylenic ketones with cyanoacetamide. CHITTARANJAN BARAT. *J. Indian Chem. Soc.* **7**, 851–62(1930); cf. *C. A.* **24**, 4785.—PhCOC : CPh and $CNCH_2CONH_2$ condensed according to Michael's method to *3-cyano-4,6-diphenyl-2-pyridone* (I), m. 320°, in 60% yield. I is identical with the dehydrogenated product from PhCOCH:CHPh and $CNCH_2CONH_2$. The Na salt of I is sparingly sol. in water; on much diln. the soln. becomes turbid from hydrolysis. With Knoevenagel's reagent 40–50% of an identical compd. was obtained on 1 week's standing. The structure is

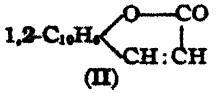


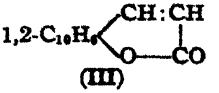
(II) (III)

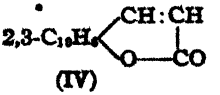
of which III predominates in the presence of alkali. The *N*-Me deriv. (IV), m. 175°, is identical with that from condensation with $CNCH_2CONHMe$. Diln. of the H_2SO_4 soln. of I gives 4,6-diphenyl-2-hydroxypyridine (V). I and II give no color with alc. $FeCl_3$ but V does. V does not yield a Me deriv. readily and is probably PhC:CH.CR:N.C(OH):CH. V could also be reached from I by an intermediate compd. $PhC(CH_2COR):C(CN)CONH_2$. The stability of the condensation products increases with increasing neg. character of R. An extension of Fry's substitution rule is offered in explanation. *p-Tolylphenylacetylene*, b_{15} 200–10°, m. 72°, and $CNCH_2CONH_2$ gave *3-cyano-4-phenyl-6-p-tolyl-2-pyridone* (VI), m. 268°. VI was also obtained from *p*-MeC_6H_4COCH:CHPh and from α-methoxy-ω-*p*-tolylstyrene; *N-Me* deriv., m. 136–8°. *4-Phenyl-6-p-tolyl-2-hydroxypyridine*, m. 228°. *Et 4-phenyl-6-p-tolyl-2-pyrone-3-carboxylate*, m. 85°. *4-Phenyl-6-p-tolyl-2-pyrone*, m. 133°. *p-*NO_2*-*C_6H_4COC : *CPh*, m. 161–2°. *3-Cyano-4-phenyl-6-p-nitrophenyl-2-pyridone*, m. 332–3°; *N-Me* deriv., m. 322–4°. *4-Phenyl-6-p-nitrophenyl-2-hydroxypyridine*, m. 275–6°. *Et 4-phenyl-6-p-nitrophenyl-2-pyrone-3-carboxylate*, m. 148°. *4-Phenyl-6-p-nitrophenyl-2-pyrone*, m. 235°. *3-Cyano-4-phenyl-6-methyl-2-pyridone*, m. 275–6°; *N-Me* deriv., m. 146°. *4-Phenyl-6-methyl-2-hydroxypyridine*, m. 206–8°. *Et 4-phenyl-6-methyl-2-pyrone-3-carboxylate*, m. 92°. *4-Phenyl-6-methyl-2-pyrone*, m. 185–6°. *3-Cyano-4-phenyl-6-ethyl-2-pyridone*, m. 267–8°; *N-Me* deriv., m. 158°. *4-Phenyl-6-ethyl-2-hydroxypyridine*, m. 165°. FOSTER DEE SNELL

The third *o*-hydroxynaphthaldehyde and the isomeric β-naphthocoumarins. THEODOR BOEHM AND ELMAR PROFFT. *Arch. Pharm.* **269**, 25–37(1931).—Of the 3 possible *o*-hydroxynaphthaldehydes only 2 were known, to which the structures 1,2- and 2,1-$C_{10}H_6(OH)CHO$ were ascribed. The prepn. of the 2,3-isomer (I) was un-

successfully attempted some years ago by Zetzsche and co-workers by the catalytic reduction of $C_{10}H_6(OH)COCl$. These expts. were taken up anew by B. and P. who, following the procedure of Rosenmund and starting with 2,3-$C_{10}H_6(OH)CO_2H$ succeeded in prepg. I, by the following transformations: $C_{10}H_6(OH)CO_2H \longrightarrow C_{10}H_6(OAc)CO_2H \longrightarrow C_{10}H_6(OAc)COCl \longrightarrow C_{10}H_6(OAc)CHO \longrightarrow$ I. This synthesis clarifies the questions hitherto existing in the constitutional make-up of the isomeric β-naphthocoumarins (III and IV).


(II)


(III)


(IV)

Owing to its derivation from α-naphthol no question arises respecting the structure of α-naphthocoumarin (II). Of the isomeric β-naphthocoumarins, the one prepd. by Kauffmann from β-naphtholaldehyde according to Perkin, m. 118°, is represented by (III). A 2nd β-naphthocoumarin was described by v. Pechmann and Welsh (*cf. Ber.* 17, 1646); it m. 141° and was designated as iso-β-naphthocoumarin. Its constitution was left undetd.; from K.'s work only structure IV would remain for it. However, when β-naphtholaldehyde was subjected to the Perkin synthesis, a product m. 163°, resulted, entirely unlike Pechmann's "iso-β-naphthocoumarin," and undoubtedly having the structure IV. Repetition of the v. Pechmann expts. on condensation of β-naphthol with malic acid in the presence of H_2SO_4 yielded a product m. 118° and identical with K.'s β-naphthocoumarin. If the same reaction is applied to α-naphthol—which according to Pechmann does not react at all—a product, m. 141°, results (already observed by Bartsch, *Ber.* 36, 1966); it is II, which had been previously prepd. by another procedure by Bezdzik and Friedländer (cf. *Monatsh. Chem.* 30, 280). Accordingly, the assumption is safe that v. Pechmann and Welsh had in hand II and that an "iso-β-naphthocoumarin," m. 141°, has no existence in fact and should be deleted from the literature. During the present study, the following compds. were prepd. and characterized: 2,3-$C_{10}H_6(OH)COCl$, m. 100° (Graff, *Ann.* 367, 253, reports m. p. 89°), which gave on reduction *2-acetoxynaphthoic aldehyde*, $C_{13}H_{10}O_4$, bright yellow, m. 100–1°, likewise the related by-product *acetoxynaphthoic anhydride*, $C_{26}H_{18}O_7$, m. 156°. I, $C_{11}H_8O_3$, yellow plates from dil. AcOH, m. 99–100°; *phenylhydrazone*, $C_{17}H_{14}ON_2$, yellow, m. 246–8°; *p-nitrophenylhydrazone*, $C_{17}H_{13}O_3N_3$, brownish yellow, m. 271–3°; *semicarbazone*, $C_{12}H_{11}O_3N_3$, m. 270°; *oxime*, $C_{11}H_9O_3N$, m. 207°; *anil*, $C_{17}H_{13}ON$, golden, m. 158–9° (*p-nitrophenylhydrazone*, $C_{16}H_{13}O_4N_3$, golden, m. 213–4°; *semicarbazone*, $C_{14}H_{13}O_3N_3$, m. 211–2°; *oxime*, $C_{13}H_{11}O_3N$, m. 202–3°). *β-Hydroxy-β-naphthylideneacetone*, $C_{14}H_{12}O_2$, yellow, m. 207–8°. *β-Hydroxy-β-naphthylideneacetophenone*, $C_{19}H_{14}O_2$, yellow, m. 188–9°. *β-Hydroxy-β-naphthylideneacetylacetone*, $C_{18}H_{14}O_3$, bright yellow, m. 162–3°. *β-Hydroxy-β-naphthylideneoxalacetic ester*, $C_{15}H_{12}O_5$, yellow, m. 112–3° (*Ac deriv.*, $C_{21}H_{20}O_7$, m. 142–3°). Condensation of I with Ac_2O and AcONa yielded IV, yellowish white, m. 163–4°. Alc. $PhNH_2$ or NH_3 effects condensation of I with malonic acid to yield *iso-β-naphthocoumarincarboxylic acid*, $C_{14}H_8O_4$, yellow, m. 258–9° (*Et ester*, $C_{16}H_{12}O_4$, yellow, m. 157–8°). With $AcCH_2CO_2Et$ and piperidine I yields *3-acetyl(iso-β-naphthocoumarin)*, $C_{15}H_{10}O_3$, yellow, m. 209–10° (*p-nitrophenylhydrazone*, $C_{21}H_{15}O_4N_3$, yellow, m. 266–7°; *Bz deriv.*, $C_{22}H_{12}O_3$, yellow, m. 225°). *Et (3-cyano-3,4-dihydro-iso-β-naphthocoumarin)cyanoacetate*, from the condensation of I with $NCCH_2CO_2Et$ in the presence of piperidine, m. 158–9°.

W. O. E.

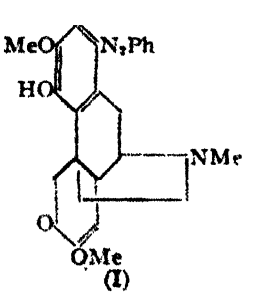
α-Naphthoic acid. Henry Gilman, Nina B. St. John and F. Schulze. *Org. Syntheses* XI, 80–3(1931).—Complete details are given for the prepn. of α-$C_{10}H_7CO_2H$ from α-$C_{10}H_7Br$ through the Grignard reagent; yield, 68–70%. C. J. West

10-Chloro-5,10-dihydrophenarsazine and its derivatives. XIV. Chloro derivatives. Leslie A. Elson and Charles S. Gibson. *J. Chem. Soc.* 1931, 294–305; cf *C. A.* 24, 5301.—Condensation of Cl derivs. of Ph_2NH with $AsCl_3$, producing derivs. of 5,10-dihydrophenarsazine, takes place except when the Cl is in the *o*-position. The production of isomers from *p*-$YC_6H_4NHC_6H_4X$-*m* and from *o*-$YC_6H_4NHC_6H_4X$-*m* is discussed and their orientation considered. 2,2'-$ClC_6H_4NHC_6H_4CO_2H$, heated 5 hrs. at 200–20°, gives *o-chlorodiphenylamine*, b_{12} 174–5°, m. 15–6°; *2,5-Cl_2 deriv.*, b_{17} 195°, does not solidify at —16° (85% yield); *3,4-Cl_2 deriv.*, b_{20} 218–20°, m. 69°, in 75% yield from *3,4-dichlorodiphenylamine-2'-carboxylic acid*, pale yellow, m. 178°; *3,5-Cl_2 deriv.*, b_{12} 200°, does not solidify at —16°, in 74% yield from the corresponding *2'-carboxylic acid*, m. 245°; *3,4,5-Cl_3 deriv.*, b_{20} 248°, m. 85°, from the *2'-carboxylic acid*, m. 238°. *5-Chloro-2-methyldiphenylamine*, b_{12} 205–7°, from the *2'-carboxylic acid*,

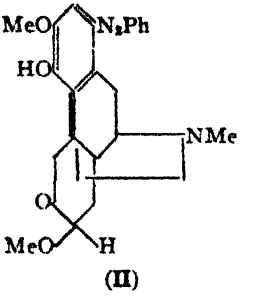
pale yellow, m. 200°. *N-3-Chlorophenylbenzimino-4-chlorophenyl ether*, m. 77°, from benz-*m*-chloroanilide iminochloride and *p*-ClC_6H_4ONa; heating 2 hrs. at 290° and hydrolysis of the Bz deriv. gives *3,4'-dichlorodiphenylamine*, b_{25} 235°, m. 63–4°; *3,3'-Cl₂ deriv.*, b_{18} 225–30°. *N-o-Tolylbenzimino-2-chlorophenyl ether*, m. 64°; heating 2 hrs. at 290° gives *benzoyl-2'-chloro-2-methyldiphenylamine*, m. 132°, which could not be hydrolyzed by the usual methods; the corresponding *3'-Cl deriv.* m. 106°; hydrolysis gives *3'-chloro-2-methyldiphenylamine*, b_{20} 203°. *N-4-Chlorophenylbenzimino-o-tolyl ether*, m. 65°; isomerization and hydrolysis give *4'-chloro-2-methyldiphenylamine*, b_{18} 200–5°, darkens in the air. *N-o-Tolylbenzimino-2,4-dichlorophenyl ether*, m. 53°; this gives *2',4'-dichloro-2-methyldiphenylamine*, b_{20} 205°, m. 48°. Condensation of 3,4-$Cl_2C_6H_3NHPh$ and $AsCl_3$ in *o*-$C_6H_4Cl_2$ gives 20% of a mixt. of *1,2,10-* and *2,3,10-trichloro-5,10-dihydrophenarsazine*, m. 265–8° and 220°; the same compds. were obtained by reducing I with SO_2 in HCl, the products m. 273–4° and 230–5°. 3,4-$Cl_2C_6H_3NH_2$, *o*-$BrC_6H_4AsO_3H_2$, K_2CO_3, AmOH and Cu, boiled 8 hrs., give *3,4-dichlorodiphenylamine-6'-arsonic acid* (I), m. 150°. 3,5-$Cl_2C_6H_3NHPh$ and $AsCl_3$ give the *1,3,10-Cl₃ deriv.*, yellow, m. 251–2°; boiling with 20 vols. H_2O_2 and AcOH gives *1,3-dichlorophenarsazinic acid*, does not m. 280°. 3,4,5-$Cl_3C_6H_2NHPh$ and $AsCl_3$ give *1,2,3,10-tetrachloro-5,10-dihydrophenarsazine*, yellow, m. 260°; oxidation gives *1,2,3-trichlorophenarsazinic acid*, does not m. 290°. (3-$ClC_6H_4)_2NH$ gives *1,9,10-*, *1,7,10-* or *3,7,10-trichloro-5,10-dihydrophenarsazine*, yellow, m. 298°. 3,4'-$ClC_6H_4NHC_6H_4Cl$ and $AsCl_3$ give a mixt. of the *1,8,10-* and the *3,8,10-tri-Cl derivs.*, m. 292° and 240–2°, resp.; the yield of the mixt. is about 20%. 4,2-ClMeC₆H₃NHPh and $AsCl_3$ give 70% of *2,10-dichloro-4-methyl-5,10-dihydrophenarsazine*, bright yellow, m. 245° (decompn.); 3-$ClC_6H_4NHC_6H_4Me$-2 gives 53% of the *1*(or *3*),*10-dichloro-6-methyl deriv.*, bright yellow, m. 262° (decompn.); 4-$ClC_6H_4NHC_6H_4Me$-2 gives 25% of the *2,10-dichloro-6-methyl deriv.*, deep yellow, m. 199°.

C. J. West

Sinomenine and disinomenine. XX. Benzeneazosinomenine. Kakuji Goto and Hideo Shishido. *Bull. Chem. Soc. Japan* **5**, 311–4(1930); cf. *C. A.* **25**, 299.—By means of a diazo coupling reaction, a radical is introduced in the sinomenine mol., in the *p*-position with regard to the phenol group. *Benzeneazosinomenine* (I), dark red tetragonal or hexagonal plates, m. 253° (decompn.). *Benzeneazodihydrosinomenine* (II), red prisms, m. 231° (decompn.). *Benzeneazothebainone*, m. 152°. *Aminodihydrosinomenine HCl salt*, m. > 300°.



(I)



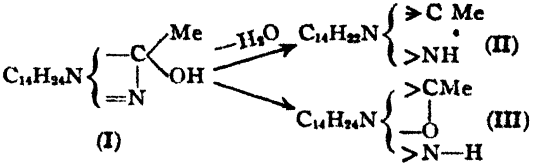
(II)

XXI. The reaction between sinomenine and formaldehyde. Kakuji Goto, Hideo Shishido and Reikichi Inaba. *Ibid* 315–20.—The interaction of sinomenine and 40% HCHO gives *5-hydroxymethylsinomenine* (I) and *1,5-dihydroxymethylsinomenine* (II). I m. 260° (decompn.), $[\alpha]_D$ −40.71°; oxime, m. 240–5°; methiodide, m. 223°, gives a green $FeCl_3$ reaction, a faint ferricyanide reaction, an intensely red diazo reaction and a green-brown HCHO-H_2SO_4 reaction. II m. 242° (from alc.) or 252° (from $CHCl_3$), $[\alpha]_D$ −74.39°; oxime m. 200-15°; methiodide m. 210°, decomps. 280°, gives a brown $FeCl_3$ reaction, a red diazo reaction, no ferricyanide reaction and a green HCHO-H_2SO_4 reaction. The reduction of V gives *dihydro-5-hydroxymethylsinomenine*, m. 244°, $[\alpha]_D$ 73.03°; oxime, m. 215–25° (decompn.), gives a green $FeCl_3$ reaction, an intensely red diazo reaction, a faint ferricyanide reaction and a blue-violet HCHO-H_2SO_4 reaction.

Albert L. Henne

Constitution of matrine. XIII. Action of Grignard reagent on matrine (1). H. Kondo, E. Ochiai and K. Iwava. *J. Pharm. Soc. Japan* **51**, 1–8(1931), German abstr. 1–3; cf. *C. A.* **23**, 2447.—*Matrine* (18.5 g.), when treated with MeMgI, followed by decompn. with NH_4Cl, gave a compd. (I), m. 221–30°, with mol. formula of $C_{16}H_{28}N_2O.HI.H_2O$ or $C_{16}H_{30}N_2O.HI.H_2O$. On hydrolysis I gave bases (II), b_6 165° and

(III), b_6 236–40°. II, m. 65°, d_4^{20} 1.0342, $n_D^{25.5}$ 1.531886; *picrate* decomps. 268°; styphnate decomps. 306°. II cannot be reduced with a catalyst, but gives pos. diazo and Liebermann reactions. II can be neither benzoylated nor acetylated. III, $C_{16}H_{26}N_2O$ or $C_{16}H_{28}N_2O$, gives pos. diazo and Lieberman reactions, but the reaction for the C:O group is neg. The reaction is shown in the following equation:



F. I. NAKAMURA

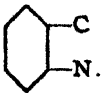
Mechanism of the oxidation of laudanosine. VINAYAK K. BHAGWAT, DOUGLAS K. MOORE AND FRANK L. PYMAN. *J. Chem. Soc.* **1931**, 443.—The compd., $C_{14}H_8(OMe)_4$, m. 231°, obtained by Pyman in the oxidation of laudanosine by MnO_2 in H_2SO_4 (*C. A.* **3**, 2966), is 2,3,6,7-tetramethoxy-9,10-dihydroanthracene (Robinson, *C. A.* **9**, 1602), it seps. from Me_2CO with 0.5 H_2O and from C_6H_6 with 0.5 C_6H_6. This identification counteracts the view of Gadamer (*C. A.* **10**, 1033) of the mechanism of this oxidation.

C. J. WEST

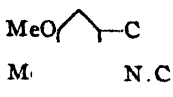
Oxonitine and remarks on a paper of S. Akabori and K. Saito. ERNST SPÄTH AND FRIEDRICH GALINOVSKY. *Ber.* **63B**, 2994–7(1930).—Earlier workers have assigned to oxonitine a formula with 23–25 C atoms, with 3 MeO groups, and it therefore seemed that if the 3 MeO, the Ac and the Bz groups were split off there would remain a compd. with only 11–13 C atoms whose structure, it was hoped, might be established and prove of great importance for the elucidation of the chemistry of the aconitines. It was soon found, however, that the formulas of the earlier investigators are incorrect, as oxonitine contains only 2.21% N instead of the 3.04–2.76% required by these formulas, and 4 instead of 3 MeO groups. Especially convincing evidence of the incorrectness of these formulas was afforded by a careful detn. of the Bz content by sapong. the oxonitine with alc. KOH, extg. the BzOH with Et_2O, subliming it at 130–50° under 10 mm and weighing the sublimate (a control detn. on aconitine gave 16.09–16.16% Bz; calcd. 16.27). In this way oxonitine was found to contain 16.08–16.28% Bz instead of the 4.1–6.1% calcd. for the older formulas. Numerous analyses gave an av. C and H content of 60.48 and 6.90%. The formula for oxonitine is therefore $C_{32}H_{43}O_{12}N$ (the true H content may differ from this by 2 atoms) and the hope of obtaining a relatively simple product by its hydrolysis proved to be illusory. Akabori and Saito (*C. A.* 25, 700), in referring to a paper by Späth and Lederer, convey the erroneous impression that S. and L. considered their β-(6-methoxy-β′-indolyl)ethylamine, m. 112–30°, to be the pure base; it was obtained by a ring closure proceeding in 2 directions, which would naturally give impure end products, and S. and L. made no attempt to sep. the resulting mixt. of free bases but isolated them as their *N*-Ac derivs. C. A. R.

Constitution of the strychnos, yohimbe and quebracho alkaloids. ERNST SPÄTH AND HERMANN BRETSCHNEIDER. *Ber.* **63B**, 2997–3006(1930).—Oxidation of strychnine with alk. $KMnO_4$ on the H_2O bath until the consumption of the $KMnO_4$ slowed up gave a mixt. of acids sepd. by their different acidities; one fraction gave an Et_2O-sol. acid (I) whose purification was rendered difficult by the fact that H_2O, the best solvent for it, gradually decomps. it at high temps. It was accordingly treated with CH_2N_2 which gave a pure di-Me deriv. $C_{11}H_{11}O_4N$ (II) which regenerated I with alc. KOH. Thermal decompn. of the K salt of I gave *o*-$H_2NC_6H_4CO_2H$ and I was identified as *o*-$HO_2CCONHC_6H_4CO_2H$ and II as its *di-Me ester* by synthesis. A sample of the acid, m. 195°, obtained by Warnat by oxidation of yohimboaic acid and to which he assigned the compn. $C_9H_7O_4N$, also proved to be identical with I. Intending to oxidize yohimboaic acid themselves, S. and B. used for its prepn. a sample of com. yohimbin hydrochloricum and found that the decompn. products and rotation of this base and the acid obtained from it by sapon. agreed almost completely with Hahn's data on quebrachine, and oxidation of the acid obtained from the quebrachine-HCl yielded I. These results show that strychnine and the yohimbe and quebracho alkaloids contain the grouping III; whether the N is present in a quinoline or an indole ring cannot as yet be stated. Brucine uses up $KMnO_4$ more rapidly than strychnine and the yield of resulting acid is smaller; this was identified by synthesis as *4,5-dimethoxy-N-oxalylanthranilic acid* (IV), showing that brucine contains the grouping V, as assumed by Leuchs and by

Perkin and Robinson. I, prepd. by Kretschy's method, decomps. 229–30° (the m. ps. 180–210°, recorded in the literature, are probably due to the presence of impurities acting catalytically). II, m. 152.5°. The *di-Me ester*, m. 205–6°, of IV was synthesized by fusing 2,4,5-$H_2N(MeO)_2C_6H_2CO_2Me$ with anhyd. $(CO_2H)_2$ and methylating the resulting *mono-Me ester*, decomps. 230° to a turbid liquid which clears up at 232°, with CH_2N_2.



(III)



(V)

C. A. R.

The melting point of pure yohimbine (remarks on the communication of G. Hahn and W. Schuch). K. Warnat. *Ber.* **63B**, 2959–61(1930); cf. H. and S., *C. A.* **24**, 5039.—H. and S. claim that *pure* yohimbine, obtained by fractional crystn. of a com. product contg. as chief impurity the so-called α-yohimbine, m. 215–6° instead of 230–5°, as generally accepted. W., in earlier work on the sepn. of these 2 alkaloids, had found that this is by no means easily effected by fractional crystn., for his isoyohimbine is none other than H. and S.'s α-yohimbine, and this isoyohimbine easily depresses the m. p. of yohimbine to 212–8°. A few new expts. with pure yohimbine have confirmed the old m. p., 234°, of the base, which showed $[\alpha]^{20}_D$ 98.8° (C_5H_5N, *c* 0.921); HCl salt, m. 302°, $[\alpha]^{22}_D$ 103.3°. Yohimboaic acid, m. 259°; anhydride, m. 298°. The rotation of 70–95° given by H. and S. for yohimbine·HCl and the decompn. temp. 284° for the yohimboaic acid also point to contamination with isoyohimbine. C. A. R.

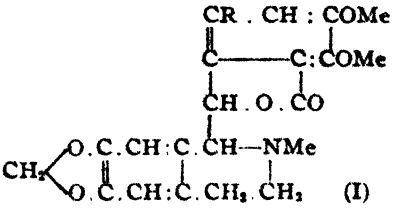
Identity of α-yohimbine with isoyohimbine. G. Hahn and W. Schuch. *Ber.* **63B**, 2961–2(1930); cf. *C. A.* **24**, 5039.—Whether or not Warnat's isoyohimbine (see preceding abstr.), which he did not sharply characterize, is identical with α-yohimbine, there is no doubt that the alkaloid decompg. 239–40°, which H. and Brandenburg called isoyohimbine (*C. A.* **21**, 1815) is different from α-yohimbine. C. A. R.

Properties of nicotine and its derivatives. III. Chloronicotine and methylnicotine. Thomas M. Lowry and Hamid Khan Gore. *J. Chem. Soc.* **1931**, 319–23; cf. *C. A.* **23**, 5186.—Chloronicotine (I) in EtOH shows an absorption band with max. log ε = 3.55 at 2700 A. U., as compared with log ε = 3.37 at 2600 for nicotine. Methylnicotine (II) gives a max. log ε = 3.44 at 3100 A. U. in cyclohexane and 3.66 at 2950 in H_2O. The rotatory dispersion of *l*-I can be expressed by 1 term of Drude's equation with characteristic wave length λ_0 = 2550 A. U. II gives λ_0 = 2668 A. U. in cyclohexane and 2654 in H_2O. Both compds., therefore, behave like the parent base and not like its salts, which are *d*-rotatory and of much lower dispersion. C. J. West

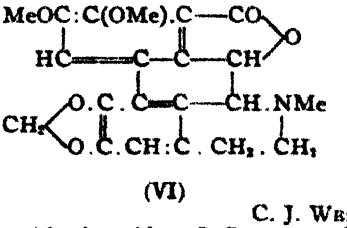
Santoninic acid amide. Karl Josephson. *Svensk Farm. Tids.* **35**, 69–75(1931); cf. *C. A.* **25**, 1534.—Five g. santonin in 50 cc. abs. alc. was satd. with dry NH_3 and shaken for over 1 day and then set aside for 2 days in a dark place. The NH_3 was removed by evapn. at reduced pressure. Yellowish red crystals formed but the color was completely removed by acetone. The yield is quant. The product m. 177°, $[\alpha]^{22}_{Hg}$ −18.1°, it is more sol. in water than santonin and is not very sol. in org. solvents; of these alc. is best. On heating it reverts to santonin. A. R. Rose

Synthesis of hydrastine. I. Edward Hope, Frank L. Pyman, Frederick G. P. Remfry and Robert Robinson. *J. Chem. Soc.* **1931**, 236–47; cf. *C. A.* **7**, 2927.—Condensation of hydrastinine and nitromeconin in boiling EtOH gives 80–90% of a mixt. of *anhydrohydrastininenitromeconins* (I, R = NH_2); it is orange-yellow; two samples m. 167–8° and 173°; *HCl salt*, yellow, m. 137–8°; sepn. by means of the HCl salt was not successful. Reduction with Sn or $SnCl_2$ in HCl and AcOH gives a mixt. of aminohydrastines *a*(II) and *b*(III), which were sepd. by the difference in soly. of the HCl salts and also of the bases. II, m. 216–7° (cor.), sparingly sol. in EtOH and Et_2O, in which it exhibits an intense blue fluorescence; *HCl salt*, m. 267–8°; *tartrate*, m. 201–3° (cor.); *Ac deriv.*, m. 208–11°. III, m. 196–7° (cor.); cryst. salts could not be obtained. Reduction of the diazo compd. from II gives *hydrazinohydrastine-a*(IV), m. 175° (cor.); *acid oxalate*, m. 225° (decompn.); *isopropylidene deriv.*, m. 190°. The *b-isomer* (V), crystals with 1 mol. $CHCl_3$, m. 183–4°; *isopropylidene deriv.*, m. 217–8°. Oxidation of IV with $Cu(OAc)_2$ gives *hydrastine a*, m. 137–8° (cor.); HCl salt, decomps. above 165°; acid oxalate, sparingly sol. in cold H_2O; *picrate*, bright yellow, m. 219° (decompn.) (the *picrate* of *l-hydrastine*, bright yellow, m. 184°); *H d-tartrate*, crystals with 3.5 mols. H_2O, m. 108–10° (cor., decompn.); *d-camphorsulfonate*, crystals with 0.5 mol. H_2O, m. 145° (cor., decompn.). V gives only a small quantity of *hydrastine-b*,

m. 150–1° (cor.); tartrate, m. 65–70°; the main product of the reaction is *dadihydrohydrastine* (VI), m. 183°; the H_2SO_4 soln. changes from colorless to yellow, orange, reddish brown, greenish brown, slaty blue and violet on heating. A comparison is given of the behavior of *l*-hydrastine, hydrastine-*a* and -*b* and VI on oxidation in H_2SO_4 with MnO_2. IV and $CuCl_2$ in about 0.5% HCl give *chlorohydrastine-a*, m. 152°, reduced by Al-Hg to hydrastine-*a* (poor yield); the I *deriv.* (VII) m. 172° and gives a better yield of hydrastine-*a* on reduction. Condensation of hydrastinine and iodomeconin gives as the main product VII but some of the *b-isomer*, m. 193–5°, is also formed; the *HCl salts* of the 2 isomers m. 222–3° (cor., decompn.). Bromomeconin gives a *bromohydrastine*, m. 170–1° (cor.); *HBr salt*, m. 287–8° (decompn.). Normeconin Me ether with Ac_2O and AcONa gives 90% of *4-acetoxy-3-methoxyphthalide*, m. 127–8° (cor.); *4-benzoyloxy deriv.*, m. 135–6° (cor.); *m-nitrobenzoyloxy deriv.*, m. 192–3° (cor.); *p-isomer*, m. 202–3°. These acyl derivs. did not condense with hydrastinine under any conditions tried. The Me ether itself gives a *hydrastininium salt*(?), m. 334° (cor.), gives no color with $FeCl_3$ but on warming with dil. acid or alkali, the blue color of the Me ether could be obtained.



(I)



(VI)

C. J. West

Salicinerein of Salix cinerea L.; its identity with piceoside. J. Rabate. *Bull soc. chim. biol.* **12**, 965–73(1930); cf. *C. A.* **24**, 4517, 4788.—The 2 compds. are identical (β-glucoside of *p*-hydroxyacetophenone). C. G. King

Saponin of Panax repens, Maxim. V. Panaxsapogenin. S. Aoyama. *J. Pharm Soc. Japan* **50**, 1163–74(1930): German abstr. 153–7; *C. A.* **25**, 1533.—In the previous paper A. proposed the structure $-CHMeCH(OH)^{II}CH(CHMe_2)C.C.C.CCH(CO_2H)$ OH^{I} for *panaxsapogenin* (I) and showed that OH^{I} can be acetylated while OH^{II} cannot and that the positions of the unsatd bonds are as shown above. I (50 g.) when treated with an equal wt. of Se at 330–60° for 70 hrs gave a compd. (II) m. 299–300° which reduced the m. p. of I to 277°. II was fractionated into (*A*) b_{12} 70–100° (0.25 g.), (*B*) b_{12} 100–50° (6.28 g.), (*C*) b_{12} 150–70° (4.45 g.). (*B*) was distd. further over Na which gave (B_1) b_{12} 125° (0.52 g.), (B_2) b_{12} 125–45° (2.45 g.) and (B_3) b_{12} 145–50° (1.28 g.). The *picrate* of (B_2) m. 123.7° and corresponds to *sapotalin picrate*, $C_{31}H_{41}N_3O_7$. On distg. over Na (*C*) gave (C_1) b_{10} 147–9° (0.37 g.) and (C_2) b_{10} 149–56° (2.05 g.). *Picrate* of (C_2) m. 125–30° and corresponds to *tetramethylnaphthalene picrate* $C_{28}H_{31}N_3O_7$. I (5 g.) when treated with 50% HCO_2H (d. 1.215) for 2 hrs gave a compd. $C_{28(30)}H_{36(40)}O_3$ (III), m. 243 3.5°, $[\alpha]_D^{29}$ 67.54°. III is called *repenin*. *Me ester* of III m. 161–4°, $[\alpha]_D^{8}$ 93.22°, *phenylurethan* m. 230°. III cannot be acetylated. Fusion of III with alkali, followed by careful acidification, gave *isorepenin*, m. 293–4°, probably a lactone. The formation of a lactone from I may be due to the formation of an α-hydroxy-γ-lactone, followed by dehydration. F. I. Nakamura

Acid- and alkali-binding power of peptides. R. Stiasny and H. Scotti. *Ber.* 63B, 2977–83(1930).—The object of this work was to det., by a study of the titration curve of glycine and its mono-, di-, tri-, tetra- and pentaglycyl derivs. (which contain only 1 NH_2 and 1 CO_2H group but an increasing no. of peptide unions), whether the peptid unions play a part in the acid- and alkali-binding power of peptides. The titration curve of glycine anhydride (diketopiperazine) was also detd. The curves show that glycine behaves like a weak monoacid base and a weak monobasic acid. Addn. of HCl at first greatly diminishes the p_H value of its soln. and then slowly decreases the p_H value of the resulting buffer. After the addn. of 1 equiv. HCl the curve coincides with that of HCl itself. Addn. of NaOH increases the p_H value in an analogous way. The dipeptide behaves exactly like glycine with HCl but with NaOH the curve does not show an inflection as soon as 1 equiv. NaOH has been added and further addn. of NaOH gives lower p_H values than would be obtained if the curve coincided with that for pure NaOH. The same behavior toward HCl and NaOH is shown by the higher peptides except that the greater the no. of peptide unions present the further away from the

point corresponding to 1 equiv. NaOH is the point of inflection of the curve shifted, and the greater is the difference between the curve for the peptide and that for pure NaOH (the hexapeptide curve is not entirely comparable with those of the other peptides because a suspension had to be used). These results show that the peptide unions take part in the binding of alkali but not in that of acid. The curve for glycine anhydride indicates that there is no acid binding and only a very slight binding of alkali. The following dissocn. consts. ($K_a \times 10^9$ and $K_b \times 10^{11}$) and isoelec. points (p_H), resp., are calcd. for the peptides from the curves: di, 0.63, 1.35, 5.66; tri, 1.0, 1.26, 5.50; tetra, 1.78, 1.12, 5.40; penta, 2.0, 1.12, 5.38; hexa, 2.5, 1.12, 5.32. For glycine, the values are: $K_a \times 10^{10}$ 1.99, $K_b \times 10^{12}$ 2.6, p_H 6.06. C. A. R.

The bile acids. XXXIII. Bromination of dehydrocholic acid and of dehydrodesoxycholic acid. HEINRICH WIELAND AND TAKAMI NOGUCHI. *Z. physiol. Chem.* **194**, 248–59(1931); cf. *C. A.* **25**, 1535.—The 2 simplest keto acids of the bile acid series, *viz.*, dehydrocholic acid (I) and dehydrodesoxycholic acid (II), were brominated and the Br removed by hydrolysis, in order to obtain material for a study of oxidative breakdown. Contrary to expectation, the substitution of Br in all positions adjacent to CO is not easily accomplished. Ring I appears to be the most reactive, since bromination is much more difficult in the case of desoxybilianic acid where this ring has been opened by oxidation. *Bromodehydrocholic acid*, m. 182–3° (decompn.), was obtained from I and the calcd. quantity of 4 *M* Br in AcOH at 15°; *Et ester* m. 192° (decompn.). Treatment of the acid with cold 0.1 *N* KOH converted it to *hydroxydehydrocholic acid*, m. 187° (decompn.). Further bromination of I in the cold gave *α-dibromodehydrocholic acid* which contains solvent of crystn. not removable at 100° *in vacuo*. With 1 AcOH the m. p. is 200°, with 0.5 Et_2O it is 174° and with 1 EtOH the decompn. point is 206°. Treatment of the di-Br deriv. with 0.5 *N* KOH gave *dihydroxydehydrocholic acid*, 2 fractions m. 198° and 212–3°, resp., both contg. 1 Et_2O. A similar treatment with 0.315 *N* $Ba(OH)_2$, followed by acidification, and Et_2O extn. of the ppt. gave the unsatd. *hydroxytriketocholenic acid*, m. 257° (decompn.), crystg. with 0.5 AcOH. When I was brominated at higher temps. with excess Br_2 an isomeric *β-dibromodehydrocholic acid*, m. 265–6°, was obtained. It holds 1 AcOH tenaciously. This isomer probably results from a rearrangement due to a reversal of the reaction after the 1st Br is substituted. Treatment of I with 5 Br_2 at 30° gave a *tetrabromodehydrocholic acid*, m. 213°. The mother liquor contained a *tribromodehydrocholic acid*, decomps. 202–3°, which could not be freed from admixt. with the tetra deriv. Finally, a *pentabromodehydrocholic acid*, m. 192°, was obtained from I and 8 Br_2. An improved method is described for the prepn. of II, which consists essentially in dissolving I in a large vol. of AcOH, cooling the soln. to 10° and turbining with CrO_3 at this temp., then pptg. the product with water, dissolving in Na_2CO_3, repptg. with HCl and extg. with Et_2O. Bromination of II yielded *tribromodehydrodesoxycholic acid*, m. 212–3° (decompn.), contg. 0.5 AcOH. Recrystd. from MeAc, the acid decomps. 184°. An isomeric *tribromodiketocholanic acid*, m. 213–4°, was obtained from the mother liquor.

A. W. Dox

The biose of chitin. MAX BERGMANN, LEONIDAS ZERVAS AND EFIM SILBERKWEIT. *Naturwissenschaften* **19**, 20(1931).—By acetolysis of lobster chitin a disaccharide of glucosamine was obtained as a cryst. octa-Ac deriv., m. 289°, $[\alpha]$ 50° in AcOH, I no. (cf. B. and Machemer, *C. A.* **24**, 2877) 31.3 (calcd. 29.6). The new disaccharide, chitobiose, may be as useful for chitin study as cellobiose for cellulose research.

B. J. C. VAN DER HOEVEN

Cholesterol. XIII. Action of phosphorus pentasulfide. E. MONTIGNIE. *Bull. soc. chim.* [4], **49**, 73–5(1931); cf. *C. A.* **25**, 1256.—Cholesterol (I) in CS_2 was refluxed with a like wt. of P_2S_5 and yielded *thiocholesterol*, $C_{27}H_{45}SH$ (II), m. 191°, α_D −39°; (*di-Br deriv.* m. 152–3°; nitro deriv. m. 125°). II does not combine with $HgCl_2$ and does not give the Liebermann reaction. I reacts with white P and O_2 to yield a noncryst. *phosphorate* according to the equation: $-CH{:}CH- + P_2 + 2O_2 \longrightarrow$ $-CH.P(:O).O.P(:O).O.CH-$. Upon hydrolysis of this compd. $(OH)_2P(:O)OCHCH-PH(:O)OH$ was obtained. The Ag, Pb, Ba, Sn^{++}, Zn, Hg, U, Cu and Hg salts were prepd. The acid yields an *acetylated product*, m. 250°, decompg. about 200°. The OH group is left intact.

I. M. LEVINE

Ursolic acid. CHARLES E. SANDO. *J. Biol. Chem.* **90**, 477–95(1931).—Ursone (I) was isolated from the leaves of *Arctostaphylos uva-ursi* by extg. with Et_2O, dissolving in EtOH contg. 1% NaOH and repeatedly crystg. from aq. EtOH contg. a little NaOH; by decompn. of the Na salt with HCl a yield of 30 g. was obtained from 2.2 kg. leaves.

On fractional crystn. from 75% EtOH, 4 out of 5 fractions gave a const. m. p. at 284–5° and formula $C_{30}H_{48}O_3$. *Prunol*, prepd. from leaves of *Prunus serotina* (Power and Moore, *C. A.* **4**, 2182) in the same way, and *malol*, prepd. from apple peels as previously described (Sando, *C. A.* **18**, 1003) both had the same formula and m. 284–5°. The malol was obtained by the above method and also by fractional crystn. without conversion to the Na salt, to avoid the possibility of change by the alkali. The identity of these 3 compds., as claimed by van der Haar (*C. A.* **18**, 2511), is confirmed by analysis and by crystal data, but the formula, based on 92 combustions, is as above and not $C_{31}H_{46}O_3$, as van der Haar states. The *di-Ac derivs.* of all 3 compds., prepd. in good yield by boiling several hrs. with excess Ac_2O, were also identical. From 4.56 g. of the di-Ac deriv. by refluxing 3 hrs. with 70% EtOH, 4 g. of the *mono-Ac deriv.*, $C_{29}H_{46}(OAc)CO_2H$ (II), m. 289–90°, was obtained. From I was prepd. by boiling with excess Me_2SO_4 in MeOH and NaOH, extn. with Et_2O and crystn. from 70% EtOH, *Me ursolate* (III), $HOC_{29}H_{46}CO_2Me$, m. 170.5–1.5°. Acetylation of III gave a *mono-Ac deriv.*, m. 246–7°. Prepn. of the same compd. by action of $SOCl_2$ on II, followed by boiling with MeOH, confirmed the HO acid formula. The name *ursolic acid* is therefore adopted for I, for prunol and for malol. The following derivs. were also prepd.: from 1 g. I by treatment with excess *o*-$C_6H_4(CO)_2O$, 1 g. *phthalylursolic acid*, m. 264–5°; from 1 g. III by similar treatment, 0.7 g. *Me phthalylursolate*, m. 214–5°; from 2.3 g. I, suspended in 70% aq. EtOH, by making nearly alk. and boiling 1.5 hrs. with 1 g. $BzCH_2Br$, 2.85 g. *phenacylursolate*, m. 199–200°. K. V. THIMANN

Alkylbeechwood lignins and their cleavage (VON WACEK) **23**. The porphyrins (FISCHER, *et al.*) **11A**. Electrolytic reduction of 4-keto-3-phenyl-3,4-dihydroquinazoline (ITOMI) **4**. The alleged electrochemical sulfonation of an aromatic hydrocarbon (FICHTER, *et al.*) **4**. New methods of organic thermochemistry (REBEK) **2**. Study of E. Fischer's polypeptides with x-rays (LENEL) **2**. The reduction potential of thymoquinhydrone (BILLMANN, MUUS) **2**. Electric moment and molecular structure (SMYTH, WALLS) **2**. The work of the International Bureau of Physical-Chemical Standards. IV. Study of the physical constants of 20 organic compounds (TIMMERMANS, HENNAULT-ROLAND) **2**. The isolation of the isomers of hexane from petroleum (BRUUN, HICKS-BRUUN) **22**. Determination of C in sewage and industrial wastes (MOHLMAN, EDWARDS) **14**. Chlorophyll formation (NOACK, KIESSLING) **11D**. Fe oxide pigment (U. S. pat. 1,793,941) **26**.

Oxygenated organic compounds by synthesis from hydrogen and oxides of carbon. H. DREYFUS. Brit. 337,409, July 24, 1929. Compds. such as EtOH, acetaldehyde, HOAc and their homologs and esters are prepd. from H and C oxides or from compds. such as MeOH synthesized from them (with or without presence also of H and C oxides) by use of catalysts such as Fe, Ni or Co borates, silicates, phosphates or salts of other oxyacids of P. Various details and examples are given, and app. may be used having Cu or Cu-lined chambers or formed of steel contg. Mo, Mn, Co or Ni. Temps. up to 600° and pressures up to 500 atm. are mentioned as suitable. Cf. *C. A.* **25**, 1839.

Oxygenated organic compounds from methane and steam. H. DREYFUS. Brit. 337,410, July 24, 1929. Compds. such as EtOH, HOAc, AcH and their homologs and ketones are formed from CH_4 and steam at 200–500° and pressures up to 500 atm. or more, and the products may be varied by adding to the reaction mixt. C oxides, H or O, and inert gases such as N also may be present. Among the catalysts which may be used are Zn, Mg, Ca, Al, Cr, Mn, V, Mo, Ti, Fe, Co, Ni and rare earths, or their compds., such as oxides, As or S compds., phosphates, silicates or borates. Also there may be used mixts. of these with alkali or alk. earth compds., with each other, with Cu, Ag or Au, with compds. such as Zn vanadate, Zn chromate, Mn chromate, Zn tungstate or molybdate or with the corresponding salts of Mg, Ca or Al. App. of Cu or lined with Cu or of steel contg. V, Mn, Ni or Co is suitable.

Olefinic or aromatic hydrocarbons by catalytic conversion. I. G. FARBENIND. A.-G. Brit. 337,434, May 30, 1929. Chambers serving for conversions of this character are alternately heated (suitably to about 900°) and initial materials intermittently passed through them, while in assocd. operation with heat regenerators, and the heat regenerators are preferably made of material catalyzing the desired reactions such as firebricks impregnated with Cu salts or bricks made from fireclay and Si, or other refractory materials may be used such as alloys of Cr and Ni, ferro-Si or SiC. Initial materials which may be used include gases obtained by the degasification of carbonaceous materials with steam and (or) gases contg. O, and reaction gases from the de-

structive hydrogenation of coals, tars, mineral oils, etc., contg. homologs of CH_4. Various details and examples of procedure are given.

Olefin oxides from chlorohydrins. JOSEF WEBER, HANS SCHRADER and ERICH WIEDBRAUCK (to Th. Goldschmidt A.-G.). U. S. 1,792,668, Feb. 17. In reactions such as the production of ethylene and propylene oxides from chlorohydrins, there is established and maintained (in an app. which is described) a slowly flowing body of boiling aq. liquid having an extensive surface, and to this, at a point near the beginning of flow, there is supplied corresponding quantities of chlorohydrin soln. and of alkali, and the condensed olefin oxide vapors are collected.

Organic isocolloids. L. AUER and L. SUSZTEK. Brit. 337,735, April 24, 1929. See Fr. 694,339 (*C. A.* **25**, 1839).

Aminoalkyl and alkylaminoalkyl compounds. JOSEPH KLARER and FRITZ MIETZSCH (to Winthrop Chemical Co.). U. S. 1,793,176, Feb. 17. A described process comprises the reaction of a compd. of the general formula R_1R_2N-alkylene-halogen, wherein R_1 and R_2 stand for substituents of the group consisting of H and alkyl, with a compd. of the general formula halogen-MgR_3, wherein R_3 stands for a substituent of the group consisting of aryl and hydroaromatic residues and heterocyclic residues contg. N and decomposing the reaction product with water. Details are given of the production of β-$Et_2NC_2H_4Ph$, $Et_2N(CH_2)_3Ph$, $Et_2N(CH_2)_4Ph$, 1-$Et_2NCH_2CH_2C_6H_4OMe$-4, 1-$Et_2NCH_2CH_2C_6H_4Br$-4, 2-methyl-3-β-diethylaminoethylindole (b_2 171° and forming white crystals after manipulation with ether), 1-$MeNHCH_2CH_2C_6H_4OMe$-4 and a base of the formula $PhCH_2CH_2NH_2$.

Replacing amino groups by halogen in aromatic and aliphatic compounds. RICHARD KUHN and ERNST EICHENBERGER. Swiss 141,750, Oct. 30, 1928. Addn. to 136,906 (*C. A.* **24**, 4305). The method of 136,906 is improved by removing the N atom from the diazonium halide compd., formed by diazotizing the amine in the presence of a high halogen concn., by radiation. In the example, the diazonium chloride obtained by diazotizing *o*-toluidine in the presence of a paste of $ZnCl_2$ and NH_4Cl, is subjected to the radiation of a Hg lamp, this induces the evolution of N.

Methylarylamines. EDGAR C. BRITTON and WM. H. WILLIAMS (to Dow Chemical Co.). U. S. 1,793,993, Feb. 24. In making an *N*-methyl deriv. of an arylamine such as dimethyl-*p*-toluidine, reaction is effected between the arylamine and MeOH with the addn. of a relatively small proportion of MeBr.

Sulfonating aromatic amines. ARTHUR R. MURPHY and JOSEPH B. OESCH (to Newport Chemical Corp.). U. S. 1,794,861, March 3. For introducing a sulfo group in *o*-position to the NH_2 group, an aromatic amino compd. such as *m*-xylidine or β-naphthylamine is treated with SO_3 in an inert solvent such as $C_2H_2Cl_4$.

Polymers of vinyl alcohol. I. G. FARBENIND. A.-G. (Fritz Klatte and Arthur Zimmermann, inventors). Ger. 514,593, Nov. 13, 1928. Halogenated polyvinyl esters are saponified with NH_4OH. Thus, polyvinyl chloroacetate is saponified with aq. NH_4OH.

Esters of organic acids and polyhydric alcohols. I. G. FARBENIND. A.-G. (Martin Luther and Walter von Knilling, inventors). Ger. 514,503, June 10, 1927. Small quantities of metal soaps are added during the esterification in the liquid phase. Thus, stoichiometric amts. of olive oil, fatty acid and glycerol are heated in a high vacuum to 170-250° with addn. of 0.2% Mg oleate.

Esters of glycolic acid. I. G. FARBENIND. A.-G. Brit. 337,609, Nov. 8, 1929. Dry anhyd. alkali metal or alk. earth metal salts of chloroacetic acid are heated with aliphatic alcs. such as ethyl, butyl or allyl alcs., 1,3-butylene glycol, glycerol or cyclohexanol, in the presence of an esterifying agent (generally above 100° and suitably under pressure). Examples are given of the production of the ethyl, butyl and allyl esters and that of 1,3-butylene glycol.

Esters and amides of 2-aminonaphthalene-3-carboxylic acid. I. G. FARBENIND. A.-G. (Ludwig Sander, inventor). Ger. 514,596, July 15, 1928. Alc. phenol, NH_4OH, or primary or secondary amines (except acyclic aliphatic secondary amines) is caused to react on 2,3-naphthoisatoic acid anhydride. Bases may be present. Thus, alc. NH_4OH contg. 5% NH_3, if stirred with the anhydride for 3 hrs. at 50°, gives a 60% yield of 2-aminonaphthalene-3-carboxamide, m. 234-236°. Several other examples are given.

Stabilizing thiocarbanilide solutions. I. G. FARBENIND. A.-G. (Philipp Siedler and August Moeller, inventors). Ger. 494,919, Jan. 29, 1928. Supersatd. solns. of thiocarbanilide in aromatic amines or heterocyclic bases are stabilized by addn. of synthetic or natural resin. Thus, a soln. of thiocarbanilide in *o*-toluidine is stabilized by addn. of colophony, turpentine basic waste resin and thick tar and cooling to —15° for 2 hrs.

Purifying benzanthrones. IVAN GUBELMANN, ROBERT J. GOODRICH and EDWARD T. HOWELL (to Newport Chemical Corp.). U. S. 1,794,848, March 3. A reaction mass comprising benzanthrone and assocd. impurities in concd. H_2SO_4 is dild. with water to a concn. of H_2SO_4 in which benzanthrone is relatively insol., and the benzanthrone is extd. by means of a selective solvent such as toluene which is immiscible with the H_2SO_4 and is then recovered from the solvent. Cf. *C. A.* **25**, 1539.

Substituted guanidines. EDUARD TSCHUNKER and HELMUTH MEIS (to I. G. Farbenind. A.-G.). U. S. 1,794,875, March 3. See Ger. 502,045 (*C. A.* **24**, 4791).

Acenaphthene derivatives. I. G. FARBENIND. A.-G. (Ernst Runne, inventor). Ger. 517,264, Aug. 27, 1929. 5-Hydroxyacenaphthene and its derivs. are prepd. by heating 5-aminoacenaphthene and its derivs. with water and a mineral acid or acid salt. Thus, 5-aminoacenaphthene may be heated for 8 hrs. at 200° with H_2SO_4 of about 10% concn. The prepn. of *5,6-dihydroxyacenaphthene*, m. 196°, from the diamino compd. is also described.

Benzophenone derivatives. I. G. FARBENIND. A.-G. (Sebastian Gassner and Berthold Bienert, inventors). Ger. 517,478, Feb. 14, 1929. Di- and tri-carboxylic acids of alkoxybenzophenones and their substitution products are prepd. by oxidizing alkoxy-mono- or -di-methylbenzoyl-*o*-benzoic acids or their substitution products with $KMnO_4$ in alk. soln. Thus, 4'-methoxy-5'-methylbenzoyl-*o*-benzoic acid yields *4'-methoxybenzophenone-2,5'-dicarboxylic acid*, m. 234–5°. Examples are given also of the prepn. of *2'-methoxybenzophenone-2,4'-dicarboxylic acid*, m. 249–50°, *2'-methoxybenzophenone-2,5'-dicarboxylic acid*, m. 238–9°, *2'-methoxy-5'-chlorobenzophenone-2,4'-dicarboxylic acid*, m. 202–4°, *2'-methoxybenzophenone-2,3',5'-tricarboxylic acid*, m. 140–2°, *2'-methoxy-3-chlorobenzophenone-2,5'-dicarboxylic acid*, m. 294–6°, and *2'-methoxy-3,5'-dichlorobenzophenone-2,4'-dicarboxylic acid*, m. 219–21°. Cf. *C. A.* **25**, 1538.

Safrole derivatives such as protocatechuic aldehyde and isoeugenol. FRITS E. STOCKELBACH. U. S. 1,792,716, Feb. 17. It has been found that, contrary to previous investigations, safrole yields, when heated with alc. potash to a temp. of 140–170°, a mixt. of two isomers, namely, 4-alkoxymethoxy-3-hydroxy-1-propenylbenzene, and 4-hydroxy-3-alkoxymethoxy-1-propenylbenzene, and that when this mixt. is subjected to the action of certain oxidizing agents, only the 4-hydroxy isomer is oxidized, while the 3-hydroxy isomer remains unoxidized and is readily recoverable. This makes possible the com. production of protocatechuic aldehyde and of obtaining as a by-product isoeugenol. Numerous details of procedure are described.

Safrole derivatives such as vanillin and isochavibetol. FRITS E. STOCKELBACH. U. S. 1,792,717, Feb. 17. When the isomeric reaction product produced by heating safrole with alc. KOH at 140–170° (see preceding abstr.) is methylated a product contg. a mixt. of methyl ethers of the two isomers is obtained, and upon heating this resulting product in a weak acid soln., the mixed ether group is split off with the evolution of formaldehyde and an alc. and the formation of isoeugenol and its isomer isochavibetol. When this mixt. of isoeugenol and isochavibetol is subjected to the action of certain oxidizing agents, only the 4-hydroxy isomer, that is, isoeugenol, is oxidized, while the 3-hydroxy isomer, that is, isochavibetol, remains unoxidized and is readily recoverable. This makes possible the com. production of vanillin from safrole, and of obtaining as a by-product isochavibetol. Various details of procedure are described.

***N*-Substituted derivatives of aromatic aminohydroxy and polyamino compounds.** I. G. FARBENIND. A.-G. Ger. 514,747, June 18, 1927. Addn. to 499,826. The methods of 499,826 (*C. A.* **24**, 4521) and 512,406 (*C. A.* **25**, 1036) for producing *N*-substituted amines of aromatic aminohydroxy and polyamino compds. are modified by replacing the aliphatic, heterocyclic and hydroaromatic linked N, by N in the form of alkylaminoalkyl compds. contg. two or more N atoms capable of conversion into strongly basic polyamino compds. Thus, 1-amino-3-methoxy-4-isopropoxybenzene and the dihydrochloride of ethyldiethylaminoethylaminoethyl chloride are fused together at 100–110° for 8 hrs. to give the base 3-MeO-4-iso-$PrOC_6H_3NHCH_2CH_2NEtCH_2CH_2NEt_2$. Other examples are given.

Organic compounds of lithium. KARL ZIEGLER. (Herbert Colonius, inventor.) Ger. 512,882, Oct. 15, 1929. Org. compds. of Li with the metal linked directly to C are obtained by the reaction of org. halogen compds. with Li in a solvent indifferent to Li alkyl and Li aryl compds., at temps. at which the reaction velocity between the Li alkyl or aryl compds. and the halogen alkyl or aryl compds. is low. Thus, Li wire or dust is added to abs. ether and PhBr added to produce a 70–80% yield of PhLi and LiBr. Other examples describe the production of MeLi and BuLi.

Aliphatic arseno compounds. CHARLES S. PALMER (to Parke, Davis & Co.).

U. S. 1,794,119, Feb. 24. Various examples are given for the production of arseno compds. some of which are suitable for combating spirochetes and trypanosomes. Na arsonopropionate and Na hypophosphite, in a 15% H_2SO_4 soln., on standing yield a product of the probable formula $HO_2CCHMeAs:AsCHMeCO_2H$. α-Arsonocaproic acid and hypophosphorous acid soln. produce a similar deriv. with C_4H_9 instead of CH_3 in both positions. Na arsonopropionate, $AsCl_3$ and Na hypophosphite produce $HO_2CCHMeAs:As.As:AsCHMeCO_2H$ and the same product may be obtained from NaOH, As_2O_3, α-bromopropionic acid, HCl and hypophosphorous acid. Crude β-hydroxyethylarsonic acid, As_2O_3, water and hypophosphorous acid yield a product contg. 70–72% As. Arsanilic acid, Na arsonoacetate, Na hypophosphite and HCl produce a product of which the middle fraction is nearly pure hydrochloride of *p*-aminophenylarsenoacetic acid. Arsenoacetic acid, 3,3′-diamino-4,4′-dihydroxyarsenobenzene.2HCl, dissolved in 10% NaOH soln., warmed on a steam bath in a current of N, cooled and neutralized with HCl, yield a product which is probably 3-amino-4-hydroxyphenylarsenoacetic acid, and a similar reaction may be effected in pyridine.

Aluminum alcoholates. Felix Kaufler and H. Georg Stangler (to A. Wacker Ges. für Elektrochemische Industrie). U. S. 1,793,935, Feb. 24. See Brit. 334,820 (*C. A.* **25**, 1265).

Triaryl phosphates. Imperial Chemical Industries, Ltd. Ger. 517,339, Oct. 19, 1929. See Brit. 322,057 (*C. A.* **24**, 2762).

Complex salts of iron. I. G. Farbenind. A.-G. (Hans Schmidt and Heinrich Jung, inventors). Ger. 514,504, May 1, 1929. See Brit. 335,965 (*C. A.* **25**, 1950).

Alkali salts of halohydroxybenzoic acid esters. Walther Schoeller and Hans Allardt (to Schering-Kahlbaum A.-G.). U. S. 1,793,021, Feb. 17. Esters of the general formula $3,4,5\text{-}X'(MO)X''C_6H_2CO_2R$ in which M represents an alkali-forming metal, X′ a halogen atom, X″ a halogen atom or H, and R an alkyl group, such as the Na salt of the 3,5-dibromo-, 3-bromo- or 3-iodo-4-hydroxybenzoic acid ethyl ester, are sol. in water with neutral reaction, "comparatively sol." in hot alc., insol. in petr. ether and benzene and *possess disinfecting properties*. They may be formed by the reaction of the corresponding acids with an alk. compd. such as Na_2CO_3.

Alkali metal salts of toluenesulfonehaloamide. I. G. Farbenind. A.-G. (Heinrich Günzler, inventor). Ger. 514,802, Oct. 19, 1924. $CaCl_2$ is caused to react on a concd. aq. soln. of the amide or its salts and simultaneously or subsequently treating the mixt. with an alkali metal salt which causes the pptn. of the Ca and leaves the desired alkali salt of the amide in the liquid from which it can then be obtained. Glauber's salt and calcined soda are mentioned as the alkali metal salts in examples.

Sodium *p*-hydroxyphenylarsonate. Union chemique belge S. A. Ger. 514,746, June 11, 1929. See Brit. 333,023 (*C. A.* **25**, 525).

Calcium formaldehydesulfoxylate. Max Baslen and Emil Rieger (to General Aniline Works). U. S. 1,793,152, Feb. 17. A difficultly sol. Ca formaldehydesulfoxylate is produced by acting on a soln. of an alkali metal formaldehydesulfoxylate with a sol. Ca salt such as $CaCl_2$ together with a hydroxide or carbonate of Ca or of an alkali metal.

Zinc oxide catalysts for methanol synthesis. Walter Bader and Stanley J. Green (to Celanese Corp. of America). U. S. 1,793,350, Feb. 17. A catalyst suitable for use in producing MeOH from H and C oxides is prepd. by heating a $ZnCO_3$ gel at a temp. not exceeding that at which the catalyst is to be used.

Aliphatic acids. H. Dreyfus. Brit. 338,187, Aug. 12, 1929. HOAc, propionic acid and similar acids are concd. by extg. their aq. solns. with a solvent such as ether, EtOAc or acetone oil and then adding a liquid such as a hydrocarbon or suitable halogenated hydrocarbon to the ext. to ppt. the dissolved water, and salts also may be used to limit the soly. of the solvent in water. Various details of app. and operation are described. Cf. *C. A.* **24**, 3250.

Acetic acid. Destilacija Drva D. D. Ger. 517,497, Sept. 29, 1928. Gases contg. AcOH vapor are washed at atm. temp. with a mixt. contg. about equal parts of a non-acetylizable base b. above 150°, *e. g.*, quinoline or $PhNMe_2$, and a high-boiling hydrocarbon or hydrocarbon mixt., *e. g.*, anthracene oil or paraffin oil. AcOH is recovered from the used washing mixt. by distn. Cf. *C. A.* **25**, 524.

Acetic acid. Soc. française de catalyse generalisee. Brit. 338,329, Jan. 26, 1929. See Fr. 36,719 (*C. A.* **25**, 970).

Aromatic mercaptocarboxylic acids. Chemische Fabrik von Heyden A.-G. (Kurt Buchheim, inventor). Ger. 514,507, June 21, 1928. Metallic compds. of aromatic mercaptans are treated with CO_2 under high temp. and pressure. Thus, an 85–88% yield of 1-mercaptobenzene-2-carboxylic acid is obtained by the action

of CO_2 on the Na salt of thiophenol at 150–190° and 36–50 atm. Other examples are given.

1-Methyl-5-chlorobenzene-2-carboxamide-3-thioglycolic acid. I. G. FARBENIND. A.-G. (Norbert Steiger, Erwin Hoffa and Hans Heyna, inventors). Ger. 514,505, April 1, 1927. 1-Methyl-2-cyano-5-chlorobenzene-3-sulfonic acid chloride is reduced with a metallic reducing agent in the presence of a strong mineral or org. acid and with addn. of an inert org. solvent for the sulfonic acid chloride, and condensing the resulting 1-methyl-5-chlorobenzene-2-carboxamide-3-mercaptan with $ClCH_2CO_2H$ at suitable temps. Examples are given.

Purifying sulfonic acids. GRIGORI PETROFF. Ger. 517,156, Jan. 18, 1927. Sulfonic acids of high mol. wt. are freed from unsulfonated material, resins, H_2SO_4, etc., by mixing them, or their solns. in water and (or) alc., with porous cellulosic material, *e. g.*, saw dust, wood meal, or hydrocellulose. The mixt. is dried and then extd. in turn with benzine, C_6H_6, and EtOH. The first extn. removes mineral oils, resins, etc., the sulfonic acids being taken up in the later extns. H_2SO_4 remains in the cellulosic material. The method may be applied to octahydroanthracenesulfonic acid, alkylnaphthalenesulfonic acids, sulfo-aromatic fatty acids, etc. An example is given.

Anhydro-*N*-pyridiniumsulfonic acid. PAUL BAUMGARTEN. Ger. 514,821, Mar. 17, 1926. SO_3 or SO_3-yielding agents such as oleum, $ClHSO_3$ or its esters, or SO_2Cl_2 is caused to react on pyridine or its *C*-alkyl homologs, alone or in presence of a diluent. Thus, a 90% yield is obtained by the action of SO_3 on a soln. of pyridine in CCl_4. Other examples are given.

Acetic anhydride, etc. H. DREYFUS. Brit. 336,668, July 19, 1929. Aliphatic acid anhydrides are made by heating the vapor of the corresponding acid in contact with a catalyst supported upon or mixed with asbestos, *e. g.*, HOAc vapor is passed rapidly through a Cu tube at 400–500° contg. Ca tungstate upon asbestos and the anhydride formed is sepd. by fractional condensation. Cf. *C. A.* **25**, 1538.

Tetrahydrofurfuryl alcohol. GEORGE D. GRAVES (to E. I. du Pont de Nemours & Co.). U. S. 1,794,453, March 3. Furfural is heated under pressure with H, a Ni catalyst and water.

Formaldehyde from oxidation of hydrocarbons. H. HARTER. Brit. 337,407, June 24, 1929. An app. is described for oxidizing gaseous or readily volatile hydrocarbons by air (or air enriched with O) which, just before use in the reaction, is passed through an elec. flaming arc by which N oxides are formed which facilitate the production of CH_2O. The oxidation may be assisted by catalysts such as Cu, Ag, Co or Mn, assocd with silica gel or active C.

Acetaldehyde from acetylene. I. G. FARBENIND. A.-G. Ger. 514,591, Nov. 9, 1916. Addn. to 504,862 (*C. A.* **25**, 524). C_2H_2 is treated with catalyzers consisting of Fe compds. which are converted by C_2H_2 into reducible oxides. Thus, powd. hydrated $Na_2SiO_3.Al_2(SiO_3)_3$ is suspended in a soln. of $FeCl_3$ and the Fe pptd. by concd. NH_4OH. The ppt. is washed, pressed and dried, and C_2H_2 is led over it at 350° to give AcH. Other examples are given.

Acetone from isopropyl alcohol. N.-V. DE BATAAFSCHE PETROLEUM MAATSCHAPPIJ. Brit. 337,566, Oct. 10, 1929. Dehydrogenation of isopropyl alc. at temps. below 400° (preferably not over 350°) is effected in the presence of catalysts such as Cu, MnO_2, BaO_2, metals of the Pt group, ZnO, CdO, blue W oxide, Mn oxide, V pentoxide, MgO, or oxides of Be or Zr, with the addn. of small quantities (preferably not over 1%) of Th oxide, Na_2CO_3, Ce oxide, or of oxides of Zn or Zr if these are used merely as auxiliary addns. The catalyst may be regenerated with steam or air or both, by heating, followed by reduction.

Urea. I. G. FARBENIND. A.-G. Brit. 337,394, July 29, 1929. Various details are described relating to the distn. of crude melts contg. urea together with NH_4 carbonate or NH_4 carbamate and water, obtained in the production of urea from NH_3 and CO_2 under pressure, to recover NH_3 and CO_2. During the stage of the distn. effected at temps. over 150° under pressures sufficient to cause the distillate to collect as a liquid, an excess of NH_3 over that required to combine with all the CO_2 present in the distn. app. is continuously maintained in the app. in order to check decompn. of urea.

Nitrobenzene purification. SYLVESTER BOYER (to General Elec. Co.). U. S. 1,793,304, Feb. 17. The material is passed through fuller's earth, then treated with Al oxide and distd.

1,2,3-Trihalobenzenes. I. G. FARBENIND. A.-G. (Richard Herz and Eduard Albrecht, inventors). Ger. 517,429, Oct. 6, 1927. See Fr. 661,490 (*C. A.* **24**, 379).

Dimethylaniline. EDGAR C. BRITTON and WM. H. WILLIAMS (to Dow Chemical

Co.). U. S. 1,794,057, Feb. 24. A mixt. of aniline and MeOH is heated with addn. of a small proportion of MeBr.

2,6-Xylidine. IMPERIAL CHEMICAL INDUSTRIES, LTD. Ger. 517,338, Mar. 1, 1930. See Brit. 328,418 (*C. A.* **24**, 5309).

Benzidine and its substitution products. HENRY J. WEILAND and IVAN GUBELMANN (to Newport Chemical Corp.). U. S. 1,794,097, Feb. 24. For effecting purification of benzidine or derivs. such as *o*-tolidine or bi-*o*-anisidine, a salt of the impure material such as the hydrochloride or sulfate is treated with an alk. aq. soln. such as NaOH to give an alk. reaction to the resulting soln. and with a sufficient quantity of a water-immiscible org. solvent to dissolve the benzidine compd. when hot; insol. impurities are sepd., the benzidine compd. is crystd. from the org. solvent and is recovered without any intermediate isolation.

Carbazoles. I. G. FARBENIND. A.-G. (Friedrich Stolz, Walter Kross, Gustav Ehrhart and Hans Schlichenmaier, inventors). Ger. 514,822, Jan. 29, 1929. Perhydrogenated carbazoles are obtained by treating carbazole or its *N*-alkyl derivs. with H under pressure and at high temps., in the presence of a catalyzer formed by heating a Ni salt alone or mixed with another metal (preferably of the Fe group) with a carrier such as SiO_2, to a temp. of above 400°. Examples are given. Cf. *C. A.* **25**, 801.

Isatins. I. G. FARBENIND. A.-G. (Hans Colombara, inventor). Ger. 514,595, Mar. 28, 1928. Isatins are obtained by treating oxamyl halides of primary amines of the general formula R·NH·CO·CO·halogen (R = a residue of the benzene series, with at least one substituent) with a condensing agent. Thus, 5,7-dimethylisatin (m. 242°) is obtained by treating 2,4-dimethyl-1-phenyloxamyl chloride with $AlCl_3$. Many other examples are given.

1-Phenyl-2,3,4-trimethyl-5-pyrazolone. I. G. FARBENIND. A.-G. (Max Bockmühl, Karl Streitwolf, Alfred Fehrle and Walter Herrmann, inventors). Ger. 514,823, May 7, 1929. More than 5 mols of CH_2O is caused to react on 1-phenyl-2,3-dimethyl-5-pyrazolone or on methylenebis(1-phenyl-2,3-dimethyl-5-pyrazolone) in the presence of concd. HCl. The reaction takes place at raised temp. and under pressure. Examples are given. Cf. *C. A.* **24**, 4524.

Antipyrine. ERNEST F. GRETHER and JOSEPH P. BELSLEY (to Dow Chemical Co.). U. S. 1,792,833, Feb. 17. Methylation of compds. such as 1-phenyl-3-methyl-5-pyrazolone in the production of antipyrine is effected with MeOH and an alkyl halide such as EtBr, the alkyl radical of which contains at least 2 C atoms.

α-Hydroxy-β′-iodopyridine. CURT RATH. U. S. 1,793,962, Feb. 24. In forming compds. of this character, an α substituted β′ aminopyridine is diazotized and the diazo soln. is caused to react with a metal iodide such as KI. The α hydroxy-β′-iodopyridine is a white cryst. compd. sol. in water. Cf. *C. A.* **24**, 2472.

Menthol. WALTER SCHOELLER, HANS JORDAN and REINHARD CLERC (to Schering-Kahlbaum A.-G.). U. S. 1,793,020, Feb. 17. See Ger. 508,095 (*C. A.* **25**, 717).

Menthol. SCHERING-KAHLBAUM A.-G. (Walter Schoeller, Hans Jordan and and Reinhard Clerc, inventors). Ger. 514,594, July 16, 1927. Addn. to 512,719 (*C. A.* **25**, 1260). The condensation product from acetone and *m* cresol is acetylated and the product hydrogenated until 8 H atoms are taken up. Sapon. then gives menthol. Examples are given. Cf. *C. A.* **25**, 717.

Sterols. I. G. FARBENIND. A. G. (Robert Griessbach and Otto Ambros, inventors). Ger. 517,499, April 7, 1927. See Brit. 322,465 (*C. A.* **24**, 2760).

Styrene and its homologs. I. G. FARBENIND. A.-G. Brit. 338,262, Sept. 10, 1929. See Fr. 682,569 (*C. A.* **24**, 4523).

11—BIOLOGICAL CHEMISTRY

PAUL E. HOWE

A—GENERAL

FRANK F. UNDERHILL

The birth of chemical biology. J. B. LEATHES. *Brit. Med. J.* **1930, II**, 671–6.—A lecture. J. B. BROWN

The porphyrins. XXVII. The mechanism of iron introduction into porphyrins and isolation of crystalline hemes. H. FISCHER, ALFRED TREIBS and KARL ZEILE. *Z. physiol. Chem.* **195**, 1–27(1931); cf. *C. A.* **25**, 118.—In the various hemins the Fe is

tervalent. With few exceptions all contain the group FeCl substituted in the NH groups of 2 pyrrole rings. A curious fact is that the prepn. of these Fe complexes from porphyrins is best accomplished by the use of Fe^{++} instead of Fe^{+++}. The explanation of Haurowitz that a $(:N)_2Fe$ complex is first formed which immediately reacts with HCl to form $(:N)_2FeCl$ and H was tested experimentally with protoporphyrin in an atm. of N. Neither free H nor the hydrogenation product mesoporphyrin could be detected; the product obtained was hematoporphyrin. On the other hand, the treatment of mesoporphyrin with Fe^{++} in the absence of O gave a product with the characteristic spectrum of hemin. The reaction is strikingly demonstrated by the use of an inverted V-tube, one arm contg. a soln. of porphyrin in AcOH, a little HCl and $Fe(OAc)_2$. The air is displaced by N and the app. sealed. When heat is applied to the mixt. the HCl distils to the other arm and the residual soln. suddenly changes color because of the formation of Fe complex. If the distillate is now poured back by tilting the tube the reaction is reversed and the original color restored. The process may be repeated 5–10 times until finally a partial oxidation results from secondary reactions. After air has been admitted the complex formation is no longer reversible. With $FeCl_3$ and pure AcOH or $PrCO_2H$ the complex is not formed unless high temps. are used, and then only partially, because of a reduction of Fe^{+++} to Fe^{++} by decompn. products. The addn. of Fe to a porphyrin thus occurs via an Fe^{++} complex. Such complexes for which the term *heme* is proposed (cf. Anson and Mirsky, *C. A.* **23**, 1428) have now been prepd. and isolated in cryst. form from etio-, proto- and meso-porphyrin and its ester. All are Cl-free even in the presence of Cl ions. When treated with pyridine they give an intense hemochromogen spectrum. The hemes are extremely unstable to HCl, the Fe is split off as Fe^{++} as shown by the Turnbull blue reaction with $K_4Fe(CN)_6$. They are easily oxidized to the stable Fe^{+++} complex especially in the presence of Cl ions. Only Fe^{++} can be introduced into the porphyrins. Since the Fe^{++} complex is more easily oxidized than the Fe^{++} salt, only a min. quantity of the latter is required, because the Fe^{+++} salt present effects the oxidation of the Fe^{++} complex. This institutes a chain reaction which proceeds almost as rapidly as that in which the required quantity of Fe^{++} is initially present. Atm. O plays an important role, as also the catalytic property of hemin itself. By using a technic which excludes the possibility of oxidation, *etioheme*, *protoheme*, *mesoheme* and *meso-ester heme* were obtained cryst. from the corresponding porphyrins. In the dry state they are more stable to atm. O than their solns. A cryst. hemochromogen was prepd. by addn. of pyridine to the meso-ester heme. Hemoglobin is probably a mol. compd. of heme with globin, the latter effecting a stabilization of the mol. O converts it to oxyhemoglobin which is still more stable. Methemoglobin, on the other hand, contains hematin with Fe^{+++} and is extremely stable to reducing agents. It is surprising that the spectrum of hemoglobin bears no resemblance to that of hemochromogen, such as might be expected on the assumption of a mol. compd. of heme and globin. A possible explanation may be its peculiar state of dispersion, since reduced hematin with native globin gives hemochromogen. A. W. Dox

The effect of radioactive emanations on the automatic activity of the frog heart with particular reference to the action of large doses of such radiations and to the antagonism of α- and β-rays. E. Polák *Arch. ges. Physiol.* (*Pflügers*) **226**, 659–75(1931). Arthur Grollman

Purinolytic enzymes of the human organism. Richard Truszkowski. *Biochem. J.* **24**, 1681–5(1930). Uricase was found to be absent from the livers of a new-born child and in 2 adults. Xanthine oxidase is present in liver exts. from the 12th to the 40th week of pregnancy. Benjamin Harrow

Denaturation of proteins. VII. Denaturation in the presence of alcohol. Norman Booth. *Biochem. J.* **24**, 1699–1705(1930); cf. *C. A.* **24**, 5314.—The speed of denaturation of hemoglobin has been detd. in the presence of alc. ranging from 0 to 30 vols. %, the temp. varying from 30° to 60.5°, and the p_H from 5.19 to 7.74. The min. point on the p_H velocity curve was shifted considerably from the neutrality point of water to the acid side by the addn. of alc. The critical increment of activation increased appreciably with the amt. of alc. present. Benjamin Harrow

Effect of light and salts on gelatin. Ada Galinsky. *Biochem. J.* **24**, 1706–15 (1930).—When gelatin is made insol. by treatment with dichromate and exposed to light, a change in the protein similar to denaturation takes place, but this involves no change in the Hausmann nos., nor in the digestibility of the protein. Cr is fixed as its sesquioxide. Coagulation probably takes place in 2 stages, the first being a chem. action, and the second, which is phys. in nature, produces the coagulation. B. H.

Enzymes and vitamins in present-day chemistry. H. C. Sherman. *J. Chem. Education* **8**, 652–60(1931). E. H.

Physico-chemical studies of phosphatides. KORETOSHI OSE. Gifu Imp. Coll. of Agr. (Japan), *Research Bull.* 2, 30 pp.(1930) (in German).—Com. egg yolk lecithin electrodialyzed for 1 month resulted in isolation of 2 cryst. substances, one white, m. 57.5°, $C_{126}H_{256}N_2PO_{11}$, the other brown, m. 50.5°, $C_{97}H_{188}NPO_{17}$. The latter is readily sol. in cold 95% EtOH, the former with difficulty. K. KITSUTA

A case of sterilization in man due to Röntgen rays. H. MADISSON. *Deut. Z. ges. gerichtl. Med.* 16, 210–5(1931). FRANCES KRASNOW

The story of histamine. D. ACKERMANN. *Z. Biol.* 91, 73–4(1931). FRANCES KRASNOW

The disintegration of proteins by amides. Disintegration of casein in acetamide. E. CHERBULIEZ AND G. DE MANDROT. *Helv. Chim. Acta* 14, 163–83(1931).—Proteins in general are sol. in acid amides and when such solns. are heated, the proteins are disintegrated yielding substances of relatively low mol. wt. For instance, when finely divided casein suspended in molten $AcNH_2$ is heated to 200°, a mixt. is obtained, the mol. wt. of which fluctuates between 247 and 396. The elementary analysis and color reactions (biuret, Millons, xanthoproteic) of the mixt. were similar to those of casein. However, the COOH groups were free but the NH_2 groups were not. When the casein was subjected to the heat treatment 5 min. or less, the products gave a pos. biuret test immediately; otherwise the test was obtained only when the mixt. was allowed to remain in the presence of alkali for some time. C. and M. consider that the long heat treatment caused a profound change in the casein mol. and that the alkali polymerized the products to compds. capable of yielding the biuret test. They agree with previous workers that the open-chain mols. in casein are broken and transformed into closed-chain substances of lower mol. wt. I. M. LEVINE

Denaturation of proteins by urea and related substances. F. GOWLAND HOPKINS. *Nature* 126, 328–30, 383–4(1930).—If in a few cc. of egg albumin recrystd. by the method of Hopkins and Pinkus and freed from the NH_4 sulfate, or in a soln. of ordinary egg white, urea be dissolved and the soln. evapd. in vacuum, the urea denaturizes the protein so that the former can be extd. with H_2O, while the protein becomes wholly insol. A change in the p_H from 4 to 7 does not affect the acquired condition of the protein. The denaturized protein gives a red-purple color characteristic of a sulfhydryl reaction when tested with nitroprusside and NH_4OH. Nondenaturized proteins do not give this reaction, indicating that a mol. rearrangement has taken place. The assumption is made that the precursor of the active thiol group is a disulfide grouping not present in the native protein, but established on denaturation. Pos. results obtained with certain N-contg. substances and neg. with certain others indicated that to some degree at least a relationship exists between denaturizing power and constitution. An amide structure appears to be necessary, and in dialkyl compds. 1 amino group apparently must remain active. The effect of urea on protein varies in detail with the abs. and relative concns. of the 2 constituents. Concomitant with the mol. rearrangement are profound changes in the colloidal and general phys. properties of the protein. A study of these resulted in the development of a simple method of detg. the degree and rate of protein denaturation, which in its turn was used for further study of the phenomenon of protein denaturation. Serum proteins, on the whole, are affected by similar denaturants in a similar manner on evapn. Observed in soln. their behavior indicated that blood proteins are more resistant to dehydration, which characterizes the change from lyophil to the lyophobe condition. The behavior of euglobins has not been studied. B. S. LEVINE

The absence of asparagine among the biuret-free products of proteins hydrolyzed by enzymes. A. CLEMENTI AND D. TORRISI. *Boll. soc. ital biol. sper.* 5, 956–8(1930).—During the digestion of casein, egg albumin and peptone to the point of their complete transformation into biuret-free products by the successive action of proteolytic enzymes present in the gastric, pancreatic and enteric juices of the dog, and thus without the intervention of asparaginase, 95% (often 100%) of the amide N is set free as NH_3. The amide N present in biuret-free products is set free completely as NH_3 by guinea-pig serum in which asparaginase is present, by dog serum, or by dog enteric juice in which asparaginase is surely absent. Conclusion: During digestion of the protein mol. aspartic acid is liberated as such and not in the form of asparagine. Asparagine cannot be considered as one of the intermediate enzyme degradation products of protein. PETER MASUCCI

The action of phosphatase of the bones on glycerophosphoric acid. A. DE RIENZO. *Boll. soc. ital. biol. sper.* 5, 1034–6(1930).—The action of phosphatase on asymmetric α-glycerophosphoric acid was studied. The enzyme was prepd. according to the Robison method and purified by electroultrafiltration. The α-glycerophosphoric acid was prepd. according to the Karrer method. Five cc. of Na α-glycerophosphate (0.1332% soln.),

2 cc. of borate buffer soln. of varying p_H values and 0.5 cc. of a 1.5% soln. of the enzyme were placed in each of 3 test tubes. In another set, an equal vol. of equimol. soln. of β-glycerophosphate was used. After 24 hrs. at 37° the inorg. P in each tube was detd. by the Bell and Doisy colorimetric method. The results obtained show that bone phosphatase hydrolyzes α-glycerophosphoric acid more readily than β-glycerophosphoric acid. PETER MASUCCI

The kinetics of fermentation processes. The kinetics of invertase. E. AVTONOMOVA. *Biochem. Z.* 231, 13–24(1931).—The invertase reaction like the catalase reaction may follow the equation of a monomol. reaction but under various conditions the consts. calcd. on this basis may be either increasing or decreasing. Decreasing consts. for invertase are obtained when a very low sugar concn. and relatively high enzyme concn. are used. On the contrary, with high concn. of catalase and low concn. of H_2O_2 the consts. are increasing. Obviously, enzymes whose activity tends to deviate from the monomol. type do so in a definite direction, and in the case of catalase this is predominantly toward decreasing, whereas in the case of invertase toward increasing, values. This is not due to differences in the nature of these enzymes but rather to the fact that the H_2O_2 is a powerful agent which destroys the catalase whereas the invertase is inhibited by the reaction products. The following equations are proposed to describe every instance of the enzyme kinetics, where the activity either decreases or increases: $C_1 = 1/t(A - D) \times \log D(A - X)/A(D - X)$ and $C_1 = 1/t(A + D) \times \log A(D + X)/D(A - X)$, resp. The value D is proportional to the initial enzyme activity. S. MORGULIS

Changes in the chloride distribution in blood under the influence of ultra-violet radiation. JERZY GLASS. *Biochem. Z.* 231, 45–53(1931).—Intensive ultra-violet radiation causes 2–4 hrs. after the treatment a change in the Cl distribution in the blood, with a tendency to accumulation in the red cells, which may persist for 24 hrs. This indicates a shift in the blood acid-base equil. toward an acidotic condition. S. M.

Enzymic formation of an ester of mandelic acid. P. RONA, R. AMMON AND H. A OELKERS. *Biochem. Z.* 231, 59–66(1931).—In the presence of isomolar concns. of *l*- and *d*- mandelic acid and Bu alc. the esterase from human, pig and cat liver, or from pig pancreas and kidney forms the Bu ester of mandelic acid with equal velocity. Thus, the marked specificity of these esterases which was found previously in the study of the hydrolysis of mandelic acid esters is not observed in the enzymic esterification. S. MORGULIS

The enzymic transformation of guanidine to urea. NICOLAI N. IVANOV AND A. N. AVETISSOVA. *Biochem. Z.* 231, 67–78(1931). —*Aspergillus niger* grown in a peptone culture can utilize guanidine very well as a source of N if this is furnished in conjunction with glucose, when the guanidine is changed to urea and NH_3. This depends upon the presence in the mycelium of a guanidinase. The dry mycelium of *Aspergillus niger* contains only guanidinase and no urease and can change guanidine quantitatively to urea and NH_3. Boiling this dry mycelium destroys its guanidinase activity. S. M

The Boas benzidine reaction of the potato. T. YOSHIOKA. *Biochem. Z.* 231, 233–8(1931).—The potato enzyme described by Boas (*C. A.* 25, 307) which reddens benzidine is entirely unaffected at 50°, but is weakened in its action at 60° and is completely inactivated at 70°. The enzyme can be pptd. by half satn. with $(NH_4)_2SO_4$ or full satn. with $MgSO_4$, and is made insol. by alc or acetone. With kaolin one obtains an insol. ppt. which has the full enzyme activity, but the enzyme cannot be leached out. With $Al(OH)_3$ no adsorption could be obtained. KCN or $HgCl_2$ inhibits the enzyme activity. Ni powder has no effect. The enzyme shows a great tendency to become insol. Through $(NH_4)_2SO_4$ pptn. enzyme prepns. can be made poor in N and of good potency, but through acetone pptn. active prepns. are made which retain full enzymic activity permanently, but they are insol. S. MORGULIS

A protein ethereal sulfate compound from spleen. ALFRED EBEL. *Biochem. Z.* 231, 306–8(1931).—A kg. of fresh spleen is chopped up fine, mixed with 1 l. H_2O and 40 cc. *N* AcOH and heated to 70°. The coagulum is filtered off, and the filtrate is pptd. with 200 cc. 20% $Pb(OAc)_2$. After this is made alk. with NH_4OH the ppt. is sepd. and the clear filtrate is freed from Pb with H_2S. The final filtrate is evapd. *in vacuo* to a small vol. and again filtered. The addn. of twice the vol. of alc. causes no turbidity. The concentrate is dialyzed 48 hrs. and, after filtering, is once more concd. *in vacuo*. Treated with 10 times its vol. of alc. a thick ppt. is formed which is allowed to settle in the ice box and is collected on a hardened filter paper, washed with alc. and dried. This powder is dissolved in very little H_2O and again pptd. as before with 10 vols. alc., the ppt. washed with abs. alc. and ether This substance gives no Millon reaction, a weak tryptophan reaction and a Molisch test for carbohydrate. The substance can be salted

out by full satn. with $(NH_4)_2SO_4$, and contains about 1.70% S which is hydrolyzable with 10% HCl at 100°. S. MORGULIS

Studies on phosphatase. I. The kidney phosphatase of different laboratory animals. MASAKI UMENO. *Biochem. Z.* **231**, 317–23(1931).—The phosphatase activity of the kidney from different animals has been tested on a Na glycerophosphate substrate. The relative activity follows the series: hen>cat>dog>steer>toad>rabbit>guinea pig. The phosphatase content of the various portions of the kidney was: cortex>medulla>papilla. **II. The liver phosphatase of different laboratory animals.** *Ibid* 324–27.—The liver phosphatase activity is about half as strong as the kidney phosphatase, and is also differently distributed in the animal series: hen>rabbit>dog>guinea pig>frog. **III. The phosphatase content of the kidney and liver in experimental nephritis.** *Ibid* 328–33.—In exptl. nephritis the kidney phosphatase activity is reduced to $^1/_2$–$^1/_3$ of its normal value. The liver phosphatase activity during nephritis is also diminished but only to a small degree. **IV. The optimum temperature and the inactivation temperature of the kidney phosphatase.** *Ibid* 334–8.—The optimum temp. for the activity of the steer or dog kidney phosphatase is 42.5°. The enzyme is destroyed at a temp. between 60 and 65°. **V. The glycerophosphatase of leucocytes in blood.** *Ibid* 339–45.—The leucocytes of a leucemia patient were found to contain much phosphatase. One cc. rabbit leucocytes hydrolyzes 0.036 g. Na glycerophosphate per day, while the erythrocytes show no phosphatase action. **VI. The presence of phosphatase in bile and pancreatic juice.** *Ibid* 346–51.—Bile contains a very strong phosphatase, whereas pancreatic juice possesses only about half as much phosphatase activity. Saliva and gastric juice are free from phosphatase, but the mucosa of the stomach, duodenum and small intestine and the salivary gland are rich in phosphatase. Phosphatase is also present in the liver, pancreas and spleen. The phosphatase content of an organ is independent of that of its secretion. S. MORGULIS

Resistance of insulin to certain bacteria. A. A. SCHMIDT AND KLARA TULICHINSKAJA. *Biochem. Z.* **231**, 352–64(1931).—*B. coli communis*, *Staphylococcus aureus*, *Streptococcus hemolyticus* and some anaerobic bacteria from dog feces cannot inactivate insulin. However, it is possible to obtain from feces putrefactive organisms which do destroy insulin very vigorously. It is suggested that bacteria of the peptolytic group, devoid of proteolytic enzymes, do not inactivate the insulin, which is perhaps due to the similarity between the insulin and the protein mol. S. MORGULIS

Influence of ptyalin on starch. II. Effect of electrolytes. J. R. BROEZE. *Biochem. Z.* **231**, 365–84(1931); cf. *C. A.* **23**, 1917.—The action of dialyzed ptyalin solns. on the starch sol in the presence of small quantities of electrolyte has been studied by changes in the expression $y_s - y_0/y_0$ in the course of time. The symbol y, of course, refers to viscosity. Without electrolyte addn. the velocity of the change is very small, and is very much increased by the least concn. of all electrolytes, with only a small advantage in favor of cations with increasing valence. A cation lyotropy is not observed but in the univalent anions the increase in reaction velocity seems to coincide with the lyotropic series: $CNS<NO_3<Cl,F$. The SO_4 ion does not behave according to its lyotropic position. S. MORGULIS

Specificity of the α-glucosidases. H. KARSTRÖM. *Biochem. Z.* **231**, 399–403 (1931).—With a strain of *Bacillus coli* which ferments maltose, glucose and fructose but not sucrose it was shown that the α-glucosidase which is operative in the hydrolysis of maltose cannot hydrolyze sucrose. S. MORGULIS

The chemical constitution of serum proteins. IV. ANTON FISCHER AND ALFRED BLANKENSTEIN. *Biochem. Z.* **231**, 404–11(1931); cf. *C. A.* **25**, 977.—Two pathological sera showed a greatly increased sedimentation reaction and an abnormally high tryptophan content. A study of the seven different chem. fractions shows that, as compared with the normal serum, there was a diminution of the albumin and an increase of the globulin content; this increase was not shared by all globulin fractions but principally by the euglobulin, which is pptd. by NaCl. S. MORGULIS

Influence of pancreatin on collagen in the absence of neutral salts and buffer mixtures. I. A. KÜNTZEL AND O. DIETSCHE. *Biochem. Z.* **231**, 423–34(1931).—The pancreatin action is exerted chiefly at the beginning of the reaction, so that prolongation of the action is safe only so far as no bacterial effect comes into play. There is practically a direct relationship between the amt. of pancreatin and the extent of the hydrolysis but the curve nevertheless shows a tendency to flatten out gradually so that an excess of pancreatin does not present any serious danger of carrying the hydrolysis too far. The enzyme activity does not increase proportionally to the rise in temp., and from about 45° the increase becomes quite remarkable, and this factor must be guarded most cautiously to prevent injury to the skins treated with pancreatin. S. M.

Influence of pancreatin on collagen in the absence of neutral salts and buffer mixtures. II. A. Küntzel and O. Dietschb. *Biochem. Z.* **231**, 435–40(1931); cf. preceding abstr.—This is in general a corroboration and extention of Merrill and Fleming's expts. on the digestion of collagen by pancreatin (*C. A.* **21**, 1369, 2396). S. Morgulis

Relation between swelling and proteolysis of collagen. F. Nauen. *Biochem Z.* **231**, 441–5(1931).—Salts of benzoic, salicylic and *p*-hydroxybenzoic acids promote proteolysis in the same order as they increase the swelling. The digestion of collagen by pancreatin is definitely promoted by previous swelling. S. Morgulis

Influence of physical factors on blood catalase. II. The influence of some physico-therapeutic procedures on the blood catalase. A. I. Alexeev and K. I. Russinova. *Biochem. Z.* **231**, 460–71(1931); cf. *C. A.* **24**, 1397.—The blood catalase of man under const. phys. conditions is practically the same. The outside temp. influences the blood catalase very much and should therefore be considered in the detn. of the catalase content and index. Elec. warm baths diminish the activity of the blood catalase more the higher the temp. of the bath. In a similar manner hot water baths greatly diminish the activity of the blood catalase, while a CO_2 bath or plain baths of ordinary temp. have no effect. The Scharko baths under 2.5 atm. pressure greatly diminish the blood catalase, but this does not occur until 30 min. after the bath. Air baths produce no noticeable changes in the blood catalase content. S. Morgulis

Specific dynamic action of protein. Henry Borsook and Howard M. Winegarden. *Proc. Natl. Acad. Sci.* **17**, 75–91(1931).—Analyses of data on the relation of the increase in metabolism following ingestion of protein or amino acids and the efficiency of renal excretion show that the course of the sp. dynamic action parallels the course of N excretion. Of the sp. dynamic action, 25–60% is due to the work of renal excretion and the rest to N and C metabolism. This will explain previous anomalies in the sp. dynamic action of protein. The sp. dynamic action of protein is not necessarily due to the conversion of the deaminized fractions into glucose. D. S. Searle

The relation of life to electricity. II. The relation of stainability to electromotive force in tissues and in a variety of artificial substances, like esters, etc. R. Beutner and Jos. Lozner. *Protoplasma* **12**, 52–65(1931).—Many data are given of potential measurements of the system:

+ aq. saline	ester or alc. + fatty acid	ester or alc. + amine	aq. saline −

The relation between stainability and e. m. f.:

+ basophilic substance/acidophilic substance −

holds for fats, esters, alc., hydrocarbons, etc. B. A. Soule

The effect of ultra-violet radiation on the respiration of avian erythrocytes and yeast cells. Gy. Surányi and M. Vermes. *Magyar Orvosi Arch.* **30**, 585–90(1929).—Ultra-violet radiation under aerobic and anaerobic conditions of avian erythrocytes and yeast cells in Tyrode soln., at p_H 7.2, increases the O_2 consumption, measured by the method of Warburg. The increase is about 50%. Cyanide inhibits the increased part as well as the normal respiration. This effect is reversible. H. Tauber

X-ray analysis of bone and teeth. H. H. Roseberry, A. Baird Hastings and J. K. Morse. *J. Biol. Chem.* **90**, 395–408(1931).—From the analysis of x-ray spectrograms of bone powder a crystal structure similar to that of the apatites is deduced, resembling closely the structure of dahlite, $CaCO_3.nCa_3(PO_4)_2$, in which n is not less than 2 nor more than 3. Neither $CaCO_3$ nor $CaHPO_4$ exists as such in bone. The results of de Jong (*C. A.* **20**, 2602) and of Taylor and Sheard (*C. A.* **4**, 24) are confirmed. $Ca_3(PO_4)_2$ also has a crystal structure similar to that of the apatites, varying slightly with different samples, but entirely different from that of $CaHPO_4$. The crystal structure of enamel also resembles the apatite series, and can probably be represented as a close-packed hexagonal lattice, of which $a_0 = 20.8$ A. U., $b_0 = 12.0$ A. U., $c_0 = 8.82$ A. U., referred to orthorhombic axes. The results of equilibration expts. between serum and solns. of Ca salts are considered to be of doubtful biol. significance. K. V. Thimann

Studies on the dielectric constant of protein solutions. Jeffries Wyman, Jr. *J. Biol. Chem.* **90**, 443–76(1931); cf. *C. A.* **23**, 5074.—The dielec. const. of solns. of zein in 70% EtOH alc. was measured by the method previously described for high frequency (*C. A.* **24**, 3681) and by a new resonance method at lower frequencies. At wave length 4 m. the dielec. const. of the zein solns. is lower than that of the solvent by an amt. proportional to the concn. of protein (cf. Fürth, *C. A.* **17**, 1579) resembling in general behavior that of

amino acid solns. (cf. Hedestrand, *C. A.* 22, 3571). It rises with temp., becoming greater than the solvent at 60°. The dielec. const., however, rapidly increases with wave length up to 260 m.—the longest wave used—becoming up to 50% greater than the solvent, and indicating anomalous dispersion. The zein mols. are therefore highly polar and possess a permanent elec. moment of about 60×10^{-18} e. s. u. No change in dielec. const. occurs during gelation, from which W. deduces that only a small fraction of the mols. is involved in the network, and that the viscosity of the whole gel is not the true viscosity of the soln. given by Stokes' expression, since it is to this viscosity that the relaxation times of the mols. are related. The theory of dielec. consts. and the application to mol. structure are briefly discussed. K. V. THIMANN

The p_H of human mixed saliva irradiation for intraoral carcinoma. GEORGE S. SHARP. *Am. J. Roentgenol. Radium Therapy* 25, 266–70(1931).—The saliva p_H for the individual patient taken during the 3 phases of irradiation forms a curve, starting with an abnormally acid saliva (p_H 6.1), rising during the acute reaction (p_H 6.5) and returning approx. to the pre-irradiation value during the post-irradiation period (p_H 6.0). R. C. WILLSON

The effect of radiation on the acidity of the blood. HELEN Q. WOODARD AND HELEN R. DOWNES. *Am. J. Roentgenol. Radium Therapy* 25, 271–5(1931).—No consistent change was observed in the p_H, CO_2-combining power or lactic acid content of the blood of patients after they had received one skin erythema dose of high-voltage Röntgen rays. No significant change was observed in the p_H of the blood of rabbits after lethal doses of high-voltage Röntgen rays. R. C. WILLSON

The effect of Röntgen rays on the inorganic phosphorus content of blood and urine of patients with carcinoma. F. I. RIVOSH AND E. R. NOVOTELNOV. *Voprosy Onkologii* 3, 150–6(1930); *J. Am. Med. Assoc.* 96, 155.—A normal P content was found in most of the 81 patients before treatment. In 2 hrs. after the treatment a steady increase in the P content of the urine and of the blood of all the patients was observed. After 24 hrs. the blood P was still increased but the urine P was normal. The same results but with larger increases in the urine and blood P were observed after Röntgen and Ra therapy of sarcoma, seminoma and lymphogranuloma. The sugar content changed in inverse proportion to the P content. R. C. WILLSON

Rotation dispersion of optically active substances (KEESER) 2. Evolution of H_2S in the Bay of Krasnovodsk (ZABRIEV) 2. Phenomena of adsorption and protection in complex colloidal media (MARIE, MARINESCO) 2. The bile acids (WIELAND, NOGUCHI) 10.

Peroxidase preparations. W. SAILER. Brit. 337,405, April 25, 1929. Vegetable substances contg. peroxidases such as embryos of rye, wheat, rice, maize or barley or parts of plants such as potatoes or bran are treated with water and fermentation is allowed to proceed in the presence of substances which in the soln. form buffer substances such as oxides, hydroxides or carbonates of alkali, alk. earth or other metals, such as ZnO, or metals not acting as catalysts. After filtering off the solids, the filtrate is treated with a preservative such as alc., benzoic acid or benzoic acid esters.

B—METHODS AND APPARATUS

STANLEY R. BENEDICT

An exact rapid method for determination of water in blood and serum. M. DOLCH AND E. PORCHMUELLER. *Z. physiol. Chem.* 195, 28–34(1931).—The ordinary method of H_2O detn. by drying to const. wt. does not exclude 3 possible sources of error in samples contg. protein, *viz.*, adsorption, occlusion and chem. reaction. The method here described obviates these errors and is far more rapid, requiring only 10–15 min. It is based on the fact that the temp. at which a mixt. of EtOH and xylene in definite proportions becomes cloudy varies with the H_2O content of the EtOH. A calibration curve is first plotted for the abs. EtOH to be used. This is done by mixing 11, 11.5, 12, etc., cc. of H_2O with 100 cc. of the EtOH, then mixing a 20-cc. aliquot with 20 cc. of dry xylene in a suitable app. provided with thermometer and stirrer, immersing in a freezing mixt. and detg. the temp. at which turbidity develops. The curve, in which temp. is plotted against amt. of H_2O added, is a straight line. Detn. of H_2O in blood or serum is performed as follows: Pipet a 15-cc. sample into a tared 150-cc. Erlenmeyer flask and weigh the sample. Add exactly 100 cc. of the EtOH, mix thoroughly, boil 10 min. and allow the pptd. protein to settle. Pipet 20 cc. of the supernatant liquid into the app., add 20 cc. of xylene and det. the temp. of clouding. Locate this temp. on the calibration curve and read the corresponding wt. of H_2O from the other axis. This value $\times$ 100 ÷ wt. of

sample is the per cent of H_2O by wt. The per cent by vol. is the wt. of H_2O × the factor 6.667. Addn. of cholesterol or dried protein did not affect the results. The values obtained by this method are slightly higher than those obtained by drying the sample to const. wt. and are claimed to be more accurate. A. W. Dox

A new method for the quantitative estimation of dissolved protein in gastric contents. Walter Wolff and Erich Jochmann. *Arch. Verdauungskrankh.* **48**, 151–7 (1930).—To 5 cc. of the filtered gastric contents add 5 cc. of a reagent contg. 10% phosphotungstic acid, 0.5% HCl and 10% alc., centrifuge and wash the ppt. with H_2O 3 times. Then dissolve in 3% NaOH, add 3 drops of 20% $CuSO_4$ soln. and 3% NaOH up to 10 cc. Centrifuge and compare the clear violet supernatant fluid colorimetrically with standards. Lowest values (<500 mg. %) are commonly obtained in achylia gastrica. Normal values may be as high as 1000–1500 mg. %. H. Eagle

The Kaufmann method of blood-sugar determination. H. Heinemann. *Arch. Schiffs-Tropen-Hyg.* **34**, 559–61(1930).—The iodometric method of Kaufmann can be used upon one drop of blood. H. Eagle

The estimation of iodine in the thyroid glands of albino rats. C. Newcomb and G. Sankaran. *Indian J. Med. Research* **18**, 557–61(1930).—The gland is dissolved in 10% KOH, ashed, extd. with alc. and again ashed. The residue is dissolved in water, and the color which develops upon the addn. of H_2SO_4, Na arsenite, CS_2 and nitrose compared with standards. H. Eagle

The determination of bile pigments in the blood serum. Pius Müller and Ludwig Engel. *Klin. Wochschr.* **9**, 2304(1930). —The degree of absorption of light of wave length 4993 A. U. is an accurate index of the amt. of bilirubin in serum. The diazo reaction used in the van den Bergh test detects only 30–60% the quantity as detd. by the spectrophotometer. The normal value is 0.6–2 mg. %. There is no regular correlation between the amounts as detd. by the two types of test. The proportion of bilirubin adsorbed on serum protein when the latter is pptd. may vary from 30 to 70% of the total; moreover, contrary to van den Bergh, such adsorption occurs even in sera which give the indirect reaction. In jaundice, there is a parallel increase in the results obtained by the two methods. H. Eagle

The Meinicke-Klarungs reaction as a rapid micro method for inactivated sera. Ernst Meinicke. *Klin. Wochschr.* **9**, 2304–5(1930). —Good results are reported, although the test is not as sensitive as the technic employing active serum. H. E.

The use of coal gas in making anatomical preparations in natural color. A. Schultz. *Klin. Wochschr.* **10**, 213–4(1931). —Tissues may be kept in Jores soln. through which coal gas has been passed, for many weeks without losing their natural blood tinge. Even the color of the organs, such as that of the liver, heart muscle and fat, is preserved by the CO. Jores soln. consists of 5% formalin, 2.5% chloral hydrate and 5% of synthetic Carlsbad salts in water. The aeration with CO-contg. coal gas must be carried out immediately before the tissue is immersed. After 3–10 days, depending upon the size of the prepn., the tissue is placed in the permanent preserving fluid: 1000 cc. H_2O, 6000 cc. glycerol and 300 g. Na acetate. For strongly jaundiced organs it is necessary to omit the glycerol and to increase the salt to 500 g. per 1000 cc. H_2O. H. Eagle

Determination of cholesterol and lecithin. Evaluation of egg products. J. Tillmans, H. Riffart and A. Kühn. *Z. Untersuch. Lebensm* **60**, 361–89(1930). —The methods suggested by other workers are critically discussed. For cholesterol a modification of the method of von Szent Gyorgyi (*C. A.* **17**, 3197) is the most direct and accurate. A soln. of not more than 4 mg. of cholesterol in 2 cc. of warm acetone is evapd. on a water bath with 1 cc. of a 2% soln. of digitonin in 80% alc. until 1.5 cc. remains. After 15 min. at room temp. the mixt. is filtered on a sintered glass crucible enclosed in a jacket through which steam can be passed, the ppt. transferred with acetone and twice washed with Et_2O, followed by 3 washes with $CHCl_3$, 2 with Et_2O, 1 with acetone and 1 with cold H_2O (1.5 cc. at a time). The suction is adjusted to filter 1 drop per sec., and the ppt. should always be covered with liquid to protect it from the air. Steam is then passed through the jacket, ten 1.5-cc. portions of H_2O are added, and the washing is finished with the full suction of the pump. The suction and heating are continued while 10 cc. of a clear 1% soln. of $K_2Cr_2O_7$ in concd. H_2SO_4 is slowly pipetted on the ppt. so as to fill ¼ of the crucible. The crucible is washed with 3 1-cc. portions of cold H_2O, sucked well and the total filtrate collected. The oxidation is complete in 1 hr., and 100 cc. of H_2O and 10 cc. of 5% KI soln. are added. The liberated I is titrated with 0.1% starch soln. for every 10 cc. of chromic acid taken, allowance being made for the blank titration. The mean of 15 expts. with pure cholesterol showed that the vol. of $Na_2S_2O_3$ soln. equiv. to the chromic acid consumed, divided by 8.7, gives the cholesterol content in mg. for 0.5–4.0 mg. The factor for phytosterol was 7.9; the m. ps. were 145° and 136°

for the 2 sterols, recrystd. from abs. EtOH, and 114° and 126°, resp., for their acetates. Egg products are first dried on the water bath with sand, extd. in a Soxhlet app. with Et_2O, evapd. and the residue is dried at 100° and weighed. A weighed portion is then dissolved in warm acetone, filtered, dild. to a suitable vol. with acetone and the above procedure followed. This gives free cholesterol. Another portion of the ethereal ext. is then sapond. on the water bath for 1 hr. with a 20% alc. soln. of KOH, the residue dried, mixed with sand and extd. as before to give the cholesterol after sapon. Results are given for various egg and pastry products. *Lecithin* was detd. by various methods, the technic giving the most accurate results consistent with the time consumed is based upon the Juckenack test (*Z. Untersuch. Lebensm.* 8, 97(1904)). The powd. 10-g. sample is extd. for 3 hrs. with hot alc. in a Soxhlet app., and the residue left on evapn. of the ext. is warmed with 15 cc. of perhydrol and 5–10 cc. of concd. H_2SO_4 until brown in color. The cool mixt. is dild. to 100 cc., 25 cc. neutralized with NH_3 to methyl orange, and the lecithin phosphate pptd. in the cold in a vol. of 60 cc. with 5 cc. of 1.5% strychnine nitrate soln. and 15 cc. of a mixt. of 33 33 g. of NH_4 molybdate in 100 cc. of H_2O and 300 cc. of dil. HNO_3 contg. 200 cc. of acid, sp. gr. 1.4. After 20 min the ppt. is filtered off on a weighed crucible, washed with 25 cc. of the ice-cold mixed reagents (dild. 5-fold), and with ice water until free from acid. The wt. of the ppt. dried at 100° and divided by 39 gives P_2O_5. The method has an accuracy of 0.02 mg. for 0.5–4.0 mg. of P_2O_5. The contents of H_2O, cholesterol and lecithin are tabulated for 21 samples of pastry products contg. eggs. A table is given for the calcn. of egg content of a sample from the cholesterol content, 58.7 and 71.4 mg. per 100 g. of ordinary and hard pastry, resp., corresponding with 1 egg per 500 g. of flour, and 151.5 and 164.2 mg., resp., for 3 eggs. Storage of samples for a year with the exception of a few home baked pastries showed no loss of lecithin or cholesterol. The free lecithin content of egg products or pastries is not a reliable means of detg. the freshness of the product. C. R. Fellers

The determination of the concentration of oxidizing agents by means of the residual current. G. Tammann and H. Thiele. *Arch. ges. Physiol.* (*Pflügers*) **226**, 694–6(1931). —An attempt was made to devise a method for detg. the concn. of oxidizing agents in biol. materials from the residual current, i, as defined in Nernst's equation: $i = (D.o.n.F/\delta).c$. In this equation D is the diffusion coeff. of the depolarizer, n is the electrochem. valence of the oxidizing agent, F the electrochem. equiv., o the surface area of the electrode, c the concn. of the oxidizing agent and δ the thickness of the diffusion layer at the cathode. With platinized Pt electrodes roughly approximate results were obtainable for the concn. of H_2O_2 in aq. solns. The residual current for oxygenated blood was 0.002 amp. as compared to 0.0001 amp. for venous blood. A. G.

The determination of the freezing points of small quantities of fluids by means of thermal elements. Experiments with turtle blood. T. Minosima. *Arch. ges. Physiol.* (*Pflügers*) **226**, 794–8(1931).—The f. ps. of 0.5 to 1 cc. quantities of fluids were detd. with an accuracy of ±2% by the use of *constantan-iron* thermoelements and a sensitive elec. arrangement for measuring small p. ds. The method is particularly applicable to biol. fluids when only small quantities of material are available. Arthur Grollman

Influence of formol on the precipitation of serum proteins. Marcel Mascre and Maurice Herbain. *Bull. soc. chim. biol.* **12**, 978–93(1930); cf. *C. A.* **24**, 5052.—Formol affects the pptn. of proteins both by forming formol proteins and by increasing the acidity of nonprotein matter present. The latter factor is responsible for the greater effect upon pptn. by alc. acetone and salts than by CCl_3COOH. The effect is more marked at lower temps. Pptn. with CCl_3COOH includes peptides, and pptn. of serum globulin with Na and Mn sulfate includes much of the albumin. C. G. King

The use of copper and iron salts for the deproteinization of blood. Michael Somogyi. *J. Biol. Chem.* **90**, 725–9(1931); cf. *C. A* **24**, 3808.—Fe salts can be used instead of colloidal $Fe(OH)_3$ for the removal of blood proteins in the detn. of true sugar. Cu salts are preferable to Fe salts for this purpose and fully the equal of Zn salts in regard to speed and simplicity of technic. For the pptn. of plasma or serum proteins Cu is superior to Zn. The technic is described in detail. A. P. Lothrop

The optimum conditions for the precipitation of casein from human and from cow milk. Chi Che Wang and Agnes A. Wood. *Am. J. Diseases Children* **40**, 787–90 (1930).—A clear, edible whey can be prepd. from human milk by treating 100 cc. of fat-free milk with 33 mg. of rennin suspended in 1 cc. of 1 *N* HCl for 15–30 min. at 38°, removing the curd by centrifugation and filtering the supernatant liquid. The max. pptn. of casein from human milk by the action of rennin (and HCl) occurs at p_H 4.97 and represents 50% of the total N of the whole milk. The max. pptn. of cow milk by lactic acid occurs at p_H 4.61, representing 80% of the total N. The max. pptn. by rennin (and HCl) occurs at p_H 6.53, representing 73% of the total N. E. R. Main

The determination of lead in feces and urine and its significance for the diagnosis of lead poisoning. FRITZ FRETWURST AND ARTUR HERTZ. *Arch. Hyg.* **104**, 315–25 (1930).—A method is described for the detn. of Pb in feces and urine by which 0.01 mg. of Pb may be detd. The samples are ashed with HNO_3, the Pb is pptd. first as PbS and finally as $PbCrO_4$, and the latter dissolved in HNO_3 and titrated with $Na_2S_2O_3$. The av. values for normal persons who have not worked with Pb are 0.05 mg. Pb per 100 g. of feces and 0.03 mg. per l. of urine; for persons who have worked with Pb but show no symptoms of poisoning, 0.06 mg. per 100 g. of feces and 0.08 mg. per l. of urine; for persons who have worked with Pb and have symptoms of poisoning 0.2 mg. per 100 g. of feces and 0.07 mg. per l. of urine. E. R. MAIN

The determination of the p_H of phosphate buffer solutions by means of the antimony–antimony oxide electrode. RUSSEL J. FOSBINDER. *J. Lab. Clin. Med.* **16**, 411–4 (1931).—The Sb-SbO electrode gives a linear relation between observed e. m. f. and p_H values. The p_H of phosphate buffer solns. can be detd. with an accuracy of ± 0.01 p_H. The electrode is not applicable to the detn. of the p_H of blood plasma. E. R. MAIN

Chart for computation of daily basal metabolism and percentile basal metabolic rate from spirometer data. CURTIS BRUEN. *J. Lab. Clin. Med.* **16**, 415–8(1931); cf. *C. A.* **24**, 3028.—A nomogram-like chart is presented by which the daily basal metabolism and the percentile basal metabolic rate may be computed from the observed values for vol. decrement of O per min., the av. spirometer temp. and atm. pressure. E. R. MAIN

The determination of silver in organs and in organic liquids. E. MENEGHETTI *Boll. soc. ital. biol. sper.* **5**, 813–4(1930).—The organs or liquids are dried and ashed with Na_2CO_3 in a crucible. Complete ashing is obtained by repeated addns. of small amts. of KNO_3. Concd. HNO_3 is added and evapd. to dryness. For qual. tests, the residue is digested with NH_4OH, filtered and the filtrate is tested for Ag (pptn. of Ag_2S with H_2S, AgCl with HNO_3). For the detn. H_2O is added and then the soln is treated with H_2S for 5 min. and centrifuged; the ppt. is washed carefully 3 times with H_2S water and centrifuged each time. Concd. HNO_3 is then added to the ppt. and brought to dryness on the water bath. The residue is dissolved in H_2O (up to this point the operations are all made in the original crucible), filtered and the ppt. on the filter washed repeatedly with H_2O. To the filtrate in the dark is then added with caution dil HCl until complete pptn. of the chloride. The ppt. is allowed to settle and collected on a Gooch crucible, the ppt. being washed first with cold H_2O contg. a small amt. of HNO_3 until the washings are free of chlorides and then twice with alc. It is dried at 100°, then at 130° to const. wt. (all the later operations are carried out as much as possible away from the light). PETER MASUCCI

Electroultrafiltration, a method for the determination of the physical state of the inorganic constituents of the serum. RUDOLF SPIEGLER. *Biochem. Z.* **230**, 253–8 (1931).—An app. is described for carrying out ultrafiltration with and without electrodialysis. S. MORGULIS

New substrates for use in detecting proteolytic activity. ROBERT L. JONES. *Ind. Eng. Chem., Anal. Ed.* **3**, 149–51(1931).—With a modified method for the prepn. of adsorption systems of egg albumin and dyes a number of reagents can be prepd. which can be used for the detection of proteolytic activity. Two reagents, *egg albumin-iodoeosin* and *egg albumin-basic fuchsin*, give good results with com. pepsin, trypsin and artificial gastric and pancreatic juices. The prepn. of these reagents is easier than that of previous ones. They can be prepd. in powder form and are stable indefinitely. H. T.

A study of glutathione. HAROLD L. MASON. *J. Biol. Chem.* **90**, 409–16(1931); cf. *C. A.* **25**, 719.—The oxidized form of glutathione prepd. by aeration at p_H 7.6, or by treatment with I_2 or $K_3Fe(CN)_6$, followed by isolation from alcoholic soln., gives low analyses, as found by Hopkins (*C. A.* **23**, 5477). This is due to the presence in close combination of 2 mols. EtOH, which can only be removed with great difficulty. Heating at 110–20° *in vacuo* leads to loss in wt. but is accompanied by a reduction in the no. of CO_2H and NH_2 groups. The aeration method gives a quant. yield of the oxidized form and is a convenient procedure for its prepn. K. V. THIMANN

Photometric determination of the cholesterol in the serum. E. BRILL AND GUSTAV HOPF. *Münch. med. Wochschr.* **77**, 142–4(1930).—Heilmeyer first used the step photometer, which was designed for the detn. of color in the textile industry and for the detn. of cholesterol. In order to obtain an easier standardization of both halves of the field and to obtain an idea of the light absorption within the various spectral regions, color filters are introduced into the photometer. These are of 2 types: (1) 3 filters, red, green and blue, which have a relatively wide penetrable area and (2) a larger no. of color filters which allow very definite, narrowly limited, regions of wave length to

pass. By this app. it is possible to det. the amt. of rays absorbed by a color soln. within the spectral region detd. by the various color filters. From this one can det. the corresponding color value of the soln. Results differed as much as 20% when checked with the Windau method. The colorometric method gave the same results indicating that other cholesterol-like substances give a color reaction. R. C. WILLSON

Determination of Ca, Mg and P in cattle excreta (MORRIS, *et al.*) 7. Device for regulating the quantity and compositions of gas mixtures used for anesthesia (U. S. pat. 1,793,608) 1.

C—BACTERIOLOGY

CHARLES B. MORREY

The bactericidal power of viosterol. B. E. MONTGOMERY. *Proc. Soc. Exptl. Biol. Med.* **28**, 481(1930).—Irradiated ergosterol in corn oil neither modified the cultural characteristics nor inhibited the growth of *Bacillus coli* and of *Staphylococcus aureus*. C. V. BAILEY

The present state of chemical study of the tubercle bacillus. ERWIN CHARGAFF. *Naturwissenschaften* **19**, 202-6(1931).—A review of recent work (cf. Anderson and C., *C. A.* **24**, 878, 1134; **25**, 128; Sabin, Doan and Forkner, *Am. Rev. Tuberculosis* **21**, 290(1930)(cf. *C. A.* **25**, 541); Doan, *Proc. Soc. Exptl. Biol. Med.* **26**, 672(1929)) with numerous references. B. J. C. VAN DER HOEVEN

Fluoroscopic examination of certain actinomycetes. FRANZ CORTESE. *Boll. soc. ital. biol. sper.* **5**, 842-4(1930).—The influence of anaerobiosis, p_H of culture media and chem. constitution of the media on fluorescence was studied. The fluorescent substance was extd. from the media by weak alc. and purified by shaking with acidified ether. It is an amorphous, odorless, reddish brown material, sol. in alkalies, pyridine, EtOH, MeOH, acetoacetic acid, acidified Et_2O and concd. inorg acids, slightly sol. in weak inorg. acids or acetone; insol. in H_2O or glycerine, benzene and other fat solvents. In 25% NH_3 it shows 4 absorption bands λ = 630-614, 588-576, 560-536, 518-492. The substance is a pigment belonging to the group of porphyrins. Fluoroscopic examn. showed that *A. albus* and *A. sulphureus* Gasperini are different species of *A. bovis* Harz. PETER MASUCCI.

Destruction of sugar in the intestine by the coli group of bacilli. The etiology of pernicious anemia. KOLOMANN V. KNORR. *Folia Hematol.* **43**, 32-94(1930).—An organism called *Diplococcus anemiae perniciosae* is described and found present in the mouth and duodenal contents of cases of pernicious anemia. *B. coli* plays a secondary role by splitting carbohydrates and proteins, producing especially compds. with the NH-OH group. This aids the toxin produced by the diplococcus. JOHN T. MYERS

Toxin production and properties of bacillus Preisz-Nocard. ABEL ROTTGARDT. *Zentr. Bakt. Parasitenk.*, 1 Abt., **119**, 323-33(1931).—The toxin can be pptd. by $(NH_4)_2SO_4$ and dried *in vacuo* over H_2SO_4. Heat destroys it but the dried toxin is more stable than liquid. Cold preserved either liquid or dried toxin. The same is true of the organisms or endotoxin. Air and light have little effect on the exotoxin. Filtration of exotoxin decreases its toxicity about 50%. Toxin concd. at 45° loses a major part of its toxicity but retains its antigenic power. Toluene, ether or mixts. of them have no effect. At a temp. of zero, 5% phenol has no harmful effect. Formalin weakens the toxin, its effect increasing with temp. The pus-producing power of the toxin is independent of its toxicity. JOHN T. MYERS

Method for preparing photographs of Petri dish cultures by direct contact printing on photographic paper. J. T. BUCHHOLZ AND I. M. LEWIS. *J. Bact.* **19**, 105(1930).—The Petri dishes are used in the same manner as negatives and the resulting prints are positives in natural size, the colonies appearing as white objects on a black background. The process is carried out in a dark room, the source of printing light being a 150-w. Mazda lamp at 3 m. from the object, centered directly above the exposing table to avoid cast shadows. The dish, with cover removed, is pressed bottom down upon the sensitized surface of the paper, and exposed. Color and transparency of the agar, its depth in the dish, type of paper, the developer and its temp. influence the time of exposure required. L. G. PERAGALLO

Resistance of trypanosomes to arseno compounds. M. ADANT. *Compt. rend. soc. biol.* **106**, 57-8(1931).—*Tryp. pecaudi* in mice are not rendered resistant to tryparsamide by a prolonged or even double contact with tryparsamide complex obtained from the liver of mice, which complex, however, according to Levaditi, would be the trypanocide elaborated by the organism following the injection of drugs such as atoxyl or tryparsamide. ALBERT L. RAWLINS

Existence of a specific carbohydrate substance in B. perfringens. MARIE E. JIMENEZ. *Compt. rend. soc. biol.* 106, 140–1(1931).—The precipitogen of *B. perfringens* in salt water or broth is pptd. by addn. of alc. contg. 1.3% Na acetate; a white, gelatinous sediment is obtained which, on drying in vacuum, yields a yellowish powder almost entirely sol. in water; the aq. soln. of this powder ppts. strongly in the presence of the serum obtained in the immunization of horses by means of *B. perfringens;* it does not give the biuret reaction, contains a carbohydrate (Molisch reaction pos.), does not reduce Fehling's soln. except after boiling for 1 hr. with 0.5% H_2SO_4, and it contains N.

ALBERT L. RAWLINS

Brucella abortus in Porto Rico. PABLO MORALES-OTERO. *Porto Rico J. Pub. Health Trop. Med.* 6, 1–88(1930).—Sunlight has a deleterious action on cultures of *Brucella abortus*, since cultures exposed to sunlight were sterile in 3 hrs. Ultra-violet light from an Alpine sun lamp had a similar effect. The temp. was kept low by exposing the cultures on ice; when the temp. was allowed to rise the destructive effect of light was even more pronounced. In studying the influence of heat alone on the cultures it was found that a marked diminution of viable organisms occurred in suspensions of *B. abortus* when incubated in the water bath at 42°, but the suspensions were not sterile after 3 hrs. Organisms which survived the exposure to sunlight and ultra-violet light were cultured in broth and injected into mice to test their virulence. The virulence was altered very little if any by the exposure to light. Vaccination with living vaccines as a method for control of Bang's disease was studied; it is believed that this method deserves further investigation. The glucose utilization, the liberation of H_2S and the growth in Huddleson's dye media were studied on 8 strains of *Brucella* and differences were noted. The serological relations of these strains were examd., but with the exception of 2 they could not be differentiated by agglutination or agglutinin absorption. A striking similarity was found between some of the strains isolated from human beings and some of the porcine strains in their action toward CO_2, their glucose metabolism and the pathol. lesions produced by them in guinea pigs. *B. abortus* seems to be capable of going through a Berkefeld W. filter. Sterile filtrates of a broth culture of *Brucella* when injected into mice did not affect them and produced no appreciable pathological lesions in their viscera. Human infection is very low in Porto Rico despite the high cattle infection. Exptl. infection with *B. abortus* in man suggests that the porcine strains are more virulent for man than are the bovine varieties. Only the most virulent bovine strains can infect man through the gastro-intestinal tract. Smaller doses are necessary to produce infection through abraded skin than through the gastro-intestinal canal. Numerous tables, graphs and references are given. G. SCHWOCH

GARDNER, A. D.: **Microbes and Ultramicrobes:** Being an Account of the Bacteriophage in its Relations to Bacterial Variation and the Invisible Viruses. London: Methuen. 3s. 6d., net.

D—BOTANY

THOMAS G. PHILLIPS

Synthetic nutrient solutions for culturing Ustilago zeae. EMERY R. RANKER. *J. Agr. Research* 41, 435–43(1930).—A standard reproducible culture medium is recommended for culturing *Ustilago zeae*. This is a synthetic nutrient soln. which has the following compn., expressed as g./l. of soln.: 0.3 g. K_2SO_4, 0.1 g. NH_4NO_3, 0.1 g. $CaCl_2$, 0.1 g. $Mg_3(PO_4)_2 \cdot 4H_2O$, 10 g. dextrose and enough distd. H_2O to make up to 1 l. The reaction of this nutrient soln. before sterilization is p_H 7.4 and after sterilization it is p_H 5.6. The optimum quantity of dextrose varies from 5 to 10 g./l. depending upon the length of time the culture is inoculated. Maltose is preferable to dextrose for certain physiologic forms of smut. When a solid medium is desired 1.5% of agar can be added.

J. R. ADAMS

Seasonal changes in the catalase activity of conifer leaves. JOSEPH DOYLE AND P. O'CONNOR. *Ann. Botany* 44, 907–15(1930).—In confirmation of the results of Doyle and Clinch (cf. *C. A.* 23, 2459) and contrary to the statements of Burge (*C. A.* 20, 2691, 3300) the authors find that the catalase activity of leaves of *Tsuga albertiana, T. canadensis, Juniperus communis, J. rigida, Pinus laricio, P. strobus, P. contorta, Abies webbiana, J. rigida* and *Picea omorica* is in all cases very markedly higher in winter (January) than in May, July or October. Increase in temp. of the plants for short periods during the winter did not alter the catalase activity. In conifers there is no correlation between catalase content and degree of metabolic activity. J. S. C.

The effect of ionized air on the rate of respiration of fungi. S. R. VAN ASPEREN DE BOER. *Ann. Botany* 44, 989–99(1930).—Expts. with *Phycomyces blakesleeanus* and

Polyporus destructor by the Pfeffer-Pettenkofer method and by a microrespirometer method gave consistently neg. effects upon respiration rate. Ionization of the air was effected by means of Po, the degree of ionization ranging from 200 times to several million times that of normal air. JOSEPH S. CALDWELL

The resistance to poisons of desiccated plant tissue. WALTER W. ALLEN. *Ann. Botany* **44**, 1001–9(1930).—Air-dried material of *Mnium hornum* submerged in abs. alc. for 1 to 13 hrs. was able to grow when thoroughly washed and again placed in the soil. Material placed in abs. alc. 1 hr., then in xylene 1 hr., then washed in alc. and in water, also grew, as did material similarly treated with alc. and acetone or alc. and ether. Submersion in dil. (50%) alc. or in chloroform was fatal. JOSEPH S. CALDWELL

Further studies on transport in the cotton plant. I. Preliminary observations on the transport of phosphorus, potassium and calcium. F. G. MASON AND E. G. MASKELL. *Ann. Botany* **45**, 125–73(1931).—The ringing methods employed in earlier studies of the transport of carbohydrates and N were used (*C. A.* **24**, 5331). In plants deprived of a ring of bark, P, K and Ca accumulate above the ring and diminish below it just as do carbohydrates and N. P, K, Ca and ash constituents ascend the stem mainly by way of the wood, and P and K are returned by way of the phloem to the roots. No evidence of the return of Ca from the leaves was obtained. There is evidence that N, K and P may be transported to the lower portion of the plant in amts. in excess of the needs there, and may there pass into the tracheal sap and again be transported to the leaves. This downward movement of mineral nutrients must affect the rate of entrance of the salts and may in part explain the absence of a marked increase in salt uptake when transpiration is increased. It was possible to reverse the direction of movement of P and of ash constituents by reversing the relative positions of the leafy and leafless portions of the stem. Removal of bolls is followed by marked increases in concn. of P and ash and smaller increases in Ca in the stem and leaves. P, K and some ash constituents travel to the boll along gradients in the phloem, Ca mainly through the xylem. J. S. C.

The effect of chloroform upon the rotation in the internodes of Nitella. SUSAN P. NICHOLS. *Bull. Torrey Bot. Club* **57**, 153–63(1930).—In continuation of earlier work upon the effect of wounding upon the rotation of protoplasm (*C. A.* **20**, 433) chloroform has been applied to the wall of an internode with a capillary pipet. An area of non-motile protoplasm is produced at the point of application, over which the general protoplasm pushes as rotation continues. The non-motile area ultimately resumes movement. Dipping the internode into chloroform for 2–5 seconds always resulted in cessation of movement after 3–6 hrs. The effect of chloroform is considered to be one of gelation. JOSEPH S. CALDWELL

Purification and certain properties of the virus of typical tomato mosaic. P. H. BREWER, H. R. KRAYBILL, R. W. SWANSON AND M. W. GARDNER. *Phytopathology* **20**, 943–50(1930). -A clear, colorless virus suspension was obtained by mincing and pressing affected plants, passing the ext. through the supercentrifuge, discarding the liquid, suspending the residue in distd. water, centrifuging and clearing and decolorizing with slightly acid Al gel. Such a suspension was highly infectious and continued to be so after filtering through a Pasteur-Chamberland F filter or Schleicher and Shull 1½% collodion filter, but was made non infectious by passage through a Pasteur-Chamberland B filter, collodion filters of 3% or more, or atmometer cylinders. The material retained by the filters was infectious. Of 9 suspensions stored at 36–40° F., 4 became somewhat weakened with age and 1 had lost its virulence after 564 days. The virus was inactivated when alkalinized to p_H 7.5–8.5 and reactivated by restoring its acidity. It was not inactivated by acid up to p_H 2.46. Heating to 82–84° for 25 min. or to 88° for a shorter time destroys the virus. In cataphoresis tests, the virus-bearing particles accumulate at the pos. pole. JOSEPH S. CALDWELL

Effect of mineral nutrition on the reaction of wheat varieties to leaf rust. K. D. DOAK. *Phytopathology* **21**, 108–9(1931).—Wheat varieties showing various types of reaction to one physiologic form of *Puccinia triticina* were grown in sand cultures with various degrees of excess and deficiency in N, P and K. N increased susceptibility and P and K decreased it. Excess N induced the development of larger primary uredinia, more abundant secondary uredinia and decreased chlorosis. Excess P increased chlorosis and retarded or prevented development of secondary without affecting primary uredinia. Excess K increased chlorosis and decreased the size of primary uredinia. In varieties of intermediate reaction, excess N increased the no. of infection points, while N deficiency, excess P and excess K decreased it. Deficiency of P or of K decreased chlorosis. JOSEPH S. CALDWELL

Hydrogen sulfide as related to the fungicidal action of sulfur. S. E. Q. MCCALLAN AND FRANK WILCOXON. *Phytopathology* **21**, 113(1931).—H_2S is exceedingly toxic to

fungus spores and is evolved when S is applied to spores or to leaves of plants. Germination of conidia and uredo spores of 8 species of fungi were completely inhibited by concns. of H_2S ranging from 0.2 to 40 mg. per l., the order of sensitivity being identical with that of these fungi to S. Evolution of H_2S has been demonstrated in 19 fungi and 26 higher plants. Spores of *Sclerotinia* and *Glomerella* produce 5 and 15% of their weight of H_2S in 6 hrs. Indications point to the reduction of S on or within the spores and its initiation by glutathione. The presence of glutathione in spores of *Sclerotinia* has been demonstrated. JOSEPH S. CALDWELL

The influence of hydrogen-ion concentration and of sodium bicarbonate and related substances on Penicillium italicum and P. digitatum. RAIMUND H. MARLOTH. *Phytopathology* **21**, 169–98(1931).—Citrus fruits are dipped in a 3% soln. of $NaHCO_3$ prior to packing to prevent decay by blue and green molds (*Penicillium italicum* and *P. digitatum*). An attempt was made to det. whether the action is specific or has a general physiol. basis. The fungi were cultured on modified Duggar's soln. to which an autoclaved aq. orange ext. was added in an app. which permitted daily renewal of the medium. *P. italicum* grew nearly equally well over a p_H range of 2.9 to 6.5; *P. digitatum*, over a range of p_H 3.0 to 6.0. Germination of spores in hanging drop cultures was inhibited at p_H 1.5–2.5, and excellent at 3.0 to 5.3, falling off at p_H 7.0–9.0. The Na ion markedly inhibits germination at concns. of 15,000–20,000 p. p. m.; the K ion does not. Na tetraborate is more toxic to *P. digitatum* and $NaHCO_3$ is more toxic to *P. italicum*. The effect of the wash treatment in preventing decay is due to the fact that the film of salt left upon the fruit forms a satd. solution of Na_2CO_3 about the developing germ tubes which is toxic thereto. JOSEPH S. CALDWELL

Enzyme formation in Penicillium glaucum. I. SAKISABURO WADA. *Acta Schol. Med. Univ. Imp. Kioto* **13**, 128–44(1930).—A study of the relationship between the compn. of the nutrient medium and the enzyme content of *Penicillium glaucum*. When this mold is grown on a protein-free, carbohydrate-free medium (salts and glycerol), it contains desamidases, urease, a glucosamine-splitting enzyme, nuclease, pepsin and trypsin-like enzymes and erepsin. It does not show the relation between the nutrient medium and enzyme content exhibited by bacteria. **II.** *Ibid* 145–57.—In the mold cultivated with the above medium lactase and a glucolytic enzyme were absent but these are also lacking in a carbohydrate-contg. medium. In the culture liquid, a nuclease, pepsin, glycogenase, invertase, a glucosidase, a lipase and a hippuric acid splitting enzyme were present. **III.** *Ibid* 158–61.—A comparison of the enzyme content of the mold when grown on a medium contg. protein and carbohydrate (glucose, meat ext. and peptone) with that above shows that the pepsin, trypsin and lipase content is much decreased when these foodstuffs are absent from the medium. H. J. D., JR.

Chlorophyll formation. KURT NOACK AND WILHELM KIESSLING. *Z. angew. Chem.* **44**, 93–6(1931); cf. *C. A.* **25**, 723.—Protochlorophyll, the precursor of chlorophyll, is present in small amt. in seedlings germinated in the dark but is more easily obtained from the inner membrane of the seed coat of pumpkin seeds. It yields a series of derivs. analogous to those prepd. by Willstatter from chlorophyll. Like chlorophyll it contains 3 carboxyls, one of which is esterified with phytol, another with Me, while the 3rd occurs in lactone or lactam linkage. Removal of Mg by acid treatment yields *protopheophytin* contg. the phytol, Me and lactam groupings of the parent substance. Esterification of this with 30% HCl in MeOH replaces the phytol by Me and esterifies the lactam carboxyl, yielding *protophytochlorin trimethyl ester*, m. 234.5°. The opening of the lactam ring causes a marked change in the spectral behavior of the protopheophytin as shown in the intensity sequence of the absorption bands. Partial sapon. of protopheophytin should yield protopheophorbide, but this method is unsatisfactory because the concn. of alkali required leads to anhydridization. *Protopheophorbide* was obtained, however, by partial sapon. of the above trimethyl ester. The substance contains 1 CO_2H, 1 CO_2Me and the lactam group, and is analogous to pheophorbide a. The dimethyl ester, *methylprotopheophorbide*, in which the lactam group remains intact, is best prepd. by reduction of methylpheophorbide a from chlorophyll by means of Fe and 80% CH_2O_2. Its spectrum is midway between that of protopheophytin and that of phylloerythrin. Both protopheophorbide and its Me deriv. yield the same trimethyl ester identical with that obtained from protopheophytin. Derivs. of the protochlorophyll series differ from the corresponding chlorophyll derivs. in that they contain 1 less O. This O, which is a structural part of the chlorophyll, is present in a linkage as yet undetd. Phylloerythrin, the chlorophyll deriv. present in beef bile, is closely related to protopheophytin. Like the latter it yields a green pigment when Mg is introduced by the Grignard reaction with *p*-$Me_2NC_6H_4MgI$. The pigment thus obtained resembles protochlorophyll spectroscopically in the same manner that phylloerythrin resembles proto

pheophytin, *i. e.*, in a displacement of the absorption bands toward the violet. Derivs. of the phylloerythrin series are isomeric with the corresponding protopheophytin derivs. The phylloerythrin used in this work was prepd. from 900 l. of beef bile. It is neither an ester nor a free acid but an intramolecular anhydride, and may be converted into an acid by treatment in the cold with KOH in Me_2CHOH. The accompanying spectral change is similar to that observed in the conversion of protopheophytin to the protophytochlorin trimethyl ester. The product is probably a tricarboxylic acid in which 1 CO_2H is anhydridized. With CH_2N_2 it yields a *trimethyl ester*, m. 232–3°, isomeric with the trimethyl ester of protophytochlorin. Phylloerythrin, like protochlorophyll, is a reduction product of chlorophyll. It gives a secondary series of derivs. in which a splitting off of CO_2 has occurred. Esterification of phylloerythrin with MeOH-HCl yields a mono- or a mixt. of mono- and di-esters according to the intensity of action. Sapon. of the ester gives a tricarboxylic acid contg. 1 Me, and this when esterified yields a *trimethyl ester*, m. 205°. Phylloerythrin thus contains an acid anhydride and a lactam group, the latter probably identical with that of chlorophyll. Chlorophyll formation represents a photooxidation of protochlorophyll. The addn. of O yields chlorophyll a, which in turn is the precursor of the more highly oxidized chlorophyll b. Phylloerythrin formation is the reverse process and consists not only in reduction, but also in Mg cleavage, sapon. and anhydridization. Probably phylloerythrin is a biol. transitional stage between leaf and blood pigment. A. W. Dox

The copper and manganese content of some vegetable tissues. Maria van Leeuwen. *Ann. physiol. physicochim. biol.* **6**, 178–81(1930).—Cu and Mn are present in approx. the same concn. (0.2–2.5 mg. %, averaging around 1) in the leaves of rhododendron, nasturtium, ivy, vine, hops, poplar, fir, etc. H. Eagle

Saponin from spinach. O. Dafert. *Z. Untersuch. Lebensm.* **60**, 408–9(1930).—Very little saponin occurs in the stem or leaf, and none at all in the seed of spinach. The hemolytic index of the root, because of its saponin content, is 1:1000 for sun-dried roots, and 1:400 for roots dried in an oven at 100°. The index rises from 1:85 for a plant 3 weeks old to a max. of 1:800 after 7 weeks, and then falls to 1:280 after 20 weeks. The saponin is extd. from the scraped and sun-dried root in a 5-fold vol. of 70% EtOH for 2 hrs., followed by extn. for 1 hr. with a 2-fold vol. of EtOH. The exts. are filtered, the residue is pressed and the crude saponin then separates from the filtrate after 1 day in the ice-chest. It is filtered off, washed with abs. alc., the filtrate evapd. to $^1/_3$ its vol., cooled and an addnl. yield of saponin is thus obtained. The total quantity is dried, extd. with EtOAc, and the saponin recrystd. from hot 96% EtOH as pointed white needles with a hemolytic index of 1:1,000,000 and m. 260 2°. The properties of saponin are given. Hydrolysis with H_2SO_4 in 50% EtOH, and treatment with charcoal gave a white amorphous *sapogenin*, $C_{24}H_{44}O_7$, m. 208–12°, sol. in alc. and EtOAc and insol. in H_2O, C_6H_6 or Et_2O. C. R. Fellers

Vegetable rennet. D. Milne. *Rept. Operations Dept. Agr., Punjab, Year ending June 30, 1929*, Pt. I, 48–9(1930).—The ripe berries of *Withania coagulans*, which grows wild on the Punjab plains, yields an ext. which is rich in rennet. The crude ext. imparts a brown coloration and a bitter taste to milk and is unsuitable for use in the prepn. of cheese. By repeated pptn. the active principle is obtained free from these objections and in a very pure condition, one part of the prepn. being sufficient to coagulate 1000 parts of milk in 1 min. K. D. Jacob

Decomposition of salts of organic acids by the mold fungus Aspergillus fumaricus. W. Thies. *Ber.* **64B**, 214–8(1931).—*Aspergillus fumaricus* decomposes sugar, forming not only H_2CO_3 and $H_2C_2O_4$ as end products, but also citric (I), fumaric (II) and gluconic (III) acids. If other acids are formed as intermediate products, the fungus should decomposes these acids in sugar-free cultures to I or II. Two series of expts. were carried out, one with the Ca salts of I, II and III, and of saccharic, succinic, tartaric, malic and lactic acids, the other with the K, Na and NH_4 salts of the same acids. I and II were included in order to det. whether they are exclusively end products, or whether they are further utilizable by the fungus. In the first series H_2CO_3 was the end product of the decompn., as shown by the formation of considerable quantities of $CaCO_3$; in the second, the end product was $H_2C_2O_4$. The results indicate that the nature of the cation affects the change: if the cation is bivalent, the end product is H_2CO_3; if univalent, the end product is $H_2C_2O_4$. The expts. show clearly that there is no support for the theory that in the decompn. of sugar to I or II, other acids are formed as intermediate products. Louise Kelley

The influence of environmental factors on acid formation by Aspergillus fumaricus. W. Thies. *Zentr. Bakt. Parasitenk.*, 2 Abt., **82**, 321–47(1930); cf. preceding abstract.—The influence of various factors as, neutralization with Pb or $BaCO_3$, O tension, character of the medium and p_H, had little influence on acid production. Gluconic and citric

acids are always formed; oxalic and fumaric acids sometimes result. Other acids are not formed. JOHN T. MYERS

Presence of rutoside in the leafy stems of Bupleorum falcatum L. J. RABATE. *Bull. soc. chim. biol.* **12**, 974–7(1930).—Extn. with alc. gave 4.3 g. per kg. dry wt. C. G. KING

Wall structure and mineralization in coralline algae. L. G. M. BAAS-BECKING AND E. WAYNE GALLIHER. *J. Phys. Chem.* **35**, 467–79(1931).—The optical properties of the cell walls of the algae, *Corallina officinalis* Lamark and *Amphiroa dorbigniana* Decaisne were studied in the hopes of detg. their chem. and phys. nature. The data show that the cell walls of these 2 organisms are made of a non-cellulosic material, probably a pectin-like substance, and are birefringent in longitudinal and isotropic in cross section. The fibers are built up of tangentially arranged, elongate lamellae interspersed with concentrically arranged interstices, both of which are small in relation to the wave length of light. Calcite is the only mineral deposited by the living organism, the individual crystals of which are only a few tenths of a micron long, and arranged with the c-axis perpendicular to the longitudinal axis of the fiber. The deposition of Mg is a secondary phenomenon. H. W. LEAHY

Investigations on the nutrition of fruit trees. Some effects of deficiencies of nitrogen, potassium, calcium and magnesium, with special reference to the behavior of certain varieties of apple trees. M. B. DAVIS. *J. Pomology and Hort. Sci.* **8**, 316–44 (1930).—Bramley seedling, Worcester Permain and Allington Pippin apples were grown under controlled conditions in pots in sand and in soil and given differential nutritional treatments. Omission of N resulted in restricted shoot growth, yellowed leaves and delayed bud break in spring. Lack of K_2O caused early partial defoliation and later retention of the remaining foliage, leaf scorch and much earlier bud break. P_2O_5 omission produced earlier defoliation, very restricted shoot growth, typical bronzing of the foliage and delayed bud break. Absence of CaO resulted in increased shoot growth and larger leaves, which later broke down either in the center or along the margins. Omission of MgO was characterized by reduced shoot growth in most cases, earlier defoliation and marked breakdown of foliage as brown spots in the center and margins of the leaves. The omission of an element always resulted in a lower percentage of that element in the ash and dry matter of the young shoots and leaves. Reduction of K_2O was assocd. with increases of CaO and MgO; low CaO was accompanied by high K_2O, high MgO and low P_2O_5; low MgO was assocd. with high CaO, low P_2O_5 and low K_2O. A high degree of correlation existed between symptoms exhibited and amt. of the related element in the ash and dry matter. A. L. MEHRING

Prolonging the longevity of rice seed. G. SAMPIETRO. *Giorn. risicoltura* **21**, 1–5 (1931).—Rice seed, dried to a moisture content of 5% and kept in an atm. of N, gave a 99% germination after 8 years. Seed kept in CO_2, in vacuum or in air did not germinate at all when dried to a normal 13% or to a 5% moisture content; likewise seed kept in N when contg. 13% moisture. ALBERT R. MERZ

The influence of iodine on the reproduction of yeasts. J. KOOIJMANS. *Zentr. Bakt. Parasitenk.*, 2 Abt., **82**, 347–53(1930).—Minute amts. of I (about one ten millionth part) have a slight growth-stimulating effect on some strains of yeast. There is no relationship between I and bios. JOHN T. MYERS

The pigment of the watermelon. L. ZECHMEISTER AND P. TUZSON. *Ber.* **63B**, 2881–3(1930).—The pigment consists of a mixt. of lycopin and carotene (8–10 parts of the former to 1 of the latter in melons from southern Hungary). In small-scale expts. 0.2 g. of the mixt. was obtained from fourteen kilograms of the fresh melons, while 150 kg. of the melons yielded 1.3 g. lycopin and 0.07 g. carotene, and another 0.07 g. of the latter remained in the mother liquors. C. A. R.

Permeability of I on some economic plants (MALHOTRA) **15**. Salicinercin of *Salix cinerea* L.; its identity with piceoside (RABATE) **10**.

E—NUTRITION

PHILIP B. HAWK

Animal experiments on the significance of increased vitamin administration in the therapy of tuberculosis. W. PFANNSTIEL AND B. SCHARLAU. *Beitr. klin. Tuberk.* **73**, 351–72(1930).—The authors used not only primary infected animals but also superinfected immune animals which had been given the preliminary infection with low virulent human tubercle bacilli. In rabbits vitamin B concentrate contg. in 1 cc. the equiv. of 100 g. of yeast, and vitamin D (ergosterol, vigantol) revealed no therapeutic effect. Vitamin A (cod liver oil), however, had a favorable influence on some of the animals.

Therapeutic action was noted with a coincident peroral administration of yeast and rayed ergosterol. With weak infections in immune animals there was a complete lack of tuberculosis following the use of vitamins B and D, while with larger infection there occurred a favorable type of disease. A similar, though smaller, effect was noted in primary infected animals. A decidedly less effect resulted when vigantol soln. was not given perorally but by inhalation. Primary infected animals were unfavorably affected by overdoses of vitamins B, D and A. In children wt. control can prevent overdosing of vitamin D, and the danger of a B hypervitaminosis need not be feared. H. J. C.

Vitamin A and carotene. NORMAN S. CAPPER. *Nature* **126**, 685(1930).—The administration of 1 mg. doses of carotene daily to chickens on a vitamin-A-free diet cured the vitamin-A deficiency and enabled normal growth to take place. The livers of these birds gave strong positive tests for vitamin A. It is concluded that carotene may serve as a precursor of this vitamin. H. J. DEUEL, JR.

The significance of the ultra-red range for the protective substance against rickets. WALTER HIRSCH AND LOTTE KELLNER. *Klin. Wochschr.* **10**, 171–2(1931).—Ergosterol, has an absorption band at 3.7μ (ultra-red); following irradiation with ultra-violet light the ergosterol develops a new weak absorption band at 0.97μ, while the normal band increases in intensity. Ergosterol, irradiated with ultra-violet light, has 2 absorption ranges in the ultra-violet range at 260–300 and 230–260 mμ. Both are increased by subsequent ultra-red irradiation; in the case of the former, the increase signifies a decompn. of the sp. protective substance; in the latter it signifies the formation of a new substance. The antirachitic factor of ergosterol irradiated with ultra-violet light is destroyed by the ultra-red. H. EAGLE

Importance of sugar as the fuel of life. F. FISCHLER. *Arch. Pharm.* **269**, 9–22 (1931).—An address. W. O. E.

Detection of vitamin A in invalid food products. H. MATTIS AND E. NOLTE. *Arch. Pharm.* **269**, 22–4(1931).—The results obtained with 3 series of rats in an exptl. examn. of the products Novotropon and Ferripan are graphically shown in connection with the keratomalacia induced and later dissipated by feeding with vitamin-A-free products and the above-named invalid foods. W. O. E.

Influence of the canning industry in the changing dietary. E. F. KOHMAN. *J. Am. Dietetic Assoc.* **6**, 123–9(1930).—Canned foods have 3 distinct advantages from the standpoint of their vitamins: (1) they are always canned promptly after harvesting; (2) oxidation, which destroys the vitamins, is not permitted to take place in com. canning as it does in open-kettle cooking and (3) after canning, the vitamins in canned foods are apparently stable and may be stored for long periods with insignificant or no loss. For example, canned tomatoes are richer in vitamins A and B than orange juice and are only slightly lower in vitamin C. Canned fish products of all descriptions contain an unusual amt. of I. The diet, even though complete in its chem. constituents, will not produce its optimum effect unless eaten with relish and enjoyment. C. R. FELLERS

Influence of fertilizer treatment on the vitamin A content of spinach. HANNAH E. HONEYWELL AND R. ADAMS DUTCHER. Penna. Agr. Expt. Sta., *Bull.* **258**, 8(1930); *43d Ann. Report* (Abstract).—Fourteen samples of Rhode Island spinach, dried and stored under CO_2, were assayed for vitamin-A content. The spinach was grown under various fertilizer treatments. No significant results were obtained except that where spinach is grown with Mn as a limiting soil nutrient, less vitamin A is found. This indicates that pigmentation, metabolism and vitamin A synthesis are correlated. The work is being continued. C. R. FELLERS

"Luxury consumption" and feeding. R. BONNET AND T. H. TCHI. *Arch. intern. physiol.* **31**, 335–57(1929); *Physiol. Abstracts* **15**, 243.—In overfeeding, rabbits and pigeons do not make a "luxury consumption," and in underfeeding the breakdown processes of the body are cut down correspondingly G. G.

Physiological ketogenesis in herbivora. P. H. FLEURET. *Arch. intern. physiol.* **31**, 363–412(1929); *Physiol. Abstracts* **15**, 243(1930).—In herbivora there is an abundant excretion of keto bodies on any diet or in inanition; these substances are of both endogenous and exogenous origin. Proteins are more ketogenic than carbohydrates, which are in turn more so than fats. The addn. of HCl to the food diminishes the excretion of "keto bodies," but there is no relation between the excretion and the total acidity or alky. of the urine. Variations occur in any one animal on a const. diet, and also in different animals. G. G.

Mineral feeding experiments. Iodine, lime and salt-lick questions. B. W. SIMPSON. *New Zealand J. Agr.* **42**, 18–23(1931).—The I content of beets and lucerne was increased about 10-fold by the application of small amts. of I salts to the soil. The

percentage increase in the growth of rabbits receiving I either in the form of inorg. salts or in the form of foods high in I was distinctly greater than that of the control animals. Addn. of lime, alone or in the form of salt-lick, to the diet of rabbits did not cause enlargement of the thyroid gland. K. D. JACOB

The vitamin D content of grasses varying in origin and fertilization. ARTHUR SCHEUNERT AND JOHANNES RESCHKE. *Tierernähr.* 2, 262–9(1930).—A no. of green grasses of varying origins were tested for their vitamin-D content. Different types of grass have different vitamin-D contents. The same type of grass may show a widely varying vitamin-D content. The reasons for this cannot be explained. No decisive influence seems to be attributable to the use of artificial fertilizers. The conditions of the soil presumably play the most important part. J. C. JURRJENS

A new cereal mixture containing vitamins and mineral elements. FREDERICK F. TISDALL, T. G. H. DRAKE AND ALAN BROWN. *Am. J. Diseases Children* 40, 791–9 (1930).—The prepn. of a cereal mixt. is described, composed of wheat meal, oat meal, corn meal, wheat germ, bone meal, dried brewer's yeast and alfalfa. The mixt. supplies the minerals and vitamins which are lacking in the ordinary milled, part grain cereal. The Fe content of the mixt. is 0.024%, the Cu content, 0.0013%, and the Ca content, 0.78%. Vitamin A is supplied by the wheat germ and the alfalfa, vitamin B_1 and B_2 by wheat germ and yeast and vitamin E by the wheat germ. Vitamin D may be secured by irradiation either of the wheat germ or the yeast. The mixt. is palatable and does not irritate the intestinal tract. E. R. MAIN

Milk sugar in infant feeding. A study of the effects of the routine use of milk sugar in infant feeding. B. WINSTON JARVIS. *Am. J. Diseases Children* 40, 993–9 (1930).—Lactose given to infants in 10 g. quantities at 3-day intervals is well tolerated when methods are used to give the other elements of the diet their max. digestibility. Infants fed with lactose resemble breast-fed infants in firmness of tissue and resistance to infection. When compared according to age-wt., they possess more living tissue than infants fed on vegetable sugar, and are less susceptible to sudden dehydration with acidosis as a result of parenteral infection. The use of lactose is desirable as a source of galactose for the development of the central nervous system. E. R. MAIN

The carbon dioxide absorption curve of infants fed lactic acid, hydrochloric acid and boiled cow milk. DANIEL C. DARROW. *Am. J. Diseases Children* 40, 1010–23(1930).—The CO_2 absorption curves for children fed either boiled whole milk or milk to which lactic acid, or both lactic acid and HCl have been added are essentially normal. The same changes in diet produce no significant changes in the bicarbonate concn., lactic acid concn. or p_H of the blood. The p_H of the venous blood, in infancy, is 7.37 ± 0.05. The venous CO_2 tension is 41 ± 5.0 mm. of Hg. The hemoglobin exerts the same influence on the slope of the CO_2 absorption curve as in adults. E. R. MAIN

Recent progress in poultry nutrition. GRIGORIJ CHOMKOVIC AND JAN PODHRADSKY. *Wiss. Arch. Landw., Abt. B., Tierernähr. Tierzucht* 2, 27–214(1930).—A review. Seven pages of references are appended. W. GORDON ROSE

Banana—a challenge to chemical investigation (VON LORSECKER) **12.** Vitamins and palm oil in margarine (EPSTEIN) **27.** Determination of Ca, Mg and P in cattle excreta (MORRIS, *et al.*) **7.**

BERG, RAGNAR: **Eiweissbedarf und Mineralstoffwechsel bei einfachster Ernährung.** Leipzig: Hirzel. 239 pp. M. 10.50; linen, M. 12.

F—PHYSIOLOGY

E. K. MARSHALL, JR.

Citric acid content of animal fluids (cerebrospinal, follicular and amniotic fluids and aqueous humor). I. I. NITZESCU AND I. D. GEORGESCU. *Compt. rend.* 190, 1325–7 (1930).—The citric acid content of the following animal fluids has been detd. by Thunberg's methylene-blue test: human cerebrospinal fluid 0.075–0.080 g. per l.; of dogs 0.090–0.100 g. per l.; aq. humor of oxen, 0.012 g. per l.; follicular fluid of cows, 0.040 g. per l.; human amniotic fluid, 0.025–0.027 g. per l. B. C. A.

Occurrence of metallic elements in biological material. W. B. S. BISHOP. *Cancer Research Comm. Univ. of Sydney* 1, 242–53(1930).—The elements of groups I and II in the periodic table are widely distributed. Group III is the poorest as regards biol. occurrence, the presence of Al in animal tissues being much in dispute. Pb (group IV) is the 1st toxic element occurring in tissues. As and V are biologically the most interesting members of group V, the latter being but slowly eliminated after injection. The carcinogenetic action of tar does not depend on its As content. Mn is found in small

amt. in animal tissues but is not related to sarcomata or carcinomata. Cu is connected with hemoglobin formation, while Zn may play some part in reproduction. B. C. A.

Fibrillar structures in the albuminous layer of the egg of the fowl. G. C. HERINGA AND S. H. VAN KEMPE VALK. *Proc. Acad. Sci. Amsterdam* **33**, 530–2(1930).—The albuminous layer surrounding the egg yolk consists of a series of strata, the outer layers being clear and transparent, while the rest is opaque. The membranes are of fibrillar structure. The fibrils are dissolved on digestion with pepsin and HCl at 37°, when the albumin of a hard-boiled egg is dissolved completely. In a raw egg the membranes are dissolved less readily than is the remainder of the albumin, and when sections are prepared from a frozen egg, the membranous structures remain in connection even after digestion. The membranes are completely sol. in alk. trypsin. Evidence is obtained that the fibrils are composed of a keratinic substance. B. C. A.

The absorption of ultra-violet light by the liquids of the organism. J. CLUZET AND T. KOFMAN. *Compt. rend. soc. biol.* **103**, 1123–5(1930).—Serum, plasma, urine, bile and aq. humor (ox) are completely opaque in a layer 15 mm. thick to ultra-violet light (3000–2300 A. U.). Cerebrospinal fluid, however, has an opacity relative to H_2O of 68.6. The opacities of increasing dilns. of these liquids show important differences. The electrolyte contents of bile and urine are responsible for as much absorption of ultra-violet light as the proteins of serum or plasma. The opacity of defibrinated blood at dilns. of 1/100–1/1000 is much greater than that of plasma for the same dilns.

B. C. BRUNSTETTER

Acetylcholine in beef blood. Comment on the paper of J. Kapfhammer and C. Bischoff. FRITZ WREDE AND WERNER KEIL. *Z. physiol. Chem.* **194**, 229–31(1931).—Kapfhammer and Bischoff (*C. A.* **25**, 127) have reported the occurrence of acetylcholine (28.8 mg. per l.) in beef blood, but neglected to verify their findings by physiol. tests on isolated intestine. Exts. prepd. by the method of K. and B. failed to show any physiol. action on guinea pig intestine in Tyrode soln. An ext. which should contain 2.9 mg. acetylcholine per cc. according to K. and B. gave no appreciable contraction with quantities of less than 5 cc. Acetylcholine added to the blood in quantities up to 30 mg. per l. disappeared completely during the process of purification. On the other hand, treatment of acetylcholine-HCl salt with 10% CCl_3CO_2H during 12 hrs. did not impair its physiol. action. It appears that the acetylcholine, originally present or subsequently added, is carried down in the protein pptn., and does not appear in the ext. as claimed by K. and B. A. W. DOX

Choline in the uterus and its relation to labor pains. ERICH STRACK AND ADALBERT LOESCHKE. *Z. physiol. Chem.* **194**, 269–76(1931); cf. *C. A.* **23**, 5493.—Although the human placenta contains 180 mg. of choline per kg. no choline could be found in the gravid uterus. The av. choline content of the non-gravid human uterus was 47 mg. per kg. Beef and pig uteri, on the other hand, showed practically the same choline content in the gravid as in the non-gravid state, approx. 160 mg. No physiol. relationship could be demonstrated between choline content of the uterus and the onset or severity of labor pains. A. W. DOX

Regulation of the secretion of insulin, with observations on the regeneration of the islands of Langerhans in the pancreas. G. JORNS. *Klin. Wochschr.* **8**, 2319–22 (1929).—An inconclusive, highly theoretical discussion. H. EAGLE

The hormones of the anterior lobe of the hypophysis. I. BERNHARD ZONDEK. *Klin. Wochschr.* **9**, 245–8(1930); cf. *C. A.* **23**, 4738.—The hormone of the anterior pituitary lobe is the true sex hormone. An ext. (prolan) injected into the infantile rat causes (1) ripening of follicles, ovulation and rut, (2) the appearance of blood points in the ovary, and (3) formation of corpora lutea. Prolan is not the same as the growth-promoting ext. of Evan; and although it contains prephyson, the substance which regulates the sp. dynamic action of foods (Kestner), its hormonal effects upon the sex glands are not due to this substance. The sex hormone in prolan contains at least 2 distinct substances: one which initiates follicular ripening, uterine hyperemia and mucosal changes in the vagina of infantile white rats 4–5 weeks old (prolan A), and another which causes the formation of corpora lutea in 3–4 weeks old female mice, and which has no effect upon the uterine or vaginal mucosa (prolan B). Folliculin is formed both by the follicles and by copora lutea in women, but only by the former in animals. In the animal prolan A would mobilize folliculin, which induces rut; prolan B would induce luteinization. The formed copora lutea would then induce the hypersecretion of the uterine and vaginal mucosa by their hormone, which Corner calls lutin. **II. Follicular ripening hormone (prolan A). Menopause. Castration.** *Ibid* 393–6.—Prolan A can usually not be demonstrated in the urine of non-pregnant women unless it is concd. more than 5 times before extn. At the onset of climacterium there is an enormous

increase in the excretion of folliculin, up to as high as 200 units per 1000 cc. of morning urine, to be contrasted with the 10 and 30 units normally excreted during the intermenstrual and premenstrual period, resp. There is at this time a polyfolliculin amenorrhea. The second stage begins weeks or months later and is characterized by a complete absence of folliculin from the urine, with accompanying vasomotor disturbances. Finally, there is increased excretion of prolan A, which can be demonstrated in the urine of 25% of women at the menopause. Following removal of both ovaries, prolan A promptly appears in the urine in 75% of the cases. Even after Röntgen-ray castration, it appeared in 4 out of 10 cases. Z. suggests that it is excreted in the urine only when the ovaries, its elective site of action, are removed. Its increased formation following castration may be due to the removal of an ovarian-inhibiting substance. It is significant that the hypophysis undergoes histological changes at the menopause or following castration. H. EAGLE

Energy metabolism and its clinical significance (formation of lactic acid and oxygen consumption, function and metabolism, diet.) S. G. ZONDEK AND F. MATAKAS. *Klin. Wochschr.* 10, 11–7(1931).—The recent evidence tending to show that the formation of lactic acid is not the actual cause of muscle contraction is summarized: (1) Acetylcholine and other substances cause contraction without the release of lactic acid. (2) In tonic contractions, the formation of lactic acid follows the beginning of contraction. (3) Lactic acid production can be entirely inhibited by bromoacetic acid, *e. g.*, the possible *role of phosphocreatine* is discussed. In muscles under tension there are structural and functional changes which may explain the anomalous increase in lactic acid. Similar aerobic glucolysis is observed in other conditions involving nonspecific disturbances in metalbolism (Basedow's disease) as also in the metabolism of old leucocytes and mature erythrocytes. Deviations from the usual course of metabolism, in general, may therefore be due to non-specific cellular injury. Thus, lactic acid is not the cause, but a product, of muscle fatigue. The authors discuss the relation of these problems of muscle metabolism to clinical conditions. H. EAGLE

The relationship of fat in its passage through the placenta (contribution to the physiology of the placenta). WERNER BICKENBACH AND HANS RUPP. *Klin. Wochschr.* 10, 63–4(1931).—The fetus receives its fat directly from the maternal organism, unchanged by its placental passage. Thus, if pregnant rabbits are fed with linseed oil, cóntg. an oil with an I no. of 165–175 (normal rabbit fat = I no. of 50–60), the fat of the fetus is found to have exactly the same I no. as that of the mother. There is no real evidence for a splitting of fat in its passage through the placenta, such as occurs in the intestinal wall. Indeed, if the methyl esters of oleic acid, and the amyl ester of palmitic acid, are injected into a pregnant rabbit intravenously, they can be found as such in the fetal tissue; but no free amyl alc. or MeOH is demonstrable, indicating that there had not been any splitting of the fat in its placental passage. H. EAGLE

Pyroracemic acid in the metabolism of animal cells. BRUNO MENDEL, MILLY BAUCH AND FRIDA STRELITZ. *Klin. Wochschr.* 10, 118–9(1931).—Pyroracemic acid increases anaerobic fermentation by body cells more than 100%, causing them to approximate glucolytic activity of cancer cells. A simple test for pyroracemic acid is described, which is based on the fact that it prevents glyceraldehyde from inhibiting the fermentation by Jensen sarcoma, a test which detects several thousandths of a mg. Using this test, as well as that of Warburg, the authors find that cancer cells under normal conditions form very large quantities of pyroracemic acid. It is also present in mammalian sera: 10 mg. % in the serum of white mice, and somewhat less in rabbit, rat, guinea pig and human serum. H. EAGLE

The solubility, dissociation and tension of carbonic acid in urine. FRITZ MAINZER *Klin. Wochschr.* 10, 119(1931).—The soly. coeff. α (38°) varies between 0.44 and 0.51, the apparent dissocn. const. P (38°) is 5.8 6.3. The tension is very variable, ranging between 16.7 and 242 mm. Hg in 20-odd urines; obviously, however, it is much greater than it can possibly be in the tissues. H. EAGLE

The occurrence of very small quantities of mercury in the urine and stools. Its diagnostic significance and causes. PAUL BORINSKI. *Klin. Wochschr.* 10, 149–53 (1931).—38 of 75 normal people excreted as high as 10γ Hg daily, despite the absence of any known exposure to Hg. People with recent dental amalgam fillings excrete considerably more. Almost all foods contain Hg, the total quantity in the daily intake being about 5γ, corresponding to the urine output. H. EAGLE

Activating split products and hormones of the tissues. WOLFGANG WEICHARDT *Klin. Wochschr.* 10, 153–4(1931). Tissue exts. injected into mice increase the performance of its muscles; in larger doses they cause paralysis. Non-specific toxic processes may cause the liberation of these tissue hormones in the body, as shown by expts. upon

hearts. Very small quantities have no effect upon normal tissues, but do increase the performance of fatigued organs. Thus, 1:20,000 diln. of a hydrolysis product of the skin had a definite effect upon the contraction of a fatigued heart. H. EAGLE

The specific gravity of blood and its constituent parts. C. OESTREICH. *Klin. Wochschr.* **10**, 160–2(1931).—The sp. gr. of whole blood is 1.05–1.06, that of plasma 1.025–1.026. In *pernicious anemia*, the sp. gr. of the erythrocytes proper is increased from a normal value of 1.085–1.094 to 1.095–1.1. H. EAGLE

The time relationship of the formation of lactic acid in muscle contraction. OTTO MEYERHOF. *Klin. Wochschr.* **10**, 214–5(1931).—M. confirms the finding of Lehnartz that the supposed const. K = tension (g.) × duration of tetanus (seconds) × (cm. of muscle length/lactic acid formed (g.)) is larger if the muscle is killed immediately after the tetanic contraction than if 2–5 min. are allowed to elapse, *i. e.*, that there is a post-tetanic formation of lactic acid. However, he is unable to find that the const. K = tension (g.) × muscle length (cm.)/lactic acid (g.) for single contractions is dependent upon the time interval between stimuli, over a wide range (1–10 sec.). This late formation of lactic acid may play an important role in making possible the anaerobic resynthesis of creatinephosphoric acid, which is an endothermic reaction. H. EAGLE

Growth and development with special reference to domestic animals. XVI. The influence of temperature and breeding upon the rate of growth of chick embryos. EARL W. HENDERSON. Missouri Agr. Expt. Sta., *Research Bull.* **149**, 5–47(1930). —Temp. exerts a profound influence on the growth rate of chick embryos as measured by daily dry wt. and N content as indicated by temp. coeffs. This influence is greatest in the earliest stages of growth and it decreases at successive stages and practically ceases when the embryo is about 16 days old or when it reaches a dry wt. of approx. 2 g. Loss of moisture of eggs is slightly increased by an increase in temp. if the relative humidity is const. In general, the limits of the growth periods at 38.8° coincide with the periods marking a change in the type of chem. compd. utilized for energy. C. R. FELLERS

Respiration of the tissues. V. Respiration of blood, in vitro, of various homothermal animals. J. ROCHE AND E. S. SORU. *Arch. intern. physiol.* **31**, 413–27(1929); *Physiol. Abstracts* **15**, 220–1; cf. *C. A.* **21**, 2499.—With the same content of erythrocytes the blood of animals with nucleated red cells has a greater respiratory intensity than that of animals with non-nucleated cells. There is no direct relationship between the oxyhemoglobin content of the blood and the O consumption. If the plasma is replaced by Ringer's soln., the respiratory intensity is diminished. G. G.

Muscular work and glucemia. V. BINCER. *Arch. intern. physiol.* **31**, 428–32 (1929), *Physiol. Abstracts* **15**, 238–9.—In the rabbit, starvation causes an immediate fall in blood sugar, followed by a const. level; intense work after several days' starvation produces a marked but very transient increase of the order of 100 mg. per l. G. G.

A new function of the stomach—its role in the metabolism of urea. R. VLADESCO, D. SIMICI AND M. POPESCO. *Compt. rend.* **192**, 308–10(1931); cf. *C. A.* **24**, 5811.—A 14 kg. dog was anesthetized with chloralose and gastric secretion stimulated by injection of 2 mg. histamine. A sample of the gastric juice showed some NH_3 present but no urea; 45 min. and 90 min. after the intravenous injection of 15 g. urea the gastric juice contained 1.5 and 2.7 times the normal amt. of NH_3 but no urea. When a 3% soln. of urea was kept at 37° *in vitro* in contact with washed dog stomach mucosa the urea was almost completely converted into NH_3 in a few hrs. *Conclusion*.—The normal stomach removes a little urea from the blood and excretes it as NH_3. In times of renal insufficiency this action may be increased 5–10 times in amt. L. E. GILSON

The relation between blood sugar and blood-clotting time. V. Inter-relation between blood sugar, clotting time and glucolysis. A. PARTOS. *Arch. ges. Physiol. (Pflügers)* **226**, 347–53(1930); cf. *C. A.* **24**, 4543.—The hyperglucemia following the administration of adrenaline or morphine is accompanied by an accelerated glucolysis. Insulin administration is accompanied by an inhibited glucolysis. No relation was found to exist between the rate of glucolysis and the clotting time of blood. **VI. The relation of the blood sugar to the lactic acid content during glucolysis.** A. PARTOS AND A. HERZOG. *Ibid* 464–71.—The lactic acid content of blood was always increased at the beginning of glucolysis. No relationship was discovered to exist between the sugar and lactic acid contents of the blood. ARTHUR GROLLMAN

The constancy of the alveolar ventilation and the variations in the alveolar carbon dioxide and oxygen deficit during voluntary variations of the frequency and depth of respiration. HANS HECKSCHER, H. FADDERSBÖLL AND ERIK MOGENSEN. *Arch. ges. Physiol. (Pflügers)* **226**, 418–30(1930). ARTHUR GROLLMAN

The oxygen deficit and carbon dioxide tension of the alveolar air. HANS HECKSCHER. *Arch. ges. Physiol.* (*Pflügers*) **226**, 431–47(1930); cf. *C. A.* **24**, 4090.
ARTHUR GROLLMAN

The chemical composition of the lung: a contribution to the metabolic physiology of the lung. H. MISCHNAT, H. SCHOENEN AND P. JUNKERSDORF. *Arch. ges. Physiol.* (*Pflügers*) **226**, 448–63(1930).—Data are given for the H_2O, glycogen, fat, total N, total P, lipoidal P and Ca contents of dog lungs. The H_2O, glycogen and fat contents of the liver, muscle and heart of the same animals were also detd. The effect of the type of food ingested, glycogen feeding, starvation, phlorhizin, insulin and adrenaline injections, on the chem. compn. of the above-mentioned organs are also given. A. G.

Investigations of the chemical composition of the various lobes of the liver. W. SCHEIFF. *Arch. ges. Physiol.* (*Pflügers*) **226**, 481–99(1931).—The glycogen, fat, total N, rest-N and H_2O contents of the various lobes of the liver differ to an appreciable extent. Various parts of the same lobe also differ as regards their chem. compn. A. G.

The heat formation of skeletal muscle when lactic acid formation is inhibited. ERNST FISCHER. *Arch. ges. Physiol.* (*Pflügers*) **226**, 500–17(1931).—The *caloric quotient* of frog muscles poisoned by $CH_2BrCOOH$ is not altered from the normal. The poisoned muscles fail to show the evolution of an *aerobic recovery heat*. A. G.

The complex nature of the hypophyseal sex hormone: its action on the female. E. DINGEMANSE AND S. E. DE JONGH. *Arch. ges. Physiol.* (*Pflügers*) **226**, 543–6(1931). The sex hormone of the hypophysis consists of at least 2 substances. One factor causes maturation of the *Graafian* follicles; the other causes *lutein* formation. A. G.

The action of the hypophyseal sex hormone on the male organism. S. E. DE JONGH. *Arch. ges. Physiol.* (*Pflügers*) **226**, 547–58(1931).—Young male rats or mice were treated with exts. of *menformone-free* urine. Such exts. contain only the hypophyseal sex hormone. The physiol. action of this hormone was demonstrated
ARTHUR GROLLMAN

The absorption of dyes by the red corpuscles. R. HÖBER AND G. PUPILLI. *Arch. ges. Physiol.* (*Pflügers*) **226**, 585–99(1931).—The distribution of dyes between red blood corpuscles and serum is detd. by the nature of the dyes—particularly its soly. relationships, and by the lipoid content of the corpuscle. ARTHUR GROLLMAN

The action of potassium and calcium ions on the function of the isolated salivary gland supplied with degenerated nerves. O. V. NIKOLAEV. *Arch. ges. Physiol.* (*Pflügers*) **226**, 689–93(1931).—If the $[Ca^{++}]$ of the perfusate through an isolated salivary gland, whose nerve supply is degenerated, is increased, there is an increase in the salivary secretion. An increase in the $[K^+]$ diminishes the secretion. In both cases there is a diminished blood flow through the gland due to vascular constriction.
ARTHUR GROLLMAN

Sleep, sleeplessness and physical exercise and their effect on the blood chemistry. II. The recovery period. H. HOCHREIN, J. MICHELSEN AND H. BECKER. *Arch. ges. Physiol.* (*Pflügers*) **226**, 738–45(1931). —The blood chemistry (lactic acid, O capacity, and p_H) of individuals deprived of sleep differs in the recovery period after exercise from that of normally rested individuals. ARTHUR GROLLMAN

The humoral nature of nervous irritability. I. P. RAZENKOV AND A. N. PCHELINA *Arch. ges. Physiol.* (*Pflügers*) **226**, 786–93(1931). —Stimulation of the vagus leads to the formation of substances in the glandular cells of the stomach and pancreas which act as hormones in the circulation. ARTHUR GROLLMAN

The relation between the hormone of the anterior lobe of the hypophysis (prolan **and the male sex gland.** M. BORST *Deut. med Wochschr.* **56**, 1117–20(1930).—The injection of *prolan*, an ext. of the anterior lobe of the hypophysis, into young male mice caused marked degenerative changes in the testicle. In the case of older mice, the effect was less pronounced. ARTHUR GROLLMAN

The importance of the thiocyanate present in gastric juice. G. LOCKEMANN AND W. ULRICH. *Deut. med. Wochschr.* **56**, 1900–2(1930).—The presence of SCN^- in gastric juice greatly enhances its bactericidal power. ARTHUR GROLLMAN

Hormones. BENJAMIN HARROW. *J. Chem. Education* **8**, 661–9(1931).—A review
E. H.

The coenzyme of lactic acid formation of the muscle. KARL LOHMANN. *Naturwissenschaften* **19**, 180(1931).—Previously the coenzyme of lactic acid formation in the muscle was found to consist of an autolyzable and a non-autolyzable part, the former being adenylpyrophosphoric acid (*C. A.* **24**, 145; Meyer, *C. A.* **22**, 2580). It was now found that the non-autolyzable part can be replaced by Mg salt. The system dialyzed muscle ext. + inorg. phosphate + adenylpyrophosphate + Mg salt is able to split

glycogen into lactic acid. Absence of any of the 4 components inactivates the mixt. Muscle ext. inactivated after prolonged standing (4 days at 0°) by enzymic demolition of the adenylpyrophosphate (Meyerhof, *C. A.* **20**, 1635) can be reactivated by addn. of this substance or of adenylic acid but to a lesser extent. A slight reactivation is caused by inosinpyrophosphoric acid; no action is found on addn. of inosinic acid. An adenylpyrophosphoric acid similar to that in the skeleton muscles of vertebrates or that of non-vertebrates occurs in heart muscle. The Harden Young hexosediphosphoric acid and Embdens hexosemonophosphoric acid are only cleaved by adenylpyrophosphate in the presence of Mg, likewise for the reverse reaction. An additional case where this combination is essential to effective action is in alc. fermentation by dialyzed maceration juice or by washed yeast (washed in weakly acid soln.). The system Mg + adenyl pyrophosphate fulfills all conditions for a coenzyme. Its relation to that of Euler and Myrbäck (*Z. physiol. Chem.* **1923–30**; cf. *C. A.* **24**, 5312) is uncertain. The system is not active for methylglyoxalase (Neuberg, *C. A.* **7**, 2413; Dakin and Dudley, *C. A.* **7**, 1532).
B. J. C. VAN DER HOEVEN

The surface potential of the gastric mucous membrane in warm-blooded animals under various conditions. KURT KRAMER. *Z. Biol.* **91**, 26–36(1931).—Surface potentials of the gastric mucous membrane were derived by using KCl, HCl and NaOH in different concns. The direction and intensity depend entirely and characteristically on the soln. It seems that HCl can vary the permeability if its concn. is varied. Contrary to other membranes, these changes are very small and reversible. NaOH causes irreversible changes.
FRANCES KRASNOW

Investigation on the fluctuations of the potential of the gastric mucous membrane in warm-blooded animals. HANS SARRE. *Z. Biol.* **91**, 37–52(1931).—The initial potential is varied by changing the soln., in contact with the membrane. When acid gastric juice is in contact with the membrane, the potential is always negative, of variable height and depends upon the condition of the animal. At death the potential falls steadily and reaches positive values.
FRANCES KRASNOW

The influence of oxygen on the generation of lactic acid in the muscle of warm-blooded animals. AMANDUS HAHN, E. FISCHBACK AND H. NIEMER. *Z. Biol.* **91**, 53–62(1931).—In work on pig muscle it was found that in the presence of O_2 the lactic acid content of muscle mash may be kept const. The amt. of total carbohydrate remains const. or decreases very slightly.
FRANCES KRASNOW

The activity of the heart and the central nervous system of mammals during great oxygen deficiency. L. ASHER AND N. SCHEINFINKEL. *Z. Biol.* **91**, 66–72(1931).—In certain cases it was possible to maintain normal breathing and circulation by inspiring air contg. only 3% O_2.
FRANCES KRASNOW

Hydrogen-ion concentration of the alimentary tracts of fowl, cat and rabbit. ALVAH R. MCLAUGHLIN. *Science* **73**, 191–2(1931). —Fowls, rabbits and cats were killed very rapidly and the p_H value of the contents of several portions of the alimentary canal was measured by means of a quinhydrone electrode. The fowls and rabbits were killed very soon after feeding. All portions of the alimentary canal of the former were acid, while those of the latter were slightly alkaline excepting the stomach (p_H 1.83) and cecum (p_H 6.26). The results for the cats were uncertain because of the lack of knowledge of their past history; all portions were definitely acid.
I. M. LEVINE

The alleged presence of "bound potassium" in muscle. WM. E. CALLISON. *J. Biol. Chem.* **90**, 665–8(1931).—"The decrease in 'bound K' in muscle tissue placed in isotonic saline is related to the amt. and frequency of change of isotonic NaCl soln. and to the size of the pieces of muscle tissue. Autolysis for a period of 24 hrs. did not apparently affect the diffusion of K into the soln. The present expts. furnish no evidence for the existence of 'bound K' in muscle tissue" as claimed by Neuschloss (*C. A.* **20**, 3497, 3498) and corroborate the findings of Raab (*C. A.* **21**, 3227) and Höber (*C. A.* **23**, 3748). Neuschloss' method for the detn. of 'bound K' is unsatisfactory.
A. P. L.

Studies on arginine. I. The rate of catabolism of arginine in rats, including a method for the determination of arginine in biological material. VERN C. KIECH, JAMES M. LUCK AND ANNA EVELYN SMITH. *J. Biol. Chem.* **90**, 677–96(1931).—A volumetric method, in principle resembling that of Bonot and Cahn (*C. A.* **21**, 1471), is described for the detn. of very small amts. of arginine in protein-free tissue exts. The proteins are pptd. by H_2WO_4, the arginine is converted by arginase into ornithine and urea and the urea is detd. as dixanthydryl urea by oxidation with $K_2Cr_2O_7$ and H_2SO_4 according to the vol. procedure of Allen and Luck (*C. A.* **23**, 5206). Muscle tissue of fasting female rats contains an av. of 26.1 mg. of arginine per 100 g. and the whole carcass 27.5 mg. If administered subcutaneously, arginine is rapidly catabolized and the ornithine which would presumably be formed must be catabolized almost as rapidly

as less than 12% of the injected N is present at any time in substances other than urea and arginine. Bibliography of 26 references. A. P. LOTHROP

The distribution of blood sugar. MICHAEL SOMOGYI. *J. Biol. Chem.* 90, 731–5 (1931).—Folin and Svedberg (*C. A.* 25, 335) have recently reported a ratio of 60:100 for the distribution of corpuscle and plasma sugar for healthy persons and claim that the corpuscles in the blood of diabetics contain relatively more sugar than those of non-diabetics. S. has redetd. the values for true sugar using his new method of deproteinization (*C. A.* 25, 2165) and obtains results approx. the same as those previously reported (*C. A.* 22, 3204), 77:100, in both diabetics and non-diabetics. F. and S. detd. total reduction values and not true sugar in plasma and slight and negligible as the amt. of non-sugar reducing substances in plasma may appear (5–6 mg. %) it suffices grossly to distort the true picture of the distribution of sugar. If the figures are corrected to true sugar values by the deduction of 5 mg. % of reducing non-sugars, a rise in the distribution ratios occurs and at once removes the apparent difference between the ratios of normal and diabetic individuals which is actually non-existent. The corrected figures are well in accord with those obtained by S. A. P. LOTHROP

Local metabolism and tissue reaction. Further investigations of the relations between local metabolism and cell growth. GERHARD MEYER-DÖRKIN. *Beitr. path. Anat.* 85, 555–64(1930).—The growth-stimulating effect of solns. of inorg. salts upon the endothelial cells of the lymph spaces of white mice observed in earlier expts. (*C. A.* 24, 5358) was not observed in later expts. carried out under more carefully controlled conditions. E. R. MAIN

The physiologic variations in the inorganic blood phosphorus content at the different age periods. An attempt to explain these in the growing child. J. K. BULLOCK. *Am. J. Diseases Children* 40, 725–40(1930).—The inorg. P content of the serum of new born infants is 4.82 mg. per 100 cc. It increases rapidly to a value of 5.66 mg. per 100 cc. at the 7th month. From this time it tends to diminish gradually until the 19th or 20th yr., the period of termination of osseous growth, and then remains more or less const. The age periods of most rapid growth do not show as marked an increase in inorg. P as the seasonal periods of most rapid growth. E. R. MAIN

The intermediate metabolism of fats. The influence of the administration of certain fatty acids of the aliphatic series on ketogenesis and on the acid-base equilibrium of the organism in diabetics and on patients suffering with liver disturbances. L. CANNAVO. *Boll. soc. ital. biol. sper.* 5, 805–10(1930).—The acidosis caused by the administration of various fatty acids and the relation of acidosis and the production and elimination of "ketone bodies" were studied clinically on patients. From the data accumulated, it appears that all or nearly all the acids of the aliphatic series produce acidosis however, only those which contain an odd no. of C atoms are intensely ketogenic The acidosis caused by the administration of acids with the odd no. of C atoms may be due to non-ketogenic org. acids formed from the former by the degradation of their mols. Whenever, as a result of the administration of fatty acids there arose a more or less intense acidosis, an increase of NH_3 in the urine was observed. In patients with hepatic lesions a fair amt. of ketones was observed in the blood and urine; this points to a diminution of the function of the hepatic cell which in all probability is a factor in hepatic acidosis and coma. PETER MASUCCI

The reticulo-endothelial system in the defense of the organism. LAMBERTO LENZI. *Boll. soc. ital. biol. sper.* 5, 825–8(1930).—Contrary to what has been observed with inorg. poisons, animals which have been previously stimulated with metallic colloids (collargol) do not become more resistant to org. poisons (morphine-HCl or quinine sulfate). PETER MASUCCI

Experimental studies on the influence which blood plasma exerts on arterial pressure in contrast to that exerted by the corpuscles. LUIGI SPADAFINA. *Boll. soc. ital biol. sper.* 5, 829–32(1930).—Repeated infusions of distd. H_2O in dogs such that the no. of corpuscles was reduced to $^1/_2$ or even $^1/_4$ of the normal did not appreciably change the arterial blood pressure. Injections of pyridine, subcutaneously or intravenously, reduced the corpuscles to $^1/_4$ the normal, but did not change the arterial pressure. These results lead S. to conclude that plasma plays a much more important role in the maintenance of the normal blood pressure than the blood corpuscles. PETER MASUCCI

The sedimentation of the blood studied by means of the nephelometer. IV. The influence of the viscosity of the medium. A. AGGAZZOTTI AND G. BUCCIARDI. *Boll. soc. ital. biol. sper.* 5, 867–9(1930); cf. *C. A.* 24, 1897.—By increasing the viscosity of Ringer soln. by the addn. to it of glycerol, starch or glucose, and using the modified Ringer as a diluent for blood (9.1% citrated blood), the variations in the luminosity which precede and follow sedimentation of the corpuscles are changed markedly. The

increase of the initial luminosity which precedes the beginning of sedimentation is noticeably retarded. PETER MASUCCI

The permeability coefficient of aqueous solutions of lactic acid on muscle. P. ROWINSKI. *Boll. soc. ital. biol. sper.* 5, 899–901(1930).—Frog muscle prepns. were perfused with Ringer soln. (without bicarbonate) and after having frozen and powd. the muscles with liquid air, lactic acid was detd. (*1*) *Perfusion with Ringer soln. contg. lactate.*—The lactic acid in the muscle increased with increasing concn. of the salt in the perfusion liquid. (*2*) *Perfusion with Ringer soln. contg. lactic acid.*—The concn. of lactic acid in the muscle varied according to the concn. of the acid in the perfusion liquid. Up to 40 mg. % (p_H 3.0) the lactic acid in the muscle increased rapidly, but with greater concns. the increase became slower. (*3*) *Perfusion with Ringer soln. contg. HCl.*—When the liquid coming out of the muscle had a p_H of 6.8 the amt. of lactic acid was normal, but when the muscle failed to regulate the p_H of the circulating liquid, the amt. doubled. P. M.

Studies on the surviving hepato-pancreatic preparation. I. The metabolism of fats. OSCAR CANTONI. *Boll. soc. ital. biol. sper.* 5, 918–21(1930).—The fatty acid content of the blood did not vary noticeably in fasting animals but did decrease in dogs with alimentary lipemia. The circulating fatty acids apparently went through a process of desaturation as evidenced by the lowering of the m. p. and solidification point, and by the increase of the iodine no. **II. The metabolism of cholesterol.** *Ibid* 921–2. The diminution of cholesterol during circulation was gradual, const. and independent of the amt. of alimentary fat. **III. The respiratory exchange.** *Ibid* 922–4. The R. Q. was generally low, indicating intensive oxidative processes. **IV. The ureopoietic function of the liver.** *Ibid* 924–5. There was an increase of urea in the blood flowing from the liver. The increase was gradual, const. and bore no relation to the alimentary fat. PETER MASUCCI

The lipoidal hormone of the hypophysis and the vitamin of fertility. RENZO AGNOLI. *Boll. soc. ital. biol. sper.* 5, 937–9(1930).—Some preliminary evidence is offered that the lipoidal hormone of the anterior pituitary lobe is similar to the fat-sol. vitamin E. PETER MASUCCI

The action of adrenaline on the reduction processes of frog muscle pulp. M. COMEL. *Boll. soc. ital. biol. sper.* 5, 932–4(1930).—With methylene blue or *m*-dinitrobenzene as indicators, adrenaline in concns. of 10^{-6} to 10^{-12} when added to frog muscle pulp did not accelerate or inhibit reduction processes. PETER MASUCCI

Experimental uricolysis in the heart-lung preparation. GINO BERGAMI. *Boll. soc. ital. biol. sper.* 5, 934–6(1930).—Uric acid injected into the heart-lung prepn. is not destroyed. The addn. of uricase to the blood circulating in the prepn. causes only a slight diminution of the uric acid content PETER MASUCCI

Parathyroids and irradiated ergosterol. G. GANFINI. *Boll. soc. ital. biol. sper.* 5, 953–5(1930).—Irradiated ergosterol cannot be substituted for the parathyroid hormone; the former merely retards tetany without influencing cachexia. PETER MASUCCI

The influence of nonelectrolytes on the buffer action of animal and vegetable organs. GIUSEPPE RUSSO. *Boll. soc. ital. biol. sper.* 5, 963–5(1930).—The aim was to establish whether a given organ displaces with equal intensity the reaction of 2 isotonic solns. of equal p_H. The nonelectrolytes used were urea, glucose, sucrose and galactose; the electrolyte was NaCl. The results show that nonelectrolytes aid in an acid reaction and inhibit in an alk. reaction the unfolding of the buffering action of tissues, *e. g.*, NaCl and glucose soln. had initial p_H of 8; after shaking both with equal amts. of frog leg tissue and for equal lengths of time, the NaCl had a p_H of 7.18, the glucose p_H 7.45. When the initial p_H was 5, after the solns. were shaken with the tissue, the NaCl soln. had a p_H of 5.65, the glucose p_H 5.93. This behavior explains in all probability the action of nonelectrolytes on the permeability of protoplasm. PETER MASUCCI

The so-called influence of the suprarenal medulla on alimentary hyperglucemia. S. RACCHIUSA AND A. CRISERA. *Boll. soc. ital. biol. sper.* 5, 993–6(1930).—Dogs subjected to the complete or incomplete ablation of the suprarenal capsule showed, immediately after the operation, a marked lowering of temp. which reached 34–35° in some cases. After the complete ablation of the suprarenal medulla, and in some cases after the removal of the greater part of the cortex, not only was there no hypoglucemia but in some cases there was a tendency toward hyperglucemia after the administration of glucose. PETER MASUCCI

The direct action of follicular liquid on the motility of the tubes. LUIGI MANZI. *Boll. soc. ital. biol. sper.* 5, 1020–5(1930). PETER MASUCCI

The energy of movement of spermatozoa. E. E. IVANOV. *Z. Tierzucht. Zuchtungsbiol. Tierernahr.* 20, 404–18(1931).—The onward movement of dog spermatozoa

lasts several hours in an anaerobic medium where the traces of O_2 present are entirely insufficient to supply the normal O_2 need. This movement under anaerobic conditions is not related to the production of CO_2. It can occur in a medium where cell respiration has almost entirely ceased as the result of the addn. of KCN. The energy for spermatozoa movement does not come from oxidation processes. The role of spermatozoa respiration consists obviously of the removal of products of decompn. processes which, where a lack of O_2 occurs, furnishes the necessary energy for movement. In the presence of O_2 the spermatozoa are very mobile even in very concd. suspensions. Under anaerobic conditions the more concd. the suspension the shorter is the period of movement.

L. A. MAYNARD

The hydremic curve for resting, marching and running. U. CASSINIS AND L. BRACALONI. *Arch. fisiol.* **28**, 128–41(1930); cf. *C. A.* **24**, 4814.—In rest, the variations are insignificant; during marching some subjects show a marked decrease in the curve, whereas in the majority the changes are slight. During running, the hydremic curve drops abruptly, but soon returns to normal. The changes are not in relation to variations in body wt.

A. E. MEYER

Lymphoganglin and choline. GAETANO VIALE. *Arch. fisiol.* **28**, 150–5(1930).—The vagotropic action of lymphatic gland ext. is not due to choline, but to vagotropin, a substance existing in the lymph and not precipitable by phosphotungstic acid. The cardio-vascular action due to lymphoganglin is usually attributed to exts. of the most different organs

A. E. MEYER

The cholesterolemia in pregnancy and puerperium. NICANOR PALACIOS COSTA AND MIGUEL V. FALSÍA. *Semana méd.* (Buenos Aires) **1931**, I, 428–34; *Rev. soc. argentina biol.* **6**, 99–107; *Compt. rend. soc. biol.* **104**, 1024(1930).—In the last 2 months of pregnancy, the cholesterol in blood is increased, that in the duodenal fluid in only 33% of the cases. A further increase was observed during labor. The cholesterol decreased in the blood during the first week of the puerperium, but did not turn to normal. The cholesterol in the blood of the umbilical vein was 0.108%, that in the duodenal liquid of normal persons 0.059%.

A. E. MEYER

Comment on P. Rona and W. Fabisch's paper: Studies on blood sugar. II. KURT P. JACOBSOHN. *Biochem. Z.* **231**, 498–9(1931).—Polemical (cf. *C. A.* **25**, 332)

S. MORGULIS

An investigation into the gastric secretion of a hundred normal persons over the age of sixty. DANIEL T. DAVIES AND T. G. ILLTYD JAMES. *Quart. J. Med.* **23**, 1–14 (1931).—In a series of 100 persons from 60 to 95 yrs. of age, 43 had a normal secretion of HCl, 13 had a high, 12 a diminished and 32 no secretion of HCl. Small vols. of juice and an inhibition of secretion during the first 1 to 1.5 hrs. were common to all. Enzyme action bore little relation to HCl secretion. Pepsin was never completely absent.

JOHN T. MYERS

The sugar content of the blood in elderly people. F. W. MARSHALL. *Quart. J. Med.* **24**, 257–84(1931).—Five types of glucose-tolerance curves occur in healthy old people: the normal adult, the lag, the flat, the storage defect and the typical diabetic. The storage defect is most frequent. The renal threshhold in healthy old age is generally raised, and is in the neighborhood of 0.200%.

JOHN T. MYERS

Quantitative and qualitative variations in the production of milk by cows under the effects of castration. J. ALQUIER AND G. SILVESTRE DE SACY. *Bull. soc. hyg. aliment.* **18**, 436–63(1930).—Contrary to a no. of published data, castration had but little effect on the progressive natural decrease of the activity of the mammary glands when the latter remains undisturbed by gestation; with some races (Normandy) there was practically no effect. Castration does not preserve cows from the unfavorable effects of certain modifications in diet which reduce the quantity and quality of the milk. It does not appreciably increase the production of butter fat and casein, but merely increases the ash content (more particularly the CaO) of the milk. No difference was observed in the biol. value (vitamin contents) of the milk of the castrated and uncastrated animal.

A. PAPINEAU-COUTURE

Hormonal test of pregnancy. ADÈLE BROUHA. *Compt. rend. soc. biol.* **106**, 6–7 (1931).—A description of a new hormonal test giving quick, accurate results. A. L. R.

Some histochemical characteristics of a melanic propigment. L. LISON. *Compt. rend. soc. biol.* **106**, 41–3(1931).—A histochem. study was made of a premelanic chromogen obtained from the middle of the hair bulbs of embryonic cat skin fixed by formol soln. The substance appears as clear, yellow rods; it takes on a beautiful orange tint when treated with the tetrazo deriv. of dianisidine in an alk. medium because of the formation of an azo dye by the combining of a tetrazo deriv. of dianisidine with the pre-melanic chromogen, indicating the presence of a benzene nucleus contg. at least one OH

group. Ammoniacal AgOH colors the yellow rods an intense black, demonstrating a reducing power; this is not due to an aldehyde group, however, because decolorized fuchsin does not have its color restored; neither is it due to the presence of 2 phenol groups, nor to the presence of one phenol and one aromatic amine group, since the chromaffin reaction is negative; on the contrary, prolonged oxidation by alk. dichromate causes the rods to disappear, an irreversible reaction as shown by treatment with reducing agents. The expts. of Bach and Haehn on the action of tyrosinase on tyrosine make it possible to deduce the presence of a quinonic nucleus; *in vitro* the quinone is condensed very easily with tyrosine to give derivs. with properties very similar to those described for the melanic propigment; therefore L. concludes that this latter substance is a condensation product of a compd. having a phenolic base like tyrosine, with a deriv. possessing a quinonic structure. This compd., first stage of melanogenesis, preserves intact a phenolic hydroxyl. ALBERT L. RAWLINS

The relation existing between the factors determining the amount of oxygen consumption of the organism. G. LITARCZEK, H. AUBERT, I. COSMULESCO AND B. NESTORESCO. *Compt. rend. soc. biol.* **106**, 108-10(1931).—The following equation is derived:

$$O_2 = \text{Output} \times HbO_2 \times \frac{[100x_a^n]}{(^1/k_a) + x_a^n] - \frac{[100x_v^n]}{(^1/k_v) + x_v^n]}}, \text{ where}$$

output is the quantity of blood which passes through the capillaries from the arterial to the venous system, expressed numerically by considering 100 cc. as unity; HbO_2 is the total O_2 capacity of the blood; $^1/k_a$ and $^1/k_v$ are the consts of dissociation of the oxyhemoglobin of arterial and venous bloods, resp.; x_a and x_v are the tensions, resp., of arterial and venous O_2 expressed in mm. of Hg. ALBERT L. RAWLINS

The growth-promoting hormone of the pituitary body. H. B. VANDYKE AND ZONJA WALLEN-LAWRENCE. *J. Pharmacol.* **40**, 413-22(1930).—An alk. ext. of the anterior lobe, which appears to be free of the luteinizing principle, further purified by filtration through a Berkefeld filter, pptn. with Na_2SO_4, dialysis, etc., is described. A method of assay is given; it involves the use of hypophysectomized or normal adult rats. C. R.

A critical study of the assay of female sex hormone preparations. F. E. D'AMOUR AND R. G. GUSTAVSON. *J. Pharmacol.* **40**, 473-84(1930).—The work of Coward and Burn (*C. A.* **22**, 632) on standardization of female sex hormone prepns. was repeated. D'A. and G. agree with Coward and Burn that the rat unit should be the amount of hormone necessary to produce estrus in 50% of a large group of animals, and that a standard unit be used by all workers. C. RIEGEL

The preparation and assay of crystalline female sex hormone. F. E. D'AMOUR AND R. G. GUSTAVSON. *J. Pharmacol.* **40**, 485-8(1930).—Prepn. of a cryst. estrin is described which on assay showed 1 rat unit equal to 0.38γ C. RIEGEL

The diuretic hormone of the brain. J. OLIVET. *Münch. med. Wochschr.* **77**, 58-9 (1930).—A substance with a strong diuretic action is mobilized by stimulations of certain portions of the brain. The substance was isolated to the extent that it was active when administered to other animals. The hormone is formed in the midbrain. R. C. WILLSON

NEWBURGH, LOUIS H., AND JOHNSTON, MARGARET W.: **The Exchange of Energy between Man and the Environment.** Springfield, Ill.: C. C. Thomas. 104 pp.

G—PATHOLOGY

H. GIDEON WELLS

Presence of pancreatic enzymes in the bile. H. L. POPPER. *Wiener klin. Wochschr.* 42, 800-3(1929).—In certain pathol. conditions the bile, which usually contains no diastatic enzyme, showed high diastatic values. B. C. A.

Ketosis in seasickness. J. R. MARRACK. *Brit. Med. J.* **1931, I**, 178-9.—Ketosis occurs in seasickness after vomiting appears, sometimes before. Ketosis is not the cause of seasickness, but rather is an evidence of some unknown metabolic disturbance. J. B. BROWN

Relation of calcium to the hemorrhagic tendency in obstructive jaundice. ROBERT R. LINTON. *Ann. Surgery* **93**, 707-21(1931).—The lowered coagulability of the blood in cases of obstructive jaundice does not seem to be due to a deficiency or abnormality of the blood Ca. The most effective means of preventing and stopping post-operative hemorrhage in obstructive jaundice is repeated direct blood transfusions used in conjunction with a high carbohydrate and fluid intake. RACHEL BROWN

Certain biochemical aspects of lobar pneumonia. D. P. CUTHBERTSON. *Glasgow Med. J.* **34**, 64–7(1931).—In lobar pneumonia the arterial blood is unsatd. with respect to O, although the O capacity is not reduced. The free CO_2 and the total CO_2 contents of the blood are diminished, although the capacity to combine with CO_2 is not appreciably below normal. RACHEL BROWN

The azoprotein gelatin-aniline. M. ADANT. *Compt. rend. soc. biol.* **103**, 541–3 (1930).—By coupling aniline to gelatin, gelatin acquires antigenic properties. The serum obtained by immunizing with gelatin-aniline precipitates its antigen as well as gelatin and the azoproteins obtained by coupling aniline to the serum proteins. B. C. BRUNSTETTER

The precipitation of azoproteins. M. ADANT. *Compt. rend. soc. biol.* **103**, 950–1 (1930).—The antigen produced by the injection of an azoprotein (precipitin) was added to the corresponding azoprotein; the resulting ppt. was centrifuged off. To one part of the supernatant liquid, more precipitin was added; to another part, more azoprotein was added and a third part was kept as control. Only in the first case was an abundant ppt. produced; slight ppts. formed in the other two cases. B. C. BRUNSTETTER

The regulation of the blood sugar in malaria. E. J. STERKIN. *Arch. Schiffs-Tropen-Hyg.* **34**, 504–15(1930).—Such variations as are found are not characteristic of malaria, but are observed in other febrile conditions. The blood sugar may be high, low or normal during an attack. H. EAGLE

The demonstration of antibodies in malaria. A. RADOSAVLJEVIĆ. *Arch. Schiffs-Tropen-Hyg.* **34**, 629–43(1930).—Cases of malaria which have become afebrile may contain parasiticidal antibodies in the blood. When their serum is incubated with blood drawn from active cases, the mixt. is no longer infectious. This parasiticidal action requires the presence of complement. Injected into febrile patients, this convalescent serum sometimes causes a fall in temp. and a coincident disappearance of organisms from the blood. H. EAGLE

Biochemical characteristics of leprosy. A. S. RAYEVSKII. *Arch. Schiffs-Tropen Hyg.* **34**, 651–7(1930).—In leprosy there is frequently a disturbance in the carbohydrate metabolism, manifested by hypoglucemia, with a very marked alimentary hyperglucemia. In stationary cases there is a pos. Ca^{++} balance, with decalcification during the active stages. In the active stages, blood $[Ca]^{++}$ falls, and $[K]^{+}$ rises. H. E.

Alkali reserve of the blood in relationship to the gastric acidity and the condition of the vegetative nervous system in certain disease groups. A. N. VOLODIN AND S. M. BELYAEV. *Arch. Verdauungskrankh.* **48**, 204–19(1930). H. EAGLE

Relationship of the true reaction of the urine and blood to ulcer disease and gastric secretion. HANS L. POPPER. *Arch. Verdauungskrankh.* **48**, 220–9(1930).—A deviation of blood p_H to the acid side is not characteristic of ulcer; moreover, a decreased excretion of alkali in the urine following the intravenous injection of $NaHCO_3$ does not indicate either gastric hyperacidity or the presence of ulcer. There is no correlation between blood p_H and gastric acidity. H. EAGLE

A case of hemoglobinuria in visceral leishmaniasis. J. PIKUL. *Arch. Schiffs Tropen-Hyg.* **34**, 358–60(1930). H. EAGLE

The determination of glucuronic acid in the urine is a test of liver function. JOACHIM SAUER. *Klin. Wochschr.* **9**, 2351–2(1930).—An increased excretion of glucuronic acid follows the ingestion of foods contg. it as glucosides; a decreased excretion is evidence of hepatic damage and constitutes a more sensitive test of hepatic function than, *e. g.*, the galactose test. A urine excretion of <0.2 g. is strongly suggestive of liver damage. H. EAGLE

Studies in immunity processes in syphilis. V. Immunobiological change in the Spirochaeta pallida and its significance for the course of the chronic infection. H. KRÓ AND N. V. JANCSÓ. *Klin. Wochschr.* **10**, 105–7(1931); cf. *C. A.* **24**, 5837.—By repeated transfers onto media contg. increasing quantities of rabbit antiserum it is possible to obtain a variant of *Sp. pallida* which, unlike the original strain, is not killed by the antiserum; simultaneously, the organism loses the property of causing the formation of spirocheticidal antibodies when injected into the rabbits. The original culture forms complement-fixing antibodies against itself when injected into rabbits, but not against this serum-resistant strain, while the latter forms similar antibodies against both types. By subculture on ordinary serum-bouillon, the variant loses its acquired immunity and becomes susceptible to an antiserum. The authors suggest that the behavior of the spirochaete in the human organism may be analogous to these findings. H. EAGLE

The iodine-deficiency theory of goiter. JOHAN HOLST. *Klin. Wochschr.* **10**, 118 (1931).—H. agrees with Hellwig in that goiter may be endemic in areas in which there

is no I deficiency. However, I deficiency may be one of several possible causes of goiter. H. EAGLE

"Uremia" following protracted vomiting. PAUL MEYER. *Klin. Wochschr.* **10**, 155–7(1931).—Protracted vomiting may cause acidosis, increased nonprotein-nitrogen in the blood, anuria and even convulsions, without any anatomical changes in the kidneys. In one case, the administration of insulin, glucose and physiol. NaCl soln. caused the disappearance of all symptoms. H. EAGLE

The color of the urine in diffuse hematogenous kidney disease. ERWIN BECHER. *Klin. Wochschr.* **10**, 157–60(1931). H. EAGLE

The demonstration of brain antibodies in human syphilis. F. GEORGI AND Ö. FISCHER. *Klin. Wochschr.* **10**, 207–10(1931); cf. *C. A.* **24**, 5852.—The mere fact that an alc. ext. of brain may give complement fixation with syphilitic spinal fluid and not with blood from the same patient does not prove the presence of brain antibodies in the fluid. The same phenomenon can be produced with any organ ext. by proper diln. and is due to the fact that spinal fluid continues to react even with high dilns. of alc. ext., while the serum does not. A concd. brain ext. gives complement fixation with the spinal fluid and serum from many non-syphilitic, organic neurological conditions, which strongly indicates that there may be a true antibody to brain lipoids. H. EAGLE

The electrolyte content of the blood in a case of diabetes insipidus. M. GRADWOHL. *Deut. med. Wochschr.* **56**, 1700–2(1930).—The blood in a case of diabetes insipidus showed an increased K, a decreased Ca, and an increased Na content. The H_2O-binding capacity of the corpuscles was increased. ARTHUR GROLLMAN

Value and duration of immunity conferred by antidiphtheritic anatoxin. Titration of antitoxin present in the serum of vaccinated children. G. RAMON AND ROBERT DEBRÉ. *Am. J. Diseases Children* **41**, 1–7(1931); cf. *C. A.* **24**, 2173.—The antitoxin content of the blood serum of children who have a neg. Schick test after immunization with diphtheria anatoxin is more than $^1/_{30}$ unit per cc. It is approx. the same whether 2 or 3 injections of anatoxin are given, but may be higher if a 4th injection is given and if there is a prolonged interval between 2 of the injections. It appears to be higher the older the child is when inoculated and does not tend to diminish with increase in the time after inoculation. E. R. MAIN

Cell and plasma chloride in the pyloric stenosis of infants. MONTAGUE MAIZELS AND CATHERINE B. MCARTHUR. *Am. J. Diseases Children* **41**, 35–44(1931).—The blood plasma of normal infants less than 3 months of age contains 22–28 millimols of bicarbonate ion and 96–106 millimols of chloride ion. The cells contain 44–56 millimols of chloride ion. In pyloric stenosis in infants, the p_H of the plasma and the concn. of bicarbonate are normal or increased. The chloride concn. of the plasma and of the cells is often decreased, the chloride content of the cells usually being lowered to a greater extent than that of the plasma. The vol. of the blood often is decreased and the relative vol. of the cells increased. E. R. MAIN

Dietary protein and blood-clotting function. I. NEWTON KUGELMASS AND EMMA LOUISE SAMUEL. *Am. J. Diseases Children* **41**, 48–52(1931); cf. *C. A.* **24**, 3547.—Prolonged feeding of a diet rich in protein tends to maintain the blood-clotting factors at a high level, thereby increasing the coagulability of the blood. An increase in the production of fibrinogen is induced by injury of the tissues through surgical intervention, and a transient increase by the introduction of heterologous proteins into the vascular system E. R. MAIN

Ossification. I. Callus formation and calcification. I. NEWTON KUGELMASS AND RICHARD N. BERG. *Am. J. Diseases Children* **41**, 236–48(1931).—Bone repair appears to be a local rather than a systemic process and may be, therefore, retarded or accelerated by locally applied agents. The degree and rate of calcification in experimentally induced fractures in rabbits are directly proportional to the amt. of available fibrous tissue. The union of the bones may be retarded by soln. of the fibrous tissue by means of the injection of an alk. soln. of trypsin at the site of the fracture. It may be accelerated by the stimulation of the production of fibrous tissue induced by the local injection of tissue fibrinogen. The local production of fibrous tissue does not appear to be altered by a diet high in protein. The Ca content of the blood tends to be higher and the phosphate content lower in the course of normal bone repair. A more rapid rate of calcification is assocd. with more marked alterations in the Ca and phosphate concns. E. R. MAIN

The proteolytic activity of the spleen in disease and hemorrhage. ARNOLD STRAUSS. *Beitr. path. Anat.* **85**, 251–77(1930).—The softening of the pulp tissue of spleens obtained at autopsy is assocd. with an increased proteolytic activity, which may be measured by the ability to liquefy gelatin or egg white. The optimum activity of the enzymes occurs

at p_H 8 and p_H 5. The enzymic activity is increased with the increase in time after death and is markedly increased in acute septic poisoning and post-hemorrhagic swelling. It is normal in spleens with chronic septic poisoning, in indurated and atrophied spleens and in those of children under 3–5 yrs. The presence of leucocytes appears to be an important factor in the degree of enzyme activity, since there is no proteolytic activity or softening of the pulp in animal spleens which contain no leucocytic enzymes. The softening of the adrenals appears to be assocd. with a purely autolytic rather than a proteolytic process. E. R. MAIN

The reactions of tissues and cells at artificial boundaries in the animal body. K. AKAMATSU. *Beitr. path. Anat.* 85, 349–70(1930).—The relation between the surfaces of small blocks of gelatin placed in the abdominal cavities of guinea pigs and the surrounding tissues appears to depend upon the concn. of H and OH ions within the blocks. The acid blocks have a marked tendency to adhere to and unite with the surrounding tissues. The alk. blocks have no tendency to unite with the tissues. The accumulation of leucocytes at the boundary surfaces and in the interiors is much more marked in the acid blocks. The leucocytes in the interior of the alk. blocks, although fewer in no., give a stronger test for the presence of oxidase. E. R. MAIN

The biologic and pathologic significance of copper, zinc and manganese. WALTER HERKEL. *Beitr. path. Anat.* 85, 513–51(1930).—The continued feeding of various salts of Cu to rabbits and rats does not induce cirrhosis of the liver. Large amts. of the ingested Cu accumulate in the liver, small quantities in the kidneys and very little in the bones. The amt. of Cu stored depends upon the amt. fed and the duration of the period of feeding and not upon the form in which it is fed. The normal liver contains from 6.5 to 36.1 mg. of Cu per kg. of dry substance. The values are doubled in pregnancy and are many times greater in the new-born. The Cu content of the liver in hemachromatosis is 24–384 mg. per kg. and is greatly increased in all other organs except the kidneys and bones. In cirrhosis without pigmentation the liver contains 67.6–374.9 mg. Cu per kg. The Zn content of the normal liver is 50–317 mg. per kg. of dry substance and is not increased in hemachromatosis. E. R. MAIN

The chemistry of hemosiderin. KURT W. SCHULTZE. *Beitr. path. Anat.* 86, 101–2 (1931).—The detn. of the amts. of ferric and ferrous ions present in the organs obtained at autopsy is extremely difficult, since the ferric ion is reduced rapidly during the 1st 6 hr. after death and the ferrous ion is then gradually oxidized. However, if an appreciable amt. of Fe is present, as in hemosiderosis of the liver, the quantity of free ferric Fe in the liver is much greater than in other organs examd. under identical conditions. HCHO and other preservatives of tissues hasten the oxidation of the ferrous ion. Expts. in which hemosiderosis is induced in animals by the injection of hemoglobin and distd. H_2O, while not conclusive, indicate that a large part of the Fe of hemosiderin exists in the ferric state. Procedures are described for the extn. of the free Fe of tissues by dil. acids with the exclusion of air and for the detn. of the total free Fe and the free ferrous and ferric Fe. E. R. MAIN

The Hinton glycerol cholesterol reaction for syphilis. Second modification. WM. A. HINTON AND ARTHUR BERK. *New Engl. J. Med.* 202, 1054–9(1930).—Supplementary procedures for the glycerol cholesterol reaction previously proposed (*C. A.* 24, 3828) are described which involve the use of a cholesterolized beef heart ext. and the formation of a characteristic ring instead of a ppt. E. R. MAIN

Blood cholesterol values in hyperthyroidism and hypothyroidism. Their significance. ROBERT L. MASON, HAZEL M. HUNT AND LEWIS HURXTHAL. *New Engl. J. Med.* 203, 1273–8(1930).—The cholesterol content of the blood tends to become decreased in hyperthyroidism, the lowest values being assocd. with severe toxemia. It becomes markedly increased in true myxedema. E. R. MAIN

Studies on anaphylaxis. VIII. The influence exerted by the liver on anaphylactic ictus and on peptone ictus, with particular reference to the experimental method and sources of error. ALBERTO MARRASSINI. *Boll. soc. ital. biol. sper.* 5, 833–7(1930). Guinea pigs were sensitized to egg albumin and to Witte peptone. The test dose was given after 19 days; part of the pigs received this dose in the jugular vein and part in a branch of the mesenteric vein. Amts. of egg albumin below certain limits when used for the test dose gave very different results with animals of the same weight. The shock varied from 0 to 6 according to the Arloing and Wauthey scale. The amt. of albumin which might produce a mortal ictus or an ictus of varying intensity even to total absence was about $^1/_6$ the dose which produced death with certainty in 250–300 g. guinea pigs. In guinea pigs 250–350 g. or over there was no relation between wt. of the animal and the dose of antigen necessary to produce a shock of equal intensity. These facts are ascribed to profound individual differences. 0.00150 g. albumin almost always

produced death; 0.00175–0.00250 g. constantly produced death. The results of slight or no shock reported by many authors who injected larger amts. of albumin must be accepted with much reserve; the same applies to results obtained with horse serum in doses of 0.05 cc., which corresponds to 0.003625 g. protein. The results obtained by injecting the test dose into the portal circulation were similar to those obtained when injected into the jugular vein. No definite ratio was found between the quantity of peptone necessary to produce sure death and the wt. of the animal. The weakest dose of peptone which produced a sure violent shock in 250–350-g. guinea pigs when injected into the jugular vein, when injected into the portal circulation gave slight or no shock in about $^1/_2$ the animals. PETER MASUCCI

Alkaline reserve in septic cases. RODOLFO REDI. *Boll. soc. ital. biol. sper.* **5**, 852(1930).—The alk. reserve values could not be used as a prognosis either for the duration or course of the disease. PETER MASUCCI

Studies on the acid-base equilibrium of the blood of septics (alkaline reserve, hydremia, glucemia, chloremia and urological examinations). RODOLFO REDI. *Boll. soc. ital. biol. sper.* **5**, 853–4(1930).—The causes which change the acid-base equil. of the blood of septic patients were investigated. The attempt was made to see whether the changes were due to the formation of an excess of acid substances, to a diminution of their neutralization or to their elimination. The results lead R. to state that there are too many factors to take into account to arrive at any definite conclusion. A knowledge of the alk. reserve in septic cases is of value only when considered along with other clinical findings. PETER MASUCCI

The adsorption of the virus of chicken sarcoma by hemoglobin. CLAUDIO PULCHER. *Boll. soc. ital. biol. sper.* **5**, 888–91(1930).—Electropos. hemoglobin adsorbs the virus; electroneg. hemoglobin does not. These results are in accord with cataphoresis expts. and show that the virus is negatively charged. PETER MASUCCI

The p_H and alkaline reserve of the blood in experimental intestinal occlusion. M. MAIRANO AND G. VECCHI. *Boll. soc. ital. biol. sper.* **5**, 912–5(1930); cf. *C. A.* **24**, 5853.– The exptl. intestinal occlusion obtained by sectioning the intestine provokes a progressive increase of the alk. reserve which runs parallel to the clinical picture. The increase of the alk. reserve bears no relation to the height of the occlusion. The p_H of the blood increases slightly, reaching a max. of 7.50–7.55 at the terminal period of the occlusion. PETER MASUCCI

Uroroseinuria and calcariuria as indices of hepatic insufficiency. S. GULLOTTA. *Boll. soc. ital. sper.* **5**, 971–3(1930). PETER MASUCCI

The acid-base equilibrium in dogs after cutting the vagi. G. QUAGLIARIELLO AND E. TRIA. *Boll. soc. ital. biol. sper.* **5**, 1016–9(1930).—After cutting both vagus nerves, the changes in the acid-base equil. of the blood were slight; there was a slight acidosis but this remained within limits compatible with life. There was also a slight diminution of blood bicarbonates. Marked changes, however, were noted in the urine. The concn. of bicarbonates increased and the acidity decreased because of the increase in NH_3. PETER MASUCCI

The influence of protein substances on the production of antibodies. I. G. ASCIONE. *Boll. soc. ital. biol. sper.* **5**, 1038–41(1930).—Beef serum albumin injected into rabbits 48 hrs. after each injection of typhoid or staphylococcus vaccine does not exert any influence on the production of antityphoid and antistaphylococcic agglutinins. The globulin of the same serum injected similarly inhibits the production of antityphoid agglutinins but accelerates the production of antistaphylococcic agglutinins in a concn. 3 times greater than the controls. **II.** *Ibid* 1042–4.—Two different strains of paratyphoid A were used. The rabbits immunized with bacteria and with lactalbumin yielded a serum with an agglutinating power no different from the controls. Similar results were obtained with rabbits immunized with bacteria and serum globulin. However, rabbits immunized with bacteria and serum albumin yielded a serum with a concn. of agglutinins 3 times greater than the animals receiving the bacteria alone. P. M.

A substance contained in lymph and lymphnodes producing hypoglucemia. PIO MARFORI. *Arch. fisiol.* **28**, 142–9(1930).—A fistula of the thoracic duct in a dog produces hyperglucemia but not glucosuria. Lymph and lymphoganglin compensate this increase of blood sugar. Both have a weak and inconst. action on the pancreas of the diabetic dog. The action is not due to insulin, but to a hormone antagonistic to adrenaline and acting by reduction of the activity of the vegetative sympathetic system. A. E. M.

The pituitary factor in arteriosclerosis. Its experimental production in rabbits. ROBERT C. MOEHLIG AND EUGENE A. OSIUS. *Ann. Internal Med.* **4**, 579–92(1930).—Marked production of atheromatous plaques in the rabbit aorta may be produced within

100 days by the feeding of a diet high in cholesterol and the daily injection of posterior lobe pituitary ext. JOHN T. MYERS

Natural bactericidal antibodies: observations on the bactericidal mechanism of normal serum. T. J. MACKIE AND H. M. FINKELSTEIN. *J. Hyg.* **31**, 35–55(1931).—Serum complement has no bactericidal action *per se*. An antibody-like substance invariably acts as an intermediary agent. This sensitizing agent is stable at 55° but labile at 60° to 65°. It is resident mainly in the fraction of the serum which is insol. in carbonic acid. It is present in the serum of young animals before certain other natural antibodies develop. The natural bactericidal antibodies are sp. for certain bacteria. A non-sp. extracellular substance occurs in bacterial cultures which may neutralize or inhibit these antibodies. This substance is liberated in large amts. when the culture is heated to 120°. It can be removed by repeated washing with saline soln. Strains of bacteria vary in their production of this substance. JOHN T. MYERS

The results of some quantitative experiments on the serum precipitation reaction. G. L. TAYLOR. *J. Hyg.* **31**, 56–83(1931).—Antigen and antibody react in equiv. proportions, in the serum pptn. reaction, to form an antigen-antibody complex which is adsorbent for suitable material in the surrounding medium. Excess of antigen is adsorbed and prevents completion of the reaction. Excess of antibody has no effect. Speed of particulation depends on the amt. of antigen-antibody complex and adsorbable matter present. There is some evidence that in certain cases the nature and amt. of adsorbable matter present may be such as to cause removal of excess antibody from the supernatent liquid. In such cases the adsorbable matter, not the antigen-antibody complex, may be adsorbent to the excess of antibody. The addn. of adsorbable matter as normal rabbit or guinea-pig serum is a useful method of hastening and facilitating the reading of reactions. JOHN T. MYERS

Observations on Salmonella agglutination and related phenomena. The influence of fresh normal serum on agglutination. P. BRUCE WHITE. *J. Path. Bact.* **34**, 23–37 (1931).—In concns. from 1:20 upward normal rat and rabbit sera inhibit sp. somatic agglutination of *Salmonella* bacilli with certain partial exception of coliform and proteus bacilli. Normal guinea-pig serum has similar properties but is much more apt also to have an agglutinative effect (conglutination). Normal serum has little effect on flagella agglutination. The inhibiting property disappears rapidly at 55°. Killed cultures, particularly alc.-treated ones, are more readily inhibited. Hemolytic complement is necessary for this inhibition, but another more stable factor must be present. Inhibition fails if the NaCl concn. is more or less than 0.85%. JOHN T. MYERS

The effect of variations in the media on the growth of normal and malignant tissues in vitro. F. C. PYBUS AND H. T. FAWNS. *J. Path. Bact.* **34**, 39–44(1931).—Preheating at 55° confers an inhibiting action on normal tissue growth which is not compensated by complement, but favors the growth of carcinoma. Pregnant serum has a stimulating effect on tissue growth. Embryonic and testis ext. stimulates the growth of embryonic tissues, the amt. of growth in 24 hrs. being double that in control cultures. J. T. M.

Schwartzman's phenomenon of local skin reactivity to bacterial products. F. M. BURNET. *J. Path. Bact.* **34**, 45–60(1931). A substance can be obtained by washing young bacterial cultures with isotonic NaCl soln., which on intradermal injection in rabbits produces a transient modification of the locally infiltrated tissues so that when the same substance is injected intravenously about 24 hrs. later an acute purpuric and necrotic reaction appears over the infiltrated area 2 or 3 hrs. later. This substance closely resembles bacterial endotoxins. Formalin-treated exts. give typical reactions when used as a skin preparatory agent but will function as the intravenous provocative agent. JOHN T. MYERS

Observations on melanosis coli. M. J. STEWART AND ELLA M. HICKMAN. *J. Path. Bact.* **34**, 61–72(1931).—Melanosis coli is due to the deposition of a melanin-like pigment within large mononuclear cells in the mucous membrane of the intestine, limited usually to the large intestine and appendix and ranging in color from gray or buff through dark gray or brown to inky black. Metastasis of the pigment may occur into the submucosa and the mesenteric lymph glands. The most acceptable theory of the mode of formation of this pigment is that of Pick, *i. e.*, that aromatic protein disintegration products are absorbed from the colon and converted into melanin within the connective tissue cells by the action of a tyrosinase-like enzyme. JOHN T. MYERS

The intermediate zone phenomenon encountered in certain Br. abortus agglutinating sera. F. W. PRIESTLEY. *J. Path. Bact.* **34**, 81–9(1931).—The nature of the agent causing inhibition at certain zones is obscure. It is pptd. from serum with the agglutinin in the globulin fraction and is removed by the homologous organism. An increase in NaCl concn. will remove the zone; this indicates that the zone is due to an in-

sufficient reduction of potential at that point and not to a decrease of cohesive force.
JOHN T. MYERS

The hypochlorhydria of asthma in childhood. GEORGE W. BRAY. *Quart. J. Med.* 24, 181–97(1931).—Asthmatic children, in general, show a markedly diminished power of secreting acid gastric juice in response to a test meal. Acid therapy should be combined with allergic treatment.
JOHN T. MYERS

The electrical charge of the virus of foot and mouth disease. IRMENGARD SICHERT-MODROW. *Zentr. Bakt. Parasitenk.*, I Abt., 119, 12–7(1930).—The virus carries a neg. charge. It is not known whether this is an actual property of the virus or of some substance which acts as a carrier.
JOHN T. MYERS

Lipoid antibodies. IV. The origin and proof of syphilitic blood changes. FELIX KLOPSTOCK. *Zentr. Bakt. Parasitenk.*, I Abt., 119, 78–84(1930); cf. *C. A.* 22, 3453.—There are lipoid compds. in the spirochetes which produce specific antibodies in rabbits and horses. The infected human patient acquires the power of combining with these substances during the early course of the disease so that antibodies may not appear till later.
JOHN T. MYERS

Hypoglucemic intoxication in trypanosomiasis, etc. KURT SCHERN. *Zentr. Bakt Parasitenk.*, I Abt., 119, 297–302(1931). —In exptl. animal trypanosomiasis, liver function is disturbed. No yeast-fermentable substance can be extd. from the liver. Only minimal quantities of sugar remain in the liver and blood.
JOHN T. MYERS

The influence of bacteriophage on the partial antigens of several microörganisms. MINORU TOYODA. *Zentr. Bakt. Parasitenk*, I Abt., 119, 350–3(1931).—After soln. by bacteriophage, the partial antigens remain in the lysate; their structure is not changed appreciably.
JOHN T. MYERS

Enzyme studies on the virus of foot and mouth disease. K. POPPE AND G. BUSCH. *Zentr. Bakt. Parasitenk.*, I Abt., 119, 398–406(1931). —The virus contained amylase, lipase and oxidase, but catalase, reductase and urease were not found. Virulence increases with the amt. of lipase, oxidase and amylase. In infected guinea pigs there is an increase of blood amylase but not of catalase.
JOHN T. MYERS

The true sugar content of skin and of muscle in diabetic and non-diabetic persons. HARRY C. TRIMBLE AND BENJAMIN W. CAREY, JR. *J. Biol. Chem.* 90, 655–63(1931).—In non-diabetic individuals the true (fermentable) sugar content of skin and of muscle averaged 56 and 28 mg. %, resp., and in diabetics 144 and 51 mg. The elevation of blood sugar is thus accompanied by a marked absolute increase of the quantity of sugar in the skin and a much smaller elevation in muscle. In diabetics who had received insulin at short intervals previous to operation, the sugar content of the muscles averaged almost the same as in the group in which externally administered insulin was no longer believed to be exerting an effect. These results are similar to those obtained by Folin, Trimble and Newman (*C. A.* 22, 267) using exptl. animals.
A. P. LOTHROP

The oxidation by potassium ferricyanide of certain constituents of the serum in anemia. G. PAYLING WRIGHT AND BARBARA ARTHUR. *J. Biol. Chem.* 90, 757–69 (1931).—Unsatd. fatty acids are oxidized by $K_3Fe(CN)_6$, and when these substances are present in the blood in any quantity as in anemia, the Haldane method for blood O_2 detns. is unsatisfactory and recourse must be made to Van Slyke's modification in which the ferricyanide-serum mixts. present a much smaller surface of contact with the O_2, which in turn is at a low partial pressure. The progress of an anemia produced by hemorrhage is accompanied by an increase in the I absorption value of the serum fats and by an almost quant. similar increase in the oxidizability of the serum by $K_3Fe(CN)_6$. After oxidation of the serum the I absorption values of the serum fats fall. The oleic acid present in the serum is probably only in a minor measure responsible for the oxidation reaction with $K_3Fe(CN)_6$, other more highly unsatd. fatty acids accounting for a greater part of it.
A. P. LOTHROP

The increase in production of tetanic antitoxin by addition of non-specific substances to the antigen. G. RAMON AND E. LEMÉTAYER. *Compt. rend. soc. biol.* 106, 71–4 (1931).—The addn. to the antigen of certain non-specific substances, such as alum, $CaCl_2$ and tapioca, exerts considerable stimulation on the development of antitoxic immunity and on the production of sp. antitoxin.
ALBERT L. RAWLINS

Tests on the relation between the increase of production of antitoxin and the hyperleucocytosis provoked. V. SORTUZ. *Compt. rend. soc. biol.* 106, 77–9(1931).—The production of tetanic antitoxin is greatly increased by the addn. to the antigen of a substance capable of producing at the same time a strong leucocytosis (for example, alum, $CaCl_2$ and tapioca). The antitoxin production is greatest when the leucocytosis reaches its highest level.
ALBERT L. RAWLINS

The ionic equilibrium of serum. Relations between the concentration of the salts

and the equilibrium of the albumin–globulin system. P. LECOMTE DU NOÜY. *Compt. rend. soc. biol.* **106**, 85–7(1931).—Results are given which were obtained in studying quantitatively the phenomenon of pptn. following the diln. of salt concn. by the addn. of distd. water to normal, heated and unheated, serum. ALBERT L. RAWLINS

Icteric bradycardia with hyperpotassemia. DUMITRESCO-MANTE, DULUGEA AND IONESCO-CRAIOVA. *Compt. rend. soc. biol.* **106**, 116–7(1931).—Four cases of icteric bradycardia are reported in which the blood modifications were characterized by hyperpotassemia, two of the cases being accompanied also by hypercholemia. A. L. R.

p_H and antigen of McIntosh in the Bordet-Wassermann reaction. B. ZABLOCKI AND S. SIERAKOWSKI. *Compt. rend. soc. biol.* **106**, 129–30(1931).—The action of the antigen of McIntosh is not affected by variations in the p_H between 3.5 and 9.0. When the reaction is acid a cloudiness appears, which diminishes as the soln. is made alk. At p_H 3.5 floccules appear; after centrifuging, the clear, supernatant liquid does not give a reaction with the positive serums; on the other hand, the sediment gives a pronounced reaction. These floccules appearing at p_H 3.5 may be divided into large and small floccules by centrifuging, the latter giving the stronger reaction with serum. ALBERT L. RAWLINS

p_H and the reaction of Kahn. S. SIERAKOWSKI AND B. ZABLOCKI. *Compt. rend. soc. biol.* **106**, 130–1(1931).—The emulsion of the antigen of Kahn, properly mixed with a soln. of physiol. serum, has a p_H of 5.8–6.5. After acidification, starting from about p_H 5.0, the antigen gives a positive reaction with a negative serum (*i. e.*, a non-specific result); this is explained by the fact that the antigen itself gives a sediment which is insol. after neutralization by the serum. In this respect the antigen of Kahn differs fundamentally from the antigen of Sachs. The antigen of Kahn made alk. with NaOH gives sp. but more feeble results, thus acting like the antigen of Sachs. Acidification or alkalization of the antigen of Kahn has no influence on the final p_H of the reaction, the buffering power of the antigen being quite strong, but weak in comparison to the great buffering power of the serum; the mixt. of the antigen and serum causes neutralization. The best results have been obtained with emulsions of Kahn having p_H 6.0–6.5. An antigen giving bad results can be corrected by the addn. of 0.5% of AcONa directly to the alc. soln. of antigen. The action of serum on the reaction of Kahn shows positive results in all cases after acidification starting at p_H 5.5; after alkalization to p_H 9.0, more feeble results are obtained with the positive serums; starting with p_H 10.6, all positive serums give negative results. ALBERT L. RAWLINS

p_H and the reaction of Sachs-Georgi. S. SIERAKOWSKI AND J. MELZAK. *Compt rend. soc. biol.* **106**, 132–3(1931).—See *C. A.* **25**, 739. A. L. RAWLINS

Physicochemical studies in gallstone formation. I. The method of the determination of the streaming potential and the applicability of Schulze-Hardy's rule. Appendix: The relation between the ζ-potential and coagulation. NOBORU FURUTANI, TSUKASA KUROKOCHI AND YOSHIO ASODA. *Japan J. Gastroenterol.* **2**, 148–57 (1930).—An app. is described for measuring the e. m. f. set up by the flow of aq. solns. of electrolytes through a glass capillary under pressure. The e. m. f. is proportional to the pressure but independent of the diam. and length of the capillary, within the limits of the expts. The streaming potential decreases in the order of KCl, $BaCl_2$, $AlCl_3$ and $Th(NO_3)_4$ in the same mol. concn. (cf. *C. A.* **22**, 4345). Lyophobic sols are coagulated by a soln. of electrolyte when the streaming potential of the latter becomes sufficiently low. This corresponds to a high concn. of univalent electrolytes, a lower concn. of bivalent, and an even lower concn. of tervalent and quadrivalent electrolytes. Crystal violet behaves like the latter. **II. The lyotropic series and the influence of acids and alkalies. Appendix: The relation between the ζ-potential and adsorption.** *Ibid* 158–61. The streaming potential of cations of the same valence decreases in the order Li, Na, K, Rb, NH_4 and Cs—and Mg, Ca and Ba, all tested as chlorides. The potential of HCl attains a much higher max. with increasing concn. than any of the salts tested. The max. potential of NaOH is much higher than that of HCl. The order for the adsorption of univalent cations (cf. Oden, *C. A.* **5**, 3535) is the same as that for their potential increasing from Li to Cs. **III. The influence of anions and halogen group. Appendix: Physicochemical consideration of gallstone formation.** *Ibid* 162–5.—The streaming potential decreases in the order $^1/_4$ $K_4Fe(CN)_6$, $^1/_3$ $K_3Fe(CN)_6$, $^1/_2$ K_2SO_4 and KCl, as well as I, Br, Cl, combined with either Na or K. An increase in the Ca content of bile may be expected to decrease the stability of the cholesterol sol. C. T. S

Studies in carbohydrate metabolism. II. Glucose-lactic acid cycle in diabetes. HAROLD E. HIMWICH, WM. H. CHAMBERS, Y. D. KOSKOFF AND L. H. NAHUM. *J. Biol. Chem.* **90**, 417–26(1931); cf. *C. A.* **23**, 4729; **24**, 1412.—Analyses for lactic acid and glucose contents of the blood of depancreatized and of phlorizinized dogs indicate that

during exercise, and also in rest, the muscle adds lactic acid to the blood and removes hexose from it, while the liver acts reciprocally. In resting depancreatized dogs the muscle adds approx. 8 mg. % of lactic acid to the blood and removes 17 mg. % of hexose; the liver removes 10 mg. % of lactic acid and adds 23 mg. % hexose. Correction for the loss in the lymph and comparison of equal vols. of blood show that the liver absorbs the whole of the lactic acid added by the muscle, but the muscle in return absorbs only 13 mg. % of the total 21 mg. % of hexose added by the liver. Most of the remaining hexose is lost in the urine. The interdependence of muscle and liver in muscular activity and recovery, both in normal and diabetic animals, is emphasized. K. V. THIMANN

The acid-base equilibrium of the blood in pathological conditions. I. Changes observed in the toxemias of pregnancy. EDWARD MUNTWYLER, NATALIE LIMBACH, ARTHUR H. BILL AND VICTOR C. MYERS. *J. Biol. Chem.* 90, 607 17(1931).—In 26 cases of toxemias of pregnancy a lowering of the alk. reserve of the plasma, similar to that of normal pregnancy, was observed. There was a corresponding decrease in total base from 153.8 to 144.7 millimols. per l. (cf. Oard and Peters, *C. A.* 23, 2469). The bicarbonate increased considerably *post partum*, and in many cases also the total base. The lowering of alk. reserve is ascribed to hyperventilation. K. V. THIMANN

Glucemic curve in malignant tumors, before and after surgical treatment and radium therapy. G. CERUTI AND F. BENSO. *Arch. ital. chir.* 27, 82–94(1930); *J. Am. Med. Assoc.* 96, 149.—Ten days after surgical intervention and after radium therapy there was an approach and later an actual return to the normal values of the glucemic curve. R. C. WILLSON

Calcium, magnesium, potassium, sodium and chlorine in blood after cranial injuries. G. SICILIANI. *Arch. ital. chir.* 27, 95(1930); *J. Am. Med. Assoc.* 96, 149.—Cranial injuries more or less grave (commotio, fracture of the base) cause a const. but transitory disturbance, for not more than 36 hrs., of the electrolytic equil., characterized by a diminution in Ca and an increase in K and P, while the remaining electrolytes behave in an inconst. manner. These changes were more pronounced when the trauma affected the area of the base of the cranium. R. C. WILLSON

H—PHARMACOLOGY

A. N. RICHARDS

Use of 7% carbon dioxide and 93% oxygen in the treatment of carbon monoxide poisoning. C. K. DRINKER AND J. SHAUGHNESSY. *J. Ind. Hyg.* 11, 301–14(1929).—The treatment of persons suffering from acute CO poisoning is best carried out by the inhalation during the first 5 to 20 min. of mixts. contg. 7% of CO_2 and 93% of O_2, followed by the usual mixt. contg. 5% of CO_2 and 95% of O_2. B. C. A.

Solution of dextrose and sodium chloride for obliterating varicose veins. HOWARD M. KERN. *Ann. Surgery* 93, 697 706(1931).—A study of 464 cases in which an equal mixt. of 50% dextrose and 30% NaCl solns. was used almost exclusively. R. B.

The action of gold preparations in tuberculosis. FRANZ WIRZ. *Z. Tuberk.* 65, 489 91(1930).—The author used Aurophos and Lopion in two cases of skin tuberculides originating hematogenously, and there resulted new lesions from this Au treatment. It is, therefore, concluded that the Au prepns. are not parasitotropic, and it is suggested that the chemical industries seek new combinatons to overcome this deficiency. H. J. CORPER

An attempt to use leucocytes as a mechanical vehicle for transporting therapeutic agents to the lungs. PHILIPP SPANIER. *Beitr. klin. Tuberk.* 73, 210–31(1929).—S. verified the observations of Christeller and Eisner that heterogeneous living leucocytes introduced into the blood stream of an animal mostly are retained in the pulmonary capillary while they pass the capillaries of all the other organs. This idea is utilized for transporting therapeutic agents. The leucocytes were obtained from dogs in which sterile turpentine oil abscesses were produced. The substances to be phagocyted were introduced either *in vivo* by injecting into a 3-day old abscess and removing the pus one-quarter hr. after introduction or *in vitro* by shaking the leucocytes at 37° with an equal vol. of isotonic soln. prepd. in 0.85% NaCl and 1.5% Na citrate used in equal amts. The suspension was given in 1 cc. amts. to rabbits or dogs intravenously. In these expts. trypan blue, iron prepns., I and contrast media such as $BaSO_4$ were utilized. H. J. CORPER

Benzene-oil treatment in tuberculosis. JONAS KAIRIUKSTIS. *Beitr. klin. Tuberk.* 73, 456–9(1930).—The author used a 30% sterile soln. of benzene in olive oil by intramuscular injection in amts. of 0.1 to 0.2 cc. This caused a focal reaction in tuberculous individuals which resulted in a favorable action upon the course of the disease. The

results in surgical tuberculosis appeared to be better than those in pulmonary tuberculosis. The clinical data are given in summarized form. H. J. CORPER

Therapeutic experiments with ascaridole. JOHANNES ZSCHUCKE. *Arch. Schiffs-Tropen-Hyg.* **34**, 472–80(1930).—Good results are reported in the treatment of *Necator* and *Ascaris* infections. H. EAGLE

The treatment of children's dysentery with Rivanol. D. TEITEL. *Arch. Schiffs-Tropen-Hyg.* **34**, 481–6(1930).—Rivanol taken in the mouth in doses of 5 mg. 3–6 times daily has a marked therapeutic effect upon amebic dysentery. If unsuccessful after 5–7 days, it should be supplemented by 2–3 injections of emetin. H. EAGLE

The treatment of surra with benzenearsonic acid "Höchst 4002." OTTO NIESCHULZ AND F. K. WAWO-ROENTOE. *Arch. Schiffs-Tropen-Hyg.* **34**, 662–9(1930).—Unsatisfactory results were obtained in the treatment of experimentally inoculated rats, mice and guinea pigs. H. EAGLE

The chemotherapeutic effect of gold compounds upon mice inoculated with Spirochaeta crocidurae, with particular reference to treatment with mixtures of neoarsphenamine and Solganal. W. MENK. *Arch. Schiffs-Tropen-Hyg.* **35**, 97–107(1931).—Solganal is much more effective than neoarsphenamine as a sterilizing agent in inoculated mice. M. recommends the use of a mixt. of the 2 in the treatment of recurrent fever and suggests a possible application in the treatment of syphilis. H. E.

Cholosulin. L. R. GROTE. *Arch. Verdauungskrankh.* **48**, 1–24(1930).—Cholosulin (an addn. compd. of insulin with the Na salt of desoxycholic acid) is supposed to be an insulin which can be taken by mouth. G. found it effective in only 2 out of 16 cases of diabetes. H. EAGLE

Can the retention of foods in the human stomach be affected by the administration of various kinds of beer or of their carbon dioxide and bitter contents? A. BICKEL AND F. FLEISCHER. *Arch. Verdauungskrankh.* **48**, 28–42(1930).—Beers cause a delayed emptying time of the stomach because of their alc. content, rather than their CO_2 or bitters contents. H. EAGLE

The effect of ephedrine upon gastro-intestinal activity. F. TRAKHTENBERG. *Arch. Verdauungskrankh.* **48**, 69–95(1930).—Ephedrine inhibits the motility of the stomach and intestines for 3–4 hrs., preceded by a short period of excitation (8–10 min.). The gastric acidity is unaffected, but the total Cl^- is increased. Its therapeutic use is indicated in gastric or duodenal ulcer, gastric hypertonicity and hypermotility, spastic obstipation, etc. H. EAGLE

The insulin-sensitivity of nondiabetic humans and its relationship to the vegetative nervous system. ERNST STAMM. *Arch. Verdauungs-Krankh.* **48**, 104–24(1930).—The intravenous injection of $^1/_{10}$ unit of insulin into normal subjects causes a maximal fall in blood sugar of 26.5 mg. %. In vagotonic subjects, this may be as high as 45.6 mg. %, in hypothyroidism it averages 47.2 mg %. On the other hand, in subjects with increased sympathetic tone (*e. g.*, with hyperthyroidism) there is less sensitivity to insulin with an av. fall of only 16.9 mg. % under the same conditions. H. EAGLE

The ingestion of vinegar and lemon juice in their relationship to the morphological character of the blood. ADOLF BICKEL AND GERHARD LISS. *Arch. Verdauungs-Krankh.* **48**, 158–66(1930); cf. *C. A.* **24**, 2169.—Continued ingestion has no harmful effect upon the blood picture. H. EAGLE

Excretion of alcohol in gastric juice following the rectal administration of alcohol. ARTHUR LUKAS. *Arch. Verdauungs-Krankh.* **48**, 332–45(1930). H. EAGLE

Histamine. ANTON KÜPPER. *Klin. Wochschr.* **9**, 2137–40(1930); cf. *C. A.* **24**, 5378.—The possible role of histamine in intestinal intoxication is discussed. As little as $^1/_2$ mg. injected subcutaneously into humans causes an increased secretion of gastric juice contg. both acid and pepsin. Intravenous injection is effective only if it is given very slowly. In approx. $^1/_2$ the cases which are diagnosed as achylia gastrica, histamine causes an active gastric secretion. It is to be emphasized that a pos. histamine test does not exclude organic gastric lesions, notably cancer; nor does an absence of secretion mean irreparable anatomical damage. This stimulating action of histamine upon gastric secretion is due to a direct action on the secreting cells. Histamine is found in all tissues, and in very high concn. in the lungs, presumably as an intermediary product of metabolism. The close similarity between anaphylactic shock and the pharmacological effects of histamine suggests the etiological role of the latter. H. EAGLE

Chemistry of uroselectan. A. BINZ AND C. RÄTH. *Klin. Wochschr.* **9**, 2297–8(1930).—2-Pyridone-5-arsonic acid was found to be less toxic than any known org linkage of As, in particular, the arsonic acids of the benzene ring. I introduced instead of the arsonic acid also resulted in a compd. of very slight toxicity; its Na salt was intro-

duced in 1927 as a therapeutic agent ("Selectan") in the treatment of streptococcal mastitis in cows. The Na salt of 1,2-dihydro-5-iodo-2-keto-1-pyridineacetic acid is uroselectan, sol. up to 35%, the lethal dose of which is 3.37 g. per kg. when injected intravenously into the rat. H. EAGLE

Cholesterol and lecithin in the water and acid-base economy. RUDOLF DEGKWITZ. *Klin. Wochschr.* 9, 2336–44(1930).—Cholesterol and lecithin have antagonistic and mutually neutralizing effects upon the hemolysis of red cells by water, acid or alkali. In general, cholesterol increases the resistance of the cell, possibly because, being a hydrophobic substance, it promotes a protoplasmic change in the nature of a water-in-oil dispersion, in which effect it would be, and is, aided by Ca^{++} and Mg^{++}. Lecithin, on the other hand, being hydrophilic, might promote an oil-in-water dispersion, which would be aided by Na^+ and K^+. Cholesterol injected into rabbits causes a transport of H_2O and Cl^- from the tissues into the blood and urine, with polyuria, and very high blood and urine $[Cl]^-$. Hyperlecithinemia, on the other hand, causes a low plasma and urine $[Cl]^-$, and a retention of H_2O and Cl^- in the tissues. Paradoxically, the prolonged peroral administration of cholesterol causes water and Cl^- retention, and decreased urinary excretion. H. EAGLE

The effect on the experimental animal of injection of a liver extract, prepared according to the method of Gänselen. W. EDERLE AND H. KRIECH. *Klin. Wochschr.* 10, 25–6(1931).—The ext. had a very favorable effect in white rats with a *Bartonella* anemia, whose spleen had been removed. H. EAGLE

Relationships between insulin and adrenaline in the human organism. BERNHARD KUGLEMANN. *Klin. Wochschr.* 10, 59–62(1931).—If the blood sugar falls below 60 mg. % following the intravenous injection of insulin, there is a considerable rise in systolic pressure and fall in diastolic pressure, the pulse pressure being doubled or even tripled. As the blood sugar returns to normal, there is a concomitant return of blood pressure to normal values. The administration of glucose prevents the blood pressure change, which is only observed if the blood sugar falls below 60 mg. %. Simultaneous with the rise in pressure there is a moderate leucocytosis, with a particular rise in lymphocytes; and, in patients with an enlarged spleen, there is a marked decrease in its size. Since all three of these phenomena (blood pressure, blood count and splenic changes) are observed following the injection of adrenaline, K. concludes that in insulin hypoglucemia there is a mobilization of adrenaline as a compensatory factor, tending to restore the blood glucose to its normal values. H. EAGLE

Adenosinephosphoric acid and cardiac activity. A contribution to the component of muscle extract which affects the heart. HANS ROTHMANN. *Klin. Wochschr.* 10, 67(1931). —Adenosinephosphoric acid causes slowing of the heart rate, and induces a more regular and stronger action in pathological conditions. Since it can be demonstrated in muscle exts., it is concluded that it is the active constituent in such exts. as regards cardiac function. H. EAGLE

The analysis of the action current curve of the heart into chemical phases. I. Relation between the action current and the formation of lactic acid. RUDOLF SIEGEL AND Z. UNNA. *Klin. Wochschr.* 10, 72–3(1931).—Monoiodoacetic acid is known to prevent the formation of lactic acid in striated muscle. In mice and rabbits small doses cause a change and broadening of the *T*-wave of the electrocardiogram while larger doses cause its complete disappearance without affecting the *Q R S* complex. S. and V. suggest that the *T*-wave and the formation of lactic acid are due to the same process; moreover, that the formation of lactic acid begins 0.05 sec. after the beginning of contraction (*Q R S* complex) and continues through systole. **II. Contractions without after-waves in the electrocardiogram.** *Ibid* 171.—After poisoning with CH_3ICO_2H, the ventricles continue to contract despite the absence of the *T*-wave in the electrocardiogram. H. EAGLE

The excretion curve of iodine from the blood following the administration of sodium tetraiodophenolphthalein under normal and pathological conditions in the animal experiment. H. EITEL AND A. LOSSER. *Klin. Wochschr.* 10, 109–11(1931). H. E.

The locally limited action of hormones, particularly that of pituitrin, upon the water exchange. ARISTID KISS. *Klin. Wochschr.* 10, 162–5(1931).—Pituitrin has an effect upon the connective tissue of the skin, causing an increased water absorption. The degree of its effect depends upon the conditions of the skin, which is apparently under the control of the liver. H. EAGLE

Comparative actions of sympathomimetic compounds: Influence of cocaine and certain related compounds upon the actions of a group of sympathomimetic amines. M. L. TAINTER. *Quart. J. Pharm. Pharmacol.* 3, 584–08(1930); cf. *C. A.* 24, 894.—The cocaine sensitization-desensitization was applied to a group of sympathomimetic

amines. Dihydroxyphenylethylamine and dihydroxyphenylpropylamine were sensitized by cocaine and reversed by ergotoxine, and thus were sympathicotropic, in common with the other catechols hitherto studied. The substitution of nitro, chloro or carbethoxy groups in the para position of phenylethylamine or the replacement of the Ph by a thiophene group produced pressor compds. which were desensitized by cocaine, and hence were pseudo-sympathicotropic. *p*-Carboxyphenylethylamine, Ph_3EtN and "salvamin," a trihydroxy product, were inactive on blood pressure. Psicaine, benzoylpseudotropeine (tropacocaine) and *β*-eucaine, which are closely related to cocaine chemically, did not reproduce the cocaine sensitization-desensitization. Cyanides, by interfering with the oxidative processes, depressed the response to adrenaline, tyramine and pituitary equally, and therefore did not resemble the cocaine action. Also, smooth muscle depression sufficient to lower the blood pressure, from large doses of papaverine, did not depress the action of these pressor drugs. It therefore seems unlikely that interference with oxidative processes or smooth muscle depression can be essentially involved in the phenomena. Cocaine increased the hyperglucemic responses of rabbits to adrenaline, and decreased those to ephedrine. The typical cocaine sensitization-desensitization phenomena can, therefore, be seen in functions not involving a smooth muscle response. W. O. E.

An unsuccessful abortion attempt or suicide by means of arsenic. A. SARTORI. *Chem.-Ztg.* 55, 105–6(1931).—Investigation into the death of a pregnant woman at first presented a picture of ergot poisoning. Later a bag contg. a gray powder was found. Analysis showed powd. C and As_2O_3. RUSSELL C. ERB

Effect of various concentrations of nicotine in tobacco on the growth and development of fowls. J. E. HUNTER AND D. E. HALEY. Penna. Agr. Expt. Sta., *Bull.* 258, 9(1930); Abstract; *43d Annual Report of the Director.*—When a high nicotine strain of tobacco is used in the feed of chicks, remarkably large amts. of nicotine can be tolerated. By building up a tolerance to tobacco in baby chicks, as much as 1.2% of pulverized tobacco can be included in the ration without noticeable injury. In fact there appears to be a stimulation due to the tobacco and better growth gains are made than by the controls. It is believed that continuous tobacco treatment will effectively control *worm infestation.* C. R. FELLERS

Pharmacological action of irradiated proteins and protein derivatives. P. HOLTZ *Arch. ges. Physiol.* (*Pflügers*) 226, 559–77(1931).—Serum irradiated with ultra-violet light has a dilator action on the blood vessels of the frog. Irradiated euglobulin, glycine, leucine, histidine and tyrosine show the same action. The action of the irradiated serum is attributed to HCNO, AcH and imidazole derivs., whose presence in such serum was demonstrated. The stimulating effect of irradiated sera on the intestine was similarly attributed to the presence of histamine or another imidazole deriv. A. G.

The effect of irradiated serum on sugar elimination by the isolated liver of warm-blooded animals. P. HOLTZ. *Arch. ges. Physiol.* (*Pflügers*) 226, 578–84(1931).—Irradiated serum markedly affects sugar elimination by the liver of guinea pigs, cats and dogs. In most cases the elimination is reduced. ARTHUR GROLLMAN

The changes in the stimulation time-tension curves by narcosis, cold and veratrine. CHUNG LIEN HOU. *Arch. ges. Physiol.* (*Pflügers*) 226, 676–88(1931). A. G.

Mode of action of compounds of insulin with bile acids on subcutaneous administration. R. STEPHAN. *Deut. med. Wochschr.* 56, 88–91(1930).—Sodium desoxycholate, coupled with insulin, shows the same action when administered subcutaneously as after oral administration. The clinical action of the combination is, however, different from that of insulin. ARTHUR GROLLMAN

The present status of chemotherapy, particularly in the treatment of tropical diseases. C. SCHILLING. *Deut. med. Wochschr.* 56, 955–8(1930).—An address dealing with the modern trend of chemotherapeutic research. ARTHUR GROLLMAN

Cholosulin and the daily blood sugar curve. RICHARD KÜHN. *Deut. med. Wochschr* 56, 1341–2(1930).—Cholosulin, a combination of insulin and the Na salt of desoxycholic acid, produced no change in the blood sugar curves of diabetics. A. G.

The initial insulin hyperglucemia. A. v. KORÁNYI. *Deut. med. Wochschr.* 56, 1683(1930).—The initial hyperglucemia which follows the injection of insulin is attributed to a demobilization of sugar in response to the rapid depletion of the sugar in the muscles. ARTHUR GROLLMAN.

The effect of soporifics on the basal metabolism in Basedow's disease. A. BORNSTEIN. *Deut. med. Wochschr.* 56, 1861–2(1930).—The increased metabolism in thyroid toxicoses is due to nervous stimulation and to an increased metabolic activity on the part of the cells. The former fraction of the metabolic increase is abolished by the use of soporifics; the latter remains unaffected. ARTHUR GROLLMAN

Is lactic acid absorbed through the skin? E. E. BAUER. *Deut. med. Wochschr.* **56**, 1869–70(1930).—No evidence is available to indicate that lactic acid or other nutrients may be absorbed through the skin. ARTHUR GROLLMAN

Distribution between blood plasma and red blood corpuscles of some substances used in therapeutics. R. FABRE. *Bull. soc. chim. biol.* 12, 954–64(1930); cf. *C. A.* **25**, 1591.—In dog blood, diethylmalonylurea and allylisopropylmalonylurea showed a distribution between red corpuscles and plasma of 6 mg.:3.6 mg. and 19.1 mg.:1.93 mg., resp., per 100 g. blood. Quinine and hydrastine were about equally distributed between corpuscles and plasma but were retained longer by corpuscles. C. G. KING

Pharmacological influence of the substitution of a methyl group in the β-carbon of methylaminomethyl(*p*-hydroxyphenyl)carbinol. RAYMOND-HAMET. *Compt. rend.* **192**, 450–2(1931).—The action of methylaminomethyl(*p*-hydroxyphenyl)carbinol has been studied in double suprarenalectomized dogs which have been treated with cocaine or yohimbine. Its action has been compared with that of *p*-hydroxyephedrine and ephedrine. The substitution of a methyl group in the β-position has endowed the drug with an adrenaline-like action, which it lacked. G. H. W. LUCAS

Investigation on the pharmacological action of the vessels of the pigeon's wing. I. The influence of the changes in concentration of sodium, calcium and potassium chlorides, as well as in the hydrogen-ion concentration in the perfusing Ringer solution. TOMONORI MANABE. *Folia Pharmacol. Japon.* 11, 225–37; Breviaria 17(1931).—The vessels in the pigeon's wing were perfused with Ringer soln. in which the chloride content and p_H were varied. Excess NaCl increases persistently the discharged quantity but a large excess causes a decrease. The vessels are dilated and the osmotic pressure is increased. The decrease in flow is due to a swelling of the endothelium in the small vessels, especially the capillaries. The tissues also are affected. The addn. of $CaCl_2$ causes a dilation of the vessels with small amts. and a constriction with larger quantities. Absence of $CaCl_2$ in Ringer soln. produces a dilation. The addn. of KCl produces a dilation or a constriction, depending on the quantity. Alk. Ringer soln. causes a dilation, as does a highly acid one. G. H. W. LUCAS

The experimental investigation of Panax ginseng. IV. The virulence of some nerve poisons and the poison phenomena brought about in rats fed on Panax ginseng. PIUNGKI MIN. *Folia Pharmacol. Japon.* 11, 238–55; Breviaria 18(1931); cf. *C. A.* **24**, 5869.—The nerve poisons adrenaline, physostigmine and pilocarpine act synergistically, while atropine and adrenaline act antagonistically in ginseng-fed rats. **V. The comparative study on the chemical constituents and the general action of Panax ginseng and Panax quinquefolius.** *Ibid* 256–60; Breviaria 19(1931).—The chief constituents of each plant were quantitatively prepd. Panax ginseng contains more panacene, panax acid, phytosterol and glucoside than *Panax quinquefolius*. Alc. exts. of both plants injected into mice produced tail symptoms (the tail being carried erect), convulsions and death. Panax gensing exts. were more potent. G. H. W. LUCAS

The antiphlogistic action of drugs on inflammation produced by streptococci. HIROSHI SUZUKI. *Folia Pharmacol. Japon.* 11, 276–86, 287–98; Breviaria 20–1(1931); cf. *C. A.* **25**, 740.—Antipyrine, quinine, erycon, salicylic acid, sinomenine, casein, rabbit serum, streptococcus serum and streptococcus vaccine exert an antiphlogistic action on the inflammation produced by streptococci-salt soln. in the rabbit eye. The action of antipyrine, quinine, erycon and sinomenine on inflammation produced by streptococci is weak, while that of salicylic acid, casein, rabbit serum and staphylococcus is scarcely antiphlogistic. The action of the drugs is stronger on the inflammation produced by streptococci than on that produced by chem. or phys. stimulation. Drugs act but slightly on the inflammation produced by cold in the rabbit eye. G. H. W. LUCAS

The pharmacology of benzoylglucuronic acid. SHINZO SAKATA. *Folia Pharmacol. Japon.* 11, 299–324; Breviaria 21–2(1931).—Warm-blooded animals are protected from poisoning by chloral hydrate, camphor, phenol, naphthol, borneol, antipyretica and morphine by the formation of a conjugated compd. with the glucuronic acid in the body. The conjugated glucuronic acid in the urine is thus increased. The conjugated acid belongs to the glucoside type, whereas the benzoyl derivs. are of the ester type. Phenylglucuronic acid, urochloralic acid and the conjugated ester type await investigation. The action of benzoylglucuronic acid was measured on rabbits and toads. On the hearts of these, tonus is increased and contraction height decreased by small doses; large doses cause a fall in tonus. The rate is unchanged and the heart stops in diastole. The action appears on the muscle itself. In small doses the drug causes a dilation of vessels in the rabbit ear and in the frog extremities. In large doses a constriction follows. It has some diuretic action in rabbits and toads; kidney vessels are dilated. A transient hydremia follows its administration. The diuretic action

is present in the toad after the ligature of the kidney portal vessels. Small doses stimulate and toxic doses paralyze isolated rabbit organs. G. H. W. LUCAS

A contribution on the pharmacology of phenylpyroracemic acid. TADASHI ISEKI AND HIROTO MATSUSHIMA. *Folia Pharmacol. Japon.* 11, 261–75; Breviaria 20(1931).—Various amino acids and their intermediate metabolic products possess some influence on certain hormone actions in animal organs. The intermediate product of phenylalanine, phenylpyroracemic acid, was studied. On perfused toad livers, it increased sugar. It produced no action on the pupil. On the surviving rabbit intestine it had a depressing action. On subcutaneous injection into rabbits, it increased blood sugar and was not synergistic with adrenaline. On the isolated hearts of toads and rabbits it had a paralyzing effect, its action being on the muscle itself. G. H. W. LUCAS

The relationship between the action of some cardiac tonics on the embryonic chicken heart and its stage of development. SAKURO KIRILARA. *Folia Pharmacol. Japon.* 11, 325–33; Breviaria 22–3(1931).—The action of coramine, digitalein, cardiazole and adonidin on 2 to 10 day old chicken embryo heart has been followed. A 2 day old embryo is stimulated by these heart tonics. The sensitivity increases up to max. where it remains unchanged for about 10 days. The action of these drugs on the stage of development was also studied. G. H. W. LUCAS

The influence of various conditions on the resorption of sodium salicylate from the pleural cavity as well as on the manner of resorption of these drugs. II. MASAYOSHI OGAWA. *Folia Pharmacol. Japon.* 11, 334–45; Breviaria 23(1931); cf. *C. A.* 25, 1286 The right lung was inflamed with $AgNO_3$. 0.1 g. Na salicylate per kg was injected in the pleural cavity and the rate of resorption followed. Relatively slight inflammation resulted in good absorption, but marked inflammation slowed up the rate on account of damage of the capillaries. Respiratory movements facilitated resorption. Secretion of exudate following damage to vessels lowers the concn. of the applied material **III.** *Ibid* 346–58; Breviaria 24–5.—The lungs were treated in the normal and in an inflamed condition, and the blood in the lung veins was examd. for Na salicylate. Low-grade inflammation assists resorption, whereas high-grade hinders it A closed pneumothorax hinders resorption The disturbance in resorption is more marked in the pleura pulmonalis than in the pleura parietalis G. H. W. LUCAS

The relationship between the vomiting-, blood-sugar- and uric-acid-regulating centers from a pharmacological standpoint. II. The influence of emetica on the uric acid excretion. MOKKIU MUN. *Folia Pharmacol. Japon* 11, 359–69; Breviaria 25 (1931); cf. *C. A.* 25, 1284. Comparative expts. were performed by injecting dogs subcutaneously with emetica and following the uric acid excretion. Morphine-HCl was used as a control. Following the injection of apomorphine-HCl, emetine-HCl, wine of Sb, $CuSO_4$ and erycon the uric acid excretion was increased over the control Na salicylate and antipyrine lowered the temp. and blood sugar stimulated vomiting and promoted the formation of uric acid. The centers regulating vomiting, blood sugar and uric acid are in close relationship with each other. G. H. W. LUCAS

Effects of insulin and adrenaline on the blood acetone in fasting children. LEIF SALOMONSEN. *Am. J. Diseases Children* 40, 718–24(1930). The antiketogenic action of insulin appears to be secondary to the influence of insulin on sugar metabolism. The administration of insulin to children whose blood sugar has been reduced by fasting reduces the concn. of acetone in the blood, the reduction being less marked the lower the sugar concn. The administration of adrenaline increases the concn. of acetone, the increase being more marked the lower the concn. of blood sugar. The injection of adrenaline is usually followed by an increase in the fatty acid content of the blood E. R. MAIN

The effect of phosphorus in rickets. I. Röntgenologic changes in rickets following administration of phosphorus. EDWARD L. COMPERE. *Am. J. Diseases Children* 40, 941–67(1930).—The administration of a combination of small quantities of elementary P and cod-liver oil to infants with severe cases of rickets has a much greater therapeutic effect than cod-liver oil alone. The administration of P alone is not sufficient to cause the healing of severe cases of rickets. The studies were made during the late fall and winter months. **II. The chemical changes in the blood in rickets following administration of phosphorus.** *Ibid* 1177–92.—The administration of a combination of cod-liver oil and P is followed by a marked increase in the Ca and P contents of the blood serum and in the product of the two. The administration of cod-liver oil alone to infants with severe rickets is followed by a slow but definite increase in the product of the Ca and P contents. The administration of P alone causes no significant changes in the Ca or P contents or in the product of the two. The healing of rickets does not appear to be assocd. with changes in the p_H of the blood serum. E. R. M.

Coffee as an intestinal disinfectant. Ernst G. Dresel and Harald Lotze. *Arch. Hyg.* **104**, 144–55(1930).—Broth infusions of finely ground coffee or prepns. from which the caffeine has been removed do not permit the growth of typhus bacilli or cholera vibrio; they inhibit the growth of Flexner bacilli and kill Shiga-Kruse bacilli. Finely ground coffee appears to be a more effective agent in its action against the pathogenic microörganisms of the intestinal tract than the com. prepns. of C.
E. R. Main

The blood in experimental benzine poisoning. L. P. Bryullova, A. S. Brussilovskaya, N. V. Lazarev, M. P. Lyubimova and D. I. Stalskaya *Arch. Hyg.* **104**, 226–38(1930).—No marked or characteristic chem. or histologic changes appear in the blood of lab. animals poisoned with benzine vapor. E. R. Main

Paths of absorption and excretion of sodium tetraiodophenolphthalein. A. J. Delario. *J. Lab. Clin. Med.* **16**, 329–40(1931).—Na tetraiodophenolphthalein appears to be absorbed by both the small and large intestines following oral or rectal administration to dogs. It leaves the blood within 2 to 4 hrs. after intravenous administration. The liver excretes from 60 to 70% of the dye, apparently unchanged; the large intestine about 25%. From 5 to 10% is eliminated in the urine partly in an inorg. state. Some of the dye may be rendered insol. by contact with pancreatic juice or fat present in the small intestine. The results are based upon the detn of I after oxidation of the blood, urine, etc. E. R. Main

The effect of calcium-precipitating substances on the ciliated epithelium of the maxillary sinus. W. F. Wenner. *J. Lab. Clin. Med.* **16**, 341–6(1931).—The movement of the cilia of the excised fragments of ciliated epithelium of the maxillary sinuses of rats and rabbits ceases when alizarin, citrate or oxalate solns. are added to the medium in which the tissues are immersed. E. R. Main

Some effects of amytal anesthesia. J. M. Olmsted and George Giragossintz. *J. Lab. Clin. Med.* **16**, 354–61(1931); cf. *C. A.* **25**, 140. The intravenous injection of amytal into dogs is not followed by an increase in the blood sugar content of dogs that have been fed a diet of lean meat. A slight increase may follow if the dogs have been fed a diet rich in carbohydrates. The hyperglucemia which accompanies the administration of morphine is prevented when amytal is injected simultaneously with the morphine. The increase in blood sugar that normally follows a short period of asphyxia is prevented by amytal. In man, the non-protein N and urea contents of the blood are markedly increased, the blood pressure is reduced and the heart rate increased after the administration of amytal. The gastric secretion of dogs is inhibited during amytal anesthesia. E. R. Main

The glucemic reaction with minimum quantities of adrenaline administered intravenously. L. Cannavo. *Boll. soc. ital. biol. sper.* **5**, 810–3(1930).—Small variable doses of adrenaline were injected intravenously into normal persons, and into patients afflicted with various diseases. The results showed that the glucemic effect of insulin is variable and is connected with the constitutional state of the subject and the sympathetic-parasympathetic equil. In some individuals there was a fall in blood sugar 5 min. after the injection and then a rise. Adrenaline, when injected intravenously, may cause appreciable changes in the glucemic titer in doses as low as 1/400 mg. Patients with hepatic lesions showed no noticeable difference to the action of adrenaline in contrast to normal or to patients affected with other diseases. Peter Masucci

Qualitative and quantitative studies on the penetration of the lungs by atomized drugs. Pompeo Spoto. *Boll. soc. ital. biol. sper.* **5**, 815–7(1930).—A method is described for studying the penetration of atomized drugs in the lungs of the dog. The substances tested were methylene blue, iodized oil colored with Sudan III, and colloidal Ag. From the results obtained, it is shown that the penetration of atomized liquids does occur if the mouth is kept open and the nares are closed; the atomized liquids may reach the alveoli of the lungs but only in small amts. and so unequally distributed that parts of the lung are not reached. Peter Masucci

Quantitative studies on the fixing power of the hepatic reticulo-endothelium apparatus. G. Orestano. *Boll. soc. ital. biol. sper.* **5**, 818–9(1930).—Colloidal Ag_2S was injected intravenously into rabbits. After different intervals of time the animals were killed and the Ag fixed by the liver was detd. After 9 min. 1/4 of the Ag injected was found in the liver. With longer intervals after injection, the velocity of fixation diminished; 1/4 was fixed in 2 hrs. and about 1/2 after 8 to 10 hrs. PbS gave similar results; after 2 hrs. 1/2 of the Pb was found in the liver. Peter Masucci

The relation between the action on the hemopoietic tissue and fixation of colloidal copper sulfide in the reticulo-endothelial apparatus. Gerlando Lo Cascio. *Boll. soc. ital. biol. sper.* **5**, 819–22(1930).—The injection of 10 cc. of an 0.8% soln. of col-

loidal CuS into rabbits resulted in the presence of 23,000 nucleated erythrocytes in 24 hrs. If, however, the injection of CuS is preceded by the injection of HgS (0.3 to 1 cc. of 1% soln.) the erythroblastic reaction diminished in proportion to the HgS injected. India ink and lithiocarmine gave similar results but HgS was the substance which produced the most complete, permanent and innocuous block of the reticulo-endothelial app. of the bone marrow, spleen and liver. PETER MASUCCI

The action of quinine on the reticulo-endothelial system. A. LEVI AND E. BELLODI. *Boll. soc. ital. biol. sper.* 5, 857–8(1930); cf. *C. A.* 24, 2176.—Quinine in relatively high doses (1–2 mg.) inhibits the development of the reticulo-endothelial system in mice; in smaller doses, (0.5 mg.) equal to those used in inhibiting the development of tumors, it stimulates the growth of this system. PETER MASUCCI

The resistance of the corpuscles after using antipyretics. A. LEVI AND R. BASSI. *Boll. soc. ital. biol. sper.* 5, 859–60(1930).—The repeated administration to rabbits of antipyretics (antipyrine, pyramidone, melubrin, cryogenin, maretin) in therapeutic doses (0.50 g.) does not give rise to variations in the resistance of the corpuscles and does not cause hemolysis. Toxic or mortal doses do exert a slight change in resistance. The above antipyretics may, therefore, be satisfactorily used in therapy. P. M.

The neuromuscular junction in curarized frogs and in frogs treated with quinine. G. M. PICCININI AND C. DELFINI. *Boll. soc. ital. biol. sper.* 5, 861 2(1930).—The gastrocnemius of the normal, of the curarized and of the quinine-treated frog when examd microscopically showed no sp. changes in the terminal motor app. P. M

The pharmacodynamic posology of quinine for frogs and the course of the spontaneous and reflex motility. G. M. PICCINNI AND C. DELFINI. *Boll. soc. ital. biol sper.* 5, 862-6(1930). Quinine-HCl.$2H_2O$ was injected into the dorsal lymph sac of (*1*) hibernating and (*2*) summer *Ranae esculentae*. Doses of 0.10, 0.08, 0.05, 0.03 g in weak solns. (1:300, 1:500, 1:1000) injected into frogs of 40, 30, 20, 12 g. were all lethal. The m. l. d. was 0.25 mg. per g. of frog. All the lethal doses produced a depression followed by a general paralysis. Under these conditions weak elec. stimuli applied to the skin contracted the muscles energetically. The reflex motility gradually decreased but lasted up to 24 hrs. Doses approaching the m. l. d. (0.2 to 0.07 mg.) produced the same toxic symptoms which were often preceded by a transitory excitation. The frogs were only apparently dead but within 24 hrs. became normal again. Moderate doses (0.06–0.04 mg.) always produced excitation phenomena of varying duration and intensity. Sub-specific doses of 0.0061–0.04 mg. showed nothing definite but did increase muscular work. The effects of injecting concd. solns. were also investigated and are discussed PETER MASUCCI

The action of insulin on the muscle contraction of the frog. G. BUCCIARDI AND A. DE NIEDERHÄUSERN. *Boll. soc. ital. biol. sper.* 5, 870 2(1930). Insulin injected into the frog causes an increase in the amplitude of muscle contractions and muscular work. The increase in the capacity for work coincides with a diminution of muscular glycogen. Insulin convulsions cause a diminution of muscle glycogen and a decrease in muscular work. PETER MASUCCI

Experimental studies on the hypoglucemic action of beer yeast administered enterically. AURELIO COSTA. *Boll. soc. ital. biol. sper.* 5, 878–81(1930).—Beer yeast administered in 5-g. doses by stomach tube to rabbits, as a general rule, produced slight hyperglucemia. It did retard, however, the hyperglucemic peak usually obtained when glucose is injected intravenously into rabbits. PETER MASUCCI

The action of insulin on thermoregulation. GIULIO CERUTI AND ENNIO SAPEGNO. *Boll. soc. ital. biol. sper.* 5, 905–6(1930).—Under the action of insulin, if the dose has been insufficient or due to the peculiar condition of resistance of the individual animal the hypoglucemia does not reach below a certain level, the internal temp. does not vary markedly. However, if the dose has been sufficiently large to produce a marked lowering of blood sugar approaching the convulsive dose (0.06–0.05%) then there is a rapid fall of temp. which is related to the glucemic titer. The fall of temp. is arrested by the injection of glucose. The temp. was detd. by a thermocouple method. PETER MASUCCI

The mechanism of action of colloidal sulfur. G. RASTELLI AND A. CASAZZA. *Boll. soc. ital. biol. sper.* 5, 939–42(1930).—Egg albumin and blood serum have the power to transform S into H_2S; the greater the dispersion of the S, the less is the reduction to H_2S. Colloidal S when injected into the circulation exerts a double action. The portion of the S which exists in the true colloidal state dets. the anaphylactic type of shock, while the portion which exists in a state of flocculation and which is present in all preparations, becomes reduced to H_2S which dets. the toxic effect. P. M.

Radium emanations and the physiologic action of certain drugs. P. MASCHERPA

AND G. BELLUZZI. *Boll. soc. ital. biol. sper.* 5, 944–6(1930).—The expts. were made on frogs and mice kept in a closed container into which circulated air that had been bubbled through a soln. of $RaBr_2$. Morphine-HCl was injected into frogs in 0.01 g. doses and into mice in 0.004 g. doses and strychnine sulfate into frogs in 0.00002 g. doses and into mice in 0.00005 g. doses. It was observed that in the animals treated with the Ra emanations the toxic picture brought on by the 2 alkaloids reached greater degrees of violence and appeared much more rapidly than in the control animals. Often the doses administered were lethal to the radioactivated animals. PETER MASUCCI

Biochemistry of magnesium narcosis. EMILIO MARTINI. *Boll. soc. ital. biol. sper.* 5, 946–8(1930).—The narcotic efficiency of Mg salts depends on the alk. reserve of the blood. The higher the alk. reserve, the less is the Mg content, or the greater is the Ca content of blood of the awakened animal. M. makes the deduction that an increase or a diminution of the alk. reserve corresponds to an increase or decrease, resp., of the narcotic efficiency of Mg. PETER MASUCCI

The action of bulbocapnine, injected intravenously on the local reflexes of posture of man. U. DEGIACOMO AND A. SEVERINO. *Boll. soc. ital. biol. sper.* 5, 965–6(1930); cf. *C. A.* 25, 742.—Bulbocapnine injected intravenously into dementia precox and phrenetic patients produced always an initial somnolence phase with a tendency for postural reflexes to become attenuated or to disappear. In the 2nd phase which is of longer duration and more characteristic, and which might be called "the catalexis phase," the postural reflexes are more or less exaggerated. PETER MASUCCI

The hypoglucemic action of "bean tea." G. SORGE. *Boll. soc. ital. biol. sper.* 5, 967–9(1930).—An aq. ext. of the pericarp of beans was made and administered to normal and diabetic subjects. 150 cc. of an infusion from 20 g. of powd. pericarp lowered the blood sugar of fasting normals 15.5–38.6% in 1 hr. and 8.7–26% after 2 hrs. The same dose of infusion given to diabetics under analogous conditions caused a const. lowering of blood sugar, 12–29% after 1 hr. and 20.4–37% after 2 hrs. The same dose administered to normal subjects along with 50 g. glucose *per os* or ½ hr. before the injection of 1 mg. adrenaline produced a const. and marked diminution of sugar and prevented the appearance of hyperglucemia. The exts. may be added to small doses of pancreatic hormone in the treatment of diabetics (synergic action). P. M.

The cure of intestinal lambliasis with naphthalene. G. SORGE. *Boll. soc. ital. biol. sper.* 5, 969–71(1930).—S. found naphthalene a satisfactory therapeutic agent in the treatment of *Lamblia intestinalis*. The administration of 50 cg. per day in 3 capsules, one after each meal for 6–7 days, is recommended. PETER MASUCCI

The influence of acetylcholine on insulinemia. FILIPPO CONDORELLI. *Boll. soc. ital. biol. sper.* 5, 977–9(1930).—C. concludes that insulinemia diminishes after the injection of medium doses of acetylcholine PETER MASUCCI

The inability of the bird organism to condense urea with glyceric acid. G. RUSSO-BIONDI. *Boll. soc. ital. biol. sper.* 5, 980–1(1930).—Neither glyceric acid nor glycerol administered *per os* to chickens or geese caused the slightest increase in the amt. of uric acid excreted, even if simultaneous to the administration of glyceric acid, urea (1–1.5 g.) was injected into the pectoral muscles. The urea injected was found mostly in the excrements, while a small quantity was transformed into NH_3. Therefore, the bird organism does not have the capacity to transform urea into uric acid. P. M.

Relations between glucemia and phosphorus of the blood under the action of uranyl salts and extracts of thyme. MARIANO MESSINI AND ARISTIDE POLI. *Boll. soc. ital. biol. sper.* 5, 982–4(1930).—The injection intravenously of uranyl acetate (0.00012–0.00024 g. equiv. per kg. of rabbit) causes a diminution of the blood phosphates and simultaneously hyperglucemia without glucosuria. This is followed by a second hyperglucemic phase with glucosuria and anuria. The injection of thyme exts. is also followed by a diminution of blood phosphates and hyperglucemia. A lowering of the blood phosphates is apparently followed by an increase in the glucemic titer. P. M.

The behavior of the phosphates and glucose of the blood in normal dogs and in dogs deficient in adrenaline-producing tissue by the action of cold baths. IVAN CIACCIO. *Boll. soc. ital. biol. sper.* 5, 997–1001(1930).—The detns. were made on normal dogs and on dogs from which the suprarenal medulla had been removed. The animals were subjected to a cold bath, 5–7°, for 10–15 min. The results showed that hyperglucemia from cold bears no relation to the hyperfunction of the medulla or to the hypersecretion of adrenaline. There was not always a quant. agreement between glucemia and blood phosphates but in general hyperglucemia coincided with a marked lowering of inorg. P. Instead these showed a behavior analogous to that observed after the administration of glucose. PETER MASUCCI

The behavior of phosphagen and phosphates in muscles after cold baths. GIUSEPPE SOLARINO. *Boll. soc. ital. biol. sper.* 5, 1001–3(1930).—Cold baths caused no variations in the phosphagen or phosphoric acid content of the striated muscles. P. M.

The action of various chemical substances applied directly to the sensomotor cortical centers of the dog. E. MORACCI. *Boll. soc. ital. biol. sper.* 5, 1003–6(1930).—The purpose was to see if any relation exists between the action of certain salts on the sensomotor cortical centers and the position of the relative ions in the Hofmeister series. The salts studied were $(NH_4)_2SO_4$, NH_4Cl, NH_4NO_3, NH_4CNS, K_2SO_4, KCl, KNO_3, KCNS, Na_2SO_4, NaCl, $NaNO_3$, NaCNS, Li_2SO_4, LiCl and $LiNO_3$. In another series, $LiClO_3$, LiI, Li_2CO_3 and Li lactate were studied. The results indicate that the action of the salts on the cortical centers is not a function of the pptg. power of the salts on colloids. With the exception of Li_2CO_3, the Li salts exerted an exciting action, the exciting action of creatine was confirmed. There was an evident analogy between the motor symptoms provoked by Li salts and those induced by creatine. P. M.

The action of certain chemical substances on the motor activity of the intestine. R. DE MARCO. *Boll. soc. ital. biol. sper.* 5, 1006–8(1930).—The motor activity was detd. by observing the length of time a small glass marble took to cross an intestinal loop under normal conditions, and under the influence of adrenaline, atropine, pilocarpine and nicotine. Adrenaline and atropine prolonged the time; pilocarpine caused no changes, while nicotine shortened the time with respect to the normal conditions. PETER MASUCCI

Adrenaline-like substances: their products of oxidation. PIETRO SACCARDI *Boll. soc. ital. biol. sper.* 5, 1010–16(1930).—The substances studied were: $(HO)_2C_6H_3COCH_2NEt_2$ (I) and $HOC_6H_4CH_2CH_2NMe_2$ (II). I was oxidized with Cl_2 water, dried on the water bath, extd. with alc., and the ext. evapd. to dryness (*A*), dissolved in H_2O (10% soln.) and injected subcutaneously into a guinea pig. The urine from the animal was dark, gave all the oxidation reactions analogous to the adrenaline blacks and gave a neg. Thormählen reaction for melanuria, but the Ehrlic diazo reaction was pos. The urine was therefore alcaptonic and not melanotic. The alc. insol. fraction (*B*) if treated with NaOH dissolved, and when injected produced the same phenomena of alcaptonuria. On analysis hydroxyhydroquinone was detected. II when oxidized and treated similar to I did not give rise to indole or pyrrole derivs. It was, therefore, not injected. The conclusion is drawn that oxidizability of these adrenaline-like substances is directly proportional to the no. of OH groups in the nucleus, and therefore the more the nucleus is oxidized, the more it is oxidizable. The hypothesis is advanced that tyrosinase acts on adrenaline-like substances giving red and then black derivs. only if at least one H of the amino group is free. PETER MASUCCI

Vagus function and adrenal insufficiency. GAETANO VIALE. *Arch. fisiol.* 28, 9–24(1930).—In adrenal operated dogs, the vagus function is unchanged; the hemodynamic action of adrenaline is increased and that of choline is decreased. Vagotomy lowers the pressure and the rhythm of the heart. Preventive injections of ergotamine or ergotoxine inhibit the tachycardia caused by vagotomy in normal dogs. Ergotamine, given after vagotomy, causes a decrease of the heart rhythm. Ligation of the adrenals lowers the pressure and retards the rhythm of the heart after vagotomy. Tachycardia caused by vagotomy is due to adrenalinemia. The sympathetic action on the heart is independent from adrenaline. Adrenaline probably exerts a central action on the vagus. A. E. MEYER

The action of heavy metals on the spinal cord. MICHELE MITOLO. *Arch. fisiol.* 28, 89–113(1930). Cu, Fe, Au and Sn have a paralyzing effect on the coördinate sensory centers of the posterior cornu of the spinal cord; they are inactive on the motor centers. Mg, Hg and Pb paralyze the motor centers only. Zn produces depression in both centers. Ag, as $AgNO_3$, has an exciting effect on the coördinate sensory centers but is inactive on the motor centers. A. E. MEYER

Gomether as a general anesthetic. José R. Ríos. *Semana méd.* (Buenos Aires) 1931, I, 396–7.—A mixt. of 80 cc. Et_2O and 10 cc. gomenol is recommended as an anesthetic in pulmonary lesions. A. E. MEYER

Insulin in diabetes of children. PEDRO B. LANDABURE AND FÉLIX PUCHULU. *Semana méd.* (Buenos Aires) 1931, I, 446–50.—The daily doses must be divided into 2, 3 or even 4 injections in suitable relation to the meals. A. E. MEYER

The local application of saturated solutions of magnesium sulfate. S. JOUAN. *Semana méd.* (Buenos Aires) 1931, I, 459; cf. *C. A.* 25, 1909.—The effect on tumefactions, purulent inflammations, stings of insects, etc., is due to osmotic changes. A summary of the beneficent actions is given. A. E. MEYER

Cessation of attacks of auricular paroxysmal tachacardia by the use of calcium.

JOSEPH B. WOLFFE AND SAMUEL BETTET. *Ann. Internal Med.* **4**, 795–803(1931). JOHN T. MYERS

Tribromoethanol anesthesia. RALPH W. WATERS AND G. W. MUEHLBERGER. *Arch. Surgery* **21**, 887–911(1930).—When kept at room temp., 3% solns. of tribromoethanol are stable toward hydrolysis for 24–48 hrs. It has practically the same margin of safety as other commonly used anesthetics, *i. e.*, $^2/_3$–$^3/_4$ of the fatal dose. With proper precautions, 0.1 g. per kg. body wt. can be safely given. It is useful, given intravenously, in very short operations, as it gives quick pleasant induction and recovery without gastro-intestinal disturbance. JOHN T. MYERS

The toxicity of atmospheres containing hydrocyanic acid gas. JOSEPH BARCROFT. *J. Hyg.* **31**, 1–34(1931).—The sp. power of HCN gas to increase the total ventilation is an important factor in detg. the sp. toxicity of the gas. Man is relatively insusceptible to the inhalation of HCN. The time of exposure sufficient for collapse is about one third of the fatal period of exposure. The extreme susceptibility of the canary makes it very valuable as an indicator of lethal concns. where a chem. indicator is not available. Pigeons are as good since they vomit at the lethal concn. for the canary, although their lethal concn. is about twice as great. Treatment consists of artificial respiration, and the administration of glucose and nitrites. JOHN T. MYERS

Experimental dust inhalation in guinea pigs. F. HAYNES. *J. Hyg.* **31**, 96–123 (1931).—Most inhaled particles contain sol. matter at least to a small extent. The solute may be harmlessly active or toxic. If harmless the cell is stimulated to detach itself from the alveolar wall and to remove the dust. If toxic the solute affects the viability of the phagocyte which becomes less able to detach itself. At the same time the solute diffuses into the neighboring tissues with irritation to them and subsequent fibrosis The more sol. form of a substance causes the greater damage; hence the solute has much to do with extent of damage. Si is the dust par excellence in predisposing to tuberculosis. The harmful effects of sol. Si may be neutralized by simultaneous administration of basic dusts as $Al(OH)_3$ or $MgCO_3$ although the latter are harmful when inhaled alone. It is suggested that the respective solutes combine to form monosilicates which are harmless. JOHN T. MYERS

Asbestosis bodies in the sputum: a study of specimens from fifty workers in an asbestos mill. F. W. SIMSON AND A. SUTHERLAND STRACHAN. *J. Path. Bact.* **34**, 1–4 (1931).—The inhalation of asbestos dust in high concns. leads to the appearance of asbestosis bodies in 48 out of 50 workers examd. The sputum is always mucoid in character. It may resemble egg albumin. The bodies seem to be the result of deposition on the asbestos fiber of an Fe-contg. substance elaborated by the cell. No tubercle bacilli were found in any of these cases. JOHN T. MYERS

Experimental liver necrosis from shale oil. CYRIL J. POLSON. *J. Path. Bact.* **34**, 5–12(1931).—Liver necrosis was produced in rabbits and rats by the intraperitoneal injection of shale oil. By graduating the doses it is possible to produce all stages from acute necrosis to cirrhosis. The poisonous action of the non-carcinogenic residue of shale oil is very slight. The liver was not thus affected in other animals. J. T. M.

The effect of oils on gastric secretion and motility. W. MORRELL ROBERTS. *Quart. J. Med.* **24**, 133–52(1931).—The efficiency of oils in inhibiting gastric secretion appears to bear some relationship to the degree of satn. of the constituent fatty acids, less satd. oils being more efficient The relationship between efficiency and sp. gr. and viscosity is less significant. Of related substances, only free fatty acids show inhibitory properties. Oil diminishes the response of the stomach to food or other substances but not to the effect of histamine. Oil inhibits both psychical and chem. stimulation of secretions. Its effect occurs almost entirely after it leaves the stomach. It diminishes the motility of achlorhydria. The effect on gastric motility is not secondary to its effect on secretion. It seems necessary to assume that oil after absorption exerts some restraining influence on the gastric cells and the motility, or that it leads to the formation or the liberation of some substance which acts in a similar manner. JOHN T. MYERS

Cholagog action of a few derivatives of the aliphatic series of low molecular weight. ETIENNE CHABROL, R. CHARONNAT, M. MAXIMIN AND R. WAITZ. *Compt. rend. soc. biol.* 106, 15–6(1931).—A study was made of the effects on the cholagog action caused by substituting various groups and atoms for the Cl and the CO_2H group in Cl_3CCO_2H. Conclusions: (1) The cholagog action disappears when the CO_2H group is replaced by an amide, alc. or Me group. (2) $BrCH_2CO_2H$ causes an immediate and powerful cholagog action, but its toxicity is too great for a prolonged study; glycine in a 2-gr. dose doubled the biliary flow during 1 hr. with a 17.5 kg. dog but was completely inactive in doses of 1 gr. with other dogs; glycolic, cyanoacetic, glyoxalic and malonic acids had no

effect in 1-gr. doses with dogs of about 20 kg.; hippuric acid had a very distinct action on 2 animals. (3) Of the compds. in which both groups are replaced at the same time, EtCl is completely inactive but EtBr or EtI increases the cholagog action when large doses are used; $CHCl_3$ and CCl_4 are completely inactive. ALBERT L. RAWLINS

The cholagog action of chlorine derivatives of acetic acid. ETIENNE CHABROL, R. CHARONNAT, M. MAXIMIN AND R. WAITZ. *Compt. rend. soc. biol.* **106**, 17–8(1931).—There is no close relationship between the cholagog action and the no. of Cl atoms in the Cl derivs. of AcOH. AcOH, $ClCH_2CO_2H$, Cl_2CHCO_2H and Cl_3CCO_2H were tested in molecularly equiv. doses of their Na salts; the acids represented thus amounted to 0.40, 0.60, 0.80 and 1.0 gr., resp. AcOH had no cholagog action; $ClCH_2CO_2H$ gave const. results, at least doubling and sometimes quadrupling the flow of bile and at the same time increasing the concn.; Cl_2CHCO_2H had no action; Cl_3CCO_2H doubled the biliary flow and increased the concn. of bile from 2.70 to 3.15. ALBERT L. RAWLINS

Respiratory stimulation by sodium sulfide. C. HEYMANS, JEAN J. BOUCKAERT AND L. DAUTREBANDE. *Compt. rend. soc. biol.* **106**, 52–4(1931).—Two series of expts. with dogs show that the stimulating action of Na_2S on respiration is largely reflex from the carotid sinus and is only very slightly due to a direct stimulating effect on the respiratory center. ALBERT L. RAWLINS

Carotid sinus and respiratory reactions by cyanide. C. HEYMANS, JEAN J. BOUCKAERT AND L. DAUTREBANDE. *Compt. rend. soc. biol.* **106**, 54–5(1931).—A series of expts. was performed with dogs in which the cyanide was caused to act solely on the carotid sinus and then solely on the centers. The results show that the inhibitory action of cyanide on respiration is due to the sensitiveness of the carotid sinus to cyanide, and not due to the action of the cyanide on the centers. ALBERT L. RAWLINS

The hypoglucemic action of sulfur. Sulfur mineral waters. I. DANIEL AND M. POPESCO-BUZEU. *Compt. rend. soc. biol.* **106**, 106–7(1931).—The action of sulfur water on dogs and normal and diabetic patients is contrasted with the action of distd. water. In all cases where the sulfur mineral water was used there was a pronounced diminution of blood sugar, while distd. water had no effect. The authors believe that the hypoglucemic action should be attributed to the colloidal S and H_2S in the water. ALBERT L. RAWLINS

The action of commercial glucose, comparatively administered by the digestive and intravenous methods, on the glycogen content of the liver, heart and muscles. D. SIMICI, M. POPESCU AND A. CRAIFALEANU. *Compt. rend. soc. biol.* **106**, 112–5(1931). The glycogen content of the liver, heart and muscles was detd. with 12 rabbits administered com. glucose by digestive and intravenous methods following a fast. To increase the liver glycogen the digestive method is more effective than the intravenous while to increase the glycogen content of the muscles, and particularly of the heart, the intravenous method is incomparably superior. ALBERT L. RAWLINS

Pharmacodynamic action of hydrogen sulfide introduced into the digestive tract. F. KMIETOWICZ. *Compt. rend. soc. biol.* **106**, 126–8(1931).—In a study with dogs the following behavior of H_2S was demonstrated: large doses introduced into the intestine first cause an acceleration of respiration and then cessation with death resulting; the blood pressure is raised; the heart rate is lowered, with an increase of amplitude; artificial alkalosis, acidosis and the injection of morphine increase the toxicity of H_2S, alkalosis having the greatest effect. The mechanism of the above actions is discussed. The absorption of H_2S is greater in the small intestine than in the large intestine. H_2S shows analogous but less distinct behavior when introduced by mineral water. ALBERT L. RAWLINS

Action of iodine, calcium and magnesium ions on the oscillometric index and arterial pressure in transcerebral dielectrolysis. GEORGES BOURGUIGNON AND SOCRATE ELIOPOULOS. *Compt. rend.*, **192**, 379–82(1931); *Compt. rend. soc. biol.* **106**, 454–8 (1931); cf. G. Bourguignon, *Rev. Actinologie* **5**, II, 180, March–April 1929. ALBERT L. RAWLINS

"Dial" a surgical anesthetic for neurological operations with observations on the nature of its action. J. F. FULTON, E. G. T. LIDDELL AND D. McK. RIOCH. *J. Pharmacol.* **40**, 423–32(1930).—For cats and dogs 0.5 cc. per kg. administered intraperitoneally was sufficient for surgical anesthesia. The motor cortex still reacted to electric stimulation. From this fact, and from other observations (of chop licking, salivation, vomiting, indicating an effect on the medulla, and of absence of excitement and a resemblance to natural sleep) it is suggested the site of action of Dial is in the hypothalamus and medulla. C. RIEGEL

The calorigenic action of morphine as revealed by addiction studies. H. G. BARBOUR, D. E. GREGG AND L. G. HUNTER. *J. Pharmacol.* **40**, 433–50(1930). Three

of 4 dogs after 7–10 weeks on morphine showed a basal metabolism higher than normal, and this high value dropped on withdrawal of the drug. Basal N excretion was decreased, although total N output increased. Carbohydrate combustion increased, fat combustion decreased. It is suggested that narcotic action may be due to inhibitory impulses arising peripherally from the calorigenic stimulation. C. RIEGEL

The reaction of iodates in vivo. L. C. MAXWELL. *J. Pharmacol.* **40**, 451–5 (1930).—Lethal intravenous dose of $NaIO_3$ was 100 mg. per kg. for rabbits. A dose of 75 mg. caused appearance of toxic symptoms (convulsions, spastic paralysis, irritation of mucus membranes, albuminuria). The toxicity of the iodate increased in the presence of NaI. The toxicity apparently is not due to liberation of I in the tissues. C. R.

Urinary sulfur and thiocyanate excretion in cyanide poisoning. RALPH G. SMITH AND RUSSELL L. MALCOLM. *J. Pharmacol.* **40**, 457–71(1930).—Rabbits on a const. diet were allowed to breathe HCN fumes for certain periods for a number of days. Inorg., and conjugated sulfates, neutral S and thiocyanate excretion in urine were detd. Neutral S increased during cyanide administration, the increase being accounted for by excretion of thiocyanate. Inorg. sulfate decreased in most cases, so that total S was the same, or less. An increase in total N caused an increase in N:S ratio. After intravenous injection of NaCN 61–100% of the cyanide given was recovered in the urine during the 1st three days as thiocyanate. Conclusions: Increased urinary neutral S is due to detoxication of cyanide rather than depressed oxidation processes. Thiocyanate formation is the principal method of cyanide detoxication. C. R.

Hemoglobin production. II. The relief of anemia, due to milk diet, by feeding amino acids. DAVID L. DRABKIN AND H. K. MILLER. *J. Biol. Chem.* **90**, 531–43 (1931).—The effect of the addn. of amino acids relatively free from Fe to anemic rats on a whole-milk diet contg. 0.2 mg. Fe per day was studied. All the prepns. were free from Cu and from other heavy metals. Alanine, alanine-HCl, histidine-2HCl and HCl alone had no effect on hemoglobin production, indicating that in this type of anemia the relief of achlorhydria is not essential (cf. McLester, *J. Am. Med. Assoc.* **95**, 719 (1930)). Arginine and Na glutamate rapidly produce continuous hemoglobin regeneration. Tryptophan, Na aspartate, pyrrolidonecarboxylic acid and a proline mixt. from hydrolyzed gelatin produce a temporary increase in hemoglobin production. It is suggested that the effective substances act as a source for the synthesis of pyrrole rings for the heme mol.; the absence of either Fe or of these substances produces anemia. K. V. THIMANN

A study of electrolyte equilibrium in the blood in experimental acidosis. HENRY N. HARKINS AND A. BAIRD HASTINGS. *J. Biol. Chem.* **90**, 565–95(1931).—The effect of injecting 2–3 cc. *N* HCl per kg. body wt. into dogs was followed by CO_2, p_H, ion distribution and refractive index measurements. The acid caused an anuria so that very little of the excess Cl was excreted. The p_H fell to 6.9 and in 2 cases to 6.1. Hyperpnea began 20 sec. after the start of the injection, but respiration became normal again in 1 min., while the p_H had not returned to normal in 3 hrs. or more. The respiratory center was not inactive, as shown by response to minimal elec. stimulus, and hence the p_H is not a respiratory hormone. The distribution of HCO_3 and Cl ions between cells and plasma was according to the Donnan relation throughout (Van Slyke, Wu and McLean, *C. A.* **17**, 3046), even on the acid side of the isoelectric point of hemoglobin. The refractive index of the serum was increased, and the water content decreased. The water content of the cells, however, and the Cl contents of both cells and serum were increased. Two expts. on blood *in vitro* gave essentially similar results. K. V. T.

The comparative effect of strychnine in the normal and dehepatized frog. J. T. PRIESTLEY. *Proc. Staff Meetings Mayo Clin.* **6**, 71(1931).—Liverless frogs showed a reaction to a given dose of strychnine that was more than twice as severe as that given by normal or splenectomized frogs. Partially dehepatized frogs were distinctly more susceptible to strychnine than normal or splenectomized frogs. R. C. WILLSON

β-Phenylethylamines. I. Mescaline and mescaline-like substances (SLOTTA, HELLER) **10. Some synthetic bases similar to ephedrine** (CHERBULIEZ, *et al.*) **10.**

JOHANNESSOHN, FRITZ: **Kinine in de geneeskundige Practijk aan de Hand van de Gegevens der Pharmacologie.** Amsterdam: Bureau tot Bevordering van het Kinine-Gebruik. 210 pp.

12—FOODS

F. C. BLANCK AND H. A. LEPPER

An outbreak of food poisoning in Staffordshire. I. The clinical manifestations. E. S. CLAYTON AND V. E. MILNE. *Brit. Med. J.* **1930, II, 684–5. II. Bacteriological investigation.** JOHN MENTON. *Ibid* 685–6.—A report is given of a limited outbreak of food poisoning due to eating pie made from pork infected with hog cholera bacillus.
J. B. BROWN

Use of buffers in determination of color by means of titanium trichloride. II. O. L. EVENSON AND R. H. NAGEL. *Ind. Eng. Chem., Anal. Ed.* **3**, 167–9(1931); cf. *C. A.* **22**, 3780.—Analysis of food colors by titration with $TiCl_3$ is made fairly accurate by the addn. of properly chosen buffer catalysts such as Na citrate or bitartrate.
H. F. LEUPOLD

The viscosities of alkali solutions of pure wheat flours and their relation to practical baking research. THEODOR BIÉCHY WITH ROBERT MÜLLER, GRAMS AND NÜCHTER. *Kolloid-Z.* **54**, 194–210(1931).—The viscosities of 0.05 *N* NaOH solns. of wheat flours are const. after 2 hrs. and were detd. at 20° with a Lawaczeck falling-body viscometer. A standard comparison may be made by comparing the viscosity of a soln. in 0.05 *N* NaOH contg. enough flour to contain 1 g. of gluten per 100 cc. The gas-holding capacity of dough was detd. at 32° with the Tillmann app. The following relation was found to hold for the wheat flours tested: [Teiggärkraft × standard viscosity]/Bread vol. (100 g. flour) = const., where Teiggärkraft is the difference between original and final dough vol.
ARTHUR FLEISCHER

Bakers' yeast. I. Influence of age upon the fermentation time of the yeast. E. ROSENBAUM. *Z. Untersuch. Lebensm.* **59**, 607–12(1930).—The manuf. of yeast cake from beet-sugar molasses is described. Analytical data on 20 samples of yeast are given. The moisture contents as detd. by heating 4 hrs. at 105–8° were 72–3%. High moisture content is assocd. with poor keeping quality. Keeping quality was detd by the time required for the cake to soften when heated at 35°, the times varied from 55 to 105 hrs. The N contents varied from 1.81 to 2.52% of the dry substance, corresponding to protein contents of 41.38–57.25%. The fermentation time is the time taken by a dough of standard compn. pressed into a mold of fixed dimensions to rise 5 times in succession to a height of 7 cm. above the mold. The sum of the 5 periods, or total fermentation time, showed great variation, 176–271 min. The fermentative power of the yeast decreases rapidly on storage, but deterioration is reduced by storage at low temps.
C. R. FELLERS

Development and heat economy of the gas bakery oven. W. RAISS. *Arch Wärmewirt.* **11**, 381–6(1930).—The development of the various German types of gas ovens for baking bread is discussed. A successful gas oven will not imitate the models for solid fuels, but must have a min. of wt. and good insulation.
E. W. T.

Milk considered as a complete and biologically balanced food. RAOUL LECOQ *Bull. soc. hyg. aliment.* **18**, 481–509(1930).—A review.
A PAPINEAU-COUTURE

The pigments of milk. MARTIN LUNDBORG. *Biochem. Z.* **231**, 274–89(1931) The natural yellow color of butter fat is due to carotene, as can be ascertained by the carotene spectrum of the unchanged fat. The tintometric detn. of the carotene according to Lovibond is unreliable because of the very min. quantities present. More reliable results are obtained from studies on the sapon. residue. Five cc. of a freshly prepd. 20% alc. KOH is used for the sapon. per g. fat, and the sapon. is carried out for 45 min. over a boiling water bath in an Erlenmeyer flask provided with a long reflux tube. The reaction mixt. is dild. with 10 vols. of H_2O, and this is then extd. 4 times with $^1/_4$ its vol. of ether. The combined ether exts. are dried 2 hrs. with anhyd. Na_2SO_4 and evapd. at 50–55°, the last stages *in vacuo*. The residue is transferred quantitatively to small measuring cylinders with small quantities of anhyd. chloroform, and the tintometric detns. are made on these solns. For this purpose the chloroform soln. is layered over $SbCl_3$ soln., and the contents are carefully mixed and examd. in the tintometer. Direct extn. of the milk fat is impossible; the extn. of the fat with petr. ether from milk acidified with lactic or acetic acid is also full of difficulties, since the acid destroys the carotene when the petr. ether is evapd.
S. MORGULIS

Determination of milk fat. A. C. ANDERSON. *Z. Untersuch. Lebensm.* **59**, 600–2 (1930).—In the detn. of fat in milk which is in an incipient state of decompn., sepn. of the fat as in the Roese-Gottlieb method may lead to low results because of sapon., even if $K_2Cr_2O_7$ has been added as a preservative. It is preferable to use the Schmid Bondzynski-Ratzlaff method as follows: Ten g. of milk is mixed with 10 cc. of HCl,

d. 1.19, and boiled for 4–5 min.; heat is applied as gently as possible to avoid discoloration. After cooling, the mixt. is extd. with 10 cc. of alc., 25 cc. of Et_2O and 25 cc. of light petroleum as in the Roese-Gottlieb method. C. R. FELLERS

Determination of the milk proteins. III. Proposed modified method for casein. GEORGE M. MOIR. *Analyst* **56**, 147–9(1931); cf. *C. A.* **25**, 1597.—The following modified method is proposed for the detn. of casein: Dil. 10 ml. of milk with 50 ml. of water which has been heated to 40–42°. Add at once 1.5 ml. of 1.67 *N* AcOH and stir by rotating the contents of the beaker 4 times against a stirring rod. After 20 min. add 4.5 ml. of 0.25 *N* NaOAc soln. and filter after it has stood an hr. or more. Wash promptly and det. the N content of the casein by the Kjeldahl method with Na alizarine sulfonate as indicator in the final titration. The directions are given in detail together with several important explanatory notes. W. T. H.

The determination of the calcium, magnesium and acid-soluble phosphorus of milk by means of trichloroacetic acid filtrates. GEORGE P. SANDERS. *J. Biol. Chem.* **90**, 747–56(1931).—The proteins of milk can be completely ppted. by [illegible] can be used for the detn. of Ca and Mg with a high degree of accuracy, and 1 working day is saved in the prepn. of samples. The procedure should also be of value in studying P combinations in milk with particular reference to casein and lipide P. In several milk samples 68.4 to 81.9% of the P was found to be acid-sol. There was no definite correlation between the amt. of acid-insol. P and the casein content, but in general milk high in casein was high in acid-insol. P. A. P. LOTHROP

Determination of the volatile fatty acids in the milks of the cow, goat and sheep. VITTORIO BORRA. *Pediatria rivista* **39**, 102–9(1931).—In the course of his investigations on the origin of the anemia resulting from the use of goat milk, B. made comparative analyses on the quantity of volatile fatty acids present in the milks of cows, sheep and goats. The Reichert-Meissl no. for the milks of the goat, cow and sheep was 7.72, 3.58 and 2.55, resp., while the Polenske no. was 3.76, 1.49 and 0.87, resp. G. S.

Simple calculation of the limit of value of the microscopical examination of milk for tubercle bacilli. D. R. WOOD. *Analyst* **56**, 179–80(1931); cf. *C. A.* **24**, 5387.—Without concn. (and the concn. methods are not really successful) from 10 to 500 bacilli per cc. can be detected by microscopical examn. If cases are excluded in which there is a bulky deposit, characteristic of tubercular mastitis complicated by streptococcal mastitis, and if the attention is confined to milk giving a normal deposit of not more than 2.5 cc. in a vol. of 100 cc., the microscopic detection is limited to the detection of not less than 10–50 bacilli per cc. and is, therefore, less than 1/500 as sensitive as the biological method. W. T. H.

Crystallization of lactose in sweetened condensed milk. B. SEGAL. *J. S. African Chem. Inst.* **13**, 33–40(1930). The texture of sweetened condensed milk is a function of the size of the lactose crystals. In the cooling of condensed milk during manuf. the immediate production of a large no. of crystal nuclei, rather than the growth of crystals around a small no. of centers, should be the aim. B. C. A.

Studies on the use of dry skim milk in manufacturing ice cream. C. D. DAHLE AND J. I. KEITH. *Ice Cream Trade J.* **27**, No. 1, 33–5(1931).—When dry skim milk of good quality was used in place of condensed skim milk in ice cream mixes contg. cream and milk, the resulting ice cream scored as high as the condensed skim milk controls. When dry skim milk was used in conjunction with butter, the score of the ice cream was lower than when cream was used. Mixes contg. butter and skim-milk powder yielded the desired overrun more slowly than mixes contg. cream and powder. From the standpoint of flavor, texture and body dry skim milk of good quality can be successfully used as a substitute for condensed skim milk in mixes contg. cream and fluid milk as a source of fat One half lb. of dry skim milk can be successfully used in one gallon ice cream mix under the conditions mentioned. A. H. JOHNSON

The causes and prevention of cream feathering. F. J. DOAN. *Creamery and Milk Plant Monthly* **20**, No. 1, 33–8(1931).—Fresh unhomogenized table cream rarely exhibits feathering in coffee. Creams which have become acid on account of fermentation and homogenized creams are susceptible to feathering. The feathering of homogenized creams was shown to be due to fat clumping. Homogenization of cream in such a way as to prevent fat clumping reduced the tendency to feather. Cream for prepg. homogenized table cream should be fresh, of low acidity, and should be pasteurized at 160–62°F. for 30 min. or, if a flash method is used, at a temp. of 175°F. The cream should then be homogenized at the same temp. If single-stage homogenization is used, the cream should be rerun at once while hot at about 1000 lb. pressure. When a two-stage machine is used, the pressure on the second valve should not be in

excess of the pressure on the first. If feathering cannot be prevented by these procedures, certain salts such as Na citrate, $NaHCO_3$ and Na_2HPO_4 may be added. The amt. of these salts to be used varies, but 0.025 to 0.10% will usually be sufficient. The salt should be added prior to homogenization. A. H. JOHNSON

The hygienic supervision of butter. A. D'AMBROSIO. *Ind. olii minerali e grassi* **10**, 169–71(1930); cf. *C. A.* **24**, 5888.—On 114 samples of butter taken between December and April when the cows were fed with dry hay, only 8 had the value of the sol. volatile acids under 26. Feed, such as grass, richer in volatile acids, produced butter richer in these. The stage of lactation has an effect on the production of rich milks. After the period of the colostrum, the quantity of the volatile fatty acids decreases from a very high figure to normal. Other conditions, such as estrus, weaning of the calf, etc., affect the compn. of the milk. Many controlled samples of butter gave the const. limits: Zeiss refractometer reading at 35° 43.2–49.5, sol. volatile acids no. 20.8–35.15, insol. volatile acids no. 1.1–3.0. R. SANSONE

New methods of analysis of oils and fats, with particular reference to butter analysis. S. FACHINI AND G. DORTA. *Atti III congresso naz. chim. pura applicata* **1930**, 683–7. Three and a half g. of butter is melted and filtered; then the sapon. no., sol. fatty acids, fixed fatty acids, I no., mol. wt. and *n* of fixed fatty acids are detd., and the fixed fatty acids are sepd. into a group contg. caprylic, capric and oleic (linoleic) acids not pptd. from soln. in acetone by KOH and a group contg. lauric, myristic, palmitic and stearic acids pptd. from soln. in acetone by KOH. The I no., mol. wt. and *n* of the first group are calcd. From the I no. the content of caprylic and capric acids and the av. mol. wt. of these 2 acids in the mixt. can be calcd. The *n* of the first group, for all grades of butter tested, was 1.4510–1.4500 at 25°; palm oil gives 1.4391–1.4380. E. M. S.

Analysis and composition of vegetable parchment used for packing dairy products. PAUL ARUP. *Analyst* **56**, 149–61(1931).—The following detns. were carried out on 10 com. samples of parchment paper; water, ash, water-sol. ext., reducing material such as dextrose, bursting strength (wet and dry), wt. per ream and power to support mold growth. The methods used are described and the results tabulated. As a result of these detns. the conclusions drawn are: The moisture content should not exceed 10%. The bursting strength, as detd. by the Ashcroft tester, should be at least 25 lb. per sq. in. for parchments weighing 25 lb. per ream and 18 lb. per sq. in. for material weighing 18 lb. per ream. The strength immediately after being wetted should be at least 33% of the strength of the unwetted material. The ash should not exceed 0.45% and the water-sol. ext. 1.30%. The percentages of reducers in the water sol. ext. were calcd. as a guide for the detection of added sugar. Certain standards adopted by Germany (8% of ext. and 3% of ash) are considered too high, being due probably to the addn. of sugar and salt. An unduly high content of ext. renders the paper particularly susceptible to attack by mold. The water-sol. ext. from genuine parchment consists of the decompn. products of lignocellulose and can be characterized by method of Cross and Bevan. W. T. H.

Fatty acids and component glycerides of Indian ghee. R. BHATTACHARYA AND T. P. HILDITCH. *Analyst* **56**, 161–70(1931).—Ghee is clarified butter or cream used in India in place of butter which, because of climatic conditions, is not suited to Indian methods of cooking. To prep. ghee, the thick scum that forms on boiled milk which it is allowed to stand in a warm place is skimmed off, mashed and churned with added cold water toward the end. The resulting buttermilk is removed, and the residual fat is heated gently in an open pan, strained and stored. Two samples of cow ghee and 2 of buffalo ghee were analyzed, one sample from a stall-fed animal and the other from a pastured one in each case. The butter fat content of the cow ghee was similar to that of ordinary butter. The Reichert-Meissl values and the % of butyric acid were toward the lower values obtained by Hilditch and Sleightholme in butter from New Zealand cows, but the oleic acid content was normal. The stearic acid content is higher in the fat from the stall fed cow than from the pastured animal, and the palmitic acid value is normal for butter fat or beef tallow. The corresponding specimens of buffalo ghee were not very different, although there is distinctly more butyric acid which corresponds to somewhat higher Reichert-Meissl and Kirschner values. The most apparent difference lies in the increased content of stearic acid and the presence of arachidic acid. Broadly speaking, it would appear that the main characteristics of the fatty acids in a fat are fairly well defined for a given species of animal, subject to minor variations due to varying climatic and feeding [illegible] With respect to the glyceride structure of the ghee, it is of the mixed "heterogeneous" type. There is no evidence of segregation of any fatty acid into a simple triglyceride, and all the satd. fatty acids are found, in more or less the same ratio, in each part of the fat. It

is doubtful whether triolein is present in appreciable amt., and the tripalmitin or tristearin present must be small if any. The 4 fats studied were of first quality, comparable in flavor and odor to the best butter fats. W. T. H.

The botany and chemistry of the soy bean. W. Riede and B. Rewald. *Landw. Vers. Sta.* **110**, 291–304(1930).—Seven samples of soy bean raised in Germany analyzed N 5.97–6.02, protein 36.59–41.37, fat 14.67–17.39 and phosphatides 1.02–2.53%. These figures are reduced to a basis of 12% H_2O. John R. Hill

Determination of moisture in soy beans. L. Jolson. *Mém. Univ. État Extrême-Orient* **13**, No. 6, 1–23(1929); *Chimie & industrie* **25**, 145(1931).—From a study of drying at 100–5° and at 120–60°, of distn. in presence of xylene, and of the effects of the fineness of grinding, wt. of samples and temp. and time of drying, J. concludes that all 3 methods give satisfactory results provided the conditions are properly selected and strictly adhered to. He recommends grinding to pass a 1.5–2.5-mm. mesh sieve and drying 5 g. for 20 min. at 130°. Drying at 100–5° requires 5–8 hrs. and should not be continued to const. wt. A. Papineau-Couture

Mineral, nitrogen and fat content of some varieties of mature bean seed and of string beans. J. S. McHargue and W. R. Roy. *J. Nutrition* **3**, 479–81(1931).—Twelve samples were analyzed for protein, fat, etc., as well as for mineral content. Both string beans and ripe beans are very rich in mineral constituents and S. It is probable that the curative property of beans for beri beri is assocd. with their relatively high mineral content. C. R. Fellers

Carbohydrates of the lotus rhizome. Teizo Takahashi and Hatsunao Yokoyama. *J. Agr. Chem. Soc. Japan* **6**, 870–2(1930).—The lotus rhizome is a common food in Japan. Most of the sugar fraction was non reducing sugar. From the hot alc. ext. of the rhizome powder sucrose was isolated. Raffinose, galactose and galactane could not be detected. The polysaccharides were mostly starch and cellulose. Y. K

Vitamin B content of raw and canned beef. Yoshio Umishio. Imp. Zootech. Expt. Sta (Japan), *Bull.* **25**, 12 pp.(1930).—For normal growth of rats, the min. daily requirement of vitamin B is supplied by an alc. ext. of 20 g. raw or 40 g. canned beef. The vitamin B content of canned beef is not diminished during storage for 4–5 years. K. Kitsuta

Detection of the onset of decomposition in meat by the content of ammonia in the form of salts. F. M. Litterscheid. *Z. Untersuch. Lebensm.* **59**, 599–600(1930).—The effect of NH_3 gas from a leaky NH_3 system for cold storage on the appearance and quality of meat is described. NH_3 contamination may be detected by testing the rinsing water with Nessler's soln. In conducting the Glassmann-Rochwarger test (*C. A.* **24**, 3063) for incipient putrefaction and for the detection of NH_3 in flesh, L. recommends that the outer and inner portions of the meat be examd. separately to det. whether the meat has been exposed to NH_3 gas or has been dressed with NH_4 salts as preservatives. C. R. Fellers

Citrus fruit production in the Lower Rio Grande Valley of Texas. Hamilton P. Traub and W. H. Friend. Texas Agr. Expt. Sta., *Bull.* **419**, 60 pp.(1930).—Very complete pomological, phys. and chem. data for grapefruit, oranges, lemons, kumquats, tangerines, etc., are given. For grapefruit, total sol. solids range from 8.3 to 10.5%, total sugars from 5.8 to 7.0, total acidity as citric from 0.96 to 1.4, p_H from 3.1 to 3.3, protein from 0.42 to 0.53 and ash from 0.19 to 3.0. C. R Fellers

Acid to sugar ratio in oranges. D. J. R van Wijk. *J. S. African Chem. Inst.* **13**, 52–8(1930).—Examn. of 3 typical varieties of oranges shows that maturity as commonly judged from the ratio, acid degrees Brix of the juice, is unsatisfactory. A better basis of comparison is the ratio acid: "calcd. sugar" (where calcd. sugar = degrees Brix − acid − 1.75). The value 1.75 represents the contribution of extraneous matter, other than acid and sugar, to the d. of the juice and is fairly const. for all samples examd. B. C. A.

Banana—a challenge to chemical investigation. H. von Loesecke. *J. Chem. Education* **7**, 1537–43(1930).—Bananas soften on ripening because of the change of protopectin into pectin. When overripe the pectin has changed to acids. Ethylene has little effect on ripening bananas except on "dormant fruit." Banana vinegar compares favorably with cider vinegar. Ripe banana flour has some therapeutic value. Bananas are rich in vitamin A and C and also contain B, G and E. Ann Nicholson Hird

Effect of solid carbon dioxide upon transportation diseases. Charles Brooks. *Phytopathology* **21**, 103(1931).—It is possible by the use of solid CO_2 to secure a CO_2 content of the atm. of a car within 30–60 min. which will check rotting and softening of warm fruit as much as would a 30–40° drop in temp. It is essential that the gas escape within the next 18–24 hrs. or injury to flavor may result, especially with peaches,

red raspberries and strawberries. Dewberries, blackberries, cherries and plums are more resistant to injury. Grapes, sweet corn, peas and beans offer the greatest promise of beneficial effects without harm to the product. JOSEPH S. CALDWELL

Photoactivity of honey. J. STITZ. *Z. Untersuch. Lebensm.* **59**, 606–7(1931); cf. *C. A.* **23**, 2223.—The possibility of Ra in the ash of honey was investigated by placing the ash as well as natural honey in both glass and quartz containers and subjecting them for 30 days to contact with photographic plates. Other samples were irradiated with ultra-violet light and Röntgen rays and similarly exposed. All results were neg. for Ra. C. R. FELLERS

A rapid method for the determination of crude fiber. U. H. PURANEN AND E. S. TOMULA. *Acta Chem. Fennica* **3**, 85–9(1930).—The Weede method consisted in treating 3 g. of the crude fiber with ether to remove fats, boiling for $^1/_2$ hour with 200 cc. of 1.25% H_2SO_4, filtering and washing until wash water was neutral. The residue was boiled for $^1/_2$ hour with 1.25% KOH, washed, dried and ignited. The process took several days due to the colloidal nature of the soln obtained and the difficulty in filtration. If the vol. fell below 172–181 cc. on boiling, the analysis showed 23.64% crude fiber (theoretical 26.08%), while if the vol. was 223–227 cc., the result was 26.53%. A later method involved the direct neutralization of the acid with KOH so that a large excess of KOH was present during the second boiling. The results were always high. The proposed method was to reflux 3 g. of finely ground fiber with 50 cc. of 5% H_2SO_4 and 150 cc. of H_2O for $^1/_2$ hr. The flask was allowed to cool somewhat and 20 cc. of 28% KOH was added with a pipet. After refluxing $^1/_2$ hr., cooling, filtering on asbestos, washing with hot H_2O, with 1.25% acid, again with hot H_2O, and finally with alc. and ether or acetone, the residue was dried at 105° and ignited. S. A. KARJALA

New procedure in the chemical investigation of fodder and foodstuffs. J. KÖNIG, F. BARTSCHAT AND B. STEMPEL. *Z. Untersuch. Lebensm.* **59**, 564–72(1930).—The deficiencies in the normal methods of recording the constituents of foodstuffs are enumerated, and a systematic scheme is presented for analysis and sepn. into the following groups: water content; fat (Et_2O ext.); crude protein (amide + pure protein, both H_2O-sol., and sol. or insol. in 2% HCl); water-sol. carbohydrates (acid as lactic acid + sugar-reducing powers before and after inversion + dextrin + residue); starch; protocellulose and hemicellulose (including hemipentosans); *o*-cellulose and *o*-lignin including *o*-pentosans; insol. lignin, cutin and suberin; mineral matter (H_2O-sol., and sol. or insol. in 2% HCl). The results of analyses of wheat, flour and bran are tabulated as examples. C. R. FELLERS

A new method for the "sand determination" in the presence of silicic acid in feed stuffs. W. LEPPER. *Landw. Vers. Sta.* **110**, 305–11(1930).—Five g. of the substance is ashed over a small flame. Twenty cc. NaOH (15%) is added to the ash in a Pt or porcelain dish which is covered with a watch glass and heated on a water bath for $^1/_2$ hour It is then washed into a beaker, dild. to 400 cc., and 100 cc. HCl (1:1) is added to it. The mixt. is stirred and filtered and the ashed residue is the "sand." JOHN R. HILL

Report on the work of the laboratories of the Central Experiment Station on feeding. I. Bioenergetics laboratory. J. LEFÈVRE AND A. AUGUET. *Bull. soc. hyg. aliment.* **18**, 328–39(1930). **II. Biological chemistry laboratory.** M. JAVILLIER. *Ibid* 339–43. **III. Physiological laboratory.** L. RANDOIN. *Ibid* 369–89. **IV. Laboratory and experiment station for investigations on livestock feeding.** J. ALQUIER. *Ibid* 390–435.—A review of the investigations carried out to date in the various labs., the results of which have already been reported to the Fr. Dept. of Agr. A. P.-C.

Fodder and quality of milk in meadow fertilization with calcium cyanamide. L. HERMANN. *Milchwirtschaft. Forsch.* **9**, 142–60(1929).—In a study on feeding fodder from land fertilized by Ca cyanamide the changes in acidity, density and fat content were observed. GEORGE R. GREENBANK

Determination of nitrite and sulfite in the presence of one another in meat products (SZABÓ) **7**. Vitamins and palm oil in margarine (EPSTEIN) **27**. Determination of Ca, Mg and P in feedstuffs (MORRIS, *et al.*) **7**. Determination of cholesterol and lecithin. Evaluation of egg products (TILLMANS, *et al.*) **11B**. Treatment of canning wastes (ANON.) **14**. Organic peroxide for oxidizing or decoloring (of cereals, cereal products, etc.) (U. S. pat. 1,793,917) **27**. Waterproof fibrous products for making milk bottles, etc. (U. S. pat. 1,793,839) **23**. Apparatus and procedure for spray desiccation of milk (U. S. pat. 1,794,978) **1**. Obtaining protein material from seeds (U. S. pat. 1,794,105) **27**.

Fumigating flour mills with nicotine vapors. BRABENDER ELEKTROMASCHINEN

GES. Brit. 337,311, March 1, 1929. A web of paper impregnated with nicotine is heated (as by passing it between elec. heaters which are at a temp. of 300–350°) without causing ignition but with carbonizing of the paper. App. is described.

Bread. STANDARD BRANDS, INC. Brit. 337,930, Oct. 11, 1929. A small quantity of urea (suitably with conjoint use of urease if desired, which enables a lesser proportion of urea to be employed) is mixed with the flour, yeast and other ingredients, and corn sugar, pure maltose and other sugars can be used in doughs contg. urea, with production of a satisfactory crust color. A small quantity of a slightly sol. acid substance such as mucic acid (with or without an admixture of acid Ca phosphate) may be added to counteract the effect of liberated NH_3 on the p_H of the mixt. The urea, urease and mucic acid may be preliminarily distributed in a filler such as flour, sugar or corn starch or soy-bean meal (which when used as a filler supplies urease).

Diastase baking powder. CARL H. MEYER. Swiss 141,861, Feb. 4, 1929. Malt flour is mixed with powd. dextrose, preferably maize dextrose.

Milk sterilizer. BERGEDORFER EISENWERK A.-G. ASTRA-WERKE. Ger. 517,217, July 11, 1929.

Apparatus for sterilizing milk and similar treatments. BERGEDORFER EISENWERK A.-G. Brit. 338,422, Jan. 9, 1929. Structural features.

Apparatus for pasteurizing milk, etc. ISAAC E. COLVIN, GRANT N. MANISON and HUGO G. WALTERS (to Pfaudler Co.). U. S. 1,794,670, March 3. Structural features.

Apparatus for pasteurizing milk. CORNELIUS MORTENSEN. U. S. 1,793,631, Feb. 24 Structural features of an app. with jacketed tubes.

Apparatus for drying milk, etc. HANS LÜBER. Ger. 514,785, Jan. 11, 1928. App. with roller driers for milk and colloidal liquids is described.

Thin brittle shell material for encasing ice cream, etc. WILLIS D. THOMPSON (one-third to Carl H. Crawford). U. S. 1,794,741, March 3. A compn., which is brittle when chilled to below 22°, is formed of a suitably selected asphalt mixed with over 3 times as much paraffin and with a small proportion of stearin.

Butter. E. G. N. SALENIUS and E. S. SALENIUS. Brit. 337,778, May 7, 1929. Whole milk or cream, during its passage from a centrifugal drum, is subjected to a vacuum of different degrees in different parts of the app. (various details of which are described). Cf. *C. A.* **25**, 546.

Purifying butter, margarine and other fatty materials. R. BENDLIN and O. URBASCH. Brit. 338,053, Jan. 9, 1929. Cleansing and working is effected by extrusion of the material into vermicelli-like threads which are immediately broken up by a jet of water, and the material is then passed to a settling vat and afterward is centrifuged. The washing may be repeated and alk. or acid solns. used if necessary. The procedure may be applied to removal of excess of salt which has been added to butter as a preservative. App. and various details of procedure are described.

Preserving meat by brine injections. G. BEISSER. Brit. 338,011, July 29, 1929. Various details of app. and procedure are described relating to injection of brines such as those contg. NaCl, sugar and water in specified proportions into the vascular tracts of meat carcasses such as those of pigs.

Meat-curing composition. ERNEST H. WRIGHT. U. S. 1,792,561, Feb. 17. A meat-curing material is obtained by distg. hard wood at a temp. of about 28–70° and discharging to the atm. the gases released at these temps., and then gradually increasing the temp. to about 480° and condensing the vapors evolved at these higher temps. App. is described. Cf. *C. A.* **24**, 2513.

Apparatus for sterilizing fruit juices. BERNHARD HUG. Swiss 143,205, Nov. 18, 1929. Addn. to 133,461 (*C. A.* **24**, 443). The juices are heated by immersed electrodes.

Treatment of fruits and vegetables. F. KIDD and C. WEST. Brit. 337,422, July 31, 1929. For storage, transport or ripening, fruits or vegetables are placed in chambers of metal, glass or other materials provided with apertures covered with permeable material such as rubberized fabric of such character as to control the diffusion and dependent concn. of gases such as O, CO_2 and C_2H_4 in contact with the fruits or vegetables.

Preparing fresh fruit such as citrus fruits for market. ERNEST M. BROGDEN and MILES L. TROWBRIDGE (to Brogdex Co.). U. S. 1,795,275, March 3. For prevention of blue-mold decay, the fresh fruit is treated with a warm aq. mold-inhibiting soln. of an alk. hydroxide (such as a 2% NaOH soln.) having a degree of alkalinity at least as high as that equiv. to 2 oz. of Na_2CO_3 per gal., and sufficient amt. of the soln. is allowed to dry on the fruit to exert a decay-preventing action. Cf. *C. A.* **24**, 174.

Cellulosic coatings on articles such as fruits and vegetables. GEORGE W. BEADLE (to Cellacote Co.). U. S. 1,794,751, March 3. A liquid hydrated cellulose prepn. such as cellulose xanthate soln. is applied successively to different portions of the arti-

cle completely to cover it, and the article is then treated successively with a soln. of a neutral salt such as $(NH_4)_2SO_4$ and an acid soln. such as H_2SO_4 soln. and is washed and dried. App. is described. Cf. *C. A.* 24, 2292.

Preventing blue mold of fruits such as citrus fruits. ERNEST M. BROGDEN and MILES L. TROWBRIDGE (to Brogdex Co.). U. S. 1,794,346, Feb. 24. In prepg. fruit for the market, it is treated with a warm aq. mold-inhibiting soln. such as Na_2CO_3 of a degree of alkalinity at least as high as that of a soln. of Na_2CO_3 2 oz. per gal. of water. Cf. *C. A.* 24, 901.

Apparatus (with a plurality of superposed conduits) for roasting coffee, cereals, etc. WM. L. PHILLIPS and JAMES R. NEAL (to Maxwell House Products Co.). U. S. 1,793,009, Feb. 17. Structural features.

Purine bases from cacao, etc. C. F. BOEHRINGER & SOEHNE. Brit. 338,057, Jan. 7, 1930. Natural materials such as cacao are extd. with liquid SO_2 (suitably in a rotatable pressure vessel at a temp. of about 45°), and by filtering and cooling an ext as thus prepd., a soln. of theobromine and caffeine and a layer of sepd. fat are obtained. The extn. may be repeated several times (preferably at higher temp., such as 100–105°) Tea dust may be similarly extd. for obtaining caffeine and theophylline, and mention is also made of the extn. of ground cacao shells. The material may be preliminarily treated with an alk. soln. Cf. *C. A.* 25, 775.

Irradiating chocolate with ultra-violet. ERNST OPPENHEIN. Swiss 141,862, April 9, 1929.

13—GENERAL INDUSTRIAL CHEMISTRY

HARLAN S. MINER

Technology and industrial research. O. MANFRED. *Caoutchouc & gutta-percha* **28**, 15375–6(1931).—A general discussion is given of the importance of research as evidenced by various cases which are cited. C. C. DAVIS

Our foreign trade in chemicals in 1930. OTTO WILSON. *Ind. Eng. Chem.* 23, 430–4(1931). G. G.

American Society for Testing Materials, Standards. 1930, two parts, 2214 pp. *Standard specifications* are given for: open-hearth C-steel rails; manuf. of open-hearth steel girder rails; splice bars of various types of C steel; track bolts and spikes of various kinds of steel; steel screw spikes and tie plates; structural steel of various types and uses; rivet steel for boilers and for ships; boiler and firebox steel, steel plates of structural and of flange quality for forge welding; billet-steel and rail steel concrete reënforcement bars; cold-drawn steel wire for concrete reënforcement; com. hot-rolled bar steels; com. cold-finished bar steels and shafting; C-steel bars for railway springs with and without special Si requirements; C-steel bars for vehicle and general-purpose springs; silico-Mn-steel and chrome-V-steel bars for railway springs; helical springs and elliptical springs for railways; C-steel and alloy-steel forgings and blooms, billets and slabs for forgings; quenched-and-tempered C-steel and alloy-steel forgings for locomotives and cars; C-steel car and tender axles; cold-rolled steel axles; wrought solid C-steel wheels for railways; steel tires and castings; C-steel castings for railroads; lap-welded and seamless steel and lap-welded Fe boiler tubes; welded and seamless steel pipe; C, high-speed, and alloy tool steel; C-steel castings for valves, flanges and fittings for high-temp. service; alloy-steel bolting material for high temp. service; forged or rolled steel pipe flanges and lap-welded and seamless steel pipe for high-temp. service; Zn coatings on structural steel shapes, plates and bars and their products; Zn-coated (galvanized) sheets, telephone and telegraph line wire, tie wires, fencing, barb wire and steel wire strand; welded wrought-Fe pipe; staybolt, engine bolt and extra-refined wrought-Fe bars; hollow-rolled staybolt Fe; common Fe bars, wrought-Fe plates; wrought-Fe rolled or forged blooms and forgings for locomotives and cars; Fe and steel chain; foundry pig Fe; cast-Fe pipe and special castings, soil pipe and fittings, locomotive cylinders, and wheels; malleable castings; gray-Fe castings; the arbitration test bar and tension test specimen for cast-Fe; W powder; spiegeleisen; ferro-Mn; ferro-Si; ferro-Cr; ferro-V; wire bars, cakes, slabs, billets, ingots and ingot bars of lake Cu and of electrolytic Cu; slab Zn; rolled Zn; pig Pb; Ni; Al for use in the manuf. of Fe and steel; Al ingots for remelting; Al sheet; phosphor Sn, phosphor Cu; silicon Cu; hot-rolled Cu rods for wire drawing; Cu wire of various kinds; bare Cu cable; bronze trolley wire; an alloy of Cu 88, Sn 10 and Zn 2%; sand castings of an alloy of Cu 88, Sn 8 and Zn 4%; bronze bearing metal; bronze castings, compn. brass or ounce-metal sand castings; yellow brass sand castings; Mn-bronze

sand castings and ingots for sand castings; Al-bronze castings; solder metal; Ag and brazing solders; white metal bearing alloys (Babbitt metal); lined car and tender journal bearings; Cu plates for locomotive fireboxes; Cu bars for locomotive stay-bolts; seamless boiler tubes of Cu and of brass; seamless admiralty condenser tubes and ferrule stock; seamless condenser tubes and ferrule stock of 70–30 brass and of Muntz metal; Muntz metal condenser-tube plates; Cu pipe and seamless tubes; brass pipe and forging rods; free-cutting brass rod for use in screw machines; cartridge brass; cartridge brass disks; naval brass rods for structural purposes; sheet high brass; non-ferrous insect-screen cloth; portland cement; natural cement; CaO and $Ca(OH)_2$ for structural purposes and for use in the cooking of rags for paper manuf.; CaO for use in the manuf. of sulfite pulp; $Ca(OH)_2$ for the manuf. of varnish; CaO and $Ca(OH)_2$ for use in the textile industry, for the manuf. of SiO_2 brick, and for use in water treatment; gypsum; calcined gypsum; calcined gypsum for use in prepn. of dental plasters; Keene's cement; gypsum plasters for various uses; gypsum plastering sand, wall board, plaster board and partition tile; building brick; paving brick; clay sewer brick and pipe; clay fire brick for various uses; cement-concrete sewer pipe; drain tile; specifications and test for hollow burned-clay wall tile, floor tile and fireproofing, partition and furring tile; raw linseed oil; Perilla oil; gum spirits of turpentine; steam-distd. and destructively distd. wood turpentine; Zn oxide; leaded Zn oxide; basic carbonate and basic sulfate white leads; red lead; mineral Fe oxide; ocher; lithopone; lampblack; bone black; chrome yellow; pure chrome green; reduced chrome green; chrome oxide green; Prussian blue; ultramarine blue; com. para red; materials for cement grout filler for brick and stone block pavements; materials for cement mortar bed for brick, stone block, wood block, asphalt block and other block pavements; block for various types of granite pavement; gravel for bituminous concrete base; broken stone and broken slag for various uses for roads; sand for sheet asphalt and bituminous concrete pavements; high-C and low-C tar for surface treatment (hot and cold application); high-C and low-C tar cements; coal-tar pitch for stone block filler; gas and coking coals; foundry coke; structural wood; wooden paving blocks; asphalts and primer (for use with asphalt) for use in damp-proofing and waterproofing; high-C coal-tar pitches and high-bitumen coal-tar pitches for use in damp-proofing and waterproofing; high-C coal-tar pitch and high-bitumen coal-tar pitch for use in constructing built-up roofs surfaced with slag or gravel; creosote oil for priming coat with coal-tar pitch in damp-proofing and waterproofing; asphalt mastic for use in waterproofing; acid-resisting asphalt mastic; bituminous grout for use in waterproofing; woven cotton fabrics and burlap satd. with bituminous substances for use in waterproofing; asphalt roll-roofing surfaced with powdered talc or with granular talc; asphalt roll-roofing and asphalt shingles surfaced with mineral granules; asphalt-satd. and coal-tar-satd. roofing felts for use in waterproofing and in constructing built-up roofs; asphalt-satd. asbestos felt for use in constructing built-up roofs; air hose for use with pneumatic tools; wrapped cold-water hose; rubber gloves for elec. workers; rubber matting for use around elec. app. or circuits; rubber pump valves; friction tape for general use for elec. purposes; textile testing machines; tolerances and test methods for single and plied cotton yarns, for elec. cotton yarns, for cotton sewing threads, for certain light and medium cotton fabrics, for tire fabrics other than cord fabrics, for tire cord (woven and on cones), for elec. silk and cotton tapes and for asbestos yarns; tolerances for numbered cotton duck, for 23/5/3 carded American tire cord and for hose ducks and belt ducks; specifications and tests for Osnaburg cement sacks; A. S. T. M. partial-immersion thermometer for general use for various temp. intervals; sieves for testing purposes. *Standard methods* are given for: sampling rolled and forged steel products for check analyses; chem. analysis of plain C steel, of alloy steels, of ferro-alloys, of slab Zn (spelter), of pig Pb, of Ni, and of alloys of Pb, Sn, Sb and Cu; chem. analysis of Mn bronze, of gun metal, of brass ingots and sand castings and of bronze bearing metals; detg. wt. of coating on Zn-coated articles and on Sn, terne, and Pb-coated sheets; test for magnetic properties of Fe and steel; testing Zn-coated (galvanized) Fe and steel wire and wire products; sampling and chem. analysis of pig and cast Fe; sampling ferro-alloys; battery assay of Cu; test for resistivity of metallic materials for resistors; test for change of resistance with temp. of metallic materials for elec. heating; metallographic testing of Fe and steel and of non-ferrous metals and alloys; verification of testing machines; Brinell hardness testing of metallic materials; testing cement; chem. analysis of limestone, quicklime and hydrated lime; sampling, inspection, packing and marking of quick-lime and lime products; testing gypsum and gypsum products; making and storing compression-test specimens of concrete in the field; making compression tests of concrete; securing

specimens of hardened concrete from the structure; tests for unit wt. of aggregate for concrete, for detn. of voids in fine aggregate for concrete, for org. impurities in sands for concrete, for sieve analysis of aggregates for concrete, for approx. apparent sp. gr. of fine aggregate, for approx. percentage of voids in inundated fine aggregate, for surface moisture in fine aggregate, for refractory materials under load at high temps., for porosity and permanent vol. changes in refractory materials, and for softening point of fire-clay brick; ultimate chem. analysis of refractory materials, including chrome ores and chrome brick; sampling and testing turpentine; test for sp. gr. of pigments; test for coarse particles in dry pigments and coarse particles and skins in mixts. of pigments and vehicles; testing oleo-resinous varnishes; test for flash point of volatile inflammable liquids; routine analyses of white pigments, of white linseed oil paints, of dry red lead, of Ti pigments, of dry Cu_2O and of dry HgO; routine analysis of yellow, orange, red and brown pigments contg. Fe and Mn; routine analysis of yellow and orange pigments contg. Cr compds., blue pigments and chrome green; analysis for the color characteristics of paints in terms of fundamental phys. units; test for detn. of toluene-insol. matter in rosin (chiefly sand, chips, dirt and bark); abridged vol.-correction table for petroleum oils; analysis of grease; tests for burning quality of kerosene oils, of long-time burning oil for railway use, and of mineral seal oil; tests for C residue of petroleum products (Conradson C residue), for cloud and pour points of petroleum products, for detection of free S and corrosive S compds. in gasoline, for the detn. of autogenous ignition temps., for the distn. of natural-gas gasoline, for flash point by means of the Pensky-Martens closed tester, for flash and fire points by means of open cup, for m. ps. of paraffin wax and petrolatum, for sapon. no., for steam emulsion of lubricating oils, for S in petroleum oils heavier than illuminating oil, for thermal value of fuel oil, for viscosity of petroleum products and lubricants, for water in petroleum products and other bituminous materials, for water and sediment in petroleum products by centrifugal means, and for the distn. of gasoline, naphtha, kerosene and similar petroleum products; testing gas oils (sp. gr., distn., S, C residue, pour point, viscosity, water); tests for abrasion and toughness of rock and for apparent sp. gr. of coarse aggregates and of sand, stone and slag screenings, and other fine non-bituminous highway materials; decantation test for sand and other fine aggregates; test for quantity of clay and silt in gravel for highway construction; test for the detn. of moisture equiv of subgrade soils in the field; sampling stone, slag, gravel, sand and stone block for use as highway materials; mech. analysis of broken stone, broken slag, sand or other fine highway material or mixts. of materials, except aggregates used in cement concrete form of specifications for certain com. grades of broken stone; test for the detn. of bitumen; test for the detn. of proportion of bitumen sol. in CCl_4; tests for loss on heating of oil and asphaltic compds., for distn. of bituminous materials suitable for road treatment, for penetration of bituminous material, for softening point of bituminous materials (ring and ball method) and for softening point of tar products (cube-in water method); float test for bituminous materials; test for sp. gr. of road oils, road tars, asphalt cements and soft tar pitches; test for sp. gr. of asphalts and tar pitches sufficiently solid to be handled in fragments; sampling bituminous materials; sampling coal; lab. sampling and analysis of coal and coke; tests for fineness of powd. coal, for sieve analysis of crushed bituminous coal and of coke, for cu. ft. wt. of crushed bituminous coal and of coke, and for vol. of cell space of lump coke; shatter test for coke, tumbler test for coke; testing small clear specimens of timber; conducting static tests of timbers in structural sizes; sampling and analysis of creosote oil; tests for coke residue and distn. of creosote oil; chem. analysis of $ZnCl_2$; testing bituminous mastics, grouts and like mixts.; test for steam distn. of bituminous protective coatings, testing felted and woven fabrics satd. with bituminous substances for use in waterproofing and roofing; testing molded insulating materials, elec. porcelain, elec. insulating oils, rubber products and woven textile fabrics; verification of testing machines. *Recommended practices* are given for: annealing of rolled and forged C-steel objects; heat treatment of C-steel castings; carburizing and heat treatment of carburized objects, radiographic testing of metal castings; laying sewer pipe. *Standard definitions* are given for: terms relating to heat-treatment operations, to wrought-Fe specifications, to metallography, to methods of testing, to sp. gr., to lime, to the gypsum industry, to refractories, to sewer pipe, to hollow tile, to paint specifications, to materials for roads and pavements, to coal and coke, to timber and to textile materials; the terms sand and slate; clay refractories. *A standard rule* is given for governing the prepn. of micrographs of metals and alloys, including recommended practice for photography as applied to metallography. G. G

American Society for Testing Materials, Tentative Standards. 1930, 864 pp.

Tentative specifications are given for: steel track spikes; open-hearth Fe plates; steel marine-boiler plates; cold-rolled strip steel; heat-treated C-steel helical springs; C-steel locomotive forgings; elec. cast-steel stud-link anchor chain; austenitic Mn-steel castings; black and hot-dipped Zn-coated welded and seamless steel pipe; Zn-coated chain-link galvanized fence fabric; chilled-tread cast-Fe wheels; fire-refined Cu other than lake; Al-alloy (duralumin) sheet; Al-Mn alloy sheet; Al-base casting alloys in ingot form; Al-base and Mg-base alloy castings; sand castings of an alloy of Cu 80, Sn 10 and Pb 10%; Cu-base alloys in ingot form; seamless Cu tubing; tests for compressive strength of portland-cement mortars; high-early-strength portland cement; sand for use in lime plaster; gypsum sheathing board; concrete aggregates, building brick and pipe; fire tests of building construction and materials; boiled linseed oil; tung oil; soy-bean oil; petroleum spirits; glazier's putty; dry-bleached and orange shellacs; Al-bronze and Au-bronze powders; toxic ingredients in anti-fouling paints; sol. nitrocellulose; synthetic AmOAc, AmOH and Et lactate; EtOAc; BuOAc; BuOH; Bu propionate; com. sizes of broken stone, broken slag, sand and gravel for highway construction; broken stone for waterbound and bituminous concrete bases; $CaCl_2$ for dust prevention; asphalt cement of various penetrations and for various uses; high- and low-C tar cements for use cold in repair work; asphalt filler for brick pavements; mineral filler for sheet asphalt and bituminous concrete pavements; timber piles; wooden boxes of various constructions; asphalt for roof coverings; rubber insulating tape; insulated wire and cable; specifications and test methods for asbestos tape for elec. purposes; rubber-lined cotton fire hose; steam hose; tolerances and test-methods for rayon and for knit goods; tests for Cuban (jute) raw-sugar bags; chafer tire fabrics; thermometers for Engler viscometers. *Tentative methods* are given for: chem. analysis of Al, light Al alloys, rubber products and metallic materials for elec. heating; accelerated life test for metallic materials for elec. heating; test for thermo-elec. power; flexure tests of concrete; testing brick for compression, flexure and absorption; tests for resistance of fire-clay brick to thermal spalling action; tests for alky. or acidity, for bleeding, for hygroscopic moisture and for oil absorption of pigments; sampling and testing shellac, lacquer solvents and diluents; detn. of Me_2CO ext. in dry lampblack and bone black; test for detn. of polishing lubricant in Al powder for paints; sampling petroleum and petroleum products; tests for color of lubricating oils and of petrolatum by means of the Union Colorimeter; test for color of refined petroleum oil by means of the Saybolt Chromometer, tests for dilu. of crankcase oil, for distn. of crude petroleum, for expressible oil and moisture in paraffin waxes, for neutralization no. of petroleum products and lubricants, for penetration of greases and petrolatum, for pptn. no. of lubricating oils, and for vapor pressure of natural gasoline; test for gr. of petroleum and its products by means of the hydrometer; test for S in motor fuels, naphthas and illuminating oils; tests for abrasion of gravel, for consistency of portland-cement concrete, for ductility of bituminous materials and for residue of specified penetration; testing bituminous emulsions; test for size of anthracite; test for the detn. of the sp. gr., 38°/15.5°, of creosote fractions; test for coarse particles in bituminous materials by means of elutriation; testing asphalt roll-roofing surfaced with talc or mineral granules, likewise asphalt shingles surfaced with mineral granules; analysis of roofing felt for fiber compn.; compression testing of natural building stone; test for absorption and apparent sp. gr. of natural building stone; test for water absorption of slate; flexure testing of natural building stone and of slate; test for detg the insulating qualities of slate; testing insulating varnishes, cable splicing and pothead compds., insulating paper, laminated sheet insulating materials, and varnished cloths and tapes; testing sheet and tape insulating materials for dielec. strength; testing elec. insulating materials for power factor and dielec. const. at frequencies of 100–1500 kilocycles; test for comparing the thermal conductivities of solid elec. insulating materials; testing insulating materials for resistance to impact; test for resistivity of insulating materials; test for hardness of soft rubber; testing grease wool, etc., for scoured content; identification of textile fibers and their detn. in mixed goods; tension testing and compression testing of metallic materials. *Tentative recommended practice* is given for: bituminous-paving plant inspection; thermal analysis of steel. *Tentative definitions* are given for: terms relating to magnetic testing, to the gypsum industry, to refractories, to petroleum, to timber preservatives, to textile materials and to methods of testing; the terms aggregate, coke and screen (sieve). *Tentative rules* are given for inspection of concrete and reinforced concrete work. *Tentative revisions* are given of standard specifications for steel track spikes, structural steel for ships, alloy-steel bolting material for high-temp. service, high-test gray-Fe castings, chilled cast-Fe wheels, bronze bearing metal in ingot form, various types of condenser

tubes and ferrule stocks, portland-cement, hydrated lime for structural purposes, cement-concrete sewer pipe, broken slag for waterbound base and wearing course, shovel-run or crusher-run broken slag for waterbound base, block for various types of granite pavement, rubber pump valves, and tolerance and test methods for cotton fabrics; of standard methods of test for magnetic properties of Fe and steel, chem. analysis of Mn bronze, test for softening point of fire-clay brick, making and storing specimens of concrete in the field, testing woven textile fabrics, sampling and analysis of creosote oil, test for distn. of creosote oil, testing elec. insulating oils and testing rubber products; of standard definitions of the term sand, of terms relating to the gypsum industry, refractories, paint specifications, coal and coke, textile materials and methods of testing. G. G.

Standards and specifications for nonmetallic minerals and their products. JOHN Q. CANNON, JR. AND A. S. MCALLISTER. Bureau of Standards, *Miscellaneous Pub.* No. **110**, 680 pp.(1930).—Standards and specifications are given for: coal and coke; coal-tar products and bituminous materials; charcoal; petroleum and its products; fuel and illuminating oils; lubricating and insulating oils and greases; asphalt and other bituminous materials; stone and stone manufactures; sand, gravel and slag; sand-lime brick; gypsum and other plasters; magnesite; cement and concrete; lime; construction work; flat glass; glass containers; table glassware; lighting globes and shades; lenses; chem. glassware; mirrors; clay; china and porcelain ware; earthenware and stoneware; bricks and tiles; natural and artificial abrasives; asbestos; chalk; mica; rare minerals; precious stones and imitations; S; magnesia; salt; graphite; fluorspar and cryolite; feldspar; silica. G. G.

Specifications and materials control for aircraft construction. H. A. BACKUS *Proc. Am. Soc. Testing Materials* **30**, Pt. II, 109–18(1930). E. H.

The relative merits of gas, oil and electricity for industrial purposes. P. HOPKINSON. *Gas World* **94**, Ind. Gas Suppl. 3(1931).—The subject is discussed from the viewpoint of the furnace engineer. F. H. BERGEIM

Wooden barrels in the chemical industry. II. LOUIS F. HORN. *Chem. Markets* **23**, 285–8(1931); cf. *C. A.* **25**, 1603. E. H.

Research in drying. M. LURJE. *Arch. Wärmewirt.* **12**, 21–3(1931).—L. gives very brief descriptions of the drying investigation of various German drier constructors, and of the Moscow drying lab. ERNEST W. THIELE

The process of evaporation. A. V. BLOM. *Farben-Ztg.* **36**, 873–5(1931).—The phys. laws governing evapn. are discussed. For single and mixed solvents, the rates of evapn. are expressed by the equations, $y = \alpha t^n$ and $y = \int_0^\infty \beta(a-y)dt$, resp., in which y = amt. of liquid evapd. in time t; a, the original amt. of liquid; α, β and n, consts. which depend upon the conditions of evapn. The value of α is independent of the presence or absence of non-volatile matter. G. G. SWARD

Industrial poisoning with aniline and similar substances. ANGELO BONZANIGO *Deut. Z. ges. gericht. Med.* **16**, 242–5(1931).—Cases are described of poisoning with aniline, nitro- and dinitrobenzene, nitrochloro- and dinitrochlorobenzene, phenylhydrazine and phenetidine and benzene. FRANCES KRASNOW

Poisoning with dilute tin chloride solution. R. ZEYNEK AND H. WAELSCH. *Deut. Z. ges. gericht. Med.* **16**, 184–9(1931). FRANCES KRASNOW

Carbon monoxide poisoning. H. HUG. *Deut. Z. ges. gericht. Med.* **16**, 72–88 (1931).—Case report. Discussion. FRANCES KRASNOW

Observations of carbon dioxide poisonings in the disaster at Neurode. G. W PARADE. *Deut. med. Wochschr.* **56**, 1385–8(1930).—Clinical observations were made after the mine disaster at Neurode. ARTHUR GROLLMAN

Comparison of heat-insulating materials for industrial furnaces and boilers. VICTOR PASCHKIS. *Arch. Wärmewirt.* **12**, 9–11(1931).—If k is the heat cond. of any substance, and p its price per unit vol., then for an infinite flat plate the most economical material (other things equal) is that which has the lowest value of kp. For actual solid bodies, especially furnaces of small dimensions, a higher power of k is required. In continuous use, k^2p does well; in most cases k^3p is still better as a discriminating quantity. ERNEST W. THIELE

Rosin in cable-impregnating compounds. J. P. MILLWOOD. *Proc. Am. Soc. Testing Materials* **30**, Pt. II, 828–31(1930).—Saturants used to impregnate the paper windings around the Cu conductor of a cable have usually contained rosin or rosin oil or both, dissolved in petroleum oils or greases. The rosin serves to improve consistency and tack of the compd., secures more complete and lasting impregnation and better retention of the saturant, prevents "bleeding" when the ends are cut, prevents move-

ment of the saturant within the cable, and diminishes ionization troubles. The use of rosin, however, serves to limit the operating voltage and current loading of the cable contg. it, because of the low dielec. strength and high dielec. loss of rosin, causing the cable to become and remain hot when heavily loaded. When processed and blended with the proper oils, however, this effect is minimized. The use of rosin has been found to result in the formation of small, rather than large voids within the saturant. Small voids are preferred, because gas contained in them is less apt to ionize than gas in larger voids. Properties which rosin, to be used in cables, should possess are: (1) dryness, (2) absence of oxidized rosin, (3) freedom from dirt, turpentine and abnormally insol. rosin, (4) constancy of the above and other properties. H. K. SALZBERG

Paragutta, a new insulating material for submarine cables (KEMP) **30.** Final report of I. M. M. representatives on the sieves and screen committee of the British Engineering Standards Association (TRUSCOTT, SULMAN) **2.** Thermal properties of compressed liquid water (KEENAN) **2.** Some final values for the properties of saturated and superheated water (KEYES, SMITH) **2.** Some additional volume data for superheated steam (SMITH, KEYES) **2.** The higher alcohols of the paraffin series [as emulsifying agents] (SCHRAUTH) **10.** Treating fibrous materials with rubber, etc., [for making insulation, etc.] (Brit. pat. 337,359) **25.** Apparatus for "neutralizing" poisonous gases (U. S. pat. 1,793,813) **1.**

Annual Reports of the Society of Chemical Industry on the Progress of Applied Chemistry, 1930. Vol. XV. London: Society of Chemical Industry. 695 pp. 12s. 6d. Reviewed in *Chem. Trade J.* **88,** 261(1931).

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LAURSON, PHILIP G., AND COX, WILLIAM J.: **Properties and Mechanics of Materials.** New York: J. Wiley & Sons, Inc. 353 pp. $3.50.

LEIGHOU, ROBERT B.: **Chemistry of Engineering Materials.** 3rd ed. New York: McGraw-Hill Book Co., Inc. 684 pp. $4.50.

PÉREZ FEITO, FELIPE: **Tratado completo de guerra química.** Material, empleo tactio y protección. Madrid: Agencia Espanola de Libreria. 290 pp. Ptas. 8.50.

VILLAVECCHIA, G. VITTORIO, *et al.*: **Dizionario di merceologia e di chimica applicata. III. Naftalina-Sena.** 5th ed., revised and enlarged. Milan: Ulrico Hoepli. L. 60. Reviewed in *Chem. Trade J.* **88,** 261(1931); cf. *C. A* **24,** 2514.

Separating liquids. A.-G., FÜR SPECIALBAUTEN. Swiss 142,335, Oct. 29, 1928. Addn. to 134,551 (*C. A.* **24,** 1684). App. is described for sepg. liquids lighter than water, *e. g.*, C_6H_6, from waste water.

Filtering alkaline liquids. ALUMINIUM-INDUSTRIE A.-G. Brit. 337,559, Jan. 17, 1929. See Ger. 502,430 (*C. A.* **24,** 4876).

Clarifying suspensions. ISIDOR TRAUBE. Ger. 517,055, Feb. 22, 1925. The settling of suspensions is accelerated by treating them in turn with a plant ext. such as carrageen moss and a salt of Ca or Sr, particularly $CaSO_4$. The treatment of ores is referred to.

Distillation of volatile substances. I. G. FARBENIND. A.-G. (Hans Franzen, inventor). Ger. 514,740, Feb. 9, 1928. In the sepn. of volatile substances from non- or difficultly volatile substances by distn. with a liquid whose b. p. lies below the distn. temp., part of the liquid is added, while the other part forms a heat-insulating layer between the liquid being distd. and the liquid about to be added. App. is described. The method is useful for refining oils and fats.

Solvents for cellulose esters and ethers, resins, fats, waxes and rubber. DEUTSCHE FARBENWERKE A.-G. Ger. 517,097, Nov. 27, 1928. Esters of cyclopentanone carboxylic acid with monohydric alcs. are used, alone or with other solvents, etc. The esters may be prepd. by treating esters of adipic acid with NaOEt.

Mixing materials for cement, pigment, fertilizer, acid phosphate or dye manufacture, J. H. MORROW (to Fuller Co.). Brit. 338,123, Oct. 3, 1928. In prepg. materials, as for cement manuf., blending is effected by passing the material from a mill cyclically to a plurality of "silos" or bins (a thin layer being successively added to the contents

of each of these) and by suitable withdrawal and redistribution of the material. Various details of app. arrangement are described.

Projecting hydrolyzable fluids such as titanium chloride into contact with air. JOHN T. REMEY. U. S. 1,792,929, Feb. 17. The fluid is discharged into the air (by a device which is described) simultaneously with a surrounding sheath of another non-reactive fluid such as dry air, CO_2 or CCl_4 in order to avoid clogging of the exit nozzle.

Gas filters for breathing purposes. GERHARD K. E. H. STAMPE (to Otto H. Dräger). U. S. 1,792,939, Feb. 17. Filters for removing NH_3 and H_2S are formed with Cu_2Cl_2 on a solid carrier substance such as activated charcoal treated with Pb nitrate soln.

Absorbent for ammonia in refrigerating apparatus. RALPH M. BUFFINGTON (to Frigidaire Corp.). U. S. 1,792,628, Feb. 17. $SrCl_2$ and NH_4NO_3 are used together. Cf. *C. A.* **25**, 1926.

Condenser (suitable for refrigerating apparatus). ROLLIN M. HYDE (to McCord Radiator & Mfg. Co.). U. S. 1,794,692, March 3.

Forming sheet insulating material such as wall board comprising a filter cake and associated deposit. FRANK W. YOUNG. U. S. 1,794,433, March 3. Materials such as fibrous pulps may be used and app. and various details of manuf. are described.

14—WATER, SEWAGE AND SANITATION

EDWARD BARTOW

Sterilization of drinking waters at Saigon and at Cholon. J. GUILLERM. *Arch. inst. Pasteur Indochine* **1929**, No. 10, 36–55; *Chimie & industrie* **25**, 69(1931).—A description of the water supply, its treatment and control. The water, which is obtained from an underground sheet which is imperfectly protected from contamination by an overlying layer of clay of varying thickness and insufficient impermeability, is rendered perfectly safe by chlorination with bleaching powder at a cost of 0.0008 franc per m.³ Sterilization is controlled by counts of the aerobic and anaerobic bacteria, test for (and count of, if present) indole-forming *B. coli* and identification of other species of bacteria and protozoa. A. PAPINEAU-COUTURE

St. Louis has model water system. L. A. DAY. *Water Works Eng.* **83**, 731–2, 819–24(1930); cf. *C. A.* **24**, 5899.—This well-illustrated article with diagrams and statistics gives detailed descriptions of the equipment, treatment, operation and maintenance of the Chain of Rocks and the Howard Bend purification plants and their systems of distribution. C. H. BADGER

New York to rebuild century-old Croton Aqueduct as a safety measure. WM. W BRUSH. *Water Works Eng.* **83**, 736–8, 851(1930). A brief history of the old Croton Aqueduct is given and its present condition discussed. The daily demand on the municipal water system within the city is 900 m. g. d., while at times outside communities need 30 m. g. d. The yearly growth of demand will average 30 m. g. d. The present sources of supply are the Catskill system delivering 600 m. g. d., the New Croton Aqueduct, 280 m. g. d., and local sources of Long Island and Richmond, 120 m. g. d. To avoid a possible water shortage, since a new large source of supply will not become available for at least 6 or 7 years, the weak sections of the old Croton Aqueduct will be rebuilt so that its present delivery of 40 to 45 m. g. d. can be doubled. The probable cost will be between 1 and 2 million dollars and the work will be finished in 1931. C. H. B

Toronto constructing $14,000,000 tunnel. EARLE W. GAGE. *Water Works Eng* **83**, 654(1930).—The new filtered water tunnel, across the city, will follow the shore-line of Lake Ontario. It will be 7 ft. in diam. for more than 5 miles and 6 ft. in diam for nearly 4½ miles. The first section will deliver 90 m. g. d. into the heart of the city and 50 m. g. d. will be received at its western end. In addn., 60 m. g. d. will go directly into the city mains from high lift pumps at Victoria Park. A pure water reservoir here will hold 12,000,000 gal. and a new service reservoir in the northern part of the city will contain 50,000,000 gal. C. H. BADGER

Observations of water supplies of London and Paris. EDWARD BARTOW. *J. Am Water Works Assoc.* **23**, 267–71(1931).—In one of the plants visited excess lime treatment was used and the plant operation included lime recovery and removal of tastes and odors by activated C. In others compressed air for filter washing and ozone for purification were considered novelties. D. K. FRENCH

Unusual construction problems met in two Far Eastern water works. M. E. BARNES. *Water Works Eng.* **83**, 625–6, 658–61(1930).—Engineering difficulties in the

Far East are discussed. Every building in Bangkok, located 40 km. from the sea on the Menam Chao Phya River, is built on mud. This river carries enormous loads of silt and directly receives the sewage of Bangkok via its many canals and the pollution of many thousands who live in house-boats. Its chief objection as a source of water supply is that the water is made brackish from the flow of sea water past Bangkok upstream in the dry season. The water supply is taken from a natural reservoir created out of a branch stream 41 km. above Bangkok. A canal, policed to prevent diversion and pollution, carries the water to a modern water works erected on the outskirts of Bangkok. This plant contains sedimentation tanks, Jewell filters and equipment for distribution at an equalized pressure. It has proved its value in cholera outbreaks. By a suitably placed dam, a large catchment area located in that part of the Federated Malay States adjacent to the Island of Singapore was drawn upon for impounding purposes.

C. H. BADGER

Increasing supply of mountain city uncovers some unique problems. GEORGE D. NORCOM. *Water Works Eng.* **83**, 629-30(1930).—The water consumption of Bluefield, W. Va., has averaged about 1.2 m. g. d. Because of an 18 months' drought in 1925–6 the supply became inadequate. Since then the storage water capacity has been increased an addnl. 127 m. g. by construction of a dam and reservoir at the mouth of Horton Hollow. This reservoir now receives also the Gravity Springs supply which formerly was usually improperly chlorinated because of its remoteness and fed directly into the mains. The reservoir supply now flows by gravity to the Ada filtration plant, which also treats water obtained from a 45-m.-g. earth reservoir supplied by Ada Spring. The treatment consists of aeration, coagulation, sedimentation, rapid sand filtration and chlorination. Ada Spring is unusual because of its size and flow, which has varied from 0.175 m. g. d. to over 30 m. g. d. Provision was made against leakage through the soft limestone rock on which the new Horton dam was built by cleaning and grouting all weak spots in the rock and forcing cement grout into deep holes drilled into the rock to fill seams and crevasses. The Beaver-Pond-Bailey supply, which also was formerly chlorinated and pumped directly into the mains, has been retained as an auxiliary source in case of interruption to the Ada-Horton development. Daily chem. and bacteriol. tests are made for the control of purification.

C. H. BADGER

Water differences—geographically speaking. C. C. HUMPHREYS. *Southwest Water Works J.* **12**, No. 11, 15(1931).—H discusses unusual water conditions and turbidity, acid, Fe and phenol at Pittsburg, Pa., and algae at Ithaca. At Tampa, Fla., 300 p. p. m. color is removed by SO_2 and Cl_2.

O. M. SMITH

How the planets affect our water supply. CALEB M. SAVILLE. *Water Works Eng.* **83**, 735, 847-8(1930).—A general discussion is given of the long-period studies of climatology and meteorology. There is a greater tendency for rain in the quarter after full moon, especially with the moon in perigee, than with it in apogee. While the correlation between tree growth, as shown by tree rings, *e. g.*, the giant Sequoia, and climatic cycles seems to be definitely established, that between sun-spot phenomena and terrestrial climate has not as yet been accepted.

C. H. BADGER

Waterworks intakes and the screening of water. JOHN W. CUNNINGHAM. *J. Am. Water Works Assoc.* **23**, 258-66(1931).—The paper applies principally to flowing streams. For effective screening the design and arrangement of the intake are of great importance. Racks (intake screens (2 to 4 meshes per in.) and fine screens (8 meshes per in. or finer) are considered with reference to their best selection and location. Some reference is made to cleaning.

D. K. FRENCH

Water purification for color removal. A. S. BEHRMAN, R. H. KEAN AND H. GUSTAFSON. *Paper Trade J.* **92**, No. 8, 121-3(1931).—Modern methods of color removal are briefly reviewed, and results are given of an investigation into the nature of the coloring matter in water and new methods of removal based thereon. It was found that: (1) The particles of coloring matter are negatively charged. (2) The particles of coloring matter are of a colloidal nature, though some of them may approach mol. dimensions and consequently be in true soln. (3) The coloring matter in surface waters is essentially org. in nature. (4) In many cases the color deepens considerably with increase in p_H of the water, particularly when passing from acid to alk. conditions. (5) The color is destroyed to a considerable, but variable, extent by chlorination. The excess Cl must be removed after destruction of the color in order to prevent corrosion; and with all the waters tested it was found that dechlorination by filtration through granular hydrodarco removed not only the Cl, but also the whole of the residual color. Filtration through hydrodarco, without previous chlorination, removed all or nearly all the color; but owing to the necessity of revivification, it is usually more economical to remove as much color as possible by coagulation and filtration under carefully controlled

p_H conditions, followed by chlorination and then dechlorination if necessary. An attempt is being made to find a method of revivification that will be so simple as to make it practical and economical to decolorize the water directly by treating with hydrodarco, without preliminary coagulation, filtration or chlorination. A. P.-C.

Treatment of water for ice manufacture. DANA BURKS, JR. Univ. Ill. Eng. Expt. Sta., *Bull.* No. 219, 114 pp.(1930).—This work done in coöperation with the Utilities Research Commission embraced a study of methods for producing clear ice from natural waters high in dissolved salts, particularly Na_2CO_3 and $NaHCO_3$. With neutralization of the water with alum or H_2SO_4 to convert the carbonates to the less troublesome sulfates and with the use of a specially designed ice can providing ample and effective air agitation, a marketable ice fairly free from opaque zones was produced If, however, the core water reaches a critical concn. of salts it must be replaced with a new supply. A second line of attack involved the utilization of the exchange properties of Mg zeolite to replace Na salts in the water with the equiv. Mg compds. Subsequent liming, followed by alum or acid treatment, produced from $NaHCO_3$ water supplies one from which satisfactory ice could be made. H. L. OLIN

Galvanized iron pipes for city water supply. J. DE GRAAFF. *Verslag. Mededeel. betreffende Volksgezondheid*, July 1930, 8 pp.—The requirements for galvanized iron piping are discussed. It should be nonporous. A test for porosity of the Zn coating is to pour a 10% gelatin soln. with 1% $K_3Fe(CN)_6$ on a part of the inside of the pipe which has been cut in half. After 24 hrs. at room temp. blue spots in the solidified gelatin indicate breaks in the coating. The thickness of the Zn layer should be sufficient. It is detd. by dissolving the Zn in HCl (d. = 1.2) to which 20 g. Sb_2O_3 per l. has been added. This acid does not attack Fe. A simple app. for the detn. is described: a 2- to 3-cm. Cu tube, 3 cm. long, is filed off to fit the inside of half of the galvanized pipe. Proper sealing is obtained by pouring asphalt around the Cu pipe. Acid is poured in through a funnel in one hole of a double-bore stopper closing the Cu pipe, H_2 evolved escapes through the other hole and is collected and measured in a bottle. A min. of 600 g. Zn per sq. m. of galvanized surface (one side) is required. The Pb content of the Zn used should be less than 0.5%. On the nature of the water depends whether the Zn will be effective in reducing corrosion. If the water causes a $CaCO_3$ deposit after some time, the corrosion chances will be diminished. If no $CaCO_3$ is deposited, the Zn will dissolve in time and corrosion take its course. From an example is shown that in water of low hardness as much as 3.9 mg. Zn per l. is present after standing 1 night in galvanized piping. Water left for 36 hrs. in a new pipe even had 7 mg. per l. Zn gives at best a temporary protection. B. J. C. VAN DER HORVEN

Subsoil management, particularly from the viewpoint of water mains. BRABANT, MOYAERTS, *et al.* *L'eau* **24**, No. 1, 5–8(1931). C. R. FELLERS

Why water mains break. FRANK A. MCINNES. *Water Works Eng.* **83**, 559–60, 589(1930).—Rigid bearing, or uneven settlement of the supporting ground, electrolysis, earthquake, frost, effect of salt-marsh land and abnormal chem. character of the pipe itself are some causes given for the fracture of cast-iron pipes. C. H. BADGER

Iodine content of Lettish waters in relation to the improvement of crops. J. KUPCIS. *Acta Univ. Latiensis Kim. Fakultat. Serija* **1**, 425–48, 449–53(in German) (1930).—K. gives complete analyses for 61 samples of Lettish waters and discusses the sources of the I in the various samples. He discusses the need of I in growing crops and points out various causes for the decrease in the amt. of available I. C. J. WEST

Detailed instructions for the performance of the dissolved oxygen and biochemical oxygen demand tests. EMERY J. THERIAULT. *U. S. Pub. Health Repts. Suppl.* No 90, 34 pp.(1931). J. A. KENNEDY

Method of determination of the chlorine demand of any water. D. K. PATTILLO AND F. D. WEST. *Paper Mill* **54**, No. 5, 4(1931).—Cl demand is defined as the amt of Cl that will combine chemically, or possibly biologically or bacteriologically, with any given water, white water or sewage to so change the state of oxidizable matter that it will not require addnl. O. The method consists essentially in titrating 500 cc. of the sample with hypochlorite soln. contg. 0.0001 g. available Cl per cc. until a blue color is obtained with iodized starch soln. used as outside indicator, adding a further slight excess of Cl and then detg. the residual Cl with a standard colorimetric Cl-testing outfit A. PAPINEAU-COUTURE

Early use of chlorine. WM. BOBY. *J. Am. Water Works Assoc.* **23**, 283–4(1931). A paper published earlier is discussed. The equipment used as well as the results obtained in the first Belgium installation in 1902 are described. The process employed was invented by Dr. Maurice Duyk, official chemist to the Belgian Govt. D. K. P

Progress in superchlorination treatment for taste prevention at Toronto, Ontario.

N. J. HOWARD. *J. Am. Water Works Assoc.* **23**, 387–95(1931).—See *C. A.* **24**, 4878. G. G.

Preammoniation of the filtered water supply of Cleveland, Ohio. J. W. ELLMS. *J. Am. Water Works Assoc.* **23**, 400–7(1931).—See *C. A.* **24**, 4878. G. G.

Eijkman test for the bacteriological examination of water. MARIO MAGALHAES. *Arch. hyg. Rio de Janeiro* **4**, No. 2(1930); *U. S. Pub. Health Eng. Abstracts* **11**, W, 19(Feb. 21, 1931).—Eijkman's method employs a glucose peptone medium, to which the water under examn. is added in the ratio of 1:8 and incubation carried out at 46°. In 18–24 hrs. a distinction can be made between *B. coli* from cold- or warm-blooded animals. In addn. to being selective for *B. coli*, it inhibits common water organisms and bears a correlation with the tests of indole production, the citrate and uric acid reaction, and may thus prevent contamination of water when *B. coli* are of non-human or cold-blooded origin. C. R. FELLERS

Dental deficiencies and drinking water. R. W. KEHR. *J. Am. Water Works Assoc.* **23**, 214–29(1931).—A dental defect, known generally as mottled enamel, is described, and the location of communities in which it is found is mapped. It is thought to be due in some way to the drinking water used by the victims. No explanation can be given at the present time. D. K. FRENCH

Lead poisoning from drinking water in Leipzig. KRUSE AND M. FISCHER. *Deut. med. Wochschr.* **56**, 1814–8(1930).—A clinical account is given of a recent epidemic. ARTHUR GROLLMAN

Water supply of a steel plant. T. J. MCLOUGHLIN. *Proc. Eng. Soc. West Penn.* **46**, 295–305(1930).—Extremely large vols. of water are necessary, one ton of steel requiring 14,000 to 17,000 gallons water. The main intake of a steel plant is one of the most vital spots. Extreme care is exercised to prevent injury by floating débris and ice. Modern variable-speed traveling screens insure freedom from floating material. Much of the water in an iron region, especially the Pittsburgh district, periodically contains considerable free H_2SO_4. A considerable portion of the water must be neutralized with milk of lime to prevent corrosion of the distribution system. Boiler-feed water usually is treated river water. A few of the smaller plants use a hot lime-soda process; some use a continuous cold lime-soda treatment; a few are zeolite plants, but by far the most use an intermittent lime-soda process followed by filtration. Internal treatment is rapidly becoming recognized as an economical and effective method of scale prevention. WAYNE L. DENMAN

Softening a well-water supply. N. T. VEATCH, JR., AND B. L. ULRICH. *J. Am. Water Works Assoc.* **23**, 272–5(1931).—The Manhattan, Kans., supply is softened by lime and alum. With chem. softening alone a hardness of 463 p. p. m. was reduced to 165 p. p. m. With recarbonation in addn. this was lowered to 124 p. p. m. D. K. F.

Water supply for high-pressure boilers. CHAS. R. HAZEN. *Pulp Paper Mag. Can.* **31**, 195–8(1931).—The formation and effects of scale and the factors favoring corrosion are briefly reviewed, and the usual processes of water softening are outlined. They do not furnish a water suitable for the very exacting requirements of high-pressure boilers. The prime essential of such boilers is clean evapg. surfaces; this can be obtained by the properly controlled addn. of NaH_2PO_4, either in the boiler or before feeding, and with or without a preliminary softening treatment according to the nature of the raw water. A. PAPINEAU-COUTURE

Boiler-scale prevention by the use of trisodium phosphate in modern boiler management. PAUL KOEPPEL. *Chem.-Ztg.* **55**, 58–9(1931).—Na_3PO_4 is the ideal softener for use in modern high-pressure boilers. It is inexpensive and efficient and requires no special equipment to add the softener. Contact during only 1 hour at 70° is required to cause pptn. of the Ca and Mg salts. C. R. FELLERS

Developments in the treatment of acid mine drainage. LEWIS V. CARPENTER AND ALFRED H. DAVIDSON. *Bull. West Va. Univ. Sci. Assoc.* **2**, No. 4, 50–7(1930).—The acidity from coal-mine drainage has created a serious problem in West Va. The amt. of drainage is approx. 25% of the rainfall. Ordinarily the flow of mine drainage will be 1000 gal. per day per acre of coal exhausted and is independent of the nature of the season. The acidity cannot be predicted, as often one mine will give an alk. drainage, while another nearby will be highly acid. The conversion of S to acid is rapid and is hard to explain by the chem. process of oxidation. Some hold that the action of anaerobic bacteria is responsible. Treatment has consisted of the addn. of powd. lime, limy marl, limestone and magnesite, but is not used to much extent practically. The Kaplan-Reger process is said to remove all chemicals in the water, forming a blue pigment, but little is known about it. Very little is known concerning the details for proper disposal by dilution. On a cost comparison basis, limestone is the cheapest. If allowance is

made for capitalized cost of the plant, drying of sludge and no return for sale of sludge, the total cost per 1000 gal. is $0.90. At this cost the process is not feasible. To be successful, the process must allow disposal of the by-products. WAYNE L. DENMAN

Eliminating odors and nuisances about the sewage-disposal plant. F. R. HASSLER. *Southwest Water Works J.* 12, No. 10, 17(1931).—The use at Perry, Okla., of NH_3 3 to 7 lbs. per million gals. together with an av. of 25 lbs. of Cl_2 in domestic sewage preceding digestion in sep. sludge digestion tanks removed H_2S odor and produced a stable effluent. O. M. SMITH

Reclamation of treated sewage. R. F. GOUDEY. *J. Am. Water Works Assoc.* 23, 230–40(1931).—By reclamation is meant treatment of such a high grade of efficiency that the water as well as the solids can represent credits in water supply economy. In Southern California this need of reclamation is of the utmost importance. While some work has already been done, much more is necessary before all its difficulties are overcome. D. K. FRENCH

Digestion of sewage solids at high temperature. THEO. F. DOZORS. *Munic. Sanitation* 2, 121–4(1931).—Samples of fresh sewage solids seeded with ripe sludge were digested at the thermophilic temp. of 55° and at room temp. Detns. of the nature and quantity of gas evolved, p_H, dry solids, ash, volatile matter and no. of bacteria were made upon duplicate samples. Thirty days was the optimum digestion period. From 18% to 20% more gas was evolved from solids digested at thermophilic temps. than at room temp. CO_2, O, CH_4 and N were present. The CH_4 and CO_2 contents fluctuated inversely. Gas produced in either case was 65–75% combustible. A p_H of 7.3 was the optimum for digestion at thermophilic temps. Total bacteria present and solid detns show little difference under the 2 conditions. GILBERT L. KELSO

Utilization of sewage gas. H. F. KUISEL. *Monats-Bull. Schweiz. Ver. Gas-Wasserfach.* 10, 293–8(1930).—Sewage gas from settling tanks of the city of Zurich (700,000 m.³ annually) contained 66% of very pure CH_4 (30% CO_2, N_2 and a trace of H_2S). Possibilities for the utilization of CH_4, chlorination, oxidation, conversion into fuel oil, etc., are considered in the light of recent patent literature. K. H. ENGEL

The mechanism of the activated-sludge process of sewage disposal. E. C. C. BALY. *J. Soc. Chem. Ind.* 50, 22–6T(1931).—The sign of the elec. charge on sewage colloids can be detd. by flocculation of suspensions of fine powders of known charge and by means of cataphoresis. Both methods indicate that sewage colloids behave as if they were electropositive when the p_H is less than 8.3 and electronegative when it is over 8.3. Sewage colloids have an isoelec. point at about p_H 4.6 which shifts toward the side of greater p_H in the presence of electrolytes. The colloids in ordinary sewage with p_H 7.4 are therefore electronegative. The bacteria of sewage carry an electronegative charge, and when their concn. is sufficient they are flocculated by electropositive colloids. When their concn. is insufficient they exist as bacteria and colloid complexes, when the colloids are electropositive. The success of the activated-sludge process is due to the much enhanced charge on the bacteria when in their state of max. activity. The necessity for this max. activity would disappear if the colloids were electropositive and operation of the process is proposed at p_H 5.8–6.0. W. H. BOYNTON

Advantage of sludge circulation and vacuum degasification as applied at the Cleburne plant. CLYDE C. HAYES AND CHESTER COHEN. *Proc. 12th Texas Water-Works Short Course* 1930, 161–6; *U. S. Pub. Health Eng. Abstracts* 11, S, 20–1(Feb. 14, 1931); cf. *C. A.* 24, 3301.—The Cleburne plant consists of a grit chamber, Imhoff tank with central gas vent, dosing chamber and Miller siphon and a sprinkling filter unit. Inadequate sludge digestion capacity, 0.5 cu. ft. per capita, foaming difficulties, odor troubles, filter bed clogging and inadequate purification of the effluent were some of the difficulties of operation formerly. Some of the theories advanced for the present hastened digestion with degasification and sludge circulation are: (1) That through the circulation of the digested sludge the end products which are inhibitory to bacterial life and are produced through decompn., are effectively removed in the form of gases distributed through the tank liquor (2) thorough and continuous mixing of the ripe and fresh solids aids in speeding digestion and maintaining a desirable H-ion concn. and secures a thorough mixing of the bacterial flora of the sludge; (3) the entrained gases are more easily liberated through the stirring action and more quickly carried off through the vacuum maintained on the gas vents; (4) the reduction of the gas concn. in the top area of the gas vent through the use of the vacuum system decreases pressure of the gas through the entire body of the liquid; (5) the maintenance of the vacuum on the gas vents serves to further increase the efficiency of the Imhoff slot, and thus tends to prevent belching of solids upward into the sedimentation compartment; (6) the scum and foam which usually accumulate on the top of the gas vents can be mechanically drawn off, at

least partially digested, which saves addnl. labor cost incidental to this process; (7) in spite of the reduced sludge-digestion capacity the tanks are producing a fairly well digested sludge which can be discharged on drying beds, without any fear of odor nuisance or fly breeding. While economic use of captured gas is not considered, as the primary function of the plant is sewage purification, a 4-hp. gas engine can be successfully operated from the sewage gas. Complete details of plant operation are given with description of plant units. Conclusions: The vacuum system of degasification and sludge circulation demonstrated the following advantages: (1) Continuous circulation of the digesting sludge is advantageous in hastening the process of org. decompn.; (2) the circulation of the sludge through the use of the vacuum pump is most economical and satisfactory; (3) the putrefactive odor from the Imhoff tank is entirely controllable; (4) foaming difficulties are avoided; (5) labor cost for scum removal and gas vent control is practically eliminated; (6) the reduced size of tank made possible through this vacuum system and sludge circulation will decrease the cost of Imhoff tank construction, greatly simplify and reduce operating expenses and minimize legal complaints. C. R. FELLERS

The role of protozoa in activated sludge. ROBERT CRAMER. *Ind. Eng. Chem.* **23**, 309-13(1931); cf. *C. A.* **24**, 2819.—Clarification of sewage can be accomplished by aeration if aerobic bacterial life, live protozoa and oxygen in soln. are present. The biochem. nature of the process is indicated. Material decompd. by aerobic and anaerobic bacterial life in sewage would remain in a colloidal, non-settlable state if the protozoa did not resynthesize it. F. W. TANNER

Lagooning sludge. EDGAR WHEDBEE. *Proc. 12th Texas Water-Works Short School* **1930**, 153-6; *U. S. Pub. Health Eng. Abstracts* **11**, S, 18(Feb. 14, 1931).—The sewage-disposal plant at Dallas, Texas, lagoons the sludge drawn from the digestion chambers of the Imhoff tanks as well as scum from gas vents and ski nmings from the surface of the flow chambers or settling basin. During extended rainy weather the sludge beds were filled and the digestion compartments became overloaded, and, when accompanied by foaming, became large septic tanks. The difficulty was remedied by running the excess sludge into a shallow slough or lagoon nearby. No odors came from the lagoon. The yield of wet sludge per million gals. was 7.6–8.0. C. R. FELLERS

Determination of carbon in sewage and industrial wastes. F. W. MOHLMAN AND G. P. EDWARDS. *Ind. Eng. Chem., Anal. Ed.* **3**, 119–23(1931).—The C detn. of Friedemann and Kendall (*C. A.* **23**, 2733) has been applied to domestic sewage and trade waste and can be completed in 3 hrs. *Results with carbohydrates, soap and amino compds.* indicate satisfactory accuracy for the purpose. When org C/total N on raw sewage, corn products, stockyards and tannery wastes is 3.96–42.7, org. C/biochem. O demand is 0.55–0.65. This indicates a relation between org C and 5-day O_2 demand and supports the theory that the first stage of the O_2 demand curve is a C oxidation. An activated-sludge effluent is in a different stage of oxidation and cannot be directly compared, the corresponding org. C/biochem. O demand being 4.1. FOSTER DEE SNELL

Fundamentals of public health law. JAMES E. BAUMAN. *U. S. Pub. Health Repts.* **46**, 631–41(1931). J. A. KENNEDY

Emergency sanitary measures following a flood disaster. PAUL S. FOX. *Am. J. Pub. Health* **21**, 294–6(1931).—F. details his experiences following the floods which occurred on the Rio Grande in New Mexico in Aug. and Sept., 1929 J. A. K.

Amelioration of atmospheric pollution. HOWARD W. GREEN. *Am. J. Pub. Health* **21**, 237–41(1931). J. A. KENNEDY

Legal aspects of water pollution. LEO T. PARKER. *Munic. Sanitation* **2**, 129–31 (1931). G. L. KELSO

Precautions needed in the ammonia-chlorine treatment of swimming pools. A preliminary study. LYLE L. JENNE AND HENRY R. WELSFORD. *Ind. Eng. Chem.* **23**, 32–4(1931).—The use of chloramine for sterilization makes possible a high residual Cl content without the unpleasant taste, odor or irritating effects of free Cl. With the recirculation of swimming pool water as generally practiced, the NH_3 content is cumulative and reduction to NO_2^- occurs in certain concns. These products interfere with the color test for available Cl. Use of an antichlor will destroy chloramine. Excess color formed under such conditions should be ignored when considering Cl values for sterilization. The apparent fallacy of this treatment should not outweigh its advantages. EDWARD S. HOPKINS

Creoline as a larvicide. DURRN. *Ann. soc. belge méd. trop.* **8**, 23–5(1928); *U. S. Pub. Health Eng. Abstracts* **11**, Ma, 2(Feb. 14, 1931).—Lab. expts. made with heavy tar oil showed 200 p. p. m. was the min. effective dosage to prevent mosquito breeding.

The oil must be applied every 10 days. It is of particular value in shallow pools rather than in deep water. C. R. FELLERS

Progress in the treatment and disposal of human wastes. R. E. MCDONNELL. *Munic. Sanitation* 2, 114–8(1931). G. L. KELSO

Treating of canning wastes. ANON. N. Y. State Dept. Health, Div. Sanitation, *Bull.* (unnumbered) 1930, 100 pp.; *U. S. Pub. Health Eng. Abstracts* 11, S, 19–20(Feb. 14, 1931).—Analytical data are tabulated in 28 tables. Suggested treatment plant designs are given. Conclusions: Screening through wire screens having 20 to 40 meshes to the in. is a necessary preliminary treatment in all cases and adequate treatment when the final diln. is greater than 1 to 100. Forty sq. ft. of effective screen area is necessary for a 2-line cannery discharging 100,000 gal. of wastes per working day of 12 hrs. About 80 cu. ft. of screenings are produced per 100,000 gal. of wastes treated. Trickling filters are very effective in the treatment of screened canning wastes when the rate of filtration is less than 0.5 million gal. per day throughout the working day, and this treatment is adequate when a final diln. is greater than 1 to 5. Rates of filtration of 2 million gal per day throughout the working day are sufficient when the final diln. is greater than 1 to 20, provided serious pooling is prevented through the periodic application of lime to the applied wastes to prevent the prolific growth of fungi on the filter. Chem. pptn. of canning wastes with 7–10 lb. of lime and 3–5 lb. of $FeSO_4$ per 1000 gal. of wastes is sufficient treatment when the final diln. is greater than 1 to 25. Although the cost of constructing chem. pptn. equipment may be less than that of trickling filters, nevertheless the cost and difficulty of operation, cost of chemicals and the less satisfactory effluent justify the use of trickling filters in most cases. Final chlorination of filtered or coagulated and pptd. canning wastes modifies the org. matter and is equiv. to the removal of about 30% of the residual unstable org. matter. Final chlorination, therefore, permits of the discharge of filtered canning wastes into streams with final dilns. as low as 1 to 3, provided the rates of filtration of 0.5 million gal. per day are used. Final chlorination of filtered or coagulated canning wastes also materially reduces or entirely suppresses the fungus growths in the streams receiving the effluent, thus eliminating an objectionable result of pollution. The required dose varies from 8 to 30 p. p. m. Cl depending upon the degree of preliminary treatment of the wastes to assure a residual of at least 0.5 p. p. m. in the effluent. Every effort should be made to reduce the water consumption of canneries and to prevent the wastage of the product so as to reduce the strength and quantity of wastes to be disposed of. The relatively high cost of treating these wastes, which are 5–15 times as concd. as raw domestic sewage, makes it very desirable that efforts be made to recover by-products from the wastes and thereby reduce the net cost of their disposal. C. R. FELLERS

Treatment of tannery wastes (ANON) **29.** Corrosion of steel water pipes by stray electric currents (ROTHE) **9.** Titrimetric determination of small quantities of NH_3. With particular attention to water analysis (HAGEN) **7.** Supplying artificially ionized O for ventilation (U. S. pat. 1,793,799) **4.**

KLUT, HARTWIG: **Untersuchung des Wassers an Ort und Stelle.** 6th ed. Berlin J. Springer. 180 pp. M. 7.80.

Apparatus suitable for filtering water through sand, etc. HAROLD D. ELFRETH (to Cochrane Corp.). U. S. 1,794,841, March 3. Structural features.

Softening water with base-exchange material. GEORGE BORROWMAN. U. S. 1,793,670, Feb. 24. The water is percolated through a granular bed comprising lignite or brown coal contg. an exchangeable alkali metal until the latter is "more or less exhausted," and the bed is then revivified by percolating a NaCl soln. through it and washing it, and is then further used for water purification.

Base-exchange compounds. GENERAL ZEOLITE CO. Brit. 337,768, July 27, 1929. Reaction is effected between an alk. metal silicate, an alk. compd. of an amphoteric hydroxide and a non-alk. compd. of an amphoteric hydroxide, to form a gel including substantially the whole reaction mixt.; *e. g.*, a soln. of Al sulfate contg. added H_2SO_4 is mixed with a Na silicate soln. and a soln. of Na aluminate is added. An acid or caustic alkali or both may be added to the reaction mixt. and the use of Na zincate and other materials is also mentioned. The gel may be dried and washed. Cf. *C. A.* 24, 909.

Water-softening apparatus. WALTER H. GREEN (to International Filter Co.). U. S. 1,794,765, March 3. Various structural details are described of an app. operating with a layer of zeolitic material superposed on a layer of non-zeolitic material such as gravel.

Domestic water vessels containing base-exchange material for softening water placed in them. E. Brenil and Établissements Phillips & Pain. Brit. 338,021, Dec. 2, 1929. Various modifications are described of an app. of the general character of that described in Brit. 295,004 (*C. A.* **23**, 1978).

Apparatus for purifying boiler feed water by sedimentation, etc. Edward J. Brock. U. S. 1,794,395–6, March 3. Various structural details are described.

Preventing furring. Jean Schnebbeli. Swiss 141,897, May 24, 1930. Furring is prevented in water heaters by addn. of H_2CrO_4 and a colloid. In the example, an aq. mixt. of H_2CrO_4 and colloidal SiO_2 is added. Cf. *C. A.* **25**, 760.

Preventing furring in boilers. Fritz Hackenbruch. Ger. 514,816, Dec. 3, 1926. Colloids are added to the water which is then made to deposit its fur, by heating under pressure, before admission into the boilers.

Distributor box for sewage-disposal system. John F. Harris. U. S. 1,795,123, March 3.

Settling tank for removing sludge from sewage. Gustav R. Roddy (to Chain Belt Co.). U. S. 1,795,143, March 3.

Apparatus for conditioning air with water sprays, etc. A. T. Lewis, H. P. Gant and R. R. Taliaferro. Brit. 338,018, Nov. 28, 1929. Structural features.

Treating waste liquors to remove sulfidic sulfur. Courtaulds, Ltd., R. S. Jones and S. Pearson. Brit. 337,533, Sept. 23, 1929. The liquor is first treated with acid until neutral or very slightly acid, in the presence of the SO_2 radical, as by the use together of $ZnSO_4$ or $MgSO_4$, $NaHSO_3$ and H_2SO_4, and on mixing the materials part of the S settles out. The remaining liquor is then treated with caustic alkali in the presence of a Zn or Mg salt until it is alk. to phenolphthalein, when $Zn(OH)_2$ or $Mg(OH)_2$ and the rest of the S settle out.

Recovering oil from waste water. Fioravante Cattelan. Swiss 140,639, Sept. 4, 1929. App. for the sepn. of C_6H_6, oil and petroleum from waste water, including a revolving drum with internal compartments, is described.

15—SOILS, FERTILIZERS AND AGRICULTURAL POISONS

J. J. SKINNER AND M. S. ANDERSON

Summary of results of German soil analyses up to 1929. Liehr. *Z. Pflanzenernähr. Düngung u. Bodenk* **9B**, 337–9(1930).—The degree of soil acidity and the P_2O_5 and K_2O contents are given in tabular form. H. B. Siems

The temperature correction in the hydrometer method of mechanical analysis of soils. Charles Richter. *Soil Science* **31**, 85–92(1931).—A study is made of factors affecting the mech. analysis of soils by use of a hydrometer. Soil suspensions of a particular soil at different concns. but at the same temp. will not give identical results when the temp.-correction factor of 0.35 is applied at all concns. Concordant results are obtained only when the correction applied is considerably smaller at the lower range of the hydrometer than at the higher range. A sliding-scale correction table is suggested. M. S. Anderson

Variation of the colloidal material extracted from the soils of the Miami, Chester and Cecil series. R. S. Holmes and Glen Edgington. U. S. Dept. Agr., *Tech. Bull.* 229, 1–23(1930).—A specially designed agitator is described in which the soil suspensions were prepd. A 75% sepn. of the colloidal material from these suspensions was obtained by means of a supercentrifuge. The colloids derived from the various samples of each series show a marked constancy, but they show an equally marked divergence between the different series. The largest amt. of colloidal matter is found in the B horizon. The H-ion concn. is on the acid side in all but 1 horizon. With few exceptions the org. matter, S and P are most abundant in the A horizon. SiO_2 increases with depth in most of the Chester profiles, whereas the reverse is true for the Miami and Cecil series. The active base constituents vary in the Miami profiles in the reverse order to their variations in the Chester and Cecil profiles. The Fe_2O_3 content is higher in the lower horizons of all 3 profiles. The relative constancy in compn. of the colloids of each series is calcd. and discussed. The colloids of the different soil series are, in general, very different. If the series are arranged in the order of the $SiO_2:R_2O_3$ ratio the order becomes Miami, Leonardtown, Chester and Cecil. This order also generally holds for the 4 major constituents if the reciprocal character of the relation is kept in mind. Combined H_2O varies inversely with the $SiO_2:R_2O_3$ ratio. The univalent and bivalent bases do not follow this ratio very closely. J. R. Adams

Interaction between ammonia and soils, as a new method of characterizing soil colloids. AMAR NATH PURI. *Soil Science* 31, 93–7(1931).—Soils react very slowly with bases. Equil. conditions can be reached quickly only when a large excess of alkali is added and the excess removed by leaching or by pptn. as some insol. compn. Completely unsatd. soils will combine with an amt. of NH_3 which may be considered equiv. to the base-exchange capacity. The method used for NH_3 adsorption consists of placing the H-satd. soil in a flat dish in a vacuum desiccator over *N* NH_4OH for 2 days. The dish is then removed and placed over 90% H_2SO_4 in vacuum for 48 hrs. The NH_3 retained is detd. by distn. with lime. The p_H values of soils contg. $CaCO_3$ are about the same after dil. acid treatment and subsequent NH_3 satn. as for the soil in the natural condition. M. S. ANDERSON

Investigations on the organic matter of soils. Their determination and their importance as nitrogen reserves. VINCENT, HERVIAUX AND GAUDIN. *Ann. sci. agron.* 47, 654–71(1930).—Humic materials extd. from a soil vary with the chem. nature of the alk. solvents, their concn., the temp. and the reaction time. The concn. of the alk. soln used affects the concn. of the humus. High alk. concns. break down humic material and too weak solns. produce variable results. The humic materials and humus reduce 0.1 *N* K permanganate solns. in a fairly const. manner. The combinations of N and their probable role in soil fertility are summarized. The necessity of stating precisely, in soil analyses, the existing humic and N combinations is emphasized. The detection and detn. of humic materials are essential. The humate solns. obtained were analyzed for total and sol. humic materials by oxidation by K permanganate. If it is wished to study the ammonification of sol. org. materials, the extn. in the cold for a protracted time with a weak, alk. soln. is preferable. It is advised that 20 g. of finely ground, decalcified soil be agitated mechanically for 2 hrs. with 500 cc. of 1% soda soln followed by 24 hrs. standing with occasional shaking by hand. F. W. MARSH

Some methods for detecting differences in soil organic matter. EDMUND C. SHORBY. U. S. Dept. Agr., *Tech. Bull.* 211, 1–25(1930).—The dark color of the alk. exts. of soils is not due to the absorption of O during the process of extn., and such color cannot be considered an indication of the presence of phenolic compds. Differences in the shades of color of humus exts. are proof of differences in the kind of org. matter, but a comparison of the depth of color of the exts. cannot be used as a measure of the quantity of org. matter present. The N in the various fractions of an alk. ext of a soil and the quantity of O absorbed when air is passed through the ext. vary with the soil. The presence of 2 classes of org. nitrogenous compds. in soils is indicated. These are chitin and its deriv., glucosamine, and some member of the indole group. The results of acid hydrolysis of soils from a N standpoint and the use of alc., water and alternate alc. and water extn. are discussed as means of showing differences in soil org. matter. The formation of azophenine when some soils are heated with $PhNH_2$ is described, and this formation is suggested as a means of showing the presence or absence of some as yet unknown org. soil constituents. A short discussion of a no. of general reactions that may be applied to soil exts. or fractions, such as the pyrrole and fluorescin reactions, are presented. W. H. ROSS

The replaceable cations in the soil and the plant. K. K. GEDROIZ. *Udobrenie i Urozhai* (*Fertilizers and Crops*) 2, 464–75(1930).—A chernozem soil was satd. with the cations, Mg, Ba, Mn, Co, Ni, Cu and H. It was used in pot expts.—700 g. per pot—on mustard with a complete fertilizer and without. No crop was obtained with any one of the enumerated cations. In another series of expts., with the same soils, 10 g. $CaCO_3$ was added, and the exptl. plant was oats. No crop was obtained from Ba, Ni and Co soils. A small crop was obtained with the Cu soil (0.39 g. of dry matter against 5.4 g on the regular chernozem soil with $CaCO_3$), a slightly better crop—1.56 g.—from the Mg soil, and 1.6 g. from the Mn soil. The H soil gave a normal crop. The next series of expts. was conducted with solid satd. with Mg, Ca, Sr, Cd, Fe^{++} and Fe^{+++}, Al and H. All pots received a complete fertilizer and one series received also an addn. of 10 g. $CaCO_3$. Without $CaCO_3$ no crop was obtained from the Cd and Fe^{+++} soils, some small yield was obtained from the Mg, Al and H soils. The Sr soil gave just as good a crop as the soil satd. with Ca, which in turn gave just as good a crop as the chernozem. Apparently Sr can replace Ca in the nutrition of plants. The pots which also received $CaCO_3$ gave a crop with all the cations, except Cd. The crops on the Fe^{++} and Fe^{+++} soils were small, and on the Al and Mg soils they comprised 50% of the normal. Thus the Ca cation is one of the most important exchange cations from the standpoint of plant nutrition. From earlier expts. G. cites the effect of a K-satd. soil. Without Ca the K was not available. On H-satd. soils only $CaCO_3$ brought about a normal crop; addns. of $CaSO_4$ had no effect. This is due to the acid reaction produced by the

formation of H_2SO_4. It was also found that part of the Ca may easily be substituted by Mg without any ill effects. J. S. JOFFE

Determination of the percentage base saturation of soils and its value in different soils at definite p_H values. W. H. PIERRE AND G. D. SCARSETH. *Soil Science* 31, 99–114 (1931).—A comparison is made of the base satn. of soils when detd. by the $Ba(OH)_2$–NH_4Cl method and by the $Ba(OAc)_2$–NH_4Cl method. The $Ba(OH)_2$–NH_4Cl method gives appreciably higher total exchange capacities than does $Ba(OAc)_2$. Soils that have been limed show much smaller differences by the 2 methods. Soils of various origins at like p_H values may show considerable differences in percentage satn. In general, highly weathered soils such as those from the Piedmont Plateau and of the Coastal Plains have a lower degree of satn. than do those from the Coastal Plain Black Belt and the Glacial and Loessial Province. There appears to be no relation between org. matter content of soils or the nature of the bases present in the exchange complex and the percentage base satn. at like p_H values. The avidity or strength of acids present varies with different soils. In general, highly weathered soils have weaker acids than the less weathered ones. There is a good correlation between the avidity of soil acids and the percentage of base satn. of soils at p_H 4.80. M. S. ANDERSON

The buffer capacity of soils, methods of determining it and its practical value. P. KUCHINSKII. *Ann. weissruth. staatl. Akad. Landw. Gory-Gorki* 9, 77–104(1929).—K detd. by the method of Jensen the buffer capacity of the loess-like soil in the vicinity of Gorki. The effect of microrelief on the buffer capacity and the variations in the profile were studied. At the same time the exchangeable bases were detd. by the Kappen method as well as by the hydrolytic acidity. The illuviation horizons had the highest buffer capacity; the eluviation horizons, the lowest. When the clay (particles <0.01 mm.) was removed, the buffer capacity was practically zero. The humus portion of the soil is high in buffer capacity. With the increase in buffer capacity the base-exchange capacity is increased. The higher the buffer capacity, the higher the fertility of the soil. On the slopes the buffer capacity is low; in the depressions it is high. There is a correlation between buffer capacity and hydrolytic acidity. J. S. JOFFE

Soil acidity and its practical significance. I. DE V. MALHERBE. *S. African J. Sci.* 27, 253–69(1930) (in S. African Dutch).—The causes and effects of soil acidity are reviewed. Exchange acidity is detd. according to Daikuhara (*C. A.* 9, 500) with methyl red (or phenolphthalein) as indicator (cf. also Goy *et al.*, *C. A.* 24, 5094); the method consists in shaking 100 g. soil with 250 cc. *N* KCl soln. for 1 hr., filtering and titrating with 0.1 *N* NaOH. Comparative results of this acidity with p_H are given for several soils. The hydrolytic acidity (Kapper, Bodenazidität, Berlin 1929) is detd. by titration after shaking with $Ca(AcO)_2$; it is always higher than the exchange acidity. A table for some 150 S. African soils of different natures gives % rock (>0.04 mm.), % clay + humus, p_H and both acidity values. Of the total, 39% is in the neutral class (p_H >5.99) and does not need lime. Thirty-five % is weakly acid (5.50 to 5.99) and needs slight lime addn. if sandy. The exchange acidity is a good indication for this need; it is higher for the humus soil than for the clay soil because of buffer effects. The same holds for the stronger acid soil groups (19% of 5.00 to 5.49 p_H). As a rule lime is always required for soils with more than 2 cc. acidity. Special cases of fertilization are discussed. The type of crop grown is a decisive factor in the matter of liming; the most acid-sensitive crops are corn, barley, sugar beet, cabbage, beans, peas and lucerne. The amt. of lime required for improvement of the soil is discussed and methods for calcn. are given. Many references are included. R. J. C. VAN DER HOEVEN

Active soil acidity and crop yields. I. T. SOLDATOV. *Ann. weissruth. staatl. Akad. Landw. Gory-Gorki* 9, 141–65(1929).—From a series of field expts. in various rotations the relation between the p_H of the soil and its crop response has been established; for rye 5.94 ± 0.014, for oats 6.05 ± 0.090 and for potatoes 5.92 ± 0.13. J. S. JOFFE

The potassium thiocyanate method for determining soil acidity. YUTAKA KAMOSHITA. *J. Imp. Agr. Expt. Sta.* (Japan) 1, 85–8(1930); cf. *C. A.* 16, 136.—Treatment of soil with an alc. soln. of KCNS produces a red color if the soil is more acid than p_H 6.88, and the depth of color is proportional to the acidity of the soil. At the same p_H values, the color increases with exchangeable acidity, since this is accompanied by increase in Al_2O_3 and Fe_2O_3 and decrease in CaO and MgO brought into exchange. The exchangeable Fe^{+++} of soils is therefore considered responsible for a part of the exchange acidity. K. KITSUTA

Change in soil acidity. E. PAASCH. *Z. Pflanzenernähr. Düngung u. Bodenk* 9B, 309–26(1930).—On limed soils green manuring lowered the p_H about 0.6–1.0. Physiologically acid and alk. reacting fertilizers increase acidity less. Barn manure did not produce increased acidity. H. B. SIMS

Colorimetric determination of p_H values in alkaline soils. P. KAMERMAN. *J. S. African Chem. Inst.* 13, 59–63(1930).—Colorimetric methods for detg. p_H values gave unsatisfactory results. Discrepancies are probably due to hydrolytic effects brought about by the increased water-soil ratio necessitated by the prepn. of a filtered soil ext. B. C. A.

Production of soil carbon dioxide. TH. OEHLER. *Z. Pflanzenernähr. Düngung u. Bodenk* 9B, 415–21(1930).—Forced ventilation of soil in pots produced larger amts. of CO_2 than was in soils not so treated. Increased CO_2 production resulted in better plant growth. Aeration of soils by tile drainage may result in greater production of CO_2 through the decompn. of soil org. matter and thus increase crop yields. H. B. S.

Temperature variation of cultivated soils. OTTO HEUSER. *Z. Pflanzenernähr. Düngung u. Bodenk.* 9B, 252–67(1930).—Soil temp. at various depths has an important influence on plant growth. The change in soil temp. at the surface, at depths of 5, 17.5 and 30 cm. with respect to air temp. from January to July, is reported. During July the temp. of the surface and 5 cm. depth was slightly higher than the av. air temp. At 17.5 cm. depth the temp. is nearly equal to the av. daily temp., except when rapid changes in air temp. take place. At 30 cm. depth the temp. is a little lower. Variation in daily soil temp. is also caused by rain, liming of soil, cultivation and covering with straw and paper. H. B. SIEMS

Organic compounds associated with base-exchange reactions in soils. W. T. MCGEORGE. Ariz. Agr. Expt. Sta., *Tech. Bull.* 31, 215–51(1931); cf. *C. A.* 25, 161. The arid soils of the Southwest contain only small quantities of org. matter. The compn. and reactions of this org. matter were investigated. *Lignin* and lignin-like substances are the most abundant and active base-exchange agents in arid soils. The exchange capacity of the lignin present in soils is not a const quantity but varies in different soils. The same is true for ligno-humates, although the range of variation is not so great. The aq.-alkali-sol. ligno-humate has a much higher exchange capacity than the alc.-alkali-sol. lignin. Leaching the lignin and ligno humate with H_2O increases the exchange capacity, probably by hydrolysis. The quantity of lignin extd from soils by alc. alkali represents a comparatively small percentage of that actually present. Max. soly. may be obtained by digesting with aq. alkali at increased pressures. Titration of lignic acid (H-satd. lignin) and ligno-humic acid (H-satd. ligno-humate) with KOH and $Ba(OH)_2$ indicates that the lignin mol. is dibasic, and ligno-humate, tetrabasic. The absorption of the base of an acetate by lignin is equal to that required as hydroxide to neutralize the H-satd. salt. Ionization of the acid and basic salts of lignin and ligno-humates was detd. by measuring the cond. of their resp. solns. at several dilns. The Na and K org. complexes show rather high ionization, while those of Ca, Ba and H are very low. The effect of a common ion on ionization and base exchange in org. matter was studied. The influence of a common ion upon replacement by another base is appreciable, but, except for Ca, it is less outstanding than in inorg. zeolites. Xylan exhibits, to a slight degree, the property of base replacement, but this is not of sufficient magnitude to account for the greater exchange capacity of the ligno-humates as compared with lignin. Synthetic humus, prepd. from xylan or cellulose, like that prepd. from sucrose, yielded materials with rather high base-exchange capacities. Xylan, lignin and ligno-humate absorbed color from basic fuchsin soln., and this color was replaceable by the base of a neutral salt soln. Green manure, from ground dry alfalfa, shows an appreciable base-exchange capacity, a large part of which is not easily destroyed by digestion with H_2O_2. The base-exchange capacity of ground alfalfa was increased 4-fold by spontaneous decompn. Just as with soils, the extn. of ground alfalfa with alc. or aq. NaOH yields a lignin of high base-exchange capacity. The lignin content of org. matter and highly org. soils is a linear function of the base-exchange capacity, while there is no relationship between hemicellulose or cellulose and the exchange capacity. The exchange capacity of the org. fraction increases as the org. matter passes through successive stages of decompn. in the soil. A bibliography is appended. C. R. FELLERS

The exchangeable bases in Malmesbury slate soils. M. H. SLABBER. *S. African J. Sci.* 27, 270–9(1930) (in S. Afr. Dutch).—Loam soil samples from the Malmesbury and Stellenbosch districts were studied; they are of slate origin. Top soil (9" deep) and the next layer (18" deep) were used. The Kelley method was used for detn. of exchangeable base (Kelley and Brown, *C. A.* 20, 2382). The results are tabulated for Ca, Mg, K and Na and include p_H. The av. is 5.8 mg. equiv. total exchangeable base for hill soils; it is 3.5 mg. equiv. for lower grounds. These low figures are due more to the colloidal condition of the soils than to an unsatd. condition; the low humus content is significant. The relative ratios of the bases are discussed; in the low grounds Na and

K predominate. Even if more K is available for plant food, the condition of the soils with high univalent-ion content is generally unfavorable; the clay fraction is largely flocculated. The exchangeable-base content of the soils studied is only an av. of 32% of the total base present in them, a figure lower than customary. B. J. C. v. d. H.

Behavior of water in a drained field. Joh. Rothe. *Z. Pflanzenernähr. Düngung u. Bodenk* **9B**, 512–18(1930).—In certain drained soils 26–29% of the total precipitation was found in the drainage water. H. B. Siems

Further studies on the relationship between the concentration of the soil solution and the physicochemical properties of the leaf-tissue fluids of cotton. J. Arthur Harris and Truman A. Pascoe. *J. Agr. Research* **41**, 767–88(1930).—There is in general a pos. correlation between the salinity of the soil and the osmotic concn. as measured in terms of f.-p. depression, sp. elec. cond., Cl content and sulfate content of the leaf-tissue fluids of both Pima Egyptian and Lone Star upland cotton. The correlation between the elec. resistance of the soil and the concn. of all solutes of the leaf-tissue fluids, as measured by f.-p. depression, is higher in both the upland and Egyptian varieties than the correlation between the salinity of the soil and the cond. of the tissue fluids. In general the correlation between the analytically detd. concn. of the 2 ions studied in the soils and the total solutes of the tissue fluids, measured in terms of osmotic concn., is higher than that between these ions and the various measures of electrolyte content of the tissue fluids. In the upland variety the correlations between the soil resistance and total solutes of the tissue fluids are higher than those between soil resistance and the chlorides of the tissue fluids, while the reverse is true with the Egyptian variety. In the Egyptian variety the correlations between soil resistance and total solutes are higher than those between soil resistance and tissue-fluid sulfate content. This is not as marked and may be reversed in the upland type. J. R. Adams

The determination of assimilable nitrogen in soils by the growth of grasses. Reinhold Wagner. *Wiss. Arch. Landw.*, Abt. A, *Pflanze* **5**, 166–200(1930).—The Neubauer method for detg. P and K is extended to the detn. of assimilable N in soils and fertilizers. Westerwold Raygrass was found to give the best index of the N content of the soil, and to utilize the N supplied in any of the common fertilizers. W. Gordon Rose

Soil nitrates as a guide to the nitrogen needs of vegetable crops. H. D. Brown. Ohio Agr. Expt. Sta., *Bimonthly Bull.* **149**, 55–8(Mar.-Apr. 1931).—The nitrate-N spot-plate test of Morgan (*C. A.* **24**, 3072) was used to advantage in testing N deficiencies in soils cropped to various vegetables. For good crop growth the soil should contain 15 or more p. p. m. of nitrates. Fresh strawy manure usually tested 5–7 p. p. m. of nitrates. A concn. of 60 p. p. m. did not injure spinach. N is often not liberated from so-called rich greenhouse soils fast enough for tomato and cucumber production, the crops suffering from N hunger. The remedy is the application of $NaNO_3$. C. R. Fellers

Determination of plant-food content in soils by the citric acid and other methods. J. Hasenbäumer and R. Balks. *Z. Pflanzenernähr. Düngung u. Bodenk* **9B**, 456–73(1930).—The citric acid method for detg. the available P_2O_5 and K_2O of the soil is practically as good as the biological methods. No method is without objections, but chem. detns. have the advantage that they can be carried out quickly. Each method, however, gives an indication in regard to the deficiency, medium content and abundance of phosphate and potash of the soils. H. B. Siems

Permeability of iodine in some economic plants. R. C. Malhotra. *Protoplasma* **12**, 1–22(1931).—Soil was analyzed for I. Portions were then treated with different amts. of that element and used for growing a variety of plants. Carrots take up the most, tomatoes the least. There is no relation between the amt. stored by the plant and the amt. added to the soil. Root crops take up more than leaf crops. The I is localized chiefly in the roots. A soil p_H of 6 is the optimum. Seventy-two references are appended. B. A. Soule

The nutrition of seedlings and the effect on root formation of cereals. Kleeman. *Z. Pflanzenernähr. Düngung u. Bodenk* **9B**, 433–56(1930).—During the germination of seed, enzymes change carbohydrates, fats and proteins into water-sol. components. After enzymic splitting of the large mols., oxidative enzymes then change the fractions into smaller mols. with the loss of CO_2. If the moisture content of the soil is insufficient for germination, enzyme activity may still proceed with the evolution of appreciable amts. of CO_2, thus decreasing the total solids in the seed. Under these conditions the resultant seedling may be greatly weakened. Growth of seedlings may be promoted if the seed is moistened (35–40% H_2O content) from 2 to 3 days in a satd. atm. at 17–18°. To prevent the action of oxidative enzymes, the seed is best stored in a vacuum. The seed is best moistened by a fine spray and not by dipping it in water to prevent the loss

of water-sol. substances. Seed thus treated gives a better root system and a larger crop yield. H. B. SIEMS

Crop rotation. F. MÜNTER. *Z. Pflanzenernähr. Düngung u. Bodenk* **9B**, 529–52 (1930).—The total plant food and the ratio $N:P_2O_5:K_2O$, representing the plant food removed by different field crops, were not const. for the same plant, but depended on weather conditions, tillage, shading, soil conditions and insect injury. Beets removed the most plant food, nearly twice as much as rye and barley. Potatoes and oats followed beets in amt. of removal. Wheat extd. less K_2O. Leguminous plants removed practically as much P_2O_5 and K_2O as potatoes and oats. H. B. SIEMS

A mathematical study of the decrease of crop yields. J. DUDLEY GREAVES. *Soil Science* **31**, 115–22(1931).—Further study of an equation developed for the study of crop yields tends toward the establishment of the 2 assumptions on which the formula was based: The rate of increase of crop yield with increase of the deficient element is proportional to the magnitude of the deficiency of the limiting nutrient from an optimum concn. The time rate of depletion of a deficient element, provided none is added from an outside source, is proportional to the product of the soils content of the deficient element and crop yield. M. S. ANDERSON

Chemical and microbiological study of Lufkin fine sandy loam in relation to productiveness. E. B. REYNOLDS. Texas Agr. Expt. Sta., *Bull.* **421**, 5–30(1931).—In field expts. the nitrifying power of the soil was correlated positively and significantly with the yields of cotton and corn. The nitrifying capacity was a better index of soil productivity than any other method studied. The nitrifying power of the soil was also positively correlated with the total N, total P_2O_5 and available P_2O_5 of the soil. The nitrifying capacity of the soil in the lab. was not affected by the season. Continuous cropping of the soil to corn lowered the nitrifying capacity. The application of nitrogenous materials, cottonseed meal and manure, and also P_2O_5 as superphosphate or rock phosphate, increased both nitrate production and nitrifying capacity. Liming greatly increased nitrate production. C. R. FELLERS

Influence of various non-nitrogenous compounds on the growth of certain bacteria in soils of low productivity. H. J. CONN AND MARY A. DARROW. N. Y. Agr. Expt Sta., *Tech. Bull.* **172**, 3–40(1930).—Two soils of low fertility were sterilized and inoculated with *B. globiforme* Conn and with 2 related species. This organism has N requirements similar to those of green plants, and it was believed that the test might show why the N in these unproductive soils was not available to plants. The bacteria did not grow in the soils unless NH_4 salts, nitrates or other forms of readily available N were added. The addn. to the soils of the hydroxides, sulfates, carbonates or phosphates of the strong alkali metals also made the N of the soil available for the bacteria. It is probable that the cause of the unavailability of the N is adsorption by soil colloids. In this case the bacteria acted like green plants. C. R. FELLERS

The influence of inorganic iodine compounds on the metabolism of some important soil bacteria. HELMUT KARNAHL. *Zentr. Bakt. Parasitenk.*, Abt. II, **82**, 494–518 (1931).—As much as 1 g. per l. of KI, KIO_3, NaI or $NaIO_3$ decreased the production of CO_2. Concns. of I salts below that gave slight increases of CO_2. The respiration rate was slightly decreased, iodate having a greater effect than iodide. I salt concns. between 1 and 10 g. per l. inhibited denitrification. Below that there was little effect. The results for N fixation and urea destruction were similar. JOHN T. MYERS

Presence of Azotobacter and absence of Thiobacillus thioöxidans in peat soils. C. E SKINNER AND I. J. NYGARD. *Ecology* **11**, 558–61(1930).—*Azotobacter* is active in peat soils only at $p_H > 5.9$. *A. chrobcoccum* was found in the more basic soils and *A. Beijerinckii* in those approaching the acid limit. *Thiobacillus thioöxidans* was not found in peat except where S had previously been used as a fertilizer. B. C. A.

The determination of the potassium needs of the soil by Aspergillus niger. H NIKLAS AND H. POSCHENRIEDER, with the collaboration of G. VILSMEIER. *Wiss. Arch Landw.*, Abt. A, *Pflanze* **5**, 152–65(1930); cf. *C. A.* **24**, 5915.—Ten soils of different types were investigated as to their P_2O_5 and K_2O content by the Neubauer method, and by the *Aspergillus niger* method, and the yields of various crops grown on these soils were detd. (1) without fertilization, (2) with fertilizer deficient in (*a*) N, (*b*) H_3PO_4 and (*c*) K, and (3) with complete fertilization. The results obtained from the *Aspergillus niger* method are to be published later with the crop yields reported in this article. W. GORDON ROSE

Potash content of Pfalz soils and conclusions in regard to fertilizer recommendations. M. KLING AND O. ENGELS. *Z. Pflanzenernähr. Düngung u. Bodenk* **9B**, 409–15 (1930).—The root-sol. K_2O in various soils was detd. by the Neubauer method. Tentative "limiting values" of mg. of K_2O per 100 g. dry soil are given as follows: for grain 30,

vegetables and clover 30, grapes 50, tobacco 50, pastures and meadow grasses 30. In many cases the crop yield could be increased by adding potash to the soil, although the soil contained more than the "limiting value" of potash H. B. SIEMS

Nature of the yield curve [of plants] with increasing applications of potash. H. WIESSMANN AND K. NAUMANN. *Landw. Jahrb.* 72, 105–23(1930).—The yield curve of oats and rye grass with increasing supplies of potash approximated to the logarithmic type of Mitscherlich (cf. *C. A.* 24, 2824). Later sowing of the seed caused slight increases in the "effect factor" of potash. The mean values of the "effect factor" of potash with rye grass and with oats were similar, but with the former crop there was a slightly decreased value with the higher applications of potash. In general, values of the "effect factors" for potash were slightly smaller than those of Mitscherlich. B. C. A.

Utilization of increasing amounts of potash on the crop yield of several varieties of barley. H. LIESEGANG. *Z. Pflanzenernähr. Düngung u. Bodenk* 9B, 397–409(1930).—Four varieties of barley grown in pots varied in their ability to utilize increasing amts. of potash as shown by crop yields, although the amt. absorbed under the same conditions was practically equal. H. B. SIEMS

The effect of sodium nitrate and ammonium sulfate on the availability of soil potash and soil phosphoric acid. M. GRACANIN. *Z. Pflanzenernähr. Düngung u. Bodenk* 9B, 300–9(1930).—The amt. of phosphate and potash absorbed by plants from the soil as measured by the Neubauer seedling method is increased noticeably when $(NH_4)_2SO_4$ is added to the soil. On extremely acid or alk. soils this effect was not noticeable and in some cases was neg. $NaNO_3$ caused an increase in absorption of P_2O_5 by plants from all soils except one with a p_H 8.35. The increase in the absorption of potash did not parallel the P_2O_5 absorption in all cases H. B. SIEMS

Remarks concerning A. Nemecs treatise "The evaluation of the results of soil analyses with respect to the need of phosphate fertilization." M. v. WRANGELL. *Wiss. Arch. Landw.*, Abt. A, *Pflanze* 4, 635–40(1930) Polemic Cf. N. (*C. A.* 25, 1935) and *Deut. landw. Presse* 57, No. 23(1930) W. GORDON ROSE

The determination of soluble soil phosphates. B. DIRKS AND F. SCHEFFER. *Wiss. Arch. Landw.*, Abt. A, *Pflanze* 4, 641–51(1930). A discussion is given of the methods available for the prepn. of a soln. contg. the easily sol. soil phosphates and of the factors that must be considered in detg. the amt. of phosphate that must be supplied for various crops W. GORDON ROSE

The mechanical analysis of finely divided natural phosphates. LYLE T. ALEXANDER AND K. D. JACOB. U. S. Dept. Agr., *Tech. Bull.* 212, 1–24(1930).—The pipet method for the mech. analysis of soils (*C. A.* 24, 1452) was successfully applied to the analysis of finely divided natural phosphates. For the analysis of phosphates, pretreatment of the sample with H_2O_2 to remove org. matter is omitted The sp. gr. of the original samples and the mech. fractions of the various types of phosphate rock produced in the U. S. do not vary sufficiently to preclude the use of an av. sp. gr. of 3.0 in calcg. the settling velocities of phosphate particles by means of Stokes formula. An exptl. study of the settling velocities of 5-μ phosphate particles at various temps. showed that the rate of fall is considerably slower than the theoretical rate calcd. by means of the customary form of Stokes formula; this is due apparently to the irregular shape of the phosphate particles. The particle-shape factor in Stokes formula as applied to natural phosphates was found to be 0.154. Results obtained by the pipet method, as modified for the analysis of finely divided phosphates, were in excellent agreement with those obtained when 800-g. samples of the phosphates were sepd. into mech. fractions by sedimentation in water regardless of any theoretical considerations, the progress and efficiency of the sepn. being detd. solely by microscopical examn. of the fractions. The possibility of utilizing the pipet method in the mech. analysis of ground limestone and marls is pointed out. W. H. ROSS

Behavior of tricalcium phosphate in cultivated soils. H. DANNEEL AND K. W. FRÖHLICH. *Landw. Jahrb.* 72, 51–8(1930).—$Ca_3(PO_4)_2$ does not dissolve in water in the mol. form. The ratio $CaO:P_2O_5$ in soln. varied from 1:1.1 at dilns. of 1 in 200 to 1:2.6 at dilns. of 1 in 50,000. The bearing of this on the compn. and soly. of naturally occurring phosphates is discussed. B. C. A.

Technical problems of the superphosphate industry. BRUNO WAESER. *Metallbörse* 21, 75–6, 123–4, 173–4(1931).—If crude phosphate meal is stirred with sufficient dil. H_2SO_4 to form $CaHPO_4$ and convert $CaCO_3$, Fe_2O_3 and Al_2O_3 into sulfates, a part of the impurities is sepd. in the acid filtrate and the residue contains $CaHPO_4$, $CaSO_4$ and undecompd. CaF_2 and silicic acid. $CaHPO_4$ is then changed to $CaH_4(PO_4)_2$ with more H_2SO_4. The prepn. of H_2O-free $CaH_4(PO_4)_2$ is technically possible by the treat-

ment of $CaHPO_4$ with 100% H_3PO_4 in a ball mill. A mixed fertilizer can also be obtained by the reaction $Ca_3(PO_4)_2 + 4HNO_3 = CaH_4(PO_4)_2 + 2Ca(NO_3)_2$. J. R. H.

Effect of fertilizers on phosphoric acid and calcium absorption of various plants. D. MEYER AND P. OBST. *Z. Pflanzenernähr. Düngung u. Bodenk* 9B, 488–512(1930).—In pot expts. with oats and tobacco, it was found that different forms of inorg. N compds. showed little difference in crop yields. Addn. of lime increased the yields in some cases and in others decreased them slightly. Results indicate that various N fertilizers may increase or decrease P_2O_5 and CaO absorption, the effect depending on the kind of plant and N compd. used. The addn. of $CaCO_3$ to the soil increased the CaO absorption, but the increase depended on the particular plant and N compd. used. Lime and various N fertilizers gave varying results in regard to P_2O_5 and CaO absorption from fertilization with di- and tri-calcium phosphate and no added phosphate. H. B. SIEMS

A field method for determining phosphoric acid in phosphate rock. E. N. ISAKOV AND V. A. KAZARINEVA. *Udobrenie i Urozhai* (*Fertilizers and Crops*) 2, 416–20(1930).—The phosphate rock is ground to pass a 0.5 mm. sieve; 15–20 g. is placed in a weighing dish and dried for 3.5 hrs. at 105°. A 4 g. sample is dissolved in 40 cc. aqua regia by heating for 30 min. It is then made up to a vol. of 250 cc. and further diluted to a dilution of 0.0001. The Denigés method is then used, making up a series of standards in tubes and comparing the unknowns with them in the same way as with p_H detns.—colorimetric method. It was found to be accurate with a max. error not exceeding 2%. J. S. JOFFE

Note on phosphoric acid of barley grain. E. M. CROWTHER. *J. Inst. Brewing* 36, 349–51(1930).—The P_2O_5 contents of various types of barley differed from each other, but no general relationship was found which could be assocd. with the type of fertilizer used in growing the barley or with any other characteristic of the barley. PETER J. F. WERER

Fertilizing experiments with phosphorite. G. TOMMASI AND S. DOJMI DI DELUPIS *Publ. Real staz. sper. chim.-agr. Roma* No. 271(1930); *Chim. ind. agr. e biol.* 7, 33–4(1931).—The Kosseir (Egypt) phosphorite contains moisture 2.85, combined H_2O 0.20, org. matter 0.58, CO_2 6.40, total P_2O_5 29.5, P_2O_5 sol. in 2% citric acid 5.75, SO_3 0.95, Cl 0.25, F 1.40, Fe_2O_3 1.05, Al_2O_3 1.54, CaO 45.50, MgO 1.95, Na_2O 0.52, K_2O 0.10, SiO_2 and sol. silicates 6.50%. Field plot and lab.-fertilizing expts. were made with this material on different soils (the complete mech. and chem. analyses of which are given) and with wheat, lucerne, beans, etc. With neutral soils or soils near neutrality, the results were not very good, but with lucerne on lime-free soils they were excellent. Phosphorite is efficient in grains <0.05 mm.; the results are better if it is mixed with ordinary superphosphates. G. A. BRAVO

"Nitrophoska." W. WERNER. *Z. Pflanzenernähr. Düngung u. Bodenk* 9B, 339–60(1930).—On heavily limed and very sandy soils with low absorption capacity, "Nitrophoska" may produce $(NH_4)_2CO_3$, which may cause loss of N and plant injury on account of free NH_3. On av. agricultural soils this is not so noticeable except in special cases. The P_2O_5 in "Nitrophoska" present as $(NH_4)_2HPO_4$ is equiv. to superphosphate in regard to crop yields. For sandy soils, the P_2O_5 in superphosphate is superior. In heavier soils, P_2O_5 from "Nitrophoska" is occasionally superior. Physiologically, its reaction is neutral to feebly acid. H. B. SIEMS

Field trials with "Nitrophoska." F. HONCAMP AND H. WIESSMANN. *Z. Pflanzenernähr. Düngung u. Bodenk* 9B, 361–3(1930).—The 3 grades of "Nitrophoska" alone or supplemented with N as "Leunasalpeter" ($(NH_4)_2SO_4.NH_4NO_3$), K as KCl and P_2O_5 as superphosphate gave good results on potatoes, turnips and oats. The crop yields were as high or slightly higher than in cases where the N, P and K had been used separately on the same field. H. B. SIEMS

Measuring absorbed phosphates and nitrogen. W. J. SPILLMAN. *Science* 73, 215–6(1931).—Small quantities of phosphate and nitrate fertilizers are absorbed by the soil. An excess of fertilizer over that necessary to satisfy this absorptive power of the soil must be added before the growing crops will obtain any beneficial effects from the fertilizer. The quantity of fertilizer made unavailable by absorption is found by detg. the point on the crop-yield curve which corresponds to the observed yield when no fertilizer is added. J. R. ADAMS

Pasture fertilization with nitrogen. MÖLLER. *Z. Pflanzenernähr. Düngung u. Bodenk* 9B, 363–77(1930); cf. *C. A.* 24, 5099.—A basic application of 60 kg. P_2O_5 and 100 kg. K_2O per hectar was made. Two, and in some cases three, applications of N were made at a total rate of 40, 80 and 120 kg. N per hectar. High N applications were profitable. H. B. SIEMS

"Humunit." K. ECKL. *Z. Pflanzenernähr. Düngung u. Bodenk* 9B, 378–82

(1930).—A humus-contg. product sold under the trade name "Humunit" was found practically valueless from the standpoint of crop production. H. B. SIEMS

The solubility of water-insoluble phosphates in silicic acid. W. OBST. *Centr. Zuckerind.* **39**, 67(1931).—A discussion of the effect of Thomas' slag meal (fertilizer). J. F. LEETE

Decomposition of organic fertilizers. II. Relations between the chemical composition and decomposition. SIGERU OHSUGI AND SHUSHI YOSHIE. *J. Agr. Chem. Soc. Japan.* **6**, 917–26(1930).—Soy-bean oil cake, rape-seed oil cake, *Astragalus sinicus*, Saatwicken, rice straw, herring cake and bone fertilizer were analyzed. Seventy-five g. of these org. substances mixed with 1.5 kg. soil were kept in the pots (the area is 1/50000 *tan*) under the condition that max. moisture content is 50% and temp. 25°. The decompn. velocity was rapid during the first 17 days. The ether ext. is easily decomposed. The decompn. of an aq. ext., especially of reducing sugars and org. N compds., is generally easy. Water-sol. ash of animal origin becomes insol. with greater difficulty than does that of plant origin. The decompns. of cellulose and hemicellulose are, resp., 70–80% and 60–70% in the presence of abundant N. The decompn. of org. N is under 60%. This may be due to absorption by microorganisms. The decompn. of lignin is difficult. Y. KIHARA

Effect of barn manure on soil conditions. S. GOY. *Z. Pflanzenernähr. Düngung u. Bodenk* **9B**, 481–7(1930).—Soils to which barn manure was applied showed, after a year, a slight increase in hydrolytic soil acidity. Manured plots usually showed, after removal of the crop, more residual root-sol. P_2O_5 and K_2O than did the check plots as shown by the Neubauer seedling method. Although the manure added more N than the plants absorbed, there was a definite loss of N as shown by König's method. H. B. SIEMS

The influence of drying manure on the nitrogen losses and on crop yields. I. P. MAMCHENKOV AND I. F. ROMASHKEVICH. *Udobrenie i Urozhai* (*Fertilizers and Crops*) 2, 394–7(1930).—Manure was taken to the field and either plowed under immediately or after 1, 2 and 5 days. The manure which was not to be plowed under immediately was placed in the field either in piles or scattered. It was found that the manure became almost air-dry. Analyses showed that the manure in the piles lost more N than the scattered manure. In the scattered manure the losses consisted primarily of NH_3, which escapes during the first 2 days. Expts. with oats have shown that the manure which was allowed to dry out in the field was slightly inferior. In pot expts. both fresh and dried manure gave the same results. When lime was added to the manures the dry manure was not so effective. J. S. JOFFE

A comparison of the various methods of storing manure. I. P. MAMCHENKOV. *Udobrenie i Urozhai* (*Fertilizers and Crops*) 2, 284–91(1930).—Three methods were tried. (1) loose throwing together of manure, (2) compacting, (3) the Krantz method (cf. *C. A.* **21**, 3493). In all cases the manure was cow manure with the addn. of 12% fresh horse manure. The various batches were kept in specially prepd. pits. In the 1st case the manure was piled up loosely 1.25 m. deep and kept that way. For the Krantz method the manure was piled up to 1 m., allowed to heat up to 55° and then compacted. After that another layer 1 m. deep was placed and again allowed to heat up to 55° and compacted. Two series were run: one with straw, the other with peat-moss as bedding. Detns. were made for NH_3 N on a water ext.; then the manure was treated with MgO to det. the combined N. Besides that, a sep. sample was treated with 0.05 *N* HCl and the ext. distd. over for total NH_3. In the fresh manure there was found, on the basis of 100 parts of abs. dry wt., 2.7% total N, of which 1.773% was protein N, 0.818% NH_3 N and the rest other forms. This was for the manure with straw. For the manure with peat the following was found: total N 3.3, protein N 1.877 and NH_3 N 1.248%. After 4 months the pits were opened and analyses made on the manure batches. The loosely packed manure lost 27.3% dry matter with the straw and 23.0% with the peat; the compacted, 9.9% and 3.4%; the Krantz manure, 21.0% and 10.2%. The N losses were: with method (1) 36.7% with the straw and 34.66% with the peat; method (2) 12.59% and 25.94%; method (3) 26.3% and 19.0%. The distribution of the forms of N in the manure kept by the 3 methods was: in (1) total N 2.35 with the straw and 2.8 with the peat, protein N 1.752 and 2.296, free NH_3 and $(NH_4)_2CO_3$ N 0.346 and 0.152, combined NH_3 N 0.152 and 0.164, NO_3 N 0.0016 and 0.009; in (2) total N 2.62 and 2.53, protein N 1.698 and 1.222, free NH_3 and $(NH_4)_2CO_3$ N 0.308 and 0.436, NO_3 N 0.0016 and 0.0022; in (3) total N 2.520 and 2.97, protein N 1.587 and 1.824, free NH_3 and $(NH_4)_2CO_3$ N 0.415 and 0.829, combined NH_3 N 0.434 and 0.208, NO_3 N 0.0018 and 0.0018. Thus in the loosely packed and Krantz manure there is a transformation of mineral N into protein N, but there is a greater loss of N. Pot expts. (5 kg.

of soil per pot) were conducted with the variously stored manures on oats. $NaNO_3$ was used as the check pot. All received similar amts. of P and K. It was found that $NaNO_3$ gave better results than did the manures. The mineral N from the manure is immediately available, whereas the protein N is not. It is concluded that the system of packing down the manure is the best one, since it preserves the mineral forms of N.
J. S. JOFFE

The use of excess molasses. H. CLAASSEN. *Deut. Zuckerind.* 55, 1377–8(1930).—The author discusses the use of beet molasses as *fertilizer* and recommends further experimentation. J. F. LEETE

Floating factories. H. HAUPTVOGEL. *Chem.-Ztg.* 53, 786–7, 806–7(1929).—A detailed, illustrated description is given of vessels equipped to catch and prep. fish and produce *fertilizer* from the waste. The modern, floating *whale oil* plants are described briefly. E. M. SYMMES

Organic fertilizers for oats and flax. Z. V. LOGVINOVA AND A. P. SHCHERBAKOV. *Udobrenie i Urozhai* (*Fertilizers and Crops*) 2, 476–82(1930).—N sources from meat scrap, horn meal, horn shavings, burned horn meal, blood meal, slime from intestines, feathers and down, oil meal, tobacco dust and wool combings were compared in pot expts. with $NaNO_3$ and $(NH_4)_2SO_4$ on oats and flax. Two sets of pots with 4.5 kg. of soil were set up. One set received 0.5 g. N, the other, 1.0 g. All pots received P in the form of Na_2HPO_4 and K in the form of K_2SO_4. The results with the oats were: the slime gave almost as good results as the mineral forms of N. The meat scrap, horn meal, horn shavings, burned horn, blood meal, feathers and down and oil meal fell behind the mineral N when 0.5 g. of N was added. With the double quantity of N these materials were just as efficient as the mineral N. The dried blood, tobacco dust and wool combings were far behind the mineral N even when 1.0 g. of N was added. The residual effects of the various org. forms of N on the succeeding crop were far superior to those of the mineral N. With flax the 0.5 g. of org. N was just as good as the mineral N; with the 1.0 g. quantity the org. N was superior to the mineral forms of N. The second crop on the flax pots was oats, and since the flax did not utilize the mineral N, it was effective on the oats giving higher yields than the residual org. N. The quality of the flax was also better with the org. forms of N. J. S. JOFFE

Fertilizing tomatoes, sweet potatoes and muskmelons in a three-year rotation. J. W. LLOYD. Ill. Agr. Expt. Sta., *Bull.* 364, 18 pp.(1931).—Field expts. continued for 6 years showed that P is especially important in the production of tomatoes. The most efficient form of P was steamed bone meal. K decreased the yield of melons and was of little or no benefit to tomatoes or sweet corn. Com. N in the form of $NaNO_3$ or dried blood increased the yield of tomatoes but decreased the yields of melons and corn. $(NH_4)_2SO_4$ decreased the yields of all crops. Dried poultry manure increased the yields of tomatoes and corn. Limestone, when used with manure, increased the yields of tomatoes, sweet corn and melons, 7, 14 and 25%, resp., as compared with the use of manure alone. For a 3-year rotation of melons, tomatoes and corn, limestone and manure should be added the first year, steamed bone and dried blood the second year, and no fertilizer is required for the third year. C. R. FELLERS

Fertilizing of mildewed vines. HENRI ASTRUC. *Prog. agr. vit.* 94, 499–502(1930).—A. recommends treating vine maladies brought on by a wet season by judicious fertilizing. He favors mixts. of org. and chem. fertilizers rather than only the easily sol. chem. fertilizers which are rapidly removed from the root zones. Such mixts. should furnish nourishment during the entire vegetating season. A N excess should be avoided, as this overstimulates foliage production and thus encourages mildew growth.
F. W. MARSH

Use of manganese in vegetable greenhouses. I. C. HOFFMAN. Ohio Agr. Expt. Sta., *Bimonthly Bull.* 149, 58–62(Mar.-Apr., 1931).—See *C. A.* 24, 5102.
C. R. FELLERS

Results obtained by two winter sprayings and one spring spraying on the vegetation of trees and the quality of fruits. L. CHASSET. *Prog. agr. vit.* 94, 502–5(1930).—These 3 treatments produced the best results. The first winter spraying was with a mixt. of anthracene oil, formol and schist oil, followed a few days later by lime-sulfur. In the spring a Cu arsenical spray was used. F. W. MARSH

Solubility of Bordeaux. GEO. L. HOCKENYOS. *Phytopathology* 21, 231–4(1931).—The colorimetric method of Callan and Henderson (cf. *C. A.* 24, 312) for detecting Cu, which is sensitive to 1 part in 25,000,000, is applied to the detn. of the percentage of Cu in a series of Bordeaux mixts. contg. various ratios of Cu to hydrated lime. When the Cu:Ca ratio was 1:0.169, 0.04% Cu was present in soln.; with a ratio of 1:0.27 it fell to 0.00009%; with a ratio of 1:0.67 the sol. Cu was found to be 0.00013%, and it remained

at this level when the ratio was made 1:1 or 1:2. The detn. is made by adding to 17.5 cc. of the soln. to be tested 0.5 cc. NH_4OH and 2 cc. 1% Na diethylthiocarbonate and comparing in a Duboscq colorimeter with 2 cc. 0.0002 *N* $CuSO_4$ soln. diluted to 17.5 cc. and similarly treated. JOSEPH S. CALDWELL

Factors influencing the character of Bordeaux mixture. W. NEWTON, F. B. JOHNSTON AND C. YARWOOD. *Proc. Can. Phytopath. Soc.* 1929, 21–6(1930); *Rev. Applied Mycol.* 10, 118.—The ideal spray is probably obtained when the solids are in a state of max. dispersion. Best results and slowest settling is obtained when the reacting solns. are as cold as possible, when the $CuSO_4$ soln. is poured slowly into the lime suspension rather than conversely and when the $CuSO_4$ is as dil. and the lime suspension as concd. as practicable. Addn. of Na silicate, fresh skim milk, various alcs., wheat flour, whale oil soap, various washing soaps, agar, alkali, or sodium resin soap failed to improve the Bordeaux mixt., while 0.15 to 0.5% Ca caseinate, 0.5% gelatin, Crystal White brand soap, or potassium resin soap did improve the Bordeaux somewhat. ODEN E. SHEPPARD

Analysis of commercial lime-sulfur materials. TETSUNOSUKE ONOUE. *J. Imp. Agr. Expt. Sta.* (Japan) 1, 89–90(1929).—High. sp. gr. of lime-sulfur soln. does not always indicate high sulfide-S content. The quality should be detd. by detn. of active-S content and not by sp. gr. K. KITSUTA

Determination of barium fluosilicate spray residue. R. H. CARTER. *Ind. Eng. Chem., Anal. Ed.* 3, 146–7(1931).—The apples are washed by immersion for 30 sec. in a boiling 3% NaOH soln. and rinsed with slightly acidulated H_2O. The rinsings and washing soln. are cooled, made strongly acid with HCl and rapidly filtered. The filtrate is then made strongly alk. with NaOH, and the Ba is pptd. as $BaSO_4$ with an excess of H_2SO_4. The $BaSO_4$ is then calcd. to Ba fluosilicate. This method is fairly rapid and gives reproducible results which are sufficiently accurate for comparative work. J. R. ADAMS

Tests of treatments against the apple worm. PEYRIÈRE. *Prog. agr. vit.* 95, 81–3 (1931).—The treatment of apple trees with Cu-arsenical sprays 3 times during the progress of flower formation proved effective. F. W. MARSH

The fungicidal action of ultra-violet radiation. W. A. R. DILLON WESTON AND E. T. HALNAN. *Phytopathology* 20, 959–65(1930).—The work in part parallels that of Fulton (cf. *C. A.* 24, 1926). Cultures on potato agar were irradiated for varying periods with a quartz Hg-vapor (Alpine sun) lamp through covers of Vita or Sanalux glass. The effect was to inhibit the growth of the mycelium, and when radiation ceased, growth was renewed at a rate proportional to the time and distance of the previous radiation. Under weaker dosage, growth of the mycelium at the surface ceased but persisted deep in the medium. Concordant results were obtained with 12–14 species. J. S. C.

Physical and chemical action of ultra-violet rays on sublimed sulfur. FONZES-DIACON. *Prog. Agr. vit.* 95, 155–8(1931).—Expts. showed that ultra-violet rays did not effect the retrogradation of sublimed S. The reason for the action of S on oidium is discussed. F. W. MARSH

The relation of pentathionic acid and its constituents to the toxicity of sulfur fungicides. O. NEAL LIMING. *Phytopathology* 21, 131–2(1931).—At summer temps. over 10% of the S on a dusted surface may pass off within 2 weeks. S vapor is not toxic to fungus spores. H_2S is present only in traces and is non-toxic in those concns. Pentathionic acid is present in concns. toxic to fungus spores, and its formation is enhanced by mild oxidizing agents and possibly by H_2S. It is stable in both acid and weak alk. solns., but toxic only in the former. It is not sufficiently volatile in dil. solns. to be toxic at a distance. The toxic action is governed by the condition of the fungus rather than by that of the pentathionate ion. JOSEPH S. CALDWELL

Sulfuring apricots. GEO. QUINN, C. G. SAVAGE, A. V. LYON AND W. R. JEWELL. *J. Dept. Agr. S. Australia* 34, 513–4(1931).—The authors, serving as a comm., recommend in detail a procedure for sulfuring fruits. M. S. ANDERSON

Fumigating tomato houses with hydrocyanic acid gas to destroy white fly (Trialeurodes vaporarium). GEO. QUINN. *J. Dept. Agr. S. Australia* 34, 519–20(1931).—A detailed procedure is given for the use of HCN as a fumigant. M. S. ANDERSON

Mercury in the disinfection of seeds. VITTORIO CASUBURI. *Industria chimica* 5, 1474–82(1930); cf. *C. A.* 25, 1942.—The various Hg compds. previously studied are compared, and the conclusion is that *Dry Tan* is the most efficient, both as an insecticide and in the promotion of germination. A. W. CONTIERI

Disinfection experiments on cotton seeds with the dusts Tillantin R and ceresan. F. FORSTENEICHNER. *Nachr. über Schädlingsbekämpf* 5, 136–47(1930); *Rev. Applied*

Mycol. 10, 103.—Excellent control of a species of *Rhizoctonia* and the facultative parasites accompanying it was obtained by use of Tillantin R and ceresan at the rate of 1 kg. per 100 kg. seed. Ceresan is most effective. The cotton seedlings are infected commonly by this species in the Adana region of Turkey. ODEN E. SHEPPARD

Contribution to the problem of cereal rust control by chemical methods. G. GASSNER AND W. STRAIB. *Phytopath. Z.* 2, 361–76(1930); *Rev. Applied Mycol.* 10, 88–9.—S with and without an equal admixt. of kaolin, 1% Bordeaux, 1% Cu chloride, Ca cyanamide mixed with kaolin, basic slag and calcined lime dusts and kainite were used in the control of brown and yellow rust (*Puccinia triticina* and *P. glumarum*) on Heine's Kolben and Dickkopf wheat and of *P. dispersa* (*P. secalina*) on Petkus winter rye Ca cyanamide mixed with large quantities (up to 99%) of kaolin gave very excellent protection, and G. and S. consider its use on a large scale. S and Bordeaux gave very good control, but the others gave little control, while Cu chloride caused much leaf burning, and $NaNO_3$ actually increased the rusts. ODEN E. SHEPPARD

The treatment of the rot of wheat (1929–1930). G. ARNAUD AND MISS GAUDINEAU. *Compt. rend. acad. agr. France* 16, 1029–35(1930); cf. *C. A.* 24, 4577.—Among the anti cryptogamic chemicals a 5% $CuSO_4$ soln. is very satisfactory. The use of the $CuSO_4$ soln. is followed by a dusting of the grains with CaO which in turn is followed by a thorough washing with H_2O. The Bordeaux mixt.-casein prepn. has given some excellent results, and in many cases treatment with formol has been very efficacious. J. R. ADAMS

Effect of some factors influencing disease conditions of potatoes. H. REILING. *Z. Pflanzenernähr. Düngung u. Bodenk* 9B, 393–7(1930).—Potato scab occcurs principally on alk. soils. Acid soils usually produce potatoes free from scab, but tubers and the plant itself may become infected with *Rhizoctonia solani*, particularly during drought Lack of potash in the soil may produce brown rings in the tuber and on the surface. H. B. SIEMS

The leaf diagnosis of the potato. I. HENRI LAGATU AND LOUIS MAUME. *Ann. sci. agron.* 47, 595–653(1930).—The chem. state of a leaf taken from a conveniently located place at a particular moment is called "the leaf diagnosis at a given instant." "The annual leaf diagnosis" is the series of chem. states of the leaf revealed by the analyses at different periods during the entire growing cycle. The results of this method are compared with indications furnished by the yields and by observations on developments. The percentages of potash, N, acid phosphate and lime detn. by the leaf diagnosis method on samples harvested on 5 dates in May and June from plots differently fertilized showed clear variations. Plots similarly fertilized gave concordant results. A definite relation is established between the leaf-diagnosis results and the fertilizers used. In general, N and acid phosphate in the leaf decreased with plant age, while lime increased. Comparisons of diagrams for N and potash show a rise of the N curve, or a lowering of that for potash or the two displacements together. Conclusion: N was needed for potatoes, but not acid phosphate or potash. In another expt. an excess of N in certain complete fertilizers was observed. Results of the study of the effect of the conditions of the cultivation media on the plant and on the leaf composition are considered. F. W. MARSH

Effect of seed-potato treatment on yield and rhizoctonosis in Florida from 1924 to 1929. L. O. GRATZ. Fla. Agr. Expt. Sta., *Bull.* 220, 5–30(1930).—Numerous field expts. conducted over a period of 6 years show no yield increases and pos. indications of definite injury from the use of *org. Hg compds.* for seed-potato treatment. The use of $HgCl_2$, hot CH_2O or org. mercurials is not justified under Fla. conditions. Ninety two references are appended. C. R. FELLERS

Increased yields from spraying and dusting late potatoes. J. E. HOWITT. *Proc. Can. Phytopath. Soc.* 1929, 19–20(1930); *Rev. Applied Mycol.* 10, 125–6.—In 1928 potato plots treated with liquid Bordeaux (4–8–40) yielded 291 bushels per acre, plots dusted with copper-lime yielded 255.5 bushels and control plots 194.5 bushels, while in 1929 the corresponding figures were 235, 193 and 156. In 1928 the beneficial effect was probably due to the preventive action of the fungicides on late blight and rot, and in 1929 the beneficial effect was correlated with tip burn. ODEN E. SHEPPARD

The control of oidium leaf disease. R. K. S. MURRAY. *Trop. Agr.* (Ceylon) 75, 294–302(1930).—S dusting is a quick and effective means of controlling oidium leaf disease. JOHN O. HARDESTY

Observations concerning the development and struggle against mildew in 1930 in the Isere. L. ROUGIER. *Prog. agr. vit.* 94, 566–9(1930).—Cu was found to be the best remedy for use against this parasite. F. W. MARSH

Copper and mildew. JAQUES LUGAN. *Prog. agr. vit.* 94, 462–3(1930).—L. dis-

agrees with Villedieu (*C. A.* **25**, 372) in certain conclusions concerning the use of ammoniacal fertilizers for grapevines and of Cu as a mildew combatant. F. W. MARSH

The effect of boron on powdery mildew and spot blotch of barley. FRANK M. EATON. *Phytopathology* **20**, 967–72(1930).—Barley was grown in pans of quartz sand, so arranged as to be flushed daily with nutrient solns. In crops grown during the summer, the plants receiving no B were heavily infested with mildew but were free of spot blotch; those receiving 5–25 p. p. m. of B were free of mildew but showed heavy infestation with spot blotch. In winter plantings, mildew was present in all the beds, most abundantly in those receiving no B, and decreased in amt. with increase in B applied. Spot blotch did not appear in the B-free bed but was abundant in all those receiving B. On wheat, powdery mildew was present irrespective of the amt. of B supplied. The B content of the summer-grown plants ranged from 57 p. p. m. dry weight on the B-free cultures to 1349 p. p. m. in those receiving 25 p. p. m. of B in the culture soln.
JOSEPH S. CALDWELL

Lessening of growth of rice plants. MIRANDA LANZA. *Boll. lab. sper. fitopatol.* (Torino) **8**, No. 1, 6–9(1931).—The observed disease is due to fungous parasites which winter on the seeds. They may be destroyed by immersion for 24 hrs. in 0.2% Kalimat (a mixt. of formaldehyde and phenol). G. A. BRAVO

Sugar beet root-rot control. H. C. YOUNG. Ohio Agr. Expt. Sta., *Bimonthly Bull.* **148**, 15–8(Jan.-Feb., 1931).—Field expts. showed that the application of 500 lb. of NaCl per acre often materially increased the stand of beets, and no injury to the crop was recorded on any plot. C. R. FELLERS

Use of oxides of unsaturated hydrocarbons for the eradication of barberries and other pests. R. B. HARVEY. *Phytopathology* **21**, 126(1931).—Ethylene oxide and propylene oxide have been used for killing gooseberries or barberries. A depth charge is injected beneath the plant by means of a prod rod or "gopher stick" provided with a measuring chamber and connected directly with the gas tank, or a soln. of ethylene oxide in water can be injected from a knapsack sprayer. The stems blacken and the leaves fall off, the plants dying in 1–2 weeks. JOSEPH S. CALDWELL

Pyrethrum (ZOCHARKEWICZ) **17**. Fodder and quality of milk in meadow fertilization with $CaCN_2$ (HERMANN) **12**. A brief history of the world's phosphate rock production (GRAY) **18**. Tung-oil tree (NEWELL, *et al.*) **26**. Mineralogical study of the soil of the Vercelli district (REPOSSI) **8**. Lignin, humic acid and humin (FUCHS) **10**. Influence of fertilizer treatment on the vitamin A content of spinach (HONEYWELL, DUTCHER) **11E**. I content of Lettish waters in relation to the improvement of crops (KUPCIS) **14**. Cyanamides [fertilizer] (Brit. pat. 338,023) **18**. Discharge device [apparatus for atomizing insecticides with CO_2] (U. S. pat. 1,794,185) **1**.

Handbuch der Pflanzenernährung und Düngerlehre. Edited by FRANZ HONCAMP. **Band II. Düngemittel und Düngung.** Contributions by Ernst Hugo Birei, Hand Brenck, R. Demoll, *et al.* Berlin: J. Springer. 919 pp. M. 86; linen, M. 89.80.

Fertilizer. OTTO RIPKE (to I. G. Farbenind. A.-G.). U. S. 1,793,133, Feb. 17. NH_4CNS is heated (suitably at a temp. of about 300°) until evolution of gases has ceased.

Fertilizers. A. HOLZ and T. VAN D. BERDELL. Brit. 337,402, July 30, 1929. Tri-Ca phosphate is decompd. with mixed H_2SO_4 and HCl, and the insol. $CaSO_4$ is sepd. from the sol. H_3PO_4 and $CaCl_2$. The $CaSO_4$ is treated with a K compd. such as KOH in the presence of CO_2 (preferably under pressure and heat) or K_2CO_3 to form K_2SO_4 and $CaCO_3$. The $CaCO_3$ is sepd. and is added to the soln. contg. H_3PO_4 and $CaCl_2$ in the presence of $Ca(OH)_2$ to ppt. di-Ca phosphate, which is then sepd. and mixed with the K_2SO_4 soln., and the mixt. is spray-desiccated to produce a granular product. Various auxiliary procedures are described.

Fertilizer. A. HOLZ and T. VAN D. BERDELL. Brit. 337,415, July 30, 1929. A mixed fertilizer free from chlorides is prepd. by treating KCl with H_2SO_4 to form $KHSO_4$ and HCl gas, expelling the HCl (preferably at a temp. well below 200°) and then treating the $KHSO_4$ with NH_3 to form K and NH_4 sulfates. The HCl is passed into an aq. suspension of rock phosphate to form $CaCl_2$ and H_3PO_4, insol. solids are sepd. and sufficient $Ca(OH)_2$ is added to ppt. di-Ca phosphate, which is then sepd. and dried (preferably at a temp. not much above 100°) and mixed with the K and NH_4 sulfates. Various details and slight modifications of procedure are described.

Fertilizers. I. G. FARBENIND. A.-G. (Ernst Jänecke, inventor). Ger. 514,509, Nov. 20, 1929. Nitrogenous fertilizers are prepd. by leading gases contg. N_2O_3 into a soln. of NH_4 salt in concd. H_2SO_4 and HNO_3, and working the product up into a nitrate- and sulfate-contg. product. In the example, N_2O_3 is led into a soln. of $(NH_4)_2SO_4$ in 50% HNO_3 to give the fertilizer $(NH_4)_2SO_4.NO_3$.

Fertilizers. N. V. MAATSCHAPPIJ TOT EXPLOITATIE VAN VEREDELINGSPROCÉDÉS. (Paul Erasmus, inventor). Ger. 514,510, Nov. 7, 1928. Carbohydrates of vegetable origin such as peat, lignite, sugar, cellulose, wood, etc., are heated to about 300° with NH_3 under pressure to form a nitrogenous fertilizer. Examples are given.

Fertilizers. KUNSTDÜNGER-PATENT-VERWERTUNGS A.-G. Swiss 141,328, Oct. 16, 1928. See Brit. 310,276 (*C. A.* 24, 679).

Fertilizers. SOCIÉTÉ D'ÉTUDES CHIMIQUES POUR L'INDUSTRIE. Swiss 140,729, Nov. 20, 1929. A nitrogenous fertilizer contg. $CaCN_2$ is produced by the action of NH_3 on $CaCO_3$ in a current of mixed H and N at 500–1000°. Cf. *C. A.* 25, 767.

Fertilizer and sodium bicarbonate. SOC. CHIMIQUE DE LA GRANDE-PAROISSE AZOTE ET PRODUITS CHIMIQUE. Brit. 338,007, Jan. 11, 1929. The process for producing a composite fertilizer and $NaHCO_3$ by double decompn. of $NaNO_3$ and KCl and treatment of the mixt. produced with NH_3, CO_2 and water, as described in Brit. 331,451 (*C. A.* 25, 165), is modified by effecting the double decompn. reaction of $NaNO_3$ with the KCl in the mother liquors of the process, as by introducing these materials into the soln. at that point of the manuf. at which the pptn. and sepn. of $NaHCO_3$ have been effected.

Rendering insoluble phosphates available for fertilizer. HANS LEHRECKE. U. S. 1,795,173, March 3. Material such as mineral phosphate is heated to about 1000–1400° with such quantities of C and silica-contg. addns. that part of the total P content of the initial material is liberated in accord with the equation: $P_2O_5 + 5C = P_2 + 5CO$ and that in the calcined residue contg. the remaining P there is a proportion of P_2O_5 about 0.9–1.1, SiO_2 about 0.9–1.1 and CaO about 4.8–5.2 mols.

Treating phosphate rock. KUNSTDÜNGER-PATENT-VERWERTUNGS-A.-G. Brit. 338,079, March 7, 1929. In leaching phosphate rock with HNO_3 and K_2SO_4, a part of the soln. of H_3PO_4 and KNO_3 from a previous operation (partly freed from KNO_3 by cooling and crystn.) is used as a diluent, thus preventing the pptn. of $CaSO_4$ contg. a high percentage of K. Various details of treatment for prepg. *fertilizer* are described, which may include addn. of NH_3.

Superphosphates. FRANCESCO C. PALAZZO and FORTUNATO PALAZZO. Swiss 141,561, Nov. 3, 1928. Superphosphates with 42–51% of P_2O_5 capable of assimilation are obtained by repeatedly extg. a superphosphate contg. 14–17% P_2O_5 capable of assimilation with half its weight of water, pptg. the H_3PO_4 by milk of lime and adding the $CaHPO_4$ to other exts. contg. free H_3PO_4. Cf. *C. A.* 24, 680.

Superphosphates. FRANCESCO C. PALAZZO. Swiss 142,459, Sept. 27, 1928. Phosphates with a content of 42–45% assimilable P_2O_5 are prepd. by kneading concd. H_3PO_4 (*e. g.*, obtained by working up phosphorites) with pure pptd. $CaHPO_4$ at 40–50° for about 2 hrs. The mixt. is vacuum dried and powd.

Superphosphate chambers. D. WELLISCH. Brit. 338,075, Jan. 31, 1930. Various different constructions are described, designed so that the reaction mass and its support are moved in relation to that part of the chamber which contains the charging device. One form comprises a cylindrical chamber mounted for rotation around a vertical axis and which, after initial charging, is adapted for continuous operation. Knives or compressed air may be used to break up the mass.

Apparatus for leaching out raw materials. KUNSTDÜNGER-PATENT-VERWERTUNGS A.-G. Swiss 141,300, Oct. 16, 1928. Raw material is placed in a succession of tanks of which each is lower than the preceding one, and the acid solvent from the bottom of one tank is led to the top of the next higher tank, while the overflow of the higher tank drips into the top of the lower tank. The method is suitable for the prepn. of *artificial fertilizer* contg. sulfates, carbonates, etc.

Jacketed sectional drying apparatus for preparing fish meal. HAROLD S. ROWTON and VOLKMAR W. HANIG. U. S. 1,793,638, Feb. 24. Structural features.

Forcing plants. FARBSALZ G. M. B. H. Ger. 517,115, Nov. 25, 1928. Unstable cyanides giving rise to HCN and another forcing agent, *e. g.*, NH_3 or C_2H_2, are used. $Ca(CNNH_2)_2$ and crude $Ca(CN)_2$ contg. free CaC_2 are suitable, the former being obtained by prepg. $Ca(CN)_2$ in liquid NH_3.

Insecticide. HANS WESCHE, KARL BRODERSEN and WERNER EXT (to Winthrop Chemical Co.). U. S. 1,794,046, Feb. 24. An aromatic monothiocyanate such as benzene thiocyanate is used as an active constituent of prepns. such as powders or solns.

Applying insecticides and fungicides to growing plants, etc. JOSEPH D. NEULS.

U. S. 1,792,860, Feb. 17. A porous carrier such as sawdust or pumice impregnated with a mineral oil is subjected to simultaneous distn and incomplete combustion, and the vapors thus produced are projected on trees or plants or other articles for their insecticidal and fungicidal effect. App. is described.

Seed-goods protection. VEREIN FÜR CHEMISCHE UND METALLURGISCHE PRODUKTION. Ger. 514,684, July 2, 1924. A prepn. for protecting seed goods from vegetable and animal blight contains sol. complex compds. or mixts. of nuclear metallized aromatic compds., with org. substitution products of NH_3. In the example, HgO is dissolved in H_2SO_4 and heated with cresol on a water bath. NaOH is added, and the ppt. dissolved in piperidine. Or pyridine and KCNS is heated with a Cu salt and the product mixed with ethylene diamine.

Seed-disinfectant composition. FOREST J. FUNK (to E. I. du Pont de Nemours & Co.). U. S. 1,793,686, Feb. 24. $HgCl_2$ is used in admixt. with a finely divided material such as bentonite to form a prepn. capable of producing relatively stable and substantially homogeneous suspensions with water.

Seed-disinfecting composition. FOREST J. FUNK (to E. I. du Pont de Nemours & Co.). U. S. 1,793,922, Feb. 24. Mercurized *o*-chlorophenol and mercurized *o*-nitrophenol are used with bentonite. Other similar mixts. also are described.

Facilitating germination of seeds. WARREN TEED SEED CO. Brit. 337,601, Nov. 15, 1928. See U. S. 1,756,488 (*C. A.* **24**, 3077).

16 THE FERMENTATION INDUSTRIES

C. N. FREY

Annual analytical report. B. LAMPE. *Z. Spiritusind.* **53**, 281-2(1930).—Report on the activity of the technical-scientific laboratories of the German alcohol manufacturers' association and the association of potato dryers. S. J.

Are asbestos-slate-lined fermentation tanks suitable for fermentation? W. KILP. *Z. Spiritusind* **53**, 268(1930). The answer is in the negative. S. J.

Absolute alcohol. F. WAGNER. *Z. Spiritusind* **53**, 260-1(1930).—A brief review. S. J.

Improvements in the manufacture of absolute alcohol. H. GUINOT. *Chimie & industrie* **25**, 26-32(1931). A description is given of the evolution of so-called azeotropic methods, which now permit of the production of pure abs. alc. directly from fermented worts by the use of the standard equipment at present used for the production of rectified 96% EtOH and at but slightly higher cost. A. PAPINEAU-COUTURE

New process of drying potatoes and the manufacture of alcohol therefrom. E. LÜDER. *Z. Spiritusind.* **53**, 251-3(1930); cf. *C. A.* **25**, 1327. An economic discussion. S. J.

Evaluation of potato flakes according to their yield of alcohol. B. LAMPE. *Z. Spiritusind.* **53**, 274-5(1930). There is no relationship between moisture content of potato flakes and yield of alc. It is necessary to score the sample for outside appearance, color, odor, uniformity, development of bacteria, moisture content, yield of alc. and starch value. Correct evaluation can be computed with these results on hand. S. J.

Composition of compressed and dried potato crumbs. B. LAMPE. *Z. Spiritusind.* **53**, 298(1930).—The compn. of potato juice was given in an earlier paper (*C. A.* **25**, 1327). The analytical results show that the pressed and dried potato crumbs contain about 40-50% of the ash usually present in potato flakes. The same relation was found for protein. S. J.

Effects of mashing methods and souring on potato flakes. B. LAMPE AND W. KILP. *Z. Spiritusind.* **53**, 267-8(1930). Two different processes were tried. The necessary proportion of malt was added in 2 portions in 1 expt. and mashed in one operation in another expt. The yield of alc. was smaller and the steam consumption was greater in case the malt was added in 2 portions, provided the mash was vigorously stirred and not allowed to form lumps. Artificial souring diminished the yield of alc. S. J.

Addition of ammonium salts to vinegar. C. AINSWORTH MITCHELL. *Analyst* **56**, 178-9(1931).—Analyses show that the practice has been revived of adding NH_4 salts to artificial vinegar to make it contain as much N as when made from malted or unmalted grain. W. T. H.

Studies on the biochemistry of zinc. Zinc and yeast fermentation. As. ZLATAROFF, M. ANDREITSCHEWA AND D. KALTSCHEWA. *Biochem. Z.* **231**, 123-34(1931). Studies made on *Saccharomyces ellipsoidens* show that $Zn(NO_3)_2$ and $ZnSO_4$ have the

same effect on fermentation. In a concn. of 0.002 *N* Zn salts stop fermentation; concns. between *N*/500 and *N*/900 inhibit it, the inhibition diminishing with dilu., and in a concn. less than 0.001 *N* there is no longer any effect. $Ca(NO_3)_2$ has the strongest stimulating action and Na succinate the strongest inhibiting action, which is still evident in dilns. of these salts of 0.0000005 *N*, but varies with their concn. The effect produced by these salts when acting alone or in a mixt. is entirely different quantitatively and qualitatively. Thus, 0.001 *N* $Zn(NO_3)_2$, which itself has no effect upon fermentation, nevertheless converts the stimulating action of $Ca(NO_3)_2$ to an inhibiting action, which becomes greater as the concn. diminishes. Likewise the presence of Zn salts increases the inhibiting action of Na succinate, and as the concn. of the latter diminishes the inhibiting effect of the mixt. increases. The strong inhibitory action of *N*/720 $Zn(NO_3)_2$ is made greater still by the presence of other salts, and together with 0.0001 *N* $Ca(NO_3)_2$ or 0.001 *N* Na succinate causes complete stoppage of fermentation. Na succinate in a concn. of 0.1 *N* decreases the inhibiting action of $Zn(NO_3)_2$, increases it in a concn. of 0.01 *N* and in a concn. of 0.001 *N* causes total cessation of fermentation. In a concn. of 0.002 *N* $Zn(NO_3)_2$ is unaffected in its toxic action by the presence of other salts. S. Morgulis

Note on the presence of Monilia in mother culture of soy sauce. Kenji Miyaji. Gifu Imp. Coll. of Agr. (Japan), *Research Bull.* 10, 5 pp.(1930) (in German).—Heretofore, *Aspergillus oryzae* has been thought to be the principal mold in the mother culture of soy sauce. M. isolated *Monilia* groups from the com. culture. These molds produce enzymes such as cellulase, amylase, invertase and tryptase. On media contg. sugar EtOH up to 2-3% is produced. In artificial media contg. NH_4 salts and glucose, the products were *d*-lactic acid and succinic acid. In $C_3H_5(OH)_3$, *l*-tyrosine and leucine media, tyrosol, *p*-hydroxyphenyllactic acid and leucinic acid were produced. K. Kitsuse

Bacterial action in the preparation of Japanese soy sauce. Kenji Miyaji. Gifu Imp. Coll. of Agr. (Japan), *Research Bull.* 9, 9 pp.(1930) (in German).—M. found not only small quantities of tyrosol and tyramine (cf. Yukawa, *J. Chem. Soc. Tokyo* 38 in soy sauce, but also identified *d*-lactic acid and *d*-*p*-hydroxyphenyllactic acid in soy sauce is a product of bacterial fermentation of soy beans and other ingredients. It is not known whether tyramine is a bacterial product or is derived from raw materials. An attempt was made to test the decompn. of the pure amino acids with bacteria in pure culture. With the use of *B. megaterium*, which is one of the bacteria participating in soy-sauce fermentation, it was confirmed experimentally that *p*-(amino-ethyl)-phenol, *i. e.*, tyramine, is a product of bacterial action upon *l*-tyrosine. *B. oxalatus* produced tyrosol and *p*-hydroxyphenyllactic acid but no tyramine from tyrosine. When *l*-leucine was used, *B. megaterium* produced small amts. of isoamylamine while *B. oxalatus* produced no amines but gave *d*-leucinic acid. K. Kitsuse

Additional malts of the 1930 season. S. Pickholz. *Brau- und Malzindustrie* 24, 7–8(1931); cf. *C. A.* 25, 1028. S. Lalin

Nitrogenous matter in malting. Léon Morns. *Bull. assoc. élèves inst. sup. fermentations Gand* 32, 62–4, 93–7(1931).—An address on the changes undergone by the nitrogenous compds. of barley in the course of malting. A. Papineau-Couture

Sidelights on copper as applied to brewing. D. M. Stewardson. *J. Inst. Brewing* 36, 369–81(1930).—An outline is given of the ores, smelting and prepn. of Cu, and the adaptability of Cu app. in the brewing processes. Peter J. F. Weber

The boiling of worts. R. Worssam. *J. Inst. Brewing* 36, 260–5(1930). Steam, either low- or high-pressure, is a more efficient and economical heating agent in boiling worts than direct firing of the kettle. Peter J. F. Weber

Barleys of the 1930 crop. R. Heuss. *Wochschr. Brau.* 47, 449–51 1930). Barleys of Germany (222 samples) and of Denmark, Bohemia, Czechoslovakia, Moravia, Hungary and Transylvania (45 samples) were analyzed and briefly discussed. W. Piratzky. *Ibid* 451–2.—Analyses of German barleys (42 samples) and foreign barleys (12 samples) are given. S. J.

Wine must in 1929 from the wine-growing districts of Nahe and Glan, Rheintal, **the Rhine district, Lahn, Rhine and Main.** A. Rößling. *Z. Untersuch. Lebensm.* 59, 629–31(1930).—Acidities and d. are given for 360 musts from the several districts. C. R. Fellers

Wine must in Baden for the year 1929. F. Mach and M. Fischler. *Z. Untersuch. Lebensm.* 59, 617–28(1930); cf. *C. A.* 24, 1699.—Approx. 470 musts were examd. for acidity and d. The low acidity and high d. are attributed to the drought and severe winter. C. R. Fellers

Wine must in 1929 from the wine-growing districts of Pillnitz, Lößnitz, Meissen

and Seussalitz. A. HEIDUSCHKA AND C. PYRIKI. *Z. Untersuch. Lebensm.* **59**, 613–5 (1930); cf. *C. A.* **24**, 1699.—The range in d. of the must was 60.7–88.4° Oechsle; titratable acids were 4.4–12.8 g. per l., and mineral constituents 2.64–5.04 g. per l. The d. averaged 4.2° higher than the av. for 1928. C. R. FELLERS

Chianti and its wines. LUIGI RICASOLI. *Atti III congresso naz. chim. pura applicata* **1930**, 285–91.—Descriptive. E. M. SYMMES

A new category of abnormal wines. CHARLES BERTIN. *Prog. agr. vit.* **94**, 564–6 (1930).—It is noted that certain normal wines do not correspond to the enological laws concerning the relative amts. of alc. and acid that should be present. F. W. M.

The influence of adjuncts on the composition of beer. E. JALOWETZ. *Brau- und Malzindustrie* **24**, 1–2(1931).—A discussion. S. LAUFER

The formation of layers in beer in storage vats. E. JALOWETZ. *Brau- und Malzindustrie* **24**, 21–5(1931).—W. Kusenak (*Tageszig Brauerei* **27**, No. 175; **28**, No 110) found that layers are formed in beer kept in storage after 4–5 weeks the layers differ in CO_2, ext. and albumin content, viscosity, acidity and p_H value. J.'s investigations agreed fairly well with K.'s findings. Methods are given for maintaining uniform compn. in stored beer. S. LAUFER

Preventing the "turning" of beer. J. RAUX. *Brasserie & malterie* **20**, 342–5, 359–62(1931).—An address. A. PAPINEAU-COUTURE

The extractives of whiskey. WM. PARTRIDGE. *Analyst* **56**, 177–8(1931).—The U. S. Pharmacopoeia states that whisky should not leave more than 0.1 g. of solids when 20 cc. is evapd. Various English books state that whisky should not contain more than 1/8 as much solids, which is probably attributable to a statement made in 1870 in Allen's *Commercial Organic Analysis* which does not hold true with respect to the whisky of today. W. T. H.

Simple universal thermostat for laboratory fermentations (FINK) **1**. [Fermentation] of the aqueous extracts from olives (CIUSA, *et al.*) **27**. Detection of iso-PrOH in brandy and spirits (REIF) **7**. Model experiments for the theory of alcoholic fermentation (CHILE, COUTSICOS) **10**. Peroxidase preparations (Brit. pat. 337,405) **11A**.

TATE, FRANCIS G. H.: **Alcoholometry**: An account of the British Method of Alcoholic Strength Determination, with an historical introduction written by the author in collaboration with George H. Gabb. London: H. M. Stationery Office. 63 pp. 3s., net. Reviewed in *Nature* **127**, 308(1931).

Device for atomizing fatty substances on fermenting liquid to keep down foam. ARNE BOYE. U. S. 1,792,963, Feb. 17. Structural features of a device designed to operate automatically according to the amt. of foam formed.

Testing saturation of barley, etc. W. & T. AVERY, LTD., W. A. BENTON and C. F. GOFF. Brit. 338,282, Sept. 26, 1929. For detg. the degree of satn. of material, such as that of barley during steeping prior to malting, a sample is centrifuged for a definite time, weighed, re-immersed, re-centrifuged and re-weighed, and these operations are repeated until 2 consecutive weighings are the same (indicating that satn. has been attained). App. is described.

Extracting the bouquet from wines and spirits. OTTO FODOR. Ger. 517,061, May 7, 1927. The constituents imparting the bouquet to wines and spirits are obtained practically free from EtOH by treating the beverages, or the mashes from which they are prepd., with adsorbents such as active charcoal or silica gel after or while reducing the alc. content, *e. g.*, by distn. The adsorption may be assisted by adding a little fatty or paraffin oil to the beverage. The bouquet substances may be recovered from the adsorbent by extn. and isolated by evapn. of the ext., and the beverage may be reconstituted by dilg. the bouquet substances with EtOH and H_2O. Examples are given.

Yeast. C. LANGEMEYER. Brit. 337,947, Oct. 24, 1928. A yeast obtained by an otherwise usual process is treated with a small quantity of K salts and albuminous substances, such as KCl or K_2SO_4 and albuminous substances derived from peanut meal, malt germ, lupins or yeast-press liquor, allowed to stand for several hrs. and then pressed. Use may be made of a mixt. of peanut meal, yeast and malt germ, digested with H_2SO_4, H_3PO_4 or lactic acid, with addn. of a small quantity of dextrose.

Hydrolyzed protein products. CHARLES N. FREY (to Standard Brands, Inc.). U. S. 1,794,370, March 3. See Can. 308,910 (*C. A.* **25**, 1922).

17—PHARMACEUTICAL CHEMISTRY

W. O. EMERY

"Enfleurage" of jasmin. TRABAUD. *Parfumerie moderne* Jan., 1930; *Masloboino Zhirovoe Delo* 1930, No. 2, 84-5.—In the enfleurage or extn. by fat a high percentage of indole is obtained whereby the glucosides are split. Methyl anthranilate is also obtained; it is absent in the oil from flowers. These constituents improve the odor. One thousand kg. of flowers yields on extn. by fats 5-6 kg. of an ointment which contains 25-28% of a pure flower oil or about 1.2-1.6 kg. while the usual extn. yields 1.3-1.4 kg. of an absolute essence, the latter contg. about 30-40% pure flower oil. The enfleurage method produces a yield 2-2.5 higher than the ordinary extn. methods. Flowers left after enfleurage upon being extd. produce more oil but of a different character. A. A. BOEHTLINGK

Mechanical processes for lemon essence extraction. FRANCESCO LA FACE. *Boll staz. sper. ind. essenze* 5, 129-37, 149-59, 178-91, 212-8, 234-43(1930).—The commonly employed processes for the extn. of the essence from lemon peel are: sponge process (I), mech. rasure processes with the Cannavò (II), Speciale (III) and Calabrese (IV) machines, mech. pressing processes with Peratoner (V) and Bennet (VI) machines and a few others. Analyses were made on the samples of each of these essences with the Wilson and Young method. With the IV method there is a max. loss of essence that remains in the fruits (30.5-46%), with the I an av. of 27.5%, and with the II and III a min. loss of 10-11%. The characters of the various types of essence, the working costs and the total yields are very different; I and VI give a yellow essence, V colorless, the others green; the III essence contains 4-4.9% of fixed residue and the V only 0.3-0.65%. The mech. processes give an essence of grass odor but less odorous (the citral loss may be 25% in regard to the citral content of the sponge essence). Among the causes that may lower the citral content, the most important are the fermentations, therefore it is better to sterilize the extn. water by boiling or by adding Na benzoate

G. A. BRAVO

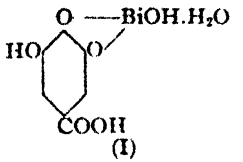
Colorimetric determination of adrenaline. ITALO SANSONI. *Officina* 3, 323-34 (1930).—Adrenaline can be detd. colorimetrically in pharmaceutical solns. by using standard pyrocatechol solns. with one of the following procedures. (A) Prep. standard solns. with increasing quantities of pyrocatechol, add 5 cc. of 40% Na acetate soln and 4 drops of 1% $FeCl_3$ to 5 cc. of each standard and of sample. Compare the resulting colors in test tubes or in the colorimeter in the ordinary way. Since the standard 0.08% pyrocatechol soln. and the 0.1% adrenaline soln give identical colors, the adrenaline content of the unknown soln. can be easily calcd. (B) To 2.5 cc. of each standard (prepd. with pyrocatechol) and of sample add 2 cc. of Folin reagent (10 g. Na tungstate, 8 cc. of 85% H_3PO_4 and 75 cc. H_2O are heated for 2 hrs. with a reflux condenser, and, after cooling, dild. to 100 cc. and filtered if necessary), 5 cc. of water and 4 cc. of 20% Na_2CO_3 soln., keep all the liquids for ½ hr. at 30° and then compare. The standard 0.14% pyrocatechol soln. and the 0.1% adrenaline soln give identical colors. (C) To 5 cc. of each standard (prepd. with pyrocatechol) and of sample add 2 cc. sulfanilic acid (4 g. acid and 90 cc. of 37% HCl dild. to 1000 cc.), 0.5 cc. of 1% $NaNO_2$ soln and 1 cc. of 28% NH_4OH and then compare. This reaction is the easiest and the most sensitive. The standards have good keeping qualities and give identical colors with adrenaline solns. of the same concn. The ordinary stabilizers added to the pharmaceutical solns. of adrenaline (chloretone, physiol. NaCl soln., etc.) do not interfere

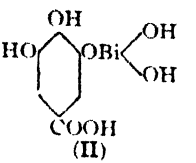
G. A. BRAVO

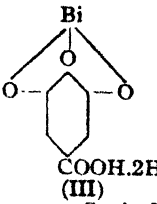
The methods of titrating the alkaloids in the Solanaceae. EDVIGE DE CECCO *Officina* 3, 335-42(1930). The Italian Pharm., 5th Ed., suggests titrating the alkaloids in the drugs by the method of titrating the alkaloids in the drug exts. With this procedure, great errors may result from the decompn. of the alkaloids in aq. soln. and from the desiccation of the residues. Comparative expts. were made with German, English and U. S. P. on stramonium and belladonna. The U. S. P. method is the best, but the results are more accurate and very concordant if 0.01 *N* solns. are used instead of 0.1 *N* solns. in the titrations.

G. A. BRAVO

The constitution of dermatol. ANTONIO GRIPPA. *Officina* 3, 343-51(1930). G. did not succeed in prepg. the Me, Ac and Bz derivs. of dermatol; therefore the hydroxyl groups do not exist free in the mol., and the constitutions I (cf. Prunier, *J. de pharm* 2, 498 (1901)) and II (cf. Bietrix, *Bull. soc. chim.* 1, 692 (1893)) are not exact. Moreover, dermatol, when heated at 110°, loses 2 mols. of H_2O. The constitution III (cf. Cazeneuve, *Bull. soc. chim.* 1, 852 (1893)) is proposed for dermatol, as prepd. by the method of the Italian Pharm., 5th Ed.


(I)


(II)


(III)

G. A. BRAVO

Extraction of orange oil. F. J DE VILLIERS. *J. S African Chem. Inst.* **13**, 48–52 (1930). - Steam-distn. of orange peel causes some decompn. of the essential oil unless carried out in high vacuum. Alc. proved the best solvent for extn., the peel being rasped under alc. and prolonged contact being avoided. Addn. of water to the ext. causes the sepn. of a fine emulsion difficult to sep. directly by centrifuging. The particles of the emulsion are negatively charged and sepn is effected by the addn. of electrolytes. The absorption of ions by the emulsion was in the order $Fe^{...} > Ca^{..} > Na^{.}$, but the most effective coagulant was the H ion. B. C. A.

Scheme for the microchemical identification of alkaloids. J. F. H. AMELINK. *Pharm. Weekblad* **68**, 159–85(1931) The scheme consists in treating the sample with a series of alkaloidal reagents and noting the character and microscopic appearance of the reaction products. The reagents employed are $PtCl_4$, $PtCl_4$ + NaI, $AuCl_3$, $AuCl_3$ + NaBr, $HgCl_2$, $K_4Fe(CN)_6$, $K_3Fe(CN)_6$, Dragendorff's reagent (K_3BiI_6), KOH and picrolonic acid The microtechnic for extn., filtration and sublimation of the alkaloid is described in some detail The reactions are tabulated and a large no. of drawings are given showing the typical cryst forms of the reaction products. In some cases the alkaloid can be identified by a single reaction, but usually 2 or more reactions are required for identification In special cases it is desirable to make confirmatory tests by specific reactions. The table gives 78 substances, mostly alkaloids, but includes also other products commonly classed with the alkaloids, *e. g.*, caffeine, cantharidin, santonin; simple bases, *e. g.*, betaine, choline, synthetic medicinals, *e. g.*, PhNHAc antipyrine, urotropine. *Ibid* 211–6. The reactions are discussed in detail as applied to *percaine*, *α* butoxy *γ*-(diethylaminoethylcarboxamido)quinoline, and *diocaine*, di-*N*,*N'* (*p*-alloxyphenyl)acetamidine, 2 local anesthetics included in the above table. A. W. DOX

Production of new disinfection preparations of thymol and carvacrol. I. Production of thymol and carvacrol. C. PHILIPP AND PH. KUHN. *Pharm. Presse, Wiss.-prakt. Heft* **1931**, 19. - A brief survey of the principles upon which the prepn. of cymene, thymol, carvacrol and mono- and dichlorocarvacrol is based. **II. Disinfectant action of thymol and carvacrol preparations.** PH. KUHN. *Ibid.* - The results obtained in a series of expts. on the disinfectant action of thymol, carvacrol and their Cl substitution products are reported. The most valuable of the products tested proved to be chlorocarvacrol (carvasept) which can be usefully employed where phenol and thymol are indicated Its advantages lie in a higher disinfectant power, lower toxicity than PhOH and thymol, slight soly in H_2O with resultant slow resorption and good compatibility. W. O. E.

Content of mydriatic alkaloids of sun- and shade-dried Solanaceae drugs (Atropa, Hyoscyamus and Datura species). ELEMER KOPP. *Pharm. Zentralhalle* **72**, 113–6 (1931). - Expts show that the alkaloidal content of *Belladonna* and of *Hyoscyamus* is not materially affected by the manner of drying, whether in the sun or shade; with *Datura*, however, the amt. of alkaloids in shade-dried material is about 10% greater than in that dried in the sun. W. O. E.

Scientific pharmacy. XVII. Production of organotherapeutic preparations. RAPP. *Pharm. Ztg.* **76**, 260–1(1931); cf. *C. A.* **25**, 380. A discussion of the various glands, their importance in pharmacy and methods of prepn. and evaluation. W. O. E.

Alcohol number of the D.A.-B.VI. F. GRAF. *Pharm. Ztg.* **76**, 261–2(1931).—A critical examn. of the official Ger. method showing that correct results are obtainable only by a thermometric check of the distn., and not by distg. off as prescribed, 13 and 11 cc. W. O. E.

Evaluation of flores cinae D.A.-B.VI. W. BRANDRUP. *Pharm. Ztg.* **76**, 262 (1931). - The official provisional test prescribed for this drug is often inadequate in its evaluation. The following is suggested: on about 2 g. of the powd. sample in a filter pour about 5 cc. of $CHCl_3$ and evap. the filtrate to dryness in a porcelain dish. The residue, moistened with alc. KOH, should yield an orange to red color. W. O. E.

Extraction of ergot by the methods of D.A.-B.VI and U. S. P. X, with notes on ammoniated tincture of ergot, B. P. FRANK WOKES AND G. K. ELPHICK. *Quart. J. Pharm. Pharmacol.* 3, 599–625(1930).—A study has been made of the methods of prepg. liquid ext. of ergot prescribed in the Ger. and U. S. pharmacopeias. The Ger. method is on the whole less efficient than the Am. method, but the difference is much smaller than appeared from the work of Linnell and Randle. In the percolation of ergot with neutral 50% alc., as in the Ger. process, the ext. efficiency is greatly affected by the degree of acidity of the ergot, because of the phosphate and other buffering substances contained therein. With the more acid ergots (p_H below 5.5) neutral alc. may ext. the ergotoxine almost completely as it is extd. by acidified alc. (contg. 2% concd. HCl or 1% tartaric acid). With the less acid ergots (p_H above 6.0) neutral alc. may ext. less than 0.5 the amt. of ergotoxine taken out by the acidified alc. Ammoniated alc., as in ammoniated tincture of ergot B. P., gives similar results to neutral alc. Whatever process of extn. is used, the buffering substances exert considerable influence on the p_H of ext. of ergot, both during extn. and in the completed product. If this p_H is to be maintained at the optimum point for extn. and stability, as suggested by American workers, it will not be sufficient to employ a fixed proportion of acid, but control will be necessary by means of p_H detns. The defatting of ergot increases the efficiency of extn. of both neutral and acidified alc. Complete removal of fat, without loss of ergotoxine, is very difficult to secure, and so-called "defatted" ergot may still contain a considerable proportion of fat. The concn. of dil. exts. of ergot should be carried out *in vacuo* below 37° with min. exposure to air. If these precautions are taken, concn. may be continued down to a soft ext. with the loss of less than 0.5 the activity, and it should be possible to obtain from an av. sample of Spanish or Portuguese ergot a soft ext. contg from 0.5 to 1.0% ergotoxine. The variation in potency of com. soft exts. suggests that sufficient care is not taken in their manuf. In the Ger. pharmacopeial process for concg. the dil. percolate, a considerable amt. of activity may be lost in the pptn and neutralization with Na_2CO_3, and the U. S. P. method of concg. down to a soft ext. appears to give better results. W. O. E.

Biological standardization of tincture of aconite, B. P. F. J. DYER. *Quart. J. Pharm. Pharmacol.* 3, 626–36(1930). - Six tinctures of aconite were bought directly from different mfg. houses and examd. for their toxicity on rats and mice. Detns. were also made of the amt. of Et_2O-sol. alkaloid, and of total solids present in each. The examn. on rats revealed only quant. differences between the different tinctures while that on mice was complicated by the emergence of qual. differences as well. The toxicities of the different tinctures both on rats and mice varied very widely, and the relative values as detd. on rats were found to be very similar to the relative amts. of Et_2O-sol. alkaloids present. *Conclusions.*—There is no uniformity in the toxicity of different samples of tincture of aconite sold as "B. P." at the present time. The figures obtained for the % of Et_2O-sol. alkaloids were either correct or they were incorrect. If correct, then there is no need for a toxicity test of tincture of aconite, because a detn. of the Et_2O-sol. alkaloids gives a parallel result. If, however, these figures were correct, then at least 4 of the 6 tinctures purchased did not comply with the B. P. If not correct, then it may be supposed that all the tinctures complied with the B. P., and the wide variation in toxicity of the different tinctures means that a toxicity test is required. W. O. E.

(Tobacco) smoking, nicotine limits and the determination of nicotine by the method of Pfyl and Schmitt. FR. BOLM. *Z. Untersuch. Lebensm.* 59, 602–7(1930).—Aside from minor modifications, the method of Pfyl and Schmitt (*C. A.* 22, 1214) was found entirely satisfactory, and the observations on the influence of rate, intermittency etc., of the smoking on the nicotine content of the smoke, were confirmed. Several samples of nicotine-free tobacco and cigarets were examd. for nicotine content. None of the methods used in fixing the nicotine in the tobacco gave a nicotine-free smoke hence the detn. of total nicotine in the tobacco is in itself sufficient in judging the tobacco. C. R. FELLERS.

Ethereal oil from Podocarpus macrophylla, Don. I. KITSUJI NISHIDA AND HIDETAKE UOTA. *J. Agr. Chem. Soc. Japan* 6, 1078–86(1930); *Bull. Agr. Chem. Soc. Japan* 6, 82–3(1930).—By the distn. of the leaves 0.049% of ethereal oil was obtained. α-Pinene, camphene, β-pinene and cadinene were proved to exist in the vacuum distn. fractions. Caryophyllene and sylvestrene were not detected. Y. KIHARA.

A method for the germicidal assay of soaps. H. C. HAMILTON AND FRED THISTLETHWAITE. *J. Lab. Clin. Med.* 16, 391–6(1931).—A method is described in which the skin of guinea pigs is used as a field for the testing of disinfectants commonly used on the skin. EtOH applied before making injections is ineffective in any concn. A 0.5%

soln. of PhOH or tincture of I, in a 33% soln. is effective. Toilet or washing soaps are wholly ineffective. A soap base in which HgI_2 is properly incorporated in a concn. of 1% is effective. E. R. MAIN

Pyrethrum. ED. ZACHAREWICZ. *Prog. Agr. vit.* **94**, 569–70(1930).—Directions are given for cultivating the plant. The application of superphosphate is important as it increases the content of the plant's active principle, *oleoresin*. F. W. MARSH

The antiseptic power of uroselectan. G. DELEPIANE. *Boll. soc. ital. biol. sper.* **5**, 822–4(1930).—Although uroselectan has feeble antiseptic power *in vitro* in the concn. used clinically (4–6% in pyelographic tests), it definitely inhibits the growth of *B. coli* in the urine. PETER MASUCCI

The determination of some medical products by mercurimetry. AL. IONESCO-MATIU AND A. POPESCO. *Bull. sci. pharmacol.* **38**, 71–6(1931); cf. *C. A.* **24**, 5428.—From a soln. of about 1% *sparteine* mix 1 to 4 cc. with 5 cc. of the reagent of Mayer-Valzer. Centrifugalize and wash the ppt. with 1% H_2SO_4. Dissolve in 5 cc. sulfonitric reagent, applying moderate heat, add 5 cc. more and 6 cc. H_2O, boil and, after cooling, destroy the nitrous vapors with $KMnO_4$. Ppt. the Hg with Na nitroprussiate (10% soln.) and add 0.1 *N* NaCl until the turbidity disappears. One cc. NaCl soln. is equiv. to 0.01423 g. of sparteine sulfate. For the detn. of *novocaine*, 1–5 cc. of a 1% soln. is taken. The method is the same as described, but 25 cc. H_2SO_4-HNO_3 is used. The factor per cc. NaCl soln. is 0.02. The same method is used for stovaine-HCl (factor 0.0155) and for *plasmochine* soln. (factor 0.00926). With plasmochine tablets, 5 are dissolved in 10 cc. H_2O and 10 drops of H_2SO_4, filtered, brought to the vol. of 25 cc. and 5 cc. is employed for the detn. In plasmochine dragées, the substance is detd. together with quinine, the factor for the latter being 0.0066. A. E. MEYER

Some new color reactions of adrenaline. MARCEL PAGET. *Bull. sci. pharmacol.* **38**, 77–8(1931); cf. *C. A.* **25**, 532.—NaBrO reagent, diln. 1:100, produces in a soln. of adrenaline of a concn. higher than 1:1000 a color between a pale violet to intense red. A violet coloration is still observed to a diln. of 1:100,000. Adrenalone gives a yellow color. The classification of adrenaline reactions in correspondence with the mol. groups involved is shortly discussed. A. E. MEYER

A new method of determination of cocaine and its salts. JUAN A. SÁNCHEZ. *Semana méd.* (Buenos Aires) **1931**, I, 487–9.—After sapon. of the cocaine, the $PhCO_2H$ is detd. Boil 0.1 g. cocaine-HCl with 5 cc. neutral EtOH and 10 cc. 0.1 *N* NaOH for 15 min. After cooling add 10 cc. H_2O and titrate with 0.1 *N* H_2SO_4 using phenolphthalein as indicator. The factor is 0.03755 when cocaine base is used and half that much when its salts are analyzed. A. E. MEYER

Studies in tobacco chemistry. IV. Methods of tobacco smoke analysis. N. J. GAVRILOV AND A. W. KOPERINA. *Biochem. Z.* **231**, 25–32(1931); cf. *C. A.* **24**, 882.—An app. is described for absorbing all the products formed in glowing tobacco. The analyses of total N, nicotine N and NH_3 N vary only 3–4%. S. MORGULIS

Experiments on Cymbopogon nardus Rendle and on Cymbopogon martini Stapf, var. Sofia. FRANCESCO BRUNO. *Parfums de France* **9**, 8–14(1931).—*C. nardus*, planted in Italy (Palermo) on March 15, 1926, had grown to an av. height of 80 cm. on Aug. 1; it was cut and distd. on Aug. 1 and on Oct. 1, yielding 14.6 and 14.2 tons of leaves (total 28.8) per ha., which gave 0.5% and 0.4% of oil, equiv. to 73 kg. and 56.5 kg., or a total of 129.5 kg. per ha. for the 2 cuttings. The corresponding yields for 1927 (cuttings on July 26 and Oct. 12) were: 28.3 and 17.1 tons, 0.535 and 0.362%, 151.4 and 61.8 kg. per ha. Analysis of this oil in the Schimmel lab. gave: d_{15} 0.8933, α (100-mm. tube) −2°11′, n_{20} 1.4720, acid no. 0.9, ester no. 58.8, Ac no. 259–5 (= 88.6% esters), sol. in 1 or more vol. of 80% alc. Analysis of the oil distd. in 1928 gave: d_{15} 0.8926, α +1°, total geraniol 84.67%, aldehydes (citral + citronellal by Schimmel's phenylhydrazine method) 44.10%, free geraniol 30.62%, other alcs. 9.95%, citronellal (Dupont and Labaune method) 33.10%, citral and other aldehydes (by difference) 11%, sol. in 1.3 vol. of 80% alc. and in 14 vol. of 70% alc. Leaves harvested during the cold season (Dec. 18) yielded 0.25% oil (as compared with 0.535% from the July harvest) which gave the following results on analysis: d_{15} 0.872, α +1°, total geraniol 70.36%, free geraniol 32.6%, aldehydes (citral + citronellal by Schimmel's phenylhydrazine method) 52.5%, citronellal (Dupont and Labaune) 27.34%, citral and other aldehydes (by difference) 24.5%, sol. in 1 vol. of 80% alc. and in 12 vol. of 70% alc. A portion of this same harvesting was allowed to dry till it had lost 72% in wt. The dried leaves gave the same yield of oil as the fresh leaves. The drying of the leaves had the follow-

vesting on Jan. 31 (preceded by 10 days of cold weather with a temp. of about 2°) gave an oil of d_{18} 0.890, α +1.66°, total geraniol 90.18%, free geraniol 5.8%, citronellal + citral + aldehydes (by hydroxylamine) 72.1%, citronellal + citral + aldehydes (by phenylhydrazine) 71.3%, citronellal (Dupont and Labaune) 52.18%, citral + aldehydes (by difference) 19.52%, alcs. other than geraniol 32.20%, sol. in 1 vol. of 80% alc. and in 5 vol. of 70% alc. *Cymbopogon martini*. Stapf, var. *Sofia*, obtained from Bombay in 1926 and planted in Italy in March, 1927, reached an av. height of 1.20 m. by Sept. 15. Distn. of the leaves and the ends of the stalks before blossoming yielded 0.2% oil, but distn. of the whole stalks yielded no oil whatever. Distn. of leaves and blossoms harvested in Oct. yielded 0.207% oil; the blossoms alone yielded 0.35% and the leaves alone 0.112%. The oils obtained from the leaves and ends of the stalks before blossoming, and from the leaves and blossoms, resp., had d_{18} 0.9364, 0.9561; α +36°, +45.54°; n 1.48857, 1.49229; soly. in 70% alc. 1 in 1.8 vol., 1 in 2 vol.; acid no. 1.5, 2.6; ester no. 11.2, 12.1; Ac no. 130.7, 151.2; total alcs. 39.8%, 46.9%; yield per ha. 49, 61.8 kg. In 1928 the yield from the leaves and blossoms was 0.22%, equiv. to 83.4 kg. per ha. of oil of d_{18} 0.9547, α −0.66° to +49.33°, acid no. 3.3, ester no. 13.08, Ac no. 169.87–171.73, total geraniol 53.22–53.87%, free geraniol 3.63%, sol. in 3 vol. of 70% alc.

A. PAPINEAU-COUTURE

Liquorice, its extract and derivatives. A. LABO. *Rivista ital. essenze e profumi* 12, 252(1930); 13, 26–7(1931).—A review. R. SANSOME

Medicinal properties of the linden tree. G. GATTI-R. CAJOLA. *Rivista ital essenze e profumi* 13, 5(1931).—The flowers contain in the parenchyma glandules much mucilage, tannin, wax, traces of tiliacin and 0.040% of essential oil with a pleasant perfume, the compn. of which has not yet been established. It is extd. from the flowers dried in the sun. These when filled with essence are light yellow. The flowers can be mixed with flowers of the *Tilia tomentosa* and *Tilia argentea*, distinguished by the presence of star fibers, by having more petals, and a different odor. Some therapeutic uses of the essential oil of the linden tree are listed. R. SANSONE

The chemical composition of digitalis. SERAFINO DEZANI. *Giorn. farm. chim.* 80, 51–4, 57(1931).—A review. G. SCHWOCH

Determination of hypophosphites and arsenites by the mercurimetric method. AL IONESCO-MATIU AND MME A. POPESCO. *J. pharm. chim* [8], 13, 12–9(1931). The method is based on the quant. reduction of $HgCl_2$ and detn. of the pptd. Hg by the general method (cf. *C. A.* 23, 5007; 24, 5428). Accurate results are obtained in using the following equivs.: 1 cc. 0.1 *N* NaCl = 0.002204 g. $PO_2H_2Na\ H_2O$ (theory: 0.00267) = 0.0021304 g. $Ca(PO_2H_2)_2$ (theory: 0.0002145) = 0.0004966 g. As_2O_3 (by detn. and theory). S. WALDBOTT

Moisture and ash of certain official extracts (French Pharm.). H. TROTHIER. *Thesis* (Paris) 1929; *J. pharm. chim* [8], 13, 34–5(1931). The methods used and results obtained will furnish useful data on liquid and dry exts. in compiling the next French Pharm. S. WALDBOTT

A critical review of the methods for the determination of formaldehyde, and a rapid and accurate method for its determination. JAKOB BÜCHI. *Pharm. Acta Helv.* 6, 1–54(1931).—A prize essay with a list of 120 references. The following methods were critically examd.: (*a*) NH_4Cl (Smith, 1806; cf. *C. A.* 17, 946), (*b*) H_2O_2, (*c*) Na_2SO_3, (*d*) HgI_2K_2, (*e*) I. With pure solns. of HCHO, all methods except that with NH_4Cl gave concordant results after each method had been suitably modified. The presence of EtOH, Me_2CO and AcH affected results, most notably EtOH in the I method of Pharm. Helv. IV. For the detn. of HCHO in *formaldehydum solutum*, Pharm. Helv. IV, B. proposes the following modification of the Na_2SO_3 method (cf. Taufel and Wagner, *C. A.* 20, 1774): Dil. an accurate wt. of about 6 g. HCHO soln. with H_2O to 100 cc. To a 25 cc. aliquot add 3 drops of 0.1% thymolphthalein, and neutralize with *N* NaOH until a blue color appears. To the mixt. add a thymolphthalein-neutral soln. of 6.5 g. crystd. Na_2SO_3 in 25 cc. H_2O and titrate slowly to complete decoloration. Each cc. of *N* HCl is equiv. to 0.03002 g. HCHO. Results agree well with those of the H_2O_2 and I methods. In the presence of as much as 27.28% EtOH, the max. deviation is only +0.04%. With acetone in concns. below 7%, deviations are as small as those with EtOH; at 34.38% Me_2CO they are +0.40%. However, AcH in concns. above only 0.5% increased the results notably (+0.20% at 0.52%, +1.97% at 5.22%, +10.29% at 26.08% AcH). To det. HCHO in *sapo formaldehydatus*, Pharm. Helv. V, by the Na_2SO_3 method, add to 6 g. of substance 25 cc. of a 10% $BaCl_2$ soln. to remove fatty acids, fill up to 100 cc. and shake well. Treat a 25 cc. aliquot as before, except that 0.1 *N* NaOH and HCl and a neutral soln. of 2.5 g. crystd. Na_2SO_3 in 10 cc. H_2O are used (equiv. of 1 cc. 0.1 *N* HCl 0.003002 g. HCHO). For the detn. of HCHO in *spiritus*

formaldehydatus, Pharm. Helv. V, by the same method, dil. 6 g. of the fluid with H_2O to 100 cc., then proceed as with the HCHO-soap soln. S. WALDBOTT

The exactness of dosage in pharmaceutical specialties. E. SCHLUMPF. *Schweiz. Apoth.-Ztg.* **68**, 641–5(1930).—In 4 tables, deviations in % are shown between declared strength of the specialty and that actually found by the official Swedish Control Lab. (cf. *C. A.* **25**, 1334). Tablet specialties and gelatin capsules showed wide variations. S. WALDBOTT

Essential oil of *Backhousia angustifolia* (CAHN, *et al.*) **10.** Detection of iso-PrOH in tinctures, cosmetics and liniments (RFIF) **7.** The higher alcohols of the paraffin series [in medicine and perfumery] (SCHRAUTH) **10.** Saponin from spinach (DAFERT) **11D.** Purine bases from cacao, etc. (Brit. pat. 338,057) **12.** Alkali salts of halohydroxybenzoic acid esters [disinfectants] (U. S. pat. 1,793,021) **10.** Aliphatic arseno compounds [for combating spirochetes and trypanosomes] (U. S. pat. 1,794,119) **10.**

BRIEGER, RICHARD: **Manual der Pharmazeutischen Zeitung.** Im Auftr. d. Redakt. d. Pharm. Ztg. hrsg. Berlin: J. Springer. 234 pp. Linen, M. 11.

Die Riechstoffe und ihre Derivate. Band V. Die Aldehyde. Abt. 4. Patentreg., Patentverz., Autorenreg. und alph. Sachreg. zu Abt. 1-4. Edited by ALFRED WAGNER, ALFONS M. BURGER and FRITZ ELZE. Vienna: Hartleben. Pp. 1088–1431. M. 40; Abt. 1-4 in 2 vols., M. 145. Cf. *C. A.* **24**, 5112.

Handbuch der praktischen und wissenschaftlichen Pharmazie. Band V. Hälfte 2, Lfg. 31. Edited by HERMANN THOMS. Berlin: Urban & Schwarzenberg. Pp. 1349–1524. M. 10. Cf. *C. A.* **25**, 1035.

Lessico di farmacia. I. Acque minerali. Edited by PIO MARFORI, ARNOLDO PIUTTI, G. ABATI and A. BALDONI. Milan: F. Vallardi. 152 pp. L. 15.

SCHMIDT, HANS. **Die Praxis der Auswertung von Toxinen und Antitoxinen.** Jena: Fischer. 87 pp. M. 6.

WOLFF, PAUL: **Morphinbuch und Kokainbuch für Ärzte.** Unter Benutzung d. amtlich vorgeschlagenen Muster. Mit. e. orientier. Übersicht, d. Text d. Verordnung und Begründung uber d. Verschreiben Betäubungsmittel enthalt. Arzneien sowie Formularen zum Eintragen. Leipzig: G. Thieme. M. 4

Therapeutic preparations from generative organs. SOC. ANON. POUR L'IND. CHIM. A BÂLE. Swiss 141,806, Oct. 20, 1927. Addn. to 134,782 (*C. A.* **24**, 1705). A water-sol. active prepn. is obtained by hydrolysing genital organs (*e. g.*, ovaries or testes) with $Ca(OH)_2$ or NaOH, extg. the hydrolysate with H_2O-insol. org. solvent, sepg. the layers and evapg. the aq. part. The residue is a stimulant and nerve tonic. Examples are given.

Therapeutic preparations from generative organs. SOC. ANON. POUR L'IND. CHIM. A BÂLE. Swiss 141,807, Sept. 30, 1927. Addn. to 136,510. Male generative organs are extd. with H_2O-sol. and H_2O-insol. solvents and water; the aq. layer is sepd., heated with dil. AcOH, the albumin sepd. and the remainder evapd. to dryness *in vacuo*. The product is a body and nerve stimulant.

Colloidal phosphate preparation for intravenous injection. FRITZ E. BISCHOFF (to Henry J. Ullmann). U. S. 1,794,510, March 3. A substantially non-toxic prepn. not affecting the hemoglobin of the blood comprises a colloidal metal phosphate such as that of Pb together with a protective dispersing agent such as gelatin and NaCl.

Iodides of 2-aminopyridine and its derivatives. MAX DOHRN and RALPH DIRKSEN (to Schering-Kahlbaum A.-G.). U. S. 1,793,683, Feb. 24. Cl I compds. of 2-aminopyridine and its derivs. described in U. S. 1,723,457 (*C. A.* **23**, 4484) when treated with an alk. medium such as a 20% NaOH soln. undergo rearrangement to form 5-iodo-2-aminopyridine (m. 129°) and its derivs.; 5-iodo-2-ethylaminopyridine, m. 86°; 5-iodo-2-isopropylaminopyridine, b. 132–5°; 5-iodo-2-isoamylaminopyridine, m. 59–61° and b_4 145–55°; 5-iodo-2-diethylaminopyridine, $b_{2.4}$ 125–9°. These compds. may be used in *production of medicinal prepns.*

Isopropyl ether of *p*-acetylaminophenol. LAMBERT THORP. U. S. 1,793,030, Feb. 17. This compd., an analgetic, white cryst., m. 131–2°, readily sol. in alc. and ether and slightly sol. in cold water, is made by a process described in detail and may be used for treating headache, neuralgia, rheumatism, etc., to relieve pain.

Arsenated di(aminobenzyl) derivatives of methylene diguaiacol. SAMUEL L. SUMMERS. U. S. 1,793,027, Feb. 17. A compd. of the empirical formula $C_{33}H_{36}O_{10}$-

N_3As_3 which is insol. in water but sol. in MeOH, EtOH and acetone is obtained by a process described in detail and is suitable for combating syphilis and sleeping sickness.

Iodinated, acetylated condensation products of the di(aminobenzyl) derivatives of methylenediguaiacol with terpin hydrate. SAMUEL L. SUMMERS. U. S. 1,793,028, Feb. 17. Products insol. in water but sol. in alc. and which may be used as antiseptic, antineuralgic, antitubercular and anticatarrhal remedies are described with details of manuf.

Neutral calcium salt of inositolhexaphosphoric acid. "CRISTALLO" A.-G. Swiss 141,522, Dec. 8, 1928. Vegetable matter rich in inositolhexaphosphoric acid and its salts are extd. with water and the neutral Ca salt pptd. from the ext. by addn. of $CaCO_3$. The Ca salt is filtered off and used in therapy. The remaining liquid is rich in vitamins which are unaffected by the presence of the carbonates, and can also be used for medicinal purposes.

Granular anhydrous citric acid. RICHARD PASTERNACK and FRANKLIN G. BREHMER (to Charles Pfizer & Co.). U. S. 1,792,657, Feb. 17. Citric acid is dehydrated by drying at temps. of 35–50°, in order to obtain a product suitable for tablets, effervescent salt compns., etc.

Isolation of scillarene A from squills. CHEM. FAB. VORM. SANDOZ. Swiss 142,364, Feb. 19, 1929. Addn. to 134,217 (*C. A.* **24**, 1706). The cryst. almost H_2O-insol. ext from squills, which has a strong action on the heart and contains glucoside and tannoid, is extd. with water and the insol. part added to a mixt. of water and org. solvent. This is treated with a tannin-pptg. agent to remove the tannin and scillarene A is obtained from the filtrate.

Anti-syphilis preparation. SALO BERGEL. Ger. 502,655, Feb. 19, 1925. Virulent syphilis spirochetes are killed, dissolved in lecithin emulsion and the resulting prepn injected into the pleural or abdominal cavities or in the ear veins of animals. The blood, abdominal and pleural exudations, lymphatic glands, milk, thyrus and ovaries are then extd. with glycerol and soda or dil. acid soln. to obtain the anti-syphilis prepn.

"Cancer remedy." H. LEITNER. Brit. 337,797, July 8, 1929. Gall bladders of animals are extd. with alc., ether or other solvent and the ext. is evapd. to dryness and the resulting product is preferably dissolved in an aq. soln. of KCl or other suitable K compd. and used for injection into the affected part.

Vaccines. PHILALETHES KUHN. Ger. 517,204, Feb. 12, 1929. The usual bacteria are cultivated on nutrient mediums which are inoculated also with filtrates from cultures of the known ameboid forms. The coccoid growths so obtained are killed or enfeebled by the action of heat or disinfectants.

Treating blood, bandages, etc., to prevent bacterial decomposition. I. G. FARBENIND. A.-G. Brit. 337,473, May 1, 1929. The materials are treated with small addns. of substances such as methylenebis-2,4-dichlorophenol, the condensation products of formaldehyde with 2 mol. proportions of *p*- or *m* chlorophenol, the condensation products from *p*-chlorobenzaldehyde or *p*-diethylaminobenzaldehyde and 2 mol. proportions of *p*-chlorophenol, a product obtained by treating the condensation product of cyclohexanone and 2 mol. proportions of phenol with a glacial HOAc soln. of Br or with a K bromate-bromide soln., or a product obtained by heating 2,6-dimethylol 4-chlorophenol with 4-chlorophenol in the presence of 50% H_2SO_4.

Filter for essences, etc. MARINO PISANI. Swiss 142,143, July 29, 1929. The filter is particularly suitable for removing particles of water contained in the essence, etc.

Medicating tobacco with iodine. FRANK P. STRICKLER. U. S. 1,793,723, Feb. 24. I is first converted into a fluid state, as by vaporization or dissolving in alc. and is caused to crystallize in contact with tobacco to render the latter suitable for use as a therapeutic source of I.

Tobacco smoke treatment. H. PAFFGEN. Brit. 338,006, Nov. 19, 1929. Poisonous constituents of tobacco smoke such as nicotine, pyridine and "brenzole" are separated by passing the smoke through a dry absorption medium such as activated C or silica gel which has been previously satd. with a volatile substance of suitable character to prevent absorption of aroma-imparting substances also (as by use of smoke from combustion of nicotine-free tobacco waste, peppermint oil, NaOH, Na_2CO_3, sucrose, NaCl, tannic or barbituric acid, O_2 or Na hyposulfite, or by merely leaving 20–25% of water in silica gel if this is used).

18—ACIDS, ALKALIES, SALTS AND SUNDRIES

E. M. SYMMES

The concentration of weak nitric acid. G. PAYRAS. *Rev. gén. mat. plastiques* **6**, 147–51(1930).—A description is given of the Chem. Construction Co.'s Fr. pat. 656,108 (*C. A.* **23**, 4026). A. PAPINEAU-COUTURE

Vanadium as a catalyst for sulfuric acid manufacture in America. ENSIO ALHOPURO. *Acta Chemica Fennica* **3**, 112–4(1930).—The characteristics of V catalysts now used in plant operation are given. The best results are obtained by the Selden V mass and the new converter developed by A. O. Jaeger, which give as high as 98% conversion. In present-day plant operation V gives a higher av. conversion than Pt, because Pt is contaminated with traces of As and Cl. The price of Pt is 184–253 times the price of V, but the high return value of Pt catalysts and the high price of licenses for V catalysts make this proportion lower. H_2SO_4 plants which were operated or built in 1929 and which use the Selden converter system have a total capacity of more than 300,000 tons of H_2SO_4 per year. The total production of H_2SO_4 by the contact process in the U. S. during the same year was 1,870,000 tons as 100% acid. S. A. KARJALA

Potash. GEO. W. STOCKING. *Chem. Markets* **28**, 247–52(1931).—The industry in Germany is described. E. H.

A study of the properties of polyhalite pertaining to the extraction of potash. VI. Experiments on the production of potassium chloride by the evaporation of leach liquors from decomposition of uncalcined polyhalite by boiling saturated sodium chloride solutions. H. H. STORCH AND F. FRAAS. Bur Mines, *Rept. of Investigations* **3062**, 7 pp.(1931); cf. *C. A.* **25**, 1338.—Evapn. of 90% of the H_2O, interspersed with 3 crystn. steps, will yield 78% of the K_2O as crude KCl, the bulk of the impurities being NaCl. This product may be refined readily by recrystn. to produce pure KCl. A preliminary estimate indicates about $20 a ton as the cost of production at the plant. A. H. E.

The acids and acid salts which contaminate cream of tartar. FILIPPO PERCIABOSCO. *Atti III congresso naz. chim. pura applicata* **1930**, 520–5.—Some cream of tar tar contains appreciable quantities of $Ca(C_4H_5O_6)_2$ instead of KCl. E. M. S.

Quinquennial review of the mineral production of India for the years 1924 to 1928. Phosphates. E. H. PASCOE. *Records Geol. Survey India* **64**, 413–21(1930).—Apatite is known in many parts of India, some deposits assaying 20–25% P_2O_5. Nodular deposits of lime phosphate also occur. ALDEN H. EMERY

A brief history of the world's phosphate rock production. A. N. GRAY. *Superphosphate* **4**, 25–46(1931).—Historical notes relating to the discovery of phosphate deposits and the early production of phosphate rock in all parts of the world are given. The world's annual production of phosphate rock by countries is given for the years 1847 to 1929. K. D. JACOB

Dehydration of salts of phosphoric acid. S. S. DRAGUNOV. *Udobrenie i Urozhai* (*Fertilizers and Crops*) **2**, 409–16(1930). Graphs show the transformations of the salts of Na, K and Ca or phosphoric acid upon drying. From these it is possible to judge the % of pyro- and meta-modifications formed, as well as the speed of the transformations at various temps. With the loss of H_2O of crystn. $CaHPO_4.2H_2O$ becomes less sol. in citrate soln. At 100° only 4% of the H_2O of crystn. was lost in 1.5 hrs. At 150° 19% was lost in 20 min. It is important not to dry phosphate very much above 100° for any period of time (not more than 30–50 min. at 100°). Ca metaphosphate, insol. in acid, can be hydrated in the autoclave at high pressures and brought back to the sol. state. J. S. JOFFE

Utilization of the gases obtained in the process of volatilizing phosphorus and the production of soluble phosphates. A. P. DUNAEV. *Udobrenie i Urozhai* (*Fertilizers and Crops*) **2**, 397–409(1930).—The relation of H_2O and O from the air to the system: P, PH_3, CO, H, in which a reaction of selective oxidation of generator gas takes place was investigated. A modification of the app. used by Britzke and Pestov (cf. *C. A.* **24**, 208) was necessary. A description and drawing of the new app. are given. The exptl. data obtained show that the oxidation of P with H_2O over CaO at a temp. from 550° to 950° is completed to phosphoric acid at fairly rapid velocity of the gas stream. Very little PH_3 is found in the gases, and the sum of CO + H is not decreased. The materials used for oxidation contained no phosphates. In the oxidation of the gases with air no excess of O was necessary in the process, except what was needed for the oxidation of P. At the lower limits of temp. no O is used up by the CO. The generator gases used in this manner can be used again for heating or other purposes. After

the process was worked out with lime, NaCl was tried. On account of the volatilization of the NaCl and even the Na phosphates formed, it was necessary to keep the temp. between 400° and 500°. With H_2O no oxidation of P took place, but with O it did, and the generator gases were free from P, but slightly diluted with N. J. S. J.

Calcium arsenate. Economic data regarding its development in Mexico. PABLO HOPE Y HOPE. *Rev. quím.* **6**, No. 2, 11–9(1930); cf. *C. A.* **25**, 1039.—As_2O_3 can be obtained from smelters in Mexico, but is unprofitable. If made into $Ca_3(AsO_4)_2$, 2,200,000 kg. could be used on cotton fields in Mexico. E. M. SYMMES

Magnesium compounds (other than magnesite). PAUL M. TYLER. Bur. Mines, *Information Circ.* **6406**, 19 pp.(1931); cf. *C. A.* **25**, 561.—Properties, uses, methods of production, domestic and foreign production, imports, exports, prices and manufacturers of $MgCO_3$, $MgSO_4$, calcined magnesia and $MgCl_2$ are discussed. A. H. E.

Separation of the constituents of sylvinite in the form of carbonates. EDOUARD URBAIN. *Compt. rend.* **192**, 232–3(1931).—Almost complete pptn. of K in the form of acid carbonate of K and Mg may be obtained, and the Cl of KCl may be removed in the form of NaCl, by using $NaHCO_3$, according to the reaction, $MgCO_3 + NaHCO_3 + KCl = MgCO_3KHCO_3 + NaCl$. This reaction may be applied to com. sepn. of K and Na in the mixt. of chlorides known as sylvinite, which is a most important mineral in potash mines. After sepn of the solid phase the soln. is treated to recover $NaHCO_3$. The cycle of operations permits quant. recovery of K_2CO_3 and Na_2CO_3 from sylvinite. ALICE W. EPPERSON

The economic significance of zirconium and its compounds. J. F. CORRIGAN *Ind. Chemist* **7**, 97–100(1931). E. H.

Extraction of beryllium, cesium and rubidium from beryl. C. JAMES, H. C. FOGG AND E. D. COUGHLIN. *Ind. Eng. Chem.* **23**, 318–20(1931).—The finely ground mineral is fused with CaO, and the resulting slag is ground, decompd. with H_2SO_4 and heated to dehydrate the SiO_2. The mass is stirred with hot water, and the filtrate is concd. to ppt. out K, Cs and Rb alums. The remaining $Al_2(SO_4)_3$ is removed as NH_4 alum, and the Fe, after oxidation, is pptd. with dil NH_4OH, the last traces being removed by H_2S under slight pressure. The Be is then pptd. as the basic carbonate by the addn of $(NH_4)_2CO_3$. The method can be adapted to the extn. of Be from other silicate minerals. K. D. JACOB

Activated carbons. G. SIMONIN. *Caoutchouc & gutta-percha* **26**, 14,357–9, 14,468–70, 14,516–9, 14,551–3, 14,594–5, 14,632–6, 14,701–2, 14,742–4, 14,788, 14,821(1929); **27**, 14,866–8, 14,903–4, 14,940–1, 14,983–5, 15,022–3, 15,064–5(1930). After the important phys. properties of activated carbons are described it is shown that the activity does not depend to any appreciable extent upon the nature of the gas from which the vapor is removed. If care is taken to avoid too high temps., it is possible to recover MeOH, EtOH, AcMe, Et_2O, EtOAc and CS_2 unaltered from activated carbons in which they have been adsorbed from air. The most rapid method for expelling the adsorbed vapors from carbons, without chem. alteration, is by treatment with steam. Below 130° the steam may be adsorbed to some extent, but above this temp. it is possible practically to avoid such adsorption. Investigations of the tarry matter retained by the carbons after removal of C_6H_6 from coal gas showed that surprisingly little real tar was present, probably because of rapid resinification of the major portion of such small quantities as may be present in the gas, by contact with the charcoal. Inactivation of carbons in the removal of C_6H_6 by coal gas is attributed to the effect of S, which converts the active C mols. into CS_2. Reactivation by calcination before and after treatment with HCl is explained tentatively by the decompn of the CS_2 by Fe naturally present. The acid not only decomposes the FeS formed in the first calcination but brings about a uniform and intimate dispersion of the regenerated Fe salt in readiness for the second calcination. Similarly, it is possible to remove the inactivating S and so to revivify the C by impregnation with $FeCl_3$ soln., followed by heating, *e. g.*, for 2 hrs. at 900°. B. C. A

A western nitrogen-fixation plant. G. N. WESTBY. *Ind. Eng. Chem.* **22**, 1099–1103(1930).—A description is given of the unique plant of the American Nitrogen Products Co., which was destroyed by fire in 1927. Nitrites were manufactured by the arc process and the details of operation are described. The final product contained 96.5–99.0% $NaNO_3$. J. R. ADAMS

The synthesis of ammonia from its elements in electric discharges. M. ALSFELD AND E. WILHELMY. *Ann. Physik* **8**, 89–123(1931).—The yield of NH_3 obtained by passing a 3:1 H_2:N_2 gas through a silent discharge in a Siemens tube has been detd. at temps. of 25° to 300°. The rate of reaction increases slowly with the temp. up to 130° and rapidly from there to 300°. The sudden change in temp. coeff. at about the crit.

temp. of NH_3 is tentatively explained as due to a sudden decrease in the no. of NH_3 mols. adsorbed at such points on the surface of the Siemens tube as to inhibit NH_3 formation. Townsend, corona, glow and arc discharges were compared as regards their effectiveness in synthesizing NH_3 in a stream of H_2-N_2 gas passed through them. NH_3 was detd. in all cases by titration. In the Townsend discharge no NH_3 was obtained. In the neg. corona the yield of NH_3 was const. from 300 to 780 mm. pressure at a given c. d.; in the glow discharge at pressures below 300 mm. it increased linearly with decreasing pressure. At 760-mm. pressure, NH_3 formation in a corona discharge increased linearly with the current until an arc was formed; it then decreased markedly. In the glow discharge the most rapid rate of synthesis occurred in the cathode region; the pos. column was less active. Fe, Cu and W as cathode materials all produced about the same yield of NH_3; Pt cathodes were 30% more effective, possibly because of some synthesis occurring on the Pt between H atoms and N_2 mols. In the neg. glow, the yield of NH_3 increased linearly with the current and for a given c. d. increased with the rate of gas passage; it decreased slightly as the cathode temp. was increased. In the anomalous cathode fall, the yield of NH_3 per unit current was greater than in the normal cathode fall. The max. rate of NH_3 synthesis was found in a gas mixt. contg. 60% N_2 and 40% H_2. At the same compn. a min. in the cathode fall was noted. P. H. EMMETT

The use of pyrethrin against bed bugs. ALBERT GUILLAUME. *Bull. sci. pharmacol.* **38**, 80–4(1931). A concd. soln of pyrethrins in MeOH dild. with 25 parts of H_2O proved to be a very effective spray against bed bugs. The eggs are not destroyed. For the extinction, the buildings must be treated 3 times a year: in March–April, in July and in August–September. A. E. MEYER

Utilization of the aqueous extracts from olives [recovery of KCl] (CIUSA) **27.** $NaHCO_3$ (Brit. pat. 338,007) **15.** Apparatus for catalysis [in oxidation of NH_3] (Swiss pat. 141,303) **1.**

Nitric and sulfuric acids. I. G. FARBENIND. A.-G. Brit. 337,406, June 13, 1929. In simultaneous production of HNO_3 and H_2SO_4 by scrubbing gas mixts contg. N and S oxides with sulfuric or nitrosylsulfuric acid, as described in Brit. 301,232 (*C. A.* **23**, 4026), a sufficient proportion of N oxides is present that all the SO_2 is converted into H_2SO_4 or nitrosylsulfuric acid or a mixt of H_2SO_4 and HNO_3. Various details of procedure are described.

Sulfurous acid. SOC. ANON. POUR L'IND. CHIM. À BÂLE. Swiss 142,731, May 15, 1929. Concd. H_2SO_3 is prepd. from gases contg. SO_2 by absorbing the SO_2 by water and aromatic amines, driving off the SO_2 by heating and reabsorbing in water.

Phosphoric acid. KUNSTDÜNGER-PATENT-VERWERTUNGS A.-G. Swiss 141,866, Apr. 3, 1929. H_3PO_4 soln is obtained by causing mineral acid to react with crude phosphates and pptg. the Ca of the crude phosphate by sulfate ions. Examples are given. Cf. *C. A.* **24**, 471.

Ammonia synthesis. LOUIS C. JONES (to Chemical Engineering Corp.). U. S. 1,794,903, March 3. The mixt. of H and N for NH_3 synthesis is purified by circulating the gases under pressure in contact with a catalyst and introducing CO_2 into the circulating system after compression and before catalysis, to react with gases and convert impurities in the system into solid products, which latter with CO_2 are simultaneously removed (suitably as $(NH_4)_2CO_3$ deposited on Raschig rings) while maintaining a continuous circulation of the gases under pressure through the system as the gases pass to the catalyst. Cf. *C. A.* **24**, 4123.

Ammonia synthesis. HERBERT A. HUMPHREY (to Atmospheric Nitrogen Corp.). U. S. 1,794,231, Feb. 24. Solid carbonaceous fuel is burned in the presence of steam, the gaseous products are subjected to catalytic action to cause reaction of CO with H_2O to form a volume of H substantially equal to that of the CO, a proportion of 3:1 between the H and N is established, O compds. are removed from the gas mixt. and the latter is catalyzed to convert part of the gases into NH_3, the NH_3 is sepd. and unconverted gas is returned to the NH_3-forming catalyst through a closed, periodically bled, circulatory system. The air and steam used with the fuel in the first step of the process are highly preheated and a temp. of about 1300° is maintained in the gasification zone. The resulting gaseous products are withdrawn from the burning fuel and heat from them is transferred to the entering air and steam while contact of the gaseous products with colder solid fuel is prevented. A substantially CH_4-free gas is thus produced which lengthens the periods between the bleedings required.

Ammonia-air mixture. HARRY PAULING. Ger. 491,961, Oct. 16, 1926. A homo-

geneous NH_3-air mixt. is obtained by absorbing the NH_3 in a circulating water current and then blowing air through the soln. App. is described. Cf. *C. A.* **25**, 1041.

Catalytic apparatus suitable for ammonia oxidation. C. TONIOLO and "AZOGENO" (SOCIETÀ ANON. PER LA FABRICAZIONE DELL'AMMONIACA SINTETICA E PRODOTTI DERIVATI). Brit. 337,680, July 25, 1929. In app. comprising a plurality of superposed layers of Pt or other suitable metallic gauze, the layers first impinged upon by the reaction gases are of coarser mesh than the subsequent layers which are less subject to attack by the gases. Various details of construction are given.

Working up mixtures containing carbon dioxide and ammonia. I. G. FARBENIND. A.-G. (Ernst Jänecke and Erich Rahlfs, inventors). Ger. 514,893, Nov. 6, 1929. Mixts. contg. CO_2 and NH_3 or their compds., especially the mixt. resulting from the prepn. of urea from NH_2COONH_4, are prepared by treating the mixt. with liquid NH_3. Thus, a mixt. of urea, NH_2COONH_4 and water is washed with liquid NH_3 at —36°, giving a soln. of urea and water in NH_3 and a pure NH_2COONH_4 residue. The urea is then recovered by evapn.

Apparatus for production of ammonium salts. "MONTECATINI" SOCIETÀ GENERALE PER L'INDUSTRIA MINERARIA ED AGRICOLA. Swiss 142,051, June 7, 1929. See Brit. 313,446 (*C. A.* **24**, 1186).

Cyanamides. N. CARO and A. R. FRANK. Brit. 338,023, Dec. 6, 1928. In prepg. cyanamides of Ca or Mg or both by reaction of the corresponding carbonates and NH_3 as described in Brit. 279,811 (*C. A.* **22**, 3024), the removal of the water produced in the reaction is accelerated by substances such as C, carbonaceous materials or P_2O_5 which are preferably mixed or briquetted with the starting materials. When C or carbonaceous materials are thus used, oxides or compds. forming oxides on heating may be substituted for the carbonates, and when P_2O_5 is used a composite *fertilizer* is obtained. Cf. *C. A.* **25**, 1041.

Phosphates and hydrogen. BAYERISCHE STICKSTOFF-WERKE A. G. (Vladimir N Ipat'ev, Nikodem Caro and Albert R. Frank, inventors.) Ger. 514,890, Mar 27 1928. See Brit. 308,684 (*C. A.* **24**, 472).

Nitrogen oxides, etc. N. CARO and A. R. FRANK. Brit. 337,847, Aug. 13, 1929. N_2O_4 or HNO_3 in concd form is obtained from mixts. contg. N oxides, O and water vapor (such as products of NH_3 oxidation) by a 3 phase process in which part only of the water is first removed without much oxidation, residual water is sepd. after or during oxidation (which is promoted by lowering the temp.) as a tetroxide contg. HNO_3 of low water-vapor pressure, while in the third phase the gas may be cooled or treated with substances which lower the vapor pressure of the tetroxide or have absorbing properties. Numerous details of procedure are given.

Precipitating metals as sulfides. NIELS C. CHRISTENSEN. U. S. 1,793,906, Feb. 24. Solns. of metals, the sulfides of which are sol. in such solns if slightly acid, e. g. solns. contg Zn, Fe and Mn, are treated simultaneously with $CaCO_3$ and H_2S to ppt the metal sulfides and form CO_2 and the latter is used for treating a $Ca(SH)_2$ soln. to form H_2S and $CaCO_3$ for further use in the process to ppt. addnl. metal

Purifying zinc salt solutions. I. G. FARBENIND. A.-G. Brit. 337,822, Aug. 8, 1929. Solns. obtained from chlorinated burnt pyrites are freed from Fe by oxidizing the latter with an alk. earth chlorate such as $Ca(ClO_3)_2$ and then pptg. with quicklime Cu is first removed by addn. of Fe.

Ammonium sulfate. UNION CHIMIQUE BELGE, SOC. ANON. Brit. 338,373, May 17, 1929. In prepg. $(NH_4)_2SO_4$ as described in Brit. 307,037 (*C. A.* **23**, 5281), with pptn. of the sulfate as crystals by addn of NH_3, the pptn. is localized in a part of the app. in which the ammoniacal soln. is mixed with a large quantity of cooler satd. soln., and a portion of this soln. is continuously circulated through a cooler so as to withdraw the heat caused by the soln. of the NH_3. Various details of app. are described. Cf. *C. A.* **24**, 715.

Decomposing ammonium sulfate. WILHELM BERTELSMANN and ALFRED C. BECKER. Ger. 517,495, Apr. 8, 1928. The thermal decompn. of $(NH_4)_2SO_4$ to NH_3 and NH_4HSO_4 is effected in vessels made of SiO_2. Shallow vessels are preferred. The temp. should be maintained above the m. p. of the sulfate melt. Addnl. details are given.

Barium aluminate. KALI-CHEMIE A.-G. (Fritz Rothe and Hans Brenek, inventors). Ger. 514,891, July 31, 1926. Aluminiferous material is heated with $BaSO_4$ to a temp. of at least 1000° in a current of steam and oxidizing or indifferent gas. Heavy spar may be used as the starting material in such amt. that besides the $Ba_3(AlO_3)_2$ formed, there is also produced silicates of the types $BaSiO_3$ or Ba_2SiO_4 or the corresponding Ti compds. In an example, 100 parts of heavy spar contg. 92.63% $BaSO_4$ and

3.72% SiO_2 are mixed with 56 parts bauxite contg. 52.86% Al_2O_3, 2.71% SiO_2 and 2.84% TiO_2. The mixt. is then heated to 1200° in the presence of steam and air, producing $Ba_3(AlO_3)_2$ and $BaSiO_3$. Other examples are given.

Barium carbide. INTERNATIONAL INDUSTRIAL & CHEMICAL CO., LTD. Brit. 338,003, Nov. 21, 1928. See Fr. 682,479 (*C. A.* **24**, 4362).

Calcium nitrate. APPAREILS ET EVAPORATEURS KESTNER. Ger. 514,589, Mar. 21, 1928. In the prepn. of $Ca(NO_3)_2$ from $CaCO_3$ and HNO_3, the $CaCO_3$ is loaded into a tower mixed with granular substance not acted on by the HNO_3, to ensure a passage for the acid through the mass. App. is described. Cf. *C. A.* **24**, 5442.

Calcium oxide. CONSORTIUM FÜR ELEKTROCHEMISCHE INDUSTRIE G. M. B. H. Ger. 514,715, July 19, 1927. CaO, prepd. by heating $Ca(OH)_2$ to 600–800° in a gas current, can be used as a dehydrating agent for liquids or molten substances by mixing therewith. Thus, 95% alc., if heated with CaO prepd. as above, reaches a purity of 99.6% in about 15 min. Other examples describe the dehydration of Na alcoholates by CaO as thus prepd.

Siliceous calcium oxide compounds. FRIEDRICH PISTOR. Ger. 514,742, Aug. 7, 1927. Sol. dry compds. are obtained by adding CaO to concd. solns. of siliceous substances. Thus, burned lime is added to Na or K water glass. The products are used in the cold cement, dyeing and artificial mass industries.

Dicalcium phosphate. ERICH THILO and ADOLF HEICKE. Ger. 517,181, Feb. 12, 1928. See Fr. 677,191 (*C. A.* **24**, 3091).

Solid carbon dioxide. AKT.-GES. DER MASCHINENFABRIKEN ESCHER, WYSS & CIE. Swiss 141,393, Oct. 19, 1929. Liquid CO_2 under pressure is allowed to expand in stages. Cf. *C. A.* **24**, 4362, 4363.

Solid carbon dioxide. MIDDEN-EUROPEEISCHE OCTROOIMAATSCHAPPIJ. Ger. 514,717, Sept. 4, 1928. App. for suddenly allowing liquid CO_2 under pressure to expand to form CO_2 snow, and for allowing further reduction of pressure to form CO_2 ice is described. Cf. *C. A.* **24**, 1474.

Carbon dioxide from limestone. P. BROTHERHOOD, LTD., H. M. DUNKERLEY and CARBON-DIOXIDE CO., LTD. Brit. 338,369, Nov. 19, 1929. Limestone from a crusher is placed in retorts fed with steam from a boiler which is heated by waste heat from the retort furnace, and the mixt. of steam and CO_2 from the retort is used to work a prime mover, exhaust steam is condensed, and the CO_2 is collected. App. is described.

Carbon disulfide. EBERHARD LEGELER and HERMANN KOB (to I. G. Farbenind. A. G.). U. S. 1,793,181, Feb. 17. Various details are described of app. comprising an elongated main retort adapted to contain a charge of C, at least one elongated supplementary retort positioned along and in contact with the main retort in the same heating chamber, and a device for introducing liquid S at one end of the supplementary retort and for leading superheated S vapors from the opposite end of this retort into the main retort.

Carbon disulfide. EBERHARD LEGELER and EUGEN FISCHER (to I. G. Farbenind. A. G.). U. S. 1,795,132, March 3. See Brit. 333,090 (*C. A.* **25**, 564).

Carbon disulfide. CHEM. FAB. KALK G. M. B. H. and HERMANN OEHME. Ger. 507,337, July 9, 1929. CS_2 is prepd. by leading a mixt. of H_2S and CO_2, with or without inert gases such as N, over glowing C. The initial gas may be obtained from coal distn. gases by washing with water. Cf. *C. A.* **24**, 2555.

Iron-free chromic chloride from ferrochromium. I. G. FARBENIND. A.-G. (Johannes Brode and Carl Würster, inventors). Ger. 514,571, Sept. 11, 1925. Granulated Fe-Cr is heated to 300–600° in a heat-insulated container in a current of Cl and the temp. maintained at such a value that the $FeCl_3$ formed sublimates, leaving $CrCl_3$. An example is given.

Magnesium carbonate; ammonium sulfate and chloride. KALI-CHEMIE A.-G. Ger. 517,496, Oct. 17, 1928. The manuf. of $MgCO_3.3H_2O$ and $(NH_4)_2SO_4$ by treating a soln. of $MgSO_4$ with $(NH_4)_2CO_3$ is effected in two stages, the first stage involving the reaction $MgSO_4 + 2(NH_4)_2CO_3 \longrightarrow (NH_4)_2SO_4 + (NH_4)_2CO_3MgCO_3.4H_2O$. The double salt is filtered off and treated with a soln. of $MgSO_4$ to effect the reaction $(NH_4)_2CO_3MgCO_3.4H_2O + MgSO_4 \longrightarrow 2MgCO_3.3H_2O + (NH_4)_2SO_4$. $MgCl_2$ may be treated similarly, with production of NH_4Cl. The products are purer than those obtained when the reaction is effected in one stage. An example is given.

Magnesium sulfate. EMILIO RODOLFO. Swiss 142,436, May 16, 1929. $MgSO_4$ is recovered from the waste water of artificial silk manuf. by addn. of $Ca(OH)_2$ which causes pptn. of $CaSO_4$, $Mg(OH)_2$ and $Zn(OH)_2$. The ppt. is sepd., suspended in water, and treated with CO_2, to ppt. $MgSO_4$. Na_2SO_4 may also be recovered from the residual liquid.

Magnesium sulfate solution. KALI-CHEMIE A.-G. Ger. 514,590, Nov. 30, 1929. Hot highly concd. $MgSO_4$ soln. is prepd. by forming an unsatd. soln. of the salt from natural kieserite and satg. with anhyd. kieserite.

Potassium, calcium and magnesium sulfates from materials such as polyhalite. EUGENE P. SCHOCH. U. S. 1,794,552, March 3. Ore such as polyhalite is dehydrated by heating, K_2SO_4 and $MgSO_4$ are extd. with hot water, undissolved $CaSO_4$ is sepd. from the soln., K_2SO_4 is crystd. from the soln. and sepd. and the soln. is further treated for recovery of $MgSO_4$. U. S. 1,794,553 relates to a similar process. Numerous details of procedure are given.

Potassium and magnesium sulfates from polyhalite. EUGENE P. SCHOCH. U. S. 1,794,551, March 3. After dehydrating polyhalite to remove its H_2O of crystn., the material is extd. with hot water to produce solns. contg. over 5% of anhyd. salts.

Potassium nitrate. FÉLIX JOURDAN. Swiss 141,306, Mar. 30, 1929. KNO_3, with $Al(NO_3)_3$, $Fe(NO_3)_3$, etc., is obtained by treating leucite with a mixt. of N-O vapor, HNO_3 vapor and water vapor.

Sodium carbonate. W. MANN. Brit. 337,401, July 30, 1929. Finely cryst. soda is made by mixing, in an edge runner mill, finely ground Solvay soda with a suitable proportion of water.

Sodium sulfide. WOLF J. MÜLLER and FRIEDRICH KLEMA. Ger. 514,954, May 15, 1928. See Austrian 116,564 (*C. A.* **24**, 2844).

Titanium dioxide. SIMON J. LUBOWSKY. U. S. 1,793,501, Feb. 24. A finely ground mixt. of rutile and magnesia is heated to form a Mg titanate, followed by acidification with H_2SO_4, chilling the soln. to deposit $MgSO_4$, removal of the mother liquor and heating it to a high temp. to produce metatitanic acid by hydrolysis with regeneration of H_2SO_4, and the metatitanic acid is washed and calcined.

Zinc carbonate and oxide. I. G. FARBENIND. A.-G. Brit. 337,792, Aug. 7, 1929. A soln. of a Zn salt such as $ZnCl_2$, of a concn. less than 1.5 *N*, is added in slight excess to an alkali metal carbonate soln. of a max. concn. of 1.5 *N* at a temp. of 60-70°, the $ZnCO_3$ ppt. formed is filtered off, washed, dried, ground to pass through a wire sieve of 350 mesh per linear in. and then calcined below redness (suitably at 350°).

Crystals of materials such as metals or salts. PERCY W. BRIDGMAN. U. S. 1,793,672, Feb. 24. A seed crystal is placed adjacent molten substance and a portion of the seed crystal is melted and the surface of solidification is advanced from the seed crystal into the substance. An app. is described.

Borax crystallization. ROBERT B. PEET (to American Potash & Chemical Corp.). U. S. 1,792,863, Feb. 17. An emulsion colloid such as oleic acid is added to an aq. soln. which ppts. substantially only borax on cooling and the soln. is cooled while being agitated, to ppt. borax. The added colloid prevents aggregation of the pptd borax crystals.

Treating crude sylvinitic potash salts containing kieserite. THEODOR THORSELL and AUGUST KRISTENSSON. U. S. 1,794,259, Feb. 24. The kieserite in the crude material is hydrated and the salts are treated with an ammoniacal soln. of NH_4Cl, the K_2SO_4 contg. Na_2SO_4 is removed and the mother liquor is treated with CO_2 for pptn. of Mg NH_4 carbonate. The mother liquor remaining is cooled to remove a portion of the NH_4Cl present and the liquor still remaining is treated with CO_2 to ppt. $NaHCO_3$. U. S. 1,794,260 describes a process for the production of K_2CO_3 from crude sylvinitic salts, with simultaneous production of Na_2CO_3, by treating the crude salt with NH_3 carbamate in substantially anhyd. liquid NH_3, converting the resulting K and Na carbamates into the bicarbonates by treatment with water, sepg. the bicarbonates from each other and from assocd. impurities (suitably by known methods) and converting the bicarbonates into carbonates.

Concentrating phosphate-bearing material such as phosphate rock. WM. TROTTER and ELTOFT W. WILKINSON (to Minerals Separation North American Corp.). U. S. 1,795,100, March 3. The material is deslimed and then agitated and aerated in the form of a pulp with oil such as pine oil and a compd. such as Na oleate adapted to control selective oiling of the phosphate so as to effect froth flotation concn.

Purifying graphite. E. RABETRANO. Brit. 337,738, Nov. 9, 1928. Graphite in minerals of low C content is sepd. from materials such as silica, silicates or Fe oxides by fractional pptn. in a liquid contg. a colloid (such as water with an addn. of dextrin, alumina, saponin, gelatin or K silicate), with subsequent treatment of the graphite by electroösmotic action in a vessel in which the settlement of all suspended particles is retarded either mechanically (as by an agitating propeller with upward thrust) or by the presence of a colloid or by both methods. App. and various details of procedure are described.

Gold and silver solutions. A. MOZER. Brit. 338,383, Jan. 7, 1929. Solns. of Au and Ag, suitable for use in refining the metals electrolytically, for treating ores or for electrolytic or other gilding and silvering processes, are prepd. by treating the metal with a soln. of I in salts such as alkali or alk. earth metal iodides, sulfites or thiosulfates forming complex compds. with Au and Ag iodides. Chloride or bromides also may be added, and in some instances a cleansing agent such as Vienna lime may be added to form a pasty compn.

Hydrogen for use in catalytic synthesis. LUIGI CASALE. U. S. 1,793,677, Feb. 24. CO is produced from CO_2, O and a carbonaceous fuel contg. S, and the CO is subsequently converted by the action of steam in the presence of a catalyst to produce a mixt. of CO_2 and H and the CO_2 is finally removed. In this procedure the conversion of the CO_2 into CO is effected at a temp. (suitably 1000° or higher) high enough to effect the oxidation of any contained S into SO_2 and the latter is removed from the CO before its further treatment.

Sulfur. WERSCHEN-WEISSENFELSER BRAUNKOHLEN A.-G. Ger. 514,570, May 8, 1928. S is prepd. from gases contg. H_2S by leading it over a contact agent of large surface in which excess of SO_2 has been adsorbed. The SO_2 oxidizes the H_2S with liberation of S.

Sulfur from ammonium sulfide solutions. I. G. FARBENIND. A.-G. Brit. 337,395, July 29, 1929. Decompn. of NH_4 sulfide solns. at temps. above the m. p. of S is effected in the presence of adsorbent substances such as silica gel, $Al(OH)_3$, $Mg(OH)_2$, $Zn(OH)_2$, ZnS or other finely pulverized substances or raw cellulose fiber (suitably countercurrentwise with steam under 1.5 atm. pressure).

Active carbon. I. G. FARBENIND A.-G. (Ludwig Klebert, inventor). Ger. 517,428, Feb. 22, 1928. Subdivided wood is stirred for some time with a hot soln. of an activating agent, *e. g.*, $ZnCl_2$ or H_3PO_4, or boiled with the soln., and the mixt. is then dried and heated as usual. The wood may first be swollen with hot water. Cf. *C. A.* 25, 1045.

Activating carbon. I. G. FARBENIND A.-G. (Heinz Thienemann and Julius Drucker, inventors). Ger. 517,316, Mar. 12, 1926. In activating C by means of superheated steam or CO_2, an activating vessel having a wall permeable to gases is used and the activating agent is caused to diffuse therethrough. Thus, activation may be effected in a permeable chamotte tube, mounted concentrically in an iron tube, into which the activating agent is introduced.

Reactivation of activated carbon after use. C. H. LANDER, F. S. SINNATT, J. G. KING and W. E. BAKES. Brit. 337,348, July 23, 1929. After employment for absorption of S compds. such as H_2S and CS_2, reactivation is effected by heating and treatment with a basic substance such as NH_3, aniline, pyridine or quinoline (which may be used with superheated steam and a small proportion of air).

Carriers for catalysts. IMPERIAL CHEMICAL INDUSTRIES, LTD., F. A. F. CRAWFORD and W. A. P. CHALLENOR. Brit. 337,761, May 3, 1929. Catalysts for SO_2 production and other uses, such as Pt, V and Cr compds., are used on a carrier produced by incorporating "guhr" with a soln. of a sol. silicate, pptg. gelatinous silicic acid from the soln. as by the action of an acid or of $(NH_4)_2CO_3$ and drying to obtain a hard porous mass.

Pressed condensation products. SOC. ANON. POUR L'IND. CHIM. À BÂLE. Swiss 142,936, Oct. 23, 1928. Filling material, aromatic amines, aldehydes and acid are intimately mixed to form a condensation product which is treated with an acid fixing agent. The product is dried and pressed. Thus, $PhNH_2$, CH_2O and HCl are mixed into an aq. suspension of asbestos. NaOH is added and the resulting mass dried, and pressure-molded to the desired shapes. Other examples are given.

Condensation products of fatty acids with polyalkylene-polyamines. I. G. FARBENIND. A.-G. Brit. 337,368, July 26, 1929. Fatty acids such as palmitic or oleic acids or their esters such as fatty oils or fats are condensed with diethylenetriamine, triethylenetetramine or a higher polyethylenepolyamine or polyalkylenepolyamine or mixts. of such compds. If not sol., the products may be alkylated and *they may be used as wetting, emulsifying, foaming and washing agents* and are stable in acid, neutral and alk. solns. Several examples are given.

Condensation products of urea and formaldehyde. MARTIN LUTHER, WILHELM PUNGS, ROBERT GRIESSBACH and CLAUS HEUCK (to I. G. Farbenind. A.-G.). U. S. 1,794,084, Feb. 24. SO_2 is used for hardening viscous completely condensed condensation products of urea and CH_2O.

Polymerized vinyl alcohol-aldehyde condensation products. I. G. FARBENIND. A.-G. Brit. 337,806, Aug. 6, 1929. Condensation products of rubber-like, plastic

and elastic or hard and brittle character are made by treating polymerized vinyl alcs. (which may be produced by saponification of polymerized vinyl esters) with aliphatic aldehydes such as formaldehyde or acetaldehyde, in the presence of acid catalysts such as HCl and H_2SO_4. Several examples with details of procedure are given, and products obtained may be formed into sheets, films, threads, etc.

Objects of albuminous material. INTERNATIONAL KUNSTHOORN INDUSTRIE N. V. Ger. 514,771, Aug. 3, 1929. Objects of insol. albuminous material of a casein character, especially animal casein, are formed by molding the objects from pure casein, subjecting them to a CH_2O bath without allowing them to harden throughout, drying the surface at 100° and molding to final form by cold pressure.

Impregnating compositions; adhesives. I. G. FARBENIND. A.-G. (Wilhelm Pungs, inventor). Ger. 517,279, Dec. 9, 1926. A mixt. of stearin pitch or like fatty pitch and vegetable or animal oils is heated with S or other sulfurizing agent, *e. g.*, S_2Cl_2, and before, during or after this treatment a product obtained by extg. tar with a partial solvent, *e. g.*, EtOH, is added to the mixt., heating being continued until the product has the desired consistency. Asphalt, tar, pitch, resins or fillers may be added to the mixt. or to the product. The animal or vegetable oils may be preliminarily oxidized or polymerized. Examples are given.

Fly and caterpillar adhesives. BERNHARD EIBES. (Viktor Scholz, inventor). Ger. 514,727, May 23, 1925. Adhesive material for catching flies and caterpillars consists of a 1–15% soln. of cellulose esters or celluloid waste products in castor oil. Odorants, coloring matter or filling agents may be added.

Pencils, crayons and chalks. A. PISCHEL and P. PISCHEL. Brit. 337,633, Nov. 27, 1929. A sulfonated oil such as Turkey-red oil is added to the mixt. used, before baking it.

Material for magnet cores, loading coils, etc. GENERAL ELEC. CO., LTD., and G. E. POLGREEN. Brit. 338,321, Oct. 24, 1929. Powd. magnetic material such as an alloy of about 80% Ni and 20% Fe (which may be prepd. as described in Brit. 327,865 (C. A. **24**, 5015)) is heated in a soln. formed of chromic anhydride and a halogen acid or halogen salt such as NaCl, preferably washed, and subjected to high pressure. Powd. refractory material such as ball clay, MgO or Al_2O_3 may be added to reduce the permeability of the core and increase the insulating of the core particles, and the cores after being formed under high pressure may be heat treated to develop their final permeability and hysteretic value (suitably at 500–600°). If desired, sol. matter may be left on the material until after the pressing and dissolved out after the heat treatment by a prolonged washing.

Wax emulsions. C. H. THOMPSON and W. J. MCGIVERN. Brit. 338,176, July 3, 1929. Emulsions, suitable for use in *polishing compns., soaps, for waterproofing* and in the manuf. of *lubricating greases*, are made by adding soap to melted montan or other non-saponifiable wax such as paraffin or ceresin, and other materials such as albumin, casein, glue or china clay or amino compds. such as triethanolamine may be added, as may also waterproofing agents such as varnish, linseed oil, shellac, rubber, silicates, etc.

Wetting agents. I. G. FARBENIND. A. G. Brit. 337,774, April 27, 1929. In a process generally similar to that described in Brit. 306,116 (*C. A.* **23**, 4082), no excess of high mol. org. acids is used for the condensation process, and the resulting acid amides or ester amides are converted into salts with acids (suitably either before or after treatment with alkylating or oxyalkylating agents). Numerous details and examples are given.

Water-soluble cleansing agents. JOHANN TENGLER. Swiss 142,691, June 1, 1929. Raw material capable of swelling is heated in an autoclave with caustic alkali, sulfonated oil or resin and hydrocarbons. Thus, starch is heated with NaOH, sulfonated castor oil and CCl_4. C_6H_6 may be added. The product is a good fat and grease solvent.

Detergent for removing tar, etc. J. H. WYLIE. Brit. 338,167, Aug. 14, 1929. A mixt. comprising benzene, turpentine, oil of citronella and olive oil is used for removing tar from, and cleansing, surfaces such as coachwork, fabrics, leather or metal surfaces.

Composition for removing grease and tar from lacquered surfaces. JOHN W. MEYER. U. S. 1,795,134, March 3. Spirits of camphor 1, "citronella" 1 and kerosene 12 parts are heated together, mixed with separately melted paraffin 2 parts, and the mixt. is cooled.

Composition for removing paint. N. C. W. PAINT & VARNISH REMOVER CO., LTD., and T. K. BONNAR. Brit. 337,944, Oct. 19, 1929. A paint remover is prepd. by cover-

ing quicklime with soft soap and water, stirring the mixt. and then successively adding Na_2CO_3, NH_4 carbonate and $Na_2S_2O_3$.

Removing paint from painted surfaces. J. H. GRAVELL. Brit. 337,461, Aug. 2, 1929. See U. S. 1,744,463 (*C. A.* **24**, 1478).

Cleaning agent for type metal. ERWIN HOFMANN. Ger. 514,726, Jan. 3, 1928. The prepn. consists of a reducing mixt. of wood charcoal, borax and earth alkali sulfide (except MgS). Molten colophony, NH_4Cl, NaOH and Na_2CO_3 may also be added.

Smoothing etched printing cylinders. CONZETT & HUBER. Swiss 141,344, June 25, 1929. Etched Cu cylinders are coated with an anti-etching prepn., which is wiped off so as to remain only in the depressions, and the cylinder is subjected to the action of an etching agent till the depressions disappear.

Removing the raised parts of etched copper printing cylinders. CONZETT & HUBER. Swiss 142,182, July 4, 1929. The cylinders are given a coating of a non-conductor of electricity which is mechanically wiped off, so that the raised parts are bared and the depressed parts covered. The cylinder is next placed as anode in a galvanic bath till the raised parts disappear. The cylinder is then removed and mechanically smoothed and polished.

Offset printing for copying documents, etc. W. L. LAWRENCE. Brit. 337,455, Aug 2, 1929. An original is prepd. with an aniline or other copying ink, an impression from this is taken onto a rubber or rubber-surfaced member previously treated with glycerol or the like and transfer to blank sheets is effected. The glycerol may be mixed with an aq. or alc. soap soln.

Waterproof coatings containing rubber latex. PAUL MEYERSBERG. Swiss 142,172, Aug. 15, 1928. A coating for materials contains natural or artificial rubber latex in a stable semi-pptd. thickened state. This state may be produced by addn. of weak org. acid. Alkali and saponifiable oils and fats may be present. In an example, the mixt. contains latex 65, concd. NaOH 1, pptd. chalk 20, castor oil 5, PhOH 0.5, colophony 4.5 and rapeseed oil 4%. Cf. *C. A.* **24**, 2906.

Waterproofing coating suitable for use on gas or oil pipes, etc. LESTER KIRSCHBRAUN (to Flintkote Co.). U. S. 1,794,522, March 3. A surface such as metal pipe to be protected from corrosion is treated with an aq. bitumen-pitch-type dispersion, the coating is allowed to dry and form a film, and over this is applied an aq. slurry of hydraulic cementitious material which is permitted to dry and form an outer protecting coating.

Wood effects on metal panels. HERMAN C. MILLER (to United Metal Products Co.). U. S. 1,794,528, March 3. A design is etched on a metal surface such as Cu or brass and the crevices and recesses in the etched surface are filled with a plastic mineral inlay such as a mixt. of whiting, graphite, varnish, lime, white lead, bronze and Al powder, water, Pb_3O_4 and oil and the inlay is baked, then ground flush with the normal surface of the metal, colored with a "chemical coloring" and the surface of the inlay is grained in imitation of wood grain.

Use of rubber and cork together in forming surfacings for power pulleys. CHARLES R. GRIFFITH. U. S. 1,793,927, Feb 24. Various details are described, involving the use of granular cork embedded in a lesser wt. of rubber.

Material for gramophone records. A. O. THOMAE. Brit. 337,437, July 1, 1929. A raw record material comprises gelatinized cellulose acetate with camphor or camphor substitute material, dried at 40–80°, the drying time being about 24 hrs. for each 0.1 mm. thickness. Various details of manuf. are described.

Material for sound records. H. T. BEANS (to Durium Products Corp.). Brit. 337,796, April 2, 1929. A core such as cardboard made from rag stock is coated with a resorcinolformaldehyde condensation product in which a plasticizer such as glycerol is incorporated to avoid brittleness. Various details of manuf. are described.

Material for playing-cards. HARRY L. POHS. U. S. 1,794,866, March 3. Cards are formed with a woven textile center fabric, an opaque phenolic condensation product on both sides of the fabric and in its interstices, and a layer of white phenolic condensation product over both sides of the opaque compn.

Dust bag material for suction cleaners. HOOVER CO. Brit. 338,253, Sept. 6, 1929. Material such as porous paper formed from pure manilla hemp fiber is strengthened by application of a resin and plasticizer such as a vinyl synthetic resin dissolved in ethylene dichloride or other solvent with dibutyl phthalate.

Preserving and improving gut for tennis rackets, etc., by treatment with synthetic resins. E. S. BARRALET. Brit. 338,223, Aug. 20, 1929. Either phenol-formaldehyde condensation products or those from glycerol and phthalic anhydride may be used. Various details and examples of treatment are given.

Fire extinguishers. I. G. FARBENIND. A.-G. (August Ruppert, inventor). Ger. 514,925, Sept. 21, 1928. The formation of $COCl_2$ in fire extinguishing by the aid of CCl_4 is diminished by adding NH_3 and aryl- or alkyl-phosphates to the extinguishing agent. Tricresylphosphate is mentioned in examples. Cf. *C. A.* **25**, 1348.

Apparatus for producing fire-extinguishing foam from water and foam-forming powdered materials. HANS BURMEISTER (to Pyrene-Minimax Corp.). U. S. 1,792,810, Feb. 17. Structural features.

Fire-extinguishing compositions. DAVID J. BLOCK (to Du-Gas Fire Extinguisher Corp.). U. S. 1,793,420, Feb. 17. See Brit. 319,372 (*C. A.* **24**, 2564).

Fire-extinguishing composition. LODIAS J. DUGAS (to Du-Gas Fire Extinguisher Corp.). U. S. 1,792,826, Feb. 17. $NaHCO_3$ is used with smaller quantities of $CaCl_2$, Na borate, NaCl and a filler such as infusorial earth, asbestos dust, silica or ash.

Fire-extinguishing system suitable for use with carbon dioxide. SWINGSPOUT MEASURE CO. Brit. 338,197, Aug. 15, 1929. Structural features.

19—GLASS, CLAY PRODUCTS, REFRACTORIES AND ENAMELED METALS

G. E. BARTON, C. H. KERR

The employment of boric oxide in the glass industry. F. H. ZSCHACKE. *Glashütte* **59**, 846–9, *Chem. Zentr.* 1930, I, 879. B_2O_3 shortens the duration of fusion and clarification, improves the resistance against hydrolysis, the workability in the blowing process and the behavior with regard to expansion, strength and hardness. The quantity added should not be excessive. G. SCHWOCH

The structure of chilled glass. P. LAZAREV AND S. LIOSNYANSKAYA. *Compt. rend. acad. sci. U. R. S. S.* Ser. A, 1929, 107–8. *Chem. Zentr.* 1930, I, 630. The decrease in d. of chilled glass is studied from the surface to the center. When plates of chilled borax glass were ground so as to remove 58%, the sp. gr. of the remaining part of the glass fell from 2.2861 to 2.2810 and n fell from 1.5170 to 1.5158. When 90% by wt. was removed, n became 1.5151. The examn. in polarized light yielded characteristic interference figures, which give a good illustration of the decrease in hardness. No change in sp. gr. (2.284) was observed when the borax glass was cooled slowly. G. SCHWOCH

Optical properties of didymium glass. F. J. MOREL, H. S. LEIN AND D. E. SHARP. *Glass Ind.* **12**, 49–51 (1931).—This glass is composed of approx. 49.5% SiO_2, 14.0% K_2O, 6.0% Na_2O, 20.5% B_2O_3 and 10.0% impure com. didymium oxide. It has a high constringence, n of 1.53, and a sharp absorption band, but it does not show anomalous dispersion. H. F. KRIEGL

The silvering of glass. DONALD F. SHARP. *Glass Ind.* **11**, 273–6 (1930). Although a wide range of formulas may be used, each one is successful only when followed very closely. An ammoniacal Ag soln. is mixed with some reducing soln. such as sugar, glucose, Rochelle salts, etc. Improper cleaning of the glass and excess NH_3 in the Ag soln. are the most common causes of failure. After cleaning, the glass surface should be treated with dil. $SnCl_2$ soln. and rinsed with H_2O. H. F. KRIEGL

Crystal modes of the technical calcium sodium silicate devitrification and their interpretation. HANS JEBSEN-MARWEDEL. *Sprechsaal* **62**, 715–7, 735–9, 753–6, 773–6, 791–3; *Chem. Zentr.* 1930, I, 878–9. cf. *C. A.* **23**, 2063. The forces active in the crystallization process surpass the "crystallizing ability" by the amt. due to the inhibition on account of the internal friction. This more comprehensive term is called "crystallizing tendency." Many photographs of cristobalite and wollastonite crystals are given. The crystal modes are influenced by external factors, therefore they vary extensively. It is shown by means of crystals of an org. glass that the directed crystn. forces of the skeletons can be altered by external factors. In this case the arrangement of the crystal pattern assumes a medium position. The modes of devitrification make it possible to draw important conclusions with regard to errors in the manuf., which otherwise can be detected only by difficult and time consuming investigations. It was found that the cristobalite crystals in the glass are subject to an unexplained torsion force which is perhaps to be attributed to an unhomogeneous melt. The hexagonal star-shaped crystals hitherto described in the literature as tridymite are cristobalite crystals. The surroundings of the crystals are so strongly altered by the formation of crystals that this secondary glass segs. another phase. The wollastonite-cristobalite paragenesis thus found was followed and interpreted through all steps. Thus by crystn. the glass

is fractionated into residual glasses, each of which assumes a new position in the equil. diagram. G. SCHWOCH

Quinquennial review of the mineral production of India for the years 1924 to 1928. Clays. E. L. G. CLEGG. *Records Geol. Survey India* 64, 371–9(1930).—India produces china clay, fire clays, fuller's earth and clay for pottery, tile, etc. A. H. EMERY

The electrical dewatering of clay suspensions. CARL E. CURTIS. *J. Am. Ceram. Soc.* 14, 219–63(1931).—A history and full review are given of much previous work. Dewatering by electrophoresis is generally not more efficient than by using the filter-press, but on very fine-grained clays it is superior. Data and bibliographies are given, also a short biography of Count Schwerin. C. H. KERR

Manufacture of magnesia and magnesite brick. FRIEDRICH REINHART. *Tonind.-Ztg.* 55, 94–7(1931).—Recent German and foreign patents are reviewed. ROBERT FULTON FERGUSON

Effects of autoclave treatments on ceramic bodies and clays. H. H. HOLSCHER. *J. Am. Ceram. Soc.* 14, 207–18(1931). Porous ceramic bodies increase in vol. and wt. in autoclave treatment with steam pressure of 150 lb. per sq. in. The change is rapid at first but tapers off with increasing time. Typical American and English china clays also increase in vol., but ball clays do not. Prolonged drying treatments after the autoclave test also were studied. Data indicate that the vol. changes are not necessarily caused by rehydration of the clay within the body. Bodies contg. clay, feldspar and flint show a greater vol. increase than do the pure clay constituents. The compn. of the body is more important than the absorption in detg. the reaction to autoclave treatment. C. H. KERR

The ceramic industry of Ontario. ROBERT J. MONTGOMERY. *Ann. Rept. Ont. Dept. Mines* 39, Pt. IV, 196 pp.(1930). The compn. and properties of clay, and the manuf. of clay products are discussed, and a geological description of Ontario clays, and brief descriptions of all ceramic plants in Ontario are given. The latter produce chiefly heavy clay products, but lesser quantities of refractories, pottery, floor tile, elec. porcelain, glass and enameled Fe. ALDEN H. EMERY

Tests on ceramic materials. O. KALLAUNER. *1st Communications New Intern. Assoc. for Testing of Materials B*, 263–77(1930). A standard procedure is proposed comprising specifications for the prepn. of samples, mech. analysis, tests for fireproof qualities and tests on the prepd. material with regard to its applicability for prepn. as a plastic mass and on the test pieces made from such a mass. The latter tests comprise the detn. of the amt. of water necessary to work up the sample of earth into the plastic mass, the forming of the test pieces and the detn. of their properties after drying and burning. The following properties are detd.: behavior while working up to the plastic mass, shrinkage on drying, tendency to form blisters, bending strength, loss of wt. after burning, color, ring, shrinkage on burning, capacity to absorb water and sp. gr., E. J. C.

Aging and non-aging ceramic bodies. FELIX SINGER. *Keram. Rund.* 38, 167–71, 183–7, 216–22(1930). The failure of porcelain after repeated heating and cooling is due to differential thermal expansion either of (1) the constituents of the body itself, (2) the old constituents and the new, produced by gradual crystn. of the glass in the body, or (3) the body and the glaze. Disruption due to dissimilar expansibilities of glaze and body may be avoided by using glazes with high elastic limits and high strength. The most satisfactory porcelain for general purposes is one composed of a homogeneous, unstrained glass contg. many very fine mullite crystals. Steatite porcelain is superior to ordinary porcelain in resistance to aging and in all other important properties except thermal expansion, because it consists of a single constituent. H. INSLEY

The influence of time on the maturing temperature of whiteware bodies. I. F. H. NORTON AND F. B. HODGDON. *J. Am. Ceram. Soc.* 14, 177–91(1931).—Six typical com. bodies showed similar shrinkage and porosity curves for different firing times, but the longer the time the lower the curve was shifted on the temp. scale. In all cases the usual log. law relating temp. with rate of reaction applied. The const., however, was not the same for all bodies. II. CHARLES F. NORTON, JR. *Ibid* 192–206.—With samples that showed the same degree of maturity by phys. tests, the long-fired, low-temp. samples showed more quartz soln. as well as more mullite development than samples fired more quickly at higher temps. C. H. KERR

The origin of pin holes in cast ware. GERHARD BUDEWIG. *Keram. Rund.* 38, 215–6(1930).—An important cause of "pin holes" is the high viscosity of slips which does not permit the release of air bubbles introduced during blunging. A simple pipet viscometer is adequate for plant measurement of viscosity, a relative value for viscosity being obtained by the ratio of discharge time for the slip to the discharge time for pure

water. Increase in viscosity of casting slip is often due to the introduction of sol. electrolytes either from the raw materials themselves or from the mill water. H. I.

Burning of Oldenburg klinker [brick]. WERNER DOHM. *Ziegelwelt* **62**, 2–4 (1931).—A slow, prolonged, even firing at about Seger cone 6a is essential in securing proper sintering and density. Slow cooling is equally necessary to prevent brittleness. H. F. K.

Special refractories for electric-furnace linings. (a) Silica, corundum and Carborundum bricks. O. KUKLA. *Stahl. u. Eisen* **50**, 800–3(1930).—Expts. with a 7-ton-Héroult-Lindenburg elec. steel furnace show that Carborundum bricks behave well as a refractory in the roof of the furnace in a reducing atm. but are not as good as SiO_2 bricks for the body of the furnace in contact with the molten charge. In this position the Carborundum is rapidly burned at the surface of the bricks, thus causing rapid wear. Corundum bricks are unsatisfactory owing to their great tendency to spall. (b) **Sillimanite bricks.** F. SOMMER. *Ibid* 804.—Sillimanite bricks behave no better than good SiO_2 bricks in elec. steel furnaces and are 4 times as expensive. B. C. A.

Refractories for boiler furnaces. W. J. REES. *Brit. Clayworker* **39**, 431–7 (1931); cf. *C. A.* **24**, 5450.—The durability depends on 7 different factors, which are listed and discussed. R. A. HEINDL

Glass paving blocks (U. S. pat. 1,795,229) **20.**

Brands of Refractories: the brands of fire brick and other refractories manufactured in the United States and Canada, together with a list of their producers. 8th ed. Pittsburgh: American Refractories Institute. 70 pp.

Modern Refractory Practice. Pittsburgh: Harbison-Walker Refractories Co. 178 pp. Reviewed in *Blast Furnace & Steel Plant* **19**, 425(1931).

Glass. HERZOGENRATHER GLASWERKE BICHEROUX & CIE G. M. B. H. Ger. 514,609, Nov. 7, 1926. Rollers for rolling out molten glass are cooled by a liquid of b. p. higher than 100°.

Apparatus for feeding batch material to glass-melting furnaces. HAZEL ATLAS GLASS CO. Brit. 337,950, Oct. 24, 1929. Structural features.

Apparatus for feeding molten glass. BRITISH HARTFORD-FAIRMONT SYNDICATE LTD., and HARTFORD-EMPIRE CO. Brit. 338,089, Feb. 28, 1930. Structural features of app. having shear blades which are cooled and lubricated by use of moistened air.

Apparatus for delivering mold charges of molten glass. JOHN F. RULE (to Owens-Illinois Glass Co.). U. S. 1,792,932, Feb. 17.

Apparatus for delivering molten glass from furnaces. BALL BROS. CO. Brit. 337,988–9, Nov. 12, 1929. Structural features.

Feeding mold charges of viscous glass from a furnace. ALBERT R. BETHEL. U. S. 1,792,727, Feb. 17. App. is described.

Apparatus for forming hollow glassware such as bottles. AUGUST KADOW (to Owens-Illinois Glass Co.). U. S. 1,792,988, Feb. 17. Structural features.

Apparatus for glass-bottle manufacture. SOC. ANON. DES VERRERIES A BOUTEILLES DU NORD. Brit. 338,395, Sept. 24, 1929. Mech. features.

Forming glass rods or tubes. P. A. FAVRE. Brit. 337,540, Oct. 1, 1928. Mech. features and app. are described.

Sheet-glass-drawing apparatus. JOHN L. DRAKE (to Libby-Owens-Ford Glass Co.). U. S. 1,793,784, Feb. 24. Structural features.

Apparatus for drawing glass sheets. PAUL ESCOLE (to Ateliers de construction & fonderies de Jeumont (Anciens établissements Th. Haut)). U. S. 1,795,254, March 3. Structural features.

Removing thickened edges of glass sheets. PITTSBURGH PLATE GLASS CO. Brit. 338,045 and Brit. 338,778, Dec. 24, 1929. Various details of app. are described for heating the glass along lines parallel with and close to the edges for a distance corresponding to the length of a section to be severed from a continuously drawn glass sheet or ribbon, followed by removal of the section and application of a cooling device to the heated lines to cause the glass to crack along the lines.

Apparatus for plate-glass manufacture. JOHN H. FOX and WM. OWEN (to Pittsburgh Plate Glass Co.). U. S. 1,792,636, Feb. 17. Structural features.

Leer for annealing glass. HAROLD A. WADMAN (to Hartford-Empire Co.). U. S. 1,793,199, Feb. 17.

Glass-melting furnaces. HARTFORD-EMPIRE CO. Ger. 514,527, April 3, 1927. Details of construction.

Thermostatic control of temperatures in glass kilns, etc. PILKINGTON BROS., LTD., and P. M. HOGG. Brit. 337,803, Aug. 2, 1929. Variations in cond. of the material being heated are utilized for temp. regulation by an elec. system, various details of which are described.

Apparatus for "frosting" glass articles such as bulbs. JAMES BAILEY (to Corning Glass Works). U. S. 1,793,893, Feb. 24. Treating fluid is supplied under atm. pressure to a partially exhausted chamber, over openings in which the articles to be treated are supported. Various structural details are described.

Glass for use as a light filter. F. WEIDERT (to Deutsche Gasglühlicht-Auer-Ges.). Brit. 338,334, Dec. 15, 1928. Glass colored with neodymium oxide is used for light filters for accentuating color contrasts. Ce oxide may be added to absorb ultra-violet rays, or Cr oxide or Pr oxide may be used to make green more pronounced in appearance. The glass may be used for spectacle lenses or otherwise for filtering or special illuminating effects.

Glass permeable to ultra-violet rays. FRITZ WOLLNER, RICHARD WOLLNER and FERDINAND NIKOLAI. Austrian 120,674, Oct. 15, 1929; Fr. 691,805, Mar. 12, 1930. Glass is rendered permeable to ultra-violet rays by reducing the Fe_2O_3 present in the mixt. or in the melt to the metallic state. This may be effected by addn. of Al, Si, Mn, Zn or Ca.

Apparatus and procedure for uniting components of "safety glass" assemblies by heat and pressures. DUPONT VISCOLOID CO. Brit. 337,547, Oct. 27, 1928.

Drying clay ware, etc., in tunnel kilns. FRANK M. HARTFORD (to Harrop Ceramic Service Co.). U. S. 1,793,086, Feb. 17. Various details of app., humidity and temp. regulation are described.

Composite brick. EDWIN M. WYATT (to American Face Brick Research Corp.). U. S. 1,794,572, March 3. A building brick is formed with a burned facing section of argillaceous material and a concrete backing section formed of an aggregate of prepd. burned argillaceous particles and a cementitious binder, this binder serving also to unite the 2 sections.

Decorating bricks, flower pots, etc. A. F. BERRY. Brit. 338,147, Aug. 8, 1929. Articles of clay or composite material such as concrete are decorated by facing them with irregular fragments of stone, granite chippings or the like, suitably after initial application of a thin moist layer of portland cement, or by pressing into the surface of a green molded brick.

Apparatus for screening potters' slip and other viscous materials. MASCHINENFABRIK VORM G. DORST A. G. Brit. 337,371, Nov. 20, 1928. Structural features.

Tunnel drier for pottery. MÜLLER & PFEIFFER. Ger. 517,167, Jan. 20, 1927.

Magnetic separator for treating porcelain sludges, etc. MAGNET-WERK GES. EISENACH SPEZIALFABRIK FÜR ELEKTROMAGNETAPPARATE. Brit. 337,759, April 5, 1929. Structural features.

Refractory materials. METALLGES. A.-G. Brit. 337,605, Nov. 7, 1929. Mg silicate materials such as olivine, serpentine or talc contg. Fe are heated, without fusion, with substances rich in Mg, such as MgO or magnesite, in an oxidizing atm. for the conversion of the Fe present into Mg ferrite and of the free SiO_2 into Mg orthosilicate. Materials contg. Ni, Mn, Cr and Al may be similarly treated, and numerous details and examples are given.

Vitreous material suitable for casting or hot pressing in molds. PERCY B. CROSSLEY (to Mycalex (Parent) Co., Ltd.). U. S. 1,795,200, March 3. A mixt. formed of colloidal mica, colloidal asbestos, refractory ceramic material such as porcelain or glass infusible below 900°, and metallic flux material such as PbO and H_3BO_3 fusible below 900° is molded and vitrified. Cf. *C. A.* 25, 573.

Tile-glazing apparatus. GEORGE F. WILDE and BENNET K. ESKESEN. U. S. 1,792,788, Feb. 17. Structural features.

Muffle furnace for enameling sheet-iron ware. MANFRED WEISS STAHL- UND METALLWERKE A.-G. Swiss 141,563, May 21, 1929.

20—CEMENT AND OTHER BUILDING MATERIALS

J. C. WITT

The testing of cements by means of earth-moist and plastic mortars. J. P. LOEVENTHAL. *1st Communications New Intern. Assoc. for Testing of Materials B*, 204–9(1930).—In earlier comparative investigations carried out by the Danish state testing house the Swiss prism method and the common hammer method were used; in continuation,

a series of tests was made dealing with mortars of portland cement, aluminous cement and a Danish pozzuolana cement (Moler cement). The test pieces were made in compact molds and were of consistencies ranging from earth-moist to fluid. They were tested after 7 and 28 days. It was shown that at both times the strength curves of the portland and Moler cements were quite similar, although there was no proportionality. In contrast with this, mortars of aluminous cement of low water content showed an increase in strength between 7 and 28 days, while mortars of high water content showed a fall in strength. The various methods of testing are discussed. E. J. C.

Some properties of high-alumina cements from six countries. P. H. Bates. *1st Communications New Intern. Assoc. for Testing of Materials B*, 210–8(1930).—High-alumina cements (ciment fondu) manufd. in 6 different countries were examd. for their properties by chem., petrographic and phys. methods. The phys. characteristics were detd. by strengths in the form of 1:3 standard Ottawa sand tensile briquets and 2-inch compression cubes. Concrete was also tested in the form of 6 × 12 in. cylinders made from a 1:2:4 mix of gravel. The chem. analyses showed the cements were rather widely different from one another. The petrographic examn. showed that the alumina was largely present either as $CaO.Al_2O_3$ or as the unstable form of $5\ CaO\ 3Al_2O_3$. The wide variation in compn. and the difference in constitution did not result in as great a difference in phys. properties as would be expected. The effect of the heat generated during the setting of the cement and the effect of the amt. of mixing water used were also studied. Increased temps. during setting resulted in decreased strength. Increased amts. of mixing water resulted also in marked decrease in strength. E. J. C.

Hydraulic additions and trass-portland cement. S. I. Druzhinin. *1st Communications New Intern. Assoc. for Testing of Materials B*, 221–37(1930).—Volcanic tuff from the Crimea and diatomaceous earth from tested sources, when ground to the fineness of portland cement and added to portland cement clinker, give pozzuolana portland cement which, when used in hydraulic structures, is more resistant to sea water and acid water than is portland cement mortar. Its mech. strength after 2 months' hardening in water is equal to that of ordinary portland cement mortar without hydraulic addn., the same quantity of sand being used. The best methods for rapidly detg. the degree of activity of the hydraulic addn. are to est. the amt. of lime it absorbs and to compare the strength of mortars, with and without such addn., under the conditions afforded by accelerated hardening of the test pieces at 80°. The best method for detg. the optimum addn. of hydraulic material is the above-mentioned accelerated or thermal method. Pozzuolana-portland cement produces a more voluminous paste than ordinary portland for the same quantity of sand. E. J. C.

Fine grinding of cement. Ernst Rissel. *Zement* **19**, 1079–80(1930). The water permeability of concrete is more greatly affected by changes in the fineness of cement than is the compressive strength. The grading of the finer fractions of the cement also has a definite bearing on its ability to make concrete impervious. H. F. K.

Mill temperatures and the setting time of cements. K. Koyanagi. *Zement* **19**, 988–9(1930); cf. *C. A.* **24**, 5452.—Cements high in SO_3 were found to set rapidly under high mill temps. while those of low SO_3 content were not affected. H. F. Kriege

Portland cement materials in Arkansas. W. R. Spencer. Univ. Arkansas, *Eng. Expt. Sta. Bull.* No. **6**, 27 pp.(1929). E. H.

Investigation of portland cement and its constituents by means of vapor-pressure measurements. F. Krausz and G. Jörns. *Zement* **19**, 1054–5(1930).—The use of a micro-tensi-eudiometer is proposed to follow the formation of cryst. or colloidal phases in the hydration of cements. H. F. Kriege

Free lime in portland cement and soundness. G. Haegermann. *Zement* **19**, 982–4(1930).—Under a range of burning temps. of 1225–1475° the free lime in 12 cements was found to vary irregularly with temp. from 0.24 to 1.85%. In general, cements were sound in cold H_2O when they contained up to 4% free lime, while 1.2% was the upper limit when subjected to the boiling test. H. F. Kriege

Free lime, soundness and strength (of cement). A. Guttmann. *Zement* **19**, 1078(1930).—G.'s investigations confirm those of Haegermann (cf. preceding abstr.) in regard to the content of free lime and soundness in cements. Further G. found a definite increase in tensile strength with a decrease in the free CaO present in the cement. H. F. Kriege

Action of gypsum, swelling and hydration. F. Tippmann. *Zement* **19**, 1030–5, 1056–60, 1080–6, 1106–12(1930).—**The properties of gypsum, raw and in its various phases of dehydration, are discussed in relation to their effects on cement.** Numerous photomicrographs are given showing the cryst. products of the hydration and hardening stages of cements and other materials. H. F. Kriege

Quicker tests of cement and concrete. H. KREÜGER. *1st Communications New Intern. Assoc. for Testing of Materials B*, 114 8(1930).—Preliminary tests made to investigate whether it might be possible to decide quickly (in 1 or 2 days instead of 28 days) whether a cement is fit for delivery showed that there probably is a fairly good concordance between the normal crushing strength of cubes after 28 days' combined air- and water-curing and after a few hours' steam-hardening. The method may be of some use also for quicker testing of concrete, but has not yet been satisfactorily developed. E. J. C.

Compression, tension and bending tests, cement and concrete. A. T. GOLDBECK. *1st Communications New Intern. Assoc. for Testing of Materials B*, 61–6(1930). E. J. C.

Cement, concrete and reënforced concrete—laboratory tests and control and practice on the building site. A. HASCH. *1st Communications New Intern. Assoc. for Testing of Materials B*, 94–9(1930) (in German); cf. *C. A.* **24**, 3874.—An attempt is made to consider briefly, from the present-day standpoint, the relative merits of ordinary and high-strength mortars and concrete, and tests to which these materials should be subjected in the lab. and on the building site. The essential point is organization of control tests on the site, combined with chem. lab. tests, because samples taken before building is started are of no value. The theory of probability is applied to results of static tests. E. M. SYMMES

Resistance of concrete pipes to corrosion by water. J. O. ROOS. *1st Communications New Intern. Assoc. for Testing of Materials B*, 144–8(1930).—In Sweden, decompn. of concrete pipes is due mostly to the external action of H_2O percolating through the pipe wall and extg. lime from the cement. Pure H_2O has a high disintegrating effect; a water contg. 0.30–80 mg. per l. of CO_2 increases and lime hardness decreases the corrosion. To be durable, concrete pipes must be impermeable to water. E. M. S.

Slag concrete. I. BENTKOVSKII. *1st Communications New Intern. Assoc. for Testing of Materials B*, 238–43(1930) (in German). Tests were made by the Institute of Metals, Leningrad, to use a particular slag for concrete. E. M. SYMMES

Resistance of concrete to chemical attack. K. MANDL. *1st Communications New Intern. Assoc. for Testing of Materials B*, 149–56(1930).—In Austria the deterioration of concrete due to injurious influences is relatively slight. The most prominent instance is the destruction of a pillar of a new dwelling house in Vienna, which was definitely found to be due to the action of gypsum. It is especially noteworthy that this damage was not due to sulfate contg. ground water, but to surface water that had percolated through the slag-contg. bottom layer, from which it dissolved the sulfate, and then was forced to pass through the concrete pillar, because the slag deposit was laid on material impermeable to water. Several cases of deterioration of the sewer system of Vienna by sulfate-contg. water are also reported. Results of an investigation into the action of nitrites on concrete have been published in part, but it is not yet possible to draw conclusions from this work. E. J. C.

The compactness of concrete and its resistance to chemical action. A. POULSEN. *1st Communications New Intern. Assoc. for Testing of Materials B*, 157–61(1930).—Even the best concrete is destroyed by the reaction of its free lime with the $MgSO_4$ contained in sea water. Rich mixts. soon show cracks of their own accord. The application of a protective coating to large masses of concrete employed in marine work is, of course, impossible. To neutralize the excess lime it is necessary to add to the cement pozzuolana contg. in sufficient quantity the necessary hydraulic constituents (*e. g.*, SiO_2 sol. in alkalies). The cement with hydraulic admixts. thus obtained should be submitted to lab. tests. In Denmark, the Danish diatomaceous earth, Mo Ler, which contains about 60% of sol. SiO_2, has been used with considerable success for the past 20 years. E. J. C.

Evaluation of shrinkage data on light-weight concrete. A. HUMMEL. *Zement* **19**, 1062–6(1930). - While light-weight concretes have greater vol. changes than do concretes contg. the usual mineral aggregates over the same humidity ranges, these vol. fluctuations need not imply greater danger of crack formation. H. F. KRIEGE

Method of disintegrating hardened concrete for the determination of the original ingredients. R. LOMAN. *1st Communications New Intern. Assoc. for Testing of Materials B*, 167–79(1930).—It is possible to disintegrate the concrete satisfactorily without smashing up the aggregate by heating for a time to 800–900° and cooling by suddenly quenching in water. The aggregate is sepd. from the cement and can be sieved; it is almost completely recovered, but has generally become a little finer as a result of the ignition and embrittlement on quenching. This increase in fineness is revealed by the sieving. The proportion of cement can be estd. by various methods. Expt. has proved, however, that the most rapid method and the one that gives the most reliable results

consists in heating to 800–900° (which removes combined water and CO_2) and then cooling in a space free from water vapor and CO_2. The wt. obtained is that of the original cement less its loss on ignition. The method is of sufficient accuracy for technical work. E. J. C.

Deterioration of concrete in hydraulic structures. A. EKWALL. *1st Communications New Intern. Assoc. for Testing of Materials B*, 162–6(1930); cf. *C. A.* **23**, 5558.—Inspections of hydraulic structures in Sweden 10 years ago showed some defects in the concrete and continued observations proved that the concrete in some cases was subject to an increasing deterioration, apparently due to the quality of the concrete materials, to the methods of making concrete or to the conditions to which the concrete was exposed. The aim of these investigations was to ascertain the causes of such increasing deterioration. It had been observed that deterioration occurred only in structures exposed to water on one side and was caused by the soly. of the lime and the decompn. of other chem. combinations in the hydrated cement. Particular attention was therefore directed to the soly. of the cement and the aggressiveness of the water. Practical expts. were made at the same time with concrete slabs exposed to low water pressure during several years. It was proved that Swedish natural waters need not be considered aggressive in this respect. The importance of using sand relatively free from org. substances was impressively established. Leaner mixts. than 1:4.5 should not be used for concrete exposed to water pressure from one side. Replacing cement by an admixt. of 10% lime or 5% $CaCl_2$ improved the watertightness, while 25% trass or slate powder gave practically no improvement. E. J. C.

Natural and artificial stone—mineralogical and petrographic properties. Methods of testing. L. FINCKH. *1st Communications New Intern. Assoc. for Testing of Material B*, 21–4(1930). E. J. C.

Coöperation of the mineralogist and petrographer in judging natural and artificial building stone and road stone. P. NIGGLI. *1st Communications New Intern. Assoc. for Testing of Materials B*, 1–9(1930).—The mineralogist should conduct the sampling of the material, so as to provide a typical sample for investigation, and thoroughly describe it from the mineralogical standpoint as to its chem. nature, durability, structure and texture. After the tech. tests, he should evaluate the behavior of the material mineralogically and relate it with the properties found. The mineralogical-petrographic methods can be conducted with min. quantities of material and are therefore particularly suited for control expts. It is thus important to elucidate experimentally the relation between tech. behavior and the nature of the material, so that tech. tests can be more and more replaced by mineralogical examn. E. J. C.

The application of mineralogical and petrographic knowledge in the testing of nonmetallic inorganic materials. R. GRENGG. *1st Communications New Intern. Assoc. Testing of Materials B*, 13–20(1930). E. J. C.

Structure of weather-resisting rocks (VAN DER VEEN) **8.** Siliceous CaO compound [for use in cold cement industry] (Ger. pat. 514,742) **18.** Decorating bricks, flower pots etc. (Brit. pat. 338,147) **19.** Rubber compositions [for expansion joints, wall and road coverings, etc.] (Brit. pat. 338,247) **30.** Producing carbide-forming metals [with cement as a by-product] (U. S. pat. 1,794,401) **4.** Forming sheet insulating material such as wallboard (U. S. pat. 1,794,433) **13.**

Concrete Year Book, 1931. A Handbook, Directory and Catalogue of Concrete, 8th year. Edited by O. FABER AND H. L. CHILDE. London: Concrete Publications, Ltd. 3s. 6d., net.

HERTEL, PAUL: **Einfluss der Verwendung von Edelzuschlag auf die Güte und die Kosten von Beton.** Charlottenburg: Zementverlag. 64 pp. M. 2.

Cement. PERRIN & TUSCHER. Swiss 141,823, April 25, 1929. The cement contains essentially blast-furnace slag, lime and bauxite. Gypsum may also be added.

Portland cement. ANDREW LUNDTEIGEN and GUY O. GARDNER (to Ash Grove Lime & Portland Cement Co.). U. S. 1,794,526, March 3. A quick-hardening cement is made by adding, to a clinker formed from argillaceous and calcareous materials, gypsum and a mixt. of $CaCl_2$ and NaCl sufficient to act as accelerators for hardening the final product, and grinding the aggregate thus formed with a lubricant such as Al stearate so that at least 78% passes a 200-mesh screen.

Chlorine-treated cement. HANS M. OLSON. U. S. 1,792,755, Feb. 17. Cl gas is directly mixed with hydraulic cement during its grinding in order to facilitate obtainment of rapid set and early strength.

Apparatus for testing cement, etc. W. D. WILLIAMS. Brit. 337,786, Aug. 2, 1929. Various details of app. are described suitable for use in boiling substances for testing as in the Le Chatelier test for cement, boiling cement pats, testing porosity or permeability of cement disks, etc.

Cement-coloring and hardening composition. MAXIMILIAN TOCH (to Standard Varnish Works). U. S. 1,793,143, Feb. 17. A material for coloring and hardening portland cement comprises a dry mixt. including a coloring material resistant to portland cement such as Fe oxide, Cr oxide, MnO_2 or lampblack together with $CaCl_2$ and a colloidally pptd. material such as Al silicate, $BaSO_4$ or Ca aluminate.

Feeding cement material to kilns. POUL T. LINDHARD (to F. L. Smidth & Co.). U. S. 1,793,499, Feb. 24. Slurry is delivered to a kiln as an atomized spray cone, dust is sepd. from the kiln gases and this dust is returned to the kiln at a point where the cone of atomized slurry substantially fills the diam. of the kiln. App. is described.

Rotary kiln (with slack chain groups in its interior) suitable for burning cement-forming slurry. JOHAN S. FASTING (to F. L. Smidth & Co.). U. S. 1,793,471, Feb. 24.

Rotary kiln suitable for cement manufacture, etc. HAAVARD KRONSTAD (to Bessemer Cement Corp.). U. S. 1,793,408, Feb. 17.

Concretes and mortars. J. W. BATTERSBY. Brit. 338,242, Aug. 27, 1929. A waterproof product is prepd. by adding a powder of colloidally readily sol. water-contg. alkali silicate 2–5% to portland cement or lime concrete or mortar prior to mixing with water (preferably to the cement clinker before grinding it). The initial set period may be controlled by varying the amt. of water in the silicate (which may be 10–30%). For some purposes such as sealing porous places in floors a much larger proportion of silicate powder may be added.

Apparatus for molding concrete blocks. FAVRE & CIE. ZELLENBETONFABRIK WALLISELLEN. Swiss 142,088, May 15, 1929.

Bituminous paving materials. EDWIN C. WALLACE. U. S. 1,793,345, Feb. 17. Bituminous paving compns. workable at atm. temp. are prepd. by coating heated particles of mineral matter with heated bituminous cement in sufficient quantity to cause agglomeration when the mass becomes chilled and, before chilling, adding to the mass cold, non coherent, non hydroscopic material comprising mineral particles coated with bituminous cement, proportioned to render the entire mass granular and friable but capable of consolidation by the application of pressure alone. Cf. *C. A.* **25**, 793.

Bituminous compositions for roads, etc. F. A. HILL. Brit. 338,206, Aug. 16, 1929. A cold-lay compn. suitable for surfacing roads, canal beds, etc. and which is stable when stored in hermetic containers) is made by mixing at a temp. of 100° or higher, asphalt, bitumen, tar, pitch or asphaltic petroleum residues with a fuel oil or petroleum product from which all the lighter portions including the illuminating oils have been distd. The material may be used in the proportions of 35–55 and 65–45%, resp.

Bituminous coating compositions. I. G. FARBENIND. A.-G. Brit. 337,521, Sept. 4, 1929. Products for covering roads, lining vessels, etc., are made by incorporating bituminous materials such as natural or artificial bitumens, mineral or brown coal tars or their distn. products with synthetic polymerization products of diolefins such as those of butadienes, which incorporation may be effected in the presence of a diluent such as benzene or cyclohexanol, and if desired with emulsification with water effected by a suitable emulsifying agent. Various details and examples are given.

Bituminous pavements. JOHN RADCLIFFE (to Colprovia, Ltd.) U. S. reissue 17,985, March 3. Reissue of original pat. No. 1,655,240 (*C. A.* **22**, 1026).

Road-surfacing materials. I. G. FARBENIND. A.-G. Brit. 337,928, Oct. 12, 1928. Slippery deposits on roads are removed by use of org. solvents or their aq. solns. or emulsions to dissolve the oils and fats or swell the rubber in the deposits, followed by brushing and washing with water. Various examples of solvents and emulsions are given.

Rubber-surfaced paving blocks. EDWIN C. WALLACE. U. S. 1,794,220, Feb. 24. Structural features.

Glass paving blocks. PIERRE NOEL. U. S. 1,795,229, March 3. Structural features.

Material suitable for expansion joints. ALBERT C. FISCHER (to Philip Carey Mfg. Co.). U. S. 1,793,439, Feb. 17. Sheets are formed with a waterproof ductile binder such as blown asphalt having mixed with it flat and relatively thin strips of fibrous roofing scrap. Cf. *C. A.* **24**, 2574, 4608.

Artificial stone. JERRE HAGGARD. U. S. 1,793,172, Feb. 17. A vesicular aggregate such as cinders or basalt is used with granulated gypsite and hydrated lime.

Artificial marble residues. ALEXANDER STAEGE. Ger. 514,710, Nov. 19, 1927. The residues from the manuf. of artificial marble contg. MgO cement are ground and all sol. constituents removed by lixiviation with water. The residue is then used as flux for portland cement mortar.

Porous building material. ERIK C. BAYER. U. S. 1,794,272, Feb. 24. A tenaceous foam which may be formed from resin soap, gelatin and water is mixed with mortar and the material is formed and cured under high steam pressure. Cf. *C. A.* **24**, 4134.

Waterproof sheet material for building construction. E. RUDIN and H. KOLLBRUNNER. Brit. 338,403, Dec. 13, 1928. Corrugated cardboard layers are superposed with the corrugations of adjacent layers at right angles to each other, fastened together by threads or wires or the like without adhesive, dried at 60–70°, impregnated with coal-tar pitch or the like and pressed.

Fireproofing binder for use with fibrous material. CHARLES H. BROWN. U. S. 1,793,357, Feb. 17. A compn. suitable for use with fiber in making wall board, etc., consists solely of NH_4 phosphate, H_3BO_3, dextrin and water, with a greater proportion of NH_4 phosphate than of H_3BO_3 and a greater proportion of dextrin than of NH_4 phosphate.

Roofing material. RALPH E. DRAKE (to Anaconda Sales Co.). U. S. 1,794,449, March 3. Crushed and graded elec cond material such as crushed coke substantially free from dust is applied as a layer to the surface of material such as asphalted roofing felt so as to form an irregular surface, and a cond powder such as graphite is applied over this surface so as to fill interstices between the granules, and a metal such as Cu is applied as an electrodeposited layer over the cond material.

Plaster. V. LEFEBURE. Brit. 337,926, Oct. 10, 1929. Anhydrite is mixed with plaster of Paris or "any standard plaster" such as Keenes cement, and the anhydrite may be "accelerated" as described in Brit. 236,695 (*C. A.* **20**, 1310) and Brit. 317,672 (*C. A.* **24**, 2267), and by varying the relative proportions of the ingredients; the setting time may be varied upward from an almost instantaneous set as desired. Various details and examples are given.

Plaster. FOSTER D. SNELL. U. S. 1,792,661, Feb. 17. A plaster of "retarded suction" comprises a calcareous binder such as slaked lime, a filler such as sand, together with water, and a "minimal" quantity of dispersed lime soap present to the extent of only about 0.16 lb. per cu. yard.

Plasterboard. HAROLD L. LEVIN (to Flintkote Co.). U. S. 1,793,810, Feb. 24. See Brit. 319,213 (*C. A.* **24**, 2573).

Kiln suitable for drying lumber. ALBERT ARMSTRONG. U. S. 1,793,892, Feb. 24.

Preserving wood. I. G. FARBENIND. A.-G. (Wilhelm Bonrath, Wilhelm Schepss and Karl Taube, inventors). Ger. 517,207, Feb. 10, 1928. The wood is treated with compds. in which Hg is linked by at least one of its valencies to an unsubstituted or neutrally substituted hydrocarbon radical. Phenylmercuric acetate and ethylmercuric bromide are suitable. The compds. may be used in soln. in an org. solvent, or in aq. emulsion or soln., and their solv. in water may be increased by addn. of alk. compds. Examples are given. Cf. *C. A.* **25**, 1056.

Treating wood. ADOLF KISSNER, JR. Ger. 514,980, Nov. 24, 1929. Wood surfaces are protected by an elastic waterproof layer of bitumen admixed with fine wood meal.

21 FUELS, GAS, TAR AND COKE

A. C. FIELDNER AND ALDEN H. EMERY

Pulverized fuel. ANON. *Fuel Economist, Pulverized Fuel Suppl.* 1, 72, Oct., 1930. An illustrated review of plant and equipment, some notable British installations and use in Lancashire boilers, in the metallurgical industries, and in marine practice.
LESLIE B. BRAGG

The use of sugar for motor fuel. K. ŠANDERA AND J. ZERMAN. *Z. Zuckerind. Čechoslovak. Rep.* **55**, 172–4 (1930). See *C. A.* **25**, 576.
J. F. LEETE

Tests on agglomeration of combustibles. M. G. LEVI, C. PADOVANI AND F. CARDIA. *Atti III congresso naz. chim. pura applicata* **1930**, 753–66.—Briquetting tests were made on lignite, anthracite, semicoke, peat and mixts. of these with sulfite tar, mineral oil, linseed oil and mixts. of these. Resistance to fracture and atmospheric effects were detd.
E. M. SYMMES

Determination of moisture in combustibles. C. PADOVANI AND C. SINIRAMED.

Atti III congresso naz. chim. pura applicata 1930, 778–81.—Combustibles may oxidize during the detn. of moisture (*Compt. rend. 7 congresso chim. ind.* Oct., 1927). All coals, heated to 60–70° in a current of N_2 free from O_2, evolve small quantities of CO_2. A method was developed to det. simultaneously the loss of wt. of the coal by heating at 100° in a current of N_2 and increase in wt. of a $CaCl_2$ tube. Loss of wt. of the coal is greater than increase in wt. of the $CaCl_2$ tube. E. M. SYMMES

Incomplete combustion: its importance, recognition and prevention. E. W. B. DUNNING. *Gas J.* 193, 271 6; *Gas World* 94, 127–30(1931).—A review is given of the fundamental principles of combustion together with the physiol. effects of the products of complete and incomplete combustion. The importance of CO in incomplete combustion is emphasized. It is the only gas that can be present in sufficient concn. to be dangerous in the flue products from gas-consuming appliances. The combustion characteristics of various types of gas appliances are reviewed and the amt. of CO to be expected is shown to be below any figure at which adverse physiol. effects can occur. The products of combustion of town gas can be and should be harmless. When this is not the case the cause can be traced to the various factors in the design of the gas appliances. The degree of incompleteness of combustion is detd. by the analysis of the flue gases for CO. The estn. of the products of incomplete combustion offers some difficulty because of the small concn. in which they are present and special methods must be used. The CuCl method is not suitable for detg. CO. The preferred method, which is very sensitive, is the oxidation of CO with I_2O_5 according to the following equation $I_2O_5 + 5\ CO = I_2 + 5\ CO_2$. A train of app. for this method is described and illustrated. An accuracy of 2–3 parts of CO per million of flue gases can be obtained. F. H. BERGEIM

The problem of lignite in Italy. ALDO REGÉ. *Chim. ind. agr. biol.* 7, 17–27 (1931).—Lignite was found in small quantities in every Italian Province, but mostly in Tuscany. The Valdarno lignite contains: moisture 51.8, volatile matter 25.35, ash 6.60, fixed C 15.25%, and has a heating value of 7663 cal (on dry basis). The gas obtained by distn. has a heating value of 5592–6192 cal; the coke is of bad quality, but a very good coke is obtained by mixing the lignite with 25–30% of ordinary coal. The Piedmont lignite has: moisture 10–13, volatile matter 30–36, fixed C 34–45, ash 12–13%. The xyloid lignite from Spoleto has: moisture 35–45, volatile matter 30–45, ash 8–18, fixed C 27–38%, heating value 3–4000 cal and the gas obtained by distn. contains: CO_2 12–14, O_2 0.2–0.7, H_2 25–29, CO 11–14, CH_4 2–5, N 34–40% and has a heating value of 1050–1350 cal. G. A. BRAVO

The torbanites of South Africa. F. H. CUNNINGHAM CRAIG. *J. Inst. Petroleum Tech* 16, 620–5(1930).—See *C. A.* 24, 2860. EMMA E. CRANDAL

Some modern ideas on coal. F. V. TIDESWELL. *Colliery Guardian* 140, 1651–4, 1744–6, 1845–6(1930). A detailed summation is given of the present state of our knowledge of the structure and compn. of coal. E. M. SYMMES

The classification of Roumanian coals. I. BLUM. *Bul. chim. soc. română stiinte* 31, No. 4–6, 3–11(1931).—The basis for the classification of coals is clarified. The geologic age is not a sufficient criterion for the purpose. Physico-chem. and petrographic characteristics of the coal must also be considered. The decisive factors in detg. the chem. age of coal are (1) elementary compn., (2) behavior on distn. and (3) resistance to action of certain solvents. The later coals contain less C and more O, have a lower calorific value, and give off more gas (largely CO_2) and at a lower temp. than the earlier ones. In consideration of these ideas Lupeni coal, usually considered a superior lignite, should be classified as bituminous. CHANNING WILSON

The rôle of the components of Roumanian fossil coals in the composition of the gas distilled from them up to 500°. I. BLUM. *Bul. chim. soc. română stiinte* 31, No. 4–6, 13–9(1931).—Four Roumanian coals and lignites were extd. with solvents, and the residues from each extn. submitted to distn. Bitumen was removed from the original coal by extn. with a benzene-alc. mixt., lignin by extn. with H_2SO_3 in an autoclave, and humic acids with NH_3 soln. at 90°. No cellulose was found in the coals examd. The residues richer in humic acids and lignin gave more gas on distn. Unsatd. hydrocarbons were less in residues after extn. of bitumen. CO and CO_2 were found in larger quantities in gas obtained from residues rich in lignin, and especially humic acids. The gas from the carbonaceous residues after all three extns. contained a larger percentage of CH_4. CHANNING WILSON

The coal industry of South Africa. T. COULTER. *J. Chem. Met. Mining Soc. S. Africa* 30, 348(1930); cf. *C. A.* 24, 4374, 5133; 25, 576.—Discussion. A. H. E.

Washability studies of the Black Creek bed at the Bradford Mine, Dixiana, Ala. B. M. BIRD, B. W. GANDRUD AND C. B. BARMORE. Bur. Mines, *Rept. of Investigations*

3083, 12 pp.(1931).—The prepn. of a washed coal contg. less than 2% ash should be practicable with a comparatively simple washing system. The coal contains a large proportion of fine sizes due to friability. There are only small quantities of flaky impurities. The coarse and fine sizes should be separately washed. A. H. E.

A contribution to the coal-dust problem. I. Mathematical treatment of the free fall of dust particles. II. Deposition of dust particles from a horizontal gas stream. III. Centrifugal separation of dust from gases. Fr. Prockat. *Glasers Ann.* **106**, 73–9, 93–7, 151–4; **107**, 38–45, 47–54(1930).—A formula for free fall of dust particles is derived, which is superior to that of Stokes, and agrees with the data within 10%. Mathematical formulas are derived for horizontal settling chambers and centrifugal separators, which are in agreement with data from exptl. equipment. L. W. T. C.

Determination of sulfur in coal, gas and purifying material. J. H. Steinkamp *Gas Age-Record* **67**, 53–4(1931).—The Parr $KClO_4$ method for coal is briefly described. A method for gas, of burning the gas, oxidizing the SO_2 in 3% soln. of H_2O_2 and titrating with 0.1 *N* KOH is described. For S in purifying material, the material is extd with CS_2, tarry matter being removed by passage of the CS_2 through a tube filled with activated coal. The CS_2 is evapd. in a crystg. dish which is placed in a drying oven at 50° for one hr., leaving pure S, which is weighed. Leslie B. Bragg

The assay of coal for gas manufacture. J. G. King. *Gas Eng.* **48**, 75–7(1931); cf. *C. A.* **24**, 944.—A modification of the Gray-King Method (*C. A.* **23**, 5026) for the assay of coal is described, making it suitable for application to coals used in gas manuf The volatile products of carbonization are passed through a cracking zone in which the temp. is controllable. The probable yields of products are calcd. from the assay yields by suitable factors obtained by comparing the yields obtained from a certain no. of typical coals. The correlation of assay and plant yields is more difficult with vertical retorts than horizontal retorts, although it is satisfactory in both cases

Channing Wilson

Midwest coals in gas-producer practice. O. L. Scales. *Blast Furnace Steel Plant* **19**, 252–4(1931).—While there is no advantage in the use of midwestern coals from the standpoints of operation, of more satisfactory railroad service or of improvement in the product, good midwestern coal is considered, at present prices, more economical for gas producers than eastern coal. H. C. Parish

Variations in the evolution of gases on preheating coals having reached different stages of evolution. M. Legrave. *Chimie & industrie* **25**, 18–21(1931); cf *C. A.* **24**, 710.—Twelve coals (all but 1 from the Liège coal fields), selected so as to have comparable contents of vitrain and durain, were treated under exactly the same conditions by the same operator, as follows: volatile matter was detd. as usual; a 2nd portion was heated 30 min. at 400°, allowed to cool, and volatile matter was then detd. in the usual way. Similar tests were carried out on 4 samples of vitrain which were sep. from the coals and which contained 10.2%, 12, 15 and 20% volatile matter, resp. Two samples of fusain, with 8.5 and 17% volatile matter, resp., both gave approx. 10% volatile after preheating. The facts that the curve for the whole coal crosses the volatile-content axis at about 15–8% volatile matter, which is approx. the crit. volatile content sepg. coking from non-coking coals, that the general trend of the vitrain curve is similar to that of the whole coal but the total evolution of gases is considerably smaller, and that the preheating treatment completely destroys the coking properties of coal suggest that a study of the chem changes undergone by vitrain carried out on carefully selected coals representing the various stages of the evolution of coal might yield valuable information on its role in the coking of coal. A. Papineau-Couture

Protection of working people and of the neighborhood in the firing of pulverized coal. W. Weitfeldt. *Zentr. Gewerbehyg. Unfallverhütung* **17**, 142–7(1930). Four dangers exist: dust, poisonous gases, explosions and fire. Inhalation of dust is less dangerous than CO and other gases, which occur from excessive pressure due to blockage. Fat coal is the most dangerous from an explosion standpoint. Coal of 50% ash is particularly free from risk. Conditions causing fire and explosion are described

George R. Greenbank

An investigation into the health of employees in gas-making plants. F. R. Kerr Commonwealth of Australia Dept. Health, *Bull.* No. 7; *Bull. Hyg.* **6**, 27(1931). Three hundred and seventy workers in gas plants were subjected to radiant heat, fumes and coal dust. They were divided into 3 groups according to Schneider's fatigue test, pulse rate and blood pressure. Only 105 fell into the last group which gave the poorest test. There seemed to be no ill effects of the work. Eight cases showed 5% or more carbohemoglobin; 1 case showed 15%, but no increase in red blood cells. K. recom-

mends appliances for administering O and CO_2 mixts. in acute cases of gassing.
GEORGE R. GREENBANK

Purification of town gas by means of oxide of iron. J. DREVERMAN. *Gas J.* **193**, 97–100(1931).—The principal factors governing the use of iron oxide for the purification of gas are (1) the activity of the oxide for the absorption of H_2S, (2) the phys. state of the oxide, (3) the concn. of the H_2S in the gas, (4) the velocity of the gas, (5) the time factor for chem. reaction and (6) the design and economical no. of boxes. In practice iron oxide is used either in the form of a slurry by mixing with water and circulating through tower scrubbers or as a relatively dry spongy mass standing on grids in covered purifier boxes through which the gas is passed. The dry method is the most commonly used. The suitability of various forms of iron oxide is discussed. When the dry method is used the oxide is usually mixed with sawdust, shavings, grain husks, cut-up straw, tan bark or old oxide. Details are given on the operation of an iron oxide purifier at Mortlake (Australia).
F. H. BERGEIM

The utilization of butane-air gas in domestic appliances. G. L. BRENNAN AND L. H. WRIGHT. *Gas Age-Record* **67**, 37–41, 60(1931).
LESLIE B. BRAGG

The tetralin process (for avoiding naphthalene stoppages in gas mains). GEORG WEISSBERGER. *Gas u. Wasserfach* **74**, 154–6(1931); cf. *C. A.* **24**, 5464, 5978.—Two methods for introducing tetralin into gas mains are given: (1) by elec. heating to vaporize the tetralin and (2) cold atomization. These methods are illustrated and discussed. The formula for the amt. of tetralin to be vaporized into the main per day is $x = 5\ m\ (A + 8)/100{,}000$, where x is the kg. of tetralin per day, m is the vol. of gas in cu. m. per day, and A is the naphthalene content of the gas in g. per 100 cu. m. Users of tetralin are warned as to its inflammable nature. Precautions are given
R. W. RYAN

Distant pressure control (in the distribution of gas). H. C. WIDLAKE. *Gas J.* **193**, 91–7(1931).—The object of a distant pressure indicator is to furnish at the works a continuous indication of the pressure prevailing at some selected point on a distant district. W. describes an instrument of his own design for this purpose. It is of the proportionate current type, *i. e.*, it maintains in its circuits a current of electricity which at all times is directly proportional to the pressure prevailing at the distant point. It consists of 2 parts (*a*) the transmitter housed at some distant key point, and (*b*) the indicator which is installed at the works. A sketch is given which shows in detail the construction of the app.
F. H. BERGEIM

Steam generation in gas works practice. W. GREGSON. *Gas J.* **193**, 215 (1931).—It is general practice to provide for all gas works power requirements with steam. The av. gas works requires 800–1200 lb. of steam per ton of coal carbonized, for power and process requirements. Steam can be generated in 2 ways: (1) by utilizing surplus heat from the retorts, (2) by firing boilers with coke breeze. The first method is most commonly used in modern works. Any well-run gas works can be self contained on "waste heat" steam alone for ordinary requirements. Coke breeze should only be used on the works when special steam requirements demand an excess over normal figures.
F. H. BERGEIM

Cheaper gas with off-peak electric power. PAUL MCMICHAEL. *Gas Age-Record* **67**, 1–5, 16(1931).—A central station can reduce the cost of generating electric energy to satisfy steady load by operating continuously at a rate approaching that of max. efficiency and selling any surplus energy for the cost of the fuel required for its generation. This surplus energy may be used to produce H and O for chem. and metallurgical processes. Pending a development of demand for this H and O the gases can be used by a gas company whenever the cost of off-peak power is no more than 1.90 mills per kw. hr. a. c. The O may be used to manufacture oil gas with which to enrich blue gas even when the off-peak energy cost exceeds 2.50 mills per kw. hr. a. c. H might be used for some process such as NH_3 synthesis pending development of a demand by chem. or metallurgical industries.
LESLIE B. BRAGG

Italian natural gas. M. G. LEVI AND C. PADOVANI. *Atti III congresso naz. chim. pura applicata* **1930**, 688–717.—The sources which contain definite, appreciable quantities of hydrocarbons higher than CH_4 are not more than 20, all in mountains or hills. It is probable that all, or almost all, of the Appenine sources contain small quantities of higher hydrocarbons. There is no great difference in the compn. of gas from mountains and of gas from plains, except that the latter contains more CO_2 and N_2.
E. M. SYMMES

Cleaning stack gases. JOHN B. C. KERSHAW. *Elec. World* **97**, 542–6(1931).—London power stations are washing the plant gases to eliminate dust and noxious gases. Three essentials for success of the treatment of flue gas are: (1) the placing of sprays

along the first flue to increase the humidity of the gases, with surfaces of Fe to assist in converting SO_2 to SO_3, (2) the provision of further sprays and of wetted contact surfaces in the second flue to continue the conversion and to effect the soln. of SO_3 and its elimination from the waste gases, and (3) the provision of further surfaces moistened with alkali for the total elimination of S from the gas. The Battersea power station is planned to fulfil 14 conditions named. The plan permits the use of an overall figure of 25 tons of water per ton of coal, and the time of contact allowed for ranges from a min. of 23 secs. to a max. of 44 secs. Corrugated plates of (*a*) Staybrite steel, (*b*) calorized steel, (*c*) a Si-Al alloy, and (*d*) tinned iron are being tried out to secure the necessary catalytic action. A close-grain cast iron or a Si-cast iron will be used for all pipe work and an alloy of Si and Cu or of cast Fe and Monel metal will be used for the circulating pumps and other machinery in contact with the wash water, and sprays of the centrifugal type will be constructed of a Si-Cu alloy. Cost estimates for gas washing (36c per ton of coal burned) are considered high. Results of exptl. trials of gas washing at Grove Road station of the London Power Co. in 1930 are tabulated.
W. H. BOYNTON

Automatic seal for water-gas plants. J. H. WAINWRIGHT. *Gas World* **94**, 56–7 (1931).—The differences between the ordinary method of water-gas manuf. and the back-run process are pointed out and the automatic seal box of the latter process is described in detail. F. H. BERGEIM

The coal water-gas plant at Plauen. MÜLLER. *Gas u. Wasserfach* **74**, 173–8 (1931).—This water-gas plant uses a "high pressure" water-gas generator with a revolving grate and a distn chamber in the upper part of the generator, a carburetor for cracking the vapors of the low-temp. tar and a superheater. This gas had a heating value of 370 B. t. u. per cu. ft. and a sp. gr. (air) of 0.56. The yield was 25.4 cu ft. of gas per lb. of coal. The cycle, analysis of the gas and some operating details are given. Although the plant has only been in operation a short time, it appears to have been successful. R. W. RYAN

Graphical determination of the calorific value of coal gas. A. ALISON. *Gas Eng.* **48**, 41–2(1931).—The construction of nomographs for the detn. of the calorific value of coal gas is described. CHANNING WILSON

Distribution experiences with dry coal gas. J. W. HARRISON. *Gas Age Record* **67**, 121–4, 130(1931).—Troubles from dust, varying gravity, naphthalene stoppages and gum formation, following a change from satd. water gas to partially satd. coke-oven gas with water gas addn. for peak loads, are discussed. Steam injection and oil fogging have been tried with partial success. LESLIE B. BRAGG

Nature and properties of certain hydrocarbons in coal gas and their effect on meter leathers. R. S. ANDREWS. *Gas J.* **193**, 158–59, 212–3(1931).—Unsatd. hydrocarbons occurring in the light oil content of carbureted water gas, particularly styrene and indene, polymerize in the presence of O_2 to gums and resins and deposit on the meter leathers and moving parts with detrimental results. These unsatd. hydrocarbons owe their origin to imperfect cracking due to the low temp. in the carburetor. Analytical data are given on the compn. of vertical retort gas, horizontal retort gas and carbureted water gas and also on light oils scrubbed from these gases. The tests show that of the 3 gases tested horizontal retort gas is by far the least damaging to meters and carbureted water gas the most damaging. The horizontal retort gas is the lowest in light oil and this light oil is the lowest in unsatd. hydrocarbons. Meter troubles have been accentuated by the presence of large percentages of continuous vertical retort gas. Methods of preventing meter troubles are, (*a*) efficient methods of washing and condensation, (*b*) avoiding low temp. in retorts, (*c*) maintaining low content of O in gas, (*d*) addn. of blue water gas, (*e*) introduction of semi-chrome tanned leather diaphragms, (*f*) correct selection of leather dressing, and (*g*) selection of a suitable position (where there is a min. temp. variation) for the consumers meter. F. H. BERGEIM

Determination of tar fog in coal gas with glass filters. HORST BRÜCKNER. *Gas u. Wasserfach* **74**, 183–4(1931). A very effective analytical filter for detg. tar fog in gas is illustrated. The filter consists of 2 fritted glass filters in a large tube, constricted at both ends. The inlet may be partly filled with cotton to remove larger particles and the other end of the filter tube is connected to the gas meter. Most of the tar fog is caught by the cotton and the first glass filter. The gas flow is stopped when a brown coloration first appears on the second fritted filter. Directions are given for carrying out accurate tar-fog detns. R. W. RYAN

The determination of the heating value of coke-oven gas with Junker's gas calorimeter. HUBERT GREWE. *Arch. Eisenhüttenw.* **4**, 75–85(1930).—A gas calorimeter with attachments for air-moistening and gas-cooling is described. H. S. VAN KLOOSTER

Development and technical accomplishment of a new process for the manufacture of hydrogen and hydrogen-nitrogen mixtures. G. Gluud, K. Keller, W. Klempt, R. Bestehorn, F. Brodkorb, J. Schröter and E. Curland. *Ber. Ges. Kohlentech.* 3, 211–370(1930).—The development of a process for the production of the cheapest possible H_2-N_2 mixts. (also H_2 alone) from coke-oven gas (and natural gas) is described, including theoretical calcns., lab. work and operation of a unit of 400 cu. m./hr. H_2 output. Existing H_2 processes from coke and coke-oven gas (Linde-Bronn liquefaction, D. R. P. 301,984) are considered less satisfactory than this process, whereby hydrocarbons are decompd. at atm. pressure with steam or steam-air mixts. in 2 steps to give H_2 contg. only 0.05–0.07% CO: (1) $CH_4 + H_2O = CO + 3H_2$; (2) $CO + H_2O = CO_2 + H_2$. Following scrubbing out of H_2S, step 1 takes place at 750–1100° in a two-chamber converter of chamotte (hottest chamber) and "nicrotherm." All org. S present is converted to CS_2. Under operating conditions, the Ni-MgO catalyst, supported on "R-Schamotte" (Haldenwanger) refractory rings, is S tolerant Gases are heated rapidly through the zone of possible soot formation by partial combustion with air. This reaction is also used to supply heat to the process. By use of air injection, exit gases from this first step have the approx. compn.: 2.6% CO_2, 0.04–0.08% CH_4, 16.3% CO, 55.8% H_2 and 25.3% N_2. Conversion of CO in step 2 is carried out over natural dolomite which serves both as a catalyst and absorbent for CO_2. Much depends on a proper dolomite, which has to be activated by burning at not over 850°. The large-scale operation of this step with 2 chambers and over a 40-hour cycle is described. Cost estimates for a 70 ton/day plant are given. Application of the process to natural gas is covered briefly. T. H. Chilton

The question of the carbon dioxide + oxygen content of furnace gas. J. W. Arbatsky. *Die Wärme* 54, 156–7(1931).—A $CO_2 + O_2$ content above 20.9% of a furnace gas is shown to result by the incomplete combustion of a coal of high O content. With some fuels, such as cellulose, it is possible to have a total $CO_2 + O_2$ content above 20.9% with complete combustion. Math. Allen S. Smith

Use of nickel and copper salt solutions for washing hydrocyanic acid out of coke gases. W. Gluud and W. Riese. *Ber. ges. Kohlentech.* 3, 437–51(1931).—Ni salts are effective in removing HCN from gases by forming first a sulfide and finally a double cyanide as follows: $NiS + 2NH_4CN \longrightarrow (NH_4)_2S + Ni(CN)_2$ and $Ni(CN)_2 + 2NH_4CN \longrightarrow (NH_4)_2Ni(CN)_4$. In the presence of NH_3, however, some of this double cyanide can be decompd to give $[Ni4NH_3](CN)_2$, the cyanide split off being converted into a thiocyanate. To avoid this, NH_3 is replaced by soda or potash, and the double cyanides of Na or K are formed. These are more sol and can reach high concns. in the wash liquid without impairing its efficiency. $Na_2Ni(CN)_4$ or $K_2Ni(CN)_4$ can be readily sepd. from the wash liquid by crystn., but the recovery of the Ni and alkali salts from the double cyanides is not as yet a commercially feasible process. In the use of Cu salts, $K_3Cu(CN)_4$ or $(NH_4)_3Cu(CN)_4$ are formed, but these compds. are not quite as stable as the corresponding Ni salts, being quite sensitive to carbonic acid. With increasing concn. of the double cyanide in the wash liquid its efficiency decreases. The same difficulty in recovery of the Cu salts is encountered as with Ni. H. Stoertz

Removal of hydrogen sulfide and hydrocyanic acid from crude benzene. K. Keller. *Ber. ges. Kohlentech.* 3, 429–36(1931).—In the presence of air and small quantities of NH_3, H_2S is readily removed from crude benzene by conversion to $(NH_4)_2S$ and subsequent oxidation to $(NH_4)_2S_2O_3$. A small amt. of H_2O is necessary. HCN is also removed simultaneously with H_2S by conversion to NH_4CNS. H. S.

Benzene recovery (in gas works). Friedrich Goldschmidt. *Gas u. Wasserfach* 73, 636–7(1930).—Efficient gas cooling will permit the tar to remove a large portion of the naphthalene. In practice, a naphthalene content of 10–15% in the wash oil must be allowed to secure a reasonable life for the wash oil. Higher concns. of naphthalene may cause naphthalene deposition behind the benzene washers or in the purifiers. Fresh wash oil is added from time to time to replace that carried away by the light oil. Both the preheating and cooling surfaces should be great enough to avoid losses when water is present. The wash oil may be successfully preheated to 130–145° without thickening, contrary to earlier belief, and steam distn. of the wash oil to 0.3% benzene may be carried to 180°. The test of efficient benzene removal from gas is not the percentage extn., but rather the amt. of benzene remaining in the gas. R. W. Ryan

Some observations on the composition and recovery of crude benzene produced under different carbonizing conditions. S. Tweedy. *Gas World* 94, 15–8(1931).—Crude benzene is mainly a coke-oven or gas-works product of boiling range 65–190°. Typical analyses (% by vol.) of crude benzene produced by carbonization in the hori-

zontal retort, in the vertical retort and in the coke oven are, resp., benzene 61.2, 32.5, 61.7; toluene 19.9, 14.0, 15.0; xylene (and light naphtha) 9.7, 24.4, 10.0; heavy naphtha —, —, 8.0; paraffins 1.6, 15.3, —; loss on washing 7.1, 13.4, 5.3. The compn. of the crude benzene varies with the time of carbonization when only one system of carbonization is used. A silica regenerative coke-oven battery gave crude benzene of the following compns. when operated under the carbonizing times of 29.5 hrs. and 16.2 hrs., resp.: benzene 42.9, 62.0; toluene 20.3, 17.9; solvent naphtha 6.8, 5.3; paraffins up to 140° 5.6, 1.1; CS_2 0.1, 0.1; washing loss 8.5, 3.1; and benzene residues 7.1, 5.2. Other important factors besides time which influence the compn. of crude benzene are (1) type and size of oven, (2) carbonizing temp., (3) uniformity of heating, (4) the degree to which the oven is filled with the charge, (5) class of coal, (6) moisture in the coal and (7) operation of the oven. Figures are given showing the absorption efficiencies of benzene in gas oil at varying temps. F. H. Bergeim

The refining of motor benzene by means of silica gel. R. C. Geddes. *Gas World* 94, Coking Section, 9–12(1931).—The silica gel process gives a greatly increased yield over the usual H_2SO_4 refining process. Where 72% is the normal yield in the old type of plant employing a once running still for refractionating the crude recovered benzene silica gel gives 85%. In a modern plant with efficient stripping stills, and the primary once running still eliminated, where 86% is being obtained, the yield with the silica-gel process is 93%. The following data give a comparison of the results of the H_2SO_4 and the silica-gel processes. By starting in each case with crude benzene of the following % compn.: diolefins 1, olefins 10 and aromatics 89 the resultant benzene refined with strong H_2SO_4 is diolefins 0, olefins 0 and aromatics 89 parts. With dil. H_2SO_4 and with silica gel the resp. figures are: 0.25, 2.5, 89 and 0, 9.5 and 89. The high yield in the silica-gel process is due to the retention of the stable unsatd. compds. which are not only not harmful to motor benzene but also have a definite antiknock value. In the silica-gel process the polymerization of the undesirable unsatd. compds. is started by the treatment with dil. H_2SO_4. The polymerization is accelerated by the catalytic action of silica gel at 150°. A unit wt. of silica gel will treat 1500 times its wt. of oil before activation becomes necessary. The general layout of a silica-gel refining plant is given. F. H. Bergeim

Construction of waterless gas holders. L. Hartley. *Gas World* 94, 61–2(1931). A review is given of the structural features of waterless gas holders. F. H. Bergeim

Measurement of the amount of dust and tar in generator gas. Gustav Neumann and Franz Strähuber. *Arch. Eisenhüttenw.* 4, 151–4(1930).—An *app.* was developed for the detn. of dust and tar in generator gas, which is suitable for the collection of the coarse and fine dust coming from the generators over longer periods of time. The 2 main parts are the collection chambers, also serving as cooling chambers, and the filters. A tube of NCT steel proved suitable as a collection tube. Cotton was used as a filter material. An av. analysis of the gas showed the presence of 8.65 g. of dust, of 11.35 g. of tar and of 55.80 g. per cu. m. of dry gas. Leopold Pessel

The free carbon in coal tar. J. Marcusson. *Chem.-Ztg.* 54, 795–6(1930). Tars from a vertical still and from a horizontal still are compared. The amt. insol. in CCl_4 was 7 and 24%, resp. The benzene-sol. part contained 8.6 and 0.5% of hydroxy acid, 73 and 16.3% of pyridine-sol. resins, 18.4 and 52% of pyridine-insol. resins and 0 and 51.2% coke, resp. A. L. Henne

Extraction of bases from primary tar by water of condensation. A. Travers and Franquin. *Compt. rend.* 191, 951–2(1930).—Detn. of the amt. of pyridine bases in the water of condensation from tar is difficult because their concn. is only about 0.1%, and NH_3 is present in 6–7 times as high a concn. Extn. of the bases by an org. solvent, *e. g.*, PhH, takes up about 90% of the phenols present in the water and a considerable proportion of the bases but complete extn. is impossible because an equil. is established between the aq. and the hydrocarbon phases. The presence of the pyridine bases improves the extn. of phenols on account of the formation of addn. compds. The best lab. procedure is to sep. the phenols by distg. from 30% NaOH, wash the distillate which contains all the NH_3 and bases 5 times with 50% of its vol. of Et_2O, distil off the Et_2O at 0°, remove the NH_3 from the residue by blowing CO_2-free air through at 0°, then add 40% NaOH soln. and read volumetrically the amt. of base liberated. Applied to the PhH used in extg. phenols, this method shows 7–8 g. of bases per l. in PhH. C. H. Pelt

Determination of phenols in primary tars. I. Ubaldini and O. Mochi. *Atti IIo congresso naz. chim. pura applicata* 1930, 782–91.—Detn. of phenols in tars may give results varying from 30 to 20% phenols. An improved method is to put 20 g. of tar in a vacuum-walled vessel, add 10 cc. of NaOH soln., d. 1.332, the tar and NaOH soln

being at the same temp. before mixing. The 2 are mixed, stirred with a glass rod and the max. temp. reached during the reaction is observed with a thermometer reading to 0.1°. The max. temp. is reached a very few sec. after mixing, and lasts long enough for reading. Dividing the rise in temp. by 0.42 gives directly the % of phenols present. E. M. SYMMES

Production of hydrocarbons from phenolic tars. C. PADOVANI AND E. DE BARTHOLOMAEIS. *Atti III congresso naz. chim. pura applicata* **1930**, 792–819.—It was possible to convert into hydrocarbons the primary lignite-tar fraction passing over at 200–300° and sol. in boiling soda soln. by heating to 750–800° in an atm. of H_2 and nascent H formed by the action of water in Fe. The best results were obtained with 100 g. of phenols heated for 2 hrs. at 780° in a tube 3 m. long, in the presence of water vapor and H_2, forming 36.16 g. of dephenolated oil b. below 200°, about half of which was pure C_6H_6. This yield can be increased by increasing the size of the tube and thus the contact surface. E. M. SYMMES

Investigations on commercial primary lignite tar from Valdarno. M. G. LEVI, C. PADOVANI AND I. UBALDINI. *Atti III congresso naz. chim. pura applicata* **1930**, 767–77.—Total analyses and fractional distn. of lignite tars are shown. E. M. SYMMES

Coking and decomposition heats of coal. III. ERNST TERRES AND KARL VOITURET. *Gas u. Wasserfach* **74**, 98–101, 122–8, 148–54, 178–82(1931); cf. *C. A.* **22**, 3035.—A new method has been devised for detg. heats of coking of coal with greater accuracy than heretofore by altering the method of operating the calorimeter. This new method is based on the fact that the heat content of the empty system is a straight-line function of temp. between 600 and 1100° and is independent of the heating time or amt. of heat applied. The heat of coking is the difference between the total amt. of heat supplied to the system and the heat taken by the calorimeter up to the shut-off point, less the heat content of the system at the given temp. The heat content of the gaseous products need be known only for calcg. the heat of decompn. Heat of coking curves are shown for 15 coals over the range from 600 to 1200°. These curves vary widely with the various coals, and no relation can be found between the curves and analytical data for the coal. The heat of coking of a given coal is reduced by storage and this decrease is somewhat proportional to time of storage. Heats of coking and heats of decompn. of 30 coals at 1000° are plotted against each other and fall on a smooth curve, permitting the estn. of the heat of decompn. of a coal when the heat of coking is known. The max. heat of decompn. of any coal is +50 kg. cal./kg. while many coals show neg. heats of decompn. The heat of coking of "pure" coal was shown to be 325 kg. cal. per kg. This investigation is being continued in the hope of applying the results to the coking process. R. W. RYAN

Coking a banded bituminous coal. C. P. FINN. *Iron Coal Trades Rev.* **121**, 949 (1930); **122**, 3; *Gas World* **94**, Coking Section, 2–5(1931). See *C. A.* **25**, 1659. LESLIE B. BRAGG

Coke-oven operation and maintenance. F. J. PELUKE. *Am. Gas J.* **134**, No. 2, 11–4, No. 3, 37–41, No. 4, 75–8(1931); cf. *C. A.* **25**, 1361. E. H.

The formation of fractures in coke. R. G. DAVIES AND R. V. WHEELER. *Gas World* **94**, 16–7(1931).—Carbonization results confirm Thau's previous work that cracks appear near the walls of the oven shortly after the start of the coking process rather than at a later stage, a short time before the carbonization is completed. F. H. BERGEIM

Coke for domestic fires. H. J. HODSMAN. *Gas World* **94**, Coking Section, 23–4 (1931).—A review is given of the progress of coking technology. F. H. BERGEIM

Continuous verticals. W. A. CURRIE. *Gas J.* **193**, 280–1; *Gas World* **94**–5 (1931).—The effects of temp., rate of carbonization and coal size on the products of carbonization are discussed. A high temp. is favorable to a large throughput, and gives a high yield in therms per retort. A formula is given for the calcn. of the optimum throughput of coal based on the free space in the charge and the swelling power of the coal. F. H. BERGEIM

Circulating-stream coke ovens. O. PRISCHER. *Stahl u. Eisen* **50**, 761–7(1930).—This type of coke oven has twin flues, and a portion of the burnt gases is drawn by suction back into the incoming stream of heating gas and air so as to retard the combustion, avoid overheating and regulate the heat flow from gas to coking retort. A furnace of this kind is described and illustrated diagrammatically, and a brief account is given of its operation. B. C. A.

Some additional volume data for superheated steam (SMITH, KEYES) **2**. The relative merits of gas, oil and electricity for industrial purposes (HOPKINSON) **13**. Miner-

alogy of the coal fields (BELLIERE) **8.** Automatic analyzers of gas mixtures based upon thermal conductivity of gases and their industrial uses (DE FROBERVILLE) **1.** Lignin, humic acid and humin (FUCHS) **10.** Utilization of sewage gas (KUISEL) **14.** Chemical properties and examination of tar and pitches (BOCKSHAMMER) **22.** Automatic gas-analysis apparatus (Brit. pat. 337,862) **1.** Recovery of oils from mixtures such as destructive hydrogenization products of brown coal (U. S. pat. 1,794,865) **2.** Freeing tars from suspended solids (Brit. pat 338,154) **22.** Destructive hydrogenation (Brit. pats. 337,671 and 338,150) **22.** Fuel from petroleum distillation residue (U. S. pat. 1,793,014) **22.**

Von den Kohlen und den Mineralölen, 1930. Bd. III. Ein Jahrbuch für Chemie und Technik des Brennstoffe und Mineralöle. Edited by Fachgruppe für Brennstoff- und Mineralöl-Chemie der Vereines Deutscher Chemiker. Berlin: Verlag Chemie. 238 pp. M. 17.

Fuel, etc. TROCKNUNGS-, VERSCHWELUNGS-, UND VERGASUNGS-G. M. B. H. Ger 482,559, Feb. 3, 1928. Material to be treated thermally in dust form, *e. g.*, coal dust, is prevented from mixing with gaseous products by elec. cohesion.

Fuel briquets. DONALD S. ANDREWS. U. S. 1,793,833, Feb. 24. In making fuel briquets with an anthracite base, culm 85–90, asphalt 5–10 and pulverized bituminous coal about 5% are used together. The asphalt is rendered freely fluent by heating, the culm is heated to about the same temp. and mixed with the asphalt and the bituminous coal is then added and intermixed.

Fuel briquets. HANS HERTIG. Swiss 142,960, April 17, 1930. Briquets are made by mixing sawdust with 8–30% of adhesive substance (*e. g.*, water glass soln.) and pressed.

Pressing fuel briquets. FIRMA CARL STILL. Ger 514,888, Sept. 3, 1929.

Carbonizing fuel briquets. MAUREL INVESTMENT CORP. Brit. 337,600, Oct. 31, 1929. Briquets of ground coal and a hydrocarbon binder are passed through a liquid seal into a distg. zone where they are heated solely by indirect heat, and then through a second liquid seal and into a hardening zone and finally into a vertical retort. Various details of app. and operation are described. Cf. *C. A.* **25**, 192.

Distilling and gasifying solid fuels. METALLGES. A.-G. Brit. 337,721, May 2, 1929. Gasification and distn. of solid fuel are effected as it passes through a vertical shaft comprising a drying zone, distg. zone, gasifying zone and cooling zone. Steam is superheated by heat from preheated refractory bodies and is introduced below the gasifying zone. Gases for heating the fuel are passed through the app. countercurrentwise and tar or heavy or light oils may be mixed with the gases to increase the heating value of the gases produced, or O may be added to the gas or steam supplied to the app. Various details of construction and operation of the app. are described.

Catalytic treatment of volatile engine fuels. FERNAND C. F. PORTAIL (to Soc. anon. le carbone). U. S. 1,795,037, March 3. Air and fuel are brought into contact with very active porous C at a temp. of 300–400°, in order to facilitate subsequent complete combustion with addnl. air. App. is described.

Destructive hydrogenation. N.-V. DE BATAAFSCHE PETROLEUM MAATSCHAPPIJ. Brit. 338,192, Aug. 14, 1929. Hydrogenation under pressure of such materials as tar, petroleum products and residues, lignite and cellulose is effected with a catalyst consisting of a Mo compd. carried on adsorbent material such as adsorption charcoal or finely divided coal. In prepg. the catalyst, an aq. soln. of NH_4 molybdate, acidified with H_2SO_4, may be treated with H_2S to form a blue colloidal soln. to which "Carboraffin" or finely divided brown coal is then added, followed by filtration, washing and drying first at ordinary temp. and then at 50–60°. Various examples with details of the hydrogenation of brown coal and gas oil are given. Cf. *C. A.* **25**, 1362.

Fuels from coal and oil. TRENT PROCESS CORP. Brit. 337,920, Oct. 20, 1928. In a process involving coal and oil amalgamation, as generally described in Brit. 228,862 (*C. A.* **19**, 3011) and Brit. 262,302 (*C. A.* **21**, 3733), the amalgamation is first effected with a light oil such as "navy fuel oil" and the process then completed by addn. of a heavy oil (suitably with intermediate removal of ash content and change of water). Proportions used may be coal 85, light oil 5.0–7.5 and heavy oil 10–7.5%. Cf. *C. A.* **24**, 1735.

Decomposing coal. DEUTSCHE BERGIN A.-G. FÜR KOHLE- UND ERDÖLCHEMIE. (Wolf Grote, inventor). Ger. 517,317, July 12, 1928. In the destructive hydrogenation of coal at a high temp. and pressure, the production of coke-like and asphaltic products is hindered by addn. of a mixt. of Fe_2O_3 75–60 with Na_2CO_3 25–40 parts, with or with-

out a little alk. earth carbonate. About 10 parts of the mixt. may be added to 140 parts of coal.

Apparatus for pneumatic separation of solids of different densities as in purifying coal. J. F. C. FRIEND. Brit. 337,458, Aug. 2, 1929. Structural features.

Furnace for coking coal and heating a boiler or the like by the heat developed in coking. T. KOMATSU. Brit. 338,435, Feb. 6, 1929. Structural features.

Retort for destructive distillation of coal or lignite. H. HARDY. Brit. 338,047, Jan. 3, 1929. A drum is provided with a hollow shaft for admission of heating gases and evacuation of combustion products. The drum contains combustion chambers, distn. chambers and gas-outlet chambers, and progressive heating is provided either by rotation of the retort on the hollow shaft or by rotation of the latter while the retort is stationary. Various structural details are described.

Plate drier for lignite. "EINTRACHT" BRAUNKOHLENWERKE UND BRIKETFABRIKEN and MAX MAYER. Ger. 514,711, Feb. 7, 1929.

Smoke consumers. GEORG KORNECK. Ger. 514,975, April 15, 1926. Addn. to 500,932 (*C. A.* **24**, 4670). App. for burning the smoke and flue gases in furnace plant is described.

Condenser suitable for steam condensation. PELLE ANDERSSON (to Allis-Chalmers Mfg. Co.). U. S. 1,792,796, Feb. 17.

Combustible gas containing hydrogen and carbon monoxide. HERBERT A. HUMPHREY (to Atmospheric Nitrogen Corp.). U. S. 1,794,232, Feb. 24. In a continuous gas-producing process a mixt. comprising steam and O, preheated to above 1000°, is passed into and through a gasification chamber and finely divided solid fuel is fed into the chamber to contact and react with the preheated mixt and to generate gas at such a high temp. that CO and H substantially free from CH_4 or other hydrocarbons and CO_2 are produced; the hot generated gas is led into and through a second preheating stage and from the latter combustible gas is withdrawn. A reversal of flow of the mixt. contg. steam and O is effected whenever its temp. immediately prior to its contact with the fuel tends to fall materially below 1000° and (irrespective of the direction of gas flow) the particles of solid fuel are maintained in suspension in a relatively large mass of enveloping gas in the reaction chamber. App. is described.

Gas from coal distillation. I. G. FARBENIND. A.-G. Brit. 338,153, May 14, 1929 Bituminous coal is distd. by heating it in granular or finely divided form in a heat accumulator which is periodically heated to about 900°; residual coke may be gasified and the producer or water gas passed through the heat accumulator to heat it. Various details of app. and operation are described.

Dry purifier for coal gas, etc. FRANCKE WERKE A.-G. Ger. 517,320, Aug. 24, 1928. Structural features are described.

Fuel gas. MATHILDE LOTZ NÉE BLICKLE, AUGUSTE LOTZ, ARTHUR LOTZ, MATHILDE SPANKE NÉE LOTZ, MARIA KOWSKY NÉE LOTZ, ROBERT LOTZ and WALTER LOTZ. Ger. 517,414, Apr. 22, 1928. Addn. to 513,233 (*C. A.* **25**, 1364). When using coal that shrinks only slightly or not at all on gasification, the method of Ger. 513,233 is modified by gasifying the coal so that a layer of partly gasified coal is obtained on a layer of coke. Steam is then led into the coke layer, the water gas so produced passing through the upper layer.

Gas mixtures. GIULIO NATTA. Swiss 141,827, Mar. 7, 1929. A gas mixt. of CO, H and CO_2 contg. at least twice as much H as oxide of C, is obtained by passing an O and steam current (contg. at least twice as much steam as O) over C at about 700° and not over 750°. Cf. *C. A.* **24**, 5765.

Mixed water gas and coal gas. EDWARD A. DIETERLE. U. S. 1,792,632, Feb. 17. A hot bed of solid carbonaceous fuel is intermittently blasted with air, and steam is intermittently passed through it upwardly. Powd. carbonaceous material is intermittently introduced above the hot fuel by causing the powd. material to pass downwardly through a vertically disposed retort positioned above the fuel bed and externally heated by the rising hot gases which are generated to effect distn. of the powd. material before it encounters the hot fuel and the generated blue water gas; the resulting gases and entrained vapors are subjected to further fixing by passing them through vertically arranged elongated heated passages above the main fuel bed and around the retort App. is described. Cf. *C. A.* **24**, 949.

Water gas. I. G. FARBENIND. A.-G. (Fritz Winkler and Rudolf Augsten, inventors). Ger. 517,469, Feb. 22, 1928. Addn. to 437,970. For the continuous manuf. of water gas from granular fuel, which may contain dust, steam is blown into a shaft contg. the fuel so that the fuel is whirled about in the shaft, and the necessary heat is supplied by heating elements located in the shaft. Cf. *C. A.* **24**, 5986.

Continuous water-gas production. I. G. FARBENIND. A.-G. Brit. 337,807, Aug. 6, 1929. Fuel such as brown coal, small coal, semi-coke or peat is passed downwardly through externally heated vertical retorts supplied with steam (preferably superheated to about 800° while the fuel is heated to about 500° and the retort heating flues are heated to about 1200°). Distn. gas from the upper part of the retort is collected separately from the water gas from the lower portions. Various details for continuous operation are described, also of app. construction.

Automatic control system for electric valve operation in apparatus for generating water gas. JAMES S. KENNEDY. U. S. 1,794,906, March 3. Mech. and elec. features.

Apparatus for producing oil gas by partial combustion of heavy oil with superheated air and steam. C. CHILOWSKY. Brit. 338,281, Jan. 18, 1929. An atomized jet of oil, superheated steam and air issues from a nozzle and impinges against a crucible which may be of graphite or carborundum or non-oxidizing steel and in which eddy currents are set up; the flames pass in contact with the outer walls of the crucible and the products of partial combustion are then discharged through a catalyst (or the crucible itself may constitute a catalyst). Various details of construction are described. Cf. *C. A.* **24**, 2583.

Gas producer. HARRY F. SMITH (to Gas Research Co.). U. S. 1,794,478, March 3. Automatic control is provided for effecting communication between the offtake and a vent pipe or delivery main in accord with the quality of the generated gas, and various structural details are described.

Gas-producer plant. POWER-GAS CORP., LTD., and N. E. RAMBUSH. Brit. 337,825, Aug. 9, 1929. Various details are given of the construction and operation of a plant comprising a generator or producer, a waste heat boiler, a generator jacket boiler and a tubular superheater, two sets being used (alternately on "run" and "blow") for making water gas.

Gas producer (with a rotatable fuel shell and rotatable ash pan). ANSON K. BRADLEY (to Morgan Construction Co.). U. S. 1,795,162, March 3.

Gas producer (with a rotary ash pan). PHILIP S. HULT (to Morgan Construction Co.). U. S. 1,793,618, Feb. 24. Structural features.

Gas producer adapted for directly heating steam boilers. W. B. CHAPMAN. Brit. 337,388, July 29, 1929.

Apparatus for distributing granular fuel to gas producers or for similar purposes. A. JADOUL. Brit. 338,141, July 11, 1928. Structural features.

Domestic gas plant for generating gas from oil and vegetable materials. JOSEPH S. BIRTCIEL (one-fourth each to E. A. Rodgers, John S. Fogarty, Gerald Redmond and Homer L. Baughman). U. S. 1,795,005, March 3. Structural features.

Apparatus for washing flue gases with water sprays. J. T. BARON and J. B. CLARKE. Brit. 337,436, July 1, 1929. Structural features.

Gas holder. E. CHUR. Brit. 337,711, March 7, 1929.

Purifying furnace gases. SIEMENS-SCHUCKERTWERKE A.-G. Brit. 337,448, Jan. 9, 1929. Furnace gases which are to be passed through a separator such as an electrostatic pptn. app. are preliminarily brought to a uniform temp. and humidity by an app. automatically controlled by a thermometer and hygrometer. Various details of app. are described.

Removing naphthalene from coal gas. C. OTTO & Co., GES. (to N.-V. Silica en Ovenbouw Mij). Brit. 337,723, May 17, 1929. A solvent for naphthalene such as xylene is introduced into the gas in atomized or nebulized form, followed by electrostatic pptn., sepn. of solvent from the naphthalene and reuse of the solvent.

Separating ammonia and hydrogen sulfide from gases. CHRISTIAN HANSEN (to I. G. Farbenind. A.-G.). U. S. 1,795,121, March 3. In treating gases such as coal gases most of the NH_3 content is sepd. by treatment with water, and the residual gases are then washed in 2 stages, in the first stage, with the aid of a soln. contg. NH_4 thiosulfate, SO_2 and NH_4 polythionate, such a part of the H_2S is pptd. in the form of S that for the washing of the residual H_2S in the second stage a neutral NH_4 sulfite-bisulfite soln. suffices which is produced from the sepd. NH_3 and S.

Ammonia and hydrogen sulfide absorption simultaneously from industrial gases. CHRISTIAN HANSEN (to I. G. Farbenind. A.-G.). U. S. 1,795,120, March 3. Absorption of NH_3 and H_2S from gases such as coke-oven gas or illuminating gas is effected in a 2-stage process in the first stage of which is used "ammonium sulfite disulfite" wash liquor having a lower ratio figure of SO_2 to NH_3 than about 1.5, and in the second stage of which there is used an "ammonium sulfite bisulfite" wash liquor having a higher ratio figure of SO_2 to NH_3 than about 1.5.

Storing explosive gases. AUTOGEN GASACCUMULATOR A.-G. Ger. 514,722, Mar 2.

1928. Porous raw material is extd. and evacuated to remove substances such as resin, fat, gas, etc., and then filled into vessels to store such gases as C_2H_2. Cf. *C. A.* **24**, 4921.

Storing acetylene, etc. INDUSTRIEGAS A.-G. ZWEIGNIEDERLASSUNG WAGIRO-DISSOUSGASWERKE (Gustav Offe, inventor). Ger. 517,351, Sept. 24, 1929. Peat or like bituminous substances mixed with active C, or with flue dust from boiler furnaces, are used as a filler for containers in which C_2H_2 or other gas is to be stored in soln. under pressure.

Distilling tar. T. O. WILTON and CHEMICAL ENGINEERING & WILTON'S PATENT FURNACE CO., LTD. Brit. 337,581, June 13, 1929. In distg. tar by a process such as that described in Brit. 307,577 (*C. A.* **23**, 5308), more intimate mixt. of the crude tar and the pitch from the process is obtained by introducing them side by side through pipes into a const.-level tank. Various details of app. and operation are described.

Coking tar or molten pitch, etc. E. O. RHODES (to American Tar Products Co.). Brit. 337,800, Feb. 9, 1929. The material to be coked is sprayed into a heated coke oven in the presence of an inert gas such as steam (preferably after a preliminary distn. of tar if the latter is used). Various details of app. and procedure are described.

Coke and distillation products from coal. RICHARD H. CARR and CORNELIUS B. WATSON (to Pure Oil Co.). U. S. 1,793,838, Feb. 24. Various details of app. and procedure are described for low-temp. distn.

Vertical-flue coke oven. C. OTTO & CO., GES. (to N.-V. Silica en Ovenbouw Mij). Brit. 337,667, May 9, 1929.

Vertical-flue coke oven. J. VAN ACKEREN (to Koppers Co.). Brit. 337,801, April 25, 1929. Numerous details of construction and operation are described.

Vertical coking retort and charging and discharging apparatus. T. TOPPING and J. S. BLACK. Brit. 337,842, March 27, 1930.

Coke-oven gas-reversing valve. COLLIN & CO. Brit. 338,040, Dec. 27, 1928.

Coke oven (door construction). CARL STILL. U. S. 1,795,239, March 3.

Apparatus for operating a coke-oven door. RAYNARD CHRISTIANSON (to Koppers Co.). U. S. 1,793,456, Feb. 24. Structural features.

22—PETROLEUM, LUBRICANTS, ASPHALT AND WOOD PRODUCTS

W. F. FARAGHER

Quinquennial review of the mineral production of India for the years 1924 to 1928. Petroleum. E. H. PASCOE *Records Geol. Survey India* **64**, 257–73(1930); cf. *C. A.* **24**, 4245.—Indian oil production from 1924 to 1928 declined, although 1928 was a banner year. The country contributes less than 1% of the world's marketed supply. World's production and consumption are reviewed and the individual Indian fields discussed in detail. ALDEN H. EMERY

The total heat and specific heat of a series of fractions of petroleum oils and their relation to other properties. H. R. LANG, R. JESSEL AND A. H. STEED. *J. Inst Petroleum Tech.* **16**, 783–813(1930).—This paper gives the 1st results of a planned systematic study of the phys and particularly the thermodynamic properties of petroleum oils. A Miri (Borneo) petroleum was sepd. into 5 fractions with little overlapping. Sp. heat, total heat, their variation with temp., *n*, mean mol. wt., sp. gr. and coeff. of expansion were measured. Variations of the sp. heat, temp. curve from the straight-line relation are explained at low temps. by the presence of C_6H_6, with its high f. p., at high temps. by the presence of vaporized mols. and intermediately, by some aggregate forming tendency of the mols. Total heat above 100° was measured by Callendar's continuous-mixt. method. Sp. gr. and *n* were strictly linear with respect to mean mol. wt. EMMA E. CRANDAL

The isolation of the isomers of hexane from petroleum. JOHANNES H. BRUUN AND MILDRED M. HICKS-BRUUN. *Bur. Standards J. Research* **5**, 933–42(1930).—*n*-C_6H_{14}, $Me_2CHCHMe_2$, $Me_2CHCH_2CH_2Me$ and $MeCH_2CHMeCH_2Me$ were isolated from an Oklahoma crude petroleum, but the 5th isomer, Me_2CCH_2Me, was not found. Ordinary fractional distn. concd. the hexanes in a set of const.-boiling mixts., the other constituents of which were ring compds. The const.-boiling mixts. were broken up by distn. after the addn. of an alc. (MeOH or EtOH) which was later removed from the distillate by washing with H_2O. The f. ps. for air-satd. $Me_2CHCH_2CH_2Me$ and $MeCH_2CHMeCH_2Me$ are —143 ± 0.5° and —118 ± 0.5°, resp. The eutectic for the system CO_2–$Me_2CHCH_2CH_2Me$ is —153 ± 0.5° R. E. SCHAAD

The electrical conductance of hydrocarbons in thin films. L. BRÜNINGHAUS. *Compt. rend.* 192, 151–3(1931); cf. *C. A.* 24, 4142.—Films of oil 1μ thick become highly conductive to 110 v. d. c. and remain so until the electrodes are sepd. by 15μ. Conductance is always preceded by a semi-conducting stage. This is doubtless due to ions similar to those in gases. V. F. HARRINGTON

Refining mineral oils with adsorbents. BALDASSARRE SALADINI. *Atti III congresso naz. chim. pura applicata* 1930, 584–606; cf. *C. A.* 24, 1963.—Tests were made with shale oil, but the results apply to other high-S oils. Active C decolorizes indifferently and desulfurizes little. Decolorizing earths give rather complete decolorization and appreciable desulfurization. SiO_2 gel decolorizes less than the above, but desulfurizes better. In general, desulfurization follows the adsorption of colored substances. Bauxite, calcined at high temp., has an appreciable desulfurizing effect and polymerizing properties. Alternate use of bauxite and decolorizing earths on crude oil gives the best results and an economy in adsorbent. Decolorization is rather complete; desulfurization reaches 50%; the oil has a pleasant, ethereal odor and is stable. Regeneration of the treating materials is effected by calcination, which allows recovery of oil and S. E. M. SYMMES

Separation of obstinate crude-oil emulsions. The L. Berkhan patent. E. PYHÄLÄ. *Erdöl u. Teer* 6, 478–80(1930).—Caspian crude oils, emulsified with H_2O that contained clay and $MgCl_2$, could not be sepd. by ordinary settling. Serious corrosion troubles made drying operations or utilization as boiler fuel impossible. The possibility of centrifugal sepn. was demonstrated in lab expts. The Berkhan method is in successful operation. Sepn. is induced by an admixture of 0.5% of kerosene-naphthenic acids and settling of the warm mixt. It was shown experimentally that the emulsions were stabilized by traces of ozocerite. Naphthenic acids dissolve the stabilizer and lower the surface tension of the oil. K. H. ENGEL

Cracking processes in the Russian petroleum industry. I. SINGER. *Petroleum Z.* 25, 893–906(1929); 26, 482–91(1930); cf. *C. A.* 24, 3634, 4619 20.—Three types of cracking processes are described which serve for the production of (1) fuel oil of a better quality as regards η and cold test, cracking being carried out at 425° and under 10–60 atm.; (2) gasoline and fuel oil; and (3) gasoline and coke, in which the treatment is carried out at 450° and 20 atm. These processes were utilized in the cracking of Grosni and Surakhani mazouts and of various heavy crude oils. The results obtained with Grosni mazout show that gentle cracking (first method) causes a decrease in the cold test of the fuel oil obtained. In the second method, with a 1% yield of coke, 35% of cracked benzine is obtained; the quantity of coke formed is independent of the temp. but is const. with equal gasoline yields. With 15% of coke in the third method, 57% of cracked gasoline is produced. The following conclusions have been reached: (*a*) Greater yields of light products cause an excessive formation of coke and deteriorate the quality of the residue. (*b*) The velocity of the reaction is doubled for each rise in temp. of 10°. (*c*) The rate of coke formation depends on the chem. compn. of the cracked petroleum products. Paraffinic products yield less coke than paraffin free or asphaltic products. Kerosene yields practically no coke; solar and spindle oils yield very little; machine and cylinder oils yield large quantities and tars greatly increase the formation of coke. (*d*) Increase of pressure causes a decrease in the content of unsatd. hydrocarbons; paraffin hydrocarbons yield no coke on cracking, while aromatic hydrocarbons tend to give significant quantities. (*e*) The extent of the production of cracked gasoline and kerosene from heavy crude oil and mazout is practically the same. (*f*) The details of a cracking process are detd. not so much by the yields of cracked gasoline (which are the same for a given temp. and cracking time with heavy crude oils and mazout) as by the yields of coke, which vary for different petroleum products. The cracking of Grosni oil tar and paraffin tar is not important on account of the excessive quantities of coke formed. B. C. A.

Refining of cracked gasolines. P. M. EDMOND SCHMITZ. *Erdol u. Teer* 6, 493–4, 510–2(1930).—Raw gasoline treated cold with NaOH (30° Bé.) or hot with fuller's earth showed discoloration and gum formation on standing, even in the dark. Washing with NaOH should be followed by treatment with H_2SO_4 (strength 1%). A gasoline of excellent color and stability was obtained by a *vapor-phase purification* (100–20° above the highest b. p.) *over* Fe_2O_3. Various brands of fuller's earth, instead of Fe_2O_3, were less effective. Dry $CaCl_2$ and NaOH were practically ineffective. K. H. ENGEL

Compression pressure is controlling factor in inducing engine knock. SANDOR D. RUBENZ. *Automotive Ind.* 63, 20–3(1930).—Antiknock rating of a fuel is detd. on a single-cylinder Liberty engine by comparing the max. of the manifold vacuum-air-fuel

ratio curve with those of similar curves obtained for known blends of com. C_6H_6 in domestic aviation gasoline. "The constancy of the manifold vacuum points of incipient knock leads to the conclusion that, other things being equal, the compression pressure is the controlling factor in inducing knock." Antiknock value of gasoline for air-craft engines can be detd. only if the base fuel is specified when C_6H_6 rating is given. With "cold-running" (large central electrode) and "hot-running" (small central electrode) spark plugs, manifold vacua at incipient knock are almost identical. In this Liberty engine the tendency to knock is greater with 2 plugs than with 1, although 2-plug ignition is usually stated to reduce knocking. R. E. SCHAAD

X-ray studies on paraffin wax and petrolatum. SHINSUKE TANAKA AND AKIRA TSUJI. *Mem. Coll. Sci. Kyoto Imp. Univ.*, Ser. A, **13**, 369–73(1930).—The effects of temp. and mech. operations were studied by taking photographs of the x-ray diffraction patterns. *Influence of Temp.*—The photographs taken at temps. lower than the m. p. have many spectral lines characteristic of cryst.-powder photographs. These lines generally decrease in intensity as the temp. rises and vanish when the substances are melting. Amorphous bands appear in other positions. One intense line, however, remains until melting is reached and then suddenly vanishes. This transformation occurs in a different manner for each substance. *Effects of Mech. Operations.*—The effect of compression and rolling at room temp. was studied with paraffin wax with the following results: (1) The wax acquires a fibrous structure, the axis of which is perpendicular to the surface of compression and rolling. (2) The crystal planes which produce the most intense reflection are also nearly perpendicular to the surface of compression and rolling. C. J. HUMPHREYS

Electrochemical oxidation of paraffin. II. I. A. ATANASIU. *Ber.* **64B**, 252–60 (1931); cf. *C. A.* **24**, 2281.—Paraffin has been oxidized to acids by nascent O in the presence of catalysts. The lower the m. p. of the paraffin, the easier the oxidation. The app. and conditions of the expt. are described. V. F. HARRINGTON

What determines the value of absorption oil? F. L. KALLAM. *Chem. Met. Eng.* **38**, 78–81(1931).—The phys. characteristics of 24 new oils and 34 used oils in use as absorption oils in various refineries are presented in the form of curves to show the predominating properties which det. the suitability of a given oil for this purpose. It is concluded that the mol. wt. of the oil should be of the order of 150 to 200. The av. b. p. of a proposed absorbent should be specified because it is the index of the initial b. p., the vapor pressure and the gravity. Max. distn. residuum or the demulsibility factor, freedom from wax sepn. at the lowest operating temp. and viscosity should also be included in absorption-oil specifications. D. F. BROWN

Notes on the viscosity-temperature relations of lubricating oils. W. L. BAILLIE. *J. Inst. Petroleum Tech.* **16**, 643–60(1930).—By calcns. from data in Archbutt and Deeley's *Lubrication and Lubricants*, it was shown that Eckart's formula for the relation of temp. to viscosity is as accurate for kinematic as for abs. viscosity. Results calcd. by it agree with exptl. results within about ±2.5%. It is a special case of the general formula given by Slotte, $V = b/(t + a)^n$, in which t is temp. and V is kinematic viscosity. An equation was derived relating efflux time in sec. in the Redwood viscometer to viscosity: $AT - B/T = w\theta^n$. A and B are consts. of the instrument, w and n, of the oil; T is time of efflux; θ is the temp. Rigorous temp. control is most important with viscous oils. A temp. variation of 0.14°F. may cause a change of 1% in viscosity. A table is given for conversion of Redwood seconds to kinematic viscosity EMMA E. CRANDAL

Inorganic lubricants. IV. Lubricants for temperatures above and below normal. WILLIS A. BOUGHTON. *J. Am. Chem. Soc.* **52**, 4858–60(1930); cf. *C. A.* **25**, 196.—Aq. solns. of HPO_3 and $NaPO_3$, mixts. of salts melted in their water of crystn. with an inert material such as kaolin or graphite and solns. of $Ca(NO_3)_2$ in melted KNO_3 are good lubricants at temps. both above and below ordinary. A lower limit of —75° and an upper one of 360° have been reached. EMMA E. CRANDAL

Amount of lubricating oil burned in the gasoline engine. CLARKE C. MINTER AND WM. J. FINN. *Ind. Eng. Chem.* **23**, 285(1931).—The amt. of oil burned in a gasoline engine was detd. by operating with H and analyzing the exhaust gases. L. W. T. C.

Effect of carbon black on insulating oils. W. B. WIEGAND, C. R. BOGGS AND D. W. KITCHIN. *Ind. Eng. Chem.* **23**, 273–6(1931).—The elec. properties of insulating oils are improved by treatment with C black. L. W. T. CUMMINGS

Improving petroleum asphalts. A. I. VORONOV AND N. I. LOGVINOVA. *J. Petroleum Ind.* **1930**, 439 (in Russian); *Asphalt u. Teer* **33**, 876–8(1930) (in German).—Still residues of low-resin and high-paraffin content may be converted into satisfactory asphalts by *vacuum distn.*, followed by the customary air blowing. Asphalts of the

naphthene-aromatic type, rich in desirable resins but deficient in asphaltenes, should not be blown. Blending these asphalts with asphalts of the Me-naphthene-aromatic type is more economical, and yields a technically superior product. K. H. ENGEL

Determination of asphaltene content. F. J. NELLENSTEIN AND N. M. ROODENBURG. *Chem.-Ztg.* **54**, 819(1930).—As a solvent for use in detg. asphaltenes, Et_2O is superior to normal benzine because it is a homogeneous substance not requiring standardization; its flocculating properties are combined with low surface tension; and it has a greater dissolving power for the hydroxy acids in asphalts produced by oxidation and for certain constituents of coal tar. R. E. SCHAAD

Separation of bitumen from bituminous sands. K. A. CLARK. *Nature* **127**, 199 (1931); cf. *C. A.* **24**, 2873.—The bitumen sepd. by means of solns. of Na_2SiO_3 contained 1–4% of mineral matter. Difficulties to duplicate results were encountered. Improvements were obtained by giving the sand a preliminary wash with cold H_2O and then treating with alkali to bring the p_H value up to 6.4. The water removes a part of the clay and reduces the necessary quantity of alkali. The acidity of the sand is considered to be due to the presence of Fe^{++} and Fe^{+++} salts carried into the beds by ground water. I. M. LEVINE

The estimation of wax in pitch. W. LITTLEJOHN AND W. H. THOMAS. *J. Inst. Petroleum Tech.* **16**, 814–24(1930).—As the outcome of a study of what factors must be controlled in order to get results approaching reproducibility for the % of wax in pitch, a cracking method is recommended. The pitch is distd., at the rate of 40–50° temp. rise per min. to 450°. Distn. is continued to 500° at 15° rise per min. The distillate is dissolved in pure Me_2CO in the proportion of 35 cc. per g., and the washings from the neck of the flask are added. The soln. is cooled to 0°F.; this ppts. the wax, which is filtered off, redissolved in 70 g. of acetone per g and repptd. at 32°F. E. E. C.

Chemical properties and examination of tar and pitches. BOCKSHAMMER. *Teer u Bitumen* **29**, 29–32(1931).—A set of tests has been arranged which allows the general characterization of unknown bituminous materials through the identification of typical components. K. H. ENGEL

Combustion and detonation in gaseous mixtures. Antidetonants (LAFFITTE) **24**. The analytical distillation of gasoline (TORMEY) **2**. The relative merits of gas, oil and electricity for industrial purposes (HOPKINSON) **13**. Critical solution temperatures of systems of SO_2 and normal paraffins (SEYER, TODD) **2**. Calculating viscosity and flash point in compounded oils (KADMER) **2**. Recovering oil from waste water (Swiss pat 140,639) **14**. Oil filter (U. S. pat. 1,792,854) **1**. Unactivated "prefiltering medium" for treating oils (U. S. pat. 1,794,862) **1**. Apparatus for extractions with liquid solvents (U. S. pat. 1,794,874) **1**. Rotary impeller agitating device and filter for treating oils (U. S. pat. 1,794,916) **1**. Separator for oil and water (Ger. pat. 517,425) **1**. Destructive hydrogenation (Brit. pat. 338,192) **21**. Wax emulsions [for manufacture of lubricating greases] (Brit. pat. 338,176) **18**. Distillation of volatile substances [in refining oils] (Ger. pat. 514,740) **13**. Apparatus for "neutralizing" gases from gasoline engines (U. S. pat. 1,793,813) **1**.

Treating residues obtained on sweetening petroleum distillates. HERBERT G. M. FISCHER (to Standard Oil Development Co.). U. S. 1,795,278, March 3. Residue oil contg. alkyl polysulfides and obtained by the contact of sour petroleum distillates with S in the presence of a catalyst followed by distn. under reduced pressure to produce a sweetened distillate and a residue oil is heated to above 175° in order to reduce its S content. App. is described

Removing corrosive sulfur compounds from petroleum. WARREN F. BLEECKER U. S. 1,794,668, March 3. Brine is electrolyzed in the presence of the petroleum to produce Cl and H, and the nascent Cl is allowed to pass directly into the petroleum while the H is separately removed without introducing it into the petroleum. App. is described.

Purifying cracked petroleum vapors. CORNELIUS B. WATSON and RUDOLPH C. OSTERSTROM (to Pure Oil Co.). U. S. 1,793,885, Feb. 24. Vapors from a cracking process are cooled sufficiently to arrest conversion reactions, liquefied oil is sepd., remaining vapors are passed to a fractionating zone into the upper portion of which a material such as fuller's earth is introduced so that it falls countercurrentwise through the vapors, and vapors passing from this zone are further treated with fuller's earth or the like before passing to a sepg. zone. An arrangement of app. and various details of operation are described. Cf. *C. A.* **24**, 489.

Apparatus (with a tank and internal pipe coil) for cracking petroleum oils. ARTHUR

E. Pew, Jr. and Henry Thomas (to Sun Oil Co.). U. S. 1,794,200, Feb. 24. **Structural details.**

Cracking petroleum oils. Lyman C. Huff (to Universal Oil Products Co.). U. S. 1,793,443, Feb. 17. In a process such as that in which the oil is heated while passing through a pipe coil and thence introduced into a reaction and sepg. chamber, any accumulation of unvaporized liquid oil in the reaction zone is prevented by continuously and rapidly withdrawing the liquid from the reaction zone, while maintaining both the heating zone and reaction zone under superatm. pressure. Cf. *C. A.* **24**, 410.

Cracking hydrocarbons. O. D. Lucas. Brit. 336,269, April 10, 1929. See Fr. 692,549 (*C. A.* **25**, 1666).

Cracking hydrocarbons. Panhandle Refining Co. Brit. 337,380, June 29, 1929. See Fr. 678,412 (*C. A.* **24**, 3637).

Distilling hydrocarbons such as petroleum, tar or coal. Emil Piron. U. S. 1,794,542, March 3. A layer of the material is applied to a moving surface such as a heated chain or conveyor which is conducted through a distn. zone to effect distn. under heating and the distn. is positively checked by adding a further layer prior to removal of the residue from the distn. chamber (to avoid over-cracking). App. is described. Cf. *C. A.* **24**, 490.

Distilling hydrocarbon oils such as petroleum. John E. Bell (to Sinclair Refining Co.). U. S. 1,795,070, March 3. Vapors of the oil are passed from a still to a refluxing tower and uncondensed vapors from the latter are brought into indirect heat-exchange relation with fresh oil to preheat the oil and cool the vapors; the preheated fresh oil is introduced into the tower at a point below the point of introduction of vapors from the fresh oil into the tower, and addnl. oil is introduced into the reflux tower at a still higher point than the fresh oil vapors. App. is described. Cf. *C. A.* **24**, 1211.

Fuel from petroleum distillation residue. Richard L. Rodgers U. S. 1,793,014, Feb. 17. Residue from petroleum distn. or cracking, in finely divided form, is mixed with a substantially neutral liquid petroleum deriv. such as residuum oil or crude petroleum and a batch of this mixt. is heated at a carbonizing temp. to form a solid, coherent fuel.

Converting hydrocarbon material into products of lower boiling point. Wm. Landes. U. S. 1,792,912, Feb. 17. Various details of app. are described including a heating coil, expansion chamber and superheated steam supply.

Converting heavy hydrocarbon oils into products of lower boiling point. Jay J. Jakowsky (to C and C Developing Co.). U. S. 1,792,744, Feb. 17. A relatively heavy oil is vaporized under conditions such that a substantial part of the resultant vapors is in non-gaseous and substantially satd. condition, and the vapors, while in operative proximity to a surface heated to a converting temp. substantially above that of vaporization, are subjected to the pptg. action of a high-tension silent elec. discharge tending to drive the non-gaseous portion of the vapors toward the heated surface, and uncondensed products are conducted away for recovery of a desired product of lower b. p. App. is described. Cf. *C. A.* **25**, 200.

Refined white viscous hydrocarbon oil. Thomas H. Rogers (to Standard Oil Co. of Ind.). U. S. 1,793,134, Feb. 17. A small proportion of a naphthol is added for preventing acid formation and increase of emulsifiability in use of highly refined viscous hydrocarbon oils such as those used for lubricating turbines. U. S. 1,793,135 specifies the addn. of about 0.04% of pyrogallol for the same purpose, and refers to the use generally of similar polyhydroxy aromatic compds. Cf. *C. A.* **24**, 5149.

Separation of unsaturated constituents from hydrocarbon oils. Wm. M. Stratford (to Texas Co.). U. S. 1,792,877, Feb. 17. Material such as products from a cracking still in vapor form is continually brought into contact with a bed of adsorbent catalytic material such as fuller's earth, and adsorbed polymers are intermittently washed from the catalytic bed by the supply of solvent such as kerosene. App. is described. Cf. *C. A.* **24**, 4928.

Apparatus for separating oil and gas. Jay P. Walker (40% to Guy O. Marchant and 6% to C. G. Wells). U. S. reissue 17,983, Feb. 24. Reissue of original pat. No. 1,661,685 (*C. A.* **22**, 1470).

Modifying mineral oils. L. Auer. Brit. 337,751, April 24, 1929. Mineral oils are modified to produce viscous oils or thin gels suitable for use as lubricants by admixt. with them, while heated, of greatly modified fats, fatty oils or resin products which may be prepd. by heating *in vacuo* with reagents such as amines (as described in Brit. 317,732, *C. A.* **25**, 2312) or with compds. such as benzenesulfonic acid (as described in Brit. 321,724, *C. A.* **24**, 2904) or with compds. such as Li sulfite (as described in Brit. 321,725, *C. A.* **24**, 2904) or with saponaceous compds. (as described in Brit.

321,691, *C. A.* **24**, 2910; and in Brit. 321,723, *C. A.* **24**, 2911, but with a larger proportion of modifying agent than used in the previously described processes), or by use of a product formed by treating an aq. soln. of salts of amines such as benzidine or dianisidine with a soap soln. of high-mol. org. acids such as the NH_4 soap or linseed oil fatty acids.

Refining mineral oils. AXTELL RESEARCH LABORATORIES, INC. Ger. 517,196, Dec. 22, 1927. See Brit. 282,738 (*C. A.* **22**, 3984).

Refining mineral oils. GRIGORI PETROFF. Ger. 517,197, Jan. 18, 1927. A fat or a fatty acid, *e. g.*, stearic or oleic acid, is added to mineral oils before refining them by means of concd. or fuming H_2SO_4. Examples are given.

Storage tank and breather system for storing mineral oils and gas. WILBUR G. LAIRD (to Doherty Research Co.). U. S. 1,794,383, March 3. Structural features.

Heating oil to cracking temperature and superheating steam. JOHN PRIMROSE (to Foster Wheeler Corp.). U. S. 1,792,925, Feb. 17. Oil is passed serially through a portion of a heating tube bank absorbing radiant heat in a combustion chamber from a horizontally disposed tube bank in a second chamber partly sepd. from the combustion chamber, at a velocity high enough at least substantially to avoid cracking of the oil being heated, and heating gases are contacted with the tube system at such temp. and volume that they may be subsequently used for superheating steam to about 480° or higher. App. is described.

Oil-still operation. BENJAMIN BROIDO (to Superheater Co.). U. S. 1,794,439, March 3. Viscous material such as heavy petroleum has its viscosity reduced rapidly by heating with a heating medium such as furnace gases while the latter is at a high temp. and transfer of heat from the heating medium to the liquid is completed under counterflow conditions without permitting any vapors to sep. from the liquid during the second heating; gaseous products are removed from the liquid after the initial heating and are added to the liquid at the end of the second heating. An app. is described comprising pipe coils in a furnace setting.

Distilling oils in vacuo. R. R. COLLINS. Brit. 337,545, Oct. 11, 1928. Distn. such as that of a heavy cylinder oil mixed with wax distillate is effected *in vacuo* by spraying in several zones across the rising vapors of the liquid in a column, collecting liquid in peripheral troughs, and recirculating in each zone by sep. pumps. Various details of app. are described.

Recovery of oils from mixtures such as destructive hydrogenization products of brown coal. MATHIAS PIER, RUDOLF WIETZEL and BRUNO ENGEL (to I. G. Farbenind. A.-G.). U. S. 1,794,865, March 3. Mixts. such as sludges and residues contg. oils and free C are centrifuged with an addn. of liquid aromatic hydrocarbons such as benzene possessing good solvent properties for the oil. Na isopropylnaphthalenesulfonate also may be added.

Destructive hydrogenation. J. M. JENNINGS (to Standard Oil Development Co.). Brit. 337,671, Dec. 21, 1928. In destructive hydrogenation of heavy fluid materials such as crude oils, tars, cracked residues or suspensions of coal in oils, by use of solid catalysts immune to poisoning from S, such as Cr or Mo oxides, the ratio of asphalt to catalyst in the material treated is kept below 1.5 and preferably below 0.5, in order to prevent coking. Various details of temps. and pressures and construction of app. used, etc., are given. Cf. *C. A.* **25**, 580.

Destructive hydrogenation. W. R. TATE, H. P. STEPHENSON and IMPERIAL CHEMICAL INDUSTRIES, LTD. Brit. 338,150, Aug. 13, 1929. In destructive hydrogenation of carbonaceous liquids such as oils or suspensions of coal in oils, a vertical reaction vessel and a vessel for the sepn. of liquid and vaporous products are housed in the same high-pressure vessel, and the separator is maintained at a temp. lower than that of the reaction vessel by using the reaction products to preheat the liquids or gaseous materials or both. The entering H may be divided into 2 streams, one of which is heated by an elec. heater and the other of which is preliminarily used to cool the reaction products and then passed to the heater. Numerous details of construction and operation of the app. are described.

Freeing oils and tars from suspended solids. I. G. FARBENIND. A.-G. Brit. 338,154, May 14, 1929. Oils and tars such as those obtained by destructive hydrogenation are freed from suspended solids by treatment with gases acid to wet litmus such as SO_2 or CO_2 and then filtering or centrifuging. A thinner such as benzine may be added and CO_2 may be bubbled through tar at a temp. of 90°.

Producing and refining cracked gasoline. FRANK A. APGAR (to Sinclair Refining Co.). U. S. 1,795,067, March 3. Raw vapor mixt. from a cracking operation is scrubbed for sepn. of unvaporized oil, tar and tarry matter, an oil condensate of higher b. p.

than gasoline is sepd. from the raw vapor mixt. discharged from the scrubbing operation before the vapor mixt., including the gasoline vapors, is passed through an adsorbent catalyst such as fuller's earth for refining, and oil condensate thus sepd. is then passed through the adsorptive catalyst together with the vapor mixt. including the gasoline vapors, to serve as a liquid washing agent, and the washing agent and assocd. polymers from the last-mentioned step are sepd. from the refined vapor mixt. and are led directly to the scrubber. An arrangement of app. is described. Cf. *C. A.* **24**, 718.

Refining gasoline. EUGENE C. HERTHEL (to Sinclair Refining Co.). U. S. 1,795,124, March 3. Vapors of gasoline to be refined, together with vapors of higher b. p. hydrocarbons in such proportion that the vapor mixt. when condensed forms a condensate contg. not less than about 50% and not more than about 75% of the gasoline product, is passed first through a condensing operation in which a part of the higher b. p. hydrocarbons is condensed, and the total vapor mixt. and condensate are then passed through an adsorptive catalyst and thereafter the constituents of higher b. p. than are suitable for inclusion in the final gasoline product are sepd. and the remaining vapors are then condensed as the refined gasoline. An arrangement of app. is described.

Filter for gasoline, etc. A. G. FENN and ANGLO-AMERICAN OIL CO., LTD. Brit. 337,539, Sept. 27, 1929. Structural features

Filter for oil or gasoline suitable for use on motor vehicles. SIDNEY L. WOLFSON (to Cuno Engineering Corp.). U. S. 1,792,791, Feb. 17. Structural features.

Decolorizing material. WALTER S. BAYLIS (to Filtrol Co. of Calif.). U. S. 1,792,625, Feb. 17. A decolorizing clay is heated sufficiently to remove all free water and also water of crystn. and then mixed with 4–8% anhyd. H_2SO_4. The product is suitable for treating gasoline.

Method and plant for separating waxy and fatty substances from oils, particularly paraffin from mineral oil, by cooling. THE SHARPLES SPECIALTY CO. Ger. 517,198, July 25, 1925. This corresponds to Brit. 261,450 (*C. A.* **21**, 3455).

Paraffin wax. I. G. FARBENIND. A.-G. (Berthold Ottens and Martin Müller-Cunradi, inventors). Ger. 517,280, Apr. 18, 1929. To remove oil from crude paraffin wax, the latter is centrifuged while gradually warming it up to the m. p. of the pure wax.

Immersion wax. FREDERICK W. SULLIVAN, JR. (to The Standard Oil Co.). Can. 308,755, Feb. 17, 1931. A immersion bath for heat treating molded articles comprises a paraffin wax and from about 0.05–0.5% of an org. aromatic compd. of the class including β-naphthol, pyrogallol, diphenylamine, gallic acid, hydroquinone and p-$C_6H_4(NH_2)_2$. This additive substance inhibits the rapid formation of excessive acidity and prolongs the life of the bath.

Apparatus for determining the friction coefficient of lubricating oils, etc. YACCO S. A. F. Ger. 517,211, July 3, 1928. See Brit. 305,242 (*C. A.* **23**, 4599).

Thickening lubricating, insulating or other oils. I. G. FARBENIND. A.-G. Brit. 337,639, Nov. 29, 1928. The viscosity of oils such as castor oil, whale oil or transformer oil is increased by adding esters, ethers, mixed esters or ether esters of carbohydrates such as those of starch or cellulose, *e. g.*, triethylcellulose, cellulose naphthenate or the like.

Purifying used lubricating oils. PRESTON, STALLARD & CO., LTD., and J. MALSBURY. Brit. 337,981-2, Nov. 8, 1929. Various details are described of an app. suitable for use in purification processes such as described in Brit. 306,771 (*C. A.* **23**, 5314).

Refining used crank case oil. RUDOLF A. WISCHIN. U. S. 1,792,882, Feb. 17. The oil is intimately mixed with cold concd. H_2SO_4 and then gradually heated in the course of several hrs. to about 50–60°, sludge is sepd., suspended solid matter is removed, and steam is injected into the mixt. App. is described.

Emulsifying asphalt. ROBERT K. PAINTER (to Bitutect, Inc.). U. S. 1,793,957, Feb. 24 Asphalt is dissolved in a solvent such as CCl_4 and there is added to the soln. an aq. soln. of colloidal clay, the solid content of which is less than 2% of the emulsion produced; the mixt. is agitated (suitably at a temp. of about 55°) and addns. of an org. acid such as HOAc are made to maintain a desired acidity, and the asphalt is pptd. in the presence of the colloidal soln. and at the proper degree of acidity. App. is described.

Aqueous dispersions of water-insoluble materials such as asphalt. JACOB M. FAIN (to Flintkote Co.). U. S. 1,793,918, Feb. 24. In producing aq. dispersions of material such as asphalt contg. less than 2% as much of a dispersing agent such as bentonite and soap or saponin, an aq. suspension is made of paste-forming colloidal material such as bentonite and the suspension is modified by adding to it an agent such as soap of such character and quantity as to reduce the surface tension of the aq. medium

and facilitate dispersion with light agitation, and the water-immiscible material is mixed with and dispersed in this suspension.

Bituminous emulsions. LEON R. MACKENZIE. U. S. 1,795,226, March 3. Molten bitumen and an emulsifer are flowed together directly at a combining temp. only slightly below the b. p. of the emulsifier, to form an emulsion with the bitumen as the external phase, and the emulsion is then immediately removed from the zone of formation and is agitated to reverse the phases of the emulsion. App. is described.

Bitumen. ANDREI MANBA. Ger. 517,166, Aug. 11, 1926. A ductile bitumen is prepd. by treating bituminous distn. residues at about 250° with a mixt. of H_2SO_4 and so much S that the H_2SO_4 is completely decompd. in the reaction. The process may be modified by treating the distn. residues with H_2SO_4, sepg. the tarry ppt., adding to this the necessary amt. of S, and heating to about 250°.

23—CELLULOSE AND PAPER

CARLETON E. CURRAN

Cellulose from sugar. V. N. IPAT'EV. *Compt. rend. acad. sci. U. R. S. S.* 1930A, 381.—Five g. of cellulosic material obtained from monosaccharides was analyzed. The cellulosic material proved to be sol. in Schweitzer reagent and did not reduce Fehling soln.; it is seen to be cryst. in a polarization microscope, and it hydrolyzes if heated with H_2SO_4. L. JACOOVLEFF

X-ray studies of cellulose derivatives. VIII. The alkali celluloses. KURT HESS AND CARL TROGUS. *Z. physik Chem.*, Abt. B, 11, 381–408(1931).—The x-ray fiber diagram of natural cellulose disappears in fibers treated with NaOH-H_2O solns. Two new fiber diagrams are obtained, one characteristic of Na cellulose I, formed in solns. contg. up to 19% NaOH by wt., and the other characteristic of Na cellulose II, formed in solns. contg. 21% or more NaOH. Drying Na cellulose II produces no change in its fiber diagram, but a new fiber diagram corresponding to an anhyd. Na cellulose III is obtained from dried fibers of Na cellulose I. Calcd. fiber periods are: Na cellulose I, 10.4 ± 0.2 A. U.; Na cellulose II, 15.1 ± 0.2 A. U.; Na cellulose III, 10.2 ± 0.2 A. U. Na cellulose I is considered responsible for the phenomenon of swelling since the greatest swelling of fibers is produced by 14.5–15% NaOH soln. Washing unstretched Na cellulose I or II with water forms a fiber giving the diagram of cellulose hydrate; by washing stretched, the diagram of natural cellulose is also obtained. Washing Na cellulose I with CH_3OH produces decompn.: Na cellulose II changes to Na cellulose I. Several weeks' action of NaOH-CH_3OH solns. on cellulose forms Na cellulose III or Na cellulose II; if water is added, Na cellulose I or Na cellulose II are formed quickly. Sharp fiber diagrams are obtained for K cellulose (fiber period 10.2 ± 0.2 A. U.) formed by the action of 18.5% KOH soln. on cellulose, and for Li cellulose (fiber period 10.4 ± 0.2 A. U.) formed by the action of 10.9% LiOH soln. Other forms of Li and K celluloses will be described later. JANET E. AUSTIN

Fatty acid-nitrocellulose mixed esters. HANNS SCHMIDT. *Nitrocellulose* 2, 4–6 (1931).—A review of patents. E. M. SYMMES

A study of some properties of nitrocellulose made from jute with special reference to its stability. RAMESH CHANDRA BAGCHI. *J. Indian Chem. Soc.* 7, 863–74(1931). The amt. of stabilization necessary increases with the content of impurities. Washing with dil. acid alone is not sufficient but must be followed by neutral or alk. washing. Alc. is a very effective washing agent for improving stability. Very small quantities of easily hydrolyzable pentosans and hexosans, or degraded cellulose from the action of concd. alkali, will give unstable products. The N content of the nitrocellulose decreases as impurities increase. Unless the jute is carefully purified uniform nitration is more difficult than with cotton. The Et_2O-alc. soln. of jute nitrocellulose is much less viscous than that of cotton; this indicates that the 2 celluloses are not identical. FOSTER DEE SNELL

Tentative standard method for the determination of α-cellulose. WM. R. WILLETS. *Paper Trade J.* 92, 117(1931).—The procedure is essentially that of Method IV of the Am. Chem. Soc. (Ritter, *C. A.* 23, 5569), with the following minor modifications: (1) The use of 95% EtOH or MeOH followed by petr. ether or other non-reacting volatile liquid for washing the α-cellulose after the final treatment with hot water is recommended to facilitate drying. (2) The detn. of residual lignin (by the Madison Forest Products Lab. method) in the α-cellulose is recommended for unbleached pulps. A. PAPINEAU-COUTURE

Extending knowledge of cellulose and lignin. HAROLD HIBBERT. *Research Notes* **3**, 37–8(1930); *Pulp Paper Mag. Can.* 31, 326–7(1931).—A brief review is given of the work during 1930 at the Dept. of Industrial and Cellulose Chemistry, McGill Univ., Montreal. A. PAPINEAU-COUTURE

Alkylbeechwood lignins and their cleavage. ANTON VON WACEK. *Ber.* **63B**, 2984–93(1930); cf. *C. A.* **24**, 2878.—It was reported in the earlier paper that cleavage of a primary beechwood methyllignin with alc. NaOEt gives an oil consisting of a neutral and an acid portion, the former of which gives 3,5-$(MeO)_2C_6H_3CO_2H$ (I) on oxidation. It was believed that the acid portion contained a pyrogallol deriv. Such a product, contg. a free phenolic group, could be oxidized only after complete etherification, and in order to be able to distinguish the alkyl group introduced after the cleavage from that already present in the cleavage product the acid oil was ethylated and then oxidized. It did not yield a gallic acid deriv. as expected, but 3,4-$MeO(EtO)C_6H_3CO_2H$ (II). Methylbeechwood lignin therefore gives as cleavage products 3,5-$(MeO)_2C_6H_2C$- and 4,3 $HO(MeO)C_6H_2C$-. To det. whether the MeO groups are present in the original lignin or are introduced during the methylation, the lignin was ethylated before the cleavage. As the prepn of the primary methyllignin from the methylwood requires an enormous excess of alkylating agent, expts. were carried out to det. if a product of as high a MeO content could be prepd. more cheaply from isolated lignin, and also if such a lignin could be made to take up a corresponding amt. of EtO instead of MeO. The lignin (max. MeO content 21.8%), prepd. by Freudenberg's method, gave on repeated methylation a product with 36.57% MeO, the ratio of the original to the newly introduced MeO being 100:81.1. The ratio is higher than that assumed in the earlier paper for the primary methyllignin, but when the product is treated by Friedrich's method only about 25% dissolves and the lignin pptd. from the Me_2CO contains only 32.59% MeO. The Freudenberg lignin, ethylated 8 times at 60°, gave a product with 19.01% EtO, the total alkoxy content (calcd. as the MeO of a methylated substance) being 34.17%, *i. e.*, less than after an equal no. of methylations. Cleavage of the methylated Freudenberg lignin under pressure gave a neutral and an acid product; the latter (after ethylation) yielded II on oxidation, but the neutral oil gave an acid which, to be sure, sublimed *in vacuo* but began to brown only above 240°, did not m. 300° and certainly was not I. The "rest" lignin, therefore, here too differs from the extd. primary methyllignin. It would seem as if a part of the lignin is more easily dissolved. In the hydrolysis by Friedrich's method, this part is not lost, but CuO-NH_4OH dissolves it along with the cellulose, leaving behind the insol. Freudenberg lignin, which behaves differently from the primary lignin. For a comparison of the cleavage of an ethyllignin with that of the primary methyllignin, it therefore became necessary to start from a primary ethyllignin also, which was prepd. from deresinified and degummed beechwood meal with Et_2SO_4. Fourteen ethylations at 60° gave a product with a const. alkoxy content of 27.35% (calcd. as MeO); with an original MeO content of 6% in the degummed wood, this corresponds to a 30.46% MeO content of a methylated beechwood, while the MeO value of beechwood meal exhaustively methylated was 39.1%. The primary ethyllignin obtained by Friedrich's method from this ethylwood contained 29.10% alkoxy (calcd. as MeO); with a 20.5% MeO content of the primary lignin (extd. with Me_2CO), this corresponds to a 30.56% MeO content of a primary methyllignin, as compared with 33.6–35.2% obtained in the isolation from methylwood. The ethylwood prepd. at this temp. and the primary ethyllignin obtained from it were very sensitive and carbonized if heated higher than 70° *in vacuo;* cleavage with alc. NaOEt under pressure gave an oil almost completely sol. in Et_2O, part of which $b_{0.5-1}$ 160–70°; on oxidation the neutral part gave only a trace of cryst. products, the acid part none at all. The ethylation was accordingly repeated at a lower temp. (25–30°); 12 treatments gave an ethylbeechwood with 30.15% alkoxy (calcd. as MeO), corresponding, with an original 5.77% MeO content of the deresinified and degummed wood meal, to a 37.34% EtO content and a 34.12% MeO content of methylated wood. Considerably more EtO can therefore be introduced by cold ethylation than at the higher temp., although the alkoxy content is still considerably less than can be obtained by methylation. The cold ethylated wood and the primary ethyllignin obtained from it according to Friedrich do not show the sensitivity of the products obtained by ethylating at 60°. The primary ethyllignin contains 31.27% alkoxy (calcd. as MeO), corresponding to 19.19% EtO and 33.26% MeO of methylated lignin. Cleavage with NaOEt under pressure gives an oil sol. in Et_2O and in part $b_{0.5-1}$ 215°; the neutral part gives with $KMnO_4$ a little I, but the acid part, after methylation, gives no cryst. products. The EtO groups could not be detected in the phenolic cleavage products. These results indicate that there is no free phenol group in the phenolic

units of genuine beechwood lignin but that there are other alkylatable groups. The MeO groups found in the cleavage products are already present in genuine lignin. The 2 cleavage fragments identified probably originate, in part, at least, from a common unit, $—OC_6H_2(OMe)_2C—$, but the MeO content of the isolated lignin and methyllignin is not in harmony with the assumption that the lignin consists only of a chain of the units $—OC_6H_3(OMe)_2CH_2CH:CH—$. C. A. R.

Recent advances in the chemistry of cellulose in relation to pulp and paper. C. J. J. Fox. *World's Paper Trade Rev.* 95, 374, 376, 420, 422, 462, 464, 518, 520(1931).—An address dealing with recent investigations on the chemistry and physics of cellulose, particularly as regards its structure. A. Papineau-Couture

Report of the committee on chemical and physical standards. H. O. Keay. *Pulp Paper Mag. Can.* 31, 185–8(1931).—The present methods of prepg. sheets for testing the initial strength of paper pulp prevailing in North America and in Europe are reviewed. The disintegration of the pulp, the formation of the sheet, couching, pressing, drying and conditioning are discussed. The comm. considers that the best means yet devised for the formation of the test sheet is the Brit. sheet machine; that the couching of the sheet should be done by means which eliminate the influence of the operator, which is probably best obtained by the use of a couch plate together with a roll of fixed wt. as adopted by the Brit. comm. on evaluation of paper pulp; that the work of Cameron and his co-workers (*C. A.* 21, 1350) has shown that 200 lb. per sq. in. is most satisfactory for pressing the sheets; and that the procedure of the Brit. Assocn. for drying the sheets, though more elaborate, is justified because it eliminates the uncertainty which results from shrinkage when the sheet is not dried under tension. It is felt that as yet insufficient data have been accumulated to warrant definite recommendations. A. Papineau-Couture

The determination of the strength of pulps. K. G. Jonas. *World's Paper Trade Rev.* 95, 466, 468, 510–6(1931); cf. *C. A.* 25, 1074.—In order that detns. of the strength of pulp may be of value, it is essential to have a beating method and a sheet-forming method, each giving reproducible results. The ideal exptl. beater should fulfil the following conditions: it must (1) work reproducibly, (2) allow of a beating effect as nearly as possible corresponding to that of the beater in practice, (3) make possible the working out of a complete beating curve without a great consumption of time (4) permit variation of and exact regulation of the beating pressure. These requirements are claimed to be met by a lab. beater devised by J. and Kross. Six cylindrical beating containers are symmetrically arranged around the axis of a disk to which they are firmly but rotatably attached; they are closed by means of covers fitted with packing rings, each cover carrying a toothed wheel which engages with a similar wheel keyed on a fixed central shaft, so that when the machine is running each container rotates about the central shaft and about its own axis. In each container is a beating roll consisting of a free massive cylinder, in whose surface a series of half round (6 mm diam.) flutes are milled so that a tooth 2 mm. wide remains between adjacent flutings. The beating pressure is regulated by adjusting the speed of rotation. The equiv. of 11.2 g. of oven-dry pulp is weighed into each beating container, the calcd. quantity of water (preferably to a consistency of 6%) is added, the material is softened by allowing it to stand exactly 30 min. and is then disintegrated by running for 10 min. at 10 r. p. m.; beating is then carried out by running at a suitable speed (150 r. p. m. or more) so as to obtain a complete beating curve within 1 hr., the containers being successively removed at stated intervals and replaced by empty containers of the same wt. A test sheet-forming machine is also described, which is claimed to give very even formation and reproducible results, the variations in the strength of sheets made from the same pulp and beaten to the same degree being from 2–3 times as great with the Schopper sheet-former as with the Jonas-Kross app. J. found that the highest breaking length was obtained with sheets weighing 90–2 g. per sq. m., and suggests that this wt. should therefore be adopted. A. Papineau-Couture

Some factors affecting the strength of groundwood. A. Ruby. *Papier* 33, 1283–1300(1930).—A review is given of the effects of the species of wood, conditions of growth, age, dryness and state of preservation of the wood, barking, nature, dressing and speed of the stone, grinding pressure and temp., screening and refining of the groundwood and conditions of storing. A. Papineau-Couture

Studies in the manufacture of groundwood pulp. H. Wyatt Johnston. *Pulp Paper Mag. Can.* 31, 221–32(1931).—An analysis is given of the program for investigation of groundwood manuf. at the Montreal Forest Products Labs. A. P.-C.

Practice and control of beating and jordaning. F. W. Motschman. *Paper Trade J.* 92, No. 8, 127, 129(1931).—Experiences and opinions concerning the manipulation of

beater rolls and measurement of power consumption and indices of hydration. Particular attention is given to types of jordan filler to make sp. grades of paper. A. P.-C.

Bibliography of wood-pulp strength testing. DONALD E. CABLE. *Paper Trade J.* **92**, No. 9, 35-9(1931).—This is a continuation of Moore's bibliography (*C. A.* **23**, 5580) and comprises abstracts of 27 articles published in 1929 and 1930. A. P.-C.

Tests on cotton and wood pulp for nitrocellulose plants. M. STEUDE. *Nitrocellulose* **2**, 10–11(1931); cf. *C. A.* **25**, 413.—Methods of detn. of Cu no., degree of bleaching, neutral gum, hemicellulose, albumen, absorptive power and viscosity are given. E. M. SYMMES

Instruments for determining the freeness or degree of beating of paper pulps. LOUIS SCHOPPER LABORATORIES. *Papier* **33**, 1303–19(1930).—The construction and method of using the latest type of Schopper-Riegler freeness tester are described. A. PAPINEAU-COUTURE

Hard facing in the pulp and paper industry. W. A. WISSLER. *Paper Trade J.* **92**, No. 8, 137-43(1931).—A discussion is given of the merits of hard-facing of equipment parts subjected to wear in various applications in the pulp and paper industry. The different types of hard-facing materials are indicated, together with their fields of application and the method of applying them to the parts to be faced. A. P.-C.

Instrument applications in pulp and paper mills cut costs and safeguard profits. REGINALD TRAUTSCHOLD. *Paper Trade J.* **92**, No. 2, 32-8; No. 4, 28–42(1931).—A general discussion is given of the importance of instruments in pulp and paper mill operation, where they make for economical operation by permitting of a satisfactory balance and coördination of all the many steps involved. A. PAPINEAU-COUTURE

The photoelectric tube in paper manufacture. S. A STAEGE. *Pulp Paper Mag. Can.* **31**, 315 6(1931).—A brief outline is given of some of the possible uses to which the photoelec. tube can be put in the manuf. of paper. A. PAPINEAU-COUTURE

Bibliography of paper making for 1930. C. J. WEST. *Paper Trade J.* **92**, No. 8, 145–85, No. 9, 40-6, No. 10, 47-54(1931).—A classified list is given of articles on pulp and paper making published in 1930. A PAPINEAU-COUTURE

United States patents on paper making: fourth quarter, 1930. C. J. WEST. *Paper Trade J.* **92**, No. 6, 61-2(1931); cf. *C. A.* **25**, 500.—A list in numerical sequence of U. S. pats. relating to pulp and paper manuf. issued during Oct., Nov. and Dec., 1930. A. PAPINEAU-COUTURE

A review of current investigations at the Division of Pulp and Paper of the Forest Products Laboratories of Canada, Montreal. E. P. CAMERON. *Pulp Paper Mag. Can.* **31**, 189-94(1931).—A review. A. PAPINEAU-COUTURE

Recent investigations of paper-making materials. ANON. *Bull. Imp. Inst.* **28**, 411-24(1930). *I. Soft wallaba wood (Eperua falcata) from British Guiana.*—The wood contained 55.3% cellulose on the dry basis, as compared with 39.7% in a sample analyzed some yrs previously (*C. A.* **22**, 3297). The difference in cellulose content is attributed to difference in age. Cooking with 20% NaOH on the wt. of the wood, at a concn. of 4%, for 5 hrs. at 160° yielded 46% of dry unbleached pulp and 40% of dry bleached pulp. This treatment gave a well-reduced pulp, which furnished a soft, opaque, rather bulky, brown paper, of fairly good strength, but containing a no. of very small pieces of undisintegrated fiber and small black specks. The pulp bleached fairly readily to a cream color, but the black specks were not eliminated. Increasing the cooking temp to 165° yielded 44% of dry unbleached pulp and 40% of dry bleached pulp, similar in quality to those obtained at 160°, but containing no specks. Kraft paper of fair quality, but lacking somewhat in strength, could be produced from the above pulp; but the wallaba fiber being very resistant to hydration, the cost of beating would be about twice as high as in the ordinary com. production of kraft paper. A sulfite pulping test carried out by cooking 100 g. of wood for 8 hrs. at 75 lb. and at a max. temp. of 158° (maintained for 7.4 hrs.), with 1000 cc. of liquor contg. 5.08% total and 3.48% free SO_2, yielded a gritty, resinous pulp showing very little felting power, which could not be made into sheets; this result is attributed to the high "resin" content (12% acetone-sol.). *II. Xerotes longifolia from Tasmania.*—The material, consisting of tough, rush-like stems and rather tightly rolled thin leaves, contained 4.2% ash and 41.1% cellulose (10% moisture basis). The fibers were 1.0–3.2 mm. long (av. 2.0), and 0.005–0.020 mm. in diam. (av. 0.012). Cooking 3 hrs. at 145° with 17.2% NaOH at a concn. of 3% yielded 40% dry unbleached pulp and 36% dry bleached pulp (bleach consumption 20%), but there remained numerous particles of brown, incompletely disintegrated material, even after bleaching. Increasing the NaOH to 21.5%, the time to 3.5 hrs. and the temp. to 150° gave 39 and 35% of unbleached and bleached pulps, resp. The unbleached pulp still contained a large no. of particles of imperfectly

digested material, most of which were removed on bleaching. The well beaten pulp yielded a tough, opaque paper of good strength, somewhat similar to that produced from esparto, but less bulky, harder and somewhat stronger. *III. Raupo leaves from New Zealand.*—Raupo leaves (*Typha angustifolia* Linn., var. *Brownii*) contained H_2O 12.7, ash 3.0, cellulose 38.3% (43.8% on dry basis); the fibers were 0.6–3.0 mm. long (av. 1.42) and 0.005–0.0177 mm. in diam. (av. 0.0076). Cooking 3 hrs. at 140° with 16% NaOH at a concn. of 3% yielded 32% of dry unbleached pulp and 29% of dry bleached pulp. The test produced a fairly well digested pulp, which furnished a pale brown, hard, rather rattly, opaque paper of good strength; this showed some shrinkage on drying and contained some imperfectly sepd. fibrous material, which was removed by bleaching. The yield is too low to make the material promising as a source of paper pulp; for the manuf. of rayon, the pitch would first have to be removed from the leaves, and this would still further reduce the yields. *IV. Reeds (Phragmites vulgaris) from northern Rhodesia.*—The material contained H_2O 7.5%, ash 1.9%, cellulose 50.0% (54.1% on the dry basis); the fibers were 0.8–3.0 mm. long (av. 1.7) and 0.0102–0.0508 mm. in diam. (av. 0.0193). Cooking 4 hrs. at 150° with 16% NaOH at a concn. of 4% yielded 47% dry unbleached pulp and 39% dry bleached pulp, similar to that furnished by esparto, yielding a fairly soft, bulky, opaque paper, but requiring nearly twice as much bleaching powder as esparto. *V. Sisal waste.*—Cooking 5 hrs. at 160° with 20% NaOH at a concn. of 4% yielded 44% of dry unbleached pulp and 42% of dry bleached pulp, which gave a tough, rather rattly, opaque paper of excellent strength but contg. numerous brown specks (consisting of cellular material) which were eliminated to a large extent on bleaching. A preliminary dusting treatment, which removed about 30% of non-fibrous matter, gave by the same treatment 53% dry unbleached pulp and 50% (equiv. to 35% on the original material) of dry bleached pulp. The unbleached pulp still contained a small amount of cellular material, which was easily eliminated on bleaching. The bleached pulp yielded a white paper of excellent strength and quality and practically free from specks. A. P.-C.

Testing of paper for water resistance. Philip W. Codwise. *Paper Trade J.* 92, No. 10, 55–7(1931).—The dry-indicator method offers the greatest promise of development to a universally acceptable standard test for the degree of total size resistance. Preliminary collaborative work having given results that were inconclusive and that indicated the necessity of further development work, the following points were studied: nature and prepn. of the indicator mixt., application of the indicator on the test sheet, reading of the end point, effects of humidity and temp. A technic embodying the results of the investigation is described in detail. A. Papineau-Couture

Porosity and air space of paper. James Strachan. *Paper Maker & Brit. Paper Trade J.* 81, No. 1, xli–xliii(Jan., 1931).—A general discussion is given of the subject defining the difference between porosity and air space, indicating the practical importance of the subject to paper users, outlining the methods of practical paper making adopted in controlling porosity and air space, and reviewing the methods of testing the porosity of paper. A. Papineau-Couture

Freeness testing. W. Boyd Campbell. *Research Notes* 3, 25-30(1930); *Pulp Paper Mag. Can.* 31, 264–7, 280(1931); cf. *C. A.* 24, 1976.—The principles underlying freeness testing of pulps are discussed and the conditions necessary for the operation of freeness testers are pointed out. The effect of the pressure head and the duration of flow in compacting the pulp are particularly stressed. A math. analysis is given which relates the freeness as detd. by the Can. freeness tester and the English sheet machine to the sp. resistance of the pulp to flow through it. For the Can. tester $R = 3044 (1000 - V)/V$; for the English sheet machine $R = 10.30\ tF/W$, where R is the resistance of 1 g. of pulp in a layer on 100 sq. cm., V is the vol. of outflow from the chamber at the end point of the test, t is the time of flow in sec., F is the fluidity of water in reciprocal centipoises, and W is the wt. of sheet formed. It is pointed out that R is different when detd. on the 2 machines and that the ratio of the 2 values is a measure of a pulp quality termed the compressibility. Exptl. values of the ratio for ground wood are about 1.55, while for kraft and unbleached sulfite (beaten) the value is about 3.0. It remains to be seen whether this quality varies in any one type of pulp to an extent sufficient to make the test of value for control work. A. Papineau-Couture

The folding resistance of paper. Raymond Fournier. *Papeterie* 53, 146–50 (1931).—A brief description is given of a new type of folding-resistance tester, based on the same principle as the Schopper-Riegler but quite different in construction. The test strip is 15 × 180 mm. (same as for the Schopper tensile test) and both ends are clamped in a 2-kg. wt., so that the tension is exactly 1 kg. The fold is effected by passing the test strip through a slot in a blade which is reciprocated vertically between 2

pairs of 14-mm. steel rolls mounted on ball bearings. When the strip breaks, the fall of the weight stops the motor and applies a powerful brake to the flywheel. An automatic revolutions-counter indicates the no. of double folds. A. PAPINEAU-COUTURE

Low-pressure steam and paper-machine drying. DONALD ROSS-ROSS. *Paper Trade J.* **92**, No. 8, 106–9(1931).—The superiority of the "blow-through" type of drainage system over that employing individual traps is explained and its advantages are enumerated. A "blow-through" system of paper-machine drainage, with temp. control, as installed on No. 1 machine at the Beauharnois Division of Howard Smith Paper Mills, is described in detail. It is claimed that this drying system has reduced cockling troubles, maintained more satisfactory final moisture in the sheet, and substantially increased the drying capacity. A. PAPINEAU-COUTURE

The efficient drying of paper. E. W. G. COOPER. *Paper Trade J.* **92**, No. 8, 110–2 (1931).—A practical discussion is given of the factors involved in paper drying, including notes on the selection of felts, press rolls and the use of pre-driers. A. P.-C.

White water in paper mills. A. I. MACNAUGHTON. *World's Paper Trade Rev.* **95**, 268–80, 360–8, 426, 428(1931).—General notes are given on the utilization of white water in a wide variety of mills. A. PAPINEAU-COUTURE

Utilizing fuel value of waste sulfite liquor. HERBERT S. KIMBALL. *Paper Trade J.* **92**, No. 8, 124–7(1931).—The details of Kuhles' process (*C. A.* **24**, 6008) for the concn. and drying of sulfite waste liquor are interpreted in terms of American practice, the calcns. being based on the waste liquor output of a 50-ton sulfite mill. It is estd. there can be generated 13,063 lb. of steam net per hr., at a cost of $2.65, or about $0.20 per 1000 lb. A. PAPINEAU-COUTURE

Waste liquors and gases of the paper industry. C. J. WEST. *Paper Trade J.* **92**, No. 3, 48–56, No. 4, 50–6, No. 5, 46–51(1931); cf. Schrohe and W., *C. A.* **20**, 987.—Abstracts are given of 350 U. S., Can., Brit., German, Fr., Swedish, Norwegian, Austrian and Swiss pats. issued during the period 1925–1930, compiled from *Paper Trade J.*, *C. A.* and *Papier-Fabrikant*. Author and subject indexes are appended. A. P.-C.

Color. R. CARTER. *World's Paper Trade Rev.* **95**, 716–26(1931).—After a brief review of the properties, uses and advantages of basic, acid and substantive dyes and of pigment colors, the chief tests which should be applied to dyes in the paper mill are briefly discussed. A. PAPINEAU-COUTURE

The preparation and purification of some paper makers' pigments. E. T. ELLIS. *Paper Maker & Brit. Paper J.* **Annual No.**, 32–4(1930).—A description is given of the prepn. and purification of bone black, ferric oxide, iron buff, lead chromate, manganese bronze, Prussian blue, red lead, smalt and ultramarine. A. PAPINEAU-COUTURE

The dyeing and coloring of paper. F. HAMILTON. *World's Paper Trade Rev.* **95**, 689–94, 730–4(1931).—An address is given which deals chiefly with the properties of the various classes of coloring matters. A. PAPINEAU-COUTURE

Improved constant humidity room. JAMES D'A. CLARK. *Paper Ind.* **12**, 1859–63 (1931).—A detailed description is given of a const. humidity room, based on, but somewhat modified from, that described by Ruff (*C. A.* **21**, 4067), built and equipped at a cost of approx. $1000. It has been operating with complete satisfaction since the end of 1928. A. PAPINEAU-COUTURE

The resins of jack pine. JOHN B. PHILLIPS. *Pulp Paper Mag. Can.* **31**, 211–9 (1931).—The resins were found to consist chiefly of resin acids and fatty and unsaponifiable matter. The fatty constituents, to which are generally attributed so-called "pitch troubles" in pulp and paper mills, are made up largely of acids and glycerides of the unsatd. type (including large proportions of oleic and linolic acids and traces of linolenic acid). The fats of seasoned wood were found to contain a high percentage of oxidized fatty acids, probably derived from the unsatd. acids, which oxidize and polymerize very readily. These transformations involve a change from oily, sticky material to more inert, solid products. As it is generally agreed that pitch trouble is brought about mainly by flocculation and coagulation of resin particles, it is suggested that the possibilities of triethanolamine as an agent for removing the troublesome resinous particles, or rendering them harmless, should be investigated. A. PAPINEAU-COUTURE

Two years' progress in corrosion resistance [in sulfite industry] (MATHEWS) **9**. Cr-plating of paper-mill rolls (CLEVELAND) **4**. Lignin, humic acid and humin (FUCHS) **10**. Lignin and related compounds (HIBBERT, SANKEY) **10**. Destructive hydrogenation (Brit. pat. 338,192) **21**. Solvents for cellulose esters and ethers (Ger. pat. 517,097) **13**. Obtaining cellulose from seeds (U. S. pat. 1,794,105) **27**. Synthetic rubber [for use in manufacture of threads, films, etc.] (Brit. pat. 338,152) **30**. Sugars from cellu-

losic material (U. S. pat. 1,793,084) 28. Cutting elements for paper-making engines (U. S. pat. 1,792,546) 9.

Cellulose. Steckborn Kunstseide A.-G. Swiss 142,113, May 6, 1929. Mat cellulose of good textile properties is obtained by emulsifying viscose with an agent insol. therein and adding a substance sol. both in this agent and in viscose. Thus, viscose is emulsified with toluene and acetone is added.

High α-cellulose product from wood cellulose. Zellstoffabrik Waldhof and A. Bernstein. Brit. 337,445, July 29, 1929. A cellulose contg. 98–99% α-cellulose suitable for production of cellulose acetate, nitrate or formate, etc., is obtained from bleached or unbleached wood cellulose by treatment with a 5% or stronger soln. of caustic alkali or alk. carbonate in the presence of a bleaching agent such as chloride of lime. A 2.5–5.0% alkali soln. gives a 90–95% α-cellulose. Various details of procedure are given.

Cooking sulfite cellulose. Sergei I. Chuvikovskii and Grigory I. Liachovetzkii. U. S. 1,793,264, Feb. 17. Liquor leaving the cookers is conducted to an evaporator where it is heated by fresh steam and the vapors are returned to the cookers. Various details of app. are described.

Cellulose derivatives. Courtaulds, Ltd. Ger. 514,802, Jan. 19, 1927. Alkali cellulose is subjected to the action of a small quantity of Et_2SO_4 at 25°, the free alkali is removed and the product dried and acetylated. The ethylated cellulose contains not more than one Et group to each $C_6H_{10}O_5$ group. Examples are given.

Cellulose derivatives. Soc anon. pour l'ind chim. à Bâle. Swiss 141,556, Aug. 31, 1928. Cellulose derivs. are obtained by the action of substances of the general formula: halogen - C_2H_4 - N=$(C_2H_5)_2$ on alkali cellulose. The product has basic properties which enable it to unite readily with acid dyes. Examples mention the action of chloroethyldiethylamine on cotton and cellulose. Cf. *C. A.* **24**, 4156.

Cellulose derivatives. Soc. anon. pour l'ind. chim. à Bâle. Swiss 142,173, Sept. 8, 1928. New derivs. are prepd. by treating cellulose with phthalic acid anhydride in the presence of tertiary bases. The product is a white mass with an affinity for cotton and basic dyes. In the exampl., cellulose is treated with the anhydride and pyridine at 60°.

Cellulose derivatives. Soc. anon. pour l'ind. chim. à Bâle. Swiss 142,175, Apr. 11, 1929. New derivs. are prepd. by the action of cyanuric chloride on alkali cellulose. The products are unresponsive to vat and acid dyes, but responsive to basic dyes, and can be used as the raw material for textile fibers. In an example, unbleached cellulose in KOH is treated with the chloride. Cf. *C. A.* **25**, 1092.

Cellulose derivatives. Soc anon. pour l'ind. chim. à Bâle. Swiss 142,749, Aug. 8, 1928. A new deriv. is obtained by the action of phenylisocyanate on cellulose. The product can be used to make textile fibers and has a strong affinity for basic dyes.

Acetylcellulose. Samuel I. Vles and Louis de Hoop (to Allgemeene Kunstzijde Unie N. V.). U. S. 1,794,126, Feb. 24. An acetylizing bath formed from Ac_2O and glacial HOAc is allowed to stand for several hrs. until part of the water in the acid has combined with the Ac_2O, and cellulose is then introduced into the bath.

Cellulose acetates, acetopropionates, acetobutyrates, etc. I. G. Farbenind. A.-G. Brit. 337,366, July 25, 1929. In the production of cellulose acetates, propionates, butyrates and mixed esters, the esterification is carried out in the presence of methylene or ethylene chloride as solvent instead of free acid, and by effecting the reaction at temps. of 20–60° degradation of the cellulose is avoided and clear solns. of unusual homogeneity and viscosity are obtained, which may be spun directly or may be hydrolyzed to give acetone sols. The quantity of catalyst such as H_2SO_4 used may be reduced to about 0.5%. Various auxiliary details of procedure are described.

Precipitating cellulose acetate. K. Werner. Brit. 338,214, Aug. 15, 1929. An app. is described for pptn. of primary or secondary cellulose acetates from HOAc soln. by a pptg. liquid such as water, by bringing the materials together in streams which flow into each other through a centrifugal pump to cause intimate admixt., suitably at a temp. of about 70°. A bleaching agent such as Cl gas may be supplied to the app.

Mixed cellulose esters. C. J. Staud and C. S. Wenner (to Kodak, Ltd.). Brit. 338,201, Feb. 18, 1929. Mixed cellulose esters, other than lacto-formate, are prepd. by digesting an acyl ester of cellulose such as cellulose acetate with an aliphatic or aromatic-aliphatic mono- or di-basic carboxylic acid contg. a hydroxy group in the α-position, such as lactic, tartaric, racemic, glycolic, glyceric, mandelic and malic acids. Several examples with details of procedure are given.

Mixed cellulose esters. C. J. Staud and C. S. Wenner (to Kodak, Ltd.). Brit.

338,202, Feb. 25, 1929. Mixed esters are formed by digesting an acyl ester of cellulose
as cellulose acetate with a carboxylic acid contg. a ketonic group in the α- or γ-
tion such as pyruvic, α-ketobutyric, α-ketovaleric, α-ketocaproic and levulinic
s, the reaction being preferably effected in a vessel provided with a reflux condenser,
hich a soln. of the cellulose acyl ester and reacting acid are heated to about 100°
er atm. pressure. Several examples are given.

Cellulose esters and ethers. SPICERS, LTD. Ger. 514,945, Nov. 24, 1926. Masses formed from cellulose ethers and esters or similar carbohydrates of empirical for- a $n(C_6H_{10}O_5)$, especially the org. acid esters, by incorporating with them, hepta- or ıchloropropane alone or mixed with other solvents or softening agents. Cf. *C. A.* 1237, 2840.

Solutions of cellulose esters and ethers. MAX OW-ESCHINGEN (to Radio Patents p.). U. S. 1,794,066, Feb. 24. Materials such as nitrocellulose, cellulose acetate thyl cellulose are dissolved in wood oil together with other known solvents such as)H or MeOH (the "wood oil" used being the product resulting from the distn., at ax. temp. of 120°, of residual oils obtained in the initial distn. of wood).

Capsules of cellulose hydrate. RUDOLF BEYRICH. Ger. 514,877, April 22, 1926. capsules are immersed in a bath of lower b. p. than water, *e. g.*, acetone, alc., etc., hat a complete or partial replacement of the water in the cellulose hydrate takes e by the liquid of lower b. p., so dimmishing the shrinkage duration of the capsule.

Capsules. KALLE & Co. A.-G. (Julius Voss, inventor). Ger. 517,021, Dec. 15, 5. Addn. to 515,377 (C. *A.* 25, 1072). Capsules made from viscose with which a and (or) mosaic gold has been incorporated, are rendered opaque as described ier. 515,377.

Effecting deodorization, bleaching and sterilization of fibrous materials such as saw- t. FREDERICK W. BRODERICK. U. S. 1,792,805, Feb. 17. The material is moist- ł with a dil. Na_2CO_3 soln., heated to about 38°, and treated with Cl gas so that latter reacts with the Na_2CO_3 present and forms HOCl directly on the material, ch is washed and dried. App. is described.

Waterproof fibrous products suitable for making milk bottles, etc. ALBERT L. IPP. U. S. 1,793,839, Feb. 24. A thermoplastic waterproofing material such as affin and rosin is mixed with a suspension of wood pulp at a temp. above the m. p. ie thermoplastic material, and while hot the suspension is made into the desired such as milk bottles, dishes or toys.

Bleaching bands, films, capsules, etc., made of regenerated cellulose or cellulose vatives. CHEM. FAB. VON HEYDEN A.-G. Ger. 517,284, Dec. 20, 1927. The erials are treated at atm. or raised temp. with solns. of salts of aromatic sulfochlor- des, *e. g.*, with a 2% soln. of the Na salt of *p*-toluenesulfochloramide.

Plastifiable material comprising acetylated wood. I. G. FARBENIND. A.-G. Brit. 791, Aug. 7, 1929. Material such as degummed beechwood meal is treated with vith or without addn. of concd. HOAc, in the presence of 8–14% of H_2SO_4 or an quantity of other acid such as HCl or H_3PO_4, at a temp. below 30°, and the mass which is no longer fibrous is further worked up as in cellulose acetate A product may be obtained sol. in HOAc or $CHCl_3$. Various details of pro- are given.

tificial silk. CARL HAMEL SPINN- & ZWIRNEREIMASCHINEN A.-G. Swiss 3, Nov. 13, 1929. App. is described for stretching the fibers after treating them softening bath.

tificial silk. N.-V. J. A. CARP'S GARENFABRIEKEN. Brit. 337,418, May 24, Various kinds of artificial silk such as that made from viscose, cellulose acetate ammonium cellulose are given a dull luster by treatment with a soln. of a fluosili- ither during or after manuf., under such conditions that silicic acid is pro- by hydrolysis and partly incorporated in the material so that it is not removable er, dil. acids or soap solns. Various details of procedure are described.

tificial silk from viscose. N.-V. NEDERLANDSCHE KUNSTZIJDEFABRIEK (to . Enka Artificial Silk Co., Ltd.). Brit. 337,350, June 8, 1929. Viscose is used spinning bath contg. at least 30% of sulfonic acids of aromatic hydrocarbons ly one contg. benzenesulfonic acid 37.9 and H_2SO_4 22.3%). Glucose and alcs. e added, and the filaments may be subsequently treated with water or dil. acid soln., and weakly matured viscose may be used. The product has an elonga-

[illegible]%.

silk and films from viscose. I. J. FRENKEL. Brit. 338,318, Oct. 21, In order to avoid evolution of disagreeable gases during the manuf., nitrocellulose ved in the viscose during its treatment with alkali (the nitrocellulose being de-

compd. into cellulose and $NaNO_3$ being formed, which reacts with the H_2S and other noxious gases liberated in the coagulation bath). A small quantity of hydrazine is also formed and preferably converted into a harmless complex Fe compd. by adding an Fe salt such as $FeSO_4$. The filaments made from material thus treated are chocolate-colored when first formed but assume a normal color after desulfurization. Various details of procedure are described.

Artificial fibers from viscose. ZELLSTOFFFABRIK WALDHOF and ARNOLD BERNSTEIN. Ger. 514,762, July 14, 1928. An app. is described in which the coagulating and fixing liquids are sepd. by a partition, the spun fiber passing through the top layers of these liquids.

Device for applying friction to filaments, etc., spun from viscose. HERMINGHAUS & Co. G. M. B. H. (Hugo Elling, inventor). Ger. 517,324, Mar. 18, 1926.

Use of viscose precipitating baths containing magnesium sulfate. JOHANN J STÖCKLY and RICHARD BARTUNEK (to the firm Vereinigte Glanzstoff-Fabrieken A.-G.). U. S. 1,793,649, Feb. 24. For maintaining the compn. of viscose-pptg. baths contg $MgSO_4$ and Na_2SO_4 in soln., the soln., at a $MgSO_4$ content of over 220 g. per l., is cooled to effect crystn. of $MgSO_4$ in practically pure form, the cryst. material is sepd., the resulting liquor is diluted and practically pure Na_2SO_4 is sepd. by further lowering of the temp., and the resulting mother liquor is concd. and is added with a suitable proportion of $MgSO_4$ to the pptg. bath to be revivified.

Artificial silk. A. BOSSE. Brit. 337,360, June 25, 1929. See Fr. 677,479 (*C. A.* 24, 3113).

Artificial silk filaments from cuprammonium cellulose solutions. BRITISH BEMBERG, LTD. Brit. 337,608, Nov. 19, 1928. In a method involving stretching and coagulation by a stream of precipitant flowing with a gradually increasing speed through a funnel within a spinning vessel, the fresh precipitant, before encountering the threads, is mixed with part of the used precipitant passing from the funnel through apertures into a surrounding space. App. is described.

Liquid treatments of wet cakes of artificial silk. J. P. BEMBERG, A.-G. (to British Bemberg, Ltd.). Brit. 337,590, Nov. 9, 1928. For treatments such as washing or satg. with soaps or fatty emulsions, etc., wet cakes of artificial silk contg. acid are removed from spinning pots and placed upon supports having a yielding periphery and are then immersed in the treating baths. Various details of app. and operation are described.

Apparatus for making silk filaments by the centrifugal box method. I. G. FARBENIND. A.-G. Brit. 337,610, Nov. 8, 1928. Impurities such as salts and acid are removed in a counter-current of washing liquor which preferably enters the guide funnel at its lower part and leaves at its upper part. Water or dil. H_2SO_4 soln. may be used for the washing. Various details of app. and operation are described.

Protecting rayon fibers. ARTHUR REILLY (to Twitchell Process Co.). U. S. 1,794,342, Feb. 24. Rayon fibers, after their formation and before completion of articles formed of them, are protected by coating them with inert mineral oil and "true mahogany" (a described sulfonate material).

Hollow artificial fibers. ERSTE BÖHMISCHE KUNSTSEIDEFABRIK A.-G. Ger. 517,355, Sept. 5, 1926. Hollow artificial fibers are prepd. by incorporating into the usual spinning solns. liquid or solid substances which are insol. in the solns. and which do not give rise to gases or vapors during the spinning process, the added substances being ultimately removed from the spun fibers by means of a solvent. Thus, paraffin oil may be emulsified in viscose, and after spinning, washing and bleaching, the oil particles may be removed from the fibers by means of C_6H_6.

Device for the wet spinning of artificial fibers. NOVASETA A.-G. ARBON. Swiss 142,046 and 142,047, Oct. 10, 1929. Addns. to 140,048 (*C. A.* 25, 815). Details of the funnel-shaped app. are given.

Apparatus for making artificial silk filaments. COURTAULDS, LTD. Ger. 517,325, July 7, 1927. See Brit. 275,042 (*C. A.* 22, 2273).

Spinning device for artificial silk. WEBER & Co. Swiss 142,115, Sept. 19, 1929.

Spinning device for artificial silk. CARL HAMEL A.-G. Ger. 514,667, Aug. 9, 1929.

Spinning chamber for artificial silk. EMIL BLASCHKE. Ger. 514,844, Oct. 6, 1929.

Saccharification of wood. EDUARD FÄRBER, GREGOIRE MINKOFF and THOMAS W. M. POND (to International Sugar and Alcohol Co., Ltd.). U. S. 1,795,166, March 3. Wood is first treated with concd. HCl and HCl gas in quantities insufficient to effect complete conversion into sugar, then is transferred to a diffusion battery and allowed to stand without agitation; the conversion is completed by treatment with HCl of a

lower concn. than that first used, but over 35%, and the sugar soln. is simultaneously withdrawn.

Disintegrating wood. WALDEMAR O. MITSCHERLING (to Albert M. Johnson). U. S. 1,793,711, Feb. 24. In disintegrating wood to form a product which is suitable for paper or rayon manuf., the wood is subjected to a partial vacuum to remove volatile constituents and then subjected to a relatively high gas pressure until the cells of the wood are permeated with the compressed gas, and the pressure is then suddenly released.

Apparatus (with reciprocating and rotating saws) for reducing wood to pulp. JOHN A WIENER (to Oswego Board Corp.). U. S. 1,795,064, March 3. Structural features.

Wood pulp. CLIFFORD E. PETERSON (to Champion Fibre Co.). U. S. 1,792,703, Feb. 17. Wood chips are digested in relatively dil. alk. cooking liquor such as NaOH and Na sulfide soln. with continuous withdrawal of liquor from the bottom of a body of liquor and chips and continuous addn. of the withdrawn liquor to the top of the same body; the temp. of the materials is raised to the desired cooking temp. by introducing steam directly into the lower portion of the body of materials, and the cooking temp. is thereafter maintained by indirect heating of the circulated liquid. App. is described.

Wood-pulp product suitable for paper making. GEORGE A. RICHTER (to Brown Co.). U. S. 1,793,194, Feb. 17. An unbeaten chemical wood pulp is homogeneously blended with like beaten or hydrated pulp. Cf. *C. A.* **24**, 2884.

Paper pulp from groundwood. RAYMOND S. HATCH, ROBERT B WOLF and RAYMOND P. HILL. U. S. 1,794,174, Feb. 24. Wood is ground to produce short-fibered groundwood pulp, slivers are sepd. from the pulp, the slivers are subjected to a softening and defibering treatment with a suitable soln. and the resulting pulp is mixed with the short-fibered ground pulp.

Furnace for recovery of values from waste wood-pulp liquor residuum. FERNANDO FALLA (to Edge Moor Iron Co.). U. S. 1,794,006, Feb. 24. A steam boiler is operated by the furnace gases, and cooling gases are supplied to the boiler space at a point beyond the inlet of the furnace gases so that the furnace gases will be cooled to an extent sufficient to ppt. entrained "chemical ash" from them. Various details of construction are described.

"Kraft-simulating" pulp. GEORGE A. RICHTER (to Brown Co.). U. S. 1,792,510, Feb. 17. Wood chips are digested by heating under pressure in an acid sulfite liquor in which the free SO_2 and combined SO_2 are in approx. equal proportion (of 3 to 4% each), the pulp is sepd. from the digesting liquor and is further digested in an alk. cooking liquor.

Apparatus for continuous filtration and dehydration of pulp for artificial leather or paper manufacture. C. CARCANO. Brit. 337,346, July 22, 1929. Structural features.

Hydrating and beating paper pulp. G. H. CARNAHAN (to Intercontinental Rubber Co.). Brit. 338,389, Dec. 4, 1928. Pulp is hydrated by repeated squeezing and rubbing between resilient surfaces such as rubber in the presence of water (suitably by the use of rubber-covered balls in a tube mill).

Apparatus for beating paper pulp. WM. V. KNOLL (to Mid-West Machine Co.). U. S. 1,793,095, Feb. 17. Structural features.

Paper. OTTO ENGEL. Ger. 514,787, Oct. 15, 1926. Addn. to 483,735. The method of 483,735 (*C. A.* **24**, 699), for producing layers of paper felt, cardboard, etc., with intermediate layers of fabric, gauze, bands or fibers, etc., is modified by using as the binding material, asphalt, resin, bitumen, etc., mixed with oil, tar, etc., with a m. p. considerably higher than that of the finishing material to be subsequently used.

Paper. I. G. FARBENIND. A.-G. Ger. 514,856, Aug. 14, 1926. Addn. to 500,567 (*C. A.* **24**, 4932). Cellulose material such as straw, wood, etc., is impregnated with dil. HNO_3 and treated with air after the removal of the excess of acid. The fibers are then worked up as usual.

Paper. ERNST FUES. Ger. 514,921, July 8, 1927. Paper consisting of one or more layers is impregnated, colored, glazed, etc., by sprinkling the impregnating, etc., materials on or between the paper layers in powd. form in the presence or absence of diluents, treating with solid or liquid assisting agents, and pressing over rollers. Synthetic resins of the CH_2O-PhOH types are mentioned as suitable assisting agents.

Paper-making apparatus. W. P. FEENEY. Brit. 337,532, Aug. 5, 1929. Structural features.

Paper-making machine (Fourdrinier type). PAUL ERKENS. Ger. 517,229, Feb. 25, 1927. Addn. to 406,942. Structural features are described.

Metallic cloth for paper-making apparatus. RICHARD KASTNER. U. S. 1,794,624, March 3.

Filtering apparatus suitable for treating "white water" from paper manufacture. EDWIN M. BASSLER (to D. J. Murray Mfg. Co.). U. S. 1,793,449, Feb. 17. Structural features.

Automatic apparatus for regulating the drying of paper, fabrics, etc. MASCHINENFABRIK AUGSBURG-NÜRNBERG A.-G. (Friedrich Englert, inventor). Ger. 517,332, Nov. 7, 1925.

Moistening device for paper, etc., sheets. HUBERT AUER, JOSEF DERCKS and GUSTAV RONSIEK. Ger. 517,035, April 9, 1929.

Sizing paper. KARL SVEEN. Ger. 517,228, July 21, 1925. A thin dispersion or soln. of a sizing material, *e. g.*, animal glue, in an amt. not exceeding 1 part of dry sizing material to 100 parts of dry paper is continuously added, at a point between the hollander and the wire cloth, to paper stuff contg. fillers, etc., and $Al_2(SO_4)_3$ or other usual precipitant. The sizing soln. may be stored for some time at atm. or reduced temp. before use.

Apparatus for locally applying coloring, etc., liquids to wet sheet material (paper). GEBR. PALM, PAPIERFABRIK. Ger. 517,325, Dec. 21, 1924. Addn. to 509,382 (*C. A.* 25, 817).

Waterproof flexible paper. THE SCUTAN CO. Ger. 514,922, Nov. 25, 1927. See Brit. 281,316 (*C. A.* 22, 3530).

Treating paper to improve its light-reflecting properties. NATIONAL PAPER PROCESS CO. Brit. 338,168, Aug. 14, 1929. To cause paper or other surfaces to reflect whiter light than usual, a light filter is applied to them in uniformly distributed areas which with the untinted areas reflects a combination of colors giving a substantially white effect (the individual tinted and untinted areas being sufficiently small to prevent conscious resolution at the normal viewing distance). The color applied (usually blue) is such as to counteract the preponderant colors normally reflected by the surface. Various details of manuf. are given.

Etching designs on paper. I. G FARBENIND A.-G (Kuno Franz and Karl Dankert, inventors). Ger. 514,626, June 15, 1928. Sharp etched designs are produced by treating the outer layer of paper material with the etching dye prior to subjecting the paper to the etching process.

Variegated paper. LUDWIG HENNEBERGER. Ger. 517,137, April 7, 1929. In the manuf. of variegated paper by dropping oil colors onto soft water and then contacting the paper sheet with the surface of the water, the spreading of the color is assisted by adding a little NH_4OH to the color, in addn. to the usual ox gall or alc. soap.

Anti-moth paper. CARTON- & PAPIERFABRIK G. LAAGER. Swiss 142,572, Nov. 15, 1929. An anti-moth prepn. such as tar soap is added to the pulp mass during the manuf. of the paper.

Coating paper on both sides with metal foil. LEOPOLD RADÓ. Ger. 514,577, April 1, 1927. Cf. *C. A.* 24, 4634.

24—EXPLOSIVES AND EXPLOSIONS

CHARLES E. MUNROE AND C. G. STORM

The characteristics of an explosive: properties determined by combustion in a closed chamber. M. E. BURLOT. *Army Ordnance* 11, 283–6(1931).—The paper describes 2 pressure-gage eprouvettes, with vols. of 25 and 150 cc., for testing pulverulent explosives and *smokeless powders*, resp., and a special calorimeter of the Landrin-Mallez type, in which the eprouvettes are immersed for detg. heat of combustion. P/Q is measured by registering the compression of Cu cylinders as a function of the time, by means of a pen attached to the crusher-gage piston, and a revolving cylinder. For measuring gas vol. (V_0) a gasometer is connected with the eprouvette through a special needle valve. T is calcd. from measured values for P and V_0, or from the equation of combustion and the value of Q detd. by the calorimeter. Potentials of explosives are measured by this app. to an accuracy of 1/1000. C. G. STORM

Consumption of explosives in January, 1931. W. W. ADAMS AND L. S. GERRY Bur. Mines, *Rept. of Investigations* 3093, 13 pp.(1931). ALDEN H. EMERY

A nitro explosive five hundred years ago. F. M. FEILDHAUS. *Nitrocellulose* 2, 12–3 (1931). E. M. SYMMES

Determination of moisture in smokeless powder by the Beneseh method. W. GRADLICH. *Nitrocellulose* 2, 13–4(1931).—Dry air is passed through smokeless powder,

the H_2O is absorbed, and EtOH and acetone vapors are oxidized by hot CuO, the CO_2 and H_2O therefrom being absorbed separately. E. M. SYMMES

A combustion theory for colloidal powders in closed vessel. HENRI MURAOUR. *Compt. rend.* **192**, 227–9(1931).—From observations on the behavior of explosive powders in a closed vessel, a theory is derived to explain the behavior based on temp., pressure and gaseous-layer effects. M. McMAHON

High-brisance studies. IV. Penthrinit versus dynamite. ALFRED STETTBACHER. *Z. ges. Schiess-Sprengstoffw.* **26**, 38–40(1931); cf. *C. A.* **25**, criticisms of Naoum (*C. A.* [illegible] compared with various types of com. *blasting gelatins*, the explosives varying in age from 30 hrs. to 34 days. The tests were made with 250 g. charges on 25 mm. steel plates, 150 g. charges on 7 mm. Fe plates resting on an Fe support, 100 g. charges on 8 mm. and 10 mm. Fe plates, and 30 g. charges stemmed in bore holes 22.5 mm. diam. × 9.4 cm. deep in steel cylinders 12 cm. diam. × 15.2 cm. high. In every case the greater brisance of the Penthrinit mixts. was demonstrated. C. G. STORM

Penthrinit, dynamite and the so-called high-brisance studies of Dr. Stettbacher. P. NAOUM. *Z. ges. Schiess-Sprengstoffw.* **26**, 40–5(1931); cf. *C. A.* **25**, 818.—N. comments on the claims of Stettbacher (cf above abstr. and *C. A.* **25**, 1674, 1998) relative to the superiority of "Penthrinit" mixts and their practical application. The plate tests of S. are interpreted as indicating relative sensitiveness to detonation rather than brisance. The more insensitive gelatin explosives require stronger confinement than that afforded in the tests of S. to develop their max brisance. Even 30 mm. steel tubes do not represent the confinement of a charge in a bore-hole in rock. The article is mainly controversial in nature. C. G. STORM

Combustion and detonation in gaseous mixtures. Antidetonants. PAUL LAFFITTE. *Bull. soc. encour. ind. nat.* **130**, 15–30(1931); cf. *C. A.* **22**, 1475, 2655; **23**, 2571; **24**, 966, 1207. ARTHUR FLEISCHER

The testing of mine dusts. A. L. GODBERT AND R. V. WHEELER. *Trans. Inst. Mining Eng.* **80**, 312–27; *Colliery Guardian* **142**, 301–4(1931).—A study of some 200 mine dusts indicates that percent of ash or incombustible dust is not a true guide to inflammability. Some 16 samples contg. more than 50% of incombustible matter were still classified as inflammable according to the test used. These tests emphasize the wide differences in inflammability that exist between coal dusts of different chem. compn. and indicate that in the use of incombustible dust as a precaution agent against coal dust, there should be greater discrimination. R. S. DEAN

The inflammation of coal dusts: effect of the presence of fire damp. T. N. MASON AND R. V. WHEELER. Safety in Mines Research Board, London, *Paper* No. **64**, 32 pp. (1931). An account is given of inter-related studies of the relative inflammability of a number of different coal dusts and the effect of the presence of fire damp in the air on the inflammability of coal dusts. There is a fairly regular relationship between the content of volatile matter in coal and the inflammability of its dust. Flame is not propagated in coal dust contg. less than 12.5% of volatile matter. The presence of fire damp in the air requires the use of a higher % of stone dust mixed with the coal dust for extinguishing the explosion of the latter. When 2.5% of fire damp was present, coal dust contg. only 7.5% volatile matter was just capable of propagating flame under the conditions of the expts. The tests were conducted in a steel gallery 48 in. in diam. and 325 ft. long, in which ignition was effected by a blown-out shot of 20 oz. of black powder stemmed with 1 lb. of coal dust from a steel cannon with 2-in. bore. C. G. S.

Gaseous explosive reaction: effect of pressure on the rate of propagation of the reaction zone and on the rate of molecular transformation. F. W. STEVENS. *Natl. Advisory Comm. Aeronautics, Rept.* No. **372**, 3–19(1930); cf. *C. A.* **24**, 1982.—A beam of light interrupted by a tuned shutter passed through a lens focused on a spark gap in the center of a soap bubble of explosive gases suspended in the center of a large sphere. Through a second window, opposite the source of light, a camera focused on the spark gap recorded the explosive transformation on a moving film. The reactions (I) $2CO + O_2 \longrightarrow 2CO_2$, (II) $CH_4 + 2O_2 \longrightarrow CO_2 + 2H_2O$, (III) $2C_4H_{10} + 13O_2 \longrightarrow 8CO_2 + 10H_2O$, (IV) 1.8 Fuel + $1.2O_2 \longrightarrow 1.8CO_2 + 0.4H_2O$, (V) 1.5 Fuel + $1.5O_2 \longrightarrow 1.5CO_2 + H_2O$ were studied over a range of pressures from 100 to 2650 mm. In all reactions studied, irrespective of the order given by stoichiometric equations from 3 to 15, the rate of transformation is proportional to the pressure. This indicates a much simpler reaction than is indicated by stoichiometric equations in accord with the impact theory. The findings are strong evidence in support of the theory of chain reactions. High order reactions proceed by many simultaneous simple reactions. Previous investigators, working in const. vol., have in most cases given the

rate of displacement of the reaction zone and not the rate of propagation of the zone relative to the gas it transforms. Conclusion: "The rate of propagation of the reaction zone within the gases is independent of the pressure," from which it follows that the "rate of mol. transformation within the reaction zone is proportional to pressure." In const.-vol. measurements of rate of propagation the generally noted fact that the rate of propagation is uniform for a time after ignition is due to the approach to const. pressure conditions during this time. The work of others is discussed. A bibliography is given. A. LLOYD TAYLOR

Sensitivity of nitroglycerin: effect of static electricity on it and related compounds. H. E. NASH. *Army Ordnance* 11, 384–5(1931).—Sparks were passed through pieces of filter paper satd. with the liquid explosives, or through small samples on a Cu plate. The condenser furnishing the spark was of 0.008 mfd. capacity. Voltage varied from 5000 to 13,000. No explosions or ignitions were obtained in repeated tests with nitroglycerin, mixts. of nitroglycerin and *ethylene glycol dinitrate, propylene glycol dinitrate, nitrosucrose,* and 40% *dynamite.* With a 50% soln. of *DNT* in anhyd. EtOH, ignition of the EtOH vapors occurred. In all tests the samples were surrounded by a cylindrical water jacket to maintain the temp. at the desired point, usually 50–60°. The insensitivity of the liquid explosives to sparks is attributed to their low vapor pressure. Conclusion: Static electricity is not a hazard on nitroglycerin lines in dynamite plants. C. G. STORM

Fire, explosion and health hazards with zapon (nitrocellulose) lacquers. MAX GREMPE. *Nitrocellulose* 2, 36–8(1931). E. M. SYMMES

Two little-known sources of explosion. HANS WOLF. *Chem.-Ztg.* 54, 796(1930). Iron sulfides resulting from the corrosion of gasometers by S products in illuminating gas can ignite spontaneously. Thin Al foil or Al bronze dust is capable of igniting under the influence of a strong light. A. L. HENNE

Gas-analysis apparatus [for attachment to a miner's lamp] (Brit. pat. 338,410) 1

Poudres et explosifs. Volume mis à jour à la date du 1 Janvier, 1930. Paris: Charles Lavauzelle et Cie. 199 pp.

Explosive primer composition. CHARLES H. PRITHAM. U. S. 1,794,732, March 3. Hg fulminate 37, $Ba(NO_3)_2$ 32, Sb sulfide 28, ground glass 3 and a high explosive such as trinitrotoluene 4–8 parts are used together.

Propellent explosive comprising colloidized nitrocellulose. CHARLES M. A. STINE and CHARLES E. BURKE (to E. I. du Pont de Nemours & Co.). U. S. 1,792,516, Feb. 17. Nitrocellulose is colloidized with a nitrated ester of lactic acid and a polyhydric alc. such as dinitroglycerylnitrolactate and nitroglycerylnitrolactate or glyceryldinitrolactate.

Paper shot shells. WATSON H. WOODFORD (to Remington Arms Co.). U. S. 1,795,191, March 3. A portion of the paper shell wall is impregnated with a heat absorbent comprising a lacquer plasticizer, such as various described varnish or lacquer compns. Cf. *C. A.* 24, 4398.

Nitrated ester of lactic acid and glycerol, etc. CHARLES M. A. STINE and CHARLES E. BURKE (to E. I. du Pont de Nemours & Co.). U. S. 1,792,515, Feb. 17. A nitrated ester of lactic acid and glycerol is prepd. by nitrating a glyceryllactate with HNO_3 and H_2SO_4 and may be used in explosives with nitrocellulose, etc. Nitrolactates of ethylene glycol are also mentioned.

Electric blasting fuses. LIGNOZA SPOLKA AKCYJNA. Brit. 337,837, June 15, 1928. Structural features.

25—DYES AND TEXTILE CHEMISTRY

L. A. OLNEY

The constitution and properties of level-dyeing rayon dyes. KARIN SCHULZE. *Seide* 36, 43–7, 85–90(1931). H. W. STIEGER

Azo dyes and their intermediate products. V. Constitution and degree of dispersion of azo dyes. PAUL RUGGLI AND ARTHUR ZIMMERMANN. *Helv. Chim. Acta* 14, 101–26(1931); cf. *C. A.* 25, 417.—Substantive dyes for cotton are usually colloidal in soln. In this work an attempt has been made to trace a relationship between the constitution of such dyes, their affinity for cotton, and their degree of dispersion as measured by the viscosity of a dil. soln. and the rate of diffusion through a 1% gelatin

soln. Definite conclusions are difficult to form. Much depends on the number and position of the SO_3H groups. A large amt. of tabulated data is given which cannot well be abstracted. VI. Relation between molecular size and properties of azo dyes. *Ibid* 127–41.—A series of dyes were prepd. by a successive 2,6′ diazo coupling of 2, 3, 4, 5 and *x* mols. of J acid (2-amino-5-naphthol-7-sulfonic acid). All showed more or less affinity for cotton, but from a technical standpoint would be considered very poor substantive dyes. J acid alone does not dye cotton. The 2-J compd. in soln. is highly dispersed. The *x*-J compd. is coarsely dispersed, nearly insol., does not diffuse, and dyes poorly. The others diffuse about the same rate as Congo red and their degree of dispersion approaches that of other substantive dyes, but even the 5-J compd., with a higher mol. wt. (1349) than any known azo dye, can hardly be classed as a true substantive, nor a true colloid, but is on the border line. L. E. GILSON

The resistance of coloring substances to ultra-violet light. II. GIUSEPPE A. BRAVO. *Boll. ufficiale stas. sper. ind. pelli mat. concianti* 8, 184–90(1930).—A continuation of earlier work (*C. A.* 24, 2888). Measurements are given of dyes belonging to the nitro, nitroso, azo, stilbene, pyrazolone, diphenylmethane and triphenylmethane series. G. SCHWOCH

Relation between fading of dyed colors in light and their color-depth. H. SOMMER. *Z. angew. Chem.* 44, 61–5(1931).—It is well known that pale shades of dyed colors fade more strongly in light than the heavier shades. By employing a Zeiss graduated photometer for the measurement of color by the Ostwald system it is possible to establish a relation between the depth of color and the amt. of fading. The general process to be carried out for the detn. of this relation is described. Graphs are given plotted on the triangulated coördinate system, and expressed in the Ostwald color units, with a dyeing of Anthracene Blue SSWG extra on wool. The relations deduced are expressed in math. formulas, such as $A = n\sqrt{t}$, where A = the Ziersch degree of bleaching, t = the time of the action expressed in normal bleaching hrs., and n = the "bleaching-coefficient," being a const dependent on the light-fastness of the dyestuff. Also the relation between the collective range of different depths of dyed color and a definitely established normal is given as: $A = N\sqrt{t}\,(\log c - \log f)$, where N is the "bleaching constant" detd. empirically from a comparison of different depths of dyed color, where c = the dyestuff quantity used and f = dyestuff quantity absorbed. The deduction of such a complicated formula from one set of expts. on Anthracene Blue is assuming rather too much, but this is simple compared with further formulas involving exponential equations expressing the psycho-phys. laws of Fechner with respect to color phenomena. J. M. MATTHEWS

Chlorinating and dyeing woolen goods. J. ROBERT. *Bol. laniera* 44, 834–5 (1930).—Treat woolen yarn for ¼ hr. with 100 l. H_2O, contg. 1.5 l. HCl (22° Bé.), eliminate excess of bath, treat in 10–20% $Ca(OCl)_2$ for ½ hr., and again in the 1st bath for 20 min. and in a cold bath with 5 g. $NaHSO_3$ per l. H_2O. After washing, initiate dyeing at a lower temp. than usual, and without acid in the case of easily absorbed colors, only adding it gradually until exhausting the bath. For a scroop treat in the cold with 5 g. soap per l., dry slightly and acidify with dil. HCl, H_2SO_4 or tartaric acid. For a soft grip treat 10–15 min. in a cold bath with 8–10 g. soap, 1–2 g. olive oil, and 3–4 g. ammonia (24° Bé.) per l. H_2O. Woolen muslins absorb 120–160 g. active Cl, while heavier articles take ¼ to ½ this quantity. Chlorination is often followed by a passage in Na stannate of 3–6° Bé., leaving the wool to itself for some time, and fixing with H_2SO_4 of 10° Bé., washing and drying. To prevent the yellowing of whites during the steaming for fixing printing colors, the cloth is prepd. with 15–20 g. Na stannate per l., and dried without souring. The same effect is obtained by passing in a bath with 50 g. oxalic acid per l. R. SANSONE

The dyeing of wool with vat colors. L. RINOLDI. *Bol. laniera* 43, 989–92(1929).—Indigo dyeings on wool sometimes have reduced fastness to light, attributed to hyposulfite, free S, colloidal S, H_2SO_4, or sulfites formed by decompn., to strong alky. or acidity, to the color absorption conditions, or to the addn. of glue. When reduced color is absorbed, even if combined with alkali, it remains in a colloidal soln., and acts as a direct product, being absorbed mechanically as aggregated mols. When absorbed as a sulfonate it acts as a well-dissolved acid color, and is fixed by the wool as simple mols., much less resistant than mol. aggregates. Weakening of the wool is caused by NaOH, and by too much hyposulfite, which provokes, even after taking from the bath, an excessive oxidation that also destroyed a part of the color. R. SANSONE

Dyeing wool with tin salt and oxalic acid. J. ROBERT. *Boll. laniera* 44, 837 (1930).—When cochineal or quercitron is used with aniline colors for dyeing wool

in shades faster to light and alkalies, prepare a bath contg. oxalic acid 2, salt 1.5, cream of tartar 1.5 and $SnCl_2$ 1%. Add the cochineal powder, after making into a paste with a little Sn salt soln., dye at the b. p. 1 hr. and wash in soft water. Cu and Fe must be absent, and wooden vats are preferred, when tinned Cu or Sn vats are not available. Orange II, palatin scarlets, ponceaux R and the rhodamines, are used in the cochineal bath after this has been fixed on the wool, although better results are obtained by using them in a fresh bath. With the phloxins and eosins this is indispensable.
R. SANSONE

Faults in the dyeing of rayon viscose and their prevention. L. RINOLDI. *Boll. laniera* **44**, 201–5(1930).—Uneven shades and other faults are produced on viscose silk during dyeing, by colloidal S, sulfides or polysulfides coming from the manufacturing process, and by ununiform threads. The S oxidizes to H_2SO_4, weakening the fiber. Deacidification with Na_2CO_3 or NaOH is not enough for uniform shades with direct or S colors, for the fiber in the more altered parts dyes less. Better results are obtained by treating with NaOH at 50–60° and addn. to the dye bath of soap, sulforicinate, pyridine, old degumming baths and glue. The greatest uniformity is obtained during the most rapid dyeing and near the b. p. Colors strongly fixed in tepid baths give more regular shades at 90–95°. With dark shades, for exhausting the bath there is added, after ½ hr. dyeing, 5–20% Na_2SO_4. Many dyers avoid this, as it can produce uneven shades.
R. SANSONE

Dyeing unmordanted cotton in cold or tepid concentrated sea-salt baths. J. ROBERT. *Boll. laniera* **44**, 837(1930).—The eosins, erythrosins, phloxins, Bengal pinks and certain acid colors are dyed in a lukewarm bath contg. 50 g. sea-salt per l. Quinoline yellow S, naphthol yellow S and metanil yellow are dyed in a lukewarm bath with 10–20 g. sea-salt per l. Azoflavine RR, orange II, orange GR, ponceaux R and fast ponceaux need instead a bath with 10–20 g. sea salt and 0.5–2 g. alum per l. The cotton is dyed for ¾ hr., freed from the excess of bath and dried in the cold without rinsing in water. Very bright shades are obtained with a mediocre fastness to washing. From 2 to 10 kg. of color is needed for every 100 kg. of cotton. The baths exhaust badly.
R. SANSONE

Conditioning textiles in laboratory experiments. W. WELTZIEN. *Seide* **35**, 482–6 (1930).—A photographically illustrated lab. app. for conditioning textile samples is explained and discussed.
H. W. STIEGLER

Physical and chemical properties of textiles. I. A. J. HALL. *Textile Mercury* **84**, 211(1931).—X-ray methods are discussed and the micelle structures of cotton and rayons are correlated with the fiber properties of dyeing, luster and resistance to decompn. by snail enzyme. The following figures give % degradation of cellulose by snail enzyme (p_H const. at 5.28 by Na phosphate buffer, temp. 36°, time 6 days): *Cotton 2.1, filter paper 7.1, cotton, solvent extracted and mercerized, 10.2, cellulose regenerated from nitrocellulose 7.8, cuprammonium cellulose 18.3, viscose cellulose 23.1, alkali sol. cellulose prepd. from nitrocellulose 32.4, cellulose regenerated from acetyl* cellulose 70.0, alkali-sol. cellulose prepd. by treatment with HCl 68.5.
A. K. J.

Some physicochemical properties of the wool fiber. J. B. SPEAKMAN. *J. Textile Sci.* **4**, 6–9(1931).—This paper relates chiefly to the adsorption of dyes by wool. Dye mols. are so enormous that there would seem to be little chance of their ever entering the fiber. The size of the pores in the dry fiber were detd. by reaction with alc. hydroxyl groups associated with stretching of the wool, the work required to stretch the fiber being measured first in water, and then in MeOH, EtOH, etc. The alcs. employed increase progressively in mol. size and wt. The resistance to extension increases until butyl alc. is reached when the fiber behaves as it does in dry air. Alcs. beyond butyl, therefore, do not enter the wool mol., and therefore the size of the pores in the dry wool fiber is approx. the same as the length of the *n*-propyl alc. mol. The work required to stretch wool fibers 30% (g. cm. per cc.) in various media at 22.2° is 5.37×10^8 for octyl alc. and 1.63×10^8 for ethylene glycol. The increase of pore size of wool fibers swollen in water is more than 100%. Dry wool fibers immersed in water give an increase in length of 1% and an increase in diam. of 18%. Water and other reagents are adsorbed on the surfaces of the constituent micelles, causing a swelling of the fiber. Actual detns. of the pore size show the micelles are about 200 A. U. thick. The size of the swollen pores is about 40 A. U. Thus any dye having a mol. greater than this size is only adsorbed on the exterior of the fiber and will be deficient in fastness to rubbing. On transferring the dry wool fiber from dry air to water the breaking load of the fiber is changed from 22.1 to 14.9×10^8 g./cm.^{2}. The increase in cross-section is about 40% and the rigidity is altered in the ratio of 15:1 as compared with the breaking load. This indicates that the micelles are much longer than they are thick. The conclusion

is that the wool fiber is built up of tiny plates, 200 A. U. thick, the long axis of the plates being parallel with the length of the fiber. When the wool is swollen in water the distance sepg. the surfaces of the plates is about 40 A. U., whereas in the dry fiber this is only 6 A. U. J. M. MATTHEWS

X-ray investigations of the inner structure of wool. W. T. ASTBURY. *J. Textile Sci.* **4**, 1-5(1931).—The minute structural elements of the wool fiber may be studied with the aid of x-rays. Wool is a complex biol. structure built up from the protein keratin which is characterised by containing S in the mol. The elements of the wool fiber are "to a large extent" cryst., meaning that the constituent mols. are built together in a regular 3-dimensional pattern Wool is generally called colloidal, but this is because its crystals are so minute. X-ray photographs are given showing that stretched wool fibers have a different crystallographic structure from the unstretched, the latter is called α-keratin and the former β keratin, though this difference is postulated entirely on the showing of the x-ray photographs and is not substantiated by any chem. analysis. Wool, when wetted, may be stretched to twice its normal length without losing its elasticity or its ability to regain its normal length when dried. But stretched wool is very susceptible to the action of steam, so that the β-keratin loses its power of returning to the α-form. The stretched wool is 20 times as sensitive to the action of Na_2S soln. as the unstretched fiber. The x-ray measurements indicate that the α to β transformation is associated with a mol elongation of from 5.15 to 10.2 A. U. along the axis of the fiber. Spatial mol. models are given showing a theoretical structure on the wool mols. J. M. MATTHEWS

The oiling of wool by means of glycerol. A. M. SEREBRIAKOV *Nili (Suppl. to Izvestiya Tekstil. Prom u Torgovli)* **1**, Nos. 4-5, 16-7(1930); *Chimie & industrie* **25**, 165(1931). - Though attempts to substitute glycerol for spinning oils have not previously been successful with high-grade wools, excellent results were obtained in the present tests by using 20-30% glycerol on wool which had been incompletely scoured and still contained a relatively large amt. of grease. Tests showed that Turkey-red oil also can be used satisfactorily, but its use will depend on the price. A. P.-C.

The oxidation of the fat used in oiled wool. G SALOMONE. *Boll. laniera* **44**, 297-300(1930) - The oils used for wool should be easily absorbed, should furnish emulsions in water with very fine fluid particles covering easily and equally the wool fibrils, should not become agglutinated in the air, should not have any corrosive action, should be very little oxidizable, should develop little heat, should be easily eliminated by a weak alkali and should give no disagreeable odor or color The oils extd. from woolen yarn stored for some time are colored brown, and have an unpleasant odor; their fatty acids turn the wool a yellow brown, not always eliminated by scouring, even with volatile solvents. Rancid oils can cause a sensible reduction in the resistance of the wool, and after scouring, a slight increase in the soly. in water, in acid and in alk. solns. The more satd. fatty acids are altered less easily. They give with soap solns. very good emulsions, but melt too high, having a weak lubricating action. Some of their esters, e. g., Me, Et or Am stearate, or Me or Et palmitate can replace natural oils and olein; they can be used alone or in mixt. with oleic acid, emulsifying easily, giving emulsions with very minute particles and an increased stability. R. SANSONE

Determining the size in cotton cloth. CAMILLO LEVI. *Boll assoc. ital. chim. tessile e color.* **6**, 249-59(1930).—To det. the amount of size, 10 g. of the cotton cloth was immersed in distd. water, boiled 15 min., treated in 500 cc. of a 1% rapidase soln. at 80-85° for 3 hrs., washed with warm distd water and cold water, boiled 15 min. in 500 cc. of 0.2% Na_2CO_3 soln., washed again with warm distd. water and cold water, with light rubbing, washed with alc. and then with ether and dried at 100-105° to a const. wt. R. SANSONE

Linseed oil size and viscose silk. K GÖTZE. *Seide* **35**, 445-9(1930).—The use of linseed oil size applied in org. solvents and as an emulsion is discussed. When used in solvents the oil penetrates the fiber but as an emulsion it penetrates only slightly. Oxidation of the oil can damage the fiber if the rayon is left on bobbins for some time. It also alters the oil, making it difficult to remove, causing streaks and affinity for acid dyes, thus preventing a pure white rayon in wool-rayon mixtures. Increase in wt proceeds with oxidation. Oxidation takes place in two steps, rapid and slow. The former causes coagulation and film formation and is desired. Catalysts or ozone complete it in 24 hrs. The slow oxidation decomposes the mol. into acids. Manganese and lead are used as oxidation catalysts. The lead, however, has a tendency to discolor later on when wool-rayon mixts. are scoured in alkali. The brown color can be obviated by adding perborate to the scouring bath. Regarding strength and elasticity, no difference was found between the soln. and emulsion methods of application. Tables

show strength variations after three months' storage. Foreign materials in the size baths can act destructively on the fiber because of decompn. of the oil. Sulfur does this especially in the emulsion method. Scrooping has no effect on strength. Iron and copper can cause damage in either method. H. W. STIEGLER

International tests for artificial silk. W. KÖNIGS. *Seide* 35, 392–4(1930).—Drying data obtained at Krefeld are presented and discussed. H. W. STIEGLER

Silk weighting and fiber swelling. H. POHL. *Seide* 36, 17–9(1931).—Many measurements of fiber cross section and fiber width are summarized in table form Charts are given for tin-phosphate-silicate and tin-phosphate-logwood weighting In general, swelling is proportional to weighting. Tin-phosphate-logwood weighting causes greater swelling than tin-phosphate-silicate, the ratio being 2.13:1 for the increase in cross section. Calcn. of swelling from measurements of fiber width is not as reliable as actual cross-section measurements. H. W. STIEGLER

Temperature control in processing of silk. FRANK A. WESTBROOK. *Am. Silk J.* 50, No. 3, 56–8(1931).—The importance of temp. in various textile processes makes the installation of automatic temp.-control devices on all units desirable. Some optimal process temps. are furnished. H. H. MOSHER

The bleaching of textile fibers. F. HERNANDEZ. *Quim. e ind.* 7, 281–6(1930); cf. *C. A.* 25, 820.—Discussion of the usual methods for bleaching and subsequent treatment of linen, cotton, flax, hemp, ramie, jute, silk, etc. Bleaching with H_2O_2, Na_2O_2, sodium perborate, $KMnO_4$, H_2SO_3, SO_2 and Na_2SO_3 is also briefly discussed with practical data. S. L. B. ETHERTON

Siliceous CaO compounds [for dyeing] (Ger. pat. 514,742) **18.** Wax emuls. [for waterproofing fabrics] (Brit. pat. 338,176) **18.**

PEARSON, HERBERT P.: **Das Wasserdichtmachen von Textilien.** Translated Paul Krais with an original paper on "Die Herstellung wasserdichter Stoffe mit Hilfe Kautschuk" by F. Kirchhof. Dresden: T. Steinkopff. 74 pp.

Dyes. I. G. FARBENIND. A.-G. Brit. 337,374, April 26, 1929. 1,2,5 or 1,2 phthaloylacridone and various other compds. having a condensed ring system of at least 5 rings comprising the acridone ring system, at least 2 further carboxylic rings [illegible] connected with the condensed ring system, and at least 2 ketonic groups being contained in the compds. in addn. to that in the acridone ring, are treated with Cl or Br or [illegible] with chlorinating or brominating agents, preferably in the presence of a suitable diluent such as trichlorobenzene and a catalyst such as I or S, metals, Se or P. Numerous examples are given, for producing dyes several of which dye orange-red shades

Dyes. I. G. FARBENIND A.-G. Brit 338,182, Aug. 7, 1929. 4,*Bz*-3,4,5 to 1-haloanthraquinone-2,1-benzacridones are made by treating anthraquinone-2,1-benzacridones halogenated at least in the *Bz*-4-position and having the *Bz*-2-position free from halogen, with halogenating agents in the presence of org. solvents When using starting materials having the 4-position free, only chlorinating agents are employed as Br enters the 4 position only in small quantities. Several examples are given

Dyes. I. G. FARBENIND. A.-G. Brit. 338,216, July 5, 1929. *Bz*-2,4 Dihalo- and *Bz*-2,3,4,5-tetrahaloanthraquinone-2,1-benzacridones are prepd. by condensing 1-haloanthraquinone-2-carboxylic acids with 3,5-dihaloanilines and 2,3,4,5-tetrahaloanilines, resp., followed by ring closure. The tetrahaloanthraquinone-2,1-benzacridones also may be prepd. by treating anthraquinone-2,1-benzacridones halogenated at least in the *Bz*-2,4-positions but not completely halogenated in the benzene nucleus, with brominating agents or by treating these anthraquinone-2,1-benzacridones with chlorinating agents followed by treating the products with agents replacing halogen by H, or by treating 4-*Bz*-2,3,4,5-pentahaloanthraquinone-2,1-benzacridones with agents replacing halogen by H. Several examples are given, the products dyeing brilliant orange shades.

Dyes. I. G. FARBENIND. A.-G. Brit. 338,217, July 6, 1929. 4,*Bz*-4,5-Pentahaloanthraquinone-2,1-benzacridones are prepd. by condensing 1-haloanthraquinone-2-carboxylic acids or their esters with tetrahaloanilines having a free *o*-position to the amino group, followed by acridone ring-closure; or, the same products may be obtained by treating anthraquinone-2,1-benzacridones contg. halogen at least in the *Bz*-2- and *Bz*-4-positions with halogenating agents in the presence of an org. solvent. When starting with compds. having the 4-position free, only chlorinating agents are used, as Br only enters this latter position in small quantities. The products are dyes giving brilliant red dyeings. Several examples are given.

Azo dyes. I. G. FARBENIND. A.-G. (Winfrid Hentrich and Rudolf Knoche, inventors). Ger. 517,437, Mar. 31, 1928. The diazo compds. from amines of the formula $RSO_2C{:}C(NH_2).CH{:}CH.C(NO_2){:}CH$, where R is an aryl residue contg. at least one sulfo group and free from or contg. other substituents, are coupled with sulfonic acids of 2-aminonaphthalene or 2-amino-8-hydroxynaphthalene or their *N*-substitution products. Examples are given.

Azo dyes. I. G. FARBENIND. A.-G. (Leopold Laska and Arthur Zitscher, inventors). Ger. 517,438, May 8, 1928. Diazo, tetrazo or diazoazo compds. not contg. SO_3H or COOH groups are coupled with 2',3'-hydroxynaphthoyl-4-aminodiphenylamine or its derivs. substituted in the diphenylamine residue. Coupling may be effected in substance or on a support. The products are red, brown or black dyes insol. in water. Numerous examples are given.

Azo dyes. I. G. FARBENIND. A.-G. (Heinrich Clingestein and Karl Dobmaier, inventors). Ger. 517,439, Dec. 6, 1928. The diazo compds. from *o*-aminobenzophenone and its derivs. or substitution products not contg. a sulfo group, are coupled with suitable components such as naphthols, arylides of 2,3-hydroxynaphthoic acid, etc. Coupling may be effected in substance or on a support. The products are yellow to red dyes insol. in water. Examples are given.

Azo dyes. HERMANN WAGNER and KARL BECK (to General Aniline Works). U. S. 1,794,219, Feb. 24. Azo dyes of excellent fastness and of favorite tints are obtained by coupling, in substance or on the fiber, a diazotized 2,3-aminonaphthoic acid ester or a substitution product thereof with a naphthol or with a 2,3-hydroxynaphthoic acid arylamide or a substitution product thereof. The dyes are characterized by the formula: $3,2\text{-}(R_1OOC)C_{10}H_6N{:}NC_{10}H_5(OH)R_2\text{-}1,2,3$, wherein R_1 stands for an alkyl group, R_2 stands for H or the group CONHaryl and wherein the aryl nuclei may contain substituents, such as the NO_2 group or halogen, but contg. no free sulfo or carboxy group. Several examples are given with details of dyeing processes. Cf. *C. A.* 24, 2304.

Azo dyes. KARL HEUSNER and MAX SIMON (to General Aniline Works). U. S. 1,795,125, March 3. Dyes of the general formula $RN{:}NR_1NHSO_3H$ wherein R represents the residue of any diazo compd. and R_1 a benzene nucleus, which may be substituted are obtainable, for instance, by coupling any diazo compd. with a sulfaminic acid of the benzene series such as the sulfaminic acid of aniline, a toluidine or a cresidine. They are, when dried and pulverized, generally reddish to brownish powders dyeing wool in yellow to orange shades. An example is given of the use of acetyl *p*-phenylenediamine and the Na salt of 2-sulfamino-4-methyl-1-methoxybenzene as starting materials.

Azo dyes containing chromium. HUGO SCHWEITZER (to General Aniline Works). U. S. 1,794,252, Feb. 24. Products dyeing wool clear greenish yellow shades of good fastness and suitable for use as lake or pigment dyes are obtained by boiling the aq. soln. of a dye of the general formula: $\overline{N\ Cx.CH(N{:}NR_1).CO.N}\ R_2\ SO_2C_6H_3(OH)\text{-}CO_2H\ 2,1$, wherein R_1 stands for an aromatic nucleus, x stands for the methyl or the carboxy group, R_2 stands for a benzene nucleus, wherein R_1 and R_2 may be substituted, and wherein the salicylic acid radical is attached to the sulfone group in *o*- or *p*-position in relation to the hydroxy group of the said radical (said dyes being obtainable according to the U. S. Patent 1,685,071, *C. A.* 22, 4833) with a H_2O-sol. salt of tervalent Cr, such as Cr formate, Cr acetate or Cr fluoride, for about 2–4 hrs. Examples with details of procedure are given.

Pyrazolone azo dyes. HERMANN WAGNER, HEINZ EICHWEDE and ERICH FISCHER (to General Aniline Works). U. S. 1,794,218, Feb. 24. Dyes giving yellow tints on wool are obtainable by coupling any diazo compd. with a compd. of the general formula $2,4,5\text{-}(HO_2S)ClMeC_6H_2\overline{N\ CO.CH_2.CX{:}N}$, wherein X represents a methyl, carboxyl or a carboxylic acid ester group. These compds., which have not yet been described, are obtainable in the known manner by condensing the hydrazine with acetoacetic ester or oxalacetic ester. Several examples are given.

Producing azo dyes on acyl celluloses. FRIEDRICH FELIX and WOLFGANG JAECK (to Soc. anon. pour l'ind. chim. à Bâle). U. S. 1,793,390, Feb. 17. Products such as "acetate silk" are dyed with an azo dye of the general formula, $NH_2.R'.N{:}N.R''.NH_2$ in which R' and R'' signify 2 aryl residues which may be different from each other (such as the diamino azo dye obtained by saponifying the coupling product from diazotized *p*-aminoacetanilide and cresidine) and the material is then treated with

nitrous acid and further coupling is effected with β-hydroxynaphthoic acid (or with β-naphthol for producing a somewhat less light-fast dyeing) in a medium with a p_H below 7.1. Various details of procedure are given.

Monoazo dyes. J. R. GEIGY SOC. ANON. Brit. 337,577, Oct. 15, 1928. Monoazo dyes giving clear red shades, fast to light and acid or alk. fulling, on wool and silk are made by combining a diazotized aryl or aralkyl ether of *o*-aminophenol or a substitution product with a *N*-arylsulfo-1-amino-8-naphtholdisulfonic acid. Several examples are given.

Vat dyes. HEINZ SCHEYER (to General Aniline Works). U. S. 1,793,138, Feb. 17. A 2-aroylpyrazoleanthrone contg. in the pyrazole ring the free imino group and in the aryl residue a halogen atom in *o*-position to the keto group such as dichlorobenzoylpyrazoleanthrone or like compd. in which the anthraquinone as well as the benzene nucleus may contain substituents, is treated with an inorg. substance of feebly alk. reaction such as KOAc or Na_2CO_3, suitably in the presence of a diluent such as $PhNO_2$ and a catalyst such as Cu powder, producing products which dye cotton from a violet vat fast blue shades. Details of procedure are given.

Vat dyes. I. G. FARBENIND. A.-G. Brit. 337,741, July 4, 1929. Anthraquinonylaminobenzanthrones contg. 2 or more anthraquinonylamino groups, one of which is in the *Bz*-1-position, are converted into vat dyes by treatment with alk. condensing agents, as by fusion with alc. KOH. Numerous examples are given of the production of dyes producing brown shades in most cases.

Vat dyes. I. G. FARBENIND. A.-G. (Fritz Baumann, inventor). Ger. 513,608, April 10, 1929. Vat dyes are produced by introducing a substituted or unsubstituted anthraquinone-β-carboxylic acid residue into the amino group of α-aminoanthrimidecarbazole or its derivs. and substitution products. Thus, 5,5′-diamino-1,1′-anthrimidecarbazole (obtained by sapong. 5,5′-di(benzoylamino)-1,1′-anthrimidecarbazole) is taken up in $PhNO_2$ and heated. Anthraquinone-2-carboxylic acid chloride is then added to form the dye. Other examples are given. Cf. *C. A.* 25, 1396, 1682.

Vat dyes. I. G. FARBENIND. A.-G. (Walter Mieg, inventor). Ger. 514,518, July 10, 1928. Addn. to 465,835. Vat dyes of the anthraquinone series are prepd. by the action of condensing agents (especially $ClSO_3H$ or H_2SO_4) on dianthraquinonylamines which contain at least one halogen-substituted acridone ring and at least one acylamino group, at low temps. The product may be oxidized. Thus, the dianthraquinonylamine deriv. prepd. as described in Ger. 513,045 (*C. A.* 25, 1396) by the condensation of 1 mol. of trichloroanthraquinoneacridone with 1 mol. of 1-benzoylamino-5-aminoanthraquinone, is treated with concd. H_2SO_4. The product is treated with Na_2O_2 to give a dye which colors cotton in fast black shades. Other examples are given.

Vat dyes. I. G. FARBENIND. A.-G. (Heinrich Neresheimer and Georg Bohner, inventors). Ger. 517,277, Oct. 3, 1929. Vat dyes are prepd. by halogenating α-arylaminoanthraquinonealdehydes contg. at least one CHO group in *o*-position to an NH group, and free from or contg. other substituents. Examples are given of the prepn. of dyes from 1-phenylaminoanthraquinone-2′-aldehyde, 1-phenylaminoanthraquinone-2-aldehyde and 1,5-diphenyldiaminoanthraquinone 2′,2″ dialdehyde.

Vat dyes. I. G. FARBENIND. A.-G. (Max A. Kunz, Karl Köberle and Erich Berthold, inventors). Ger. 517,440, July 27, 1929. Addn. to 409,169 (*C. A.* 24, 4168). Vat dyes contg. more than one halogen are prepd. (1) by treating dibenzanthrone or isodibenzanthrone or their derivs. with at least two different halogens or halogenating agents, simultaneously or in succession, or (2) by introducing into halodibenzanthrones or haloisodibenzanthrones a halogen other than that already present, or (3) by treating polyhalodibenzanthrones or polyhaloisodibenzanthrones so that the halogen is partly replaced by another halogen, or (4) by treating substitution products of dibenzanthrone or isodibenzanthrone so that a nitro, sulfo or other substituent group is replaced by halogen, and then introducing a different halogen, if necessary. Examples are given. Cf. *C. A.* 25, 2003.

Vat dyes. I. G. FARBENIND. A.-G. (Robert Berliner, inventor). Ger. 517,441, Aug. 8, 1928. Carbazole derivs. useful as vat dyes are prepd. by the action of H_2SO_4 at a low temp., on dianthraquinonylamines contg. at least two acridone rings, the products being oxidized, if necessary. An example is given.

Vat dyes. I. G. FARBENIND. A.-G. (Filip Kačer, inventor). Ger. 517,443, April 12, 1929. Vat dyes giving yellow shades on cotton are prepd. by heating 3-mercapto-2-methylanthraquinone or its derivs. with S. An example is given.

Vat dyes. I. G. FARBENIND. A.-G. (Karl Schirmacher and Karl Eishold, inventors). Ger. 517,444, May 31, 1927. See Brit. 291,361 (*C. A.* 23, 1283).

Blue vat dyes. I. G. FARBENIND. A.-G. (Paul Nawiasky, Emil Krauch and Alfred Ehrhardt, inventors). Ger. 517,278, Oct. 13, 1929. Dibenzanthrone or isodibenzanthrone or their derivs. is treated with S_2Cl_2 in the presence of a metal halide having a condensing action, *e. g.*, $AlCl_3$ or $FeCl_3$. Examples are given.

Indigoid vat dyes. ERWIN HOFFA and WILHELM LUCE (to General Aniline Works). U. S. 1,793,173, Feb. 17. Vat dyes are produced by treating with P_2O_5 a mixt. of an arylthioglycolic acid (such as 1-chloronaphthalenethioglycolic acid, β-naphthylthioglycolic acid or 6-methyl-4-chlorophenyl-1-thioglycolic acid) and an *o*-diketone capable of being coupled (such as isatin, 5,7-dibromoisatin or acenaphthenequinone). In the examples given, red and brown dyes are formed. Cf. *C. A.* **24**, 3653.

Violet indigoid vat dyes. HERBERT A. LUBS and JOSEPH G. DINWIDDLE (to E. I. du Pont de Nemours & Co.). U. S. 1,792,648, Feb. 17. By the condensation of a haloisatin chloride (such as dibromoisatin chloride or monochloroisatin chloride) with hydroxyalkylthionaphthenes such as 3-hydroxy-4-chloro-6-methylthionaphthene or 3 hydroxy-5-chloro-7-methylthionaphthene, dyes are produced which are considerably superior in brightness, shade and tinctorial value to those made by condensation of hydroxythionaphthene with isatin chloride, and subsequently brominating this condensation product. By varying the particular combination of intermediates, shades of violet may be obtained varying from reddish to bluish. Several examples with details of procedure are given.

Azophthalein dyes. J. R. GEIGY A.-G. Ger. 514,973, May 25, 1928. See Fr. 675,507 (*C. A.* **24**, 3116).

Indigoid dyes. I. G. FARBENIND. A.-G. (Walter Mieg and Rudolf M. Heidenreich, inventors). Ger. 514,515, Aug. 1, 1928. See Brit. 324,119 (*C. A.* **24**, 3380).

Indigo powder. CHARLES J. STROSACKER, HAROLD KENDALL, CHESTER C. KENNEDY and EARL L. PELTON (to Dow Chemical Co.). U. S. 1,794,805, March 3. A dispersing agent including a "spreader" such as 1% each of gelatin, NaOH and Monopol oil is mixed with indigo paste and the material is dried. The product is readily miscible with water.

Dyes of the thioindigo series. I. G. FARBENIND. A.-G. Brit. 338,104, Feb. 11, 1930. The stable reduction products of 4,4'-dimethyl 6,6'-dihalothioindigos described in Brit. 334,878 (*C. A.* **25**, 1394) are made by hydrogenating the dyes in the presence of an alkali such as Na_2CO_3 and a catalyst such as a Ni catalyst capable of promoting hydrogenation. The products may be used for printing as described in Brit. 334,907 (*C. A.* **25**, 1391).

Acid wool dyes. I. G. FARBENIND. A.-G. (Carl Taube, Ludwig Zeh and Josef Hilger, inventors). Ger. 517,276, July 25, 1929. 1-Amino-4-bromoanthraquinone-2-sulfonic acid is treated with ethers derived from aminophenols and polyhydric alcs. Thus, a blue dye is prepd. by boiling the Na salt of the sulfonic acid in water with *p*-aminophenol glycol ether in the presence of a little $CuSO_4$. Other examples are given also.

Stilbene dyes. CHEM. FAB. VORM. SANDOZ. Swiss 141,766 to 141,770, Jan. 17, 1929. Addns. to 125,479 (*C. A.* **24**, 1747). Alkali fast stilbene dyes are obtained by condensing *p,p'*-dinitrostilbene-*o,o'*-disulfonic acid with sulfanilic acid-azo-*m*-toluidine, amidoazobenzenesulfonic acid, amidoazotoluenesulfonic acid, or the dye from diazotized sulfanilic acid and *m* amino-*p*-cresol. The products are treated with oxidizing agents. The first three substances yield yellowish orange dyes and the last a reddish orange dye. An orange dye is also produced by condensing the reaction product of concd. NaOH and *p*-nitrotoluenesulfonic acid with dye from diazotized sulfanilic acid and α-naphthylamine, and oxidizing the product (141,770).

Anthraquinone derivatives. I. G. FARBENIND. A.-G. (Gustav Reddelien and Werner Müller, inventors). Ger. 517,275, Aug. 5, 1929. Hydroxyalkylaminoanthraquinones are prepd. by the reaction of aminoanthraquinones with halohydrins in the presence of an acid-binding substance. Thus, 1-aminoanthraquinone is heated with HOC_2H_4Cl at 150–155° for 5 hrs. in the presence of Na_2CO_3 to form 1-β-hydroxyethylaminoanthraquinone. Other examples are given also. The products dye acetate silk, wool, etc.

Benzanthrone derivatives. I. G. FARBENIND. A.-G. (Max A. Kunz, Rudolf Stroh and Hermann Dimroth, inventors). Ger. 517,069, Mar. 12, 1929. New compds. are prepd. by treating benzanthrone or its derivs. with alkylated aromatic amines in the presence of a halide of Al. Thus, benzanthrone may be agitated with $PhNMe_2$ at 60–70° in the presence of $AlCl_3$. The products are sol. in acids, and can be vatted only with difficulty, if at all. They are useful as *intermediates for dyes*. Examples are given.

Arylaminoanthraquinones suitable for dyeing cellulose esters and ethers. Soc. anon. four l'ind. chim. à Bâle. Brit. 338,412, Dec. 22, 1928. Arylaminoanthraquinones are made by heating with H_3BO_3 and a primary aromatic amine the leuco deriv. of a hydroxyanthraquinone, or of an amino or alkylamino deriv. or of a sulfonic acid of any of these compds., in aq. soln. or suspension (or instead of the leuco derivs. the anthraquinone compds. themselves may be used in the presence of a reducing agent). If desired the reaction may be so conducted that any sulfonic groups present in the β-position are completely or partially removed during the condensation. The products are *acid dyes* for animal fibers or for artificial fibers such as "acetate silk," or, if non-sulfonated, for *resins, varnishes* or colloids such as nitrocellulose varnish or cellulose acetate. Several examples are given of the production of dyes giving green and blue colorations.

Aniline-black dyeing on cellulose acetate. Silver Springs Bleaching & Dyeing Co., Ltd. and A. J. Hall. Brit. 337,746, July 27, 1929. Fibers, films, fabrics, etc., comprising cellulose acetate, are treated with a mixt. contg. aniline and at least one org. amine serving as an oxidation catalyst such as *p*-aminodiphenylamine, *p*-phenylenediamine, *p*-aminophenol or nitrosodimethylaniline, followed by oxidation in a hot acidified soln. of a dichromate at least nearly satd. with NaCl. Other amines may be used with the aniline, such as *o*- and *p*-toluidines, *m*-phenylenediamine or α-naphthylamine. Various details of procedure are given.

Thickening agents for dyeing. Ferd. Sichel Komm. Ges. Ger. 514,842, Mar. 2, 1928. A thickening agent is prepared, by pulverizing vegetable mucus with a small quantity of steeped starch.

Dyes and intermediates. I. G. Farbenind. A.-G. (Georg Kränzlein, Heinrich Greune and Max Thiele, inventors). Ger. 517,194, June 7, 1928. See Brit. 313,094 (*C. A.* **24**, 971).

Dyes and intermediates. I. G. Farbenind. A.-G. Brit. 337,860. Aug. 20, 1929. Monoöxamic acids of 4,4′-diaminodiaryl-1,1′-cyclohexane are made by heating with oxalic acid (preferably in the presence of a solvent) parent substances such as 4,4′-diaminodiphenyl-1,1′-cyclohexane, 4,4′-diamino-3,3′-dimethyldiphenyl-1,1′-cyclohexane, 4,4′-diamino-3,3′-dimethoxy-1,1′-cyclohexane, 4,4′-diamino-3,3′-diethoxy-1,1′-cyclohexane, 4,4′-diamino-3,3′-dichloro(or dibromo)-1,1′-cyclohexane or 4,4′-diamino-3,3′-dimethyl-4″-methylcyclohexane. The monoöxamic acids thus formed may be diazotized and coupled with various components to form azo dyes (of which numerous examples are given).

Dye intermediates. I. G. Farbenind. A.-G. Brit. 338,240, Aug. 27, 1929. 4-Aminodiphenylamine derivs. substituted in the 3- or 4′-positions or both, by alkyl, Cl or alkoxy groups are obtained by condensing a *p*-alkyl-, chloro- or alkoxy-substituted or an unsubstituted nitrosobenzene, with an *o*-alkyl-, chloro- or alkoxy-substituted or an unsubstituted nitrosobenzene (at least one nucleus being substituted) and reducing the product (suitably with Na sulfide). Several examples are given.

Dye intermediates. I. G. Farbenind. A.-G. Brit. 338,314, Oct. 18, 1929. Urea derivs. of the general formula (NH—R—CO—NH)$_2$R′—(OH)$_2$CO (in which R and R′ are aromatic residues of the benzene or naphthalene series which may contain substituents but no free sulfonic or carboxylic acid group and in which at least one *o* or *p* position to the OH group is free) are made by condensing a diarylureadicarboxylic acid or the corresponding acid chloride in the presence of a dehydrating agent with an aminophenol. Several examples are given for producing intermediates, the alkali salts of which can be used for impregnating cotton goods for the production of azo dyes on the fiber.

Dye intermediates. I. G. Farbenind. A.-G. Brit. 337,563, Oct. 10, 1929. Azo and azoxy compds. are made by reduction, in alk. soln., of compds. of the general formula HO-aryl-NHCO-aryl-NO$_2$ (in which the aryl radicals may be the same or different and may contain further substituents, and *o*- or *p*-position to the OH group being free and the NO$_2$ group being in *m*- or *p*-position to the CO group). Glucose, Zn dust and Na sulfide are suitable reducing agents. Several examples are given and nitroarylacylaminophenols suitable for use as starting materials are made by condensing *m*- or *p*-nitrobenzoic acid or their halogen, alkyl or alkoxy derivs. with an aminophenol or substitution product, which has a free *o*- or *p*-position to the OH group.

Dye intermediates. I. G. Farbenind. A.-G. Brit. 337,821, Aug. 8, 1929. 3-Methoxytetrahydrocarbazole distd. over Pb oxide at 500–600° gives 3-hydroxycarbazole and, similarly, 2-hydroxycarbazole is obtained from 2-ethoxytetrahydrocarbazole. The starting materials may be obtained by forming hydrazones from the alkoxyphenyl-

hydrazines and cyclohe and effecting ring closure with H_2SO_4 to the corresponding tetrahydrocarbazole.

Dye intermediates. I. G. FARBENIND A.-G. Brit. 337,902, Sept. 18, 1929. Carboxylic acids of aromatic diamino compds. in which both amino groups are nitrobenzoylated or in which one amino group is nitrobenzoylated and the other is either unsubstituted or contains a substituent which is easily eliminated or of mononitrobenzoylated aminonitro compds., are subjected to a slight reduction such as required to convert an aromatic nitro compd. into an azo or azoxy compd. The resulting products may be diazotized and coupled to form azo dyes on the fiber with compds. such as 1-phenyl-3-methyl-5-pyrazolone or β-naphthol. Several examples are given for dyeing various yellow and red shades.

Dyeing and printing fibers. I. G. FARBENIND. A.-G. (Erwin Hoffa and Max Kerth, inventors). Ger. 514,738, Oct. 21, 1927. To produce fast colors on fibers, the fibers are treated with an arylthioglycol-*o*-carboxylic amide of the general formula $H_2NCO.R.SCH_2CO_2H$ and an alkali. Thus, cotton is printed with a paste contg. 5-chloro-1-methylbenzene-3-thioglycolic acid-2-carboxylic amide, water, NaOH, alk. thickening and gum. The thickening contains gum and NaOH in the proportions 1.10. After drying, the cotton is steamed, oxidized and developed in a soln. of $K_3FeC_6N_6$. The resulting colors are fast. Other examples are given. Cf. *C. A.* **24**, 733.

Dyeing cellulose esters and ethers. I. G. FARBENIND. A.-G. Brit. 338,095, April 9, 1930. Deep greenish yellow tints are produced on products such as "acetate silk" by use of compds., non-sulfonated in the nucleus, such as are obtainable by interaction of 4-amino-1,8-naphthalic anhydride with hydrazine or a deriv. or compds. of the same general type. Cf. *C. A.* **25**, 2007.

Dyeing cellulose derivatives. I. G. FARBENIND. A.-G Ger. 514,952, Dec. 19, 1926. In dyeing cellulose derivs., alkylated, arylated or aralkylated ethers or thioethers of the anthraquinone series, contg. no addnl. chromophoric groups, are used. Thus, acetate silk is colored golden yellow, greenish yellow and orange by neutral soap pastes contg., resp., 1,4-dimethoxy-, 1,4,8-trimethoxyanthraquinone and anthraquinone-1,4-dithioldimethyl ether.

Dyeing cellulose acetate. GEORGE H. ELLIS (to Celanese Corp of America) U. S. 1,793,360, Feb. 17. The material is treated with at least one amino compd. such as *p*-aminodiphenylamine from an aq. soln. and is then impregnated with a soln. comprising an oxidizing agent such as a mixt. contg $NaClO_3$ and then, without rinsing, subjected to aging in a warm moist atm

Dyeing regenerated cellulose materials. IMPERIAL CHEMICAL INDUSTRIES, LTD., and R. BRIGHTMAN. Brit. 338,111, July 3, 1929. Level dyeings are produced by use of dyes of any of the three following characters: (1) an aminobenzoylphenylenediamine of the formula $NH_2C_6H_4CONHC_6H_4NH_2$ or a homolog or substitution product of suitable character, tetrazotized and coupled with 1 mol of a 2,8-, 1,8- or 1,5-aminonaphtholsulfonic or disulfonic acid or a *N*-substituted or azo deriv. or aminocyclic aryl or aroyl deriv., contg. no external amino group, of 2,5,7-aminonaphtholsulfonic acid, and with 1 mol. of a coupling component other than 2,5,7-aminonaphtholsulfonic acid or a monocyclic aryl deriv. contg. an external amino group; (2) an aminoacetanilide or a nitroaniline or a substitution product, diazotized and coupled with a component corresponding to one of those specified in "(1)" (which component, when a diazotized aminoacetanilide is used, should not contain an acylamino or unsubstituted amino group, and, when a diazotized nitroaniline is used, should not contain a nitro or unsubstituted amino group), followed by hydrolysis of the acylamino group or reduction of the nitro group, diazotizing of the aminoazo product and coupling to a component such as the other components specified in "(1)"; or, (3) a diazo compd. is coupled with an amine of the benzene series which couples in *p*-position to the amino group, the aminoazo product is condensed with a nitrobenzoyl chloride, the nitro group is reduced, and the product is diazotized and coupled with a 2,8-, 1,8- or 1,5-aminonaphtholsulfonic or -disulfonic acid, or a *N*-substituted or azo deriv. or a monocyclic aryl deriv. contg. no external amino group, of 2,5,7-aminonaphtholsulfonic acid. Numerous examples are given of dyes suitable for use on "viscose silk." Cf. *C. A.* **25**, 1951.

Dyeing threads, etc., with developing dyes. F. KARRER. Brit. 338,012, Nov. 25, 1929. The material in the form of cops or transverse wound bobbins is introduced into a vessel which is filled with grounding liquor and subjected to a vacuum after satn. with the liquid. The vacuum is broken and the liquor removed, and, without removal from the vessel, an intermediate dyeing is effected followed by development. Various details of app. are described.

Dyeing furs, hairs and feathers. KARL MARX and ERICH LEHMANN (to General Aniline Works). U. S. 1,795,133, March 3. In contradistinction to 4-aminodiphenylamine, the salts of the *N*-substituted-4-aminodiphenylamines are easily sol. in water, and they give good gray tints on furs, hair, feathers and the like, even when dyed from a soln. in hard water or from a soln. which is alk. as from the presence of a small quantity of NH_3. Among the substances which may be used are: 4-amino-*N*-methyldiphenylamine, 4-amino-*N*-ethyldiphenylamine, 4-amino-*N*-propyldiphenylamine, 4-amino-*N*-butyldiphenylamine, 4-amino-*N*-benzyldiphenylamine, 4-amino-*N*-ethoxydiphenylamine or corresponding compds. with a substituent in the *p*-position of the benzene nucleus. The fur to be dyed may be treated with a mordant. The *N*-substituted amines may be manufd. by subjecting the *N*-substituted diphenylamines to nitration and subsequent reduction.

Dyeing and printing textiles. I. G. FARBENIND. A.-G. Brit. 337,846, Aug. 13, 1929. Acid amides or esters obtainable from vat dyes or their leuco compds. as described in Brit. 324,119 (*C. A.* **24**, 3380) or Brit. 330,579 (*C. A.* **24**, 6032) are used for dyeing or printing and development is effected with alk. agents (some of which may be added to the thickening in printing cotton so that partial development is effected by moist steaming). Several examples are given.

Dyeing and printing textiles. MANCHESTER OXIDE CO., LTD. Ger. 514,953, June 29, 1928. See Brit. 296,530 (*C. A.* **23**, 2580) and Fr. 656,827 (*C. A.* **23**, 4350).

Mordanting, weighting and metallizing textile materials, films, etc. BRITISH CELANESE, LTD., W. A. DICKIE and F. B. HILL. Brit. 337,813, Aug. 7, 1929. Metals such as Al, Sn or Zn or alloys of lake-forming and other metals, are applied (intermittently or in the form of a pattern if desired) by an app. such as a Schoop metallizing app., to textile materials, films or the like and the metal may then be oxidized on the material if not sufficiently oxidized during its application. In mordanting by this method, the dye may be applied before or after the mordant or at the same time with it as by spraying through a stencil. In treating materials of cellulose esters or ethers, the dye is preferably used together with an org. solvent. Various details and modifications of procedure are described.

Coloring plastic masses or their solutions. I. G. FARBENIND. A.-G. (Werner Müller, Karl Holzach and Hans Krzikalla, inventors). Ger. 517,491, May 26, 1929. Celluloid, cellulose esters or ethers, natural or synthetic resins and other plastic masses or their solns., are colored by incorporating into them sol. Cr or Cu compds. of dyes, particularly *o*-hydroxyazo dyes. Solns. in org. solvents of the dye compd. and the celluloid, etc., may be mixed, or the materials may be kneaded together on rolls. Examples are given.

Acid baths in dyeing. I. G. FARBENIND. A. G. (Josef Nüsslein and Josef Stadler, inventors). Ger. 514,801, May 16, 1929. Addn. to 466,420 (*C. A.* **23**, 529). Instead of the soap or Turkey-red oil of 466,420, other soap like substances are added to the dye baths. Thus, a soln. of olein in ethyl ether of polyglycol is stirred with isopropylated Na naphthalenesulfonate. The product congeals into a clear soln. and is used in acid dye baths. Butylated naphthalenesulfonic acid or its salts, or sulfite cellulose lye may be used.

Fabric printing machine. JOHN WALDRON CORP. Ger. 514,950, Aug. 9, 1928.

Dye vat and jigger apparatus. F. HEWITT. Brit. 337,804, Sept. 12, 1929. Structural features.

Apparatus for dyeing tubular packages of textile threads. J. BRANDWOOD. Brit. 338,134, Aug. 7, 1929. Various details of construction and operation are described.

Apparatus for dyeing thread or yarn in packages. CHARLES K. DUNLAP (to Sonoco Products Co.). U. S. 1,703,736, Feb. 24. Structural features.

Apparatus for passing woven fabrics through dyeing, washing or bleaching baths, etc. CHARLES G. HANHART (to Farbetei Weidmann A.-G.). U. S. 1,794,403, March 3. Structural features.

Apparatus for applying sizing, dyeing or dressing liquids etc., to, cellulose acetate or other yarns. BRITISH CELANESE, LTD., and W. I. TAYLOR. Brit. 337,433, May 30, 1929. Structural features.

Treating fabrics. EDUARD TSCHÖRNER and HEINRICH RIBS. Ger. 514,951, Aug. 25, 1928. Pile fabric is prepd. for cutting by treating the weft with an alk. soap soln. or a soln. of alkali with sulfonated oil, to which an oxidizing agent, such as Na_2IO_3, Na_2O_2 or H_2O_2, is added.

Impregnating textiles. GIULIA KNÖZINGER and LEO KNÖZINGER. Ger. 517,174, Oct. 9, 1928. Textile materials are strengthened and given a weighty appearance by

applying a suspension of kaolin or $BaSO_4$ in glue The treatment is particularly intended for theatrical accessories, decorations, etc.

Retting flax with yeast and sulfurous acid. MARTIN WADDELL and HENRY C. WATSON. Ger. 517,100, Oct. 20, 1927. See U. S. 1,708,812 (*C. A.* **23**, 2582).

Bleaching jute fiber. J. BERLINERBLAU. Brit. 337,986, Nov. 22, 1928. Jute fiber is moistened with acid such as a 2-3% HCl soln. and treated with SO_2 at normal pressure to brighten its color while retaining its natural tint and gloss.

Fibers. FIRMA A MONFORTS Ger. 514,706, Nov. 27, 1927. Yarn, cord, etc., made from hard fibers such as manilla, etc., is smoothed and polished by treating with rubber or rubber soln., and with a mineral lubricant such as talcum.

Mercerizing fabrics. C. MOCKER. Brit. 337,646, Dec. 6, 1929. The fabrics are subjected to a series of baths of increasing concns. and gradually decreasing temps., detd. continuously by the shrinkage or elongation of the fabric during treatment, maintained in counterflow to the movement of the fabric and suitably replenished. App. is described.

Zig-zag roller apparatus for mercerizing fabrics. O. HOFFMANN. Brit. 337,712, March 10, 1930. Structural features.

Preventing creasing in liquid treatments of textile materials. BRITISH CELANESE, LTD. and G. H. ELLIS. Brit. 338,190, Aug. 13, 1929. In treating materials such as those of cellulose acetate or other cellulose esters or ethers made by dry-spinning processes, with scouring, dyeing or other liquids, in folded form as in winch machines, creasing is avoided by first wetting out the material thoroughly in open width form. Various wetting agents are mentioned as suitable and this treatment may be combined with other treatments such as delustering with a hot soap soln.

Steaming printed textile fabrics. I G FARBENIND. A.-G. Brit. 336,590, March 18, 1929. A steaming process as described in Brit 333,873 (for reducing printed fabrics by passing steam from the lower part of a vessel up through the fabric surrounded with a protective filling material such as sand) is applied to various printed or dyed fabrics.

Bleaching materials such as linen. O. HOFFMANN. Brit. 337,305, Feb. 9, 1929. The material is uniformly and moderately moistened and then kept in constant and uniform movement (as by passing fabric in a zig-zag path over rollers) while exposed to a low concn. of ozone (not over 2 g. per cu.m. of air and preferably a much lower concn.). App. and various details of procedure are described

Delustering artificial threads and filaments. COURTAULDS, LTD., and C. DIAMOND. Brit. 338,269, Sept. 16, 1929. Products such as those formed from cellulose acetate (suitably by dry spinning in acetone contg 1% of Arachis oil) are treated with aq. soap soln. at or near the b. p.

Improving elasticity of knitted artificial silk fabrics, etc. COMFOLASTIC CORP. Brit 337,400, Nov. 2, 1928. The material is stretched while moist (as after dyeing), in one direction, allowed to dry in stretched condition, and a sheet of rubber is vulcanized on one face of the fabric. The material is suitable for making waist bands, garters, etc.

Waterproofing fabrics. BRITISH CELANESE, LTD. Brit. 338,065, Jan. 15, 1929. A material suitable for raincoats or bathing-suit bags comprises a fabric base having on it a layer of rubber compn. and also a layer of a cellulose ester or cellulose ether compn. together with a compatible synthetic resin Various examples of materials used are given, and plasticizers, coloring agents, etc., may be added.

Waterproofing wool. MERKEL & KIENLIN GES. Brit. 338,391, Dec. 13, 1928. Waterproofing is effected by treating the material first with an aq. emulsion contg. soap and an oil or fat of animal or vegetable origin (suitably olive oil) and then with a soln. of salts of those metals the hydroxides and carbonates of which are insol. or but slightly sol. in water, such as Al formate, and subsequently heating to 60–80° for some time.

Carbonizing wool. I. G. FARBENIND. A.-G (Albrecht Kittel, Carl Daimler and Gerhard Balle, inventors). Ger. 517,201, Jan. 11, 1925. In carbonizing wool with H_2SO_4, an aromatic sulfonic acid having a tanning action, or a salt of such acid, is added to the bath. A bath of lower H_2SO_4 content than is usual can then be used. An example is given.

Forming yarns and threads of impregnated fibers. L. S. M. LEJEUNE and J. E. C. BONGRAND. Brit. 338,381, Nov. 25, 1929. Fibers such as cotton, wool, silk, flax, hemp, ramie, etc., are impregnated with solns., suspensions or dispersions of materials such as rubber, rubber-like substances or synthetic resins on the spinning-frame when the fibers are in the roving stage and before twisting into thread. Numerous details of app. and procedure are described.

Imitation linen, etc. E. O. MUNKTELL. Brit. 338,224, Aug. 20, 1929. Imitation linen, towels, handkerchiefs, etc., are made by pressing superposed layers of cellulose wadding material, which may be replaced wholly or in part by Japanese yoshino paper or the like, some of the layers of which are impregnated more strongly than others with waterproofing or sizing agents, etc., such as compns. comprising cellulose esters, gelatin, glue, paraffin oil or wax, starch, borax, Japan wax, casein, resin glue, etc., in various mixts. Goffering is usually effected simultaneously with the pressing.

Plaited fabric containing cellulose acetate yarns. CAMILLE DREYFUS. U. S. 1,793,915, Feb. 24. The material is subjected to a plaiting operation in the presence of a softening agent for the cellulose acetate such as aq. acetone soln. in order to render the plaiting permanent.

Washing materials with soap-forming substances. A. MARQUARDT and E. WALTER. Brit. 338,121, Aug. 8, 1929. In a combined soap-forming and cleansing process, the materials of soap-forming character are added together or successively to the wash without previous pressing into the articles to be washed and without pressing out of the liquid, and alcs., hydrocarbons, colloids, ferments, bleaching agents, etc., also may be added. Carbonates may be used for saponifying fatty substances and for liberating gas which assists in the cleansing. Numerous details and modifications of treatment are described. Cf. *C. A.* 24, 3869.

Edging fabrics to prevent fraying. TILLIE MILLER. U. S. 1,793,630, Feb. 24. Various details are described of a treatment involving the application of a metallic material (such as a mixt. of shellac, rosin, stearic acid and Al bronze) to the edge of the fabric so that it serves as a binder when it solidifies.

Material for "jacquard" cylinders of looms. MILES J. SMITH and HERBERT CHILSON (to Carolina Rubber Co.). U. S. 1,793,722, Feb. 24. A compn. is used formed of clean thin brown rubber 35, ZnO 10, "Dixie clay" 25, "Cycline oil" 3, lime an accelerator 0.4 and S 15 parts, cured by heating. Various details of manufacture described.

Transferring pictures to fabrics. A. DENGLER. Brit. 337,877, Nov. 3, 1929. Pictures fast to light and to washing are applied to fabrics by a transfer comprising a paper backing carrying a paste contg. colors and mordants which only commence to interact under the influence of heat and moisture applied in the transferring. K perearbonate may be added to a cooled soln. of gelatin and this soln. added to an aq. soln. of com. Na phosphate contg. indigo. Various other substances are mentioned which may be used.

Gasproof fabric suitable for aircraft gas cells. JOHN B. FLOWERS. U. S. 1,793,075, Feb. 17. Alternate layers of rubber cement and metal leaf are applied to a fabric and each layer of cement is allowed to dry until tacky before applying the metal leaf and to harden before applying the next layer of cement. The metal leaf is applied in sheets which are overlapped.

Treating fibrous materials with rubber, etc. F. T. LAHEY. Brit. 337,359, June 19, 1929. Animal or vegetable fibers, either combed or in the form of batting, yarn or cloth are cleaned, mordanted with a latex coagulating substance, and then treated with a natural or artificial dispersion of rubber which may be assocd. with linseed oil, and various compounding, pore-forming or other substances for making *artificial leathers, tire fabrics, floor coverings, insulation*, etc. Cf. *C. A.* 24, 4406.

Rubber-coated fabric. JOHN R. COUTURE (to E. I. du Pont de Nemours & Co.). U. S. 1,795,199, March 3. A material suitable for automobile tops comprises a textile fabric coated with rubber and provided with an overlying coating of baked petroleum asphalt varnish. Cf. *C. A.* 24, 1524.

Protein products resembling wool, hair, horn, etc. SOC. D'APPLICATIONS DES RECHERCHES SCIENTIFIQUES ET INDUSTRIELLES (S. A. R. S. I.). Brit. 338,014, Oct. 24, 1928. Materials such as gelatin, chondrin, albumin, casein and gelose are treated with an alkali or alk. earth metal thiosulfate in the presence of an acid or salt (such as an alum) which decomposes the thiosulfate and liberates S in a colloidal or finely divided state within the mass. The material may be successively and alternately treated with reagents of this character until the entire mass is insol. in hot water and swells but little, and may be subjected to a preliminary treatment or subsequent treatment with substances such as formal, Na borate, a dichromate, picric or pyrogallic acid, tannin or alum to impart insoly. and impermeability to the material, and may be rendered more flexible by treatment with a final bath such as one contg. glycerol or molasses or a plasticizing agent. Cf. *C. A.* 24, 3868.

Protecting wool, fur, hair, etc., from "textile pests." I. G. FARBENIND. A. G. Brit. 337,823, Aug. 8, 1929. The materials are treated with solns. of as phenyl

caproylpseudothiourea, *as*-phenylvalerylthiourea, acetylallylthiourea or other thiourea derivs. of the same general type.

Halogenated hydroxy-di- and tri-arylmethanes. I. G. FARBENIND. A.-G. Brit. 337,832, Aug. 9, 1929. Products suitable for mothproofing wool, furs, etc., are obtained by condensation of an aldehyde deriv. in which the carbonyl O is replaced by alkyloxy or inorg. or org. acid residues, with a *p*-halogenated phenol contg. a free *o*-position to a OH group but which may be substituted in the other positions by "indifferent" substituents such as halogens or alkyl groups. The products may be used as addns. to dye baths. Among the starting materials which may be used are: (1) methylal, methylenediacetate or the dimethylacetal of *o*-chlorobenzaldehyde, condensed with *p*-chlorophenol; (2) 2,4-dichlorophenol condensed with the acetal-like chlorides and sulfates produced by adding benzal chloride, 2,6-dichlorobenzal chloride or 2-chlorobenzal chloride to H_2SO_4; (3) 2-chloro-, 4-chloro-, 2,6-dichloro-, 4-chloro-2-sulfo- or 5-chloro-2-sulfobenzal chloride condensed with *p*-chlorophenol, 2,4-dichlorophenol or mixts of *p*-halogenated phenols; (4) *p*-chlorophenol condensed with the chloride obtained by treating *o*-sulfobenzaldehyde with PCl_5. Condensing agents such as H_2SO_4, chlorides of Zn, Fe or Al or a mixt. of HCl and glacial HOAc may be used and the condensation may be effected in solvents such as PhCl or $PhNO_2$. 4-Chloro- and 5-chlorosulfobenzaldehydes are prepd. by treating the corresponding benzaldehyde with PCl_5.

Sulfonated hydroxyarylmethanes. I. G. FARBENIND. A.-G. Brit. 337,808, Aug. 6, 1929. Hydroxy-di- and tri-arylmethanes, prepd. as described in Brit. 316,900 (*C.* **1** 24, 1993); Brit. 333,561 (*C. A.* **25**, 607); Brit. 330,893 and Brit. 330,894 (*C. A.* **24**, 6036); Brit. 335,547 (*C. A.* **25**, 1687); Brit. 337,832 (preceding abstr.) and Brit. 338,126 (following abstr.), are sulfonated (suitably in the presence of org. solvents, and the products thus obtained may be used for *protecting furs, wool, etc., from moths* (being used conjointly with a dye bath if desired). Various details and examples are given.

Brominated and chlorinated *o*-hydroxy-di- and tri-arylmethanes. I. G. FARBENIND. A.-G. Brit. 338,126, Aug. 9, 1929. Compds. of this character are prepd. by brominating or chlorinating the corresponding parent materials, and are suitable for use in *mothproofing wool, fur, hair*, etc., and for this purpose may be added to dye baths. Examples are given of the prepn. of 2,2′-dihydroxy-5,5′-dichlorodiphenylmethane, 2-hydroxy-3,5-dibromodiphenylmethane, 3,5-dichloro-2-hydroxydiphenylmethane and some similar compds.

Wetting agents. I. G. FARBENIND. A.-G. Brit. 337,737, April 27, 1929. Monoamines contg. only one hydroxyalkyl group and free from aromatic groups are condensed with aliphatic carboxylic, sulfonic or sulfonated carboxylic acids contg. at least 8 C atoms or their esters or halides (at a temp. above 100° when the free acids or their esters are used) and the products may be treated with alkylating agents and (being usually basic in character) may be converted into salts with acids. Numerous details and examples are given for prepg. compns. which may be used as wetting, emulsifying, cleansing and dispersing agents in the textile industry, etc. Cf. *C. A.* **24**, 1947, 4906.

Apparatus for degreasing clothes by treatment with solvents. MAURICE DEW. HIRST (one-half to Leroy A. Goodwin). U. S. 1,795,170, March 3. Structural features.

Bag filter for filtering garment-cleaning solvents or other liquids. ANTON L. DORFNER. U. S. 1,794,281, Feb. 24.

Apparatus for purifying garment-cleaning liquids by materials such as saponifying agents and water. CLARENCE V. FUQUA (to Cleaners Equipment Corp.). U. S. 1,793,475, Feb. 24. Structural features.

26 PAINTS, VARNISHES AND RESINS

A. H. SABIN

Additional field tests on quick-drying paints. H. A. GARDNER AND L. P. HART. *Proc. Paint & Varnish Mfrs' Assoc.* Circ. No. 377, 113–9(1931).—The formulas of 20 spar paints supplementing those reported in *C. A.* **25**, 1104 are given. G. G. S.

Rapid methods for detecting with organic reagents the metals used in the paint industry. HANS SCHEIBER. *Farbe u. Lack.* **1931**, 111–2.—Methods are compiled for the detection of Fe, Al, Mn, Co, Zn and Mg. G. G. SWARD

Experiences in painting façades (plaster). HANS WOLFF. *Farbe u. Lack.* **1931**, 101–100.—Regardless of the type of material (aq. or non-aq.) used to paint plaster, water must be excluded after the coating is in place. If water does not destroy the film

itself, it promotes efflorescence, permits growth of molds, collection of soot, etc. Spraying a painted surface with a colloidal soln. of paraffin (Schmidt's encaustic process) is effective in excluding water. G. G. SWARD

The preparation of precipitated white lead with high hiding power. A. I. KOGAN. *Farben-Ztg.* **36**, 826–8(1931).—White lead prepd. by pptn. from a basic Pb acetate soln. by CO_2 is low in hiding power because of the formation of considerable $PbCO_3$. When CO_2 is passed through a basic lead acetate soln., $2Pb(OH)_2 \cdot PbCO_3$ is formed in the early stages. Later $PbCO_3$ is also formed at the expense of some of the basic carbonate already formed. If the process is stopped in the early stages a pigment of high hiding power is obtained. This ppt. may be removed and the process repeated several times. Hiding-power values for the pigment obtained in the improved manner ranged from 22.4 to 29.3 sq. cm./g. as compared with 15.3 sq. cm./g. for the complete pptn. method. The sp. gr. ranged from 5.95 to 6.26. G. G. SWARD

The red lead question. A. V. BLOM. *Farben-Ztg* **36**, 1045–6(1931).—The reaction of linseed oil with red lead is governed not only by the particle size and percentage of PbO, but also by the cryst. structure of the PbO. *E. g.*, flat plates and spheres are less reactive than irregular crystals or clusters. The form which is ideal for non reactivity is a kernal of PbO surrounded by small spheres of Pb_3O_4. G. G. SWARD

Adulteration of red lead and chrome green. E. DINSLAGE AND B. STEMPEL. *Pharm. Ztg.* **76**, 262(1931).—Red lead (minium) was found admixed with heavy spar ($BaSO_4$) colored with an aniline dye. Chrome green (normally a mixt. of oxides of Cr) carried $PbCrO_4$ and $BaSO_4$. W. O. E.

The colorimetry of pigments and a suggested scale of fastness. G. F. NIX, G. S. DISNEY AND D. L. TILLEARD. *J. Oil & Colour Chem. Assoc.* **14**, 3–48(1931). A method for quantitatively measuring the extent of fading of colored surfaces is given. The color quality before and after fading is located on the trichromatic color chart. The length in color triangle units (C. T. U.) of the line connecting these loci is then plotted against the time of fading. In most comparisons brightness need not be considered. Colors of different hues, satn. and brightness may be directly compared. According to their fastness pigments and dyestuffs may be placed in 10 or more groups, group 1 being the most stable with a fading line of 1 to 1.33 C. T. U. for 75 hrs.' exposure to a C arc. The lengths of the fading lines of successive groups bear a ratio of 2. Examples of the fading of red pigments diluted with white pigments are given. The study of the color characteristics of pigments is best made at a dilution of 9 parts of diluent. The medium recommended is a 1% soln. of gelatin in H_2O in such quantity that not more than 0.5% of the film is gelatin. A discussion follows. G. G. S.

Fastness of pigment finish to rubbing. M. C. LAMB AND R. DENYER. *J. Internat. Soc. Leather Trades Chem.* **15**, 107–13(1931). The whole question of the manufacture of pigment finishes is critically considered. Suitable grinding media for pigments are soap solns., sulfonated oils, and solubilized mineral oils. Pigments ground in soap oils possess exceptional covering power and stability in suspension. Pigments should not be allowed to dry before mixing with the binder. NH_4OH is preferred to borax or soda for dissolving casein or shellac to be used as a binder, since the excess NH_3 is evolved on drying and the resulting deposit is more waterproof. Since a finish containing only shellac-casein-ammonia-pigment would be too brittle, various gums are added. Casein (and other protein binders) are made insol. by HCHO, but the resulting finish is brittle and available softening agents are not very satisfactory. *Tung oil* seems to be an excellent binder. The following tentative procedure is suggested: Add 1–2 parts tung oil to 10 parts soap dissolved in 250 parts water (not over 60°), emulsify, let stand 24 hrs., add 250 parts H_2O, emulsify, add 100 parts dry pigment and grind until the pigment is sufficiently fine. Mix this pigment emulsion with (1) a soln. conts. 1% casein and 1% com. NH_4OH, (2) a 10% soln. of glue and (3) glycerol, in the proportions 15:30:25.8. Sterilize with about 0.13% nitrobenzene. Apply by spraying, and top off with HCHO soln. H. B. MERKEL

Pigments and lacquers from organic coloring materials. A. SANDER. *Angew. chimica* **5**, 1490–5(1930).—A brief summary of the history, classification, theory, prepn., use and analysis of org. dyestuffs. A. W. CONTIERI

Reactions between inorganic basic pigments and linseed oil. K. CHARISIUS AND E. KINDSCHER. *Farben-Ztg.* **36**, 780–3(1931); cf. *C. A.* **24**, 3913–4.—Equal apparent vols. of ZnO, basic Pb carbonate, basic Pb sulfate, highly disperse red lead, ordinary red lead and litharge were each suspended in raw linseed oil in the absence of air. The reaction of the oil with the pigments was essentially the same as in systems in which air was not excluded, *viz.*, large amts. of metal were found in the oil in ordinary red lead and litharge and relatively small quantities in the other pigments. G. G. S.

Some properties of pigment-oil pastes. W. Droste. *Farben-Ztg.* **36**, 916–8 (1931); cf. *C. A.* **25**, 831.—The relationship between the oil absorption of pigments and the consistency of paint is reviewed. G. G. Sward

Application of a few colloid-chemical methods of investigation to the drying of linseed oil. H. Freundlich and H. W. Albu. *Z. angew. Chem.* **44**, 56–60(1931).—Depolarization expts. as well as viscosity measurements and ultramicroscopic examn. show that at a low drying rate colloidal properties are not obtained in pure or siccative linseed oil. H. Stoertz

The drying time of linseed oil. J. Rinse. *Chem. Weekblad* **28**, 131–2(1931).—The influence of the humidity and other factors of the atm. on the drying time of linseed oil is discussed. E. Schotte

Tung-oil tree. Wilmon Newell, Harold Mowry and R. M. Barnette. Fla. Agr. Expt. Sta., *Bull.* **221**, 5–63(1930); cf. *C. A.* **24**, 1526.—The Fla. acreage in tung-oil trees is about 5000. The fruits on examn. gave 55% hulls, 45% meat, 49% oil in the meat and 32 9% of oil in the seeds. Fully matured and thoroughly air-dried fruits consist of approx. 56% seed and 44% hulls. The tree thrives best in an acid, well-drained soil. Lack of N in the soil is the principal limiting growth factor in Fla. but a well-balanced mixed fertilizer gives max. growth and yields of nuts. A tung-oil expression plant is located at Gainesville The oil is graded as cold Pressed Fla. No. 1 and Fla. No. 2. The appearance of the former is pale and clear with a sp. gr. at 15.5° of 0.941, acid no. 0.5, sapon. no. 193 8, I no. 166, A. S. T. M. heat test 10.75, and n_{25} 1.519. Hulls and pomace remain after extn. of the oil. Pomace contains about 6% of N and compares favorably with castor-bean pomace as a *fertilizer*. The hulls contain a little N and K and are valuable chiefly as a mulching material. For *varnish manuf.*, the oil gives a clearer and faster drying finish than the ordinary imported Chinese oil. C. R. Fellers

Reactivity of mineral umbers with oils. A. Eibner, Richard Schwarz and E. Rossmann. *Farben-Ztg.* **36**, 962–4, 1006–7, 1046–9(1931).—The formation of soaps in mixts. of pigments and drying oils is usually due to the presence of the original fatty acids. Only a few pigments, *e. g.*, red lead, are able to react with glycerides under the conditions of storage and drying usually prevailing The principal requirement is an elevated temp. If a reaction does occur, the products are mixts. of normal soaps and mixed glycerides of the metal, the so-called aggregates. Such a reaction should not be called sapon. With 2 umbers, no reaction took place with either linseed oil or poppyseed oil until resins were added. This indicates greater reactivity of resin acids than of fatty acids. Metal aggregates improve not only the drying but also the durability of paints. Under certain conditions linseed and poppyseed oils, and presumably all other drying oils, yield H_2O soluble cryst. compds. of a peroxide nature. With further oxidation, the cryst. character is destroyed. Such a reaction in the drying of oils is contrary to Auer's theory. C. G. Sward

Lacquer poisoning. G. Ohnesorge. *Deut. med. Wochschr.* **56**, 961–3(1930).—Several cases of poisoning among workers in a hat factory were traced to the *action of tetrachloroethane.* Arthur Grollman

Nitrocellulose lacquers in the wood-working industry. Prillwitz. *Nitrocellulose* **2**, 8–10(1931). E. M. Symmes

Alcohol-soluble nitrocellulose. Hans Wolff and B. Rosen. *Farben-Ztg.* **36**, 964–6(1931).—The hardness, abrasion resistance, tensile strength, elongation and resistance to pressure of a no. of alc.-sol. nitrocelluloses were detd. Better properties were exhibited by those samples possessing the highest viscosities. G. G. Sward

New method for examination of pictures. A. M. de Wild. *Chem. Weekblad* **28**, 126–8(1931); cf. *C. A.* **24**, 739.—A summary of the scientific methods of picture examn. developed during the last 3 years. Chem. analysis can det with certainty the period in which a painting was made. Röntgen-ray examn. is a valuable method for the detection of technical particulars about a certain painter. The method of magnified photographs and photography with grazing light need too much of a subjective interpretation yet to give conclusive and convincing results. E. Schotte

Determining the roughness of a surface. K. Wurth. *Farben-Ztg.* **36**, 875–6 (1931).—Since the amt. of paint required to cover a surface depends upon the roughness as well as the porosity, a method of detg. roughness is desirable. W. does this by making an impression of the surface on tinfoil. G. G. Sward

Rosin used to produce rosin oil. V. E. Grotlisch. *Proc. Am. Soc. Testing Materials* **30**, Pt. II, 834–8(1930).—Rosin oil is produced by distg. 6500–12,000 lb. of rosin, usually of a dark or opaque grade, in a cast-Fe or steel still. Water is first liberated. Rosin spirits (pinolin) begin to distil at 160°, "light oil" at 200°, "kidney

oil" at 250° and "bloom oil" at 270°. The "kidney oil" is the most valuable fraction. It is used in the manuf. of greases and printing inks, and may be redistd. to give the higher-grade oils. Other uses of rosin oils are listed. "Synthetic" rosin oils are soln. of rosin in mineral oils. H. K. SALZBERG

Rosin in the manufacture of rosin esters. STEPHEN BABCOCK. *Proc. Am. Soc Testing Materials* 30, Pt. II, 795-7(1930).—The discussion is limited to ester gum, its history and manuf., and the properties of rosin which are important in its manuf Wood oil-ester gum combinations are popular because they require relatively little time to age. Clean rosin of a clear grade having a high m. p. and acid no. is desirable in manufg. ester gum. H. K. SALZBERG

Tests on oil cloth and artificial leather. R. HESSE. *Nitrocellulose* 2, 6-8(1931) Detailed methods of proximate analysis are given. E. M. SYMMES

Rosin as a linoleum component. M. K. BARE. *Proc. Am. Soc. Testing Materials* 30, Pt. II, 803-6(1930).—Since 1926 the use of rosin by the linoleum industry has increased by 31%. At present this industry ranks fourth in the consumption of rosin Linoleum cement, which is made from wood rosin, accounts for 90% of the total rosin used by the industry The remainder, gum rosin, goes into linoleum paint. Linoleum binder consists of oxidized linseed oil, rosin and other resins. The rosin serves as a solvent for the oxidized oil, its solvent power being greater the higher its acid no. A rosin of very high acid no. cannot be used, however, because of its high m. p. and susceptibility to attack by alkali. The presence of rosin in the binder gives it heat sensitiveness, enabling it to be worked under the compounding machines. Rosin also serves to keep the finished linoleum in a flexible condition. Substitutes for rosin are deficient in this stabilizing effect. H. K. SALZBERG

Fire, explosion and health hazards with nitrocellulose lacquers (GREMPE 24. ... resins of jack pine (PHILLIPS) 23. Solvents (DURRANS) 2. Solvents for resins ... pat. 517,097) 13. Arylaminoanthraquinones [dyes for resins and varnishes] (Brit ... 338,412) 25. Coloring plastic masses or their solutions (Ger. pat. 517,491) 25. Synth... rubber [for addition to paints or lacquers] (Brit. pat. 338,152) 30. Discharge de... [apparatus for atomizing paints with CO_2] (U. S. pat. 1,794,185) 1.

BIANCHI, CALISTO. **Celluloseesterlacke.** Revised German ed. by Adolf W... Berlin: J. Springer. 328 pp. Bound, M. 22.50. Reviewed in *Chem. Trade J.* 88, 2... (1931).

Paints. A. ROGLER Brit. 337,523, Sept. 5, 1929 Paints which dry rapidly are made by heating, drying or semi-drying oils such as linseed, poppyseed or wood oil with metal oxides such as those of Zn or Ti, to about 100-150° until a pasty product is formed, and mixing the latter with solvent and pigments Resins may be added

Paints containing finely divided metals. L. V. ADAMS (to British Thomson Houston Co., Ltd.). Brit. 337,682, Jan. 11, 1929. Metal powders such as Al, Zn, Cu alloys (bronzes), Ag or Au are suspended in a soln. comprising a volatile solvent and a synthetic resin compn. such as one formed from glycerol, phthalic anhydride, linseed oil fatty acids, wood oil, resin and diethylene glycol. Paints thus formed contg. Zn or Al may be applied to base metals such as iron or Cu and the Zn or Al subsequently alloyed with the coated base metal surface by heating.

Apparatus for mixing ingredients of paints, etc. I. I. BAGROV. Brit. 337,915, Oct. 21, 1929. The materials to be mixed are passed under pressure through a pipe coiled in roll of metal net (suitably of 25-35 mesh and about a meter long).

Pigment. SOC. ANON. POUR L'IND. CHIM. À BÂLE Swiss 141,886, Aug. 21, ... A colored pigment is prepd. by mixing chalk or other similar Ca compds. with the azo dye produced by the action of $COCl_2$ on the sapond. dye from the diazotized *p* tolu... sulfonic acid ester of 1,8-aminonaphthol-3,6-disulfonic acid and cresidine, 1,4-... $(MeO)(NH_2)C_6H_3$. The resulting pigment is red and has good light-, water- and w... resisting power. Examples are given.

Iron oxide pigment. JULIUS LAUX (to I. G. Farbenind. A.-G.). U. S. 1,7... Feb. 24. An aromatic nitro compd. such as $PhNO_2$ is reduced with Fe and an ac... contg. at least 25% of a salt of an org. amino compd. such as $PhNH_2$.HCl, and the re... sulting Fe oxide sludge is sepd. from the aromatic amino compd. produced and p... fied by washing. U. S. 1,793,942 relates to a process in which an aromatic nitro compd such as $PhNO_2$ is reduced with Fe and an aq. soln. of acid such as HCl contg. at last 2 mols. of anhyd. acid in 1000 parts of soln., insufficient in quantity to dissolve the Fe,

the sludge formed being sepd. from the resulting amino compd. and purified by washing. Cf. *C. A.* **24**, 5171.

Drying oil. IRVIN W. HUMPHREY (to Hercules Powder Co). U. S. 1,793,220, Feb. 17. A drying oil suitable for use instead of linseed oil comprises a polymerized terpene product composed mainly of polymers having a higher b. p. range than that of the polymer $(C_{10}H_{16})_2$.

Modifying the physical properties of fatty oils. L. AUER. Brit. 337,736, April 24, 1929. For producing a modified product sol. in a desired org. solvent for the manuf. of *"leather cloth," lacquer* or *varnish*, the fatty oil is treated with a modifying agent insol. in the selected solvent, and there is heated with the material over 2% of a soly.-promoting agent such as phenols or ketones; *e. g.*, linseed oil heated with CaO_2 and $ZnSO_3$ produces when the product is dissolved in turpentine a varnish too viscous for use, but a suitably reduced viscosity may be attained by adding about 4% of *o*-nitrophenol or benzoic acid to the modifying agents. The modified products may be used as softening agents with nitrocellulose. Products sol. in acetone or benzene are obtained by heating castor oil with Li_2CO_3 or Li sulfite to which *p*-cresol has been added. Cf. *C. A.* **24**, 2910.

Varnish. "CIRINE-WERKE" JOSEF LORENZ & Co. Swiss 142,167, April 18, 1929. A weather- and acid-proof varnish is made by pulverizing a composition made from several varieties of wax, cold-emulsifying with a dry vegetable oil and mixing with a soln. of Co linoleate in dry vegetable oil and a wax solvent. Thus, bees-, carnauba, mineral and shellac wax are ground up and emulsified with linseed oil. A paste of Co linoleate and linseed or wood oil and C_6H_6 is then added.

Varnish bases. BAKELITE G. M. B. H. (Fritz Seebach, inventor). Ger. 517,445, Feb. 26, 1929. Phenol-aldehyde condensation products capable of being hardened are combined with partly or completely oxidized drying oils. The materials may be combined in soln. and the solvent then evapd. The process may be effected in the presence of an O-carrier, and the oil may be oxidized *in situ*. Examples are given.

Lacquers. KAZUO TAKEMURA and KAZUE OIWA. Ger. 517,349, Aug. 15, 1926. Nitrocellulose is dissolved in AcOAm, Et_2O and acetone, and the soln. is dild. with EtOH and Bu tartrate. $K_4Fe(CN)_6$ and powd. bamboo cane are then incorporated.

Oil lacs. I. G. FARBENIND. A.-G. (Karl Ott and Hanns Bernard, inventors). Ger. 514,914, Sept. 11, 1927. See Fr. 660,748 (*C. A.* **24**, 252).

Non-inflammable nitrocellulose lacquer. MARKUS THAU. U. S. 1,793,726, Feb. 24. CCl_4 is added to a soln. of nitrocellulose in a solvent mixt. such as BuOAc and turpentine.

Coating sheet materials such as wallboard with enamel. JOHN W. COWELL. U. S. 1,793,437, Feb. 17. Mech. features.

Coating metal foil. STAINOLFABRIK BURGDORF A.-G. Brit. 338,340, Oct. 9, 1929. Sn or other foil is coated with a soln. of nitrocellulose in Et lactate and alc., an alc. shellac soln. and castor oil, with or without AmOAc.

Impregnating porous materials. ADOLF KANZOK. Swiss 141,109, Jan. 2, 1928. The materials are soaked in a liquid contg. a phenolic soln. of a substance which will not react with the phenol on forming synthetic resin, but which will promote the polymerization of the phenolic resin. Thus, wood is steeped in a mixt. of aldehyde-NH_3 and cresol, and heated to about 100°. The aldehyde and cresol form a synthetic resin which later polymerizes under the contact action of the NH_3.

Films of cellulose esters or ethers, etc., suitable for tipping cigarets. CHEMISCHE FABRIK VON HEYDEN A.-G. Brit. 337,501, Feb. 15, 1929. Thin bands are formed comprising 2 continuous layers of cellulose esters or ethers such as cellulose acetate and ethyl or benzyl cellulose or the like, one layer contg. a pigment such as a metal powder while the other layer contains a material such as powd. magnesia, lithopone, powd. cellulose or cork which enhances its affinity for adhesives. Various details of manuf. are described.

Revivifying decolorizing clays containing rosin impurities. ROBERT C. PALMER (to Newport Co.). U. S. 1,794,537, March 3. Clay such as that which has been used for purifying rosin is treated with a mixt. of alc. and an org. solvent such as petroleum naphtha to dissolve the impurities in the clay, and the soln. thus formed is displaced from the clay with an org. alc. solvent such as a further quantity of petroleum naphtha.

Revivifying fuller's earth contaminated with rosin impurities. ROBERT C. PALMER. U. S. 1,794,539, March 3. Fuller's earth which has been used as a filter for purifying rosin is washed with a soln. of a rosin solvent such as petroleum naphtha and an org. revivifying liquid such as acetone having a high miscibility with the rosin solvent em-

ployed and at least moderate miscibility with water at the temp. of the process (which may be about 65°). Mention is made of various other solvents which may be used.

Removing water from fuller's earth such as that used for purifying rosin. ROBERT C. PALMER and JOHN L. BURDA. U. S. 1,794,538, March 3. The material is treated with a substantially anhyd. liquid immiscible with water such as petroleum naphtha at a temp. (suitably about 130–150°) above the normal initial b. p. of the liquid and under pressure, and the pressure is then reduced to vaporize part of the anhyd. liquid together with the water contained in the earth.

Casings of weighing apparatus formed of resinous material. C. F. M. VAN BERKEL. Brit. 338,424, Jan. 11, 1930. Casings of weighing app. are formed wholly or in part of molded natural or synthetic resin compn. which may comprise a filling of wood flour, asbestos or linen or other fabric. Various details of manuf. and construction are described.

Refining wood-resin. WILLI SCHULTZE (to A. Schultze & Co.). U. S. 1,793,967, Feb. 24. Resin obtained from dead trees is distd. in a high vacuum (of 8 mm. Hg or less) in the absence of foreign gases.

Modifying the properties of resins. L. AUER. Brit. 337,733, April 24, 1929. In a process such as is described in Brit. 321,724 (*C. A.* **24**, 2904) for modifying the phys. properties of resins contg. high-mol. org. acids, such as colophony or ester gum, the resins are heated under atm. or higher pressure with org. compds. of the O acids of S or their Cl derivs. such as aromatic sulfonic acids or chlorides. The material such as colophony or ester gum may, *e. g.*, be heated at 280–300° in an open vessel with *p*-toluenesulfonyl chloride, 2,5-dichlorobenzenesulfonic acid, β-naphthol-3,6,8-trisulfonic acid or sulfosalicylic acid. The products are either viscous oils or are brittle solids and may be used in *varnishes*. They may be subjected to a supplementary gas treatment or to irradiation. Brit. 337,734 relates to the modification of the phys. properties of fats, fatty oils or fatty acids by heating and dispersing in them modified isocolloids such as those prepd. by heating with amines (Brit. 337,732, following abstr.) or with compds. comprising an org. residue united to an inorg. acidic residue (such as benzenesulfonic acid) as described in Brit. 321,724 (*C. A.* **24**, 2904) or with water-insol. compds. as described in Brit. 321,725 (*C. A.* **24**, 2904), or by treating an aq. soln. of the salts of amines such as benzidine or bianisidine with a soap soln. of high-mol. org. acids. The products may be irradiated with ultra-violet or x-rays, treated with gases such as SO_2 or N, and may be vulcanized; they are suitable for *varnish* or *rubber-substitute manuf.*

Modifying isocolloids for varnish or rubber-substitute manufacture, etc. L. AUER. Brit. 337,732, April 24, 1929. Materials such as linseed or China wood oil or their fatty acids are heated to above 250° (or thickened oils or tung oil to above 200°) with 2–10% of a primary aromatic diamine or a monoamine of high mol. wt. or both, such as *m*-phenylenediamine, *p*-tolylenediamine, β-naphthylamine or *p,p'*-diamines such as *p,p'*-diaminodiphenylamine or *p,p'*-diaminodiphenylurea. Various other substances may be added and the products may be vulcanized with or without use of an accelerator or activator. Cf. *C. A.* **24**, 2904.

Modifying natural and artificial resins. L. AUER. Brit. 337,750, April 24, 1929. Various materials such as colophony or ester gum are heated under less than atm. pressure with metal-free inorg. S compds. such as S chloride, chlorosulfonic acid, H_2SO_4, or sulfuryl or thionyl chloride (suitably at a temp. of about 290–300°). The products thus formed are brown viscous oils or semi-solids suitable for use in varnishes and may be irradiated with ultra-violet or x-rays or mixed with ketones, phenols, etc. Cf. *C. A.* **24**, 2904.

Synthetic resin from xylenols and furfural. EMIL E. NOVOTNY (to John S. Stokes). U. S. 1,793,715, Feb. 24. In making a potentially reactive resinous product, a mixt. of the ingredients is heated to above 100° and the water of soln. and of reaction is removed substantially as fast as it is vaporized while the reactive ingredients are returned to the zone of reaction, and a methylene-contg. hardening agent such as formaldehyde is combined with the reaction product. Cf. *C. A.* **24**, 5173.

Synthetic resins. CARLETON ELLIS (to Ellis-Foster Co.). U. S. 1,793,310, Feb. 17. A chlorination product of toluene, chlorinated in the side chain and contg. benzotrichloride is caused to react on a phenol in the presence of a chloride of Fe or Al to produce a resinous product, and the latter is acted upon with about 10% of CH_2O. U. S. 1,793,311 relates to products similarly formed with the further addition of $(CH_2)_6N_4$, and U. S. 1,793,312 also relates to details of procedure of processes of the same general character.

Synthetic resins. BRITISH CELANESE, LTD. Brit. 338,002, Nov. 17, 1928. A toluenesulfonamide-aldehyde condensation product is further condensed with a toluene-

sulfonamide, and an addn. of 5–10% urea may be made to the initial materials, and the reaction may be effected in the presence of a catalyst of acid or alk. character or in the absence of a catalyst. The products are suitable for use in lacquers, plastic compns., etc., together with cellulose derivs., other synthetic resins, natural resins, solvents, plastifiers, modifiers, etc., various details and examples being given both of the prepn. and use of the products. Cf. *C. A.* **24**, 2317.

Synthetic resins. BRITISH CELANESE, LTD. Brit. 338,024, Dec. 5, 1928. Resinous products prepd. by condensing a toluenesulfonamide-aldehyde condensation product with a toluenesulfonamide, as described in Brit. 338,002 (preceding abstr.) are modified by further condensing with an aldehyde; *e. g.*, a benzene-insol. product formed as described in Brit. 338,002 may be heated with formaldehyde soln. under reflux at 120–150° to form a non-resinous product which is converted into a benzene-sol. resin by heating at 130–150° in an open vessel.

Synthetic resins. WILFRED S. ROTHERA, STANLEY BLYTHEN and HENRY R. GILLESPIE. Ger. 517,251, Feb. 16, 1926. Hydrophobe resins are prepd. by warming urea or a urea deriv. with an aldehyde, particularly CH_2O, for a short time, treating the primary condensation product so obtained with an org. compd. capable of condensing with the aldehyde in an acid medium, *e. g.*, PhOH or thiourea, and then heating the mixt. in the presence of free H ions until the resin ppts. from the mixt. on cooling. The mixt. may be neutralized or rendered feebly alk. before cooling. Examples are given.

Synthetic resins. I. G. FARBENIND. A.-G. Brit. 338,109, May 9, 1929. Cyclic hydrocarbons contg. at least one aromatic nucleus but having no olefinic side chains, such as benzene, naphthalene or tetrahydronaphthalene, or their alkylated, halogenated, nitrated, alkloxylated or carboxylic ester derivs., are condensed with diolefins such as 1,3-butadiene, isoprene or 2,3-dimethyl-1,3-butadiene, in the presence of anhyd. inorg. halides which evolve heat on contact with water such as $AlCl_3$, $ZnCl_2$, $FeCl_3$, B chloride or B fluoride, or of "ansolvo" acids derived from such halides, such as complex compds. of the halides of Zn, Ca or Mg with HOAc. Products are obtained suitable for use in lacquers, etc., and several examples are given.

Synthetic resins. I. G. FARBENIND. A.-G. (Friedrich Frick, inventor). Ger. 517,430, Dec. 29, 1928. Resins are prepd. by condensing urea with CH_2O in the presence of aryl ethers of glycols or polyglycols, or lower fatty acid esters of such ethers. About 0.5 mol. of glycol deriv. may be taken for each mol. of urea. Examples are given. Cf. *C. A.* **25**, 835

Synthetic resins. I. G. FARBENIND. A.-G. (Leo Rosenthal, inventor). Ger. 517,477, May 1, 1928. Resins are prepd. by treating crude solvent naphtha, alone or contg. phenols or naphthols, with compds. of BF_3 and fatty acids. The reaction may be effected by gradually adding about 3% of a BF_3-fatty acid compd. to crude solvent naphtha while stirring and preventing rise of temp. above 70°. The products are colorless or nearly so, and are *useful as varnish bases.* Examples are given.

Apparatus for cutting thin sheets from a heated block of fully hardened artificial resin. HEROLD A.-G. Brit. 337,530, Sept. 13, 1929. Structural features.

Urea-formaldehyde resins. TOLEDO SCALE MFG. CO. Brit. 337,357, April 27, 1929. Urea and CH_2O are caused to react in aq. soln. to form an initial condensation product, the soln. is concd., a condensation product of a "polybasic" acid and a polyhydric alc. is then added and the soln. is further concd. In the initial condensation, the p_H may be adjusted to from 5 to 6 by adding triethanolamine, and after such condensation the p_H may be increased to 7 or 8. Sufficient of the "polybasic acid"-polyhydric alc. condensation product may be added to lower the p_H to 3.5 to 5.0 and the mixt. may be dried by heating *in vacuo* and may be molded under pressure and cured by heating. Thiourea may be substituted for part of the urea. Cf. *C. A.* **24**, 6041.

Linoxyn or similar material. VICTOR SCHOLZ (to Atlas Ago Chemische Fabrik). U. S. 1,794,325, Feb. 24. Oil such as linseed oil is preliminarily converted into a jelly by heating and blowing with air and is then subjected to a kneading process to give the product a fine crumby, flaky, yellowish opaque character. Cf. *C. A.* **24**, 2316.

Decorating linoleum and similar materials. H. W. PRENTIS (to Armstrong Cork Co.). Brit. 338,205, Oct. 9, 1928. Various mech. features of operation are described.

Forming color patterns on linoleum, felt, oil cloth, etc. J. C. MCCARTHY (to Armstrong Cork Co.). Brit. 337,924, Nov. 21, 1928. Various details are given of procedure for successive color applications. Cf. *C. A.* **24**, 2623.

Floor covering. JULIAN T. BALDWIN (to Sandura Co.). U. S. 1,793,666, Feb. 24. A thin sheet material such as paper is placed on a supporting base such as a linoleum

or felt base with an intervening cementing material comprising a resin such as rosin, shellac or ester gum, a plasticizer for the resin such as diethyl phthalate and a "modifier" such as montan wax, rubber or oil and the product is provided with a decorative coat such as a pigmented resin compn. and an overlying transparent wear-resisting coating such as a shellac varnish contg. a plasticizer. U. S. 1,793,667 relates to floor covering material prepd. by mixing body ingredients such as cork, wood flour, starch or rubber with a binder such as a resin and plasticizer and affixing the resulting mixt. under pressure to a fibrous support such as textile fabric.

27—FATS, FATTY OILS, WAXES AND SOAPS

E. SCHERUBEL

A new method for determining iron in fats and soaps. O. HAGEN. *Seifensieder-Ztg.* **58**, 110–2(1931).—H. dets. Fe in oils by carefully ashing 10 g. and detg. Fe in the HCl soln. of the ash colorimetrically with standard Fe soln. and KCNS. The following results are tabulated: colorless coconut oil 0.4–0.9, I A lard 0.6, II A lard 27.0, 1st pressing castor oil 0.9, tallow 4.5–36.0, coconut oil fatty acids 20.7 mg. Fe per kg. of oil. Soaps are ashed in successive portions; a total of 5 g. is used and combustion is aided with a few crystals of NH_4NO_3. The titration with KCNS gave for soaps a content of 2.3–25.2 mg. Fe per kg. of soap. In a series of expts. for development of brown spots, the unchanged soaps contained 1.4–1.8 and the discolored soaps up to 9.0 mg. Fe per kg. P. ESCHER

Wool fat. P. MARTELL. *Pharm. Presse, Wiss.-Prakt. Heft* **1931**, 17–8.—A description of the secretion of wool fat and of its phys. and chem. properties in connection with the usual procedures followed in the production of the crude and refined brands. W. O. E.

Wool fat, its properties and composition. G. SALOMONE. *Boll. laniera* **44**, 199–201(1930).—The properties and compn. of wool fat depend greatly on the way it is extd. The wax extd. with petr. ether has a thicker consistency and is richer in hydroxy acids than that extd. with trichloroethylene. It is brown or brown-yellow, has no disagreeable odor, is little sol. in 95° alc., much more in ether, in benzine, in chloroform, trichloroethylene, CS_2, and is dextrorotatory. It has d_{15} 0.941–0.945, m. 36–42°, sapon. no. 98–115, I no. 17–29, unsaponifiable 30–52%, fatty acids m. 42°, mol. wt. of acids 327.3. The fat extd. with petr. ether or acetone has little acidity, while that obtained from scouring baths has 20–25% of free fatty acids calcd. as oleic acid. Wool fat is difficultly sapond.; it contains lactones that are transformed gradually by the alkali into acids and their salts. There is a little myristic acid and a large amt. of palmitic, stearic, carnaubic and cerotic acids. Small quantities of cetyl, carnaubyl and ceryl alcs. are present with cholesterol, isocholesterol and oxycholesterol, in a free state in limited amount, and for the greater part esterified with the fatty acids. Such alcs. represent the unsaponifiable portion that can reach 50% of wool fat. The esters predominating in wool fat are principally palmitate, stearate and cerotate of cholesterol and isocholesterol. The identification of wool fat is based on the presence of cholesterol. Impure wool fat, if exposed for some time to air, becomes brown, and acquires a less disagreeable odor, a greater consistency, a higher refractive index, a lower I no., a less complete soly. in petr. ether and a higher mol. wt. by the decompn. of the cholesterol esters that are first hydrolyzed and then oxidized. R. SANSONE

Freezing-point method for the examination of cacao butter. A. G. AVENT. *Analyst* **56**, 180(1931).—In the paper published on the classification of chocolate fats by the f.-p. method (*C. A.* **24**, 4946) mention should have been made of the assistance obtained from H. R. Jensen in devising the standard solidification test. W. T. H.

Extracted cacao butter—imitation or adulterated. W. NORMANN. *Allgem. Öl Fett. Ztg.* **27**, 259–61(1930).—The inconsistency of German rulings on the subject of extd. edible fats is discussed. W. F. BOLLENS

Measurement of rate of formation of oxidative decomposition products in fats and oils. D. P. GRETTIE AND R. C. NEWTON. *Ind. Eng. Chem., Anal. Ed.* **3**, 171–3(1931).—The method used is a modification of the methods of Bailey and Issoglio. The measurement of the volatile products is taken as a measurement of the degree of spoilage of the fat, and is performed by titrating against acid $KMnO_4$; the products carried away in a given time by a const. stream of air pass over the fat which is dispersed on filter paper and maintained at a specified elevated temp. The stream of air is drawn over the fat and then through a standard soln. of acid $KMnO_4$ maintained at 25°. This

soln. is then titrated against oxalic acid to det. how much was used by the decompn. products condensed in it. E. SCHERUBEL

Causes of deterioration of fats and oils. W. L. DAVIES. *Oil and Fat. Ind.* 7, 427–31, 453–7(1930).—The 2 main causes of deterioration are oxidation and the agency of microörganisms. O absorption is not rapid until after the induction period has been overcome. This means the time required by the system to undergo activation. The conditions likely to catalyze the subsequent oxidation of fats have also the effect of shortening the induction period, *e. g.*, heat, light, acidity, other impurities and metallic catalysts. Lipoids in fats are oxidized first; thus in butter the fishy flavor is due to oxidation of lecithin forming trimethylamine. Foots which contain lipase and protein decompn. products also shorten the induction period. The tests used for following the course of oxidation such as the Kreis test and the extn. of the oxidizability values of the steam-volatile or water-sol. products of oxidation have been found valueless in detecting incipient deterioration. When bacteria are present in fat no autocatalytic oxidation occurs as the organisms use all available O in the fat. Molds cause more deterioration in fats than bacteria. They are of 2 classes: those which preserve the solid consistency of fat and those which have strong lipolytic properties and liberate fatty acid. Very little is known of the effect of yeasts on fat. E. SCHERUBEL

Determination of rancidity in oils and fats. ALAN TAFFEL AND CECIL REVIS. *J. Soc. Chem. Ind.* 50, 87–91T(1931).—On account of emulsification caused by ether in the Kreis reagent and the presence of peroxides which tend to oxidize phloroglucinol, the Kreis test was modified by substituting alc. for ether and using 10 drops of a 5% soln. of phloroglucinol in alc Oils which have been air-blown or have become rancid at moderate temp. contain peroxides which are reduced by HI and oils becoming rancid around 120° contain more peroxides together with other forms of combined O which offer more resistance to reduction by HI. Oils air-blown at 170° contain only difficultly reducible peroxides. The amts. of each type of oxide present in an oil can be detd. For oils becoming rancid at moderate temp., add 10 g. of oil to 40 cc. glacial AcOH and then 2 cc. of 50% KI soln. Shake the mixt. for 2 min., hold for 2 min. and again shake for 2 min. and then pour into 100 cc. H_2O, rinse with 20 cc. and titrate with 0.1 *N* $Na_2S_2O_3$ and starch. Two g. of BaI_2 may be used instead of the KI soln. For oils which have become rancid by exposure to air at high temp. the proportions of the reagents must be found by expts. Ten to 20 g. of BaI_2 and 100 cc. of AcOH are suitable for 1.25 to 2.5 g. of oil. For the samples examd. the Kreis reaction and the I or peroxide figure showed a close correlation, a strong reaction of the former accompanying a high peroxide figure. While the peroxide methods have not stood the test of long experience they are of apparently general application to all types of rancidity. Definite and reproducible figures are obtained by the methods which distinguish between oxidation in ordinary rancid oils and that which occurs in oils blown at high temps. E. S.

Three new oils. ERICH STOCK. *Farben-Ztg.* 36, 830(1931).—The analytical consts. of 3 new oils were:

	Moquilia tomentosa Benth.	*Oenocarpus*	*Udilo*
sp. gr.	0.9864 (at 16°)	0.9244 (at 15°)	0.9241 (at 15°)
solidification pt.	—14 5°	7.5°	7.9°
n	1.4919 (at 30°)	1.4700 (at 15°)	1.4699 (at 15°)
sapon. no.	196	190	198.9
acid no.	18.8	1.38	66.9
I no. (Wijs)	81.5	80.6	98.8
unsaponifiable %	7.5	0.84	....
resins	..	...	19.4%

G. G. SWARD

Some titer points of mixed fatty acids. I. Mixtures of commercial oils, fats and fatty acids. GEORGE W. JENNINGS. *Ind. Eng. Chem.* 23, 413–5(1931).—Mixed fatty acids of tallow, corn, olive, coconut and cottonseed oils, garbage, grease and red oil were prepd. and mixed with each other in the desired proportion just before detn. of the titer. The results are reported in the form of curves, plotted with the titer points as ordinates and the % compn. of the mixed fatty acids as abscissas. The work is to continue in order to explain the cause of the apparently erratic results obtained in some cases. E. SCHERUBEL

Intramolecular rearrangement of the ester of simple unsaturated fatty acids during hydrogenation. A. STEGER AND H. W. SCHEFFERS. *Chem. Umschau Fette, Oele, Wachse Harze* 38, 45–53(1931).—S. and S. used specially prepd. pure ethyl, glycol and glycerol esters, etc., for a partial and complete hydrogenation with Ni on kieselguhr—

reduced at fixed temps. and with Pd on C according to Mannich and Thiele (*C. A.* **10**, 2158). They examd. the influence of Ni reduction temps., of the hardening temps. and of the amt. of catalyst upon the quality of the product. The results of the detns. of the I no. of the liquid and solid acids, % solid acids and % linolic acid are tabulated and plotted in graphs. Results: Solid isoöleic acid is formed soon after hydrogenation; higher temp. increases it and a max. is reached at 50–60 I no.; linolic acid disappears rapidly and becomes oleic acid, especially at higher temps.; no stearic acid is formed until only a few percentages of linolic acid remain. Oleic esters have their oleic acid in part converted into isoöleic acid which reaches a max. and then diminishes, disappearing entirely around I no. 20. Et esters form more iso-acid than glycerol esters. Solid elaidic ester forms liquid oleic acid, more of it with Et ester than with glycerides. Changes in the reduction temp. of Ni are not reflected in the phys. properties of the product; an increase in the amt. of catalyst increases the isoöleic acid but slightly. A Pd catalyst forms more iso-acid than Ni; but the type of carrier (kieselguhr and C) does not influence the results. P. ESCHER

Detection of sesame oil in solid mixtures of fats. R. LUCENTINI. *Ind. olii minerali e grassi* **10**, 156–7(1930).—If less than 0.5% of sesame oil is present ext. 50 g. of the melted fat for 2 hrs. with 100 cc. 95° alc., using a Marino extractor, cool to ppt. the excess of dissolved fat, filter and evap. off the alc. on the water bath. The residue contains, with a little fat, the greater part of the phenolic substance that produces the color reaction for sesame oil. After cooling, dissolve the residue in 5 cc. of petr. ether, bring it into a test tube contg. 2 drops of a furfurole soln. in alc., add 5 cc. of concd. HCl and agitate several times softly. In the presence, even of very small quantities of sesame oil, a pink-red color is produced. R. SANSONE

Vitamins and palm oil in margarine. ALBERT K. EPSTEIN. *Oil and Fat Ind.* **8**, 107, 109(1931).—Tests made on samples of palm oil made from selected raw material and which were refined and deodorized by careful methods were found to respond to the Drummond color test for vitamin A equiv. to about 60 units per g. This is a higher test than that given by the av. butter. E. SCHERUBEL

Present state of the olive-oil industry in Italy. HUMBERTO MORINI. *Quim. e ind.* **7**, 232–5(1930). S. L. B. ETHERTON

Analysis of olive oil in Wood's light. G. LOEW. *Ind. olii minerali e grassi* **10**, 140–2(1930); cf. *C. A.* **24**, 1532.—Tests showed that the olive fluorescence of olive oil is due principally to the presence of vitamin C or to a substance that accompanies vitamin C. R. SANSONE

Utilization of the aqueous extracts from olives. RICCARDO CIUSA, ANGELO MANGINI AND DOMENICO MASSIMEO. *Industria Chimica* **5**, 1461–4(1930).—The aq. ext. obtained during the manuf. of olive oil, previously rejected, has been found to undergo spontaneous fermentation, a max. of 3% EtOH being obtainable. In addn. ½% of oil can be recovered by centrifuging, as well as 2% of KCl. A. W. CONTIERI

The processing of the fish oils. G. HINARD. *Boll. ufficiale staz. sper. ind. pelli mat. concianti* **8**, 161–7(1930).—The properties and uses of fish oils and of products obtained from fish oils are discussed and the methods involved in the prepn. of the products are described. G. SCHWOCH

The behavior of bleaching powders in acid oils and attempts at removing free acid by distillation. LEV PICK. *Allgem. Öl- Fettztg.* **27**, 291–4(1930).—Bleaching earths and carbons, when mixed at 105° with peanut oil or coconut oil, contg. free fatty acids, were found partially to remove the free acidity. This was found to be true for acid earths, as well as for neutral earths, when amts. of 10–50% were used. This removal of free acid is thought to be due to the adsorption of the free carboxyl groups to the surfaces of the bleaching powder. This interferes with the adsorption of pigments, and thus accounts for the lower bleaching power of earths and C on acid oils. Attempts to remove the free acidity from peanut oil by steam distn. at atm. pressure were only partially successful. The best results were obtained at 287°, the free acidity being reduced from 3.5 to 2.0%. During the distn. 2.7% of fatty acids was distd. off, showing that hydrolysis had taken place. When this procedure was used on coconut oil, the free acidity was reduced from 2.2 to 0.2%. The distn. temp. was 305°. When 3% of coconut oil was added to peanut oil (free acid 4.5%) and subjected to the above process, at 300°, the free acid was reduced to 0.4%. This difference in behavior of the 2 oils is said to be that, at temps. of 280° to 300°, the higher free acids replace the lower acids of coconut oil, which at this temp. are readily distd. leaving a practically neutral oil. Attempts were also made to remove the free acid by distn. with a volatile solvent. An app. is described in which the oil dissolved in benzene (2:1) is subjected to a continuous distn. under a reduced pressure of about 100 mm. Hg. The benzene soln. is

drawn through a long Al tube submerged in an oil bath at 300°, and thence into a flask submerged in an oil bath at 250°. The neutral oil collects in this flask, while the fatty acid and benzene vapors are carried through a condenser into a receiver. This procedure reduced the free acid of peanut oil from 4.0 to 0.4%, and that of coconut oil from 1.4 to 0.1%. In another sample of coconut oil the free acid was reduced from 13.6 to 0.7%. W. F. BOLLENS

Substitution of steam for carbon dioxide in the hydrogenation of oils. V. YASHCHENKO. *Masloboino Zhirovoe Delo* **1929**, No. 5, 23–4; *Chimie & industrie* **23**, 427–8.—Before removal of the catalyst after hydrogenation CO_2 is passed through the hydrogenation vessel. Passing steam at about 120–40° (to prevent condensation) was found equally satisfactory. A. PAPINEAU-COUTURE

Preparation of nickel catalyst for the hydrogenation of oils. A. BAG. *Masloboino Zhirovoe Delo* **1929**, No. 5, 32–4; *Chimie & industrie* **23**, 428.—In the regeneration of Ni catalyst, the Fe being present in the Fe^{++} state ppts. as $FeCO_3$ along with the $NiCO_3$ instead of with the Al and Zn. This is overcome by aerating the soln. before pptn. to convert Fe^{++} into Fe^{+++}. A more active catalyst is obtained by pptg. the Ni by adding the $NiSO_4$ soln. to the mixt. of kieselguhr and Na_2CO_3 soln., instead of *vice versa*. A. PAPINEAU-COUTURE

The effect of supports on the catalytic activity of nickel. CHARLES R. GLASS AND LOUIS KAHLENBERG. *Trans. Elektrochem. Soc.* **59**, preprint(1931).—Those support materials which inhibit the catalytic activity of Pt and Pd have been found to effect Ni similarly. The behavior of the supports with relation to the hydrogenation of cottonseed oil by Ni can be classified as follows: Reducible heavy metal oxides completely inhibit the activity of Ni. The salts of those metals that decompose on heating in a stream of H completely inhibit activity. Substances with corrosive properties retard but do not completely inhibit activity. The salts in every case have been found to yield more active supports than the corresponding oxides. The more inert the support becomes toward Ni the greater is its tendency to enhance activity. The less inert the support becomes toward Ni, the greater is its tendency to retard activity. The oxides of Si, Al, Cr, Mn, Ti, Ce, U and Mg and the phosphates and borates of Al, Cr, Mn, Ce, U, Mg, Ca, Sr, Ba and Li proved very beneficial as supports for Ni in hydrogenation. C. G. F.

The bleaching of waxes. J. DAVIDSOHN. *Allgem. Öl- Fettztg.* **27**, 261–2, 286–7, 312–3(1930).—A review. W. F. BOLLENS

Sodium chloride determination in soaps. STEINCHEN. *Seifensieder-Ztg.* **58**, 112–3 (1931).—S. combines the NaCl detn. with that of the total alkali and the fatty acids, using Volhard's KCNS method for the NaCl detn.: Decompose 5 g. with known HNO_3, shake out with ether, wash the ether soln. for fatty acid detn. To the HNO_3 soln. add 5 cc. ether per 100 cc. soln., shake out, add 5–10 cc. 0.1 *N* $AgNO_3$, shake well and set aside for 5 min. in the dark; add Fe indicator in HNO_3 soln. and titrate back with KCNS to a light rose tint. P. ESCHER

Properties of soap solutions. I. Estimation of detergent capacity. B. TYUTYUNNIKOV. *Allgem. Öl- Fettztg.* **27**, 241–3(1930).—The ideal way of expressing detergent capacity would be to express it in terms of the energy, which a known soln. of known concn. and temp. exercises toward the overcoming of the attaction between the substrate and soil, and toward the suspension of the soil in the soln. This energy would be measured by phys. and colloidal chem. methods, rather than by the highly standardized exptl. washing tests. **II. The influence of saponin on soap solutions.** B. TYUTYUNNIKOV, N. KASSVANOVA AND R. GVIRZMAN. *Ibid* 273–6, 294–8(1930).—The influence of the addn. of successive portions of saponin soln. to soap solns. is divided into 3 stages. In the 1st stage the lathering power is reduced until it is 0. During the 2nd stage the lathering power remains at 0 while during the 3rd stage lather is again produced. Curves showing the influence of addns. of saponin on the lathering properties of Na soaps of various fatty acids and of rosin are given. Tables are also given showing the influence of addns. of saponin to these soaps on the lather vol. (cf. *C. A.* **24**, 3668), the property of carrying pptd. MnO_2 through a filter, and the surface tension. It is supposed that the saponin is adsorbed by the soap, and that the adsorbing power of the soap is not completely satisfied until the beginning of the 3rd stage. This may be numerically expressed by the amt. of saponin required just to bring forth a lather after having destroyed it, expressed in multiples of the wt. of soap present in the soap soln. The no. is called the saponin no. Saponins of different origins were found to give somewhat different results, and as yet no method for the evaluation of the various saponins has been developed. W. F. BOLLENS

Evaluation of detergency. JAMES G. VAIL. *Soap* **7**, No. 3, 29–30(1931).—The

trend in soiling tests has been in favor of simple pigments, carbon black and umber being preferred. Two methods of applying pigments in water give fairly even colors. In one, 5 g. of umber in 100 ml. of water is used with 5 × 12 in. of cloth which is passed through a clothes wringer and the treatment repeated until the cloth color is const. The second method involves the use of the Launderometer, a machine with a round-bottom metal tank supported in an open frame and having a shaft bearing 16 threaded posts. By means of clips and wing nuts 20 jars may be attached. A motor drives the shaft at 40 r. p. m. Heat is applied by a gas burner underneath. A cloth bag contg. 50 Monel metal balls is rotated for 1 hr. at 60° in a suspension of 1 g. of umber in 100 ml. of water. This machine is also used for the washing tests. For judging results a color chart was devised but results did not agree and another plan was to print the color in stripes across the cloth. Washing was to be continued until the marks were invisible but it was difficult to judge when they disappeared. At present no procedure has been adopted. E. SCHERUBEL

[Fatty acids of] the resins of jack pine (PHILLIPS) **23.** The oxidation of the fat used in oiled wool (SALOMONE) **25.** Floating factories [for whale oil] (HAUPTVOGEL) **15.** Calculating viscosity and flash point in compounded oils (KADMER) **2.** Report of the oil and fat commission (AUERBACH) **29.** The higher alcohols of the paraffin series [as waxes] (SCHRAUTH) **10.** Wax emulsions [for soaps] (Brit. pat. 338,176) **18.** Solvents for fats and waxes (Ger. pat. 517,097) **13.** Thickening oils (Brit. pat. 337,639) **22.** Method and plant for separating waxy and fatty substances from oils (Ger. pat. 517,198) **22.** Rotary impeller agitating device and filter for treating oils (U. S. pat. 1,794,916) **1.** Apparatus for extractions with liquid solvents (U. S. pat. 1,794,874) **1.** Unactivated "prefiltering medium" for treating oils (U S. pat. 1,794,862) **1.** Distillation of volatile substances [in refining oils and fats] (Ger. pat. 514,740) **13.** Apparatus and procedure for spraying desiccation of soap (U S. pat. 1,794,978) **1.**

Fat separators. WILHELM STEINMANN Swiss 142,451, Nov. 2, 1929. A fat separator for a plant for working up animal waste, carcasses, etc., is described.

Extracting oils and grease with solvents. IMPERIAL CHEMICAL INDUSTRIES, LTD., and F. E. ROGERS. Brit. 337,770, Aug. 1, 1929. Various details of app. are described for use in a process such as described in Brit. 278,891 (*C. A.* **22**, 2851). A condenser and the means for heating the app. are interconnected so that the cooling of the condenser ceases when the heat is shut off.

Organic peroxide for oxidizing or decoloring. HENRY B. FABER (to S. G. Turnbull). U. S. 1,793,917, Feb. 24. Substitution of O for Cl in material comprising an aliphatic dicarboxylic acid chloride and an aromatic monocarboxylic acid chloride (such as the reaction products from heating fumaric acid with benzotrichloride at 140–170°) is effected by treatment with H_2O_2 in the presence of an alk. substance such as Na_2CO_3. The product may be used for oxidizing or decolorizing oils, cereals, cereal products, etc.

Leaching materials such as in extracting oil from seeds. JESSE M. COAHRAN. U. S. 1,793,465, Feb. 24. Various details of app. and procedure for countercurrent extn. are described.

Obtaining oil, protein material, starch and cellulose from seeds. LOUIS F. DAVID and GEORGES FELIZAT. U. S. 1,794,105, Feb. 24. Seeds are crushed and the crushed mass is mixed with a slightly alk. aq. soln. such as Na_2CO_3 to dissolve protein material, swell the cellulose and suspend the starch and oils (the latter being in emulsion); the cellulose is sepd. by screening, the screened liquid is centrifuged at slow speed to sep. suspended starch, and the liquid is then centrifuged at higher speed to break the emulsion and sep. the oil; the liquid from the second centrifuging is treated with acid to ppt. protein material.

Apparatus for separating solvent from extracted seeds. KARL LÖFFL. Ger. 514,915, Feb. 6, 1929. The greater part of the solvent is recovered by blowing non-condensable gas through the seeds, and the remainder by squirting the seed through a nozzle into a chamber.

Scouring composition. W. J. A. HUYZER. Brit. 337,355, July 26, 1929. Soap powder is mixed with 1–3 times its quantity of natural magnesite ground to approx. 50 mesh per linear in.

Dry soap. ALBERT RUF. Swiss 142,452, May 13, 1929. A good ordinary soap is dissolved in boiling water. Calcined soda and a water-fixing stabilizing agent are added. The whole is reboiled and spirit added during violent agitation. On cooling, the whole is worked up to a creamy mass. In the example palm-olive soap forms the starting material.

Apparatus for molding soap. L. H. NELLES. Brit. 337,430, May 2, 1929. Structural features.

Cold press for soap, with heat-absorbing plates. AUGUST JACOBI A.-G. Ger. 514,520, Dec. 20, 1929.

28—SUGAR, STARCH AND GUMS

J. K. DALE

A hundred years ago. X. E. O. v. LIPPMANN. *Deut. Zuckerind.* **56**, 18–9(1931); cf. *C. A.* **24**, 1536.—A history of beet sugar. J. F. LEETE

Cuba's five-year plan. EARL L. SYMES. *Intern. Sugar J.* **32**, 612–4(1930).—A description of the operation of the governmental control method for sugar production in Cuba which became effective Nov. 15, 1930. W. L. OWEN

Technical notes from Usina Cucau Pernambuco. N. E. LAMONT. *Intern. Sugar J.* **32**, 629–31(1930).—The use of "Sumaphos" in clarification applied at the rate of 200 g. per ton of cane at the liming and sulfuring tanks results in an improved decantation and an increased yield of sugar, while the massecuites are freer working and the washed sugars are much more easily filtered. Expts. made on the purging of second massecuites with warm dil. exhausted molasses showed that the purity of the resultant molasses was on an av. 1% lower than without this aid and the actual time gained in curing each charge was reduced 20%. Expts. on the influence of p_H on alc. recovery showed that the closer the initial p_H to that of the final fermented wash, the higher is the efficiency of yield. An increase of 18% in yield was obtained by introducing the fresh wort on a footing of sour wash. W. L. OWEN

Factory results in Java during the last seven years. R. J. PRINSEN-GEERLIGS. *Intern. Sugar J.* **32**, 631(1930). W. L. OWEN

Dilution in relation to comparative purities. NOEL DEERR. *Intern. Sugar J.* **32**, 616–7(1930).—D. discusses Hill's article (cf. *C. A.* **24**, 6023) and replies to the exception taken by the latter to the statement that *"to be strictly comparable, gravity solids detns. should be made in solns. of the same nonsugar concn."* Taking the formula sugar recovered $S(J - M)/J(S - M)$, where S, J and M are the purities of the sugar recovered, the original impure material, and the residue or molasses, resp., D demonstrates that an accurate Brix or gravity solids balance can also be made where nonsugars are detd. in equal concns. The identity of the values obtained from the use of absolute and gravity purities shows what is meant by the word "comparable" in the official Direction of the Hawaiian Sugar Technologists. W. L. OWEN

Cylindrical or centrifugal pumps (in the sugar industry)? V. SÁZAVSKÝ. *Z. Zuckerind. Čechoslovak. Rep.* **55**, 127–8(1930).—A discussion. S. states that centrifugal pumps are suitable even for mud liquors. J. F. LEETE

An improvement in the testing of press mud for sugar. F. BRUCKNER AND TH. BREITHAUPT. *Centr. Zuckerind.* **38**, 1359(1930).—The authors find that foaming and dark-colored filtrates are avoided by substituting a soln. contg. 8% NH_4NO_3 and 2% $Al(NO_3)_3$ for the 10% NH_4NO_3 soln. in the method of the Institut für Zucker-Industrie. Numerous expts. indicate that no errors are introduced by the change. J. F. L.

The calculation of the amount of massecuite in a white sugar factory. E. DEHN. *Deut. Zuckerind.* **55**, 1031–2, 1080–1(1930).—A math. discussion. J. F. LEETE

Charring of sugar in centrifuging. W. C. BEDDING. *Arch. Suikerind.* **38**, 256 (1930).—Sugar which was gray was found under the microscope to be permeated with particles of C, because of the fact that it had been washed with superheated steam which had been produced from boiler water contg. sugar. B. C. A.

Precipitation of lime by sulfurous acid in sugar solutions. EMILE SAILLARD. *Compt. rend.* **192**, 178–80(1931).—This study was undertaken to decide whether SO_2 added to limed juices combines first with the lime, with the alkalies, or with both at the same time. Solns. contg. 10 and 20%, resp., of sugar were prepd. One g. CaO and increasing quantities of NaOH were added to each. Then SO_2, amounting to less than its CaO equiv., was passed into the solns. The alky. and the % SO_2 in the filtrates were detd. It was found that the SO_2 combines with both the CaO and the NaOH. As the quantity of NaOH increases, more SO_2 is taken up by it. At equal alky., more SO_2 combines with the CaO if the soln. contains a large % of sucrose. F. W. ZERBAN

The use of the refractometer in cane-seedling selection work. N. CRAIG. *Intern. Sugar J.* **33**, 14–18(1931).—The refractometer can be used to advantage in cane-seedling work, the results obtained being very reliable. The method of sampling is rapid, re-

liable and easy of application. Whenever possible it is advantageous to take 6 borings from each stool, although the analysis of 3 borings is sufficient to give a fairly good indication of the sugar-producing capacity of a cane seedling. The final choice of a seedling should be decided by the weights of the cane in the stool, and the richness in sucrose, and of these two the latter, which shows no correlation with the wt., is the more difficult to det. W. L. OWEN

Recent investigations into sugar-beet problems. I. Storage of sugar beet. G. R. CLARKE, L. F. NEWMAN AND A. W. LING. *J. Ministry Agr.* **36**, 950–60(1930); cf. *C. A.* **24**, 2629.—Beets were stored in various types of clamps during one season; in the next season only the mangold type of clamp was used, with free circulation of air. Samples were removed at stated intervals, and the following detns. made: loss in wt., dry substance in pulp, and % sucrose by Sachs-le-Docte method; the latter was checked by other methods. The results are shown in 8 tables. Conclusions: Under adverse climatic conditions beets lose both moisture and dry substance. Beets crowned before storage may seriously deteriorate. Secondary growth may start in imperfectly cut or in uncrowned beets. The net result is a decrease in the com. sugar yield. With normal weather conditions the loss is very small, and in favorable seasons beets can be stored without serious damage. F. W. ZERBAN

Increasing the daily production or lengthening the (beet sugar) campaign. P. HIRSCHFELDER. *Deut. Zuckerind.* **56**, 41-2(1931).—A discussion. H. points out 3 reasons in favor of a longer campaign; the low price of sugar, high interest rates and good storage facilities for beets. **Reply.** E. TROJE. *Ibid* 95–6. J. F. L.

Comparative determination of the marc content of fresh and stored (sugar) beets by the methods of Claassen and of Thielepape and Meier. MATSCHKY. *Centr. Zuckerind.* **38**, 1112(1930).—M. describes and discusses his methods. The exptl. data show agreement within 0.10% by the 2 methods in most cases. The greatest discrepancy found was Claassen 5.31%, T. and M. 4.76%. J. F. LEETE

The determination of the natural alkalinity (in sugar-beet juice): the method of the Institut für Zucker-Industrie or that of Düwell and Solon. K. DOMNING. *Deut. Zuckerind.* **55**, 1054–82(1930).—D. gives comparative results for the 2 methods and concludes that the D. and S. method is sufficiently accurate for factory control when only natural residual alky. and residual lime are to be detd., provided NH_3 is boiled out before carbonation, but recommends an occasional check by the method of the Institut. J. F. LEETE

The sugar losses of beet-sugar manufacture. H. CLAASSEN. *Intern. Sugar J.* **32**, 580–1, 626–9(1930); cf. *C. A.* **24**, 2912.—The total losses in the usual method of working in beet-sugar manuf. amounts to 1.2–1.5% of the roots when all calcns. are carried out by correct methods. The correct estn. of the wt. of roots entering the factory is of prime importance. Through faulty detns. this error may have a value of from ±0.05 to ±0.10. When returning the best wastes (tails) into the process, the quantity of sugar so introduced should be calcd. Because of inadequate sampling too low figures are usually found for the detd. loss, while with proper sampling they amount to from 0.4 to 0.6% of the roots. Undetd. losses, or losses undeterminable according to the usual methods, reach up to 0.75–0.90% of the roots, and are composed of apparent losses due to incorrect tares, increase of polarization of the beet slices through drying, polarization increases from the action of lime, too low results from the sugar content of the scums, sugar losses from decompn., and mech. sugar losses. Hence of the 0.75–0.90% undeterminable losses from 0.3 to 0.4% can be explained, while the remainder cannot be accounted for. W. L OWEN

Action of different decolorizing products in beet-sugar refining. C. GROSSI. *Ind. Saccarif. Ital.* **22**, 489–94(1929).—When decolorizing beet sirups with animal charcoal an excess of alkali is not beneficial, but increases the ash of the sugar. As the absorption of good charcoals is only 0.002%, alky. between 0.01 and 0.015% is a sufficient protection against inversion during a first and second refining. 0.3% CaO does not cause sirups contg. a min. of invert sugar to become strongly colored, even when these are kept for more than 1 hr. at 90°. It often causes a slight ppt. Turbidity takes away a part or all the decolorizing power of the animal C. Only a limited portion of the color is removed by the animal C, an excess causing no further color removal. 0.035% gives good results. There was no improvement when the amt. was doubled The addn. of hyposulfite always gave satisfaction. In reasonable amt., no inversion took place in slightly alk. massecuites. Fifty g. of hyposulfite is effective with 14 tons of first refining massecuites, while 14 tons of 2nd refining massecuites require 100 g. Most of the hyposulfite decoloration resists subsequent oxidation. R. S.

The question of the applicability of the conductimetric method for the official

determination of ash in raw (beet) sugars. J. PUCHERNA. *Z. Zuckerind. cechoslovak. Rep.* **55**, 205–6(1931); cf. *C. A.* **25**, 1406.—A discussion with statistical data. P. recommends the adoption of the conductimetric method. J. F. LEETE

The conductometric ash apparatus (for beet sugar) in the practical field. Q. JEDLIČKA. *Z. Zuckerind. cechoslovak. Rep.* **55**, 227–8(1931).—A discussion with statistics from 3 campaigns. J. prefers this method. J. F. LEETE

Measurement of turbidity with a spectrophotometer, with especial reference to sugarhouse products. R. T. BALCH. *Ind. Eng. Chem., Anal. Ed.* **3**, 124–6(1931).—Previous methods, none of which has come into extended use, are reviewed. The present method is based on a direct spectrophotometric comparison; the transmittancy is detd., with the turbid soln. in one cell, and a filtered portion of the same soln. in the other. Filtration through paper with the aid of a slow filtering type of kieselguhr is satisfactory. Kieselguhr does not cause true adsorption. Solids and semisolid products are dild. to approx. 50 Brix; any similar products to be compared should be dild. always to the same concn. The transmittancy measurements may be made at any convenient wave length, such as 560 mμ, but it was observed that the transmittancies at the red end of the spectrum are higher than those at the blue end. Beer's law does not hold exactly, but the approximation is close enough to permit expression of the turbidity in terms of $-\log t$. Expts. with bentonite suspensions showed that equal turbidity concentrates in a water-white medium and in one colored strongly with caramel give the same transmittancy readings. The results of turbidity measurements on a no. of granulated and raw sugars are given in a table, and it is also shown that the turbidities found are roughly proportional to the % of suspended matter obtained by weighing. F. W. ZERBAN

Working of molasses in the experimental molasses station at the sugar plant in Gniezno. FELIKS POLAK. *Przemysl Chem.* **15**, 37–43(1931).—This work is based chiefly on the sulfite fermentation of molasses. The app. and processes are discussed. The experimentation has reached a semi-plant stage in its development and includes fermentation and distn. of alc. and AcH, oxidation of the aldehyde to HOAc, oxidation of the sulfite to sulfate and distn. and purification of glycerol. A. C. ZACHLIN

Acetone compounds of the sugars and their derivatives (OHLE, LICHTENSTEIN) **10**. Sugar-beet root-rot control (YOUNG) **15**. The use of excess molasses (CLAASSEN) **15**. The use of sugar for motor fuel (ŠANDERA, ZEMAN) **21**. Report of the most important work in the field of pure sugar chemistry published during the first half of the year 1930 (v. LIPPMANN) **10**. Unactivated "prefiltering medium" for treating sugar solutions (U. S. pat. 1,794,862) **1**. Rotary impeller agitating device and filter for treating sugar solutions (U. S. pat. 1,794,916) **1**. Obtaining starch from seeds (U. S. pat. 1,794,105) **27**.

Sugar. RAFFINERIE TIRLEMONTOISE SOC. ANON. Ger. 514,713, Mar. 6, 1927. Air currents are prevented from circulating through the sugar crystals sepd. in a centrifuge, to prevent air drying of mother liquor adhering to the crystals before complete sepn.

Sugars from cellulosic material. ROBERT GRIESSBACH and ERNST KOCH (to I. G. Farbenind. A.-G.). U. S. 1,793,084, Feb. 17. Various details are given of a process involving treatment of cellulosic material such as pine sawdust with a mixt. of strong H_3PO_4 and com. concd. HCl.

Filter suitable for sugar solutions, etc. JOHN J. ARMSTRONG. U. S. 1,792,797, Feb. 17. Structural features.

Rotary filtering apparatus for filtering sugar solutions, etc. JOHN J. NAUGLE. U. S. 1,793,289, Feb. 17. Structural features.

Crystallization apparatus for sugar, etc. FERNAND LAFEUILLE. Ger. 517,154, May 3, 1928. See Brit. 301,453 (*C. A.* **23**, 4095).

29—LEATHER AND GLUE

ALLEN ROGERS

Bibliography of papers on the physical properties of leather. III. C. H. SPIERS. *J. Intern. Soc. Leather Trades Chem.* **15**, 61–7(1931); cf. *C. A.* **24**, 4951, 5178.—The references are classified under: *gaseous permeability* (13 titles); behavior to *bending* forces (30); *cracking* of grain (46); pipiness, *break* (14); *tinniness* (5); resistance to

tear (13); behavior on *compression* (6); *hardness* (3); *resilience* (3); other phys. properties (4 classes—6 titles). H. B. MERRILL

Report of the International Commission on Leather Analysis. R. FARADAY INNES. *J. Intern. Soc. Leather Trades Chem.* **15**, 6–12(1931).—Current problems and recent advances are discussed. Topics include the detn. of H_2O, ash, fat and acidity in vegetable-tanned, and of basicity of Cr salt, fat, H_2O-sol. matter and N in Cr-tanned leathers. The theoretical basis of the Atkin-Thompson method (*C. A.* **23**, 4843) for acidity of vegetable-tanned leather—namely that the leather contains free amino groups that enable it to function like a gel with respect to acid—is questioned. Infusions of leather in H_2O and in 0.1 *N* KCl do not differ appreciably in p_H value. Failure of petr. ether completely to ext. sulfonated oils and Al soaps is pointed out. H. B. M.

[Methods employed in] Chinese leather centers. H. A. BRAUNSTEIN. *Hide and Leather* **81**, No. 4, 30 (1931). H. B. MERRILL

Emulsions and suspensions in the leather industry. A A. CLAFLIN. *J. Am. Leather Chem Assoc.* **25**, 544–50(1930).—An address. H. B. MERRILL

Photomicrographic methods for determining the kind of leather and its defects. F. FEIN. *Collegium* **1930**, 593–8.—The method is briefly described. Eight photomicrographs (×28) of sheep, horse, calf and goat leathers are reproduced. I. D. C.

The international commission on the analysis of artificial bates. V. KUBELKA. *Collegium* **1931**, 16–21.—The literature since 1928 is reviewed and the problems yet to be solved are stated. A number of substances have been proposed as substrates but casein is most used. The casein method is not yet satisfactory. Also in *J. Intern. Soc. Leather Trades Chem.* **15**, 56–60(1931). I D. CLARKE

Enumeration (counting) of bacteria in soak waters. GEO. E. ROCKWELL. *J. Am. Leather Chem. Assoc.* **26**, 2–7(1931).—In sampling, a piece of skin should be included. Correct diln. may vary from 1:10 to 1:1,000,000, depending upon the type of soak water. In plating, 1 cc. of a fresh meat ext. is added to the dish, followed successively by 1 cc. dil. soak water and the agar. Incubation at 37° for 24 hrs., followed by 24 hrs. at room temp., is advised. H. B. MERRILL

The problem of improving the quality of the hides. A. GANSSER. *Boll. ufficiale staz. sper. ind. pelli mat. concianti* **8**, 110–5(1930). G. SCHWOCH

Contribution on hide damages by M. Bergmann and collaborators. IX. Bacteriology of the reddening of salted hides. WILLI HAUSAM. *Collegium* **1931**, 12–6, cf. *C. A.* **24**, 262.—A description is given of bacteria, other than those described previously, which have been isolated from red stained hides. I. D. CLARKE

Raw-skin defects and their effect on leather. FRITZ STATHER. *Collegium* **1931**, 3–12.—A summary of present knowledge of skin defects and damages. I. D. C.

Use of sulfide-lime liquors in the sterilization of hides infected with anthrax. M. E. ROBERTSON. *Leather World* **22**, 407, 488, 590, 670, 792(1930); *J. Am. Leather Chem. Assoc.* **26**, 120; cf. *C. A.* **24**, 4653 and following abstr. H. B. MERRILL

Use of sulfide-lime liquors in the sterilization of dried hides infected with anthrax. IV. Experiments on China hides. DOROTHY JORDAN LLOYD AND MADGE E. ROBERTSON. *J. Intern. Soc. Leather Trades Chem.* **14**, 641–57(1930); cf. *C. A.* **24**, 4653.—Pieces of hide known to be infected (from guinea-pig inoculations) were treated with lime-sulfide soln. at various temps. for different time periods, neutralized, triturated, extd., the ext. was centrifuged, and guinea pigs were inoculated with the deposit. The proportion of positive results increases with the vol. of ext. taken for centrifuging, showing that a relatively small no. of organisms are very resistant to treatment. Complete sterilization, with little or no damage to hides, was attained by treating them for 8 hrs. at 32° in a soln. contg. 1.0% $Na_2S.9H_2O$, + 1.2% CaO followed by a 4-day treatment at room temp. Higher temps. and (or) sulfide concns. ruined the hides. Fairly certain disinfection results at temps. down to 20° if the time is increased, but below 20° disinfection is very slow and uncertain Cf. preceding abstr. H. B. MERRILL

Estimation of total sulfuric acid in hides. X. K. A. BUSHMAN. *Ukrainskii Khem. Zhur.* **5**, Tech. Pt., 113–5(German Abstract 116)(1930).—The method is based upon the chlorination principle applied by A. P. Sementzev and V. L. Pavlov to the detection of As in the intestinal tract of animals and man (*Arch. Crim. and Med. Jurispr* **1**, 43(1926)). Place 4–5 g. of finely cut hide in a 1.5-l. flask; add 25 cc. distd. water and 10 g. NaOH; heat gradually to boiling and when the hide is almost dissolved add 80 cc. water and continue boiling till the hide is completely dissolved. Cool in ice water and introduce a moderate stream of Cl_2 gas for about 15 min. From time to time add distd. water until a final vol. of about 150 cc. is reached to prevent sepn. of NaCl crystals. At the end of 15 min., acidify with HCl and remove the Cl_2 gas by bubbling air through the soln. Filter and to the filtrate add a 3% soln. of hot $BaCl_2$. B. S. L.

Hydration of goat skin. EDWIN R. THEIS AND ADOLF GRYNKRAUT. *J. Am. Leather Chem. Assoc.* **26**, 134–43(1931).—Hydration during soaking and liming is followed by the dilatometer method (*C. A.* **23**, 2319). With H_2O max. hydration was attained in 14 hrs., followed by degenerative dehydration ascribed to bacterial or enzyme actions. HCOOH in soak decreases and delays attainment of max. hydration; this effect increases with increasing HCOOH concn.; the onset of degenerative changes is correspondingly postponed but not otherwise affected. NaOH in soak delays the attainment of, but does not decrease the extent of, max. hydration, and does inhibit degenerative dehydration. Extent of max. hydration and time required for its attainment are both decreased by increasing the temp. of the soak. Hydrations produced in soaking and in subsequent liming are largely additive. In soaking dried skins, hydration seems to take place in 2 stages, the second of which is shorter, and results in more hydration than the first. H. B. MERRILL

Principles of the liming process. R. H. MARRIOTT. *Leather World* **22**, 305 (1930); *J. Am. Leather Chem. Assoc.* **26**, 116.—The liming process has 2 functions: to remove the hair and to plump and sep. the fibers in prepn. for tanning. The conditions of liming should be regulated so that both aims are achieved simultaneously. Plumping of the fibers results in a characteristic "weave" which is described as flat or steep; the optimum condition depends upon the kind of leather. Unhairing results from the action of alkali on keratin, which is promoted by reduction of cystine linkages before the alkali has acted. H. B. MERRILL

[Some] details of leather manufacture. FINI G. A. ENNA. *Hide and Leather* **80**, No. 11, 21(1930).—Soaking green-salted skins prior to liming is unnecessary. NaCl, blood, etc., carried into lime when soaking is omitted are without detrimental effect. Omission of soaking avoids bacterial damage. For dried hides, neither acid soaking nor alk. soaking is to be recommended. Salts are effective in the order: $NH_4Cl > (NH_4)_2SO_4 > CaCl_2 > NaCl$. Some tanners put dried hides directly into strong Na_2S and lime, for combined soaking-unhairing, with good results; a soln. contg. 1.25% NH_4Cl and 1.25% Na_2S (60 %) is an effective softener. H. B. MERRILL

Processes of patent-leather manufacture. F. G. A. ENNA. *Leather World* **22**, 36, 116, 196, 412, 593(1930); *J. Am. Leather Chem. Assoc.* **26**, 118.—A description. H. B. MERRILL

Hazards in the manufacture of patent leather. E. H. MERRILL. *Hide & Leather* **80**, No. 14, 19(1930); *J. Am. Leather Chem. Assoc.* **26**, 36.—The naphtha fire hazard is discussed. H. B. MERRILL

Acidity of leather. H. G. BENNETT. *J. Intern. Soc. Leather Trades Chem.* **15**, 31–8(1931).—The "acid figure" of Atkin and Thompson (*C. A.* **23**, 4843), which is believed to be the p_H value of the concd. soln. of tannin on the outer part of the fibers, can be obtained arithmetically as well as graphically from measurements of p_H value at known dilns. in 0.1 *N* KCl. p_H (at any diln.) = tan θ log d + F, where tan θ = slope of the p_H-diln. plot, d = diln. and F = acid figure, or p_H at zero diln. Tan θ is thought to be fully as important as F. Two points are sufficient to det. the p_H-diln. plot, and calcns. are simplified if these 2 p_H values whose logs are simple integers are detd. at fixed dilns.; *e. g.*, diln. = 100-fold and 1000-fold; log d = 2 and 3. To find the proper wt. of leather to take to obtain these dilns. when the leather is soaked in 100 cc. of 0.1 *N* KCl, det. the % H_2O (W) and weigh $101W$ g. for 100-fold, and $10.1W$ g. for 1000-fold diln. If p_H values of these solns. are $(p_H)_2$ and $(p_H)_3$, then $F = 3(p_H)_2 - 2(p_H)_3$, and p_H (at any diln.) = $[(p_H)_3 - (p_H)_2]$ log d $- F$. Examn. of many leathers (chiefly sole) selected as representative com. products showed only 1 leather for which $F < 2.5$, and av. value of F was 3.5. Generally a high value for F is assocd. with a low value for tan δ; that is, with a well-buffered leather; and this is due often to the presence of appreciable amts. of Na salts. H. B. MERRILL

Application of the Atkin-Thompson method for acidity to vegetable-tanned calf leather. HENRY B. MERRILL AND REUBEN G. HENRICH. *J. Am. Leather Chem. Assoc.* **25**, 511–7(1930); cf. *C. A.* **23**, 4843.—Data are presented which indicate that the method gives results on leathers tanned with so-called spruce ext. (which is high in sulfonated bodies) that are rational and self-consistent, in contrast to results given by the Procter-Searle method. H. B. MERRILL

Present state of the determination of wear resistance of leather and methods for bettering it. U. J. THUAU. *J. Intern. Soc. Leather Trades Chem.* **14**, 602–23(1930); cf. *C. A.* **23**, 1768, 4096; **24**, 2634, 4654.—An improved wear test machine is described. For standardization, a plate of pure Cu, previously heated to 600° for 15 min., is employed, and all wear resistances are expressed in terms of this standard taken as 100. Soles are rubbed across a Carborundum plate under pressure of 70 kg. (av. human wt.),

Accessory gadgets assure a clean and uniform wearing surface at all times. Results are expressed in cm.^{2} of abrasive surface with which 1 cm.^{2} of leather must be brought into contact in order to wear off a layer 1 mm. thick. As the ratio of abrasive surface to leather surface exposed at a single revolution is 1:1, the coeff. of resistance is directly proportional to the no. of revolutions and inversely proportional to the thickness removed. The latter is obtained from wt. loss and density measurements. The coeff. of resistance varies with time, generally increasing after the grain layer has been worn away; curves are given for numerous leathers. Results are given for numerous kinds of sole leather and substitutes. Wear resistance of vegetable-tanned leather is increased by retannage with chrome, by previous acid swelling of the pelt, and by increasing its resistance to extn. by H_2O. The superiority of leathers tanned by the "slow" process is ascribed to their relatively low content in matter extractable by H_2O. *Hardness* is measured by the Brinell machine. H. B. MERRILL

Little trips to tanneryland. I. Wild grain. JOHN A. WILSON. *Hide and Leather* **81**, No. 7, 8(1931).—Wild grain is caused by overdevelopment of the blood-vessel system supplying the sebaceous glands. It can be minimized by proper control of all tannery operations. H. B. MERRILL

Report of the commission on qualitative analysis of tannins. O. GERNGROSS. *Collegium* **1930**, 524–32; cf. *C. A.* **25**, 230.—The aniline-HCl, cinchonine and fluorescence tests for sulfite cellulose were generally in agreement. Pine and malet to bark exts. interfere with the fluorescence test in its present form. I. D. CLARKE

Report of the commission on quantitative tannin analysis. M. BERGMANN. *Collegium* **1930**, 573–4; cf. *C. A.* **23**, 4592.—A review. I. D. CLARKE

Rapid tanning. MAX BERGMANN, WILLY MÜNZ AND LUDWIG SELIGSBERGER. *Collegium* **1930**, 520–4.—Neradol N D and α- and β-naphthalenesulfonic acid solns. pass through skin more rapidly than H_2O does; therefore they enlarge the skin capillaries. But the total H_2O of swelling and imbibition is less and so the H_2O of swelling must be less (H_2O of imbibition is greater since the capillaries are larger) in these solns than in H_2O. Agents to increase the speed of tanning may not only decrease the size of the tannin particles but may act on the hide to decrease resistance to penetration Also in *J. Intern. Soc. Leather Trades Chem.* **15**, 67–72(1931.) I. D. CLARKE

The enzymes of tanning chemistry and the structural-chemical explanation of their action. MAX BERGMANN. *Collegium* **1930**, 516–20.—Studies of some reactions of protein-building units are reviewed; these studies should aid in explaining the mechanism of those reactions of proteins which are catalyzed by enzymes. I. D. CLARKE

Filtration of tannin solutions for the determination of insolubles. A. L. C. A. Committee Report, 1930. J. S. ROGERS, *et al. J. Am. Leather Chem. Assoc.* **25**, 493–510(1930).—For the purpose of this investigation, "insolubles" are defined as substances which render the tannin soln., of analytical strength, at 18°, cloudy, turbid or opalescent by either reflected or transmitted light. Methods studied are (1) the International Method and the methods of (2) Turnbull (*C. A.* **23**, 2596), (3) Riess (*C. A.* **23**, 3369, 4592) and (4) McCandlish-Atkin (*C. A.* **23**, 3368); solid quebracho, chestnut, hemlock and "valex" exts. were used. In all cases the solns. were filtered until a clear filtrate was obtained, after which 2 successive portions were collected, pipetted, evapd. and weighed. Results (regarded as preliminary) indicate that the International Method returns too low insolubles and does not always give clear filtrates; that the other 3 methods do give clear filtrates; and that of these the Riess method is most promising from the standpoint of app. and manipulation. H. B. MERRILL

The tannin balance in the extraction of pine bark. E. BELAVSKY AND G. WANEK. *Ledertech. Rundschau* **23**, 1–4(1931).—The tannin balance for pine bark and the ext showed a gain of 8.38% if the raw and spent bark were analyzed by the International Method but only 0.39% if the method was modified to give max. results. Completeness of extn. is affected by many factors such as temp., time and the percentage which the ext. is of the raw material but the greatest loss of tannin is always in the extd. bark. I. D. CLARKE

Determination of the copper content of tanning extracts. Committee report. D. BURTON. *J. Intern. Soc. Leather Trades Chem.* **15**, 99–106(1931).—Cu in exts is even more objectionable than Fe. Cu is always estd. in the ext. ash. Of numerous procedures tested, electrolytic deposition from H_2SO_4 soln. is recommended. *Procedure.*—Dry 50 g. ext. in an oven, ash at min. temp., moisten with H_2SO_4, expel chlorides, dissolve in 10 cc. 2 *N* H_2SO_4 and dil. to 100 cc. Electrolyze overnight at 2 v. Wash with H_2O, then with EtOH (abs.), dry at 100° and weigh. H. B. MERRILL

The determination of the color of tanning extracts. G. BALDRACCO. *Boll. ufficiale staz. sper. ind. pelli mat. concianti* **8**, 100–9(1930).—The different methods are reviewed. The Pulfrich stage photometer is considered as the instrument most suited for the detn. of the color of tanning exts. G. SCHWOCH

Determination of the p_H (value) of tanning extracts. D. BURTON, *et al.* *J. Intern. Soc. Leather Trades Chem.* **14**, 597–601(1930).—The quinhydrone method is unsuitable. The bubbling H_2 method gives accurate results with exts. that are not sulfited. The glass electrode method (*C. A.* **23**, 4365) is suitable for use in all types of tannery liquors. Working directions for the 2 latter methods are given. H. B. MERRILL

Importance of the p_H of the pelt in tanning. G. PEACE. *J. Intern. Soc. Leather Trades Chem.* **15**, 22–4(1931).—It is a mistake to assume that the pelt speedily assumes the p_H value of the tan liquor in which it is placed, and to center attention on the p_H value of the liquor. Heavy hides, especially, should be brought to the optimum p_H value (which generally lies in the p_H range 5 to 3) before entering the tan liquors. This procedure makes it unnecessary to add acid to the tan liquors, permits rapid tannage and satisfactory plumping in liquors of moderate acidity, greatly simplifies control and makes for numerous operating economies. H. B. MERRILL

Determination and control of the buffer index of tan liquors. WINNIFRED B. PLEASS. *J. Intern. Soc. Leather Trades Chem.* **15**, 73–8; *Leather World* **23**, 35(1931).—The detn. of effective acidity (p_H) should be accompanied by that of reserve acidity (buffer index). The latter is defined as "the no. of cc. of *N* NaOH or HCl required to be added to 100 cc. of a tan liquor of 20° barkometer (sp. gr. = 1.020) to alter its p_H value by 1 unit." The buffer index should be estd. on a portion of the titration curve covering at least 2 p_H units, in the p_H range 2.5–5. This involves titration with NaOH for liquors of low p_H, and with HCl for liquors of high p_H; liquors of p_H value = 3.0–4.5 must be titrated with both. If the barkometer of the undiluted liquor is less than 20°, the buffer index at 20° is obtained by simple proportion. Generally speaking, a high buffer index is given by old, mellow liquors, rich in non-tannin or sol. Ca salts (such as bottom suspenders). The buffer index should decrease from the oldest liquor in a series to about the mid-point, and should be approx. const. for the remaining (fresher) liquors. Sharp differences in buffer index between successive liquors are objectionable. The buffer index increases with increasing non-tannin/tannin ratio in the tanning materials used, is increased by adding lactic acid, and decreased by adding H_2SO_4. A high buffer index results in the production of a soft, full leather; a low buffer index results in a firmer, harder leather. H. B. MERRILL

Determination of p_H value of tannery liquors. W. B. PLEASS. *Shoe & Leather Reporter* **80**, No. 12, 21(1930); *J. Am. Leather Chem. Assoc.* **26**, 111.—The glass electrode is recommended as most reliable, with the capillator second. H. B. MERRILL

The basicity concept of one-bath chrome liquors. E. STIASNY. *Collegium* **1930**, 574–7.—The basicity of the Cr salt in a one-bath Cr liquor is greater than that of the liquor as a whole because of "olation"; the complex ol. compds. react with the free acid only very slowly. It is important to know the basicity both of the liquor and of the Cr salt. The former is given by the formula $[(a-b)/b]100$ and the latter by $[(a-b+c)/a]100$, in which a is the no. of cc. of 0.1 *N* $Na_2S_2O_3$ used in the iodometric detn. of Cr (in 25 cc. of liquor), b is the no. of cc. of 0.1 *N* NaOH used in titrating the liquor as usual (to phenolphthalein) and c is the no. of cc. of 0.1 *N* NaOH used in a cold titration to p_H 3.0 with *p*-benzenesulfonic acid-azo-benzylanilide. At p_H 3 only the free acid in soln. is detd. I. D. CLARKE

Origin of ammonia found in lime liquors. R. H. MARRIOTT. *J. Intern. Soc. Leather Trades Chem.* **15**, 25–30(1931).—Collagen from oxhide and degreased oxhair was treated with satd. $Ca(OH)_2$ for periods of 8–72 days. Total N and volatile N were detd. in the used liquors. The undissolved proteins were washed and hydrolyzed by 20% HCl. Hydrolyzate was analyzed for NH_3 and total N. With collagen, the amt. of NH_3 found in the liquor agrees almost quantitatively with the observed decrease in amide N in the protein; with hair, more NH_3 is formed than can be accounted for by the decrease in amide groups; the excess is supposedly due to breakdown of cystine groups. Amide N is removed very much faster both from hair and from collagen than is non-amide N. H. B. MERRILL

Preparation and preservation of sheepskin skivers for color tests [on tanning materials]. Committee Report, 1929–30. C. A. BLAIR, *et al.* *J. Am. Leather Chem. Assoc.* **25**, 550–61(1930).—Two methods for depickling and preservation are investigated with pickled skin as the starting material: (1) The skin is suspended in 5% NaCl soln. and the acid titrated repeatedly to the neutral point, until the skin no longer swells when placed in H_2O. The skin is preserved in satd. NaCl soln. (2) Excess

borax is used and the excess neutralized with dil. AcOH. The p_H is adjusted to 4.8 with acetate buffer; the skin is preserved in phenol-boric acid soln. p_H values of solns. in equil. with skivers prepd. according to (1) are not very uniform. Method 2 is generally preferred, although the borophenol causes some darkening of the skiver on long storage. H. B. MERRILL

Treatment of tannery wastes. Condensed report to the Sanitary Water Board. TANNERY WASTES DISPOSAL COMMITTEE OF PENNSYLVANIA. *J. Am. Leather Chem. Assoc.* **26**, 70–110(1931).—Two main plans of waste treatment were developed and given long tests under full-scale operating conditions in a small vegetable leather tannery. Depending upon the degree of purification required, which in turn depends upon the type of wastes, type of stream and vol. of wastes compared to stream vol., 1, 2, 3 or all 4 of the following steps may be required: mixing and settling; primary filtering and settling; chem. coagulation; secondary filtering and settling. The above is a general scheme, believed to be applicable to any tannery. A special scheme consists in segregating and chemically pptg. certain wastes, followed by filtering and settling. Spent tan liquors and bleaches are the forms of pollution most difficult to treat, and arrangements should be made to discharge them at a uniform day-to-day rate. Sludge should be removed at regular intervals; cinder bed drying is satisfactory. Cost data and detailed drawings of the exptl. plants are given. H. B. MERRILL

Tanning shark skins. F. A. COOMBS. *Hide & Leather* **80**, No. 11, 24(1930); *J. Am. Leather Chem. Assoc.* **26**, 110.—A description. H. B. MERRILL

Nature of water solubles in leather tanned with wattle bark extract. II. R. O. PAGE AND H. C. HOLLAND. *J. Am. Leather Chem. Assoc.* **26**, 143–56(1931); cf. *C. A.* **23**, 541.—Soaked, limed and bated steer hide was tanned for 6 weeks with wattle bark ext. at p_H 4; thereafter it was tanned at p_H values of 4, 3 and 2 for periods up to 2 yrs. Analyses were made at the end of 3, 6, 26, 52 and 104 weeks, the authors' method for free and combined H_2O-sol. matter being used. At the outset, fixed tannin rises rapidly to 30 g. per 100 g. collagen, with little combination of H_2O-sol. matter; in the 2nd stage, tannin slowly increases and combined H_2O-sol. matter rises to about 30 g per 100 collagen; in the final stage (3 months to 2 yr.) fixed tannin continues to rise, approaching a max. of 60 parts per 100 collagen, while combined H_2O-sol. matter remains stationary. The p_H value in the 2nd and final stages is without effect on combined H_2O-sol. matter; fixed tannin increases slightly with decreasing p_H value in the range studied. In expts. with hide powder, with different ratios of wattle ext. solids to collagen, the ratio, fixed tannin: combined H_2O-sol. matter, declines steadily with increasing ratio of ext. to collagen; the percentage of the total ext. solids removed from the soln. is nearly independent of the ratio of the ext. to collagen, decreasing slightly in the more concd. solns., which show the presence of tannin by the gelatin-salt test after tanning is complete; for the more dil. solns., the % of the total ext. solids thus removed as fixed tannin and combined H_2O-sol. matter is very nearly the % of tannin in the ext. according to the A. L. C. A. Method. These results are explainable on the assumption that collagen combines with tannin to form a compd. highly resistant to washing (fixed tannin), then with more tannin to form a compd. less resistant to washing (combined H_2O-sol. matter). The fixed tannin and combined H_2O-sol. matter are thus the same substances differently combined. The A. L. C. A. Method for detg tannin is approx. correct; that of Wilson and Kern is in error. The effect of the p_H value was studied at 15° and 35° for 6-weeks' tannage. At 15° both fixed tannin and combined H_2O-sol. matter are at a min. at $p_H = 5$; at 35° this min. vanishes, and fixation decreases from $p_H = 3$ to $p_H = 8$. Fixed tannin is much greater, and combined H_2O-sol. matter somewhat less at 35° than at 15°. By treatment with dil. H_2SO_4 at temps. from 35° to 60°, most of the combined H_2O-sol. matter is fixed as tannin. When a leather so treated is retanned, fixed tannin does not increase but combined H_2O-sol. matter reassumes its former value (before the heat-acid treatment). The change of state of combination is ascribed to changes in the collagen and not in the material fixed originally as combined H_2O-sol. matter. The recurrence of the factor 30 in the ratios of fixed tannin and (or) combined H_2O-sol. matter to collagen suggests that the combining ratio of wattle tannin to collagen is 100:30, giving a combining wt. of 225 (if collagen is 750) for wattle tannin. Conclusion: Combined H_2O-sol. matter is tannin, combined in a manner different from fixed tannin. H. B. MERRILL

Deterioration of vegetable-tanned leather in storage. R. FARADAY INNES. *Intern. Soc. Leather Trades Chem.* **14**, 624–40(1930).—Old book bindings were analyzed for H_2SO_4 (Procter-Searle method), "difference figure" (*C. A.* **23**, 4367), sol. N and grease. Comparison of backs (exposed) and sides (less exposed) showed that large amts. of SO_2 are absorbed from the atmosphere, particularly in industrial cities. Ex-

amination of books kept side by side for many years shows that leathers differ in their absorptive capacity for SO_3; the absorption may be a result rather than a cause of the rotting. All rotted bindings were very high in H_2SO_4, but not all leathers high in H_2SO_4 were rotted; an extreme case is a leather contg. 4.7% H_2SO_4 which was sound after 42 yr. Sol. N is proportional to H_2SO_4, and like it is not directly related to deterioration. It is thought that the kind of tanning material dets. whether or not a large H_2SO_4 content is harmful. Other factors may be: phys. condition of fibers resulting from pre-tanyard operations; lack of grease; overtannage. It is advised that bookbinding leathers be tanned with oak bark or sumac only, and that H_2SO_4 be not used after tannage is complete. The use of H_2SO_4 for deliming and pickling has no ill effect. H. B. MERRILL

The action of pickles of different compositions. II. Acid absorption and swelling of collagen in sulfuric acid and formic acid pickles. A. KÜNTZEL AND W. PREISENTANZ. *Collegium* **1930**, 577–93; cf. *C. A.* **24**, 4654.—A H_2SO_4 pickle, whether it contains NaCl or Na_2SO_4, behaves like a HCl pickle. The absorption values for H_2SO_4 are the same as those for HCl; the calcns. given previously for HCl apply to absorbed H_2SO_4 in H_2SO_4-Na_2SO_4 pickles without reservation but for H_2SO_4-NaCl pickles the NaCl influences the absorption of H_2SO_4 so that a correction (max. absorption is 0.6 instead of 0.7 equivs.) must be applied. The swelling weights of collagen are analogous to those in HCl-NaCl pickles; the abs. values, however, become smaller as Cl^- is replaced by SO_4^{--} (swelling in HCl-NaCl > in H_2SO_4-NaCl > in H_2SO_4-Na_2SO_4 pickles). Systems contg. weak org. acids are entirely different; the rising portion of the absorption curve is not linear and the absorption of acid is either greatly decreased (lactic) or greatly increased (acetic, formic) by the salt content of the pickle. The pickling or de-swelling actions of NaCl and Na formate on formic acid are exactly the same although the former has no, and the latter a great, influence on the p_H. These results disprove Procter's theory that all pickles contg. NaCl, regardless of the kind of acid, behave like HCl pickles. They also disprove the theory that the swelling action of weak org. acids can be repressed by buffering. Salts repress swelling because of their pickling action and regardless of whether they have a buffering action or not. I. D. CLARKE

Report of the oil and fat commission. M. AUERBACH. *Collegium* **1930**, 532–4.—A brief discussion of general methods. I. D. CLARKE

Dyestuffs and leather. W. E. NORTON. *Leather Trades Rev.* **63**, 640, 739(1930); *J. Am Leather Chem. Assoc.* **26**, 51.—Uneven coloring on Cr leather is ascribed (1) to uneven acid distribution in leather due to prolonged "horsing" before coloring and (2) to the presence in the dye mixt. of dyes that penetrate and fix at different rates. Over-mordanting increases rubbing of the color. Sufficient penetration must be secured so that the leather does not appear lighter in shade when it is stretched. Penetration is secured by using acid dyes, adding acid to the dye bath and slow drying of the dyed leather. Basic and direct dyes should be used for topping off—not for bottoming, and they should never be used in a bath with acid dyes. Practical working directions are given for various types of leather and special color effects. H. B. M.

Osage orange and yellow wood extract. G. DESMURS. *Leather World* **22**, 201 (1930); *J. Am. Leather Chem. Assoc.* **26**, 116.—Formulas are given for using yellow or Cuba wood ext. in dyeing Cr leather The following test is used for differentiating osage orange from wood: Measure 10 cc. of 0.4% ext. into a test tube, and add 2.0 cc. of a 1.0% U nitrate soln. Colors produced are: osage orange, a full orange-red; Cuba wood, yellow-orange. Other tests are given. H. B. MERRILL

Technical preparation of glue and gelatin. D. GURIAN *Kolloid-Z.* **54**, 239–43 (1931); cf. *C. A.* **25**, 1408.—A review of German patents. A. FLEISCHER

Influence of pancreatin on collagen in the absence of neutral salts and buffer mixtures (KÜNTZEL, DIETSCHE) **11A.** Tests on artificial leather (HESSE) **26.** Glass electrode and vacuum-tube potentiometer [in tannery analyses] (CAMERON) **1.** Treating fibrous materials with rubber, etc. [for making artificial leathers] (Brit. pat. 337,359) **25.** Protein products resembling horn (Brit. pat. 338,015) **25.** Apparatus for continuous filtration and dehydration of pulp for artificial leather manufacture (Brit. pat. 337,346) **23.**

Dressing leather. OTTO L. STEVEN. Ger. 514,723, July 23, 1927. See U. S. 1,750,732 (*C. A.* **24**, 2635).

Leather. HERMANN BOLLMANN and BRUNO REWALD. Ger. 517,353, Dec. 8, 1927, and 517,354, Feb. 24, 1928. A substitute for yolk of egg in the manuf. of glacé leather comprises an aq. soln. of an aromatic or aliphatic sulfonic acid or sulfonate and a phos-

phatide of vegetable or animal origin, with or without a vegetable albumin, *e. g.*, soybean albumin. An example is given (517,353). Alternatively there may be used an emulsion of vegetable or animal albumins and phosphatides prepd. by dissolving the albumins in water contg. a small quantity of alkali and then adding the phosphatides, which may be first dissolved in a fatty oil (517,354).

Leather. CARL H. TRÖGER, JR. Ger. 517,102, July 26, 1928. Vegetable-tanned leather is treated, before drying, with a bleaching bath to which substances promoting fermentation, *e. g.*, yeast, have been added. In this way the time required for drying is considerably reduced.

Tanning. W. SAILER. Brit. 337,377, April 30, 1929. Hides are treated with a liquor prepd. by treating sulfite cellulose lyes with oxidizing compds. such as perborates or persulfates followed by treatment, about 2 hrs. later, with Cl or Br. Pelts may be preliminarily treated with the liquor and then depilated. Cf. *C. A.* **25**, 2019.

Rotary-drum apparatus for tanning skins. E. G. WILSON. Brit. 337,408, July 22, 1929. Structural features.

Tanning agents. I. G. FARBENIND. A.-G (Ludwig Teichmann and Hermann Noerr, inventors). Ger. 517,446, Jan. 3, 1929. See Fr. 687,411 (*C. A.* **25**, 839).

Tanning agents. J. R. GEIGY AKT.-GES. Swiss 141,788 and 141,789, July 30, 1928. Addns. to 138,884 (*C. A.* **25**, 839). A weakly acid, powerful gelatin-depositing tanning agent is obtained by the reaction on Ω-chloromethylenesalicylic acid in dil AcOH suspension with Na naphthalene-β-sulfonate or Na *o*-cresol-*p*-sulfonate. Cf *C. A.* **25**, 839.

Tanning hides. O. RÖHM. Brit. 337,524, Dec. 6, 1928. A substitute for egg yolk suitable for use in the manuf. of glacé leather consists of an oil emulsion and one or more esters formed from di- or poly-hydric alcs. and H_3PO_4. These constituents may be used in a tanning liquor together with meal, alum and NaCl.

Tanning skins. J. R. GEIGY A.-G. Ger. 514,874, July 7, 1925. The depilated skins are treated with mineral acid and neutral or basic Cr, Al or Fe salts. They are then treated, in the same bath or in a separate soln., with neutral synthetic tanning material, the soly. of which, in water, depends on the presence of the HSO_3 group. Sulfite cellulose lye may be also used for further steeping of the skins. In an example, the skin is pretreated with Cr alum and tanned with the condensation product of CH_2O and cresolsulfonic acid. Other examples are given.

Moistening and "wetting out" leather and hides. FRIEDRICH POSPIECH (to Chemische Fabrik Pott & Co.). U. S. 1,794,920, March 3. Thorough moistening is effected with an aq. soln. contg. sulfonic acids of a compd. obtained by condensing naphthalene or a ring substitution product of naphthalene such as naphthalenesulfonic acids in the presence of condensing and oxidizing agents such as H_2SO_4 with an alc of the aliphatic series contg. over 2 C atoms such as Pr or Bu alcs., cyclohexanol, etc

Glue. BENNO NORDON. Ger. 517,098, Dec. 30, 1928. Glue liquid in the cold is prepd. by treating animal glue with $HClO_4$. Thus animal glue 10 dissolved as usual in water 15 may be stirred with 20% $HClO_4$ 3 parts.

Glue and gelatin. HERMANN STREIDL. Ger. 514,721, Feb. 7, 1928. App. for molding is described.

30—RUBBER AND ALLIED SUBSTANCES

C. C. DAVIS

The preparation of plantation rubber. G. MARTIN. *Bull. Imp. Inst.* **28**, 440–50 (1930).—A description is given of the methods of prepn. of plantation rubber used in Ceylon, Malaya and Java, with tables to show the differences in detail between the procedures followed in the 3 countries. Also in *Trop. Agr.* (Ceylon) **76**, 18–26(1931). A PAPINEAU-COUTURE

Liquid rubber compounding. WEBSTER NORRIS. *India Rubber World* **83**, No. 5, 53–5, 64(1931).—An illustrated description of recent developments in the preservation, diln., stabilization and neutralization of latex, mixing operations, typical compds. and industrial applications. C. C. DAVIS

Action of nitrogen oxide on rubber. ADOLF GORGAS. *Ber.* **63B**, 2700–5(1930).—Various observers have reported the formation of definite products by the action of NO_2 on rubber (Weber, $C_{10}H_{16}N_2O_4$; Emden, $C_{10}H_{16}N_2O_6$; Harries, Alexander, products of more complex compn.). These workers paid no particular attention to the purity of the NO_2. The best results were obtained with the gaseous decompn. prod-

ucts of $Pb(NO_3)_2$; Emden used the product obtained from HNO_3 and starch. G., on the other hand, carefully purified his NO_2, which was prepd. from HCHO and concd. HNO_3. The resulting mixt. of N_2O_3 and N_2O_4 was liquefied in a freezing mixt., completely converted into N_2O_4 with air, frozen, repeatedly crystd. and fractionated by distn. For the reaction with rubber the N_2O_4 was used in CCl_4 soln. satd. at room temp. Total rubber, prepd. from "Revertex" according to Pummerer and Pahl by treatment with alkali at 50° and subsequent dialysis, was used in 1% soln. in CCl_4. This rubber, as has been described elsewhere (*C. A.* **23**, 1525), gave by the modified Hanus method I nos. agreeing well with the calcd. values, and the sol and gel rubbers prepd. from this total rubber also gave normal I values (1 mol. I per C_5H_8 group). Contrary to Pummerer and Mann, G. found for the gel rubber with BrI an I no. about 10% too low instead of too high. By the Kaufmann $(SCN)_2$ method, the 2 rubbers showed no appreciable difference. The nitrosation was effected by adding the rubber soln. to 5 parts of the N_2O_4 soln. at 0° and letting the mixt. stand 15 min. in 1 series of expts. and 24 hrs. in another. The compn. of the resulting products did not correspond to any of the formulas given by earlier workers, even after pptn. from Me_2CO with Et_2O, and the expts. showed decisively that abs. pure NO_2 does not form homogeneous products with purified rubber. As already pointed out by Alexander, the addn. of NO_2 is accompanied to a considerable extent by oxidation. The addn. reaction apparently does not give NO_2 derivs.; at least, G. has thus far been unable to effect a reduction to NH_2 derivs., but he did observe that when the product of the 24-hr. treatment with NO_2 is heated with concd. alkali, about 1/7 of the N is split off as NH_3, which makes it probable that the N is present as an NOH group (probably as an isonitroso ketone). In view of the strongly oxidizing action of NO_2, expts. were made with NO. As it reacts much more slowly than NO_2, the well-purified NO was passed for 4 hrs. through a very dil. soln. of rubber in CCl_4 at 20°. The product was non-pulverizable, and had a compn. (about $C_{15}H_{19}N_2O_{10}$), indicating that oxidation to a marked degree accompanied the addn. reaction. The product was also no more homogeneous or const. in compn. than that obtained with NO_2, and gave NH_3 with hot concd. alkali. With HNO_3 it is possible to keep the 2 reactions sep. Dil. HNO_3 and rubber give a N-contg. product which, however, is partially insol. in Me_2CO, and this insol. portion is N-free while the N in the sol. portion is split off as NH_3 by boiling alkalies. The formation of the N-contg. product can be prevented by complete removal with urea of the HNO_2 which is formed. The yellow pulverizable product is sol. in $PhNO_2$, $PhNH_2$ and dil. alkalies. G. hopes soon to be able to report its compn., mol. wt., etc. C. A. R.

The rubber era. T. L. Garner. *India Rubber J.* **80**, 643-8(1930).—An illustrated description is given of modern technical applications of rubber. C. C. Davis

The trend of American rubber development research. Arnold S. Smith. *India Rubber J.* **80**, 664–7(1931).—An English version (slightly abbreviated) of *C. A.* **24**, 4954. C. C. Davis

Industrial uses of rubber. H. E. Fritz. *Paper Mill* **54**, No. 3, 14, 16–7(1931).—An outline of the widening applications of rubber rendered possible by the discovery of the Vulcalock process of bonding rubber to metal, which permits of utilizing to better advantage the corrosion-resisting and abrasion-resisting qualities of rubber. A. P.-C.

Preparation of sheet rubber. R. O. Bishop. *Malayan Agr. J.* **19**, 14–21(1931).—A discussion is given of present-day methods for the collection and handling of latex, its coagulation, handling of the coagulated rubber and drying and packing of the rubber. C. C. Davis

Toxic substances in the rubber industry. XIX. Sulfur and its derivatives. P. A. Davis. *Rubber Age* (N. Y.) **28**, 513-4(1931); cf. *C. A.* **25**, 1117.—With proper ventilation, choice of individuals and cleanliness, no trouble is likely with S. Fifteen yrs.' experience showed no serious cases of conjunctivitis, dermatitis, etc., from exposure to S. C. C. Davis

Technical note on the use of certain solvents in solutions. H. Coulangeon. *Caoutchouc & gutta-percha* **27**, 15274-6(1930).—When a film of cement dries, the evapn. of the solvent causes a lowering of the temp., which may be great enough to reach the dew point and thus cause moisture deposit on the rubber. This results in poor adhesion when the surfaces are united. Since the lowering of the temp. varies with the solvent, it is possible to avoid this condensation of moisture by the proper choice of solvent for the conditions. Data were obtained on the lowering of temp. (wet bulb) of cements of the same viscosity made with solvent naphtha, toluene, aviation gasoline and benzene, resp., with the atm. at different temps. (10–30°) and humidities. By plotting the results graphically, the resulting chart shows under what conditions of temp. and humidity cements made with the various solvents can be used successfully without re-

course to warming, and under what conditions and to what extent warming is necessary.
C. C. DAVIS

Paragutta, a new insulating material for submarine cables. A. R. KEMP. *J. Franklin Inst.* **211**, 37–57(1931).—Gutta-percha and balata have proved themselves eminently suitable for insulating long deep-sea telegraph cables, but their dielec. losses are too high to meet the requirements of submarine telephone cables for long distances or for shorter cables with carrier currents. Accordingly an extensive investigation was made of the causes of elec. defects of submarine insulation, including a search for an improved material. One result was the development of a new material called *paragutta*, and the present paper describes its properties and tests for detg. its utility. Paragutta consists essentially of the purified balata or gutta-percha hydrocarbons, with a small proportion of waxes. In developing this mixt., it was necessary first to purify the rubber, especially to remove proteins, in order to increase its elec. stability on prolonged immersion in water. Rubber from which water-sol. substances have been removed absorbs no more water than does gutta-percha (cf. Williams and K., *C. A.* **21**, 1372, Lowry and Kohman, *C. A.* **21**, 1372; Boggs and Blake, *C. A.* **20**, 2092), but when immersed in water it fails completely as an insulator. To explain this elec. instability, rubber hydrocarbon freed of proteins, resins and other impurities was prepd. and tested. The product absorbed very little water, and on prolonged immersion in water it showed practically no change in elec. properties. Many expts. showed that the only practical method for removing proteins from rubber is to heat the rubber in an autoclave in water alone, which hydrolyzes the proteins to water-sol. products. Subsequent washing removes nearly all N. Sheet rubber or latex can be used for prepg. N-free rubber in this way. Thus ammoniated latex is diluted by addn. of 4 vols. of water, heated 10 hrs at 150° in an autoclave, cooled, coagulated with AcOH, washed thoroughly and dried The N content is then under 0.1%. When vulcanized, this deproteinized rubber is superior to ordinary rubber in its elec. stability in water. The deproteinized rubber is also more easily plasticized and mixed with gutta-percha than is ordinary rubber Paragutta is prepd. by blending deproteinized rubber with purified gutta-percha hydrocarbon, with the optional addn. of special hydrocarbons or montan wax. The proportions of the 3 components may be varied to suit the conditions. Thermoplastic insulators thus prepd. are almost like gutta-percha in mech. and elec. properties in water, and they are cheaper. Data show tensile, compression, flexibility, plasticity, brittleness, water absorption and elec. tests of paragutta in comparison with gutta percha. These data prove conclusively that paragutta behaves in almost the same way as gutta-percha in all these respects. It has the desirable thermoplastic and mech. properties of gutta-percha, and its superior insulating properties render it particularly adapted for transoceanic telephone cables. Paragutta is also of advantage for shorter deep-sea carrier telephone cables and for ocean telegraph lines. C. C. DAVIS

Reconditioning air bags by burning. CHARLES E. MAYNARD. *Chem. Met. Eng.* **38**, 91; *Rubber Age* (N. Y.) **28**, 565(1931).—A new machine is described for reconditioning air bags used in the vulcanization of rubber tires. It removes the hardened surface layer of used bags by burning and scraping, thus leaving a smooth surface and thoroughly reconditioning in one operation. C. C. DAVIS

Accelerators of vulcanization. Mercaptobenzothiazole. F. JACOBS. *Caoutchouc & gutta-percha* **28**, 15350–4(1931); cf. *C. A.* **25**, 1118.—The prepn. and properties of mercaptobenzothiazole are described, including its behavior and utility in rubber mixts **Mercaptides.** *Ibid* 15394–6.—By mercaptides are meant combinations of mercaptobenzothiazole with other accelerators having basic properties, *e. g.*, with hexamethylenetetramine, diphenylguanidine, di-*o*-tolylguanidine and ethylideneaniline. The behavior of some of these com. substances as accelerators is described, with examples to show their utility. C. C. DAVIS

Oxidation of vulcanized rubber mixtures extracted with acetone. T. YAMAZAKI AND K. OKUYAMA. *Caoutchouc & gutta-percha* **28**, 15359–60(1931).—See *C. A.* **24**, 4664. C. C. DAVIS

Activated carbons (SIMONIN) **18.** Modifying the properties of resins [for rubber-substitute manufacture] (Brit. pat. 337,733) **26.** Modifying isocolloids for rubber substitute manufacture (Brit. pat. 337,732) **26.** Improving elasticity of knitted artificial silk fabrics [for waist-bands, garters, etc.] (Brit. pat. 337,400) **25.** Waterproof coatings (Swiss pat. 142,172) **18.** Rubber-coated fabric (U. S. pat. 1,795,199) **25.** Means for heating or intensively cooling hollow rolls or drums for working rubber (Ger. pat. 517,361) **1.** Rubber-surfaced paving blocks (U. S. pat. 1,794,220) **20.** Solvents for

rubber (Ger. pat. 517,097) **13.** Treating fibrous materials with rubber, etc. [for making tire fabrics] (Brit. pat. 337,359) **25.**

Rubber. I. G. FARBENIND. A.-G. (Julius Eisele and Johannes Stöhrel, inventors). Ger. 517,490, Sept. 13, 1927. Rubber latex is rapidly mixed with sufficient acid to establish a hydrion concn. greater than p_H 2, preferably greater than p_H 1, and a compd. reducing the surface tensions is then added, *e. g.*, Na β-naphthalenesulfonate or Turkey-red oil. The mixt. sets to an irreversible gel with sepn. of a small quantity of clear serum. Vulcanizing agents, accelerators or fillers may be added before or after the formation of the gel. Examples are given. Cf. *C. A.* **25**, 1706.

Rubber. SOCIETÀ ITALIANA PIRELLI. Ger. 517,208, Oct. 12, 1926. The aging properties of rubber are improved by addn. of about 5% of the evapn. residue of latex serum from which quebrachitol has been removed, *e. g.*, by crystn. Albumins may also be removed from the serum to be evapd., *e. g.*, by pptn. with tannic acid.

Rubber deposition. IMPERIAL CHEMICAL INDUSTRIES, LTD., and R. B. F. F. CLARKE. Brit. 337,946, Oct. 21, 1929. A hollow gas-permeable vessel, filled with CO_2 under pressure, is immersed in latex, and rubber is deposited on it as the CO_2 diffuses through the walls of the vessel and effects coagulation of the rubber deposit. Material to be impregnated may be wrapped around the vessel, and the vessel may be shaped to produce sheets or articles of other desired form.

Rubber composition. ELLWOOD B. SPEAR and ROBERT L. MOORE (to Thermatomic Carbon Co.). U. S. 1,794,558, March 3. A C black of the kind designated as "P-33" is used in making a rubber compn. having an ultimate tensile strength approx. the same as a similar rubber compn. contg. an equal wt. of "common com. C black" but having a stiffness materially less than such a rubber compn. An app. is described suitable for making the C from hydrocarbon gas. Cf. *C. A.* **24**, 212.

Rubber compositions. E. O COWPER. Brit. 338,247, June 5, 1929. Compns. suitable for covering athletic grounds, for use as *expansion joints, wall and roof coverings*, machinery beds, etc., are formed of latex from which the serum constituents have not been removed, mixed with waste rubber, rubber scrap, old tire stock or the like and with breeze, ashes, clinker, brick dust, baked clay, slate dust or the like; vulcanizing materials, pigments and bituminous or portland cement, etc., may also be added, as may also fibrous fillers. The material may be placed on a backing such as cloth or paper coated with bituminous material. Various details and examples are given.

Rubber composition suitable for tire treads, shoe soles, etc. ARTHUR B. COWDERY and THEODORE A. BULIFANI (to Barrett Co.). U. S. 1,793,161, Feb. 17. There is incorporated in a rubber mixt. a coal tar substantially free from cryst. material at 25°, having a sp. gr. above 1.06 at 38° and b. above 200°. Cf. *C. A.* **24**, 1545.

Coloring rubber. I. G. FARBENIND. A.-G. (Rudolf Krech, inventor). Ger. 517,450, Sept. 5, 1926. Rubber is mixed with an insol. metal salt of Patent Blue A, which may be deposited on a substrate. The colors obtained are fast to vulcanization. Examples are given.

Coloring rubber. DUNLOP RUBBER CO., LTD., D. F. TWISS, E. A. MURPHY and R. G. JAMES. Brit. 338,303, Oct. 11, 1929. Rubber articles obtained from aq. dispersions by dipping, spreading, painting, extruding, spraying, electrophoresis impregnating or molding are colored, locally or generally, after formation, by reaction between successively added substances which together form a desired coloring substance and one of which if desired may be added to the initial dispersion, *e. g.*, β-naphthol may be initially added and subsequently combined with a diazo soln., or the formed article may be dipped in indigo white soln. and subsequently oxidized, or an article formed by use of acid may be dipped in an alk. sulfide soln. of a S dye.

Preserving rubber. MARION C. REED (to B. F. Goodrich Co.). U. S. 1,793,635, Feb. 24. *Asym*-diphenyl- or other diaryl-hydrazine (suitably in the proportion of about 0.1–5.0%) is added to rubber compns. as a preservative.

Rubber dispersions, etc. DOUGLAS F. TWISS and EDWARD A. MURPHY (to Dunlop Rubber Co., Ltd.). U. S. 1,793,265, Feb. 17. For the production of substantially reversible compns. of pasty consistency from aq. dispersions contg. rubber or similar materials and a protective colloid, the dispersions are evapd. in the presence of one or more substances such as glycerol, glycol or a glycol alkyl ether, having as their principal function to serve in place of water as a medium in which the protective colloids, both naturally occurring and artificially incorporated, will continue to function when the water in the dispersions is substantially removed.

Making thin rubber bathing caps. MELVIN S. LOWER (to Sun Rubber Co.). U. S.

1,794,192, Feb. 24. App. and various details (mainly of mech. character) are described.

Rubber footwear. JAMES B. CROCKETT (to Cambridge Rubber Co.). U. S. 1,795,075, March 3. A last is dipped into an aq. rubber-contg. material contg. a coloring agent to form a deposited coating on the last, and the coated last is then dipped in an aq. rubber compn. of different coloring and the sole portion of the article is selectively dipped in an aq. rubber compn. contg. fillers for increasing the resistance of the sole to wear.

Molded rubber footwear. H. C. L. DUNKER. Brit. 337,831, Aug. 9, 1929. Articles such as galoshes or "seaside shoes" are formed by molding over a prevulcanized lining drawn onto the last and there covered with unvulcanized rubber to be molded.

Rubber battery boxes, etc. J. FERGUSON & SONS, LTD., and J. E. FERGUSON. Brit. 338,114, July 10, 1929. Boxes are formed in such a way that the sides are harder than the base (as by subjecting the sides to a higher heat than the base in the vulcanization); they may be made of raw rubber or of waste rubber from old tires, mixed with S, ZnO, an accelerator such as diphenylguanidine and a lubricant such as paraffin. Various details of manuf. are given.

Rubber cement. THEODORE WHITTELSEY. U. S. 1,793,983, Feb. 24. Rubber latex is used with a solvent such as C_6H_6 and a small quantity of an emulsifying agent such as Na oleate, which facilitates diln. of the cement with water.

Synthetic rubber. I. G. FARBENIND. A.-G. Brit. 337,460, Aug. 2, 1929. Alkali metal such as Na used in effecting polymerization of diolefins is enclosed in a small perforated container (which may be formed of glass or metal) placed within the reaction vessel. When the small perforated container becomes filled with polymerizate the latter with some assocd. alkali metal is forced out into the main reaction vessel to promote further polymerization of its contents. The process may be carried out in 2 stages and a diluent such as diethylene dioxide may be used.

Synthetic rubber. I. G. FARBENIND. A.-G. Brit. 338,152, May 14, 1929. Polymerization of diolefins such as butadiene is effected with at least 30% of an inorg. O-contg. acid or an org. deriv. of such an acid (without addn. of any other substance influencing the reaction). Among the substances which may be used are: H_2SO_4, H_3PO_4, benzenesulfonic acid, toluenesulfonic acid, *p*-toluene sulfonylchloride and benzene sulfonylchloride. Products of varying character are obtained by varying the conditions of the reaction, and they may be suitable for adhesives, as *addns. to paints or lacquers, manuf. of threads, films,* molded articles, etc. Several examples with details of procedure are given.

Rubber-like product. JEAN BAER. Swiss 142,456, Jan. 8, 1929. A rubber-like mass is obtained by treating an isoprene halide with alkali or alk. earth polysulfides. In the example, isoprene dibromide is treated with K_2S_x. Cf. *C. A.* **24**, 1545.

Factice. JEAN BAER. Swiss 142,354, to 142,357, June 19, 1928. Addns. to 137,477 (*C. A.* **24**, 4426). Factice sol. in hydrocarbons is prepd. by heating the rubber-like mass from CH_2Cl_2 and a polysulfide soln. with an oil such as rapeseed oil. The CH_2Cl_2 may be replaced by $C_2H_4Br_2$, CH_2Br_2 or CH_2O.

Rubber vulcanization accelerators. ALBERT M. CLIFFORD (to Goodyear Tire & Rubber Co.). U. S. 1,792,819, Feb. 17. As an accelerator, there is used the reaction product of cyclohexylamine and an aldehyde such as aldol, butyraldehyde, crotonaldehyde, heptaldehyde or formaldehyde.

Rubber vulcanization accelerators. LORIN B. SEBRELL and DEXTER N. SHAW (to Goodyear Tire & Rubber Co.). U. S. 1,792,770, Feb. 17. *o*-Tolylamidoxime or other compds. of the general formula $RC(:NOH)NH_2$, in which R represents a benzene group, are used as accelerators.

Rubber vulcanization accelerators. JAN TEPPEMA (to Goodyear Tire & Rubber Co.). U. S. 1,792,780, Feb. 17. Vulcanization with S is effected in the presence of the reaction product of mercaptobenzoxazole and a basic amine such as diphenylguanidine. Cf. *C. A.* **24**, 3135.

Apparatus for vulcanizing lengths or sheets of rubber or rubberized material. HARRY WILLSHAW and WALTER G. GORHAM (to Dunlop Rubber Co., Ltd.). U. S. 1,793,269, Feb. 17. Structural features.

CHEMICAL ABSTRACTS

Vol. 25. **MAY 20, 1931** **No. 10**

1—APPARATUS AND PLANT EQUIPMENT

W. L. BADGER

Modern laboratory furniture. CARL G. SCHWALBE. *Chem. Fabrik* **1931**, 111–3.—Improvements in floor and wall coverings, desks, showcases, downward ventilation and waste-water sedimentation are described. J H. MOORE

Simple laboratory autoclave. HAROLD A. CASSAR. *Ind. Eng Chem., Anal. Ed.* **3**, 197–8(1931).—Details are given for making a small app. at a cost of about $20. J. H. MOORE

The removal of traces of oxygen from nitrogen. E. C. KENDALL. *Science* **73**, 394–7(1931). —See *C. A.* **24**, 4428. G. G.

New heating chamber for micro carbon-hydrogen determinations by the method of Pregl. A. VERDINO. *Mikrochemie* **3**, 123–5(1931).—Some difficulty has been encountered with respect to the heating of the PbO_2 to the necessary temp. in the combustion train. The vessel described in this paper consists of a chamber 65 mm. in length and 30 mm. in outside diam. with an opening for the insertion of the combustion tube and 2 other openings for the Cu pieces which serve to heat the capillary restrictions of the $CaCl_2$ tube. The heating chamber is filled with decalin (decahydronaphthalene) b. 190°. A vertical metal tube serves as air cooler for the vapors with an outside mantle of glass into which the condensed liquid overflows when the chamber is heated too strongly. The chamber is heated electrically. W. T. H.

A micro-manometer with convenient reading. A. BETZ. *Messtech.* **7**, 37–9 (1931).—The app. was designed for measuring changes in pressure up to about 200 kg. per sq. m. with a sensitivity of 0.05–0.1 kg. per sq. m. A vertical glass scale is attached to a float in water in a closed vessel so constructed that changes in the water level are increased 9-fold in the tube contg. the float. The scale readings, magnified 20-fold, are projected on a screen. J. H. MOORE

Apparatus for determining coefficients of conductivity of insulating slabs. C. CODEGONE. *Industria* (Milan) **44**, No. 15, 401–3(1930). E. I. S.

Control of the ocular scale of Abbé's butyrorefractometer. K. SZÁHLENDER. *Magyar Gyógyszerészlud. Társaság Értesitoje* **7**, 135–8(1931).—The correction table of D. A. B. 6 cannot be used for controlling and correcting the scale, since the controlling liquid (paraffin) should not be older than 6 months. New correction data should be obtained from the factory when new controlling liquid is bought. Data for freshly bought normal liquid no. 29 show divergences up to 3% from the D. A. B. 6 table. S. S. DE FINÁLY

A tube voltmeter. FRIEDRICH L. HAHN. *Chem. Fabrik* **1931**, 121; cf. *C. A.* **24**, 5185.—The app. was evolved from the Goode app. (*C. A.* **19**, 3389) and resembles the Berl app. (*C. A.* **25**, 235). J. H. MOORE

Improved hydrogen-electrode cell for determination of p_H. W. B. BOLLEN. *Ind. Eng. Chem., Anal. Ed.* **3**, 203–9(1931).—The cell, constructed from usual lab. materials, is widely applicable for rapid and accurate p_H detns. Novel features are (1) a Pyrex-Alundum porous-tip calomel electrode, the porous tip being made by sintering a 100-mesh mixt. of Pyrex glass and Alundum in a glass tube, (2) an H-shaped salt bridge capable of giving sharp, reproducible liquid junctions and (3) a stirrer which centrifugally circulates through the soln. a small const. vol. of H under const. pressure. The stirrer-circulator especially adapts the H electrode to solns. contg. dissolved CO_2 or other gases entering into the H-ion equil. and enables foaming liquids to be handled easily. Satn. of the soln. with H is effected in min. time and the true H-ion equil. quickly attained. The use of voltage-time curves in estg. the true H-ion equil. in solns. where secondary reactions occur is discussed, together with the advantages of the new app. over the bubbling H electrode. Typical data given illustrate the rapidity (1–2 mins. for equilibrium), accuracy (values to within 1 mv.) and versatility of the app. EDWARD B. SANIGAR

The Stroboglow. W. ENDRES BAHLS AND D. D. KNOWLES. *Elec. J.* **28**, 250–3 (1931).—This instrument is a rugged portable stroboscope. The true behavior of the various parts of a machine having periodic motion can usually be learned only when the machine is in normal running operation. The Stroboglow is designed to permit the study of moving parts in out-of-the-way places. It is portable, self-contained, and is packed in two large-size suitcases. There are no moving parts and expert service is unnecessary. It has a broad speed range. The requisites of the ideal stroboscope are summarized as: (1) ruggedness, (2) portability, (3) simple and effective control of large currents, (4) exceedingly short duration of light pulsations; (5) very intense light pulsations, (6) minimum of moving parts, (7) simplicity of operation and (8) accuracy of timing light flashes. The Stroboglow, it is claimed, fulfils these requirements. It consists essentially of the oscillator or interrupter and the light unit. The heat of the light unit is the power grid-glow tube. The instrument is illustrated, and the oscillator circuit shown in a diagram. Various applications are indicated. W. H. BOYNTON

Color pyrometry. GERHARD NAESER. *Mitt. Kaiser-Wilhelm Inst. Eisenforsch. Düsseldorf* **12**, 299–316(1930).—An instrument has been constructed for selecting 2 widely sepd. spectral colors by means of a double prism. Light from an unknown source is then compared with light from a Pt strip by adjusting intensities on a half-shadow field. The combination of red (0.65μ) and green (0.53μ) was found to be the most sensitive combination for several different observers, the max. error amounting to 4°. The instrument could also be used as an intensity pyrometer, and the const. in Wien's formula was measured and found to be 1.4235 cm./degree in red and 1.4179 cm./degree in green. On comparison with Pt, W and oxidized Fe, it was found that the instrument registered 60° low for Pt, 20° low for W and very nearly correct on Fe. Elimination of the comparison lamp was found to be possible, but the max. error was somewhat larger. H. C. D.

Determination of color with F. Herzfeld-Hoffmann's polarization-photometer. I. B. MINTZ AND A. K. KARTASHOV. *Nauk. Zapiski z. Tzukrovoi Prom.* **10**, 257–67(1930) —The app. and its use are described. V. E. BAIKOW

Material requirements and material testing for heavy-duty chemical apparatus. ERNST FRANKE. *Chem. Fabrik* **1931**, 133–5.—A brief review of the demands placed on construction materials in regard to aging, embrittlement, durability at high temps., etc., with remarks on methods of taking test pieces and making tests for phys. properties. J. H. MOORE

The classification of wet materials. C. H. S. TUPHOLME. *Mech. World* **88**, 228 331(1930).—An outline of some of the more prominent devices for screening wet materials. E. I. S.

Chemical apparatus and their relation to the provisions of the Berufsgenossenschaft of the chemical industry and to the steam-vessel regulations. SCHEFFEL. *Chem Fabrik* **1931**, 109–11.—A discussion is given of the lack of uniformity of regulations for steam vessels in the German states, the desirability of having national regulations, the effect of new materials and specifications and the use of autogenous and elec. welding. J. H. MOORE

Simple calculations for reciprocating compressors. JOS. IMMERSCHITT. *Apparatebau* **43**, 62–5(1931).—A table of values is given to simplify the selection of the proper size of compressor for gases. An example is worked out to show how the table is to be used. M. C. ROGERS

Transfer of heat in recuperators. I. E. TERRES AND W. BESECKS. *Heat Treating and Forging* **16**, 1573–6, 1579(1930).—See *C. A.* **23**, 3378. J. BALOZIAN

Furnace-door arches and air-cooled walls. WM. C. REIFUSS. *Heat Treating and Forging* **16**, 1571–2(1930).—The construction of a double furnace (for heating for steam hammers) is briefly described, a party wall with an air passage sepg. the 2 furnaces. This method of construction conserves space and gives very satisfactory results. A method of constructing furnace-door arches with tongued and grooved radial blocks is briefly indicated. J. BALOZIAN

A precision cryostat with automatic temperature regulation. R. B. SCOTT AND F. G. BRICKWEDDE. *Bur. Standards J. Research* **6**, 401–10(1931).—A detailed description is given of the construction and operation of an app. that will, by means of a photo-elec.-cell thermo-regulator, automatically hold any desired temp. between 0 and −170° const. to 0.001°. The temp. is easily adjusted, and the degree of refrigeration is controlled by varying the gas pressure in the double-walled bath which is surrounded by a Dewar flask contg. liquid air. J. H. MOORE

Introducing alkali or alkaline earth metals or O into sealed glass vessels (Austrian

pat. 121,033) **4.** Purifying inert gases in electric-discharge tubes, etc. (Austrian pat. 121,056) **4.** Stoneware in the chemical industry (WEINREB) **19.**

APPLETON, E. V.: **The Thermionic Valve.** London: Methuen. 2s. 6d., net.

WÜNSCH, G.: **Regler für Druck und Menge.** Berlin: R. Oldenbourg. 207 pp. Bound, M. 13. Reviewed in *Eng. Progress* **12**, 96(1931).

Filter. CHRISTIAN HÜLSMEYER. Ger. 515,852, Oct. 4, 1925. A filter for mechanically and chemically purifying liquids, especially water, contains a pad of steel wool.

Leaf filter for filtering liquids. E. A. ALLIOTT and MANLOVE, ALLIOTT & Co., LTD. Brit. 338,567, Aug. 15, 1929.

Leaf filter for filtering liquids. E. A. ALLIOTT and MANLOVE, ALLIOTT & Co., LTD. Brit. 338,510, Aug. 15, 1929.

Submerged drum filter. ERNEST J. SWEETLAND (to Oliver United Filters, Inc.). U. S. 1,796,491, March 17.

Submerged continuous filter. ERNEST J. SWEETLAND, JOSEPH V. ZENTHOEFER and JOHN T. HOYT (to Oliver United Filters, Inc.). U. S. 1,796,492, March 17.

Air filter. DEUTSCHE LUFTFILTER-BAUGES. M. B. H. Ger. 518,439, Sept. 8, 1928.

Vacuum seal for continuous rotary vacuum filters. ROBERT O. BOYKIN (to Alex Mills). U. S. 1,795,634, March 10.

Pressure filter. N. A. VOSTOKOV. Russ. appl. 71,047, May 31, 1930.

Continuously working filter press. DANIEL BALLET. Fr. 695,177, Aug. 20, 1929.

Scraper for cleaning filter presses. V. I. BORISOV. Russ. appl. 69,890, May 12, 1930.

Separating dust, etc., from air, etc. PLATEN-MUNTERS REFRIGERATING SYSTEM AKTIEBOLAG. Ger. 518,087, June 19, 1927. See Brit. 292,479 (*C. A.* **23**, 1452).

Device for separating dust from air by baffling and centrifugal action. HECTOR RABEZZANA (to A C Spark Plug Co.). U. S. 1,795,888, March 10. Structural features.

Baffle-screen device for removing dust from air, etc. GLENN P. HEATH. U. S. 1,796,946, March 17. Structural features.

Centrifugal separator. AKTIEBOLAGET SEPARATOR. Brit. 339,566, March 4, 1929. In an app. for sepg. liquids from solids, a layer or stream of Hg serves for a carrier of the solids. Various details of construction and operation are described.

Gas separator suitable for separating liquid particles from steam, etc. GRANT D. BRADSHAW and RALPH N. ROBERTSON (to Blaw-Knox Co.). U. S. 1,796,435, March 17. Structural features.

Separator for oil and water, etc. DAVID SAMIRAN and PHILLIPS MELVILLE. Ger. 518,149, Jan. 1, 1929. See Brit. 322,654 (*C. A.* **24**, 2643).

Calorimeter. HERMANN SANDVOSS. Ger. 515,712, Nov. 20, 1926. Addn. to 491,954 (*C. A.* **24**, 3402).

Pyrometer (suitable for indicating the failure of a railway or other signal lamp). C. W. COOKE. Brit. 339,200, June 11, 1929. When a lamp flame is burning properly, the expansion of metal strips in the device serves to complete an indicator circuit which is broken when the flame is extinguished or becomes too low. Various details of construction are described.

Apparatus and method for reducing the temperature of air by dehydration and saturation. WALTER L. FLEISHER (to Cooling & Air Conditioning Corp.). U. S. reissue 17,998, March 10. Reissue of original pat. No. 1,749,763 (*C. A.* **24**, 2012).

Bimetallic strip thermometer suitable for ovens. THERMOSTATICS, LTD., O. MILLER and F. MILLER. Brit. 339,397, Sept. 30, 1929.

Automatic level regulator for liquid containers, etc. WM. MONCHEN. Ger. 515,677, Feb. 13, 1930.

Drying apparatus for pasty or gelatinous materials, especially pigments. FRITZ HAAS. Ger. 518,379, Aug. 3, 1929.

Cascading apparatus suitable for drying crystals, cereals, etc. REGINALD V. FARNHAM. U. S. 1,796,324, March 17. Structural details of an app. for drying with gaseous media.

Automatic control system for apparatus for drying materials by recirculated air. GEORGE B. BAILEY. U. S. 1,795,418, March 10. Structural features and details of a thermostatic control system are described.

Rotary drum for cooling or drying chemicals or raw materials. BERNHARD SÄGEBARTH. Ger. 515,834, July 28, 1927.

Tube-cleaning device for rotary-tube drying apparatus. MASCHINENFABRIK BUCKAU R. WOLF A.-G. Ger. 518,380, Dec. 6, 1929.

Means for inspecting the interior of evaporators. HANS WOLLENBERG. Ger. 518,314, Mar. 19, 1929.

Röntgen-ray apparatus. SIEMENS-REINIGER-VEIFA GES. FÜR MEDIZINISCHE TECHNIK. Brit. 339,212, March 1, 1929. Structural features.

Röntgen-ray apparatus. C. H. F. MÜLLER A.-G. Brit. 339,215, March 9, 1929. Structural features.

X-ray tubes. SENDLINGER OPTISCHE GLASWERKE G. M. B. H. (Fritz Eckert, inventor). Ger. 518,172, Aug. 14, 1923 Hot-cathode x-ray tubes are made of glass contg. up to 8% of rare earths, with or without TiO_2 and (or) V_2O_5. A suitable compn. is SiO_2 70, Al_2O_3 2, MgO 3, Na_2O 20 and Ce_2O_3 or other rare earth 5%.

Electric-discharge lamps. PATENT-TREUHAND-GES. FÜR ELEKTRISCHE GLÜHLAMPEN (to General Electric Co., Ltd.). Brit. 338,844, May 2, 1930. Some modifications of construction are described, relating to devices such as those of Brit. 315,391 (*C. A.* **24**, 1550).

Electron-emission device. JOHN W. MARDEN (to Westinghouse Lamp Co.). U. S. 1,795,730, March 10. Various structural details of sealed devices contg. alkali metal. Cf. *C. A.* **25**, 622.

Electron-emitting cathodes of discharge devices. GRAMOPHONE CO., LTD., and G. B. BAKER. Brit. 339,451, Nov. 14, 1929. A refractory core or oxide-coated filament is coated with a substance which on heating in the absence of appreciable O leaves a residue contg. the oxide of an electron-emitting metal, such as Cs tartrate or Ba tartrate, and free C. Various details of manuf. are described.

Electron-emitting cathodes for discharge tubes. GRAMOPHONE CO., LTD., W. F TEDHAM and F. ELLINGTON. Brit. 339,057, Oct. 16, 1929. Cathodes are formed with a core or layer of Al provided with an oxidized surface having on it an electron-emitting coating which may comprise Cs, Ba or other metal deposited electrolytically or otherwise on the Al (which may have been preliminarily oxidized by making it anode in a dil. chromic acid soln.). If desired the oxidized Al may be carried on a core of other material such as W or kaolin.

Rotary-hearth furnace. ERNEST G. DE CORIOLIS, JESSE R. MOSER and ARNOLD L. LARSEN (to Surface Combustion Corp.). U. S. 1,796,144, March 10.

Movable-hearth furnace with automatic dumping mechanism suitable for heat treatments. JOHN F. BAKER (to Westinghouse Elec. & Mfg. Co.). U. S. 1,795,921, March 10. Structural features.

A two-chamber furnace with movable roof. YA. A. FRANTZUZ. Russ. appl. 56,402, Oct. 15, 1929.

Continuous-chain furnace. SOC. ANON. DES APPAREILS DE MANUTENTION ET FOURSTEIN. Fr. 695,230, Aug. 30, 1929.

Refractory furnace or retort setting. SOUTH METROPOLITAN GAS CO. and W. T. SEACH. Brit. 339,268, Sept. 3, 1929.

Inclined-grate furnace. ERNST VÖLCKER. Ger. 518,429, July 15, 1928. Means for advancing the fuel is described.

Step grate for low-grade or pulverulent fuel. FRANZ HOLZINGER. Austrian 121,290, Sept. 15, 1930.

Traveling grate. HERMANN KRÖNAUER. Ger. 518,430, Oct. 27, 1929.

Oil burner (open-dish type). OTTO SCHIEDEK and BERTHOLD OSTER. Ger 518,425, Sept. 25, 1929 and 518,426, April 24, 1929.

Regenerative gas furnace. FRIEDRICH SIEMENS A.-G. Fr. 37,175, July 2, 1929 Addn. to 591,158.

Gas burner. JAY M. AXTELL. U. S. 1,796,915, March 17.

Gas burner suitable for ovens. A. H. CLUTTERBUCK and S. W. HUMPHREY Brit. 338,806, Jan. 30, 1930.

Diaphragm-controlled gas-valves for heating systems. PAUL F. SHIVERS (to Minneapolis-Honeywell Regulator Co.). U. S. 1,796,544, March 17. Structural features.

Fuel-distributing means for annular or chamber kilns. MICHAEL BOHN. Austrian 120,993, Aug. 15, 1930.

Movable feeding device for annealing ovens. A.-G. BROWN, BOVERI & CIE Ger. 518,218, Jan. 11, 1927.

Rotary-tube oven for treating cork with hot gases. NICOLO MASSA. Austrian 121,253, Sept. 15, 1930.

Pressure-operated valve-actuating means for blast heaters, etc. ZIMMERMANN & JANSEN G. M. B. H. Ger. 518,413, Dec. 17, 1929.

Air heaters. MAX & ERNST HARTMANN. Ger. 518,174, May 21, 1927. Failure of the air supply automatically operates dilg. means for the heating gases.

Air heater for drying apparatus. BRUNO WAGNER. Ger. 518,162, Jan. 20, 1928.

Heat-exchange apparatus. I. G. FARBENIND. A.-G. Brit. 338,818, Feb. 13, 1930. An app. for heat exchange between 2 fluids comprises a composite block formed of plates of good thermal cond. such as Cu or Al alternating with plates of low-heat cond. such as asbestos or mica. The fluids traverse alternate borings in the block, and the layers of low cond. reduce the heat loss in the direction of flow of the fluids.

Heat-exchange apparatus suitable for heating air by hot gases. WM. A. JONES (to Babcock & Wilcox Co.). U. S. 1,796,944, March 17. Structural features.

Heat-exchange apparatus suitable for heating air by hot gases. ISAAC HARTER (to Babcock & Wilcox Co.). U. S. 1,796,945, March 17. Structural features.

Heat-exchange apparatus suitable for drying, evaporating, melting, etc. OTTO ENGLER (to Schmidt'sche Heissdampf-G. m. b. H.). U. S. 1,796,707, March 17. Structural features.

Heat-exchange apparatus (suitable for heating water by gas burners). FRANK W. OFELDT. U. S. 1,796,662, March 17. Structural features.

Tubular heat-transfer apparatus suitable for use as an auxiliary water heater. WALTER A. DALEY (to Bell & Gossett Co.). U. S. 1,796,509, March 17. Structural features.

Electric water heater. T. DALL. Brit. 339,475, Nov. 26, 1929.

Enameled boilers and other vessels with heating or cooling coils in their walls. RICHARD SAMESREUTHER, BUTZBACH HESSEN and GEORG KRÄNZLEIN (one-half each to I. G. Farbenind. A.-G. and Samesreuther & Co. G. m. b. H.). U. S. 1,796,123, March 10. Plane or curved metal sheets which do not possess the qualities of ingot iron may be formed into heating or cooling elements by pressing a support of soft metal (skelp), as for instance, Cu, Pb or Al, between the tubes and the surface of the metal plate or wall and then welding the exposed parts of the tubes by one of the usual methods so as to unite them closely. Before carrying out the welding operation, the coils of the tubes may be pressed upon the support of soft metal by means of solid metal clamps, which on their part are firmly united with the plane or curved surface of the metal by a cam device, flanges or other auxiliary means. Advantageously, the clamps are in this case united with the tubes by welding. In this manner it is possible to prepare from iron silicide, cast iron, Al, Ag or Ni steels app., as for instance pans or boilers, which can be indirectly heated or cooled.

Apparatus for mixing added materials with flowing streams of liquid. J. A. PICKARD. Brit. 338,945, Aug. 1, 1929. Various details of construction are described of an app. suitable for supplying "filter aid" to beer passing to a filter, etc.

Receptacle and outlet valve for compressed or liquefied gases. CHARLES W. JOHNSTON (to Virginia Smelting Co.). U. S. 1,795,560, March 10.

Apparatus for saturating liquids with gases. GEORGE F. SUGDEN. Ger. 518,288, Dec. 19, 1924. See U. S. 1,561,036 (*C. A.* **20**, 2).

Bell cap for use in apparatus such as gas and liquid contact towers. WM. J. SEELAND (to Standard Oil Development Co.). U. S. 1,796,256, March 10.

Bubble tower for gas and liquid contact operations such as fractionation or absorption. CLIVE M. ALEXANDER. U. S. 1,796,135, March 10.

Apparatus for purifying gases, such as steam, carrying liquid particles. GRANT D. BRADSHAW (to Blaw-Knox Co.). U. S. 1,796,436, March 17. Structural features.

Apparatus for purifying air by spray treatments. CARL J. SCHOBRONE. U. S. 1,796,405, March 17. Structural features.

Gas purifier suitable for treating steam. HARRY E. BOYRIE (to Blaw-Knox Co.). U. S. 1,796,434, March 17. Structural features.

Gas washer. P. J. ROBINSON. Brit. 338,527, May 18, 1929. Structural features of an app. with an alloy steel shell or a shell made of flanged sections sheathed with Pb.

Measuring tube for gas-analyzing apparatus. H. DUBOVITZ. Hung. 100,695, Dec. 6, 1929. Analysis can be made more accurately by the use of measuring tubes with diminishing diameters, *e. g.*, conical forms.

Apparatus for estimating gas concentrations. SIEMENS & HALSKE A.-G. (Heinz Grüss, inventor). Ger. 517,112, Jan. 13, 1929. Addn. to 501,514 (*C. A.* **24**, 4876). The method depends on variation of the elec. cond. and is specially applicable to CO_2.

Surface condenser. FRANCOIS X. J. A. DELAS. U. S. 1,796,510, March 17.

Condenser suitable for use with steam. JOHN F. GRACE (to Worthington Pump and Machinery Corp.). U. S. 1,796,708, March 17. Structural features.

Catalytic apparatus. COMPAGNIE INTERNATIONALE POUR LA FABRICATION DES

ESSENCES ET PÉTROLES. Fr. 37,265, Mar. 16, 1929. Addn. to 673,683 (*C. A.* **24**, 2514–5). In the treatment of gases and vapors with purifying or catalytic agents a vessel of annular cross section is used having the catalytic or purifying material between 2 false bottoms, the spaces between the false bottoms and the bottoms serving, resp., as admission chamber for the gases to be treated and exit chamber for the treated gases. Cf. *C. A.* **25**, 1125.

Apparatus for carrying out physical and chemical reactions. I. G. FARBENIND A.-G. (Hans Bähr, inventor). Ger. 514,500, Sept. 10, 1929. Addn. to 503,993 (*C. A.* **24**, 5541). The chains mentioned in Ger. 503,993 for circulating the reacting substances pass through tubes of various lengths.

Apparatus for testing gases or liquids by thermal conductivity measurements. CHARLES ENGELHARD, INC. Ger. 518,177, Oct. 18, 1927. See Brit. 288,908 (*C. A.* **23**, 551).

Apparatus for converting concentrated solutions into granulated solids. I. G. FARBENIND. A.-G. Fr. 37,354, Aug. 19, 1929. Addn. to 673,135 (*C. A.* **24**, 2340). The app. consists of a rotating plate beneath a circular distributor provided with notches so as to form a circular opening between the two.

Apparatus for the distillation of solids and liquids. HENRY DUPUY. Fr. 37,244, July 23, 1929. Addn. to 552,349.

Filling for reaction and washing towers, etc. ERNST BERL. U. S. 1,796,501, March 17. A filling device is formed from a circular blank of any suitable material, folded in a crosswise reversed manner to resemble a riding saddle, the height and breadth being substantially equal.

Apparatus for liquefying chlorine by compression. KREBS & CO. G. M. B. H. (Wilhelm Lehmann, inventor). Ger. 515,929, Oct. 11, 1929.

High-speed mixer for making emulsions, effecting chemical reactions, etc. GASTON S. P. DE BÉTHUNE. Ger. 518,200, Mar. 14, 1928. See Brit. 292,592 (*C. A.* **23**, 1314).

Pump and high-speed emulsifier system for making emulsions such as those of bituminous materials. G. C. HURRELL and ROAD DEVELOPMENT CO., LTD. Brit 338,496, Aug. 13, 1929. Various details of construction and procedure are described

Acid-resistant apparatus. H. FRISCHER. Brit. 339,032, Sept. 26, 1929. Vessels or appl resistant to HNO_3 comprise an Al alloy contg. Mg, Si, etc., where exposed to acid liquid and a more resistant alloy such as Fe-Si or Cr-Ni alloy where exposed to the fumes.

Apparatus (with an immersed propeller) for mixing acids, etc. MASCHINENFABRIK AUGSBURG-NÜRNBERG A.-G. Brit. 338,440, Sept. 6, 1929. Various structural details are described.

Float for determination of the specific gravity of accumulator electrolytes. TUDOR ACCUMULATOR, LTD. Hung. 101,225, Feb. 4, 1930 "Kunstwachs" is mixed with $BaSO_4$ to form balls having different sp. gravities. These balls are not influenced by gas bubbles as are those made of natural wax.

Apparatus for casting films. RADEBEULER MASCHINENFABRIK AUGUST KOEBIG G. M. B. H. Ger. 518,037, Dec. 23, 1928.

Apparatus for making films from masses which harden in the air. RICHARD MARIOTTI. Austrian 121,598, Oct. 15, 1930.

Sheet metal articles coated with corrosion-resisting material which can be hardened by vulcanization or other treatment. P. PICK. Brit. 339,320, July 23, 1928. Various details of manuf. are given, mainly of mech. character, for making funnels, drums for holding chemicals, etc.

Annealing pot. ÖSTERREICHISCHE SIEMENS-SCHUCKERT-WERKE. (Erwin Häuser, inventor). Austrian 120,850, Aug. 15, 1930.

Acetylene generator. AUTOGENWERK SIRIUS G. M. B. H. Ger. 518,336, Feb. 6, 1930. Addn. to 474,145 (*C. A.* **23**, 2855).

Apparatus for distilling water by heat from the exhaust of an internal-combustion engine. H. J. WILSON. Brit. 338,953, Aug. 27, 1929. Structural features.

Mercury boiler. B. P. COULSON (to British Thomson-Houston Co., Ltd.). Brit 339,237, June 14, 1929.

Aluminum-coated steel soot-blower tubes for boilers, etc. WHITTEMORE, HULBERT, WHITTEMORE & BELKNAP and H. G. C. FAIRWEATHER. Brit. 338,867, Aug. 21, 1929. A tubular steel core is coated on both sides with a thin layer of Al which is adapted to alloy with the steel when the tube is placed within the boiler and subjected to heat. Various details of manuf. are described.

Safety gas valve for cutting off gas on flame extinguishment. LOUIS KREUTZKAMP. U. S. 1,796,998, March 17. Structural features.

Thermostatic electric switch. HILTON I. JONES. U. S. 1,795,400, March 10.

Thermostatic electric switch (containing mercury). THEODORE M. BURKHOLDER (to Engineering Products Corp.). U. S. 1,795,831, March 10. Structural features.

Thermostatic control device for electric circuits. EDMUND SCHERER. U. S. 1,796,726, March 17. Structural features.

Thermostatic control device for electric circuits. HARRY L. BRADLEY and GUSTAV O. WILMS (Wilms to Lynde Bradley). U. S. 1,797,126, March 17. Structural features.

Snap-action thermostatic device suitable for controlling electric circuits. ADOLPH A. THOMAS. U. S. 1,795,907, March 10. Structural features.

Thermostatic device suitable for controlling the flow of steam, etc. GLENN H. SEELY (to Bristol Co.). U. S. 1,796,124, March 10. Structural features.

Thermostatic control device suitable for control of fluid fuel supply to burners. EDWARD L. FONSECA (to Wilcolator Co.). U. S. 1,796,196, March 10. Structural features.

Thermostatic valve suitable for controlling the flow of heating fluids. FREDERICK W. JAEGER. U. S. 1,795,860, March 10.

Thermostatic valve. H. N. ROBINSON, G. W. WORTLEY and R. & A. MAIN, LTD. Brit. 339,341, Sept. 4, 1929.

2—GENERAL AND PHYSICAL CHEMISTRY

FREDERICK L. BROWNE

Chemists, chemistry and people. E. T. STERNE. *Can. Chem. Met.* **15**, 71–3 (1931).—An address. W. H. BOYNTON

Eduard Cramer. HIRSCH. *Z. angew. Chem.* **44**, 230–1(1931).—Obituary. E. H.

Fritz Pregl. H. LIEB. *Mikrochemie* **3**, 105–16(1931).—Obituary. W. T. H.

Edgar Fahs Smith: Provost, chemist, friend. CHARLES F. THWING. *Science* **73**, 331–3(1931). E. H.

In memoriam—Henry Leffman—1847-1930. IVOR GRIFFITH. *Am. J. Pharm.* **103**, 118–9(1931). W. G. GAESSLER

Dr. Henry Leffman—life story. CHARLES H. LAWALL. *Am. J. Pharm.* **103**, 113–17(1931).—Biography with portrait. W. G. GAESSLER

The scientific work of P. A. Levene. OTTO FOLIN. *Chem. Bull.* **18**, 99–101, 121 (1931). E. H.

Rudolf Dietz on his seventieth birthday. F. FOERSTER. *Z. angew. Chem.* **44**, 229–30(1931).—A portrait is included. E. H.

The work of Marcelin Berthelot and his influence on modern chemistry. JEAN PEPIN-LEHALLEUR. *Ann. soc. pharm. chim. Sao Paulo* **2**, 38–44(1931). E. H.

Lord Melchett and his accomplishments. JAROSLAV JELÍNEK. *Chem. Listy* **25**, 41–7(1931). FRANK MARESH

The achievements of Josef Schneider. E. TEYKOVSKÝ. *Chem. Listy* **25**, 49–53 (1931).—A brief biography is followed by a bibliography of Schneider's contributions covering all branches of chemistry. FRANK MARESH

Some scientific-instrument makers of the eighteenth century. I, II. ROBERT S. WHIPPLE. *J. Sci. Instruments* **7**, 241–53, 273–81(1930); *Science* **72**, 208–13. E. J. C.

Recent advances in science: Physical chemistry. R. K. SCHOFIELD. *Science Progress* **25**, 398–403(1931).—Recent work on contact catalysis is reviewed. J. S. H.

Discoveries and investigations in the older chemistry up to the phlogiston theory of Stahl. HOFFMAN. *Sitzb. preuss. Akad. Wiss.* **1931**, lviii–lxvi. E. H.

The activity of the general chemistry laboratory [at the University of Gand, Belgium]. F. SWARTS. *Bull. soc. chim. Belg.* **39**, 444–53(1930).—A review dealing more especially with work on org. fluorides. A. L. HENNE

What conclusions must classical physics and chemistry draw from the principle of greatest simplicity? L. ZEHNDER. *Z. Physik* **63**, 706–12(1930).—Ten postulates are given based on the principle of greatest simplicity. Classical physics must either obey these or be wrong in its fundamental suppositions. B. C. A.

Multiple preparation of hydrogen electrodes. V. RICHARD DAMERELL. *J. Chem. Education* **7**, 1664–7(1930).—A rubber stopper was bored to take 6 electrodes, 2 reference electrodes and a H-inlet tube. This was used to stopper all beakers in which the operations required by Clark's method took place. Platinization is best at 2.5 v. It is not

necessary to bubble the H gas directly on the foil, for Pt black readily absorbs the gas in soln. ANN NICHOLSON HIRD

The equilibrium between matter and energy. I. PETRYANOV. *J. Russ. Phys.-Chem. Soc.*, Phys. Pt. **62**, 241–5(1930).—The conditions of equil. between matter and energy were investigated. The following equation was derived: $W_T = RT\ln K_T - ((M_2 - M_1)c^2/3)$, where W_T is total work done, M_1 and M_2 are mol. wts. of true gases, c is the velocity of light and $K_T = -c_2/c_1$, where c_1 and c_2 are the concns. of gases in the system. V. VESSELOVSKY

The molecular structure of triatomic gases. II. H_2O, H_2S and N_2O. P. C. MAHANTI. *Physik. Z.* **32**, 108–10(1931); cf. *C. A.* **24**, 276.—Data on dipole moments, Raman spectrum, and infra-red absorption indicate that H_2S has a triangular structure like H_2O, while N_2O has a symmetrical linear form. T. H. CHILTON

Recent advances in the interferometric determination of the form of molecules. H. MARK. *Z. angew. Chem.* **44**, 125–30(1931).—Recent significant developments in the exptl. methods and the theory of the x-ray interferometric detn. of the structure of crystals are summarized. These have been of particular value in elucidating the structure of the more complex and less sym. org. mols. Recent applications of x-ray methods and of streams of electrons to the detn. of the structure of mols. in gases are discussed. The results of numerous x-ray interferometric studies of simple CH_4 derivs are correlated to show the extent to which they substantiate the regular tetrahedral symmetry of CH_4 demanded by classical theory. R. H. LOMBARD

Dielectric constants of liquefied gases. J. C. MCLENNAN, R. C. JACOBSEN AND J. O. WILHELM. *Trans. Roy. Soc. Can.* [3], **24**, Sect. 3, 37–46(1930).—The dielec. consts. of liquid N_2, A, CH_4 and N_2O were detd. in a specially constructed flask and at various temps. at and above their f. ps. The dielec. consts. referred to vacuum and at selected temps. are as follows: N_2 at 70.5°K. 1.478, A at 87.1°K. 1.520, CH_4 at 106.7°K. 1.694 and N_2O at 70.8°K. 2.023 J. W. SHIPLEY

The dielectric constant of supercooled sulfur and several sulfur solutions. STEFAN ROSENTAL. *Z. Physik* **66**, 652–6(1930).—For the examn. of liquids that attack metal plates, a glass condenser was made, consisting of concentric glass vessels. On the inside surface of the inner vessel was a sheet of Ag; on the outside of the app. a sheet of Cu The liquid was admitted between the glass vessels through connecting tubes. The dielec. const. of S was 3.720 ± 0.003 at 130°. Values were obtained from 135° to 95° At 107° a sharp change was observed. Liquid S followed the law of Clausius-Mossotti (polarization, p = const.); $p = 0.26280 \pm 0.00006$. This law was also followed by S in C_6H_6 and CS_2. L. P. HALL

The dielectric constant of liquid bromine. DOBIESLAW DOBORZYŃSKI. *Z. Physik* **66**, 657–68; *Bull. intern. accad. polonaise* **34**, 97–111(1930); cf. *C. A.* **22**, 1897.—With the condenser described in the preceding abstr., the dielec. const. of Br was measured from 0° to 53.8°; 3.334 ± 0.010 was found at the lower, and 2.964 at the higher, temp Polarization was a function of temp. Thus, Br followed the Debye theory for dipoles and the dipolar moment was calcd. as 0.49×10^{-18} e. s. u. L. P. HALL

Thermodynamic properties of dichlorodifluoromethane, a new refrigerant. I. Equation of state of superheated vapor. RALPH M. BUFFINGTON AND W. K. GILKEY *Ind. Eng. Chem.* **23**, 254–6(1931).—The consts. of a Beattie-Bridgeman equation of state for superheated CCl_2F_2 vapor were detd. from measurements of isometrics between vols. of 1.4 and 4.2 l. per mol. In this region the isometrics are straight. The final equation is $p = [RT(V + B)/V^2] - (A/V^2)$, where $A = 23.7[1 - (0.305/V)]$ and $B = 0.59[1 - (0.622/V)]$. The units are atms., degrees abs. and l. per g.-mol. The equation fits the observed data with an av. error of 0.5%. A. L. H.

The most important methods for determining surface tension. E. HIEDEMANN *Z. physik. chem. Unterricht* **44**, 1–12(1931).—The various methods of surface-tension measurement are discussed from the standpoint of their adaptability as student expts in physics labs. Four methods are suggested: (1) the torsion-balance method of Lenard (cf. *C. A.* **18**, 2827); (2) capillary-rise method in a specially designed simple app.; (3) a differential capillary-rise method using an app. in which 2 capillary tubes and a tube (*a*) of wider bore are attached to a horizontal tube and fitted with a close-fitting thermometer which serves as a piston to regulate the height of the liquid in the capillary tubes; (4) a compensation method of Ferguson and Dowson (cf. *C. A.* **16**, 2436). Bibliography. E. R. SCHIERZ

The density of liquids. OSCAR DE SOUZA VIEIRA. *Rev. brasil. chim.* **1**, 92–6 (1929).—A study of the methods of operating the hydrostatic balance in the detn. of the d. of liquids. JOHN M. LADINO

The critical anisotropic point of ferromagnetic crystals. N. S. AKULOV. *Physik.*

Z. **32**, 107–8(1931).—The relative change of elec. resistance of a ferromagnetic crystal under the influence of magnetization is expressed by an equation of the same form as that previously given for the change in phys. properties (*C. A.* **24**, 2345). The following law is deduced: If 2 curves of the relative change of elec. resistance *vs.* magnetization, derived for 2 different angles between the magnetization vector and chief axis of the crystal, intersect, then curves for any angles must also pass through this point. An example is given from data of Webster (*C. A.* **21**, 204, 1748). T. H. CHILTON

Translation-gliding in crystals of the sodium chloride structural type. M. J. BUERGER. *Am. Mineral.* **15**, 174–87, 226–38(1930); cf. *C. A.* **24**, 4680.—For crystals of NaCl-like structure, the translation direction, *t*, is detd. by the densest rows of like-charged ions. The translation plane, *T*, is a function both of ion-radius ratio and of the polarizabilities of the constituent ions. Translation along (001) is assocd. with high polarizabilities, translation along (110) with low polarizabilities; with intermediate values both (001) and (110) may function as translation-gliding planes under favorable conditions of load. If the original lattice coördinates of the geometrical crystal structure theory are retained, it is found that translation direction, unit translation, direction of closest equiv. lattice points and direction of closest like charges are identical. The correlation, with minor modifications, extends to other crystals such as magnesite and other carbonates, barite, fluorite, anhydrite. It is pointed out that the translation direction is sp. for a given structural type because the translation direction has the structural character alignment of closest like leptons for all leptons in the structure. An adequate mechanistic explanation of the gliding direction is presented on the assumption that the leptons are individually charged and thus have the character of ions. The actual translation direction is the one resulting in a min. loss of cohesion.
A. M. BRANT

The mechanism of activation of thoriated tungsten and molybdenum. A. GEHRTS. *Z. tech. Physik* **12**, 66–71(1931).— A math. treatment. The mechanism derived on the assumption of Th migration by slip along the crystal surfaces to the surface of W and Mo wires agrees with the exptl. results. The grain-size-diminishing action of thoria in wires may be due to adsorption and migration of Th on the crystal surfaces. A. F.

Addition centers as coördination centers. The crystal structure of veronal. EDUARD HERTEL. *Z. physik. Chem.*, Abt. B, **11**, 279–90(1930).—The crystal structure of veronal, 5,5-diethylbarbituric acid, was detd. crystallographically and roentgenographically. Crystals, m. 191°, d. 1.220, formed by slow growth from aq. soln., were rhombic-bipyramidal, with axial ratios $a:b:c = 0.491:1:0.688$, translation group I_o', space group V_h^{17}, 4 mols. forming the elementary group. Models are depicted. The arrangement of the mols. is attributed to secondary valences. L. P. HALL

Growth and solution of nonpolar crystals. I. N STRANSKI *Z. physik. Chem.*, Abt. B, **11**, 342–9(1930); cf. *C. A.* **22**, 4289. —Soln of homeopolar crystals begins at the corners and edges and growth occurs more easily at the face. Metals in electrolytes, however, grow from the corners. Since homeopolar crystals present more active centers than heteropolar, they should be more effective catalytically. L. P. HALL

Explanation of the electrocapillary Becquerel-phenomenon. A correction. H. FREUNDLICH AND K. SÖLLNER. *Z. physik. Chem.*, Abt. A, **152**, 313–4(1931); cf. *C. A.* **23**, 4394.—The only condition necessary for the sepn. of metal in the Becquerel phenomenon is a pos. value for the decompn. potential, with the convention of a circular current going in one direction through the salt soln., in the other through the metallically conducting membrane. W. W.

Method of obtaining a single crystal of aluminum of any desired crystallographic orientation. T. SANO. *Mem. Coll. Sci. Kyoto Imp. Univ* **13A**, 307–9(1930).—An Al crystal of any desired orientation can be obtained by bringing another crystal into contact with molten Al and lowering the temp very slowly. B. C. A.

Crystal structure of metallic lanthanum. J. C. MCLENNAN AND R. W. MCKAY. *Trans. Roy. Soc. Can.* [3], **24**, Sect. 3, 33–5(1930).—The x-ray spectrum of powdered La was examd. and La found to crystallize in the hexagonal system. The coördinates of the atoms referred to hexagonal axes are $1/3$, $2/3$, $1/4$ and $2/3$, $1/3$, $3/4$. The side of the unit cell is 3.72 A. U. and the axial ratio is 1.63. This arrangement is the same as that of the hexagonal close packing of spheres. J. W. SHIPLEY

Crystal structure of uranium. J. C. MCLENNAN AND R. W. MCKAY. *Trans. Roy. Soc. Can.* [3], **24**, Sect. 3, 1–2(1930).—An x-ray analysis of the crystal structure of metallic U was made by the powder method. The calcd. spacings are for a body-centered cubic arrangement with the side of the unit cell equal to 343×10^{-8} cm. The lines corresponding to the 222 and 004 planes were not observed. Calcd. from the data obtained the d. is 19.6. J. W. SHIPLEY

New forms of crystalline ice. N. ALTBERG AND W. TROSCHIN. *Naturwissenschaften* **19**, 162–4(1931).—In the Kungur caverns (Ural mountains) natural temp. and satn. conditions are such that the growth of large ice crystals (up to 50 cm. in size) is promoted. A few photographs of specimen are presented. B. J. C. VAN DER HOEVEN

Structure of silicon tetrafluoride. G. NATTA. *Gazz. chim. ital.* **60**, 911–22(1930).—A survey of the literature shows that the lattice structures of very few binary compds. of the AB_4 type have been studied by x-rays. It was of interest therefore to exam. compds. of this type, particularly those with a non-ionic structure. The form and symmetry of the cryst. lattice of the latter depend, to a greater degree than for ionic compds., upon the form and symmetry of the individual mol., which maintains its structural unity and behaves as a fundamental constructive element of the cryst. edifice, like the single ions of ionic compds. The present paper deals only with SiF_4, but is part of a more extended series of expts. on the halides of C, Si and Ti. Most of them give excellent x-ray photographs, all of which show the cubic or tetragonal system. SiF_4 has the simplest structure. Since most of the halides have a very low m. p., the app. already used in examg. liquids and gases was again employed (cf. *C. A.* **24**, 4973). Pure SiF_4 was prepd. by freezing out at —60° the HF from the gas evolved from a mixt. of K_2SiF_6, Al silicate and concd. H_2SO_4. The SiF_4 was then liquefied by liquid air. The powder method was used for the x-ray examn. The lattice of the Si atoms in SiF_4 is body-centered cubic. The elementary cell contains 2 mols., with $a = 5.41 \pm 0.01$ A. U. and $v = 158 \times 10^{-24}$ cc. at —170°. The d. is 2.17. SiF_4 is not an ionic compd., and it possesses a "mol. lattice." It belongs to the O^2 spatial group. The position of the atoms in the cell is defined by the coördinates:

$$\begin{array}{l} \text{F } u\,u\,u,\ u\,\bar{u}\,\bar{u},\ \bar{u}\,u\,\bar{u},\ \bar{u}\,\bar{u}\,u. \\ 1/2 + u\ 1/2 + u\ 1/2 + u,\ 1/2 + u\ 1/2 - u\ 1/2 - u \\ 1/2 - u\ 1/2 + u\ 1/2 - u,\ 1/2 - u\ 1/2 - u\ 1/2 + u \end{array}$$

The closest agreement between the calcd. and exptl. intensity was found for values of u around 0.17. The radius of the neutral F atom is approx. 0.50 A. U. C. C. DAVIS

An x-ray study of mannitol, dulcitol and mannose. THORA C. MARWICK. *Nature* **127**, 11–2(1931).—Results:

	Space group	a A.	b A.	c A.	Density g./cc.	Molecules per cell
Mannitol	O_4	8 65	16.90	5.56	1.497	4
Dulcitol	C_{2h}^5	8.61	11.60	9.05	1.466	4
Mannose	O_4	7.62	18.18	5.67	1.501	4

In all three compds. the long dimension of the mol. probably corresponds to the a-axis. C. J. HUMPHREYS

The crystallographic character of the amides of methylbutenoic acids. J. THOREAU *Bull. sci. acad. roy. Belg.* [5], **16**, 823–8(1930); *Bull. soc. chim. Belg.* **39**, 412–6.—The amide of tiglic acid gave orthorhombic crystals with 8 faces. The amide of angelic acid gave long crystals but could not be measured by the goniometer. The amide of α-ethylacrylic acid gave long monoclinic crystals, and that of methylethylglycolic acid gave monoclinic crystals. WALLACE R. BRODE

Conductivity of the crystals of sodium chloride. A. K. WALTHER AND B. M. HOCHBERG. *J. Russ. Phys.-Chem. Soc.*, Phys. Pt. 62, 399–408(1930).—The cond. of NaCl crystals was investigated for the temp. range 25–800°. Polarization and its influence on the cond. were studied. The change in the cond. with temp. above 550° is attributed to the transport of electricity by Cl ions. The cond. between 25° and 550° was expressed by the equation $\delta = Ae^{-B/T}$, where δ is the sp. conductance, T the abs. temp. and A and B are consts. for a given substance and are connected with the work done in the sepn. of ions from the crystal lattice. The deviation from the above equation at temps. higher than 550° is attributed to migration of Cl ions. V. V

Zero volumes of crystalline organic substances. W. BILTZ. *Z. Elektrochem.* 36, 815–8(1930).—A discussion of the mol. vol. and its relationship to the additivity and constitutional properties of the at. vol. Plotting the mol. vol. of homologous series against the no. of C atoms gives a value of 13.7 cc. for the $-CH_2$ group, and 33 cc. for the aromatic $-C_4H_2$ group. The empirical increment for the individual groups thus the zero vols. of the elements to be calcd. $C_{(aromatic)} = 5.4$ = graphite; $_{\text{hatic)}} = 3.4$ = diamond; H = 5.8 = 1/2 H atom; O″ = 10.9 = 1/2 O atom; = 3.6 = 1/2 O atom. The zero vols. of the oxides of N are discussed. The calcd. zero vol. for the $-CH_2$ group is 15.0, whereas the av. observed value is 13.7. The energies

of decompn. and the spatial requirements are roughly proportional. The exceptionally large zero vol. of CH_4, calcd. 26.6, observed 30.65, needs to be clarified. Staudinger's study of polyoxymethylene diacetates is considered. L. L. QUILL

Relations between thermal force, thermolysis and ionic mobility in solid salts and mixed crystals. H. REINHOLD. *Z. physik. Chem.* Abt. B 11, 321–41(1930); cf. *C. A.* 22, 3358.—Chiefly math. L. P. HALL

Some reactions that take place in the solid state. MME. MATHIEU, MATHIEU AND PAIĆ. *Compt. rend.* 192, 416–8(1931).—Reactions take place readily in the solid state but they are difficult to follow unless there is a change in color or evolution of gas. The changes in x-ray spectra before and after reaction prove that the following reactions take place when the mixts. of solid powders are heated: (*1*) $Hg + I_2 \longrightarrow HgI_2$, (*2*) ZnS (wurtzite) $\longrightarrow$ ZnS(blende), (*3*) $3K_2SO_4 + Na_2SO_4 \longrightarrow Na_2SO_4.3K_2SO_4$, (*4*) $HgSO_4 + 2HgO \longrightarrow 3HgO.SO_3$, (*5*) $HgSO_4 + HgI_2 \longrightarrow HgSO_4.HgI_2$, (*6*) $(PbI)_2CO_3 \longrightarrow PbI_2 + PbCO_3$, (*7*) $[3HgO.2SO_3.2H_2O] + 3HgO \longrightarrow 2[3HgO.SO_3] + 2H_2O$. Reactions *1*, *4* and *6* take place with increase in mol. vol., reactions *2* and *3* with decrease, and reaction *5* with no change in mol. vol. Application of thermodynamics to reactions in the solid state is not yet practicable. F. L. BROWNE

Spiral-shaped cracks in the drying of precipitates. G. SCHIKORR. *Naturwissenschaften* 18, 376(1930).—$Fe(OH)_3$ was pptd. from $FeCl_3$ soln. with NH_3, filtered and washed and about 50 g. of the moist ppt. was placed on a glass plate and allowed to dry in the air. After 8–10 days, there was formed in the course of a few hrs. on the bottom surface a regular spiral-shaped crack. This spiral formation takes place also with $Al(OH)_3$. No explanation of the observed phenomenon is given. L. T. C.

Spiral formation in chemical precipitation. R. ED. LIESEGANG. *Naturwissenschaften* 18, 645–6(1930).—Spiral cracks during the drying out of gels recently described by Schikorr (preceding abstr.) are a modification of ordinary rhythmic ring formation in ppts., etc. Its exact cause has so far not been explained. B. J. C. VAN DER HOEVEN

The density of atmospheric air and its variations. E. MOLES, M. PAYA AND T. BATUECAS. *Rev. acad. cienc. Madrid* [2], 25, No. 10, 95 170(1930).—An historic review of the studies of the d. and chem constituents of air followed by extensive original investigations. Methods used to det. the individual factors are described in detail, and drawings are presented of the app. used. Air samples were taken from various localities. B. S. LEVINE

Change of density of ethyl ether with temperature. J. MAZUR. *Nature* 127, 270 (1931); cf. *C. A.* 25, 627.—The d. of very pure Et_2O increases from 0.6964 at 35° to 0.8595 at —105.4°, below which the rate of increase of d. is much slower. This checks the transition temp. found in the detn. of sp. heat and dielec. const. At the m. p. —117.2° d. is 0.8654. ARTHUR FLEISCHER

The nature of specific properties of molecular surface fields. The structure of active carbons and the inversion of the effects of adsorption and wetting heats. B. IL'IN AND I. SIMANOV. *Z. Physik* 66, 613–8(1930).—Exptl. data are given on an inversion of the adsorption from aq. fatty acid solns. and also an inversion of the wetting heat in the homologous alc. series by two modifications of active carbon prepd. from sugars. The Debye figures of these carbons are considered. M. MCMAHON

Interface potential and reactions at surfaces. I. Reduction of permanganate by charcoal. A. WASSERMANN. *Z. physik. Chem.*, Abt. A, 149, 223–39(1930).—The actions of different charcoal prepns. on $KMnO_4$ soln. were comparatively investigated. If the velocity of reduction of the $KMnO_4$ is a measure of the diffusion of the MnO_4 ion to the interface, the surface charge on the charcoal should influence the velocity of decompn. The effect of p_H on the reaction velocity in the acid region confirms this assumption. Also $KMnO_4$ is reduced about equally readily by normal and by activated sugar charcoal in alk. soln. where both charcoal surfaces are negatively charged, whereas in acid soln. the positively charged active charcoal is the more active. The fact that the velocity of reaction in alk. soln. is independent of the concn. of the alkali is explained by supposing that the C adsorbs OH ions only in small amts. B. C. A.

Note on the adsorption theories of Frenkel and Hückel. A. GANGULI. *Z. Physik* 66, 704–7(1930); cf. *C. A.* 24, 2656.—The adsorption equations of F. (*C. A.* 18, 3302) and H. (*Adsorption und Kapillarkondensation*, p. 172) are identified with G.'s statistical derivation of the Langmuir adsorption isotherm. CHANNING WILSON

A study of adsorption processes. II. V. N. KRESTINSKAYA. *J. Russ. Phys.-Chem. Soc.* 61, 2111–32(1929); cf. *C. A.* 22, 9.—Prolonged sorption by C of acetic and benzoic acids is not due to the formation of solid solns. or to chem. reactions. It is merely an adsorption, which is conditioned by a slow diffusion of dissolved substances. Benzoic and acetic acids are adsorbed by charcoal in equiv. quantities. V. V.

The adsorptive bond. H. CASSEL AND F. SALDITT. *Naturwissenschaften* **19**, 110–1 (1931).—The surface tension, σ, of pure Hg was measured by the method of maximal drop-pressure in the absence of air and impurities and in the presence of its own vapor and several other vapors at different p and T. The σ-p isotherms allow calcn. of the adsorbed amts. by the Gibbs method. This procedure is an ideal one for testing the dipole theory of adsorption (Debye, *Physica* **1**, 362(1921); Lorenz and Lande, *C. A.* **17**, 3818; Magnus, *C. A.* **21**, 844). In accordance with London and Polanyi (*C. A.* **25**, 1715; and London, *C. A.* **25**, 1715) the dipole moment plays only a secondary role in adsorption. H_2O vapor, between 0° and 50° and at pressures up to 62 mm. Hg, had no effect at all on the surface tension of 0.1% accuracy; this means that it is not adsorbed below satn. pressure. Considerable adsorption was found for Et_2O with a much smaller dipole moment, more still for hexane, cyclohexane and benzene in the order mentioned (different from the order for mol. refraction) which are without dipole moment. MeOH, EtOH, and PrOH are adsorbed more strongly with increasing chain length. The S-shape of the σ-p curves proves that the adsorbed state is an assocd. one. Nitromethane shows the same behavior. It would seem that dipole qualities by themselves even act as a deterrent to adsorption. B. J. C VAN DER HOEVEN

Occlusion of hydrogen by platinum black. A. SIEVERTS AND H. BRÜNING. *Festschr. Heraeus* **1930**, 97–114.—For a particular temp. and pressure the sorption of H by Pt black depends on the previous treatment of the latter. The isobars exhibit a change of direction between 0° and —20°, becoming again rectilinear between —20° and —120°. B. C. A.

Desorption of gases from molecularly plane glass surfaces. JAMES R. CURRY. *J. Phys. Chem.* **35**, 859–73(1931).—The desorption of air, CO_2, $C_6H_5CH_3$, NH_3, H_2, CO, and C_2H_4 from glass surfaces was studied, in an app. with a large ratio of surface : vol and a plane surface. The adsorbed gas covered only a fraction of the surface Desorption was complete at temps. below 220°. S. LENHER

The heat of adsorption of certain organic vapors by charcoal at 25° and 50°. J. N. PEARCE AND G. H. REED. *J. Phys. Chem.* **35**, 905–14(1931); cf. *C. A.* **24**, 3690.—The heats of adsorption of CH_3Cl, CH_2Cl_2, $CHCl_3$ and CCl_4 on charcoal were detd. at 25° and 50°. There does not appear to be a temp. coeff. of the heats of adsorption. The mol. heats of adsorption increase with the no. of Cl atoms in the mol. S. L.

Chemical sorption. IV. Complex sorption processes and hydrolysis. S. LIPATOV AND N. SOKOLOVA. *Z. anorg. allgem. Chem.* **192**, 383–90(1930); cf. *C. A.* **24**, 766, 2355.—The adsorption of NaOH by salt-free cellulose films was detd Corrections were made for swelling. Na ions are adsorbed at the positions of the OH groups of the cellulose Max. adsorption shows 3 NaOH combined with each $C_6H_{10}O_5$. The swelling of cellulose reaches a max. at 10% of NaOH. H_2O covers the cellulose in NaOH solns. with a monomol. film. ARTHUR FLEISCHER

Adsorption in solutions in relation to the dielectric properties of the solvent. I. E. HEYMANN AND E. BOYE. *Z. physik. Chem.*, Abt. A, **150**, 219–56(1930); cf *C. A.* **25**, 13.—The relation between dielec. properties of solvents and adsorption of solutes is discussed theoretically and investigated exptly. Purified, almost ash free wood char coal was the adsorbent. Adsorption of BzOH, AcOH, CH_2O_2, butyric acid and I (violet solns. only) is weak from strongly polar solvents and strong from weakly polar solvents. This antibatic relation between dipole moment and adsorption is not universal, however, and is probably influenced by the mutual affinities of solute and solvent This suggestion is supported by the observation that I is much more weakly adsorbed from brown solns. in alc., Et_2O and C_6H_6, where it is solvated, than from violet solns., where there is practically no solvation. A definite and const. relation between dielec properties and adsorption occurs only in solvents that are closely related chemically, such as a homologous series of alcs. The adsorption of BzOH or picric acid in alc. soln. by charcoal decreases with increasing mol. polarization of the alc., *i. e.*, with increasing deformability of the mol. A similar relation is found between adsorption and dipole moment in the adsorption of I from the series of chloromethanes. An investigation of adsorption in solvent mixts. was also made, and a connection established between the adsorption curve (relating percentage adsorption to the compn. of the mixt.) and the mol. polarization curve. In general, there are two types of behavior. Adsorption curves are linear when both components of the solvent mixt. are non-polar (C_6H_6—CCl_4) or when one component is polar but when its sp. polarization is not altered appreciably by the presence of the non-polar solvent (mixts. of C_6H_6 with PhMe, $CHCl_3$ or PhCl). Complicated curves showing one or more minima are obtained when the sp. polarization of the polar component is altered by admixt. with the non-polar component (C_6H_6 with $PhNO_2$ or alc., CCl_4 with alc. or Me_2CO), or when both components are polar. In such

cases the max. polarization corresponds with the min. of adsorption. Adsorption in solvent mixts. is further discussed in relation to vapor pressure and soly. B. C. A.

Oxide hydrates. XXXV. The crystallized oxides and oxide hydrates of aluminum as adsorbents for organic dyestuffs. GUSTAV F. HÜTTIG AND ALFRED PETER. *Kolloid-Z.* **54**, 140–7(1931); cf. *C. A.* **24**, 2075, 5654.—The adsorption of methyl violet, methyl blue, Congo red, eosin and Bordeaux red *R* by artificial hydrargillite, boehmite, γ-Al_2O_3 (Willstätter), corundum and natural hydrargillite, bauxite and diaspore was detd. In neutral solns. the adsorption follows Freundlich's isotherm. With the natural ores the accessory minerals play an important part in the adsorption. The oxides in order of decreasing adsorption are: boehmite, γ-Al_2O_3, diaspore, artificial hydrargillite, corundum. Selective adsorption is greatest for corundum, while boehmite shows hardly any selective effect. ARTHUR FLEISCHER

Direct measurement of the adsorption of soluble substances by the bubble method. DAVID M. GANS AND WM. D. HARKINS. *J. Phys. Chem.* **35**, 722–39(1931).—The adsorption of *p*-toluidine and isoamyl alc. in the air-soln. interface was measured by the bubble method. The adsorption exceeds that deduced from the equation, $u = (1/RT)(\delta\gamma/\delta \ln a)$, in agreement with measurements of McBain and Davies (cf. *C. A.* **21**, 3510) although the adsorption is, in general, smaller. As the adsorbing bubbles grow smaller adsorption appears to decrease, approaching the value for the solute obtained from the adsorption equation. S. LENHER

Separation and size distribution of microscopic particles. An air analysis for fine powders. PAUL S. ROLLER. Bur. Mines, *Tech. Paper* **490**, 46 pp.(1931); cf. *C. A.* **25**, 364.—The various methods for the particle-size analysis of a microscopic powder are described. The principle, construction and operation of an improved air separator are described. Results for the sepn. of portland cement and chrome-yellow pigment in steps of 0–5, 5–10, 10–20, 20–40, 40–60 and 60–100μ are given in detail. A closer sepn. beginning with 0–3μ was made for gypsum and anhydrite. For soft powders only, in the 0–5μ range, there is an attrition of the grains. Quant. methods for correction are described. A size-distribution analysis of the particles of each of the fractions made under the microscope showed that Stokes' law is closely obeyed. In each fraction there is a small overlap of a few μ due to irregularities in the shape and surface of the grains, inhomogeneity of the density of the grains, and incompleteness of fractionation. The most important particle-size properties of a powder are those that relate to the surface per unit wt. The mean diam. is defined therefore in relation to the sp surface. The surface mean diams. for the cement powder and chrome-yellow pigment are 9.6 and 6.1μ, resp. The dispersion is a measure of the extent of the distribution of the particle diams. about the mean diam. of the microscopic powder. The surface dispersion, related to the surface diam., is calcd. as 13.3 and 6.1 for the cement and pigment, resp. The latter is therefore twice as homogeneous as the cement. General graphic methods are described with reference to a frequency distribution of the particle diams. The method in which the area under the curve between 2 diams. gives the surface area of the particles per g. of powder between these diams. is described in detail. ALDEN H. EMERY

Triangular diagrams for the graphic representation of colloidal systems. A. DUMANSKII. *Kolloidchem. Beihefte* **31**, 418–33(1930).—By the use of triangular diagrams the effect of such peptizing agents as polyhydroxy alcs., sugars and hydroxy acids upon the reaction between $FeCl_3$ and NaOH or NH_4OH is shown clearly. By this means it is possible to show the range of stability of the pos. sol, the stability of the neg. sol and the concns. at which pptn. takes place. Peptization conditions for the pptd. $Fe(OH)_3$ by peptizing agents are shown well by this means. Sensitized and stabilized regions of such hydrated sols as gelatin due to the addn. of org. substances like EtOH are also represented by these diagrams. The coagulation of hydrophilic and hydrophobic colloids under changing concns. of solvents having 3 components, *i. e.*, water, alc. and ether are shown by the same method. The diagrams also find useful application in representing emulsification and foam formation in the realm of colloids. L. H. R.

A note on the complexity of the magnetic properties of elements in the colloidal state. S. S. BHATNAGAR. *J. Indian Chem. Soc.* **7**, 957–8(1930).—Both powd. and colloidal Bi contain oxide. BiO is weakly diamagnetic or even paramagnetic. A strip of Bi tarnished by dipping in HNO_3 is less diamagnetic than the original. That colloidal metals such as Bi are less diamagnetic than crystals of the metal (see Vaidyanathan, *C. A.* **24**, 3149) is at least partly due to the presence of oxides. O. T. Q.

Observations on the dielectric behavior of dispersed systems. R. FRICKE AND L. HAVESTADT. *Z. anorg. allgem. Chem.* **196**, 120–8(1931); cf. *C. A.* **24**, 3183.—Changes of dielec. const. were measured for suspensions of ThO_2 hydrate, $Al(OH)_3$ hydrate and

stannic acid, on adding small quantities of NaOH and HCl. The dielec. const. was decreased in each case. This decrease can be correlated with changes in the characteristics of the suspensions. The relationship is not as clear as F. and H. previously thought. The time change of the dielec. const. was measured for a gelatin soln.; the results apparently disagree with the data for stannic acid. Colloidal Au suspensions show practically the same dielec. const. as pure water. The theory of Szegvari and Wigner (*C. A.* 18, 492) is criticized. E. J. ROSENBAUM

Preparation of an electrolyte-free sol of manganese dioxide. SHRIDHAR S. JOSHI AND T. SURYA NARAYAN. *J. Indian Chem. Soc.* 7, 883–5(1930).—MnO_2 sol was prepd. by adding concd. NH_4OH drop by drop to boiling $KMnO_4$ soln. Although the sol coagulated slowly when in contact with unglazed porcelain, animal charcoal, celluloid, glass-wool, filter and parchment papers, it could be successfully purified by dialysis with a parchment membrane by either of two methods. Application of a sufficiently high neg. potential to the membrane prevented coagulation until the sol became practically electrolyte-free. In one expt. a pos. potential of 200 volts caused coagulation in 10 min.; zero potential allowed coagulation in 30 min.; a neg. potential of 200 v. prevented coagulation for over 13 hrs. Sols purified by dialysis at high neg. potentials were very sensitive to added electrolytes. The impure sol could also be purified by hot dialysis. If coagulation were caused by chem. reaction with the membrane substance, hot dialysis would have been impossible because of the temp. coeff. of reaction rate. The increased stability in hot dialysis is ascribed to diminution of the adsorption of colloid by the parchment. OSCAR T. QUIMBY

Colloidchemical studies of dye sols. II. The solution of Congo acid sols by neutral salts. R. TANAKA. *Kolloid-Z.* 54, 156–64(1931); cf. *C. A.* 25, 631.—The color of the soln. and the ppt. was noted on adding varying amts. of KI, KCl, $Ca(NO_3)_2$ and $CaCl_2$ soln. to Congo red sol. A change of color to red appears at the soln. max., a point independent of the p_H of the soln. $CaCl_2$ showed the greatest effect. A. F.

Dispersoidal investigations on selenium. I. KIYOSHI JUNA. *Bull. Chem. Soc Japan* 6, 23–4(1931).—Se sols are formed when Se solns. in hydrazine hydrate are poured into H_2O, C_2H_5OH, or glycerol in the presence of air, O_2, or CO_2 but not in a N atm. ARTHUR FLEISCHER

The effect of stirring on the rate of coagulation of gold sol. EMLYN JONES. *Trans Faraday Soc.* 27, 51–8(1931).—The effect of stirring was detd. by calcg. β in the von Smoluchowski formula from coagulation expts. with $BaCl_2$ on a Au sol made by acetone reduction. For fast coagulation, β increases with increasing rate of stirring; for slow coagulation, β decreases with increasing rate of stirring. ARTHUR FLEISCHER

Coagulation. G. WIEGNER. *J. Soc. Chem. Ind.* 50, 55–62T(1931); cf. *C. A.* 22, 4311, 4312; 23, 750, 1552.—The work at Zurich on rapid and slow perikinetic coagulation of monodisperse systems, rapid perikinetic coagulation of polydisperse systems, rapid and slow orthokinetic coagulation, rapid and slow perikinetic coagulation of needle-shaped particles and the coagulation of oppositely charged colloids is reviewed ARTHUR FLEISCHER

The measurement of permeability of porous alundum disks for water and oils. HOLBROOK G. BOTSET. *Rev. Sci. Instruments* 2, 84–95(1931).—Lab. expts. were conducted to gain a more accurate knowledge of the flow of liquids in underground reservoirs. The app. consisted of a vertical brass tube in which a porous disk was placed The flow through the disk was collected and measured in a graduate. The first expts with water indicated that the decrease of the rate of flow with time was due to hydrolysis of the glass reservoir by the water in which H_2SiO_3 was formed. With kerosene, the decrease in the rate depends on the presence of unsatd. hydrocarbons. This is also true for a light lubricating oil. Expts. with a crude oil showed that dissolved O_2 decreases the rate of flow. It is concluded that when both O_2 and unsatd. hydrocarbons are present the rate of flow of an oil through a porous disk decreases, but the removal of either one permits a const. rate, because clogging of the disk is caused by the oxidation products of the unsatd. hydrocarbons. Permeability measurements applied to field conditions are questionable unless it is known that the oils tested contain no unsatd. hydrocarbons or are tested in the absence of air. ALLEN S. SMITH

Membrane and osmosis. I. F. A. H. SCHREINEMAKERS. *Rec. trav. chim.* 50, 221–9(1931); cf. *C. A.* 24, 4686.—Theoretical. When a membrane, permeable only to H_2O, separates two liquids that differ in *O. W. A.* (osmotic water action), the direction of osmosis depends upon the *W*-amt. given to the membrane by the liquid. If the pressure is the same on both sides of the membrane, H_2O diffuses toward the liquid giving the membrane, the smaller *W*-amt. If the membrane is homogeneous, water diffuses

toward the boundary plane with the smaller W-amt. Through a heterogeneous membrane, however, diffusion in the opposite direction is possible. F. L. BROWNE

Disturbance of neutrality of solution in electrodialysis, the facts and the explanation. SHUMPEI OKA. *J. Soc. Chem. Ind., Japan* **34**, Suppl. binding 4–9(1931).—A soln. tends to lose neutrality during electrodialysis unless special precautions are taken. The prevailing theory is that the electrokinetic potential of the diaphragm membrane, the ζ potential, alters the mobility of the ions while passing through the capillary pores of the membrane. Parchment paper and collodion membranes decrease the transport no. of anions and increase that of cations. With a pair of such neg. diaphragms in a 3-compartment cell, cations are removed more rapidly than anions, and the soln. becomes acid. Solns. of 0.005 N KCl were electrodialyzed in a glass container having 3 chambers sepd. by 2 similar diaphragms. The H_2O in the electrode chambers was not renewed during an expt. The diaphragms were parchment, or filter paper impregnated with collodion or with chromated gelatin. The ζ potential of the diaphragms against 0.005 N KOH, KCl and HCl were detd. With a const. applied voltage the current at first increased, reached a max., then decreased. The p_H of the soln. decreased promptly, reached a low and nearly const value, then increased gradually. The current-time and current-p_H curves for parchment and for collodion, with 50 v., nearly coincide, although the ζ potential of collodion was 10 times that of parchment. When the p_H of the soln. is plotted against total watts consumed for expts. at different const. voltages with a given membrane the curves coincide, showing that change in p_H with a given membrane depends solely upon the amt. of current passed. Current is carried by K^+ ions from the central to the anode chamber, by H^+ ions from the central to the anode chamber, and by OH^- ions from the cathode to the central chamber. The acidity or basicity of the soln. is detd. by the relative amt. of H^+ ions coming from the anolyte, and of OH^- from the catholyte. The prevailing theory is modified by attributing the change in p_H to two variables instead of to one only, (*1*) the ζ potential of the diaphragm, and (*2*) the concns. of ions in the diaphragm. E. M. SYMMES

Physicochemical properties of clays. I. Base exchange or ionic exchange. G. WIEGNER. *J. Soc. Chem. Ind.* **50**, 65–71T(1931).—Permutites and clays with exchange properties are micelles consisting of an ultramicron, an inner layer of anions, and an outer swarm of cations. The displacement of ions by exchange depends on the attractive forces between the inner and outer layer as well as upon the hydration of the ions. The ionic exchange determines the elec. potential of the micelles and also their behavior on coagulation. The water content and viscosity as well as the plasticity and cohesion of clay are in accord with the hydrations of the ions in the outer swarm. F. L. BROWNE

The optimum conditions for the formation of silica gel from alkali silicate solutions. II. R. C. RAY AND P. B. GANGULY. *J. Phys. Chem.* **35**, 596–601(1931); cf. *C. A.* **24**, 2358.—The optimum conditions for formation of SiO_2 gel by the action of HCl on Na_2SiO_3 of 1:3.3 and 1:4 ratios were studied. The limiting p_H ranges in which gel formation takes place were detd. The large amt. of SiO_2 in the higher ratio does not affect the conditions of gel formation. The amts. of heat evolved when 1 mol. of $FeCl_3$ reacts with Na_2SiO_3 solns. of different ratios were also detd.; the heat of reaction decreases with increase in the ratio of SiO_2/Na_2O from 1:2 to 3:4. The reaction between $FeCl_3$ and Na_2SiO_3 solns. results mainly in the formation of ferric silicates. H. W. LEAHY

Molecularly dispersed, dissolved silicic acid and titanic acid. H. BRINTZINGER AND W. BRINTZINGER. *Z. anorg. allgem. Chem.* **196**, 44–9(1931); cf. *C. A.* **24**, 11.—Tetraethyl orthosilicate was sapond. by 0.002 N HCl. Detn. of the dialysis coeff. of portions of the resulting soln. that had stood for different lengths of time made it possible (*1*) to det. whether one or several species of mol. of silicic acid were present after a given time, (*2*) to det. the mol. wt. when a single species was present and (*3*) to follow the condensation of the silicic acid from the rapidly diffusing, disilicic acid, through the more slowly diffusion molecularly dispersed forms, to the colloidal ones, which no longer pass through cellophane membrane. The soln. of the freshly sapond. ester contained disilicic acid, $2SiO_2.2H_2O$, mol. wt. 153. After standing 1 day this had condensed to $4SiO_2.3H_2O$, mol. wt. 290. After 1 more day the silicic acid was present as $8SiO_2.4H_2O$, mol. wt. 549. After 4 days the mol. wt. was 862. For many subsequent days the soln. seemed to contain a mixt. of differently aggregated acids. In the 45-day old soln. a silicic acid of mol. wt. 8260 seemed to be stable, but interpretation of the results for solns. of such high mol. wt. is uncertain. 0.001 N HCl sapond. the ester more slowly than did 0.002 N HCl, so that drops of unsapond. ester persisted for a considerable time. Local action at the surfaces of the drops tended to produce nonuniformity of the species of silicic acid mol. present in the soln. However, the 0.001 N HCl seemed to stabilize

the molecularly dispersed silicic acid less readily than did the 0.002 *N*, because the change in state of mol. aggregation was more rapid. Even so, the presence of silicic acids of mol. wt. 8260 and 32,870 were noted. Orthotitanic acid tetraethyl ester, dissolved in MeOH, was saponified in H_2O and in 0.001 *N*, 0.01 *N* and 0.1 *N* HCl. The dialysis coeff. indicated that titanic acid is capable of forming molecularly dispersed acids, but that they are only slightly stable and alter rapidly to colloidally dispersed TiO_2 hydrate. The soln. of sapond. titanic acid ester stiffens to a jelly after 6 to 22 hrs. Gelatinous silicic acid is formed as the result of the sapon. of Et orthosilicate in a mixt. of H_2O + EtOH (100:1), after several weeks, providing opportunity is afforded for the alc. to evap. Cf. *C. A.* **24**, 1812, 3191. R. H. LOMBARD

Changes in the viscosity of gelatin sols in the process of gelation. S. N. BANERJI AND S. GHOSH. *J. Indian Chem. Soc.* **7**, 923-31(1930).—Gelatin sols of various concns. (2–10%) were prepd. and divided into 2 parts. Part I was kept at 50° and part II was allowed to gel and then kept at 25°. Parts I and II were then brought to an intermediate temp. at which viscosity measurements were made with an Ostwald viscometer The viscosity of I increased and that of II decreased with time. Such effects are greatest near the gelation temp. Inoculation of gelatin sols near the gelation point with gel of the same concn. causes an abrupt increase in viscosity which is greater the nearer the temp. is to the gelation point. OSCAR T. QUIMBY

Simultaneous action of electrolytes and alcohol on gelatin below the isoelectric point of Michaelis. ST. PRZYLECKI. *Compt. rend. soc. biol.* **106**, 134–6(1931); of *Compt. rend. soc. biol.* **104**, 1079(1930).—In a study of the action of salts and acids on gelatin solns. to which alc. had been added the following results were obtained. (*1*) Action of acids: HCl impedes the coagulation up to a certain limit. The action of H_2SO_4 is much less marked. HCl added to the sulfate of the gelatin diminishes the H_2SO_4 coagulation. (*2*) (*a*) Action of salts on the chloride of gelatin: NaCl, $MgCl_2$, $CaCl_2$, $AlCl_3$ or $FeCl_3$ added in varying amt. to a soln. of 10 cc. of gelatin contg. 5 millimol. of HCl (p_H 1.8) causes no opalescence. $MgSO_4$, Na_2SO_4 or $Fe_2(SO_4)_3$ causes a strong coagulation in solns. varying from 0.5 to 6 millimol. The addn. of HCl to this gelatin does not affect the coagulation phenomena. If Na_2SO_4 is replaced by H_2SO_4 merely a simple opalescence is observed. The differences between the action of Na_2SO_4 and H_2SO_4 do not depend on the differences of p_H but on the differences of the influence of the particles of gelatin on the potential. The SO_4 ion perhaps causes this potential to fall below the minimum necessary to stabilizing the sol so that salts with multivalent cations protect the sol against the coagulation provoked by Na_2SO_4. (*2*) (*b*) Action of salts on the sulfate of gelatin: The coagulating action produced by large doses of H_2SO_4 is diminished by HCl, $MgCl_2$ or $AlCl_3$ (a peptizing action depending on the valence of the cation). ALBERT L. RAWLINS

Thermal disaggregation of gelatin. (Röntgenographic study of its degradation.) O. GERNGROSS, O. TRIANGI AND P. KOEPPE. *Ber.* **63B**, 1603-14(1930).—Electro-osmotically purified gelatin contg. 0.13% of ash is heated in Jena glass vessels in 25% soln. of exactly isoelec. reaction for 24, 72, 75 and 336 hrs. at 100° and 48 hrs. at 121°. Possible peptide degradation is examd. by measurement of increase of the free amino groups according to Van Slyke (*C. A.* **23**, 5207), by alkalimetric detn. of free carboxyl groups according to Willstätter and Waldschmidt-Leitz (*C. A.* **16**, 944), and by the CH_2O no. Phys. changes are followed by measurements of the viscosity of the solns. and observations on mutarotation and the gelatinizing power of the heated sols. Even after 75 hrs. at 100° there is no sign of a chem. valency degradation by rupture of peptide linkings, whereas the gelatinizing power is completely destroyed, the viscosity reduced to 18.8%, and the mutarotation to 28.4% of the initial value of the intact gelatin. Protracted heating at 121° or exposure for 336 hrs. at 100° causes distinct, true hydrolysis. In slightly acid soln. (p_H 1.8) much more pronounced peptide degradation is observed after 8 hrs. at 100°. On the basis of detns. of mol. wt. and x-ray diagrams, the following picture of the structure and thermolysis of gelatin is drawn. Intact gelatin gels consist of extended structures that arise from extra-mol. union of the gelatin particles. In aq. soln. of concn. lower than 0.5% at 20° these individual particles, according to the previous history of the prepns., have a mean mol. wt. of 50,000–90,000 if the reaction is isoelec. The particles undergo an almost completely reversible distribution into mols. of mean mol. wt. of a few thousands when the solns. are heated for a short period at 100°, but, even under these conditions, an irreversible change that reduces the mol. wt. of the intact material is also obvious. Protracted ebullition causes the formation of individual mols. (mean wt. 4500), which do not recombine to aggregates when cooled; the power of forming gels or viscous, adhesive solns. is lost. It is assumed that the mols. of the intact gelatin are not united to the structures of mol. wt. 90,000 by main

valency forces, but this is not established with certainty. Reaggregation of the thermolyzed particles is observed to a certain degree if the solns. are evapd. to dryness and the residue is dissolved in water. B. C. A.

Swelling of cellulose in perchloric acid. K. ANDRESS AND L. REINHARDT. *Z. physik. Chem.*, Abt. A, **151**, 425–32(1930); cf. *C. A.* **22**, 4795.—Adsorption of $HClO_4$ by cellulose from aq. soln. at 0° indicates that above the limiting concn., 9.3 *M*, an addn. product is formed, $2C_6H_{10}O_5.HClO_4$, which shows a characteristic Röntgen diagram, the elementary unit having the dimensions: $a = 16.5$, $b = 10.3$, $c = 10.7$ A. U., $\beta = 93°$. Below this concn. the product after being washed with water gave diagrams characteristic of the native fiber. At higher concns. esterification begins, and above 10.6 *M* the fiber is destroyed. W. L. HILL

Structure of the crystal lattice of cellulose. W. T. ASTBURY AND THORA C. MARWICK. *Nature* **127**, 12 3(1931).—It is reasoned from crystallographic data for native and hydrated cellulose and sugars, that the six-atom sugar ring in the cryst. state possesses certain approx. const. linear dimensions, and that at least one of these dimensions usually corresponds to one of the axial lengths of the unit cell. The structures of native and hydrated or mercerized cellulose may differ in that the plane of the hexagonal glucose residues in native cellulose lies parallel to the *a* axis, while in hydrated cellulose the plane of the rings lies more nearly parallel to the *c* axis C. J. HUMPHREYS

Cellobiosan and cellulose. K. HESS AND E. GARTHE. *Naturwissenschaften* **19**, 180–1(1931).—Freudenberg (*C. A.* **24**, 1213) claimed that the f. p. depressions of AcOH solns. of cryst. biosan acetate (Hess and Friese, *C. A.* **23**, 1118), which is identical with acetylcellulose II (by x-ray), are caused by heat losses due to retarded crystn. of the solns. Recent expts. on the velocities of crystn. indicate that Freudenberg's retardations depend on the choice of exptl. conditions (11° to 15° bath, 0.08° to 0.15° undercooling) which favor heat losses. If sufficiently great undercooling and a bath temp. equal to the "convergence" temp. are used (Raoult, Nernst, Abegg conditions) these abnormal delays do not occur. This reëstablishes the validity of the depressions previously measured. B. J. C. VAN DER HOEVEN

The change in x-ray spectrum of insulin on swelling in water. J. R. KATZ AND J. C. DERKSEN. *Rec. trav. chim.* **50**, 248–51(1931).—Inulin contg. amts. of water varying from the equil. moisture content in satd. air down to equil. over P_2O_5 at 100° was examd. with K_α rays from Cu. A distinct crystal pattern, made up of concentric rings, was obtained. The spectra for inulin satd. with water and air-dry inulin (15% water) are identical. As the moisture content is reduced below about 8%, however, the spectrum changes, both with respect to diam. of rings and their relative intensity. The change in spectrum is therefore connected with the first portions of water taken up by dry inulin, that is, with the first bend in the S-shaped hygroscopicity curve (*C. A.* **11**, 3141). Over much the greater portion of the hygroscopicity curve the spectrum remains unaltered. Conclusion: the swelling of inulin involves not only formation of shells of water around the micelles, but also an absorption of water within the crystal lattice. F. L. BROWNE

Preliminary study of the sol and the coagulum of ichthyocoll. H. G. BUNGENBERG DE JONG AND N. F. DE VRIES. *Rec. trav. chim.* **50**, 238–47(1931).—The ichthyocolla (I) was obtained as a white, amorphous product by extg. the drug ichthyocoll with hot water, centrifuging, filtering, adding enough NaOH to reduce the "alc. no." to a min., pptg., washing with alc. and drying in air. Warm water dissolves I completely. The 0.73% soln. at 37° obeys Poiseuille's law. The curve of p_H *vs.* viscosity is similar to that for gelation within the range p_H 1–4 but differs markedly above p_H 4. Between p_H 5 and 10 the curve for I is very flat, with a min. at p_H 8–9. Sols in the range p_H 6.7–9.3 become turbid on cooling, with a max. turbidity near p_H 9. The isoelec. point also lies between p_H 8 and 9. Above p_H 9 the viscosity increases to a relatively low max. at p_H 12. The viscosity of pos. sols at p_H 4.70, 3.16 and 1.51 is strongly affected by anions of electrolytes according to their valence, but is not affected materially by cations. At p_H 3.16 coagulation is brought about by 10 milli-equivs. of $K_3Fe(CN)_6$. Simple coagula of I can be prepd. with alc., resorcinol, $MgSO_4$, etc. Complex coagula with I as pos. component can be made with gum arabic, yeast nucleate, egg lecithin and soy-bean lecithin. Coagula with I as neg. component can be made with clupein. However, complex coagulation of I with gelatin does not result in aq. medium in the p_H range 5–9, where it was expected. The failure to coagulate is attributed to the flat course of the p_H-viscosity curve. The drawing together of the 2 sorts of particles under the influence of elec. forces is perhaps too weak to overcome their powerful solvation. F. L. B.

Actual prevision of the solubility of substances. FREITAS MACHADO. *Rev. brasil. chim.* **1**, 151–69(1929).—In studying the possibilities of prevision, consideration is

given to the chem. similarity of solvent and solute, the inorg. salts sol. in org. solvents, the soly. of deliquescent salts in alc., the soly. of various solid forms of the same substance, the electro-affinity and soly. of the salts, rule of Bodlaender and the difference in soly. of large and small crystals of the same substance. JOHN M. LADINO

Individuality of the osmotic coefficients for alkali halides. G. KARAGUNIS, A. HAWKINSON AND G. DAMKÖHLER. *Z. physik. Chem.*, Abt. A, **151**, 433–66(1930); cf. *C. A.* **25**, 632.—With the *thermoelec. app.* employed the max. variation in the f. p. detns. of aq. solns. below 0.1 *M* amounted to 0.0002°. The *concn. of* the *solns.* was *detd.* with an *interferometer*, the procedure for its *calibration* being fully described. The calcd. max. error in the mol. lowering of the f. p. is const., 0.2%, for solns. above 0.1 *M*, and is 1–2% for 0.01 *M* solns. Accordingly, the f. p. detns., over the range 0.002–3.0 mol./1000 g. H_2O, were made on KCl, RbCl, CsCl, LiF, NaF, KF, RbF, CsF and NaI, from which the osmotic coeffs. were calcd. and compared. W. L. HILL

The freezing of dilute undisturbed solutions. V. GIAMBALVO. *Z. tech. Physik* **12**, 111–3(1931).—The temp. of max. d. (t_m) decreases faster than the f. p. (t_0) with increasing wt. of solute in water. If t_m and t_0 are plotted against p, parts by wt. of solute per 100 of solvent, the 2 lines meet at a point a. For a soln. freezing in a cylindrical vessel with a nonconducting bottom, 2 typical cases are possible depending on whether $p > a$ and $t_m > t_0$ or $p < a$ and $t_m < t_0$. The form of the ice on the walls was checked for each case with NaCl solns. ARTHUR FLEISCHER

Vapor pressure and heat of dilution. VII. Vapor pressures of aqueous solutions of sodium hydroxide and of alcoholic solutions of calcium chloride. AILEEN M. HAYWARD AND E. P. PERMAN. *Trans. Faraday Soc.* **27**, 59–69(1931); cf. *C. A.* **21**, 1387.—The vapor pressure of NaOH solns. in Ag tubes was detd. by the dynamic method at 30°, 40°, 60°, 70° and 80°. The same method was used for the $CaCl_2$-EtOH solns. from dil to nearly satd. at 20°, 30°, 40°, 50° and 60°. The heat of diln. and the osmotic pressure were calcd., the former agreeing well with exptl. data. ARTHUR FLEISCHER

The determination of molecular weights from dialytic coefficients. H. BRINZINGER AND W. BRINTZINGER. *Z. anorg. allgem. Chem.* **196**, 33–43(1931); cf. *C. A.* **24**, 3695.—The dialytic coeff. k is defined by the equation $c_t = c_0 e^{-kt}$ in which c_0 is the initial concn. and c_t the concn. t min. later. Certain membranes give characteristic values of k such that $k\sqrt{\text{mol. wt.}} = \text{const.}$ With a cellophane membrane (quality 300, Kalle & Co.), the values of this const. deviated from the mean by less than 5% over the mol. wt. range 46(EtOH) to 504 (raffinose). Relatively large amts. of impurities have little influence upon k. Except when the solute is monodisperse (in which case k is independent of time), k decreases with time. A description of the method and app for detg. k are given. Mol. wts. can be detd. in much less time by dialysis than by diffusion. OSCAR T. QUIMBY

(Molecular weight) measurements by the dialytic method. Enzymic decomposition of starch and thermal decomposition of dextrin in the presence of acids. H. BRINTZINGER AND W. BRINTZINGER. *Z. anorg. allgem. Chem.* **196**, 50–4(1930); cf. preceding abstr.—A clear aq. soln. contg. 0.30% starch was treated with diastase and stored at 30°. Addn. of 0.01 g. diastase to one l. of soln. caused the mol. wt. to decrease from 22,900 (at 20 min.) to 450 in 312 hrs. When 0.1 g. diastase was added to one l. soln. the starch was reduced to the maltose stage (mol. wt. 342) in 38 hrs. Two l. of 0.30% dextrin soln. was acidified with 5 cc. of 0.2 *N* HCl and heated at 100° for 860 hrs. During this time the mol. wt. was reduced to about 180, but the solute was not yet monodisperse, *i. e.*, the dialytic coeff. was still decreasing with time. OSCAR T. QUIMBY

The determination of the degree of association of isopoly-acid ions with the aid of dialytic coefficients. H. BRINTZINGER AND W. BRINTZINGER. *Z. anorg. allgem. Chem.* **196**, 55–60(1931); cf. preceding abstracts.—By applying the rule (dialytic coeff.) $\sqrt{\text{mol. wt.}} = \text{const.}$, the ionic wt. of the tungstate ion in aq. $NaNO_3$ solns. was detd. as a function of p_H. Similar detns. were made with molybdate ion in aq. NH_4NO_3 or $NaNO_3$ solns. The results, tabulated below, are in harmony with those of Jander (*C. A.* **24**, 1810).

Type of salt	p_H range	Complexity of ion
Tungstate	4.5–6.5	Hexa
"	6.5–8–0	Mono
Molybdate	1.0–1.8	Dodeca
"	1.8–4–7	Hexa
"	4.7–6.2	Tri
"	6.2–8.0	Mono

OSCAR T. QUIMBY

Electrolyte–water systems. Distribution of the ions of two salts after diffusion through a membrane. H. BRINTZINGER AND W. BRINTZINGER. *Z. anorg. allgem. Chem.* **196**, 61–4(1931); cf. preceding abstracts.—In a soln. of a binary salt the dialytic coeffs. of the anion and cation are necessarily equal (if the concn. is expressed in mols). However, if the soln. contains 2 salts, the faster anion and faster cation tend to pass through the membrane together and, in general, each ion will have a different dialytic coeff. Thus, with tenth-normal solns. and a cellophane membrane, the following coeffs. were obtained: for LiCl and K_2SO_4 in solns. contg. a single salt, 0.739 and 0.574, resp.; for Li, K, Cl and SO_4 ions in a soln. contg. all 4 ions, 0.409, 0.728, 0.882 and 0.361, resp. With 0.1 *N* solns. and a parchment membrane, the following coeffs. were obtained: for LiCl and KI in solns. contg. a single salt, 0.165 and 0.274, resp.; for Li, K, Cl and I ions in a soln. contg. all four ions, 0.142, 0.301, 0.205 and 0.219, resp. O. T. Q.

Experiment to show the removal of ions in double decomposition. FRANK D. MCCLELLAND. *J. Chem. Education* **7**, 1579(1930).—The reactions are carried out in an ordinary cond. cell in which the decompn. of the electrolyte is indicated by the glowing of an elec. lamp. ANN NICHOLSON HIRD

Conductivity data of aqueous mixtures of hydrogen peroxide and organic acids. W. H. HATCHER AND M. G. STURROCK. *Can. J. Research* **4**, 35–8(1931).—Cond. changes on adding H_2O_2 to aq. solns. of formic, acetic, propionic and glycolic acids were observed. Propionic acid gave a sudden increase in cond. on adding H_2O_2, which became const. within 3 hrs. The other 3 acids gave a sudden sharp decrease followed by a gradual increase to a const. value within 4 or 5 hrs. The const. values attained indicated the presence of peracids whose cond. is of the same order as that of the complexes supposed to be formed during the oxidation. J. W. SHIPLEY

The conductivity of electrolytes in nitromethane. C. P. WRIGHT, D. M. MURRAY-RUST AND HAROLD HARTLEY. *J. Chem. Soc.* 1931, 199–214.—The elec. conductivities of LiCNS, NaCNS, KCNS, NH_4CNS, $LiClO_4$, NH_4ClO_4, $TlClO_4$, $AgClO_4$, $HClO_4$, LiI, KI and Et_4N nitrate, iodide, thiocyanate and picrate were measured at 25° in 0.0001–0.002 *N* nitromethane (I) soln., by Frazer and Hartley's method (*C. A.* **20**, 136). Of these electrolytes, only the Et_4N salts show a linear relation between Λ_0 and $\sqrt{c}$; the other solutes give curves represented by the empirical equation: $\Lambda_c = \Lambda_0 - xc^{2/3}$. Extrapolating these curves, the following Λ_0 values are obtained.

Salt	Λ_0	Salt	Λ_0	Salt	Λ_0
KI	122	$AgClO_4$	116.5	$N(C_2H_5)_4CNS$	119.7
LiI	117.5	$TlClO_4$	124.5	$N(C_2H_5)_4ClO_4$	113.4
KCNS	130	NH_4ClO_4	128.5	$N(C_2H_5)_4NO_3$	114.3
$NaClO_4$	122.5			$N(C_2H_5)_4I$	111.2
		($HClO_4$)	127	$N(C_2H_5)_4Pic$	93.5

The observed and calcd. (from the Debye-Hückel-Onsager equation) results for the Et_4N salts agree closely, showing little tendency to ionic assocn. in soln. Those salts that deviate greatly from the ideal are probably highly assocd. This ionic assocn. is not entirely controlled by the elec. forces between the ions. $HClO_4$ is a strong electrolyte in I, while H_2SO_4, HCl, HNO_3, etc., are very weak electrolytes therein. On the addn. of H_2O to I the elec. cond. of electrolytes that deviate widely from the ideal is increased greatly. At 25°, the soly. of H_2O in I is 2%, while the soly. of I in H_2O is 10%. The d. and viscosity of I at 25° are 1.1312 and 0.00627, resp. J. BALOZIAN

The conductivity of electrolytes in nitrobenzene. D. M. MURRAY-RUST, H. J. HADOW AND HAROLD HARTLEY. *J. Chem. Soc.* 1931, 215–19; cf. preceding abstr.—The elec. conductivities of 0.0001–0.002 *N* nitrobenzene (II) solns. of Et_4N picrate and perchlorate, $AgClO_4$ and $HClO_4$ were measured at 25°. As an ionizing agent II behaves similarly to CH_3NO_2, but very differently from hydroxylic solvents. The deviation of each of the electrolytes from the ideal is somewhat greater in II than in CH_3NO_2, indicating that in the former the tendency for ionic assocn. is greater. Et_4N picrate and perchlorate are strong electrolytes, and give Λ_0 values that closely approx. the ideal. These 2 salts give results that agree with those calcd. from the Debye-Hückel-Onsager equation, while those for $AgClO_4$ do not agree. $HClO_4$ is an electrolyte intermediate in strength between the Et_4N and the Ag salts, being appreciably assocd. in II solns. It is a much stronger electrolyte than any other acid, approx. cond. measurements for HCl, $C_6H_5SO_3H$ and trinitrobenzoic acid showing that these are only very slightly dissocd. Extrapolation to infinite diln. of the graph of Λ_0 against $\sqrt{c}$ give the following values for Λ_0; Et_4N picrate = 32.7; Et_4N perchlorate = 37.6; $AgClO_4$ = 38.4; $HClO_4$ = 43. J. BALOZIAN

Influence of the strength of aromatic amines on their reactions. EDUARD HERTEL AND KURT SCHNEIDER. *Z. physik. Chem.*, Abt. A, **151**, 413–9(1930).—Cond. curves were obtained for aniline-HCl (I), α-(II) and β-naphthylamine (III), 4-bromo(or chloro)-1-naphthylamine (IV) and 1-bromo(or chloro)-2-naphthylamine (V) in acetone-water soln., and for the same compds. with the addn. of free amine until further addns. were without effect. Accordingly, if the capacity of the amine to bind H-ions be taken as a measure of its strength, II and III are strong, IV is medium strong and V is weak. The addn. reaction between amines and phenol derivatives in pure acetone as measured by a similar cond. method in conjunction with mol. wt. detns. indicate the same order of reactivity. In the addn. of phenol derivs to amino groups in the crystal lattice the bond, —O—N—, is favored, while the weak ones favor the bond, —N—C—. Medium strong amines with medium strong phenol derivs. yield *complex isomers* (*C. A.* **21**, 1802). The reactivity of amines with ethers (*C. A.* **25**, 855) is parallel with their capacity to add H-ions. W. L. HILL

The relative strengths of bases in non-aqueous solutions. III. ERIC I. JOHNSON AND JAMES R. PARTINGTON. *J. Chem. Soc.* **1931**, 86–92.—The influence of dimethyl-, diphenyl-, phenylmethyl- and γ-pyrone on the rate of esterification of $PhCH_2CO_2H$ in alc.-HCl soln. is studied by calcg. the ratios of the equil. consts. for the formation of complex ions between the H-ion and by each pyrone and by H_2O, resp., applying Lapworth's theory (*C. A.* **3**, 738). The reaction is retarded in the order given by the following compds., H_2O, γ-pyrone, diphenyl-, phenylmethyl- and dimethyl-pyrone, the last named having the greatest effect. Alc. free from aldehyde, ketone and NH_3 is prepd by refluxing 96% spirit for 6 hrs. with half its vol. of well-burnt lime and 2 sticks of NaOH per l., distg. into a flask contg. a lime and soda mixt., refluxing again, distg. into a dry flask the exit of which is guarded with a $CaCl_2$ tube, dropping clean, fresh Ca turnings into it, letting stand for a day, refluxing for 6 hrs., distg. off through a 12-bulb fractionating column and collecting the middle fraction. The esterification is slightly accelerated by small amts. of benzil and furan, and not affected by small amts. of dipropyl and diisopropyl ethers and glycerol. J. BALOZIAN

The dissociation of strong electrolytes in nonaqueous solution. RUDOLF SCHINGNITZ. *Z. Elektrochem.* **36**, 861–74(1930).—The data on nonaq. solns. are reviewed. The Nernst-Thompson rule is valid for all solvents investigated. A more quant. relation for solvents whose dielec. const. is above 6.7 is given by the equation: $1 - \alpha = 65.7 (D\Lambda_\infty \eta_\infty \sqrt{v})$. The behavior of the cond. found by Martin (cf. *C. A.* **23**, 1802), which leads to the assumption of incomplete dissocn., appears to be generally true for other solvents. This action is shown by the fact that the curves for $\sqrt{c}$ are higher than would be expected from the assumption of complete dissocn. On the other hand, the influence of dielec. const. and of ionic charge follow closely the Debye-Huckel theory. Likewise the values of the coeffs. are proportional to the square root of the concn. JOHN R. HILL

The problem of electrolytic dissociation. KARL FREDENHAGEN. *Z. physik. Chem.*, Abt. A, **152**, 321–79(1931).—The true state of affairs does not agree with the assumptions that (*a*) the dissocg. compds. are composed of charged particles held together by *Coulomb forces;* (*b*) the solvents exert a dielec. action on the solutes, according to their dielec. const.; (*c*) ions in soln. are solvated gaseous ions. Dissocn. and soly. do not run parallel to the dielec. const. of the solvent. The electrostatic theory of *electrolytic dissocn.* is untenable. A new theory is proposed. Electrolytic dissocn. is caused by the selective chem. affinity of the solvent's secondary valence forces for the polar components of the solute. A thermodynamic relation between dissocn. in the gaseous and liquid phases is given, by means of which liquid dissocn. may be calcd. from the dissocn. in the gas phase and the distribution no. The new theory reconciles the contrast between strong and weak electrolytes, explains the *dissocn. of pure solvents and molten salts*, focuses attention on *soly. forces* and the *mechanism of electrolytic conductance.* FRANK URBAN

Simple deposition of reactive metals on noble metals. A. S. RUSSELL. *Nature* **127**, 273–4(1931).—U, Ti, W and Mo are deposited on a Hg surface, as expected according to the Nernst theory of electrode potential, when acidified solns. of their salts are shaken with Hg amalgam. The presence of the very slight concn. of metal is detected by their catalytic effect on the evolution of H_2 from H_2SO_4 solns. by pure Zn. The deposited metals are quite insol. in Hg. ARTHUR FLEISCHER

Contact potentials. I. Measurement of the contact potential between metals and insulators. FREDRICH POLEDNIK. *Z. Physik* **66**, 619–31(1930).—The potentials between certain metals and glass and quartz were detd. by an electrometer method.

A filament of glass or quartz in a clip of the metal being investigated, was held between charged plates and the deflection measured. From standardizations with known charges contact potentials were calcd. for Pt, Fe, Cu, Au, Ag, Al, Mg, Zn, Pb and Sn against quartz as +2.22, 1.99, 1.60, 1.60, 1.42, 0.93, 0.93, 0.45, 0.16 and —0.30; against glass +1.15, 1.15, 0.58, 0.58, 0.58, 0.14, 0.14, —0.29, —0.60 and —1.14 v. These potentials were a function of the m. p. of the metals. **II. The potential difference between salts and their saturated solutions.** MARIANNE LEDERER. *Ibid* 632–45.—An electrometer, in which quadrants cut from salts moved over satd. solns., permitted measurement of the charge of the double layer for pairs of salts. The contact potential for solid salt against satd. soln. was —0.18 ± 0.08 v. for NaCl-KCl, —0.04 ± 0.07 v. for NaCl-$NaNO_3$ and —0.21 ± 0.06 v. for $NaNO_3$-$Ba(NO_3)_2$. L. P. HALL

The theory of Nernst. OSCAR DE SOUZA VIEIRA. *Rev. brasil. chim.* **1**, 193–200 (1929).—Nernst's theory is outlined with particular attention to the difference of potential created between the electrode and the saline soln. In the case of $ZnSO_4$ with a Zn electrode the osmotic tension of the ions emitted by the electrode is added to the tension of the preëxisting ions, in order to equalize the tension of the soln. of the metal. The effect of high concn. and successively decreasing concn. in a series of solns. is also discussed. The results conform to the Nernst formula for calcg. the p. d. J. M. L.

The propagation of flame in electric fields. I. Distortion of the flame surface. ERNEST M. GUÉNAULT AND RICHARD V. WHEELER. *J. Chem. Soc.* **1931**, 195–9.—The effect of an elec. field on the shape and speed of the flame-surface during its propagation is studied. The gaseous mixts. (CO and air or O_2 dried over $CaCl_2$ and H_2SO_4), contained in a spherical explosion-vessel of glass, were ignited electrically, and a photographic study (by the "snapshot" method of Ellis and Robinson, *C. A.* **19**, 2747) made of the flame spread, with and without an elec. field (3000 and 5000 v./cm.). The field was produced between two parallel plates of a condenser, placed at the center of the vessel. Photographs show that the normal symmetry of the flame spread is destroyed by an elec field. As soon as the flame touches the condenser plates the system tends to discharge itself, the elec. field being almost entirely destroyed and consequently the flame-surface suffering distortion. The photographs indicate that the movement of the flame-surface may be due to the movement of the heavy pos. ions dragging the flame-surface with them. Transverse to the field there is no change in the rate of growth of the flame, while longitudinally to it the speed of the flame is apparently increased toward the neg. plate of the condenser by the elec. field. J. BALOZIAN

Periodic process in a chemical reaction. W. T. GIBSON. *Nature* **127**, 13(1931).—The peculiar manner of slow oxidation of the K layer in a photoelec. cell that had developed a leak in the glass bulb contg. the material is described. Instead of oxidizing uniformly, sharply marked rings were attacked first. The rings were roughly circular with centers at the crack. These rings remained visible throughout the entire oxidation process. C. J. HUMPHREYS

Chemical reaction between metallic magnesium and salt solutions. (Quantitative Part, II.) ICHIRO IITAKA. *Tetsu-to-Hagané* (*J. Iron and Steel Inst. Japan*) **16**, 1056–63 (1930).—Metals of the alkali and alk. earth groups undergo hydrolysis in acids of concn. less than 10^{-3} *N*, instead of forming salts of the acid. The present paper deals with Mg in dil. HCl, the Cl^- concn. of which is kept at 10^{-2} *N*. The concn. of H^+ was varied from 0 to 10^{-13}. Conclusions: The reaction velocity diminishes with diminution of H^+, but does not vanish when H^+ becomes 0. The velocity remains const. between H^+ = 10^{-4} and 10^{-11}, being independent of H^+. Therefore, hydrolysis must take place here, too, though some replacement of H^+ by metallic Mg occurs, especially when the soln. is stirred. The stirring effect is explained by auto-catalytic action, forming an unknown compd. between Mg, H_2O and Cl^-. Cf. *C. A.* **25**, 863. M. KURODA

The study of chemical reactions from potential-energy diagrams. AXEL R. OLSON. *Trans. Faraday Soc.* **27**, 69–76(1931).—Potential-energy diagrams for *cis-trans* isomers are used to predict the effect of temp., pressure, solvents and light frequency on the stability. ARTHUR FLEISCHER

The decomposition tension of anhydrous uranyl nitrate and of anhydrous thorium nitrate. P. MISCIATELLI. *Gazz. chim. ital.* **60**, 882–5(1930).—Anhyd. $UO_2(NO_3)_2$ was prepd., not by the method of Markétos (*Bull. soc. chim.* **11**, 244(1912); *C. A.* **6**, 3376) or of de Forcrand (*C. A.* **9**, 1882) but by treating $UO_2(NO_3)_2.6H_2O$ with liquid N_2O_5 by the procedure used by Guntz and Martin with $Mn(NO_3)_2$ and $Cu(NO_3)_2$ (cf. *C. A.* **4**, 427). The *app.* is described and illustrated. According to the literature pure anhyd. $Th(NO_3)_4$ has not been prepd. heretofore except in an expt. by Kolb, which could not be repeated (cf. *C. A.* **8**, 306). In the present work, a product contg. only 0.6% excess N_2O_5 and no H_2O was obtained. The tensions corresponding to the equil.:

$Th(NO_3)_4 \rightleftharpoons ThO_2 + 4NO_2 + O_2$ and $2UO_2(NO_3)_2 \rightleftharpoons 2UO_3 + 4NO_2$ were measured by the dynamic compensation method of Centnerszwer and Krustinson (*C. A.* **21**, 689; Crustinson, *Acta Univ. Latviensis* **17**, 665(1928)). Following are the temps. and the pressures (mm. of Hg), resp.: $UO_2(NO_3)_2$, 87°, 95; 131°, 157; 141°, 119; 150°, 340; 160°, 540; $Th(NO_3)_4$, 124°, 82; 134°, 119; 145°, 119; 161°, 359. The same results were obtained with partially decompd. nitrates and with those contg. only 4% N_2O_5. Therefore in this thermal decompn., basic salts are not formed and 2 phases are present in the systems at equil., *viz.*, anhyd. nitrate and oxide. From the decompn. tensions the heats of decompn. can be calcd. by the approx. formula of Nernst. For $UO_2(NO_3)_2$, Q has a mean value of 39,442 and for $Th(NO_3)_4$ a mean value of 81,828. C. C. DAVIS

Reduction of nitric acid by nitric oxide. I. Equilibrium. HANS BODE. *Z. anorg. allgem. Chem.* **195**, 195–200(1931).—The equil. const. for the reaction $H^+ + NO_3^- + 2NO + H_2O \rightleftharpoons 3HNO_2$ was detd. by measuring the pressure of NO above the system. Activities of the HNO_3 are considered. Av. results: K_{298}, 29.4; K_{308}, 50.8; K_{318}, 80.1. **II. Electrochemical potential.** *Ibid* 201–6.—Measurements of the e. m. f. of the equil. system, HNO_3–HNO_2–NO gives as the normal potential for the reaction $NO + NO_3^- \rightleftharpoons 2NO_2^- + \oplus$, 0.517 ± 0.003 v. and for the reaction $NO + 2H_2O \rightleftharpoons NO_3^- + 4H^+ + 3\oplus$, 0.960 v. WILLIAM E. VAUGHAN

What are chain reactions? R. H. CRIST. *J. Chem. Education* **8**, 504–9(1931).—Consecutive reactions that repeat their cycle many times after being initiated are called chain reactions. Several examples are given, such as the reactions between H_2 and O_2, the formation of HCl from H_2 and Cl_2 and the thermal and photochem. formation of HBr. These require an initial process yielding an "active" substance that proceeds through a set of individually known or assumed consecutive reactions to the regeneration of the active product, which repeats the process. The termination of a chain occurs when one of the components of the set is removed permanently or suffers an energy loss sufficient to prevent its continued reaction. In case the number of chains initiated per unit time is greater than the no. of those terminated the reaction may increase to explosive proportions. Chains may be initiated by a variety of methods, photochem., particle and electron collisions, and chem. The photochem. equivalence law affords a means of estg. the number of chains started. R. H. CARTER

A pressure stabilization process for crystalline hydrates. MAURICE AUMERAS. *Compt. rend.* **192**, 229–31(1931).—The equil. conditions under which $Na_2SO_4.10H_2O$ can be kept in hydrated state for an indefinite period of time were investigated. This hydrate can be maintained in a desiccator contg. H_2SO_4, provided the concn. of the H_2SO_4 is such that its vapor pressure is between that of a satd. soln. of Na_2SO_4 and the dissocn. pressure of the hydrate $Na_2SO_4.10H_2O$. Below 30° variations in temp. do not affect the hydrated state of the Na salt. 24.26% H_2SO_4 is the optimum concn. M. MCMAHON

The dissociation of mercuric halides. H. BRAUNE AND S. KNOKE. *Z. physik. Chem.* **152**, 409–31(1931).—The dissocn. of HgI_2, $HgBr_2$ and $HgCl_2$ was measured over a wide temp. range. Heats of formation from the equil. measurements were compared with the calorimeter detns. and were found to agree well. By comparing the measurements with theoretical calcns. of the equil., the moment of inertia of the halides was detd. On the basis of fixed assumptions as to sp. heat, values were obtained which for HgI_2, $HgBr_2$ and $HgCl_2$ are in the proportion 1:0.48:0.22, which is in close agreement with data estd. from gas kinetic data. The app. used is similar to that used with NH_4Cl (*C. A.* **22**, 3570). M. MCMAHON

Statistical treatment of reaction-velocity data. I. Critical review of current methods of computation. LOWELL J. REED AND EMERY J. THERIAULT. *J. Phys. Chem.* **35**, 673–89(1931).—The usual methods of computing rate consts. is reviewed Unimolecularity of rate cannot be tested by the consistency of a series of K values The least-squares procedures described in chem. literature are not applicable to unimolecular data. Systems of weighting unimolecular const. are inapplicable in presence of const. errors. S. LENHER

The solution velocity of oxygen in water. IV. SUSUMU MIYAMOTO AND AKIRA NAKATA. *Bull. Chem. Soc. Japan* **6**, 9–22(1931); cf. *C. A.* **25**, 635.—O_2 gas was passed into a stirred vessel contg. Na_2SO_3 soln. The rate of oxidation of the Na_2SO_3 was independent of the concn. of the Na_2SO_3 and dependent only on the surface area exposed and the temp. (The rate of stirring was const. and only pure O_2 was used.) The theory is proposed that only those mols. of O_2 dissolve whose component of velocity normal to the surface is greater than a threshold value about 3.4 times the root mean square velocity. T. H. CHILTON

Kinetics of heterogeneous formate formation. GUSTAW BIRSTEIN AND NIKOLAUS

LOBANOW. *Z. anorg. allgem. Chem.* **195**, 173–94(1931).—The rate of reaction between aq. HCHO solns. and NaOH in equiv. amts. in the presence of CuO was measured at temps. of 0° and 20°. The total reaction is as follows: $HCHO + NaOH + {}^1/_2CuO \longrightarrow {}^1/_2Cu + HCOONa + {}^1/_2H_2 + {}^1/_2H_2O$. In the presence of CuO the reaction is autocatalytic. An induction period of 20 to 70 min. was noted; the variation depends upon temp. and concn. The reaction apparently is an absorption process, which depends upon the surface of the catalyst. When there are equiv. amts. of HCHO and NaOH the reaction obeys the equation $dx'/dt = ka'^{1/2}x'(1 - x')^{1/2}$. Temp. coeffs. were detd. When either HCHO or NaOH is present in excess, the reaction follows the equation $dx'/dt = kax'(1 - x')$. WILLIAM E. VAUGHAN

Rates of intramolecular change between ammonium thiocyanate and thiourea. WM. URE AND T. BENTLEY EDWARDS. *Trans. Roy. Soc. Can.* [3], **24**, Sect. 3, 153–9 (1930).—The reaction $NH_4SCN \rightleftharpoons CS(NH_2)_2$ in ethylene glycol was studied at 178.8° and 184.3° and over a 5-fold range in concn. The reaction is not as simple in the presence of solvent as it is in its absence. Complicating side reactions are indicated by the fact that the value of K representing the ratio $\frac{CS(NH_2)_2}{NH_4SCN}$ does not remain const. at const. temp but decreases with decreasing total concn. J. W. SHIPLEY

Effect of sodium salts of monohydroxy acids on the rate of saponification of methyl acetate by sodium hydroxide. F. L. ALLEN. *Trans. Faraday Soc.* **26**, 527–33(1930).—The hydrolysis of AcOMe in 0.0125 *N* soln. by NaOH at 20° is markedly retarded by Na salicylate at a concn. of 0.1 *N* or even 0.05 *N*, and Na glycolate, mandelate, lactate, β-hydroxy-β-phenylpropionate and α-hydroxy-β-phenylpropionate at a concn. of 0.1 *N* have a similar, but much less pronounced, effect. The position of the OH and Ph groups in the salt mol. bears little relation to its retarding action, which is ascribed to the formation of H ions by ionization of the OH group. By means of this assumption the dissocn. const. of the OH group can be calcd. from the velocity data, the neutral salt effect apparently being small. B. C. A.

The complexity of sulfur trioxide. A. SMITS. *Z. physik. Chem.* **152**, 432–50 (1931).—Previous results of investigation of the SO_3 system (*C. A.* **19**, 1213; **20**, 3107) are reviewed in detail. There are 3 solid phases α, β and γ; the α and β modifications are metastable and the γ modification is stable. It was shown experimentally that the α and γ modifications are mixed crystals of pseudo-components. The mixed crystals of γ form behave like a mixt. The α modification, in extremely dry state, behaves somewhat like the γ modification. X-rays show not only the inner equilibrium but also the change from metastable form to stable modification. M. MCMAHON

An allotropic transformation of calcium in the solid state. E. RINCK. *Compt. rend.* **192**, 421–3(1931).—Heating and cooling curves for Ca exhibit a horizontal portion that reveals a point of transition between 2 solid forms of Ca. Below 450° the stable form is α-Ca; between 450° and the m. p. at 848° the stable form is β-Ca. The curve of elec. resistance *vs.* temp. exhibits a break at 450°. The change from β- to α-Ca involves contraction in vol. Attempts to retain β-Ca at room temp. by rapid cooling were unsuccessful. F. L. BROWNE

Investigation of the system: bismuth–selenium. N. PARRAVANO AND V. CAGLIOTI. *Gazz. chim. ital.* **60**, 923–33(1930).—Thermal analysis and micrographic studies of the system: Bi–Se, have already proved the existence of Bi_2Se_3 and BiSe (cf. *C. A.* **7**, 3103). Since bivalent Bi compds. are not known otherwise, it was of interest to confirm the existence of BiSe by x-ray examn. Alloys from Bi 63.50, Se 36.50 to Bi 89.10, Se 10.82 were studied, as well as Bi and Se themselves. The spectrographs are reproduced and the results are tabulated. For Bi, the lattice const. a_0 is 4.531, which agrees well with the 4.539 value of Davey (cf. *C. A.* **19**, 2891). For Se, the lattice const. is 4.360 (rhombohedric), in good agreement with the 4.379 value of Olshausen (cf. *C. A.* **20**, 131). Prepd. artificially, Bi_2Se_3 differs from the natural product in that it shows trigonal symmetry, with an axial ratio c/a of approx. 1.68. Its a_0 value is 6.702 and 5.382 (rhombohedric), its exptl. d. 7.398 and the nos. of mols. in the hexagonal and rhombohedric cells are 3 and 1, resp. BiSe gave c/a = 1.60, a_0 = 5.021 and 3.846 (rhombohedric) and exptl. d. =7.98, with 3 mols. and 1 mol. in the hexagonal and rhombohedric cells, resp. The röntgenographs of Bi_2Se_3 and BiSe are very similar in the succession, general character and intensity of the interference lines, which suggests similar structures. The closeness of the axial ratios suggests solid solns., *i. e.*, BiSe is the limiting case of a solid soln. of Bi in Bi_2Se_3. Neither hypothesis can, however, be valid, not only because of the thermal analysis and x-ray diagrams, but because BiSe lacks certain interference lines and shows other lines which mark it as a distinct compd. Moreover there is no gradual displacement of the lines in the various alloys, and all of the latter show their 2

spectra superposed. The powder method did not allow a decision as to the similarity of structure of Bi_2Se_3 and BiSe. C. C. DAVIS

The two-component system: iron–vanadium. FRANZ WEVER AND WERNER JELLINGHAUS. *Mitt. Kaiser-Wilhelm Inst. Eisenforsch. Düsseldorf* **12**, 317–22(1930).—The liquidus-solidus curves correspond to those of other investigators, showing a min. at 1468° with 31% V. The α-mixed crystals from 0° to 100% V are cubic centered with lattice parameters that increase from 2.86×10^{-8} cm. for 0 atom % V to 2.89×10^{-8} for 50 atom % and 3.04×10^{-8} for 100 atm. %, thus departing from Vegard's law. The γ-Fe field is bounded by a closed curve beginning at 1400° extending to 1.15% V and 1150° and then back to 900°. The α-mixed crystals are transformed at 1234° to a homogeneous, friable crystal mass that corresponds to FeV. This combination dissolves both Fe and V. The crystals are non-magnetic at room temp. V at first increases the magnetic transformation temp. and then decreases it after passing a max with 17% V, and approaches room temp. with 58% V. H. C. DUUS

Making a three-component liquid-vapor chart. JOHN HAPPEL AND JOHN GRISWOLD. *Chem. Met. Eng.* **38**, 92–3(1931).—An alignment chart is described from which the vapor-liquid equil. relation may be detd. for a 3-component system. A chart for benzene, toluene, and xylene at one atm. is given. L. W. T. CUMMINGS

The system: water–potassium nitrate–calcium nitrate. MOHAMMED ABDUL HAMID AND RAM DAS. *J. Indian Chem. Soc.* **7**, 881–2(1930).—The isotherm was detd. at 25°. The soly. of KNO_3 is 27.30 and that of $Ca(NO_3)_2$ 57.98 g. per 100 g. soln. O. T. Q.

The acid-basic-catalysis according to J. N. Brønsted. I. M. KOLTHOFF. *Chem. Weekblad* **28**, 110–21(1930); cf. *C. A.* **24**, 3697.—A review. E. SCHOTTE

Thermal dissociation. J. KRUSTINSONS. *Acta Univ. Latviensis Kim. Fakultat Serija* **1**, Fasc. 1, Burtnica, (in German, 63), (in Lettish 29–62)(1929).—Dissocn. phenomena of Tl_2CO_3, $LiNO_3$, $NaNO_3$, KNO_3, $RbNO_3$ and $CsNO_3$ are discussed. The isochores of liquid compds. between 200 and 900 mm. approach a straight line. Single compds. with a common ion dissolved in Tl_2CO_3 show a mol. raising of the dissocn. temp. Nitrates dissolved in the corresponding nitrite show a strong initial rise. Binary mixts. of unlimited soly. show a min. dissocn. temp. dependent upon the mol. compn.

ANN NICHOLSON HIRD

Refrigerants show similarities (STARR) **13.** Obtaining anhydrous $AlCl_3$ from natural Al-containing raw materials (SPITZVIN, GVOSDEVA) **6.**

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WELD, LEROY D., AND PALMER, FREDERIC, JR.: **A Textbook of Modern Physics.** 2nd ed., revised. Philadelphia: Blakiston. 743 pp. $3.75.

3—SUBATOMIC PHENOMENA AND RADIOCHEMISTRY

W. ALBERT NOYES, JR.

Recent advances in science: physics. L. F. BATES. *Science Progress* **25**, 383–9 (1931).—A review is given of recent work on α-particles, ionic mobilities and related subjects. JOSEPH S. HEPBURN

Analytic atomic wave functions. C. ZENER. *Phys. Rev.* **36**, 51–6(1930).—Math. BERNARD LEWIS

The specific charge of the electron according to wave mechanics. FRITZ SAUTER. *Naturwissenschaften* **19**, 165–6(1931).—The suggestion of Page (*C. A.* **24**, 5602; *Phys. Rev.* **36**, 1418(1930)) explaining on the basis of wave mechanics the difference between spectroscopic and magnetic values of e/m is erroneous (cf. also Eckart, *Phys. Rev.* **36**, 1014, 1514(1930); Uhlenbeck and Young, *Phys. Rev.* **36**, 1721(1930)) B. J. C. VAN DER HOEVEN

Interaction between excited and unexcited hydrogen atoms at large distances. E. C. KEMBLE AND F. F. RIEKE. *Phys. Rev.* **36**, 153–4(1930).—Quantum mech. calcns. on the energy of different quantum states are given. The exact first-order computations of Kemble and Zener (*C. A.* **23**, 4878) are extended to internuclear distances R = 5, 6, 7, 10. BERNARD LEWIS

Calculation of energy values. C. ECKART. *Phys. Rev.* **36**, 149–50(1930).—Calcd. by a modification of the Ritz method for characteristic nos. in quantum dynamical problems, the results are given for the $2P$ and $3D$ states. BERNARD LEWIS

Physical and chemical principles that underlie the interpretation of novae. A. C. GIFFORD. *Scientia* **49**, 169–82(1931).—A crit. review of existing theories of the formation of novae. G. finds the only satisfactory explanation to be that they arise from the grazing collision of 2 stars. J. B. AUSTIN

Stellar structure. F. A. LINDEMANN. *Nature* **127**, 269(1931).—The assumption of a temp. of mc^2/k in the inside of a star is not necessary to explain the generation of energy by the annihilation of matter. In stars the important factor is the rate at which protons and electrons disappear as radiation. If an equil. state is attained matter can be annihilated in stars with interiors at temps. of 1.1×10^{13}°. A. F.

A new measurement of the temperature in the arc. ALFRED V. ENGEL AND MAX STEENBECK. *Naturwissenschaften* **19**, 212–3(1931).—By detn. of the weakening of an x-ray passing through hot arc gases the d. of the gas and hence its temp. for known pressure is calcd. The x-ray intensity decreases for density δ by $I/I_0 = e^{-al\delta}$ for α the (known) absorption coeff. and l the electrode distance. For air at atm. pressure the measurements were made with 1600 to 3300 v., 1 ma., Cu anode, x-radiation filtered through 7μ Al and passed through a 1.5-mm. hole in the water-cooled Cu electrode of the arc. Through an aperture in the other arc electrode the x-ray reaches a Geiger point counter (p = 100 mm. Hg). The d. c. arc with stabilization was rectilinear inside a 5-cm. glass tube. The gas d. was found by measuring the no. of counter impulses on evacuating the cold arc tube and recording the d. at which the no. of impulses equaled that from the hot arc. With proper corrections for edge effects, etc., was found from 45,000 counted impulses a gas temp. of the 2-amp. air arc of 5250° abs. (±300°). A measurement by the carbon pencil method in the middle of the arc gave 3100° abs. The former figure is considered to be better. B. J. C. V. D. H.

A charge exchange effect during the passage of protons through helium. R. DÖPEL. *Naturwissenschaften* **19**, 179–80(1931).—A study of the passage of H canal rays through He revealed a charge exchange effect. The canal ray is deviated by passing through condensers K_1 and K_2 and subsequently its energy is measured. For a no. of protons n_1 at K_1, n_2 at K_2 will hold $n_2 = n_1 e^{-\alpha a}$ with α a measure for the active radius for charge exchange, a the condenser distance. It is assumed that the He pressure is low enough to prevent repeated charge exchanges of the neutral atoms between K_1 and K_2. The active radius α has been detd. as a function of the proton

velocity v. α increases with decreasing v and decreases again after reaching a max. at about 10^8 cm. per sec. (analogous to the Ramsauer effect). B. J. C. v. D. H.

Mobility of sodium ions in hydrogen. L. B. LOEB. *Phys. Rev.* **36**, 152–3(1930).—The mobilities of Na^+ ions were measured in purified H_2. It is found that within 2×10^{-8} sec. after their liberation the ions have more than twice the mobility of the normal ions. BERNARD LEWIS

Electron diffraction. F. KIRCHNER. *Physik. Z.* **31**, 1025–8(1930); cf. *C. A* **24**, 5602.—Electron diffraction patterns are sharper than x-ray patterns, because the nucleus governs the scattering of electrons, and the electrons affect the scattering of x-rays. In electron diffraction patterns the 2nd-order spectra due to the (111) planes of NaF are not entirely extinguished, since the nuclear charges of Na^+ and F^- are unequal. Debye-Scherrer diagrams due to electrons diffracted by comparatively large crystals sometimes show interference points at the ends of a diam. of one or more of the rings. These can be ascribed to a mosaic-like structure of the crystal. Sublimation under vacuum of $HgCl_2$ from a heated Pt strip to a celluloid surface gives a cubic instead of a rhombic crystal. Diffraction by gaseous N, O or CO_2 gave patterns in accord with Debye x-ray patterns. A. L. HENNE

Electron diffraction and molecular structure. R. WIERL. *Physik. Z.* **31**, 1028 (1930).—This is a detn. of the distance between at. nuclei in a mol. as measured by electron diffraction. In CS_2, the distance S-S is 3.20 A. U.; in CO_2, O-O is 2.26 A. U., in N_2O, N-N is 2.38 A. U.; in SO_2, the distance S-O is doubtful, on account of the triangular shape of the mol.; the value 1.37 A. U. is proposed. A. L. HENNE

Emission of electrons caused by an electric field when the surface of a metal is exposed to the light. L. ROZENKEVICH. *J. Russ. Phys.-Chem. Soc.*, Phys. Pt., 62, 229–30(1930).—It is pointed out that a study of the emission of electrons caused by an elec. field when a metal is exposed to the light may lead to a new conception of electronic energy. V. VESSELOVSKY

The photoelectric effect from sodium chloride in various gases. N. GUDRIS AND L. KULIKOVA. *J. Russ. Phys.-Chem. Soc.*, Phys. Pt., 62, 247–50(1930).—The photoelec effect from dielectrics is highly stimulated by the presence of the vapors with high dielec consts. in the vicinity of the surface investigated. It seems that the mols. of such gases having a high dipolar moment may disengage ions from the surface of the crystal. When the vapors dissolve the crystal (water vapor) this can also take place inside the lattice, which would also increase the intensity of the photoelec. current. In the other gases the photoelec. effect is similar to that in air. V. VESSELOVSKY

Photoelectric effect and electron reflection at hydrogenated potassium surfaces W. KLUGE AND E. RUPP. *Physik. Z.* **32**, 163–72(1931).—An app. is described which permits photoelec. and electron-reflection measurements to be made on the same K surface. The surfaces studied were: pure K, K in H_2 atm. (I), K subjected to weak glow discharge in H_2 (II), and K subjected to strong glow discharge in H_2 (III). The colors of these layers were: K, metallic; I, metallic; II, reddish violet; and III, greenish With the pure K surface, the voltages causing max. electron reflection corresponded to planes in the K lattice only. With I only electron-reflection max. for KH were observed. With II and III max. for both K and KH were observed, those for KH predominating in the case of II. In all cases the photoelec. effect showed a pronounced max. in the region 4000–4500 A. U. This "selective" effect increased in the order K, I, III, II. The electron-reflection max. led to a value 7.3 v. for the inner potential of K and 5.4 A. U. for the lattice const. of KH (assumed cubic). O. T. Q

A thermal theory of cathodic disintegration. H. P. WARAN. *Phil. Mag.* [7], 11, 397–404(1931); cf. *C. A.* **16**, 1043; **17**, 3643.—The sputtering of cathodes is due to the evapn. of small masses of metal under localized intense heat due to proton bombardment. The observed relative sputtering of various metals agrees qualitatively with those expected from the thermal conductivities of the metal and gas surrounding the cathode, the sp. heat of the metal and the gas, the gas pressure, metal d., b. p. and latent heat of the metal. ARTHUR FLEISCHER

Measurement of capacity for reflection of glowing tungsten in the ultra-violet part of the spectrum. E. SPILLER. *Z. Physik* **64**, 39–42(1930).—The relative intensities of emission at different wave lengths from a lamp with a W filament heated to 2873° abs. were found, a special microphotometer being used. The emission departs from blackbody radiation. The energy distribution was measured over a wave-length range of 400–340 mμ. The values of the emission coeff. for wave lengths from 436 to 270 mμ for a filament at 2100° abs. are tabulated. B. C. A.

Photo-ionization of salt vapors. A. TERENIN. *Phys. Rev.* **36**, 147–8(1930).—The photo-ionization of the halides of Th was investigated with wave lengths longer than

1850 A. U. The ionization and dissocn. energies and the stability of the neutral and the ionized mol. are discussed. The photo-ionization decreases from the iodide to the chloride. BERNARD LEWIS

A theory of the arrangement of protons and electrons in the atomic nucleus. WENDELL M. LATIMER. *J. Am. Chem. Soc.* **53**, 981–90(1931).—A model of the nucleus is proposed in which the protons and electrons are held in a definite space lattice. Because the most stable nuclei contain 4, 7, 10, 12 and 14 α-particles, L. suggests a tetrahedral arrangement of these α-particles, which themselves are considered to be tetrahedral arrangements of 4 protons about an electron pair. This model satisfies the requirements of quantum mechanics for vector combination. E. J. ROSENBAUM

Theory of the emission of electrons by α-particles. H. C. BRINKMAN AND H. A. KRAMERS. *Proc. Acad. Sci. Amsterdam* **33**, 973–84(1930).—Math. G. M. E.

Pleochroic "giant" halos in cordierite. M. S. KRISHNAN AND C. MAHADEVAN. *Indian J. Physics* **5**, 669–80(1930).—Several "giant" halos having radii 0.050 and 0.063 mm., which are larger than those for normal-range α-particles, were found in a cordierite-gneiss from Madura. These large rings are ascribed to long-range α-particles from Ra C′ and Th C′ which have a theoretical penetration in cordierite of 0.052 and 0.064 mm., resp. J. B. AUSTIN

The content of radium in oil-well waters in the district of Grozny. V. G. KHLOPIN AND B. A. NIKITIN. *Compt. rend. acad. sci. U. R. S. S.* **1930A**, 393–8.—The authors give a detailed analysis of the Ra content of the oil-well waters of the district of Grozny. The waters have a very high content of Ra, which indicates a possibility of obtaining Ra from this source on a com. scale. L. JACOVLEFF

The radioactivity of oil-well waters. V. I. VERNADSKII. *Compt. rend. acad. sci. U. R. S. S.* **1930 A**, 399–401.—The content of Ra in the oil-well waters of the district of Grozny reaches 1.2×10^{-8}%. V. discusses the possible origin of the Ra and concludes that the origin of Ra in this district is due to biochem. processes. L. JACOVLEFF

Modification of quanta by photo-ionization. S. BHARGAVA AND J. B. MUKERJIE. *Nature* **127**, 273(1931); cf. B. B. Ray, *C. A.* **24**, 3705, 4213, 5608.—The spectrum of Cu $K\alpha_1$, α_2 radiation after passing through 1 mm. thickness of paraffin showed a modified line on the long wave length side sepd. by the approx. distance $\Delta\nu = R$. The quantum may on its passage through at. shells impart any part of its energy to the electron from $h\nu_k$ to $h\nu$ and be modified from ν to the frequency range $\nu - \nu_k$ to zero. *Ibid* 305.—The emergent ray from Ag $K\alpha$ radiation passed through 0.06 mm. thickness of Ni foil showed a modified band at $\nu/R = 1019.7$. The ν/R of Ag $K\alpha$ radiation minus the ν/R of the expt. is 612.9, which checks Siegbahn's value of 612 for Ni. This supports the view that quanta are modified as previously described. A. F.

Raman lines in x-ray spectra. GEO. A. LINDSAY. *Nature* **127**, 305(1931); cf. preceding abstr.—Displacement of Cu K lines on passing through graphite and amorphous C, as reported by the preceding investigators, could not be reproduced. ARTHUR FLEISCHER

The most penetrating component of cosmic radiation (Hess radiation). E. REGENER. *Naturwissenschaften* **19**, 177–9(1931).—Data are given on cosmic-radiation measurements under water (*C. A.* **23**, 2648). B. J. C. VAN DER HOEVEN

Breadth of Compton modified line. J. W. M. DUMOND. *Phys. Rev.* **36**, 146–7 (1930). BERNARD LEWIS

Spectral lines obtained by the method of convergent x-rays. T. FUJIWARA. *Mem. Coll. Sci. Kyoto Imp. Univ.* **13A**, 303–6(1930); cf. *C. A.* **23**, 1811.—A detailed study of the spectral lines produced by fine single-crystal wire is presented. B. C. A.

X-ray structure investigations. SCHIEBOLD AND H. REININGER. *Giesserei-Ztg.* **26**, 634–41, 666–72(1929).—The production and characteristic properties of x-rays and their application to structure analysis are reviewed. MALCOLM DOLE

The lattice distance and the reflecting power for x-rays of bismuth relative to the cleavage planes. E. ADINOLFI. *Rend. accad. sci. Napoli* [3], **36**, 69–75(1930).—A new procedure is described for detg. the lattice distances of crystals by Bragg's method. Direct comparison is made with the lattice distance of calcite relative to the (100) planes, which has been taken as the basis for spectrometric measurements. By this procedure the lattice distance for Bi atoms in (111) planes was detd. to be 3.970 A. U. The structure factor of calcite is const., whereas that of Bi, for the same range of frequencies, increases with diminishing wave length of the radiation used. This indicates that increasing the frequency increases the no. of electrons of Bi which participate in the phenomenon of reflection. This method of the direct comparison of 2 crystals results in increased precision, in detection of parasitic lines and in greater exactness

in the study of the relative reflecting power of the 2 crystals in a given spectral region. R. H. LOMBARD

The construction of an experimental x-ray tube to furnish the homogeneous *K* radiations of uranium. WARNFORD MOPPETT. *J. Cancer Research Comm. Univ. Sidney* **2**, 147–52(1930).—Constructional details of the app. are given and the method of operating it is described. G. SCHWOCH

Partial absorption of x-rays. B. B. RAY. *Z. Physik* **66**, 261–8(1930).—The Compton effect is studied by means of CuK_α, NiK_α, Ni$K_{\beta 1}$, W$K_{\alpha 1}$ and Fe$K_{\beta 1}$ radiation sent through C, N and O. A possible mechanism for the Raman effect is worked out at some length. GREGG M. EVANS

The paramagnetism of polychromates. FRANCIS W. GRAY AND JOHN DAKERS. *Phil. Mag.* [7], **11**, 297–314(1931); cf. *C. A.* **24**, 5613.—The mol. susceptibilities were detd. in the app. of Gray and Dakers (cf. *Phil. Mag.* [7], **9**, 81). The values ($\times 10^6$) are K_2CrO_4 0.0, $K_2Cr_2O_7$ + 54.0, $K_2Cr_3O_{10}$ + 95.0, $K_2Cr_4O_{13}$ + 193.0, CrO_3 + 41, Na_2CrO_4 + 19.4. The av. susceptibility of CrO_3 in solns. with 1 mol. CrO_3 to from 39.27 to 18.89 mols. H_2O was +0.39. A small paramagnetism due to the interchange of electrons and consequent fluctuations of angular momentum gave the best interpretation of the exptl. results. ARTHUR FLEISCHER

A synchronous film drum for recording periodic spectra. DONALD C. STOCKBARGER AND CARL G. SELIG. *Rev. Sci. Instruments* **2**, 211–6(1931). E. H.

Studies in peculiar stellar spectra. I. The manganese lines in α Andromedae. W. W. MORGAN. *Astrophys. J.* **73**, 104–17(1931).—The spectrum of α Andromedae is of Class A_0p, the peculiarity being due to the presence of many lines of ionized Mn. An examn. at the Yerkes Observatory of spectrograms of stars belonging to Classes B_8 to A_0 has revealed the presence of enhanced Mn lines in 13 other stars. The lines probably belong to Mn III, indicating that the element is present in the 2nd stage of ionization. If the high abs. magnitudes of these stars are taken into consideration the presence of enhanced Mn lines seems to be a normal feature of their spectra, the lines reaching their max. in stars of Class B_9. C. C. KIESS

Influence of an inhomogeneous electrical field upon the fine structure of hydrogen-like atoms. SISIRENDU GUPTA. *Z. Physik* **66**, 246–56(1930).—The frequencies and intensities of the lines for the inhomogeneous Stark effect are derived math. and the sepn. is found to be of the order of 0.001 A. U., even for a field gradient of 10^6–10^7. This sepn. is so small as to be discernible only as a slight broadening of the lines. GREGG M. EVANS

The radiation emitted by compressed substances under high potentials. ISAY A BALINKIN. *Phil. Mag.* [7], **11**, 315–22(1931); cf. Reboul, *C. A.* **21**, 20.—The expts of Reboul were repeated for compressed potash alum, NaCl and other powders. The factors controlling the emission were the applied potential, relative humidity, size of cryst. grains and the pressure used in compressing the powders. The very absorbable radiation is due to the escape of air from the bottom of the cell and belongs to the same class as "Entladungsstrahlen." ARTHUR FLEISCHER

Experimental evidence for the existence of quadripole radiation. R. FRERICHS AND J. S. CAMPBELL. *Phys. Rev.* **36**, 151–2(1930).—The green auroral line at 5577 A. U. was found to be resolved into 4 components by means of the Zeeman effect. This indicates that the line is quadripole radiation. BERNARD LEWIS

Regularities in the second spectrum of xenon. C. J. HUMPHREYS, T. L. DE BRUIN AND W. F. MEGGERS. *Bur. Standards J. Research* **6**, 287–93(1931).—The ground doublet ($^2P°_{1/2}$, $_{3/2}$) in the spectrum of ionized Xe (Xe II) has been identified; the levels are sepd. by 10,540 wave nos. This spectral term has been connected with others which combine so as to give most of the intense lines in the visible Xe II spectrum. The abs. values of the terms have been fixed by extrapolating series-forming terms to their limits, and from these spectroscopic data the ionization potential of Xe^+ is found to be about 21.1 v. W. F. MEGGERS

A study of stellar hydrogen lines and their relation to the Stark effect. C. T ELVEY AND O. STRUVE. *Astrophys. J.* **72**, 277–300(1930); cf. *C. A.* **24**, 3950.—The contours of the H absorption lines in early-type stars have been detd. from microphotometer measurements of stellar spectrograms. The lines exhibit extensive wings which are evidence for the existence of a Stark effect. The theoretical contour of a line subject to an elec. field in an atm. in which the pressure increases with depth is detd. and is found to be very similar to those actually observed. C. C. KIESS

Probabilities of recombination into the 1^2S state of cesium. C. BOECKNER. *Bur Standards J. Research* **6**, 277–85(1931).—Measurements are made of the intensity distribution in the continuous emission band, appearing at the 1^2S series limit of Cs, a

low-voltage thermionic discharge in the vapor is used as a source. The wave-length range covered lies between the series limit 3184 A. U. and about 2750 A. U. The methods of photographic densitometry are employed, a W-strip lamp in quartz being used as a comparison source. From the variation of intensity with wave length and the velocity distribution of the discharge electrons are computed the relative probabilities of recombination of free electrons into the 1^2S state as a function of their initial velocities. Previous work has shown that the probability of recombination into the 2^2P and 3^2D states of Cs varies approx. inversely as the square of the velocity of the free electron, a relation which is also predicted by quantum mechanics for recombination into any level of a H atom. The present measurements show that the probability of recombination into the 1^2S Cs level falls off much more rapidly with the velocity; for electron energies greater than 0.15 v., more nearly as the inverse 4th power. W. F. M.

Structure of the iron spectrum. M. A. CATALÁN. *Anales soc. españ. fís. quím.* **28**, 1239–385(1930).—Previous data on the at. structure of Fe are summarized and new advances given. More than 2350 lines are classified in the spectrum of Fe I, in 304 levels. The most intense lines originate by addn. of a valence electron to the at. residue in one or both spark configurations $3d^64s$ and $3d^7$. Lines produced by a double jump are frequently intense. E. M. SYMMES

The raies ultimes in the arc spectrum of rhenium. HERBERT SCHOBER AND JOSEF BIRKE. *Naturwissenschaften* **19**, 211–2(1931).—The raies ultimes of the Re arc spectrum as observed from varying concns. of Re salt on C, *i. e.*, those lines that originally have the largest intensity, are at 3452.02, 3460.61 and 3464.87 A. U. Intensity and wave length are given for 23 other Re lines. B. J. C. VAN DER HOEVEN

Resonance radiation of manganese vapor. J. FRIDRICHSON. *Z. Physik* **64**, 43–7 (1930).—The fluorescence in satd. Mn vapor at 700–900° was examd., the light of the Mn spark being used for excitation. The triplets $1S-2P$ and $1S-2P'$ of the Mn spectrum correspond with the resonance lines. With rise of temp., and consequently less dense vapor, the triplet $1S-2P'$ becomes much more intense, whereas at a lower temp. only the triplet $1S-2P$ is found. The resonance lines found are in agreement with Catalan's analysis (*C. A.* **17**, 1586; **22**, 1901) of the Mn spectrum and indicate that $1S$ is the lowest state of the Mn atom. B. C. A.

Spectrum of the tungsten mercury arc. W. E. FORSYTHE AND M. A. EASLEY. *Phys. Rev.* **36**, 150–1(1930).—The pressure of Hg vapor in a Hg arc lamp is increased by external heating between W electrodes and the effect on the absorption bands in the region 2100–4000 A. U. is described. The absorption spectrum is compared with that of Hg in another quartz absorption cell. BERNARD LEWIS

Note on the spark spectra of chlorine. KIYOSHI MURAKAWA. *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) **15**, 105–9(1931).—About 30 lines between 2469 A. U. and 4695 A. U. are classified as members of the quartet system of Cl III. A few corrections and extensions of the analysis of Cl II, previously reported (*C. A.* **25**, 1157), are noted. C. C. KIESS

Spectrum of doubly ionized iodine. J. B. SETH. *Nature* **127**, 165(1931).—A short table is given of some new measurements on doubly ionized I in the visible and the ultra-violet regions. MALCOLM DOLE

Temperature classification of the stronger lines of columbium, with preliminary notes on their hyperfine structure. ARTHUR S. KING. *Astrophys. J.* **73**, 13–25(1931).—The spectra of Cb, as excited in arcs and in spark discharges, and in the vacuum elec. furnace at temps. ranging from 2500° to 2900°, were examd. in the region from 3094 A. U. in the ultra-violet to 6918 A. U. in the red. Temp. classifications have been detd. for 646 lines in this interval, of which approx. 200 appear with furnace excitation. The others, consisting of lines of both the neutral and ionized atoms, require the higher excitation energy of the arc and spark for their appearance. About 40% of the lines examd. are complex, the hyperfine structure consisting of 2, 4, 6, and in some cases, more components. C. C. KIESS

Calorimetric and electric measurements in the mercury arc. JÓZEF KAWA. *Sprawozdania i Prace Polski. Towarzystwa Fiz.* **4**, 27–58; *Chem. Zentr.* **1929, II**, 2979.—The Fe anode of a Hg-arc lamp of Pyrex glass was constructed in such a way as to serve as a calorimetric vessel, which was filled with H_2O. The Hg cathode and the glass wall of the lamp up to the anode were immersed in water in order to obtain const. temp. and const. Hg-vapor tension during the arcing period. The calorimetric measurements carried out with various c. ds. and arc lengths gave the following results with regard to the mechanism of the Hg arc. Ionization occurs in the 1st part of the pos. column on account of the greater field strength. The pos. and the neg. space charges are formed. Between these originates a reverse elec. field which brakes the speed of

the electrons accelerated in the 1st part of the column. Because of this also the heat formation at the anode is diminished. Between the pos. space charge at the front of the pos. column and the neg. space charge in the Faraday dark space an increased pos. field strength is developed. With further increase of the arc length, under suitable conditions, there occurs a 2nd max. These results are supported by spectroscopic investigations. The arc was mixed with some He, whose lines appear only in places of higher field strength on account of the higher excitation potential. G. SCHWOCH

Different spark spectra of mercury. R. RICARD. *Compt. rend.* **192**, 618–20 (1931).—A no. of new lines have been found in the spectrum of the electrodeless discharge in Hg. These lines fall into the 3 spectra, Hg II, Hg III and Hg IV. A no. of these lines in the Hg II spectrum can be interpreted by admitting the existence of doublets and quadruplets. J. R. ADAMS

Influence of pressure and temperature of added neon on the absorption in excited mercury vapor. OSAMU MASAKI. *Z. Physik* **66**, 229–40(1930).—Ne purified by passing over liquid air and through discharge tubes with Mg electrodes was circulated through an emission and an absorption tube contg. Hg excited by 10 ma. at 8000 v. The beam from the emission tube was split, one beam passed through the absorption tube, reunited in a spectrophotometer, and the absorption measured. The $2^3P_{0,1,2}$–2^3S transitions were studied. The absorption of lines 4047 and 5461 A. U. diminishes slightly with increasing pressure; 4358 shows a slight increase. A satn. is shown with increase in temp., 4358 and 4047 increasing toward about the same value, while 5461 decreases to reach a satn. value slightly under that of the others. GREGG M. EVANS

The crystal structure of parahydrogen at liquid-helium temperatures. W. H. KEESOM, J. DE SMEDT AND H. H. MOOY. *Nature* **126**, 757(1930).—See *C. A.* **25**, 873. A. L. HENNE

Spectroscopic isotope determinations. R. SCHMID. *Magyar Chem. Folyóirat* 36, 185–91(1930).—General description of present theory and methods. S. S. DE F.

The interpretation of molecular spectra. V. The excited electron terms of molecules with two equal nuclei (H, He, Li, N, O). F. HUND. *Z. Physik* **63**, 719–51 (1930); cf. *C. A.* **21**, 3310; **23**, 564. W. F. MEGGERS

A new band system of hydrogen and the conditions for its production. Z. BAY, W. FINKELNBURG AND W. STEINER. *Z. physik. Chem.*, Abt. B, **11**, 351–62(1931).—A strong condensed discharge ($^1/_2$ mf. capacity) produces a yellow band group of the many-lined spectrum and a no. of other strong lines, while the remaining many-lined spectrum vanishes. From the variation of intensity with gas concn. in the discharge tube it is concluded that the yellow group belongs to the H_2 mol. The group was not completely analyzed, because the weak lines were missing, but it appears to be 2-band systems with a common initial or final term. This term is not one of the known H_2 terms. The electron jump has the values 2.1 and 2.6 v., which excludes a transition between the 2nd, 3rd and 4th levels. J. B. AUSTIN

Some relationships between the continuous and the many-lined spectrum of hydrogen. I. YOSISIGE HUKUMOTO. *Science Repts. Tôhoku Imp. Univ.* **19**, 773–92 (1931).—The behavior of the H_2 spectrum under different conditions of pressure was observed and the relative intensities were estd. Most of the lines which are enhanced at high pressure when the continuous spectrum is intense are classified as the transitions $3^3\Pi \longrightarrow 2^3\Sigma$, $4^3\Pi \longrightarrow 2^3\Sigma$, etc. These exptl. facts favor the theory that the continuous spectrum arises in the transition from any one of the excited triplet levels to the unquantized ground state $1^3\Sigma$. W. F. MEGGERS

Nitric oxide δ-bands. R. SCHMID. *Z. Physik* **64**, 279–85(1930).—In order to produce the δ-bands of NO in sufficient intensity to be photographed special means of excitation must be used. With a Tesla app. and other devices for special excitation it was found possible to produce the bands in the afterglow in the production of active N mixed with air. The rotation analysis of the band δ(0.3) is given, and the rotation const. of the δ-bands for the $^2\Sigma$ initial level is calcd. to be $B_0 = 1.995$ cm.$^{-1}$. Also in *Matematik. és Természettudományi Értesetö* **47**, 534–42(1930). B. C. A

Nitric oxide β- and γ-bands. R. SCHMID, D. FARKAS AND T. KÖNIG. *Z. Physik* **64**, 84–120(1930).—The NO lines previously measured were classified and ordered. In this way some 3000 γ- and 1000 β-lines were arranged. The rotation and vibration consts. were in some cases calcd. afresh. The doublet splitting of the levels $^2\Pi_i$ was obtained as a function of rotational and vibrational states. The potential-energy curve for NO was obtained, as well as Condon's parabola. Also in *Matematik. és Természettudományi Értesetö* **47**, 485–532(1930). B. C. A

The structure of the spectra of sulfur. Contribution to the study of the relations between spectra of the same multiplicities. M. GILLES. *Ann. Phys.* **15**, 267–408

(1931).—Grating and prism spectrographs were employed to observe the spectra of singly and doubly ionized S from 2089 A. U. in the ultra-violet to 7634 A. U. in the red. The Zeeman effects of some of these lines have also been observed with fields of 31,700 gausses. These new observations together with other available wave-length data have permitted an analysis of S II into doublets and quartets, and of S III into triplets and quintets. For the most part the spectral structures which have been established in these spectra conform to the quantum-theoretical requirements. A few exceptions are noted. The terms of S III are compared with the corresponding terms of Si I and P II by means of the irregular-doublet law; similarly those of S II are compared with Cl III. Certain numerical relations between the sepns. of the terms of the isoelectronic systems N II and O III, and P II and S III are shown to correspond to the nuclear charges of the resp. ions. C. C. KIESS

High-frequency discharges in nitrogen in the presence of mercury. R. ZOUCKERMANN. *Compt. rend.* **192**, 409–11(1931).—The spectra of N in the presence of Hg were obtained by excitation with high-frequency currents ranging in wave length from 10 m. to 570 m. The spectra were principally the bands of N_2, N_2^+ and CN, and numerous lines of at. Hg. The neg. bands of N_2, corresponding to low vibrational quantum nos., were very feeble for high-frequency currents but became very intense for currents of frequencies corresponding to wave length 570 m. The neg. bands of high quantum nos. were apparently unaffected by changes in the exciting currents. The pos. bands always appeared strongly. Likewise the Hg lines representing the P ⟶ S transitions were unaffected, whereas those representing P ⟶ D transitions were more intense for the higher-frequency currents. C. C. KIESS

The band spectra of scandium, yttrium and lanthanum monoxides. WM. F. MEGGERS AND JOHN A. WHEELER. *Bur. Standards J. Research* **6**, 239–75(1931).—The ordinary arc spectra of Sc, Y and La show, in addn. to lines characteristic of neutral and ionized atoms, complex banded structures which are ascribed to a mol. compd. of the atoms with O. These bands have the same general appearance as those due to well-known diatomic mols. and are, therefore, attributed to ScO, YO and LaO, rather than to the chemically stable oxides Sc_2O_3, Y_2O_3 and La_2O_3. The band spectra of these oxides are so complex that the fine structure of the individual bands has not been sufficiently well resolved to permit analysis of the rotational energies; consequently only a description of band heads and their classification in various systems resulting from transitions between a no. of vibration levels of initial and final electronic states can be given. The ScO spectrograms showed 139 band heads which have been divided into 5 systems, the 0, 0 transitions being represented by band heads at I, 4857.79 A. U., 4858.09 A. U.; II, 6017.07 A. U.; III, 6036.17 A. U.; IV, 6064.31 A. U.; V, 6079.30 A. U. The YO spectrum closely resembles that of ScO; 120 bands have been described for YO and divided into 5 systems with 0, 0 transitions at I, 4817.38 A. U., 4818.20 A. U.; II, 5939.08 A. U.; III, 5972.04 A. U.; IV 6096.78 A. U.; V, 6132 06 A. U. The spectrum emitted by the LaO mol. is exceedingly complex; more than 300 bands have been observed. The analysis of LaO bands agrees in the main with that given earlier by Jevons (*C. A.* **23**, 5414). W. F. MEGGERS

Theoretical value of the fundamental vibration quantum for gaseous alkali iodides. H. J. VAN LEEUWEN. *Z. Physik* **66**, 241–5(1930).—A math. calcn. from the standpoint of wave mechanics, on the assumption that the cation is small with respect to the anion, and neglecting polarization effects. The fundamental frequency ω_e 10^{-13} in sec.$^{-1}$ is for LiI 9.59, NaI 4.99, KI 3.53 and RbI 2.57, which gives $\omega/(2\pi c)$ as 509, 265, 187 and 136, resp. These agree with expt. only in the case of the first 2. G. M. E.

Rotation oscillation spectrum of acetylene. I. Band analysis. K. HEDFELD AND R. MECKE. *Z. Physik* **64**, 151–61(1930).—In order to study the configuration and form of oscillation of simple gaseous mols. the spectrum of C_2H_2 has been investigated. The spectrum was photographed in the range 9000–7000 A. U. with large dispersion (2.6 A. U./mm.). Three absorption bands were found at wave lengths 7887, 7956 and 8520 A. U., of which the 1st was by far the most intense. The absorption lines were measured to 0.01 A. U. The spectrum was analyzed. The *P* and *R* branches were very simple, no fine structure of the lines being visible within the above limit of error. There were marked intensity changes. The simple structure of the bands leads to the conclusion that the 4 atoms of the mol. are arranged in a straight line, so that the method of rotation of a diat. mol. has to be dealt with. The fact that only 1 line [*P*(0)] is missing in the spectrum is in agreement with the usually accepted electronic structure of C_2H_2 and shows the analogy of the C_2H_2 mol. HC : CH to the N_2 mol. N : N. The moment of inertia of the mol. in the fundamental state is 23.509×10^{-40}. The nuclear distance for C—H is 1.08×10^{-8} cm., in agreement with that arrived at for the CH_4

mol. by a study of the Raman spectrum; the value for the C : C distance is 1.19×10^{-8} cm. These figures are considerably less than those for the diamond lattice. B. C. A.

Rotation oscillation spectrum of acetylene. II. Intensity measurements. W. H. J. CHILDS AND R. MECKE. *Z. Physik* **64**, 162–72(1930).—Accurate intensity measurements were made with the band at 7887 A. U., this being a $^1\Sigma - {}^{'1}\Sigma$ combination. The expected intensity changes for a combination of this type were found, the i factors (*i. e.*, transition probabilities) being for the R branch, $(J)i = J + 1$, and for the P branch, $(J)i = J$. Conclusions are reached concerning the nuclear spin of elements. The intensity ratio is 3:1. The odd J values must therefore have 3 times the wt., statistically, of the even J values. The nuclear spin of the H in the C_2H_2 mol. must be 0.5, while that of the C is 0. Summing up the results previously obtained for nuclear spins, it is pointed out that elements having at. wts. divisible by 4 (equal, say, to $4n$), have no spin. This is true for He, C and O. The elements with at. wts. equal to $4n + 1$ (hydrogen) have spins equal to 0.5. Elements with at. wts. equal to $4n + 2$ (nitrogen) have the spin 1. Elements with at. wts. equal to $4n + 3$ have the spin 1.5 (lithium). The elements Na, Cl and I also have spins greater than 1. This rule should be useful in dealing with isotopic elements. B. C. A.

Rotation oscillation spectrum of acetylene. III. Characteristic frequencies of simple symmetrical molecules. R. MECKE. *Z. Physik* **64**, 173–90(1930).—The characteristic frequency of a mol. may be regarded as being made up of 2 parts —a valency oscillation and a deformation oscillation. A no. of linear mols. are considered. Mols of this type possess $n-1$ valency oscillations, equal to the no. of valency linkings, and $n-2$ deformation oscillations. The sym. mols. of CO_2, N_2O, CS_2, C_2H_2, C_2N_2 and possibly also H_2O_2 are to be regarded as linear. The triat. mols. possess 2 valency oscillations, the size of which depends mainly on the oscillating masses and one deformation oscillation, parallel to the axis of symmetry, but in the case of a linear arrangement of atoms, it becomes a double oscillation perpendicular to the axis of the mol For tetraat. mols. (C_2H_2 and C_2N_2) there are two C.H oscillations, one (HC) : (CH), and 2 deformation oscillations perpendicular to the axis of the mol. For C_2H_4 there are four C.H oscillations, one (H_2C) : (CH_2) oscillation, and 5 deformation oscillations, of which one, as a pure C:C oscillation, is independent of the mass of other atoms and is found in all derivs. contg. the C:C linking. The 5 characteristic frequencies of C_2H_2 and the 9 of C_2H_4 are calcd. B. C. A.

The ultra-violet absorption spectra of the amides of α-methylbutenoic acids. A. CASTILLE. *Bull. sci. acad. roy. Belg.* [5], **16**, 811–6(1930); *Bull. soc. chim. Belg.* 39, 417–22.—The nitriles, amides and acids described by Bruylants, Ernould and Dekoker (*C. A.* **25**, 2116) were observed in hexane and aq. solns. The *cis*-nitriles absorbed less than the *trans*-, although the effect was reversed in the acids and amides. WALLACE R. BRODE

Some peculiarities of the Raman effect. ANTONIO CARRELLI. *Rend. accad. sci. Napoli* [3], **36**, 61–8(1930).—The Raman effect and the Tyndall effect were studied for benzene and CCl_4. The Raman rotation lines are emitted with less intensity than radiation due to Tyndall scattering. The intensity of a Raman line is about one thousandth of that of the Tyndall line. For substances having absorption in the ultra-violet the intensity of the Raman light increases with diminishing wave length more rapidly than required by the λ^{-4} law, which is valid for the Tyndall effect. Theoretical treatment is included. R. H. LOMBARD

Raman effect and constitutional problems. II. Cyanogen compounds. A. DADIEU. *Ber.* **64B**, 358–61(1931); cf. *C. A.* **24**, 4706.—Previous work on the structure of allyl mustard oil and of mustard oil is supported and the constitution of isonitrile is clarified in a series of investigations of cyanogen compds. Frequency data and relative intensities are tabulated. While the structure for mustard oil, $R.N{=}C{<}_{S}^{|}$, is substantiated, it is not correct from the standpoint of the electron theory of chem. valence. The constitution of isonitrile from Raman spectra agrees well with that formulated by Langmuir (*C. A.* **13**, 3065), $R.N \equiv C$. Analogous conclusions have been reached by other investigators (cf. *C. A.* **24**, 5018, 5732) by different exptl. methods. Since in the spectrum of CO there exists a frequency in the region of the 3-fold bond it is likely that in all other compds. with bivalent C there is an analogous structure, *e. g.*, fulminic acid and its salts. The constitution of HCN can be decided on the basis of Raman spectra. Frequencies of 2094, relative intensity 12 and 2062, 1/2, indicate both HCN and HNC, the iso compd. being present in the order of magnitude of 1/2%. A. S. S.

The Raman effect in certain substances with a new apparatus. B. VENKATESACHAR AND L. SIBAIYA. *Indian J. Physics* **5**, 747–54(1930).—A new app. was designed to meet the following requirements: (1) It must permit the use of solids; (2) it must use a strong ultra-violet line for excitation; (3) it must allow the use of elevated temps. This was accomplished by enclosing the specimen in a capsule which is placed in a fused silica tube which in turn is fixed inside a larger Pyrex tube. The exciting arc is formed in the annular space between the tubes. The temp. is changed by blowing heated air through the inner tube. With increasing temp. the lines become more diffuse and the intensity of the anti-Stokes lines is enhanced as is also that of the anti-Stokes side of the wings accompanying the unmodified lines. The spectra of calcite and aragonite are given. Halite and fluorite gave neg. results. C_2H_2 gas gives lines corresponding to the infra-red absorption bands at 2.45μ and 7.5μ. The band at 13.7μ has no corresponding Raman line. J. B. AUSTIN

The Raman spectrum of nitric oxide. F. RASETTI. *Z. Physik* **66**, 646–9(1930); cf. *C. A.* **24**, 5627.—NO appears to be the only chemically stable diat. mol. with a $^2\Pi$ term as its ground state. The Raman spectrum of NO was observed and shows a pair of lines sepd. by the same $\Delta\nu$ as are the components of $^2\Pi_{1/2}$ and $^2\Pi_{3/2}$, as detd. by observations on the absorption spectrum of NO. The Raman lines corresponding to the rotation spectrum of NO were also observed, and although only partially resolved, are in qual. agreement with those required by theory. C. C. KIESS

Raman effect in solutions of sodium nitrate of varying concentrations. V. STERLING AND E. R. LAIRD. *Phys. Rev.* **36**, 148–9(1930).—The Raman spectrum of 5, 10, 30% satd. solns. of $NaNO_3$ shows a line with a frequency difference of 1049 ± 6 cm.$^{-1}$. It is attributed to the NO_3 ion. BERNARD LEWIS

Studies in Raman effect. X. The Raman spectra of organic substances. A. DADIEU AND K. W. F. KOHLRAUSCH. *Sitzb. Akad. Wiss. Wien*, Abt. IIa, **139**, 459–72(1930); *Monatsh.* **57**, 225–40(1931); cf. *C. A.* **25**, 875.—Measurements of propyl-, diethyl-, diphenyl-, trimethyl- and triethylamines, aniline, formamide, dicyanodiamide, methylnitroamine, chloral, ethyl chloroformate, chloracetyl chloride, dimethyl and diphenyl ethers. The spectra of 16 amines are compared. L. ONSAGER

Raman effect in methyl halides. GAJENDRA NATH BALL. *Z. Physik* **66**, 257–60(1930).—The 2 bands at 16.8 and 19.6μ for CH_3Br and CH_3I which were beyond the range of Bennett and Meyer (cf. *C. A.* **23**, 2657) but which were predicted by them, have been found. Complete measurements to 0.001 mm. have been made of Raman spectra for all of the methyl halides, and are compared tabularly with B. and M. and Kohlrausch. GREGG M. EVANS

Raman effect in trimethylethylene. D. FRANKLIN AND E. R. LAIRD. *Phys. Rev.* 36, 147(1930).—Raman lines in trimethylethylene were found which correspond to infra-red lines at 3.44 ± 0.05μ and 8.4 ± 0.2μ. An anti-Stokes line was found at 8.4μ. BERNARD LEWIS

Raman spectra of organic sulfides. V. N. THATTE AND A. S. GANESAN. *Nature* 127, 306(1931).—The Raman spectra detd. are as follows, expressed in cm.$^{-1}$: Et_2S 652, 1061, 1282, 1439, 2923; allyl sulfide, 410, 588, 741, 917, 1011, 1101, 1210, 1291, 1312, 1420, 1534, 1636, 3007, 3088. The frequency 652 seems characteristic of satd. sulfides; the frequency 751 a characteristic of unsatd. sulfides A. F.

Color and constitution from the standpoint of recent electronic theory. IV. Various types of anomalous nitration; chelation; complex salt formation; unusual stability of substituted aminophenols; direct diacetylation of amines; inhibited hydrolysis of sulfonic acids; reaction of caustic potash with benzaldehyde. H. H. HODGSON. *J. Soc. Dyers Colourists* **46**, 183–8(1930); cf. *C. A.* **24**, 4223.—The reaction of HNO_2 with dimethyl-*p*-toluidine to give monomethyl-*p*-toluidine-*N*-nitrosoamine and 3-nitrodimethyl-*p*-toluidine is described and explained. It was observed in a series of isomeric and homologous compds. that the picrates in which the greatest salt formation occurred had the higher m. ps., while those where the union was of a more chelate type had lower m. ps. The anomalous behavior of the picrate of dimethyl-*p*-toluidine is explained. The direction of nitration of anilides and phenols, *o* or *p*, is detd. by the strength of the cation of the nitrating agent used. Strong cationoid reagents cause para nitration and weak ones ortho. The stability of the 3-halo-2(4, and 6)-aminophenols is considered to be due to the prevention of inner-salt formation by the constraint imposed on the electrons of the N by the halogens. The fact that acetylation of 2,6-dichloro-4-nitroaniline produces always the di- instead of the mono-acetylated product is explained by assuming a mol. rearrangement after the introduction of the first acetyl group which greatly facilitates further acetylation. The effect of other ring substituents on the case of hydrolysis of sulfonic acids is explained. The reaction of caustic potash with

BzH is explained by assuming the formation of an isomeride of benzoin which subsequently decomposes to form benzyl alc. and BzOH. T. G. HAWLEY

Chemical decomposition by radiation. G. HARKER. *J. Cancer Research Comm. Univ. Sidney* **2**, 111–8, 160–81(1930).—A review with bibliography. Radiation as applied in therapeutics is also discussed. G. SCHWOCH

Mechanism of the chemical action of x-rays in aqueous solutions. O. RISSE. *Strahlentherap.* **34**, 578–81(1929); cf. *C. A.* **24**, 5602.—Ultra-violet irradiation of water whether in presence or absence of O, did not lead to the formation of H_2O_2 unless Zn oxide was present; x- or β-irradiation of pure water leads, however, to its formation. H_2O_2 is decomposed by all 3 radiations. The reaction depends on the dissolved O; hence the presence of dissolved O in irradiated solns. may cause changes dependent on the primary formation of H_2O_2. The conversion of ferrous into ferric salts is an example. The mechanism of the formation of H_2O_2 is discussed. B. C. A.

A new method of preparation of phosphorescent zinc sulfide. JOSEF EINIG. *Chem.-Ztg.* **55**, 31(1931).—After illumination, ZnS becomes phosphorescent if it be otherwise as nearly pure as possible, but mixed with a small quantity of a heavy metal, particularly Cu, and heated to above 900° to convert the ZnS to cryst. form. Very nearly pure ZnS contg. less than 1/100,000 per 1000 parts of heavy metals does not phosphoresce. The amt. of Cu required to make ZnS phosphoresce is 0.00001–0.001 part; outside these limits there is no phosphorescence. The new process consists in purification of $ZnSO_4$ soln. by causing a slight pptn. by addn. of H_2S or Na_2S, then heating to ppt. all metal sulfides less sol. than ZnS. Sulfides more sol. than ZnS remain in soln. and can only be removed later, since they form during the reaction. ZnS so formed does not phosphoresce, but can be made to do so by addn. of the required amt. of Cu The product is superior in luminosity to the com. product. E. M. SYMMES

Extinction of fluorescence of solutions of dyes by electrolytes. A. V. BANOV *Z. Physik* **64**, 121–34(1930); cf. *C. A.* **24**, 2052.—The application of the theory of Vavilov concerning collisions of the 2nd kind to the extinction of fluorescence in solns of dyes by adding electrolytes does not agree fully with exptl. results. This leads to the search for some other cause of extinction which is to be found in the "salting-out" effect of the electrolyte on the dye. Exptl. work supports this view. Calcns. of the sum of the radii of the mol. of the dye and of the ion of the electrolyte give results in agreement with those arrived at by other methods. The extinction curves reveal a connection between the concn. of the electrolyte, c, and the intensity ratio after and before adding the electrolyte, which can be expressed in the form $L/L_o = e^{-k\sqrt{c}}$. B. C. A.

Photoreaction of hydrogen and iodine monochloride. S. E. ASHLEY AND WILLIAM WEST. *Nature* **127**, 308(1931).—Impurities reduce the rate to a small but measurable value, confirming Mellor and Iredale (cf. *C. A.* **25**, 1736) but not agreeing with Rollefson and Lindquist (cf. *C. A.* **24**, 4224; **25**, 1736). The photoreaction between CH_4 and ICl is very rapid. ARTHUR FLEISCHER

Photochemical kinetics of chlorine detonating gas. Oxygen-free gases. MAX BODENSTEIN AND WALTER UNGER. *Z. physik. Chem.*, Abt. B, **11**, 253–78(1930); cf. *C. A.* **8**, 452; **20**, 3646; **21**, 3527.—H was prepd. O-free by passage over heated Pd asbestos and diffusion through Pd. Cl was liquefied and swept out with pure H. Fractionation under low pressure was also used. The reaction between H and Cl was followed by the methods of Dux and Thon in a quartz vessel, illuminated with light of 4360 A. U. Without O the reaction followed the mass law, $d[HCl]/dt = k[H_2].[Cl_2]$ and considering the intensity, of the absorbed light $d[HCl]/dt = k.I.[H_2]$. The breaking of reaction chains by reactions on the vessel walls was found proportional to [Cl]. To account for this the hypothesis of diffusion of Cl atoms to the walls and recombination there appeared untenable. This effect was due to formation of a volatile compd. of Cl and Si from the container walls. The influence of temp. was studied from 30° to 167° by a streaming method. The effect of small amts. of O was further investigated. L. P. HALL

Cystine and its absorption spectra. D. BARNÉS. *Anales soc. espaü. fís. quím.* **28**, 1386–1406(1930).—A spectrographic study of the absorption spectra of cystine and alanine in HCl soln. was made by a sector photometer with a small quartz spectrograph to analyze the light absorbed by the amino acid in a Baly tube. The light source was a discharge through pure H_2 at a pressure to give a continuous spectrum. The results are shown graphically by plotting the mol. absorption coeff. against wave length. They agree with Ward (*C. A.* **18**, 1117) within exptl. error. Curves obtained with cystine and alanine are similar, and show no selective absorption. The alanine absorption begins further in the ultra-violet, and the curve is incomplete because of limited instrument sensitivity. Intensity of absorption increases with short wave lengths.

From the detn. of wave length at which absorption begins, energy of dissocn. or $h\nu$ = 4.9×10^{-12} ergs per mol., and the heat of dissocn. = 70,800 cal. per g.-mol., and for alanine $h\nu = 5.75 \times 10^{-12}$ and H = 83,000, resp. The structure of cystine is aliphatic. Cystine is more easily dissocd. than alanine. E. M. SYMMES

Absorption spectra of bibenzyl and its derivatives. MME. RAMART-LUCAS AND J. HOCH. *Compt. rend.* **192**, 53–5(1931).—Bibenzyl and its derivs., prepd. by the action of Mg or Na on BzCl or similar compds. gave compds. with 2 absorption bands, (*a*) between 3300 and 2700 A. U. and (*b*) between 2700 and 2300 A. U. Similar compds. prepd. by the action of $PhCH_2CH_2Br$ on benzene in the presence of $AlCl_3$ gave compds. with a band at 2700–2300 A. U. only. Further investigation showed band *a* to be due to stilbene. WALLACE R. BRODE

The action of radiation on colloids. III. Action of ultra-violet light on emulsions. P. C. SINHA AND B. G. GANGULI. *Kolloid-Z.* **54**, 147–50(1931); cf. *C. A.* **24**, 540, 5632.—Emulsions of C_6H_6, benzine and CS_2 in water with Na oleate as the emulsifier sepd. into 2 layers on illumination. The p_H of the illuminated emulsion increased, indicating that the breaking is due to a partial destruction of the emulsifying agent. A. F.

Colloidal nature of the coloring substance in colored rock salt. M. SAVOSTYANOVA. *J. Physik* **64**, 262–78(1930).—Mie's theory was applied to the system Na–NaCl, and the absorption and diffusion spectra for different particle sizes were calcd. and compared with the exptl. curves obtained for colored rock salt. The absorption spectra of the following kinds of colored salts were detd. by the spectrophotometer method: (*a*) natural blue salt, (*b*) additive (in liquid Na) colored salt and (*c*) salt obtained from yellow salt by the action of heat and pressure under the influence of light. The exptl. data agree with the assumption that the colors are due to particles of colloidal Na. Besides the absorption maxima due to the presence of colloidal Na, a further max. was found for yellow salt in the infra-red, the explanation of which is not clear. B. C. A.

The influence of light on the flocculation of colloidal solutions in fluorescent media. Role of antioxygens. AUGUSTIN BOUTARIC AND JEAN BOUCHARD. *Compt. rend.* **192**, 357–8(1931); cf. *C. A.* 1738.—In continuation of the work previously described, the parallelism between the effect of some electrolytes in depressing the fluorescence of fluorescein solns. and their effect on the flocculation of As_2S_3 sols by light in presence of fluorescein is studied. The difference Δt between the time required for flocculation in the dark and in daylight or ultra-violet is approx. proportional to the logarithm of the fluorescing power of the mixt. of fluorescein and the electrolyte. H_2SO_4 gives the greatest effect, LiCl none. Tannin, hydroquinone, phenol and cresol in presence of LiCl also reduce both fluorescing power and Δt. Fluorescing power was detd. by the fluorometer of Perrin. The possible biol. significance is discussed. K. V. T.

Luminescence analysis (BEUTEL, KUTZELNIGG) **26**. The molecular structure of diatomic gases (MAHANTI) **2**. The propagation of flame in electric fields (GUÉNAULT, WUFELER) **2**. Literature on the use of the x-ray (POLANSKY) **9**. Separation of salts of Ra and Ba (Ger. pat. 515,681) **18**.

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Concentrating radioactive substances. KURT WEIL and KURT PETERS. Ger. 518,205, Dec. 21, 1929. The concn. of active substance in radioactive carbonate mixts. is raised by fractional thermal decompn. followed by washing with water. Thus, a mixt. of $RaCO_3$ and $BaCO_3$ may be heated to 400° *in vacuo*, cooled and washed with hot water, a residue richer in Ra than the initial mixt. being obtained.

Activating metals or alloys. OSKAR RIED. Austrian 121,243, Sept. 15, 1930. Metals or alloys are subjected to radiations of suitable wave length, *e. g.*, to ultra-violet radiations, whereby they are physically and biologically activated. Numerous applications of the invention are mentioned. Thus, the growth of yeast may be influenced by effecting the cultivation in irradiated metal vessels, or the stability of milk under trans-

port may be improved by using irradiated metal cans, or butter or cheese may be packed in irradiated metal foil.

4—ELECTROCHEMISTRY

COLIN G. FINK

The institute for technical electrochemistry in the Berlin technische Hochschule. K. ARNDT. *Z. Elektrochem.* **37**, 218–21(1931). G. G.

The present development of the electrochemical industry and electrometallurgy in Italy. G. MORSELLI AND O. SCARPA. *Trans. 2nd World Power Conference* (Berlin) I, 299–305(1930). E. H.

The application of electric heat in industry. H. NATHUSIUS, *et al.* *Trans. 2nd World Power Conference* (Berlin) I, 390–428(1930). E. H.

Theoretical consideration of the oxidation of pig iron during its transformation into steel. MIKIO MUKOHYAMA. *Tetsu-to-Hagané* (*J. Iron and Steel Inst. Japan*) **16**, 1041–57(1930).—From the mass-action law, M. deduced the formula for the equil. const., $K' = dx/dt \cdot (1/(a + K'-x)(b-x))$, where x is the density of C at time t, a and b are the initial contents of FeO and C, resp., and M is the diffusivity of FeO when no reaction occurs. To eliminate M, he obtained an approx. value of $K' = 1/t \cdot \log_e b/(b-x)$. Expts. were undertaken to obtain values for b. After heating the mixt. of pig and hematite in a resistance furnace and an induction furnace, the products were examd. by chem. analysis and microscopic observation. Results showed that $K' = 0.060$ at 1450° and 0.066 for 1500° in the induction furnace and 0.069 and 0.067, resp., for the resistance furnace. M. KURODA

High-frequency induction furnaces for making tool steel. J. A. SUCCOP. *Metal Progress* **18**, No. 6, 40–4(1930).—A review. W. A. MUDGE

A new cyanide furnace. R. F. JAMES AND GLENN COLEY. *J. Franklin Inst.* **211**, 327–34(1931).—A new elec. resistance furnace has been constructed on the hypothesis that the maintenance of an oxidizing atm. in the heating element chamber at all times is essential to the preservation of the elements. A drawing is shown. The test pot had an input of 43 kw. After a service of 1800 work hrs., a check of the element showed a power input of 42.5 kw., which is a considerable improvement over the power-consumption curves from previous designs. No scale was found on the heating elements, but the pot showed traces of leakage and a heavy deposit of what appeared to be cyanates on the floor of the element chamber. Elec. tests and phys. examn. showed no deterioration of the elements. This furnace consistently produced over 4 lb. of work per kw. hr. without any covering of the pot. A full charge of work was delivered in 18 to 20 min., which is well within the production speed desired. Appreciable quantities were lacking of the black sludge usually formed on the surface of molten NaCN. H. C. P.

Bright anneal in artificial atmospheres. J. C. WOODSON. *Elec. J.* **28**, 246–7 (1931).—Electrically heated furnaces are very successfully used for bright anneals. Partially cracked and purified coke-oven gas and treated blast-furnace gas are not entirely satisfactory for the bright anneal of certain metals; H, dissocd. NH_3, natural or city gas (with or without water vapor), MeOH and butane are similarly used. Blast-furnace and coke-oven gas are used on low-C, cold-rolled steel; cracked butane is used on high-C steel or roller-bearing stock. The artificial furnace atm. will probably soon be adopted in fabricating and mfg. processes. W. H. BOYNTON

The electrolytic industry of Germany. V. ENGELHARDT, *et al.* *Trans. 2nd World Power Conference* (Berlin) I, 317–48(1930). E. H.

Operating data on electrolytic metal production and refining. C. L. MANTELL *Eng. Mining J.* **131**, 256–9(1931).—Operating data from the electrolytic plants of the U. S. and Canada show: the compn. of electrolytes, equipment, methods of applying the current and efficiency obtained from the power, raw materials used, and by-products produced. The tables cover the electrolytic refining of Cu, the electrolysis of Cu-bearing solns. obtained by leaching processes, and the production of Zn, Cd, Pb, Ni, Sn, Ag and Au. The high power cost of processes using insol. anodes is indicated in the tables. The diaphragm used in Ni production causes an increase in cell voltage with attendant high power costs. W. H. BOYNTON

Factors affecting the smoothness and mechanical properties of electrodeposited copper. A. W. HOTHERSALL. *J. Electroplaters' and Depositors' Tech. Soc.* **6**, 95–122, *Metal Ind.* (London) **38**, 343–6(1931).—Growth formation, unequal current distribution, maintenance of an adequate supply of Cu ions at the cathode, factors which tend to reduce the rate of Cu deposition in practice and the detn. of the influence

of the more favorable depositing conditions on the mech. properties of the deposits are discussed. From solns. contg. 200 g. $CuSO_4.5H_2O$ and 50 g. H_2SO_4 per l. (Soln. *A*) (temp. = 26°), variations in c. d. from 15 to 200 amp./sq. ft., with or without air agitation, caused little change in the Brinell hardness (from 42 to 52) of the deposited Cu. Increasing c. d. and increasing acid concn. caused slightly harder deposits to be given. A hard deposit (Brinell no. 81) was obtained at 15 amp./sq. ft. from a soln. contg. 200 g. $CuSO_4.5H_2O$ and 20 g. $(NH_4)_2SO_4$ per l. and no free acid. A very hard, smooth and exceedingly brittle deposit of polished appearance was obtained at 16° and 15 amp./sq. ft. from a neutral soln. contg. $CuSO_4$ and NH_4NO_3. The unequal current distribution (particularly marked in Cu deposition because of the steepness of the cathode potential-c. d. curve), together with the formation of nodular growths, due to (*a*) irregular crystal growth of the deposit and (*b*) adherence of electrically conducting particles (formed in the soln.) to the cathode surface, and the effect of agitation on the above factors, is discussed in detail. Precautions (*e. g.*, warm solns., filtration, adjustment of agitation to c. d. being used and correct pickling of cathode basis metal) which should be taken in solns. contg. no addn. agents in order to secure smooth Cu deposits are reviewed. The effects of various addn. agents in Cu deposition, the control of such substances, the mechanism of their action and the mech. properties of Cu deposited from solns. contg. addn. agents are discussed. Addns. of $Al_2(SO_4)_3$ up to 32 g./l. to Soln. *A* (above) had no effect on the mech. properties of deposits obtained on a rotating cathode (peripheral speed 450 ft./min.) at 50 amp./sq. ft., nor on the cathode potential. The ductility of the Cu deposited from Soln. *A* upon the rotating cathode was considerably increased by the addn. of 0.06 g./l. Cl (as NaCl), the % elongation increasing from 33 to 48, and at the same time the tendency for finely divided Cu to form in soln. was retarded. Although beneficial in agitated baths, in still baths the Cl induced the growth of thin needle-like single crystals. The addn. of the requisite amt. of Ag_2SO_4 soln. to remove the Cl from such baths caused them to yield satisfactory deposits subsequently. Addns. of gelatin and peptone to Soln. *A* caused the deposits to have smaller crystals and to be smoother, harder and more ductile. The Brinell hardness of the deposits from still baths increased from 42 to 83–93 by 2 p. p. m. of these substances, and 0.01 g./l. gelatin raised the hardness to 128. Dextrin, up to 10 g./l., had little influence on the hardness and crystal size of the Cu from freshly prepd. solns., but when "aged," such solns. gave harder and more brittle deposits. Cu from freshly prepd. solns. (*A*) contg. up to 10 g./l. phenol (as phenolsulfonic acid) was similar in properties to, but much smoother than, that from solns. contg. no addn. agents. On continued electrolysis the effect of the phenol and also of the gelatin and of peptone disappeared. The hard deposits given in "aged" solns. contg. phenol were more ductile than those formed without addn. agents. Dextrin is concluded to be the least suitable addn. agent; the pronounced effects of gelatin and peptone make it necessary for very small quantities to be used—with the consequent difficulty of estn. and control of the amt. present—whereas phenol can be used up to 10 g./l. and can be detd. analytically (Hull and Blum, *C. A.* **25**, 460). Tables are given showing the hardness of the deposits from solns. free from addn. agents, and also the effect of addn. agents on the hardness and tensile properties of the deposits from still and from air-agitated solns. Cathode potential-c. d. curves for solns. with and without addn. agents, both for freshly prepd. and for "aged" solns., are given, as well as photographs of some deposits (including nodules and single crystals) and their micro-structures. A bibliography is appended. EDWARD B. SANIGAR

The reduction of arsenic acid and arsenates to arsine at the mercury cathode. I. WM. V. LLOYD. *Trans. Faraday Soc.* **27**, 89–94(1931).—A rotary commutator was used to connect the cathode to the source of current and a potentiometer alternately 3000 times a min. The overpotential decreased by 0.5 v. to that of As, although analysis of the Hg cathode showed no As present. The decrease in overpotential was less when an uninterrupted current was used, and varied directly with increasing concn. of H_3AsO_4. The quantity of AsH_3 produced increased with increasing H_3AsO_4 concn. The efficiency of the reduction process, based upon the H converted into AsH_3 at the cathode, varied from 1.71 to 14.1%. Cf. *C. A.* **24**, 1582. CURTIS L. WILSON

Temperature measurements on working electrodes. IV. B. BRUŽS. *Z. physik. Chem.*, Abt. A, **153**, 309–20(1931); cf. *C. A.* **24**, 3179.—The electrolytic Peltier effect which occurs in working electrodes was evaluated with the help of a dynamic calorimetric method, a detailed discussion of the theory of the method being included. The Peltier effect is measured for Hg | Hg_2^{++} in perchlorate and nitrate solns. at different concns., and the results are applied to the calcn. of the partial entropy of Hg_2^{++} ion for the same concns. For solns. of unit activity this is 29 ± 1 cal./degree. H. STOERTZ

The composition of manganese amalgam and manganese-silver alloys in relation to

the electrode potential of manganese. HARVEY D. ROYCE AND LOUIS KAHLENBERG. *Trans. Electrochem. Soc.* 59 (preprint) 23 pp.(1931).—Four Mn-Ag alloys were prepd. from highly purified materials. Electrode potentials and replacing power of these alloys have been measured. The replacing power and potential of alloy D (31 at. % Mn) were correlated with alloy structure by means of photomicrographs and thermal diagrams. None of the Mn-Ag alloys yields electrode potential approaching that of Mn amalgam. Mn amalgam consists of solid Mn_2Hg_5 in equil. with a very dil. soln. of Mn in Hg (0.0032% Mn). The behavior of Mn amalgam in contact with Mn salt solns. has been interpreted on the basis of these figures. A new compd. of Mn and Hg, isolated from the dil. amalgam by the application of pressures exceeding 150,000 lb. per sq. in. (10,500 kg./sq. cm.) and having the formula MnHg, is described. MnHg constitutes the stable solid phase in the system Mn–Hg at temps. between 86° and 100°. Pressure-concn. curves are presented to justify the assumption that the solid phase obtained by pressure is MnHg contaminated with a small percentage of the liquid amalgam. C. G. F.

Bright silver plating from the cyanide bath. A preliminary note. L. C. PAN. *Trans. Electrochem. Soc.* 59 (preprint) 5 pp.(1931).—A no. of chemicals were investigated with regard to their brightening effect upon electrodeposits of Ag from the cyanide bath. NH_4OH was found to have a decided whitening effect upon silver deposits, and was especially effective in an electrolyte containing large amts. of impurities. Na thiosulfate at a conc. of about 1 g./l. was found to be a good brightener for the Ag bath, and more effective than CS_2. The combination of NH_4OH and Na thiosulfate in a Ag bath produces a bright deposit similar to bright Cr, even in the presence of impurities which ordinarily cause dark yellow deposits. With the above brighteners, bright deposits are possible at moderately high current densities. C. G. F.

The change in reflecting power caused by tarnishing electrodeposited silver-cadmium alloys. LAWRENCE E. STOUT AND WILLIAM G. THUMMEL. *Trans. Electrochem. Soc.* 59 (preprint) 13 pp.(1931).—AgCd alloys can be deposited from a commercial Cd-plating bath to which AgCN has been added. The compn. of the alloy depends on the Ag concn. in the bath (if the Cd content remains const.) and on the cathode c. d. The co-deposition of Ag lowers the reflecting power of electrodeposited Cd. The tarnishing of the alloys depends both on the compn. and on the rate of deposition and is materially less than that of pure Ag. A Ag-Cd alloy contg. about 24% of Ag recommends itself as the best general-purpose reflector. Its reflecting power is equal to that of pure Cd, and it is considerably harder and more resistant to abrasion than pure electrodeposited Cd. C. G. F.

Progress of the hot nickel solution. OLIVER P. WATTS. *Trans. Electrochem. Soc.* 59 (preprint) 5 pp.(1931).—A report is made of the vol. and operating conditions of many of the hot Ni-plating solns. now in use in the U. S. and Canada. Since there was a period of 5 years between the announcement of the advantages of heating the Ni-plating soln. and its commercial adoption, the reported growth to 158,000 gallons has occurred in 10 years. Opinions of platers on the respective merits of the hot and cold Ni solns. are included. C. G. F.

Control of acidity in low-p_H nickel-plating baths. L. C. PAN. *Trans. Electrochem. Soc.* 59 (preprint) 8 pp.(1931).—For the control of acidity in Ni-plating baths of low p_H, the titration method, including a "control chart" for direct readings, was found to be most practical in a commercial plant. It is based upon the assumption that for a given bath, whose compn. is kept approx. const., the p_H value will be the same as long as the acidity is maintained at the same point. The "control chart" also provides a direct method of regulating and correcting the acidity or p_H, eliminating all labor of computation and all guesswork. C. G. F.

Chromium deposits directly on aluminum. HAROLD K. WORK AND CHARLES J. SLUNDER. *Trans. Electrochem. Soc.* 59 (preprint) 7 pp.(1931).—Thin layers of Cr which have fairly good resistance to salt spray and atm. corrosion may be electrodeposited directly on Al. Such deposits have a gray color on leaving the plating bath and must be buffed if a higher luster is required. These deposits protect Al to a marked degree from alkaline corrosion. Heavy deposits for abrasion resistance have also been applied to certain Al alloys. C. G. F.

The electrodeposition of chromium and the influence of the cathode metal. J. W. CUTHBERTSON. *Trans. Electrochem. Soc.* 59 (preprint) 24 pp.(1931); cf. *C. A.* 25, 35.—In Cr plating the best results and greatest flexibility and reliability in operation are obtained from a soln. of CrO_3 and H_2SO_4. The molarity of the CrO_3 should not be greater than 3.25, and the ratio of this to SO_4 normality should be about 58 to 60. The tank should be lined with hard Pb, the lining *not* being anodic to the soln. except as a

temporary measure. Pb is the only material that can be considered for anodes. The temp. should be reasonably high, but not above 45°, as then the Cr^{III} equil. conc. reaches too high a figure. Care should be paid to the ratio between anode and cathode surfaces. The anode area should be 1.5 to 3 times that of the cathode, and anodes should be disposed with respect to the cathode size and shape. Even under the best of conditions, the cathode current efficiency is not above 16%. The nature of the cathode is of the greatest moment. It should be of a metal of high H overvoltage corresponding to that of Cr. Ni is the material mostly used now, but it is far from ideal. For many purposes Cu is a far better undercoating. It is impossible to increase materially the throwing power of CrO_3 solns. The best way to improve upon existing conditions is to increase the plating range in which bright plate is obtainable. Except in the case of Cu little success has been obtained from Cr deposits direct on the base metal. This may be due to the inherent porosity of these deposits. Direct deposits can be improved by heat treatment, but this does not lend itself readily to commercial practice. C. G. F.

Electrodeposition of chromium-iron alloy. G. Fuseya and K. Sasaki. *Trans. Electrochem. Soc.* 59 (preprint) 24 pp.(1931).—See *C. A.* 25, 1164(1931). C. G. F.

Chromium-plated molds. H. E. Stockfisch. *Am. Machinist* 73, 553–5(1930).—The advantages are given of Cr-plated surfaces in the molding of glass, brick and micarta to reduce wear and improve finish, and the compn. and treatment of molds are discussed. E. I. S.

The electrodeposition of tungsten from aqueous solutions. Colin G. Fink and Frank L. Jones. *Trans. Electrochem. Soc.* 59 (preprint) 23 pp.(1931).—The W deposited from aq. solns. is smooth, hard and coherent and has a high luster. Like Cr, it needs no polishing if the plated article was previously polished. W has remarkable acid-resisting properties, which make it desirable as a protective coating for other metals. Several types of solns. have been investigated in regard to their usefulness as W plating baths. Solns. of W salts in org. solvents are unsuitable. Aq. solns. of an acid nature do not give satisfactory metal deposits. Alk. solns. contg. alkali tungstates are preferably used as plating baths. The temp., cathode c. d. and H-ion concn. of the soln. must be controlled. Alloys of W and Fe, and of W and Ni, were electrodeposited from similar solns. contg. very small concns. of the ions of these second metals. The usefulness of highly alk. solns. as plating baths for the electrodeposition of other metals is pointed out. C. G. F.

The production of hydrogen at certain metal surfaces in relation to overvoltage. G. Raymond Hood and Francis C. Krauskopf. *J. Phys. Chem.* 35, 786–95(1931).—The efficiency of electrolytic reduction of $KClO_3$ (in 0.493 *N* soln.) was detd. concurrently with the cathode potential *V* (measured against a satd. calomel electrode with a KCl bridge), various metal cathodes and several c. ds. being used. The data for different cathode materials conform to the same relation between *V* and reduction efficiency; the efficiency decreases with increasing *V*, and is negligible for $V > 1.5$ v. Measurements of the decompn. potentials of H_2SO_4 (0.1 *N*), KCl (0.493 *N*) and $KClO_3$ (0.493 *N*) with Pt anodes and various cathodes are given and compared with the reduction expts. L. O.

Electrolytic production of hydroxides and hydrogen. R. Saxon. *Chem. News* 142, 85, 113–4, 149–50(1931).—These articles are statements of the phenomena occurring when pure H_2O (contg. no acid or salt for conduction) is electrolyzed, 240 v. being used, with Pt or C cathodes and anodes of various metals. The gas liberated at the cathode was collected over H_2O and found to be H only. The solns. took on various colors depending on the metal used as anode, and metal hydroxides were formed in the solns. Expts. with the following metals as anodes are reported: *Fe.*—The soln. turned umber, then green; green $Fe(OH)_2$ formed in the soln., while a scum of $Fe(OH)_3$ floated on the soln., even that in contact with the cathodic H. The soln. was acid to methyl orange but gave no test for Fe unless acid was added. It is concluded that the natural tendency is for $Fe(OH)_3$ to be formed, but that the nascent (not the molecular) H reduces this to $Fe(OH)_2$. *Cu.*—The soln. turned green and, later, green-blue to purple. The nascent H reduced the $Cu(OH)_2$ first formed to CuOH and then to Cu which floated on the surface of the soln. The $Cu(OH)_2$ first formed was found to be electropositive. *Co.*—The soln. became pale bluish: a green-blue scum, thought to be $Co(OH)_3$, collected on the H_2O in the tube over the cathode. Red-brown flakes of $Co(OH)_3$ appeared in the soln. followed by brown and black masses of Co_2O_3 and CoO. *Ni.* An apple-green film of $Ni(OH)_3$ was observed followed by a green scum of $Ni(OH)_3$ and, later, floating specks of Ni_2O_3, followed quickly by green NiO. From the expts. it is concluded that the reductions are brought about only by nascent H (not by molecular H_2), and that Ni is preferentially divalent, Fe preferentially tri-valent, while Co is bi- and ter-valent without preference. Edward B. Sanigar

The use of antimonial lead for accumulator grids: a cause of self-discharge of the negative plates. J. T. CRENNELL AND A. G. MILLIGAN. *Trans. Faraday Soc.* **27**, 103–12 (1931).—It was observed that the neg. plates of Pb accumulators at high temps. and high acid concns. lost capacity as the cells became older. The use of exptl. cells with pure Pb grids and with grids of antimonial Pb indicated that the "aging" of the neg. plate was due to the soln. of Sb from the alloy of the pos. plate and its deposition on the neg. plate. The low H-overvoltage at an Sb surface reduced the current efficiency of the plate by allowing evolution of H. Sb added to the electrolyte produced the same effects. No quant. relation between the total Sb added and the rate of sulfation of the neg. plate could be established. It is concluded that antimonial Pb should not be used for the pos. grids of Pb accumulators. CURTIS L. WILSON

Diatomite as a filler in battery boxes. PAUL HATMAKER. Bur. Mines, *Rept. of Investigations* 3078, 2 pp.(1931).—Diatomite for battery fillers must have < 8–10% acid-sol. material and < 0.75% Fe and be low in clay and org. substances. Mn and MgO are objectionable. Present consumption for this use is 10,000–15,000 tons annually. ALDEN H. EMERY

Electricity in modern dairy plants. A. J. DREUX AND H. C. BRUNNER. *Elec. Eng.* **50**, 285–7(1931).—The elec. current passes through the milk in the Electropure method of pasteurizing. The application at the Rieck-McJunkin Dairy in Pittsburgh, Pa., is described, also other uses of electricity in such plants. W. H. BOYNTON

Electrochemistry applied to glass. ALEXANDER SILVERMAN. *Trans. Electrochem Soc.* **59** (preprint) 9 pp.(1931).—Accessory applications of electrochemistry to glass manuf. are discussed, *e. g.*, cond. as a control of viscosity; elec. pptn. in purifying producer gas; Cr plating of molds; and electroplating of the finished product with various metallic coatings. A review is given of studies that have been conducted on the electrochem. properties of glass, such as conductance through the glass in d. c. electrolysis. C. G. F.

Influence of traces of hydrogen on sparking potential of helium. A. GÜNTHERSCHULZE AND F. KELLER. *Z. Physik* **66**, 219–23(1930).—The disappearance of the last traces of H in glow lamp rectifiers caused an increase in the flash-over voltage from 182 to 330 v. This is explained by reference to the four-fold longer mean free path of the H ion over other positive ions. GREGG M. EVANS

Current collection in hydrogen atmosphere. R. M. BAKER. *Elec. Eng.* **50**, 266–7 (1931).—Test runs of commutators and slip rings operating in H_2 gas reveal interesting characteristics and lead to the following conclusions: A commutator machine designed and adjusted for good commutation in air will operate satisfactorily and give good brush life in H_2. If a commutator machine must spark in H_2, the brush life may be increased many times by keeping the relative humidity below 10%. The contact resistance of C brushes on a commutator may be lowered by the introduction of H_2. C or graphite brushes cannot be operated satisfactorily on plain tool-steel slip-rings running in H_2. The contact drop between a C or graphite brush and a brass slip-ring may be 10 times as high when the ring is running in air as when in H_2. W. H. B.

The development of an electron-emitting alloy. O. S. DUFFENDACK, R. A. WOLFE AND D. W. RANDOLPH. *Trans. Electrochem. Soc.* **59** (preprint) 17 pp.(1931).—It was discovered that irregularities in the sparking voltage of spark gaps were due to nonuniformities in the compn. of the electrode materials. Small inclusions of Mg in the Ni alloy ordinarily employed for spark plug electrodes were found to be distributed at random through the wire and to affect the sparking voltages. A thorough investigation established a complete coördination between the sparking voltage of a gap and the work function of electron extn. from the cathode surface. The sparking voltage of a standardized gap increases when the thermionic electron emission of the electrode wire, measured under standardized conditions, decreases. After many expts. a Ni alloy contg. Ba has been developed which is homogeneous in compn. and readily reproducible. Spark gaps having electrodes made of this alloy have very const. sparking voltages. The alloy has marked electron-emitting properties that make it valuable for use in various elec. devices. Its uses in several ways are being developed. C. G. F.

The decomposition of iron oxide in vacuum tubes. E. R. WAGNER. *Trans. Electrochem. Soc.* **59** (preprint) 3 pp.(1931).—An oxidized Fe anode in a vacuum tube, type "245," liberated large quantities of gas during the operation of the tube. If the potential gradient is increased to 300 v., the emission of gas is almost instantaneous. The phenomenon does not appear to be a purely electrolytic one, but rather due to electron bombardment. C. G. F.

New photoelectric cells with potassium. ANON. *Ann. chim. anal. chim. appl.* 13,

72–5(1931).—In the new cells, the cathode is a deposit of K on the interior wall of the bulb, and the anode consists of straight or curved metallic filaments. Each electrode is connected with an external circuit of high resistance (100,000 ohms to 100 megohms) and to a storage cell which creates between the electrodes an elec. field to accelerate the electrons emitted from the cathode. In the dark, the cell presents infinite resistance and permits the passage of no current in the external circuit. The very feeble current produced by the action of light is amplified by a lamp with 3 electrodes, and its variations can be measured directly with a milli-ammeter. The photoelec. cell and the triode amplifier are mounted in a metallic case, and the cells are preferably filled with a gas like A. W. T. H.

Production of color from tungsten lamps. M. LUCKIESH. *Elec. World* **97**, 645 (1931).—In order to obtain colored light from a lamp it is necessary to filter out the undesired colors, but it is impossible to obtain light of a pure, spectral color by means of filters. W. H. BOYNTON

The condensation of hydrocarbons by electrical discharge. A study of the M/N-ratio for methane, ethylene and acetylene. S. C. LIND AND GEORGE R. SCHULTZE. *Trans. Electrochem. Soc.* **59** (preprint) 16 pp.(1931); cf. *C. A.* **25**, 1440.—An accurate method is given for taking into account all temp. effects which have involved some uncertainty in judging the pressure changes during the expts. in the course of the earlier investigations. The properties and the applicability of the system employed for the measurements, namely, the ozonizer type of discharge, are discussed. For the acetylene condensation, a neg. catalytic wall effect of the solid reaction product on the condensation velocity has been discovered. The condensation of CH_4, C_2H_4 and C_2H_2 was studied in an elec. discharge with respect to the yield of ionization as represented in the M/N-ratio of the condensation, where M equals the no. of reacting mols. and N, the no. of pairs of charges. The same proportionality was found for the M/N-ratios of CH_4 and C_2H_2 (2:20), whereas the value of the ratio for C_2H_4 is exactly twice as high (10 instead of 5) as has been found in the α-ray work of Lind and co-workers. Recent investigations, which have been made since this paper was first written, indicate that the correlation between α-ray work and elec. discharge finds its best basis in the assumption that not the chem. yield per ion pair is the sole controlling factor, but the product of the yield (M/N-ratio) and the mol. ionization. This brings the results for CH_4, C_2H_6 and C_2H_4 in agreement, whereas the results of the C_2H_2 runs now remain out of line, though it is believed that the low values found for C_2H_2 will be raised upon further purification of the gas from acetone or some other inhibitor. C. G. F.

Cracking oil by electricity. HERBERT R. ROWLAND. *Elec. Eng.* **50**, 288–90 (1931).—Low-grade oils formerly wasted are now "cracked" to form gasolines and other highly volatile oils. Some of the problems involved are discussed. Three theories have been advanced as to the part the silent corona discharge plays in the cracking process. It seems feasible to consider an electron moving through an appreciable distance in space and either carrying with it or driving before it a mol. of H_2 in the vapor form. At last a surface is reached which permits no further movement of the oil vapor mol., but which readily absorbs the electron. The violent agitation of the vapors by the silent corona discharge is undoubtedly of prime importance in the complete cracking of the vapors, which facts tend to support the electromech. theory. The gasoline has high anti-knock value and gives greater mileage than "doped" fuels. W. H. B.

Power cable technic. P. DUNSHEATH. *Electrician* **106**, 432–5(1931).—The best preventive of Pb-sheath *corrosion* is the provision of adequate, compounded, waterproof coverings over the Pb. The principal cause, if not the whole explanation, of *ionization* (rise of power factor voltage) in impregnated paper cables is found in the presence of voids, or spaces not filled with solid or liquid dielectric. Sheath and armor effects and armoring of single core cables are discussed. For lower voltages the ordinary routine insulation resistance and pressure tests meet all requirements, but for higher voltages other tests are necessary. Breakdown tests seem more reliable than ionization stability tests, though each has its place. W. H. BOYNTON

A new measurement of the temperature in the arc (V. ENGEL, STEENBECK) **3.** Producing patterns in metals by photography and electrodeposition (Ger. pat. 515,900) **5.** Purifying bitumen, etc., for use in "electrical contrivances" (Brit pat. 339,470) **22.** "Basing cement" for uniting lamp bulbs to bases (U. S. pat. 1,795,746) **18.** Electric system for protecting boilers (U. S. pat. 1,796,715) **14.** Extracting metals (Austrian pat. 121,523) **9.** Alloys for sheathing electric cables (Austrian pat. 121,525) **9.** Float for determination of the specific gravity of accumulator electrolytes (Hung. pat. 101,225) **1.** Treating metals in ladles as in an induction furnace (Brit. pat. 339,579) **9.**

MÜLLER, ERICH: **A Laboratory Manual of Electro-Chemistry.** Translated from 4th ed. by H. J. T. Ellingham. London: Geo. Routledge & Sons, Ltd. 364 pp. 15s. Reviewed in *Chem. Trade J.* 88, 314(1931).

WEJNARTH, AXEL: **Beiträge zur Kenntnis der elektrothermischen Zinkgewinnungsmethode.** Stockholm: Wille Hedbergs Tryckeri Aktiebolag. 146 pp.

Electric batteries. C. DILLGER (trading as Hamburger Batterie-Fabrik C. Dillger) and D. SCHMIDT. Brit. 338,765, March 22, 1929. A battery of the Leclanche type has a depolarizer consisting of a double salt of NH_3 or an amine and Zn or other electropositive metal, such as the double salt of $ZnCl_2$ and methylamine-HCl or *o-m-p*-toluidine-HCl or Zn NH_4 chloride.

Electric batteries. LOUIS F. J. ROUSSEAU. Fr. 37,261, Feb. 21, 1929. Addn. to 668,569 (*C. A.* 24, 1584). Electrolytes of strong acid concn. are immobilized by fibrous masses of animal origin such as wool or felt or by dissolving an appropriate amt. of cellulose in the liquid.

Electric battery. MARIE IRLE NÉE GAUJACQ. Fr. 37,211, July 12, 1929. Addn. to 674,622 (*C. A.* 24, 2677). To prevent the Zn being covered with Cu or like metal resulting from the diffusion of the depolarizing liquid into the liquid which surrounds the Zn, a metallic screen is placed in the layer of sepn. of the 2 liquids. A salt of Hg may be added to the depolarizing liquid, which salt by diffusion comes in contact and amalgamates with the Zn.

Dry batteries. KUNO WOLF. Ger. 515,694, Oct. 25, 1929. The "dry" filling consists of colloidal H_2SiO_3 and concd. H_2SO_4. A 15% soln. of H_2SiO_3 is preferred.

Dry-cell electric-battery assembly. ELMER J. STROHL and EDWARD C. SMITH (to National Carbon Co.). U. S. 1,797,161, March 17. Structural features.

Storage battery. A. G. OWENS. Brit. 339,050, Oct. 9, 1929. Structural features

Storage battery. JOSEPH L. WOODBRIDGE. U. S. 1,796,818, March 17. Structural features.

Storage batteries. SOC. ANON. DES ACCUMULATEURS MONOPLAQUE. Brit. 338,921-2, Jan. 29 and Feb. 26, 1929. Structural features.

Storage-battery hydrometer (attached to the vent plug). CHARLES E. LINEBARGER. U. S. 1,796,379, March 17. Structural features.

Battery container. EDWARD LYNDON. U. S. 1,796,034, March 10. Containers are made of permeable material non-resistant to acids such as pressed wood pulp impregnated with prevulcanized rubber.

Depolarizers for galvanic batteries. NEUE ELEMENT-WERKE GEBR. HAAS & CO. Ger. 515,762, July 11, 1926. A depolarizer is made up by mixing together graphite and soot, compressing the mixt. and then mixing in MnO_2.

Galvanic elements. FIRMA AUGUST ALEXANDER. Ger. 515,693, July 3, 1929. Details of arranging the C rods and metal caps in dry batteries.

Selenium cell. F. H. CONSTABLE and RADIOVISOR PARENT, LTD. Brit. 339,245, Sept. 2, 1929.

Lead accumulator. JOHANN MATUSCHEK. Austrian 121,320, Sept. 15, 1930. The PbO_2 constituting the active mass of the pos. electrode is not exclusively generated during the manuf. of the electrode, but is included in a substantial proportion in the mass from which the pos. electrode or both electrodes is or are to be formed. Other oxides of Pb may be present also, and the mass is preferably supported on unalloyed Pb. Details of the charging are described.

Protecting layer for the electrolytes of accumulators. GY. DIAMANT. Hung. 100,891, Feb. 20, 1929. A layer consisting of loose particles of solid materials is located on the surface of the electrolyte, *e. g.*, charcoal particles impregnated with hydrocarbons or resins. This layer is afterward partly or totally solidified.

Dry rectifier with electrodes coated with metallic oxide. SIEMENS-SCHUCKERTWERKE A.-G. Ger. 515,529, Nov. 19, 1926. Plates of Cu are coated on one side with Cu_2O and on the other with Ag. Cf. *C. A.* 24, 27.

Electrodedeposition of metals such as chromium, etc. HARRY SCHMIDT, GEORG ERLWEIN and MARTIN HOSENFELD (to Metal & Thermit Corp.). U. S. 1,795,512, March 10. Solid adherent coatings are obtained by electrolytically depositing metals such as Cr at a temp. below their m. p. from a fused bath, the point of fusion of which is at least 100° lower than the m. p. of the metal to be deposited and which contains a B compd. such as mixed borates together with a compd. of the metal to be deposited.

Electrodeposition of chromium. WM. S. EATON. U. S. 1,795,481, March 10. The cleaned articles to be plated are immersed in an aq. electrolytic bath, the active ingredients of which consist solely of chromic acid and Na_2CO_3 in soln. in water.

Chromium plating. LEON R. WESTBROOK (to Grasselli Chemical Co.). U. S. 1,795,459, March 10. A bath for Cr plating contains chromic acid in aq. soln. together with a small proportion of the SO_4 radical (which may be supplied by use of Na_2SO_4) and a small proportion of the neg. radical of molybdic or vanadic acid (suitably supplied by use of a molybdate or vanadate).

Electrodeposition of metals such as copper, nickel or cobalt on rotating cylindrical mandrels. S. O. COWPER-COLES. Brit. 338,487, May 15, 1929. Numerous details of app. and procedure are described for the deposition of the metal and its consolidation by the action of rollers which may be formed of glass or of metal such as ferro-Si. The mandrel is preferably of welded steel or iron sheet or turned and polished cast iron, and to allow detachment of the deposit in tubular form the mandrel is first made passive by treatment with HNO_3 and then polished and treated with a stripping prepn. An anode of Pb, C, ferro-Si or other material may be used and various details of electrolyte compns., etc., are given. Deposition of Zn and Ag also is mentioned.

Electrodeposition of metals on rotating mandrels. S. O. COWPER-COLES. Brit. 338,540, May 15, 1929. In a process such as described in Brit. 338,487 (preceding abs.), the surface of the rotating mandrel is prepd. to facilitate detachment of the deposit by forming on it a film of oxide or sulfide or by applying a film of Pb which is then polished with plumbago or other suitable polishing material. The surface of the mandrel is preferably formed of Cu or brass.

Electrodeposition of tin. SIEMENS & HALSKE A.-G. Brit. 338,488, May 16, 1929. Thick, coherent, firmly adhering deposits are obtained in the electrodeposition of Sn from alkali metal stannate or stannite solns., sol. anodes being used, by maintaining the free alkali content in the electrolyte (inclusive of that set free by hydrolysis, but not including alkali metal carbonate) below 1.5%. A Sn concn. of 0.05% or more may be employed, and if the Sn concn. is above 7%, the alkali content must be somewhat higher but should be not more than one-fifth of the Sn content. Cf. *C. A.* **25**, 882.

"White gold" plating. DEUTSCHE GOLD- UND SILBER-SCHEIDEANSTALT VORMALS ROESSLER (Leo Nowack, inventor). Ger. 515,579, Oct. 15, 1926. Objects to be plated in "white gold" are formed of a ground metal which is given a thin layer of metal which then alloys with the ground metal to form the "white gold" surface. Thus, a degreased 18 c. gold object (Au-Ag-Cu) is nickeled by electrolysis in the usual way. The Ni plated object is then immersed in a fused salt mixt. and heated to 700° for 20 min. This causes the Ni to alloy with the gold to form a "white gold" surface. Further examples are given.

Plating aluminum with other metals. M. K. DE TRAIRUP. Brit. 339,339, Sept. 3, 1929. Al surfaces are prepd. for plating with metals such as Ni, Cu, Ag or Au by a preliminary electrodeposition of an amalgam such as may be deposited from a bath formed of NaOH 200, sodamide 200, $SnCl_2$ 40, $ZnCl_2$ 10, $Hg(NO_3)_2$ 5, KOH 10 and water 20,000 parts.

Electroplating apparatus with a tumbling-barrel. CARL H. HANSEN. U. S. 1,795,336, March 10. Structural features.

Mold for making articles by electrodeposition. G. ROSENQVIST. Brit. 339,428, Oct. 24, 1929.

Liquid seal for gas chambers of electrical precipitation plants. LODGE-COTTRELL, LTD., and L. LODGE. Brit. 338,827, March 4, 1930.

Degasifying electrolytically deposited metals. JULIUS VON BOSSE. U. S. 1,795,-384, March 10. Electrodeposited coatings of metals are freed from absorbed H tending to cause embrittlement of the metal, by subjecting the metal coating to an elec. discharge in a vacuum tube in which the coating is made one of the electrodes.

Drying by electrolysis. N. ALTAI. Hung. 100,547, Sept. 3, 1929. Moisture is eliminated by electrolysis of material in its natural state or after grinding or pressing to briquets.

Electrolytic apparatus for removing salts from liquids. JEAN BILLITER. Austrian 121,039, Aug. 15, 1930.

Aluminum production by electrolysis of fused halide baths. I. G. FARBENIND. A.-G. Brit. 338,668, July 4, 1929. A fused mixt. which may be formed of NaCl 14, KCl 6 and $AlCl_3$ 80% is electrolyzed at a temp. of 100° with a graphite anode and a rotating cylindrical cathode of graphite or metal (a compact deposit being obtained by use of a c. d. of 1 amp. per sq. dcm. or even higher); or a mixt. comprising NaCl 18 and $AlCl_3$ 82% may be electrolyzed at 160° with a W anode and an iron roller cathode. Various details of app. and procedure are described.

Electrolytic refining of aluminum. UKRAINSKII NAUCHNO-ISSLEDOVATELNUII

INSTITUT METALLOV "UKRINMET." Russ. appl. 30,500, July 24, 1928. A complex ammonium aluminum halide is used as electrolyte.

Magnesium. DOW CHEMICAL CO. Brit. 339,504, Dec. 16, 1929. See U. S. 1,749,210 (*C. A.* **24**, 2064).

Recovery of tin. SIEMENS & HALSKE A.-G. Fr. 37,495, Oct. 7, 1929. Addn. to 650,579 (*C. A.* **23**, 3173). In the electrolytic recovery of Sn from Sn residues not contg. plumbite, bismutite or other substances acting in the same way, the electrolysis is carried out without the addn. of colloid after quantitative transformation of all the Sn into stannate form.

Nitrogen fluoride. OTTO RUFF. Ger. 518,202, Feb. 2, 1930. NF_3 prepd. by electrolyzing fused NH_4HF_2, or by interaction of NH_3 and F, is freed from NHF_2 and N_2O by passage over soda-lime at 100°, followed by washing with warm acid KI soln. and fractionating.

Coating metal articles with lead peroxide electrolytically. JOHANNES FISCHER (to Siemens & Halske, A.-G.). U. S. 1,795,941, March 10. Metal articles such as iron or steel are made anodes in an alk. bath contg. Pb and at least one cyanide, sulfocyanide such as KCNS or dimethylglyoxime. The bath is free from heavy metals other than Pb.

Electrolytic condenser. JOSEPH SLEPIAN (to Westinghouse Elec. & Mfg. Co.). U. S. 1,795,900, March 10. Various elec. and structural features of condensers with film-forming electrodes immersed in an electrolyte are described. Cf. *C. A.* **24**, 1302

Introducing alkali or alkaline earth metals or oxygen into sealed glass vessels. VEREINIGTE GLÜHLAMPEN UND ELECTRICITÄTS A.-G. Austrian 121,033, Aug. 15, 1930. This is effected by electrolyzing the wall of the vessel. A part of the vessel is coated on the inside with a very thin metal layer, which constitutes one electrode, and the coated part is heated and supplied with current. The external electrode may be a fused bath, *e. g.*, a salt of the metal to be introduced into the vessel. Numerous details are given of the application of the method to the manuf. of cathodes for electric discharge tubes and photo-elec. cells. Cf. Austrian 120,121 (*C. A.* **25**, 1710).

Purifying inert gases in electric discharge tubes, etc. VEREINIGTE GLÜHLAMPEN UND ELECTRICITÄTS A.-G. Austrian 121,056, Aug. 15, 1930. Alkali or alk. earth metals are introduced into the vessel contg. the gas by the electrolytic method described in Austrian 121,033 (preceding abst.).

Electric furnaces and electrolytic vats. ALFRED FRANCHINI and PAUL GIROD Fr. 695,216, Aug. 27, 1929. Method of mounting and moving the electrodes is described.

Electric induction furnace. PORTER H. BRACE (to Westinghouse Elec. & Mfg. Co.). U. S. 1,795,827, March 10. Structural and elec. features.

Electric induction furnace. NEVILLE R. DAVIS (to Westinghouse Elec. & Mfg. Co.). U. S. 1,795,842, March 10. Structural features of a furnace, the lining of which has embedded in it a metal cage to effect its heating and drying by the heating from induction.

Electric induction crucible furnace suitable for melting metals. PORTER H. BRACE (to Westinghouse Elec. & Mfg. Co.). U. S. 1,795,926, March 10. Structural and elec features.

Coreless electric induction furnace suitable for melting metals. NEVILLE R. DAVIS and CECIL R. BURCH (to Westinghouse Elec. & Mfg. Co.). U. S. 1,795,934, March 10. A metal conduit is arranged to cool an inductor coil which is adjacent and coextensive in length. U. S. 1,795,935 describes various details of procedure for sintering a desired portion of the lining of an elec. induction furnace.

Electric resistance furnace for heat treatments. SVEN P. AXELL (to Westinghouse Elec. & Mfg. Co.). U. S. 1,795,819, March 10. Structural features of a muffle furnace provided with a conveyor.

Electric resistance furnaces and ovens. F. W. CUFFE. Brit. 338,816, Feb. 11, 1930. Structural features.

Electrical and mechanical control system for furnaces such as plural-hearth-tray rotary dumping furnaces. HARLAN S. GANO (to Westinghouse Elec. & Mfg. Co.). U. S. 1,795,945, March 10. Various structural and elec. features are described.

Electrode holder for electric furnace. SIEMENS-PLANIAWERKE A.-G. FÜR KOHLEFABRIKATE. Ger. 518,332, June 27, 1926.

Electric regulating device for ovens for baking lacquered wire. ELECTRICAL RESEARCH PRODUCTS, INC. Ger. 518,078, Nov. 16, 1927. The temp. is regulated in accordance with the hardness of the coating on the wire leaving the oven.

Electrically heating the contents of high-pressure vessels. SIEMENS-SCHUCKERTWERKE A.-G. (Günther Scharowsky, inventor). Ger. 515,944, Aug. 24, 1926.

Electric gas purifiers. METALLGESELLSCHAFT A.-G. (Walter Deutsch and Wilhelm Hoss, inventors). Ger. 515,928, Nov. 30, 1928. An arrangement for preventing damage to the electrodes by sparking is described. Cf. *C. A.* 25, 2061.

Apparatus for electrical precipitation of suspended particles from gases. INTERNATIONAL PRECIPITATION CO. and LODGE-COTTRELL, LTD. Brit. 338,796, Jan. 14, 1930. Structural features.

Apparatus for electrical precipitation of suspended particles from gases. LODGE-COTTRELL, LTD., and L. LODGE. Brit. 338,739, Nov. 29, 1929. Structural features.

Electrical purification of gases such as carbon dioxide. SIEMENS-SCHUCKERTWERKE A.-G. Brit. 338,944, April 17, 1929. Various details are described for use of high-potential rectified a. c.

Use of silent electric discharges to facilitate catalytic gas reactions. FRITZ LECHLER (to International Precipitation Co.). U. S. 1,796,110, March 10. Apparatus and details of operation are described for promoting reactions by the combined action of contact substances and silent elec. discharge, in such manner that the elec. discharge acts not only to promote directly the reaction, but also to create an elec. wind in the gas so as to bring the gases into more effective contact with the contact substance. The process may be applied to the promotion of any reaction between materials in the gaseous phase, which is facilitated or promoted by the presence of a catalytic contact substance, for example to the oxidization of SO_2 to form SO_3 as in the contact process of H_2SO_4 manuf. or to the chlorination or hydrogenation of hydrocarbons or other org. gases.

Spark-discharge apparatus for producing a bleaching gas for corn, etc. FRITZ STUFF. Ger. 518,201, June 28, 1929.

Apparatus for heating "lyes and acids" by electrical resistances. VEREINIGTE ALUMINIUM-WERKE A.-G. Brit. 338,740, Nov. 29, 1928. Tubular coils (suitably formed of Pb) serve as elec. resistances and communicate with the interior of the vessel, the contents of which are to be heated. These coils are placed around the vessel, and are in turn surrounded by heat insulating material.

Protection of electrical apparatus such as switches, transformers, choke coils, motors or dynamos. MAX BUCHHOLZ U. S. 1,796,746, March 17. A cell, the wall of which is of such a degree of porosity as will permit osmotic diffusion of the products of decompn. occurring in the insulation of the app. such as a transformer under abnormal conditions, is assocd. with a device such as an alarm device which is influenced by products thus passing through the wall of the cell. Various structural details are described.

Electric ozone generator. MARIUS P OTTO U. S. 1,796,214, March 10. Structural features.

Special loading of long submarine cables. V. E. LEGG (to Electrical Research Products, Inc.). Brit. 339,049, Nov. 8, 1928. End sections of a cable are provided with loading of greater thickness than the central portion and which has a lower hysteresis loss, lower resistivity and a higher constancy of permeability for a wide range of magnetizing forces than the material of the central section loading. The central portion of the cable may be loaded with an alloy contg. Ni 45, Fe 23, Co 25, Mo 7, Si 0.47% or Ni 55, Fe 34 and Cr 11%. The end sections may be loaded with an alloy contg. Fe 27, Ni 45, Co 25, Mo 2.5 and Mn 0.35%.

Cut-out for series lamps. DANIEL S. GUSTIN and EWALD DIETZ (to the Canadian Westinghouse Co., Ltd). Can. 309,241, Mar. 10, 1931. A cut-out medium for series lamps is produced by mixing powd. Cu with sodium silicate and dehydrating the mixt., then mixing the dehydrated mixt. with sodium silicate and applying pressure to produce a compact mass.

Electric incandescent lamp. LLOYD D. LOCKWOOD (to Westinghouse Lamp Co.). U. S. 1,795,785, March 10. Devices such as incandescent lamps are flushed with water gas during baking, in order to eliminate surface oxides on the metal parts. Cf. *C. A.* 24, 3958.

Decoration of electric incandescent lamps. K. MENESDORFER. Hung. 101,377, Nov. 12, 1929. Cellulose varnish is sprayed on the lamp as a base, and the decoration is produced by spraying various paints through stencils. The decoration thus produced does not crack off.

Coating for lamp bulbs. ALBERT F. LINDSTROM (to The Canadian Westinghouse Co., Ltd.). Can. 309,250, Mar. 10, 1931. A green coating compd. for the interior of lamp bulbs comprises sodium silicate, kaolin, hydrated chromic oxide and boric acid.

5—PHOTOGRAPHY

E. P. WIGHTMAN

Further advances in photographic science. S. O. RAWLING, *Science Progress* 25, 465–75(1931).—A review is given (with a bibliography of 23 references) of recent work on the chemistry of the photographic emulsion. JOSEPH S. HEPBURN

Formation of photographic images on cathodes of alkali metal photoelectric cells. A. R. OLPIN AND G. R. STILWELL. *J. Optical Soc. Am.* 21, 177–81(1931); cf. *C. A.* 24, 5614.—Both neg. and pos. photographic images on the cathodes of K and Na photoelec. cells in a vacuum have been obtained by focussing an image of the object to be photographed on the cathode during the treatment with a suitable dielectric. The necessary optimum constitution of the surface structure will thus exist though perhaps only momentarily. The images are well defined and can be permanently "fixed" by proper treatment with various materials such as S vapor, air, O and H in the ratio of 9 to 1, HF and Br. The photoelec. sensitivity of the exposed areas decreases approx. 30% during the formation of the image. There appears to be little difference in the sensitivity of the cathode area bearing the image and neighboring area after the image has been permanently fixed. The effect is undoubtedly photochem. but the great variety of materials which can be used in treating the exposed surfaces complicates the chemistry of the phenomenon. W. VANSELOW

Depression of density produced by the presence of bromide in the developer of photographic emulsions exposed to light and to x-rays. A. P. H. TRIVELLI AND E. C. JENSEN. *J. Franklin Inst.* 211, 335–47(1931).—The density depressions of sol. bromide in the developer were detd. with 2 different emulsions for light and for x-ray exposures with hydroquinone and with pyrogallol developer. Abegg's theory of the action of sol. bromide in the developer was the best explanation of the results obtained. This theory was connected with the speck growth theory of the latent image, and the results obtained were explained on the basis of the size and the distribution of the specks. It was shown that there are 2 depression factors: (1) The difference in sizes of developable centers formed by exposure will, with sol. bromide, give a greater density depression for light than for x-ray exposures. (2) The distribution of the developable centers throughout the thickness of the photographic layer will give, for light, a smaller density depression with sol. bromide than for x-ray exposures. A. P. H. TRIVELLI

The question of the metallic ("Mr") silver content and germ formation in photographic emulsions. H. ARENS AND J. EGGERT. *Z. wiss. Phot.* 28, 178–90(1930) P. O. P. emulsions, according to Valenta, increase their amt. of free Ag with age For ordinary photographic layers the results are not const., which shows that the $Ag_2S_2O_3$ complex is not entirely separable from metallic Ag, so that Weigert and Lühr's data (*C. A.* 23, 4900) are too high and consequently also the previous data of the authors A. P. H. TRIVELLI

Cement for films (Hung. pat. 100,689) 23.

HIBBERT, L. J.: **A Manual of Photographic Technique.** 2nd ed. London: Pitman. 133 pp. 2s. 6d., net.

WALL, E. J.: **The Dictionary of Photography.** 12th ed., revised by F. J. Mortimer. London: Iliffe. 681 pp. 7s. 6d., net.

Color photography. B. E. LUBOSHEZ. Brit. 339,511, Dec. 23, 1929. Various details are described of a color filter used with lenticular films.

Color photography. J. N. GOLDSMITH, T. T. BAKER, C. BONAMICO and SPICERS, LTD. Brit. 339,238, Aug. 1, 1929. In the production of regular pattern multicolor screens by means of dye-repellent resists, the dyes in a non-penetrative condition or medium are applied to intermediate surface layers only of a film support which may be formed of celluloid, cellulose acetate or other suitable cellulose ester or ether compn.; *e. g.*, a powd. dye or finely divided dyed substance may be rubbed or spread on the film, or a dye such as cochineal in suspension or a dye in a viscous soln. such as castor oil or gum arabic soln. may be applied. Cf. *C. A.* 25, 1748.

Color photography. MULTICOLOR FILMS, INC. Brit. 339,323, June 4, 1929. Fixed Ag images are treated with a basic dye bath and then with a U toning and mordanting bath, in a process for producing color films having color component images on opposite sides which are simultaneously printed in register from color component nega-

tives. The printed positive is developed, fixed and washed and that side bearing the images printed from the orange-red negative is toned blue by application to that side only of an Fe toning soln. which may be formed from ferric ammonium oxalate, $K_3FeC_6N_6$, NH_4Cl and HCl. The U toning bath may comprise K oxalate, U nitrate, $K_3FeC_6N_6$ and HCl. Various details and modifications of procedure are described.

Dye-impression color photography. J. E. THORNTON. Brit. 339,296, July 3, 1929. In producing 2-color pictures by dye-impression printing, a duplex dye-printing plate is prepd. as described in Brit. 339,321 having upon its composite faces a pair of dye images of complementary character, produced by exposing in a camera from one side only a sensitive film bearing complementary color-sensitive emulsions on opposite sides with assocd. light filters, developing the images, treating them to render the gelatin dye-repellent in proportion to its Ag content, and dyeing with complementary colors the gelatin which remains dye-receptive; also, pos. images are printed simultaneously from the duplex plate as described in Brit. 339,319, by pressure-contact upon 2 sheets of dye-absorbent non-sensitive material provided with registration holds and placed one on each side of the duplex plate; and the printed dye positives are cemented together in register and face to face. Numerous details of procedure are given both in this specification and in Brit. 339,319 and Brit. 339,321.

Screens for color photography. HAROLD WADE. Ger. 518,066, Jan. 25, 1929. See Brit. 322,432 (*C. A.* **24**, 2681).

Screens for color photography. ANTON RYSAVY and ALOIS GRÄF. Austrian 120,858, Aug. 15, 1930. The screens are prepd. from fabrics woven from colored fibers, each fiber comprising a no. of differently colored filaments twisted together. Various methods of prepg. the screens are described.

Photographic films. I. G. FARBENIND. A.-G. (Hermann Lummerzheim, inventor). Ger. 515,776, Dec. 23, 1928. Addn. to 487,586 (*C. A.* **24**, 1808). A roll film with opaque ends which are not affected by the developing bath, is coated with a layer of dye soln. in aq. or org. solvents which is opaque to actinic rays.

Photographic roll films. I. G. FARBENIND. A.-G. Brit. 338,741, Nov. 29, 1928. The sensitive layer of a roll film with a protective paper backing is covered with transparent foil (which may be made of gelatin, regenerated cellulose, a cellulose ester, ether or ether-ester) colored to serve as a light filter when the film is exposed. Cf. *C. A.* **25**, 887.

Roll films from cellulose acetate. KODAK-PATHÉ SOC. ANON. FRANÇAISE. Ger. 515,533, Apr. 20, 1927. The back of the film is colored by coating with an alc. soln. of magenta and aurine, with or without addn. of naphthalene green.

Photographic negatives. MAX WOLFRAM and EDWIN SCHAFFER. Ger. 515,584, Dec. 20, 1929. Film negatives which can be easily detached from their glass, etc., carriers are prepd. by giving the transparent carrier a layer of rubber, gelatin or celluloid soln., before giving them the light-sensitive layer.

Paste for over-exposed negatives. JOSEF PFEIFFER. Austrian 121,139, Sept. 15, 1930. A paste for application to portrait and like negatives showing extremes of contrast comprises finely sifted kieselguhr 1 and tallow 3 parts, with a little $PhNO_2$ or wintergreen oil. For landscape and like negatives, only 1 part of tallow is taken, and coarse kieselguhr or tripoli is used instead of fine kieselguhr. The paste is rubbed onto the over-exposed parts, and acts mechanically by removing some of the excess of reduced Ag.

Photographic toned prints. RICHARD MICHEL. Austrian 121,141, Sept. 15, 1930. In the prepn. of toned prints on development papers contg. Ag salts by bleaching out, exposing and redeveloping, prints showing two or more tones are obtained by using a bleaching bath contg. an iodide and at least one other halide. A suitable bath is prepd. by adding 0.25–1.5 cc. of 1% KI soln. to a soln. of KBr 2, $CuSO_4$ 2 and citric acid 2 g. in water 100 cc. Addnl. details are given.

Photographic papers. CHARLES EMDÉ. Fr. 37,318, Aug. 8, 1929. Addn. to 676,317 (*C. A.* **24**, 2682). Blue variamine salt in aq. soln. is used as the diazo compd. to apply on the supports. A little sulfate of Ni or Al and a few g. of an org. acid may be added.

Apparatus for developing photographic paper by use of ammonia. KNUD MURCK (to Charles Bruning Co.). U. S. 1,795,344, March 10. Structural features.

Photographic layers. I. G. FARBENIND. A.-G. (Walter Frankenburger and Georg Rössler, inventors). Ger. 518,064, Jan. 23, 1929. Light-sensitive substances and insensitive substances are suspended together in a colloidal material or a soln. thereof, and the suspension is distributed onto a support in the form of fine particles, *e. g.* by atomizing the suspension into a hot atm. so that a fine powder is obtained,

which is spread on the support. Different light-sensitive substances may be applied to a common support. Thus, for the prepn. of layers useful for color photography, three gelatin emulsions are prepd., each contg. a silver halide sensitive to light in a primary color and a correspondingly colored pigment. The emulsions are atomized, and the resulting fine powders are mixed and applied to the support. Details are given also of the prepn. of layers for making anaglyphs.

Anti-halation layers for photographic plates and films. I. G. FARBENIND. A.-G. (Hermann Dürr and Wilhelm Schneider, inventors). Ger. 518,363, Feb. 18, 1930. These layers contain dyes obtained by condensing a substituted aromatic aldehyde with a quaternary heterocyclic base contg. a reactive Me group. Such dyes are irreversibly decompd. by the developing solns. A suitable dye is obtainable from quinaldine methyl bromide and *p*-dimethylaminobenzaldehyde, or from quinaldine methyl sulfate and piperonal.

Printing on photographic layers. I. G. FARBENIND. A.-G. Fr. 37,317, Aug. 12, 1929. Addn. to 671,999 (*C. A.* **24**, 2072). The 2 ends of the band of film are provided on the whole surface of the side of the layer with a color (obtained by the method of the prior patent) impermeable to actinic rays and insol. in photographic treating liquid

Photographic emulsions. V. L. MAKAROV. Russ. appl. 68,855, April 23, 1930. Photographic emulsion is sprayed on paper or plates with NH_3 or AcCl or with air satd. with these compds.

Thioxanthonium or selenoxanthonium dyes for the preparation of photographic bleach-out layers. I. G. FARBENIND. A.-G. (Bruno Wendt and Alfred Fröhlich, inventors). Ger. 518,065, Mar. 1, 1930. Examples are given.

Photographic etching. ALEX B. DAVIS (to Keystone Watch Case Corp.). U. S 1,797,210, March 17. A photographic resist is prepd. by treating a hydrophobic colloid such as asphalt with a sensitizer comprising a soln. of S chloride in CS_2 in a single step, removing the solvent, washing the treated colloid with an ether to increase its sensitivity to light, and dissolving in benzene. U. S. 1,797,211 describes forming a light sensitive hydrophobic colloid by the reaction of a CS_2 soln. of an asphalt-base material with a CS_2 soln. of S chloride *en masse*, removing non-reacted light-sensitive portions, placing a film of the light-sensitive residue on an object to be etched, projecting a design on it, developing and etching. Cf. *C. A.* **24**, 2390.

Producing patterns in metal by photography and electrodeposition. OLIVE MILLER NÉE ASSINDER and FREDERICK MILLER. Ger. 515,900, Mar. 23, 1930. A photographic plate having a sol. light-sensitive layer is exposed behind a diapositive of the pattern An elec. conducting material in powder form is allowed to accumulate on the unexposed parts and this deposit is coated with an aq. insol. membrane, to which it adheres. The coatings are then removed and the conductor deposit of the desired pattern plated galvanically with metal.

6—INORGANIC CHEMISTRY

A. R. MIDDLETON

Coördinated compounds of the alkali metals. III. FREDERICK M. BREWER *J. Chem. Soc.* **1931**, 361–8; cf. *C. A.* **20**, 740.—The coördinated compds. of the alkali metals with salicylaldehyde (I) are prepd. The covalency nos. established for the metals in these compds. are: Li, 4; Na, 4; K, 4 and 6 (the 6-covalent compd. is formed only with difficulty); Rb, 4 and 6 (only here the 6-covalent compd. is definitely more stable); Cs, 4 and 6 (only a slight difference in the stability of these 2 compds.). Of the compds. prepd. those contg. 4-covalent Na or K are by far the most stable The compd. contg. 4-covalent Li ($C_7H_5O_2Li$, $C_7H_6O_2$, pale yellow solid) was obtained when dry LiOH was added to I and the mixt. warmed gently. Both the 4-covalent compds. of Na and K with I have been prepd. by Hantzsch (*Ber.* **39**, 3089(1906)). Attempts to prep. the compd. contg. 6-covalent Na were unsuccessful. The compd. contg. 6-covalent K ($C_7H_5O_2K$, $2C_7H_6O_2$, pale yellow feathery crystals) was obtained by adding concd. KOH soln. to I, dissolving the resulting solid in a mixt. of alc. and I, crystg., and washing with alc. A mixt. of the compds. contg. 4- and 6-covalent Rb was obtained as almost colorless crystals when powd. Rb_2CO_3 was dropped into warm I. On heating these crystals under reduced pressure a residue of *rubidium salicylaldehyde* ($C_7H_5O_2Rb$) was obtained. The compd. contg. 4-covalent $Rb(C_7H_5O_2Rb$, $C_7H_6O_2$, colorless crystals which melt indefinitely with decompn.) was prepd. by dissolving Rb_2CO_3 in a min. of H_2O, adding I contg. a small quantity of alc., warming until the CO_2 evolution ceases, cooling, recrystg. from alc. and washing with Et_2O. The compd.

contg. 6-covalent Rb ($C_7H_5O_2Rb$, $2C_7H_6O_2$, colorless feathery crystals) was obtained (*a*) by allowing the product of recrystn. in the preceding to stand in I for several hrs in the cold, and (*b*) by recrystg. from I contg. a min. of alc. to effect soln. below 100°. The compd. contg. 6-covalent Cs ($C_7H_5O_2Cs$, $2C_7H_6O_2$) was prepd. by carrying out the initial reaction without alc., recrystg. using sufficient H_2O to keep any excess Cs_2CO_3 in soln., filtering, washing with H_2O, keeping in I for several hrs., filtering and washing with alc. The compd. contg. 4-covalent Cs ($C_7H_5O_2Cs$, $C_7H_6O_2$, pale yellow cryst. solid which melts with decompn. at about 165°) was prepd. from the initial product by (*a*) washing with Et_2O until a slight decolorization begins, or (*b*) pptg. from an alc. soln. with Et_2O. In the compds. prepd., Li alone forms a true coördinated hydrate. *Rubidium benzoylacetone* ($C_{10}H_9O_2Rb$, $C_{10}H_{10}O_2$, bright yellow plates which melt to a red liquid at 131°) was prepd. by dissolving Rb_2CO_3 in an excess of molten benzoylacetone, and recrystg. from hot toluene. J. BALOZIAN

Reactions in the solid state at elevated temperatures. VIII. Reactions of columbium pentoxide and tantalum pentoxide with metallic oxides and alkaline earth carbonates. WILHELM JANDER AND HERMANN FREY.. *Z. anorg. allgem. Chem.* **196**, 321–34(1931); cf. *C. A.* **24**, 4974.—This work involved a study of the reactions between BaO, SrO, CaO, MgO, ZnO, CuO, $BaCO_3$, $SrCO_3$ and $CaCO_3$ on the one hand and Ta_2O_5 and Cb_2O_5 upon the other hand. Heating curves, percent decompn. and temp.-pressure curves were detd. by different methods. The following figures were given for the temp. at which a perceptible reaction commenced: MgO + Ta_2O_5 (485°), ZnO + Ta_2O_5 (500°), MgO + Cb_2O_5 (500°), ZnO + Cb_2O_5 (520°), $BaCO_3$ + Ta_2O_5 (480°), $SrCO_3$ + Ta_2O_5 (410°), $CaCO_3$ + Ta_2O_5 (400°), $BaCO_3$ + Cb_2O_5 (450°), $SrCO_3$ + Cb_2O_5 (420°) and $CaCO_3$ + Cb_2O_5 (380°). The following compds. were prepd. for the first time: $2BaO.Ta_2O_5$, $4BaO.Ta_2O_5$, $2SrO.Ta_2O_5$, $4SrO.Ta_2O_5$, $4CaO.Ta_2O_5$, $BaO.Cb_2O_5$, $4BaO.Cb_2O_5$, $SrO.Cb_2O_5$, $4SrO.Cb_2O_5$ and $5CaO.Cb_2O_5$. $2CaO.Ta_2O_5$ and $2CaO.Cb_2O_5$ were also obtained. H. STOERTZ

Obtaining anhydrous aluminum chloride from natural aluminum-containing raw materials. VICT. I. SPITZVIN AND O. M. GVOSDEVA. *Z. anorg. allgem. Chem.* **196**, 289–311(1931).—The conditions for obtaining anhyd. $AlCl_3$ from kaolin earth and argillaceous earth-coal mixts. were studied. Cl and HCl gas were used as chlorinating agents. The raw material must first be freed of Fe by heating in a current of HCl gas at 400–900°; wood charcoal was the most successful form of C used. In the treatment with HCl gas an excess of C is essential, while with the treatment with Cl this is not necessary, nor is gas velocity of great influence. In this reaction, silicic acid is likewise chlorinated. Thermodynamic considerations indicate that Al_2O_3 acts as a catalyst in promoting the chlorination of SiO_2. The chlorination reaction begins at 600° and is accelerated at higher temps., the most favorable conditions occurring at about 800°. In an effort to diminish the chlorination of SiO_2, HCl was added to the gas, but this likewise decreased the yield of $AlCl_3$. $SiCl_4$, however, when added to the Cl, suppressed the chlorination of SiO_2 without appreciable effect upon the reactivity of the argillaceous earths. H. STOERTZ

Crystallization of copper from molten cuprous chloride. V. SIHVONEN. *Z. Elektrochem.* **37**, 80–2(1931).—Cu crystd. out in dendritic form in the cooler portions of CuCl unevenly heated to 370–470°. The reaction taking place in the melt was $2CuCl \leftrightarrows Cu + CuCl_2$. G. T. MOTOK

Some copper mercaptides and their reaction with carbon disulfide. W. E. DUNCAN, EMIL OTT AND E. EMMET REID. *Ind. Eng. Chem.* **23**, 381–4(1931).—By the interaction of solns. of mercaptides in C_6H_6 with an aq. soln. of $(AcO)_2Cu$, the complete series of cuprous mercaptides from Me to *n*-nonyl and from *sec*-Pr to *sec*-nonyl was prepd. They react with S in a way similar to that observed for the Pb salts (*C. A.* **24**, 4758). They add CS_2 to form alkyl cuprous trithiocarbonates. No basic Cu mercaptides were formed. LOUISE KELLEY

Hydrogen fluoride and its solutions. J. H. SIMONS. *Chem. Reviews* **8**, 213–35 (1931); cf. *C. A.* **25**, 861.—S. discusses the following: the prepn. of anhyd. HF; the technic of handling HF; the chem. and phys. properties of HF; its mol. structure; the soly. of substances in anhyd. liquid HF, which acts as a polar solvent very similar to H_2O; the conductance of solns. in anhyd. HF of salts, inorg. and org. acids, alcs., Me_2CO and Et_2O; the system: C_6H_6–HF. LOUISE KELLEY

The decomposition of Carborundum by a mixture of hydrofluoric and nitric acids. N. SLOMNESCO. *Compt. rend.* **192**, 361(1931).—Finely divided SiC is decompd. by treatment with concd. HF and a little concd. HNO_3 for a period of 15 days. The liberation of gas marks the progress of the reaction. F. W. LAIRD

Thiophosgene and some of its strange derivatives. ALBERT HUTIN. *Rev. gén.*

mat. plastiques **7**, 95–7(1931).—A few of the reactions of $CSCl_2$ are very briefly outlined.
A. PAPINEAU-COUTURE

Preparation of hydrocyanic acid by oxidation of ammonium thiocyanate or thiocyanic acid with nitric acid. W. GLUUD AND K. KELLER. *Ber. ges. Kohlentechnik* **3**, 395–419(1931); cf. *C. A.* **24**, 2684.—In the oxidation of NH_4CNS with HNO_3, to get a good yield of HCN it is necessary to count on a 10% loss of NH_3 and NO, because of the fact that HNO_3 is formed, which in turn forms NH_4NO_3, and this is decompd. into N and H_2O. If NH_4CNS, however, is first converted into HCNS by treatment with H_2SO_4, oxidation of the free acid to HCN can be brought about without this loss of N. The reaction proceeds according to the equation: $HCNS + 2HNO_3 \longrightarrow HCN + H_2SO_4 + 2NO$. A study made of the most favorable conditions of concn. showed that if a soln of HCNS contg. about 20 g. per 100 cc. is treated with HNO_3 soln. contg. about 40 g. per 100 cc., a 95% yield of HCN can be obtained with very little loss of NO or HNO_3. This represents 3–4 moles of HNO_3 per mole of HCNS, or a 100% excess of HNO_3. Expts. were made on a larger scale with the following results: To manuf 1000 kg. of HCN from 17% HCNS soln., 14,350 kg. of the HCNS soln., 13,950 kg. of HNO_3 (52.8%), 8.4 cu. m. of reaction water, 43.8 cu. m. of cooling H_2O and 10 kw hrs. of elec. energy were required. This yielded, in addn. to the HCN, 2300 kg. of NO gas and 3820 kg. H_2SO_4
H. STOERTZ

Constitution of cyanogen halides. II. Refractometric study of cyanogen chloride and iodide. ENRIQUE V. ZAPPI. *Bull. soc. chim.* [4], **47**, 537–45(1930).—See *C. A.* **24**, 5248.
E. M. SYMMES

Refractometric study of chromic acid reduction. GEORG GRASSER AND HIROSHI OHOKI. *J. Faculty Agr. Hokkaido Imp. Univ.* **27**, Pt. 2, 289–94(1930).—Changes in *n* accompanying reduction by a wide variety of reducing agents are described.
H. B MERRILL

Liquid hydrogen sulfide as a reaction medium. JOHN A. WILKINSON. *Chem. Reviews* **8**, 237–50(1931).—Liquid H_2S is discussed in regard to the following points: its prepn.; its phys. properties; its action as a solvent for org. and inorg. substances; conductance of solns. of org. substances, particularly thiol and dithio acids, and inorg. substances in liquid H_2S; thiohydrolysis, or the metathetical reaction of H_2S with other substances, such as the chlorides of P, As, Sb, Bi and esters of CH_3COSH; its reaction with various substances, such as liquid SO_2, CaO, CaC_2, nitriles and Grignard reagents.
LOUISE KELLEY

The polysulfides of the alkali metals. II. Lithium. THOMAS G. PEARSON AND PERCY L. ROBINSON. *J. Chem. Soc.* **1931**, 413–20; cf. *C. A.* **24**, 4724.—An attempt to prep. Li polysulfides from soln. (by the action of S on Li_2S in alc., alc.-H_2O and H_2O solns. (I), and on LiHS in anhyd. alc. soln. (II)) and by dry methods (by the action of S on Li_2CO_3 (or LiOH) (III), and on molten Li (IV)). In I polysulfide solns. are obtained, which, however, could not be crystd. In II the primary product is Li_2S_4, providing the S is in sufficient quantity, as demanded by $2LiHS + 3S = Li_2S_4 + H_2S$. On crystn. of the resulting soln. at room temps. $Li_2S_4.2C_2H_5OH$ is obtained, while at the b. p. $Li_2S_2.C_2H_5OH$ is obtained. When S is used in smaller quantity than is demanded by the equation a mixt. of Li_2S_4 and LiHS results. In III a reaction first starts at 200° giving thiosulfate and polysulfide; at 400° some S and thiosulfate are formed, and at 700° polysulfide, sulfate and small quantities of thiosulfate and sulfite are produced. In IV there is no reaction until 0.5 g. atom of S has been added to 1 g. atom of Li, when it takes place with explosive violence, giving principally Li_2S and small quantities of polysulfide. A study of the system Li_2S–S shows that at atm. pressure only Li_2S (stable at its m. p., 900–975°) and Li_2S_2 (slightly decompd. at its m. p., 369.5°) are stable.
J. BALOZIAN

Autoxidation of phosphorus in carbon tetrachloride solution. BRUNO BLASER. *Ber.* **64B**, 614–9(1931).—Besson (*Compt. rend.* **125**, 1033(1897)) found that when dry air was conducted through suspensions of colorless P in CCl_4 there was formed a pale yellow ppt. from which he obtained P_2O. Blaser has studied this reaction quantitatively, using suspensions of finely divided P and an app. similar to that of Willstatter (*C. A.* **9**, 308). With absorption of O, a pale yellow, voluminous ppt. began to sep. The velocity of oxidation was found to depend very much upon the temp. and the purity of the solns. Analysis of the product gave a P:O ratio of 2:3. The same product was obtained when P was used in excess. The compd. is not P_4O_6, but is probably a new trioxide, $(P_2O_3)_x$. Its lack of color and the fact that no P can be extd. from it with solvents indicate that it does not contain impurities; yet its lack of the essential outward signs of homogeneity—m. p., b. p., crystal form and soly.—demands further expts. to prove that it is a chem. individual. The new compd. was very hygroscopic

Dried *in vacuo* it became white. It did not decomp. at 100° *in vacuo;* at a higher temp. it decompd. but did not melt. In air at room temp. the white compd. turned yellow and smelled of H phosphide; at a higher temp. the yellow portions became red and P was formed. When some of the compd., suspended in CCl_4, was added carefully to cold H_2O, a yellow ppt. was obtained which was apparently identical with the P_2O described by Besson. LOUISE KELLEY

The nature of hydrates of iron oxide. E. YA. RODE. *J. Russ. Phys.-Chem. Soc.* 62, 1443–52(1930).—An investigation was made of temp.-dehydration curves of artificially prepd. iron oxide gel, of samples of granular lake-ore (Lake Pialo, Olonetzk Gov.), xanthosiderite, brown ore (Ural, Bakal) and of göthite. The results agree with previous investigations in regard to the existence of 3 classes of natural hydrates of iron oxide, α-, β- and γ-. S. L. MADORSKY

The mechanism of the formation of nitric esters. ROBERT C. FARMER. *J. Soc. Chem. Ind.* 50, 75–8T(1931).—F. discusses "pseudo acids," as designated by Hantzsch (*C. A.* 17, 2983), and shows that esterification is a property of the pseudo form and is complementary to the acidic or salt-forming function. Dil. HNO_3 solns. contain only small quantities of pseudonitric acid (I); HNO_3 solns. more concd. than 78% (HNO_3.-H_2O) contain large amts. of I. Addn. of large amts. of H_2SO_4 may decrease the amt. of I, on account of the formation of nitronium sulfate, $(HO)_3N(SO_4H)_2$. F. shows that formation of cellulose nitrate occurs with HNO_3 of above 78% concn. in the absence of H_2SO_4, or with concd. HNO_3 in the presence of P_2O_5 or N_2O_5. F. states that the H_2SO_4 used in nitrations does not have the "pioneering" action of first forming sulfates, but acts only in dehydration. The formation of cellulose nitrate takes place best when about 10% of H_2O is present. With less than this, or in the presence of more than the usual amt. of H_2SO_4, the nitrating action is suppressed, because of the formation of nitronium sulfate. The fact that with mixed acid principally nitrates are formed, the difficulty of formation of sulfuric esters, and the use of alkyl sulfates in alkylation are explained by the reluctance of H_2SO_4 to form the pseudo acid. It is pointed out that the nitration of aromatic compds. is a function of the I present, and is suppressed except at higher temp. where nitronium sulfate is unstable, by the use of large proportions of H_2SO_4. Numerous references are given to the literature on pseudo acids and nitration of cellulose. G. R. YOHE

Contribution to the ebullioscopic study of complexes formed by the halides of cadmium and the corresponding alkaline halides. MLLE. O. HUN. *Compt. rend.* 192, 355-6(1931); cf. *C. A.* 24, 5251.—Evidence is presented indicating the formation of $(NH_4)_2CdCl_4$, $(NH_4)_2CdBr_4$ and Na_2CdI_4. For the chlorides and iodides the stability of these complexes decreases in passing from K to NH_4 to Na, while in the case of the bromides there is an inversion between Na and NH_4. The affinity of these different complexes increases for the same alkali in going from Cl to Br to I. F. W. L.

Nitroso- and isonitrosoferropentacyanide derivatives from nitroprussiates. L. CAMBI WITH A. CAGNASSO AND T. RICCI. *Gazz. chim. ital.* 61, 3–13(1931).—The present paper deals with the ferropentacyanides which are formed by condensation of alk nitroprussiates with substances which contain $:CH_2$ groups with mobile H. New reactions between nitroprussiates and aliphatic NO_2 compds., cyanoacetic acid esters, $PhCH_2CN$ and its derivs. and indole, which are described, confirm the mechanism of the reactions and the structure of the colored complexes already suggested by C. (cf. *C. A.* 7, 2551; 9, 451; 21, 1941), and data based on an x-ray examn. of aq. isonitrosoferropentacyanide derivs. of MeAc, acetylacetone, PhAc, $AcCO_2H$ and indole confirm the structure of the complexes. $EtNO_2$ (2.37 g.) added to satd. K nitroprussiate (8.79 g.) in MeOH, cooled to 0° in an inert atm., EtOK (from 2.34 g. of K) added, the pptd. salt (which changes immediately from red to greenish gray) sepd. in an inert atm., dried, washed with MeOH and then with abs. Et_2O, dried *in vacuo*, dissolved in very dil. H_2SO_4, extd. with Et_2O, evapd. and the residue recrystd. from $CHCl_3$, yields ethylnitrolic acid, m. 81° (decompn.). The same procedure was used with Na nitroprussiate (7.83 g.), $NCCH_2CO_2Et$ (3.39 g.) and NaOEt (from 1.38 g. of Na). The bright red salt when dried became yellow, and it also turned yellow in contact with water. The dry salt was decompd. as before, the product was extd. with Et_2O and purified from C_6H_6, which yielded $NCC(:NOH)CO_2Et$ (cf. *Ber.* 42, 736 (1900)). With $PhCH_2CN$, the Na salt formed in abs. MeOH is red and is still more unstable than the preceding ones, changing to yellow. Decompn. as before yields an oxime which m. 105° and which after again solidifying m. 129°, probably as a result of isomerization. The compd. which m. 105° also m. 129° after recrystn. from water. It is therefore PhC(:NOH)CN (cf. Zimmermann, *J. prakt. Chem.* [2], 66, 361(1855)). The yield is 100%. Under the same conditions, p-$O_2NC_6H_4CH_2CN$ forms a dark red complex compd. which

changes rapidly to green. Decompd. and dried, it forms an oxime, $C_8H_6O_2N_3$, m. 95°, which confirms the data of Zimmermann (*loc. cit.*) for *p*-$O_2NC_6H_4C(:NOH)CN$. Similar results were obtained with other derivs. of $PhCH_2CN$. The yields of isonitronitrile in all cases were 85%, based on the nitroprussiate. Even in dil. EtOH, indole condenses with nitroprussiates, with formation of intense blue complexes. K (0.85 g.) in abs. MeOH (35 cc.) added to K nitroprussiate (2.93 g.) and indole (1.17 g.) in abs. MeOH (50 cc.), and the product washed with MeOH and abs. Et_2O yields the *complex salt* $K_4[C_8H_6ON_2Fe(CN)_5]$, probably contg. the residue of nitroso- or isonitrosoindole. It is violet-black and strongly hygroscopic, and its concd. aq. solns., which are violet, become indigo-blue when dild., as a result of the formation of the *acid salt* $K_3[C_8H_7ON_2Fe(CN)_5]$, which is also deliquescent and is stable in water. Decompn. did not lead to well-defined stable complexes. Under the same conditions as in the prepn of $K_4[C_8H_6ON_2Fe(CN)_5]$, α-methylindole gives a reddish *product* which was not identified. β-Methylindole does not react, which makes it probable that in the formation of $K_4[C_8H_6ON_2Fe(CN)_5]$ and the reddish product above, the NO group enters in the β-position of indole, as has been verified by Angeli in the reaction of alc. nitrites. The results of the x-ray examn. are shown graphically. The examn. was limited to the visible field because of the tendency to decompn. The greater stability of $K_3[C_8H_7ON_2Fe(CN)_5]$ allowed measurements in the ultra-violet region. With MeAc, acetylacetone and $AcCO_2H$, the salts prepd. in water were compared with aq. solns. of the same salts prepd. in abs. MeOH. For comparison, the results with the PhNO complex (cf. Cambi and Ricci, *C. A.* **20**, 1769; **24**, 4231) are also given. The complex salts of $AcCO_2H$, PhAc and indole when in dil. aq. soln., corresponding to the acid salts, show absorption bands similar to that of the pentacyanide from PhNO, *viz.*, from $\nu = 490 \times 10^{-12}$ to 640×10^{-12}. Because of the displacement caused by various radicals united to the N of the NO group, this band is probably evidence of the similar chromophore group in the salts in question. The results show that alcoholates do not, as do alkalies, transform nitroprussiates into nitritocyanides, and that when the reaction can be carried out in water, the same products are obtained as in MeOH (except for $(H_2N)_2CS$ and arylhydroxylamines, cf. C., *C. A.* **24**, 4231). *The structure of the isonitrosoferropentacyanide derivs. of nitroprussiates.* A detailed discussion of the structural problem is included, based both on the previous and present expts. of C. and on expts. by others (cf. C., *loc. cit.*; C. and Szegö, *C. A.* **22**, 2722; C. and Ricci, *loc. cit.*; Pfeiffer and Richarz, *C. A.* **22**, 1291; Tarugi, *C. A.* **22**, 1293; Zwikker, *C. A.* **24**, 4259). In some cases the acid salts which are formed from primary nitroso complexes by weak acids or by great diln. of their aq. solns. are relatively stable. They probably contain the oxime group, thus: $(NC)_5Fe...N{:}C<$, but in some salts at least the NO group may be present: $(NC)_5Fe...NC<$ (with O). In this connection the facts are significant that the complexes obtained from arylnitroso derivs. of the type: $[(NC)_5Fe...NPh]Na_3$, are comparable in all their properties to nitroso- and isonitrosopentacyanides (cf. *C. A.* **20**, 1769; **24**, 4231), and that the great stability of $K_3[C_8H_7ON_2Fe(CN)_5]$ is comparable only with that of derivs. of arylnitroso compds., which it resembles insofar as it contains the NO united to the aromatic heterocyclic nucleus. The expts. described in the present paper confirm the structures already suggested. In the reaction of nitroprussiates with $EtNO_2$, $NCCH_2CO_2Et$, $PhCH_2CN$, etc., it is probable that the salts initially formed, which are intensely colored, isomerize with loss of the characteristic chromophore group: $(NC)_5FeN{:}C=$ (with O), which passes to $(NC)_5Fe.O.N{:}C=$ (with O), which in turn undergoes cleavage, with loss of the oxime anion. With $PhCH_2CN$, the transformation would be: $[(NC)_5FeN{:}C(CN)Ph]Na_4$ (red) ⟶ $[(NC)_5Fe.O.N{:}C(CN)Ph]Na_4$ (yellow) (with O). C. C. Davis

The color reactions of octacyanomolybdates. G. A. Barbieri. *Atti accad. Lincei* **12**, 148–53(1930).—There are 2 series of compds., $K_4Mo(CN)_8.2H_2O$ and $K_3Mo(CN)_8$, in which Mo has a valence of IV and V, respectively, which are analogous to ferro- and ferricyanides. To bring out this similarity further their reactions with Fe salts have been studied. $Mo(CN)_8^{IV}$ with ferric ions in acid soln. gives a deep blue

color, while $Mo(CN)_8^{III}$ does not. However, the blue is less stable, as no ppt. forms, the colored material being present in colloidal form. Addn. of Cu or Ag salts ppts. the corresponding salt. Similarly, ferrous salts with $Mo(CN)_8^{III}$ give blue coloration (*Turnbull blue*). Uranyl acetate behaves in the same way, giving a red-brown color with the IV-ion, but no color with the III-ion. The Ag salt of IV is yellow, while that of III is red-brown, corresponding to the ferro- and ferri-silver salts. A. W. C.

The decomposition tension of anhydrous uranyl nitrate and of anhydrous $Th(NO_3)_4$ (MISCIATELLI) **2.**

CANALES TORO, MARÍA: **Metales de la tierras raras.** Santiago, Chile: Imprenta nacional. 48 pp.

A Text Book of Inorganic Chemistry. Edited by J. NEWTON FRIEND. **Vol. VII, Part 2. Sulphur, Selenium and Tellurium.** By R. H. VALLANCE, D. F. TWISS AND A. R. RUSSELL. Philadelphia: Lippincott. 391 pp. $14 Reviewed in *Chem. Trade J.* **88,** 314(1931).

7—ANALYTICAL CHEMISTRY

W. T. HALL

An aid to calculations in gas analyses. JÜRGEN SCHMIDT. *Chem. Fabrik* **1931,** 137–8.—A nomogram for calcg. H_2 and CH_4 is given. J. H. MOORE

Use of steam for Kjeldahl distillation of nitrogen. JESSE GREEN. *Ind. Eng. Chem., Anal. Ed* **3,** 160–1(1931).—Constructional details and efficiency data are given. B. A. SOULE

Quantitative studies on the boric acid-alcohol flame test. WOLDEMAR STAHL. *Z. anal. Chem.* **83,** 268–89(1931).—See *C. A.* **25,** 1455. W. T. H.

Notes on qualitative microchemical analysis. J. MIKA. *Bányás. Kohás. Lapok* 63, 89–97(1930).—Present qual. methods are described. S. S. DE FINÁLY

Importance of microanalysis. D. KISS. *Technika* **10,** 146–7(1929).—The development of microanalysis and a summary of its advantages over macroanalysis are given. S. S. DE FINÁLY

Microanalysis with an ordinary balance. I. Determination of nitrogen by micro-Dumas method. WM. J. SASCHEK. *Ind. Eng. Chem., Anal. Ed.* **3,** 198–9(1931).—A comparatively large sample of substance (0.1 g) is ground up with a large amt. of finely pptd. CuO and an aliquot portion of the mixt. (about 0.2 g.) weighed on an ordinary analytical balance for analysis. The error in sampling in practice is less than 0.01% as calcd. by the Baule and Benedetti-Pichler formula. When the mixt. is weighed with an accuracy of 0.1 mg. on an ordinary balance, the substance under analysis has been weighed to 0.001 mg., which is the accuracy of the microbalance. N detns. were made of *o*-toluamide, acetanilide, azobenzene and benzamide by the Pregl-Dumas method with satisfying accuracy. L. T. FAIRHALL

Microacidimetric studies. I. J. MIKA. *Mikrochemie* **3,** 143–64(1931).—A theoretical discussion of the errors involved in microacidimetric work. The proper quantities of methyl red, bromothymol blue, phenol red, phenolphthalein, thymolphthalein and alizarin red for microchem. work are worked out. W. T. H.

Colorimetric investigations of indicators in presence of neutral salts. N. V. SIDGWICK, W. J. WORBOYS AND L. A. WOODWARD. *Proc. Roy. Soc.* (London) **129A,** 537–49(1930).—The change of color exhibited by a definite concn. of an indicator in a soln. of given p_H on the addn. of a neutral salt is investigated by a colorimetric method. An optical wedge is employed in conjunction with a Lindemann electrometer and a Rb photoelec. cell, the light absorption being measured by means of the wedge shift. The photoelec. effect enters into the method only as a null-point observation. The Tizard relation $K = [H](C_1-C)/(C-1)$ is used, where K is the apparent dissocn. const. of the indicator acid, C the color of a slightly alk. soln. of methyl orange at a given concn. and C_1 the relative color, which is the ratio of the color of any other soln. to the unit color. A correction is made for the part of the H ions combined with the indicator anions to form undissocd. indicator acid. Detns. of K are made in the absence of neutral salts with varying concns. of HCl, and a method is described for studying the possibilities that the neutral salt may alter the absorption bands of the colored forms of the indicator, and that it may affect the chem. equil. between these forms. The first possibility is studied independently of the second by dealing with solns. in which the indi-

cator is completely in the yellow or the red forms. Measurements are also made of the dissocn. const. of methyl orange in the presence of varying concns. of several salts (NaCl, NaBr, NaO_3Cl, $NaNO_3$, KCl and KBr), the concn. of the indicator being $N/40{,}000$. For NaCl, K rises to a max. between 0.05 N and 0.1 N and afterward falls. A series of measurements was also carried out with a const. quantity of AcOH-NH_4OH buffer, instead of HCl, at an indicator concn. of $N/53{,}000$, and the results were of the same type for all salts; the value of $[H^+_{free}]$ rises with increase of salt concn., passing through a max. at about 0.5 N. The theoretical significance of these results is discussed.
A. L. Henne

Determinations by Wood light. A. G. Nasini and P. De Cori. *Atti III congresso naz. chim. pura applicata* **1930**, 668–78.—The use of eosin, coumarin, umbelliferone, quinine, naphtholsulfonic acids, fluorescein, acridine, dichlorofluorescein and β-methylumbelliferone as fluorescent indicators for dark solns. is reviewed. The p_H of the soln. affects the intensity of the light emitted. Detns. were made on black liquor, sulfuretted oils, wines, beers, acid $FeSO_4$ solns. and com. indigo carmine, certain advantages as well as difficulties in the use of fluorescent indicators being shown.
E. M. Symmes

Volumetric determination of selenium. B. Ormont. *Z. anal. Chem.* **83**, 338–9 (1931).—Benesch (*C. A.* **23**, 790) proposed a method for detg. Se based upon titrating a Na_2S soln. with KCN. It is pointed out that Se forms the compd. $Na_2SSe_2.5H_2O$ when it dissolves in Na_2S, instead of a colloidal soln. of Se as B. assumed. It seem probable that difficulties will be encountered in practice in attempting to det. Se by this method. W. T. H.

The microchemical determination of strontium. L. de Zombory. *Technika* 10, 147–9(1929).—The Sr (4–5 mg.) is pptd. as $SrCO_3$ and weighed after drying at 150°; or the ppt. can be treated with H_2SO_4 and weighed as $SrSO_4$. S. S. de Finály

Separation of iron-titanium-aluminum in tartrate solution. Erich Schwarz von Bergkampf. *Z. anal. Chem.* **83**, 345–50(1931).—A satisfactory sepn. of Fe, Al and Ti (corresponding to 0.084 g. Fe_2O_3, 0.018 g. TiO_2 and 0.07 g. Al_2O_3) was accomplished by first reducing the Fe^{+++} with H_2S in acid soln., making slightly ammoniacal and pptg. FeS with H_2S, making acid with H_2SO_4 and pptg. Ti with cupferron, and finally pptg. Al with oxine acetate in ammoniacal soln. The presence of V caused trouble.
W. T. H.

Determination and separation of lead and bismuth by the volumetric filtration method. Hans Th. Bucherer and F. W. Meier. *Z. anal. Chem.* **83**, 352–61(1931). B. and M. (*C. A.* **25**, 47) have shown the advantages of carrying out quant. pptns. with measurement of the vol. of reagent required to effect complete pptn. as detd by filtering the soln. and testing with more reagent and also with a soln. contg. the ion to be pptd. For detg. Pb, pptn. as $PbSO_4$, as $Pb_3(PO_4)_2$, as $PbCrO_4$ and as PbSeO, was tested, and the last two methods proved suitable for this kind of an analysis. For pptn. of Bi, a 0.015–0.02 M soln. of H_2SeO_3 is suitable. The Bi selenite is formed in 0.05–0.08 N HNO_3 soln., but HNO_3 prevents the pptn. of the corresponding Pb salt. For the detn. of Bi and Pb, therefore, make the soln. 0.05–0.08 N in HNO_3 (0.15 g. Bi or less) and the vol. of soln. about 100 cc. Heat to 70° and add the H_2SeO_3 soln. with shaking. Toward the end of the reaction, heat to boiling. After the detn. of the Bi, add an excess of NaOAc, heat to 80–90° and ppt. the Pb (0.1 g. or less) with the same H_2SeO_3 soln. or with $K_2Cr_2O_7$ soln. The results obtained in 8 analyses all agreed within 0.23 mg. (1.5% of the Pb content). W. T. H.

Separation of magnesium from potassium and sodium in the analysis for cations. G. Kalikinskii. *J. Russ. Phys.-Chem. Soc.* **62**, 1355–6(1930).—After the pptn. and filtration of $MgNH_4PO_4$, the excess PO_4^{---} is removed by adding $CaCO_3$, and the filtrate from the $Ca_3(PO_4)_2$ ppt. is divided into 2 portions and sep. tests made for Na^+ and K^+. S. L. Madorsky

Microdetermination of calcium and magnesium in the presence of each other. K. L. Malyarov. *Mikrochemie* **3**, 132–5(1931).—If not over 10 mg. of CaO or MgO (as carbonate, oxide or hydroxide) and only very little, if any, alkali carbonate is present, a satisfactory sepn. and detn. can be accomplished by taking advantage of the fact that CaO is quite sol. in water and MgO is not appreciably sol. Ignite the sample for some time, preferably over the blast lamp, cool in a desiccator over soda lime or KOH and then dissolve the CaO by means of 60–80 cc. of hot water free from CO_2. Filter and titrate the filtrate with 0.05–0.02 N HCl with methyl orange as indicator. Dissolve the residual MgO in a measured vol. of the HCl and titrate the excess acid with NaOH. W. T. H.

Determination of calcium and magnesium by titrating in the same solution. K. L.

MALYAROV. *J. Russ. Phys.-Chem. Soc.* **62**, 1529–31(1930).—Ca is pptd. by means of oxalic acid, and then, without filtration, Mg is pptd. as hydroxide from the same soln. by means of KOH. The two can then be detd. microanalytically, without sepn., in the following way: Mg is detd. by titrating with H_2SO_4, and Ca is detd. by titrating with $KMnO_4$. The soln., however, must be free from NH_4 salts, and the amt. of MgO must not exceed 0.01 g. S. L. MADORSKY

Detection of gold, palladium and silver with dimethylaminobenzylidenerhodanine. F. FEIGL, P. KRUMHOLZ AND E. RAJMANN. *Mikrochemie* **3**, 165–73(1931).—*p*-Dimethylaminobenzylidenerhodanine, $S.CS.NH.CO.C:CHC_6H_4NMe_2$, can be used to advantage for the detection of Au, Pd and Ag. To detect Ag in the presence of Au, Pt, Pd and Hg, take a drop of the soln. on a spot plate, mix it with a drop of 10% KCN soln., add 1 drop of the reagent dissolved in alc. and make acid with a few drops of HNO_3; a violet ring forms if Ag is present. Cu must be absent, as it also gives a color reaction with the reagent. 0.001 mg. of Ag can be detected in the presence of 1000 times as much Hg, 4000 times as much Au and 300 times as much Pd. Au, like Ag, gives a colored ppt. with the reagent. The reddish violet ppt. can be used as a test in a test tube or on the spot plate. After adding the reagent, its excess can be removed by shaking with ether, and a red skin will form at the layer between the 2 solns. Palladous salts give a violet ppt. Of the other Pt metals, Pt and Ir also give tests with the reagent, but not so readily; so it is possible to test for Pd in the presence of other Pt metals. Pd can also be detected in the presence of Ag if the latter is first converted into $[AgBr_2]^-$. If Au is present, it can be reduced to metal by treatment with alkali nitrite in a soln. kept neutral by the addn. of an excess of $CaCO_3$. W. T. H.

Determining molybdenum in steel. H. C. WEIRICK AND C. H. MCCOLLAM. *Heat Treating and Forging* **16**, 1145–6, 1155(1930).—In the detn. of Mo by the $PbMoO_4$ method 2 sources of error may appear: (1) the interference of elements other than Mo; (2) errors found in the method itself. If Al or V is indicated by sep. analysis, either the sulfide pptn. or the colorimetric method (Maag and McC., *C. A.* **19**, 1675) should be used. In carrying out the procedure frequent blanks must be made on the reagents to check their purity; the Pb and the NH_4 acetate solns. should be reasonably fresh; the NaOH should be of high purity; and the correct amt. of HCl should be added. J. BALOZIAN

Detection of fluorine in plants and soils. PAUL RECKENDORFER. *Mikrochemie* **3**, 126–31(1931).—The method depends upon the combustion in a calorimetric bomb with O_2 at a pressure of 25 atm. About 2 g. of the sample was compressed to a small pill, and this pill was covered with a cotton wick. A little 20% KOH soln. was also placed in the bomb. The combustion was effected as in the detn. of the heating value of coal. After the combustion the ash and the KOH soln. were examd. separately for F, the test depending upon volatilization as SiF_4 by treatment with SiO_2 and H_2SO_4 and carrying out the molybdate-benzidine test for the sol. Si compd. By means of soil and plant tests it was shown in one case that the F content of a plant was due to fumes and not to absorption from the soil. W. T. H.

Rapid determination of small quantities of boric acid by the intensity of the flame coloration. WOLDEMAR STAHL. *Z. anal. Chem.* **83**, 340–4(1931); *Acta Univ. Latvensis Kim. Fakultat Serija* **1**, 401–7 (in Lettish), 407 (in German).—With the aid of turmeric paper and standard solns., Bertrand and Agulhon (*C. A.* **8**, 2005) detd. 0.0005 to 0.1 mg. of B. By means of the green flame test with Me_3BO_3 it is easy to det. 0.3 mg. of B_2O_3 or more with an accuracy of 0–15%. For this purpose it is necessary to have a colorimetric scale, produced with standard solns. of known B content, 3 Bunsen burners of the same size, and an app. suitable for introducing equal vols. of air through the soln. being tested and through 2 standard solns. The best mixt. consists of 100 vols. of MeOH and 20 vols. of H_2SO_4. Directions are given in detail and the results of many tests are included. W. T. H.

Titration of sulfate in the presence of ferric ions. L. DE ZOMBORY. *Technika* **10**, 192 3(1929).—If 1–3 cc. of dil. H_3PO_4 is added to a soln. contg. SO^{--} and Fe^{+++}, then an excess of 0.5 *N* $BaCl_2$ soln. should be added. The excess $BaCl_2$ can be detd. by titration with 0.2 *N* alkali or NH_4 sulfate soln. in the presence of 5–10 drops of 0.25% Na rhodizonate soln. as an indicator. The red color changes to a greenish white at the end point. S. S. DE FINÁLY

Method for the estimation of iron in biological material. ROBERT HILL. *Proc. Roy. Soc.* (London) **B107**, 205–14(1930).—Addn. of $\alpha\alpha'$-dipyridyl to a soln. of a ferrous salt between p_H 3.5 and 8.5 yields an intense-red complex ferrous ion. The color is not influenced by the presence of other metals unless they are present in great excess over the Fe.

Their presence may be overcome by use of sufficient excess of the reagent to insure complete transformation of the Fe into its dipyridyl complex. Fe^{+++}, except in high concn., gives no color and does not interfere with the reaction for Fe^{++}. Both Fe^{++} and Fe^{+++} may be detd. by addn. of dipyridyl and measurement of the intensity of the pink color both prior to and after reduction. The best reducing agent for this purpose is $Na_2S_2O_4$ prepd. as follows: To an almost satd. soln. of $Na_2S_2O_4$ at 40° add sufficient $\alpha\alpha'$ dipyridyl to produce the max. red color (traces of Fe^{++}), filter rapidly on a Buchner funnel, and ppt. $Na_2S_2O_4$ from the filtrate with alc. Let stand 20 min., collect the ppt. on a filter, wash with 70% alc. until colorless, then with 97% alc. Boil with 97% alc. for 10 min., filter immediately and transfer the salt at once to a vacuum desiccator contg H_2SO_4. Hydrazine hydrate may also be used as a reducing agent at a temp. of 40° $\alpha\alpha'$-Dipyridyl does not react with reduced hematin or pyridine-hemochromogen and does not remove Fe from hematin; it inhibits the catalytic reactions of Fe ions. Iodides, tungstates, alkaloidal reagents and $Fe(CNS)_3$ + HCl tend to interfere with the development of the red color, usually by causing formation of a ppt. Permanent standards are prepd. by sealing 5 cc. of a standard soln. in a tube 1.3 cm. in diam. and 8 cm. long The standard solns. are prepd. from 2 stock solns., 0.01 *M* ferrous ammonium sulfate, and 0.03 *M* $\alpha\alpha'$-dipyridyl-HCl; these solns. are equiv. from the viewpoint of the colored complex ion. The most concd. standard is 0.0001 *M* ferrous dipyridyl, contg. twice the theoretical amt. of the dipyridyl group; it is prepd. from the 2 stock solns., acetate buffer and a trace of $Na_2S_2O_4$. From this standard are prepd. 23 addn. standards, contg. from 0.0051 to 0.00056 mg. Fe^{++} per cc., acetate buffer soln. being used as the diluent. SO_2 is passed into the Standards prior to sealing in order to insure their permanence. The p_H of unknown solns. is brought within the proper limits by addn. of a soln. of Fe-free AcONa contg. AcOH. The ferrous dipyridyl may be adsorbed by proteins in neutral, slightly alk. or even slightly acid solns.; this usually may be prevented by use of AcONa plus SO_2, or of 30% alc. These procedures may be used for the detn. of Fe in biol. material without previous incineration. Baker's yeast contained 0.0016% non-hematin Fe^{+++}, hen egg yolk 0.0085% Fe^{+++} probably as colloidal $Fe(OH)_3$. At p_H 7.3, low concns. of $\alpha\alpha'$-dipyridyl inhibit the catalysis of the oxidation of cysteine by Fe, but have no influence on the action of Cu on this reaction.

JOSEPH S. HEPBURN

Determination of gold in animal substances. S. TUKATS AND M. LEINZINGER *Magyar Gyógyszerésztud. Társaság Értesitöje* 6, 43–54(1930).—Treat the sample with concd. HNO_3, evap. and heat the residue in an elec. oven to about 300°. To the ash add 3 cc. HCl and 30 cc. of $CaOCl_2$ soln. and evap. to dryness. Add 1–2 drops of 25% HNO_3, 2 cc. of fresh Cl_2-water and 5 cc. of water. Add 1–2 drops H_3PO_4 and boil 10–15 min. to remove Cl. The soln. is now ready for an electrolytic, gravimetric or iodometric detn.

S. S. DE FINÁLY

The Nessler reagent and its action on reducing sugars. LIVIO PAVOLINI. *Chim. ind. agr. biol.* 7, 39–40(1931).—Instead of Fehling soln., which is blue and does not permit a good observation of the color changes, P. proposes Nessler soln. (alk. soln. of K_2HgI_4) for the detection of sugars: 5 cc. of cold soln. contg. 0.1–0.2 g. sugar are treated with 0.5 cc. of reagent and shaken: a yellow or green-yellow ppt. is obtained with glucose, lactose, fructose and dextrin. Sucrose does not give the test. G. A. B

Microdetermination of glucosides in plant materials, with emphasis on the difficulties. ANNELIESE NIETHAMMER. *Mikrochemie* 3, 136–42(1931).—Rosenthaler (*C. A.* 24, 3531) has indicated the advantages of sublimation tests for the identification of glucosides in plant materials. His work is confirmed by studies on the bark of the wild horse-chestnut contg. esculin, seeds of the yellow wattle and of cow wheat contg rhinanthin, bark and leaves of the elder contg. syringin, leaves of the common leek contg. saponarin, digitalis plants contg. digitonin and bark of the *Salix caprea* contg salicin. The glucosides, to be sure, undergo slight decompn. during the sublimation, but the sublimate usually yields crystals which can be identified, particularly after treatment with Br-KBr soln.

W. T. H

The determination of arsenic in arsenobenzenes. UGO CAZZANI. *Giorn. farm. chim.* 79, 62–4, 67–70, 73–4, 77, 107–14, 117–8, 163–6, 169–72, 175–8, 181–3, 186–7 (1930); cf. *C. A.* 20, 263.—A complete review is given of the various methods employed in the detn. of As in arsenobenzenes. The methods are described in detail and their merits and defects are discussed. Lehmann's method (with slight modifications), De Myttenaere's method, and the bromometric method of Kircher and Ruppert are considered to be the best methods; analytical evidence is given in support of this view. The following modification of Lehmann's method is suggested. Mix 0.2 g. of arsenobenzene with 1 g. of finely powd. $KMnO_4$; add 5 cc. of 30% H_2SO_4 slowly, with gentle

agitation. Allow to stand 10 min., shaking occasionally. Then add 10 cc. of concd. H_2SO_4 and some H_2O_2 soln. Add 5 cc. of H_2O_2 in excess after the liquid has become limpid and colorless. Dil. with 25 cc. of H_2O and gently boil the liquid until white heavy fumes appear. After cooling add 50 cc. H_2O, cool again, add 2.5 g. of powd. KI, cover the flask with a watch glass and shake until the KI is dissolved. Allow to stand in the dark for 1 hr. and then titrate with 0.1 *N* $Na_2S_2O_3$ without starch. Run a blank in the same way. C. prefers the following procedure. To 0.20 g. of substance add 10 cc. of H_2O_2 soln. and 10 cc. of concd. H_2SO_4. Heat gently on the sand bath until more gas is evolved. Remove from the sand bath, add 5 cc. more of H_2O_2 soln. and heat gently until no more gas is evolved; then heat strongly for 10–15 min. Dil. the resulting colorless liquid with 50 cc. H_2O; add dropwise 1% $KMnO_4$ until a rose color persists. Decolorize with oxalic acid soln., cool, add 2.50 g. of powd. KI and shake the soln. in a covered flask until the KI is dissolved. After 30 min. in the dark titrate with 0.1 *N* $Na_2S_2O_3$ soln. without addn. of starch. Then add 75 cc. of satd. Na_2CO_3 soln. and about 10 g. of $NaHCO_3$ and titrate with 0.1 *N* I until a light yellow color persists. Run a blank test in the same manner. Comparative results are shown with various procedure and 2 pages of references are given. G. SCHWOCH

Critical study of the method proposed by G. Florence for finding alkaloids in viscera. N. J. JOANID. *Bull. soc. chim. biol.* **12**, 1001–13(1930); cf. *C. A.* **21**, 3905.—Recovery of strychnine, morphine and cocaine from fresh and putrefied beef was much lower when the method proposed by F. was used, instead of the method of Kohn-Abrest (modification of Stas-Otto method). Recovery from the organs of a dog poisoned with strychnine was only 0.25 that recovered by the older method. C. G. KING

Detection of semen in legal cases. J. PELTZER. *Chem.-Ztg* 55, No. 7, 70(1931).—Microscopic examn. of an aq. or H_2O_2 suspension may disclose characteristic elements or spermatozoa. The suspected spots or flecks are moistened with H_2O_2. If semen is present, much foaming occurs. Microscopic mounts may be stained with 2% aq. soln. of eosin. If the mount is pos., long, lance-like characteristic crystals (of Florence) appear. The addn. of I-KI soln. to the mount in very small amt. colors the crystals chocolate-brown at first; gradually the crystals disappear but are recrystd. by the addn. of a little more of the I soln. The presence of spermatozoa or of the Florence crystals is pos. evidence of the presence of semen. C. R. FELLERS

Titration of ethylenic nitriles. G. HEIM. *Bull. soc. chim. Belg.* **39**, 458–61(1930).—Ethylenic nitriles, with a double bond in the α–β position, add Br much more slowly than nitriles with a β–γ double bond. If the following conditions are respected, a mixt. of both forms can be titrated by bromination, because for practical purposes the α–β forms are not affected. Dissolve the nitriles in enough $CHCl_3$ to obtain 1/40 mol. in 100 cc. of soln. The brominating soln. is a 0.1 *N* Br aq. soln. contg. 100 g. KBr/l. For titration, add twice the quantity of Br soln. needed for the amt. of nitrile, shake vigorously for 10 seconds to emulsify, add a 10% KI soln. and titrate the I liberated. A. L. HENNE

Three new reactions of alanine. JUAN A. SÁNCHEZ *Semana méd.* (Buenos Aires) **1931**, I, 651–3.—(1) Heat 0.01 g. alanine with 20 drops of 1% $KMnO_4$ soln. to 100° for 1 min., cool, add 0.05 g. oxalic acid and then to the colorless liquid 2 cc. EtOH, 0.02 to 0.03 g. *o*-nitrobenzaldehyde and 10 drops of 30% NaOH. Shake with $CHCl_3$; the $CHCl_3$ takes a blue color. The reaction is explained as being due to the formation of indigo. (2) Heat alanine with NaOCl for some seconds, add 2 drops of 30% NaOH and by drops a soln. of I in KI. A ppt. of CHI_3 is formed. The intermediate formation of AcH is supposed. (3) Heat dry alanine in a closed tube and dissolve the condensed vapors in dil. HCl. The soln., which contains $EtNH_2$, gives with the reagent of Bouchardat a reddish brown ppt., with Dragendorff's reagent a red one and with S.'s molybdic reagent a white ppt. A. E. MEYER

Determination of benzene in alcoholic solutions. GY. GRÓH AND E. FALTIN. *Magyar Chem. Folyóirat* **36**, 156–9(1930).—Small quantities of benzene may be detd. by means of the characteristic absorption in the ultra-violet spectrum. Extinction coeffs. of alc. benzene solns. were detd. by a Hilger's spectrograph in layers of various thickness, and it was found that the law of *Beer-Labert* holds. Sensitivity was found to be 0.01 g. per l. S. S. DE FINÁLY

Color tests for some saturated and unsaturated carboxylic acids. L. EKKERT. *Magyar Gyógyszerészetud. Társaság Értesitője* **7**, 121–4(1931).—Color tests with different aldehydes were tried. Satd. monocarboxylic acids with few C atoms do not give tests with aldehydes in alc.-H_2SO_4 solns. Acids with more C atoms, *e. g.*, palmitic and stearic acids and unsatd. acids, *e. g.*, oleinic and ricinoleic acids, show, on the contrary, striking color reactions. S. S. DE FINÁLY

Examination of a new reaction of acetic acid. J. ERDÖS. *Magyar Gyógyszerésztud. Társaság Értesitöje* **6**, 332–6(1930).—The color test with La nitrate described by Krüger and Tschirch (*C. A.* **23**, 5129) was studied. The minimum quantity of AcOH giving a blue color was found to be 0.1 mg. as stated by K. and T. The test fails if over 1.5 times as much lactic acid is present, no test was given in 1% soln. by several mono-, tri- and amido-substituted acetic acids, acetonitrile, aniline acetate, Et acetate, or iso butyl acetate. NaOAc gave the blue color. The following conclusions are drawn (1) Substitution in the Me radical of acetic acid, (2) esterification of carboxyl by org radicals and (3) substitution of a carboxyl group prevent the reaction, but (4) inorg salts of AcOH give a positive test. S. S. DE FINÁLY

Allen's Commercial Organic Analysis. 5th ed., revised. **Vol. VIII.** Glucosides, Non-Glucosidal Bitter Principles, Enzymes, Putrefaction Bases, Animal Bases, Animal Acids, Cyanogen and the Cyanogen Halides, Proteins and the Digestion Products of the Proteins. Edited by S. S. SADTLER, E. C. LATHROP AND C. A. MITCHELL. Philadelphia: P. Blakiston's Son & Co. 733 pp. $7.50. Cf. *C. A.* **22**, 1303.

BAILEY, E. H. S., AND CADY, HAMILTON: **Qualitative Analysis.** 8th Ed., revised by Paul V. Faragher. Philadelphia: P. Blakiston's Son & Co $2.

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LUNGE, G., AND KEANE, CHAS. A.: **Technical Methods of Chemical Analysis.** 2nd ed., revised and edited by C. A. Keane and P. C. L. Thorne. **Vol III.** London Gurney & Jackson. 698 pp. £3, 3s., net. Cf. *C. A.* **23**, 580.

SUTTON, FRANCIS: **Volumetric Analysis.** 11th ed., revised by W. Lincolne Sutton and Alfred E. Johnson. Philadelphia: P. Blakiston's Son & Co., Inc. $9.

8- MINERALOGICAL AND GEOLOGICAL CHEMISTRY

EDGAR T. WHERRY AND J. F. SCHAIRER

Röntgenographic examination of remelted algodonite and whitneyite. Supplement. FELIX MACHATSCHKI. *Centr. Mineral. Geol.* **1929A**, 371–3; *Chem. Zentr.* 1930, I, 957; cf. *C. A.* **25**, 1459.—The expts. of Borgström (*C. A.* **12**, 2507), on the remelting of algodonite and whitneyite were checked by x-ray study. The results obtained confirm the view of B. that different products, namely Cu_6As and Cu, are formed. G. SCHWOCH

Two minerals from the Belgian Congo. I. A non-pyro-electric tourmaline. II A colorless chrysoberyl. J. MELON. *Bull. sci. acad. roy. Belg.* [5], **16**, 996–1000 (1930).—The tourmaline occurs in fine needles, very pleochroic, d. 3.0, n about 1.630 The chrysoberyl occurs in hexagonal prisms. Measurements are given. R. S. DEAN

Chemical and crystallographic investigations on lithidionite from Vesuvius. GUIDO ÇAROBBI. *Rend. accad. sci. Napoli* [3], **36**, 21–31(1930); cf. *C. A.* **25**, 1462.—Lithidionite occurs both in vitreous and cryst. forms. The cryst. phase is richer in Cu, and samples contg. 13.29% CuO had sp. gr. 2.737–2.742; the vitreous phase, contg. 2 to 3% CuO, had 2.483–2.373. Analyses of 3 samples ((*a*) vitreous, (*b*) vitreous plus cryst., and (*c* cryst.) are given. They establish its formula to be essentially $(Cu, Na_2, K_2)Si_3O_7$, with CaO, MgO, Fe_2O_3 and PbO present as minor constituents. The lithidionite probably contained $Fe_2Si_3O_8$ in solid soln. It was microscopically heterogeneous, and small quantities of wollastonite, and possibly of rivaite, were sepd. from it. It is monoclinic, optically —; $2V = 124°$; the n_D^5 are: $n_p = 1.548$ and $n_m = 1.574$. Selected crystals contg 13.29% CuO melted at about 780° to a blue glass which did not devitrify on cooling. An analysis of a sample of *neocianite* agrees well with that of lithidionite, establishing their identity. Arguments are advanced in support of the existence of *rivaite* as a definite mineral species. R. H. LOMBARD

Genesis of Japanese acid clay. K. KOBAYASHI AND K. YAMAMOTO. *Chem. News* **142**, 116(1931); cf. *C. A.* **24**, 2352–3.—The acid clay is formed exclusively along an intrusion of liparite through pre-tertiary strata. Chalcedony, opal, pumice, primary kaolin and fine crystals of pyrite occur as impurities. Its formation is attributed to the decompn. of interposed Na feldspar and Na silicate. W. L. HILL

Quinquennial review of the mineral production of India for the years 1924 to 1928.

Records Geol. Survey India **64** (1930). **Jadeite.** J. COGGIN BROWN. 146–54.—The jadeite occurs as large lenses (5–7 ft. thick) in albite intruded into partially serpentinized peridotites. Alluvial jadeite is also produced. **Mica.** CYRIL S. FOX. 233–54.—Most of the Indian mica comes from pegmatites traversing mica schists. The pegmatites usually have a quartz core with marginal feldspar. Between these 2 are the largest mica books. Marketable mica is also found along the contact between dike and schist. The mica-bearing pegmatites are recrystallized products of the schists. Less than 1% of the quarried rock is marketable mica. Other associated minerals are biotite, tourmaline, garnet, apatite, beryl and rarely samarskite, pitchblende and monazite. **Ruby, sapphire and spinel.** J. COGGIN BROWN. 273–6.—The following gems are produced in Burma: quartz (amethyst, etc.), apatite, beryl (aquamarine), chrysoberyl, epidote, garnet, iolite, lapis lazuli, feldspar (moonstone), olivine, phenakite, tourmaline (rubellite), topaz, zircon. Most of the precious stones, and all the rubies and spinels, have been derived from bands of cryst. limestone in Archean gneisses. **Zircon.** W. A. K. CHRISTIE. 312–3.—Zircon occurs (6%) in the Travancore sands, worked chiefly for ilmenite. **Bauxite.** C. S. FOX. 328–43.—India contains large deposits of bauxite, largely unexploited. Uses are extensively discussed. **Steatite.** E. L. G. CLEGG. 437–40.—Steatite is one of the most widely distributed minerals in India. A. H. E.

The Tadzhikistan phosphate region. B. M. ZDORIK. *Udobrenie i Urozhai* (*Fertilizers and Crops*) **2**, 504–16(1930).—Z. gives the geology of the region, petrography and mineralogical components of the rocks and of the phosphate deposits, their extent and approx. analyses. J. S. JOFFE

Hydrargillite and sulfurous bauxite in Istria. T. KORMOS. *Bányás. Kohás. Lapok* **63**, 269–77(1930).—Bauxites of Santa Domenica and Portole show postvulcanic influences, *e. g.*, a bluish gray bauxite with 10% S. Hydrargillites of the same region are probably of secondary origin formed independently of the bauxites, since they contain no Ti nor S, but have $H_2O > 30\%$. Several bauxite analyses are published. S. S. DE FINÁLY

Coal formation, mountain formation and bauxite formation in Hungary. E. VADÁSZ. *Bányás. Kohás. Lapok* **63**, 213–20(1930).—The largest coal occurrences of Hungary were formed in post-orogenic sinking periods. Coal formation generally took place during the change of earth surface caused by the orogeny; the formation of bauxites, on the contrary, is the dry-land formation product of an ended orogeny. S. S. DE FINÁLY

The Kuréjka graphite occurrence of the Tunguzka coal basin, Siberia. A. PÉCZELI. *Bányás. Kohás. Lapok* **63**, 242–52, 277–81(1930).—A coal basin covering about 900,000 sq. km. consists of 2 types of rock deposits. Coal of younger formation (Angara-type) is weakly metamorphic, contg. rather considerable ash. Coal of older formation (Jenissei-type) is strongly metamorphic. The 14-m. amorphous graphite deposit of Kuréjka lies on a 1.5 m. lime layer. The proved coal content of the basins is estd. at 1,200,000 metric tons. S. S. DE FINÁLY

A new physicochemical explanation of the formation of humus, peat and coal. The significance of biological factors in these processes. J. ZOLCINSKI. *Wiss. Arch. Landw.*, Abt. A, *Pflanze* **4**, 196–228(1930).—Decompn. of org. material of both plant and animal origin follows the same basic laws as are observed for the decompn. of rocks and minerals, in which simpler, more stable compds. are formed. Seventy references are given. W. GORDON ROSE

Comparison of the behavior to thermic action of rock from Ragusa and from Abruzzo. M. G. LEVI AND C. COLLINA. *Atti III congresso naz. chim. pura applicata* **1930**, 740–52.—The rocks studied were asphaltic calcites. They were subjected to fractional distn. to sep. liquid, solid and gas. A plant design is shown to sep. these substances commercially, a part of the rock being used for fuel. The residue can be used for CaO *manuf.* E. M. SYMMES

Sapphires. J. W. HOWARD. *J. Chem. Education* **8**, 613–24(1931).—The sources, mining, sorting, grading and properties of natural sapphires are described. Details of the prepn. of synthetic sapphires are given and the methods of distinguishing natural and synthetic sapphires discussed. E. H.

Classification of rocks. F. PAPP. *Bányás. Kohás. Lapok* **63**, 556–63(1930).—The classification of Hungarian rocks is discussed. S. S. DE FINÁLY

Astrophyllite-bearing nephelite syenite gneiss—found as a boulder in Kiihtelysvaara, eastern Finland. PENTTI ESKOLA AND TH. G. SAHLSTEIN. *Bull. comm. geol. Finlande* **1930**, No. 92, 77–88.—The mineralogical composition of the boulder was nephelite 34.27, plagioclase 27.92, K feldspar 17.15, amphibole 13.86, aegirite 0.14, astrophyllite 2.30, cataplеite-like mineral 0.90, titanite 1.01, cancrinite 0.18, apatite

0.45%. It is accordingly highly alk. and unlike any outcrops in the vicinity.
R. S. DEAN

The disintegration of rapakivi. PENTTI ESKOLA. *Bull. comm. geol. Finlande* 1930, No. 92, 96–105.—The Finnish word rapakivi means crumbly stone and is used to designate certain granites which disintegrate spontaneously. The disintegration of rapakivi seems to presuppose the coincidence of several different circumstances. Its main condition seems to be a comparatively simple texture with rather smooth boundary surfaces between the mineral grains. The consistency of the rock may have been, and in some cases certainly has been, loosened by slight disturbances in the crust. Where layers thus predisposed become exposed to air and rain water and subjected to the influence of temp. changes, there the rock will break up into grit. At the same time chem. weathering sets in, causing decompn. of the Fe-rich lepidomelane and oxidation of its Fe^{++} into rusty products. Part of the anorthite in the plagioclase, moreover, may be dissolved and some of its Al_2O_3 may remain in the insol. portion. From a rock which like the rapakivi is available in the form of loose grit the heavy minerals may be easily sepd. by means of panning. The rapakivi was thus found to contain considerable amts. of zircon and ilmenite, but no other minerals heavier than hornblende.
R. S. DEAN

Rocks of the upper Bargousin and Namama regions in Transbaikalia. PENTTI ESKOLA. *Bull. comm. geol. Finlande* 1930, No. 92, 106–40.—The following rocks occurring in the Bargousin region are described: graphite-bearing limestone, amphibolites and gneisses, quartzite, granite In the Namama region, cryst. limestone and dolomite, quartzite shale, greenschists and metamorphic andesites are described as supercrystal and quartz keratophyre; orthoclase porphyry, granite, granodiorite, hornblende gabbro and hornblendite are described as intracrustal. Cu ore also occurs in the cryst. limestone bounded on the east by quartz keratophyre and on the west by Namama diorite. The chem. nature of the igneous rocks of the Bargousin magmatic province is discussed in detail.
R. S. DEAN

The eruption of the volcano of the Kaménis (Santorini) in 1925. CONST. A. KTENAS. *Bull. volcan.* **4**, 7–49(1927); cf. *C. A.* **20**, 564; **21**, 880; **24**, 2086.—A general description is given of the eruption. Two analyses of fumarole gases and 4 of lavas are given.
H. S. WASHINGTON

Report on studies on the last eruption of the Kaménis (Santorini). CONST. A. KTENAS. *Bull. volcan.* **4**, 171–6(1927).—An addn. is made to previous papers on the eruption without new analyses.
H. S. WASHINGTON

Report on the work of the Laboratory of Petrology of the University of Athens, relating to the study of the volcanoes of the Aegean Sea. CONST. A. KTENAS. *Bull. volcan.* **4**, 182–7(1927)(map).—Brief notes are given on the petrography of some little known Greek island volcanoes The lavas are mostly dacites and andesites. H. S. W.

The basaltic volcanoes of southern Indochina. M. F. BLONDEL. *Bull. volcan.* **4**, 193–4(1927).—Very brief notes are given. No analyses are included. H. S. W.

The chemico-mineralogic characters of the Tertiary intrusive and volcanic rocks of North Africa. A. LACROIX. *Bull. volcan.* **4**, 199–204(1927).—A summary paper Although no analyses are given, the rocks are classified according to the C. I. P. W. system.
H. S. WASHINGTON

First observations on the mineralogic and chemical composition of the Mesozoic and Tertiary lavas of eastern China. A. LACROIX. *Bull. volcan.* **4**, 205–17(1927). Brief petrographical descriptions are given with 20 chem. analyses.
H. S. WASHINGTON

The lithologic constitution of the South Central Pacific. A. LACROIX *Bull. volcan.* **4**, 218–31(1927).—A general petrological description is given; no analyses are included.
H. S. WASHINGTON

Collection of chemical analyses of Russian eruptive and metamorphic rocks. A. NÉMOVA AND F. LOEWINSON-LESSING. *Mem. Com. Geol.* (Moscow), New series, No. **186**, 361(1930).—The collection numbers 1676 analyses. The text is in Russian, except that rock names are also given in French.
H. S. WASHINGTON

Unusual depositional stalactites in a lava-tunnel at Mount Albert, Auckland. J. A. BARTRUM. *New Zealand J. Sci. Tech.* **12**, 188–92(1930).—The material appears to consist of crust-like layers of small white flakes of opal intermixed with kaolin and sepd. irregularly by similar discontinuous thin layers of granular white kaolin.
H. C. PARISH

Slippings of clay territories at Budapest. A. VENDL. *Magyar Mérnök Építészegylet Közlönye* **64**, 65–72(1930).—Slippings are caused by a thin water-contg. layer within the loess covering Kiscelli clay strata.
S. S. DE FINÁLY

Translation-gliding in crystals of the NaCl structural type (BUERGER) **2. Membranes of spores and pollen. IV. Fossil sporopollenins from Tasmanite and Russian lignite** (ZETZSCHE, *et al.*) **11D.**

FARNHAM, C. MASON: **Determination of the Opaque Minerals. New York:** McGraw-Hill Book Co., Inc. 236 pp. $3.50.

NASINI, RAFFAELO: **I soffioni e i lagoni della Toscana e la industria boracifera.** Rome. Reviewed in *Analyst* **56,** 215(1931).

9—METALLURGY AND METALLOGRAPHY

D. J. DEMOREST, H. W. GILLETT AND RICHARD RIMBACH

Development and present state of metallurgy. F. ALTNÉDER. *Bányás. Kohás. Lapok* **62,** Supplement 3–46(1929).—A historical and descriptive treatise including a bibliography. S. S. DE FINÁLY

Origin of flotation. L. MICHEL. *Rev. financiera salitre y minas* (Santiago) **5,** 702–4(1930).—A historical review. E. I. S.

Properties of the bog iron ore from Hokkaidoh and of the brown iron ore from Chohsen as determined by thermal analysis. KATSUMI INOUE. *Tetsu-to-Hagané (J. Iron and Steel Inst. Japan)* **17,** 99–108(1931).—From thermal analysis of these ores, the heat necessary to expel the combined water was calcd. The amt. of heat required for the bog iron ore was larger than that for the brown ore at the same rate of heating, though the decompn. temp. of the former was lower than that of the latter. I. attributed this to the internal strain in the grains of the Chohsen brown ore. The sintering temp. of the brown ore of Chohsen was higher. M. KURODA

Investigation on the reduction processes of iron ore. III. BERTIL STÄLHANE AND TORE MALMBERG. *Jernkontorets Ann.* **114,** 609–722(1930).—The reduction of Kiruna magnetite in H_2 and H_2-CO mixts. has been investigated. At 950° 0.2 mm. grains were completely reduced by H_2 in 2 min.; 2.0 mm grains in 7 min. and 4.0 mm. grains in 17 min. The rate falls off with the temp. but there is a marked discontinuity at 910°, at which temp. the time required is 2.5 times that at 890°. Addn. of CO to the H_2 slows up the rate quite markedly, the rate in 100% H_2 being 7 times as great as in 100% CO. Pure CO also gives the same discontinuity as H_2 at 910°. Mixts show the same but less markedly. The temp. at which the reduction becomes exceedingly slow, 900°, corresponds to the transition point of α-Fe to γ-Fe. H. C. DUUS

Statistics on the Swedish iron industry during recent years. ARVID JOHANSSON. *Jernkontorets Ann.* **114,** 623–34(1930).—Consumption of charcoal decreased from 2.72 million cu. m. in 1924 to 1.98 million cu. m. in 1929. The production of Fe ore remained sensibly const. at 550,000 to 670,000 tons. The value of the export was 8.5% of the total value of all exports, and the value of imports 4.9% of the total. H. C. DUUS

Superroasting of zinc blende by different methods. E. PROST. *Rev. univ. mines* **72,** 234–40, 269–77(1929). E. I. S.

Free energy of some copper compounds. MERLE RANDALL, RALPH F. NIELSEN AND GEO. H. WEST. *Ind. Eng. Chem* **23,** 388–400(1931).—A review, intended primarily to aid Cu metallurgists, of the equilibria in various reactions of Cu compds. The free energies of various Cu compds. important in the metallurgy of Cu are given. References (102) to articles in the literature used in obtaining the data are given. J. B.

Sand tests in the foundry. J. HIRD. *Foundry Trade J.* **44,** 191–3, 197(1931).—Methods for making sand tests and their application to foundry control are described for both facing and core sands. Data sheets are included showing various phys. properties of many types of sands found in several different districts in England. D. S.

Investigation of furnaces used in rolling mills. L. A. RICHTER. *Stahl u. Eisen* **51,** 377–85(1931).—A review of the operating practice of the furnaces used in rolling mills in Austria. The type of furnaces, the method of operation, the heat balance, the oxidation losses, the dependence of the fuel consumption on the type of material rolled and the ratio of the hearth surface to the total furnace surface are discussed. J. A. SZILARD

Rotary-hearth furnace for heat treating. R. E. BARKER. *Heat Treating and Forging,* **16,** 1189–90(1930).—A rotating hearth mounted on ball bearings in oil and motor-driven is described. It burns producer gas, natural gas, oil or tar, is adaptable to all classes of steel and has proved ideal for "open" annealing of all types of material. J. BALOZIAN

Utilization of slag from blast furnaces in Japan. TAIZOH KURODA. *Tetsu-to-Hagané (J. Iron and Steel Inst. Japan)* **17**, 118–22(1931).—Statistics of the production of pig iron and slag in Japan are given. The main uses for slag are in the production of cement, slag ballast, brick and slag wool. The analyses of slag and its uses in 8 main blast furnace works in Japan are given. M. KURODA

The slag in the basic open-hearth steel furnace. R. BACK. *Stahl. u. Eisen* **51**, 317–24, 351–60(1931).—In 19 melt tests carried out in the basic Siemens-Martin furnace, the basicity of the slag as characterized by the $CaO:SiO_2$ ratio was followed During the melt-down period, with increasing basicity of the slag, the amt. of Fe in the form of oxides increased, while the SiO_2 content decreased. No definite relationship could be found between the Mn content of the slag and the basicity during the melt down period. Increasing amts. of Mn addns. caused increased Mn content in the slag during this period. During the boiling period, which, in the scrap-Fe process, is the time between the end of the melt-down and the addn. of the finishing flux, the Fe and Mn contents increased with the increasing basicity of the slag. Five different types of slag, classified according to the $CaO \cdot SiO_2$ ratio, were investigated: acid slag with a ratio of 1.3–1.5, medium basic 1.5–1.8, good normal 1.8–2.0, basic 2.0–2.4 and highly basic over 2.4. The above ratios refer to the compn. of the slag at the end of the boiling process. For the regeneration of Mn from the slag the acid slags, contrary to expectation, gave very good results. The best results were obtained with the medium basic slags. Even with the good normal slag the Mn had the tendency to go back from the slag into the bath. In the basic slag the tendency for the reduction of Mn was found to be very slight. The highly basic slag gave the poorest results. At very high temps the results with highly basic slag were somewhat better. The Fe content of the slag during the boiling period, as in the melt-down period, is a direct function of the basicity of the slag. The Mn content is governed by the Fe content: with increasing basicity more FeO and Fe ferrite are formed in the slag and these have an oxidizing effect on the Mn in the bath. It is emphasized that the basicity of the slag has a detg role in the transformation of Fe and Mn. The slag test is described; it gives a good indication of the compn. of the slag and is of importance in cases where the P and Si contents of the raw materials are subject to great variations J. A. SZILARD

Method of slag determination. H. KJERRMAN. *Jernkontorets Ann.* **1929**, No. 4, 181–99.—A discussion of (1) the slag of different kinds in steel, (2) its microscopical detn., (3) the relation between slag content and strength and (4) the sulfate content in Cr ball-bearing steel. E. J. S

Some modern tendencies in siderurgy and the establishment of this industry in the Argentine Republic. SVEN WASSMAN *Anales soc. cient. argentina* **111**, 65–92(1931). E. H

The preparation of the raw materials at the Röchlingen Iron and Steel Works in Völklingen (Germany). A. WAGNER. *Stahl u. Eisen* **51**, 217–25(1931).—The parts of the plant for the prepn. of the raw materials, including breaking, screening and sintering, are described and their economies discussed J. A. SZILARD

Choice of raw materials for malleable cast iron. I. II. III. J. V. MURRAY *Metallurgia* **1**, No. 3, 107–9, No. 4, 161–2, 165; **2**, No. 9, 101–2(1930). E. J. C

Statistical evaluation of pig-iron analyses. K. DAEVES *Stahl u. Eisen* **51**, 202–4 (1931).—A method is shown for the evaluation of the daily analyses of 3 blast furnaces and one mixer during 3 months. The deviation from the av. values is greater for the blast furnaces than for the mixer. Curves are given which show the relationship between the S, Mn, Si and P contents. J. A. SZILARD

Advantages of fine-grain over coarse-grain pig iron for production of high-test cast iron. R. STOTZ. *Z. ges. Giessereipraxis* **51**, No. 3, 25–8(1930); cf. *C. A.* **24**, 42.—S seeks to show that 2 pig irons with apparently the same chem. compn. do not necessarily possess the same phys. characteristics. E. I. S

The manufacture of cast-iron rolls. E. PEIPERS. *Stahl u. Eisen* **51**, 345–51 (1931).—The manufacture of loam and chilled cast rolls is described, and also the development of alloyed rolls. J. A. SZILARD

The development of the research program of the steel-making processes on a physicochemical basis. H. SCHENCK. *Stahl u. Eisen* **51**, 197–202(1931).—In the effort to reduce production costs and improve the quality of steel products, comparatively little attention was given to the basic chem. reactions involved in steel making The unsolved problems of steel making are listed and a research plan is developed which would make coöperation between steel plants, exptl. stations and scientific research institutions possible, to obtain a better knowledge of the metallurgical processes J. A. SZILARD

Refining of aluminum and its alloys by treatment with chlorine gas and nitrogen. W. KOCH. *Metallwirtschaft*, 10, 69–72, 85–8(1931).—Lab. expts. were carried out to det. the influence of impurities in Al upon the temp. of chlorination. The samples were heated in a Cl stream in combustion boats, the temp. of the beginning of volatilization was detd. and the volatile matter analyzed. The chlorination should conform with the following theoretical considerations: (1) It is a function of pressure and temp. and subject to the mass law. (2) The chlorination temp. of a pure metal must be reduced by alloying it with another constituent of a lower chlorination temp. The bigger the difference between the chlorination temp. of the base metal and of the alloying constituent, the greater will be the influence of such an addn. (3) The volatility of the chlorides formed is an essential factor in the speed of chlorination. It is increased by the presence of compds. of a lower temp. of volatilization. Impurities act proportionally to the difference between the volatility of their chlorides and those of the base metal. The expts. brought out that the temp. of volatilization of pure Al is reduced by impurities, especially Fe and Si. At the same time the volatility of $AlCl_3$ is being increased. The impurities also interfere with the formation of a protective film, Si to a greater extent than Fe. They form centers of corrosion, thereby rendering the metal less compact and increasing the surface, both of which factors interfere with the film formation and facilitate the attack. Refining tests were made on a technical scale by introducing Cl into the molten metals and finally removing it by blowing N through the melt. Various types of com. Al and of Al-Fe, Al-Si and Al-Cr alloys were thus treated. In alloys contg. 0.8, 1.6 and 1.86% Fe, the chlorination resulted in a fine and dense grain, while the original material was coarsely cryst. The plasticity and toughness of the alloys was also increased. No change in the chem. compn. of the alloys could be ascertained. An alloy contg. 3.52% Fe and 0.43% Si showed the grain-refining effect of the chlorination especially distinctly. In this case the treatment decreased the Fe by 0.37%. In an alloy contg. 11.7% Fe and 0.45% Si no refining effect of the chlorination could be found, except the removal of considerable quantities of gases. The Fe was reduced by 0.67%. In Al-Si alloys contg. 0.8, 1.3 and 2.1% Si the chlorination had a dispersing effect upon the segregations found in these alloys, which consist mainly of Al-Fe-Si compd. The *chlorination of silumin* had a slightly coarsening effect upon the metal grain, because of the chlorination and volatilization of the colloidal Na particles. An Al-Cr alloy contg. 2.8% Cr showed only a slight refinement of the Al-Cr segregation. An alloy contg. 1.9% Cr and 1.4% Fe showed a much more distinct improvement. The eutectic and the Al-Cr segregation were finely divided and the Al grain was considerably refined. Expts. made with com. grades of Al and Al scrap showed in each case that the chlorination had the effect of refining the grain and dispersing the impurities. The chlorination has a favorable effect upon the mech. properties of the treated materials. The ductility and the bending properties are improved and the hardness is increased. The main field of application of the Cl and N treatment will probably lie in the refining of Al scrap. While a selective volatilization of the impurities appears to be impossible, a no. of valuable phys. improvements are obtained, such as: removal of gases, clean grain boundaries, grain refinement and homogenization, and an increase of fluidity. The castings obtained show a dense structure, free of blow holes, and a smooth, shiny surface. Most of the mech. properties show distinct improvements.

LEOPOLD PESSEL

An investigation of core oils. CARL H. CASBERG AND CARL E. SCHUBERT. Univ. Ill. Eng. Expt. Sta., *Bull.* No. 221, 5–22(1931).—The oils investigated were those commonly used in core work, *i. e.*, the drying oils linseed, China wood and perilla, together with the semi-drying and non-drying such as soy-bean and kerosene. The object was (1) to det. any possible relation between tensile strength of the cores and the chem. and phys. properties of the oils and (2) to note the effect of moisture on tensile strength. Tests made on the oils included ash content, sp. gr., flash and fire points, sapon. and I nos. Results showed that no definite relations exist between these properties and the av. original tensile strengths of the finished cores, although the initial tensile strength was found to be proportional to both the sapon. and I nos.

H. L. OLIN

Progress in metallurgical research. C. H. DESCH. *Foundry Trade J.* 44, 105–6 (1931).—The impregnation of solid ores by C must play an important part in the reactions of the blast furnace. Ore so impregnated with C is readily reduced at a higher temp., the fine solid C in the mass being a much more powerful reducing agent at 750° than is CO. The solid C may also form a somewhat impervious layer around the ore granules and hinder the reduction. The exact conditions detg. the form that the C will take have yet to be learned. Endurance tests, rather than short-period tensile

tests, are necessary at high temps. on metals, as creep under prolonged stress bears no const. relation to the mech. properties under static conditions. An abbreviated test, described by W. H. Hatfield has been found useful as an approx. guide. That stress is found which, at the given temp, produces an elongation not exceeding 0.5% in the 1st 24 hrs., and produces no further change of length in the next 48 hrs., when measurements are made such as would detect an elongation of the order of 1 millionth in per in. per hr. The safe stress is then taken as $^2/_3$ of this limit. Both magnetic aging and strain etching are dependent upon the sepn. of nitride from solid soln. There is no direct relation between them. X-ray analysis has greatly assisted in carrying out an immense amt. of research work relating to changes which metals undergo during deformation. App. has been devised for measuring pressures developed at the rolls and at the dies and records have been kept of power consumption with different degrees of reduction. By quenching in a blast of H and by using the string galvanometer cooling curves have been taken during the short period of quenching. The evidence thus obtained indicates that martensite is a heterogeneous mixt. contg. finely divided ferrite and cementite and not a supersatd. soln. of carbide in α-iron. H. C. P.

Literature on the use of the x-ray. II. Victor S. Polansky. *Heat Treating and Forging* 16, 1011–14(1930); cf. *C. A.* 24, 5690.—A bibliography is given of the literature available in the *Carnegie Library of Pittsburgh* on x-ray examn. of ferrous metals and alloys for authors names from F to K, inclusive. The list has been brought up to May, 1930. J. Balozian

The deformation of metals under prolonged loading. I. Flow and fracture of aluminum. D. Hanson and M. A. Wheeler. *J. Inst. Metals*, Advance copy No. 554, 29 pp.(1931).—Al samples were subjected to static loads at room temps. and at 250°. The mode of deformation was detd. by microscopic examn. of the polished and unetched surface of the test specimens. Samples consisting of various sized crystals, including single crystals, were used. Conclusions: "(1) The extension under a prolonged load that will ultimately break the metal may be conveniently considered as consisting of 3 periods: (*a*) a period of primary extension, during which the rate of flow diminishes; (*b*) a period during which flow is very slow or even suspended; (*c*) a period during which the extension again continuously increases until fracture occurs (2) During the first period the flow of the metal is the result of slip within the crystals, and flow diminishes because of the hardening effect of slip. (3) The behavior during the second and third periods varies with different specimens. (4) Three types of failure have been recognized under creep conditions: (*a*) failure by intercryst. cracking; cracks form while the elongation is low, and the metal fails with little reduction of area at the fracture; (*b*) failure by the resumption of slipping within the original crystals, leading to a fracture of the normal type; (*c*) failure through the recrystn. of the metal, removing strain-hardening and permitting further flow of the softened metal; the metal pulls out to a point fracture, with a high elongation. (5) Al can fail to "creep" at room temp. (6) Al consisting of uniform aggregates of crystals fails at 250° by intercryst. cracking. (7) Al aggregates at room temp., and Al single crystal specimens at all temps., fail under creep conditions by shear along the slip planes. (8) In single crystals when flow recommences slip occurs only on some of the surfaces that had previously slipped during the primary flow. (9) The prolonged action of a suitable stress can cause disintegration of a metal either at the junctions of the grains or on the surfaces of previous slip, and failure (*i. e.*, fracture) must be regarded as having commenced when this weakening occurs. (10) Under suitable conditions, *e. g.*, in crystal aggregates with moderate rates of flow at 250°, or with very slow rates of flow in single crystals, slip is distributed over a very large no. of slip surfaces, and a polished surface of the metal may show little or no signs of slip bands. (11) No change in density is believed to occur when a crystal is distorted by moderate amts.: changes in density in crystal aggregates are thought to occur at grain boundaries. (12) The view is expressed that rupture of the crystals commences along slip planes formed at an early stage in the deformation of the metal. (13) The results are consistent with the theory of slip and rupture previously advanced by Gough, Hanson and Wright." Four references are included. J. L. Gregg

The mode of deformation of a single crystal of silver. H. J. Gough and H. L. Cox. *J. Inst. Metals*, Advance copy No. 552, 18 pp.(1931).—A single crystal of Ag was subjected to alternating torsional stresses and the surface examd. to det. the mechanism of deformation. Numerous slip bands were formed on the octahedral planes, but there was no definite evidence of twinning even when the stresses were applied until failure. The slip bands might have been narrow twins, but this appears to be improbable. No twins could be produced by compression. Because of the ease with which twinning

occurs in an aggregate of small crystals, the mechanism of deformation in a single crystal must be essentially different from that in the aggregate. J. L. GREGG

Microstructures of fifteen silver Greek coins (500-300 B. C.) and some forgeries. C. F. ELAM. *J. Inst. Metals*, Advance copy No. 550, 10 pp.(1931).—All of the genuine coins had been struck, while only one of the forgeries showed any indication of striking. Some of the coins had apparently been struck hot. Treatment differed at different mints. Analyses indicate that Cu had been intentionally added. J. L. GREGG

New uses for aluminum. L. JAKÓBY. *Bányás. Kohás. Lapok* **63**, 236–41(1930)—A review. S. S DE FINÁLY

Some properties of metallic cadmium. C. H. M. JENKINS AND G. D. PRESTON. *J. Inst. Metals*, Advance copy No. 556, 32 pp.(1931).—Hardness and tensile values of rolled Cd show that the temp. of working has a pronounced effect on these properties. In ordinary tests the worked Cd appeared to be stronger than the cast, but the conditions were reversed in the long-time ball test. Material in the cold-rolled condition was completely recrystd. In such material appreciable grain growth was found after 5 years. No evidence was found of an allotropic transformation. By x-ray examn. the parameter of the unit cell was found to be $a = 2.9724 \pm 0.0005$ Å. U., with an axial ratio of 1.8854 ± 0.0005. In cold-rolled Cd the $(\bar{1}011)$ plane tends to lie parallel to the surface, and the normals to the basal plane (0001) are inclined at about 65° to the normal to the surface of the sheet. In hot-rolled sheet another preferred orientation is found. Seventeen references are given. J. L. GREGG

Three crystalline modifications of electrolytic chromium. KUMAZO SASAKI AND SINKITI SEKITO. *Trans. Electrochem. Soc.* 59 (preprint) 7 pp.(1931).—See *C. A.* **25**, 1195. C. G. F.

The independence of the hardness and the hydrogen content of electrolytic metals. GUICHARD, CLAUSMANN, BILLON AND LANTHONY. *Compt. rend.* 192, 623–5(1931).—The exceptional hardness of electrolytic Fe, long noted, has been attributed, on the one hand, to the fine state of diffusion of the metal and, on the other, to the presence of a compd. of H and Fe having a characteristic metallographic structure. The authors have repeated the expts. of Hugues (*C. A.* 20, 572) and reached an entirely different conclusion. The results of their expts. indicate that it is necessary to exercise considerable caution before attributing the remarkable mech. properties of electrolytic metals to the presence of occluded gases. O. W. ELLIS

Notched-bar impact tests. E. HÖEG. *1st Communications New Intern. Assoc. for Testing Materials* **1930A**, 213–6.—Notched-bar impact tests of heat-treated steel contg. 0.15% C showed the effect of the superheating after heating for 1, 2 or 3 hrs. at 1100°. Examn. of plates from an exploded boiler showed the energy absorbed in fracture of notched-bar test pieces after various heat treatments and at differen ttemps. of the test bar during the impact test. E. M. SYMMES

Cyaniding and salt-bath working. J. W. URQUHART. *Heat Treating and Forging* 16, 989–93(1930).—The details involved in successful salt-bath hardening, and general heat treatment in salt baths are briefly described. J. BALOZIAN

Heat treatment of non-ferrous metals. A. H. VAUGHN. *Heat Treating and Forging* 16, 1036–8, 1041(1930).—A brief survey is given of the present practice. J. BALOZIAN

Heat treatment of aircraft engine parts. R. R. MOORE. *Fuels & Furnaces* **9**, 279–89(1931).—The importance of proper heat treatment is outlined and methods of heat-treating steel and Al alloy parts are described. The chem. compn. and phys. properties of the Al alloys are tabulated. MORRIS SCHRERO

Variations in hardness of metals and alloys resulting from cold working. GUICHARD CLAUSMANN AND BILLON. *Bull. soc. chim.* [4], **49**, 173–85(1931).—See *C. A.* **24**, 4749. G. G.

Some phases of heat treatment of cylinder and alloy irons. F. J. WALLS AND A. HARTWELL, JR. *Trans. & Bull. Am. Foundrymen's Assoc.* 2, No. 3, 865–96(1931).—Tests were run to det. the relief of stresses in cylinder irons on heating to temps. of 750° to 1150°F. The hardness of the irons as affected by air-, water- and oil-quenching was investigated. Max. relief of stresses is obtained with min. growth and change in hardness by heating to 950°F., followed by slow cooling. Similar tests were made on Cr-Mo and Cr-Ni-Mn cast irons. C. H. LORIG

Wear resistance of nitrided nitralloy. V. O. HOMERBERG AND J. P. WALSTEAD. *Metal Progress* **18**, No. 6, 68–71(1930).—A study of the wear resistance of nitrided nitralloy against itself, gray and white cast Fe, Monel metal and 3 bronzes shows com. possibilities of nitrided materials in engine or machine parts which are subject to severe wear conditions and which are difficult to lubricate. W. A. MUDGE

Tests on the resistance of cast iron to wear. R. SPAZIER. *1st Communications New Intern. Assoc. for Testing of Materials* **1930A**, 64–73(in French).—There is no standard method in use for measuring resistance to wear of cast Fe, and no basis of comparison of results obtained by various methods of testing this property. Tests were made by pressing at 25 kg. pieces of cast Fe shaped like a brake shoe 1 cm. thick and 3 cm. deep against a steel disk 4 cm. in diam. and 1 cm. thick, revolving on an axle at 188 r. p. m., tangential velocity 0.395 m. per sec. Phys. tests of the samples were made previously. It was impossible to recognize any relation between hardness, resistance to traction, resistance to flexure and resistance to shock. In general, wear was inversely proportional to hardness. After a certain period of testing, due to the grinding action of abraded material, less hard cast Fe often showed less wear than harder samples. Wear is faster at first than near the end of the test. Wear of cast Fe is proportional to that of the steel disk. Wear is greater in a continuous than in an intermittent test. Wear increases with increase in graphitic C, and decreases with increasing P content. E. M. SYMMES

Comparison of the physical properties of different sections of cast iron and of the standard arbitration test bar. M. V. HEALEY. *Proc. Am. Soc. Testing Materials* 30, Pt. 1, 206–12(1930).—A hollow box, cast in green sand with a dry sand core was made with one wall 4″ thick, one 2″ and one nominally $^1/_2$″, but actually, from the flexure test table, $^3/_4$″. Standard 1.3″-diam. arbitration bars were cast from the same metal, in dry sand. In the different sections total C ranged from 2.74 to 3.08%; combined, from 0.49 to 0.63%; Si from 1.95 to 2.19%; Mn 0.56%; P 0.37%. In flexure tests on 12″ supports, with bars 1″ wide by 4, 2, 1 and $^3/_4$″ with 1″ dimension vertical, deflection ran from 0.165 to 0.19″ on the specimens from the casting, with no marked effect of size, while the arbitration bars gave 0.12″. The modulus of rupture of the 4″-thick section was 45,000 lb. and for the thinner sections varied from 46,000 to 52,500 with no marked effect of size. Averages showed a decrease with the size of the section but individual figures for each size scattered over about the same range. The arbitration bars, however, gave 68,000. Tensile tests showed 32,000 for the arbitration bar and 23,500–30,000 for the castings with increase in strength as the section diminished. The $^1/_2$″ section was a trifle out of line, probably through insufficient feeding. Brinell tests showed 195 for the arbitration bar and 150–170 for the casting. Brinells showed fair correlation with strength. Micrographs are shown. H. W. GILLETT

Comparative tests on cast iron in Czechoslovakia. F. PISEK *1st Communications New Intern. Assoc. for Testing Materials* **1930A**, 25–34(in French). Strength tests and cutting tests are described. E. M. SYMMES

Nitrogen in technical iron. III. The separation of nitrogen and carbon from α-iron as an example of the decomposition of a doubly supersaturated solid solution. WERNER KÖSTER. *Arch. Eisenhüttenw.* **4**, 145–50(1930); cf. *C. A.* **25**, 671 and following abstr. The tempering isotherms were detd. for a no. of steels of varying N content for different quantities of dissolved C at 100° and the increase of the coercive force measured during the first rise. For any percentage of C there exists a linear relation between the total amt. of N and the coercive force. The isothermic sepn. of N from α-Fe supersatd with it at 100° is interfered with if C in solid soln. is present at the same time. The quantities of N eliminated are smaller the higher the concn. of the dissolved C, and no sepn takes place at all if a certain limit of C is exceeded. These limiting values can be plotted as a curve in the Fe–C–N system. The points along this curve indicate the amt. of N remaining in soln.; these values depend on the amt. of C in soln. and are independent of the total amt. of N. The expts. give an example of the influence exerted by a constituent in a solid supersatd. soln. upon the sepn. of another. L. P.

Nitrogen in technical iron. IV. The combined action of cold working and nitrogen separation on the magnetic properties of technical iron. WERNER KÖSTER. *Arch. Eisenhüttenw.* **4**, 289–94(1930); cf. preceding abstr.—The influence of various heat treatments on the magnetic properties of cold-worked steels (0.012% N) is investigated. The coercive force is detd. of specimens (1) which have been cold-worked (elongated 0–20%) and subsequently annealed at 100° up to 14 days, and (2) which have been treated as in 1 and then re-annealed for 1 hr. at temps. up to 700°. These expts. show that the coercive force is a result of (1) that attributable to cold working (increasing in this case with increasing elongation), and (2) that caused by N sepn. (decreasing here approxly. linearly with the elongation). The relation between the coercive force and the degree of straining is independent of the order of treatment. The change in the magnetic properties of cold-worked steel between 100° and 300° is the result of the sepn. and soln. of N. The observations in the literature are explained on the basis of the results of these expts. J. BALOZIAN

The development of quality thin sheet iron. H. KLEIN. *Stahl. u. Eisen* **51**, 189–96(1931).—A discussion is given of the increased demand for quality thin sheet iron, leading to improvements in the equipment of rolling mills, in the annealing and finishing of sheet iron. The methods of galvanizing and tinning and the properties of rust-resisting steels are also discussed. J. A. SZILARD

Progress of the knowledge regarding slag (solid nonmetallic) inclusions in iron and steel. C. BENEDICKS AND H. LÖFQUIST. *1st Communications New Intern. Assoc. for Testing of Materials* **1930A**, 345–7.—A review with bibliography of the more important progress since the author's 1927 paper (*C. A.* **23**, 75). E. J. C.

Continuous load experiments on various construction steels at high temperatures. ERNST POHL, HANS SCHOLZ AND HUBERT JURETZEK. *Arch. Eisenhüttenw.* **4**, 105–10 (1930).—Normalized flat test pieces of low-C steel (0.1% C), Mo steel (0.15% C, 0.34% Mo) and Ni steel (0.28% C, 2% Ni) were subjected at const. temp., at intervals of 50° between 300° and 500°, to definite loads, successively increased. The max extension reached at each load was recorded as a function of the time, and from the data obtained, curves were plotted giving the relation between load and elastic strain and between load and total extension. Within the range of temps. investigated the Mo steel proved to be most resistant to permanent flow under the loads applied. At 350° under a load of 175 kg./sq. mm. applied for 504 hrs. the Mo steel had not yet attained the condition of plastic flow. The elongation at rupture was 0.172%. H. S. VAN KLOOSTER

Steel hardening. H. ESSER AND W. EILENDER. *Arch. Eisenhüttenw.* **4**, 113–44; *Stahl. u. Eisen* **50**, 1616–7(1930).—After having proved in preliminary quenching tests that the heat effects occurring during the quenching of steel specimens in water cannot be detd. accurately, the quenching was performed by means of gas. The heating and quenching of the samples were performed in a vacuum in a container designed for this special purpose. The specimens used were either thin sheets (0.5 to 1 mm. thick, 1–2 mm. wide) or small balls 1–2 mm. in diam. Quenching curves with varying cooling velocity were taken on C steels from 0.01 to 1.75%. The results permit certain conclusions to be drawn as to the nature of Ar′ and Ar″. The heat effect occurring between 300° and 400° with cooling velocities of about 100° to 200°/sec. is assumed to be a tempering effect due to the essentially decreased cooling velocity within this temp. range. In considering these results, the authors arrive at a new explanation for the causes of temper brittleness. A hardening diagram for a cooling velocity of 1000°/sec is designed, indicating that the heat effects during quenching are similar to the transformations of the Fe–C diagram. It must probably be assumed that martensite is not a pseudo solid soln. but a heterogeneous submicroscopical mixt. of α-iron and cementite. It is furthermore concluded that all Fe-C alloys, even those with very low C contents, are hardenable if they are sufficiently rapidly cooled. The microscopical investigations are in accordance with the results of the thermal analysis. The development of a new theory of hardness is attempted, which explains the hardness in quenching the austenite with crit. velocity by the following 2 factors: (1) the high degree of dispersion of the cementite; and (2) the pronounced distortion of the α-lattice during the γ-α transformation and the cementite pptn. in the temp. range of a decreased plasticity of the steel. Both factors account for the hardness. G. G. NEUENDORFF

Stainless steels used in heavy machining. CHARLES E. HERD. *Metal Progress* **19**, No. 1, 44–9(1931).—Special applications in paper-mill machinery and hydraulic turbines are described. W. A. MUDGE

Steels used in Ford industries. J. L. MCCLOUD. *Metal Progress* **19**, No. 3, 32–9 (1931).—A general review. W. A. MUDGE

Steel and its heat treatment for parts that must resist wear. H. W. MCQUAID. *Heat Treating and Forging* **16**, 1159–62(1930); cf. *C. A.* **25**, 2090.—The different steels and treatments which can be used for obtaining hard surfaces are enumerated, discussed, and classified according to their relative cost. J. BALOZIAN

Creep of steel at elevated temperatures. P. G. MCVETTY. *Mech. Eng.* **53**, 197–200(1931).—The principles underlying the creep of steel at elevated temps. are discussed. The phenomenon of creep is defined, typical creep curves are shown and interpreted, and the metallurgical significance of creep phenomena and its significance to the designer are pointed out. G. G. NEUENDORFF

Some long-time tension tests of steels at elevated temperatures. J. J. KANTER AND L. W. SPRING. *Proc. Am. Soc. Testing Materials* **30**, Pt. I, 110–32(1930).—Very detailed evidence is given to show the value of a logarithmic method of plotting for comparing strain-hardening effects and to bring out the fact that rates of creep are not necessarily const. Long-continued tests often show a decreasing rate because of strain-hardening.

Comparison of short-time tensile and long-time flow tests shows that at the higher temps. the short-time tests do not reliably reflect the properties. At the higher temperatures large grain size, whether obtained in cast as compared with wrought alloys, or by annealing as compared with quenching and drawing, or with rolling without annealing, tends to reduce creep. Step-loading, running awhile at one load and then increasing the load on the same specimen, may give misleading results. The discussion deals primarily with methods, but the curves give much actual data on the flow properties of carbon and Ni-Cr cast steels and on wrought carbon, Cr-Mo, Ni-Cr, stainless and 18–8 Cr-Ni steels. Some of the curves show results from observation of the same specimen for a year or more. H. W. GILLETT

Structural changes in annealed soft steel. W. HEIKE AND W. BRENSCHEIDT. *Arch. Eisenhüttenw.* **4**, 99–103(1930).—Mild steel (0.16% C, 0.02% Si, 0.35% Mn, 0.065% P and 0.007% S) was cold-rolled to different degrees (as far as 60% reduction in area) and annealed in limestone, in air and in a lead bath for periods up to 100 hrs. at temps. between 730° and 800°. Large columnar grains appear on the periphery at a degree of deformation around 3%. The phenomenon disappears when the reduction in cross-sectional area reaches 6%. The columnar growth can be used as an indication of previous cold-work deformation, in conjunction with Fry's method of etching. Grain growth occurs also in the interior but uniformly, as soon as the C has diffused towards the outside. The loss of C, even in an annealing bath of lead, is about 40%. Prolonged annealing slightly below A_3 in an oxidizing atm. at degrees of deformation above 30% produces unusually large grains which originate in spots that are rich in P. When the annealing process is carried out between A_1 and A_3 the C is displaced from the spots that contain a considerable amt. of P and grain growth occurs as a result of the diffusion of P. H. S. VAN KLOOSTER

Thermodiffusion of elements in steel. II. JOHN H. HRUSKA. *Heat Treating and Forging* **16**, 1530-3(1930); cf. *C. A.* **25**, 1200. —The thermodiffusion of C in carburizing and cyaniding, and of O, and of decarburization as a thermodiffusion phenomenon are discussed J. BALOZIAN

Nitrided steel and its properties. J. H. HIGGINS. *Heat Treating and Forging* **16**, 1527–9(1930).—The existing practical conditions confronting the com. nitrider are discussed. J. BALOZIAN

German versus American sheet steel. EDWARD S. LAWRENCE. *Heat Treating and Forging* **16**, 1156-8(1930).—The av. processing of an extra-deep drawing auto-body sheet as manufd. in this country and in Germany is compared. J. BALOZIAN

Characteristics of rimmed steel. EDMUND C. BITZER. *Blast Furnace Steel Plant* **19**, 249–51, 415–7, 422(1931) —Rimmed steel is one which has been partially deoxidized either in the furnace or in the ladle and is poured in this condition. C, Mn and S have a profound effect upon the rimming properties of the steel. Too much Mn and C will cause the steel to grow without any indication of rimming action. 0.06% S would cause the rimming action in an ordinary open-hearth heat to be too weak and the blowholes in the ingots would be too near the surface. Al facilitates the pouring of certain grades of rimmed steel whose C is low. It is added in shot form according to the judgment of the pourer. It makes the metal pour quietly, thus cutting down the pouring time. Segregation is the principal evil in rimmed steels. Since different heats of rimmed steel segregate to different degrees, it seems logical that a more detailed knowledge of the effect of FeO content in the metal would lead to the mfg. of a better grade. A method has been developed for detg. FeO in liquid steel. The importance of temp. in the mfg. of rimmed steel cannot be over-emphasized, as excessive temp. has probably ruined more steel than the total amt. spoiled from other causes. The advantages of rimmed steel are its low cost and use of less deoxidizer; it contains a min. of nonmetallic inclusions; the yield from ingot to finished product is greater because of the absence of pipe in properly made steel Better control is needed to decrease segregation, thin-skinned ingots and over-oxidation. H. C. PARISH

Crystal structure of martensite. E. ÖHMAN. *Nature* **127**, 270–2(1931).—The present knowledge of tetragonal martensite is summarized and results of earlier investigators are reviewed with reference to C content and lattice dimensions. Ö employed Cr K-radiation and obtained photograms of quenched steel specimens in which the line (101) of the tetragonal phase is sepd. from the γ-Fe line (111). It was thus possible to det. the lattice dimensions of the tetragonal structure. Results are in agreement with those of Kurdumoff and Kaminsky that the tetragonal martensite is a supersatd. soln. of C in α-Fe. Ferrite and tetragonal martensite are thus one and the same phase, but as they are often present in one and the same specimen as sep constituents, it seems convenient to denote the tetragonal phase as α'. Westgren and

Phragmen suggested that the C atoms dissolved in γ-Fe do not occupy any points of the face-centered lattice, but are statically distributed in the interstices between the Fe atoms. Seljakow, Kurdumoff and Goodtzow suggested that the same might be the case in the α'-phase, but Ö. thinks this improbable as the space available for the C atoms would be extremely small. Another probable explanation is that there is a complex substitution in such a way that a group of 2 C atoms is substituted for 1 Fe atom in the lattice. These compds. have a tetragonal structure in which the C_2 group is oriented parallel to the tetragonal axis, an explanation which holds equally well for tetragonal martensite. By density measurements, it is shown that the assumption of a complex substitution of C atoms is in good agreement with x-ray intensities. The only suggested structure of tetragonal martensite which explains the observed density, the increase of vol. with the C content, and the elongation of one of the crystallographic axes may be described as follows: In the body-centered lattice groups of 2 C atoms statically distributed replace some of the Fe atoms. The C atoms are most probably oriented in such a way that the axes of the C_2 groups are parallel to the tetragonal axis of the lattice. G. L. CRAIG

Effects of alloys on rolled and cast steels. R. C. GOOD. *Iron & Steel Can.* **13**, 121–2, 141–2(1930); *Can Machinery* **41**, No. 16, 39–40.—A brief summary is given of the reasons for using Cr, Ni, Co, Mo, Mn, V and Si, individually and in certain combinations, as alloys, in rolled and cast steels. DOWNS SCHAAF

Some lesser known facts concerning alloy steels. J. H. ANDREW. *Trans. Inst. Eng. Shipbuilders Scotland* **73**, 166–98(1929).—See *C. A.* **24**, 810. A. N. H.

Relative merits of some different alloy steels with respect to certain mechanical properties. BRADLEY STOUGHTON AND WILBER E. HARVEY. *Proc. Am. Soc. Testing Materials* **30**, Pt. II, 241–57(1930).—Data in the literature are studied by the application of various "quality factors," such as tensile times elongation, elastic limit times reduction of area, tensile times Izod, etc., in an effort to find a quality factor that will pick out superior steels. The data are tabulated in various ways. In one classification such widely varying compns. as C 0.47, Cr 0.51 and C 0.09, Cr 16.0% are classed together as Cr steels. Variations in methods of testing for elastic limit, in notches used on Izod bars, etc., in size of bar from which a test specimen was taken, whether heat-treated in test bar or larger size, etc , are not given and these variations probably affect the tabulations. No attention is paid in quality factors employed, to cleanliness of steel, ease of rolling, response to heat treatment, depth hardening, weldability, machinability or cost, though attention is called to the fact that some of these are important. Numerous data are recorded on Ni, Ni-Cr and Cr-V steels of tensile strengths from 100,000 to 300,000 lb./sq. in. with references to the original sources of the data. No conclusions are drawn as to which, if any, "quality factor" is to be preferred. H. W. G.

Can residual analysis by decomposition with chlorine be applied to alloy steels? ROLAND WASMUHT. *Arch. Eisenhüttenw.* **4**, 155–9(1930).—In order to apply this method to the detn. of metal oxides the alloy and any metal carbides which may be present must be completely decompd at temps at which the oxide is not yet attacked by the Cl. A no. of alloys and metal carbides and also a number of oxides, by themselves as well as in the presence of C, were investigated for their resistance against Cl at various temps. The oxides of W, Mo, Ni, Co cannot be detd. by this method, as they are attacked by the Cl at temps. at which the carbide or the metallic alloy are not yet completely decompd. It seems possible to det. Cr oxide if a decompn. temp. of 500° is chosen. Such residual analyses were made on Cr steels and showed that the materials contained varying quantities of Cr oxide, from which conclusions could be drawn as to the behavior of the alloy. The use of chips or metal pieces as initial material for the analysis is briefly discussed. LEOPOLD PESSEL

Alloy steels in the railroad field. CHARLES MCKNIGHT. *Trans. Am. Soc. Mech. Eng., Railroads* **52**, 81–93(1930).—There is an increasing interest in the use of alloy steels for railroads. They are used purely as a matter of economy. Better work must be done at the same cost or the same work at less cost. The use of alloy miscellaneous castings materially cuts down weight with the same strength and same cost as C steel castings. C steels are used for special applications. Semi-alloy steels are slightly more expensive than C steels and have slightly better properties. Some of the uses include boiler materials, forgings and castings. Corrosion-resisting materials, nitriding and miscellaneous materials are discussed and the economies of each are given. R. RIMBACH

Preliminary report on the behavior of copper steel rails. FRANCESCO ABBOLITO. *Rivista tec. ferrovie ital.* **37**, 292–6(1930).—Cu steel rails (contg. 0.08–0.23% Cu and having 66–83.5 kg./sq. mm. strength) were examd. after 16 yrs.' service: a loss in the

breaking strength of 1.4 kg. was found, and an av. loss of 4.2 sq. cm. on the original section of 47 sq. cm. G. A. BRAVO

Results of laboratory tests and practical experience with rails on Swiss railways. P. LUCCHINI AND M. ROŠ. *1st Communications New Intern. Assoc. for Testing Materials* **1930A**, 190–212(in German).—Simultaneous tests in the Swiss Federal Testing Laboratory and the Swiss Federal Railways on various mild steel rails of known compn., especially with regard to wear, showed that hard steel rails and heat-treated rails of great hardness have a greater resistance to wear than older and newer rails of lower hardness and strength. E. M. SYMMES

Alloy cast iron and high-strength cast iron in the United States of America. F. B. COYLE. *1st Communications New Intern. Assoc. for Testing Materials* **1930A**, 35–48; cf. *C. A.* **23**, 4175.—The extent of development of alloy cast Fe in the U. S. A. is described. The alloying elements are carbide-forming and graphitizing. There is described the general effect of alloying elements on grains, tendency to chill, hardness, machinability, resistance to wear, d. and strength, and the strength limits of plain and ordinary alloy Fe are given. To develop extremely high strength, superheating, partial malleabilization, low-C cupola Fe and white cupola Fe graphitized by ladle addns. may be used. E. M. SYMMES

Alloy additions improve gray iron pressure castings. F. J. MCGRAIL. *Foundry* **59**, 52–5(1931).—Ni and Cr alloys in the form of shots are sprinkled into molten metal. These 2 metals eliminate the use of expensive chills, and the grain structure is uniform to the center of the test pieces. Photomicrographs are shown of test pieces which broke around 5000 lb. on the transverse test. H. C. DUUS

The relations between structure and properties in metallic alloys. A. GUERTLER. *1st Communications New Intern. Assoc. for Testing of Materials* **1930A**, 320–7.—A philosophical discussion of individual crystals of pure metals, of compds., of solid solns. and of aggregates. H. W. GILLETT

Heat-resisting alloys in furnaces. L. J. STANBERY. *Heat Treating and Forging* **16**, 1031–5; 1191–2, 1195–6(1930).—The principles involved, the effect on the properties of the alloy of various chem. elements and of heat treatment are discussed. J. B.

The influence of silicon and manganese on the type of solidification of iron-carbon alloys. OTHMAR VON KEIL AND FRANZ KOTYZA. *Arch. Eisenhüttenw.* **4**, 295–7(1930). The influence of Si and Mn on the type of solidification and the carbide decompn. of Fe-C alloys is investigated metallographically and by cooling-curve detns. The fusions were made at 1350–1400°, and the cooling velocity was 30°/min. (av.). At these cooling velocities Fe-C-Si alloys of hypo-eutectic compn. show metastable solidification with subsequent carbide decompn., and only in the hypereutectic alloys does the stable solidification appear. By addn. of Mn the white solidification is more stable at low C contents, while at approx. eutectic concns. the stable phase is favored. Also, the field of metastable solidification with subsequent decompn. is smaller with increasing Mn content. J. BALOZIAN

The alloys of iron and manganese. V. N. KRIVOBOK. *Heat Treating and Forging* **16**, 1538–40(1930).—The heat treatment and metallography of Fe-Mn alloys are discussed. Micrographs (9) are shown. J. BALOZIAN

Dimensional stability of heat-treated aluminum alloys. J. D. GROGAN AND D. CLAYTON. *J. Inst. Metals*, Advance copy No. 553, 28 pp.; *Engineering* **131**, 371–3(1931).—It was found that the change in length of both cast and forged heat-treated Al alloys over a period of years was inappreciable. Changes in length on machining these alloys, however, may occur. Samples of Y-alloy, duralumin and 25S 3 in. in diam. by 5 in. long were heat-treated and machined into dumb-bell form. As the outer surface was removed appreciable shrinkage occurred in the fully aged alloys. The shrinkage was greatest in those quenched in cold water, less in those quenched in oil and almost negligible in those quenched in boiling water. The decrease in length in some cases amounted to almost 0.020 in. Tensile and hardness tests indicated that the alloys quenched in boiling water were as effectively hardened as those quenched in cold water. Dimensional changes on machining did not occur in annealed alloys. The corrosion resistance of the hot-water quenched alloys may be low, and the greater resistance of the cold-water quenched alloys may result from compressive stresses in layers near the surface, which heal intercryst. corrosion cracks. J. L. GREGG

A note on the silver-rich aluminum-silver alloys above 600°. T. P. HOAR AND R. K. ROWNTREE. *J. Inst. Metals*, Advance copy No. 555, 6 pp.(1931).—Alloys up to 15% Al were studied by thermal and microscopic methods. The results substantiate Petrenko's diagram except that the diagram is shifted to higher temps. The diagram is similar to the Cu-Al diagram. J. L. GREGG

Influence of heat treatment on resistance of aluminum-silicon alloys containing up to 2.5 percent silicon. L. GUILLET AND M. BALLAY. *Rev. métal.* **27**, 398–403 (1930).—See *C. A.* **24**, 5702. E. J. C.

An air-hardening copper-cobalt alloy. CYRIL S. SMITH. *Mining and Met.* **11**, 213–5(1930).—A Cu alloy containing between 1 and 5% Co when quenched sufficiently rapidly from a high temp. remained in the soft alpha condition. The quenched alloy on re-annealing at a suitable temp. was hardened by submicroscopic pptn. of the Co-rich solid soln. in a manner similar to duralumin. The alloy softened again if the annealing temp. was too high, as a result of the coagulation of the ppt. A peculiar scale resulted when the alloy was annealed in an oxidizing atm. Underneath the usual black and red scale, there appeared a layer of tightly adherent metallic "sub-scale" which was detached only when the metal was very severely distorted. It consists of polygonal grains continuous with the underlying metal but containing innumerable black particles of Co oxide. F. W. BOECH

Rolling of alloys of copper and phosphorus containing up to 5 percent of phosphorus. OWEN W. ELLIS. *J. Inst. Metals*, Advance copy No. **551**, 6 pp.(1931).—Contrary to recent reports, Cu contg. as much as 5% P can be rolled. Sheets for brazing have been rolled to 0.015 in. The Cu-P alloys were rolled at a temp. of 450° or above to between 0.02 and 0.04 in., and then rolled cold. A strip of the 5% P alloy 0.018 in. thick had a tensile strength of 88,000 lb./sq.in. and practically no elongation. J. L. GREGG

Nickel alloys. W. R. BARCLAY. *Metal Ind.* **37**, 414–6, 437–40(1930).—A historical review of B.'s 35 years of personal experiences in the manuf. of Ni alloys. The importance of const. study and research is insufficiently realized. O. M. SMITH

Etching nickel and its alloys. W. A. MUDGE. *Metal Progress* **18**, No. 6, 72–3 (1930). W. A. MUDGE

The advantages of lead-antimony and lead-antimony-cadmium alloys over lead in the manufacture of sheaths for telephone cables. H. GODIN. *Rev. univ. mines* [8], **5**, 106(1931).—The failure of cable sheath has been found to be largely a matter of fatigue. On the basis of this property, an alloy of Pb 99.25, Sb 0.5 and Cd 0.25% has been found superior to the 1% Sb alloy and very much better than Pb. R. S. DEAN

Special bronzes. WILLI CLAUS. *Metallbörse* **20**, 1769–70, 1825–6, 1881–2, 1937–8, 1993–4, 2049–50, 2105–6, 2161–2, 2217–8, 2274–6, 2331–2, 2386–7(1930); cf. *C. A.* **23**, 5144.—Special bronzes are defined as alloys contg. at least 78% of Cu and other metals besides Zn. The special bronzes discussed are those contg. Pb, Mg, Cd, Si, Mn, P, Al, Ni, Sb, As, Bi, Co, Ag, Fe, Cr, W, V, Mo, Ti and Be. A complete discussion of the properties of these various special bronzes is given but no new data. R. S. DEAN

Carburizing with gas in underground retorts. W. F. MCNALLY. *Metal Progress* 19, No. 1, 39–43(1931).—Gas carburization with natural gas, propane and dehydrated city gas is superior to solid material carburization because of lower labor, fuel, carburizing media and container costs together with greater uniformity and flexibility. W. A. MUDGE

Pickling of metals. E. GIRARD. *Rev. chim. ind.* **40**, 7–12(1931).—A review. P. THOMASSET

Some practical features of wire pickling. W. G. IMHOFF. *Wire* **5**, No. 3, 77, 79–80, 94–5(1930). E. I. S.

How to select thin plate for deep drawing. H. T. MORTON. *Metal Progress* **18**, No. 6, 54–9(1930).—A discussion is given of chem. compn., slag inclusions, surface decarburization and annealing upon drawing quality. W. A. MUDGE

Coatings, corrosion protection and coloring of aluminum. HERBERT KURREIN. *Metallwirtschaft* **9**, 1009, 1031–2, 1049–50(1930).—A review. LEOPOLD PESSEL

Theory of the rust-protective action of protective coatings. W. BECK. *Korrosion u. Metallschutz* **6**, 229–30(1930); *Gas J.* **193**, 216–7(1931).—By means of colloid-chem. considerations an attempt is made to explain the mechanism of the protective action of protective coatings. An explanation is given of why, in spite of a very distinct lack of elec. insulation, an effective rust protection may exist. Adsorption layers may be formed on the surface of the metal which may have great protective value and yet, on account of their great thinness, only a very small elec. resistance. The impossibility is emphasized of drawing conclusions from the poor insulating qualities of the protective coating as to its protective value. LEOPOLD PESSEL

Selective solution of magnesium corrosion products. L. WHITBY. *J. Soc. Chem. Ind.* **50**, 83–5T(1931).—A boiling 20% soln. of pure CrO_3 may be used to remove corrosion products rapidly from Mg and Mg-base alloys. The soly. of the metal in acid is negligible for most purposes. If Cl^- is present its activating effect may be inhibited

by adding small quantities of Ag_2CrO_4 to the CrO_3 soln. SO_4^{--} exerts no activating action when present in small quantities. B. E. ROETHELI

Initial corrosion rates of metals. R. H. BROWN, B. E. ROETHELI AND H. O. FORREST. *Ind. Eng. Chem.* 23, 350–2(1931).—The initial corrosion rates of Al, Zn, Fe, Cu, Ni, Sn and Ag in oxygenated water were studied. All the metals investigated were shown to have finite corrosion rates. Tendencies of the metals to corrode (calcd. as free energy decreases for the cells:

$$\left(\begin{array}{c|c|c} M(s) & \begin{array}{l} M(OH) \text{ satd.} \\ \text{Satd. soln. } O_2(0.21 \text{ atm.}) \end{array} & O_2(0.21 \text{ atm.}) \end{array}\right)$$

were obtained and found to be in better agreement with the facts than tendencies obtained from consideration of the molal e. m. f. series. Corrosion rates decreased with immersion time. This was attributed to the formation of films which reduced the rate of diffusion of ions and dissolved O_2. B. E. ROETHELI

Metal corrosion. G. CHAUDRON. *La Nature* 1930, I, 172–4; *Wasser u. Abwasser* 27, 171.—The electrochem. corrosion theory as applied to metals and the importance of O_2 in corrosion are explained. Corrosion is best detd. on metals by detg. the loss of wt. during exposure under fixed conditions of temp., etc. Protective alloys and coatings are discussed. C. R. FELLERS

Influence of stress on corrosion. D. J. MCADAM, JR. *Am. Inst. Mining Met. Eng., Tech. Pub.* No. 417, 39 pp.(1931); cf. *C. A.* 24, 2412.—Special attention is given to Ni, Al bronze, stainless Fe, nitrided steel and Muntz metal. Each expt. was in 2 stages: (1) a corrosion stage, in which the specimen was corroded with or without cyclic stress; (2) a fatigue stage, in which the specimen was tested to fatigue failure and the fatigue limit was estd. The lowering of the fatigue limit is used as a measure of the "damage" due to corrosion. Diagrams of 3 types are presented: type 5 illustrating relative influence of stressless corrosion and corrosion under cyclic stresses in causing damage; type 10 illustrating influence of cycle frequency on net-damage; and type 11-a illustrating influence of stress range. These diagrams, in addn. to diagrams for steels, Al alloys and Monel metals presented in previous papers, illustrate the behavior of a great variety of metals under similar conditions of corrosion. The rate of net damage varies as the third to at least the fifth power of the corrosion stress, depending on the metal, cycle frequency and corrosion conditions. The general conditions favoring intercryst. corrosion are discussed. Application of stress-corrosion data to design, construction and operation of machinery and structures is discussed briefly. C. L. MANTELL

The effect of artificial aging upon the resistance of superduralumin to corrosion by sea water. K. L. MEISSNER. *J. Inst. Metals*, Advance copy No. 557, 15 pp.; *Engineering* 131, 406–8(1931); cf. *C. A.* 25, 62.—Specimens of superduralumin (0.8% Si) that had been quenched from 500° and aged for 20 or 40 hrs. at temps. up to 200° were exposed in the North Sea for 3 months. During exposure they were under water for 7 or 8 hrs and in the air for 4- to 5-hr. periods. The corrosion was detd. by appearance, change in weight, change in tensile properties and microscopic examn. The samples aged at 125° and 145° were badly pock-marked. Tensile tests indicated that these samples had been most severely attacked. Microscopic examn. showed that these samples were corroding at the grain boundaries and that the pock-marks were caused by chunks of Al falling off. In such an alloy there is therefore a crit. tempering range between 100° and 150° at which the corrosion resistance is at a min. This range is just below the crit. hardening temp. J. L. GREGG

First report of the corrosion of pipes sub-committee. ALBERT STOKES, *et al.* *Inst. Gas. Eng.* 1930, *Communication* No. 20, 10 pp.—The effects of various coatings on wrought Fe and steel were detd. in 2 types of tests. (*a*) The coated metal was placed in soil and made the anode of a closed elec. system. The source of current was a 6 v battery. The current was measured at different intervals of time and the resistance of the coating calcd. (*b*) The e. m. f. differences between a coated and uncoated specimen were measured at various times. The resistance of the coating decreased with increasing H_2O content while the e. m. f. measurements showed increasing values. Painted pipes showed much greater resistance to the flow of current than bare pipe. Pipes covered with paper wrappings and paints were about 50 times as resistant to the flow of current as paint coatings. Deep pits occurred in the metal surfaces where the coatings were broken. Cement coatings were found temporarily resistant to stray current electrolysis. Also in *Gas J.* 192, 725–9(1930). B. E. ROETHELI

Error of averages and its application to corrosion tests. C. H. HUMES, R. F. PASSANO AND ANSON HAYES. *Proc. Am. Soc. Testing Materials* 30, Pt. II, 448–55 (1930).—If all samples of a given material in a corrosion test failed at the same time,

only one sample would be required. When failures occur over a time range the no. and area of samples that must be tested to give a true measure have to be detd. by the methods of statistics. The mathematics of the procedure needed to arrive at the no. of samples required for reasonable assurance of a given desired accuracy in the mean of the exptl. data are discussed. H. W. GILLETT

Outline of welding and allied processes. F. T. LLEWELLYN. *Metal Progress* **18**, No. 6, 95–104; **19**, No. 1, 51–60(1931).—This is an outline of the practice recommended by the Am. Soc. Steel Treating comm. W. A. MUDGE

Electric arc welding of aluminum. W. M. DUNLAP. *Welding* **1**, 762–6(1930); cf. *C. A.* **24**, 2975, 5277.—A discussion of equipment, flux, electrodes, procedure control and advantageous application. E. I. S.

Metallurgy of the fusion welding process. F. RAPATZ. *Stahl u. Eisen* **51**, 245–53 (1931).—The fusion welding process is reviewed. The desirable qualities of welding rods are: good melting off, that is the rod should form uniform drops in the arc and the cast should be free of pipes; then good fusing together, that is a good alloying of the weld with the rest of the material; the deeper this "burning in" the better the weld. For elec. welding if d. c. is used with the electrode as the neg. pole, bare rods or wires are required contg. non-metallic admixts., best in the form of non-metallic cores. This method is best suited for soft ingot steel. For steel with higher C content and alloy steels this welding on the neg. pole cannot be used. If the pos.-pole welding is used for all types of alloyed steel, good melting off of the rods is obtained. However, the alloying, the "burning in," is poor. This method is best suited for high-C steel. For a.-c. welding, rods with an outside cover, consisting of either asbestos or a mixt. of Fe oxide, materials giving an exothermic reaction and metals readily combining with O, such as Al or ferromanganese, are used. Wires or rods with non-metallic core can be used also. Plain steel rods or wires cannot be used. In d.-c. welding, with well-covered wires or rods, the electrode should be the pos. pole. In gas fusion welding, the rods should be free of non-metallic admixts. The compn. of the weld depends on the compn. of the welding rods, on the gas absorption and oxidation of the various constituents of the material welded and on the alloyed "burnt in" layer. The effect of the alloying elements, such as Ni and Cr, on the characteristics of the welded part is discussed. There is an overheated zone around the weld, then a normal annealed, a slightly affected and in some cases, a blue brittle zone. The area of this heat-affected zone is greater in gas fusion welding than in elec. welding. The Brinell hardness figures for the various zones are given for both cases. In highly alloyed steel a very decided effect on the area around the weld is obtained, because of air hardening. On account of the zones of different hardness, great care should be taken in the evaluation of the results of the various bending and tensile tests. J. A. SZILARD

Valves for blast-furnace and producer gas (JOHANSSON) **21**. Corrosion reduced by new constructional materials (LEE) **23**. Boiler-tube corrosion halted by hot-process treatment (COUGHLAN) **14**. The coking industry and its development in relation to the manufacture of Fe and steel (DICKIE) **21**. Oxidation of pig Fe during its transformation into steel (MUKOHYAMA) **4**. The critical anisotropic point of ferromagnetic crystals (Akulov) **2**. Special refractories for metallurgical research (TURNER) **19**. Piping materials for mineral water (MAURER) **14**. Special loading of long submarine cables (Brit. pat. 339,049) **4**. Enameled boilers and other vessels with heating or cooling coils in their walls (U. S. pat. 1,796,123) **1**. Attaching rubber to metals (Brit. pat. 339,421) **30**. Activating metals or alloys (Austrian pat. 121,243) **3**. Combined gas-producer furnace for heating metals (Brit. pat. 338,893) **21**. Pb pigments (Brit. pat. 339,357) **26**. Charcoal for Fe metallurgy (Hung. pat. 101,960) **21**.

KEHL, ROBERT J.: **Oxy-acetylene Welding Practice.** Chicago: Am. Technical Soc. 104 pp.

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Ore flotation. A. BORSIG G. M. B. H. Ger. 515,757, July 24, 1926. Addn. to 446,086. App. for sweeping out the slime from clarifying vessels is described.

Flotation apparatus for concentrating ores, etc. FRANK E. ELMORE. Ger. 518,301, Aug. 13, 1927. See Brit. 275,778 (*C. A.* **22**, 2296).

Flotation apparatus for concentrating ores. LÉON C. V. BENETT. Fr. 37,243, July 22, 1929. Addn. to 568,182.

Extracting metals. RUDOLF SCHAUR and KLEMENS SCHUMACHER. Austrian 121,535, Oct. 15, 1930. In extg. metals from oxide ores by blowing reducing gases through the fused ore, *e. g.*, in effecting the reaction $FeO + CO \rightleftharpoons Fe + CO_2$, the metal is continuously withdrawn from the reaction, in order to shift the equil. point in the desired direction. This may be effected by maintaining such a reaction temp. that the ore remains liquid but the metal solidifies. Also, a converter may be used to which the reducing gases are fed at points above the bottom, the metal sinking to the bottom out of contact with the gases. Powd. C may be blown in with the gases.

Extracting metals. RUDOLF SCHAUR and KLEMENS SCHUMACHER. Austrian 121,523, Oct. 15, 1930. In the extn. of Fe and other metals by blowing highly heated reducing gases through molten ore, the temp. of the ore is maintained by passing an elec. current and (or) high-frequency current through it. Suitably, the ore is melted in a hearth furnace and then transferred to a tiltable elec. furnace to which the reducing gases are supplied.

Treating ores or concentrates of copper and nickel, etc. E. A. ASHCROFT. Brit. 338,556, Aug. 20, 1929. Material contg. Cu or Ni sulfides or both, or Cu or Ni oxidized compds., together with added S such as Fe sulfide, is treated with air or O at 600° to convert the Cu and Ni to sulfate (without disturbing or rabbling the materials during the reaction). The heat of reaction is usually sufficient to maintain the temp. after the reaction is started, and the charge may be covered by a thin layer of inert material. When Ni is present, $FeSO_4$ or $FeCl_2$ may be added with advantage. Most of the Fe present remains in the residue as oxide on leaching, together with sulfates of gang materials such as $CaSO_4$. O or air enriched with O may be used to start or assist the reaction, and various other details and modifications of app. and procedure are described.

Leaching copper and nickel sulfide ores. I. BÁLINT. Hung. 101,498, Feb. 15, 1930. The ores are leached at a temp. higher than 100°, under pressure, with FeCl or $CuCl_2$ as solvent.

Leaching copper sulfide ores. I. BÁLINT. Hung. 101,495, Oct. 5, 1929. The used CuCl soln. may be regenerated by sepg. it into part (1), contg. as much Cu as was dissolved out of the ores, and part (2), contg. as much as was originally used for leaching. Cu is sepd. from part (1) by cementation. The remaining soln is united with part (2) and the mixt. transformed to $CuCl_2$ by aeration. The iron hydroxide ppt. formed in the cementation can be sepd.

Combined reduction of ores and hydrogenation of carbonaceous materials. J. L. FOHLEN. Brit. 339,276, July 25, 1929. Ores such as Ni ore are reduced to metals, and carbonaceous materials (such as lignite and its distn. products) are hydrogenated to form volatile fuels, by first reducing the ore in the presence of the carbonaceous material or its distn. products and H heated to about 350–400°, then allowing the temp. to fall to 150–300° and hydrogenating the gaseous products of the reaction by contact with freshly reduced metal. An arrangement of app. and various details of procedure are described, and the process may be applied to the production of hydrogenated products from anthracene, etc.

Treating sulfide ores. NATIONAL PROCESSES, LTD., and T. B. GYLES. Brit. 338,886, Aug. 27, 1929. Sulfide ores are blast-roasted or sintered together with a coarse granular material, such as sintered ore, and a small porportion of sulfate or sulfite of a metal other than Fe or an alkali or alk. earth metal (suitably sinter from a previous operation treated so that it contains $ZnSO_4$ with or without $ZnSO_3$). Sulfurous gases may be passed over the sinter (preferably moistened) as described in Brit. 321,390 (*C. A.* **24**, 2515) or the gas may be passed over the mixt of raw ore and diluent in a mixer from which it is fed to the sintering app. (or $ZnSO_4$ liquors may be used instead of sulfurous gases).

Direct production of metals such as iron from ores. THOMAS ROWLANDS. U. S. 1,795,681, March 10. Ore such as Fe ore is passed through preheating, reduction and cooling zones of a rotary furnace and carbonaceous fuel such as coal is subjected to low-temp. carbonization in the cooling zone by heat from the treated charge that has passed through the reduction zone but without direct contact with the charge; ore reduction in the reduction zone is effected at comparatively low temp. and considerably below melting temp. by the reducing gases and solid fuel from the low-temp. carbonization. App. is described.

Production of pig iron from ores poor in iron and from iron-containing bauxites.

I. PFEIFER. Hung. 100,509, March 12, 1929. Ores contg. 30–35% or less Fe are mixed with slag-forming materials, *e. g.*, silica or alumina, and heated in the presence of CO or hydrocarbons. The iron produced is satd. with C and the m. p. is thus lowered to 1150–1200°. The slag-forming material should be so selected that the slag also melts at this temp. and thus can be easily sepd. from the melted iron. For Fe-contg. bauxites, the slag-forming material should contain alkalies, *e. g.*, Na_2CO_3, which lowers the m. p. of alumina by formation of Na aluminate.

Direct production of cast iron from ore. J. E. FLETCHER. Brit. 338,535, Aug. 19, 1929. Reduction is effected in one or more primary rotary furnaces and the molten product is passed into a secondary furnace in which it is further heated with any accompanying slag and with desired addns. of modifying or alloying materials. Some mention is made of the applicability of the process to production of metals other than iron.

Preparing cast iron from ores. A. G. KHOTYAN. Russ. appl. 24,991, Mar. 27, 1928. A mechanical device is specified.

Extraction of iron from its ores. VEREINIGTE STAHLWERKE A.-G. Ger. 518,392, Sept. 17, 1927. See Fr. 35,306 (*C. A.* **24**, 3746).

Reducing oxide ores of metals such as iron. SAMUEL L. MADORSKY (to Gathmys Research Corp.). U. S. 1,796,871, March 17. A reducing gas is passed through molten ore in part of a furnace (details of construction of which are described), and the waste gas passing from the ore is passed over molten ore in another part of the furnace to effect partial reduction of the ore. Cf. *C. A.* **24**, 4499.

Titanium recovery from ores. OSCAR T. COFFELT. U. S. 1,795,361, March 10. A Ti ore contg. Fe is digested with acid such as 75–90% H_2SO_4 and the sol. salts thus formed are dissolved, the Fe and some of the Ti are reduced (suitably by use of Fe or Zn) and an NH_4 halide such as NH_4Cl is added in an amt. equal to the Ti present, water is added to double the volume, followed by boiling and maintaining the diln. until a ppt contg Ti in combination with O is formed, and this ppt. is removed.

Tungsten from ores. CHARLES V. IREDELL (to Westinghouse Lamp Co.). U. S. 1,796,026, March 10. Alk solns. such as may be formed by treating a W ore with alkali are treated to reduce their alkalinity to 0.3–0.7% free alkali (using phenolphthalein as indicator), and a Ca salt such as $CaCl_2$ is then added to the soln. to ppt. the W content. A product of the formula $CaWO_4.H_2O$ may be obtained.

Acid extraction of metals such as vanadium and zinc from ores. ROYALE H. STEVENS, GERALD C. NORRIS and WM. N. WATSON (to Rhodesia Broken Hill Development Co., Ltd.). U. S. 1,795,412, March 10. The ore is leached with a soln. of relatively low acidity such as a spent electrolyte and the residue is sepd. and releached with acid maintained at a concn. equiv. to not less than 4% H_2SO_4.

Reducing zinc, lead and like ores. FREDERICK L. DUFFIELD. U. S. 1,796,562, March 17. See Brit. 310,252 (*C. A.* **24**, 581). U. S. 1,796,563 relates to an app. similar to the one described in the preceding patent.

Apparatus for reducing ores such as those of zinc. HENRY E. COLEY. U. S. 1,797,130, March 17. Ore is fed into an internally heated reducing chamber provided with an outlet for gang and an inlet for introduction of hydrocarbon material to the ore in the reducing chamber, arranged so that the hydrocarbon material reaches the ore in substantially undecomposed condition; an inlet for combustion air is provided to effect combustion in the reducing chamber of products produced by the cracking of the hydrocarbon material. Various features of construction are described. Cf. *C. A.* 24, 2711.

Obtaining zirconia from ores. CHARLES O. TERWILLIGER (to Ward Leonard Elec. Co.). U. S. 1,796,170, March 10. Finely ground ore is treated with H_2SO_4 and HCl of such strength as to dissolve impurities without dissolving the zirconia, and the soln. is removed and the residue is washed.

Treating metals in ladles (as in an induction furnace). F. KRUPP A.-G. Brit. 339,579, April 30, 1929. When heating molten steel or other metal or alloy in a ladle by the heater described in Brit. 312,063 (*C. A.* **24**, 760), the ladle is placed in a chamber in which a vacuum is created. Cf. *C. A.* **24**, 4468, 4502.

Mold for metal casting. MASCHINENFABRIK ADOLF VIEBAHN. Ger. 502,935, Feb. 3, 1929.

Mold for making tubes by centrifugal casting. SOCIETÀ ALTI FORNI, FONDERIE, ACCIAIERIE E FERRIERE FRANCHI-GREGORINI. Austrian 120,888, Aug. 15, 1930.

Vertical mold for making hollow bodies by centrifugal casting. HEINRICH LENT, HERMANN J. SCHIFFLER and GUSTAV TICHY. Ger. 518,122, Mar. 26, 1929.

Core for centrifugal casting molds. Soc. anon. des hauts fourneaux et fonderies de Pont-a-Mousson. Ger. 518,123, Nov. 6, 1926.

Machines for making hollow bodies by centrifugal casting. Società alti forni, fonderie, acciaierie e ferriere Franchi-Gregorini. Austrian 120,889, and 120,890, Aug. 15, 1930.

Two-part metal founding molds. Henry T. Richardson. Ger. 515,772, May 19, 1928.

Cooling system for casting troughs such as those used in centrifugal casting. Frank G. Carrington (to Ferric Engineering Co.). U. S. 1,796,644, March 17. Various details of app. are described. U. S. 1,796,645 also relates to centrifugal casting app.

Water-cooled die-casting machine. Compagnie générale des conduites d'eau Soc. anon. Ger. 515,799, April 21, 1929.

Metal-casting apparatus. Carl E. Becker. U. S. 1,797,041, March 17. Structural features.

Centrifugal casting apparatus suitable for casting belled pipes. Frank G. Carrington (to Ferric Engineering Co.). U. S. 1,795,637, March 10. Structural features

Centrifugal casting of metal pipes. Soc. anon. des hauts fourneaux et fonderies de Pont-a-Mousson. Brit. 339,095, Dec. 10, 1928. App. and various mech details are described.

Casting metal bushings. Otto Bergner. Ger. 515,801 Sept. 20, 1928.

Casting flanged pipes. Heinrich Nolze. Ger. 515,800, Nov. 10, 1928.

Water-cooled slide-way for ingot-reheating furnaces. Friedrich C. Siemens U. S. 1,795,410, March 10.

Bessemer converter. L. F. Ignatovskii. Russ. appl 67,354, Mar. 30, 1930 Mechanical features

Apparatus for charging the Martin furnace. N. G. Gergesel. Russ. appl 68,282, June 7, 1930. Mechanical details.

Cowl reversible gear for Martin furnaces, etc. O. Reiner. Brit. 338,788, Jan. 10, 1929. Structural features.

Regenerative oven, especially useful as a metallurgical smelting furnace. Walter Alberts and Paul Zimmermann. Ger. 515,855, May 22, 1929.

Oil-fired cupola furnace. Peter Marx. Ger. 515,796, Feb. 2, 1928.

Slag collector for cupola furnace. Friedrich Schinke. Ger. 518,176, Jan. 28, 1927.

Smelting metals such as iron and iron alloys. Carl Brackelsberg. U. S. 1,797,125, March 17. In operating rotatable drum furnaces for melting metals by use of powd. coal as fuel, the fuel is burned directly in the melting chamber of the furnace by the aid of combustion air of such vol. and pressure as to cause the fuel to be burned in suspension and the ashes of combustion to be blown through the outlet of the furnace. App. is described.

Apparatus for charging retorts such as those for zinc production. Walter F. Naylor (to Beardsley & Piper Co.). U. S. 1,796,802, March 17. Structural features.

Modifying the properties of metals. E. G. Herbert. Brit. 338,511, Aug. 16, 1929. Metals (suitably after hardening by working or otherwise) or other substances such as rock salt, sugar or quartz are subjected to the action of a concd. locally generated magnetic field "or like flux or vibration other than heat" (the magnetic field or the like being alternating or rotating).

Fusing refractory metals. Siemens & Halske A.-G. Ger. 518,499, Nov. 2, 1926 Metals such as Ta, W, Th or their alloys are completely fused in strongly cooled crucibles made of materials of lower m. p. than the said metals, *e. g.*, of quartz, Cu or Ag. The metal to be fused may be heated by high-frequency elec. current, and the crucible, if electrically conductive, may be made in a no. of insulated segments.

Metal-reduction bomb suitable for use with calcium and calcium chloride. Wm. P. Kiernan (to Westinghouse Lamp Co.). U. S. 1,795,780, March 10. Various details of stopper construction and fastening are described. The main portion of the bomb may be formed of an alloy resistant to heat and to oxidation such as "nichrome" or "hardite."

Coating metals. Otto Sprenger Patentverwertung Jirotka m. b. H. Fr. 37,112, June 19, 1929. Addn. to 655,786 (*C. A.* 23, 3894). The deposition of MnO_2 on Al, Mg or their alloys is accelerated by adding bi- or ter-valent salts of Mn or ferrous or stannous salts to the baths contg. the permanganate and free acid. Cf. *C. A.* 24, 2097.

Galvanizing pot. O. Middermann. Brit. 339,384, Sept. 20, 1929. Walls of iron

galvanizing-pots which come in contact with the molten Zn are freed from pores by melting their surface layers (suitably with a welding burner or elec. arc).

Rolling thin metal strips or sheets from bars. L. E. BROEMEL. Brit. 338,771, Dec. 18, 1929. Mech. features.

Pointed tubular metal articles such as hypodermic needles. S. J. EVERETT. Brit. 338,592, Aug. 22, 1929. In a process involving swaging, rolling or drawing a tubular billet on a core of metal capable of extreme elongation and retention of tensile strength, such as Ni-Ag or brass (as described in Brit. 210,156), the cored tube is subjected to heat treatment to anneal the core and temper the tube while on the core. Numerous details of procedure for the treatment of different specified metals are given.

Blow-pipe for cutting metals by fusion with the use of oxygen. W. EBERLE. Brit. 339,161, Jan. 15, 1930.

Pickling bath for metals. JAMES H. GRAVELL and ALFRED DOUTY (Gravell to American Chemical Paint Co.). U. S. 1,796,839, March 17. See Can. 302,397 (*C. A.* **24**, 4253).

Bright-annealing metals. SIEMENS-SCHUCKERTWERKE A.-G. Brit. 339,423, Oct. 22, 1928 Various details of app. are described relating to a chamber in which the treated metal is cooled in inert gas the expansion and contraction of which is provided for by connection with a bell gas holder.

Apparatus for annealing sheet-metal strips in coils or bundles. HERMAN C. CAPPEL and OTIS C. GROSS (to Greer Steel Co.). U. S. 1,796,082, March 10. Structural features.

Case-hardening composition. ERNEST C. MOFFETT (to American Cyanamid Co.). U. S. 1,796,800, March 17. See Can. 302,499 (*C. A.* **24**, 4253).

Heat-treating wire and strip material. L. D. WHITEHEAD. Brit. 339,155, Jan. 6, 1930. Wire or strip which is to be subsequently galvanized or otherwise surface-treated is annealed or cleaned (or both) by passing it through a horizontal metal tube arranged in a furnace and contg. molten metal, salts or other suitable liquid material (the 2 ends of the tube being up-turned to retain the contents) Various details of app. are described.

Heat treatment of iron. LINK-BELT Co. Brit. 338,924, May 31, 1929. Malleable cast iron is heated to a temp. (suitably about 800°) sufficient to cause the formation of Fe carbide, cooled or quenched, again heated to a temp. (suitably about 650°) below the C-combining temp., and finally cooled or quenched (after heating to above the galvanizing temp. if the product is to be galvanized by dipping). The first heating may be effected in the presence of a carburizing agent to form a hardened surface on the article. Brit. 338,925 relates to metal similarly treated which is highly resistant to abrasion.

Deoxidizing iron. RUDOLF SCHAUR and KLEMENS SCHUMACHER Austrian 121,730, Oct. 15, 1930. In deoxidizing Fe by blowing reducing gases through the molten metal, the reducing gases are strongly preheated, and the temp. of the metal is maintained by electrically heating, *e. g.*, by means of high-frequency current.

Cementation of iron and steel. HERMANN FREUDENBERG (to Roessler & Hasslacher Chemical Co.). U. S. 1,796,248, March 10. Hardening of ferrous articles is effected by immersing them in a fused salt bath such as soda and NaCl to which is added finely divided C (suitably in the form of charcoal) and an alkali metal hydroxide which serves to enhance the hardening effect.

"Slushing grease" suitable for treating iron or steel to prevent rusting. ARTHUR H. BRANSKY (to Standard Oil Co. of Ind.) U. S. 1,795,993, March 10. A wax such as montan wax is used with Na soaps of sulfonic acid compds. derived from the treatment of hydrocarbon oils with strong H_2SO_4 and with lubricating oil.

Apparatus for heat treatment of steel. V. A. MOZHAROV and I. V. MOZHAROV. Russ. appl. 20,409, Oct. 5, 1927; 32,405, Sept. 10, 1928 and 50,854, July 9, 1929.

Tempering steel strip. ALFRED M. REMINGTON (to Simonds Saw & Steel Co.). U. S. 1,796,304, March 17. The stock is fed slowly through a hardening furnace and the forward end of the stock is fed rapidly into a drawing furnace a distance approx. equal to the effective length of the furnace. App. is described.

Special steel for car wheels, brake shoes, etc. H. J. VAN ROYEN. Brit. 338,528, Dec. 8, 1928. Rails, wheel tires, etc., subjected to hard wear, are made of eutectoid steel contg. double carbides with laminated pearlitic structure. The laminas may contain Fe carbide 75–85 and carbides of metals such as Mn, Cr, W, Mo and V 15–25%.

Steel billets. SAMUEL B. SHELDON. U. S. 1,795,519, March 10. An ingot is formed having an alloy skin which may contain Al alloy and the skin is subsequently removed so that surface imperfections are avoided in the billets formed from ingots thus prepd.

Manganese steel. TAYLOR-WHARTON IRON & STEEL CO. Brit. 339,521, Dec. 31, 1929. For refining the grain structure and improving the properties of Mn steel, it is heated for 12–96 hrs. at 400–600°, slowly cooled, reheated to about 1060° and quenched. Various compns. of steels suitable for this treatment are described.

Heat treatment of alloy irons and steels. P. R. KUEHNRICH and DARWINS, LTD. Brit. 338,912, Aug. 28, 1929. Articles of alloy irons and steels contg. Cr 8–20 and C 1.0–3.5%, with or without up to 6% Co and up to 1% each Ni, V, Mo, Si and Mn, and contg. less than 0.05% each of S and P, are hardened and rendered "stainless" and rustless by heating to 1150–1250° and then cooling at a definite rate corresponding to the rate at which steel in sheet form of about 18 gage cools in water at normal temp. Various details are given for treating spoons or other articles.

Alloys. SIEMENS & HALSKE A.-G. (Bruno Fetkenheuer, inventor). Ger. 515,798, May 16, 1926. A speculum for medical use is made of an alloy contg. Co or Ni 20–60, W or Mo 15–50, Cr 30 and C, Si or B 1–5 parts.

Alloy for armoring alternating current cables. FELTEN & GUILLEAUME CARLSWERK A.-G. Brit. 339,383, Sept. 25, 1929. See Ger. 504,318 (*C. A.* **24**, 5281).

Alloys for sheathing electric cables. VEREINIGTE TELEPHON- UND TELEGRAPHEN FABRIKS-A.-G. CZEIJA, NISSL & Co. Austrian 121,525, Oct. 15, 1930. An alloy contg. Cu 10–50 and Sb 90–50% is fused with so much Pb and, if desired, unalloyed Sb, that a product contg. Pb up to 0.5 and Sb 0.8–1.2% is obtained.

Alloys resistant to acids. SOC. ANON. DES ANCIENS ÉTABLISSEMENTS SKODA A. PLZEN. Fr. 37,433, Sept. 12, 1929. Addn. to 681,578 (*C. A.* **24**, 4254). Alloys of low content of Ti and Si are used.

Alloy for belt conveyors for high-temperature service. WICKWIRE SPENCER STEEL Co. Brit. 338,951, Aug. 26, 1929. Various structural details are given of belts suitable for use up to temps. of about 870° which may be made of an alloy contg. C 0.16–0.21, Cr 17–18, Ni 25–26, Si 2–3 and Fe 55.84–52.76%.

Bearing alloy. EMIL ABEL (to Jacob Neurath). U. S. 1,795,633, March 10. In forming a bearing alloy of Pb, Sb, Sn and Ni in which the Ni is present in the α-form, the Ni content is restricted to less than about 1% and Cu is added in an amt. at least 1.5 times that of the Ni content.

Antifriction alloy and its production. J. E. ENSLÉN and F. STEIN. Hung. 101,303, May 14, 1928. In an antifriction alloy contg. less than 50% Sn harder Sn-Sb-Cu crystals embedded in the eutectic Cu may be partly replaced by one or more metals of the 3rd group. Also graphite or simliar substance can be added in fine dispersion. To the melted Cu or its alloys with the metals of the 3rd group are added first Sn, then Sb and Pb; the liquid mixt. is cooled with stirring; graphite is added; and finally the alloy is solidified.

Aluminum alloys. H. J. GARRARD. Brit. 338,923, May 30, 1929. In the production of an Al alloy contg. Zn and Mg, with or without Bi, a preliminary alloy of part of the Al with the Zn and Mg is added to the remainder of the Al, and the Bi, if used, is subsequently added. Various details of proportions and procedure are given.

Aluminum alloys. O. KAMPS. Brit. 339,469, Nov. 25, 1929. Alloys are formed of Al together with Ni 0.3–1.5, Th 0.05–0.9, Mn 0.4–0.8 and up to 6.8% of a Cu-Ce alloy contg. 90% Cu. The alloy is quenched from 480–535° to room temp. in a BaCl$_2$ bath and reheated to 50–300°.

Protecting aluminum alloys. ALADAR PACZ. Fr. 695,155, Aug. 14, 1929. Al alloys are protected by colored layers obtained by treating the alloys in alk. solns. of chromates or dichromates contg. not more than 0.25% by wt. of dichromates calcd. as $K_2Cr_2O_7$ and at least 1.5% of alk. substance calcd. as Na_2CO_3.

Alloys of iron and aluminum. BRITISH & DOMINIONS FERALLOY, LTD., and J. W. BAMPFYLDE. Brit. 338,688, Oct. 21, 1929. In making or remelting alloys of Fe and Al, fluorspar or SrF_2 is added. Various details and modifications of procedure are described.

Iron alloys. FERRANTI, LTD. Ger. 515,700, July 11, 1925. An elastic alloy suitable for wire for low-frequency windings of telephones consists of Fe 60.5, Ni 25.99, Cr 11.60 W 1.6 and C 0.36%.

Iron alloys hardened by nitridation. H. A. DE FRIES (to Nitralloy, Ltd.). Brit. 338,655, Oct. 9, 1928. Alloys suitable for hardening by nitridation (suitably as described in Brit. 174,580; *C. A.* **16**, 1738) contain Fe together with C 0.05–2, Al 2.1–6% and a total of 0.2–8% of one or more of the elements Si, Mn, Ni, Cr, Cu, Mo, W, V, Ti or Zr (the C content being about one-third the Al content and the Si content not exceeding the Al content).

Acid-resistant iron alloy. V. F. DONAT and K. V. VLADIMIROV. Russ. appl.

31,146, Aug. 9, 1928. An acid-resistant alloy is prepd. from a 70–80% ferrosilicon and a 60–70% ferrochromium and iron scrap proportions to yield about 18% Si and 2–3% Cr in the alloy. Cast iron melted in another furnace is then added to the above alloy.

Iron and its alloys for chemical apparatus. I. G. FARBENIND. A.-G. Fr. 37,362, Aug. 23, 1929. See Brit. 334,926 (*C. A.* **25**, 1213).

Copper alloys. G. H. WHITEMAN and IMPERIAL CHEMICAL INDUSTRIES, LTD. Brit. 338,676, Oct. 14, 1929. Alloys suitable for tubes contain Cu together with Ni 30 and 4% or less (suitably 2.5%) of Cr. Some mention is also made of the use of larger proportions of Cr.

Copper-aluminum alloys. ALADAR PACZ. Ger. 515,805, Dec 4, 1927. See Brit. 318,802 (*C. A.* **24**, 2421).

Lead alloys for bearings, etc. METALLGES. A.-G. Ger. 518,395, May 19, 1927. Li 0.03–0.05, Na 0.58–0.66, Ca 0.65–0.73, and Al less than 0.2%, the remainder being Pb.

Acetylene. I. G. FARBENIND. A.-G. Ger. 515,916, Aug. 12, 1927. C_2H_2 for autogenous welding is stored and shipped in pressed solid form.

Autogenous welding. I. F. KUBARZHEVSKII. Russ. appl. 49,743, June 21, 1929. An explosive gas mixt. is admitted into the burner simultaneously with acetylene.

Welding composition. JOHN A. HEALY. U. S. 1,796,329, March 17. A compn suitable for use in welding cutting tips to shanks comprises fused borax 30, ferro-Mn 60, ferro-Si 10 parts, together with high-speed steel filings.

Solder. WILHELM REUSS. Fr. 37,159, June 28, 1929. Addn. to 645,549 (*C. A.* **23**, 1866). The solder described in the prior case is used for soldering steel, Fe, Cu, etc.

Treating flux-cored solder. PERRY C. RIPLEY (to Kester Solder Co.). U. S. 1,796,163, March 10. To prevent leakage of flux in storage, solder having a liquid flux core is subjected to a temp. higher than that to which the solder will normally be exposed prior to actual use, to effect an expansion of the liquid flux, and the ends of a strand of the solder are sealed while the liquid flux is in the expanded condition. App is described.

Soldering flux. DANA W. BOWERS (49% to Charles T. Asbury). U. S. 1,797,124, March 17. Beeswax 6–10, oleic acid 25–40 and Ag oxide 1–3 parts are used with a quantity of finely granulated solder about equal to the other ingredients.

Electrical resistance heating device suitable for use in soldering irons, pipes, etc. EDWIN L. WIEGAND. U. S. 1,795,628, March 10. Structural features.

10—ORGANIC CHEMISTRY

CHAS. A. ROUILLER AND CLARENCE J. WEST

Recent advances in science: organic chemistry. J. N. E. DAY. *Science Progress* 25, 389-92(1931).—A review is given of recent work in org. chem. J. S. H.

Oxidation of methane. I. The homogeneous oxidation of methane under ordinary pressure. KIYOSHI YOSHIKAWA. *Bull. Inst. Phys. Chem. Research* (Tokyo) **10**, No. 3, 251-5(1931)(*Abstracts* 30-1(in English), *published with Sci. Papers Inst. Phys. Chem. Research* (Tokyo) **15**, Nos. 289-91).—CH_4 is oxidized in the presence of air at 600° to CO, CO_2, CH_2O and HCO_2H. At 700° H_2 is formed. HNO_3 promotes the start of the reaction to 500°, yielding more CH_2O. $PbEt_4$ has the opposite effect. The reaction is a homogeneous gas reaction of the chain type. ALFRED BURGER

The reaction of methane and lower homologs with carbon monoxide and dioxide at various catalysts. FRANZ FISCHER AND HERBERT BAHR. *Ges. Abhandl. Kenntnis Kohle* **8**, 279-81; *Chem. Zentr.* **1930**, I, 31.—A repetition of Berthelot's expt., in which C_4H_8 was formed on conducting 1 vol. CO and 2 vols. CH_4 through a glowing glass tube filled with pumice, yielded the same phenomenon. It was impossible to identify the hydrocarbon on account of the small quantity obtained. In another expt. F. and B. conducted the same mixt. of CH_4 and CO over various catalysts at different temps. CO was decompd. with formation of CO_2, and CH_4 dissocd. partly into C and H, but a reaction between CH_4 and CO was scarcely detectable. When the waste gas from a catalyst for the synthesis of mineral oil was conducted over metallic sponge Fe at 900°, the greatest part of the CO_2 was reduced to CO; gasol, heavy hydrocarbons and a fraction of H disappeared, and a large quantity of water was formed. G. SCHWOCH

The decomposition of methane at various temperatures at various catalysts. FRANZ FISCHER AND HERBERT BAHR. *Ges. Abhandl. Kenntnis Kohle* **8**, 27–94; *Chem. Zentr.* **1930**, I, 31.—When a gas mixt. rich in CH_4 (natural gas from Altengamme with 92.5% CH_4) was conducted through a heated quartz tube or through a heated porcelain

tube which was empty or filled with porcelain fragments, the decompn. started at 850° with deposition of C on the tube walls and with the formation of H, tar mist and a slight quantity of small $C_{10}H_8$ crystals. When moist CH_4 is employed, the quantity of the H formed is almost twice that with dry CH_4 (34.3:19.1%). With finely distributed graphite as a catalyst no tar and only very little $C_{10}H_8$ is formed. With $BaSO_4$ as a catalyst H_2O and H_2S are formed at 630–650°; in this case also traces of an unsatd. hydrocarbon were noticed. The latter was also obtained when BaO was used. CH_4 is also decompd. when its presence in the gas current amounts to only 15%; in this case traces of C_6H_6 were noticed, which was identified as $PhNO_2$. When ZnO with addn. of 1% K_2O in the form of K_2CO_3 was used, the CH_4 decompn. began at 700°; at 850° the increase in vol. of the gas was 50.9% and remained the same when the velocity of the current was reduced from 2–5 l. per hr. to 0.5 l. per hr., but it was considerably lessened when the velocity of the current was increased to 6 l. per hr. G. SCHWOCH

The synthesis and spectrochemistry of normal alkanes. A. KARVONEN. *Acta Chem. Fennica* 3, 101–11(1930)(in German).—Normal pentane (I) and heptane (II) were prepd. synthetically and their optical refraction and dispersion compared with those of naturally occurring I and II. I was prepd. by condensation of HCO_2Et with EtMgBr. The resulting Et_2CHOH was treated with I and red P, and the Et_2CHI formed was treated with HI and Zn dust at 0°. Steam distn., washing with NaOH, and drying with $CaCl_2$ and finally with Na gave 66% I, $b_{758.8}$ 36.3° (cor.). II was prepd. from $C_6H_{13}CHO$ by reduction with HCl and amalgamated Zn. Steam distn., washing with $NaHSO_3$, and drying with Na gave II, b_{741} 96°. II was also prepd. in purer form from HCO_2Et and PrMgBr. The Pr_2CHOH (b. 154°) was converted with I and red P to Pr_2CHI, which was treated with Zn dust and HI in glacial AcOH at 0°. Purification gave II in good yields, b_{761} 98.0–98.2° (cor.). The consts. for I and naturally occurring I from petroleum, resp., were: d_4^{20} 0.62783, 0.6249; n_α^{20} 1.35650, 1.35465; n_D^{20} 1.35828, 1.35638; n_β^{20} 1.36267, 1.36080; n_γ^{20} 1.36630, 1.36440. The consts. for II compared in the same way were: d_4^{20} 0.68480, 0.6842; n_α^{20} 1.38734, 1.38584; n_D^{20} 1.38939, 1.38777; n_β^{20} 1.39416, 1.39251; n_γ^{20} 1.39794, 1.39636. When the mol. and sp. refractions, resp. were compared with the dispersions normal values were obtained which were identical for both natural and synthetic I and II. This offers a means for detg. the purity of alkanes. S. A. KARJALA

Transformation of butylenes into liquid hydrocarbons. A. MAILHE AND RENAUDIE *Compt. rend.* 192, 429–31(1931); cf. *C. A.* 24, 5283; 25, 1795.—1-Butene and methylbutene when passed over silica gel at 700° give CH_4, ethylene hydrocarbons, and aromatic hydrocarbons. 2-Butene gives, besides these, $C_{10}H_8$ and anthracene. J. W.

Preparation of some allyl derivatives. R. BRECKPOT. *Bull. soc. chim. Belg.* 39, 462–9(1930).—Allyl chloride is prepd. with a quant. yield, and in a very short time from allyl formate or allyl alc. and concd. aq. HCl. The presence of water does not harm the reaction. CuCl is used as a catalyst, together with a small quantity of H_2SO_4. Very pure vinylacetonitrile is obtained with almost quant. yield, from allyl chloride and CuCN or from a mixt. of CuCN, concd. aq. HCl and allyl alc., or allyl formate, or both. The reaction is fast. Exptl. directions are given. A. L. HENNE

The couples of stereoisomeric ethylenic normal monochlorobutenes. L. NAVEZ. *Bull. soc. chim. Belg.* 39, 435–43(1930).—This reports the prepn., and sepn. by fractional distn., of the following *new* compds. *trans*-MeClC:CHMe (I), b. 62.4–2.8°, d_4^0 0.9361, d_4^{15} 0.9185, $n_\alpha^{13.4}$ 1.4190, $n_D^{13.4}$ 1.4217, $n_\beta^{13.4}$ 1.4289; *cis*-form (II), b. 66.6–7.0°, d_4^0 0.9420, d_4^{15} 0.9246, $n_\alpha^{13.4}$ 1.4225, $n_D^{13.4}$ 1.4250, $n_\beta^{13.4}$ 1.4326; CH_2:CClCH$_2$Me (III), b. 58.4–8.6°, d_4^0 0.9288, d_4^{15} 0.9107, $n_\alpha^{14.1}$ 1.4138, $n_D^{14.1}$ 1.4166, $n_\beta^{14.1}$ 1.4235; *cis*-ClCH:CHEt (IV), b. 63.4–3.6°, d_4^0 0.9329, d_4^{15} 0.9153, n_α^{15} 1.4168, n_D^{15} 1.4194, n_β^{15} 1.5265, *trans*-form (V), b. 68.0–8.2°, d_4^0 0.9376, d_4^{15} 0.9205, $n_\alpha^{14.6}$ 1.4197, $n_D^{14.6}$ 1.4225, $n_\beta^{14.9}$ 1.4296; CH_2ClCHClEt (VI), b. 124°, d_4^0 1.1382, d_4^{15} 1.1224, d_4^{25} 1.1116, n_α^{15} 1.4450, n_D^{15} 1.4474, n_β^{15} 1.4533; inactive MeCHClCHClMe (VII), b. 115.9°, m. −80.4°, d_4^0 1.333, d_4^{15} 1.1147, d_4^{25} 1.1025, n_α^{15} 1.4420, n_D^{15} 1.4445, n_β^{15} 1.4502; *dl*-MeCHClCHClMe (VIII), b. 119.5, d_4^0 1.1366, d_4^{15} 1.1183, d_4^{25} 1.1051, n_α^{15} 1.4433, n_D^{15} 1.4458, n_β^{15} 1.4517 The azeotropic mixts. formed with abs. alc. are as follows (the last figure indicates the % of chlorobutene by wt.): I, b. 56.8–7.2°, d_4^0 0.9131, d_4^{15} 0.8960, 84.6%; II,

b. 60.0–0.4°, d_4^0 0.9139, d_4^{15} 0.8964, 81.6%; III, b. 53.6–4.0°, d_4^0 0.9119, d_4^{15} 0.8945, 88.5%; IV, b. 57.8—8.2°, d_4^0 0.9121, d_4^{15} 0.8946, 85.2%; V, b. 61.2—1.6°, d_4^0 0.9081, d_4^{15} 0.8912, 79.8%. A. L. HENNE

Aliphatic diazo compounds. II. ALEXANDER SCHÖNBERG AND TH. STOLPP (IN PART WITH J. TSCHOLAKOFF AND E. WILLNER). *Ber.* **63B**, 3102–16(1930); cf. *C. A.* **25**, 931.—CH_2N_2 itself reacts with arylsulfur chlorides like diaryldiazomethanes to give hemimercaptole halides: $CH_2N_2 + RSX = CH_2(SR)X$ (I) or $[CH_2(SR)]X + N_2$ (II). The aromatic hemimercaptole halides form mercaptoles with mercaptans and give "free" radicals with Hg and other heavy metals. In C_6H_6 they react instantaneously with BzOAg to give $R_2C(SR')OBz$; the rapidity of the reaction makes it probable that the structure II must be considered along with I. With H_2O they give the corresponding ketone and mercaptole, probably through the hemimercaptole, $R_2C(SR')OH$. With NH_3 in C_6H_6 they do not give the expected $R_2C(SR')NH_2$ (which is probably an intermediate product) but the mercaptole and ketone imide. It had been found that diaryl thioketones react with 1 mol. of certain inorg. metal compds. and it had been concluded that the products are mol. compds. (*e. g.*, $R_2C{:}S\ldots..HgCl_2$). This investigation has been concluded and the results are reported here because these products are now thought to be complexes and very closely related to the aromatic hemimercaptole halides. • A systematic study of the action of aromatic thioketones on $HgCl_2$, $HgBr_2$, $AgNO_3$ and $AgClO_4$ has shown that reaction takes place in every case, although the products cannot always be obtained in cryst. form, and sometimes, although cryst., they decomp. so rapidly that they cannot be isolated in analytically pure form. The following *complex compds.*, however, were obtained in cryst., analytically pure form: $[R_2C(SHgCl)]Cl$: R = *o*-$MeOC_6H_4$, red; *p*-$MeOC_6H_4$, orange. $[R_2C(SHgBr)]Br$: R = *p*-$MeOC_6H_4$, orange; *p*-$EtOC_6H_4$, orange; 3,4-$MeO(EtO)C_6H_3$, orange. $[O(C_6H_4)_2C(SAg)]ClO_4$, blood-red. $[O(C_6H_4)_2C(SHgCl)]Cl$, orange. The color of these compds. is in every case lighter than that of the thioketones from which they are derived, probably because of the disappearance of the C:S group. Some of the compds. are quantitatively converted into the thioketones by covering them with Et_2O and shaking out with aq. KI; this is explained by assuming in the Et_2O phase the equil. thioketone + $HgCl_2 \rightleftharpoons$ complex compd., which is disturbed by the aq. KI. A continuation of the study of the action of diaryldiazomethanes on aromatic disulfides has shown that the formation of mercaptoles in this way is also a general reaction, although it is of significance as a method of prepn. only for asym. mercaptoles which, for some reason or other, cannot be prepd. by other methods, and in connection with the study of the reaction mechanism. *Diazothioxanthene*, $S(C_6H_4)_2CN_2$ (I), was obtained from thioxanthone, $S(C_6H_4)_2CS$ (II), by conversion with N_2H_4 into the hydrazone and oxidation of the latter with HgO or treatment with $S(C_6H_4)_2CCl_2$. Attempts to prep. diazoxanthene (III) in the same way were unsuccessful; the $O(C_6H_4)C{:}NNH_2$ was unchanged by yellow HgO in the cold, and on heating there was obtained the ketazine, $[O(C_6H_4)_2C{:}N]_2$ (IV), the decompn. product of the intermediate III. IV is also obtained from the hydrazone and $O(C_6H_4)_2CCl_2$. Chromone hydrazone could likewise not be converted into the diazo compd. *(o-Nitrophenylmercapto)chloromethane*, from $O_2NC_6H_4SCl$ and CH_2N_2 in Et_2O, yellow, m. around 95°, shows green halochromism with red fluorescence in concd. H_2SO_4, the soln. soon becoming brown. *Diphenyl(o-nitrophenylmercapto)bromomethane*, from $O_2NC_6H_4SBr$ and Ph_2CN_2, red-brown, m. about 108°, fumes in the air (HBr) and gradually becomes smeary. *Diphenyl(p-chloro-o-nitrophenylmercapto)chloromethane*, yellow, m. 121°, evolves HCl on long standing in moist air. *Diphenyl(phenylmercapto)methyl benzoate*, from $Ph_2(PhS)CCl$ and AgOBz in Et_2O, m. 148–9°, shows red-yellow halochromism in concd. H_2SO_4. *Diphenyl(o-nitrophenylmercapto)methyl benzoate* (4.5 g. from 4 g. of the chloride), faintly yellow, m. 132°, shows red-orange halochromism in concd. H_2SO_4. *Diphenylene(phenylmercapto)methyl benzoate* (2 g. from 4 g. $(C_6H_4)_2C(SPh)Cl$), faintly yellow, m. around 132°, shows yellow-brown halochromism with concd. H_2SO_4. *Diphenyl(phenylmercapto)-(o-nitrophenylmercapto)methane* (0.1 g. from 5 g. $O_2NC_6H_4SSPh$ and Ph_2CN_2 refluxed in C_6H_6), yellow, m. 134°. *Di-β-naphthyldiphenylmercaptomethane*, from $(C_{10}H_7)_2CN_2$ and Ph_2S_2, m. 160°, shows deep red halochromism and splits off PhSH in concd. H_2SO_4. The mercaptole could not be isolated from the products of the reaction of (*p*-$MeC_6H_4)_2CN_2$ with Ph_2S_2 and of Ph_2N_2 with (*p*-$MeC_6H_4)_2S_2$ but that it was formed was indicated by the fact that after removal of the ketazine the residual products turned blue at about 210°, and in concd. H_2SO_4 showed halochromism and split off PhSH and MeC_6H_4SH, resp. *Xanthone hydrazone*, from xanthione and $N_2H_4.H_2O$ in abs. alc., light yellow, m. 128–30°, sol. in concd. H_2SO_4 with light yellow color. *Ketazine* (IV), red-yellow,

m. 285°, sol. in concd. H_2SO_4 with orange-yellow color. *Thioxanthone hydrazone*, yellowish, m. 115°, sol. in concd. H_2SO_4 with orange-red color. I, green, m. 105°, sol in ether, petroleum ether and C_6H_6 with violet color and green fluorescence, in H_2SO_4 with orange-red color. *Thioxanthone ketazine*, from the hydrazone with $S(C_6H_4)_2CCl_2$ in C_6H_6, yellow-red, m. 284°, sol. in H_2SO_4 with bright red color. *Chromone hydrazone*, m. 96°, was obtained in 4.5 g. yield from 5 g. chromone with $N_2H_4.H_2O$ in alc. and in 80% yield from 4-thiochromone. C. A. R.

***n*-Butyl ester of phosphoric acid.** A. Arbuzov and I. Arbuzova. *J. Russ Phys.-Chem. Soc.* **62**, 1533–6(1930).—By acting with PCl_3 on BuONa was obtained tri-Bu phosphite, $P(OBu)_3$ (I), identical with the product prepd. by Milobedzki and Sachnowski (*C. A.* **13**, 2865) by the interaction of BuOH, PCl_3 and C_5H_5N. The action of BuI on I gives the isomeric di-Bu butanephosphonate, $BuPO(OBu)_2$, (II), which when sapond. with HCl produces butanephosphonic acid, (III). *Exptl. part.*—First was prepd. BuONa by heating on the water bath 950 g. of freshly distd. *n*-BuOH, b 117°, with 70 g. of metallic Na, then, while cooling, were added Et_2O and PCl_3, the Et_2O was expelled, and the reaction product on distn. gave at 9 mm and 180° (temp. of glycerol bath) 174 g. (68.6%) of crude I. Close fractionation being impossible, the fraction b_7 116–39° (97 g.) was added to 4.5 g. of Na wire suspended in dry Et_2O, then heated 1 hr. on the water bath, poured off from unchanged Na, and redistd., producing 27.6% of I b_8 119.5–20°, d_0^0 0.9309, d_0^{17} 0.9201. In the distg. flask there remained P(OBu)ONa. When 1.28 g. of Br is added to 2 g. of I and then distd. there is obtained 1.83 g. (91.5%) of C_4H_9Br, b. 98°. The isomerization of I to II is effected on heating 8 hrs. at 150–60° in a sealed tube a mixt. of 20 g. of I and 12 g. of freshly distd. BuI (b. 129–31°); the reaction product on redistg. gives 11.80° g. of II, b_{10} 150–51°, d_0^0 0.9634, d_0^{17} 0.9520, colorless and odorless liquid. II is sapond. to III on heating 5 hrs. at 170° in a sealed tube a mixt. of 6.3 g. of II and 2 vols. of HCl (1:1); the upper layer of BuCl, in theoretical yield, was sepd., and the aq. soln. was repeatedly evapd. with H_2O on a water bath, the heavy mass was treated with H_2O, the sepd crystals filtered off, boiled in H_2O with animal charcoal, filtered, and evapd. to dryness; yield of crude III 3.55 g., m. 89–99°; recrystd. from ligroin and dried over H_2SO_4 it m. 101–3°; the acid is dibasic. Chas. Blanc

2-Methyl-2-buten-4-al. F. G. Fischer, L. Ertel and K. Löwenberg *Ber* **64B**, 30–4(1931); cf. *C. A.* **24**, 595.—In connection with the building up of terpene-like substances with open and closed chains it was of interest to prep. and characterize *2-methyl-2-buten-4-al* (I). In a note on the rearrangement of tertiary acetylenecarbinols with HCO_2H, Rupe and Kambli (*C. A.* **20**, 3443) state that dimethylethinylcarbinol gives in poor yield "isopropylidenacetaldehyde" (I), the m. p. of whose semicarbazone is given as 244° in Engl. pat. 267,954. In agreement with them, the authors find that this method is ill adapted to the prepn. of I; after short heating of the carbinol with HCO_2H there is obtained a small amount of a C:O compd. whose semicarbazone, however, m. 221–2° and *p*-nitrophenylhydrazone m. 161–2°. After other methods of prepg. I from Me_2CO had failed, the following method was devised: iso-AmOH ⟶ Me_2CHCH_2CHO ⟶ $Me_2CHCHBrCH(OEt)_2$ (II) ⟶ Me_2C:CH-$CH(OEt)_2$ ⟶ Me_2C:CHCHO (I). The use of fermentation amyl alc. as the starting material has the disadvantage that the Me_2CHCH_2CHO is accompanied by the isomeric EtCHMeCHO, which, however, is removed in the last step of the above reaction, it is probably present as $EtC(:CH_2)CHO$ in the first runnings of the fractionated crude I. The C_4H_8CHO, b. 90–2°, $[\alpha]_D^{29}$ 5.5° (and therefore contg. about 75% Me_2CHCH_2-CHO) in $CHCl_3$ at —25° slowly treated with Br in the light of an Osram lamp and then with abs. EtOH gave 75% of the II, b_{13} 88–9°, d_4^{20} 1.1772, n_D^{20} 1.4489, which, heated 4 hrs. in N with fused KOH, yielded 65–70% of the *methylbutenal di-Et acetal*, b_{13} 163–5°, d_4^{20} 0.8555, n_D^{20} 1.4201, decolorizes only about 0.1 of the calcd. amt. of Br in $CHCl_3$, a slight excess quickly giving a dark green color changing to blood-red on addn. of NaOH; Br water is also decolorized but without the play of colors; anhyd $(CO_2H)_2$ gives a grass-green color and changes the acetal into a viscous liquid converted by heating into a brittle amber-like resin insol. in the ordinary org. solvents but swelling markedly under C_6H_6. Hydrolysis of 53 g. of the acetal with cold satd aq. tartaric acid gives 5 g. b_{60} 26–8°, b. 77–80°, of an unsatd. aldehyde, probably $EtC(:CH_2)CHO$ (*semicarbazone*, m. 183–4°; *p-nitrophenylhydrazone*, golden yellow, m. 141–2°), and 18 g. of I, b_{60} 62–3°, b_{730} 132–3°, d_4^{20} 0.8722, n_D^{20} 1.4526, is easily autoxidizable but stable for a long time in sealed vessels; *semicarbazone*, m. 221–2°; *p-nitrophenylhydrazone*, violet-red, m. 161–2°. Hydrogenation of I with Pd-$CaCO_3$

gives Me_2CHCH_2CHO (semicarbazone, m. 126–7°; *p*-nitrophenylhydrazone, m. 116°). C. A. R.

Absorption and reactivity of the ketone group. Mme. Ramart-Lucas and Mme. Bruzau. *Compt. rend.* **192**, 427–9(1931).—Variations in the chem. activity of the hexaalkyl-substituted ketones can be explained by the rate of absorption of ultra-violet light. This is due to a mutual influence between the alkyl radicals present and the ketone group. Julius White

Catalytic hydrogenation of azines. V. Hydrogenation of ketazines. Determination of affinity capacities of methyl and ethyl groups. K. A. Taipale and P. V. Usachev. *J. Russ. Phys.-Chem. Soc.* **62**, 1241–58(1930); cf. *C. A.* **20**, 3282.—The speed of the reaction of catalytic hydrogenation of aldazines makes possible an estimation of the relative consumption of affinity by various radicals at the C atom in the azimethylene grouping of aldazines (*C. A.* **19**, 3478). If the affinity capacity of the Me group is 100, the relative values of the affinity capacity of hydrocarbon radicals and the H atom for this C atom can be deduced, as follows: H 12, Me 100, Et 135, Pr 200, iso-Pr 555, iso-Bu 700, Ph 600. Other investigators, detg. the affinity capacity of radicals in relation to C, found that the Me group absorbs a greater amt. of affinity than the Et group. Therefore it is desirable to compare the affinity capacities of Me and Et groups in another example than that previously obtained by hydrogenation of the aldazines of AcH and PrH. The following ketazines are considered: bis(dimethyl)azimethylene, $Me_2C{:}NN{:}CMe_2$ (I), bis(methylethyl)azimethylene, (II), bis(diethyl)azimethylene, (III). From the speed of hydrogenation of I and II, and of II and III, we are able to study the different influences of Me and Et groups on the speed of addn. of H to the azimethylene group $>C{:}NN{:}C<$, and from that of I and III the difference in the influence of 2 Me and 2 Et groups, the resulting relations of speeds of hydrogenation enabling us to make an estimate of the relative values of affinity capacities of these 2 radicals. The expts. show that the speeds of hydrogenation of II and I in the presence of Pt black are to each other as 1 to 1.3, those of III and II as 1 to 1.7, and those of III and I as 1 to 2.6; *i. e.*, an azimethylene group joined with Et groups combines with H less readily than the one joined with Me groups. Considering that the speed of hydrogenation of a double bond depends on the magnitude of the residual affinity of the atoms constituting this bond, and that the magnitude of the residual affinity in turn depends on the degree of consumption of the affinity by the radicals combined with these atoms, the conclusion is made that the Et group possesses a higher affinity capacity than the Me group. Having previously assumed the affinity capacity of Me as 100, that of Et then is 140, which corresponds with the value of 135 derived from the speeds of hydrogenation of the aldazines (cf. Kindler, *C. A.* **21**, 1453). The catalytic hydrogenation of ketazines led also to investigation of the properties of the fatty hydrazo compds. formed in the reaction. The properties of hydrazo compds. depend on the size and structure of the radicals attached to the hydrazo group, which influence its reactivity, and are noticeable in their basicity, the reactivity of the H of the imino group, and, probably, in the stability of the hydrazo grouping against decompn. into amines by further addn. of H. T. (*C. A.* **18**, 3049) has shown that $(NHCHMe_2)_2$, obtained by hydrogenation of I, possesses a considerably lower basicity than $(NHMe)_2$, $(NHEt)_2$, $(NHPr)_2$ and $(NHCH_2CHMe_2)_2$. The $(NHCHMe_2)_2$ forms a di-HCl salt, which, however, easily loses 1 HCl; moreover, only the H of 1 imino group is capable of reacting, giving mononitro-, mono-Bz derivs. and the corresponding derivs. of $(NH_2)_2CO$ and $(NH_2)_2CS$, while the other above named hydrazo compds. give disubstituted derivs. Hydrazo-α-methylpropane (IV) and hydrazo-α-ethylpropane (V) obtained, resp., from II and III, behave also like $(NHCHMe_2)_2$. Their di-HCl salts are even less stable: the stability decreasing with the increasing wt. of the radicals. The more affinity is consumed by the radicals from the hydrazo group, the less of the residual affinity remains with the latter, the lower it seems, is its basicity, and also the lower is the stability possessed by the HCl salts. The hydrazines also form only mono-substitution products with BzCl and PhNCS. IV and V and their homologs are very readily oxidized in the air, forming azo compds., which are isomerized with acids and alkalies to hydrazones, and the latter are decompd. with acids into ketones and primary hydrazines. The hydrogenation of ketazines in Ac_2O proceeds differently than in other solvents. After addn. of 1 mol. of H as in the case of AcOH, the addn. of the next mol. of H is very slow. This is explained from a study of the hydrogenation of II, by assuming that the azo compd formed in the first phase of the reaction is isomerized to the hydrazone, which is readily acetylated, and the Ac deriv. of the hydrazone under the influence of the Ac group is more difficultly hydrogenated than the free hydrazone or the azo compd. (Skita and Rolfes, *C. A.* **14**, 3667). *Exptl. part.*—The ketazines were prepd. by the known

methods (K. and C., *C. A.* **15**, 2879). I b_{761} 131–3°, b_{16} 38°, d_4^{20} 0.8389, n_D^{20} 1.45318, calcd. MR_D 36.11, found MR_D 36.16. II b_{760} 171–2°, b_{10} 72°, d_4^{20} 0.8404, n_D^{20} 1.4511, calcd. MR_D 45.35, found MR_D 45.27. III b_{758} 196–7°, b_{37} 110.5–11°, b_{11} 82°, d_4^{20} 0.8419, n_D^{20} 1.4574, calcd. MR_D 54.58, found MR_D 54.44. For the method of hydrogenation see *C. A.* **20**, 3282. Results of hydrogenation: I adds H 1.3 times more readily than II, II 1.5 times more readily than III. The products of hydrogenation of the ketazines were isolated from alc. either by drying the filtrate with K_2CO_3 and then redistg. in H, or by satg. the filtrate with HCl, whereby 60–70% of the mono-HCl salt of the hydrazine is pptd. The mother liquor evapd. *in vacuo* deposits the di-HCl salt contaminated with amino-HCl. The hydrogenation in AcOH produces a 100% yield with no formation of amines (*C. A.* **17**, 3015). IV b_{760} 168.5–9°, b_{11} 100–1°, d_0^0 0.8214, d_4^0 0.8050, n_D^{20} 1.4283, calcd. MR_D 46.28, found MR_D 46.05. The di-HCl salt, loses 1 HCl in the air or H_2O, giving the mono-HCl salt, m. 147°. Diisobutylsemicarbazide, $NH_2CON(C_4H_9)NH(C_4H_9)$, obtained by the action of 1.5 mols. of concd. KCN on 1 mol. of the HCl salt, m. 48–9°. Diisobutyl-4-phenylthiosemicarbazide, $PhNHCSN(C_4H_9)NHC_4H_9$, prepd. by mixing 1 mol. of the base with 1 (or 2) mols. of PhNCS, evapg. and filtering, m. 78–8.5°. Azo-α-methylpropane (VI) was prepd. by adding the calcd. amt. of HgO to 7.5 g. of IV in Et_2O, while cooling; after 24 hrs.' standing the mass was heated on the water bath, filtered, dried with BaO, the Et_2O expelled and redistd., yielding 5.2 g. (70%), b_{758} 140–1°. It is also prepd. by adding 3.5 g. of $NaNO_2$ in H_2O to 6 g. of the HCl salt of IV in H_2O, then a few drops of AcOH is added, allowed to stand 24 hrs., neutralized with Na_2CO_3, extd. with Et_2O, dried with K_2CO_3, b_8 31°, d_0^0 0.7904, d_4^{20} 0.7748, d_{20}^{20} 0.7757, n_D^{20} 1.4127, MR_D (calcd.) 45.81, MR_D (found) 45.72. The isomerization of VI to the hydrazone was carried out by refluxing 3 hrs. with NaOH, fractionating, taking up the part b. 155–64° in Et_2O and satg. with HCl, giving about 50% of isobutylhydrazine-2 HCl, which heated *in vacuo* at 50° goes over to the mono-HCl salt. Dibenzoylisobutylhydrazine, $C_4H_9N_2(BZ)_2$, prepd. by refluxing several hrs. on the water bath a mixt. of 3 g. of VI in C_6H_6, 4 g. of BzCl and some calcined Na_2CO_3, m. 169–70°. Isobutylsemicarbazide, $NH_2CO·N(C_4H_9)NH_2$, was obtained by heating in a water bath a mixt. of the hydrazine-HCl with KCN in soln., extg. with C_6H_6, m. 97.5–8°. V, obtained by hydrogenation of III, b_{753} 193–3.5°, d_4^{20} 0.8210, n_D^{20} 1.4388, MR_D (calcd.) 55.51, MR_D (found) 55.16. The di-HCl salt crystallizes with 1 H_2O, the mono-HCl salt is prepd. from the di-HCl salt on warming. Benzoyldiamylhydrazine, AmNBzNHAm, was obtained by heating the mono-HCl salt of the base with BzCl and dry Na_2CO_3 in C_6H_6, b_{18} 184–5°. Diamylsemicarbazide, $NH_2CONAmNHAm$, prepd. by the action of KCN on the HCl salt of the base, m. 57–57.5°. Azo-α-ethylpropane, obtained by oxidation of the hydrazo compd. with HgO in Et_2O, b_{755} 182°, b_{13} 70°. Amylhydrazine-2 HCl, $Et_2CH·NHNH_2.2HCl$, was obtained by the action of HCl on the azo compd. or hydrazone in Et_2O; the mono-HCl salt is formed on heating the di-HCl salt at 60–70°. Dibenzoylamylhydrazine, $Et_2CHNH_2Bz_2$, prepd. by heating the azo compd. in Et_2O with an excess of BzCl, m. 199.5–200°. Amylsemicarbazide, $NH_2CONAmNH_2$, prepd. from a concd. soln. of HCl salt of the primary hydrazine on heating with an excess of KCN, m. 107–8°.

CHAS. BLANC

A few derivatives of propylene glycol. A. DEWAEL. *Bull. soc. chim. Belg.* **39**, 395–401(1930).—The following *new* compds. have been prepd. $CH_2ClCH(OMe)Me$, obtained by methylation of $CH_2ClCH(OH)Me$ (I) with Me_2SO_4, b. 103–4°, d_4^{20} 1.009, n_D^{20} 1.41372. $CH_2ClCH(OEt)Me$, prepd. by ethylation of I with Et_2SO_4, b. 117°, d_4^{20} 0.9965, n_D^{20} 1.41902. The dehydration of I by H_2SO_4 gives $(CH_2ClCHMe)_2O$ b_{761} 187–8°, d_4^{20} 1.103, n_D^{20} 1.45046, which reacts with KOAc and HOAc to give $(CHMeCH_2OAc)_2O$, b_{761} 248°, d_4^{20} 1.050, n_D^{20} 1.42654. $EtOCH_2CH(OH)Me$, obtained from alc. and propylene oxide with 2 drops of H_2SO_4, b. 136°, d_4^{20} 0.9028, n_D^{20} 1.4. $EtOCH_2CHMeOAc$ b. 158–60°, d_4^{20} 0.9461, n_D^{20} 1.40968. $CH_2(OH)CH(OEt)Me$, obtained from I through the acetin, b_{761} 140–1°, d_4^{20} 0.9044, n_D^{20}. $CH_2(OMe)CH(OH)Me$ b. 126–7°, d_4^{20} 0.9260, n_D^{20} 1.40696, is obtained from MeOH and propylene oxide, with H_2SO_4. $MeOCH_2CH(OAc)Me$ b_{761} 147°, d_4^{20} 0.9709, n_D^{20} 1.40449. $Me_2CHOCH_2CH(OH)Me$, b_{765} 142–3°, d_4^{20} 0.9059. The condensation of $HOCH_2CHClMe$ and propylene oxide with H_2SO_4 gives $MeCHClCH_2OCH_2CH(OH)Me$, b_{762} 204–5°, d_4^{20} 1.059. $CH_2(OCOPr)CHClMe$ b_{761} 184°, d_4^{20} 1.031, n_D^{20} 1.42875. $AcOCH_2CH(OAc)Me$

b_{758} 190–1°, d_D^{20} 1.059, n_D^{20} 1.4173, treated with HCl gives a mixt. of $ClCH_2CH(OH)Me$ (preponderant) and $CH_2(OH)CHClMe$ while HBr gives a mixt. of the 2 corresponding Br derivs. A. L. HENNE

Ether-like compounds. III. Polyether acids of the type $R.O.(CH_2.CH_2.O)_n.CH_2CO_2H$. M. H. PALOMAA AND T. A. SITONEN. *Ber.* 63B, 3117–20(1930); cf. *C. A.* 13, 2863.—The mono- and di-ether acids of the above type (n = 1 and 2) are readily obtained by converting the com. "alkylglycols" and "alkylpolyglycols" into the corresponding Na alcoholates, adding $ClCH_2CO_2H$ and liberating the acids from the resulting Na salts. The Na alcoholates are very sol. in ether or the corresponding ether alc. and on evapn. of the solvent yield crystals which have not yet been investigated. The poly-ether acids are also relatively easily sol. in H_2O and their extn. (especially of the MeO derivs.) from H_2O with ether is a time-consuming operation. The MeO compds. exchange the Me for H with HI. *(β-Methoxyethoxy)acetic acid* (yield, 80%, based on the $ClCH_2CO_2H$), thick oil miscible with water in all proportions, b_4 121-2°, d_D^{20} 1.1634, n 1.43375, 1.43592, 1.44129, 1.44556 at 20° for α, D, β and γ; *Et ester*, from the acid in abs. alc. with $CuSO_4$ and a few drops concd. H_2SO_4, miscible with water in all proportions, b_{10} 90°, d_4^{20} 1.0369, n 1.41697, 1.41908, 1.42412, 1.42836. *(β-Ethoxyethoxy)acetic acid*, b_4 125–6°, d_4^{20} 1.1103, n 1.43349, 1.43572, 1.44100, 1.44534. *(β-Propoxyethoxy)acetic acid* (from *ethylenglycol mono-Pr ether*, b. 150–0.5°, d_4^{20} 0.9106), b_4 131°, d_4^{20} 1.07415, n 1.43432, 1.43652, 1.44186, 1.44604. *(β-Butoxyethoxy)acetic acid* (from redistd. com. "butylglycol," b_{758} 168–9°, b_4 50°, d_4^{20} 0.9015, n 1.41711, 1.41980, 1.42493, 1.42901), miscible with water, b_6 141°, d_4^{20} 1.04635, n 1.43605, 1.43823, 1.44360, 1.44797. Repeatedly refractionated $MeOCH_2CH_2OCH_2CH_2OH$ (com. "methyl polyglycol"), b_4 65°, d_4^{20} 1.02695, 1.42475, 1.42686, 1.43197, 1.43620, gave *[β-(β'-methoxyethoxy)ethoxy]acetic acid*, miscible with water, b_4 155–6°, d_4^{20} 1.1492, n 1.44351, 1.44575, 1.45112, 1.45553. C. A. R.

Itaconic anhydride and itaconic acid. R. L. SHRINER, S. G. FORD AND L. J. ROLL. *Org. Syntheses* 11, 70–2(1931).—Heating citric acid until it melts and then rapidly distg. gives 37–47% of itaconic anhydride; the free acid is obtained by refluxing with H_2O for 1 hr. C. J. WEST

Resolution of synthetically prepared isoleucine into its four optically active components, namely *l*- and *d*-isoleucine and *d*- and *l*-alloisoleucine. EMIL ABDERHALDEN AND WALTHER ZEISSET. *Z. physiol. Chem.* 195, 121–31(1931).—Isoleucine, $EtCHMeCH(NH_2)CO_2H$, contains 2 asym. carbons, and its synthetic prepn. should therefore consist of 2 pairs of optical isomers. The 2nd pair has hitherto been overlooked. Isoleucine was prepd. by the previously described method (*C. A.* 4, 172) in which $EtCHMeCHBrCO_2H$ is aminated with NH_4OH. The sepn. of the isomeric pairs was effected by repeated pptn. of the aq. soln. by EtOH in which *dl*-isoleucine is insol., and recovery of *dl*-alloleucine from the mother liquor by distn. of the Et ester and sapon. of the distillate by boiling with H_2O. Sepn. of the optical isomers was effected by converting the *dl*-mixt. into the formyl deriv. and crystg. the brucine salt of the latter. The properties of the 4 individual isomers and their HCO, $PhSO_2$, PhNCO and α-$C_{10}H_7NCO$ derivs. are described. *l-Isoleucine* m. 285–6 (decompn.), $[\alpha]_D^{20}$ in H_2O 30.7°, in 20% HCl 40.8°; *l-alloisoleucine* m. 278° (decompn.), $[\alpha]_D^{20}$ in H_2O 14.0°, in 20% HCl 38.1°; *d-isoleucine*, m. 283–4° (decompn.), $[\alpha]_D^{20}$ in H_2O —10.7°, in 20% HCl —41.6°; *d-alloisoleucine*, m. 274–5° (decompn.), $[\alpha]_D^{20}$ in H_2O —14.2°, in 20% HCl —38.0°; *formyl-l-isoleucine*, m. 155°, $[\alpha]_D^{20}$ in EtOH 26.6°; *formyl-l-alloisoleucine* m. 126°, $[\alpha]_D^{20}$ in EtOH 24.2°; *formyl-d-isoleucine*, m. 156°, $[\alpha]_D^{20}$ in EtOH —26.8°; *formyl-d-alloisoleucine*, m. 126°, $[\alpha]_D^{20}$ in EtOH —25.2°; *benzenesulfonyl-l-isoleucine* m. 153°, $[\alpha]_D^{20}$ in *N* NaOH —14.4°, in EtOH 25.3°; *benzenesulfonyl-l-alloisoleucine*, m. 147-8°, $[\alpha]_D^{20}$ in EtOH 30.7°; *benzenesulfonyl-d-isoleucine*, m. 153–4°, $[\alpha]_D^{20}$ in *N* NaOH 14.3°, in EtOH —25.5°; *benzenesulfonyl-d-alloisoleucine*, m. 147–8°, $[\alpha]_D^{20}$ in EtOH —30.7°; *l-isoleucine phenyl isocyanate deriv.*, m. 121°, $[\alpha]_D^{20}$ in *N* NaOH 14.9°, in EtOH 37.5°; *l-alloisoleucine phenyl isocyanate deriv.*, m. 151°, $[\alpha]_D^{20}$ in NaOH 16.9°, in EtOH 30.8°; *d-isoleucine phenyl isocyanate deriv.*, m. 119–21°, $[\alpha]_D^{20}$ in NaOH —15.0°, in EtOH —36.3°; *d-alloisoleucine phenyl isocyanate deriv.*, m. 151°, $[\alpha]_D^{20}$ in NaOH —16.8°, in EtOH —30.6°; *l-isoleucine α-naphthyl isocyanate deriv.*, m. 178–9°, $[\alpha]_D^{20}$ in EtOH 30.1°; *l-alloisoleucine α-naphthyl isocyanate deriv.*, m. 165–6°, $[\alpha]_D^{20}$

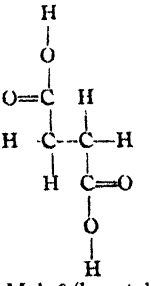
in EtOH 25.1°; *d-isoleucine α-naphthyl isocyanate deriv.*, m. 177–8°, $[\alpha]_D^{20}$ in EtOH —29.5°; *d-alloisoleucine α-naphthyl isocyanate deriv.*, m. 168°, $[\alpha]_D^{20}$ in EtOH —25.5°. *Formyl-dl-isoleucine*, m. 120–1°; *formyl-dl-alloisoleucine*, m. 117–8°; and *dl-alloisoleucine Et ester*, b_{15} 85–8° (7–8° lower than the recorded b. p. of *dl*-isoleucine Et ester).

A. W. Dox

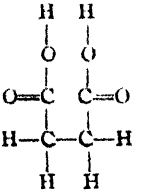
Action of thionyl chloride on some anilic acids. W. H. Warren and R. A. Briggs. *Ber.* **64B**, 26–30(1931).—By the action of PCl_5 on $HO_2CCONHPh$ Aschan obtained $ClCOCONHPh$ which on heating readily lost HCl and CO and yielded about 85% PhNCO. He suggested that oxanil (I) was possibly an intermediate product, but the properties of I are so characteristic that it could not have escaped detection if it had been formed; moreover, it is not affected by PCl_5. In attempting to prep. PhNCO by this method but with $SOCl_2$ instead of PCl_5 W. and B. obtained I instead of PhNCO, and they found that a no. of other anilic acids react in the same way with $SOCl_2$. The anils were obtained by refluxing the anilic acid with 8 parts $SOCl_2$ in an all-glass app. until the evolution of HCl and SO_2 ceased, distg. off the excess of $SOCl_2$, washing with petroleum ether (dried over Na) or C_6H_6, extg. the last traces of anilic acid with boiling H_2O and crystg. from an appropriate solvent. I, crystd. from $PhNO_2$, does not m. 320°, mol. wt. in boiling $PhNO_2$ 154.4, unchanged by most dil. or concd., hot or cold mineral acids but sol. in hot concd. H_2SO_4 with decompn. into $PhNH_2$, CO and CO_2, decompd. by hot NaOH with evolution of a PhNC odor, converted by boiling $Ba(OH)_2$ into $PhNH_2$ and $(CO_2)_2Ba$, by alc. NH_3 in sealed tubes into $(CONHPh)_2$ and $(CONH_2)_2$ and by excess of boiling $PhNH_2$ into $(CONHPh)_2$. *Malonanil*, light yellow, m. 249°, similarly obtained from $HO_2CCH_2CONHPh$, is apparently not affected by concd. HNO_3 or HCl, decompd. by hot concd. H_2SO_4 into $PhNH_2$, CO_2 and AcOH, converted by alc. NH_3 in sealed tubes into $CH_2(CONHPh)_2$ and $CH_2(CONH_2)_2$ and by boiling NaOH into $PhNH_2$ and $CH_2(CO_2Na)_2$. In the same way were prepd. succinanil, m. 156°, *glutaranil*, does not m. 320° (possibly a polymer of Bödtker's compd., m. 144–5°, obtained directly from glutaric acid and $PhNH_2$ (*Diss. Leipzig*, 1891)), phthalanil, m. 203°, camphoranil, m. 116°, and *diphenanil*, m. 199° (*diphenanilic acid*, from diphenic anhydride and $PhNH_2$, m. 176°).

C. A. R.

The polymorphism of the saturated diacids of the aliphatic series as a function of temperature. F. Dupré la Tour. *Compt. rend.* **191**, 1348–50(1930).—Two forms of succinic acid have been studied under the microscope and by x-rays. β-Succinic acid, stable at low temps., is triclinic pinacoidal with *a* 5.04 A. U., *b* 7.58 A. U., *c* 9.75 A. U. At about 137° a transformation to the α-form occurs The α-acid is monoclinic prismatic with *a* 5.03 A. U., *b* 8.75 A. U., *c* 7.48 A. U. The mol. structure appears to be modified thus in the cryst. change:



Mol. β (less stable)



Mol. α

H. W. Walker

Additive heteropolymerization. Theodor Wagner-Jauregg. *Ber.* **63B**, 3213–24 (1930).—In the investigation of highly polymerized org. natural products Staudinger and his pupils have made use of model compds. prepd. by polymerization, or addn. to each other, of several identical mols. of low mol. wt. It is now shown that 2 unlike units of low mol. wt., each contg. a C:C union, can likewise be combined into a large mol. by polymerizing addn. The name *additive heteropolymerization* is suggested for such a process. The present paper deals with the prepn. of addn. heteropolymerizates without the use of catalysts from 2 ethylene components, 1 of which was maleic anhydride (I). I alone shows no tendency to polymerize but has a pronounced additive capacity. When it is boiled with stilbene (II) in xylene, there seps. 45–70% of a white, amorphous, infusible *substance* (III) insol. in most org. solvents, sol. colloidally, with preliminary

swelling, in others (including camphor). Because of its slight soly., its mol. wt. could not be detd., but it is doubtless very high, for the accompanying polymer homologs extd. in very small amount by boiling xylene have in molten camphor an av. particle size of about 4200, corresponding to an av. content of 15 mols. each of I and II. On dry distn. with or without $Ba(OH)_2$ it decomps. with regeneration of II. From its compn. it consists very nearly of equal nos. of I and II mols., irrespective of the relative proportions of the 2 components in the original reaction mixt. (the ratio II:I in the product obtained from a 2:1 mixt. is 1:1, and in that obtained from a 1:2 mixt. it is 0.95:1). The constancy of the stoichiometric compn. would seem to point to a product built up according to a definite plan, such as —$\left[\begin{matrix}\text{CHPh.CHPh.CH}\text{——}\text{CH}\\ \qquad\qquad\qquad\quad\ \ \text{CO.O.CO}\end{matrix}\right]_x$—. A soln. of the product in $(CHCl_2)_2$ absorbed Br only after long boiling and in very small amount. Along with the III there is formed a very small amount (about 10% of the wt. of the III) of very slightly more sol. polymerization products; the rest of the original materials remains unchanged. The polymerization does not take place in the lower-boiling C_6H_6 and PhMe, but there also seems to be a sp. solvent factor, for the yield is much smaller in $(CHCl_2)_2$ which boils about 6° higher than xylene and even less in the molten mixt. at the temp. of boiling xylene. Conversely, benzalfluorene (IV) and I give in good yield in the fused mixt. at 130°, but not in xylene, a white amorphous *heteropolymer* very similar to III, insol. in the fused mixt. of the components; no intermediate products of lower mol. wt. were observed; the ratio IV:I is 1:1 and 0.9:1, resp., in the products obtained from 2:1 and 1:2 mixts. of IV and I. The fused mixt. of anisalfluorene and I at about 130° also deposits an amorphous *polymer*. The *heteropolymers* of $PhCH_2CH_2CH:CHPh$ (V) and I are likewise sol. in the fused mixt. of the nonomers. The ratio V:I is not 1:1 but shifted in favor of I (1:1.5 and 1:1.3–1.25); the V are relatively easily sol. Attempts to prep. heteropolymerizates of bromostilbene, $Ph_2C:CPh_2$, $(PhCH_2CH:)_2$ and other unsatd. compds. with I were unsuccessful, indicating that the nature of the substituents on the C:C union has an influence on the tendency to heteropolymerization. Steric influences also play a role, for isostilbene with I gave a polymer in only very poor yield. While the hydrocarbons which are well adapted to heteropolymerization show no marked tendency to homopolymerization, the easily polymerized $Ph_2C:CH_2$ forms with 2 mols. I a well crystd. *compd.* (VI) having the calcd. mol. wt. 376. Succinic anhydride cannot be substituted for I in these reactions but $(PhCH_2)_2$ gives, although in very poor yield, a 1:1 heteropolymerizate with I. Amylene and styrene heated with I give viscous, gummy masses. Styrene and di-Me maleate gave a white amorphous powder which, from its compn., contained 4–5 styrene mols. to each ester mol. and gave di-Me fumarate on dry distn. Some substances with a C:N union also seem to form heteropolymerizates with I; I boiled with fluorenone-imine in C_6H_6 or with benzal- or cinnamalazine, in PhMe or xylene gives yellow to brown, amorphous products; benzalazine, in addn., gives a cryst. addn. *product* (VII) contg. 2 mols. I, and, with di-Me maleate in xylene, an analogous product (VIII). VI, $C_{32}H_{16}O_6$, m. 279–81° (cor., decompn.), mol. wt. in camphor 373–8, sol. in hot 2 *N* NaOH and boiling 2 *N* Na_2CO_3, gives a green color with cold alk. $KMnO_4$, decolorizes $KMnO_4$ in Me_2CO only very slowly, does not decolorize Br in boiling AcOH VII, $C_{32}H_{16}O_6N_2$, m. 243–4° (cor.). VIII, $C_{36}H_{28}O_6N_2$, m. 232–4° (cor.). C. A. R.

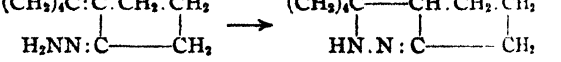
Glucomannan from "konjak." I. Kitsuji Nishida and Hideo Hatori. *J. Agr. Chem. Soc. Japan* **6**, 991–5; *Bull. Agr. Chem. Soc. Japan* **6**, 78–80(1930).—The mannan was liquefied by boiling with H_2O or by enzymes and pptd. with alc. The mannan still contains the other impurities such as inulin, pectin, galactan, fructan, xylan, araban, etc. The powd. crude mannan was heated with H_2O under 1–1.5 atm. in an autoclave. It was pptd. by Fehling soln. and decompd. by alc. HCl. Pure mannan was pptd. by alc. and Et_2O. It is a white powder which has no I reaction and does not reduce Fehling soln. Its ash content is 0.10–0.45%. II. *J. Agr. Chem. Soc. Japan* **6**, 1065–77; *Bull. Agr. Chem. Soc. Japan* **6**, 80–2(1930).—The mannan was hydrolyzed by mineral acids of various concns. The hydrolysis was complete with 2% HCl after 25 hrs. The ratio of mannose to glucose was 1:1 from the detn. of mannose as the phenylhydrazones and 2:1 by calcn. from the rotation. The difference is due to the incomplete pptn. of mannose phenylhydrazone. When a large amt. of $PhNHNH_2$ was added, the ratio was 2:1. Glucomannan of "konjak" consists of 2 mols. of mannose and 1 mol. of glucose. Y. Kihara

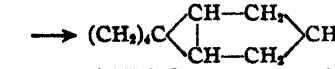
A mannan from the bulb of Lilium. I. Teizo Takahashi. *J. Agr. Chem. Soc. Japan* **6**, 791–9(1930).—The water ext. of the lily bulb powder was filtered and

pptd. with alc. The ppt. was hydrolyzed by dil. HCl. Only mannose and glucose were identified, resp., as phenylhydrazone and osazone in the hydrolyzate. The mannan obtained was named "yurl-mannan." Tri-Ac deriv. is a white powder, sol. in AcOH, CH_2Cl, acetone, AcOEt and pyridine, m. p. about 245°, $[\alpha]_D^{14}$ —17.61°. II. *Ibid* 861–9.—The mannose and glucose ratio is 2:1. The aldose detn. method of Willstätter and Schudel was examd. for mannose, galactose, glucose, fructose, arabinose and xylose. When 3.5–5 times the 0.1 *N* I theoretically required was used, mannose was detd. quant. In "yurl-mannan" no ketose is present. Y. KIHARA

The dispersion of the refraction of cyclic hydrocarbons. MARCEL GODCHOT AND (MLLE.) G. CAUQUIL. *Compt. rend.* 191, 1326–8(1930).—From $n_D^{13.5}$ and $n_\alpha^{13.5}$ and $d_{13.5}$ the sp. dispersion $\Delta n/d$ has been calcd. for a no. of satd. and unsatd. cyclic hydrocarbons of C_6, C_6, C_7 and C_8. Δn increases with increasing mol. wt. and the value for the unsatd. compds. is more than 20 units greater than that for the corresponding satd. compd. $\Delta n/d$ has the nearly const. value of 124×10^{-4} for the satd. compds. and 151×10^{-4} for the unsatd. compds. It is independent of the nature of the ring, being the same for methylcyclopentane, cyclohexane and methylcyclooctane and likewise the same for cyclooctene and methylcycloheptene. Aromatic hydrocarbons with $\Delta n/d$ about 250×10^{-4} may be detd. in oils in the presence of cyclic hydrocarbons. H. W. WALKER

Cyclopentylidenecyclopentane and its relation to catalytic hydrogenation. N. D. ZELINSKI AND N. I. SHUIKIN. *J. Russ. Phys.-Chem. Soc.* 62, 1343–54(1930); cf. *C. A.* 25, 1513.—After the failure to obtain 1,1-dihydroxydicyclopentyl (pinacol of cyclopentanone) for the prepn. of spirocyclodecane (*C. A.* 24, 76), the attempts to obtain the pinacol from cyclopentylidenecyclopentane (I) by oxidation with BzO_2H, or to convert I into the glycol with $KMnO_4$, have also met with negative results. The hydrogenation of I in presence of Pt-C produced a satd. hydrocarbon different from the expected dicyclopentyl (II). These 2 negative results have led to an investigation of the starting product, cyclopentylidenecyclopentanone (III). III was prepd. by Wallach's method (*Ber.* 29, 2955(1896)), and by dehydrating cyclopentanone (IV) vapors with Al_2O_3 at 200°. Of interest is a large increment in the mol. refraction of III, while I derived from III shows considerable optical decrement. The high coeff. of refraction of III may indicate that a considerable part of III is present in tautomeric (enol) form The relation of the structures of III and I may be elucidated by decompn. of the hydrazone of III in the presence of Pt, whereby instead of substitution of H_2 for N at the C bearing O, the reaction probably proceeds by way of an intermediate pyrazoline to a tricyclic spiro-hydrocarbon:





1,1-Tetramethylenebicyclohexane (V) reacts with Br and $KMnO_4$ as an unsatd. compd., and with BzO_2H not at all. By catalytic reduction must be formed a satd. hydrocarbon $C_{10}H_{18}$, spirocyclodecane, $(CH_2)_4C(CH_2)_4CH_2$ (VI), which evidently undergoes isomerization to methylspirocyclononane, $(CH_2)_4C.CHMe.CH_2.CH_2.CH_2$ (VII). The phys. properties of V are almost identical with those of IV, and greatly different from those of II. *Exptl. part.*—The prepn. of III from IV with such agents as alc. EtONa (Wallach), solid KOH, alc. KOH, or KCN gives up to 40% of higher condensation by-products, while passing vapors of IV over Al_2O_3 at 200° results in a 41% yield of III with practically no formation of by-products. A mixt. of IV and concd. alc. KOH is allowed to cool, then heated 1.5 hrs. on the water bath, treated with H_2O, the oily layer extd. with Et_2O, dried with solid KOH, the Et_2O expelled, and distd. *in vacuo*, b_{10} 116–8°, n_D^{20} 1.5211, d_4^{20} 1.0172; oxime m. 122–3°; semicarbazone, m. 167–70° (decompn.); hydrazone, m. 88–94° (decompn.). III obtained by heating IV 4 hrs. with 10% solid KCN, n_D^{20} 1.5186, d_4^{20} 1.0172, b_{11} 119–21°, b. 252–4°. The fraction b_{10} 185–200° on recrystn. from EtOH m. 83–4° and analyzes for a compd. to which Wallach ascribes the m. p. 76–7°, and the formula $(CH_2)_4C:C.CO.C:C(CH_2)_4$.



V, obtained by distg. the hydrazone of III in presence of KOH and Pt, treating with dil. AcOH, washing with H_2O to a neutral reaction, drying with K_2CO_3, and twice distg. over metallic Na, colorless liquid, reacting with $KMnO_4$ and Br, $b_{744.5}$ 189–90°, n_D^{17} 1.4864, d_4^{17} 0.9134. V produces with $KMnO$

no pinacol, and does not react with BzO_2H. By passing V 3 times over Pt-C at 190° and subsequently distg. over Na is obtained VII, b_{739} 184–5°, n_D^{19} 1.4708, n_D^{20} 1.4701, d_D^{20} 0.8728, which reacts with $KMnO_4$ very slowly, and on dehydrogenation over Pt-C at 300° shows no change. 1-Cyclopentenylcyclopentane, (VIII), was obtained by dehydrating cyclopentyl-2-cyclopentanol (IX), prepd. by reduction of III with Na in aq. Et_2O. VIII, b_{741} 189–91°, n_D^{20} 1.4853, d_4^{20} 0.8898, reacts with $KMnO_4$ and Br, and when reduced over Pt-C at 190° gives II. Cyclopentyl-2-cyclopentanone (X), obtained when 38 g. of IX is mixed with 80 cc. of 80% AcOH, to which is added 17 g. of CrO_3 in 80 cc. of H_2O, the whole is heated 30 min. on the water bath, dild. with H_2O, the oily layer sepd., washed with H_2O, dried with calcined K_2CO_3, and redistd., b_{10} 111–3°; semicarbazone, m. 210°, d_4^{22} 0.9748, n_D^{22} 1.4793. *Prepn. of* II. The hydrazone was prepd. by heating on the water bath 23 g. of X with 11.5 g. of $N_2H_4.H_2O$ in alc., the crude product was decompd. with KOH in presence of Pt powder, dried with $CaCl_2$ and redistd. over Na, b_{744} 188–89.5°, d_4^{21} 0.8652, n_D^{21} 1.4638. CHAS. BLANC

A hydrocarbon from pine oil essence and the stereoisomeric 1,2-dimethylcyclopentanes. G. CHAVANNE. *Bull. soc. chim. Belg.* 39, 402–11(1930).—A fractional distn. of C_7H_{12}, prepd. by dehydration of 1,2-dimethyl-1-cyclopentanol, gives about 10% of MeC:CMe.CH_2.CH_2.CH_2, b. 96–7°, d_4^{20} 0.783, n_α^{20} 1.4321, n_β^{20} 1.4415, n_γ 1.4472, n_{H_α} 1.4349, m. —124.8°, and 90% of HC:CMe.CHMeCH_2.CH_2, b. 105.0–5.2°, d_4^{20} 0.7952, d_4^{15} 0.7998, n_α^{20} 1.4412, n_β^{20} 1.4511, n_γ^{20} 1.4571, n_{H_α} 1.4442, viscosity η_{15} 0.00537, m. —90.4°. These synthetic hydrocarbons are compared with C_7H_{12} from pine oil, and it is concluded that the natural product is probably the isomer b. 105°, with a small amount of impurity which affects its d. and n, but not its b. p. The hydrogenation of C_7H_{12} with Pt black gives the 2 stereoisomeric forms of 1,2-dimethylcyclopentane, one of which b. 91.8° ± 0.1°, b_{741} 90.95°, d_4^{20} 0.7495, d_4^{15} 0.7541, m. 120°, n_α^{20} 1.4093, n_β^{20} 1.41659, n_γ^{20} 1.42077, $n_{H_\alpha}^{20}$ 1.41155, while the other b. 99.25 ± 0.1°, b_{741} 98.40°, m. —62°, d_4^{20} 0.7718, d_4^{15} 0.7764, n_α^{20} 1.42014, n_β^{20} 1.42748, n_γ^{20} 1.43180, $n_{H_\alpha}^{20}$ 1.42202. The spatial configuration is discussed. A. L. HENNE

β-Enines and β-diines. V. GRIGNARD AND L. LAPAYRE. *Compt. rend.* 192, 250–3(1931).—The influence of 2 triple bonds; or 1 triple and 1 double bond, in the β-position, on the acidity of the central CH_2 group was investigated. For this purpose the reactions of *1,5-diphenyl-1,4-pentadiine* PhC:CCH_2C:CPh (I), *1-phenylpent-4-en-1-ine*, PhC:CCH_2C:CH_2 (II), and *dec-1-en-4-ine* Me$(CH_2)_4$C:CCH_2CH:CH_2 (III) with Na, $NaNH_2$, EtMgBr were studied. By heating I with EtMgBr, 1 mol. of C_2H_6 is evolved at 35°, 2 mols. at 70°. II and III show monoacidity at 70°, III does not evolve 2 complete mol. equivs. of C_2H_6 at 175°. $NaNH_2$ evolves more than one NH_3 from I and III, in consequence of a partial rearrangement to derivs. of C_2H_2 with free active H. The triple bond exerts a more negativating effect on the CH_2 group in these systems than the double bond; the aromatic substituents reënforce this action. I, prepd. from CH_2I_2 and Mg phenylacetylide (IV), m. 88–90°; yield 8%. Allyl bromide (V) and IV yield 70% of II, a liquid, b_{20} 103–5°, d_{16}^{16} 0.940, n_D^{18} 1.558, exaltation of the mol. refraction 1.9. Mg pentylacetylide and V yield III, a liquid b_{18-20} 82–5°, d_{11}^{11} 0.806, n_D^{16} 1.459, exaltation 0.4. It becomes resinous on standing. ALFRED BURGER

Sulfides and polysulfides of organic bases. T. G. LEVI. *Gazz. chim. ital.* 60, 975–87(1930).—A review of the literature shows a great scarcity of expts. on the prepn. of polysulfides of org. bases. In view of this, several polysulfides were prepd. and their properties studied. Phenylbiguanide-H_2S (I) was prepd. by the method of Romani (cf. *C. A.* 18, 1066), and its analysis, not undertaken by R., confirmed its compn. Phenylbiguanide sulfide could not be obtained as indicated by R. (who did not analyze it), *i. e.*, by slow conversion of I in air, or rapid conversion on heating, with loss of H_2S; and even by the action of concd. aq. $(NH_4)_2S$ on phenylbiguanide only I is formed, and on the other hand when aq. I is heated gently, H_2S is eliminated, but no neutral sulfide is formed. All attempts at the prepn. of diphenylguanidine sulfide were without success. Alc. *o*-tolylbiguanide treated with H_2S, and Et_2O added, ppts. in good yield *o-tolylbiguanidine hydrosulfide* $C_9H_{12}N_5.H_2S$, m. 123–6°, stable at room temp. when kept dry, decomps. slowly in cold water. Benzylamine polysulfide, $(PhCH_2NH_2)_2.H_2S_6$ (II), was prepd. in a different way from that described by Bruni and Borgo (cf. *C. A.* 2, 2058). Addn. of S to $PhCH_2NH_2$ (III) gives the orange color characteristic of poly-

sulfides; if at the same time H_2S is passed in, there is an abundant ppt. of II, but it is so unstable that it cannot be washed and dried to const. wt. without loss of H_2S. When dil. aq. III-HCl is poured into excess NH_4 polysulfide (approx. compn. $(NH_4)_2S_{3.6}$ prepd. from NH_4OH of d. 0.92), II is pptd. and under these conditions it is more stable, and it can be washed with water without losing H_2S, but when it is dried in a desiccator or in air, it decomps. slowly. Since it was impracticable to obtain II dry enough to analyze, it was analyzed in the wet state. This analysis indicated $(PhCH_2NH_2)_2.H_2S_6$. Further attempts to isolate polysulfides of other aliphatic and heterocyclic bases, particularly secondary bases, were unsuccessful, though the formation of the polysulfides was proved. When S is added to $C_5H_{10}NH$ (IV) the liquid turns more intensely orange than with III, and heat is evolved (cf. Bedford, U. S. Pat. 1,719,920 (*C. A.* 23, 4376). To isolate the IV polysulfide (V), the reaction product was washed with Et_2O and with CS_2, but during this it decompd. with evolution of H_2S. The reaction mixt. was therefore extd. with cold water, but the yellow water ext. let stand rapidly became turbid and S sepd. With acids it forms H persulfide, which proves the formation of V. V is readily decompd. by excess PbO, in which case the liquid becomes colorless, and IV probably forms a polythioamine. By filtering off the PbS, spontaneous evapn., soln. in EtOH and partial pptn. with water of the residue from the evapn., the polythiopiperidine seps., and can be purified by recrystn. from EtOH. The reactions are: (1) $2\,IV + xS \longrightarrow (C_5H_{10}N)_2S_{x-1} + H_2S$, and (2) $2\,IV + H_2S + xS \longrightarrow (C_5H_{10}NH)_2.H_2S.S_x$. Data on *N*-polythioamines higher than the dithio derivs. are to be published in a forthcoming paper. Et_2NH and S behave similarly at ordinary temp. With all these bases, attempts to sep. the polysulfides from solns. of salts of the corresponding bases and $(NH_4)_2S_x$ were not successful. The method of Romani (*loc. cit.*) for the prepn. of phenylbiguanide polysulfide, $(C_8H_{11}N_5)_2.H_2S_2$, *viz.* by boiling aq. I with S, was not considered satisfactory, because, as was verified by expt., there is too great a loss of H_2S and sepn. of phenylbiguanide (VI). Accordingly concd. alc. VI contg. S was treated with H_2S, under which conditions a mixt. of I and a polysulfide (VII) pptd., and the latter alone could not be obtained because I is insol. and seps. immediately, and then is transformed slowly and incompletely into VII. In contrast to this, $(PhHN)_2C{:}NH$ does not form directly a sulfide or H_2S deriv., and in general this method of prepn. of polysulfides is of greater advantage where the base forms only the polysulfide. A mixt. of I and VII was also obtained when the starting material was alc. $(NH_4)_2S$. In contrast to this, cold satd. aq. pure (approx. 5%) VI (m. 143°) (100 cc. + 10 cc. addnl. water) and aq. $(NH_4)_2S_5$ (100 cc. prepd. by satg. NH_4OH (100 cc. of d. 0.920) with H_2S, adding 100 cc. more of NH_4OH and heating in the absence of air with 70 g. of S) let stand several days in a sealed vessel, the ppt. (low yield) removed, pulverized in a mortar, washed successively with water, EtOH, CS_2, EtOH, and Et_2O, and dried *in vacuo*, yields *phenylbiguanide hexasulfide*, $(C_8H_{11}N_5)_2.H_2S_6$ (VIII), orange-yellow, m. 130–5°, stable when dry (did not lose H_2S when kept all summer at 26–30°), decomps. very slowly in cold water and rapidly in hot water (liberation of S), and decomps. slowly in EtOH (liberation of H_2S). Under no conditions was the disulfide of Romani isolated. Thus with $(NH_4)_2S_x$ contg. less S (prepd. as above but with 30 instead of 70 g. of S per 200 cc. of NH_4OH) only I was obtained. On increasing the quantity of S to 45 g., a mixt. of I and VII was obtained. To obtain VIII, it is necessary to adhere strictly to the proportions noted above; otherwise mixts. are obtained. These mixts. with HCl evolve H_2S and H persulfide seps., whereas pure VIII and HCl give only H persulfide. This difference is strictly analogous to the behavior of strychnine hexasulfide (IX) with acids. Besides the orange-red IX obtained by Hofmann (cf. *Ber.* 1, 1868; 10, 1087) from cold satd. alc. strychnine (X) and alc. $(NH_4)_2S_x$, the IX prepd. by Schmidt (cf. *Ann.* 180, 287) from alc. X and H_2S was also obtained, and in this latter case the compn. of the IX is, contrary to Schmidt, identical with that obtained by the method of Hofmann. Cold satd. (8%) alc. $(PhHN)_2C{:}NH$ (4 g.) and S (3 g.) in suspension treated with H_2S, let stand in a sealed vessel, filtered, the residue washed successively with EtOH, CS_2, EtOH and Et_2O, and dried *in vacuo*, yields *diphenylguanidine hexasulfide* $(C_{13}H_{13}N_3)_2.H_2S.S_5$ (XI), m. 100–10° (to a red liquid), stable when kept dry, decomps. slightly in cold water and more so in EtOH. When the S in the prepn. is diminished even as low as 0.5 g. of S (*loc. cit.*), XI is still obtained but the yields are smaller. XI is also obtained from aq. $(PhHN)_2C{:}NH.H_2SO_4$ or other salts and aq. $(NH_4)_2S_{2.5}$ (from NH_4OH of d. 0.92). Unlike VIII, XI liberates H_2S and S when treated with acids. Therefore either it first forms a persulfide, and this is unstable, or its structure is like that of strychnine polyiodide (the more probable hypothesis). Prepd. like XI, though the passage of H_2S must be much longer, *di-o-tolylguanidine heptasulfide* $(C_{15}H_{17}N_3)_2H_2S.S_6$ (XII), is stable when kept dry, decomps.

slowly in cold org. solvents, and with acids liberates H_2S and S. Since di-*o*-tolylguanidine (XIII) is only slightly sol. in cold EtOH (3% at 25°), it may be preferable to pass H_2S into boiling satd. alc. XII. XII is also formed when XIII·HCl or other XIII salt soln. is poured into excess of aq. $(NH_4)_2S_{2.5}$. XII is the 1st heptasulfide of an org. base described in the literature. Di-*p*-tolylguanidine and di-*m*-tolylguanidine give with H_2S and S sed solns., which probably contain the corresponding polysulfides, but in neither case could the polysulfide be isolated by evapn. *in vacuo* with a current of H_2S. Prepd. in the same way as XI and XII, *asym. triphenylguanidine hexasulfide* $(C_{19}H_{17}N_3)_2.H_2S_6$ is canary-yellow, decomps. in org. solvents (with evolution of more H_2S than from XI and XII); with acids it liberates H_2S and H persulfide. *Sym. triphenylguanidine polysulfide* is readily formed in the same way, but the orange-yellow product which seps. is unstable, and liberates large quantities of H_2S when it is being washed with CS_2. It also loses H_2S *in vacuo* and could not, therefore, be analyzed. Brucine polysulfide, $(C_{20}H_{22}N_2O_3)_3.2H_2S_6$, prepd. by Schmidt (*loc. cit.*) from 1% alc. brucine and H_2S, was formed whether or not air was excluded, but its formation was more rapid in air. Contrary to Schmidt, the product is stable. The yellow hydrated polysulfide, $(C_{20}H_{22}N_2O_3)_3.H_2S_6.6H_2O$, was also obtained by the method of Schmidt, and his data were confirmed. All attempts to isolate polysulfides of other alkaloids in a pure state were without success. From alc. quinine, quinidine, cinchonine and codeine, passage of H_2S in the presence of S for several days pptd. the corresponding polysulfides, but in no case could the product be purified sufficiently for analysis. The *detn. of H_2S in sulfides and hyposulfites* can be made conveniently by the ordinary volumetric method by means of standard I solns. but in sealed tubes, *i. e.*, putting the sample in a tube into another tube contg. excess I and HCl, and sealing this latter tube. When the reaction is completed, the tube is let stand 12 hrs. before opening and titrating back with $Na_2S_2O_3$ (which is carried out with addn. of CS_2 to dissolve the I mixed with the sepd. S). C. C. DAVIS

Oxidation of sulfides with benzoyl hydrogen peroxide. IV. L. N. LEVIN AND I. CHULKOV. *J. prakt. Chem.* **128**, 171–9(1930).—Correction. Benzoyl peroxide in (*A* **25**, 911 should read benzoyl hydrogen peroxide. L. T. C.

Isonitriles. XVII. Reactions with nitroso derivatives. MARIO PASSERINI WITH NICOLETTA ZITA. *Gazz. chim. ital.* **61**, 26–33(1931); cf. *C. A.* **21**, 3197.—The present paper begins a study of the behavior of isonitriles with aromatic nitroso and isonitroso derivs., and deals with nitrosonaphthols. In hot C_6H_6, PhNC (I) reacts easily with α,β-$C_{10}H_6(NO)OH$ (II), but the product is a black pitchy mass from which no definite compd. could be isolated. On the other hand, *p*-$CNC_6H_4N_2Ph$ (III) (cf. P., *C. A.* 15, 2279) is particularly well adapted for a study of the reaction. Concd. III (20.7 g.) in anhyd. C_6H_6, II (17.3 g.) and $CaCl_2$ (5 g.) refluxed 6 hrs. (CO, CO_2 and H_2O are evolved), concd., let stand several hrs., the ppt. filtered, washed with C_6H_6 and then with water (16.5 g. of crude product), and recrystd. from C_6H_6, yields *p-benzeneazoanilcarbonyl-α-amino-β-naphthol* (IV), $O.C_{10}H_6.NH.C\,NC_6H_4N{:}NPh$, yellow, m. 241–3° (decompn.), has a tendency to entrain C_6H_6 in the crystn. Omission of the $CaCl_2$ gives lower yields, and the product is contaminated with secondary products which give it a black color with violet reflection. IV in a great excess of concd. HCl and excess of Sn heated 40–50 min. on a water bath until the mixt. (at first intensely red) becomes colorless, a great excess of KOH added, cooled, the ppt. filtered, washed with water (the white color tends to become violet, and the wash waters contain $PhNH_2$), dried *in vacuo* over H_2SO_4, extd. with boiling C_6H_6, the ext. decolorized with charcoal, filtered, concd. to a small vol., cooled, and the ppt. recrystd. from C_6H_6, yields *p-aminoanilcarbonyl α-amino-β-naphthol* (V), m. 220–1° (decompn.) (yield, 6 g. from 10 g. of III), sol. in aq. acids (repptd. by alkalies); treated in EtOH with alkalies, it gives a violet-blue color, and with $FeCl_3$ an intense blue, holds C_6H_6 tenaciously when crystd. (must be dried at 120° *in vacuo*). The C_6H_6 mother liquors from the prepn. of V contain a small quantity of an unidentified compd., m. approx. 165°. V moistened with a little MeOH, a slight excess of BzH added, heated until homogeneous, cooled, filtered, the residue washed with MeOH, then with water contg. a little Na_2CO_3, and recrystd. from C_6H_6, yields *p-benzalaminoanilcarbonyl-α-amino-β-naphthol* (VI), yellow, m. 205–8°. Following the same reduction of IV with Sn and HCl but prolonging the heating for 2 hrs., decanted hot, the soln. evapd. to a small vol., the residue boiled in excess 20% aq. NaOH, the ppt. dissolved in C_6H_6, and fractionally crystd. yields V and an identified *basic compd.*, turns brown at 77°, m. 92–5°, could not be purified sufficiently for analysis. The NaOH mother liquor acidified with HCl, the ppt. dried, dissolved in hot C_6H_6, decolorized with charcoal, filtered, and recrystd. yields carbonyl-α-amino-β-naphthol

(VII) (cf. Meyer, *C. A.* 10, 594). An intimate mixt. of V and excess solid KOH heated over a flame, the vapors collected as an oil, allowed to solidify, and recrystd. from C_6H_6, yields *p*-$C_6H_6(NH_2)_2$. By the same procedure as with I, β,α-$C_{10}H_6(NO)OH$ (VIII) and III yield 4,4'-formamidineazobenzene (cf. P., *C. A.* 17, 1632), m. 196–7°. When evapd., the C_6H_6 mother liquor yields formyl-*p*-aminoazobenzene. In dissolving the solid product from the reaction of VIII and III, a small quantity of an unidentified brown-black *compd.*, insol. in all solvents, remained undissolved. Further expts. have been started on the reaction of isonitriles with true NO derivs., *e. g.*, PhNO. I and PhNO boiled in C_6H_6 form, besides resinous products, $(PhNH)_2CO$ and a red *compd.*, m. 212–3°, which analysis indicated as an integral condensation product of 3 mols. of I, with no PhNO in combination. It is therefore not a trimer, but a true condensation compd. With PhNO, III reacts like I. This investigation is to be published in more detail in a forthcoming paper. C. C. Davis

Derivatives of *m*-xylenols. II. Intermediate products from *m*-2-xylenol (2-hydroxy-1,3-dimethylbenzene). F. M. Rowe, S. H. Bannister and R. C. Storey *J. Soc. Chem. Ind.* 50, 79–80T(1931); cf. *C. A.* 25, 930.—2,6,4-$Me_2(NH_2)C_6H_2OH$ (I) was prepd. in 92% yield from 2,6-$Me_2C_6H_3OH$ (II) by coupling with PhN_2Cl and reducing with $Na_2S_2O_4$, and in 79% yield by reducing the corresponding NO compd. with $Na_2S_2O_4$. I, leaflets from H_2O or C_6H_6, m. 137–8° (decompn.), gives a di-Ac deriv., m. 160°. With 2,4-$(NO_2)_2C_6H_3Cl$ in the presence of Cu, I gave 2,4-dinitro-4'-hydroxy-3',5'-dimethyldiphenylamine, m. 193°. 2,6-$Me_2C_6H_3OMe$ (III), b. 182–3°, was prepd. from II and Me_2SO_4. III was best nitrated by gradually adding 103 cc. of 70% HNO_3 to 50 g. III in 75 cc. of AcOH and warming at 60–70°. This gave 2,6,4-$Me_2(NO_2)C_6H_2OMe$ (IV) in 50% yield, m. 92°, which was hydrolyzed with 60% H_2SO_4 to give 2,6,4-$Me_2(NO_2)C_6H_2OH$, m. 169–70°. Reduction of IV to 2,6,4-$Me_2(NH_2)C_6H_2OMe$ (V), m. 66°, was best done with Fe; $SnCl_2$ gave hydrolysis. V gave an Ac deriv. (VI) m. 136–7°. IV and $Na_2S_2O_4$ gave 89% of 2,6,4-$Me_2(NH_2)C_6H(OMe)SO_2Na$(3), from which the SO_2H group can be easily hydrolyzed to give V. V reacts with β-hydroxynaphthoic acid in the presence of PCl_3 to give 99% of the 3,5-dimethyl-4-methoxyanilide needles from EtOH. This gives red colors on coupling with diazo compds. VI is easily nitrated in AcOH, giving 96.5% of 2 nitro-3,5-dimethyl-4-methoxyacetanilide, pale yellow, m. 128°. The Ac group can be hydrolyzed off with NaOH or HCl, producing 1-methoxy-2,6-dimethyl-3-nitro-4-aminobenzene, m. 47°, which is converted to the corresponding 3,4-isoxadiazole oxide, m. 96°, by boiling with NaOCl. G. R. Yohe

Preparation of salicylyl chloride. A. Kirpal. *Ber.* **63B**, 3190(1930).—By adding a little $AlCl_3$ *o*-$HOC_6H_4CO_2H$ can be made to react with $SOCl_2$ at a temp at which secondary reactions do not occur; when 10 g. of the acid, 7 cc. $SOCl_2$ and 0.02 g. $AlCl_3$ are kept at 45–50° the reaction is complete in 1.5 hrs. if the acid was sufficiently finely divided. Removal of the excess of $SOCl_2$ *in vacuo* leaves a mobile liquid solidifying in ice and showing, without further purification, the m. p. 18° given by Kopetschni and Karczag for *o*-HOC_6H_4COCl. C. A. R.

Constituents of the volatile oil from the leaf of Chamaecyparis obtusa, Sieb. et Zucc., **F. Formosana, Hayata or Arisan-Hinoki. I.** Kinzo Kafuku, Tetsuo Nozoe and Chuta Hata. *Bull. Chem. Soc. Japan* **6**, 40–53(1931).—Steam distn. of leaves of *Chamaecyparis obtusa* gave 0.3% of oil, slightly yellow changing to red on standing, d_{28} 0.8988, n_D^{25} 1.4878, $[\alpha]_D^{25}$ —5.83°, acid value 0.96, ester value 12.63, ester value after acetylation 54.81. From 5 kg. of oil, 12 g. of acids and 1.5 g. of phenols were obtained by extn. with 5% KOH and subsequent regeneration of the ext. in the usual manner with CO_2 and H_2SO_4. On vacuum fractionation of the acids the main portion was an unsatd. acid apparently of the aliphatic terpene group, $C_{10}H_{16}O_2$, b_8 133–5°, d_4^{20} 0.9544, n_D^{20} 1.4732, $[\alpha]_D$ 0°, mol. refraction 49.40. The remainder of the acid fraction consisted apparently of *hinokic acid*, m. 165–6°, lower fatty acids and traces of phenols. The oil remaining after extn. of the acids on vacuum fractionation yielded 34.1% of terpenes and 11.4% of terpene alcs. Of the terpenes 50% was *d-sabinene*, $[\alpha]_D^{17.5}$ 86.4°, and 20–30% *chamene* (I), a new terpene, b_{10} 86–8°, b_{760} 168 70°, d_{45}^{2} 0.8228, n_D^{25} 1.4686, $[\alpha]_D$ 35°, mol. refraction 46.00. Satn. of the cold ether soln. of I with dry HCl gas gave the hydrochloride, b_{11} 80–90°, d_{25} 1.0196, n_D^{25} 1.4783, mol. refraction 58.09. Shaking 20 g. of I with 20 cc. H_2SO_4 (1:3) at room temp. gave *isochamene* (II), b_{10} 88–90°, d_4^{25} 0.8222, n_D^{25} 1.4726, $[\alpha]_D^{25}$ —0.27°, mol. refraction 46.42, and, contrary to chamene, fairly stable to atm. oxidation. II with alc. H_2SO_4 (1:1) polymerized to *diisochamene*, b_4 155–6°, d_4^{20} 0.9150, n_D^{20} 1.5134, $[\alpha]_D^{20}$ —0.7°, mol. re-

fraction 89.40. II with HNO_2 in benzene gave *α-terpinene nitrosite*, apparently by rearrangement of isochamene nitrosite. I gave a deep red color in Ac_2O on addn. of 1 drop of H_2SO_4. Other terpenes found were *α-pinene*, *α-thujene*, *p-cymene*, *α-terpinene*, *γ-terpinene* and dipentene. The terpene alcs. consisted of *d-Δ-terpineol-4*, *borneol*, *l-linaloöl*, and its esters, and an octenol, $C_8H_{16}O$, d_4^{30} 0.8454, n_D^{30} 1.4441, $[\alpha]_D^{30}$ —10.62°, and its esters.

R. C. ELDERFIELD

Bitolyl series. I. A. ANGELETTI WITH A. BRAMBILLA. *Gazz. chim. ital.* **60**, 967–74(1930).—The growing interest and importance of the Ph_2 group induced A. to start a systematic series of expts. on bitolyl compds. Of these, the 2,2'- and 6,6'-dimethylbiphenyl derivs. are of special importance because of the cases of optical stereoisomerism without asym. atoms (cf. Mascarelli, *C. A.* **22**, 68; **23**, 2962, 3694; *Atti III congresso naz. chim. pura applicata* Firenze 249–62(1930); Meisenheimer and Höring, *C. A.* **21**, 2892). 4,5-Cl(O_2N)C_6H_2Me was converted to *o,o'*-dinitrobitolyl by the reaction of Ullmann and Bielecki (cf. Mascarelli and Pirani, *Gazz. chim. ital.* **41**, i, 70(1911)) and this was partially reduced with alc. $(NH_4)_2S$ by the method of Mascarelli and Gatti (*C. A.* **24**, 2121) to 2-amino-2'-nitro-4,4'-dimethylbiphenyl (I). I (5 g.) in 7% H_2SO_4 (200 cc.) diazotized at 4° with aq. $NaNO_2$ (1.6 g. in 25 cc.), poured slowly into a large excess of KI in 10% H_2SO_4 at 100° (cf. Gelmo, *Ber.* **39**, 4175(1906)), decolorized with SO_2, the semi-oily product dried *in vacuo*, extd. with Et_2O (a small quantity of insol. black residue is probably bitolyleneiodonium iodide (II), for treated with moist Ag_2O at 60°, filtered, KI added to the filtrate, and the yellow powder recrystd. from boiling water, it yields a yellowish compd. which turns brown at 198° and m. 204–5° (decompn.), while Mascarelli and Pirani (*loc. cit.*) give a m. p. of 206° for II), the ext. extd. with aq. NaOH, the residue evapd., steam-distd., the 1st portion of the distillate (a small yield of 4,4'-dimethylbiphenylene oxide (III) (cf. *Ber.* **34**, 3336(1901)) the later portion (oil which solidifies to a yellow mass) dissolved in petr. ether (b. p. 70–80°), concd., and the cryst. ppt. recrystd. from 80% EtOH yields 0.70 g. of *2-iodo-2'-nitro-4,4'-dimethylbiphenyl* (*o*-iodo-*o'*-nitrobitolyl), pale yellow, m. 83–4°. The same procedure was used in an attempt to prep. the corresponding Br deriv., but only resinous products which could not be purified were formed. A very small yield was obtained by diazotizing I-HBr in presence of CuBr, following, in general, the method of Dobbie, Fox and Hoffmeister (cf. *C. A.* **5**, 3048; **6**, 593) for the prepn. of 2,2'-dibromobiphenyl. I (12 g.) and hot water (100 cc.) added to aq. HBr (45 cc. of d. 1.49) and freshly prepd. CuBr (16 g.), all air removed from the flask by CO_2, heated on a water bath, diazotized with aq. $NaNO_2$ (4 g. in 50 cc.), (maintained at approx. 100°), heated 1 more hr. at 100°, cooled, dild. with water, the product (a black pitch contg. a yellow solid), washed with water, dried *in vacuo*, extd. with Et_2O (the black residue contg. Cu will be studied later), the ext. washed with aq. NaOH, dried, evapd., the semi-oily residue (5 g.) steam-distd., yields 2 portions: (1) a white substance (2 g.) of agreeable odor and (2) brown pitch. Portion (1) recrystd. from 95% EtOH (very sol.) and then from 80% EtOH, yields 0.40 g. of III, which in this case is difficult to purify because of contamination with the chief product. The 95% alc. mother liquor from the 1st crystn. of III contains a trace of 4,4'-dimethylcarbazole. Portion (2) steam-distd. again yields an oil which partially solidifies, and which crystd. from 70% EtOH yields after long standing 0.25 g. of *2-bromo-2'-nitro-4,4'-dimethylbiphenyl* (*o*-bromo-*o'*-nitrobitolyl) (IV), pale yellow, m. 73–4°. The most convenient method for prepg. the Cl deriv., though the yield is very low, is the following. I (12 g.) in a mixt. of concd. HCl (50 cc.) and water (200 cc.), diazotized hot with aq. $NaNO_2$ (4 g. in 50 cc.) and fresh CuCl (16 g.), the black resin extd. with Et_2O, the ext. washed with aq. NaOH, dried, evapd., the oily residue (approx. 4 g.) steam-distd. (III first distils in small quantity as before), and the later oily distillate crystd. repeatedly from 70% EtOH, yields 0.22 g. of *2-chloro-2'-nitro-4,4'-dimethylbiphenyl* (*o*-chloro-*o'*-nitrobitolyl), light yellowish, m. 85–6°. Attempts were made to prep. 2-hydroxy-2'-nitro-4,4'-dimethylbiphenyl (V), but the product could not be purified. In one case the soln. of diazonitro deriv., decompd. by bubbling in steam in the presence of urea, yielded a small quantity of III, while the chief product (also a very small yield of acidic nature) repeatedly dissolved in aq. NaOH and repptd. with HCl, yielded a brown-red, amorphous product which could not be steam-distd., sublimed or otherwise purified. Likewise no success was had in decompg. the diazo deriv. by pouring the soln. in hot dil. H_2SO_4. Finally attempts were made to acetylate the reaction product, but starting from 3 g. of product (from 20 g. of I) there was obtained, after acetylation, by crystn. from 80% EtOH, a red-yellow cryst. *compd.*, m. 99–100°, mixed with a yellowish powder. The yield was so low that it could not be identified. If II is formed from small quantities of diamino deriv. as an impurity, the same explanation does not apply to the formation of

III, for the yield of III in the prepn. of IV is too great to be accounted for thus. In the decompn. of the diazonitro deriv., the hydroxynitro deriv. 4,6-Me(HO)C_6H_3-$C_6H_3(NO_2)$Me-2,4 (VI) is formed initially, and this by elimination of 1 mol. of HNO_2 passes to III. This hypothesis is supported by the fact that it was impossible to obtain V in the attempts in which III was formed. Furthermore it is possible that, by the action of water, the NO_2 group in VI is replaced by OH, a reaction which occurs in polynitro derivs. (cf. Claessen, *Ger. pat.* 289,446). The di-HO deriv. thus formed passes readily by elimination of water, to III (cf. *Ber.* **25**, 2745(1892)). The tendency of the Ph_2 derivs. to form heterocyclic, pentatomic nuclei is observed in numerous other cases (cf. Mascarelli, *C. A.* **3**, 781; **23**, 3694; Treche, *Thesis Bologna* **1911**; Dobbie, Fox and Hoffmeister, *loc. cit.*, Mascarelli and Gatti, *loc. cit.*). C. C. DAVIS

Remark on the work on "aromatic thio ketones." E. BERGMANN. *Ber.* **63B**, 3225(1930).—In connection with the statement in the paper abstracted in *C. A.* **25**, 1239, that aromatic thio ketones react with Na apparently differently from the O analogs, Schönberg has drawn B.'s attention to the fact that he (S.) first observed the reactivity of thio ketones toward Na (*C. A.* **20**, 364). C. A. R.

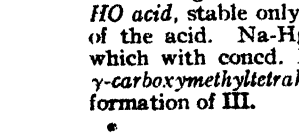
Stereochemical structure. II. Optically active α- and β-methylhydrobenzoin. ROBERT ROGER. *Biochem. Z.* **230**, 320-9(1931); cf. *C. A.* **24**, 3000.—*d*(+)-PhAcCHOH (I) was prepd. by Neuberg's carboligase method (*C. A.* **17**, 1484) and also from *d*(−)-mandelamide and MeMgI. I and PhMgBr give *d*(+)-*methylhydrobenzoin* (*α-form*) (II), m. 92–3°, $[\alpha]_{5893}$ 31° in acetone, 40° in EtOH. *d*(+)-Methylhydrobenzoin(*β*-form) (III), m. 80–1°, $[\alpha]_{5893}$ 31° in acetone, 21° in EtOH, prepd. from *d*(−) benzoin and MeMgI, is not identical with II as shown by mixed m. ps. The compd. Neuberg prepd. from I and PhMgBr, which he called III is not identical with II or III, but may be a phys. modification of II. *d*(+)-*2-Methyl-2-hydroxy-1,1-diphenyl ethanol* (IV), m. 92–3°, $[\alpha]_{5893}$ 133° in acetone, was prepd. from PhMgBr and Et *d*(+)-lactate. IV is not identical with II or III as shown by the color with concd. H_2SO_4, and mixed m. ps. Hence I reacts as such and does not rearrange to BzMeCHOH

D. S. SEARLE

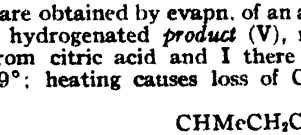
Synthesis of munjisthin. P. C. MITTER AND HAROGOPAL BISWAS. *Nature* **126**, 761(1930).—Munjisthin is a dihydroxyanthraquinonecarboxylic acid occurring in *Rubia munjistha*. It has been synthesized from 2,6-Cl(MeO)C_6H_3Me and $C_6H_4(CO)_2O$.

A. L. HENNE

Partially hydrogenated lactones of naphthalenes. GEORG HUPPMANN. *Süddeut Apoth.-Ztg.* **71**, 137-9(1931).—In the present study it is shown that relatively good yields of partially hydrogenated lactones are obtained by condensation of *ar-β*-tetralol (I) with HO acids or *β*-ketone acid esters in the presence of concd. H_2SO_4. Thus, malic acid and I give CO + 3 H_2O + *tetrahydronaphtho-α-pyrone* (II), m. 131°. Similarly, $AcCH_2CO_2Et$ and I give *γ-methyltetrahydronaphtho-α-pyrone* (III), m. 154°. On heating with alkalies the lactone ring is opened with formation of the corresponding *HO acid*, stable only in the form of its salts which are obtained by evapn. of an alk. soln. of the acid. Na-Hg converts the acid into the hydrogenated *product* (V), m. 107°, which with concd. H_2SO_4 gives the lactone. From citric acid and I there resulted *γ-carboxymethyltetrahydronaphtho-α-pyrone* m. 189°; heating causes loss of CO_2 with formation of III.



(II)

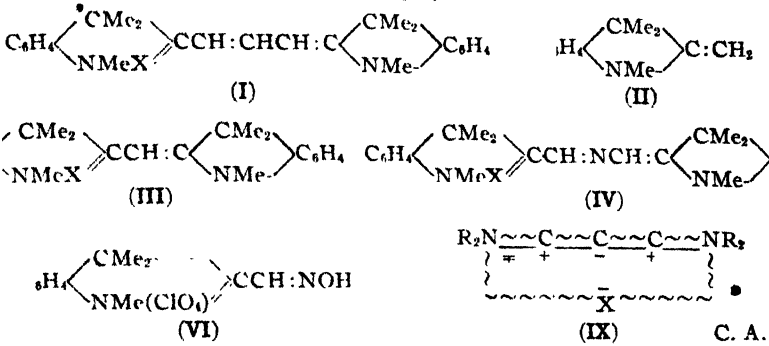


(V)

W. O. EMERY

Conjugated double bonds. XV. Constitution of indolenine yellow. RICHARD KUHN, ALFRED WINTERSTEIN AND GEORG BALSER. *Ber.* **63B**, 3176-84(1931); cf. *C. A.* **25**, 1513.—As a rule, replacement of methine groups, =CH—, in a polyene chain by =N— has practically no influence on the color. Deviations from this rule occur in the initial members of homologous series and seem always to lie in the direction of stronger absorption by the N-contg. compds. An apparent exception was afforded by the violet indolenine red (I) (pure red in soln.), obtained from the methylene base (II) and salts or esters of HCO_2H, and the greenish yellow compd. (III) (called *indolenine yellow* in the present paper), obtained according to Ger. pat. 459,616 from II and HNO_2 and which, by analogy, was assigned the structure IV. It has been found, however, that in the condensation of bases of type II with HNO_2 in the presence of Ac_2O not only H_2O but also 1 mol. HCN is split off. The yellow dye is therefore given

the structure III, which makes it a lower vinylene homolog of I and most satisfactorily explains its color. Attempts to obtain III by condensing 1,2,3,3-tetramethylindolenium salts with 1,2,3-trimethylindolinone (V) were unsuccessful. If, however, II in cold AcOH is slowly treated with 1 mol. $NaNO_2$ in a little water and then pptd. with $HClO_4$, there seps. an *oxime perchlorate* (VI) which with II in Ac_2O yields III but also decomps., when heated in Ac_2O, into V, $HClO_4$ and HCN; in the absence of II this decompn. is very smooth and affords a better method of prepg. V than does oxidation of II with $KMnO_4$. If the formula III is correct, the condensation of II with the *1,3,3;5,7-penta-Me homolog* (VII) of VI on the one hand, and of the 1,3,3,5,7-penta-Me homolog of II with VI on the other hand, should give 2 different di-Me derivs., but as a matter of fact the same dye (VIII) was obtained in both cases. This can be explained on the basis of König's theory that in dyes of this type the anion is not arrayed with the one or the other N atom but with both simultaneously, giving rise to a system of "fluid heteropolar unions," as represented by formula IX. The derivation of an electronic formula, in which this equivalence of the two N atoms is brought out, is briefly discussed. *1,3,3-Trimethyl-2-formoxime-indolinium 1-perchlorate* (VI) (96% yield), m. 215° (Berl block, cor.) with decompn. *Perchlorate* of III, m. 267° (Berl block, cor.) with decompn. Free III, m. 147°. VII, m. 210° (decompn.). *5,7-Di-Me deriv.* (VIII) of III, isolated as the *perchlorate*, yellow, m. 250.5° (decompn.).

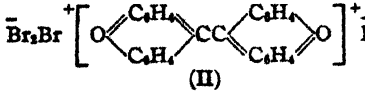


(I) (II) (III) (IV) (VI) (IX)

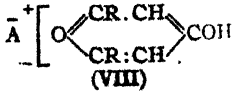
C. A. R.

Relationships between dipyrylenes and *meri*- as well as *holo*-dipyrylium salts. Action of halogens on fulvenes. F. Arndt and L. Lorenz. *Ber.* **63B**, 3121–32(1930).—The results of these expts., which were completed 4 yr. ago (L., *Diss. Breslau* **1927**) were to be published later in connection with others and are now given separately only on account of the appearance of the paper by Bergmann and v. Christiani (*C. A.* **25**, 1236–7). They assign to the hexabromide of dixanthylene (I), which A., Scholz and Nachtwey had represented as a dixanthonium or dixanthylium perbromide (II), the structure $O(C_6H_4)_2C(Br.Br_2)C(Br.Br_2)C(C_6H_4)_2O$ (III), but A. and L. believe that II is in better agreement with the known facts, such as the existence of those other dixanthylium salts with the same cation but different anions described by Werner, the formation of an analogous hexabromide by dithioxanthylene (IV) but not by the *disulfone*, the behavior toward Br of tetraphenyldipyrylene (V) and dipyrylenetetracarboxylic ester (VI). From all these it follows that the behavior of the xanthenes and dipyrylenes toward halogens is not comparable with that of open and carbocyclic fulvenes; the Br addn. product (II) of I contains all its Br in the form of 2 anions, $BrBr_2$, and the manner and ease of such Br addn. depends materially on the possibility of a change from a quinoid pyrone to a benzenoid pyrylium form. This does not mean that formula II completely represents the actual state of the compd. If it be assumed that the Bergmann formula III is changed only in that the $BrBr_2$ groups are represented as anions, there results a dicarbenium salt in the cation of which all the at. nuclei occupy the same relative positions as in the dioxonium cation of II, the 2 salts differing from each other only in the distribution of the "bonds" and "charges." Between these 2 extreme forms there conceivably exists that "intermediate stage" recently discussed (*C. A.* **25**, 2145), and it may be assumed that in the hexabromide of I the "intermediate stage" lies far on the side of the pyrylium or oxonium form (II) but that there is still present a residue of carbenium unsaturatedness which plays a role in the color of the hexabromide. The expts. described in this paper were based on the following line of reasoning. γ-Pyrones $O(CR:CH)_2O$ (VII), like ordinary ketones, add the H nucleus of an acid at the C:O group but instead of an unsatd., positively charged

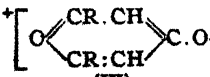
carbenium group they form a satd. positive oxonium group and an aromatic ring, the resulting salts (VIII) therefore being colorless and much more stable than ordinary ketone salts. A. and L. assume that such inner satn. in the direction of the betaine form (IX) has already begun in the free γ-pyrones which therefore do not behave like unsatd. ketones; in VIII and IX the electron-seeking γ-O atom has attracted an electron from the C, as manifested by the replacement of the "double bond" in VII by the "single bond" in VIII and IX. The excess negative charge which the O atom thereby acquires is compensated for in VIII by the newly introduced H nucleus but is still present in IX. A diperylene system $O(CR:CH)_2C:C(CH:CR)_2O$ (X), however, can of itself not undergo such an inner satn. since there is no electron-seeking atom on the central or γ-O atoms, and such a system (insofar as it is not condensed with C_6H_6 rings as in I) is a true fulvene system and intensely colored. Its latent tendency to pyrylium formation can be brought out only by (1) introduction of an electron-seeking atom or group on the one γ-C atom or (2) complete removal of 1 of the 2 pairs of electrons (*i. e.*, of 2 electrons) of the double bond. The simplest example of (1) is where the newly introduced atom is the H nucleus of a strong acid, with formation of the *meri*-dipyrylium salt (XI). (2), on the other hand, is equiv. to an oxidation and from X or from XI, in the absence of the necessary anions, there results the *holo*-dipyrylium salt (XII). The XI are more deeply colored than the X themselves and the XII are in general considerably less deeply colored. The XII are most simply prepd. from the X with Cl or Br, the halogen acting as an oxidizing agent and also furnishing the anion (the Br anion adds another mol. of Br_2 to give II). The resulting dichlorides exist in 2 forms (red and black) which rearrange into each other with extreme ease in a non-controllable manner. It is assumed that the red forms are the *holo*-salts while the black forms have the structure XIII, the Cl_2 splitting into Cl^- and Cl^+ and the latter adding at 1 of the central C atoms. I, faintly greenish yellow, m. 325°, dissolves in hot *o*-$C_6H_4Cl_2$ with blue-green color (light yellow in the cold), forms a blue-green melt, shows intense light-blue fluorescence under the quartz lamp. Thioxanthone, very faintly yellow, m. 213°, shows yellow fluorescence in ultra-violet light. Thioxanthione, dark needles with green surface luster, m. 176°, sol. in C_6H_6 with red color (by transmitted light, green by incident light or in thin layers), in $CHCl_3$ with pure green, in concd. H_2SO_4 with dark orange color. IV, m. 365°, shows blue fluorescence in ultra-violet light. Thioxanthone gives on reduction according to F. Mayer a compd. m. 346° but behaving toward Br like IV. *Dithioxanthylene disulfone*, from IV and H_2O_2 in AcOH, gradually darkens between 380° and 500°, melts at red heat on Pt, does not react with Br soln. or vapor even on heating. *Dixanthionium perbromide*, crimson, darkens 220°, decomps. 245°, regenerates IV with Zn dust and AcOH. *meri-Perchlorate* from V, obtained by boiling finely divided V (pptd. from C_5H_5N with water) in AcOH under CO_2, filtering and adding 70% $HClO_4$, brown-black, decomps. 287–8° with considerable violence. *holo-Perchlorate*, from V and $HClO_4$ at about 200°, red, deflagrates vigorously when heated. *meri-Perchlorate* from VI, red needles, changes in hot concd. H_2SO_4 or 70% $HClO_4$ or on treatment in cold AcOH with $HClO_4$ and Br from deep red to green. Tetraphenyldithiopyrylene (XIV) in $CHCl_3$ adds only 2 atoms Cl in CCl_4, forming 2 mutually interconvertible *dichlorides* (red and black); the red form darkens around 80°, both sinter 100° and decomp. 300–10°. *Dichlorides* of V; the red rapidly changes into the black form which sinters around 100°, m. 305°. With Br in $CHCl_3$ XIV gives a *hexabromide*, golden yellow, loses Br at 80–100° on slow heating, becomes smeary at 120°.



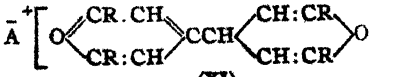
(II)



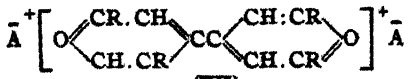
(VIII)



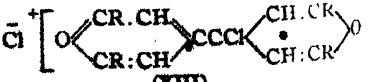
(IX)



(XI)



(XII)



(XIII)

C. A. R.

Some 2,4-substituted derivatives of pyridine. RODERICH GRAF (WITH ERNST

LEDERER-PONZER AND LEOPOLD FREIBERG). *Ber.* **64B**, 21–6(1931); cf. *C. A.* **23**, 837.—**4-Chloro-** (I) and **4-iodopicolinic acid** (II) were degraded by the Curtius method through the hydrazide and azide to *4-chloro-* (III) and *4-iodo-2-aminopyridine* (IV). Attempts to convert the I by the Naegeli method through the chloride directly into III failed because of the slight reactivity of the chloride with NaN_3. In C_6H_6 the chloride with $N_2H_4.H_2O$ gave *di-4-chloropicolinic hydrazide* (V). The simple *hydrazide* (VI) was best prepd. by converting the I with $SOCl_2$ into the chloride, then with excess of MeOH into the Me ester which gave the VI almost quant. Attempts to degrade the VI directly to the urethan, without isolating the azide, by boiling in abs. alc. with AmONO gave a difficultly sol., unreactive *substance* which carbonized at 272° without melting. On the other hand, the azide boiled with dil. AcOH gave III directly. By the Schotten-Baumann method, III gives the di-Bz deriv., converted by long boiling with alc. into the mono-Bz deriv. I, faintly yellowish, m. 180–1°, was obtained in 50–5% yield by refluxing anhyd. picolinic acid-HCl in $SOCl_2$ for 10 days and decompg. the resulting chloropicolinyl chloride-HCl with H_2O. V, faintly yellowish, m. 269–71° (decompn.). VI, from the *chloride* (m. 46°), m. 167–8° (18 g. from 18.5 g. of I); *benzal deriv.*, m. 178°. *Azide*, from VI in cold *N* HCl with aq. KNO_2, m. 92°, deflagrates on rapid heating, gives with 1:1 AcOH on the water bath N, CO_2 and III (3.2 g. from 7.4 g. VI), m. 130–1°, easily volatile with steam; *picrate*, yellow, m. 243–4°. *N-Carbethoxy deriv.* of III, from the azide and boiling abs. alc., m. 161°, best hydrolyzed by const.-boiling HI, which gives III. *HI*, m. 206–7°, soon turns yellow in the air. *N,N-Di-Bz deriv.* m. 165–6° *N-Bz deriv.*, m. 120–1°. *N-Ac deriv.*, from III and boiling Ac_2O, m. 115–6°. *2-HO compd.*, from III in dil. H_2SO_4 with the calcd. amount of KNO_2, m. 184°, only slightly sol. in dil. acids. *2,4-Dichloropyridine*, from III by the Sandmeyer method (about 1 g. from 5 g. III), b. about 184°, m. 0°, almost insol. in dil. acids, exceedingly volatile with steam, forms a cryst. double salt with $HgCl_2$ but no picrate. II from I refluxed in HI (d. 1.7) with some red P, m. 169° (decompn.), cannot be converted into the chloride with $SOCl_2$ because of exchange of the I for Cl. The Me ester, from II and MeOH-H_2SO_4, yielded with concd. alc. NH_3 the *amide*, m. 158°, and with alc. $N_2H_4.H_2O$ the *hydrazide*, m. 160–1° (*benzal deriv.*, m. 207–8°). IV (through the *azide*, m. 89° (foaming)), m. 163–4°; *picrate*, yellow, m. 253–4°; *N-carbethoxy deriv.*, m. 167°; *N,N-di-Bz deriv.*, m. 176–7°; *N-Bz deriv.*, m. 167–8°; *N-Ac deriv.*, m. 150°; *2-HO compd.*, m. 195°. C. A. R.

Imide and amide chlorides of non-aromatic acids. VI. A new way in the quinoline series. JULIUS V. BRAUN AND ALBRECHT HEYMONS (WITH L. SCHNITZSPAHN). *Ber.* **63B**, 3191–203(1930); cf. *C. A.* **24**, 2999.—Wallach assigned the structure $MeC(:NR)CH_2CCl:NR$ to the compds. obtained by condensation, with loss of 1 HCl, of 2 mols. of the imide chlorides, $MeCCl:NR$, derived from AcOH, but it was later shown that they are amidines, $MeC(:NR)NRCCl:CH_2$, *i. e.*, that the condensation takes place between a C and N atom. It was thought that imide chlorides of the type $R'CH_2CCl:NR$ undergo a similar condensation, since Wallach, and later Bischoff and Walden, had found that $ClCH_2CONHPh$ gives a compd. $C_{16}H_{12}N_2Cl_2$ (I), whose formation through an intermediate imide choride, $ClCH_2CCl:NPh$, could readily be explained by the equation $2\ C_8H_7NCl_2 = I + HCl$. I, however, is characterized by an unexpectedly strong, bright yellow color and by the surprising ease (treatment with cold Na_2CO_3) with which it loses another mol. of HCl, and in addn. to the Wallach formula, $ClCH_2C(:NPh)CHClCCl:NPh$, Bischoff and Walden suggested the structure of a HCl salt $ClCH.C(:NPh).CHCl.CH:NPh$ HCl. Recently, in connection with the prepn. of imide chlorides from chloroacetanilides with substituents in the *o*-position to the N (*C. A.* **24**, 2999), similarly bright yellow compds. were obtained, and although analysis showed they were formed by loss of 1 mol. HCl from 2 mols. imide chloride the difference in color between the AcOH and $ClCH_2CO_2H$ derivs. was too great to be explainable on the basis of the amidine structure for both. A more thorough study has now shown that I is indeed a HCl salt of a colorless base $C_{16}H_{12}N_2Cl_2$ (II) which when heated with mineral acids under pressure splits off only 1 mol. $PhNH_2$; on less-energetic treatment with concd. HCl it yields a weakly basic substance $C_{10}H_6NCl_3$ (III) and on more vigorous treatment a phenolic compd. $C_{10}H_6(OH)NCl_2$ (IV) which regenerates III with PCl_5. III with HI and P loses all its Cl and gives pure quinaldine. The imide chlorides derived from the chloroacetarylides therefore condense with 2-fold elimination of HCl to give, not amidines like the acetarylides, but quinolines. It has thus far been impossible to force the PCl_5 reaction with $ClCH_2CONHPh$ in the amidine direction and that with AcNHPh in the quinoline direction. Derivs. of $EtCO_2H$ and $PhCH_2CO_2H$ also yield quinolines. The new reaction should prove to be one of the

most fruitful for the prepn. of quinolines, for the ring formation takes place very readily and in part quantitatively and the products can undergo numberless further transformations. *2-Chloromethyl-3-chloro-4-anilinoquinoline-HCl* (I), decomps. 222° (B. and W. give 212°), is obtained in 90–5% yield from $ClCH_2CONHPh$, cooled in running H_2O, treated with 1 mol. PCl_5, allowed to stand 12 hrs. and washed with Et_2O; the free *base* (II), m. 134°, is obtained by taking I up in a little cold C_5H_5N and quickly pptg. the II with dil. NH_4OH or Na_2CO_3. The course of the reaction of II with aq. HCl under pressure depends on the length of heating, the temp. and the amt. of HCl, for not alone is the NHPh group replaced by Cl and the latter by HO but the Cl in the CH_2Cl side chain can independently be replaced by HO. The *2-chloromethyl-3-chloro-4-hydroxyquinoline* (IV), m. 303°, is obtained in about 80% yield from II and 4 parts concd. HCl heated 12 hrs. at 160–5° and 1 hr. at 175–80°; it dissolves only in excess of concd. acid and is repptd. by diln. with H_2O. Along with the IV is formed the alkali-insol. III, the amt. of which is the greater the shorter the length of heating (46% each of III and IV after 14 min. at 170–80°). With only 1.5 parts by wt. of concd. HCl at 165°, II gives 77% IV and the H_2O-sol. *2-hydroxymethyl-3-chloro-4-hydroxyquinoline*, m. 283°, readily obtained by boiling IV several hrs. with aq. alkali. The *2-chloromethyl-3,4-dichloroquinoline* (III), m. 119–20°, is readily obtained by heating IV a few min. at 130–40° with somewhat more than 1 mol. PCl_5 and a little $POCl_3$. The 4-Cl and still more the Cl atom in the side chain are reactive and therefore heating III in aq. alc. a few hrs. with 1 mol. alkali gives the alkali-insol. *2-hydroxymethyl-3,4-dichloroquinoline*, m. 44°, $b_{0.2}$ 150–4°. The compd. obtained by Bischoff and Walden from I with Zn dust and AcOH, which they believed to have the compn. $C_{16}H_{15}N_2Cl$, is in reality *3-chloro-4-anilinoquinaldine;* it is best obtained from II with excess of Sn and concd. HCl on the H_2O bath and m. 172°; *picrate*, yellow, m. 229°. *3-Chloro-4-hydroxyquinaldine*, from IV in much boiling AcOH with 10 parts Zn dust, m. 340°, converted by PCl_5-$POCl_3$ into *3,4-dichloroquinaldine*, m. 322°. With 30 atoms Na and alc. II yields *py*-tetrahydroquinaldine, b_{12} 125°. Short warming of II with aq. alc. KOH gives *2-hydroxymethyl-3-chloro-4-anilinoquinoline*, m. 93–4°; with KCN in aq. alc. is obtained the *2-cyanomethyl compd.*, m. 156°, which readily condenses with BzH in alc and a few drops of alkali to form a *compd.* $C_{24}H_{16}N_3Cl$, yellow, m. 192°. With $PhNH_2$, II gives *2-anilinomethyl-3-chloro-4-anilinoquinoline*, m. 192°, isolated as the yellow *HCl salt*, and acetylated on the new N atom by hot Ac_2O, giving an *Ac deriv.* m. 209° With 3 mols. $NHMe_2$ in alc. II gives *2-dimethylaminomethyl-3-chloro-4-anilinoquinoline*, $b_{0.2}$ 215–20°, m. 93°; *picrate*, m. 190–3°; with 24 atoms Na and alc. the base gives $PhNH_2$ and *2-dimethylaminomethyl-py-tetrahydroquinoline*, yellowish, b_{15} 148–52°. *2-Dimethylaminomethyl-3,4-dichloroquinoline*, similarly obtained from III, m. 62°, *picrate*, red-yellow, m. 177°. *2-Piperidinomethyl-3-chloro-4-hydroxyquinoline*, from IV, m. 233–5°, sol. in both acids and alkalies. II and III also react with tertiary bases through the reactive CH_2Cl group. II with C_5H_5N gives the quaternary *compd.* $C_{21}H_{17}N_3Cl_2$, deep yellow, m. 245°; *isoquinoline compd.*, $C_{25}H_{19}N_3Cl_2$, m. 258°. Both give with aq. alkali slimy ppts. of the corresponding pseudo bases which, when fresh, redissolve in HCl to form the original salts but undergo change on standing. The yellow *compd.* $C_{18}H_{17}N_2Cl_3$, m. 272°, obtained by Bischoff and Walden from *p*-$MeC_6H_4NHCOCH_2OH$ and PCl_5, is readily obtained from *p*-$MeC_6H_4NHCOCH_2Cl$. *N*-(*Chloroacetyl*)-*p-iodoaniline*, m. 193°, likewise gives with PCl_5 a yellow magma which, pptd. from cold C_5H_5N with dil. Na_2CO_3, yields the *di-I analog*, $C_{16}H_{10}N_2Cl_2I_2$, of II, m. 184° (*HCl salt*, yellow, m. 232°; *picrate*, m. 202°); *2-diethylaminomethyl compd.*, $C_{20}H_{20}N_3ClI_2$, faintly yellow, m. 152° (*picrate*, yellow, m. 178°). *m*-$ClC_6H_4NHCOCH_2Cl$ gives practically only 1 *product*, $C_{16}H_{10}N_2Cl_2$, m. 179°, reacting smoothly with *p*-$EtOC_6H_4NH_2$ to form *2-p-phenetidinomethyl-3-chloro-4-m-chloroanilino-7-chloroquinoline*, m. 131°. Likewise, 3,4-$ClMeC_6H_3NHCOCH_2Cl$ gives a practically homogeneous *quinoline* $C_{18}H_{14}N_2Cl_4$, m. 174°. These results with $PhNH_2$ and its *m*- and *p*-substituted derivs. showed that the compds. recently isolated in very small amounts along with the imide chlorides from *o*-substituted chloroacetanilides are quinolines and not amidines. These compds. have the following m. ps.: from *o*-toluidine, 160°; *o*-anisidine, 196°, *o*-$ClC_6H_4NH_2$, 116°; *o*-$BrC_6H_4NH_2$, does not crystallize well (*HCl salt*, m. 135°). *2-Ethyl-3-methyl-4-anilinoquinoline-HCl*, from EtCONHPh and PCl_5 (yield, more than 50%), yellow, m. 217–20°; free *base*, m. 178°; *HCl salt*, yellow, m. 219–20°; *picrate*, m. 221°. The base heated 2.5 hrs. at 155° with 10 parts concd. HCl gives $PhNH_2$ and *2-ethyl-3-methyl-4-chloroquinoline*, m. 40–3°. If the temp. during the heating is raised to 180–90° there is obtained the *4-HO compd.*, only slightly sol. in alkalies but easily sol. in dil. mineral acids, m. 284°, converted back into the 4-Cl compd. by PCl_5-$POCl_3$ at 140° and reduced by Na-EtOH to the *py*-tetrahydro-2-ethyl-3-methyl-

quinoline, b_{12} 136–40° (HCl salt, m. 193°). *2-Benzyl-3-phenyl-4-anilinoquinoline-HCl* (80% yield), yellow, m. 209°; free *base*, m. 172°; *picrate*, m. 188°. Heated 6 hrs. at 170–200° with concd. HCl the 4-Cl compd. gives the *4-HO deriv.*, m. 308°. *2-Benzyl-3-phenyltetrahydroquinoline*, light yellow, $b_{0.3}$ 190–2°, non-volatile with steam.

C. A. R.

Azo compounds from trimethylmethyleneketopyrazine. VII. E. PRINCIVALLE. *Gazz. chim. ital.* **60**, 963–6(1930); cf. *C. A.* **24**, 3792.—2,5-Dimethyl-6-keto-1,6-dihydropyrazine couples easily with diazonium salts (cf. *C. A.* **23**, 3472), but if the formation of a lactimic group is prevented by substitution of the iminic H by a radical, no coupling takes place (cf. *C. A.* **24**, 3792). Azo compds. are also formed by the reaction of 1,2,4-trimethyl-5-methylene-6-keto-1,6,4,5-tetrahydropyrazine (I) (cf. *C. A.* **24**, 1383) and diazonium salts, since diazonium salts react easily with compds. which contain multiple aliphatic bonds (cf. Meyer, *C. A.* **14**, 1330; Quilico, *C. A.* **23**, 597, 3675). The reaction takes place by addn. to the $C:CH_2$ group, with subsequent elimination of H_2O thus: $OC\langle NMe.CMe:CH\rangle NMe.C:CH_2$ (I) + $PhN:NOH \longrightarrow -NMe.C(OH)CH_2N:NPh \longrightarrow -NMe.C:CHN:NPh$. I reacts also with $PhHNNH_2$ (II), with formation of the same azo compd. as that by the action of PhN:NCl, and the reaction takes place in a similar way. The basic products are stable compds., in general of an intense red color, and with H halides form salts; the structure is not certain (see later). I and II (equimol. quantities) heated in 20% AcOH for 48 hrs. at 50°, cooled, neutralized with NaOH, and the product recrystd. from EtOH, yields *1,2,4-trimethyl-5-phenylazomethylene-6-keto-1,6,4,5-tetrahydropyrazine* (III), red, m. 201° (decompn.). A better yield of III is obtained with PhN_2Cl though the procedure is more tedious, *i. e.*, sufficient NaOH is added to 1,2,5-trimethyl-6-keto-1,6-dihydropyrazine-MeI soln. to liberate the base, the mixt. is cooled, PhN_2Cl (calcd. quantity) is added dropwise, the product is let stand until sepn. is complete, the ppt. (a mixt. of III-HCl and IV) recrystd. from dil. HCl, decompd. with NaOH, and the III recrystd. from EtOH, dil. HCl or dil HI. III and dil. HI allowed to crystallize yield the *HI salt* $C_{14}H_{17}ON_4I$ (IV), red, m. 228° (decompn.). By the same procedure as in the previous prepn., there is obtained from *p*-$MeC_6H_4N_2Cl$, after recrystn. from EtOH, *1,2,4-trimethyl-5-p-tolylazomethylene-6-keto-1,6,4,5-tetrahydropyrazine* (V), red, m. 214° (decompn.). V and dil. HI yield the *HI salt* $C_{15}H_{19}ON_4I$ (VI), brilliant green, m. 226° (decompn.). Likewise from V and dil. HCl is obtained the *HCl salt*, $C_{15}H_{19}ON_4Cl$ (VII), green, m. 205° (decompn.). The salts IV, VI and VII may have either or both of two structures, *viz.*, $OC.NMe.CMe:CH.NHMeI.C:CHN:NPh$ (VIII) or $OC.NMe.CMe:CH.NMeI:CCH:NNHPh$ (IX). VIII would be formed by the normal addn. of the halogen acid, with conversion of N from tervalent to quinquevalent. IX would be formed from VIII by subsequent isomerization. It is very probable that IX represents the form of IV, VI and VII, which means that they have a structure analogous to those formed from 2,3,3-trimethylindolenine-MeI (cf. Rosenhauer and Feilner, *C. A.* **21**, 407). Further expts. are in progress to settle this problem.

C. C. DAVIS

Strychnos alkaloids. LVII. Oxidation of tetrahydrostrychnine and some derivatives. HERMANN LEUCHS (IN PART WITH FRITZ KRÖHNKE). *Ber.* **63B**, 3184–9(1930); cf. *C. A.* **25**, 705.—Whereas in the oxidation of brucine, the aminostrychnines, strychnine and strychnidine (I) by CrO_3 only products which had been attacked in the C_6H_4 nucleus could be isolated, the oxidation of tetrahydrostrychnine (II) proceeded differently. While here, too, there was obtained a *compd.* $C_{17}H_{20}O_4N_2$ (III), analogous to diketonucidine, isolated in 7.4% yield as the perchlorate, there was also obtained 14% of an amino acid $C_{21}H_{32}O_4N_2.4H_2O$ (IV), whose compn. shows that the C_6H_4 nucleus is still intact. IV had already been observed in the oxidation of I, but in such small and widely varying yields that its formation was probably due to the presence of II in the crude I. The oxidation of the II consists in the taking up of two O and loss of four H atoms; since a CO_2H group is formed, there may have occurred the change $CH_2(OH)$ into CO_2H, with which would have to be related that of $-CH_2.NH-$ into $-CO.NH-$ or $-C(OH):N-$. For in strychninic acid, with the same groups $-CH_2.NH-$ and HO_2C-, these are anhydrized by mineral acids. The negative semicarbazone test would indicate that the compd. is not a ketone. Oxidation of a (b):$N.CH_2-$ residue would still leave a salt-forming group in (a):NH.CH= but would not explain the lactam ring remaining open. To test these views, the Ac derivs.

of II were studied. The *O,N*-di-Ac deriv. (V) is quite stable toward CrO_3; it consumed less than 19 equivs., giving chiefly, with loss of the *O*-Ac group, an *amino acid* $C_{23}H_{28}O_4N_2$ (VI), isolated as the perchlorate in 55% yield. From the compn. of VI, the reaction must have been limited to sapon. and conversion of $—CH_2(OH)$ into $—CO_2H$, *i. e.*, VI must be *N*-acetylstrychninic acid; attempts to prep. it from Ac_2O and an alk. soln. of the acid gave only strychnine. The sapon. precedes the oxidation, and the *N*-Ac deriv. likewise gives VI (in 77% yield, with only 14 equivs. CrO_3); 10 equivs. KMnO in Me_2CO at 0° gave no cryst. products. Attempts to oxidize II with Br gave first an aromatic *di-Br deriv.* (*o*, *p* to the (a)N) (VII) which then changed into resinous substances. *Perchlorate* of I, needles and prisms with 1 H_2O, $[\alpha]_D^{17}$ —10.1°/d. (H_2O); HCl salt, $[\alpha]_D^{17}$ —13.5°/d. *Perchlorate* of II, $[\alpha]_D^{15}$ —74.9°/d.; HCl salt, $[\alpha]_D^{15}$ —86.6°/d.; free base, needles with 2 H_2O, m. 202° (vacuum); *N*-Ac deriv., prisms with 1 H_2O, m. 157–9° and, anhyd., 197–9° (vacuum); *perchlorate*, $[\alpha]_D^{15}$ 104–6°/d.; HCl salt, $[\alpha]_D^{15}$ 122.3°/d. V, tables and prisms with 1 H_2O, m. around 100° and, anhyd., 135–42° $[\alpha]_D^{15}$ in 1 mol. 0.1 *N* HCl 112.2°/d.; *perchlorate*, prisms with 1.5 H_2O, $[\alpha]_D^{15}$ 96°/d VII, sinters 238°, m. 248–50° (250–2° *in vacuo*), shows no basic reactions and does not react with $FeCl_3$, dissolves in CrO_3–H_2SO_4 with red-violet color, is unchanged by boiling $Ba(OH)_2$; *HBr salt*, needles losing 10.1% in wt. at 100° and 15 mm.; *HCl salt*, $[\alpha]_D^{15}$ —23.2°/d. IV, needles or leaflets with 4 H_2O (erroneously given as 3 H_2O in an earlier paper (*C. A.* **25**, 705)), sol. in *N* $KHCO_3$ but not in *N* NaOAc, does not m. 320°; HCl salt, $[\alpha]_D^{15}$ —24.0°/d. *Perchlorate* of III, tables and octahedrons with 2 H_2O, $[\alpha]_D^{15}$ 73.8°/d.; free *base*, faintly yellow prisms, losing (under 15 mm.) 1.5% in wt. at 75° and 2.3% at 115°, sinters 230°, m. 243–5° (245–7° *in vacuo*). Oxidation with 24 equivs. CrO_3 gave more than 10% IV and less than 5% salt of III; pretreatment of the II with $FeNH_4(SO_4)_2$ decreased the yields. *Perchlorate* of IV, $[\alpha]_D^{20}$ 118.5°/d. (H_2O), free *acid*, prisms with neutral reaction, sinters 180–200°, becomes foamy 220°, decomps. 305°. C. A. R

Sinomenine and disinomenine. XXIII. The identity of β-tetra-hydrodesoxy-codeine and dihydrothebacodine. KAKUJI GOTO AND SHINGO MITSUI. *Bull. Chem. Soc. Japan* **6**, 33–9(1931).—Kondo and Ochiai (*C. A.* **24**, 3243) obtained desoxytetra-hydrosinomenine, the *d*-form of dihydrothebacodine (I), by Clemmensen reduction of sinomenine (II) whereby the phenolic OH group is apparently removed and the CO group reduced to a secondary alc. Goto (*C. A.* **24**, 1385) attempting to repeat this obtained desoxydemethoxydihydrosinomenine (III), the *d*-form of β-tetrahydrodesoxy-codeine (IV). The retention of the phenolic OH and reduction of the CO group to CH_2 is now confirmed by reduction of demethoxydihydrosinomenine to III by means of PCl_5 and subsequent catalytic reduction of the ketone dichloride. By subjecting various derivs. of II to the Tafel electrolytic reduction G. and M. were able in no case to remove the phenolic OH and obtain an alc. base corresponding to the dihydrothebacodine of Speyer and Siebert. The identity of I and IV is further supported by the identity of the des-*N*-Me bases, m. 147–8°, and the N-free bases, m. 107–8°, from both sources. It is proposed to substitute the name *dihydro-eu-thebainan* for K. and O.'s *dihydrothebainan*, designating I, III and IV. The easy reduction by the Clemmensen method of the MeO and corresponding OH groups in all derivs. of I contg. the CO group makes it seem probable that these groups are vicinal. R. C. ELDERFIELD

The sapogenin of guaiac bark. I. E. WEDEKIND AND W. SCHICKE. *Z. physiol. Chem.* **195**, 132–8(1931).—The crude saponin was hydrolyzed with 5% H_2SO_4 and the insol. amorphous end sapogenin, for which the name *guagenin* is proposed, was used in the prepn. of derivs. Ac_2O converted it into a cryst. *acetylguagenin*, m. 268°, $[\alpha]_D^{17}$ in $CHCl_3$ 74.5°, from which the *Me ester*, m. 220°, $[\alpha]_D^{17}$ in $CHCl_3$ 69.2°, was obtained by treatment with CH_2N_2. By sapong. the Ac deriv. with KOH in MeOH the *guagenin*, $C_{30}H_{48}O_3$, m. 310°, was obtained cryst. This cryst. product yielded a *Me ester*, m. 196°, $[\alpha]_D^{17}$ 73.9°, and an Ac deriv. identical with that prepd. from the amorphous sapogenin A. W. DOX

Synthetic experiments on the constitution of the bile pigment. III. Synthesis of hydroxypyrromethenes, and some derivatives of coproporphyrin I. HANS FISCHER AND WALTER FRÖWIS. *Z. physiol. Chem.* **195**, 49–80(1931); cf. *C. A.* **18**, 2515.—A study was first made of the reactivity of the α-Br in 4,3′,5′-trimethyl-3,4′-dipropionic acid-5-bromopyrromethene and its Me ester (I), since a replacement of the Br by OH should yield a product very closely related to xanthobilirubic acid. I reacts with $PhNH_2$ to form *4,3′,5′-trimethyl-3,4′-di(propionic Me ester)-5-phenylaminopyrromethene-*

HBr, m. 186°. The *free base*, m. 145°, forms a *complex Cu salt*, m. 120°. Treatment of I with $MeNH_2$ does not replace the Br but converts the ester groups into the corresponding amide, yielding *4,3',5'-trimethyl-3,4'-di(propionic methylamide)5-bromopyrromethene* (II), m. 212° (decompn.). A similar reaction occurs with NH_3 in MeOH, which yields *4,3',5'-trimethyl-3,4'-di(propionamide)-5-bromopyrromethene*, decomps. 260–70°. Treatment of II with 10% KOH in MeOH replaces the Br by MeO, forming *4,3',5'-trimethyl-3,4'-di(propionic methylamide)-5-methoxypyrromethene*, m. 225°. I yields a similar MeO deriv., *viz.* *4,3',5'-trimethyl-3,4'-di(propionic Me ester)-5-methoxypyrromethene* (III), m. 88°. The OH deriv. representing hydrolysis of the Br in I, *viz.*, *4,3',5'-trimethyl-3,4'-di(propionic Me ester)-5-hydroxypyrromethene*, m. 180°, may be prepd. directly from I by heating the AcOH soln. with AgOAc, or from III by hydrolysis of the MeO. This is accomplished by heating III with MeONa at 170–80° and reësterifying the carboxyls with Me_2SO_4, or better by resorcinol fusion of III at 170–80°. This hydroxymethene in $CHCl_3$ gives a green color reaction with diazobenzenesulfonic acid and HCl. Heated to 170–80° with HBr-AcOH, 2 mols. condense to coproporphyrin in small yield. The di-Et deriv. corresponding to the free acid of I, when heated with KOH in MeOH, yields *4,3',5'-trimethyl-3,4'-diethyl-5-methoxypyrromethene*, m. 70°, from which *4,3',5'-trimethyl-3,4'-diethyl-5-hydroxypyrromethene*, m. 243°, is obtained in small yield by resorcinol fusion. The mother liquors remaining from the prepn. of the HBr salt of I (free acid), when evapd. spontaneously over a period of several months, gradually formed coproporphyrin I, which was isolated and identified as the tetra-Et ester, m. 226°. In the prepn. of coproporphyrin tetra-Me ester by citric acid fusion a mother liquor remained from which the Me ester of coproporphyrin IV, m. 177°, was isolated. Porphyrin formation occurs also in small yield when the HBr salt of the free acid of I is treated with H_2SO_4. Coproporphyrin tetra-Me ester I and isouroporphyrin octa-Me ester II yield *complex Co salts*, m. 270° and 316°, resp. The copro ester gives a *Ag salt*, m. 286°, which may be sapond. to the free acid by boiling with KCN in 90% EtOH and reësterified by shaking with Me_2SO_4 and Na_2CO_3. Treatment of the Ag salt ester with $Fe(OAc)_2$ and AcOH contg. a little NaCl replaces the Ag by Fe, yielding the tetra-Me ester of coprohemin, m. 245°. Na_2CO_3 converts the latter into coprohematin tetra-Me ester, m. 215°. Reduction of this ester with Na and AmOH converts it into the corresponding *chlorintetracarboxylic acid* which dissolves in Et_2O to a stable green soln., but its alk. soln. soon reverts to the red porphyrin. Exposure of an aq. colloidal suspension of coproporphyrin to summer sunlight for several days converts it into a chlorin which differs from the synthetic chlorin in that its alk. soln. is stable to atm. O. Nitration of the copro ester with concd. HNO_3 yields a *dinitrocoproporphyrin*, and hematinic anhydride as a by-product. This dinitro deriv. forms a *tetra-Me ester*, m. 191° (*complex Cu salt*, m. 200°, *complex Ag salt*, m. 240°). If the esterification is performed by refluxing with 5% HCl in MeOH the product is a *mononitrodihydroxyporphyrin ester*, m. 206° (*complex Cu salt*, m. 245°). Attempts to prep. an aminoporphyrin by reduction of the NO_2 were unsuccessful. After treatment of the dinitro deriv. with Na-Hg the products isolated were coproporphyrin, dinitroporphyrin, and *mononitroporphyrin*, from which a *tetra-Me ester*, m. 204°, was prepd. The mono- is more stable than the dinitro deriv. and can be esterified at refluxing temp. Finally a *tetrahydrazide*, was prepd. from the tetra-Me ester of coproporphyrin and $N_2H_4 \cdot H_2O$ in MeOH. Its *Fe salt* was obtained in the same manner from coprohemin ester. The *tetraazide of coproporphyrin* was prepd. by treatment of the hydrazide with $NaNO_2$ and HCl with ice cooling. It explodes at about 90°. MeOH converts the azide into a *tetraurethan*, m. 190°. This is a remarkably stable substance, not attacked by concd. H_2SO_4 or by resorcinol fusion at 200°. It is apparently sapond. by HCl at 200°, but the expected tetraaminoporphyrin could not be isolated in a pure state.

A. W. Dox

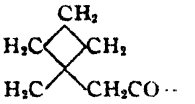
Blossom xanthophylls. The pigment of the sunflower. L. Zechmeister and P. Tuzson. *Ber.* **63B**, 3203–7(1930).—The polarimetric method is at present probably the most reliable means of distinguishing closely related pigments of the xanthophyll type from each other. The non-homogeneity of leaf xanthophyll was proved by the isolation of analytically pure prepns. of widely varying rotations (137–92°) from stinging nettles; the maize pigment, zeaxanthin, can readily be distinguished from the xanthophyll of leaves by its *l*-rotation, and the lutein of egg yolk by its characteristically low *d* rotation (72°). In the search for other natural xanthophylls differing in rotation from that of leaves, it has been found that the well-crystd. pigment (I) of the sunflower (*C. A.* **25**, 314) has a low *d*-rotation (75°) identical, within the exptl. errors, with that of the egg lutein, and as its other consts. also agree with those of lutein, there can hardly be any doubt that the two substances are identical. The sunflower

seems to contain the lutein mostly in the form of a cryst. ester. The I (0.234 g. from 300 g. dried petals) was isolated by letting the fresh petals stand 1 day under 90–5% EtOH, drying at 35°, powdering, percolating with C_6H_6, concg. *in vacuo* at 40°, adding 98% alc. (which ppts. a colorless substance), filtering, adding H_2O, extg. with Et_2O, letting the washed Et_2O ext. stand 20 hrs. with concd. KOH in MeOH, concg. the Et_2O layer (dried with Na_2SO_4) *in vacuo* in a current of CO_2, pptg. with petroleum ether, extg with boiling 70% EtOH and crystg. the insol. residue from MeOH. It m. 193° (cor.) $[\alpha]_C^{18}$ 75° ($CHCl_3$), spectrum in 96% EtOH (5 mg. in 1 l., 10-mm. layer), 486–72, 455.5 442.5, about 420. C. A. R.

The iron salt of pheophorbide *b*. Otto Warburg. *Ber.* **64B**, 682–3(1931).—A mixt. of 1 g. Fe powder, 1 g. NaCl and 60 cc. glacial AcOH is boiled in an atm. of CO_2, cooled and filtered. The Fe salt of pheophorbide *b* is obtained in 520 mg. yield by adding 1 g. pheophorbide *b* to the above soln., passing a current of CO_2 through it and heating for 10 min. on a water bath. The crude product deposited on cooling is centrifuged and washed with 50% AcOH and H_2O. It may be crystd. by dissolving 100 mg in 15 cc. hot propionic acid, filtering and adding 7.5 cc. hot 0.5% HCl. The crystals which sep. on cooling are probably $(CH_3CH_2CO)C_{31}H_{32}N_4O_6FeCl$. The Fe salt of pheophorbide *a* may be similarly prepd. Ruth Berggren

Isolation of phytosterolin from wheat embryo. Nobuzo Nakamura and Akiyoshi Ichiba. *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) **15**, Nos. 289–91, 137–41(1931).—From the ether ext. of wheat embryo 0.2% of phytosterolin was isolated It is identical with the glucoside ipuranol of phytosterol from other materials (*C. A.* **7**, 2218). It forms needles (from AmOH), m. 285–90°. *Ac deriv.* m. 168°, $[\alpha]_D$ −22.4° (in $CHCl_3$). *Bz deriv.* m. 198°, $[\alpha]_D$ 17.24° (in $CHCl_3$). Alfred Burger

Some relations between constitution and odor. A. Angeli. *Gazz. chim. ital* **60**, 939–46(1930).—In view of the odorous characteristics of aromatic musks and of violet ketones, it is surprising that the ketones first synthesized by Ruzicka possess such remarkable odors, for they contain no Me groups around the CO residue Consequently, because of the size of the ring resulting from a great no. of methylene groups, deformation of the ring itself probably occurs in such a way that lateral nodes are formed. These nodes are made up of residues which function in the same way as do the Me groups in the musks and ketones mentioned In this case there would be a twisting as represented by the structure:



and this seems likely from the fact that, though x-ray examn. of the ketones of Ruzicka furnish no evidence, Lee (cf. *C. A.* **21**, 3189) has noticed anomalies in certain long-chain compds. which are greatest with 15 C atoms. Furthermore Lee and van Rysselberge (cf. *C. A.* **24**, 59) suggest a spiral form in long-chain compds. To throw light on this problem, the chem. behavior of some cyclic ketones was studied, particularly the influence of certain substituents (alc. radicals) on the reactions which are characteristic of these ketones. If the hypothesis already suggested, *i. e.*, that in proximity to the CO group the methylene chain is deformed, were true, then it is probable that the condensations mentioned take place only partially or not at all. The cycloketone contg. 15 atoms (with the com. name of hexalthone) was mixed with BzH (equimol quantities) and condensation was attempted with cold, dil. KOH, hot aq. KOH (as with cyclohexanone) and with alc. KOH. There was no condensation in any case Moreover as in expts. of Wieland (no reference) hexalthone (1 mol.) and then (cooling with ice) $EtNO_2$ (1 mol.) were added to EtOK (1 mol.) in abs. EtOH, and the next day Et_2O was added, but no salt sepd., and upon the adds. of water all the hexalthone was recovered. This behavior makes it probable that there is a steric hindrance at work, which would in turn support the hypothesis suggested. Very probably the same arguments apply to polymethylenic lactones, *e. g.*, ambrettolides, which have been studied by Kerschbaum. The exptl. details of the present paper will be published later. Cf. *C. A.* **24**, 4525. C. C. Davis

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Aqueous liquors from low-temperature carbonization of coal (Morgan, Pettet) 21. The protective action of some antioxidants. II. The metal halide compounds of some protective agents against aging (Kirchhof) 30. AcOH recovery in the cellulose acetate industry (Clotworthy) 23. The ultra-violet absorption spectra of the amides

of α-methylbutenoic acids (CASTILLE) 3. Color and constitution from the standpoint of recent electronic theory (HODGSON) 3. Studies in Raman effect. X. The Raman spectra of organic substances (DADIEU, KOHLRAUSCH) 3. Raman effect and constitutional problems. II. Cyanogen compounds (DADIEU) 3. Thermal disaggregation of gelatin (GERNGROSS, *et al.*) 2. Kinetics of heterogeneous formate formation (BIRSTEIN, LOBANOW) 2. Influence of the strength of aromatic amines on their reactions (HERTEL, SCHNEIDER) 2. An x-ray study of mannitol, dulcitol and mannose (MARWICK) 2. The crystallographic character of the amides of methylbutenoic acids (THORRBAU) 2. Zero volumes of crystalline organic substances (BILTZ) 2. Isoprene and rubber (STAUDINGER, JOSEPH) 30.

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Organic compounds. I. G. FARBENIND. A.-G. (Otto Nicodemus and Walter Berndt, inventors). Ger. 514,174, Sept. 16, 1925. Addn. to 481,819 (*C. A.* **24**, 2139). Org. compounds are obtained by leading the vapors of mixed aromatic-heterocyclic ketones, optionally in the presence of oxidizing agents and catalyzers, over highly porous materials. Thus, 2-xylyl-5-xyloylpyridine is evapd. under reduced pressure in an air current and passed over active C at 400–420°. The substance 1-xylyl-7-methylbenzoquinoline (m. 170°) is found among the unchanged starting material and other products. Other examples are given.

Hydrocarbons. I. G. FARBENIND. A.-G. Fr. 695,125, May 6, 1930. Products of higher b. p. are prepd. by treating satd. compds. of the aliphatic or hydroaromatic series, particularly the halogen derivs., with hydrocarbons of the C_2H_4 or C_2H_2 series under pressure and in the presence of condensing agents. Thus, hydrocarbons distg. between 120° and 200° are prepd. from C_2H_4 and MeCl in the presence of $AlCl_3$, and a product distg. between 150° and 180° contg. about 2% of O from the double compd. of Et_2O and BF_3 under pressure of C_2H_4. Cf. *C. A.* **25**, 1536 and following abstrs.

Hydrocarbons. I. G. FARBENIND. A.-G. Fr. 37,296, Aug. 1, 1929. Addn. to 663,539. In the process of the prior patent the conditions of working in the second or following phases are made more vigorous otherwise than by a rise of temp., *e. g.*, by an increase of pressure, an increase of the partial pressure of H, the use of a more active catalyst, etc., or these measures are used along with a rise of temp. (cf. *C. A.* **24**, 2875).

Hydrocarbons. I. G. FARBENIND. A.-G. Fr. 37,440, Sept. 17, 1929. Addn. to 650,583 (*C. A.* **23**, 5312). The S and O compds. are eliminated from the starting materials by heating these in the presence of catalysts and, if necessary, gases other than H or treating the starting materials with appropriate solvents or in any other manner.

Diolefins. PAUL FEILER (to I. G. Farbenind A.-G.). U. S. 1,795,549, March 10. In the recovery of diolefins such as butadiene from various mixed gases contg. the diolefins, the gas is treated with a salt of a heavy metal from groups 1 and 2 of the periodic system such as Cu_2Cl_2 or $AgNO_3$ and the diolefins are subsequently liberated (suitably by heating) from the resulting additive compds.

Organic oxygen compounds. I. G. FARBENIND. A.-G. Fr. 37,351, Aug. 16, 1929. Addn. to 646,087 (*C. A.* **23**, 2186). Benzene hydrocarbons having a lateral chain bound cyclically to the C_6H_6 ring, particularly benzopolymethylenic compds. are oxidized by O or gases contg. O in the presence of catalysts, preferably heavy metals. Thus, tetrahydronaphthalene is oxidized to α-ketotetrahydronaphthalene and α-hydroxytetrahydronaphthalene. Several examples are given.

Oxygenated organic compounds from carbon oxides and hydrogen. H. DREYFUS. Brit. 338,854, July 24, 1929. Products such as EtOH, PrOH, acetaldehyde, HOAc, MeOAc and their higher homologs, and ketones, are formed from mixts. contg. C oxides and H such as water gas, coke-oven gas or producer gas in the presence of catalysts consisting of alkali or alk. earth or Cu silicates, borates or phosphates or salts of oth[illegible]xyacids of P. Temps. of 200–600° and pressures of 50–500 atm. may be used,

CH_4 or inert gases such as N may be present and reaction chambers of Cu or steel lined with Cu or of steel contg. Mo, W, Mn, Co or Ni may be used. Cf. *C. A.* **25**, 1839.

Mixtures of hydrogen and carbon monoxide. Maria Casale-Sacchi. Austrian 121,228, Sept. 15, 1930. Hydrocarbons are treated with O and an excess of steam at a temp. above 1000° under reduced pressure.

Oxidizing organic substances. Consortium für elektrochem. Ind. G. m. b. H. (Erich Baum and Willy O. Herrmann, inventors). Ger. 518,391, May 7, 1924. A mixt. of the org. substance to be oxidized and an oxygen-contg. gas or other oxidizing agent is caused to flow rapidly through a narrow orifice and impinge on a heated surface, which may consist of, or contain, a catalyst. The oxidation of AcH, C_4H_2 and MeOH to CH_2O, of C_6H_6 to maleic acid, and of $C_{10}H_8$ to phthalic acid or phthalic anhydride is referred to. Examples are given.

Recovering organic substances from adsorbent materials. I. G. Farbenind. A.-G. Fr. 695,123, May 6, 1930. Org. substances are recovered from adsorbent materials contg. them by heating them with water, or aq. solns. or other org. or inorg. liquids in which the org. substances are scarcely or not at all sol. in the presence of substances which are more easily wetted by the org. substances than the adsorbent materials which contain them. Thus fuller's earth contg. oil is mixed with active C and soft soap and the mass is boiled with water. An oily layer contg. the C seps., and the C is removed by filtration.

Hydrocyclic compounds. I. G. Farbenind. A.-G. Fr. 37,498, Oct. 9, 1929. Addn. to 663,564 (*C. A.* **24**, 625). Hydrocyclic compds. are prepd. by condensing unsatd. α,β-nitriles contg. the atomic group $-C=C-C\equiv N$ in the form of a chain, with compds. contg. doubly conjugated $C=C$ compds. Thus, the nitrile of crotonic acid ($CH_3CH:CHC:N$) is heated under pressure with cyclopentadiene. The product has probably the formula $CH:CH.CH.CHMe.CH(CN).CH.CH_2$. With 2,4-dimethyl butadiene, a product of the formula $CH_2.CHMe.CH(CN).CHMe.CH:CMe$ is obtained. Products from the nitrile of sorbic acid are also described.

Basic products. I. G. Farbenind. A.-G. Fr. 37,289, July 30, 1929. Addn to 671,362 (*C. A.* **24**, 2244). Imido ethers, the acids from which they are derived, their chlorides, esters or amides are condensed with primary or secondary aromatic amines contg. a basic lateral side chain with a tertiary N, or the side chain with a tertiary N may be introduced afterward. Thus, if *p*-β-diethylaminoëthoxyaniline is condensed with oleic acid chloride a product of the formula $C_{17}H_{33}CONHC_6H_4OC_2H_4NEt_2$ is obtained. Other examples and the formulas of the products obtained are given. Cf. *C. A.* **25**, 837, 1261.

Diaryl compounds. Federal Phosphorus Co. Fr. 37,449, Sept. 20, 1929. Addn. to 667,840 (*C. A.* **24**, 1394). Complex diaryl compds. of b. p. higher than biphenyl are produced by vaporizing the corresponding hydrocarbon, *e. g.*, pure com benzene or com. 90% benzene contg. aromatic hydrocarbons other than C_6H_6 such as toluene and xylene. The preliminary heating is to a temp. just below that at which diaryl compds. are formed and the temp. is then rapidly raised to that at which these compds. are formed.

Complex diaryl compounds. J. N. Carothers, T. J. Scott and Federal Phosphorus Co. Brit. 338,631, Sept. 5, 1929. See preceding abstr.

Drying organic liquids. Wilhelm Kopeska. Austrian 120,875, Aug. 15, 1930. Benzine and other org. liquids contg. water in suspension are dried by treatment with a higher fatty acid ester of a carbohydrate of the formula $(C_6H_{10}O_5)_n$. The ester must be insol. in the org. liquid, and may be used in such a form that the org. liquid can filter through it. Cellulose stearate, palmitate and laurate are suitable esters.

Trichloroalcohols. Chemische Fabriken Joachim Wiernik & Co. A.-G. (Gustav Heilner, inventor). Ger. 515,539, Jan. 14, 1925. The corresponding ketone is caused to react with acid. The alkali amide may be suspended in a water-free indifferent solvent. Thus, acetone and $CHCl_3$ are added to a suspension of $NaNH_2$ in Et_2O. The temp. is kept at 0°. Dil. H_2SO_4 (33%) is added and a steam distn. gives a 60% yield of $C_4H_7Cl_3OH$. Further examples are given.

Hydrogenating paraldol. I. G. Farbenind. A.-G. Brit. 338,807, Jan. 30, 1929. 1,3-Butylene glycol is made by catalytic hydrogenation of paraldol at 30–50° in the presence of a solvent or diluent such as water, EtOH, isopropanol or butanol, under

pressure, with catalysts such as Ni or Cu or both on pumice or kieselguhr. Use of Co, Pt and Pd also is mentioned.

Ketones such as acetone. H. DREYFUS. Brit. 338,518, Aug. 19, 1929. The vapors of aliphatic alcs. contg. at least 2 C atoms, in admixt. with air or O, are subjected to temps. of 250–700° in the presence of catalysts such as oxides, hydroxides, carbonates, metaborates, ortho-, meta- and pyro-phosphates and silicates of Ca, Ba or Mg which may be deposited on pumice or kieselguhr. Natural compds. such as wollastonite, augite, osteolite, danburite or datolite may be used, and the gases may be passed through a tube of Cu, Fe, "staybrite" or earthenware contg. the catalyst and the vapor of an aliphatic acid such as HOAc may be added and a large excess of O used. Brit. 338,519 relates to a similar process in which steam is added to the reaction mixt.

Carbocyclic ketones. Brit. 339,348, Oct. 9, 1928; Soc. anon. M. NAEF & CIE. Fr. 37,380, Aug. 30, 1929. Addn. to 599,765. Unsatd. cyclic ketones having more than 9 ring members are prepd. by submitting to the action of heat a metallic salt of an unsatd. dicarboxylic acid contg. at least 11 atoms of C in the normal chain and the 2COOH groups at the ends of the chain. Salts of UO_2, or metals having the at. numbers 59–72 are referred to.

Methylene ethers. IMPERIAL CHEMICAL INDUSTRIES, LTD., T. BIRCHALL and S. COFFEY. Brit. 338,624, Aug. 30, 1929. In the production of products such as methylene diethyl ether, methylene di-*n*-butyl ether and 1,3-dioxane, $(CH_2)_6N_4$ is caused to react with mono- or di-hydric alcs. in the presence of acids such as HCl or H_2SO_4. Among the alcs. which may be used for such reactions are: MeOH, EtOH, *n*-Bu alc., allyl alc., benzyl and substituted benzyl alcs., and ethylene and trimethylene glycols.

Diazo compounds from 4-aminoresorcinol. N. N. VOROZHTZOV. Russ. appl. 49,050, June 12, 1929. 4,1,3-$H_2NC_6H_3(OH)_2$ is diazotized by known methods in the presence of Cu or Fe salts or Co, Ni, Zn or other similar metal

Diazoamino compounds. I. G. FARBENIND. A.-G. Fr. 37,246, July 25, 1929. Addn. to 677,579 (*C. A.* **24**, 3248). Diazoamino compds. are made by the reaction of diazo compds. on polycyclic primary amines sol. in water, which on account of the position of the substituents, with respect to the amino group, are not capable of forming azo dyes. Thus, 3-nitro-4-amino-1-methylbenzene is diazotized and combined with 1-naphthylamine-2,4-disulfonic acid. Other examples are given.

Aromatic amines. I. G. FARBENIND. A.-G. (Julius Laux, inventor). Ger. 515,758, Aug. 21, 1925. Aromatic amines are prepd. by reducing the corresponding nitro compds. with Fe in the presence of aq. Al salt solns. Thus $PhNO_2$ is reduced to $PhNH_2$ by Fe in the presence of aq. $AlCl_3$. After distg. off the $PhNH_2$, a yellowish brown ppt. is left, which, on sepn. from the unused Fe, produces a deep violet-red Fe dye on heating to glowing. Further examples are given.

***N*-Aminoalkylamines.** I. G. FARBENIND. A.-G. (Werner Schulemann, Fritz Schonhöfer and August Wingler, inventors). Ger. 518,207, Jan. 26, 1927. Amines are caused to react with aminoalkyl halides or the corresponding sulfonates, the aminoalkylating agents being used in the form of their salts, in the presence or absence of an acid-binding agent and a solvent. Thus, ω-diethylaminoethylaniline may be prepd. by heating $PhNH_2$ with $Et_2NCH_2CH_2Cl.HCl$. Other examples are given also. Cf. *C. A.* **24**, 2469.

Esters. E. I. DU PONT DE NEMOURS & Co. Ger. 515,678, Mar. 25, 1928. Esters and other org. compds. result when primary alcs. with more than 1 C atom or a mixt. of alcs. are subjected to the action of dehydrogenating catalyzers at raised temp. and pressure. The alcs. are circulated over an equal amt. of catalyzer, volume-for-volume, at a pressure of 10 atm. The catalyzers may be Ni, Cu, Co, Fe alone or mixed with MnO_2, Cr_2O_3, MgO, CaO, etc. EtOH treated in this way gives 55% unchanged EtOH, 25% AcOEt, 12.5% BuOH and small quantities of AcOH, AcH, CO_2 and CH_4.

Lactic acid esters. SCHERING-KAHLBAUM A.-G. (Frank Hartwich, inventor). Ger. 518,388, Jan. 23, 1926. A mixt. of Mg lactate, an alc. and an acid, with or without a catalyst, *e. g.*, an excess of acid or $CaCl_2$, is heated. Examples are given.

Halogenated phosphorous and phosphoric esters. I. G. FARBENIND. A.-G. Brit. 338,981, Aug. 31, 1929. Reaction is effected between a compd. contg. an alkylene oxide group and a P trihalide or oxyhalide, suitably with use of a catalyst such as I, $FeCl_3$, S or iron filings. *E. g.*, with PCl_3 and ethylene oxide, the O bridge is opened and a Cl atom combines with a CH_2 group while the P atom combines with the O. Thus ethylene oxide can be attached up to three times, so that the neutral ω-chloroethyl ester of phosphorous acid may be formed. Examples are also given of reactions between epichlorohydrin and P oxychloride with iron filings as catalyst and of epichlorohydrin with PBr_3.

Alkyl halides. N.-V. DE BATAAFSCHE PETROLEUM MAATSCHAPPIJ. Brit. 338,742, Jan. 8, 1929. Products such as pentyl, butyl and propyl chlorides and butyl bromide are made by chlorination or bromination of paraffin hydrocarbons such as propane, butane and pentane, as by mixing the reacting materials in the dark at a low temp. and then heating without exposure to light (suitably in app. of enameled metal or Pyrex glass).

Addition products from acetylene and hydrogen halides. CONSORTIUM FÜR ELEKTROCHEMISCHE INDUSTRIE GES. Brit. 339,093, Nov. 19, 1928. Addn. products are formed by passing a mixt. of C_2H_2 and a halide such as HCl or HBr at a raised temp. over a catalyst comprising a compd. of an alk. earth metal, Mg, Bi, Sb, V, Zn, Al, Fe or Hg, or a mixt. of such compds., carried on a material of large surface such as active C or SiO_2 gel.

1-Aroylamino-4-haloanthraquinones. I. G. FARBENIND. A.-G. (Willi Hartmann, inventor). Ger. 518,406, Dec. 23, 1926. 1-Aroylaminoanthraquinones are halogenated in inert solvents. Examples are given.

Anthraquinoneazines. W. SMITH, S. G. WILLIMOTT, J. THOMAS and SCOTTISH DYES, LTD. Brit. 338,486, May 13, 1929. Anthraquinonetetrahydrodiphenazines are made by condensing α,α-dichloroanthraquinones with *o*-nitroaniline or α,α-diaminoanthraquinones with *o*-nitrochlorobenzene, and treating the products with alc. Na sulfide. The condensation may be effected by heating in an inert solvent such as $PhNO_2$ in the presence of an acid-absorbing agent such as Na_2CO_3 and a Cu catalyst, and the hydrodiphenazines may be converted into phenazines by treatment with oxidizing agents. Several examples are given.

Mercaptobenzothiazoles. I. G. FARBENIND. A.-G. (Eduard Tschunkur and Ernst Herdieckerhoff, inventors). Ger. 518,206, Feb. 22, 1928. See Fr. 669,921 (*C. A.* **24**, 1867).

Monoxanthogens. GEORGE S. WHITBY (to Roessler & Hasslacher Chemical Co.) U.S. 1,796,972, March 17. Monoxanthogens of the general formula RO—CS—S—CS—OR, wherein the group RO— is the radical of any aliphatic alc. or deriv. thereof capable of yielding a xanthate and wherein R is of a non-cyclic nature can be prepd. in excellent yield by the reaction of alkali metal cyanides with the corresponding disulfide compds as follows: RO.CS.S_2.CS.OR + MCN = RO.CS.S.CS.OR + MSCN (where M is an alkali metal). The disulfides used may be prepd. by a variety of methods, such as electrolysis of concd. xanthate solns., action of I with KI on a xanthate soln., etc., but preferably are prepd. through the action of an alkali metal hypochlorite on a xanthate. The propyl, butyl, isobutyl, isoamyl and hexyl derivs. are yellow oils, while the methyl deriv. forms yellow needles m. 55°. The monoxanthogens prepd. from a mixt. of higher alcs. (corresponding in mean mol. wt. to decyl alc.) as well as from the monoethyl ether of ethylene glycol, by way of the corresponding xanthates and dixanthogens, are also yellow oils. Those monoxanthogens in which R—O—, of the formula R—O—CS S.CS—O—R is a secondary aliphatic alc. radical, are good accelerators of the vulcanization of rubber and are called secondary alkyl monoxanthogens. As an example of this group the isopropyl deriv. or isopropyl monoxanthogen, is a golden yellow cryst. solid m 54–55°. Details are given of the production of isopropyl monoxanthogen.

Calcium humate. R. KEKÉTS. Hung. 100,679, Oct. 24, 1928. Materials in the state of primary carbonization (*e. g.*, peat, lignite or brown coal) are finely powdered and boiled under pressure with alkalies. The alkali humates are filtered and lime water is added to ppt. Ca humate.

Anthraquinone derivatives. I. G. FARBENIND. A.-G. Fr. 37,109, June 17, 1929. Addn. to 630,511. Esters of *o*-aminocarboxylic acids of the anthraquinone series are prepd. by treating an anthraquinone-1,2-isoxazole with a compd. of the formula ROH in which R is an alkyl or aryl group such as alcs. or phenols in the presence of an agent of alk. action. Examples are given of the prepn. of the Et, Me and Ph esters of 1-aminoanthraquinone-2-carboxylic acid.

Azine derivatives. I. G. FARBENIND. A.-G. Brit. 339,283, Aug. 30, 1929. 1,2,5,6-Dibenzophenazine and its derivs. are made from 2-naphthylamine or its corresponding derivs. which contain a free 1-position by oxidation in an inert solvent of high b. p. with a metal oxide such as CuO or MnO_2. Several examples are given. Cf. *C. A.* **24**, 2242.

Benzanthrone derivatives. I. G. FARBENIND. A.-G. (Otto Braunsdorf, Eduard Holzapfel and Hans Lange, inventors). Ger. 518,410, Aug. 3, 1926. Addn. to 479,356 (*C. A.* **23**, 4830). The aminobenzanthronyl sulfides, etc., described in Ger. 479,356 are now prepd. by the action of NH_2OH in H_2SO_4 soln. on benzanthronyl sulfides, bisulfides, mercaptans or their derivs. The reaction is effected at about 125°, and a

catalyst may be present, *e. g.*, $FeSO_4$ or $CuSO_4$. Examples are given. Cf. *C. A.* **25**, 2301.

Cyclohexanol derivatives. SCHERING-KAHLBAUM (Walter Schoeller and Hans Jordan, inventors). Ger. 514,417, July 24, 1927. Addn. to 512,719 (*C. A.* **25**, 1260). Alkylisoalkylcyclohexanol and corresponding ketones are prepd. by subjecting a mixt. of the corresponding phenol and alkylated coumaran to the action of H, in the presence of catalyzers, until 6 or 8 H atoms are taken up, and sepg. the alkylated coumaran from the hydrogenated product. Thus, a mixt. of 4-methyl-6-isopropylenephenol and 2,4-dimethylcoumaran is treated with H at 150° in the presence of a Ni catalyzer. Pressure may be applied. The reaction is stopped when 8 atoms are taken up. A 60% yield of the hydrogenated product *p*-menthol and a 3–5% yield of *p*-menthone, can be obtained by careful fractional distn. Further examples are given.

Guanidine derivatives. REINHARD FREIHERR VON GODIN. Ger. 518,407, July 24, 1928. Salts of diguanidine derivs. of higher paraffin hydrocarbons are prepd. by the reaction of α,ω-dihalogenated higher paraffin hydrocarbons with guanidine in warm alc. soln. About 3 mols. of guanidine should be used for 1 mol. of halogenated hydrocarbon. Examples are given.

Substituted guanidines. HERBERT SCHOTTÉ (to Schering-Kahlbaum A.-G.). U. S. 1,795,738, March 10. In forming a compd. such as α-dimethyl-β-ethylguanidine, a dialkylcyanamide such as dimethylcyanamide is treated with a salt of an amine having at least one H atom attached to the N atom, such as ethylamine-HCl in the presence of the corresponding free amine.

Diacyl derivatives of *m*-xylene. I. G. FARBENIND. A.-G. (Otto Wulff, inventor). Ger. 515,540, Dec. 21, 1926. Aromatic or aliphatic acid chlorides are caused to react on monoacyl *m*-xylene derivs. or their $AlCl_3$ compds. at temps. above 50°. Excess of $AlCl_3$ and diluents may be present. In an example, acetyl-*m*-xylene is mixed slowly with $AlCl_3$ at 40°. $AcCl_3$ is dropped in at about 45°. The temp. is then raised to 85–90° for two hours, *i. e.*, until the HCl evolution ceases. The temp. is then raised to 95°. The reaction mass gives an 80% yield of diacetyl-*m*-xylene. Further examples are given.

Reduction products of *N*-acetylindoxyl. I. G. FARBENIND. A.-G. (Curt Schumann, Eduard Münch and Bruno Christ, inventors). Ger. 515,544, May 27, 1928. *N*-Acetylindoxyl, its homologs, anologs or derivs. are treated with H in the presence of hydrogenating catalyzers. Numerous examples are given. In one, *N*-acetyl-2,3-naphthindoxyl is treated with H at 100 atm. at 25° for 16 hrs., in an autoclave, in the presence of alc. and a Ni-kieselguhr catalyzer, to give *N*-acetyl-2,3-naphthodihydroindoxyl. Cf. *C. A.* **24**, 2142.

Solid compounds from hydrogen peroxide combinations. I. G. FARBENIND. A.-G. Brit. 339,332, Aug. 6, 1929. Gaseous mixts. contg. vapors of H_2O_2 are passed (suitably countercurrentwise) over substances which unite with it such as urea, methylolureas, acetamide, urethan, succinic amide, mannitol, erythritol, pinacol, $(CH_2)_6N_4$, or alkali metal sulfates, carbonates, borates, nitrates, phosphates or pyrophosphates (either with cooling, heating (to not above 80°) or at ordinary temp.). Stabilizers such as starch, dextrin, amines, EtOH, borates or acid or neutral pyrophosphates may be incorporated in small proportions with the solid substances, and the gaseous mixt. used may be obtained by the action of a silent elec. discharge or of ultra-violet rays on H contg. air or O.

Concentrating acids. SOC. ANON. DES DISTILLERIES DES DEUX-SÈVRES. Fr. 37,269, Mar. 19, 1929. Addn. to 651,528 (*C. A.* **23**, 3234). The processes of the prior patent and its addns. 34,574 (*C. A.* **24**, 1392) and 34,691 (*C. A.* **24**, 1392) are applied to the dehydration of org. acids in general and of the fatty series in particular. A solvent insol. or slightly sol. in water is used the b. p. of which is higher than that of the acid to be dehydrated, and which does not form an azeotropic mixt. with the anhyd. acid. A carrying substance giving with water an azeotropic mixt. boiling below the mixt. of water and solvent is also used. The method described in the addn. 35,750 (*C. A.* **24**, 4052) is varied by using an accessory liquid which forms with the acid to be dehydrated a binary mixt. of min. b. p. Cf. *C. A.* **25**, 970.

Acylated hydroxy fatty acids. ORANIENBURGER CHEMISCHE FABRIK A.-G. Ger. 515,679, Aug. 24, 1928. Hydroxy fatty acids or derivs. are treated with org. acids or their anhydrides or chlorides. A small quantity of $ClSO_3H$ is added during the acylation, and the product is neutralized after the reaction is over. Thus, ricinoleic acid is mixed with BzCl and a small quantity of $ClSO_3H$ added. After the reaction is over, the product is neutralized with NaOH. Further examples are given.

Mixtures of hydroxy fatty acids. CARL STIEPEL. Ger. 518,390, June 5, 1926.

Acid mixts. resembling the acids of castor oil are prepd. from unsatd. animal or vegetable fats or oils, or their free acids or their soaps, by partially satg. these by chlorination, and then replacing the Cl atoms by OH groups in known manner, by heating with NaOH soln. under pressure, etc. Examples are given.

Acid- and lime-resisting derivatives of unsaturated fatty acids. FERDINAND MÜNZ (to General Aniline Works). U. S. 1,796,801, March 17. Acids such as com. oleic acid or ricinoleic acid (heated to 150–60° until its acidity is reduced by about one-half, with formation of diricinic acid) are treated with fuming sulfuric acid contg. 66% of SO_3 (suitably in CCl_4) to obtain products which are not pptd. from soln. by hard water and are resistant to acids.

Pyrazoleanthrone-2-carboxylic acid. I. G. FARBENIND. A.-G. (Heinz Schever, inventor). Ger. 515,680, Apr. 6, 1928. N_2H_4 is caused to react on 1-haloanthraquinone-2-carboxylic acid. Examples are given. Cf. *C. A.* **25**, 969.

Phenylglycidic acid. ADOLF KAUFMANN. Ger. 515,034, Oct. 30, 1928. Addn. to 509,938 (*C. A.* **25**, 715). The method of 509,938 for forming the above acid by oxidation of cinnamic aldehyde is modified by using hypohalogenite soln. as the oxidizing agent. Examples are given.

1-Hydroxy-4-haloanthraquinone-2-sulfonic acids. I. G. FARBENIND. A.-G. (Ernst Honold, inventor). Ger. 518,214, Aug. 29, 1929. The diazo compds. from 1-amino-4-haloanthraquinone-2-sulfonic acids in an aq. medium are treated with Cu or a Cu compd. in the presence or absence of free acid. The amt. of Cu may be such that the product seps. as the insol. Cu salt. Examples are given.

Formic acid. N.-V. DE BATAAFSCHE PETROLEUM MAATSCHAPPIJ. Brit. 339,045, Oct. 31, 1928. See Fr. 683,088 (*C. A.* **24**, 4522).

Acetic acid. HERMANN SUIDA. Austrian 120,859, Aug. 15, 1930. Concd. AcOH is recovered from dil. AcOH by extn. in the liquid phase with esters b. above 150° and derived from mono- or poly-basic cyclic carboxylic acids and mono- or poly-hydric alcs. Examples describing the use of dibutyl and diethyl phthalates are given. Cf. *C. A.* **24**, 3250.

Concentrating acetic acid. HERMANN SUIDA. U. S. 1,795,977, March 10. Dil. HOAc is subjected to cold extn. with a solvent such as anthracene oil and quinoline and the acid and extg. medium are sepd. by distn.

Concentrating acetic acid. HERMANN SUIDA. U. S. 1,796,059, March 10. A superheated aq.-HOAc vapor mixt. is brought into direct contact with a counter-flow of a liquid ester such as dihexyl phthalate to effect extn. of the HOAc from the mixt. and concd. HOAc is recovered from the soln. thus formed. App. is described.

Recovering acetic acid. HERMANN SUIDA. Austrian 121,251, Sept. 15, 1930. Dil. AcOH is extd. in the cold with a mixt. of a non-acetylatable base b. above 150° and pentachloroethane or a hydrocarbon b. above 150°. A suitable extg. mixt. is quinoline 1 and anthracene oil 1 part. Concd. AcOH is recovered by distg. the ext.

Acetic acid and other acids from nitriles. I. G. FARBENIND. A.-G. Brit. 339,235, Dec. 18, 1929. Nitrile vapors, either directly as produced by the method described in Brit. 332,258 (*C. A.* **25**, 115) or after previous condensation and revaporization, are saponified by continuously passing the nitrile vapor in contact with a current of inorg. acid such as a 50–90% H_2SO_4 or H_3PO_4. Various details and examples are given.

Anhydrides of aliphatic acids. N.-V. DE BATAAFSCHE PETROLEUM MAATSCHAPPIJ. Brit. 338,507, Aug. 9, 1929. Anhydrides such as Ac_2O or butyric-acetic anhydride are obtained by heating "monobasic" aliphatic acids in admixt. with monoketones such as acetone or ketone-forming substances such as iso-Pr alc., secondary Bu alc., propylene oxide or MeOAc (suitably at about 600–700° and under ordinary, increased or reduced pressures). The materials may be passed through a heated tube of porcelain, quartz, yellow brass or other suitable material and catalysts may be used such as Cu, yellow brass or Al sulfate together with fillers such as porcelain, kieselguhr or pumice. Solid ketone-forming substances such as NaOAc or $Ca(OAc)_2$ may be used and caused to pass through the reaction tube by a device such as a screw conveyor.

Dehydrogenating isopropyl alcohol. N.-V. DE BATAAFSCHE PETROLEUM MAATSCHAPPIJ. Brit. 339,491, Dec. 6, 1929. Isopropyl alc. vapor, with or without admixt. with other gases, is passed through a liquid medium such as molten Pb or salts or other non-reactive materials, heated to 300–700°, to produce acetone and H_2. Various details of app. and procedure are described.

Polymers of vinyl alcohol. I. G. FARBENIND. A.-G. (Fritz Klatte and Hermann Müller, inventors). Ger. 515,780, Nov. 29, 1929. Addn. to 514,598 (*C. A.* **25**, 2153). Polyvinyl mixed esters, which contain a halogenated org. acid and a non-halogenated

org. acid, are sapond. by NH_4OH. Thus, polyvinyl acetate chloroacetate is sapond. with NH_4OH to give a solid polyvinyl alc.

Acetaldehyde. Consortium für elektrochem. Ind. G. m. b. H. (Erich Baum and Martin Mugdan, inventors). Ger. 518,290, July 22, 1913. An excess of C_2H_2 is led through aq. H_2SO_4 of 6–35% concn. contg. a compd. of Hg, the acid being maintained at 60–80°. AcH is removed from the gases leaving the reaction vessel, and the excess of C_2H_2 is returned to the vessel.

Acetylene. Russell W. Millar (to The Shell Development Co.). Can. 309,544, Mar. 17, 1931. C_2H_2 is formed by the controlled combustion of a stream of O-contg. gas in an atm. of hydrocarbon gas.

Normal butyl oleate. Wm. J. Bannister (to Commercial Solvents Corp.). U. S. 1,796,231, March 10. Normal Bu oleate is made by reaction of butanol and oleic acid in the presence of H_3PO_4. It is a mobile yellow oily liquid, insol. in water, b_{10-18} 235–45°.

Acetals. Willy O. Herrmann and Hans Deutsch (to Consortium für Elektrochemische Industrie). U. S. 1,796,690, March 17. See Ger. 502,431 (*C. A.* **24**, 4793).

2,5,6-Trichloro-1,3-dimethylbenzene, etc. Georg Kalischer and Fritz Frister (to General Aniline Works). U. S. 1,796,108, March 10. 2,5,6-Trichloro-1, 3-dimethylbenzene, crystg. from glacial HOAc as white needles m. about 95–6°, b. 255–60°, is formed by the action of an inorg. acid on the corresponding 4-sulfonic acid (which in turn is obtained by reaction of NaOCl on 1,3-dimethylbenzene-4-sulfonic acid in aq. HCl soln.) and, in general chlorinated products are formed by treating 1,3-dimethylbenzene-4-sulfonic acid in a mineral acid soln. with a chlorinating agent. Depending on the amt. of Cl employed the mono-, di- or tri-chloro-1,3-dimethylbenzene-4-sulfonic acid is obtained. By hydrolysis effected in the usual manner, for instance, by heating with H_2SO_4 or H_3PO_4 or the like, the sulfonic acid group is split off from the mol. of the aforesaid compds. and the corresponding chlorinated benzene derivs. are obtained. For splitting off the sulfonic acid group from the trichloro-1,3-dimethylbenzenesulfonic acid an excess of Cl may be employed, whereby the sulfonic acid group is replaced by C and tetrachloro-1,3-dimethylbenzene is obtained. Details of procedure are also given for the production of 2-chloro-1,3-dimethylbenzene-4-sulfonic acid (the amide of which m. about 223°), 2-chloro-1,3-dimethylbenzene (b. about 185–7°), dichloro-1,3-dimethylbenzene-4-sulfonic acid (the amide of which m. about 330°), tetrachloro-1,3-dimethylbenzene (m. 218–20°) and derivs.

***m*-Nitroaniline.** G. A. Kirchov and I. T. Eskin. Russ. appl. 66,606, Mar. 18, 1930. *m*-$O_2NC_6H_4NH_2$ is prepd. by reducing an aq. suspension of *m*-$C_6H_4(NO_2)_2$ with Na_2S in the presence of NH_4Cl.

2,4-Dihydroxypyridine-3-carboxylic nitrile. Georg Schroeter. Ger. 515,991, Jan. 18, 1927. The above nitrile and its derivs. are prepd. from dihydroxyhalopyridinecarboxylic nitrile by (a) replacing the halogen by H or a substituted NH_2 group, or (b) treating with 1 mol. of an alkylating agent to form the *N*-alkylated pyridone compd., and substituting the halogen by H, OH, SH, NH_2 or substituted NH_2. Thus, 2,4-dihydroxy-6-chloropyridine-3-carboxylic nitrile is treated with 2 *N* H_2SO_4 and Zn dust to give the required nitrile. Or, the chloro deriv. is treated with NaOH and Me_2SO_4 to give 1-methyl-4-hydroxy-6-chloro-2-pyridone-3-carboxylic nitrile. The Cl is then substituted by H and treated with H_2SO_4 and Zn as before. Further examples are given.

Pure phenylazo-2,6-diaminopyridine hydrochloride. C. F. Boehringer & Soehne G. m. b. H. Ger. 515,781, Nov. 5, 1927. 2,6-Diaminopyridine is coupled with diazotized $PhNH_2$ in the presence of a sufficient amt. of dil. HCl to form the dihydrochloride at 12°. The dihydrochloride is then decomposed to the monohydrochloride by addn. of water. An example is given.

Hydroxythionaphthenes. Karl Schirmacher and Ernst Fischer (to General Aniline Works). U. S. 1,797,104, March 17. Hydroxythionaphthenes can be obtained with an excellent yield from compds. of the formula: $\begin{matrix}CX{:}CX.CX{:}C\ \text{alkyl}.\\ CH_2CO_2Z\end{matrix}$ $\begin{matrix}CY{:}CS-\\ \end{matrix}$ wherein X may be H, alkyl or halogen, Y may stand for CN, COOH, COO-metal and Z for H or a metal, by heating them with water to a temp. of 100–200°, preferably 180°, that is to say, by using such *o*-carboxythioglycolic acids, or salts thereof, or *o*-cyanothioglycolic acids as contain in *o*-position to the carboxyl or nitrile group a further substituent, particularly an alkyl residue. If there is no further substituent in *o*-position to the cyanogen group, no hydroxythionaphthene is formed. Examples with details of procedure are given for the production of 4-methyl-6-chlorohydroxythionaphthene and 4,7-dimethyl-6-chlorohydroxythionaphthene. Cf. *C. A.* **25**, 973.

Alkoxy-3-hydroxythionaphthenes. I. G. FARBENIND. A.-G. (Ernst Runne, Karl Moldaenke and Ernst Fischer, inventors). Ger. 515,541, Oct. 9, 1927. Alkoxyarylthioglycolic acid halides of the C_6H_6 or $C_{10}H_8$ series are treated with Al halides in the presence of solvents. Thus, 6-ethoxynaphthalene-2-thioglycolic acid (m. 122°) in C_6H_5Cl is converted to the chloride by addn. of PCl_5. $AlCl_3$ is added at 30–40° and the C_6H_5Cl steam-distd. off. An 80% yield of the corresponding ethoxybenzohydroxythionaphthene is obtained. Further examples are given. Cf. *C. A.* **24**, 379.

4-Alkylquinolines. SCHERING-KAHLBAUM A.-G. (Clemens Zöllner, inventor). Ger. 518,291, Jan. 15, 1927. $PhNH_2$ or its substitution products is caused to react with alkyl-β-haloethyl ketones in aq. acid or alk. soln. in the presence of an oxidizing agent. Thus, 4-methylquinoline is prepd. by heating on the water bath a mixt. of $PhNH_2$ with methyl-β-chloroethyl ketone, concd. HCl, and $PhNO_2$. Other examples are given also.

Anthraquinone and its derivatives. I. G. FARBENIND. A.-G. Fr. 37,337, June 26, 1929. Addn. to 673,825 (*C. A.* **24**, 2757). The transposition products, obtained by treating with alk. or acid agents or by heating the products resulting from the condensation of one mol. of benzoquinone with 2 mols., identical or different, of 1,3-butadiene hydrocarbons, are submitted to a regulated dehydrogenation which may be followed by a more vigorous dehydrogenation. The transposition and the regulated dehydrogenation may be carried out in one operation. 1,4,5,8-Tetrahydroanthrahydroquinone, 1,4,5,8-tetrahydroanthraquinone, their homologs and derivs. prepd. by this process are stated to be new. Cf. *C. A.* **25**, 965.

2-Aroylpyrazoleanthrones. I. G. FARBENIND. A.-G. (Heinz Scheyer, inventor). Ger. 518,120, Apr. 6, 1928. Pyrazoleanthrone-2-carboxylic acid or its *N*-alkyl or *N*-aralkyl derivs., or substitution products of any of these, are converted into the chlorides, and these are condensed with aromatic hydrocarbons or their substitution products in the presence of an acid condensing agent. Examples are given.

***N*-Substituted 3,6-diaminoxanthones.** IMPERIAL CHEMICAL INDUSTRIES. Ger. 515,524, Mar. 3, 1929. See Brit. 314,826 (*C. A.* **24**, 1521).

Phenols. E. PERILHOU. Brit. 338,638, Sept. 11, 1929. Phenols are sepd. from phenolic tar oils by treating the oils with aq. solns. of alkali carbonates under pressure and at temps. above 100°, with continuous escape of CO_2, isolation of the phenates thus formed and then decompn. of them with CO_2 liberated in the process, to regenerate the phenols. Various details of procedure and app. are described.

α-Naphthol. I. G. FARBENIND. A.-G. (Emil Laage, inventor). Ger. 518,409, Apr. 11, 1929. See Fr. 693,596 (*C. A.* **25**, 1539).

Coumarone. GES. FÜR TEERVERWERTUNG M. B. H. and OTTO KRUBER. Ger. 515,546, July 14, 1929. Heavy benzine contg. coumarone, is sulfonated and cooled in the presence of at least sufficient water-absorbing agent (*e. g.*, Ac_2O) to absorb the water formed during sulfonation. The resulting sulfonic acids are then split up by H, causing pure coumarone to sep. Examples are given.

Isatins. DEUTSCHE GOLD- UND SILBER-SCHEIDEANSTALT VORMALS ROESSLER. Ger. 515,542, May 13, 1927. Isatins are prepd. by converting *N*-substituted cyanoformarylides into the corresponding imide compds. at high temps. in the presence of condensing agents, and sapong. the product. Thus, diphenylcyanoformamide is shaken with concd. H_2SO_4. The product is cooled and treated with hot dil. NaOH, to give *N*-phenylisatin m. 140°. Other examples describe the prepn. of *N*-methylisatin, and *N*-ethylnaphthisatin.

Diphenolisatin. G. RICHTER, LTD. Hung. 101,105, Jan. 28, 1930. Isatin is condensed with phenol in dil. mineral acids.

1,2,4-Triazoles. GEORG SCHEUING and BRUNO WALACH (to C. H. Boehringer Sohn A.-G.). U. S. 1,796,403, March 17. Triazoles are in general obtained, *e. g.*, by treating oxime ester, *e. g.*, the benzenesulfonic acid esters of the oximes, with acylhydrazines under conditions under which the esters undergo Beckmann transformation to the imido ester of the corresponding secondary acid amide. Further, triazoles may also be obtained by subjecting oximes to the Beckmann transformation with the aid of acid halides, such as PCl_5, $POCl_3$ and the like and by causing acylhydrazines to react with the reaction product. The same imido compds. and therefore also the triazoles may be obtained from mono-substituted acid amides by acylating the same in their enolic form, *e. g.*, by treating the mono-substituted acid amides with acid halides, such as acid chlorides, and then causing an acylhydrazine to react with the reaction product. The 1,2,4-triazole is formed by the elimination of water from the resulting primary hydrazidine. Numerous examples with details of procedure are given and particular claim is made to *3-methyl-4-xylyl-5-isopropyl-1,2,4-triazole* as a new product, manuf. of which and of various similar compds. is described.

Thymol, etc. SCHERING-KAHLBAUM A.-G. (Hans Jordan, inventor). Ger. 518,209, Aug. 17, 1926. Thymol and its isomers and homologs are prepd. by hydrogenating the phenol-ketone condensation products obtainable as described in Brit. 273,684 (*C. A.* **22**, 1982), the process being continued until 4 atoms of H have been taken up. A phenolate or a compd. giving rise thereto may be present in the reaction mixt., as well as a catalyst promoting hydrogenation. Examples are given. Cf. *C. A.* **25**, 717.

Porphyrin. HANS FISCHER and JOSEF KLARER. Ger. 515,992, Oct. 9, 1926. Addn. to 509,939 (*C. A.* **25**, 716). The method of 509,939, for producing porphyrin by acting on halogenated dipyrrylmethenes with concd. H_2SO_4, is extended to include other acids. Examples mention HCOOH, succinic acid, AcOH and H_3PO_4. Cf. *C. A.* **25**, 716.

Skatole. GES. FÜR TEERVERWERTUNG M. B. H. and OTTO KRUBER. Ger. 515,543, Nov. 10, 1928. Skatole is obtained by treating the tar-oil fraction contg. indole homologs with Na or $NaNH_2$ at temps. above 165°, and sepg. the unchanged oil from the Na indole compds. The skatole is then sepd. from the oil by direct cooling. The mixt. of Na indole compds. may also be treated with CO_2 with exclusion of water, to cause the skatole to sep. Thus, crude indole oil is treated with Na at 190–5°. A stream of dry CO_2 is led in. An oil seps. above the lye. This is cooled to a low temp. to cause solid skatole to sep. Another example is given.

11—BIOLOGICAL CHEMISTRY

PAUL E. HOWE

A—GENERAL

FRANK P. UNDERHILL

A model for the segregation of enzyme from substrate (diastase-starch) in the cell. M. MÜHLBAUER. *Fermentforschung* **12**, 273–94(1931). —The sepn. existing between enzyme and substrate in the living cell and the more or less marked abolition of this sepn. under definite conditions is illustrated with pancreatic diastase and starch as a model. This spatial sepn. in the model is effected by superficially active substances which occur in the cell, such as Na oleate, lecithin, salts of bile acids and cholesterol. With Na oleate the sepn. of enzyme from substrate is brought about by its property of surrounding enzyme and substrate particles and thereby imparting to them a definite and uniform elec. charge. The enveloping film is thus a superficially active substance and the enclosed particles are mutually repelled by similar charges. The sepn. is reversible under biol. conditions. The reversal is best effected by changing the H-ion concn. In a mixt. of diastase and starch without soap, a change in p_H between 6.8 and 8.0 hardly exerts a measurable influence on the rate of digestion. If, however, the system contains soap, a slight change in p_H within these limits is of enormous influence. The time required for disappearance of the starch, as shown by neg. I reaction, may thus be several hrs. at the higher and only a few sec. at the lower p_H. The change in p_H toward the acid side merely removes the protecting soap film from the particles. The addn. of Ca salts has much the same effect, by pptg. the fatty acid as an insol. soap. Other superficially active substances can bring about a reversible sepn. of enzyme and substrate, *e. g.*, alcs. in isocapillary proportions. The hormones, adrenaline, thyroxine and insulin, and the ergot poison, ergotamine, were practically without influence. A. W. Dox

The problem of the specific action of tyrosinase. EMIL ABDERHALDEN AND WALTER SCHAIRER. *Fermentforschung* **12**, 329–32(1931).—Previous expts. with exts. of dried champignon [*Agaricus?*] showed that the tyrosinase present was very reactive toward *p* tyrosine, adrenaline and 3,4-dihydroxyphenylalanine, but inert toward *o*- and *m*-tyrosine. The expts. have now been repeated with practically the same results, except that a slight reddish coloration was noted at the surface of the *o*-tyrosine and 2-amino-tyrosine solns. The same effects were produced by a tyrosinase prepn. from dried potato peelings. On the other hand, exts. of *Russula delica* gave a pos. reaction with *m*-tyrosine, also with *o*- and *m*-cresol. The reaction was neg. with ephetonine, *d*- and *l*-ephedrine and thyroxine. The tyrosine dipeptides, glycyl-*l*-tyrosine, *d*- and *l*-alanyl-*l*-tyrosine, aminoisobutyryl-, *d*-valyl-, *d*- and *l*-norleucyl-, *d*- and *l*-leucyl-*l*-tyrosine and the corresponding haloacyl derivs. all reacted at p_H 6.5 with formation of the characteristic red color. 2,5-Iodo- and 2,5-dibromotyrosine reacted, also *l*-tryptophan, while *d*-alanyl-*l*-tryptophan remained colorless. Possibly the pos. result now obtained with *m* tyrosine is due to the presence of an addnl. enzyme. A. W. Dox

The active group of catalase. II. KARL ZEILE. *Z. physiol. Chem.* **195**, 39–48 (1931); cf. *C. A.* **25**, 119.—The close relationship between porphyrin-Fe content and catalase activity of horse liver ext. is further shown by the constancy of this ratio in prepns. purified by $Ca_3(PO_4)_2$ adsorption, dialysis, $Al(OH)_3$ adsorption, and $Ca_3(PO_4)_2$ adsorption after 76% inactivation. The same relationship is now shown to hold for catalase prepns. from plant sources. Expts. with the fungus, *Boletus scaber*, were unsatisfactory because of low enzyme activity and the presence of hemin in some other form which gave the hemochromogen reaction. A suitable source of plant catalase was found in the cotyledons of germinated pumpkin seeds. The max. activity develops between the 3rd and 6th days of germination. These cotyledons yield an ext. with $^1/_{15}$ the catalase activity of liver ext. The ratio of enzyme to porphyrin-Fe as detd. by the hemochromogen spectrum is approx. 8000, about 3 times as high as that of liver ext. The dissocn. const. of the HCN compd. of pumpkin catalase is about $^1/_3$ that of liver catalase. In both enzymes the active group is probably of similar constitution

A. W. Dox

Activators Z. H. v. EULER AND TORE PHILIPSON. *Z. physiol. Chem.* **195**, 81–100 (1931).—Caffeine, theobromine, xanthine, tryptophan, adenosine, thymidine and hemin, in concns. of 1–5 mg. per cc., have no influence on the rate of fermentation, even in the presence of an activator Z prepn. Plant material from various sources was examd. for the presence of activator Z but the evidence was very slight except in malt germs where the ext. showed practically the same activity as boiled yeast ext. Z consists of 2 factors which are differentiated by their temp. stability and, like vitamin B, are more sensitive to alkali than to acid. Various pptn. and adsorption reactions were applied with a view to purifying the Z factors. A concd. yeast dialyzate was freed from certain impurities by treatment with $Pb(OAc)_2$ and $Hg(OAc)_2$. The filtrate was then used for adsorption expts. Treatment with $AgNO_3 + Ba(OH)_2$ removes some of the activity. Picric acid does not ppt. the activator, since the loss of activity is not restored by recombining the ppt. and filtrate. Addn. of MeAc to 95% gives a ppt. which contains the full activity, and about 40% of the inert material is left in the filtrate. $Fe(OH)_3$ gives a ppt. from which the Z activator can be recovered by elution with 1% KH_2PO_4, but without the preliminary Pb-Hg treatment the adsorption of activator does not occur. The Fe filtrate does not give up its active substance to charcoal, regardless of the p_H of the medium. A good adsorbent is $Ba_3(PO_4)_2$ when this is prepd. in the presence of the activator; otherwise no adsorption is effected. Recovery of the activator from this ppt. cannot be accomplished by elution but requires a decompn. of the phosphate by H_2SO_4. $AlPO_4$ has the advantage of insoly. in AcOH and the activator which it adsorbs can be released by AcOH extn. and thus freed from phosphate. $Al(OH)_3$ gives the same adsorption as $Fe(OH)_3$. The activation of yeast by activator prepns. reaches a max. beyond which further addn. is ineffectual. Bottom yeast is activated to the same extent by the original dialyzate as by the Fe filtrate; hence it is influenced only by that part of the Z activator which is not adsorbed by $Fe(OH)_3$.

A. W. Dox

The nature of the proteases. VIII. Refractometric studies on the activity of various pepsin preparations. I. A. SMORODINTZEV, A. N. ADOVA AND S. S. DROSDOV. *Z. physiol. Chem.* **195**, 113–20(1931); cf. *C. A.* **25**, 1268.—The sol. products resulting from digestion of an insol. protein, such as fibrin, increase the n of the medium. By detg. the n of the soln. after enzyme and substrate have reacted under standard conditions it is possible to compare the activity of various pepsin prepns. Control expts. with enzyme alone show that the more active prepns. have higher n values.

A. W. Dox

Studies on the intermediary metabolism of tryptophan. I. Kynurenine, an intermediary metabolic product of tryptophan. Y. KOTAKE AND J. IWAO. *Z. physiol. Chem.* **195**, 139–47(1931).—When tryptophan is injected subcutaneously into rabbits whose metabolism has been lowered by a regime of polished rice, a product intermediate between tryptophan and kynurenic acid is excreted in the urine. The name *kynurenine* is proposed for this substance. If the kynurenine is present in considerable amt. it can be crystd. out directly as sulfate by addn. of H_2SO_4 and a little Et_2O, but ordinarily its isolation requires a pptn. by phosphotungstic acid or $HgSO_4$ and decompn. of the ppt. by $Ba(OH)_2$ or H_2S. Kynurenine is $o\text{-}H_2NC_6H_4C(CO_2H):CHCH(NH_2)CO_2H$. It m. 190° (decompn.) with previous sintering and darkening, and has $[\alpha]_D^{17} -28.5°$. It forms a *sulfate* which begins to darken at 165° and becomes black at 180°, and has $[\alpha]_D^{18}$ 10.7°. Esterification by satg. the EtOH soln. with HCl gives a *diethyl ester di-HCl salt*. The α-NH_2 is shown by the ninhydrin reaction, and the double bond in

the side chain by the addn. of 2 Br to form a *dibromide*, m. 206–7° (decompn.), which is the lactone of the aromatic NH_2 and the γ-CO_2H, and is thus an indole deriv. Excretion of kynurenine is accompanied by a decrease in kynurenic acid excretion. On the other hand, when kynurenine is fed to rabbits 20–40% may be recovered as kynurenic acid. **II. The cleavage of kynurenine by means of barium hydroxide.** Y. KOTAKE AND M. KIYOKAWA. *Ibid* 147–52.—Kynurenine is very stable to acids and withstands 10 hrs.' boiling with 25% H_2SO_4. It is very unstable to alkalies, splitting off NH_3 and CO_2. After boiling with 1% $Ba(OH)_2$ the products isolated were *o-aminoacetophenone* in 70–81% yield (identified as the HCl salt, m. 264–5°, the Ac deriv. m. 75–6°, the mono-Br deriv. of the latter, m. 157–8°), and kynurenic acid. The reaction is best explained by the intermediate formation of *o-aminobenzoylpyruvic acid*, which on the one hand would yield *o*-$H_2NC_6H_4Ac$ and $C_2H_2O_4$ by hydrolysis, and on the other hand kynurenic acid by enolization and ring closure to the quinoline structure. These products of hydrolysis furnish further proof of the structure of kynurenine (see above). **III. The cleavage of kynurenine by means of sodium bicarbonate solution.** Y. KOTAKE AND G. SHICHIRI. *Ibid* 152–8.—When refluxed with 2% $NaHCO_3$ kynurenine splits of NH_3 and the soln. becomes canary yellow, then orange yellow and soon shows fluorescence. Some *o*-$H_2NC_6H_4Ac$ is formed, but much less than in the cleavage by $Ba(OH)_2$. After removal of this by Et_2O extn., the orange-yellow product may be obtained from the mother liquor by acidifying and again extg. with Et_2O. The substance crystallizes on evapn. of the Et_2O, but is unstable to air, light and heat. Its m. p. varies considerably with different prepns.; hence the substance is probably not pure. Further treatment with $NaHCO_3$ or $Ba(OH)_2$ yields $H_2NC_6H_4Ac$ but no NH_3. When treated with warm water part of the substance dissolves and part forms an oil. A soln. of the latter in Et_2O shows an intense blue fluorescence and yields yellow crystals of *kynurenine yellow*, m. 182°, an unstable substance closely related to kynurenic acid. The orange-yellow product obtained from kynurenine by $NaHCO_3$ cleavage probably consists mainly of *o-aminobenzoylpyruvic acid*, a part of which appears to be present in a condensation form. Kynurenine gives a blue color reaction when its aq. soln. is treated with $PhNHNH_2.HCl$ and $NaHCO_3$, the mixt. heated to boiling, then cooled and treated with concd. H_2SO_4. **IV. The mechanism of kynurenic acid formation in the organism.** Y. KOTAKE. *Ibid* 158–66.—The discovery of kynurenine as an intermediate in the metabolism of tryptophan to kynurenic acid, and the elaboration of its structural formula, furnishes an important link in the chain of reactions involved in the breakdown of tryptophan. The successive reactions are now believed to occur as follows: (1) tryptophan is oxidized to its Py-α-hydroxy deriv.; (2) the pyrrole ring is opened by hydrolysis to γ-*o*-aminophenylglutaric acid; (3) removal of 2H from the glutamic acid grouping yields kynurenine; (4) CO_2 and NH_3 are removed by oxidation, yielding *o*-aminobenzoylpyruvic acid; (5) the tautomeric form of the latter closes to a quinoline ring with formation of kynurenic acid. **V. The formation of kynurenic acid from kynurenine by microörganisms.** G. SCHICHIRI AND M. KIYOKAWA. *Ibid* 166–71.—Synthetic culture media to which kynurenine had been added as the source of N were inoculated with *Oidium lactis* and *Willia anomala* and incubated for 17 and 33–89 days, resp. Both organisms converted part of the kynurenine into kynurenic acid, which was isolated and identified by m. p. and by analysis of the Ba salt. From the mold culture a small quantity of a substance m. 122° was obtained by Et_2O extn.; it was probably anthranilic acid. The yeast culture contained a colored substance possessing the general properties of urochromogen. A medium contg. 2,3 quinolinedicarboxylic acid gave a good growth of mold but no kynurenic acid. From kynurenine the max. yield of kynurenic acid was 60%. The cleavage of kynurenine by yeast is essentially the same as that by the animal organism, and supports the view that the formation of kynurenic acid and urochrome from tryptophan in the animal organism occurs via kynurenine. **VI. The excretion of kynurenic acid in the bile and its stability in the organism.** Y. KOTAKE AND K. ICHIHARA. *Ibid* 171–9.—The path of excretion of the kynurenic acid formed in the organism from tryptophan varies with different animals. With dogs the excretion is often greater in the bile than in the urine, while with rabbits the excretion is entirely in the urine. This explains the variable results reported on dogs where only the urine was examd. Kynurenic acid, after subcutaneous injection as the Na salt, is excreted in both bile and urine by rabbits as well as dogs. It is not utilized by the organism, but is eliminated quantitatively, although only slowly after large doses. Kynurenic acid is not an intermediary product but an end product of tryptophan metabolism. **VII. The site of formation of kynurenic acid in the organism.** K. ICHIHARA, S. OTANI AND J. TSUJIMOTO (WITH COLLABORATION OF Y. OKAGAWA AND T. KIYOMATSU). *Ibid*

179-84.—Tryptophan was administered subcutaneously to dogs that had been hepatectomized after connecting the portal vein to the vena cava by means of a canula. The animals lived 9.5 and 12.5 hrs., resp., at the end of which time the blood and urine were examd. for kynurenic acid. The results were neg. A perfusion expt. in which defibrinated blood contg. kynurenine was passed 18 times through the isolated liver gave an 18% yield of kynurenic acid. In a control expt. without kynurenine no kynurenic acid was obtained. It is evident that conversion of kynurenine into kynurenic acid occurs in the liver. The excretion of kynurenic acid is increased by extirpation of the spleen. **VIII. The question of the origin of urochromé.** Y. KOTAKE AND H. SAKATA (WITH COLLABORATION OF Y. SHIRABE AND S. OTANI). *Ibid* 184-91.—After ingestion of 3 g. of tryptophan the urochrome content of the alloxyproteic acid fraction of the urine, as detd. colorimetrically, nearly doubled. The Ba and Ca salts prepd. from this fraction were easily sol. in H_2O and gave the Pauly diazo and the PbS reactions, but neither the biuret nor the Ehrlich diazo reaction. The N content of the urochrome fraction varied with the intensity of the color. When kynurenine instead of tryptophan was administered the Ehrlich reaction became pos. The urine then had a greenish color which became yellow on standing in the air. The urochromogen or urochrome is formed from tryptophan by way of kynurenine. Oral administration of tryptophan to a patient with pulmonary phthisis gave a marked increase in diazo and urochrome values of the urine. **IX. The effect of tryptophan on experimental anemia and its relation to the spleen.** Y. OKAGAWA and M. TATSUI. *Ibid* 192-202.—The recovery from exptl. anemia produced in dogs by injection of $PhNHNH_2 \cdot HCl$ is somewhat more rapid, as detd. by erythrocyte count and hemoglobin content of the blood, if the animals are given injections of tryptophan every 2 days. If the anemia is produced 25-45 days after removal of the spleen, recovery is less rapid and is not accelerated by the tryptophan treatment. One year after splenectomy the tryptophan treatment is somewhat more effective in curing exptl. anemia. The spleen appears to play some role in the utilization of tryptophan for purposes of blood building. The liver contains somewhat more tryptophan than the kidney. The amts. present undergo practically no change within 40 days after extirpation of the spleen, but after a longer period the tryptophan content of the liver increases. This compensation of spleen function also supports the view that tryptophan can serve as building material for hemoglobin formation. **X. *dl*-Indolelactic acid and its use in nutrition.** K. ICHIHARA AND N. IWAKURA. *Ibid* 202-7.—The indolelactic acid used by Jackson (*C. A.* **21**, 3079) with neg. results as a substitute for tryptophan in feeding expts. was not the *dl*-form as J. supposed but the *l* form as indicated by m. p. The *dl*-acid prepd. by autoclaving the *l*-acid with $Ba(OH)_2$ until optically inactive, and tested by mixed m. p. with synthetic *dl*-acid obtained by reduction of indolepyruvic acid, gives positive results with rabbits. The acid recovered from the urine was mainly the *l*-form, showing that the *d*-acid was actually utilized. Feeding expts. with rats showed that a loss in wt. occurred when the animals received a tryptophan-free ration consisting of hydrolyzed casein, cystine, tyrosine, starch, sugar, salt and agar. When this ration was supplemented by *dl*-indolelactic acid the animals more than made up the loss. Indolepyruvic acid and *l*-indolelactic acid were ineffectual as substitutes for tryptophan. **XI. The effect of methyltryptophan on artificial anemia and nutrition.** Z. MATSUOKA AND T. NAKAO. *Ibid* 208-14.—As measured by increase in erythrocyte count and hemoglobin content and decrease in reticulocytes, the recovery of guinea pigs from exptl. anemia is more rapid with α-methyltryptophan than with tryptophan administered subcutaneously. On the other hand, the feeding of α-methyltryptophan to rats does not compensate a dietary deficiency in tryptophan. The action of methyltryptophan, and probably that of tryptophan, in curing exptl. anemia is independent of their nutritional value.

A. W. DOX

The chemical nature of urease. ERNST WALDSCHMIDT-LEITZ AND FELIX STEIGERWALDT. *Z. physiol. Chem.* **195**, 260-6(1931).—The protein character of cryst. urease brings up the question whether the enzyme is actually a protein or whether the protein is merely a carrier which stabilizes the enzyme. The effect of activators such as amino acids and HCN is to overcome the inhibitory effect of accessory substances, since the activation is observed only with crude enzyme and not with purified or cryst. prepns. The protein is not an essential component of urease, as shown by the fact that proteolysis by pancreatic ext., trypsin or papain-HCN to the point where sulfosalicylic acid no longer gives a ppt. does not diminish the activity of the enzyme. Hydrolytic products resulting from the breakdown of this protein function equally well as carriers of the urease activity. The protein may even be only an accessory concomitant of the pure enzyme.

A. W. DOX

The intermediary metabolism of histidine. III. S. Edlbacher and J. Kraus. *Z. physiol. Chem.* **195**, 267-72(1931); cf. *C. A.* **25**, 118.—In the enzymic cleavage of histidine, previously reported, the products isolated were glutamic acid, HCO_2H and $2NH_3$. The method of isolation, however, involved the use of NaOH and HCl, and the possibility remains that the end products were thus formed from an unknown intermediate. Kauffmaan and Mislowitzer (*C. A.* **25**, 307) have since shown that the use of Na_2CO_3 instead of NaOH yields only $1NH_3$. This observation is now confirmed by E. and K. The possible intermediates glutamine and $HCONH_2$ show the same difference in behavior toward Na_2CO_3 and NaOH. Both differ, however, from the histidine intermediate in that the former is hydrolyzed by dil. HCl while the latter is not. In the progress of the enzymic cleavage of histidine the ratio of NH_3 liberated by Na_2CO_3 to that liberated by NaOH decreases from 0.83 after 2 hrs. to 0.58 after 24 hrs., where it then remains const. The first attack of the enzyme breaks open the imidazole ring and liberates $1NH_3$. The product is probably an amide which is hydrolyzed by NaOH but is resistant to HCl. Whether a further breakdown is due to enzymic action or to a spontaneous decompn. has not as yet been detd. A. W. Dox

An easily cleavable phosphoric acid compound in yeast. Hans v. Euler and Ragnar Nilsson. *Z. physiol. Chem.* **195**, 273-6(1931).—Ext. of dried yeast, after removal of protein by CCl_3CO_2H, contains a substance from which H_3PO_4 is not pptd. by magnesia mixt. and NH_4OH but which gradually forms a ppt. with Embden's reagent. The H_3PO_4 is thus easily split off. The amt. of this complex rapidly diminishes during the first few hrs., but less rapidly in the presence of added Na hexosediphosphate. In the presence of H_3PO_4 it increases while the H_3PO_4 disappears within 2 hrs., then the amt. rapidly decreases. Addn. of creatine retards this synthesis. A. W. Dox

Pepsin. (**Preliminary paper.**) Heinz Holter *Z. physiol. Chem.* **196**, 1-9 (1931).—The early stages of peptic digestion were studied by measuring the changes in viscosity of a 3% casein soln. at p_H 2.3 and 30°. Dil. pepsin solns. were used in order to prolong the initial stage and make possible a greater no. of observations. The viscosity, as measured by timing the flow through a viscometer, decreases in the very first phase of the digestion and soon reaches a min., after which it rapidly increases and attains a sharp max., which is a multiple of the original value. This stage marks the coagulation of the entire casein soln. As the digestion proceeds there occurs a sepn. of phosphopeptone, and with increasing d. of the floccules the viscosity again decreases. The peptic cleavage was followed by means of the Linderström-Lang acid titration in acetone. The initial digestion stage in which viscosity decreases was studied in particular. Viscosity change is not a simple function of cleavage but varies with the nature of the peptide linkages broken. The ratio between cleavage and viscosity is different for different pepsin prepns. but const. for one and the same prepn. The curve can serve for characterization of a pepsin digestion just as the location of p_H optimum toward definite substrates distinguishes different proteolytic enzymes. Studies were made of different pepsin prepns., including Northrop's crystd. pepsin, and fractions obtained by adsorption on $Al(OH)_3$. The sep. fractions give different curves, but when they are recombined the original curve is again obtained. Even the crystd. pepsin is amenable to fractionation. Peptic action is therefore not a simple phenomenon, and the variations noted must be due to differences in the enzyme itself. A. W. Dox

The physiological actions of cozymase. Sven Gard. *Z. physiol. Chem.* **196**, 65-70(1931).—Injection of cozymase into the jugular vein of rabbits under urethan narcosis causes a lowering of blood pressure. This effect is independent of the specific action of cozymase, since inactivation by heating does not diminish it. Pure adenylic acid of yeast is somewhat more active in this respect, possibly because of the fact that cozymase is not an entirely pure adenylic acid. Adenylthiomethylpentose has about the same effect. Introduction of the thiomethyl group into the adenosine mol. apparently does not diminish this special action. In the surviving rabbit heart, on the other hand, cozymase injection is followed by a considerable increase in activity, perhaps on account of dilation of the coronary vessels. Here also there is no difference in effect between active and inactive cozymase. The action of cozymase in lowering the blood pressure is a non-specific effect of adenylic acid or homologous adenosine derivs., which corresponds to that observed by Zipf with muscle adenylic acid. A. W. Dox

Cytochrome. R. Bierich and A. Rosenbohm. *Z. physiol. Chem.* **196**, 87-8 (1931).—The discrepancy pointed out by Shibata and Tamiya (*C. A.* **24**, 3533) between his results and those of B. and R. (*C. A.* **24**, 133) with regard to the influence of KCN in preventing the disappearance of the cytochrome band by oxidation is due to the fact that the cytochrome in the first instance was of vegetable origin (yeast) while in

the 2nd it was of animal origin (rat testes). In animal tissues the B component is oxidized in the presence of KCN while the C and A components remain reduced.
A. W. Dox

The absorption of ultra-violet light by amino acids (fragments of proteins). H. Guthmann, K. Schwerin and F. Stähler. *Strahlentherapie* **39**, 401–41(1931).—In synthetic mixts. of the amino acids corresponding in compn. to albumin, globulin and fibrin, 2 absorption maxima are present, at 300$\mu\mu$ and 250$\mu\mu$, which are the specific bands for the action of the ultra-violet rays on the skin. Tyrosine, phenylalanine and glutamic acid are the substances which absorb the ultra-violet rays very powerfully. In substances of the propionic acid series (propionic acid, alanine, phenylalanine, tyrosine, histidine and tryptophan) the influence of various groups on the absorption power is entirely independent of the mol. wt., but depends on the stereochem. structure of the mol. The most powerful in this respect is the aldehyde group; the activity decreases in the order NH_2, CO_2H, OH.
F. R. Greenbaum

The biologic action of Röntgen rays. Action of Röntgen rays on the potassium and calcium in the blood serum of man. G. Schaal, M. A. Gruschetzkaya and E. J. Zwilichwoskay. *Strahlentherapie* **40**, 111–23(1931).—Röntgen rays caused a change in the quotient K/Ca in the human blood serum. The direction of this change seems to depend upon the time interval between irradiation and blood examn. After the first day of the radiation, the K seems to be increased but later on the Ca seems to be increased. This may account for the following phenomena: fluctuation of a no. of leucocytes, analgesic action, early reactions and poisoning due to Röntgen treatment.
F. R. Greenbaum

Biologic investigations on the transparency of gypsum and mica to ultra-violet. Tomoshige Takagi. *Strahlentherapie* **40**, 189–92(1931).—Light from a Hg-arc lamp which has passed through natural plates of gypsum is very active on blood agar plates as well as on the human skin; light filtered through mica was without action.
F. R. Greenbaum

Effect of hydrogen-ion concentration upon the precipitation of certain basic substances by phosphotungstic acid. Rudolf A. Peters. *Biochem. J* **24**, 1852–5 (1930).—With most bases the pptn. appears upon passing from a more alk. to a less alk. soln., with guanidine compds., this is reversed.
Benjamin Harrow

Inhibition of esterases by excess substrate. David R P. Murray. *Biochem J.* **24**, 1890–6(1930).—Haldane's suggestion ("Enzymes," p. 84(1930); cf. *C. A.* **25**, 720) that the inhibition of certain enzymes by excess of substrate is due to the formation of a non-hydrolyzable complex of the enzyme with 2 mols. of the substrate, has been tested for the esterase of sheep liver and found to explain the facts.
Benjamin Harrow

Crystalline urease: a review. Henry Tauber. *J. Am. Inst. Homeopathy* 24, 366–8(1931).—The literature on urease is reviewed. A bibliography is given.
Joseph S. Hepburn

Prothrombase: its preparation and properties. John Mellanby. *Proc. Roy Soc.* (London) **B107**, 271–85(1930).—Prothrombase is prepd. from oxalated mammalian serum by: (1) pptn. of its globulin complex at p_H 5.3 after diln. with 10 vols. of H_2O, (2) extn. from this complex with a dil. soln. of $Ca(HCO_3)_2$ and (3) pptn. from the resulting soln. by addn. of acid to p_H 5.3. Approx. 40 mg. prothrombase results from 100 cc. plasma; as a rule, 1 mg. of the prepn., after its conversion into thrombase coagulates 100 cc. plasma in 20 sec. Prothrombase is a white amorphous powder giving the characteristic reactions of acid metaprotein; it is insol. in H_2O, readily sol in dil. alkali and not dialyzable through a collodion membrane. Heating at a temp of 100° for 5 min. does not destroy prothrombase, but diminishes the rate at which it may be activated. Activation is produced by addn. of thrombokinase, is initially slow and proceeds with a rapidly increasing velocity, is influenced by the reaction of the medium and the temp., is accelerated greatly by the presence of small quantities of Ca or Sr, and slightly by Ba or Mg.
Joseph S. Hepburn

Porphyrin of component *c* of cytochrome and its relationship to other porphyrins. R. Hill and D. Keilin. *Proc. Roy. Soc.* (London) **B107**, 286–92(1930).—Unmodified cytochrome *c* of bakers' yeast yields 2 different porphyrins. The *one* porphyrin, obtained by the action of HBr and AcOH, is indistinguishable from hematoporphyrin having the following properties of the latter: (1) soly. in Et_2O and AcOH, (2) absorption spectra in Et_2O and in HCl, (3) combination with Fe, various compds. of N, and globin to form hemochromogens or hemoglobins, (4) conversion into protoporphyrin by (*a*) heating *in vacuo*, or (*b*) heating the corresponding hematohematin *in vacuo*, or (*c*) heating the hematohematin in AcOH in a sealed tube. The *other* porphyrin results from the action of HCl in the presence of a reducing agent such as SO_2; it is insol in

Et_2O and AcOH and in $CHCl_3$. Its absorption spectrum may be detd. in either acid or pyridine; its absorption bands lie between those of hematoporphyrin and protoporphyrin, but nearer to those of the former. Recombined with Fe and a N compd. *e. g.*, pyridine, it forms a hemochromogen indistinguishable from that of component *c* dissolved in pyridine. It gradually changes into hematoporphyrin on prolonged standing in HCl in the presence of SO_2. JOSEPH S. HEPBURN

Differential action of x-rays on tissue growth and vitality. II. The biological reaction to x-radiation in relation to a phenomenon called antagonism. WARNFORD MOPPETT. *Proc. Roy. Soc.* (London) B107, 293–301(1930); cf. *C. A.* **24**, 2152; **III. The biological reaction to x-radiation in relation to the area of tissue irradiated.** *Ibid* 302–7. **IV. The biological reaction to x-radiation in relation to time.** *Ibid* 308–12. Some attention is paid to ionization or similar changes in the atom as the result of irradiation. JOSEPH S. HEPBURN

Recent advances in science: biochemistry. P. EGGLETON. *Science Progress* **25**, 393–8(1931).—A review is given of recent work on enzymes, p_H and r_H, and hexose phosphates. JOSEPH S. HEPBURN

Nitrogen peroxide from the mechanical rectifiers of a deep x-ray therapy plant. ROLLO K. NEWMAN. *Med. J. Australia*, May, 1930; Sidney Univ. Reprints Ser. 3, 1, Nos. 45–61, 4 pp.—The air around the mech. rectifiers of an x-ray therapy plant was found to contain sufficient NO_2 to be a source of danger to operators and patients. Efficient ventilation is considered imperative. C. E. P. JEFFREYS

Studies on the biochemistry of sulfur. VI. Cystine content of conphaseolin and phaseolin, the α- and β-globulins of the navy bean (Phaseolus vulgaris). M. X. SULLIVAN AND D. BREESE JONES. *U. S. Pub. Health Repts.*, Suppl. No. 82, 9 pp. (1930); *C. A.* **24**, 4796.—With the highly sp. Sullivan method, it was found that conphaseolin, the α-globulin of the navy bean, contains over 1% cystine, while phaseolin, the β-globulin, if free from the α-globulin, contains little, if any, cystine—a chem. finding in keeping with the results of feeding expts. The β-globulins of the mung bean, the adsuki bean and, to a degree, the lima bean are also deficient in cystine. The α-globulins, on the contrary, are relatively rich in cystine. Since the protein of these beans is mainly the β-globulin, the beans as a whole would tend to be deficient in cystine. Accordingly, in general diets, these beans should be used with foodstuffs rich in cystine, such as meat, fish and eggs. There are 19 references to the literature. **VII. Cystine content of purified proteins.** M. X. SULLIVAN AND W. C. HESS. *Ibid* No. 86, 11 pp. (1930).—The cystine content of 23 purified proteins was detd. by estg. cystine in hydrolyzates. The methods employed were the Sullivan, the Okuda, the Folin-Looney and, with 14 proteins, the Folin-Marenzi (cf. *C. A.* **23**, 4492). With material in which cystine is the predominant S compd., such as wool and serum albumin, the Folin methods and the Sullivan and Okuda methods gave concordant results. In many cases the Folin-Looney and the Folin-Marenzi methods gave higher values. For all the proteins listed, the Sullivan colorimetric method and the Okuda iodometric method gave results of the same order of magnitude, with the Okuda values slightly higher. The Sullivan and Okuda method gave results with the β-globulins of various beans in agreement with feeding expts. which indicate that these globulins are deficient in cystine; the Folin-Looney method gave cystine findings not in such agreement. As judged from the exptl. data, comparison with feeding expts., etc., it would seem that the higher degree of probability of the correctness of the cystine findings is with the Sullivan method, with the Okuda method closely following. It has been found that a mixt. of NH_2 acids such as exist in casein without cystine or other S compds. gives, on heating with acid, a mixt. which reacts strongly pos. in the Folin-Marenzi test for cystine though neg. with the Sullivan and the Okuda methods. There are 25 references to the literature. J. A. KENNEDY

Amylosynthease. SUKEHARU NISHIMURA. *J. Agr. Chem. Soc. Japan* **6**, 160–7, 485 6, 987–90(1930); **7**, 29–35(1931).—The aq. ext. of yeasts contains enzymes which liquefy starch, coagulate the starchy soln. of glutinous rice and polymerize dextrins. The I reaction of amylase degradation products is lessened by the yeast ext. When the yeast ext. was used with amylase the amylolytic action was accelerated markedly. The optimum p_H and temp. for the amylosynthease of the yeast ext. were, resp., 6.2 and 20°. Warming at 55–60° for 10 min. destroys the activity. The synthetic action was proved with a clear soln. of sol. glutinous rice starch. The I color reaction changed from red to violet after 3 days and the ppt. appeared after 4–5 days. The ppt. is difficultly sol. in water and gives a blue-violet I reaction. Amylase causes the ppt. to lose this reaction. Thus polymerization was proved. The yeast ext. was purified with colloidal Fe oxide at p_H 6.5. The purified enzyme was added to achro-

dextrin, in which the I reaction was yellow, and kept for 10 days at 20° and p_H 6.2. The soln. gives a violet-blue color reaction for I-IK. From the soln. the synthesized dextrin was pptd. It was proved by the reactions, the soly., the viscosity and mol wt. to be a polymerized dextrin. The existence of amylocoagulase in the malt ext. could not be verified. But coagulation of starch by the yeast ext. was found at any concn. Amylocoagulase and amylosynthease exist in the yeast ext. Sol. starch was hydrolyzed as much as possible by malt amylase and then the yeast ext. was added. The I reaction became violet after 18 days. The synthesized dextrin was pptd. by alc. The hydrolysis of the synthesized dextrin by amylase was like that of starch.
Y. KIHARA

Proteins of wool. II. MICHIO SAITO. *J. Agr. Chem. Soc. Japan* **6**, 1109-24 (1930).—The wool was treated with 1% HCl under 5 atm. pressure for 5 hrs. Ninety % of the solid matter was dissolved. By fractional pptn. 6 albumoses and a peptone were obtained. These are compared.
Y. KIHARA

Glucuronic acid fermentation. TEIZO TAKAHASHI AND TOSHINOBU ASAI. *J. Agr. Chem. Soc. Japan* **7**, 1-5(1931).—By the fermentative action of *Bact. industrium var.* Hoshigaki on a medium consisting of 1 l. yeast ext., 100 g. glucose and 25 g. CaCO for 30 days, 35 g. Ca hydroxygluconate was obtained. From the filtrate 20 g. Ca gluconate was obtained. By the addn. of MeOH to the filtrate of Ca gluconate, 20 g Ca glucuronate was pptd. Ca glucuronate was proved by the color reactions, sp rotation of the free acid ($[\alpha]_D^{23}$ = −18.5°) and Ca salt ($[\alpha]_D^{23}$ = −24.0°), phenyl osazone, m. 131-2°, *p*-nitrophenylhydrazone, m. 209-10°, Ba salt of *p*-bromophenyl osazone, m. 204-7°, and brucine salt, m. 178-9°. From the fermentation products of *Bact. industrium var.* Hoshigaki on a medium of yeast ext. and Ca gluconate, 5 g. Ca glucuronate was obtained. The bacteria produce glucuronic acid and hydroxyglucomc acid not only from glucose, but also from gluconic acid.
Y. KIHARA

Amylase from wheat. DATTATREYA V. KARMARKAR AND VINAYAK N. PATWARDHAN. *J. Indian Inst. Sci.* **13A**, 159-64(1930).—The amylase from wheat is more active than that from barley. Its optimum temp. is 49-58°; p_H 4.6. Heating the dry enzyme at 160° for 1 hr. destroys its activity, which is not regenerated by adding salts or amino acids. Inactivation results on prolonged dialysis through collodion bags or in the presence of pepsin. Neutral salts and amino acids are without influence.
MARY E. LEAR

Isolation of protein crystals possessing tryptic activity. JOHN H. NORTHROP AND M. KUNITZ. *Science* **73**, 262-3(1931).—A cryst. protein has been isolated from a com. prepn. of "trypsin" which digests casein and gelatin in neutral solns. The digestive power of the crystals is about 10 times that of the most active com. prepns. The activity remains const. through 3 successive crystns. The substance is unstable and may become less active during its prepn. unless proper care is exercised. The process of prepn. of the substance is briefly outlined.
B. S. LEVINE

The action of blood on acetylcholine. K. MATTHES. *J. Physiol.* **70**, 338-48 (1930).—The destruction of acetylcholine by blood is due to the action of an esterase, which is specifically inhibited by eserine and also by fluorides.
J. F. LYMAN

The inactivation of histamine. C. H. BEST AND E. W. MCHENRY. *J. Physiol* **70**, 349-72(1930).—The destructive agent, which is in highest concn. among the tissues of the dog in kidney and intestine, appears to have the properties of an enzyme; the name *histaminase* is suggested. Histamine seems to be destroyed by it through a change involving rupture of the imidazole ring.
J. F. LYMAN

A physicochemical theory of the action of substances on living matter. P. LAZAREV *J. chim. phys.* **28**, 42-8(1931).- It is assumed that the functions of a cell depend on the concn. of the material introduced C_0, and that the sensibility E can be expressed in such measurable quantities as rate of oxygen consumption, speed of nervous reaction, etc. The equation $E = E_c + E_1 \beta C_0(1 - e^{-\alpha t})$ is derived to show the sensibility of the cell at time t, where β is the ratio of the diffusion rate into the cell to the rate out of the cell, the latter being α. The equation is applied to the action of Et_2O on assimilation by chlorophyll and to the action on the nervous centers of substances introduced into the blood.
J. G. MCNALLY

The action of monochromatic light. GUIDO GUERRINI. *Boll. soc. ital. biol sper* **5**, 1098-1100(1930); cf. *C. A.* **25**, 534.—The action of light filtered through colored plates on *S. cerevisiae* in the presence of glucose was studied. The amt. of CO_2 liberated as a function of time was: max. for light filtered through red plates; slightly less for light filtered through yellow plates; still less for light filtered through green plates; and nothing or almost nothing for light filtered through blue plates. Light rays of long

wave length therefore stimulate the action of *S. cerevisiae* in the presence of glucose. PETER MASUCCI

Alcoholic fermentation in liver. VIRGILIO MARTINI. *Boll. soc. ital. biol. sper.* **5**, 1172–5(1930).—Liver pulp, strongly acidified with HCl (0.6–0.7%), and incubated at 37°, undergoes alc. fermentation with the formation of CO_2 and EtOH. The fermentation is caused by some thermolabile factor. PETER MASUCCI

Precipitation of animal proteins. GEORG GRASSER *J. Faculty Agr. Hokkaido Imp. Univ.* **27**, Pt. II, 227–42(1930).—The behavior of solns. of gelatin and egg albumin with a large no. of phenols, naphthols, aldehydes and inorg. salts is tabulated. H. B. MERRILL

Electrokinetic phenomena. III. The "isoelectric point" of normal and sensitized mammalian erythrocytes. HAROLD A. ABRAMSON. *J. Gen. Physiol.* **14**, 163–77 (1930); cf. *C. A.* **24**, 5568.—Published isoelec. points of certain mammalian erythrocytes derived from studies of electrophoretic mobilities are the result of equil. incidental to erythrocyte destruction. This is a study of the mobilities of washed sheep and human erythrocytes in 0.85% NaCl soln. at p_H 3.6 to 7.4 made in 2 min. after prepn. of the suspensions. Under these conditions reversal of the sign of elec. charge did not occur; it occurred only after time had elapsed for the adsorption of the products of red cell destruction. Mobility changes little with decrease of p_H. The reversal of the sign of the charge occurs in the presence of normal and immune (anti-sheep) rabbit sera. The isoelec. point detd. under these conditions is apparently not specifically connected with the immune body but may be incidental to red cell destruction and the presence of serum. The characteristic lowering of mobility by amboceptor, however, occurs from p_H 4.0 to 7.4. The identity of the isoelec. points for normal and sensitized sheep cells is apparently not concerned with the immune reaction. Red cells are probably not covered with a film of albumin or globulin. Serum protein reacts with red cells in acid soln. whereas gelatin does not. Lowering of mobility, usually ascribed to anti-sheep rabbit serum, may also occur, but to lesser degree, in normal rabbit serum. This diminution of mobility is not assocd. with sensitization to hemolysis induced by complement. Only a very small part of the surface of the red cell need be changed to obtain complete hemolysis in the presence of complement. C. H. RICHARDSON

The kinetics of penetration. III. Equations for the exchange of ions. W. J. V. OSTERHOUT. *J. Gen. Physiol.* **14**, 277–84(1930); cf. *C. A.* **24**, 5318.—This is a preliminary attempt to outline the math. treatment of an exchange of ions between the interior of a living cell and the external soln C. H. RICHARDSON

The reversion of protein hydrolysis. A. SARLUY *Arch. néerland. physiol.* **16**, 136–44(1931).—The idea of Wasteneys and Borsook that such simple aromatic compds as benzene, toluene, xylene, benzoic acid or benzaldehyde when added to peptic protein hydrolyzates synthesize proteins is not held by S. It is his belief that the addn. of BzH to these hydrolyzates forms Schiff's base and that the addn. of benzene, toluene and xylene is merely an adsorption phenomenon M. H. SOULE

The action of muscle phosphatase, cozymase and insulin. J. BODNÁR AND B. LANKÓ. *Magyar Orvosi Arch.* **31**, 105–31(1930); cf. *C. A.* **25**, 1889.—The amt. of esterified phosphoric acid increases remarkably if the phosphate concn. is increased; 0.25 g muscle powder (prepd. by Euler's method, from pigeon breast) esterified in max. 11.42 mg. P_2O_5 (4.57%). The original muscle powder is not affected by boiled muscle juice. Muscle powder washed with H_2O at room temp. inhibits considerable of its activity, which is due to the want of cozymase, since the boiled juice increases the phosphoration of the washed powder in the presence of higher phosphate concn. Washed muscle powder esterified 0.63%, washed muscle-powder plus boiled muscle juice 2.03% P_2O_5. The boiled muscle juice not only increases the esterification of the washed muscle powder but it has the power of counteracting the lowering of the optimum caused by the injury of the phosphatase. Boiled yeast juice also has the power of reactivating the esterification of the washed muscle powder. Fresh muscle paste loses its activity in a few hours, but the dry powder keeps rather long. In 5 weeks only 20% of its activity is lost. Insulin has no effect on the power of phosphoration either in fresh muscle paste or in muscle powder. H. TAUBER

Thermal **disaggregation of gelatin** (GERNGROSS, *et al.*) **2.** Chemical decomposition by radiation (HARKER) **3.** A new physicochemical explanation of the formation of humus, peat and coal. The significance of biological factors in these processes (ZOLCINSKI) **8.** Some relations between constitution and odor (ANGELI) **10.**

DOGNON, ANDRÉ: **Compendio de físico-química biológica y médica.** Translated from the French by Germán García. Madrid: Espasa-Calpe. 318 pp.

NEEDHAM, JOSEPH: **A Chart to Illustrate the History of Biochemistry and Physiology.** Cambridge, Eng.: the author. 2 charts. Paper, 10s. 6d. Reviewed in *J. Am. Med. Assoc.* **96**, 1100(1931).

Vegetable albumins. HENRI A. BEAUFOUR. Fr. 695,233, Aug. 30, 1929. Colloidal solns. of the albumins are treated in a salt medium by dialysis and ultrafiltration in 2 successive phases. The 1st phase consists in the use of the phenomenon of dialysis and osmosis or electrodialysis and electroösmosis an ultrafilter membrane of medium porosity is used as dialyzing membrane. Between the 2 phases a large part of the albumin is sepd. by hypercentrifugation; this process depends on the change of mol. state provoked by the dialysis. Cf. *C. A.* **24**, 5951.

Enzymes. ALBERT R. BOIDIN and IVAN A. EFFRONT. Fr. 37,420, May 23, 1929. Addn. to 670,099 (*C. A.* **24**, 2007). The p_H of worts fermented to obtain proteolytic enzymes of high power is corrected during this fermentation as often as necessary by the addn. of compds. of alk., acid or amphoteric reaction.

Enzymes. I. G. FARBENIND. A.-G. Ger. 515,931, Feb. 18, 1928. Enzymes are prepd. by treating the starting material such as milk, latex, etc., with proteases of p_H about 7, sepg. the coagulation product and isolating the enzymes therein in the usual manner. Cf. *C. A.* **24**, 4186.

B—METHODS AND APPARATUS

STANLEY R. BENEDICT

A simplified method for quantitative tissue culture in vitro. MACHTELD SANO AND LAWRENCE W. SMITH. *Proc. Soc. Exptl. Biol. Med.* **28**, 282–4(1930).—The tissue is grown in media contained in a special chamber consisting of a Pyrex glass ring 3 in in diam., 5–6 mm. high, with parallel flat ground surfaces, 2–3 mm. in thickness. Thin sheets of mica 3¼ in. in diam. form the top and bottom of the chamber; they are held in place by rims of petrolatum. The chamber is kept in a 4 in. Petri dish. The method permits the examn. of the growing tissue with high-power microscopic objectives, quant. growth is possible and the tissues may be fixed and stained without distortion.
C. V. BAILEY

Micro method for the determination of cystine in proteins. A. D. MARENZI *Compt. rend. soc. biol.* **104**, 405–7(1930).—See *C. A.* **24**, 5049. E. J. C.

The methylene-blue staining of yeast cells and studies on the permeability of the yeast-cell membrane. I. HERMANN FINK. *Z. physiol. Chem.* **195**, 215–40(1931), cf. *C. A.* **24**, 4354.—A crit. study was made of the methylene-blue-staining method commonly employed for distinguishing between living and dead yeast cells, and also a study of the permeability of the cell membrane. Both the quantity of dye taken up by the yeast and the no. of cells stained depend on the p_H. For one and the same yeast quite different values may be obtained for the no. of "dead" cells according to whether the yeast is taken directly from the fermented substrate or given a subsequent treatment with tap water. The influence of salts on the methylene-blue staining is still more important. In distd. water the no. of stainable cells rapidly increases while in tap water it remains practically const. during the same period of time. This difference becomes enormous when sugar is also present. In a few min. as many as 98% of the cells in the salt-free sugar soln. are stained deep blue, while in tap water the presence of sugar has little influence. This result is not to be interpreted in the sense of the methylene-blue method as the death of the cells, but must be considered from the standpoint of a change in permeability of the cell membrane. By the brief sojourn in an electrolyte-free sugar soln. the cells or their membranes are so altered that the methylene blue can penetrate. These cells thus prepd. for the reception of dye and easily stained deep blue are sound and capable of proliferation. They are not killed until the dye has actually penetrated. The predisposition to reception of dye can be completely removed again by a small addn. of salt. The same phenomena are evoked equally by glucose, fructose, sucrose and galactose; maltose is somewhat less effective. They are more pronounced with brewer's yeast than with baker's yeast. The results were confirmed and extended in eudiometer expts. In electrolyte-free mixts the fermentation velocity was less than in the presence of salts. If methylene blue was also present in the system the fermentation was strongly inhibited. This inhibition is almost completely overcome by salts, the activity of their ions following essentially the order of the Hofmeister series.
A. W. DOX

The microdetection of alkaloids. G. D. LANDER. *Am. J. Pharm.* 103, 100–3 (1931).—See *C. A.* **24**, 5048. W. G. GAESSLER

Studies on the specificity of Asher's method for testing thyroid gland function by oxygen want. LEON ASHER AND HANS WAGNER. *Z. ges. exptl. Med.* **68**, 32–81(1929).

F. L. DUNN

The chemical detection of adrenaline in the blood. G. VIALE. *Boll. soc. ital. biol. sper.* **5**, 1163–7(1930).—To 1 cc. of blood add 1 cc. of satd. $HgCl_2$ acidified with traces of HCl (p_H = 6). Filter; add to the filtrate a few drops of satd. sulfanilic acid and satd. KIO_3 soln.; boil. The soln. develops a rose color. The reaction is always pos. with blood; occasionally with lymph; neg. with cerebrospinal fluid. The reaction is not given by urea, uric acid, tyrosine, tryptophan, indole, cholesterol, ephetonine, nor by the products of acid hydrolysis of egg white. Animal expts. indicate that the reaction is given by adrenaline. Since the blood of dogs deprived of the suprarenal capsules also gave a pos. reaction, the hypothesis is advanced that the reaction is also given by precursors of adrenaline, substances contg. the pyrocatechin group. The reaction may be used as an index of the amt. of adrenaline in the blood, by estg. the quantity colorimetrically. It is sensitive in a diln. of 1 to 30 million.

PETER MASUCCI

Preferred methods for the clinical determination of glucemia. LUIGI PINELLI AND ATTILIO CORBIA. *Biochim. terap. sper.* **18**, 19–33(1931).—The methods of Folin-Thivolle, Hagedorn, Hartmann-Schaeffer, Ionesco-Matiu and Bertrand-Silvestri are described and the results compared. Generally, the methods based on the reduction of Fe salts give higher results than the Cu methods. The av. figures for normal persons by the method of Folin are 0.085, by Hagedorn 0.135, Ionesco 0.162, Schaeffer 0.076 and Bertrand 0.085%. The av. in diseases was 0.088, 0.105, 0.157, 0.085 and 0.094, resp. The Ionesco method gave in some cases results 4 times as high as those by the Folin method.

A. E. MEYER

Estimation of Fe in biological material (HILL) 7.

OSGOOD, EDWIN E., AND HASKINS, HOWARD D.: Laboratory Diagnosis. Philadelphia: P. Blakiston's Son & Co. $5.

Determination of albumin according to Esbach. J. VÁSÁRHELYI. Hun. 101,531, Dec. 21, 1929. Esbach tubes that can be used in centrifuges are specified. They reduce the time required for the detn. to a few min. instead of 24 hrs.

C—BACTERIOLOGY

CHARLES B. MORREY

Microbic dissociation with reference to the attenuated tubercle bacillus of Calmette and Guerin (B. C. G.). R. S. BEGBIE. *Edinburgh Med. J.* **38**, 174–82(1931).—Evidence is presented for the dissocn. of B. C. G. into intermediate, rough and smooth types. By guinea-pig inoculation the virulence is found to increase in the order named. A fresh culture of B. C. G. on glycerol bile potato medium is less virulent than a subculture on Dorset's egg medium.

RACHEL BROWN

Experimental and applied studies in electrosterilization. I. LOUIS I. GROSSMAN AND J. L. T. APPLETON, JR. *Dental Cosmos* **73**, 147–60(1931).—With oral bacteria and a clinically tolerated dosage of current (30 ma.-min.), greater antibacterial effect was uniformly obtained from an electrolyzed soln. than from the same soln. without electrolysis. The antibacterial effect always was greater at the anode. ZnI_2 was more efficient than KI. Of approx. 50 solns. tested, the greatest antibacterial effect compatible with tissue tolerance was given by 1 *M* ZnI_2 in 0.1 *M* I; this soln. had no greater irritant action than 0.85% NaCl soln. The action exerted was bactericidal and due directly to the action of the electrolyzed compd., and not to a change in the reaction of the medium. **II. Relative antibacterial effects of different electrodes used in electrosterilization.** *Ibid* 250–3.—The antibacterial effect depended upon both the electrode and the electrolyte. With NaCl as the electrolyte, a Zn electrode gave a greater antibacterial effect than an Ir-Pt electrode. With either $ZnCl_2$ or ZnI_2 + I_2, both types of electrode gave similar results. As electrode material Wipla steel was more efficient than Pt, less efficient than Zn. Both Zn and Zn-coated electrodes were slightly corroded by 1 *M* ZnI_2 in 0.1 *M* I, while an Ir-Pt electrode was unaffected. **III. Single- and multiple-electrode studies.** *Ibid* 370–3.—The antibacterial effect from a single electrode is greater than that from each of the 2 or 3 electrodes constituting a multiple electrode. Each constituent of a multiple electrode has practically the same effect.

JOSEPH S. HEPBURN

Theories of the bacteriophage. JULES BORDET. *Proc. Roy. Soc.* (London) **B107**, 398–417(1931).—The bacteriophage is not a virus, but its intense action represents

merely the pathol. exaggeration of a normal function connected with mutation, the lysis being a transmissible autolysis. JOSEPH S. HEPBURN

Modification of the Morse-Kopeloff culture of anaerobes. ARAO ITANO AND SACHIO ARAKAWA. *J. Agr. Chem. Soc. Japan* **6**, 996-8(1930).—A mixt. of 0.5–1.0 g. pyrogallol and 10–15 cc. 10% KOH was put in a Petri dish, and covered by another dish with agar culture medium. The dishes were sealed with Toma tape. This is a convenient method for the culture of *Clostridium pastorianum* and of thermobacteria at 60–5°. Y. KIHARA

The influence of soaps on the germicidal properties of certain mercurial compounds. BETTYLEE HAMPIL. *Am. J. Hyg.* **13**, 623–37(1931).—The presence of Na oleate or a mixt. of soaps such as Lux in concn. of 1% or over greatly increases the toxicity of $HgCl_2$ to virulent staphylococci at 37°. Smaller quantities of soap gave varying results; large amts. were no better than 1%. Destruction of the bacteria occurred in 5 min. The fact that there is no toxicity is not due to increased absorption due to the soap influencing the membrane, for it makes no difference whether the soap and the mercurial are used together or in any order. Some other organisms were not affected by the soap and for some its presence was protective. Soap increases the action of $HgBr_2$ and $Hg(NO)_2$ in some instances, particularly for *Staph. aureus*. The toxicity of $Hg(CN)_2$ and *o*-chloromercuriphenol is increased 3 to 4 times by soap. G. H. W. LUCAS

Germicidal efficiency of soaps and of mixtures of soaps with sodium hydroxide or with phenols. J. M. SCHAFFER AND F. W. TILLEY. *J. Agr. Research* **41**, 737–47 (1930).—Coconut-oil soap is the only common soap with significant germicidal activity at room temp. Its activity against most of the organisms tested is comparatively low but in the absence of org. matter it manifests a very high germicidal activity against *Pasteurella avicida* and *P. suiseptica* and some strains of hemolytic streptococci. In the presence of org. matter, however, its activity toward these organisms is relatively low. The addn. of NaOH to solns. of neutral coconut-oil soap increases the effectiveness of the solns. against the various bacteria tested. Coconut-oil soap, castor oil soap or linseed-oil soap when mixed with various phenolic compds. in the proportion of 1 part of soap to 2 parts of phenol considerably increased the germicidal efficiency of the phenols in the absence of org. matter. In the presence of milk or blood serum such increases were comparatively small. Germicidal soaps made by adding cresol, commercial cresylic acid or orthophenylphenol to coconut-oil soap are efficient against *Staphylococcus aureus* even in the presence of milk or blood serum. There is no satisfactory explanation of the germicidal activity of soaps, or of their action in enhancing the germicidal activity of phenols. W. H. ROSS

A System of Bacteriology in Relation to Medicine. Vol. VII. Virus Diseases and Bacteriophage. Issued by Medical Research Council at London. New York (551 Fifth Ave.): The British Library of Information. 509 pp. $6. Reviewed in *Am. J. Pub. Health* **21**, 462; *Nature* **127**, 265(1931).

D'HERELLE, F.: **The Bacteriophage and Its Clinical Applications.** Translated by George H. Smith. London: Baillière, Tindall & Cox. 254 pp. 18s. Reviewed in *J. State Med.* **39**, 248(1931).

D—BOTANY

THOMAS G. PHILLIPS

Changes in the phosphorus content of growing mung beans. JAMES E. WEBSTER AND CLAUDE DALBOM. *J. Agr. Research* **41**, 819–24(1930).—A study of the P content of the various aerial organs of the mung bean as the plant grew to maturity shows that the stems and branches have a greater proportion of total inorg. P than is found in the leaves. The decrease in total P is much larger than the decrease in ash content. There is a relatively small change in the amt. of inorg. P in any one organ as the plant matures. There are indications that the P taken into the plant is metabolized to org. forms for storage. Lipoid P constitutes only a small fraction of the green plant and changes little during growth. There is only a slight change in the total P content at harvest times, so that differences of 2 or 3 weeks would make only negligible changes in the P feeding value. There is no evidence that P is transferred from the leaves and branches to the stems, and it is assumed that the localization of P follows the normal ash intake and is not the result of metabolic activities. J. R. ADAMS

The chemical composition of Ambrosia trifida at successive growth stages. R. B. DUSTMAN AND L. C. SHRIVER. *J. Am. Soc. Agron.* **23**, 190–4(1931).—The crude protein, N-free ext. and ash content of *Ambrosia trifida* are high well up to the time of

bloom while the fiber is correspondingly low. This plant might be made to yield considerable amts. of forage of high nutritive value because of its leafy nature and the high N content of the leaves. J. R. ADAMS

Guttation and its relationship to nitrates and other salts in the nutrient medium. A. DRAGHETTI. *Ann. staz. sper. agr. Modena* [N. S.], 1, 123–32(1930).—Wheat plants were cultivated on nutrient media contg. several salts, and the quantity of liquid obtained by guttation was measured. This quantity always reaches a max. in the 4th or 5th day of culture. When the nutrient soln. contains Ca, Na, NH_4 or K nitrates, the guttated liquid gives the nitrate reaction, but when Ba or Sr nitrates are present, the NO_3 reaction is not obtained. G. A. BRAVO

Morphological, biometrical and chemical notes on the cherries cultivated in the Modena Province. G. D'IPPOLITO AND E. ALBERTI. *Ann. staz. sper. agr. Modena* [N. S.], 1, 189–202(1930).—The chem. analyses of the cherries made by Berard, Fresenius and Richardson are given (without bibliography) and the morphological characters of 11 varieties of cherries (derived from *Cerasus avium* L.) are described. G. A. B.

Effect of turbulence (of the atmosphere) on the carbon-dioxide exchange in plants. P. LEHMANN. *Fortschritte Landw.* 4, 745(1929).—Variations in the CO_2 content of the air at short intervals and under varying conditions are recorded. The effect of wind velocity, temp. and environmental conditions on local changes in the moisture and CO_2 contents of air and the resulting influence on the CO_2 assimilation of plants, are discussed. B. C. A

Cyanogenetic glucosides in Australian plants. II. (a) Eremophila maculata. HORACE FINNEMORE AND CHARLES BERTRAM COX *J. Proc Roy. Soc. N S. Wales* 63, 172–8(1930).—Prunasin (cyanogenetic glucoside) has been isolated from the bark of *Prunus serotina*, and its identity with the glucoside now isolated from *Eremophila maculata* has been confirmed by the mixed m.-p. method **(b) Presence of enzymes in fodder plants as a factor in the poisoning of stock.** SUZANNE K. REICHARD. *Ibid* 179–82(1930).—The isolation of sambunigrin and prunasin has afforded the opportunity of testing, by means of these cyanogenetic glucosides, for the presence of enzymes in plants capable of decompg. them, and liberating the HCN which they contain. Investigation of *E. maculata* showed that the sample of dried plant employed contained practically no enzyme, and that, therefore, only a trace of HCN was liberated, and, in spite of the presence of an exceptionally large amt of glucoside, there still remained some doubt whether this plant was poisonous or not. Another plant, *Heterodendron oleaefolium*, recently submitted for examn., similarly contained a large amt. of cyanogenetic glucoside, but insufficient enzyme to give a positive reaction until enzyme from another source had been added. In this particular case it has been recorded by Petrie that only 1/3 the amt. of acid was liberated before the addn of enzyme (emulsin). Some of Petrie's work has been repeated, notably that involving amygdalin and its splitting enzyme β-amygdalase. The case with which prunasin and sambunigrin are decomposed, as compared with amygdalin by the enzymes of plants, is shown, and the significance of the presence of enzymes in fodder plants is illustrated W. O. E.

Membranes of spores and pollen. II. Lycopodium clavatum L. 2. FRITZ ZETZSCHE AND HANS VICARI. *Helv. Chim. Acta* 14, 58–62(1931); cf. *C. A.* 22, 2949.—The sporenin from lycopodium spores previously described was not free from cellulose and ash The cellulose could not be entirely removed by Schweitzer's cuprammonium reagent Treatment with 85% H_3PO_4 gave a cellulose-free product; so did 75% H_2SO_4 but some sulfonation took place Ash was reduced to < 0.2% by concd HF. Hydroxyl groups were detd. by acetylation. The formula is fixed as $C_{90}H_{127}O_{12}(OH)_{15}$. The yield was 23.8% of the spores. **III. 2. Picea orientalis, Pinus silvestris L., Corylus avellana L.** *Ibid* 62–7.—Qual. tests on many pollens showed that their hulls or membranes are similar chemically to lycopodium-sporenin, and the name *pollenin* is proposed for such compds. Three were isolated by treating the pollen successively with volatile solvents, KOH, H_3PO_4 and HF, and their formulas detd. as: *Picea* pollenin, $C_{90}H_{146}O_{25}$; *Pinus* pollenin, $C_{90}H_{144}O_{24}$ or $C_{90}H_{131}O_{11}(OH)_{13}$; *Corylus* pollenin, $C_{90}H_{188}O_{22}$. The yields were, resp., 21.9, 20.0 and 7.3% of the pollens. **IV. 3. Fossil sporopollenins from Tasmanite and Russian lignite.** FRITZ ZETZSCHE, HANS VICARI AND GUSTAV SCHÄRER. *Ibid* 67–78.—Fossil spores and pollens have been found in many coals and oil shales. Selected specimens of a Tasmanian oil shale, tasmanite, were ground and the organic material was sepd from the sand by floating on CCl_4. Clay was removed by shaking with soap soln. The crude sporopollenin, *i. e.*, mixt. of spore and pollen membranes, obtained was purified as previously described. The yield was 17% of a substance with the probable formula, $C_{90}H_{134}O_{18}(OH)_2$, for which the name *tasmanin* is proposed. From a lignite from the Tschulchowsky deposits near Skopin

8.5% of a fossil sporenin, $C_{10}H_{11}O_{12}(OH)_6$, was isolated. This is believed to be derived from macrospores of the genus *Bothrodendron;* hence the name *bothrodendrin* is proposed for the compd. A S-contg. sporenin was also present. Recent lycopodium sporenin and fossil bothrodendrin dissolve in concd. HNO_3 in 12–24 hrs. at room temp.; tasmanin requires 3 weeks. This is attributed to the decreased no. of OH groups making it more paraffin-like in character. L. E. Gilson

Biochemistry of tomato pigment. H. von Euler, P. Karrer, E. von Krauss and O. Walker. *Helv. Chim. Acta* **14**, 154–62(1931).—Green tomatoes kept at 20–1° ripened normally in a few days, developing the usual red lycopin coloring. At 30° they developed only a yellow color. Tests showed carotene, xanthophyll and an unidentified yellow flavone dye but no lycopin. At 37° they turned yellow and spoiled rapidly. Light, or its absence, has no effect on the rate of coloring. It is believed that lycopin is formed by an enzyme action which is inhibited by the higher temp. The pigment of the naturally yellow variety of tomato, "Golden Queen," was studied. Dried skins from vine-ripened fruit contained 0.021 g. carotene and 0.0053 g. xanthophyll per kg. but no lycopin. A considerable amt. of a yellow flavone dye, insol. in CS_2, sol. in alk., was also present. This has not yet been identified

L. E. Gilson

The significance of iodine in (plant and) human metabolism. J. Stoklasa *Z. Ernähr.* **1**, 3–15(1931).—I is absorbed by many plants in comparatively large quantities and changed to org. I. The I-satd. plants have an important pharmacol. significance and can well be used in place of org. I. The I aids the oxidation processes in plants and animals and hinders a rise in H-ion concn. in the individual organs. *The I absorbed by plants* accumulates chiefly in the chlorophyll-rich portion of the plant. For expts. on the absorption of I by plants and its distribution in org. and inorg. form, the following data are given. The p_H of the soil was 6.68–7.36 High org. and inorg. soil I were closely correlated with high org. and inorg. plant I in the cases of *Cucumis sativus, Solanum lycopersicum, Raphanus sativus, Rheum undulatum* and *Spinacea oleracea* For example, the fruit of *Cucumis sativus* gave 1300 parts per billion of total I with a soil content of 236; and 2600 parts per billion with a soil content of 859. The p_H values of the juices from the roots of various plants are given. By I fertilization the p_H is raised. The author, after 14 days on a diet of plants high in I, noticed a lowering of the H-ion concn. of the urine from p_H 4.8 5.2 to 5.6 6.2. By the feeding of silk worms with leaves high in I a 65–85% increase in the no. of eggs laid was obtained Thirty-three references are given. Francis P. Griffiths

Organic matter given off by algae. August Krogh, Eugen Lange and Willi. Smith. *Biochem. J.* **24**, 1666–71(1930). —Culture expts. show that the org. material synthesized by the assimilation of freshwater algae is almost quantitatively stored in the cells of the algae. Benjamin Harrow

Determination of maltose in plant extracts by maltase. Nadigar Narasimhamurty and Motnahalli Sreenivasaya. *Biochem. J.* **24**, 1734–6(1930).—The enzyme ext. was prepd. from finely ground brewer's yeast desiccated over P_2O_5 by treating the material with 10 parts of a 5.8% soln. of Na phosphate at 20° for 14 hrs. The ext was centrifuged for 10 min., the filtrate neutralized to litmus with 4% KH_2PO_4 and preserved at 0°. This maltase ext. can be used for estg. maltose in mixts. of sugars occurring in plant exts. and tissue fluids. Benjamin Harrow

Accumulation of electrolytes in plant cells. A suggested mechanism. G. E. Briggs. *Proc. Roy. Soc.* (London) **B107**, 248–69(1930).—"A possible scheme, based on alternating phases, one of greater permeability to anions and the other of greater permeability to cations, is suggested to explain the accumulation of ions." J. S. H.

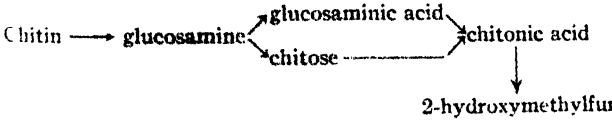
Alteration of the iron in chloroplasts due to chemical treatment. Hans Griessmeyer. *Planta, Abt. E., Z. wiss. Biol.* **11**, 331–58(1930).—When leaves of certain cereal plants were exposed in darkness to such vapors as SO_2 and fuming HNO_3 and to solns. of KCN and NH_4CNS the sol. Fe in the plastids increased at the expense of the insol. Fe. Plasmolytic tests with KNO_3 immediately after treatment showed that the leaf cells had not been killed. In contrast, treatment with ether and phenylurethan failed to increase the sol. Fe. Placing leaves in an Fe soln. increased the Fe content of the plastids. Leaves lacking a normal green color due to etiolation, variegation or to lack of Fe all contained a normal amt. of Fe in the plastids. But after treatment with the chemicals previously mentioned, these abnormally colored leaves behaved the same as normal green leaves in regard to an increase in sol. Fe. These results are offered as direct evidence for the participation of Fe in photosynthesis. A. E. H.

Experiments on the influence of iron salts on the pigments of chlorophyll. T. N.

GODNEV, S. K. KORZHENEVSKII AND M. H. GONCHARIK. *Ann. Weissruth. Staatl. Akad. Landw. Gory-Gorki* 9, 126–35(1929).—In expts. with *Pisum sativum* in culture solns. it was found that there was no proportional relation between the Fe taken up from the soln. and the coloring matter in the plants as was the case in maize. Fe is not of immediate importance for the building of chlorophyll; it is rather important primarily in the metabolic activity of the plasma. Fe enters as a constituent part of the chlorophyll mol.
J. S. JOFFE

Limiting factors in photosynthesis. V. A. CHESNOKOV AND E. N. BAZUIRINA. *Comp. rend. acad. sci. U. R. S. S.* No. 8, 193–8(1930A).—Ch. and B. analyze the theory of Blackman (*Ann. Botany* 19, 28(1905) and *Proc. Roy. Soc.* (London) B76, 402(1905)) on the influence of direct and indirect factors on photosynthesis as it is based on the Liebig law of minima. They question the character of the optimum curve as expounded by Blackman. An increase in the temp. of the medium which surrounds the leaf, according to Blackman, causes a series of changes in photosynthesis. Two groups of changes are noted; one corresponds to an increase in photochem. activity following the van't Hoff reaction. The other one has to do with some processes in the plasma. Both influences take place simultaneously and the curve is a result of that. They point out that the temp. of the leaf itself and not the external temp. of the medium is responsible for the thermal increase in reactivity. In general they consider that all the factors in photosynthesis are nothing more than indirect factors. From the expts of Warburg and Negelein (cf. *C. A.* 16, 3929–30) it is apparent that the coeff. of utilization of light is very high even with a small light intensity, which shows that light influences other processes which in turn change the velocity of photochem. reactions. As an increase in the temp. of the leaf takes place, there is an increase in transpiration, dehydration of the plasma, a change in the penetration of CO_2 in the plasma, etc The only rational way of investigating external factors is to det. the direct limiting factors. Such factors may be found in the internal system of the plant. They criticize the work of Lundegårdh on the effect of CO_2 concn. and intensity of light on photosynthesis. They do not consider the CO_2 or light as the limiting factors. It is the velocity of the penetration of CO_2 in the plasma that is responsible for the changes observed. They explain Lundegårdh's expts. as follows: Under the influence of light an increase in the penetration of CO_2 in the protoplasm takes place. This causes the chloroplastids to take up more moles of CO_2 and photosynthesis is speeded up. The same takes place with an increase in the concn. of CO_2. Thus the min. is the CO_2 entrance in the plastids. They prove their point with the results described by Warburg. They conclude that Lundegårdh's new theory does not overthrow the fundamentals of Blackman, if the latter's theories are analyzed in the light of the authors' contention that it is the internal influences which are responsible for the behaviors noted. J. S. JOFFE

The fermentation products of molds. VIII. Aspergillus glaucus. YUSUKE SUMIKI *J. Agr. Chem. Soc. Japan* 6, 1153–65; *Bull. Agr. Chem. Soc Japan* 6, 105–6 (1930); cf. *C. A.* 24, 3812.—In the culture of *A. glaucus* 2 hydroxymethylfuran-5-carboxylic acid (m. 163°) was produced and identified as the mono-Ac deriv. (m. 115°). It was not obtained in the culture solns. of gluconic acid and hydroxymethylfurfurol, but glucosamine, glucosaminic acid and chitose or chitonic acid were. The source of 2-hydroxymethylfuran-5-carboxylic acid may be chitin in the mold.



Y. KIHARA

Phytin and the methods of its preparation. N. E. ZELIGSON. *Trans. Sci. Chem.-Pharm. Inst.* (Moscow) No. 23, 4–81 (in German 82–3)(1930).—A monograph contg. a review of the literature, a restatement of the most reliable methods for the estn. of the constituent element of phytin and a description of a new method for the double combustion of C. A new method is offered for the estn. of the mineral phosphoric acid in phytin by pptn. with molybdic soln. in the cold. The following detns. were made: total phosphoric acid, mineral phosphoric acid, phosphoric acid added to phytin previously freed from mineral phosphates, phosphoric acid in org. combination, C and H, bases (Ca and Mg, Na and K, NH_4), Fe and Mn, Na and moisture. Analysis of several samples of phytin and a study of the Ba, Ca, Na, strychnine and borax salts of inositol phosphoric acid were made. Inositolhexaphosphomolybdic acid was given

some consideration analytically. Summaries in Russian and in German are appended.
B. S. LEVINE

Physico-chemical studies of rice produced in Gifu province. HANNEMON ITO, TATSUO WATANABE AND MASUO KITAHARA. Gifu Imp. Coll. of Agr. (Japan), *Research Bull.* 13, 48 pp.(1930).—Rice with high protein content is generally harder. The protein content of rice of poor quality is generally high, but grain of superior quality is high in fat. The fat of rice varieties adapted to growth in colder regions is higher in acid value than the varieties requiring warmer climate. Elementary analyses of the glutelin and globulin of rice showed the following values:

	C %	H %	N %	S %	Ash %	Isoelectric point, p_H
Glutelin	50.6–53.3	7.0–7.7	16.5–17.3	0.53–0.64	0.31–0 79	6.2–5.0
Globulin	50.8–52.5	7 0–7.6	16.5–17.3	0.44–1.15		5.5–4 6

K. KITSUTA

The role of iron and copper in the growth and metabolism of yeast. C. A. ELVEHJEM. *J. Biol. Chem.* 90, 111–32(1931).—The yeast was grown in a modified Wildiers medium, the constituents of which were purified so that they were practically Fe and Cu-free. Addn. of a small amt. of Fe accelerates the rate of yeast growth, increases the cytochrome content to the amt. normally present in com. yeast, and increases the respiratory quotient to Q_{O_2} values of 35–40. Addn. of both Cu and Fe causes a further increase in the growth rate and the production of cytochrome with a distinctly higher *a* component. Cu has the property of stimulating the formation of certain hematin compds. 0.02 mg. of Cu per 200 cc. of medium is the optimum amt for stimulating the formation of cytochrome *a* and additional amts. inhibit cell growth during the 1st 48 hrs. The toxic effect disappears as the no. of cells per unit of medium increases. The ratio of available Fe to the amt. of yeast present determines the Fe content of the yeast. Yeast low in inorg. Fe is unable to assimilate Fe from a phosphate buffer at p_H 7.0 but readily takes up Fe at p_H 4.0. Thus, the availability of Fe may be the limiting factor in many of the synthetic media which have been used for studying the growth requirements of yeast, Q_{O_2} values of 35–40 in 48-hr. cultures decrease to 15–20 when the culture is 6–7 days old because of the high acidity of the medium. At least 80% of the respiration is inhibited by KCN at 48 hrs. of age but the KCN-labile portion gradually decreases and after 7 days the O_2 uptake is completely unaffected by KCN. The KCN-stable system metabolizes glucose, is destroyed by heating to 60° and is inhibited by urethan to the extent of 70%. The respiration of yeast grown on beer wort, which prevents the development of high acidity, is largely inhibited by KCN. The total respiration of yeast grown on wort may be low on account of an insufficient supply of Fe in the beer wort. Bios stimulated the growth rate to a small extent but had no effect on the respiratory activity. The activity of bios is not so noticeable when the medium is maintained at the proper p_H. Further work will be required to det. whether the effect of bios can be eliminated entirely by regulation of acidity or whether it actually stimulates yeast growth but in either case the effect will be closely associated with the availability of the Fe. Bibliography of 23 references.
A. P. LOTHROP

The non-volatile organic acids of green tobacco leaves. HUBERT B. VICKERY AND GEORGE W. PUCHER. *J. Biol. Chem.* 90, 637–53(1931); *Connecticut Agr. Expt. Sta. Bull.* 323, 155–202.—The existing methods for the *detn. of the org. acids in plant tissues* have been so modified as to make possible approx. quant. isolation and positive identification of the predominating acids. The acids are initially pptd. as Ba salts in the presence of dil. alc. rather than as the Pb salts by basic Pb acetate. In tobacco leaf exts. only about ½ of the total titratable acidity consists of acids of the familiar types such as malic, citric, succinic and fumaric. The remainder is due to acidic substances, the nature of which has not been detd. although part appears as phenolic acids. On account of the presence of these substances, indirect methods for the detn of oxalic, citric and malic acids, such as those of Kissling and of Fleisher, do not yield trustworthy results. Bibliography of 29 references.
A. P. LOTHROP

Causes of unequal resistance of a vine to mildew. L. RIVES AND G. KALÉ. *Prog. agr. vit.* 95, 138–9(1931).—An examn. of the f. ps. of extd. juices of grape vine leaves, sampled in October, indicated no relation between their resistance to mildew and the concn. of their cellular juice.
F. W. MARSH

Variations in the osmotic pressure of certain Basidiomycetes. SYLVIA COLLA AND ZIPORA DANIN. *Boll. soc. ital. biol. sper.* 5, 885–7(1930).—The juice of *B. edulis*,

A. cesarea L., *C. cibarius* Fries and *Russulavirescens* Schäft was obtained by pressing and the Δ detd. The Δ varied from species to species; it varied during the development of the reproductive cells and decreased during maturation and when aged; it was not equal in all parts of the same fungus. PETER MASUCCI

Respiration of seeds from oil plants. A. I. ERMAKOV AND NICOLAI N. IVANOV. *Biochem. Z.* **231**, 79–91(1931).—The respiration of oil seeds during the early stages of germination does not differ from that of seeds contg. carbohydrate stores. The CO_2 production bears a ratio of 1:1 to the O_2 absorption of these oil seeds. Neither the quantity nor the quality of the oil changes in the first hrs. of germination, while the amt of sugar increases at the expense of polysaccharides undergoing enzymic hydrolysis. The fact that the I no. of the oil does not change leads to the conclusion that the oil is not directly oxidized by the O_2 from the air, carbohydrates being the material primarily used in the respiration. S. MORGULIS

The presence of a dihydroxyphenyl derivative and of a specific enzyme in the apple and other fruits. KARL SPITZER. *Biochem. Z.* **231**, 309–13(1931).—The presence of an *o*-dihydroxyphenyl deriv. has been established in apples, pears and other fruits, and its identity with dopa seems very probable. Also an enzyme has been found in these fruits which reacts in a sp. way on dopa but has no effect on tyrosine. The enzyme is attached to the tissues. The browning of the fruit is due to its action on the chromogen. S. MORGULIS

Relations existing between the different organic acids elaborated by Sterigmatocystis nigra. MOLLIARD. *Compt. rend.* **192**, 313–5(1931).—When *Sterigmatocystis nigra* is cultivated in media sufficiently low in minerals to insure the utilization of a given quantity of org. substance, org. acids are formed of which the most important are gluconic, citric and oxalic acids. From cultures grown for 90 days in a medium contg. sucrose and only $^1/_{25}$ of the normal amts. of mineral the following information was obtained: An appreciable amt. of reducing sugar remained at the end; at no time did oxalic acid appear; gluconic acid increased rapidly for 10 days, remained stationary from the 10th to the 60th day and then rapidly diminished; citric acid was not very abundant at the end of 10 days, but increased in concn. constantly throughout the entire 90 days. To det. whether citric acid is formed from gluconic acid a culture of *S nigra* was grown under conditions similar to those of the above expt., gluconic acid being used instead of sucrose as the base. The following results were obtained: No trace of citric or oxalic acids was formed; the polarimetric deviation remained proportional to the free acidity. Gluconic acid, then, acts as a nutrient in the same manner as glucose, but never gives rise to citric acid. Gluconic acid, like the sugars, gives rise to oxalic acid when the culture medium tends toward alky. Analogous conclusions are reached concerning citric acid. M. concludes that gluconic and citric acids must be considered as oxidation products of sugars because of inanition in mineral substances; they both may be utilized subsequently by the fungus, but citric acid cannot be formed from gluconic acid. Oxalic acid is incapable of being utilized by *Sterigmatocystis nigra* and must be considered a final excretion product. ALBERT L. RAWLINS

The influence of nickel compounds and of cyanides on the germination of grains. ANNELIESE NIETHAMMER. *Wiss. Arch. Landw., Abt A, Pflanze* **4**, 607–34(1930).—Grains of wheat were placed in vessels contg. H_2O, $NiSO_4$, $Ni(NO_3)_2$, $NiCl_2$, $NiCO_3$, $Ni(CN)_2$ 2KCN, KCNS, NaCNS solns. of 0.1, 0.5 and 1.0% and the germination was observed. Arranged in the order of injurious effects, the compounds rank $Ni(CN)_2 \cdot 2KCN > Ni(NO_3)_2 > NiCO_3 > NiCl_2 > NiSO_4$. 0.1% solns. of $Ni(NO_3)_2$ and $NiSO_4$ accelerate germination. It was not detd. whether the effect was due to physical or chemical changes, although histological examn. showed that the Ni solns. penetrated to the embryo as well as the endosperm. Wheat grains of the years 1921, 1923 and 1924 were similarly treated, and similar results were observed. The individual grains were then examd. quantitatively for acetaldehyde, starch, reducing sugar and protein. The same investigation was conducted on *Allium cepa*. W. GORDON ROSE

The algae flora of the Ruhr River. HERMANN BUDDE. *Arch. Hydrobiol.* **21**, 550–648(1930).—Numerous data on the compn. of the Ruhr water are included. The analyses comprised temp., transparency, color, sediment, reaction to phenolphthalein, H-ion concn., hardness, no. of germs and content of org. substance, Cl, HNO_3, HNO_2, NH_3, Fe, CO_2 and O_2. Large bibliography. G. SCHWOCH

The metabolism of mosaic-diseased and healthy tobacco plants. M. LÜDTKE. *Phytopath. Z.* **2**, 341–59(1930); *Rev. Applied Mycol.* **10**, 132–3.—Chem. analysis of healthy and mosaic tobacco plants showed that the accumulation of starch in the latter is not due to a disturbance or reduction of diastatic activity. A sucrose- and a pep-

tone-splitting enzyme displayed equal activity in healthy and mosaic plants. Gelatin was not split up by the leaf enzymes. The injection of isoamylene into tobacco plants did not produce symptoms resembling mosaic. No alteration was observed in the pectin substance of mosaic leaves as compared with those of normal plants. These data indicate that tobacco mosaic does not result from a disturbance of the enzymic activity. OLDEN E. SHEPPARD

The thermodynamics of ion concentration by living plant cells. F. PAUL ZSCHEILE, JR. *Protoplasma* 11, 481–96(1930).—Ionic strength and activity coeffs. are used to calc., thermodynamically, the free energy change of ion concn. by living cells of *Nitella* and *Valonia*. The radioactive energy of K^+ is inadequate to account for this change. The e. m. f. due to oxidation-reduction potential may be an important factor.
B. A. SOULE

Diffusion of certain solutes through membranes of living plant cells and its bearing upon certain problems of solute movement in the plant. FREDERICK C. STEWARD *Protoplasma* 11, 521–57(1930).—By use of a special cutting device, cylinders, 3.4 cm. in diam., of potato and beet were prepd. These were used as membranes for diffusion expts. involving various sugars and salts. Diffusion of solutes through the living tissue is much slower than in aq. soln. This is due to the resistance of the protoplasm. Whether the small amt. of diffusion occurring is through the cells or along the walls is not decided. Diffusion through maple or cherry bark does not increase with rise in concn. of solute as much as it does through potato or beet. B. A. SOULE

Influence of the reaction of the medium upon the germination of spores of certain species of Mucor. R. CESBRON. *Thesis.* Paris, 1929; *J. pharm. chim.* [8], 13, 33–4(1931).—With 6 species of *Mucor, viz., M. spinosus, M. circinelloides, Circinella spinosa, Absidia cerulea, Rhizopus nigricans* and *Cunninghamella echinulata*, the influence of the reaction of the medium upon the germination of spores was studied by the method of hanging drops under minutely defined working conditions; the source of N of the media was of varied nature. On the alk. side, extreme limits have not been noted; even at p_H = 9.8 germination was still abundant with several species. On the acid side, germination stops near p_H = 3 although the limit is about 3.5 or 4 when the source of N is an NH_4 salt, and 2.5 when the source of N is an alk. nitrate, an amino acid or peptone. The resulting curves denoting percentage of germinated spores as a function of p_H show a double max. sepd. by a sometimes very pronounced min.; the min. is observed in all media and with all species. It is important that the drops examd. shall contain about the same no. of spores, as germination takes place faster when their no. is greater, under otherwise the same conditions. Media contg amino acids and a sugar cannot be sterilized by heat; notably in an alk. medium the soln. becomes colored and acidity rises, causing the p_H to fall several units. S. WALDBOTT

New apparatus for measuring the speed of penetration of saline solutions in plant protoplasm. R. BOUILLENNE. *Bull. sci. acad. roy. Belg.* [5], 16, 1017–26(1930).—Strips of tissue of *Tradescantia virginica* and *Allium cepa* are fastened by one end in glass dishes and submerged in a soln. A series of these dishes is arranged in a circle on a stand in such a way that they can be moved successively under a camera. As plasmolysis or deplasmolysis occurs the strip of tissue bends, and this can be followed by a series of exposures taken at intervals. An illustration of the app. is given.
J. J. WILLAMAN

Permeability of cells of Tradescantia virginica and Allium cepa. R. BOUILLENNE *Bull. sci. acad. roy. Belg.* [5], 16, 1027–47(1930).—KNO_3, KCl, NaCl, NH_4Cl and the NH_4 salts of formic, acetic, propionic, butyric and valeric acids were used at p_H 7. The first four cause definite plasmolysis of *Tradescantia* leaves at about 0.20 *N*, and of *Allium* at about 0.13 *N*. The salts of the fatty acids behaved irregularly, and the formate was definitely toxic. They penetrate the cells rather rapidly and hence tend to confuse the detn. of plasmolysis. The isotonic concn for *Tradescantia* and *Allium* are: acetate 0.34 *N* and 0.30 to 0.19 *N*; butyrate, 0.47 for both; valerianate, 0.50 and 0.30 *N*. Cells of *Tradescantia* were plasmolyzed with 0.67 *N* KNO_3, and the rate of deplasmolysis was measured in 0.67 *N* solns. of the NH_4 salts of the fatty acids. The results in min. were: formate, 21; acetate, 6.5; propionate, 5.5; butyrate, 3.5; valerionate, 1.5. Cells of *Allium* may be plasmolyzed and deplasmolyzed 6 times, with an increasing rate of penetration, and then they become useless for the detn. Older leaves are deplasmolyzed more slowly than younger, and the tips more slowly than the middle. J. J. WILLAMAN

Sexuality and cellular oxidation in Mercurialis annua. R. BOUILLENNE AND M. BOUILLENNE. *Bull. sci. acad. roy. Belg.* 16, 1047–51(1930).—Male individuals had a

higher rate of respiration than the females, although the respiratory quotient was the same. J. J. WILLAMAN

The toxic agent of Ambrosia pollen. M. BOUILLENNE AND R. BOUILLENNE. *Bull. sci. acad. roy. Belg.* [5], **16**, 1052–73(1930).—Ragweed pollen (*Ambrosia trifida* and *A. artemisiaefolia*) was extd. with a soln. contg. 0.363 g. KH_2PO_4, 1.431 g. Na_2HPO_4.-$12H_2O$, 5 g. NaCl and 4 cc. PhOH per liter. Exts. as low as 0.01% gave a positive skin reaction. The exts. could be boiled for 1 minute or heated at 75° for 15 hrs. without losing all their activity. A bibliography of 138 titles is given. J. J. WILLAMAN

Detection of F in plants (RECKENDORFER) **7.** A mannan from the bulb of *Lilium* (TAKAHASHI) **10.** Isolation of phytosterolin from wheat embryo (NAKAMURA, ICHIBA) **10.** Blossom xanthophylls. The pigment of the sunflower (ZECHMEISTER, TUZSON) **10.**

KOSTUICHEV, S.: Chemical Plant Physiology. Translated from the Russian and edited by Charles J. Lyon. Philadelphia: P. Blakiston's Son & Co. $6.

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E—NUTRITION

PHILIP B. HAWK

Isolation of the antineuritic vitamin. N. STECHOW AND L. WAMOSCHER. *Arch. Pharm. Inst. Univ. Berlin* **13**, 145–7(1927).—In expts. with rice bran, pptn. with K Bi iodide, but not that with $Pb(AcO)_2$, afforded active prepns. B. C. A.

The vitamins of milk and their behavior toward chemical, thermal and physical agents. A. FARINE. *Tech. Ind. Schweiz. Chem.-Ztg.* **1930**, 133–6, 149–50.—The amts. of vitamins A, B and C in milk and milk products are increased when green food is added to the diet. Vitamin C is most easily destroyed, being most sensitive especially to heat. The amt. of D can be increased by irradiation with ultra-violet rays. No appreciable amt. of vitamin E occurs in milk. H. J. DEUEL, JR

Effects of radiant energy on hemorrhagic anemia. HENRY LAURENS AND H. S. MAYERSON. *J. Nutrition* **3**, 465-77(1931); cf. *C. A.* **23**, 2195.—Anemia was produced in 24 dogs by the method and diet of Whipple and Robscheit-Robbins (*C. A.* **19**, 2692). C- and Hg-arc irradiation of these animals results in marked and persistent increases in the no. of erythrocytes and reticulocytes, the responses being more marked with massive exposures than with smaller exposures repeated more often. There was no significant effect on the amt. of hemoglobin formed. When irradiated dogs were fed peaches, apricots or lettuce, immediate hemoglobin increase was noted. C. R. F.

Vitamin studies. XVIII. Biological assay of food materials for vitamin A as influenced by yeast from various sources. HANNAH E. HONEYWELL, R. ADAMS DUTCHER AND JACOB O. ELY. *J. Nutrition* **3**, 491–8(1931); cf. *C. A.* **24**, 2163.—Long-continued expts. on the use of yeast in the ration of albino rats led to the conclusions: Yeast made by the same manufacturer may or may not contain traces of vitamin A. Vitamin A response, the curative method being used, varies depending upon the yeast used as a source of the vitamin B complex. Quant. results in assaying foods for vitamin A will likewise vary, depending upon the potency of the vitamin B complex in the yeast employed. In the interest of accuracy, periodical tests should be made of new yeast supplies in order to prevent this variable from affecting the usual vitamin A technic. Vitamin A may consist of 2 factors, 1 possessing antiophthalmic properties and which tends to preserve normality of other epithelial tissues, and the other factor possessing the growth-stimulating properties usually ascribed to vitamin A. Differences in anti-ophthalmic properties of different lots of yeast probably account for the incidence of ophthalmic symptoms in but 20% of the rats being used for the vitamin A assay. C. R. FELLERS

Metabolic rate and respiratory quotients of rats following the ingestion of dextrin and during fasting. LAURENCE G. WESSON. *J. Nutrition* **3**, 503–18(1931).—By maintaining male rats for some days at the environment under which the respiratory gas exchange is to be detd., the low basal rate of 718 Cal. per sq. m. per 24 hrs. was obtained. This basal value was reached in the 14th hr. after feeding dextrin and was maintained approx. const. for 30 hrs. following. The hourly averages of the respiratory quotients after a dextrin feeding decrease rapidly to 0.744 at the 16th hr. thereafter and slowly with several slight diurnal changes to 0.738 at the 43rd hr. The av.

respiratory quotient for the 38th to 44th hr., inclusive, is 0.733, uncorrected, or 0.722 if corrected for protein metabolism. The gas-exchange studies were definitely controlled and can be reproduced. C. R. FELLERS

Specific dynamic action. GRAHAM LUSK. *J. Nutrition* **3**, 519–30(1931).—A review. L. believes that sp. dynamic action of carbohydrate is due to heat production of the intermediary metabolism rather than to carbohydrate plethora. His views are now in agreement with those of Rubner. C. R. FELLERS

Investigations in the feeding of cottonseed meal to cattle. J. O. HALVERSON AND F. W. SHERWOOD. North Carolina Agr. Expt. Sta., *Tech. Bull.* **39**, 5–158(1930).—Eight years' results are reported in full. The feeding of large amts. of cottonseed meal and hulls to cattle over considerable periods of time results in what is commonly called "cottonseed meal poisoning," a condition formerly ascribed to a toxic substance, *gossypol*. Numerous expts. showed definitely that the disease was not due to a poisonous principle but rather to nutritive deficiencies of the rations. A crit. study of the various combinations of nutritive adjuvants used indicates that cottonseed meal and cottonseed hulls do not contain sufficient Ca or vitamins A, D or B to meet fully the needs of the animals. Great care must be used to select rations furnishing adequate amts. of minerals and vitamins for dairy cows. White corn is likely to be deficient in Ca, P and vitamin A, and corn silage or grain should not be used to supplement cottonseed feeds. The typical symptoms of cottonseed poisoning, *i. e.*, staggers, impaired vision and spasms, were readily reproduced on heifers receiving meals other than cottonseed such as linseed, peanut and soy bean in the presence of minerals. On autopsy, the livers of the animals were shown to be almost totally lacking in vitamin A. Cod-liver oil added to the ration proved moderately efficacious in preventing or curing the condition. Reproduction of cows fed on a cottonseed or similar deficient ration was decidedly subnormal. Numerous expts. where cottonseed meal was supplemented by poor roughage, wheat straw and a small quantity of green feed showed inadequate maintenance, poor reproduction and other conditions attributable to Ca and vitamin-A deficiency. Similarly, rations of cottonseed meal contg. minerals, timothy hay and corn silage did not quite maintain health and vigor in the animals. Even when 1/4 of the entire ration was alfalfa hay and beet pulp was fed in addn., the ration was inadequate for dairy cows over an extended period of time. Cottonseed or other meals from high oil-bearing seeds must be freely supplemented with good hay and possibly non-maize grains to avoid various nutritive deficiencies. Bibliography. C. R. FELLERS

Corn silage versus a mixture of wet beet pulp and molasses for milk production. C. F. MONROE, C. C. HAYDEN AND A. E. PERKINS. Ohio Agr. Expt. Sta., *Bimonthly Bull.* **148**, 3–8(Jan.–Feb., 1931).—Slightly higher milk and butterfat production were obtained on the beet pulp-molasses ration, though insufficient to justify the increased cost of the ration. C. R. FELLERS

Does the feeding of corn silage to dairy cows lead to acidosis? A. E. PERKINS, C. C. HAYDEN AND C. F. MONROE. Ohio Agr. Expt., *Bimonthly Bull.* **148**, 8–11(Jan.–Feb., 1931).—The total acidity of corn silage averaged 2–3%, consisting of lactic and acetic acids. The blood and urine of cattle normally have a slightly alk. reaction. The urine of several cows fed daily rations contg. 30–50 lb. of corn silage as compared with beet pulp showed no significant increase in either total acidity or H-ion concn. NH_3 and bicarbonate CO_2, were also unaffected by the feeding of silage. Conclusion: The org. acids in silage are fully metabolized and do not appear as org. acids or related compds. in the urine. C. R. FELLERS

Relation of food to the growth of pre-school children. MARY A. BROWN. Ohio Agr. Expt. Sta., *Bimonthly Bull.* **149**, 73–6(Mar.–Apr., 1931).—Two groups were formed, based on different economic levels, of 114 kindergarten children. The children were regularly weighed and examd. for phys. defects, etc., for approx. 1 year. Conclusion: It is desirable to include a quart of milk, vegetables, cooked and uncooked fruits, and cereals in the daily diet of the growing child, and eggs should be used several times a week, since a greater rate of growth was observed for those children whose diets contained these foods than for those children whose diets were lacking in quantity in certain food elements. C. R. FELLERS

Adsorption of vitamin A on silica gel. L. L. LACHAT, R. ADAMS DUTCHER AND H. E. HONEYWELL. Penna. Agr. Expt. Sta., *Bull.* **258**, 8(1930) Abstract; *43d Ann. Report of Director.*—Vitamin A in cod-liver oil may be adsorbed on highly activated silica gel so tenaciously that it cannot be rendered available when the silica gel is fed to rats. Toluene removes the adsorbed vitamin A from the silica gel, while acetone exts. are inactive. Further studies on availability before and after adsorption are being continued. C. R. FELLERS

Digestibility by sheep of the constituents of the nitrogen-free extract of feeds. G. S. FRAPS. Texas Agr. Expt. Sta., *Bull.* **418**, 5-15(1930).—The contents of starch, pentosans, residual N-free ext. and sugars were detd. on 56 feeds. The digestibility by sheep of the sugars, starches, pentosans and residual N-free ext. was detd. by animal feeding tests. Feeds known to be of high feeding value are characterized by a high content of starch, or starch and sugar combined, or if the starch content is not high, by a high content of protein. The N-free ext. of feeds of low feeding value contains a high percentage of pentosans and of residual N-free ext. The N-free ext. of some feeds contains an appreciable percentage of compds. which are not carbohydrates, whose digestibility is uniformly high. For several feeds the digestibility of pentosans was 50–60%, but was somewhat variable. The pentosans in crude fiber are usually digested to a less extent than the total pentosans, or the pentosans in the N-free ext. The residual N-free ext. in hays and fodders is generally digested to a greater extent than are the pentosans. C. R. FELLERS

The nature of dietary deficiencies of milk. J. ERNESTINE BECKER AND E. V. MCCOLLUM. *Am. J. Hyg.* **12**, 503-10(1930).—Of 38 diets in which milk powder was used at 60-85% levels in combination with other substances, only 24 sufficed for the production of young rats. The best supplements from the standpoint of reproduction records were cooked dried beef liver, yeast and a mixt. of ferric citrate and copper sulfate. The liver is believed to owe its value to the Cu and Fe which it contains. S. B. FOSTER

Effect of cod-liver oil on calcium metabolism of young chicks. ARTHUR D. HOLMES AND MADELEINE G. PIGOTT. *Ind. Eng. Chem.* **23**, 190-6(1931).—Four hundred vigorous, day-old Rhode Island Red chicks were divided into 12 comparable pens, and the effect of cod-liver oil on their Ca utilization was detd. (1) when the Ca was obtained from different sources, (2) when it was fed at different levels, and (3) when it was fed at varying ratios to P. Judged by the rate of growth and bone development, the chicks which received cod-liver oil showed better Ca utilization than the controls. The oil was most effective when the Ca-P ratio was low. When this ratio was 5–1 the growth and Ca utilization of both exptl. and control groups were unsatisfactory. S. B. FOSTER

Radiographic study of the effect of irradiated ergosterol on the healing of experimental fractures. J. MORELLE. *Rev. Belge. Sci.* **2**, 226-8(1930); *Bull. Hyg.* **6**, 88 (1931).—M. studied the action of vitamin D on the lesions of the fibula of rats. The rats were divided into 3 groups which were given 0.001 mg., 0.01 mg. and 2–4 mg. of ergosterol per day. Up to the 20th day no results were visible, but after that time in those receiving the medium dose the fracture lines were invisible, while in the controls they were still apparent. After the 30th day there was a dense callus in treated animals while in the controls the disappearance had just begun. Heavy doses caused abnormally dense and exuberant callus formation. GEORGE R. GREENBANK

The mode of action of the vitamin B complex. I. EMIL ABDERHALDEN. *Arch. ges. Physiol.* (Pflügers) **226**, 723-37(1931).—The paralytic symptoms of pigeons fed on a diet of polished rice could be abolished by feeding small quantities of various organ exts. (particularly liver). The bearing of these expts. on the problem of the nature of the vitamin B complex is discussed. **II.** EMIL ABDERHALDEN AND V. VLASSOPOULOS. *Ibid* 808-15.—The *dehydrase* content of liver, muscle, and brain tissue of pigeons maintained on a diet of polished rice is abnormally low. The addn. of yeast or of dried organ exts. to the diet of such pigeons restores the above-mentioned organs to their normal dehydrase content. ARTHUR GROLLMAN

The utilization of soy-bean flour and a new soy protein preparation by man and the lower animals. J. KAPFHAMMER AND H. HABS. *Deut. med. Wochschr.* **56**, 1168-70 (1930). Metabolism expts. on men and dogs showed the value of soy-bean flour as a source of protein in the diet. *Novo-Tropon*, a com. prepn. contg. soy-bean flour, also proved efficacious as a source of protein. ARTHUR GROLLMAN

Carotene and vitamin A. L. K. WOLFF, J. OVERHOFF AND M. VAN ECKELEN. *Deut. med. Wochschr.* **56**, 1428-9(1930).—Carotene and vitamin A were sepd. from a no. of plant and animal substances. Their detn. in such substances is described. ARTHUR GROLLMAN

The effect of hypophyseal extracts and various protein bodies on the specific dynamic action of protein. ERNST HERZFELD. *Deut. med. Wochschr.* **56**, 1558-60 (1930).—Muscle, milk, and liver protein showed a specific dynamic action in normal individuals. ARTHUR GROLLMAN

"Diet 4" for breeding rats for work on vitamin A. SKULI V. GUDJÓNSSON. *Biochem. J.* **24**, 1591-4(1930).—The diet contains (in per cent) skimmed-milk powder

(made from pasteurized milk) 30, rice flour 40, autolyzed yeast 15, hardened coconut oil and shark-liver oil 15. BENJAMIN HARROW

Influence of foodstuffs on the acid-base balance of cattle urine. FREDERICK J. WARTH AND NARAYANA K. AYYAR. *Biochem. J.* **24**, 1595–1600(1930).—Urines from green fodders and cereal straws were alike in contg. excess of alkali and large amounts of CO_2. Urines from over-ripe hays contained very little CO_2 and were neutral or acid. These urines contain very little H_3PO_4 but relatively large amounts of hippuric acid. BENJAMIN HARROW

Studies in embryonic mortality in the chick. I. The effect of diet upon the nitrogen, amino nitrogen, tyrosine, tryptophan, cystine and iron content of the proteins and on the total copper of the hen egg. WM. D. MCFARLANE, HUGH L. FULMER AND THOMAS H. JUKES. *Biochem. J.* **24**, 1611–31(1930).—The source of protein in the diet of the hen has a marked influence on the mortality of the embryos during incubation. As regards total N, total amino N, tyrosine, tryptophan and cystine content, no difference was found in the compn. of eggs of poor hatchability and those of high hatchability. The Cu content varied considerably. The results offer no explanations of the differences in the hatchability of the eggs. BENJAMIN HARROW

Vitamin B deficiency in the rat. Bradycardia as a distinctive feature. ALAN N DRURY, LESLIE J. HARRIS AND CECIL MAUDSLEY. *Biochem. J.* **24**, 1632–49(1930). Vitamin-B deficiency reduces the heart rate from 500–550 per min. to 350–300 per min. BENJAMIN HARROW

Further observations upon the correlation between the arginine and vitamin B content of diets, and the effect of thyroxine upon tumor growth. ESMÉ GILROY. *Biochem. J.* **24**, 1659–65(1930); cf. *C. A.* **24**, 5061.—On a diet deficient in arginine, tumor growth in mice was inhibited in a way similar to a vitamin-B-deficient diet. Injection of thyroxine caused a slight inhibitory effect upon tumor growth. B. H.

Antiscorbutic fraction of lemon juice. IX. SYLVESTER S. ZILVA. *Biochem. J.* **24**, 1687–98(1930); cf. *C. A.* **24**, 2165.—The activity of the vitamin is controlled by the presence of a reducing substance which in itself is not antiscorbutically active. Attempts to replace the reducing substance after mild oxidation have so far failed to activate antiscorbutic fractions which have lost their potency through the destruction of the former. The reducing substance acts perhaps irreversibly as a protective agent against the oxidation of the vitamin. BENJAMIN HARROW

Effect of cooking on the digestibility of meat. WINIFRED MARY CLIFFORD. *Biochem. J.* **24**, 1728–33(1930).—Meats in the raw and cooked condition were digested either with pepsin and trypsin or with trypsin alone, and the rate of hydrolysis was detd. by Sorensen's method. If the rapidity of hydrolysis is taken as a criterion, meat when raw is in the least digestible condition. The most rapidly digested meat is that which is roasted or grilled until it is just red inside with a moist surface when cut. The rate of digestion is the same whether trypsin alone is used or pepsin followed by trypsin. BENJAMIN HARROW

Histopathology of experimental molar caries in rats. HENRY KLEIN AND DAVID H. SHELLING. *J. Dental Research* **11**, 151–7(1931).—"In the course of an investigation on the effects of unbalanced diets on the teeth of rats, it became apparent that frequent caries-like lesions were present in the molars of rachitic rats which had been fed viosterol therapeutically for long periods. The present communication is concerned with a description of the histology of such cavities." JOSEPH S. HEPBURN

Remark on the note of R. C. Gibbs, J. R. Johnson and C. V. Shapiro: The **absorption spectrum of blood and its relation to rickets.** R. SUHRMANN AND W. KOLLATH *Naturwissenschaften* **19**, 65–6(1931).—The neg. results obtained by G., J. and S. (*C. A.* **24**, 5771) on a relation between rickets and the absorption spectrum of blood are attributed to their studying a type of exptl. rickets in rats different from that observed by S. and K.; the authors used different rickets-producing and breeding diets. It is suggested that the absorption method apparently permits of distinction between types of rickets, valuable at least for theoretical work. Standardization of the animals is a prime requisite. B. J. C. VAN DER HOEVEN

Physiological significance of some inorganic elements. E. V. MCCOLLUM AND ELSA ORENT. *J. Maryland Acad. Sci.* **2**, 33–6(1931).—A diet adequate with respect to vitamins, proteins and salts, but which is spectroscopically free from Mn, has been prepd. Rats which were maintained upon this diet grew normally for about 8 months. However, second litters could not be obtained, apparently because the testes had degenerated. The females bore young which survived but a few days, seemingly because sufficient milk for their maintenance was not secreted. Mn is therefore an indispensable nutrient element for mammals. W. D. LANGLEY

Simple methods for metabolic balance studies and their interpretation. EVA DONELSON, BETTY NIMS, HELEN A. HUNSCHER, CARROLL F. SHUKERS AND ICIE G. MACY. *J. Home Econ.* 23, 267–72(1931).—The mean difference between the chem. compn. of a diet as computed from standard tables and as detd. in the lab. was 2–5%. N varied 0.7–38%; Ca varied 0–22%; and P varied 0–38%. The magnitude of retention or loss that can be considered significant in any expt. is detd. by calcg. the av. deviation. A calcn. of metabolic balance for short observation periods shows daily fluctuations, while balances for longer periods show the general tendency better. A list of 23 references is given.
AMY LEVESCONTE

The effect of feeding sorghum and sugar-cane sirups on nutritional anemia. OLIVE SHEETS AND ERNESTINE FRAZIER. *J. Home Econ.* 23, 273–80(1931).—Sorghum and sugar-cane sirup are effective in producing hemoglobin in the rat. A few expts. with Crooked Top sirup proved it to be almost as potent as calf liver.
A. LEV.

A differentiation of the so-called antipellagric factor, vitamin G. BARNETT SURE, MARGARET ELIZABETH SMITH AND M. C. KIK. *Science* 73, 242–3(1931).—Many expts. indicate that vitamin G contains 2 factors, one producing dermatitis without affecting the growth of rats, the other stunting the growth without sign of skin lesions. It is suggested that the growth-promoting factor be designated by the letter F.
AMY LEVESCONTE

Comparison between irradiation of diet and supplemental irradiation of animals in vitamin A and D deficiency. F. E. CHIDESTER, A. G. EATON AND N. K. SPEICHER. *Science* 73, 190–1(1931).—Rats depleted of vitamins A and D were fed on a diet (Sherman No. 380) low in D and deficient in A and given 0.01 mg. of ergosterol daily. Some of these rats were irradiated also for 30 sec. daily. The addnl. irradiation stimulated growth for a short time but did not produce the striking effects observed when FeI, was also added.
I. M. LEVINE

Sterol content and antirachitic activatibility of mold mycelia. L. M. PREUSS, W. H. PETERSON, H. STEENBOCK AND E. B FRED. *J. Biol. Chem.* 90, 369–84(1931).—The autoclaved, dried and finely grown pads, resulting from the growth of certain molds in a synthetic, inorg. medium contg. 4% glucose as the source of C, were irradiated with ultra-violet light and fed to rachitic rats. Five kinds of mushroom were also tested for antirachitic activatibility. Eight of 12 molds and 3 of the mushrooms brought about distinct healing of rickets even when fed at a level of 10 mg. of irradiated material per rat for 7 days. The total alc.-sol. sterol, detd. by the digitonide method, in 11 molds and 4 mushrooms varied from about 0.1 to 1.0% of the dry wt. of the fungus material. In most cases 90% or more of the alc.-sol. sterol was present in the free state. The sterol content of the molds varied not only with the species but also with different strains of the same species and was decreased by increasing the glucose content of the medium. Supplementing the medium with such org. nutrients as an aq. ext. of malt sprouts or fresh yeast did not appreciably change the sterol content but the mycelial growth of 1 of the strains studied, *Aspergillus oryzae*, was increased from 20 to 50%. A decrease of 56% in the wt. of the pad resulted from increasing the incubation period of this strain from 10 to 50 days. In most cases increasing the glucose content of the medium to 10 or 20% more than doubled the wt. of the dry pad. Bibliography of 22 references.
A. P. LOTHROP

The induction of tetany in rachitic rats by means of a normal diet. ALFRED F. HESS, MILDRED WEINSTOCK, H. R. BENJAMIN AND J. GROSS. *J. Biol. Chem.* 90, 737–46(1931).—"Tetany can be induced in rachitic rats simply by an abrupt change from a rickets-producing ration, high in Ca and low in P, to a normal ration of dried milk or of dried milk and whole wheat. The fall in Ca in the serum which is brought about by this means develops within 48 hrs. but is maintained for only a few days. This striking reaction is due not to an absolute or to a relative increase of P in the dietary but to a sudden shift in the Ca:P ratio in the subsequent diet as compared to the preliminary diet. When this ratio of Ca:P is decreased from about 4:1 to 1 or 1.5:1 tetany ensues, whereas if it is decreased only to about 2:1 the fall in Ca and nervous symptoms do not come about. Attention should be directed to the effect of marked alterations in the constitution of dietaries, as such shifts may help to explain nutritional disturbances which are inexplicable merely from the standpoint of adequacy."
A. P. LOTHROP

The effect of heat upon the biological value of cereal proteins and casein. AGNES F. MORGAN WITH THE COÖPERATION OF FLORENCE B. KING, RUTH E. BOYDEN AND V. ANN PETRO. *J. Biol. Chem.* 90, 771–92(1931).—The digestibility of proteins toasted at 150–200° for 30–45 min. is but little different from that of the raw protein but there are differences in the biol. values (ranging from 10 to 19%) which are in all cases more

than 6 times as great as their probable errors. The unexplainable loss of N occurs chiefly in the urine, indicating that the change produced by the heat treatment lies probably in the assortment or availability of the amino acids absorbed. The addn. of 5% casein to the toasted diets very nearly made up the discrepancy between the latter and correspondingly supplemented raw diets, thus indicating that the deficiency observed lay in the protein fraction of the toasted diet. With wheat gluten the max. growth rate (1.4 g. per g. of protein eaten in 56 days) occurred when the diet contained 18% of the protein. At an approx. 12% level the biol. values of raw and toasted gluten were 66 and 54, resp. The values for raw and toasted casein at an 8% level were 66 and 53. Cooking with H_2O, in general, slightly increased the biol. value of the protein. The values of raw, water-cooked and toasted whole-wheat protein alone and supplemented with 5% casein were found to be 64, 67 and 52 for wheat alone and 67, 75 and 69 with wheat plus casein. Bibliography of 33 references. A. P. L.

Digestive erythropenia and factors which cause it. GIUSEPPE SOLARINO AND VITTORIO CATTAINO. *Boll. soc. ital. biol. sper.* **5**, 985–9(1930).—The administration of a diet rich in protein substances (meat) or in HCl in concn. corresponding with that of gastric juice causes in normal dogs and in man a marked, const. erythropenia. Erythropenia more marked and of longer duration follows the administration of liver. Digestive erythropenia is related to 2 series of factors: to the accumulation of blood in the splanchnic area and to the erythrocytic activity of certain hemopoietic tissues. PETER MASUCCI

Studies on the metabolism of fats. VII. The glycogen content of adipose tissue of rats under varying conditions of alimentation. G. SCOZ. *Boll. soc. ital. biol. sper.* **5**, 1037(1930); cf. *C. A.* **24**, 5804.—Glycogen detns. expressed as mg. per 100 g. adipose tissue were: fasting animal 181, animal at const. wt. 527, animal after refeeding 1600. PETER MASUCCI

The diet in diabetes of children. PEDRO B. LANDABURE AND FÉLIX PUCHEU. *Semana méd.* (Buenos Aires) **1931**, I, 360–3.—The caloric intake should be in the first decade of life 69 cal. per kg. wt., in the second 48 cal. The requirement for carbohydrates is 2.09 g. per kg. in the first decade and 1.44 g. in the second decade; for proteins it is 2.47 and 1.58 g., resp., and for fats 5.57 and 3.87 g. Only in a few cases is it possible to dispense with insulin. A. E. MEYER

Calcium metabolism. ALBERT RANSON. *Semana méd.* (Buenos Aires) **1931**, I, 465–7.—After a short review on the subject, opocalcium is recommended, a product composed of minerals, parathyroid, suprarenal and thymus gland, which has been exposed to ultra-violet light. A. E. MEYER

Results of exclusively dietary treatment in forty-six cases of obesity. EGGERT MØLLER. *Acta med. scand.* **74**, 341–52(1931).—Forty-six patients were treated with a diet contg. 950 calories with about 6 g. protein N per day. This treatment continued for 54 days, the av. loss in wt. sustained being 8.8 kg. The basal metabolic rate of one patient who lost 29 kg. in 5 months showed no significant changes during that period. S. MORGULIS

Influence of some fats and oils, meat and bread on growing rats. V. A. LEIBOVICH-LIVSHINA. *Biochem. Z.* **231**, 260–73(1931).—Large amts. of cod-liver oil cause toxic effects which manifest themselves in extensive losses of body wt., trophic disturbances and premature death. With corresponding quantities of olive oil the body losses are smaller and the animals do not die prematurely even in long-continued expts. Small or moderate amts. of olive, linolic and other oils do not stimulate the growth of the rat. The greatest stimulating effect upon increase in body wt., especially following a preliminary fast, has been obtained with 5 g. meat added to a bread diet or with meat alone. The stimulating effect of the meat lasts longer in growing rats which have had a previous fasting experience than in rats without this. S. MORGULIS

The presence of vitasterol A in the cacao and its products of extraction. H. LABBE, HEIM DE BALSAC AND R. LERAT. *Bull. soc. therap.* No. **10**, 12 pp.(1930); cf. *C. A.* **25**, 729.—The following exts. of the cacao bean were made: (1) cacao butter; (2) alc. ext. of bean; (3) alc. ext. of shell; (4) the tailings of crystn. after extn. of α- and β-sterols. These products, in comparison with cod-liver oil, were tested by the color reaction with $AsCl_3$ and $SbCl_3$ according to the procedure of Carr and Price. The alc. ext. of the bean gives a feeble color reaction with both reagents, $AsCl_3$ and $SbCl_3$; the alc. ext. of the shell and the tailings of crystn. give color reactions comparable to that obtained with cod-liver oil. These exts. were further tested for their growth-promoting and antirachitic properties in expts. with white rats which had been sensitized by a vitamin-A-deficient diet according to a procedure of Lecoq. It was shown that important amts. of a vitasterol, similar to vitamin A of growth and develop-

ment, were present in the alc. ext. of cacao shell and in the tailings of crystn. and a small quantity in the alc. ext. of the bean. In the same order of importance, small quantities of antixerophthalmic vitamin were shown to be present in the exts.
N. M. NAYLOR

Fat-soluble vitamins in tumor tissues. MIDZUHO SUMI AND WARO NAKAHARA. *Sci. Papers Inst. Phys. Chem. Research* (Tokyo) **15**, No. 283, 69–74(1931).—The expt. was undertaken to det. the vitamin A and D contents of tumors. Tumors were obtained as follows: Rous chicken sarcoma, Fujinawa rat sarcoma, Flexner-Jobling rat carcinoma and Bashford mouse carcinoma. Tumors were removed at 3 weeks' growth, dehydrated and dried. The fats were obtained from them by extn. with ether and then alc. Fat consts. were detd. The total cholesterol content is high: chicken sarcoma 16%, rat carcinoma 13%, rat sarcoma 12%, mouse carcinoma 12%. The absorption spectra of the cholesterol from chicken and rat sarcoma showed absorption bands for ergosterol. These tumor exts. were tested for vitamin A by being fed to white rats on Steenbocks' rickets-producing diet, namely wheat gluten 20, yellow cornmeal 76, $CaCO_3$ 3 and NaCl 1%. After 30 days on this diet, the ration was supplemented by 1 to 2 drops of the tumor oil per rat per day. It was shown that these tumor oils tended to heal rachitic lesions indicating the presence of vitamin D. Color reactions with H_2SO_4, with acid clay, and with $SbCl_3$, as used for vitamin A, with each tumor oil gave neg. results indicating the absence of vitamin A.
N. M. NAYLOR

Fixation of strontium in experimental rickets. G. MOURIQUAND, A. LEULIER AND NOGIER. *Compt. rend. soc. biol.* **106**, 18–9(1931).—Sr is not found in the normal boney tissue of rats, and is fixed only irregularly and in infinitesimal traces in this tissue when young rats are fed a diet contg. 2.2% $SrCO_3$. However, the wt. of the epiphysis ash of young rats fed on this diet is always notably greater than that of young rats fed on a Sr-free diet.
ALBERT L. RAWLINS

Investigation on a colorimetric method for estimating the silverskin (antiberiberi-vitamin) percentage of rice. J. P. SPRUIJT. *Chem. Weekblad* **27**, 298–304(1930). See *C. A.* **24**, 5802.
W. GORDON ROSE

Quantitative relations of the dry matter of the food consumed, the heat production, the gaseous outgo and the insensible loss in body weight of cattle. MAX KRISS. *J. Agr. Research* **40**, 283–95(1930).—A biometric study of relations between values representing the feed consumption, the production of heat, CO_2, water vapor and CH_4 and the insensible loss in body wt. of cattle showed that for practical purposes the dry matter of feed consumed is a better basis for predicting the heat production of cattle than the insensible loss in body wt.
W. H. ROSS

The irradiation of ergosterol. G. RANZOLI. *Boll. chim. farm.* **69**, 803–7(1930).—After discussing the phenomena involved in vitamin D deficiency and the chem. and therapeutic properties of irradiated ergosterol, R. stresses the importance of the exact standardization of the latter. On account of the conflicting statements in the literature he is not convinced that the spectrographic changes exhibited by ergosterol after irradiation are indicators of its activity. He does not attach practical significance to Black's findings that irradiated ergosterol has a lower m. p. than the non-irradiated substance, because the difference between the m. ps. of the 2 sterols is only very slight. R. believes that the biological methods are difficult to carry out in the chem. lab. After studying the reaction of Shear and Kramer R. convinced himself that this reaction is a feasible method for the approx. estn. of the quantity of ergosterol that by irradiation had been converted into the active principle.
G. SCHWOCH

Proteins and alimentation. GIOVANNI ISSOGLIO. *Giorn. farm. chim.* **80**, 58–62 (1931).—A review.
G. SCHWOCH

Electrolytic dissociation and serum protein content of the blood of nurslings with nutritional disturbances. B. VASILE. *Pediatria Rivista* **38**, 1217–26(1930).—Blood samples were taken 4 hrs. after the meal, from 5 healthy nurslings, 6 nurslings with acute nutritional disturbances, and 13 nurslings with chronic nutritional disturbances. The protein content of the serum was within the normal range in most of the chronic cases, while it was augmented in the acute cases. The electrolytic dissocn. was more or less normal in the serum of the chronic cases and was diminished in the acute cases. Numerous references are given.
G. SCHWOCH

The effect of altered acid-base equilibrium on growth. L. ZILZER. *Magyar Orvosi Archivum* **31**, 171–6(1930).—Rats about 25 days old, about 30 g. in wt. and from the same litter were fed acid and basic diets. The compn. of the diet was: albumin, fats, carbohydrates and some neutral salts, to which were added the acid and basic salts, resp. Nine groups were examd. In every group there were 3 acid- and 3 base fed animals. Increase in wt. was observed during 5–13 weeks. In 2 groups

the acid-fed animals increased in wt.; in the other groups the base-fed animals gained. The av. gain of 27 base-fed animals was 8% greater than the av. of 27 acid-fed animals. Diuresis caused in both acid- and base-fed animals the same loss of body wt. which shows that the difference in growth was not caused by the retention of fixed fluid. H. TAUBER

The significance of the calcium and phosphorus content of the food. K. WALTNER. *Magyar Orvosi Archivum* 31, 276–82(1930).—For white rats the min. quantity of P necessary for optimum growth is the same as that of Ca. A food contg. P and Ca in the same ratio as that in human milk is deficient in P for rats. Twice the min. amt of one of the elements can be ingested without injury in the presence of the min. amt of the other. Ca deficiency of the food can be partly compensated by vitamin D, but the deficiency in P only to a very limited degree. H. TAUBER

The influence of liver diet on the action of hemolytic poisons. V. FEHÉR. *Magyar Orvosi Archivum* 31, 446–50(1930).—The development of anemia in rats caused by phenylhydrazine poisoning is retarded by liver diet, but the regeneration of blood is not stimulated. Typical anemia cannot be produced by Cu acetate. Liver diet has no effect upon Cu acetate poisoning. H. TAUBER

The destructive action of finely divided solids on vitamin A. JOSEPH K MARCUS. *J. Biol. Chem.* 90, 507–13(1931).—The activity of vitamin A concentrates from cod-liver oil (Marcus, *C. A.* 23, 1162, 4093) is largely destroyed on standing 8–26 days in presence of various finely divided powders, whether in air or CO_2. K. V. T.

The fundamental food requirements for the growth of the rat. VI. The influence of the food consumption and the efficiency quotient of the animal. LEROY S. PALMER AND CORNELIA KENNEDY. *J. Biol. Chem.* 90, 545–64(1931); cf. *C. A.* 23, 4499.—The digestibility of various stock diets by rats varies from 80 to 95%, and diets should therefore be compared on the basis of an equal intake of digestible dry matter. This is done very reproducibly by collecting, drying and weighing the feces. When diets are thus compared, differences in the growth curves on synthetic vitamin-contg. and natural complete diets almost disappear, though the natural diet appears still slightly superior. Furthermore, the efficiency of food utilization, expressed as the efficiency quotient (E. Q.), or gain in wt. per 100 g. body wt. per g. of food digested, is higher in males than in females. The greater gain in wt. of males is due to this (cf. Osborne and Mendel, *C. A.* 20, 3487, Mendel and Cannon, *C. A.* 22, 798). Differences in E. Q. also account for the variations in growth between groups of rats on the same diet. The stimulating effects of fresh lettuce, liver and carrots, given with yeast, on the growth of rats are shown to be due solely to effects on the food consumption, when allowance is made for differences in the E. Q. With the same method yeast and wheat embryo are found equally effective as sources of water-sol. vitamin in a diet otherwise complete. By means of the E. Q., growth expts. can be more accurately controlled, and individual variation in gain in wt. of animals can be partially eliminated. K. V. T.

A critique of the line test for vitamin D. CHARLES E. BILLS, EDNA M. HONEYWELL, ALICE M. WIRICK AND MILDRED NUSSMEIER. *J. Biol. Chem.* 90, 619–36(1931).—The 4 grades or degrees of healing of rickets devised by Bills and McDonald (*C. A.* 20, 2522) are not proportional to the dosage of vitamin D. A graphic method is described whereby the amt. of diln. required for any vitamin-D-contg. prepn. to give 2+ healing can be detd. Av. cod-liver oil is taken as that which induces 2+ healing when given to rickety rats at 1/4% in diet 3143 for 5 days. The sex, color and wt of rats are not of importance in the line test. The relation of dosage required to the duration of the test period (between 3 and 14 days) is plotted, and the probable error of the method estd. K. V. THIMANN

KLINKE, KARL: **Der Mineralstoffwechsel. Physiologie und Pathologie.** Band III of "Einzeldarstellungen aus d. Gesamtgebiet d. Biochemie. Leipzig: Deuticke. 298 pp. M. 24; linen, M. 27.

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F—PHYSIOLOGY

E. K. MARSHALL, JR.

Basal metabolic rate of medical students and nurses in training at Charleston, S. C. ROB E. REMINGTON AND F. BARTOW CULP. *Arch. Internal Med.* 47, 366–75(1931).—The basal metabolic rate of student nurses and male medical students at Charleston, S. C., showed results 10% lower than the Aub-Dubois standards. The I intake, dietary

habits and the state of nutrition are not believed to be responsible for the results obtained. J. B. BROWN

Effect of acidosis upon capacity for work. H. DENNIG, J. H. TALBOTT, H. T. EDWARDS AND D. B. DILL. *J. Clin. Investigation* 9, 601–13(1931); cf. *C. A.* 24, 2504.—Acidosis produced by the oral ingestion of NH_4Cl lowers the capacity for work as evidenced by decrease in capacity for O debt. The buffer value of blood proteins is reduced 1/9 or more with a decrease of 1/2 in CO_2 capacity. The ability to neutralize lactic acid is lowered. These factors are raised in alkalosis. J. B. BROWN

Normal standards of gastric function. W. SCOTT POLLAND AND ARTHUR L. BLOOMFIELD. *J. Clin. Investigation* 9, 651–8(1931).—The results of gastric analysis, detd. under fasting basal conditions and resulting from the injection of histamine, are plotted in a number of charts showing the normal ranges. The charts are useful in clinical diagnosis. J. B. BROWN

Studies on the physiology of the parathyroid glands. II. The relation of the serum calcium to the serum phosphorus at different levels of parathyroid activity. FULLER ALBRIGHT, WALTER BAUER, JESSIE REED COCKRILL AND READ ELLSWORTH. *J. Clin. Investigation* 9, 659–77(1931); cf. *C. A.* 23, 5231.—Study of a large no. of simultaneous detns. of serum Ca and inorg. P in patients with hypo- and hyper-parathyroidism shows a slight reduction of P at high Ca level and a marked increase of P at low Ca level, so that the product of Ca and P is roughly const Parathyroid dysfunction is a disorder in which body fluids show normal Ca phosphate but an abnormal ratio of Ca to phosphate. At high Ca levels, however, P is no longer excreted and the fluids contain high Ca phosphate, with calcification elsewhere than in the bones as the result. The data do not explain the casual relationship between Ca rise and P fall. J. B. BROWN

The effect of injections of female sex hormone (estrin) on conception and pregnancy in the guinea pig. G. LOMBARD KELLY. *Surgery, Gynecol. Obstet.* 52, 713–22 (1931); cf. *C. A.* 24, 3816.—Small doses of estrin injected into female guinea pigs prevent conception. Pregnancy may be interrupted by this hormone. An excess of female sex hormone in the blood over the corpus luteum hormone is incompatible with conception. J. B. BROWN

Hormonal sterilization. K. JUNKMANN. *Z. angew Chem.* 44, 162–3(1931).—A review and bibliography are given of the different chemotherapeutical ways of producing facultative sexual sterility in the animal and human body. During pregnancy the corpus luteum prevents the ripening of new ova by internal secretion. The same effect is obtained by the injection of prepns. from ovaries or placentas of pregnant animals, such as placentaoptone (Merck), progynon, folliculin, menformone or the inner secretions of the corpus luteum. The hormones of the anterior lobe of the pituitary body can have the same effect, though the mechanism of their action is different. In the male body sterility can be produced by administering female sexual hormones. ALFRED BURGER

Combined peptic-tryptic digestion in vitro and the digestibility of foodstuffs. A. RONCATO. *Arch. fisiol.* 28, 69–98(1930).—See *C. A.* 25, 329. E. J. C.

The existence of a pancreas hormone which lowers blood pressure. P. GLEY AND N. KISTHINIOS. *Wiener klin. Wochschr.* 43, 1530–6(1930).—The amt. of the hormone is quite variable in different com. insulin prepns. Its effect is not the same as that of histamine or choline. It neutralizes the effect of adrenaline on blood pressure. D. B. DILL

Action of the heart hormone, "Eutonon," from the liver. H. SALOMON AND G. ZUELZER. *Z. ges. exptl. Med.* 66, 291–324(1929).—The response to eutonon was detd. in the frog heart, various heart-lung prepns and in selected clinical cases. F. L. D.

The antimasculine action of the female sex hormone, menformone. E. BORCHARDT, E. DINGEMANSE, S. E. DEJONGH AND E. LAQUEUR. *Z. ges. exptl. Med.* 68, 86–105(1929). F. L. DUNN

Corpus luteum and the sexual hormone. L. FRAENKEL AND E. FELS. *Z. ges. exptl. Med* 68, 172–84(1929). F. L. DUNN

A hormone affecting heart activity. XIII. Effect on the frog heart. L. HABERLANDT. *Z. ges. exptl. Med.* 68, 185–95(1929); cf. *C. A.* 24, 5817–8; *Med. Klin.* 1929, No 14. The action of Hormocardiol (Hoechst) on the frog heart is discussed. F. L. DUNN

Effect of muscle activity, adrenaline and stimulation with the galvanic and faradic currents upon the blood sugar. M. DORLE. *Z. ges. exptl. Med.* 69, 242–54(1930).—Below the point of fatigue muscle activity produced a variable response in the blood sugar and in various diseases and constitutional types. Adrenaline produced the same reaction in the two constitutional types. Elec. stimulation of the gastro-intestinal canal

in animals produced the greatest rise in blood sugar. The rise in blood sugar did not parallel the rise in blood pressure following the injection of adrenaline. F. L. DUNN

The mercapto group in blood cells. E. GABBE. *Z. ges. exptl. Med.* **69**, 392–421 (1930).—A method is described based on the oxidation of the SH group by $K_4Fe(CN)_6$ in strongly acid soln. by which the relation of SH and SS groups in glutathione and thionine can be detd. in blood. In venous blood the SH form is found, while in arterial or oxygenated blood the proportion of SH group is reduced 10–50%. The SH combination remains attached to protein when the soln. is treated with CCl_3CO_2H, neutralized with U acetate in the cold, but it is sepd. following hemolysis. The SH content of the blood cells increases following bleeding, anoxemia and $PhNHNH_2$ poisoning. There is an extensive bibliography. F. L. DUNN

Metabolism at reduced pressure. I. H. ELIAS AND M. TAUBENHAUS. *Z. ges exptl. Med.* **69**, 529–60(1930). F. L. DUNN

Behavior of δ-keto-*n*-hexoic acid in the perfused liver. WALTER L. DULIÈRE AND HENRY S. RAPER. *Biochem. J.* **24**, 1672–7(1930).—The Na salt of δ-ketohexoic acid on perfusion through the liver yields acetone bodies; this indicates a β-oxidation BENJAMIN HARROW

Male hormone. IV. CASIMIR FUNK AND BENJAMIN HARROW. *Biochem. J.* **24**, 1678–80(1930); cf. *C. A.* **24**, 5824.—A simplified method of prepg. the hormone is described. This involves the extn. of strongly acidified male urine with $CHCl_3$, heating the evapd. $CHCl_3$ residue with alkali, repeatedly extg. the alk. solution with ether, evapg. the ether ext. and taking up the residue with oil. About twice as much of the hormone can be obtained from a strongly acidified urine as from an alk. urine. An important difference in the chem. behavior of the male and female hormones has been noted. BENJAMIN HARROW

The presence of a volatile organic chlorine compound in blood. NOAH MORRIS AND SAMUEL MORRIS. *Biochem. J.* **24**, 1716–22(1930).—For each blood there is a certain max. and min. amt. of volatile Cl present beyond which the content does not pass. The Cl in normal blood probably exists in 3 forms: (*a*) inorg., (*b*) org. non volatile and (*c*) org. volatile. BENJAMIN HARROW

Studies on the biochemistry of sulfur. VIII. Rate of absorption of cystine from the gastro-intestinal tract of the white rat. M. X. SULLIVAN AND W. C. HESS. *U. S. Pub. Health Repts.*, Suppl., No. **89**, 16 pp.(1931); cf. *C. A.* **25**, 2449.—Studies are made on the rate of absorption of cystine, fed as the Na salt, from the gastrointestinal tract of the rat by means of 3 cystine methods, the Folin-Marenzi method, the Okuda iodometric method and the Sullivan method. The last two methods are in close agreement when corrections are made for the cystine value of the Na cystinate fed and the % recovery of cystine in the method of extn. The value found by these methods is, in round nos., 50 mg. of cystine per 100 g. of body wt. per hr.—a value which puts cystine in the same class as other amino acids as far as absorption is concerned. The F.-M. method gives a lower value, in round nos., 30 mg. of cystine per 100 g. of body wt. per hr., in agreement with the work of Wilson (cf. *C. A.* **24**, 3821), with the same method. If the value obtained by the F.-M. method is the true one, this method must be reacting to a desulfurized changed cystine left in the gastro-intestinal tract, a complex to which the other methods do not react. If this assumption is made that the excess of material reacting to the F.-M. method is only changed cystine, then the findings by the F.-M. method are the true rate of absorption of cystine by the white rat. Data are given to show that hydrolyzates of amino acids with no cystine present react pos. as cystine in the F.-M. method, but neg. in the other 2 methods, and that feeding glycine, and especially alanine, gives an increase in cystine value by the F.-M. method. Indications were obtained of an increase in glutathione content of the liver by feeding cystine. There are 27 references. J. A. KENNEDY

Modern conceptions on the antagonism of the sexual glands. ANGELO MIGLIACCA. *Boll. soc. ital. biol. sper.* **5**, 1082–4(1930). PETER MASUCCI

Relation between the calcium in the blood and the inhibitory action of the splanchnic nerve. E. GLEY AND H. JANKOWSKA. *J. physiol. path. gén.* **28**, 789–99(1930). The inhibitory action of the splanchnic nerve on the movement of the intestines depends, as does its vasomotor action, upon the Ca content of the blood. When this content falls $^1/_3$ or $^1/_2$ there results a large diminution and sometimes even a temporary suppression of the inhibitory action. This action is reëstablished rapidly under the influence of Ca injection. The inhibitory system is less sensitive to Ca deprivation than is the vasomotor system. L. A. MAYNARD

Suprarenal capsules and glutathione. A. BLANCHETIÈRE, LÉON BINET AND A. ARNAUDET. *J. physiol. path. gén.* **28**, 816–21(1930).—The suprarenal gland is the organ

which is richest in glutathione. The amt. of glutathione diminishes after ovariotomy and increases considerably during lactation. The venous blood of the suprarenals is particularly rich in glutathione. Perfusing the glands with blood to which glutamic acid and cystine have been added causes an increase of glutathione in the perfusate and in the tissues of the gland, indicating that glutathione can be synthesized from these constituents. L. A. MAYNARD

Psychic influences upon the calcium content of the blood serum. M. CH. EHRSTRÖM. *Acta med. scand.* **74**, 378–95(1931).—The effect of induced sleep is the same as that of normal sleep upon the Ca level of the serum. Psychic functions which are characterized by a state of quiet produce an effect upon the chemistry of the blood which manifests itself in a lowering of the serum Ca, while psychic states characterized by restlessness have the opposite effect upon the serum Ca. S. MORGULIS

The ammonia content and ammonia formation in muscle and its relation to function and change in condition. VIII. The assumed participation of the amide nitrogen of blood and muscle protein in the chemical processes of active muscles. T. MANN. *Biochem. Z.* **231**, 33–8(1931).—This is chiefly a critical examn. of the expts. of Bliss (*C. A.* 23, 1946), who claims for the tissues the ability to synthesize from NH_4 ions and blood protein amide compds. and to utilize these amide groups for the neutralization of acids produced during work. It was found that neither in the human blood nor in the isolated frog muscle does amide N take part in the chemistry or the metabolic processes. **IX. The position of ammonia formation in the series of chemical processes in active muscle.** WL. MOZOLOWSKI, T. MANN AND C. LUTWAK. *Ibid* 290–305.—The curve of NH_3 formation during activity of muscles poisoned with CH_2ICO_2H shows that the largest production of NH_3 takes place not during activity but during fatigue, exhaustion of the creatine-phosphate and the development of rigidity. S. MORGULIS

Experimental studies on the influence of air rarefaction on the resistance of red blood corpuscles to hypotonic salt solutions. CLARA NAEGELI. *Biochem. Z.* **231**, 95–102(1931).—Keeping animals in rarefied air greatly affects the resistance of their red blood cells to hypotonic NaCl solns. and after 6–8 days the min. resistance diminishes by 0.02–0.08% NaCl and the max. increases at least 0.08%. S. MORGULIS

Changes in the physical state of inorganic components of serum under reciprocal influences. HANS G. SCHOLTZ. *Biochem. Z.* **231**, 135–43(1931).—Studies by means of ultrafiltration show that a colloidal Ca-P complex is formed in serum when either the Ca or P level is raised. A similar complex is also formed with Mg. The addn. of $CaCl_2$ to serum increases the ultrafiltrability of the K and the addn. of $MgCl_2$ increases that of Ca. The hypothesis of a colloidal K compound in serum is given support by these expts. S. MORGULIS

Studies on blood glucolysis. III. Inhibition of glucolysis. H. K. BARRENSCHEEN AND KARL BRAUN. *Biochem. Z.* **231**, 144–72(1931); cf. *C. A.* **25**, 1889.—Under all conditions or agents which inhibit glucolysis of the erythrocytes (hemolysis, narcotics such as ether and $CHCl_3$, fluorides, oxalates and the monohalogen derivs. of AcOH, CH_2XCO_2H) there is a splitting of inorg. P from org. combination, the chief source being the pyrophosphate fraction of the org. phosphate. With fluorides and CH_2XCO_2H the inhibition of glucolysis is assocd. with a synthesis of difficultly hydrolyzable esters related to the hexosediphosphate fraction. From these considerations it is concluded that the pyrophosphate fraction is essential for the glucolytic process and is either the coenzyme or the activator of the coenzyme. This is sustained by such facts as the following: the fermentation of yeast prepns. free from, or poor in, coenzyme is somewhat activated by the addn. of the pyrophosphate fraction from erythrocytes, and the inhibition of glucolysis by hemolysis, fluorides or CH_2XCO_2H is accompanied by an accumulation of methylglyoxal from added hexosediphosphate. S. M.

Cholesterols in structural combination in the protoplasm. VI. Studies on the cow spleen. G. PFEIFFER. *Biochem. Z.* **231**, 239–43(1931); cf. *C. A.* **25**, 1889.—The spleen of the 1-yr.-old cow contains 0.0946% total cholesterol per 100 g. fresh substance. Of this 64.4% are cholesterol + oxycholesterol (oxycholesterol = 6%) and 35.6% cholesterol esters. Of the latter the oleic acid of cholesterol was 7.5% and of oxycholesterol 28.0%. The spleen shows thus a higher cholesterol content than other organs which is assocd. with its physiol. function of destroying red blood cells. The cholesterol set free in the process of erythrocyte destruction accumulates in the spleen. S. MORGULIS

Presence of ergosterol in the human brain. IRVINE H. PAGE AND WILH. MENSCHICK. *Biochem. Z.* **231**, 446–59(1931).—The absorption spectra were detd. of the purified sterol fraction from the brains of fetuses, newborn babies, lactating babies and adults. In the first three the absorption maxima of the brain sterols were at 294, 283 and

250 mμ, resp. The absorption at 294 and 283 mμ belongs to ergosterol, and its concn. in the cholesterol diminishes from 0.05% (fetus) to 0.01% in the 1½-yr.-old baby. The substance corresponding to the absorption band at 250 mμ has not yet been identified. The ergosterol has been identified by means of digitonin pptn. and change in absorption spectrum under the influence of ultra-violet radiation. The absolute amt. of ergosterol reaches a max. of 1 mg. in the brain of the 1-yr.-old baby, and then diminishes considerably. S. MORGULIS

The non-inhibition of cell respiration by hydrocyanic acid. OTTO WARBURG *Biochem. Z.* 231, 493–7(1931).—Dixon's discovery (*C. A.* 24, 426) that KCN affects only 60% of the cell respiration is shown to be based on error. Liver, kidney and spleen cells are injured by the phosphate buffer, as used by Dixon. When these cells are experimented with in a Ringer-$NaHCO_3$ + CO_2 medium their respiration is completely inhibited by KCN just as is that of yeast cells. Attention is called to several other exptl. errors in Dixon's work. A no. of instances are cited demonstrating that injury of the cell frequently affects the inhibition of its respiratory activity under certain conditions. W. points out that the cardinal problem in cellular respiration is not whether O_2 or H_2 is activated but whether or not activation is catalyzed by Fe. From the fact that baker's yeast heated 90 min. at 52° practically loses the ability to oxidize physiol substances, though it can still oxidize a mixt. of *p*-$C_6H_4(NH_2)_2$ and α-naphthol to indophenol, which is also inhibited by CO, Keilin (*C. A.* 23, 3719) concluded that the respiratory enzyme is the indophenoloxidase. The reaction with the heated yeast, however, is irregular and the expts. are interpreted as showing merely that the respiratory enzyme has been injured. S. MORGULIS

Skin and climacterium. CLARA NAEGELI AND MARIAN FEILNER. *Endokrinologie* 8, 81–121(1931). —General. S. MORGULIS

The endocrine function of the placenta. ARTHUR V. PROBSTNER. *Endokrinologie* 8, 161–9(1931).—From the fact that a patient who underwent an operation for double ovariectomy during pregnancy completed the term, gave birth to a normal child and still continued to secrete in the urine the sex hormone, just as the normal female does, it is concluded that the hormone must be produced by the placenta. S. MORGULIS

The mechanism of the action of the sex (follicular) hormone. PETER HAUPTSTEIN. *Endokrinologie* 8, 169–80(1931).—Studies on mice show that the effectiveness of the follicular hormone depends only up to a certain degree upon the amt. of the hormone administered. Repeating the dose at short intervals may increase its effectiveness even a hundred-fold. The loss of activity is rapid and independent of the dose and is apparently due to quick excretion. Following prolonged administration of nonphysiol amts. of the hormone there is definite evidence of injury of the follicular app. of the mouse, manifesting itself in inhibition of the follicular development and the failure of development of corpora lutea. The last fact is especially important in human therapeutics. S. MORGULIS

The chemical composition of animal fetuses. HAMDI ÖMER. *Arch. Wiss. Prakt. Tierheilkunde* 62, 248–66(1930).—Water, fat and ash were detd. in hog and sheep fetuses, and in hogs and sheep at various times shortly after birth. The water content of the fetus decreases, and the ash content and material free from fat and ash increase, as the fetus increases in size. The ash content of the fetus is less than that of the mature animal. W. GORDON ROSE

Partial diuresis. GIULIO LEGA. *Arch. farmacol. sper.* 51, 49–54(1930). —When 1000 cc. physiol. NaCl soln. was given to normal fasting humans, the NaCl was promptly excreted, while an increased water elimination became noticeable after 4–5 hrs. Urea administered in physiol. NaCl soln. to healthy persons was immediately excreted, while the elimination of water and NaCl was retarded. Daily administration of NaCl to nephrotics did not at first exert an influence on the NaCl excretion, which, however, began to rise after a few days. Administration of 500 cc. water to nephritics with polyuria and with glomerular and vascular lesions caused a retarded diuresis, if any. Protracted administration of urea to chronic nephritics with normal NaCl elimination and scanty urea exretion was followed in some cases by a prompt and prolonged urea excretion in the urine. In other cases with more severe lesions no urea was eliminated after administration of a single dose; in many of these cases, however, protracted urea administration was followed by increased elimination. No exptl. data are given G. SCHWOCH

Action of some organic and inorganic substances on the capacity for work of the gastrocnemius of the frog. VINCENZO FAMIANI. *Arch. farmacol. sper.* 51, 65–79 (1930).—One of the gastrocnemic muscles together with its nerve was isolated and immersed in a soln. of NaCl 0.60, KCl 0.03 and $CaCl_2$ 0.02% for 15 min. Then it was

put to work under isotonic conditions until it was completely exhausted. Meanwhile the substance to be tested was injected into the dorsal lymphatic sac of the frog. After 1 hr. (1.5 hrs. with glucose) the other gastrocnemius was isolated, immersed in the salt soln. for 15 min. and stimulated to complete exhaustion. From the muscular contractions as registered by the kymograph the work done was calcd. in g. m. and from the difference in work accomplished by the 2 muscles conclusions were drawn with regard to the favorable or unfavorable effect of the substance tested. Creatine, and to a slightly lesser degree NaH_2PO_4, caused an increase in the capacity for work. K_2HPO_4 in very small doses acted similarly, while in large doses it had an injurious effect. The influence of creatine in combination with K_2HPO_4 or NaH_2PO_4 was not greater than that of one of the compds. alone. Glucose alone or in combination with creatine or phosphates, or together with creatine and phosphates, always caused a distinct diminution in the work done. Other expts. showed that within certain limits the isolated gastrocnemius of the frog had a greater capacity for work the longer it had been immersed in the salt soln. All conditions being equal, the right muscle had a greater capacity for work than the left muscle. A large bibliography is included. G. SCHWOCH

The participation of the nucleolus of hepatic cells in iron metabolism. GIOVANNI CORRADINI. *Arch. farmacol. sper.* **51**, 125–8(1930).—By means of the Berlin blue reaction C. demonstrated that in the white mouse the nucleoli of hepatic cells participate in Fe metabolism. Normally the reaction is distinct only in the vicinity of the centrolobular vein, but after injection of colloidal Fe it was observed throughout the liver. Similar expts. on rabbits and guinea pigs showed that in these animals the Berlin blue reaction could not be produced in the nucleoli of the hepatic cells. G. SCHWOCH

Effect of experimental hyperthyroidism on reproductive processes of female albino rats. CHARLES K. WEICHERT. *Physiol. Zoöl.* **3**, 461–6(1930).—When normal female rats, which had shown regular estrous cycles, were fed with 0.25 g. of desiccated thyroid daily, the diestrous condition persisted as long as the thyroid feeding was continued (6–22 days). The animals came into estrus 2–10 days after feeding was discontinued. The general health of these rats was not markedly altered, though the body wt. had decreased approx. 19% after 3 weeks of thyroid feeding. Sections of the ovaries revealed a no. of corpora lutea along with follicles of all sizes. When pregnant mature rats were fed with desiccated thyroid (0.25 or 0.5 g. daily) very severe reactions followed. Some of the animals resorbed their young; others died before or after delivery. The gestation period was prolonged in those rats which lived long enough to deliver their young. The young were born dead or died within 1 or 2 days. The animals appeared to be in good health until the last 2 or 3 days of pregnancy. The reactions were more severe in the groups receiving the larger dose. The possibility is discussed that the anterior lobe of the pituitary body may be involved. G. SCHWOCH

Separation of anterior-lobe substances and study of their individual effects. PEARL L. CLAUS. *Physiol. Zoöl.* **4**, 36–57(1931); cf. *Proc. Soc. Exptl. Biol. Med.* **27**, 29–30.—Armour's desiccated anterior lobe was extd. with acid alc. In the attempt to sep. the hormones the method of Fevold, Hisaw and Meyer (*Proc. Soc. Exptl. Biol. Med.* **27**, 604) was used with some modifications. Two substances were isolated. One of them (I) was a constituent of a cryst. fraction; when injected subcutaneously it stimulated follicular development in adult female rats and induced early maturity in immature female mice and rats and in immature male mice. Identical crystals with the same physiol. properties were also obtained from urine of pregnant women, the epididymis of the bull, fish sperm, the thyroid gland and adrenal cortex. The other active fraction (II) was sol. in abs. alc. and contained a luteinizing hormone which was not obtained from a similarly prepd. ext. of adrenal cortex or epididymis. The luteinizing fraction caused, in the ovary of an adult rat, the formation of atretic corpora lutea with the ovum inclosed, but it did not induce early maturity. It also stimulated placentomata formation which does not occur with I. No increase in wt. was noticed after adult rats had been treated with I or II for 6 weeks. Numerous references and 6 plates are given. G. SCHWOCH

The formation of bile pigments in tissue cultures. I. SÜMEGI AND M. CSABA. *Magyar Orvosi Arch.* **31**, 473–7(1930).—The spleens of chicken embryos and those of amphibians are able to produce bilirubin in tissue cultures from laked blood. The bile pigments were identified by the indirect diazo reaction. Undissolved hemoglobin (erythrocytes from the explanates) produces bilirubin in the same way but only in trace. The formation of bile pigments is a vital function of the spleen. H. T.

The conditions of metabolism which can permit the change of sex. PH. JOYET-LAVERGNE. *Compt. rend.* **192**, 180–2(1931).—The changes of sex in animals, which have been described in recent years are attributed to simple physiol. causes: the change

from male to female to the deposition of fat in the testicles, the change from female to male to an increase in metabolism, a decrease in reducing power of the tissues and changes in the compn. of the blood. The last changes can be produced by tuberculous tumors (Crew, *Proc. Roy. Soc.* B95, 256, 1923) and are accompanied by the expected sex change. K. V. THIMANN

The relation between the effect of the estrus-producing hormone and a corpus luteum extract on the growth of the mammary gland. C. W. TURNER AND A. H. FRANK. *Science* 73, 295-6(1931).—Development of the mammary glands characteristic of pregnancy could not be obtained in rabbits by injection of the estrus-producing hormone alone. Injection of the hormone together with corpeus luteum ext. prepared by Allen's method (*C. A.* 24, 4819), however, gave after 30 days a development of the mammary glands of castrated males similar to that of advanced pregnancy. The active principle of the corpus luteum ext. responsible for this effect was present in a water- and EtOH-sol. ext. of the urine of pregnant cows, and this ext. could be substituted for the Allen's ext. in the above expts. K. V. THIMANN

Protoplasma-Monographien. Edited by FR. WEBER AND L. V. HEILBRUNN. **Band V.** PH. JOYET-LAVERGNE: **La physicochimie de la sexualité.** Berlin: Gebrüder Borntraeger. 457 pp. M. 32.

G—PATHOLOGY

H. GIDEON WELLS

A modified method for the production of antipneumococcus serum in horses. EDWIN J. BANZHAF AND THEODORE J. CURPHEY. *Proc. Soc. Exptl. Biol. Med.* 28, 279-80(1930).—Horses were immunized by intramuscular injections of phenolized pneumococcus pleural exudate and intravenous injections of formalinized sediment of 18-hr broth cultures. The sera of such horses had a greater therapeutic value than was indicated by their mouse protection unit content detd. by comparison with antiserum produced by administering vaccine intravenously. C. V. BAILEY

Is ferratin precipitinogenic? LUDVIG HEKTOEN AND WM. H. WELKER. *Proc. Soc. Exptl. Biol. Med.* 28, 293-4(1930).—Ferratin, a deriv. of nucleoprotein high in Fe, is obtained by boiling the liver, filtering and pptg. with tartaric acid. It can be rendered practically free from blood and lymph protein. Hog, beef and sheep ferratins were used in expts. on rabbits. The precipitinogenic power was slight and ferratin was not demonstrated to be a species-specific antigen. C. V. BAILEY

Antigenic power of ultra-violet-irradiated tetanus toxin. EMERSON MEGRAW AND HENRY WELCH. *Proc. Soc. Expt. Biol. Med.* 28, 494-5(1931).—A mixt. of 2 tetanus toxins dild. to contain 1 m. l. d. per cc. was irradiated with the C arc at 25 cm. distance for 2 min.; the toxin was partly destroyed; half the inoculated guinea pigs developed late tetanus. A further irradiation of 2 min. rendered the material atoxic. By use of a quantity originally contg. 1 m. l. d., 9 guinea pigs were given 5 subcutaneous injections of this irradiated toxin at 6–7 day intervals and were inoculated 3 weeks later with freshly titrated tetanus toxin in doses of 1–10 m. l. d. Tetanus did not develop in the 45 days of observation. Ultra-violet irradiation destroys the toxic but not the antigenic power of tetanus toxin. C. V. BAILEY

Absorption of hydrokollag from the obstructed bowel. H. A. CARLSON, H. J. DVORAK, F. W. LYNCH AND O. H. WANGENSTEEN. *Proc. Soc. Exptl. Biol. Med.* 28, 542-4(1931).—Hydrokollag, a colloidal suspension of graphite, was not absorbed from the obstructed intestine of the dog or of the rabbit. It was absorbed from the peritoneal cavity and possibly from the ulcerated intestine. C. V. BAILEY

Gastric acidity in diabetes mellitus. Its clinical significance based on a study of one hundred cases. I. M. RABINOWITCH, A. F. FOWLER AND B. A. WATSON. *Arch. Internal Med.* 47, 384-90(1931).—A study of normal cases shows a possible incidence of 20% who have achlorhydria. This incidence is, however, only one-half that found in diabetes mellitus, suggesting that this disease is accompanied by low gastric acidity. The etiology of this condition is discussed. J. B. BROWN

The metabolism of galactose. I. Conditions underlying the use of galactose in tests on the function of the liver. HARRY SHAY, EUGENE M. SCHLOSS AND MILTON A. BELL. *Arch. Internal Med.* 47, 391-402(1931).—Galactose is very suitable for testing liver function for the following reasons: readily obtainable pure; readily absorbed from the intestine; convertible with difficulty by the liver into glycogen; not utilized by other tissues than the liver; in the general circulation it is readily excreted in the urine, regardless of the condition of the kidney or endocrine activity. J. B. BROWN

The blood calcium in diabetic retinitis. R. D. LAWRENCE, KATE MADDERS AND

H. R. MILLAR. *Brit. Med. J.* 1930, II, 559.—The observation that diabetic retinitis is accompanied by low blood Ca is not confirmed. J. B. BROWN

The relationship of blood uric acid content to the state of renal function in nephritis. CHRISTOPHER JOHNSTON. *J. Clin. Investigation* 9, 555–9(1931).—Simultaneous detn. of blood uric acid and urea clearance showed the former to be of little value in the estn. of kidney function. Despite 80% loss of urea-excreting power by the kidney, uric acid may be normal. J. B. BROWN

The excretion of intravenously injected bilirubin as a test of liver function. GEORGE A. HARROP AND E. S. GUZMAN BARRON. *J. Clin. Investigation* 9, 577–87(1931).—The bilirubin excretory power is the most delicate method for testing liver function. J. B. BROWN

Studies of serum electrolytes. VII. The total base and protein components of the serum during lobar pneumonia with a note on the gastric secretion. F. WM. SUNDERMAN. *J. Clin. Investigation* 9, 615–33(1931).—Study of the base and protein constituents of the serum in patients with lobar pneumonia showed a decreased concn. of Na in proportion to the decrease in concn. of total base. In over half of the detns. an increase of K appeared before and after the crisis. During the febrile period Ca was decreased, while the Mg values were variable. A decrease in albumin was balanced by increase in globulin, making the total protein concn. nearly normal. Protein-bound base usually fell during the febrile period. Gastric acidity was low until after the crisis. There was no apparent correlation between serum total base or chloride with gastric acidity. J. B. BROWN

The cause of death in liver autolysis. EDMUND ANDREWS. *Surgery, Gynecol. Obstet.* 52, 61–6(1931).—Implantation of sterile liver (*in vivo* autolysis) produces a toxic reaction, described as autolytic peritonitis The toxic agent probably falls within the albumose group. J. B. BROWN

Action of parathyroid graft on calcemia in normal or parathyroidectomized dogs. J. T. LEWIS AND REBECA GERSCHMAN. *Compt. rend soc. biol* 103, 1281–3(1930).—See *C. A.* 25, 337. E. J. C.

Leucine and tyrosine in urine in lung tumors. HANS ASPERGER. *Wiener klin. Wochschr.* 43, 1281–4(1930).—Leucine and tyrosine are excreted in the urine in increasing quantities with the progress of carcinoma of the lungs. Their presence in the urine is of diagnostic value in doubtful cases. D. B. DILL

The influence of ergotamine and liver diet on liver function. RICHARD BAUER AND OSKAR WOZASEK. *Wiener klin. Wochschr.* 43, 1337–41(1930).—The administration of 40 g. of *galactose* results in *galactosuria* in some cases of liver disease when on a liver diet but does not occur with normal subjects on a liver diet. D. B. DILL

Distribution of electrolytes in serum and cerebrospinal fluid. I. Calcium and magnesium. ZDENKO STARY, ADALBERT KRAL AND RUDOLF WINTERNITZ. *Z. ges expl. Med.* 66, 671–91(1929); cf. *C. A.* 24, 3543.—The Ca content of cerebrospinal fluid approaches that of the dialyzable fraction of the serum. Dialysis of serum against spinal fluid produces only a slight change in the Ca distribution. The Ca content of cerebrospinal fluid is more constant than the serum Ca in the same individual, while Mg is the reverse. The spinal fluid Mg is higher than the serum Mg. A series of compensation dialysis experiments suggests that the serum Mg is in a complex anion. The ratio of Mg in spinal fluid and serum varied between 110 and 200% for non-meningitic cases. Tuberculous meningitis had a ratio less than 100%. **II. Potassium and sodium.** *Ibid* 691–701.—The K content of cerebrospinal fluid in a group of miscellaneous cases averaged 11.7 mg. % with an av. of 21.7 mg. % for the serum, giving a distribution coeff. of 53.92%; similarly for Na 295 mg. % for spinal fluid and 321 mg. % for serum, and a quotient of 91%. Dialysis of serum and cerebrospinal fluid results in both fluids having the same K concn. There were no characteristic changes in the distribution ratio of K or Na in the various diseases studied. F. L. DUNN

Behavior of free cholesterol and its ester in the blood and organs of the rabbit following artificial obstruction of the bile. E. VON ROSZTOCZY. *Z. ges. exptl. Med.* 68, 690–700(1929).—The rise in free cholesterol occurs in spite of the defective absorption of cholesterol resulting from the failure of the bile acids to be secreted because of the obstruction. The ester cholesterol showed a decrease in the organs while it was increased in the blood. The liver damage resulting from biliary obstruction is a factor in determining the relative amounts of free cholesterol and its ester. Part of the increase in cholesterol is due to the erythrocyte destruction accompanying biliary obstruction. The bibliography contains 75 references. F. L. DUNN

The specific dynamic action of protein in disturbed endocrine function. M. SEREISKII AND SOPHIE JISLIN. *Z. ges. exptl. Med.* 69, 321–36(1930).—Disease of the

thyroid resulted in a reduction or absence of the sp. dynamic action for protein. This change in hyperthyroidism was due to the satn. of the body with thyroid substance and to the over-stimulation of the vegetative nervous system. In hypothyroidism the lowered sp. dynamic action is a reflection of the general torpidity of bodily processes. The metabolism in thyroid disease is essentially endothermic in type. F. L. DUNN

Serum proteins in secondary syphilis. A. SEZARY AND P. MARTINET. *Bull. Mem. Soc. Med. Hopit. Paris* 1930, 945–7; *Bull. Hyg.* 6, 55.—The authors investigated the relation of albumin and globulin in the sera of 6 syphilitics in the secondary stage showing no nephrosis. The normal ratio is 1.6/1. The authors' figures range from 0.67 to 0.97/1. They assume the change due to changes in the metabolism brought about by spirochetal septicemia, not to nephrosis. GEORGE R. GREENBANK

Present status of the investigation of the cause, and of the geographical distribution, of mottled enamel, including a complete bibliography of mottled enamel. FREDERICK S. MCKAY. *J. Dental Research* 10, 561–8(1930).—"The evidence has been so overwhelmingly conclusive, to the effect that the productive influence resides in the drinking water, that the investigation now rests upon this hypothesis." The bibliography contains 47 references. JOSEPH S. HEPBURN

Cellular individuality in the higher animals with special reference to the individuality of the red blood corpuscle. II. CHARLES TODD. *Proc. Roy. Soc.* (London) B107, 197–205(1930).—Examn. of a family of Plymouth Rock chickens by means of exhausted immune iso-agglutinating sera revealed that the corpuscles of no 2 chickens were exactly alike; the cells of different individuals differed in immunological behavior from a close resemblance to a very marked contrast. Individual chickens, immunized with the blood of their own brothers and sisters, yielded active, highly sp. agglutinating sera. The ease of formation of the agglutinins varied with the degree of difference in character between the erythrocytes of the injected chicken and those used for immunization. "The red blood corpuscle must be regarded as a 'multiple antigen' in the sense that it contains a large number of different antigenic units or 'receptors,' which apparently behave as independent units when hereditarily transmitted." JOSEPH S. HEPBURN

Heat of rigor of mammalian muscle. E. C. SMITH. *Proc. Roy. Soc.* (London) B107, 214–22(1930).—Neither the disappearance of glycogen nor the formation of lactic acid suffices to explain the stiffening in rigor. A third chem. change, as yet not clearly understood, must also be involved. JOSEPH S. HEPBURN

Lactic acid content of the blood in several diseases, especially malignancy. E. M. GELSTEIN AND M. I. FRANKSTEIN. *Z. klin. Med.* 111, 563–81(1929).—The av. lactic acid content of the blood in healthy well-nourished persons is 9.08 mg. per 100 cc. It was increased in anemia, leucemia and cardiac disease with cyanosis and decreased oxidation in the tissues, and also in 56% of the cancer patients studied. A dose of 100 g. of dextrose or sucrose produced a temporary increase in the lactic acid content of the peripheral blood, the av. concn. being 66.9 mg. per 100 cc. at the end of 1 hr. This phenomenon was still more marked in some cancer patients. JOSEPH S. HEPBURN

Precipitation of sediments and the formation of calculi in the urinary tract. JOHANNES MEYER. *Z. klin. Med.* 111, 613–87(1929).—Pure uric acid calculi form in a normal, strongly acid urine with p_H approx. 5.0. Mixed calculi, composed of pure, quite dense uric acid, urate, oxalate and Ca phosphate layers, arise in normal urine of p_H 6.0. Pure Ca phosphate calculi form in normal neutral urine of p_H approx. 7.0. Hard, stratified calculi, composed chiefly of $MgNH_4PO_4$, Ca phosphate and NH_4 urate, form slowly in an ammoniacal urine with a faintly alk. reaction ($8 > p_H > 7$). If layers contg. considerable amts. of $CaCO_3$ be present in these calculi, then the reaction at their formation has been decidedly more alk. Soft free calculi, consisting chiefly of $MgNH_4PO_4$, $CaCO_3$ and NH_4 urate, form rapidly in a strongly alk. urine with $p_H > 8$. Org. compds. are simultaneously pptd., but the degree of satn. of the urine with crystalline compds. decides when the calculus grows, and the compn. of the deposited layers. An elaborate bibliography is appended. JOSEPH S. HEPBURN

Kidney function tests and blood-urea determination. H. KRUNKENBERG. *Arch. Gynäkol.* 143, 56–71(1930).—The various methods for detg. the functional activity of the kidney are reviewed. Most of them are too complicated for the average practitioner and require elaborate lab. equipment and often special prepn. of the patient. The detn. of the urea content of the blood by means of the azotometer is suggested as a reliable method for the average practitioner as the test is easily made and requires no special prepn. of the patient. HARRIET F. HOLMES

The xanthoproteic reaction in blood from which protein has been removed in pregnancy. H. EUFINGER. *Arch. Gynäkol.* 143, 366–75(1930).—The xanthoproteic reaction according to the method of Becher was carried out on blood from which the

protein had been removed from 80 pregnant women, 40 cases *sub partu* and 175 cases *post partum*. The xanthoproteic reaction was neg. during pregnancy and *sub partu*. *Post partum* a positive reaction was obtained in 45% and the reaction was obtained most often between the 5th and 10th days *post partum*. Fractionation of the total xanthoproteic content makes it seem probable that an increase of the intermediary aromatic amino acids is an indication of autolytic processes in the uterus in the puerperium. A pos. xanthoproteic reaction was obtained in 40% of the toxicoses of pregnancy, nephropathy and eclampsia. The xanthoproteic reaction is often markedly increased in cases of carcinoma of the uterus after x-ray or radium irradiation. Possibly the reaction will furnish a means for following the effect of irradiation in carcinoma cases. HARRIET F. HOLMES

Carbohydrate metabolism in cancer of the uterus after Röntgen and radium irradiation. I. LUCAS. *Arch. Gynäkol.* **143**, 389–411(1930).—In 10 cases of carcinoma of the uterus after treatment with x-ray or radium irradiation the sugar content and lactic acid content of the blood remain normal with the exception of a transitory increase in lactic acid content shortly after irradiation. The values for the alkali reserve indicate a hypocapnia of the blood. There was a decrease of alkali reserve 2–4 hrs. after the irradiation which was of short duration and 24 hrs. later there was an increase of alkali reserve which was slightly increased by each further irradiation. However, there is never a return to normal CO_2-binding power. The transitory increase in lactic acid shortly after irradiation coincides in time with the decrease in alkali reserve. The products of carbohydrate metabolism furnish no explanation for the persisting hypocapnia in patients with carcinoma of the uterus. HARRIET F. HOLMES

The Manoiloff reaction for pregnancy. F. FRETWURST AND K. OTTO. *Arch. Gynäkol.* **143**, 459–64(1930).—The Manoiloff reaction (*C. A.* **24**, 4315) for pregnancy was tried on sera from pregnant women, from healthy nonpregnant women and healthy men, and from patients with conditions that frequently give pos. results with other serological tests for pregnancy. The reaction was 61% pos. in the later months of pregnancy, but almost uniformly neg. in the earlier months of pregnancy. The reaction, therefore, is of no practical importance for the diagnosis of pregnancy. The reaction is not sp. HARRIET F. HOLMES

The two types of bilirubin diazo reactions in serum, with a hypothesis on the nature of the bilirubin in the serum from hemolytic jaundice. G. HUNTER. *Brit. J. Exptl. Path.* **11**, 415–9(1930).—An attempt has been made to det. the probable nature of the 2 kinds of diazo reactions for bilirubin obtainable in icteric sera. The so-called direct reaction, as it occurs in bile or in the serum of patients with obstructive jaundice, is most probably due to the presence of Na H bilirubinate. The so-called delayed reaction as it occurs in hemorrhagic exudates and in the serum of patients with hemolytic jaundice is probably due to the presence of free bilirubin in an undetd. solvent which is sol. in alc. The bilirubin solvent (it may be a lipoid or sterol) need be present in only relatively small amts. to retain the bilirubin in solution on the addn. of alc. The bilirubin may be in combination with its solvent or some other serum constituent so that it resists salt formation and oxidation. It would not be dialyzable or extractable with $CHCl_3$. H. thinks such a hypothesis to account for the delayed type of bilirubin would fit the findings better than the assumption of the presence of colloidal bilirubin. H. F. H.

Phosphorus, total calcium and diffusible calcium content of the blood sera of lepers and their relation to bone changes. JERALD G. WOOLEY AND HILARY ROSS. *U. S. Pub. Health Repts.* **46**, 641–58(1931).—Sera from 47 lepers were analyzed for Ca and inorg. P; the results were found to be within the range usually considered normal. Sera from 15 normal, healthy young men were examd. for inorg. P, total Ca, diffusible Ca, the % of Ca that was diffusible, the Ca-P and the diffusible Ca-P balance ratios were detd. Sera from 53 lepers, representing the various types and stages of progression of the disease, were similarly examd. The diffusible Ca and the % of total Ca that was diffusible averaged considerably lower in the lepers than in the normal young men, and in only a few instances did the diffusible Ca in the lepers approx. the level found in the controls. Radiographic studies of the bones of the hands and feet of 48 of these lepers showed bone atrophy in 44 (91.0%), the condition manifesting itself either as decalcification or absorption. The writers appreciate that the records here submitted do not include a sufficient no. of cases, observed over a sufficiently long period, to warrant the drawing of conclusions; it is thought, however, that deviation from the presumed normal has been marked enough to justify continuation of the investigation. J. A. KENNEDY

Antigenic value of scarlet-fever streptococcus toxin modified by the action of formalin. M. V. VELDEE. *U. S. Pub. Health Repts.* **46**, 693–8(1931).—V. briefly

reviews the data presented by various independent workers. The exptl. work here presented confirms the findings of others that scarlet-fever streptococcus toxin can be rendered much less toxic by subjecting it to heat and formalin. The antigenic value of the toxin apparently is not destroyed either by the action of the formalin or by the prolonged exposure to 37° to 38°. The amt. of antigen tolerated by susceptible individuals in each injection is greatly increased by this method of detoxification, so that the number of doses required for active immunization may be reduced. At the same time the reactions following the injections occur much less frequently and their severity is markedly diminished. Further experimentation may, it is hoped, develop a technic for removing the remaining toxic factor, thereby eliminating all disagreeable reactions and permitting the use of greater quantities of antigen. J. A. KENNEDY

The reactions of immunity among invertebrates. J. CANTACUZÈNE. *Arch roum. path. exptl. microbiol.* 1, 1–75(1928).—The introduction into the celom of *Sipunculus nudus* of sheep red corpuscles causes a certain no. of reactions on the part of the organism which have as their final effect the elimination of foreign particles in suspension in the cavity liquid, their reabsorption and the ultimate incorporation of the residue of this process into the brown bodies of the general cavity. The reabsorption is brought about solely by the phagocytes; the phagocytic action is facilitated by the agglutinant action of the viscous secretions. The process is characterized by an overproduction of all the cellular elements, and an intensification of their secretions, as well as a marked tendency toward agglutination and pptn. MARIE MAXIM

Investigations in the resistance of diphtheria and dysenteric toxin to different concentrations of hydrogen ions. C. IONESCO-MIHAIESTI AND A. DÂMBOVICEANU. *Arch roum. path. exptl. microbiol.* 1, 115–21(1928).—The destruction of the diphtheric toxin by the different concns. in H or OH ions is not immediate. For zone p_H 4.7–4.9 and 9.6–10.1 the toxicity is almost unchanged for 30 min. For 24 hrs. the limits are p_H 5.7–5.9 and 9–9.4. Likewise for dysenteric toxin the toxicity does not diminish until after a certain time; 30 min. in a medium of p_H 2.07–2.15 or p_H 11 does not suffice for any change; 24 hrs. of p_H 2.5–3 completes the action of the toxin. MARIE MAXIM

Appearance of a desensitizing and hypotensive substance in the organism after blocking of the reticulo-endothelial system. I. MODOVAN. *Arch. roum. path exptl microbiol* 1, 167–77(1928).—The intravascular or intraperitoneal injection of substances provoking the blocking of the reticulo-endothelial tissue brings about in the serum of inoculated animals the appearance of a desensitizing, hypotensive, thermo resistant substance, sol. in acids, alc., water, easily dialyzable through membranes of collodion and which has not been identified. MARIE MAXIM

Investigations on blood lipase in different forms of tuberculosis. I. NICOLAU AND O. ANTINESCU. *Arch. roum. path. exptl. microbiol.* 1, 437–51(1928).—Fat, detd according to the stalagmometric method, is generally diminished in the blood of tuberculous patients; its variations are in relation to the general state of the sufferer and not to the degree of tuberculous lesion. MARIE MAXIM

The glycogenesis of the sarcoma of Peyton Rous. E. C. CRACIUN. *Arch. roum. path. exptl. microbiol.* 2, 105–11(1929).—The sarcoma of Rous presents a quite abundant and irregular glycogenesis at the level of coagulation necrosis as well as with liquefying necrosis. There is no relation between the glycogenesis and the virulence of this tumor. MARIE MAXIM

Investigations on specific substances (residual antigens) of the anthrax bacilli. D. COMBIESCO, E. SORU AND S. STAMATESCO. *Arch. roum. path. exptl. microbiol.* 2, 291–312(1929).—A water-sol. substance having the properties of polysaccharides has been sepd. from *B. anthracis*. This substance is not toxic for white mice and guinea pigs, does not form antibodies and gives a pptn. with specific serums. The rotary power after hydrolysis is —20; it contains hexoses and pentoses. MARIE MAXIM

Glycogenesis and regeneration of voluntary muscles. E. C. CRACIUN. *Arch roum. path. exptl. microbiol.* 2, 313–23(1929).—The sarcoblasts and granulation tissue contain no glycogen; this substance is often present in abscesses. M. M.

The heliotropic property of cholesterol in relation to cancer of the skin. A. H. ROFFO AND FR. PILAR. *J. physiol. path. gén.* 28, 854–6(1930).—Exposure of the skin to sunlight or ultra-violet light increases its cholesterol content. In the authors' experience 92% of the skin tumors of the face occur on parts directly exposed to the sun. They conclude that there is a relationship between the heliotropic properties of cholesterol, its fixation in the skin and tumor formation. L. A. MAYNARD

The chemical investigation of lung tissue in pneumoconiosis. LUIS ROSSI AND SANTIAGO A. CELSI. *Semana méd.* (Buenos Aires) 1931, I, 629–34.—In the lungs of

miners in Bolivia, SiO_2, Fe, Al and Sn were found, the last at a ratio of 1.0963% calcd. on dry or 0.272% calcd. on fresh substance. A. E. MEYER

Studies on the subfractions of the serum globulins and albumins. II. The distribution of lipoids, precipitinogens and bacterial agglutinins among the separate fractions of serum. B. LUSTIG AND R. KATZ. *Biochem. Z.* **231**, 39–44(1931).—The largest lipoid content is found together with the albumin and the smallest with the euglobulin fractions of serum. Among the subfractions of euglobulins and pseudoglobulins the highest total lipoid and lecithin content is found in the proteins sol. in NaCl and the smallest in the water-sol. ones. The largest amt. of the sp. precipitinogen is also in the NaCl-sol. euglobulins and pseudoglobulins and the least in the albumin fractions I and II. Normal agglutinins are chiefly associated with the euglobulin and are practically absent in the albumins. Among the globulins the Na_2CO_3-sol fraction has the largest amt. of agglutinin while the NaCl-sol fraction has the smallest amt. **III. Elementary composition, distribution of amide nitrogen, humin nitrogen, diamino nitrogen, mono- or non-amino nitrogen, of tryptophan, and of carbohydrate in the separate subfractions of cow serum.** B. LUSTIG AND P. HAAS. *Ibid* 472–92(1931).—The water absorption (% increase in wt. of dry powder suspended in H_2O) of the different serum protein fractions is as follows: water-sol. euglobulin 8.8–12.3%, NaCl-sol. euglobulin 9.6–13%, Na_2CO_3-sol. euglobulin 8.3–10% and NaOH-sol euglobulin 8.3–12.8%, water-sol. pseudoglobulin 8.8–11%, NaCl-sol. pseudoglobulin 8.1–12.5%, Na_2CO_3-sol. pseudoglobulin 6.8–9.5%, albumin I 10.5–14%, albumin II 9.5–12.5% and albumin III 8.0–12.8%. The elementary compns. of the different fractions, in the same order, are: % C 51.89, 52.44, 55.76, 49.51; 53.02, 54.59, 57.14; 53.70, 53.27, 55.82. % H 6.38, 6.39, 7.27, 6.32; 6.75, 6.91, 7.53; 7.25, 6.71, 7.31. % N 15.25, 15.96, 13.84, 9.83; 14.05, 15.45, 13.25; 15.43, 14.68, 15.92. % S 1.53, 1.55, 1.71, 1.57, 1.64, 1.34, 1.28; 2.37, 2.18, 2.27. % P 0.06, trace, 0.15, 0.24; 0.12, 0.20, 0.06; 0.07, 0.06, 0.15. % CH_3 on O 0.46, 0.66, 0.49, 0.47; 0.95, 0.42, 0.63; 0.57, 0.06, 1.04. % CH_3 on N 0.79, 1.50, 0.57, 0.38, 0.43, 0.83, 0.68; 0.93, 0.58, 0.66. The percentages of amide N in the different fractions were 4.5, 1.5, 3.2, —; 4.3, 1.6, —; 4.8, 4.3, —; of humin N, 4.8, 2.1, 2.2, —; 4.2, 1.9, —; 1.5, 1.7, —; of diamino N, 23.6, 26.5, 27.0, —; 21.8, 26.0, —; 32.5, 32.7, —; of mono- and non-amino N, 68.2, 71.8, 61.8, —; 72.2, 68.1, —; 63.8, 62.5, —. The av. percentages of carbohydrate were 0.84, 0.98, 2.38, 8.50; 0.98, 0.64, 6.40; 0.47, 0.55, 0.65. S. MORGULIS

Studies on antiricin. FRITZ REUTER. *Biochem. Z.* **231**, 175–232(1931).—The antiricin is adsorbed with kaolin from an anti-serum. The relation of the antiricin to the serum proteins is thereby not affected since the latter are likewise adsorbed, the adsorption of both being proportional to the quantity of kaolin. The adsorption is complete in 10 min., neither the order of mixing nor the degree of dilu. of the serum being of any consequence. Small amts. of kaolin adsorb the antiricin and proteins without reacting NH_2 groups, whereas with larger amts. proteins with reacting NH_2 groups also appear. A *M*/3 phosphate buffer of p_H 7.17 leaches out the antiricin only to a small extent, but this is improved by the addn. of normal serum to the buffer. NaCl does not leach out the antiricin even in the presence of a great excess of serum. Infusorial earth C is an excellent adsorbent, and the antiricin can be very well leached out with phosphate buffer (not with NaCl), the ease depending upon the concn. of the buffer. Evidently the PO_4 ions are essential for the leaching out. With increasing acidity of the buffer soln. it becomes less suited for leaching out purposes. Furthermore, the PO_4 ions also tend to displace the protein and antiricin from the adsorbent, since the latter treated with phosphate loses some of its adsorbing power. The leaching out was repeated 3 times, most of the antiricin together with most of the protein being removed after the first leaching, each successive leaching, however, removing a const. portion of the antiricin present in the adsorbent. The second leaching yields antiricin poorest in protein. Through fractional pptn. with $(NH_4)_2SO_4$ much protein can be removed without affecting the antiricin content. Further purification can be effected through electrodialysis, etc. Antiricin is not attacked by proteinase, carboxypolypeptidase or trepsin. S. MORGULIS

Rose bengal in the examination of the liver function. ALFREDO RICCI. *Arch. farmacol. sper.* **51**, 25–31(1930).—R. concludes from the analysis of liver-function tests on 12 patients that with the Rose bengal test the eliminating power of the liver, but not the entire functional ability of the hepatic cells, is detd. When bile pigment or urobilin is found in the urine and when the Rose bengal test is positive, the functional ability of the liver is altered. The reverse is not true, however, since the elimination may be normal, though the more complex functions of the liver may be impaired. G. SCHWOCH

The gastric secretion in fasting patients. FLAMINIO RICCI. *Arch. farmacol.*

sper. 51, 55–63(1930).—In 70 patients with gastric disturbances the gastric secretion was studied with respect to quantity of fluid, free HCl and total HCl. The samples were taken from patients in the fasting state or after a meal. In the patients in the fasting state a distinction is made between the "immediate secretion" which represents the 1st sample taken and the "late secretion" comprising samples taken after the removal of the 1st sample, in 10-min. intervals for the following 30 min. An "immediate fasting secretion" was found in 94% of the cases. In 72% the quantity of juice was less than 40–45 cc. Quantities in excess of 40 cc. were found in diseases assocd. with hypersecretion. Quantities larger than 60 cc. contained food residues and were due to pyloric stenosis. Free HCl was found in 78.57% of the cases; this percentage increases with the "late secretion" or after a meal. In general the immediate fasting secretion varied with the different gastric disorders and a relation between secretion and disease could be established. In diseases assocd. with hyperchlorhydria the secretion was generally abundant (25–60 cc.), while in diseases with normal or subnormal HCl the secretion was small (5–25 cc.). In the diseases with little secretion the content of free HCl was very slight. About 30 cc. is considered as the normal immediate fasting secretion. The "late secretion" was in general more abundant in cases with hyperchlorhydria and less abundant in cases with hypochlorhydria and anachlorhydria; the av. quantity secreted within 30 min. is 35–50 cc. The content of free HCl was generally greater in the late secretion than in the immediate secretion and slightly smaller than in the secretion after the meal. The late secretion was quite frequently (30%) contaminated because of duodenal regurgitation; therefore this test is only of relative value. The importance of the examn. of the fasting gastric secretion is emphasized with respect to its value in the diagnosis. G. Schwoch

Uricidemia in diabetes mellitus. Alfredo Ricci. *Arch. farmacol. sper.* 51, 41–8(1930).—The uric acid of the blood was detd. in 18 fasting diabetic patients who in the days previous to the expts. had been given a diet low in purine-contg. foods. The uric acid was normal in the cases treated with insulin and was increased in the cases not treated with insulin. Since the detns. were carried out according to the method of Folin and Denis, and since xanthine and guanine give the same reaction with this method, R. assumes that the oxidation of the intermediate products in the purine metabolism, for which the kidneys are impermeable, is retarded, thus giving rise to the accumulation of these products in the blood. This hypothesis is supported by expts. which were conducted to exam. the degradation of the exogenous purine substances. One normal person and 11 diabetics were given a meal consisting of 150 g. liver and 50 g. calf's tripe. Three hrs. later the uric acid was elevated in the healthy person and 6 hrs. later it had almost returned to its initial value. In the diabetics the uric acid was increased after 3 hrs. and was still far above normal after 6 hrs. The uric acid curve of the diabetic treated with insulin was similar to that found in the normal person. These results indicate that the purine metabolism is intimately linked with the carbohydrate metabolism; when the latter is deranged, as in the diabetic, the purine metabolism is also affected. Insulin administration to diabetics restores the carbohydrate metabolism to normal and consequently the purine metabolism is also restored to normal. G. S.

Chloremia and azotemia in cardiopaths. Serafino Manca. *Arch. farmacol. sper.* 51, 81–94(1930).—Urea N and Cl of the blood and Cl of the urine were detd. in 20 patients with heart disease who had been kept on a const. diet for 2 or 3 days before the test. The patients with compensated heart disease showed values similar to those obtained from 8 healthy people. In the patients with non-compensated heart disease the Cl of the blood and urine was diminished, while the non-protein N of the blood was augmented. The more the non-compensated state was reduced by proper treatment the more the Cl and urea N approached normal values, without ever completely equaling them. These findings are probably related to the fact that in these cases slight renal lesions persist even after compensation has occurred. G. Schwoch

Lactacidemia in renal insufficiency. Alfredo Ricci. *Arch. farmacol. sper.* 51, 141–4(1930).—Lactic acid was absent in the plasma of 12 patients with partial renal insufficiency; it was present (0.019 and 0.015%) in 2 cases of complete renal insufficiency. Its presence signifies an unfavorable prognosis. G. Schwoch

The question of the effect of unilateral eye extirpation. Bernhard Do
sunlight
92% of the *neralis* 6, 511–52(1930).—D. had found in the course of earlier investigation
conclude that there after unilateral eye extirpation the normal development of the midbr
fixation in the skin and tunic rated eye is inhibited. The controls developed normally in u

The chemical investigation ts. revealed that the water used in those expts. conta
Santiago A. Celsi. *Semana me* ated from a zinc-plated storage basin. Recent inv
s the development of extremities, midbrain and eye,

inhibited also in non-operated animals when a relatively large amt. of Zn was present in the water. However, the eye extirpation was an aggravating factor, since all of the operated larvae, when kept in the water with high Zn content, developed the symptoms mentioned. With the exception of the immediate consequences of the operation no disturbance was exhibited by the operated animals kept in Zn-free water. G. S.

The chlorine content in the blood of tuberculous infants during the tuberculin shock. IGNAZIO GATTO. *Pediatria Rivista* 39, 143–9(1931); cf. *C. A.* 25, 339.—Expts. on 10 infants with active tuberculous foci showed that the Cl content of whole blood was diminished during the tuberculin shock. The ratio corpuscular Cl : plasma Cl decreased first, but it increased during the period of the max. febrile reaction.
G. SCHWOCH

Experimental contribution to the study of rickets. CAMILLA NERVI. *Pediatria Rivista* 38, 1268–78(1930).—The amt. of inorg. P found in the blood of children with rickets appeared to be slightly lower than that found in normal children; however, no relation existed between inorg. P and the severity of the rachitic lesions. Detn. of the inorg. P of the blood in rachitic children showed that after ingestion of a meal the behavior of the P curve is similar to that observed in normal children. In rats kept on a rachitogenic diet no relation was found between the inorg. P of the blood and the extent of the rachitic lesions
G. SCHWOCH

The effect of acid and alkaline food on the growth of mouse carcinoma. I. MARTON, G. MAGASSY AND A. LESZLER. *Magyar Orvosi Archivum* 31, 59–64(1930).—The growth of transplanted mouse carcinoma is retarded by food contg. $(NH_4)_2HPO_4$ or $(NH_4)H_2PO_4$, which are known to cause acidosis. On the other hand, tumor growth is accelerated by food contg. $NaHCO_3$, which causes alkalosis. H. TAUBER

Tumor immunity. THOMAS LUMSDEN. *Am. J. Cancer* 15, 563–640(1931).—If the euglobulin is pptd. from an anti-malignant-cell serum (by dilg. the serum with distd. water and adding enough AcOH to bring the mixt. to the isoelec. point) a soln. of the ppt. in normal rat serum is as toxic to cultures of cancer cells as the original anti-malignant-cell serum itself. Euglobulin pptd. from the serum of a sheep which has been immunized against human breast cancer can be redissolved in Ringer soln. or normal mouse serum to the original vol. of the serum from which it was made, and, when recomplemented, kills cultures of mouse cancer (M_{63}) or sarcoma (A_{37}) as rapidly as the iginal serum. This fraction (euglobulin), therefore, contains the anti-malignant-cell odies. This euglobulin fraction is even more specifically anti-malignant than the iginal anti-human-breast-cancer serum itself, since in the process of pptn. most of the terotoxins present are destroyed. Hence, if the redissolved and recomplemented globulin is applied to a mixed culture of mouse cancer and mouse normal tissues, all e cancer cells are killed in a few min., while the normal tissue cells are quite undamaged id continue to divide and migrate out actively. The euglobulin fraction of the serum a rabbit immunized against mouse sarcoma kills, when recomplemented, cultures of ouse carcinoma, but does not damage cultures of mouse heart cells nearly so rapidly or verely. The pseudoglobulin pptd. from the serum of the sheep immunized against man cancer is not toxic to cultures of normal mouse tissues, but it causes mouse ncer cells to agglutinate. The cytolytic effects produced by the euglobulin fraction on ouse cancer cells are not observed if the pseudoglobulin is pure. This pseudoglobulin action is still toxic (cytolytic) to human cancer cells, which suggests that anti-species odies are contained in it. They demonstrate conclusively the fact that antibodies hich are specifically lethal to malignant cells exist. These antibodies can be pptd. out the appropriate sera, can be in this way refined and concd., and when redissolved and complemented are as potent as before pptn. The fact that they are toxic to malignant lls of all varieties, and from any species of animal, strongly suggests that some special ntigenic factor is common to all malignant cells. These cells all have certain common haracteristics, such as the power of indefinite multiplication, dedifferentiation, etc. ence it would have been surprising if they had not had as a common basis for these eculiarities some common constituent capable of acting as an antigen.
H. G. WELLS

Biochemical studies of malignant conditions. JOSEPH H. ROE AND HELEN M. YER. *Am. J. Cancer* 15, 725–31(1931).—Glucose-tolerance tests showed a lowered arbohydrate tolerance in fowls bearing the Rous sarcoma No. 1. The reduced carbohydrate tolerance is probably secondary to changes produced in the organs regulating arbohydrate metabolism, either by metastases or by a toxemia due to the malignant owth. The glycogenolytic activity of the blood of hens in which the Rous sarcoma . 1 had developed showed no variation from that of normal controls. The blood of wls bearing the Rous sarcoma No. 1 has a glucolytic activity about twice as great as

that of normal fowls. This is a primary change resulting apparently from an overflow into the blood stream of the glucolytic enzyme, which Warburg showed to be in tumor tissue in greatly increased amounts. An examn. of the glucolytic activity of the blood of 16 patients with malignant tumors gave values that are within normal limits. The detn. of the glucolytic activity of the blood is, therefore, of no clinical value in studying malignant conditions. The discrepancy between the glucolytic activity of the blood of hens with the Rous sarcoma No. 1 and that of the blood of patients with malignant conditions is probably due to the greater ratio of tumor tissue to normal tissue in the fowls with the sarcoma. H. G. WELLS

Immunological relationships among the pneumococci. V. Anaphylaxis and precipitation between antigens and antisera of yeast of type II pneumococci. JOHN Y. SUGG AND JAMES M. NEILL. *J. Exptl. Med.* 53, 527–34(1931).—A report is given of the interactions of anaphylaxis and pptn. between antigens and antisera derived from Type II variety of pneumococcus and from one variety of yeast. That the reactions occurred only with Type II and not with Types I and III is proof that the pneumococcus antigen responsible for the anaphylaxis of the antiyeast-sensitized animals was the type-sp. carbohydrate (S). C. J. WEST

Bilirubinemia. E. S. GUZMAN-BARRON. *Medicine* 10, 77–133(1931).—An exhaustive critical review of the literature of the physiology and chemistry of bilirubin, methods of detn. and their clinical application, with a bibliography of 290 references. H. G. WELLS

Biochemistry of Rous sarcoma of fowls. I. Biophysics. V. Coagulation of the serum. JIŘÍ HOLÝ. *Z. Krebsforsch.* 33, 133–45(1930); cf. *C. A.* 24, 5858.—In all cases the quantity of serum proteins of normal fowls showed wide variations, quite as great as in disease, and the proteins show the same coagulation properties, whether normal or pathol., with most precipitants. With $CuSO_4$ and $Cd(NO_3)_2$ some irregular differences were obtained. VI. Alterations in the crystal form of sodium chloride. *Ibid* 146–54.—A difference was found in the crystal forms when serum from normal and sarcomatous fowls was evapd. to dryness. H. G. WELLS

Vitamin A content of melanosarcoma of horses. SK. V. GUDJONSSON. *Z. Krebsforsch.* 33, 155–7(1930) —The amt. present in the tumors and in the adjacent muscle tissue is very small. H. G. WELLS

Sulfur impoverishment of the body and the tendency to cancer. GRUMME. *Z. Krebsforsch.* 33, 376–7(1931).—Purely speculative. H. G WELLS

The stimulation of epithelial growth with synchronous disturbance of connective tissue growth in tissue cultures by substances which affect surface tension. M KATZENSTEIN AND ELSE KNAKE. *Z. Krebsforsch.* 33, 378–410(1931).—Substances with high surface effects have a sp. action on tissue cultures of the chicken embryo. Cholesterol or amyl alc. depresses connective tissue growth and stimulates epithelial proliferation. Other substances exert a similar effect in direct proportion to their surface effects. H. G. WELLS

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H—PHARMACOLOGY

A. N. RICHARDS

Avertin. F. B. PARSONS. *Brit. Med. J.* 1930, II, 554–7; cf. *C. A.* 24, 5373.—A review of the chem. properties and the clinical uses of this drug. J. B. BROWN

Sodium amytal and other derivatives of barbituric acid. L. G. ZERFAS. *Brit. Med. J.* 1930, II, 897–902.—A review. J. B. BROWN

The elimination of ethyl iodide after inhalation and its relation to therapeutic administration. HERRMAN L. BLUMGART, DOROTHY ROURKE GILLIGAN AND JACOB H. SWARTZ. *J. Clin. Investigation* 9, 635–50(1931).—Following the introduction and inhalation of 1 to 3 cc. of EtI in the inspired air, 45% is immediately exhaled during the treatment, 9% is exhaled during the next 2 hrs. and 31% is excreted by the kidneys as iodide. A total of 85% of the dose is accounted for, the remainder being probably excreted in the sweat, etc. Eighty-five % of the urinary excretion appears in the first 24 hrs. and 97% in 48 hrs. To maintain high iodide concn. in the body daily administration must be given, the treatment being omitted every 3rd or 4th day to avoid iodism. The % of EtI retained in the body is independent of the size of the dose. J. B. BROWN

Studies in congestive heart failure. VIII. The effect of the administration of

dibasic potassium phosphate on the potassium content of certain tissues. J. ALFRED CALHOUN, GLENN E. CULLEN, GURNEY CLARKE AND T. R. HARRISON. *J. Clin. Investigation* 9, 693–703(1931); cf. *C. A.* 25, 1283.—Detns. of total solid and K were made on skeletal muscle, cardiac muscle from both ventricles and on liver and kidney in subjects dying without cardiac disease, with congestive heart failure without K and with congestive heart failure when K was administered during life. The controls showed a higher K content in both wet and dry tissues than the heart failure cases. The administration of K to the heart cases increased the tissue K, but the difference was most striking with skeletal muscle and least in heart muscle. J. B. BROWN

The toxicity and balantidicidal action of "di-hydranol" in guinea pigs. NORMAN A. DAVID AND CHAUNCEY D. LEAKE. *Proc. Soc. Exptl. Biol. Med.* 28, 196–9(1930).—"Di-hydranol" (2,4-dihydroxyphenyl-*n*-heptane) caused death in the guinea pig in about 4 days with symptoms of loss of wt., diarrhea and lethargy at an av. single dose of 400 mg. per kg. of body wt. It cures *Balantidium coli*-infested guinea pigs when given in doses of 75–100 mg. per kg. at 1–2 day intervals until the total amt. administered is 200–225 mg. per kg. of body wt. Doses slightly higher than the curative range may be toxic. C. V. BAILEY

Value of hexuronic acid in the treatment of Grave's disease with suprarenal cortex. DAVID MARINE, EMIL J. BAUMANN AND BRUCE WEBSTER. *Proc. Soc. Exptl. Biol. Med.* 28, 327–9(1931).—Marked clinical improvement followed the oral administration of a glycerol ext. of fresh ox suprarenal cortex in patients with Grave's disease. A hexuronic acid, readily destroyed by exposure to air, had been found in suprarenal cortex (cf. *C. A.* 23, 1423). Large doses of hexuronic acid concentrate, 400 mg. twice daily, given by mouth did not relieve the symptoms of Grave's disease and did not add to the therapeutic value of the suprarenal cortex ext. C. V. BAILEY

Effects of the halogenation of hydroxyquinoline on biological activity. H. H. ANDERSON, N. A. DAVID AND DOROTHY A. KOCH. *Proc. Soc. Exptl. Biol. Med.* 28, 484–5(1931).—Toxicity increased with halogenation of hydroxyquinoline and in proportion to the at. wt. of the halogen. The addn. of both I and Cl to hydroxyquinoline caused a considerable increase in toxicity which was slightly reduced by the addn. of a solubilizing group. The balantidicidal action in naturally infested guinea pigs was also increased by halogenation. In monkeys naturally infested with *Endameba histolytica*, 900 mg. per kg. of body wt. of iodochlorohydroxyquinoline given in divided doses over a 6 weeks' period eradicated the amebae. C. V. BAILEY

Blood-sugar response to intravenous insulin in normals and in diabetics. WM. S. COLLENS AND HAROLD G. GRAYZEL. *Proc. Soc. Exptl. Biol. Med.* 28, 487–9(1931).—Equivalent intravenous doses of insulin on the basis of body wt. produce a much greater depression in the blood sugar level in diabetic than in normal man. The absence of an insulin-inhibiting substance in the blood of diabetics is inferred. C. V. BAILEY

Parathyroid and fluoride hypocalcemia. R. GERSCHMANN. *Compt. rend. soc. biol.* 104, 411–2(1930).—See *C. A.* 25, 348. E. J. C.

Parathyroids and hyperglucemic curves. R. GERSCHMANN. *Rev. soc. Argentina biol.* 6, 35–9(1930).—See *C. A.* 25, 348. E. J. C.

Bromide poisoning with the picture of typhus abdominalis. HEINRICH MAYRHOFER AND ALFRED FESZLER. *Wiener klin. Wochschr.* 43, 1315–6(1930).—A case is described. D. B. DILL

The comparative effects of diuretics containing mercury. ELISABETH BERGER. *Wiener klin. Wochschr.* 43, 1505–8(1930).—The diuretic properties of NH_4Cl, NH_4Br and HCl are due to acid formation in the organism. They are used together with *salyrgan* and *decholin* when these alone are ineffective. D. B. DILL

The effect of age upon the action of thyroxine. EMIL ABDERHALDEN AND ERNST WERTHEIMER. *Z. ges. exptl. Med.* 68, 1–19(1929).—Loss of weight and toxicity are more marked in older or heavier guinea pigs and rats when given thyroxine than in younger or lighter animals. The glycogen losses are more marked in the older animals. No definite differences were made out with regard to gaseous and N metabolism at different ages, following administration of thyroxine. Increasing the dosage of thyroxine from 0.3 to 3 mg. per day in young animals results in but very little increase in toxicity. F. L. DUNN

Ketonuria in experimental hyperthyroidism. I. ABELIN AND A. JORDI. *Z. ges. exptl. Med.* 68, 20–31(1929).—Following thyroid ext. feeding or injections of thyroxine in rats there is an excretion of acetone, diacetic acid and β-hydroxybutyric acid in the urine, the last being in greatest amt. Maximal excretion occurs on the 10–14th day. It is much less than that observed following phlorhizin or alkaloids. F. L. DUNN

The influence of thyroxine on the blood iodine in myxedema. B. EISLER AND

A. SCHITTENHELM. *Z. ges. exptl. Med.* **68**, 487–92(1929).—The I content of the blood is markedly lowered in myxedema. Thyroxine administration (oral or intravenous) raises the blood I above the normal values for a short period after which it remains normal. The blood I in normal individuals is not altered by thyroxine feeding.
F. L. DUNN

Mechanism of action of small doses of salts and "Trunecek-serum." K. I. KOTELNIKOV. *Z. ges. exptl. Med.* **69**, 297–320(1930).—Subcutaneous injection of inorg. salts (5–15–25 mg.) and Trunecek-serum results in definite changes in the acid-base balance measured by alveolar air CO_2.
F. L. DUNN

Intravenous injection of ethyl alcohol for anesthesia. I. I. NITZESCU. *Compt. rend. soc. biol.* **104**, 25–8(1930).—See *C. A.* **24**, 5865.
G. G.

Action of arsenite on tissue respiration. ALBERT SZENT-GYÖRGI. *Biochem. J.* **24**, 1723–7(1930).—Arsenite strongly inhibits respiration of minced liver tissue, but has no effect on O activation, and little effect on H activation. In yeast, arsenite in higher concns. inhibits respiration but has no effect on alc. fermentation.
B. H.

Ethylene and carbon dioxide. JAMES TAYLOR GWATHMEY AND M. HILLEL FELDMAN. *Dental Cosmos* **72**, 1164–6(1930).—The use of C_2H_4, N_2O, CO_2 and O_2 for general anesthesia is described.
JOSEPH S. HEPBURN

Effects of strontium administration on the histological structure of the teeth of rats. HENRY KLEIN, J. ERNESTINE BECKER AND E. V. MCCOLLUM. *J. Dental Research* **10**, 733–8(1930).—A ration, adequate in all respects except its Ca content and contg. Sr chemically equiv. to 0.6% Ca, produced a proliferation of dentinoid, *i. e.*, the uncalcified ground substance, when fed to rats.
JOSEPH S. HEPBURN

Contraction of the extrinsic muscles of the eye by choline and nicotine. W. S. DUKE-ELDER AND P. M. DUKE-ELDER. *Proc. Roy. Soc.* (London), **B107**, 332–43(1930). —Choline, acetylcholine and nicotine produce a slow, tonic contraction of the normal extrinsic muscles of the eye, which is unaffected by atropine, increased by adrenaline and abolished by nicotine plus curare.
JOSEPH S. HEPBURN

Experimental addiction of animals (monkeys) to opiates. LAWRENCE KOLB. *U. S. Pub. Health Repts.* **46**, 698–726(1931).—The relative effects in the order of their severity of the 3 drugs given to monkeys in one toxic dose or in smaller daily doses were: toxicity; *heroin* was decidely most toxic, *morphine* least toxic; general health: *codeine* was decidedly most harmful, *heroin* least harmful; dependence-producing properties: *morphine* was most potent, *codeine* very slight or nonexistent.
J. A. KENNEDY

Intraperitoneal iron. CLIFFORD G. GRULEE AND HEYWORTH N. SANFORD. *Am. J. Diseases Children* **41**, 53–61(1931).—Fe injected intraperitoneally into rabbits becomes deposited in the liver rather than in the spleen. The hemoglobin and erythrocyte contents of the blood remain unchanged. The intraperitoneal administration of Fe to children with secondary anemia appears to be a safe and easy way of introducing Fe into the organism and creating a reservoir upon which the body may draw. Following the intraperitoneal injection of 5–8 mg. of Fe, as colloidal $Fe(OH)_3$, at 3-day intervals, the hemoglobin content of the blood and the no. of erythrocytes become markedly increased. The injections are combined with exposure to ultra-violet light or with blood transfusions.
E. R. MAIN

The blood constituents in acute rheumatism before and after salicylate treatment. EVELYN M. HICKMANS AND SIDNEY H. EDGAR. *Arch. Disease in Childhood* **5**, 387–96 (1930).—The urea, non-protein N and uric acid contents of the blood are somewhat higher than normal in acute rheumatism. The values tend to remain high during treatment with salicylate. The urea tends to become increased after the treatment while the administration of the same quantities of salicylate to normal children does not affect the urea content of the blood. The treatment with salicylate may further decrease the degree of renal efficiency in acute rheumatism.
E. R. MAIN

Quantitative studies on local anesthetics. A. RABBENO. *Boll. soc. ital. biol. sper.* **5**, 1094–8(1930).—The method used consisted in the application, to the dorsal skin of the leg of the decerebrated frog, of a rectangular piece of cotton satd. with the soln. under examn.; this was left for a definite time, and the reflexes were tested with disks of paper wetted with *N* AcOH. By varying the time of application of the drug, at const. concn., the min. time necessary to obtain the abolition of the reflexes is detd. and with successive tests at varying concns. a curve of the min. time of anesthesia as a function of the concn. of the drug is obtained. The curve is bound by 2 limiting values of concn.: the one which provokes immediate anesthesia (1 min.) and that which acts after several hrs. of application. Pyrryl alkyl or aryl ketones: (α-acetyl-, α-propionyl-, α-butyryl-, α-benzoylpyrrole). The curve which graphically represents the manner with which the min. time of anesthesia of pyrryl ketones varies with varying concns. of the drugs is

an arc of an hyperbola, represented by the equation $y = a + (b/x)$ (1), where y = min. time, x = concns., a and b are consts. When $y = 0$, $x = b/a$, that is, for zero time, the curve intersects the axis of x at a concn. equal to $-b/a$. For concns. equal to or greater than this, anesthesia is almost immediate. From the intersection at x, the curve rises with varying rapidity as indicated by the numerical value of the const. a (acetylpyrrole —58.8, propionyl- and butyryl- —4). For values of y between 60 and 140 min. the relation between the concns. is a const. and the conclusion is that the anesthetic activity of the acetyl-, propionyl-, butyryl- and benzoylpyrrole increases as 1:10:110:250. Referred to cocaine, the activity of the acetyl and propionyl derivs. is less, while that of the butyryl and benzoyl derivs. is 8 times greater. Cocaine and cocaine substitutes (cocaine, stovaine, alypine, novocaine, eucaine B and tutocaine-HCl). The curves for the min. time for these drugs resemble those of the pyrryl ketones. Cocaine gives values corresponding to equation (1), novocaine to $xy = b$, and the others to $y = b/(x - a)$. It was observed that the ratio alypine/cocaine, tutocaine/cocaine, stovaine/cocaine and eucaine/cocaine is const. only for very high values of min. time (150–200 min.) while for novocaine/cocaine it is 60–150 min. For lower values of min. time (10, 30, 60 min.), different numerical values are obtained. Conclusion: The activity of the local anesthetics used, tested by the method described, is less than that of cocaine. For brief intervals of anesthesia, alypine has just slightly less, tutocaine and stovaine has 2/3–3/4, eucaine 1/2 and novocaine 1/20–1/80 the activity of cocaine. PETER MASUCCI

Chloroform narcosis and radon. P. MASCHERPA. *Boll. soc. ital. biol. sper.* **5**, 1167–72(1930).—White mice narcotized with $CHCl_3$ and kept in an atm. rich in Ra emanations showed more rapidly phenomena of excitation and the narcosis intervened more quickly than in the control mice that were also narcotized but kept in ordinary air. Also on awakening, the radioactivated animals required a longer time to reëstablish normal functions than the controls. PETER MASUCCI

Uroselectan in pyelography. JUAN SALLERAS. *Semana méd.* (Buenos Aires) **1931**, I, 570–1.—Uroselectan was given intravenously. In most cases satisfactory results could not be obtained. A. E. MEYER

Irradiated ergosterol in the treatment of tuberculosis. F. MEERSSEMAN AND G. TRICAULT. *Semana méd.* (Buenos Aires) **1931**, I, 595–6.—In 11 human cases, improvement was observed. Tuberculous guinea pigs treated with irradiated ergosterol lived longer than the controls, and the lesions were found to be less severe. A. E. MEYER

The treatment of asthma with sulfarsenol. FÉLIX J. LICEAGA. *Semana méd.* (Buenos Aires) **1931**, I, 636–51.—Clinical cases of successful treatment are reported. A. E. MEYER

Clinical investigations into the effect of intravenous injections of insulin. V. The action of adrenaline on the stomach secretion. KAJ ROHOLM. *Acta med. scand.* **74**, 359–69(1931); cf. *C. A.* **25**, 353.—It was found that injections of insulin stimulate gastric secretion and that this stimulation was really an adrenaline effect. However, adrenaline injections have no effect upon the secretion of the fasting stomach. S. MORGULIS

The effect of colloids on histamine action. BEHREND BEHRENS. *Biochem. Z.* **231**, 92–4(1931).—Small amts. of kaolin or talcum do not affect the action of histamine but large amts. may cause inhibition. S. MORGULIS

The fate of parenterally administered sulfur. R. MEYER-BISCH AND F. TECHNER. *Biochem. Z.* **231**, 110–2(1931).—No changes either in the water content or in the hydrolyzable and total S of the liver have been found in rabbits receiving S parenterally. The changes in S metabolism must therefore be attributed to processes occurring in more peripheral organs, such as cartilage, skin, etc. S. MORGULIS

Influence of insulin on blood and organ lipoids. IRVINE H. PAGE, L. PASTERNAK AND MARIE L. BURT. *Biochem. Z.* **231**, 113–22(1931).—The most pronounced effect of insulin is manifested in the phosphatide content of serum, which diminishes 30%. The cholesterol contents of the blood, kidney and brain are higher than those in the non-insulinized controls. The aliphatic acid contents of brain, blood and serum seem to diminish under insulin, but the I_2 nos. of the acids increase in some (brain, liver) and decreases in other tissues (blood, serum). S. MORGULIS

The relative toxicities of some organic salts of triethyl lead hydroxide. HENRY GILMAN AND O. M. GRUHZIT. *J. Pharmacol.* **41**, 1–4(1931).—The m. l. d. intravenously to rats, and the m. l. d. for the first 3 intramuscularly to rabbits are given for the following: triethyl lead salicylate, triethyl lead phenyl acetate, triethyl lead furoate, triethyl lead *p*-toluenesulfonate, triethyl lead *p*-aminobenzoate, triethyl lead furylacrylate. All the compds. were extremely irritating and produced nervous symptoms. C. RIEGEL

Notes on the importance of exact preparation of tincture of digitalis and on the number of pigeons in the pigeon-emesis method. P. J. HANZLIK, A. B. STOCKTON AND S. S. DAVIS. *J. Pharmacol.* 41, 5–10(1931).—The min. emetic dose (m. em. d.) of digitalis tincture varied with the length of time allowed for extn. of the digitalis leaves. The practicability of using as the m. em. d. that amt. causing emesis in 2 out of 3 pigeons is confirmed by detns. on larger groups. C. RIEGEL

Some clinical actions and therapeutic uses of racemic synephrine. A. B. STOCKTON, P. T. PACE AND M. L. TAINTER. *J. Pharmacol.* 41, 11–20(1931).—Racemic synephrine raised the blood pressure in patients when 0.2 g. intramuscularly or 0.05 g intravenously was given, the rise being from 25 to 30 mm. Hg, and lasting ½ to 1 hr It was ineffective in asthma, and did not prolong the action of procaine in local anes thesia. Applied to the nasal mucous membrane it produced shrinkage of the mucosa without irritation, engorgement or swelling. Solns. of synephrine are stable and could be sterilized by heat. C. RIEGEL

The effect of mechanical constriction of the hepatic veins upon the anticoagulant action of Witte's peptone. ELIZABETH CRANSTON AND O. R. CAILLET. *J. Pharmacol.* 41, 65–70(1931).—Constriction of the hepatic veins previous to injection of the peptone produced a delay in the appearance and a reduction in the intensity of its anticoagulant action, and a less marked reduction in platelet count. C. RIEGEL

Apomorphine tolerance and its relationship to morphine tolerance. FRANK CO TUI. *J. Pharmacol.* 41, 71–82(1931).—Dogs habituated to apomorphine develop a tolerance to its emetic action, but not to its other effects. Dogs tolerant to apomorphine are tolerant to the emetic action of morphine, and vice versa. There is no cross tolerance as regards other effects. Neither morphine- nor apomorphine-tolerant animals are tolerant to the emetic action of pilocarpine. C. RIEGEL

Glycogen storage in the white rat when fed the roots of Arctium lappa. JOHN C. KRANTZ, JR., AND C. JELLEFF CARR. *J. Pharmacol.* 41, 83–7(1931).—Glycogen storage in the liver was increased in rats fed the roots or the carbohydrate prepd. from them, over that in rats fed only on a basal diet of cacao butter. C. RIEGEL

The influence of insulin on the formed blood elements, on the sedimentation rate of the erythrocytes, and on the bleeding and coagulation time. GIULIO LEGA. *Arch farmacol. sper.* 51, 1–23(1930).—In the blood of the diabetic there exists in general a diminution of hemoglobin and red cells, a slight and inconst. increase in leucocytes and bleeding time, and an almost const. increase in coagulation time and sedimentation rate The graver the condition of the diabetic is, the more marked are these changes, though they are not directly related to the degree of glucemia. Dietetic treatment resulting in an improvement of the general condition of the patient causes an increase in erythrocytes and hemoglobin, but it does not influence the leucocyte formula, coagulation time, bleeding time and sedimentation rate. Insulin treatment resulting in a notable improvement of the general condition of the patient has a remarkable influence on the factors under examn., since coagulation time, bleeding time, sedimentation rate and no. of formed blood elements returned rapidly and almost constantly toward physiol. conditions. G. SCHWOCH

The behavior of experimental glucemia in cases of diabetes mellitus treated with insulin. GIULIO LEGA. *Arch. farmacol. sper.* 51, 33–40(1930).—When 20 g. of glucose in 200 cc. water was given to healthy persons, the blood sugar, which was detd. every 30 min. for 3 hrs., rose to a max. during the 1st hr. after ingestion of the glucose. Then it decreased and finally reached values below the normal level. When the same test was carried out in diabetics, the rise in blood sugar was much greater, the values remained at an elevated level for a considerably longer period, the decrease was much slower, and the original level was not reached at the end of the 3rd hr. The grave cases presented the strongest deviations from the normal curve. The more a case improved under insulin treatment, the more closely the glucemic curve approached the normal type. The improvement in the condition of the patient is due to the improved functioning of the pancreas brought about under the influence of insulin. Thus the test described may serve as a method of detg. the functional ability of the pancreas with respect to its internal secretion. G. SCHWOCH

Is codeine without influence on the blood pressure? LUIGI SCREMIN. *Arch. farmacol. sper.* 51, 97–110(1930); cf. *C. A.* 24, 4643.—Intravenous injections of small doses of codeine caused an increase in blood pressure in rabbits and guinea pigs. In the cat the blood pressure was raised by very small doses of codeine; somewhat larger doses, which, however, were still far below the min. convulsive dose, caused a considerable decrease in blood pressure. G. SCHWOCH

The action of photodynamic substances on the carbohydrat metabolism. II.

GABRIELE MONASTERIO. *Arch. farmacol. sper.* **51**, 111–24(1930).—In an earlier study M. had investigated the influence of trypaflavine on the blood sugar of rabbits. In this work its effect on the blood sugar of dogs was studied. Intravenous doses of 5 mg. per kg. were without effect on the blood sugar. Ten mg. caused a pronounced hyperglucemia, while 40 mg. caused hypoglucemia after about 7 hrs. Trypaflavine is quite toxic for dogs, and therefore the 40 mg. dose was given in single doses of 10 mg. each at intervals of 1 hr. This method of subdividing the dose is probably the reason why the hypoglucemia was preceded by a hyperglucemia. The symptoms of hypoglucemia, consisting of generalised tremors and sometimes convulsions disappeared after glucose injection, but the animal remained in poor condition because of the intoxication caused by the trypaflavine. When rabbits injected with 20 mg. trypaflavine per kg. were irradiated by ultra-violet rays the hyperglucemia produced in them was much more intense than when they were kept in the dark after injection of the same dose. Other expts. were concerned with the influence of antiphotodynamic substances injected simultaneously with, or after, the administration of trypaflavine. When small doses of resorcinol totalling about 0.5 g. were injected into dogs, which a few hrs. previously had received sufficiently large doses of trypaflavine, the hyperglucemia developed normally, but the onset of hypoglucemia was greatly retarded. When the resorcinol was injected at the beginning of the expt., the onset of hyperglucemia was retarded. Eosin injected subcutaneously or intravenously did not alter the blood sugar of normal rabbits. The hyperglucemia induced in rabbits by adrenaline or subcutaneous injection of glucose was intensified after eosin administration. On the other hand, the hypoglucemia-producing effect of insulin was attenuated by eosin. Of some other acridine derivs. studied, acridine orange and, to a slight extent, flavicid are capable of producing hyperglucemia. Rivanol was without effect. Inconst. results were obtained with acridine yellow and acridine red. G. SCHWOCH

Changes in the osmotic pressure of the organs after intravenous injection of urea. LUIGI SCREMIN. *Arch. farmacol. sper.* **51**, 129–34(1930); cf. Messini, *C. A.* **24**, 657.—The expts. were carried out on 8 rabbits to which quantities of urea varying from 2.10 to 0.89 g. per kg. were slowly administered by intravenous injection of a 13% soln. The animals were bled to death 90 sec. after the injection was completed and the osmotic pressure of the blood serum and various organs was detd. by the cryoscopic method. In normal rabbits Δ rises in the organs examd. in the following order: serum, brain, muscle, heart, kidney, liver. In the exptl. animals Δ generally increased with increasing doses of urea. For a certain dose, serum always showed the lowest values; slightly higher values were found in the brain, while muscle and liver gave the highest figures. However, the relative increase was greatest in the serum and was smallest in the kidney and liver. The results obtained are discussed in connection with the pathogenesis of uremia, but no definite conclusions are drawn. G. SCHWOCH

Influence of some carbohydrates on the toxicity of potassium cyanide. P. MORETTI AND G. MUSCOLINO. *Arch. farmacol. sper.* **51**, 135–40(1930).—Mixts. of 4% KCN soln. and glucose soln. (10–30%) were allowed to stand at 37° for 24 hrs. When such mixts. in quantities corresponding to 2, 4, and 10 times the m. l. d. of KCN were injected intramuscularly into pigeons, the animals remained alive and well. It is calcd. from the quantities of glucose added that 1 g. KCN is neutralized *in vitro* by 15 g. glucose or less. After a certain period of time the KCN-glucose solns. assume a distinctly ammoniacal odor, however, the reactions of Wortmann and Pagenstecher-Schönbein remain positive. In attempting to hydrolyze the glucose in the glucose-KCN complex a mixt. of KCN and glucose soln. was treated with yeast. After the treatment the mixt. does not reduce Fehling soln., which shows that KCN, after combining with glucose, has lost its antienzymic properties; however, its toxicity was not restored. Similar expts. in which glucose was replaced by other carbohydrates showed that fructose, galactose, mannose and lactose also neutralized KCN, while dextrin, sucrose and gum arabic did not. Starch was only very slightly effective as a neutralizing agent. G. SCHWOCH

The action of yohimbine on the blood pressure and the reversal of the blood-pressure action of adrenaline and adrenalone by yohimbine. MASASHI YAMAUCHI. *Okayama-Igakkai-Zasshi* **40**, 1220; *Chem. Zentr.* 1929, II, 3029.—Small doses of yohimbine cause an increase in blood pressure by exciting the vascular muscle itself. The blood-pressure-reducing effect of larger doses of yohimbine seems to be due to the ability of the poison to render the sympathetic fibers insensitive for the adrenaline, which always circulates in the organism; therefore only the action of adrenaline on the vasodilators becomes manifest, which then surpasses the exciting action of yohimbine on the vascular muscle. By a previous treatment with yohimbine the action of adrenalone is inhibited more strongly than that of adrenaline. G. SCHWOCH

Reversible coagulation in living tissue. I. WILDER D. BANCROFT AND J. E. RUTZLER, JR. *Proc. Natl. Acad. Sci.* 17, 105–11(1931).—Anesthesia and anaphylactic shock are due to the reversible coagulation of protein in certain nerve colloids. Intravenous injection of a 10% NaCNS soln., which peptizes protein, hastens the return of consciousness of rabbits under ether, amytal or morphine anesthesia and prevents death from strychnine or histamine. It prevented anaphylactic shock in rabbits sensitized by subcutaneous injection of egg-white sol. KCNS cannot be used because of its high toxicity. D. S. SEARLE

The influence of insulin and adrenaline on the sugar content of the spinal fluid. J. LUKÁCS. *Magyar Orvosi Archivum* 30, 591–7(1930).—The sugar of the spinal fluid is decreased after the injection of insulin. Decrease in blood sugar sets in sooner than that in spinal fluid. Preceding the decrease in the sugar of the spinal fluid a temporary increase takes place; this is not true for blood sugar. Adrenaline raises the sugar in the spinal fluid and also in the blood; however, the increase in blood sugar takes place first. H. TAUBER

The action of histamine on human blood vessels. J. POGÁNY. *Magyar Orvosi Archivum* 32, 51–6(1931).—0.001–0.002 mg. of histamine intravenously injected into the human vein causes a rise in venous pressure, which sets in immediately after injection but only in veins affected first by adrenaline. 0.01–0.02 mg. histamine also raises venous pressure. The rise sets in after 25–60 sec. and is manifested by accompanied warmth. This can be eliminated if the vein is shut off in the capillary region. H. TAUBER

The action of histamine on human adrenaline sensibility. J. POGÁNY AND G PILAU. *Magyar Orvosi Archivum* 32, 57–61(1931).—The adrenaline sensibility is increased considerably 30–50 min. after subcutaneous injection of small doses (0.005–0.01 mg. per body wt.) of histamine. This effect is attributed partly to the dilatation of peripheric small vessels and partly to the characteristic histamine distribution in the blood. H. TAUBER

Induction of lymphocytosis and lymphatic hyperplasia by means of parenterally administered protein. BRUCE K. WISEMAN. *J. Exptl. Med.* 53, 499–510(1931).—In this study 2 animals received chick "embryonic ext." intraperitoneally, 2 intravenously and 1 subcutaneously; 2 received egg albumin intravenously and 1 subcutaneously; 1 received normal horse serum intravenously and 1 received normal salt intravenously; each injection carried approx. 50 mg. of protein in 66 cc. normal salt soln. The injections caused an increase of lymphocytes in the peripheral blood varying from 23 to 139%. It seems probable that the degree of response is conditioned upon the type of protein used. At autopsy the lymph nodes and spleen showed hyperplastic changes. The thymus did not participate in the hyperplasia. C. J. WEST

I—ZOÖLOGY

R. A. GORTNER

The oxidation-reduction potential in slugs (Agriolimax agrestis). EUGÈNE AUBEL AND ROBERT LÉVY. *Compt. rend. soc. biol.* 105, 358–9(1930).—Oxidation-reduction indicators were injected into living slugs. The oxidation-reduction potential figures for slugs were identical with those formerly obtained for caterpillars. The physiol. r_H in aerobiosis is about 20; in anaerobiosis, it is lowered to a limit between 5 and 6. B. C. BRUNSTETTER

The action of placenta on the metamorphosis and on the development of the smooth muscles in tadpoles. G. GANFINI. *Boll. soc. ital. biol. sper.* 5, 949–53(1930).—The larvae of *Bufo vulgaris* were fed with raw beef, raw and cooked human placenta, aq. ext of placenta and planktons. Raw, cooked or exts. of human placenta contained substances which accelerated the development and metamorphosis of tadpoles and activated the development of the smooth muscles. The amt. of these substances was, however, greatest in the beef. PETER MASUCCI

The importance of arginine-phosphoric acid in the metabolism of the reacting crustacean muscle. EINAR LUNDSGAARD. *Biochem. Z.* 230, 10–8(1931) The metabolism of the reacting crustacean muscle is altered exactly like that of the frog muscle when its lactic acid production is stopped by poisoning with CH_3ICOOH, whereby the arginine-H_3PO_4 of the crustacean muscle behaves just as the creatine-H_3PO_4 of the frog muscle. It is therefore concluded that the hydrolysis of either arginine- or of creatine-H_3PO_4 must be considered as a source of energy. The crustacean muscle is very much less sensitive to CH_3ICO_2H than is frog muscle. S. MORGULIS

Hydrogen-ion concentration in a unicellular body. S. DATE. *Compt. rend. soc.*

biol. **106**, 89–93(1931).—The p_H of the protoplasm of *Amoeba proteus* in the culture (p_H = 8.0) is 6.4 to 7.3 (it is more acid during movement than during repose); the p_H of the nucleus is a little higher than that of the protoplasm. When the exterior p_H varies from 5 to 9, it does not greatly influence the interior p_H. ALBERT L. RAWLINS

A radioactive indicator method for estimating the solubility of acid lead arsenate within the alimentary tract of the silkworm. F. C. CAMPBELL AND CHARLES LUKENS. *J. Econ. Entomol.* **24**, 88–94(1931).—This study describes the use of a radioactive indicator method for the detn. of the amt. of Pb evacuated by the silk worm (*Bombyx mori*) after being fed known dosages of $PbHAsO_4$ and $Pb_4(PbOH)(AsO_4)_3.H_2O$. An arsenate of Th B, a radioactive isotope of Pb, is mixed with known quantities of Pb arsenate. The mixt. is then fed to an insect. The Th B accompanies the Pb wherever it goes in the body and the ratio of Th B to Pb will remain the same as in the original mixt. regardless of the reactions into which the arsenate may enter. The prepn. which was fed to the insect was tested in an electroscope to obtain the quantity of Pb present. The ash of the excrement was similarly tested and from this information the quantity of Pb, and therefore of the Pb arsenate evacuated, was obtained. Results: At least 25% of a moderately lethal dose of $PbHAsO_4$ (0.12 mg. per g. body wt.) passes into soln. within the intestine during the survival period. Basic lead arsenate was much less sol. within the intestine. C. H. RICHARDSON

The catalase content of the Colorado potato beetle during metamorphosis. DAVID E. FINK. *J. Agr. Research* **41**, 691–6(1930).—The variation in the activity of catalase during the metamorphosis of the Colorado potato beetle, beginning with the mature larva, was ascertained by making daily detns. of the quantity of O_2 per g. of tissue evolved from H_2O_2 by the action of catalase during prepupal and pupal development. Analysis of the resulting data indicated a reduction in catalase of 16% on the first day of histolysis and 19% on the second, followed on the third day of histolysis by an increase which, when the pupa was formed, reached the max. of 6% above that of the mature larva. The decline in content of catalase during pupal development was continuous thereafter until a reduction of 51% below that of the mature larva was reached with the formation of the adult. The curves obtained for catalase content and those previously reported for O_2 consumption and excretion of CO_2 (*C. A.* **19**, 2536) were similar for the prepupal period of histolysis. During pupal development, however, the catalase curve declined rapidly whereas the curves for O_2 and CO_2 followed the usual growth curve. W. H. Ross

Phosphorus distribution, sugar and hemoglobin in the blood of fish, eels and turtles. C. M. MCCAY. *J. Biol Chem* **90**, 497–505(1931).—The distribution of P in blood fractionated by Youngburg's method (*C. A.* **25**, 1857) was detd. by a modification of the method of Kuttner and Cohen (*C. A.* **22**, 606); $HClO_4$ was used in place of H_2O_2 for the oxidation. The total P in 100 cc. whole blood of pike is 87 mg., carp 92 mg., bullhead 77 mg., *Chelydra serpentina* 49 mg., compared with beef blood 22.9 mg. Figures for the P distribution, blood sugar and Fe are given. During spawning the hemoglobin and reducing sugar in the blood of lamprey eels decreases while the total P is unchanged. K. V. THIMANN

Physicochemical properties of crocodile blood. D. B. DILL AND H. T. EDWARDS. *J. Biol. Chem.* **90**, 515–30(1931).—The concn. of protein in the serum and of hemoglobin in the blood of crocodiles is lower than in man. The buffer value of the blood is also much less, although that of the serum protein itself is higher than in man. The change in strength of acidity on oxygenating crocodile hemoglobin is twice as great as in human blood, and correspondingly the effect of p_H change on the O_2 affinity is twice as great. The content and distribution of water, Na, K, Ca, Mg, Cl, HCO_3, phosphates, lactate and proteinate in the plasma and cells were also detd. K. V. THIMANN

Effect of inorganic salts on photic orientation in Allolobophora foetida (Sav.). VI. Magnesium sulfate, nitrate and chloride. EKITARO NOMURA AND SHINRYO OHFUCHI. *Science Repts. Tôhoku Imp. Univ.* [4], **5**, 669–89(1930).—A large no. of data are given to show that immersion of the worm in solns. of $MgSO_4$, $MgCl_2$ and $Mg(NO_3)_2$ alters the degree of orientation to light. The forward crawling mechanism in the brain and ventral nerve cord is also affected. The effects are complex. K. V. THIMANN

Effect of light on porphyrin from the integument of the earthworm Allolobophora foetida (Sav.). SATARO KOBAYASHI. *Science Repts. Tôhoku Imp. Univ.* [4], **5**, 763–78 (1930).—The worms were extd. with 20% HCl-alc., centrifuged, the filtrate was neutralized and extd. with Et_2O. The well-washed ext. was treated first with glacial HOAc, then with 20% HCl, re-extd. with EtO_2 each time, washed and evapd., the whole operation being carried out in the dark. A yield of 1.5 g. was obtained from 2 kg. worms. The spectrum of the porphyrin in 20% HCl-alc. slowly fades on illumination, but in 25%

HCl, in alc., AmOH, Et_2O or 6% HOAc-alc., the 4 bands move slightly toward the violet and 2 new bands appear in the red at λ649 and 670μμ. With the appearance of the new bands the intensities of the others decreases. The spectrum agrees approx. with that given by Fischer and Schaumann (*C. A.* **17**, 3349), and is entirely different from that of hematoporphyrin. The changes occur very rapidly and support the view that these pigments of the erythrocytes are photodynamically sensitive. K. V. THIMANN

Analysis of the proteolytic enzymes of Maja squinado by the adsorption method. J. J. MANSOUR-BEK. *Proc. Acad. Sci. Amsterdam* **33**, 858–70(1930).—The ext. of the small intestine contains a protease, carboxypolypeptidase, aminopolypeptidase and dipeptidase. The p_H optimum of the protease of the raw ext. is 6.0 on casein and 6.1 on gelatin, while that of the purified protease is 7.4 and 8.1. The raw ext. is not activated by HCN, H_2S or enterokinase, while the purified ext. is activated by the latter. Separation of the enzymes was achieved by differential adsorption on kaolin and on fuller's earth. The protease was purified by repeated adsorption on $Fe(OH)_3$. J. J. WILLAMAN

12—FOODS

F. C. BLANCK AND H. A. LEPPER

Chemical and physical methods in the examination of food products. EGGERT. *Pharm. Presse, Wiss.-prakt. Heft.* 1931, 20–1.—An address is given which deals with some of the more recent methods. W. O. E.

International agreement for the unification of the presentation of analytical results on foodstuffs for man and animals. ANON. *Ann. fals.* **24**, 69–75(1931).—Final text of the International agreement for the unification of the presentation of analytical results established as a result of the International conference held in Paris on May 13, 1929, by which a unanimous decision was reached. A. PAPINEAU-COUTURE

Determination of water in foods, condiments, etc. B. BLEYER AND W. BRAUN. *Z. anal. Chem.* **83**, 241–68(1931).—Water may be detd. (*a*) by thermic expulsion and weighing the residue, (*b*) by distn. with a high-boiling liquid which is immiscible with water and measuring the vol. of water in the distillate, (*c*) by treatment with CaC_2 and measuring the vol. of C_2H_2 formed and (*d*) by detn. of the dielec. const. These methods are discussed, and a no. of typical food ingredients and food products were examd. comparatively. Conclusion: There is no one method which is always preferable, but preliminary tests will show which particular method is best for a given material. W. T. H.

Biochemical data on wheat harvested at the experiment station of Bordenave. CARLOS ALBIZZATI. *Rev. facultad cienc. quím.* (*Univ. La Plata*) **7**, Pt. 2, 53–7(1930).—Analysis of wheat in the processes of grinding and baking led to the development of an index designated as the "value of utilization." Any wheat having a utilization value of 95 or above is considered suitable. Before discarding a wheat variety because of its low utilization value agronomical and ecological expts. should be made with a view to a possible increase in the utilization value. No conclusions are drawn with regard to bread-making qualities and the diastatic properties of the wheat because of the insufficient no. of expts. performed. B. S. LEVINE

Artificial refrigeration in mill industries and its influence on the quality of flours. S. GÖMÖRY. *Magyar Mérnök Epitészegylet Közlönye* **64**, 387–92(1930).—The heat of the rollers has a bad influence on the chem. and phys. properties of flours. Flours ground on cooled rollers contained about 0.5% more moisture and had their water-absorbing capacities increased by 1–2 cc. for 100 g. of flour. Bread baked from such flours had a somewhat greater vol. and was more homogeneous. The glutenin content of flour did not change, but its quality changed because of its increased moisture content. Intensive refrigeration during rolling prevents evapn. of moisture from wheat, formation of pulpy knots in the flour and eventual fermentation. The flour yield of wheat ground under cooled rollers increased, since peel particles are more easily sepd. from starch and aleuron particles when the moisture content is higher. S. S. DE FINÁLY

Analytical control of imported flours. JOS. KULMAN. *Chem. Listy* **25**, 53–9 (1931).—The methods for analyzing flours suspected of chem. treatment are described. Sp. methods for N oxides, Cl, peroxides, bromates and iodates are given. F. M.

The significance of the acidity in baking. E. ELION AND L. ELION. *Chem. Weekblad* **28**, 103–5(1931).—Twenty-five g. wheat flour extd. with 500 cc. water contg. 50 mg. tartaric acid gave an ext. (I) of p_H 5.9 and with a *diastatic activity* more than twice as high as the diastatic activity of an ext. of the same flour made with water alone (p_H 6.6). Adjusting the p_H of I with alkali to 6.6 did not change the diastatic activity of this ext.

By extn. in the presence of tartaric acid the diastase is apparently either extd. in larger quantity or changes to a more active form. F. DE LEEUW

New method for determining the swelling capacity of bread. L. KARÁCSONYI. *Magyar Chem. Folyóirat* **36**, 59–61(1930).—Detn. with a viscometer is made as follows: Cut up and moisten 10 g. bread crumbs. After 5 min. press through a sieve 10 cm. in diam. covered with Dufour's silk. Dil. the pulp with water to 100 g. with an exactness of 0.01 g. Pour the homogeneous pulp into an Ostwald viscometer (Lüers and Ostwald, *C. A.* **14**, 1167) in a 20° thermostat, mix with an air current and measure the time required for flowing within 0.2 sec. Calc. the av. of 4–5 measurements. The results were well reproducible in the case of wheat breads. Detns. can be made in 30–40 min. as compared with the 24 hrs. of the sedimentation method according to Katz. S. S. DE FINÁLY

The distribution of electrolytes in milk and in the dialyzate. ALESSANDRO ROSSI. *Boll. soc. ital. biol. sper.* **5**, 1060–3(1930); cf. *C. A.* **24**, 5359.—Milk, 20 cc. samples in collodion sacs, was dialyzed against 25 cc. of distd. H_2O. When osmotic equil. was reached, samples from the inside and outside of the sacs were analyzed for Ca, K and P. The results are given in tabular form. Conclusion: the K in the bound form is rather labile and is dependent on the concn. of the diffusible fraction. PETER MASUCCI

Dialysis of milk. I. MICHIO SAITO. *J. Agr. Chem. Soc. Japan* **6**, 1087–92 (1930).—Milk was dialyzed for 5 hrs. The outer soln. was evapd. under diminished pressure. The ppt. thus obtained was a mixt. of phosphates and Ca salts. In the filtrate lactose and lactic acid were found. A substance giving no biuret reaction but giving the ninhydrin reaction was found. Boiled milk was also dialyzed. The dialyzable N substances increased markedly, owing to the production of NH_3 by the heating. Y. KIHARA

Does filtered milk keep longer? K. VAS. *Kisérlet. Közlemények* **32**, 342–55 (1929); *Chimie & industrie* **25**, 453(1931).—Filtration removes the coarser impurities but facilitates the dispersion of bacteria throughout the mass of the liquid, favoring more rapid decompn. of the milk. Of ten samples, in 1 the result was clearly unfavorable; in 3 no difference was noted; in the remaining 6 there was a retardation (up to 11 hrs.) in the rate of coagulation. It would appear that filtration is efficacious only if it is carried out immediately after milking, before the bacteria originally adherent to the larger particles of fecal matter and dirt have become distributed through the milk. A. PAPINEAU-COUTURE

The distribution of phosphorus in cow milk and a scheme for the separation of phosphatides. RINJIRO SASAKI. *Bull. Agr. Chem. Soc. Japan* **6**, 52–61(1930).—Milk powder, dried by the Buflovak drum drier below 70°, was used. The greater part of the phosphatides was more easily sol. in warm alc. or warm acetone than in ether. The existence of much P in the phosphatide fraction has been proved. Y. KIHARA

Commercial sour cream. F. J. DOAN. *Creamery and Milk Plant Monthly* **20**, No. 2, 21–2(1931).—A method of mfg. com. sour cream is given. Before the starter is added, the cream is pasteurized for 30 min. at 180°F. Pasteurization at the high temp. yields a cream which will increase in acidity more rapidly during ripening and which will reach max. viscosity in a shorter time. Homogenization of the cream after pasteurizing is desirable, as the sour cream produced from homogenized cream will be thicker in body and smoother in texture than sour cream produced from unhomogenized cream. Increased body of the sour cream may also be obtained by using cream of higher fat content, by adding solids in the form of plain condensed milk, by the use of gelatin and by the use of rennet. The cream is caused to sour by the addn. of 1–2% of lactic starter. The souring is allowed to proceed at 70°F. until 0.6 to 0.65% acid (as lactic) has developed, whereupon the cream is cooled and bottled. A. H. JOHNSON

The basic viscosity of ice cream mix. J. C. HENING. *Ice Cream Trade J.* **27**, No. 2, 41–5; *J. Dairy Sci.* **14**, 84–92(1931).—Mech. agitation of ice cream mixes reduces their viscosity by a partial splitting of fat clumps. The viscosity of mechanically agitated ice cream mixes may be further reduced by passing them through the homogenizer at low pressures. Different conditions of agitation may vary in their effectiveness in splitting fat clumps and introduce a variable factor in the magnitude of the basic viscosity. The term basic viscosity, as now used for ice cream mixes, denotes a value secured under specified conditions and not a correct min. value from the viewpoint of its being the lowest possible viscosity in the absence of fat clusters. A. H. JOHNSON

Determination of the egg content of egg pastes. O. SZAKACS. *Kisérlet. Közlemények* 32, 459–60(1929); *Chimie & industrie* **25**, 309(1931).—Digest 2 g. of paste with 100 cc. distd. H_2O for 1 hr. shaking at 15-min. intervals; let stand 30 min.; to 70 cc. of clear soln. add 5 cc. of 5% β-naphthosulfonic acid; coagulate on a water bath at 90°, cool

without shaking and centrifuge. The egg content is obtained by comparing the coagulum obtained with that of a blank detn. As the results are very const., a graduated tube may be used instead of comparison with a blank. A. P.-C.

Hawaiian honey. JAR. SVOBODA. *Chem. Listy* **24**, 462–3(1930).—Hawaiian honey imported into Czechoslovakia during 1927 had a powerful aroma and a saline taste. A complete analysis is given. The salty taste was due to a high ash content (0.47–0.88%), in which the NaCl (0.03–0.09%) and KCl (0.19–0.29%) predominated. FRANK MARESH

Note on the manufacture and analysis of chocolates. RAOUL LECOQ. *Ann. fals.* **24**, 11–22, 96–104(1931). See *C. A.* **25**, 153, 1295. A. PAPINEAU-COUTURE

Refrigeration an essential in candy manufacture. TRESPER CLARKE. *Refrigerating Eng.* **20**, 219–22(1930).—C. outlines the manner in which temp. control has been applied to the candy industry. The temp. of the chocolate mix dets. the viscosity of the mix and other properties assocd. with viscosity. The proper rate of cooling of chocolate candy makes it possible to prevent "graying" or dulling. Also the rate of cooling of sugar candies enables one to control the type of crystn. and to obtain the type of crystal desired. Dry rooms are maintained by removing excess moisture from the atm. by cold water or brine circulating in pipes. Maintenance of proper temp. and humidity makes it possible to store candy for 6 months to 1 year without deterioration. A. H. JOHNSON

The disappearance of ozone in cold-storage rooms. ARTHUR W. EWELL. *Refrigerating Eng.* **20**, 358–60(1930).—Under practical conditions the rate of decompn. of O_3 follows the equation for monomolecular reactions. With an initial concn. of 1 part of O_3 per million by vol. the absorption in one-half hr. by the several food products studied was eggs 0.03 p. p. m., fresh apples 0.33 p. p. m., apples previously exposed to O_3 0.06 p. p. m., fresh meat 0.38 p. p. m., meat previously exposed to O_3 0.20 p. p. m. and cauliflower 0.21 p. p. m. A. H. JOHNSON

A new method for the prevention of mold on marmalades, jellies, fruit pastes, etc. RUDOLF RIPA. *Konserven-Ind.* **1931**, 171–3.—After jellification has begun, but before complete cooling, the surface of the product is coated with a thin layer of pectin soln. The pectin soln. dries to a glaze which prevents mold growth. After complete cooling the container is sealed. FRANCIS P. GRIFFITHS

Blue and green molds of oranges. G. B. TINDALE AND S. FISH. *J. Dept. Agr Victoria* **29**, 101–4(1931).—The atm. of the packing shed and the dust on the grader are the important sources of infection of oranges with blue and green molds. Both molds may spread to sound fruit by contact. The optimum temp. for infection with both types of mold is 70–78°F. With shallow inoculations development of the molds is completely controlled by keeping the fruit at 94°F. for 5 days. Oranges, however, will not stand a temp. of 94°F. for more than 4 days without developing a bitter flavor. Storage of the fruit at 94°F. for 3 days, which gives about 90% control of the molds, is recommended. K. D. JACOB

Organic solvents for aiding the removal of spray residue from waxy or oil-covered fruit. R. L. ROBINSON. *J. Econ. Entomol.* **24**, 119–25(1931).—The removal of spray residues from apples which have been sprayed with petroleum oils, or which are covered with an excessive wax formation, is difficult. The addn. of certain org. solvents (alc., $C_6H_6(CH_3)_2CO$, kerosene) to the HCl washing soln. renders removal of the residue most effective. Kerosene appears to be the most practicable for this purpose. C. H. R.

A simple test for sulfur dioxide content of dried apricots. W. R. JEWELL. *J. Dept. Agr. Victoria* **29**, 90–1(1931).—Add 500 cc. of water to 2 oz. of the minced sample contained in a stoppered bottle and shake thoroughly every 10 min. for 2 hrs. Add a teaspoonful of starch soln., prepd. by boiling a teaspoonful of starch with 2 cups of water, and 18 cc. of 0.1 *N* I soln., and shake vigorously for 15 sec. If the dark blue color persists at the end of this period, the sample contains less than 14 grains of SO_2 per lb. of fruit. A gray or apricot color indicates the presence of larger amts. of SO_2. If a green color develops, the test should be repeated with the addn. of a larger amt. of starch soln. The method is designed for rough testing at the packing shed. K. D. JACOB

The supposed relation between the p_H value and acid taste of aqueous solutions, particularly wines. P. CRISCI. *Ann. chim. applicata* **20**, 566–83(1930).—Although there is undoubtedly a relation between the p_H value of a wine and its acid taste, other factors influence this taste markedly, such as sugar, EtOH, glycerol, salts, tannins, etc. The undissocd. org. acid radicals also affect this taste, as the addn. of org. acids affects the acid taste noticeably, while it only affects the p_H value slightly. Dilu. of sour wines with water does not affect the p_H value much, but it greatly changes the taste. A. W. CONTIERI

Refrigeration and the fishing industry (FINN) **13. Electricity in modern dairy plants** (DREUX, BRUNNER) **4.** Isolation of phytosterolin from wheat embryo (NAKAMURA, ICHIBA) **10.** Cherries cultivated in the Modena Province (D'IPPOLITO, ALBERTI) **11D. Biochemistry of tomato pigment** (VON EULER, *et al.*) **11D. Water requirements [in creameries]** (KEHREN, STOMMEL) **14.** Activating metals or alloys [for containers for milk, butter or cheese] (Austrian pat. 121,243) **3.** Cascading apparatus for drying cereals, etc. (U. S. pat. 1,796,324) **1.**

CRUESS, W. V.: **Commercial Fruit and Vegetable Products.** New York: McGraw-Hill Book Co., Inc. 515 pp. $4.50.

JORDAN, EDWIN O.: **Food Poisoning and Food-borne Infection.** Chicago: Univ. of Chicago Press. 286 pp. $2.50.

KNAPP, A. W.: **The Cocoa and Chocolate Industry.** 2nd ed. London: I. Pitman and Sons, Ltd. 212 pp. 7s. 6d. Reviewed in *Chimie & industrie* **25**, 534(1931).

TARUGI, N. **Trattato di chimica bromatologica.** Milan: F. Vallardi. 460 pp. L. 50.

WOODMAN, ALPHEUS G.: **Food Analysis.** 3rd ed. New York: McGraw-Hill Book Co., Inc. 557 pp. $3.50.

Treating meal. ERICH STAUDT. Ger. 515,843, May 22, 1926. Foodstuffs, especially meal, is sterilized, matured and bleached by treatment with compds. contg. ClO_2. In the example, wheat or rye flour is treated with gaseous ClO_2 mixed with air and CO_2. The gas is absorbed by the meal.

Improvement of the baking capacity of cereal flours. M. VUK and S. GÖMÖRY. Hung. 101,845, Nov. 12, 1929. A paste-like pulp is formed of the flour with water. This pulp is kept at a temp. higher than that at which albumins coagulate (drying, however, is avoided) until the outlines of starch particles begin to fade under the microscope. Then it is dried at a temp. lower than that of caramelization and is ground to dust. Of this product 4–6% is added to flours to improve them.

Heat treatment of flour. D. W. KENT-JONES, C. W. CHITTY and WOODLANDS, LTD. Brit. 338,603, Aug. 23, 1929. Various details of app. and procedure are described for heating cereal flours for use in ordinary manner or as addns. to untreated flour to improve its properties.

Complex organic peroxides. PILOT LABORATORIES, INC. Brit. 339,336, Aug. 29, 1929. Mixts. of the acid chlorides of higher fatty acids and benzoyl chloride, chlorobenzoyl chloride or bromobenzoyl chloride are treated with peroxidizing agents. Products are obtained suitable for bleaching flour, oil-seed meals, soaps, oils, fats, waxes, egg yolk and other foods products, etc. Acid chlorides derived from the mixed fatty acids of coconut oil may be used as an initial material. Various details of procedure are described.

Bread, etc. JEAN J. PUTSCHER. Fr. 37,165, June 28, 1929. Addn. to 657,741. Petrolatum oil, glycerol and dextrin are added to the cooking salt ordinarily used in the manuf. of bread, etc., dough.

Irradiating bread or other products in baking ovens. ALBERT WÖRNER. U. S. 1,796,134, March 10. A Hg-vapor lamp is mounted in a baking oven with a reflector arranged to deflect the rays from the lamp so that all the irradiation is by reflected rays. This is stated to avoid impairment of taste such as direct irradiation may cause.

Use of pectin in baked food products. ARNOLD S. WAHL (to E. W. Stewart & Co.). U. S. 1,795,980, March 10. In making baked goods such as sweet rolls or cake, pectin is added to a sugar soln. used as an ingredient, in order to improve the texture and yield. The proportion of pectin may be about 5% the wt. of the flour used.

Pectin. ROGER PAUL and ROBERT H. GRANDSEIGNE. Fr. 695,204, Aug. 24, 1929. Neutral pectic juices are caused to solidify slowly to a gel at ordinary temp. by adding 2–10% of com. HCl. The gel. is afterward finely ground and washed free from HCl by water.

Milk preparation free from milk sugar. JACOB POHLMANN and JACOBUS R. F. RASSERS. Ger. 515,894, Sept. 13, 1928. See Brit. 320,497 (*C. A.* **24**, 2512).

Apparatus for pasteurizing milk, etc. FRITZ G. CORNELL, JR. (to Jensen Creamery Machinery Co.). U. S. 1,795,932, March 10. Structural features.

Corrugated heat-exchange shell apparatus suitable for pasteurizing milk EDGAR B. NICHOLS. U. S. 1,797,014, March 17. Structural features.

Tubular heat-exchange apparatus suitable for treating milk, cream, etc. FRITZ G. CORNELL, JR. (to Jensen Creamery Machinery Co.). U. S. 1,795,837, March 10. Structural features.

Apparatus for pasteurizing, aerating and degasifying cream. OLIVER V. JONES and ALVIN SCHNEIDER. U. S. 1,796,951, March 17.

Apparatus for sterilizing milk. RICHARD SELIGMAN. Ger. 518,462, July 10, 1928. See Brit. 302,743 (*C. A.* 23, 4279).

Apparatus for spray desiccation of materials such as milk. FRANK H. DOUTHITT (one-half to Chester E. Gray). U. S. 1,797,055, March 17. Various structural details and details of operation are described. Cf. *C. A.* 24, 4560.

Conserving animal and vegetable matter, especially foods. RICHARD WILLSTÄTTER. Ger. 515,960, Apr. 16, 1929. Addn. to 513,665 (*C. A.* 25, 1921). As in 513,665, HCN is used as the conserving agent. In conserving meat, 20 mg. HCN is packed with each kg. of meat.

Preserving food materials such as fruits, vegetables and meats. U. GIOMI. Brit. 338,768, Dec. 17, 1929. Fruits such as strawberries, peaches, grapes or apricots are immersed in pure alc. and then dried before packing. Vegetables and meats may be packed in vessels and then sterilized with steam, and all such products, placed in suitable receptacles, are subjected to a vacuum treatment, treated with an inert gas and then sealed. App. is described.

Preserving foods such as fish or meats. M. T. ZAROTSCHENZEFF. Brit. 339,172, Feb. 16, 1929. The materials are rapidly chilled or frozen for preservation or transport by subjection to air satd. with a highly atomized liquid such as fresh or sea water or brine in the form of fog and at a low temp. (suitably about —22° to —25°) and may be subsequently defrosted by treatment with a fog-laden atm. at a temp. above freezing. App. and details of procedure are described.

Apparatus for freezing foods such as fish. ALEXANDER H. COOKE (to Atlantic Coast Fisheries Co.). U. S. 1,795,330, March 10. Heat-conducting elements depending from an endless-belt carrier serve as heat-transfer means between the cooling agent and the articles to be frozen. Various structural details are described.

Meat extracts, etc. BEEFEX, LTD., and J. E. APS. Brit. 338,808, Jan. 30, 1930. Cubes of material such as meat exts. are toasted to sterilize them and harden their surfaces so that they can be handled without wrapping. Various details of treatment are described.

Vacuum treatment of corn, fruits, etc. A. E. JONSSON. Brit. 338,635, Sept. 9, 1929. Vegetable products are subjected to a vacuum in the presence of a regulated proportion of water which is vaporized by heating during the continuation of the vacuum treatment (a temp. of 30–45° being suitable for corn).

Apparatus for conditioning raisins or other fruits by dry air treatment. THOMAS W. W. FORREST (to Sun-Maid Raisin Growers of Calif.). U. S. 1,795,302, March 10. Structural features.

Filter press for raisins, etc. PAUL COMBESCURE. Fr. 695,211, Aug. 27, 1929.

Machine for extracting grape juice. KARL MAURER. Ger. 515,925, Aug. 14, 1928.

Cocoa preparations. G. SENFTNER. Brit. 339,034, Sept. 28, 1929. Radioactive chocolate is prepd., *e. g.*, by admix. with sugars which have been dehydrated and then allowed to cryst. in water contg. emanation or radioactive salts.

Coffee preparations. W. PÄFFGEN. Brit. 339,543, Sept. 18, 1929. Caffeine and "roasting toxins" are stated to be removed by use of absorption paper impregnated with finely divided active C.

Stock feed. GAGE A. KENT. U. S. 1,796,031, March 10. Pea- or nut-sized pieces of cracked pressed oil cake are provided with a substantially uniform and continuous coating of sorghum molasses, and each molasses-coated piece is further provided with a final coating of powd. oil-cake meal which prevents adhesion.

Preserving green fodder. SIGMUND VON KAPFF. Ger. 518,463, Oct. 26, 1927. The fodder is sprayed with a soln. contg. HCOONa and a salt or acid capable of liberating HCOOH therefrom.

13—GENERAL INDUSTRIAL CHEMISTRY

HARLAN S. MINER

Good lighting—an executive problem. DEAN M. WARREN. *Ind. Eng. Chem.* 23, 512–6(1931). G. G.

The use of emulsions in industry. V. KUBELKA. *Chem. Listy* 24, 354–7, 372–4 (1930); *cf. C. A.* 24, 5393.—The use of much com. app. for prepg. lab. or theoretical emulsions on a com. scale is discussed. FRANK MARESH

Metafiltration. GEORGES GENIN. *Rev. prod. chim.* **33**, 613–6(1930); cf. *C. A.* **23**, 1186; **24**, 4961.—This method of filtration is described. P. THOMASSET

The injurious action of smoke, dust, gases, factory fumes, etc., on plants. ANTONIN ROLET. *Rev. gén. sci.* **42**, 111–20(1931).—A discussion is given of the origin in the atm. of chem. gases, vapors from tar roads, illuminating gas and other contaminations, and their effect on plants. J. T. SULLIVAN

Heat transfer in superheaters. W. GUMZ AND F. MICHEL. *Feuerungstech.* **18**, 129–34, 152–5(1930). E. I. S.

Measurement of air temperatures. M. TOMLINSON. *Heating, Piping and Air Conditioning* **2**, 769–70(1930). E. I. S.

Predicting the flow of liquids in pipes. R. E. GOULD. *Heating, Piping and Air Conditioning* **2**, 850–2(1930). E. I. S.

Heat transmission to water flowing in pipes. A. E. LAWRENCE AND T. K. SHERWOOD. *Ind. Eng. Chem.* **23**, 301–9(1931).—Expts. indicate that for heating water in turbulent flow the effect of pipe length on the film coeff. of heat transfer is negligible. D. GORDON

Heat transfer through air spaces. P. D. CLOSE. *Heating, Piping and Air Conditioning* **2**, 875–8(1930).—A résumé of important investigations. Brief abstracts are presented. E. I. S.

Calculation of loss of head in straight channels. D. KESTLICHER. *Rev. univ. mines* [8], **3**, 271–91(1930).—A theoretical mathematical discussion leading to the construction of a logarithmic chart for computation of loss of head in rectilinear channels carrying water, oil, steam or air, account being taken of the viscosity of the fluids. E. I. S.

Method for demustardization of one-ton mustard containers. H. P. AVERILL AND F. W. LANE. *Chem. Warfare* **17**, 932–3(1931).—The containers to be demustardized were 2 steel drums which had held mustard for 10 years. For reasons given it was impracticable to use corrosive agents or solvents for mustard to destroy the mustard remaining after emptying the drums. The drums were steamed for a period of 8 hrs. with steam at a pressure of 5–15 lb. per sq. in This destroyed (hydrolyzed) practically all the mustard, only traces remaining in the approx. 75 lb. of residual S. A. L. KIBLER

Refrigerants show similarities. J. E. STARR. *Refrigerating Eng.* **20**, 302–3 (1930).—Similarities between 16 different substances were shown in terms of pressure-temp. and compressor displacement relations. From a knowledge of one point on the pressure-temp. curve it is possible from the curves given to predict the pressure exerted by a gas at any given temp. This was done for CCl_2F_2 and exptl. results agreed fairly well with those predicted from the curves. A. H. JOHNSON

Refrigeration and the fishing industry. D. B. FINN. *Refrigerating Eng.* **20**, 287–90(1930).—Rapid freezing results in the formation of min. ice crystals. Small ice crystals do not rupture the cell walls of the material frozen and therefore when thawed such material more closely resembles the fresh food product than if slow freezing had occurred with consequent formation of large ice crystals. In order not to allow the crystals to grow the storage temp. must not be allowed to fluctuate. Also fluctuations of temp. set up internal pressures which tend to cause oil to ooze from the material frozen. Loss of moisture from frozen material during storage may be reduced by keeping all objects within the storage chamber at as near the same temp. as possible. In such a case moisture will not condense on colder surfaces such as cooling coils, etc. Sufficient insulation so that the temp. differential between the cooled product and the coils is low will prevent serious shrinkage. The occurrence of "rusting," the yellow discoloration which occurs in oily fish during cold storage, may be reduced by using low storage temp. "Rusting" appears to be concerned with a change in the fat or oil, but nitrogenous constituents and possibly H-ion concn. are thought to play an important part. A. H. JOHNSON

Dangerous liquids. B. L. HUBSTIS. *Safety Eng.* **60**, No. 3, 174, 176, 178–9 (1930).—The main considerations in selection of containers for shipment are: strength and tightness, possible reaction of liquid on containers, and proper handling of container, both loaded and empty. E. I. S.

Role of gas masks in mines. P. ESZTÓ. *Bányás. Kohás. Lapok* **63**, 55–60 (1930).—Modern gas masks (respirators), *e. g.*, the "All-Service-Mask" examd. by the U. S. A. Bureau of Mines in May, 1924, yield perfect defense against CO. Therefore gas masks should be used in mines instead of expensive air-regenerating app., as the cost of the former is only 12–15% that of the latter. S. S. DE FINÁLY

The moisture in technical gases. III. Examples. FRIEDRICH LÜTH. *Arch.*

Eisenhüttenw. **4**, 281–7(1930); cf. *C. A.* **25**, 1924.—Numerical examples (10) showing the applications of the method of calcn. are given. J. BALOZIAN

Control and regulation of distilling columns. M. PÉRARD. *Chimie & industrie* **25**, 286–90(1931).—A brief discussion is given, from a practical operating standpoint, of various points regarding the control and regulation of continuous distg. columns, more particularly columns for distg. alc. A. PABINEAU-COUTURE

Vacuum as an insulator. CHARLES O. DUEVEL, JR. *Refrigerating Eng.* **20**, 223–8 (1930).—D. reviews the subject of heat transfer in vacuum insulation and in gases. An app. is described by the use of which it is possible to measure thermal cond. of vacua and gases. A. H. JOHNSON

Separation and size distribution of microscopic particles (ROLLER) **2.**

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LEIGH, C. W., AND MANGOLD, J. F.: **Practical Mechanics and Strength of Materials.** 2nd ed. New York: McGraw-Hill Book Co., Inc. 420 pp. $2.75. Reviewed in *J. Western Soc. Eng.* **35**, 495(1930).

Purifying gases. UNION CHIMIQUE BELGE S. A. Fr. 37,418, May 17, 1929. Addn. to 650,516 (*C. A.* **23**, 3284). The pptn. of the $(NH_4)_2SO_4$ is localized in the part of the app. where the NH_3 is dissolved and is prevented in the part where the cooling takes place. The fall of temp. of the satd. soln. is reduced during the cooling but is afterward repeated several times. Cf. *C. A.* **24**, 3843.

Separation of gas mixtures, and nitric acid production. N. CARO and A. R. FRANK. Brit. 338,497, Aug. 13, 1929. A constituent of a gas or vapor mixt. is sepd. by condensation by cooling under such conditions that the mixt. leaving the condenser is unsatd. with respect to the sepd. constituent. Various details of app. and operation are described. Hot aq. nitrous gases, produced by oxidation of NH_3, with addn. of steam, H, O or SO_2 in some cases, can be treated to sep. the water, free from or low in HNO_3, and if desired the N oxides may be directly worked up to form nitrates or nitrites by reaction with suitable oxides, carbonates, chlorides, etc. Sepn. of water, etc., may be effected by the method described in connection with the production of Ca cyanamide, HCN and NH_4 salts or aq. NH_3.

Distilling or drying carbonaceous or other solid materials, etc. E. M. SALERNI and E. M. S. INDUSTRIAL PROCESSES, LTD. Brit. 338,939, July 30, 1929. Operations of this general character or evapn. or other heat treatments of liquids are effected in a described app. which may comprise a plurality of juxtaposed troughs through which the material successively passes while at the same time it is subjected to a secondary movement by the action of agitators in a direction counter to that of main passage of the material.

Alumino-thermic reactions. E. BLÜMMER. Brit. 338,468, March 11, 1930. In effecting reactions such as those of Fe oxide and Al, very high temps. are attained by employing one or both of the reacting materials in molten state. Various details of app. and procedure are described and the operation may be conducted in a vessel surrounded by N under 200 atm. pressure.

Regulating the temperatures of chemical reactions. HOLZVERKOHLUNGS-INDUSTRIE A.-G. Brit. 339,144, Jan. 18, 1929. In regulating temps. such as in the production of acetone from C_3H_7 and water vapor, the reacting constituents are maintained in motion in a continuous circuit past heat-exchanging walls which sep. part of the circuit from a reaction zone, while part of the constituents are diverted continuously into the reaction zone; the reaction temp. is controlled by regulating the speed of travel of the reacting materials in the circuit. App. is described. The procedure is suitable for exothermic or endothermic reactions between liquids or between liquids and gases. Brit. 339,148

relates to similar regulation of reactions carried out under pressures above atm. pressure.

Furnace operation for chemical reactions. Soc. chimique de la Grande Paroisse (Azote et produits chimiques). Brit. 338,444, Jan. 28, 1930. A jet of O or of air enriched with O is impinged on a restricted area of a bed of coke to produce a high temp. zone in which refractory materials such as silica, alumina and Ca phosphate can be volatilized and caused to react. Fine powders are sepd. from the combustion products and in the operation of the process silica or ferric oxide for polishing metals may be reduced to fine powder, and silica or alumina can be caused to react on Ca phosphate for the production of Ca silicate or Ca aluminate and oxides of P. App. is described.

Autolysis or heterolysis of animal or vegetable materials. Soc. française des produits alimentaires azotés. Ger. 518,263, Jan. 14, 1925. The operation is effected with the aid of an antiseptic mixt. comprising $CHCl_3$ and an alc. of lower sp. gr. than the materials under treatment. Thus, fish may be autolyzed with water for 4 days at 40° in the presence of a mixt. of $CHCl_3$ and BuOH.

Granulating salts. I. G. Farbenind. A.-G. (Bodo Haak, inventor). Ger. 518,090, Dec. 14, 1927. In granulating salts, particularly fertilizer salts, by causing the fused salt to fall in drops into a liquid, the path of the salt through the liquid is lengthened by stirring the liquid so that it circulates around the vertical axis of the vessel contg. it.

Gelatinizing organic liquids such as benzine. I. G. Farbenind. A.-G. Brit. 339,360, July 4, 1929. To facilitate safe handling and storage, liquids such as benzine or petroleum ether have formed in them a voluminous "framework" of solid inorg. oxide or hydroxide such as may be produced by the action of a base such as NH_3 on $SnCl_4$, $SiCl_4$ or a chloride of Fe or of Al.

Gel-like benzine. L. Lorber. Hung. 101,509, May 3, 1930. Soap is boiled in alc., then shaken with benzine and water until the mixt. becomes gel-like; *e. g.*, 2 g. soap and 2 g. alc. are boiled, then 500 g. benzine and 2 g. water are gradually added.

Oil or wax emulsion. L. Pócs. Hung. 101,357, Feb. 22, 1930. The aq. phase of the emulsion contains a mol. or a colloidal soln. of halogenated fatty acid soap as emulsifier. A disinfectant agent can be added or the emulsified oil, *e. g.*, turpentine oil, may also have disinfectant qualities.

Oil or wax emulsion. L. Pócs. Hung. 101,358. March 5, 1930. Oil or wax is emulsified with soap, and sufficient alcohol or alcoholic KOH is added to give permanent emulsion in water. Finally the disinfectant is added.

Emulsions, ointments, etc. T. Goldschmidt A.-G. Brit. 339,558, March 9, 1929. Emulsions are prepd. by mixing esters (contg. non-esterified OH groups) of polyhydric alcs. with higher fatty acids, such as glycerol monostearate or diethylene glycol monostearate, with water or aq. solns. in the presence of acylated alkylene diamines or their derivs. such as the C-substituted or N-alkylated derivs., and various other substances may be emulsified or dispersed in the products, such as glycerol, H_3BO_3, citric acid, fats, fatty acids, waxes, vegetable or mineral oils, rubber, glue, gelatin or dextrin, terpenes, perfumes, latex, cow milk, lampblack, talcum or ZnO. Examples are given. Cf. *C. A.* 24, 5437.

Lining liquid containers. Standfasswerke Rostock & Baerlocher and Georg Walter. Austrian 121,533, Oct. 15, 1930. In lining *fermentation vats* and other liquid containers made of concrete or the like with bituminous, resinous or waxy substances the lining substances are applied as aq. emulsions. Preferably, a relatively stable emulsion is first applied, followed by a relatively unstable emulsion. Fibrous materials and other fillers may be included in the emulsions, and the addn. of a small quantity of a hydraulic mortar is advantageous.

Detecting leakage of noxious gases from pipes. Gabriele Windisch. Austrian 121,257, Sept. 15, 1930. The pipes conveying the gases are enclosed in protective pipes, which are connected through a manometer to a suction app. Means for sealing off sections of the protective piping may be provided to assist in locating a leak.

Use of substances of low-boiling point such as carbon dioxide, ammonia or methyl ether for operating engines. Olga, Princess zur Lippe and M. Brand. Brit. 338,894, June 28, 1929.

Use of hydrochloric acid to prepare bore holes for blasting. V. Tschenn. Brit. 338,454, Feb. 11, 1929. Bore holes are provided with spherical enlargements to receive blasting charges by forcing acid such as HCl in fine jets through the nozzle of a described app., and a preliminary charge may be exploded in the bore hole to facilitate the action of the acid.

Drying air surrounding perishable goods during shipment. T. Robbins, F. C.

DEHLER and SILICA GEL, LTD. Brit. 338,855, July 4, 1929. The air supplied to containers in cars, ships, etc., is dried by silica gel or like material. App. is described.

Refrigerating chemicals. N. CARO and A. R. FRANK. Brit. 339,194, Feb. 8, 1929. In processes for absorbing at low temps., liquefying or freezing out N oxides, HNO_3 and their mixts., an aq. NH_3 soln. is used as the "cold-conveying" medium and substances such as NH_4NO_3, metal nitrates and metal thiocyanates may be added to the soln. Various details of concns. of solns. for different temps. are given.

Refrigerator boxes formed of Celotex or the like dipped in asphalt. J. C. STATON (to Coca-Cola Co.). Brit. 338,959–60, Jan. 9, 1929.

Refrigerating apparatus using solid carbon dioxide. W. T. HEDLUND (to Electrolux, Ltd.). Brit. 338,795, Jan. 12, 1929. Structural features.

Refrigerating apparatus utilizing solid carbon dioxide. WALTER S. JOSEPHSON and THOMAS B. SLATE (to Dryice Equipment Corp. and American Patents Development Corp.). U. S. 1,796,907, March 17. U. S. 1,796,908–9–10 (THOMAS B. SLATE to American Patents Development Corp.) also relate to app. for the same general purpose. Cf. *C. A.* **24**, 446, 2517.

Heat-insulating material suitable for building construction. GEORGE B. STRYKER, JR. (to Weatherproof Products Co.). U. S. 1,796,631, March 17. A base of compressed fibrous material such as compressed waste paper and cotton fiber is provided with a top layer consisting of a hardened mixt. of fibrous material with cement, clay and lime. Cf. *C. A.* **25**, 754.

Heat insulators. S. A. I. G. (SOC. ANON. INVENZIONI, GUADAGNIN). Brit. 338,743 Dec. 3, 1929. See Fr. 686,226 (*C. A.* **25**, 549).

Insulating electric wires and cables. FRANCIS J. BRISLEE (to British Insulated Cables, Ltd.). U. S. 1,795,994, March 10. An esterified cellulose compn. such as a cellulose acetate compn. in hard and substantially solvent-free form is applied in layers with textile supports around a conductor under approx. atm. pressure, and the material is then heated to about 100°, at which temp. the compn. softens and flows so that adjacent layers unite and impregnation of the textile supporting material is effected.

Insulation of wire for electrical purposes. I. G. FARBENIND. A.-G. Ger. 518,328, April 24, 1929. The insulation consists of filaments of butadiene hydrocarbon polymerization or condensation products which have been hardened so that they no longer show the extensibility and elasticity of rubber. Hardening may be effected by heat or the action of sulfurizing or oxidizing agents. Examples are given.

14—WATER, SEWAGE AND SANITATION

EDWARD BARTOW

Water supply work of the U. S. Public Health Service. ARTHUR P. MILLER *Water Works Eng.* **83**, 907–8(1930).—The relations of the P. H. S. officials with local health agencies, water and sewage treatment plant operators and the like are usually of an advisory character. A review of the manner of certifying water supplies to be used on common carriers engaged in interstate traffic is given. The objectionable practice of adding ice directly to the drinking water used on railway coaches has been nearly eliminated. The effect on the drinking water by careless handling by railway employees is being studied. Since the beginning of the certification of water supplies, the P. H. S. has assumed the entire responsibility of assuring water of good quality on vessels. In 1921 the P. H. S. arranged to do the sanitary engineering work for the National Park Service in the national parks. The work included development of water supplies, building of sewage-treatment plants, mosquito eradication and disposal of combustible and non-combustible waste. C. H. BADGER

Study of a spring in Monferrato (Italy). GIOVANNI CALVI. *Giorn. farm. chim* **79**, 543–8(1930).—A qual. and quant. chem. analysis was carried out on the water of an inexhaustible spring. G. SCHWOCH

New pipe materials for Dresden water mains. SCHEMEL. *Gas u. Wasserfach* **74**, 169–73(1931).—Various types of Fe and steel water mains with and without internal coatings, as well as reënforced concrete and wooden mains, are discussed. R. W. R.

Piping materials for mineral water. E. MAURER. *Gesundh.-Ing.* **53**, 333(1930); *Wasser u. Abwasser* **27**, 369–70.—Most mineral waters in themselves contain no substances corrosive to Fe or other piping. By far the most important agent in corrosion is O_2, introduced from the air. O_2 is not normally present in mineral waters obtained from deep in the earth. CO_2 has little or no corrosive effect. Incrustants will deposit on any

pipe but in less quantity where O_2 is absent. Hence to reduce both corrosion and incrustation, the piping system should be planned to avoid entry of O_2. Wood and galvanized Fe are shortlived while Sn, Pb and Cu pipes are too expensive. Cast-Fe is the best all-around pipe for mineral waters. C. R. FELLERS

Protection of water supply pipe lines system from electrolysis with particular reference to insulation, pipe bonding, electrical drainage and return systems. J. J. LAUDIG, *et al.* *Am. Ry. Eng. Assoc. Proc.* 32, 415–9(1931), *Bull.* 333.—Regular inspections with tests are recommended where electrolysis is suspected and correction is made by insulation or bonding elec. drains where needed. R. C. BARDWELL

Taste and odor troubles in the Minneapolis water supply. F. RAAB. *J. Am. Water Works Assoc.* 23, 430–4(1931).—Certain types of algae, growing in the filters, were the producers of varying and unpleasant tastes and odors. Alum, chlorine and ammonia were tried without effect. Prechlorination, however, was very successful and increased noticeably the filter runs. D. K. FRENCH

Elimination of taste and odor in the water supply of Lancaster, Pennsylvania. EDWARD D. RUTH. *J. Am. Water Works Assoc.* 23, 396–9(1931).—Tastes and odors of various kinds were always present. The filter plant was overloaded. Much of the time the water was not safe to drink. By using anhyd. ammonia and chlorine, almost perfect results were obtained. D. K. FRENCH

Successful superchlorination and dechlorination for medicinal taste of a well supply, Jamaica, N. Y. FRANK E. HALE. *J. Am. Water Works Assoc.* 23, 373–86 (1931).—The water contained Fe and Mn, and the growth of *Crenothrix* was quite noticeable. Treatment with Cl as required produced a medicinal taste. Investigation showed that leaking gasoline, rather than algae, was responsible. After much exptl. work it was found that superchlorination followed by dechlorination gave the best results. SO_2 was used. The method was inexpensive and quickly applied. D. K. FRENCH

Interpretation of water analysis. Equilibrium considerations, determining activities and concentration of ions. D. S. MCKINNEY. *Ind. Eng. Chem., Anal. Ed.* 3, 192–7(1931).—Present methods of detg. the anions of the slightly dissocd. acids (carbonic and phosphoric and their salts) are stoichiometric, and disregard the equilibria which control the relations of these anions and the H and OH ions and hence give the operator a false impression of the quantity of each anion present Further, the results obtained by present methods cannot be evaluated when more than one weak acid is present, unless unwarranted assumptions are made. Derivation and a list of formulas for the calcns. of the fractional activity or activity ratios of various ions obtained from H_2CO_3 and H_3PO_4 at 25° are given. In order to obtain the ion concn. and activities, it is necessary to know the activity coeffs. The relation between the activity and the concns. may be expressed by means of the simplified equation of Debye and Hückel. Methods of application of the equation to actual water analysis are given and explained. WAYNE L. DENMAN

An investigation into the clogging of the filter beds at Topchanchi waterworks during hot weather. B. K. MANDAL. *Indian Med. Gaz.* 66, 84–5(1931).—The growth as well as the actual decay of the lower forms of vegetable life (particularly *Crenothrix*) are the more important factors influencing the clogging of filter beds during hot weather. An increase in temp. with an acceleration in the production of org. matter cause a simultaneous reduction in the dissolved O_2 content, and the evolution of CO_2; these conditions are favorable for the production of the so-called "iron bacterium" and allied forms of life. FREDERICK G. GERMUTH

Chemical control and general supervision of water-treating plants. R. M. STIMMEL, ET AL. *Am. Ry. Eng. Proc.* 32, 419–22(1931), *Bull.* 333.—Survey indicates field inspection is desirable in addn. to lab. check; the field-test method for rapid boiler water analysis recommended in A. R. E. A. Manual is used. Treating plant results should be coordinated with the performance of water in locomotive boilers. R. C. BARDWELL

Treats water twice in new plant. R. V. ZAHM. *Ry. Eng. and Maintenance* 27, 363–4, 377(1931).—The Missouri, Kansas and Texas R. R. installed a complete 30,000 gal. per hr. water-softening plant at its Franklin, Mo., terminal in 1929. Lime, soda ash and Na aluminate are used to soften and clarify a reservoir water ranging from 5.0 to 7.5 gr. per gal. total hardness and 4.0 to 20.0 gr. per gal. suspended matter. Addnl. treatment with alum to neutralize OH and Na hypochlorite for sterilization is given that portion used for drinking purposes with subsequent filtration. A Sparling meter is used for lime and soda ash control. Aluminate is added separately by an automatic dry feeder. A min. settling time of 6.8 hrs. with a max. of 13.8 hrs. clarifies the water satisfactorily. Hardness of treated water averages consistently under 1.5 gr. per gal. R. C. B.

Results of water treatment. T. F. POWERS. *Ry. Age* **90**, 329–31(1930).—In 1911 the Chicago and Northwestern RR. had a leaky flue failure each 58,633 locomotive miles but with supervised water treatment this had been reduced by 1929 to one failure per 4,343,302. Corrosion and pitting still constitute a problem and embrittlement is a potential danger. A properly supervised wayside treating plant has been found a most satisfactory method for correcting water quality. R. C. BARDWELL

Lump or hydrated lime? O. T. REES, *et al.* *Ry. Eng. and Maintenance* **27**, 276–8, 385(1931).—Available CaO for use in water treatment can be obtained in lump lime at as much as 55% lower first cost than in hydrated lime. However, rapid deterioration of lump lime in shipment and storage affects the reliability and where more uniform results and greater accuracy of treatment are required together with greater ease of control, use of hydrated lime is favored. R. C. BARDWELL

Experiments with chlorinated copperas as a coagulant. A. CLINTON DECKER. *Water Works Eng.* **83**, 887–8(1930); cf. *C. A.* **23**, 5525; **24**, 1447, 2818.—The source of supply for the Chickasaw, Ala., filtration plant originates in springs and flows through a heavily cypress wooded territory which imparts to the water a color ranging from 40 to 130 p. p. m. Alky., total hardness and turbidity are low. Color removal was complete when 0.7 grain per gal. of copperas, mixed with 2.16 p. p. m. Cl_2, was added as a coagulant. The Cl_2 added was sufficient to oxidize the Fe and also to satisfy the Cl_2 demand of the raw water. The filtered water is adjusted with lime to a p_H of 7.0–7.2. The increase in color is less when the lime is introduced into the clear-water well than when introduced into the coagulating basin. The length of the filter runs has been increased by this process as compared with alum and lime, thus lessening by 50% or more the wash water required. The cost of chemicals is approx. $10 less per million gal. water. C. H. B.

Clarification of water movement (phenomena). A. REUTHER. *Gesundh.-Ing.* 53, 164–7, 180–5, 194–202(1930); *Wasser u. Abwasser* **27**, 163.—A math. discussion is given with formulas. C. R. FELLERS

Economics of reservoirs. PAUL HANSEN. *Water Works Eng.* **83**, 943–4, 982–6 (1930).—Impounding reservoirs should be formed which will meet the requirements for water during the dryest period likely to occur within the period of anticipated demands. Because of the cost of constructing dams and spillways and the difficulty of bonding new work on dams with old it is not usually economical to provide impounded storage for less than 10 yrs. and often provision for 20 to 30 yrs. is justified. There should be sufficient filtered-water storage to neutralize the differential (for ordinary domestic purposes $^1/_6$ to $^1/_8$ the total day's consumption is usually required) between the uniform rate of filtration and the variable rate of consumption, plus a suitable reserve for fires and that needed for washing filters, less elevated storage on the distribution system. Cost of elevated storage should be balanced against cost of pumping. Steel is considered best for tanks built on towers. At present, 2 million gal. is the max. practicable size for such steel tanks. For the construction of the smaller sizes of exposed reservoirs built on top of the ground steel is cheaper than reënforced concrete. For covered reservoirs steel has a small advantage in first cost with capacities up to 5 million gal. Tables showing the comparative costs of constructing different types of reservoirs are given. C. H. B.

Overcoming algae troubles in a clear-water reservoir. V. BERNARD SIEMS. *Water Works Eng.* **83**, 739–40(1930).—The water supply at Greenville, Pa., is obtained from a stream on which are located 2 reservoirs in series with a sedimentation basin at the lower end. The water then flows to rapid sand gravity filters and Cl_2 is added to the effluent which passes to the clear-water reservoir. Doses of 2 p. p. m. $CuSO_4$ to the clear-water reservoir cut off for several days, followed by doses of 1 p. p. m. $CuSO_4$ to the sedimentation basin, did not satisfactorily prevent algae, especially in hot weather. At present, 1.0 p. p. m. NH_4OH is added between the lime and the alum dosages. The Cl_2 dosage is 1.5 p. p. m. which gives a residual Cl_2 of 0.2–0.3 p. p. m. in the distribution system. Results obtained during 2 months' operation indicate that more Cl_2 can be added without causing tastes and odors, as was formerly the case. This permits a higher factor of safety in sterilization. In addn. Cl_2 is more effective. C. H. B.

Turbidity, plankton and mineral content of Detroit water supply. BERT HUDGINS. *J. Am. Water Works Assoc.* **23**, 435–44(1931).—As a result of the shallowness of Lake St. Clair, the water could readily become turbid and carry plant and animal life. Several types which give the most trouble in water were identified. At the present time little trouble is being experienced and the present plant is considered satisfactory. The natural conditions which are combating the growth of objectionable forms are discussed. D. K. FRENCH

Water softening for small municipalities. C. P. HOOVER. *Am. City* **42**, No. 3, 7 (1930); cf. *C. A.* **23**, 656; **24**, 4106.—Most of the 322 incorporated communities in

Ohio with populations of less than 10,000 use well water for their municipal water supplies. Many such supplies are hard and contain considerable Fe. A hardness of 90 p. p. m. or less seems to be acceptable in this section. High per capita cost together with limited and mediocre technical supervision makes the designing of water-softening plants in small communities difficult. Carbonation has overcome the objections to the taste of softened water and has also made it possible to distribute softened well water without filtration.

C. H. BADGER

Water softening: Some properties of certain base-exchange materials. I. AUSTIN R. MARTIN. *J. Soc. Chem. Ind.* **49**, 389–94T(1930); cf. *C. A.* **24**, 1688.—A discussion is given of the bulk ds. and vol. of interstitial spaces, exchange values at various rates of flow of water, regeneration, mech. disintegration and losses and contamination of water with SiO_2 of Basex, Doucil, Borromite, Kenzelite, Zepholite, Refinite, Natrolith and Nat-Rol. There is greatest exchange value and mech. disintegration in the synthetic material.

O. M. SMITH

Effect of the disposal of water-softening-plant sludge through the sewage-disposal plant. E. F. ELDRIDGE. Mich. Eng. Expt. Sta., *Bull.* **34**, 7 pp.(1931).—Twelve 1500 samples of fresh solids were placed in individual 3-l. bottles which were connected to inverted glass cylinders for gas collection and measurement. Two bottles contained no added softening-plant sludge; 2 were treated with a dry wt. of lime-softening-plant sludge equiv. to 25% of the total solids in the sewage sludge; other samples contained 50, 75, 100 and 150%, resp., of the softening-plant sludge. The total wts. of sewage solids in all of the samples were practically identical at 41.6–42.6 g. Max. gas production, 5.2 l., was obtained from the samples contg. 50% added softening-plant sludge. The optimum p_H for sludge digestion is approx. 7.2–7.6. Excessive amts. of the lime sludge produced an unfavorable p_H for sludge digestion. The expts. are being continued.

C. R. FELLERS

Concentration control of boiler water. HERBERT S. WHITON. *Power Plant Eng.* **35**, 452–4(1931).—Control of concn. is necessary to avoid foaming and steam contamination with impurities, sol. or insol., from the boiler. In certain cases the Baumé hydrometer, especially calibrated, can be used. In others, the titration of chloride as a measure of total concn. is valuable. Cond. methods also have a place. Frequent chem. analyses may be necessary. The concn by-products of various methods of treatment are described. Blowing down the boiler will reduce its concn. and various methods for its regulation are given.

D. K. FRENCH

Relative cost of eliminating impurities in locomotive boiler waters and the value of treatment with respect to chemicals and compounds applied direct to locomotive boilers and roadside tanks, and conditions under which they may be desirable. C. H. KOYL, *et al. Am. Ry. Eng. Assoc. Proc.* **32**, 402–5(1931). *Bull.* 333.—The phys. condition of the sludge formed is important in the successful internal treatment of locomotive boiler waters. Chemicals forming large heavy particles are desirable. A limit of 15 gr. per gal. alkali salts is recommended. Good results can be obtained with soda ash or proprietary compds. under careful supervision, the cost varying with the quality of the water.

R. C. BARDWELL

Boiler-tube corrosion halted by hot-process treatment. R. E. COUGHLAN. *Ry. Age* **89**, 855–6(1930); *Ry. Eng. and Maintenance* **26**, 550(1930).—The Chicago and Northwestern RR. eliminated serious pitting in six 500 h. p. water tube boilers using Chicago city water, by installation in 1928 of a hot-process softener using lime, soda ash and Na aluminate; this replaced unsatisfactory internal treatment. R. C. B.

Experiments and results with boiler-water recycling. FEIGE AND WEISS. *Arch. Warmewirt.* **12**, 16–8(1931).—A rather full account is given of practical expts. on a 1000 h. p. boiler in returning blow-down to the feed water continuously through a 3 mm. orifice. No difficulty was experienced, and the indicated saving was 1500 M. per year.

ERNEST W. THIELE

Water requirements in the textile industry. KEHREN AND STOMMEL. *Z. ges. Textilind.* **32**, 651–3, 676–7, 698–700, 798–800, 811–4, 830–1, 845–7, 860–2(1929); *Wasser u. Abwasser* **27**, 170.—Ground waters and their suitability for use in dye factories, bleaching plants, laundries and creameries are discussed, together with methods of softening, Fe and Mn removal, filtration, Al coagulation and deoxidation.

C. R. FELLERS

Past and present developments in sewage disposal and purification. H. W. CLARK. *Sewage Works J.* **2**, 561–71(1930).—A general discussion touching on all phases of sewage disposal with particular reference to the developments at the Lawrence Expt. Sta.

E. HURWITZ

Review of present sewage-disposal technic. HERMANN BACH. *Vom Wasser* **4**,

160–86(1930); *U. S. Pub. Health Eng. Abstracts* 11, S, 25(Feb. 28, 1931).—A comprehensive review. C. R. FELLERS

Conditions affecting general layout of sewage-treatment works. PAUL HANSEN. *Sewage Works J.* 2, 572–81(1930).—In the design of sewage-treatment works provision must be made for population growths and changes in character of sewage. Each element of the works should be so arranged that future extension can be made contiguously to the initial installation for economy and improved operating control. E. HURWITZ

Operation and control of sewage-treatment plants. CHAS. C. AGAR. *Sewage Works J.* 2, 597–614(1930).—A report of the Division of Sanitation, New York Dept. of Health, contg. suggestions on operation and control of all units which might be embodied in a treatment plant. E. HURWITZ

Laboratory service in sewage treatment. M. STARR NICHOLS. *Sewage Works J.* 2, 591–6(1930).—N. proposed classifying lab. service in 4 divisions: (1) operator's lab., (2) field-control lab., (3) central or state lab. and (4) central or field-research lab. The duties of each division are specified. E. HURWITZ

Sewage filter media and loadings. WM. E. STANLEY. *Sewage Works J.* 2, 486–94 (1930).—See *C. A.* 25, 1928. E. HURWITZ

Chert gravel as sewage filter stone. J. E. LAMAR. *Sewage Works J.* 2, 495–9 (1930).—Natural chert stream gravel gave satisfactory results in that part of the filter more than 3 feet from the surface of the bed. The gravel supported biol. growth and was not materially affected by soln. Chipping at the surface of the bed indicated that under long-continued use it might in time have caused "pooling." E. HURWITZ

Use of domestic sewage purifiers. L. DE FINÁLY. *Technika* 11, 20–6(1930).—A general review is given of different systems, the principles of domestic purifiers based on artificial biol. oxidation methods are discussed; and two newly erected purifiers with activated-sludge treatment are described. S. S. DE FINÁLY

Observations on scum in the Imhoff tanks of the Ruhr District. KARL IMHOFF. *Sewage Works J.* 2, 549–54(1930).—See *C. A.* 25, 369. E. HURWITZ

Effect of gases on growth of bacteria. R. G. UPTON. *Proc. 12th Texas Water Works Short School* 1930, 151–3; *U. S. Pub. Health Eng. Abstracts* 11, S, 23(Feb. 28, 1931); cf. *C. A.* 24, 184.—In order to test the effect of partially vacuumizing Imhoff tanks to remove the gases of decompn., lab. expts. with flasks contg. sewage were partially vacuumized and the effect on bacterial nos. was noted. In general, there was a slight increase in nos. by the agar plate method where the samples were held under 15 in. Hg vacuum. There was no significant difference in the nos. of H_2S formers or anaerobes. Conclusion: The toxic effect of sewer gas on bacteria and other organisms that might aid in decompn. of sewage sludge in the digestion chambers is slight or negligible. C. R. FELLERS

Activated-sludge experiments at the Calumet Sewage Treatment Works. F. W. MOHLMAN AND C. E. WHEELER. *Sewage Works J.* 2, 529–48(1930).—The paddle-wheel-diffused air process of activated sludge shows considerable promise in reducing power requirements. The scheme is readily adaptable to large units and is flexible in that requirements for agitation and for O may be adjusted separately so that the air rate need not be excessive merely to maintain the required degree of agitation. The tests indicated that 10 to 15 h. p. per million g. is sufficient to produce a satisfactory effluent. With the 2-stage process for activated sludge good results were obtained with small quantities of air. However, this process is very sensitive biologically and requires careful control. Bulking of sludge occurred occasionally in the first stage. The sludge produced by the 2nd stage was generally well flocculated and readily settleable. E. HURWITZ

Effect of iron on the anaerobic decomposition of sewage sludge. L. R. SETTER. *Sewage Works J.* 2, 504–20(1930).—Gasification of sewage sludge is not affected by $FeCl_3$ in amounts up to 5 p. p. m. Amounts of $FeCl_3$ from 5 to 20 p. p. m. cause a progressive retardation of gas formation with consequent doubling or tripling of the digestion period. Retardation was partly eliminated by neutralization of the acidity caused by the hydrolysis of $FeCl_3$. Addn. of $FeCl_3$ up to 10 p. p. m. was not toxic to the organisms of sewage sludge; greater amounts showed decided reductions of organisms and amounts as high as 20 p. p. m. completely reduced the microbial population with the exception of the sewage fungi. Iron added as the element, oxide or hydroxide had no appreciable effect on digestion; the acetate, citrate, $FeCl_3$ and $FeSO_4$ caused slight retardation. E. HURWITZ

Rejuvenated sludge. MAX PRÜSS. *Sewage Works J.* 2, 477–85(1930).—Sludge can be rejuvenated by daily vertical mixing of the fresh solids with all the old sludge in a digestion tank. Vertical mixing with the app. described is so thorough that there are

no fresh sludge pockets and fly and odor nuisance due to pumping fresh sludge on to the drying beds is eliminated. Mixing increases the gas yield 100%, reduces the org. content of the sludge, breaks up scum formation and tends to equalize the p_H value and maintain a uniform temp. throughout the tank. E. HURWITZ

Correlation between biochemical oxygen demand and suspended solids of activated-sludge effluent. H. GLADYS SWOPE. *Sewage Works J.* **2**, 500–3(1930).—Results of expts. show that the biochem. O demand of activated-sludge effluents increases with an increase in suspended solids. The relative increase in biochem. O demand is greater as the period of incubation is lengthened. E. HURWITZ

Biological oxidation of sulfur. IV. Influence on ammonification and nitrification in activated sludge. C. V. R. AYYAR. *J. Indian Inst. Sci.* **13A**, 165–71(1930).—Suspensions of sulfur and activated sludge, constantly aerated with ammonia-free air, showed a rapid fall in ammonia during the first 3 days with a corresponding decrease in bacterial numbers. But ammonia was rapidly produced from the 11th to 18th day and large numbers of fungi appeared. After the 10th day, nitrates accumulated steadily until acidity developed to about p_H 5.4. With phosphates present, the active nitrification proceeded longer before being hindered by the acidity. Development of acidity p_H 2.4 reduced the ammonia somewhat in the second 3 weeks. A sudden decrease in ammonia from the 20th to the 22nd day may have been caused by fungus activity. The steady increase in ammonia after the 22nd day may have been due to the colloids, flocculated by the H_2SO_4, leaching out the adsorbed ammonia. With phosphate present, the changes in the second 3 weeks were similar but less intense. M. E. L.

Making and interpreting a sanitary survey. EDWIN C. HURD. *Sewage Works J.* **2**, 582–90(1930).—The manner of making a survey, the elements to be considered, and the method of obtaining desirable information are considered. E. HURWITZ

Recent progress in air conditioning. W. H. CARRIER. *Refrigerating Eng.* **21**, 187–9(1931).—Air conditioning is discussed in relation to the comfort of the individual, fields of application and mech. and engineering requirements. A. H. JOHNSON

Air conditioning on passenger equipment. R. W. WATERFILL. *Ry. Age* **90**, 233–4 (1931).—Air-conditioning equipment being tested in passenger car service, weighing approx. 5 tons, operates by thermostatic control supplemented by hand dampers regulating raw outdoor air. The refrigerating app. uses Carrene (CH_2Cl_2) and Trieline (C_2HCl_3) which are non-inflammable and safe. Practical air conditioning in railway cars is considered to be in the early development stage. R. C. BARDWELL

Soot particles in New York City air. E. E. FREE. *Fuels and Steam Power* (A.S.M.E. Trans.) **53**, 9–12(1931).—Counts were made by an impact dust counter. The more important variable affecting results was the direction of the wind. Another is clumping of the soot particles, the cause of which has not been detd. An av. of approx. a half-million dust and soot particles is to be found in each cu. ft. of N. Y. City air. At least 90% is ordinary soot or unburned C. The following were also found: auto, tire rubber, asphalt, brick, rock, org. materials, slivers of glass, glazed tile, leather, cotton fiber, hair and a few living mold spores. The size varies from 0.0001 to 0.0500 in. At 100 ft. above the street level the no. of soot particles decreases 25 to 50% at 5th Avenue and 23rd St.; no high level counts were made at other points. For the air over the entire city the av. amt. of suspended matter is 4 to 5 short tons. The relative absence of ash indicates that most of the city's soot and air dust comes from small fires in apartment houses, office buildings and homes, rather than from smoke stacks of the large power houses or other industrial plants. H. C. PARISH

Investigation of atmospheric pollution—report of superintendent of observations. J. S. OWENS, *et al. Dept. Sci. Ind. Research 16th Rept.* 1931, 7–26.—The rept. contains a list of stations, results obtained with the deposit gage, results obtained with the automatic filter, measurement of daylight and deposit of microörganisms at Stockport. Tables show the mean monthly deposits recorded in 1929–30, classification of mean monthly deposits recorded in 1929–30, expressed as % of the general av. for the respective stations and hourly variations of suspended impurity, in different seasons. Eighty-four stations have deposit gages and 11 have automatic filters. No conclusions are drawn. W. H. BOYNTON

Stream pollution from the operator's point of view. EARLE B. PHELPS. *Sewage Works J.* **2**, 555–60(1930).—There are 3 types of stream pollution with which the operator of a sewage plant has to contend, namely, phys., chem. and bacteriol. Sewage-treatment works are designed to deal with each of these types independently or as a whole depending on the capacity and limitation of the stream into which the effluent is to be discharged and on the uses to which the stream is to be put. A knowledge of conditions down-stream facilitates the intelligent operation of the plant. E. H.

Importance of the vacuum system of sludge removal and septic-tank cleaning. A. RINGEL. *Gesundh.-Ing.* 1930, 308–14; *Wasser u. Abwasser* 27, 176.—The advantages of the method are outlined. C. R. FELLERS

Removal of ordinary sewer gases. A. SALMONY-KARSTEN. *Wasser u. Gas* 1930, 785–7; *Wasser u. Abwasser* 27, 177; cf. *C. A.* 25, 1313.—A patented app. is described. C. R. FELLERS

Packing-plant waste treatment. M. STARR NICHOLS AND JOHN C. MACKIN. *Sewage Works J.* 2, 435–42(1930).—Treatment of packing-house waste by plain sedimentation and sprinkling filter resulted in 90% purification based on removal of suspended solids, org. N and fats and about 80% based on reduction in biochem. O demand E. HURWITZ

Use of sewage gas as city gas (FULWEILER) 21. Leather, sanitation and colloid chemistry (WILSON) 29. Mottled enamel (MCKAY) 11G. Filter [for water] (Ger. pat. 515,852) 1.

PLANCHON, RENÉ: **Traitement industriel et rationnel des sous-produits d'abattoires et des déchets organiques.** Paris: Dunod. 460 pp. F. 140; bound, F. 150.

Filter suitable for filtering water through sand. STANISLAUS J. RICKS and CHARLES E. DOUGLAS. U. S. 1,796,960, March 17. Structural features.

Apparatus for softening water with base-exchange materials. S. A. KRÜGER. Brit. 339,510, Dec. 21, 1929. Structural features.

Transportable plant for sterilizing water by chlorination. JOSEF MUCHKA. Austrian 121,020, Aug. 15, 1930.

Apparatus for addition of corrosion-preventive chemicals to water in hot-water systems. HENRY L. SHULDENER. U. S. 1,796,407, March 17. Structural features.

Electric system for protecting boilers. ALEXANDER KIRKALDY (to Electro Anti-Corrosion Corp.). U. S. 1,796,715, March 17.

Device for degasing boiler-plant water. MASCHINENFABRIK OERLIKON Ger. 515,597, Mar. 27, 1928.

Boiler-scale remover. Z. V. PIVNEV and S. N. IGNATCHENKO. Russ. appl. 44,852, Apr. 12, 1929. A mixt. of K_2CO_3 and $CuSO_4$ is placed in the boiler. The mixt. is then removed with water together with the scale after a certain period.

Use of sodium aluminate to increase the rate of anaerobic digestion of sewage solids. WILLEM RUDOLFS (to National Aluminate Corp.). U. S. 1,797,157, March 17.

Rotary sewage distributor. E. HARTLEY. Brit. 338,650, Sept. 20, 1929. Structural features.

Aeration tank (with a power-driven agitator) for sewage treatment by activated sludge. KARL IMHOFF, FRANZ FRIES and FRIEDRICH SIERP (Fries and Sierp to Imhoff) U. S. 1,797,147, March 17. Structural features.

Apparatus for incinerating garbage, etc. ALEXANDER A. GOLOVTCHIKOV (one-half to Shun Ichi Ono). U. S. 1,795,771, March 10. Structural features.

Apparatus for clarifying waste waters of the paper, cellulose, etc., industries. ERNST BUCHHAAS. Ger. 518,063, June 5, 1928. See Austrian 114,184 (*C. A.* 24, 189).

15—SOILS, FERTILIZERS AND AGRICULTURAL POISONS

J. J. SKINNER AND M. S. ANDERSON

Method and procedure of soil analysis used in the Division of Soil Chemistry and Physics. W. O. ROBINSON. U. S. Dept. Agr., *Circ.* 139, 1–19(1930).—The fusion method of soil analysis developed for use in the soil chemistry lab. of the Bureau of Chemistry and Soils is described. Directions are given for the prepn. of the soil sample after it reaches the lab. The limits of error allowable in a satisfactory analysis are discussed, and the limits of error for various elements are given in percentages and in lbs. per acre. Methods and procedures are given for the detns. of moisture, loss on ignition, org. matter, Cl, F and the oxides of Si, Ti, Al, Fe, Mn, Ca, Mg, K, Na, P and S. The method is designed to show accurately the ultimate comp. of the soil for scientific purposes, but it is claimed to have only a very general application to problems involved in soil fertility studies. W. H. Ross

The study of the dynamics of the absorbing complex of soils. M. A. VINOKUROV. *Pochvovedenie* (Pedology) 23, No. 3–4, 46–92 (in English 92–3)(1928).—In a series of

expts. on the A and B horizons of a chernozem soil the amt. of exchangeable Ca and Mg, exchange capacity and unsatn. were detd. during the vegetation period on different systems of cropping, and during the various seasons. It was noted that the Ca was higher in the fall and lower in the spring. The reverse is true for Mg. The total bases was lower in the spring. The base-exchange capacity as detd. by the $BaCl_2$ method showed some variations. During the first part of the growing season the total exchange capacity decreased slightly, whereas the Ca increased. In the spring the soil was found to be slightly unsatd. In the B horizon the unsatn. was greater in the spring, and in A it was greater in the fall. In some cases, especially on the soils in sod the total Ca and Mg absorbed was greater than the base-exchange capacity. The suggestion is made to consider the absorption capacity as detd. by the Ba method as the exchange or true absorption capacity. The increase in absorption capacity is also to be considered as absorption capacity, but the cations are not exchangeable. During the summer and winter seasons there is an increase in absorption capacity. Vinokurov ascribes this increase to the changes in p_H and perhaps mech. absorption. The quantity of highly dispersed particles of the absorption complex drops beginning with the spring season up toward the middle of summer. It is due to the state of satn. of the complex; it is more unsatd. in the spring. J. S. JOFFE

Experiences with the Neubauer method for determining mineral nutrient deficiencies in soils. S. F. THORNTON. *J. Am. Soc. Agron.* **23**, 195–208(1931).—Comparisons are made of the 0.2 *N* HNO_3 extn., Neubauer method, Illinois phosphate test, Hoffer stalk test, pot tests and field yields on 6 soil series. The Neubauer method gives results which agree most closely with those of pot and field tests. The 0.2 *N* HNO_3 extn. and Illinois phosphate tests give extremely high P_2O_5 results for all soils having received applications of phosphate rock and for soils of the Culver sand series regardless of previous fertilization. The Neubauer method sets as tentative limits for deficiencies for field crops under Indiana farming conditions 4 mg. P_2O_5 and 10 mg. K_2O. Nutrient absorption by seedlings is greatly affected by the selection of seed and temp. control and in a minor way by light intensity, moisture content, soil reaction and the presence of other nutrients. J. R. ADAMS

A method of oxidizing and dissolving soil for the determination of total and filtrable manganese and phosphorus. E. M. EMMERT. *Soil Science* **31**, 175–82(1931).—Soils are prepd. for total Mn and P analyses by the use of H_2SO_4 and $NaClO_3$ to destroy org. matter and to bring minerals into soln. One g. of soil is placed in a Kjeldahl flask, 2 g. $NaClO_3$ added, then 25 cc. of 50%, (by vol.) H_2SO_4, and the flask is gently heated. If the acid concn. is correct and the heat applied properly, ClO_2 will not accumulate in sufficient quantity to cause an explosion. P detd. in solns. prepd. in this way is greater than when the $Mg(NO_3)_2$ method is used. A method for detg. available Mn and P consists of shaking 200 g. of soil with 400 cc. of H_2O, filtering through a Whatman No. 2 filter paper and making detns. in the filtrate, which may contain some colloidal material. It is assumed that the soln. contains the approx. amt. of Mg and P present in available form. M. S. ANDERSON

Profile studies in the western province with reference to hardpan formation. M. S. DU TOIT AND J. REYNEKE. *South African J. Sci.* **27**, 280–95(1930).—Complete chem. analyses are given for soils of 3 profiles. There appear to be 2 extreme modes of hardpan formation: one involves accumulations of SiO_2 under arid alk. conditions and in some cases subsequent dehydration and building up of complex silicates, while the other mode consists of accumulation of sesquioxides and in some cases humus or both. Later desiccation of this may result in the formation of Fe_2O_3 concretions and Fe_2O_3-cemented sand grains. Between these 2 extremes there may exist a great variety of pans of varying degrees of intensity. A study of the behavior of $Fe(OH)_3$ and $Al(OH)_3$ in the presence of SO_4 and Cl ions indicates the possibility of a sol. state beyond the point of complete coagulation. M. S. ANDERSON

The potash requirement of South African soils. I. DE V. MALHERBE AND M. H. SLABBER. *South African J. Sci.* **27**, 236–52(1930).—Analytical data are given for a large no. of South African soils. The detns. made include mech. analyses, p_H, K_2O sol. in strong HCl and in citric acid, K_2O by the Neubauer seedling method, and Al_2O_3 sol. in HCl. The soils are, for the most part deficient in K_2O. Fertilization with K_2O prevents leaf scorch on certain varieties of fruit trees and berry fruits under arid conditions and increases the quality of the fruit and its keeping qualities. Fairly const. ratios exist between K_2O dissolved in concd. HCl, citrate-sol. K_2O, and K_2O by the Neubauer method. Approx. crit. values of these several ratios are proposed for these soils when grain crops are grown. The sandy soils are particularly deficient in K_2O, and frequent applications involving relatively large quantities of K_2O are required for

markedly increasing the quality of fruit and for preventing leaf scorch under the arid conditions prevailing. M. S. ANDERSON

The nature of soil acidity as affected by the SiO_2-sesquioxide ratio. L. D. BAVER AND G. D. SCARSETH. *Soil Science* 31, 159–73(1931).—A study is made of the colloidal material from 21 different soils representing various kinds and states of weathering. The SiO_2-sesquioxide ratio, the total base-exchange capacity, and certain characteristics of the nature of the soil acids have been detd. on each of these colloids. The nature of the soil acids varies considerably in different soils. In weathered soils the nature of the acids is solely a function of the kind and extent of weathering and is independent of the parent material. This indicates that there is more than 1 type of soil acid. Colloidal material of high SiO_2-sesquioxide ratio extd. from well-weathered soils tends to be more highly buffered and to exhibit stronger acidity than colloids having a low ratio. Total exchange capacity is also higher. The nature of the soil acids may prove a valuable criterion in the classification of soils. Buffer capacity of the colloids appears to be primarily a function of the nature of the soil acid. The exchange complex may develop by removal of certain constituents from the original aluminosilicate minerals; by mutual flocculation of colloidal oxides of Al, Fe and Si; and by pptn. of Al, Fe and Si from soln. There is no one direct relationship between SiO_2-sesquioxide ratio and the total exchange capacity of the colloid, or the nature of the soil acid. Free oxides of Al, Fe and Si may be present in colloids, and it is suggested that it might be desirable to eliminate these when considering the relation of the compn. of colloidal material to physicochem. properties. M. S. ANDERSON

The development of roots related to the calcium content of soils. JOH. GÖRBING. *Zuckerrübenbau* 12, 125(1930); *Listy Cukrovar* 49, No. 12, Rozhledy 9; Cf. *C. A.* 25, 553.—The growth of fine roots was studied in soils of various p_H values; the greens were normal in soils in which the roots were stunted. In the more acid strata, the roots became stunted regardless of the depth of stratum in which they were planted. In neutral or alk. strata, a luxurious development of roots occurred. FRANK MARESH

The influence of drying the soil on the microbiological processes in the soil. V. K ZALESSKII AND A. M. KUKHARKOVA. *Pochvovedenie* (Pedology) 23, Nos. 3–4, 94–111 (in German 111–2)(1928).—Drying the soil increased the soly. of org. matter, the amt. of available N and P compds. Peptone added to dried soil upon wetting did not increase the activity of the flora, whereas mannitol and glucose did. Drying the soil decreases the absorption power of the soil for microbes; hence there is a greater activity providing available org. matter is furnished. The addn. of carbohydrates to a dried soil stimulates the activity of the microörganisms, and they use the available N and P. The disappearance of nitrates from the soil is due primarily to the absorption by plants and microörganisms. J. S. JOFFE

The fungus flora of the soil. H. L. JENSEN. *Soil Science* 31, 123–58(1931); cf. *C. A.* 25, 1934.—A study of the fungus flora of 100 Danish soils of reactions varying from p_H 3.34 to 8.35 shows the largest amt. of mycelium in acid soils rich in org. matter. There is no clear relationship between no. of fungi and soil type or soil reaction except that very heavy clay soils are relatively low in fungi. The addn. of lime does not markedly depress fungi, but greatly stimulates bacteria and actinomyces. Some fungi will grow in soil made as acid as p_H 1.5, while others are checked at p_H 3.7 to 4.2. M. S. ANDERSON

Soil bacteria. II. YOSHIHIKO YAMAMOTO. *J. Agr. Chem. Soc. Japan* 6, 873–83 (1930).—Mucors are classified into 2 groups: (1) monomucors (sporangiophores not branched) and (2) polymucors (sporangiophores branched). The list of soil Mucorales was mentioned. Y. KIHARA

Reducing the consumption of sulfuric acid in reworking of phosphorite of Izyum. M. A. EGOROV. *Ukrainskii Khem. Zhur.* 5, No. 2, Tech. Pt. 43–63(1930).—Agricultural expts. have shown that a certain part of Ca contained in the phosphorite of Izyum (I) possesses unusal mobility and acts as a very strong retrograding agent on the phosphoric acid (II) in I, rendering it sparingly sol. and thus only slightly available for plant vegetation. Instead of the costly process of removing Ca from I (Rozhdestvenskii, *C. A.* 22, 2022) the present investigation gives methods of chemically binding Ca, whereby its deleterious action on the mobility of II in I may be entirely eliminated. Conclusions: The activation of II in I by citric acid (III) is greatly increased with the addn. of oxalic acid (IV), KCl and NaCl. The activation of II by IV is increased with NaCl. Under some conditions IV *per se* can entirely remove II from I. The activity of H_2SO_4 on I is greatly increased by addn. of alkali oxalates (which is not the case with phosphorites of other origins), whereby the entire II in I may be rendered H_2O-sol. and the consumption of H_2SO_4 may be reduced about 2.5 times. With the aid of a

little H_2SO_4 and some $(COONa)_2$ a phosphate was prepd. which produced in 1929, with cultivation of sugar beets, results equal to those of superphosphate, the prepn. of which consumes 3 times as much H_2SO_4. The work is being continued. CHAS. BLANC

The electrodialysis of phosphorite of Izyum. K. N. TARANOV. *Ukrainskii Khem. Zhur.* 5, No. 2, Tech. pt. 65–75(1930); cf. *C. A.* 23, 460.—The investigation has been undertaken for the reworking of low-grade phosphorite (I) of Izyum by electrodialysis, whereby its P_2O_5 may become available for plant vegetation. Conclusions: By the electrodialysis method it is possible completely to decompose I and sep. all of the P_2O_5 and Ca in the form of aq. solns. The residue of I has an acid reaction (AcONa). By the double-chamber process of sepn. of P_2O_5 from I, there are formed residua of I, which proved as effective as superphosphates in vegetative expts. (oats). The enrichment of residua with P_2O_5 is due to the removal of some components, such as Ca, CO_2, Cl, etc. By the electrodialysis method only H_2O and the elec. current are required. Questions pertaining to such factors as tension and strength of the current, the relation between the electrode surface and the mass of I, etc., have not yet been studied. CHAS. BLANC

Experiments on the production of thermophosphates from the Khibinsk apatite. S. I. VOLFKOVICH AND S. S. PERELMAN. *Udobrenie i Urozhai* (*Fertilizers and Crops*) 2, 570–80(1930).—By a flotation method a product was obtained from the Khibinsk apatite with a 40.5% P_2O_5 content. This and 2 other samples contg. 27.12 and 19.47% P_2O_5 were fused with Na_2CO_3. By using 30.2 parts of the 40.5% P_2O_5 sample for 100 parts of the phosphate at 900–1200° a product was obtained with a 70% coeff. of decompn., the latter representing the ratio of citrate-sol. P_2O_5 to the total. With a 25% excess of Na_2CO_3 the coeff. increases irrespective of the temp. from 900° to 1200°. With a 50% increase the proportionality between the Na_2CO_3 and increase in P_2O_5 disappears. At 1100° the coeff. drops from 75.3 to 60.7% and then again increases at 1200° to 92.6%. At 1300° the mixt. fuses, but there is no increase in P_2O_5. The optimum conditions were found to be at 1200° with 1.5 times the amt. of soda used originally, *i. e.*, 45 parts of Na_2CO_3 to 100 parts of apatite. With the 27.1% P_2O_5 sample at 1000–1200° with 20 parts of Na_2CO_3 to 100 parts of phosphate the coeff. of decompn. was 70–80%. A 25% increase of Na_2CO_3 increased the coeff. of decompn. almost to 100%. Even at 900° such a mixt. gave an 82.2% coeff. With the 19.5% P_2O_5 sample at 1200° with 22 parts of Na_2CO_3 to 100 parts of the phosphate almost 100% of the phosphate became citrate sol. Addns. of 10% SiO_2 to the mixt slightly increased the coeff. of decompn. SiO_2 alone had no effect. An increase of the SiO_2 to 20% produced neg. results. Addns. of $CaCO_3$ alone had no effect, but with the Na_2CO_3 an increase in the coeff. took place. The time factor of heating the mixt. brought out the fact that 30 min. gives the optimum. The cooling of the mix immediately after 30 min. heating increased the soly. of the product. Heating with various chlorides gave neg. results. With Na_2SO_4 and charcoal a product was obtained with a coeff. of 80%. Vegetation expts. with thermophosphates show that it is just as good as Thomas slag, but it is slightly inferior to superphosphate. J. S. JOFFE

The relation between the geological origin and the available phosphoric acid of a soil. L. NEUBERGER. *Kunstdünger u. Leim* 28, 77–8(1931).—Review. C. J. S.

A colorimetric determination of phosphoric acid in soils. A. NĚMEC, LANÍK AND KOPPOVÁ. *Vestník svazu výzkumných ústavu zemedelskcýh* 5, 18(1930); *Listy Cukrovar* 49, No. 4, Rozhledy 2.—The Konig-Lemmermann method requires a long time for analysis, and soils high in Ca make the ignition of citrate salts very difficult. For routine work the method is: shake 10 g. of soil with 100 cc. of a 1% citric acid soln. (soils high in Ca have to have a correction factor) for 1 hr. Repeat the process for 1 hr. on a subsequent day. Filter or centrifuge, treat 5 cc. of the clear soln. with 10 cc. of 40% H_2SO_4, bring to a boil, and treat with 0.1 *N* $KMnO_4$ until a faint but permanent pink color remains. Remove any excess of $KMnO_4$ with H_2O_2. Digest the soln. on a water bath for 30 min., drain into a 100-cc. vol. flask, treat with 4 drops of α-dinitrophenol, and neutralize with 15% NH_4OH. Cool the soln. and treat with 2 cc. molybdic acid and 0.3 cc. $SnCl_2$. This produces a blue color; make up the soln. to 100 cc. and compare colorimetrically. The standard soln. is made from K_2HPO_4 contg. 0.05–0.5 P_2O_5 per 10 cc. The values run higher than those with the K.-L. method; N. ascribes this to a more thorough extn. FRANK MARESH

The use of the Neubauer method for determining phosphoric acid supplies in soils. A. NĚMEC. *Zemedelský arch.* No. 3, 129(1930); *Listy Cukrovar* 48, No. 52, Rozhledy 11.—The Neubauer method of sprouting plants yielded low P_2O_5 values in soils which were adequately supplied according to fertilizer tests. The cause of a lowered resorption of P was found to be due to a low N content. All soils had a low N and low nitrifica-

tion power. The Neubauer method does not take into consideration the laws of minima. Fertilizing with N increased the resorption of P in which low Neubauer values were obtained. FRANK MARRSH

Efficiencies of phosphoric acid of various fertilizers for spring- and autumn-sown barley. IWAO OMAI. *Ann. Agr. Expt. Sta. Government-General of Chosen* **3**, 394–402 (1930).—Application of Na_2HPO_4, bone meal and superphosphate gave about 190% greater yield and 130–140% more of absorbed P_2O_5; rice polish and $AlPO_4$ gave 150% greater yield and 60–70% more absorbed P_2O_5 than when no P_2O_5 was applied. In general autumn-sown barley showed higher absorption and higher yield than spring-sown barley. Tests for residual P_2O_5 after the first crop showed great value for the second crop. K. KISUTA

A contribution to the evaluation of requirements for fertilizing soils with phosphorus. A. NĚMEC. *Vestník Ústř. Jednoty Repařo Csl* **11**, 277(1930); *Listy Cukrovar* **49**, No. 4, Rozhledy 1.—The use of P_2O_5 in fertilization is closely allied with Ca; soils with adequate Ca should have more available P_2O_5 than soils deficient in Ca. Other elements controlling the availability of P_2O_5 are Fe and Al; soils contg. more than 50 mg. Fe freely sol. in 1% citric acid fail to respond to P_2O_5 treatments, even though they show a P_2O_5 deficiency by the König-Lemmermann method. The method for detg. the available P by evaluating only the P_2O_5 sol. in H_2O becomes of no value for soils contg. less than 3 mg P_2O_5 (sol.) per 1 kg. soil. Soils contg. large quantities of Fe did not react to P_2O_5 fertilizations, even though the sol. P_2O_5 was high or low. All available methods were inadequate to det. what soils would respond to P_2O_5 treatments. Soils deficient in both Fe and P_2O_5 gave increasing yields of beets; N. attributes this to SiO_2, for only soils contg. less than 12 mg. sol. SiO_2 per 1 kg. of soil reacted to H_3PO_4 treatments regardless of whether the P_2O_5 was high or low. In soils with a high Fe content, P_2O_5 fertilizers fail to increase the yield of beets, even though the sol. SiO_2 may be less than 12 mg. per kg. of soil. FRANK MARESH

The retrograding action on phosphates of the soil under various conditions. F. V. TRIFONOV. *Ukrainskii Khem. Zhur.* **5**, No. 2, Tech. pt. 77–91(1930).—The influence of moisture on the retrogradation of phosphates is considerable. Thus the soly. in H_2O of $CaHPO_4$ decreases by 30% with an increase of 30–100% in the moisture based on the total moisture capacity of the soil. The soly. of Izyum phosphate in citric acid increases to 65% with an increase in moisture. The highest amt. in soln. was observed at a moisture content of 80–100% of the total moisture capacity. The influence of temp. on the retrogradation is different for different phosphates; *e. g.*, temp. changes do not affect solns. of Izyum phosphorite in H_2O or in citric acid, while increase in temp. greatly decreases the soly. of $CaHPO_4$ in both water and citric acid. The retrograding action on phosphates of soils of the region of forest steppe varies greatly; there is a regular decrease of retrogradation with declining richness of the soil. CHAS. BLANC

The constitution and citrate solubility of tricalcium phosphate and of phosphate rock. K. D. JACOB. *Phosphorus Digest* (April, 1931), pp. 7–9; cf. *C. A.* **25**, 1619.—When 0.5-g. samples are used, 65–75% of the total P_2O_5 in pptd. $Ca_3(PO_4)_2$ and in steamed bone meal is sol. in neutral NH_4 citrate soln., but when the wt. of the sample is increased to 2.0 g., only 25–30% of the total P_2O_5 goes into soln. The citrate soly of ground phosphate rock is only about 12% of that of $Ca_3(PO_4)_2$ and bone. The low soly. of phosphate rock seems to be due principally to the fact that the phosphate is combined with F to form a complex Ca fluophosphate of the same type as cryst. fluorapatite. K. D. JACOB

Can superphosphate and its components increase the solubility of soil potash? C. DREYSPRING AND K. BRINKMANN. *Superphosphate* **4**, 69–75(1931); cf. Dreyspring and Heinrich, *C. A.* **25**, 1935.—The increased soly. of soil potash as a result of the application of superphosphate is due principally to the presence of free H_3PO_4 in the superphosphate. The $Ca(H_2PO_4)_2$ and $CaSO_4$ in superphosphate also increase the soly. of soil potash. K. D. JACOB

Superphosphates enriched with ammonia. S. I. VOLFKOVICH, L. E. BERLIN, I. L. HOFMAN AND A. A. IONAS. *Udobrenie i Urozhai* (*Fertilizers and Crops*) **2**, 495–504 (1930).—Tests were made of mixing H_2SO_4 with $NH_4H_2PO_4$, with $(NH_4)_2HPO_4$, with a mixt. of both, and with $(NH_4)_3PO_4$. The factors studied were the quant. relationship of the reagents, order of mixing, duration of process and temp. involved. A definite amt. of H_2SO_4 was placed in a Pb container, and the various NH_3 phosphates were added gradually. A stirrer was started and raw phosphates were added slowly, lumping being avoided. The stirring lasted 1–2 min., after which the mixt. was placed in a thermostat at 95–105°. After 3 hrs. the mixt. was weighed, to follow the loss in wt., and placed in thin layers on paper; it was left that way for 2 days and weighed again. Analy-

ses were then made. Total H_2O-sol. and citrate-sol. P_2O_5, were then detd. Methods of prepg. the various NH_4 phosphates, as well as the amts. of H_2SO_4 used with them, are given. J. S. JOFFE

Organic fertilizers. VII. KIYONAO YOSHIMURA, KOTARO NISHIDA AND ARITOMO YAMADA. *J. Agr. Chem. Soc., Japan* **6**, 999–1002(1930).—Steamed bone powder was kept with water for 55 days. The av. temp. was 32.8°. The aq. ext. of the putrefaction products was analyzed: total N 2.550%, protein N 0.044%, P_2O_5 0.019%. Ninety % of total N was changed into NH_3. One g. histamine (Au salt), 3.31 g. putresine-HCl and 280.74 g. NH_4OH were isolated from 10 kg. of the bone powder. Y. K.

The economical and profitable use of commercial fertilizers under present conditions. O. ENGELS. *Kunstdünger u. Leim* **28**, 126–36(1931).—A general discussion. C. J. SCHOLLENBERGER

The use of sawdust as a fertilizer. MARCEL H. MOTTE. *J. agr. prat.* **95**, 192 (1931).—Sawdust used exclusively in large quantities on the soil has generally given an excellent plant growth without any apparent lack of nitrate and with normal nitrification. Artichokes, leeks, sugar beets, maize and strawberries all have produced good crops without any other fertilizer. J. R. ADAMS

The Gerard manure pit. F. MAGNIEN. *J. agr. prat.* **95**, 71–4(1931).—The conditions governing the transformation of barnyard manure into a fertilizer contg. available nutritives are listed. The Gerard manure pit is intended to satisfy these conditions and is described in considerable detail. J. R. ADAMS

Potash fertilizer for sugar beets. J.-PH. WAGNER. *Compt. rend. acad. agr. France* **17**, 77–9(1931).—Sugar beet cultivation calls for a soil with a p_H of 7–7.5, which can be obtained by liming. Max. yields have been obtained when approx. 1,000 kg./acre of sylvinite-kainite has been added to the soil. The yields have amounted to 761 kg of sugar per acre. The large amts. of K_2O aid the plant in obtaining an early and vigorous growth and greater resistance to disease. They also sensibly increase the saccharin content. J. R. ADAMS

The nitrification of ammonium sulfate as influenced by soil reaction and degree of base saturation. JAMES A. NAFTEL. *J. Am. Soc. Agron.* **23**, 175–85(1931).—There appears to be a relationship between the percentage base and Ca satn. and the nitrification of $(NH_4)_2SO_4$. After 10 days' incubation nitrification occurred at p_H 4.1 only in the soil with a high percentage base and Ca satn. Lower base satn. prevented nitrification. All the soils had a higher percentage nitrification of $(NH_4)_2SO_4$ at the highest p_H values studied. In most cases plant growth was better at p_H 6.5 than at the very acid reactions. Nitrification varied considerably in different soils and showed a fairly good correlation with plant growth data. J. R. ADAMS

Experiments with calcium nitrate-I.-G. F. X. KREŠL. *Listy Cukrovar* **49**, 261–2(1931).—The $Ca(NO_3)_2$ was prepd. by the I. G. firm and contained N 15.5% and CaO 28%, which corresponds to 50% $CaCO_3$; the N is rapidly utilized by plants. Expts. were carried out in 18 sections of an estate, with varied results. Because of the sol. form of N, less H_2O is required for soln. than for any other nitrate fertilizer; the $Ca(NO_3)_2$ maintains a porosity during periods of drought, and on account of its fine dispersion the Ca is equally distributed and swells and aerates the soil. Plots fertilized with 400 kg. superphosphate and 200 kg. of a 40% K salt per ha. showed an increased yield of sugar beets over unfertilized plots; adjacent plots fertilized with 100 kg. $Ca(NO_3)_2$ per ha. showed about the same increase as those with the superphosphate mixt. F. M.

The action of chromium on the growth of plants. EL. HASEHLOFF, F. HAUN AND W. ELBERT. *Landw. Vers. Sta.* **110**, 283–6(1930).—The addn. of Cr to the soil has a detrimental action on the plant growth as shown by the effect on the yield of summer barley and mustard. The amts. used were not greater than 0.003%. This action depends on the compd. of Cr used and is greater with chromic acid than with chromic hydroxide. The injurious action is greater in sandy than in loam soils. J. R. H.

The action of arsenic on plant growth. E. HASELHOFF, F. HAUN AND W. ELBERT. *Landw. Vers. Sta.* **110**, 287–9(1930).—Addns. of As up to 0.003% have no effect on the yield of summer barley. This result is not in disagreement with the work of König because different compds. and amts. of As were used. JOHN R. HILL

The nutrition requirements of vegetable plants. I. Cabbage, beet, carrot and onion. FELIKS KOTOWSKI. *Roczniki Nauk Rolniczych i Lesnych* **24**, 372–449 (450–2 English) (1930).—Fertilizer expts. carried out on a rather poor sandy loam in 1928 near Warsaw are described. Beets, carrots and onions were sown in exptl. plots in rows 40 cm. apart. The food supply consisted of mineral fertilizers and stable manure in the ratio of 600 kg. per 100 sq. m. after the tomato crop. Cabbages and carrots received 90 kg. N, 40 kg. P_2O_5 and 120 kg. K_2O; beets 63 kg. N, 28 kg. P_2O_5 and 84 kg. K_2O; onions 28

kg. P_2O_5, 84 kg. K_2O and 63 kg. N per hectare. N was applied as NH_4NO_3, P as superphosphate and K in the form of 26% potash salts. Sampling for chem. analysis was done at various intervals of plant development, the last sample being taken at harvest time. The results are presented in tables and the following conclusions are drawn: For (*a*) Brunswick short stem cabbage, (*b*) dark red flat Egyptian beet, (*c*) Chanteney carrot and (*d*) Zittau onion the max. intake of N, P, K and Ca falls in *a* in the second, *b* in the fourth, *c* in the third and *d* in the fourth months after transplanting of (*a*) and germination of (*b*, *c*, *d*). A crop of (*a*) 500,000 kg. heads and 350,000 kg. refuse parts, (*b*) 500,000 kg. roots and 200,000 kg. leaves, (*c*) 250,000 kg. roots and 80,000 kg. leaves, (*d*) 294,000 kg. bulbs and 72,000 kg. leaves per hectare removes from the soil 150, 122, 80, 80 kg. N; 50, 34, 30, 26 kg. P_2O_5; 225, 200, 120, 116 kg. K_2O; and 180, 76, 100, 58 kg. CaO, resp. The N, P_2O_5 and K_2O ratios are: 3:1:4; 3.5:1:5.5; 2.5:1:4 and 3:1:4.5, resp. As compared with cereals, cabbages, beets, carrots and onions are remarkable for their high N, P, K and especially Ca contents. There is also a considerable difference in the N, P_2O_5 and K_2O ratio, which is on an av. 2:1:2 in cereals and 3:1:4 in the plants reported here. These differences, therefore, should be considered in any fertilizer program. J. KUČERA

The role of humic materials in fertility. A. DEMOLON. *J. agr. prat.* **95**, 109–11 (1931).—The maintenance of humic reserves in the soil is almost always indispensable in maintaining a high fertility and in particular for obtaining the max. use from mineral fertilizers. They are excellent soil conditioners and aid the soil in retaining H_2O. Colloidal humic material increases the nutritive absorptive capacity of soils. The value of farm manure and the manuf. of artificial manure are discussed. J. R. ADAMS

Brief study of (reasons for) beneficial action of brown coal upon the development of cultivated plants. II. ALEXANDER KISSEL. *Brennstoff-Chem.* **12**, 101–7(1931); cf. *C. A.* **25**, 371.—Investigations during 1924–26 with grain growing in arable soil fertilized with coal dust show a growth increase by kernel weight of 24–55%, depending upon the amt. of coal dust used. This is believed due to improved germination and branching rather than to any change in soil compn. Potatoes also showed tuber-weight increases but with sugar beets, the sugar content fell off with root-weight increases. Structural aggregates in the soil are formed by the freshly pptd. water-insol. humic acid salts which lose this cementation property on drying. The impregnation of soil with coal dust or humic compds. thus increases the resistance to water influx into individual soil particles and increases water seepage and aeration in upper soil layers and, in general, restores its fallowness. Small quantities of coal dust increase the soil resistance to machinery, but large amts. decrease it. It is contended that difficulties encountered in the use of artificial agricultural fertilizers are to be traced to factors other than the amt. of mineral matter made available. The structural compn. of the soil, its phys. characteristics and the total content of org. humic combinations are also involved. F. W. JUNG

Decomposition of rotenone in solution. HOWARD A. JONES. *Ind. Eng. Chem.* 23, 387–8(1931).—The decompn. of rotenone is accelerated by access of air but is not affected by differences in amt. of light or by the presence of water. Pyridine solns. of rotenone decompose most rapidly and in a few days crystals of dehydrorotenone and rotenonone are formed by oxidation. Rotenone is completely sol. in benzene, and in a benzene soln. there is no appreciable decompn. Acetone may be used for a water-sol. solvent. J. R. ADAMS

The relation of chemical composition of cultivated and wild green-manure plants to decomposition of the nitrogenous constituents. HIDEO MISU, IWAO OMAI AND TADAO HIBINO. *Ann. Agr. Expt. Sta. Government-General of Chosen* **5**, 1–126(1930).—Twenty-two varieties of cultivated and wild green-manure plants were decompd. by fermentation for 48 days under conditions simulating those in soil with upland and lowland systems of culture. The relations of ammonification, nitrification and the yield of titrable acids to the chem. compns. of green manures are as follows: Ammonification differs greatly with the different raw materials used under both upland and lowland conditions. In upland conditions, it decreases later. Nitrification is negligible under lowland conditions, but it differs greatly under upland conditions with the different raw materials used, and it decreases later. Attainment of max. ammonification is favored by the increase of total N, ash, CaO, or CaO + MgO and disturbed by the increase of crude fiber, N-free ext., crude-fiber protein, and N-free ext./protein. Attainment of max. nitrification is favored by the increase of total N, K_2O and CaO + MgO and disturbed by the increase of crude fiber, N-free ext., and N-free ext./protein. Attainment of max. titrable acidity is favored by the increase of total N and of CaO + MgO and disturbed by the increase of lignin, N-free ext., and N-free ext./protein. The max. ammonification and the

development of max. acidity were greater in lowland conditions than in upland conditions. K. KITSUTA

Availability of nitrogen of green manure for rice and the supplementary value of various fertilizers. HIDEO MISU AND H. SHIMOHIRA. *Ann. Agr. Expt. Sta. Government-General of Chosen* 4, 65–94(1929).—The availability of N was lower in dried than in fresh green manure. The value of N of dried green manure was greatly increased by replacing $^1/_2$ of the N with $(NH_4)_2SO_4$. Although the N of fresh material appeared less available, the yield obtained was better than that with fermented green manure. Superphosphate, K_2O and CaO had great value as supplements to green manure, increasing availability of the N and yields. Yields with fresh green manure were 83.4 and 89.3% of those with soy-bean cake and $(NH_4)_2SO_4$, resp. K. KITSUTA

The availability of nitrogen of air-dried green manures for rice. HIDEO MISU. *Ann. Agr. Expt. Sta. Government-General of Chosen* 4, 167–72(1929).—Green manures showed lower availability of N and lower yield than did soy-bean cake and $(NH_4)_2SO_4$. K. KITSUTA

Nitrogen in the intensive exploitation of pastures. CAMILLE MATIGNON. *Chimie & industrie* 25, 271–5(1931).—A discussion is given of the advantages, from the double standpoint of yield andqua lity, of the use of N fertilizers on pasture lands. A. P.-C.

Comparative value of nitrogenous fertilizers on the growth of fall and spring barley. IWAO OMAI. *Ann. Agr. Expt. Sta. Government-General of Chosen* 3, 347–54(1930).—Among 15 tested materials Chilean $NaNO_3$ and $(NH_4)_2SO_4$ gave the highest percentage of recovery of N by the plants (60–66%) and the best yield. $CaCN_2$, dried fish meal, dried blood, soy-bean cake, bone meal and human excrement showed 45–55% recovery of applied N by the plants with 68–87% yield compared with the yield by $(NH_4)_2SO_4$ as 100%. Heavy application of mulch made of weeds was rather injurious on the first crop as a result of its fermentation, and the benefit to the second crop was small in comparison with the loss of N by fermentation. The efficiencies of the N in stable manures from swine and cattle were very small. The value for the second crop of any residual N after the first crop was rather small. K. KITSUTA

The effect of various fertilizer treatments on the crop-yield factors and the structure of leaves of barley and wheat. K. BOEKHOLT. *Z. Pflanzenernähr., Düngung u Bodenk.* 9B, 289–300(1930).—Stooling, weight per 1000 grains, grains per single head, weight of grains per head and total yield are affected by various single fertilizers and combinations. K has little effect on stooling, P more and N most. The 1000 grain weight and weight per single head are least with N. A mixt. of N, P and K usually gave the highest values for all the factors mentioned and always the highest yield. The leaf surface varies with the fertilizer treatment, *e. g.*, if no treatment is 100, then a mixt of K and P is 97.8, a mixt. of K and N 128.9, a mixt. of P and N 144 4, a mixt. of K, P and N 134.7, and 2 pts. K, 1 pt. P and 1 pt. N 136 7. The microanatomic structure also varies with different fertilizer treatments. H. B. SIEMS

Effect of ammonium sulfate on field germination of rape and turnips. J. W. WOODCOCK. *New Zealand J. Agr.* 42, 89–90(1931).—Germination of rape and turnip seed fertilized with $(NH_4)_2SO_4$, either alone or mixed with other fertilizer materials, at the rate of 100 lb./acre was only 10 to 44% of the germination obtained when the seeds were fertilized only with a mixt. of 100 lb. of superphosphate plus 10 0 lb. of ground limestone Fertilization with superphosphate alone gave germination counts 66 to 100% of those obtained with the mixt. of superphosphate and ground limestone. In all cases the fertilizers were applied with the seed in 14-in. rows. K. D. JACOB

Fertilizer experiments on citrus seedlings. I. TAKAHASHI. *J. Okitsu Hort. Soc.* (Japan) 25, 38–50(1930).—Pot expts. with seedlings indicated that N is the most necessary element for growth. The requirements of P_2O_5 and K_2O were $^1/_2$ and $^2/_3$, resp., of the N requirement. Requirement of P_2O_5 for growth of the citrus tree was not very great, but deficiency of this element retarded growth markedly. The requirement of K_2O was greater than that of P_2O_5; however, the growth continued uninterruptedly without K_2O for a certain time by compensation with the supplement of the other elements. K. KITSUTA

Fertilizer experiments with Satsuma orange. K. TASAKI, Y. INOUE AND N. MATSUOKA. Imp. Hort. Expt. Sta. (Japan), *Research Bull.* 13, 60 pp.(1930).—Plots were arranged into those with no fertilizer, N, P or K and complete fertilizer treatment. No fruit was obtained from the trees in the plot without N. When P was omitted, the yield was much decreased, and the acidity of the fruit was high. Lack of K caused decrease in yield, poor color of skin and small sized fruits; the spoilage of fruits during storage was 5.5 times higher than that of the fruits from the completely fertilized plot. K. KITSUTA

Is fertilization to prevent frost injury practical? WALTER OBST. *Kunstdünger u. Leim* 28, 26–7(1931).—The resistance of plants in general toward injury from cold is increased by complete fertilization, excess N being avoided. C. J. S.

The importance of artificial fertilizers in modern pond culture. K. HEITZ. *Kunstdünger u. Leim* 28, 27–8(1931).—Growth of plankton serving as food for fish is greatly increased by proper fertilization with K_2O and P_2O_5. The application of CaO to a drained pond during winter is advised as a sanitary measure. C. J. SCHOLLENBERGER

Carbon dioxide in relation to glasshouse crops. V. An analysis of the response of the tomato crop to an atmosphere enriched with carbon dioxide. H. L. WHITE. *Ann. Appl. Biol.* 17, 755–66(1930).—The enrichment of the atm. has the following effects upon the tomato plant: It shortens the period between opening of the flower and picking of the fruit. A high percentage of blossoms develop into fruit. Less fruit is retarded in ripening. There is better development of the truss. There is earlier development and ripening of trusses. There is better swelling of fruit at end of season. Conclusion: Increased CO_2 concn. is most beneficial to the plant at periods of low fruit production. C. H. RICHARDSON

A study by foliar diagnosis of the influence of temperature on plant nutrition. H. LAGATU AND L. MAUME. *Compt. rend.* 190, 1516–8(1931); cf. *C. A.* 24, 4575; 25, 2234.—Potatoes were grown on plots receiving various fertilizer treatments, and the leaves were analyzed for P at intervals. During May the temp. averaged about 14°, and the P content remained rather const. During June, when the temp. averaged 21°, the P content decreased markedly on the plots which received N, but did not on those without N. The explanation offered is that with added N tuber development is more abundant, and this tends to deplete the P in the leaves. J. J. WILLAMAN

Some studies on the use and action of mercuric chloride as a fungicide. J. L. HOWATT. *Twenty-first Ann. Rept. Quebec Soc. Protect. Plants* 1928–9, 40–2(1929); *Rev. Applied Mycol.* 10, 196–7.—The control of fungicides in certain seed-borne diseases by use of $HgCl_2$ is due to retardation of the germination of the spores sufficient for them to be outgrown by the host and so removed from the meristematic tissue. Stimulation of the seed after treatment is attributed to indirect partial sterilization effect on the soil. Temp., concn., time of action, age of spore and host plants, assocn. and type of seed are considered to affect the toxicity. ODRN E. SHEPPARD

Titrimetric determination of arsenic in plant-protecting agents. J. PÁSKUJ. *Magyar Chem. Folyóirat* 36, 76–83, 95–101(1930).—The agents are destroyed with HNO_3 and H_2SO_4, then dild. to a concn. of about 50% H_2SO_4. Now 50 cc. concd. HCl, 5 g. crystd. $FeSO_4$, and 2 g. KBr are added, 25 cc. is distd. and As titrated in the distillate according to Györy with 0.1 *N* $KBrO_3$ soln. Detns. may thus be made within 1–5 hrs. Also a micromethod was worked out, the results of which quite agree with those of the macromethod. Hydrazine sulfate should replace the $FeSO_4$ in the micro-detn. S. S. DE FINÁLY

The biochemical influence of arsenic. J. PÁSKUJ. *Magyar Chem. Folyóirat* 36, 111–8(1930).—Spores of *Tilletia tritici*, Bjerk Winter, adsorb some As of H_3AsO_4 and arsphenamine but no As of other arsenicals, either inorg. (arsenites, arsenates) or org. (arsacetin, atoxyl, solarson, cacodylic acid, etc.). Adsorbed As does not kill spores but hinders their multiplication. Agents of which no As is adsorbed have no influence at all on spores. Spores treated with arsenites and dried without washing off the agent were killed. Arsenates did not show such results. S. S. DE FINÁLY

Effect of arsenic on the composition of citrus fruits. I. TAKAHASHI. *J. Okitsu Hort. Soc.* (Japan) 25, 153–63(1930).—Spraying citrus trees with arsenates caused a decrease in acidity and an increase in sugar content of fruit juice. The reduction of acidity depends greatly upon the time of spraying, amts. of other spraying materials mixed with arsenate and the method of application. Excessive use of arsenate should be avoided, as it affects the yield and taste of fruit. A decrease in acidity and an increase in sugar content of fruit caused poor keeping quality; therefore, in warmer regions caution must be exercised in spraying with arsenicals. Beside controlling harmful insects, spraying arsenates may be of benefit by hastening maturity or reducing excessive acidity of fruit. K. KITSUTA

Effects of some sulfur sprays on fruit-bud development. C. E. PETCH AND J. L. HOWATT. *Twenty-first Ann. Rept. Quebec Soc. Protect. Plants* 1928–9, 39(1929); *Rev. Applied Mycol.* 10, 197.—Comparative tests of koloform (prepd. by fusing bentonite with S, with Ca caseinate added to assist the mixing in water) and lime-sulfur on the development of apple trees shows that koloform-treated buds were 0.4903 in. long when those sprayed with lime-sulfur were 0.3979 in. long. This difference is attributed to absence of injury in koloform-treated foliage, whereas burning and dwarfing of foliage

was evident on the trees treated with lime-sulfur. Koloform was applied at the rate of 8 lbs., and lime-sulfur at the rate of 1 gal. to 40 gals. water. ODEN E. SHEPPARD

The mineral nutrition of plants in relation to their predisposition or resistance to attack by pathogenic agents. L. PETRI. *Boll. R. Staz. Pat. Veg. N. S.* **10**, 121–52 (1930); *Rev. Applied Mycol.* **10**, 200.—The action of different fertilizers (including nitrogenous and phosphatic fertilizers, lime, sulfur, gypsum, potash, iron and aluminum sulfates, and manganese salts) on the anatomical and physiol. properties of plants with reference to their resistance to injurious inorg. agencies as well as to various fungus and animal parasites was studied. In general, nitrogenous dressings aggravate susceptibility, whereas phosphatic and potash dressings reduce it. The action of the fertilizer is indirectly on the mechanism of the host resistance and is influenced by local factors; comparative tests must be carried out under identical conditions. ODEN E. SHEPPARD

Spraying and dusting experiments with potatoes on Long Island. H. C. HUCKETT. N. Y. State Agr. Expt. Sta., *Bull.* No. 592, 1–38(1931).—Expts. in spraying and dusting Irish Cobbler (I) and Green Mountain (II) potatoes have been conducted during 5 successive seasons, 1926–1930. With the exception of applications contg. nicotine, Bordeaux mixt. (4–6–50) was used in sprays and $CuSO_4.H_2O$ and $Ca(OH)_2$ (20–80) for dusts. For biting insects $CaAsO_4$ was added to Bordeaux mixt. at the rate of approx. 5 lbs. or to dust mixts. at 10–12 lbs. per acre. Arsenical treatments were usually made 3–4 times each season to combat Colorado beetle and flea beetles. For sucking insects nicotine sulfate (40% soln.) was added to Bordeaux mixt. or a mixt. of dolomite and $Ca(OH)_2$ (10–50) at the rate of about 1 pint or 3 pints per acre, resp. There were no significant differences in the results from dusting and spraying in the case of I. Also nicotine treatments in spray or dust form did not give rise to addnl. increases in yield over other spraying and dusting operations. With II Cu treatments in spray form gave on an average slightly superior results to Cu treatments in dust form. Nicotine treatments in dust form were more reliable, and in years when aphids were a limiting factor gave superior results to nicotine in spray form. J. KUČERA

The effect of gypsum upon the growth and common scab of the potato. J. G. COULSON. *Twenty-first Ann. Rept. Quebec Soc. Protect. Plants* **1928–9**, 64–80(1929); *Rev. Applied Mycol.* **10**, 202.—Increasing applications of gypsum above 500 lbs. per acre in field tests progressively reduced the number of tubers formed and gave an increased amount of scab infection. A lab. test showed that addn. of gypsum did not effect the p_H of the soil. Addn. of gypsum to potato dextrose agar from 0.5 to 50% caused no difference in the rate of growth of *O. scabies*. ODEN E. SHEPPARD

Seed treatment for controlling covered smut of barley. R. W. LEUKEL. *U. S. Dept. of Agr. Tech. Bull.* **207**, 1–22(1930); *Rev. Applied Mycol.* **10**, 173–4.—Satisfactory control of covered smut (*Ustilago hordei*) of barley was obtained by steeping the seed grain for 1 hr. in either 1 in 320 formaldehyde, 0.5% semesan, 0.5% corona 620, 0.5% uspulun, 0.25% germisan, 0.25% tillantin or 0.5% Bayer compd. Expts. with more than 45 dusts indicated that their effectiveness is independent of soil reaction, but a soil moisture content of less than 25% satn. decreases the efficacy of most dusts. Hochst, abavit B, and ceresan are the most effective dusts and give satisfactory control. Use of dusts avoids the seed injury common with steeping treatments, and thus better stands and yields are obtained. ODEN E. SHEPPARD

Dry pickling for control of smut in oats. W. B. MILLER AND J. A. MORROW. *J. Dept. Agr. Victoria* **29**, 86–9(1931).—Good control was obtained by dusting the seed with Cu carbonate at the rate of 2 oz. per bushel. Treatment of the seed with formalin solns. gave better control of the smut but adversely affected germination of the seed. K. D. JACOB

Action of low potencies. W. MAAG. *Süddeutsche Apoth.-Ztg.* **71**, 143–5(1931).—The results obtained in a series of expts. on the germination of wheat in the presence of varying low potencies of HCl, H_2SO_4 and $CuSO_4$ are illustrated, as also those obtained with paper strips vertically suspended and just dipping into varying potencies of KOH and H_2SO_4. W. O. E.

Control of the webbing spider (Lampona obscoena) of citrus trees. S. A. COCK. *J. Dept. Agr. Victoria* **29**, 83–5(1931).—Good control is obtained by spraying the webs with an emulsion of 2 pints of kerosene and 4 ounces of soap in 3 gallons of water to which is added 1.5 lb. of pyrethrum. The kerosene serves to penetrate the web, while the pyrethrum acts as the killing agent. K. D. JACOB

The destruction of weeds by chemical procedures. M. BARBUT. *J. agr. prat.* **95**, 9–11(1931).—Comparisons are made of the efficacy of the weed eradicators used for those weeds which are harmful to cereals. A 6–8% soln. of H_2SO_4 gives excellent results, destroying charlock, chenopodium and polygonum. The objection is that it is

very active in deliming the soil. Dehydrated iron sulfate and a nitrocopper compd. are very effective against charlock, but both these materials are somewhat more expensive. A special powd. sylvinite is perfectly satisfactory against some of the weeds such as charlock, but great care must be used, as large quantities of this material are injurious to the crop. J. R. ADAMS

Cucumber disease investigations on Long Island. E. E. CLAYTON. N. Y. State Agr. Expt. Sta., *Bull.* No. 590, 3–20(1931).—The cucumber diseases, mosaic, wilt and mildew or blight, can be best checked by treating the seeds with org. Hg compds. when the seed is sown early, by using wet and dry sprays with dust mixts. such as $Ca_3(AsO_4)_2$ + $CaSO_4.2H_2O$ (1:15), copper-lime, kayso-$Ca_3(AsO_4)_2$ (3–3–50) and by breeding disease-resistant varieties. Spraying does not control mosaic. J. K.

Study of the warble and its eradication. A. GANSSER. *Schweiz. Leder-ind. Ztg.* **1930**, No. 3/4; *J. Intern. Soc. Leather Trades Chem.* **14**, 324; cf. *C. A.* **20**, 2223.—The hypocotine (nicotine salve) treatment previously described has worked well in practice. The treatment seems to have a lasting prophylactic effect. H. B. M.

Recovering of NH_3 in beet-sugar manufacture [for use as fertilizer] (VOSTOKOV, KOTLYARENKO) **28.** Detection of F in soils (RECKENDORFER) **7.** Organic solvents for aiding the removal of spray residue from waxy or oil-covered fruit (ROBINSON) **12.** Estimating the solubility of acid Pb arsenate within the alimentary tract of the silkworm (CAMPBELL, LUKENS) **11I.** Quinquennial review of the mineral production of India for the years 1924 to 1928. Saltpeter (PASCOE) **18.** $(NH_4)_2SO_4$ (Hung. pat 101,900) **18.**

KEEN, BERNARD A.: **The Physical Properties of the Soil.** New York: Longmans, Green and Co. 380 pp. $8.

VERMOREL, V.: **Agenda agricole et viticole, 1931.** Paris: Dunod. 384 pp. F. 6.50.

Reagent for treating alkali soils. CHINOIN, LTD. Hung. 101,149, Jan. 4, 1930. S bacteria and NH_4 salts are added to a mixt. of powd. gypsum and S; *e. g.*, a mixt of 45% $CaSO_4$ is made of 4.5% S and 50.5% powd. peat inoculated with S bacteria

Fertilizers. CHEMIEVERFAHREN G. M. B. H. Fr. 37,452, Sept. 21, 1929. Addn to 682,081 (*C. A.* **24**, 4351). Crude phosphate is attacked with HNO_3, and the Ca is pptd. as $CaSO_4$ by a mixt. of K_2SO_4 and $MgSO_4$ or a corresponding natural compd The amt. of Mg is equiv. to that of P_2O_5 in conformity with the formula $MgHPO_4$. The $CaSO_4$ is pptd., K_2CO_3 is added to the soln. to ppt. $MgHPO_4$ and the rest of the P_2O_5 is pptd. as $Mg_3(PO_4)_2$ by adding more K_2CO_3. KNO_3 is obtained by evapn.

Fertilizers. ODDA SMELTEVERK AKTIESELSKAP and ERLING JOHNSON. Fr. 37,494, Oct. 7, 1929. Addn. to 682,423 (*C. A.* **24**, 4351). The soln. contg. phosphoric acid obtained by treating natural phosphates with HNO_3 is neutralized or caused to react with substances forming a fertilizer, such as NH_3, compds. of NH_3 and CO_2, urea, cyanamide or its salts or natural phosphates, so that on removing the water a dry stable fertilizer is obtained. Other salts of K, NH_4, etc., may be added in the solid state

Fertilizers. ÉDOUARD URBAIN. Fr. 695,221, Aug. 29, 1929. A fertilizer contg. P_2O_5 30–34, K_2O 8–11 and N 10–11% is made by using natural phosphate and aluminosilicate rocks in suitable proportions. Lime is introduced in such amt. that a utilizable slag is obtained.

Fertilizers. I. G. FARBENIND. A.-G. Fr. 37,217, July 16, 1929. Addn. to 673,093 (*C. A.* **24**, 2538). Compd. fertilizers are prepd. contg. NH_4NO_3 but not $CaCO_3$.

Fertilizers. HERBERT J. KRASE, HARRY C. HETHERINGTON and LOUIS A. PINCK (to Arthur B. Lamb, trustee). U. S. 1,797,095, March 17. See Fr. 678,693 (*C. A.* **24**, 3599).

Fertilizers. ODDA SMELTEVERK AKTIESELSKABET and E. JOHNSON. Brit. 339,340, Oct. 27, 1928. See Fr. 662,423 (*C. A.* **24**, 4351).

Calcium phosphates and fertilizers. ODDA SMELTEVERK AKTIESELSKABET and E. JOHNSON. Brit. 339,500, Dec. 14, 1928. The mother liquor obtained by treating rock phosphate with HNO_3 and sepg. a substantial proportion of $Ca(NO_3)_2$ by cooling as described in Brit. 339,340 (preceding abs.) is treated with gaseous or aq. NH_3, NH_4 carbonate or alkali metal carbonate; pptd. di-Ca phosphate is sepd., and the filtrate is used for the production of products contg. N and phosphoric acid, or the di-Ca phosphate may be treated together with the soln. to obtain solid products. By suitably restricting the quantity of $Ca(NO_3)_2$ sepd., relatively pure NH_4NO_3 can be obtained by evapg. the filtrate. Production of tri-Ca phosphate and various fertilizer mixts also is described.

Fertilizer comprising urea and calcium nitrate. I. G. FARBENIND. A.-G. Brit. 338,644, Sept. 16, 1929. A fertilizer contg. the double compd. of urea and $Ca(NO_3)_2$ is prepd. by melting together the anhyd. components preferably in the mol. proportions of 4 and 1, resp., and subdividing by spraying or other suitable treatment. Oil may be added to increase the stability of the product in storage. Cf. *C. A.* **25**, 554.

Mixed ammonium compounds suitable for use as fertilizer. R. TERN. Brit. 338,869, Aug. 22, 1929. Gases produced by roasting crude S or spent oxide from gas and coke-mfg. plants are mixed with ammoniacal gases produced by heating the gas-water from the scrubbers, and the material is ionized by a high tension current of 70,000–80,000 v., a mixt. being produced which comprises NH_4 sulfate, sulfite and imidosulfonate and other compds. of S and NH_4, which may be elec. pptd.

Stimulant for tap roots and tubers. I. G. FARBENIND. A.-G. (Georg Wesenberg and Eduard Bischkopff, inventors). Ger. 515,884, Mar. 28, 1926. Salts of polythionic acids act as a stimulant and increase potato, turnip, etc., yields. Examples state that mixts. of $Na_2S_2O_3$ or BaS_2O_3 or $CuS_2O_3.Na_2S_2O_3$, with kieselguhr, cause 20–50% increases in potato crops.

Fungicides. I. G. FARBENIND. A.-G. (Adolf Steindorff, Kaspar Pfaff and Georg Dahmer, inventors). Ger. 518,097, Mar. 30, 1928. Products comprising finely divided $Cu(OH)_2$ pptd. in the presence of fatty acids of high mol. wt. (or their salts) are used. Thus, wool-fat acids may be dissolved in NaOH, the soln. treated with solid $CuSO_4$ and the pasty product mixed with talc, dried and ground.

Organo-mercury compounds. T. W. F. CLARK. Brit. 338,963, Aug. 29, 1929. Phenolphthalein, fluorescein or their homologs or halogen derivs. are treated with Hg oxycyanide (or a mixt. of Hg oxide and an alkali cyanide), or reaction is effected with an alkali cyanide on Hg compds. of phenolphthalein, fluorescein or their homologs or halogen derivs. contg. the group HgX in which X represents OH, NO_3, SO_4H, halogen, etc. The *products are bactericides and fungicides.* Several examples are given.

Insecticides. ÉTABLISSEMENTS ET LABORATOIRES GEORGES TRUFFAUT. Fr. 695,164, Aug. 16, 1929. Insecticide solns. are prepd. by adding as adhesive one or more substances which lower the surface tension of water such as sulfite cellulose lyes, substituted amides of fatty acids or salts of sulfonic acids.

Insecticides. UNION CHIMIQUE BELGE. Ger. 515,633, Aug. 21, 1929. Prepns. contg. the insecticidal constituents of *Pyrethrum cinereafolium* are obtained by extg. the plant with hydrocarbon solvents, evapg. off the solvent and dissolving the residue in pyridine or ethyl lactate. Examples describe the extn. of the pulverized flowers with such solvents as pyridine, petroleum ether and alc.

Insecticide and fumigant. GUY H. BUCHANAN (to American Cyanamid Co.). U. S. 1,795,593, March 10. A compn. is described which comprises the reaction product formed by fusing together of Ca cyanamid, C and NaF.

Pest-destroying composition. PERMUTIT A.-G. (Otto Liebknecht, inventor). Ger. 515,348, June 15, 1926. Addn. to 472,738 (*C. A.* **23**, 3049). Seed goods, etc., are protected against animal and vegetable pests by a powder contg. insol. or nearly insol. Cr compds. instead of the gaseous Cr compds. of 472,738. The prepn. may contain $Cr(OH)_3$, Cr_2O_3, CrF_3, $CrPO_4$, chromates and bichromates, mixed with talcum, etc.

Composition for protecting plants. CHINOIN GYÓGYSZER ÉS VEGYÉSZETI TERMÉKEK GYÁRA R. T. (KERESZTY ÉS WOLF). Austrian 120,877, Aug. 15, 1930. Plant-protecting compns. comprising an aq. dispersion of S and a hydrocarbon are prepd. by stirring a concd. aq. soln. of $(NH_4)_2S$ and a hydrocarbon contg. an emulsifying agent into a large amt. of water. The hydrocarbon may be petroleum or tar oil, preferably free from phenol, and the emulsifying agent may be Turkey-red oil or an NH_4 soap. Examples are given.

Preventing infection of plants. ÉTABLISSEMENTS ET LABORATOIRES GEORGES TRUFFAUT. Fr. 695,165, Aug. 16, 1929. Cryptogamic infections of plants are combatted by the use of org. dyes, such as dimethyldiaminonaphthophenasoxonium hydrochloride, mixed with products which lower the surface tension of water.

Disinfecting seeds. IGNAZ KREIDL. Austrian 121,349, Sept. 15, 1929. Fungicides are applied in paste or pulp form, *e. g.*, by mechanically mixing the seeds with the paste or pulp. Fungicides sol. or insol. in water may be used, and solid diluents, glycerol, etc., may be included in the mixts. Examples are given.

Dry-cauterizing seed goods. I. G. FARBENIND. A.-G. (Wilhelm Bonrath, Wilhelm Schepss and Carl Taube, inventors). Ger. 515,957, June 7, 1928. The goods are treated with alkyl Hg compds. of the general formula RHgX, where R = an aliphatic hydrocarbon residue and X = OH or an acid residue. Examples mention talcum and C mixed with EtHgCl, PrHgBr, BuHgAcO or EtHgAcO.

16—THE FERMENTATION INDUSTRIES

C. N. FREY

Formation of kojic acid from sugars by Aspergillus oryzae. FREDERICK CHALLENGER, LOUIS KLEIN AND T. KENNEDY WALKER. *J. Chem. Soc.* **1931**, 16–23.—A strain of *Aspergillus oryzae* was used in these expts. in a medium contg. inorg. salts and designated "medium K." (Cf. *C. A.* **23**, 4966.) Two expts. were made with dihydroxyacetone, one contg. 11 cc. of medium K and 0.5 g. of dihydroxyacetone, the other contg. 5% dihydroxyacetone. The temp. of incubation was 31–2°. Kojic acid was identified in both cases by its m. p. and further characterized in the form of the diacetyl deriv. Kojic acid was also obtained by the fermentation of glycerol by a strain of *Aspergillus oryzae*. Fermentation expts. with 5% ethylene glycol, 2% Ca gluconate, 2% KH saccharate, 2% K citrate and 1% glyceric acid were neg. The action of *Aspergillus niger* on glycerol was studied. Trioses were produced when *Aspergillus niger* acted upon a 5% glycerol soln. with the salts of medium "M." After 9 days the liquid was filtered, made faintly alk. with ammonia, concd., pptd. with Pb acetate and decompd. with H_2S. Oxalic acid was obtained and identified by titration with 0.02 *N* NaOH and 0.02 *N* $KMnO_4$ and by formation of the di-*p*-bromophenacyl ester. Neither tartronic nor saccharic acid could be detected. S. JOZSA

Selective fermentation. II. Fermentation of sugar mixtures by Sauterne yeast. HARRY SOBOTKA AND MIRIAM REINER. *Biochem. J.* **24**, 1783–6(1930); cf. *C. A.* **25**, 166.—Sauterne yeast ferments fructose preferably to glucose in a mixt. B. H.

Notes on the determination of cane sugar in sweet wines. H. JAHR. *Z. anal Chem.* **83**, 321–38(1931).—The detn. of sugar in wine was carefully studied and it is pointed out that in detg. cane sugar it is necessary to proceed as in the detn. of the original reducing sugar and use Pb acetate together with AcOH. It is recommended, moreover, to simplify the official method of analysis as follows: If the wine contains, *e.* g. of ext. per l., take about $3000/e$ g. for the analysis. Weigh out the sample accurately in a weighing beaker, transfer to a 100 cc. measuring flask and make up to the mark at 15°. Shake and transfer to a somewhat larger dry flask. Add 1.5 g. of freshly ignited bone-char and allow to stand 10 min. with occasional mixing. For the detn of the directly reducing sugar, take 25 cc. of the filtrate in a 150-cc. measuring flask and neutralize with *N* NaOH. Make up to the mark at 15°, treat 50 cc. with Fehling's soln. as in the official method. Take 50 cc. of the filtrate from the bone-char clarification for the detn. of the cane sugar. Make up to 75 ml. in a measuring flask with marks at 75 cc. and 100 cc. and invert according to the official directions. After the inversion, take 50 cc., dil. to exactly 100 cc., neutralize with NaOH and treat with Fehling soln. as in the detn. of the original reducing sugar. W. T. H

The acidity of wine and the new (French) regulations. L. FERRÉ. *Ann. fals* **24**, 75–80(1931).—A plea for the adoption of more precise definitions of total, free and volatile acidity, and for the adoption as official of methods capable of yielding results conforming with the definition thus adopted. A. PAPINEAU-COUTURE

Detection of fruit wine in grape wine by Werder's sorbitol method. A. SCHREMPF. *Chem.-Ztg.* **55**, 52(1931); cf. *Chem.-Ztg.* **54**, 765, 997(1930).—S. states that the cause of contradictory results is due to samples contg. very small quantities of fruit wines. The method of detn. is discussed, the difficulties are emphasized and greater accuracy is suggested. Conclusion: The accuracy and reliability of the method do not depend primarily upon the size of the sample to be analyzed. S. JOZSA

Brandy wines and wine-brandy products. H. ZELLNER. *Chem.-Ztg.* **54**, 925–8 (1930).—The summary and conclusions of 246 analyses are given. The fusel oil and ester content of brandy wines, distillates and wine brandies are discussed. The figures obtained for yield do not give reliable results in every case, and it is necessary to taste the product for complete estn. The importance of the sense of taste is emphasized and its correlation to various analytical results set forth. S. JOZSA

Infectious turbidity in beer. DE GRONCKEL. *Bull. assoc. élèves inst. sup. fermentations Gand* **32**, 117–25(1931).—An address dealing with causes and remedies A. PAPINEAU-COUTURE

Brewery yeast in the chemical industry. FABER. *Brasserie & malterie* **21**, 13–5 (1931).—The possibility of production of nucleic acid, amino acids, ergosterol, vitamins and bios from brewery yeast is briefly discussed. A. PAPINEAU-COUTURE

The supposed relation between p_H value and acid taste of wines (CRISCI) 12. Control and regulation of distilling columns (PÉRARD) 13. The methylene-blue staining

of yeast cells and studies on the permeability of the yeast-cell membrane (FINK) **11B.** **Activating metals or alloys** [for vessels for yeast] (Austrian pat. 121,243) **3.** **Lining** [fermentation vats] (Austrian pat. 121,533) **13.** **Apparatus for mixing materials added** [to beer passing to a filter] (Brit. pat. 338,945) **1.**

Rectifying alcohol. SOC. ANON. DES DISTILLERIES DES DEUX-SEVRES. Fr. 695,214, Aug. 27, 1929. In the direct rectification described in Fr. 689,914 (*C. A.* **25**, 1030) the first purification is carried out on a liquid titrating at most a few degrees Gay-Lussac and of which at most 3% is vaporized and treated, any concn. of the alc. being avoided.

Denaturing alcohol. I. G. FARBENIND. A.-G. Fr. 37,197, July 6, 1929. See Ger. 513,410 (*C. A.* **25**, 1329).

Non-alcoholic beverage. JOSEF PARSCHIK. Austrian 121,415, Mar 15, 1930. A mash from incompletely saccharified malt, with or without fruit juices, is fermented with a coccoid bacillus of the lactic acid group cultivated from bread leaven. The mash is fermented until an acidity of about 0.15%, calcd. as lactic acid, has developed. It is then cooled, satd. with CO_2, filtered and bottled. Cf. *C. A.* **24**, 5085.

Dealcoholizing alcoholic liquids such as fermented beverages. HERMAN HEUSER (to U. S. Process Corp.). U. S. 1,796,022, March 10. The liquid is heated to vaporize alc. from it and the vapors are passed through a cooling zone in indirect conductive contact with aq. cooling liquid, to condense the alc.; the uncondensed constituents of the vapors are withdrawn and the alc. condensate and aq. cooling liquid are combined. App. is described.

Alcohol from fermented wines, musts, etc. É. A. BARBET. Brit. 338,569, May 16, 1929. In a process in which wines or the like are first distd and then rectified, with use of heat of the distn. vapors for rectification, the rectification is effected in 2 stages, the second rectification being effected solely by the heat contained in the alc. vapors (suitably *in vacuo*). Various details of app. and procedure are described.

Stopping alcoholic fermentation. L. VÁSONY. Hung. 101,986, July 4, 1930. Yeasts are pptd. to clarify the turbid must. The new yeasts making the clarified must again turbid are pptd. in turn, and this procedure is repeated until bottom fermentation begins. Now must is sucked off the bottom yeasts repeatedly until the must produced remains pure, contg. no nutrient matter for yeasts.

Malting cereals. T. R. DIXON. Brit. 339,047, Oct. 7, 1929. The cereals are treated with a soln. of an org. acid such as lactic acid as soon as the testa is broken by natural growth or after germination, in order to stimulate and accelerate the action of the enzymes of the grain.

Beer. EDUARD JALOWETZ and MAX HAMBURG. Austrian 121,348, Nov. 15, 1928. $CaSO_4$ or $CaCl_2$ is added to brewery water or to the mash or the wort, whereby beer contg. a reduced proportion of deleterious albuminous constituents is obtained. The amt. of salt to be added is detd. by estg. the NH_3 content of the beer, since the deleterious albumins readily split off NH_3. A method of estg. the NH_3 content is described.

Yeast fermentations. ERNST REINISCH. Austrian 121,078, Aug. 15, 1930. The fermentation with yeast of mashes of all kinds is improved by subjecting the water initially supplied to the yeast, and also the yeast-free mash, to regulated treatment with ultra-violet rays, with or without oxidizing salts that do not retard the fermentation. The method may be applied in prepg. a pressed yeast rich in vitamins.

Biologically active yeast preparations. M. MOSKOVITS. Hung. 101,496, Dec. 27, 1928. Life activity of yeast is stopped with 20% alc. The alc. ext. is distributed in liqueurs, bonbons or jelly-contg. pills.

Yeast with high enzyme activity. M. MOSKOVITS and KRAUSZ-MOSKOVITS, LTD. Hung. 100,910, March 22, 1929. Yeast is produced in dild. mash under aeration. Enzyme activity is increased (1) by diminishing aeration, which retards multiplication, and addn of N-contg. food, which improves the plasma, (2) by using a mash that contains much carbohydrate.

17—PHARMACEUTICAL CHEMISTRY

W. O. EMERY

Microchemical identification of alkaloids. J. F. H. AMELINK. *Pharm. Weekblad* 68, 921-9(1931); cf. *C. A.* **25**, 2241.—*Harmine* and *harmaline* (dihydroharmine) as HCl salts in concns. as low as 0.1% give cryst. ppts. with $PtCl_4$, $AuCl_3$, $HgCl_2$, $K_4Fe(CN)_6$ $K_3Fe(CN)_6$, Dragendorff's reagent, and KOH. A sp. reaction of harmaline is the blood-

red color obtained on warming it with AcH. The red product is sol. in $CHCl_3$ and 90% EtOH, but insol. in Et_2O. A. W. Dox

Aconitine from Cashmerian Aconitum chasmanthum. K. H. Bauer and Tara Chand Radjhan. *Pharm. Zentralhalle* **72**, 146–52(1931).—An aconitine which differed from all aconitines hitherto reported was isolated from the Cashmerian aconite. The m. p. and cryst. form are identical with those found for indaconitine, but differs markedly in being insol. in Et_2O. W. O. E.

Examination of liquor cresoli saponatus. H. Noerdlinger. *Süddeutsche Apoth.-Ztg.* **71**, 159–61(1931).—The method suggested by Kaiser has been subjected to renewed study with the conclusion that it cannot be depended upon to reveal the true compn. of cresol soap soln. In the absence, therefore, of a better method, recourse should be had to the official pharmacopeial procedure. W. O. E.

New drugs and pharmaceutical specialties during the 4th quarter of 1930. F. Zernik. *Süddeutsche Apoth.-Ztg.* **71**, 165–8(1931).—The more important novelties of this period are enumerated and to some extent described. W. O. E.

Percolation or diacolation. Breddin. *Süddeutsche Apoth.-Ztg.* **71**, 172–3(1931); cf. *C. A.* **24**, 4896.—The apparent phys. and hence economical advantages of the diacolation method (involving multiple cylinders) over percolation (the so-called American method) in the extn. of crude drugs are emphasized and fully discussed. W. O. E.

The reactions of novocaine. L. Ekkert. *Magyar Gyógyszerésztud. Társaság Értesitöje* **6**, 221(1930); cf. *C. A.* **24**, 4897.—A dark red to carmine-red color is formed by adding 2 drops of 10% $NaNO_2$ soln. and 10 drops of an alk. soln. of α-naphthol to dil. HCl contg. a soln. of novocaine chloride or nitrate. The soln. of novocaine is mixed with 10 drops of $CaOCl_2$ soln. and 0.01 g. phenol and NH_4OH added. The mixt. becomes green on warming. A soln. of chloramine may be used instead of the $CaOCl_2$ soln. S. S. de Finály

Hungarian procedure of morphine manufacture. J. Kabay. *Magyar Gyógyszerésztud. Társaság Értesitöje* **6**, 226–34(1930); cf. *C. A.* **24**, 3322.—Opium poppies are cut up and extd. to a jam-like pulp of about 0.4–0.8% morphine content. The washing liquid contains free H_2SO_3 which binds Ca and forms easily sol. alkaloid salts, prevents the further hydrolysis of chlorophyll and the fermentation or oxidation of the concd. ext. The mixt. of alkaloids is then sepd. and chlorophyll obtained as a secondary product. S. S. de Finály

New reaction for the identification of guaiacol carbonate. K. Száhlender. *Magyar Gyógyszerésztud. Társaság Értesitöje* **6**, 235–6(1930).—One-half g. guaiacol carbonate is mixed with 0.5 g. $ZnCl_2$ and heated in a dry test tube. A dark brown melt is formed with a very intense smell of guaiacol. The reaction may be brought about faster by using dried or melted $ZnCl_2$, since then it is not necessary to wait until the hygroscopic moisture evaps. S. S. de Finály

Evaluation of insulin. A. Stasiak and B. Zboray. *Magyar Gyógyszerésztud Társaság Értesitöje* **6**, 268–74(1930).—Cross tests of Marks (*C. A.* **23**, 5272) for the evaluation of insulin are modified by injecting into each animal 0.5 cc. soln. equal to 1 international standard. Three blood tests are taken for sugar detns. 1.5, 3 and 5 hrs. after injection. This method gives as exact data as that taking 5 blood tests. The sensitivity reaches 10% in 10-10 expt. series, 6 animals being used in each case. S. S. de F.

Early products in the history of drugs. J. Horváth. *Magyar Gyógyszerésztud. Társaság Értesitöje* **6**, 292–5(1930).—An address. S. S. de Finály

Comparative studies of camomile. P. Rom. *Magyar Gyógyszerésztud. Társaság Értesitöje* **6**, 296–9(1930).—The essential oil content of Hungarian camomile was detd. (1) by measuring the oil on the surface of the water during distn. as carried out in factory practice and adding the oil content of the cohobation water. (Results, 0.22 and 0.20%, resp.; total oil content, 0.42%); (2) by using the method prescribed by D. A. B. 6 (result, 0.49%). Earlier Hungarian data gave smaller contents since the oil content of the cohobation water was not detd. Some German samples contained 0.6–0.8%, a Russian one 0.58%. This latter was a yellow oil rather more sol. in water than that of Hungarian or German camomile. Examn. of 11 samples of Hungarian camomile of various regions showed oil contents of more than 0.4% for each. The sand content varied from 0.8 to 1.1% and the ash content from 10 to 11%. German samples contained 9–10% ash and 0.4–1.0% sand, Russian samples 11.5–15% ash and 2.7–5% sand. S. S. de Finály

Russian flores chamomillae. Á. Boros. *Magyar Gyógyszerésztud. Társaság Értesitöje* **6**, 300–6(1930).—Four samples of the Russian drug were examd. It may be distinguished from the Hungarian drug by the presence of *Agropyrum* (*Triticum*) *prostratum* L. and *Salsola tamariscina Pall.* and further of animal particles of *Amphicoma*

vulpes var. *hirta* Fabr. and *Dulaea Lichatschovi* Humm., which species do not occur on territories east of South Russia. S. S. DE FINÁLY

The evaluation of commercial Solanaceæ drugs. S. PERCSNÉ JÓNÁS. *Magyar Gyógyszerésztud. Társaság Értesitöje* **6**, 307–12(1930).—Folia belladonnae (I), radix belladonae (II), folia stramonii (III) and folia hyoscyami (IV) of Hungarian origin were examd. for alkaloid content according to Ph. Helvetica IV. I contained 0.18–0.20%, II 0.59–0.66%, III 0.21–0.33% and IV 0.11% alkaloids. Ash and sand contents were detd. by the method of U. S. National Formulary, p. 428. The values (in %) obtained for ash and sand contents, resp., were: I 16.99–17.04, 5.51–5.84; II 6.35–7.52, 0.68–0.76; III 18.67–23.80, 2.68–10.00; IV 22.04–22.23, 7.30–7.63. S. S. DE FINÁLY

Determination of alkaloids, especially the determination of morphine in preparations. E. SCHULEK. *Magyar Gyógyszerésztud. Társaság Értesitöje* **6**, 442–51(1930).—The indicators used for the titrimetric detn. of alkaloids should have p_H intervals agreeing with the p_H of the alkaloid soln. after titration. The morphine detn. method of Ph. Hung. 3 cannot be used in the case of some opium prepns. (*e. g.*, pantopone-like drugs). A micromethod was therefore worked out: Mix 0.605 g. of opium powder with some water, dil. to 6 cc. and filter through dry filter paper. Put 4 cc. of the filtrate into a 30-cc. bottle, add 0.20 cc. *N* NH_4OH and filter the ppt. through dry filter paper. Suck up a part of the filtrate with a micropipet, put into a 30-cc. Erlenmeyer flask and add 1 cc. purified EtOAc and 0.4 cc. *N* NH_4OH. Shake the mixt. for 15 min., again add 1 cc. EtOAc, shake and after 10 min. pour the EtOAc soln. on a filter paper. Now again add 1 cc. EtOAc, shake occasionally and pour first the EtOAc soln. and then the whole liquid on the filter, wash out the flask 3 times with 1 cc. water each time. Dissolve the cryst. morphine in 10 cc. boiled 0.02 *N* H_2SO_4 and titrate back the excess acid with 0.02 *N* NaOH. For the evaluation of tinctura opii evap. 5 g., dissolve the residue in 2–3 cc. water, add 0.2 cc. *N* NH_4OH and dil. to 6 cc. Filter the mixt., pour 5 cc. of filtrate into a 30-cc. Erlenmeyer flask, add 0.4 cc. *N* NH_4OH and det. the morphine as above. For the evaluation of extractum opii treat 0.3 g. ext. with a few drops of water and work up as above. The method of Buchbinder (U. S. Drug Control Laboratory) may well be used for the detn. of the morphine content of pulvis Doveri. S. S. DE FINÁLY

Water-soluble oils. K. GÖLLNER. *Magyar Gyógyszerésztud. Társaság Értesitöje* **6**, 452–9(1930).—Sulfonation expts. were made on olive, sesame, peanut, rape and neat's-foot oils and on pure white olein. Sulfonated neat's-foot oil gives the finest emulsion. It is suitable for cosmetic and skin-treating purposes. Cf. *C. A.* **25**, 557. S. S. DE FINÁLY

The adsorption capacity of bolus alba (kaolin) for different drugs. Z. CSIPKE. *Magyar Gyógyszerésztud. Társaság Értesitoje* **6**, 460–7(1930).—One to 35 g. of bolus alba was treated with 100 cc. of different solns. and shaken for 30 min. After sedimentation 10 cc. was examd. for its content of reagent remaining. 14.4–98.0 mg. methylene blue was adsorbed from a 1% soln.; 0–8.6 mg. $HgCl_2$ from a 1.30% soln.; 2.52–11.9 mg. I from a 50% alc. soln.; and 0–0.95 mg. nicotine from a 1% soln. No reagent was adsorbed from a 1% soln. of phenol or a 3% soln. of HCHO. Non-sterile bolus adsorbed 4.8 water vapor, sterilized bolus 7.2%. The ultraporosity of bolus is small since it has large but not many pores which bind only reagents having large mols. Sterilization often increased adsorptive power. S. S. DE FINÁLY

Researches on coffeinum natrium benzoicum. A. HÉRAY. *Magyar Gyógyszerésztud. Társaság Értesitöje* **6**, 468–73(1930).—Expts. showed that 2 mols. caffeine and 3 mols. Na benzoate form an addn. compd. The prepn. can be made by mixing 9.9 g. caffeine with 20 g. ether and 10 g. Na benzoate to pulp and evapg. the ether. The detn. of the caffeine and Na benzoate can be made as follows: Dissolve 0.30 g. coffeinum Na benzoicum in 5 g. distd. water, shake with 10 and 5 cc. $CHCl_3$, resp., for 5 min. and evap. the $CHCl_3$ soln. at a temp. not higher than 40°. The residue should weigh 0.15 g. Now add 2 cc. HCl to the caffeine-free aq. soln. and again shake with 2 5-cc. portions of $CHCl_3$ for 5 min. Add 30 cc. concd. alc. to the $CHCl_3$ ext. and titrate with 0.1 *N* NaOH with phenolphthalein as indicator. About 10.3–10.4 cc. should be used (1 cc. is equiv. to 0.0144 g. Na benzoate). S. S. DE FINÁLY

Examination of solutions of cresol soaps. I. LÉVOLT. *Magyar Gyógyszerésztud. Társaság Értesitöje* **6**, 474–80(1930).—Five samples of com. liquor cresoli saponatus and two samples of home-made liquors (one made according to Ph. Hung. 3 and the other according to D. A. B. 6) were examd. for cresol content and for the quality and quantity of the K soap contained. The fatty acid content and I-Br no. were detd. The presence of soap made of oleum jecoris was proved by the cholesterol reaction; of that made of sesame oil, by the furfural reaction, and finally the presence of naphthoic,

colophonic or linoleic acids by the $CuSO_4$ reaction of Charitschkov. The following method was used to det. cresol content: Dissolve 10 g. liquor in a mixt. of 100 cc. water and 30 cc. 10% KOH soln., add 30 cc. 10% $BaCl_2$ soln., shake the mixt. and dil. to 200 cc. Ba soap ppts. Filter 100 cc. of the purified upper part of soln. contg. alkali cresolates of 5 g. of the original liquor. Divide the filtrate into 2 parts, to each of them add 10 cc. dil. HCl and shake with 25 cc. petroleum ether. Evap. the solvent and dry the cresol for 30 min. at 100°. The av. of 2 detns. multiplied by 40 gives the % content of liquor in cresol. 42–50% was found in the samples. The soap examn. may be replaced by the detn. of the emulsifying capacity in the case of cresol soaps of naphthoic and colophonic acids. The cresol content was detd. by the method of Ph. Russ. 7 and by steam distn. with $CaCl_2$. The former method gave higher values, since colophonic acids are also distd. at the high temp. of the former method and increase the no. of cc. of NaOH used. S. S. DE FINÁLY

Present state of chemical evaluation of ergot (Secale cornutum). P. LIPTÁK. *Magyar Gyógyszerésztud. Társaság Értesitöje* 7, 9–23(1931).—The method of Keller-Fromme dets. other materials besides the sp. alkaloids. The method of Forst is exact but too complicated for drug-store practice. The D. A. B. method may give inexact data since Mg soaps may be formed and Na_2CO_3 may get into the ether, giving too high a value for alkaloids. Detns. based on the cornutine reaction of Keller-Fromme are inaccurate. A simple acid-no. detn. may give some information about the proper storage and age of ergot. S. S. DE FINÁLY

Determinations of the essential oil content of Hungarian coriandrum. S. PERCSNÉ JÓNÁS. *Magyar Gyógyszerésztud. Társaság Értesitöje* 7, 24–9(1931).—Hungarian coriandrum formerly contained more than 1% essential oil, but in the present harvests it has diminished to 0.6–0.3% content. The sp. gr. diminishes with the increase in oil content. Simple distn. of coriandrum with superheated steam gave higher values for essential oil content than did the method prescribed by D. A. B. 6. This may be explained by the very slight soly. of coriandrum oil in water. S. S. DE FINÁLY

Colloid-chemical methods in drug stores and laboratories. J. VONDRASEK. *Magyar Gyógyszerésztud. Társaság Értesitöje* 7, 59–72(1931).—An address. S. S. DE F.

Lycopin. L CHOLNOKY. *Magyar Gyógyszerésztud. Társaság Értesitöje* 7, 95–107 (1931).—Lycopin was extd. from *Tamus communis* and *Solanum dulcamara*. The crude product was purified by recrystn. from CS_2-petroleum ether. Combustion of this product gave 89.23–89.43% C and 10.63–10.84% H (theoretical compn. of $C_{40}H_{56}$, 89.48% C and 10.52% H). The mol. wt. detd. ebullioscopically in $CHCl_3$ was 526, 564 and 565 (theoretical, 536); that detd. cryoscopically in $CHBr_3$, 649, agreeing with Montanari's result obtained in benzene (cf. *Lestazione sperimentali agrarie italiane* 37, 909 (1904)). *Tamus* lycopin m. 170°, *Solanum* lycopin m. 174°. No secondary pigments could be found. The data in the botanical literature should be corrected, since the above plants contain lycopin only. S. S. DE FINÁLY

The volatility of nicotine. L. NAGY. *Magyar Gyógyszerésztud. Társaság Értesitoje* 7, 125–30(1931).—Expts. made with nicotinum puriss, Merck, showed that large losses of nicotine occur during distn. of the solns. Only about 10 cc. of nicotine solns. can be distd. without any appreciable losses in the case of solvents with high b. p. (as petroleum ether, alc.). About 100 cc. can be distd. without significant losses in the case of solvents with low b. p. (ether or a mixt. of ether and petroleum ether). The loss of nicotine by evapn. is greater from beakers than from Erlenmeyer flasks. About 0.6 mg. of pure nicotine is volatilized in 5 min. at 20–22°. S. S. DE FINÁLY

Senega roots adulterated by sarsaparilla. I. TEMESVÁRY. *Magyar Gyógyszerésztud. Társaság Értesitöje* 7, 131–4(1931).—An ext. of a com. sample of senega roots gave too brown a liquor. No green color was obtained on adding liquor ammonii anisatus but stronger darkening was observed. On examn. under a magnifying glass the sample was found to be adulterated with about 30–5% of sarsaparilla roots. Microscopic examn. showed the structural texture of sarsaparilla roots. The saponin content was detd. by dissolving defibrinized blood with ext. of sarsaparilla particles in physiol. NaCl soln. S. S. DE FINÁLY

Cascara. T. J. STARKER AND A. R. WILCOX. *Am. J. Pharm.* **103**, 73–97, 147–75 (1931).—A dissertation covering names, species, distribution, description, medicinal value, silvics of cascara, growth, collection and curing of the bark, safeguarding the future supply, the industry, est. of existing stand, prospects of future stands and artificial propagation of cascara. A bibliography is appended. W. G. GARSTER

The analysis of the more commonly used ointments of the British Pharmacopeia containing an inorganic principle as the active constituent. EDWIN H. BUNCE. *Indian*

Med. Gaz. **66**, 137–8(1931).—Methods are given for the detn. of the base in boric acid ointment, mercury ointment and other ointments that find general employment.
FREDERICK G. GERMUTH

The potentiometric titration of alkaloids with potassium iodomercurati. LOUIS MARICQ. *Bull. soc. chim. Belg.* **39**, 496–502(1930); cf. *C. A.* **24**, 1705, 4895.—The method previously reported for the titration of atropine, hyoscyamine, pilocarpine, cinchonine and sparteine is extended. The accuracy is as good as before. A. L. H.

Chemical composition of certain homeopathic tinctures. JOSEPH S. HEPBURN AND ALAN E. SMITH. *J. Am. Inst. Homeopathy* **23**, 1207–9(1930).—Detn. (as g. per 100 cc.) of (*A*) total solids, (*B*) ash, (*C*) total N, (*D*) ether ext. of certain homeopathic tinctures yielded the following results: *Dioscorea villosa A* 2.415, *B* 0.275, *C* 0.03670, *D* 0.082. *Hydrastis canadensis A* 1.408, *B* 0.275, *C* 0.03123, *D* 0.161. *Iberis amara A* 2.791, *B* 0.338, *C* 0.03992, *D* 0.164. *Sarracenia flava* (pitcher) *A* 1.927, *B* 0.340, *C* 0.02423, *D* 0.212. *Sarracenia minor* (pitcher) *A* 2.205, *B* 0.084, *C* 0.03123, *D* 0.313; (rhizome) *A* 3.150, *B* 0.095, *D* 0.098. *Sarracenia purpurea* (entire plant) *A* 0.855, *B* 0.255, *C* 0.00812, *D* 0.080. *Sarracenia rubra* (rhizome) *A* 4.280, *B* 0.075, *Sarracenia drummondii* (rhizome) *A* 1.930, *B* 0.045, *C* 0.02955, *D* 0.142. *Tectona grandis A* 0.908, *B* 0.233, *C* 0.01078, *D* 0.190. The presumptive test for the presence of alkaloids was pos. with the tinctures of *Hydrastis canadensis, Iberis amara, Sarracenia flava* pitcher and *S. rubra* rhizome, and neg. with the other tinctures. The alc. content ranged between 56.15 and 76.62% by vol., and between 49.89 and 69.73% by wt. J. S. H.

A comparison of assays of homeopathic tinctures made according to the American Homeopathic Pharmacopeia and the Homeopathic Pharmacopeia of the United States. (A. I. H.). RAYFORD E. WRIGHT AND JOHN A. BORNEMAN. *J. Am. Inst. Homeopathy* **24**, 61–70(1931).—Assays for alkaloids were made of tinctures of aconite, belladonna, gelsemium and nux vomica prepd. according to each of the 2 pharmacopeias. "The results of the assays indicate that tinctures made according to the Pharm. of the Am. Inst. of Homeopathy are actually 0.1 drug strength tinctures, and that they come up to the requirements of the U. S. Pharm. The results further indicate that the alkaloidal content of tinctures made according to the Am. Homeopathic Pharm. is variable, and that the assay of these tinctures (particularly Class I tinctures) is far below the assumed standard." JOSEPH S. HEPBURN

The determination of cineole in cajaput oil. A. RECLAIRE AND D. B. SPOELSTRA. *Ber. Afdeel. Handelsmuseum Ver. Koloniaal Inst.* No. **54**, 8 pp.(1930).—The method of Cocking (*Perfumery Essent. Oil Record* **18**, 165(1927); cf. *C. A.* **21**, 3252) was tested on known mixts. of turpentine oil, cineole, terpineol and citronella oil as well as on several samples of cajaput oil from the Dutch East Indies and found to be very useful. Up to 12.5% terpineol does not influence the results, but in case of a higher percentage a correction must be applied which can easily be calcd. from a table given. It is pointed out that the *o*-cresol used in the detn. must be freshly distd., otherwise the results are too low. J. C. JURRJENS

The preparation, composition and value of the sirup of iodotannate. Z. WEINSTOCK. *Rev. facultad cienc. quim.* (*Univ. La Plata*) **7**, Pt. 2, 83–95(1930).—There is no loss of I through volatilization in the prepn. of the sirup according to the formula given in the French Codex Supplement of 1920. Detn. of the I according to the Pharm. of Brazil is simple, rapid and exact as is the method of Ugarte. The entire I in the sirup is in the form of HI. It is therefore proposed that the sirup be replaced by a simple sirup of HI, thus eliminating the astringent tannins and their products of oxidation. The prepn. and essay methods of Machado and Sonol (cf. *C. A.* **24**, 5938) are considered unacceptable. B. S. LEVINE

Determination of moisture in tobacco by means of the hygrometer. N. M. MILOSLAVSKII AND A. I. PALANT. *Ukrainskii Khem. Zhur.* **5**, Tech. Pt., 117–25(1930).—Expts. show the absence of a simple relationship between the moisture in tobacco and that in the atm. This can be explained on the ground that the amt. of moisture in tobacco is detd. by its biol. condition and by the adsorptive capacity of the leaf itself. The hygrometer is not applicable to the measurement of moisture in tobacco, because the tobacco leaf is neither chemically nor biologically definite. S. L. MADORSKY

A new method of determining arsphenamine preparations. S. KEIMATSU AND K. WADA. *J. Pharm. Soc. Japan* **51**, 65–80(1931).—The sample (0.1–0.2 g.) was digested gently with K_2SO_4 (10 g.), $KClO_3$ (1 g.), water (10 cc.) and dil. H_2SO_4 (40 cc. of 1:1 vol.). On cooling, 0.5 cc. of 50% soln. of glucose was added and the mixt. digested again. When the soln. became clear it was titrated against 0.05 *N* $KBrO_3$ soln. with methyl orange as indicator. F. I. NAKAMURA

Oil of ambrette. R. N. *Parfums de France* **9**, 32–8(1931) (in French and Eng-

lish).—A review of the compn. of oil of ambrette and of the constitution of its principal constituents. A. PAPINEAU-COUTURE

The bitter orange and its products. GUIDO ROVESTI. *Rivista ital. essenze e profumi* **13**, 35–61(1931).—From the bitter-orange plant are produced the fluid ext., neroli oil, the concrete flower essence, bitter-orange water, petitgrain essence, petitgrain water and bitter-orange juice. The fluid ext. is produced by extg. the dry powd. peels with 60° alc. It is a limpid green-yellow liquid with bitter taste and pleasant odor, sol. in water and sugar sirups. Neroli oil is obtained together with bitter-orange water by distg. the flowers with steam. After distn. neroli oil is nearly colorless; with time it becomes red with a blue fluorescence. It keeps best in the dark. Ligurian neroli oil has d_{15} 0.8815–0.831, $[\alpha]$ 0.5–6.9, n_{20} 1.4710–1.4728, sapon. no. 28–67.5, esters as linalyl acetate 9.80–23.5%, soly. in 80° alc. 1–1.2 vols. Calabrian neroli oil has d_{15} 0.727–0.8755, $[\alpha]$ 5.30–6.48, n_{20} 1.4715–1.4720, sapon. no. 52–63, esters as linalyl acetate 17.64–21.56%, soly. in 80° alc. 1–1.2 vols. Sicilian neroli oil has d_{15} 0.860–0.924, $[\alpha]$ —2.54–5.65, n_{20} 1.4680–1.4740, sapon. no. 6–127. Neroli oil contains pinene I, camphene I, limonene, dipentene, paraffin, phenylethyl alc., linaloöl, nerol, terpineol, nerolidol, geraniol, farnesol, decylaldehyde, linalyl acetate, Me anthranylate, benzoates, palmitates, phenylacetates, acetates of different alcs., indole, phenylacetonitrile, a ketone analogous to jasmone, and acetic and palmitic acids. There are 35% of terpenes, 30% of linaloöl, 18% of linalyl acetate and 1% of Me anthranylate; the ketone gives the perfume. The yield in essential oil depends on the meteoric conditions during the collection of the flowers. The greatest is obtained on warm and dry days. Bitter-orange water is the by-product of the neroli oil distn. Its preservation is difficult as it is attacked by the microörganisms. The product has in suspension much neroli oil. The concrete flower essential oil is prepd. with petr. ether; it is of ointment consistency, having an agreeable odor and coffee color. The yield is 0.230–0.390%. The abs. essence is obtained from the flowers with 4 alc. washings, followed by cooling to —15°, filtration, and evapn. of the alc. *in vacuo*. The yield is 0.45–0.55%. It has d_{15} 0.9105–0.9228, $[\alpha]$ —0.74 to —5.48, n_{20} 1.4658–1.4729, sapon. no. 105–137.8, esters as linalyl acetate 36.7–48%, soly. in 95° alc. 1:1 by vol. Petitgrain essence is obtained by distg. the twigs of the bitter-orange tree. It is yellow, with the odor of the leaves, and contains pinene I, limonene, dipentene, camphene, linaloöl, geraniol, terpineol, linalyl acetate, geranyl acetate, Me anthranylate and furfural. The Ligurian product has d_{15} 0.890–0.900, $[\alpha]$—2.5 to —6.7, n_{20} 1.460–1.465, sapon. no. 115–170, esters as linalyl acetate 50–59%, soly. in 70° alc. 1 vol. in 2.5–3 vol. Calabrian petitgrain has d_{15} 0.8971, $[\alpha]$ —6.12, sapon. no. 214.60, esters as linalyl acetate 75.10%, soly. in 80° alc. 1 vol. in 1.3 vol. The yield is 250–280 g. per 100 kg. Petitgrain water is obtained during the distn. of the bitter-orange twigs. Bitter-orange juice is obtained from the ripe fruits; it is an intensely yellow liquid, the chem. compn. of which is not much different from that of sweet oranges, excepting for the bitter principles present. Its principal constituent is limonene (90–97%). Seven hundred g. is obtained per 100 kg. of fruits. The consts. are d. 0.852–0.856, $[\alpha]_{20}$ 88–96, n_{20} 1.473–1.475, sapon. no. about 9. R. SANSONE

Lemon and orange oils. E. BERTE. *Rivista ital. essenze e profumi* **13**, 75–7(1931).—A large no. of lemon oil samples sponge extd., had the consts. $[\alpha]_{15}$ 56° 0′ to 62° 0′, d_{15} 0.8560–0.8590, aldehydes as citral 4.50–6.00%, evapn. residue on the water bath 2.50–3.50%, n_{20} 1.474–1.4759. Sweet-orange oil had $[\alpha]_{15}$ 98° 0′ to 100°, d_{15} 0.8485–0.8500, evapn. residue 1.50–2.50%, n_{15} 1.473–1.475, soly. in 90° alc. 1:8. In Sicily there exist zones producing lemon oil with d_{15} lower than 0.8560. There is no lemon oil with d_{15} above 0.8600, except that from green fruits, having the low $[\alpha]_{15}$ 50° 0′ to 54° 0′, and a d_{15} sometimes above 0.8600. In 1930 were found lemon oils with $[\alpha]_{15}$ 67° 0′ and 70° 0′ and d_{15} under 0.855. Samples of directly prepd. and of distd. lemon oil, taken in 1931, had n_{15} 1.4740–1.467 and 1.4723–1.4745, d_{15} 0.8560–0.8581, citral 3.85–4.45%. In Nov., 1930, orange oil had the av. consts. $[\alpha]_{15}$ 98°, 20′ to 100°, 15′, d_{15} 0.8480–0.8498, residue on the water bath 1.50–2.65%. R. SANSONE

The essential oil of Satureia nepeta. L. PEPPINO LIOTTA. *Rivista ital. essenze e profumi* **13**, 93–4(1931).—The oil is a light caramel-brown, b. 214.5°, showing the absence of terpenic hydrocarbons. The soly. in 80° alc. confirmed the presence of considerable amts. of oxygenated products. The consts. were d_{17} 0.9335, $[\alpha]_D^{17}$ 109° 30′ soly. in 80° alc. 1:1, evapn. residue 4.82%, sapon. no. of residue 156. It contained 3% of pulegone. On boiling, the rotatory power rapidly decreases. With 50 min. of steam distn. all the oil is obtained from the plant. R. SANSONE

Microsublimation. A. CHALMETA. *Anales soc. españ. fis. quím.* **28**, 1407–19

(1930).—The convenience of microsublimation with caffeine and theobromine and with glucosides is discussed. E. M. SYMMES

Biphenyl [as source of intermediates for drugs] (MORGAN, WALLS) **25.** Alloys [for speculums] (Ger. pat. 515,798) **9.** Emulsions, ointments, etc. (Brit. pat. 339,558) **13.**

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GIBSON, H. C.: **Chemistry of Dental Materials.** Philadelphia: P. Blakiston's Son & Co. $3.50.

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Therapeutic solutions of soporific drugs. I. G. FARBENIND. A.-G. Brit. 338,985, Aug. 29, 1929. The method of prepg. aq. solns. of barbituric acids (described in Brit. 325,847; *C. A.* **24,** 4121), by use of a monoalkylated amide of a lower aliphatic acid, is applied to the prepn. of solns. of other soporific drugs such as the urethan of trichloroethyl alc., tribromoethyl alc. and bromodiethylacetamide. In examples given, *N*-ethylacetamide is used as a solubilizing agent.

Medicinal product. E. K. FREY and HEINRICH KRAUT. Ger. 518,292, Feb. 24, 1926. A medicine affecting the circulation of the blood and the action of the heart is prepd. from urine by freeing this from phosphates in the usual manner, adding uranyl acetate, filtering off the ppt., decompg. the ppt. with $(NH_4)_2HPO_4$ soln., filtering, removing phosphates from the filtrate, and then removing other salts by dialysis. The final filtrate may be purified by treatment with kaolin or like adsorbent followed by extn. of the adsorbent with $(NH_4)_2HPO_4$ soln. Alternatively, the adsorbent may be added to the dephosphatized urine. Examples are given.

Synthetic drugs. SCHERING-KAHLBAUM A.-G. Brit. 339,436, Oct. 31, 1929. Dihydroketo-1-alkylhalopyridine compds. are prepd. by treating 2-hydroxypyridine derivs. contg. a halogen atom in the 3- or 5-position (or both) with a simple alkylating agent or with one which contains a carboxy group (preferably in the presence of an acid-binding substance). Examples are given of the production of 1,2-dihydro-1-methyl-2-keto-5-iodopyridine, 1,2-dihydro-2-keto-5-bromopyridine-1-acetic acid, 1,2-dihydro-2-keto-3,5-dibromopyridine-1-acetic acid, 1,2-dihydro-2-keto-5-iodopyridine-1-acetic acid, 1,2-dihydro-2-keto-3,5-diiodopyridine-1-acetic acid and 2-hydroxy-3-bromo-5-iodopyridine. The products are sol. in water.

Synthetic drugs, etc. I. G. FARBENIND. A.-G. Brit. 339,359, Aug. 14, 1929. Basic compds. are prepd. by condensation of a satd. or unsatd. fatty acid contg. at least 10 C atoms, or an ester, chloride, amide or imido ester of such an acid (such as palmitic or oleic acid chlorides) with an aromatic primary or secondary amine having a side chain contg. tertiary N such as *p*-β-diethylaminoethoxyaniline, *p*-aminobenzoyldiethylaminoethanol and unsym. ethyl(or methyl)diethylaminoethyl-*p*-phenylenediamine.

Synthetic drugs. I. G. FARBENIND. A.-G. (Karl Streitwolf, Alfred Fehrle, Paul Fritzsche and Walter Herrmann, inventors). Ger. 518,208, June 16, 1929. Acylaminobenzenestibinic acids substituted in an *o*-position to the stibinic acid residue are prepd. by the customary processes. Thus, *m*- or *p*-acylaminoanilines substituted in the *o*-position to the NH_2 group, *e. g.*, with OH, OCH_3, CH_3, or halogen, and free from or contg. substituents, may be diazotized and then treated with an antimonite. Alternatively, *m*- or *p*-aminobenzenestibinic acids substituted in the *o*-position to the acid residue, and free from or contg. other substituents, may be acylated. Examples are given. The products are effective against diseases caused by trypanosomes, and may be administered *per os.*

Alkaloids. GEORG KNOTH. Ger. 516,283, Nov. 28, 1928. Addn. to 497,630. In obtaining volatile alkaloids by steam distn. by the methods of 497,630 (*C. A.* **24,** 4121), 500,294 (*C. A.* **25,** 560) and 500,998 (*C. A.* **24,** 4901), the distn. takes place at a steam pressure of above 2 atm. The process is especially applicable to nicotine, a mash of

tobacco being treated with a base such as NaOH to free the alkaloid before distn. In the example, the nicotine yield is increased from 0.16% to 2.12% by increasing the steam-distn. pressure from a pressure of 0.5 atm. to 5 atm.

Caffeine. KAFFEE-HANDELS. A.-G. Ger. 515,604, Oct. 23, 1923. Caffeine is extd. from raw coffee beans by moistening the beans and extg. with CCl_2H_2 at low temps.

Aqueous solutions of pure glucosides. G. RICHTER, LTD. Hung. 101,049, June 28, 1930. Glucosides sepd. from various plants or drugs are made water-sol. by adding salts or mixts. of cholic acid or its derivs.

Anthraquinone glucosides from drugs such as cascara and frangula. FRIEDRICH KAYSER and KARL SCHRANZ (to Winthrop Chemical Co.). U. S. 1,796,109, March 10. The water-sol. anthraquinone glucosides may be isolated in substantially pure form by a procedure involving the treatment of alc. or other exts. of the drugs with $Fe(OH)_3$, Mn hydroxide or Al hydroxide, thereby sepg. substantially all of the inert material, and subsequent drying of the solns. of the glucosides so isolated. The dried products, thus obtained in the form of fine leaflets, represent the substantially pure effective anthraquinone glucosides or mixt. of glucosides contained in the drugs. They are sol. in water with a slightly acid reaction, forming clear solns. generally of a brownish color, adaptable for use as purgative injections. Examples with details of treatment of cascara and frangula are given.

Betaine thiocyanate. I. G. FARBENIND. A.-G. Ger. 515,545, June 29, 1927. See Brit. 316, 693 (*C. A.* **24**, 1937).

1-(*m*-Aminophenyl)-2-methylamino-1-propanol. FIRMA E. MERCK. (Otto Dalmer and Max Oberlin, inventors). Ger. 518,212, May 16, 1929. The customary reduction methods are applied to 1-(*m*-nitrophenyl)-2-methylamino-1-propanone. Examples are given. The therapeutic properties of the product compare favorably with those of 1-phenyl-2-methylamino-1-propanol. Cf. *C. A.* **25**, 1264.

Basic tertiary alcohols. I. G. FARBENIND. A.-G. (Fritz Mietzsch, Josef Klarer and Hans Hahl, inventors). Ger. 518,211, Mar. 3, 1928. Compds. in which an amino or alkylamino group is linked by an aliphatic residue to an aromatic, hydroaromatic, or heterocyclic ring attached to a tertiary alc. group, are prepd. by the action of org Mg compds. on esters of cyclic carboxylic acids contg. an aminoalkyl or alkylaminoalkyl residue directly substituted in the nucleus or attached thereto through N or O. Thus, diphenyl-*p*-(diethylaminoethylamino) phenyl carbinol may be prepd. by treating ethyl *p*-diethylaminoethylaminobenzoate with the Grignard reagent from Mg and PhBr. Other examples are given also. The products are therapeutically useful and resemble ephedrine, hardenine and adrenaline in their effects.

Hydroxyanthraquinone derivatives. WALTHER STRAUB. Ger. 518,215, Feb. 6, 1929. The total content of hydroxyanthraquinone derivs., both free and combined, is extd. from drugs contg. them, *e. g.*, cortex frangulae, by means of a moist org. solvent not completely miscible with water, *e. g.*, Et_2O, $CHCl_3$ or C_2HCl_3. An example is given.

Gold compounds of succinimide. W. J. POPE. Brit. 338,506, July 19, 1929. *Therapeutic compds.* (various formulas of which are given) are prepd. by the interaction of chloroauric acid or Au hydroxide or a salt thereof, or fulminating gold, with succinimide in the presence of a base (suitably by heating in alc.). Compds. contg Br and the CNS radical also are mentioned.

Increasing the hypoglucemic action of insulin. G. RICHTER, LTD. Hung. 101,262, Jan. 28, 1930. Insulin is mixed with ext. of tonsilla.

Antirachitic preparation from yeast. GY. FEHÉR. Hung. 100,696, Aug. 4, 1927. Yeast is boiled with water and KOH or NaOH, then mixed with org. solvents. The upper phase is sepd., concd. and cooled. The fluffy crystals formed are recrystd. from alc., dried and irradiated in thin layers by a mercury lamp. The product is incorporated in cacao butter, mixed with sugar and pressed into tablets.

Vitamin-containing products. AAGE W. OWE. Ger. 472,814, Oct. 11, 1924. See Norw. 44,018 (*C. A.* **25**, 1336).

Liver esterase. HEINRICH KRAUT. Ger. 518,024, Jan. 5, 1928. Liver exts. are dialyzed against running water, whereby salts are removed and part of the albumin content is flocculated. The residual soln. is treated with an adsorbent, *e. g.*, kaolin or Al_2O_3, which adsorbs the remaining albumins. The purified solns. so obtained are suitable for therapeutic use. An example is given.

Hormones. SIGMUND FRÄNKEL. Austrian 121,007, Aug. 15, 1930. Details are given of the extn. of hormones from testicles by a process similar to that described in Brit. 292,962 (*C. A.* **23**, 1474–5). Cf. *C. A.* **24**, 3608.

Active lipoids. HENRI ISCOVESCO (to Health Products Corp.). U. S. 1,796,027, March 10. Dry pulverized organs such as testes, heart muscle, brain, adrenal cortex,

adrenal total, intestine, stomach, ovary, corpus luteum, red corpuscle, mammary gland, thymus, kidney, pancreas, total pituitary, placenta, prostate, lung, spleen, thyroid and liver are extd. with ether, $CHCl_3$ and alc. The solns. thus obtained are treated with acetone to effect pptn. of a lipoid-contg. material, and the ppt. is sepd. from the soln. and is treated successively with cold abs. alc., ether and $CHCl_3$ to effect purification if desired by soln. and subsequent repptn. with acetone. The starting material, such as cod livers, may be given a preliminary extn. with acetone. Various details and modifications of procedure are described.

Purifying olive oil or other vegetable oils. H. HATAKEYAMA and H. WATANABE. Brit. 339,011, Sept. 12, 1929. Remaining traces of fatty acids in partially purified oil are esterified with an aromatic alc. such as benzyl alc., phenylethyl alc., hydroxybenzyl alc. or cinnamic alc. to prepare a fully purified oil suitable for use as a *solvent for medicinal injections*.

Sterilization vessel for injection liquids. RUDOLF SCHMITZ. Ger. 515,947, Mar. 19, 1929.

Soaps, creams, etc. AUBERT C. J. PARENT. Fr. 695,218, Aug. 28, 1929. Esters of the *p*-aminobenzoic and phthalic series are incorporated in soaps, creams and other toilet prepns. Those esters classed as toxic are excluded.

Vermicidal composition. WM. E. WATERHOUSE. U. S. 1,796,070, March 10. A compn. suitable for killing worms consists of a water-sol. brown powd. material prepd. from powd. oil-extd. mowrah seeds by first extg. with water and then evapg. this soln. to dryness.

Improvement of tobacco and tobacco products. I. SCHÖN and I. HERCZEGH. Hung. 100,779, Sept. 24, 1929. Tobacco is moistened with a soln. contg. hygroscopic disinfectant and must-preventing agents, *e. g.*, 1000 g. water, 2.5 g. camphor, 1 g. saffron flour, 100 g. sirupus kaliumsulfoguajacolicus, 100 g. dild. alc. and 6 oz. $ZnSO_4$.

18—ACIDS, ALKALIES, SALTS AND SUNDRIES

E. M. SYMMES

Manufacture of synthetic nitric acid and its salts. E. GUERIN. *Rev. chim. ind.* **39**, 258–62(1930).—A review. P. THOMASSET

The process of intensive production of sulfuric acid. E. OWSIANY. *Chem.-Ztg.* **55**, 76(1931).—App. is inserted between Glover towers and the first chamber, and between the first 2 chambers, mechanically to disperse, compress and expand the components, to ensure better contact. The consumption of pyrites was increased from 36.3 to 46.8 tons, and the H_2SO_4 made in the chambers decreased 11.8%, the balance being produced in the intensive mixers. E. M. SYMMES

The navy's sulfuric acid plant. H. M. COSTER. *U. S. Naval Inst. Proc.* **57**, 317–9(1931).—This plant, at the Naval Powder Factory, Indian Head, Md., is of the Grillo-Schröder type with Pt-$MgSO_4$ contact mass, having a rated capacity of 70 tons of 100% H_2SO_4 per 24 hrs. Several special features of the plant are described: (1) *a SO_2 recorder* operating on thermal-cond. principles, which enables the operator to supply gas of uniform SO_2 content to the converter; (2) a special *app. for detg. the strength of oleum* by cond. measurement; (3) a unique method for adding automatically the necessary water to the absorbing towers by admitting a mixt. of water and steam into a by-pass line in the circulation system. These features greatly reduce the cost of operation and simplify plant control. C. G. STORM

Problems of a Hungarian nitrate factory. T. SZAFFKA. *Technika* **10**, 155–60, 185–91, 247–52(1929).—Methods of nitrate manuf. in different countries are described. The Hungarian factory should avoid arc fixation of N_2, and should only use Ca cyanamide or synthetic NH_3 methods. S. S. DE FINÁLY

The manufacture of potassium metabisulfite. I. FERRAN. *Quim. e ind.* **7**, 277–9 (1930).—The manufacture of $K_2S_2O_5$ is described. Cost figures (in pesetas), in a plant making $Na_2S_2O_5$ at the same time, are 1027 kg. of 92% KOH 1129.7, 1422 kg. of 98% K_2CO_3 1707.6, 1138 kg. of 98% S 318.65, 247 kw. hrs. 74.1, water and light 10, 1400 kg. of Cardiff coal 112.0, salaries 135.3, 27 workmen 189, watchman 50, amortization 44 45, charges 71.7; metabisulfite obtained 3100 kg.; cost per 100 kg. of metabisulfite 117.4. S. L. B. ETHERTON

Outline of a potassium dichromate plant. VICTOR MAIDA. *Chimica e industria* **3**, 470–4, 510–3(1928).—$K_2Cr_2O_7$ is obtained by an oxidation of chromate or Cr ore in the presence of CaO and Na_2CO_3. The app. required and a plant sketch, with a calcn.

of cost for a daily production of 3000 kg. $K_2Cr_2O_7$, is given in detail. In Brazil $K_2Cr_2O_7$ can be produced for 876 reis per kg. R. D. BUMBACHER

The production of potassium sulfate from potassium chloride and sulfur dioxide. E. BRITZKE, S. VOLFKOVICH AND M. KAMENSKAYA. *Udobrenie i Urozhai* (*Fertilizers and Crops*) **2**, 492–5(1930).—Expts. with a no. of catalytic agents to speed up the reaction between KCl and SO_2 in the presence of water vapor were made. At 500°, without a catalyst, only 4.5% of the KCl decompd. in 20 hrs. $CoSO_4$, $Co(NO_3)_2$, Fe_2O_3, $Fe(OH)_3$, Al_2O_3, CuO, burned pyrites and a series of slags contg. oxides of Al, Fe, Si, Ca and Na were tried. These were prepd. in the lab. or taken from com. plants. Max. effects were obtained from the slags contg. oxides of Fe, Al, Si and Na. The slag was ground to pass a sieve with 4900 holes per sq. cm., and 0.5% of the slag was added to the salt, which was ground to particles of 0.2–0.4 mm. diam. The yield of sulfate reached 98.2–99.8% in one hr. With 0.1% Fe_2O or 0.01% $Fe(OH)_3$ (of the wt. of KCl) the yield was 78–83% in 3.75 hrs. Burned pyrites gave a yield of 70% in 2 hrs. when 1% was used. With 0.5% CuO the yield reached 44% in 30 min. Various other slags were tried out, but without much improvement. J. S. JOFFE

Formation of carbon disulfide from hydrogen sulfide and coke. T. J. DRAKELEY AND W. J. BAKER. *J. Soc. Chem. Ind.* **49**, 475–8T(1930).—CS_2 in coal gas may be formed by decompn. of org. S compds. in the coal, or by reactions between C and free S derived from pyrites. When H_2S was passed over heated wood C or coke, an extended delay occurred before evolution of gas and CS_2 formation, caused by H_2S absorption by C. Small quantities of CS_2 were formed by the action of H_2S on wood C between 700° and 1000°, or on coke between 600° and 950°. In the tests the max. CS_2 yield was obtained at 2.4 l. of H_2S per hr. passed over. CS_2 was not obtained by the action of H_2S on coke from coal carbonized above 950°, nor was CS_2 obtained from H_2S and C at less than 500° or above 975°. Over 99% of CS_2 is decompd. on passing over wood C or coke at 850–1000°. E. M. SYMMES

Titanium oxide. RENÉ SPEITEL. *Rev. prod. chim.* **34**, 1–5, 40–4(1931).—A review. P. THOMASSET

The kinds of lime and their manipulation. F. EISEMANN. *Tonind.-Ztg.* **55**, 339–40 (1931). F. O. ANDEREGG

Quinquennial review of the mineral production of India for the years 1924 to 1928. Saltpeter. E. H. PASCOE. *Records Geol. Survey India* **64**, 287–92(1930).—The Gangetic plain is famous for its production of saltpeter which is extd. from the earth (1–29% salt). Wood ashes are added to decompose $Ca(NO_3)_2$. The liquors analyze NaCl 15.25, KNO_3 7.24, KCl 0.40, $MgCl_2$ 0.20, $CaCl_2$ 0.10, $CaSO_4$ 0.10 and $MgSO_4$ 0.10%. ALDEN H. EMERY

The solubility of salt, alone or in combination, in water and brines at temperatures below and above 100°. W. FROEHLICH. *Mitt. Kali-Forschungs-Anst.* **1929**, 37–66; *Chem. Zentr.* **1929**, II, 2485.—F. detd. the solubilities of KCl, NaCl and $MgSO_4$ in H_2O; of NaCl in the presence of KCl in H_2O; of $MgSO_4$ in H_2O contg. different quantities of $MgCl_2$; of NaCl in the presence of KCl in technical sylvinite extn. liquor and in van't Hoff's liquor Q 20; and of carnallite in the liquor Q 20. All detns. were made in an autoclave between 100° and 200°; in a few cases also some known figures at temps. below 100° were reëxamd. The values obtained are plotted in wt. %, and the curves are continued to the fusion temp., where the relation of salt to solvent becomes 100:0. For quantities of KCl + NaCl dissolved simultaneously in 100 g. soln. this line is absolutely straight, and at 722° it meets the m. p. of a mixt. contg. 1 mol. NaCl + 4 mols. KCl, according to the known fusion diagram of the mixt. of both chlorides, while from 120° downward NaCl shows an unvaried soly. of 16.4%. The most recent detns. of the soly. of $MgSO_4$ were confirmed, and deviating results obtained by F. or earlier investigators were traced to the presence of sediments consisting of labile hydrates; these hydrates hold an intermediate position between the stable hydrates $MgSO_4.6H_2O$ and $MgSO_4.H_2O$. G. SCHWOCH

The processing of sylvinite at temperatures above 100°. Dissolving, crystallizing and heat consumption. W. FROEHLICH AND E. RITTER. *Mitt. Kali-Forschungs-Anst.* **1929**, 67–89; *Chem. Zentr.* **1929**, II, 2485.—By means of the figures obtained for soly. in solns. satd. with NaCl and KCl (cf. preceding abstract) the sepn. of dissolved salt on cooling the soln. is calcd. The soly. of NaCl in a soln. satd. with KCl is greatest at 80°. Thus when such a soln. is cooled, NaCl + KCl is sepd. down to this temp.; NaCl is just dissolved again by solns. satd. at 150° and cooled to 20°, provided that the solns. are thoroughly agitated. Thus at a soln. temp. below 150°, KCl free from NaCl can be produced, while above 150° only KCl contg. NaCl is obtained. When the cooling is accompanied by evapn. of H_2O, as occurs especially in the vacuum cooling app.,

a mixt. of NaCl and KCl is obtained, which affects the results accordingly. In any case, a quantity of H_2O sufficient to keep the NaCl in soln. can be added. The kind and proportions of salts and liquor, as well as the H_2O to be added, are calcd. for a dissolving temp. of 100° and 200°, and for cooling with or without evapn. and with or without addn. of H_2O. These calcns. are carried out with reference to the practical conditions met with in the soln. of sylvinite. These conditions are discussed, together with thermotheroretical considerations on soln. at temps. above 100°. G. S.

Modern arrangements for extracting salt from the ocean in East Africa. Fr. Riedig. *Intern. Bergwirtsch. u. Bergtech.* **23**, 142–3(1930); *Kali* **24**, 271–3, 294–7(1930).—A brief description of the salt-extn. plant in the Italian colony Somaliland, claimed to be the largest ocean salt works in the world. E. I. S.

Commercial manufacture of hydrogen. E. Guerin. *Rev. chim. ind.* **39**, 354–7 (1930).—A short description is given of the methods in use. P. Thomasset

Mechanical mining and treatment of sulfur. J. B. Nealey. *Eng. Mining J.* **131**, 253–5(1931).—The practices at the Hoskins Mound and Bryanmound, Tex., plants of the Freeport Sulphur Co. are described. W. H. Boynton

Mica. J. H. Frydlender. *Rev. prod. chim.* **33**, 549–54, 584–6, 616–9, 654–5 (1930).—A review. P. Thomasset

Bleaching earths. O. Eckart. *Seifensieder-Ztg.* **58**, 132–3(1931).—Kaolins without bleaching properties yield their H_2O at 450–700°, while bleaching earths give off their H_2O rather uniformly between 200° and 900°; the nearer this curve comes to a straight line, the better is the bleaching power. A bleaching earth that has been acid treated follows the same rule, this indicating that bleaching earths possess a gel body and non-bleaching earths a cryst. body. By mixing 10 g. of oil with 10 g. of earth at room temp. bleaching earths showed an increase in temp. ("heat of wetting") of 4–13°, while non-bleaching earths showed a rise of 1°. P. Escher

Washing and bleaching clays of Azerbaidzhan (bentonites and floridines). S. A. Kovalevskii. *Azerbaĭdzhanskoe Neftyanoe Khozyaĭstvo* 50 pp (1931). —Natural deposits are described. Bleaching clays as yet discovered require activation with H_2SO_4, but scarcity of acid prevents their immediate utilization. V. K.

Preparation of HCN (Gluud, Keller) **6**. Apparatus for mixing acids (Brit. pat. 338,440) **1**. HNO_3 production (Brit. pat. 338,497) **13**.

Kali-Kalender, 1931. Taschenbuch für Kalibergbau und Kalindustrie. Edited by C. Hermann. Halle (Saale): W. Knapp. M. 5.20.

Kausch, Oskar: **Die Kontaktstoffe der katalytischen Herstellung von Schwefelsäure, Ammoniak und Salpetersäure.** Halle (Saale): W. Knapp. 216 pp. M. 21; linen, M. 23.

Lendel, E.: **Interferometrische und spektroskopische Untersuchungen zum Nachweis von Unterschieden zwischen natürlichen Quellsalzen und irhen künstlichen Ersatzprodukten.** Berlin: Schoetz. 39 pp. M. 3.

Standage, H. C.: **Cements, pastes, glues and gums.** London: Crosby Lockwood. 164 pp. 3s. 6d.

Chromic acid and sodium bisulfate. Harshaw Chemical Co. Brit. 338,938, July 30, 1929. Reaction between oleum and $Na_2Cr_2O_7$ is effected in an *app.* (details of which are described) so that molten products are produced directly which are then sepd. by centrifuging or settling; either or both products may be solidified by spraying or atomizing.

Nitric acid. N. Caro and A. R. Frank. Brit. 338,566, Aug. 13, 1929. NH_3 is oxidized with O or gases contg. O under normal pressure, resulting N oxides are compressed to "several atm." pressure in a turbo compressor and at this pressure are converted into HNO_3 by condensation and absorption. Cf. *C. A.* **24**, 5946.

Sulfuric acid. Willi Büsching. U. S. 1,795,995, March 10. See Fr. 673,105 (*C. A.* **24**, 2552).

Concentrating sulfuric acid. P. I. Kharitonov. Russ. appl. 58,870, Nov. 23, 1929. H_2SO_4 is concd. by hot vapors from the Kessler and Gaillard app. by first directing these gases contg. SO_2 and SO_3 into a superheater, where they are heated to 900–1200°, followed by their recycling through the concn. app. to conc. new portions of H_2SO_4 and to eliminate losses in S oxides by means of a continuous recycling of gases used for heating.

Material resistant to acids and alkalies. Kábelgyár, Ltd. Hung. 101,471, Jan.

24, 1930. S and Se are used together with animal hairs, paper sheets, waste cloth or materials, which in themselves are not resistant to acids and alkalies. The mixt. is pressed to forms, then heated under pressure to a temp. higher than the m. p. of S or of Se.

Alkali and alkaline earth metals. JAN H. DE BOER (to N.-V. Philips' Gloeilampenfabrieken). U. S. 1,797,131, March 17. See Brit. 323,718 (*C. A.* **24**, 3329).

Alkali and alkaline earth carbonates and chlorides. Soc. ANON. ALCALINA. Brit. 339,330, Aug. 1, 1929. See Belg. 358,292 (*C. A.* **24**, 925).

Alkali chromates. BOZEL-MALETRA (SOC. INDUSTRIELLE DE PRODUITS CHIM.). Fr. 37,257, Jan. 28, 1929. Addn. to 683,604. The amt. of alkali used is limited to the equiv. necessary for the formation of dichromate instead of chromate.

Alkali chromates. O. F. TARR (to Mutual Chemical Co. of America). Brit. 338,469, April 3, 1929. See U. S. 1,752,863 (*C. A.* **24**, 2553).

Alkali chromites. BOZEL-MALETRA (SOC. INDUSTRIELLE DE PRODUITS CHIM.). Fr. 37,256, Jan. 25, 1929. Addn. to 683,179 (*C. A.* **24**, 4593). Alkali chromites are prepd. by heating ores of Cr in the presence of alkalies in a reducing atm. or in a reducing medium, with or without pressure. The Fe obtained is sepd. by known means.

Alkali and alkaline earth metal cyanates. DEUTSCHE GOLD- UND SILBER-SCHEIDEANSTALT VORM. ROESSLER. Brit. 339,220, April 10, 1929. Urea is heated in the absence of solvents (suitably to 120–150°) with basic alkali metal compds. such as soda or potash or alkali hydrides (but excluding alkali hydroxides) or with alk. earth metal compds. such as CaO, $Ca(OH)_2$, or Ca carbide, hydride, amide or carbonate. NH_3 is evolved and recovered, and C_2H_2 also is formed when CaC_2 is used. Alk. earth metal cyanates obtained may be treated in aq. suspension or soln. with alkali metal compds. such as NaCl to produce alkali metal cyanates.

Cyanates and cyanamides. I. G. FARBENIND. A.-G. Brit. 339,371, Sept. 13, 1929. Cyanates and cyanamides are prepd. by heating urea with oxides or carbonates of bivalent metals such as the alk. earth metals (including Mg) and metals above Hg in the electromotive series such as Zn, Cd, Cu, Ni and Pb. At temps. between 130° and 400° mainly cyanates are formed, and at higher temps., cyanamides. NH_3 and CO_2 can be used instead of urea, and various modifications and details of procedure are described.

Cyanides and ferrocyanides. EMIL HENE. Ger. 515,850, Dec. 22, 1928. Alkali sulfates, CaO and H_2S are allowed to react to produce alkali hydrosulfides and $CaSO_4$. The latter is removed by filtration. The hydrosulfides are obtained by evapn. and heated with $C_2N_2(NH_2)_2$ to produce alkali thiocyanate and NH_3. The thiocyanate is heated with Fe or H or both to produce alkali cyanide and FeS or H_2S. The FeS reacts with the alkali cyanide to form ferrocyanide. Extn. with cold water removes the alkali cyanide, and extn. with hot water removes the ferrocyanide and alkali sulfide, which are sepd. by fractional crystn. The alkali sulfide is worked up to alkali sulfate.

Alkali metal hydrides. HERMANN FREUDENBERG and HARRY KLOEPFER (to Deutsche Gold- und Silber-Scheideanstlat vorm. Roessler). U. S. 1,796,265, March 10. Finely divided alkali metal is subjected to the action of H at temps. of about 180–300°.

Alkali phosphates; hydrogen chloride. METALLGES. A.-G. Ger. 518,203, Dec. 30, 1928. These are prepd. from alkali chlorides and P_2O_5 by introducing vaporized or solid P_2O_5 into a melt of alkali chloride into which steam is led.

Alkali sulfates. KALI-CHEMIE A.-G. Ger. 515,930, Jan. 18, 1927. In producing alkali sulfates from alkali chlorides by treating them with flue gases and steam, a 1% addn. of surface-active material such as clay, bauxite, SiO_2, etc., is present. Thus, the chlorides may be briquetted with rock salt, burned clay or fuller's earth before submission to the flue gas and steam.

Aluminates. MAX PASCHKE. Ger. 518,204, Feb. 15, 1927. Water-sol. aluminates are obtained as by-products in the manuf. of crude Fe, by adding Na compds., particularly Na_2CO_3, to the blast-furnace charge. The aluminates are extd. from the slag with hot water.

Metal salts by the double decomposition of salts with sulfates. I. G. FARBENIND. A.-G. (Otto Balz, inventor). Ger. 514,651, Nov. 15, 1927. HPO_3 or its salts are added. Gypsum is obtained as a by-product if Ca salts are used. Thus, $Ca(NO_3)_2$ soln. is treated with HPO_3 and hot 90% K_2SO_4 soln. The resulting KNO_3 soln. is readily sepd. from the coarse $CaSO_4$ produced. Other examples are given.

Metal carbonyls. I. G. FARBENIND. A.-G. Fr. 37,284, July 29, 1929. Addn. to 677,548 (*C. A.* **24**, 3329).—The process of the prior patent is carried out by mixing the primary material with liquids or molten masses and afterward treating with CO

to produce carbonyls under such conditions that the liquids or molten masses are in the gaseous phase or almost exclusively so during the reaction.

Aluminum chloride. I. G. FARBENIND. A.-G. Fr. 695,124, May 6, 1930. See Ger. 515,033 (*C. A.* **25**, 1644).

Ammonium nitrate. E. E. LIDER and I. E. KOROBCHANSKII. Russ. appl. 35,845, Nov. 22, 1928. NH_4NO_3 is prepd. from HNO_3 and NH_3 in a vacuum neutralizer connected by pipes successively with a column which acts as a trap for NH_3 and with a heat exchanger used for preheating HNO_3 passing into the neutralizer.

Ammonium nitrate. ODDA SMELTEVERK AKTIESELSKAPET and E. JOHNSON. Brit. 339,562, March 4, 1929. See Fr. 690,757 (*C. A.* **25**, 1342).

Ammonium sulfate. I. BÁLINT. Hung. 101,900, May 26, 1930. Na_2SO_4 is treated in soln. with NH_3 and CO_2. NH_3, however, is not regenerated from the mother liquor after the pptn. of $NaHCO_3$, but evapn. is continued and the soln. cooled until $(NH_4)_2SO_4$ is produced. To mother liquor contg. $(NH_4)_2SO_4$ may be added NH_4NO_3 in order to produce the double salt for use as fertilizer.

Borax. AMERICAN POTASH & CHEMICAL CORP. Fr. 37,316, Aug. 10, 1929. See Brit. 330,453 (*C. A.* **24**, 5949).

Carbon disulfide. ZAHN & Co. G. M. B. H. Fr. 37,206, July 10, 1929. Addn. to 672,766 (*C. A.* **24**, 2252). The CS_2 is cooled in the condenser to a temp. a little below its b. p. so that only a small quantity of H_2S is absorbed, which is afterward removed in known manner in the separator. Preferably, the gases liberated from the condenser are brought into a second condenser of the same kind but of smaller dimensions, from which the condensed materials are returned to the retort.

Separating calcium and magnesium chlorides from brines. WM. R. COLLINGS (to Dow Chemical Co.). U. S. 1,796,920, March 17. Tachydrite crystals are sepd. from a mother liquor having a higher proportion of $CaCl_2$ to $MgCl_2$ than the original soln.; the crystals are dissolved in a limited quantity of water with heating such that a soln. is produced from which on cooling to about 30° crystals of $MgCl_2$ hexahydrate will be pptd. and the filtrate remaining from the crystals will be of approx. 42.5–43° Bé. This filtrate retains the $CaCl_2$ in soln. at 30°.

Calcium-magnesium chloride. WM. R. COLLINGS and JOHN J. SHAFER (to Dow Chemical Co.). U. S. 1,796,885, March 17. A free-flowing non-caking mixt. of hydrated crystals of chlorides of Mg and Ca is pptd. as crystals of tachydrite and $CaCl_2$ dihydrate from a soln. satd. with the chlorides, and the crystals are superficially dehydrated to the point which avoids caking together. U. S. 1,796,886 relates to superficially dehydrating crystals after pptn. as crystals of the hydrated double chloride $MgCl_2.2CaCl_2$, $6H_2O$ and $CaCl_2$ dihydrate. Cf. *C. A.* **24**, 927.

Calcining lime or dolomite. W. VOSS and VULCAN-FEUERUNG A.-G. Brit. 339,105, Nov. 27, 1929. Water which is injected into a shaft kiln for calcining lime or dolomite is cooled nearly to the f. p. to prevent its conversion into steam before it contacts with the charge.

Hydrating lime. CLARENCE R. REX. U. S. 1,796,396, March 17. Various details are described for mixing a measured quantity of water with a measured quantity of quicklime, detg. the vol. of the water and the rate of supplying it to the lime and mixing to approx. a constant temp. during the reaction (the reaction being checked as complete by predetd. increase in vol.) so as to constitute a standardized com. operation.

Copper sulfate briquets. HUNGÁRIA MŰTRÁGYAGYÁR, LTD. Hung. 101,213, Feb. 1, 1928. $CuSO_4$ crystals of 0.25 to 5.00 mm. are formed by interrupted crystn. and briquets are formed from these. Generally no cementing matter is required since postcrystn. takes place after briquet formation. The briquets may be moistened with concd. mother liquor.

Hydrogen peroxide. ELEKTROCHEMISCHE WERKE-MÜNCHEN A.-G. Ger. 515,596, Sept 7, 1926. Solns. of H_2O_2 in caustic alkali are preserved and used in vessels of Al or its alloys.

Ferric phosphate. METALLGES. A.-G. (Freiherr Conway von Girsewald and Hans Weidmann, inventors). Ger. 518,315, May 30, 1929. The manuf. of $FePO_4$ by roasting ferro-phosphorus in air is accelerated by addn. of a catalyst, *e. g.*, NaCl or Na_2CO_3.

Iron carbonyl. I. G. FARBENIND. A.-G. (Alwin Mittasch and Carl Müller, inventors). Ger. 518,387, Dec. 16, 1924. Addn. to 499,296 (*C. A.* **24**, 4127). The method of Ger. 499,296 is extended to the use of Fe in non-spongy form. The preliminary reduction, if applied, should take place in a vessel sep. from that in which the carbonyl is prepd.

Liquefying nitrogen oxides. I. G. FARBENIND. A.-G. (Christoph Beck and Heinrich Diekmann, inventors). Ger. 518,386, Aug. 19, 1927. In sepg. N_2O_4 from gas

mixts., with or without other oxides of N, by liquefaction at atm. or raised pressure, the vapor pressure of the N_2O_4 is reduced by addn. of up to 10% of HNO_3 in liquid or vapor state. The added acid may first be enriched in oxides of N. If the gas mixt. is moist and contains O, the necessary acid may be formed *in situ*. Cf. *C. A.* **24**, 670.

Apparatus for adsorbing nitrogen oxides. V. I. MALYAREVSKII and V. V. PAPKOV. Russ. appl. 21,946, Nov. 28, 1927, 37,713 and 37,714, Dec. 28, 1928. Mechanical features.

Separation of salts of radium and barium. IVAN YA. BASHILOV. Ger. 515,681, July 24, 1925. See Russ. 5046 (*C. A.* **23**, 1059).

Separation of rubidium or cesium salts from alkali salts. KALI-FORSCHUNGS-ANSTALT G. M. B. H. (O. F. Kaselitz and Hans Grasshoff, inventors). Ger. 515,851, Mar. 22, 1930. Complete sepn. of technically pure Rb or Cs salts from alkali salts is effected by pptg. the Rb and Cs as alkali-Mg double phosphates. Thus, carnallite contg. 4% $RbCl_2$ is dissolved in water and treated with $Na_2HPO_4.12H_2O$. The ppt. is Rb-free $MgHPO_4.7H_2O$. The filtrate is treated with further $Na_2HPO_4.12H_2O$ and neutralized. The salt $MgRbPO_4.6H_2O$ is pptd., free from K. This ppt. is sepd. and dried. A further example is given.

Caustic soda; ammonium chloride. ALFRED MENTZEL. Ger. 510,093, Mar. 27, 1929. $NaHCO_3$ prepd. by the ammonia-soda process is mixed with C and treated with N at a high temp. The NaCN so obtained is treated with steam, NaOH and NH_3 being obtained. The latter is returned to the ammonia-soda process and ultimately recovered as NH_4Cl.

Sodium peroxide. HECTOR R. CARVETH (to Roessler & Hasslacher Chemical Co.). U. S. 1,796,241, March 10. Na_2O_2 is made by treating with O a pulverulent mixt. of Na_2O and not over 10% of finely divided metallic Na at a temp. of 200–350°. App. is described.

Titanium dioxide. JOSEPH BLUMENFELD (to Commercial Pigments Corp.). U. S. 1,795,467, March 10. A soln. of a Ti salt such as the sulfate is slowly added to water or to a soln. of lesser concn. while agitating, so that colloidal particles of TiO_2 are produced. Cf. *C. A.* **24**, 4175.

Verdigris. A. A. SVITZUIN. Russ. appl. 35,471, Nov. 17, 1928. Cu powder, obtained by pulverizing molten Cu, is treated with $Cu(OAc)_2$.

Treating silicates. F. JOURDAN. Brit. 339,028, Oct. 22, 1928. See Fr. 682,764 (*C. A.* **24**, 4594).

Treating greensand and other materials containing potassium. ARTHUR LAMBERT (to Cosmic Arts, Inc.). U. S. 1,797,002, March 17. The material is treated with an acid such as HCl or H_2SO_4 and with a basic Na compd. such as Na_2CO_3 to produce a substantially neutral soln. contg. K and Na salts, and the Na is then pptd. as $NaHCO_3$, the K salts being left in soln. Various modifications of procedure are described.

Treating kaolin, etc. R. ILLNER. Brit. 338,726, Dec. 13, 1928. Materials such as clay, kaolin, diatomaceous earth and sericite earth are improved by treating them in suspension with a slightly sol. salt such as $CaSO_4$ or $CaSO_3$ by stirring with such salts (which may be formed *in situ*). The material may also be treated with a bleaching agent or mixed with ultramarine or indanthrene blue for improvement of color. Brit. 338,730 describes stirring the material in acid suspension with $Na_2S_2O_4$, blowing with air, and adding $Ca(OH)_2$ with or without addn. of blue coloring substances.

Stabilizing solutions of per-compounds. ÖSTERREICHISCHE CHEM. WERKE G. M. B. H. Ger. 518,402, Sept. 22, 1926. See Austrian 119,036 (*C. A.* **25**, 385).

Activated carbon. SOC. DE RECHERCHES ET D'EXPLOITATIONS PÉTROLIFÈRES. Fr. 695,212, Aug. 27, 1929. Carbonaceous materials are heated with combustion gases or combustion residues and then activated with activating gases which are of such a compn. that they produce combustible gases. Activating gases which may be used are O, steam or CO_2, alone or mixed with Cl or HCl. Cf. *C. A.* **24**, 2558.

Reactivating carbon. METALLGES. A.-G. Brit. 338,500, June 8, 1928. Reactivation of C in lump form is effected en masse in a container such as an adsorber by preheating at least a portion of the material and then treating it with a gas or gas and vapor mixt. contg. less than 8% O. The preheating is then discontinued and the heating gas supplied at a temp. not substantially greater than 250° and preferably below 200° (thus effecting a localized reactivation zone formation, with travel of this zone in the direction of the gas flow). Cf. *C. A.* **24**, 1188.

Dispersion of carbon black in water. CHARLES R. PARK (to The Goodyear Tire and Rubber Co.). Can. 309,276, Mar. 10, 1931. Carbon black is exposed to the vapors of a material selected from a class comprising petroleum distillate and pine distillate to increase its dispersibility in later.

Bone black. T. L. WHEELER and J. B. CARPENTER (to Baugh & Sons Co.). Brit. 338,476, April 11, 1929. See Ger. 512,484 (*C. A.* 25, 1045).

Amorphous carbon from tar. ALEXANDER L. ULLRICH. U. S. 1,796,815, March 17. A solvent such as benzol is added to tar liquefied by heating, and to this mixt. there is added a relatively heavy hydrocarbon material such as fuel oil or kerosene in proportion to cause pptn. of the carbon particles of the mixt.; the ppt. is removed and treated with a solvent such as a light oil to remove sol. constituents, and the remaining substantially pure carbon is dried after being sepd. from the assocd. solvent.

Sulfur from sulfide ore. RAYMOND C. BENNER and ALFRED P. THOMPSON (to General Chemical Co.). U. S. 1,795,705, March 10. A mixt. of sulfide ore such as pyrites or pyrrhotite and a carbonaceous reducing agent such as coal is contacted in co-current flow with an oxidizing gas such as air, and the carbonaceous material is employed in sufficient quantity to effect reduction of the S to its elemental form. App. is described. Cf. *C. A.* 24, 2557.

Condensation products containing sulfur. I. G. FARBENIND. A.-G. Brit. 338,604, Aug. 24, 1929. Condensation products such as those formed from glycerol, ricinoleic acid and phthalic anhydride or similar initial materials, of oily to resin-like character, are heated with S or S compds. such as S monochloride (suitably at 160–70°) to produce products sol. in hydrocarbons and oils and suitable for use in the manuf. of stains, filling or priming compns., cements and varnishes, together with oils, resins, cellulose derivs., softening or plasticizing agents and siccatives. Several examples with details of procedure are given.

Sulfur and bentonite mixture suitable for use in making molded products. CARLETON ELLIS (to Ellis-Foster Co.). U. S. 1,795,364, March 10. A dry mixt. contg. S 90 and bentonite 10% is prepd. by grinding the materials with water and drying the dispersion thus formed at a temp. below the sintering point of S. Quicklime 1% may be added, and the compn. may be used with asphalt for waterproofing roofing, etc.

Artificial substances. SOC. ANON. POUR L'IND. CHIM. À BÂLE. Fr. 37,496, Oct. 7, 1929 Addn. to 646,922 (*C. A.* 23, 2257). Artificial substances are prepd. by condensing in the presence of acid 1 mol. of an aromatic amine with almost 1 mol. of an aldehyde or the equiv. of an agent capable of liberating an aldehyde and converting the fusible resin thus formed, after elimination of acid, either alone or mixed with fillers, dyes, softening agents, etc., to the infusible state with hardening agents. Examples are given. Cf. *C. A.* 24, 5119; 25, 1046.

Preparing artificial masses. G. S. PETROV and A. K. PETROV. Russ. appl. 35,158, Nov. 12, 1928. Addn. to pat. 360. Artificial masses obtained according to pat. 360 are also prepd. from powdered substances such as are obtained in the treatment of cellulose with hydrating substances, *e. g.*, $ZnCl_2$, KSCN or caustics.

Plastic material. K. I. TARASOV. Russ. appl. 24,198, Feb. 25, 1928; 29,211, June 22, 1928. Addn. to pat. 10,398. Gypsum or a mixt. of gypsum with kaolin or chalk or with hydrocellulose or wood flour is mixed with casein which was preliminarily treated with condensation products of phenol and formalin, and the whole is treated according to pat. 10,398.

Plastic composition. STEFAN DISSMAIER. Austrian 121,553, Oct. 15, 1930. The compn. comprises wood pulp and comminuted leather waste, in approx. equal amts., and a water-insol. org. binder, *e. g.*, resin size. It may be used for coating masonry, protecting steam or water pipes, making buttons, etc.

Adhesive for bronze printing, etc. REINHOLD WOLFFRAM. Ger. 515,522, Mar. 20, 1929. A cement of sufficient adhesiveness for bronze printing, etc., is prepd. by incompletely fermenting a mixt. of dextrin and glucose with yeast and adding H_2O_2 or Na_2O_2. The fermentation is carried out at about 24°, and 0.3 to 1% NaOH and a small quantity of aq. castor-oil emulsion may be added. A conserving agent such as B_2ONa_2 may also be added.

Cement for uniting glasses of bi-focal spectacle lenses. A. BANISTER. Brit. 338,555, Aug. 20, 1929. A mixt. is used comprising cellulose acetate, glucose and acetone oil.

"Basing cement" for uniting lamp bulbs to bases. CLETUS C. VAN VOORHIS (to Westinghouse Lamp Co.). U. S. 1,795,746, March 10. A conducting substance such as graphite and an alc.-sol. gum such as shellac are used with $BaSO_4$, marble flour and a volatile solvent such as alc.

Decorating asbestos-cement slabs. HAWENTA-PLATTEN-GES. M. B. H. Ger. 477,210, July 16, 1927. See Brit. 327,871 (*C. A.* 24, 5129).

Wetting, etc., agents. H. TH. BÖHME A.-G. Fr. 37,134, June 18, 1929. Addn. to 671,456 (*C. A.* 24, 2257). Wetting, cleaning and impregnating agents for use in

the textile and other industries are made by sulfonating alcs. of high mol. wt. of the fatty acid or oleic acid series in the presence of anhyd. org. acids, their anhydrides or chlorides. Cf. *C. A.* **24**, 5952.

Wetting, etc., agents. I. G. FARBENIND. A.-G. Fr. 37,163, June 29, 1929. Addn. to 632,155. Non-aromatic hydrocarbons contg. more than 8 C atoms in the mol. and their derivs. are sulfonated with gaseous SO_2, preferably in the presence of an org. diluent. Examples are given.

Wetting, etc., preparations. I. G. FARBENIND. A.-G. Fr. 37,122, June 24, 1929. Addn. to 624,010. Prepns. having the properties of soaps to a very high degree and also a wetting and emulsifying power are composed of sulfonic acids of aliphatic, hydroaromatic, aromatic or heterocyclic compds. having the properties of soaps, or salts of these acids, and, besides, free sulfonic acids or other org. compds. not having in themselves pronounced soap properties. Thus, propylnaphthalene sulfonic acid is mixed with naphthalene sulfonic acid. Cf. *C. A.* **24**, 4906.

Wetting, foaming, emulsifying, etc., agents. I. G. FARBENIND. A.-G. Ger. 518,408, Jan. 31, 1929. These are prepd. (1) by the reaction of nuclearly halogenated aralkyl halides with aromatic or partly hydrogenated aromatic sulfonic acids during or after the sulfonation process, or (2) by condensing nuclearly halogenated aralkyl halides with aromatic or partly hydrogenated aromatic hydrocarbons and sulfonating the products. Thus, a mixt. of $C_{10}H_8$ and trichlorobenzyl chloride may be sulfonated, or first heated with $ZnCl_2$ and then sulfonated. Examples are given.

Detergent. ELECTRIC SMELTING & ALUMINUM CO. Brit. 339,355, Sept. 7, 1929. See U. S. 1,745,844 (*C. A.* **24**, 1712).

Detergents and lubricants containing fatty acid salts. P. SPENCE & SONS, LTD., and T. J. I. CRAIG. Brit. 338,919, May 21, 1929. A fatty acid such as stearic acid is treated with a soln. of alkali combined with a metal oxide sol. in the alkali such as that of Al or Zn, to produce products such as normal or basic double stearates, palmitates, oleates, etc., suitable for thickening lubricants, use with H_3BO_3 in polishing compns., etc.

Polishing agent. ARTHUR VAN DER BRUGGEN. Fr. 37,403, April 15, 1929. Addn. to 667,360 (*C. A.* **24**, 1191). The polishing agent is made by adding the $PhNO_2$ to the collodion and the acetone to the petroleum to facilitate the mixt. of the petroleum with the collodion in the presence of the $PhNO_2$.

Composition for cleaning and polishing silver. CINDERELLA RAISCH. U. S. 1,795,676, March 10. NaCl 8 oz., quinine chloride 1 oz., $MgSO_4$ 1.5 oz. and indigo 4 drops.

Treating magnesium articles to prevent tarnishing. EDWARD C. BURDICK (to Dow Chemical Co.). U. S. 1,795,473, March 10. The articles are subjected to the action of 10–30% H_2SO_4 soln. and then washed.

Bleaching powder. E. KREBS. Brit. 338,940, July 30, 1929. Lime is treated with Cl in a vertical-shelf absorber, and air is admitted in the bottom portion of the absorber while Cl is admitted at one or more higher points. Various details of the app. and its operation are described.

Trade-marking carbon paper. SAMUEL A. NEIDICH (to Neidich Process Co.). U. S. 1,796,956, March 17. Marking is effected by applying an acid material such as oleic acid capable of increasing the capacity of the web for absorption of waxy, oily transfer material, previous to application of the latter.

Carbon papers for manifolding or transfers. P. MEYER. Brit. 338,673, Oct. 11, 1929. Water-sol. soap and a water-sol. dye are used together (suitably with addn of a small proportion of oil) in prepg. coating compns.

Transfer material. W. S. LAWRENCE and KAUMAGRAPH CO. Brit. 338,611, Aug. 27, 1929. Transfers are formed with a paper base and a compn. contg. ethyl or benzyl cellulose, a resinous material such as cumar, a blown oil such as blown castor oil, and coloring material, and other substances such as Et lactate, tricresyl phosphate, Et abietate and glycol monoethyl ether also may be used in various mixts.

Duplicating printed or written matter. WILHELM RITZERFELD. U. S. 1,795,378, March 10. Reproduction from originals furnished with reverse characters is effected by making the original stencil on a sheet of paper which is thick and soft but has a smooth and dense surface, such as a paper contg. chalk, so that upon producing the stencil the characters are impressed deeply into the paper and form raised reversed characters on its back from which copies are made onto previously moistened copy sheets.

Stencil paper. DANIEL A. WILLIAMS (to A. B. Dick Co.). U. S. 1,795,461, March 10. Paper is coated with a compn. comprising a cellulose ester such as nitrocellulose

or cellulose acetate, glycerol (suitably in a quantity several times that of the cellulose ester), a relatively small proportion of a resin and a solvent which together form a soft stable product easily displaceable by impact of type. Cf. *C. A.* **24**, 4598.

Sound-record compositions. H. J. BILLINGS (to A. D. Little, Inc.). Brit. 339,335, July 17, 1929. Records are formed with a backing (suitably formed of sheets of paper alternating with sheets of fibrous material mixed with a thermoplastic binder), a record sheet (which may comprise shellac 48, graphite 25 and paper pulp 22% together with C black and rosin), and a thin coating comprising shellac which may be mixed with a filler and pigment. Various details of manuf. are described.

Combined sound and picture records. I. G. FARBENIND. A.-G. Brit. 338,817, Feb. 22, 1929. Sound and picture records are produced on a single film, and both records are then copied on a single film having a fine-grained colored emulsion of steep gradation (there being placed before the film bearing the sound record a screen of color complementary to that of the colored emulsion).

Light-diffusing panels. FRANK COLLINS (to Mutual-Sunset Lamp Mfg. Co.). U. S. 1,795,294, March 10. A fine-gauge wire screen fabric is immersed in a clear lacquer which solidifies on exposure to the air and forms a continuous transparent sheet encasing the fabric; there is then applied to one surface of this sheet a translucent color medium such as a colored lacquer compn. to form a design, and the entire opposite surface is treated with a translucent color medium contrasting in color with the design and providing a background.

Freezing-point depressant for use in automobile engine cooling systems, etc. JOHN W. ORELUP and OSCAR I. LEE. U. S. 1,795,883, March 10. Dispersed V oxide is used in compns. such as $CaCl_2$ solns. in order to protect metal parts of the cooling system from corrosion. Dispersed compds. of Th, Zr, Mo, Ta, Cb, Ti, W or U also may be used.

Dual-effect compression method and apparatus for producing carbon dioxide snow. JUSTUS C. GOOSMANN. U. S. 1,795,772, March 10. Various details of construction and operation are described.

Artificial snow. IGNAZ KREIDL. Austrian 120,806, Aug. 15, 1930. Artificial snow for decorative purposes is prepd. by pouring hot water on to a mixt. of a solid fatty acid and an alkali carbonate and beating the mass.

Apparatus (with agitators, screen and brush) for slaking lime. EDWIN J. SHAUT (to Baker Lime Machinery Co., Ltd.). U. S. 1,796,411, March 17.

Substitutes for sugars in industrial processes. I. G. FARBENIND. A.-G. (Otto Schmidt and Egon Meyer, inventors). Ger. 518,196, June 14, 1927. Water-sol. condensation products obtainable from aliphatic aldehydes are used as substitutes for glucose and other sugars in processes such as *printing or dressing textiles, filling transparent soaps, improving the elasticity of cements and adhesives, chrome tanning* and *coagulating latex*. Suitable condensation products may be obtained from CH_2O, glycolic aldehyde, glyoxal, or mixts. of CH_2O and AcH by treatment with a mild alk. reagent at a temp. between 0° and 100°. Examples are given.

Magnetic structures or cores. JACK C. CHASTON and JOHN P. JOHNS (to Western Elec. Co.). U. S. 1,795,639, March 10. Particles of magnetic material such as a Ni-Fe alloy contg. 80% Ni are insulated (suitably by CrO_3, Na silicate and talc) and the insulated particles are compressed to suitable form and then subjected to the action of a fluid such as moist air for a sufficient time to appreciably change the character of the insulating material as by swelling, and the resulting product is then heat treated.

Material for brake linings, clutch facings, etc. AURBORN L. HAGER and LON S. HAGER. U. S. 1,797,141, March 17. A fabric material is impregnated with a liquid mixt. comprising graphite, white lead and creosote. U. S. 1,797,142 relates to manuf of similar material by weaving a fabric and during the weaving impregnating it with a liquid mixt. comprising graphite, white lead and creosote, and heating the woven impregnated material to harden the white lead and graphite.

Fireproofing peat, etc. E. DYCKERHOFF. Brit. 339,067, Oct. 30, 1929. Peat or similar material is rendered substantially fireproof and non-smouldering by treatment with fireproofing solns. such as H_3PO_4 (suitably with heat and pressure), and the treated material is pressed and dried and may be formed into peat meal or shaped or pressed articles.

19—GLASS, CLAY PRODUCTS, REFRACTORIES AND ENAMELED METALS

G. E. BARTON, C. H. KERR

Glass. K. LOENBERG-HOLM. *Arch. Rec.* 68, No. 4, 327–58(1930).—The properties of glass as a building material are discussed. E. I. S.

Expansion measurements of several glasses by means of a self-registering apparatus. WILLI M. COHN. *J. Am. Ceram. Soc.* 14, 265–75(1931); cf. *C. A.* 24, 4434.—The app. registers photographically. Quartz glass is used as a control material. Slight variations which might escape visual observation can be detected. If results thus obtained are used a close regulation of annealing is made possible. C. H. KERR

Variations caused in the heating curves of glass by heat treatment. A. Q. TOOL AND C. G. EICHLIN. *J. Am. Ceram. Soc.* 14, 276–308(1931).—Variations in heating curves, due to previous heat treatment, are fully indicative of the nature of such treatment and they also bear a relation to changes in other characteristics of the glass. Differences in heating curves arise from differences in thermal properties, especially exothermic and endothermic effects. It is possible by rapid cooling to suppress the exothermic processes to a great extent and thus prep. the way for relatively large exothermic effects on subsequent heating. Annealing procedures may often be so manipulated that the resultant changes in certain properties, such as n, will cause a glass to meet certain standard specifications, when otherwise it would not. Also in *Bur. Standards J. Research* 6, 523–52(1931). C. H. K.

Devitrification. F. W. PRESTON. *Glass Ind.* 12, 1–3(1931).—During the slow cooling down of a soda-lime-silica glass melt, the first crystals which form are usually tridymite, wollastonite, or $Na_2O.3CaO.6SiO_2$, especially the last compd., according to Morey, *C. A.* 24, 5448, rather than cristobalite and wollastonite as stated by Dietzel, *C. A.* 24, 5447. Diagrams are given showing which cryst. phase may be expected if devitrification does occur in soda-lime-silica glass of any known compn. H. F. K.

Influence of water content of clays on their properties in drying and firing. V. P. ZUBCHANINOV AND D. I. SMIRNOV. *Trans. Ceram. Research Inst.* (Moscow) No. 24, 30–62(in German 62–5)(1930).—The authors investigated: (1) shrinkage and porosity of clays after drying to 110°; (2) shrinkage and porosity of bodies after firing to vitrified states; and (3) shrinkage and loss in wt. at different periods of drying and change taking place during these processes. Satisfactory results were obtained in measuring the vol. change, loss in wt. and vol. porosity of samples while drying and after firing to Seger Cones 010 and 10. Three periods can be distinguished during drying. In the first, shrinkage and loss of water proceed with const. velocity; shrinkage in vol. of the body remains equal to the vol. of the water evapd. In the second, the decrease in water (pore water) proceeds with changing velocity while the vol. of the clay body remains const. When drying in the air a certain part of the water remains in the clay. During the third period the hygroscopic water is removed by heating to 110°. The quantity of shrinkage water depends on the initial water content, but the quantities of the pore and hygroscopic water do not. The extent of shrinkage depends only on the quantity of the shrinkage water. The relation between the amt. of shrinkage and the amt. of pore water is a characteristic property of each clay. The relative content of pore water in kaolins is larger than in clays, although kaolin is more porous than clays. The water content of the paste has no influence on the change of the d. and size of the clay piece during firing. M. V. KONDOIDY

Ammonium hydroxide as a deflocculant for clay suspensions. ANGELO CASTIGLIONI. *Industria chimica* 5, 1465–8(1930).—NH_4OH (0.888), when added in proportions as low as 0.02% by wt. to clay suspensions, increases the fluidity markedly, thus making possible the use of much more concd. suspensions. In the manuf. of molded ceramic ware it permits the use of suspensions of d. 1.85 which remain as fluid as suspensions of d. 1.72 when Na_2SiO_3 is used as deflocculant. A. W. CONTIERI

Experiments in weathering plastic fireclays. STUART M. PHELPS AND C. G. DENNEY. *J. Am. Ceram. Soc.* 14, 319–24(1931).—Changes produced in weathering cannot be readily detected by the usual clay-testing methods. Either weathering changes are over-estd. or the present test methods are inadequate. C. H. KERR

High-alumina firebricks. J. F. HYSLOP. *Roy. Tech. Coll. Met. Club J.* (Glasgow) 1929–30, No. 7, 18–9.—For max. refractoriness, resistance to stresses and resistance to corrosion by slag it is desirable to have a high Al_2O_3 and thus a high mullite ($3\,Al_2O_3.2SiO_2$) content. Spalling tendency is greatly increased by the presence of free SiO_2. While a high Al_2O_3 content is desirable, refractories with 60% or more

Al_2O_3 tend to become more liable to spalling as the expansion coeff. increases with the Al_2O_3 content. Because of the cost it is economical only in extreme cases to employ materials with high Al_2O_3 derived from diaspore, bauxite, cyanite or corundum. Properly made bricks from clays approaching 45% Al_2O_3 show high resistance to temp., as well as to corrosion and spalling. H. C. PARISH

Oldenburg clinker. WERNER DOHM. *Ziegelwelt* **61**, 571–4(1930).—Clinker differs from the ordinary brick in that it has been burned to a sintering point. To make clinker it is essential to use a clay rich in alkali and Fe_2O_3, but low in $CaCO_3$ and $MgCO_3$. A suitable clay analyzed: SiO_2 70.22, Al_2O_3 13.67, Fe_2O_3 6.80, CaO trace, MgO 1.30, K_2O and Na_2O 3.37, ignition loss 5.30 per cent. The clinker is commonly 22 × 10.5 × 5 cm. in size. Well-burned units are very dense, hard, tough and very satisfactory as paving and heavy building materials. H. F. KRIEGE

Correlation of the crystal structures and hardness of nitrided cases. O. E. HARDER AND GEORGE B. TODD. *Fuels & Furnaces* **9**, 295–7(1931); *Steel* **88**, 51–2. M. S.

Recent developments in the German ceramic industry. FELIX SPRINGER. *Bull. Am. Ceram. Soc.* **10**, 85–7(1931). C. H. KERR

Moisture expansion of glazes and other ceramic finishes. H. G. SCHURECHT AND G. R. POLE. *J. Am. Ceram. Soc.* **14**, 313–6; *Bur. Standards J. Research* **6**, 457–63 (1931); cf. *C. A.* **23**, 5554; **24**, 3871.—Some glazes show expansion, due to moisture, similar to that of the body. This means less liability to crazing when the ware is exposed to moisture. Artificial weathering treatment (exposure to steam at 150 lb. sq. in. for 1 hr.) caused an av. expansion, in lustrous glazes, of 0.004%; in mat glazes, 0.011%; in vitreous slip finishes, 0.005%; and in porous slip finishes, 0.033%. The moisture expansion of one of the mat glazes was 30% of the av. for a ceramic body with approx. 12% absorption. C. H. KERR

Electrical porcelain. H. M. KRANER. *Elec. Eng.* **50**, 209–11(1931).—American and European samples of standard insulating porcelains show similar characteristics in the finished product despite the variations in raw materials and mfg. processes. A table gives the modulus of rupture of ceramic materials including tests on quenched samples. W. H. BOYNTON

Comparison of bodies containing blended feldspars and one-mine feldspar of similar composition. C. W. PARMELEE AND C. R. AMBERG. *J. Am. Ceram. Soc.* **14**, 309–12 (1931).—Tests were made with an elec. porcelain body mixt. Since it is impossible to consider more than 2 factors in the blending of 2 materials, all but 2 factors should be uniform and this can be obtained only from one-mine materials. C. H. KERR

Stoneware in the chemical industry. F. WEINREB. *Chemistry and Industry* **50**, 213–4(1931).—Because of its strength, its machinability and resistance to acids and bases, *steatite* may in the future find more application in the chem. industry. Its high expansion coeff. limits its use. At present the ceramic industry has not succeeded in making a material combining d. with the ability to resist high temps. The porosity of stoneware has caused a considerable monetary loss from absorption of precious metals in electrolytic baths. A sillimanite mass can be used for making very dense vessels with an absorption of only 0.01%. H. C. PARISH

Economy in selection and design of chemical stoneware. J. M. W. CHAMBERLAIN. K. D. JACOB *Chem. Met. Eng.* **38**, 142–4(1931).

Manufacture of stoneware. T. W. TALWALKER *J. Indian Ceram. Soc.* **2**, 21–27, 65–74, 83–97, 130–43(1930).—Expts. were carried out in a factory mfg. acid jars. Economics of the industry and materials and processes are discussed. T. concludes that it is possible to make a low-temp., highly resistant body, by using frit in the body, and using a fritted glaze high in resistant materials such as ZnO, B_2O_3 and ZrO_2. JOHN M. LADINO

The use of refractory natural stone. H. KALPERS. *Zentr. Europ. Giesserei-Ztg.* **2**, No. 2, 1–3; *Chem. Zentr.* **1929**, II, 1196; *Giesserei* **17**, 1045–7(1930).—The refractory natural brick of Hugo Schlenkermann (cf. O. Beckmann, *Giesserei-Ztg.* **25**, 156–9) contains SiO_2 90.59, Al_2O_3 + TiO_2 6.85, Fe_2O_3 0.20, MgO 0.15, K_2O 0.22 and Na_2O 0.90%. The loss on ignition is 1.10%. The refractoriness of these bricks varies from cone 35 to 36. The behavior of these bricks under pressure was tested with the app. constructed by the Chem. Lab. für Tonindustrie. The bricks were also examd. with regard to their behavior toward changes in temp. and their ability to keep their vol. Their fitness for cupola and reverberatory furnaces is emphasized. Hollow spaces and gaps between the bricks are filled with a special stamped material. G. SCHWOCH

Refractory pastes for use in laboratories. MANUEL FELIU. *Quim. e ind.* **7**, 280 (1930).—F. mentions various pastes and recommends the Pythagoras paste made by Haldenwanger, porcelain manufacturers, in Spandau, Berlin. It is a mixt. of kaolin,

Al_2O_3 and feldspar. The kaolin decomposes into Al_2O_3 and a glass which, with the Al_2O_3, gives sillimanite. Tubes made of this paste withstand all temps. up to 1700° and above. The paste is used in protecting tubes for thermoelec. elements and such tubes are impermeable to gases even above 1700°. S. L. B. ETHERTON

Special refractories for metallurgical research. DONALD TURNER. *Trans. Faraday Soc.* **27**, 112–24(1931).—A description of the refractory materials developed for use in various investigations at the National Phys. Lab., and the methods of production employed. CURTIS L. WILSON

Investigations on the slagging of refractory materials. IV. Investigations on the corrosive power and the constitution of iron-smelting slags. HERMANN SALMANG AND FRIEDRICH SCHICK. *Arch. Eisenhüttenw.* **4**, 299–316(1930); cf. *C. A.* **22**, 3272.—The corrosive power of the oxides present in Fe-smelting slags (CaO, FeO, MgO, MnO, Fe_2O_3, Mn_2O_3, Al_2O_3, TiO_2, SiO_2, P_2O_5 and also K_2O, Na_2O, CaS, and CaF_2) on fireclay (at 1410° and 1500°) and on sillimanite (at 1580°) was detd. synthetic binary, ternary and quarternary slags being prepd. from these oxides. In the fusions, CaO is found to be the strongest oxide, FeO, MnO and MgO following next in strength. Oxides of the type MO (M = metal) react as bases, while those of the type M_2O_3 react as acids. Thus, the latter oxides do not attack fireclay and check the attack of bases. In silicate fusions Fe_2O_3 is stable up to 1580°, while Mn_2O_3 decomposes at 1500°. Contrary to expectation from the heats of formation of the silicates of the corresponding oxides, the alkali oxides behave as weak acids at these high temps., while the alk. earth oxides act as strong bases. P_2O_5 checks the attack of bases, and when present in large amts. in the slag, the excess attacks strongly (especially at the higher temps.). The attack on these refractories increases about 50% from 1410° to 1500° and from 1500° to 1580°, from which it is concluded that the dissocn. of the melt increases in the same ratio. J. BALOZIAN

Preparation of chamotte-free fireproof and acidproof objects. P. P. BUDNIKOV, S. N. ZHIKHAREVICH AND I. G. SHAKHNOVICH. *Ukrainskii Khem. Zhur.* **5**, Tech. Pt., 93–103(in German 104)(1930).—Chamotte-free fireproof and acidproof objects can be prepd. by using artificially prepd. lean lime to the extent of 85–93% of the mixt. The process lends itself easily to mech. treatment. For the dehydration of lime a drying drum is required working on the counter-current principle. To make brick by this process a pressure of 250 atm. is required. This method eliminates prepg. the mixt before shaping the objects and drying before firing. S. L. MADORSKY

Standards and tests for coated abrasives. E. C. SCHACHT. *Am. Soc. Mech. Eng.*, Advance Paper, Oct. 16–17, 1930, 7 pp. E. I. S.

Cr-plated molds (STOCKFISCH) **4.** Coating for lamp bulbs (Can. pat. 309,250) **4.**

Apparatus for feeding mold charges of molten glass. GEORGE E. HOWARD (to Hartford-Empire Co.). U. S. 1,796,929, March 17. Structural features.

Device for withdrawing or delivering measured quantities of fused glass. ADOLF SCHILLER. Ger. 518,236, July 29, 1926.

Glass leer of the muffle type with an endless conveyor for carrying articles through it. WM. A. MORTON (to Amsler-Morton Co.). U. S. reissue 18,004, March 17. Reissue of original pat. No. 1,684,239 (*C. A.* **22**, 4218).

Glass-gathering apparatus. GEORGE E. HOWARD (to Hartford-Empire Co.). U. S. 1,797,206, March 17. Structural features.

Glass furnace and associated apparatus for making spun glass. LOUIS MATHIEU. U. S. 1,796,571, March 17 Structural features.

Apparatus for pouring molten glass into sheets. N.-V. MAATSCHAPPIJ TOT BEHEER EN EXPLOITATIE VAN OCTROOIEN. Fr. 37,359, Aug. 22, 1929. Addn. to 579,444

Furnace and associated apparatus for sheet-glass manufacture. SAMUEL C. CRIPE (to Libbey-Owens-Ford Glass Co.). U. S. 1,795,933, March 10. Structural features.

Apparatus for sheet-glass manufacture. JOHN L. DRAKE (to Libbey-Owens-Ford Glass Co.). U. S. 1,796,836, March 17. Structural features.

Apparatus for drawing sheet glass. WERT FRENCH (to Libbey-Owens-Ford Glass Co.). U. S. 1,796,943, March 10. Structural features.

Apparatus for manufacture of sheet glass by rolling. CHANCE BROS & CO., LTD., and A. L. FORSTER. Brit. 339,535, Jan. 23, 1930. Structural features.

Rolling glass sheets. Y. BRANCART. Brit. 338,477, April 20, 1929. Various details of procedure are described for insulating glass sheets from their receiving surfaces during rolling, by a gaseous cushion of combustion products.

Apparatus for plate-glass manufacture (roller construction). Y. BRANCART. Brit. 339,546, Feb. 14, 1929.

Pressed molded glassware. CHANCE BROS. & CO., LTD., and R. BROWN. Brit. 339,484, Dec. 3, 1929. Various mech. details of manuf. are described.

Marbled or multicolored glassware. C. LOCREILLE. Brit. 339,583, April 9, 1929. Masses of glasses are prepd. which are of different colors but of substantially the same compn.; they are melted in sep. pots or furnaces, and one of the glasses is treated with sep. quantities of the others. Various details of temps., etc., are given.

Cooling oven for glass. N.-V. MAATSCHAPPIJ TOT BEHEER EN EXPLOITATIE VAN OCTROOIEN. Ger. 516,193, June 15, 1929. Addn. to 476,927 (*C. A.* **23**, 3785).

Blowing and molding articles of fused silica. QUARTZ ET SILICE. Brit. 338,456–7, April 16, and 17, 1929. Mech. features.

Blown articles of fused silica. QUARTZ ET SILICE. Brit. 339,197, Oct. 30, 1929. Various details of manuf. are described.

Fusing together grooved sections of fused quartz, etc. LESLIE SAMPLE (to Thermal Syndicate, Ltd.). U. S. 1,796,401, March 17. Mech. features.

Uniting glass sheets with non-brittle transparent material. LIBBEY-OWENS GLASS CO. Brit. 338,988, Aug. 30, 1929. The surface of the intermediate sheet is roughened by spraying onto it a discontinuous layer of an adhesive material such as a mixt. of equal parts of an ester of phthalic acid such as dibutyl phthalate and of a polyglycol deriv. such as monoethyl ether or diethyl glycol. The inner surfaces of the glass sheets may be coated with a soln. of a cellulose deriv. and a synthetic resin, with or without a plasticizer, and may also be coated with adhesive, and the sheets are united under pressure while heated. Cf. *C. A.* **25**, 1962.

Reënforced glass. SOC. DES USINES CHIMIQUES RHONE-POULENC. Fr. 37,119, June 22, 1929. Addn. to 658,563 (*C. A.* **23**, 5291). The compound sheets of glass are heated without pressure to a temp. above the ordinary after removal from the bath of plastifying material.

Bricks. FRANCO BANDINI. Austrian 120,972, Aug. 15, 1930. Clay contg. at least 20% of water is warmed to about 95° and molded in a press maintained at the same temp. The bricks are dried at once in a moist atm. in an oven in which the temp. is initially the same as that of the bricks, but is gradually raised.

Bricks and mortar from magnesite or magnesia. MAGNEZITIPAR, LTD. Hung. 101,353, July 20, 1929. Overheated natural or artificial magnesia is powdered, particles smaller than 0.1 mm. are removed, and 5 to 35% of a substance rich in Al matter, *e. g.*, bauxite, corundum or corundum slag, is added. Bricks made of this mixt. are very refractory.

Tunnel kiln for bricks. VOJTĚCH LAŠTOVIČKA. Austrian 120,977, Aug. 15, 1930.

Extracting clay and other aluminous raw materials with acids. OSKAR JONAS, KURT WEGER and GOTTHARD TREBITZ (to I. G. Farbenind. A.-G.). U. S. 1,796,107, March 10. Material such as calcined clay is treated with acid such as HCl in large batches *in situ*. The reaction is started by flooding the charge with acid washing water from a previous operation and adding in preheated condition a small portion of the total acid required for the reaction, with further acid addn. to obtain a strong alumina soln., simultaneous withdrawal of satd. ext. to maintain a const. level of liquid on the charge and maintenance of a min. temp. of 105° in the reaction zone by the heat of reaction.

Ceramic noble metal preparations. DEUTSCHE GOLD- UND SILBER-SCHEIDEANSTALT VORMALS ROESSLER (Franz Schelling, inventor). Ger. 515,588, Oct. 14, 1927. Noble metal prepns. for decorating and coloring ceramic ware are obtained from dispersions of the metal or its compds. in cellulose derivs., in the presence or absence of solvent and flux. Thus, a 30% $AuCl_3$ soln. in alc. is stirred into a soln. of nitrocellulose in ethyl glycol and cyclohexanone. Several addnl. examples are given. The method is stated to be applicable to all metals.

Apparatus for dipping pottery or earthenware into glazing or coloring liquid. G. WADE & SON, LTD., and G. A. WADE. Brit. 339,395, Sept. 27, 1929. Structural features.

20—CEMENT AND OTHER BUILDING MATERIALS

J. C. WITT

A new shaft-kiln cement plant. HORST LAEGER. *Tonind.-Ztg.* **55**, 322–5(1931).—The shaft kiln with rotating grate recently erected in Ankara (Angora) is described. F. O. ANDEREGG

The enumeration of French cement plants. PAUL RAZOUS. *Ciment* **36**, 13–8, 59–61(1931).—A list is given of the different companies and plants in France making the following cements: natural, Roman, artificial (portland), high-early-strength, alumina, slag (with lime), grappier (from flint nodules), iron (70% portland with 30% granulated blast-furnace slag) and blast-furnace (containing less clinker than iron cement).
F. O. ANDEREGG

Modern cement burning. HEINRICH LUFTSCHITZ. *Tonind.-Ztg.* **55**, 184–6(1931).—A description is given of the Schröder kiln, in which the dry, powd. raw material falls through a shaft heated by powd. coal falling through an outer annular space (Ger. pat., 495,001, *C. A.* **24**, 3340). The Rigby patent (Ger. pat., 478,632, *C. A.* **23**, 4792) for spraying slurry into a kiln is also described. F. O. ANDEREGG

Cement synthesis in the four-component parallelogram and the degree of lime saturation according to Kühl. M. SPINDEL. *Tonind.-Ztg.* **55**, 305–7(1931).—The parallelogram for the 4 components CaO, SiO_2, Al_2O_3 and Fe_2O_3 may also be conveniently used for Kühl's degree of lime satn. HANS KÜHL. *Ibid* 320–2.—K. prefers his quotient based on mol. wts. M. SPINDEL; HANS KÜHL. *Ibid* 366–8.—More polemics.
F. O. ANDEREGG

To secure cement of uniform quality. W. SACH. *Tonind.-Ztg.* **55**, 291–3(1931).—Proper feeding, weighing and mixing, obtained with suitable automatic equipment, are useful in maintaining a uniform quality. F. O. ANDEREGG

High-early-strength cements and their increases in strength. P. MAY. *Tonind.-Ztg.* **55**, 171–3(1931).—Generally increasing strengths have been encountered up to 5 years, with occasional temporary retrogressions. F. O. ANDEREGG

German specifications for alumina cement. HUGO VIERHELLER. *Tonind.-Ztg.* **55**, 325–6(1931).—Fineness is to be not more than 2% on the 75- and not more than 15% on the 180-mesh sieve. Tests are to be made at 15° to 20°. Specimens are to be stored 24 hrs. in a damp closet and then under wet cloths. The min. strengths are to be: compression 400, 500, 600 and tensile 25, 30 and 45 kg. per sq. cm. after 24 hrs.' 28 days' wet and 28 days' combined storage, resp. F. O. ANDEREGG

Tentative specification for high-alumina cements. *Structural Eng.* **8**, No. 10, 369–73(1930). E. I. S.

Asbestos-cement pipes—their production, characteristics and uses. A. SCHOTTAK. *Gas u. Wasserfach* **74**, 293–7(1931).—Up to the present, the use of asbestos-cement pipes has been limited because of their small production. These pipes are made by mixing 1 part of ground asbestos with 5 parts of cement and sufficient water to give a thin grout. This grout is then collected in a 0.2-mm. layer on an endless belt which transfers the material to an iron roll of the internal diam. of the desired pipe. This roll presses out the surplus water, and when the coating becomes heavy enough the roll is removed and a new roll substituted. The tube is removed from the iron roll while still soft and placed on a wooden mandrel of similar size. The pipe is then allowed to harden in a damp, fairly warm room. These pipes have found use for flue pipes, house-drain lines, etc. Some difficulties have been encountered with their use for gas and water, but these difficulties are being solved and the pipe can be used up to moderate water pressures. The pipes can be sawed, burned or bored with ordinary wood-working tools. They may be dropped 6 ft. on a concrete floor without damage. Breaking strengths, etc., are given, as well as hydraulic tests. Joints are described and illustrated. The pipe is said to cost about $^1/_3$ less than cast-iron or steel pipe. R. W. RYAN

Rapid determination of magnesia in portland cement. CH. ROGOZINSKI. *Tonind. Ztg.* **55**, 355–6(1931).—Remove silica and add *N* NaOH till a ppt. forms and the supernatant liquor is clear. Filter into an excess of 0.2 *N* HCl, and titrate the excess with 0.2 *N* NaOH with phenolphthalein indicator. F. O. ANDEREGG

Zeolites and hydraulic cements. HENRI LAFUMA. *Rev. matériaux construction trav. publics* **1931**, 1–5, 45–9.—The properties of hydrated Ca aluminates and silicates are reviewed and compared with those of zeolites. The best explanation of the setting and hardening of the silicates seems to be the development of a network structure.
F. O. ANDEREGG

The influence of free lime in cement clinker on the solubility of lime and clay. KATSUZO KOYANAGI. *J. Soc. Chem. Ind., Japan* **34**, Suppl. binding 56–8(1931); cf. *C. A.* **25**, 1353.—Well-burned, low-lime clinker shows high soly. for clay and low for lime. An increase in lime greatly decreases the soly. of clay and increases that of lime. Low-lime cement when mixed with H_2O forms K aluminate crystals first, then $Ca(OH)_2$ and gels; with high lime the process is reversed. V. F. HARRINGTON

Suitability of argillaceous sands for cement mortar and concrete. WERKEN. *Zentr. Bauverwaltung* **50**, 671–3(1930).—Report on original tests, using sands with per-

centage of impurities up to 13.6. W. advises strongly against the use of impure sands. E. I. S.

Determining the proportions of mortars and concretes. LUDWIG SCHUSTER. *Tonind.-Ztg.* **55**, 224–5, 243–4(1931).—Examples are given of analyses of old mortars and concretes from which the approx. original compn. can be calcd. The analysis of the aggregate, if available, simplifies the calcn. F. O. ANDEREGG

Theory of composition and structure of concrete. A. M. GÜNZBERG. *Rev. matériaux construction trav. publics* 1930, 477–81; 1931, 21–5.—The space between the largest aggregate grains in concrete may range from 73 to 29%. To obtain the latter, very exact placing of each particle is required, which is hard to accomplish. Therefore, an intermediate range is selected with the ratios of sizes lying between 1:15:225 and 1:30:900; *e. g.*, cement 0.03 mm., sand 0.45 to 0.9 mm., gravel 7 to 27 mm. and plums 100 to 800 mm. This type of grading gives good packing. The water content is very important. G. suggests that the addn. of solutes, by lowering surface tensions, should reduce the voids in concrete. To get a porous concrete select those sizes and shapes which give poorest packing. F. O. ANDEREGG

The uniformity of concrete and its control on the job. FRITZ EMPERGER. *Tonind.-Ztg.* **55**, 382–3(1931).—Cubes and beams are made on the job and broken at 7 days. F. O. ANDEREGG

Calculation of the best composition of aggregate for concrete. H. RICHARZ. *Tonind.-Ztg.* **55**, 113–4(1931).—An example is given of a suitable blending of Rhine sand and Monier gravel that produced a grading closely approaching the ideal. F. O. A.

Testing protective coatings for concrete. P. MECKE. *Tonind.-Ztg.* **55**, 322(1931).—For accurate solvent detn. in bituminous prepns., place 5 g. in a small foil box contg. a small roll of gauze. After one hour at 100° distribute the bitumen evenly over the gauze and sides of the box and dry to const. wt. at 110°. To test the resistance to chem. effects cover a mortar slab with three coats after a cylinder has been cemented to the slab with neat cement. Place the soln. to be tested in the cylinder. F. O. ANDEREGG

Cracks in concrete. M. E. ROSSBACH. *Rev. matériaux construction trav. publics* 1931, 12–7.—Cracks developing in concrete result from a combination of shrinkage and insufficient tensile strength. Emphasis should be laid in securing a greater tensile elasticity in concrete, even at the expense of compressive strength, because concrete seldom fails in compression. F. O. ANDEREGG

Researches on the protection of concrete against corrosive waters. OTTO GRAF. *Zement* **19**, 936–41, 970–4, 995–8, 1041–3, 1066–8(1930).—The study of the corrosive action of water on concrete involves many factors beside the concn. of salt solns. Corrosive action increased with stirring of the solns. coarseness of cement used in the test pieces and poor gradation of cement particles, fineness of the sand used and quantity of mixing H_2O used, a deficiency being as objectional as an excess. The addn. of 3% clay to the specimens decreased their resistance to $MgCl_2$ solns. if they had not been air-cured. The compressive and tensile strengths were not decreased by clay addn. A curing period of 21 days in air after 6 days under H_2O made the mortar specimens (1:3) resistant to the attack of a 10% $MgCl_2$ soln. during 20 months' exposure. H. F. K.

The extraction of bitumen for testing from street paving material and the determination of sulfur in bitumen. FR. SEELIG. *Chem.-Ztg.* **55**, 145–6(1931).—Directions are given for the extn. of the bitumen (the method is claimed to be more accurate and reproducible) and for the complete combustion of the bitumen in the detn. of S. V. F. H.

Moldering of natural building stones and prevention of their quick decaying. O. LÁCZAY-FRITZ. *Magyar Mérnök Epitészegylet Közlönye Havi Füzetei* **7**, 1–21(1930).—The process of moldering is described. The ideal preventive agent should keep water out but should let the original moisture evaporate from the stone. The stones of the Hungarian Parliament Building were treated by Möller's method. This consists in spraying the stone surface with a paraffin liquid and repeating this process twice, each time after complete drying. The impregnation requires warmth, so is easiest in summer. If the stone is not warmed enough by the sun's rays, it must be heated artificially. The surface should be quite pure and dry. The cost of the treatment tried at the Cathedral at Pécs did not reach 40 (Hungarian) cents per sq. m. of surface. S. S. DE FINÁLY

Concrete coverings for pipe lines (HOUGH) **22.** Separation and size distribution of microscopic particles (ROLLER) **2.** Substitutes for sugars [in improving elasticity of cements and adhesives] (Ger. pat. 518,196) **18.** Compositions containing rubber and cement (Brit. pat. 339,002) **30.** S and bentonite mixture for use [as roofing] (U. S. pat. 1,795,364) **18.**

Cement. W. Reismann, R. H. Schloss and W. H. Evers. Brit. 338,664, Oct. 3, 1929. A cement for use as a binder in hydraulic mortar comprises a mixt. of finely ground slag 92 and burnt magnesite 8 parts together with 50 parts of a 25° Bé. Na silicate soln., suitably prepd., conjointly with admixt. with an aggregate such as sand.

Cement. Desider Vitéz. Austrian 120,861, Aug. 15, 1930. In the manuf. of cement from hydrated bauxite, *e. g.*, Hungarian bauxite, and CaO, the crude mixt. is only ground to such a degree that 3–6% is retained by a 900-mesh sieve, and the heating temp. does not exceed that necessary to frit the mixt., the duration of heating being less than 20 hrs.

Rotary kiln suitable for cement manufacture. Louis S. Petersen (to F. L. Smidth & Co.). U. S. 1,796,664, March 17. Structural features of a kiln provided with chains on its interior.

Rotating cement furnace. Pierre Bezard. Fr. 695,153, May 6, 1930. Means for feeding is given.

Concrete. Hans Fritz. Austrian 121,401, Sept. 15, 1930. A rapidly hardening concrete is prepd. by mixing an ordinary dry concrete mixt. with an aq. sludge of alumina cement. The amt. of alumina cement dets. the rapidity of the hardening. The concrete may be cast in molds made of or coated with Al or Zn.

Air-free concrete. John S. Morgan. Ger. 515,975, June 9, 1929. The cement is mixed with water in a centrifuge of high angular velocity, with or without the employment of a vacuum. Cf. *C. A.* **24**, 5129.

Steel reënforcements for concrete. E. Freyssinet and J. Seailles. Brit. 338,934, Nov. 19, 1928. High-tensile steel reënforcing members are used and are subjected to an initial tension substantially greater than the elastic limit of the steels "normally used" for reënforcing concrete. Brit. 338,864 relates to various articles of concrete thus prepd. and gives details of manuf.

Road materials. Rol, Lister et Cie. Fr. 37,369, Aug. 26, 1929. Addn. to 671,889 (*C. A.* **24**, 2266). Bitumen or asphalt is softened by crude or refined tar and mixed with mineral substances and an org. substance such as sawdust. The mixt. is applied cold.

Road-making compositions. Firma Georg Schicht and Ernest A. Kolbe. Austrian 121,552, Oct. 15, 1930. An addn. of asbestos, with or without an alk. earth sulfate and (or) kaolin, is made to the known compns. comprising stones and water-glass soln., with or without alk. earth or heavy metal oxides or hydroxides, hydraulic binders, etc. The binding is thus accelerated. Better binding is obtained also by using water-glass solns. that have been treated with CO_2.

Building construction units such as bricks. Howard C. Byland and Frank L. Ormesher (to Cemroc, Inc.). U. S. 1,796,559, March 17. Concrete, NH_4 stearate and $CaCl_2$ are poured into a mold, the concrete is subjected to a blow to reduce it appreciably in thickness, and the molded product is immediately withdrawn from the mold and allowed to dry in the air.

Weatherproofing building materials, particularly natural stones. Elektrochem. Werke München A.-G. Ger. 511,447, July 23, 1929. Fatty oils such as linseed oil are applied as aq. emulsions.

Disinfection of surfaces of natural and artificial stone. B. László. Hung. 101,351, Apr. 8, 1929. Stone surfaces are covered by a mixt. of 1 kg. flowers of S, 500 g. SnO_2, 1 kg. oxalic acid, 500 g. powd. glass, 500 g. 15% gelatin, 250 g. 15% gum arabic and 1 kg. turpentine. This film is covered by a mixt. of 1 kg. linseed oil, 0.1 kg. eucalyptus oil and 0.1 kg. benzoic acid.

Artificial stone. Paul Anft. Ger. 518,482, Aug. 14, 1929. Addn. to 390,433. According to Ger. 390,433, a quantity of wood meal, sawdust or the like is soaked in milk of lime to which KNO_3 has been added, while another quantity of wood meal, etc., is soaked in milk of cement to which K_2CO_3 has been added. The batches of wood meal, etc., are then dried and mixed while using cement as the binder. This method is now modified (1) by using $KMnO_4$ and alum in addn. to KNO_3, and (or) (2) by treating the wood meal, etc., in one batch with a mixed lime and cement milk to which all the reagents mentioned have been added.

Artificial stone and plastic masses. A. A. Bryushkov. Russ. appl. 68,506, April 17, 1930. Dried and ground sea weeds are added to clay dough together with water, or the weeds are first treated with a soda soln. and then mixed with clay.

Refractory stone. Firma Aug. Klönne. Ger. 515,535, Oct. 31, 1925. A light refractory stone is obtained by molding, drying and firing an intimate mixt. of kieselguhr, water and combustible material. The kieselguhr, which may or may not contain clay,

is well mixed with about an equal amt. of water before the combustible material is added. A small quantity of HCl may be added to the plastic mass before firing.

Artificial marble. BARTHÉLEMY J. BRUNEL. Fr. 37,177, Jan. 5, 1929. Addn. to 597,896. Ferrotitanium is used with $MgCl_2$ and $MgSiO_3$ for the production of artificial marble.

Making artificial marble from cements of various colors. KARL WALDERT. Austrian 121,563, Oct. 15, 1930. Manipulative details are described.

Using the residues of the artificial marble industry. ALEXANDER STAEGE. Ger. 515,519, Apr. 16, 1930. Addn. to 514,710 (*C. A.* 25, 2264). The MgO-contg. residue from the artificial stone and marble processes is extd. with dil. HCl and the remainder used as flux for portland cement.

Blocks and other shaped articles of alabaster and gypsum. F. J. G. GARNER. Brit. 338,465, Feb. 28, 1930. In order to give the articles the hardness and appearance of marble, they are dried by heating to 150–200°, impregnated with a soln. formed of water 1 gal., concd. Na silicate soln. 1 lb., $MgSO_4$ 1 oz. and fused $CaCl_2$ 1 oz., and then polished and rubbed with raw linseed oil.

Roofing material. GEORGE D. CRABBS U. S. 1,796,861, March 17. A flexible foundation material contg. a major proportion of mineral fiber such as asbestos is satd. with a relatively hard asphalt having a penetration not exceeding 11 at a temp. of 25°.

Roofing composition. GEORGE A. OSTERDAY (one-half to Edward Dome). U. S. 1,796,474, March 17. A mixt. is formed of pitch 25–40, asphalt 25–50, cork 25–50 and asbestos 5–10%

Dampproofing and waterproofing walls. JOSEPH ROSE. U. S. 1,796,269, March 10. The inner surfaces of walls are coated successively with a cementitious material such as a portland cement mixt. contg. emulsified asphalt, an overlying bonded coating of waterproofing material such as an asphalt paint and a finishing coating such as plaster, which is protected from dampness seeping through the wall by the underlying coatings.

Wires and wire netting for carrying plaster. C. SCHRÖDER. Brit. 338,755, Dec. 10, 1928. The wires are first coated with an adhesive such as glue, then treated with sand or volcanic ashes to form a facing, and then sprayed or washed with an aq. concrete mixt. or the like (leaving the meshes of the netting open).

Drying lumber, etc. HENRY W. COWAN. U. S. 1,796,141, March 10. The material is placed in a chamber the air in which is heated to a temp. capable of damaging the material on prolonged exposure, and hot moisture-laden air is periodically removed while dry air simultaneously admitted is to cause periodical reductions in temp. to below the damaging point through absorption of moisture from the material by the newly admitted dry air (which is heated to a suitable temp. in the chamber). App. is described.

Apparatus for partly impregnating timber. FRANZ KRAUSZ and LUDWIG TRAMER. Austrian 121,256, Sept. 15, 1930. Means is described for sealing the tank in which the trunk is partly immersed.

Impregnating wooden loom shuttles. I. G. FARBENIND. A.-G. Brit. 338,976, Aug. 30, 1929. The wood is impregnated with chlorinated org. compds. such as chlorinated naphthalenes or solid chlorinated biphenyl, suitably with conjoint use of a substance of lower m. p. such as paraffin or montan wax. Various details and examples are given.

Preserving wood. SOC. DE RECHERCHES ET DE PERFECTIONNEMENTS INDUSTRIELS. Brit. 339,247, April 8, 1929. The process of wood impregnation described in Brit. 310,805 (*C. A.* **24**, 707) is modified by the use of a soln. of As sulfide in an alkali sulfide such as Na sulfide as the first injected soln. which may also contain acetates and phenols, and this treatment may be followed by a second impregnation as described in Brit. 310,804 (*C. A.* **24**, 707). Various details and modifications of procedure are described.

Wood-preserving composition. BASILIUS R. V. MALENKOVIC. U. S. 1,795,658, March 10. A stable cryst. addn. product of 2,4-dinitro-1-chlorobenzene and α-naphthylamine is used, suitably with various other preservatives.

21—FUELS, GAS, TAR AND COKE

A. C. FIELDNER AND ALDEN H. EMERY

Alcohol automobile fuels. K. R. DIETRICH. *Chem.-Ztg.* 55, 245–6(1931).—See *C. A.* 25, 576.

The use of alcohol for motor-fuel mixtures. KAREL LOSKOT. *Chem. Listy* 25, G. G.

37–44, 62–7(1931).—"Dynalkol" has been used on the continent successfully for 8 years; it has the compn.: gasoline 30 parts, anhyd. EtOH 30, and C_6H_6 20. Further modifications of the above formula have been studied; best results were obtained with EtOH 40 parts, gasoline 60. The EtOH need not be stronger than 99%. F. M.

Use of fuel oil in internal-combustion engines. MARCEL GAUTIER. *Tech. moderne* **23**, 1–9, 119–26(1931).—A review. P. THOMASSET

Kinetics of a type of heterogeneous reactions. The mechanism of combustion of pulverized fuel. S. P. BURKE AND T. E. W. SCHUMANN. *Ind. Eng. Chem.* **23**, 406–13 (1931).—A theory of the kinetics of the combustion of pulverized solid fuel is developed mathematically. This theory yields results in accord with exptl. data. S. LENHER

New developments in smokeless fuels. R. GLENK. *Engrs. and Eng.* **47**, No. 9, 242–52(1930).—A review. E. I. S.

Developments in powdered fuel practice for marine service. E. W. GREEN. *Trans. Inst. Marine Eng.* **42**, 391–425(1930).—If powd. coal is used in Scotch marine boilers firebrick linings are not necessary to protect the walls but some sort of incandescent surface is needed. The fuel should be thrown from the burner with sufficient force to reach but not touch the boundaries. Fineness is the all-important factor in detg. the vol. of the flame. At least 97% of the product should pass a 100 I. M. M. screen and not more than 12% remain on the 200 screen. Ash ejectors remove the ash by way of the funnel. ANN NICHOLSON HIRD

Pulverized fuel for the small unit-shell type boiler, metallurgical and chemical processes. H. W. HOLLAND AND E. C. LOWNDES. *J. Inst. Fuel* **3**, 225–30(1930).—Brief discussion of pulverized-coal firing. It is used in cement, macadam and chemical plants. Comparative results of oil and coal firing are given. E. I. S.

Briquets for locomotives and their economic value. T. ISHIDA. *J. Fuel Soc. Japan* **10**, 233–46(1931); Section 2, 17–8(in English).—The Japanese Government Railways recently decided on the adoption of briquets as fuel for locomotives on certain trains on a heavy grade and began an investigation on the method of firing. The use of briquets of a certain kind causes a saving of 12.9% in the consumption of fuel and reduction of CO_2, CO and SO_2 in tunnels. A saving of 19.5% in the consumption of fuel was also reported for the special limited express train by using briquets instead of ordinary coal. F. I. NAKAMURA

Low-temperature distillation in Estonia. JOHN ROBERTS. *Colliery Eng.* **7**, 373–6 (1930).—A new type of low-temp. retort for carbonization of coal consists of a rectangular tunnel-oven large enough to take a car of shale or coal. From 50 to 70 tons can be handled per 24 hrs. ANN NICHOLSON HIRD

Notes on low-temperature carbonization. F. J. MATTHEWS. *Colliery Eng.* **8**, 65–7(1931).—The retort should be designed for high-oil production, high-calorific gas or best semi-coke as desired. ANN NICHOLSON HIRD

Aqueous liquors from low-temperature carbonization of coal. II. GILBERT T. MORGAN AND A. E. J. PETTET. *J. Soc. Chem. Ind.* **50**, 72–4T(1931); cf. *C. A.* **23**, 3326.—In addn. to previously isolated compds., *o*- and *m*-MeC_6H_4OH, 1-MeC_6H_3-3,4-$(OH)_2$, and 1-MeC_6H_3-2,3-$(OH)_2$, *m*- and *p*-$C_6H_4(OH)_2$ were identified by means of their phenylcarbamates. A liquor sample contained S (g./l.) in the form of the radicals of H_2S 1.02, H_2SO_3 0.24, $H_2S_2O_3$ 0.65, H_2SO_4 0.44, HCNS 0.2. A primary tar liquor from a carbonization at 450° (9 l. from 650 lb. coal) yielded 12 g. PhOH and 5.6 g. *o*-$C_6H_4(OH)_2$. *o*-MeC_6H_4OH, *m*- and *p*-$C_6H_4(OH)_2$ and AcOH were identified. C_5H_5N was completely absent. A comparison of low-temp. liquors from various coals showed that the yields of tar acid depended largely on the O content of the coals. Low-temp. carbonization gave much greater yields of tar acids than high-temp. carbonization of the same coals, but greater quantities of PhOH were formed at high temp. K. H. E

Coal as fuel about 1600. J. J. BLANKSMA. *Chem. Weekblad* **28**, 210–3(1931). G. G.

The chemical constitution of coal. WM. A. BONE. *J. Roy. Soc. Arts* **79**, 77–95 (1930).—Preliminary remarks deal with: coal as a problem in org. chemistry; the origin and formation of coals; exptl. methods used with coal; and the thermal decompn. of the coal substance. A wood-coal transformation series is outlined and the ultimate analyses of wood, lignin, peat, 3 brown coals, 3 lignites, a sub-bituminous, bituminous and an anthracite coal are tabulated. Another table gives the analyses of the gases evolved at successive temp. ranges in the thermal decompn. of dry Morwell brown coal. As mined this coal contains 55% water, all of which can be eliminated by drying at 110°. Data are given calcd. to cu. ft. per ton, also lb. of CO_2 plus CO, and of H_2O. The total amts. of O_2 evolved were, resp., at: 130–375°, 217 lb.; 375–500°, 215 lb.; 500–700°, 80 lb.; 700–850°, 144 lb.; total 656 lb. O_2 per ton dry coal. The H evolved varied from

nil in the first 2 ranges to 755 and 2165 cu. ft. per ton, resp., in the last 2 temp. ranges. With immature brown coals it is always possible to distinguish 3 successive and independent changes, resulting in successive expulsions from the coal substance of: (1) CO_2 and H_2O, as if by internal condensation; (2) methane, higher paraffins and olefins, as if by the elimination of aliphatic side chains from the coal complex, oils also appearing; and (3) H. With increasing maturity of coals these successive steps overlap and are not easily distinguishable on distg. well-matured bituminous coals. The "Soxhlet method" of benzene-pressure extn. of coals at 250, 500 and 700 lb. per sq. in. and results obtained thereby are outlined. The 4 different fractions obtained by this method from bituminous coals are described and their effects on coking properties discussed. Recent results from extn. expts. appear to furnish an explanation to the problem of the development of coking propensities during the maturing of coals. Extn. of certain immature brown coals yielded none of the usual Fractions III and IV but in their place a quantity of phenolic compds. (among which phenol, *p*-cresol and catechol were identified) and phenolic esters. Expts. on Canadian lignitic coals of somewhat greater maturity showed that brown lignites from Saskatchewan yielded phenolic compds. instead of fractions III and IV while with laminated black lignites from Alberta phenolic compds. were not obtained, but in their place a substance simulating fractions III and IV began to appear. These laminated black lignites appear to represent a transition stage in the development of fractions III and IV obtained from bituminous coal with coking properties. This conclusion is strengthened by recent exptl. proofs of the benzenoid character of fraction IV yielded by coking coals. The yields of fractions I, II, III and IV totaling 1.25-15.6% of the coal substance obtained from 9 different kinds of coal are tabulated. The last section of the paper is on the benzenoid character of the main coal substance (85% + of the coal) as shown by its oxidation with alk. permanganate (*C. A.* **24**, 5967). The C:H ratio of the original dry coals and of the dry residue after benzene-pressure extn. and the percentage of volatiles of the original dry ashless coal and of the dry ashless residues are given for 6 coals varying from immature brown coal to strongly coking bituminous coal. The C:H ratio was always higher in the dry residues and the percentage of volatiles always less than in the original coal. The wts. of acetic, oxalic and crude benzenoid acids obtained from 3 of the coals and the C:H in crude benzenoid acids are tabulated. A table on C balance of the oxidation shows the percentage of original C of the coal substances appearing as CO_2, acetic, oxalic, succinic and benzenoid acids. With the Morwell brown coal total C accounted for equaled 99.7%; with the Durham "Busty" coking coal 99.4%. The oxidation products from 3 of the coals have been completely investigated. From the Canadian Estevan brown lignite the products were: CO_2, and the acids: acetic, oxalic, succinic, phthalic, isophthalic, terephthalic, trimellitic, hemimellitic, trimesic, pyromellitic, mellophanic, benzenepentacarboxylic and mellitic. The same products except trimesic acid were obtained from Australian Morwell brown coal and with the exceptions of succinic, hemimellitic and trimesic acids from Durham Busty coking coal. The possible benzene-ring condensation compds. or condensed nuclei with aliphatic side chains present in the coal substance which give on oxidation the various acids isolated are discussed. The large new fields in coal chemistry opened up by this discovery and the possible great economic value of continued research along these lines are suggested. An extended discussion follows the article.

W. W. Hodge

Proximate analyses of coals from North China. S. D. Wilson. *J. Assoc. Chinese and Am. Eng.* **11**, No. 7, 9–22(1930); cf. *C. A.* **24**, 5460. E. I. S.

Unit coal studies on some Virginia coals. F. H. Fish and J. A. Addlestone. *Ind. Eng. Chem., Anal. Ed.* **3**, 155–8(1931).—The 3 formulas most commonly used for correcting the calorific value of coal to an ash-free basis are given and briefly discussed. To det. which formula could best be used in correcting ash to obtain unit B. t. u. for some Virginia coals, expts. were carried out on coal from 10 different seams and on 28 samples from the Merrimac seam. Coals from the 10 seams were ground to 20-mesh and float-and-sink sepns. made with CCl_4 + C_6H_6 of sp. gr. 1.35. Two tables give: (1) percentages of ash, S, observed B. t. u., calcd. B. t. u. by the 3 formulas and differences for untreated, float and sink coal from the 10 seams; and (2) percentages of ash, S, observed B. t. u. and calcd. B. t. u. for the 28 samples of Merrimac coal with deviations from the av. B. t. u. From these data the unit B. t. u. values calcd. by the Fieldner modification of the Parr formula were in best agreement. However, the differences were rather large and a second series of expts. was run to correct for CO_2. A description and a diagram of the app. used for detg. the CO_2 in coal are given. Two other tabulations summarize the new data obtained by modifying Parr's formula to correct for CO_2: the unit B. t. u. = (B. t. u. − 5000 S)/(1.00 − [1.08(ash + CO_2) + 22/40S]) and

Fieldner's formula unit B. t. u. = (B. t. u. − 4650S)/(1.00 − [1.08(ash + CO_2) + $^3/_4$S]). With these modified formulas the unit coal B. t. u.'s are in closer agreement. For the 10 coals examd. the av. of differences in unit B. t. u. between the untreated, float and sink portions of each coal was 82 B. t. u. by the Parr formula and 96 B. t. u. by the Fieldner formula. For the 28 samples from the same seam the av. deviation from the mean is ±75 B. t. u. by the Parr formula and ±86 B. t. u. by the Fieldner modification of this formula. These variations may be due to the inherent variations in the different layers of the coal seam, but if this factor is neglected the av. deviation is not much greater than the exptl. error in the B. t. u. detn. W. W. HODGE

Hungarian coal and coal-oil problems. I. VITÁLIS. *Bányás. Kohás. Lapok* **62**, 299–304, 323–32, 347–356(1929).—Expts. were carried out with highly bituminous brown coals of the Upper Oligocene of Bakony Mountain in Hungary. The quality of the extd. bitumen and of low-temp. tars corresponds with that of pyropissite found near Halle, Germany. S. S. DE FINÁLY

Preparation and drying of briquetting coals. A. GEBHARDT. *Braunkohle* **28**, 282–304(1929). E. I. S.

Temperatures in briquets during briquetting. H. SCHUSTER. *Braunkohle* **28**, 185–92(1929).—Three methods of detg. temp. of 7-in. room-heating briquets during briquetting are described. E. I. S.

Ash and clinker of upper Silesian coals in furnace operation. PAUL FUCHS. *Arch. Wärmewirt.* **12**, 7–9(1931).—The compns. of the coarse stone and the finely divided ash in the coal proper are very different; the fly ash resembles the latter more than the former. It is not possible to tell from the compn. of a refractory whether it will be attacked by the ash. Effects of local overheating, both on brickwork and on iron parts, are often wrongly attributed to the slagging effect of the ash. ERNEST W. THIELE

Portable equipment for crushing and quartering samples of coal, coke or other lumpy materials. E. S. PETTYJOHN. *Ind. Eng. Chem., Anal. Ed.* **3**, 163–4(1931).—Dimensioned drawings are given with the descriptions of a portable steel quartering hopper and crusher. The hopper is an inverted cone and the coal is discharged from it on to crossed angle irons and received into 4 triangular boxes of approx. $1^1/_2$ cu. ft capacity. The crusher consists of a steel plate perforated with 1 in. holes, surrounded by an 18″ high hopper and with a receiving drawer fitted below the plate. A steel tamper is used to crush the coal until it passes the holes in the plate. Directions for using the app. are given. P. has used the app. for sampling coal up to 8 in. lumps. W. W. HODGE

Short tube mills for pulverizing coal. C. PFAHL. *Rev. matériaux construction trav. publics* **1931**, 25–9.—For efficiency and low cost of installation, short tube mills with circulating loads have many advantages. F. O. ANDEREGG

The present state of the pneumatic process for dry-cleaning coal. I. II. III. KENELM C. APPLEYARD AND EDWARD O'TOOLE. *Blast Furnace and Steel Plant* **18**, 1834–5; **19**, 268–72, 418–22(1931). E. H.

Industrial heating with powdered coal in the inorganic industries. J. DEFORGE. *Rev. matériaux construction trav. publics* **1930**, 469–73; **1931**, 5–10, 49–53, 101–5.—The advantages include complete combustion of the fuel with ready starting, stopping and control, and the possibility of using lower-grade fuels. The disadvantages are danger of accidents, which can be largely overcome by proper design and training of personnel, the difficulty of handling cinders, which can usually be handled in designing the equipment; and the cost of installation, which is sufficient to require a very careful study before making a new installation. F. O. ANDEREGG

Burners for pulverized-coal boilers in their relation to development of combustion chambers. J. GWOSDZ. *Braunkohle* **28**, 389–95, 413–9(1929). E. I. S.

A useful combustion chart. A. ALISON. *Colliery Eng.* **8**, 102–4(1931).—A chart is described for detg. excess air in the combustion of coal, depending on the proportion of N and uncombined O present in the flue gas. ANN NICHOLSON HIRD

Valuation of coal used for heat source. H. MATSUNAMI. *Japan. Govt. Rys. Bull* (Tokyo) **18**, No. 34, 25 pp.—The meaning of the chem. constituents of coal and their influence on combustion are discussed. E. I. S.

Lignite research and pollen analysis. F. KIRCHHEIMER. *Braunkohle* **29**, 448–63 (1930).—The microfloral, especially pollen-analytical, method as an aid in lignite research is discussed. Bibliography. E. I. S

Improvement of Hungarian lignites by drying. G. SZELÉNYI. *Magyar Mérnok Építészegylet Közlönye* **63**, 225–32(1929).—Drying can be accomplished with good results either by Fleissner's method (treating with steam at 10–20 atm.) or by the method adapted by Mátravidéki Coal Mine, Ltd. (boiling with high-pressure water). The

removal of 1 kg. moisture requires 0.6 kg. steam. Dried lignite, especially that dried by the 2nd method, has good grain size and contains little waste dust. The ash content diminishes about equally in both methods. **Reply.** H. KLEIN. *Tüzelőstech.* **2**, 39–42(1930).—K. states that Fleissner's method is more useful for effecting drying. **Reply.** G. SZELÉNYI. *Ibid* 43.—S. insists on his former views on the basis of his own expts. S. S. DE FINÁLY

Preparation of pulverized lignite with pneumatic circulation drying. P. ROSIN AND E. RAMMLER. *Braunkohle* 29, 557–63(1930).—Circulation drying is a pneumatic process according to which the transport and drying of wet products in suspension are effected by hot gases which circulate at high speed through a pipe system. Details of a circulating drier are given. E. I. S.

Calculations and investigations of lignite-briquet cooling. H. SCHUSTER. *Braunkohle* **28**, 305–18(1929).—It is technically possible to cool briquets to about 2 to 3% of the surrounding temp., and loading at this temp. without the possibility of further cooling in car is considered safe in respect to quality of briquet and self-ignition hazard. E. I. S.

By-product ammonia. H. HOLLINGS AND E. W. SMITH. *Inst. Gas Eng. Communication* No. **19**, 25–30(1930).—A discussion is given of possible ways and means for increasing the net value of NH_3 at the gas works, which in many cases under existing conditions does not pay the cost of its removal from the gas. Production in Great Britain is equiv. to 150,000 tons of $(NH_4)_2SO_4$ annually. At the present time the Comm. cannot indicate any new research in this field with any reasonable prospect of economic advantage. H. L. OLIN

Preparation of ammonium sulfate in the form of coarse thick plates. W. GLUUD, W. KLEMPT AND H. RITTER. *Ber. ges. Kohlentechnik* **3**, 371–84(1931).—The effects of various conditions upon the cryst. form of coal-tar $(NH_4)_2SO_4$ were studied. Temp. and rate of crystn. and the quantity of such impurities as pyridine, tar acids, phenol and As appeared to have no effect upon the form of the crystals, but Fe did appear to be the detg. factor. To det. the effect of Fe salts, the Fe present in the crude liquors was pptd. out with H_2S and then definite quantities of Fe salts were added. Fe^{III} ion had an injurious effect upon the cryst. form, only a fine crystal brew being obtained in its presence. Cr and Al have the same effect, but the lower-valence forms of Fe, Mn and Co on the other hand have very favorable effects. The quantities of Fe, Mn and Co used were 2.4 g. of sulfate per l. If it is desired to get the same cryst. form of sulfate as is obtained from synthetic NH_3, it is necessary to remove the Fe. This is accomplished by oxidation to Fe^{III} and pptn. as hydroxide by making alk. with NH_3. H. STOERTZ

Naphthalene removal with tetralin. P. DEUTSCH. *Gas u. Wasserfach* **74**, 245–7 (1931).—A satisfactory naphthalene solvent to be introduced into gas mains must be (1) a good solvent for naphthalene, (2) of low vapor pressure to avoid too great losses, (3) of higher vapor pressure than naphthalene in order to be present in sufficient amts. to dissolve the condensed naphthalene. The vapor pressure of naphthalene and a series of possible naphthalene solvents, as well as the soly. of naphthalene in these solvents, are given for 0° and 20°. Tetralin satisfies the above conditions best. A given gas contained 13 g. naphthalene per 100 cu. m. On cooling from 20° to 0° 8.5 g. of naphthalene will be deposited per 100 cu. m. of gas. 62.5 g. of tetralin is required to dissolve this amt. of naphthalene at 0° (satd. soln.) and 60 g. to sat. the gas at 0° or a total of 122.5 g. of tetralin per 100 cu. m. of gas. The vapor pressure of tetralin is such that gas at 20° can carry 200 g. per 100 cu. m. Xylene can dissolve 20.8 g. of naphthalene per 100 g. at 0° so only 32.3 g. of xylene is required to dissolve the naphthalene. However, the gas requires an addnl. amt. of 1690 g. xylene to sat. itself at 0°, or a total of 1722 g. must be added to the gas to insure sufficient xylene condensate to dissolve the naphthalene when the gas is cooled to 0°, over 10 times as much as with tetralin. At Bremerhaven tetralin costs 55.25 marks per 100 kg. The total cost of adding tetralin for the first year was 2.9 pfg. per 100 cu. m. The typical app. for vaporizing tetralin is described and illustrated. Experiences in other cities are given. D. regards tetralin as the single satisfactory means for combating naphthalene and removing tarry deposits from mains. R. W. RYAN

Esthonian combustible shales. OTAKAR VONDRÁČEK. *Chem. Listy* **24**, 471–3 (1930).—Combustible shales are located between the cities Tapa and Narva and cover 2470 sq. km. The shales contain 70% org. matter which came from a rich sea fauna; the shale burns with a luminous flame and emanates an oily odor. The shales are used in the industry and in firing locomotives; a great deal of fine ash forms which penetrates everywhere. The ash nuisance is obviated by using an oil prepd. by the destructive distn. of shale. FRANK MARESH

The Italian gas industry. R. DECKERT. *Gas u. Wasserfach* **74**, 203–4(1931).—Facts and figures are given for the Italian gas industry. R. W. RYAN

Determination of the heating value of gases by explosion. 'HANS LÖFFLER. *Arch. Wärmewirt.* 11, 403–4(1930); cf. *C. A.* **25**, 207.—An app. is described and illustrated in which the gas is mixed with a definite vol. of air and exploded, the heating value being detd. by the rise in temp. of a Hg thermometer placed in the center of the pipet, which is built like a Dewar flask. The calibration appears to be empirical. E. W. T.

The 25th report of the Joint Research Committee of the Institution and Leeds University. Examination of the products of combustion from typical gas appliances. V. THOMAS HARDIE, *et al. Inst. Gas Eng. Communication*, No. 16, 50 pp.(1930).—Tests on properly adjusted surface combustion water heaters showed CO in waste gas less than 0.01%. Similar tests with inverted incandescent mantle burners indicated a higher rate of CO production than with the Bunsen flame especially at gas rates lower than normal. The rapid increase of CO when the burner was turned low points to the advantage of using a smaller unit at full capacity when little light is required. H. L. OLIN

Some further experiments on the combustion of inflammable gases by electric sparks. J. D. MORGAN. *Phil. Mag.* [7], **11**, 158–63(1931); cf. *Phil. Mag.* **43**, 359 (1922); *C. A.* **17**, 2505.—Weak mixtures of coal gas with air at atmospheric temp. and pressure were subjected to a stream of high-tension sparks, maintained without burning in the gas. Combustion in the mixture is proportional to the heat energy of the spark discharge when the gap width is constant; and proportional to the gap width when the heat energy is constant. The results are consistent with the previous theory. ARTHUR FLEISCHER

The 27th report of the Joint Research Committee of the Institute and Leeds University. First report on the back-run process for the manufacture of carbureted water gas. THOMAS HARDIE, *et al. Inst. Gas Eng. Communication* No. **18**, 47 pp.(1930).—This report covers an elaborate test made to det. the efficiency of production of carbureted water gas in a modern, automatically operated plant, equipped with generator boiler and self-clinkering grate and designed to use the back-run principle of heat regeneration. Results are given in condensed form: time of test, 96 hrs.; coke to generator, 151.3 tons; thermal value of coke, 12,910 B. t. u.; oil to carburetor, 20,163 gallons; thermal value, 19,640 B. t. u. per lb.; total steam (30 lb. pressure) to generator, 313,000 lb.; av. percentage of steam decompd., 60.8; total carbureted water gas made (purified) 9,534,000 cu. ft.; thermal value of gas, 503 B. t. u.; efficiency of production of carbureted water gas, 69.3%; efficiency of production of blue water gas, (*a*) accounting for extra steam to generator and steam to auxiliary plant, 49.3%, (*b*) without accounting for such steam, 55%. H. L. OLIN

The 26th report of the Joint Research Committee of the Institution and Leeds University. Second report on the use of creosote in the manufacture of carbureted water gas. THOMAS HARDIE, *et al. Inst. Gas Eng. Communication* No. **17**, 7 pp.(1930).—Gas oil, light and heavy creosote, and mixts. of gas oil and creosote were cracked over a temp range of 700–900° in atms. of H_2, H_2 and CO, and H_2, CO and steam. The tabulated data indicate the highly unsatisfactory results obtained:

Kind of oil	Therms per gal. of oil	Percent tar	Percent naphthalene
gas oil	1.211	30.1	3.0
light creosote	0.489	67.7	16.0
heavy "	0.167	80.3	18.3
mixt. of 80% gas oil–20% light creosote	1.054	40.1	6.3

H. L. OLIN

V. D. I. rules for gas-flow measurement with standard nozzles and orifices. K. BUNTE AND L. ZIPPERER. *Gas u. Wasserfach* **74**, 250–4(1931).—Flow formulas are given as well as drawings of standard nozzles and orifices, and practical applications. R. W. RYAN

Testing gas-distribution systems with ethyl mercaptan. A. THAU. *Gas u. Wasserfach* **74**, 247–50(1931).—A discussion is given of the expts. carried out in 2 American cities with Et mercaptan to detect leaks in distribution system, and possible application to German conditions. R. W. RYAN

Simple flue-gas diagram for excess air. L. ZIPPERER. *Gas u. Wasserfach* 74, 199–200(1931).—A simple diagram is given for facilitating the estn. of flue-gas concns for a given gas with various amts. of excess air. R. W. RYAN

The dew point of the flue gases of solid fuels. W. GRAULICH. *Feuerungstech.* **19**, 26–8(1931).—G. asserts that the H content on a wet basis is nearly the same for all solid fuels. This assumption enables him to draw a simple diagram relating dew point of flue gases to the water content of the fuel and to the excess air. ERNEST W. THIELE

Coal gas for heating retorts in small gas works. ERICH DUBOIS. *Gas u. Wasserfach* **74**, 269–74(1931).—The alternative use of coal gas may permit better balances between gas send-out and coke demand. An economic study is necessary to det. the desirability of using coal gas for heating retorts in each case. R. W. RYAN

Use of sewage gas as city gas. W. H. FULWEILER. *Sewage Works J.* **2**, 424–34 (1930).—The collection of gas from digestion or Imhoff tanks is not justified in the U. S. as a substitute for city gas because (1) it has a relatively high sp. gr. (0.77) which would necessitate greater expenditure of power for pumping and decrease the capacity of the distribution system; (2) it has a very low H content which gives rise to undesirable flame characteristics; (3) the max. production which could be expected is only 1% of that required for city gas and this would be produced in summer when it is least required; and (4) the enriching quality which sewage gas possesses because of its high B. t. u. value (650 to 800) is obtained at considerably lower cost by the use of bunker oil. E. HURWITZ

Valves for blast-furnace and producer gas. A. JOHANSSON. *Jernkontorets Ann.* **114**, No. 7, 368–72(1930).—Detailed description of 600-mm., 300-mm. and 180-mm. valves used in Swedish iron works designed to prevent soot accumulation on the valve seat. E. I. S.

The gas producer. I. Continuous producer. II. Operation and items related to operation. III. Conduction of gas-producer fuel tests. JOHN W. ROMIG. *Am. Gas J.* **133**, No. 2, 47–8, No. 3, 44–5, No 4, 68, 73–4, No. 6, 45–6, 59(1930); **134**, No. 1, 54–5(1931). E. H.

The disposal of liquor effluents from gasworks. A. C. MONKHOUSE AND W. ETHERIDGE. *Inst. Gas. Eng. Communication*, No. 21, 12–30(1930), cf. C. A. 23, 5562.—The report is presented under 3 heads: (*a*) methods of reducing the higher tar acid content of NH_3 liquor, (*b*) the evapn. of effluent liquor on producer bars and (*c*) the biological purification of effluent liquors. The principal studies under (*a*) were directed on the effects of keeping the heavy tars out of contact with the main effluent liquors and thus keeping tar acids out of the latter. Highly promising results with the Cottrell electrostatic tar sepn. and with the Cyclone tar extractor are cited. Under (*b*) the method of evapg. "devil" liquor by spraying it on the grates of producers operated in connection with vertical gas retorts was found to be successful since no fumes or other nuisance was noted. It was estd. that the total "devil" liquor output and 27% of the spent liquor from the NH_3 still could be disposed of in this way. (*c*) Spent still liquor from the Coventry Gasworks amounting to 7,152,000 gallons in 1930 with an O_2 absorption value 9560 p. p. m. is being reduced to 985 p. p. m. by treatment on bacterial beds. The latter, which consist of graded granite about 5 feet deep, are activated during rest periods with sewage. H. L. OLIN

Catalytic desulfuration and hydrogenation of a primary tar fraction. J. M. PERTIERRA. *Anales soc. espaü. fis. quim.* **28**, 1435–50(1930).—The S content, existing as H_2S, mercaptans, thioethers, and thiophene derivs. of a 180–300° fraction of primary tar, was detd., then the tar fraction desulfurized by passing the vapors by means of a current of dry H_2 over oxides previously reduced and heated to 300–350°. Two passages over the catalyst reduced the S content 60%. A second catalyst following the first reduced the base content 64.2% and the tar phenols 13.3%. In hydrogenating com. primary tar from which fractions boiling below 180° had been removed previously, by the Bergius process with Fe and Mo oxides as catalysts, there is obtained a benzine, b. 50–185°, with a content of phenols and bases reduced 73.9% and 59.3%, resp., and wholly sol. in Et_2O, which proves the transformation of the 2.6% "ulmins" of primary tar. E. M. SYMMES

The coking industry and its development in relation to the manufacture of iron and steel. JAMES K. DICKIE. *J. West. Scotland Iron & Steel Inst.* **38**, Pt 4, 45–55(1931). E. H.

Influence of water in the by-product coke oven. G. E. FOXWELL, *Colliery Eng.* **7**, 307–9, 338–40(1930).—The occurrence of hygroscopic moisture seems to depend on the presence of minute pores in the material. Coke made from coal contg. much hygroscopic moisture is very reactive. Water vapor affects the yield of NH_3. Financial effects are discussed. ANN NICHOLSON HIRD

Gas coke as a raw material for household briquets. R. KADA. *J. Fuel Soc. Japan* **10**, 219–32(1931); Section 2, 15–7(in English).—K. manufd. briquets by mixing

semi-coke with gas coke in various proportions and studied their properties. The equiv. mixt. of semi-coke and gas-coke produces most suitable briquets which resemble anthracite briquets in their combustibility. K. also suggests the production of coke suitable for household briquets by adjusting the temp. of carbonization. F. I. NAKAMURA

Formation of CS_2 from H_2S and coke (DRAKELEY, BAKER) **18**. A new physicochemical explanation of the formation of humus, peat and coal (ZOLCINSKI) **8**. Beneficial action of brown coal upon the development of cultivated plants (KISSEL) **15**. Oven for dry distillation of brown coal (U. S. pat. 1,796,264) **22**. Phenols (Brit. pat. 338,638) **10**. Apparatus for separating peat fiber from liquids (Brit. pat. 338,547) **23**. Combined reduction of ores and hydrogenation of carbonaceous materials (Brit. pat. 339,276) **9**. Destructive hydrogenation (Brit. pats. 338,544, 338,576 and 339,317) **22**. Purifying bitumen, etc. (Brit. pat. 339,470) **22**. Distilling or drying carbonaceous materials (Brit. pat. 338,939) **13**.

RE, UMBERTO, AND VARETON, E.: **Carburanti e carburazione.** Milan: Ulrico Hoepli. 516 pp. L. 50. Reviewed in *Ind. Eng. Chem.* **23**, 597(1931).

Method and plant for drying fuels with circulated superheated steam. RUDOLF STEINER and VIKTOR SKUTL. Austrian 121,405, Dec. 15, 1929.

Low-boiling liquid fuels from coals, tars, oils or bituminous materials. A. ROMWALTER. Hung. 100,880, Dec. 5, 1929. The raw materials are powdered or vaporized and treated at 350–550° with a mixt. of CO and steam at a partial pressure lower than 1 atm. The low-boiling liquid fuels formed are led away in vaporized form.

Motor fuel. I. G. FARBENIND A.-G. Fr. 37,306, Aug. 5, 1929. Addn. to 643,785 (*C. A.* **23**, 1739). In the process of the prior patent the extn. is carried out in steps under conditions which become more and more severe and the residue is afterward submitted to hydrogenation under pressure.

Fuel briquets. GUSTAV KOMAREK (one-half to Monarch-Greaves & Co., and one-fourth each to George MacPhail and Charles Coryell). U. S. 1,796,465, March 17. Petroleum coke is used with a coke product from the destructive distn. of coal.

Charcoal for iron metallurgy. E. GABROVITZ. Hung. 101,960, Jan. 7, 1930. Briquets are formed from charcoal dust and lime-contg. water. *E. g.*, 22.5 parts CaO is added to 100 parts H_2O, then 80 parts of this solution is mixed with 100 parts of powd. waste charcoal and charcoal dust and the forms are pressed under 2–3 atm.

Distilling fine bituminous material. KOHLENVEREDLUNG A.-G. Ger. 515,911, Mar. 18, 1924. The finely powd. material is treated with a blast of hot gas so that the distn. begins at above 800°.

Apparatus for continuously distilling carbonaceous materials and cracking or hydrogenating the vapors. "INTERCARBO" SOC. ANON. POUR LA CARBONISATION ET LA TRIATEMENT CATALYTIQUE DES COMBUSTIBLES. Ger. 518,403, Mar. 26, 1927. See Brit. 277,404 and 278,041 (*C. A.* **22**, 2655).

Destructive hydrogenation. H. P. DEAN and IMPERIAL CHEMICAL INDUSTRIES, LTD. Brit. 339,040, Oct. 4, 1929. In a described app. for the destructive hydrogenation of liquid carbonaceous material, the H is passed into the reaction chamber through an indirect heat exchanger surrounded by the material and which may be made of or coated with catalytic material.

Destructive hydrogenation. GUTEHOFFNUNGSHÜTTE OBERHAUSEN A.-G. Brit. 339,048, Oct. 8, 1928. Fatty oils such as soy-bean oil are converted into products suitable for operation of internal-combustion engines by heating to above their b. ps. in the presence of H at a pressure below 45 atm. (suitably by use of illuminating gas) and a catalyst prepd. by pouring dil. Na_2CO_3 over Fe oxide and drying and reducing the mixt.) Use of catalysts contg. Zn and Cu is also mentioned. If desired, the process may be carried out in 2 sep. stages, vapors being formed in the first stage and catalytically hydrogenated in the second stage.

Apparatus for destructive hydrogenation. W. R. TATE, H. P. STEPHENSON, J. F. LEHMANN and IMPERIAL CHEMICAL INDUSTRIES, LTD. Brit. 339,479, Nov. 29, 1929. Various details of app. are described, particularly relating to control of the liquid level in a reaction vessel or catch pot.

Apparatus for low-temperature distillation of solid carbonaceous materials such as coal or oil shale. OSWALD HELLER (to Bamag-Meguin A.-G.). U. S. 1,796,100, March 10. Various structural details are described of an app. comprising rotating drums and adapted for heating the material undergoing distn. by use of preheated heat-accumulating elements which may have a net-like cross section.

Hydrogenating coal, etc. I. G. FARBENIND. A.-G. Fr. 37,394, Sept. 6, 1929. Addn. to 666,683 (*C. A.* **24**, 1204). Other means than that in Fr. 666,683 is used to keep the catalyst dispersed in the liquid contained in the reaction chamber, *e. g.*, the catalysts may be used in the colloidal state so that they remain easily in suspension, or the difference in d. between the substances to be treated and that of the catalyst is reduced so that the catalyst remains easily suspended. Examples are given.

Preparing peat for briqueting. MADRUCK, GES. FÜR MASCHINELLE DRUCKENTWÄSSERUNG M. B. H. Brit. 338,950, Aug. 23, 1929. Raw peat is mixed with peat dust (preferably in such quantity that the wt. of dry material in the dust exceeds that in the raw peat), and the mixt. is highly compressed (as by a hydraulic press) to ext. water. Numerous details of app. and operation are described.

Lignite distillation. H. DEBAUCHE. Brit. 339,129, Dec. 17, 1929. Destructive distn. is effected in an app. such as described in Brit. 270,921 (*C. A.* **22**, 1673), first at relatively low temp. (300–500°) and then at higher temp. (suitably 800°), for removal of heavy hydrocarbons and production of a clean and brilliant coke suitable for making briquets (various details of manuf. of which also are given). App. is described.

Plate drier for lignite. "EINTRACHT" BRAUNKOHLENWERKE UND BRIKETTFABRIKEN and MAX MAYER. Ger. 515,520, Dec. 11, 1929. Addn. to 514,711 (*C. A.* **25**, 2273). Constructional details.

Phenols from industrial liquors. FRITZ ULRICH (to Zeche Mathias Stinnes). U. S. 1,795,382, March 10. Phenol-bearing liquors such as ammoniacal liquors are treated with tar bases such as pyridine or quinoline in order to improve the recovery of phenols.

Preparing highly concentrated ammonia gas from ammoniacal liquor. L. F. FOKIN and E. E. LIDER. Russ. appl. 18,221, May 4, 1927, addn. to pat. No. 3856. Concd. ammoniacal liquor is dild. with hot waste water from the distn. column. The hot, dil. mixt. is passed through the dissociator for the removal of CO_2 and H_2S in gaseous state. The partly purified water is then freed from NH_3, H_2S and CO_2 in the distn. column.

Purifying benzenes. I. G FARBENIND. A.-G. Fr. 37,363, Aug. 23, 1929. Addn. to 621,505. The purification of benzene or the intermediate product by a treatment with H under pressure and at a high temp. in the presence of catalysts not attacked by S is carried out in a single operation with the hydrogenation of substances such as coal, hydrocarbons or their derivs.

Apparatus for desuperheating steam. SUPERHEATER CO., LTD., and COMPAGNIE DES SURCHAUFFEURS. Brit. 339,575, March 19, 1930. Structural features.

Gas production. A. S. RAMAGE. Brit. 338,905, Aug. 24, 1929. Olefins, terpenes or acetylenic hydrocarbons, substantially free from paraffinic hydrocarbons, are passed, at a temp. of about 420–700°, over iron, with 20–30% or more of steam, producing mainly H, CO and CH_4, and leaving the iron as metal. Various details of app. and procedure are described. Cf. *C. A.* **24**, 2866.

Fuel gas. HERMANN HEBEL. Austrian 121,094, May 15, 1930. In the manuf. of fuel gas by degasifying coal and converting the residual coke into water gas, the degasification is effected by leading a part of the water gas through the degasifying retort and another part around the retort, the latter part being afterward reheated and returned to the water-gas generator with superheated steam. The calorific value of the gas may be regulated by controlling the amt. of water gas admitted to the degasifying retort, complete degasification being in any case ensured by regulating the temp. of the water gas so admitted, and also the temp. and the amt. of water gas led around the retort. Cf. *C. A.* **24**, 228.

Fuel gas. ANTON KRATKY. Austrian 121,099, Aug. 15, 1930. Gas for heating or for driving internal-combustion engines is prepd. by the action of steam at 500–1000° on atomized or gaseous or vaporized hydrocarbons in a chamber heated electrically to approx. the temp. of the steam. Ale vapor may be mixed with the steam. App. is described.

Fuel gas from bituminous materials. ARTHUR H. LYMM Ger. 515,982, Feb. 22, 1927. Details of retorts and method of distg. are given.

Coal gas. MARIA T. STRACHE. Austrian 121,540 and 121,542, Oct. 15, 1930. Addns. to 118,062 (*C. A.* **24**, 4921). In the method of Austrian 118,062, uniform distribution of the fresh fuel and tar is effected by feeding the fuel to the generator through the tar which may act as a seal for the generator. App. is described (121,540). Addnl. tar may be added with the fresh fuel, besides the tar produced in the gasification. Low-temp. tar, generator tar, wood tar, or lignite tar may be so added. Mineral oils or their distn. products or residues may be added also (121,542).

Desulfurizing coal-distillation gases, etc. ISTVÁN HUNYADY and KARL KOLLER. Ger. 518,431, May 11, 1928. The gases are freed from tar, NH_3 and CN compds., and

then treated with an aq. suspension of $Mn(OH)_2$. The sludge of MnS and S so obtained is withdrawn and treated with SO_2, to produce a suspension of S in an aq. soln. of MnS_2O_4. The soln. is sepd. and treated in turn or simultaneously with the gases to be purified and with SO_2, whereby MnS_2O_4 is converted into MnS_3O_6, which is stable to H_2S. The soln. of MnS_3O_6 is then boiled, yielding $MnSO_4$, S and SO_2. The $MnSO_4$ is treated with NH_3 and O to regenerate $Mn(OH)_2$.

Oil gas. FRANK J. NOLAN. U. S. 1,796,299, March 17. A mixt. of vaporous hydrocarbon material and steam is introduced to a zone contg. a plurality of individually spaced metallic catalysts such as an alloy of Al 50, Ni 15, Cu 10, Ti 10, Ag 2, Mg 10 and Bi 3%, each spanning the zone and heated to above 540° and the mixt. is passed over the catalysts without further addn. of steam and the gas produced is withdrawn for collection. App. is described.

Oil gas. A. S. RAMAGE. Brit. 338,904, Aug. 24, 1929. Materials such as heavy mineral oils are passed, with 1–2% of steam, over ferric oxide at a temp. of about 420–540° and the (largely olefinic) gases thus formed are passed, with 10–40% of steam, over finely divided iron at a higher temp. (suitably about 600–800°), producing a gas contg. H, CO, CH_4, C_2H_4 and some aromatic hydrocarbons. Motor fuel is sepd. from the gas, and various details of app. and procedure are described.

Water gas. A. F. KUNBERGER (to Humphreys & Glasgow, Ltd.). Brit. 338,804, March 2, 1929. H produced by passing steam over hot iron is superheated and carbureted and then passed with excess steam through the upper part of the fuel bed (the whole of which is used simultaneously in generating water gas by "up-running") and the mixed gas is taken off above the fuel bed. Various details of app. and operation are given.

Water-gas producer. MOTOR FUEL PROPRIETARY, LTD., and W. JOHNSON Brit. 338,877, Aug. 26, 1929. Various details are described of an app. having an inner generator located within an annular generator, charges in each generator being independently gasified.

Water-gas producer for the continuous distillation of powdered fuel. JULIUS PINTSCH A.-G. Fr. 37,192, July 4, 1929. Addn to 658,586 (*C. A.* **23**, 5307).

Apparatus for making water gas from pulverulent fuel. HARALD NIELSEN and BRYAN LAING. Ger. 518,427, May 31, 1927. See Brit. 299,485 (*C. A.* **23**, 3333).

Gas producer. S. I. R. I., SOC. ITALIANA RICERCHE INDUSTRIALI. Brit. 338,911, Aug. 27, 1929. See Fr. 680,849 (*C. A.* **24**, 3932).

Gas producer (suitable for generating gas from solid fuels on automobiles). WM W. ODELL and EARL N. PERCY. U. S. 1,795,670, March 10. Structural features.

Combined gas-producer furnace suitable for heating metals. R. A. HADFIELD and R. J. SARJANT. Brit. 338,893, June 26, 1929.

Gas-generating plant. ADOLF WEIGEL. Ger. 515,983, May 10, 1925. Details of a surface cooler for the gases produced are given.

Apparatus for producing fixed combustible gas from fluid fuels such as oil. ORRELL O. THWING (to General Oil Gas Corp.). U. S. 1,796,733, March 17. Numerous structural details are described.

Enriching combustible gases. HERMAN A. BRASSERT and CHARLES W. ANDREWS (to H. A. Brassert & Co.). U. S. 1,795,829, March 10. A gas to be enriched, together with a regulated proportion of air, is passed through a mass of partly consumed coke at high temp., then through a mass of coke at still higher temp. which will effect formation of CO from CO_2, and a controlled proportion of preheated air is introduced laterally into the last-mentioned coke mass, and the gas is then passed through a mass of coal at a lower temp. to effect enrichment. App. is described.

Washing flue gases, etc. P. J. ROBINSON. Brit. 338,492, May 18, 1929. Gases such as flue gases are passed through a centrifugal dust separator, adjusted to leave a regulable small proportion of fine dust in the gases, and are then subjected to steam or fine water sprays to wet the remaining fine dust particles and effect oxidation of SO_2 to SO_3, after which the gases are caused to impinge upon baffle plates and are washed with a heavy shower of water to remove the dust and acid. Various details of the app. (which may be formed of Ni-Cr steel resistant to corrosion) and of operation are described.

Regenerative heat-storing device, especially for preheating fuel gas. AKTIEBOLAGET LJUNGSTRÖMS ÅNGTURBIN. Ger. 515,870, Nov. 15, 1927.

Refining tars, oils, etc. I. G. FARBENIND. A.-G. (Carl Krauch and Mathias Pier, inventors). Ger. 515,523, Aug. 15, 1925. The tars, oils, distn. products, residues, etc., are treated with H or H-evolving materials at high temps. and pressures, optionally, in the presence of catalyzers. The material to be refined by this process is intimately mixed with up to 30% peat or lignite or a mixt. of both. In an example, lignite-gener

ator tar is mixed with 20% crude lignite and heated in a Mn-bronze-lined high-pressure reaction chamber to 450°, and subjected to the action of H at 200 atm. A 20–35% yield of benzine results. Further examples are given. Cf. *C. A.* **24**, 4378.

Distillation of tar. ALEXANDER A. MACCUBBIN and JOSEPH ZAVERTNIK (to The Barrett Co.). Can. 309,218, Mar. 10, 1931. A method and app. are specified in which tar is distd. at atm. pressure to produce distillate oils and a pitch residue. The pitch residue is withdrawn during distn. at approx. the temp. of the first distn. and immediately subjected to a high vacuum to effect further distn. of high-boiling oils by the self-contained heat of the pitch. Cf. *C. A.* **24**, 2585.

Removing acid constituents from low-temperature tar or its fractions. CURT BUNGE and FORSCHUNGSINSTITUT FÜR BERGWERKS- UND SPRENGSTOFFCHEMIE SOWIE VERWANDTE GEBIETE. Ger. 518,210, Sept. 13, 1925. An aq. emulsion of the tar or tar fraction is treated with alkali soln. The emulsion may be prepd. with the aid of soap, and the treatment with alkali soln may be effected in a no. of stages.

Chamber oven for the production of gas and coke. C. OTTO & CO. G. M. B. H. Ger. 515,978, Oct. 20, 1926. Details of heating the distn. gas to produce gas of better illuminating quality are given. Cf. *C. A.* **24**, 4379, 5139.

Coke oven. RUDOLF WILHELM (to Arnold Beckers). U. S. 1,795,324, March 10.

Coke oven. KOKSOFENBAU UND GASVERWERTUNG A.-G. Ger. 512,334, Nov. 22, 1927. The heating channels are lined with steel or other heat-resistant metal.

Regenerative coke ovens. COLLIN & CO. Fr. 37,387, Sept. 2, 1929. Addn. to 576,379.

Regenerative compound coke oven with twin outlets. C. OTTO & CO. G. M. B. H. Ger. 515,849, Aug. 18, 1929. Addn. to 503,895 (*C. A.* **24**, 5987)

Coke-oven battery with horizontal chambers. THE KOPPERS CO. Ger. 518,312, Dec. 15, 1928. See Brit. 302,365 (*C. A.* **23**, 4331).

Heating wall for coke-oven chambers. KOKSOFENBAU UND GASVERWERTUNG A.-G. Ger. 518,385, April 29, 1926.

Coke oven (door construction, etc.). R. & J. DEMPSTER, LTD., and C. E. HOLT Brit. 339,557, Feb. 19, 1930.

Coke-oven door. HEINRICH SCHWARZ. U. S. 1,795,515, March 10.

Coke-oven door. E. WOLFF. Brit. 338,450, Oct. 9, 1929.

Coke-oven cover. ARTHUR KILLING and WILHELM ELBERT. Ger. 515,538, Aug. 19, 1928

Method and plant for drying coke. WESTFÄLISCHE MASCHINENBAU-GES. M. B. H. Ger. 518,313, June 17, 1930.

22—PETROLEUM, LUBRICANTS, ASPHALT AND WOOD PRODUCTS

W. F. FARAGHER

Petroleum mine in the old Groznui District. L. LUTOVINOV. *Azerbaïdzhanskoe Neftyanoe Khozyaĭstvo* **1931**, No. 1, 57–63.—A complete description is given of the proposed method of mining oil similar to that adopted in Pechelbronn (France).
V. KALICHEVSKY

Determination of the toluene content of a Mid-Continent petroleum. JOHANNES H. BRUUN, R. T. LESLIE AND SYLVESTER T. SCHICKTANZ. *Bur. Standards J. Research* **6**, 363–7(1931).—Com. petroleum fractions from an Okla. crude oil were fractionated into 1° cuts and tested for toluene by nitrating to 2,4-dinitrotoluene by means of a nitrating method which was found not to attack the other constituents of the fractions. Toluene was found in all the cuts boiling between 90° and 112°. The max. concn. (32.2%) was found in the fraction boiling between 107° and 108°. Total toluene present amounted to 1/3 of 1%, based on the crude petroleum.
D. F. BROWN

Separation of normal octane from petroleum by distillation and crystallization. R. T. LESLIE AND SYLVESTER T. SCHICKTANZ. *Bur. Standards J. Research* **6**, 377–86(1931).—A fraction b. 100–130° from an Okla. crude oil was subjected to an interlocking process of distn. and crystn. to sep. octane. The method and app. are described in detail. The b. p., f. p., refractive index and mol. wt of the product are given and compared with the properties of a carefully purified sample of synthetic octane. It is estd. that not less than 1% of octane was present in the oil investigated.
D. F. BROWN

The acids of Baku petroleum. A. E. CHICHIBABIN. *Compt. rend. acad. sci. U. R.*

S. S. **1930A**, 382–4.—A summary is given of work done on petroleum and naphthenic acids. The sepn. of the acids from the lower fractions as amides showed that fatty acids with 7 C atoms were present. Bromination and sepn. of HCOOH from the hydroxy-acids prepd. from the bromocarboxylic acids indicated that the carboxyl group is bound to primary radicals as well as to secondary and tertiary radicals. By sepg. the acids into cyclic and fatty acids by means of their Cd salts, it was found that the petroleum acids b. 215–18° consist principally of fatty acids. The content of cyclic acids increases regularly with the b. p., so that acids b. above 268° (C_{10} acids) belong almost exclusively to the cyclic series. The consts. of the so-called lower naphthenic acids do not agree with those of acids with 5- and 6-C rings. The C_7 acid, heptanaphthenic acid, is really a mixt. of fatty and naphthenic acids. L. JACOVLIFF

The refining of light petroleum distillates. E. W. SHEEL. *Chem. Eng. Mining Rev.* **23**, 171–8(1929).—The predominating impurities in straight-run distillates are S compds. which in undue amts. cause corrosion, particularly of the brass and Cu fittings of the carburetor. Data are given to show that the S content of distd. fractions from any oil increases with rise in b. p. The chief chem. refining processes are described briefly, *i. e.*, the NaOH, Na plumbite, H_2SO_4, Frasch and Na hypochlorite processes. In the refining of cracked distillates desulfurization with the simultaneous removal of gum-forming diolefins is the objective. Acid treatment combined with sweetening is usually given these cracked distillates. A batch and a continuous treating system are described. D. F. BROWN

Report of Subcommittee XXVIII on autogenous ignition of petroleum products. A. H. NUCKOLLS, *et al.* *Proc. Am. Soc. Testing Materials* **30**, Pt. 1, 788–92(1930). As a result of coöperative tests on aviation gasoline, ordinary gasoline, Stoddard solvent, kerosene, motor oil, Et_2O, acetone, CS_2 and heptane, the results of which are given, minor changes in the tentative standard D-286-28T are suggested. It is recommended that the test be adopted as standard with these revisions and that further coöperative tests be made. D. F. BROWN

Atmospheric and vacuum distillation of Mid-Continent crude oil. JOHN PRIMROSE. *Refiner and Natural Gasoline Mfr.* **10**, No. 3, 69(1931).—The processes and equipment applicable to atm. and vacuum distn. are discussed. J. L. ESSEX

Physical properties of mineral oils and their investigation. I. THAMM. *Magyar Mérnök, Épiteszegylet Közlönye Havi Füzetei* **8**, 25–38(1931).—A general description S. S. DE FINÁLY

Refining shale oils with silica gel and with bauxite. II. Filtrations in liquid phase. B. SALADINI. *Industria Chimica* **5**, 1482–7(1930); cf. *C. A.* **24**, 2279; **25**, 2276.—Shale oils contg. as high as 9.58% S were filtered through silica gel, bauxite, mixts. of these, and also mixts. of each with decolorizing materials. Silica gel alone or with decolorants gives the best results, removing up to 30% of the total S, whereas bauxite removes up to 18–20%. Mixts. contg. bauxite, as well as the material itself, cause trouble in filtering, so that silica gel is preferable. A. W. CONTIERI

Black shale deposition in central New York. EDWARD W. HARD. *Bull. Am. Assoc. Petroleum Geol.* **15**, 165–81(1931). Lab. distn. tests of N. Y. black shales show the amt. of petroleum increases to the west, but with no corresponding increase in content of volatile matter, indicating that the petroleum was derived from org. constituents. The bituminous content of these shales seems to be directly related to the type of decompn. rather than to the type of org. material, and this particular type of decay existed only where the water was truly saline and toxic conditions were present. ALDEN H. EMERY

Discovery of oil in White Point gas field, San Patricio County, Texas, and history of the field. W. ARMSTRONG PRICE. *Bull. Am. Assoc. Petroleum Geol.* **15**, 205–10(1931). ALDEN H. EMERY

Heavy Dutcher oil in Bristow district, Oklahoma. CHARLES G. CARLSON. *Bull. Am. Assoc. Petroleum Geol.* **15**, 211–3(1931).—The gravity of most of the Dutcher oil produced in the Bristow district is 29–34° Bé. A new well gives oil of 18.3° Bé. asphalt 92, S 0.908, gasoline 6 and kerosene 2%. ALDEN H. EMERY

Development and production history on the Salt Flat and other fault fields of east central Texas. H. B. HILL, E. V. H. BAUSERMAN AND C. B. CARPENTER. Bur. Mines, *Rept. of Investigations* **3059**, 46 pp.(1931). ALDEN H. EMERY

New productive horizon in California. WALTER STALDER. *Bull. Am. Assoc. Petroleum Geol.* **15**, 201(1931). ALDEN H. EMERY

Can absence of edge-water encroachment in certain oil fields be ascribed to capillarity? J. VERSLUYS. *Bull. Am. Assoc. Petroleum Geol.* **15**, 189–200(1931).—Capillarity cannot hold the oil outside the depleted area around the well and cannot prevent

the edge water from moving toward the well. In the depletion zone, when the formation is an unconsolidated sand, 2 conditions are possible: the funicular, in which oil and generally gas flow freely, and the pendular, in which gas flows freely and may be followed by oil. If the oil-bearing formation is consolidated and the interstices are pores with narrowings, the Jamin effect would not stop the flow altogether because the gas would diffuse through the films of oil which shut off the pores in the narrowings. Light oils would evap. from one film and condense on the next nearer to the well.
ALDEN H. EMERY

Some effects of metamorphism on certain débris in source rocks. TAISIA STADNICHENKO. *Bull. Am. Assoc. Petroleum Geol.* 15, 161-4(1931).—Geodynamic alteration (carbonization) of the plant substances in the source rocks of petroleum results in raising the temp. of fusion and volatilization and in change in optical characters from isotropic to anisotropic.
ALDEN H. EMERY

Concrete coverings for pipe lines. J. F. HOUGH. *Oil and Gas J.* 29, No. 35, 62, 140, 141(1931).—From tests carried out under the most severe conditions, it was found that concrete-covered pipe resisted corrosion satisfactorily. The best results were obtained by using a concrete with less than 5 gal. of water per sack of cement. More water causes the concrete to disintegrate. Pressures of 1000 lb. per sq. in. did not give pressure cracks in the concrete coverings.
J. R. STRONG

The compression of hydrocarbon gases. I. N. BEALL. *Refiner and Natural Gasoline Mfr.* 10, No. 2, 99, No. 3, 154(1930). —The math. development of formulas pertinent to compression of gases is described. Calcn. of the percentage of liquefaction on compression, molal vol. of hydrocarbons, importance of compression before condensation for certain types of oil-absorption plants, compression at high pressures and multiple-stage compression are discussed. All gases become more compressible as their temp. is lowered and deviations from Charles' and Boyle's laws reach a max. at equil.
J. L. ESSEX

Safe-guarding cracking operations from accident. E. M. MATSON. *Refiner and Natural Gasoline Mfr.* 10, No. 1, 97, No. 2, 122, No. 3, 164(1931); cf. *C. A.* 25, 1066.—The hazards of water in a cracking system and the dangers arising from the corrosion of the equipment are discussed. Methods of preventing both occurrences are considered.
J. L. ESSEX

Manufacture of cracked tractor fuel. V. VALGIS. *Azerbaĭdzhanskoe Neftyanoe Khozyaĭstvo* 1931, No. 1, 64–73; cf. *C. A.* 24, 2588.—Exptl. work is described.
V. KALICHEVSKY

Use of the new natural-gasoline specifications. S. S. SMITH. *Refiner and Natural Gasoline Mfr.* 10, No. 2, 90(1931).
J. L. ESSEX

Progress in distillation and fractionation. EARL PETTY. *Refiner and Natural Gasoline Mfr.* 10, No. 2, 67(1931).—The changes in distn. procedure due to the use of stabilizers are discussed and the use of vacuum in the distn. of heavier lubricating-oil fractions is described.
J. L. ESSEX

Pressure-distillate stabilization and gas-recovery systems. A. W. BURKET. *Refiner and Natural Gasoline Mfr.* 10, No. 3, 75(1931). —The essential factors are given by means of which the basic app. can be modified to suit any particular plant. For every vol. of propane removed from pressure distillate, 3.5 or more vols. of butane can be introduced without changing the vapor pressure. A complete description of the equipment necessary for combined stabilization and recovery is given.
J. L. E.

Chemistry of fuels greatest problem before refiner and motor builder. EARL BARTHOLOMEW. *Natl. Petroleum News* 23, No. 11, 72, 76, 79, 81, 82, 84, 85(1931).—The 2 variables most affecting the relative knock ratings are temp. and air-fuel ratio. Tests have shown that the single-cylinder test conditions give too high an antiknock value for benzene and some cracked gasoline.
R. W. KELLY

Chemistry of the doctor sweetening process. ARTHUR LACHMAN. *Ind. Eng. Chem.* 23, 354–7(1931).—L. verifies the 2 views that the PbS formed during the sweetening reaction reacts to form more plumbite and also acts as a catalyst when a sour gasoline is blown with air in the presence of Na plumbite soln. L. claims that Na_2S is also formed, which then oxidizes to $Na_2S_2O_3$. The sensitiveness of the doctor test was found to be 0.00006 molar concn. of mercaptan. The molar concn. of mercaptan in an av. sour gasoline was 0.01. Mercaptans can be oxidized with air alone in the presence of NaOH soln. or in the presence of fine inert solids, provided that the air stream is broken up into small bubbles. The quantity of Na_2S in alk. soln. contg. suspended PbS should be kept at a min. Air blowing assists in fulfilling this requirement. Finely divided free S should be added in the quantity detd. by analysis of the distillate for mercaptans.
J. L. ESSEX

Notes on adsorption. HAROLD J. TORMEY. *Refiner and Natural Gasoline Mfr.* **10**, No. 2, 78(1931).—A general discussion is given of the Freundlich and Langmuir equations for adsorption. J. L. ESSEX

Oil consumption and antiknock rating. H. R. STACEY. *Oil and Gas J.* **29**, No. 38, 26, 115(1931).—Errors in detg. knock rating due to different rates of oil consumption by leakage past the pistons are approx. one octane no. The error due to variation in temp. of the oil may be as much as one octane no. All knock-testing engines should be run with the oil consumption at the min. for the most accurate results. The oil temp. should be kept const. and as low as possible consistent with good lubrication J. R. STRONG

Porosity of non-friable substances. I. PREOBRAZHENSKIĬ. *Azerbaĭdzhanskoe Neftyanoe Khozyaĭstvo* 1931, No. 1, 85-90.—The gravimetric method is the most reliable. Bitumen is extd. from the sample in a Soxhlet app. and the sample is satd. with kerosene under vacuum and weighed in the air. The exact procedure is described. V. KALICHEVSKY

Report of Subcommittee XXV on crankcase dilution. T. H. ROGERS, *et al.* *Proc. Am. Soc. Testing Materials* **30**, Pt. 1, 782–7(1930).—Results obtained on test samples by the tentative method D-322-30T are given. It is recommended that this tentative test be adopted. D. F. BROWN

The manufacture of grease. F. M. SIMPSON AND C. C. WILCH. *Refiner and Natural Gasoline Mfr.* **10**, No. 3, 77(1931).—Three general types of grease consisting of (1) admixts. of mineral oil and solid lubricants, (2) blends of residuum, waxes, uncombined fats, rosin oils and pitches and (3) soap-thickened mineral oils are discussed Na and K soap greases are highly sol. in water and have high m. ps.; Ca greases are insol. and unstable at high temps.; Pb and Zn soaps have low m. ps. and Al soap greases are stable at high temps. The soap is not so important as the mineral oil, which possesses the lubricating power. Types of equipment are described. J. L. ESSEX

Narrow operating temperature range improves lubricant performance. H. C. MOUGEY. *Natl. Petroleum News* **23**, No. 10, 32-D—32-H, 83(1931); cf. *C. A.* **24**, 2589. Oil consumption is kept at a min. by using oil of proper viscosity. The proper viscosity is detd. by actual performance and maintained by oil coolers. Max. viscosity is controlled by ease of starting. R. W. KELLY

Alignment chart for estimating viscosity-gravity constant of petroleum lubricating oils. W. F. HOUGHTON AND J. A. ROBB. *Ind. Eng. Chem., Anal. Ed.* **3**, 144–5(1931). An alignment chart is given for the rapid detn. of the viscosity-gravity const. as developed by Hill and Coats (*C. A.* **22**, 2834). Viscosity-gravity consts. of lubricating oil distillates from 14 crude oils are tabulated. D. F. BROWN

Evaluation and identification of mineral lubricating oils. B. MARSCHALKÓ AND I. BARNA. *Magyar Mérnök Épitészegylet Közlönye* **63**, 29–36(1929).—A practical method of evaluation consists in the detn. of the viscosity-temp. curve. The larger the value of $t''-t'$, or that of $t''-t'$ (*C. A.* **23**, 4053), the better the quality of oil, if the abs value of the viscosity reaches the required min. value at the working temp. The viscosity-temp. curve may be examd. by detg. 3 points: namely, the temps. belonging to the abs. viscosity values of 1.0, 0.1 and 0.025 poises. S. S. DE FINÁLY

The purification of mineral lubricating oils. M. J. PRELAZ. *Ind. olii minerali e grassi* **10**, 146–7(1930).—When the nature and phys. state of the impurities in mineral oils are known, the selection of the purification process is easy. Gaseous, liquid or solid materials that are sol., colloidal or insol. have to be eliminated. Water is sepd by drying in a vacuum without overheating; the O and some decompn. products are driven off also. On account of the very small quantity of impurities it is difficult to show their elimination by analysis. The oils lose their pungent odor and acidity. In some mineral oils, fibrils, dust, decolorizing earth and cryst. bodies of asphaltic nature are revealed by the microscope. Filtration is therefore necessary. Oxidation products that facilitate the alteration of the oil are still present. Centrifuging at a convenient temp. eliminates the water less completely than desiccation in a vacuum. Filtration eliminates the solid impurities in non-colloidal suspension. The cotton fibrils and org. dust are satd. with water and can be eliminated by centrifuging with the heavier particles. The sepn. of colloidal substances is effected by ultrafiltration. The elimination of the products dissolved in the oil is effected by using adsorbents. Properly chosen earths give satisfactory results. The above purification methods recondition used oils with sufficient safety. The following acidities were found: used untreated transformer oil, 0.062%; centrifuged, 0.077%; treated with 10% of earth and filtered, 0.008%; with 8%, 0.006%; with 5% earth and decanted, 0.028%; with 5% earth,

decanted and centrifuged, 0.026%; with 10% earth and decanted, 0.018%; and with 10% of earth, decanted and centrifuged, 0.018%. R. SANSONE

Raw materials and production of mineral lubricating oils. M. FREUND. *Magyar Mérnök Építészegylet Közlönye Havi Füzetei* 8, 1–10(1931).—A general description of present production methods. S. S. DE FINÁLY

Principles of chemical investigation of mineral lubricating oils. M. FREUND. *Magyar Mérnök Építészegylet Közlönye Havi Füzetei* 8, 18–25(1931).—A general description of research methods. S. S. DE FINÁLY

Regeneration of used lubricating oils. F. SCHNEIDER. *Azerbaidzhanskoe Neftyanoe Khozyaistvo* 1931, No. 1, 107–8.—Na_2SiO_3, NaOH and bleaching earth are almost equally satisfactory. V. KALICHEVSKY

Vacuum. GERRITT VAN DEN BERG. *Refiner and Natural Gasoline Mfr.* 10, No. 2, 88(1931).—A few schemes for preventing leaks are outlined. J. L. ESSEX

Report on coöperative work on the separation of cut-back asphalt. W. H. FULWEILER, *et al. Proc. Am. Soc. Testing Materials* 30, Pt. 1, 801–4(1930).—Coöperative results from the use of 2 different methods for sepg. cut-back asphalts to det. the amt. and character of both the base and the solvent are given. The first method is described in tentative specification D-20-28T. The second starts with atm. distn. and completes the distn. in a vacuum of not more than 10 mm. of Hg. The second method appears to have certain disadvantages. The work is to be continued and certain modifications suggested are to be tried. D. F. BROWN

Utilization of wood waste in the chemical industries. B. B. FOGLER. *Am. Soc Mech. Eng.*, Advance paper, Oct. 16–17, 1930, 4 pp.—Principal uses, other than for fuel, for wastes from saw-mill and wood-working industries are found in the following chem industries: destructive distn., manuf. of pulp, paper and building boards and those industries consuming large quantities of wood flour, principally the linoleum, plastics and explosives industries. The paper is intended to present a comparative summary of several outlets which chem. industries afford for salvage of waste from wood-working industries. E. I. S.

Wood chips. I. Motor oils from wood. OSKARI ROUTALA. *Acta Chem. Fennica* 3, 115–8(1930).—A review is given of the methods for cracking oils to obtain the lower fractions for use in gasoline motors. Lignite at 150–200 atm. and 450–80° yields about 80% of oily products, which yield considerable gasoline on cracking. When sawdust is treated with Cu, Fe and Co salts, and then with NH_4OH or NaOH, an impregnation with metallic hydroxides occurs. The latter are reduced to the free metal on treatment of the sawdust with H under pressure at 400–450°. Ni formate, NH_4 molybdates and chromates are also used as catalysts, a complete conversion of the sawdust to oily products resulting. At 260°, 50% conversion is obtained. On distn up to 350° the product gives water 4.45, oil 35.55, residue 52.10, gas 6.73 and loss 1.17%. Of the oil fraction, 74% distd. below 300°. Sawdust at 450° and 100 atm. with Zn and Cu catalysts gave 33% conversion to oils, of which 40% distd below 200°. Forty-five % of the weight of the wood was water-sol., with low acid but high MeOH content S. A. KARJALA

Dust explosions, with special reference to wood-working industries (BROWN) **24.** The radioactivity of oil-well waters (VERNADSKII) **3.** Cracking oil by electricity (ROWLAND) **4.** The content of Ra in oil-well waters in the district of Grozny (KHLOPIN, NIKITIN) **3.** Washing and bleaching clays of Azerbaidzhan (KOVALEVSKII) **18.** Apparatus for low-temperature distillation of oil shale (U. S. pat. 1,796,100) **21.** Pump and high-speed emulsifier system for bituminous materials (Brit. pat. 338,496) **1.** Refining oils (Ger. pat. 515,523) **21.** Detergents and lubricants containing fatty acid salts (Brit. pat. 338,919) **18.** Gel-like benzine (Hung. pat. 101,509) **13.** Gelatinizing organic liquids such as benzine (Brit. pat. 339,360) **13.**

Converting petroleum oils. ROY CROSS (to Gasoline Products Co.) U. S. 1,796,507 March 17. Oil is raised to a cracking temp. without substantial conversion (suitably by heating in a pipe coil in a furnace), the oil is collected in a substantial body and lighter fractions are distd. off in a vaporizing stage with refluxing and condensation of the vaporized material; unvaporized products are directed to a stagnant pool adapted to be heated to facilitate settling of free carbonaceous matter, the heavy settlings are withdrawn from the bottom of the pool and the liquid, relatively carbon-free oil, is withdrawn from a vertical restricted column in the pool so that turbulency in the oil body is prevented. App. is described.

Distillation of petroleum oils. ALEXANDER A. MACCUBBIN and JOSEPH ZAVERTNIK (to The Barrett Co.). Can. 309,219, Mar. 10, 1931. A method and app. are specified for distn. of petroleum at atm. pressure to produce distillate oils and residual oils. The residual oil is withdrawn during distn. while it is at approx. the temp. of the first distn. and immediately subjected to a high vacuum to effect further distn. of high-boiling oils by self-contained heat of the residual oil. The residue from such distn. is passed to a coke still maintained under high vacuum and distd. to coke, and the distillate is condensed under a high vacuum.

Apparatus for chilling liquids such as petroleum distillates to separate solids from them. HENRY TORRANCE (to Carbondale Machine Co.). U. S. 1,796,772, March 17. Numerous structural details are described.

Dehydrating emulsions such as those of petroleum. HAROLD C. EDDY (to Petroleum Rectifying Co. of Calif.). U. S. 1,796,750, March 17. Dispersed particles of the emulsion are mechanically agglomerated (suitably by the action of excelsior or steel wool) and the emulsion is subjected to the action of an elec. field. App. is described. Cf. *C. A.* **25**, 409.

Hydrocarbons. GENERAL TECHNICAL CO., LTD. Fr. 695,185, Aug. 20, 1929. Bituminous, and asphaltic compds., petroleum exts., tar exts. and natural waxes are submitted to a temp. of 360–440° under ordinary pressure in a retort provided with a system permitting the vapors to pass out to the condensers at a temp. between 170° and 250°, the speed of distn. being preferably such that the hourly amt. of distillate is always above 10% of the wt. of the capacity of the retort. Lighter hydrocarbons such as gasoline and kerosene are obtained.

Solidifying hydrocarbons. ROGER HOLTZMANN. Fr. 695,194, Aug. 22, 1929. Hydrocarbons, such as gasoline, petroleum and mazout, are solidified by incorporating therein, before or after heating, a binding agent, such as resin, suitably powd. and then adding while mixing milk of lime. The product is molded under pressure and hardened by immersion in water which preferably contains gallic acid.

Cracking hydrocarbons. I. G. FARBENIND. A.-G. Fr. 37,191, July 4, 1929. Addn. to 659,906 (*C. A.* **23**, 5312). Hydrocarbons of high b. p., such as mineral oils, tars, etc., are cracked under such conditions that a limited formation of benzine results, and the residue is afterward submitted to a hydrogenation under pressure, the untransformed fraction being submitted afresh to a cracking. Cf. *C. A.* **25**, 1666.

Cracking hydrocarbons. I. G. FARBENIND. A.-G. Brit. 339,274, May 30, 1929. Cracking of hydrocarbons in the gaseous or vapor phase is effected in the presence of a catalyst of pieces of Si (which may be molded from powd. Si and may be placed in a quartz tube) or Si deposited on a carrier. The material may be mixed with N, CH_4, water vapor, etc., and examples are given of the cracking of a mixt. of C_3H_8 and C_4H_{10} at 700° to form C_3H_6 and C_4H_8, and of the cracking of pentane, ligroin, paraffin and petroleum oils. It is stated that no carbon is deposited on the catalyst.

Cracking oils. CHARLES B. BUERGER (to Gulf Refining Co.). U. S. 1,796,138, March 10. Vapors are withdrawn under pressure from a confined body of oil heated under pressure, the pressure on the vapors is released and they are condensed, and the confined body of oil is replenished by oil heated under pressure and introduced under the surface of the body of oil while simultaneously permitting vapors from the preheated replenishing oil to mingle directly with vapors above the confined body of oil. Liquid oil is withdrawn from the main body of oil and mingled with the replenishing oil fed to the preheater App. is described.

Cracking oils. PANHANDLE REFINING CO. Brit. 339,291, June 29, 1929. Oil is preheated in a pipe coil and is then passed into a vaporizing zone, whence vapors are passed to a cracking coil, and the cracked vapors are fractionally condensed in a series of dephlegmators and fractionating columns by indirect heat interchange with make up oil or condensate. Various details of app. and operation are described. Cf. *C. A.* **24**, 3637.

Cracking oils. ROBERT E. WILSON and RICHARD J. DEARBORN. Can. 309,377, Mar. 17, 1931. A process and app. for converting higher-boiling oils into lower-boiling oils are specified. A stream of oil is heated in a coil under high pressure to a temp. sufficient to effect conversion; the heated oil is discharged into a conversion chamber maintained under a reduced pressure but substantially above atmospheric; the vapors thus formed are sepd. into several fractions by condensation; the residues from the conversion chamber are expanded into an expansion zone under a pressure below that in the chamber; a portion of the condensates resulting from the first-mentioned sepn. is returned to the heating coil at an intermediate point; another portion of the condensates is delivered into said expansion zone; fresh charge is introduced into said expan-

sion zone; and a fraction of the oil collected in said expansion zone is passed to the heating coil. Cf. *C. A.* **24**, 2594.

Vaporizing device (suitable for use with automobile engines) for catalytic decomposition or cracking of liquid fuels. D. BALACHOWSKY, P. CAIRE and M. LEVY. Brit. 339,251, July 26, 1929. Various structural details are described.

Refining hydrocarbon oils. ALEXANDER S. RAMAGE (to Gyro Process Co.). U. S. 1,796,621, March 17. S and Cl are removed from alc.-sol. hydrocarbon materials such as olefin and naphthene hydrocarbons or crude benzene by dissolving the materials in an alc. soln. of an alkali metal hydroxide, permitting the soln. to stratify and separately removing the purified oil and the alc. alk. soln. contg. impurities.

Purifying hydrocarbon oils with liquid sulfur dioxide. PAN AMERICAN PETROLEUM CO. Brit. 338,482, May 7, 1929. Materials such as lubricating oil, kerosene or various cracked distillates are treated at a temp. below 0° with liquid SO_2 and, after sepn., the partly purified oil contg. SO_2 is further treated, also at a temp. below 0°, with fuming H_2SO_4 and the purified oil is sepd. from SO_2 and sulfo acids. Numerous details of app. and procedure are described. Brit. 338,483 relates to a generally similar process in which, however, the H_2SO_4 used is not specified as being fuming acid. Brit. 338,484 describes a process of treating crude petroleum, shale or cracked oils with fuming or concd. H_2SO_4 in the presence of liquid SO_2 (simultaneously or previously added to the oil), preferably at a temp. not greater than the b. p. of SO_2, thus freeing the oils from polymerizable, unstable and S-bearing hydrocarbons. Various details of app. and procedure are given.

Treating hydrocarbon oils with aluminum chloride. JOHN L. COOLEY (to Standard Oil Co. of Calif.). U. S. 1,795,761, March 10. A hydrocarbon oil is mixed with $AlCl_3$ in a flowing stream at a temp. sufficient to cause reaction and formation of a relatively low-boiling product, the stream is passed to a flash zone in which vapors of low b. p. are sepd. from residual oil and $AlCl_3$, and a stream of the vapors and a sep. stream of the oil and tar are passed to a conversion zone in which the still heated vapors are again brought into contact with the oil-tar mixt. for agitating it and effecting further decompn. App. is described.

Apparatus for continuous vacuum distillation of hydrocarbon oils. KLAUS DREYER. Ger. 515,704, Nov. 1, 1927. Details of arrangement.

Separation of mixtures of hydrogen and hydrocarbon gases. W. K. LEWIS (to Standard Oil Development Co.). Brit. 338,719, Nov. 12, 1928. See Can. 305,734 (*C. A.* **25**, 788).

Purifying mineral oils. ALLGEMEINE GES. FÜR CHEMISCHE INDUSTRIE. Brit. 338,579, July 22, 1929. Material such as the total distillate from crude Persian petroleum up to 400° is treated with liquid SO_2 without previous fractionation, or the distillate may be freed from the benzine fraction b. up to 100° before treatment. The raffinate and ext. are freed from SO_2 and fractionated. Cf. *C. A.* **24**, 3109.

Adsorbent clay for decolorizing oils. ROBERT E. MANLEY and MERTON L. LANGWORTHY (to Texas Co.). U. S. 1,796,799, March 17. The clay is treated with a H_2SO_4 soln. of about 10% strength to improve its decolorizing properties.

Oven for dry distillation of bituminous shales, brown coal and similar materials. JOHAN G. GRÖNDAL and CARL L. CARLSON (to Patentaktiebolaget Grondal-Ramén). U. S. 1,796,264, March 10. Structural features of an app. with a perforated traveling grate.

Destructive hydrogenation. J. FOHLEN. Brit. 338,544, June 21, 1929. In the production of light hydrocarbons from materials such as anthracites, other coals, peat, wood, petroleum, asphalts or various org. vegetable or animal materials (or from products of pyrogenation of these), nascent H is produced from reacting material introduced independently into the reaction vessel (an example being given of the treatment of shale oil mixed with Fe and Cu shavings, introduced into an autoclave at 300° and 300 atm. pressure contg. an aq. soln. of a halide such as $AlCl_3.3NaCl$ for production of light oils). Reaction of water or steam on coke may also be used for obtaining nascent H. Cf. *C. A.* **24**, 1212.

Destructive hydrogenation. F. UHDE. Brit. 339,317, Oct. 3, 1928. Low-boiling hydrocarbons are produced from carbonaceous materials such as oils, bitumens, carbon, wood, etc., by heating them with finely divided or spongy iron and water in an autoclave to 400–500° with development of 200 atm. pressure during the reaction from the vapor pressure of the water, etc., present (the water reacting on the Fe to form H). The gases generated can be used to regenerate the Fe from the Fe oxide formed in the reaction, and hydrogenating catalysts such as Ni, Cu, ZnO or Zn chromate or splitting

catalysts such as $AlCl_3$ or reagents such as soda or potash also may be used. Various details of procedure are given.

Destructive hydrogenation. C. F. R. HARRISON, E. D. KAMM and IMPERIAL CHEMICAL INDUSTRIES, LTD. Brit. 338,576, July 16, 1929. In a 2-stage process for producing gasoline from heavy oil or coal (or a mixt. of coal and oil) by destructive hydrogenation, middle oil is isolated from the products of the first stage by fractional condensation and is subsequently treated with H in the vapor phase in the presence of a catalyst. The first stage may be carried out with use of a "massive" catalyst such as tin plate, and the middle oil may be treated in the presence of a similar catalyst or other catalysts such as Fe oxide, gels of oxides of metals such as Sn, Ni, Co, Fe or Mo or carbon black impregnated with Sn compds. Temps. of 420–80° and pressures of 100–250 atm. are suitable.

Gasoline production. FRANK A. HOWARD and NATHANIEL E. LOOMIS (to Standard Oil Development Co.). U. S. 1,797,145, March 17. Vapors such as those from petroleum oil are subjected to partial condensation to produce a first condensate requiring chem. treatment and a second condensate which requires no chem. treatment and has an end b. p. of about 150–75°; the second vapor is sepd. into liquid products substantially free of normally gaseous hydrocarbons and into a gas, the first condensate is chemically treated (suitably with H_2SO_4, alkali or "doctor" soln.) and the treated condensate is blended with the liquid products sepd. from the second vapor. App. is described.

Gasoline from natural gas. FRED E. HOSMER. U. S. 1,796,755, March 17. Various details of app. and procedure are described of a compression and cooling system for condensing relatively heavy and relatively light oils from natural gas, casinghead gas, etc., involving heat exchange between different materials in the treatment system. Cf. *C. A.* **24**, 955.

Filter for gasoline fed to engines. GEORGE B. INGERSOLL. U. S. 1,797,198, March 17. Structural details.

Preventing "knocking" in internal-combustion engines. A. J. DUCAMP. Brit. 338,780, Feb. 16, 1929. Hg cyanide is introduced into the engine (suitably as a dispersion of a soln. in glycerol or other suitable solvent with or without phenol, together with fatty acids or soaps such as Ca or Mg oleate as dispersing agents) The Hg cyanide may also be simultaneously introduced into the engine with the fuel or independently Cf. *C. A.* **24**, 496.

"Motor spirit" with added "anti-detonating" material. L. W. E. TOWNSEND and A. RICHMOND. Brit. 338,581, July 23, 1929. An "anti-detonating" ingredient is prepd. from shale oil or paraffin hydrocarbons or distillates from shale oil, petroleum or coal tar, which may be mixed with hydrocarbons of higher b. p. not normally suitable as motor fuel. *E. g.*, high-boiling shale oil is cracked and yields a liquid product which seps. into an upper layer of unchanged oil and a lower layer of tar; the tar is dehydrated at 120° in CO_2 and then distd. under reduced pressure in an inert atm. below 120° or distd. with wet steam below 120° and dried with a dehydrating agent.

Apparatus for cooling oil by direct contact with water. HEINRICH KOPPERS. Ger. 518,167, April 17, 1921.

Emulsions of tar oils, etc. VERKAUFSVEREINIGUNG FÜR TEERERZEUGNISSE G. M. B. H. (Fritz Bock, Georg Geisselbrecht and Josef Oberbach, inventors). Ger. 518,394, Aug. 3, 1926. Coal-tar oils are rendered directly emulsifiable with water by slightly oxidizing them, *e. g.*, with a little HNO_3. The oxidized oils may also be mixed with pitch, asphalt, tar, montan wax, etc., and the mixt. stirred with water to yield an emulsion.

Apparatus for separating bitumen from bituminous sandstone. S. F. PROSYANOV and V. V. PARFENOV. Russ. appl. 68,990, April 25, 1930. Structural details.

Purifying bitumen, pitch, tar, etc. D. ANDERSON & SON, LTD., and R. O. CHILD Brit. 339,470, Nov. 25, 1929. The material is dissolved in a solvent and a colloidal substance such as silicic acid is added; the impurities are allowed to settle and the purified soln. is then siphoned off and decanted and may be distd. The purified material may be used in the *manuf. of paints* or *in "electrical contrivances."*

Oxidation products of paraffin wax, etc. I. G. FARBENIND. A.-G. (Martin Luther and Hans Franzen, inventors). Ger. 518,389, Aug. 6, 1927. Addn. to 467,930 (C. A. **23**, 1748). The sepn. of the oxidation products from unaltered hydrocarbon as described in Ger. 467,930 is assisted by pressing the mass. The mixt. of oxidation products and unaltered hydrocarbons may first be saponf., and the unsaponifiable portion of the oxidation products then sepd. from hydrocarbon by warming and pressing.

Lubricant for internal-combustion engines. DANIEL P. BARNARD (to Standard Oil

Co. of Ind.). U. S. 1,796,857, March 17. A fluid lubricating oil is used with an addn. (suitably in the proportion of about 7%) of a relatively volatile and substantially non-inflammable diluent such as CCl_4.

Lubricant suitable for use in drawing and polishing metals. HERBERT L. JOHNSON (to Standard Oil Development Co.). U. S. 1,795,491, March 10. A salt (such as the Na salt) of a substantially water-sol. acid obtained from the sludge formed by treating petroleum lubricating oil with H_2SO_4 is heated together with water and a fatty oleaginous material such as tallow under such conditions as to effect distribution of the fatty material in the water.

Lubricating oil. WM. O. STEVENS (to Anti Hot Box Co.). U. S. 1,796,310, March 17. Dried wood ashes are immersed in lubricating oil in order to improve the oil, and the ashes and oil are then sepd.

Lubricating oils from petroleum. RED RIVER REFINING CO., INC. Ger. 515,840, Mar. 17, 1923. App. for distg. the petroleum *in vacuo* at 1–5-mm. pressure is described.

Apparatus for filtering lubricating oil. WM. W. NUGENT. U. S. 1,796,613, March 17. Structural features.

Bag filter suitable for filtering oil. WM. W. NUGENT. U. S. 1,796,532, March 17.

Regeneration of used lubricating oils. I. THAMM. Hung. 100,735, Dec. 20, 1929. An aq. emulsion is made of the changed part of the oils which can be sepd by sedimentation from the unchanged lubricating oil. Emulsification may be accelerated by adding carbonates or oxides of earth metals to the oil. The treatment with steam emulsifies the changed oil particles and carries away the fuel particles which were mixed with the oil. Grease can be made of the sepd. emulsion and the regenerated oil may be filtered and used again for lubricating.

Wood distillation plant. JOHN T. MYERS. U. S. 1,795,404, March 10. Various details of construction are described.

23—CELLULOSE AND PAPER

CARLETON E. CURRAN

Some new processes for the separation of fibrous cellulose from plant substances. MELROSE ARNOT. *World's Paper Trade Rev.* 95, 961–4(1931).—An address in which are briefly discussed some of the most recently proposed pulping processes. A. P.-C.

Absorption of water vapor by cotton cellulose. ROBERT H. PICKARD. *J. Am. Chem. Soc.* 53, 1610–1(1931).—Polemical with Pidgeon and Maass (*C. A.* 24, 1974, 1155). Attention is called to work on the same subject at the Shirley Inst. C. J. WEST

Calculations and numerical data on the nitration of cellulose. L. SAUZAY. *Rev. gén. mat. plastiques* 7, 83–9, 139–45(1931).—Indications are given regarding the control of nitrating acids and the prepn. of mixts. of predetd compn A. P.-C.

Nitration of cellulose with phosphoric-nitric mixed acids (preliminary communication). E. BERL AND G. RUFFF. *Ber.* 63B, 3212(1930).—Nitration of cellulose with H_3PO_4-HNO_3 shows some marked contrasts with the ordinary H_2SO_4-HNO_3 nitration since H_3PO_4 does not sapon. cellulose nitrates, it is possible, with a suitably adjusted nitrating mixt. (slight excess of P_2O_5), to obtain readily cellulose nitrates with 14.0–13.7% N The nitration is accompanied by a marked swelling which facilitates the penetration of the HNO_3 into the interior of the fiber, resulting in a uniform nitration throughout. Unlike the product with much less N obtained with H_2SO_4-HNO_3, the cellulose nitrates prepd. with H_3PO_4-HNO_3 are perfectly stable after very short boiling; they contain no trace of mixed H_3PO_4-HNO_3 esters producing instability. Nitrates with 11–11.5% N cannot be produced in fiber form with H_3PO_4-HNO_3. In the nitration with H_3PO_4-HNO_3 the lattice of the native cellulose changes into that of hydrate cellulose, whereas with H_2SO_4-HNO_3 not too rich in HNO_3 the lattice of the native cellulose is retained in the nitrate. With H_3PO_4-HNO_3 the nitration is relatively slow, and it can be observed that the HNO_3 converts the cellulose into mercerized cellulose before esterification begins. With H_2SO_4-HNO_3 contg. not too much HNO_3, H_2SO_4 apparently enters the cellulose mol. as ester quite rapidly, and the sulfate then reacts to a greater or lesser extent with the HNO_3. Partially nitrated cellulose with the lattice of the native cellulose unchanged is no longer mercerized by H_3PO_4-HNO_3, *i. e.*, the lattice of the native cellulose is retained in such nitrates. The nitrates obtained with H_3PO_4-HNO_3 give a clear point diagram of cellulose trinitrate when the nitration and washing are effected under tension. Details of the expts. will be published elsewhere. C. A. R.

Viscosity of cellulose esters. I. The relation between concentration and viscosity of cellulose nitrate solution. KATSUMATA ATSUKI AND MASANORI ISHIWARA. *J. Soc. Chem. Ind., Japan* 33, Suppl. binding 506–8; *Caoutchouc & gutta-percha* 28, 15462–4(1930).—Cellulose nitrates were prepd. from spinning waste, cotton rag tissue and H_2SO_4 hydrocellulose, their viscosities being measured by a modified Ostwald viscometer. The relation between viscosity and concn. was found to be $\eta_s/\eta_0 = (1 + ac)^K$, where η_s and η_0 are the viscosities of the soln. and solvent, resp., c is the concn. yielding viscosity η_s, and a and K are consts. When the concn. of the ester is low, the viscosity follows Einstein's formula $\eta_s/\eta_0 = [1 + (5/2)f]$, where f is the vol. of the dispersed phase. When diln. is a max., swelling is diminished and the ester undergoes hydrolysis. **II. The viscosity of mixed cellulose nitrate solution.** *Ibid* 508–11.—When 2 kinds of cellulose nitrates of different viscosities are dissolved in a solvent, the total concn. of ester being const., the relation between the viscosity and concn. is $\eta_s/\eta_0 = [1 + a(nc' + c)]^K$, where c and c' are the concns. of the esters, a and K are consts. and $n = c'/c$.

P. S. BILLINGTON

Acetic acid recovery in the cellulose acetate industry. H. R. S. CLOTWORTHY. *Ind. Chemist* 7, 111–4(1931).—For every 100 lb. of cellulose treated there is available for recovery 558.5 lb. AcOH in a 15 to 40% soln. The procedures of converting to glacial AcOH by distn. with concd. H_2SO_4 or converting to Ac_2O by the action of SCl_2 are unsatisfactory because of the various chemicals necessary, the low yield, the necessary concn. of the soln. and the resulting high cost. Other processes employ a solvent of lower b. p. than AcOH, extg. the acid from its soln. and subsequently distg. off the solvent. These methods are not commercially satisfactory. A satisfactory method is described whereby a solvent of higher b. p. than the acid is used, the acid being fractionated from the solvent by distn.

P. S. BILLINGTON

Velocity of swelling of acetate film. Effect of swelling upon the mechanical properties of the film. KOTARO TANEMURA. *J. Soc. Chem. Ind. Japan* 33, Suppl. binding 497–9; *Caoutchouc & gutta-percha* 28, 15464–5(1930).—The velocity of swelling of acetone-sol. cellulose acetate in water is given by $x = (1/z)\log[W'_\infty/(W_\infty - W)]$, where W_∞ is the limit of swelling, W' the swelling at time z and x a const. Max. swelling was obtained in a 20% EtOH soln. The elongation of strips of the film under a given load was proportional to the degree of swelling.

P. S. BILLINGTON

Influence of plasticizer upon the mechanical properties of cellulose acetate film. KOTARO TANEMURA. *J. Soc. Chem. Ind. Japan* 33, Suppl. binding 499–500(1930).—The load-elongation curves of acetone-sol. cellulose acetate films prepd. from cellulose acetate in acetone and triacetin resemble those of cellophanes steeped in acetone-water mixts. The cellulose acetate film contg. triacetin shows both elastic and plastic elongation.

P. S. BILLINGTON

Some properties of cellophane and cellulose acetate film as dialysis membrane. Distribution of impurities in the case of recovery of waste soda from the viscose factory by the dialysis method. KOTARO TANEMURA AND SHIGEO MIYOSHI. *J. Soc. Chem. Ind. Japan* 33, Suppl. binding 432–4(1930).—The diffusion rates of certain acids and salts through cellophane were proportional to their diffusion coeffs., except for NaOH, the rate for which was twice as great as would be expected. LiCl diffused in larger quantities from an aq. soln. than when MeOH was present. The reverse was true of EtOH up to 75%. By proper manipulation waste NaOH from the viscose factory can be recovered from a mixt. of impurities by means of dialysis through cellulosic membranes.

P. S. BILLINGTON

Swelling of cellophane and rayon cloth by caustic soda solution and the effect of solutes upon the swelling. KOTARO TANEMURA AND SHIGEO MIYOSHI. *J. Soc. Chem. Ind., Japan* 33, Suppl. binding 431–2(1930).—A circular sheet of com. cellophane became elliptical when immersed in 6.12% NaOH. The contraction occurred in the direction in which the tensile strength of the air-dry sheet was greatest, and elongation least. Max. swelling of cellophane occurred in 10% NaOH. Rayon cloth disintegrated in 8–13% NaOH. Swelling decreased with addn. of solutes.

P. S. BILLINGTON

Lilienfeld rayon. ERNST GEIGER. *Helv. Chim. Acta* 13, 1114–6(1930).—Polemical with Hans E. Fierz-David and August Brunner (*cf. C. A.* 24, 967, 3643). G. concludes that F.-D. and B. discussed earlier mfg. weaknesses which are no longer characteristic of Lilienfeld rayon.

C. H. PERI

New method for the recovery of viscose spinning bath. I. Rapid method for analysis of sodium sulfate in spinning bath. KOTARO TANEMURA AND SHIGEO MIYOSHI. *J. Soc. Chem. Ind., Japan* 33, Suppl. binding 323–4(1930).—The temp. at which $Na_2SO_4.10H_2O$ begins to crystallize is detd., and the percentage of salt in the bath is found

from a previously prepd. chart. **II. Specific heat of Glauber's salt.** KOTARO TANEMURA. *Ibid* 324–5.—The mol. heat of H_2O of crystn. of $Na_2SO_4.10H_2O$ was calcd. as 9.6 cal. The mean mol. heat of H_2O of crystn. was detd. to be 9.6–9.8 cal. The mol. heat of $Na_2SO_4.10H_2O$ was calcd. as 128.2 cal. and the sp. heat of the crystal at 25° as 0.40. **III. Properties of sodium sulfate.** KOTARO TANEMURA AND SHIGEO MIYOSHI. *Ibid* 330–1.—A summary of the physicochem. characteristics of Na_2SO_4 is given. H_2SO_4 lowers the transition temp. and increases the soly. of $Na_2SO_4.10H_2O$, *i. e.*, it lowers the crystn. temp. of the salt. $MgSO_4$ at first lowers the crystn. temp. of $Na_2SO_4.10H_2O$, but increasing $MgSO_4$ concn beyond a certain limit increases the crystn. temp., the solid phase then being $MgSO_4.7H_2O$. With a normal viscose spinning bath for centrifugal systems, the salt which crystallizes out on cooling is always $Na_2SO_4.10H_2O$, completely free from Na_2SO_4 and $NaHSO_4$. It forms no double salts with $ZnSO_4$, $FeSO_4$, $MnSO_4$ or $CuSO_4$, which accumulate in the bath. **IV. Dehydration of Glauber's salt.** KOTARO TANEMURA, SHIGEO MIYOSHI AND MIZUKI YOSHIDA. *Ibid* 332–3.—The vapor pressure of the system $Na_2SO_4.10H_2O \rightleftharpoons Na_2SO_4 + 10H_2O$ at 25° is 18.4 mm. Hg. The hydrous salt can be dehydrated in a closed chamber by circulating air dried with concd. H_2SO_4 and NaOH. It also can be dehydrated by treating with twice its wt. of 92% EtOH, or with concd. caustic; 45.8 g. with 100 g. 50% NaOH soln. yield 21 g. Na_2SO_4. Heating to the transition temp., centrifuging, cooling to 5° and centrifuging 3 times yields 31.95 g. Na_2SO_4 from 100 g. $Na_2SO_4.10H_2O$. If 36.3% of the wt. of the decahydrate is added as solid NaOH at the transition temp., the salt is dehydrated. **V.** KOTARO TANEMURA AND SHIGEO MIYOSHI *Ibid* 333–4. In the *method of sulfate recovery* patented by the authors 0.9 kg. Na_2SO_4 and 4 kg. H_2O are assumed to accumulate as spent bath per 1 kg viscose rayon; 0.9 kg. Na_2SO_4 combines with 1.1 kg. H_2O on cooling. When 2.3 kg. anhyd. Na_2SO_4 is added to the spinning bath, and 7.3 kg. of the decahydrate is removed on cooling, both 0.9 kg. Na_2SO_4 and 4 kg. H_2O are at the same time removed. The necessary equipment, crystallizer, hydroextractor and dehydrator, lasts much longer than an evaporator and is more efficient from the standpoint of heat utilization.

P. S. BILLINGTON

Manufacture of artificial silk. Spinning of viscose. H. L. DE LEEUW. *Tech. moderne* **22**, 521–9, 623–7, 720–4(1930); cf. *C. A.* **24**, 3643.—A detailed description is given of the methods and app. used and methods of producing artificial silk other than viscose.

P. THOMASSET

Studies on lignin and related compounds. VII. A kinetic study of the action of hypochlorous acid on spruce lignin and its bearing on the constitution of the spruce lignin molecule. HAROLD HIBBERT AND K. AUSTIN TAYLOR. *Can. J. Research* **4**, 240–53(1931); cf. *C. A.* **25**, 2010.—The action of HClO on glycol lignin in finely divided aq. suspension, and in alk. soln., is autocatalytic; the autocatalysis is due to formation of HCl, which catalyzes the reaction strongly. Apparently HNO_3 acts only by increasing the concn. of undissocd. HCl. The effects of HCl may be a direct catalytic effect or undissocd. HCl or may be due to formation of Cl. A comparison of the amts. of HClO absorbed and HCl formed by methylated and unmethylated lignin indicates that if ketomethylene groups are present in lignin, they do not enolize sufficiently to play an appreciable part in the rapid reaction between HClO and lignin. The rapid absorption of HClO by lignin dissolved in alkali indicates that there is probably about 15% of a phenol nucleus in lignin. This value is supported by the rapid absorption by lignin, dissolved in alkali, of Br from Br water at very low concns. and is based on the assumption of only 1 atom of halogen entering the phenol nucleus, which is true with vanillin. If 2 or 3 atoms enter the nucleus, this value of 15% must be divided by 2 or 3. It represents in any case a max. value. The phenol nucleus accounts for only 1/3, or less, of the total rapid HClO absorption. The remainder is probably due to addn. of HClO to an ethylene linkage, chlorination of a phenol ether or a combination of both reactions.

A. PAPINEAU-COUTURE

Alpha- and beta-lignosulfonic acids. PEDER KLASON. *Svensk Pappers-Tid.* **34**, 118–9(1931); cf. *C. A.* **25**, 1077.—K. gives the analytical data on which he based the formula $3C_9H_{10}O_3 + H_2SO_3 + C_{18}H_8N - H_2O$ (cf. *C. A.* **24**, 3358) and states that he has also succeeded in making the tetraconiferyl aldehydes.

WILHELM SEGERBLOM

Some notes on the recovery of soda. J. A. WALKER. *Proc. Tech. Sect. Paper Makers' Assocn. Gt. Brit. Ireland* **11**, Pt. 1, 186–202(1930).—A good recovery of soda can be obtained only if an adequate proportion of black liquor is forthcoming at a strength and vol. which can be efficiently dealt with. The factors effecting this are discussed. The black liquor must be reduced to such a consistency as will permit a const. combustion in the rotary. The factors on which the efficiency of the evaporator depend are discussed. Troubles which may arise in the system are described. The rotary is

discussed. The causticizing process is dealt with in some detail, and strict control is urged. P. S. BILLINGTON

Soda process studies. III. Action of alkali solutions on sulfite pulp. J. H. ROSS AND C. R. MITCHELL. *Research Notes* **3**, 21–3(1930); *Pulp Paper Mag. Can.* **31**, 402–3, 414(1931); cf. *C. A.* **24**, 4153.—When bleached sulfite is treated in a rotary digester for 3 hrs. with NaOH solns. at 150–80°, the concn. of alkali (over the range 1–7%) at temps below 160° has but little effect on the quantity of material dissolved and on the α- and β-cellulose contents of the residue; at higher temps. the effect of concn. is much more marked. For every temp. there is an optimum concn. of alkali which produces a residue of max. alkali resistance and a concn. of alkali which produces a max. of bulking properties in the fiber. The fluidity of solns. of the treated pulp increases regularly as the temp. of digestion and alkali concn. are intensified. A. PAPINEAU-COUTURE

Bleaching studies. I. An integrating attachment for the Hess-Ives tintometer. F. H. YORSTON. *Research Notes* **3**, 11–3(1930); *Pulp Paper Mag. Can.* **31**, 338–9, 360(1931); cf. Ross, Mitchell and Y., *C. A.* **25**, 1078.– The Hess-Ives tintometer has been supplied with a device for intensifying the tint of nearly white materials by multiple reflection of light at the surface of the material. By its use differences between the reflection factors of different bleached papers, measured through any particular color filter, are magnified 2–3 fold. Further, since the magnification increases with the value of the reflection factor, differences in hue are greatly accentuated. **II. Measurement of hydrogen-ion concentration of bleach liquors with the glass electrode.** *Research Notes* **3**, 15–6(1930); *Pulp Paper Mag. Can.* **31**, 374–5(1931).—Consistent and accurately reproducible measurements of the H-ion concn. of bleach liquors can be made with the glass electrode and a vacuum-tube potentiometer. HOCl acts as a buffer in bleach liquors within the range of p_H 6.5–8.5. A. PAPINEAU-COUTURE

Some notes on the Southern yellow pine district—the large sulfate wood reserve in the United States. FOLKE JOHANSSON. *Svensk Pappers-Tid.* **34**, 82–7(1931).—Descriptive. WILHELM SEGERBLOM

The composition of Diospyros ebenum Koen. YOSHIZO SHINODA. *Cellulose Ind.* (Tokyo) **6**, Abstracts 37(1930).—The sample analyzed as follows: moisture 10.5, alc.-benzene ext. 15.1, sol. in 0.2% NaOH 4 5, lignin 36.8, Cross and Bevan cellulose 36.9, purity of cellulose 98.5, pentosans 13.8%. Xylose, mannose and galactose were identified. P. S. BILLINGTON

Papermaking properties of phormium tenax (New Zealand Flax). MERLE B. SHAW, GEORGE W. BICKING AND MARTIN J. O'LEARY. *Bur. Standards J. Research* **6**, 411–20(1931).—The caustic-soda process and 2-stage cooks using sodium sulfite and caustic soda, resp., produced good results as to quality and yield for wrapping and writing papers. P. S. BILLINGTON

Utilization of industrial by-products with particular reference to the pulp industry of the United States. ROBERT W. GRIFFITH. *J. Am. Leather Chem. Assoc.* **26**, 180–6 (1931).—An address. H. B. MERRILL

Wood-pulp flour and shives in mechanical wood pulp. O. M. HALSE. *Proc. Tech. Sect Paper Makers' Assocn. Gt. Brit. Ireland* **11**, Pt. 1, 18–20(1930).—See *C. A.* **24**, 5488. P. S. BILLINGTON

The Norwegian pulp and paper research laboratory, 1930. MAGNUS CHRISTIANSEN. *Proc. Tech. Sect. Paper Makers' Assocn. Gt. Brit. Ireland* **11**, Pt. 1, 3–17(1930).—Descriptive. P. S. BILLINGTON

Estimation of wood pulp in paper. E. DEBENEDETTI. *Boll. staz. sper. carta e fibre tessili vegetali* **9**, 134–7(1930).—The chem. methods for detecting and detg. wood pulp in paper utilize reactions for cellulose and lignin. The lignin content varies with different wood pulps, but av. values have been detd. for the woods and celluloses used in papermaking, and from these values can be calcd. approx. the wood or mechanical pulp contents in a paper when jute and manilla are absent. Reagents used are: (*a*) 1 g phloroglucinol, 500 cc. alc., 25 cc. concd. HCl; (*b*) 5 g. aniline sulfate, 100 cc. distd water, 1 drop H_2SO_4; (*c*) dimethyl-*p*-phenylenediamine. Their use is limited to white or light-colored papers. The quantity of lignin is detd. (1) directly by liberating from the cellulose and weighing, (2) by measuring the consumption of certain chemicals absorbed by the lignin substances, (3) by dissolving the lignin with suitable agents, weighing the residual cellulose, and calcg. the lignin by difference. Many methods use the hydrolysis of cellulose with strong acids that under proper conditions do not attack the lignin, which can be dried and weighed. H_2SO_4, HCl and HNO_3 alone, or together or with dehydrating agents, have been proposed. Cl, Br, phloroglucinol and $KMnO_4$ also are used for detg. lignin. R. SANSONE

Pulping with chlorine. I. Pulping bagasse. J. KAWAMURA. *J. Soc. Chem. Ind.*

Japan **33**, Suppl. binding 392–5(1930).—Air-dry bagasse contained moisture 12.55, C_6H_6 ext. 0.94, alc. ext. 1.99, H_2O ext. 2.84, 1% NaOH (hot) ext. 29.0%. The NaOH-extd. residue contained ash 3.5, lignin 22.3, cellulose (Cross and Bevan) 43.4, pentosans 27.4%. The cellulose contained 69.9% α-cellulose and 9.3% pentosans. Bagasse after extn. with 0.5, 1.0 and 2.0% NaOH was chlorinated at about 50% consistence, the change in yield, lignin, pentosan and ash being followed. The more drastic the alk. pre-treatment, the lower were the yield and lignin content for an equal Cl consumption. The pentosan content remained fairly const. at 31–33% of the chlorinated material. Of this, ½ was removed by treating for 12 hrs. with cold 10% NaOH, 7% cellulose being likewise removed. II. Reactions of chlorine. 1. *Ibid* 396–8.—The ratio of Cl as HCl to organically combined Cl formed in chlorinating ligno-celluloses has been variously reported from 1:1.3 to 1:0.4. K. extd. bamboo with alc.-benzene and 1% NaOH, chlorinated, washed and extd. the residue 3 times with 1% NaOH. HCl was detd. in the wash water, after expelling free Cl, while organically combined Cl was detd. by heating the NaOH ext. at 250° and detg. as NaCl. The ratio of acid to organically combined Cl was 1:0.4. III. Reactions of chlorine. 2. *Ibid* **34**, Suppl. binding 62–4(1931).—Results similar to those reported above for bamboo were obtained with bagasse. When a large excess of Cl was allowed to act on the bagasse for a long time, the ratio of HCl to org. chlorides was slightly increased, indicating an oxidation.

M. HEINIG

The technic of purifying pulp: effect of calcium lime in the production of a bleached sulfite with a high α-cellulose content. G. P. GENBERG. *Pulp Paper Mag. Can.* **31**, 199–210, 219(1931).—By cooking bleached or partly bleached sulfite pulp with lime, the α-cellulose content of the final residue is increased appreciably, accompanied by a loss in wt. depending principally on the original α-cellulose content. More than 5–10% CaO has no beneficial effect on the final results and on the loss in wt. of the pulp. More than 70% of the total increase in α-content is effected in the first 4 hrs. at the consistency (4.5%) and temp. (100–40°) used. The most important factor is the initial α-cellulose content, and in order to obtain, under most economical conditions, a final pulp with a max. α-content, it is necessary to start with a pulp so treated that a max. α-content is retained before the CaO treatment is begun. A multiple treatment with CaO has no increased effect on the α-cellulose content, but produces addnl. loss in wt. By omitting washing after bleaching and by starting the CaO treatment immediately after exhaustion of the bleach, a higher α-cellulose content is obtained. Practically the same α-cellulose content is obtained by treatment with 10% CaO and with 5% NaOH, but the CaO-treated pulp has a lower Cu no. and suffers a higher loss in wt. The optimum conditions for max. α-cellulose, min. bleach consumption and min. shrinkage were: Unbleached sulfite is given a preliminary bleaching with a ratio of 35% bleach powder to Roe Cl no. of 2:1, treated with CaO, washed and given a final bleaching to a full white color with a 0.75:1 bleach:Cl no. ratio. If the ratio of bleach to Cl no. is controlled at 2.0:1, the final α-cellulose content will be independent of the Cl no. of the unbleached pulp, but the shrinkage will be higher with increased Cl no. The use of MgO lime instead of Ca lime is of no advantage. The time to exhaust the bleach is prolonged, and a lower α-cellulose content is obtained when the CaO is added to the pulp at the same time as the bleach liquor and when the bleaching action is allowed to take place in the presence of the CaO. Com. trial runs made by the procedure developed in the lab. produced a sulfite pulp with high α-cellulose content. Sulfate pulp is not affected to any extent by either CaO or NaOH under the conditions applied to sulfite pulp in the investigation. A. P.-C.

The Rosen process for the production of sulfite pulp from resinous woods. E. MEUNIER. *Papeterie* **53**, 214–8(1931).—A brief discussion of the process and its merits. The difficulties encountered in pulping resinous woods by the sulfite process have been shown to be due to the fact that the compn. of the resin acids in the heartwood apparently differs from that of the resin acids in the sapwood. Rosen overcomes the difficulty by a preliminary treatment of the chips in the sulfite digester with a weak alk.-earth soln. for 2–5 hrs. at a temp. of up to 110°, followed by washing with salt soln.; this treatment can be repeated if necessary; the chips are then treated with SO_2 gas, and are then subjected to the usual low-temp. sulfite cooking, yielding a very pure pulp, low in ash and contg. up to 92.4% of α-cellulose, which can be bleached with 2.5–4% available Cl.

A. PAPINEAU-COUTURE

Determining the bleachability of pulps. R. KARLBERG. *Paper Trade J.* **92**, No. 11, 41–4(1931).—A review is given of methods developed for the detn. of the amt. of bleaching powder or Cl required for bleaching pulps, in the form of abstracts taken mostly from the German literature.

A. PAPINEAU-COUTURE

The childhood of paper making, as illustrated by Kashmiri methods of the present

day. W. RAITT. *Proc. Tech. Sect. Paper Makers' Assocn. Gt. Brit. Ireland* **11**, Pt. I, 21–52(1930); cf. *C. A.* **24**, 1975.—Historical. Twenty-five photographs of great interest to the modern paper maker are given. P. S. BILLINGTON

Fundamental research and the paper industry. T. TREVOR POTTS. *Proc. Tech. Sect. Paper Makers' Assocn. Gt. Brit. Ireland* **11**, Pt. I, 115–29(1930).—A résumé is given of past fundamental investigations and the suggestions of some problems for future study. P. S. BILLINGTON

What patents mean to the paper technologist. JOSEPH ROSSMAN. *Paper Trade J.* **92**, No. 14, 58–60(1931).—R. describes the classification system of the U. S. Pat. Office, outlines the patent holders' rights, interprets the validity of claims, discusses the sulfate process patent of Eaton and Dahl and shows the advantages of patent protection. A. PAPINEAU-COUTURE

The development of paper manufacture from southern pines. R. H. STEVENS. *Paper Ind.* **12**, 2019–26(1931); cf. *C. A.* **25**, 590.—A general discussion of the advantages and possibilities of the Southern U. S. for the production of pulp, particularly kraft, and paper. A. PAPINEAU-COUTURE

The formation of paper. W. BOYD CAMPBELL. *Research Notes* **3**, 1–3(1930); *Pulp Paper Mag. Can.* **31**, 424–5, 438(1931).—An address dealing particularly with the qualities of pulp which make it suitable for paper. The adhesion of cellulose to cellulose is particularly stressed, and C.'s theories as to the mechanism of the so-called hydration by beating (*C. A.* **24**, 1976) are explained. A. PAPINEAU-COUTURE

Corrosion reduced by new constructional materials. JAMES A. LEE. *Paper Trade J.* **92**, No. 12, 67–8(1931).—A discussion of the merits and possibilities of alloy steels (particularly 18–8 alloy and others of the same type) and of C in the sulfite and paper industries. A. PAPINEAU-COUTURE

Simple electrometric methods of analysis in the paper mill laboratory. T. TREVOR POTTS. *World's Paper Trade Rev.* **95**, 1037–8(1931).—Callan and Horrobin's app. (*C. A.* **23**, 789) did not give good results for alkalimetric work with the circuit in the original form suggested by C. and H.; inserting a potentiometer across the output of the transformer allows of much better control of the voltage of the input to the electrodes, enables better adjustment of the initial reading of the measuring instrument, and prevents damage to the latter if the soln. under examn. happens to be of high cond. The outstanding use of this method in the paper mill lab. is the examn. of highly colored caustic liquors; but it is also applicable to other titrations, such as sulfates with BaCl$_2$ and pptn. of size by alum. Attention is drawn to the effects of the presence of dissolved CO_2 in ordinary distd. H_2O on the potentiometric detn. of H-ion concn. For ordinary paper mill work, direct detn. on the stock taken from the mixing box or stuff chest is preferable to extn. of paper with distd. water. The quinhydrone electrode used in conjunction with the satd. calomel electrode is by far the most useful in the paper mill lab. A. PAPINEAU-COUTURE

Notable recent improvements to high-speed paper-making machines. S. RICHARDSON. *Proc. Tech. Sect. Paper Makers' Assocn. Gt. Brit. Ireland* **11**, Pt. I, 131–43(1930). The increased production from paper machines has been due to increased paper speed, increased wire width, and reduction of over-all mfg. costs. These 3 factors are discussed in some detail. P. S. BILLINGTON

The application of electrical power in paper mills. JAMES R. HAPPER. *Proc. Tech. Sect. Paper Makers' Assocn. Gt. Brit. Ireland* **11**, Pt. I, 164–79(1930).—The a. c. and d. c. systems are compared. The placing of a beater-drive motor inside the beater-roll has worked out very satisfactorily. The merits of steam *vs.* electricity are discussed. P. S. BILLINGTON

The testing of condenser paper. F. L. ROMAN. *Proc. Am. Soc. Testing Materials* **30**, Pt. II, 1012–24(1930).—A discussion is given of the relationship between several characteristics of condenser paper made from linen stock and the dielec. strength (breakdown voltage) of the condensers wound with this paper. Variations in the density of the condenser paper have no noticeable effect on the dielec. strength of the corresponding condensers. It is shown that, when in small nos., conducting paths through the paper have no important effect on the dielec. strength of condensers wound with 2 sheets of the paper between tinfoils, but the percentage of "shorted" condensers or of condensers failing at very low voltages may be expected to increase approx. as the square of the no. of conducting paths per unit area of the paper. Variations in the porosity of the paper are shown to have marked influence on the dielec. strength of the corresponding condensers and *porosity requirements* are suggested for papers used in low-voltage condensers and for papers used in high-voltage condensers. P. S. BILLINGTON

Variability in results met with in paper strength testing. CYRIL V. OLIVER. *Proc.*

Tech. Sect. Paper Makers' Assoc. Gt. Brit. Ireland **11**, Pt. I, 53–84(1930).—See *C. A.* **24**, 3366.

A critical study of the bursting-strength test for paper. F. T. CARSON AND F. V. WORTHINGTON. *Bur. Standards J. Research* **6**, 339–53(1931).—See *C. A.* **24**, 1977. P. S. BILLINGTON

Correlation of bursting strength and tensile strength of paper. JAMES STRACHAN. *Proc. Tech. Sect. Paper Makers' Assoc. Gt. Brit. Ireland* **11**, Pt. I, 86–114(1930); cf. *C. A.* **24**, 5485.—A math. treatment of the subject, and a discussion of the formulas obtained by various investigators. The methods of calcn. indicated give a means of investigating the degree of cohesion produced between the fibers by papermaking operations, as reflected by the bursting test. A voluminous discussion is included. P. S. B.

The coloring of paper. N. L. MATHEWS. *Proc. Tech. Sect. Paper Makers' Assoc. Gt. Brit. Ireland* **11**, Pt. I, 144–63(1903); cf. *C. A.* **24**, 5486.—A description of the nature and source of natural vegetable dyes and pigments is given. The theory of the org. constitution as related to color is briefly discussed, and the theory of dyeing is touched upon. The characteristics of direct or substantive, basic, and vat dyestuffs are discussed. The cause of two-sidedness is explained, and the reason for adulteration of the dyestuffs is discussed. P. S. BILLINGTON

Classes of color used in the dyeing of paper. HAROLD E. PRATT. *Paper Trade J.* **92**, No. 14, 57(1931).—A brief review of the application of basic, acid and direct dyes and pigments to paper coloring. Their limitations are pointed out. A. P.-C.

Further study of paper-coating minerals and adhesives. MERLE B. SHAW, GEORGE W. BICKING AND MARTIN J. O'LEARY. *Bur. Standards J. Research* **5**, 1189–1203(1930); *Paper Trade J.* **92**, No. 14, 52–7(1931); cf. Hamill, Gottschalk and Bicking, *C. A.* **19**, 175; **20**, 1519; **21**, 175.—American clays examd. compared favorably with foreign clays as paper-coating minerals and produced good printing qualities. Diatomaceous earth compd. did not adhere well to the base paper. The modified starches used did not appear to have as strong adhesive qualities as casein or glue. Graded according to their clay-suspending property, the adhesives were in the following descending order: starch, casein, glue. Chem. analyses, color measurements and settling data for the minerals used are given. A. PAPINEAU-COUTURE

Animal and vegetable adhesives for paper manufacture. GIULIO C. CIOCCHI. *Ind. carta e arti grafiche* **33**, 265–8, 512–3(1930).—The manuf. of glue from bones, hides, etc. is described. The material generally employed in paper manuf. is obtained from the fleshy side of hides, butcher's residues, hide cuttings, and calf and mutton heads. Animal glue is a positive colloid; its solns. represent dispersed systems with a very fine phase. The reaction of the gelatin must be nearly neutral, since the presence of acids reduces and hinders its fixation in paper. Microörganisms transform gelatin into an unfixable product. SO_2 eliminates this danger. A good glue absorbs 10–12 parts of water. The value of glue depends on the water and ash contents, m. p., viscosity, swelling capacity, fatty matter, acidity, mineral impurities, the elastic force and adhesive power, all of which are influenced by the p_H. Gelatin has two max. swelling points in water, p_H = 2.4 and p_H = 11.6, and has a min. swelling point at p_H = 7.7. In the hydrolysis of ossein there is a min. between p_H 4.7 and p_H 6; the reaction proceeds well with formation of a good product at p_H = 3–4. The decompn. of gelatin into proteoses and peptones follows in a 2nd hydrolysis; it is not strong between p_H = 3 and p_H = 8, but takes place beyond this. To avoid hydrolysis during the evapn., the soln. is brought to p_H = 4.7. Casein must be produced under conditions that effect coagulation in an acid medium with p_H = 4–4.1. At this hydrogen-ion concn. is obtained a product contg. the min. quantity of salts. The greatest yield with starch pastes is below 100°, above that temp. alteration follows. Stayco gum is starch solubilized by oxidation; Osalon and Vosgeline are farina treated with O_3. Dextrin prepd. with farina gives a limpid water soln. not obtained with starch from cereals. The cohesive power of dextrins decreases with the increase of their soly in cold water. Gums are not well-defined chem. products. Kordofan gum destroys the capillarity of water solns., having the same viscosity in cold and warm solns. Gum arabic solns. of 20° Bé. are used in paper making. Gum Senegal is less sol. in water than gum arabic, and its more viscous and gelatinous solns. sep. the gum more easily with many chemicals. R. SANSONE

Finishing, processing and converting of paper. NORMAN CLARK. *Paper Trade J.* 92, No. 13, 53–5(1931).—After a brief summary of developments in the field of finishing, processing and converting paper during the year 1930, the Tech. Assoc. of the Pulp and Paper Industry literature relating to coated and processed papers is reviewed. A. PAPINEAU-COUTURE

The porosity of paper. GIRO SILVIO. *Papier* **34**, 173–81(1931); cf. *C. A.* **24**,

6011.—The effects of the thickness of the sheet and the pressure on the detn. of the porosity are studied. The tests were carried out on 100% soda, unloaded and uncalendered paper, all the samples being made from the same beaterful of stock to eliminate possible differences in degree of beating and sizing. *Effect of thickness:* (1) The time required for the passage of a given vol. of air through the sheet does not vary directly with the thickness, at least above a certain thickness, which might be called the limiting thickness. (2) Above the limiting thickness, the time is practically const. for a given pressure. *Effect of pressure:* By defining the impermeability as the reciprocal of the porosity and calcg. it from the formula $pt/2$, in which p is the pressure and t the time, it was found to be an essentially variable property, increasing with the pressure at which it is detd. but varying only slightly above a certain pressure. As it has been suggested that the impermeability is rather a function of $\sqrt{p}$, it was calcd. from the formula $t \times f(\sqrt{p})$ but was found to be even more variable when expressed in this form. An attempt to find a formula which would give a practically const. value for the impermeability at different pressures led to the formula $I = t/2 \times p^{0.938}$; but even this did not give absolutely const. values. It is therefore considered preferable always to carry out the detn. at a definite pressure, which should be selected either in the zone where small variations in p lead to small errors in t, or in the zone of utilization of the paper.

A. Papineau-Couture

Stainless steels used in heavy machining [in paper mills] (Herd) **9.** Animal materials for artificial silk (Mendel) **29.** Structure of the crystal lattice of cellulose (Astbury, Marwick) **2.** Swelling of cellulose in $HClO_4$ (Andress, Reinhardt) **2.** Cellobiosan and cellulose (Hess, Garthe) **2.** Bleaching machines (Ger. pat. 515,613) **25.** Apparatus for clarifying waste waters of the paper, cellulose, etc., industries (Ger. pat. 518,063) **14.** Resins from cellulosic material (Russ. appl. 56,420) **26.** Ultramarine [from sulfite liquor] (Russ. appl. 59,674) **26.**

Luhmann, E., and Esslinger, R.: **Die Fabrikation der Dachpappe und der Anstrichmasse für Pappdächer.** 3rd ed. Leipzig: A. Hartleben's Verlag. 172 pp. M. 4; bound, M. 5.

Trotman, S. R., and Trotman, E. R.: **Artificial Silks.** London: Griffin. 274 pp. 18s., net.

Cellulose. I. G. Farbenind. A.-G. (Heinrich Diekmann and Christoph Beck, inventors). Ger. 518,154, Jan. 9, 1929. In the manuf. of cellulose by treating wood with HNO_3, the concn. of the acid is maintained during the treatment by leading NO_2, or gases contg. NO_2, into the reaction mixt.

Cellulose. Zellstoffabrik Waldhof, Valentin Hottenroth and Otto Faust. Fr. 37,121, June 22, 1929. Addn. to 663,684 (*C. A.* **24**, 722). Cellulose of all kinds is improved by a treatment with NaOH, the temp. of treatment and the concn. of the NaOH being adapted to one another, the lower the concn. of the soln., the lower being the temp. used.

Treatment of grasses for the production of cellulose. L. Ordódy, B. Ordódy, Z. Hollósy and E. Horváth. Hung. 101,627, May 12, 1930. Pectic substances and lignins are decompd. by boiling under pressure with sufficient $Ca(OH)_2$ to neutralize the acid decompn. products. The silica of the raw material may be extd. by hydroxides, carbonates or sulfides of alkali metals. Cf. *C. A.* **24**, 5495.

Yellow pigmented cellulose. Emile de Stubner. U. S. 1,795,764, March 10. Various details are described for pptg. a yellow pigment from Pb acetate, $K_2Cr_2O_7$ and H_2SO_4 solns. on "sol. fibrous cellulose" such as cellulose ester or ether material in such finely subdivided form that when the material is dissolved, the pigment becomes dispersed in the soln. without subjection to grinding or other special dispersing treatments.

Cellulose esters. British Celanese, Ltd. Brit. 338,745, Dec. 11, 1928. Cellulosic material such as cotton, cotton linters, reconstituted cellulose or wood pulp is subjected to successive pretreatments with HNO_3 (for an hr. at about 50°) and an aliphatic acid anhydride such as Ac_2O or propionic or butyric anhydrides (for an hr. at room temp.) and may then be esterified by addn. of a catalyst such as H_2SO_4 or $ZnCl_2$ and, if desired, a further quantity of the anhydride. Products suitable for making rayon, films, etc., are obtained.

Cellulose esters. I. G. Farbenind. A.-G. Brit. 338,798, Feb. 25, 1929. See Fr. 687,627 (*C. A.* **25**, 813).

Apparatus for digestion of nitrocellulose or for purification of cellulose. M. G.

MILLIKEN (to Hercules Powder Co.). Brit 338,941, May 29, 1929. In an app. of the character described in Brit. 301,267 (*C. A.* **23**, 4071), the material is forced under pressure together with water through a restricted passage such as a coil (which may be formed of chrome steel of small diam. and a length of 2500–3000 ft.) which leads directly or through a suitable valve to a stand-pipe or chamber to effect substantial equalization of pressure in the coil between the inlet and discharge ends. The coil may be heated by steam to 130–160°. Various details of app. and operation are described.

Apparatus for saponifying cellulose acetate. VEREIN FÜR CHEMISCHE INDUSTRIE A.-G. (Karl Werner, inventor). Ger. 515,779, Aug. 12, 1928.

Cement for films. M. SÁRY. Hung. 100,689, Oct. 3, 1929. Ten g. celluloid is dissolved in 5000 g. acetone and 500 g. amyl acetate, and 10 g. AcOEt is added.

Bleaching tower for fibers, especially cellulose. PAPER PATENTS CO. Ger. 515,-961, Nov. 30, 1928.

Bleaching unspun fibers. PAPER PATENTS CO. Ger. 515, 731, Aug. 5, 1928. The bleaching of raw material, especially cellulose, for paper manuf. is described.

Modifying the luster of rayon at the time of production. H. DREYFUS. Brit. 338,490, May 17, 1929. In making filaments or other products from various specified cellulose esters or ethers, a reduced or modified luster is obtained by adding to the solns. used for dry or wet spinning a small proportion (suitably 0.5–2%) of finely subdivided insol. materials (preferably white pigments) such as $BaSO_4$, Pb sulfate, ZnO, Ba phosphate, $ZnCO_3$, $CaCO_3$, $MgCO_3$, $CaSO_4$, Al_2O_3 or silica, and, to minimize settling, materials of low sp. gr. may be added such as Li and Mg silicates; oils, dispersing agents, etc., also may be used. The use of alkyl and aralkyl ethers of starch also is mentioned, and various details and modifications of procedure are described.

Artificial silk from viscose. I. G. FARBENIND. A.-G. (Adolf Kämpf and Arnulf Hager, inventors). Ger. 518,234, Apr. 27, 1929. Artificial silk of reduced luster is prepd. by spinning viscose solns. to which a small quantity of a stannate or antimonate, particularly a pyroantimonate, has been added. The added salt is decompd. during the spinning process, with the result that colloidal metal oxide is deposited in and on the fibers. An example is given.

Artificial silk, etc. LÉON LILIENFELD. Fr. 37,344, July 31, 1929. Addn. to 666,178 (*C. A.* **24**, 1509). Artificial threads of a high resistance in the dry state, above 2 g. per denier, are made by coagulating a thread of viscose by means of a gaseous mineral acid.

Artificial silk spinning. HANS EGGERT. Ger. 515,871, July 14, 1926. The adhering pptg. bath is removed from spun artificial silk fibers by suction-washing the fibers after they are wound on spools.

Artificial filaments, ribbons, etc. BRITISH CELANESE, LTD., R. P. ROBERTS and L. W. GREGORY. Brit. 338,936, July 29, 1929. Opaque products formed from org. esters or ethers of cellulose coagulated with aq. media are given improved transparency and tensile strength by heating them (suitably with dry steam or other hot gases or vapors while under tension, and if desired after preliminary impregnation with solvents, swelling agents or plasticizers). Various details of procedure are described.

Centrifugal spinning apparatus for artificial silk manufacture. W. S. MUMFORD. Brit. 338,958, Aug. 29, 1929. Structural features.

Piston pump for solutions of viscose, cellulose acetate, etc. TEXTILES ARTIFICIELS ING. A. MAURER. Ger. 518,100, June 22, 1929.

Spinning pumps for artificial silk. LOUIS CLAUDE BRUN. Fr. 37,287, July 30, 1929. Addn. to 658,463 (*C. A.* **23**, 5317).

Apparatus for dry-spinning of artificial silk filaments. NELSONS SILK, LTD., and J. NELSON. Brit. 338,881, July 25, 1929. Structural features.

Pulp from wood. LINN BRADLEY and EDWARD P. MCKEEFE (to Bradley-McKeefe Corp.). U. S. 1,795,754, March 10. Wood is digested in a cooking liquor contg. most of its soda in the form of a sulfite of Na; the residual liquor is subjected to a treatment including a reducing furnacing operation to yield a product contg. Na_2CO_3 and a relatively large amt. of Na_2S; and the Na_2S thus formed is utilized in an alk. cooking liquor to cook an addnl. quantity of wood. Residual liquor from this second cooking operation is subjected to a furnacing to yield a product contg. Na_2CO_3 and a lesser proportion of Na_2S than was present in the alk. cooking liquor, and the furnace product is subjected to a sulfiting to produce a cooking liquor contg. a quantity of Na_2SO_3 at least equiv. to any $Na_2S_2O_3$ present; and the cycle is repeated, by use of the last-mentioned cooking liquor in the first stage of the process. U. S. 1,795,755 relates to a cyclic process, in which one lot of wood is cooked in a liquor contg. SO_2 and $NaHSO_3$ and another lot of wood is cooked in a liquor contg. NaOH and a lesser quantity of Na_2S, residual liquors from these

2 operations being mixed and suspended matter sepd. This is followed by addn. of a Na compd. such as NaOH capable of redissolving remaining suspended org. material, concn., treatment of a portion of the concd. liquor by a reducing furnacing operation to form Na_2CO_3 and a considerable amt. of Na_2S, treatment of another portion of the liquor by furnacing to produce mainly Na_2CO_3 without much Na_2S, forming sep. liquors from these 2 furnace products, causticizing the liquor contg. the greater proportion of Na_2S to form a cooking liquor contg. NaOH and Na_2S, and subjecting the other liquor to treatment to form a cooking liquor contg. $NaHSO_3$ and SO_2 and not contg. any objectionable quantity of $Na_2S_2O_3$. U. S. 1,795,756 relates to a generally similar process in which, however, the wood cooked in alkali is treated with a larger proportion of Na_2S than NaOH when freshly charged into the digester. Cf. *C. A.* **25**, 816.

Pulp from material such as wood chips. Erwin H. Hussey (to Bauer Bros. Co.). U. S. 1,795,603, March 10. Material such as wood chips is disintegrated in the presence of sufficient water to thoroughly impregnate the material but without any substantial excess of water; further reduction and disintegration is effected (suitably by rotating disks) in the presence of a large quantity of water, followed by rolling, pressing and squeezing of the material, without appreciable cutting, between rotating, relatively movable disks having teeth inclined in an opposite direction to the direction of rotation. App. is described.

Bleaching wood pulp. Linn Bradley and Edward P. McKeefe (to Bradley-McKeefe Corp.). U. S. 1,795,757, March 10. Fibrous material from an incomplete digestion of wood is treated with liquor comprising a manganate such as $NaMnO_4$ together with an alkali metal hypochlorite. U. S. 1,795,758 describes numerous details and modifications of procedure of a process which may comprise digesting raw cellulosic materials in successive batches, one in an alk. cooking liquor and the other in an acid cooking liquor, and forming each liquor with inorg. compds. derived and recovered from the other liquor after the cooking operation therewith. Cf. *C. A.* **24**, 4634.

Paper pulp. Mead Pulp & Paper Co. Brit. 339,333, Aug. 28, 1929. In a continuous process of pulp production, stock of high consistency is treated with a gaseous chlorinating agent as it is fed down a tower (which may be fed with gaseous Cl from a liquid Cl supply). Numerous details of arrangement and construction of app. are described. Cf. *C. A.* **24**, 4392.

Paper pulp. Mead Pulp & Paper Co. Brit. 339,334, Aug. 28, 1929. For producing a free pulp of high strength, color, and clay-carrying quality suitable for paper making, from wood, straw, fibrous grasses and the like, such as that which has been subjected to an incomplete chem. digestion (*e. g.*, leached chestnut chips), the material is subjected to multi-stage and coördinated chlorinating treatment, the first stage being with an insufficient quantity of chlorinating agent acting at a limited temp. and the second stage involving treatment of a thickened pulp with a stronger chlorinating agent. Numerous details of app. and procedure and auxiliary and preliminary treatments of the material are described.

Rotating perforated drum apparatus for separating paper pulp, peat fiber, etc., from liquids. E. F. Sundström and K. E. Steen. Brit. 338,547, July 18, 1929. Structural features.

Treating black liquor from the soda-pulp process. Erik Häglund. Ger. 518,062, June 24, 1926. See Brit. 273,267 (*C. A.* **22**, 1854).

Tfeating black liquor formed in the soda-pulp process. Erik Häglund. U. S. 1,795,557, March 10. The liquor is subjected to a heat and pressure treatment to ppt. most of the org. substances present as carbonaceous and pitchy material. After sepn. of the liquor from the ppt. thus formed, it is causticized (the acetate content being left substantially unchanged) and concd., and a portion of the NaOAc content is crystd. out. Another portion of the causticized liquor is used to increase the alkalinity of the black liquor, and a further portion is used to act upon pulp-forming fibrous material; crystd. NaOAc and volatile products are recovered. An arrangement of app. is described. Cf. *C. A.* **21**, 3128; **24**, 4932.

Paper. Felix Thunert. Ger. 518,099, Dec. 24, 1924. A method is described of making packing, etc., paper having a downy upper surface, by securing cellulose wadding to a smooth paper support by means of an adhesive.

Paper, molded sheets, blocks, etc., from fibrous materials. Respats, Inc. Brit. 339,528, Jan. 11, 1930. See U. S. 1,770,430 (*C. A.* **24**, 4634).

Bituminous paper board. A. Sommer. Hung. 100,522, Aug. 7, 1929. Molten asphalt is emulsified with paper pulp by mixing and heating. The emulsion is broken down by drying, and paper board is made from the solid phase by rolling.

Roll for calendering apparatus. Theodor Gerth. U. S. 1,795,556, March 10. A

calendering roll comprises a core around which is wound a band or ribbon of material standing on edge and having its weft threads arranged in staggered relation.

Imparting high finish to paper. ALBERT L. CLAPP (to Bennett, Inc.). U. S. 1,797,048, March 17. After the drying operation, there is applied to paper an aq. dispersion of solid particles of waxes flexible at the calendering temp. of the usual hot calendering rolls at the dry end of the paper machine, and the paper is hot calendered. App. is described.

Apparatus (with twin glazing cylinders) for glazing paper. J. W. GRANT. Brit. 339,370, Sept. 13, 1929. Structural features.

Waterproof flexible paper. THE SCUTAN CO. Ger. 514,922, Nov. 25, 1927. See Brit. 281,316 (*C. A.* **22**, 3530).

24—EXPLOSIVES AND EXPLOSIVES

CHARLES E. MUNROE AND C. G. STORM

Fifty years' experimental research upon the influence of steam on combustion of carbonic oxide. WM. A. BONE. *J. Chem. Soc.* 1931, 338–61.—An historical account is given of expts. and theories on the combustion and explosion of gaseous mixts. from the time of H. B. Dixon's discovery of the activation by water vapor of the combustion of CO (1877) up to now. Chem. and phys. theories of gaseous explosions are considered in sep. sections. J. G. McNALLY

The laws of combustion of colloidal powders containing vaseline. H. MURAOUR AND G. AUNIS. *Compt. rend.* **192**, 418–21(1931); cf. *C. A.* **24**, 4396.—The variation in $\int p dt$, in which p is the pressure prevailing during combustion and t is time, was studied in powders contg. (1) vaseline and (2) centralite ($(EtPhN)_2CO$) to lower the temp. of explosion of the nitrocellulose-nitroglycerin mixt. The decrease in $\int p dt$ with d. of charge is much less with vaseline than with centralite. The powders contg. vaseline obey the same laws of combustion as other powders at high ds. of charge but not at ds. corresponding to pressures below 500 kg. per sq. cm. The peculiar behavior of vaseline is attributed to the fact that it is emulsified rather than dissolved in the powder. F. W. BROWNE

Dust explosions, with special reference to wood-working industries. H. R. BROWN. *Am. Soc. Mech. Eng.*, Advance paper, Dec. 1–5, 1930, 3 pp.—Explosions in flour mills have been common, but now this hazard is recognized in grain elevators, starch factories, sugar refineries, wood-working plants, textile mills and other factories in which materials in form of dust are manufd. Precautionary measures are suggested, and regulations have been tentatively adopted for prevention of dust explosions in wood-flour mfg. establishments. E. I. S

The constitution of atmospheres behind stoppings. T. DAVID JONES. *Colliery Guardian* **142**, 398–401, 493–4(1931).—Many analyses are reported of mine air contained in sections of coal mines which, for one reason or another, have been sealed off. Four different types are distinguished which are characteristic of the action taking place in the district sealed off. (1) The air is almost unchanged with time. There is little formation of CO_2. (2) The air is more or less rapidly replaced by CH_4, the CO_2 formed from the original air being pushed out. In one case CH_4 reached 90% in 12 weeks, the addnl. 10% being N. (3) The air is replaced by a mixt. of CO_2 and N_2 (black damp). In one unusual case black damp (with 18% CO_2) reached 100% in 134 weeks. This type is due to fires. When the O_2 has been reduced below 10% flames cannot exist, although heating may continue until the O_2 has been used up. (4) This results from a race between the accumulation of fire damp and the diminution of O. From a safety point of view explosions do not occur when the CH_4 exceeds 15% or the O_2 is less than 10%. Generally the CH_4 wins the race. Examples of consecutive analyses and diagrams illustrating the 4 types are given. A. L. KIBLER

Role of **gas masks in mines** (ESZTÓ) **13.** The propagation of flame in electric fields (GUÉNAULT, WHEELER) **2.** Use of HCl to prepare bore holes for blasting (Brit. pat. 338,454) **13.**

Explosive derived from hexamethylenetetramine. E. L. D'ASTECK. Brit. 339,024, Sept. 20, 1929. $(CH_2)_6N_4$ is oxidized with H_2O_2, the resulting product is treated with HNO_3 and is further oxidized with H_2O_2. Various details of procedure are described.

Blasting cap. WM. PRITCHARD, JR. (to Hercules Powder Co.). U. S. 1,795,440,

March 10. A weighting material such as Pb is placed in a cap comprising a casing and a charge which may be formed of fulminate-chlorate compn. in order to give the cap as an entirety a sp. gr. higher than that of coal, so that mech. sepn. from the broken coal is facilitated.

Diffusion apparatus for indicating the presence of combustible gases in air. BRUNO TREBITSCH. Austrian 120,986, Aug. 15, 1930.

Testing mixtures of coal dust and stone dust in mines. EMIL WITTE. Ger. 472,529, Dec. 11, 1925. The mixt. is compared with a graduated color tube contg. coal dust at one end and stone dust at the other, with gradual intermediate mixing.

Testing mixtures of coal dust and stone dust in mines, etc. EMIL WITTE. Ger. 514,162, June 15, 1929. Addn. to 472,529 (preceding abstr.).

25—DYES AND TEXTILE CHEMISTRY

L. A. OLNEY

Biphenyl: A starting point in organic synthesis. GILBERT T. MORGAN AND LESLIE P. WALLS. *J. Soc. Chem. Ind.* 50, 94T(1931).—Biphenyl, now available industrially at a moderate price, is pointed out as a possible source of *intermediates for synthetic dyes and drugs*. Examples are given. H. W. LEAHY

The copperas indigo vat. J. CLAROU. *Tiba* 9, 247-51(1931).—A description of the vat dyeing of cotton with indigo in the presence of $FeSO_4$. A. PAPINEAU-COUTURE

Troublesome fibers in the dyeing of garments. VALETTE. *Tiba* 9, 141, 143 (1931).—A brief outline of the chem. and tinctorial properties of some fibers which give trouble to dyers and cleaners: acetate rayon, acetylated wool, "immunized" cotton, "passive" cotton, "amido" cotton. A. PAPINEAU-COUTURE

Cause of the greenish shade of cotton fabrics jigged in indigosol O by the steaming process. LOUIS A. DRIESSEN. *Tiba* 9, 139(1931).—One method of application of indigosol O consists in jigging cotton fabric in a bath contg. indigosol O, NH_4CNS, $NaClO_3$ and NH_4VO_3, drying and steaming 1-15 min. In some cases a greenish shade is produced. It is shown that this is due to the use of too much NH_4CNS which, on heating (especially if prolonged) gives rise to the formation of persulfocyanic acid. The trouble can be eliminated by reducing the proportion of NH_4CNS or by using NH_4 oxalate or lactate in place of NH_4CNS. A. PAPINEAU-COUTURE

Even dyeings on wool. ALB. BYTEBIER. *Rev. chim. ind.* 39, 262-5(1930). P. THOMASSET

Partial alkaline hydrolysis of acetyl silk as a pretreatment for dyeing. W. COLTOF, H. I. WATERMAN AND J. G. WOLF. *Z. angew. Chem.* 44, 163-8(1931).—Superficial hydrolysis of acetylcellulose fibers in dil. NaOH and AcOH, at 60°, attained max. effects, which depended on the alkali concn. The wt. losses were 4.2, 6.3 and 8.4% in 0.0067, 0.0101 and 0.0133 *N* NaOH. If complete deacetylation of cellulose units took place (as has been claimed), the cellulose formed should be calculable from the wt. losses. Extn. of the treated fibers with Me_2CO gave greater residues of cellulose than the calcd. values. It is concluded that intermediary layers of incompletely deacetylated material exist below the completely hydrolyzed surfaces. The treated fibers were dyed under standard conditions (1 hr. at 70°) with benzopurpurin 4B. Absorption was detd. by colorimetric examn. of the bath before and after dyeing. Absorption on the untreated fiber was negligible; it increased rapidly, at first, with increasing deacetylation, but reached a max. when the wt. losses were 2-3%. Greater absorption may be produced only by lengthening the time of dyeing. Consideration of this factor is of great importance to the dyer. K. H. ENGEL

Unit heaters prevent condensation in dye houses. J. R. COOPER. *Heating, Piping and Air Conditioning* 2, 767-9(1930).—A discussion of the problem of air transportation in plants where moisture removal is of paramount importance and a description of several specific installations of unit heaters in dye rooms. E. I. S.

Note on the boiling of cotton preliminary to bleaching. J. DUTREILLIS. *Tiba* 9, 245, 247(1931).—It is considered that the most logical procedure is as follows: treatment with hot 1.5°Bé. HCl, treatment with C_6H_6 or similar fat solvent and boiling at atm. pressure with Na_2CO_3; if necessary a pancreatin treatment can be carried out between the fat extn. and soda boiling. A. PAPINEAU-COUTURE

The use of liquid chlorine in the industry of bleaching cotton cloth. LA BLANCHISSERIE ET TEINTURERIE DE THAON-LES-VOSGES. (Sealed communication of 1914.) *Bull. soc. ind. Mulhouse* 97, 60-2(1931).—A process for the prepn. of hypochlorite liquors

and their use in bleaching cotton are described. The app. consists of a column in which an ascending stream of Cl gas meets a spray of NaOH soln. or milk of lime. I. H. O. BOXSER.

The generating and application of x-rays for textile investigations. HERMAN *Am. Dyestuff Reptr.* **20**, 163–6(1931).—Seven references are listed. A. K. JOHNSON

Physical and chemical properties of textiles. II. A. J. HALL. *Textile Mercury* **84**, 239(1931); cf. *C. A.* **25**, 2296.—Some effects of the phys. conditions of rayons and the methods of manuf. on the resistance of cellulose to snail enzyme degradation are shown. A. K. JOHNSON

Identification and analysis of rayons. H. TATU. *Russa* **6**, 175–87(1931).—A critical review of methods proposed for the identification and analysis of nitrocellulose rayon, the identification and analysis of acetate rayon, the sepn. of viscose from cuprammonium rayon, microscopical examn. and ultra-violet examn. Bibliography of 40 references. A. PAPINEAU-COUTURE

Pieces of artificial crepes containing acetate rayon. A. CRISPE. *Russa* **6**, 243–7 (1931).—Practical operating directions. A. PAPINEAU-COUTURE

Cellulose amyloid and the utilization of the amyloid effect in the textile industry. JUSTIN-MUELLER. *Tiba* **9**, 129–33(1931). The optimum conditions for the production of amyloid consist in dissolving 5.82 parts of cellulose in 100 parts of H_2SO_4 (d. 1.580) to a thick starch-like paste and then pouring the soln. slowly into a large vol. of cold H_2O, which gives a white, curdy ppt. To obtain a pulverulent ppt. it is necessary to use a large excess of acid, or to allow the latter to act for a longer period, but this results in attack of the amyloid with production of dextrin or glucose. On drying the ppt. after washing to neutrality, it becomes grayish, hard, horny and more or less translucent, but softens again on prolonged contact with cold water. The wet ppt. or its NaOH soln. does not reduce Fehling's soln.; but if allowed to stand after boiling with Fehling's soln. the surface becomes very slightly reddish, showing a very slight reduction by surface action. The chief characteristic is that the dried ppt. is more resistant to the action of reagents than the undried ppt., indicating that there is probably a certain amt. of polymerization on drying. The production of cambric effects on cotton by treatment with H_2SO_4 and the parchmentizing of paper are both considered to be due to a superficial amyloidation of the fabric or paper. Rapidly passing rayon (viscose, acetate, cuprammonium) fabrics through H_2SO_4 (50–52° Bé.), followed immediately by thorough washing and final treatment with dil. NH_4, increases the tensile strength, but gives a rougher touch. A. PAPINEAU-COUTURE

The behavior of the aqueous solution of domestic cocoons. I. II. HIDEO KANEKO. *J. Agr. Chem. Soc. Japan* **6**, 623–32, 1015–22(1930).—The greater the surface tension of the aq. soln. of boiled cocoons is, the better the reeling. The isoelec. pt. of aq. solns. in which the reeling is easy is 4.25–4.4. The sp. elec. cond. (k) of the aq. soln. $= \log C + B$, in which C is the concn. and B is the const. (about 1.1); k increases with the temp. The cond. of the soln. is changed more by acids than by bases. The cond. of a soln. having good reelability is not changed by the addn. of electrolytes. Y. KIHARA

Medulla in wool. A new test for detection of hairiness in the fleece. B. L. ELPHICK. *New Zealand J. Agr.* **42**, 91–8(1931).—Medullated fibers present a bright chalky appearance when a sample of wool, free of grease and dirt, is immersed in benzene and is viewed against a black background. Pure wool fibers have a silky transparent appearance. The test can be carried out in about 5 min. K. D. JACOB

Recovery of spinning oil from fulling plants. A. BEYER. *Tiba* **9**, 133–7(1931).—A brief outline of the advantages and of the various processes of recovery, and also of the necessity of controlling the compn. of the effluent to eliminate portions contg. such small amts. of oil as to render the recovery uneconomical. A. PAPINEAU-COUTURE

Glue and gelatin in the textile industry. HERMANN STADLINGER. *Kunstdünger u. Leim* **28**, 61–9(1931).—Numerous uses of these materials in various operations in mfg. textiles are described, with notes on the qualities required and suggestions for new uses. Many working formulas are included. C. J. SCHOLLENBERGER

Proteins of wool (SAITO) **11A.** Water requirements in the textile industry (KEHREN, STOMMEL) **14.** Aromatic amines [dyes] (Ger. pat. 515,758) **10.** Substitutes for sugars [in printing or dressing textiles] (Ger. pat. 518,196) **18.**

Deutscher Färberkalender, 1931. Wittenberg: A. Ziemsen Verlag. M. 5. Reviewed in *J. Soc. Dyers Colourists* **47**, 82; *Tiba* **9**, 211(1931).

Dyes. CHEMISCHE FABRIK VORM. SANDOZ. Brit. 338,858, Dec. 20, 1928. An arylaminoanthraquinone contg. in the benzene ring to which is attached the arylamino group, a halogen atom in β-position, and in the other benzene residue a sulfonic acid group, is treated with sulfite (with or without the presence of phenol or a similarly acting compd.), which effects replacement of the β-halogen atom by a sulfo group. Examples are given of the production of water-sol. dyes suitable for wool dyeing and printing, giving fast blue to greenish blue shades.

Dyes. I. G. FARBENIND. A.-G. Brit. 338,747, Dec. 4, 1928. Halogenated dibenzopyrenequinones are made by causing halogen or a halogenating agent to react in an alkali-$AlCl_3$ melt with a 3,4,8,9-dibenzopyrene-5,10-quinone or a 4,5,8,9-dibenzo pyrene-3,10-quinone, or with a ketone capable of being transformed into such a pyrenequinone by ring closure. The products may be after-treated with a hypochlorite to improve the shades of the dyeings. Several examples are given, including dyes giving orange and scarlet tints.

Dyes. I. G. FARBENIND. A.-G. Brit. 339,489, Dec. 6, 1928. 4,5,8,9-Dibenzopyrene-3,10-quinones contg. both Cl and Br are made by chlorination of brominated dibenzopyrenequinones or by bromination of chlorinated dibenzopyrenequinones. Several examples are given for the production of dyes producing various red tints.

Dyes. I. G. FARBENIND. A.-G. Fr. 37,120, June 22, 1929. Addn. to 670,562. *N*-Dihydro-1,2,2′,1′-anthraquinoneazines contg. Me groups in the anthraquinone ring are made resistant to Cl by a treatment with H_2SO_4 and MnO_2 or other oxidizing agents having a similar action. An example is given of the treatment of the 3,3′-dimethyl deriv. Cf. *C. A.* **24**, 2608.

Dyes. I. G. FARBENIND. A.-G. Fr. 37,442, Sept. 18, 1929. Addn. to 667,108. The sulfonic acids of Fr. 667,108 (*C. A.* **24**, 1223) are replaced by the corresponding carboxylic acids of aromatic diamino compds. Examples are given.

Dyes. SOC. ANON. POUR L'IND. CHIM. À BÂLE. Fr. 37,190, July 4, 1929. Addn. to 677,782 (*C. A.* **24**, 3378). Dyes of the general formula 2,3-$(R^1N{:}N)(HO_3S)C_{10}H_4$-$(NH.X.NH.R^2.N{:}NR^3)$-6, in which X represents a residue such as CO or CS or a triazine, quinazoline, pyridazine, pyrimidine or like heterocyclic residue, R^1 is the residue of anthranilic acid or a deriv. thereof, R^2 is an aryl ring and R^3 is an aryl ring contg. an OH and COOH group *o*- to one another, are prepd. by coupling the aminonaphthol derivs. with a diazo compd. corresponding to the group R^1. Examples are given.

Azo dyes. I. G. FARBENIND. A.-G. Brit. 338,672, Oct. 10, 1928. Azo dyes (examples of which dye cotton yellow and red shades) are made by diazotizing the compds. produced by subjecting mono- or di-nitrobenzoylated diaminoarylsulfonic acids to slight reduction (such as is required to convert an aromatic nitro compd. into an azo- or azoxy-compd., as described in Brit. 313,636; *C. A.* **24**, 1227) and coupling with a coupling component. Several examples are given.

Azo dyes. I. G. FARBENIND. A.-G. Fr. 37,157, June 28, 1929. Addn. to 677,491 (*C. A.* **24**, 3116). Azo dyes are prepd. by coupling *o*-hydroxydiazo compds. with hydroxyquinolone derivs. and choosing the reaction components in such a manner that the product contains at least one sulfonic group. Thus, 4-chloro-2-aminophenol-6-sulfonic acid is diazotized and coupled with 1-phenyl-4-hydroxy-2-(1)quinolone to give a dye which dyes Cr-mordanted wool a Bordeaux-red shade. Other examples are given.

Azo dyes. I. G. FARBENIND. A.-G. Fr. 37,203, July 10, 1929. Addn. to 674,638 (*C. A.* **24**, 2892). Azo dyes are prepd. in substance or on the fiber from condensation products of diazo compds. with primary amines which contain groups giving soly. in water. Thus the diazoamino compd. of 2,5-dichloro-1-aminobenzene and 4-sulfo-2-aminobenzoic acid is coupled with 2′,5′-dimethoxyanilide-2-hydroxynaphthalene-3-carboxylic acid, the dye formed giving a yellowish brown shade. Several examples are given.

Azo dyes. I. G. FARBENIND. A.-G. Fr. 37,383, Aug. 31, 1929. Addn. to 645,771 (*C. A.* **23**, 2041). Azo dyes are prepd. by coupling 2,3-hydroxynaphthoyl-2-amino-3-naphthol ethers with diazo compds. of *p*-aminodiaryl ethers, the 2 and 5 positions of which, with respect to the NH_2 group, are substituted but which do not contain COOH, SO_3H or nitric groups, *e. g.*, 3-methyl-6-chloro-4-aminodiphenyl ether.

Metal compounds of azo dyes. SOC. ANON. POUR L'IND. CHIM. À BÂLE. Ger. 518,016, Sept. 8, 1928. See Brit. 297,478 (*C. A.* **23**, 2836).

Azo dyes containing chromium. FRITZ STRAUB and HERMANN SCHNEIDER (to Soc. anon. pour l'ind. chim. à Bâle). U. S. 1,796,058, March 10. A chromable dye such as that formed from diazotized 6-nitro-2-amino-1-phenol-4-sulfonic acid and β-naphthol is treated with Cr hydroxide in the presence of a water-sol. salt of hydrosulfuric acid such as Na_2S. Various other examples are given. Cf. *C. A.* **24**, 5164.

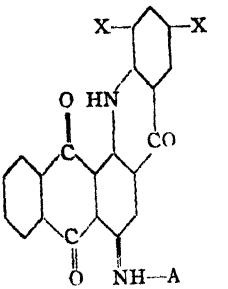
Chromium compounds of azo dyes. I. G. FARBENIND. A.-G. Brit. 338,595, Aug. 22, 1929. Compds. dyeing wool greenish yellow shades are formed by boiling a Cr salt with dyes such as those formed from 2-chloroaniline (or 4-chloro-3-toluidine) and the methylpyrazolone from 2-amino-2'-hydroxy-4-sulfo-3'-carboxy-5'-methyldiphenyl sulfone or similar components. Cf. *C. A.* 24, 1746.

Vat dyes. I. G. FARBENIND A.-G. Brit. 339,396, Sept. 28, 1929. An acylating agent is caused to react on a condensation product obtained by treating a 1-(*Bz*-1-benzanthronylamino)-4- or 5- or 8-aminoanthraquinone or a substitution product halogenated in the benzanthrone residue with an alkali condensing agent. Products are obtained dyeing olive shades fast to Cl, and several examples are given. Among the acylating agents which may be used are benzoyl chloride and cinnamic acid chloride.

Vat dyes. BRITISH DYESTUFFS CORP., LTD., and ANTHONY J. HAILWOOD. Fr. 37,360, Aug. 22, 1929. Addn. to 638,387 (*C. A.* 23, 286). The dye obtained by the fusion of naphthalimide or acenaphthenequinone with NaOH under conditions other than those indicated in the 1st example of Brit. 26,690/13 is brought into a sol. or colloidal form for use in the vat by treatment with an acid agent such as oleum or $ClHSO_3$ followed by a fresh pptn. by dilu.

Vat dyes. I. G. FARBENIND. A.-G. Fr. 37,173, July 2, 1929. Addn. to 669,740 (*C. A.* 24, 1990). The action of Br on dibenzanthrone or isodibenzanthrone or their derivs. for the production of dyes is carried out in the presence of $ClHSO_3$ at temps. below 50°.

Vat dyes. I. G. FARBENIND. A.-G. Fr. 37,184, July 2, 1929. Addn. to 674,639 (*C. A.* 24, 2891). Vat dyes are prepd. by the reaction of a halogenated anthraquinone-acridone contg. 3 or more halogen atoms with a halogenated aromatic amine. The products obtained probably correspond with the formula



in which X represents any halogen atoms and A is an aromatic ring. Examples are given.

Vat dyes. I. G. FARBENIND. A.-G. Fr. 37,309, Aug. 6, 1929. Addn. to 679,912 (*C. A.* 24, 3909). Vat dyes are prepd. by condensing an α-hydroxyanthracene with an α-compd. of a 4-methyl-5-halo-7-alkoxyisatin. Thus, α-anthrol heated in PhCl with 4-methyl-5-chloro-7-methoxyisatin gives 2-anthracene-4'-methyl-5'-chloro-7'-methoxy-2'-indole indigo which dyes fiber a greenish blue shade.

Vat dyes. I. G. FARBENIND. A.-G. (Wilhelm Eckert and Otto Braunsdorf, inventors). Ger. 517,195, June 19, 1928. See Brit. 313,887 (*C. A.* 24, 1226).

Vat dyes. I. G. FARBENIND. A.-G. (Hugo Wolff and Ernst Honold, inventors). Ger. 517,442, Apr. 30, 1929. Addn. to 489,957 (*C. A.* 24, 2305). Vat dyes are obtained by treating polyanthraquinonylaminobenzanthrone compds. which have an anthraquinonylamino residue in the *Bz*-1-position, with alkali and, optionally, treating the resulting dye with acid condensing agents. Thus, di(1'-anthraquinonyl)-6-*Bz*-1-diaminobenzanthrone (obtained from 6-*Bz*-1-dihalobenzanthrone and 1-aminoanthraquinone) is fused with NaOH and alc. at 180–200°. The resulting mass is heated with water, filtered and washed. The dye so obtained colors vegetable fibers in olive-brown shades from a NaOH and hydrosulfite vat. Further examples are given. Cf. *C. A.* 24, 4941.

Vat dyes. I. G. FARBENIND. A.-G. (Georg Rösch, inventor). Ger. 518,017, Aug. 9, 1929. Yellow to orange vat dyes are prepd. by combining 2 mols. of an α-aminoanthraquinone with 1 mol. of naphthalene-2,6-dicarboxylic acid or its derivs. not contg. OH groups. Suitably, the dichloride of the acid is heated with the α-aminoanthraquinone in $PhNO_2$. Examples are given.

Vat dyes. I. G. FARBENIND. A.-G. (Heinrich Neresheimer and Wilhelm Schneider, inventors). Ger. 518,230, July 26, 1929. The dyes described in Ger. 491,430 (*C. A.* **24**, 2306) are halogenated. The products are faster to Cl than the initial dyes and give modified dyeings. Examples are given.

Violet vat dyes. I. G. FARBENIND. A.-G. (Maximilian P. Schmidt and Wilhelm Neugebauer, inventors). Ger. 502,352, Apr. 30, 1927. Haloperylenetetracarboxylic acids contg. not more than 3 halogen atoms are condensed with *o*-diamines. An example is given.

Blue-green vat dyes. SOC. ANON. POUR L'IND. CHIM. À BÂLE. Brit. 339,516, Dec. 24, 1929. 2-Methylbenzanthrone or a deriv. contg. a replaceable substituent in the *Bz*-1-position is sulfurized and converted into products of improved properties by dissolving in H_2SO_4 and dilg. the soln. thus formed continuously with water or with aq. H_2SO_4 so that the dye is pptd. but impurities are retained in soln., or purification may be effected by reducing to the leuco compd., sepg. and oxidizing the latter if desired.

Blue vat indanthrone dye. D. A. W. FAIRWEATHER, J. THOMAS and SCOTTISH DYES, LTD. Brit. 338,891, May 25, 1929. 2-Aminoanthrahydroquinone-9,10-disulfuric ester is oxidized by use of a cupric salt such as the sulfate or chloride (suitably with addn. of NaOH or HCl), to avoid danger of over-oxidation and produce a product which is presumably indanthrone.

Acid wool dyes. I. G. FARBENIND. A.-G. (Rudolf Müller and Ernst Honold, inventors). Ger. 518,229, Mar. 18, 1928. The diazo compds. from 1-aminoanthraquinone-2 sulfonic acids substituted in the 4-position with a readily exchangeable atom or group or the residue of a base are treated with primary or secondary bases. Thus, the diazo compd. from 1-amino-4-bromoanthraquinone-2-sulfonic acid may be treated with $PhNH_2$ while cooling in the presence of a little Cu. The reaction proceeds with evolution of N. Other examples are given also. Cf. *C. A.* **25**, 214.

Acid wool dyes. WILHELM ECKERT (to General Aniline Works). U. S. 1,796,011, March 10. Dyes producing generally yellow or greenish yellow dyeings (according to the several examples described) on animal fibers or cellulose esters and ethers are produced by causing a compd. of the group consisting of NH_3, alkyl NH_2, aralkyl—NH_2, aryl—NH_2 and *o*-arylene-$(NH_2)_2$ (the aryl residues being substituted or not) to act upon a compd. of the general formula of a naphthalic anhydride wherein may be substituted the sulfonic or the sulfamic acid group and a univalent substituent in the presence of water at a temp. of about 100°. The use of the Na deriv. of 4-sulfamino-1,8-naphthalic anhydride and *o*-$C_6H_4(NH_2)_2$ and similar starting materials is described, and the same or similar dyes are obtained by transforming the reaction products of naphthalic anhydride, or a deriv. thereof, with NH_3, an aliphatic or aromatic amine into the sulfonic acids or sulfamic acids, resp., or by subjecting naphthalic anhydride or a deriv. thereof to react with a sulfonic acid of an amine. U. S. 1,796,012 describes the production of generally similar dyes by treating nitronaphthalic acid derivs. (such as nitro-1,8-naphthalimide contg. H, alkyl, aralkyl or aryl on the N) in an aq. soln. with such reducing agents as simultaneously effect the entrance of a sulfonic acid group. Such agents are, for instance hyposulfite, bisulfite or the like. It is advantageous to add to the aq. soln. a water-sol. org. solvent, *i. e.*, alc. The reaction is generally carried out at boiling temp., but it is also sufficient to heat the soln. to a somewhat lower temp. It is also possible to use as parent materials such nitronaphthalic acid derivs. as contain a sulfonic acid group. In this case the introduction of a further sulfonic acid group is unnecessary and it is sufficient to reduce the nitro group. Examples are given of the use as starting materials of *N*-methyl-4-nitronaphthalimide (or the corresponding ethylimide or phenylimide), 4-nitronaphthalimide and *N*-(*p*-sulfophenyl)-4-nitro 1,8-naphthalimide. Cf. *C. A.* **25**, 1097

Anthraquinone dyes. I. G. FARBENIND. A.-G. Brit. 339,266, Sept. 3, 1929. 1-Amino-4-bromoanthraquinone-2-sulfonic acid is caused to react with an aromatic amine contg. a hydroxyl group, which is etherified by a polyhydric alc., such as *o*- or *p*-aminophenol glycol ether or *p*-aminophenol glycerol ether, suitably in the presence of Cu or a Cu salt and of Na_2CO_3. The dyes dye wool clear blue or greenish blue shades.

Acylaminoanthraquinone dyes. I. G. FARBENIND. A.-G. Brit. 339,267, Sept. 3, 1929. Two mol. proportions of α-aminoanthraquinone or a substitution product are condensed with 1 mol. proportion of a reactive deriv. of a naphthalenedicarboxylic acid, a diphenylmethanedicarboxylic acid, diphenyl-*p*,*p*'-dicarboxylic acid or a halogen substitution product of such compds. (with the exception of such dicarboxylic acids as are capable of forming internal anhydrides). Various examples are given for the production of dyes giving yellow, orange and red shades.

Dibenzanthrone dyes. R. S. BARNES, R. F. THOMSON, J. THOMAS and SCOTTISH

DYES, LTD. Brit. 339,324, May 31, 1929. Enolic esters of dibenzanthrone or halogenated dibenzanthrone are treated with oxidizing agents (such as $Na_2Cr_2O_7$, $K_2S_2O_8$, $KMnO_4$, V_2O_5 or H_2O_2) in the presence of an inorg. acid of at least 4% strength. Various details and examples are given.

Sulfurized dyes. I. G. FARBENIND. A.-G. Fr. 37,484, Oct. 2, 1929. Addn. to 653,785 (*C. A.* **23**, 3816). Sulfurized dyes are prepd. by heating halogenated dinaphthylene dioxide with S, with or without diluents of high b. p., or melting these compds. with polysulfides in the known manner. Examples are given of dyes from the tetrachloro, pentachloro, tetrabromo and hexachloro compds. Cf. *C. A.* **25**, 1096.

Sulfuretted dyes. I. G. FARBENIND. A.-G. Brit. 339,410, Oct. 10, 1928. Acid mordant dyes probably of the thiazine series are obtained by reaction of S in fuming H_2SO_4 on a β-hydroxynaphthoquinonesulfoarylimide (in which O, OH and the $NRSO_2H$ group are in the 1, 2 and 4 positions, resp.) in which the aryl group (R) may contain further substituents with the exception of alkylamino groups. Examples are given for the production of dyes dyeing wool from an acid bath reddish violet shades which turn green when after-chromed; the dyes are suitable for printing wool or cotton by the chrome printing process. Cf. *C. A.* **25**, 2005.

Pastes from insoluble mordant dyes. E. YA. VINETZKAYA. Russ. appl. 22,888, Sept. 13, 1927. Pastes are prepd. from alizarin by mixing the dry dye with 5–10% of a protective colloid, such as gum tragacanth, etc., and grinding the mixt. in a colloid mill together with water.

Pasting sulfur dyes with resin soaps. I. G. FARBENIND. A.-G. (Franz Schweitzer-Hennig and Walter Hagge, inventors). Ger. 518,198, June 10, 1928.

Improving the solubility of dyes. ARTHUR R. MURPHY and JOSEPH B. OESCH (to Newport Chemical Corp.). U. S. 1,796,115, March 10. A dye such as direct fast yellow 5G is dissolved in water in the presence of a sol. pyrophosphate salt such as Na pyrophosphate, which serves as a solubilizing agent.

Fuchsin. C. N. IGNATYEV and I. I. VASIN. Russ. appl. 50,998, July 11, 1929. Fuchsin is prepd. by heating above 100° in the presence of air a mixt. of aniline, *o*- and *p*-toluidine and activated carbon without the addn. of any kind of oxidizer. The fuchsin is extd. from the melt by any of the known methods.

Parafuchsin. S. N. IGNATYEV and I. I. VASIN. Russ. appl. 59,307, Nov. 29, 1929. Parafuchsin is prepd. by heating a mixt. of $(p\text{-}H_2NC_6H_4)_2CH_2$, aniline and its salt, iron chloride and activated wood charcoal in the presence of air. The dye formed is extd. from the melt, which is first freed from the excess of aniline by the usual methods. The extn. can be carried out, *e. g.*, first with acidified water and then with org. solvents.

Bisulfite compound of alizarin blue. A. A. RAZUMEVEV. Russ. appl. 49,462, June 19, 1929. A mixt. of alizarin blue paste or the dry dye with a soln. of alkali is super satd. with sulfurous gas under agitation and let stand under ordinary or superatmospheric pressure at ordinary or elevated temp. until a sample is completely sol. in water. The product is then isolated by ordinary methods.

Anthanthrone derivatives. I. G. FARBENIND. A.-G. (Max A. Kunz, Karl Köberle and Erich Berthold, inventors). Ger. 518,231, Aug. 10, 1928. New compds. useful as *vat dyes* or *intermediates* are prepd. from di- or poly-aminoanthanthrones by substituting a radicle for H in one or more of the NH_2 groups. Examples are given describing the reaction of diaminoanthanthrone with PhCOCl, 1-chloroanthraquinone and 1-aminoanthraquinone-2-carboxylic acid chloride. Cf. *C. A.* **25**, 602.

Condensation products from benzoin. SOC. ANON. POUR L'IND. CHIM. À BÂLE. Ger. 517,498, July 20, 1928; Fr. 37,391, Sept. 5, 1929. New compds. are prepd. by treating benzoin with aromatic sulfonic or carboxylic acids in the presence of a condensing agent, *e. g.*, H_2SO_4, oleum, or HSO_3Cl. Thus, a soln. of Na benzenesulfonate in H_2SO_4 may be stirred with benzoin at 80–90° until a sample gives a clear soln. in water. Alternatively, mixts. of benzoin and aromatic compds. may be treated with reagents having both a sulfonating and condensing action. Thus, $C_{10}H_8$ and benzoin may be fused together and the cooled melt introduced into H_2SO_4 and HSO_3Cl at 60°. Other examples are given also. The products are useful as assistants in the *manuf. of lakes and dye pastes* and in dyeing with ice colors and vat dyes.

Dye intermediates. I. G. FARBENIND. A.-G. Brit. 338,764, Dec. 16, 1929. 2-Aroylbenzanthrones are made by treating benzanthrones contg. the group $—CH(R)CN$ (in which R represents aryl) in the 2-position, described in Brit. 319,593 (*C. A.* **24**, 2613), with oxidizing agents such as $KMnO_4$ or $Na_2Cr_2O_7$ in the presence of org. diluents such as glacial HOAc or acetone. Several examples are given.

Dye intermediates. I. G. FARBENIND. A.-G. (Walter Mieg, Berthold Stein and

Willy Trautner, inventors). Ger. 518,213, May 3, 1927. New condensation products are prepd. by treating aminoanthraquinones or their derivs. or substitution products with alc. alkali hydroxide solns. at a temp. below 100°, while leading air into the reaction mixt. The products are strongly colored and are sol. in H_2SO_4, but they are not useful as vat dyes. Examples are given.

Gray dyeings on furs, hairs and feathers. I. G. FARBENIND. A.-G. Brit. 339,444, Nov. 7, 1928. The material (with or without mordanting) is treated with a soln. contg. a suitable oxidizing agent such as H_2O_2 and a 4-amino-*N*-alkyl- or *N*-aralkyldiphenylamine or a 4′-halo- or 4′-alkyl- deriv. Various examples and details of procedure are given.

Color lakes. WILHELM EBERLEIN. Ger. 515,981, Jan. 25, 1928. Color lakes are produced by pptg. basic dyes by sulfite-cellulose lye. Fixing agents, emulsions, fats and waxes may be added. Thus methyl violet is treated with the lye. $Al(OH)_3$ may be added to form a printing paste. Addn. of a colloid (*e. g.*, bentonite) and wax or oil renders the lake suitable for use as a marbled paper-coloring agent.

Dyeing textile materials. PIETER MIJER (to Two-Tone Corp.). U. S. 1,796,039, March 10. Various details of app. and procedure are described for coloring webs of permeable fabric by forming 2 color clouds while sepg. the heavy particles or drops from the lighter particles and exposing one face of the fabric to one of the clouds and the other face to the other cloud. Cf. *C. A.* **24**, 3383–4.

Dyeing piece goods and yarns with vat dyes. I. G. FARBENIND. A.-G. (Gerhard Poetzsch and Hermann Jäger, inventors). Ger. 518,197, Feb. 3, 1928. Better penetration is obtained by slop-padding the materials with the unvatted dye paste with the addn. of an agent promoting running or bleeding, and then treating the materials as usual with an alk. hyposulfite soln. Suitable agents for promoting running are emulsions of oils and fats or their free acids or water-sol. derivs., *e. g.*, Turkey-red oil or cellulose derivs. forming neutral or alk. aq. colloidal solns., *e. g.*, an alkali salt of carboxymethyl cellulose. The method is intended particularly for tightly beaten cotton or linen fabrics or strongly twisted or mercerized yarns. Examples are given.

Dyeing fulled goods. V. V. KUVICHINSKII and N. V. VORONKOV. Russ. appl 41,382, Feb. 22, 1929. Fulled goods are steamed, known dye solns. are added by the usual methods and the goods are again steamed.

Dyeing acetyl cellulose. WOLFGANG JAECK and JOSEPH LANG (to Soc. anon. pour l'ind. chim. à Bâle). U. S. 1,796,028, March 10. Acetylcellulose is treated with a colloidal prepn. from an intermixture of insol. aminoazo dyes having an affinity for acetylcellulose, with waste sulfite liquor, which serves as a dispersing agent. U. S. 1,796,029 relates to the similar use of aminoanthraquinones with waste sulfite liquor.

Dyeing cellulose esters. BRITISH CELANESE, LTD. Brit. 339,429, Oct. 26, 1928. In dyeing fabrics, such as those comprising cellulose acetate, formate, propionate or butyrate on machines of the winch type, formation of creases is avoided by partially saponifying the ester before dyeing, and delustering may be simultaneously effected. Various details of procedure and reagents used are given.

Dyeing fur, hair and feathers. I. G. FARBENIND. A.-G. (Karl Marx and Karl Bittner, inventors). Ger. 518,199, Dec. 11, 1928. The mordanted or unmordanted materials are treated with an oxidizing agent and a base (or its salt) of the formula $R_3R_2NC_6H_4NR_1CH_2CH_2N(alkyl)_2$, where R_1 is H or an alkyl group and R_2 and R_3 are H or alkyl or aryl groups. Nuclear substitution products of such bases may also be used. Thus, Cu- or Fe-mordanted fur may be treated with an aq. bath contg. H_2O_2 and 4-amino-1-(ω-diethylaminoethylamino)benzene, brown shades being obtained. Other examples are given also. Cf. *C. A.* **25**, 2007.

Printing with vat dyes. I. G. FARBENIND. A.-G. Fr. 37,188, July 3, 1929. See Brit. 314,904 (*C. A.* **24**, 1522).

Printing with vat dyes. I. G. FARBENIND. A.-G. Fr. 37,282, July 4, 1929. Addn. to 642,991 (*C. A.* **23**, 1514). Merchandise is printed with a vat dye mixed with thickening agents other than cellulose esters or ethers capable of easy pptn., and the merchandise is treated with a reducing agent and an alkali. Examples are given of the use of carrageen moss.

Printing fabrics. I. G. FARBENIND. A.-G. (Ludwig Löchner, inventor). Ger. 516,088, Sept. 12, 1928. Addn. to Ger. 513,526 (*C. A.* **25**, 2006). In producing polychromatic effects by ester salts of vat dyes by the method of 513,526, β-naphthol and other coupling compds. are used instead of 2,3-hydroxynaphthoic acid arylides. Thus, fabric is soaked in a lye contg. β-naphthol, Turkey-red oil and NaOH. For red printing, the dried fabric is treated with a paste contg. diazotized *p*-nitroaniline, water, starch and AcONa. Further examples are given.

Printing wool. I. G. FARBENIND. A.-G. Fr. 37,474, Sept. 30, 1929. Addn. to 662,205 (*C. A.* **24**, 510). Illumination effects are obtained by printing wool, colored with a dye capable of being discharged, with discharge agents contg. esterified salts of leuco compds. of vat dyes, then treating the merchandise after steaming with a soln. of a persulfate contg. a free acid. Cf. *C. A.* **25**, 1102.

Piece-dyeing machine. SIEMENS-SCHUCKERTWERKE A.-G. (Georg Schlenk, inventor). Ger. 515,926, June 10, 1929. Addn. to 459,546.

Apparatus for washing, dyeing or other treatments of articles with liquids. KENNETH C. ANDERSON. U. S. 1,796,312, March 17. Structural features of an app. suitable for treating fabrics or other materials.

Treating textiles. CAMILLE DREYFUS. Fr. 37,382, Aug. 31, 1929. Addn. to 679,429 (*C. A.* **24**, 3911). A limited amt. of a sapong. agent in other than paste form is applied to textile materials of or contg. cellulose esters and rapidly dried.

Cleaning textiles, etc. LOUIS A. H. LANTELME. Fr. 695,131, May 6, 1930. A colloidal product such as starch, paste, bone glue or skin glue is used in the cleaning, washing, bleaching, dyeing or charging of textiles or threads of all kinds.

Waterproofing textile materials. FRITZ FUCHS. Austrian 121,364, Sept. 15, 1930. Addn. to 109,167 (*C. A.* **22**, 4836). The materials are impregnated with a soln of degradation products of vulcanized rubber in a high-boiling solvent, *e. g.*, pitch, asphalt or bitumen, with or without a drying oil. The prepn. of the soln. may be interrupted before soln. is complete, the undissolved portion acting as a filler.

Treating textile materials for mercerization. EMIL GRIMDER. U. S. 1,796,598, March 17. Woven material is subjected to the action of a shrinking liquid such as mercerizing soln. and is afterward subjected to a series of alternate cooling and transverse stretching treatments.

Bleaching and mercerizing machines. ALLGEMEINE ELEKTRIZITÄTS-GES. Ger. 515,613, Aug. 14, 1928. Details of regulating.

Bleaching bast fibers. I. G. FARBENIND. A.-G. Brit. 339,550, March 16, 1929. Bast fibers, either as crude fiber or in yarn or finished goods, are bleached by successive use of baths comprising: (1) peroxide, (2) acid Cl soln., (3) Na_2CO_3 soln., (4) alk. or neutral Cl soln. and (5) peroxide. Various details are described.

Bucking process for vegetable fibrous materials. GUSTAV ULLMANN Austrian 121,528, Oct. 15, 1930. See U. S. 1,787,880 (*C. A.* **25**, 828).

Bucking linen, etc. WERNER ERB. Ger. 515,675, May 10, 1927. Vegetable fibers are bucked in a mechanically stirred bleaching bath at 60–70°.

Preparing vegetable textile fibers for spinning. JOSEPH VIALLET (to N. T. Artificial Wool Co., Ltd.). U. S. 1,795,414, March 10 Cleaned waste vegetable fibrous material such as waste jute fabric is treated with a soln. which promotes fermentation such as a dil. soln. of $MgSO_4$, KNO_3 and K phosphate and heated to 30° with a softening agent such as olein, and after the fermentation has sufficiently proceeded the material is unravelled and boiled with a dil. alkali soln.

Textile fiber from materials such as ramie, flax, hemp, sisel and bamboo. DINSHAW R. NANJI (one-half to Duncan M. Stewart). U. S. 1,796,718, March 17. The material is heated with a 0.1–0.5% $(NH_4)_2SO_4$ soln. at a temp corresponding to a vapor pressure of 1–2 atm. for 60–20 min. and then subjected to pressure to remove slimy matter; subsequently the fiber is washed, dried and obtained from the straw by an ordinary scutching or similar process. U. S 1,796,719 describes a process for the manuf. of textile yarns consisting in resolving natural bast fibers such as those of plants of the genus *Boehmeria* embodying ultimate filaments of a length of at least 2.5 in. into such ultimate fibers, blending the latter with synthetically produced fibers such as any variety of rayon and then spinning the blend. Cf. *C. A.* **24**, 1750

Fiber and yarn from unretted flax. HENRY C. WATSON and MARTIN WADDELL (to Watson-Waddell Ltd.). U. S. 1,795,528, March 10 After breaking, scutching and twisting the fibers into a rove, the rove is wound onto an open reel in the roving frame, retted while on the reel, washed and spun. U. S. 1,795,529 and U. S. 1,795,530 also relate to app. for treating flax.

Dressing yarns. EDOUARD PINEL. Ger. 518,195, Nov. 27, 1926. Yarns of cotton, wool, etc., are treated with a soln. of carob-bean gum, which may contain a softening agent such as glycerol, and then with a soln. of starch or other size.

Singeing fabrics. W. OSTHOFF. Brit. 339,281, Aug. 28, 1929. A rich excess of O is supplied with the primary air or O to a gas or vapor burner and singeing is effected by the highly heated O thus obtained. App. is described. Cf. *C. A.* **24**, 511.

Delustering fibers of fabrics of regenerated cellulose. I. G. FARBENIND. A.-G. (Walther Schieber, Hugo Pfannenstiel and Herbert Mahn, inventors). Ger. 518,194,

Aug. 22, 1929. The materials are treated with a soln. of a cellulose ester or ether in conjunction with a non-solvent for the ester or ether, with the result that a cloudy film is produced on the materials when they are dried. Thus, regenerated cellulose yarn may be treated with a 0.2% soln. of benzylethylcellulose in equal parts of MeOH and C_6H_6 to which 10% of water has been added. Alternatively, the yarn may be impregnated with a simple soln. of the cellulose deriv., and the non-solvent applied later, *e. g.*, by steaming.

Carbonizing cellulosic fibers in mixed goods. H. DREYFUS. Brit. 339,300, Aug. 2, 1929. Mixed fabrics contg. cellulosic fibers such as cotton together with other materials such as cellulose derivs., wool and silk are heated in inorg. acid or acid salt solns. sufficiently dild. to have no deleterious effect on the non-cellulosic materials, to render the cellulose fibers removable without drying in the presence of a carbonizing reagent. Ornamental effects may be produced by use of colored or other reserves, and delustering of cellulose acetate may be prevented by avoiding undue heating or by using suitable protective reagents.

Filling and weighting fabrics of cellulosic materials. R. W. R. MACKENZIE, E. H. ROBINSON, D. LUMSDEN and M. FORT. Brit. 338,654, Sept. 23, 1929. Materials such as cotton or linen are loaded and filled "in an invisible way" with mineral loading agents such as clay, talc or barite (alone or together with unwoven cotton, wood fiber, paper or paper pulp) by rendering them sticky by treatment with a plasticizing agent such as H_2SO_4, caustic alkali, CS_2, cuprammonium soln. or the like, applying the filling before, during or after the plasticizing treatment, and subsequently subjecting the material to a setting bath. The properties of the material are stated to be improved in various respects.

Artificial silk, etc. I. G. FARBENIND. A.-G. Brit. 339,089, Nov. 14, 1928. Artificial threads, hairs, bands, etc., are made by dissolving natural silk waste in H_3PO_4, coagulating the viscous soln. thus formed by use of an alkali metal salt soln. (suitably a NaCl soln. contg. also NH_4 formate) and stretching the coagulated material to the desired form. Various details of the process are described.

Artificial silk, etc. H. DREYFUS. Brit. 338,989, May 31, 1929. Filaments, threads, ribbons, films, etc., of cellulose or its derivs. such as nitrocellulose are subjected to the action of sulfonic acids contg. at least 6C atoms (such as benzenesulfonic acid) of a concn. of at least 20% (preferably 30–50%) for the purpose of improving the strength and elasticity and modifying the luster of the material. The process is particularly suitable for the treatment of viscose products made from alkali cellulose unripened or ripened for only a short time. After treatment, the sulfonic acids are preferably removed by washing with water alone or with water contg. an alkali or base. As a substitute for or addn. to the sulfonic acids, acids such as methylphosphinic acid or nitrophenylphosphinic acid may be used, and benzylsulfonic acid, phenolsulfonic and-disulfonic acids and naphthalene- and naphtholsulfonic acids may be used. Various details and modifications of procedure are described.

Dull finish viscose silk. BENNO BORZYKOWSKI (to Swiss Borvisk Co.). U. S. 1,796,744, March 17. The viscose silk, while still contg. S, is treated directly with a bleaching agent such as a very dil. Cl soln. which will not remove the S.

Treating raw silk. I. G. FARBENIND. A.-G. (Robert Griessbach and Otto Ambros, inventors). Ger. 513,373, Jan. 22, 1928. Raw silk is scoured by treatment with a soln. contg. an activated protease, *e. g.*, papain activated with a trace of HCN. Examples are given.

Impregnating jute bags or other fabrics. L. D'ANTAL. Brit. 338,538, Oct. 19, 1928. An impregnating material is prepd. by oxidizing a vegetable drying oil (such as linseed oil or sunflower oil) or a mixt. of such oils by treating at temps. of 180–200° or higher with acid sludge from oil refining. Various details of treatment are described and mention also is made of the use of castor oil and substances contg. the SO_4 radical.

Apparatus for carbonizing woollen fabrics in open width. ERNST GESSNER A.-G. Ger. 518,310, May 6, 1928.

Gas-cell fabric for aircraft lighter than air. ARTHUR D. CUMMINGS (to Goodyear Tire & Rubber Co.). U. S. 1,797,189, March 17. A textile material is impregnated with waterproofing material such as Al acetate, oleate or stearate and provided with a coating of an agglutinant such as glue or gelatin and with a ply of material, such as goldbeater's skin or "cellophane," which is highly impermeable to inflating gases, over the agglutinant.

Nitrocellulose and linoxyn mixture suitable for coating fabrics, etc. VICTOR SCHOLZ (one-half to Atlas Ago Chemische Fabrik A.-G.). U. S. 1,796,219, March 10. Linseed oil is oxidized and polymerized in the presence of a Pb compd. catalyst such as

PbO or Pb linoleate and kneaded, the kneaded oil is dissolved in alc. with use of heat and pressure, and the resulting soln. is mixed with nitrocellulose. Cf. *C. A.* **25**, 2313.

Mothproofing fabrics. The Larvex Corp. Ger. 515,632, Nov. 11, 1928. See Brit. 301,421 (*C. A.* **23**, 4085).

Mothproofing wares. I. G. Farbenind. A.-G. (Wilhelm Lommel and Henrich Münzel, inventors). Ger. 515,956, Jan. 1, 1930. The wares are rendered mothproof by treatment with Sr salts, *e. g.*, $Sr(NO_3)_2$.

26—PAINTS, VARNISHES AND RESINS

A. H. SABIN

Aluminum powder for paints. Brit. Eng. Standards Assoc., *Specification* No. **388**, 6 pp.(Aug., 1930). Specifications. E. I. S.

Measurement of color tone. W. van Wüllen-Scholten. *Farben-Ztg.* **35**, 1824–5 (1930).—After a brief discussion of the Ostwald and the Baumann-Prase systems of color designation, the author recommends the step-photometer. It should be useful in standardizing tinting pigments. G. G. Sward

Luminescence analysis. II. Luminescence of white painters' colors and the employment of luminescence analysis for investigations of paintings. Ernst Beutel and Artur Kutzelnigg. *Monatsh.* **57**, 9–14(1931); cf. *C. A.* **24**, 2952.—The work was undertaken from the point of investigation of paintings to det. their origin. Most ZnO whites showed canary yellow, one only showing brown. This was so strong in even min. quantities that quant. ests. were impossible. $PbCO_3$ showed a *beige* color and could be identified in mixts. with $BaSO_4$. TiO_2 showed dark violet and mixts. with ZnO showed gradations up to the ZnO yellow. In com. colors the vehicle had little influence on the luminescence. The presence of ZnO could be established with certainty, but $PbCO_3$ not so surely, partially on account of the variety of reactions possible after exposure to air for long periods. It varies greatly as the paintings yellow with age. Gregg M. Evans

Difficulties in paint and varnish manufacture. Robert Bürstenbinder. *Farbe u. Lack* **1931**, 135.—Many difficulties attributed to faulty material are often due to improper formulation or to carelessness. A careful study by producer and user will eliminate misunderstandings and uncover economies. Some specific examples are given. G. G. Sward

Preparation and investigation of titanium white. Paul Askenasy and Kurt Heise. *Z. anorg. allgem. Chem.* **196**, 257–83(1931).—A completely Fe-free metatitanic acid can be obtained from a Ti sulfate soln. contg. Fe by sepn. as Ti K oxalate followed by hydrolysis of the mixed oxalate. This takes place at 135°, the yield depending upon the diln. Orthotitanic acid can be sepd. quantitatively in the cold at a p_H of 4. At this acid concn. $FeSO_4$ remains in soln. By resoln. of orthotitanic acid in H_2SO_4 and hydrolytic sepn. of metatitanic acid at 95°, a completely Fe-free high-grade paint pigment is obtained. The brilliancy of this Fe-free TiO_2 is comparable with that of other white pigments, while its covering power is not approached by any other. The influence of the ratio $TiO_2/BaSO_4$ upon covering power was studied. Pigments which were obtained by pptn. of the metatitanic acid upon a $BaSO_4$ suspension were superior in covering power to the corresponding mech. mixt. of TiO_2 and $BaSO_4$. The best covering power was obtained when the $BaSO_4$ and metatitanic acid were simultaneously pptd. In the extn. of Ti from ilmenite with H_2SO_4, 6 hrs.' treatment with a 55% acid is sufficient. This produces a basic sulfate metatitanic acid mixt. contg. Fe. Removal of Fe by treatment with acids leads to too great a loss of Ti. H. Stoertz

Standoil. R. Priester. *Verfkronick* **3**, No. 10, 12–8(1930); *Chimie & industrie* **25**, 418(1931).—Prolonged heating of linseed oil (and others) at 280–300° produces an increase in the viscosity and the acidity, which occurs more rapidly the higher the temp. The effect of temp. was studied on 10-kg. samples in Al kettles at 280°, 285°, 290°, 295° and 300°. The viscosity increases as an exponential function of the time of heating. The acidity increases fairly rapidly at first (1st hr.), and then approx. linearly. It is preferable not to heat above 300°, as the increase in acidity is too rapid and becomes too great in the very highly thickened oils. A. Papineau-Couture

Colophony in varnishes and oil paints. R. Schwarz. *Farbe u. Lack* **1931**, 123–4.—The low price and many uses of colophony make it a very important raw material. The principles of its uses in gloss oils, rubbing varnishes, tung oil spar varnishes and ester gum are briefly outlined. G. G. Sward

Kauri gum in nitrocellulose lacquers. I. Solubility of kauri gum in mixed lacquer solvents. LEONARD S. SPACKMAN. *New Zealand J. Sci. Tech.* 12, 65–93(1930).—Kauri is sol. in (1) ansol to which may be added AmOAc or (and) C_7H_8; (2) petroleum distillate, used in mixts. with other solvents; (3) Cellosolve. AmOH is also used with these. All these are compatible with pyroxylin. This long paper is a treatise on using kauri with these in pyroxylin lacquers. D. THUESEN

Printing-ink patents. JOSEPH ROSSMAN. *Am. Ink Maker* 8, No. 8, 21–3; No. 9, 23–5, 41, 43; No. 10, 27, 29, 41; No. 11, 27, 29, 41; No. 12, 27, 29 (1930); 9, No. 1, 25, 27 (1931). E. J. C.

TiO_2 (SPEITEL) **18.** Separation and size distribution of microscopic particles (ROLLER) **2.** Use of vulcanized rubber waste as a fixing agent in bronze printing (RICE) **30.** Rubber conversion product [for use in varnishes or lacquers] (U. S. pat. 1,797,188) **30.** Drying apparatus for pigments (Ger. pat. 518,379) **1.** Purifying pitch, etc. (Brit. pat. 339,470) **22.**

JACOBI, WERNER: **Die Fabrikation von Wachstuch, amerikanischem Ledertuch, Wachstaffet, Maler- und Zeichenleinwand, Teertuch, unverbrennlichen Geweben, Linoleum, Linoleumersatz und Kunstleder.** Leipzig: A. Hartleben's Verlag. 182 pp. M. 4.50; bound, M. 5.50.

Green paint. P. N. SHURUIGIN. Russ. appl. 72,760, June 4, 1930. Dehydrated $CuSO_4$ is added, with agitation, to a mass of white lead and litharge ground in linseed oil after heating and recooling. The mass is then passed through a color mill, and water is added. The product is taken up in ground white lead and a soln. of rosin in gasoline.

Rust-resisting paint. CARL NITTINGER (to Carnitt-Rostschutz & Farbstoff G. m. b. H.). U. S. 1,795,962, March 10. A paint suitable for use on iron, wood or other surfaces is formed of a vehicle such as varnish and a pigment comprising finely ground coal slag about 80 and finely ground "electro-positive Zn" about 20%.

Anticorrosive and antifouling paints. N. J. SHIELDS. Brit. 339,128, Dec. 17, 1929. Paints are formed contg. over 25% by wt. of Hg oxide, with vehicles such as MeOH, shellac, turpentine, linseed oil and japan and pigments such as ZnO, Indian red or other Fe oxide pigments or red lead or other Pb compds.

Masking paste for use in sign painting, etc. ALBERT E. VAUGHN. U. S. 1,795,455, March 10. A pigment such as yellow ocher is mixed with an emulsion formed of honey 10, evapd. milk 8 and glycerol 6 parts and a small proportion of "sulfurated potassium"

Oil colors for printing, etc. FIRMA HERMANN FRENKEL. Ger. 518,322, Sept. 11, 1929. A strongly blown linseed oil having an acetyl no. of at least 100 is used as the vehicle.

Iron oxide pigments. I. G. FARBENIND. A.-G. (Bernhard Würzschmitt and Annemarie Beuther, inventors). Ger. 515,563, Dec. 5, 1928. A $Fe(OH)_2$-contg. ppt. is oxidized by O gas in presence of water or aq. salt solns. at temps. above 100° and with raised pressure. Thus, $Fe(OH)_2$ is pptd. from a $FeSO_4$ soln. by NaOH and the ppt. oxidized in an autoclave at 190–200° and 10 atm. to give a bright red pigment. Further examples are given.

Lead pigments. SWISS INVENTIONS SYNDICATE, LTD., and A. V. BLOM. Brit. 339,357, Sept. 7, 1929. A pigment consisting of a fine dispersion of Pb in Pb oxide is prepd. by melting an alloy rich in Pb (suitably an alloy contg. Pb 85, Sb 13 and Sn 2%) in a thin layer in an air-tight furnace in the presence of Ca resinate (suitably 0.5% the quantity of the alloy), maintaining the temp. just above the m. p. of the alloy, and creating a vacuum in the furnace so that streams of air are drawn into the furnace to oxidize the Pb of the alloy. A temp. of 280–310° is suitable with the specified alloy.

Ultramarine. V. F. OSMULSKII and M. P. RESH. Russ. appl. 59,674, Dec. 5, 1929. The black caustic obtained from spent sulfite liquor is evapd. to dryness, disintegrated, mixed with sulfur, kaolin and silica, calcined in crucibles or muffle furnaces and then worked over by usual methods.

Composition for colored pencils. V. M. RODIONOV and I. M. FEDOROV. Russ appl. 47,402, May 17, 1929. Graphite, talcum, etc., are added to the mass obtained in the prepn. of methyl violet by oxidation of $PhNMe_2$. The mass is then worked up by the usual methods after the addn. of a gum, such as gum tragacanth.

Drying oil products. J. SCHEIBER. Brit. 338,932, May 21, 1929. Products having properties generally similar to those of wood oil are obtained by heating oils of the linseed, soy bean and fish oil classes to 200° or somewhat higher with small quantities of catalysts such as H_2SO_4, $SbCl_5$, Al_2O_3, HgO, I bromide, Fe, Ni, Zn or Sn. The corre-

sponding fatty acids may be similarly treated and the products thus formed then esterified with glycol or glycerol or a mixt. of these.

Driers for paints, varnishes, etc. I. G. FARBENIND. A.-G. (Franz Pohl, inventor). Ger. 518,094, Oct. 26, 1927. See Brit. 311,716 (*C. A.* 24, 979).

Coloring nitrocellulose lacquers and plastics. I. G. FARBENIND. A.-G. Ger. 518,018, Sept. 24, 1929. Addn. to 515,057 (*C. A.* 25, 1692) and 516,315 (*C. A.* 25, 2011). The dyes specified in Ger. 515,057 and 516,315 are used in conjunction with dinitrodiphenylamines. Green colors fast to light are so obtained.

Protective coating on iron, wood or other materials. WALTER BAUR. U. S. 1,795,703, March 10. Protection from the atm. is effected by applying, at ordinary temp., a mixt. of castor oil and 5–10% metal oxides such as those of Pb, Mn, Co or Zn with an addn. of solvents consisting of easily drying oils such as turpentine or naphtha followed by heating and "burning in" the coating by a suitable hot air blast. App. is described.

Protective coatings on metal pipes, etc. HEROLD A.-G. Brit. 338,983, March 9, 1929. The material to be coated is preliminarily heated to the m. p. of a fusible intermediate artificial resin such as one formed from phenol or urea and formaldehyde and such a material is applied (without a solvent) in pulverulent form (either as a dust or in suspension in water or other non-solvent liquid or by rubbing on as a solid block). During hardening the coated surface may be treated with a solvent or solvent vapor and fillers also may be added.

Reducing the viscosity of nitrocellulose solutions. WM. C. WILSON (to John S. Stokes). U. S. 1,795,918, March 10. A phenolic condensation product contg. an active methylene compd. such as $(CH_2)_6N_4$ is added to a nitrocellulose lacquer to lower its viscosity.

Cellulose-covered wire gauze. KALLE & Co. A.-G. (Adolf Dulitz, inventor). Ger. 515,531, June 28, 1928. The gauze is dipped alternately into a cellulose ester soln. and a weakly acting swelling agent. The product may be coated with a thin layer of dil. nitrocellulose. In the example, a wide-meshed wire gauze is dipped into acetylcellulose lacquer and, when dry, into aq. alc. as swelling agent. The operations are repeated until the required thickness is attained. C_6H_6 or PhOH may be used instead of aq. alc. The finished product may be rendered weather proof by a coating of 2–3% tricresyl phosphate.

Linoleum. E. CLAXTON (to Armstrong Cork Co.). Brit. 338,965, Oct. 15, 1928. The oxidizable components of a linoleum cement contg. a siccative oil are first substantially completely oxidized (suitably as described in Brit. 305,656, *C. A.* 23, 4837) and a coagulant is added to the cement (about 1% of H_3BO_3 being preferred as coagulant), and the material is mixed with suitable fillers. Numerous details of compns. and procedure are described. Brit. 338,978 specifies the use of a "delayed action" coagulant such as dehydrated boric acid in the form of metaboric or pyroboric acid or boric anhydride, or urea.

Resins from cellulosic material. UCHEBNO-OPUITNUI ZAVOD MOSKOVSKAGO TEKHNIKUMA ZHIROVOI PROMUISHLENNOSTI "TEKHZHIRZAVOD." Russ. appl. 56,420, Oct. 15, 1929. Sunflower husks are heated under pressure with water or an aq. soln. of alkali followed by hydrolysis with mineral acids and extn. by the usual methods.

Artificial resin compositions for lacquers, etc. I. G. FARBENIND. A.-G. Brit. 339,271, Sept. 3, 1929. Homogeneous products are prepd. by mixing, in soln. or otherwise, a polymerization product of a vinyl ester such as polyvinyl chloride with the condensation product of a phenol deriv. and aldehyde (such as the product from anisole and CH_2O) or the like. An example is given for making a lacquer with C_6H_6 as solvent.

Molding synthetic resins. A. V. KELLER. Brit. 338,915, Aug. 28, 1929. Decorative articles are made from synthetic resins by placing lace or other fabric (without preliminary impregnation) between a covering sheet and backing of initial condensation product and heating the materials under pressure. Cf. *C. A.* 25, 610.

Synthetic resins such as urea-formaldehyde resins. I. G. FARBENIND. A.-G. Brit. 338,937, July 29, 1929. Condensation of reacting materials such as urea or thiourea and CH_2O for obtainment of non-inflammable products is effected in the presence of org. solvents formed at least mainly of haloaryl substituted aliphatic alcs. such as mono- and di-bromobenzyl alcs. and chlorobenzyl alcs., and preferably in the presence of an acid-reacting substance such as oxalic acid or HOAc (the reaction being accelerated by heating). Numerous examples with details of procedure are given, for producing products suitable for making lacquers, molded articles, etc.

Synthetic resins. J. M. WEISS. Brit. 338,845, July 10, 1929. Polymerization of coumarone, indene and their homologs is effected by using as the polymerizing agent

a mixt. of an adsorbent earth such as fuller's earth and an acid sulfate of a tervalent metal such as acid ferric sulfate. Various details of procedure are described.

Synthetic resins. COMPAGNIE FRANÇAISE POUR L'EXPLOITATION DES PROCÉDÉS THOMSON HOUSTON. Fr. 37,234, July 19, 1929. Addn. to 654,175 (*C. A.* **23**, 3822). The production of artificial resins of the alkyl kind combined with drying oils is described. Thus, a mixt. of glycerol and phthalic anhydride is heated progressively to 200°, a mixt. of phthalic anhydride and one or more fatty acids derived from drying oils (china wood oil, linseed oil or Perilla oil) is added and the heating is continued until the foam disappears, then the desired amt. of drying oil is added, *e. g.*, 10–50% of the wt. of the resin. It is preferable to incorporate the drying oil before complete condensation has taken place. Instead of acids from a drying oil, one or more oxidizable unsatd. acids such as oleic acid, stearic acid or linoleic acid may be used. In another example an unsatd. fatty acid, *e. g.*, an acid derived from linseed oil, is heated with glycerol to 200–250°, linseed oil is then added until a clear soln. is obtained. The soln. is mixed with phthalic anhydride and heated further, The compns. of resin and oil are sol. in acetone, AcOBu, BuOH, triacetin, etc., and may be used as a varnish, etc., or incorporated with fillers for making molded objects.

27—FATS, FATTY OILS, WAXES AND SOAPS

E. SCHERUBEL

Little-known Brazilian oil seeds. F. W. FREISE. *Seifensieder-Ztg.* **58**, 131–2 (1931); cf. *C. A.* **24**, 1238.—F. tabulates the consts. of 27 varieties of little-known Brazilian oil seeds, giving the source, popular and botanical names and the time of ripening. P. ESCHER

The fatty oil of seeds of Colchicum autumnale L. G. GAAL. *Magyar Gyógyszerészt. Társaság Értesitoje* **6**, 149–67(1930).—The consts. of the oil are: d_{15} 0.9104–5, n_D^{20} 1.4723, acid no. 14.76, sapon. no. 199.0 9.8, acetyl no. 12.3, Reichert-Meissl no. 2.41, Polenske no. 0.32, Hehner no. 91.6–92.1, I-Br no. 92.47, satd. fatty acids 12.73%, glycerin 10.8%, mol. wt. 269.5. The fatty acids contained 2.1% raw phytosterin. The presence of arachidic acid could not be demonstrated. Daturic acid was found in the oil.

S. S. DE FINÁLY

Experiments with the shipment of some tropical products containing oil in pressed bales. IR. W. SPOON. *Ber. Afdeel. Handelsmuseum Ver. Koloniaal Inst.* No. **56**, 28 pp.(1930).—With copra the results were satisfactory, there being no loss of oil and only a small increase in free fatty acids. The results with earth-nuts and rubber-seed kernels were very unsatisfactory, as both had suffered from the pressing and the percentage of free fatty acids had increased considerably. J. C. JURRJENS

New compounds produced during the hydrogenation of fish oils. II. The formation of the higher alcohols. SEI-ICHI UENO AND RIICHIRO YAMASAKI. *J. Soc. Chem. Ind., Japan* **34**, Suppl. binding 35–7(1931); cf. *C. A.* **25**, 612.—One kg. of unsapon. matter was washed with methanol to sep. hydroxy compds. from hydrocarbons. After evapn. of the methanol the residue was taken up with ether, treated with $Na_2S_2O_3$ and phenyl hydrazine to remove aldehydes and ketones and then washed, dried and evapd. The higher alcs. obtained were fractionated by distn. and the fact was confirmed that the unsapon. volatile matter produced during hydrogenation contains iso-aliphatic C_9, C_{10} and C_{12} primary alcs. of the satd. and olefin series together with hydrocarbons of the iso-paraffin and olefin series. E. SCHERUBEL

Catalytic fat hardening. I. Progressive hardening decreases the speed of hydrogenation. II. Selective hydrogenation of fish oils. L. UBBELOHDE AND H. SCHÖNFELD. *Z. angew. Chem.* **44**, 184–7(1931).—The decreasing speed in progressive hydrogenation of oils is not due to the catalyst, since it can be used over several times; each time it shows a high speed at the start and slows up toward the end. Nor is it due to the concn. in the oil of the double C bond, since linseed oil and fish oils are hardened less rapidly than cottonseed oil. It is due to the increasing concn. of satd. acids and to the manner of hydrogenating. By detg. the insol. bromides, formed by highly unsatd. acids, at the different stages during fish-oil hardening, U. and S. confirmed the fact that clupanodonic acid can be reduced completely to less unsatd. acid without forming stearin, by means of a gentle hydrogenation, reduction of the amt. of Ni, temp. and agitation The fish-oil odor disappeared at I no. 95 when rapidly hardened and the clupanodonic acid at I no. 80–90; slow hardening (45–50 I nos. per hr.) showed only 0.5% of the highly unsatd. clupanodonic acid remained at I no. 120. P. ESCHER

Solubility of fats in various solvents. Solubility of Tsubaki oil and rape oil in ethyl alcohol. K. HASHI. *J. Soc. Chem. Ind., Japan* **34**, Suppl. binding 64–6, 66–7 (1931).—The soly. of refined and bleached Tsubaki oil (*Camellia*, family Theaceae) as well as that of rape oil was detd. in various concns. of ethyl alc. by heating known amts. of oil and alc. of different concns. in closed tubes and observing the temp. at which both layers turned clear. The turbidity temp. was read during slow cooling. The results are tabulated and expressed in graphs. P. ESCHER

An installation for continuous washing with alcohol in refining oils and obtaining a high percentage of fatty acids and their esters. OTTO KREBS. *Chem. App.* **18**, 15–6, 49–51(1931).—A system is described for washing fatty acids from oils with alc. The alc. removes the acids and is recovered in a rectifying column. M. C. ROGERS

Intramolecular rearrangements when hydrogenating esters of fatty acids with one double bond. II. A. STEGER AND H. W. SCHEFFERS. *Chem. Umschau Fette, Öele, Wachse u. Harze* **38**, 61–6(1931); cf. *C. A.* **25**, 2315.—A Δ^9-elaidic, a Δ^9-oleic and a Δ^9-oleic Et ester were partially hydrogenated with Ni at 180° to an I no. of 55, at which point a max. of solid unsatd. acids is formed. The products were analyzed for their solid and liquid acids by Twitchell's alc. method, sepd. into their individual acids by fractional crystn. in different solvents, and the constitution of each acid was detd. by ozonization and analysis of the ozonides for m. p., proximate compn. and sapon. no. The double bonds in Δ^9-elaidic and Δ^9-oleic acids are shifted during hydrogenation from Δ^9 toward both sides to Δ^{10} and Δ^8, a greater amt. being formed of the former than of the latter; the elaidic acid forms less of the Δ^{10}- and Δ^8-elaidic acids than oleic acid, and thus it may be assumed that the principal shifting of the double bond occurs in the liquid oleic acid and that the first-formed Δ^8- and Δ^{10}-oleic acids are later converted into Δ^8- and Δ^{10}-solid elaidic acids. The Δ^6-oleic Et ester shifts its double Δ^6 bond also to its neighboring C atoms, forming Δ^5- and Δ^7-oleic acids and possibly also the corresponding Δ^5- and Δ^7-elaidic acids. No conclusions could be drawn with respect to the manner in which the bonds of solid unsatd. acids change during hydrogenation, since hardening was stopped at the point of their max. formation. P. ESCHER

The spontaneous ignition of commercial oleic acid. PAUL ERASMUS. *Allgem. Öl- Fettztg.* **27**, 309–12, 345–8, 367–8, 408–9(1930). –Oleic acid manufd. from bone fat contained no highly unsatd. acids. It was very susceptible to spontaneous ignition in the Mackey app. When the anhydrides present were removed it was no longer susceptible to spontaneous ignition. The removal of the anhydrides also prevented the darkening of the oleic acid on atm oxidation. Addn. of the isolated anhydrides to an oleic acid which was not spontaneously ignitable caused it to take on this property. The substance causing the spontaneous ignition was identified as γ-stearyl lactone. This substance on oxidation yields ketonic acid, which in turn gives up O_2 easily to form the lactone again. The addn. of 0.05% of γ-stearyl lactone to oleic acid causes it to become spontaneously ignitable. The presence of Fe was found necessary to bring about this result. Removal of Fe from a spontaneously ignitable oleic acid caused it to lose this property. Addns. of small quantities of Fe oleate to an oleic acid not spontaneously ignitable did not show any effect. When larger amts. (0.5%) were added it became spontaneously ignitable. Conclusion: The lactones are O_2 carriers, requiring the presence of Fe as catalyst, and are a cause of the spontaneous ignition of oleic acid. The addn. of 1% linolic and linolenic acids (lactone free) to an oleic acid not spontaneously ignitable caused it to become so. W. F. BOLLENS

Oleiferous Allanblackia. Chemical composition of Allanblackia floribunda Oliv. J. PIERAERTS AND SERGE VLASSOV. *Mat. grasses* **22**, 8975–7(1930).—Addnl. analysis has been made supporting previous conclusions that this plant is the cheapest and most satisfactory raw material for the *manuf. of* pure or technical *stearic acid*. P. T.

Thermodynamics in the soap industry. K. LÖFFL. *Seifensieder-Ztg.* **58**, 127–8, 152–3(1931).—L. discusses the calcn. of the total calories required for boiling and drying soaps. Spray drying shows simplicity of app. and least heat consumption. P. E.

Bleaching earths (ECKART) **18.** Germicidal efficiency of soaps and of mixtures of soaps with NaOH or with phenols (SCHAFFER, TILLEY) **11C.** The influence of soaps on the germicidal properties of certain mercurial compounds (HAMPIL) **11C.** Soaps, creams, etc. (Fr. pat. 695,218) **17.** Destructive hydrogenation [of fatty oils] (Brit. pat. 339,048) **21.** Complex organic peroxides [for bleaching soaps, oils, fats, waxes, etc.] (Brit. pat. 339,336) **12.** Mixtures of hydroxy fatty acids (Ger. pat. 518,390) **10.** Substitutes for sugars in [filling transparent soaps] (Ger. pat. 518,196) **18.**

HUSSON, M.: **Les huiles d'olives.** Algiers: Impr. algérienne. 14 pp.

MARTIN, GEOFFREY: **The Modern Soap and Detergent Industry. Vol. I. Theory and Practice of Soap Making.** 2nd ed., revised and enlarged. London: Crosby Lockwood. 36s., net.

Preparation for splitting fats. G. S. PETROV. Russ. appl. 62,843, Jan. 23, 1930. Addn. to pat 18,855. Fat-splitting agents are prepd. by sulfonation of highly hydrogenated fats or fatty acids, excluding hydrogenated castor oil.

Oils and fats. PETER FRIESENHAHN. Ger. 515,769, May 28, 1925. Addn. to 365,160. The hydrated phenols of 365,160 for prepg. emulsions or solns. of oils and fats are supplemented or replaced by alcs. formed by the hydrogenation of unsatd. hydrocarbons obtained from the cracking of acid resins or from the residual pitch of aliphatic raw material distns.

The concentration or drying of masses containing fatty oils. L. AUER. Hung. 101,164, May 28, 1925. Masses are concd. or dried in an atm. contg. less O than does air.

Preventing oxidation of oils, etc. COMPAGNIE FRANÇAISE POUR L'EXPLOITATION DES PROCÉDÉS THOMSON-HOUSTON. Fr. 695,119, May 6, 1930. The oxidation of oils, fats, waxes, etc., is prevented by adding 0.5–1% of phenyl-α-naphthylamine.

Extracting oil from blubber, meat, bones, tongues and other parts of whales, etc. C. O. JOHNSON. Brit. 339,305, Aug. 31, 1929. In a wet rendering process, the materials are submerged in water which is kept boiling under pressure during the digestion by introduction of steam. App. and various details of procedure are described.

Apparatus for extracting oil from olives, etc. Soc. JEANJEAN ET CASAS. Fr. 37,352, Aug. 9, 1929. Addn. to 654,217 (*C. A.* **23**, 3824).

Reaction products of cashew nut shell oil. THE HARVEL CORP. Ger. 518,424, June 4, 1927. See Brit. 272,510 (*C. A.* **22**, 1863) and 275,574 (*C. A.* **22**, 2285).

Soap. JEAN GNAEDINGER. Fr. 37,464, Sept. 27, 1929. Addn. to 665,425 (*C. A.* **24**, 984). The α-abientinic acid is converted to the β-form which is more stable before combining it, by the aid of catalysts, with unsatd. oils of the fatty series to form a soap.

Soaps. I. G. FARBENIND. A.-G. (Otto Ambros and Anne Nies-Harteneck, inventors). Ger. 518,019. Mar. 13, 1928. Products yielding stable foams and emulsions are prepd. by adding soft or hard fish roe or prepns. thereof to soaps or saponaceous materials. A suitable addnl. substance may be prepd. by removing fat from soft fish roe by means of an org. solvent and then drying, or the active material may be extd from the roe with dil. alkali.

Dry-cleaning soap. LEO R. HUBBARD (to Camille Dreyfus). Can. 309,361, Mar 10, 1931. A detergent adapted for the dry cleaning of fabrics comprises a mixt. of oleic acid 1, cyclohexanol 1, CCl_4 1, ammonia of (26° Bé.) $^1/_8$ and water $^1/_2$ part.

28—SUGAR, STARCH AND GUMS

J. DALE

Quality of the mineral fuel received by sugar factories for the campaign 1929-30. I. B. MINTZ. *Nauk. Zapiski Tsukrovoi Prom.* **10**, 225–35(1930).—A report.
V. E. BAIKOW

Movement of nitrogenous substances in sugar manufacture during the campaign of 1929-30 at the Usinskii sugar factory. B. A. LYASKO. *Nauk. Zapiski Tsukrovoi Prom.* **10**, 23–38(1930).—From a no. of analyses made during the campaign L. shows the amt. of noxious N represents about $^1/_3$ of the total N of the beet. At the diffusion battery about $^1/_3$ of the total N, $^4/_5$ of the albuminum N and $^1/_{10}$ of the noxious N are eliminated, while ammonia and amide N go almost entirely into the diffusion juice. 96.5% of N in sirup is of the noxious type. Ninety % of the noxious N passes into the final molasses with 10% eliminated in the diffusion battery. Ten tables and 2 diagrams are shown.
V. E. BAIKOW

Experiments in the harvesting of burned cane. III. P. O. J. 213 cane. H. H. DODDS AND P. FOWLIE. *Proc. S. African Sugar Tech. Assoc.* **1930**, 122–32(1931); *cf. C. A.* **24**, 3125.—It is shown in a no. of tables and graphs that the variety P. O. J. 213, like the Uba cane, deteriorates more slowly after being burned than when it is not fired. The burned cane keeps better if left standing than after it is cut. The differences between burned and unburned canes are even greater than in the case of Uba, and unburned cane must be taken to the mill without delay, while burned cane may be kept for about a week. But in fields which have been burned over, the supply of org. matter must be maintained by fertilizing.
F. W. ZERBAN

Determination of small proportions of invert sugar in raw sugars. LEWIS EYNON AND J. HENRY LANE. *J. Soc. Chem. Ind.* 50, 85–6T(1931); cf. *C. A.* 17, 1400, 2091; 18, 763.—The original tables were calcd. only for products contg. not less than 0.3% invert sugar. A new table is presented for a range of 0–0.464% invert sugar. Twenty-five g. of the sugar plus 0.1 g. invert sugar in the form of the standard soln. is dissolved to 100 ml. This soln. is titrated against 10 ml. Fehling soln. by the standard method previously described. It is unnecessary to clarify with $Pb(OAc)_2$ or to remove lime salts with $K_2C_2O_4$, because the same results are obtained without their use.

F. W. ZERBAN

Measurement of color in solutions of white sugars. J. A. AMBLER AND S. BYALL. *Ind. Eng. Chem., Anal. Ed.* 3, 135–6(1931).—The measurement of the colors of white sugars was placed on a reproducible, accurate basis by matching the colors of water solns. of the sugar against a standard made by dilg. 10 g. of Balch's No. 5 maple sirup color standard soln. (*C. A.* 24, 2630) with water to 100 cc. For the detn. of color of hard candies made from the sugars the candies were dissolved in water and the colors of the solns. matched against a No. 9 maple sirup standard soln., dild. in the same way as the No. 5. The color of the barley candy is not related to that of the original white sugar.

F. W. ZERBAN

Impurities in white sugars. I. Determination of phosphorus. S. BYALL AND J. A. AMBLER. *Ind. Eng. Chem., Anal. Ed.* 3, 136–7(1931).—The importance of traces of [illegible] necessitates analytical methods of greater sensitivity. Total P_2O_5 is detd. in the HNO_3 soln. of the residue obtained by ashing in the presence of Na_2CO_3; inorg. P_2O_5 is detd. directly in a water soln. of the sugar, and org. P_2O_5 is found by difference. The Briggs modification (*C. A.* 16, 3493) of the Bell and Doisey ceruleo-molybdate method (*C. A.* 14, 3685) detects as little as 0.3 p. p. m. of P_2O_5 in a 10-g. sample. Analytical results on 26 samples of white sugars show up to 1 4 p. p. m. of inorg., and up to 45.6 p. p. m. of org., P_2O_5.

F. W. ZERBAN

Recovering of ammonia in beet-sugar manufacture. A. I. VOSTOKOV AND M. P. KOTLYARENKO. *Nauk. Zapiski Tzukrovoi Prom.* 10, 241–9(1930).—The methods for recovering NH_3 from evapd. water from beet juice are described. The product is a high-grade *fertilizer*.

V. E. BAIKOW

The German report on the Oxford sugar method. OSKARI ROUTALA. *Acta Chemica Fennica* 3, 94–5(1930).—If sugar beets were not treated immediately after picking the yield of sugar was low and there was considerable inversion, especially if the beets were stored in a warm place. The yield was also low if the beets were frozen. The Oxford sugar method consists in the rapid picking, cutting and drying of the sugar beets to preserve the sugar content for later use. The beets were cut into very small pieces and dried in a 3-compartment oven at 60–70° for 1 hr. The dry beets had 60–70% sugar, compared to 7–8% in the undried beets. Very little inversion was found. The drying affected the protein and protoplasmic content of the beets in such a way that little of these substances was found in the sugar solns. The sugar from the dried beets was extd. very readily by water. The soln. turned black when 0.2–0.3% of Ca as oxide, pectate, oxalate or phosphate was added. Addn. of activated charcoal and centrifuging gave a colorless sugar soln. The molasses obtained was sweeter than ordinarily, because of a higher invert-sugar content. The German investigation comm. reported that the procedure is as yet not industrially profitable since the change to the new equipment is costly.

S. A. KARJALA

Experiments on raw sugar with Russian activated carbon. M. P. KOTLYARENKO AND N. K. KONIBOLOTZKII. *Nauk. Zapiski Tzukrovoi Prom.* 10, 102–11(1930).—The decolorizing power of the Russian activated C is higher than that of Norit-Standard, Amsterdam, 1926. The adsorption of colloids and ash by Norit is smaller than that by Russian C. The colloids and ash are not retained by the C and are almost entirely washed back into the thick juice. The wash (sweet) water must be given a preliminary treatment to eliminate the ash and colloids before it is mixed with a sirup. The max. regenerating effect of activated C was obtained by thermal and HCl treatment.

V. E. BAIKOW

The quality of the sweet (wash) water from the bone-black filters. M. I. NAKHMANOVICH AND I. F. ZELIKMAN. *Nauk. Zapiski Tzukrovoi Prom.* 10, 51–74(1930).—From a no. of expts. the following conclusions can be drawn: With decrease of the density, the proportion of non-sugars increases. The sweet water washes out from the chars the col[illegible] matters adsorbed in the early stages of the filtration. Washing should be [illegible] when the sweet water decreases to 2.5 Brix (1.5–1.6% of sugar).

V. E. BAIKOW

Norit installation at the Khutor-Mikhailovskii sugar refinery. G. I. ZHURIK. *Nauk. Zapiski Tzukrovoi Prom.* **10,** 86–102(1930).—A description. V. E. BAIKOW

Regeneration of the bone chars. N. S. VOLKOV. *Nauk. Zapiski Tzukrovoi Prom.* **10,** 294–307(1930).—Regeneration of bone chars can be divided into 2 parts: (1) boiling for a certain period of time in the same vol. of water, and (2) washing with clean water for a limited time. With poor quality of water, the time of boiling and amt. of water should be increased. While the water dissolves mineral salts and org. matters, the bone black adsorbs coloring matters from the water. If the temp. of the wash water is decreased from 90–95° to 55–60°, the amt. of water must be increased 30–40%. Washing with condensed water has the advantage of decreasing the amt. of steam. The chem. control of the regeneration consists in checking and comparing the mineral residue of the wash waters before and after washings.
V. E. BAIKOW

Prospects and advantages of rotary filters in sulfitation factories. W. H. FOSTER. *Proc. S. African Sugar Tech. Assoc.* **1930,** 71–6(1931).—The sucrose (2%) lost in filter cake in Natal is higher than in other countries. Higher diln. of settlings is not economical. Washing in the presses gives indifferent results, and furnishes a sloppy cake. The use of filter aids in sufficient quantity is too expensive. Double filtration through the presses reduces the sucrose loss in filter cake, but also the purity of the filtrate and the boiling house efficiency. Double settling is being practiced, but it requires too much steam for evapn. The Mauss continuous rotary vacuum filter has been tried in various ways. The 2nd operation in double filtration can be carried out more economically with the rotary filter, the machine being particularly suitable to this type of work. The low purity of the 2nd filtrate is an undesirable feature of the process. The solid content of the settlings is rather low for the successful direct operation of the rotary filter. Should a thickened sludge be possible at low cost, the filter offers considerable advantages over the filter press as regards economy in labor and cloth, increased sugar recovery and greater cleanliness. The floor space required is much greater than in the case of filter presses.
F. W. ZERBAN

Metafiltration in the sugar industry. ANON. *Intern. Sugar J.* **33,** 18–20(1931).—It is a well-established fact that the filtration employed in the carbonatation process is responsible for the increased yield, and the better quality of the sugar as compared with the defecation or the sulfitation process. Filtration app., whether of cloth, sand, wire gauze or rings as in the case of the Metafilter, act simply and solely as a support to the solid matter which it retains. The filtering elements of the Metafilter are made up of thin brass rings $^7/_8$" outside and $^5/_8$" internal diam. The rings are piled one upon another to form a tube so that a 1-in. run of filtering elements is composed of some 30 rings. Alternate rings carry a light embossing on each face exactly 0.002 in. high, which provides a gap of this thickness between each pair of rings. The rings are strung on a fluted rod which acts as a support and provides drainage channels, the rings being pressed together by screw pressure from the end. An ingenious aspect is an arrangement to rotate the whole filter body *en bloc*. In operating the Metafilter on filtering juices in a defecation or sulfitation factory it is necessary first to precoat the column of rings with a thin film of kieselguhr. It was found in Java that an addn. of 0.5% on the Brix of the heavy liquor being filtered was all that was necessary to obtain a fairly rapid flow. In 60 min., in one run, 1000 l. of 55–60 Brix juice at a temp. of 70° was filtered with a filtering area of 2.2 sq. m., corresponding to a capacity of 7.5 l. per sq. m., per hr., a very high rate of filtration.
W. L. OWEN

Loss in polarization of Natal raw sugars on storage. L. BLACKLOCK. *Proc. S. African Sugar Tech. Assoc.* **1930,** 105–7(1931).—Several cases of excessive deterioration of Natal sugars call for remedial measures. The safety factor should be kept low, by drying if necessary. The sugar should be of uniform grain and not acid. The mill must be kept in sanitary condition. Mixing of high-grade with low-grade sugars should be avoided. Storage and transport conditions should be as perfect as possible, low humidity and low temp. being essential.
F. W. ZERBAN

Palmyra palm and its uses in gur manufacture. M. R. GOKARN. *Poona Agr. Coll. Mag.* **21,** 241–52(1930).—The manuf. of gur (crude sugar) from the juice obtained by tapping the immature nuts of the palmyra palm (*Borassus flabelifer*) is described. The best yields of juice are obtained from the female spathes, the av. yield per tree ranging from 60 to 100 gallons per season. Saccharimeter readings on several samples of palmyra juice ranged from 11° to 13° Brix as compared with 13.5° to 18° Brix for coconut juice. There was no marked difference in the saccharimeter readings on the juice from the male and female palmyra spathes. Two samples of the crude sugar contained 2.10 and 2.61% glucose and 86.68 and 83.51% sucrose, resp.
K. D. JACOB

New sources of inulin. E. YANOVSKY AND R. M. KINGSBURY. *J. Am. Chem. Soc.* **53**, 1597–601(1931).—Three new sources of inulin (I) are discussed: Camas roots (*Quamasia guamash* (Pursh)•Coville, (*Camassia esculenta* (Lindl.), of which 200 g. gives 30–1 g. of I; *Allium nuttallii* S Wats, a variety of wild onion, 200 g. of which gives 25 g. I; and *Balsamorrhiza sagittata* (Pursh) Nutt, belonging to the family Compositae, 100 g. of which gives 3.2 g. I. The sp. rotation of I from these sources ranged from —28° to —33°; all products were sol. in H_2O and dil. EtOH. In the light of this work and that of Chevastelon (*J. pharm. chim.* 2, 83(1895)), it appears that there is no correlation between the sp. rotation and the soly. of I. No claim is made that any of the products described was a definite chem. individual. C. J. WEST

Measurement of consistency of starch solutions. J. C. RIPPERTON. *Ind. Eng. Chem., Anal. Ed.* **3**, 152–4(1931).—The swell of starches is measured by pouring the starch suspension, prepd. by a standardized procedure, into water in a cylinder, allowing it to stand and measuring the vol. occupied by the starch granules on the next day. It was found that the product of concn. and swell, plotted against the viscosity, furnishes a curve which may be used to evaluate starches without a viscosity detn. The method gives best results with starches showing large swell, like potato, sago and arrowroot starch. F. W. ZERBAN

Potash fertilizer for sugar beets (WAGNER) **15**. The change in x-ray spectrum of inulin on swelling in water (KATZ, DERKSEN) **2**.

Sugar Abstracts (*New journal*). Published by the Palmer Publishing Corp. of New York, 153 Waverly Place, New York City. Appears as a part of *Facts About Sugar* and also as a separate journal. Vol. 1, No. 1 appeared in Jan., 1931. Price, $5 per year.

Sugar. INTERNATIONAL PATENTS DEVELOPMENT CO. Brit. 339,015, Sept. 16, 1929. See Fr. 680,975 (*C. A.* **24**, 4183)

Calandria apparatus for evaporating sugar solutions, etc. JAMES HAMILL, JOHN F. TADDIKEN and GEORGE W. CONNON. U. S. 1,795,601, March 10. Structural features.

29—LEATHER AND GLUE

ALLEN ROGERS

Leather, sanitation and colloid chemistry. JOHN A. WILSON. *Ind. Eng. Chem.* **23**, 437–42(1931).—An address. H. B. MERRILL

New Zealand-made leather. P. WHITE. *New Zealand J. Sci. Tech.* **1930**, 283–7; *J. Intern. Soc. Leather Trades Chem.* **14**, 573.—Results of density, water absorption and wear tests are given. H. B. MERRILL

Gas poisoning in the leather industry. A. GOLDENBERG. *Vestnik Kozhevennoi Prom. i Torgovli* (*Vestnik of Leather Ind. and Trade*) **1929**, No. 7/8, 431–4; *J. Intern. Soc. Leather Trades Chem.* **14**, 488–90.—A fatal poisoning occurring when workmen entered an empty tan vat is ascribed to HCN, produced from amygdalin of pine bark by enzyme action. Under certain manipulative conditions this gas may form a layer in the bottom of the vat when the liquor is drawn away. This may be dispersed by a water jet. Safety rules are given H. B. MERRILL

Stretching tests for leather. G. A. BRAVO. *Boll. ufficiale staz. sper. ind. pelli mat. oncianti* **8**, 130–41(1930); *J. Intern. Soc. Leather Trades Chem.* **14**, 385.—Samples cut from adjacent positions in the same skin show such variations that it is dangerous to draw conclusions except from a large no. of detns. A stretching force below that required for rupture causes permanent elongation. The relation between elongation and contraction in width and thickness is not the same as that obtained with isotropic substances. Simple rupture and tearing rupture (in a direction not at right angles to the strain) are distinguished. H. B. MERRILL

Estimation of fat in leather. P. KOPELIOVICH. *Vestnik Kozhevennoi Prom. i Torgovli* (*Vestnik of Leather Ind. and Trade*) **1928**, No. 4, 147. *J. Intern. Soc. Leather Trades Chem.* **14**, 578.—Extn. with petr. ether for 6 hrs. (36 siphonings), without previous drying of the leather, is advised. H. B. MERRILL

Determination of water in vegetable leather. R. FARADAY INNES AND J. M. COSTE. *J. Intern. Soc. Leather Trades Chem.* **15**, 126–36(1931).—Inaccuracies in the oven-drying method are studied. Factors considered are time of heating, pressure and temp. (vacuum at 98° *vs.* air at 110°), and grease content of the leather. Many of the findings

are contradictory, and it is concluded that the accuracy of the detn. of water in vegetable leather by the oven method cannot be guaranteed, no matter what the exptl. conditions, unless the grease content of the leather is extremely low. Regain in wt. of oven-dried samples stored over concd. H_2SO_4 is ascribed to adsorption of air. H. B. MERRILL

Irgitan and its use in dyeing chrome leather. J. G. GEIGY. *Boll. ufficiale staz. sper. ind. pelli mat. concianti* **8**, 154(1930); *J. Intern. Soc. Leather Trades Chem.* **14**, 438.—Methods of application are described. H. B. MERRILL

Waterproof finishes [lacquer finishes for leather]. D. WOODROFFE. *Leather Trades Review* **1930**; *J. Intern. Soc. Leather Trades Chem.* **14**, 318.—A discussion. H. B. MERRILL

Hydration of animal skin by the volume change method. IV. Effect of various factors on the hydration of calf skin. EDWIN R. THEIS AND F. T. BENTON. *Ind. Eng. Chem.* **23**, 367–70(1931); cf. *C. A.* **23**, 2319.—The dilatometer method has been improved so as to measure hydrations quantitatively in ml. Postmortem changes reduce hydration and hasten the onset of degenerative dehydration. The onset of degenerative dehydration is prevented by salts and antiseptics, which indicates that bacterial action is responsible. Hydration, though in reduced amt., takes place in satd. solns. of salts, indicating that the wt. loss accompanying curing is due to removal of free rather than bound water. Hydration in satd. salt and alkali solns. follows the order: LiCl, (NaCl + Na_2CO_3) < $MgSO_4$ < NaCl < 0.05 *N* NaOH < $Ca(OH)_2$ + excess lime < H_2O, $Ca(OH)_2$. With dry-cured skin, NaCl in low concn. (2–4%) hastens the attainment of max. hydration but also hastens the onset of degenerative dehydration; in moderate concns. (8–10%) it delays the attainment of max. hydration without diminishing its extent, and inhibits dehydration; in high concns. (15–20%) it decreases the extent of hydration. Hydration increases with the ratio of water to the skin in the total exptl. system, and decreases with increasing temp. (again contrary to the effect on swelling). Increase in sp. gr. by the displacement method can be used to measure hydration. H. B. MERRILL

Physicochemical differences of hide powder by sex. T. TADOKORO AND K. YOSHIMURA. *J. Soc. Chem. Ind., Japan* **34**, Suppl. binding 37–8(1931).—Hide powder prepd from bull hide showed the following differences from that prepd. from cow hide: greater "acid-producing power" in neutral salt soln.; greater tannin absorptive power; less I_2 absorptive power; less swelling capacity in salt solns. (no difference if hide powders are purified) H. B. MERRILL

Microscopic study of the effects of cold temperatures upon skins and hides. FRED O'FLAHERTY AND WM. T. RODDY. *J. Am. Leather Chem. Assoc.* **26**, 172–80(1931) No damage was observed that could be attributed directly or indirectly to low or sub freezing temp. Keeping skins or hides at low temp. has a tendency to dehydrate them, which also aids in their preservation. Frozen skins should never be flexed, and should be allowed to thaw before soaking. H. B. MERRILL

Columbian hides. V. A. LATHOM SHARP. *Leather Trades Review* **1930**, 889–92; *J. Intern. Soc. Leather Trades Chem.* **14**, 587.—Methods of cure and preservation are described. H. B. MERRILL

Investigations on animal skin. GEORG GRASSER AND HIROSHI OHOKI. *J. Faculty Agr. Hokkaido Imp. Univ.* **27**, Pt. 2, 263–74(1930).—The time of hydrolysis of skins of different species in solns. of acids, bases and salts is tabulated. H. B. MERRILL

Investigations on gelatin and skin. GEORG GRASSER AND HIROSHI OHOKI. *J. Faculty Agr. Hokkaido Imp. Univ.* **27**, Pt. 2, 275–84(1930).—The peptizing effects of numerous salts are listed. H. B. MERRILL

Cultivation and tannin content of Caesalpina coriaria (divi-divi) in [former] German E. Africa. T. MARX. *Tropen* **33**, 100–5(1930); *J. Intern. Soc. Leather Trades Chem.* **14**, 587–8.—The tannin content is fair after 9 years' growth and excellent after 15 yrs The percentage of tannin compares favorably with that of Indian divi-divi. H. B. M.

Problem of tannery waste. D. JORDAN LLOYD. *Leather World* **22**, 1102–5(1930).—Products are enumerated and current practice for their disposal is discussed. H. B. MERRILL

Tanning materials and their characterization. II. Organic tanning materials. GEORG GRASSER AND HIROSHI OHOKI. *J. Faculty Agr. Hokkaido Imp. Univ.* **27**, Pt. 2, 243–61(1930); cf. *C. A.* **24**, 4951.—Contraction temp. and time required for complete hydrolysis on boiling are tabulated for hide and gelatin tanned with a large no. of tanning materials, including natural tannins, syntans, aldehydes, phenols and their derivs. The effect of added salts and of solvent (in case of aldehydes) is studied. No general relationships are found and no conclusions drawn. H. B. MERRILL

Analytical control of sulfonated oils used in the tannery. M. GERONAZZO. *Boll. ufficiale staz. sper. ind. pelli mat. concianti* **8**, 142–50(1930); *J. Intern. Soc. Leather*

Trades Chem. **14**, 373; cf. *C. A.* **22**, 2485.—The procedure devised for sulfonated castor oil has been applied to sulfonated animal and fish oils. The results are sufficiently precise for technical purposes. H. B. MERRILL

Combined working of two tanning materials on gelatin and animal's skin. Chemical investigation of combination tannage. GEORG GRASSER AND MASATAKE ICHISE. *J. Faculty Agr. Hokkaido Imp. Univ.* **27**, Pt. 2, 319–48(1930).—The contraction temp. of the skin and fh. p. of gelatin tanned successively with 2 tanning materials are tabulated. H. B. MERRILL

Mangrove as a tanning material. T. A. BUCKLEY. *Malayan Forest Records* **1929**, No. 7; *J. Intern. Soc. Leather Trades Chem.* **14**, 277–8.—Analyses show the variations in tannin content in bark from different species, different trees and different parts of the same tree. Great variations exist; the average compares unfavorably with Madagascar and E. Africa mangrove. *Rhizophora mucronata* has very high tannin content (28% of moist bark); the more plentiful *R. conjugata* contains only about 16%; *Carapa obvata* is the species richest in tannin, but its exts froth badly. Bark should be extd. as soon as stripped; there is a gain in tannin on drying, but this is offset by objectionable darkening of color. The tannin content tends to increase from the bottom to the top of the tree, and is highest in older, bigger trees. H. B. MERRILL

The Pavlovitsch alkaline tanning method for the preparation of sole leather. L. KEIGUELOVKIS. *Ledertech. Rundschau* **1930**, 81; *J Intern Soc Leather Trades Chem.* **14**, 574.—The leather is tanned first with quebracho at p_H = 8 – 7.5 for 6 days, the concn. and temp. being gradually increased; then with oakwood ext at p_H = 3.8 – 4.0. Analyses and wear tests show the leather so made to be normal H. B MERRILL

Tanning small fur skins. O. DUJARDINE. *Leather Manufacturer* **41**, 260–1(1930).—A description. H. B. MERRILL

Tanning reptile skins. D. WOODROFFE. *Leather Trades Review* **1930**, 840; *J. Intern. Soc. Leather Trades Chem.* **14**, 573. H. B. MERRILL

The theory of chrome tanning in the light of detanning processes. C. STIEPEL. *Kunstdünger u. Leim* **28**, 15–21(1931).—Chrome tanning proceeds in 2 stages, beginning in the alk. bath, but the max. destruction of swelling properties of hide does not result until the bath has become acid from pptn. of a basic Cr compd upon the fibers of the hide. In detanning chrome scrap for glue, 2 products are obtained: one H_2O-sol. and of normal behavior, the other H_2O insol., so-called "chrome glue" obtained by the magnesite process (cf. Stiepel, *C. A.* **25**, 2018), which represents hide substance tanned under acid conditions, more difficult to detan. C. J. SCHOLLENBERGER

Tanno-chemical investigation of chrome salts. GEORG GRASSER AND MASATAKE ICHISE. *J. Faculty Agr. Hokkaido Imp. Univ.* **27**, Pt. 2, 295–318(1930).—The contraction temp. of the skin, and m. p. of gelatin tanned with different chrome salts, prepd. under different conditions, are tabulated H. B. MERRILL

The gel strength of glue from hide, from chrome leather and from bones and its relation to the viscosity and chromium content. O. GERNGROSS AND H. MENDEL. *Kunstdünger u. Leim* **28**, 109–16(1931).—Ten hide glues, 5 bone glues and 13 glues from chrome leather were investigated. Procedures are described in detail. Gel strength of a 12.5% soln. at various temps. was detd. with the Greiner app. Viscosity of a 17.75% soln. at 40° was measured by the Vogel-Ossag app. The p_H of a 1% soln., water and ash contents of samples are also given, but methods are not described. Cr_2O_3 in chrome glues varied 0.03–4.20%. Among com. Cr glues, there was no connection between Cr_2O_3 and phys. properties, but 3 samples from leather dechromed in the lab. showed progressive improvement in gel strength and viscosity with Cr removal. Chrome glues (with one exception) and bone glues showed higher gel strength than hide glues of the same viscosity. The relation of gel strength to viscosity was fairly regular among all samples and most regular among hide glues. The p_H varied 5.0–7.6, and within this range had no important effect upon viscosity. C. J. SCHOLLENBERGER

Influencing of gelatin-metal salt precipitation by addition of neutral salts. GEORG GRASSER AND HIROSHI OHOKI. *J. Faculty Agr. Hokkaido Imp. Univ.* **27**, Pt. 2, 285–8(1930).—The effects of a large no. of Na salts on pptn of gelatin by salts of weak bases and heavy metals are listed. H. B. MERRILL

ERNST GOEBEL. *Kunst-*

compared with ignition over a Bunsen burner. Comparison materials showed that least time and gas were required with Pt, slightly more with "Weta" ware and most with silica and porcelain. With the latter, time and gas consumption were approx. 100% greater than with Pt. C. J. SCHOLLENBERGER

Animal materials for artificial silk, a chemico-technical problem for the glue and gelatin industry. H. MENDEL. *Kunstdünger u. Leim* **28**, 120–1(1931).—If filaments of gelatin could be tanned or fixed while under tension, the tendency of the mols. to orient themselves (cf. Katz and Gerngross, *C. A.* **20**, 528) should result in a fiber with superior strength, which might compete with artificial silk. Investigation of this or similar problems might well be undertaken by the industry. C. J. SCHOLLENBERGER

The collagen fiber. F. HALLA AND R. TANDLER. *Z. physik. Chem.*, Abt. B, **12**, 89–92(1931).—X-ray spectrograms of collagen fibers from *fish skin* were identical with those of gelatin under tension. FRANK URBAN

Changes in the use of adhesives. HERMANN STADLINGER. *Kunstdünger u. Leim* **28**, 8–11(1931).—A general outline is given of the uses of natural adhesives in the past, recent substitution of synthetics and possible new applications for old materials. C. J. SCHOLLENBERGER

Glue and gelatin in the textile industry (STADLINGER) **25.** Refractometric study of chromic acid reduction (GRASSER, OHOKI) **6.** Study of the warble and its eradication (GANSSER) **15.** Uniting rubber and leather (Brit. pat. 338,789) **30.** Substitutes for sugars in [chrome tanning] (Ger. pat. 518,196) **18.**

STIASNY, ED.: **Gerbereichemie.** Dresden: T. Steinkopff. About 600 pp. About M. 35; bound, about M. 37.

WIENER, FERDINAND, and WEBER, H.: **Die Lederfärberei und die Fabrikation des Lackleders.** Ein Handbuch für Lederfärber und Lactierer. 4th ed., revised and enlarged. Leipzig: A. Hartleben's Verlag. 220 pp. M. 5; bound, M. 6

Rotary-drum tanning apparatus. E. G. WILSON. Brit. 339,252, Aug. 23, 1929. Structural features.

Removing fat from sheepskins. P. I PAVLOVICH, N. G. SHCHEKOLDIN, V. I. DRELING, K. I. ZYABLOV and V. F. DROZDOV. Russ. appl. 68,138, Apr. 11, 1930. Skived sheepskins are treated with caustic solns. of "Kontakt" (petroleum sulfonic acids) or its soap.

Chrome velvet leather. V. S. AVTONOMOV. Russ. appl. 59,844, Dec. 7, 1929. Chrome leather is treated with warm water followed by an alternating treatment with a soda soln. and Cr alum, and then by the usual treating methods.

Leather for driving belts, etc. A. MCLELLAN. Brit. 338,536, Aug. 19, 1929. Leather for belt conveyors or driving belts is rendered resistant to moisture and wear by buffing and treating with a soln. formed of gutta percha, Sb sulfide or other cold vulcanizing agent, and CS_2 or CCl_4 or both (which may be applied in successive coats, each of which is allowed to dry before applying the next coat). The material may be subsequently subjected to pressure, and may be preliminarily impregnated with rubber. Various details of solns. and procedure are described.

Dyeing leather. N. P. SHAVROV. Russ. appl. 39,491, Jan. 26, 1929. An ext. is obtained by boiling the bark of the larch tree or pine tree with caustic remaining after a complete extn. of tanning material. The leather is dyed with this ext. with the usual metal mordants by the customary dyeing methods.

Dyes for chrome leather. I. G. FARBENIND. A.-G. Brit. 338,930, July 22, 1929. Aromatic *N*-nitroso compds. are warmed with aromatic amino-, hydroxy-, or amino-hydroxy-compds. (suitably in the dye bath at the time of dyeing chrome leather). Numerous examples are given for producing dyeings of various colors.

Monoazo dyes for leather. I. G. FARBENIND. A.-G. Brit. 339,029, Sept. 24, 1929. Dyes giving brown shades on leather are obtained by coupling a diazotized *p*-nitroaniline negatively substituted in *o*-position to the NH_2 group, or a homolog, with a compd. of the diphenylamine series such as diphenylamine or a sulfo or carboxy deriv. Examples are given.

Artificial horn. I. G. FARBENIND. A.-G. (O. Schmidt, K. Seydel and E. Meyer, inventors). Ger. 482,930, Aug. 28, 1926. Casein is worked up by the customary processes after addn. of a small quantity of a liquid or solid hydroaromatic or aliphatic-hydroaromatic base, or an aliphatic base contg. an OH group, or a salt or deriv. of such a base. The use of cyclohexylethanolamine is described in an example.

Glue. PORA-WERK PAUL SCHROT. Ger. 515,868, April 27, 1926. A filling material for animal glue consists of wood dust and such mineral as gypsum or chalk. The filling material is intimately mixed with the glue under pressure.

Glue and gelatin from chrome leather cuttings. BRITISH GLUES & CHEMICALS,

LTD., and R. B. DREW. Brit. 338,584, Aug. 17, 1929. Chrome leather cuttings are subjected to percolation with a soln. of an alk. earth such as magnesia, repeatedly and cyclically in one direction at such a rate that the acid extd. from the leather neutralizes sufficient alkali to maintain the desired alkalinity (a p_H of 8–8.5 being suitable). A temp. of 105° is suitable for thick cuttings and undesirable sol. matter such as salt may be removed by a preliminary extn. at room temp. Various details of app. and procedure are described.

30—RUBBER AND ALLIED SUBSTANCES

C. C. DAVIS

The chemical technology of rubber. SIDNEY M. HAGMAN. *Reprint from Svenska Gummi Ind. Memorial Number*, issued on the occasion of Disponent Henry Dunkers' 60th anniversary, September 6, 1930.—A general discussion. H. C. DUUS

A modern service laboratory—the I. C. C.'s work for the rubber industry. ANON. *Chem. Trade J.* **52**, 100–1(1931). - A description is given of the new service lab. for the rubber industry that has been equipped by the Brit. Dyestuffs Corp., Ltd., at Hexagon House, Blackley, near Manchester. One section deals with the solution of technical problems, the second with the routine testing of rubber industry chemicals and colors and the third with research. W. H. BOYNTON

The world's rubber supplies. GEO. RAE. *Bull. Rubber Growers' Assoc.* **13**, 59–84 (1921).—Though chiefly economic, the paper is of general interest, as it deals with planted areas, output, exports, imports, consumption and stocks in the producing and mfg. localities. C. C. DAVIS

Metallurgical methods used in producing rubber. PAUL D. V. MANNING. *Chem Met. Eng.* **38**, 131–2(1931).—An illustrated description is given of new machinery for planting, cultivating and prepg. guayule. C. C. DAVIS

Patents and custom standards of new machines for the manufacture of rubber articles. RUDOLF DITMAR. *Kolloid-Z.* **54**, 237–9(1931).—A review. A. FLEISCHER

The use of pigments in the rubber industry. FERD. A. RICHTER. *Farbe. u. Lack* **1931**, 135.—The primary use of pigments in rubber is not for the color but for the phys. properties imparted to the rubber. The choice of pigment depends upon the method of vulcanization as well as the use to which the product is put. G. G. SWARD

Reënforcing action of pigment mixtures on rubber compounds. D. J. BEAVER AND J. W. MACKAY. *Ind. Eng. Chem.* **23**, 294–6(1931).—The exptl. data which are presented show that mixts. of varying proportions of either channel gas black or a "soft" C black with whiting, lithopone or clay impart additive phys. properties to the vulcanizate. Mixts. of "soft" C black with ZnO also impart additive properties, whereas mixts. of channel black with ZnO result in poorer resistance to abrasion, in a higher modulus and in a higher tensile strength than those corresponding to the additive effects. These facts are explained by a chem. reaction between the basic ZnO and the acidic compds. in the rubber or on the C black. These results are applied to the formulation of a solid tire rubber mixt., which shows a greater resistance to abrasion and to "blow-out" when it contains a "soft" black than with a channel gas black. C. C. D.

American-grown rubber produced from guayule. GEO. H. CARNAHAN. *Chem. Met. Eng.* **38**, 128–31(1931).—An illustrated description of recent developments (cf. Spence, *C. A.* **24**, 2914). C. C. DAVIS

Physical tests of sponge rubber. F. L. HAUSHALTER. *India Rubber World* **83**, No. 5, 59–60(1931).—An *app.* to measure the compressibility and the permanent set after compression of sponge rubber is described and illustrated. C. C. DAVIS

Soft rubber in chemical process equipment. H. E. FRITZ. *Chem. Markets* **28**, 273, 275, 277(1931).—An illustrated description is given of the application of rubber to ball mill linings, and machinery bearings, with special reference to the Vulcalock process. C. C. DAVIS

Chemical constitution of rubber. MARIO D. PINTO. *Rev. brasil. chim.* **2**, 267–70 (1930).—P. discusses the work of the early investigators, and shows the evolution of the present formula $(C_5H_8)_x$. JOHN M. LADINO

Isoprene and rubber. XXII. Isorubber-nitrone. H. STAUDINGER AND H. JOSEPH. *Ber.* **63B**, 2888–99(1930); cf. *C. A.* **24**, 4954.—Pummerer's view that the unit mol. of rubber is $(C_5H_8)_3$ is supported by mol.-wt. detns. on rubber in menthol and especially on isorubber-nitrone (I) in C_6H_6 and $PhNO_2$. These results, which have been confirmed as to their order of magnitude, are apparently not in agreement with Staudinger's view, based on model expts. with polystyrenes, the conversion of rubber into col-

loid-sol. rubber-phosphonium salts, the prepn. of polymer-homologous series of polyprenes, the degradation of rubber, the relationship between viscosity and mol. wt., etc., all of which lead to the conclusion that the primary colloid particles of rubber, *i. e.*, the particles in dil. soln., are macromols. contg. some 1000 isoprene mols. joined in a chain (mol. wt. around 68,000). A study of the action of PhNO on rubber solns. gave results somewhat different from those of Pummerer and Gündel. They believed that the resulting decrease in viscosity is due to the disturbance of the rubber micelles. It has been found, however, that the viscosity of solns. of macromol. (eucolloid) polystyrene is greatly diminished by Cl, Br, strong oxidizing agents (N oxides, O_3), etc., as the result of an irreversible cleavage of the long sensitive macromols. into shorter fragments having a hemi-colloid character. The viscosity changes (often considerable) produced in highly viscous rubber solns. by the addn. of reagents are also irreversible, and therefore cannot be due to adsorption of the reagent on the colloid particles or to changes in their micellar structure. The macromols. of rubber, because of their double bonds, are much more sensitive than the satd. macromols. of polystyrene, and their cleavage into shorter fragments of hemi-colloidal character is a primary phase of almost all transformations undergone by rubber. To det. the extent of such a cleavage in the reaction with PhNO, varying quantities (0.01–3.0 mols.) of PhNO were added to a 0.2 *M* soln. of rubber (purified according to Pummerer) in C_6H_6, and after 24 hrs. at 20° the time of flow from an Ostwald viscometer was noted. Parallel expts. were made with NO_2 and Bz_2O_2. Below are, resp., the no. of mols. of reagent used and the viscosity of the resulting soln. as compared with pure C_6H_6 taken as 1: PhNO 0.01, 3.2; 3.0, 1.4. NO_2 0.01, 2.1; 0.05, 1.9; 0.1–1, product pptd. out. Bz_2O_2 0.01, 3.6, 0.5, 2.9. $PhNO_2$ 0.1, 3.7; 1, 3.7. Rubber soln. alone 3.6. If I, then, is not a deriv. of rubber itself but of oxidative degradation products, it should contain somewhat more O than that calcd. for pure isorubber-nitrone, and such is the case. In P. and G.'s published analyses only 2 show C values equal to the theoretical, the other 5 being 1–1.5% too low. S. and J. in about 20 analyses obtained values 1.5–2% too low although they completely excluded air in the prepn. of the I and carried out the filtration and washing in a N atm. As to the mol. wt. of the product, a series of detns. in 1% C_6H_6 soln. gave values about twice as large as in $PhNO_2$, but the latter, which on the av. were only slightly higher than P. and G.'s, varied considerably. I is not a homogeneous substance but a mixt. of polymer-homologous products which can be sepd. by means of cold C_6H_6 into more easily and less easily sol. portions of approx. the same compn. but with different mol. wts. in $PhNO_2$, and forming $CHCl_3$ solns. of different viscosities. Furthermore, it was shown by isothermal distn. in Signer's app. (*C. A.* 24, 4433) that in equally concd. solns. of the 2 portions there are fewer mols. in the soln of the less sol. portion. The reaction with PhNO does not permit of detg. whether the mol. of rubber is made up of 100 or 1000 isoprene residues. **XXIII. Cryoscopic measurements on rubber solutions.** H. Staudinger and H. F. Bondy. *Ibid* 2900–5.—Reply to Pummerer, Andriessen and Gündel (*C. A.* 24, 1102). Mol.-wt. detns. on rubber in camphor cannot serve to clear up the structure of rubber, for, as already shown, the rubber undergoes extensive degradation to hemi-colloidal cleavage products when heated in molten camphor (170–80°). The ratio of the time of flow of a C_6H_6 soln. of rubber which has been dissolved in molten camphor to the time of flow of a soln. prepd. from the same quantities of rubber and camphor without heating is about 1:15; the rubber recovered from the former soln. has the properties of a deeply degraded hemi-colloidal rubber, is smeary, has almost completely lost its viscosity, dissolves without swelling and forms solns. of low viscosity. The relative viscosities of a 0.2 *M* soln. of pure rubber in tetralin are 14.89 and 2.60, resp., before and after the rubber has been heated with camphor. The sepn. of mixed phases observed by P. and Andriessen in attempts to det. the mol. wt. of rubber in freezing C_6H_6 is easily explained by the fact that concd rubber solns. in C_6H_6 (1%) are not sol but gel solns.; for rubber purified according to P. the limiting concn., *i. e.*, the transition from sol to gel soln., is about 0.5%, and it is only in the dil. sol solns. that mol.-wt. detns. can be made successfully. With the hemi-colloidal degradation products, mol.-wt. detns. can be made by the f.-p. method, the limiting concn. of a degraded rubber of polymerization degree 100 is reached in an approx. 5% soln. P. and Gündel express the opinion that S.'s rubber was not completely N-free, but G. and B. were unable to detect any N by heating with K, although a control showed that 0.01% N can be detected in this way. C. A. R.

Swelling pressure of rubber. Paul Stamberger. *Nature* **127**, 274(1931); cf. *C. A.* 24, 4659.—The formula $P = K/V^3$ gives satisfactory results with the data of the previous paper, where P is the swelling pressure, V is the vol. of solvent bound to a unit wt. of jelly, and K is a const. whose meaning is expressed by substituting the above

equation in the max. work term: $dA = PdV$. The swelling pressure results from the attraction of solvent mols. by the mols. of the gel. ARTHUR FLEISCHER

The action of lead selenide in rubber mixtures. R. DITMAR AND K. H. PREUSSE. *Caoutchouc & gutta-percha* 28, 15448–50(1931).—Recent interest in Se in the rubber industry led to a study of its derivs. as possible valuable compounding ingredients. The present paper continues the previous work on Se red (cf. *C. A.* 24, 4663; D. and Preusse, *C. A.* 24, 4659). Zn selenosulfide (5% Se) and K_2SeSO_3 had no notable effect in rubber mixts., either on the rate of vulcanization or otherwise, so PbSe was next examd. A finely-ground natural product (hardness 2.5–3, d. 8.2–8.8) was used. In rubber-S mixts., PbSe has no influence on the rate of vulcanization nor any reënforcing effect. On the mixing mill, PbSe has a strong plasticizing action which becomes marked with 4% PbSe, and accordingly this property may be utilized in prepg. adhesive cements from rubber. In the mixt.: crepe 100, S 3, PbSe 2, accelerator 2, whiting 30, the PbSe acts as a very powerful activator with the majority of com. accelerators (the results with 16 are tabulated), so that no other activator is needed, and it also reënforces the vulcanizates, particularly in increasing their resistance to abrasion. Its action, therefore, resembles that of Se. On increasing the PbSe in an accelerated mixt. to 100 parts on the rubber, the reënforcement increased continuously. In cures with S_2Cl_2 in CS_2 or with S_2Cl_2 vapor, PbSe had no action at all, except that because of its softening action (*loc. cit.*) the cure had to be prolonged. C. C. DAVIS

Liquid rubber and carpets. WEBSTER NORRIS. *India Rubber World* 83, No. 6, 56(1931).—An illustrated description is given of the application of rubber dispersions in a new type of carpet. C. C. DAVIS

The curing of sheet rubber. T. E. H. O'BRIEN. *Trop. Agr.* (Ceylon) 75, 280–92 (1930).—Smoking of sheet rubber prevents undesirable surface stickiness. Unsmoked sheet contg. *p*-nitrophenol is inferior in aging properties to a like sample without *p*-nitrophenol. Smoked sheet after vulcanization is superior in aging properties to unsmoked sheet when both contain *p*-nitrophenol. A sheet weighing 1.5 lb. and measuring 23 × 18 in. is of correct thickness for efficient drying, combined with good appearance, and is also the most suitable size for packing in a standard rubber chest. J. O. H.

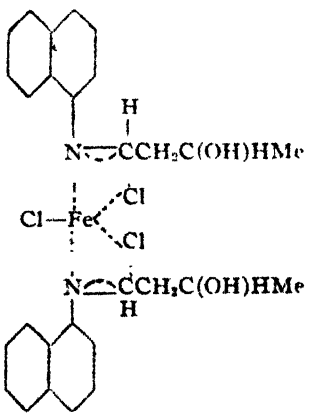
The consistency of the particles in balata latex. E. A. HAUSER. *Kautschuk* 7, 2–3(1931); *Gummi-Ztg.* 45, 1030(1931).—The expts. deal with balata latex from Peru, which was preserved with AcOH. For this reason the acid character of the latex may have brought about certain changes in the consistency of the particles, so that the conclusions drawn from the expts. do not necessarily hold good for the particles of fresh latex. The micromanipulator examn. was carried out with the aid of a new kind of dark-field condenser, with the finest microneedle which was equipped with a new device for its control (cf. *C. A.* 25, 1409). The examn. shows that there are 2 kinds of particles in such latex: (1) a uniformly tacky kind, which probably represents the resinous components of the latex, and (2) a smaller kind of particle which does not have a homogeneous structure. This 2nd type consists of a viscous inner part and a plastic outer part, which even has a certain degree of elasticity. By evapn. of the latex or by addn. of coagulating agents the consistency of the 1st type changes only slightly or not at all, whereas the 2nd kind of particle contracts to a homogeneous mass. The 2nd kind of particle probably therefore represents the actual balata hydrocarbon. Further expts. proved that during the evapn. only the particles of the 1st type fuse together, whereas the particles of the 2nd type remain distinctly sepd. from each other. This latter fact probably depends upon each hydrocarbon particle having an adsorbed skin of the non-balata components dissolved in the serum. This observation is of particular interest, since it offers the possibility of obtaining pure balata by some convenient method, such as fractional pptn. or fractional sepn. from the latex, without having to resort to extn. C. C. DAVIS

Gathering, treatment and properties of guttapercha. H. R. BRAAK. *Chem. Weekblad* 27, 567–71(1930).—A review. A. L. HENNE

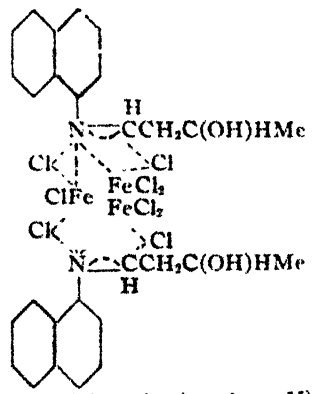
Age-resistant rubber. A survey of United States and foreign patents for chemical prevention of the deterioration of rubber. JOSEPH ROSSMAN. *India Rubber World* 83, No. 5, 65–8(1931). C. C. DAVIS

The protective action of some antioxidants. II. The metal halide compounds of some protective agents against aging, with special reference to aldol-α-naphthylamine. F. KIRCHHOF. *Kautschuk* 7, 7–12(1931); cf. *C. A.* 23, 3371.—It has already been shown that alc. solns. of heavy metal chlorides change the color of alc. solns. of certain antioxidants like aldol-α-naphthylamine (I), "Stabilite Alba" (II) and "Agerite powder" (III), both when viewed in visible and in ultra-violet light. The present paper, in which the behavior of I in particular was studied, attempts to explain this

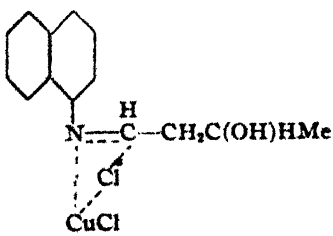
phenomenon, which is of importance not only from the antioxidant point of view, but because of the discoloration of vulcanizates contg. such antioxidants. With $AuCl_3$, $CuCl_2$, $FeCl_3$ and $PtCl_4$, I gives cherry-red colors at low concns. and intense blue colors at higher concns. of the metal chlorides. The blue colors are, however, unstable and change to violet, then to cherry-red. With $AlCl_3$, $AsCl_3$, $CoCl_2$, $FeCl_2$, $HgCl_2$, $MnCl_2$, $NiCl_2$, $SbCl_3$, $SnCl_2$, $SnCl_4$, $TiCl_3$, UO_2Cl_2 and $ZnCl_2$ no colors are obtained. While $AuCl_3$, $CuCl_2$, $FeCl_3$ and $PtCl_4$ cause the disappearance of the fluorescence of I in ultra-violet light, $SbCl_3$ is the only other chloride of those above which affects the fluorescence, and this gives a yellow-white ppt. From the cherry-red I solns. with $CuCl_2$ and $FeCl_3$, chocolate and coffee-brown *ppts.* with high Cu and Fe contents sep. on long standing, and these remain dark even after long washing with EtOH. Their C_6H_6 solns. are intense yellow-brown. Analysis of the ppts. showed that the Cu ppts., which vary from coffee-brown to ocher-yellow, are adsorption compds. of the cherry-red sol. Cu-I compds. with solid I, and that the Fe ppts., which are chocolate-brown, are adsorption compds. of the sol. cherry-red Fe-I compds. with solid I. These reactions are not the same as that of aq. I with aq. $FeCl_3$, $ZnCl_2$, $AgNO_3$ and CrO_3 (cf. "Meyer-Jacobson," II, 350), because water and dil. alkalies cause cleavage of the alc. Cu and Fe compds., with formation of blue-violet flocculant ppts. which contain no metal and which become yellow-brown in air. Since these color reactions are confined to chlorides of a higher state of oxidation, the more loosely combined halogen plays the essential part. The fact that the reaction with $CuCl_2$ is in every case more rapid than with $FeCl_3$ may be utilized to distinguish analytically small quantities of these compds. A similar color reaction occurs with free halogen, *e. g.*, Br in CCl_4, where a deep indigo appears immediately, changes to violet, then to cherry-red and finally to yellow-brown. These Br addn. compds. give no color reaction with $FeCl_3$ or $CuCl_2$, so that in the color reaction the metal halide combines at the double bond between the N and CH. Since the cherry red I-$FeCl_3$ and I-$CuCl_2$ compds. are decompd. by small quantities of HCl to yellow-brown products, only unstable compds. are formed, and since the quantity of addn. compd. depends upon the concn. of halide, the N does not always have the same valence, and the following formulas are assigned:



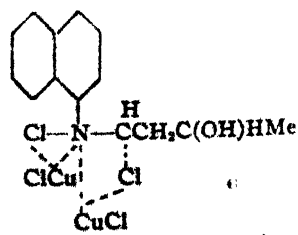
Cherry-red soln. (3-valence N) from low $FeCl_3$ concn. Stable



Blue-violet soln. (4-valence N) from high $FeCl_3$ soln. Unstable



Cherry-red soln. (3-valence N) Stable



Blue soln. (4-valence N) Unstable

These resemble the hemin (IV) formula of Willstätter and Küster. The I-metal halide solns. absorb all visible light up to a bright band in the red and orange between 560 and 680$\mu\mu$, and since HCl-solns. of IV show a similar band, the absorption limits may be characteristic of the $FeCl_3$ and $CuCl_2$ groups. The ultra-violet fluorescence of all the I-metal halide compds. is very feeble compared with that of the original substance, and the colors vary greatly. The following fluorescent colors appeared in EtOH in ultra-violet light: I, intense sky-blue; I + $FeCl_3$, very pale violet; I + $CuCl_2$, pale yellow-green; I + $CuCl_2$ + HCl, pale green-brown; I + Br, pale violet; II intense violet; II + $CuCl_2$, pale yellow-green; II + $CuCl_2$, pale yellow-green; II + $CuCl_2$ + HCl, pale green-brown; II + Br, pale brown; IV + alc. HCl, pale red-brown. The source of the strong fluorescence is probably in the N:CH double bond, and it is lost by addn. of the halide. The O-transporting power of Fe in hemin occurs also in the I-metal halide and II-metal halide compds., for I soln. made pale rose by $FeCl_3$ becomes deep blood-red when O is passed through it, whereas I soln. alone is pale yellow. The O-transporting power of the $CuCl_2$ compds. is many times greater than that of the corresponding Fe compds. and this agrees with the similar behavior of Fe and Cu compds. in rubber. With 1% $CuCl_2$, O caused a turbidity with I and intense carmine with II, by the formation of oxidation products, and after prolonged passage of O, about 50% of the dissolved substances sepd. as a chocolate-brown *ppt.* contg. only a small percentage of combined Cu. Treatment of I soln. contg. $FeCl_3$ for many hrs. gave an intense carmine color, with no insol. oxidation products. Not only is the autoxidation of antioxidants greatly accelerated by their $FeCl_3$ complexes and especially by their $CuCl_2$ complexes, but it is inhibited by catalytic poisons. Thus with II-$CuCl_2$ soln., a little HCN greatly retards the time of appearance and the intensity of the carmine which is formed upon treatment with O. III gives no immediate color with alc. $FeCl_3$ or $CuCl_2$, but on long standing in air a brown color appeared, because of oxidation. III is probably more stable than I and II toward oxidizing agents and oxidation catalysts. In titrating III in ultra-violet light, the quantity of $FeCl_3$ required to destroy the violet fluorescence is approx. 2 mols. of $FeCl_3$ per mol. of III. II gives no immediate color with $FeCl_3$, but on long standing a carmine color appears, especially in light. II and $CuCl_2$ give an immediate yellow or yellow-brown which changes soon to deep carmine. The carmine solns. with II and $FeCl_3$ and $CuCl_2$ show similar spectral properties, and are not changed by HCl, in contrast to the colors with I complexes. In titrating in ultra-violet light, only 0.5 mol. of $FeCl_3$ or $CuCl_2$ is required to destroy the fluorescence of the II-$FeCl_3$ and II-$CuCl_2$ complexes. Based on the similar absorption spectra of these metal halide complexes with the previous ones, they probably contain similar $FeCl_3$ and $CuCl_2$ complexes which cause the colors. The Fe complex

would be $PhN.CH_2.CH_2.NPh.FeCl$, where the stability toward HCl results from the formation of high valences. Since antioxidants are oxidized in time by autoxidation they protect an antioxidizable substance like rubber only as long as they remain active. Since traces of sol. heavy metal compds., especially of Fe, are invariably present in rubber compounding ingredients, rubber mixts. which contain protective agents are discolored by the formation of dark colored metal complexes and their oxidation products.

C. C. Davis

New light on vulcanization. The process as revealed by electrical tests. W. H. Nuttall and J. Kirkwood. *India Rubber J.* **80**, 657-60(1930).—A review and discussion, with particular reference to the work of Curtis, McPherson and Scott (*C. A.* **22**, 330), Kitchen (*C. A.* **23**, 2375) and Boggs and Blake (*C. A.* **24**, 4425). C. C. D.

Tensile tests of vulcanized rubber at high speed. A. van Rossem and H. B. Belverdam. *Rev. gén. caoutchouc* **7**, No. 57, 27-34(1930).—Most of the testing machines used for detg. the elongation of rubber have a slow speed, and 60 cm. per min. is somewhere near the speed usual in practice, regardless of the state of cure. This is in spite of the fact that undervulcanized rubber, which has a high elongation when stretched at slow speed, is brittle when stretched very rapidly, and has an extremely low elongation. For this reason, it was of interest to make elongation tests at high speeds. No app. was available for recording the stress-strain curve, and resort was had to the pendulum app. of Charpy. The technic employed in adapting this app. to the present expts. is described and illustrated. Different accelerated rubber mixts. at various states of cure were tested in this way. The energy at rupture was calcd. and the results were compared with tests on the Schopper dynamometer. The results show that (1) the max. energy at rupture as a function of the time of vulcanization is much more sharply defined at the high speeds of the pendulum app. than in the tests with the Schopper machine, and (2) the max. strength with the pendulum app. is at a

lower state of cure than with the Schopper machine. With vulcanizates contg. a low percentage of S, *e. g.*, the mixt.: rubber 100, S 3, diphenylguanidine 1, ZnO 5, the pendulum app. gives a less sharply defined max., but nevertheless here too this max. is at a lower state of cure than that with the Schopper machine. The influence of loading with pigments and fillers was also studied. The magnitude of the max. depends upon the substance added, but the sharpness of this max. and its relation to the time of vulcanization are independent of the nature of the filler. Accelerated aging tests were made in the Geer oven at 70° and the aged vulcanizates were then tested in the same way. After aging, the time of cure/energy at rupture curve obtained from the Schopper machine was similar to that obtained from the pendulum app. before heating. The energy at rupture curve detd. by the pendulum app. is therefore of great importance in relation to the state of cure, because the time of vulcanization which corresponds to the max. energy at rupture by the pendulum app. is, contrary to the time of vulcanization corresponding to the max. tensile strength by the Schopper dynamometer, the time of vulcanization which corresponds to the best aging. The importance of tests at the high speeds and the shortcomings of the pendulum app. for this purpose make it desirable that an app. be developed which at a very rapid speed of stretching will: (1) det. the resistance to stress, the ultimate elongation and the energy at rupture; (2) record graphically the relation between the stress and the elongation and (3) perform at different speeds. Also in *Kautschuk* **6**, 224–9(1930). C. C. Davis

Hard spots in vulcanized rubber compounds. J. H. Howby. *Ind. Eng. Chem.* **23**, 287–90(1931).—Expts. are described, the object of which was to ascertain the cause of local variations in the hardness of exptl. slabs of rubber mixts. of the C black tread type. It was found that areas of excessive hardness correspond to regions where the max. flow or displacement occurs when the rubber mixt. is pressed into the mold at the time of curing. A knowledge of this fact is of importance in testing the hardness of a vulcanizate by the Am. Soc. of Testing Materials standard of hardness, and for increasing the precision and reliability of this convenient test. It was also found by chem. analysis that these variations in hardness cannot be attributed to heterogeneous regions (non-uniform compn.) in the rubber-S-accelerator-pigment mixt., and it is concluded that the variations must depend either upon altered conditions of dispersion in the regions of max. displacement or else upon a local grain effect set up by the flow. C. C. Davis

Use of vulcanized rubber waste as a fixing agent in bronze printing. Geo. Rice. *Rubber Age* (N. Y.) **28**, 611–2(1931).—An illustrated description. C. C. Davis

Monoxanthogens [vulcanization accelerators] (U. S. pat. 1,796,972) **10**. Substitutes for sugars in coagulating latex. (Ger. pat. 518,196) **18**. Dispersion of carbon black in water (Can. pat. 309,276) **18**.

Purifying latex. K. D. P., Ltd. Brit. 338,766, Dec. 20, 1928. Latex is subjected to heat treatment with simultaneous evapn. and then subjected to a usual purifying treatment, as by centrifuging to sep. serum, which is facilitated by the pretreatment.

Device for spraying rubber latex by an air jet. Charles E. Maynard (to Fisk Rubber Co.). U. S. 1,795,875, March 10. Structural features.

Rubber. K. D. P., Ltd. (Rudolf Pummerer and Hans Kroepelin, inventors) Ger. 515,603, May 26, 1926. Addn. to 460,950. Pure rubber hydrocarbons are prepd. from rubber latex by treating with alkali in an electrodialyzer.

Rubber compositions. Dunlop Rubber Co., Ltd., E. A. Murphy, A. Niven and D. F. Twiss. Brit. 338,975, Aug. 30, 1929. Crumb-like rubber compns. are prepd. by coagulating an aq. dispersion of rubber or the like, by pptn. *in situ* (in relatively large amounts on the dry rubber content) of compounding ingredients formed by the interaction of one or more water-sol. reagents normally having no coagulating effect, with other added water-sol. reagents, such as reagents which together form products such as $MgCO_3$, $CaCO_3$, $ZnCO_3$, Ca, Ba or Zn silicates, silicic acid or Zn, Cd or Pb sulfides. Soap, glue, gum acacia, etc., may be added to modify the properties of the product.

Use of amines as rubber coagulants. Albert J. Gracia (to Goodyear Tire & Rubber Co.). U. S. 1,797,192, March 17. Latex is coagulated by use of amines such as ethylamine, diethylamine, propylamine, dipropylamine, tripropylamine, butyl amine, amylamine, iso-amylamine, di-isoamylamine or allyl amine.

Preserving rubber. Lorin B. Sebrell (to Goodyear Tire & Rubber Co.). U. S.

1,797,179, March 17. Anilinohexylideneaniline (suitably in the proportion of about 0.5%) is added to rubber compns. before vulcanization.

Rubber "antioxidant." Wm. S. Calcott and Wm. A. Douglass (to E. I. du Pont de Nemours & Co.). U. S. 1,796,980, March 17. Deterioration of rubber is retarded by the addn. of a small proportion (suitably about 0.5–2.5%) of a transparent brittle solid obtained by the reaction of glucose on *m*-tolylenediamine.

Trinaphthylamine. Albert M. Clifford (to Goodyear Tire & Rubber Co.). U. S. 1,797,196, March 17. This compd. is obtained by extn. with C_6H_6 from crude dinaphthylamines and is an antioxidant for rubber.

"Micro-porous" rubber. H. Beckmann. Brit. 338,698, Oct. 26, 1928. The process described in Brit. 240,430 (*C. A.* 20, 2262) is modified by adding to the latex a substance capable of being coagulated to form a hydrophilic gel, such as 2% of blood albumin, and then adding a coagulating agent, such as HOAc, which will cause coagulation of both the latex and the added substance. Among the substances which may be added are: silicic acid, stannic acid, $Al(OH)_3$, colloidal Fe_2O_3, colloidal chromic oxide, colloidal tungstic and molybdic acids, manganic hydroxide, V pentoxide, albuminoids, polypeptides and hemoglobin, and substances such as silicic acid may be formed in the latex by reaction. Cf. *C. A.* 24, 752.

Apparatus for molding rubber articles such as tennis balls. Harry Willshaw and Sydney N. Goodhall (to Dunlop Tire & Rubber Corp.). U. S 1,795,917, March 10. Various structural features are described.

Uniting rubber and leather. K. Ehmke. Brit. 338,789, Jan. 8, 1930. Materials such as shoe parts of rubber are roughened on a grinding wheel, coated with rubber soln., sprayed with particles of crepe rubber and further coated with rubber soln. and then united by hammering with leather coated with rubber soln.

Attaching rubber to metals. C. M. Carson (to Goodyear Tire & Rubber Co.). Brit. 339,421, Feb. 23, 1929. A cement is used consisting of latex, hemoglobin, a tanning agent such as formaldehyde, $K_2Cr_2O_7$, $K_4FeC_6N_6$ or $Al_2(SO_4)_3$, and vulcanizing ingredients and this cement is vulcanized after application.

Compositions containing rubber and cement. N. Swindin and Nordac, Ltd. Brit. 339,002, Sept. 5, 1929. In making a material suitable for floors, road surfaces or acid-resisting coating, raw rubber (heated or swelled with a solvent) is dispersed with water (preferably in the presence of a hard porous inert powder such as fine coke dust which acts as a triturating agent), suitably with addn. of emulsifying agents such as soap, saponin, borax, NH_3 and soda, and the material is then mixed with a cement (such as portland or oxychloride cement materials) which reacts with the water and causes setting of the mass. Various details and use of different fillers, etc., are described.

Films, threads, disks, etc. I. G. Farbenind. A.-G. Fr. 37,485, Oct. 3, 1929 (Addn. to 676,658 (*C. A.* 24, 3135). Mixts. of natural rubber with the polymerization products of butadiene hydrocarbons are treated with sulfuring agents until the high plasticity characteristic of rubber disappears.

Isomerizing rubber. Imperial Chemical Industries, Ltd., and E. B. Robinson. Brit. 339,398, Sept. 30, 1929. Rubber is liquefied by heat and then treated with isomerizing substances such as H_2SO_4, sulfonic acids, sulfonyl chlorides, sulfuric esters or metallic halides, with or without phenolic compds., to produce a thermoplastic product. Various details of procedure are given.

Apparatus for curing tire flaps. Robert W. Snyder (to Goodyear Tire & Rubber Co.). U. S. 1,797,180, March 17. Structural features.

Rubber conversion product. Herman A. Bruson (to Goodyear Tire & Rubber Co.). U. S. 1,797,188, March 17. See Can. 299,963 (*C. A.* 24, 3135).

Synthetic rubber. I. G. Farbenind. A.-G. Brit 338,534, Aug. 17, 1929. Polymerization of diolefins such as butadiene is effected in the presence of alkali or alk. earth metals or their alloys in particles of uniform size, such as with Na balls of 1.1 mm. diam. in a rotating Fe autoclave at 40°.

Synthetic rubber. I. G. Farbenind. A.-G. Brit. 339,135, Dec. 20, 1929. Polymerization of diolefins such as butadiene with an alkali metal such as Na is effected in the presence of at least 25% of a low b.-p. aliphatic ether such as dimethyl, diethyl or methylethyl ether (these ethers serving both as diluents and as catalysts). Various details and examples are given.

Synthetic rubber. I. G. Farbenind. A.-G. Brit. 339,243, Aug. 30, 1929. Polymerization of diolefins such as butadiene is effected in the presence of alkali or alk. earth metals or their alloys such as Na amalgam or of alkali or alk. earth metal compds. with org. radicals which are not capable of ionization (such as Na ethyl, K ethyl, K diphenylmethylmethane, Na triphenyl methane and Li alkyls) and the polymer-

ization agent is added gradually or in at least 3 successive portions during the polymerization. The polymerizing agent may be mixed with other substances such as polymers of diolefins, rubber, paraffin, salt or waxes. Several examples are given.

Synthetic rubber. I. G. FARBENIND. A.-G. Brit. 339,255, Aug. 30, 1929. Rubber-like products suitable for various purposes similar to those for which rubber is usually employed are obtained by polymerizing a mixt. of a diolefin such as erythrene, isoprene, butadiene, methyl- or dimethyl-butadiene, with styrene (suitably after emulsification of the initial materials together with Na stearate or other suitable emulsifying agent). The polymerization may be carried out at 40-60° for several days, and products of different properties may be produced by varying the proportions of the starting materials.

Synthetic rubber. I. G. FARBENIND. A.-G. Fr. 37,374, Aug. 29, 1929. Addn. to 655,217 (*C. A.* **23**, 4103). Synthetic rubber, etc., is intimately mixed with finely divided soot such as lampblack or C black before vulcanization.

Thiuram disulfides. GEORGE C. BAILEY (to Roessler & Hasslacher Chemical Co.). U. S. 1,796,977, March 17. Compds. suitable for use as rubber vulcanization accelerators and having the general formula R_1-CS-S-S-CS-R_1 are made by treating a compd of the type R_1-CS-S-M with NaOCl, R_1 comprising an org. radical and M a metal radical. Tetramethylthiuram disulfide is made by treating Na dimethyldithiocarbamate with NaOCl in aq. soln.

Rubber vulcanization accelerators. RUBBER SERVICE LABORATORIES, INC. Brit. 339,352, Sept. 7, 1929. Accelerators are prepd. by reaction of an aldehyde amine such as butylidene isoamylamine with a substituted unsatd. aldehyde such as α-ethyl-β-propylacrolein. Various details of procedure for manuf. and use of the accelerator are described. Cf. *C. A.* **24**, 266,752.

Apparatus for vulcanizing automobile tires. MATTHEW [illegible] testing [illegible]. U. S. 1,795,680, March 10. Structural features.

Vulcanizing rubber. INDUSTRIAL PROCESS CORP. Brit. [illegible] Nov. [illegible] heterogenes. See Fr. 681,061 (*C. A.* **24**, 4426). U. S. 1, [illegible] it is co[illegible]ine or

Vulcanizing rubber. HAROLD GRAY (to B. F. Goodrich Co.). U. S. 1,796,240, March 10. A product formed by reaction of an org. amine such as aniline or [illegible] and an aliphatic aldehyde such as butyric aldehyde 3 or more mol. proportions is used as an accelerator.

Rubber vulcanization. ADRIEN CAMBRON (to Roessler & Hasslacher Chemical Co.). U. S. 1,796,240, March 10. An accelerator is used comprising the product obtained by causing aniline and acetaldehyde, under essentially anhyd. conditions, to react in the presence of a small quantity of $ZnCl_2$. Cf. *C. A.* **24**, 2640.

Vulcanized colored rubber. RUDOLPH KEECH (to I. G. Farbenind. A.-G.). U. S. 1,796,656, March 17. Before vulcanization, there is incorporated with rubber an insol. metal salt such as the Ba salt of an acid anthraquinone dye contg. at least one amino group, such as 1-amino-4-phenylaminoanthraquinone-2-sulfonic acid, and the material is then vulcanized.